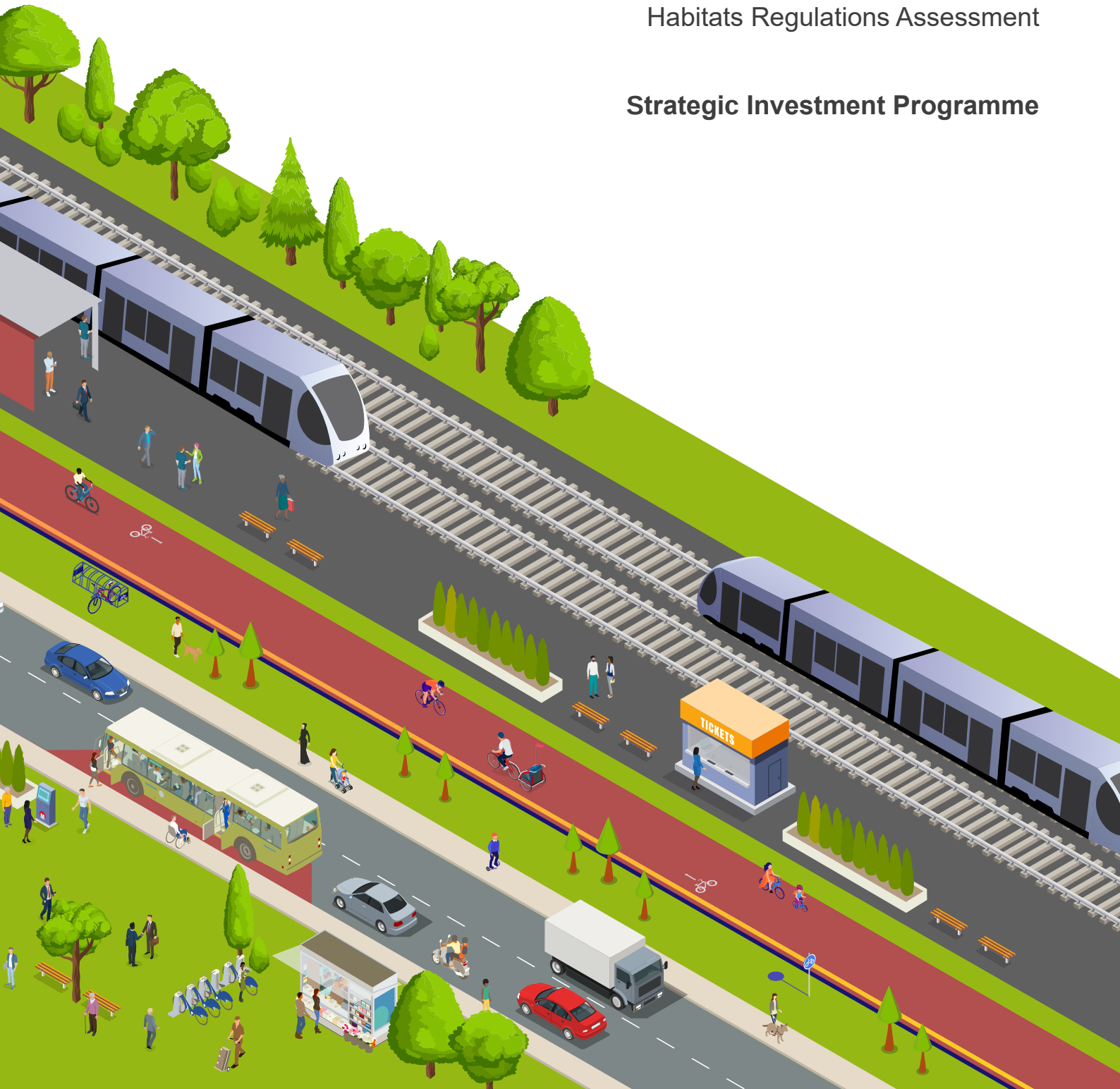
TRANSPORTEAST Jacobs

Transport East
Transport Strategy

Habitats Regulations Assessment

Strategic Investment Programme



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1. Introduction and Background

1.1 Transport East and the Transport East Region

Transport East is the sub-national transport body for the East of England comprising public and private sector partners to act a single voice for the future of transport in Norfolk, Suffolk, Essex, Southend-on-Sea and Thurrock. It is developing its first Transport Strategy which aims to identify the transport investment required to achieve the region's ambitious and inclusive economic, social and environmental goals for 2050.

The Transport East region has a diverse economic base, with key strengths in distribution, manufacturing, information and communications technology, agricultural technology, biosciences, green energy production, financial services and tourism. The region aspires for a green recovery from the Covid-19 pandemic and will capitalise on the aforementioned strengths to deliver new jobs and bring significant benefits to the local and national economy.

The Transport East region hosts ports that are critical to the economy and trade of the United Kingdom, London Stanstead Airport and some of the largest wind farms in the UK. Outside of the urban areas, sustainable transport options are limited, presenting a key challenge for the Transport Strategy.

The region encompasses over 5,000 square miles including several urban areas (e.g., Norwich, Ipswich, Chelmsford), numerous smaller villages and sparsely populated coastal areas. Outside of the urban areas, the region supports habitats including ancient woodland, lowland grasslands, lowland heathland and fens. Numerous major rivers flow through the region including the River Thames at its southern border, the River Crouch, River Blackwater, River Store, River Great Ouse and River Wensum. The region also hosts numerous sites of local, UK and European importance (the latter displayed in Figure 1.1).

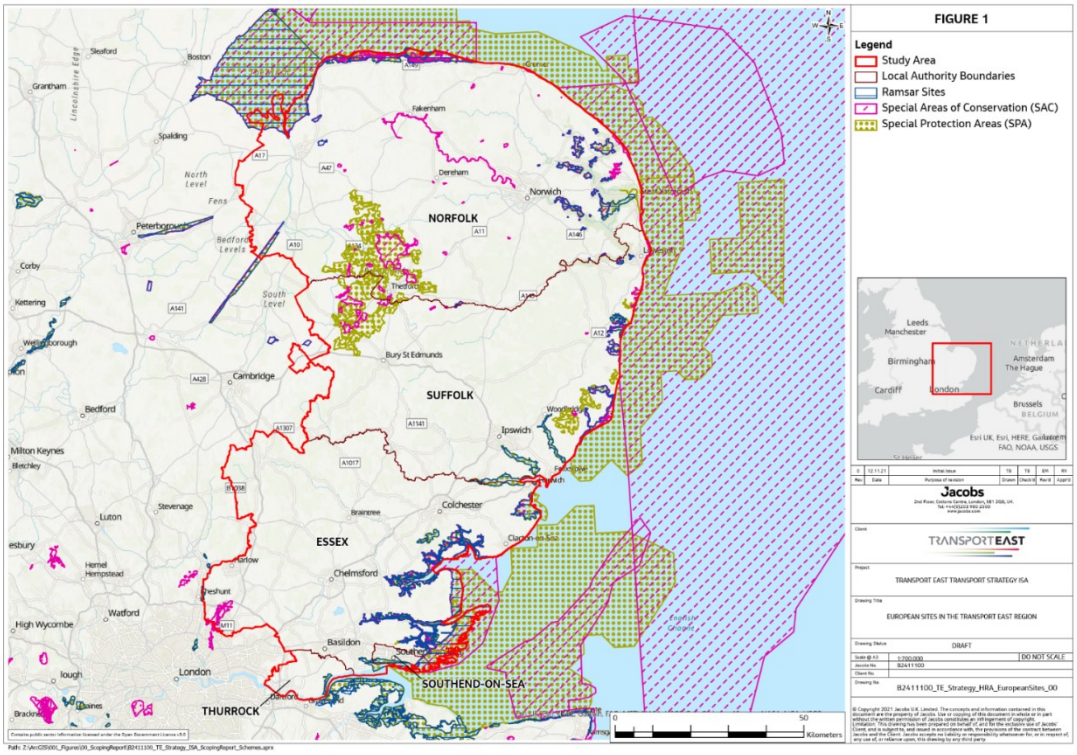

Figure 1.1: The Transport East Region (red outline) and nature conservation sites of European importance

1.2 Transport East Strategy

The Transport East region is expected to experience significant growth over the next 15 years and is in need of improved regional transport to support this growth and enhance social and economic opportunities in the region. To accomplish this aim, Transport East has developed a Transport Strategy for the region. The Transport Strategy sets out measures to deliver a high-quality, sustainable transport network for the Transport East region that is resilient to the demands for future growth in the region.

Transport East has identified the following overall vision for its Transport Strategy:

A thriving economy for the East, with fast, safe, reliable, and resilient transport infrastructure driving forward a future of inclusive and sustainable growth for decades to come.

To deliver this vision, Transport East has identified four strategic priorities for transport:

- **Decarbonisation to net-zero** – working to achieve net-zero carbon emissions from transport by 2040, building on our status as the UK's premier renewable energy region;
- **Connecting growing towns and cities** – enhanced links between our fastest growing places and business clusters. Improving access for people to jobs, supplies, services, and learning; enabling the area to function as a coherent economy and improving productivity;
- **Energising coastal and rural communities** – a reinvented sustainable coast for the 21st century which powers the UK through energy generation. Supporting our productive rural communities and attracting visitors all year round; and
- **Unlocking international gateways** – better connected ports and airports to help UK businesses thrive, boosting the nation's economy and helping to level up communities through better access to international markets and facilitating foreign direct investment.

The Transport Strategy was published in draft form in November 2021 and public consultation on the draft strategy concluded on 30 January 2022. The Transport Strategy has now been finalised, and it will be monitored regularly and updated as appropriate.

1.3 Strategic Investment Programme

Accompanying the draft Transport Strategy is an Strategic Investment Programme (SIP). The SIP sets out the schemes and mechanisms that will be put in place to ensure that Transport East delivers the strategic priorities set out in the Transport Strategy. The SIP focuses on the Transport Strategy's four strategic priorities and identifies schemes that will address the regional issues identified in the Transport Strategy, concentrating on the strategy's six priority corridors.

The main text of the SIP presents the approach to delivering the aims and objectives of the Transport Strategy. The SIP also contains the following appendices:

- Appendix A: provides a summary of assessment criteria;
- Appendix B: Weighting and scoring ;
- Appendix C: Summary of assessment results
- Appendix D: Current Investment Programme
- Appendix E: Map of committed and pipeline projects;
- Appendix F: Monitoring and Evaluation Key Performance Indicators
- Appendix G: Technical Programme.

Transport East is undertaking an ISA to inform the development of the Transport Strategy and SIP. The main text of the SIP outlines the key stages in the ISA process and SIP Appendix E presents the objectives and targets associated with a typical ISA monitoring plan.

The schemes identified in SIP Appendix D are at varying stages of development, and therefore the final SIP categorised each scheme based on its current stage. The categories are:

- Ideas pool – projects that could deliver the strategic priorities identified in the Transport Strategy but are not sufficiently advanced. These will include concepts, early feasibility studies and pre-Strategic Outline Business Cases. Although these will have considered options and alternatives, they will not have been subject to any in-depth assessment.
- Development pool – projects that are in development and have already been subject to a feasibility study or are currently developing or have completed a Strategic Outline Business Case that comprises a short-list of alternative options for delivering the project.
- Delivery pool –projects where the development of a business case has achieved programme entry for delivery funding, although planning consent may still be required. For these projects, a preferred option has already been identified.

Each scheme was also assigned a timescale for delivery. The timescales assigned are as follows:

- 0-5 years;
- 5-10 years; and
- 10+ years.

The SIP also identifies schemes to be delivered by neighbouring authorities. These are schemes that are located outside of the Transport East region and will not be delivered by Transport East but will deliver transport benefits to the region.

The SIP has now been finalised but is designed to be a live document that will be regularly reviewed and updated. Figure 2 shows the locations of the SIP Appendix D schemes within the Transport East region.

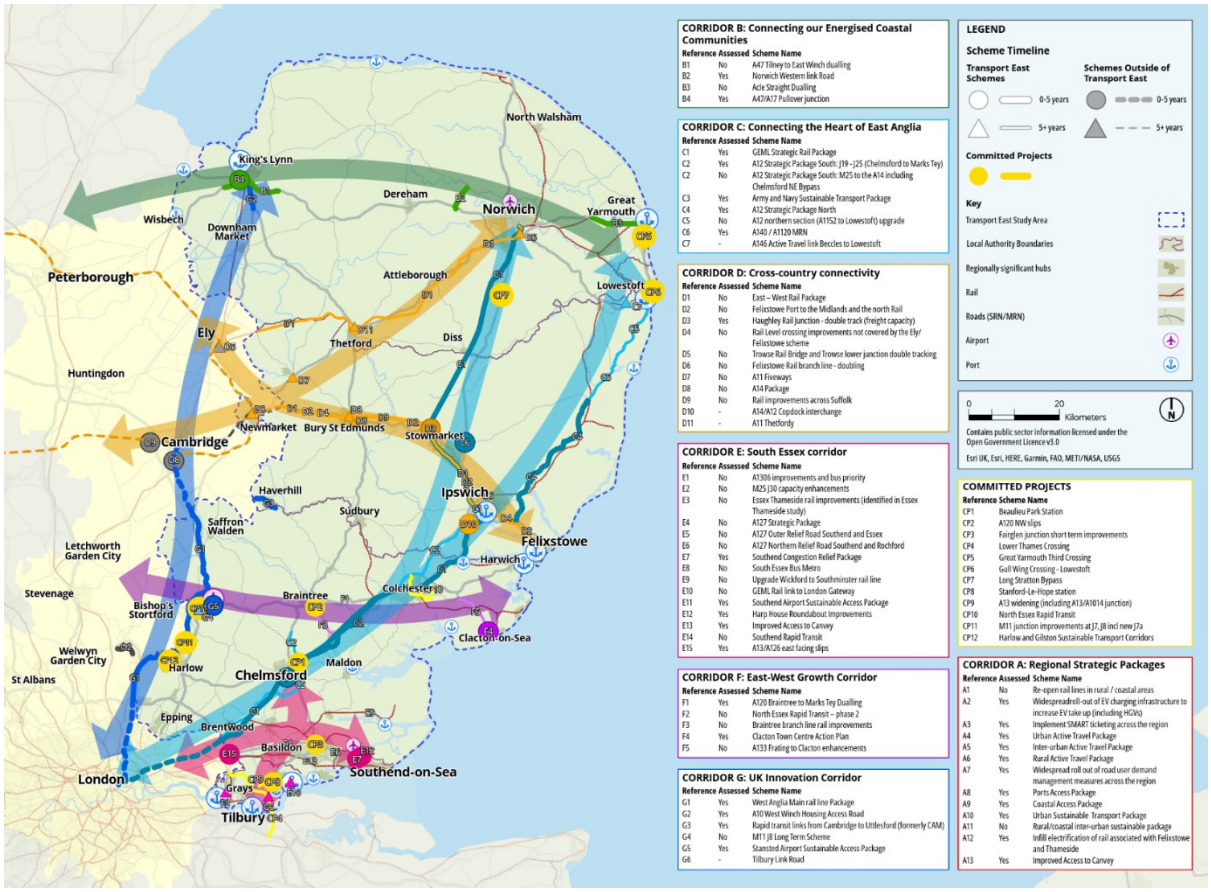

Figure 1.2: Schemes identified in SIP Appendix D within the Transport East region

1.4 Previous Habitats Regulations Assessment

A Habitats Regulations Assessment (HRA) Stage One: Screening was undertaken on the draft Transport Strategy and draft SIP, and this report was published alongside those documents[1]. The objective of Screening is to determine whether any plans or projects will have a likely significant effect (LSE) on the qualifying features of any European sites (further details on HRA process in Section 2). As the Transport Strategy and SIP were in draft form, the Screening identified elements of those reports that could result in *potential* effects on European sites, as opposed to likely significant effects.

The Stage One: Screening HRA identified 18 schemes from the SIP that had the potential to result in LSEs on the qualifying features of 45 European sites. The HRA also presented potential impacts that the schemes could have on those sites and presented other plans or projects that could also impact the European sites, in-combination with those from the SIP.

1.5 Purpose of the Report

This report presents the HRA undertaken on the SIP and its appendices. A separate report presents the results of the HRA undertaken on the Transport Strategy[2].

This report covers Stage One: Screening and Stage Two: Appropriate Assessment of the HRA process (Section 2.2). Although the SIP was previously screened1, the entire document is re-screened here to reflect any changes that have occurred after public consultation.

2. Habitats Regulations Assessment

2.1 Legislative Context

The Conservation of Habitats and Species Regulations 2017 (as amended by the EU Exit Regulations 2019) (hereafter referred to as the 'Habitats Regulations')[3] is the primary piece of UK legislation that provides protection for threatened habitats and species. The legislation transposes the land and marine aspects of EU Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as the 'Habitats Directive')[4] into UK law, as well as certain elements of Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (hereafter referred to as the 'Wild Birds Directive')[5].

Regulation 63 of the Habitats Regulations sets out the requirement that a competent authority must undertake appropriate assessment of any plan or project which

"(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of the site."

The appropriate assessment must assess the implications of the plan or project in light of the site's conservation objectives. The assessment process is referred to as Habitats Regulations Assessment[6] and is a sequential process which begins by identifying European sites potentially affected by the plan or project (referred to as 'screening', see Section 2.2).

Habitats Regulations Assessment only considers the implications of a plan or project on sites of European importance. Prior to the UK's departure from the European Union (EU), sites of European importance were identified within the EU's Natura 2000 network[7]. Based on current legislation and policy, the sites to be assessed under the Habitats Regulations include:

- Special Areas of Conservation (SACs): these areas were selected as they make a significant contribution to conserving species and habitats of UK and European importance;
- Special Protection Areas (SPAs): these areas were selected as they support important populations of birds of UK and European importance;
- proposed SACs (pSACs): sites proposed to be SACs but are not yet confirmed;
- potential SPAs (pSPAs): sites that may potentially become SPAs but are not yet confirmed;
- areas secured as sites compensating for damage to a European site; and
- Ramsar sites: wetlands of international importance designated under criteria set out in the Ramsar Convention on Wetlands[8].

For the purposes of this HRA, the above sites will collectively be referred to as European sites, as they are all sites of European importance.

2.2 Habitats Regulations Assessment Process

The HRA process has up to four stages, each of which assesses whether there will be impacts on a European site[7,9,4] (Table 2.1). If at any stage in the process it can be determined that there will be no negative impacts on a site, then the process is effectively completed and there is no need to progress to the next stage.

This report covers Stage One: Screening and Stage Two: Appropriate Assessment. The schemes identified in the Transport Strategy are all in early stages of development, and the design process is either ongoing or has not yet begun. Therefore, it is expected that avoiding impacts on European sites will be considered during the design process, and therefore any AESI identified in this plan-level HRA may no longer exist at the project-level. The project-level HRAs for any of the schemes identified within the Transport Strategy will cover the entire HRA process, including Stage Three and Stage Four, as required.

Table 2.1: Four stages in the HRA process

Stage	Description
Stage One: Screening	This stage determines whether the plan or project is likely to have significant effect(s) on any European site either alone or in-combination with other plans or projects. During the screening exercise, the precautionary principle must be applied, which requires that in the event of uncertainty, the conservation objectives of the site(s) must prevail.
Stage Two: Appropriate Assessment (AA)	If LSEs are identified during Stage One: Screening, then AA is undertaken in which the competent authority determines the impact of the effects on the integrity of the site(s). AA considers the structure and function of the site(s) and the conservation objectives of the qualifying feature(s) both alone and in-combination with other plans or projects. The precautionary principle applies at this stage. Where adverse effects on site integrity (AESI) are identified, mitigation measures to avoid negative effects may be proposed.
Stage Three: Assessment of Alternative Solutions	If AESI or uncertainties remain following AA and after applying mitigation measures, then an Assessment of Alternative Solutions is required. This process involves identifying alternative ways to achieve the objectives of the plan or project that would avoid affecting the integrity of the site(s).
Stage Four: Imperative Reasons of Overriding Public Interest (IROPI) and compensatory measures	If no alternative solutions can be identified during Stage Three, but AESI still remain, then a further assessment must be undertaken to determine if there are IROPI for consenting the plan, with the assumption (or expectation) that compensatory measures are available. If the site hosts priory species or habitats (as identified in Annex I and II of the Habitats Directive), then only human health or safety considerations may be considered when determining IROPI. If the affected species or habitats are not identified as priority, then the assessment may also consider economic and social reasons, in addition to the above considerations. If it is agreed that a plan or project must proceed due to IROPI, then compensatory measures must be added to the plan or project to ensure the overall coherence of the National Site Network.

2.3 Consultation

Section 63 in the Habitats Regulations states that consultation with the appropriate nature conservation body must be undertaken during HRA and that the competent authority '*must have regard to any representations made by that body within such reasonable time as the authority specifies'*. Joint UK government guidance on undertaking HRA states that consultation with the relevant statutory nature conservation body must be undertaken at the appropriate assessment stage of the HRA process[6,7].

2.4 Habitats Regulations Assessment of Plans

The Habitats Regulations require HRA to be undertaken for both projects and plans. In this context, a plan is a document which is not aspiration but rather sets out an intended future course of action, or is a detailed proposal for doing, planning, regulating or achieving something[7]. In contrast, a project is more specific than a plan and typically results in physical modification to an area of land, for example the construction of a new road.

For plans, the competent authority may be responsible for both producing the plan and conducting the HRA[7]. In addition, the competent authority is also responsible for identifying all necessary mitigation measures and building them into the plan and developing the plan's strategy for avoiding adverse effects on European sites.

Plans must undergo the HRA process as described in Table 2.1. Due to the general nature of many plans, it is recognised that the assessment of a plan may be less precise than that of a project. Therefore, when assessing the impacts of a plan the precautionary principle must be applied in a way that recognises the lack of specificity within some plans, or parts of plans. Where uncertainties or conflicts exist between the policies or proposals within a plan and the conservation objectives of a European site, measures should be built into the plan to mitigate, or preferably avoid, negative impacts to the site[7]. Such measures may include explicit site-specific or proposal-specific conditions designed to protect the site, or assurances that a more detailed plan assessment will be undertaken to ensure that the site is protected from adverse effects.

3. Methodology

This report covers Stage One: Screening and Stage Two: Appropriate Assessment, as required. Each stage in this process is described in more detail below.

3.1 Determine if HRA is required for the plan

There are numerous reasons why an HRA may not be required for a plan. For a plan to be exempt from HRA, it must be directly connected with or necessary for the management of the European site potentially affected.

If a plan is not exempt from HRA, it should then be determined whether all or a part of the plan can be excluded from HRA. According to Tyldesley and Chapman[7] plan is a new, modified, altered or repealed document which is a formal statement that:

- sets out a framework for future developments or projects;
- goes beyond aspiration and set out an intention for future development or action;
- is a detailed proposal for doing, planning, regulating or achieving something; or
- sets out an intention or decision about something that is going to be done or should be done.

While the above is not an exhaustive list, it provides a means for determining whether a document constitutes a plan and requires HRA. However, all assessments should be completed on a case-by-case basis and serious consideration should be made into whether all or a part of a document could impact a European site.

If it has been decided that the plan should not be exempt or excluded from HRA, it should then be determined whether it can be eliminated from further assessment on the grounds that it cannot have any conceivable effect on a European site. The European Commission has advised that plans (or subsets of plans) which are by their nature policy statements or those that merely show political will or intention, will by this nature be unlikely to have a significant effect on a European site, and can be eliminated from further assessment early in the Screening process[7].

3.2 Identification of European sites

European sites are designated for a range of features including, but not limited to, terrestrial and aquatic habitats, groundwater dependent terrestrial ecosystems (GWDTEs), highly mobile species, species with limited mobility or species with strict habitat requirements. Different features have different impact pathways and therefore identifying European sites through a single linear buffer is not appropriate. For this HRA, criteria were used that were designed to account for different impact pathways for different receptors.

European sites were considered for potential effects if the boundary of the Transport East region met any of the following criteria, as adapted from guidance from the Design Manual for Roads and Bridges[10,11]

- is ≤2km from any European site;
- is ≤30km from any European site where bat species are qualifying features;
- is located ≤20km from any European site where internationally important assemblages of wintering wildfowl are qualifying features, to incorporate any functionally linked land utilised by qualifying birds of such sites;
- is located ≤30km from any European site where gulls or seabirds are qualifying features due to the extended foraging range of these species;
- is located ≤5km upstream of any European site and has a hydrological link to that site;

- is ≤200m from any European site with habitats or species sensitive to nitrogen (N) deposition[1] , including non-designated supporting habitat for qualifying species; or
- one or more of the designated features of the European site is a mobile species that may be affected by a scheme proposed by the SIP, as determined by professional judgement.

To initially identify European sites to be considered in the assessment, all European sites that fell wholly or partially within a 30km buffer of the Transport East region were identified using Magic Map (https://magic.defra.gov.uk/MagicMap.aspx). A 30km buffer was used at this stage as this was the largest buffer from the above criteria, so would encompass all sites potentially affected.

3.3 Conservation Objectives

The overall objective of undertaking an HRA is to determine whether a plan or project will undermine the conservation objectives for any of the qualifying features of the site, and therefore assessments of impacts should be made explicitly against the conservation objectives for each qualifying feature.

Conservation objectives are set by Natural England with the aim to maintain or restore the favourable conservation status of the qualifying features of the sites. The following standard conservation objectives have been set by Natural England[12] which will apply to all sites unless amended on an individual basis.

Conservation Objectives:

With regard to the site 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;

[For Qualifying Habitats]

- *The extent and distribution of qualifying habitats;*
- *The structure and function (including typical species) of qualifying habitats; and*
- *The supporting processes on which the qualifying habitats rely.*

[For Qualifying Species]

- *The extent and distribution of habitats of qualifying species;*
- *The structure and function of habitats of qualifying species;*
- *The supporting processes on which habitats of qualifying species rely;*
- *The populations of qualifying species; and*
- *The distribution of qualifying species within the site.*

3.4 Stage One: Screening for Likely Significant Effects

Stage One: Screening determines whether the project or plan is likely to have a significant effect(s) on any European site(s), either alone or in-combination with other plans or projects. At this stage, the test is of the likelihood of adverse effects, not the certainty. In the context of HRA, and as a result of the Waddenzee Judgement (European Court of Justice C-127/02)[13] a likely effect is one that cannot be

[1] sensitivity to N deposition was determined for all qualifying features of the site using the Air Pollution Information System (APIS) (apis.ac.uk). Ramsar sites are not assessed by APIS, so sensitivity from a corresponding SPA, SAC or Area/Site of Special Scientific Interest was used, where available.

ruled out on the basis of objective information. Significant effects are defined as those that would undermine the conservation objectives for a European site.

During the screening exercise, the full range of criteria from Section 3.2 was initially applied to the each SIP scheme to identify European sites and qualifying interests potentially affected. Likely significant effects were then identified for the qualifying interests of those European site(s) using details about the proposed scheme, an understanding of the ecology of the qualifying species and habitats and professional judgement.

At this stage in the HRA process, mitigation measures cannot be considered as a means to conclude that the plan will not result in LSEs on European sites.

The text of the SIP and its appendices was screened in full to determine if either plan, in part or whole, would result in LSEs on European sites. Within a plan document, much of the text often introduces the region, provides background on current conditions and challenges and presents next steps for implementing the plan. This type of text can often be screened out as it cannot conceivably have an impact on European sites. The remaining sections of a plan often contain the vision, aims and objectives, and these have the potential to impact European sites.

For the SIP, each section of the document, including appendices, was read and assessed against screening categories (Table 3.1) to determine if any aspect could affect a European site. Although the Transport Strategy and SIP are being assessed separately, some aspects of the Transport Strategy that could result in impacts on European sites are also included within the SIP (e.g., examples of roads requiring upgrades identified in the Transport Strategy but included as Priority Projects in Appendix C of the SIP). To avoid duplication of effort, such projects were only assessed once, in either this Transport Strategy HRA or in the SIP HRA. Wherever this situation arises, it will be fully explained in the text to explain where the aspect is being assessed.

Table 3.1: Screening Categories (adapted from Tyldesley and Chapman[1])

Category	Description	Screening Outcome
Administrative Text	Introductory or general text about the region, current conditions, challenges and general aspirations for the strategy. This text sets the stage for the remainder of the plan and cannot conceivably have an impact on European sites. Objectives or outcomes may be presented in general in these sections, but if they are presented in greater detail in other sections of the plan, then they can be excluded from assessment in these sections.	Out
A	**General statement of policy or general aspirations:** Policies which are no more than general statements or aspirations may be screened out because they cannot have a significant effect on a site. This would include strategies, or parts of strategies, that may promote physical change but where effects on any European site cannot be identified because the strategy is too general. For example, if a physical change is intended but it is not known where, or when or how the change will be implemented, it can be screened out under this category.	Out
B	**Policies listing general criteria for testing the acceptability or sustainability of proposals:** Policies that present criteria that will be used to assess other aspects of the proposals within the plan.	Out
C	**Proposal referred to, but not included in the plan:** References to other plans, strategies or projects that are not explicitly a part of the plan being assessed. A useful test for whether the proposal should be screened out in this step is to ask the question "*Is the project proposed as a part of another plan or programme and would it be likely to proceed under that other plan or programme irrespective of whether this plan is adopted with or without reference to it?*"	Out

Category	Description	Screening Outcome
	If the answer is yes, it will likely be appropriate to screen it out at this step. These external plans will typically be included in an in-combination assessment.	
D	**General plan-wide environmental protection, site safeguarding or threshold policies:** Plan-wide policies that have the obvious intention of protecting or enhancing the environment, including biodiversity.	Out
E	**Policies or proposals that steer change to protect European sites from adverse effects:** Policies or proposals that have the indirect or unintentional effect of directing change away from European sites whose qualifying features may be affected.	Out
F	**Policies or proposals that cannot lead to development or change:** Policies that cannot lead to development or change for example because they relate to design or other qualitative criteria for development.	Out
G	**Policies or proposals that could not have any conceivable adverse effect on a site:** Policies that will result in change but have no causal link between them and the qualifying features of a site or would have a positive effect on sites.	Out
H	**Policies or proposals the (theoretical or actual) effects of which cannot undermine the conservation objectives:** Policies or proposal which direct a change, but the change can have no significant effect on a site, either alone or in-combination with other plans or projects.	Out
I	**Policies or proposals with a likely significant effect on a site alone:** Many of these will relate to proposals with specific locations, but some more generic sources of possible effects include proposals that steer change towards a site or impacts routes to a site (e.g., changes in hydrology or air quality).	In
J	**Policies or proposals not likely to have a significant effect alone:** Aspects of the plan that may have some effect alone, but the effect is unlike to be significant. An in-combination assessment should be conducted, and these policies or proposals should be re-categorised as either K or L.	Check for in-combination, re-categorise as K or L
K	**Policies or proposals not likely to have a significant effect either alone or in-combination.** Following an in-combination assessment, LSEs were not identified.	Screen out after in-combination
L	**Policies or proposals likely to have a significant effect either alone or in-combination.** Following an in-combination assessment, LSEs were identified.	Screen in after in-combination
M	**Bespoke area, site or case-specific policies intended to avoid or reduce harmful effects on a European site:** More specific than general policies for protecting the environment (Category D), these aspects of the plan are obviously in place to avoid or reduce actual harm to a site.	In

3.5 Stage Two: Appropriate Assessment

For all European sites where LSEs were identified during Stage One: Screening, an appropriate assessment was undertaken to assess the implications of the plan on the qualifying features of the European site. It is recognised that at the plan level, the AA is unlikely to be as detailed as an AA at the project level.

The objective of the AA is to determine whether the implications of the plan, both alone and in-combination with other plans or projects (Section 3.6), will result in adverse effects on the integrity of the European site, with respect to the site's structure and function, in light of the conservation objectives for the site's qualifying feature(s). The integrity of a site is defined as 'the coherence of its

ecological structure and function across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which the site is (or will be) designated[7].

One function of the AA is to identify mitigation or other measures that, where possible, could reduce, or avoid or eliminate the significant effects on the European site(s). At the plan-level, the identification of specific mitigation measures is often not possible, as plans frequently lack the detailed information necessary to develop such mitigation.

3.6 In-Combination Assessment

A key component of the HRA process is an assessment of the plan both alone and in-combination with other plans or projects. Such in-combination assessments are undertaken at both Stage One: Screening and Stage Two: Appropriate Assessment. These assessments require identification of other plans or projects that have been proposed, approved but not completed, or are already completed that may also have an impact on European sites.

As many of the schemes identified in the SIP do not have defined timescales or locations, it is difficult to identify every potential in-combination effect. In addition, given that many of the schemes in the SIP are located relatively close to each other, it is conceivable that in-combination effects on European sites may occur between multiple schemes identified within these two documents.

Given the lack of specific details about the schemes, including timescales, the in-combination assessments in this HRA are expected to be incomplete. Should any of the schemes identified in the SIP be developed further, a full in-combination assessment will be undertaken, should an HRA be required at the plan- or project-level.

4. Stage One – Updated Screening on final Strategic Investment Programme

4.1 Determining if HRA is required

This section presents the outcome of the updated screening process for the SIP. A screening1 was completed on the draft Transport Strategy and SIP in November 2021. Following public consultation, the Transport Strategy and SIP were finalised and these final documents were re-screened in this HRA.

Neither the Transport Strategy or SIP was exempt or excluded from HRA, as no aspect of either is directly connected with or necessary to the management of any European sites, and both set out an intention for future development or action.

4.2 Identification of European sites and Conservation Objectives

One hundred and three sites were identified as falling wholly or partially within a 30km buffer of the Transport East region (Appendix A). This list included 39 SACs, 32 SPAs and 32 Ramsar sites. Many of these sites overlapped in area with each other.

The conservation objectives for individual sites were obtained from Natural England's website[14].

4.3 Screening

The main text of the SIP and five appendices were assessed for LSEs on European sites (Appendix C).

Eighty-three schemes were assessed from SIP Appendix D (Table B.2, Appendix B). A total of 76 schemes were listed in SIP Appendix C, but several of these schemes had multiple components that were assessed in this HRA as individual schemes (e.g., Army and Navy Junction, SIP C2 assessed here as C2a, C2b, C2c and C2d). Of the 83 schemes, 12 were categorised as committed schemes and are currently in delivery; eight are schemes that will be delivered by neighbouring authorities; 13 are regional strategic packages and the remaining 49 schemes are associated with one of the four strategic priorities of the Transport Strategy.

4.4 Aspects of the SIP where no LSEs were identified

It was concluded that there would be no LSEs on any European sites as a result of the measures outlined in the main text of the SIP or SIP Appendices A, B, D or E (Table B.1, Appendix B). SIP Appendix B does include a list of schemes, but these are also listed in SIP Appendix C so are assessed there.

The main text of the SIP outlines Transport East's proposed approach to delivering the Transport Strategy but does not identify any specific schemes or actions that could impact European sites (Administrative Text). SIP Appendices A and C present assessment criteria for aspects of the SIP itself, so cannot result in any impacts on European sites (Category B).

All 12 of the committed schemes in SIP Appendix D were identified as being in the Delivery stage, indicating that they are in an advanced stage of design or construction has already commenced. These schemes are all being delivered by authorities within the Transport East region but were screened out because they are in such an advanced stage that they will be progressed regardless of whether the Transport Strategy and SIP are adopted or not (Category C). Environmental assessments, including HRA (where required), will be undertaken for each of these schemes prior to construction, so any impacts on European sites will be fully assessed.

All nine of the schemes being delivered by neighbouring authorities outside of the Transport East region were also screened out, as they are proposals that are not being delivered by Transport East

but are referred to in the SIP as they will affect transport within the Transport East region (Category C).

Of the remaining schemes, 44 were screened out as having no LSEs on European sites. Most of these were screened out because they described only general aims or aspirations for the region and did not provide enough detail to assess impacts on European sites (Category A). Several schemes were screened out because they could not lead to any physical change (Category F) or could not result in impacts on European sites that would undermine their conservation objectives (Category H).

4.5 Aspects of the SIP where LSEs were identified

Likely significant effects on one or more European site(s) were identified for six schemes (Appendix D). These schemes are:

- A10 West Winch housing access road (F2);
- A11 Fiveways Junction (D7);
- A12 strategic package north (A14 to A1152) (C4);
- Great Eastern Main Line strategic rail package (improvements in London, Essex Suffolk and Norfolk): improving frequency (C1a);
- Norwich Western Link (B2);
- West Anglia Main Rail Line package (Stansted Line capacity works) (F1a);

4.6 The LSEs were identified for these schemes predominantly because:

- they would clearly result in physical changes (e.g., new or dualled road) that could have direct effects on the qualifying feature(s) of one or more European site(s);
- it is expected that they would result in indirect effects on the qualifying feature(s) of one or more European site(s), or the supporting functional habitat of qualifying species, for example, through increased emissions (leading to Nitrogen deposition) or increased visitor pressure; and/or
- it could not be determined whether a scheme is expected to result in LSEs, due to a lack of a detailed design or information on construction methods or timings. In these instances, schemes were screened in for potential effects on a precautionary basis. All schemes that are developed further will undergo HRA at the plan- and/or project-level.

Due to the uncertainty around detailed design and construction methods or timings, it is not possible to fully identify all impacts, or assess all expected in-combination effects. However, potential impacts that are typically associated with construction projects are presented in Section 4.7 below, to provide an assessment of the anticipated impacts on European sites resulting from these schemes.

4.7 Potential Impacts

The construction of new transport infrastructure, or changes to transportation patterns, can result in impacts to the qualifying features of European sites, either directly or indirectly. Potential impacts to European sites that are often associated with construction activities are presented below. The sensitives of the qualifying features and their supporting habitat, when considered with impact pathways between scheme and the site, will determine how a scheme or proposal could result in LSEs. Therefore, not all the potential impacts identified below will be considered for each European site and scheme. Furthermore, additional impacts may be added to subsequent plan- or project-level HRAs, as schemes are further developed, and more details are available.

4.7.1 Habitat loss and/or fragmentation

New or improved transport infrastructure could require temporary or permanent land take from one or more European sites (e.g., new or dualled road, construction site compounds). This could result in a

loss of overall qualifying habitat within the site or reduce the amount of functional supporting habitat for qualifying species of the site.

The construction of new or expanded transport infrastructure could also introduce barriers which would restrict the movement of species or fragment qualifying or supporting habitats.

4.7.2 Species mortality

Direct mortality of species could result from activities such as contact with plant and material during construction, or increased risk of road collisions on dualled roads. Significant pollution events arising from construction activities can also cause direct species mortality.

4.7.3 Disturbance (noise, vibration, lighting)

Disturbance to species can result from construction activities or operation of new or expanded transport infrastructure. Construction activities can cause disturbance through excessive noise and/or vibration, illuminating areas during both construction and operation, increased human presence or other visual disturbances. Such disturbances can restrict migration of species or causes individuals to avoid areas.

4.7.4 Increased visitor pressure or other recreational impacts

Improving transport access and options in the region could direct more individuals towards European sites for recreation, which in turn could impact the qualifying species and habitats of those sites through disturbance or damage (e.g., from increased footfall).

4.7.5 Changes to water quality

Transport activities and infrastructure can impact water quality both within and outside of European sites, resulting in impacts to European sites. Pollution events can occur during construction activities if pollution prevention measures are not properly implemented. Additionally, increased surface runoff from new or expanded transport infrastructure can cause chronic negative impacts to adjacent waterbodies, if not properly captured and treated. This could impact sites located within as well as downstream of a scheme area if a hydrologic connection exists between the scheme and site.

4.7.6 Changes to hydrology

Transportation infrastructure can result in changes to hydrology, for example through installation or replacement of culverts or other river crossings, or through increased surface runoff.

4.7.7 Changes to air quality

Transport schemes can affect air quality through increased vehicle traffic on new or dualled roads, or increased train capacity on rail lines. Vehicle and train engines are a contributor to air pollution through the emission of nitrogen oxides (NOx) and can impact European sites with receptors that are sensitive to nitrogen (N) deposition, either directly (e.g., qualifying habitats) or indirectly (e.g., functional supporting habitat for qualifying species).

4.7.8 Coastal squeeze

Coastal squeeze is defined as:

"*…the loss of natural habitats or deterioration of their quality arising from anthropogenic structures, or actions, preventing the landward transgression of those habitats that would otherwise natural occur in response to sea level rise (SLR) in conjunction with other coastal processes. Coastal squeeze affects habitat on the seaward side of existing structures.*"[15].

Under natural conditions, coastal processes that could lead to the landward migration of habitats under sea level rise include tidal inundation on saltmarshes, wave action impacting shingle beaches and winds altering dunes. Anthropogenic structures and actions can disrupt or inhibit these natural processes and prevent the natural landward progression of habitats. Examples of anthropogenic structures that can result in coastal squeeze include flood and coastal erosion protection structures, quay walls, and embankments for roads and railways.

4.8 In-Combination Assessment

Other plans or projects must be considered when undertaking screening of any plan or project. The purpose of the in-combination assessment is to consider the potential for cumulative effects on a site, as repeated impacts, even those that were individually assessed as not significant, from multiple projects can result in an LSE when considered in-combination.

As the schemes that were screened in from the SIP do not currently have detailed design or timescale information, it is not possible to complete a detailed in-combination assessment with other projects. However, it should be noted that given the volume of schemes proposed within the SIP for the Transport East region, it is conceivable that in-combination effects could occur between schemes identified within this SIP. Thus, all of the schemes identified in Appendix B (Table B.2) should be considered in any in-combination assessment at the project-level.

There are numerous other plans that cover the Transport East region (or are in close proximity to it) which have the potential to result in in-combination effects on European sites. As with the Transport East Transport Strategy, such plans outline the strategic goals for the region that they cover, and therefore many of the projects that could result in in-combination effects will arise from the policies and objectives outlined in the strategic plans.

4.9 Summary of Screening

Likely significant effects were identified for 15 European sites (Table 3). These sites will be taken forward for Appropriate Assessment to determine if the schemes in SIP Appendix C are expected to result in adverse effects on the integrity of these European sites.

- Deben Estuary SPA;
- Deben Estuary Ramsar;
- Lee Valley SPA;
- Lee Valley Ramsar;
- North Norfolk Coast SPA;
- North Norfolk Coast Ramsar;
- North Norfolk Coast SAC;
- Paston Great Barn SAC;
- Rex Graham Reserve SAC;
- River Wensum SAC;
- Stour and Orwell Estuaries SPA;
- Stour and Orwell Estuaries Ramsar;
- The Wash SPA;
- The Wash Ramsar; and
- The Wash and North Norfolk Coast SAC.

Table 4.1: Outcome of the screening for sites where likely significant effects were identified.

European Site and Qualifying Features	Schemes Affecting Site (distance to site)	LSE Conclusion and Justification	Nature of Effect(s)
Deben Estuary SPA (UK9009261) **Qualifying features:** • dark-bellied brent goose (*Branta bernicla*) • pied avocet (*Recurvirostra avosetta*)	C4: A12 strategic package north (A14 to A1152) (870m, 1.4km upstream) **In-Combination:** Ipswich Housing Strategy 2019-2024[16]	**Yes, all qualifying features** Disturbance caused by human activity; including presence of people and animals, trampling; was identified as a pressure on both qualifying species of the site[17], and therefore improvements to the A12, combined with anticipated residential development along its route, could result in LSEs to the qualifying species of the site through increased visitor pressure. Additionally, as the scheme is hydrologically connected to the site, changes in water quality during both construction and operation could impact the species.	• changes in water quality • increased visitor pressure
Deben Estuary Ramsar (UK11017) **Designation criteria:** Supports a population of the mollusc, *Vertigo angustior* (Criterion 2) Species/populations of international importance (Criterion 6): • dark-bellied brent goose	C4: A12 strategic package north (A14 to A1152) (870m, 1.4km upstream) **In-Combination:** Ipswich Housing Strategy 2019-2024[16]	**Yes, all designation criteria** See Deben Estuary SPA for the designated bird species of the site. The scheme is hydrologically connected to Martlesham Creek which supports a population of the mollusc *Vertigo angustior* (Criterion 2).	• changes in water quality • increased visitor pressure
Lee Valley SPA (UK9012111) **Qualifying features:** • gadwall (*Anas strepera strepera*) • great bittern (*Botaurus stellaris*) • northern shoveler (*Anas clypeata*)	F1a: West Anglia Main Rail Line package (Stansted Line capacity works) (rail line crosses site)	**Yes, all qualifying features** Nitrogen oxide (NO_x) from diesel train emissions due increased capacity on the line is expected to have a negative impact on the fen, marsh and swamp habitats within the site and may also negatively impact the open standing waters used by the qualifying species[18].	• changes in air quality
Lee Valley Ramsar (UK11034) **Designation criteria:** Supports nationally scarce plant *Myriophyllum verticillatum* and rare vulnerable invertebrate *Micronecta minutissi* (Criterion 2) Species/populations of international importance (Criterion 6): • gadwall • northern shoveler	F1a: West Anglia Main Rail Line package (Stansted Line capacity works) (rail line crosses site)	**Yes, all designation criteria** Nitrogen oxide (NO_x) from diesel train emissions due increased capacity on the line is expected to have a negative impact on the fen, marsh and swamp habitats within the site and may also negatively impact the open standing waters used by the designated bird species[18] and may also negatively impact the supporting habitat for the Criterion 2 species.	• changes in air quality
North Norfolk Coast SPA (UK001983) **Qualifying features:** • common tern (*Sterna hirundo*) • dark-bellied brent goose	F2: A10 West Winch housing access road (26km) **In-Combination:** North Runcton and West Winch Neighbourhood Plan[19]	**Yes, all qualifying features** The A10 housing access road is located more than 26km away from the site and is not expected to result in LSEs due to increased visitor pressure individually. However, as the road is being constructed to support plans for residential development in the adjacent area[19], and there are plans for other residential	• increased visitor pressure

European Site and Qualifying Features	Schemes Affecting Site (distance to site)	LSE Conclusion and Justification	Nature of Effect(s)
• Eurasian marsh harrier (*Circus aeruginosus*) • Eurasian wigeon (*Anas penelope*) • great bittern • little tern (*Sterna albifrons*) • pied avocet • pink-footed goose (*Anser brachyrhynchus*) • red knot (*Calidris canutus islandica*) • sandwich tern (*Sterna sandivicensis*)	North Norfolk Local Plan 2016-2036[20]	development in the wider area, it is concluded that these projects could result in LSEs on the qualifying species of the site when considered in-combination with each other.	
North Norfolk Coast Ramsar (UK11048) **Designation criteria:** Large undeveloped expanse of coastal habitats (Criterion 1) Supports a number of British Red Data Book plants, lichen and invertebrates (Criterion 2) Waterfowl assemblage of international importance (Criterion 5) Species/populations of international importance (Criterion 6): • bar-tailed godwit* (*Limosa lapponica lapponica*) • common tern • dark-bellied brent goose • Eurasian wigeon • little tern • Northern pintail (*Anas acuta*) • pink-footed goose • red knot • ringed plover* (*Charadrius hiaticula*) • sanderling* (*Calidris alba*) • Sandwich tern	F2: A10 West Winch housing access road (26km) **In-Combination:** North Runcton and West Winch Neighbourhood Plan[19] North Norfolk Local Plan 2016-2036[20]	**Yes, all designated criteria** See SPA for the designated bird species of the site. Increased visitor pressure could also impact the Criterion 1 habitat and Criterion 2 communities of the site.	• increased visitor pressure
North Norfolk Coast SAC (UK0019838) **Qualifying features:** • Coastal lagoons • Perennial vegetation of stony banks • Mediterranean and thermo-Atlantic halophilus scrubs (*Sarcocorneta fruticose*) • Embryonic shifting dunes	F2: A10 West Winch housing access road (26km) **In-Combination:** North Runcton and West Winch Neighbourhood Plan[19] North Norfolk Local Plan 2016-2036[20]	**Yes, all qualifying features except coastal lagoons** An increase in the local population is expected to result in increased visitor pressure to the SAC. More visitors to the site have the potential to impact the qualifying species and habitats both directly and indirectly. Disturbance from human activity was not identified as a specific pressure for coastal lagoons[17]. This habitat is located offshore and is expected to be less likely to be impacted by increased visitors to the site.	• increased visitor pressure

European Site and Qualifying Features	Schemes Affecting Site (distance to site)	LSE Conclusion and Justification	Nature of Effect(s)
• Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) • Fixed coastal dunes with herbaceous vegetation • otter (*Lutra lutra*) • petalwort (*Petalophyllum ralfsii*)			
Paston Great Barn SAC (UK0030235) **Qualifying feature:** • Barbastelle bat (*Barbastella barbastellus*)	B2: Norwich Western Link (29km) **In-Combination:** Norfolk Boreas Offshore Wind Farm (onshore elements)[21]	**Yes, barbastelle bat** The Norwich Western Link route crosses woodland habitat which has been found to support an important population of barbastelle bats[22]. As barbastelle bats are known to forage over a wide area and use multiple roosts[23], individuals from this SAC could be present within the woodland crossed by the scheme.	• habitat loss and/or fragmentation • species mortality • disturbance
Rex Graham Reserve SAC (UK0019866) **Qualifying feature:** • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (important orchid sites) (Annex I priority habitat)	D7: A11 Fiveways Junction (880m)	**Yes, qualifying habitat** The A11 Fiveways Junction is approximately 880m away from the boundary of the SAC. Although the works are anticipated to be localised to the junction, other construction activities (e.g., compounds, access roads) could be situated within or adjacent to the boundary of the SAC and could result in impacts to the qualifying habitat.	• habitat loss or degradation
River Wensum SAC (UK0012647) **Qualifying features:** • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • brook lamprey (*Lampetra planeri*) • bullhead (*Cottus gobio*) • Desmoulin's whorl snail (*Vertigo moulinsiana*) • white-clawed crayfish (*Austropotamobius pallipes*)	B2: Norwich Western Link (scheme crosses site)	**Yes, all qualifying features** The proposed route of the scheme crosses the River Wensum, and at the proposed crossing point, the River Wensum and small areas of its riparian habitat are within the boundary of the River Wensum SAC. A new crossing point is required for the road, which could result in LSEs on all of the qualifying species and habitat of the SAC.	• habitat loss and/or fragmentation • species mortality • disturbance • changes to water quality • changes to hydrology
Stour and Orwell Estuaries SPA (UK9009121) **Qualifying features:** • black-tailed godwit (*Limosa limosa islandica*) • common goldeneye (B*ucephala clangula*) • common redshank (*Tringa totanus*) • common shelduck (*Tadorna tadorna*) • cormorant (*Phalacrocorax carbo*) • dark-bellied brent goose	C1a: Great Eastern Main Line strategic rail package (improvements in London, Essex, Suffolk and Norfolk): improving frequency (scheme crosses site)	**Yes, all qualifying features** Increased frequency along this rail line could result in increased nitrogen deposition, which may negatively impact the habitats adjacent to the line.	• Changes in air quality

European Site and Qualifying Features	Schemes Affecting Site (distance to site)	LSE Conclusion and Justification	Nature of Effect(s)
• dunlin (*Calidris alpina alpina*) • Eurasian curlew (*Numenius arquata*) • Eurasian wigeon • European golden plover (*Pluvialis apricaria apricaria*) • gadwall • great crested grebe (*Podiceps cristatus*) • greater scaup (*Aythya marila*) • grey plover (*Pluvialis squatarola*) • mute swan (*Cygnus olor*) • Northern lapwing (*Vanellus vanellus*) • Northern pintail • pied avocet • red knot • ringed plover • ruddy turnstone (A*renaria interpres*)			

Stour and Orwell Estuaries Ramsar (UK11067)
Designation criteria:
• Contains nationally scarce plants, British Red data book invertebrates and an endangered snail (Criterion 2)
• Waterfowl assemblage of international importance (Criterion 5)
• Species/populations of international importance (Criterion 6):
  ○ black-tailed godwit
  ○ common redshank
  ○ dark-bellied brent goose
  ○ dunlin
  ○ grey plover
  ○ Northern pintail
  ○ red knot
	C1a: Great Eastern Main Line strategic rail package (improvements in London, Essex, Suffolk and Norfolk): improving frequency (scheme crosses site)	**Yes, all designation criteria**
		See Stour and Orwell SPA for bird species.
		Nitrogen deposition could negatively affect the supporting habitat within the site for the Criterion 2 communities of the site.
			• changes in air quality

The Wash SPA (UK9008021) **Qualifying features:** • bar-tailed godwit • Bewick's/tundra swan (*Cygnus columbianus bewickii*)	F2: A10 West Winch housing access road (7km) **In-Combination:** North Runcton and West Winch Neighbourhood Plan[19] North Norfolk Local Plan 2016-2036[20]	**Yes, all qualifying features** The A10 housing access road is located more than 7km away from the site and is not expected to result in LSEs due to increased visitor pressure individually. However, as the road is being constructed to support plans for residential development in the adjacent area[19], and there are plans for other residential development in the wider area, it is concluded that these projects could result in	• increased visitor pressure

European Site and Qualifying Features	Schemes Affecting Site (distance to site)	LSE Conclusion and Justification	Nature of Effect(s)
• black (common) scoter (*Melanitta nigra*) • black-tailed godwit • common goldeneye • common redshank • common shelduck • common tern • dark-bellied brent goose • dunlin • Eurasian curlew • Eurasian oystercatcher (*Haematopus ostralegus*) • Eurasian wigeon • gadwall • grey plover • little tern • Northern pintail • pink-footed goose • red knot • ruddy turnstone • sanderling		LSEs on the qualifying species of the site when considered in-combination with each other.	

The Wash Ramsar
(UK11072)
Designation criteria:
• Extensive marshes, intertidal banks, and deep channels (Criterion 1)
• The inter-relationship between its various habitat components (Criterion 3)
• Waterfowl assemblage of international importance (Criterion 5)
• Species/populations of international importance (Criterion 6):
  ○ bar-tailed godwit
  ○ black-tailed godwit*
  ○ common redshank
  ○ common shelduck
  ○ dark-bellied brent goose
  ○ dunlin
  ○ Eurasian curlew
  ○ Eurasian oystercatcher
  ○ European golden plover*
	F2: A10 West Winch housing access road (7km)
	In-Combination:
	North Runcton and West Winch Neighbourhood Plan[19]
	North Norfolk Local Plan 2016-2036[20]
		Yes, all designated criteria
		See SPA for the designated bird species of the site.
		Increased visitor pressure could also impact the Criterion 2 communities of the site.
			• increased visitor pressure

European Site and Qualifying Features	Schemes Affecting Site (distance to site)	LSE Conclusion and Justification	Nature of Effect(s)
○ grey plover ○ Northern lapwing* ○ Northern pintail ○ pink-footed goose ○ red knot ○ ringed plover* ○ ruddy turnstone ○ sanderling			
The Wash and North Norfolk Coast SAC (UK0017175) **Qualifying features:** • Sandbanks which are slightly covered by seawater at all times • Mudflats and sandbanks not covered by seawater at low tide • Large shallow inlets and bays • Reefs • Salicornia and other annuals colonising mud and sand • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • Mediterranean and thermo-Atlantic halophilus scrubs (*Sarcocornetea fruticose*) • Coastal lagoons (priority feature) • harbour seal (*Phoca vitulina*) • otter	F2: A10 West Winch housing access road (7km) **In-Combination:** North Runcton and West Winch Neighbourhood Plan[19] North Norfolk Local Plan 2016-2036[20]	**Yes, all qualifying features except for coastal lagoons, large shallow inlets and bays, reefs** An increase in the local population is expected to result in increased visitor pressure to the SAC. More visitors to the site has the potential to impact the qualifying species and habitats both directly and indirectly. Disturbance from human activity was not identified as a specific pressure for coastal lagoons, large shallow inlets and bays, and reefs[17]. These habitats are located offshore and are expected to be less likely to be impacted by increased visitors to the site.	• increased visitor pressure

5. Stage Two – Appropriate Assessment on Strategic Investment Programme

An appropriate assessment was undertaken on the 15 European sites where LSEs were identified (Section 4). The purpose of the AA was to determine whether the schemes, both individually and in-combination with other plans or projects, could result in adverse effects on the integrity of the European site(s), with respect to the conservation objectives of the qualifying species (for SPAs and SACs) or designation criteria (for Ramsar sites).

As the schemes in the SIP currently lack detailed design and timeline information, it is not possible to complete full assessment of adverse effects at the plan-level. Should any of these schemes be progressed further, a project-level HRA will be undertaken which will consider impacts of the detailed design elements on European sites.

Therefore, this AA can be considered to be identifying potential adverse effects on site integrity (AESI), as opposed to certain adverse effects on site integrity. The outcome of this AA can be used by the plan-making body and the organisations progressing the schemes to identify aspects of the scheme that could have the most significant impacts on European sites. This information can be used in the design process to avoid LSEs and adverse impacts, or aid in the development of appropriate mitigation to avoid adverse effects.

Mitigation measures are outlined in the sections below. However, as detailed information is not yet available on the schemes or on the qualifying features of the European site(s), the mitigation outlined below represents typical or general mitigation that is associated with these types of schemes. At the project-level, detailed mitigation or avoidance will be developed based on in-depth assessment of how the schemes could impact the qualifying feature(s) of the European site(s).

5.1 Deben Estuary SPA and Ramsar

5.1.1 Likely Significant Effects

Likely significant effects were identified for the Deben Estuary SPA and Ramsar sites due to changes in water quality and increased visitor pressure as a result of the A12 Strategic Package North (A14 to A1152) (SIP scheme C4, Table 3, Appendix C).

Likely significant effects were identified for the following qualifying/designation features:

- SPA and Ramsar:
  - dark-bellied brent goose (non-breeding (SPA), peak counts in winter (Ramsar))
- SPA only:
  - pied avocet (non-breeding)
- Ramsar only:
  - population of the mollusc Vertigo angustior (Criterion 2)

5.1.1.1 Changes in water quality

The A12 strategic package north (A14 to A1152) scheme is hydrologically connected to the sites through an earthworks drain to the west of the roundabout for the B1438 (TM 25286 47912). This drain flows into the River Flynn which is a tributary of Martlesham Creek. This reach of the River Flynn is classified by the Environment Agency under the Water Framework Directive (WFD)[24] (waterbody ID GB105035040300).

New housing developments may also have hydrological connections to the designated sites, which could impact the sites both during construction and after completion.

Martlesham Creek is within the boundary of the SPA/Ramsar sites and supports a population of the mollusc Vertigo angustior, one of fourteen total populations in the country. Pollution events during construction or chronic pollution during operation both have the potential to impact the habitat of the sites for both Vertigo angustior and the qualifying bird species.

5.1.1.2 Increased visitor pressure

Improvements to the local transport system, when combined with new residential development, has the potential to lead to more visitors to the SPA/Ramsar sites. Disturbance as a result of public access was identified as a threat to the qualifying species of the Deben Estuary SPA in the Site Improvement Plan (SIP)[25]. However, disturbance at Deben Estuary is currently low and most of the disturbance occurs during the spring and summer when recreational use of the area is high[17].

Increased visitor pressure can negatively impact the qualifying/designated species of the SPA/Ramsar sites and their supporting habitat through trampling and disturbance to individuals; leading to behavioural changes such as abandonment of nests and feeding areas. Both dark-bellied brent geese and pied avocet at the site are particularly vulnerable to visual and noise disturbance from walkers, dogs, light aircraft, water sports and nearby shooting[17].

5.1.2 In-Combination Effects

Ipswich has a growing population, and the provision of new housing is a key objective for the region. Increased residential development will bring new visitors to the Deben Estuary SPA/Ramsar sites, and the developments also have the potential to impact water quality, depending on the location of the developments. Therefore, in-combination effects were identified for the Deben Estuary SPA/Ramsar sites with the Ipswich Housing Strategy 2019-2024[16].

5.1.3 Mitigation and Avoidance

5.1.3.1 Changes in water quality

During any construction works associated with the scheme that could impact watercourses, best practice guidelines and measures for pollution prevention will be adhered to. These will be described in full in any subsequent assessments required for the scheme (e.g., environmental impact assessment, project-level HRA).

Examples of measures that could be required include:

- all reasonable steps must be taken to prevent silt and chemical pollutants from entering any watercourses;
- plant and wheel washing to be carried out in a designated area of hard standing at least 10m away from any watercourse or surface water drain;
- refuelling must take place at least 10m away from any surface water;
- biodegradable oils should be used for vehicles and plant where possible;
- dust, debris and contaminated water will be appropriately contained to reduce the risk of pollution;
- a pollution incident response plan will be developed and adhered to; and
- following the operation of the machinery, any damage caused by the operation to the bed and banks of the surface water must be repaired, including the re-establishing of vegetation on any areas of bare earth on the banks resulting from the operation.

Examples of guidance documents that could be required to be adhered to include:

- Design Manual for Roads and Bridges LA 113 Road drainage and the water environment26;

- Control of water pollution from construction sites. Guidance for consultants and contractors (C532)[27];
- Control of water pollution from linear construction projects. Technical guidance (C648)[28];

Additionally, any project must ensure that it does not cause deterioration to any waterbodies that would result in a reduction in their Water Framework Directive classification[26]. Therefore, the scheme must ensure that its design, construction and/or operation do not negatively impact any WFD water bodies located downstream of the scheme. This will be fully addressed should any aspect of the scheme be taken forward but could include the pollution prevention mitigation described above and introducing multiple levels of treatment of road runoff.

5.1.3.2 Increased visitor pressure

Mitigation items for the estuary were developed by the Deben Estuary Partnership, which is made up of a network of stakeholders including Natural England, Suffolk Coasts and Heaths Area of Outstanding Natural Beauty, Environment Agency and East Suffolk Council, among others.

The Deben Estuary Partnership has developed the Deben Estuary Plan, which identifies a range of policy areas, including access and recreation. Within the plan, the Deben Estuary Partnership outlines potential threats of disturbance from visitor pressure to the estuary, including the SPA/Ramsar site and its qualifying features, and presents mitigation measures to alleviate these pressures. Mitigation items included in the Deben Estuary Plan[29] include:

- habitat management: improving and enhancing existing habitat;
- screening or protecting important areas: separating visitors from wildlife in sensitive locations;
- managing visitor access: restricting or adapting access to some areas at certain times;
- managing visitor numbers: using methods such as modifying parking fees, parking capacity and limiting on-road parking; and
- communication and education: through signs, interpretation boards, leaflets, and other measures.

Should the scheme, or any elements of it, be taken forward, consultation with the Deben Estuary Partnership should be undertaken to develop specific mitigation items for the SPA/Ramsar site.

5.1.4 Conclusions

It was concluded that, with proper development and application of mitigation measures, the A12 strategic package north (A14 to A1152), in-combination with planned development elsewhere in Ipswich, will not result in AESI on the SPA/Ramsar site due to changes in water quality (Table 4).

Furthermore it was concluded there would be no AESI on the SPA/Ramsar site due to increased visitor pressure as a result of these schemes. Should the scheme be progressed further, consultation should be undertaken with Natural England and Deben Estuary Partnership to develop mitigation and avoidance measures that minimise the impact of visitors on the SPA/Ramsar site. The project level Appropriate Assessment for this scheme will identify whether any specific mitigation is required above that identified here to avoid AESI. If AESI cannot be avoided then alternatives to the project will need to be identified.

Table 5.1. Summary of the results of the appropriate assessment.

Conservation Objective(s)	AESI Conclusion and Justification
SIP Scheme and any other plans or projects: C4: A12 Strategic Package North (A14 to A1152) (870m, 1.4km upstream) Ipswich Housing Strategy 2019-2024[16]	
Changes in water quality	
Maintaining or restoring • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features; • the supporting processes on which the habitats of the qualifying features rely.	No The roundabout is located far upstream of the site (1.4km). Mitigation measures will be put into place during construction and operation of the scheme to minimise the risk of pollutants entering the minor drain and reaching the SPA/Ramsar site.
Increased visitor pressure	
Maintaining or restoring • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features; • the supporting processes on which the habitats of the qualifying features rely; • the distribution of the qualifying features of the site; • the population of each of the qualifying features.	**No** Although current disturbance is low during winter, when dark-bellied brent geese and pied avocet are more likely to be using the site, it is considered that these two species could be adversely affected if recreational disturbance increases[30]. Improvements to access in the area, when combined with an increase in the local residential population, is expected to increase visitor pressure to the SPA/Ramsar site. Mitigation and avoidance measures already included in the Deben Estuary Plan should be should be incorporated into the design and construction of the scheme(s) to minimise the impact of visitor pressure on the qualifying species of the site.

As the SPA and Ramsar site boundaries overlap, they are considered together here. Ramsar sites do not have conservation objectives, so the conservation objectives for the SPA are also applied to the Ramsar site.

5.2 Lee Valley SPA and Ramsar

5.2.1 Likely Significant Effects

Likely significant effects could not be excluded for the Lee Valley SPA and Ramsar sites due to changes in air quality. These effects are from the West Anglia Main Rail Line package (Stansted Line capacity works) (SIP scheme F1a; Table 3; Appendix C). Potential likely significant effects were identified for the following qualifying features:

- SPA and Ramsar:
    - gadwall (wintering)
    - Northern shoveler (wintering (SPA), peak counts in spring/autumn (Ramsar))
- SPA only:
    - great bittern (wintering)
- Ramsar only:

- nationally scarce plant *Myriophyllum verticillatum* (a water milfoil) and rare invertebrate *Micronecta minutissi* (a water boatman) (Criterion 2)

Diesel train emissions include nitrogen oxides (NOx)[31] and increasing capacity on this line has the potential to negatively impact the supporting habitat for the qualifying/designated species of the SPA/Ramsar site. Risk of atmospheric nitrogen deposition was identified as a threat in the Lee Valley SPA SIP[32].

5.2.2 In-Combination Effects

No other plans or projects were identified that are expected to result in in-combination effects on the SPA/Ramsar site.

5.2.3 Mitigation and Avoidance

Should the project be taken forward, an air quality assessment should be undertaken to support further environmental assessment (e.g., environmental impact assessment, project-level HRA). If air quality impacts are realised they are likely to be localised to habitats immediately adjacent to the West Anglia Main Rail Line. The potential for effects are minimised by ensuring capacity upgrades do not involve trains idling on track within the designated site.

5.2.4 Conclusions

It was concluded that with appropriate mitigation there would be no AESI on the habitats supporting qualifying species of the SPA and Ramsar sites from changes in air quality as a result of the scheme (Table 5). Air quality modelling will form an integral part of the evidence based to determine the impact of increased capacity on the line on the supporting habitat for the qualifying species of the sites.

Table 5.2. Summary of the results of the appropriate assessment.

Conservation Objective(s)	AESI Conclusion and Justification
SIP Scheme and any other plans or projects: F1a: West Anglia Main Rail Line package (Stansted Line capacity works) (scheme runs adjacent to the sites)	
Changes in air quality	
Maintaining or restoring • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features; • the supporting processes on which the habitats of the qualifying features rely.	**No** Mitigation can be designed to avoid adverse effects on site integrity. Any effect on air quality on supporting habitats is likely to be highly localised and is not considered to lead to adverse effects.

As the SPA and Ramsar site boundaries overlap, they are considered together here. Ramsar sites do not have conservation objectives, so the conservation objectives for the SPA are also applied to the Ramsar site.

5.3 North Norfolk Coast SPA, Ramsar and SAC

5.3.1 Likely Significant Effects

Likely significant effects were identified for the North Norfolk Coast SPA, Ramsar site and SAC as a result of increased visitor pressure from the A10 West Winch housing access road (SIP scheme F2; Table 3, Appendix C). The following qualifying features and designation criteria were identified as being affected by increased visitor pressure to the sites:

- SPA and Ramsar (qualifying for wintering unless otherwise noted):
    - common tern (breeding)
    - dark-bellied brent goose
    - Eurasian wigeon
    - little tern (breeding)
    - pink-footed goose
    - red knot (peak counts spring/autumn (Ramsar))
    - Sandwich tern (breeding)
- SPA only:
    - Eurasian marsh harrier (breeding)
    - great bittern (breeding)
    - pied avocet (breeding)
- Ramsar only:
    - large undeveloped expanse of coastal habitats (Criterion 1)
    - supports a number of British Red Data Book plants, lichen and invertebrates (Criterion 2)
    - waterfowl assemblage of international importance (Criterion 5)
    - Northern pintail (peak counts in winter)
- SAC only:
    - perennial vegetation of stony banks
    - Mediterranean and thermo-Atlantic halophilus scrubs (*Sarcocorneta fruticose*)
    - embryonic shifting dunes
    - shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
    - fixed coastal dunes with herbaceous vegetation
    - otter (*Lutra lutra*)
    - petalwort (*Petalophyllum ralfsii*)

Impacts associated with visitors to sites vary by site and season, but include trampling of habitats, disturbance due to presence of people and animals (particularly dogs), and disturbance from noise and light.

Disturbance to the qualifying bird species from visitors to the site has the potential to cause abandonment of nest sites, desertion of foraging area, increased energy expenditure from increased flights and increased exposure to predators. These behavioural changes can undermine successful nesting, foraging, roosting and rearing of young which can impact the distribution of species within the site and the populations.

Petalwort is found on dune slacks and other sandy ground and requires substrates that are firm or compact[17]. Too much disturbance can cause the substrates to become too instable to support petalwort, although too little disturbance results in the ground becoming overgrown with ground turf and unsuitable for petalwort.

Otters have not been identified as particularly susceptible to disturbance by anthropogenic activity, but the A149 is a barrier for otters using the SAC and the River Glaven and River Cley/Blakeney[17].

Increased visitor pressure to the site will likely increase traffic on this road, which could result in more otter deaths or injuries.

5.3.2 In-Combination Effects

The A10 West Winch housing access road is located more than 26km from the sites and is not expected to result in any LSEs on the qualifying features of the sites individually. However, LSEs were identified in-combination with planned development in the wider area[19,20], particularly because the road is planned to support adjacent residential development.

A previous study found that residents of new housing located within 42km of the North Norfolk Coast SPA, Ramsar site and SAC are likely to regularly visit the site for recreation33. Additionally, disturbance due to public access was identified as a threat in the SIP for the North Norfolk Coast SPA and SAC[34].

5.3.3 Mitigation and Avoidance

In 2021, the Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy was published[33]. The purpose of the strategy is to address the potential for in-combination effects on nature conservation sites and their qualifying species from proposed residential development and increased tourism accommodation as outlined within the various Local Plans for the Norfolk County.

The intention is to mitigate against the effects of development at the plan- and project-levels through the provision of green infrastructure. Green infrastructure aims to divert daily recreational visits away from sensitive sites (including the North Norfolk SPA, Ramsar site and SAC) to avoid AESI of these sites.

The strategy also introduces a recreational impact avoidance and mitigation strategy (RAMS), which, once adopted, will outline the strategic mitigation measures that will ensure the avoidance of AESI due to in-combination effects. As the A10 West Winch housing access road falls within Norfolk, adherence to the measures outlined in the RAMS will be essential to ensuring that the scheme results in no AESI on these sites.

5.3.4 Conclusions

It was concluded that there would be no AESI on the qualifying features of the sites as a result of increased visitor pressure (Table 6). The road scheme is not expected to result in impacts individually. The measures presented in the Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy will apply to the housing developments and are specifically designed to avoid in-combination effects on European sites in Norfolk.

Table 5.3. Summary of the results of the appropriate assessment.

Conservation Objective(s)	AESI Conclusion and Justification
SIP Schemes and other plans or projects (where applicable) affecting the site: F2: A10 West Winch housing access road (26km) North Runcton and West Winch Neighbourhood Plan[19] North Norfolk Local Plan 2016-2036[20]	
Increased visitor pressure	
SPA, SAC species and Ramsar (Criteria 2, 5 and 6): Maintaining or restoring • the distribution of the qualifying features of the site; • the population of each of the qualifying features. **SPA, SAC habitats and Ramsar (Criterion 1):** Maintaining or restoring • the extent and distribution of the qualifying natural habitats and habitats of the qualifying species; • the structure and function (including typical species) of the qualifying natural habitats;	No The A10 West Winch housing access road is only expected to result in LSEs on the sites in-combination with planned residential development. Through adherence to the Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy[33], in-combination effects on the sites will be avoided.

Conservation Objective(s)	AESI Conclusion and Justification
• the structure and function of the habitats of the qualifying species; • the supporting processes on which the qualifying natural habitats and habitats of the qualifying species rely;	

As the SPA, Ramsar and SAC site boundaries overlap, they are considered together here. Ramsar sites do not have conservation objectives, so the conservation objectives for the SPA and SAC are also a

5.4 Paston Great Barn SAC

5.4.1 Likely Significant Effects

Likely significant effects were identified for the Paston Great Barn SAC as a result of the Norwich Western Link (SIP scheme B2, Table 3, Appendix D). The Norwich Western Link is a new road west of Norwich connecting the A1067 near Taverham with the A47 near Honingham. Likely significant effects were identified for barbastelle bat (*Barbastella barbastellus*) for habitat loss and/or fragmentation, disturbance and species mortality.

Barbastelle bats are one of the UK's rarest mammal species and is a British Red Data Book rare and threatened species[35]. Barbastelle bats have been shown to use the Paston Great Barn SAC throughout the year, and it supports a known maternity colony. Radiotracking have identified several other maternity roosts elsewhere in Norfolk and have demonstrated that females will move between different maternity roosts in the area[35]. Therefore, it is considered highly likely that barbastelle bats from the SAC are a part of a wider metapopulation, and that the survival of the Paston Great Barn SAC will be reliant on the success of other maternity colonies in Norfolk.

The proposed route for the Norwich Western Link crosses an area of woodland that was assessed to be of high suitability for bat species, including barbastelle bats. Subsequent surveys have demonstrated that barbastelle bats are present in the woodlands adjacent to the proposed route for the road, with at least one barbastelle bat maternity roost identified in the wider area[36] and therefore would be considered functionally linked.

5.4.1.1 Habitat loss and/or fragmentation

The Norwich Western Link is a new road, and therefore will result habitat loss and/or fragmentation along its proposed route. As barbastelle bats from the SAC are considered to be a part of a larger metapopulation within Norfolk, a loss of supporting habitat to the scheme could impact the overall habitat availability for this metapopulation.

5.4.1.2 Disturbance and species mortality

Disturbance to the metapopulation of barbastelle bats could occur during both construction and operation of the scheme, for example through noise, vibration and/or lighting.

Barbastelle bats are known to use the area crossed by the scheme for foraging and commuting, and therefore mortality could occur during both construction and operation of the scheme.

5.4.2 In-Combination Effects

A search was undertaken for other plans that could result in in-combination effects on the SAC. Both the North Norfolk and Great Yarmouth local plans[20,37] include measures which could impact European sites, but no LSEs were identified on the Paston Great Barn SAC for both plans[38,39]. Furthermore, potential in-combination effects from residential development in North Norfolk are specifically addressed through the North Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy[33]. Therefore, no in-combination effects were identified for other local plans.

The Norfolk Boreas Offshore Wind Farm is proposed for off the Norfolk coast but will have some onshore development. A HRA screening was undertaken on the onshore elements of the scheme and identified LSEs on the Paston Great Barn SAC[21]. Although these onshore elements are not located close to the Norwich Western Link, there is still a potential for in-combination effects on barbastelle bats from the SAC.

5.4.3 Mitigation and Avoidance

The following measures were identified within the Environmental Impact Report[40] as mitigation being considered for the scheme:

- undertaking construction works under a European Protected Species Mitigation Licence;
- retention and enhancement of roosting, foraging and commuting habitat, or replacement of habitat;
- provision of suitable crossing features such as green bridges and bat underpasses; and
- provision of bat boxes as replacement roost features;
- lighting strategy designed to protect sensitive habitats for bats (with a preference for avoiding lighting above baseline conditions);
- soft felling of trees; and
- timing of works to avoid sensitive periods.

The design of the scheme route is ongoing and is considering the impact on local bat communities into account. The design was refined in 2022 to minimise its impact on a woodland where barbastelle bats are known to be roosting[41].

An Ecology Liaison Group has been developed for the scheme which includes representatives from local nature conservation organisations. The intention of this group is to share information and obtain detailed local insight on ecological sensitivities in the area. This information can be used to further develop mitigation for the scheme or influence the design to avoid sensitive habitats.

5.4.4 Conclusions

It was concluded that there would be no AESI on barbastelle bat as a result of the Norwich Western Link (Table 7). Through careful design of the route and proper application of mitigation measures, it is not expected that the scheme will affect the conservation objectives of barbastelle bats in the SAC.

Table 5.4. Summary of the results of the appropriate assessment.

Conservation Objective(s)	AESI Conclusion and Justification
SIP Scheme and any other plans or projects: B2: Norwich Western Link (29km) Norfolk Boreas Offshore Wind Farm (onshore elements)	
Habitat loss and/or fragmentation, disturbance, species mortality	
Maintaining or restoring • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features; • the supporting processes on which the habitats of the qualifying features rely; • the distribution of the qualifying features of the site; • the population of each of the qualifying features.	No The scheme is located a substantial distance from the site, and individual bats from the SAC are not expected to use the habitat surrounding the scheme for foraging. Individual females from the SAC may use the habitat adjacent to the scheme for roosting, as a part of a wider metapopulation within Norfolk. The design of the scheme is taking the local barbastelle bat population into account, and

Conservation Objective(s)	AESI Conclusion and Justification
	mitigation measures are currently being developed to reduce impacts on this species. Given this, it is concluded that the scheme will not result in any adverse impacts on site integrity for barbastelle bats.

5.5 Rex Graham Reserve SAC

5.5.1 Likely Significant Effects

Likely significant effects were identified for the Rex Graham Reserve SAC as a result of the A11 Fiveways Junction (SIP scheme D7, Table 3, Appendix C). The scheme would improve the A11 Fiveways Junction which is located southeast of Mildenhall. Likely significant effects were identified due to potential loss or degradation of the qualifying habitat, semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) (Annex I priority habitat).

The A11 Fiveways Junction is located more than 800m from the site boundary, so direct or indirect impacts of the improvement to the junction itself are not anticipated. However, other construction activities (e.g., compounds, access roads) could be located within the site boundary which could result in a loss or degradation of the qualifying habitat.

5.5.2 In-Combination Effects

No other plans or projects were identified that are expected to result in in-combination effects on the site.

5.5.3 Mitigation and Avoidance

Should the A11 Fiveways Junction be taken forward, mitigation measures will be developed to minimise the risk of impacts to the SAC and its qualifying habitat. Such mitigation measures could include carefully siting construction compounds and access tracks away from the SAC boundary.

5.5.4 Conclusions

It was concluded that there would be no AESI on the qualifying habitat as a result of the A11 Fiveways Junction through proper application of mitigation measures (Table 8).

Table 5.5. Summary of the results of the appropriate assessment.

Conservation Objective(s)	AESI Conclusion and Justification
SIP Scheme and any other plans or projects: A11 Fiveways Junction (880m)	
Habitat loss and/or degradation	
Maintaining or restoring • the extent and distribution of the qualifying natural habitats; • the structure and function (including typical species) of the qualifying natural habitats; and • the supporting processes on which the qualifying natural habitats rely.	No Although the works to the scheme are expected to be predominantly localised to the junction, there is a potential that other activities associated with construction could impact the site. The SAC encompasses a small area, so any degradation or habitat loss has the potential to result in adverse effects on the integrity of the site. Mitigation measures during construction, predominantly consisting of the careful siting of all construction activities, should minimise the risk of negative impacts to the site.

5.6 River Wensum SAC

5.6.1 Likely Significant Effects

Likely significant effects were identified for the River Wensum SAC as a result of the Norwich Western Link (SIP scheme B2, Table 3, Appendix C). The Norwich Western Link is a new road west of Norwich connecting the A1067 near Taverham with the A47 near Honingham. Likely significant effects were identified for the following qualifying features:

- brook lamprey (*Lampetra planeri*);
- bullhead (*Cottus gobio*);
- Desmoulin's whorl snail (*Vertigo moulinsiana*);
- white-clawed crayfish (*Austropotamobius pallipes*); and
- watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.

Brook lamprey is a freshwater species with specific habitat requirements at different life stages. Adults do not feed but hide under stones or other forms of cover until river temperatures are suitable for spawning, which it does in gravels[42]. After hatching, the larvae drift downstream until they reach a deposit of fine sediments (silt/sand) that they will burrow into and mature for multiple years before metamorphosing as adults. Brook lamprey were recorded in 2009 in the River Wensum near the crossing point for the scheme[43], indicating that this species is present in this reach of the river.

Bullhead is a small freshwater fish that is adapted to live on the bottom of rivers. Current populations in the SAC are below the densities that would indicate favourable conservation status, so restoring the population of bullhead in this river is a key target for the site[44]. Bullhead were recorded in 2009 in the River Wensum near the crossing point for the scheme[43], indicating that this species is present in this reach of the river.

Desmoulin's whorl snail is a terrestrial species that lives in permanently wet swamps, fens and marshes, which are often present in riparian areas of rivers[44]. Desmoulin's whorl snail was recorded at numerous locations in the River Wensum valley in the vicinity of the scheme, indicating that this area of the SAC supports a large population of the species[45].

White-clawed crayfish is the primary reason for selection of this river as a SAC. The population of white-clawed crayfish in the River Wensum is thought to have declined substantially due to an outbreak of crayfish plague and the introduction of invasive North American signal crayfish (*Pacifastacus leniusculus*)[44]. One white-clawed crayfish was collected from the area surrounding the scheme during a fish survey in 2009[46], but none were collected during field surveys in 2019.

5.6.1.1 Habitat loss and/or fragmentation

The route of the Norwich Western Link crosses the River Wensum, and this crossing could result in temporary and/or permanent habitat loss from the SAC. Additionally, habitat fragmentation could occur during construction of the scheme.

5.6.1.2 Changes to water quality

Changes to water quality could occur during both construction and operation of the scheme. This could occur through pollution events during construction and a new source of road runoff during the operation of the scheme.

5.6.1.3 Changes to hydrology

The scheme will require a crossing over the River Wensum. The design of the crossing is currently ongoing and could result in a change in hydrology through the introduction of hard surfaces such as piers in the river, bed protection or bank protection. These elements can impact local hydrological conditions and affect the qualifying habitat or supporting habitat for the qualifying species.

5.6.1.4 Disturbance and species mortality

The construction of the crossing over the River Wensum could require works within the River Wensum, which could result in disturbance to the qualifying species (e.g., noise, vibration, lighting) or mortality. Additionally, illumination of the river during operation can disturb the qualifying species.

5.6.2 In-Combination Effects

No other plans or projects were identified that are expected to result in in-combination effects on the site.

5.6.3 Mitigation and Avoidance

Consultation is ongoing with Natural England and the Environment Agency on the design of the crossing of the River Wensum[47]. Through this consultation, it has been agreed that a bridge will be acceptable, but the design of the bridge is not yet complete. However, the design and construction of this bridge will take the qualifying features of the SAC into consideration, and consultation with Natural England and the Environment Agency will be ongoing to ensure minimal impacts to the SAC.

The following measures were identified within the Environmental Impact Report[40] as mitigation being considered for the scheme:

- pollution prevention measures (see Section 5.1.3.1 for examples of guidance and measures that could be considered during construction);
- enhancement of the existing watercourses;
- protection of supporting habitat for Desmoulin's whorl snail;
- habitat enhancement in areas of the River Wensum floodplain over 200m away from the scheme;
- translocation of supporting habitat for Desmoulin's whorl snail.

Additionally, any project must ensure that it does not cause deterioration to any waterbodies that would result in a reduction in their Water Framework Directive classification[26]. Therefore, the scheme must ensure that its design, construction and/or operation do not negatively impact the River Wensum, which is classified by the Environment Agency under the WFD (water body ID GB105034055881). This will be fully addressed should any aspect of the scheme be taken forward but could include the pollution prevention mitigation described above and introducing multiple levels of treatment of road runoff.

5.6.4 Conclusions

It was concluded that there would be no AESI on the qualifying features of the SAC as a result of the Norwich Western Link (Table 9). Through careful design of the River Wensum crossing and proper application of mitigation measures, it is not expected that the scheme will affect the conservation objectives of the species of the SAC.

Table 5.6. Summary of the results of the appropriate assessment.

Conservation Objective(s)	AESI Conclusion and Justification
SIP Scheme and any other plans or projects: B2: Norwich Western Link (29km)	
Habitat loss and/or fragmentation, disturbance, species mortality	
Maintaining or restoring • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features; • the supporting processes on which the habitats of the qualifying features rely; • the distribution of the qualifying features of the site; • the population of each of the qualifying features.	No LSEs were identified as a result of construction and operation of the crossing over the River Wensum. The design of this crossing is ongoing and will take into account the qualifying features of the SAC. Natural England and the Environment Agency are a part of this design process, and this will help ensure minimal impacts to the site. Other mitigation measures will be implemented during construction and operation of the scheme to avoid or minimise impacts to the site.

5.7 Stour and Orwell SPA and Ramsar

5.7.1 Likely Significant Effects

Likely significant effects were identified for the Stour and Orwell SPA and Ramsar sites as a result of changes in air quality from the Great Eastern Main Line (GEML) strategic rail package (improvements in London, Essex, Suffolk and Norfolk): improving frequency (SIP Scheme C1a, Table 3, Appendix C). Likely significant effects were identified for the following qualifying features:

- SPA and Ramsar (qualifying for wintering unless otherwise noted):
    - black-tailed godwit
    - common redshank (peak counts spring/autumn (Ramsar))
    - dark-bellied brent goose
    - dunlin
    - grey plover
    - Northern pintail
    - red knot
- SPA only (qualifying for wintering unless otherwise noted):
    - common goldeneye
    - common shelduck
    - cormorant
    - Eurasian curlew
    - Eurasian wigeon
    - European golden plover
    - gadwall
    - great crested grebe
    - greater scaup

  - mute swan
  - Northern lapwing
  - pied avocet (breeding)
- Ramsar only:
  - contains nationally scarce plants, British Red data book invertebrates and an endangered snail (Criterion 2)
  - waterfowl assemblage of international importance (Criterion 5)

The GEML crosses the SPA/Ramsar sites north of Lawford and improving the frequency of trains on the line is expected to increase emissions. Diesel train emissions include nitrogen oxides (NO_x)[31] and increasing capacity on this line has the potential to negatively impact the supporting habitat for the qualifying/designated species of the SPA/Ramsar sites. Risk of atmospheric nitrogen deposition was identified as a threat in the Stour and Orwell SPA Site Improvement Plan[48].

5.7.2 In-Combination Effects

No other plans or projects were identified that are expected to result in in-combination effects on the sites.

5.7.3 Mitigation and Avoidance

Should the project be taken forward, an air quality assessment should be undertaken to support further environmental assessment (e.g., environmental impact assessment, project-level HRA). If air quality impacts are realised they are likely to be localised to habitats immediately adjacent to the GEML. The potential for effects are minimised by ensuring capacity upgrades do not involve trains idling on track within the designated site.

5.7.4 Conclusions

It was concluded that with appropriate mitigation there would be no AESI on the habitats supporting qualifying species of the SPA and Ramsar sites from changes in air quality as a result of the scheme (Table 10). Air quality modelling will form an integral part of the evidence based to determine the impact of increased capacity on the line on the supporting habitat for the qualifying species of the sites.

Table 5.7. Summary of the results of the appropriate assessment.

Conservation Objective(s)	**AESI Conclusion and Justification**
SIP Scheme and any other plans or projects: C1a: Great Eastern Main Line strategic rail package (improvements in London, Essex, Suffolk and Norfolk): improving frequency (scheme crosses site)	
Changes in air quality	
Maintaining or restoring • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features; • the supporting processes on which the habitats of the qualifying features rely.	**Yes, precautionary** It is currently unknown what the impact of this scheme will be on the supporting habitat for the species of these sites. Should this scheme progress further, assessment should be undertaken at the design stage to ascertain how increased capacity will affect air quality and nitrogen deposition on the sites.

As the SPA and Ramsar site boundaries overlap, they are considered together here. Ramsar sites do not have conservation objectives, so the conservation objectives for the SPA are also applied to the

5.8 The Wash SPA and Ramsar and The Wash and North Norfolk Coast SAC

5.8.1 Likely Significant Effects

Likely significant effects were identified for The Wash SPA and Ramsar site and The Wash and North Norfolk Coast SAC as a result of increased visitor pressure from the A10 West Winch housing access road (SIP scheme F2, Table 3, Appendix C). The following qualifying features and designation criteria were identified as being affected by increased visitor pressure to the sites:

- SPA and Ramsar (qualifying for wintering unless otherwise noted):
    - bar-tailed godwit
    - common redshank (peak counts spring/autumn (Ramsar))
    - Common shelduck
    - dark-bellied brent goose
    - dunlin
    - Eurasian curlew (peak counts spring/autumn (Ramsar))
    - Eurasian oystercatcher (peak counts spring/autumn (Ramsar))
    - grey plover (peak counts spring/autumn (Ramsar))
    - Northern pintail
    - pink-footed goose
    - red knot (peak counts spring/autumn (Ramsar))
    - ruddy turnstone (peak counts spring/autumn (Ramsar))
    - sanderling (peak counts spring/autumn (Ramsar))
- SPA only:
    - black (common) scoter
    - black-tailed godwit
    - common goldeneye
    - common tern (breeding)
    - Eurasian wigeon
    - gadwall
    - little tern (breeding)
    - Bewick's/tundra swan
- Ramsar only:
    - extensive marshes, intertidal banks, and deep channels (Criterion 1)
    - the interrelationship between its various habitat components (Criterion 3)
    - waterfowl assemblage of international importance (Criterion 5)
- SAC only:
    - sandbanks which are slightly covered by seawater at all times
    - mudflats and sandbanks not covered by seawater at low tide

- Salicornia and other annuals colonising mud and sand
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Mediterranean and thermo-Atlantic halophilus scrubs (*Sarcocornetea fruticose*)
- harbour (common) seal (*Phoca vitulina*)
- otter

Residential development is planned for the immediate areas surrounding the A10 West Winch housing access road and other areas of Norfolk. A previous study found that residents of new housing located within 61km of The Wash SPA/Ramsar site are likely to regularly visit the site for recreation[33].

Visitors to the sites have the potential to cause disturbance to birds using the site, which can cause abandonment of nest sites, desertion of foraging area, increased energy expenditure from increased flights and increased exposure to predators. These behavioural changes has the potential to undermine successful nesting, foraging, roosting and rearing of young which can impact the distribution of species within the site and the populations.

Impacts associated with visitors to sites vary by site and season and include trampling of habitats, disturbance due to presence of people and animals (particularly dogs), and disturbance from noise and light.

Within the site, harbour (common seals) feed in the coastal waters and will haul out on Blakeney Point[17]. Harbour (common) seals are vulnerable to disturbance during haul out and moulting, which can cause them to extent more energy by abandoning and seeking new sites.

Otters are known to use both freshwater and coastal habitats within the site, predominantly choosing inland areas for resting[17]. Increased visitor pressure has the potential to cause disturbance to otters on the site, and increased traffic on the surrounding roads (due to more visitors to the area) may result in more road traffic injuries and deaths.

5.8.2 In-Combination Effects

The A10 West Winch housing access road is located more than 7km from the sites and is not expected to result in any LSEs on the qualifying features of the sites alone. However, LSEs were identified in-combination with planned development in the wider area[19,20], particularly because the road is planned to support adjacent residential development.

A previous study found that residents of new housing located within 61km of The Wash SPA are likely to regularly visit the site for recreation[33]. Additionally, disturbance due to public access was identified as a threat in the SIP for The Wash and North Norfolk Coast SPA and SAC[34].

5.8.3 Mitigation and Avoidance

In 2021, the Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy was published[33]. The purpose of the strategy is to address the potential for in-combination effects on nature conservation sites and their qualifying species from proposed residential development and increased tourism accommodation as outlined within the various Local Plans for the Norfolk County.

The intention is to mitigate against the effects of development at the plan- and project-levels through the provision of green infrastructure. Green infrastructure aims to divert daily recreational visits away from sensitive sites (including The Wash SPA, Ramsar site and SAC) to avoid AESI of these sites.

The strategy also introduces a recreational impact avoidance and mitigation strategy (RAMS), which, once adopted, will outline the strategic mitigation measures that will ensure the avoidance of AESI due to in-combination effects. As the A10 West Winch housing access road falls within Norfolk, adherence to the measures outlined in the RAMS will be essential to ensuring that the scheme results in no AESI on these sites.

5.8.4 Conclusions

It was concluded that there would be no AESI on the qualifying features of the sites as a result of increased visitor pressure (Table 11). The road scheme is not expected to result in impacts individually. The measures presented in the Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy will apply to the housing developments and are specifically designed to avoid in-combination effects on European sites in Norfolk.

Table 5.8. Summary of the results of the appropriate assessment.

Conservation Objective(s)	AESI Conclusion and Justification
SIP Scheme and any other plans or projects: F2: A10 West Winch housing access road (7km) North Runcton and West Winch Neighbourhood Plan[19] North Norfolk Local Plan 2016-2036[20]	
Increased visitor pressure	
SPA species, SAC species and Ramsar (Criteria 5 and 6): Maintaining or restoring • the distribution of the qualifying features of the site; • the population of each of the qualifying features. **SPA, SAC habitats and Ramsar (Criteria 1 and 3):** Maintaining or restoring • the extent and distribution of the qualifying natural habitats and habitats of the qualifying species; • the structure and function (including typical spcies) of the qualifying natural habitats and haibtats of the qualifying species; • the supporting processes on which the qualifying natural habitats and habitats of the qualifying species rely.	No The A10 West Winch housing access road is only expected to result in LSEs on the sites in-combination with planned residential development. Through adherence to the Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy[33], in-combination effects on the sites will be avoided.

As the SPA, Ramsar and SAC site boundaries overlap, they are considered together here. Ramsar sites do not have conservation objectives, so the conservation objectives for the SPA are also applied to the Ramsar site.

6. Conclusions

This report presents the outcome of the Stage One: Screening and Stage Two: Appropriate Assessment of the HRA for the Transport Strategy and SIP.

Likely significant effects were identified for 15 European sites. These LSEs arose from schemes identified within SIP Appendix C both individually and in-combination with other plans or projects. Through the implementation of appropriate mitigation, it was concluded that these schemes would result in no AESI on the qualifying features of these sites. Project HRA will be required for any of these schemes should they be adopted. The outcome of this assessment does not prejudice these assessments, which will be undertaken with a more detailed understanding of the individual projects and up to date baseline data. No aspects of the main SIP text or SIP appendices A, B, D or E were found to result in LSEs on European sites.

Both the final Transport Strategy and SIP will be periodically monitored and reported on to assess progress towards the strategy's four strategic priorities. Following each monitoring and assessment exercise, the Transport Strategy and SIP will be updated to reflect any changes to the documents or priority schemes. It is expected that this will occur every 2 to 5 years. As the Transport Strategy and SIP are updated, a HRA will also be completed on the updated documents.

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