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Table of Contents

17.	Effect Interactions	1
17.1	Introduction	1
17.2	Legislative Context.....	1
17.3	Stakeholder Engagement	2
17.4	Assessment Methodology	4
17.5	Effect Interactions	5
17.6	Cumulative Effects	11
17.7	References	24

Tables

Table 17-1	Consultation Matters Raised and Responses for Effect Interactions and Cumulative Effects	2
Table 17-2	Criteria for determining the significance of effect interactions and cumulative effects significance.....	5
Table 17-3	Potential effect interactions during construction	6
Table 17-4	Potential effect interactions during operation	9
Table 17-5	Potential effect interactions during decommissioning	10

17. Effect Interactions

17.1 Introduction

- 17.1.1 This chapter addresses the potential for effect interactions and cumulative effects as a result of the Scheme.
- 17.1.2 Effect interactions may arise where several different effects resulting from the Scheme have the potential to affect a single receptor (e.g. decrease in air quality, alongside an increase in noise disturbance). The assessment draws on the assessment of impacts provided in **Chapters 6 to 16** of the Environmental Statement (ES) [EN010118/APP/6.1].
- 17.1.3 Cumulative effects are where there is the potential for two or more developments that are reasonably foreseeable and/or consented, but not yet constructed or operational, within close enough proximity to the Scheme to lead to effects on the same receptor. Technical **Chapters 6 to 16** of this ES present high-level conclusions of potential cumulative effects. A summary of the potential cumulative effects is provided in this chapter. A detailed description of the assessment methodology for cumulative effects can be found in **Chapter 5: EIA Methodology** of the ES [EN010118/APP/6.1].

17.2 Legislative Context

- 17.2.1 In relation to cumulative effects, Schedule 4 Part 5 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires an ES to include:

“A description of the likely significant effects of the development on the environment resulting from, inter alia:

...(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources...

The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development”.

- 17.2.2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 17-1) make explicit reference to the requirement for an assessment of the effect interactions between types of effect, and states:

“The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors-

- (a) population and human health;*
- (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC2 and Directive 2009/147/EC3;*
- (c) land, soil, water, air and climate;*

- (d) *material assets, cultural heritage and the landscape;*
(e) *the interaction between the factors referred to in sub-paragraphs (a) to (d)."*

17.2.3 No further guidance or requirement beyond the need for the requirement for an assessment of the interrelationships between types of effect is provided.

17.3 Stakeholder Engagement

17.3.1 A summary of consultation and responses relating to the interaction of effects and cumulative effects is provided in **Table 17-1**.

Table 17-1 Consultation Matters Raised and Responses for Effect Interactions and Cumulative Effects

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
Chelmsford City Council	The Scoping Report does not refer to the Chelmsford Garden Community.	Noted.	Interactions with the Chelmsford Garden Community, and other relevant developments as identified in the long list of cumulative schemes, is addressed in individual chapters where there is assessed to be an effect. These include Chapter 10: Landscape and Visual Amenity, and Chapter 13: Transport and Access.
	The scope for the Scheme to directly provide neighbourhood scale power for the new garden community should be considered.	The Energy generated by the Scheme would be supplied directly into the National Grid network and distributed where there was a need for it.	Not relevant to this ES.
Chelmsford City Council	Paragraph 2.2.3.7 of the Scoping Report advises that 132kV cables are likely to be required to export the electricity produced by the Longfield Solar Farm to the National Grid sub-station. Overhead power lines which previously extended across the Beaulieu development and close to the Grade I listed New Hall were placed underground; these were a specific requirement of the approved Landscape Design and Management Plan (LDMP) which supported the then adopted North Chelmsford Area Action Plan and have	The Bulls Lodge Substation Extension will require the temporary diversion of two pylons and associated overhead line (OHL), however, no new overhead lines will be constructed within the Order limits. A section of existing OHL near Stocks Farm will be undergrounded as	Chapter 2: The Scheme [EN010118/APP/6.1]

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
	dramatically improved and enhanced the landscape.	part of the Scheme.	
Chelmsford City Council	The EIA should assess the visual and landscape impact of these power lines, if required to be above ground, and consider the amenity impacts to both the existing communities and the strategic proposals within the adopted Chelmsford Local Plan, which include the proposed Chelmsford NE Bypass and the new Garden Community (Strategic Growth Site 6), which make up some of the surrounding context.	The Bulls Lodge Substation Extension will require the temporary diversion of two pylons and associated overhead line (OHL), however, no new overhead lines will be constructed within the Order limits. A section of existing OHL near Stocks Farm will be undergrounded as part of the Scheme. The impact of these changes is assessed in Chapter 10: Landscape and Visual Amenity. The Grid Connection Route and cabling associated with the Solar Farm Site, will all be buried below ground and have been assessed in the ES.	Chapter 2: The Scheme and Chapter 10: Landscape and Visual Amenity of this ES [EN010118/APP/6.1]
Chelmsford City Council	The EIA will also need to assess and demonstrate the impact of the proposal on the local highway network having regard to planned development e.g.: the future Chelmsford NE Bypass, Radial Distributor Road 2, which will extend through the Chelmsford Garden Community, planned works to the Boreham Interchange and a future scheme to widen the A12.	Cumulative impacts between the construction phase of the Scheme and other committed developments /highways improvements including the A12 widening scheme have been considered as part of the ES and Transport Assessment (TA). No cumulative impacts upon the highway network are envisaged based on the assessment in the ES. The	Chapter 13: Transport and Access of this ES [EN010118/APP/6.1] assesses the impact of the Scheme on the local highway network with regards to planned development. The long list of cumulative schemes (including the planned developments listed by Chelmsford City Council) is presented in Appendix 5A: Long List of Cumulative Schemes of the ES. [EN010118/APP/6.2] Traffic management measures are set out in Appendix 13B:

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
Natural England	<p>The ES should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. The following types of projects should be included in such an assessment, (subject to available information):</p> <ul style="list-style-type: none"> a. Existing completed projects; b. Approved but uncompleted projects; c. Ongoing activities; d. Plans or projects for which an application has been made and which are under consideration by the consenting authorities; and e. Plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects. 	<p>cumulative effects are therefore expected to remain negligible.</p> <p>Assessment of cumulative effects with other developments has been conducted using a four-stage approach, as taken from The Planning Inspectorate's Advice Note 17 on the assessment of cumulative effects and is broadly in line with Natural England's suggested approach.</p>	<p>Construction Traffic Management Plan (CTMP) of this ES [EN010118/APP/6.2].</p> <p>Chapter 5 of the ES outlines the EIA Methodology and approach to cumulative effects. The long list of cumulative schemes is presented in Appendix 5A: Long List of Cumulative Schemes of the ES.</p> <p>Each technical chapter of this ES (Chapters 6-16) addresses cumulative effects, and this Chapter summarises them.</p>

17.4 Assessment Methodology

17.4.1 The assessment of effect interactions is based on the methodology described in **Chapter 5: EIA Methodology** and considers the potential for several direct or indirect effects arising from the Scheme to give rise to an effect on a single receptor that is greater than or different to the effects on their own. There are no specific, relevant guidelines on how the assessment of effect interactions should be undertaken, and so the assessment has been undertaken on a qualitative basis using the results of the individual assessments, informed by professional judgement.

17.4.2 Potential sources of environmental effect are not identified specifically in this chapter; this chapter instead relies on the technical chapters (**Chapters 6 to 16**) of the ES for the identification of receptors, potential effects and their assessment. The embedded design mitigation and additional mitigation, where proposed in other technical chapters, is assumed to be implemented before consideration of the effects in this chapter, i.e., residual effects are

considered in this chapter. However, to ensure a robust assessment, Year 1 landscape and visual residual effects during operation are considered for the effect interactions. Similarly, this chapter draws from the other technical chapters for descriptions of aspects of the baseline environment, where required.

- 17.4.3 Only receptors that are expected to incur more than one potential effect have been included in the assessment (e.g. noise and dust). Receptors predicted to be affected by only a single effect (e.g. only noise) are excluded because there is considered to be no potential for effect interactions to take place.

Significance Criteria for Effect Interactions and Cumulative Effects

- 17.4.4 The effect interaction is the effect over and above the individual effects assessed in other chapters and is described as the difference between the change caused to a receptor from one effect alone and the change caused to the receptor from all effects combined. The significance of effect interactions and cumulative effects has been determined in accordance with the criteria set out in **Table 17-2**.

Table 17-2 Criteria for determining the significance of effect interactions and cumulative effects significance

<i>Significance category</i>	<i>Typical descriptors of effect</i>
Significant effect interactions	Where the combined impacts of the Scheme, or cumulative impacts of the Scheme along with other developments, would likely lead to a change in the significance of effects at a receptor, when compared with considering these impacts in isolation. Consideration of additional mitigation or enhancement measures is required.
No significant effect interactions	Where the combined impacts of the Scheme, or cumulative impacts of the Scheme along with other developments, are not likely to lead to a change in the significance of effects at a receptor, when compared with considering these impacts in isolation.

17.5 Effect Interactions

- 17.5.1 The interaction of two or more predicted environmental effects resulting from the Scheme may collectively cause a greater (or lesser) effect than each effect in isolation. The potential for effect interactions is assessed within this section.
- 17.5.2 A detailed matrix of the receptors is provided in **Appendix 17A: Effects Interactions [EN010118/APP/6.2]**. The matrix sets out the residual effects on individual receptors identified in each technical chapter of the ES and identifies the potential effect interactions arising from the individual impacts. **Table 17-3** below summarises the potential effect interactions identified in **Appendix 17A: Effects Interactions**.

Table 17-3 Potential effect interactions during construction

Receptor	Description of potential effect interactions	Residual significance of effect determined through EIA			Effect interactions	Additional mitigation required (if any)
Landscape & Visual Receptors also affected by Noise and Vibration						
		Landscape and visual	Noise and Vibration			
Residents of Buftons House (Viewpoint 15); Residents on Noakes Lane (Viewpoint 8)	These residents will experience moderate to major adverse visual effects due to the presence of construction plant and machinery, in addition to minor adverse noise effects created during the construction. The combination of these impacts has the potential to result in effect interactions.	Major	Minor		No significant effect interactions: The potential increase in noise from construction activities may disturb some receptors who have sight of the construction works, but it is not considered sufficiently noisy to intensify the effects already identified through these individual assessments.	No additional mitigation is proposed, as the effect interaction will be temporary, and mitigation has already been included as part of the design as embedded mitigation.
Residents of Little Weathers (Viewpoint 11a and 11b); Residents on western side of Terling Hall Road (Viewpoint 10)		Moderate	Minor			
Landscape & Visual Receptors also affected by Noise & Vibration and Cultural Heritage						
		Landscape and Visual	Noise and Vibration	Cultural Heritage		
Residents on Noakes Lane (Viewpoint 8)	Residents and recreational users will experience major or moderate visual adverse effects due to the introduction of construction activity affecting the visual amenity. These receptors	Major	Minor	Minor	No significant effect interactions: The potential increase in noise from construction activities may disturb some receptors who have	No additional mitigation is proposed, as the effect interaction will be temporary, and mitigation

Receptor	Description of potential effect interactions	Residual significance of effect determined through EIA			Effect interactions	Additional mitigation required (if any)
Recreational user of PRow 113_33 (Viewpoint 6)	will also experience noise effects, although this is only assessed as minor. Additionally, the introduction of construction activity will have a minor to moderate adverse impact on cultural heritage due to the temporary impacts on setting of heritage assets. The combination of these impacts has the potential to result in effect interactions.	Moderate	Minor	Minor	sight of the construction works and affects the historic setting of the asset, but it is not considered sufficiently noisy to intensify the effects already identified through these individual assessments.	has already been included as part of the design as embedded mitigation.

Noise and Vibration Receptors also affected by Cultural Heritage

		Noise and Vibration	Cultural Heritage		
Noakes Barn, Noakes Lane, Little Waltham (R10)	These residents will experience minor noise effects, coupled with major or moderate visual adverse impacts due to the introduction of construction activity and a minor effect on the historic setting of the listed building. The combination of these impacts has the potential to result in effect interactions.	Minor	Minor	No significant effect interactions: The potential increase in noise from construction activities may disturb some receptors who also experience a temporary change to the historic setting of the asset, but it is not considered sufficiently noisy to intensify the effects already identified through	No additional mitigation proposed.

Receptor	Description of potential effect interactions	Residual significance of effect determined through EIA	Effect interactions	Additional mitigation required (if any)
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these individual assessments.

	Noise and Vibration	Cultural Heritage		
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<p>Dog and Gun Public House, Boreham Road, Little Waltham (R12 and DBH42); Roll's Farm, Terling (R15 and DBH9); Scarlett's Farmhouse, Terling (R19 and DBH34); Leylands Farmhouse, Terling (R8 and DBH44); Sparrow's Farmhouse, Terling (R21 and DBH7, 8, 45); Little Russells (DBH55)</p>	<p>These residents will experience minor noise effects, coupled with a minor to moderate adverse effect on the historic setting of the asset; for example, the visibility and noise associated with construction traffic. The combination of these impacts has the potential to result in effect interactions.</p>	<p>Minor</p>	<p>Minor</p>	<p>No significant effect interactions: The potential increase in noise from construction activities may disturb some receptors who also experience a temporary change to the historic setting of the asset, but it is not considered sufficiently noisy to intensify the effects already identified through these individual assessments</p>	<p>No additional mitigation is proposed.</p>
<p>Ringers Farmhouse, Terling Hall Road, Terling (R14 and DBH7 and 15)</p>		<p>Minor</p>	<p>Moderate</p>		

Table 17-4 Potential effect interactions during operation

Receptor	Description of potential effect interactions	Residual significance of effect determined through EIA		Effect interactions	Additional mitigation required (if any)
Landscape & Visual Receptors also affected by Noise and Vibration					
		Landscape and Visual	Noise and Vibration		
Recreational user of PRoW 113_33 (Viewpoint 6); Residents on Noakes Lane (Viewpoint 8); Residents of Western side of Terling Hall Road (Viewpoint 10);	Residents and recreational users will experience a moderate to major adverse visual amenity effect due to the presence of the PV Arrays, BESS and the Longfield Substation. The noise impact at these locations is assessed as being minor. However, the combination of these impacts has the potential to result in effect interactions.	Moderate	Minor	No significant effect interactions: Given the small change in noise levels at these receptors during operation, it is not expected that the effect interactions will increase the effects presented for the aspects individually.	No additional mitigation is proposed.
Socio Economics Receptors also affected by Landscape & Visual and Noise & Vibration					
		Socio Economic	Landscape and Visual	Noise and Vibration	
Users of PRoW	Users of PRoW experiencing a minor beneficial effect on socio-economics (due to a new permissive footpath) will experience a moderate to major adverse visual amenity effect due to the presence of the PV Arrays, BESS and the Longfield Substation in the immediate foreground. The noise impact will be minor due to the solar panels being mounted on fixed structures. The combination of these impacts has the potential to result in effect interactions.	Minor	Moderate to Major	Minor	No significant effect interactions: Given the small change in noise levels at these receptors during operation, it is not expected that the effect interactions will increase the effects presented for the aspects individually or change the benefit significance associated with the introduction of new permissive paths.

Table 17-5 Potential effect interactions during decommissioning

Receptor	Description of potential effect interactions	Residual significance of effect determined through EIA		Effect interactions	Additional mitigation required (if any)
Landscape & Visual Receptors also affected by Noise and Vibration					
		Landscape and Visual	Noise and Vibration		
Recreational user of PRoW 213_19 (Viewpoint 16); PRoW 213_18 (Viewpoint 57) and PRoW 113_25 (Viewpoint 9)	Residents and recreational users will experience a moderate and major adverse visual impact due to the top of the decommissioning equipment being visible amongst the vegetation. The noise impact will be minor from the traffic movements associated with the decommissioning the equipment. The combination of these impacts has the potential to result in effect interactions.	Major	Minor	No significant effect interactions: There is a potential for increased ‘annoyance’ for these residents and recreational users due to increased traffic movements and noise in the area, however this effect will be short term and temporary. It not expected that the effect interactions will increase any effects on receptors.	No additional mitigation is proposed.
Noise & Vibration Receptors also affected by Landscape & Visual					
		Noise and Vibration	Landscape and Visual		
				No significant effect interactions: There is a potential for increased ‘annoyance’ for these residents due to increased traffic movement and noise in the area, however this effect will be short term and temporary. It is not expected that the effect interactions will increase any effects on receptors.	No additional mitigation is proposed.

17.6 Cumulative Effects

17.6.1 Technical **Chapters 6 to 16** of the ES present high-level conclusions of potential cumulative effects derived from their own short list of schemes, based on the long list of cumulative schemes presented in **Appendix 5A: Long List of Cumulative Schemes** of the ES. A summary is presented below in **Table 17-6**.

Table 17-6 Summary of the cumulative effects identified within each of the technical Chapters 6 to 16 of this Environmental Statement

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
6. Climate Change – Consideration of cumulative effects have been scoped out of the Climate Change assessment. Refer to <i>Chapter 6: Climate Change</i> of this Environmental Statement for further information.			
7. Cultural Heritage			
Impacts on the significance of designated heritage assets and setting as a result of construction activities, security lighting, operational noise and associated traffic as well as a result from glint and glare of the solar panels.	The site is located immediately to the north of the Order limits and includes narrow silos 28m high and mill buildings and load out facility 20m high. Boundary landscaping is included as embedded mitigation to screen views. The ZTV shows theoretical visibility across a large part of the site using a bare earth model. When surface features are taken into account visibility is restricted (amongst designated assets for which this ES chapter has assessed there to be impact) to Ringers Farm. This asset is approximately 2.0km distant and impact will be negligible.	3 - Flour Mill	No significant cumulative effects: It is not considered that the cumulative effect of both developments would increase the significance of effect above that already assessed during construction and operation of the Scheme.
	The safeguarded corridor is approximately 1.8km from Brent Hall [DBH5], the closest designated built heritage asset for which this ES chapter has assessed there to be impact.	4 - Chelmsford North East Bypass	No significant cumulative effects: It is not considered that the cumulative effect of both developments would increase the significance of effect above that already assessed during construction and operation of the Scheme.
	Mineral extraction at Bulls Lodge Quarry is not expected to impact upon any built heritage asset with the potential to receive impact from the Longfield Solar Farm.	7 - Bulls Lodge Quarry	No significant cumulative effects: It is not considered that the cumulative effect of both developments would increase the significance of

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
	<p>The masterplan shares a boundary with the Order limits along the access route on Wheeler's Hill and Cranham Road and is approximately 150m from the developable part of the Longfield Solar Farm at Russell Green. The masterplan is at an early stage and options are still being considered but has the potential for impact on Brent Hall with a possible cumulative effect. Given the distance of the asset from the masterplan area of approximately 320m and intervening features including woodland and a water-filled gravel pit it is likely that impact on the asset as a result of the masterplan would be minor and any cumulative effect would not be significant.</p>	<p>32 - Chelmsford Garden Village – Local Plan site allocation (North East Chelmsford)</p>	<p>effect above that already assessed during construction and operation of the Scheme.</p> <p>No significant cumulative effects: It is not considered that the cumulative effect of both developments would increase the significance of effect above that already assessed during construction and operation of the Scheme.</p>
<p>8. Ecology</p>			
<p>Temporary loss of hedgerows during construction within the Order limits (for access and grid connection cables only).</p> <p>Temporary loss of habitat during construction used by the breeding bird assemblage across the Scheme.</p> <p>Temporary disturbance to breeding during construction and decommissioning Red Kite, Hobby and Barn Owl during the breeding season only.</p>	<p>Construction, operational and decommissioning effects on ecology are predicted not to be significant. All of the other schemes identified in Appendix 5A of the ES which were considered to have the potential to interact cumulatively with the Scheme have followed good design principles to minimise and avoid significant effects on ecological receptors and all avoid spatial and temporal interaction with the Scheme.</p>	<p>All planning applications listed in Appendix 5A of this ES.</p>	<p>No significant cumulative effects: No cumulative effects are anticipated during construction, operation or decommissioning. Mitigation will be provided for the Scheme.</p>
<p>9. Water Environment</p>			
<p>Potential pollution of River Ter and Boreham Brook and tributaries from construction site run off containing pollutants and fine sediment; chemical</p>	<p>Potential for overlap between construction of adjacent schemes and construction of this Scheme. Thus there is potential for short term, temporary construction related</p>	<p>3 - Flour Mill; 4 - Chelmsford North East Bypass; 5 - Stonepath Drive Residential Development;</p>	<p>No significant cumulative effects: No cumulative effects are anticipated during construction or decommissioning. Provided that all mitigation measures are implemented for all</p>

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
spillages; increased flood risk during construction.	pollutants generated from both the Scheme and adjacent developments to impact on watercourses in the study area. Provided that standard and good practice mitigation is implemented on the construction sites through their respective CEMPs and as per the conditions of the relevant planning permission, environmental permits and licences, as is being proposed for this Scheme, the cumulative risk can be effectively managed and there would not be a significant increase in the risks to any waterbodies. As such, there would not be any significant cumulative effects anticipated during construction.	6 - Hatfield Bury Farm Residential Development; 7 - Bulls Lodge Quarry; 11 - A12 Chelmsford to A120 Widening Scheme; 13 - Land at Station Road Residential Development; 14 - Hatfield Bury Lane Residential Development; 15 - Land East of Plantation Road; 19 - Chelmsford Civic Amenity & Recycling Centre; 20 - Chelmsford Water Transfer Station; 25 - Land South of Stonepath Drive; 33 - Great Leighs – Local Plan Site allocation; and 40 - Willows Green Solar Farm, Braintree	schemes, cumulative impacts from the scheme and nearby schemes will not be anticipated to produce any significant effects.
Potential pollution of River Ter and Boreham Brook and tributaries from diffuse urban runoff from the development; increased flood risk from increased impervious area in the catchment; potential hydromorphological impacts from watercourse crossings and road outfalls.	Drainage strategies and flood risk assessments for all cumulative developments would be developed in line with best practice to ensure no long-term deterioration in water quality or increase in flooding during operation.		No significant cumulative effects: No cumulative effects are anticipated during operation. Provided that all mitigation measures are implemented for all schemes, cumulative impacts from the scheme and nearby schemes will not be anticipated to produce any significant effects.
10. Landscape and Visual			
Construction activity from the Scheme and cumulative schemes introducing additional activity and construction features into LCA B1.	Construction of the cumulative schemes in combination with the Scheme would introduce additional activity and construction features into LCA B1. This would include intense activity related to largescale residential development, most notably Beaulieu Station Hub, and linear	1 - Beaulieu Station Hub 4 - Chelmsford North East Bypass 7 - Bulls Lodge Quarry 9 - Sheepcotes Farm Quarry to form agricultural reservoir. 11 - A12 Chelmsford to A120 Widening Scheme	No significant cumulative effects: No change to the effect reported on county level LCAs during construction or operation (year 1), given the localised scale of the effects relative to the overall LCA.

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
Additional infrastructure present during operation from the Scheme and cumulative schemes.	<p>infrastructure, such as the A12 widening. Relative to the overall scale of LCA B1 the impacts of these developments would be localised to a very small part of the LCA, in proximity to the Scheme, such that the geographical extent of the LCA impacted would remain similar to that identified for the Scheme. Most of the LCA would remain unchanged.</p> <p>The extent of development would remain localised to a small part of LCA B1, such that most of the LCA would remain unchanged. The magnitude of effect would remain as very low.</p>	<p>12 - North East Chelmsford urban extension – Beaulieu and Channels 16 - Radial Distributor Road (RDR) Phase 3 17 - Radial Distributor Road (RDR) Phases 2a and 2b. 32 - Chelmsford Garden Village – Local Plan site allocation 33 - Great Leighs – Local; plan site allocation</p>	
<p>Construction activity from the Scheme and cumulative schemes introducing additional activity and construction features into LCA B17.</p> <p>Additional infrastructure present during operation, introducing new built features within the LCA.</p>	<p>Construction of the cumulative schemes in combination with the Scheme would introduce additional activity and construction features into LCA B17. This would further reduce the level of tranquillity and alter the condition of the landscape local to the sites. The extent of the change relative to the scale of the LCA would be increased, compared to the Scheme alone. Change would be focussed in the western half of the LCA.</p> <p>The cumulative schemes would result in permanent change, introducing new built features within the LCA. This would introduce change to the western part of the LCA; resulting in the partial alteration of the extent of arable farmland, settlement pattern and network of winding lanes, which are recorded as being key characteristics.</p>	<p>4 - Chelmsford North East Bypass 9 - Sheepcotes Farm Quarry to form 33 - Great Leighs – Local; plan site allocation</p>	<p>Significant cumulative effects: The magnitude of effect would increase from minor adverse to moderate adverse for both construction and operation (year 1), due to the increased extent of LCA B17 changed by the cumulative schemes and the cumulative effect on key characteristics.</p>
Construction activity from the Scheme and cumulative schemes introducing additional activity and construction features.	The cumulative schemes would include substantial construction of new housing and infrastructure. This would increase the	<p>1 - Beaulieu Station Hub 7 - Bulls Lodge Quarry</p>	<p>Significant Cumulative Effects: The magnitude of effect would increase from minor adverse to moderate adverse for construction, considering</p>

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
Alterations to surface landform and the presence of construction activity.	level of construction activity and would alter the condition of the landscape, likely resulting in the loss of vegetation cover.	11 - A12 Chelmsford to A120 Widening Scheme 12 - North East Chelmsford urban extension – Beaulieu and Channels	the scale of construction relative to the overall LCA.
Additional infrastructure present during operation, introducing new built features within the LCA.	The cable route in LCA B21 would be below ground. The Bulls Lodge Substation Extension would be in keeping with the existing land use and therefore any further change to landscape character would result from the cumulative schemes alone, rather than any combined effect resulting from the DCO Scheme.	16 - Radial Distributor Road (RDR) Phase 3 17 - Radial Distributor Road (RDR) Phases 2a and 2b. 32 - Chelmsford Garden Village – Local Plan site allocation	No Significant Cumulative Effects: The magnitude of effect during operation (year 1) would remain negligible.
Construction of the cumulative schemes in combination with the Scheme would introduce additional activity and construction features into LLCA 02.	Construction of the cumulative schemes in combination with the Scheme would introduce additional activity and construction features into LLCA 02. This would further reduce the level of tranquillity and alter the condition of the landscape local to the sites. The extent of the change relative to the scale of the LLCA would be increased, compared to the Scheme alone, resulting particularly from Chelmsford North East Bypass which would occupy a similar length to the Scheme within the LLCA. The magnitude of effect would increase to high.	4 - Chelmsford North East Bypass 9 - Sheepcotes Farm Quarry to form	Significant cumulative effects: The magnitude of effect would increase from moderate adverse to major adverse for construction and remain moderate adverse for operation (year 1).
Increase in the presence of built structures within LLCA 02.	There would be an increase in the presence of built structures within LLCA 02. Those associated with the cumulative schemes would be permanent. There would be a partial alteration to the level of tranquillity and the extent of arable land, noted as key characteristics. The cumulative change would remain a partial alteration to the LLCA and therefore the magnitude of effect would remain as medium.		

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
<p>Construction activity from the Scheme and cumulative schemes introducing additional activity and construction features to the landscape.</p> <p>Alteration of key landscape characteristics.</p>	<p>Only a very small part of construction activity relating to the Chelmsford North East Bypass would be located in, or in proximity to, LLCA 03 such that the geographical extent of construction activity in the LLCA would remain very small.</p> <p>The portion of Chelmsford North East Bypass within LLCA 03 would tie into the existing alignment of Braintree Road such that there would be no alteration of key characteristics.</p>	<p>4 - Chelmsford North East Bypass</p>	<p>No significant cumulative effects: The magnitude of effect would remain as low during construction as only a small part of construction activity relating to the Chelmsford North East Bypass would be located in, or in proximity to LLCA03.</p> <p>No significant cumulative effects: The magnitude of effect for operation would remain as low as there would be no alteration of key characteristics.</p>
<p>Construction activity from the Scheme and cumulative schemes introducing additional activity and construction features which would likely alter the condition of the landscape, resulting in the loss of vegetation cover.</p> <p>Changes to landscape character as a result of increased presence of built structures from the Scheme and cumulative schemes.</p>	<p>The cumulative schemes include substantial construction of new housing and infrastructure. This would increase the level of construction activity and would alter the condition of the landscape, likely resulting in the loss of vegetation cover. Considering the scale of construction relative to the overall LCA the magnitude of effect would increase to high. The level of cumulative effect would remain as reported for the Scheme, given the very low sensitivity of LLCA 08.</p> <p>The cable route in LCA B21 would be below ground. The Bulls Lodge Substation Extension would be in keeping with the existing land use and therefore any further change to landscape character would result from the cumulative schemes alone, rather than any combined effect resulting from the DCO Scheme. The magnitude of effect therefore remains as very low</p>	<p>1 - Beaulieu Station Hub 7 - Bulls Lodge Quarry 12 - North East Chelmsford urban extension – Beaulieu and Channels 16 - Radial Distributor Road (RDR) Phase 3 17 - Radial Distributor Road (RDR) Phases 2a and 2b.</p>	<p>No significant cumulative effects: the magnitude of effect would remain minor adverse for construction and negligible for operation (year 1).</p>
<p>Additional construction activity visible for visual receptors.</p>	<p>Glimpses of construction activity and features related to the A12 Chelmsford to A120 Widening Scheme may be visible in</p>	<p>11 - A12 Chelmsford to A120 Widening Scheme</p>	<p>Significant cumulative effects: The magnitude of effect for construction will increase from minor adverse to moderate adverse.</p>

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
Additional infrastructure present during operation.	<p>the background of the view in combination with the installation of the cable route and Bulls Lodge Substation Extension. Although intervening landform and vegetation lining the northern side of the railway would substantially screen such features. Overall, the extent of the view with potential to be changed by construction would be increased and therefore the magnitude of effect would increase to medium.</p> <p>Both the Scheme and the cumulative scheme would be barely perceptible in the view due to the intervening distance, landform and vegetation. The magnitude of change would remain very low.</p>		No significant cumulative effects: The magnitude of effect of operation (year 1) will remain negligible.
Additional construction activity visible for visual receptors.	Field boundary vegetation would screen views of the construction of the A12 Chelmsford to A120 Widening scheme (in winter) such that there would be no visual cumulative effect.	11 - A12 Chelmsford to A120 Widening Scheme	No significant cumulative effects: The magnitude of effect will remain minor adverse for construction and negligible for operation (year 1).
Additional infrastructure present during operation.	Field boundary vegetation would screen views of the A12 Chelmsford to A120 Widening scheme such that there would be no visual cumulative effect		
11. Noise and Vibration			
Any overlapping of construction phases between the Scheme and adjacent developments has the potential to contribute to cumulative effects.	Due to these nearby schemes being located within 500m of the Scheme, this may result in some interactive construction noise if constructed at the same time as the Scheme.	1 - Beaulieu Station Hub 3 - Flour Mill 16 - Radial Distributor Road (RDR) Phase 3 17 - Radial Distributor Road (RDR) Phases 2a and 2b	No significant cumulative effects: Based on the distances from key project components to cumulative developments, it is considered that any overlapping of construction phases between the Scheme and other developments would not result in any cumulative effects at common noise-sensitive receptors. Given the requirement for new developments to achieve operation noise standards, and the relative distance between
Interaction of operational noise from the Scheme and other nearby developments.	There is potential for operational noise from the Scheme and the cumulative		

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
	schemes to interact, causing cumulative effects on nearby receptors.		cumulative developments and the Scheme, operational noise effects from the Scheme will remain unchanged from the residual effects.
12. Socio-economics and Land use			
Increase in construction-related employment demand. Increase in employment opportunities during operation	The combined effect of the construction of the cumulative developments is likely to bring considerable additional employment to the local economy. The overall cumulative effect from the generation of construction workers is likely to remain as temporary moderate beneficial effect on the economy of the study area, which is considered significant. If all the schemes are to be realised there will be considerable additional employment demand from some of the cumulative schemes offering quarrying activities, office and retail space. Most cumulative schemes, however, will not generate considerable operational employment due to their nature as infrastructure or utilities projects or as purely residential-led development projects.	All planning applications listed in Appendix 5A of this ES.	Significant cumulative effects: Moderate beneficial on the local economy during construction. No significant cumulative effects: Negligible for employment generation during operation.
Increase in generation of Gross Value Added (GVA) from construction employment	The overall cumulative effect from the generation of GVA from construction is likely to remain temporary minor beneficial on the local economy, resulting in a temporary minor beneficial effect, which is not considered significant.	All planning applications listed in Appendix 5A of this ES.	No significant cumulative effects: The overall cumulative effect from the generation of GVA from construction is likely to remain temporary minor beneficial on the local economy.
Temporary disruptions of PRoW during the construction phase of the Scheme. Effects on PRoW during operation.	The overall cumulative effect on PRoWs is likely to remain temporary minor adverse as the cumulative schemes adjacent to the Scheme, if constructed could temporarily sever routes between Little Waltham and Terling, which traverse the Order limits of	All planning applications listed in Appendix 5A of this ES.	No significant cumulative effects: No cumulative effects are anticipated during construction, operation and decommissioning. The cumulative significance of effects remains the same as the assessment of the scheme alone.

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
	<p>the Scheme. Therefore there are likely to be no significant cumulative effects.</p> <p>The overall cumulative effects on PRow during the operational phase will be long term minor adverse as the cumulative schemes have the potential to temporarily sever routes between Little Waltham and Terling that traverse the site.</p>		
<p>Potential for noise, air quality, visual and traffic effects arising from construction and operation of the Scheme to impact on the amenity of residents, businesses and users of community facilities</p>	<p>The overall cumulative effect on residential properties, business premises, and community facilities if all the cumulative schemes, including multiple residential developments, highway improvement works, and quarrying activities are constructed is likely to be negligible which is not considered significant, as there are no effects on the amenity of receptors arising from the Scheme.</p>	<p>All planning applications listed in Appendix 5A of this ES.</p>	<p>No significant cumulative effects: Negligible effect on residential properties, business premises and community facilities during construction and operation.</p>
<h3>13. Transport and Access</h3>			
<p>Increased traffic flows, including staff vehicles, LGVs and HGVs on the roads leading to the Site.</p> <p>Severance and intimidation associated with increased construction traffic, pedestrian and driver delay, pedestrian and cyclist amenity and accidents and safety.</p>	<p>It is anticipated that any cumulative effects arising from other developments would be focussed around the Strategic Road Network (SRN), including the A12(T), Boreham Interchange and the A130., There will be no significant cumulative effects on these parts of the highway network in combination with those already identified for the Scheme in isolation.</p> <p>In terms of Bulls Lodge Substation Extension, there is expected to be a maximum of 20 additional two-way vehicle movements on the RDR and the private road to/ from Bulls Lodge Substation, via</p>	<p>1 - Beaulieu Station Hub 3 - Flour Mill 7 - Bulls Lodge Quarry 9 - Sheepcotes Farm Quarry 11 - A12 Chelmsford to A120 Widening Scheme; 12 - North East Chelmsford urban extension (Beaulieu and Channels); 15 - Land East of Plantation Road, Boreham 16 - RDR Phase 3 19 - The Chelmsford Civic Amenity and Recycling Centre 20 - The Chelmsford Waste Transfer Station</p>	<p>No significant cumulative effects: no cumulative impacts upon the highway network are envisaged based on the assessment in the ES. The cumulative effects are therefore expected to remain negligible. The conclusions of this ES are considered to remain valid in the instance that there is a delay to the start of the construction phase of up to 5 years. This assessment is based on the known committed schemes as of February 2022.</p>

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
	<p>the Boreham Interchange and the A12(T) as a result of the Bulls Lodge Substation Extension during the construction phase. This equates to a maximum of one additional vehicle movement every three minutes. The construction of the Bulls Lodge Substation Extension is not anticipated to have a cumulative impact.</p> <p>The future baseline scenario (2025) includes operational traffic associated with the Land North of Cranham Road committed development. Therefore, the cumulative effects arising from this development and the Scheme have been considered.</p> <p>The highway improvements to be implemented in support of the Chelmsford Garden Community as well as National Highways' A12 Chelmsford to A120 Widening Scheme are set to benefit the Scheme, by improving the surrounding highway network and offering alternative routes and / or additional capacity. As above, the RDR and Boreham Interchange improvements are currently under construction and have been incorporated as part of the future baseline (2025) situation as agreed with ECC Highways.</p>	<p>22 - The Dunmow Waste Management Site 23 - The Springfield Highways Depot 24 - The Essex Regiment Way Stone Plant; 32 - Chelmsford Garden Village – Local Plan site Allocation (North East Chelmsford); and 40 – Willows Green Solar Farm, Braintree</p>	
<p>14. Air Quality - It is not anticipated that there is any potential for cumulative effects on air quality. Refer to Chapter 14: Air Quality of this Environmental Statement [EN010118/APP/6.1] for further information.</p>			
<p>15. Human Health</p>			
Access to Healthcare Services and other Social Infrastructure	The assessment undertaken in Chapter 15: Human Health of this Environmental Statement [EN010118/APP/6.1] is	All planning applications listed in Appendix 5A of this ES.	No significant cumulative effects: No cumulative effects on access to people in relation to access to healthcare services, social

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
Accessibility and Active Travel	<p>inherently cumulative as the traffic data which the assessment is based on includes the change in traffic generated by other committed developments.</p> <p>From a non-motorised user environment perspective, changes in traffic flows have already been assessed as part of Chapter 13: Transport and Access and in the assessment presented within Chapter 15: Human Health and are therefore inherent as part of the assessment presented in the chapter. It is therefore concluded that the potential cumulative effects on non-motorised users will be the same as is the case for the Scheme when assessed in isolation</p>		infrastructure impacts and accessibility and active travel impacts.
Access to Work and Training	<p>The construction phases of the Scheme and other cumulative developments would both be expected to generate employment. It is expected that there would be a beneficial effect on construction related employment within the local area, which would have a beneficial effect on human health and wellbeing. Once the committed developments are built there will be new commercial, retail and leisure space created that will provide further opportunities for residents to access work and training in the local area. The new employment space would provide job opportunities for existing and new residents to the area, resulting in a cumulative beneficial effect for the local community</p>	All planning applications listed in Appendix 5A of this ES.	Potential significant cumulative effects: It is expected that there would be a cumulative beneficial effect on construction related employment within the local area. The magnitude of this effect is difficult to quantify in the absence of information relating to construction costs of the cumulative developments. It is expected that there would be a cumulative beneficial effect on operation related employment within the local area
Air Quality, Noise and Neighbourhood Amenity	<p>There are no anticipated cumulative effects on air quality, however there are some cumulative noise effects during the</p>	All planning applications listed in Appendix 5A of this ES.	No significant cumulative effects: Cumulative effects are not expected to be greater than when considering these developments in isolation.

Potential Impact	Potential for Cumulative Effect	Relevant Cumulative Schemes	Cumulative Effect
	<p>construction and operation phases of the Scheme. It is considered that any overlap of construction or decommissioning phases between the Scheme and cumulative developments would not result in any in-combination cumulative effects at common noise-sensitive receptors. This is based on the distances between key project components within the Order limits and cumulative developments, as well as any requirements for other developments to implement best practicable means (BPM) to mitigate noise effects. It is also expected that any operational noise emissions from nearby developments will be designed to achieve appropriate operational noise limits so as not to contribute additional noise to the area and that there will be no cumulative operational effects at common noise-sensitive receptors.</p>		
16. Other Environmental Topics			
<p>Increased HGVs transporting waste to recycling plants and landfill.</p>	<p>The Essex and Southend-on-Sea Waste Plan considers waste needs up to 2035 and considers allocated sites and other forms of strategic development therefore consideration has been made at the regional level for the cumulative waste generated by these schemes. It is also assumed that each of the cumulative schemes will also be considering and implementing the waste hierarchy. Therefore, no significant cumulative effects are anticipated.</p>	<p>All planning applications listed in Appendix 5A of this ES.</p>	<p>No significant cumulative effects: It is not considered that the Scheme and the cumulative schemes would give rise to any significant effects, provided that this Scheme and each cumulative scheme considers and implements the waste hierarchy.</p>

17.7 References

Ref 17-1 Her Majesty's Stationary Office (HMSO) (2017) The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.