Chapter 13: Effect Interactions

INTRODUCTION

13.1 This chapter of the 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, dust 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 ***ES Volume 1: Chapters 6 – 12*** and ***ES Volume 2***), as appropriate, and have not been re-iterated within this ES Chapter to avoid repetition.

13.2 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 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 – 12*** 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 Chapter 15 - Mitigation and Monitoring Schedule (Volume 1)***); the mitigation measures have been assumed to be secured / implemented through the discharge of suitably worded planning conditions and Section 106 obligations.

13.3 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, neutral or adverse in nature and that are minor, moderate or major in scale have been considered. Within the tables presented throughout this chapter, adverse (or negative) effects are shaded in 'orange', beneficial (or positive) effects are shaded in 'green' and neutral effects are shaded in 'blue' for ease of identification. Based on the definitions of what negligible effects comprise for each of the technical assessments, such negligible effects do not warrant further consideration in relation to effects interactions and therefore have not been pulled through into the assessment of effect interactions. Only residual effects described as minor and above are considered in the assessment of effect interactions. It is considered that there would not be a scenario where multiple negligible effects could lead to a noticeable effect interaction. This is owing to the nature of negligible effects as they present no discernible change therefore if multiple negligible effects were to interact the in-combination effect would also present no discernible change.

13.4 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.

13.5 The scale of an effect interaction is not assigned as part of this assessment; however, whether the effect interaction is considered to be a likely significant effect has been identified. For example, when one or more residual significant effects (i.e., effects that are typically moderate or major in scale) from different EIA topics (i.e., air quality, 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 has been given as to whether or not the combination of non-significant effects could result in a combined significant effect, based on professional opinion..

13.6 It is recognised that effects associated with human health are the result of the residual effects defined within the technical assessments presented within the ES. An objective of the Health Impact Assessment (***ES Volume 3 – Appendix: Health***) is to demonstrate how residual effects interact with each other to result in effects to human health. For this reason, the residual human health effects (which themselves are effect interactions) have been presented within this chapter following the main assessment of in-combination effects and effect interactions from the demolition and construction works, and the completed and operational Proposed Development.

13.7 The potential for effect interactions during the demolition and construction phase is presented in **Table 13.1**. All effects during demolition and construction of the Proposed Development are the same under both Option 1 and Option 2 and therefore this table represents both Option 1 and Option 2.

13.8 The potential for effect interactions once the Proposed Development is complete and operational has been presented separately for Option 1 in **Table 13.3** and for Option 2 in **Table 13.4**.

DEMOLITION AND CONSTRUCTION

13.9 **Table 13.1** presents the in-combination effects assessment associated with the demolition and construction works of the Proposed Development (for both Option 1 and Option 2) and identifies the potential for effect interactions. Where the potential for an effect interaction is identified, this is discussed in more detail below.

Table 13.1 Effects Interactions - Demolition and Construction (Option 1 and Option 2)

Sensitive Receptor Group	Technical Topic Area and Residual Effect	Scale and Nature (Geographic Extent) Significance	Potential for In-Combination Effects / Effect Interactions
Local Construction Workforce	**SOCIO-ECONOMICS** Temporary construction employment	Minor Beneficial (Regional) Not Significant	No - No other residual effects to interact with.
Commercial Properties **(Specifically, Becket House and 57-71 St Thomas Street)**	**VIBRATION** Vibration during construction works	Minor Adverse (Local) Not Significant	Yes **Noise** Interacting with **Vibration** In relation to Becket House, The Glasshouse (2-4 Melior Street), 8-14 Melior Street, 57-71 St Thomas Street and The Horseshoe Inn
Residential / Public House Properties **(Specifically, The Glasshouse (2-4 Melior Street), 8-14 Melior Street, The Horseshoe Inn)**	**VIBRATION** Vibration during construction works	Moderate Adverse (Local) Significant	
Residential / Public House Properties **(Specifically, The Horseshoe Inn)**	**NOISE** Onsite construction works noise	Moderate to Major Adverse (Local) Significant	
Residential Properties **(Specifically, Snowsfields Flats)**	**NOISE** Onsite construction works noise	Minor to Major Adverse (Local) Significant	
Residential Properties **(Specifically, 8-14 Melior Street, 16 Melior Street)**	**NOISE** Onsite construction works noise	(Negligible to) Major Adverse (Local) Significant	
Residential Properties **(Specifically, The Glasshouse (2-4 Melior Street), 147 Snowsfields)**	**NOISE** Onsite construction works noise	(Negligible to) Moderate Adverse (Local) Significant	
Medical, Religious and Commercial Properties **(Specifically, Guys Hospital, Our Lady of La Salette and St Joseph Church, Becket House, Capital House and 57-71 St Thomas Street)**	**NOISE** Onsite construction works noise	(Negligible to) Minor Adverse (Local) Not Significant	
Buried Heritage Assets **(Specifically, Roman remains)**	**ARCHAEOLOGY** Damage to potential archaeological remains during substructure works	Minor Adverse (Local) Not Significant	No - No other residual effects to interact with.
Built Heritage Assets **Railway Viaduct Arches (Grade II)**	**HERITAGE** Effects on built heritage assets	Negligible to Minor Adverse (Local) Not Significant)	Yes **Built Heritage Assets** Interacting with **Townscape Character Areas** Interacting with

Sensitive Receptor Group	Technical Topic Area and Residual Effect	Scale and Nature (Geographic Extent) Significance	Potential for In-Combination Effects / Effect Interactions
			Views
Built Heritage Assets **Conservation areas (CA)** **(Bermondsey Street CA)**	**HERITAGE** Effects on built heritage assets	Minor Adverse (Local) Not Significant	Yes **Built Heritage Assets** Interacting with **Townscape Character Areas** Interacting with **Views**
Built Heritage Assets **Non-designated heritage receptors** **(Specifically 9 Fenning Street)**	**HERITAGE** Effects on built heritage assets	Minor Adverse (Local) Not Significant	Yes **Built Heritage Assets** Interacting with **Townscape Character Areas** Interacting with **Views**
Townscape Character Areas **(Specifically, St Thomas Street, Bermondsey and London Bridge and Railway Infrastructure Character Areas)**	**TOWNSCAPE** Effects on townscape character areas	Minor Adverse (Local) Not Significant	Yes **Townscape Character Areas** Interacting with **Built Heritage Assets** Interacting with **Views**
Views **(Specifically view reference numbers: 17, 20, 23, 24, 24W, 25 and 28)**	**VISUAL AMENITY** Effects on pedestrians, residents, road users and workers	Minor Adverse Not Significant	Yes **Views** Interacting with **Townscape Character Areas** Interacting with **Built Heritage Assets**

13.10 Table 13.1 shows that there is potential for significant effect interactions during demolition and construction of the Proposed Development under Option 1 and Option 2 with regards to:

- **Noise and Vibration effects relating to construction activities on existing commercial and residential / public house properties** – The noise generated from construction activities (minor adverse effect) as well as vibration generated from construction activities (minor adverse effect) has the potential for an in-combination effect on the existing Becket House and 57-71 St Thomas Street. Furthermore, the noise generated from construction activities (moderate to major adverse effects) as well as vibration generated from construction activities (moderate adverse effect) has the potential for an in-combination effect on the following existing residential properties: The Glasshouse (2-4 Melior Street), 8-14 Melior Street and the residential flat at The Horseshoe Inn. These effects are considered to be short term and temporary in nature. Furthermore, these effects will be managed thorough site-specific management plans and strategies including a CEMP as discussed throughout this ES and set out in ***ES Chapter 15 - Mitigation and Monitoring Schedule (Volume 1).*** Due to the temporary nature of the effect and the sensitivity of the receptor (non residential), the effect interaction on Becket House and 57-71 St Thomas Street is considered to be not significant. The effect interaction to The Glasshouse (2-4 Melior Street), 8-14 Melior Street and the Horseshoe Inn is considered to be significant on the basis of the receptor sensitivity (residential use) and that the individual effects (noise and vibration) have themselves been assessed as being significant.
- **Townscape, Built Heritage and Visual Amenity effects on character and function of the surrounding townscape, setting of built heritage assets and people** - There is potential for effect interactions to take place during the demolition and construction of the Proposed Development between built heritage assets, townscape character areas and visual amenity. Due to the nature of built heritage assets, townscape character areas and local views, any effects between them are considered to be generally inherently linked. The adverse effects are related to the impact on the setting and significance of Bermondsey Conservation Area, the Grade II Railway Viaduct Arches and the non designated heritage asset (9 Fenning Street). The adverse visual effects relate to View 17, 20, 23, 24, 24W, 25 and 28 where visual receptors (i.e. pedestrians, residents, road users and workers) are experiencing the views. Further details can be found within the Built Heritage, Townscape and Visual Impact Assessment in Volume 2 of this ES.

13.11 Table 13.2 presents the in-combination effects assessment and identifies the potential for effect interactions throughout the demolition and construction works in relation to effects to human health. Refer to ***ES Volume 3 – Appendix: Health*** for the full Health Impact Assessment.

13.12 As noted above, the residual human health effects are themselves effect interactions.

Table 13.2 Effect Interactions – Health – Demolition and Construction

Receptor	Description of Health Impact	Nature of Potential Health Impact
Human Health Receptors (Local residents, Pedestrians, Cyclists, Visitors, Patients, Employees, Users of the surrounding retail uses etc)	**Air Quality, Nosie and Neighbourhood Amenity** The Proposed Development minimises construction impacts such as dust, noise, vibration and odours, however significant adverse effects have been identified at some existing residential properties as a result of the construction activities.	Neutral
	Access to Work and Training The Proposed Development will support an average of 520 FTE construction jobs each year over the Proposed Development's demolition and construction period of three years.	Positive

COMPLETED DEVELOPMENT

13.13 Table 13.3 presents the in-combination effects assessment associated with the completed and operational Proposed Development under Option 1 and identifies the potential for effect interactions on particular receptors. Where the potential for an effect interaction is identified, this is discussed in more detail below.

Table 13.3 Effect Interactions - Completed Development (Option 1)

Sensitive Receptor Group	Technical Topic Area and Residual Effect	Scale and Nature (Geographic Extent) Significance	Potential for Intra-Project Cumulative Effects / Effect Interactions
Labour Market / Workforce (Employment)	**SOCIO-ECONOMICS** Job creation / employment opportunities	Minor Beneficial (Local, Borough and Regional) Not Significant	No – No other residual effects to interact with.
Local Economy	**SOCIO-ECONOMICS** Gross Value Added	Minor Beneficial (Borough, Regional) Not Significant	Yes **Effect on GVA** Interacting with **Effect on Business Rates Generation** In relation to the local economy
	SOCIO-ECONOMICS Business Rates Generation	Minor Beneficial (Borough, Regional) Not Significant	
Open Space	**SOCIO-ECONOMICS** Availability of Open Space	Minor Beneficial	No -

Sensitive Receptor Group	Technical Topic Area and Residual Effect	Scale and Nature (Geographic Extent) Significance	Potential for Intra-Project Cumulative Effects / Effect Interactions
		(Local) Not Significant	No other residual effects to interact with.
Residential Properties (Specifically, 8-14 Melior Street, 16 Melior Street, The Glasshouse (2-4 Melior Street) and The Horseshoe Inn	**NOISE** Effects of operational traffic noise	Minor Adverse (Local) Not Significant	No - No other residual effects to interact with.
Entrances (On-Site)	**WIND MICROCLIMATE** Local wind microclimate suitable for the intended pedestrian use at onsite building entrances	Minor Beneficial (Local) Not Significant	No - No other residual effects to interact with.
Pedestrian Thoroughfares (On-Site)	**WIND MICROCLIMATE** Local wind microclimate suitable for the intended pedestrian use at onsite thoroughfares	(Negligible to) Moderate Beneficial (Local) Not Significant	
Residential Properties (Specifically, The Glasshouse, 8 Melior Street to 36 Snowsfields, 8-20 Snowsfields)	**DAYLIGHT** Change in daylight amenity to surrounding receptors	Major Adverse (Local) Significant	Yes **Daylight** Interacting with **Sunlight** In relation to 16 Melior Street and 8 Melior Street – 36 Snowsfields
Residential Properties and Educational Buildings (Specifically, 16 Melior Street, 1-15 Guinness Court, Raquel Court, 14 Melior Street and Snowfields Primary School)	**DAYLIGHT** Change in daylight amenity to surrounding receptors	Minor Adverse (Local) Not Significant	
Residential Properties (Specifically, 16 Melior Street and 8 Melior Street to 36 Snowsfields)	**SUNLIGHT** Change in sunlight amenity to surrounding receptors	Minor Adverse (Local) Not Significant	
Road and Rail Viewpoints (Specifically, Viewpoint S3, W2, TNW3, S1 and E1)	**SOLAR GLARE** Instances of solar glare from road and rail viewpoints	Minor Adverse (Local) Not Significant	No - No other residual effects to interact with.
Road and Rail Viewpoints (Specifically, Viewpoint S2)	**SOLAR GLARE** Instances of solar glare from road and rail viewpoints	Moderate Adverse (Local) Significant	
Built Heritage Assets Conservation Areas (CA), Listed Buildings and Non-designated built heritage assets (Specifically, Railway Viaduct Arches, Bermondsey Street CA and 9 Fenning Street)	**BUILT HERITAGE ASSETS** Effects on listed buildings (Railway Viaduct Arches) and non-designated built heritage assets (9 Fenning Street)	Minor Beneficial Not Significant	
	Effects on Bermondsey Street CA	Minor Adverse Not Significant	
Townscape Character Areas (Specifically, St Thomas Street, Bermondsey, C20 Residential Estates and London Bridge and Railway Infrastructure)	**TOWNSCAPE** Effects on townscape character areas (St Thomas Street, Bermondsey and London Bridge and Railway Infrastructure)	Moderate Beneficial Significant	Yes **Townscape Character Areas** Interacting with **Built Heritage Assets** Interacting with **Views**
	TOWNSCAPE	Minor Beneficial Not Significant	
	Effects on townscape character areas (C20 Residential Estates)		
Views	**VISUAL AMENITY** Effects on visitors, pedestrians and road users, residents and workers (**9, 9N, 11, 15, 15N, 16, 22, 26)**	Minor Beneficial Not Significant	Yes **Views** Interacting with **Built Heritage Assets** Interacting with **Townscape Character Areas**
	VISUAL AMENITY Effects on pedestrians, road users, residents and workers (**17, 23**)	Moderate to Major Beneficial Significant	
	VISUAL AMENITY Effects on pedestrians, road users, residents and workers (**18,18W,19, 20**)	Minor to Moderate Beneficial Not Significant	
	VISUAL AMENITY Effects on pedestrians, road users, residents and workers (**24, 24W, 25, 28**)	Minor to Moderate Adverse Not Significant	

13.14 Table 13.3 shows that there is the potential for effect interactions to take place when the Proposed Development under Option 1 is complete and operational and are as follows:

- **Socio-economics in relation to the Local Economy –** The Proposed Development under Option 1 is estimated to support 682-900 gross jobs and 378-432 net jobs. It is estimated the on-site employment generated will result in around £78.5-£80.0 million in GVA annually and £29.4-£29.6 million in net additional GVA each year, resulting in a minor beneficial effect in the context of the borough and region. In addition, the Proposed Development is anticipated to generate additional revenue for the LBS through business rates resulting in an overall rateable value in the region of £4.7 million and generate around £2.4 million in annual business rates revenue for LBS. This results in a minor beneficial effect in the context of both the borough and the region. The effect interaction is considered to be not significant.
- **Daylight and Sunlight Amenity at 16 Melior Street and 8 Melior Street to 36 Snowsfields** – The reduction in daylight amenity (a minor to major adverse effect) and reduction in sunlight amenity (a minor adverse effect) have the potential for an in-combination effect on existing receptors at the following properties: 16 Melior Street and 8 Melior Street to 36 Snowsfields. These receptors although roughly similar in height to the surrounding buildings to the north, have large balconies, many with recessed windows that would restrict the access to daylight and sunlight. The effect interaction on 16 Melior Street is considered to be not significant. The effect interaction on 8 Melior Street to 36 Snowsfields is considered to be significant (due to the significant adverse effect to daylight amenity). It is important to note however that many of the windows that experience significant (moderate or major) adverse percentage changes in daylight and/or sunlight fall into one or more of the following categories:
  - a) are located beneath balconies or overhangs;
  - b) they have low levels of light and are thus susceptible to large percentage alterations;
  - c) they serve less sensitive spaces such as bedrooms.

  Furthermore, although defined as a significant daylight amenity effect (and so a significant daylight / sunlight effect interaction) in accordance with EIA methodology and terminology, the daylight / sunlight values in the BRE Guidelines are derived on the basis of a 2-3 storey suburban model, and therefore the application of the BRE Guidelines in inner urban environments should be treated flexibly. Clearly in more urban environments, if development is to meet the scale and proportion of neighbouring buildings, large factor reductions are very difficult to avoid. In addition, it should be noted that this property (8 Melior Street to 36 Snowsfields) has large balconies with recessed windows which can block daylight and sunlight leading to a low baseline value and so a disproportionate percentage change as a result of the Proposed Development.

- **Townscape, Built Heritage and Visual Amenity** – It could be considered that the significant beneficial effects generated by the Proposed Development (i.e. design, public realm) give rise to improving the quality of the surrounding townscape and local views and could help to offset the adverse effects to surrounding residential receptors, and the adverse effects on local views, with respect to pedestrians, road users, residents and workers (along Melior Street, Kirby Grove, Kirby Grove at Snowfields and Hardwidge Street) as well as the adverse effect on the setting of the Bermondsey CA. These adverse effects are largely inevitable with the redevelopment of land which has been underdeveloped for a long period of time and supported by Southwark's aspirations for the London Bridge and Bermondsey area. Due to this being subjective however, it is not considered appropriate to state whether this possible effect interaction is significant or not.

13.15 Table 13.4 presents the in-combination effects assessment associated with the completed and operational Proposed Development under Option 2 and identifies the potential for effect interactions on particular receptors. Where the potential for an effect interaction is identified, this is discussed in more detail below.

Table 13.4 Effect Interactions - Completed Development (Option 2)

Sensitive Receptor Group	Technical Topic Area and Residual Effect	Scale and Nature (Geographic Extent) Significance	Potential for Intra-Project Cumulative Effects / Effect Interactions
Labour Market / Workforce (Employment)	**SOCIO-ECONOMICS** Job creation / employment opportunities	Minor Beneficial (Local, Borough and Regional) Not Significant	No – No other residual effects to interact with.
Local Economy	**SOCIO-ECONOMICS** Gross Value Added	Minor Beneficial (Borough, Regional) Not Significant	Yes **Effect on GVA** Interacting with **Effect on Business Rates Generation** In relation to the local economy
	SOCIO-ECONOMICS Business Rates Generation	Minor Beneficial (Borough, Regional) Not Significant	
Open Space	**SOCIO-ECONOMICS** Availability of Open Space	Minor Beneficial (Local) Not Significant	No - No other residual effects to interact with.
Entrances (On-Site)	**WIND MICROCLIMATE** Local wind microclimate suitable for the intended pedestrian use at onsite building entrances	Minor Beneficial (Local) Not Significant	No - No other residual effects to interact with.
Pedestrian Thoroughfares (On-Site)	**WIND MICROCLIMATE** Local wind microclimate suitable for the intended pedestrian use at onsite thoroughfares	(Negligible to) Moderate Beneficial (Local) Not Significant	
Residential Properties **(Specifically, The Glasshouse, 8 Melior Street to 36 Snowsfields, 8-20 Snowsfields)**	**DAYLIGHT** Change in daylight amenity to surrounding receptors	Major Adverse (Local) Significant	Yes **Daylight** Interacting with **Sunlight** In relation to 16 Melior Street and 8 Melior Street – 36 Snowsfields
Residential Properties and Educational Buildings **(Specifically, 16 Melior Street, 1-15 Guinness Court, Raquel Court, 14 Melior Street and Snowfields Primary School)**	**DAYLIGHT** Change in daylight amenity to surrounding receptors	Minor Adverse (Local) Not Significant	
Residential Properties **(Specifically, 16 Melior Street and 8 Melior Street to 36 Snowsfields)**	**SUNLIGHT** Change in sunlight amenity to surrounding receptors	Minor Adverse (Local) Not Significant	
Road and Rail Viewpoints **(Specifically, Viewpoint S3, W2, TNW3, S1 and E1)**	**SOLAR GLARE** Instances of solar glare from road and rail viewpoints	Minor Adverse (Local) Not Significant	No - No other residual effects to interact with.
Road and Rail Viewpoints **(Specifically, Viewpoint S2)**	**SOLAR GLARE** Instances of solar glare from road and rail viewpoints	Moderate Adverse (Local) Significant	
Built Heritage Assets **Conservation Areas (CA), Listed Buildings and Non-designated built heritage assets** **(Specifically, Railway Viaduct Arches, Bermondsey Street CA and 9 Fenning Street)**	**BUILT HERITAGE ASSETS** Effects on listed buildings (Railway Viaduct Arches) and non-designated built heritage assets (9 Fenning Street)	Minor Beneficial Not Significant	
	BUILT HERITAGE ASSETS Effects on Bermondsey Street CA	Minor Adverse Not Significant	
Townscape Character Areas **(Specifically, St Thomas Street, Bermondsey, C20 Residential Estates and London Bridge and Railway Infrastructure)**	**TOWNSCAPE** Effects on townscape character areas (St Thomas Street, Bermondsey and London Bridge and Railway Infrastructure)	Moderate Beneficial Significant	Yes **Townscape Character Areas** Interacting with **Built Heritage Assets** Interacting with **Views**
	TOWNSCAPE Effects on townscape character areas (C20 Residential Estates)	Minor Beneficial Not Significant	
Views	**VISUAL AMENITY** Effects on visitors, pedestrians and road users, residents and workers (**9, 9N, 11, 15, 15N, 16, 22, 26**)	Minor Beneficial Not Significant	Yes **Views** Interacting with **Built Heritage Assets** Interacting with **Townscape Character Areas**
	VISUAL AMENITY Effects on pedestrians, road users, residents and workers (**17, 23**)	Moderate to Major Beneficial Significant	
	VISUAL AMENITY Effects on pedestrians, road users, residents and workers (**18,18W,19, 20**)	Minor to Moderate Beneficial Not Significant	
	VISUAL AMENITY Effects on pedestrians, road users, residents and workers (**24, 24W, 25, 28**)	Minor to Moderate Adverse Not Significant	

13.16 Table 13.4 shows that there is the potential for effect interactions to take place when the Proposed Development under Option 2 is complete and operational and these are the same effect interactions as discussed for Option 1 at **Paragraph 13.14** above. It is noted however, that there is no longer a minor adverse effect in relation to traffic noise as a result of the Proposed Development once operational on 8-14 Melior Street, 16 Melior Street, The Glasshouse (2-4 Melior Street) and The Horseshoe Inn. This is as a result of there being slightly less traffic generated by the Proposed Development under Option 2 as opposed to Option 1 and, as

such, it is considered that the existing ambient noise levels are not expected to increase as much as it would under Option 1. No effect interactions have been identified in relation to noise related traffic effects.

13.17 In addition, and with regards to socio-economics, the Proposed Development under Option 2 is estimated to support 885 gross jobs and 554 net jobs. It is estimated the on-site employment generated will result in around £101.1 million in GVA annually and £38.0 million in net additional GVA each year, resulting in a minor beneficial effect in the context of the borough and region. In addition, the Proposed Development is anticipated to generate additional revenue for the LBS through business rates resulting in an overall rateable value in the region of £4.7 million and generate around £2.4 million in annual business rates revenue for LBS (the same as Option 1). This results in a minor beneficial effect in the context of both the borough and the region. The effect interaction is considered to be not significant.

13.18 For effect interactions between socio-economics, between daylight and sunlight as well as between townscape, built heritage and visual amenity, please see **Paragraph 13.14** for Option 1 which remains applicable for Option 2.

13.19 **Table 13.5** presents the in-combination effects assessment and identifies the potential for effect interactions once the Proposed Development is complete in relation to effects to human health. Refer to ***ES Volume 3 – Appendix: Health*** for the full Health Impact Assessment.

13.20 As noted above, the residual human health effects are themselves effect interactions.

Table 13.5 Effect Interactions – Health – Completed Development

Receptor	Description of Health Impact	Nature of Potential Health Impact
Human Health Receptors (Local residents, End users of the Proposed Development, Pedestrians, Cyclists, Visitors, Patients, Employees, Users of the surrounding retail uses etc)	**Access to Health and Social Care** The Proposed Development retains an existing warehouse considered to make a positive contribution to the Bermondsey Conservation Area and the use will be community focussed. The scheme also has flexible commercial space designed for medical or research and development use.	Positive
	Open Space The Proposed Development provides a new public garden and public space around the site. In addition, external terraces are proposed which contain hard and soft landscaping.	Positive
	Open Space The Proposed Development provides links between open and natural spaces and the public realm	Positive
	Open Space The open and natural spaces provided are welcoming, safe and accessible for all	Positive
	Open Space The Proposed Development will set out how new open space will be managed and maintained.	Neutral
	Air Quality, Noise and Neighbourhood Amenity The Proposed Development minimises air pollution caused by traffic and commercial uses	Neutral
	Air Quality, Noise and Neighbourhood Amenity The Proposed Development minimises noise pollution caused by traffic and commercial uses	Positive
	Accessibility and Active Travel The Proposed Development addresses the ten Healthy Streets indicators	Positive
	Accessibility and Active Travel The Proposed Development prioritises and encourages walking through the use of shared spaces	Positive
	Accessibility and Active Travel The Proposed Development prioritises and encourages cycling by the provision of cycle storage and showers	Positive
	Accessibility and Active Travel The Proposed Development connects public realm and internal routes to local and strategic cycle and walking networks	Positive
	Accessibility and Active Travel The Proposed Development helps reduce and minimise road injuries	Positive
	Accessibility and Active Travel The Proposed Development is well connected to public transport, local services and facilities	Neutral
	Accessibility and Active Travel The Proposed Development seeks to reduce car use by providing no car parking provision (except for disabled car parking), supported by the controlled parking zones	Positive
	Accessibility and Active Travel The Proposed Development allows people with mobility problems or a disability to access buildings and places	Positive
	Crime and Community Safety The Proposed Development incorporates elements to help design out crime	Positive
	Crime and Community Safety The Proposed Development includes attractive, multi-use public spaces and buildings	Positive
	Crime and Community Safety Engagement and consultation have been carried out with the local community and voluntary sector	Positive
	Access to Healthy Food The Proposed Development provides a mix of retail, art, affordable studio space and food and drink offers as well as new community space	Neutral/Positive
	Access to Healthy Food The Proposed Development will most likely avoid contributing towards an over-concentration of hot food takeaways in the local area, tenants are yet to be secured	Neutral/Negative
	Access to Work and Training The Proposed Development provides access to local employment in terms of permanent 'end-use' jobs	Positive
	Access to Work and Training The Proposed Development provides managed and affordable workspace for local businesses	Positive
	Access to Work and Training The Proposed Development includes opportunities for work for local people via sustainable procurement arrangements	Neutral/Positive

Receptor	Description of Health Impact	Nature of Potential Health Impact
	Social Cohesion and Inclusive Design The Proposed Development connects with existing communities	Positive
	Social Cohesion and Inclusive Design The Proposed Development includes a mix of uses and a range of community facilities	Positive
	Social Cohesion and Inclusive Design The Proposed Development provide opportunities for the voluntary and community sectors	Positive
	Social Cohesion and Inclusive Design The Proposed Development takes into account issues and principles of inclusive and age-friendly design	Positive
	Minimising Resource Use The Proposed Development makes best use of existing land	Positive
	Minimising Resource Use The Proposed Development encourages recycling, including building materials	Positive
	Minimising Resource Use The Proposed Development incorporates sustainable design and construction techniques	Neutral
	Climate Change The Proposed Development incorporates renewable energy via the use of Air Source Heat Pumps	Positive
	Climate Change The Proposed Development ensures that buildings and public spaces are designed to respond to winter and summer temperatures, for example ventilation, shading and landscaping	Neutral
	Climate Change The Proposed Development maintains or enhance biodiversity	Positive
	Climate Change The Proposed Development incorporates sustainable urban drainage techniques	Neutral

SUMMARY AND CONCLUSIONS

13.21 The assessment presented within this ES Chapter has identified the following:

13.22 Potential for effects interactions during the demolition and construction of the Proposed Development (under both Option 1 and Option2) have been identified as:

- **Temporary Adverse** effects interactions in respect to noise and vibration to existing commercial and residential / public house properties. The effect interaction is not considered significant to the commercial properties and significant to the residential / public house properties; and
- **Temporary Adverse** effects interactions in respect to Townscape, Heritage and Views – to the setting of built heritage assets specifically Bermondsey Conservation Area, the Railway Viaduct Arches and the non-designated heritage receptor: 9 Fenning Street, interacting with effects on townscape character areas (specifically, St Thomas Street, Bermondsey and London Bridge and Railway Infrastructure) and visual amenity at views 17, 20, 23, 24, 24W, 25 and 28 and associated effects on pedestrians, residents, road users and workers. The effects interactions in the round on townscape/heritage/views is not considered to be significant.

13.23 Potential for effects interactions when the Proposed Development (under both Option 1 and Option 2 unless stated otherwise) is complete and operational:

- **Permanent Beneficial** effects interactions in respect to effect on Gross Value Added and Business Rates on the local economy. These effects will interact with each other to enhance the local economy. This effect interaction is not considered to be significant; and
- **Permanent Adverse** effect interactions in respect of daylight and sunlight amenity to existing residential properties at 16 Melior Street and 8 Melior Street to 36 Snowsfields. The reduction in daylight amenity (a minor to major adverse effect) and reduction in sunlight amenity (a minor adverse effect) have the potential for an in-combination effect on existing receptors at the following properties: 16 Melior Street and 8 Melior Street to 36 Snowsfields. These receptors although roughly similar in height to the surrounding buildings to the north, have large balconies, many with recessed windows that would restrict the access to daylight and sunlight. The effect interaction on 16 Melior Street is considered to be not significant. The effect interaction on 8 Melior Street to 36 Snowsfields is considered to be significant (due to the significant adverse effect to daylight amenity). It is important to note however that many of the windows that experience significant (moderate or major) adverse percentage changes in daylight and/or sunlight fall into one or more of the following categories:
  - a) are located beneath balconies or overhangs;
  - b) they have low levels of light and are thus susceptible to large percentage alterations;
  - c) they serve less sensitive spaces such as bedrooms.

  Furthermore, although defined as a significant daylight amenity effect (and so a significant daylight / sunlight effect interaction) in accordance with EIA methodology and terminology, the daylight / sunlight values in the BRE Guidelines are derived on the basis of a 2-3 storey suburban model, and therefore the application of the BRE Guidelines in inner urban environments should be treated flexibly. Clearly in more urban environments, if development is to meet the scale and proportion of neighbouring buildings, large factor reductions are very difficult to avoid. In addition, it should be noted that this property (8 Melior Street to 36 Snowsfields) has large balconies with recessed windows which can block daylight and sunlight leading to a low baseline value and so a disproportionate percentage change as a result of the Proposed Development.
- **Permanent Beneficial** effect interactions in respect of townscape, built heritage and visual amenity. This includes a number of significant beneficial effects in relation to the effect on the St Thomas Street, Bermondsey and London Bridge and Railway Infrastructure townscape character areas and the visual amenity along St Thomas Street (as well as a minor beneficial effect on the listed Railway Viaduct Arches and 9 Fenning Street (not significant)). In addition, adverse effects relating to visual amenity have been identified along Kirby Grove and Hardwidge Street and an adverse effect has been identified in relation to the setting of the Bermondsey CA in relation to built heritage. In the whole the effects interactions between built heritage, townscape and visual amenity as a result of the completed Proposed Development is considered to be significant.

13.24 A number of human health impacts (neutral and positive) have also been identified during the demolition and construction and the operational phases of the Proposed Development, however, given the methodology for defining these effects, they are by default effect interactions and are summarised as such within this ES Chapter.

COMPARISON OF INTERACTING EFFECTS

13.25 The assessment of effect interactions discussed above has shown that a number of effect interactions could occur as a result of the Proposed Development, specifically in relation to noise and vibration as well as townscape, built heritage and visual amenity during the demolition and construction stage. In addition, three effect interactions have been identified that could occur in relation to socio-economics, daylight and sunlight and townscape, built heritage and visual amenity once the Proposed Development is complete and operational.

13.26 Comparison of the effect interactions as a result of the 2021 Proposed Development and the effect interactions as a result of the 2018 Proposed Development, identifies the following changes (for ease of reference, the effect interactions tables from the 2018 ES are provided in Annex A of this ES Chapter):

- Demolition and Construction:

- The effect interactions in relation to noise and vibration that have been identified within the 2021 ES, were identified in the 2018 ES, but the effect interaction was not subdivided into two separate categories (i.e., noise separate from vibration) and instead considered together hence the effect interaction was not previously defined.
- The 2018 ES identified effect interactions between townscape and built heritage. The 2021 ES has identified effect interactions between townscape, built heritage and visual amenity.
- The health effects that were previously defined in the 2018 ES within the technical chapters (such as noise and air quality) have now been addressed separately within this chapter of the 2021 ES. The 2021 ES recognises that health effects are themselves effect interactions and so for completeness has presented the results of the Health Impact Assessment within this chapter of the ES.

- Completed Development:
  - Effect interactions in relation to daylight and sunlight amenity and traffic related noise generated from the 2018 Proposed Development were identified in the 2018 ES. Although daylight, sunlight and traffic related noise effects have been identified within this 2021 ES, based on professional judgement an approach to the effect interactions assessment these effects are not considered to interact (only effect interactions relating to daylight and sunlight have been identified).
  - The health effects that were previously defined in the 2018 ES within the technical chapters (such as noise and air quality) have now been addressed separately within this chapter in the 2021 ES. The 2021 ES recognises that health effects are themselves effect interactions and so for completeness has presented the results of the Health Impact Assessment within this ES Chapter.

ANNEX A: 2018 EFFECT INTERACTIONS ASSESSMENT

EXTRACT FROM 2018 ES VOLUME 1, CHAPTER 13 EFFECT INTERACTIONS

"DEMOLITION AND CONSTRUCTION

13.27 ***Table 13.6*** *presents the in-combination effects assessment and identifies the potential for effect interactions throughout the demolition and construction works.*

13.28 ***Table 13.6*** *shows that there is no potential for effect interactions to take place during the demolition and construction of the Proposed Development, for either the 'Local Construction Workforce' or 'Residential, Medical and Commercial Properties' within proximity to the site.*

13.29 *There is potential for effect interactions to take place during the demolition and construction of the Proposed Development between built heritage assets, townscape character areas and visuals. Due to the nature of built heritage assets, townscape character areas and local views, any effects between them are considered to be generally inherently linked. The adverse effects are related to the demolition of a non-designated heritage building on site within the Bermondsey Conservation Area. The building, however, has very limited heritage value and it is considered that the loss of the non-designated heritage receptor may be outweighed by the planning benefits which will be delivered by the Proposed Development. The adverse visual effects relate to View 17, 20, 23, 24 and 25 where visual receptors (i.e. pedestrians, residents, road users and workers) are experiencing the views.*

Table 13.6 [2018 Proposed Development] Potential for Effects Interaction - Demolition and Construction

TECHNICAL TOPIC AREA & Sensitive Receptor Group	Residual Effects	Scale and Nature of Residual Effect	Potential for In-Combination Effects / Effect Interactions
SOCIO-ECONOMICS **Local Construction Workforce**	Temporary construction employment	Minor Beneficial	No - No other residual effects to interact with.
VIBRATION **Residential Properties** **(Specifically, The Glasshouse, 8-14 Melior Street, Beckett House, The Horseshoe Inn)**	Vibration during construction works	Minor to Moderate Adverse	No All residual effects are related to noise and vibration; there are no other topic effects that these noise and vibration related effects can interact with.
NOISE **Residential Properties** **(Specifically, The Glasshouse, 8-14 Melior Street, 2 Melior Place, The Horseshoe Inn)**	Onsite construction works noise	Minor to Major Adverse	
NOISE **Medical and Residential Properties** **(Specifically, 16 Melior Street, 147 Snowfields Street, Guys Hospital)**	Onsite construction works noise	(Negligible to) Moderate Adverse	
NOISE **Church and Commercial Properties** **(Specifically, Our Lady of La Salette and St Joseph Church and Becket House)**	Onsite construction works noise	(Negligible to) Minor Adverse	
BUILT HERITAGE ASSETS **Conservation areas (CA) and non-designated heritage receptors** **(Specifically, Bermondsey Street CA and 9 Fenning Street)**	Effects on built heritage assets	Minor to Moderate Adverse	Yes **Built Heritage Assets** Interacting with **Townscape Character Areas** Interacting with **Views**
TOWNSCAPE CHARACTER AREAS **(Specifically, St Thomas Street, Bermondsey and London Bridge and Railway Infrastructure)**	Effects on townscape character areas	Minor Adverse	Yes **Townscape Character Areas** Interacting with **Built Heritage Assets** Interacting with **Views**
VISUAL **(Specifically view reference numbers: 17, 20, 23, 24 and 25)**	Effects on pedestrians, residents, road users and workers	Minor Adverse	Yes **Views** Interacting with **Townscape Character Areas** Interacting with **Built Heritage Assets**

COMPLETED DEVELOPMENT

13.30 ***Table 13.7*** *presents the in-combination effects and effect interactions to relevant receptors / receptor groups arising from the completed and occupied Proposed Development. Where the potential for an in-combination effect / effect interaction is identified, this is discussed in more detail below.*

Table 13.7 [2018 Proposed Development] Potential for Effect Interactions - Completed Development

TECHNICAL TOPIC AREA & Sensitive Receptor Group	Residual Effects	Scale and Nature of Residual Effect	Potential for In-Combination Effects / Effect Interactions
SOCIO-ECONOMICS **Labour Market / Workforce (Employment)**	Job creation / employment opportunities	Minor Beneficial	No All residual effects are related to socio-economics; there are no other topic effects that these socio-economic related effects can interact with. It is acknowledged however that these socio-economic effects do all interact to have a beneficial effect on the Local Economy. On the basis that the residual effect are minor beneficial, the in-combination effect to the Local Economy is not considered significant.
SOCIO-ECONOMICS **Local Economy**	Gross Value Added	Minor Beneficial	
SOCIO-ECONOMICS **Local Economy**	Business Rates Generation	Minor Beneficial	
NOISE AND VIBRATION **Medical and Residential Properties** **(Guys Hospital, Becket House)**	Entertainment noise – crowd dispersion	Minor to Major Adverse	No - No other residual effects to interact with.
NOISE AND VIBRATION **Residential Properties** **(Specifically 8-14 Melior Street, 2 Melior Place, 16 Melior Street, The Horseshoe Inn)**	Noise from road traffic attributable to the Proposed Development	Minor Adverse	Yes **Noise and Vibration** Interacting with **Daylight** Interacting with **Sunlight**
WIND MICROCLIMATE **Entrances (On-Site)**	Local wind microclimate suitable for the intended pedestrian use at onsite building entrances	(Negligible to) Minor Beneficial	No - No other residual effects to interact with.
WIND MICROCLIMATE **Roadway (On-Site)**	Local wind microclimate suitable for the intended pedestrian use within open space	Moderate Beneficial	No - No other residual effects to interact with.
WIND MICROCLIMATE **Crossings (Off-Site)**	Local wind microclimate suitable for the intended pedestrian and cyclist use along roads	Moderate to Minor Beneficial	No - No other residual effects to interact with.
DAYLIGHT **Residential Properties** **(Specifically, The Glasshouse, 8 Melior Street – 36 Snowsfields, 8-20 Snowsfields)**	Change in daylight amenity to surrounding receptors	Major Adverse	Yes **Daylight** Interacting with

TECHNICAL TOPIC AREA & Sensitive Receptor Group	Residual Effects	Scale and Nature of Residual Effect	Potential for In-Combination Effects / Effect Interactions
DAYLIGHT ***Residential Properties*** ***(Specifically, 16 Melior Street, 1-15 Guinness Court, Raquel Court, 14 Melior Street and Snowfields Primary School)***	*Change in daylight amenity to surrounding receptors*	*Minor Adverse*	***Sunlight*** *Interacting with* ***Noise and Vibration***
SUNLIGHT ***Residential Properties*** ***(Specifically, 16 Melior Street and 8 Melior Street – 36 Snowsfields)***	*Change in sunlight amenity to surrounding receptors*	*(Negligible to) Minor Adverse*	
OVERSHADOWING ***Communal Gardens serving Melior Street and Fenning Street***	*Overshadowing (Sun Hours on the Ground)*	*Moderate Adverse*	*No -* *No other residual effects to interact with.*
SOLAR GLARE ***Road and Rail Viewpoints***	*Instances of solar glare from road and rail viewpoints*	*(Negligible to) Moderate Adverse*	*No -* *No other residual effects to interact with.*
BUILT HERITAGE ASSETS ***Conservation Areas (CA) and Listed Buildings*** ***(Specifically, No.9 and attached Railings, 9A St Thomas Street, Mary Sheridan House (Part) and Area Railings, Nos. 4-8 and 12-16 and attached railings, Railway Viaduct Arches and Bermondsey Street CA)***	*Effects on listed buildings*	*Minor to Major Beneficial*	*Yes* ***Built Heritage Assets*** *Interacting with* ***Townscape Character Areas*** *Interacting with* ***Views***
	Effects on Bermondsey Street CA	*Minor Adverse*	
TOWNSCAPE CHARACTER AREAS ***(Specifically, St Thomas Street, Bermondsey, C20 Residential Estates and London Bridge and Railway Infrastructure)***	*Effects on townscape character areas*	*Minor to Moderate Beneficial*	*Yes* ***Townscape Character Areas*** *Interacting with* ***Built Heritage Assets*** *Interacting with* ***Views***
VISUAL ***(Specifically view reference numbers: 9, 9N, 11, 15, 15N, 16, 17, 18, 19, 20, 22, 23, 24 and 25***	*Effects on visitors, pedestrians and road users, residents and workers*	*Minor to Major Beneficial*	*Yes* ***Views*** *Interacting with* ***Built Heritage Assets*** *Interacting with* ***Townscape Character Areas***
	Effects on pedestrians, road users, residents and workers	*Minor to Moderate Adverse*	

13.31 ***Table 13.7*** *shows that there is potential for effect interactions to take place once the Proposed Development is completed and occupied for i) Residential Properties and ii) Built Heritage, Townscape and Visual. This is discussed further below.*

13.32 *As shown in* ***Table 13.7*** *there is the potential for interactions between the effects relating to noise and vibration, daylight and sunlight on surrounding residential properties. The properties affected are located along Melior Street and Snowsfields. These effects could combine / interact to adversely affect residential amenity.*

13.33 *Based on the scale and significance of the individual residual effects, the effect interaction is defined as being adversely significant. The most significant effects (major effects) relate to change in daylight amenity respectively.*

13.34 *It could be considered that the significant beneficial effects generated by the Proposed Development (i.e. design, public realm) give rise to improving the quality of the surrounding townscape , built heritage assets and local views and could help to offset the adverse effects to surrounding residential receptors, the conservation area, and the adverse effects on local views, with respect to pedestrians, road users, residents and workers (along Melior Street, St Thomas Street and Kirby Grove). These adverse effects are largely inevitable with the redevelopment of land which has been underdeveloped for a long period of time (due to the use of the site in relation to the works at London bridge Station) and supported by Southwark's aspirations for the London Bridge and Bermondsey area. Due to this being subjective however, it is not considered appropriate to state whether this possible effect interaction is significant or not."*