

Chapter 15: Effect Interactions

INTRODUCTION

- 15.1 This chapter of the Environmental Statement (ES) summarises the likelihood for in-combination 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. Note that effects arising from the Proposed Development in combination with other developments or 'cumulative schemes' have been discussed separately throughout this ES (in **Volume 1, Chapters 6-14** and **ES Volume 2, Townscape, Visual Impact and Heritage Assessment**), as appropriate, and have not been re-iterated within this ES chapter to avoid repetition.
- 15.2 There is no established EIA methodology for assessing the nature and scale of effect interactions on a receptor. However, the European Commission (EC)¹ has produced guidelines 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 6-14, Volume 2, Townscape, Visual Impact and Heritage Assessment**) 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 17: Mitigation and Monitoring Schedule**); the mitigation measures have been assumed to be secured / implemented through the discharge of relevant planning conditions and Section 106 Obligations.
- 15.3 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, adverse or neutral in nature and that are minor, moderate or major in scale have been considered. Residual effects that are negligible in scale have been omitted, as these effects are, by definition, unnoticeable and insignificant. It is not considered that there would be a scenario where multiple negligible effects could lead to significant effect interactions. Based on the definitions of what negligible effects comprise for each of the technical assessments, these do not warrant further consideration therefore have not been pulled through into the assessment of effect interactions within this ES chapter. Only residual effects described as minor and above will therefore be considered in the assessment of effect interactions.
- 15.4 The effects highlighted in **green** within the tables presented in this chapter reflect beneficial effects, those in **blue**, neutral effects and those in **orange**, adverse effects.
- 15.5 The potential for in-combination effects is identified, and professional judgement is 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.
- 15.6 The scale of an effect interaction is not assigned as part of this assessment; however, whether the effect interaction is considered to be significant or not is identified. For example, when one or more residual significant effects from different EIA topics (i.e. air quality, noise and vibration, highways and transport or visual) coincide on a receptor or receptor group, the effect interaction has been identified² as significant. If none of the individual effects are significant, consideration will be given as to whether or not the combination of many not significant effects could result in a combined significant effect, based on professional opinion.
- 15.7 The majority of technical chapters have assessed several scenarios for the demolition and construction works, and once the Proposed Development is complete and operational, in order to assess the worst-case scenario. This chapter is based on the residual effects of each technical chapter of this ES (**ES Volume 1, Chapters 6-14**) from the scenario that tested both the detailed and outline proposals. The effects presented in this ES chapter are representative of a realistic worst case, as assessed throughout the ES, of the residual effects associated with the outline and detailed proposals in combination.
- 15.8 In-combination effects or effect interactions arising from the demolition and construction works, and the completed and operational Proposed Development are discussed below. As such, the remainder of this chapter has been divided into two parts:
 - Table 15.1 addresses the potential for in-combination effects and effect interactions to relevant receptors / receptor groups arising from the demolition and construction works; and

- Table 15.2 addresses the potential for in-combination effects and effect interactions to relevant receptors/ receptor groups arising from the completed and operational Proposed Development.

DEMOLITION AND CONSTRUCTION

- 15.9 **Table 15.1** presents the in-combination effects assessment and identifies the potential for effect interactions throughout the demolition and construction works. Where the potential for an effect interaction is identified, this is discussed in more detail below the table.

Table 15.1 Demolition and Construction

Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions
Loss of existing, on-site residential	Socio-Economics: Displacement of existing, on-Site residential as a result of demolition and construction activity.	Minor Adverse	Not Significant	NO No other residual effects to interact with.
Local economy	Socio-Economics: Temporary employment opportunities at the regional level as a result of demolition and construction activity.	Minor Beneficial	Not Significant	NO No other residual effects to interact with.
Pedestrians and cyclists	Traffic and Transport: Adverse effect on pedestrian and cyclist severance due to construction activities and construction traffic	Minor Adverse	Not Significant	NO No other residual effects to interact with.
Road users (vehicle passengers)	Traffic and Transport: Increased vehicle severance as a result of construction traffic	Minor Adverse	Not Significant	NO No other residual effects to interact with.
Existing and Introduced Residential Receptors	Noise and Vibration: Demolition and construction noise and vibration on residential receptors immediately adjacent to activities (short term)	Negligible to Major Adverse	Significant	YES Potential for in-combination effects in relation to: Noise and vibration (short and long term) With Flood risk to local residents and new site occupants On Residential Receptors
	Noise and Vibration: Demolition and construction noise and vibration on residential receptors immediately adjacent to activities (medium term)	Minor Adverse	Not Significant	
	Water Resources, Flood Risk and Drainage Temporary flood risk on local residents of the surrounding area	Minor Adverse	Not Significant	
	Water Resources, Flood Risk and Drainage Temporary flood risk on new site occupants of the surrounding area	Minor Adverse	Not Significant	
Listed Buildings Not in a Conservation Area	Built Heritage: Bromley Hall Road: former Bromley Hall School (GII)	Minor Adverse	Not Significant	NO No other residual effects to interact with.
Construction workers	Water Resources, Flood Risk and Drainage Flood risk on construction workers	Minor Adverse	Not Significant	NO No other residual effects to interact with.
Thames Water Drainage Network	Flood Risk: Drainage quantity and quality on the drainage network capacity	Negligible/Minor Adverse	Not Significant	NO No other residual effects to interact with.

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

² The methodology for determining a significant in-combination effect has been defined by the HS2 Phase 2a: West Midlands – Crewe Scoping and Methodology Report (July 2017) and the published HS2 Phase 2a Environmental Statement Volume 1 Introduction and Methodology and

Volume 2 Community Area Reports (July 2017). The methodology for assigning significance to in combination effects has been specifically included in this ES to assess if there are any combination effects would result in a significant effect.

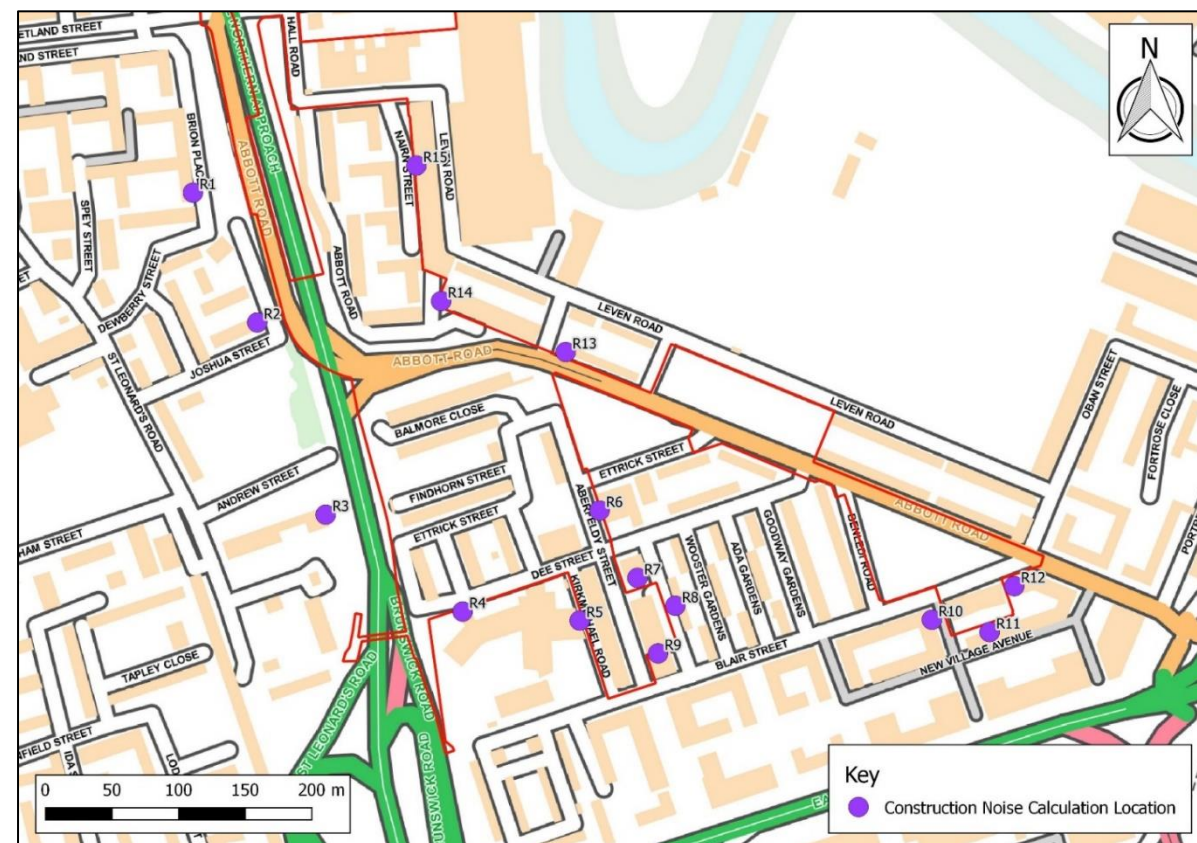
Climate Systems	Climate Change Adverse effects to climate systems as a result of construction emissions	Minor Adverse	Significant	NO No other residual effects to interact with.
Groundwater	Water Resources, Flood Risk and Drainage Adverse effects to the quality of groundwater	Negligible/Minor Adverse	Not Significant	NO No other residual effects to interact with.

Residential Receptors

15.10 Potential in combination effects and effect interactions as a result of noise and vibration effects to local residents immediately adjacent to construction activities with new site occupants in terms of flood risk are not anticipated to interact. These residual effects would occur at different periods of the construction programme to various residential receptors both surrounding the Site as well as new site occupants. Residual flood risk effects refer to a potential temporary increase in flood risk to local and new site occupancies whereas noise and vibration effects are to be experienced by residential receptors during the majority of the construction phase (when considering a worst-case scenario). As such, there is no potential effect interaction between noise and vibration and flood risk residual effects.

15.11 However, there is a potential for an in-combination effect and effect interaction in relation to noise and vibration effects to residential receptors during demolition and construction works. Throughout the construction phase, when considering a worst-case scenario, receptors immediately adjacent to construction activities will exceed the significant observed adverse effect level threshold for noise, as well as vibration. Residential receptors which are expected to experience significant effects as a result of construction noise include receptors at locations R3 – R15 (see **Figure 15.1** below) during all demolition and construction activities, with the exception of R13 (which would experience a minor adverse effect during sub structure construction activities and roadwork activities and moderate adverse effects during all other activities). All other receptors would experience negligible to minor adverse effects throughout the entire demolition and construction phase. Receptors R5 – R12 and R14 and R15 would also experience between moderate and major adverse effects as a result of construction vibration. These effects would be expected throughout the majority duration of the construction programme. This in-combination effect and effect interaction is considered **significant** as receptors would experience significant adverse noise as well as significant adverse vibration effects.

Figure 15.1 Existing Residential Receptors (Noise Construction Assessment)



15.12 However, it is recognised that these effects are based on a worst case scenario in which construction activities occur simultaneously and assumed to be conducted at the closest distance to residential receptors. In reality, this would be unlikely (of short term only) and when taking into consideration the separation distance between these activities and residential receptors, the relocation of noisy activities as the construction programme progresses away from the site boundary as well as the adoption of recommended best practicable means (see **ES Volume 1, Chapter 9: Noise and Vibration** and **ES Volume 1, Chapter 17: Mitigation and Monitoring Schedule**) construction noise levels can typically be reduced by 10 dB(A) and individual effects to residential receptors would be expected to reduce to negligible.

15.13 Notwithstanding this, procedures will be implemented to control the potential impact of noise and vibration for residential receptors in which consideration will be given to the use of quieter techniques or targeted and specific noise mitigation measures (such as reduced duration of operation, enclosure of equipment etc.) to ensure continued compliance with the criterion limit.

15.14 Whilst the noise and vibration effects have the potential to interact, the interaction of these effects is not unusual for construction works and would be managed as far as reasonably possible through measures such as the Construction Environmental Management Plan (CEMP). It is not uncommon for construction works to be undertaken near sensitive uses and the potential for temporary or short-term adverse effects on local residences and residential amenity is expected. This is an inevitable consequence of living within an urban environment, particularly within an area undergoing rapid regeneration in accordance with a local development plan.

COMPLETED DEVELOPMENT

15.15 **Table 15.2** presents the in-combination effects and effect interactions to relevant receptors / receptor groups arising from the completed and operational Proposed Development. Where the potential for an in-combination effect and an effect interaction is identified, this is discussed in more detail below.

Table 15.2 Completed Proposed Development

Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions
Housing targets	Socio-Economics: The delivery of new homes to support housing need at the LIA and LBTH levels as set out within the New London Plan.	Moderate to Major Beneficial	Significant	NO No other residual effects to interact with.
Population and labour market	Socio-Economics: Population, and labour market growth enabled as a result of the new homes delivered as part of the Proposed Development.	Minor Beneficial	Not Significant	NO No other residual effects to interact with.
On-site employment	Socio-Economics: On-site employment supported by the non-residential uses delivered as part of the Proposed Development.	Minor Beneficial	Not Significant	NO No other residual effects to interact with.
Local economy (local expenditure)	Socio-Economics: Increased expenditure on convenience and comparison goods and services by the families living within the new dwellings delivered as part of the Proposed Development.	Minor Beneficial	Not Significant	NO No other residual effects to interact with.
Play space	Socio-Economics: Increased requirement for play space for children under the age of 18 living within the new homes in the Proposed Development.	Minor Beneficial	Not Significant	NO No other residual effects to interact with.
Community centres	Socio-Economics:	Minor Beneficial	Not Significant	NO

Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions
	Increased requirement for community centres.			No other residual effects to interact with.
Deprivation	Socio-Economics: Improvements to the public realm, increased labour market participation, and the delivery of new affordable units.	Moderate Beneficial	Significant	NO No other residual effects to interact with.
Crime and social cohesion	Socio-Economics: Overall reduction in crime and improved feeling of social cohesion.	Minor Beneficial	Not Significant	NO No other residual effects to interact with.
Pedestrians and cyclists	Traffic and Transport Beneficial effect on pedestrian and cyclist severance due to the improved landscaping added priority crossing facilities provided for pedestrians.	Major Beneficial	Significant	YES Potential for in-combination effects in relation to:
	Traffic and Transport Beneficial effect on pedestrian and cyclist delay as a result of reduction in traffic flows	Minor Beneficial	Not Significant	Pedestrian and cyclist severance With
	Traffic and Transport Beneficial effect on pedestrian and cyclist amenity, fear and intimidation due to provision of a high-quality public realm	Major Beneficial	Significant	Pedestrian and cyclist delay With
	Traffic and Transport Beneficial effect on pedestrians and cyclists in terms of traffic safety (accidents and safety) as a result of traffic calming measures	Moderate Beneficial	Significant	pedestrian and cyclist amenity, fear and intimidation With
	Wind Microclimate Wind conditions at pedestrian crossings (windiest season)	Moderate Beneficial	Not Significant	Pedestrians and cyclists traffic safety With
	Wind Microclimate Strong winds within or around the Proposed Development including roads and car parks (Outline Proposals only)	Adverse*	Significant	Wind conditions at pedestrian crossings With
				Strong Winds On
Public transport users (bus passengers)	Traffic and Transport Beneficial effects to the bus passenger severance due to additional bus trips and bus network infrastructure generated by the Proposed Development	Moderate Beneficial	Significant	YES Potential for in-combination effects in relation to:

Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions
	Traffic and Transport Adverse effects to bus passenger delay.	Negligible - Minor Adverse	Not Significant	Bus passenger severance With
	Wind Microclimate Wind conditions at bus stops (existing and proposed)	Minor Adverse to	Significant	Bus passenger delay With
		Minor Beneficial		Wind conditions at existing and proposed bus stops On
Road users (vehicle passengers)	Traffic and Transport Adverse and beneficial effects to the vehicle passenger severance due to the new highway improvement works.	Minor Adverse to	Not Significant	YES Potential for in-combination effects in relation to:
	Traffic and Transport Adverse effects to vehicle passenger delay.	Negligible - Minor Adverse	Not Significant	Vehicle severance With
	Solar Glare Instances of solar glare at Viewpoint 5	Minor Adverse	Not Significant	Vehicle passenger delay With
	Solar Glare Instances of solar glare at Viewpoint 8	Minor Adverse	Not Significant	Instances of solar glare With
	Solar Glare Instances of solar glare at Viewpoint 9	Minor Adverse	Not Significant	Instances of solar glare On
	Solar Glare Instances of solar glare at Viewpoint 12	Minor Adverse	Not Significant	Road users (vehicle passengers) On
		Visual Impact Improvements and enhancements to: <ul style="list-style-type: none"> View 2 Junction of Robin Hood Lane and Poplar High Street, View 4 Portree Street, junction with Abbott Road; View 11 A12, junction with Teviot Street View 16 Pedestrian path from A102 / St Leonards Road View 22 Bartlett Park. 	Minor to Moderate Beneficial	Not Significant
Views	Visual Impact Improvements and enhancements to: <ul style="list-style-type: none"> View 1 South of East India Dock Road; 	Moderate Beneficial	Significant	NO No other residual effects to interact with

Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions
	<ul style="list-style-type: none"> View 5 LBTH borough designated view 6: View from East India Dock Road to Balfron Tower & Canary Wharf in the background, View 6 A12, junction with Zetland Street; View 7 Riverside footpath north of River Lea / Bow Creek, View 12 Uamvar Street; View 13 LBTH borough designated view 5: View from Langdon Park to Balfron Tower & Canary Wharf in the background; View 15 St Leonards Road Principally experienced by a mix of local residents and workers; View 30 A12, junction with East India Dock Road, looking north; View 31 Dee Street / Abbott Road. 			
	Visual Impact Improvements and enhancements to: <ul style="list-style-type: none"> View 3 Abbott Road / Ettrick Street View 8 Bow Creek / River Lea Bridge View 14 Jolly's Green; View 32 Dee Street, midway 	Moderate to Major Beneficial	Significant	NO No other residual effects to interact with
	Visual Impact Impact to view: <ul style="list-style-type: none"> View 10 Star Lane Park View 17 All Saints Churchyard, inside west entrance gates View 18 Poplar High Street, bridge over railway tracks View 19 Poplar Recreation Ground View 21 Cordelia Street View 24 Greenwich Park: the General Wolfe statue – at the orientation board View 29. Chrisp Street, looking along Willis Street View 34 Memorial Recreation Ground 	(Negligible to) Minor Neutral	Not Significant	NO No other residual effects to interact with
	Visual Impact Impact to the view: <ul style="list-style-type: none"> View 23 Twelvetees Crescent, bridge over River Lea and Bow Creek View 28 South side of Bow Creek 	Minor to Moderate Neutral	Not Significant	NO No other residual effects to interact with

Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions	
Townscape Character Areas	Townscape: TCA 1: Poplar	Moderate to Major Beneficial	Significant	NO No other residual effects to interact with	
	Townscape: TCA 2: Poplar Riverside	Moderate Significant	Significant		
	Townscape: TCA 4: East of the River Lea	Minor to Moderate Beneficial	Not Significant		
	Townscape: TCA 5: Limehouse Cut	Minor to Moderate Neutral	Not Significant		
Existing and Introduced Residential Receptors	Onsite Introduced Residential Receptors	Wind Microclimate Wind conditions at thoroughfares (on site) – windiest season	Minor Adverse to Moderate Beneficial	Significant	YES Potential for in-combination effects in relation to: Wind conditions at thoroughfares, entrances, ground level amenity (mixed use and on-site seating), roof terraces With Reduced flood risk for new site occupants With Overheating effects On Onsite Introduced Residential Receptors
		Wind Microclimate Wind conditions at entrances (on site – windiest season)	Moderate Adverse to Minor Beneficial	Significant	
		Wind Microclimate Wind conditions at ground level amenity (on site mixed used) – summer season	Negligible to Minor Adverse	Significant	
		Wind Microclimate Wind conditions at ground level amenity (on site seating) – summer season	Negligible to Moderate Adverse	Significant	
		Wind Microclimate Wind conditions at roof terrace amenity – summer season	Negligible to Minor Adverse	Significant	
		Water Resources, Flood Risk and Drainage Beneficial effects of reduced flood risk on new site occupants	Moderate Beneficial	Not Significant	
	Climate Change Adverse overheating effect to future users / occupants by the 2030s, 2060s and 2090s	Minor Adverse	Significant		
	Offsite Residential Receptors	Water Resources, Flood Risk and Drainage Beneficial effects of reduced flood risk on local residents of the surrounding area	Moderate Beneficial	Not Significant	
		Daylight: Daylight availability: <ul style="list-style-type: none"> 128-132 Leven Road Mills Grove 1-9 Mills Grove 12-20 Mills Grove 17-25 Mills Grove 9-15 St Leonards Road 118-132 St Leonards Road 134-146 Wooster Gardens 1-7 	Negligible to Minor Adverse	Not Significant	

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Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions
	<ul style="list-style-type: none"> Wooster Gardens 9-15 Balfroon Tower Joshua Street 6-14 Joshua Street 17-33 St Leonards Road 148-154 			Reduced sunlight levels
	Daylight: Daylight availability: <ul style="list-style-type: none"> Ailsa Wharf Block D Carradale House Dewberry Street 16-46 Devons Wharf Joshua Street 1-15 Joshua Street 35-41 Aberfeldy Estate Phase Three Block G 	Minor Adverse	Not Significant	With Overshadowing
	Daylight: Daylight Availability: <ul style="list-style-type: none"> 177-195 Abbott Road Aberfeldy Estate Phase One Block C Aberfeldy Estate Phase Three Block J Aberfeldy Estate Phase Two Block D 	Minor to Moderate Adverse	Significant	With Changes in road traffic
	Daylight: Daylight availability: <ul style="list-style-type: none"> 110-126 Leven Road 	Moderate Adverse	Significant	On Existing Residential Receptors
	Daylight: Daylight availability: <ul style="list-style-type: none"> 199-225 Abbott Road Lansbury Gardens 2-12 Loren Apartments Sherman House 	Moderate to Major Adverse	Significant	
	Daylight: Daylight availability: <ul style="list-style-type: none"> Atelier Court Leven Road Phase Three 	Major Adverse	Significant	
	Sunlight: Sunlight availability: <ul style="list-style-type: none"> 128-132 Leven Road 177-195 Abbott Road Ailsa Wharf Block A Ailsa Wharf Blocks K L Joshua Street 35-41 	Negligible to Minor Adverse	Not Significant	
	Sunlight: Sunlight availability: <ul style="list-style-type: none"> Ailsa Wharf Block D 110-126 Leven Road Devon's Wharf Mills Grove 2-10 	Minor Adverse	Not Significant	

Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions
	Sunlight: Sunlight availability: <ul style="list-style-type: none"> Aberfeldy Estate Phase One Block C 	Minor to Moderate Adverse	Significant	
	Sunlight: Sunlight availability: <ul style="list-style-type: none"> Lansbury Gardens 2-12 Sherman House 	Moderate Adverse	Significant	
	Sunlight: Sunlight availability: <ul style="list-style-type: none"> Leven Road Phase Three Loren Apartments 199-225 Abbott Road 	Moderate to Major Adverse	Significant	
	Sunlight: Sunlight availability: <ul style="list-style-type: none"> Atelier Court 	Major Adverse	Significant	
	Overshadowing: Rear garden at 9 Wooster Garden	Minor Adverse	Not Significant	
	Overshadowing: Private terraces at 3 and 4 Dee Street	Major Adverse	Significant	
	Overshadowing: Rear gardens of the properties at 197, 201, 205, 209, 213, 217, 221 and 225 Abbott Road	Minor Adverse	Not Significant	
	Residential Dwellings on Abbot Road Noise and Vibration Changes in road traffic flows	Major Beneficial	Significant	
Climate Systems	Climate Change Adverse effects to climate systems as a result of operational energy emissions.	Moderate Adverse	Significant	NO No other residual effects to interact with
	Climate Change Beneficial effects to climate systems as a result of improvements from transport emissions	Minor Beneficial	Significant	NO No other residual effects to interact with
Existing Educational Properties	Daylight: Daylight Availability: <ul style="list-style-type: none"> Bromley Hall 	Negligible to Minor Adverse	Not Significant	YES Potential for in-combination effects in relation to:
	Daylight: Daylight Availability: <ul style="list-style-type: none"> Culloden Primary School 	Minor to Moderate Adverse	Significant	Reduced daylight levels With
	Sunlight: Sunlight Availability: <ul style="list-style-type: none"> Bromley Hall 	Minor Adverse	Not Significant	Reduced sunlight levels With

Sensitive Receptor Group	Technical Topic Area & Residual Effects	Scale and Nature of Residual Effect	Significant Effect	Potential for In-Combination Effects / Effect Interactions
	Overshadowing: 6 out of 14 open spaces at Bromley Hall School	Minor to Moderate Adverse	Significant	Overshadowing On Existing Educational Properties
Existing Religious Properties	Daylight: Daylight Availability: – St Nicholas Church	Minor to Moderate Adverse	Significant	YES Potential for in-combination effects in relation to: Reduced daylight
	Sunlight: Sunlight Availability: – St Nicholas Church	Minor to Moderate Adverse	Significant	With Reduced sunlight On St Nicholas Church
Thames Water Drainage Network	Water Resources, Flood Risk and Drainage Improved drainage quality on the drainage network capacity	Minor Beneficial	Not Significant	NO No other residual effects to interact with.
Listed Buildings Not in a Conservation Area	Built Heritage Bromley Hall Road: former Bromley Hall School (GII)	Minor Beneficial	Not Significant	NO No other residual effects to interact with.
* for 'strong winds' the residual effect is defined as being significant or not significant. The scale of effect criteria are not applicable to 'strong winds'.				

15.16 Table 15.2 has identified the potential in-combination effect and effect interactions once the Proposed Development is completed and operational to the following sensitive receptors groups:

- Pedestrians and cyclists;
- Public transport users (bus passengers);
- Road users (vehicles passengers);
- Onsite introduced residential receptors;
- Existing residential receptors;
- Existing Educations Receptors; and
- St Nicholas Church.

15.17 The potential for in-combination effects and effect interactions are considered in further detail below.

Pedestrians and Cyclists

15.18 The traffic and transport assessment (ES Volume 1, Chapter 7: Traffic and Transport) has considered the potential impacts on local transport links and their users, as a result of the Proposed Development. Minor beneficial (not significant) effects are anticipated to pedestrian and cyclist delay as a result of reductions in traffic flows when the Proposed Development is completed and operational. In addition to this, pedestrians and cyclists are expected to experience major beneficial (significant) effects to pedestrian and cyclist severance, amenity and reductions in fear and intimidation due to the improved landscaping and added priority crossing facilities provided for pedestrians. These effects are considered major beneficial (significant). Pedestrians and

cyclists are also anticipated to experience a moderate benefit (significant) effect in terms of traffic safety as a result of traffic calming measures.

15.19 The wind microclimate assessment (See ES Volume 1, Chapter 13: Wind Microclimate) determined that pedestrians crossings around the site (probe locations 237 and 238) would experience improved wind conditions (moderate beneficial) suitable for standing use during the windiest season which would not be considered significant. In addition to this, locations within or around the Proposed Development would experience strong winds which would exceed the safety threshold. This would be considered significant; however these significant residual effects are as a result of the Outline Proposals (Configuration 3). These exceedances would be addressed through further detailed design (informed by further wind assessment and incorporation of wind mitigation design measures, as appropriate) and the associated reserved matters applications.

15.20 The potential for in-combination effects relating to Traffic and Transport and Wind Microclimate has been identified as pedestrians and cyclists would experience a range of effects once completed and operational. The effect interaction is considered significant as severance, amenity, fear and intimidation and traffic safety effects are each considered significant individually. Pedestrians and cyclists would also experience changes to wind microclimate conditions around the site. As such, this potential effect interaction on pedestrians and cyclists between Traffic and Transport and Wind Microclimate effects is considered a **significant effect**.

Public Transport Users (Bus Passengers)

15.21 Public transport users (bus passengers) are anticipated to experience a moderate beneficial (significant) effect due to additional bus trips and bus network infrastructure as a result of the Proposed Development. However, bus passengers may also experience negligible - minor adverse (not significant) effects as a result of delay to particular services once the Proposed Development is operational. See ES Volume 1, Chapter 7: Traffic and Transport for further details.

15.22 Bus passengers may also experience minor adverse (significant) to minor beneficial (not significant) wind microclimate conditions at bus stops around the Site (See ES Volume 1, Chapter 13: Wind Microclimate). However, it should be noted as described above that these exceedances are as a result of the Outline Proposals. Where bus passengers would experience significant adverse wind effects, these would be expected to be addressed through further detailed design (informed by further wind assessment and incorporation of wind mitigation design measures, as appropriate) and the associated reserved matters applications.

15.23 The potential for in-combination effects relating to Traffic and Transport and Wind Microclimate has been identified as public transport users would experience both beneficial and adverse effects as a result of the Proposed Development. This effect interaction is considered **significant** as both passenger severance effects and wind microclimate effects are considered significant in isolation. However, it is reasonable to assume that the not all bus passengers that would be expected to interact with the Proposed Development would experience both passenger severance effects in combination with unsuitable / suitable wind conditions at the same time. These effects would vary depending on the time of day and year the bus services are being used.

Road Users (Vehicle Passengers)

15.24 Road users (vehicle passengers) are anticipated to experience minor adverse to minor beneficial (not significant) vehicle severance effects due to the new highway improvement works of the Proposed Development. However, in combination with this, these receptors may also experience adverse effects (negligible – minor adverse) to vehicle passenger delay. This will depend on road user journey routes and when journeys are undertaken by these receptors, as delay will be more likely during peak AM and PM travel times. Therefore, there is the potential for an in-combination effect and effect interaction between these two effects to road users. This effect interaction is considered **not significant**.

15.25 Solar glare effects (Refer to ES Volume 1, Chapter 14: Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare) are not considered to interact with the above-mentioned Traffic and Transport effects as they each will be limited to specific viewpoints surrounding the Site and specific times throughout the day and year. In addition to this, the individual solar glare effects, which are each considered to be minor adverse (not significant), would not interact with each other as they relate to different viewpoints surrounding the Site in which road users (vehicle passengers) are likely to only encounter individually. As such, it is considered that there would not be an in-combination or effect interaction between both vehicle passenger severance, vehicle passenger delay and instances of solar glare as defined by the Traffic and Transport and Solar Glare assessments.

On-site Introduced Residential Receptors

- 15.26** The Wind Microclimate assessment (see **ES Volume 1, Chapter 13: Wind Microclimate**) determined that on-site introduced residential receptors are likely to experience a range of wind microclimate conditions a various locations around the site. Wind conditions at thoroughfares, entrances, ground level amenity (mixed use and on-site seating) and roof terraces are anticipated to range from negligible to minor adverse (significant) to moderate beneficial (not significant). On-site introduced residential receptors may experience in-combination effects when moving around the Site, however effects are likely to be experienced across either the summer and windiest season at different locations and as such may not be experienced at the same time or by the same introduced residential receptors. Adverse Wind Microclimate effects, as reported within **ES Volume 1, Chapter 13: Wind Microclimate**, are as a result of the Outline Proposals and as such will be subject to further detailed design (informed by further wind assessment and incorporation of wind mitigation design measures, as appropriate) and the associated reserved matters applications. However, based on the Proposed Development there is the potential for an in-combination effect and effect interaction between these effects which would be considered **significant** as each of these effects are considered significant individually.
- 15.27** The Climate Change assessment and the Water Resources, Flood Risk and Drainage assessment have determined that on-site introduced residential receptors would experience both beneficial effects in terms of reduced flood risk, and adverse overheating effects by the 2030s, 2060s and the 2090s. It is not considered likely that these effects would interact with wind microclimate effects described above as these effects relate to comfort whereas flood risk and overheating effects relate to future climate reliance and adaptation to future conditions. Both the Water Resources, Flood Risk and Drainage assessment and the Climate Change assessment presented within **ES Volume 1, Chapter 9: Climate Change** and **ES Volume 1, Chapter 12 Water Resources, Drainage and Flood Risk** are based on future climate change projections which would be subject to ongoing climate change modelling and assumptions. In addition, reduced flood risk effects and potentially adverse overheating effects do not interact with one another as they relate to different components of the Proposed Development operation and as such would be addressed separately in the future as climate change projections are further investigated.

Existing Residential Receptors

- 15.28** Existing residential receptors are anticipated to experience both beneficial effects as a result of reduced flood risk as well as reduced availability (adverse effects) of daylight and sunlight as well as changes to overshadowing as a result of the Proposed Development. In addition to this, residential receptors along Abbott Road are expected to experience beneficial noise effects as a result of the reduction in traffic flows on the surrounding road network.
- 15.29** The Daylight, Sunlight and Overshadowing assessment (see **ES Volume 1, Chapter 14: Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare**) determined that existing residential receptors would experience adverse effects ranging from minor adverse (not significant) to major adverse (significant) to individual residential receptors. Some receptors would also experience reductions in sunlight availability which range from minor adverse (not significant) to major adverse (significant). As such, there is the potential for an in-combination effect and effect interaction to some existing residential receptors which would be considered **significant**. The following existing residential receptors are anticipated to experience an adverse daylight effect in combination with an adverse sunlight effect in which one or both effects are considered significant individually:
- Atelier Court;
 - 199-225 Abbott Road;
 - Loren Apartments;
 - Leven Road Phase Three;
 - Sherman House;
 - Lansbury Gardens 2-12;
 - Aberfeldy Estate Phase One Block C;
 - 110-126 Leven Road; and
 - 177-195 Abbott Road.
- 15.30** Overshadowing effects to existing residential receptors are not anticipated to interact with the daylight and sunlight effects defined above as these effects would be experienced by different individual residential

receptors. As such there is no additional in-combination effect or effect interaction between daylight, sunlight, and overshadowing effects as defined by **ES Volume 1, Chapter 14: Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare**.

- 15.31** Residential dwellings on Abbott Road are also expected to experience a major beneficial (significant) effect as a result of reduced road traffic noise when the Proposed Development is complete and operational. However, this effect is not considered to interact with overshadowing effects (minor adverse) to the rear gardens of properties at 197, 201, 205, 209, 213, 217, 221 and 225 Abbott Road as a reduction of road traffic noise would occur at different periods of the day to overshadowing effects to rear gardens. As such, there is not potential for an in-combination effect or effect interaction to these existing residential receptors.

Existing Educational Properties

- 15.32** The Daylight, Sunlight and Overshadowing assessment determined that Culloden Primary School and the former Bromley Hall School building would each experience adverse effects in regard to reduced levels of daylight and sunlight and changes to overshadowing levels. The former Bromley Hall School building is anticipated to experience a negligible to minor adverse (not significant) effects as a result of reduced daylight and sunlight levels. This in-combination effect and effect interaction is considered **not significant**.
- 15.33** Culloden Primary School is anticipated to experience moderate to major adverse effect (significant) as a result of construction noise and major adverse effect (significant) as a result of construction vibration. This existing education receptors
- 15.34** No other effects are anticipated to Culloden Primary School apart from the reduction in daylight availability which is considered minor to moderate adverse (significant) in isolation. Therefore, there are no in-combination effects or effect interactions to this existing education property. The former Bromley Hall School building is also only anticipated to experience changes to overshadowing levels to 6 out of 14 open space areas within the grounds of the property. As such, there are no in-combination effects or effect interactions to this property.

St Nicholas Church

- 15.35** St Nicholas Church is anticipated to experience a minor to moderate adverse (significant) effect as a result of reductions in daylight availability and a minor to moderate adverse (significant) effect as a result of a reduction in sunlight availability. As such, there is the potential for an in-combination effect and effect interaction to this existing religious receptor which would be considered **significant** as both effects are considered significant in isolation.

SUMMARY

- 15.36** The above assessment presented within this chapter has identified the following:

- Potential for **significant** in combination effects relating to Traffic and Transport and Wind Microclimate as pedestrians and cyclists would experience a range of beneficial effects once completed and operational. The effect interaction is considered significant as severance, amenity, fear and intimidation and traffic safety effects are each considered significant individually. Pedestrians and cyclists would also experience a change to wind microclimate conditions around the Site;
- Potential for **significant** in combination effects relating to Traffic and Transport and Wind Microclimate as public transport users would experience both beneficial and adverse effects as a result of the Proposed Development in regard to wind conditions in combination with improvements to passenger bus severance. However, it is reasonable to assume that the not all bus passengers that would be expected to interact with the Proposed Development would experience both passenger severance effects in combination with unsuitable / suitable wind conditions at the same time;
- Potential for **significant** in combination effects relating to Wind Microclimate conditions at thoroughfares, entrances, ground level amenity (mixed use and on-site seating) and roof terraces on onsite introduced residential receptors. These receptors may experience these effects when moving around the site, however effects are likely to be experienced across either the summer and windiest season at different locations and as such may not be experienced at the same time or by the same introduced residential receptors;
- Potential for **significant** in combination effects relating to reductions in daylight and sunlight conditions at the following existing residential receptors: Atelier Court, 199-225 Abbott Road, Loren Apartments, Leven Road Phase Three, Sherman House, Lansbury Gardens 2-12, Aberfeldy Estate Phase One Block C, 110-126 Leven Road and 177-195 Abbott Road; and

- Potential for **significant** in combination effects relating to reductions in daylight and sunlight availability to St Nicholas Church.

15.37 In conclusion, it is not uncommon for a range of in-combination effects and effect interactions to be defined for a project and given the complexity, scale and nature of the Proposed Development, the identification of five potentially significant adverse in-combination effect and effect interaction is not unreasonable and expected as a result of redevelopment within urban environments.