

Report

Biodiversity Air Quality Screening Assessment

**South Dock, Alexandra Docks,
Newport Air Quality Assessment**

For Stephenson Halliday

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Contents

1	Introduction	1
2	Policy Context	4
3	Critical Levels and Critical Loads	7
4	Relevant Guidance	9
5	Assessment Approach	15
6	Background Information and Context	19
7	Impact Assessment	20
8	Conclusions	27
9	References	28
10	Glossary	31
11	Appendices	33
A7.1	Relevant Case Law	34
A7.2	Data from (Caporn et al., 2016) Cited by National Highways	37
A7.3	Modelling Methodology	38

Tables

Table 1:	Vegetation and Ecosystem CLe ^a	7
Table 2:	Vegetation and Ecosystem CLo ^a	7
Table 3:	Environment Agency Screening Criteria (% of CLe or CLo)	9
Table 4:	Site-Relevant and Decision-Making Thresholds for Application to Individual Plans and Projects (AQC, 2021)	14
Table 5:	Guidance on Defining Development Density for On-site Emissions (AQC, 2021)	14
Table 6:	Description of Roadside Receptor Transect for the Salt Marsh Area in the River Usk SAC	15
Table 7:	Estimated Annual Mean Background Pollutant Concentrations in 2022 and 2028 ($\mu\text{g}/\text{m}^3$)	19
Table 8:	Estimated Annual Mean Background Deposition Fluxes in 2022 and 2028 ($\mu\text{g}/\text{m}^3$)	19
Table 9:	Air Quality Conditions at Worst-case Locations in the River Usk SAC	20
Table 10:	Summary of Worst-case Changes to Air Quality Conditions in the River Usk SAC	21
Table 11:	Summary of Worst-case Changes to Air Quality Conditions in the River Usk SAC as Percentage of Relevant Criteria ^a	21
Table A2-1:	Values from Table 21 of Caporn et al (2016) Relied on in National Highways' Assessment Method	37
Table A3-1:	Summary of Model Inputs	38
Table A3-2:	Summary of Traffic Data used in the Assessment	38

Table A3-3: Deposition Velocities Used in This Assessment	42
Table A3-4: Species Included in Acid Deposition Calculations	42

Figures

Figure 1.1: Proposed Development Setting	1
Figure 1.2: Salt Marsh Area of the River Usk Sensitive to Nitrogen Deposition	2
Figure 5.1: Transect Locations for Designated Conservation Site	16
Figure 7.1: Visualisation of Forecast Changes to Annual Mean NO _x at the Location of the Maximum PC under Different Future Scenarios	23
Figure 7.2: Visualisation of Forecast Changes to Annual Mean Ammonia at the Location of the Maximum PC under Different Future Scenarios	24
Figure 7.3: Visualisation of Forecast Changes to Nitrogen Deposition at the Location of the Maximum PC under Different Future Scenarios	25
Figure 7.4: Visualisation of Forecast Changes to Acid Deposition at the Location of the Maximum PC under Different Future Scenarios	26
Figure A3-1: Wind Rose	41

1 Introduction

- 1.1 This report describes a screening assessment for air quality effects on biodiversity associated with operational phase traffic of the proposed industrial development at South Dock, Alexandra Docks, Newport. It accompanies AQC report J10/14834A/10/F3 which considers the air quality effects of the proposed development during both the construction and operational phases. Since the main air quality assessment was originally prepared, the project transport consultants (SCP Transport Planning) have provided revised traffic data. The revised traffic data was greater and, therefore, further consideration of potential air quality effects on biodiversity has been considered necessary and is presented within this report.
- 1.2 The proposed development is within 160 m of the River Usk Special Area of Conservation (SAC)/Site of Special Scientific Interest (SSSI) and within 500 m of the River Severn Estuary Ramsar/Special Protection Area (SPA)/SSSI and within 3 km of the nearest Air Quality Management Area (AQMA).
- 1.3 The location of the proposed development is shown in Figure 1.1, along with the nearby ecological receptors.

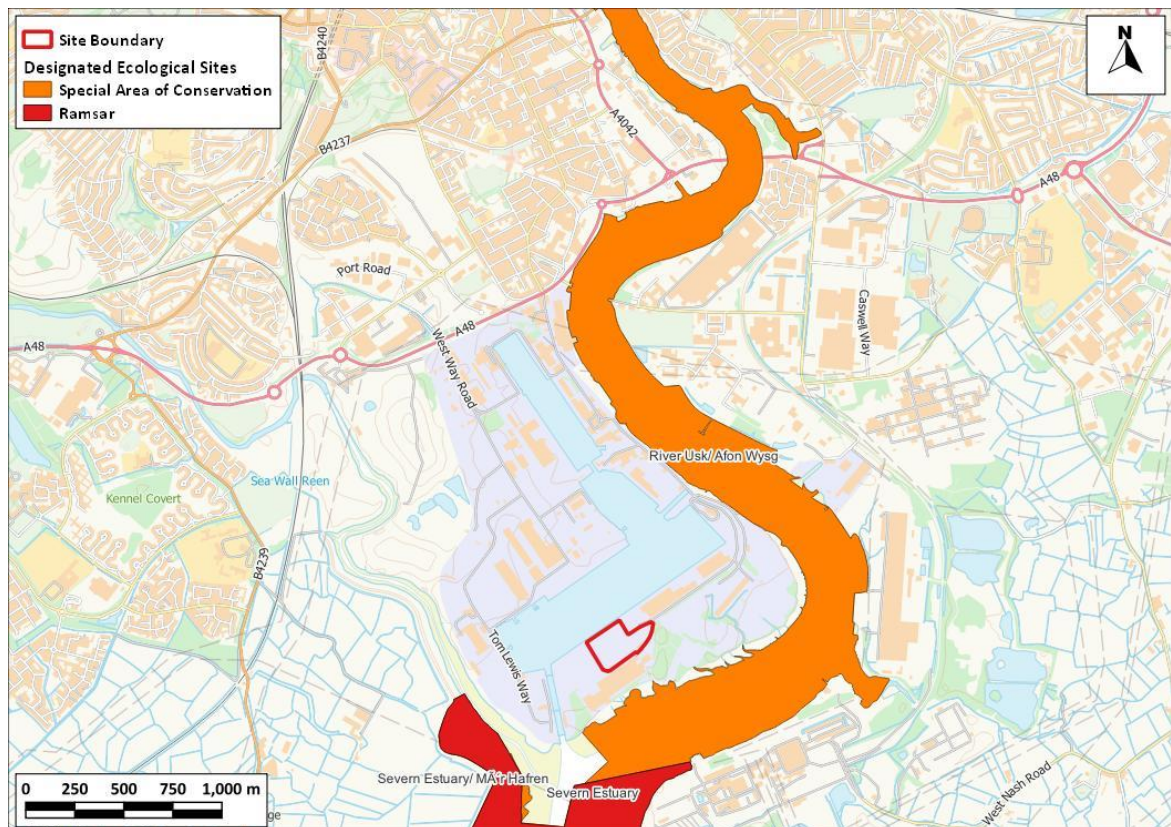


Figure 1.1: Proposed Development Setting

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- 1.4 The proposed development will lead to changes in traffic flows on roads which pass within 200 m of the River Usk SAC. The proposed development will not lead to a change in traffic flows on roads within 200 m of the River Severn SPA. Road traffic can emit nitrogen oxides (NO_x) and ammonia, and some sensitive vegetation may be affected by elevated concentrations of these pollutants.

Furthermore, the deposition of both NO_x and ammonia can alter the nutrient and acidity balance of some ecosystems, causing changes to their composition and health. It has been advised by the project ecologists (Ramm Sanderson Ecology Ltd) that the only part of the SAC within 200 m of the relevant roads which is sensitive to nitrogen deposition is an area of salt marsh habitat, extending up to the A48 as shown in Figure 1.2. This assessment has quantified the changes to NO_x and ammonia concentrations that would be caused by the proposed development within this sensitive area, as well as the changes to nitrogen and acid deposition fluxes.

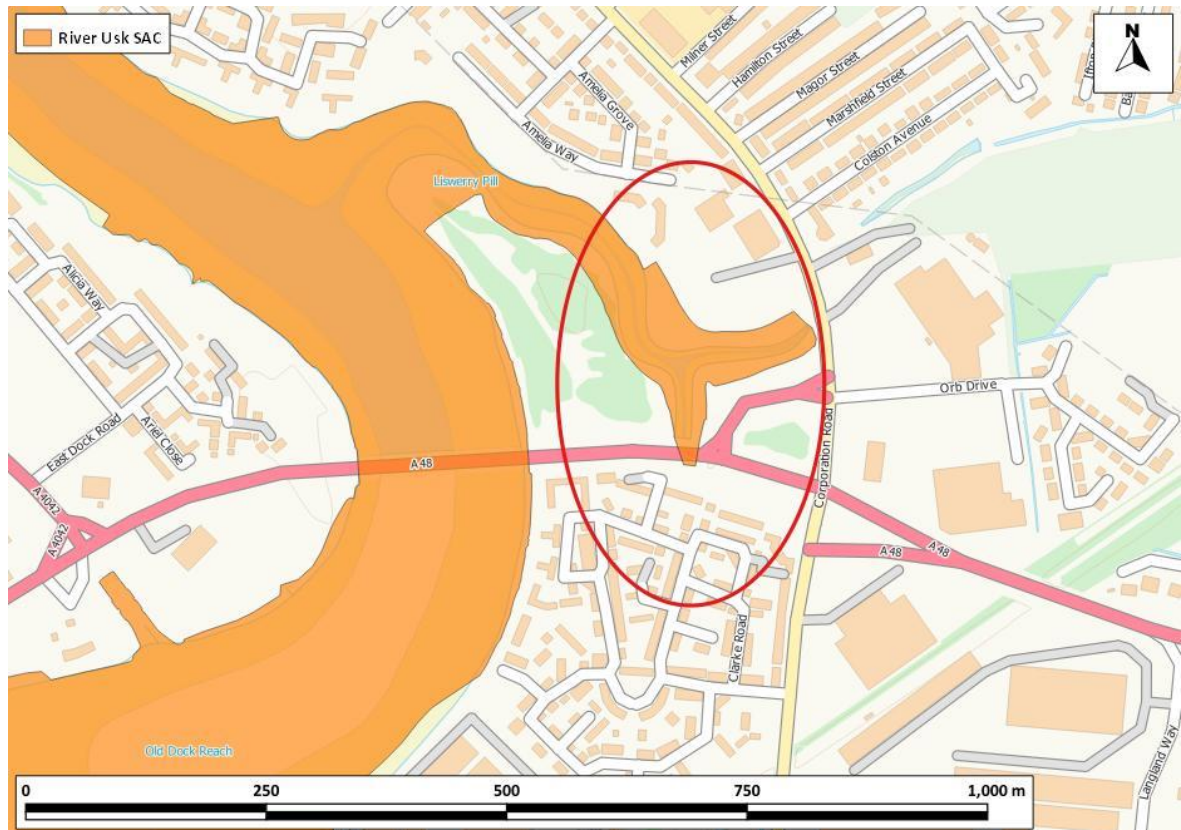


Figure 1.2: Salt Marsh Area of the River Usk Sensitive to Nitrogen Deposition

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- 1.5 In this report, the term 'impact' refers to a change to concentrations or deposition fluxes, while the term 'effect' refers to the consequence of that change. Because this is a screening report, the approach has been to consider changes to air quality and deposition in the context of *potential* effects on ecosystem health. This has relied on published and commonly accepted screening criteria which make worst-case assumptions regarding the sensitivity of any given habitat to air pollution effects. This assessment does not extend to defining the specific sensitivity of the habitats in practice and is thus worst-case.
- 1.6 This report describes existing local air quality conditions (base year 2022), and the predicted air quality in the future assuming that the proposed development does, or does not proceed. The assessment of traffic-related impacts focuses on 2028, which is the anticipated year of operation for phase 3 of the proposed development. Phase 3 is when the greatest heavy duty vehicle (HDV) movements are anticipated for the proposed development (for further details see AQC report ref: J10/14834A/10/F3).

- 1.7 This report has been prepared taking into account all relevant local and national guidance. The professional experience of the consultants involved in the assessment is summarised in the main report (ref: J10/14834A/10/F3) Appendix A3.

2 Policy Context

- 2.1 Protection of nature conservation sites is provided by an array of different national and international policies. This effectively provides different levels of protection to different types of sites, as outlined below.

European Sites

- 2.2 The Habitats Directive (European Council Directive 92/43/EEC, 1992) requires all European member states to introduce a range of measures for the protection of habitats and species. Conservation of Habitats and Species Regulations (2017) ('the Habitats Regulations') transpose the Directive into UK law. Changes to the Habitats Regulations in 2021 (Defra, 2021) transferred functions from the European Commission to the appropriate UK authorities.
- 2.3 The following European sites are protected by the Habitats Regulations and any proposals that could affect them will require a Habitats Regulations Assessment ('HRA'):
- Special Areas of Conservation (SACs), which are designated because of their importance for specific habitats or species listed in the Directive;
 - Special Protection Areas (SPAs), which are designated for the protection of birds under the "Birds Directive" (Directive 2009/147/EC, 2009), implemented in UK law through the Conservation of Habitats and Species Regulations (2010).;
 - Ramsar Sites. Originally intended to protect waterfowl habitat, the Ramsar Convention has broadened its scope to cover all aspects of wetland conservation;
 - proposed SACs and SPAs (often termed cSAC and cSPA); and
 - areas secured as sites compensating for damage to a European Site
- 2.4 In practice, it is not uncommon for the same area of land to be covered by more than one designation.
- 2.5 The Habitats Regulations require competent authorities (in this case Newport City Council) to only allow new projects (e.g. individual developments seeking planning permission) or plans (e.g. local plans) having first ascertained that they will not adversely affect the integrity of a European site either alone or 'in-combination' with other projects and plans.
- 2.6 HRA refers to the process of assessment required under the Regulations, which is commonly described as four distinct stages (e.g. the Planning Inspectorate (2017)):
- Stage 1 - screening;
 - Stage 2 - Appropriate Assessment ('AA'),
 - Stage 3 - assessment of alternatives, and
 - Stage 4 - assessment of Imperative Reasons of Overriding Public Interest ('IROPI').
- 2.7 Not all stages are required for most projects or plans. In particular, if the screening stage can show that the project will not have a Likely Significant Effect ('LSE') on the interest features either alone or in-combination with other plans and projects then an AA is not required. This report considers the screening stage only but also contains information which may be used in subsequent stages of the assessment where needed.

- 2.8 An effect is 'significant' if it undermines the conservation objectives. Before granting planning permission, decision makers must be satisfied that no reasonable scientific doubt remains as to the absence of adverse effects to site integrity.
- 2.9 Interpretation of the Habitats Regulations with respect to air quality impacts and effects has been shaped by judgements and opinions of European and UK courts, and a brief summary of some relevant case law is provided in Appendix A7.1. These Judgements and Opinions have highlighted the extent to which the Directive, and therefore Regulations, require a precautionary approach. However, the Courts have also recognised that there is no such thing as absolute certainty. This is particularly important with air quality modelling, which is always uncertain, with this uncertainty impossible to quantify precisely. Decision makers must identify reasonably foreseeable risks based on information that can readily be obtained. The courts have also established that, whilst a risk is sufficient to constrain development under the Habitats Regulations, there must be credible evidence that this risk is real, rather hypothetical (see Paragraph A1.3).
- 2.10 UK interpretation of the Habitats Regulations has also been shaped by guidance given by Natural England (NE) to local planning authorities and the Planning Inspectorate. A key area where this prior advice is important is the reliance which should be placed on forecast reductions in emissions from road traffic and other sectors over time. Measures which are expected to improve air quality in the future which are unrelated to a plan or project being determined are described as 'autonomous measures', and the forecast improvements resulting from these measures are termed 'autonomous reductions'. Paragraphs A1.9 to A1.14 in Appendix A7.1 explain that there are significant risks to local planning authorities if they do not adequately take account of the ability of autonomous reductions to offset and negate adverse changes caused by new plans and projects.

Sites of National and Local Importance

- 2.11 Sites of national importance are designated as Sites of Special Scientific Interest (SSSIs). Originally notified under the National Parks and Access to the Countryside Act (1949), SSSIs have been re-notified under the Wildlife and Countryside Act (1981). Improved provisions for the protection and management of SSSIs (in England and Wales) were introduced by the Countryside and Rights of Way Act (2000) (the "CROW" act). If a development is "*likely to damage*" a SSSI, the CROW act requires that a relevant conservation body (in this case Natural Resources Wales (NRW)) is consulted.
- 2.12 The CROW act also provides protection to local nature conservation sites, which can be particularly important in providing 'stepping stones' or 'buffers' to SSSIs and European sites. A broad range of site designations are included under the umbrella term of 'sites of local importance'. They are largely non-statutory designations, with sites identified by the local authority, the Wildlife Trusts, or other local groups. An ancient woodland inventory is provided by NRW to identify the locations of the main historic woodlands. It is important to note, however, that local site designations, including ancient woodlands, are frequently updated and that there is no single published database which includes all sites. It is thus necessary to apply professional judgement in determining the key locations where a proposed project might have air quality effects, noting that sites which are both highly sensitive and highly valuable would be expected to be designated as being of national or international importance.
- 2.13 The CROW act is less prescriptive than the Habitats Regulations in terms of assessment approach. In particular, the requirement to ensure the absence of LSE in combination with other plans and projects is specific to the Regulations (and thus to European sites). This does not, however, mean that other plans and projects may be ignored with respect to impacts on nationally- and locally-designated sites. Planning policy (see the next section) defines the main assessment requirements with respect to the impacts of new developments on sites of national and local importance.

Planning Policy

National Policies

- 2.14 Land-use planning policy in Wales is established within the policy document Planning Policy Wales (PPW12) (Welsh Government, 2024), which provides the strategic policy framework for the effective preparation of local planning authority development plans. The PPW12 translates the principles of the Sustainable Management of Natural Resources (SMNR) into use for the planning system, which includes 'halting and reversing loss of biodiversity' as a key feature. Chapter 6: Distinctive and Natural Places highlight the importance of protecting, maintaining and enhancing biodiversity as part of the planning process.
- 2.15 Paragraph 6.71 of the PPW12 notes:
- "...air quality, noise and light pollution can have negative effects on people, biodiversity and resilience of ecosystems and should be reduced as far as possible."*
- 2.16 PPW12 places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an environmental role to minimise pollution. Local development plans should enable consideration of the effects that the proposed development may have on air quality, as well as the effect that air quality may have on the proposed development. To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location, and states:
- 2.17 *"Development should prevent problems from occurring or getting worse such as the generation of carbon emissions, poor air quality and waste and the depletion of our natural resources which will need to be managed for many years to come."*

Local Policies

- 2.18 The Local Development Plan 2011-2026 (Newport City Council, 2015b) was adopted by Newport City Council in January 2015, and within this Policy SP8 on Special Landscape Areas (SLA) references the River Usk and states that:
- "Developers will be required to ensure that proposals do not impact or affect the intrinsic character, quality, feature or conservation value of the SLA. Designs will be required to be of a high standard, appropriate in scale and massing, integrated sympathetically into the landscape as well as ensuring long term management."*
- 2.19 Policy GP5 on General Development Principles – Natural Environment includes a point relevant to Nature Conservation Designations and includes a point about biodiversity:
- "Development will be permitted where, as applicable:*
- [...] ii) The proposals demonstrate how they avoid, or mitigate and compensate negative impacts to biodiversity, ensuring that there are no significant adverse effects on areas of nature conservation interest including international, European, national, Welsh section 42 and local protected habitats and species, and protecting features of importance for ecology."*

3 Critical Levels and Critical Loads

- 3.1 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets a limit value for annual mean concentrations of nitrogen oxides and for annual and winter mean concentrations of sulphur dioxide. The same values have been set as domestic objectives within the Air Quality (Wales) Regulations (2000) and the Air Quality (Wales) (Amendment) Regulations (2002). The limit values and objectives only apply a) more than 20 km from an agglomeration (about 250,000 people), and b) more than 5 km from Part A industrial sources, motorways and built-up areas of more than 5,000 people.
- 3.2 Critical levels (CLEs) and critical loads (CLOs) are the ambient concentrations and deposition fluxes below which significant harmful effects to sensitive ecosystems are unlikely to occur. Some of the CLEs are set at the same concentrations as the objectives but do not have the same spatial constraints on where they apply. Exceedances of the CLEs and CLOs are considered in the context of preventing harm to sites which are protected under the various designation frameworks outlined in Section 2. The CLEs relevant to this assessment are set out in Table 1. The CLOs are specific to different habitat types, and those which are most relevant to this assessment are provided in Table 2. The River Usk SAC designation includes Atlantic salt marsh, and within a saltmarsh different zones can be distinguished based on flooding frequency. As the flooding frequency of the study area is unknown, the more conservative CLOs (i.e. lower) for upper-mid & mid-low salt marshes have been selected for use within this assessment.

Table 1: Vegetation and Ecosystem CLEs ^a

Pollutant	Time Period	CLE
Nitrogen Oxides (expressed as NO ₂)	Annual Mean ^{a,b}	30 µg/m ³
	24-Hour Mean ^{a,c}	75 (200 ^d) µg/m ³
Ammonia	Annual Mean	3 µg/m ³ ^e

^a The CLEs are defined by the World Health Organisation (WHO, 2000).

^b Away from major sources (see Paragraph 3.1), this CLE is set as an objective (Defra, 2007) and a limit value (The European Parliament and the Council of the European Union, 2008).

^c This CLE is not an objective and thus does not have the same legal standing.

^d The CLE is 75 µg/m³ but Natural England and the Institute of Air Quality Management (IAQM) both recommend that a value of 200 µg/m³ is usually more appropriate for current UK conditions. The current assessment considers values of both 75 µg/m³ and 200 µg/m³.

^e A more stringent CLE of 1 µg/m³ only applies where lichens or bryophytes are present or form a key part of the ecosystem integrity. The NRW open data maps (Natural Resources Wales, 2024) for air quality and habitats advises there are no nitrogen sensitive lichens or bryophytes in the study area and therefore 3 µg/m³ is the appropriate CLE for the assessment.

Table 2: Vegetation and Ecosystem CLOs ^a

Habitat Type	Nutrient Nitrogen (kgN/ha/yr)	Acid Deposition 'N _{max} ' (keq/ha/yr)
Atlantic upper-mid & mid-low salt marshes	10	4.0 ^b

^a CLoS for nutrient nitrogen and acid deposition taken from (APIS, 2024). N_{max} is the value above which additional nitrogen deposition will lead to an exceedance.

^b APIS advises there is no comparable acid critical load class for which the CL function is calculated. Therefore, the soil base empirical CL (based on the dominant soil) for the grid square considered within the assessment has been used.

4 Relevant Guidance

- 4.1 Different organisations have issued assessment guidance and screening criteria for different types of emissions source and different site designations. This has resulted in different levels of protection being provided with respect to effects of the same pollutants on the same sites. There is no single official guidance document which fully covers the impacts assessed in this report and so it is helpful to consider the protection provided with respect to different development types.

Environment Agency

- 4.2 The Environment Agency has published criteria, which are also used by NRW, which allow impacts from developments requiring environmental permits to be rapidly screened out as insignificant (Environment Agency, 2021a; 2021b). These are applied to the impacts from developments in isolation (i.e. not in combination with other plans or projects). Exceeding these criteria does not mean that there is an LSE, it simply means that further consideration is required of the potential changes to air quality or deposition. No further assessment is required if the changes caused by the proposed development (termed the Process Contributions 'PC' by the Environment Agency) are all less than the relevant criteria in Table 3.

Table 3: Environment Agency Screening Criteria (% of CLe or CLo)

Site Type	Averaging Period ^a	Impacts of Ammonia Emissions from Intensive Pig and Poultry Farms	Impacts from Other Emissions
European Sites	LT	4% to 20% ^b	1%
	ST	^c	10%
SSSIs	LT	20% to 50% ^b	1%
	ST	^c	10%
NNRs, LNRs, LWS, and AW	LT or ST	100%	100%

^a LT = Long Term (annual mean or 1-week mean), ST = Short-term (15-minute, 1-hour and 24-hour).

^b The upper thresholds apply in where there are no other intensive farms which might affect the same receptors. Internally, the Environment Agency has begun requiring detailed modelling wherever the PC exceeds 4% of a CLe or CLo and the 20% criterion is not supported, but is still recommended in the Environment Agency's published guidance.

^c There is no short-term CLe for ammonia and no short-term CLo.

- 4.3 The Environment Agency (2021a) also notes that there is no need for further consideration of changes to concentrations or deposition fluxes if:
- the annual mean concentration or flux is less than 70% of the CLe or CLo; and
 - the short-term Process Contribution is less than 20% of the short-term CLe minus twice the long-term background concentration.
- 4.4 These criteria have been widely applied to the results from detailed dispersion modelling but are principally intended by the Environment Agency to guide a decision as to whether detailed modelling is required, with changes below the criteria not requiring such modelling.

National Highways

- 4.5 National Highways (then Highways England) issued guidance on the assessment of air quality impacts caused by Highways England road schemes as part of its Design Manual for Roads and Bridges (DMRB). The current version of this guidance is LA 105 (Highways England, 2019). This states that the air quality impacts of each individual project should be scoped out from any further assessment where the changes caused by the project in isolation (i.e. not in combination with other plans or projects) do not meet any of the following criteria within 200 m of a designated site:
- annual average daily traffic (AADT) $\geq 1,000$; or
 - heavy duty vehicle (HDV) AADT ≥ 200 ; or
 - a change in speed band; or
 - a change in carriageway alignment by $\geq 5\text{m}$.
- 4.6 As with the Environment Agency criteria, National Highways uses these values to define when a more detailed consideration of air quality impacts is required and not to define an LSE.
- 4.7 Where detailed air quality modelling has been carried out, guidance from National Highways is that there will be no significant effect wherever:
- the total nitrogen deposition is less than the relevant CLo; OR
 - the change to nitrogen deposition caused by the proposed development (alone) is $< 1\%$ of the CLo.
- 4.8 Changes with respect to a CLe are also considered to be not significant where one of the above criteria is met.
- 4.9 Where the potential for an LSE cannot be discounted using the above criteria, National Highways refers to Table 21 of Natural England Report 210 (Caporn et al., 2016), which is reproduced in Appendix A7.2 of this current report. This table estimates the increase to nitrogen deposition which would reduce species richness by one species. National Highways states that the effects will be not significant (i.e. no LSE) if the increases to nitrogen deposition caused by the project alone (i.e. not in combination with other projects or plans) are smaller than those in Appendix A7.2. This approach is described here in order to add context to the more robust approach which has been followed in the current assessment.

Natural England

- 4.10 Natural England's guidance on advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (Natural England, 2018) recommends the use of the DMRB criteria (see Paragraph 4.5) for changes to traffic caused by all types of plans or projects, and not just for highways schemes. In the same way, irrespective of their original derivation, Natural England (2018) adopts the 1% change criterion from the Environment Agency (Table 3) as a basis for screening out the need for more detailed assessment. It explains:

"the AADT thresholds and 1% of critical load/level are considered by Natural England's air quality specialists ... to be suitably precautionary, as any emissions below this level are ... considered to be imperceptible". It goes on: "There can therefore be a high degree of confidence in [the use of these criteria] to screen for risks of an effect".

- 4.11 Natural England (2018) further explains that the AADT criteria have *"been adopted here to simply help trigger when to look further where traffic projection data is the sole means of assessment – [triggering the criteria] does not immediately mean there will be an effect"*.
- 4.12 A key difference between how these criteria are applied by Natural England (2018) when compared with both National Highways and the Environment Agency is that Natural England suggests that they should be applied first to the change caused by each individual project and then to the changes caused by relevant plans and projects in combination with one another.
- 4.13 Natural England provides guidance on which plans and projects should be considered within an in combination assessment for European sites. It explains that this *"is restricted to plans and projects which are 'live' at the same time as the assessment being undertaken. These can potentially include:*
- The incomplete or non-implemented parts of plans or projects that have already commenced;
 - Plans or projects given consent or given effect but not yet started;
 - Plans or projects currently subject to an application for consent or proposed to be given effect;
 - Projects that are the subject of an outstanding appeal;
 - Ongoing plans or projects that are the subject of regular review and renewal;
 - Any draft plans being prepared by any public body;
 - Any proposed plans or projects that are reasonably foreseeable and/or published for consultation prior to application."
- 4.14 Natural England also explains that an exhaustive search for live plans or projects which could potentially fall within the scope of an 'in-combination' assessment is not necessary:
- "it is Natural England's view that staff in a competent authority can apply their professional judgment when considering this. It might be that a pragmatic approach to identifying the most pertinent ones may be required from the competent authority. It might be reasonable to initially limit a search to those plans and projects which are of most direct relevance to the subject plan or project under HRA (i.e. the likelihood of that plan or project's effects impacting upon the same site in-combination with the proposed plan or project). This may be those which are simply the closest to the site or within a certain distance from it, or the most influential in nature."*
- 4.15 Natural England also stresses that, at the screening stage, the competent authority must "remember that the subject plan or project remains the focus of any in-combination assessment. Therefore, it is Natural England's view that care should be taken to avoid unnecessarily combining the insignificant effects of the subject plan or project with the effects of other plans or projects which can be considered significant in their own right... it is only the appreciable effects of those other plans and projects that are not themselves significant alone which are added into an in-combination assessment with the subject proposal."

IAQM

- 4.16 IAQM issued a guide to the assessment of air quality impacts on designated nature conservation sites in 2019, which was then amended in 2020 (Holman et al, 2020). This summarises the other guidance referred to above, but does not definitively recommend any one complete assessment approach. The limited areas where the IAQM guidance adds to, or unambiguously supports, that contained within other guidance documents are:

- on traffic screening criteria:
 - if the DMRB criteria (Paragraph 4.5) are used, they should be applied to changes in traffic caused by the development alone as well as in combination with other projects and plans;
- on the Environment Agency screening criteria:
 - the Environment Agency criteria (Paragraph 4.2) are suitable for screening the need for further assessment from all types of emissions sources where detailed air quality modelling has been carried out and not just those requiring environmental permits. The criteria should, though, “be used in the context of an in-combination assessment”. The guidance also hints that the 100% criterion used by the Environment Agency for local site designations should not be used and that the 1% criterion should be used instead. The 100% criterion is not used in this assessment.
 - the 1% criterion should not be used rigidly, or with more precision than the modelling can justify (for example emphasising the difference between 0.9% and 1.1%);
 - that exceeding the 1% criterion is simply an indication that further investigation is needed and does not necessarily indicate an LSE;
- on defining in combination projects:
 - projects and plans to be considered include those that may have been approved but are, as yet, incomplete, the subject of an outstanding appeal, or ongoing review;
- on receptor siting:
 - it is recommended that the predictions are not made closer than 2 m from the edge of the road; and
- on designation types:
 - the IAQM document covers all site designation types and thus suggests that the same overall assessment method should be applied regardless of the designation.

CIEEM

4.17 The Chartered Institute of Ecology and Environmental Management (CIEEM) has published advice on the Ecological Assessment of Air Quality Impacts (CIEEM, 2021), which is intended for use by both ecologists and air quality specialists. This provides six steps to exploring potential effects:

- 1) identifying the baseline ecological features and air quality;
- 2) assessing confounding factors, background pollution trends, the relative importance of each sector, and the sensitivity of the receptor;
- 3) determining if the CLEs or CLOs are exceeded;
- 4) applying the CLEs and CLOs with expert judgement;
- 5) considering the project duration and seasonal effects; and
- 6) considering the relative importance of ambient concentrations versus deposition fluxes.

JNCC

- 4.18 The Joint Nature Conservation Committee (JNCC) has published Decision-Making Thresholds (DMTs) and Site-Relevant Thresholds (SRTs) for air pollution (Chapman and Kite, 2021), which were developed for JNCC by AQC (AQC, 2021). The thresholds define changes caused by individual projects (i.e. not in combination with other projects and plans) which can be discounted as not significant without additional work. Where the appropriate thresholds are exceeded, then further assessment will be needed. The SRTs are for emissions from industry and agriculture and take account of the overall development pressure in an area. The DMT for road traffic takes account of the scale of each development within the context of overall traffic growth but is ultimately expressed as a proportion of the baseline traffic flow. The thresholds are set out in Table 4, with additional guidance on defining development density given in Table 5.
- 4.19 The JNCC guidance makes clear that an air quality assessment is only necessary if the effects of a project have not already been assessed. This is particularly relevant with respect to development sites which are allocated in strategic development plans which have themselves been considered through a HRA. For example, there is no need to consider impacts on a European site from a development site which is allocated within a Local Plan if those impacts have already been considered when developing that Plan. The guidance also makes clear that the study area for the assessment of impacts from road traffic should not extend more than 10 km from a plan boundary, and that impacts alongside the Strategic Road Network¹ only require consideration for road infrastructure schemes.
- 4.20 Where the DMT for road traffic in Table 4 is exceeded, a "road-relevant" approach may be taken based on the distance between the affected road and the nearest boundary of a designated site. The JNCC guidance recommends that professional judgement is used, taking account of the predicted reduction with distance away from the road, and a view as to whether other plans and projects are likely to cause a combined exceedance of the 1% criterion described in paragraph 4.10 (Chapman and Kite, 2021).
- 4.21 There are specific exceptions where the JNCC criteria should not be used. These are summarised as:
- 'clean' or 'pristine' sites (i.e. those with very low existing levels of air pollution) where there is reason to doubt the improving background trend;
 - sites with sensitive epiphytic or epilithic components that are, or form an important part of, a qualifying feature of the site and which are at or just below their CLo or CLe;
 - sites with sensitive epiphytic or epilithic components that are, or form an important part of, a qualifying feature of the site and which are at or just below their CLo or CLe;
 - sites with a highly localised and sensitive qualifying feature(s) that may coincide spatially with maxima of nitrogen deposition / ammonia concentrations from clusters of emission sources; and
 - situations where it may be inappropriate to rely on DMTs because the assumptions which underpin them do not reflect the particular circumstances which apply (Chapman and Kite, 2021).
- 4.22 The development of these criteria included widespread consultation with ecology specialists and UK nature conservation agencies, as well as extensive legal review. The criteria are thus considered appropriate for use in this assessment.

¹ [Our roads - Highways England, Official list of trunk roads \(transport.gov.scot\)](https://www.transport.gov.scot/en/our-roads-highways-england), [Welsh Government strategic road network map](https://www.welsh.gov.uk/strategic-road-network-map) | [Traffic Wales](https://www.wales.gov.uk/traffic-wales), [Link Corridors and Trunk Roads brochure](https://www.wales.gov.uk/link-corridors-and-trunk-roads-brochure) | [Department for Infrastructure \(infrastructure-ni.gov.uk\)](https://www.infrastructure-ni.gov.uk).

Table 4: Site-Relevant and Decision-Making Thresholds for Application to Individual Plans and Projects (AQC, 2021)

Development Density	Very Low	Low	Medium	High
Site-Relevant Thresholds for On-site Emissions				
Annual Mean NH ₃ (lichens/bryophytes) (µg/m ³)	0.0075	0.0034	0.0020	0.00079
Annual Mean NH ₃ (higher plants) (µg/m ³)	0.022	0.010	0.0060	0.0024
Annual Mean NO _x (µg/m ³)	0.087	0.046	0.030	0.014
Annual Mean N dep (woodland) (kg-N/ha/yr)	0.13	0.057	0.034	0.013
Annual Mean N dep (grassland) (kg-N/ha/yr)	0.088	0.040	0.024	0.0093
Decision-Making Threshold for Road Traffic				
Increase in Traffic Flow	0.15% of AADT in the year that the assessment is carried out			

Table 5: Guidance on Defining Development Density for On-site Emissions (AQC, 2021)

Development Density	Very Low	Low	Medium	High
Description ^a	Remote area which sees very little development	Area which sees small amounts of development	Typical agriculture / industrial area	Area experiencing intensive growth (e.g. Powys or Immingham docks)
Example Number of additional new projects below the thresholds within 5 km of proposed development over 13 yrs ^a	1	5	10	30

^a These might be either industrial or agricultural projects, or both.

5 Assessment Approach

Study Area

- 5.1 Consideration has been given to potential effects on all European sites, SSSIs, National Nature Reserves, Local Nature Reserves, and ancient woodlands within 200 m of roads on which traffic flows have been predicted by SCP Transport Planning to increase as a result of the scheme. This is the distance used in guidance from National Highways (Highways England, 2019) and Natural England (2018).
- 5.2 The locations of designated nature conservation sites have been identified from information published by Defra, JNCC and the Welsh Government. In principle this identifies all European sites, SSSIs, National Nature Reserves, Local Nature Reserves, and ancient woodlands. There may be other local scale designations which are not included in these datasets, but it is not within the scope of this assessment to carry out an exhaustive search of conservation sites which are not collated by the statutory nature conservation bodies.
- 5.3 Relevant habitat features within the designated sites, and where relevant their potential geographic extent, have been identified with reference to APIS and NRW maps and in consultation with the project ecology consultants (Ramm Sanderson).
- 5.4 The only site that has been identified as being potentially affected by the proposed development and having sensitive features is that part of the River Usk SAC shown in Figure 1.2.

Receptors

- 5.5 Impacts have been predicted at the receptor selected to represent the location within the relevant salt marsh area which is closest to the A48, along with a transect of receptors running perpendicular to the roadside, extending 200 m from the road. Following guidance from the IAQM (Paragraph 4.16), impacts have not been predicted within 2 m of roads. These roadside receptors are shown in Figure 5.1 and described in Table 6.
- 5.6 All receptors within the transect have been modelled at a height of 1.5 m to ensure consistency with the national background deposition modelling carried out on behalf of Defra and used within this assessment.

Table 6: Description of Roadside Receptor Transect for the Salt Marsh Area in the River Usk SAC

Receptor	Distance from Roadside (m)	X coordinate	Y coordinate
Receptor 1	2	332851.4	186916.8
Receptor 2	3	332851.6	186917.8
Receptor 3	5	332851.9	186919.7
Receptor 4	9	332852.2	186923.7
Receptor 5	17	332853.1	186931.5
Receptor 6	33	332855.1	186947.4
Receptor 7	65	332858.4	186978.8
Receptor 8	129	332828.8	187041.8

Receptor	Distance from Roadside (m)	X coordinate	Y coordinate
Receptor 9	200	332792.6	187106.1

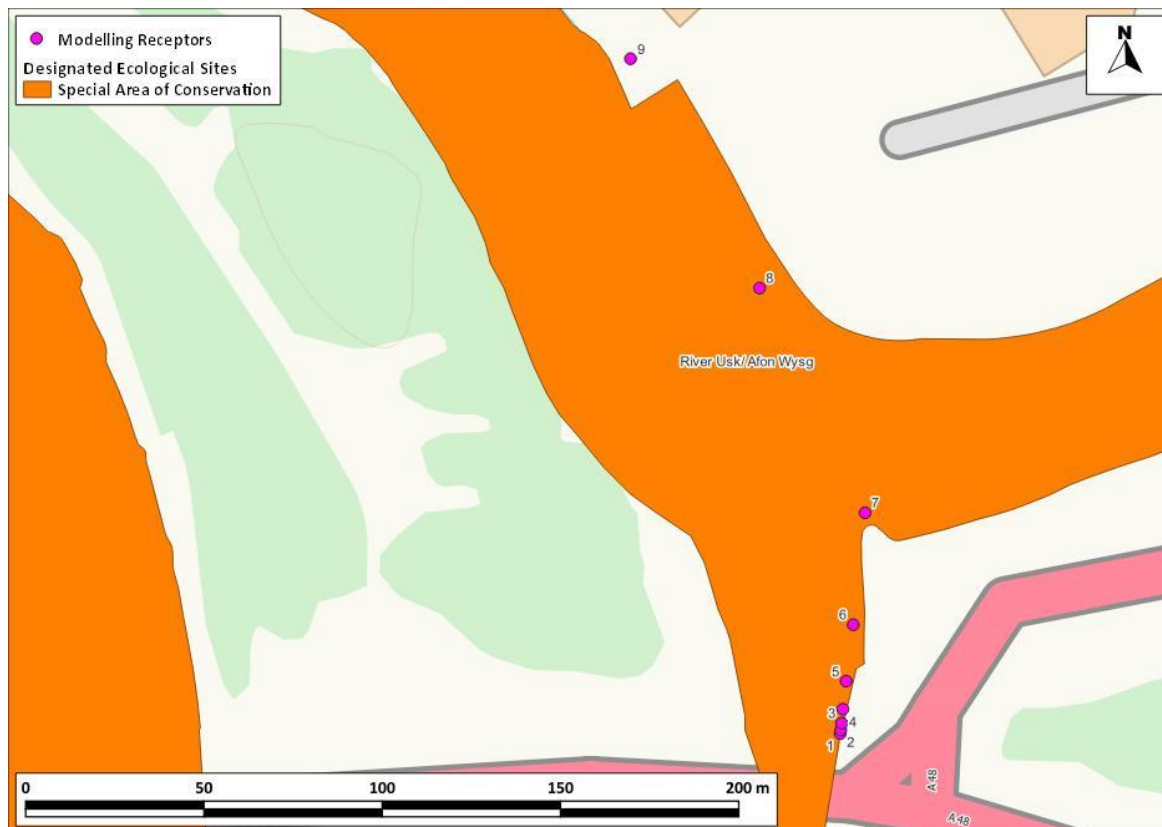


Figure 5.1: Transect Locations for Designated Conservation Site

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Background Concentrations and Fluxes

- 5.7 Background concentrations of NO_x and ammonia, and nitrogen and acid nitrogen deposition fluxes, have been taken from the Air Pollution Information System (APIS) website (APIS, 2024). The NO_x concentrations represent 1 km x 1 km averages, while the ammonia concentrations and deposition fluxes represent 5 km x 5 km averages. APIS currently presents 3-year mean values centred on the calendar year of 2021. These have been adjusted to represent 3-year averages centred on 2022 and 2028 using the rate of change, at each individual receptor, predicted using the Business-as-Usual assumptions of JNCC's Nitrogen Futures project² and specifically, the 1 km x 1 km gridded data

² <https://jncc.gov.uk/our-work/nitrogen-futures/>. A linear rate of change has been assumed between 2017 and the 2030 Business as Usual scenario, with the APIS 2021 data scaled based on the location-specific predicted changes. Acid nitrogen deposition has been scaled proportionally to nutrient nitrogen.

published by JNCC. Background concentrations of NO₂ have been defined using Defra's 2018-based background maps (Defra, 2024a). These cover the whole of the UK on 1x1 km grid.

Assessment Scenarios

5.8 NO_x and ammonia concentrations, and nitrogen and acid deposition fluxes, have been predicted for the following scenarios:

A) 2022 base year;

B) 2028 without any increase in traffic from 2022 (including future-year emissions factors and future-year background concentrations and fluxes but base-year traffic within the dispersion model). This is a counterfactual scenario used to determine the in-combination impacts;

C) 2028 without the development but with the forecast background increase in traffic from 2022 to 2028 (also including future-year emissions factors and background concentrations and fluxes); and

D) 2028 with both the proposed development and background traffic growth (also including future-year emissions factors and background concentrations and fluxes).

5.9 The three 2028 scenarios have been compared to derive the impacts of the proposed development alone and in-combination with other projects and plans:

- the difference between scenarios C and D represents the change caused by the proposed development which, for consistency with other regimes, is termed the Process Contribution ('PC'); and
- the difference between scenarios B and D represents the In-Combination Change ('ICC').

5.10 It should be noted this is a highly conservative approach for determining in-combination effects which is used when traffic data for specific in-combination schemes is unavailable; it is the effect of all traffic growth from the baseline year in-combination with the proposed development.

Modelling Methodology

5.11 Concentrations have been predicted using the ADMS-Roads dispersion model, with emissions of NO_x derived using Defra's Emission Factor Toolkit (EFT) (v12.0) (Defra, 2023), and emissions of ammonia derived using AQC's Calculator for Road Emissions of Ammonia (CREAM) (v1A) model. Traffic flows have been derived from data provided by Department for Transport (DfT) and baseline traffic data presented within an air quality assessment report in support of the planning application for the nearby Former Orb Site Steelworks Phase 1 development in Newport (Kairus Ltd, 2024). Details of the model inputs are provided in Appendix A7.3. Deposition fluxes have been calculated from the predicted concentrations of nitrogen dioxide and ammonia. Details on the method for calculating the deposition are also provided in Appendix A7.3.

Uncertainty

5.12 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

5.13 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to

traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of Defra's EFT tended to over-state emissions reductions into the future. However, analyses of the more recent versions of Defra's EFT carried out by AQC (2020b) (2020c) suggest that, on balance, these versions are unlikely to over-state the rate at which NO_x emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NO_x concentrations are most likely to decline more quickly in the future, on average, than predicted by the current EFT, especially against a base year of 2016 or later. Using EFT v12.0 for future-year forecasts in this report thus provides a robust assessment.

- 5.14 Historically, less attention has been given to calculating emissions of ammonia from road traffic than to calculating emissions of NO_x. Future forecasts of traffic-related ammonia are thus quite uncertain. However, the CREAM model takes a deliberately conservative approach regarding these future uncertainties and can thus be considered robust.

Assumptions

- 5.15 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:
- the assumption that the phase 3³ of the proposed development is complete and fully operational in 2028;
 - that the Cardiff meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A7.3); and
 - that the A48 passes the SAC at a variety of elevations where the bridge crosses over the SAC (this is discussed further in Appendix A7.3).

³ Phase 3 of the proposed development has the greatest HDV movements once operational. The HDV movements associated with the earlier phases (1 and 2) are below the JNCC DMTs and therefore no detailed assessment of the earlier phases has been undertaken.

6 Background Information and Context

Habitat Features

- 6.1 The River Usk SAC extends over 1015 hectares. Information available on APIS shows that the site as a whole supports a large number of notified features. However, Ramm Sanderson have advised that many of these features are highly unlikely to be present, either now or in the future, within 200 m of any of the roads included in this assessment. The current assessment has thus considered potential impacts with respect to the Atlantic upper-mid & mid-low salt marshes, as NRW maps show salt marsh as present within 200 m of the A48, in the area shown in Figure 1.2.

Background Concentrations and Fluxes

- 6.2 Estimated background concentrations of NO_x and ammonia are set out in Table 7. A range of values is presented covering the receptors of concern to this assessment. The background concentrations of NO_x are predicted to be well below the CLe in both 2022 and 2028. Predicted background concentrations of NH₃ are below the CLe of 3 µg/m³ in both years.

Table 7: Estimated Annual Mean Background Pollutant Concentrations in 2022 and 2028 (µg/m³)

Year	NO _x	NH ₃
2022	17.39	1.44
2028	13.21 – 13.22	1.49 – 1.51
CLe	30	3

- 6.3 Background nitrogen deposition fluxes are presented in Table 8. Predicted background nutrient nitrogen deposition rates exceeded the lower CLo in both years. The predicted background acid nitrogen deposition rates were below the CLo in both years.

Table 8: Estimated Annual Mean Background Deposition Fluxes in 2022 and 2028 (µg/m³)

Year	Nutrient Nitrogen Deposition (kgN/ha/yr)	Acid Nitrogen Deposition (keq/ha/yr)	Nutrient Nitrogen CLo (kgN/ha/yr)	Acid Nitrogen CLo (keq/ha/yr)
2022	13.31	0.95	10	4.0
2028	12.86	0.92	10	4.0

7 Impact Assessment

Changes to Traffic Flows

- 7.1 There are no roads within the study area on which the proposed development is predicted to increase traffic flows by more than the criteria defined by National Highways (Paragraph 4.5). There is, however, one road (the A48) on which the increase in traffic caused by the operational phase 3 of the proposed development exceeds the DMT for road traffic defined by JNCC (Table 4) and which passes within 200 m of an area of salt marsh within the River Usk SAC.
- 7.2 It has thus been necessary to consider the air quality impacts of the proposed development on this site.

Air Quality Conditions at Worst-case Locations

- 7.3 Air quality conditions at the worst-case location within the River Usk SAC are set out in Table 9. Predictions are presented for the modelled receptor which is 2 m away from the road, as this location had the highest predicted concentrations and fluxes, maximum PC and maximum ICC.
- 7.4 Results are provided for all four assessment scenarios described in Paragraph 5.8. The CLo for nitrogen deposition is exceeded at the worst-case location in all scenarios. The CLe for annual mean and 24-hour mean NO_x concentrations, annual mean ammonia concentrations and acid deposition are achieved in all scenarios. Annual mean NO_x concentrations are less than 70% of the CLe in all future scenarios but not in the 2022 Existing Baseline scenario.

Table 9: Air Quality Conditions at Worst-case Locations in the River Usk SAC

Year Pollutant/Averaging Period	2022 Existing Baseline	2028			Cle / CLO
		No Growth ^a	Without Development ^b	With Development ^c	
Annual Mean NH ₃ (µg/m ³)	2.10	2.22	2.26	2.26	3
Annual Mean NO _x (µg/m ³)	26.58	17.46	17.67	17.70	30
24-Hr Mean NO _x (µg/m ³)	66.75	41.58	42.33	42.43	75/200
Nitrogen Deposition (kg-N/ha/yr)	17.46	16.93	17.14	17.17	10
Acid Deposition (keq/ha/yr)	1.25	1.21	1.22	1.23	4

^a Assuming future-year emissions factors and background concentrations/fluxes, but excluding any increase in traffic on local roads between 2022 and 2028. The predicted changes to background implicitly include increases to traffic on a UK level.

^b Assuming future-year emissions factors and background concentrations/fluxes and forecast increase to traffic on local roads (excluding the proposed development) between 2022 and 2028.

^c Assuming future-year emissions factors and background concentrations/fluxes, forecast increases to traffic and the proposed development.

Changes to Air Quality at Worst-case Locations

- 7.5 Table 10 summarises the changes to concentrations and deposition fluxes at the worst-case identified location. Table 11 expresses these changes in relation to the CLeS (Table 1) and CLoS (Table 2). It also shows how much of the improvements to NO_x concentrations and deposition fluxes which are predicted without either the proposed development or the IC projects will be removed by these developments.
- 7.6 All of the PC's (when rounded) are 0% (i.e. less than 0.5% when unrounded) of the CLoS and CLeS. Thus, according to the guidance summarised in Section 4, the effects of the proposed development, when viewed in isolation, will be not significant and not give rise to an LSE. All of the ICC's are no greater than 1% of the CLoS and CLeS, except for nitrogen deposition where the ICC is predicted to be 2% of the CLo at the worst-case receptor. Based on the guidance in Section 4, the effect in-combination with other projects (based on conservative assumptions on traffic growth) on annual mean ammonia, annual and 24-hour NO_x and acid deposition, will not be significant and not give rise to an LSE. However, as the ICC for nitrogen deposition is greater than 1% of the CLo at some transect locations, the guidance from Natural England and IAQM (see Section 4) does not, therefore, allow the effects in-combination with other relevant projects to be immediately discounted for nitrogen deposition.

Table 10: Summary of Worst-case Changes to Air Quality Conditions in the River Usk SAC

Pollutant/Averaging Period	Change from Existing Baseline			ICC	PC
	Without IC ^a	With IC ^a Without Development	With IC ^a and With Development		
Annual Mean NH ₃ (µg/m ³)	0.12	0.15	0.16	0.04	0.01
Annual Mean NO _x (µg/m ³)	-9.13	-8.91	-8.88	0.25	0.03
24-Hr Mean NO _x (µg/m ³)	-25.17	-24.42	-24.32	0.86	0.10
Nitrogen Deposition (kg-N/ha/yr)	-0.53	-0.32	-0.29	0.24	0.03
Acid Deposition (keq/ha/yr)	-0.04	-0.02	-0.02	0.02	0.00

^a i.e. with and without forecast increases to traffic which are unrelated to the proposed development.

Table 11: Summary of Worst-case Changes to Air Quality Conditions in the River Usk SAC as Percentage of Relevant Criteria ^a

Pollutant/Averaging Period	As % of CLe/CLo		As % of Autonomous Changes ^b	
	PC	ICC	PC	ICC
Annual Mean NH ₃	0%	1%	-5%	-36%
Annual Mean NO _x	0%	1%	0%	3%
24-Hr Mean NO _x ^c	0% (0%)	1% (0%)	0%	3%
Nitrogen Deposition	0%	2%	5%	45%

	As % of Cle/CLo		As % of Autonomous Changes ^b	
Acid Deposition	0%	0%	5%	45%

^a Following guidance from the IAQM (Paragraph 4.16) percentage values have been rounded to the nearest whole number.

^b i.e. as a percentage of the changes which are forecast from the existing baseline without any IC projects.

^c Values in parentheses are as a percentage of the higher CLe of 200 µg/m³.

Spatial Distribution of Air Quality Impacts

- 7.7 The nitrogen deposition ICC exceeds 1% of the CLo at receptors of distances up to 33 m from the roadside only and does not exceed this criterion at distances of 65 m or more. Therefore, it is judged that area over which the nitrogen deposition ICC exceeds 1% of the CLo covers approximately 0.01% of the total SAC area. The ICC does not exceed 1% of the CLe or CLo at any modelled receptors for any other pollutants.

Assessment

- 7.8 For all pollutants modelled, the PC (when rounded) was 0% of the respective CLe or CLo. Furthermore, the ICC (when rounded) was no more than 1% of the respective CLe or CLo for any pollutant except for nitrogen deposition where the worst-case ICC was 2% of the CLo. However, as stated in Paragraph 7.7, this ICC exceedance of 1% of the CLo affects a very small area (approximately 0.01%) of the overall SAC.
- 7.9 It should also be recognised that the deposition velocities which have been used for ammonia may be particularly conservative. There is strong evidence that where ammonia concentrations are high, the deposition of ammonia can be significantly inhibited (Cape et al, 2008). The deposition velocity for ammonia used in this assessment was developed by the AQTAG to be precautionary in most settings. Thus, close to emissions sources it is likely to have caused the deposition of ammonia to have been over-predicted. Nevertheless, the worst-case PC for ammonia and nitrogen and deposition were below 1% of the CLe or CLo.
- 7.10 As shown in Table 11, even with the conservative assumptions which have been included in the assessment, the maximum PCs for NO_x, nitrogen deposition and acid deposition, represent only a small fraction (0 to 5%) of the autonomous changes which have been predicted between the baseline year and the assessment year.
- 7.11 The PCs and ICCs for NO_x, nitrogen deposition and acid deposition, when expressed as fractions of the autonomous changes, are smaller than those which NE has previously described as causing only a "marginal" retardation of the forecast improvements to air quality, meaning that concentrations and deposition rates will "continue to decline" (see Paragraphs A1.12 to A1.14 Appendix A7.1). Paragraph A1.13 explains that the absence of a net reduction for ammonia does not prevent the same conclusion being reached. This is important since, to conclude a potential LSE in this situation, would go against the clear advice given, and defended, by NE regarding the interpretation of PCs and ICCs in relation to autonomous changes.
- 7.12 Figure 7.1 to Figure 7.4 show the forecast changes to pollutants under different future scenarios (i.e. scenarios B, C and D in paragraph 5.8). They only consider the location where the PC is greatest, as

this provides a worst case assessment. Nevertheless, the forecast changes in pollutant levels are almost indistinguishable for all three future scenarios, with or without the proposed development. Over the remainder of the site, impacts will be even smaller.

- 7.13 On the basis of this assessment, it is concluded that the effects of the proposed development can be screened out as not significant. No further assessment is thus needed to discount the potential for an LSE in relation to the proposed development.

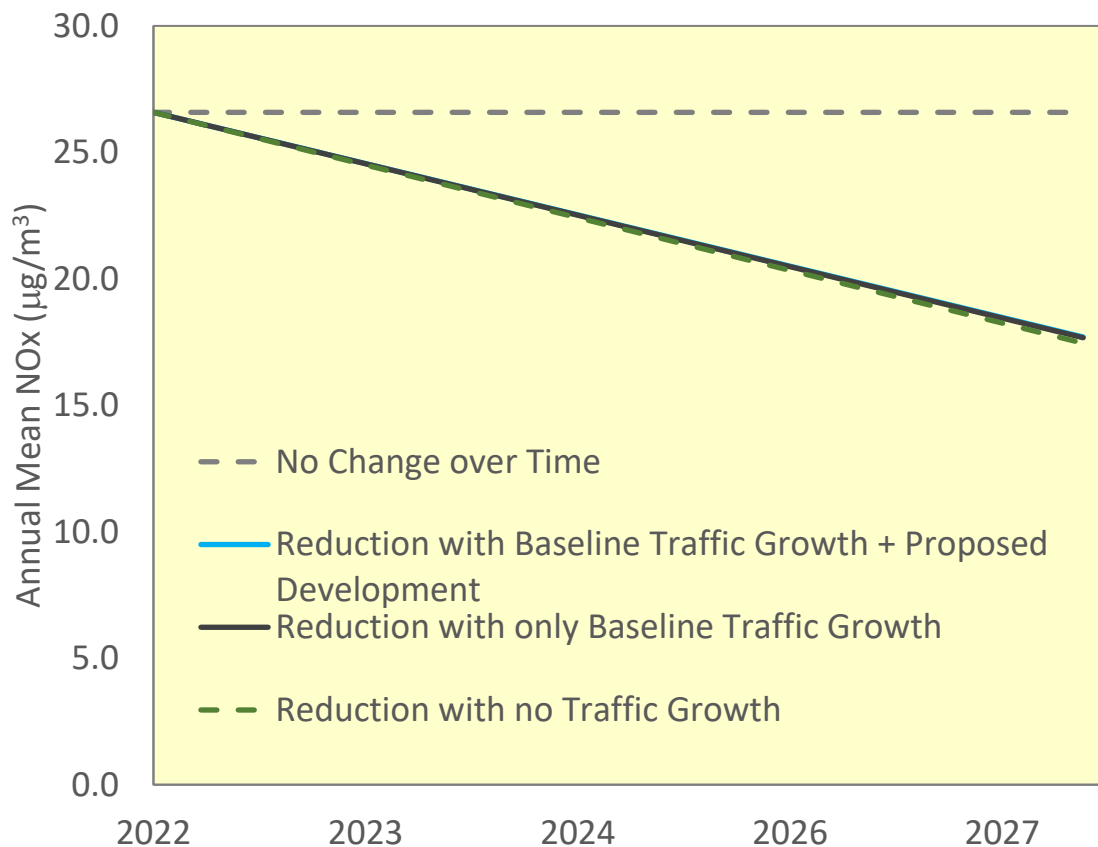


Figure 7.1: Visualisation of Forecast Changes to Annual Mean NOx at the Location of the Maximum PC under Different Future Scenarios⁴

⁴ For the sake of simplicity, trajectories are shown as being linear.

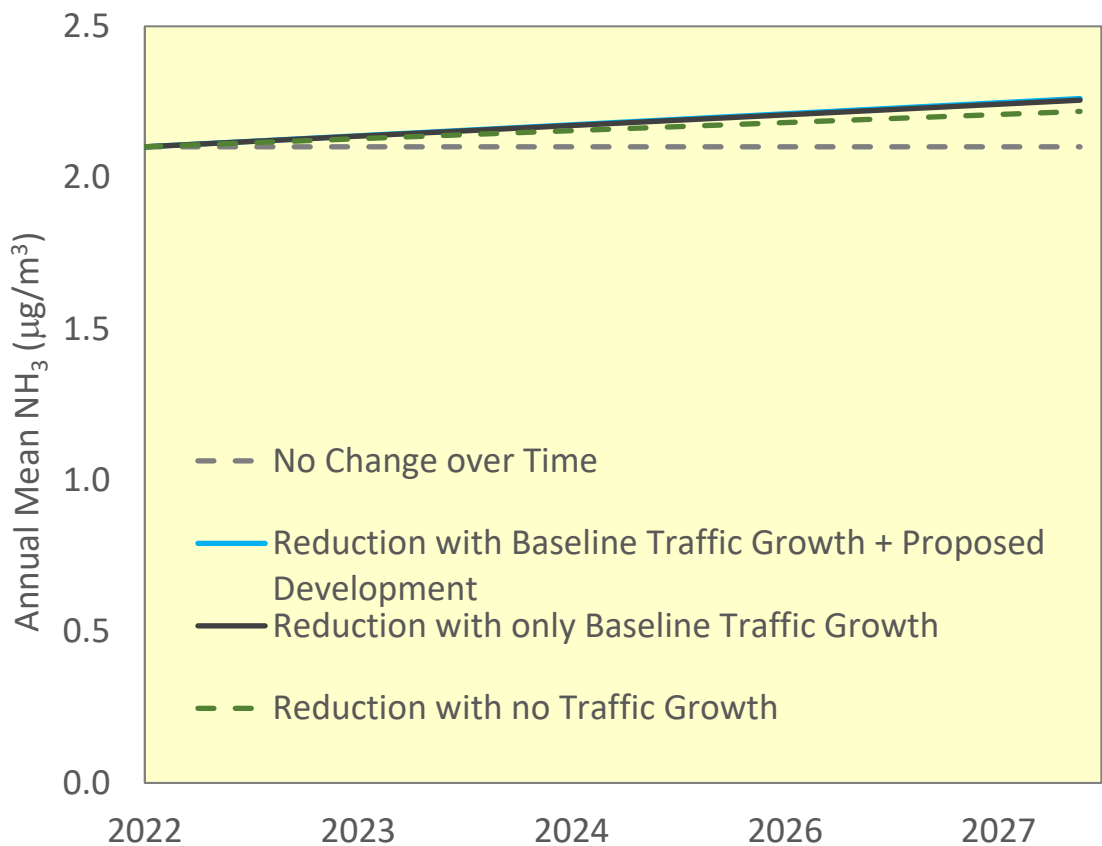


Figure 7.2: Visualisation of Forecast Changes to Annual Mean Ammonia at the Location of the Maximum PC under Different Future Scenarios⁴

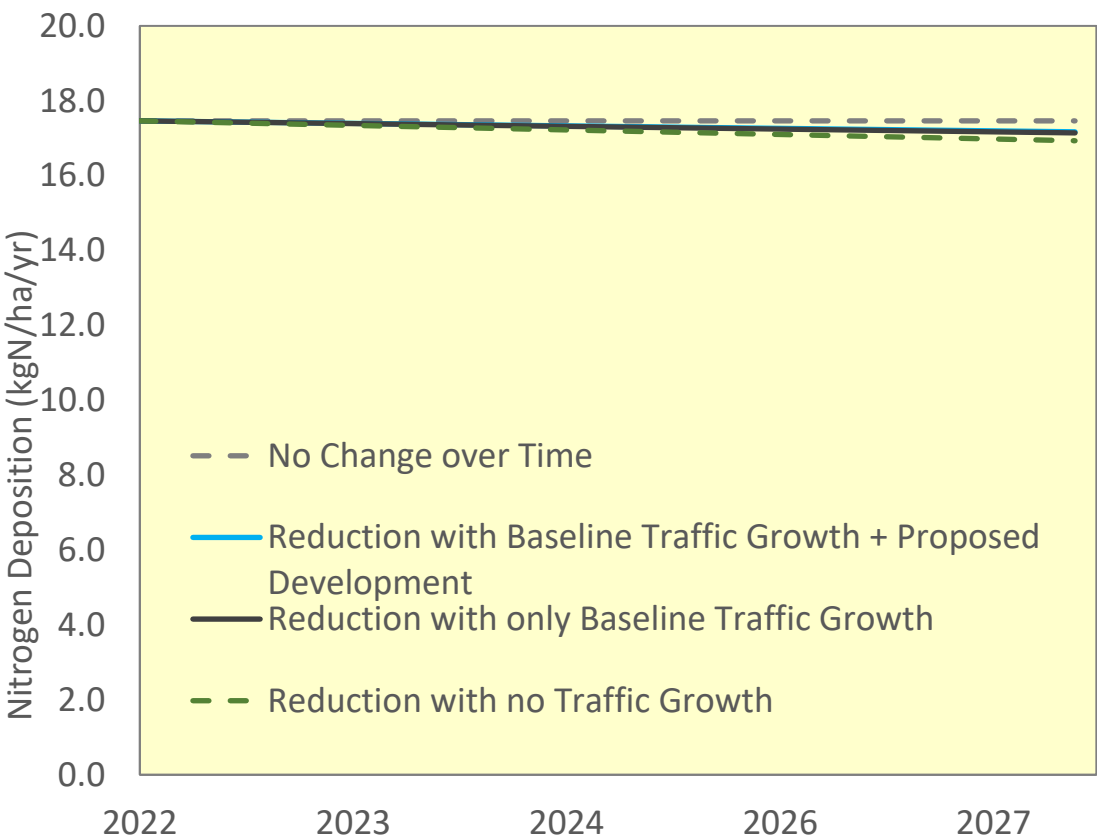


Figure 7.3: Visualisation of Forecast Changes to Nitrogen Deposition at the Location of the Maximum PC under Different Future Scenarios⁴

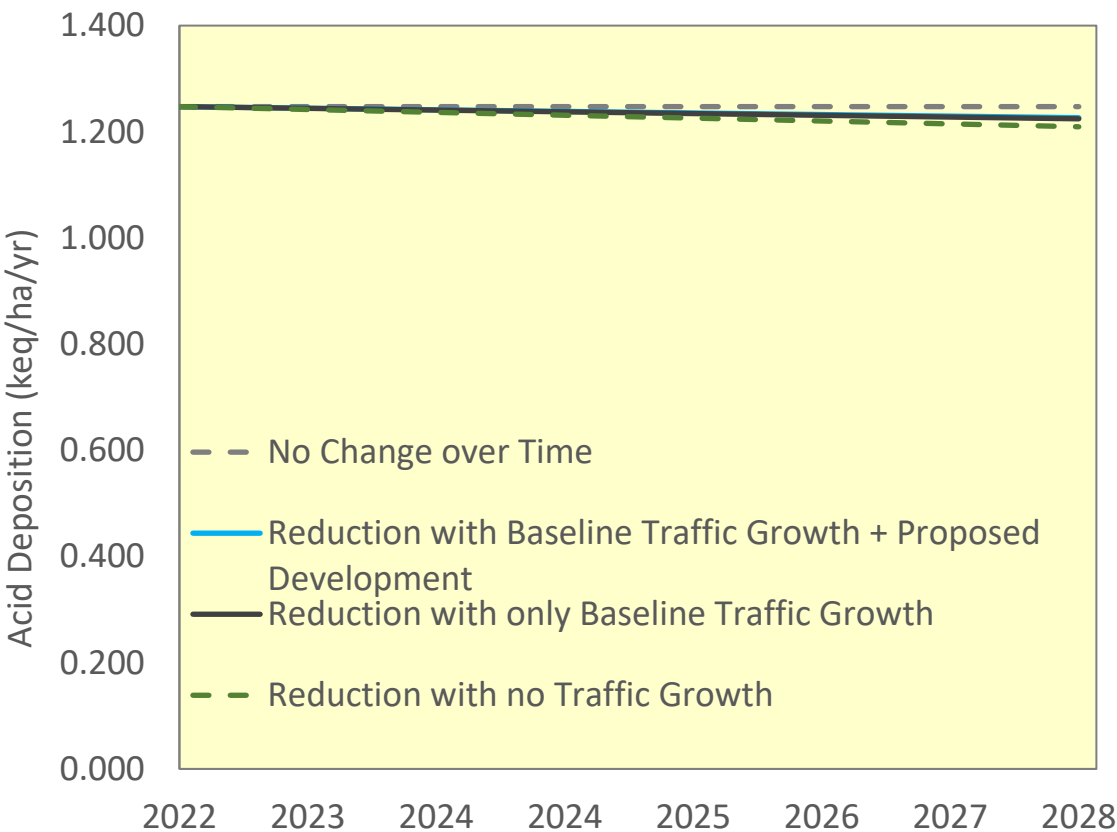


Figure 7.4: Visualisation of Forecast Changes to Acid Deposition at the Location of the Maximum PC under Different Future Scenarios⁴

8 Conclusions

- 8.1 A screening assessment has been provided for air quality effects on biodiversity associated with operational phase traffic of the proposed development. The emissions which have been considered are emissions from road traffic generated by the phase 3 operation of the proposed development. The increase to traffic associated with the proposed development will be greater than the Decision-Making Threshold defined by JNCC, meaning that a quantitative assessment is required.
- 8.2 The proposed development will increase concentrations of NO_x and ammonia, and nitrogen deposition fluxes within the salt marsh area of the River Usk SAC within 200 m of the A48. However, there is only a very small part of the site where the increase for nitrogen deposition in combination with other projects and plans, cannot readily be discounted as insignificant through application of commonly accepted screening criteria. For all other pollutants, the increases can be discounted as insignificant at every modelled location. Additionally, the slight exceedance of the screening criteria for nitrogen deposition is only seen when assessing effects in combination with future traffic growth, not when assessing the effects of the proposed development in isolation. Furthermore, the percentage of the River Usk SAC where the exceedance of the screening criterion is seen is very low (approximately 0.01% of the SAC's area).
- 8.3 The increase to concentrations and deposition fluxes at the worst-case locations within the River Usk SAC, both in isolation and in combination with other projects, have been compared with the concurrent changes forecast without these projects. This follows the assessment process which NE has taken with respect to air quality impacts elsewhere. It has been shown that, when viewed in this context, the impacts are smaller than those which NE describes as causing only a marginal retardation of the improvements over time. It is acknowledged that this is an area of scientific uncertainty and NRW may take different views from NE.
- 8.4 On the basis of this assessment, it is concluded that the effects of the proposed development on biodiversity can be screened out as not significant without needing any additional assessment.

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10 Glossary

AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
APIS	Air Pollution Information System
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
CLe	Critical Level - "concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge" (APIS, 2024)
CLo	Critical Load – "a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge" (APIS, 2024)
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	His Majesty's Stationery Office
IAQM	Institute of Air Quality Management
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LNR	Local Nature Reserve
LSE	Likely Significant Effect. An effect is 'likely' if it cannot be excluded on the basis of objective information. An effect is 'significant' if it undermines the conservation objectives.

$\mu\text{g}/\text{m}^3$	Microgrammes per cubic metre
NE	Natural England
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides (taken to be NO ₂ + NO)
NRW	Natural Resources Wales
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PC	Process Contribution
PM ₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM _{2.5}	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
PPW	Planning Policy Wales
RDE	Real Driving Emissions
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TAN	Technical Advice Note
TEMPro	Trip End Model Presentation Program
WHO	World Health Organisation

11 Appendices

A7.1 Relevant Case Law

- A1.1 Interpretation of the Habitats Regulations with respect to air quality impacts and effects has been shaped by judgements and opinions of European and UK courts. Published findings of the Planning Inspectorate for England and Wales, and the advice given to this Inspectorate by Natural England, has also proven seminal in defining how air quality impacts on European sites should be assessed. A brief summary of some key cases, in chronological order, is given below.

2004 - Waddenzee⁵

- A1.2 This case in the Court of Justice of the European Union (CJEU) explained the extent to which the precautionary principal must be followed in HRA. In particular, the judgement (para 61) notes: *"the competent national authorities are to authorise such an activity only if they have made certain that it will not adversely affect the integrity of that site. That is the case where no reasonable scientific doubt remains as to the absence of such effects"*.

2009 - Boggis⁶

- A1.3 This judgement explained that a breach of Article 6.3 does not occur solely because of a hypothetical risk of harm to a designated site. There must be credible evidence that the risk is real for this to require consideration (para 37).

2011 Sweetman⁷

- A1.4 This judgement from the CJEU also emphasised the need for the precautionary principal. In particular, it highlighted that the word "Likely" in LSE is unique to the English language interpretation of the Habitats Directive and should not be seen as synonymous with 'probable'. The judgement explained that an AA *"cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works proposed on the protected site concerned"*.

2013 – Lough Corrib⁸

- A1.5 This case in the CJEU explained that the entirety of each European site is protected by the Habitats Directive: if a "plan or project will lead to the lasting and irreparable loss of the whole or part of a priority natural habitat type whose conservation was the objective that justified the designation of the site concerned ..., the view should be taken that such a plan or project will adversely affect the integrity of that site." (para 46).

2017 - Wealden 1⁹

- A1.6 This case in the UK High Court concerned the approach to in-combination assessments pursuant to the Habitats Regulations. The principal issue was whether it was appropriate to apply a screening criterion published by Highways England (in which changes of less than 1,000 vehicles per day could be discounted as not significant) to consider the impacts of individual plans. The overall conclusion in this respect was that the criterion should have been applied to the aggregated change caused by two plans and not to each plan in isolation. This has changed the approach taken at the screening

⁵ Case C-127/02. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:62002CJ0127:EN:PDF>

⁶ [2009] EWCA Civ 1061. [Boggis & Anor v Natural England & Anor \[2009\] EWCA Civ 1061 \[20 October 2009\] \(baillii.org\)](#)

⁷ Case C-258/11 (Sweetman) Judgement para 44, 46 and 47

⁸ Case C-258/11. [CURIA - Documents \(europa.eu\)](#)

⁹ Judgment in Wealden District Council v Secretary of State for Communities and Local Government, Lewes District Council and South Downs National Park Authority) [2017]

stage of HRA, which now routinely considers the effects of plans and projects in combination as well as on their own.

2018 People over Wind¹⁰

- A1.7 The judgement of the CJEU was that it was more appropriate to consider the effects of mitigation at the AA stage rather than at the screening stage: *"it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site"*. This is particularly challenging to reconcile with the concepts of 'better by design' and 'air quality positive' which expect consideration of air quality improvement to run throughout the design of a project. Since the People over Wind judgement, most assessments consider that on-site measures to reduce emissions which are not required solely to avoid an LSE can form part of the assessment considered at the screening stage.

2018 Dutch Nitrogen Cases¹¹

- A1.8 These two cases highlighted several interesting points. The most relevant in terms of air quality assessment in the UK are:

- 1) that an AA may not take into account the existence of 'autonomous' measures¹² (i.e. measures not part of that programme), if the expected benefits of those measures are not certain;
- 2) that screening thresholds may only be used to discount an LSE from a project if there is no reasonable scientific doubt that that project will not affect the integrity of a designated site in combination with other plans and projects; and
- 3) that recurring activities such as grazing and fertilizer use may be classified as a 'project' in the context of the Habitats Directive.

2019 - Examination of the Submission Wealden Local Plan

- A1.9 This does not relate to a court case, but the judgements expressed by NE and the planning inspectorate have had significant implications for the way in which air quality impacts on nature conservation sites are assessed in the UK. In particular, they form the basis of the approach which was taken to derive the DMTs and SRTs (see Paragraph 4.18). Furthermore, the political implications for Wealden District Council (WDC) of not following NE's advice on this matter have provided a clear signal to other local planning authorities regarding the treatment of autonomous measures in planning decisions.
- A1.10 In the evidence supporting its 2018 Submission Local Plan, Wealden District Council showed the impact of its Submission Plan on air quality conditions within the Ashdown Forest SAC. It quantified the PC and ICC, and also showed the net effect of forecast changes to national and international emissions (i.e. autonomous measures). These emissions were forecast using three alternative approaches, each of which assumed a different level of efficacy of the autonomous measures.

¹⁰ C-323/17 Judgement of the Court 12 April 2018, Request for a preliminary ruling under Article 247 TFEU from the High Court (Ireland), made by decision on 10 May 2017, received at the Court on 30 May 2017, in the proceedings of People Over Wind and Peter Sweetman v Coillte Teoranta, curia.europa.eu/juris/document/document.jsf?text=&docid=200970&pageIndex=0&doclang=en&mode=req&dir=&occ=first&part=1&cid=619449.

¹¹ Coöperatie Mobilisation for the Environment UA and Vereniging Leefmilieu v College van gedeputeerde staten van Limburg and College van gedeputeerde staten van Gelderland. Requests for a preliminary ruling from the Raad van State Joined Cases C-293/17 and C-294/17

¹² i.e. measures which are not being delivered as part of the plan, project, or programme being assessed.

- A1.11 NE advised WDC that it should base its plan-making solely on the scenario that used AQC's CURED model¹³, but instead the Council took account of all three emissions scenarios, including one in which autonomous measures were assumed to have no effect¹⁴.
- A1.12 Under NE's preferred scenario¹³, improvements caused by autonomous measures were predicted to be greater than the adverse effects of the Submission Local Plan, both alone and in-combination with other predicted traffic growth (i.e. the effect of autonomous measures was greater than both the PC and ICC). Detailed habitats surveys had identified the distribution of the protected feature, and at the worst relevant location, the PC was predicted to remove 53% of the autonomous improvements, while the ICC was predicted to remove 74% of the autonomous improvements¹⁵. These predictions were used by NE to inform its supplementary conservation objectives for Ashdown Forest (Natural England, 2019). Making specific reference to the modelling published by WDC, NE stated:
- "Assessment of improvements in vehicular technology and in particular Euro6/VI standards that all vehicles are currently being manufactured to, will outweigh impacts from new development. The improvements will be marginally retarded by additional development but future nitrogen deposition and concentration will continue to decline with the existing trend." (Natural England, 2019).
- A1.13 This statement relates to the entire SAC and thus takes account of the large area where the ICC was predicted to remove less than 74% of the autonomous improvements, as well as these worst-case impacts. NE also explained the importance of this net downward trend in its representations to the planning inspector^{16,17}. The predicted improving trend related only to NOx and nitrogen deposition. The modelling published by WDC, to which NE referred, did not predict any reductions to ammonia concentrations, only adverse impacts. NE's advice took a holistic view of ambient concentrations in general in its advice relating to air quality.
- A1.14 It is important to note that NE's position regarding the importance of autonomous emissions reductions at Ashdown Forest did not refer to specific habitat features, their sensitivity, or any other ecological context. The statement which is quoted in Paragraph A1.12, relates solely to air quality forecasts. A key disagreement between WDC and NE was whether the autonomous measures included in the air quality forecasts were sufficiently certain for decision making in the context of the Habitats Regulations¹⁸. The Submission Plan ultimately had to be withdrawn, partly because of WDC's failure to take account of NE's advice on the significance of the PC and ICC when viewed in the context of the benefits provided by autonomous measures¹⁹.

¹³ This was termed 'Scenario B'. AQC's CURED model has since been withdrawn but the modelling presented in this report is consistent with the level of precaution which was inherent in this model scenario.

¹⁴ This was termed 'Scenario A'.

¹⁵ As documented in the executive summary of the air quality modelling report cited by Natural England (2019) which shows the maximum deposition to heath predicted using the most detailed modelling would fall from 22.7 kgN/ha/yr in 2015 to: 19.3 kgN/ha/yr in 2028 without any 'in-combination' traffic; 20.8 kgN/ha/yr in 2028 without the Submission Plan, and 21.8 kgN/ha/yr with the Plan..

¹⁶ e.g. Paragraphs 19 to 25, and Paragraphs 37 to 46 of Annex 1 to Natural England Comments on Proposed Submission Document 05/08/18 – Natural England ref 255168 (available on request).

¹⁷ It is important to note that the examination in public followed shortly after the judgement from the Dutch Nitrogen Cases, which were discussed at length and thus fully accounted for in advice from both Natural England and the planning inspector.

¹⁸ In particular, WDC noted that measurements showed that traffic-related nitrogen deposition had, on average, been increasing for many years despite the same forecasts showing concurrent reductions.

¹⁹ Wealden District Council concluded that the PC and ICC were both potentially significant without mitigation, while for the reasons given in Paragraph 1(a)i)(1)(a)(i)A1.12, Natural England determined that mitigation was not required.

A7.2 Data from (Caporn et al., 2016) Cited by National Highways

Table A2-1: Values from Table 21 of Caporn et al (2016) Relied on in National Highways' Assessment Method

Habitat	Nitrogen Deposition KgN/ha/yr CLo	Background deposition					
		5	10	15	20	25	30
		Increase required to reduce measured species richness by 1					
Upland heath ^a	10-20	0.4	0.8	1.3	1.7	2.0	2.4
Upland heath ^a	10-20	1.7	2.0	2.5	3.3	5.0	20.0
Lowland heath	10-20	0.4	0.8	1.3	1.7	2.0	2.4
Bog	5-10	-	-	-	3.3	-	-
Sand dunes ^a	8-15	0.1	0.5	1.1	2.0	-	-
Sand dunes ^a	8-15	0.3	0.6	0.9	1.3	-	-
Sand dunes ^a	8-15	0.3	0.6	0.9	1.3	-	-
Acid grasslands	10-15	1.7	1.7	2.0	2.0	2.5	2.5

^a Based on two separate studies using different quadrat sizes.

A7.3 Modelling Methodology

Model Inputs

- A1.15 Predictions have been carried out using the ADMS-Roads dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width and height where applicable). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 12.0) published by Defra (2023). Model input parameters are summarised in Table A3-1 and, where considered necessary, discussed further below.

Table A3-1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	No
Urban Canopy Flow Used?	No
Advanced Street Canyons Modelled?	No
Noise Barriers Modelled?	No
Meteorological Monitoring Site	Cardiff
Meteorological Data Year	2022
Dispersion Site Surface Roughness Length (m)	1
Dispersion Site Minimum MO Length (m)	30
Met Site Surface Roughness Length (m)	0.2
Met Site Minimum MO Length (m)	1
Gradients?	No

- A1.16 AADT flows, diurnal flow profiles, speeds, and vehicle fleet composition data have been determined from the interactive web-based map provided by DfT (2021), as well as an air quality assessment in support of the planning application for the nearby Former Orb Site Steelworks Phase 1 development in Newport (Kairus Ltd, 2024). The 2022 AADT flows have been factored forward to the future assessment year of 2028 using growth factors derived using the TEMPro System v7.2 (DfT, 2017). Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. The traffic data used in this assessment are summarised in Table A3-2. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2022).

Table A3-2: Summary of Traffic Data used in the Assessment

Road Link	2022		2028 (Without Scheme)		2028 (With Scheme)	
	AADT	%HDV	AADT	%HDV	AADT	%HDV
2	19279	7	20264	7	20314	7

Road Link	2022		2028 (Without Scheme)		2028 (With Scheme)	
	AADT	%HDV	AADT	%HDV	AADT	%HDV
3	19615	7	20617	7	20668	7
27	19279	7	20264	7	20314	7
28	19615	7	20617	7	20668	7
29	5003.5	5	5259	5	5259	5
6	5003.5	5	5259	5	5259	5
7	6307	9	6629	9	6629	9
8	6307	9	6629	9	6629	9
9	6307	9	6629	9	6629	9
10	6307	9	6629	9	6629	9
11	5003.5	5	5259	5	5259	5
12	5003.5	5	5259	5	5259	5
13	5003.5	5	5259	5	5259	5
14	19279	7	20264	7	20314	7
15	3984	6	4188	6	4188	6
16	3984	6	4188	6	4188	6
17	3984	6	4188	6	4188	6
18	19615	7	20617	7	20668	7
21	19615	7	20617	7	20668	7
22	19279	7	20264	7	20314	7
23	3984	6	4188	6	4188	6
24	3984	6	4188	6	4188	6
25	19615	7	20617	7	20668	7
26	19279	7	20264	7	20314	7
4	19279	7	20264	7	20314	7
1	19279	7	20264	7	20314	7
19	19615	7	20617	7	20668	7
5	19615	7	20617	7	20668	7
20	19615	7	20617	7	20668	7

A1.17 Figure A3.1 shows the road network included within the model, along with the speed at which each link was modelled.

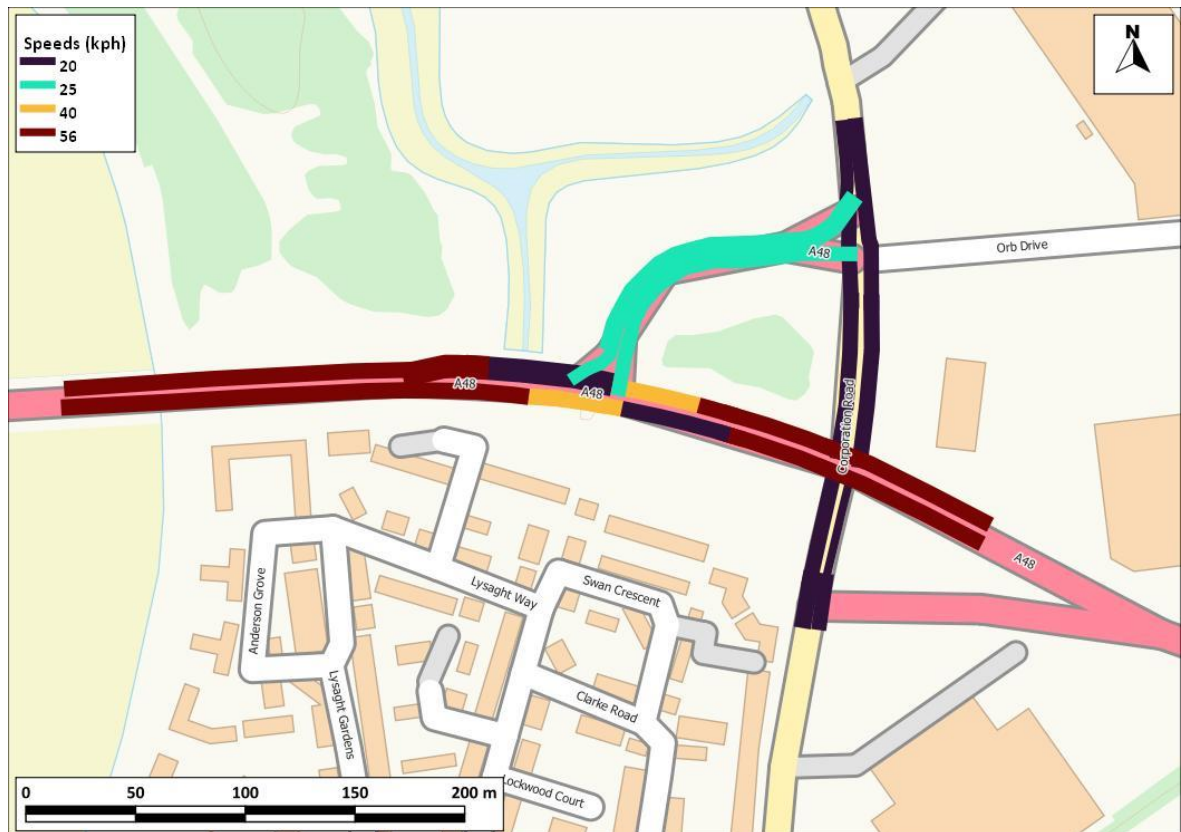


Figure A3-1: Road Network including Modelled Speed

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- A1.18 Hourly sequential meteorological data in sectors of 10 degrees from Cardiff for 2022 have been used in the model. The Cardiff meteorological monitoring station is located at Cardiff Airport, approximately 30 km southwest of the proposed development. It is deemed to be the nearest monitoring station representative of meteorological conditions in the vicinity of the proposed development; both the application site and the Cardiff meteorological monitoring station are located near the south coast of Wales where they will be influenced by the effects of coastal meteorology. A wind rose for the site for the year 2022 is provided in Figure A3-1. The station is operated by the UK Met Office. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

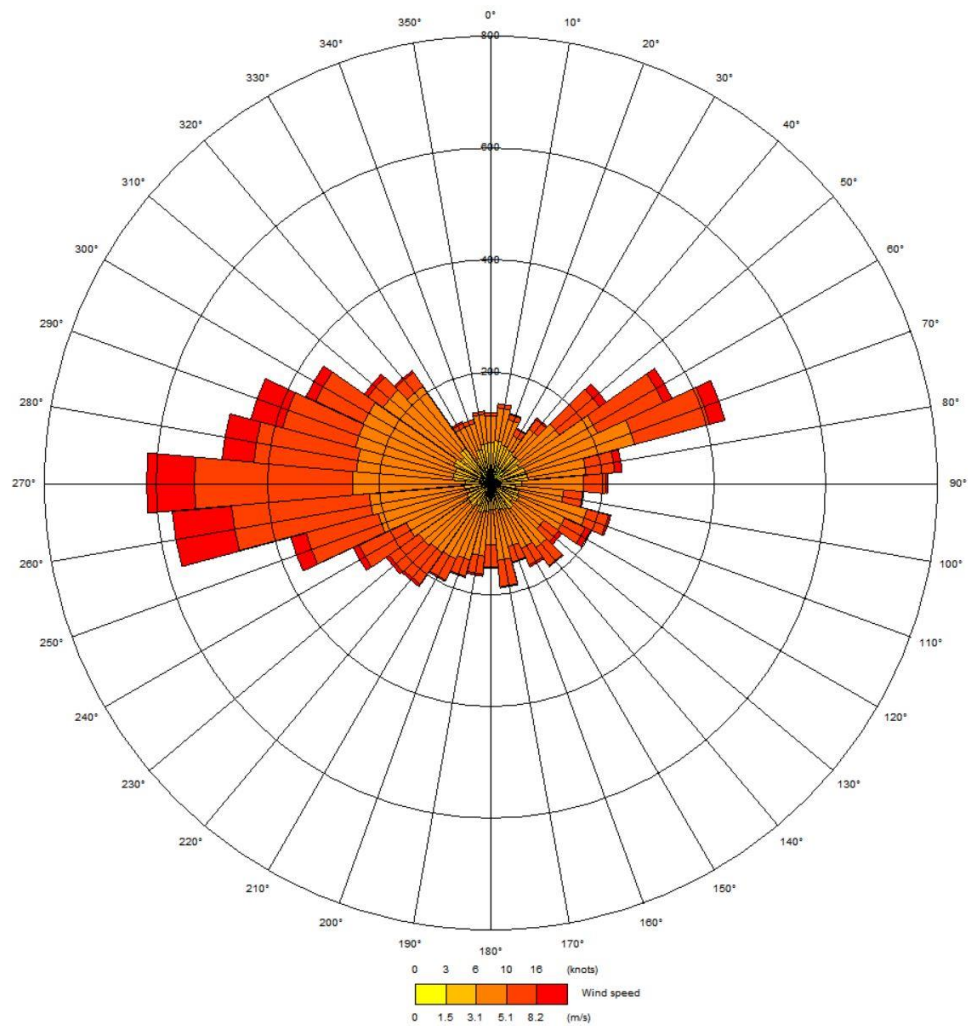


Figure A3-1: Wind Rose

Model Verification

- A1.19 Evidence collected over many years has shown that, in most urban areas, dispersion modelling relying upon Defra's EFT has tended to under-predict roadside nitrogen dioxide concentrations. To account for this, it is often necessary to adjust the model against local measurements. However, the transect of receptors considered within this assessment is adjacent to a busy section of an a-road (dual-carriageway) in an open setting where the model is likely to over-predict nitrogen dioxide concentrations. The nearest nitrogen dioxide roadside or façade monitoring sites on Corporation Road where traffic has been assumed to be less free-flowing than the A48 and buildings are located in close proximity along Corporation Road and thus the model is likely to under-predict at these locations. As such using the monitoring data from the Corporation Road sites is not considered appropriate as it would likely lead to a large over-prediction of results. Therefore the modelled road-NO_x concentrations were not adjusted in order to ensure as evidence suggests that the model performs well in open locations adjacent to roads with free flowing traffic.

Ammonia

- A1.20 There are no local roadside ammonia monitoring sites which can be used to verify the model results for traffic-related ammonia emissions. Development of the CREAM emissions model (AQC, 2020) included verification of concentrations predicted using the ADMS-Roads dispersion model and

measured traffic data against ambient measurements from the most detailed network of roadside monitoring sites which has ever been run in the UK. No further adjustment to the model predictions is considered appropriate.

Post-processing

- A1.21 The model predicts road-NO_x concentrations at each receptor location, which, along with the background NO₂, has been processed through the NO_x to NO₂ calculator available on the Defra LAQM Support website (Defra, 2023). The traffic mix within the calculator has been set to "All other urban UK traffic", which is considered suitable for the study area. The calculator predicts the component of NO₂ based on the adjusted road-NO_x and the background NO₂.

Deposition Rates

- A1.22 Deposition has not been included within the dispersion model because the principal depositing component of concern is nitrogen dioxide and this is calculated from nitrogen oxides outside of the model. Instead, deposition has been calculated from the predicted ambient concentrations using the deposition velocities set out in Table A3-3. Deposition velocities refer to a height above ground, typically 1 or 2 m, although in practice the precise height makes little difference and here they have been applied to concentrations predicted at a height of 1.5 m above ground. The velocities are applied simply by multiplying a concentration (µg/m³) by the velocity (m/s) to predict a deposition flux (µg/m²/s) and then scaling by time and area to represent kg/ha/yr of the nitrogen component of the molecule.

Table A3-3: Deposition Velocities Used in This Assessment

Pollutant	Deposition Velocity (m/s)	Reference
Nitrogen Dioxide	0.0015 m/s (Grassland)	AQTAG06 (AQTAG, 2011)
Ammonia	0.02 m/s (Grassland)	AQTAG06 (AQTAG, 2011)

- A1.23 Wet deposition of the emitted pollutants close to the emission source will be restricted to wash-out, or below cloud scavenging. For this to occur, rain droplets must come into contact with the gas molecules before they hit the ground. Falling raindrops displace the air around them, effectively pushing gasses away. AQTAG06 guidance (AQTAG, 2011) is that the wet deposition of dioxide and ammonia is not significant within a short range. It has thus not been included.
- A1.24 Deposition may have an acidifying effect through the release of acid protons during chemical transformation in the soil or biota. Thus, even alkaline gases such as ammonia can have an acidifying effect. The acidity CLoS are expressed as equivalents ('eq'), referring to the molar equivalent of potential acidity. This is calculated from the mass (in g) of the deposited element, taking account of both its atomic mass and its valency. For example, the acidifying potential (in eq) of both ammonium (NH₄⁺) and nitrate (NO₃⁻) is 1/14 times the deposited mass in grammes (with 14 being the atomic mass of nitrogen). The species included in the calculation of acid deposition, and their calculated acidifying potentials, are set out in Table A3-4.

Table A3-4: Species Included in Acid Deposition Calculations

Pollutant	Calculation (kg deposition to keq)
N (from deposited NO ₂ , Ammonia)	0.071

