

A46 Coventry Junctions (Walsgrave) Scheme number: TR010066

6.3 Environmental Statement Appendices **Appendix 8.15 Assessment of Air Quality Impacts on Ecological Features**

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**ENVIRONMENTAL STATEMENT APPENDICES
Appendix 8.15 Assessment of Air Quality
Impacts on Ecological Features**

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1. Introduction and methodology

1.1. Introduction

- 1.1.1. This document has been produced as an Appendix to the Environmental Statement (ES) (**TR010066/APP/6.1**) for the A46 Coventry Junctions (Walsgrave) Scheme to detail the assessment of air quality impacts relating to nitrogen (N) deposition, ammonia (NH₃) deposition and where relevant nitrogen oxide (NO_x) deposition upon ecological features.

1.2. Assessment methodology

- 1.2.1. This assessment has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) LA 105 Air quality (2019). The assessment determines the air quality impacts, including from N and NH₃ deposition, upon ecological features including designated sites, nature improvement areas, ancient woodland and veteran trees within 200m of the triggered links (any road which meets the traffic scoping criteria as outlined in Section 5.7 of ES Chapter 5 (Air Quality) (**TR010066/APP/6.1**)).
- 1.2.2. The assessment has been summarised in ES Chapter 5 (Air Quality) (**TR010066/APP/6.1**) and reported in full herein.
- 1.2.3. Designated sites include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsars, Sites of Special Scientific Interest (SSSIs), Local Nature Reserves (LNRs) and Local Wildlife Sites (LWSs). In accordance with DMRB LA 105 Air Quality sites designated for riverine (running water) hydrological habitat have been scoped out.
- 1.2.4. This assessment has also been undertaken with reference to the Chartered Institute of Ecology and Environmental Managements (CIEEMs) *Advisory Note: Ecological Assessment of Air Quality Impacts* (2021) and *Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations* (2018), which despite being primarily for assessment upon internationally designated sites still has many points of relevance to this assessment. Annex B sets out how this assessment has been undertaken with reference to the Natural England guidance document.
- 1.2.5. ES Chapter 5 (Air Quality) (**TR010066/APP/6.1**) screens the scoped in ecological features (those within 200m of the triggered links) following modelling of N deposition, NH₃ deposition and NO_x. Air quality modelling includes modelling for a 'do minimum' scenario which shows the future baseline in the absence of the Scheme, and a 'do something' scenario which would show the deposition rates during Scheme operation. In accordance with the Institute of Air

Quality Management's *A guide to the assessment of the air quality impacts on designated nature conservation sites* (2020) and with Natural England's guidance (2018) with regards to N deposition and NO_x, features screened in upon which there could be potential effects are those for which:

- the modelled change in N deposition in the 'do something' scenario (in other words modelled levels in the opening year of the Scheme) exceeds 1% of the lower critical load, and/or
- the modelled NH₃ deposition in the 'do something' scenario exceeds the non-statutory critical level of 1µg/m³ (lichens and bryophytes) or 3µg/m³ (higher plants)
- the modelled change in NO_x deposition in the 'do something' scenario exceeds 1% of the statutory critical level of 30µg/m³ (therefore where changes exceed 0.3µg/m³).

1.2.6. This initial screening threshold of 1% of the lower critical load/critical level has been applied to this assessment throughout this Appendix to the change due to the Scheme only (i.e., the difference between the 'do minimum' and 'do something' scenarios).

1.2.7. Also scoped into the ecological assessment are those ecological features for which modelled background N deposition rates (baseline prior to the Scheme) are already above the lower critical load and the Scheme would result in an adverse impact (an increase in N deposition) thereby worsening any potential effects. However, whilst detailed within this Appendix for each ecological feature, increases in N deposition <1% of the lower critical load due to the Scheme have not been considered in the assessment of significance of effect as they are considered sufficiently minor as to be imperceptible causing a de minimis effect (Natural England, 2018).

1.2.8. As detailed within Table 5-18 of Environmental Statement Chapter 5 (Air Quality) (**APP-027**), the background nitrogen deposition rates are presented based on the three-year grid average data (2017 – 2019) published by APIS. The APIS background deposition rates specific to the most appropriate land use type for each assessed ecological feature has been applied, which is either forest (i.e. woodland) or moorland (i.e. short vegetation) based upon the qualifying interest of the feature and sensitive habitat. For those ecological features which have a mix of both woodland and short vegetation types as qualifying interests, woodland has been used to provide a relative worst-case representation of background rates. Woodland habitats have a higher deposition velocity for nitrogen compared to short vegetation habitats, which results in an elevated deposition flux (i.e. higher deposition rate) for nutrient nitrogen. for nutrient nitrogen.

- 1.2.9. In addition to the conservative approach with regards to background deposition rates where both woodland and short vegetation habitats are of interest within the ecological feature, a further precautionary approach has been adopted for areas with dense vegetation/tree buffers between the emission source (i.e. the road) and the ecological feature (designated site or ancient woodland) boundary, or from the veteran tree. The modelling assumes no depletion of NO₂ and NH₃ emissions by the buffer (i.e. none of the pollutants are removed from the emission plume as it disperses across the vegetation buffer). In reality, deposition of both NO₂ and NH₃ onto these vegetated areas outside of the designated site would occur, thereby reducing the deposition levels within the designated site boundary. Therefore, the results presented are conservative in this regard. Given that much of the A46 triggered links have highway boundary woodland present on the verge, located between the road and the ecological features, the levels of nitrogen deposition on the ecological features adjacent to the A46 will be lower than the levels reported in the assessment.
- 1.2.10. Critical loads are those identified on the Air Pollution Information System (APIS) website (2016). For statutory designated sites, qualifying features and features mentioned on the citation only have been assessed. Where critical loads are not available for qualifying features of statutory designated sites, these qualifying features have been understood not to be sensitive to N deposition or NH₃, unless specifically identified as sensitive. Where critical loads are not available for specific habitat types for assessment of non-statutory designated sites, or where the citation includes insignificant information to confirm specific habitat type to those identified on APIS, the lowest critical load for a specific habitat of the same broad habitat type available has been used. The exception is for specific habitats which would not be considered present in the area based on professional judgement (for example, alpine and subalpine grasslands and mountain hay meadows).
- 1.2.11. One tree (T11) was identified within the arboricultural survey (ES Appendix 7.4 (Arboricultural Impact Assessment) (**TR010066/APP/6.3**)) as 'beginning to veteranise' however has not yet been classified as veteran. In consideration of the future baseline with regards to T11, an assessment regarding air quality impacts on this tree has been undertaken based on modelling of a nearby veteran tree also identified within the arboricultural survey (T12) which is located closer to the Order Limits. The modelling for T12 will be used to assess potential air quality impacts upon T11. Further veteran trees within 200m of the triggered links and subject to assessment were identified on the Woodland Trust's Ancient Tree Inventory (The Woodland Trust, 2024).

1.3. Potential impacts

Construction

- 1.3.1. Air quality impacts in relation to N deposition, NH₃ deposition and NO_x during construction have been scoped out within ES Chapter 5 (Air Quality) (**TR010066/APP/6.1**). Scoping out of air quality impacts during construction has been agreed with the Planning Inspectorate as detailed within ES Appendix 4.1 Scoping Opinion Response.

Operation

NH₃ deposition

- 1.3.2. As detailed within ES Chapter 5 (Air Quality) (**TR010066/APP/6.1**), modelling has identified an increase in NH₃ deposition of >1% of the lower critical load at Willenhall Wood LNR, LWS and an ancient woodland site.
- 1.3.3. Modelling has demonstrated that the Scheme would have a beneficial or partial localised beneficial impact (a reduction) in NH₃ deposition at a number of modelled features including Coombe¹ Pool SSSI, Sowe Valley: Wyken Croft to Antsy Road LWS, Sowe Valley Dorchester Way LWS, Gainford Rise LWS, Piles Coppice LWS, Lower Sowe Meadows LWS and Stonebridge Meadows LWS. As NH₃ deposition is considered relating to a lower critical load, and these ecological features are not experiencing baseline levels above the lower critical load, these beneficial effects are not considered further within this assessment.
- 1.3.4. Modelling has also demonstrated that the Scheme would have an adverse or partial localised adverse impact (an increase) on NH₃ deposition at a number of modelled features including Coombe Pool SSSI, Herald Way Marsh SSSI, Gainford Rise LWS, Piles Coppice LWS, Baginton Fields LWS, Lower Sowe Meadows LWS, Stonebridge Meadows LWS and a parcel of ancient woodland at Binley Common Farm Wood. As the increase in NH₃ deposition at these ecological features does not result in an exceedance of the critical level, this would not result in an effect upon the features as a result of the Scheme, and as such these impacts will not be considered further in Section 9 of ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**). This information has been included in consideration of assessment of cumulative impacts in ES Chapter 14 (Combined Cumulative Effects) (**TR010066/APP/6.1**).

N deposition

- 1.3.5. Modelling for N deposition, as detailed within ES Chapter 5 (Air Quality) (**TR010066/APP/6.1**), has identified benefits and disbenefits with regards to N

¹ Coombe is also spelt as Combe in some databases. For consistency, hereafter the spelling of Coombe will be used.

deposition at identified ecological features. Modelling for the following ecological features has identified an increase in N deposition exceeding the lower critical load with the predicted change >1% of the lower critical load:

- Coombe Pool SSSI
- Herald Way Marsh SSSI
- Willenhall Wood LNR, LWS
- Piles Coppice LWS
- Gainford Rise LWS
- Stretton Croft LWS
- One veteran tree (T12) adjacent to the west of the Order Limits in proximity to Hungerley Hall Farm (see ES Figure 8.2 (Ecological Constraints) (TR010066/APP/6.2))
- Binley Common Farm Wood ancient woodland

1.3.6. Modelling for N deposition, as detailed within ES Chapter 5 (Air Quality) (TR010066/APP/6.1), has identified a beneficial reduction of >1% change of the lower critical load in N deposition at the following ecological features:

- Coombe Pool SSSI
- Sowe Valley Dorchester Way LWS
- Sowe Valley: Wyken Croft to Ansty Road LWS
- Gainford Rise LWS
- Stonebridge Meadows LWS
- One veteran tree to the west of the Scheme adjacent to the B4082 Clifford Bridge Road (ES Figure 8.2 (Ecological Constraints) (TR010066/APP/6.2))

1.3.7. Coombe Pool SSSI, Gainford Rise LWS and Stonebridge Meadows LWS would experience both adverse and beneficial impacts with regards to N deposition, with modelled transects showing an increase in N deposition in some areas and a decrease in others. Whilst some areas of Coombe Pool SSSI, Gainford Rise LWS, Stonebridge Meadows LWS, Sowe Valley: Wyken Croft to Ansty Road LWS and the veteran tree adjacent to the B4082 would experience reductions in N deposition (including reductions >1% of the lower critical load), the deposition rates would still be significantly above the upper critical load (as they are for all ecological features with the exception of Sowe Valley Dorchester Way LWS and certain habitats within Herald Way Marsh SSSI). As such, there would not be any on-the-ground benefits from these reductions in isolation.

1.3.8. The modelled reductions at Sowe Valley Dorchester Way LWS are not identified as a beneficial effect within this Appendix as background levels were already

below the identified lower critical load. The modelled beneficial reductions in N deposition impacting Sowe Valley: Wyken Croft to Ansty Road LWS and one veteran tree adjacent to the B4082 are not discussed within Section 9 of ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**) as the modelled N deposition levels are still above the identified upper critical load at which impacts are anticipated to occur. However, these features are listed here to allow for an assessment of cumulative impacts.

- 1.3.9. One veteran tree within Piles Coppice LWS would experience lower N deposition rates in the 'do something' scenario (33.79 kg N/ha/yr) with the Scheme than would be experienced in the 'do minimum' scenario (33.80 kg N/ha/yr) in the absence of the Scheme. Background N deposition levels at the tree, are already 12.7kg N/ha/yr above the upper critical load. As the N deposition would still be above the upper critical load this is not discussed in Section 9 of ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**) as a beneficial impact solely due to the Scheme, however, may contribute a cumulative beneficial impact.
- 1.3.10. Effects on these ecological features are considered in ES Chapter 5 (Air Quality) (**APP-027**) and summarised within this ES Chapter 8 (Biodiversity) (**APP-030**) which have been updated and resubmitted at Deadline 3. The modelled ecological features are shown on Figure 1a and Figure 1b of this appendix (in Annex A). Figures 2a to 2c, 3a to 3c and 4a to 4c (Annex A) show modelled levels for NO_x, NH₃ and N deposition respectively.
- 1.3.11. Modelled ecological features which would see an increase in N deposition of less than 1% of the lower critical load include Stonebridge Meadows LNR, Lower Sowe Meadows LWS and one veteran tree within Piles Coppice LWS. Table 1-1 below details the modelled N deposition for these ecological features, in which all figures are rounded to two decimal places.
- 1.3.12. These ecological features are considered in this assessment in Section 9 of ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**) as any increase in N deposition due to the Scheme can be considered as worsening the impact from loads already above the lower critical load.

Table 1-1: Modelled change in N deposition at ecological features which would see an increase of <1% of the lower critical load however are already above this load.

Ecological feature	Critical load range	Maximum increase as a % of lower critical load**	Do minimum N deposition*	Maximum increase in N deposition from the Scheme** only
Stonebridge Meadows LNR	10 - 20 kg Na/ha/yr	0.63%	42.1 kg N/ha/yr	0.06 kg N/ha/yr
Lower Sowe Meadows LWS	10 - 20 kg Na/ha/yr	0.79%	39.9 kg Na/ha/yr	0.08 kg Na/ha/yr
Veteran tree within Piles Coppice	10 - 20 kg Na/ha/yr	0.02%	33.57 kg Na/ha/yr	<0.01 kg Na/ha/yr

*at the location of the maximum change

** the change from the Scheme only is taken as the difference between the 'do minimum' scenario and the 'do something' scenario

- 1.3.13. In addition to the modelled increases Lower Sowe Meadows LWS and Stonebridge Meadows LNR would also be impacted by an improvement (reduction) in N deposition. However, these improvements would be <1% of the lower critical load and the LWS/LNR would still experience levels significantly above the upper critical load. As such, the improvements attributed to the Scheme would not be considered to deliver on-the-ground benefits.

NO_x

- 1.3.14. Modelling for NO_x, as detailed within ES Chapter 5 (Air Quality) (TR010066/APP/6.1), has identified benefits and disbenefits with regards to NO_x at identified ecological features. Modelling for the following ecological features has identified an increase in NO_x exceeding 1% the critical level:

- Coombe Pool SSSI
- Willenhall Wood LNR, LWS and ancient woodland
- One veteran tree

- 1.3.15. As the increase in NO_x at Coombe Pool SSSI and the veteran tree does not result in an exceedance of the critical level, this would not result in an effect upon the features as a result of the Scheme, and as such these impacts will not be considered further in Section 9 of ES Chapter 8 (Biodiversity) (TR010066/APP/6.1). This information has been included in consideration of assessment of cumulative impacts in ES Chapter 14 (Combined Cumulative Effects) (TR010066/APP/6.1).

- 1.3.16. Modelling for NO_x, as detailed within ES Chapter 5 (Air Quality) (TR010066/APP/6.1), has identified a beneficial reduction of >1% of the critical level (i.e. reductions of -0.3µg/m³ or more) at the following ecological features:

- Coombe Pool SSSI
- Sowe Valley Dorchester Way LWS
- Gainford Rise LWS
- One veteran tree

- 1.3.17. As the levels of NO_x at these ecological features do not exceed the critical level these reductions as a result of the Scheme are not considered to result in measurable beneficial effects and as such are not discussed further. Reductions in NO_x as a result of the Scheme include a reduction of -1.59µg/m³ (-5.3% of the critical level) at one location in Sowe Velly Dorchester Way LWS with levels reduced from 32.21µg/m³ in the 'do minimum' to 30.69µg/m³ (a fraction over the critical level) in the 'do something'. However, this reduction impacts only the site boundary, and therefore verge habitats only, and as such is not considered a beneficial impact on the LWS. Reductions in NO_x as a result of the Scheme include reductions at Sowe Valley Dorchester Way LWS >1% of the critical level also include a reduction from 30.83µg/m³ in the 'do minimum' to 29.38µg/m³ in the 'do something' at one location. However, as these reductions impact only the boundary of the site and therefore verge habitats it is not considered a beneficial effect on the LWS.
- 1.3.18. NO_x modelling has identified other increases and reductions in NO_x as a result of the Scheme which are below 1% of the critical level. However, as in these instances the levels in the 'do something' scenario are below the 30µg/m³ critical level at which adverse impacts could be expected to occur, these increases and decreases have been scoped out of this assessment. There is one exception to this at the Lower Sowe Meadows LNR where levels in the 'do something' are 34.23µg/m³. However, as the increase due to the Scheme is <1% of the critical level (0.43% at 0.13µg/m³) this impact is considered not significant in accordance with Natural England guidance (2018).

1.4. Assessment of likely significant effects (during operation)

Coombe Pool SSSI

- 1.4.1. The Scheme would result in changes in N deposition affecting the SSSI during the operational phase. With regards to N deposition the Scheme has a beneficial impact (a reduction in N deposition) in some areas and an adverse impact (an increase in N deposition) in others.
- 1.4.2. Modelling demonstrates that reductions in N deposition >1% of the lower critical load would be experienced in the north-westernmost corner of the SSSI where the realigned A46 mainline begins to move away from the SSSI.

- 1.4.3. The increases in N deposition >1% of the lower critical load would be experienced further south, and south of the current junction location where the SSSI is located alongside the A46. Table 1-2 below details the results from the two modelled transects located within the SSSI which resulted in an increase >1% of the lower critical load. Only the figures with the said increase are presented, other points on the transect are excluded from the table. Two transect points have been included as the boundary of the SSSI is located between the two transect points, and as such the SSSI would experience N deposition above the levels of the first transect point located within the SSSI itself.

Table 1-2: Modelled N deposition results for two transects showing only points within the SSSI for which an increase of >1% of lower critical load was modelled, showing change as a result of the Scheme

Approximate distance (m) into the SSSI	Change in N deposition (kg N/ha/yr)	% Change in N deposition	Habitats impacted
2.5m outside*	1.11	11.11%	Woodland
8m	0.6	5.97%	
18m	0.36	3.6%	
28m	0.24	2.38%	
38m	0.17	1.66%	
48m	0.13	1.26%	
58m	0.1	1.03%	
8m outside**	0.61	6.10%	Woodland
2m	0.46	4.61%	
12m	0.37	3.71%	
22m	0.31	3.08%	
32m	0.26	2.63%	
42m	0.23	2.30%	
52m	0.2	2.02%	
62m	0.18	1.78%	Pool
72m	0.16	1.64%	
82m	0.15	1.47%	
92m	0.14	1.39%	
102m	0.13	1.27%	
112m	0.12	1.19%	
122m	0.11	1.12%	
132m	0.1	1.03%	

*This transect point is included as approximately 7.5m of the SSSI is between this point and the next.

**This transect point is included as approximately 2m of the SSSI is between this point and the next.

- 1.4.4. Increases in N deposition <1% of the lower critical load (increases <0.1kg/ N/ha/yr) potentially impacting Coombe Pool SSSI are recorded across all four modelled transects and would potentially impact the north-west areas of the pool and woodland within the SSSI. All increases in N deposition would occur in the SSSI up to approximately 185m back from the modelled carriageway and impact approximately 4.4ha of the 36ha pool.
- 1.4.5. Baseline woodland N deposition levels for all modelled areas of the SSSI are 33.6kg IN/ha/yr. No critical load data is available on the APIS website for the species identified as qualifying features of the SSSI (grey heron *Ardea cinerea*, shoveler *Anas clypeata* and breeding bird assemblages associated with lowland open waters and their margins).
- 1.4.6. APIS quotes a lower critical load of 2kg N ha/yr for priority habitat permanent oligotrophic lakes, ponds and pools and 5kg N ha/yr for priority permanent dystrophic lakes, ponds and pools. The Coombe Pool has not been confirmed to be oligotrophic or dystrophic and consultation with Coventry City Council regarding eutrophication at the SSSI has identified that Coombe Pool prior to the Scheme is subject to large algal blooms and extensive weed growth, impacts which often make Coombe Pool unfishable. The Council reported that there is no targeted management for eutrophication. As oligotrophic and dystrophic lakes are characterised by low nutrient levels they can be considered more sensitive to N deposition than other water bodies. As such it is considered appropriate, and a worst-case scenario, to take a lower critical load for Coombe Pool of 10kg N/ha/yr to assess potential impacts on Coombe Pool itself and the three aforementioned qualifying features associated with Coombe Pool. This lower critical load has been applied to the modelled outputs in Table 1-2.
- 1.4.7. The critical load range for broadleaved deciduous woodland, a terrestrial habitat present extensively within the SSSI and which is identified within the SSSI citation as supporting a diverse breeding bird community, as identified on APIS is also 10 (lower) – 20 (upper) kg N/ha/yr.
- 1.4.8. In the modelled 'do minimum' scenario, future baseline data for N deposition is provided in the absence of the Scheme. The modelled N deposition rates in this scenario, which would affect the SSSI within the area impacted by increases >1% of the lower critical load, range from 35.65kg N/ha/yr to 40.74kg N/ha/yr). This 'do minimum' scenario data will be used to assess the impacts of N deposition in the Scheme's 'do something' scenario, where total N deposition

levels are between 35.75kg N/ha/yr and approximately 41.35kg N/ha/yr in the areas impacted by similar increases.

- 1.4.9. With baseline deposition levels of 33.6kg N/ha/yr, the SSSI and ecological features within are already experiencing levels of N deposition 13.6kg N/ha/year above the upper critical load of 20kg N/ha/year. This has been taken into account in the assessments upon individual qualifying features below.
- 1.4.10. The woodland habitat between the A46 and the Coombe Pool is considered a rough surface habitat (APIS, 2016) (and as such better at intercepting N deposition than for example grassland habitat) and would intercept N deposition from the A46 (as detailed in Section 1.2). As such, the modelled statistics within Table 1-2 likely present a worst-case scenario than would occur with regards to N deposition, as the modelling was undertaken without regard to habitats present on the transect. The interception of N deposition by the woodland between the A46 and Coombe Pool, and therefore the likely lower actual kg N/ha/yr depositions will be taken into consideration in the below assessment.
- 1.4.11. The sources of N deposition at Coombe Pool SSSI, as identified by APIS, include 6.11% attributable to fertiliser application. The creation of woodland habitat within the Order Limits to the north of Coombe Pool SSSI, which within the baseline is intensively managed arable land, would result in a reduction in N deposition from this source at this location. As such this can be considered a beneficial effect of the Scheme upon the Coombe Pool SSSI with regards to N deposition and will be considered within the below assessments.
- 1.4.12. The heronry at Coombe Pool SSSI is located on the far east side of Coombe Pool, beyond the impacts of increased N deposition during the operation of the Scheme. As such no direct impacts are anticipated upon the heronry itself. Heron was observed on Coombe Pool during breeding bird surveys and were confirmed breeding. Nitrogen enrichment of waterbodies can impact upon fish populations through eutrophication and toxicity thereby increasing fish mortality. The increase in N deposition >1% of the lower critical load from the operation of the Scheme would impact only a small area of Coombe Pool (approximately 1.22ha), with a much larger area of Coombe Pool (approximately 34.78ha) not impacted. Additionally, potential foraging habitat exists in the wider un-impacted area including Smite Brook upstream of the Scheme to the east and further potential foraging areas to the south in Brandon Marsh and the River Avon basin. Impacts upon grey heron within the SSSI due to a worst-case scenario depletion in fish supply due to increases in N deposition >1% of the lower critical load within the impacted area of Coombe Pool would be a permanent minor adverse impact. This would result in a slight or moderate adverse effect in accordance with the significance matrix in the DMRB LA 108. However, given the small footprint of the area of Coombe Pool impacted relative to the size of

Coombe Pool the effect on the SSSI qualifying feature of national importance is assessed as **slight adverse (not significant)**.

- 1.4.13. No shovelers were recorded using Coombe Pool during the wintering bird surveys. Consultation with the Ecologist for Coombe Pool SSSI reported that Shoveler use of Coombe Pool for breeding has much declined with “about two to three pairs” present. It is considered that the creation of new reserves and biodiversity improvements within the wider area has resulted in a reduction of the importance of the Coombe Pool SSSI to the shoveler populations. This can therefore be considered to hold true for other wildfowl. The APIS website identifies a sensitivity to N deposition with regards to shoveler. Potential adverse impacts of increased N deposition >1% of the lower critical load within Coombe Pool upon shoveler, and other wintering wildfowl, include a reduction of available prey due to smaller numbers of and/or changes in assemblages of aquatic invertebrates and crustaceans within Coombe Pool. Given that no shoveler were recorded during the breeding and wintering bird surveys, the likely reduction in importance of Coombe Pool for the species within the context of the wider area, and the small area of Coombe Pool negatively impacted by increases in N deposition >1% of the lower critical load, the level of impact is assessed as minor adverse resulting in a **slight adverse effect (not significant)**. This should be taken as a worst-case scenario with regards to shoveler, as in the event shovelers were not present within Coombe Pool, as was the conclusion based upon surveys alone, there would be no impact. This assessment is also applicable to other wintering wildfowl in the SSSI.
- 1.4.14. Waterbirds recorded on Coombe Pool during the breeding bird surveys and considered possibly or probably breeding include great-crested grebe *Podiceps cristatus*, little egret *Egretta garzetta*, and tufted duck *Aythya fuligula*. In addition to heron, waterbird species recorded on Coombe Pool and confirmed breeding during the surveys include Birds of Conservation Concern (BoCC) green-listed coot and amber-listed mallard *Anas platyrhynchos*, moorhens *Gallinula chloropus* and mute swans *Cygnus olor*. Potential impacts of N deposition on these species include impacts on food availability due to a reduction in, or a change in the composition/assemblage of aquatic macrophytes, aquatic invertebrate, fish, and of relevance to great-crested grebe and little egret, amphibians. Given the small area of Coombe Pool affected by increase in N deposition >1% of the lower critical load, the availability of suitable prey within the wider unaffected area of Coombe Pool and the presence of populations of these bird species within the baseline which is already experiencing N deposition above the upper critical load, the level of impact is assessed as minor adverse. There would therefore be a **slight adverse effect (not significant)** upon the breeding bird assemblages associated with lowland open waters and their margins.

- 1.4.15. Potential impacts of increased nitrogen on the diverse breeding and wintering bird assemblages present within the SSSI woodland as identified on the citation would occur through impact on the woodland habitat. Impacts upon woodland can indirectly impact the birds present through changes in food source type, quantity and quality, timing of food source availability, changes in vegetation cover required for protection and changes in the environment for predators. Given the small area of SSSI woodland affected by increases in N deposition >1% of the lower critical load, the availability of food sources in woodland and other habitats within the wider area, including areas of SSSI woodland unaffected, and the presence of populations of these species within the baseline which is already experiencing N deposition above the upper critical load, the level of impact is assessed as minor adverse. There would therefore be **slight adverse effect (not significant)** upon the breeding and wintering bird assemblages within the SSSI woodland.

Herald Way Marsh SSSI, LNR and LWS

- 1.4.16. Herald Way Marsh SSSI, LNR and LWS consists of a mosaic of wetland communities, grassland, scrub and woodland habitats and the SSSI is designated primarily for its assemblage of invertebrates associated with open water, marsh, reed, fens and sand habitats.
- 1.4.17. The APIS website identified the invertebrate assemblage as being a feature sensitive to N deposition, however confirmed no comparable habitat with established critical load estimates were available. As such a critical load range of 10 (lower) – 15 (upper) kg N/ha/yr has been applied to the N deposition modelling for the SSSI, LNR and LWS. This critical load range is identified on APIS for wetland habitats valley mires, poor fens and transition mires. As invertebrate assemblages are most likely to be impacted from increase in N deposition through alterations to their habitat this is considered the most appropriate critical load range. APIS identifies an upper critical load of 20kg N/ha/yr for broadleaved woodland, which from a review of aerial imagery is largely the dominant habitat present within the impacted area. However, using a critical range of 10 – 15kg N/ha/yr is considered to provide an appropriate assessment for the wetland habitats should any be present within the impacted area and a worst-case scenario for the woodland habitat.
- 1.4.18. The changes in N deposition >1% of the lower critical load resulting from the Scheme would impact only approximately 5m of the designated sites along the roadside boundary. Changes in N deposition to the SSSI only are discussed as the statutorily protected SSSI incorporates the LNR and LWS. Additionally, the impacts on the SSSI would be considered a worst-case scenario for the LNR and LWS however it should be noted impacts to the LNR and LWS would be slightly less. The maximum change in N deposition in the impacted area of the

SSSI is 1.24% of the lower critical load and would result in a total N deposition of 24.7kg N/ha/yr in the modelled 'do something' scenario, compared to 24.6 kg N/ha/year in the 'do minimum' scenario.

- 1.4.19. Increases in N deposition <1% of the lower critical load potentially impacting the SSSI, LNR and LWS would occur up to approximately 185m back from the modelled carriageway potentially impacting approximately 7.8ha of the SSSI (ca. 10.2ha in total).
- 1.4.20. Potential impacts of N deposition above the lower critical load on the habitats present in the designated sites could include changes in species-richness and composition. Potential indirect impacts of these changes upon invertebrate assemblages could include a change in suitability of habitat as breeding habitat and changes to the food source quantity and quality.
- 1.4.21. Whilst the Scheme would result in N deposition above the lower critical load for the SSSI, LNR and LWS, the modelled background N deposition levels are 18.7kg N/ha/yr and as such the designated sites and communities present therein are already experiencing levels 8.7kg N/ha/yr above the lower critical load and 3.7kg N/ha/yr above the upper critical load. From a review of aerial imagery, broadleaved woodland/scrub is present between the A46 and the designated sites which may absorb some N deposition and lessen the levels reaching the designated sites from those modelled figures (see Section 1.2). Given this and as the areas of the SSSI, LNR and LWSs impacted are small relative to the entire size of the sites, the impact is considered minor adverse which would result in a **slight adverse effect (not significant)** upon the nationally important SSSI and LNR and the county important LWS.

Willenhall Wood LNR, LWS and ancient woodland

- 1.4.22. The boundaries of the LNR, LWS and ancient woodland parcel largely overlap and as such they are considered together within this section, and it is assumed that the site features described in the LWS citation are also present within the LNR and ancient woodland. The LNR is designated for mixed deciduous ancient and semi-natural woodland. Ancient woodland habitats present include ancient and semi-natural woodland and ancient replanted woodland.

NH₃ deposition and NO_x

- 1.4.23. The LWS citation states that the wood is thought to hold a diverse community of fungi and mosses, and due to the latter, the lower critical load for modelling was set at 1µg/m³ in accordance with the APIS website.
- 1.4.24. The operation of the Scheme would result in an increase in NH₃ at Willenhall Wood. The increase in NH₃ deposition in the modelled 'do something' scenario

within the LWS would be between 1.1% and 2.51% and $0.01\mu\text{g}/\text{m}^3$ and $0.03\mu\text{g}/\text{m}^3$. This change would impact the area of the LWS between 10m and 40m from the A46. The increase in NH_3 deposition in the modelled 'do something' scenario within the LNR would be between 1.1% and 1.56% and $0.01\mu\text{g}/\text{m}^3$ and $0.02\mu\text{g}/\text{m}^3$. The impacted area of the LNR would be significantly less with impacts in one area between approximately 15m and 30m from the A46.

- 1.4.25. Willenhall Wood LWS would also experience increases in NO_x deposition levels above 1% of the critical level $30\mu\text{g}/\text{m}^3$ on one of the two modelled transects impacting approximately the closest 1m of the LWS to the A46. NO_x levels at this location would be $32.22\mu\text{g}/\text{m}^3$ in the modelled 'do something' scenario. In the absence of the Scheme, in the 'do minimum' scenario, NO_x levels experienced within the LWS would be $31.91\mu\text{g}/\text{m}^3$ and as such would still be higher than the critical level with the impact from the Scheme therefore amounting to $0.32\mu\text{g}/\text{m}^3$ (an increase of 1.07% of the critical level) NO_x depositions at the LWS.
- 1.4.26. As the modelled background (baseline) NH_3 deposition is $2\mu\text{g}/\text{m}^3$, and therefore already double the identified lower critical load of $1\mu\text{g}/\text{m}^3$, it is considered that the mosses within the LWS woodland would already have been subject to adverse impacts associated with NH_3 deposition for some time. No adverse impacts are anticipated upon the ancient woodland, with the exception of the mosses, as the critical threshold for higher plants, $3\mu\text{g}/\text{m}^3$ as quoted on the APIS website, would not be exceeded. Furthermore, from a review of aerial imagery and mapping provided from Warwickshire Biological Records Centre (WBRC) with the LWS citation, much of the impacted habitat between 10m and 40m from the roadside consists of highway boundary woodland and in the south-eastern and south-western corners of the LWS grassland, bracken and scrub habitats, as opposed to the more valuable ancient woodland habitat and mosses within it. Additionally, the A46 verge embankment at this location would be considered to potentially reduce NH_3 and dispersal from the road from the modelled figures.
- 1.4.27. The impacted areas of the designated sites from increase in NH_3 and NO_x are small in footprint, particularly with regards to the LNR. The data regarding moss diversity at the LWS is dated 1983. In the absence of more recent survey data to confirm a high diversity of mosses at the site or otherwise, a precautionary approach has been taken. As such, an increase in NH_3 above the lower critical load could result in a decrease in moss diversity and permanent loss of species sensitive to NH_3 . As a worst-case a minor adverse level of impact would result in a **slight adverse effect (not significant)** on the county important LWS.
- 1.4.28. Minor adverse impacts upon ecological features of national importance such as LNRs result in a slight or moderate effect. However, considering the age of the data regarding mosses, the lack of impact upon the ancient woodland cited in

the LNR citation (due to the NH₃ increase not exceeding the NH₃ lower critical load) and the very small footprint of the impacted areas in the LNR (approximately 0.02ha of the 9.89ha LNR) the effect is assessed as **slight adverse effect (not significant)**.

N deposition

- 1.4.29. The applicable critical range for N deposition as identified on APIS and applied to the modelling is 10kg N/ha/r (lower) to 20kg N/ha/yr (upper) for deciduous/broadleaved woodland.
- 1.4.30. The operation of the Scheme would result in an increase in N deposition at Willenhall Wood. The increase in N deposition in the modelled 'do something' scenario within the LWS in areas impacted by increases >1% of the lower critical load would be between 1.03% and 2.39% of the lower critical load and would result in between 37.63kg N/ha/yr and 43.75kg N/ha/yr. This change would impact the area of the LWS between 10m and 40m from the A46. The increase in N deposition in the modelled 'do something' scenario within the LNR would be between approximately 1.03% and 1.48% of the lower critical load and would result in N deposition of between 38.80kg N/ha/yr and 40.36kg N/ha/yr. The impacted area of the LNR would be significantly less with impacts in one area between approximately 15m and 30m from the A46.
- 1.4.31. Increases in N deposition <1% of the lower critical load potentially impacting the site are recorded across both modelled transects. These increases would potentially impact the sites up to approximately 75m (LWS) and 60m (LNR) at the most extensive transect back from the roadside and impact approximately 1.36ha of the LNR and 4.33ha of the LWS.
- 1.4.32. Potential impacts of N deposition above the lower critical load on the ancient woodland habitat include changes in species richness and composition.
- 1.4.33. As the modelled background (baseline) N deposition is 32.4kg N/ha/yr, and therefore already 12.4kg N/ha/yr above the upper critical load, it is considered that the woodland would already have been subject to adverse impacts associated with N deposition for some time. Furthermore, from a review of aerial imagery and mapping provided from WBRC with the LWS citation, much of the habitat impacted by changes >1% of the lower critical load between 10m and 40m from the roadside consists of highway boundary woodland and in the south-eastern and south-western corners of the LWS grassland, bracken and scrub habitats, as opposed to the more valuable ancient woodland habitat. Additionally, the A46 verge embankment at this location would be considered to potentially reduce N dispersal from the road from the modelled figures.

- 1.4.34. The areas of the designated sites impacted by increases >1% of the lower critical load are small in footprint, particularly with regards to the LNR. Furthermore, and importantly, whilst the N deposition levels in the 'do something' scenario are above the upper critical level the impact from the Scheme alone results in only small increases (between +0.1kg N/ha/yr and +0.24kg N/ha/yr). As such the impacts from increases in N deposition resulting from the Scheme are considered unlikely to impact the designated sites integrity and key characteristics. The minor adverse impact would result in a **slight adverse effect (not significant)** upon the nationally important ancient woodland, and a **slight adverse effect (not significant)** on the county important LWS and LNR.

Gainford Rise LWS

- 1.4.35. The Scheme would result in changes to N deposition levels at Gainford Rise LWS. The northernmost part of the LWS would experience a decrease in N deposition levels, whilst modelled transects from the southern section would experience an increase in N deposition.
- 1.4.36. The LWS is designated for its mosaic of habitats including wet and dry semi-improved grassland, tall herb, scrub and crack willow woodland. Also mentioned within the citation are a "good bird population", water vole on Smite Brook and "good numbers of typical butterflies". As wet/marshy grassland has been identified, the critical range for N deposition modelling has been set at 10 - 15kg N/ha/yr in accordance with the value provided by APIS for wetland habitats valley mires, poor fens and transition mires and on a precautionary basis in the absence of a detailed botanical survey.
- 1.4.37. The citation cites the former Sharman's Tip area of the site as the most valuable. This area of the LWS is situated in the south to the west of the footpath running through the site and as such will not be impacted by N deposition as a result of the Scheme.
- 1.4.38. Adverse impacts from increases in N deposition >1% of the lower critical load are limited to the easternmost area of the LWS up to 15m back from the LWS boundary. The modelled background N deposition levels which the LWS is already subject to are 33.6kg N/ha/yr, 18.6kg N/ha/yr above the upper critical load. The modelled 'do minimum' scenario provides the future baseline data for N deposition in the absence of the Scheme. Modelled N deposition rates in the 'do minimum' scenario impacting this area of LWS range from 36.3kg N/ha/yr to 36.7kg N/ha/yr and as such are significantly (>1%) above the upper critical load of 15kg N/ha/yr.
- 1.4.39. With regards to the area of the LWS which would experience an increase in N deposition >1% of the lower critical load due to the Scheme (the 'do something'

scenario) deposition levels would be between 36.4kg N/ha/yr and 36.9kg N/ha/yr with an increase of 0.13kg N/ha/yr to 0.19kg N/ha/yr attributable to the Scheme.

- 1.4.40. Increases in N deposition <1% of the lower critical load which could potentially impact the site are recorded. These increases would occur within the site up to approximately 75m from the LWS boundary.
- 1.4.41. From a review of aerial imagery, the habitats adjacent to the A46 mainline and within the impacted area are scrub and/or young woodland habitats. As such impacts from an increase in N deposition could include changes in the species richness and/or composition of the ground flora and lower plants within the woodland and indirect impacts upon species inhabiting the woodland including changes to cover available and changes in the quantity and quality of food sources.
- 1.4.42. Modelling has shown that the Scheme during the operational phase would have a beneficial impact (reductions >1% of the lower critical load) upon the northernmost area of the LWS with regards to N deposition. A review of aerial imagery suggests woodland, scrub and grassland habitats would be beneficially impacted. N deposition levels in this area of the LWS would, with the construction of the Scheme (in the 'do something' scenario) see a reduction of between -9.14% and -1.47% of the lower critical load, which is between -0.91kg N/ha/yr and -0.15kg N/ha/yr better than the 'do minimum' scenario. Whilst N deposition levels in these areas would still be above the upper critical load of 15kgN/ha/yr, between 34.7kg N/ha/yr and 36.64kg N/ha/yr, they would be better (i.e. lower deposition levels) than those experienced in the absence of the Scheme. These beneficial impacts could be considered to offset negative impacts in other areas of the LWS and may contribute to a cumulative impact and result in a future reduction of N deposition below the upper critical load.
- 1.4.43. Overall, as the area of the LWS negatively impacted by changes >1% of the lower critical load is small relative to the whole site and is not within the area identified as most valuable in the LWS citation, the overall impact is assessed as minor adverse resulting in a **slight adverse effect (not significant)**. As the offsetting provided by the beneficial affects elsewhere in the LWS do not result in a reduction in N deposition below the upper critical load in the absence of any cumulative effects this has not been considered to reduce the effect to neutral.

Stretton Croft LWS

NH₃ deposition

- 1.4.44. The operation of the Scheme would result in an increase in NH₃ at Stretton Croft LWS. The increase in NH₃ deposition in the modelled 'do something' scenario within the LWS would be between 0.32% and 0.64% and 0.01µg/m³ and

0.02µg/m³. This change would impact the area of the LWS up to approximately 50m back from LWS boundary.

- 1.4.45. Background levels of NH₃ at the LWS are below the non-statutory critical level 2.2µg/m³. Whilst levels in the 'do something' scenario with the Scheme operation would be above this level at between 3.02 µg/m³ and 3.55 µg/m³, the impact from the Scheme alone (i.e. the difference between the 'do minimum' future baseline and the 'do something') is minor (between 0.01µg/m³ and 0.02µg/m³) and below the initial screening threshold for potentially significant impacts of changes >1% of the non-statutory critical level (see Section 1.2). Impacts of NH₃ deposition from the Scheme are therefore assessed as a minor adverse level of impact resulting in a **slight adverse (not significant) effect** on the county important LWS.

N deposition

- 1.4.46. Air quality modelling has identified that Stretton Croft LWS would experience increases in N deposition during the operational phase of the Scheme >1% of the lower critical load. Stretton Croft LWS is designated for a mosaic of habitats and the butterfly and bird species supported by those habitats. The critical range applied is that with the lowest lower critical load of the present habitats as identified on APIS and is 10 - 15kg N/ha/yr for wetland habitats valley mires, poor fens and transition mires, deciduous woodland habitats and neutral grassland habitats.
- 1.4.47. The increase in N deposition >1% of the lower critical load would impact the LWS up to approximately 45m from the designated site boundary back from the triggered links in the M69. The increase in N deposition would be between 1.01% and 1.79% of the lower critical load and would result in between 43.3kg N/ha/yr and 47.7kg N/ha/yr in the modelled 'do something' scenario.
- 1.4.48. Potential impacts of N deposition levels above the lower critical load on habitats include changes in individual plant growth, and changes in species richness and composition. These habitat impacts can indirectly impact species present within the habitats through changes in food source quantity and quality and suitability of habitat for breeding and taking cover.
- 1.4.49. Increases in N deposition <1% of the lower critical load are recorded. These increases would potentially impact the site up to approximately 160m back from the LWS boundary potentially impacting a significant area of the LWS.
- 1.4.50. Whilst the N deposition levels in the 'do something' scenario in the areas impacted by increases >1% of the lower critical load are between 28.3kg N/ha/yr and 32.7kg N/ha/yr above the upper critical load, and these levels will impact a

significant area of the LWS, the site is already experiencing levels significantly above this upper critical load in this impacted area where background levels are 35kg N/ha/yr. Further levels in the 'do something' scenario (levels in the event the Scheme is built) do not differ significantly from levels in the 'do minimum' scenario (the future N deposition baseline should the Scheme not be built). Within the impacted area of the site (the area subject to increases >1% of the lower critical load) the difference between the 'do minimum' and 'do something' scenarios (i.e. impacts from the Scheme alone) is between 0.1kg N/ha/yr and 0.18kg N/ha/yr. As such changes in N deposition due to the Scheme alone are considered minor adverse resulting in a **slight adverse effect (not significant)**.

Piles Coppice LWS and ancient woodland

- 1.4.51. Piles Coppice LWS is designated for sessile oak *Quercus petraea* and small-leaved lime *Tilia cordata* (broadleaved) ancient woodland with a diverse ground flora and population of breeding birds. As ancient woodland is of national importance, the assessment of effect upon the ancient woodland LWS is undertaken on this basis.
- 1.4.52. The Scheme in the operational phase would result in an increase in N deposition >1% of the lower critical load, which has been identified on APIS as 10kg N/ha/yr for broadleaved woodland. The upper critical load applied to this assessment is 20kg N/ha/yr. The change in N deposition >1% of the lower critical load resulting from the Scheme would be between 1.07% and 1.5% of the lower critical load and total N deposition of 37.1kg N/ha/yr and 38.4kg N/ha/yr respectively.
- 1.4.53. Increases in N deposition <1% of the lower critical load at the site are recorded across both modelled transects and include increases between <0.01% (<0.01kg N/ha/yr) and 0.81% (0.08kg N/ha/yr) of the lower critical load. These increases would potentially impact the site up to approximately 175m back from the site boundary and together with increases >1% of the lower critical load would potentially impact approximately 10ha of the site.
- 1.4.54. Potential impacts of the increase in N deposition include changes in vegetation composition and species richness of the woodland which can have an indirect impact on the breeding birds and other species inhabiting the woodland due to changes in cover and food source quantity and quality.
- 1.4.55. The increase in N deposition >1% of the lower critical load will impact approximately the 10m of the LWS closest to the A46 and as such the footprint of the adversely impacted area is very small relative to the whole area of the LWS. From a review of aerial imagery broadleaved woodland is present between the A46 and the LWS and is likely to absorb some of the N deposition before it

reaches the LWS, and as such the modelled figures are likely a worst-case scenario. As such, any adverse impacts upon the LWS resulting from N deposition during the operational phase of the Scheme would not be considered to impact the integrity or characteristics of the LWS. Additionally, the modelled baseline within the LWS is already experiencing levels of N deposition 12.7kg N/ha/yr above the upper critical load (20kg N/ha/yr) and increases in N deposition >1% of the lower critical load from the Scheme alone are limited to increases of between 0.1kg N/ha/yr and 0.15kg N/ha/yr. As such the level of impact on the feature of national importance is minor adverse which would result in a slight or moderate adverse effect upon the ancient woodland LWS. In accordance with DMRB LA 108 and the assessment of importance in Table 8-7 of ES Chapter 8 (Biodiversity) (TR010066/APP/6.1) an effect of slight or moderate adverse would be reported. Given the minor extent of the impact in relation to the size of the ancient woodland LWS site, the magnitude of the increase from the Scheme alone and the other mitigating factors mentioned above the effect is assessed as **slight adverse (not significant)**.

Baginton Fields LWS

N deposition

- 1.4.56. Whilst the LWS citation states varying grassland communities as qualifying interests, a review of aerial imagery confirms the site currently consists entirely of woodland or scrub habitat. As such the critical range for broadleaved woodland, 10 – 20kg N/ha/yr, has been applied to the assessment of impacts upon this LWS.
- 1.4.57. Increases in N deposition >1% of the lower critical load are limited to impacting the first 3m of the LWS back from the roadside site boundary. This area would be impacted by an increase of 1.05% of the lower critical load resulting in 42.8kg N/ha/yr in the 'do something' scenario. However, background levels the LWS is already subject to are 12.3kg N/ha/yr above the upper critical level and the impacts from the Scheme alone are limited to an increase of 0.11kg N/ha/yr.
- 1.4.58. Increases in N deposition <1% of the lower critical load potentially impacting the site are recorded. These increases would potentially impact the site up to 165m back from the modelled carriageway and are below the change threshold considered perceptible (>1% of the lower critical load) Natural England, 2018).
- 1.4.59. Due to the very small footprint of the area of the LWS impacted by increases >1% of the lower critical load and the small magnitude of impacts from the Scheme alone, and also considering that the habitats the LWS was initially recognised for are no longer present, the level of impact on the county important feature is considered minor adverse resulting in a **slight adverse (not significant) effect**.

NO_x

- 1.4.60. Air quality modelling has identified NO_x levels above the critical level at Baginton Fields LWS. The LWS is designated for a mosaic of grassland habitats including coarse semi-improved grassland, rank species-poor grassland and less rank grassland with a medium to tall sward height and a greater abundance and variety of forbs.
- 1.4.61. The LWS would experience NO_x levels above the critical level 30µg/m³ within approximately the 3m closest to the A46 where modelled levels are 31.57µg/m³.
- 1.4.62. NO_x can be toxic to vegetation and can result in direct impacts including leaf yellowing and dieback and can also contribute to acidifying compounds (CIEEM, 2021). Direct impacts upon vegetation could impact species differently and as such result in changes to grassland species composition and richness.
- 1.4.63. The impacted area of the LWS which would experience NO_x levels above the critical level is small in footprint in comparison to the size of the LWS as a whole. A review of aerial imagery suggests the impacted area of the LWS is highway boundary woodland and as such not the grassland habitats described within the LWS citation, which was based on a survey dated 2005. Furthermore, the modelled NO_x levels in the 'do minimum' scenario in the absence of the Scheme also exceed the critical level at 31.39µg/m³. The difference in NO_x levels between this future baseline scenario and the Scheme equals 0.17µg/m³ and as such this can be taken as the sum of the NO_x levels solely due to the Scheme.
- 1.4.64. Given the minor extent of the LWS which would experience impacts from NO_x above the critical level this would be assessed as a minor adverse impact resulting in a neutral or slight adverse effect (not significant) on the LWS. Furthermore, the increase due to the Scheme is <1% of the critical level, which is considered imperceptible and unlikely to result in a significant effect in accordance with guidance from Natural England (2018). However, in the absence of grassland habitat detailed on the LWS citation within the impacted area of the LWS, there is considered to be no change on the LWS features within the citation and therefore a **neutral effect (not significant)**.

Ancient woodland and veteran trees

- 1.4.65. Where ancient woodland forms part of a designated site impacts have been assessed in the above sections pertaining to designated sites.
- 1.4.66. Air quality modelling has identified one veteran tree (T12) present within 200m of the triggered links which would be impacted by increases in N deposition during Scheme operation. As a deciduous oak *Quercus* tree, as identified within the arboricultural impact assessment (ES Appendix 7.4 (Arboricultural Impact

Assessment) (TR010066/APP/6.3)), the critical load range was identified on APIS as 10 – 20kg N/ha/yr. The Scheme would result in an increase in N deposition of 2.98% of the lower critical load resulting in 36.1kg N/ha/yr. The arboricultural impact assessment identified one further deciduous broadleaved tree which was ‘beginning to veteranise’ (T11). As not yet confirmed as a veteran tree, no targeted modelling was undertaken for T11, however an assessment will be undertaken on a precautionary basis in the event the tree should qualify as a veteran at the onset of Scheme operation. T11 is located approximately 120m from the modelled veteran T12. The modelled T12 veteran is approximately 75m from the triggered links and T11 is approximately 170m from the triggered links. As such the assessment for the modelled veteran T12 can apply as a worst-case scenario for assessment upon T11.

- 1.4.67. One further veteran tree, located within Piles Coppice, would experience increases in N deposition in the operational phase. However, this increase is 0.002kg N/ha/yr and 0.02% of the lower critical load, and therefore is not considered significant in accordance with guidance (Natural England, 2018).
- 1.4.68. Potential impacts of N deposition on trees above the lower critical load include alterations to tree growth, increased litter production, changes in mycorrhizal flora, increased sensitivity to stress and pests (APIS, 2016).
- 1.4.69. Given the veteran tree is already experiencing N deposition levels of 33.6kg N/ha/yr, 13.6kg N/ha/yr above the upper critical load, it is considered likely the tree would already be experiencing impacts of N deposition prior to the Scheme. As the modelled N deposition in the ‘do minimum’ scenario shows a deposition rate of 35.82kg N/ha/yr in the absence of the Scheme, the increase in N deposition resulting from the Scheme alone (0.3kg N/ha/yr) would not be considered significant in comparison to the future baseline. Due to the small increase from the Scheme alone, and in the context of the tree already experiencing significant levels of deposition, a minor adverse impact would be experienced. The resulting effect is assessed as **slight adverse (not significant)**.
- 1.4.70. Binley Common Farm Wood ancient woodland site would experience an increase in N deposition due to the Scheme in the operational phase. As a deciduous broadleaved woodland the critical load range is 10 - 20kg N/ha/yr as identified on APIS. The ‘do something’ scenario would result in changes in N deposition >1% of the lower critical load up to 60m into the woodland from the site boundary. The increase in N deposition >1% of the lower critical load ranges from 1.02% to 1.41% of the lower critical load resulting in deposition levels between 34.4kg N/ha/yr and 35.34kg N/ha/yr in the ‘do something’ scenario. Increases <1% of the lower critical load impact up to approximately 115m back

into the designated site and include increases between 0.86% (0.09kg N/ha/yr) and 0.97% (0.1kg N/ha/yr) of the lower critical load.

- 1.4.71. Impacts of N deposition on woodland habitat includes impacts to individual trees such as alterations to tree growth, increased litter production, changes in mycorrhizal flora, increased sensitivity to stress and pests, changes in species richness and composition of the understorey and ground flora and changes in soil chemistry and fauna (APIS, 2016).
- 1.4.72. Whilst the N deposition levels at Binley Common Farm Wood in the 'do something' scenario in the areas impacted by >1% of the lower critical load are between 14.36kg N/ha/yr and 15.34kg N/ha/yr above the upper critical load, and these levels will impact a significant area of the ancient woodland site, the site is already experiencing levels 12.7kg N/ha/yr above this upper critical load in the background. Furthermore, and of a higher importance in the assessment, levels in the 'do something' scenario (levels in the event the Scheme is built) in the area impacted by increases >1% of the lower critical load do not differ significantly from levels in the 'do minimum' scenario (the future N deposition baseline should the Scheme not be built). Within the area impacted by >1% of the lower critical load of the site the difference between the 'do minimum' and 'do something' scenarios are between 0.1kg N/ha/yr and 0.14kg N/ha/yr. As such changes in N deposition due to the Scheme alone are considered minor adverse resulting in a **slight adverse effect (not significant)**.

2. References

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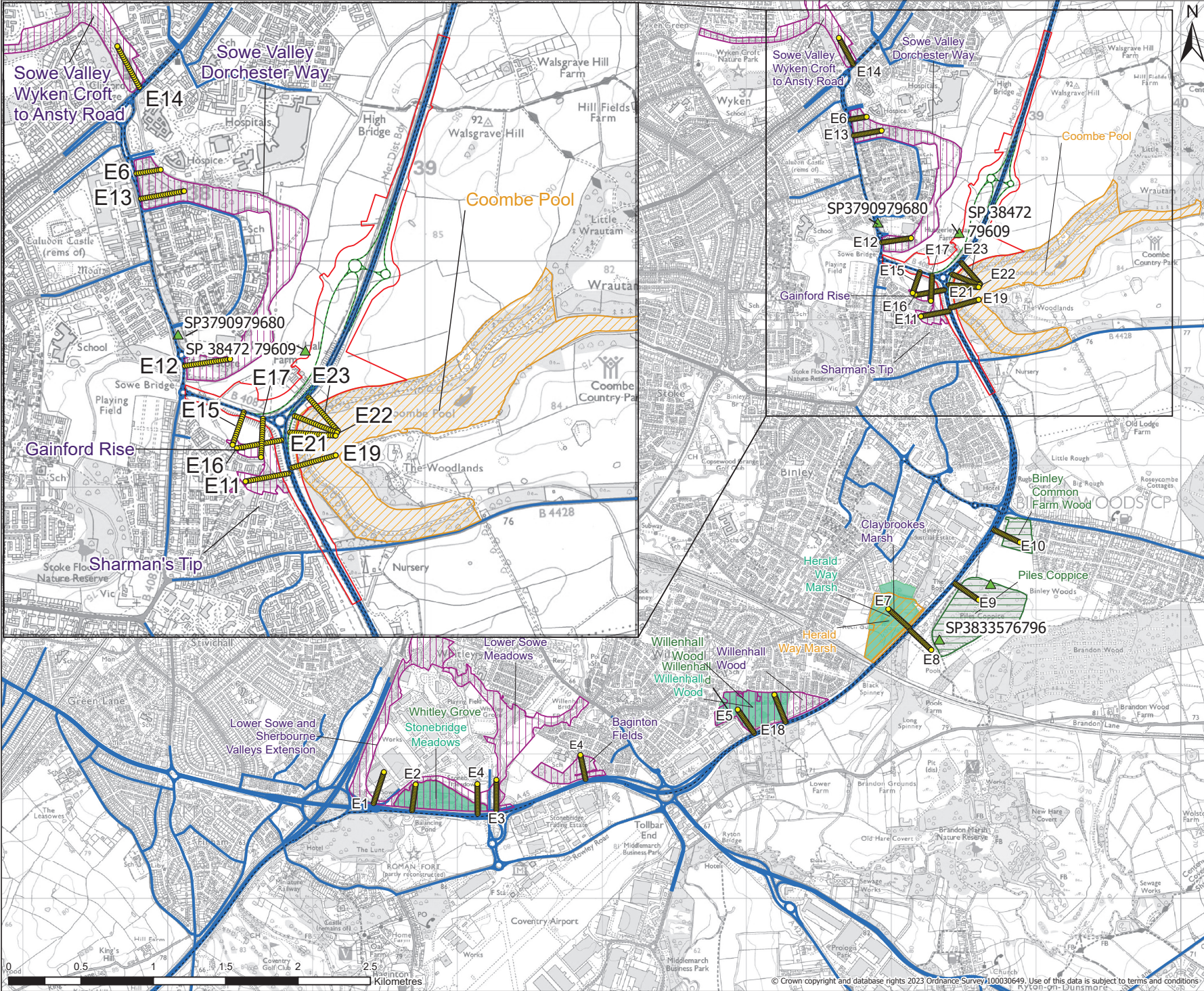
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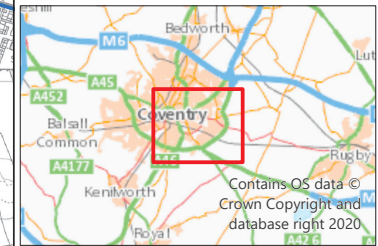
The Woodland Trust (2024). Ancient Tree Inventory. Available online at: <https://ati.woodlandtrust.org.uk/tree-search/?v=2635505&ml=map&z=13&nwLat=51.54794297215686&nwLng=-0.2598221218749952&seLat=51.46150083227914&seLng=0.0697677218750048> (Accessed September 2024)


Annex A: Figures

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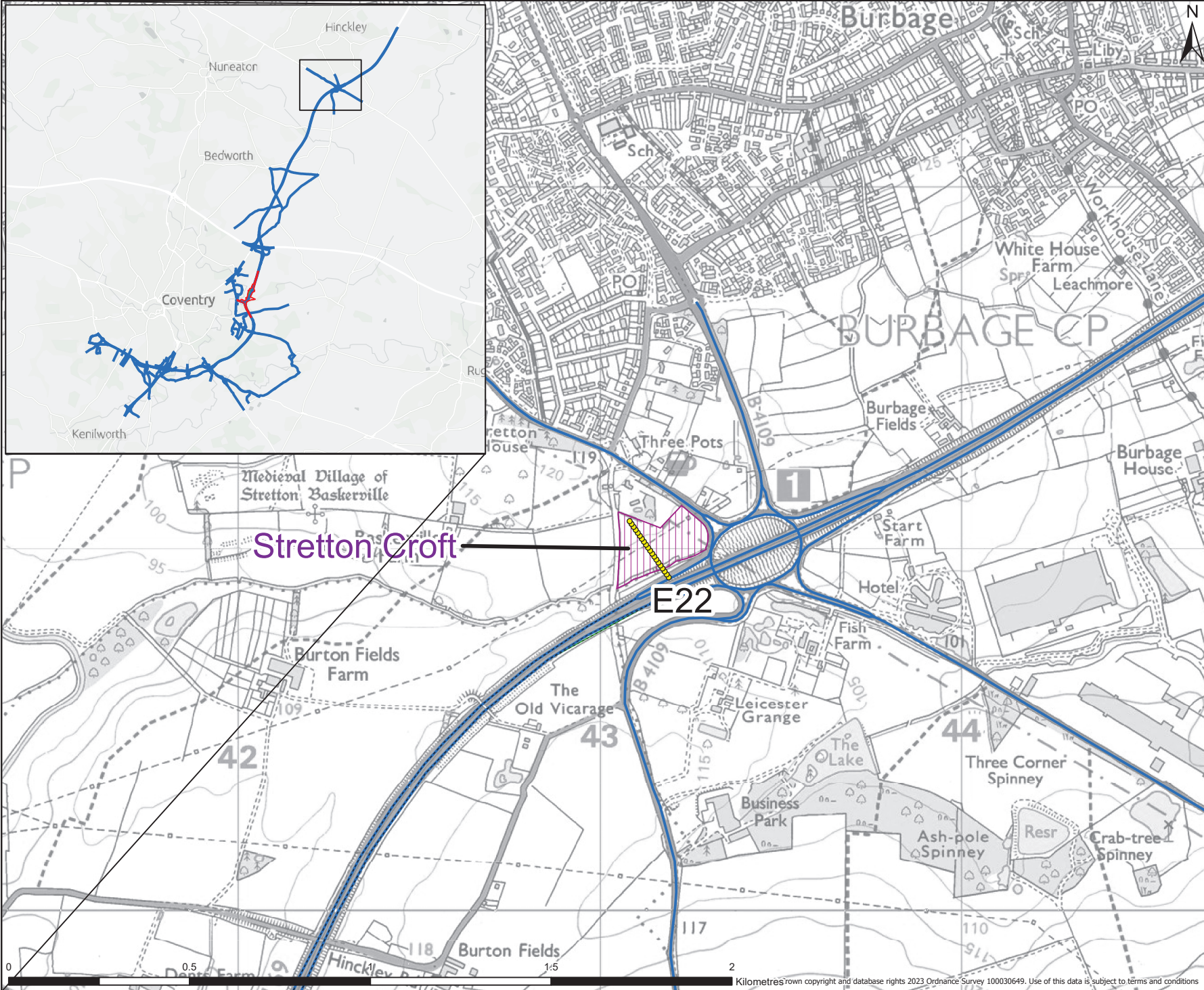


- Legend**
- Order limits
 - Transect receptor
 - Veteran tree
 - LA 105 Screening Criteria (Triggered Link Network (TLN))
 - Proposed Scheme
 - Affected Road Network (ARN)
 - Ancient Woodland Inventory
 - Local Nature Reserve
 - Local Wildlife Site
 - Sites of Special Scientific Interest

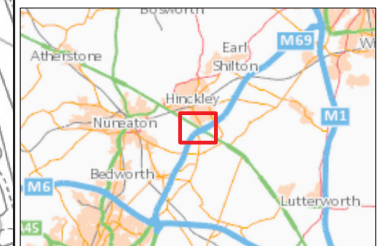


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Client					
<div>national highways</div>					
Project Title					
A46 COVENTRY JUNCTIONS (WALSGRAVE)					
Project Stage					
DCO APPLICATION					
Drawing Title					
FIGURE 1A - ECOLOGICAL TRANSECT RECEPTOR LOCATIONS FOR DESIGNATED SITES INCLUDED IN OPERATIONAL PHASE AIR QUALITY ASSESSMENT					
Subsidiary					
FOR INFORMATION					
Sheet Size	Scale	Status	Revision		
A3	1:25,000	S2	P01		
Drawing Number					
HE604820-OIL-EBD-00-DR-LB-30077					

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- Legend**
- Transect receptor
 - Local Wildlife Site
 - LA 105 Screening Criteria (Triggered Link Network (TLN))
 - Proposed Scheme
 - Affected Road Network (ARN)



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Project Title
A46 COVENTRY JUNCTIONS (WALSGRACE)

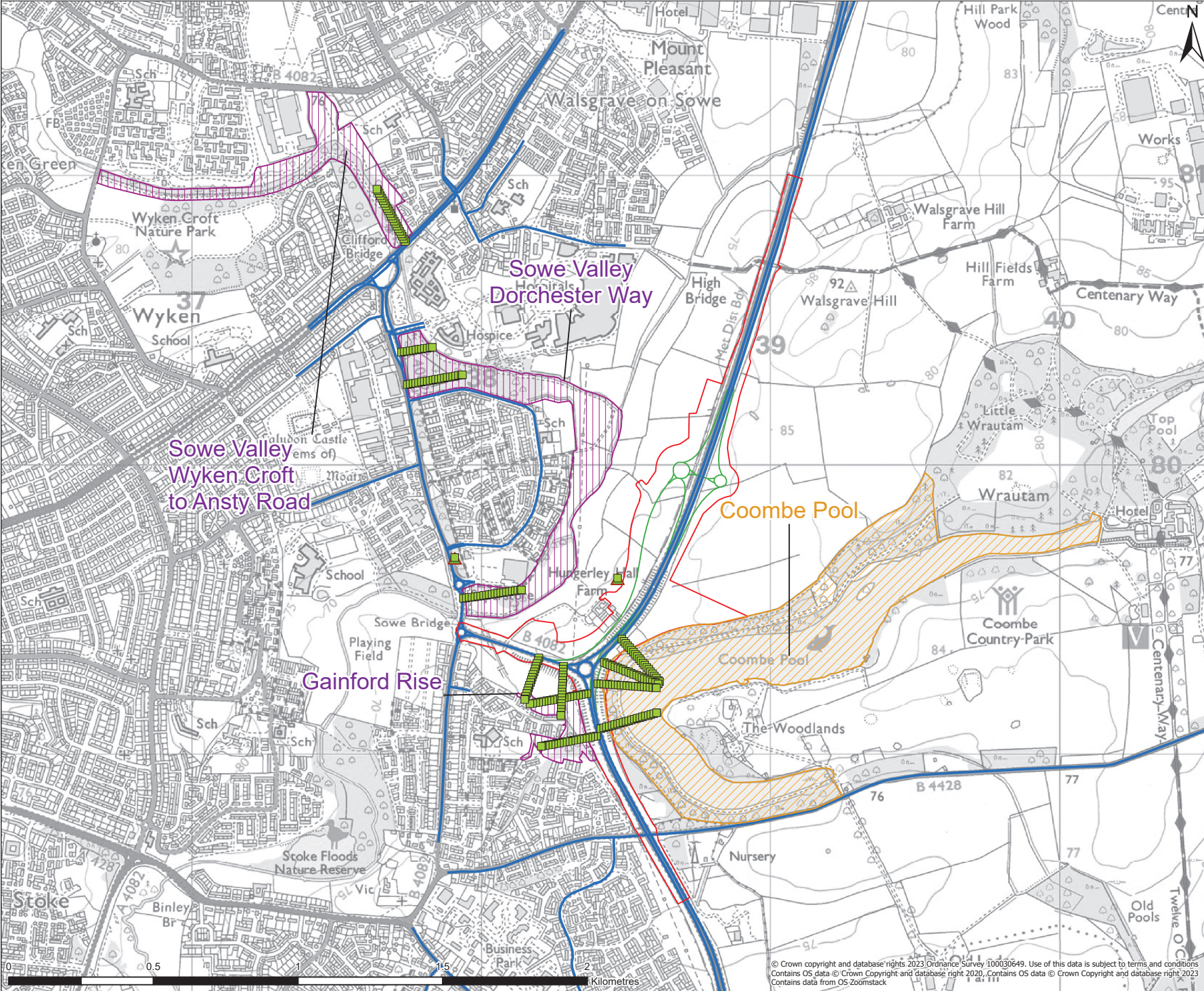
Project Stage
DCO APPLICATION

Drawing Title
FIGURE 1B - ECOLOGICAL TRANSECT RECEPTOR LOCATIONS FOR DESIGNATED SITES INCLUDED IN OPERATIONAL PHASE AIR QUALITY ASSESSMENT

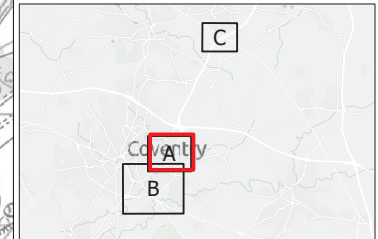
Subsidiary
FOR INFORMATION

Sheet Size	Scale	Status	Revision
A3	1:10,000	S2	P01

Drawing Number
HE604820-OIL-EBD-00-DR-LB-30078



- Legend**
- Order limits
 - Local Wildlife Site
 - Sites of Special Scientific Interest
 - Veteran tree
 - NO_x impacts at ecological transect receptors
 - Below critical level (30µg/m³) and less than 1% impact
 - Affected Road Network (ARN)
 - Proposed Scheme



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Project Title
A46 COVENTRY JUNCTIONS (WALSGRAVE)

Project Stage
DCO APPLICATION

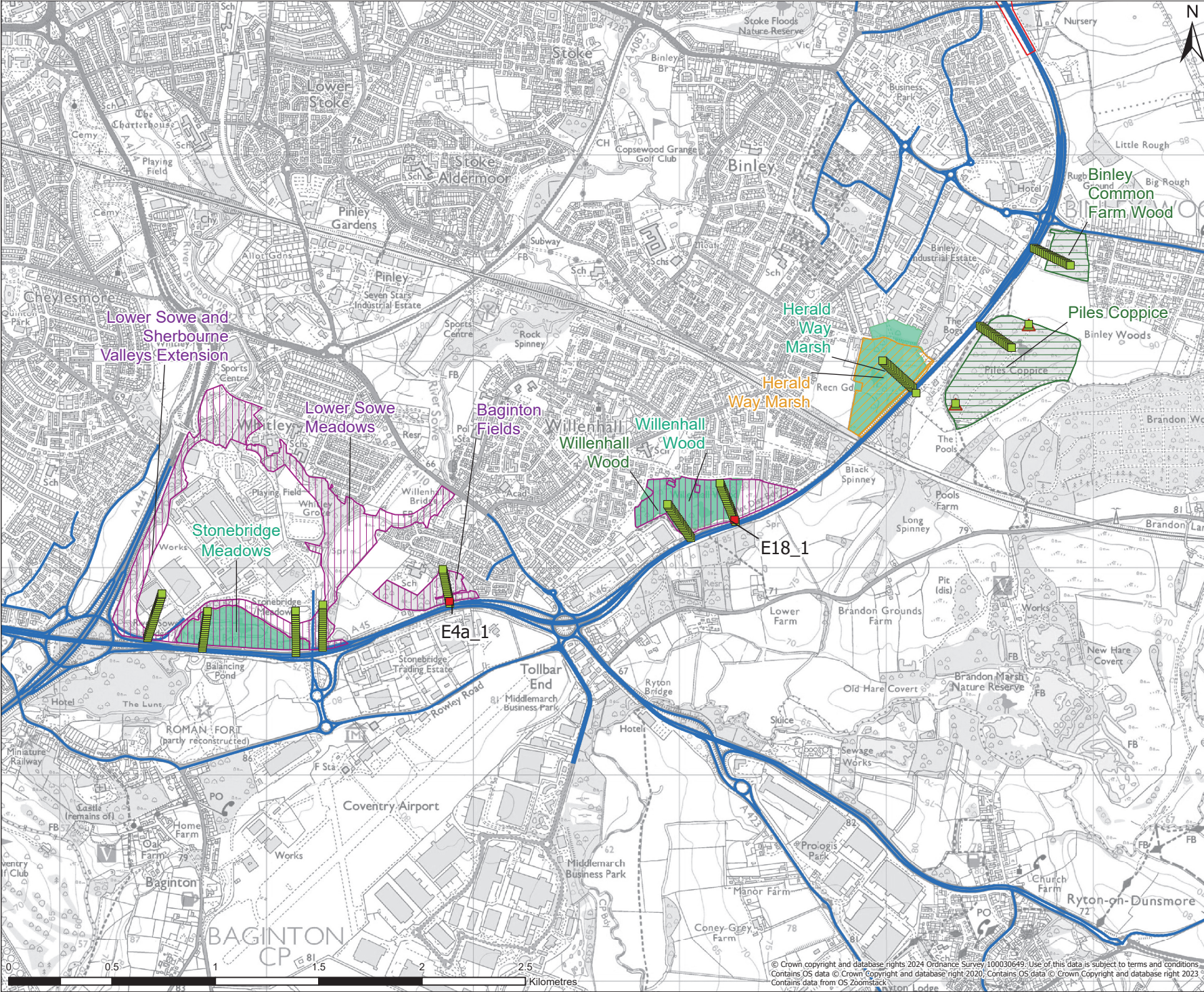
Drawing Title
FIGURE 2A – OPERATIONAL PHASE ANNUAL MEAN NO_x CONCENTRATION IMPACTS AT ECOLOGICAL TRANSECTS

Subsidiary
FOR INFORMATION

Sheet Size	Scale	Status	Revision
A3	1:12,500	S2	P01

Drawing Number
HE046820-OIL-EBD-00-DR-LB-30079

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Legend

- Order limits
- Ancient Woodland Inventory
- Local Nature Reserve
- Local Wildlife Site
- Sites of Special Scientific Interest
- Veteran tree

NO_x impacts at ecological transects receptors

- Exceedance of critical level (30µg/m³) and greater than 1% impact
- Below critical level (30µg/m³) and less than 1% impact

Affected Road Network (ARN)

Proposed Scheme

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Client					

Project Title

A46 COVENTRY JUNCTIONS (WALSGRAVE)

Project Stage

DCO APPLICATION

Drawing Title

FIGURE 2B – OPERATIONAL PHASE ANNUAL MEAN NO_x CONCENTRATION IMPACTS AT ECOLOGICAL TRANSECTS

Subtitle

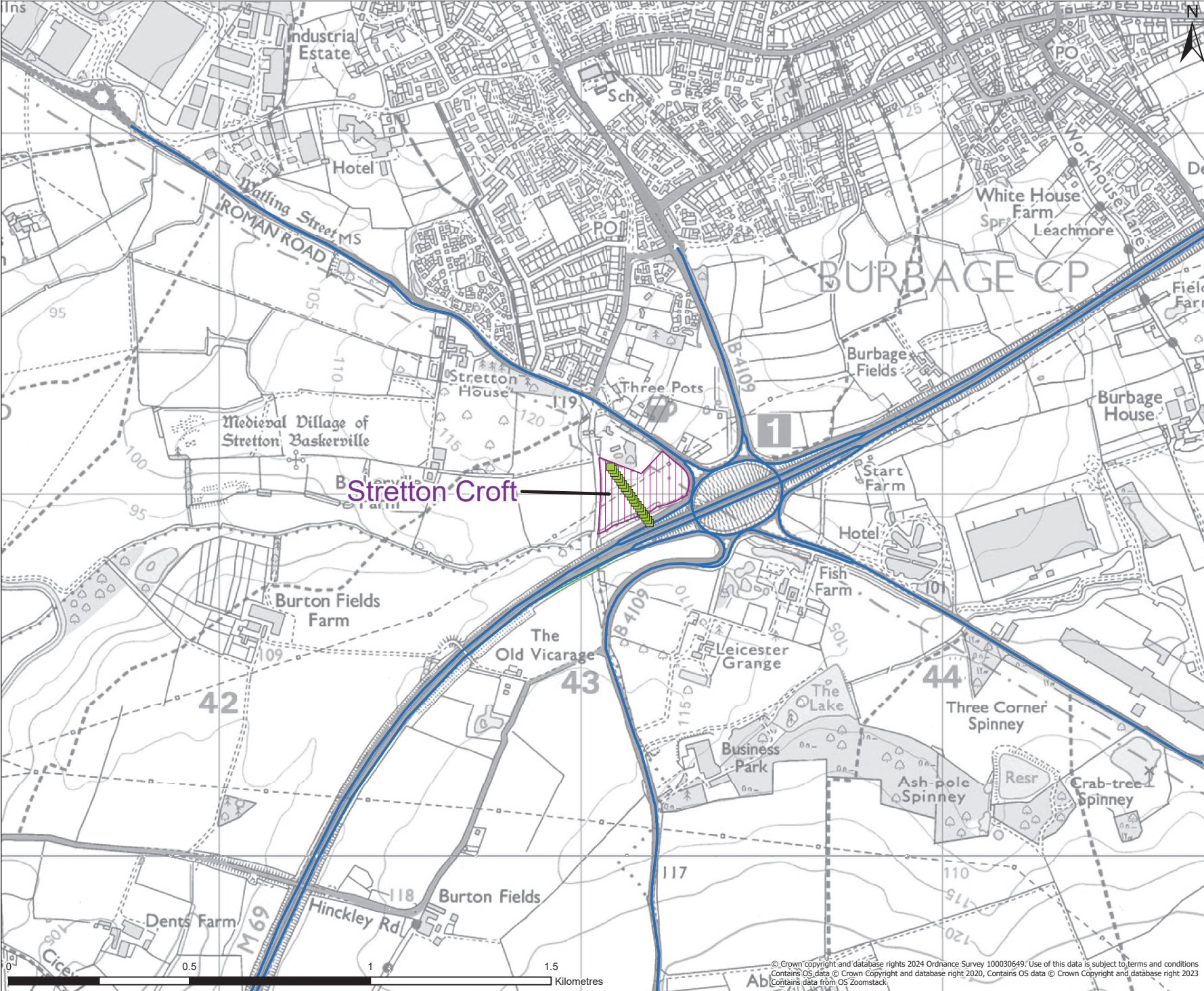
FOR INFORMATION

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Drawing Number

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Legend

- Local Wildlife Site
- NO_x impacts at ecological transects receptors
 - Below critical level (30µg/m³) and less than 1% impact
- Affected Road Network (ARN)
- Proposed Scheme

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Client					

Project Title
A46 COVENTRY JUNCTIONS (WALSGRAVE)

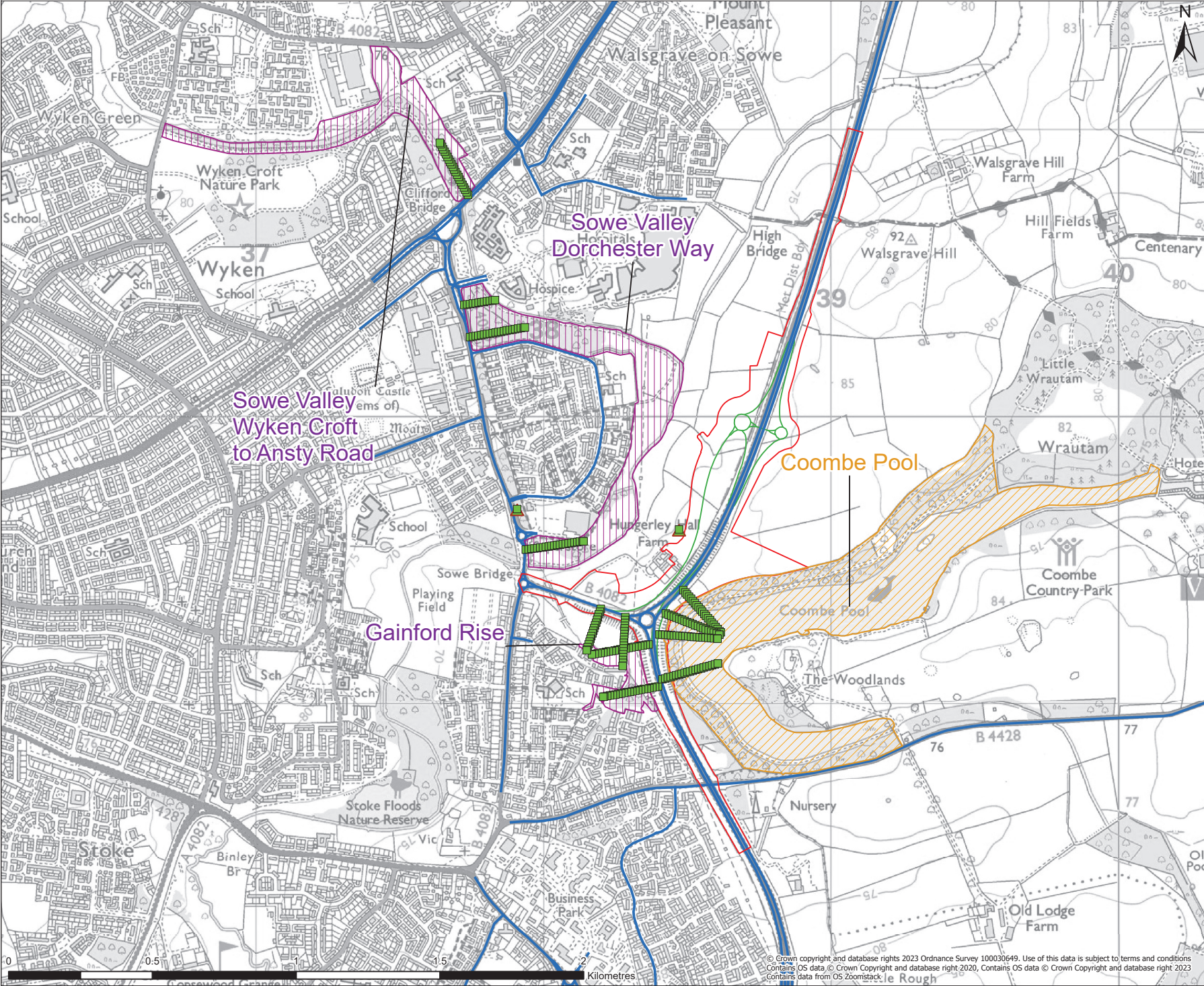
Project Stage
DCO APPLICATION

Drawing Title
FIGURE 2C – OPERATIONAL PHASE
ANNUAL MEAN NO_x CONCENTRATION
IMPACTS AT ECOLOGICAL TRANSECTS

Stability
FOR INFORMATION

Sheet Size A3	Scale 1:10,000	Status S2	Revision P01
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Drawing Number
HE604820-OIL-EBD-00-DR-LB-30081



Legend

- Order limits
- Local Wildlife Site
- Sites of Special Scientific Interest
- Veteran tree
- NH₃ impacts at ecological transects receptors
- Below critical level (1 or 3µg/m³) and less than 1% impact
- Affected Road Network (ARN)
- Proposed Scheme

Figure 3A – OPERATIONAL PHASE ANNUAL MEAN NH₃ CONCENTRATION IMPACTS AT ECOLOGICAL TRANSECTS FOR INFORMATION

Project Title
A46 COVENTRY JUNCTIONS (WALSGRIVE)

Project Stage
DCO APPLICATION

Drawing Title
FIGURE 3A – OPERATIONAL PHASE ANNUAL MEAN NH₃ CONCENTRATION IMPACTS AT ECOLOGICAL TRANSECTS

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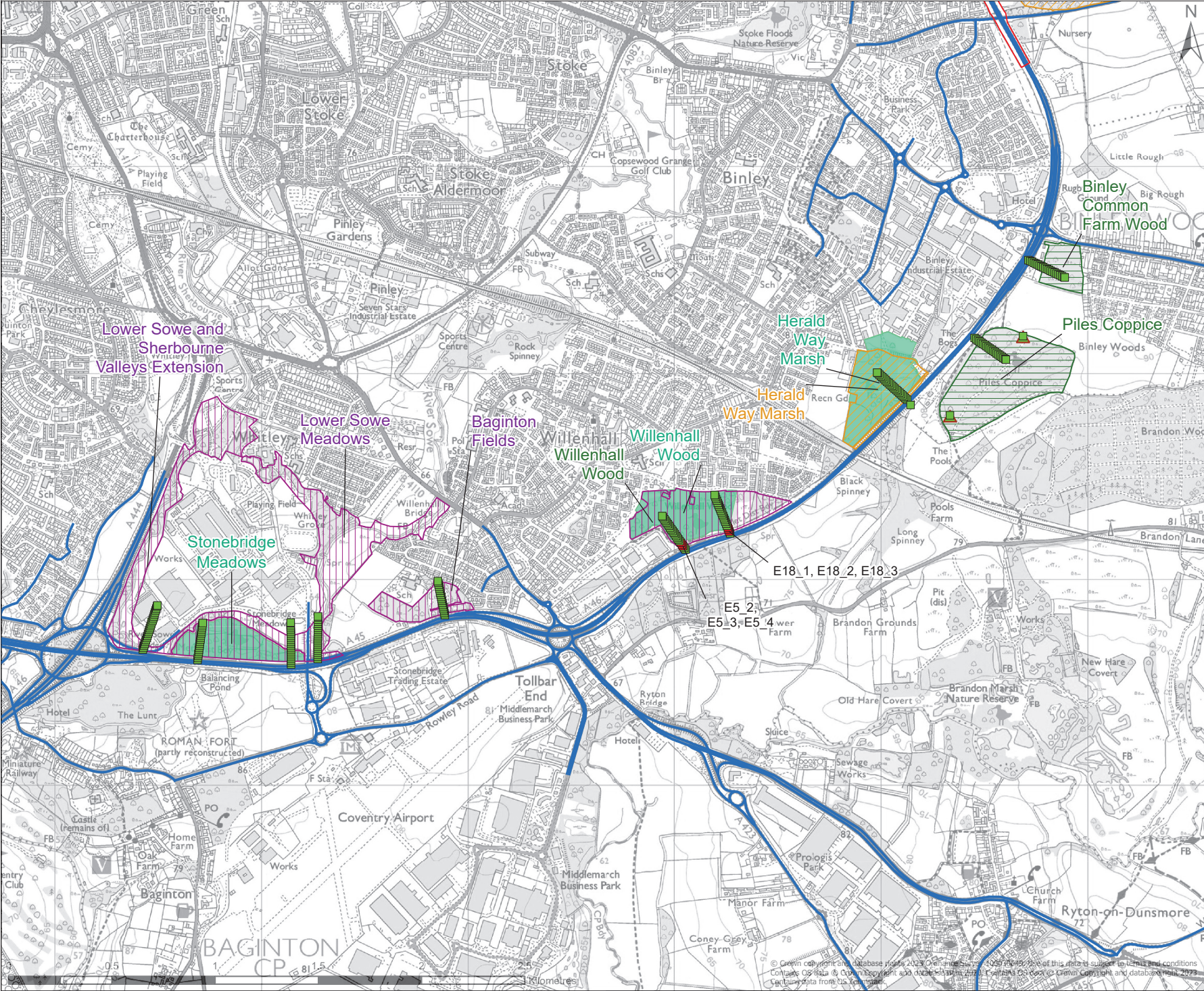
Status
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Revision
P01

Client
national highways

Client Reference
HE046820-OIL-EBD-00-DR-LB-30082

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Legend

- Order limits
- Ancient Woodland Inventory
- Local Nature Reserve
- Local Wildlife Site
- Sites of Special Scientific Interest
- Veteran tree

NH₃ impacts at ecological transects receptors

- Exceedance of critical level (1 or 3 µg/m³) and greater than 1% impact
- Below critical level (1 or 3µg/m³) and less than 1% impact

- Affected Road Network (ARN)
- Proposed Scheme

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Client					

Project Title
A46 COVENTRY JUNCTIONS (WALSGRAVE)

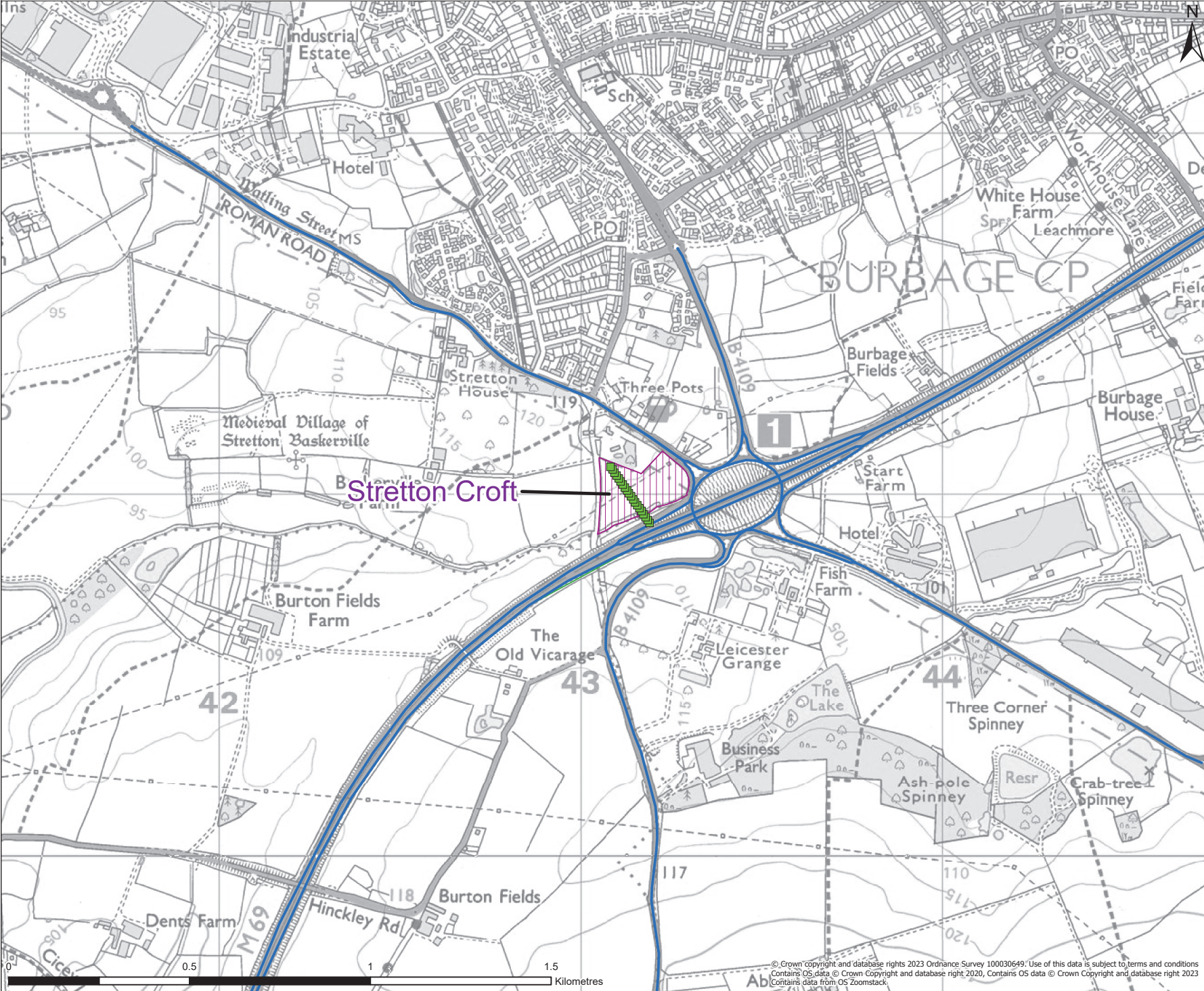
Project Stage
DCO APPLICATION

Drawing Title
FIGURE 3B – OPERATIONAL PHASE ANNUAL MEAN NH₃ CONCENTRATION IMPACTS AT ECOLOGICAL TRANSECTS

Suitability
FOR INFORMATION

Sheet Size A3	Scale 1:17,500	Status S2	Revision P01
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Drawing Number
HE604820-OIL-EBD-00-DR-LB-30083



Legend

- Local Wildlife Site
- NH₃ impacts at ecological transects receptors
 - Below critical level (1 or 3µg/m³) and less than 1% impact
- Proposed Scheme
- Affected Road Network (ARN)

Figure 3C – OPERATIONAL PHASE ANNUAL MEAN NH₃ CONCENTRATION IMPACTS AT ECOLOGICAL TRANSECTS FOR INFORMATION

Client

national highways

Project Title

A46 COVENTRY JUNCTIONS (WALSGRAVE)

Project Stage

DCO APPLICATION

Drawing Title

FIGURE 3C – OPERATIONAL PHASE ANNUAL MEAN NH₃ CONCENTRATION IMPACTS AT ECOLOGICAL TRANSECTS

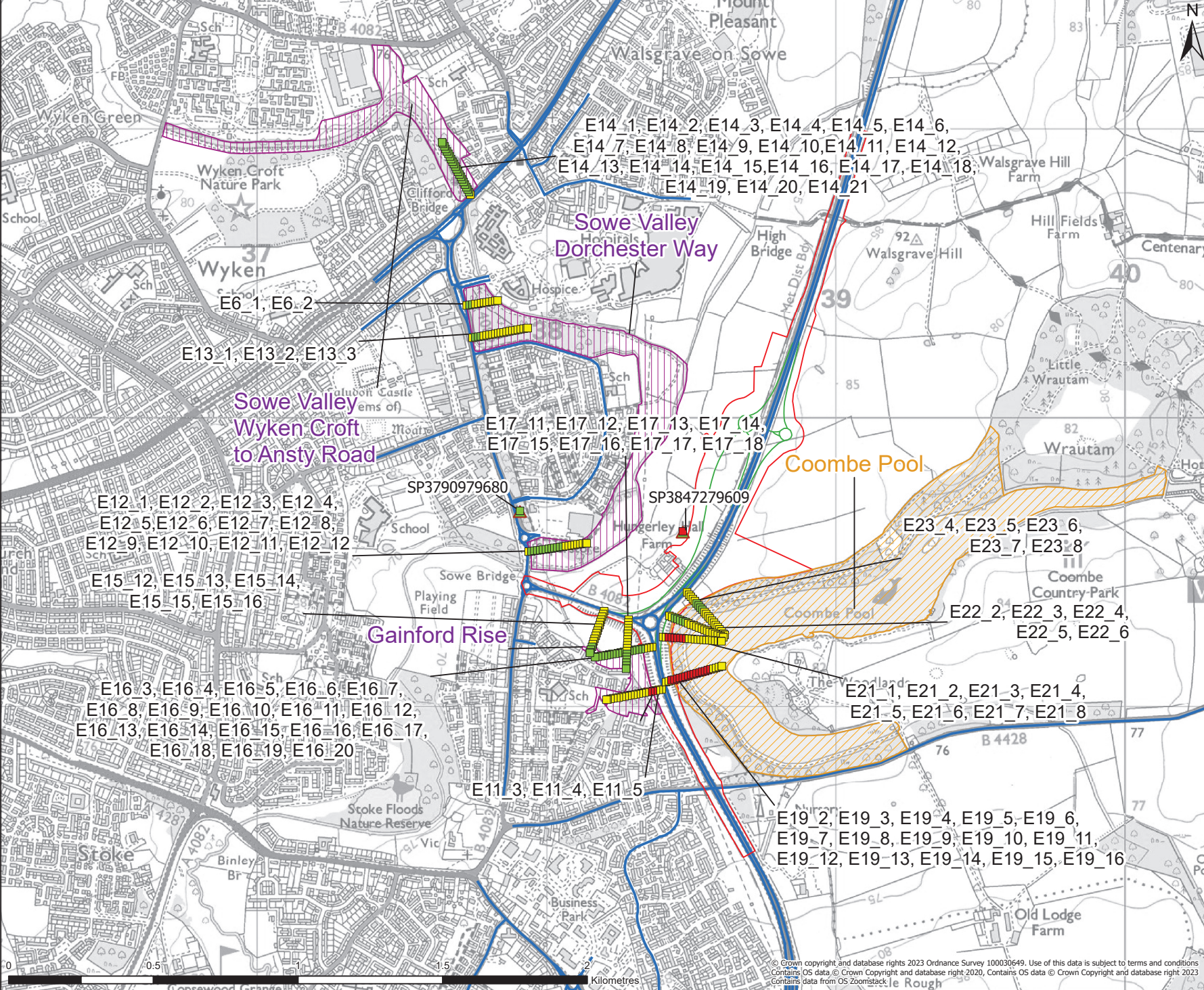
Stability

FOR INFORMATION

Sheet Size	Scale	Status	Revision
A3	1:10,000	S2	P01

Drawing Number

HE604820-OIL-EBD-00-DR-LB-30084



Legend

- Order limits
- Local Wildlife Site
- Sites of Special Scientific Interest
- Veteran tree
- Nitrogen Deposition impacts at ecological transects receptors
 - Less than 1% of the critical level
 - Greater than +1% of the critical load
 - Between -1% and +1% of the critical load
 - Proposed Scheme
 - Affected Road Network (ARN)

Project Title
A46 COVENTRY JUNCTIONS (WALSGRAGE)

Project Stage
DCO APPLICATION

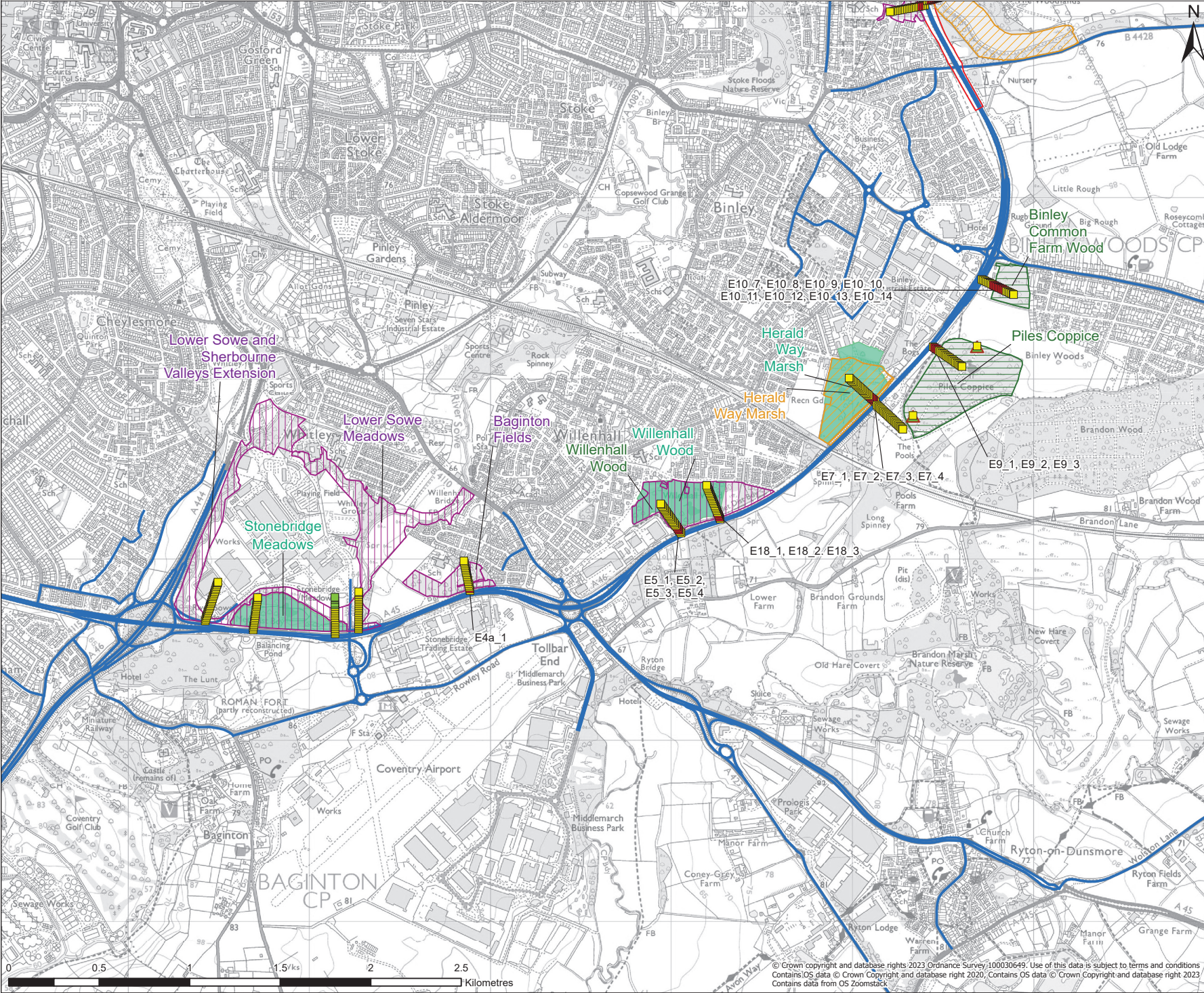
Drawing Title
FIGURE 4A – OPERATIONAL PHASE ANNUAL MEAN N-DEPOSITION IMPACTS AT ECOLOGICAL TRANSECTS

Subsidiary
FOR INFORMATION

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A3	1:12,500	S2	P01

Drawing Number
HE046820-OIL-EBD-00-DR-LB-30085

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Legend

- Order limits
- Ancient Woodland Inventory
- Local Nature Reserve
- Local Wildlife Site
- Sites of Special Scientific Interest
- Veteran tree

Nitrogen Deposition impacts at ecological transects receptors

- Less than 1% of the critical level
- Greater than +1% of the critical load
- Between -1% and +1% of the critical load
- Proposed Scheme
- Affected Road Network (ARN)

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Client

Project Title

A46 COVENTRY JUNCTIONS (WALSGRAVE)

Project Stage

DCO APPLICATION

Drawing Title

FIGURE 4B – OPERATIONAL PHASE ANNUAL MEAN N-DEPOSITION IMPACTS AT ECOLOGICAL TRANSECTS

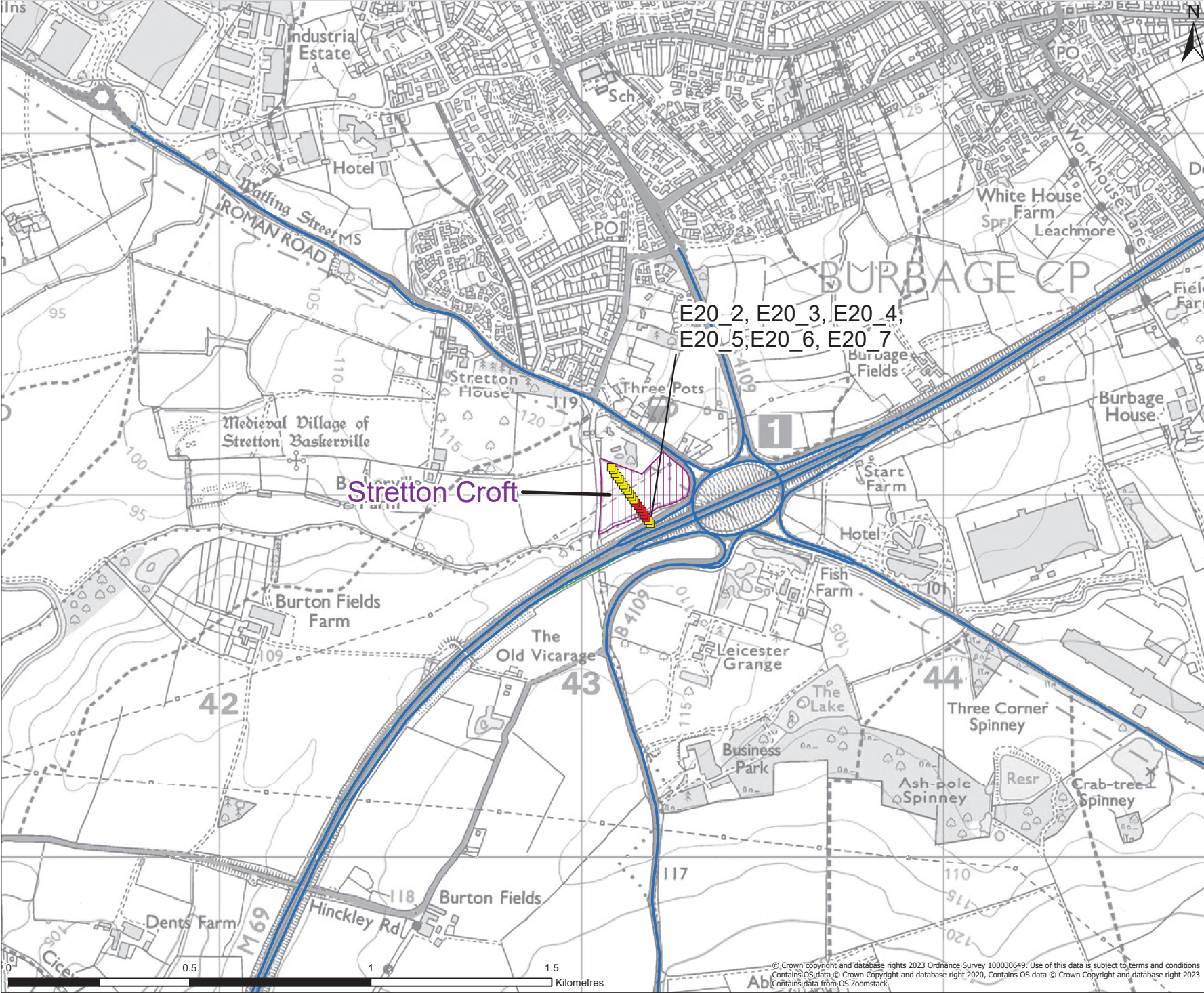
Subtitle

FOR INFORMATION

Sheet Size	Scale	Status	Revision
A3	1:20,000	S2	P01

Drawing Number

HE604820-OIL-EBD-00-DR-LB-30086



Legend

- Local Wildlife Site
- Nitrogen Deposition impacts at ecological transects receptors
 - Greater than +1% of the critical load
 - Between -1% and +1% of the critical load
- Proposed Scheme
- Affected Road Network (ARN)

Figure 4C – OPERATIONAL PHASE ANNUAL MEAN N-DEPOSITION IMPACTS AT ECOLOGICAL TRANSECTS FOR INFORMATION

Project Title: A46 COVENTRY JUNCTIONS (WALSGRAVE)

Project Stage: DCO APPLICATION

Drawing Title: FIGURE 4C – OPERATIONAL PHASE ANNUAL MEAN N-DEPOSITION IMPACTS AT ECOLOGICAL TRANSECTS

Stability: FOR INFORMATION

Sheet Size	Scale	Status	Revision
A3	1:10,000	S2	P01

Drawing Number: HE604820-OIL-EBD-00-DR-LB-30087

Annex B: Natural England Guidance

The table below has been adapted from *Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations* (2018) guidance document. Information on this assessment has been filled out within the table to demonstrate how this assessment has been undertaken in accordance with the guidance. For the supplemental evidence / basis for judgement notes the reader is directed to the original document.

Stage	Flowchart step		Assessment of Air Quality Impacts on Ecological Features: A46 Walsgrave
Initial screening for credible risk of an effect	1	Check distance criteria – could significant emissions reach a protected site? <i>Yes</i> = move to step 2. <i>No</i> = no further assessment required.	Yes – multiple designated sites, ancient woodlands and veteran trees within 200m of the triggered links.
	2	Check the sensitivity of qualifying habitats or supporting habitat of the qualifying species. Are habitats in proximity sensitive to the emission type? <i>Yes</i> = move to Step 3. <i>No</i> = no further assessment required.	Yes – critical loads are those identified on APIS. Paragraph 1.2.10 of the Appendix details how critical loads have been identified.
Detailed screening for determining whether screening thresholds are appropriate	3	Check habitat likelihood to be exposed to emissions. Are the sensitive habitats where emissions are predicted to be? <i>Yes or unsure</i> = move to Step 4a. <i>No</i> = no further assessment required.	Available information was used to determine whether qualifying habitats would be impacted by emissions modelled within the transects include aerial imagery and designated site citations. However, to provide a worst-case scenario, and as many of the non-statutory designated sites have multiple varying habitats mentioned on their citations, impacts upon all habitats have been assessed. This has been undertaken using the lowest most appropriate critical load range, again to provide a worst-case scenario. Yes – all ecological features were taken forward for assessment based on this approach.
Applying screening thresholds	4a	Apply screening threshold alone. <i>If below threshold alone</i> = move to step 4b. <i>If above</i> = move straight to step 5.	Screening thresholds applied include >1% of the lower critical load for N deposition, exceedances of the non-statutory critical NH ₃ level of 1µg/m ³ (lichens and bryophytes) or 3µg/m ³ (higher plants) and exceedances of the statutory critical level of 30µg/m ³ for NO _x . The following ecological features were taken forward for detailed assessment of adverse impacts following increases above the screening threshold for N deposition: <ul style="list-style-type: none"> • Coombe Pool SSSI, • Herald Way Marsh SSSI,

Stage	Flowchart step	Assessment of Air Quality Impacts on Ecological Features: A46 Walsgrave
		<ul style="list-style-type: none"> • Willenhall Wood LNR, LWS and ancient woodland, • Gainford Rise LWS, • Stretton Croft LWS, • Piles Coppice LWS and ancient woodland, • Baginton Fields LWS, • one veteran tree (T12) and • Binley Common Farm Wood ancient woodland. <p>The following ecological features were taken forward for detailed assessment of adverse impacts following increases above the screening threshold for NO_x:</p> <ul style="list-style-type: none"> • Willenhall Wood LNR, LWS and ancient woodland. <p>Baginton Fields LWS was also taken forward for detailed assessment, as whilst the increase in NO_x from the Scheme would be <1% of the critical level, NO_x levels would be above the critical level.</p> <p>The following ecological features were taken forward for detailed assessment of adverse impacts following increases above the screening threshold for NH₃:</p> <ul style="list-style-type: none"> • Willenhall Wood LNR, LWS and ancient woodland.
	<p>4b</p> <p>Apply screening threshold in combination with other traffic/roads</p> <p><i>If below threshold in-combination</i> = move to step 4c.</p> <p><i>If above</i> = move straight to step 5.</p>	<p>ES Chapter 15 (Combined and Cumulative Effects (APP-037)) details the cumulative and combined effects of the Scheme which follows Planning Inspectorate Advice Note Seventeen: Cumulative Effects Assessment. As this air quality assessment utilises forecasts from traffic modelling, which includes other developments to be brought forward in the future, the assessment includes cumulative impacts by default, as detailed within ES Chapter 15.</p>
	<p>4c</p> <p>Apply screening threshold in-combination across sectors</p>	<p>Environmental Statement Chapter 15 details the cumulative and combined effects of the Scheme which follows Planning Inspectorate Advice Note Seventeen: Cumulative Effects Assessment. ES Chapter 15 (Combined and Cumulative</p>

Stage	Flowchart step		Assessment of Air Quality Impacts on Ecological Features: A46 Walsgrave
		<p><i>If below threshold in-combination</i> = no further assessment is required</p> <p><i>If above</i> = move to step 5.</p>	<p>Effects (APP-037) details the establishment of the Zone of Influence (ZOI) and long list of other developments, following which threshold criteria in Schedule 1 and Schedule 3 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 to establish a short list of developments to be considered in the cumulative assessment. The cumulative assessment with other developments concluded no in-combination effects.</p>
Advise assessment is required and contribute scoping advice	5	<p>Provide supporting evidence to Planning Inspectorate (scoped as appropriate)</p> <p>Proceed to step 6 when requested by Planning Inspectorate and sufficient information is available to provide advice.</p>	<p>Assessment includes:</p> <ul style="list-style-type: none"> • Ecological features within 200m of triggered links • Review of qualifying interests of ecological features • Application of appropriate critical loads/levels dependent on qualifying interests and habitats present (see Section 1.2) • Review of background N deposition and NH₃ concentrations and where these exceed critical loads/levels • Assessment of duration of impacts as permanent • Assessment of scale (spatial) of impact considering the amount of the ecological feature impacted <p>Assessment has identified no significant residual effects.</p>
Advice on the assessment	6	<p>Planning Inspectorate has provided an assessment conclusion.</p> <p>When requested by Planning Inspectorate and information is available to provide advice.</p>	N/A.