Babergh and Mid Suffolk Joint Local Plan

Ecological Interpretation of Air Quality Monitoring at Protected Habitats Sites

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Essex County Council

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1. Introduction

1.1 The aim of this report is to provide an ecological interpretation assessment of air quality monitoring to inform the Babergh and Mid Suffolk Joint Local Plan.

1.2 Adverse air quality, in combination with other plans and projects, was identified as a relevant impact upon the Stour and Orwell Estuaries Special Protection Area (SPA) and Ramsar site, the Waveney and Little Ouse Valley Fens Special Area of Conservation (SAC) and the Redgrave and Lopham Fen Ramsar site. This was identified as part of the Babergh and Mid Suffolk Joint Local Plan: Pre-Submission (Regulation 19) because of the potential increase of road vehicle traffic at sensitive locations, as a result of site allocations included as part of the Babergh and Mid Suffolk Joint Local Plan, which may result in Adverse Effects on the Integrity (AEOI) of the listed Habitats sites from increased vehicle emissions.

1.3 As a result, to ensure compliance with Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended), baseline air monitoring at four sensitive locations was considered necessary to inform likely impacts from adverse air quality, during the lifetime of the Joint Local Plan. This included three locations on the Stour and Orwell Estuaries SPA and Ramsar site and one location for the Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site. The locations of these monitoring sites are outlined in Appendix 1 and 2 and are listed below:

- Shotley
- Cattawade
- Wherstead (B1456, South of the Orwell Bridge)
- Redgrave (B1113).

1.4 The air quality monitoring was carried out at monthly intervals from September 2021 to August 2022 and was reviewed by the UK Centre for Ecology and Hydrology (UKCEH). The survey consisted of continuous time-integrated measurements of Nitrogen Dioxide (NO_2) and Ammonia (NH_3) made with Gradko diffusion tubes and UKCEH ALPHA® samplers, respectively. This included a single monitoring station at Shotley, with three monitoring stations for the other three sites. This was undertaken to compare roadside concentrations (within ~ 2 m of road edge) with measurements further away from the road (~ 12 m) to compare with likely influence from local farming sources.

1.5 The scope of this survey was based on Natural England guidance on air quality assessment[1] and Highways Agency Design Manual for Road and Bridges (DMRB) - LA 105 Air quality[2],

[1] Natural England (2018) Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Available at: https://publications.naturalengland.org.uk/publication/4720542048845824

[2] Design Manual for Roads and Bridges (DMRB) (2019). Sustainability & Environment Appraisal LA 105 Air quality. Available at: https://www.standardsforhighways.co.uk/dmrb/search/10191621-07df-44a3-892e-c1d5c7a28d90

with impacts from traffic emissions over 200m from a Protected Habitats site being scoped out as part of the Habitats Regulations Assessment. This was agreed as part of a statement of common ground with Natural England to support the Babergh and Mid Suffolk Joint Local Plan: Pre-Submission (Regulation 19).

1.6 The purpose of the assessment was to identify whether increased NO_2 and NH_3 from traffic emissions at these sites are currently causing impacts upon the identified European sites or whether increased NO_2 and NH_3 are likely to result in impacts during the lifetime of the Joint Local Plan. If adverse air quality is considered likely as a result of the Joint Local Plan, then section 5 of 'Policy SP09 – Enhancement and Management of the Environment' of the adopted Babergh and Mid Suffolk Joint Local Plan – Part 1 triggers the need for further mitigation measures to be included as part of the Part 2 Plan.

1.7 As a result, Babergh and Mid Suffolk District Councils requested that Place Services undertakes an ecological interpretation assessment of air quality monitoring undertaken by the UKCEH[3]. The ecology interpretation is based on guidance provided by the UK Air Pollution Information System (APIS) and the Chartered Institute of Ecological Environmental Management (CIEEM).

1.8 Additional consideration has also been made using the APIS database to confirm whether the critical loads of Nitrous Oxides (NO_x) will be exceed. In addition, further consideration has been provided on whether the critical levels of Sulphur Dioxide (SO_2) have been exceeded for the sample areas. This was not included with the monitoring report as high concentrations of SO_2 are typically produced from the burning of fossil fuels from industry rather than traffic emissions.

1.9 This report also includes a review of the conservation advice for the relevant Habitats sites provided by Natural England, with a key focus in regard any key factors affecting site integrity, to determine whether air quality survey has identified any potential impacts upon the relevant Habitats sites and whether the Councils need to commit to an immediate review of the planning policies if the baseline monitoring identifies that Adverse Effects On site Integrity upon the relevant Habitats sites.

[3] UK Centre for Ecology & Hydrology (May 2023) Nitrogen dioxide and ammonia monitoring at Cattawade, Redgrave, Shotley and Wherstead

2. Review Methodology

2.1 The 'Natural England (June 2018) Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations' outlines the following direct and in-direct effects from air pollution upon qualifying features:

a) The direct effects which arise when a pollutant which is dispersed in the air is taken up by vegetation (through pores on the surface called stomata). Pollutants taken up by vegetation can cause adverse impacts to plant health and viability. The relevant assessment benchmark for pollutant concentrations 'in the air' is referred to as a critical level expressed in units of µg/m3 (micrograms per cubic metre).

b) There are indirect effects which arise when the pollutant settles onto the ground (referred to as 'deposition') causing nutrient enrichment of the soil ('eutrophication') or changes to the soil pH ('acidification'). These effects can decrease the ability of a plant to compete with other plants and can hinder the inherent capacity for self-repair and self-renewal under natural conditions. In other words, nitrogen acts as a fertiliser for plants that can thrive on high nitrogen levels and can dominate plant communities. The speed with which a given pollutant settles (or deposits) after it is released into the atmosphere is different for each pollutant, and is influenced by how dense (or heavy) the particles are. Some pollutants travel a long distance before deposition occurs whilst others will settle much closer to their source. Wind speed and direction will also have an influence on deposition properties.

2.2 Therefore, the relevant assessment benchmark for pollutant concentrations 'in the air' is referred to as a **critical level** expressed in units of µg/m3 or µg m^{-3} (micrograms per cubic metre). Whereas the relevant assessment benchmark for pollutant levels which settle from the air onto a surface (or deposit) is referred to as a **critical load**. This is expressed in units of kilograms of nitrogen per hectare per year (kgN/ha/yr) for nitrogen deposition.

2.3 Where the change in concentration/deposition is predicted to be 1% of the identified critical level or critical load threshold or more, either alone or in combination, there is a risk that the relevant species and habitat could be affected. However, these thresholds are only tool to indicate when further ecological assessment and/or detailed air quality monitoring is required to determine the extent of impacts. Therefore, further ecological interpretation is essential to confirm the extent of likely impacts upon a Protected Habitats Site when the critical level or critical load has been exceed.

2.4 Therefore, this ecological interpretation of air quality monitoring sets to determine whether the baseline or whether a predicted environmental concentration exceeds the critical level or critical load at the Protected Habitats sites. This will include the use of the 'Site Relevant Critical Loads Search Tool' and the 'habitat/species pollutant impacts database' on the Air Pollution Information System (APIS) (www.apis.ac.uk).

2.5 If no negative effects are identified or that impacts are considered de-minimis, then it will be reasonable to rule out adverse effects on site integrity at this stage. A de-minimis effect is a level of risk that is too small to be concerned with when considering qualifying features present on a Protected Habitats site necessary to ensure their favourable conservation condition.

2.6 If negative effects are identified, with critical levels and/or critical loads exceeded at a Protected Habitats Site, then further ecological interpretation will be provided on whether this directly related to traffic emissions or likely to be from an alternative input (e.g. Agricultural practices). Further consideration will also be provided on whether any effects are likely long-term or short-term impacts. If it is identified that critical levels or critical loads are exceeded from traffic emissions and will only increase as a direct result of the adopted Babergh and Mid Suffolk Joint Local Plan, further recommendations for additional assessment or mitigation will be provided to avoid an Adverse Effects On site Integrity upon the relevant Protected Habitats Sites.

2.7 Regardless of whether negative effects are identified, Babergh and Mid Suffolk District Councils have committed to long-term monitoring during the lifetime of the Joint Local Plan, to ensure that mitigation measures can be implemented where necessary and ensure compliance under the Conservation of Habitats and Species Regulations 2017 (as amended).

3. Review of Protected Habitats Sites

3.1 The Qualifying Features, Conservation Objectives and Key Vulnerabilities / Factors Affecting Site Integrity of the Stour and Orwell Estuaries SPA and Ramsar site, the Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site have been set out in Appendix 3 of this report.

3.2 An interpretation of the potential impacts from NO_x, NH_3 and SO_2 from traffic emissions upon the Protected Habitats sites is outlined below.

Stour and Orwell Estuaries SPA and Ramsar site:

3.3 The Site Improvement Plan for the Stour and Orwell Estuaries identifies that Nitrogen deposition exceeds the site-relevant critical load for ecosystem protection and hence there is a risk of harmful effects, but the sensitive features are currently considered to be in favourable condition on the site.

3.4 The sensitive habitat features on site include coastal saltmarsh, vegetated shingle / coastal dune habitat and intertidal mudflats.

3.5 The nearest habitat / ecosystem type for nitrogen deposition on the APIS database[4] for coastal saltmarsh is 'Pioneer, low-mid, mid-upper saltmarshes'. There are very few studies of Nitrogen deposition effects on these systems, but work undertaken in the Netherlands suggest coastal saltmarsh vegetation is Nitrogen limited (Mitsch & Gosselink, 2000), which would make it vulnerable to eutrophication effects from atmospheric Nitrogen deposition. These systems are typically inter-tidal, i.e. subject to continual, daily, periodic flooding with saline water. Therefore, overall atmospheric Nitrogen deposition is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs. There are no specific critical loads / levels for ammonia for this habitat, albeit it is noted that there may be some localized effects of ammonia from wintering wildfowl, especially large geese flocks. There are also no specific critical loads / levels for Sulphur Dioxide for this habitat.

3.6 The nearest habitat / ecosystem type on the APIS database for vegetated shingle or coastal dunes is 'Shifting coastal dunes' for Nitrogen deposition, albeit is not an accurate representation of the habitat type. The APIS database states that there is very little known about Nitrogen effects on these communities and it is assumed that the habitat acts in a similar way to acidic dune communities, albeit that moisture is strongly limiting and may moderate Nitrogen responses in early successional shingle habitats. The APIS database includes higher plants to consider impacts upon critical level for Ammonia concentration. There are also no specific critical loads / levels for Sulphur Dioxide for this habitat.

[4] APIS. Available from http://www.apis.ac.uk/ [Accessed July 2024].

3.7 There is no nearest habitat / ecosystem type for intertidal mudflats on the APIS database to provide an established critical load estimate. The APIS database did consider that mudflats were sensitive to nitrogen deposition, but this habitat type has since been removed from the database. This habitat will be inter-tidal, i.e. subject to continual, daily, periodic flooding with saline water. Therefore, overall atmospheric Nitrogen deposition is likely to be of low importance for these systems as any inputs are probably significantly below the large nutrient loadings from river and tidal inputs. There are also no specific critical loads / levels for Ammonia or Sulphur Dioxide for this habitat.

3.8 The relevant critical load / level Nitrogen deposition for the relevant habitats are as follows, in line with the APIS database:

- **Pioneer, low-mid, mid-upper saltmarshes (Coastal Saltmarsh):** 20-30 kgN ha^{-1} $year^{-1}$
- **Shifting coastal dunes (Vegetated Shingle / Coastal Dunes):** 10-20 kgN ha^{-1} $year^{-1}$

3.9 The relevant critical level for Ammonia concentration for the relevant habitats are as follows, in line with the APIS database:

- **Higher plants (Vegetated Shingle):** 3 µg NH_3 m^{-3} annual mean (uncertainty of 2-4 µg NH_3 m^{-3})

3.10 Both vegetated shingle and coastal saltmarsh require professional judgement to identify if there is a productivity increase in late successional species and graminoids.

3.11 In terms of the individual qualifying features of the Stour and Orwell Estuaries SPA and Ramsar site, it is indicated that the APIS database states the following with regard to the impacts from Nitrogen deposition and Ammonia:

- **Black-tailed Godwit:** Breeding populations sensitive to changes in broad habitat type, via the increase in tall grasses from nitrogen deposition. Breeding populations are not listed as a qualifying feature Stour and Orwell Estuaries SPA and Ramsar site, so no impacts are expected upon the species.
- **Cormorant:** Breeding populations can be sensitive to nitrogen deposition. However, decisions must be taken at a site specific level depending on the specific habitat type. Breeding populations are not listed as a qualifying feature Stour and Orwell Estuaries, so no impacts are expected upon the species.
- **Curlew:** Breeding populations sensitive to changes in foraging habitat, via the increase in tall grasses from nitrogen deposition. No breeding population is listed as a qualifying feature Stour and Orwell Estuaries SPA and Ramsar site, so no impacts are expected upon the species.

- **Dark-bellied Brent Goose:** Overwintering population is sensitive to changes in broad habitat type from nitrogen deposition, if using coastal saltmarsh to forage**.** Therefore, there is possible impact from increases in nitrogen deposition upon the qualifying feature.
- **Dunlin:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh).
- **Goldeneye:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh). Potential positive impact on species due to impacts on the species' food supply.
- **Great Crested Grebe:** Overwintering population is sensitive to changes in broad habitat type from nitrogen deposition, if using coastal saltmarsh to forage**.** Therefore, there is possible impact from increases in nitrogen deposition upon the qualifying feature.
- **Grey Plover:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh). Potential positive impact on species due to impacts on the species' food supply.
- **Knot:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh). Potential positive impact on species due to impacts on the species' food supply.
- **Lapwing:** Breeding populations sensitive to changes in foraging habitat, via the increase in tall grasses from nitrogen deposition. No breeding population is listed as a qualifying feature Stour and Orwell Estuaries SPA and Ramsar site, so no impacts are expected upon the species.
- **Oystercatcher:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh). Potential positive impact on species due to impacts on the species' food supply.
- **Pintail:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh). Potential positive impact on species due to impacts on the species' food supply.
- **Redshank:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh). Potential positive impact on species due to impacts on the species' food supply.
- **Ringed Plover:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh). Potential positive impact on species due to impacts on the species' food supply.

- **Shelduck:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh).
- **Turnstone:** No expected negative impact on over-wintering populations due to impacts on the species' broad habitat type (coastal saltmarsh). Potential positive impact on species due to impacts on the species' food supply.
- **Wigeon:** Overwintering population is sensitive to changes in broad habitat type from nitrogen deposition, if using coastal saltmarsh to forage**.** Albeit there may be a potential positive impact on species due to impacts on the species' food supply. Therefore, there is possible impact from increases in nitrogen deposition upon the qualifying feature.

3.12 Therefore, the only qualifying features of the Stour and Orwell Estuaries SPA and Ramsar site which may be affected by increases in Nitrogen deposition are Dark-bellied Brent Goose, Great Crested Grebe and Wigeon.

3.13 Dark-bellied Brent Goose during the winter feed on intertidal habitats, where the main plants exploited are *Zostera spp.* and green algae (*Enteromorpha spp.* and *Ulva spp.*). However, they also forage on coastal saltmarshes and in-land habitat, including grasslands, winter cereals, oilseed rape, and even recreation and sports grounds. It is considered likely that any increase in traffic emissions at specific locations will not impact populations of Dark-bellied Brent Goose, due to habitat / foraging availability across both estuaries.

3.14 Great Crested Grebe spends majority of its time foraging in open water during the winter, feeding on small fish and aquatic invertebrates. Therefore, it is uncertain how this species could be affected from increases of nitrogen deposition upon saltmarsh, as the species forages over open water during the wintering period. As a result, based on expert judgement, the only possible indirect link would be if nitrogen deposition upon saltmarsh changed fish stock / invertebrate levels in the estuary.

3.15 Wigeon during the winter feed in open water on aquatic plants, algae and eelgrasses in estuaries. However, they also feed in grasslands and arable fields nearby their freshwater habitat, grazing on leaves, stems, grass seeds and sedges. It is considered likely that any increase in traffic emissions at specific locations will not impact populations of Wigeon, due to habitat / foraging availability across both estuaries.

3.16 The Site Improvement Plan for the Stour and Orwell Estuaries also only identifies that nitrogen concentration and deposition values across the whole site the Stour and Orwell Estuaries exceed the relevant critical loads for ‘coastal dune habitats’ and the breeding terns it supports. However, the only location of shingle dunes is located outside of the boundaries of the districts, as the only instance of this habitat is present on the Stour Estuary within

Tendring District, Essex[5]. In addition, breeding terns are not listed as a qualifying feature of the Stour and Orwell Estuaries SPA & Ramsar, as well as the underpinning Sites of Special Scientific Interest.

Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site:

3.17 The Site Improvement Plan for the at the Waveney and Little Ouse Valley Fens SAC identifies that Nitrogen deposition exceeds the site-relevant critical load, with likely impacts being caused from agricultural practices.

3.18 The sensitive habitat features on site include the following:

- H6410. Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*); Purple moor-grass meadows
- H7210. Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*; Calcium-rich fen dominated by Great Fen Sedge (Saw Sedge) *Cladium mariscus**

3.19 The nearest habitat / ecosystem type for Purple moor-grass meadows for considering nitrogen deposition on the APIS database is 'Moist and wet oligotrophic grasslands: Molinia caerulea meadows'. However, it is highlighted that this habitat is recorded within the acid grassland habitat types and therefore calculations have not been based on calcareous soils. The increase of Nitrogen deposition will result in a loss of floristic diversity, as grasslands became more grass dominated, showing increasing canopy height, leaf area index and productivity. There are also no specific critical loads / levels for Ammonia or Sulphur Dioxide for this habitat.

3.20 The nearest habitat / ecosystem type for Calcareous fens for considering Nitrogen deposition on the APIS database is 'Calcareous fens'. These habitats are permanently, seasonally or periodically waterlogged and ground fed, receiving potentially nutrient rich or polluted water from the surrounding area (e.g. surface runoff and precipitation). Thus atmospheric Nitrogen deposition may not be the only source of Nitrogen eutrophication in these systems, making it difficult to predict likely effects of Nitrogen deposition. Atmospheric Nitrogen deposition will, however, represent the only source of Nitrogen deposition direct to epiphytic flora and terricolous mosses, lichens and liverworts. There are also no specific critical loads / levels for Sulphur Dioxide for this habitat.

3.21 The relevant critical load / level Nitrogen deposition for the relevant habitats are as follows, in line with the APIS database:

[5] The Suffolk Coast & Heaths AONB (2018). The Suffolk Coast & Heaths AONB Management Plan 2018-2023. Available from https://www.suffolkcoastandheaths.org/wp-content/uploads/2021/01/SCH-AONB-Management-Plan-2018-23.pdf

- **Moist and wet oligotrophic grasslands: Molinia caerulea meadows (Purple Moor Grass):** 15-25 kgN ha^{-1} $year^{-1}$
- **Rich fens (Calcareous fens):** 15-30 kgN ha^{-1} $year^{-1}$

3.22 The relevant critical load / level for Ammonia concentration for the relevant habitats are as follows, in line with the APIS database:

- **Higher plants (Rich Fens):** 3 µg NH_3 m^{-3} annual mean (uncertainty of 2-4 µg NH_3 m^{-3})
- **Lichens and Bryophytes (Rich Fens):** 1 µg NH3 m^{-3} annual mean

3.23 Both Calcareous fens and Purple Moor Grass require professional judgement to identify if there is a productivity increase in late successional species and graminoids.

3.24 In terms of the individual qualifying features of the the Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site, it is indicated that the APIS database states the following with regard to the impacts from Nitrogen deposition and Ammonia:

- S1016. Desmoulin`s whorl snail *Vertigo moulinsiana*

3.25 However, the species is associated with rivers and streams and the APIS database indicates that there is no comparable habitat with established critical load to impacts to be estimated for this species.

4. Review of APIS Baseline Data

4.1 The APIS database provides a desk-based assessment for 2021 (Mid-year for 3 year average 2020-2022) based on 1km grid squares. This includes average Nitrogen deposition (KgN/ha/yr), Ammonia concentration (µg/m3), NOx concentration (µg/m3) and SO_2 Concentrations (µg/m3).

4.2 This includes the following results for the monitoring locations on the Stour and Orwell Estuaries SPA and Ramsar site:

- **Shotley** (WGS84: 1.262, 51.957):
  i. Nitrogen deposition – 9.08 kgN ha-1 year-1
  ii. NOx concentration – 15.77 µg m^{-3}
  iii. Ammonia concentration – 1.38 µg m^{-3}
  iv. SO_2 concentration – 1.34 µg m^{-3}
- **Cattawade (**WGS84: 1.06, 51.957):
  i. Nitrogen deposition - 8.2 kgN ha^{-1} $year^{-1}$
  ii. NOx concentration – 12.39 µg m^{-3}
  iii. Ammonia concentration – 1.67 µg m^{-3}
  iv. SO_2 concentration – 3.41 µg m^{-3}
- **Wherstead** (WGS84: 1.164, 52.024):
  i. Nitrogen deposition - 9.71 kgN ha-1 year-1
  ii. NOx concentration – 11.25 µg m^{-3}
  iii. Ammonia concentration – 1.7 µg m^{-3}
  iv. SO_2 concentration – 1.05 µg m^{-3}

4.3 This includes the following results for the monitoring location adjacent to Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site:

- **Redgrave** (WGS84: 0.995, 52.37):
  i. Nitrogen deposition – 10.9 kgN ha-1 year-1
  ii. NOx concentration – 9.55 µg/m3
  iii. Ammonia concentration – 3.59 µg m^{-3}
  iv. SO_2 concentration – 0.67 µg m^{-3}

4.4 With regard to the Stour and Orwell Estuaries SPA and Ramsar site, the APIS database states that the critical loads of Nitrogen Deposition have not been exceeded for any of the relevant habitats associated for the monitoring period. This includes Pioneer, low-mid, mid-upper saltmarshes (Coastal Saltmarsh) and Shifting coastal dunes (Vegetated Shingle / Coastal Dunes). In addition, Ammonia concentration have also not been exceeded the critical level for the relevant habitats.

4.5 No critical level has been provided for NOx concentration for the relevant habitats on the APIS Database. However, based on guidance from the United Nations Economic Commission for Europe (UNECE)[6], the critical level of air concentrations of nitrogen oxides upon all vegetation types is an Annual mean 30 µg m^{-3} and 24 hour mean 75 µg m^{-3}. Therefore, none of the sites exceed the critical level NOx concentration.

4.6 No critical level has been provided for SO_2 concentration has been provided for the relevant habitats on the APIS Database. However, based on guidance from UNECE, the critical level for SO_2 concentration is 10 µg m^{-3} for cyanobacterial lichens and 20 µg m^{-3} for forest ecosystems / Semi-natural habitats. As a result, the sites do not exceed the critical level for SO_2 concentration.

4.7 With regard to the Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site, the APIS database states that the critical loads of Nitrogen Deposition have not been exceeded for any of the relevant habitats associated for the monitoring period. This includes Moist and wet oligotrophic grasslands: Molinia caerulea meadows (Purple Moor Grass) and Rich fens (Calcareous fens).

4.8 However, the critical levels of NOx concentration are exceeded for both Higher plants and Lichens and Bryophytes. This is above the 1% significant threshold and is likely due to existing agricultural practices, rather than any effects related to traffic emissions.

4.9 No critical level has been provided for NOx concentration has been provided for the relevant habitats on the APIS Database. However, based on guidance from UNECE, the site does not exceed the critical level NOx and SO_2 concentration.

[6] UNECE (2017) Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends. (Chapter 3). http://icpmapping.org/Latest_update_Mapping_Manual

5. Ecological Interpretation of Air Quality Monitoring

5.1 The UK Centre for Ecology and Hydrology (UKCEH) has produced an ecological assessment of Nitrogen Dioxide and Ammonia monitoring at Shotley, Cattawade, Wherstead and Redgrave.

5.2 The air monitoring was carried out at monthly intervals from September 2021 to August 2022 and consisted of continuous time-integrated measurements of Nitrogen Dioxide (NO_2) and Ammonia (NH_3) made with Gradko diffusion tubes and UKCEH ALPHA® samplers, respectively. This included a single monitoring station at Shotley, with three monitoring stations for the other three sites. This was undertaken to compare roadside concentrations (within ~ 2 m of road edge) with measurements further away from the road (~ 12 m) to compare with likely influence from local farming sources.

5.3 The air monitoring only looks at the annual mean pollutant concentrations 'in the air' of NO_2 and NH_3 and therefore only considers whether the critical level of these pollutants. The use of NO_2 has been used rather than any other subtype of Nitrogen oxides (NO_x) as Nitrogen dioxide primarily results from fuel combustion from sources such as motor vehicles and industrial activities. NO_2 is typically found in high densities in urban areas but tends to be equivalent to background levels in rural areas with a lower density of NOx-emitting sources.

5.4 As a result, the results for the monitoring NO_2 and NH_3 are outline below, with ecological interpretation:

Annual Mean NO_2 Results:

- **Shotley:** The report outlines that the annual mean NO_2 concentration at the single site in Shotley was 13.2 µg m^{-3}. Therefore, this was below the NOx concentration for the area 15.77 µg m^{-3} for 2021. In addition, all concentrations were also below the UNECE critical level of air concentrations of nitrogen oxides (Annual mean 30 µg m^{-3} and 24 hour mean 75 µg m^{-3}). Therefore, it is considered unlikely that impacts upon the Stour and Orwell Estuaries SPA and Ramsar site are being caused by existing traffic emissions of NO_2 at this monitoring location**.**

- **Cattawade**: The report outlines that this site had the largest roadside NO_2 concentrations, with the eastern roadside (Cattawade 3) provided the largest concentration of 18.2 µg m^{-3}. Therefore, this above average NOx concentration for the area 12.39 µg m^{-3}. However, this declines by 10 % to 16.4 µg m^{-3} on the other side of the road (Cattawade 1), and by a further 19 % to 13.3 µg m^{-3} at Cattawade 2 (10 m west of Cattawade 1). Therefore, Cattawade 2, which was nearest to the Stour and Orwell Estuaries only estimated only a slightly higher concentration of NO_2 compared to the average NOx concentration for 2021. All concentrations were also below the UNECE critical level of air concentrations of nitrogen oxides (Annual mean 30 µg m^{-3} and 24 hour mean 75 µg m^{-3}). Therefore, it is considered unlikely that impacts upon

the Stour and Orwell Estuaries SPA and Ramsar site arel being caused by existing traffic emissions of NO_2 at monitoring location.

- **Wherstead:** The report outlines that the distance from the road at made little difference in NO_2 concentrations. Annual mean NO_2 concentrations were 13.9 - 14.7 µg m^{-3}, with no clear gradient in concentrations. Therefore, this was above the average NOx concentration for the area 11.25 µg m^{-3} for 2021. However, all concentrations were also below the UNECE critical level of air concentrations of nitrogen oxides (Annual mean 30 µg m^{-3} and 24 hour mean 75 µg m^{-3}). Therefore, it is considered unlikely that impacts upon the Stour and Orwell Estuaries SPA and Ramsar site are being caused by existing traffic emissions of NO_2 at monitoring location.

- **Redgrave:** The report outlines that the distance from the road at made little difference in NO_2 concentrations. Annual mean NO_2 concentrations were 8.0 – 9.1 µg m^{-3}. Therefore, this was below the average NOx concentration for the area (9.55 µg m^{-3})for 2021. All concentrations were also below the UNECE critical level of air concentrations of nitrogen oxides (Annual mean 30 µg m^{-3} and 24 hour mean 75 µg m^{-3}). Therefore, it is considered unlikely that impacts upon the Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site are being caused by existing traffic emissions of NO_2 at monitoring location.

Annual Mean NH_3 Results:

- **Shotley:** The report outlines that this monitoring station had the smallest annual mean NH3 concentration of 1.7 µg m^{-3}. Therefore, this was below the average NH_3 concentration for the area (1.38 µg m^{-3}) for 2021. This is also below the Critical Level of Higher plants (3 µg m^{-3}). Therefore, it is considered unlikely that impacts upon the Stour and Orwell Estuaries SPA and Ramsar site are being caused by existing traffic emissions of NH_3 at the monitoring location.

- **Cattawade**: The report outlines that this monitoring station had an annual mean NH_3 concentration of 2.01 – 2.78 µg m^{-3}. Therefore, this was above the average NH_3 concentration for the area (1.67 µg m^{-3}) for 2021 at all monitoring locations. This suggests slightly elevated ammonia levels from traffic emissions. However, 2.78 µg m^{-3} at Cattawade 3 could be from non-traffic related sources, as Cattawade 2 on the other side of the road showed a concentration of 2.05 µg m^{-3}. However, the ammonia concentrations are below the Critical Level of Higher plants (3 µg m^{-3}). Therefore, it is considered unlikely that impacts upon the Stour and Orwell Estuaries SPA and Ramsar site are being caused by existing traffic emissions of NH_3 at the monitoring location.

- **Wherstead:** The report outlines that this monitoring station had an annual mean NH_3 concentration of 2.65 – 2.50 µg m^{-3}. Therefore, this was above the average NH_3 concentration for the area (1.7 µg m^{-3}) for 2021 at all monitoring locations. However,

whilst ammonia concentrations are above the yearly mean average it is not reasonable to attribute this to traffic emissions as there is no obvious gradient in NH_3 concentrations that could be attributed to the road. The ammonia concentrations are also below the Critical Level of Higher plants (3 µg m^{-3}). Therefore, it is considered unlikely that impacts upon the Stour and Orwell Estuaries SPA and Ramsar site are being being caused by existing traffic emissions of NH_3 at the monitoring location.

- **Redgrave:** The report outlines that the monitoring stations had an annual mean NH_3 concentration of 5.68 – 6.59 µg m^{-3}, with the highest concentration at Redgrave 2, nearest to the Protected Habitats sites. This is significantly higher than the average NH_3 concentration for the area (3.59 µg m^{-3}) for 2021 at all monitoring locations. Therefore, it has predicted that NH_3 concentrations at the roadside locations at Redgrave will therefore be largely agricultural in origin, with further minor enhancement from vehicular emissions. Ammonia concentrations are above the Critical Level of Higher plants (3 µg m^{-3}) and Lichens and Bryophytes (1 µg m^{-3}) at the monitoring location. The monitoring report compares data from a NAMN Redgrave & Lopham Fens ALPHA® sampler site (UKA00311)[7]. An updated review of this monitoring from 2021 shows that the monthly NH_3 concentration ranged from 0.64 – 3.38 µg m^{-3}, with a yearly mean of 2.265 µg m^{-3}. However, the yearly mean of NH_3 concentration for 2023 was 1.227 µg m^{-3}. Therefore, this is below the Critical Level of Higher plants (3 µg m^{-3}) and highlights that agricultural practices generating greater ammonia concentrations may have changed in the last 2 years. Therefore, it is considered unlikely that impacts upon the Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site are being caused by existing traffic emissions of NH_3 at the monitoring location and that this is more likely due to changes in agricultural practices. However, it is not possible to confirm whether traffic emissions are resulting in a de-minimis effect at the surveyed location.

[7] NAMN Redgrave & Lopham Fens ALPHA® sampler site (UKA00311). Data downloaded from https://uk-air.defra.gov.uk/networks/network-info?view=nh3 (accessed 10/07/24)

6. Conclusion

6.1 Following the monitoring for NO_2 (annual mean before September 2021 to August 2022) at the four sample locations, it was confirmed that none of the surveyed locations are above the critical level of NOx concentration. In addition, based on the APIS database assessment for 2021 (Mid-year for 3 year average 2020-2022), it was confirmed that Nitrogen deposition is unlikely to exceed to critical loads at the sample locations. Therefore, no Adverse Effects on the Integrity are predicted on the Stour and Orwell Estuaries SPA and Ramsar site and location for the Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site from Nitrogen oxides from traffic emissions.

6.2 Following the monitoring for NH_3 (annual mean before September 2021 to August 2022) at the four sample locations, it was confirmed that only the Redgrave monitoring location exceeded the critical level for Higher plants and Lichens and Bryophytes. However, the NAMN Redgrave & Lopham Fens ALPHA® sampler site (UKA00311) demonstrates that atmospheric concentrations of NH_3 may have decreased in recent years, albeit the concentrations of NH_3 in 2023 do still exceed the Critical Level for Lichens and Bryophytes. The relatively high levels of NH_3 is likely to be attributed to agricultural practices, but some minor amount of NH_3 emissions will be attributed to traffic emissions. Therefore, no Adverse Effects on the Integrity on the Stour and Orwell Estuaries SPA and Ramsar site from ammonia from traffic emissions. However, the monitoring does not confirm whether de-minimis impacts are being caused by traffic emissions to rule out an Adverse Effects on the Integrity on the Waveney and Little Ouse Valley Fens SAC and the Redgrave and Lopham Fen Ramsar site from ammonia traffic emissions.

6.3 In addition, based on the APIS database assessment for 2021 (Mid-year for 3 year average 2020-2022), it was confirmed that Sulphur Dioxide is unlikely to exceed to critical loads at the sample locations.

Effect upon the Joint Local Plan:

6.4 Babergh and Mid Suffolk District Councils have committed to long-term monitoring during the lifetime of the Joint Local Plan, to ensure that mitigation measures can be implemented where necessary and ensure compliance under the Conservation of Habitats and Species Regulations 2017 (as amended). As a result, it is recommended that further monitoring will be required to confirm whether critical loads / levels will be exceeded for NOx and NH_3 for the monitoring locations during the lifetime of the Joint Local Plan.

6.5 No further mitigation measures are considered reasonable for the Redgrave monitoring location, where high levels of NH_3 emissions were identified. This is because this is likely to be attributed to agricultural practices that the Babergh and Mid Suffolk Joint Local Plan cannot affect with policies as part of the Part 2 Plan. However, further long-term monitoring during the lifetime of the Joint Local Plan should aim to determine whether the effects of NH_3 from traffic emissions are likely to be de-minimis.

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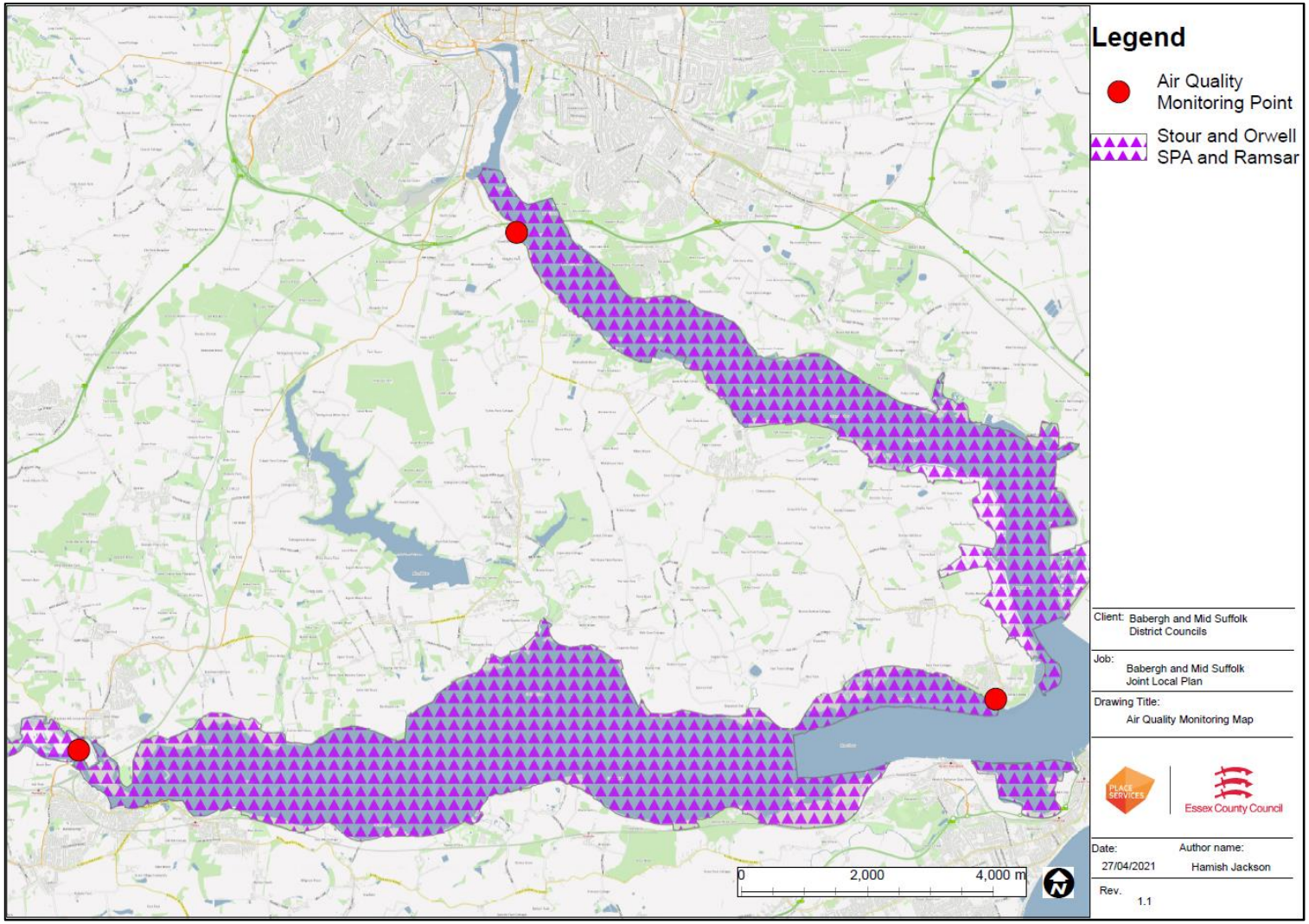
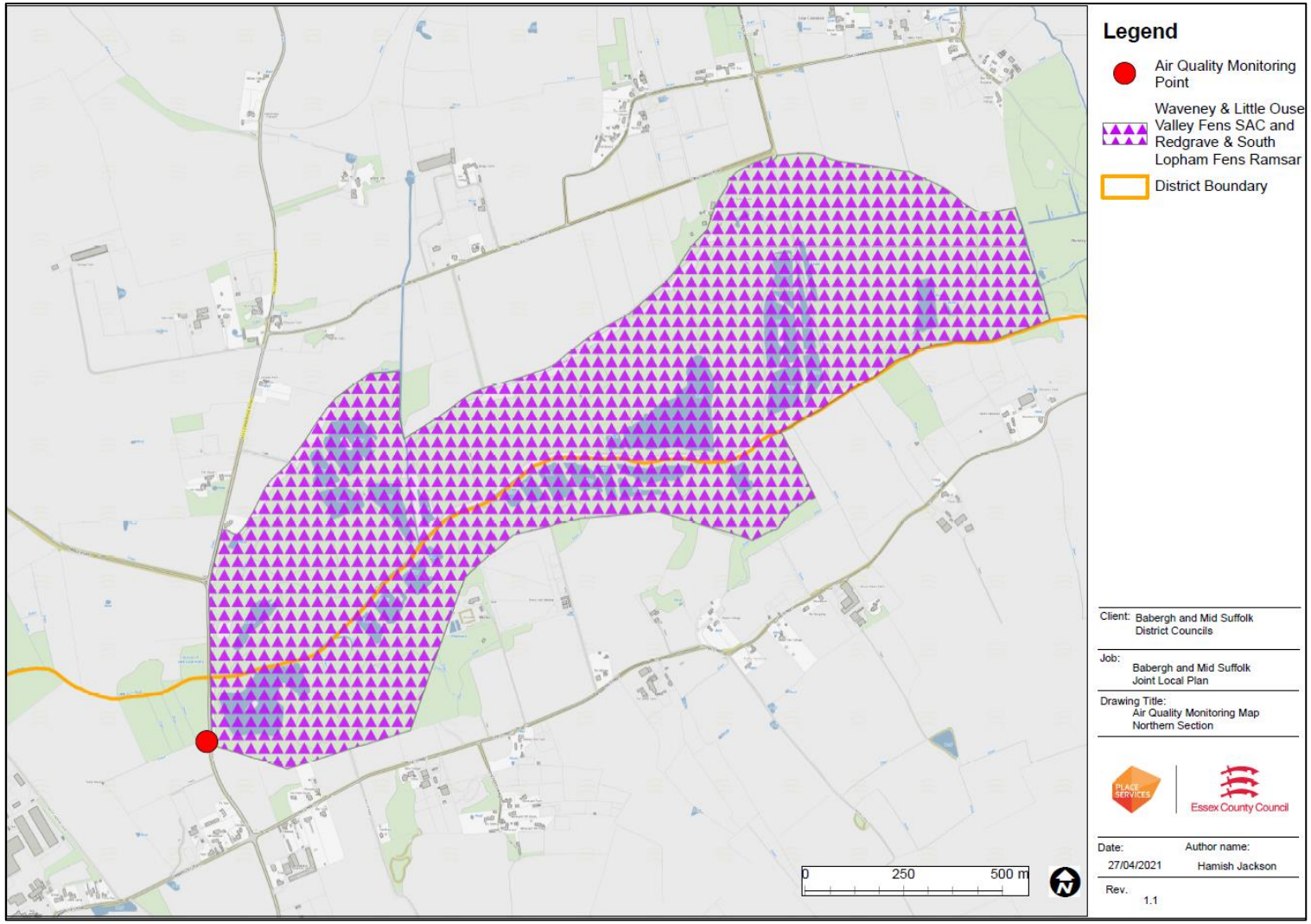
8. Appendix

Appendix 1. Air quality monitoring points for Stour and Orwell Estuaries SPA and Ramsar site



Appendix 2. Air quality monitoring points for Redgrave and South Lopham Fens Ramsar site and Waveney & Lt Ouse Valley Fens SAC



Appendix 3. European Sites Qualifying Features, Conservation Objectives and Key Vulnerabilities / Factors Affecting Site Integrity

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
The Stour and Orwell estuaries These estuaries straddle the eastern part of the Essex/Suffolk border in eastern England. The estuaries include extensive mud-lats, low cliffs, saltmarsh and small areas of vegetated shingle on the lower reaches. The mud-flats hold Enteromorpha, Zostera and Salicornia spp. The site also includes an area of low-lying grazing marsh at Shotley Marshes on the south side of the Orwell. In summer, the site supports important numbers of breeding Avocet *Recurvirostra avosetta*, while in winter they hold major concentrations of water birds, especially geese, ducks and waders. The geese also feed, and waders roost, in surrounding areas of agricultural land outside the SPA. The site has close ecological links with the Hamford Water and Mid-Essex Coast SPAs, lying to the south on the same coast.				
Stour and Orwell Estuaries SPA EU Code: UK9009121	3676.92	Qualifying Features potentially affected: Annex I species: Over winter: Hen Harrier *Circus cyaneus* This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: Over winter: • Black-tailed Godwit *Limosa limosa islandica*	With regard to the individual species and/or assemblage of species for which the site has been classified ("the Qualifying Features" listed below); Avoid the deterioration of the Habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive. Subject to natural change, to maintain or restore: The extent and distribution of the Habitats of the qualifying features;	**Coastal squeeze –** Coastal defences are present along most of the Orwell coastline to mitigate for impacts from climate change, such as rising sea level. Unless changes are made to the management of the coastline, Habitats supporting qualifying SPA birds will be lost or degraded through coastal squeeze, sedimentation and reduced exposure. **Public access/disturbance –** Stour and Orwell Estuaries is subject to land- and water-based activities, including boating and water sports; walking; bait-digging; fishing; wildfowling; and military overflight training. These activities are likely to impact Habitats supporting

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
		• Dunlin *Calidris alpina alpina* • Grey Plover *Pluvialis squatarola* • Pintail *Anas acuta* • Redshank *Tringa totanus* • Ringed Plover *Charadrius hiaticula* • Shelduck *Tadorna tadorna* • Turnstone *Arenaria interpres* The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl including: • Cormorant *Phalacrocorax carbo* • Pintail *Anas acuta* • Ringed Plover *Charadrius hiaticula*	The structure and function of the Habitats of the qualifying features; The supporting processes on which the Habitats of the qualifying features rely; The populations of the qualifying features; The distribution of the qualifying features within the site.	breeding and overwintering water birds. A better understanding of which species and Habitats are most susceptible; which types of activity are most disturbing; and which locations and times of year are most sensitive is required to ensure the Estuaries are appropriately managed. Changes in species distribution – Declines in the number of bird species present at Orwell coastline have occurred. This is likely to be the result of changes in population and distribution on an international scale, due to climate change. **Invasive species –** An increase in Spartina anglica may be affecting the growth of Spartina maritime, a key habitat feature for qualifying bird roosting and feeding areas of saltmarsh and mudflat. **Planning permission: General –** The issue of development in combination with other factors is not fully understood. To ensure management is appropriate to the SPA a better understanding of the sensitivities relating to each habitat, species and location to different types of

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
		• Grey Plover *Pluvialis squatarola* • Dunlin *Calidris alpina alpina* • Black-tailed Godwit *Limosa limosa islandica* • Redshank *Tringa totanus* • Shelduck *Tadorna tadorna* • Great Crested Grebe *Podiceps cristatus* • Curlew *Numenius arquata* • Dark-bellied Brent Goose *Branta bernicla bernicla* • Wigeon *Mareca penelope* • Goldeneye *Bucephala clangula* • Oystercatcher *Haematopus ostralegus*		development is required. Difficult issues highlighted by the SIP include; a) Assessing the cumulative effects of numerous, small and often 'non-standard' developments. B) Development outside the SPA boundary can have negative impacts, particularly on the estuaries' birds. C) Assessing the indirect, 'knock-on' effects of proposals. D) Pressure to relax planning conditions on existing developments. **Air pollution: impact from atmospheric nitrogen deposition –** Atmospheric nitrogen deposition exceeds the relevant critical loads for coastal dune Habitats used by breeding terns and hence there is a risk of harmful effects. **Inappropriate coastal management –** Due to the presence of existing hard sea defences, such as sea walls there is little scope for adaptation to rising sea levels. Any freshwater Habitats behind failing seawalls are likely to be inundated by seawater, which would result in the loss of this habitat within the SPA.

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
		• Lapwing *Vanellus vanellus* • Knot *Calidris canutus* • Turnstone *Arenaria interpres*		Fisheries: Commercial and estuarine – Commercial fishing activities can be very damaging to inshore marine Habitats and the bird species dependent on the communities they support. Any 'amber or green' categorised commercial fishing activities in Habitats Marine Sites are assessed by Kent and Essex Inshore Fisheries Conservation Authority (IFCA). This assessment takes into account any in-combination effects of amber activities and/or appropriate plans or projects.
Stour and Orwell Estuaries Ramsar site EU Code: UK11067	3676.92	Ramsar criterion 2 Contains seven nationally scarce plants: • Stiff Saltmarsh-grass *Puccinellia rupestris* • Small Cord-grass *Spartina maritime* • Perennial Glasswort *Sarcocornia perennis* • Lax-flowered Sea Lavender *Limonium humile*	There are no Conservation Objectives set for Ramsar sites.	Similar to Stour and Orwell Estuaries SPA (See above). A key threat identified by RIS was erosion. **Erosion –** Natural coastal processes exacerbated by fixed sea defences, port development and maintenance dredging. Erosion is being tackled through sediment replacement for additional erosion that can be attributed to port development and maintenance dredging. A realignment site has been created on-site to make up for the loss of habitat due to capital dredging. General

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
		• *Eelgrasses Zostera angustifolia, Z. marina* and *Z. noltei.* Ramsar criterion 5 Assemblages of international importance; species with peak counts in winter; 63,017 waterfowl. Ramsar criterion 6 Species/ populations occurring at levels of international importance: Species with peak counts in spring/autumn: • Redshank, *Tringa totanus* • Species with peak counts in winter: • Dark-bellied Brent Goose, *Branta bernicla bernicla* • Northern Pintail, *Anas acuta*		background erosion has not been tackled although a Flood Management Strategy for the site is being produced. The notes in the RIS for Ramsar sites of factors affecting site's ecological character are not considered as necessary for HRA screening purposes. The assessment under the provisions of the Habitats Regulations is strictly limited to the qualifying features which meet the Ramsar criteria. Where the qualifying features of a Ramsar site would or could be adversely affected by a plan or project, the tests at Appropriate Assessment would need to be based on Article 4 of the Ramsar Convention, which allows a Contracting Party (in this case the UK government) to delete or restrict the boundaries of sites only " in its urgent national interest".

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
		• Grey Plover, *Pluvialis squatarola* • Red Knot, *Calidris canutus islandica* • Dunlin, *Calidris alpina alpina* • Black-tailed Godwit, *Limosa limosa islandica*		

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
Redgrave & South Lopham Fens The site lies to the North-West of Suffolk within Mid Suffolk District. It is an extensive example of lowland base-rich valley, remarkable for its lack of fragmentation. The diversity of the site is due to the lateral and longitudinal zonation of the vegetation types characteristic of valley mires, such as dry birch woodland, scrub and carr, floristically-rich fen grassland, mixed fen, wet heath and areas of reed and saw sedge. The site supports many rare and scarce invertebrates, including a population of the fen raft spider *Dolomedes plantarius*				
Redgrave & South Lopham Fens Ramsar Site EU Code: UK11056	127.09	Ramsar criterion 1 The site is an extensive example of spring-fed lowland base-rich valley, remarkable for its lack of fragmentation Ramsar Criterion 2 The site supports many rare and scarce invertebrates, including a population of the fen raft spider *Dolomedes plantarius*. Ramsar criterion 3 The site supports many rare and scarce	There are no Conservation Objectives set for Ramsar sites.	The Ramsar Information Sheet (RIS) identified the following Factors affecting the site's ecological character: • **Dredging –** On site with major impact to qualifying features • **Eutrophication –** An onsite impact. Catchment nutrient-loading hoped to be investigated to address eutrophication. • **Pollution –** Offsite agricultural fertilisers – Catchment nutrient-loading hoped to be investigated to address fertiliser pollution. • **Pollution –** Offsite pesticides/agricultural runoff

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
		invertebrates, including a population of the fen raft spider *Dolomedes plantarius*. The diversity of the site is due to the lateral and longitudinal zonation of the vegetation types characteristic of valley mires.		The notes in the RIS for Ramsar sites of factors affecting site's ecological character are not considered as necessary for HRA screening purposes. The assessment under the provisions of the Habitats Regulations is strictly limited to the qualifying features which meet the Ramsar criteria. Where the qualifying features of a Ramsar site would or could be adversely affected by a plan or project, the tests at Appropriate Assessment would need to be based on Article 4 of the Ramsar Convention, which allows a Contracting Party (in this case the UK government) to delete or restrict the boundaries of sites only "in its urgent national interest".
Waveney & Lt Ouse Valley Fens The site lies to the North-West of Suffolk within Mid Suffolk District. It contains calcareous fens with a very extensive Great Fen-sedge *Cladium mariscus* beds, including managed examples, as well as stands in contact zones between small sedge mire and species-poor Cladium beds. The habitat type here occurs in a spring-fed valley fen. Purple moor-grass – meadow thistle (*Molinia caeruleja – Cirsium dissectum*) fen-meadows are associated with				

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
the spring-fed valley fen systems. The Molinia meadows occur in conjunction with black bog-rush – blunt-flowered rush (*Schoenus nigricans – Juncus subnodulosus*) mire and calcareous fens with great fen-sedge. Where the fen-meadow is grazed it is more species-rich, with frequent southern marsh-orchid *Dactylorhiza praetermissa*. A population of Desmoulin's whorl snail *Vertigo moulinsiana* occurs in a valley fen at Weston Fen.				
Waveney & Lt Ouse Valley Fens SAC EU Code: UK0012882	192.37	H6410. Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae); Purple moor-grass meadows H7210. Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*; Calcium-rich fen dominated by Great Fen Sedge (Saw Sedge) *Cladium mariscus** S1016. Desmoulin`s whorl snail *Vertigo moulinsiana*	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; 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,	**Inappropriate Scrub Control:** Historically sections of the fen have been allowed to scrub over. These now form wet woodland and scrub with glades containing the remnants of the qualifying features. The aim is to ensure the site includes the same area of Cladium fen (H7210 Calcium-rich fen dominated by great fen sedge (saw sedge)) present at the time of designation. **Inappropriate Water Levels:** Concerns have been expressed about water levels in the SAC. Some areas such as Redgrave and Lopham Fens have already been worked on. Others (Blo' Norton and Thelnetham Fens) are currently being investigated through the Water Level Management Plan process. Historical evidence suggests that water levels have significantly dropped over time and as a result habitats and features have been damaged. Parts of

Site name	Area (ha)	Qualifying Features	Conservation objectives (only available for SACs & SPAs)	Key vulnerabilities / factors affecting site integrity
			The distribution of qualifying species within the site.	the fen supported swingmoor habitats and these are a poor representation of their former selves. **Air Pollution - impact of atmospheric nitrogen deposition:** Nitrogen deposition exceeds site relevant critical loads. **Water Pollution:** Poor water quality arising from agricultural run-off particularly from nearby outdoor poultry and pig units causes nutrient enrichment and can lead to a reduction in biodiversity.

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