Leek Neighbourhood Plan

Habitats Regulations Assessment
Test of Likely Significant Effects

March 2024

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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1. Introduction

Background to the Project

1.1 AECOM Ltd. was appointed to undertake the test of likely significant effects component of a Habitats Regulations Assessment (HRA) for the Leek Neighbourhood Plan (NP). This is to inform the Leek Neighbourhood Plan Steering Group and the Leek Town Council of the potential effects of the NP development on Habitats Sites. Leek Town Council will then be able to utilise this report to inform their formal Habitats Regulations Assessment decision making regarding the Neighbourhood Plan.

1.2 Leek Town Council is located within Staffordshire Moorlands District Council, and as such this HRA will be undertaken with the assumption that any policy provided by the Leek NP will be in accordance with policies set out in any Staffordshire Moorland District Council's adopted development plan documents.

Legislative Framework

1.3 The UK left the European Union (EU) on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 ("the Withdrawal Act"). While the UK is no longer a member of the EU, a requirement for Habitats Regulations Assessment continues as set out in the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[1].

1.4 The HRA process applies the 'Precautionary Principle'[2] to Habitats Sites. Plans and projects can only be permitted having ascertained that there will be no adverse effect on the integrity of the habitat site(s) in question. To ascertain whether or not site integrity will be affected, an Appropriate Assessment should be undertaken of the Plan or project in question. Figure 1 below sets out the legislative basis for an Appropriate Assessment.

1.5 Plans and projects that are associated with potential adverse impacts on habitat sites may still be permitted if there are no reasonable alternatives and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead. In such cases, compensation would be necessary to ensure the overall integrity of the site network.

Conservation of Habitats and Species Regulations 2017 (as amended)

The Regulations state that:

"A competent authority, before deciding to … 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) … must make an appropriate assessment of the implications for that site in view of that site's conservation objectives … The authority shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site ".

Figure 1: The legislative basis for Appropriate Assessment

1.6 Over time the phrase 'Habitats Regulations Assessment' (HRA) has come into wide currency to describe the overall process set out in the Regulations from screening through to IROPI. This has arisen in order to distinguish the process from the individual stage described in the law as an 'Appropriate Assessment'.

1.7 In spring 2018 the 'Sweetman' European Court of Justice ruling[3] clarified that 'mitigation' (i.e. measures that are specifically introduced to avoid or reduce a harmful effect on a Habitat site that would otherwise arise) should **not** be taken into account when forming a view on Likely Significant Effects. Mitigation should instead

[1] These don't replace the 2017 Regulations but are just another set of amendments.
[2] The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as: *"When human activities may lead to morally unacceptable harm* [to the environment] *that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis"*.
[3] People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

only be considered at the Appropriate Assessment stage. As this report consists of a test of likely significant effect, mitigation measures are therefore not taken into consideration at this stage.

2. Methodology

Introduction

2.1 This HRA has been carried out with reference to the general EC guidance on HRA (European Commission, 2001), general guidance on HRA published by the UK government in 2021 (Department for Environment, Food & Rural Affairs, 2021).

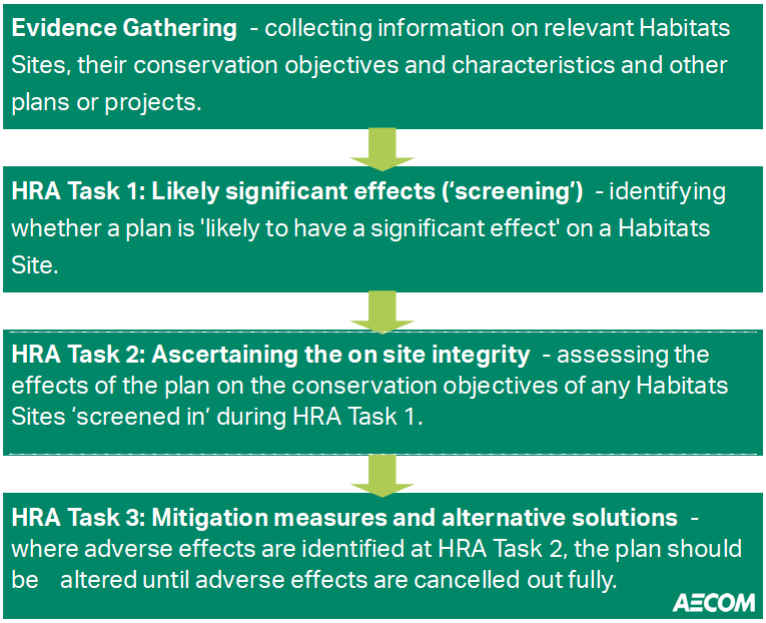


Plate 1. Four Stage Approach to Habitats Regulations Assessment (Department for Environment, Food & Rural Affairs, 2021)

2.2 Plate 1 above outlines the stages of HRA according to current Department for Levelling Up, Housing & Communities (DLUHC) guidance. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations, and any relevant changes to the Plan until no significant adverse effects remain.

HRA Task 1 – Likely Significant Effects (LSE)

2.3 Following evidence gathering, the first stage of any Habitats Regulations Assessment is a Likely Significant Effect (LSE) test - essentially a risk assessment to decide whether the full subsequent stage known as Appropriate Assessment is required. The essential question is:

"*Is the project, either alone or in combination with other relevant projects and plans, likely to result in a significant effect upon habitat sites?*"

2.4 The objective is to 'screen out' those plans and projects that can, without any detailed appraisal, be said to be unlikely to result in significant adverse effects upon Habitat sites, usually because there is no mechanism for an adverse interaction with Habitat sites. This stage is undertaken in Chapter 4 of this report.

Scope of the Project

2.5 There is no pre-defined guidance that dictates the physical scope of an HRA of a Neighbourhood Plan document. Therefore, in considering the physical scope of the assessment, we were guided primarily by the identified impact pathways (called the source-pathway-receptor model).

2.6 Briefly defined, impact pathways are routes by which the implementation of a policy within a Neighbourhood Plan document can lead to an effect upon a European designated site. An example of this would be new residential development resulting in an increased population and thus increased recreational pressure, which could then affect Habitat sites by, for example, disturbance of non-breeding or breeding birds. Guidance from the Ministry of Housing, Communities and Local Government (MHCLG, now DLUHC) states that the HRA should be '*proportionate to the geographical scope of the* [plan policy]' and that '*an AA need not be done in any more detail, or using more resources, than is useful for its purpose*' (MHCLG, 2006, p.6).

2.7 This basic principle has also been reflected in court rulings. The Court of Appeal[4] has ruled that providing the Council (competent authority) was duly satisfied that proposed mitigation could be 'achieved in practice' to satisfy that the proposed development would have no adverse effect, then this would suffice. This ruling has since been applied to a planning permission (rather than a Core Strategy document)[5]. In this case the High Court ruled that for '*a multistage process, so long as there is sufficient information at any particular stage to enable the authority to be satisfied that the proposed mitigation can be achieved in practice it is not necessary for all matters concerning mitigation to be fully resolved before a decision maker is able to conclude that a development will satisfy the requirements of Reg 61 of the Habitats Regulations'*.

3. Summary of Scoping Report

Introduction

3.1 There is no guidance that dictates the general physical scope of an HRA of a Plan document. Therefore, in considering the physical scope of the assessment, we were guided primarily by the identified impact pathways (called the source-pathway-receptor model).

3.2 Briefly defined, impact pathways are routes by which the implementation of a project can lead to an effect upon a European designated site. An example of this would be increased recreational pressure stemming from increased residential development (housing delivery) allocated by a Plan. For some impact pathways (notably air pollution) there is guidance that sets out distance-based zones required for assessment. For others, a professional judgment must be made based on the best available evidence.

Habitat Sites Relevant to the Neighbourhood Plan

3.3 Due to the distances involved and the impact pathways involved, the following Habitats Sites have been considered within this HRA:

- South Pennine Moors SAC, 2.8km northeast;
- Peak District Moors (South Pennine Moors Phase 1) SPA, 2.8km northeast;
- Peak District Dales SAC, 8.3km east;

3.4 The above Habitat Sites need to be considered in more detail. The following section provides an introduction, the qualifying features, the conservation objectives and the threats / pressures to each of these Habitats Sites.

[4]No Adastral New Town Ltd (NANT) v Suffolk Coastal District Council Court of Appeal, 17th February 2015
[5]High Court case of R (Devon Wildlife Trust) v Teignbridge District Council, 28 July 2015

South Pennine Moors SAC

Introduction[6]

3.5 South Pennine Moors SAC covers an area of approximately 65,000ha. The site is representative of upland dry heath which covers extensive areas, occupies the lower slopes of the moors on mineral soils or where peat is thin, and occurs in transitions to acid grassland, wet heath and blanket bogs. The site also supports extensive areas of acid grassland largely derived from dry and wet heath. In the cloughs, or valleys, which extend into the heather moorlands, a greater mix of dwarf shrubs can be found together with more lichens and mosses. The moors support a rich invertebrate fauna, especially moths, and important bird assemblages. This site also contains areas of blanket bog, although the bog vegetation communities are botanically poor. Around the fringes of the upland heath and areas of bog are sessile oak woods. Small areas of alder woodland along stream-sides add to the overall richness of the woods. The moorland also supports a range of flush and fen habitats associated with bogs, cloughs, rivers and streams. Although generally small scale features they have a specialised flora and fauna, which makes a great contribution to the overall biodiversity of the moors.

Qualifying Features

3.6 Annex I habitats present as a qualifying feature:

- Northern Atlantic wet heaths with *Erica tetralix*; Wet heathland with cross-leaved heath
- European dry heaths
- Blanket bogs
- Transition mires and quaking bogs; Very wet mires often identified by an unstable ‘quaking’ surface
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

Conservation Objectives[7]

3.7 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the ‘Qualifying Features’ listed below), and subject to natural change;

3.8 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species
- The structure and function (including typical species) of qualifying natural habitats
- The structure and function of the habitats of qualifying species
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

Threats / Pressures to Site Integrity[8]

3.9 The Natural England Site Improvement Plan for South Pennine Moors identified the following threats and pressures:

- Hydrological Changes
- Managed rotational burning

[6] South Pennine Moors SAC Citation: https://publications.naturalengland.org.uk/file/4643219392430080
[7] South Pennine Moors SAC Conservation objectives: https://publications.naturalengland.org.uk/file/4877034534993920
[8] South Pennine Moors SAC Site Improvement Plan: https://publications.naturalengland.org.uk/file/6518808585961472

- Low breeding success/recruitment
- Inappropriate management practices
- Public Access/disturbance
- Air pollution
- Wildfire/arson
- Vehicles
- Overgrazing
- Forestry and Woodland management
- Changes in Species Distribution
- Disease
- Undergrazing
- Invasive Species
- Planning permission

Peak District Moors (South Pennine Moors Phase 1) SPA

Introduction[9]

3.10 Peak District Moors (South Pennine Moors Phase 1) SPA consists of an extensive tract of moorland and moorland-fringe habitat. It includes most of the unenclosed moorland areas of the north, eastern and south-western Peak District. It also includes areas of wet rushy pasture, hay meadows and small wetlands. The moorland habitats include blanket bog and dry heath, which together with wet heath, acid grassland, small flushes, gritstone edges and boulder slopes, streams and moorland reservoirs, fringing semi-natural woodland and enclosed farmland, represents the full range of upland vegetation characteristic of the South Pennines. The site supports several important species assemblages, including plants, insects and breeding birds. Many physical features are of geological interest.

Qualifying Features

3.11 The site qualifies under article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain population of a species listed in Annex I, in any season:

- Merlin Falco columbarius
- Golden Plover Pluvialis apricaria
- Short-eared Owl *Asio flammeus*

Conservation Objectives[10]

3.12 With regard to the SPA and the individual species and/or assemblage of species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

3.13 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features

[9] Peak District Moors (South Pennine Moors Phase 1) SPA Citation: https://publications.naturalengland.org.uk/file/5444624587948032
[10] Peak District Moors (South Pennine Moors Phase 1) SPA Conservation Objectives: https://publications.naturalengland.org.uk/file/4730802567118848

- The supporting processes on which the habitats of the qualifying features rely
- The populations of qualifying features, and,
- The distribution of qualifying features within the site.

Threats / Pressures to Site Integrity[11]

3.14 The Natural England Site Improvement Plan for Peak District Moors (South Pennine Moors Phase 1) SPA identified the following threats and pressures:

- Hydrological Changes
- Managed rotational burning
- Low breeding success/recruitment
- Inappropriate management practices
- Public Access/disturbance
- Air pollution
- Wildfire/arson
- Vehicles
- Overgrazing
- Forestry and Woodland management
- Changes in Species Distribution
- Disease
- Undergrazing
- Invasive Species
- Planning permission

Peak District Dales SAC

Introduction[12]

3.15 Peak District Dales SAC covers an area of approximately 2300ha. The Peak District Dales consists of valleys, the 'dales', which contain a wide range of wildlife habitats, particularly woodland, scrub and grassland. This mosaic of habitats and the transitions between them are of exceptional interest for a wide range of characteristic, rare and uncommon flora and fauna. Grasslands at this site range from hard-grazed short turf through to tall herb-rich vegetation, with transitions through to calcareous scrub and ash Fraxinus excelsior-dominated woodland. Taken together the ash woods of the ravines and slopes of the Dales comprise one of the largest areas of this habitat in Great Britain. There is also a great physical diversity due to rock outcrops, cliffs, screes and a variety of slope gradients and aspects. The Dales provide good examples of woodland-scrub-grassland transitions, with associated rich invertebrate populations and plant communities. Many dales are dry but some have streams in winter only and some, permanent or semi-permanent rivers. A number of the dales also support fen vegetation associated with springs and flushes.

Qualifying Features

3.16 Annex I habitats present as a qualifying feature:

- Alkaline fens. (Calcium-rich springwater-fed fens)
- Calaminarian grasslands of the *Violetalia calaminariae* (Grasslands on soils rich in heavy metals)

[11] South Pennine Moors SAC Site Improvement Plan (Covers Peak District Moors (South Pennine Moors Phase 1) SPA) https://publications.naturalengland.org.uk/file/6518808585961472

[12] Peak District Dales SAC Citation: https://publications.naturalengland.org.uk/file/6716670957584384

- Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*). (Base-rich scree)
- Calcareous rocky slopes with chasmophytic vegetation. (Plants in crevices in base-rich rocks)
- European dry heaths
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*). (Dry grasslands and scrublands on chalk or limestone)
- *Tilio-Acerion* forests of slopes, screes and ravines. (Mixed woodland on base-rich soils associated with rocky slopes)

3.17 Annex II species present as a qualifying feature:

- Brook Lamprey *Lampetra planeri*
- Bullhead *Cottus gobio*
- White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*

Conservation Objectives[13]

3.18 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

3.19 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species
- The structure and function (including typical species) of qualifying natural habitats
- The structure and function of the habitats of qualifying species
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

Threats / Pressures to Site Integrity[14]

3.20 The Natural England Site Improvement Plan for South Pennine Moors identified the following threats and pressures:

- Inappropriate Scrub Control
- Fertiliser use
- Water Pollution
- Inappropriate Weirs, dams and other structures
- Overgrazing
- Undergrazing
- Inappropriate water levels
- Disease
- Invasive Species
- Climate change
- Air pollution: impact of atmospheric nitrogen deposition

[13] Peak District Dales SAC Conservation Objectives: https://publications.naturalengland.org.uk/file/6491879046905856
[14] Peak District Dales SAC Site Improvement Plan: https://publications.naturalengland.org.uk/file/6580695786848256

- Vehicles
- Forestry and Woodland management
- Direct impact from 3rd party
- Public Access/Disturbance

Relevant Impact Pathways

3.21 Based on the treats and pressures identified for these sites the following impact pathways have been considered in this report:

- Physical damage, fragmentation or loss of habitat,
- Hydrological impacts
- Non-physical disturbance: noise, vibration and light pollution
- Air pollution
- Recreation / Urban edge

4. Background to Impact Pathways

4.1 In carrying out an HRA it is important to avoid confining oneself to effectively arbitrary boundaries (such as Local Authority or parish boundaries), but to use an understanding of the various ways in which Land Use Plans can impact habitat sites to evaluate whether development is connected with habitat sites, in some cases many kilometres distant. Briefly defined, impact pathways are routes by which a change in activity associated with a development can lead to an effect upon a habitat site. As highlighted earlier, it is also important to bear in mind MHCLG (now DLUHC) guidance which states that the AA should be '*proportionate to the geographical scope of the [plan policy]*' and that '*an AA need not be done in any more detail, or using more resources, than is useful for its purpose*' (CLG, 2006, p.6[15], now DLUHC).

4.2 It is noted that this HRA is not undertaken in isolation. As previously noted, Leek Town Council is located within Staffordshire Moorlands District Council, and as such this HRA will be undertaken with the assumption that any policy provided by the Leek NP will be in accordance with policies set out in any Staffordshire Moorland District Council's adopted development plan documents.

4.3 Based upon Natural England's Site Improvement Plans (SIPs) and professional judgement, the following impact pathways require consideration regarding development proposals within the NP area and the identified habitat sites:

Table 1. Table Showing Sensitivity of Habitat Site to Impact Pathways

Habitat Site	South Pennine Moors SAC	Peak District Moors (South Pennine Moors Phase 1) SPA	Peak District Dales SAC
Recreational Pressure	Sensitive	Sensitive	Sensitive
Air Pollution	Sensitive	Sensitive	Sensitive
Water Quantity Level and Flow	Sensitive	Sensitive	Sensitive
Water Quality	No known sensitivity	No known sensitivity	Sensitive

[15] Department for Communities and Local Government. 2006. *Planning for the Protection of European Sites: Appropriate Assessment*. http://www.communities.gov.uk/index.asp?id=1502244

Background to Recreational Pressure

4.4 There is concern over the cumulative impacts of recreation on key nature conservation sites in the UK, as sites must fulfil Conservation Objectives while also providing recreational opportunity. Various research reports have provided compelling links between changes in housing and access levels **Invalid source specified.**, and impacts on Habitats Sites **Invalid source specified.**. This applies to any habitat, but recreational pressure from housing growth is of particular significance for habitat sites designated for their bird interest. Different habitat sites are subject to different types of recreational pressures and have different vulnerabilities. Studies across a range of species have shown that the effects from recreation can be complex. HRAs of planning documents tend to focus on recreational sources of disturbance as a result of new residents[16].

4.5 Recreational use of an Habitats Site has potential to:

- Cause damage through mechanical/ abrasive damage and nutrient enrichment;
- Cause disturbance to sensitive species, particularly ground-nesting birds and wintering wildfowl; and
- Prevent appropriate management or exacerbate existing management difficulties.

Trampling Damage and Nutrient Enrichment

4.6 Most terrestrial habitats (especially heathland, woodland and dune systems) can be affected by trampling and other mechanical damage, which dislodges individual plants, leads to soil compaction and erosion. The following studies have assessed the impact of trampling associated with different recreational activities in different habitats:

4.7 Wilson & Seney[17] examined the degree of track erosion caused by hikers, motorcyclists, horse riders and cyclists in 108 plots along tracks in the Gallatin National Forest, Montana. Although the results proved difficult to interpret, it was concluded that horses and hikers disturbed more sediment on wet tracks, and therefore caused more erosion, than motorcycles and bicycles.

4.8 Cole[18] conducted experimental off-track trampling in 18 closed forest, dwarf scrub and meadow & grassland communities (each trampled between 0 – 500 times) over five mountain regions in the US. Vegetation cover was assessed two weeks and one year after trampling, and an inverse relationship with trampling intensity was discovered, although this relationship was weaker after one year than two weeks indicating some recovery of the vegetation. Differences in plant morphology was found to explain more variation in response than soil and topographic factors. Low-growing, mat-forming grasses regained their cover best after two weeks and were considered most resistant to trampling, while tall forbs (non-woody vascular plants other than grasses, sedges, rushes and ferns) were considered least resistant. The cover of hemicryptophytes and geophytes (plants with buds below the soil surface) was heavily reduced after two weeks but had recovered well after one year and as such these were considered most resilient to trampling. Chamaephytes (plants with buds above the soil surface) were least resilient to trampling. It was concluded that these would be the least tolerant of a regular cycle of disturbance.

4.9 Cole[19] conducted a follow-up study (across four vegetation types) in which shoe type (trainers or walking boots) and trampling weight were varied. Although immediate damage was greater with walking boots, there was no significant difference after one year. Heavier tramplers caused a greater reduction in vegetation height than lighter tramplers, but there was no differential impact on vegetation cover.

4.10 Cole & Spildie[20] experimentally compared the effects of off-track trampling by hikers and horse riders (at two intensities – 25 and 150 passes) in two woodland vegetation types (one with an erect forb understorey and one with a low shrub understorey). Horse trampling was found to cause the largest reduction in

[16] The RTPI report 'Planning for an Ageing Population' (2004) which states that 'From being a marginalised group in society, the elderly are now a force to be reckoned with and increasingly seen as a market to be wooed by the leisure and tourist industries. There are more of them and generally they have more time and more money.' It also states that 'Participation in most physical activities shows a significant decline after the age of 50. The exceptions to this are walking, golf, bowls and sailing, where participation rates hold up well into the 70s'.
[17] Wilson & Seney, 1994
[18] Cole, Experimental trampling of vegetation. I. Relationship between trampling intensity and vegetation response, 1995; Cole, Experimental Trampling of Vegetation. II. Predictors of Resistance and Resilience, 1995
[19] Cole, Recreational Trampling Experiments: Effects of Trampler Weight and Shoe Type. Research Note: INT-RN-425, 1995
[20] Cole & Spildie, Hiker, horse and llama trampling effects on native vegetation in Montana, USA, 1998

vegetation cover. The forb-dominated vegetation suffered greatest disturbance but recovered rapidly. Generally, it was shown that higher trampling intensities caused more disturbance.

4.11 In heathland sites, trampling damage can affect the value of a site to wildlife. For example, heavy use of sandy tracks loosens and continuously disturbs sand particles, reducing the habitat's suitability for invertebrates[21]. Species that burrow into flat surfaces such as the centres of paths, are likely to be particularly vulnerable, as the loose sediment can no longer maintain their burrow. In some instances, nature conservation bodies and local authorities resort to hardening paths to prevent further erosion. However, this is concomitant with the loss of habitat used by wildlife, such as sand lizards and burrowing invertebrates.

4.12 A major concern for nutrient-poor terrestrial habitats (e.g. heathlands, sand dunes, bogs and fens) is nutrient enrichment associated with dog fouling (addressed in various reviews[22]). It is estimated that dogs will defecate within 10 minutes of starting a walk and therefore most nutrient enrichment arising from dog faeces will occur within 400m of a site entrance. In contrast, dogs will urinate at frequent intervals during a walk, resulting in a more spread out distribution of urine. For example, in Burnham Beeches National Nature Reserve it is estimated that 30,000 litres of urine and 60 tonnes of dog faeces are deposited annually[23]. While there is limited information on the chemical constituents of dog faeces, nitrogen is one of the main components[24]. Nutrient availability is the major determinant of plant community composition and the effect of dog defecation in sensitive habitats is comparable to a high-level application of fertiliser, potentially resulting in a shift towards plant communities that are more typical of improved grasslands.

Background to Air Quality

Table 2. Main sources and effects of air pollutants on habitats and species[25]

Pollutant	Source	Effects on habitats and species
Sulphur Dioxide (SO_2)	The main sources of SO_2 are electricity generation, and industrial and domestic fuel combustion. However, total SO_2 emissions in the UK have decreased substantially since the 1980's. Another origin of sulphur dioxide is the shipping industry and high atmospheric concentrations of SO_2 have been documented in busy ports. In future years shipping is likely to become one of the most important contributors to SO_2 emissions in the UK.	Wet and dry deposition of SO_2 acidifies soils and freshwater and may alter the composition of plant and animal communities. The magnitude of effects depends on levels of deposition, the buffering capacity of soils and the sensitivity of impacted species. However, SO_2 background levels have fallen considerably since the 1970's and are now not regarded a threat to plant communities. For example, decreases in Sulphur dioxide concentrations have been linked to returning lichen species and improved tree health in London.
Acid deposition	Leads to acidification of soils and freshwater via atmospheric deposition of SO_2, NOx, ammonia and hydrochloric acid. Acid deposition from rain has declined by 85% in the last 20 years, which most of this contributed by lower sulphate levels.	Gaseous precursors (e.g. SO_2) can cause direct damage to sensitive vegetation, such as lichen, upon deposition. Can affect habitats and species through both wet (acid rain) and dry deposition. The effects of acidification include lowering of soil pH, leaf chlorosis, reduced decomposition rates, and compromised reproduction in birds / plants. Not all sites are equally susceptible to acidification. This varies depending on soil type, bed rock geology, weathering rate and buffering capacity. For example,

[21] Taylor , Anderson , Liley, & Underhill-Day, 2006
[22] E.g. Taylor, Anderon, Taylor, Longden, & Fisher, 2005
[23] Barnard, 2003
[24] Taylor , Anderson , Liley, & Underhill-Day, 2006
[25] Information summarised from the Air Pollution Information System (http://www.apis.ac.uk/)

Pollutant	Source	Effects on habitats and species
		sites with an underlying geology of granite, gneiss and quartz rich rocks tend to be more susceptible.
Ammonia (NH_3)	Ammonia is a reactive, soluble alkaline gas that is released following decomposition and volatilization of animal wastes. It is a naturally occurring trace gas, but ammonia concentrations are particularly related to the distribution of livestock. Ammonia reacts with acid pollutants such as the products of SO_2 and NO_X emissions to produce fine ammonium (NH_4+) – containing aerosol. Due to its significantly longer lifetime, NH_4+ may be transferred much longer distances (and can therefore be a significant trans-boundary issue). While ammonia deposition may be estimated from its atmospheric concentration, the deposition rates are strongly influenced by meteorology and ecosystem type.	The negative effect of NH_4+ may occur via direct toxicity when uptake exceeds detoxification capacity and via N accumulation. It also has an adverse effect through eutrophication, leading to species assemblages that are dominated by fast-growing and tall species. For example, a shift in dominance from heath species (lichens, mosses) to grasses is often seen. As emissions mostly occur at ground level in the rural environment and NH_3 is rapidly deposited, some of the most acute problems of NH_3 deposition are for small relict nature reserves located in intensive agricultural landscapes.
Nitrogen oxides (NO_x)	Nitrogen oxides are mostly produced in combustion processes. Half of NO_X emissions in the UK derive from motor vehicles, one quarter from power stations and the rest from other industrial and domestic combustion processes. In contrast to the steep decline in Sulphur dioxide emissions, nitrogen oxides are falling slowly due to control strategies being offset by increasing numbers of vehicles.	Direct toxicity effects of gaseous nitrates are likely to be important in areas close to the source (e.g. roadside verges). A critical level of NO_x for all vegetation types has been set to 30 ug/m3. Deposition of nitrogen compounds (nitrates (NO_3), nitrogen dioxide (NO_2) and nitric acid (HNO_3)) contributes to the total nitrogen deposition and may lead to both soil and freshwater acidification. In addition, NO_x contributes to the eutrophication of soils and water, altering the species composition of plant communities at the expense of sensitive species.
Nitrogen deposition	The pollutants that contribute to the total nitrogen deposition derive mainly from oxidized (e.g. NO_X) or reduced (e.g. NH_3) nitrogen emissions (described separately above). While oxidized nitrogen mainly originates from major conurbations or highways, reduced nitrogen mostly derives from farming practices. The N pollutants together are a large contributor to acidification (see above).	All plants require nitrogen compounds to grow, but too much overall N is regarded as the major driver of biodiversity change globally. Species-rich plant communities with high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication. This is because many semi-natural plants cannot assimilate the surplus N as well as many graminoid (grass) species. N deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.
Ozone (O_3)	A secondary pollutant generated by photochemical reactions involving NO_X, volatile organic compounds (VOCs) and sunlight. These precursors are mainly released by the combustion of fossil fuels (as discussed above). Increasing anthropogenic emissions of ozone precursors in the UK have led to an increased number of days when ozone levels rise above 40ppb ('episodes' or 'smog'). Reducing ozone pollution is believed to	Concentrations of O_3 above 40 ppb can be toxic to both humans and wildlife, and can affect buildings. High O_3 concentrations are widely documented to cause damage to vegetation, including visible leaf damage, reduction in floral biomass, reduction in crop yield (e.g. cereal grains, tomato, potato), reduction in the number of flowers, decrease in forest production

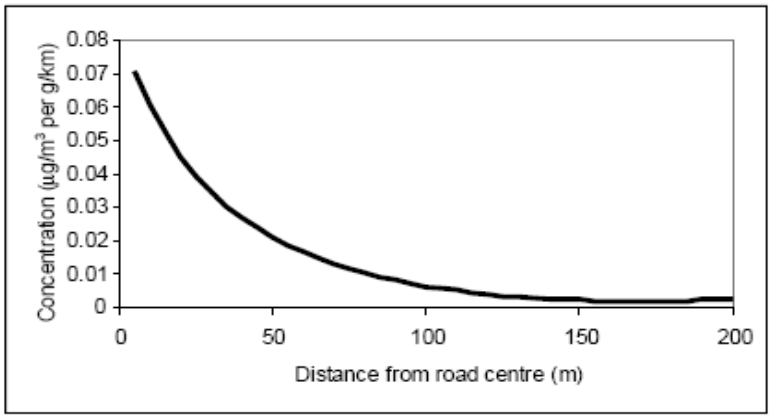
Pollutant	Source	Effects on habitats and species
	require action at international level to reduce levels of the precursors that form ozone.	and altered species composition in semi-natural plant communities.

4.13 The main pollutants of concern for international sites are oxides of nitrogen (NO_X), ammonia (NH_3) and sulphur dioxide (SO_2) and are summarised in Table 1. Ammonia can have a directly toxic effect upon vegetation, particularly at close distances to the source such as near road verges**Invalid source specified.**. NO_X can also be toxic at high concentrations (far above the annual average critical level). High levels of NO_X and NH_3 are likely to increase the total N deposition to soils, potentially leading to deleterious knock-on effects in resident ecosystems. Increases in nitrogen deposition from the atmosphere can, if sufficiently great, enhance soil fertility and to lead to eutrophication. This often has adverse effects on the community composition and quality of semi-natural, nitrogen-limited terrestrial and aquatic habitats[26].

4.14 Sulphur dioxide emissions overwhelmingly derive from power stations and industrial processes that require the combustion of coal and oil, as well as (particularly on a local scale) shipping[27]. Ammonia emissions originate from agricultural practices[28], with some chemical processes also making notable contributions. As such, it is unlikely that material increases in SO_2 or NH_3 emissions will be associated with the available Local Plan Documents. NOx emissions, however, are dominated by the output of vehicle exhausts (more than half of all emissions). A 'typical' housing development will contribute by far the largest portion to its overall NOx footprint (92%) through the associated road traffic. Other sources, although relevant, are of minor importance (8%) in comparison[29]. Emissions of NOx could therefore be reasonably expected to increase because of a higher number of vehicles due to implementation of the new development.

4.15 According to the World Health Organisation, the critical NOx concentration (critical threshold) for the protection of vegetation is 30 μgm^{-3}; the threshold for sulphur dioxide is 20 μgm^{-3}. In addition, ecological studies have determined 'critical loads'[30] of atmospheric nitrogen deposition (that is, NOx combined with ammonia NH_3).

4.16 According to the Department of Transport's Transport Analysis Guidance, beyond 200m (see Figure 2), the contribution of vehicle emissions from the roadside to local pollution levels is not significant[31]. This is therefore the distance that has been used throughout this HRA in order to determine whether international sites are likely to be significantly affected by the Proposed Development.



[26] Wolseley, James, Theobald, & Sutton, 2006; Sheppard, et al., 2011
[27] Air Pollution Information System, 2022
[28] Pain, Weerden, Chambers, Phillips, & Jarvis, 1998
[29] Proportions calculated based upon data presented in Dore CJ et al. 2005. UK Emissions of Air Pollutants 1970 – 2003. UK National Atmospheric Emissions Inventory. http://www.airquality.co.uk/archive/index.php
[30] The critical load is the rate of deposition beyond which research indicates that adverse effects can reasonably be expected to occur
[31] Department for Transport, 2021

Plate 2. Traffic contribution to concentrations of pollutants at different distances from a road (Department for Transport, 2016)

4.17 Exhaust emissions from vehicles can adversely affect certain habitats. Considering this, an increase in net population and employment growth within the neighbourhood plan area could result in increased traffic flowing past the SACs.

Water Quality

4.18 Increased amounts of housing or business development can lead to reduced water quality of rivers and estuarine environments. Sewage and industrial effluent discharges can contribute to increased nutrients on international sites leading to unfavourable conditions. In addition, diffuse pollution, partly from urban run-off has been identified during an Environment Agency Review of Consents process and a joint Environment Agency and Natural England evidence review, as being a major factor in causing unfavourable condition of international sites.

4.19 The quality of the water that feeds international sites is an important determinant of the nature of their habitats and the species they support. Poor water quality can have a range of environmental impacts:

- At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour. Eutrophication, the enrichment of plant nutrients in water, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of eutrophication. In the marine environment, nitrogen is the limiting plant nutrient and so eutrophication is associated with discharges containing available nitrogen;
- Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life; and
- Increased discharge of treated sewage effluent can result both in high levels of macroalgal growth, which can smother the mudflats of value to SPA birds and in greater scour (as a result of greater flow volumes).

4.20 At sewage treatment works, additional residential development increases the risk of effluent escape into aquatic environments in addition to consented discharges to the catchment. Greater pressure on water treatment services due to new development, especially housing, may increase the risk of effluent escape into aquatic environments.

5. Test of Likely Significant Effects

Introduction

5.1 When seeking to identify relevant Habitats Sites, consideration has been given primarily to identified impact pathways and the source-pathway-receptor approach, rather than adopting purely a 'zones'-based approach. The source-pathway-receptor approach is a standard tool in environmental assessment. For an effect to occur, all three elements of this mechanism must be in place, whereas the absence of one or more of the elements means there is no potential for an effect. Furthermore, even where an impact may occur, it may not result in significant effects (i.e., those which undermine the Conservation Objectives of a habitat site).

5.2 The likely zone of impact (also referred to as the likely Zone of Influence, ZoI) of a plan or project is the geographic extent over which significant ecological effects are likely to occur. The ZoI of a plan or project will vary depending on the specifics of a particular proposal and must be determined on a case-by-case basis with reference to a variety of criteria, including:

- the nature, size / scale and location of the plan;
- the connectivity between the plan and habitat sites, for example through hydrological connections or because of the natural movement of qualifying species;
- the sensitivity of ecological features under consideration; and,
- the potential for in-combination effects.

Policy Screening Table

Table 3. Policy And Allocations Screening Table for the Leek Neighbourhood Plan

Policy Name	Policy Description	Screening Outcome
TCE1: Leek Town Centre and Employment	This policy supports development in Leek Town Centre where it compliments or enhances the town centre for use by visitors and the local community. Ground floor frontages should remain open to the public use and shop fronts should be retained. Employment development is supported in Leek Town Centre and where is involves development of brownfield sites, demolition and redevelopment of existing employment sites, or sensitive refurbishment of historic buildings. Class E development outside of the Town Centre may be restricted where it could harm the town centre.	No likely significant effects. This policy is a development management policy. It controls development of employment facilities and development within Leek Town Centre. This policy does not set any quanta or allocation for development. There are no linking impact pathways and this policy can be screened out.
TCE2: Redevelopment Opportunities	This policy sets out certain sites which are suitable for redevelopment and sets out guidelines that these should abide by. Redevelopment of the Smithfield Centre is supported. Guidelines include: • support for an additional 2-3 storeys if the scheme is of high quality; • retention of town centre uses on the ground floor and shared workspace or residential uses in upper floors; • Enhancement of environment and facilities of the bus station. Redevelopment of the Pickwood Road Shopping Centre is supported. Guidelines include: • improvement of the road frontages, including provision of windows to provide active frontages; • Suitable uses are town centre uses, shared workspace or residential development; • Opportunities should be taken to improve pedestrian access	No likely significant effects. This policy is a development management policy, which sets criteria for the design of any redevelopment of The Smithfield Centre and Bus Station, and Pickwood Road Shopping Centre. While it states that residential development is appropriate for these locations 9i.e. it supports the development), it does not set any quantum for housing at these sites. Therefore, there are no linking impact pathways and this policy can be screened out.

Policy Name	Policy Description	Screening Outcome
TEC3: Historic Mill Buildings	Policy supports the sensitive redevelopment and reuse of historic mill buildings for use as: • Residential accommodation • Workspace • Arts and cultural uses • Ancillary car and cycle parking on the lower levels of the building Where there are viability challenges to the conversion of historic mill buildings, the following should be considered: • Flexible application of affordable housing targets • Provision of a green travel plan in addition to on-site parking provision • Provision of green external amenity space where possible within the site	No likely significant effects. This policy is a development management policy. It seeks to ensure that historic mill buildings are developed appropriately. While it states that residential development is appropriate for these locations, it does not set any quantum for housing at these sites. Therefore, there are no linking impact pathways and this policy can be screened out.
TCE4: Connectivity	This policy requires developments that provide new residential units or employment space to have high-speed broadband connectivity within the site to be ready as local services are improved. .	No likely significant effects. This policy requires the provision of highspeed broadband connectivity within residential and employment developments. It does not set any allocations for development. There are no linking impact pathways and this policy can be screened out.
RES1: Residential Development	This policy supports the provision of residential development at: • Allocated housing sites; • Upper floors within Leek Town Centre; • development of brownfield sites; • infill development of street-frontage gaps; • demolition and redevelopment of existing housing; • sensitive refurbishment of historic buildings. The mix of residential accommodation should be based on the latest evidence of local need. Residential accommodation should be flexible to changing needs, including home working. Residential development should include design features to reduce carbon use and support biodiversity. Residential development must be supported by outdoor amenity space All new dwellings must have screened storage for refuse and recycling bins, and for cycles, scooters and personal vehicles.	No likely significant effects. This is a design management policy that sets requirements for the nature of residential development and the provision of outdoor space and storage facilities. This policy supports development of sites allocated in overarching development plan documents. It does not set any quanta or allocations for development within this Neighbourhood Plan. There are no linking impact pathways and this policy can be screened out.
RES2: Affordable Housing	This policy states that affordable housing provision should be provided as part of development and be tenure blind. Where the provision of affordable housing should be delivered offsite due to robust planning reasons, this should be provided as close to the site as possible and within the neighbourhood plan area in order to meet local need. First Homes are supported as part of the provision of affordable housing.	No likely significant effects. This policy supports the incorporation of affordable housing into development plans. It does not set any allocations for development. There are no linking impact pathways and this policy can be screened out.
DCE1: Biodiversity, Landscape and Watercourses	This policy states that development should not have an adverse impact on the natural and rural, taking opportunities to achieve biodiversity net-gain. Development should not adversely impact the character, accessibility and amenity of watercourses. Development should retain trees and hedges and create new green spaces using local native species. Where trees or hedges must be lost, development should include replacement planting of local native species.	No likely significant effects. This is a positive policy which requires development not to negatively impact the environment and requires replanting of any lost trees or hedges. It does not set any allocations for development. There are no linking impact pathways and this policy can be screened out.
DCE2: Sustainable Design	This policy states that development: • should include design features to minimise carbon impacts; • must compliment the local character; • should retain trees and hedges, as well as historic and heritage features.	No likely significant effects. This policy supports sustainability measures incorporated into the design of new developments and ensures the protection of the local character. This

Policy Name	Policy Description	Screening Outcome
	• should provide active frontages with windows into streets and spaces; • must prioritise pedestrian movement, with regards to site layout; • should integrate carparking into the design and layout to avoid car dominated streets and spaces; • must use high quality building materials, durable to weathering Creative and innovative design solutions are supported, especially if they incorporate enhanced environmental performance.	policy does not set any quanta or allocations for development. There are no linking impact pathways and this policy can be screened out.
DCE3: Leek Conservation Area	This policy states that development in and around the Leek Conservation Area should preserve and enhance the character or appearance of Leek as a historic market town. Historic shop fronts and features should be retained and where possible reinstated. New shop fronts should complement the character of the building and provide level access where possible.	No likely significant effects. This is a design management policy that controls the appearance of development within the Leek Conservation Area. It does not make any allocations for development. There are no linking impact pathways and this policy can be screened out.
DCE4: Caldon Canal Conservation Area	This policy states that development in and around the Caldon Canal Conservation Area should preserve or enhance the character or appearance of the Conservation Area, specifically considering its features, including the canal and associated structures, in addition to hedgerows, mature trees and views of surrounding landscapes. Development should not harm and where possible enhance accessibility to and recreational use of the canal.	No likely significant effects. This is a design management policy that controls development within and in proximity to the Caldon Canal Conservation Area. It does not make any allocations for development. There are no linking impact pathways and this policy can be screened out.
TRM1: Sustainable Transport	This policy states that development likely to generate additional journeys include appropriate transport options. Development should also incorporate links to existing footways and cycleways, enhancing them where feasible. Parking provision should incorporate storage for cycles and charging points for electric vehicles.	No likely significant effects. This is a design management policy that controls development within and in proximity to the Caldon Canal Conservation Area. It does not make any allocations for development. There are no linking impact pathways and this policy can be screened out.

6. Conclusion

6.1 The Leek Neighbourhood Plan (LNP) area is located within 10km of the following Internationally designated sites:

- South Pennine Moors SAC;
- Peak District Moors (South Pennine Moors Phase 1) SPA;
- Peak District Dales SAC;

6.2 Based on an analysis of the threats and pressures that are faced by these sites, as specified in their respective site improvement plans, the following potential impacts pathways were considered with respects to the LNP:

- Recreational Pressure,
- Air Pollution,
- Water quantity, level and flow
- Water quality

6.3 The Leek Neighbourhood Plan (LNP) has a total of 11 policies. No Leek Neighbourhood Plan policies allocate any form of development. The Neighbourhood Plan purely provides development management policies. As such, no of the Leek Neighbourhood Plan policies were found to have the potential to cause a likely significant effect in isolation or in combination.

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