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Bramford to Twinstead Reinforcement

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1. Introduction

- 1.1.1 This appendix outlines the methodology for the intra-project cumulative effects assessment (CEA) and identifies potential intra-project cumulative effects during construction and operation of the project. The potential intra-project cumulative effects identified below are assessed in Section 15.6 of Environmental Statement (ES) Chapter 15: Cumulative Effects Assessment (**application document 6.2.15**).
- 1.1.2 Chapter 2 sets out the methodology used and Chapter 3 presents the intra-project cumulative effects matrices for both construction and operation.

2. Methodology

2.1.1 There is no standard approach to the assessment of intra-project cumulative effects. A checklist matrix has been used to visually represent relationships between project impacts and environmental components. For example, protected lanes could have effects identified within the landscape, ecological, historic environment, and traffic and transport assessments. The checklist matrix presented in this appendix plots key project activities against representative groups and/or individual receptors to identify potential intra-project cumulative effects.

2.1.2 The matrix was used to identify potential intra-project cumulative effects. This involved the following steps, which are described further in the following sub-sections:

- Step 1: Review of ES topic chapters and discussions with technical specialists to identify representative groups and/or individual receptors;
- Step 2: Identification of key project activities during the construction and operational phases which could impact on representative groups and/or individual receptors; and
- Step 3: Identification of potential intra-project cumulative effects. The key project activities which could impact on each representative group and/or individual receptor are identified, and further review of the ES topic chapters is undertaken to determine whether effects of multiple project activities on each representative group and/or individual receptor have already been assessed within the ES topic chapters. Effects which have not been assessed within ES topic chapters are identified for inclusion within the intra-project cumulative effects assessment.

Step 1: Identification of Representative Groups and/or Individual Receptors

2.1.3 Representative groups and/or individual receptors, such as people, a watercourse, a group of listed buildings or protected species, have been identified following review of the ES topic chapters. The identified receptors are presented in the tables in this appendix as rows in the table and have been grouped by theme for example, water environment receptors and landscape and visual receptors.

Step 2: Identification of Key Project Activities

2.1.4 Key project activities have been identified for the construction and operational phases. These key project activities are listed as column headings in the tables in this appendix. Key project activities during the construction phase have been identified and grouped into the following categories:

- Effects due to construction machinery and vehicles (e.g. general construction activities, set up of site compound, increase in traffic during construction);
- Effects due to land-take of temporary works (e.g. vegetation removal, light spill from construction areas, materials storage, installation of temporary access routes); and
- People, services and goods (e.g. construction staff living and working within the area, materials being purchased for the project, and waste generated by the project).

2.1.5 Key project activities have been identified for the operational phase and are grouped into the following categories:

- Normal operational activities (including inspection visits); and
- Maintenance activities (such as refurbishment).

Step 3: Identification of Potential for Intra-project Cumulative Effects

2.1.6 During Step 3, the ES topic chapters were further reviewed to confirm which key project activities identified in Step 2 may impact on the representative groups and/or individual receptors identified in Step 1. Where a key project activity was identified as impacting on a representative group and/or individual receptor, this was indicated in the matrix at the intersection of the key project activity column and the representative group and/or individual receptor row using a 'Y' symbol.

2.1.7 Where the same representative group and/or individual receptor is identified in more than one ES topic chapter, this may indicate a spatial overlap of effects (i.e. in the same location/area). Potential spatial overlaps of effects are checked for a temporal overlap of effects (i.e. at the same time). Where both a spatial and temporal overlap exists, this indicates potential for an intra-project cumulative effect. Where there is a blank cell in the matrix this indicates that the particular key project activity does not impact on the particular representative group and/or individual receptor, therefore it would not contribute to a potential intra-project cumulative effect.

2.1.8 During this step it is identified whether the potential cumulative effects were already assessed within ES topic chapters, to avoid double counting of effects. This screening has been indicated in the matrix by shading the boxes in different colours using the following system (see the legend in the following section):

- Coloured background (excluding red): A 'Y' symbol on a coloured background indicates that effects on a representative group and/or individual receptor have been assessed within an ES Chapter. For example, the effects of noise and vibration and visual intrusion on the setting of protected lanes has been considered within ES Chapter 8: Historic Environment (**application document 6.2.8**), therefore it does not require separate assessment for intra-project cumulative effects. Different background colours have been used for each ES topic chapter.

- White background: A 'Y' symbol on a white background indicates that either: only a single effect has been identified for the representative group and/or individual receptor, hence there is no potential for an intra-project cumulative effect on this representative group and/or individual receptor; or, it is considered unlikely that this effect would lead to a significant effect on a receptor in combination with other effects (i.e. the significance of effect would be negligible/neutral).
- Red background: A red background indicates potential for an intra-project cumulative effect. Where an effect is assessed in more than one chapter, this is indicated using initials (e.g. T&T = Traffic and Transport; N&V = Noise and Vibration; HE = Historic Environment). A 'Y' symbol on a red background has been used for potential intra-project cumulative effects identified for socio-economic receptors, as there is no standalone socio-economics chapter.

2.1.9 Where screening highlights effects not covered by the previous assessment chapters, this would indicate a potential intra-project cumulative effect that requires further assessment. This screening assessment has drawn on the experience of different technical specialists to determine the likely cumulative effect on the receptor as a whole, and whether the combined effect is likely to be significant.

2.1.10 The potential intra-project cumulative effects identified during the screening exercise have been taken forward to a more detailed assessment presented in Section 15.6 of ES Chapter 15: Cumulative Effects Assessment (**application document 6.2.15**) to determine whether there are likely significant cumulative effects and, where appropriate, mitigation measures identified.

3. Intra-Project Cumulative Effects Assessment Matrix

Legend

Symbol	Description
Y	Effects on landscape; already discussed in ES Chapter 6: Landscape and Visual (application document 6.2.6).
Y	Effects on ecology receptors; already discussed in ES Chapter 7: Biodiversity (application document 6.2.7).
Y	Effects on heritage receptors; already discussed in ES Chapter 8: Historic Environment (application document 6.2.8).
Y	Effects on water and hydrogeology receptors; already discussed in ES Chapter 9: Water Environment (application document 6.2.9) and ES Chapter 10: Geology and Hydrogeology (application document 6.2.10).
Y	Effects on people and communities; already discussed in ES Chapter 11: Agriculture and Soils (application document 6.2.11).
Y	Effects on traffic and transport; already discussed in ES Chapter 12: Traffic and Transport (application document 6.2.12).
Y	Indicates that either: <ul style="list-style-type: none"> only a single effect has been identified for this receptor, hence there are no intra-project cumulative effects on this receptor; or it is not considered likely that this effect would lead to a significant effect on a receptor in combination with other effects (i.e. the significance of effect would be negligible/neutral)
	A blank cell indicates that there would not be an impact from the project activity on the identified receptor.
Y	Indicates that this effect has either: <ul style="list-style-type: none"> not been assessed in a topic chapter because in isolation the effect would not be significant, but in combination with other effects it could be significant; or it is assessed in more than one topic chapter, indicating a potential intra-project cumulative effect. Where an effect is assessed in more than one chapter, this is indicated using initials (e.g. T&T = Traffic and Transport; N&V = Noise and Vibration; HE = Historic Environment).

Construction Phase

3.1.1 Table 3.1 presents the intra-project cumulative effects matrix used to identify potential construction phase intra-project cumulative effects.

Table 3.1 – Construction Phase Intra-Project Cumulative Effects Matrix

Sensitive Receptors	Effects Due to Construction Machinery and Vehicles				Effects Due to Land Take of Temporary Works						People, Services and Goods			Further Explanation of Potential Effects
	General construction activities (e.g. excavation of trenches, constructing pylons)	Set up of site compound including site offices, material storage and receipt of deliveries	Increase in traffic during construction	Noise and vibration generated by construction activities (e.g. at trenchless crossings)	Light spill from construction lighting	Temporary land take during construction	Deep excavations at trenchless crossings	Material storage such as topsoil and subsoil heaps	Changes to accesses to improve access and visibility	Installation of temporary access routes for temporary works, including temporary bridges over watercourses	Construction staff living and working within the area	Materials being purchased for the project	Wastes generated from the project	
Landscape														
Dedham Vale Area of Outstanding Natural Beauty	Y	Y	Y	Y	Y	Y		Y	Y	Y				Construction activities will change the landscape through the removal of vegetation and from the presence of construction vehicles. Increases in construction traffic, noise and light will temporarily alter the setting and tranquillity of landscape designations and features. These effects are considered within ES Chapter 6: Landscape and Visual (application document 6.2.6).
Stour Valley	Y	Y	Y	Y	Y	Y		Y	Y	Y				
Special Landscape Areas (Gipping Valley, Brett Valley, Stour Valley and Box Valley)	Y	Y	Y	Y	Y	Y		Y	Y	Y				
Ecology														
Habitats including designated and non-designated sites	Y	Y	Y			Y	Y		Y	Y				Habitats can be disturbed and fragmented during construction. Excavation of trenches can lead to lowering of the water table affecting groundwater dependent habitats. Protected species can be harmed by construction vehicle movement and can be disturbed through increases in light, noise and vibration associated with construction activities. These effects are considered within ES Chapter 7: Biodiversity (application document 6.2.7).
Protected species	Y	Y	Y	Y	Y		Y		Y	Y				

	Effects Due to Construction Machinery and Vehicles				Effects Due to Land Take of Temporary Works						People, Services and Goods			Further Explanation of Potential Effects
	General construction activities (e.g. excavation of trenches, constructing pylons)	Set up of site compound including site offices, material storage and receipt of deliveries	Increase in traffic during construction	Noise and vibration generated by construction activities (e.g. at trenchless crossings)	Light spill from construction lighting	Temporary land take during construction	Deep excavations at trenchless crossings	Material storage such as topsoil and subsoil heaps	Changes to accesses to improve access and visibility	Installation of temporary access routes for temporary works, including temporary bridges over watercourses	Construction staff living and working within the area	Materials being purchased for the project	Wastes generated from the project	
Sensitive Receptors														
Historic Environment														
Listed buildings	Y		Y	Y	Y		Y							Heritage assets can be damaged or disturbed during construction activities where soil is disturbed. Changes to groundwater levels resulting from deep excavations may cause subsidence near to heritage assets. The setting of heritage assets can be impacted by noise and vibration and visual intrusion associated with construction activities. These effects are considered within ES Chapter 8: Historic Environment (application document 6.2.8).
Other cultural heritage assets	Y			Y			Y							
Historic landscapes	Y		Y	Y						Y				
Protected Lanes	Y		Y	Y				Y	Y					
Water and hydrogeology														
Rivers and watercourses (including Rivers Stour, Box and Brett and Belstead Brook)	Y	Y					Y	Y		Y				Trenchless crossings could affect aquifer water quality due to the potential introduction of new contaminants (e.g. drilling fluids) and contaminant pathways. Temporary physical disturbance to watercourse channels, banks and riparian corridors, and temporary changes to flow regimes, may occur during construction of underground cable crossings and during installation of crossings for the temporary access routes. Temporary works and the creation of soil stockpiles can temporarily reduce the volume of floodplain storage or impede flood flows. These effects are considered within ES Chapter 9: Water Environment (application document 6.2.9) and ES Chapter 10: Geology and Hydrogeology (application document 6.2.10).
Functional floodplain						Y		Y						
Aquifers and private water supplies							Y							

Sensitive Receptors	Effects Due to Construction Machinery and Vehicles				Effects Due to Land Take of Temporary Works						People, Services and Goods			Further Explanation of Potential Effects
	General construction activities (e.g. excavation of trenches, constructing pylons)	Set up of site compound including site offices, material storage and receipt of deliveries	Increase in traffic during construction	Noise and vibration generated by construction activities (e.g. at trenchless crossings)	Light spill from construction lighting	Temporary land take during construction	Deep excavations at trenchless crossings	Material storage such as topsoil and subsoil heaps	Changes to accesses to improve access and visibility	Installation of temporary access routes for temporary works, including temporary bridges over watercourses	Construction staff living and working within the area	Materials being purchased for the project	Wastes generated from the project	
People and communities														
Local economy (including tourist industry)	Y								Y	Y	Y	Y		A temporary increase in the population due to construction workers may benefit the local economy through induced spend by construction workers. Materials being purchased from local businesses may also benefit the local economy. The tourist industry may be temporarily affected due to a temporary road closures and diversions, however disruption to access would be short-term (up to two weeks) and this is considered unlikely to affect the tourism industry significantly. These effects were scoped out of the assessment as an individual effect in the Scoping Report (application document 6.5.1). However, the potential for a significant cumulative effect resulting from general construction activities, construction staff living and working within the area, and materials being purchased for the project is identified here.
Local communities	Y	Y	Y	Y	Y					Y	Y			Sudbury, Hadleigh and other local communities may be affected by an increase in traffic. This is considered in ES Chapter 12: Traffic and Transport (application document 6.2.12). Local communities may be affected by an increase in traffic, and dust, noise and light spill close to construction working areas. This could result in a potential significant intra-project cumulative effect. Disruption to access would be very short term (up to two weeks) and therefore unlikely to result in an intra-project cumulative effect.
Recreational users / tourists (using rights of way or navigation)	Y	Y	Y	Y						Y				Recreational users (including walkers, cyclists and horse riders) and tourists may be affected by temporary restrictions and diversions of PRow. These effects are considered within ES Chapter 12: Traffic and Transport (application document 6.2.12).
Landowners and businesses	Y	Y				Y	Y		Y	Y	Y	Y	Y	Agricultural land would be lost through temporary land take during construction, reducing agricultural productivity. Agricultural operations may be affected due to disturbance, fragmentation, access restrictions, disruption to water supply, or land drainage. Soils can be disturbed through access for overhead line installations and removals and excavation and soil stripping from working areas.

Sensitive Receptors	Effects Due to Construction Machinery and Vehicles				Effects Due to Land Take of Temporary Works						People, Services and Goods			Further Explanation of Potential Effects
	General construction activities (e.g. excavation of trenches, constructing pylons)	Set up of site compound including site offices, material storage and receipt of deliveries	Increase in traffic during construction	Noise and vibration generated by construction activities (e.g. at trenchless crossings)	Light spill from construction lighting	Temporary land take during construction	Deep excavations at trenchless crossings	Material storage such as topsoil and subsoil heaps	Changes to accesses to improve access and visibility	Installation of temporary access routes for temporary works, including temporary bridges over watercourses	Construction staff living and working within the area	Materials being purchased for the project	Wastes generated from the project	
														These effects are considered within ES Chapter 11: Agriculture and Soils (application document 6.2.11).
Vehicle users			Y								Y	Y		Users of the local road network may be affected by an increase in traffic during construction (construction vehicles and staff commuting), and temporary road closures. These effects are considered within ES Chapter 12: Traffic and Transport (application document 6.2.12).

Operational Phase

3.1.2 Table 3.2 presents the intra-project cumulative effects matrix used to identify potential operational phase intra-project cumulative effects.

Table 3.2 – Operational Phase Intra-Project Cumulative Effects Matrix

	Normal operation (including inspection visits)					Maintenance activities (e.g. refurbishment)							Further Explanation of Potential Effects
	New above ground structures (overhead line, CSE compounds and GSP substation)	New below ground features (underground cables)	Restrictions on planting associated with the legal land rights	Permanent land take due to footprint of above ground structures, e.g. GSP substation	Small increases of traffic due to inspections	Construction activities associated with maintenance activities	Increase in traffic during maintenance activities	Temporary land take during maintenance activities	Temporary loss of vegetation during maintenance activities	Construction staff during maintenance activities	Materials being purchased for the project	Wastes generated from the project	
Sensitive Receptors													
Landscape													
Dedham Vale Area of Outstanding Natural Beauty			Y			Y		Y	Y				The setting of landscape designations and features could be altered by new above ground structures (e.g. pylons) and associated permanent land take, and by maintenance activities which result in temporary land take and loss of vegetation. Maintenance activities may also affect tranquillity due to noise and visual intrusion. These effects are considered within ES Chapter 6: Landscape and Visual (application document 6.2.6).
Stour Valley	Y		Y	Y		Y		Y	Y				
Special Landscape Areas (Gipping Valley, Brett Valley, Stour Valley and Box Valley)	Y		Y	Y		Y		Y	Y				
Ecology													
Habitats including designated and non-designated sites	Y		Y					Y	Y				New above ground structures in the landscape could have a severance/displacement effect on mobile species in flight. Planting restrictions associated with the legal land rights could create severance between habitat areas. Changes to groundwater flows or levels due to underground features such as cables and foundations may affect groundwater-dependent habitats. These effects are considered within ES Chapter 7: Biodiversity (application document 6.2.7).
Protected species	Y	Y						Y	Y				
Historic Environment													
Listed buildings	Y		Y										The setting of heritage assets (including listed buildings) and historic landscapes could be altered by new above ground structures and restrictions on planting. These effects are considered within ES Chapter 8: Historic Environment (application document 6.2.8). No effects are anticipated on Protected Lanes during operation.
Other cultural heritage assets	Y		Y										
Historic landscapes	Y		Y										
Protected Lanes													

Sensitive Receptors	Normal operation (including inspection visits)					Maintenance activities (e.g. refurbishment)							Further Explanation of Potential Effects
	New above ground structures (overhead line, CSE compounds and GSP substation)	New below ground features (underground cables)	Restrictions on planting associated with the legal land rights	Permanent land take due to footprint of above ground structures, e.g. GSP substation	Small increases of traffic due to inspections	Construction activities associated with maintenance activities	Increase in traffic during maintenance activities	Temporary land take during maintenance activities	Temporary loss of vegetation during maintenance activities	Construction staff during maintenance activities	Materials being purchased for the project	Wastes generated from the project	
Water and hydrogeology													
Rivers and watercourses						Y		Y					New below ground features (underground cables), temporary land take and maintenance activities may temporarily affect water quality. These effects are considered within ES Chapter 9: Water Environment (application document 6.2.9).
Functional floodplain													
Aquifers and private water supplies		Y											
People and communities													
Local economy (including tourist industry)										Y	Y	Y	No potential significant effects have been identified. There may be a small amount of induced spend by construction staff, and materials purchased for the project may benefit local businesses, but this is not likely to be significant.
Local communities					Y	Y	Y						As maintenance activities would be limited and infrequent there are unlikely to be significant effects outside of the immediate vicinity of the working areas. Increases in traffic during maintenance activities are expected to be low and would have a limited effect on local communities. Temporary land take for maintenance activities may affect PRoW. These effects are considered within ES Chapter 12: Traffic and Transport (application document 6.2.12).
Recreational users / tourists (using rights of way or navigation)						Y	Y	Y	Y				
Landowners and businesses	Y		Y	Y	Y	Y	Y	Y	Y				Agricultural land and associated soils will be permanently lost due to the new cable sealing end (CSE) compounds, grid supply point (GSP) substation and associated permanent access routes. Temporary land take and loss of vegetation during maintenance activities may affect agricultural land. These effects are considered within ES Chapter 11: Agriculture and Soils (application document 6.2.11).
Vehicle users					Y		Y						Only small increases in traffic are anticipated during operational inspection visits and maintenance activities. These effects are considered within ES Chapter 12: Traffic and Transport (application document 6.2.12).

Summary

- 3.1.3 Tables 3.1 and 3.2 show the screening stage of the intra-project cumulative effects assessment based on the individual effects reported in the ES topic chapters. Many of the potential cumulative effects have already been assessed within ES topic chapters, as indicated by the colour coding within the matrices.

Construction

- 3.1.4 Two aspects have been identified within Table 3.1 with potential for significant construction phase intra-project cumulative effects. These are effects on the local economy (including the tourism industry) and effects on local communities. The intra-project CEA for these two aspects is summarised in Section 15.6 of Chapter 15: Cumulative Effects Assessment (**application document 6.2.15**).

Operation

- 3.1.5 No potential for significant intra-project cumulative effects during the operational phase of the project was identified in Table 3.2.

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