

Chapter 16: Effect Interactions

INTRODUCTION

- 16.1** This chapter of the Environmental Statement (ES) assesses the likelihood for intra-project effects or 'effect interactions'. Effect interactions occur because of interactions between multiple individual effects associated with just one project on a receptor, i.e. the combination of individual effects, for example effects in relation to noise, air quality and traffic on a receptor.
- 16.2** Effects arising from the Proposed Development in combination with other developments or 'cumulative schemes' have been discussed separately throughout this ES (in **ES Volume 1, Chapters 6 to 15** and **ES Volume 2**), as appropriate, and have not been re-iterated within this ES chapter to avoid repetition.
- 16.3** The Proposed Development will be phased, with new receptors (e.g. residents) introduced to the site whilst construction of later plots is still ongoing elsewhere within the site (i.e. it is expected that the Phase 1 plots will be occupied and operational whilst Phase 2 is being constructed). This EIA has therefore utilised an interim assessment scenario (Assessment Scenario 2) where relevant in order to appropriately assess the potential for likely significant effects upon relevant receptors throughout the demolition and construction and operational phases of the Proposed Development, as discussed in **ES Volume 1, Chapter 2: EIA Methodology**. The effects interactions assessment considers the conclusions of each of the technical assessments and their respective assessment scenarios. Where a technical ES chapter has followed an alternative assessment approach to that set out in **ES Volume 1, Chapter 2: EIA Methodology** with regards to assessment scenarios, this has been clearly defined within the ES chapter. For example, a number of technical assessments consider a single demolition and construction phase assessment scenario as the residual effects established are relevant to both the Phase 1 (Assessment Scenario 1) and Phase 2 (Assessment Scenario 2) demolition and construction.
- 16.4** Although the Proposed Development has residual greenhouse gas ("GHG") emissions in the opening year (representing a minor adverse effect), these have been minimised through an appropriate degree of mitigation consistent with best practice and IEMA guidance to ensure the Proposed Development is compliant with relevant policies and the UK's target for net zero carbon emissions by 2050. The Proposed Development has been demonstrated to meet all relevant policies related to greenhouse gas emissions and climate change. It is judged that significant effects as a result of the Proposed Development are not likely and they are therefore not discussed in this chapter of the ES. See **ES Volume 1, Chapter 12: Climate Change and Greenhouse Gas Assessment** for further information with regards to the GHG assessment and conclusions.
- 16.5** Effects associated with human health are the result of the interaction of residual effects defined within the technical assessments presented within the ES (**ES Volume 1, Chapter 6 to 15** and **ES Volume 2**). An objective of the Health Impact Assessment ('HIA') (refer to **ES Volume 3, Appendix: Socio-Economics and Health – Annex 2**) is to demonstrate how residual effects interact with each other to result in effects to human health. For this reason and to avoid duplicating any effects / effect interactions in relation to health, the residual human health effects (which themselves are considered to be effect interactions) are not included within this ES chapter. Any residual positive / neutral / negative health effects (in line with the HIA approach in establishing effects) are however presented within **ES Volume 1, Chapter 17: Likely Significant Effects and Conclusions**.
- 16.6** There is no established EIA methodology for assessing the nature and scale of effect interactions on a receptor. However, the European Commission (EC) has produced guidelines¹ to assist EIA practitioners in developing an approach which is appropriate to a project. These guidelines have been used to develop an approach which uses the defined residual effects of the Proposed Development (as presented throughout this ES (in **ES Volume 1, Chapters 6 to 15** and **ES Volume 2**) to determine the potential for effect interactions. These residual effects are reliant on mitigation measures (as identified throughout this ES and presented in **ES Volume 1, Chapter 18: Environmental Management, Mitigation and Monitoring Schedule**); the mitigation measures have been assumed to be secured / implemented through the discharge of relevant planning conditions and / or legal agreement.
- 16.7** The approach to defining effect interactions, involves tabulating the residual effects of the Proposed Development against receptors or, where more appropriate receptor groups, to identify the potential for in-combination effects or effect interactions. Residual effects that are beneficial, neutral or adverse in nature and that are minor, moderate or major in scale have been considered². Based on the definitions of what negligible effects comprise for each of the technical assessments as presented in this ES, these negligible

effects do not warrant further consideration in relation to in-combination effects and are therefore not considered. Only effects described as minor and above in scale are therefore considered.

- 16.8** The potential for in-combination effects is identified, and professional judgement is then used to determine if the potential in-combination effects could lead to an effect interaction. Where a resultant effect interaction is identified, this is further discussed qualitatively.
- 16.9** The scale of an effect interaction has not been assigned as part of this assessment; however, whether the in-combination effects / effect interaction is considered to be a likely significant effect has been identified. For example, if one or more residual significant effects (i.e. effects that are typically moderate or major in scale) from different EIA topics (e.g. air quality and noise and vibration) coincide on a receptor, the effect interaction will be considered as being 'significant'. If none of the individual effects are significant, consideration will be given as to whether or not the combination 'not significant' effects could result in a combined significant effect, based on professional opinion.
- 16.10** For all topics, apart from Wind Microclimate, effects that are identified as moderate or major are considered to be significant (with effects that are negligible or minor in scale being not significant). For Wind Microclimate, as explained within **ES Volume 1, Chapter 11: Wind Microclimate**, wind conditions would represent a significant effect if they are unsuitable for their intended use and would require mitigation measures therefore all adverse effects (minor, moderate and major in scale) are considered a significant effect, and all beneficial effects (minor, moderate and major in scale) are not considered significant.
- 16.11** Potential effects in relation to daylight, sunlight, overshadowing, solar glare and light intrusion during the construction stage of the Proposed Development have not been included within **Table 16.1**. The construction of the new buildings on the site would have a gradual effect upon the levels of daylight, sunlight and overshadowing as the massing of the Proposed Development increases over time. It is therefore considered that the completed Proposed Development represents the worst-case assessment in terms of likely resultant effects. The effects during the demolition and construction works would almost certainly be less than that of the completed Proposed Development, given that the extent of permanent massing would increase throughout the construction programme, until the Proposed Development is complete. With regards to solar glare and light intrusion, given that these effects are likely to arise as a result of those elements of the Proposed Development installed at the final stage of the construction works prior to operation – e.g. solar glare effects arising from the installation of glazed elements and light intrusion effects resulting from operational lighting, it is not considered appropriate to consider the potential for effect interactions in relation to these effects during construction.
- 16.12** Within the tables presented within this ES chapter, adverse (or negative) residual effects (minor, moderate or major) are shaded in 'orange', beneficial (or positive) residual effects (minor, moderate or major) are shaded in 'green' and neutral³ residual effects (minor, moderate or major) are shaded in 'blue' for ease of identification.
- 16.13** Effect interactions arising from the demolition and construction works (see **Table 16.1**) and the completed and operational/occupied Proposed Development (see **Table 16.2**) are discussed in the following sections of this ES chapter.

DEMOLITION AND CONSTRUCTION

- 16.14** **Table 16.1** presents the in-combination effects assessment associated with the demolition and construction works of the Proposed Development, split by Assessment Scenario 1 (Phase 1 demolition and construction) and Assessment Scenario 2 (Phase 2 demolition and construction), and identifies the potential for effect interactions on particular receptors (i.e. those receptors that have been assessed within this ES to experience residual effects at a scale of minor to major (beneficial, adverse or neutral) as discussed in paragraph 16.7). Where the potential for an effect interaction is identified, this is discussed in more detail below.

¹ European Community (1999); Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

² Where the geographical extent was identified in the relevant technical assessment, this has been included in the tables below.

³ As noted within **ES Volume 1, Chapter 2: EIA Methodology**, neutral effects are relevant for the Townscape and Visual Impact assessment (**ES Volume 2**).

Table 16.1 Potential for Effects Interactions – Demolition and Construction

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
Assessment Scenario 1 (Phase 1 Demolition and Construction)					
Construction Employment (Businesses and their Employees)		Socio-Economics Employment generation during the period of demolition and construction	Moderate Beneficial (Regional)	Significant	NO (No effects to interact with)
Local Economy (The Gravesham Economy / Workforce)		Socio-Economics Skills development and training opportunities including apprenticeships during construction	Minor Beneficial (Borough)	Not Significant	NO (No effects to interact with)
Displacement of Existing Businesses (Existing Businesses and their Employees)		Socio-Economics Loss or displacement of business premises and associated jobs	Minor Adverse (Borough)	Not Significant	NO (No effects to interact with)
Buried Heritage Receptors	Palaeolithic deposits	Archaeology Physical effect through construction activities	Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
	Palaeoenvironmental/waterlogged remains		Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
	Remains of Cement Works		Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
	Unknown Archaeological Remains		Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
	Palaeoenvironmental/waterlogged remains outside of the site	Archaeology Physical effect to deposits outside of the site through hydrological changes	Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
Existing Residential Receptors	Taunton Road Robinson Way	Noise Construction Noise	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions for existing residential receptors in relation to noise from construction activities and vibration)
		Vibration Construction Vibration	Minor Adverse (Local)	Not Significant	
	Black Eagle Drive	Noise Construction Noise	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions for existing residential receptors in relation to noise from construction activities and vibration)
		Vibration Construction Vibration	Moderate Adverse (Local)	Significant	
	Railway Street	Vibration Construction Vibration	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions for existing residential receptors in relation to noise from construction activities and construction traffic)
		Noise Construction Traffic	Minor Adverse (Local)	Not Significant	
	Tower Wharf	Noise	Minor Adverse	Not Significant	NO

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
		Construction Traffic	(Local)		(No effects to interact with)
Pedestrian, Cyclist, Public Transport Network and Local Highway Network	Link 17 (B2175 - Stonebridge Road)	Traffic and Transport Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Traffic and Transport Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Pedestrian Delay	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Pedestrian Amenity	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Fear and Intimidation	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Accidents and Safety	Minor Adverse (Local)	Not Significant	
	Link 12 (High Street)	Traffic and Transport Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Traffic and Transport Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Pedestrian Delay	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Pedestrian Amenity	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Fear and Intimidation	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Accidents and Safety	Minor Adverse (Local)	Not Significant	
	Link 15 (A226 - Stonebridge Road)	Traffic and Transport Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Traffic and Transport Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Pedestrian Delay	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Pedestrian Amenity	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Fear and Intimidation	Minor Adverse (Local)	Not Significant	
		Traffic and Transport Effects on Accidents and Safety	Minor Adverse (Local)	Not Significant	
Views (Visual Amenity)	View 14	Visual Impact Assessment:	Minor Neutral (Regional)	Not Significant	NO (No effects to interact with)

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
	Views 1, 3, 4, 6, 11 and 12	Effect of demolition and construction related works on views.	Minor Adverse (Regional)	Not Significant	NO (No effects to interact with)
	Views 8, 13 and 15		Minor to Moderate Adverse (Regional)	Not Significant	NO (No effects to interact with)
Townscape Receptors (Townscape Character Areas)	TCA1: Mixed-use/commercial estate TCA2: Traditional town centre TCA3: 20th century housing TCA4: Green Space TCA5: Industrial TCA6: River Thames	Townscape Changes to the townscape characteristics due to the construction works	Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
Assessment Scenario 2 (Phase 2 Demolition and Construction)					
Socio-Economic Receptors	The socio-economic assessment considered a single demolition and construction scenario, as set out in ES Volume 1, Chapter 16: Socio-Economics and Health . Therefore, all socio-economic effects for Assessment Scenario 2 are the same as those outlined in Assessment Scenario 1 above. No further effect interactions are identified.				
Buried Heritage Receptors	The archaeological assessment considered a single demolition and construction scenario, as set out in ES Volume 1, Chapter 13: Archaeology . Therefore, all buried heritage effects for Assessment Scenario 2 are the same as those outlined in Assessment Scenario 1 above. No further effect interactions are identified.				
Townscape Receptors (Townscape Character Areas)	The townscape assessment considered a single demolition and construction scenario, as set out in ES Volume 2 . Therefore, all townscape effects for Assessment Scenario 2 are the same as those outlined in Assessment Scenario 1 above. No further potential effect interactions are identified.				
Views (Visual Amenity)	The visual assessment considered a single demolition and construction scenario, as set out in ES Volume 2 . Therefore, all visual effects for Assessment Scenario 2 are the same as those outlined in Assessment Scenario 1 above. No further potential effect interactions are identified.				
Existing Residential and Industrial Receptors	Tower Wharf Railway Street Wallis Park	Noise Construction Traffic	Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
Introduced Residential Receptors	Plots 5, 8, 15 and 16	Noise Construction Noise	Moderate Adverse (Local)	Significant	YES (Potential for effect interactions for existing residential receptors in relation to noise from construction activities and vibration)
		Vibration Construction Vibration	Minor Adverse (Local)	Not Significant	
	Plot 7	Noise Construction Noise	Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
Pedestrian, Cyclist, Public Transport Network and Local Highway Network	Link 12 (High Street)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Accidents and Safety	Minor Adverse (Local)	Not Significant	

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
	Link 13 (A226 - Galley Hill Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Accidents and Safety	Minor Adverse (Local)	Not Significant	
	Link 15 (A226 - Stonebridge Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
	Link 16 (Grove Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Fear and Intimidation	Minor Adverse (Local)	Not Significant	
	Link 17 (B2175 - Stonebridge Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
	Link 18 (A226)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
	Link 19 (Link Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
	Link 20 (Thames Way - A226)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	

16.15 Table 16.1 shows that there is the potential for effect interactions to take place during the demolition and construction activities associated with the Proposed Development. Potential effect interactions have been identified in respect of the following:

Noise and Vibration in relation to Existing and Introduced Residential Receptors

16.16 The alterations to the existing levels of noise (an adverse effect) and vibration (an adverse effect) during the demolition and construction activities have the potential to have an in-combination effect on existing and

introduced residential properties at: Taunton Way and Robinson Way (minor adverse for construction noise and minor adverse for construction vibration), Black Eagle Drive (minor adverse for construction noise and moderate adverse for construction vibration), Wallis Park and Railway Street (minor adverse for construction noise and minor adverse for construction traffic), and introduced Plots 5, 8, 15 and 16 (moderate adverse for construction noise and minor adverse for construction vibration).

- 16.17** The effect interactions at Black Eagle Drive are deemed **significant** as at least one of the effects (construction vibration) is significant in isolation. Adverse effects, however, are only likely to occur if piling activities are taking place in close proximity to sensitive receptors (i.e. assuming the worst case, less than 20m distance). In reality, high vibration generating activities are unlikely to occur so close to sensitive receptors as it is expected that detailed planning methodology such as the. Piling Method Statement discussed at paragraph 16.19 can seek to further reduce the potential for adverse impacts, and if they do, the impacts would be of short-term duration (restricted to the duration of the piling works) and appropriately monitored.
- 16.18** Given that there is potential for predicted impacts to be significant under the worst-case scenario, mitigation measures will be put in place to ensure that vibration effects are minimised as far as practicable through the use of an appropriate piling technique, design and methodology. To reduce potential vibration impacts due to piling, the contractor shall use a piling technique that is least likely to cause adverse vibration impacts (e.g. auger piling), to ensure that the likely effect of vibration is reduced or avoided at nearby receptors.
- 16.19** A 'Piling Method Statement' will also be provided and agreed prior to the commencement of these works. This will be secured by planning condition or obligation. Vibration limits will be set in accordance with BS5228-2 to minimise the risk of complaints or building damage. These limits will be controlled through implementation of the Construction Environmental Management Plan (CEMP) and vibration monitoring. The statement will also include vibration and noise monitoring and action levels.
- 16.20** It is considered that, with the appropriate and successful implementation of the mitigation proposed, the likely adverse effects predicted would reduce (for example, this assumes that no piling will occur within 5m of a high sensitivity receptor, and that should the piling methodology be able to prevent piling occurring within a 10-15m radius of the receptor, it is considered that the likely effects can be reduced further).
- 16.21** The effect interactions at introduced residential receptors Plots 5, 8, 15 and 16 are deemed **significant** as at least one of the effects (construction noise) is significant in isolation. Whilst the effects have the potential to interact, the interaction of these effects is not unusual for construction works. All reasonable steps will be taken to mitigate and minimise the effects through the adoption of Best Practicable Means (BPM). Noise mitigation measures and noise management plans covering BPM shall be put into place to ensure that noise is minimised at all times. Construction noise predictions are based on worst case months that are assumed to represent high periods of construction activity over the course of a working day, with all plant being operational at all areas of all worksites during each period assessed. In reality, it is likely that the worst-case noise levels would be for limited periods of time when plant are operational, and are also likely to vary in the level of noise when in use. Furthermore, it is not uncommon for construction works to be undertaken near introduced sensitive uses on a phased, large-scale development of this nature, and the potential for temporary adverse effects on introduced receptors is expected.
- 16.22** The effect interactions at Taunton Way, Robinson Way and Railway Street are deemed not significant as no individual effect is considered to be significant. Based upon professional judgement, it is considered that the potential for significant adverse effect interactions will be avoided given that the mitigation applied, e.g. through the implementation of construction noise management and mitigation measures detailed within a CEMP, including providing the residents with prior notification before works commence.

Traffic and Transport related effects upon the Pedestrian, Cyclist, Public Transport and Local Highway Network

- 16.23** The alterations to traffic flows and subsequent effects upon Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity, Fear and Intimidation and Accidents and Safety (adverse effects) during the demolition and construction activities have the potential to have an in-combination effect at a number of road links (links 12, 13, 15, 16, 17, 18, 19 and 20).
- 16.24** The effects at links 12, 13, 15, 16, 18, 19 and 20 are deemed not significant. It is proposed that a Construction Environmental Management Plan (CEMP) will be implemented to minimise the risk of the likely environmental effects occurring during the construction phase and to effectively reduce the effect associated with construction activities, including the use of defined routes and timing. This will be secured by planning condition or obligation. The type of vehicle that will transport materials to the site will be determined in advance to ensure safe and efficient delivery taking into consideration local constraints. The future detailed CEMP(s) will adhere to the Outline CEMP submitted with the planning application, as found at **ES Volume 3, Appendix: Demolition and Construction – Annex 1**.
- 16.25** Construction traffic movements will be kept to agreed working hours where practicable and designed to minimise disruption to the highway network and local residents. The CEMP (which will be implemented and monitored in accordance with best practice construction management processes) will also include the following measures:
- Management of construction traffic including the avoidance of any sensitive site boundaries;
 - The Construction Logistics and Community Safety (CLOCS) standards for all vehicles shall be adopted;
 - Safety for pedestrians through separate pedestrian gates and footpaths;
 - Maintenance and protection of existing public and private (e.g., Stansted Airport) routine and emergency access routes;
 - Details of access and egress with wheel cleaning facilities and agreed HGVs access routes to and from the site including specific measures relating to the transportation of any hazardous loads;
 - Procedures for the management of deliveries (including organised time slots / just in time deliveries);
 - Construction deliveries would be carefully planned with delivery times agreed with each contractor using a web-based booking system. Delivery schedules would be produced to look at the profiles of forthcoming deliveries to regulate journeys and eliminate bottlenecks and reduce over ordering of materials and waste generation; and
 - A proportion of the trips will be scheduled to arrive at the construction site outside of peak hours, thus avoiding the busiest times on the local road network.
- 16.26** In light of the above measures, based upon professional judgement it is considered that the potential for significant adverse effect interactions upon the pedestrian, cyclist, public transport and local highway network will be avoided given the mitigation applied, e.g. through the implementation of mitigation measures detailed within a CEMP.

COMPLETED DEVELOPMENT

- 16.27** **Table 16.2** presents the in-combination effects assessment associated with the completed and operational Proposed Development, and identifies the potential for effect interactions on particular receptors (i.e. those receptors that have been assessed within this ES to experience residual effects at a scale of minor to major (beneficial, adverse or neutral) as discussed in paragraph 16.7). Where the potential for an effect interaction is identified, this is discussed in more detail below.

Table 18.1

Table 16.2

Potential for Effects Interactions – Completed Development

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
Housing Need / Availability in Gravesham		Socio-Economics Provision of housing for the GBC Housing Supply Pipeline	Major Beneficial (Borough)	Significant	NO (No effects to interact with)
GBC Council Tax and Non-Domestic Rates Income		Socio-Economics Generation of new Council Tax Receipts	Major Beneficial (Borough)	Significant	NO (No effects to interact with)
		Socio-Economics Generation of new Non-Domestic Rates Receipts	Moderate Beneficial (Borough)	Significant	NO (No effects to interact with)
The Gravesham Economy / Workforce		Socio-Economics Creation of new Permanent Jobs	Major Beneficial (Local)	Significant	NO (No effects to interact with)
		Socio-Economics New Household Expenditure	Moderate Beneficial (Local)	Significant	NO (No effects to interact with)
Social Infrastructure		Socio-Economics Primary Healthcare Availability	Moderate Beneficial (Local)	Significant	NO (No effects to interact with)
		Socio-Economics Nursery Place Availability	Minor Beneficial (Local)	Not Significant	NO (No effects to interact with)
Ecology and Biodiversity	Additional Planting	Ecology and Biodiversity Increased habitat connectivity to the adjacent Swanscombe Peninsula SSSI and increased biodiversity and ecological value within the local area	Minor Beneficial (Local)	Not Significant	NO (No effects to interact with)
Water Resources	Surface Waters	Water Resources Water quality treatment to the surface water runoff	Negligible to Minor Beneficial (Local)	Significant	NO (No effects to interact with)
Wind Microclimate	On-site Pedestrian Users and Occupants	Wind Microclimate Wind conditions at Ebbsfleet United Football Stadium	Minor Beneficial (Local)	Not Significant	NO (No effects to interact with)
		Wind Microclimate Wind conditions at ground level amenity spaces	Negligible – Minor Adverse (Local)	Significant	NO (No effects to interact with)
	Off-site Pedestrian Users and Occupants	Wind Microclimate Wind conditions at Black Eagle Drive play area	Minor Beneficial (Local)	Not Significant	NO (No effects to interact with)

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
Existing Residential and Industrial Receptors		Wind Microclimate Wind conditions at Swanscombe Marshes	Major Beneficial (Local)	Not Significant	NO (No effects to interact with)
	36/37 Railway Street	Air Quality Road traffic emissions (NO ₂)	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions for existing residential receptors in relation to road traffic emissions and noise from road traffic and pedestrians attending football matches)
		Noise Football pedestrian noise emissions	Minor Adverse (Local)	Not Significant	
		Noise Road traffic noise	Minor Adverse (Local)	Not Significant	
	10-11 Galley Hill Rd	Air Quality⁴ Road traffic emissions (NO ₂)	Moderate Adverse (Local)	Not Significant ⁵	YES (Potential for effect interactions for existing residential receptors in relation to alterations in daylight and road traffic emissions)
		Daylight Alterations in daylight	Negligible to Minor Adverse (Local)	Not Significant	
	Wallis Park Railway Street (remaining properties) Tower Wharf	Noise Road traffic noise	Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
	Black Eagle Drive Wallis Park Taunton Road (remaining properties) Robinson Way Railway Street (remaining properties)	Noise Football pedestrian noise emissions	Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
	Taunton Road 15-19	Daylight Alterations in daylight	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions for existing residential receptors in relation to alterations in daylight and noise from pedestrians attending football matches)
		Noise Football pedestrian noise emissions	Minor Adverse (Local)	Not Significant	
	Phoenix Court 104-151	Daylight Alterations in daylight	Minor Adverse – Moderate Adverse (Local)	Significant	YES (Potential for effect interactions)

⁴ Note, the receptor in the air quality assessment (as presented in **ES Volume 1, Chapter 8: Air Quality**) at this location was 10 Galley Hill Road, however given that the daylight assessment combined properties 10 and 11 Galley Hill Road, it is considered appropriate to assume that the air quality effects would be the same at 11 Galley Hill Road as a worst-case, and therefore consider potential effect interactions with regards to air quality and daylight at both 10 and 11 Galley Hill Road.

⁵ As noted in **ES Volume 1, Chapter 8: Air Quality**, the overall significance of the air quality effects is determined using professional judgement, giving consideration to various factors including the magnitude of the predicted impacts and the presence of any objective exceedances. Full details of the EPUK/IAQM approach are provided in **ES Volume 3, Appendix: Air Quality – Annex 3**. Taking into account the conservative assumptions made as part of the air quality assessment, and that predicted concentrations remain well below the objective, it is judged that the effect of operational road traffic generated emissions will be ‘not significant’.

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
		Light Intrusion Light pollution to sensitive receptors	Negligible to Minor Adverse (Local)	Not Significant	for existing residential receptors in relation to alterations in daylight and light intrusion)
	Galley Hill Road 12-13 Taunton Road 20-38 Railway Street 44 to 50	Daylight Alterations in daylight	Negligible to Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
Road and Rail Users	Road viewpoints 1 and 2 Rail viewpoints A and B	Solar Glare Solar glare to road and rail viewpoints	Negligible to Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
Introduced Residents	Future residential uses internal to the site	Light Intrusion Light pollution to sensitive receptors	Negligible to Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
Existing Waterbodies	Robin's Creek	Overshadowing Overshadowing of water bodies	Minor Adverse (Local)	Not Significant	NO (No effects to interact with)
	River Thames / Priority Habitats (Mudflats)	Overshadowing Overshadowing of water bodies	Minor Adverse (Local)	Not Significant	NO (No effects to interact with – both effects relate to an overshadowing effect upon the same receptor)
		Ecology and Biodiversity Overshadowing of habitats	Minor Adverse (Local)	Not Significant	
Designated Site / Public Realm	Swanscombe Peninsula Site of Special Scientific Interest (SSSI)	Overshadowing Overshadowing of public realm	Minor Adverse (Local)	Not Significant	NO (No effects to interact with – both effects relate to an overshadowing effect upon the same receptor)
		Ecology and Biodiversity Overshadowing of habitats	Minor Adverse (Local)	Not Significant	
Pedestrian, Cyclist, Public Transport Network and Local Highway Network	Link 10 (A226 - London Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Accidents and Safety	Minor Adverse (Local)	Not Significant	
	Link 12 (High Street)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Accidents and Safety	Minor Adverse (Local)	Not Significant	

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
	Link 13 (A226 - Galley Hill Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
		Effects on Accidents and Safety	Minor Adverse (Local)	Not Significant	
	Link 15 (A226 - Stonebridge Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
	Link 17 (B2175 - Stonebridge Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
	Link 18 (A226)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
	Link 19 (Link Road)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
	Link 20 (Thames Way - A226)	Effects on Severance	Minor Adverse (Local)	Not Significant	YES (Potential for effect interactions on the pedestrian, cyclist, public transport and local highway network)
		Effects on Driver Delay	Minor Adverse (Local)	Not Significant	
Views (Visual Amenity)	Views 10 and 12	Visual Impact Assessment:	Minor Neutral (Regional)	Not Significant	NO (No effects to interact with)

Sensitive Receptor Group		Technical Topic Area & Residual Effects	Scale of Residual Effect	Significant Effects	Potential for Effect Interactions
	Views 2 and 16	Effect of completed Proposed Development on views.	Minor to Moderate Neutral (Regional)	Not Significant	NO (No effects to interact with)
	View 7		Minor Beneficial (Regional)	Not Significant	NO (No effects to interact with)
	Views 1, 3, 4, 6, 8 and 13		Minor to Moderate Beneficial (Regional)	Not Significant	NO (No effects to interact with)
	Views 14 and 15		Moderate Beneficial (Regional)	Significant	NO (No effects to interact with)
Townscape Receptors (Townscape Character Areas)	TCA4: Green Space	Townscape Changes to the townscape characteristics due to the completed Proposed Development	Minor Beneficial (Local)	Not Significant	NO (No effects to interact with)
	TCA2: Traditional town centre TCA3: 20th century housing TCA6: River Thames		Minor to Moderate Beneficial (Local)	Not Significant	NO (No effects to interact with)
	TCA1: Mixed-use/commercial estate TCA5: Industrial		Moderate Beneficial (Local)	Significant	NO (No effects to interact with)

16.28 Table 16.2 shows that there is the potential for effect interactions to take place once the Proposed Development is completed and operational. Potential effect interactions have been identified in respect of:

Air Quality and Noise in relation to Existing Residential Receptors

- 16.29 The NO₂ road traffic emissions (an adverse effect), noise resulting from pedestrians attending football matches on-site (an adverse effect) and noise arising from traffic emissions (an adverse effect) once the Proposed Development is complete and operational have the potential to have an in-combination effect on existing residential receptors at 36/37 Railways Street (minor adverse for air quality, and minor adverse for noise).
- 16.30 The effect interactions at 36/37 Railways Street are deemed not significant. It is considered that the pedestrian noise effects (which assume a capacity crowd as a conservative assumption) will be appropriately managed, for example via the implementation of additional crowd management measures, as required. It is considered that this short-term, temporary effect (i.e. limited to when pedestrians are entering or exiting the site for football matches) will not interact with the 'increase in NO₂ concentrations at the receptor (note, there are no new exceedances of the air quality objectives). The air quality traffic emissions assessment is also based on a worst-case scenario, which assumes the Proposed Development and all relevant cumulative schemes are fully operational by 2026 (therefore overestimating traffic emissions and the predicted 2026 concentrations). Therefore, it is not considered likely these effects will combine to generate a significant effect.

Daylight and Noise in relation to Existing Residential Receptors

- 16.31 The alterations to the existing levels of noise as a result of pedestrians attending football matches on-site (an adverse effect) and alterations to daylight levels (an adverse effect) once the Proposed Development is complete and operational have the potential to have an in-combination effect on existing residential receptors at 15-19 Taunton Road (minor adverse for noise, and minor adverse for daylight).
- 16.32 The effect interactions at 15-19 Taunton Road are deemed not significant. As noted above, the assessment of football pedestrian noise emissions made conservative assumptions in order to enable a reasonable worst

case assessment. It is considered that the crowds would be appropriately managed on game-days, for the relatively short periods of time where fans are entering/exiting the grounds. With regards to the assessment of potential daylight effects, the assessment is based on the maximum massing parameters of the Proposed Development in order to represent a worst-case for assessment. Owing to the low-rise nature of the existing site conditions, alterations of this magnitude with regards to the Proposed Development are to be expected. Throughout the design process, maximising the availability of daylight to existing residential receptors has been taken into account where possible (as discussed in **ES Volume 1, Chapter 3: Alternatives and Design Evolution**) and will continue to be an important consideration at RMA stage. Therefore, it is not considered likely these effects will combine to generate a significant effect.

Air Quality and Daylight in relation to Existing Residential Receptors

- 16.33 The NO₂ road traffic emissions (an adverse effect), and alterations to daylight levels (an adverse effect) once the Proposed Development is complete and operational have the potential to have an in-combination effect on existing residential receptors at 10-11 Galley Hill Road (moderate adverse for air quality, and negligible to minor adverse for daylight).
- 16.34 The effect interactions at 10-11 Galley Hill Road are deemed not significant. As noted in paragraph 16.32, with regards to the assessment of potential daylight effects, the assessment is based on the maximum massing parameters of the Proposed Development in order to represent a worst-case for assessment. Owing to the low-rise nature of the existing site conditions, alterations of this magnitude with regards to the Proposed Development are to be expected. The availability of daylight to existing residential receptors will continue to be an important consideration at RMA stage. It is considered that this effect will not interact with the increase in NO₂ concentrations at the receptor (note, there are no new exceedances of the air quality objectives). The air quality traffic emissions assessment is also based on a worst-case scenario, which assumes the Proposed Development and all relevant cumulative schemes are fully operational by 2026 (therefore overestimating traffic emissions and the predicted 2026 concentrations). Therefore, it is not considered likely these effects will combine to generate a significant effect.

Daylight and Noise in relation to Existing Residential Receptors

- 16.35 The alterations to the existing levels of noise as a result of pedestrians attending football matches on-site (an adverse effect) and alterations to daylight levels (an adverse effect) once the Proposed Development is complete and operational have the potential to have an in-combination effect on existing residential receptors at 15-19 Taunton Road (minor adverse for noise, and minor adverse for daylight).
- 16.36 The effect interactions at 15-19 Taunton Road are deemed not significant. It is considered that the pedestrian noise effects (which assume a capacity crowd as a conservative assumption) will be appropriately managed, for example via the implementation of additional crowd management measures, as required. It is considered that this short-term, temporary effect (i.e. limited to when pedestrians are entering or exiting the site for football matches) will not interact with the change in daylight levels at this receptor. Owing to the low-rise nature of the existing site conditions, alterations of this magnitude with regards to daylight are to be expected. The availability of daylight to existing residential receptors will continue to be an important consideration at RMA stage.

Daylight and Light Intrusion in relation to Existing Residential Receptors

- 16.37 Light pollution (an adverse effect) and alterations to daylight levels (an adverse effect) once the Proposed Development is complete and operational have the potential to have an in-combination effect on existing residential receptors at Phoenix Court 104-151 (minor adverse to moderate adverse for daylight, and negligible to minor adverse for light intrusion).
- 16.38 The effect interactions at Phoenix Court 104-151 are deemed **significant** as at least one of the effects (alterations in daylight) is significant in isolation. With regards to the assessment of potential daylight effects, the assessment is based on the maximum massing parameters of the Proposed Development in order to represent a worst-case for assessment. Owing to the low-rise nature of the existing site conditions, alterations of this magnitude with regards to the Proposed Development are to be expected. The availability of daylight to existing residential receptors will continue to be an important consideration at RMA stage.
- 16.39 With regards to light intrusion, until further information on an emerging detailed scheme is available, the practicality of the measures is not yet known, and so residual light intrusion effects are based on a worst-case qualitative assessment. In order to minimise any potential light intrusion effects from the commercial office

elements upon residential receptors, potential for light intrusion will be considered throughout the detailed design process and potential effects will be mitigated through the below measures to ensure that effects are reduced:

- Ensuring that any external lighting, such as the stadium, does not directly illuminate the sky;
- Ensuring that any external lighting visible from any sensitive receptor is of low intensity;
- Avoiding external lighting which directly illuminates the SSSI and the Riverfront docks in particular;
- Provision of blinds for commercial offices;
- Lighting strategies that reduce the output of luminaires closer to the façades; and
- Light fittings controlled through the use of sensors which switch on and off the light according to office occupancy.

16.40 The details of any mitigation and its efficacy will be guided by ILP Guidance notes (2021) and presented and reported upon where relevant at reserved matters stage.

Traffic and Transport related effects upon the Pedestrian, Cyclist, Public Transport and Local Highway Network

16.41 The alterations to traffic flows and subsequent effects upon Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity and Accidents and Safety (adverse effects) during the operation of the Proposed Development activities have the potential to have an in-combination effect at a number of road links (links 10, 12, 13, 15, 17, 18, 19 and 20).

16.42 The effects at links 10, 12, 13, 15, 17, 18, 19 and 20 are deemed not significant. A site-wide Travel Plan (TP) and a Delivery and Servicing Plan (DSP) will be implemented as part of the Proposed Development. The TP will ensure that travel to and from the site, as well as across it, is made as sustainable as possible through continued communication with site residents and visitors on the most accessible and practical modes to use. This will list alongside the mobility hub in mitigating the long-term effects of increases in traffic associated with the site operations.

16.43 The DSP will enable a proactive approach to be taken to site deliveries and servicing with a top-down approach taken when developing scrive yards and delivery areas across the site. Freight consolidation is one such mitigation strategy which will minimise the impacts of site operations on the traffic and transport networks surrounding the site.

16.44 Both the TP and DSP will be secured via an appropriate planning condition with framework details of the TP and DSP included within **ES Volume 3, Appendix: Traffic and Transport– Annex 1**.

16.45 In light of the above measures, based upon professional judgement it is considered that the potential for significant adverse effect interactions upon the pedestrian, cyclist, public transport and local highway network will be avoided given the implementation of operational measures such as the TP and DSP.