NEW CITY COURT

Environmental Statement

Part 1: Main Text

WATERMAN INFRASTRUCTURE & ENVIRONMENT

Client Name: GPE (St Thomas Street) Limited
Document Reference: ES_Part_1_Main_Text
Project Number: WIE11375

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
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Comments Final version

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1. Introduction

Background Information

1.1 GPE (St Thomas Street) Limited (hereafter referred to as the ‘Applicant’) is seeking to obtain full planning permission and listed building consent for the demolition of existing 1980s office buildings, part restoration and refurbishment of listed terrace, and redevelopment of Keats House with retention of existing façade, and construction of an office-led, mixed-use scheme (hereafter referred to as the ‘Development’). The Development is proposed on a parcel of land on St. Thomas Street in the London Bridge area (hereafter referred to as the ‘Site’). The Site covers an area of land of approximately 0.36 hectares (ha), is approximately centred on National Grid Reference (NGR) 532727 180155 and is located within the administrative boundary of Southwark Council (SC). **Figure 1.1** and **Figure 1.2** illustrate the location of the Site and extent of the planning application boundary respectively.

1.2 The Development would comprise office and retail space within a new tower building of 37 storeys (144m AOD) in height and remodelled existing buildings and a double basement across part of the Site, together with publicly accessible garden, a new access to London Bridge Underground Station, new pedestrian routes and public realm at ground level, and a regenerated King’s Head Yard. A detailed description of the Development is provided within **Chapter 5: The Development**.

1.3 An Environmental Impact Assessment (EIA) is a formal procedure that must be followed for certain types and scales of development, where the potential environmental effects of a development proposal are systematically assessed and reported, to assist in the determination of a planning application. The EIA process can also identify ways in which the Development can be modified, or adverse effects mitigated, so as to reduce or avoid potential adverse effects and to optimise beneficial effects. The likely significant environmental effects of the Development (during demolition, deconstruction, refurbishment and construction (hereafter referred to as the ‘Works’), and once completed and operational) have been considered, together with relevant cumulative effects, and are presented within this Environmental Statement (ES).

Site Context

1.4 The Site is bound by St. Thomas Street to the north; shops on Borough High Street (A3) to the west; King’s Head Yard to the south; and Guy’s Hospital buildings to the east. It is currently almost entirely occupied by:

- Georgian terraced townhouses at Nos. 4, 6, 8, 12, 14 and 16 St. Thomas Street (No. 10 St. Thomas Street does not exist), referred to as the ‘Georgian Terrace’;
- New City Court office building at No. 20 St. Thomas Street; and
- Keats House at Nos. 24 to 26 St. Thomas Street.

1.5 In addition to the above, there is also a central courtyard at lower ground level, which adjoins the rear of the townhouses, and a service area off King’s Head Yard. There is no public open space on the Site, although a non-public pedestrian route runs through the Site from St. Thomas Street to King’s Head Yard.

Development Context

1.6 The Site falls within the London Bridge Borough and Bankside Opportunity Area, as designated by the London Plan (existing[1] and draft[2]), and the London Bridge Business Improvement District (BID), which provides additional or improved services to business within the BID, including extra safety, cleaning and environmental improvement measures.

1.7 The Development seeks to enhance the area of Southwark around London Bridge station, St. Thomas Street and Borough High Street by regenerating the underutilised historic yards to provide generous and accessible new public spaces, improve pedestrian connections, and retain and restore built heritage on Site. A clear set of objectives have developed through rigorous investigation over the course of four years of study and extensive consultation.

1.8 These objectives can be summarised as follows:

- Retain and enhance the listed and historic buildings of merit on Site;
- Enhance transport links and reduce pedestrian congestion;
- Create new connections and desire lines;
- Create generous new public realm;
- Enhance the setting of adjacent buildings;
- Provide new market and affordable retail space; and
- Provide new market and affordable workspace.

1.9 The Applicant aims to regenerate the Site including delivery of the following:

- demolition of existing 1980s buildings and alterations;
- provide a 37-storey building (including ground, mezzanine and two storeys of plant at roof level) extending to 144m AOD, providing high quality office and retail floorspace (the Tower);
- introduction of retail floorspace at ground, lower ground and first floor levels providing an enhanced retail offer for the local area and provision of active frontages along St. Thomas Street;
- provision of 1,067 sqm of affordable workspace on upper floors of Georgian Terrace and 181 sqm of affordable retail at ground floor/lower ground floor level of nos. 4-6 St. Thomas Street;
- provision of shared space at 21st and 22nd floor level of office building providing auditorium and exhibition space (the Hub) for both office and wider commercial use;
- sympathetic restoration of listed buildings along St. Thomas Street (the Georgian Terrace);
- reconstruction of Keats House as a standalone building with retention of existing façade;
- deliver high quality and fully accessible public realm, providing enhanced connectivity through new public routes and a public square;
- delivery of an elevated double height public garden at fifth and sixth floor level with a complementary café/restaurant area within the Tower;
- creation of a new entrance to London Bridge Underground Station; and

- improve the servicing strategy to maximise servicing options with least impact on the surrounding infrastructure.

Legal Framework for the Environmental Statement

1.10 The Town and Country Planning (EIA) Regulations 2017[3] (hereafter referred to as the 'EIA Regulations') require that, before consent may be granted for certain types of development, an EIA must be undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments which may require assessments if they breach certain thresholds and criteria, and therefore are likely to give rise to significant environmental effects (Schedule 2 development).

1.11 The Development falls under Schedule 2, Category 10(b) of the EIA Regulations which relates to 'Urban development projects' where 'the development includes more than 1 ha of urban development which is not dwelling house development'; or 'includes more than 150 dwellings'; or the 'overall area of the development exceeds 5 ha'. The Site is less than 5 ha in area and the Development does not propose the provision of residential dwellings; however, due to the nature of the Development and surrounding environment, and the proposed provision of 'urban development which is not dwelling house development', the Applicant has decided to voluntarily undertake an EIA to identify and assess the likely significant environmental effects of the Development, to ensure that adverse effects are mitigated through design wherever possible. As such, a formal EIA Screening Opinion regarding whether the Development requires an EIA has not been sought from SC.

1.12 Waterman Infrastructure and Environment Limited (hereafter referred to as 'Waterman IE') has been appointed by the Applicant to coordinate the EIA process and to prepare this ES for the Development. This ES will be submitted with the full planning and listed building consent applications.

1.13 A key stage of the EIA process is 'EIA Scoping', which enables the identification of the likely significant effects to be addressed and the scope of the various technical studies to be undertaken as part of the full EIA process. Therefore, an EIA Scoping Report (**Appendix 2.1**) was submitted to SC on 3 August 2018 to obtain a formal EIA Scoping Opinion upon which this ES has been based. The EIA Scoping Opinion was received on 4 October 2018 and is presented in **Appendix 2.2**. This EIA scoping process is described in further detail in **Chapter 2: EIA Methodology**.

1.14 This EIA has been undertaken in line with the EIA Scoping Opinion to determine the likely significance of environmental effects arising as a result of the Development, and the nature of any mitigation measures that may be required. The findings of the EIA are presented in this document, which forms an ES for the purposes of the EIA Regulations. The planning application will be determined by SC, taking into account the environmental effects of the Development reported herein.

1.15 In accordance with the EIA Regulations, this ES considers the likely significant environmental effects of the Development during demolition, deconstruction, refurbishment and construction (hereafter referred to as 'the Works'), and once the Development is completed and operational. The cumulative effects of the Development together with cumulative schemes have also been considered. Where significant adverse effects on the environment are identified, the ES sets out measures that should be implemented to prevent, reduce and, where possible, offset these effects. These are known as mitigation measures. The ES also presents an assessment of the likely residual effects of the Development which would occur following implementation of the mitigation measures.

Nature of the Planning Applications

1.16 The full planning and listed building applications for the Development have been submitted to SC for determination. The Applicant is seeking permission for:

'Comprehensive redevelopment of the site to include demolition of existing 1980s office buildings and erection of a 37-storey building (including ground and mezzanine) of a maximum height of 144m (AOD), restoration and refurbishment of existing listed terrace, and redevelopment of Keats House with retention of existing façade to provide a total of 46,374 sqm of Class B1 office floorspace, 765 sqm of Class A1 retail floorspace, 1,139 sqm of Class A3 retail floorspace, 615 sqm of leisure floorspace (Class D2), 719 sqm hub space (Class B1/D2) and a 825 sqm elevated public garden, associated public realm and highways improvements, new station entrance, cycling parking, car parking, servicing, refuse and plant areas, and all ancillary or associated works.'

1.17 The Development is defined by the drawings submitted as part of the application. These drawings, together with the description of the Development being provided in **Chapter 5: The Development** of this ES, form the basis of the EIA. A selection of drawings used to inform the EIA is presented in **Part 2: Figures** of this ES.

1.18 A description of the anticipated demolition and construction programme, together with the likely construction activities, is provided in **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction** of this ES. Information set out in **Chapter 6** of this ES was used to inform the assessment of likely significant environmental effects associated with the Works.

Structure of the Environmental Statement

1.19 The ES comprises four separate parts:

- **Part 1**: Main Text (this document);
- **Part 2**: Figures;
- **Part 3**: Townscape, Visual Impact and Built Heritage Assessment; and
- **Part 4**: Appendices.

1.20 In addition, a Non-Technical Summary (NTS) of the ES has been prepared and is presented as a standalone document. All parts and the NTS should be read together since they present the full ES.

1.21 A summary of the content of each part of the ES is as follows:

Environmental Statement Part 1 – Main Text

1.22 This Part comprises 15 Chapters, including a description of the approach to the EIA (**Chapter 2: EIA Methodology**); the Site, existing land-use activities and surroundings (**Chapter 3: Existing**

Land Uses and Activities); the main alternatives that were reasonably considered by the Applicant (**Chapter 4: Alternatives and Design Evolution**); the nature, extent and justification for the Development (**Chapter 5: The Development**) and the Works (**Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**). Chapters 7 to 14 present the findings of the EIA for the following disciplines: Transport; Noise and Vibration; Air Quality; Archaeology; Water Resources and Flood Risk; Wind Microclimate; Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare; and Cumulative Effects. **Chapter 15: Residual Effects and Monitoring** presents a summary of the residual effects and proposed monitoring identified in the ES.

1.23 Each technical Chapter of the ES is set out in accordance with Government guidance and best practice,and comprises: (i) an introduction; (ii) a methodology of assessment (iii) a description of baseline conditions; (iv) an assessment of the likely environmental effects of the Development; (v) a description of mitigation measures and discussion on residual effects and (vi) a summary of the key issues.

1.24 There is a summary of the residual effects and any monitoring of post-mitigation environmental effects in **Chapter 15: Residual Effects and Monitoring**.

1.25 Further detail on the structure of the technical chapters is provided in **Chapter 2: EIA Methodology**.

Environmental Statement Part 2 – Figures

1.26 Part 2 of the ES comprises a set of figures and illustrations that support the main text of the ES (**Part 1**). Therefore **Part 1: Main Text** and **Part 2: Figures** should be read in conjunction with one another.

Environmental Statement Part 3 – Townscape, Visual Impact and Built Heritage Assessment

1.27 Part 3 sets out the findings of the Townscape, Visual Impact and Built Heritage Assessment, including a series of Accurate Visual Representations (AVRs) of the Development. Although separate from **Part 1**, the assessment described in **Part 3: Townscape, Visual Impact and Built Heritage Assessment** forms an integral part of the EIA reported in this ES.

Environmental Statement Part 4 – Appendices

1.28 **Part 4** comprises appendices (such as data, reports and correspondence) that are relevant evidence bases to the assessments reported in **Part 1** of this ES. All appendices are supplied as a separate part of the ES to prevent the main text of the ES becoming excessively long.

Environmental Statement – Non-Technical Summary

1.29 This comprises a summary of the ES in 'non-technical language' as required under the EIA Regulations. Its objective is to provide a concise and balanced summary of the ES without excessive technical detail or scientific language, so as to be readily and quickly understood by non-technical experts and members of the public that are not familiar with EIA terminology. The NTS is produced as a separate document to facilitate wider public distribution.

Project Team

1.30 The EIA has been co-ordinated by Waterman IE. Waterman IE has prepared the ES in conjunction with a team of competent experts, as required by Regulation 18 of the EIA Regulations, which states:

"In order to ensure the completeness and quality of the environmental statement: (a) the developer must ensure that the environmental statement is prepared by competent experts; and (b) the environmental statement must be accompanied by a statement from the developer outlining the relevant expertise or qualifications of such experts".

1.31 **Table 1.1** sets out a summary of relevant qualifications and experience for the professional team who have prepared and contributed to this ES. It should also be noted that Waterman IE is a Registered Environmental Impact Assessor Member of the Institute of Environmental Management and Assessment (IEMA), providing independent recognition of the quality of Waterman's EIA work.

Table 1.1: Competent Experts' Qualifications and Experience

Name	Qualifications	Relevant Experience
Jo Dickson	BA (Hons), MSc. Associate member of the Institute of Environmental Management and Assessment (IEMA).	12 years' experience of preparing EIAs under the Town & Country Planning Act EIA Regulations.
Peter Gardner	BSc (Hons), MSc. Full member of the Institute of Environmental Management and Assessment (IEMA). Chartered Environmentalist	Over ten years experience preparing and coordinating EIA for a variety of projects, under the Town & Country Planning Act EIA Regulations.
Mark Maclagan (Noise and Vibration)	Corporate Member of the Institute of Acoustics (MIOA).	13 years' experience of preparing Noise and Vibration Environmental Statement Chapters and Planning Assessments under the Town & Country Planning Act EIA Regulations.
Niall Machin (Ecology)	Full Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM).	Over 20 years' experience of ecology surveys and ecological appraisals, 10 years of preparing Sustainability Appraisals, Strategic Environmental Assessments and Habitat Regulation Assessments, 5 years of preparing and assuring ecology chapters for Environmental Statements under the Town & Country Planning Act EIA Regulations and the design of mitigation strategies.
Guido Pellizzaro (Air Quality)	Member of the Institute of Air Quality Management.	Over 10 years of air quality consultancy experience and a technical expert in the use of a variety of advanced atmospheric dispersion models (including the ADMS and

Name	Qualifications	Relevant Experience
	Member of the Institute of Environmental Science. Associate Member of the Institute of Environmental Management and Assessment (PIEMA). Associate member of the All Party Parliamentary Group on Air Pollution.	AERMOD suite of models) as well as screening air quality modelling methods (DMRB and WebTAG) and undertaking Air Quality Environmental Statement Chapters.
Freddie Alcock (Ground Conditions and Contamination)	IEMA Practitioner. BSc (Hons). MSc.	Over 10 years' experience of detailed site investigation, hydrogeological and groundwater characterisation, brownfield redevelopment, waste classification and soil and groundwater remediation. Freddie also has experience of preparing and assuring ground conditions and contamination chapters under the Town and Country Planning Act EIA Regulations.
David Purcell (Water Resources and Flood Risk)	BTEC. ONC. HNC.	Civil engineer with 20 years' experience, undertaking SuDS and drainage design and preparing flood risk assessments in Flood Zones 1 to 3b.
Russell Vaughan (Transport)	BSc (Hons). BEng (Hons).	Approximately 20 years' experience in Transport Planning and Highway Engineering. Areas of expertise include the design of highway accesses and parking arrangements associated with major retail and mixed-use developments. Also has considerable experience in the production of highway designs, junction designs and the use of capacity assessment models required for Transport Assessments and master planning studies.
Jon Winchester	BSc in Mathematics. MSc in Mechanical Engineering. PhD in Mechanical Engineering.	5 years' experience of CFD for built environment, developed methods for pedestrian comfort analysis, wind loading and natural ventilation. Lead on various architectural CFD projects, including the 22 Bishopsgate pedestrian comfort study.
Maddalena Liverani	MSc. ARB.	6 years' experience of undertaking daylight and sunlight, solar glare, light pollution and overshadowing assessments. Undertaken research at University of Westminster (London) to develop her dissertation on daylight for office buildings under different climatic conditions.
Peter Stewart	MA (Cantab). Dip Arch. RIBA.	Former Director of Design Review at the Commission for Architecture and the Built Environment (CABE).

Name	Qualifications	Relevant Experience
		12 years' experience of preparing townscape, visual Impact, and built heritage assessments for major projects under the Town & Country Planning Act EIA Regulations.
Sinead Marshall	B.A. Archaeology and German (Joint Hons). Health, Safety and Welfare at Work (EQF 4 Cert). Health, Safety and Environment Test (CSCS). Associate Member of Chartered Institute of Archaeologists (ACIfA).	Archaeologist since 1995. Commercial and research fieldwork in the UK and abroad, on a range of large infrastructure projects to small developments, in urban and rural contexts. Archaeological Site Director, Licenced to direct archaeological investigations (Ireland) since 2007. Archaeological consultant with MOLA since 2015, carrying out Historic Environment Assessment and providing consultancy for proposed developments, ES Chapters for EIA and WSIs for pre-planning fieldwork across London and the south-east.
Ellie Evans (Volterra)	Member of the Institute of Economic Development.	14 years' experience preparing socio-economic and health impact assessments under the Town & Country Planning Act EIA Regulations. Ellie also has experience of being an expert economic witness at public inquiry.

1.32 In addition to the competent experts as set out in **Table 1.1**, the assessments undertaken have been based on information provided by the professional team as set out in **Table 1.2**.

Table 1.2: Professional Design Team

Role	Organisation
Applicant	GPE (St Thomas Street) Limited (GPE)
Planning Consultant	DP9
Project Managers	Gardiner & Theobald (G&T)
EIA Project Managers and authors of technical assessments for: air quality, noise and vibration. Author of Water Resources and Flood Risk Chapter	Waterman IE
Planning Lawyers	Linklaters
Architect	Allford Hall Monaghan Morris (AHMM)
Landscape Architect	MRG Studio
Transport Consultant	Transport Planning Practice (TPP)
Archaeology Consultant	Museum of London Archaeology (MOLA)
Wind Microclimate Consultant	Wirth Research
Daylight, Sunlight, Overshadowing and Solar Glare Consultant	GIA
Townscape, Visual Impact and Built Heritage Consultant	Peter Stewart Consultancy and KMHeritage
Economics and Health Consultant	Volterra

Role	Organisation
Utilities, transport, flood risk and structural engineers	AKTII
Mechanical and Electrical Engineers	Chapman BDSP
Construction Advisors	Gardiner & Theobald

ES Availability and Comments

1.33 The ES is available for viewing by the public on the SC website: https://www.southwark.gov.uk/. Copies of the ES are also available for viewing by the public during normal office hours in the planning department of SC at the address provided below. Comments on the planning application should be forwarded to the SC planning case officer at the address given below:

Southwark Council
160 Tooley Street
PO BOX 64529
London
SE1P 5LX
Tel: 0207 525 5000

1.34 Additional copies of the ES can be purchased from Waterman IE on request (contact details below). A CD version of the ES can be purchased at a cost of £25.

Waterman Infrastructure & Environment Ltd
Pickfords Wharf
Clink Street
London
SE1 9DG
Tel: 020 7928 7888
Email: ie@watermangroup.com

waterman

References

[1] Greater London Authority, (2016); London Plan: Spatial Development Strategy for London Consolidated with Alterations since 2011. March 2016

[2] Greater London Authority, (2018); Draft New London Plan, August 2018.

[3] Her Majesty's Stationery Office, (2017); Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

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2. EIA Methodology

Introduction

2.1 This chapter sets out the general approach to, and methodology for undertaking, the Environmental Impact Assessment (EIA). Consideration is given to the legislative framework within which the EIA has been undertaken and to the process of scoping the EIA. In particular, this chapter details the process of identifying the environmental issues to be addressed in the EIA and the general method of assessing the likely significance of effects.

2.2 Specific assessment methodologies and significance criteria relating to each technical assessment scoped into the EIA are provided in the relevant technical chapters of this Environmental Statement (ES) (**Chapter 7** to **Chapter 14** inclusive) and in **Part 3: Townscape, Visual Impact and Built Heritage Assessment**.

General Approach

2.3 As outlined in **Chapter 1: Introduction**, this ES has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017[1] (hereafter referred to as the 'EIA Regulations'). Reference has also been made to currently available best practice guidance in EIA, including (but not limited to) the:

- Planning Practice Guidance[2]; and
- Institute of Environmental Management and Assessment's (IEMA's) Guidelines for Environmental Impact Assessment[3].

2.4 The EIA has considered the potential environmental effects of the Development using current knowledge of the Site and the surrounding environment.

2.5 The assessments have addressed both the potential beneficial and adverse significant effects of the Development during the Works, and once the Development is completed and operational. In line with legislative and best practice requirements, direct, indirect, cumulative, short-term, medium-term, long-term, permanent, temporary, beneficial and adverse effects have been addressed where applicable. The approach taken in the assessment of cumulative effects is set out later in this chapter and within **Chapter 14: Cumulative Effects**.

2.6 As outlined in **Chapter 1: Introduction**, the Applicant is seeking full planning permission for the Development. The description of the Development within this ES must be sufficient to enable the requirements of the EIA Regulations to be fulfilled and, in particular, to enable the identification of the likely significant effects of the Development.

2.7 The details of the demolition, deconstruction refurbishment and construction, and operation of the Development which are assessed and reported in this ES are set out in **Chapter 5: The Development** and **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**.

2.8 Detailed technical studies have been undertaken on an on-going basis throughout the design process, providing information about environmental issues, constraints and opportunities that may influence the design of the Development. The Applicant and the design team have therefore taken these environmental issues and constraints into account during the design evolution and sought to 'design out' potential adverse effects, wherever possible and maximise opportunities to provide beneficial effects. Further details are provided in **Chapter 4: Alternatives and Design Evolution**.

2.9 Following the findings of various studies contributing to the EIA process, and where likely significant effects of the Development cannot be designed out as indicated within the relevant technical chapter, methods of avoiding, reducing, or offsetting significant adverse effects (collectively known as 'mitigation measures') were identified. Such mitigation measures are set out in each relevant technical Chapter.

Location of Information Required by 2017 EIA Regulations within ES

2.10 Schedule 4 of the EIA Regulations sets out the type of information that is required to assess the environmental effects of a development. This information, and where it can all be located within the ES, is presented in **Table 2.1**.

Table 2-1 Location of Information within the ES (as defined by Schedule 4 of the EIA Regulations)

Specified Information		Location in the ES
1.	A description of the development, including in particular:	
(a)	A description of the location of the development;	**Chapter 1**: Introduction **Chapter 3**: Existing Land Uses and Activities
(b)	A description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;	**Chapter 5**: The Development **Chapter 6**: Development Programme, Demolition, Deconstruction, Refurbishment and Construction
(c)	A description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;	**Chapter 5**: The Development **Chapter 6**: Development Programme, Demolition, Deconstruction, Refurbishment and Construction Energy Statement (submitted as a separate standalone document to support the planning application)
(d)	An estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities) and types of waste produced during the construction and operation phases.	**Chapter 6**: Development Programme, Demolition, Deconstruction, Refurbishment and Construction **Chapter 8**: Noise and Vibration **Chapter 9**: Air Quality **Chapter 11:** Water Resources and Flood Risk: **Appendix 11.1**: Flood Risk Assessment

Specified Information		Location in the ES
		Chapter 13: Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare **Appendix 2.1:** EIA Scoping Report including Preliminary Environmental Risk Assessment (PERA)
2.	A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	**Chapter 4**: Alternatives and Design Evolution
3.	A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	**Chapter 3**: Existing Land Uses and Activities All technical Chapters (**Chapters 7-14**) Townscape, Visual Impact and Built Heritage Assessment (provided in **Part 3** of this ES)
4.	A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape	All technical Chapters (**Chapters 7-14**) Townscape, Visual and Built Heritage Assessment (provided in **Part 3** of this ES)
5	A description of the likely significant effects of the development on the environment resulting from, inter alia:	
(a)	The construction and existence of the development, including, where relevant, demolition works;	**Chapter 6**: Development Programme, Demolition, Deconstruction, Refurbishment and Construction
(b)	The use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;	**Chapter 4**: Alternatives and Design Evolution **Chapter 5**: The Development **Chapter 11:** Water Resources and Flood Risk

Specified Information		Location in the ES
		Appendix 11.1: Flood Risk Assessment **Appendix 2.1:** EIA Scoping Report including Preliminary Environmental Risk Assessment (PERA) Sustainability Statement (submitted as a separate standalone document to support the planning application)
(c)	The emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;	**Chapter 6**: Development Programme, Demolition, Deconstruction, Refurbishment and Construction **Chapter 8**: Noise and Vibration **Chapter 9**: Air Quality **Chapter 13**: Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare
(d)	The risks to human health, cultural heritage or the environment (for example due to accidents or disasters);	All technical Chapters (**Chapters 7-14**). Townscape, Visual Impact and Built Heritage Assessment (provided in **Part 3** of this ES)
(e)	The cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;	**Chapter 14:** Cumulative Effects
(f)	The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;	**Chapter 5**: The Development **Chapter 9:** Air Quality
(g)	The technologies and the substances used	**Chapter 4**: Alternatives and Design Evolution **Chapter 5**: The Development All technical Chapters (**Chapters 7-14**) Townscape, Visual Impact and Built Heritage Assessment (provided in **Part 3** of this ES)
6.	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	**Chapter 2**: EIA Methodology All technical Chapters (**Chapters 7-14**) and the Townscape, Visual Impact and Built Heritage Assessment (provided in **Part 3** of this ES), where appropriate.

Specified Information		Location in the ES
7.	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	All technical Chapters (**Chapters 7-14**) Townscape, Visual Impact and Heritage Assessment (provided in **Part 3** of this ES)
8.	A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies	**Chapter 2**: EIA Methodology All technical Chapters (**Chapters 7-14**), where appropriate
9.	A non-technical summary of the information provided under paragraphs 1 to 8.	Non-Technical Summary (NTS) (a separate standalone document)
10.	A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.	All technical Chapters (**Chapters 7-14**) and the Townscape, Visual Impact and Built Heritage Assessment (provided in **Part 3** of this ES), where appropriate.

Requirements of the EIA Process

Scoping of the EIA

2.11 The ‘Scoping’ stage of the EIA process involves focussing the study (and hence the ES) on those issues of greatest likely significance throughout the design and construction, completion and operation of the Development, to ensure that appropriate mitigation options are considered and where possible incorporated into the Development.

2.12 The 2017 Regulations provide applicants with the opportunity to ask the relevant Local Planning Authority to state in writing the information that they believe ought to be provided in an ES, i.e. a ‘Scoping Opinion’. However, it should be noted that seeking a Scoping Opinion from a Local Planning Authority is not mandatory. The Applicant commissioned Waterman Infrastructure &

Environment (Waterman IE) to undertake an EIA Scoping Study and seek a Scoping Opinion from Southwark Council (SC).

2.13 The key issues to be scoped into the EIA were identified through a review of the emerging Development design, the consideration of available baseline information, consultation with various statutory consultees, and the application of professional judgement and relevant experience.

2.14 The findings of this exercise were presented within an EIA Scoping Report (refer to **Appendix 2.1**), submitted to SC on 3 August 2018, to provide SC and the relevant statutory consultees with an opportunity to comment on the content and broad EIA methodology.

2.15 It should be noted that prior to the request for an EIA Scoping Opinion made on the 3 August 2018, draft versions of the EIA Scoping Report had been submitted to SC for their consideration (in July 2017 and May 2018) with regard to the iterations of the emerging proposals that are described broadly within **Chapter 4: Alternatives and Design Evolution**, following which meetings were held with SC to discuss informally the proposed approach to the EIA.

2.16 Following receipt of the EIA Scoping Report, SC consulted with a number of statutory and non-statutory consultees before providing their formal EIA Scoping Opinion which was received on 4 October 2018 (**Appendix 2.2)**.

Potentially Significant Issues

2.17 Based on the EIA Scoping process, as identified above, it was concluded that the Development would have the potential to give rise to a number of significant environmental effects that would need to be considered and assessed as part of the overall EIA process. These were categorised within key topic areas as listed below, and are presented according to the Part (and where relevant, Chapter) in which they are considered within this ES:

- Transportation and Access (ES Part 1, Chapter 7);
- Noise and Vibration (ES Part 1, Chapter 8);
- Air Quality (ES Part 1, Chapter 9);
- Archaeology (ES Part 1, Chapter 10);
- Water Resources and Flood Risk (ES Part 1, Chapter 11);
- Wind Microclimate (ES Part 1, Chapter 12);
- Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare (ES Part 1, Chapter 13);
- Cumulative Effects (ES Part 1, Chapter 14);
- Residual Effects and Monitoring (ES Part 1, Chapter 15); and
- Townscape, Visual Impact and Built Heritage Assessment (ES Part 3).

Insignificant Issues

2.18 As part of the EIA scoping process, it was agreed with SC that the following themes and new topic areas (which were not included within the previous EIA Regulations[4]) would be unlikely to give rise to significant environmental effects as a result of the Development. Accordingly, the following environmental disciplines were considered as 'insignificant issues' and therefore are not considered further within this ES:

- Socio-economics;
- Human Health;
- Ground Conditions and Contamination;
- Biodiversity;
- Climate Change;
- Waste; and
- Risk of Major Accidents and Disasters.

2.19 In addition, it was agreed that effects on telecommunications and risk to aviation were not considered significant issues and also are engineering design issues rather than environmental effects. Further details on why topics were scoped out are included in **Appendix 2.1** EIA Scoping Report and **Appendix 2.2** EIA Scoping Opinion.

Consultation

2.20 Consultation was carried out throughout the EIA process. The following statutory and non-statutory organisations were consulted regarding the Development throughout the EIA process either directly by the EIA team or by SC through the Scoping Opinion consultations:

- Southwark Council (SC);
- Greater London Authority (GLA);
- Environment Agency;
- Natural England;
- Historic England;
- Greater London Archaeological Advisory Service (GLAAS);
- Transport for London (TfL);
- London Underground Limited (LUL);
- Network Rail (NR);
- Thames Water (TW); and
- Local community groups and residents (see paragraph 2.24).

2.21 All received and relevant comments from the consultees relating to the EIA, whether made directly to the EIA consultant team or through the Scoping Opinion, are addressed in the relevant technical Chapters (**Chapters 7** to **14** and **Part 3 of the ES**). A summary of the comments made within the Scoping Opinion, together with a reference to the location within the ES or other documents where the comments are addressed, can be found in **Table 2.2**.

2.22 Copies of consultation responses received directly by the EIA consultant team, in addition to those received by SC as part of their consultation process, can be found in **Appendix 2.3**.

Table 2.2: Summary of Key Points raised in Scoping Opinion

Summary of Key Points Received	Location of Response provided in ES / Planning Application
Southwark Council	
The Applicant should ensure that adequate detail on the final proposals is included in the ES.	Chapter 5: The Development
The ES should ensure that the full range of potential of effects is considered in each assessment where applicable and should be clear as to which effects are considered significant in the context of the EIA Regulations.	Chapters 7 to 14
The ES should clearly set out which mitigation measures have been incorporated into the design of the scheme and which are additional measures to address significant effects.	Chapter 4: Alternatives and Design Evolution and Chapters 7 to 14
A description should be provided of the reasonable alternatives for ground level pedestrian routes studied by the developer.	Chapter 4: Alternatives and Design Evolution Pedestrian Forecast & Landscape Assessment
Any mitigation measures proposed for inclusion in the outline Travel Plan, including any contingency measures identified, should be properly assessed and any effects and their significance identified.	Chapter 7: Transportation and Access
Details of alternative servicing arrangements that have been considered. The rationale for selecting the chosen option and the reasons for other arrangements being discounted should accordingly be provided.	Chapter 4: Alternatives and Design Evolution
The scope and measurement procedures for baseline noise and vibration surveys are required to be agreed in consultation with LBS EHO.	Appendix 8.4: Correspondence with Southwark Council Environmental Health Department
The ES should confirm that receptor locations identified include amenity areas. And how the construction noise assessment has taken account of existing ambient noise conditions at receptors.	Chapter 8: Noise and Vibration
The potential effects of vibration from the Jubilee Line on the completed development should also include an assessment of potential groundborne noise.	Chapter 8: Noise and Vibration
The ES should give consideration to the Mayor of London's policy on achieving the World Health Organisation's recommended PM2.5 threshold of 10 µg/m^3.	Chapter 9: Air Quality
The relevant correspondence on with the Environmental Protection Team within SC confirming that baseline monitoring not required should be included in the submission.	Appendix 9.1: Correspondence with Southwark Council
Screening of construction vehicle impacts using IAQM Land Use and Development should be used to determine if a quantitative detailed modelling study should be undertaken.	Chapter 9: Air Quality
If no dispersion modelling of road sources is to be included to consider where the development could have a significant effect on traffic flows, the ES should include any relevant	Chapter 9: Air Quality, Appendix 9.1 Correspondence with Southwark

waterman

Summary of Key Points Received	Location of Response provided in ES / Planning Application
correspondence on this matter (from the Council's Environmental Protection Team) and an air quality neutral assessment provided.	Council and Appendix 9.4 Air Quality Neutral Assessment
Air quality concentrations need to be predicted at the proposed development to establish if any mitigation is required for the proposed property use. It is recommended that dispersion modelling is undertaken at areas of ambient air intake such as windows or air intakes for mechanical ventilation.	Chapter 9: Air Quality
Hourly mean nitrogen dioxide concentrations should be assessed at any potentially relevant exposure location where annual mean levels are forecast to be above 60 $\mu g/m^3$.	Chapter 9: Air Quality
The detailed dispersion modelling should consider the maximum contribution of NOx/NO2 in the local area by modelling across a grid centred on the site.	Chapter 9: Air Quality and Figure 9.3
Cross reference should also be made to specialist sections in the ES considering artificial lighting, as well as to shading that may result from the new development.	Part 3 of ES, cross referencing with Chapter 13 Daylight, Sunlight Overshadowing, Light Pollution and Solar Glare
The assessment should include an assessment of the visual effects upon people in buildings, streets and spaces which surround the site, as well as visual receptors in the wider area. These should include local residents and those travelling on the Thames Path National Trail and River Thames.	Part 3 of ES
All LVMF views and "locally significant" views identified in relevant planning policy and guidance documents or Conservation Area appraisal should be considered.	Part 3 of ES
A Zone of Theoretical Visibility map will be a useful reference tool to include in the assessment.	Part 3 of ES
The Heritage Statement should be included as a technical appendix to the ES and cross-referenced where appropriate.	Part 3 of ES
The heritage assessment must present a full consideration of significant effects on the designated and non-designated assets on site, as well as any heritage assets in the wider area. Any mitigation for effects identified by the Heritage Statement and the noise and vibration assessment (see below) should also be included in the heritage assessment.	Part 3 of ES
There is no mention of heritage significance in the scope of the proposed heritage assessment. It is the effect on a heritage asset's significance that forms the primary focus of any heritage assessment and this should be taken into account in the assessment. The assessment must also articulate the way in which an asset's setting contributes (or otherwise) to its heritage values and its overall heritage significance. It is recommended that this information is broken down into appropriate sub-headings, and supported by a range of clearly referenced images.	Part 3 of ES

Summary of Key Points Received	Location of Response provided in ES / Planning Application
ES to include plan of archaeological potential, DBA and consultation summary with local archaeological officer.	Figure 10.2: Archaeological Survival Potential within the Site, Appendix 10.1: Historic Environment Assessment and Appendix 10.2: Letter from MOLA to Southwark Council's Archaeological Officer
A qualitative assessment of the effects during demolition and use the CFD modelling of the completed Development, to qualitatively comment on the effects during construction, when it is nearing completion is acceptable.	Chapter 12: Wind
Student residential accommodation should be assessed for daylight and sunlight and any classrooms or teaching spaces in the London School of Commerce should be assessed for daylight.	Chapter 13: Daylight, Sunlight Overshadowing, Light Pollution and Solar Glare
The use of alternative target values (ATVs) derived in accordance with Appendix F of the BRE Guide are acceptable if it is considered necessary to deviate from the factors stated in Appendix I of the BRE Guide.	Chapter 13: Daylight, Sunlight Overshadowing, Light Pollution and Solar Glare. ATVs not used within assessment.
Water Resources and Flood Risk should be scoped into the EIA due to the potential flood risk to the Site and impact to existing surface water drainage and foul sewer network capacity. The assessment should consider the risk of groundwater flooding to the basement levels, especially considering that the main tower development requires a double basement.	Chapter 11: Water Resources and Flood Risk
Ground conditions and contamination can be scoped out of the EIA. Measures to deal with the excavation of Made Ground, UXO, storage/re-use/disposal of waste soils, dewatering effluent, and ground gas risks must be included for in a CEMP that will be subject to a planning condition.	EIA Scoping Report (Appendix 2.1), Detailed UXO Risk Assessment (Appendix 3.1) and Preliminary Environmental Risk assessment (Appendix B to EIA Scoping Report) and Construction Management Plan (standalone document)
The application should detail any special measures needed to protect workers or the public as the south-eastern corner of the Site is likely to be a historic grave pit.	ES Chapter 10: Archaeology and Construction Management Plan (standalone document)
Ecology can be scoped out of the EIA. Update the Preliminary Ecological Appraisal in light of Development proposals and submit to support planning	EIA Scoping Report (Appendix 2.1), Preliminary Ecological Appraisal (Appendix C to EIA Scoping Report) Updated Preliminary Ecological Appraisal submitted as standalone document.
Waste can be scoped out of the EIA, however chapter 6 of the ES should include information on the estimated total arisings of demolition and construction waste, the proportion of waste to be reused and whether this re-used waste will require processing. The sources and disposal methods and locations of materials and waste should be identified, as should approaches that will be implemented to maximise resource efficiency.	Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction

Summary of Key Points Received	Location of Response provided in ES / Planning Application
Telecommunications can be scoped out of the EIA.	EIA Scoping Report (Appendix 2.1)
Environment Agency	
Flood risk should be scoped into the EIA as the site is at risk of flooding if there were to be a breach in the defences.	Chapter 11: Water Resources and Flood Risk
Confirmed that it was appropriate to scope out ground contamination and that issues can be dealt with by planning conditions	EIA Scoping Report (Appendix 2.1) and Preliminary Environmental Risk assessment (Appendix to EIA Scoping Report)
Transport for London	
Details of alternative servicing arrangements that have been considered should be included.	Chapter 4: Alternatives and Design Evolution
London City Airport	
Discussions held post receipt of the Scoping Opinion confirmed no impact on London City Airport.	N/A

2.23 Consultation with Historic England, the GLA and other bodies including Historic Royal Palaces took place in relation to the townscape, visual impact and built heritage assessment. This consultation is reported in **Part 3: Townscape, Visual Impact and Built Heritage Assessment**.

2.24 Kanda Consulting LLP undertook comprehensive consultation with the local community through a survey in September 2017, meeting local stakeholder groups and public events in July 2017 and October 2018 on the Development proposals. In addition, the Applicant has provided regular updates on the proposals for the Development to the London Bridge Stakeholder Board Bi-annual meeting, a meeting organised by Southwark Council and Team London Bridge to facilitate discussion between Stakeholder Groups and major land owners in the area.

Means of Assessment

2.25 Detailed methodologies for the assessment of each of the environmental topic areas scoped into the EIA are provided within each technical chapter of this ES (**Chapters 7 to 14** inclusive and **ES Part 3: Townscape, Visual Impact and Built Heritage Assessment**). However, in general terms, the assessments have been based upon:

- a review of the current situation at and surrounding the Site for the environmental topic areas under consideration, via various sources of existing information, data and reports;
- desk-top studies;
- Site surveys;
- consideration of relevant legislation and planning policies (national, regional and local);
- identification of potential environmental effects and an evaluation of their likely duration, magnitude and significance;
- consideration of potentially sensitive receptors that could be affected by the Development;
- expert opinion;

- the use of technical guidance and best practice; and
- specific consultations with the appropriate organisations (e.g. Environment Agency and Thames Water).

Evaluation of Significance

2.26 The EIA process aims to provide SC with sufficient information with respect to the 'likely significant environmental effects' of the Development, in order to aid the planning decision making process.

2.27 Likely significant environmental effects associated with the Development have been assessed with reference to definitive standards and legislation, where available. Where it was not possible to quantify the likely significant effects, qualitative assessments were carried out, based on available knowledge and professional judgement. Where professional judgement was used, or where uncertainty exists, this is noted in the relevant technical Chapter.

2.28 The significance of the predicted likely significant effects has been determined with reference to assessment criteria for each environmental topic considered. These criteria apply a common EIA approach of classifying effects according to whether they are major, moderate, minor or insignificant and whether the effects are considered to be adverse or beneficial.

2.29 Specific criteria for each environmental topic were developed, giving due regard to the following factors:

- Extent and magnitude of the effect;
- Duration of the effect (whether short, medium or long-term);
- Nature of the effect (whether direct or indirect, reversible or irreversible);
- Likelihood of the effect to occur;
- Whether the effect occurs in isolation, is cumulative or interactive;
- Performance against environmental quality standards or other relevant pollution control thresholds;
- Sensitivity of the receptor; and
- Compatibility with environmental policies.

2.30 In order to provide a consistent approach to expressing the outcomes of the various technical assessments undertaken as part of the EIA, the following terminology has been used throughout this ES to define residual effects:

- **Adverse** – detrimental or negative effects to an environmental resource or receptor;
- **Insignificant** – no effects to an environmental resource or receptor; or
- **Beneficial** – advantageous or positive effect to an environmental resource or receptor.

2.31 Where adverse or beneficial effects have been identified, these have been assessed against the following scale:

- **Minor** – slight, very short or highly localised effects of no significant consequence;

- **Moderate** – limited effect (by extent, duration or magnitude) which may be considered significant; and
- **Major** – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

2.32 Effects have, therefore, been expressed as either:

- Beneficial effects of major, moderate or minor significance;
- Insignificant effects: No significant effects (either adverse or beneficial) to environmental resources or receptors; and
- Adverse effects of minor, moderate or major significance.

2.33 For the purposes of this ES, minor, moderate and major are all considered as significant effects. The exception to this is in the Townscape, Visual Impact and Built Heritage Assessment where minor or minor/moderate effects are considered to be not significant; moderate and major effects are considered as significant effects.

2.34 Each of the technical chapters within the ES will outline the criteria, including sources and justifications, for identifying the different levels of effect. Where possible, this is based upon quantitative and accepted criteria together with the use of value judgements and expert interpretations, where necessary, to establish to what extent an effect is environmentally significant.

2.35 Specific criteria for each environmental topic will give due regard to the following factors:

- Extent and magnitude of the effect;
- Duration of the effect (whether short, medium or long-term);
- Nature of the effect (whether direct or indirect, reversible or irreversible);
- Likelihood of the effect to occur;
- Whether the effect occurs in isolation, is cumulative or interactive;
- Performance against environmental quality standards or other relevant pollution control thresholds where appropriate;
- Sensitivity of the receptor; and
- Compatibility with environmental policies.

2.36 In this ES, the following terminology will also be used to define the temporal and spatial scale of the effects:

- 'Short' to 'medium-term' effects are considered to be those associated with the demolition, deconstruction, refurbishment and construction of the Development;
- 'Long-term' effects are those associated with the completed and operational Development;
- 'Local' effects are those affecting neighbouring receptors;
- 'District' effects are those which are likely to occur to receptors within the administrative boundary of Southwark Council;
- 'Regional' effects are those affecting receptors within the Greater London area; and

- ‘National’ effects are those that affecting receptors within different parts of the country or England as a whole.

Establishing a Baseline

2.37 For the purposes of EIA, the baseline condition is the baseline against which the assessment of likely changes (i.e. environmental effects) arising from demolition, construction and operational use of a development is made. These are generally taken to be the environmental and built characteristics of a site (in terms of air quality, noise, ecology, geology) and its environs that exist at the time of undertaking the EIA.

2.38 To establish a robust baseline for the EIA, Site surveys and desk-based data collation was undertaken in respect of the existing conditions of the Site and immediate surroundings during 2017 and 2018. Where data is used before this time, this is considered in the relevant technical chapter. Baseline conditions, which are described in each of the technical chapters (**Chapter 7** to **Chapter 13**) of the ES, were established through a review of publicly available records, data, historical reports and surveys.

Cumulative Effects

2.39 In line with the 2017 EIA Regulations, an EIA must consider the cumulative effects or effect interactions of a development. Cumulative effects are those that result from incremental changes caused by other present or reasonably foreseeable activities or projects in the local area, in combination with the Development. Further details of the committed developments, including how they were identified and their location relative to the Site, are provided in **Chapter 14: Cumulative Effects**.

Reporting Structure of Part 1 Technical Chapters

2.40 Each key environmental topic considered in the EIA has been assigned a separate chapter in this ES (**Chapters 7 to Chapter 14** inclusive), with the exception of the Townscape, Visual Impact and Built Heritage Assessment which is presented as a separate part (**Part 3**) of the ES. Within each of the ES Part 1 technical chapters, the assessment is presented and reported in the following format:

Introduction

2.41 This provides a brief introduction to the assessment and the issues considered in the chapter. It confirms the author and highlights relevant appendices which accompany the chapter.

Assessment Methodology and Significance Criteria

2.42 This section of each assessment sets out the methods used in undertaking the technical study, together with an explanation of the approach to defining the significance of likely environmental effects with reference to published standard guidelines, best practice and defined significance criteria. The limitations and assumptions of the assessment are also defined, together with any specific consultation undertaken to agree the scope or methodology of the assessment

Baseline Conditions

2.43 In order to assess the likely significant effects of the Development, it is necessary to establish the environmental conditions that currently exist on and surrounding the Site, in the absence of the Development. These are known as baseline conditions. The baseline conditions relevant to each environmental issue are set out in this section. For the purposes of the EIA, the baseline conditions have been taken as the existing conditions when surveys were undertaken or when latest relevant baseline data were available, as described in each assessment.

Likely Significant Effects

2.44 This section of each technical Chapter presents the assessment of the likely significant effects of the Development during the Works and once the Development is completed and operational. The assessments were carried out in relation to the relevant baseline conditions. An evaluation of the significance of the likely effect is given in accordance with relevant criteria as defined earlier in the assessment.

Mitigation Measures and Likely Residual Effects

2.45 One of the principal aims of the EIA is to identify, and so assist in developing, mitigation measures to prevent, reduce and where possible, offset significant adverse effects of a development. An iterative approach was adopted towards the design of the Development, which evolved in parallel with the EIA process. This enabled many mitigation measures to be effectively designed into the Development (inherent mitigation), thereby reducing the need for further mitigation. Mitigation measures can relate to design, the Works or the activities associated with the completed and operational Development. Inherent mitigation within the design of the Development is considered within the Likely Significant Effects sections as described above.

2.46 Where significant adverse environmental effects have been identified, the Applicant has committed to implement additional appropriate mitigation measures as set out in the relevant technical assessments, in order to further prevent, reduce and, where possible, offset any significant adverse effects of the Development.

2.47 This section also identifies the nature and significance of the likely residual effects of the Development, assuming the implementation of the proposed mitigation measures. The significance of likely residual effects is identified in accordance with the significance criteria defined for the respective technical assessment.

Monitoring

2.48 In compliance with Schedule 4(7) of the EIA Regulations, the ES chapter where appropriate outlines monitoring arrangements post mitigation to cover both the construction and operational phases.

Reporting Structure of Part 1 Summary Chapter

2.49 In compliance with Schedule 4(7) of the EIA Regulations, Chapter 15 will demonstrate, where appropriate, post mitigation monitoring of environmental conditions is required. The chapter will also summarise the residual effects following mitigation.

Planning Documentation

2.50 Additional documentation that will be submitted to accompany the planning application includes, but is not limited to, the following:

- Application Document, Covering Letter and Application Forms;
- Planning Application figures and drawings (including a Site Location Plan, existing and proposed floor plans / sections / elevations, and Planning Application Drawing Schedule);
- Planning Statement / Community Infrastructure Levy (CIL) Form & Certificates;
- Design and Access Statement;
- Landscaping Strategy;
- Statement of Community Involvement;
- Economic and Health Report;
- Energy Strategy;
- Sustainability Statement;
- Heritage Statement;
- Transport Assessment;
- Preliminary Ecological Appraisal;
- Delivery, Servicing and Waste Management Plan;
- Pedestrian Forecast and Landscape Assessment
- Transport Assessment Report including Interim Travel Plan;
- Basement Impact Assessment;
- Foul Sewage and Utilities Assessment;
- Lighting Assessment; and
- Construction Management Plan.

Assumptions and Limitations

2.51 The principal assumptions that have been made, and any limitations that have been identified in undertaking the EIA, are set out as follows:

- Information received from third parties is accurate, complete and up to date;
- All assessments are based upon the detailed planning application drawings, floorspace schedules, accommodation schedules, and landscape proposals submitted for approval;
- The assessment of likely significant effects associated with the Works is based upon the indicative demolition and construction programme which assumes works commence in quarter one 2022 and are completed in quarter four 2025, and methodologies as provided by the project team and agreed by the Applicant (refer to **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**);
- The relevant baseline conditions have been established from a variety of sources, including surveys, historical data and best available information at the time of undertaking the EIA;

- The design, demolition and construction, and completed and operational Development would satisfy environmental standards consistent with contemporary legislation, practice and knowledge as a minimum, but would also strive to achieve best practice at the time of the works;
- A Site-specific Environmental Management Plan (SEMP) to control construction activities would be agreed with SC after the planning application is determined. This SEMP would be enforced and monitored during all key stages of the Works;
- It has been assumed that the construction works on Shard Place will be completed by the time the Works start on Site.

2.52 Where relevant, assumptions specifically relevant to each topic area included within the ES are noted in **Chapters 7 to 14** inclusive of this ES.

References

[1] Her Majesty's Stationery Office, (2017); Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

[2] Department for Communities and Local Governance (DCLG), (2017); Planning Practice Guidance (Environmental Impact Assessment).

[3] Institute of Environmental Management and Assessment (IEMA), (2004); Guidelines for Environmental Impact Assessment 2004 (as amended 2006).

[4] Her Majesty's Stationery Office, (2011); Town and Country Planning (Environmental Impact Assessment) Regulations 2011.

3. Existing Land Uses and Activities

Introduction

3.1 This chapter presents a summary of the predominant existing land uses and activities currently within, and around the Site. This chapter also identifies the key environmental characteristics of the Site and its adjacent areas, thereby identifying potentially sensitive receptors which may be affected by the Development.

3.2 For a full description of the baseline conditions relevant to each technical assessment, reference should be made the relevant technical chapter of this ES (**Chapters 7 to 14**) and **Part 3: Townscape, Visual Impact and Built Heritage Assessment**.

Site Location and Setting

3.3 As described within **Chapter 1: Introduction** and illustrated in **Figure 1.1**, the Site is located within the administrative boundary of Southwark Council (SC) and covers an area of approximately 0.36 hectares (ha) of land. The planning application boundary for the Site is shown in **Figure 1.2**.

3.4 The Site is centred on National Grid Reference (NGR) 532727 180155 and is bound by:

- St. Thomas Street to the north;
- Guy's Hospital buildings to the east;
- King's Head Yard to the south; and
- Shops on Borough High Street (A3) to the west.

Summary of Site History

3.5 In prehistoric times, the Site was located on a gravel 'island' and was historically low-lying. There is evidence of prehistoric activity in the area, and some Roman settlement south of the River Thames (the 'Thames'), opposite the Roman and medieval city on the north bank, occurred on the Site.

3.6 The later medieval period (11-14th centuries) saw the southern side of the Thames develop with many townhouses, churches and inns. By this time the gravel islands are no longer visible.

3.7 The Site was adjacent to a busy road (what is now Borough High Street) extending from London Bridge, and was in the south-west corner of the walled precinct of St. Thomas' Hospital, established in the early 13th century. The principal buildings and church were located on the north side of St. Thomas Street, outside the Site. The rest of the Site is likely to have been developed with backyards and outbuildings of properties lining the road.

3.8 Braun and Hogenberg's pictorial map of 1572 (**Figure 6** within **Appendix 10.1**) is the earliest map available and shows the Site to be open land indicating that it would have been a burial ground.

3.9 By 1682 Morgan's map (**Figure 7** within **Appendix 10.1**) shows the area had changed dramatically with streets and buildings filling the open spaces. St. Thomas Street is shown and named as well as the churchyard to the south of the church, within the south-eastern part of the Site. A building likely to be a chapel is shown on the Site.

3.10 By 1875 there were residential terraced buildings along the north-eastern boundary. Small yards and gardens appear to the rear of these houses, which are the present Grade II listed buildings. There was a single building occupying the western and southern boundary and a dis-used graveyard situated in the south-east of the Site.

3.11 Whilst no significant changes were noted following 1882, a London Map indicates that the graveyard previously noted in the south-east of the Site was no longer present from 1938 onwards. The Site was relatively unaffected by bombing during the Second World War, with the majority of the area listed as receiving 'minor blast damage'.

3.12 Ordnance Survey (OS) extracts (1969-1983, 1981, and 1988) show the Site had been partially cleared for the building phase of New City Court. No terraced buildings are shown between numbers 24 and 18 St. Thomas's Street, presumably this area was cleared for an access route. Outbuildings and gardens had been cleared and the area of the graveyard was open space.

3.13 By 1991, new buildings had been constructed, resulting in the Site in its current setting, and no significant changes have occurred since. Some small buildings are shown at the west side of the Site, where today an open car and bicycle parking area exists above the underground car park.

Predominant Land Uses and Activities

3.14 The following sections should be read in conjunction with **Figure 3.1**, which illustrates predominant land uses currently existing within and immediately surrounding the Site. **Figure 3.1** also illustrates the potentially sensitive receptors and environmental constraints.

Within the Site

3.15 The Site is currently primarily occupied by Georgian terraced townhouses (the 'Georgian Terrace') at Nos. 4, 6, 8, 12, 14 and 16 St. Thomas Street, the part four and part five storey New City Court office building at No. 20 St. Thomas Street and Keats House at Nos. 24 to 26 St. Thomas Street.

3.16 The New City Court office building occupies the majority of the Site, whilst the Georgian Terrace forms most of the northern boundary of the Site. Keats House is located in the east of the Site.

3.17 Keats House comprises a relatively new building, which was constructed in the 1980s, together with the original front façade which dates to 1862. It was originally two houses, but only one entrance is currently in use. It is four storeys and is currently used as offices. The basement to first floor is accessed from the street while the upper floors are connected with the main New City Court building.

3.18 The Georgian Terrace comprises three storey early 19th Century houses with full attics and basements. They are Grade II listed and the listing includes the iron railings to the front of the properties and the pavement vaults. They are constructed of yellow brick with stucco (fine plaster) details, with slate roofs and sash windows. The townhouses are currently used as offices.

3.19 The Site currently provides approximately 12,763 sqm Gross Internal Area (GIA) of office floorspace and there are currently approximately 900 people employed on the Site. **Figure 3.2** presents a drawing of the existing Site.

3.20 In addition to the above, there is a central courtyard at lower ground level which adjoins the rear of the Georgian Terrace and a service area off King's Head Yard.

3.21 Vehicular and pedestrian access to the Site is currently from St. Thomas Street (A200) and King's Head Yard. There is no public open space on the Site; however, a non-public pedestrian route runs through the Site from St. Thomas Street to King's Head Yard.

3.22 A basement lies across the majority of the Site, with the exception of the south-east corner.

3.23 Levels across the Site are typically between 4.3m and 5.3m Above Ordnance Datum (AOD) but there are basement commercial units that are at 2.3m AOD.

3.24 There are gas mains running below St. Thomas Street to the north and King's Head Yard to the south. There is an existing electrical substation in the south west corner of the Site. This is positioned over two floors from basement to ground.

3.25 Vaults are located at basement level beneath the pavement on St. Thomas Street associated with the Georgian Terrace. They are constructed of masonry bricks and extend approximately 1.6m at No. 4 St. Thomas Street and 2.6m in front of Nos. 6-16 St. Thomas Street.

Existing Land Uses Surrounding the Site

3.26 The Site is located within the largely commercial area of London Bridge, although there are a variety of land uses within the surroundings of the Site. These include:

- Commercial properties located to the north, south-east and west of the Site, including shops, restaurants, office, hotels, public houses (including The Old King's Head), banks, museums and post offices;
- Residential properties situated on St. Thomas Street, King's Head Yard, White Hart Yard and Borough High Street; and
- King's College University facilities, including Guy's Campus, which comprises the hospital, student centre and student accommodation, as well as a library, IT suite, and auditoriums to the south and east of the Site.

3.27 The Shard, which is a mixed-use building, is located approximately 60m to the east of the Site and includes retail, offices, hotel, apartments, restaurants and a public viewing gallery. It is a destination for tourists. Other tourist attractions in the area include Borough Market, Shakespeare's Globe theatre, Hayes Galleria and Tate Modern. Southwark Cathedral is located to the west of the Site beyond Borough High Street. The Old Operating Theatre Museum and Herb Garret is located on the opposite side of St. Thomas Street to the Site.

3.28 External alterations and refurbishment works are currently taking place to the south-east of the Site, including landscaping works to Guy's Hospital Courtyard. Works are also taking place at Shard Place (formerly known as Fielden House), to the east of the Site, for the construction of a part 26 storey and part 16 storey tower, with 148 residential apartments and flexible retail space. Construction is due to be complete by 2020.

3.29 There is also a cellar along King's Head Yard belonging to The King's Head public house.

3.30 Surrounding land uses in the immediate vicinity of the Site are shown in **Figure 3.1**.

Key Existing Environmental Characteristics

Transportation and Access

3.31 The Site is located approximately 50m from the closest London Bridge Underground Station entrance on Borough High Street and is situated within 200m of the London Bridge Mainline station. As such, the Site is very well located for access to public transport.

3.32 In addition to the above, the Site is within walking distance of several bus services on Southwark Street and at the London Bridge bus station. Therefore, accordingly, the Site has a Public Transport Accessibility Level (PTAL) rating of 6b (the highest obtainable).

3.33 Borough High Street (the A3) is approximately 25m to the west of the Site. Beyond the Site, King's Head Yard turns south and becomes White Hart Yard, joining back onto Borough High Street. The local highway network in the vicinity of the Site is currently undergoing extensive changes as a result of the improvements at London Bridge Mainline station.

3.34 Cycle parking facilities are provided throughout St. Thomas Street in the form of Sheffield Stands. A cycle hire docking station is located on Tooley Street, approximately 400m (4-5 minute walk) to the north of the Site. The docking station has a maximum provision of 20 bikes.

3.35 Further details are provided in **Chapter 7: Transportation and Access** of this ES.

Noise and Vibration

3.36 As previously noted, the Site is situated in a busy central location and is surrounded by a mix of land uses, including commercial, residential, hospital and university uses.

3.37 The noise climate is dominated by constant vehicular traffic on St. Thomas Street/Borough High Street. Contributory noise from nearby construction activities, as well as noise from distant flying aircraft movements (approximately one plane every 10 minutes going over the Site) and distant mainline railways is audible. Baseline noise monitoring was undertaken and confirmed the east of the Site to be exposed to the highest levels of noise during the daytime, evening and night-time periods where it overlooks onto St. Thomas Street (monitoring position LT1). Average ambient (LAeq,T) noise levels of 64, 62 and 60 dB and maximum noise levels of 81, 80 and 77 dB LAFmax, 90th percentile were recorded during the daytime, evening and night-time periods respectively.

3.38 The Jubilee Line runs under the Site's north-western tip (see **Figure 3.3**) but detailed vibration measurements undertaken across the Site indicate that the Vibration Dose Values (VDV) levels associated with train movements during both the daytime and night-time periods will be 0.008 to 0.013 Maximum Vertical VDV (m/s$^{1.75}$) which is significantly below the "low probability of adverse comment" range (0.1 or 0.2 Maximum Vertical VDV (m/s$^{1.75}$)) as defined by BS 6472[1] within all areas of the Development.

3.39 Further details are provided in **Chapter 8: Noise and Vibration** of this ES.

Air Quality

3.40 In accordance with the 'UK Air Quality Strategy' (2007)[2] and Part IV of the 'Environment Act' (1995)[3], SC has and will continue to review the ambient air quality within their administrative boundary. As the levels of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) are not expected to meet the National Air Quality Strategy Objectives, the area in which the Site is located has been declared as an Air Quality Management Area (AQMA) for NO_2 and PM_{10}.

3.41 The Site is also located within the Congestion Charge Zone and Low Emissions Zone and will be within the Ultra Low Emissions Zone, which will take effect from 2020. This will require all vehicles entering the zone to meet specific exhaust emission standards or to pay a daily charge.

3.42 There is a London Underground Limited (LUL) vent from the underground that vents at the north-western corner of the existing New City Court building.

3.43 Potentially sensitive receptors include residential properties surrounding the Site, as well as the nearby hospital.

3.44 Further details are provided in **Chapter 9: Air Quality** of this ES.

Archaeology

3.45 The Site is located within the Borough, Bermondsey and Rivers Archaeological Priority Zone (which will be renamed Archaeological Priority Areas as part of a London-wide revision), as designated by SC owing to the potential for deposits from the prehistoric through to the industrial periods to be present relating to the exploitation of the Thames and local area.

3.46 The majority of the Site (with the exception of the Georgian Terrace of the Grade II listed buildings and the façade of Keats House), was previously demolished prior to the construction of the existing New City Court in the early 1980s. During the construction of New City Court, an archaeological investigation was undertaken and as much archaeology as possible was excavated down to natural deposits within the trenches on-site. Consequently, there is unlikely to be any surviving archaeology beneath New City Court, other than foundations of buildings or deep cut features. However, the investigation revealed significant multi-period remains including prehistoric pits with Iron Age pottery, at least seven Roman buildings and a possible medieval chapel likely associated with St. Thomas' Hospital, along with post-medieval buildings, and human remains associated with a later medieval and post-medieval St. Thomas' Hospital burial ground.

3.47 The Georgian Terrace was underpinned as part of the construction of New City Court in the 1980s. In addition, as part of the Jubilee Line works grouting would have been injected into the area below and around the Georgian Terrace to add additional strength to protect the tunnel. The extent of archaeological survival in this area is not known at present.

3.48 Further details are provided in **Chapter 10: Archaeology** of this ES.

Water Resources and Flood Risk

3.49 The Site is located approximately 200m to the south of the Thames and, according to the Environment Agency's Flood Map for Planning[4], the Site is located within Flood Zone 3 and is, therefore, considered to have a high probability of tidal and / or fluvial flooding. However, the Site is protected from flooding up to the 1 in 1,000-year standard by the Thames defences. Therefore, despite being located within an area at a high probability of flooding, the Site will be protected from tidal flooding assuming normal operation of the Thames' defences (see **ES Chapter 11 Water Resources and Flood Risk**).

3.50 The Thames Water Asset Map in **Figure 3.4** shows the existing public sewers in the vicinity of the Site. Running along King's Head Yard, on the southern boundary of the Site, there is a 375mm sewer (connecting to a combined Borough High Street sewer) which appears to lie in close proximity to the Site. On the northern boundary along St. Thomas Street there is a 1,143mm by 762mm main public sewer. Finally, on the east side, running from south to north, under the existing basement of Keats House there is a 300mm cast iron sewer. The main sewer in Borough High Street to the west is understood to sometimes cause flooding from surrounding surface sewers due to a lack of capacity in the main sewer.

3.51 On the northern boundary along St. Thomas Street there is a 250mm potable pipe. Running along King's Head Yard, on the southern boundary of the Site, there is a 180mm potable water pipe. Off this is a 65mm pipe of unknown condition coming to the Site.

3.52 Indications from available borehole records identify that the water table beneath the Site is generally 5m below ground level (0.00m AOD).

3.53 There is chalk at a depth of >50m below ground level and there is a 20m layer of clay, over 15m of Lambeth beds and 15m of Thanet formation above this layer. The Source Protection Zone (SPZ) map from Envirocheck indicates that the Site is not located within a groundwater SPZ. It is likely that any groundwater abstractions are from the Chalk Aquifer.

3.54 Further details are provided in **Chapter 11: Water Resources and Flood Risk** of this ES.

Unexploded Ordnance

3.55 Whilst London was heavily bombed during Second World War, the Site is not known to have suffered any direct bomb strikes, as shown on **Figure 3.5**. This would appear to be corroborated by the historic maps which show no extensive new buildings post the Second World War.

3.56 A detailed UXO Risk Assessment Report; DA3587-00 (**Appendix 3.1**) highlights the Site to be at low risk, with a small area of medium risk in the western section of the Site area, which is adjacent to the St. Thomas Street buildings and the New City Court courtyard.

Wind Microclimate

3.57 The Site is currently occupied by relatively low-rise buildings of up to five storeys in height. The wind microclimate conditions throughout and surrounding the Site are generally as would be expected within an urban environment, ranging from acceptable for long-term sitting to walking use during the windiest season (winter).

3.58 Further details are provided in **Chapter 12: Wind Microclimate** of this ES.

Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare

3.59 The baseline conditions at the Site are characterised by the existing relatively low-rise commercial buildings. There is no publicly accessible amenity space located within the Site. There are several tall buildings, including the seventeen storey News Building and The Shard, close to the Site to the north and north-east respectively.

3.60 Further details are provided in **Chapter 13: Daylight, Sunlight, Overshadowing, Light Pollution and Solar Glare** of this ES.

Townscape, Visual and Built Heritage Effects

3.61 The Site is located within the Borough High Street Conservation Area and, as noted in **ES Chapter 1: Introduction**, is currently almost entirely occupied by the Georgian Terrace, the New City Court office building, and Keats House.

3.62 As outlined earlier the Site contains the Georgian Terrace Grade II listed buildings and Keats House with the original 1862 front façade.

3.63 There are a number of listed buildings in the vicinity of the Site, with the nearest being the Grade II listed Bunch of Grapes Public House (located at 2 St. Thomas Street, directly adjacent to the Site's western boundary), Grade II Old Kings Head Pub (on the southern boundary) and the Guy's Hospital Main building, including the Wings and Chapel, which is Grade II* listed and is directly adjacent to the Site's eastern boundary. The hospital building also includes gates, piers and railings listed at Grade II and a statue of Thomas Guy also listed at Grade II. There are several listed buildings on the north side of St. Thomas Street (Grade II*) and along the east side of Borough High Street (Grade II). Off Borough High Street, approximately 800m south of the Site, is the George Inn, located in George Inn Yard which is Grade I listed.

3.64 There are no Scheduled Monuments on-site or directly adjacent to the Site. The nearest Scheduled Monuments to the Site are:

- Romano-British bath house and Medieval remains at Nos. 11 – 15 Borough High Street, 50m north of the Site;
- Roman Boat at New Guy's House, approximately 200m south-east of the Site; and
- Remains of Winchester Palace, Clink Street, approximately 230m to the north-west of the Site.

3.65 The Site is located within some Strategic Viewing Corridors as identified within the Mayor of London's London View Management Framework Supplementary Planning Guidance, including Primrose Hill to St Paul's Cathedral and Kenwood to St Paul's Cathedral.

3.66 Further details are provided in **ES Part 3: Townscape, Visual Impact and Built Heritage Assessment**.

Potentially Sensitive Receptors

3.67 Site visits and technical assessments have been undertaken to identify residential properties, buildings, people and environmental resources that should be considered as being sensitive to the Works and the completed and operational Development. Potential significant effects on these receptors have been considered as part of the EIA.

3.68 Specific sensitive receptors identified in the local area are set out in **Figure 3.1**. Further details on sensitive receptors are provided in the baseline conditions section of **Chapters 7 to 13** inclusive and **Part 3: Townscape, Visual Impact and Built Heritage Assessment** of this ES.

Table 3.1: Potentially Sensitive Receptors

Topic / Type of Receptor	Sensitive Receptor
Visitors / Commercial Occupants	Existing occupants of businesses operating on the Site and immediately surrounding the Site including St. Thomas Street, Borough High Street, King's Head Yard, White Hart Yard, Joiner Street, London Bridge Street and Southwark Street. Demolition and construction workers associated with the Development. Visitors and occupants of the Development once completed.
Residential	Existing residential properties in the vicinity of the Site, most notably these are understood to include: • residents in the upper floors of the Bunch of Grapes Public House adjoining the western boundary of the Site, No. 2 St. Thomas Street. • residents in the upper floors at No. 43 Borough High Street. • residents in the flats in White Hart Yard. • residents in the upper floors of The Old King's Head Public House, King's Head Yard, Nos. 45 - 49 Borough High Street, to the south of the Site. • residents at Nos. 51, 53, 55, 57, 59, 61 and 63 Borough High Street to the south of the Site. • Residents at Isis Brook and Orchard Lisle House, comprising student accommodation for King's College approximately 50m to the south of the Site. • Residents at No. 6 London Bridge Street. • St. Thomas Hospital patients. • Future residents in Shard Place (currently under construction).
Community / Amenity	The Old Operating Theatre Museum and Herb Garret, located north of the Site on the opposite side of St. Thomas Street at No. 9a. St. Thomas Church, St. Thomas Street, approximately 20m north of the Site. London Bridge Hotel, London Bridge Street, approximately 50m north of the Site. Guy's Hospital including the Chapel, located immediately east of the Site. The Shard including bars, restaurant and viewing galleries, approximately 60m to the east of the Site. Ark Globe Academy approximately 1km to the south of the Site. King's College, Guy's Campus approximately 100m to the south of the Site. St Joseph's Catholic Primary School approximately 350m to the south-west of the Site.

Topic / Type of Receptor	Sensitive Receptor
	Borough Medical Centre approximately 800m to the south-west of the Site. Falmouth Road Group Practice, approximately 1km to the south-west of the Site. Bridge Dental Practice approximately 100m to the south-west of the Site. Borough Police Station approximately 750m to the south-west of the Site. Chaucer House, London School of Commerce, including library, IT suite, teaching rooms and auditorium, immediately to the south-west of the Site. Borough Market 60m west of the Site. Southwark Cathedral 100m to the north-west of the Site.
Heritage Assets	Listed buildings within 250m of the Site, including (but not limited to): • Georgian Terrace at Nos. 4-8 and 12-16 St. Thomas Street (Grade II) (on Site). • Bunch of Grapes Public House (Grade II) immediately west of the Site. • Old Kings Head Public House (Grade ii) on the southern side of Kings Head Yard. • Guy's Hospital Main building including the Chapel (Grade II*) immediately east of the Site. • the parish Church of St. Thomas, No. 9A St. Thomas Street (Grade II*) north of the Site. • No. 9 St. Thomas Street (Grade II*) north of the Site. • Hibernia Chambers (Grade II) north of the Site. • Nos. 6, 8 and 10 Borough High Street (Grade II) north of the Site. • An archway beneath southern end of London Bridge (Grade II) north of the Site. • Mary Sheridan House (Part), Nos. 11 & 13 St. Thomas Street (Grade II*) north of the Site. • Mary Sheridan House (Part), No. 15 St. Thomas Street (Grade II) north of the Site. • a telephone kiosk outside Nos. 17 & 19 St. Thomas Street (Grade II) north-east of the Site. • Post office, No. 19A Borough High Street (Grade II) north of the Site. • Nos. 53 & 53A Borough High Street (Grade II) west of the Site. • No. 55 Borough High Street (Grade II) west of the Site. • No. 67 Borough High Street (Grade II) south-west of the Site. • the Wheatsheaf Public House (Grade II) west of the Site. • George Inn within George Inn Yard (Grade I) west of the Site. • the Hop Exchange (Grade II) west of the Site. • Cathedral Church of St Saviour and St Mary Overie (Southwark Cathedral) (Grade I) north-west of the Site.

Topic / Type of Receptor	Sensitive Receptor
	Unlisted buildings of merit in the Conservation Area: • Keats House (Nos, 24-6 St. Thomas Street). Scheduled Monuments located within 250m of the Site including: • Roman Boat at New Guy's House, approximately 200m south-east of the Site. • Remains of Winchester Palace, Clink Street, approximately 230m north-west of the Site. • Romano-British bath house and Medieval remains at Nos. 11 – 15 Borough High Street 50m north of the Site.
Conservation Areas	Borough High Street Conservation Area (CA). Conservation Areas located within 250m of the Site including: • Tooley Street CA approximately 200m east of the Site. • Bermondsey Street CA approximately 250m south-east of the Site. • Thrale Street CA approximately 240m to the west of the Site.
Archaeology	Archaeological Priority Zone (as defined by SC) located across the entire Site.
Townscape Views	Viewing Corridors (including Primrose Hill to St Paul's Cathedral and Kenwood to St Paul's Cathedral). Long, medium and close non-statutorily protected views to the Site.
Transportation	Cyclists, pedestrians and vehicle users on the surrounding road network. Jubilee Line which runs under the Site's north-western tip. Northern Line which runs close to the Site's north-western tip. London Bridge London Underground and National Rail Station.
Controlled Waters	Groundwater beneath the Site (Secondary A Aquifer).
Ecology	There are no statutorily designated sites for ecology or nature conservation within 2km of the Site. The Thames and tidal tributaries Site of Metropolitan Importance (SMI) and other non-statutory designated sites in the surrounding area.
Air Quality	Air Quality Management Area (AQMA) in the northern part of the Borough.

References

[1] HMSO (2008), BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting.

[2] Department for Environment, Food and Rural Affairs (Defra), (2007); 'The Air Quality Strategy for England, Scotland, Wales & Northern Ireland'.

[3] Her Majesty's Stationery Office (HMSO), (1995); Environment Act 1995.

[4] Environment Agency. 2014. Flood Map for Planning. [Online]. [Accessed 13 August 2014]. Available from: http://maps.environmentagency.gov.uk/wiyby/wiybyController?topic=floodmap&layerGroups=default&lang=_e&ep=map&scale=7&x=531500&y=181500

4. Alternatives and Design Evolution

Introduction

4.1. Under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017[1] (hereafter referred to as the 'EIA Regulations'), an Environmental Statement (ES) is required to provide, as set out in Regulation 18(3)(d):

"*a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment."*

4.2. This chapter has been prepared by Waterman Infrastructure & Environment Ltd (Waterman IE) in conjunction with the Applicant, the project Architects (AHMM), Landscape Architects (MRG Studio) and Space Syntax's Pedestrian Forecast and Landscape Assessment. The chapter presents the environmental impacts of different design options, considered as a result of the environmental opportunities and constraints of the Site, that have influenced the final design of the Development as described in **Chapter 5: The Development**.

4.3. The design evolution has been guided by the consultation the Applicant, planners and design team have had through pre-application meetings, Commission for Architecture and the Built Environment (CABE) design reviews, public consultation and one-to-ones with local businesses and stakeholder groups.

4.4. Reasons for the choice of the design alternatives taken forward are also summarised within the chapter.

Key Principles of the Development

4.5. As noted in **Chapter 1: Introduction**, the Site falls within the London Bridge Borough and Bankside Opportunity Area, as designated by the London Plan (existing[2] and draft[3]), and the London Bridge Business Improvement District (BID), which provides additional or improved services to business within the BID, including extra safety, cleaning and environmental improvement measures.

Site Opportunities

4.6. The starting point in 2014 was assessing the opportunities that the Site has and evaluating the potential for taller buildings on the Site. The team has undertaken extensive consultation with Southwark Council (SC), Historic England, London Underground Limited (LUL), Transport for London (TfL) and the Greater London Authority (GLA), as well as local groups such as Borough Market, Southwark Cathedral and neighbours including Guy's Hospital estate buildings. Key opportunities that the redevelopment of the Site offers are considered to be:

- assisting with reducing crowded pavements of Borough High Street outside the underground station;
- provision of public realm to service additional exit from tube station directly into the Site's public realm;
- limiting the number of vehicles associated with the Development and hence emissions to air;

- avoiding the creation of a windy microclimate at ground level within this dense urbanised setting;
- complementing the existing building heights of surrounding developments;
- complementing the regeneration of London Bridge Station with its new southern entrance;
- provision of additional retail areas for surrounding residential development;
- retention of key listed buildings and returning them closer to their original design;
- consideration of the London View Management Framework requirements and ensure compliance;
- respecting the location of the Site within the Borough High Street Conservation Area;
- increasing active frontage along St. Thomas Street and King's Head Yard;
- provision of additional north-south links between Guy's Hospital estate, Collingwood Street, King's Head Yard and St. Thomas Street;
- creation of high quality public realm off St. Thomas Street;
- creation of commercial space for start-up businesses;
- facilitation of regeneration of King's Head Yard and White Hart Yard;
- creation of publicly accessible significant garden area with views of Southwark Cathedral, St. Pauls and Tate Modern; and
- creation of conference space available to building tenants and the wider commercial community.

Alternatives to the Development

4.7. The principal alternatives that were considered by the Applicant, taking into account potential environmental effects, included the 'No Development' Scenario and 'Alternative Layout Design'.

4.8. No alternative development sites were considered by the Applicant because the Site is already identified as a brownfield site with capacity for development – such as housing or commercial use - and existing or potentially improved public transport access within the London Bridge, Borough and Bankside Opportunity Area designation. Although other sites within the London Bridge, Borough and Bankside Opportunity Area have also been identified as development sites, these are considered as additional sites for redevelopment by others rather than alternative sites for this Development.

The 'No Development' Scenario

4.9. Guidance on the preparation of an ES stipulates that it is good practice to consider the evolution of a site in the absence of specific proposals, i.e. the 'No Development' Scenario. The 'No Development' scenario is based on leaving the Site in its current state. It is considered that under this scenario, the Site would remain underutilised and without redevelopment would lead to several missed opportunities for the Site and Southwark, including:

- limited provision of office space beside London Bridge station;

- loss of the potential to generate approximately £6 million in Business Rate receipts from the redevelopment of New City Court which would provide significant uplift in commercial and retail space;
- loss of several million pound contribution towards the Mayor's Community Infrastructure Levy (MCIL2) fund and million pound contribution towards Southwark's Community Infrastructure Levy (CIL) (based on April 2019 proposed rates) from the floorspace development;
- no connection between St. Thomas Street, King's Head Yard and Borough High Street along desired directions of travel;
- no opportunity to provide public realm to facilitate opening up additional exit from London Bridge Underground Station avoiding the Brough High Street pavement;
- loss of opportunity to increase flexible office floorspace;
- loss of catalyst to bring forward other development opportunities around Guy's Hospital and St. Thomas Street;
- no creation of new public spaces and communal facilities; and
- lost opportunity to preserve and enhance existing heritage assets.

Evolution of Baseline Conditions

4.10. The EIA Regulations require the consideration of the likely evolution of the baseline conditions of the Site without implementation of the Development as a result of natural changes occurring. The existing conditions of the Site are reported in **Chapter 7** to **Chapter 14** of this ES and relate to conditions identified at the time the surveys and desk-based research were undertaken between 2017 and 2018. The baseline conditions without the Development are expected to evolve for a number of the environmental issues considered within this ES, as outlined in **Table 4.1**. Where no evolution of the baseline conditions as a result of natural changes occurring is anticipated, the baseline conditions would remain as reported in the technical chapters of this ES.

Table 4.1: Likely Evolution of Baseline Conditions without implementation of the Development

Issue	Evolution of Baseline
Transport	Transport infrastructure around the Site would not alter but as part of the Shard Place scheme, the Borough High Street and St. Thomas Street pavements would become even more busy. As outlined in the **ES Chapter 7 Transportation and Access** there would likely be a net increase in combined pedestrian and public transport users over the course of the day and an increase of cyclists due to the occupation of consented developments around the Site.
Noise and vibration	Noise and vibration during demolition and construction would occur to sensitive receptors around the Site as surrounding schemes are redeveloped.
Air Quality	Based on current guidance for air quality, it is expected that there would be a progressive reduction in vehicle emission rates and background concentrations due to newer vehicles with lower emissions replacing older vehicles and due to tighter emission standards for polluting industries. Therefore, future emissions to air are expected in the long term to be lower than concentrations currently experienced at and surrounding the Site.
Built Heritage, Townscape and Visual	The overall townscape character and visual amenity of the Site is expected to improve with the redevelopment of the surrounding areas.

Issue	Evolution of Baseline
Wind	As other schemes progress on neighbouring sites, it is expected that the wind microclimate may change around the Site boundary, however the microclimate within the Site would remain largely unchanged. It is possible that the wind conditions to the east of London Bridge Place would remain uncomfortable.
Daylight, Sunlight, Overshadowing and Solar Glare	As other schemes progress on neighbouring sites, levels of daylight and sunlight in the local area would generally reduce over time as these are built out and levels of overshadowing may increase. The buildings on Site do not currently cause any solar glare and this would remain the case in a no-development scenario.

'Alternative Uses'

4.11. The Applicant has not considered fundamentally different alternative land uses, or mix of uses, for the Site, which would be beyond those identified within the London Bridge, Borough and Bankside Opportunity Area. The Site is in commercial use at present and this use is protected in this location. Residential development was not considered, as commercial is a protected use and there was already a residential development, Shard Place, being built opposite. The Applicant chose to retain a commercial use and complement this by providing additional small office and retail space.

Design Evolution for the Development

4.12. The key principles of the Development in terms of its objectives and the principles of its layout have remained the same from the outset of its design. However, during the process of refining the design of the Development, a degree of design evolution has occurred in response to design and environmental constraints and opportunities and these changes are reflected in the final design for the Development which has been applied for. The changes which were made as the design evolved, and consideration of potential differing environmental effects, are outlined below.

4.13. The evolution of the design can be broadly split into six main stages:

- 2014 – review of conventional redevelopment/reuse. Assessment of the Site, opportunities it offers and evaluation of the potential for a taller building.
- March to July 2015 – consideration of different shapes of the Tower to maximise public space at ground level.
- July to September 2015 – initial expression of a Tower on the Site.
- October to December 2015 – refinement of height and massing and integration with surroundings.
- 2016 – refinement of height and massing and focus on public realm spaces and new connections.
- 2017 onwards – form and articulation refinement.

4.14. The evolution of the design is illustrated on **Figure 4.1 and 4.2**. Consideration is given below to various aspects of the design, how environmental effects have been considered within the design process and, where it is possible, a comparison of environmental effects.

4.15. There is always a balance to be made between issues such as maximising floorspace which has the benefits of maximising job creation, providing the massing in a tower which can provide significant public realm at ground level compared to a lower building which fills the majority of the Site and provides little public realm.

Alternative Layout Designs

4.16. The Georgian Terrace on the northern boundary of the Site are Listed Buildings and therefore they have always been intended to be retained and improved. There are alterations made in the 1980s which detract from their appearance and historic interest and past repairs and renovations have not always been undertaken to the highest standards. Keats House façade is an important historic feature contributing to the Borough High Street Conservation Area designation and has always been intended to remain on part of St. Thomas Street as part of the Development, although it would be deconstructed, stored and relocated 2.7m to the west to create a servicing route to the east for the whole Development.

4.17. It is proposed to create a thoroughfare between St. Thomas Street, Collingwood Street /King's Head Yard and London Bridge Underground Station and the discussions with SC have concluded that the south-eastern part of the Site is the most suitable location for the tall element of the scheme.

Footprint and Building Orientation

4.18. Studies were undertaken by the architect early on in the design process to ascertain the appropriate floor print size and orientation of the buildings, considering the Site's area and appearance from different viewpoints.

4.19. The connection with the underground station and surrounding roads has influenced the location of the public realm and building position. The elongated shape of the Site east-west has meant that the buildings on Site can only sensibly be orientated east-west.

4.20. The footprint of the building has always been meant to be minimised to maximise space for the public realm and assist with linking the yards to the Development.

4.21. The Tower would result in a number of daylight, sunlight and overshadowing impacts ranging from insignificant to significant against a variety of property uses including residential, student accommodation, ecclesiastical, educational and hospitals. These properties are located within a relatively close proximity to the existing footprint which is already tightly constrained by other neighbouring buildings at each boundary, meaning there is limited scope to significantly alter the existing building footprint.

Height and Massing Options

4.22. The height of the Tower above ground level has been the primary focus during the design process. The Development is surrounded by existing and proposed developments of significant height above ground level, for example The Shard (310m), Shard Place (100m), Guy's Hospital Tower (150m) and the new application for The Quill/Capital House (138m) (see **Figure 4.3)**. The aim is to provide a building of similar height that matches the massing of surrounding buildings and that can deliver significant improvements to the existing building and ground level public realm.

4.23. The principal strategy in the Development's architectural design has been to alter the building's mass proportions from medium height and medium width to tall and slender. The other key aim has been to maximise the public realm on Site by reducing the footprint of the building. The design response to achieve this was to remove volume at the base and top of the building by tapering and stepping. Therefore the Tower element of the Development has gone through over a hundred different designs.

4.24. Initially the design was to create a 148m tall building that resembled two 'stickle bricks' stuck end on end. This design was not selected on aesthetic grounds (see **Figure 4.1**). Next was a smooth lined 168m hour glass shaped building. This option had the largest massing and also provided the largest amount of public amenity space. However, it was considered that the building did not fit in with the surrounding buildings' standalone/island form.

4.25. The third iteration was known as the 'truck and trailer' design with the tallest element a narrow flat tower on the western side with three larger blocks connect to it that were delineated by two floors with smaller footplates. The appearance of several buildings merged together was favoured but the changes in footplate created wind accelerating through these 'gaps'. The fourth iteration known as 'Metabolist Tower' had a central narrow flat tower with blocks on either side. This was the tallest option at 210m and due to the narrow base provided a reasonable amount of public amenity space. However, the height would have been competing with the Shard's and it was considered, although not tested, that the larger block massing could have caused wind issues in the ground level public realm. A fifth solid block design with different height elements was considered but the block massing appeared to high in visual and townscape terms for the surrounding buildings. The single tower element was progressed in design but reduced in height which provided benefits in relation to various environmental issues including wind, daylight and sunlight, overshadowing and visual impacts compared to the previous versions.

4.26. Once the basic form and height was selected the design was refined to achieve a satisfying level of slenderness to lighten the Tower (see **Figure 4.2**). This was achieved by cutting out massing at the corners of the Tower to make the tall building appear more slim and slender. This change in massing also reduces the capacity of the Tower to channel wind to ground level. The form was further developed through the introduction of a curve on the north façade to avoid overhanging soffits (visually unattractive) and achieve the same overall massing form. The centre of the curve was raised higher to create 'broad shoulders' rather than 'broad belly' to the Tower (see **Figure 4.4**).

4.27. To maximise the area given to the office and public event amenity space (the Hub), the curve was located at levels 21 and 22 which allows the Hub to be placed on the largest two floorplates available, and high enough to look over adjacent tall buildings.

4.28. Compared to previous iterations of the design, the curve of the north façade respects the line of the existing set back from the theoretical line of the deepest listed building, Georgian property (no. 14) on Site, allowing daylight into the New Yard and maintaining a compact footprint.

4.29. High resolution Computational Fluid Dynamics (CFD) analysis conducted by wind consultants Wirth Research early in the design process indicated that prevailing south-westerly winds were being deflected around the sides of the Tower due to the shear face of the south façade of the building. Therefore the massing was stepped on this façade adjacent to the core so that the direction of the airflow path was disrupted; with the intention of mitigating the potential wind effects (see **Figure 4.5**).

4.30. Another issue identified was that if the design increased the footplate at ground level this massing increased the wind speed within the yard areas (as well as reduced public realm area) and so this massing was removed from the design (see **Figure 4.6**).

4.31. Studies were undertaken to review how to minimise the wind effects of a tall building channelling wind into the existing narrow King's Head Yard and prevent significant wind effects through the yard's entrance archway. A four-storey tall volume, the 'Wedge' was created on the south eastern edge of the Tower to follow the footprint of King's Head Yard, channel the wind away and protect ground level (see **Figure 4.6**). It would also provide a link between the Tower and King's Head Yard and the archway compared to previous iterations.

4.32. Development of the scale proposed for the Site has the potential to be visible in a number of strategic views, as defined in the Mayor of London's London View Management Framework Supplementary Planning Guidance' (LVMF), as well as in several views of borough-wide importance, as identified by SC and LB Islington. A number of these views are focussed on London landmarks, most notably St. Paul's Cathedral.

4.33. The relevant policy documents were consulted to establish which views were of particular relevance to the Development. With regards to the LVMF, it was clear from inspection that the Development would have an effect on the following views:

- LVMF views 1A.1 and 1A.2 from Alexandra Palace;
- LVMF views 2A.1 and 2B.1 from Parliament Hill;
- LVMF view 3A.1 from Kenwood;
- LVMF view 4A.1 from Primrose Hill;
- LVMF view 5A.2 from Greenwich Park;
- LVMF view 6A.1 from Blackheath Point;
- LVMF view 10A.1 from Tower Bridge;
- LVMF view 12B.1 from Southwark Bridge;
- LVMF views 15B.1 and 15B.2 from Waterloo Bridge; and
- LVMF views 17B.1 and 17B.2 from Golden Jubilee/Hungerford Footbridges.

4.34. A Zone of Theoretical Visibility exercise was also carried out at an early stage to understand the potential visibility of the Development in local and medium range views, including borough views defined by SC and the London Borough of Islington (see **Figure 4.7)**. This exercise informed design development, including refinement in the form and massing of the Development's tall building.

4.35. The results indicated that the effects of the Development on LVMF views would be **long-term, regional,** and a **neutral** or **beneficial effect** of no more than **moderate significance** and that no additional mitigation was required.

4.36. Residential properties are considered to be the most daylight, sunlight and overshadowing sensitive uses according to the BRE Guidelines. The highest concentration of residential properties are located along Borough High Street to the west and south west of the Site. In response, the massing is set further back from these properties than the existing building is, which is part of the proposal for the new public realm. This set back would allow more light to pass around the proposed building and penetrate the rooms within the more sensitive properties along Borough High Street.

Building Articulation

4.37. The CFD wind microclimate study undertaken highlighted areas of enhanced wind effects at the Tower's corners, on terraces and areas in the ground level public realm. Therefore the pedestrian entrances would all be located away from building corners, and terrace and roof areas would have enhanced screens and landscaping introduced to protect them from potentially unfavourable wind conditions.

4.38. Wind testing of the design has shown that opening up the passageway through the Georgian Terrace would not result in significant wind effects.

Amenity and Land Uses

4.39. The ground floor amenity areas' design has not change much, as the initial aim of providing public thoroughfare to join St. Thomas Street, Borough High Street and Southwark Street/King's Head Yard and providing a public realm area served by retail outlets has been consistent since early in the design which set the positions for these areas. However, the designs have evolved to maximise the public realm and ensure a suitable environment in the space, including in relation to wind and daylight and sunlight, such as the curved façade, and stepped massing at the corners of the Tower.

4.40. The provision of mostly office space with some retail has also not altered from the initial concept for the Site.

4.41. The introduction of a garden area was always intended but it was soon realised that due to the thoroughfare nature of the public realm at ground level that this was not the best location for a garden as it would restrict pedestrian flow and so instead the gardens were placed inside on Level 5 of the Tower where they could be increased in size, would be better suited for sitting (as there would be no wind effects despite being elevated) and provide views over the surrounding rooftops to local landmarks. Level 4 would have been sufficient but to futureproof views from the Development and based on CABE design review the garden level was raised to Level 5 of the Tower.

Access

4.42. The demolition of the 1980s building on St. Thomas Street was always planned to provide access into and through the Site. The change in massing from the existing New City Court building to a smaller footprint has created space for access to King's Head Yard/White Hart Yard and Southwark Street.

4.43. The steps into the existing tower, Georgian Terrace and Keats House have been removed in the final design to assist those of impaired mobility.

4.44. The original access for service yard on Kings Head Yard / on street loading bay servicing was partly across hospital land but this has been altered so that White Hart Yard is the primary service route. This has the effect of making King's Head Yard safer for pedestrians and cyclists (especially those using the 1,322 cycle spaces being created). More detail is provided in the Servicing section below.

4.45. Early on in the design process it became clear that the project offered an opportunity to create new public routes through the Site between St. Thomas Street and Borough High Street and King's Head Yard.

4.46. Space Syntax, specialists in pedestrian movement analysis, were appointed to undertake a review of the use of the Site and surroundings by pedestrian, both in the week and at the weekend. Their analysis showed that there are three existing dominant pedestrian routes from the London Bridge Underground Station on Borough High Street:

- Along the eastern pavement of Borough High Street going north;
- Along the eastern pavement of Borough High Street going south; and
- Along the southern pavement of St. Thomas Street going east.

4.47. Flows are highest during the week with three peaks – in the morning, at lunch and in the evening. Flows are also high at the weekends, increasing toward the afternoon with the peak at lunchtime.

4.48. There are also important pedestrian movements running between Borough High Street and Great Maze Pond, with King's Head Yard and Collingwood Street both being well used routes.

4.49. Space Syntax used TfL's Pedestrian Comfort Levels (PCL) to measure how the proposal compares to the 'do nothing' 2031 scenario[1] and to the 2016 pedestrian baseline. Using the flows from the pedestrian forecast Space Syntax constructed a Public Space Model to identify the key pedestrian desire lines through the Site and to inform the landscape design. The model was also used for the Landscape Assessment of the proposed design.

4.50. The pedestrian movement forecast for the 'do nothing' scenario shows that the projected transport growth and committed developments in the area around the Site would increase overall movement levels adding pressure on the already congested public realm, particularly at the intersection of Borough High Street with St. Thomas Street.

4.51. Compared to the 2016 baseline, the forecast flows for this scenario during the AM Peak show an increase of 17% on the eastern footway of Borough High Street and 21% on the southern footway of St. Thomas Street. This would result in PCL less than the TfL recommended minimum for Office and Retail areas along the eastern footway of Borough High Street, around the London Bridge Underground Station entrance during the two all day average and AM peak time scenarios.

4.52. In line with the overall improvements to public realm quality, the new routes proposed by the Development creates more permeability adding circulation choices and alternative routes which helps to evenly disseminate movement at this busy junction, and therefore takes pressure off Borough High Street and St. Thomas Street.

4.53. Compared to the 2031 Future baseline 'do nothing scenario', the forecast flows during the AM peak decrease by 28% along Borough High Street eastern footway (16% lower than the existing). The additional permeability and the improved public realm of the proposed scheme results in a significant improvement of pedestrian comfort levels around the Site. All locations within the Development are comfortable and well above the minimum PCL recommended.

4.54. This study highlighted that there would be a clear benefit to providing pedestrian routes through the Site to the yards - with visual connections on to the hospital estate. Analysis undertaken

[1] 2031 year was used as analysis based on Network Rail passenger predictions for 2031

during the design and reported in Space Syntax's Pedestrian Forecast and Landscape Assessment, shows that the key route and therefore the widest route required would be from St. Thomas Street to Borough High Street, using the new entrance/exit to the underground station (see **Figure 4.8**).

Servicing

4.55. As part of the design process a number of options for servicing the Development were reviewed:

- all servicing to take place from the basement accessed from the Yards;
- all servicing to take place from the basement accessed from St. Thomas Street;
- all servicing to take place from the basement accessed 'in' from the Yards and 'out' via St. Thomas Street or vice versa; and
- all servicing to take place on-street from St. Thomas Street.

4.56. Due to land constraints and the desire to provide a vibrant public realm, on-Site at grade servicing options were previously discounted due to the area they required. However following comments from TfL the following two options have also been reviewed:

- at grade servicing within the Site accessed via St. Thomas Street with vehicles exiting via the yards; and
- at grade servicing within the Site accessed via St. Thomas Street.

4.57. Based on the servicing trip generation as set out in the Servicing Management Plan the Development requires three LGV loading bays, one HGV loading bay and ancillary parking for motorcycle couriers. In addition, two disabled bays need to be provided on the Site for staff.

4.58. Regardless of the location of the service area, the goods would need to be stored close to the unloading area in order to reduce vehicle unloading times, and would need to be transported within the basement area to the respective units (as opposed to being transported across the pedestrianised area.)

4.59. Any basement option would require two vehicle lifts, one for entering and one for exiting vehicles. The size of the lift would depend on the vehicles using the service yard, either LGVs or LGVs and HGVs.

Option 1 - All servicing on-site basement via the yards

4.60. The option to undertake all servicing from a basement accessed directly from King's Head Yard was initially reviewed, but it was noted that there are existing constraints on both King's Head Yard and White Hart Yard (the 'yards') with regard to the size of vehicles that can access the yards and therefore the basement. Following detailed surveys and an assessment of small refuse vehicles, it was concluded that the limitations on the vehicle sizes to LGV size or smaller precluded this option being pursued for all servicing. The review included investigating options for accessing the Site across third party (hospital) land, but this was not achievable. The findings of this initial study formed the basis for only LGVs to access the basement loading bay in the proposed scenario.

Option 2 - All servicing on-site basement via St. Thomas Street

4.61. Whilst it is possible (and currently proposed) to relocate Keats House slightly there is still minimal unaffected frontage along St. Thomas Street where two lifts capable of accommodating HGVs could be located. As well as forming a long length of inactive frontage on St. Thomas Street, this proposal would require the lifts being in the middle of the existing frontage (in order to avoid a Victorian Sewer at basement level in the north east corner of the Site) which would restrict pedestrian access through the Site and result in poor permeability.

4.62. Vehicle access into the lifts would involve all vehicles crossing the footway, which currently experiences high levels of footfall and would therefore result in a higher level of conflict than servicing from the rear via the yards. In order to ensure that vehicles would not stop on the red route whilst waiting for the lift it would need to be recessed into the Site by at least 10m, impacting on the public realm and design.

Option 3a - Servicing to take place from the basement, St. Thomas Street entry

4.63. As discussed previously, due to the constraints on accessing the yards in larger vehicles, it would not be possible for all deliveries to take place from the basement under this arrangement. This option where LGVs would access from St. Thomas Street and depart via White Hart Yard was investigated and discounted for the following reasons:

- Due to the location of the Victorian sewer connections in St. Thomas Street the vehicle lift would need to be located between the Georgian Terrace and Keats House where the main pedestrian access would be. This would increase the conflict between vehicles and pedestrians and provide blank frontage adjacent to the main access.
- In order to ensure that vehicles would not stop on the red route whilst waiting for the lift, it would need to be recessed into the Site by at least 10m, impacting on the public realm and Development design.
- Vehicles exiting onto the yards would not know where they were and would be presented with little information to help orientate them.
- Exiting vehicles would be less aware of the nature of White Hart Yard and the interaction with pedestrians than if they had entered using the same route.
- Entering vehicles would have to cross the busy footway on St. Thomas Street.

Option 3b - Servicing to take place from the basement, White Hart Yard entry

4.64. Similar to option 3a it would not be possible for all deliveries to take place from the basement under this arrangement. An option where LGVs would access from White Hart Yard and depart via St. Thomas Street was investigated and discounted for the following reasons:

- Similar to Option 3a the location of the Victorian sewer means the exit vehicle lift would increase the conflict between vehicles and pedestrians and provide blank frontage adjacent to the main access.
- There is not adequate space to provide a lift in this location and the required visibility splay for the existing vehicles would impact on the alignment of the frontage.

- The requirement for a lift, and the resultant cross-over, requires additional carriageway length to be kept clear. This, in conjunction with the requirement for an HGV bay on St. Thomas Street, has an even greater impact on the carriageway and parking / taxi ranks / cycle parking.
- Exiting vehicles would have to cross the busy footway on St. Thomas Street and would not know where they were and would be presented with little information to help orientate them.

Option 4 - Servicing to take place directly from St. Thomas Street

4.65. In order to provide an adequate servicing area on St. Thomas Street would require most of the southern side of the road to be dedicated as loading bays (circa 30m). This is not in keeping with the ethos / requirement to provide as much servicing as possible within the Site boundary and would not be in keeping with the high pedestrian flows along the road, or with the new approach for Healthy Streets, and as such has been discounted.

Option 5 - TfL at grade option A

4.66. Option A would involve:

- Moving the Keats House façade further by more than 2 metres so that a one-way in LGV access could be created into the Development from St. Thomas Street.
- Replacing the current basement servicing proposals with a ground floor servicing area behind Keats House and where some of the proposed retail is located.
- Using the White Hart Yard as exit only with vehicles turning left into Borough High Street.
- Reconfiguring the existing proposed Development and creating new development above the new ground floor servicing area.

4.67. This proposal would not allow more than one vehicle to service the Development at a time. Given that the current proposal requires three on-site loading bays, it is not feasible to fit these within the ground level public realm. To assist with understanding the current service area requirements, **Figure 4.9** shows the area required for the three LGV servicing bays and two disabled parking spaces superimposed in blue on the ground floor plan.

4.68. The design is endeavouring to provide an enhanced new public realm where this option proposes a service yard, which is considered detrimental to the overall design.

4.69. Whilst there would be a halving of traffic on White Hart Yard, all the incoming traffic would need to cross the footway of St. Thomas Street where there is currently no vehicle access. This would also increase the traffic along St. Thomas Street, an area where TfL are proposing enhancing the pedestrian areas and minimising vehicle flows.

4.70. Under the current proposals, all vehicles exiting from White Hart Yard would have already entered that way, meaning they are aware of the constraints and the crossing of the footway. It is considered that this is safer than drivers entering one way and exiting via a new route.

4.71. The ‘at grade’ exit onto White Hart Yard would need to be in a similar position to the proposed exit lift in order to provide adequate visibility. This would impact on the entire corner of the building removing any revenue generating opportunities.

Option 6 - TfL at grade option B

4.72. Option B would involve:

- Relocating the Keats House Façade so that it is at right angles to the main building, linked to the main building, and is incorporated into the new Public Square facing the footfall from the newly created entrance to the underground.
- Creating a functional and fit for purpose frontage where the façade currently sits, to include Vehicle / HGV access to the Site.
- Setting the Ground Floor frontage back to widen the footway and to address some of the visibility and safety issues associated with the new vehicle access.
- Replacing the current Basement servicing proposals with a Ground Floor servicing area behind Keats House and where some of the proposed Retail is located.
- Installing a HGV Turntable in the area of the proposed vehicle lifts to enable vehicle turning.
- Relegating White Hart Yard as a one-way exit for emergency / Fire service access.
- Reconfiguring the existing proposed Development and create new development above the new Ground Floor servicing area.

4.73. As set out above, this proposal requires all vehicles to access the Site across the footway of St. Thomas Street and would not leave adequate space to meet the expected servicing requirements, especially allowing for larger vehicles to use the service area.

4.74. In addition to the architectural issues involved in turning Keats House, the proximity of the two-way access to the neighbouring properties would impact on the inter-visibility for pedestrians and vehicles. Even if possible, the inclusion of a turntable capable of accommodating even a 10m rigid vehicle would require a clear span of 12m which would impact on the design of the building above.

Conclusion

4.75. The servicing arrangements were comprehensively reviewed at an early stage and the other options discounted for practical reasons. The design evolution has been discussed with SC since early in the scheme, and the proposals have also been reviewed by TfL.

4.76. Due to the restrictions on the yards it is not possible for all servicing to take place from here, but the design team are of the opinion that the current proposal offers the best solution. The yards are already used predominantly for servicing and the current proposals seek to minimise the conflict between vehicles and pedestrians.

Basement Layout and Design

4.77. The existing basement extends over all of the B1 level of the Site (excluding the south east corner) containing a mix of car parking, plant and low-grade office space. Three key considerations informed the layout and sizing of the basement. Firstly a desire to maximise active frontages, retail and public space at ground (i.e. move functions below ground). Secondly Southwark's forward-thinking cycle provision levels of 25% of office population. At this level the cycle parking needs to occupy half the Site's footprint and hence could not be provided at ground level to meet this aspiration. Thirdly to maximize the retail offer, it was necessary to create 'ice-berg' retail, where larger basement space is connected via a small ground level entrance. This meant with Level B1 occupied by retail, cycle parking, showers and a gym that the servicing yard and plant was displaced down to Level B2. The target has always been to minimise the size of the basement to suit the functions of the buildings.

Plant

4.78. Heat rejection systems are typically placed at roof level, alongside boilers and life safety power generation given flue requirements. The Tower proposal provides dedicated plant space at every level housing the units floor by floor together with other tenant services. This solution offers significant energy and spatial advantages, as well as future proofing for later adaptive reuse including:

- Factory fabricated plant rooms including risers and connections for rapid Site install and minimum separate trade Site deliveries.
- Reduced energy consumption via reduced Specific Fan Power (SFP) requirements compared to central systems.
- AHUs are operational only when required / floor occupied – compared to minimum turn down levels for central plant.
- Enables separate metering of otherwise centralised systems.
- Flexibility in commissioning / early occupation of floor plates.
- Tenant adaptable to suit specific requirements for building use.
- Removal of 'lost' space for large air risers.
- Clean, continuous façade appearance by avoiding whole plant floors.

4.79. Whole plant floors are common in taller buildings and were considered for the Tower but dropped instead for plant on every floor because of the reasons above.

4.80. Air exhausts are fitted to plant vents and air intakes are fitted with attenuators beneath the roof grille to limit noise leak to surrounding buildings.

Landscape

4.81. The planned seating in the New Yard was relocated from lining the central area to the edge to areas of highest comfort level as identified by the CFD wind model. The location of the trees within the ground level public realm reduces the effect of wind even further at ground level.

4.82. By locating the gardens on Level 5/6 this provides not only views over neighbouring rooftops but a sheltered area that can be utilised all year round. As part of the design evolution consultation exercises were held about the design and valuable feedback was received eg the inclusion of medicinal plants in the landscaping. In addition, it was recognised that the gardens could be an educational resource offering additional social benefit.

Façade

4.83. The Georgian Terrace and Keats House façade are to be retained, however there would be improvements made to both, for example opening up original entrances to the Georgian Terrace and reinstatement of alleys through them as well as removal of recent additions which detract from the quality of the buildings.

4.84. For the Tower, initially the design when massing was the primary focus was a smooth glazed façade to maximise daylight as well provide internal views across London skyline. However the aesthetic did not fit with the townscape of the yards and character of Southwark and solid horizontal elements were introduced to the Tower façade to distinguish the building from the surrounding buildings.

4.85. Horizontal elements with wind acceleration features were also introduced on the southern façade to change the vertical down draft into a horizontal output further disrupting the vertical down draft, with the shape leading the wind along the baffle and away from the façade. These features also act as part solar shading on the southern façade of the Tower (see **Figure 4.10**).

4.86. Next 1.5m vertical subdivisions were introduced to match the internal planning grid. This subdivision introduced another distinguishing feature to the façade whilst providing a standardised unitised panel system. Using a unitised panel system facilitates prefabrication of elements away from the Site (meaning reduced noise effects locally). The panels can be transported efficiently as flat-pack and quickly assembled, leading to reduced wastage of materials, less vehicle movements and overall better sustainability within the design.

4.87. The introduction of special floors across the building on floors 5/6 (garden) and 21-22 (Hub) has the benefit of providing subtle changes to break up the massing of the façade. The garden has been positioned to be visible from the street to enhance the visual effect, whilst the Hub location is both convenient for Tower occupants and also provides panoramic views of the city.

4.88. The north façade features a C-channel integrated in the glazing reflecting the curved structure behind and enhancing the slenderness, whilst east and west façades showcase the exoskeleton external structure with thermal breaks.

4.89. On the Tower wind baffles were designed in the inner corner between the main south façade and the stepped elevation to further disperse the wind and roughen up the façade, which was particularly important to reduce potential down draft (see **Figure 4.10**).

4.90. Wind screens were designed on the Tower terraces to reduce wind penetration into the public areas at higher levels. Wind modelling identified the need for a 2.7m wind screen on the most exposed terrace to protect users.

Mitigation by Design

4.91. As outlined above the EIA studies have significantly influenced the design evolution but additionally some design measures have inherent environmental mitigation built into them and these are outlined below.

4.92. The provision of alternative pedestrian routes avoiding the pavement of Borough High Street would improve pedestrian safety especially at junctions around the underground station entrance.

4.93. The fixed building plant should achieve the proposed noise limits set out in **Table 8.15** in **Chapter 8 Noise and Vibration** and therefore the noise effects of building services plant on human and biodiversity receptors would be insignificant.

4.94. Building services plant that meets London Plan SPG standard would minimise emissions to air. The introduction of additional vegetation would improve the air quality and provide shelter for birds and invertebrates. The use of the chimney pots on the Georgian Terrace to house bird and bat boxes would improve the habitats provided for biodiversity.

4.95. The refurbishment of the Georgian Terrace including reintroducing the chimney pots, reinstatement of Keats House as a detached building and removal of the 1980's New City Court Building on St. Thomas Street all improve the heritage value of the buildings.

4.96. The removal of the made ground as part of basement excavations over almost the whole Site would remove any contaminated soils in these areas, and the risk of exposure to Site users.

4.97. As outlined in **Chapter 15: Wind**, landscape measures that improve wind conditions include screens on terraces and roof areas and soft landscape planting on the terrace.

4.98. The use of blue roofs and permavoid to achieve greenfield runoff rates would reduce the problems of surface water ponding in King's Head Yard. The detailed design of drainage would include interceptors as required by Document H3 of the Building Regulations[4]. Blue roofs along with the interceptors would improve the quality of surface runoff being discharged.

4.99. The final scheme is the one presented in ES **Chapter 5: The Development**.

References

1 HMSO (2017). The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (S.I. 571) HMSO, London.

2 Greater London Authority, (2016); London Plan: Spatial Development Strategy for London Consolidated with Alterations since 2011. March 2016

3 Greater London Authority, (2018); Draft New London Plan, August 2018.

4 HMSO (2015), Part H of Schedule 1 to the Building Regulations 2010: 2015 Edition.

5. The Development

Introduction

5.1. This chapter provides a description of the Development, which forms the basis of the EIA. The description has been formulated with reference to the full planning application and the listed building consent description, the Development Accommodation Schedule, the application drawings and the Design and Access Statement prepared in respect of each of the planning application and listed building consent application. Details of the anticipated Site preparation and construction activities, and programme of works, are outlined separately in **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**.

5.2. This chapter has been written by Waterman Infrastructure & Environment Ltd (Waterman IE) with input from the Applicant's architects, AHMM Architects and landscape architect, MRG Studio.

Overview of the Development

5.3. The Development as described in the planning application form is as follows:

'Comprehensive redevelopment of the site to include demolition of existing 1980s office buildings and erection of a 37-storey building (including ground and mezzanine) of a maximum height of 144m (AOD), restoration and refurbishment of existing listed terrace, and redevelopment of Keats House with retention of existing façade to provide a total of 46,374 sqm of Class B1 office floorspace, 765 sqm of Class A1 retail floorspace, 1,139 sqm of Class A3 retail floorspace, 615 sqm of leisure floorspace (Class D2), 719 sqm hub space (Class B1/D2) and a 825 sqm elevated public garden, associated public realm and highways improvements, new station entrance, cycling parking, car parking, servicing, refuse and plant areas, and all ancillary or associated works .'

5.4. Therefore, the Development would provide:

- demolition of the existing 1980s buildings and alterations;
- delivery of a 37-storey building (including ground, mezzanine and two storeys of plant at roof level) extending to 144m Above Ordnance Datum (AOD), providing high quality office and retail floorspace;
- introduction of retail floorspace at ground, lower ground and first floor level providing an enhanced retail offer for local area and provision of active frontages along St. Thomas Street;
- provision of 1,067 sqm of affordable workspace on upper floors of Georgian Terrace and 181 sqm of affordable retail at ground floor/lower ground floor level of nos. 4-6 St. Thomas Street;
- provision of hub space at 21st and 22nd floor level of office building providing auditorium and exhibition space for both office and wider commercial use;
- sympathetic restoration of listed buildings along St. Thomas Street;
- reconstruction of Keats House as a standalone building with retention of existing façade;
- delivery of high quality and fully accessible public realm, providing enhanced connectivity through new public routes and a public square;

- delivery of an elevated double height public garden at fifth and sixth floor level with a complementary café/restaurant area;
- creation of a new entrance to London Bridge Underground Station; and
- improved servicing strategy to maximise servicing options.

5.5. The total amount of floor space proposed by the Development is set out within **Table 5.1**.

Table 5.1: Proposed Floorspace of the Development

Land Use and Class	Floorspace Area (sqm)		
	Gross External Area (GEA)	Gross Internal Area (GIA)	Net Internal Area (NIA)
Office (B1)	-	46,374	31,126
Retail (A1 and A3)	-	1,904	2,163
Hub (D2)	-	719	685
Gym (D2)	-	5615	564
Public Garden (D2)	-	825	640
Servicing	-	1,918	-
Plant	-	2,146	-
TOTAL	**56,150**	**54,501**	**35,178**

Application Drawings

5.6. A series of drawings have been submitted to Southwark Council (SC) for approval. These drawings have informed the basis of the EIA.

5.7. The Environmental Statement (ES) makes reference to the following planning drawings that have been submitted to support the applications. These are listed within **Table 5.2**.

Table 5.2: Planning Application Drawings Included in this ES

Planning Application Drawings Reference	Title	Level
14032_X_(00)_P002	Proposed - Site Plan	G
14032_X_(00)_P118	Proposed - Basement 2	B2
14032_X_(00)_P119	Proposed - Basement 1	B1
14032_X_(00)_P120	Reception / Retail G	G
14032_X_(00)_P121	Office	01
14032_X_(00)_P125	Garden/Retail	05
14032_X_(00)_P141	Hub	21
14032_X_(00)_P153	Office	33
14032_X_(00)_P154	Plant	34

Planning Application Drawings Reference	Title	Level
14032_X_(00)_P156	Roof RF	RF
14032_X_(00)_P201	Proposed - North Elevation	
14032_X_(00)_P301	Proposed - Section A	
14032_X_(00)_P302	Proposed - Section B	
GA00	General Arrangement - Ground Floor Landscape + Public Realm	GF
LP10	Landscape Plan - L5 Terrace and Garden	L5
SL01	Soil Profile Plan - Ground Floor Landscape + Public Realm	GF

5.8. A landscape strategy, prepared by MRG Studio, has also been prepared to accompany the application. This is contained within Volume 3 Technical and Design Studies (a standalone document produced to accompany the Design and Access Statement).

Development Arrangement

5.9. Planning Application Drawing 14032_X_(00)_P120 shows the layout and footprint of the Development. The Development would include three buildings:

- The Tower would replace existing 1980s New City Court buildings with a 37-storey office block;
- Keats House is a four-storey building with retained 19th Century façade to be redeveloped with relocation of the façade; and
- The Georgian Terrace is a row of early 19th Century Grade II listed buildings which are to be retained, restored and refurbished.

5.10. A number of images of the Development are presented in the following figures:

- **Figure 5.1** Site in Context
- **Figure 5.2** Artist's Impression of the Development Looking East from Proposed Exit from Tube Station. Georgian Terrace on Left, Tower Straight Ahead and King's Head Yard to the Right
- **Figure 5.3** Artist's Impression of the Development Looking from The Georgian Terraces to King's Head Yard
- **Figure 5.4** Artist's Impression of the Development Looking East Along King's Head Yard
- **Figure 5.5** Artist's Impression of the Development Looking East Along South Side of Georgian Terrace
- **Figure 5.6** Artist's Impression of the Development Looking South East from St. Thomas Street with Relocated Keats House and Level 5 Public Gardens Visible Above the Refurbished Georgian Terrace

- **Figure 5.7** Artist's Impression of the Development from Southwark Street in the Context of Surrounding Buildings

Building Massing and Form

5.11. The height and massing of the Tower building has responded to Site constraints, planning guidance and consultation with statutory and non-statutory consultees (refer to **Chapter 4: Alternatives and Design Evolution**). Such factors have resulted in the height not exceeding 144.045m AOD, making it 139m high above ground level. The Tower would have a smaller footprint (at 1,353 sqm) than the existing New City Court building allowing for a greater area of public realm, but would be taller.

5.12. Keats House would remain at four storeys (20.9m AOD) but the façade would be relocated and the building reconstructed 2.7m to the west to create ground level servicing access onto St. Thomas Street. The Georgian Terrace would remain at 20.15m AOD.

5.13. At level 34 of the Tower the building's floor plate would reduce from 1,378 sqm to 889 sqm with terraces provided on the east and west side of the building.

Basement Levels

5.14. The existing lower ground floor below the Georgian Terrace would be refurbished and used for retail. The existing basement below Keats House and the Tower would be extended to a two-storey basement (9.65m below ground level), with layout as in 14032_X_(00)_P119 and 14032_X_(00)_P118. The lower level basement B2 at -4.650 AOD, would be either plant or storage tanks on the western side and retail storage, service yard, lifts and loading bay on the eastern side. The service yard would have access to two vehicle lifts and the bin holding area.

5.15. Basement level B1 at 0.150 AOD would be cycle parking and showers for the western half of the basement. Keats House basement would be dedicated to building management and staff mess room. The remaining section of the eastern half of the basement would be a gym D2 use class.

Substructure

5.16. Details of the substructure are provided within **Chapter 6: Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**.

Land Uses

5.17. As set out within **Table 5.1,** the Development would provide a mix of uses, the quantity and composition of which is described as follows.

Commercial Land Uses (Use Class B1)

5.18. All three buildings together would provide 46,374 sqm GIA office space. The Tower is 44,906 sqm GIA office and 1,063 sqm retail except for Level 5 and 6 which is a double height elevated garden level accessible to the public, and the western half of levels 21 and 22 which would be an auditorium and meeting hub area for office and wider commercial use. Half the ground floor of the

Tower would be a double height reception area for the offices. The Georgian Terrace would provide 1,067 sqm GIA office space and Keats House 401 sqm GIA.

Commercial Land Uses (Use Class A1/A2 retail and A3 food and beverage)

5.19. Ground and lower ground of the Georgian Terrace (as in plan 14032_X_(00)_P119 and 14032_X_(00)_P120) would be 633 sqm GIA of individual retail spaces split into seven retail units with areas ranging between approximately 64 sqm and 95 sqm. Customers would access the ground floor retail from the New Yard, with potential for through-trading via access at St. Thomas Street, whilst employees would enter from St. Thomas Street. Each unit has separate access to the basement through a staircase shared between retail and office employees.

5.20. The western half of Keats House at ground level and mezzanine level would be 208 sqm GIA retail (as in plan 14032_X_(00)_P120). To the east and west sides of the reception in the Tower would be duplex retail units (possible cafes servicing the offices). In addition, on the fifth and sixth floor of the south side of the Tower (within the public garden) there would be retail floor space accessible from King's Head Yard.

Commercial Land Uses (Use Class D2)

5.21. The 615 sqm GIA D2 space likely to be a gym would be on the basement Level B1 of the Tower (as in plan 14032_X_(00)_P119) and would be run by a third party and open to both building users and the public. There would be a 719 sqm GIA hub (shared 150-200 seater auditorium space) on the 21st and 22nd floors of the Tower which would be used for presentations and meetings. The hub would be accessible to office users but could also be booked by non-occupiers.

Station Entrance

5.22. It is proposed to open up the rear of the LUL station building at ground level to provide a new exit directly onto the Site's public realm and the enhanced connectivity it affords. TFL / LUL support the proposal and the Applicant is to enter into a developer agreement with LUL to undertake the works

Ancillary Land Use

5.23. 438 sqm of level 34 and 35 of the Tower (as in plan 14032_X_(00)_P154 and 14032_X_(00)_P156) is dedicated to plant and photovoltaic cells. The 281 photovoltaic panels would be orientated east west to optimise operational density / PV output. The basements are also mostly in ancillary use, as described above.

Publicly Accessible and Amenity Space

Publicly Accessible Space

5.24. There is proposed to be 2,021 sqm of public space within the Development as shown on plan GA00. The elevated garden on Level 5 would be 640 sqm NIA of double height temperature controlled enclosed area (as in plan LP10) and accessible to the public at times to be agreed with SC during determination. There is also a 76 sqm external terrace garden.

5.25. The 1,305 sqm public space on ground level outside the Tower is intended to be fully accessible and used by both the office tenants and the wider general public. Hours of operation are intended to be extensive and the area could double up as a ‘classroom’ as part of an educational outreach programme. The area is split into five different sections (see **Figure 5.8**):

- Main Courtyard – 664 sqm
- New Yard – 181 sqm
- St. Thomas Street Entrance – 239 sqm
- East Courtyard – 149 sqm
- East Passage – 72 sqm

Hub

5.26. The 719 sqm GIA hub on the 21st and 22nd floors provides a two-level communal space linked via a 150-200 fixed seat auditorium (as in plan 14032_X_(00)_P141 and **Figure 5.10**). Connected with the mid-high-rise lift transfer, this provides quick and easy access for all office tenants. The hub would also be accessible to the wider Southwark / City population for use as a conference space. These two levels also enjoy external terraces and balconies with a sheltered environment.

Terrace Amenity Space

5.27. There are terraces on Level 34 and Level 5. Level 5 is a 76 sqm external extension of the elevated garden and would be open to the public. The western terraces on level 34 is for the use of the office workers and the eastern terrace is to be used for maintenance.

Materials, Façade Treatment, and Finishes

5.28. The Tower is narrower at the base to create more public realm space. To create a smooth view looking up the building the glass façade is curved, being broadest at Level 21/22. There is a metal exoskeleton to reference the railway bridges and arches scattered across the Southwark borough. The exoskeleton serves as a working structural element, stabilising the overall building in conjunction with the main core. The different components of the core have been expressed distinctly using colour.

5.29. The core cladding incorporates both solar shading and aerodynamic wind modifiers to enhance the building performance. The glass façade would be standard single order unitised panel on all levels except the double height ground floor, Level 5/6 where glazing has been replaced with adjustable glass louvers for ventilation and Level 21/22 which would be a double height variation. The plant would have fixed glass louvres; the ground floor would be glazing with perforated metal spandrel ventilation and a variety of solar reducing glazing types on all levels of the southern façade.

5.30. The core would be exposed to solar radiation due to the large glazed area facing east, south and west. To achieve comfortable internal temperatures and prevent overheating, the following measures have been incorporated into the design: solar control glazing, shadow boxes on the staircase façade to reduce g-value, trickle vents on the lift shaft panels, exposed thermal mass, passive vents to the stairs, secondary cooling from adjacent conditioned spaces and rear-mounted vents for air extract systems.

5.31. The cleaning, maintenance and glass-replacement for the façade would be undertaken through an automated Building Maintenance Unit (BMU), discretely located on the roof of the Tower (Level 35). The BMU would be track mounted to allow for greater access and to minimise the need for a longer extendible arm, making the unit less visible from street level.

5.32. Currently, only the St. Thomas Street façade and north east return remains of the original Keats House building. The proposal recreates the west, south and east façades. Between Keats House and Conybeare House would be a recessed glass façade behind a perforated brick screen. In restoring Keats House the Development seeks to reintroduce the pitched roof forms similar to those that would have been present in the original building, which was designed as a pair of houses.

5.33. The Georgian Terrace works would remove the 1980s intervention from the south façade and restore the rear elevation to create a new active retail environment to the rear. In addition the Works would include refurbishment of the north façade (St. Thomas Street) by reactivating disused entrances/ passages. As well as rebuild misshapen roofs / disproportionate chimney stacks, the proposals would reintroduce clay chimney pots and replace asbestos tiles with natural slate.

Vehicular and Pedestrian Access, Circulation and Parking

Vehicular Servicing Access

5.34. Deliveries and servicing carried out by cars and LGVs would utilise White Hart Yard to access the vehicle lifts to the service yard (where three loading bays are proposed) on basement level B2 as in plan 14032_X_(00)_P118. By using White Hart Yard as a primary service route, traffic can be alleviated on King's Head Yard, making it more pedestrian friendly and accessible (see **Figure 5.9**).

5.35. The movement of Keats House to the west allows the creation of a new controlled service route to the east, including convenient access to a new bin store for the collection of refuse. The creation of a broader pavement via loading and parking bays elevated to a shared surface type finishes, is intended to make St. Thomas Street feel less congested and pedestrian friendly, while a new loading bay adjacent to Keats House makes for more convenient deliveries from the new loading bay on St. Thomas Street.

5.36. Motorcycle couriers would also stop on St. Thomas Street to deliver / collect packages from the Development. It is also proposed that the on-street loading bay would be used by HGVs, given the existing access constraints, ie that White Hart and King's Head Yard entrances are too narrow to allow access for HGVs.

5.37. The servicing analysis by Transport Consultants TPP shows that the Development would attract 99 servicing vehicles a day, 77 LGVs and cars utilising White Hart Yard and St. Thomas Street and 22 HGVs using St. Thomas Street, as well as additional motorbike visits.

5.38. Two vehicle lifts are proposed to be installed at the rear of the Tower serving the service yard and allowing for goods to be delivered to the lower basement level, as well as providing vehicular access for visitors with access requirements. UKPN also require 24hr access to the basement level substations.

5.39. The lifts are positioned at the widest part of the yards offering the greatest manoeuvring potential for vehicles, and the highest degree of visibility for entering and exiting the premises. Two lifts allow for multiple deliveries during peak hours, minimising any vehicles on the adjacent yards, and provide resilience in the event of power failure / maintenance on one of the lifts.

Pedestrian and Cycle Access and Circulation

5.40. As shown on drawing 14032_X_(00)_P120 pedestrian (and cycle) access to the Development would be from either St. Thomas Street or Borough High Street. It is expected that a significant footfall through the Site would be from people accessing London Bridge Mainline Station, the underground station exit, King's Head Yard and travelling south on Borough High Street.

5.41. The original passageway through the midpoint of the Georgian Terrace from St. Thomas Street to the yards behind would be opened up again.

Car Parking

5.42. This would be a car free development however there are two blue badge spaces on basement level B2.

Cycle Parking Facilities

5.43. Cycle parking at the Development would be provided in accordance with the Draft London Plan's standard which is consistent with LBS's currently adopted standards and also emerging requirements in the Draft Southwark Local Plan. In total, the Development would provide 1,322 cycle spaces including 104 spaces on the street, 16 accessible spaces, 48 spaces in the pavement vaults and 1,154 spaces in the Tower. Cycle parking spaces and associated 70 showers and 447 locker provisions have been allocated across ground level and Basement Level 1. Access down to B1 for cyclists with bikes is provided via a combined cycle stair ramp with a special conveyor system to assist.

Waste Management

5.44. Waste would be stored in 1,280l Eurobins at basement level with separate containers provided for the residual and recyclable waste streams. On-site facilities management would transport the relevant waste stream to a ground level storage room via a goods lift, whose primary function is for waste collections and bulk servicing, on collection day. The storage room would be located at ground level fronting St. Thomas Street where an on-street loading bay is located allowing a refuse vehicle to stop within 10m of the waste storage room, as required by SC.

5.45. Waste would be collected by private contractors daily for each of the waste streams based on a five-day week. The number of 1,280l Eurobins required have been determined as 13 (six for residual and seven for recyclable). A cardboard baler is also proposed on basement level B2 given that paper is expected to make up the majority of the office recyclable waste.

5.46. The ground floor waste storage room would only need to be large enough to accommodate seven Eurobins since residual and recyclable waste streams would be collected separately. It is envisaged that waste would be collected early morning to avoid highway peak periods.

Landscaping and Ecological Enhancements

Landscaping Design

5.47. The aims of the ground floor landscaping is to create a setting for a new London Underground entrance/exit (to accommodate a range of pedestrian flows and facilitate movement through the space) and provide open space away from the busy streets. The area would be planted with 14 medium and tall trees to enhance biodiversity and microclimatic conditions on the Site. There would be use of native trees of local habitats where appropriate as well as the use of ornamental non-native species. The planting selection would include plants historically used for medicinal purposes at Guy's Hospital. Typically, rainwater attenuation would be integrated into soil and an attenuation layer under permeable paving.

5.48. The elevated garden within the Tower would be filled with tropical and subtropical planting inspired by habitats found in Asia and East Africa today. The garden's internal climate would be controlled to create suitable conditions (light, temperature, humidity and ventilation) for plant growth and human comfort. Automated sub-surface irrigation and fogging would minimise water waste (approx. 50% reduction when compared with manual watering). In addition all irrigation and fogging for plants on Level 5 of the Tower will use treated greywater. Horticultural lighting would mostly mimic natural sunlight during the day, with parts of the light spectrum boosted where required.

5.49. The external terraces would be planted with temperate and hardy subtropical plants. Natural paving and natural stone cladding on raised planters is proposed on these terraces.

5.50. The materials would be robust and with durable finishes for ease of maintenance.

Ecological Enhancements

5.51. The landscaping includes native trees in the ground floor public realm and plants of benefit to biodiversity (such as pollen, nectar, seed and berry producing species). Trees would be sourced as close to the Site as possible and would provide food and shelter to birds and invertebrates. Trees would be planted in extensive soil volumes, which provide root space and infiltration/attenuation benefits.

5.52. The landscaping specification will include advice on the use of peat-free composts, mulches and soil conditioners. The use of pesticides (herbicides, insecticides, fungicides and slug pellets) would be discouraged to prevent fatal effects on the food chain particularly invertebrates, birds and/or mammals. Any pesticides used should be non-residual.

5.53. The provision of at least four nest boxes placed near each other for house sparrows is proposed. Similarly, two nest boxes with unobstructed entrances are proposed for swifts and two boxes for starlings placed at least 3m apart to reduce aggression in starling pairs is proposed. All of these nest boxes need to be self-maintaining as the design is to include these in the feature chimney pots (which are capped and have no function) and have easterly aspects. In addition, there are window boxes / rain water goods – all of which are natural nesting positions.

5.54. Where possible, the incorporation of deadwood features within the garden on Level 5 of the Tower, plus the use of ground cover and understorey plants as recommended above would provide increased opportunities for a range of invertebrates.

Utilities and Services

5.55. Modification and / or relocation of selected existing utilities would be required to implement the Development. Accordingly, where appropriate, the existing infrastructure networks would be diverted, remodelled and reinforced to suit the demands of the Development.

5.56. The existing UKPN substation would be relocated to a temporary gantry during the Works and then installed in the basement and accessed via the vehicle lift. As UKPN require 24-hour access in case of malfunction / power failure, the lifts would be accessible at all times and secured with a backup power generator.

5.57. The east sewer that currently runs beneath Keats House is proposed to be diverted from manhole 39 (upstream manhole) to run closer to Conybeare House, running along the party wall and then would be reconnected to the existing manhole located in the lightwell. A formal S185 application for the sewer diversion under Keats House has been submitted to Thames Water by AKT II.

5.58. It is proposed that a new 67mm diameter incoming potable water pipe is routed from King's Head Yard into the Site. This would have a current design load of 159 m^3 daily and 4.1 l/s peak.

5.59. The existing natural gas mains in St. Thomas Street and King's Head Yard would be reused for the main building service (subject to National Grid approval). However, it is likely that the service would require a gas booster to overcome the gas pressure issues.

Flood Protection

5.60. The Environment Agency's "Flood Risk from Rivers or the Sea"[1], shows that the Site lies in Zone 3a.(an area with a high probability of flooding from rivers and sea without the local flood defences). A Flood Risk Assessment (**Appendix 11.1**) has been undertaken by AKT II and concluded that the Development would not increase the food risk to other properties. Due to the presence of the Thames Flood Barrier, the Development has an acceptable flood risk within the terms and requirements of the National Planning Policy Framework. In the event of breach, as there are no habitable areas at ground and basement levels the occupants can evacuate to first floor level and safely remain inside or can leave the Site early having been alerted by the Flood Warning Service. In addition, the Applicant would register for the Environment Agency's Flood Warning Service as a precaution. Therefore the proposed retail and office uses are acceptable within Flood Zone 3a.

5.61. The risk of surcharging sewers, groundwater and artificial source flooding is considered low risk. There is a risk of surface water flooding from King's Head Yard, so flood barriers would be provided at building entrances (see **Appendix 11.1)** including a flip-up flood barrier at the threshold to the vehicle lifts as an emergency measure to protect the basement from flooding.

Drainage Strategy

5.62. There are no watercourses in the immediate vicinity of the Site and so it would not be possible to discharge to one. As outlined in the Drainage Strategy (**Appendix 11.2**) the most viable solution for the Site is to limit the flows from the Site and connect to existing public sewers. To reduce the surface water discharge rate to greenfield rate (5 litres per second (l/s)) would require 190m^3 of storage volume on Site. The discharge rate would be agreed with Thames Water by way of the submitted pre-planning enquiry.

5.63. The proposed attenuation features would comprise permeable paving suspended by Deeproot Silva cells (or similar product) over the soil and aggregate layers. These provide a first (and deep) layer of infiltration before the water reaches the 160mm deep permavoid system (podium deck) covering 1,000 sqm of the public accessible area creating 150m^3 of storage volume. In addition, a 40m^3 attenuation capacity in the blue roof system below the photovoltaics on the Tower block roof is proposed. Both systems would allow gravity discharge to the sewers in St. Thomas Street and King's Head Yard. There is an alternative option to utilise a type 3 sub-base (30% void ratio) instead of the permavoid at ground level to deliver the required attenuation and this system would require 500mm depth.

5.64. Water for sub-surface irrigation would be supplied by the building's greywater recycling system, with additional treatment to ensure public health and safety.

5.65. Grey water harvesting would be provided with the plant located within the lower basement. Dedicated waste vent pipes would be provided to take the discharge of waste water from the showers and wash hand basins. The waste water would discharge into the Grey Water recycling system and be treated and filtered to a quality whereby the water can be reused for WC / urinal flushing and washdown points. The treated water would be stored in a non-potable cold-water storage tank which would be provided with a mains/boosted cold water service as a secondary means of supply to enable the grey water plant to be maintained and to retain an uninterrupted supply to the cold water draw off points during the course of the maintenance works.

5.66. The existing foul flow from New City Court and Keats House is 8.5 litres per second (l/s) which passes underneath Keats House and into the main combined sewer in St. Thomas Street. Once rerouted to the eastern side of Keats House, the pipe would take a flow of 18.4 l/s. A pre-development enquiry has been submitted to Thames Water to confirm if any upgrades of sewers are required.

5.67. The existing combined sewer connections from the Georgian Terrace would be retained and used.

5.68. Interceptors would be provided for the service yard area. The interceptor would have visual and audible warning when the level of oil reaches 90% of the oil storage volume under static liquid level conditions.

5.69. All plants on Level 5 of the Tower would be watered by automated irrigation using treated greywater. Although the outdoor terrace would also receive some rainwater laterally, the building level above would prevent adequate rain from reaching these plants.

Lighting Design Masterplan

5.70. The St. Thomas Street entrance to the Development would be lit with an artistic light installation over the tree canopies at the threshold. The southern threshold (Kings Head Yard entrance) would be marked with lights inserted within the cobbles.

5.71. The main courtyard steps would be lit with linear fittings within the steps which would provide sufficient lighting to emphasise the level changes and also the main ramp.

5.72. The main courtyard would be lit with wall-mounted fittings on the existing and proposed buildings to avoid cluttering the space with poles. This same principle would apply to the St. Thomas Street entrance where the existing historic buildings would be used to mount the light fittings.

5.73. The feature trees would be lit with subtle fairy lights for a soft night-time effect. The New Yard would be lit with traditional wall-mounted light fittings fixed to the historic façades. All lights within Level 5must be turned off or to their lowest setting (for emergency access levels only) at night to allow plants to rest properly. Special lighting could be installed in the building façade and at this level for special public events.

5.74. Internal lighting levels are proposed to be:

- Offices: 400 lux at working plane;
- Toilets: 250 lux above basins, 150 lux elsewhere;
- Reception: 200 lux in general, 300 lux over reception desk and seating area;
- Stairs: 100 lux main circulation stairs, 100 lux secondary staircases; and
- Lift Lobbies: There is no value specified in the design brief, however a value of 200 lux is recommended in front of lifts by BS EN 12464-1.

5.75. A detailed lighting strategy would be agreed with SC prior to installation.

Security Design Strategy

5.76. The Applicant has appointed Toren Consulting Ltd (Toren) as Security Design Consultant. Following a review of relevant policy including Southwark Policy 3.14 – Designing Out Crime, the team anticipates providing significant improvements to the existing condition with regard to the design solutions described in Policy 3.14. The Development would be designed cognisant of security design and risk management best practice, as described in:

- Operational Requirements (2018), CPNI;
- Crowded Places Guidance, NaCTSO and Counter Terrorism Policing;
- Protecting Crowded Places: Design and Technical Issues, Home Office / CPNI / NaCTSO;
- SABRE New Facilities, Building Research Establishment; and
- Commercial 2015 V2, Secured by Design.

5.77. The security measures are to be developed in the subsequent design phases as outlined in the DAS.

Inclusive Design

5.78. Design features would include raising the ground level of the Site and creating level entrances into the rear of the Georgian Terrace as well as lowering the stepped entrance into the rebuilt Keats House façade to enable level access into the reception / office areas via lift.

5.79. In the Tower, when a mobility/sensory impaired building user requires access to the upper deck of the lift, access is provided at the ground floor and the lift is placed into special service mode enabling the upper deck to be accessed at ground level. Special service also ensures that the lift doors would remain open for longer and the volume of audible warnings would increase. The lifts would also include visible visual signals. Lift access is provided to all floor levels. Accessible cyclists would have to use of the goods lift to the south-east end of the Site to gain access to the cycle provisions in the basement. Close to the lift there is provision for accessible cycle storage and accessible WCs.

5.80. The elevated garden on Level 5 of the Tower with feature a panoramic lift and the public realm at ground level is designed to provide level access to the tube station and shallow (below ramp gradient) access between the new public square / tube and the lower Kinds Head Yard.

5.81. Repaving works would take place to the yards and St. Thomas Street to improve accessibility (i.e. flush cobbles). Such works would be governed by a S.278 highways agreement where they are on public highway.

Energy and Sustainability

Energy Strategy

5.82. An Energy Strategy has been developed by Chapman BDSP and is submitted separately to support the application. The local planning policies refer to the London Plan[2] in which the regulated carbon dioxide emissions reduction target is 35% beyond Part L 2013 of the Building Regulations[3] for non-domestic elements.

5.83. The Energy Strategy seeks to achieve targets on-Site where feasible and viable, and any shortfall would be met by a financial contribution to SC as required by policy.

5.84. In line with the London Plan, the Development would follow the Energy Hierarchy of ‘Be Lean’, ‘Be Clean’ and ‘Be Green’ to reduce the carbon dioxide emissions of the entire Development.

5.85. The following passive design and active energy efficient measures have been incorporated within the Development:

- a window g-value of 0.28 was used for the new windows of the Tower;
- use of concrete slab would provide high thermal mass to moderate the cooling loads for the Tower on ground to Level 4; and Keats House and Georgian Terrace benefit from the thermal mass of the building envelope structure;
- south facing staircase in the Tower incorporates vent and shadow box to reduce overheating risk;
- low air permeability to façades generally;

- good level of insulation on the new building fabric and where possible also on the refurbished exposed walls and roof of the Georgian Terrace;
- openable fenestrations are provided at every floor of Keats House and the Georgian Terrace to allow for the potential of natural ventilation during mid-season period;
- openable panels and louvres on Level 5 of the Tower that enable natural ventilation across the garden;
- highly efficient LED lighting has been used for the proposed design particularly for the office asset reach 120 luminaire lumens/circuit watt;
- energy efficiency lighting and occupancy sensors and daylight control sensors;
- well insulated ductwork with very low losses in the heating/hot water system distribution and thermal insulation on solid elements of the new building fabric;
- high efficiency mechanical ventilation with heat recovery systems would be provided for the office and retail spaces of the Tower and Keats House; and
- high efficiency chiller and efficient VRF system for the Georgian Terrace's retail assets.

5.86. The ventilation plants are fitted with heat recovery devices (where feasible relative to function served) to minimise pre-heating and pre-cooling required for air supply. The service yard would be fitted with CO sensors so that if the traffic usage is low the fans would be able to turn down whilst keeping good air quality conditions.

5.87. Chilled water is generated via a central cooling plant that serves all functional assets. Each individual unit as well as individual retail unit is fitted with a combined heating and cooling interface unit that hydraulically decouples each tenancy from the central system thus offering quasi operational autonomy to each individual tenancy/unit. This would also facilitate individual monitoring of cooling energy consumption by each respective unit/tenancy. Variable speed pumps circulate chilled water to suit the variable levels of demand thereby minimising energy consumption.

5.88. Low Temperature Heating Water (LTHW) is provided via five 650kW boilers located on the roof level of the Tower. Domestic hot water would be provided via two 124kW direct gas-fired water heaters. Four of the LTHW boilers would operate between October and April with one operating all year round to service the A1 and A3 retail units. Hot water storage vessels would also assist in maximising the boiler operational efficiencies by reducing rapid start/stop functions as well as rapid ramping up/down of peak loads in line with heating load fluctuations.

5.89. An area of 438 sqm on Levels 35 and 36 on the Tower is dedicated to photovoltaics (assumed to accommodate 281 units).

5.90. The Variable Refrigerant Flow (VRF) system installed for the retail units in the Georgian Terrace would minimise the impact on the listed buildings as they have flow and return pipe dimensions that are smaller in comparison to LTHW and combined hot water pipework. The VRF condenser would be placed in the lower ground floor external passageway between No's 8 and 10.

5.91. The Energy Strategy indicates that the overall predicted reduction in CO_2 emissions beyond Part L 2013 of the Building Regulations, as a result of the above measures, is approximately 35.1% which represents an annual saving of approximately 355.4 tonnes of CO_2.

Sustainability

5.92. A Sustainability Statement has been developed by Chapman BDSP and is submitted separately to support the planning application. The Development is targeting a BREEAM New Construction Shell and Core 2018 (offices) rating of 'Excellent' for the new build assets in line with Southwark policy P61[4]and BREEAM Refurbishment Fit-out 2014 (office and retail) 'Very Good' for the refurbishment assets. Measures have been taken to ensure that the design stays WELL[i] – enabled and BREEAM 2018 – enabled going into detailed design.

5.93. Sustainable drainage systems (SuDS) such as blue roofs, permeable pavements and permavoid and rainwater recycling system are specified to reduce the peak surface water discharge from the Development to a greenfield rate, reducing the risk of flooding from sewer to the Site and other properties downstream.

5.94. The Development would also incorporate water efficient fittings ensuring a 50% water demand reduction against nondomestic baselines for offices and 40% for retail units. Additional features include for the non-domestic assets the specification of greywater recycling, water meters with pulsed output, flow control devices in high demand areas and a major leak detection system. Water efficient irrigation systems would also be specified for the Development at detailed design.

5.95. The proposed building design takes into consideration the existing soil characteristics to make sure the foundations are designed to withstand heavier rainfalls as well as long periods of dry weather. This is particularly important for clay soils which make most of London geology.

5.96. The adopted approach would aim to minimise the carbon footprint and environmental impact of New City Court construction processes. The Site would be registered under the Considerate Constructor Scheme to commit to best practice management, including the monitoring and mitigation of local habitat, air and water pollution.

5.97. A Resource Management Plan would be developed for the scheme. On-Site waste would be minimised, and a high proportion of the waste that is produced would be diverted from landfill. An aspirational target of 7.5m^3 or 6.5 tonnes per 100 sqm GIA has been set for the maximum amount of waste generated from construction /refurbishment activities. A BREEAM New Construction 2018 target of 70% of volume (or 80% of tonnage) of non-demolition waste and 80% of volume (or 90% of tonnage) of demolition waste has been set for waste to be diverted from landfill.

5.98. Responsible sourcing of materials from suppliers that operate an Environmental Management System would be prioritised. 100% of all timber included in the construction of floors, roofs, walls and staircase would be sourced from certified sources. Where possible the team would aim to use A and A+ rated materials as these have the lowest environmental impact. Other material sustainability measure include:

- The use of insulation materials with low Global Warming Potential (GWP) would be prioritised.
- The use of high Volatile Organic Compounds (VOC) content paints, sealants and all ozone depleting materials including insulation would be avoided.
- Materials would be specified to ensure they can be supplied for the scheme without leading to any critical supply issue due to scarcity of materials.

[i] WELL is a tool for advancing health and well-being in buildings

- Materials would be selected to ensure materials hazardous at end of life are avoided wherever possible. If not, a proper methodology for end of life disposal would be provided.
- Products that can be recycled at end of life would be preferred and selected wherever possible.

5.99. The noise level from the completed Development (as measured from the nearest or most exposed noise-sensitive development) has been assessed to be no greater than +5dB during the day and +3dB at night.

5.100. The external lighting would be designed in compliance with the guidance in the Institution of Lighting Professionals (ILP) Guidance notes for the reduction of obtrusive light, 2011[5]. Lighting would be designed so that it is directed to where it is needed and does not spill into neighbouring residential properties or affect wildlife. All external lighting specified for the non-domestic scheme (except for safety and security lighting) would include appropriate controls to ensure they can be automatically switched off between 11pm and 7am. Where specified, illuminated advertisements would be designed in compliance with ILP Technical Report 5 – 'The Brightness of Illuminated Advertisements[6]'.

5.101. A five-year Habitat Management Plan would be produced by an ecologist and handed over for implementation by to the Development's facilities management team.

References

1 EA website accessed 1/11/18 https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

2 Mayor of London (2016), The London Plan, The Spatial Development Strategy for London Consolidated with Alterations since 2011

3 Department for Communities and Local Government (2016), 'Conservation of fuel and power: Approved Document L: 2013 edition incorporating 2016 amendments'.

4 Southwark Council (2017), New Southwark Plan. December 2017.

5 Institute of Lighting Professionals Lighting (2011), Guidance Notes for the Reduction of Obtrusive Light GN01:2011.

6 Institute of Lighting Professionals Lighting (2015), PLG05 The Brightness of Illuminated Advertisements.

6. Development Programme, Demolition, Deconstruction, Refurbishment and Construction

Introduction

6.1. This chapter, which has been prepared by Waterman Infrastructure & Environment (Waterman IE) with input from the Applicant's construction advisors Gardiner & Theobald, sets out the proposed programme of the demolition, deconstruction, refurbishment and construction works for the Development (hereafter referred to as 'the Works') together with the key activities that would be undertaken on the Site. A summary of the proposed mitigation measures expected to be implemented by the construction contractor is set out. Detailed assessments of the likely significant environmental effects resulting from the Works are presented in technical chapters 7 to 14 of this Environmental Statement (ES).

6.2. It is proposed that a Site-specific Environmental Management Plan (SEMP) and Construction Logistics Plan would be prepared for the Development. The SEMP would include details of relevant environmental management controls necessary for environmental protection during the Works, as detailed later in this chapter. This would be discussed and agreed with the relevant planning officers from Southwark Council (SC), pursuant to a discharge of condition application, following the approval of the planning application.

6.3. The detailed assessments of the likely significant environmental effects resulting from the proposed Works, together with mitigation measures, are presented in technical **Chapters 7** to **14** inclusive of this ES and in **Part 3: Townscape, Visual Impact and Built Heritage Assessment** of this ES.

Existing Structures

6.4. The existing New City Court building (see **Figure 3.2**) is part four storeys and in part five storeys high with a one storey basement at 1.5 metres (m) Above Ordnance Datum (AOD), 3.5m below ground floor level. The existing foundation consists of 450mm diameter reinforced concrete piles, with 10 m deep pile caps located below the 250mm thick reinforced concrete basement slab.

6.5. Keats House is a four-storey building with a retained 19th Century façade which would be redeveloped and the façade retained. Keats House has an existing one storey basement. There are six vaults located in front of Keats House. The larger vaults had been previously closed up with a masonry skin and four 4 of the six vaults contained large entities of mass concrete. The Foundations of Keats House main superstructure are approximately 450 diameter piles as part of the main existing development. The façade foundations appear to have been underpinned.

6.6. The four-storey Georgian Terrace forms a row of listed buildings which are to be retained, restored and refurbished. The Georgian Terrace also has a one storey basement. The existing foundations are corbelled brickwork strip footings. The rear footings were underpinned using various combinations of brickwork and mass concrete, during the 1980s conversion. The vaults within the Georgian Terrace appear to be made of masonry bricks which are vaulted beneath the pavement, extending approximately 1.6m at No. 4 St. Thomas Street and 2.6m in front of numbers 6-16.

Programme of Works

6.7. The programme of Works is necessarily broad at this stage and may be subject to modification. Specific demolition, deconstruction, refurbishment and construction activities may vary in frequency, depending upon the particular stage of works. However, it is considered that sufficient planning has taken place at this stage to enable the likely significant environmental effects relating to the Works to be identified and assessed.

6.8. It is anticipated that the Works would be carried out over a period of approximately three years and 11 months (47 months). The Works would include**:**

- Site set up and enabling works;
- demolition and Site clearance to ground level of identified units;
- piling;
- basement construction;
- construction of the superstructures;
- service installation and fit-out; and
- landscaping and external works.

6.9. The estimated start date for the Site clearance and demolition is quarter one 2022. The anticipated duration of each task within the Works is set out in **Table 6.1**. Although the exact weeks may vary, the approximate duration of the works means the works are expected to finish in quarter four 2025.

Table 6.1: Indicative Programme of the Works

Activities	Anticipated Start Date	Anticipated Completion Date	Approximate Duration (Weeks)
Site set up and enabling works	Week 1	Week 37	**38**
Demolition and Site clearance	Week 1	Week 31	**32**
Piling	Week 29	Week 47	**19**
Basement construction	Week 46	Week 78	**34**
Construction of the superstructures	Week 76	Week 160	**85**
Service installation and fit-out	Week 75	Week 205	**131**
Keats House	Week 134	Week 179	**40**
Landscaping and external works	Week 171	Week 196	**26**

Description of the Works

Site Set Up and Enabling Works

6.10. Secure 3m hoarding would be erected around the perimeter of the Site prior to the commencement of demolition works. The design of the hoarding would be in accordance with SC Technical Guidance – Demolition and Construction[1] (hereafter referred to as the 'Code'). The

Main Contractor would be required to maintain the hoarding to provide full security and safety for the general public and to minimise adverse visual and noise effects. The Site would be secure at all times to prevent unauthorised access and a traffic management plan/ site logistics strategy would be provided, separating vehicular and pedestrian access.

6.11. The enabling works would include:

- set up of the Site welfare offices in the existing Georgian Terrace on St. Thomas Street;
- erecting the tower crane;
- carrying out a Site-wide asbestos survey; and
- moving the UKPN substation to a temporary gantry on St. Thomas Street;
- carrying out investigation works to the existing structure.

6.12. It is anticipated that the Site would be serviced from St. Thomas Street. All Works vehicles during set up and enabling works would be held on Druid Street.

Archaeological Evaluation

6.13. As reported in **Chapter 10: Archaeology** evaluation trial pits or trenches would be excavated once the basement slab is removed. If the results of these investigations indicate that it is necessary, mitigation would comprise of targeted excavation and recording, and / or a watching brief during the groundworks under a planning condition to secure preservation by record.

Demolition, Deconstruction and Site Clearance

6.14. The existing New City Court building would be soft stripped and demolished to ground level. Keats House façade would be carefully dismantled, each element labelled, stored off-site and later rebuilt in the location 2.7m to the west to allow creation of a new ground level servicing access onto St. Thomas Street. The remains of Keats House would be demolished to the existing basement Level B1. The Georgian Terrace would be soft stripped of material during this stage.

6.15. The demolition of the buildings would be preceded by a period of Site investigation and would be carried out according to the following sequence:

- hazardous material identification and removal works;
- internal soft strip out of the identified buildings;
- removal of all mechanical plant and equipment; and
- deconstruction of the buildings on a floor-by-floor basis.

6.16. The following main principles would be followed:

- The main building would be demolished (see **Figure 6.1**) starting from the roof and working down to the ground floor slab.
- The works would be subject to the detailed method statement from the demolition contractor.
- The lift would be removed early in the programme, and the shaft would be used to drop debris to ground floor.
- Suitable demolition material would be retained on Site to provide a piling platform for the operations; and

- An external scaffold would be deployed around the existing buildings to ensure the safety of the workers.

6.17. Once the buildings are removed, the existing sewer under Keats House would be relocated to the east to be beneath the service access between Conybeare House and the relocated Keats House (see **Figure 6.2**).

6.18. It is expected that 1,200 tonnes of material would be created from the soft strip much of which can be re-used or recycled. The demolition of the reinforced concrete structure would create about 7,200 tonnes of concrete and bricks and 800 tonnes of ferrous and non-ferrous metal. It is expected that over 98% of the above materials would be recycled.

6.19. An approximate total of 13,450m^3 of excavated material is expected to be removed from the Site, during the groundworks phase. The material would be separated into material for disposal and material for recycling.

6.20. The impact of the Development on the adjacent buildings is to be assessed and approvals secured via party wall awards where required. As part of the basement impact assessment, halfspace modelling to assess ground movements was undertaken and would be revised and combined with those results from the proposed retaining wall analysis as appropriate in order to develop predicted vertical and lateral ground movement contouring and model required mitigation (see Appendix 4 of the Basement Impact Assessment (standalone document) for details).

Substructures and Piling

6.21. After the demolition of the existing identified structures (New City Court and Keats House), the ground floor slabs would be broken down on-site to allow excavation of the basement (see **Figure 6.2**). The proposed basement would be two storeys deep and confined by secant pile retaining walls. The levels of the first and second basement floors are approximately -0.150 OD and -4.650 OD with the level of the ground at 5.0m AOD.

6.22. All of the surrounding buildings have at least one level of basement, albeit with different heights/levels, that allows the outline of the first level of basement to generally be pushed up against the Site boundary.

6.23. Piling rigs would then be used to construct the new foundations and install the new drainage (see **Figure 6.3**). The diameter of the secant piles is generally 600mm. Along the east side of the building in relation to the Tower footprint, the diameter has been increased to 900mm due to the double height basement space to allow for vehicle access. The piles would be ‘sleeved’ as they pass through the existing basement void.

6.24. There are two zones (beside off-site buildings Conybeare House on the north-east side and Iris Brook House on the south-east side) where the diameter is reduced to 450mm. The secant piles[i] would be constructed using a different piling rig, generally used for restricted access to move the piles closer to the party walls.

6.25. In all cases, the secant piles wall would be constructed by drilling with a Contiguous Flight Auger (CFA). Secant piles are installed from either existing Level B1 or ground, while bearing piles from the existing basement Level B1.

6.26. Piling would commence at basement level from the south west corner working – south to north. The piling line would be set such that adequate clearance to the adjacent structures is maintained from the centre line of the pile to the adjacent high-level obstruction (as required by the

[i] Secant pile walls are formed by constructing intersecting reinforced concrete piles.

contractor). The vibration induced by piling and the movements arising from piling and excavation would be assessed against agreed specified limits.

6.27. Generally, the piling of the retained wall is proposed to be done from the existing Level B1. The wall is set out 1.2m inside the existing masonry walls. Along the south and the east faces, the piling would be carried out from ground floor level to avoid restriction from the existing basement walls. Utilising mainly demolition rubble, a berm would be formed against the existing retaining wall, thus allowing for the piling rig to be positioned on top.

6.28. In some instances, the party walls adjacent to the Site would need to be underpinned to account for the increased depth of the basement. The extent of the underpinning is significant in length and depth. Therefore, jet grouting[ii] could be an alternative option to the traditional methods. This would be confirmed immediately prior to construction.

6.29. Once the entire ground floor slab is removed, a logistic slab would be constructed, due to limited areas for storage and laid down areas, adjacent to St. Thomas Street. This would be supported on plunge columns and designed by a qualified temporary works engineer.

6.30. The bearing piles and plunge columns would be installed from basement Level B2. The piles for the Tower would support a 1,350mm deep pile cap which occupies the entire footprint of the building. Therefore, the formation level of the basement is -6.0m OD under the footprint of the Tower and -5.0m OD under the public realm and Keats House with exception of the pile caps and the lift pits, which would be deeper.

6.31. The bearing piles for the public realm and Keats House would be 900mm deep. The pile caps underneath the columns and the core of Keats House are 1,350mm deep.

6.32. The ground floor logistics slab would be constructed on plunge columns[iii]. The excavation would begin from the existing basement Level B1 to proposed basement B2 formation level (see **Figure 6.4**). Next the core of plunge columns would be constructed. The slabs at both B1 and B2 levels would be a 350mm thick reinforced concrete suspended slab.

6.33. The underpinning work on the Georgian Terrace undertaken in the 1980s would be additionally strengthened as part of this work.

Construction of the Superstructures

6.34. The building superstructure would be constructed around a concrete stability core, with a steelwork frame and *in situ* concrete slabs positioned on structural metal decking (see **Figure 6.5**). The core would house the lifts, stairs and primary landlord service risers. Traditional reinforced concrete slabs would be utilised at ground floor level and below. The priority would be to build the main core as quickly as possible and considering the building height and potential weather impacts, a "jumpform [iv]" self-climbing formwork system[v] for the cores has been adopted.

6.35. The steelwork construction is due to commence once the core is sufficiently installed to allow full access to install the embedment plates.

[ii] Jet grouting is the procedure for injecting water in to displace soil and simultaneously replace it with cement-based grout.

[iii] Plunge column is a structural steel or concrete section embedded in freshly poured concrete pile. This is done to allow simultaneous superstructure construction and basement excavations.

[iv] Jump form is a method (formwork) the structure is cast in a series of vertical sections called "lifts". After the concrete has gained sufficient strength the framework is moved back and then 'jumped' to the next level above

[v] The mould/formwork structure elevates itself with the help of mechanic leverage equipment (usually hydraulic). To do this, it is usually fixed to sacrificial cones or rails emplaced in the previously cast concrete

6.36. Superstructure floor slabs are generally reinforced concrete flat plates, positioned on metal decking which is secured to the steelwork frame. The frame would span from the external elevation to the core. Cast-in plates would be provided within the core structure and welded plates would be installed prior to the steelwork commencing. A temporary propping system may be required to the underside of the metal decking; however, this would be minimal.

6.37. It is expected that the construction would use the following amounts of material:

- Reinforced concrete (superstructure) = 4,800m^3
- Reinforced concrete (substructure) = 2,153m^3
- Reinforced concrete (piling) = 6,264m^3
- Steelwork = circa 5,400 pieces
- Façade panels = 4,200no.

6.38. The façade construction would commence once the superstructure reaches Level 6 of the Tower (see **Figure 6.6**). This should ensure the cladding never clashes with the structure.

6.39. During certain works eg the work on the external facades of Keats House, the external scaffold would be progressively erected to provide protection for the façade operations**.**

6.40. The method of installation of the panels requires more detailed assessment when more information is available, and a specialist contractor is appointed. This would ensure the floors are made watertight to allow commencement of the CAT A installations.

Fit Out

6.41. It is envisaged that all elements of the building would be fitted out completely with the office areas up to CAT A position (e.g. raised floors and suspended ceilings, basic mechanical and electrical services installed). The cores and landlord areas would be fitted out fully to working areas including all services which would be commissioned.

6.42. Work to the risers start on completion of the frame to Level 4 of the Tower. Access to the upper floors would then be released in line with the frame cycle. The main mechanical and electrical carcasses to the floors would be installed and followed by the progressive fit-out of the offices, cores and lobbies.

6.43. Temporary waterproofing is essential to allow early services installation and the first stage fit-out works to commence. This is to consist of two levels of protection (such as bundling) at Levels 5, 15 and 25 of the Tower to prevent water ingress to risers from floor plates.

6.44. Lift Installation to the cores would commence once the frame structure is complete. The lifts would be installed as early in the programme as possible to allow for early beneficial use to facilitate logistics, during the final stages of construction.

6.45. CAT A fit-out to the office areas would commence once the cladding at Level 5 of the Tower is complete and be sequenced on a floor-by-floor basis, with a duration of approximately 21 weeks with a 2-week lag between floors.

External Landscaping

6.46. The proposed areas of landscaping would be completed towards the end of the construction of the structures.

6.47. The external works would comprise the construction of the courtyards, plus all of the public realm, including the soft landscaping, hard landscaping and seating areas.

Employment

6.48. The Main Contractor would work with SC to promote the employment of local people during the demolition and construction works and the patronage of local businesses.

Plant and Equipment

6.49. Consideration has been given to the types of plant that would likely be used during the Works. The anticipated plant and equipment likely to be used is out in **Table 6.2**.

Table 6.2: Anticipated Demolition, Deconstruction, Refurbishment, and Construction Plant

Plant and Equipment	Demolition	Excavation /Piling	Substructure	Superstructure and Envelope	Fitting out
1.5 tonne Skid Steer Loader Shovels	3				
Luffing jib tower crane	1		2	2	
30 tonne excavator with hydraulic muncher attachment	1				
30 tonne excavator with muncher attachment	1				
30 tonne excavator with bucket attachment	1				
5 tonne minis with hydraulic pulveriser/impact hammer attachments	3				
Brokk		2			
Excavator		2	4		
Concrete Pump		2	2	2	
Piling Rig		2			
Crawler crane		2			
Temporary Substation		1	1	1	
Mobile access Platforms			5	4	8
Single hoist			1	1	
Twin hoist				2	2

Plant and Equipment	Demolition	Excavation /Piling	Substructure	Superstructure and Envelope	Fitting out
Common Tower				1	1
Scaffolding					✓
Concrete lorry (6m^3)*	Peak 30 Average 20	Peak 44 Average 26	Peak 24 Average 22	Peak 43 Average 16	Peak 24 Average 8
Muck away lorry (standard 16 tonne)*					
Articulated lorry*					
Low Loader*					
Lorry*					

* all of these peak and average numbers are two-way movements e.g. Peak 44 is 22 vehicles into the Site and 22 vehicles out of the Site. These peak figures have been revised downwards by around 25% by the construction advisor, but the environmental assessments are based on the higher numbers as presented in the table to ensure assessments consider the worst-case scenario.

Hours of Work

6.50. It is anticipated that the normal core working hours for the Works would be:

- 08:00 - 18:00 hours Monday to Friday;
- 08:00 - 14:00 hours Saturday; and
- No working on Sundays or Bank Holidays.

6.51. The hours of working would be confirmed via a planning condition and agreed with SC prior to the commencement of the Works. It is conceivable that certain works such as the delivery or maintenance of large plant and equipment may have to be undertaken outside these periods.

6.52. Any Works outside these hours would only happen with prior approval from Southwark Public Protection Services. The hours would be discussed further with local residents and businesses.

Materials Distribution

6.53. Materials would be loaded and unloaded utilising two luffing jib tower cranes. The location of this crane would need to avoid any potential over-sailing issues and also to ensure that it does not impede the progress of the Works. The proposal is for the crane to be situated to the north of the office block and the second one to be on the top of the core. A number of mobile crane lifts would be required throughout the project, which would mean a partial road closure of the St. Thomas Street carriageway. Any road closures would be agreed with SC.

Environmental Issues

6.54. Demolition and construction sites have the potential to cause temporary disturbance and nuisance to neighbouring occupants, highway users and other sensitive receptors. Detailed assessments of the likely significant environmental effects resulting from the Works of the Development are described within the technical chapters of this ES (i.e. **Chapters 7: Transportation and Access** to **Chapter 14: Cumulative Effects** inclusive) and **Part 3: Townscape, Visual Impact and Built Heritage Assessment** of this ES. In addition, recommended mitigation measures and residual environmental effects are outlined.

Environmental Management and Mitigation

6.55. Below is the Site environmental protection measures and Site practices already proposed by the Applicant.

Site Environmental Management Plan

6.56. The nature, extent and magnitude of potential adverse effects associated with the Works are largely dependent on the implementation of effective management controls, e.g. the employment of dust suppression methods and the use of properly maintained plant.

6.57. The Main Contractor would be required to prepare and implement a SEMP in accordance with SC's Code. The implementation of a SEMP is an established method for managing potentially adverse environmental effects resulting from demolition and construction works and is consistent with methods generally adopted for major schemes in urban areas. The SEMP would be an operational manual for carrying out environmental controls and monitoring during works. The content of the SEMP would be discussed and agreed with SC prior to the commencement of the Works and could be secured through an appropriately worded planning condition.

6.58. It is envisaged that the SEMP would include:

a. Procedures implemented in line with ISO14001 including: environmental Site inspections, constant monitoring of subcontractors, environmental training, signage, waste management, COSHH storage

b. Available details of the sequencing of the works;

c. Details of the demolition, deconstruction, refurbishment and construction activities to be undertaken, highlighting any operations likely to result in adverse environmental effects, with an indication of the specific detailed mitigation measures to be employed;

d. Prohibited or restricted operations;

e. A framework for compliance with relevant legislation and guidance;

f. Details of plant to be used;

g. Details of proposed routes for Heavy Goods Vehicles (HGVs) travelling to and from the Site;

h. Roles and responsibilities of key staff including training of staff, liaison with stakeholders and management of enquiries and complaints;

i. Details of emergency procedures which would be implemented on the Site;

j. Requirement for spill kits and drip trays;
k. Details of general Site management practices, including working hours, hoarding, access, lighting, Site facilities, energy and water use, waste, materials procurement and storage;
l. Details of environmental management and control procedures, covering traffic and access, noise and vibration, dust, archaeology, contamination, hazardous materials and waste management, drainage and pollution control;
m. Details of all works involving interference with a public highway, including temporary road / footpath closures, realignment and diversions, and temporary car parks;
n. Requirements for auditing, monitoring and record-keeping;
o. Mechanisms for third parties to register complaints and the procedures for responding to complaints;
p. Provisions for reporting, public liaison and prior notification, especially where dispensations would be required; and
q. Measures implemented to ensure procurement of certified, sustainably sourced materials in order to comply with BREEAM.

6.59. The preparation and implementation of a SEMP would place stringent contractual and procedural performance obligations upon trade contractors.

Management of Contractors

6.60. Individual trade contracts would incorporate appropriate requirements in respect of environmental control, based largely on the standard of 'good working practice' outlined in the SEMP, the Code and the Considerate Constructors Scheme. Contractors would be required to demonstrate how they would achieve the provisions of the SEMP, how targets would be met and how potential adverse effects would be minimised.

Management of Construction Works

6.61. The Applicant anticipates that construction of the Development would be managed on their behalf by a Main Contractor and that the Main Contractor would participate in the Considerate Constructors Scheme, which sets stringent targets for environmental performance, neighbourhood liaison and workers welfare facilities.

6.62. The Main Contractor would demonstrate in the SEMP how management, monitoring, auditing and training procedures are in place to ensure compliance with the Code. The SEMP would also set out the specific roles and responsibilities of the contractors' personnel in managing, monitoring and controlling all sub-contractors.

Communications with Neighbours

6.63. The Main Contractor would have a Site based project team who would manage every aspect of the construction process. Their Senior Construction Manager's responsibilities include ensuring that the Site team are doing everything practically possible to minimise disruption to the neighbours and other local residents. They would have regular liaison meetings and distribute newsletters on progress and plans of upcoming work.

Public Safety, Emergencies and Accidents

6.64. The Main Contractor would be required to liaise fully with SC, the police (where necessary) and other relevant parties with regard to maintaining and contributing to a safe environment around the Site.

6.65. A clear and secure demarcation between operational activities and other areas would be maintained to ensure public safety. Particular attention would be given to crossing points on surrounding roads, routes for the Works, access gates and security arrangements. A ‘clean site’ policy would be maintained.

6.66. The Code states the Main Contractor should follow a ‘good housekeeping’ policy that would ensure that the Site is, amongst other things, left clean and tidy, and has high safety standards on the Site, and is fully compliant with current health and safety legislation.

6.67. Emergency procedures would be developed in consultation with the emergency services to ensure plans would be in place to deal with any spillages and / or pollution incidents. Any notifiable pollution incidents would be reported immediately to the regulatory bodies.

6.68. To assist the programme of works, it is anticipated that the footpath adjacent to the Site would be closed from pedestrians, and a new crossing may be sited at either end of the Site to allow safe access to the opposite side.

6.69. All construction entering and leaving the loading bays would be closely managed by the Applicant’s traffic management team/ traffic marshals.

Traffic and Access Management

6.70. From the outline Site logistic proposals, it is anticipated that delivery points on St. Thomas Street would be suitable for receiving deliveries from HGVs. To ensure that St. Thomas Street is not congested during the Works, all deliveries would comply with a booking system coordinated by the main contractor’s logistics manager and the project team. This would ensure that materials are pre-booked in a timely manner on a “just in time” basis. An off-site consolidation centre should also be considered as this would assist in ensuring that the scheduled deliveries arrive and depart from the Site on time.

6.71. Full time banksmen/ traffic marshals would be stationed within the proposed loading bay area within St. Thomas Street and would be responsible for managing safe access and egress of all vehicular traffic. St. Thomas Street being a main thoroughfare into London would have very high usage in the morning and evening and therefore all deliveries would be restricted to be outside these core times

6.72. No parking on Site would be permitted, with exception to the delivery vehicles loading and unloading within the loading bay.

6.73. As previously mentioned, designated routes to and from the Site have been developed (**Figure 6.7**).

Control of Noise and Vibration

6.74. To minimise potential noise and vibration effects during the Works, site-specific code of practice measures would be implemented and adhered to. Such measures set out in the SEMP would be in accordance with the Code and suitable plant / working methods would be agreed with SC prior to the commencement of any works. Noise and / or vibration monitoring on the Site and in adjacent buildings would also be undertaken, where necessary, which would assist in establishing noise and vibration levels. Works would be limited to the specified hours outlined above and would be subject to agreement with SC. Control measures to minimise noise are outlined in **Chapter 8 Noise and Vibration.**

Control of Dust

6.75. To minimise the release of dust and air pollution during the Works, in accordance with the Code, the GLA SPG on The Control of Dust and Emissions during Construction and Demolition[2] and guidance from the Institute of Air Quality Management[3], a number of measures would be implemented. These are detailed in the CMP and in **Chapter 9: Air Quality**.

Ground Contamination

6.76. A desk-based ground conditions assessment was undertaken (Appendix B in **Appendix 2.1**) and concluded that whilst there is potential for contamination to be present, existing underground structures - the basement - are likely to have removed much of the potential sources of contamination. However, piling and other intrusive sub-structure works may create a risk of disturbance and a potential contamination pathway to aquifers underlying the London Clay Formation.

6.77. There is an area in the south east corner of the Site where no basement currently exists, and this area may have been a former burial ground. Development affecting any former burial ground is regulated by statute, principally the Burial Act 1857[4], the Disused Burial Grounds Act 1884[5] and 1981[6], and the Mission and Pastoral Measure 2011[7]. The exhumation of any human remains requires approval from either the Secretary of State or the Church of England, depending on whether the land is subject to the Church of England's jurisdiction. Under the Town and Country Planning (Churches, Places of Religious Worship and Burial Grounds) Regulations 1950[8], the removal and re-interment of human remains would be in accordance with the direction of the local Environmental Health Officer.

6.78. The following measures have been committed to by the Applicant which would ensure that the residual effects, following the application of the mitigation measures, are negligible:

- Undertaking the Works in accordance with best practice, which would include undertaking a Site investigation following the demolition element of the Works, to provide information for both geotechnical and contamination purposes. This would include testing samples of soil and groundwater and taking readings of levels of ground gas and vapour;
- Based on the findings of the Site investigation preparation and implementation of a remediation strategy during the works to ensure identified contamination receptor linkages are broken as part of the development; and

- Removal of the buried diesel tank along with associated pipework and infrastructure in accordance with best practice measures. It would be drained, cleaned and appropriately decommissioned prior to removal from the Site.

6.79. In addition, the Works would be undertaken in accordance with the SEMP to negate adverse risks to the health of construction workers, Site residents, Site visitors, Site neighbours, ecological receptors and the environment. Protective measures would include:

- Dust monitoring within the Site hoarding and also public areas surrounding the SIte and taking preventive measures to control dust eg use of a fine water spray at the working face and loading areas;
- Handling and storage of any potential hazardous liquids/materials in accordance with relevant legislation and Environment Agency (EA) pollution prevention guidance;
- The use of appropriately tanked and bunded storage areas for fuels, oils and other chemicals;
- Procedures for the management of materials, spillage and spill clean-up, use of best practice construction methods and monitoring;
- Surface drainage would pass via settlement and oil interception facilities, where required, and discharge arrangements would be agreed with the EA and Thames Water Utilities Limited (TWUL);
- The provision of adequate drainage to manage surface water run-off and minimise contaminated water reaching the groundwater;
- The stockpiling of contaminated materials would be avoided, wherever possible. Stockpiles would be located on areas of hard standing or on plastic sheeting to prevent mobile contaminants infiltrating into the underlying ground; and
- Potentially hazardous liquids on the Site, such as fuels and chemicals, would be managed and stored in accordance with best practice guidance, such as that published by the EA. Storage tank and container facilities would be appropriately bunded with designated areas and located away from surface water drains.

Site Drainage

6.80. The Main Contractor would hold plans on the Site showing the location of all surface and foul water drains and would make trade contractors aware of the drainage network.

6.81. Surface drainage and wastewater would be disposed of in accordance with the EA and TWUL.

6.82. All liquids and solids of a potentially hazardous nature would be stored on hard surfaced areas with bunding, to the satisfaction of the EA. Above ground tank storage of oil would be undertaken in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001[9].

Materials Storage and Handling

6.83. Environmental issues would be considered in the procurement of raw materials and all such materials would be appropriately stored in order to minimise damage by vehicles, vandals, weather or theft. The SEMP would detail the process that the Main Contactor and their trade contractors would be required to follow to maintain a tidy Site and, where practicable, to operate a 'just-in-time' policy for the delivery and supply of materials for the Works.

6.84. Excavated materials would be removed from the Site, as there would be limited opportunity to store this material on spoil heaps. Any stockpiled material on the Site would be located on hardstanding and covered in sheeting. Potentially hazardous materials (such as lubricating and hydraulic oils) would also be stored in tanks on hardstanding and bunded in accordance with EA guidance.

Waste Management and Minimisation

6.85. Waste would be generated during all stages of the Works from a number of sources, including:

- spoil - including concrete, brick rubble, steel, aluminium, plastics, glass, wood;
- soils (including potentially contaminated soils);
- packaging - including plastics, pallets, expanded foams; and
- waste materials generated from inaccurate ordering, poor usage, badly stored materials, poor handling and spillage.

6.86. The Main Contractor would ensure that construction waste is segregated into separate categories, such as timber, steel and packaging, to reduce the amount of waste sent to landfill.

6.87. The Main Contractor and trade contractors would investigate opportunities to minimise waste arisings at source and, where such waste generation is unavoidable, to maximise the recycling and reuse potential of other demolition and construction materials. Strategies including just-in-time deliveries and suitable storage of materials prior to use would also be applied to prevent spoiling.

6.88. The destination of all waste or other materials removed from the Site would be notified by the Construction Site Manager for approval. Loads would only be deposited at authorised waste treatment and disposal sites daily. Deposition would be in accordance with the requirements of the EA, the Control of Pollution Act 1974[10], Part IIA of the Environmental Protection Act 1990[11], Clean Neighbourhoods and Environment Act 2005[12], Hazardous Waste Regulations 2005[13] and the Environmental Protection (Duty of Care) Regulations 2003[14]. The disposal of excavated materials would be carried out in accordance with relevant legislation and options for disposal are currently being investigated.

Protection of Ecological Resources

6.89. A Preliminary Ecological Appraisal report (refer to **Appendix 2.1** of this ES) identified that the Site consists of habitats assessed to be of between low and negligible value. It has been assessed that the Site does not have potential to support notable and legally protected species however, it is considered that it may support common species of bird and invertebrates.

6.90. As set out in the Preliminary Ecological Appraisal should any habitats of value to nesting birds require removal to facilitate the Development this would be undertaken outside of the breeding bird season (March to August inclusive). However, if the Works cannot be undertaken outside the breeding bird season an ecologist would inspect any vegetation / building to be removed. An experienced ecologist would be deployed to carry out an inspection at least within 24 hours prior to the clearance. If an occupied nest is detected, an appropriate buffer zone would be created around the nest, and clearance of this area delayed until the young have fledged.

6.91. The Works would be carried out according to the British Standards Institute (BSI) and Best Practice Guidelines with regard to ecology, including guidelines produced by the EA[15]. The Code includes measures to prevent disturbance from noise, light, vibration, surface water run-off and dust deposition. Protection of ecological resources would already be covered by the measures within the SEMP.

References

1 Southwark Council (2016); Technical Guidance – Demolition and Construction [Online]. [Accessed October 2018]. Accessed from http://www.southwark.gov.uk/assets/attach/1477/Technical%20Guidance%20for%20Construction%20-%202016.pdf

2 Greater London Authority (2014); SPG The Control of Dust and Emissions during Construction and Demolition. 2014

3 Institute of Air Quality Management; Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance, January 2012

4 HMSO (1857); Burial Act 1857

5 HMSO (1884); Disused Burial Grounds Act 1884

6 HMSO (1981); Disused Burial Grounds (Amendment) Act 1981

7 HMSO (2011); Mission and Pastoral Measure 2011

8 HMSO (1950); The Town and Country Planning (Churches, Places of Religious Worship and Burial Grounds) Regulations 1950

9 Statutory Instrument No. 2954, 'Control of Pollution (Oil Storage) (England) Regulations 2001

10 HMSO (1974); Control of Pollution Act 1974

11 HMSO (1990); Environmental Protection Act 1990

12 HMSO (2005); Clean Neighbourhoods and Environment Act 2005

13 HMSO (2005); The Hazardous Waste (England and Wales) Regulations 2005

14 HMSO (2003); The Environmental Protection (Duty of Care) Regulations 2003

15 EA; Pollution Prevention Advice and Guidance. Available from http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx

7. Transportation and Access

Introduction

7.1 This chapter, which was prepared by Transport Planning Practice (TPP), presents an assessment of the likely transport and access effects of the Development. Information on traffic flows and routes during the Works has been provided by Gardiner & Theobald.

7.2 This chapter provides a description of the assessment methodology; a description of the relevant baseline conditions of the Site and surrounding area; and an assessment of the likely significant effects of the Development, that could arise during demolition, deconstruction, refurbishment and construction, and once the Development is completed and operational. Where appropriate, mitigation measures are identified to avoid, reduce or offset adverse effects and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

7.3 This chapter refers to the Transport Assessment and Travel Plan submitted to support the applications.

Assessment Methodology and Significance Criteria

Assessment Methodology

Consultation

7.4 Consultation has taken place with Southwark Council (SC) Highways over the last three years by means of pre-application meetings.

7.5 A formal pre-application meeting with Transport for London (TfL) took place on 14 August 2018.

7.6 An EIA Scoping Report was submitted to SC in July 2018 and an EIA Scoping Opinion was received from SC on 4 October 2018 (refer to **Appendix 2.1** and **2.2**). Relevant comments raised within the EIA Scoping Opinion have been summarised in **Table 7.1** below, along with an indication of where within this ES Chapter each issue is addressed.

Table 7.1 Consultation Feedback

Consultee	Comment	Where in the Chapter this is addressed
Southwark Council	In respect of the changes which will result from the new areas of public realm to be created at ground level within the Site along with a potential new access to London Bridge Underground Station, a description should be provided of the reasonable alternatives for ground level pedestrian routes studied by the developer. The alternative route options considered should be noted and the main reasons for selecting the chosen option should be set out together with the reasons for other route options being discounted so that the transport effects can be properly weighed.	The alternatives for ground level pedestrian routes are considered in Chapter 4: Alternatives and Design Evolution. A description of the new public realm created at ground level is included in Chapter 5: The Development. An assessment of the effects on pedestrians of the Development is included within this Chapter.
Southwark Council	Any mitigation measures proposed for inclusion in the outline Travel Plan, including any contingency measures identified, should be properly assessed and any effects and their significance identified.	The Travel Plan is included in Appendix 7.2 and a summary of the measures have been set out within the mitigation section of this ES chapter.

Consultee	Comment	Where in the Chapter this is addressed
TfL	It is noted that TfL has stated that it would like to see details of alternative servicing arrangements that have been considered. The rationale for selecting the chosen option and the reasons for other arrangements being discounted should accordingly be provided.	The alternatives considered for servicing arrangements are discussed in Chapter 4: Alternatives and Design Evolution.

Establishing Baseline Conditions

7.7 The baseline conditions have been identified using a combination of site observations, desktop studies, traffic surveys and reviews of available information such as the 2011 Census data. In particular, information on the following transport modes has been obtained:

- Public transport services by review of service routes and frequencies;
- Review of pedestrian routes from the Site to local public transport nodes (bus stops, London Bridge Underground and National Rail stations) undertaken during a site visit;
- Undertaking of a Pedestrian Environment Review System (PERS) audit in order to assess the level of provision and quality of the local pedestrian environment;
- Accident data for the most recent three-year period, from 2015 to 2018, for roads surrounding the Site;
- Information on the 2011 travel to work modal split data for the local area;
- Review of the London Borough of Southwark (LBS) and TfL car and cycle parking standards;
- The most up-to-date Rolling Origin and Destination Survey (RODS) data has been obtained for the Jubilee Line and the Northern Line from TfL;
- Review of the frequencies of the River taxi services from the London Bridge City Pier;
- Automatic Traffic Count (ATC) surveys have been undertaken in 2018 on Borough roads in the vicinity of the Site i.e. White Hart Yard, Marshalsea Road and Southwark Street;
- Traffic data has been obtained from TfL for roads forming part of the Transport for London Road Network (TLRN) for 2017 in the vicinity of the Site i.e. London Bridge, Borough High Street, Southwark Bridge Road, St. Thomas Street and Tooley Street; and
- Review of the Department for Transport (DfT) website for current and historical traffic data has been undertaken for the period from 2000 - 2017 for the surrounding roads.

Assessment Area

7.8 The assessment area has been established based on the likely areas of influence on the various travel modes available and where these are likely to give rise to significant effects as follows:

- Travel by foot - the focus is on access to amenities and facilities within 10 - 15 minutes' walk;
- Travel by cycle - the focus is on access to amenities and facilities within 10 - 15 minutes' cycle;
- Travel by public transport - the focus is on access to stops within the range of travel by foot and those destinations which can be reached within 40 minutes on public transport; and
- Traffic flows – the broad rules set out by the Institute of Environmental Management and Assessment (IEMA)[1] guidance have been followed to define the geographical extent of the assessment of traffic flows:
  - Rule 1 – Include highway links where traffic flows will increase more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and

- Rule 2 – Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

Assessment Scenarios

7.9 The following scenarios have been considered within the assessment:

- Existing Baseline 2018;
- Assessment (Future) Baseline 2026: This scenario comprises the Existing Baseline 2018 + committed developments which are currently under construction and are expected to be completed by the Development opening yea (see below paragraph 7.11 below for more detail);
- Assessment (Future) Baseline 2026 + Development; and
- Assessment (Future) Baseline 2026 + Development + committed developments: This scenario comprises the Assessment Baseline 2026 + Development + the remaining committed developments.

7.10 These cumulative schemes are identified in **Chapter 14 Cumulative Effects** together with consideration of the likely cumulative transport effects,

7.11 A list of those committed developments which are already under construction and which have been included to create the Assessment Baseline are as follows:

- Tower Bridge Magistrates Court and Police Station (15/AP/3303);
- 175-179 Long Lane (15/AP/4072);
- 25-29 Harper Road (15/AP/3886);
- Isis House, 67-69 Southwark Street;
- 1 Bank End (15/AP/3066); and
- Fielden House (Shard Place) (17/AP/4008).

7.12 With regard to the traffic assessment, traffic surveys were undertaken in 2018 for all SC roads within the assessment area. For the Transport for London Road Network (TLRN) roads, the traffic data has been obtained from TfL. Where the data obtained was from 2017 or earlier, traffic growth has been applied based on the review of the DfT traffic trends over the last 10 years.

Assessment of Likely Significant Transport and Access Effects

7.13 This section outlines the methodologies applied to identify and assess the range of potential transport and access effects that may result from the Development. The assessment has been undertaken in line with TfL's Transport Assessment Best Practice guidelines[2] and IEMA Guidelines.

The Works

7.14 An assessment of the potential effects of demolition, deconstruction, refurbishment and construction (referred to as the 'Works') traffic from the Development has been undertaken based upon professional judgement and experience of such analysis at other comparable schemes within London and Southwark. Detailed consideration of the demolition and construction activities for the Development is set out within **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**. For the purposes of providing a robust, worst case assessment of the Works, the peak construction period has been used, and traffic control measures that would be developed post planning secured through a Construction

Logistics Plan (CLP) and Site Environmental Management Plan (SEMP) have not been included within the main assessment (pre-mitigation).

7.15 Based on the review of the Works programme, the most intensive period for construction vehicle activity is predicted to be during piling, substructure works. The peak figure from these periods has been used in the assessment of effects of Works traffic.

Completed and Operational Development

7.16 A detailed multi-modal trip generation for the Development is set out in the Transport Assessment (TA) and summarised later in Table 7.15 and Table 7.16.

Employee and visitors travel

7.17 The morning and evening peak hour trip generation assessment has been undertaken based on an agreed methodology with SC and TfL. For both the existing and proposed office space (B1 use) at the Site, the total person trips during the AM and PM peak hour have been established based on a first principles assessment taking into consideration the expected occupancy levels in terms of the number of employees, supplemented by the TRICS database. This assessment has shown that the Development morning peak would be expected to occur between 08:30 – 09:30 which is typical for employment uses in central London. The evening peak is predicted to occur between 17:00 – 18:00.

7.18 The mode distribution of the trips has been derived from the 2011 Census method of travel to work data with adjustments made to take account of the limited car parking provision around the Site and the lack of parking at the Development (other than two disabled bays). On the basis of the above, a net change in trips on all modes of transport has been calculated which forms the basis of the assessment of potential effects.

7.19 With regard to the proposed A1/A3 uses, the trips are expected to be pass-by or linked trips and would not generate additional movements on the transport infrastructure. This is with the exception of staff travel and servicing trips which are considered later in the chapter. Staff travel is expected to be arranged in shift work arriving and leaving outside of the peak hours. It is noted that some customers might be arriving/departing using a taxi and an assessment of the likely taxi movements for the A1/A3 uses has been undertaken.

Servicing vehicle generation

7.20 For the proposed office element of the Development, servicing vehicle generation has been established based on a servicing survey undertaken in July 2016 at an existing office development in Southwark; this methodology has been agreed with SC and TfL during pre-application discussions. The expected number of servicing trips to the A1/A3 uses has been calculated based on data contained within the TRICS database.

Significance Criteria

7.21 Guidance provided by the Institute of Environmental Management and Assessment (IEMA)[1] and Department for Transport (DfT)[3] has been consulted in order to identify significance criteria applicable to the assessment of walking, cycling, public transport and vehicle trips associated with the Development.

7.22 For a number of effects there are no readily available thresholds of significance, in which case interpretation and judgement has been applied based on knowledge of the Site or quantitative data where available.

Characterisation of Effects

7.23 All effects have been characterised as being either:

- **Beneficial**: meaning that the changes produce positive benefits in terms of transportation and access (such as reduction of traffic, travel time or patronage, or provision of a new service, access or facility);
- **Insignificant**: meaning that their bearing is too small to measure meaningfully (e.g. less than 10% change); or
- **Adverse**: meaning that changes produce negative effects in terms of transportation and access (such as increase of traffic, travel time, patronage or loss of service or facility).

7.24 Effects have been further characterised as:

- **Minor**: slight, very short or highly localised effect (where the data is available/applicable, 10% to 30% change);
- **Moderate**: limited effect (by extent, duration or magnitude) which may be considered significant, (where the data is available/applicable, 30% to 60% change); or
- **Major**: considerable effect (by extent, duration or magnitude) of more than local significance or breach of recognised acceptability, legislation, policy or standards (where the data is available/applicable greater than 60% change).

7.25 The significance criteria apply to all assessments within this ES Chapter are summarised below in **Table 7.2**:

Table 7.2 Significance Criteria

	Effect	Insignificant	Minor	Moderate	Major
Highway Network	Change in traffic flow on highway network	Increase or decrease in flows of less than 10%	Increase or decrease in flows of 10-30%	Increase or decrease in flows of 30-60%	Increase or decrease in flows of more than 60%
Bus Network	Change in passenger numbers leading to a change in journey experience	Less than 10% change in passenger numbers leading to no change in journey experience	10%-30% change in passengers leading to a change in journey experience	30%-60% change in passenger numbers leading to a change in journey experience	More than 60% change in passenger numbers leading to a change in journey experience
Underground and Rail Network	Change in passenger numbers leading to a change in journey experience	Less than 10% change in passenger numbers leading to no change in journey experience	10%-30% change in passengers leading to a change in journey experience	30%-60% change in passenger numbers leading to a change in journey experience	More than 60% change in passenger numbers leading to a change in journey experience
Walk and Cycle Network: Severance	Change in perceived divisions within a community separated by a traffic route	Increase in traffic flows of less than 10%	Increase in traffic flows of 10-30%	Increase in traffic flows of 30-60%	Increase in traffic flows of more than 60%
Pedestrian Delay	A judgement based on the routes with two way traffic flow exceeding 1,400 vehicles per hour in context of their individual characteristics				

	Effect	Insignificant	Minor	Moderate	Major
Pedestrian Amenity	Change in perceived pleasantness of the journey/walking route	Change in total traffic or HGV flows < 100%		Change in total traffic or HGV flows < 100%	
Pedestrian Fear and Intimidation	Increase in traffic flows, HGV composition and narrow footways	Increases in traffic flow, HGV composition and narrow footways		As set out in Table 7.4.	
Accidents and Safety	A judgement based on change in collision numbers over a route under consideration				
Dust and Dirt on the road	A judgement taking into account baseline construction management processes				

Assessing Significance of Changes in Traffic Flows

Receptor Sensitivity

7.26 In order to help define the value and sensitivity of receptors, the following guidance has been obtained from the IEMA Guidelines as shown in Table **7.3**.

Table 7.3 Guidelines for the Assessment of Receptor Value and Sensitivity

Receptor Type	Receptor Sensitivity
Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident clusters, retirement homes, roads without footways that are used by pedestrians.	High
Traffic flow sensitive receptors: congested junctions/links, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, recreation facilities.	Medium
Receptors with some sensitivity to traffic flow: places of worship, public open space, tourist attractions and residential areas with adequate footway provision.	Low

Assessing Significance of Changes on Pedestrians, Cyclists and Public Transport Users

Pedestrian Severance

7.27 Pedestrian severance can be described as the perceived divisions that can occur within a community when it becomes separated by a traffic route. Thresholds for assessing severance are based on changes in traffic flows as set out in the Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3, Part 8[4]. This document suggests changes in traffic flow of 30%, 60% and 90% are considered equivalent to 'minor', 'moderate' and 'major' changes in severance respectively.

Pedestrian Delay

7.28 Increases in traffic flows can lead to increases in delay to pedestrians seeking to cross roads. IEMA guidance suggests a range of pedestrian crossing times of 10 seconds (lower threshold) to 40 seconds (higher threshold) which equate to a link with no crossing facilities and a two-way flow of approximately 1,400 vehicles in the peak periods. However, the guidance also recommends that assessments should be based on judgement rather than specific thresholds to determine whether or not there is significant pedestrian delay.

Pedestrian Amenity

7.29 The IEMA Guidelines describe pedestrian amenity as the relative pleasantness of a journey. It is affected by traffic flow, traffic composition, footway width and separation from traffic. The Guidelines suggest that the threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow is doubled. Significance of such an increase beyond that would be based on professional judgement.

Accidents and Safety

7.30 The significance of the change to accidents and safety likely to be introduced by the Development was assessed by means of professional judgement based on the projected changes to daily vehicle flows and Development trips.

Dust and Dirt on the Road

7.31 The significance of the change to dust and dirt likely to be introduced during the construction activities for the Development was assessed by means of professional judgement.

Pedestrian Footway Movement and Capacity

7.32 The significance of the change to pedestrian footway movement and capacity likely to be introduced by the Development was assessed by means of professional judgement.

Pedestrian Fear and Intimidation

7.33 Pedestrian fear and intimidation is caused by a number of factors, including a combination of volume of traffic, its Heavy Goods Vehicle (HGV) composition, its proximity to people and the lack of protection caused by such factors as narrow footway widths. The criteria for assessing fear and intimidation in the IEMA Guidelines are presented in **Table 7.4**. The significance is determined from the change of the classification of the degree of hazard for a particular road.

Table 7.4 IEMA Thresholds for Pedestrian Fear and Intimidation

Degree of Hazard	Average Traffic Flow over 18 Hour Day (vehicles/hour)	Total 18 Hour Goods Vehicle Flow	Average Speed over 18 Hour Day (miles/hour)
Extreme	1,800+	3,000+	20+
Great	1,200 – 1,800	2,000 – 3,000	15 – 20
Moderate	600 – 1,200	1,000 – 2,000	10 – 15

Public transport

7.34 The effects on the public transport users have been assessed based on the increase in trips in relation to the capacity of the services and the significance criteria.

Walking and cycling

7.35 In addition to the effects of traffic flows on pedestrians, the effects of the Development, including increase in walking and cycling trips and provision of pedestrian and cycle facilities, have also been assessed by means of professional judgement, using the significance criteria.

Limitations and Assumptions

7.36 The modal split of the trips undertaken by the existing and future staff have been derived from the 2011 Census Method of Travel to Work – Workday Population dataset for Southwark 002 Middle Layer Super Output Area, with adjustments made to reflect the limited car parking provision at the existing Site and the car-free nature of the Development (other than two disabled bays).

7.37 The Development lies within this area and therefore it is reasonable to assume that the travel characteristics of people travelling into this area would be representative of those which would be generated by the existing and the Development.

7.38 In order to determine the likely direction the employees would be travelling to and from the Development, the 2011 Census data: Special Workplace Statistics (SWS) has been used.

Baseline Conditions

7.39 In order to assess the potential effects of the Development, it is necessary to determine the environmental conditions, resources and sensitive receptors that currently exist on the Site and in the surrounding area.

Existing Land Uses

7.40 The Site comprises the offices of New City Court occupying the majority of ground level on the Site behind the buildings on St. Thomas Street and Borough High Street. The Site also includes the Georgian townhouses and Keats House which form most of the northern boundary of the Site fronting onto St. Thomas Street.

7.41 Vehicular and pedestrian access to the Site is currently from St. Thomas Street (A200) and King's Head Yard. King's Head Yard provides access to the Site's car parking/servicing area. Servicing to the existing buildings has also been observed to take place from St. Thomas Street.

7.42 There is currently no public open space or a route through the Site.

Pedestrian Network and Facilities

7.43 The Site is located in an area with an established network of footways and pedestrian facilities. Due to its central London location, numerous public transport services and amenities can be accessed on foot. Details of the existing pedestrian infrastructure on each of the roads surrounding the site are provided below.

7.44 The key pedestrian desire lines are expected to be the footways of St. Thomas Street and Borough High Street (see **Figure 1.2 Planning Application Boundary**) as they would provide access from the Site to the nearest facilities for public transport.

St. Thomas Street

7.45 St. Thomas Street provides footways on both sides of its carriageway. The width of the footways varies between 2m (western section of the road near the junction with Borough High Street) and 5m (in the vicinity of London Bridge Station and Weston Street).

7.46 A signalised pedestrian crossing facility is located on St. Thomas Street, near the junction with London Bridge Street and Bedale Street. The crossing is provided with tactile paving on the footways on both sides of the carriageway and zig-zag road markings.

7.47 Signalised pedestrian crossings are also located at the junction with Borough High Street and outside the entrance to London Bridge Underground Station. Both crossings are provided with tactile paving on the footways on both sides of the carriageway. The crossing outside the entrance to London Bridge Underground Station is provided with zig-zag road markings.

7.48 The footways of St. Thomas Street are well lit as they are provided with light columns at regular intervals.

Borough High Street

7.49 Borough High Street provides footways on both sides of the carriageway. The footways are generally wide and provide a minimum width of approximately 3m.

7.50 Signalised pedestrian crossings are located on each arm at the four-arm junction between Borough High Street, St. Thomas Street and Bedale Street. Signalised crossings are also provided at the junction between Borough High Street and Southwark Street, at the junction between Borough High Street and London Bridge Street and at the junction between Borough High Street and Duke Street Hill.

7.51 The footways of Borough High Street are well lit as they are provided with light columns at regular intervals.

King's Head Yard and White Hart Yard

7.52 King's Head Yard is accessible from the south-eastern side of Borough High Street and provides narrow footways (approximately 1.0-1.5m wide) on both sides of the carriageway. White Hart Yard is also accessible from the south-eastern side of Borough High Street and offers very limited footway provision. The road is very lightly trafficked and is effectively used as a shared surface with pedestrians utilising the whole width of the yard and having priority over vehicles.

PERS Audit

7.53 A PERS audit has been undertaken of the existing pedestrian network surrounding the Site including area immediately south of London Bridge and around London Bridge Station.

7.54 It is noted that the local pedestrian environment would be undergoing changes as a result of the proposed Development's public realm and also TfL's proposals for St. Thomas Street. Therefore, the pedestrian environment in the vicinity of the Site by the time the Development is completed and operational would be different to the one currently in place. Notwithstanding this, the PERS audit was requested by TfL and SC during pre-application discussions. The audit has been undertaken by Transport Research Laboratory (TRL) and is included in Appendix A of the Transport Assessment.

7.55 Crossing points were also assessed and all were given a good or acceptable score with the exception of the diagonal crossing on Borough High Street.

7.56 The audit shows that at present, a number of links achieved a red rating which indicates poor level of provision. These include on the southern side of St. Thomas Street, on the southern side of Borough High Street outside of the Site, on White Hart Yard and on King's Head Yard. The links have scored based on several parameters with worst scoring parameters being poor maintenance, user conflict, colour contract, tactile information and permeability. It is noted that this is the existing situation and the Development includes proposals which would improve the existing situation. The new entrance to the London Bridge Underground Station means that pedestrian conditions on St. Thomas Street and Borough High Street are expected to improve as pedestrians divert through the Site:

- In respect of St. Thomas Street, this would be subject to improvements as part of TfL's proposals and would be expected to provide good level of pedestrian provision once implemented.
- In respect of King's Head Yard, this would become a largely car-free pedestrian route and would be adjacent to the new public square as part of the Development proposals significantly enhancing this link.
- With regard to White Hart Yard, the Development is not expected to add any additional pedestrians onto the yard and the pedestrian enhancements and new connection through the site seek to encourage pedestrians to divert from this link. Additionally, the audit assumed that pedestrians are limited to the limited footway provision on the yards whereas in reality, pedestrians are observed utilising the whole width with the yards operating as informal shared surfaces.

Cycle Network and Facilities

7.57 The Site is located in close proximity to established cycle routes which provide access within the Borough and the wider area (see Figure 3 in the TA for the local cycle network in the context of the Site). The available network for cyclists and cycle facilities in the vicinity of the Site include:

- Cycle Superhighway 7 (CS7); and
- National Cycle Network Route 4.

7.58 Additionally, Weston Street and Bermondsey Street are located to the east of the Site and are identified by TfL on their cycle maps as routes "signed or marked for use by cyclists on a mixture of quiet or busier roads". Tooley Street (north to the site) has been labelled in the same way.

7.59 Newcomen Street, Snowsfields and Crosby Row are local roads located to the west of the Site which feature on the TfL cycle map as 'quieter roads recommended by other cyclists'.

7.60 Cycle parking facilities are provided along St. Thomas Street in the form of Sheffield Stands. A cycle hire docking station is located on Tooley Street, approximately 400m (4-5 minute walk) to the north of the Site. The docking station has a maximum provision of 20 bikes.

7.61 Southwark Bridge Road is located to the west of the Site and is part of Cycle Superhighway 7. The superhighway extends by approximately 13.7km (an approximate 45-minute cycle) and connects the City, Southwark, Lambeth, Wandsworth and Merton. Tooley Street is part of the National Cycle Network Route 4, a long distance route between London and Fishguard via Reading, Bath, Bristol, Haverfordwest and St. Davids.

7.62 A Cycling Level of Service (CLoS) assessment has recently been undertaken for the cycle routes near the Site as part of the planning application submission for Capital House (planning reference: 18/AP/0900) which is available from SC's planning portal. The assessment shows that the existing routes between the Site and CS7 / CS3 are considered to be suitable for cyclists, indicating that the site has good connections to the wider cycle network and is therefore in a favourable location to encourage cycling.

Public Transport Accessibility Level (PTAL)

7.63 The TfL Planning Information Database[5] identifies the Site as having a PTAL of 6b, ('excellent') the highest obtainable.

Bus Network and Services

7.64 The local area is served by several bus routes. London Bridge Bus Station is located within a 200m walking distance (2-3 minute walk) to the north of the Site and provides access to bus stops 'B', 'C' and 'D'. Bus stop 'B' provides access to routes 521 and N343. Bus stop 'C' provides access to routes 43 and 141. Bus stop 'D' provides access to routes 149, N21 and N343.

7.65 Bus stops 'S' and 'R' are located on Duke Street Hill within a 300m walking distance (3-4 minute walk) to the north of the Site. Both bus stops are served by routes 47, 343, 381, N381 and RV1. Bus stop R is also served by route N199.

7.66 Bus stops 'M' and 'Y' are located on Borough high Street within a 320m walking distance (3-4 minute walk) to the north of the Site. Bus stop 'M' is served by routes 17, 21, 35, 40, 43, 47, 48, 133, 141, 149, 344 and N21. Bus stop 'Y' is served by routes 17, 21, 35, 40, 47, 48, 133, N21, N133 and N199.

7.67 There are two bus stops located outside of The Hop Exchange on Southwark Street within a 250m walking distance (2-3 minute walk) to the west of the Site. These bus stops are served by routes 344, 381, N343, N381 and RV1.

7.68 Bus Stop 'Southwark Street' is located on Borough High Street within a 280m walking distance (2-3 minute walk) to the south-west of the Site. The bus stop provides access to routes 21, 35, 40, 133, 343, N21, N133, and N343. Bus stop 'G' is located on Borough High Street within a 400m walking distance (4-5 minute walk) to the south-west of the Site and is served by the same bus routes as bus stop 'Southwark Street'.

7.69 Bus stop 'BD' is located on Southwark Bridge Road within a 580m walking distance (5-7 minute walk) to the west of the Site. The bus stop is served by route 344.

7.70 **Table 7.5** presents the bus services which are accessible from the Site.

Table 7.5 Summary of Local Bus Services

Bus Route	Stop Location	Destination	Monday - Friday		Saturday	Sunday
			AM Peak	PM Peak		
48	Y	London Bridge	6	6	6	5
	M	Walthamstow Bus Station	6	6	6	5
343	S / Southwark Street	New Cross / Jerningham Road	7	7	8	6
	R / G	City Hall	8	8	8	6
21	Y / Southwark Street	Molesworth Street	9	9	8	5
	M / G	Newington Green	9	9	8	5
17	Y	London Bridge	7	7	6	4
	M	Archway Station	8	8	6	4
40	M / G	Duke's Place	8	8	6	4
	Y / Southwark Street	Dulwich Library	7	7	6	4
35	M / G	Shoreditch	6	6	6	4

Bus Route	Stop Location	Destination	Monday - Friday		Saturday	Sunday
			AM Peak	PM Peak		
	Y / Southwark Street	Clapham Junction Station / Falcon Road	6	6	6	4
381	S / The Hop Exchange	County Hall	6	6	6	5
	R / The Hop Exchange	Peckham Bus Station	6	6	6	5
344	M / The Hop Exchange	Appold Street	8	8	6	7
	BD	Clapham Junction Station	8	8	7	7
RV1	R / The Hop Exchange	Tower Gateway Station	4	3	3	3
	S / The Hop Exchange	Covent Garden / Catherine Street	4	3	3	3
521	B	London Bridge Station	20	20	-	-
	B	Waterloo Station / Mepham Street	21	23	-	-
141	C	London Bridge Station	8	8	8	5
	C / M	Tottenhall Road	8	8	7	6
149	London Bridge Station	London Bridge Station	11	9	8	7
	A / M	Edmonton Green Bus Station	11	9	7	7
43	C	London Bridge Station	11	11	9	7
	C / M	Halliwick Park or Archway Station	11	11	7	6
47	S / M	Shoreditch	6	6	5	3
	R / Y	Catford Garage	5	5	5	3
133	M / G	Great Winchester Street	11	11	7	4
	Y / Southwark Street	Streatham Station	11	11	8	4
Total			**257**	**253**	**182**	**138**

Underground Services

7.71 Access to London Bridge Underground Station can be taken from St. Thomas Street, Borough High Street and Tooley Street. The station is served by the Jubilee Line, which provides services towards Stratford and Stanmore, and the Bank branch of the Northern Line, which provides services towards High Barnet, Mill Hill East, Edgware and Morden. **Table 7.6** shows the peak hour frequencies at London Bridge Underground Station.

Table 7.6 Services & Frequencies from London Bridge Underground Station

Service	Direction	Monday – Friday		Saturday	Sunday
		0800-0900	1700-1800		
Jubilee Line	Westbound	30	30	24	24
	Eastbound	30	30	24	24
Northern Line	Northbound	25	23	20	20
	Southbound	23	23	20	20

7.72 **Table 7.6** indicates that London Bridge Underground Station provides 30 Jubilee Line services and a minimum of 23 Northern Line services in both directions during the weekday AM and PM peak hours. Over Saturday and Sunday, the station provides 24 hourly Jubilee Line and 20 hourly Northern Line services in both directions throughout the day.

National Rail Network and Services

7.73 London Bridge National Rail Station provides services operated by Southern, Southeastern Rail and Thameslink.

7.74 **Table 7.7** presents the peak hour frequencies of National Rail services departing from London Bridge National Rail Station. These include through trains heading north (Thameslink) or terminating / leaving London Charring Cross or Cannon Street as well as the services to the south, to destinations in Sussex, Kent and Surrey.

Table 7.7 Services & Frequencies from London Bridge National Rail Station

Destination	Monday – Friday		Saturday	Sunday
	0800-0900	1700-1800		
Bedford and northern destinations	11	13	6	4
Other London Terminating stations	53	29	29	15
Sussex, Kent and Surrey	57	71	21	9

River Taxi services

7.75 The London Bridge City Pier is located approximately within a 550m walking distance (5-7 minute walk) to the north-east of the Site. It is served by services RB1, RB1X, RB2 and RB6.

7.76 RB1 and RB1X provide services between Westminster and North Greenwich. RB1 operates daily whereas RB1X provides additional services on the weekend. RB2 operates daily and provides services between Battersea Power Station and London Bridge City. RB6 provides services between Blackfriars to Canary Wharf on weekday mornings and evenings only.

7.77 The river services during the AM, PM and weekend peak hours are summarised in **Table 7.8** below.

Table 7.8 River Taxi Services

Service	Destination	AM Peak 0800–0900	PM Peak 1700-1800	Saturday	Sunday
RB1	Westminster	3	1	2	2
	North Greenwich	2	3	2	2
RB1X	Westminster	-	-	2	2
	North Greenwich	-	-	2	2
RB2	Battersea Power Station	-	-	2	2
	London Bridge City	-	-	2	2
RB6	Blackfriars	2	3	-	-
	Canary Wharf	3	1	-	-

Highway Network

St. Thomas Street

7.78 St. Thomas Street is a TfL red route and is marked with double red lines on both sides of the carriageway which restrict stopping at all times. The road is approximately 8-9m wide near the junction with borough High Street (at its western end) but narrows to approximately 5m to the east of the Shard.

7.79 The eastern section of the road only allows for one-way westbound traffic. The western section of the road allows for two-way traffic. The road allows for two-way traffic from the vicinity of the junction with Weston Street (approximately 80m to the west of the junction).

7.80 There are a number of parking facilities located on the western section of the road, near the Site's access and in the vicinity of the junction with Borough High Street. At this location, there are marked taxi and 'Pay and Display' bays located on the southern side of the carriageway. The 'Pay and Display' bays are in operation from Monday to Saturday between 08:00 and 18:30 and provide a maximum stay of four hours. There is also a loading bay located on the southern side of the carriageway which has a 'No stopping' restriction between 07:00 and 19:00 except between 10:00 and 16:00. During these times, loading is available for a maximum of 20 minutes. The northern side of the carriageway provides bays restricted to authorised vehicles only.

Borough High Street

7.81 Borough High Street provides a wide carriageway which ranges between 12m and 15m in width. The section of the road in the vicinity of the Site is a TfL red route and is marked with double red lines on both sides of the carriageway which restrict stopping at all times.

7.82 There are loading bays provided on Borough High Street, near the access junction with Talbot Yard and King's Head Yard / White Hart Yard. The loading bays have a 'No stopping' restriction between 07:00 and 19:00 except between 13:00 and 16:00 or between 10:00 and 13:00. During these times, loading is available for a maximum of 20 minutes and parking for disabled users is available for up to three hours.

King's Head Yard and White Hart Yard

7.83 King's Head Yard and White Hart Yard are marked with single yellow lines on both sides of the carriageway with restrictions from Monday to Saturday between 08:00 and 18:30. A disabled bay is provided at the south-eastern end of White Hart Yard and is available for use only by disabled badge holders. Both yards operate effectively as shared spaces with pedestrians utilising the full width of the roads given low traffic flows on the yards.

Baseline Traffic Flows

7.84 Traffic data has been obtained for roads and junctions surrounding the Site which are summarised in **Table 7.9** below.

Table 7.9 Baseline Traffic Flows

Link	AM Baseline Flows		PM Baseline Flows		Daily Flows	
	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
London Bridge to the north of Tooley Street	1,294	276	1,108	236	25,388	4,663
Borough High Street to the south of London Bridge	2,347	673	2,525	572	19,622	3,566
St. Thomas Street	258	7	213	4	6,104	567
White Hart Yard	4	1	2	1	26	5
Southwark Street to the east of Southwark Bridge Road	413	56	381	34	12,375	1,375
Southwark Street to the west of Southwark Bridge Road	890	87	741	72	14,825	1,447
Southwark Bridge Road	759	134	623	88	14,493	1,768
Marshalsea Road	763	160	755	107	14,311	2,044
Borough High Street to the north of Union Street	862	160	837	127	14,326	2,371
Long Lane	683	45	570	38	11,390	756
Tower Bridge Road to the south of Druid Lane	1,392	145	1,160	95	23,202	1,909
Tooley Street	537	116	460	100	8,949	1,932

Assessment Baseline Flows 2026

7.85 Given that the Development is not expected to be completed before 2026, the future baseline conditions which are expected to be in place at the year of opening are considered more applicable in terms of assessing of the Development effects. To this end, a future baseline scenario has been created incorporating those committed developments which are currently already under construction and would be expected to be operational by the Development opening year.

7.86 Based on the review of the transport reports for each of the committed developments under construction it has been found that they are reported to result in minor changes to traffic flows across the whole day with not changes in traffic during the AM and PM peak hours. The 2026 assessment baseline flows for the AM and PM peak hour as well as across the whole day are provided in **Table 7.10**.

Table 7.10 Assessment Baseline Traffic Flows

Link	AM Baseline Flows		PM Baseline Flows		Daily Flows	
	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
London Bridge to the north of Tooley Street	1,294	276	1,108	236	25,427	4,664
Borough High Street to the south of London Bridge	2,347	673	2,525	572	19,661	3,567
St. Thomas Street	258	7	213	4	6,104	567
White Hart Yard	4	1	2	1	26	5
Southwark Street to the east of Southwark Bridge Road	413	56	381	34	12,429	1,375
Southwark Street to the west of Southwark Bridge Road	890	87	741	72	14,887	1,447
Southwark Bridge Road	759	134	623	88	14,501	1,768
Marshalsea Road	763	160	755	107	14,319	2,044
Borough High Street to the north of Union Street	862	160	837	127	14,361	2,372
Long Lane	683	45	570	38	11,406	756
Tower Bridge Road to the south of Druid Lane	1,392	145	1,160	95	23,202	1,909
Tooley Street	537	116	460	100	8,965	1,934

Accident Data

7.87 Road traffic collision data has been provided by Transport for London (TfL) and provides an account of all incidents within the local area in the three year period between February 2015 and February 2018.

7.88 **Table 7.11** presents a summary of the collisions that occurred within the most recent three years.

Table 7.11 Road Collision Data for 2015 to 2018

Year	Collision severity			Total
	Slight	Serious	Fatal	
February 2015 – February 2016	12	1	0	13
February 2016 – February 2017	5	1	0	6
February 2017 – February 2018	17	2	0	19
Total	**34**	**4**	**0**	**38**

7.89 As shown in **Table 7.11,** there were a total of 38 collisions recorded over the three year period, the majority of which (90%) were classified as slight in severity. Of the casualties involved in the 38 collisions, 12 were pedestrians and 17 were cyclists with remainder being drivers or motorbike riders.

7.90 It is noted that no collisions were recorded on King's Head Yard and White Hart Yard.

7.91 The majority of collisions occurred at / near the junctions between Borough High Street and St. Thomas Street and between Borough High Street and Bedale Street. A total of 13 collisions took place at or near the junction of Borough High Street with St. Thomas Street all of which were slight. Of these collisions, three involved a pedestrian and five involved a cyclist.

7.92 Of the total number of collisions, 4 (10%) were serious and two of these occurred at the junction of Borough High Street with Southwark Street. The other two serious collisions took place on Borough High Street near its junction with Talbot Yard and near the junction of Union Street.

7.93 All of the collisions that occurred over the three-year period primarily occurred due to human error. “Failure to look properly”, “reckless” behaviour and “poor manoeuvring” were among the main reasons for the collisions occurring. Only one collision was attributed to the conditions of the local highway network although this collision was also attributed to numerous human errors.

7.94 Overall, it can be concluded that the local area is relatively safe given the very few (4) serious injuries and no fatal collisions over the three year study period.

Assessment of Likely Significant Effects

The Works

7.95 Information related to the Works has been provided within **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction** which includes an indicative construction programme, predicted construction traffic flows, vehicle routing and the proposed hours of working.

Vehicle Movements

7.96 The Works would generate short-term increases in vehicle movements on the highway in the vicinity of the Site. It should also be noted that these increases would not be constant throughout the construction period and consideration has only been given in the assessment to the highest peak frequency of vehicle movements as this gives a worst case assessment.

7.97 Based on the information provided within **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**, there is expected to be a maximum of 44 two-way Heavy Goods Vehicles (HGVs) movements a day during the most intense construction period (piling activities). Based on a ten-hour day, the peak hour two-way HGV traffic would be 4 movements (i.e. 2 in, 2 out). This represents a worst-case assessment as it looks at only the peak operational periods, at other times of construction traffic movements would be less.

Construction Vehicle Distribution

7.98 All construction vehicles would enter the Site via St. Thomas Street from the east. In order to depart, vehicles would travel in the westbound direction on St. Thomas Street and turn left onto Borough High Street which is a strategic route and enables connections with other major road links.

Impact of Construction Vehicles

7.99 The predicted increases in traffic flows during construction based on assessment baseline traffic are shown in **Tables 7.12, 7.13** and **7.14** for the AM peak, PM peak and 24 hours respectively.

Table 7.12 AM Peak Percentage on Local Roads Attributed to Construction Traffic

Link	Assessment Baseline Flows		Assessment Baseline Flows + Construction Traffic		Percentage Increase	
	All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
London Bridge to the north of Tooley Street	1,294	276	1,294	276	0.0%	0.0%
Borough High Street to the south of London Bridge	2,347	673	2,347	673	0.0%	0.0%
St. Thomas Street	258	7	262	11	1.7%	62.9%
White Hart Yard	4	1	4	1	0.0%	0.0%
Southwark Street to the east of Southwark Bridge Road	413	56	414	57	0.1%	1.0%
Southwark Street to the west of Southwark Bridge Road	890	87	890	87	0.1%	1.3%
Southwark Bridge Road	759	134	760	135	0.1%	0.8%
Marshalsea Road	763	160	764	161	0.1%	0.7%
Borough High Street to the north of Union Street	862	160	864	162	0.2%	1.0%
Long Lane	683	45	683	45	0.1%	1.2%
Tower Bridge Road	1,392	145	1,392	145	0.1%	0.8%
Tooley Street	537	116	537	116	0.0%	0.2%

Table 7.13 PM Peak Percentage on Local Roads Attributed to Construction Traffic

Link	Assessment Baseline Flows		Assessment Baseline Flows + Construction Traffic		Percentage Increase	
	All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
London Bridge to the north of Tooley Street	1,108	236	1,108	236	0.0%	0.0%
Borough High Street to the south of London Bridge	2,525	572	2,525	572	0.0%	0.0%
St. Thomas Street	213	4	217	8	2.1%	100.0%
White Hart Yard	2	1	2	1	0.0%	0.0%
Southwark Street to the east of Southwark Bridge Road	381	34	382	35	0.1%	1.6%
Southwark Street to the west of Southwark Bridge Road	741	72	742	73	0.1%	1.5%
Southwark Bridge Road	623	88	624	89	0.2%	1.3%
Marshalsea Road	755	107	756	108	0.1%	1.0%
Borough High Street to the north of Union Street	837	127	839	129	0.2%	1.3%
Long Lane	570	38	571	39	0.1%	1.4%

Link	Assessment Baseline Flows		Assessment Baseline Flows + Construction Traffic		Percentage Increase	
Tower Bridge Road	1,160	95	1,161	96	0.1%	1.2%
Tooley Street	460	100	460	100	0.0%	0.0%

Table 7.14 Daily Percentage on Local Roads Attributed to Construction Traffic

Link	Assessment Baseline Flows		Assessment Baseline Flows + Construction Traffic		Percentage Increase	
	All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
London Bridge to the north of Tooley Street	25,427	4,664	25,429	4,666	0.0%	0.0%
Borough High Street to the south of London Bridge	19,661	3,567	19,661	3,567	0.0%	0.0%
St. Thomas Street	6,104	567	6,148	611	0.7%	7.8%
White Hart Yard	26	5	26	5	0.0%	0.0%
Southwark Street to the east of Southwark Bridge Road	12,429	1,375	12,435	1,381	0.0%	0.4%
Southwark Street to the west of Southwark Bridge Road	14,887	1,447	14,898	1,458	0.1%	0.8%
Southwark Bridge Road	14,501	1,768	14,512	1,779	0.1%	0.6%
Marshalsea Road	14,319	2,044	14,330	2,055	0.1%	0.5%
Borough High Street to the north of Union Street	14,361	2,372	14,378	2,389	0.1%	0.7%
Long Lane	11,406	756	11,412	762	0.0%	0.7%
Tower Bridge Road	23,202	1,909	23,213	1,920	0.0%	0.6%
Tooley Street	8,965	1,934	8,965	1,934	0.0%	0.0%

7.100 From the above analysis, it can be seen that construction vehicle activity would have a negligible effect on the majority of the surrounding roads (i.e. resulting in an increase or reduction of less than 10%). The greatest changes in traffic would occur on St. Thomas Street which has existing low HGV flows in the AM and PM peak hour. The increase in HGVs would be up to 100% for St. Thomas Street in the PM peak. This equates to a major adverse effect, but this is only as a result of the low baseline HGV movements on this road. In real terms, there would only be an increase of 4 HGV movements (which is the equivalent of 2 HGVs) in the AM and PM peak hour which averages an additional 1 HGV vehicle every 15 minutes; this level of increase is not considered significant. It is also noted that St. Thomas Street has been closed to through traffic since 2012 as part of the London Bridge Station redevelopment project resulting in a lower amount of HGV traffic that would otherwise be expected to occur on this road. It is also noted that in respect of the overall traffic flows, the increase in vehicle movements would be less than 10% on all road links and therefore **insignificant**.

7.101 On the basis of the above, the overall effects of construction traffic on the road users on local highway network are assessed as being **insignificant** for all links but a **temporary adverse** effect of **major** significance as a result of HGV flows only on the road users on St. Thomas Street during the AM and PM peak hour.

Pedestrian Movement, Capacity, Severance, Delay, Amenity, Fear and Intimidation

7.102 Potential traffic and transportation related effects could arise causing temporary disruption to road users and pedestrians from vehicles (particularly HGVs) entering and leaving the Site. These include footway closure on the southern side of St. Thomas Street outside the Site with pedestrians being diverted onto the opposite side of the road. Pedestrian capacity, severance, delay, amenity, fear and intimidation effects are considered to be **local** to immediately outside the Site, and **temporary adverse** effects of **moderate significance** in the absence of mitigation, based on professional judgement and the traffic flow changes predicted.

7.103 Given the low number of construction vehicles associated with the Site, the effects on pedestrian movement would be **insignificant**.

Dust and Dirt on the Road

7.104 Another potential effect as a result of construction would be mud and dirt on road surfaces. This effect is considered to be **temporary adverse** effect of **minor significance** on pedestrians and cyclists in the absence of mitigation.

Cyclists

7.105 Given the low number of construction vehicles associated with the Development (a maximum of 4 vehicle movements an hour), the effects on cyclists as a result of construction activities would be **insignificant.**

Public Transport Users

7.106 During the Works there would be an increased number of workers in the local area who would use the public transport network. However, based on the proposed working hours which would be from 8am – 6pm, the majority of the construction workers would be travelling outside of the peak periods. Therefore, the significance of effects on the bus, rail and underground network users would be **insignificant.**

Completed and Operational Development

Land Uses within the Development

7.107 The proposals are to provide a total of 46,374 sqm Gross Internal Area (GIA) of B1 office within the Development. The majority of this space would be provided within the proposed Tower (44,906 sqm GIA) with 1,468 sqm GIA accommodated within Keats House and the Georgian Terraces fronting St. Thomas Street.

7.108 It is also proposed to provide 1,904 sqm GIA of flexible retail/restaurant Use Class (A1-A3) space, 719 sqm GIA of hub space (Class B1/D2*)* and an elevated public garden of 825 sqm GIA.

7.109 There would also be a 615 sqm GIA gym (Use Class D2) at basement level B1 of the Tower, open to both building users and the public.

Public Realm Improvements

7.110 The proposed public spaces include a public garden of 825 sqm GIA located on the 5th and 6th floors of the Tower. In addition, public realm is proposed on ground level outside the Tower and this is intended to be fully accessible and used by both the office workers and the wider general public. Hours of operation are intended to be extensive and the area could double up as a ‘classroom’ as part of an educational outreach programme. The area is split into five different sections (See Chapter 5: The Development):

- Main Courtyard – 730 sqm
- New Yard – 140 sqm
- St. Thomas Street Entrance – 250 sqm
- East Courtyard – 160 sqm
- East Passage – 70 sqm

7.111 A 719 sqm GIA hub provides a multi-level communal space linked via a fixed seat auditorium. Connected with the mid-high rise lift transfer, this provides quick and easy access for all office tenants. These levels also enjoy external terraces and balconies with a sheltered environment.

7.112 Additionally, as part of the planning application, it is proposed to open up the rear of the London Underground Limited (LUL) station building at ground level to provide a new exit directly onto the Site’s public realm and the enhanced connectivity it affords. TFL / LUL support the proposal and the Applicant is to enter into a developer agreement with London Underground Limited (LUL) to undertake the works.

Proposed Parking Provision

7.113 The Development would be car-free with the exception of two bays at basement level for the use of blue badge holders only.

7.114 Cycle parking at the Development would meet the provision requirements set out in the currently adopted London Plan, the Draft New London Plan, the currently adopted SC’s standards as well as SC’s emerging requirements in their Draft Local Plan. In total, the Development would provide 1,322 cycle spaces. Of these, 1,031 spaces would be long stay spaces located at basement level B1 of the Tower and within the pavement vaults underneath St. Thomas Street. 291 spaces would be for short-stay use (visitors and customers) of which 187 would be provided within the Tower with 104 located within the public realm at ground level.

Proposed Access and Servicing

7.115 Deliveries and servicing carried out by cars and LGVs would utilise White Hart Yard to access the vehicle lifts to the service yard (where three loading bays are proposed) on basement level B2. Two vehicle lifts have been provided, one for entering and the other for exiting vehicles.

7.116 Deliveries to the proposed office accommodation within Keats House and the Georgian Terrace are envisaged to stop on St. Thomas Street within the on-street loading bay or the pay & display bays if they are not being used for parking. Motorcycle couriers would also stop on St. Thomas Street to deliver / collect packages from the Development. It is also proposed that the on-street loading bay would be used by HGVs, given the existing access constraints on White Hart Yard and King’s Head Yard.

7.117 With regard to refuse, the strategy is that waste would be stored in 19 x 1,280l Eurobins at basement level with separate containers provided for the various waste streams (general/recyclables). On-site management would transport the relevant waste stream to a ground level storage room via a bin lift on collection day. The storage room would be located at ground level fronting St. Thomas Street where an on-street loading bay is located allowing a refuse vehicle to stop within 10m of the waste storage room.

7.118 A Stage 1 Road Safety Audit (RSA) has been carried out for the proposed access and Servicing arrangements proposals. Comments and recommendations made by the Safety auditors have been reviewed and responded to. A copy of the RSA and the Designer's Response are provided within the Delivery, Servicing and Waste Management Plan.

Development Trips

7.119 **Table 7.15** provides the multi-modal trip generation for the Development for the weekday AM and PM peak hour with servicing vehicle generation shown in **Table 7.16**. Trip generation figures for the individual land uses along with the trip generation methodology are set out in greater detail within the Transport Assessment.

Table 7.15 Development Trips (Net Change)

Mode	AM Peak (08:30-09:30)			PM Peak (17:00-18:00)		
	In	Out	Total	In	Out	Total
Underground	298	18	316	30	270	300
Underground (having used train as main mode)	133	8	141	13	121	134
Train	512	30	542	51	464	515
Bus	108	6	114	11	98	109
Bicycle	59	4	63	6	53	59
On foot	53	4	57	5	49	54
Car	-5	0	-5	0	-5	-5
Taxi (Person)	2	0	2	0	2	2
Motorcycle	16	1	17	1	15	16
Passenger in a car	4	0	4	1	3	4
Other (River Taxi)	3	0	3	0	3	3
Total	**1,183**	**71**	**1,254**	**118**	**1,073**	**1,191**

Table 7.16 Servicing Trips – Net Change

Mode	AM Peak (08:30-09:30)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Cars + LGVs	2	2	4	2	2	4	76	76	152
HGVs	0	0	0	0	0	0	20	20	40
Taxi Vehicles	2	2	4	3	3	6	28	28	56

Effect on Pedestrian Movement and Capacity

7.120 The total two-way pedestrian trips to and from the Development are calculated to be 1,032 and 981 in the AM and PM peak hours respectively. These include walking trips between the Development and transport access points such as to/from the local bus stops and Underground/train station with the remainder being undertaken solely on foot. The breakdown of the pedestrian trips associated with the Development is set out below in Table **7.17**:

Table 7.17 Breakdown of Development Wallking Trips

Mode	AM Peak (08:30-09:30)			PM Peak (17:00-18:00)		
	In	Out	Total	In	Out	Total
Walking to/from Underground	298	18	316	30	270	300
Walking to/from Underground (having used train as main mode)	133	8	141	13	121	134
Walking to/from London Bridge Train Station *	379	22	401	38	343	381
Walking to from Buses	108	6	114	11	98	109
Walking to from Other (River Taxi)	3	0	3	0	3	3
Solely on Foot	53	4	57	5	49	54
Total	**974**	**58**	**1,032**	**97**	**884**	**981**

*Note: *Trips to/from railway stations other than London Bridge excluded from walking trips as they would use the Underground to get to/from the area and are already accounted for in the table.*

7.121 The walking trips would be dissipated across the existing network and the main pedestrian desire lines are anticipated to be to/from the London Bridge Underground Station and National Rail Mainline Station and to local bus stops on Borough High Street and St. Thomas Street. Nearly 45% of the walking trips are predicted to be between the Site and the underground station. The nearest entrance to London Bridge Underground Station is adjacent to the Site on Borough High Street and as such these trips would be contained within the immediate vicinity of the Development minimising impacts on the local highway network. Furthermore, as part of the Development, there are proposals to provide a new entrance to the Underground station directly from the Development's public square. With the new entrance in place, the Development walking trips associated with the Underground access would be contained within the Site's boundary and would have no impact on the pedestrian network.

7.122 It is noted that approximately 39% of walking trips would be between the Site and London Bridge National Rail station. The Development would have a pedestrian entrance directly off St. Thomas Street approximately 100m to the west of London Bridge Street which provides access to the station either via the retail arcade or the escalators adjacent to the Shard. The pedestrian provision between the Development's entrance and London Bridge station is of high quality with some recently improved sections especially in the vicinity of the Shard. The only walking trips that would be expected to be undertaken over a wider pedestrian network are those being made solely on foot which only account for approximately 6% of all walking trips. Pedestrian trips to and from the bus stops would be on the local pedestrian network.

7.123 As shown in Space Syntax's Pedestrian Forecast and Landscape Assessment the new routes proposed by the Development create more permeability, adding circulation choices and alternative routes, which helps to evenly disseminate movement at the busy Borough High Street and St. Thomas Street junction, and therefore takes pressure off Borough High Street and St. Thomas Street. For example the new route through the Site would reduce flows by 16% along the Borough High Street eastern footway compared with a do-nothing scenario. The additional permeability and the improved public realm of the Development results in a significant improvement of Pedestrian Comfort Levels (PCL) around the Site. All locations within the Development are comfortable and well above the minimum PCL recommended."

7.124 The existing and proposed infrastructure is therefore considered sufficient to meet the additional pedestrian and cyclists demand and bring benefits to the local area. Hence the Development would have a **permanent beneficial** effect of **moderate significance** on pedestrian movement and available pedestrian facility capacity in the local area.

7.125 It is noted that the Development would increase traffic flows on White Hart Yard which is considered to be a sensitive receptor as it is a road shared between vehicles and pedestrians with limited footway provision. It will be shown later in the chapter that the addition of the Development traffic would technically result in a major adverse effect on White Hart Yard due to very low baseline traffic flows on this road. It should be noted, however, that during the AM and PM peak hour, the flows are set to increase to 8 and 6 two-way movements respectively and this level of increase is considered insignificant. The resultant traffic flows would continue to be well within the 'low traffic volumes' threshold for when pedestrians treat a street as a space to be occupied and not a road based on advice provided within the Manual for Streets. Therefore, the effect of the Development on pedestrian movement and capacity on White Hart Yard could be classed as an **adverse** effect of **major significance.** However, due to the very low baseline traffic levels on the yard, in real terms, the effect on pedestrian movement and capacity has been assessed as an **adverse** effect of **moderate significance** on White Hart Yard before mitigation.

Effect on Pedestrian Severance, Delay, Amenity and Fear and Intimidation

7.126 The pedestrian environment within the Site would be of high quality with the provision of fully accessible public realm, providing enhanced connectivity through new public routes and a public square. The public areas would be well maintained and would benefit from natural natural/passive surveillance provided by the office lobby and entrances to the retail/restaurant units. The Development would also contribute to the perception of pedestrian safety on Site by significantly enhancing the public realm.

7.127 The Development would enhance permeability by providing a pedestrian route through the Site linking King's Head Yard with St. Thomas Street. At present, no such connection is possible.

7.128 With the above in mind, the effects local to the Site would be:

- **permanent beneficial** effect of **moderate significance** on pedestrian severance given that the Development would open up the existing Site to pedestrians and potentially offer a new connection to the London Bridge Underground Station in future;
- **permanent beneficial** effect of **moderate significance** on pedestrian delay due to increased connectivity and permeability. This is with the exception of pedestrians on White Hart Yard where the effects are being assessed as **minor adverse** in respect of pedestrian delay;
- **permanent beneficial** effect of **minor significance** on pedestrian fear and intimidation due to provision of active frontages and improvements to and creation of public amenity spaces which is considered significant. The Development would allow for natural surveillance, provision of lighting and CCTV to provide security coverage within public and private areas; and
- **permanent beneficial** effect of **major significance** on pedestrian amenity due to public realm enhancements, provision of active frontages, seating, landscaping and improvements to open spaces.

Effect on Cycle Network

7.129 As shown on **Table 7.15**, the Development is expected to generate 63 and 59 cycle trips in the AM and PM peak respectively. The proposed long-stay cycle parking at the Site would more than meet the operational demand. Additionally, cycle stands would be provided within the public realm for the use of the visitors/customers and the general public.

7.130 With the above in mind, the Development is expected to have an **insignificant** effect on cyclists on the local cycle network.

Effect on Bus Services

7.131 As shown on **Table 7.15**, the Development is predicted to generate 114 two-way bus trips during the AM peak and 109 two-way bus trips during the PM peak.

7.132 Based on an average bus operational capacity of 63 persons and a weekday AM and PM peak bus frequency of 128 buses in each direction, the planning bus capacity was calculated as 8,064 passengers per direction per hour. On this basis, the effect of the additional bus trips associated with the Development on the bus network is set out in **Table 7.18**.

Table 7.18 Bus Network Impact Assessment

Time and direction		Bus Trips	Bus network capacity (hr)	% of bus network capacity
AM Peak	In	108	8,064	1.34%
	Out	6	8,064	0.07%
PM Peak	In	11	8,064	0.14%
	Out	98	8,064	1.22%

7.133 **Table 7.18** shows that the greatest impact on the bus network as a result of the Development would be 1.34% which would occur as a result of the arrival trips in the AM peak and equates to approximately on average one additional person per bus. This level of increase in passengers is considered **insignificant** on the existing bus users.

Effect on Underground Services

Planning Capacity

7.134 As shown on **Table 7.15**, the Development is predicted to generate 316 and 300 two-way London Underground person trips during the AM and PM peak hour respectively. Additionally, some of the Development rail trips are expected to use the underground to get to London Bridge having used one of the other railway stations in London as their main mode. Based on the analysis of the 2011 Census "*Location of usual residence and place of work by method of travel to work"* it has been found that about 26% of rail trips would terminate at stations other than London Bridge and therefore, 26% of these rail trips have been added onto the number of Underground trips (141 and 134 in the AM and PM peak hour respectively). As a result, the total number of Underground trips is 457 and 434 two-way trips in the AM and PM peak hour respectively.

7.135 London Bridge Underground station is served by the Jubilee Line and the Bank branch of the Northern Line and thus the Underground trips would be split between the various services. The 2011 Census data: Special Workplace Statistics (SWS), which provides travel to work data, has been used to determine the direction employees would be travelling to and from and then which Underground services is most appropriate. The split of the main mode underground trips is set out in **Table 7.19**.

Table 7.19 Split of Underground Trips

Underground Line	Direction	Arrivals	Departures
Jubilee Line Westbound	From Bermondsey to London Bridge	22.7%	0%
	To Southwark from London Bridge	0%	22.7%

Underground Line	Direction	Arrivals	Departures
Jubilee Line Eastbound	From Southwark to London Bridge	20.3%	0%
	To Bermondsey from London Bridge	0%	20.3%
Northern Line Northbound	From Borough to London Bridge	16.1%	0%
	To Bank from London Bridge	0%	16.1%
Northern Line Southbound	From Bank to London Bridge	40.9%	0%
	To Borough from London Bridge	0%	40.9%

7.136 In respect of the rail trips that have been added on the underground as a secondary mode, the expected split is as follows based on the location of the railways stations relative to London Bridge and available underground connections:

- Jubilee Line to/from Southwark 44.4%; and
- Northern Line to/from Bank 55.6%.

Planning Capacity

7.137 Planning capacity figures obtained from TfL indicate that each Jubilee Line train has a planning capacity of 960 passengers. Based on the AM Peak frequency of 30 trains per hour per direction there is a planning capacity of 28,800 passenger per hour per direction (pphd) on the Jubilee Line. With regard to the Northern Line, each train has a planning capacity of 800 passengers and therefore capacity of 20,000 pphd in the northbound direction in the AM peak and 18,400 in the southbound direction. In the PM peak the capacity is 15,295 per each direction. The assessment of the Development underground trips on the Jubilee Line and the Northern Line planning capacity is set out in **Table 7.20** and **Table 7.21** respectively.

Table 7.20 Assessment of Development Jubilee Line trips on Jubilee Line Planning Capacity

Time	Direction	Jubilee Line person trips	Jubilee Line planning capacity (pphd)	% of Jubilee Line network capacity
AM Peak	Westbound To Southwark	75	28,800	0.26%
	Eastbound To Bermondsey	124	28,800	0.43%
PM Peak	Westbound To Southwark	115	28,800	0.40%
	Eastbound To Bermondsey	73	28,800	0.25%

7.138 The largest impact on the Jubilee Line network would be 0.43% of the planning capacity, due to AM peak arrivals from the west. The likely effect of the Development on the users of the Jubilee Line network is therefore assessed as **insignificant.**

Table 7.21 Assessment of Development Northern Line trips on Northern Line Planning Capacity

Time	Direction	Northern Line person trips	Northern Line planning capacity (pphd)	% of Northern Line network capacity
AM Peak	Northbound to Bank	60	20,000	0.30%
	Southbound to Borough	199	18,400	1.08%
PM Peak	Northbound to Bank	183	18,400	0.99%
	Southbound to Borough	63	18,400	0.34%

7.139 It can be seen that the largest impact on the Jubilee Line network would be 1.08% of the planning capacity, due to AM peak arrivals from the north. The likely effect of the Development on the users of the Northern Line network is therefore assessed as **insignificant.**

Demand Capacity

7.140 The passenger numbers on the Jubilee Line and the Northern Line have been obtained from TfL in order to establish the effects of the Development on the assessment baseline line flows. The assessment baseline flows have been created by applying predicted growth in passenger numbers to the existing baseline flows, supplied by TfL. This has been undertaken for the AM peak hour when the impact of the Development on the underground network is predicted to be greater than the PM peak.

Table 7.22 Development (Demand Capacity) Underground Person Trips AM Peak

Direction		Baseline Planning Capacity (pphd)	Assessment Baseline Demand Capacity	Ratio of Demand to Capacity	Development Trips	Assessment Baseline + Development	Ratio of Demand to Capacity	% Change
Jubilee Line	From Bermondsey	28,800	24,828	86.21%	68	24,896	86.4%	0.23%
	To Southwark	28,800	24,688	85.72%	7	24,695	85.7%	0.03%
	From Southwark	28,800	20,313	70.53%	120	20,433	70.9%	0.42%
	To Bermondsey	28,800	21,214	73.66%	4	21,218	73.7%	0.01%
Northern Line	From Borough	20,000	15,402	77.01%	48	15,450	77.3%	0.24%
	To Bank	20,000	18,094	90.47%	12	18,106	90.5%	0.06%
	From Bank	18,400	12,243	66.54%	196	12,439	67.6%	1.06%
	To Borough	18,400	6,353	34.53%	3	6,356	34.5%	0.01%

7.141 **Table 7.22** shows that in respect of the Jubilee Line services, the greatest increase of ratio to flow capacity is 0.42% on inbound services from the west. Regarding the Northern Line, the highest increase of ratio to flow capacity is 1.06 % for inbound services from the North. Therefore, the effect of the Development on the users of the Jubilee Line and the Northern Line network is assessed as **insignificant**.

Effect on Rail Services

7.142 As shown in Table 7.15, the Development is predicted to generate 542 two-way rail trips during the AM peak and 515 two-way rail trips during the PM peak. As mentioned previously, based on the SWS Census data, approximately 74% of rail trips would be expected to use London Bridge Station with 26% of trips using other railways stations within London and then using the underground. The number of total trips expected to use London Bridge Station is therefore calculated as 401 and 381 trips in the AM and PM peak respectively.

7.143 London Bridge Station is currently served by 121 trains arriving and departing in the AM Peak with 113 services arriving and departing in the PM peak hour including South-eastern, Southern and Thameslink services. Based on the information provided on each of the train operators' websites, the average capacity of each train has been taken as 980 passengers. This equates to a capacity of 118,588 passengers in each direction in the AM Peak and 115,200 passengers in the PM peak hour. Therefore, based on the Development rail trips, the impact of on the rail network has been calculated in **Table 7.23**.

Table 7.23 Rail Network Impact Assessment

Time and direction		Rail Trips	Rail network capacity (hr)	% of rail network capacity
AM Peak	In	379	118,588	0.32%
	Out	22	118,588	0.02%
PM Peak	In	38	115,200	0.03%
	Out	343	115,200	0.30%

7.144 The above shows that the largest impact on the current rail network is expected to be 0.32 % which would occur in the weekday AM peak hour as a result of the additional 379 inbound trips. This represents an **insignificant** effect on rail users.

Effect on Traffic Flows

7.145 The Development is predicted to generate 8 two-way vehicle trips during both the AM and PM peak hour and 258 two-way vehicle trips across the whole day. **Table 7.24, Table 7.25** and **Table 7.26** show the predicted effect these trips would have on the local highway network during the AM, PM peak and across the whole day.

Table 7.24 Effect of Development Trips on Traffic Flows – AM Peak

Link	Assessment Baseline Flows		Assessment Baseline Flows + Development		Percentage Increase	
	All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
London Bridge to the north of Tooley Street	1,294	276	1,296	276	0.1%	0.0%
Borough High Street to the south of London Bridge	2,347	673	2,349	673	0.1%	0.0%
St. Thomas Street	258	7	263	7	1.7%	0.0%
White Hart Yard	4	1	8	1	100.0%	0.0%
Southwark Street to the east of Southwark Bridge Road	413	56	415	56	0.5%	0.0%
Southwark Street to the west of Southwark Bridge Road	890	87	892	87	0.2%	0.0%
Southwark Bridge Road	759	134	762	134	0.3%	0.0%
Marshalsea Road	763	160	766	160	0.3%	0.0%
Borough High Street to the north of Union Street	862	160	867	160	0.6%	0.0%
Long Lane	683	45	684	45	0.1%	0.0%
Tower Bridge Road to the south of Druid Lane	1,392	145	1,392	145	0.0%	0.0%
Tooley Street	537	116	537	116	0.0%	0.0%

Table 7.25 Effect of Development Trips on Traffic Flows – PM Peak

Link	Assessment Baseline Flows		Assessment Baseline Flows + Development		Percentage Increase	
	All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
London Bridge to the north of Tooley Street	1,108	236	1,110	236	0.2%	0.0%
Borough High Street to the south of London Bridge	2,525	572	2,527	572	0.1%	0.0%
St. Thomas Street	213	4	220	4	3.1%	0.0%
White Hart Yard	2	1	6	1	200.0%	0.0%
Southwark Street to the east of Southwark Bridge Road	381	34	384	34	0.7%	0.0%
Southwark Street to the west of Southwark Bridge Road	741	72	744	72	0.3%	0.0%
Southwark Bridge Road	623	88	626	88	0.4%	0.0%
Marshalsea Road	755	107	758	107	0.3%	0.0%
Borough High Street to the north of Union Street	837	127	843	127	0.7%	0.0%
Long Lane	570	38	571	38	0.1%	0.0%
Tower Bridge Road to the south of Druid Lane	1,160	95	1,160	95	0.0%	0.0%
Tooley Street	460	100	460	100	0.0%	0.0%

Table 7.26 Effect of Development Trips on Traffic Flows – Daily

Link	Assessment Baseline Flows		Assessment Baseline Flows + Development		Percentage Increase	
	All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
London Bridge to the north of Tooley Street	25,427	4,664	25,462	4,666	0.1%	0.0%
Borough High Street to the south of London Bridge	19,661	3,567	19,694	3,567	0.2%	0.0%
St. Thomas Street	6,104	567	6,214	608	1.8%	7.2%
White Hart Yard	26	5	178	5	584.6%	0.0%
Southwark Street to the east of Southwark Bridge Road	12,429	1,375	12,485	1,380	0.5%	0.4%
Southwark Street to the west of Southwark Bridge Road	14,887	1,447	14,948	1,457	0.4%	0.7%
Southwark Bridge Road	14,501	1,768	14,605	1,778	0.7%	0.6%
Marshalsea Road	14,319	2,044	14423	2,054	0.7%	0.5%
Borough High Street to the north of Union Street	14,361	2,372	14,540	2387	1.2%	0.6%
Long Lane	11,406	756	11,429	761	0.2%	0.7%
Tower Bridge Road to the south of Druid Lane	23,202	1,909	23,211	1,919	0.0%	0.5%

Link	Assessment Baseline Flows		Assessment Baseline Flows + Development		Percentage Increase	
Tooley Street	8,965	1,934	8,967	1,936	0.0%	0.1%
London Bridge to the north of Tooley Street	25,427	4,664	25,462	4,666	0.1%	0.0%

7.146 The above tables show that all of the road links would experience change in traffic flows of less than 10% with traffic flows predicted to increase by negligible amounts. This is with the exception of White Hart Yard where the increase in traffic would technically result in a major adverse effect. However, this is only as a result of very low baseline traffic flows on this road at present. The resultant traffic flows would remain within the environmental capacity thresholds for when pedestrians treat a street as a space to be occupied and not a road. With the above in mind, the Development traffic would have an **insignificant** effect on the road users in respect of all road links other than White Hart Yard where the effect is being assessed as being **adverse** and of **major significance** although this would result in an **insignificant** level of traffic flow.

Mitigation Measures and Likely Residual Effects

7.147 As part of the Applicant's commitment to ensure an appropriate development response, the Applicant and the design team have developed a number of measures within the Development proposals to ensure that the potential for adverse effects are avoided. These are discussed in the following paragraphs.

The Works

Construction Traffic Vehicular Movements

7.148 Consideration has been given to the likely numbers of construction vehicles and the routes to and from the Site. The construction vehicles would be managed in accordance with a CLP and a SEMP. These documents would be agreed with the SC prior to the commencement of works and are expected to be secured by planning conditions.

7.149 Other potential effects as a result of construction would be on road surfaces from mud and dirt, as well as temporary footway closure on the southern side of St. Thomas Street which would be actively managed in accordance with measures set out in the SEMP and the CLP. These measures would be expected to be incorporated as planning conditions / Section 106 measures and are therefore considered as mitigation measures rather than part of the scheme design, hence their consideration as such within this assessment. These measures are summarised as follows:

- restricted hours of work;
- demolition and construction method statements;
- Considerate Constructors Scheme;
- management of deliveries and trade contractors;
- management of noise, vibration and dust; and
- management of construction waste.

7.150 With the implementation of a SEMP and CLP, the residual effects of the Works traffic are considered to be **insignificant** on the road users.

Dust and Dirt on the Road

7.151 In respect of dust and dirt mitigation, this would be undertaken as per details provided within SEMP which would be agreed with SC and TfL. This includes washing down vehicles before leaving the Site.

Pedestrian and Cyclist Movement and Amenity

7.152 Details on the management of footway closures and routing would be agreed with the SC through the SEMP post-planning and prior to commencement of the Development as part of discharging the expected planning conditions / Section 106 Obligations for the CLP and SEMP.

7.153 Given the predicted level of hourly volumes of construction vehicles associated with Works activities on the Site and the control measures within the CLP and SEMP that would be implemented, the residual effects of construction traffic on pedestrian movement and capacity would be **insignificant.**

7.154 Details on the management of road closures and routing would be agreed with SC through the CLP and SEMP post-planning. The residual effects of construction traffic on cyclists would be **insignificant**.

Public Transport (DLR, LUL, Bus Network)

7.155 During the construction period there would be an increased number of workers in the local area that would use the public transport network. As the majority of the construction workers would be travelling outside of the peak periods due to their normal working hours, the residual effect on public transport users would therefore be **insignificant**.

Completed and Operational Development

Pedestrian and Cyclist Facilities and Conditions

7.156 The pedestrian and cyclist environment within the Site would be enhanced by the Development and therefore no mitigation is required.

7.157 The Development would create an attractive pedestrian route using King's Head Yard which would be largely car-free. This in combination with the management of vehicle servicing trips through the Delivery, Servicing and Waste Management Plan (DSWMP) for the Development would to a degree mitigate the major adverse effect of increased traffic flow on the Yard. The residual effects on pedestrians and cyclists using White Hart Yard are therefore assessed as **permanent adverse** effects of **minor significance**. It is noted that the level of traffic expected on White Hart Yard would continue to be insignificant.

7.158 Outside of White Hart Yard, the residual effects are assessed as follows:

- Pedestrian movement and capacity – **beneficial** effect of **moderate significance**.
- Pedestrian severance – **beneficial** effect of **moderate significance**.
- Pedestrian delay - – **beneficial** effect of **moderate significance**.
- Pedestrian fear and intimidation – **beneficial** effect of **minor significance**.
- Pedestrian amenity - **beneficial** effect of **major significance**.
- Cyclists – **insignificant** effect.

7.159 As shown above, there would be **beneficial residual** effects **of major, moderate and minor significance** on pedestrians and cyclists within the study area.

Public Transport Network and Accessibility

7.160 The completed Development is predicted to have a negligible effect on bus, London Underground and rail service capacities. It is noted that TfL might require contributions towards improving bus service frequencies as part of the Development to accommodate the additional patronage predicted. This would be secured through a financial contribution to bus services, if required. As this would increase service frequencies or the number of services provided it would also benefit the wider public within the area.

7.161 The residual effect on bus, London Underground and rail services would be **insignificant**.

Traffic Flows and Highways

7.162 The increase in traffic on White Hart Yard compared to the very low baseline flows is within the threshold of environmental capacity of the road and no mitigation is required.

7.163 The effects on the wider highway network are considered to be **insignificant** and therefore no mitigation is required in respect of traffic flows on the surrounding highway network.

7.164 The completed Development would be subject to a Travel Plan, and a DSWMP. Each of these would be subject to planning conditions or Section 106 Obligations within any planning consent for discharge post-planning.

- Travel Plan – The Development would be subject to a Workplace Travel Plan which would be expected to be subject to planning condition or Section 106 Obligation for discharge post-planning, prior to first occupation. As the Development is car-free and has a central London location with excellent public transport accessibility, it is already sustainable and staff and visitors would already be influenced towards sustainable modes. Therefore, the proposed measures would be focused on provision of information to staff to make them aware of all travel options available to them to encourage employees to move up within the sustainable transport hierarchy (e.g. from public transport to walking or cycling where practical). Other measures would include provision of high quality cycle parking, lockers and shower facilities which form part of the design of the Development, to make cycling a viable alternative as a transport mode. With the above in mind, it is considered that no other measures would be necessary as part of the Travel Plan as staff would be expected to select sustainable and active modes for travel to and from the Development.
- DSWMP – this would manage the arrival and departure of delivery and servicing vehicles and their activities when on-site.

7.165 The residual effect on traffic flows and highway capacity is **insignificant** except for White Hart Yard where there would be an **adverse** effect **of minor significance.**

7.166 **Table 7.27** summarises the likely significant effects, mitigation measures and likely residual effects identified within this Chapter.

Table 7.27: Summary of Likely Significant Effects, Mitigation Measures and Likely Residual Effects

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
The Works			
Effects of traffic flows from construction vehicle	Adverse effect of major significance on St. Thomas Street (HGVs only),	Site Environmental Management Plan (SEMP) and Construction Logistics	Insignificant

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
movements upon the local highway network users.	insignificant on all other links.	Plan (CLP) prior to commencement	
Effects of construction activities on pedestrians in terms of movement and capacity, severance, delay, fear and intimidation, amenity.	Adverse effect of moderate significance to Insignificant	Management of walkways, any temporary closures and routing would be agreed with the SC through the CLP and SEMP post-planning and prior to commencement.	Insignificant
Dust and dirt	Insignificant	Dust and dirt to be prevented and managed as set out in SEMP.	Insignificant
Effects of construction on cyclists.	Insignificant	Management of road closures and routing would be agreed with the SC through the CLP and SEMP post-planning and prior to commencement.	Insignificant
Effects of increased number of public transport trips as a result of construction workers' travel on public transport users.	Insignificant	None required	Insignificant
Completed and Operational Development			
Effects of the Development on pedestrians in respect of pedestrian movement and capacity.	Beneficial effect of moderate significance. adverse effect of moderate significance on White Hart Yard only.	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from White Hart Yard. Delivery, Servicing and Waste Management Plan (DSWMP) minimising servicing vehicles on White Hart Yard during peak periods.	beneficial effect of moderate significance. adverse effect of minor significance on White Hart Yard.
Effects of the Development on pedestrian severance.	Beneficial effect of moderate significance. Insignificant on White Hart Yard	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from White Hart Yard.	Beneficial effect of moderate significance. Insignificant on White Hart Yard
Effects of the Development on pedestrian delay.	Beneficial effect of moderate significance. Adverse effect of minor significance on White Hart Yard.	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard	Beneficial effect of moderate significance. adverse effect of minor significance on White Hart Yard.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
		from White Hart Yard. DSWMP minimising servicing vehicles on White Hart Yard during peak periods.	
Effects of the Development on pedestrian fear and intimidation.	Beneficial effect of minor significance. Insignificant on White Hart Yard.	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from White Hart Yard.	Beneficial effect of minor significance. Insignificant on White Hart Yard
Effects of the Development on pedestrian amenity.	Beneficial effect of major significance. Insignificant on White Hart Yard.	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from White Hart Yard.	Beneficial effect of major significance. Insignificant on White Hart Yard.
Effects of the Development cycle trips on cyclists using the local cycle network	Insignificant	None required	Insignificant
Effects of the Development bus services on bus users.	Insignificant	None required	Insignificant
Effects of the Development underground trips on Underground passengers.	Insignificant	None required	Insignificant
Effects of the Development Rail trips on train passengers.	Insignificant	None required	Insignificant
Effects of the Development Traffic Flows on road users on the local highway network.	Adverse effect of major significance on White Hart Yard. Insignificant on all other links.	DSWMP minimising servicing vehicles on White Hart Yard during peak periods.	Adverse effect of minor significance on White Hart Yard. Insignificant on all other links.

References

1 Institute of Environmental Management and Assessment (1993); Guideline for the Environmental Assessment of Road Traffic

2 https://tfl.gov.uk/info-for/urban-planning-and-construction/transport-assessment-guidance

3 Department for Transport (2007): Guidance on Transport Assessment.

4 Department for Transport (1993); Design Manual for Roads and Bridges – Volume 11, Section 3, Part 8: Pedestrians, Cyclists, Equestrians and Community Effects.

5 https://tfl.gov.uk/info-for/urban-planning-and-construction

8. Noise and Vibration

Introduction

8.1 This chapter, which was prepared by Waterman Infrastructure & Environment (Waterman IE), presents an assessment of the likely noise and vibration effects of the Development. Information on traffic flows during the operation of the Development has been provided by Transport Planning Practice (TPP) (the project's transport consultants). Information has been supplied by Gardiner & Theobald, Chapman BDSP and Sandy Brown Associates on construction, servicing plant and acoustic design limits respectively.

8.2 This chapter provides a description of the assessment methodology, a description of the relevant baseline conditions at the Site and surrounding area; and an assessment of the likely significant effects of the Development that could arise during demolition, deconstruction, refurbishment and construction, and once the Development is completed and operational. Where appropriate, mitigation measures are identified to avoid, reduce or offset adverse effects and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

8.3 This chapter is accompanied by the following appendices, presented in **ES Part 4**:

- **Appendix 8.1**: Acoustic Glossary
- **Appendix 8.2**: Baseline Survey
- **Appendix 8.3:** The Works Noise Calculations
- **Appendix 8.4:** Correspondence with Southwark Council Environmental Health Department

8.4 Please note that for the purposes of this ES chapter, the demolition, deconstruction, refurbishment and construction works will be referred to as 'the Works'.

Assessment Methodology and Significance Criteria

8.5 The assessment of likely significant noise and vibration effects has involved the following:

- identifying potentially sensitive existing and future receptors within the area surrounding the Site;
- establishing the baseline noise and vibration conditions currently existing at the Site and at existing sensitive receptors surrounding the Site through survey;
- assessing likely noise and vibration levels generated by the Works;
- assessing likely noise levels from the complete and operational Development;
- establishing design criteria for plant and building services associated with the Development;
- formulating proposals for mitigation (where appropriate); and
- assessing the likely significance of any residual noise and vibration effects.

Assessment Methodology

Consultation

8.6 Within the Scoping Opinion dated 4 October 2018, Southwark Council (SC) provided the following responses in relation to noise and vibration, as set out in Table 8-1 below.

Table 8-1: Southward Council Consultation Responses

Item	Waterman Action
The scope and measurement procedures for baseline noise and vibration surveys are required to be agreed in consultation with SC EHO and confirmation of this should be provided in the ES.	In a conversation with Ken Andrews, Principal Environmental Health Officer at SC, it was confirmed that he had no objections to the scope and measurement procedures for baseline noise and vibration surveys.
The ES should confirm that receptor locations identified include amenity areas.	**Figure 8.2** illustrates receptor locations and includes three amenity areas.
The ES should confirm how the construction noise assessment has taken account of existing ambient noise conditions at receptors.	BS5228-1:2009+A1:2014 ABC method was used, which sets construction threshold levels based on existing ambient noise levels established through baseline survey.
The potential effects of Jubilee Line vibration on the completed development should also include an assessment of potential groundborne noise.	An assessment of potential effects resultant from groundborne noise associated with the London Underground Limited (LUL) Jubilee Line has been undertaken based on measured vibration levels, which were established as part of the baseline survey.
ES should include a summary of residual effects following mitigation and consideration of the potential cumulative effects from other nearby developments	Residual noise and vibration effects following mitigation are presented within this chapter. Cumulative effects are presented within Chapter 14.

Establishing Baseline Conditions

8.7 Long-term noise monitoring was undertaken at two key locations on the periphery of the Site over a six-day period from Thursday 13 October to Tuesday 18 October 2016 (refer to **Figure 8.1** Noise and Vibration Monitoring Locations). The survey period covered both a typical weekday and weekend period. Four additional concurrent short-term noise measurements were undertaken at each Site boundary.

8.8 Due to the significant amount of construction activity, and hence associated noise, around the Site in 2018, the survey undertaken in 2016 is expected to be more representative of baseline conditions than measurements taken in 2018 would be. There is no reason to believe baseline conditions would have changed between October 2016 and October 2018 and therefore the use of 2016 data is considered appropriate.

8.9 Short-term vibration monitoring was undertaken toward the west of the Site at basement and ground floor level (refer to **Figure 8.1**) to determine the magnitude of existing vibration from train passes on the Jubilee Line which runs underneath the north western corner of the Site.

Assessment of Likely Significant Noise and Vibration Effects

The Works - Noise

8.10 As noted in **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**, the Works are planned to commence in the Quarter 1 of 2022 with a completion date of Quarter 4 2025. Noise levels associated with these works have been estimated based upon the plant typically used for such a development as detailed in Chapter 6 and are based on source noise levels contained within BS 5228-1:2009+A1:2014[1] '*Code of practice for noise and vibration control on construction and open sites –Part 1: Noise*'.

8.11 The Works which are considered to be the noisiest can be divided into the following main activities:

- demolition;
- earthworks;
- piling;
- concreting; and
- road paving.

8.12 To assess the likely significant effects of the Works on existing and future Sensitive Receptors (SRs) surrounding the Site as shown on **Figure 8.2**, the 'ABC Method' provided in BS 5228-1:2009+A1:2014[1], has been used. This method defines category threshold values, which are determined by the time of day and existing prevailing ambient noise levels. The noise generated by the Works activities is compared with the threshold value. If the Works noise level exceeds the 'threshold value', a significant effect is deemed to occur.

8.13 Noise threshold levels have been established for the relevant SRs based upon the prevailing baseline noise levels. Noise levels associated with the Works have been predicted using the calculation methodology detailed within BS 5228-1:2009+A1:2014. Calculations representing a worst-case scenario over a one-hour period with plant operating at the closest point to the nearest SR and in the absence of mitigation are presented. In practice, noise levels will tend to be lower owing to greater separation distances, screening effects of boundary hoarding and periods of plant inactivity and so can be considered as a worst-case assessment.

The Works - Vibration

8.14 There are two aspects of vibration that require consideration:

- potential vibration effects on people or equipment within buildings; and
- potential vibration effects on buildings.

8.15 There are currently no British Standards that provide a methodology for predicting levels of vibration from demolition and construction activities other than BS 5228-2[2] 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration', which relates to percussive, or vibratory, rolling and piling only. As stated in BS 5228-2, and as generally accepted, the threshold of vibration perception for humans in residential environments is typically in the Peak Particle Velocity (PPV) range 0.15 to 0.3 mm/s at frequencies between 8 Hertz (Hz) and 80Hz with complaints likely at 1 mm/s. Based on historical field measurements undertaken by Waterman IE and having regard to information contained within BS 5228-2, **Table 8.2** details the distance at which certain activities may give rise to 'just perceptible' levels of vibration.

Table 8-2: Distance at which Vibration May be Just Perceptible

Construction Activity	Distance from Activity when Vibration may be just Perceptible, *m*[1]
Heavy Vehicles	5-10
Excavation	10-15
Continuous Flight Auger (CFA) Piling	15-20
Rotary Bored Piling	20-30
Vibration Piling	40-60

Note:
[1] Distances for perceptibility are only indicative and dependent upon several factors, such as the radial distance between source and receiver, ground conditions, and underlying geology

8.16 **Table 8.3** presents typical levels of vibration with distance from continuous flight auger (CFA) piling methods.

Table 8-3: Typical Levels of Vibration from CFA Piling

Distance, m	Peak Particle Velocity[1] (PPV), mm/s
5	0.54
10	0.38
20	0.3
30	0.3

Note:
[1] PPV Levels are indicative only and dependent upon ground conditions and underlying geology

8.17 It is a widely held belief that if vibration can be felt, then damage to property is inevitable. However, vibration levels at least an order of magnitude higher than those for human disturbance are required to cause damage to buildings. It is generally accepted that building damage will not arise at PPV levels below 12.5 mm/s.

8.18 Vibration from piling operations has the potential to affect utilities and will be a function of the distance of the piling works from the utility location. Some statutory undertakers have introduced criteria governing the maximum level of vibration to which their services should be subjected. In the absence of specific criteria from the undertakers, BS5228-2 recommends the following limits:

- Maximum PPV for intermittent or transient vibrations 30 mm/s; and
- Maximum PPV for continuous vibrations 15 mm/s.

8.19 In the event of encountering older and dilapidated brickwork sewers, the base data should be reduced by 20% to 50%. For most metal and reinforced concrete service pipes however, BS5228-2 consider that the values stated within BS5228-2 should be tolerable.

8.20 At this stage, the detail of the methods and equipment to be used during the Works is unconfirmed as they will be established in detailed design stages. Therefore, a detailed assessment cannot be undertaken. Consequently, the significance of vibration effects from the Works cannot be assessed quantitatively and has therefore been assessed qualitatively based on typical plant used and distance of works to the SRs. Vibration level data has been drawn from BS5228-2.

The Works Road Traffic Noise

8.21 Assessment of noise level changes arising from demolition and construction traffic has been undertaken using the calculation methodology detailed within the Calculation of Road Traffic Noise[3] (CRTN). This involved the use of the forecast construction traffic flow data (as set out in **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**) and the baseline traffic data provided by the project transport consultant (TPP) as set out in **Chapter 7: Transportation and Access**.

Completed and Operational Development

Fixed External Plant & Building Services

8.22 The guidance provided in BS 4142:2014[4] 'Methods for rating and assessing industrial and commercial sound', has been used to assess whether noise from fixed plant and building services associated with the Development will be likely to give rise to significant adverse impacts for existing and future SRs. Predicted noise levels have also been assessed in accordance with the requirements of SC later in this chapter.

Commercial Uses and Servicing Noise

8.23 Specific details concerning the end users of the commercial elements of the Development are not known at this stage and will be dependent on the future tenants. As such, a qualitative assessment has been undertaken of noise sources associated with the commercial elements of the Development.

8.24 Assessment of servicing noise has been undertaken based on the Leq prediction methodology set out in the Noise Advisory Council document entitled '*A Guide to the Measurement and Prediction of the Equivalent Continuous Sound Level Leq*'[5] and guidance provided in BS4142:2014 based on the forecast volume of servicing vehicles and the resultant predicted change in the prevailing noise level at SR locations.

Significance Criteria

The Works - Noise and Vibration

8.25 As outlined above, to assess the significance of effects from the Works noise on existing and future SRs, 'The ABC Method' provided in BS 5228-1:2009+A1:2014 was used. The vibration assessment has been made against the criteria for human perception as presented in BS 5228-2:2009. Regard has also been given to the requirements of LBS detailed within their Technical Guidance Note on 'Demolition and Construction[6]'. **Table 8.4** presents the significance criteria to assess both noise and vibration from the Works.

Table 8-4: Significance Criteria for Assessment of Noise and Vibration from the Works

Significance	Noise Level Above Threshold Value, dB(A)	Level of Vibration, mm/s	Definition
Insignificant	≤ 0 - 2.9	< 0.14	The effect is not of concern.
Adverse effect of minor significance	3.0 - 4.9	0.14 - <1	The effect is undesirable but of limited concern.
Adverse effect of moderate significance	5.0 - 9.9 or ≥75dB $L_{Aeq,15\ min}$ (short-term), ≥70dB $L_{Aeq,10\ hr}$ (08:00-18:00) whichever is lower	1 to 3	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration.
Adverse effect of major significance	≥10 or ≥80dB $L_{Aeq,15min}$ (short-term), 75dB $L_{Aeq,10\ hr}$ (08:00-18:00) whichever is lower	>3	The effect gives rise to serious concern and it should be considered unacceptable.

8.26 SC specify the following vibration limits which are receptor dependent within their Technical Guidance[7] and are expected to be applicable in the absence of other restrictions:

- 1 mm/s PPV at occupied residential and educational buildings;
- 3 mm/s PPV at occupied commercial premises where work is not of an especially vibration sensitive nature or for potentially vulnerable unoccupied buildings;
- 5 mm/s at other unoccupied buildings.

8.27 With regard to potential damage to any utilities and Listed buildings / structures, provided vibration is ≤7.5mm/s (derived from BS5228-2 advice) the potential effect is insignificant. For all other buildings, a vibration level of ≤10mm/s is insignificant with regard to building damage.

The Works - Road Traffic Noise

8.28 The significance criteria normally used in the short-term assessment of operational road traffic noise, presented as **Table 8.5**, has been used to assess the significance of changes in road traffic noise as a result of traffic generated by the Works.

Table 8-5: Significance Criteria for Change in Road Traffic Noise

Significance	Change in Road Traffic Noise Level, dB(A)
Insignificant	0 – 0.9
Adverse effect of minor significance	1 – 2.9
Adverse effect of moderate significance	3 – 4.9

Significance	Change in Road Traffic Noise Level, dB(A)
Adverse effect of major significance	>5

Complete and Operational Development

Fixed External Plant & Building Services

8.29 The guidance provided in BS 4142[8] 'Methods for Rating and Assessing Industrial and Commercial Sound,' together with the requirements of SC detailed with their Technical Guidance for Noise[9], has been used to assess whether noise from fixed plant and building services will be likely to give rise significant adverse impacts for existing and future SRs.

8.30 In order for planning permission to be recommended, as detailed within the Technical Guidance, SC require:

"Rating sound level does not exceed the typical minimum $L_{A90\ (15\ minute)}$ background sound level at any time. Furthermore, in order to prevent gradually creeping background levels over time it is required that the unrated 'Specific' sound level does not exceed 10dB below the typical minimum $L_{A90\ (15\ minute)}$ background sound level at any time. The 'Specific', 'Rating' and 'Background' sound levels shall be calculated fully in accordance with the methodology of BS4142:2014."

8.31 At this stage of the Development specific detail on plant with regard to make, model and numbers is not known. On this basis, plant noise limits have been recommended at SR locations based on the noise monitoring data and in accordance with the requirements of SC.

Commercial Uses and Servicing Noise

8.32 In the absence of published guidelines for assessing the effects of noise from delivery and servicing, the significance criteria in **Table 8.6**, which are based on the predicted change in the prevailing noise level, have been adopted. The criteria are widely used by acoustic practitioners and are based on human perception and response to changes in environmental noise levels.

Table 8-6: Significance Criteria for Non-Residential and Servicing Noise Assessment

Significance	Change in Prevailing Noise Level, dB(A)	Definition
Insignificant	< 3	The effect is not of concern.
Adverse effect of minor significance	3.0 – 4.9	The effect is undesirable but of limited concern.
Adverse effect of moderate significance	5 – 9.9	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration.
Adverse effect of major significance	≥ 10	The effect gives rise to serious concern and it should be considered unacceptable.

8.33 With regard to commercial uses where specific detail is unknown a qualitative assessment has been undertaken.

Environmental Vibration

8.34 Vibration resultant from the LUL Jubilee Line which runs under the north western corner of the Site has been undertaken against BS6472:2008 Vibration Dose Value (VDV) criteria, which are reproduced in Table 8.7.

Table 8-7: Significance Criteria for the Assessment of VDV

Place and Time	Low Probability of adverse comment $m/s^{-1.75}$	Adverse comment possible $m/s^{-1.75}$	Adverse comment probable $m/s^{-1.75}$
Office Buildings 16 h day	0.4 – 0.8	0.8 – 1.6	1.6 – 3.2

Limitations and Assumptions

The Works

8.35 The BS 5228 calculation methods allows accurate noise levels to be determined for various demolition and construction activities. However, at this stage specific detail on the construction plant and machinery to be used (make/model) is not known.

8.36 A number of assumptions have therefore made regarding the number and type of plant to be utilised, their location, and detailed operating arrangements. Some of this information will be clarified as the detailed design progresses and later when resources are mobilised, and the contractor is appointed, but other information (such as exactly where the plant operates and for how long) will remain uncertain, even after works have commenced. As such, the Works noise levels have been based on generic plant detail contained within BS5228-1:2009+A1:2014 and as detailed in ES **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**.

8.37 The available information is considered sufficient to undertake a noise assessment of the Works, focussing on key activities operating at the Site, with the aim of identifying whether a significant, albeit temporary, adverse noise effect is likely to arise at the nearest sensitive receptors. In this respect, a medium to high degree of confidence is assigned to the predicted significance of the potential effects.

Fixed Plant and Building Services

8.38 At this stage in the design of the Development, the number, location, specific type and configuration of fixed plant and building services connected with the Development are not defined. Consequently, it is not possible to undertake predictions to determine whether appropriate standards might be met. Plant noise emission limits have therefore been recommended which are compliant with the requirements of SC.

Baseline Conditions

Receptors

8.39 The nearest existing and future sensitive receptors (SRs) to the Site which may be affected by the Development are shown in **Table 8.7** and **Figure 8.2.** The dominant noise source was constant vehicular traffic on St. Thomas Street/Borough High Street. Contributory noise from aircraft movements (approximately one plane every 10 minutes going over the Site) and distant mainline railways was audible. Where a number of receptors are located close to the Works the closest and hence worst effected has been included.

Table 8-8: Sensitive Receptors

Receptor	Receptor Type	Description / Name	Approximate Distance to Site Boundary, *m*
SRA	Residential	4-6 London Bridge Street	45m North
SRB	Future Residential	Shard Place, 28 London Bridge Street	35m North East
SRC	Hospital	Guy's Hospital and associated buildings including Guy's Chapel	12m East
SRD	Residential on Upper Floors	Bunch of Grapes, 2 St. Thomas Street	12m West
SRE	Residential on Upper Floors	The Old King's Head, 47-49 Borough High Street	10m South
SRF	Student Halls	Iris Brook House / Orchard Lisle House	12m South
SRG	Amenity Space	Guy's Hospital Courtyard	30m South East
SRH	Amenity Space	Iris Brook House Courtyard	40m South
SRI	Amenity Space	Guy's Hospital Forecourt	25m East
SRJ	Residential on Upper Floors	43 Borough High Street	10m West

8.40 SRs that lie further away would, due to distance and potentially screening effects, be exposed to lower noise levels than the SRs presented in **Table 8.8**. Should the significance of effects be acceptable for the nearest SRs, it is automatically assumed that it will also be for those located at greater distance from the Site.

Baseline Noise Surveys

8.41 The noise monitoring locations are shown on **Figure 8.1** and described in **Table 8.9**. A summary of the measured daytime (07:00 to 23:00) and night-time (23:00 to 07:00) noise levels at these locations are presented in **Table 8.10**, with full results displayed graphically in time-history format in **Appendix 8.2**.

Table 8-9: Noise Monitoring Locations

Monitoring Location[1]	Description	Observations and Predominant Noise Sources
LT1	Façade measurement taken at rooftop level on the northern Site boundary overlooking St. Thomas Street	Noise climate dominated by constant vehicular traffic on St. Thomas Street/Borough High Street. Contributory noise from nearby construction activities[2], as well as noise from flying aircraft movements (approximately one plane every 10-minute going over the Site) and distant mainline railway noise was audible.
LT2	Façade measurement taken at rooftop level on the southern Site boundary overlooking King's Head Yard.	
ST1	Façade measurement taken at ground level on the northern Site boundary fronting St. Thomas Street.	Noise climate dominated by constant vehicular traffic on St. Thomas Street. Contributory noise from nearby construction activities[2], as well as noise from flying aircraft movements (approximately one plane every 10-minute going over the Site) and distant mainline railway noise was audible.
ST2	Façade measurement taken at ground level on the eastern Site boundary fronting Talbot Yard.	
ST3	Façade measurement taken at ground level on the southern Site boundary fronting King's Head Yard.	Noise climate dominated by constant vehicular traffic on Borough High Street. Contributory noise from nearby construction activities[2], as well as noise from flying aircraft movements (approximately one plane every 10-minute going over the Site) and distant mainline railway noise was audible.
ST4	Façade measurement taken at ground level on the western Site boundary fronting carpark / service yard.	

Note: [1]LT – Long Term; ST – Short Term; [2]Contamination from nearby construction activities expected to be less than in a more recent survey

Table 8-10: Summary of Measured Baseline Noise Levels

Monitoring Location (Table 8.7)	Period	Duration	$L_{Aeq,T}$, dB Average[1]	$L_{AFmax,T}$, dB 90th %tile	$L_{A10,T}$ dB Average[2]	$L_{A90,T}$ dB Average[3]
LT1	Day	12 hour	64	81	65	58
	Evening	4 Hour	62	80	63	58
	Night	8 hour	60	77	61	54
LT2	Day	16 hour	61	78	62	58
	Evening	4 Hour	62	77	63	60
	Night	8 hour	58	74	59	54
ST1	Day	35 min	70	85	68	58
ST2	Day	30 min	55	70	56	53
ST3	Day	20 min	56	77	59	53
ST4	Day	30 min	59	76	60	56

Notes: [1]Logarithmic average of measured values [2]Arithmetic average of measured values [3]Modal value of data sets

8.42 The average measured daytime noise levels at LT1 during the weekend period were slightly lower (approximately 2 to 3dB lower) when compared to the weekday measured noise levels for the L_{Aeq}, L_{A10} and L_{A90} parameters. The measured night-time noise levels were comparable for both the weekday and weekend period. Full analysis details are presented in **Appendix 8.2.**

8.43 The average measured daytime noise levels at LT2 during the weekend period were 2dB lower when compared to the weekday measured noise levels for the L_{Aeq}, L_{A10} and L_{A90} parameters. There was no difference between the average measured night-time noise levels for the weekday and weekend periods.

8.44 The Site is situated in an urban location adjoining the strategic road network with transportation noise being the dominant noise source. Prevailing ambient noise levels during both the weekday and weekend periods are comparable as illustrated in the time history plots presented in **Appendix 8.2**.

Baseline Vibration Surveys

8.45 On Monday 17 October 2016 short term attended vibration measurements were undertaken at two key locations (as shown in **Figure 8.1**) to determine the magnitude of existing vibration from train passes on underground lines beneath the north-western corner of the Site for a representative sample of train events.

8.46 Vibration measurements were undertaken using a calibrated Rion DA-20 waveform recorder (*Serial Number: 11160666*) with PV-87 high sensitivity accelerometers (*Serial Numbers: x-axis 23749; y-axis 23760; z-axis 23754*) fixed to a tri-axial mounting weighted DIN plate with ground spikes. The meter was set-up to continuously record vibration levels for each axis of vibration (*tri-axial*), the x-axis positioned perpendicular to the rail line for all measurements.

8.47 **Table 8.11** describes each measurement location and the predominant source of vibration.

Table 8-11: Vibration Monitoring Locations

Monitoring Location	Description	Observations and Predominant Vibration Sources
V1	Measurement taken at basement level on the western Site boundary	Trains pass-by from the Jubilee Line operating to and from London Bridge Underground Station.
V2	Measurement taken at ground floor level, north of monitoring position V1	

8.48 **Table 8.12** presents the measured maximum event VDV level in each axis. At each measurement location the highest vibration level was measured in the vertical (z) axis which has been used for assessment purpose.

Table 8-12: Summary of Measured Baseline Vibration Levels

Monitoring Location (Table 8.7)	Period	Measured VDV Level for Single Event, $m/s^{1.75}$			Estimated Number of Train Passes
		X-Axis	Y-Axis	Z-Axis	
V1	Day	0.75×10^{-3}	0.58×10^{-3}	2.4×10^{-3}	835
	Night				103
V2	Day	0.51×10^{-3}	0.42×10^{-3}	2.5×10^{-3}	835
	Night				103

Assessment of Likely Significant Effects

The Works

Noise

8.49 **Table 8.13** presents the predicted unmitigated noise levels at the selected receptors listed in **Table 8.8** during the Works.

8.50 Noise levels presented are representative of a worst-case scenario when the Works are undertaken at the closest practical point to the sensitive receptors. This is taken as being either the Site boundary or the closest existing structure to be demolished/deconstructed.

8.51 Predicted construction noise levels are based on the shortest distance of the Works to the SRs, with the significance of effect assessed against the relevant construction threshold noise level of 65-70dB $L_{Aeq,T}$ depending on receptor location. Threshold levels determined by existing ambient noise levels measured on the Site, are shown in Table 8.10. These levels are then compared with the Site noise level. If the Site noise level exceeds the appropriate category value described in in BS 5228-1:2009+A1:2014[1], then a potential significant effect is indicated.

Table 8-13: Predicted Unmitigated The Works Noise Levels dB $L_{Aeq,T}$

SR	Location	Threshold dB	Demolition	Earth-Works	CFA Piling	Concreting	Pavement
A	4-6 London Bridge Street	70	59	51	51	52	46
B	Shard Place (Fielden House)	70	82	74	74	75	69
C	Guy's Hospital including Chapel	70	91	83	83	84	78
D	Bunch of Grapes	70	91	83	83	84	78
E	The Old King's Head	65	70	62	62	63	57
F	Iris Brook House / Orchard Lisle House	65	89	81	81	82	76
G	Guy's Hospital Courtyard	65	54	46	46	47	41
H	Iris Brook House Courtyard	65	54	46	46	47	41
I	Guy's Hospital Forecourt	66	55	47	47	48	42
J	43 Borough High Street	65	70	62	62	63	57

8.52 **Table 8.14** presents the level of significance of noise effects at the nearest receptors resultant from the Works. All significant effects identified will be **temporary, local, short-term and adverse**. Three receptors including 4-6 London Bridge Street, Guy's Hospital Courtyard and Iris Brook House Courtyard are predicted to experience insignificant effects throughout the duration of the Works. The Old King's Head would experience insignificant effects except during the demolition works.

Table 8-14 Significance of Unmitigated Demolition and Construction Noise Effects

SR	Location	Demolition	Earth-Works	CFA Piling	Concreting	Pavement
A	4-6 London Bridge Street	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
B	Shard Place (Fielden House)	Major Adverse	Minor Adverse	Minor Adverse	Moderate Adverse	Minor Adverse
C	Guy's Hospital including Chapel	Major Adverse	Major Adverse	Major Adverse	Major Adverse	Major Adverse
D	Bunch of Grapes	Major Adverse	Major Adverse	Major Adverse	Major Adverse	Major Adverse
E	The Old King's Head	Moderate Adverse	Insignificant	Insignificant	Insignificant	Insignificant
F	Iris Brook House / Orchard Lisle House	Major Adverse	Major Adverse	Major Adverse	Major Adverse	Major Adverse
G	Guy's Hospital Courtyard	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
H	Iris Brook House Courtyard	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
I	Guy's Hospital Forecourt	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
J	43 Borough High Street	Moderate Adverse	Insignificant	Insignificant	Insignificant	Insignificant

8.53 It should be noted that in reality the Works will be transient in nature, with most works taking place at locations significantly removed from the Site boundary. Nonetheless, given that some potential effects of moderate to major significance have been predicted, mitigation measures will be required and are discussed in the relevant section below.

Vibration

8.54 During the Works, vibration impacts could arise at nearby premises when vibration generating activities are carried out. These activities include the breaking up of concrete slabs during demolition and piling. Based on **Tables 8.3** and **8.4**, there is the potential for adverse effects to occur at premises located within 15m of the works.

8.55 Receptors SR A, SR B and SR F are located in excess of 15m from the Site boundary and therefore **insignificant** vibration effects are anticipated due to the distance from the Works. This statement is based on the method of piling, being Continuous Flight Auger (CFA), which is the method which gives rise to the lowest levels of vibration. There is the potential for adverse vibration effects to occur at SR C, SR D and SR E due to their proximity to the Site boundary. The significance of the effect will be dependent on type and distance of works to the receptor. As such, there is the potential for **local**, **short term, adverse** effects of **minor significance** to arise at these locations.

8.56 The potential for building damage arising from the Works is considered to be **insignificant** at all SRs located at a distance ≥10 metres, based on use of CFA piling method. Where piling or breaking up of concrete slabs is undertaken at a distance of less than 10 metres there is the potential for **local, permanent**, **adverse** effects of **minor significance**.

8.57 As previously described with regard to potential damage to any utilities and listed buildings / structures, provided vibration is ≤7.5mm/s (derived from BS5228-2 advice) the potential effect is insignificant. For all other buildings, a vibration level of ≤10mm/s is insignificant with regard to building damage. In line with this guidance the potential for damage to listed structures and rail infrastructure is considered to be **insignificant** where distance of works is ≥10 metres. Where vibration generating works are taking place within 10m of listed buildings there is the potential for **adverse** effects to occur of **minor or above significance**. This will need to be reviewed once specific detail of plant and construction activities is known. Potential mitigation measures to control the effects of construction vibration upon listed structures are discussed within the mitigation section of this chapter.

Works Traffic

Construction Traffic Noise

8.58 In addition to construction plant operating on the Site, there will be some movement of materials to and from the Site by road, though these are predicted to be low in relation to existing road traffic flows. The peak daily two-way movement is forecast to be 44 HGVs with an average of 26 HGVs per day. Peak levels of noise or vibration arising from construction vehicles will not be any greater than can presently arise from existing heavy-duty vehicle movements on the existing roads. Further to this the increase in base flows resultant from the Work traffic on the existing road network will be less than 10% increase and therefore will give rise to an increase in road traffic noise of less than 1dB(A) and therefore is **insignificant**.

Completed and Operational Development

Fixed External Plant & Building Services

8.59 Any items of fixed external plant and building services associated with the operation of the Development will have the potential to generate noise. At this stage in the design, specific details of the plant associated with the Development are not yet known. Consequently, suitable limits to which plant should adhere have been recommended to safeguard existing amenity and are presented in **Table 8.15.**

Table 8-15: Plant Noise Emission Limits

SR	Location	Period	Representative $L_{A90,5min}$	Plant Noise Emission Limit, $L_{Aeq,t}$
A	4-6 London Bridge Street	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
B	Shard Place	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
C	Guy's Hospital including Chapel	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
D	The Bunch of Grapes	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
E	The Old King's Head	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
F	Iris Brook House / Orchard Lisle House	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
G	Guy's Hospital Courtyard	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
H	Iris Brook House Courtyard	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
I	Guy's Hospital Forecourt	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44
J	43 Borough High Street	Daytime (07:00 – 23:00)	58	48
		Night Time (23:00 – 07:00)	54	44

8.60 The recommended plant noise emission limits have regard to the results of the baseline noise survey and the noise requirements of SC, thereby ensuring the acoustic acceptability of plant that may be introduced as part of the Development.

8.61 Based on the above noise emission limits for new building plant being achieved (and potentially being controlled by a standard planning condition), noise generated from new building plant will have an **insignificant** effect on surrounding existing and future SRs.

Commercial Uses and Servicing Noise

8.62 An assessment of predicted noise levels has been undertaken based on peak HGV movements, as provided by TPP within servicing areas at St. Thomas Street and White Hart Yard. Results of this assessment are shown in **Table 8.16**.

8.63 It should be noted that the servicing area for the Development is in the basement. Access to the service area is off White Hart Yard using vehicle lifts. The servicing area at St. Thomas Street is located at ground level. The majority of SRs are completely screened from access routes to and from the service yard areas except Guy's Hospital to St. Thomas Street service area and Iris Brook House and Orchard Lisle House to White Hart Yard.

Table 8-16: Predicted Servicing Noise Levels & Significance of Effect

<table>
<tr><th rowspan="2">SR Position</th><th colspan="2">Measured Ambient Noise Level, dB</th><th colspan="2">Predicted Servicing Noise at 1m from SR, dB</th><th colspan="2">Noise Level Increase due to Servicing Noise</th><th colspan="2">Significance of Level Difference</th></tr>
<tr><th>Day</th><th>Night</th><th>Day</th><th>Night</th><th>Day</th><th>Night</th><th>Day</th><th>Night</th></tr>
<tr><td colspan="9">St. Thomas Street Deliveries</td></tr>
<tr><td>**SR A**</td><td rowspan="4">64</td><td rowspan="4">60</td><td>25</td><td>25</td><td>0</td><td>0</td><td rowspan="10" colspan="2">Insignificant</td></tr>
<tr><td>**SR B**</td><td>25</td><td>25</td><td>0</td><td>0</td></tr>
<tr><td>**SR C**</td><td>52</td><td>51</td><td>0.3</td><td>0.5</td></tr>
<tr><td>**SR D**</td><td>53</td><td>52</td><td>0.3</td><td>0.6</td></tr>
<tr><td>**SR E**</td><td rowspan="6">61</td><td rowspan="6">58</td><td rowspan="6" colspan="2">negligible</td><td>0</td><td>0</td></tr>
<tr><td>**SR F**</td><td>0</td><td>0</td></tr>
<tr><td>**SR G**</td><td>0</td><td>0</td></tr>
<tr><td>**SR H**</td><td>0</td><td>0</td></tr>
<tr><td>**SR I**</td><td>0</td><td>0</td></tr>
<tr><td>**SR J**</td><td>0</td><td>0</td></tr>
<tr><td colspan="9">White Hart Yard Deliveries</td></tr>
<tr><td>**SR A**</td><td rowspan="4">64</td><td rowspan="4">60</td><td rowspan="4" colspan="2">negligible</td><td>0</td><td>0</td><td rowspan="5" colspan="2">Insignificant</td></tr>
<tr><td>**SR B**</td><td>0</td><td>0</td></tr>
<tr><td>**SR C**</td><td>0</td><td>0</td></tr>
<tr><td>**SR D**</td><td>0</td><td>0</td></tr>
<tr><td>**SR E**</td><td>61</td><td>58</td><td>53</td><td>50</td><td>0.7</td><td>0.6</td></tr>
</table>

SR Position	Measured Ambient Noise Level, dB		Predicted Servicing Noise at 1m from SR, dB		Noise Level Increase due to Servicing Noise		Significance of Level Difference	
	Day	Night	Day	Night	Day	Night	Day	Night
SR F			14	11	0	0		
SR G			13	9	0	0		
SR H			15	12	0	0		
SR I			13	9	0	0		
SR J			53	50	0.7	0.6		

8.64 Due to screening and distance attenuation, the effects resultant from delivery and servicing noise associated with the Development are predicted to be **insignificant** at all SRs when assessed against the significance criteria set out in **Table 8.6**.

8.65 It is not possible at this stage to predict effects from the non-office elements of the Development as specific details are not known. The assumption however is that planning controls will be in place to control potential adverse effects so that they are **insignificant**.

Environmental Vibration

8.66 Predicted day and night-time Vibration Dose Value (VDV) levels have been predicted based on measured maximum VDV event level and number of train movements derived from the timetable and are presented in **Table 8.17.**

Table 8-17 Predicted Day and Night VDV Values

Monitoring Location	Period	Estimated Number of Train Passes	Maximum Vertical VDVd, $m/s^{1.75}$
V1	Day	835	0.013
	Night	103	0.008
V2	Day	835	0.013
	Night	103	0.008

8.67 **Table 8.18** presents the predicted VDV values at the first four floors of the Development and are based on transfer functions described in Association of Noise Consultants (ANC) Guidelines[10]: Measurement and Assessment of Groundborne Noise and Vibration and the floor by floor attenuation described in UK Transportation Noise Reference Book[11].

Table 8-18: Predicted Building VDV Levels

Monitoring Location	Measured Z-Axis VDV Level, $m/s^{1.75}$	Predicted VDV Level, $m/s^{1.75}$				
		Ground Floor	First Floor	Second Floor	Third Floor	Fourth Floor
V 1	0.013	0.013	0.018	0.013	0.009	0.007
V 2	0.013	0.013	0.018	0.013	0.009	0.007

8.68 All of the predicted VDV levels are below the level of low probability of adverse comment within office buildings (refer to Table 8.7). On this basis vibration arising from the LUL Jubilee Line which passes under the north-western corner of the Site should not adversely affect the proposed commercial use of the Site.

8.69 An additional assessment has been undertaken of the potential for structure-borne noise based on measured VDV Values and based on attenuation and amplification factors taken from the *UK Transportation Noise Reference Book.* The predicted structure borne noise levels are presented as **Table 8.19**.

Table 8-19: Predicted Structure-borne Noise

Monitoring Location	Predicted Z-Axis structure-borne noise, dB L_{ASmax}				
	Ground Floor	First Floor	Second Floor	Third Floor	Fourth Floor
V 1	30	27	24	21	18
V 2	19	16	14	11	9

8.70 Open plan office space is located on second floor and above within the Development. The BS8233:2014 guideline internal ambient noise level criteria for open plan offices is $L_{Aeq,t}$ 40-45 dB. Structure-borne noise L_{ASmax} levels presented in **Table 8.18** are therefore considered to be **insignificant** when compared against these criteria.

Mitigation Measures and Likely Residual Effects

The Works

8.71 Measures to control the noise and vibration effects from the Works will be incorporated into a Site Environmental Management Plan (SEMP). This SEMP will have regard to appropriate legislation, guidance and measures to minimise construction noise, including but not limited to:

- Application of the principle of Best Practical Means (BPM) as defined in Section 72 of the Control of Pollution Act 1974, carrying out all work in such a manner as to reduce any disturbance from noise to a minimum.
- Identification and use of low noise techniques. For example, equipment that breaks concrete by munching or similar, rather than by percussion. Where construction plant is known to

generate significant levels of noise then it is to be used sparingly and the construction activity closely monitored to minimise noise levels.

- All plant brought on to Site should comply with the relevant EC / UK noise limits applicable to that equipment. Plant should be properly maintained and operated in accordance with manufacturers' recommendations.
- Where feasible, all stationary plant should be located so that the noise at all occupied SRs is minimised and, if practicable, every item of static plant when in operation should be sound attenuated using methods based on the guidance and advice given in BS 5228 (e.g. local screening).
- Items of plant on the Site operating intermittently should be shut down in the intervening periods between use.
- The use of tower cranes for vertical transportation to reduce noise and vibration.
- Adoption of a noise monitoring regime and the establishment of noise Action Levels in consultation with SC, above which consideration will be given to the use of alternative techniques and / or other means of controlling noise levels.
- Use of hoarding to the required height and density appropriate to the noise sensitivity of the area.
- Implementation of a Construction Logistics Plan (CLP) to pre-plan and manage traffic associated with the works to minimise disturbance to SRs.

8.72 Accounting for the implementation of mitigation, as outlined above, **Table 8.20** summarises the predicted mitigated Works noise levels with the significance of these presented in **Table 8.21**. It should be noted that when works are being undertaken in close proximity to SRC and SRD, then it is assumed that deconstruction will be adopted rather than normal demolition methods where appropriate and practical and that enhanced mitigation such as provision of localised screening will be employed when works are being undertaken in close proximity to all SRs, affording up to 15dB attenuation for earthworks, CFA piling and concreting operations.

Table 8-20: Predicted Mitigated[2] Noise Levels dB L_{Aeq} during the Works

SR	Location	Threshold dB	Demolition	Earth-Works	CFA Piling	Concreting	Pavement
A	4-6 London Bridge Street	70	44	36	36	37	31
B	Shard Place	70	65	57	57	58	52
C	Guy's Hospital including Chapel	70	70-75	68	68	69	63
D	Bunch of Grapes	70	70-75	68	68	69	63
E	The Old King's Head	65	55	47	47	48	42
F	Iris Brook House / Orchard Lisle House	65	74	66	66	67	61
G	Guy's Hospital Courtyard	65	39	31	31	32	26
H	Iris Brook House Courtyard	65	39	31	31	32	26
I	Guy's Hospital Forecourt	66	40	32	32	33	27
J	43 Borough High Street	65	55	47	47	48	42

Note: [1]Assumed that deconstruction methods are employed thereby affording attenuation to ensure short term noise level of 75dB $L_{Aeq,15\ minutes}$ is not exceeded together with 70dB $L_{Aeq,10\ hr}$. [2] Enhanced mitigation affording 15dB attenuation when compared to unmitigated noise levels when works undertaken proximate (within 15 metres) to SR. [3] Standard demolition techniques being used adjacent to SRF, and so a short-term exceedance of SC criteria is expected

Table 8-21: Significance of Mitigated Demolition and Construction Noise Effects

SR	Location	Demolition	Earth-Works	CFA Piling	Concreting	Pavement
A	4-6 London Bridge Street	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
B	Shard Place	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
C	Guy's Hospital including Chapel	Moderate Adverse	Insignificant	Insignificant	Minor Adverse	Insignificant
D	Bunch of Grapes	Moderate Adverse	Insignificant	Insignificant	Minor Adverse	Insignificant
E	The Old King's Head	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
F	Iris Brook House / Orchard Lisle House	Moderate Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Insignificant
G	Guy's Hospital Courtyard	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
H	Iris Brook House Courtyard	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
I	Guy's Hospital Forecourt	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
J	43 Borough High Street	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant

8.73 Based on the implementation of mitigation measures as detailed above, the likely residual effects from construction noise are assessed as **insignificant** at all SRs apart from SRC, SRD & SRF. This conclusion is predicated on the basis that all on-Site plant activities operate simultaneously at the shortest distance to the SR, a situation which in practice is seldom likely to occur. This assessment therefore represents a worst-case scenario. As such, for the majority of the construction phase potential impacts will be **insignificant** to, at worst, a **temporary local adverse** effect of **moderate significance**.

Works Vibration

8.74 With regards to the potential effects of construction generated vibration on SRs, agreed vibration limits will be set to ensure compliance with national standards and, hence, minimise the risk of complaints or building damage. These limits will be controlled through the implementation of a SEMP and planning conditions as required. Consequently, residual vibration levels are anticipated to be reduced to a level that is **insignificant.**

8.75 With regards to the potential effects of construction generated vibration on listed buildings, utilities and the Jubilee Line as previously described, the potential for damage to listed structures and rail infrastructure is considered to be **insignificant** where distance of works is ≥10 metres from the receptor. However, where listed structures and rail assets are located within 10 metres of piling or breaking up of concrete slabs mitigation including the use of low vibration generating techniques should be considered to ensure vibration levels at these locations do not exceed 10mm/s.

8.76 Monitoring of vibration should also be undertaken, where necessary, to ensure vibration levels at these receptors do not exceed 10mm/s when piling works are being undertaken within 10m. Given this level is not exceeded, effects are expected to be **insignificant.**

Works Traffic Noise

8.77 Although **insignificant** effects are predicted to arise from construction related traffic noise, due to the small percentage increase in base flows, a Construction Logistics Plan (CLP) will be implemented. The CLP will pre-plan and manage traffic associated with the Works as far as practically possible to minimise any potential disturbance to local-residents and businesses from noise associated with road-going vehicles, including haulage vehicles.

8.78 Following the application of the principle of BPMs and implementation of a Site-specific CLP, the likely residual effects from construction traffic are expected to remain **insignificant**.

Completed Development

Building Services Plant Noise

8.79 Mitigation for building services plant may include the following measures:

- procurement of ‘quiet’ non-tonal plant;
- locating plant and air vents away from SRs;
- use of acoustic enclosures;
- use of in-duct attenuators; and
- use of acoustic louvres.

8.80 Provided appropriate mitigation measures are implemented to achieve the recommended noise limits set out in **Table 8.15** either through specification of plant and / or the use of the above attenuation measures, the likely residual noise effects of building services plant associated with the Development are likely to be **insignificant.**

Commercial Uses and Servicing Noise

8.81 During the detailed design stages of the Development, the sound insulation performance requirements of the external building fabric will be appropriately specified to control noise break-out, having regard to the nature of future uses. Noise from commercial uses will be subject to standard controls that could be secured through planning conditions. The likely residual noise effects associated with commercial uses of the Development on existing and future sensitive receptors are expected to be **insignificant**.

8.82 Despite predicted potential impacts arising from servicing and delivery being insignificant, a Delivery, Servicing and Waste Plan (DSWP) is proposed to be implemented to manage the arrival and departure of delivery and servicing vehicles and their activities when on-site. It will assist in mitigating noise emissions from this source. This may include:

- managing the deliveries (including by courier) and servicing requirements of retail, office and leisure tenants;
- hours of operation of the for any servicing areas and loading bays; and
- refuse and recycling collections.

8.83 With the implementation of the DSWMP, the likely residual effects of noise from the servicing and deliveries within the Development will be **insignificant**.

Environmental Vibration

8.84 Based on results of the vibration survey and subsequent predictions of VDV and structure-borne noise, the indication is that mitigation is not required for the Development.

Summary

8.85 **Table 8.22** presents a summary of the likely significant effect resultant from the Development together with proposed mitigation and likely residual effects.

Table 8-22: Summary of Likely Significant Effects, Mitigation Measures and Likely Residual Effects

Issue		Likely Significant Effect	Mitigation Measures	Likely Residual Effect
The Works				
Noise	*SR A*	**Insignificant**	Adoption of BPM mitigation measures which will be outlined in the SEMP as well as noise and vibration limits. The SEMP is expected to be secured by planning condition. Monitoring of Site vibration levels when piling within 10m of listed buildings, utilities or LUL lines.	**Insignificant**
	SR B	**Local, temporary, short to medium term effects of minor to major adverse significant**		**Insignificant**
	SR C	**Local, temporary, short to medium term effects of major adverse significant**		**Insignificant to Local, temporary, short to medium term effects of moderate adverse significance**
	SR D	**Local, temporary, short to medium term effects of major adverse significant**		**Insignificant to Local, temporary, short to medium term effects of moderate adverse significance**
	SR E	**Insignificant, except during demolition where local, temporary, short to medium-term effects of moderate adverse significance**		**Insignificant**
	SR F	**Local, temporary, short to medium term effects**		**Insignificant to local, temporary, short to medium**

Issue		Likely Significant Effect	Mitigation Measures	Likely Residual Effect
		of major adverse significant		**term effects of moderate adverse significance**
	SR G	**Insignificant**		**Insignificant**
	SR H	**Insignificant**		**Insignificant**
	SR I	**Insignificant**		**Insignificant**
	SR J	**Insignificant**		**Insignificant**
Vibration		**Insignificant to local, temporary, short to medium term effects of minor adverse significant**		**Insignificant**
Traffic Noise		**Insignificant**	Adoption of a CLP	**Insignificant**
Completed and Operational Development				
Building Services Plant Noise		**Insignificant**	Plant noise limit secured through planning condition.	**Insignificant**
Commercial Uses and Servicing Noise		**Insignificant**	Building envelope and Delivery, Servicing and Waste Plan (DSWP)	**Insignificant**

Monitoring

8.86 Monitoring of Site of vibration should be undertaken when piling works are being carried out within 10m of Listed Buildings, utilities and LUL lines. Monitoring will ensure vibration at these assets does not exceed 10mm/s.

8.87 The Development will be subject to a SEMP which is anticipated to be secured by means of a planning condition. The SEMP, which will be agreed prior to the commencement of the work with SC, will include a requirement for ongoing noise and vibration monitoring during the works.

8.88 It is anticipated that there will be a planning condition which states the plant noise limits and requires monitoring to ensure these limits are adhered to.

8.89 As stated in Chapter 7: Transportation and Access, monitoring will be undertaken of the delivery and servicing vehicles in terms of arrival profile and dwell times.

References

1 British Standard (BS) 5228:1 (2014) +A1 2014: Code of practice for noise and vibration control on construction and open sites, Part one: Noise, BSI, Great Britain

2 British Standard (BS) 5228:2, 2009. Code of practice for noise and vibration control on construction and open sites, Part Two: Vibration, BSI, Great Britain.

3 Department of Transport (1988) Calculation of Road Traffic Noise, HMSO

4 British Standard (BS) (2014) BS414 'Methods for rating and assessing industrial and commercial sound. BSI. Great Britain.

5 Nosie Advisory Council, 1978, '*A Guide to the Measurement and Prediction of the Equivalent Continuous Sound Level Leq*'

6 LBS. (2016) Technical Guidance for Demolition and Construction Guidance document for all developers and contractors undertaking works in the Borough. LBS.

7 LBS. (2017) London Borough of Southwark Technical Guidance for Noise. LBS.

8 British Standard (BS) 4142 (2014): Methods for rating and assessing industrial and commercial sound', BSI, Great Britain.

9 LBS (2017) Technical Guidance for Noise. LBS

10 Rupert Taylor (2012) Association of Noise Consultants Guidelines: Measurement and assessment of ground borne noise and vibration. ANC.

11 Paul Nelson (1987) Transportation Noise Reference Book. Butterworth-Heinemann Ltd

Waterman

9. Air Quality

Introduction

9.1 This chapter, which was prepared by Waterman Infrastructure & Environment (Waterman IE), presents an assessment of the likely air quality effects of the Development. Information on the heating and energy centre during the operation of the completed Development have been provided by Chapman BDSP (the project's building services engineer).

9.2 This chapter provides a description of the assessment methodology, a description of the relevant baseline conditions of the Site and surrounding area and an assessment of the likely significant effects of the Development, that could arise during demolition, deconstruction, refurbishment and construction (the 'Works') and once the Development is completed and operational. Where appropriate, mitigation measures are identified to avoid, reduce or offset adverse effects and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are also described.

9.3 The Development would not provide car parking, except for two blue badge spaces. The increase in commercial floor space would result in an additional 99 servicing vehicles per day, 77 of which would be Light Goods Vehicles/cars and 22 would be Heavy Goods Vehicles (HGVs). Additionally, no sensitive (residential) uses are proposed within the Development. Therefore, as agreed with Southwark Council's (SC) Environmental Health Department (see **Appendix 9.1**), the effects on local air quality from traffic movements generated from the completed Development have not been assessed.

9.4 This chapter is accompanied by the following appendices, presented in **ES Part 4**:

- **Appendix 9.1**: Correspondence with Southwark Council;
- **Appendix 9.2**: Air Quality Assessment Detailed Methodology;
- **Appendix 9.3**: Air Quality Modelling Results; and
- **Appendix 9.4**: Air Quality Neutral Assessment.

9.5 Please note that for the purposes of this ES Chapter, the demolition, deconstruction, refurbishment and construction works will be referred to as the 'the Works'. Where required, specific reference to the deconstruction and refurbishment works will be made.

Assessment Methodology and Significance Criteria

Assessment Methodology

Consultation

9.6 As well as the EIA Scoping Report (submitted in August 2018) and EIA Scoping Opinion (dated 4 October 2018) (described in **Chapter 2: EIA Methodology**), consultation was undertaken with the Environmental Health Department at SC to confirm the methodology to be used within the air quality assessment (see **Appendix 9.1**).

Establishing Baseline Conditions

9.7 To establish baseline conditions at and around the Site, information has been taken from a review of SC's Air Quality Updating and Screening Assessment and Progress Reports, published as part of the Local Air Quality Management (LAQM) regime. It was agreed with the Principal Enforcement Officer within the Environmental Health Department at SC that site specific diffusion tube baseline NO_2 monitoring was not required.

Assessment of Likely Significant Air Quality Effects

9.8 This section of this chapter outlines the methodology used to assess the likely significant air quality effects arising from the Works and the completed and operational Development.

9.9 This air quality assessment has been undertaken using a variety of information and procedures, and professional judgement, as follows:

- review of the local area to identify potentially sensitive receptor locations that could be affected by changes in air quality due to the Development;
- review and use of relevant heating and energy plant data from the Applicant's building services engineer (Chapman BDSP);
- application of atmospheric dispersion modelling using the ADMS™ model to predict the likely pollutant concentrations at the Site and the effects of the Development on local air quality due to the additional emissions that would be generated by the proposed energy and heating plant when operational;
- comparison of the predicted air pollutant concentrations with the relevant Air Quality Strategy (AQS) objectives;
- determination of the effects of the operational phase of the Development on air quality, based on the application of the Environmental Protection UK and Institute of Air Quality Management significance criteria to modelled results;
- qualitative assessment of the likely effects of the proposed activities during the Works;
- an Air Quality Neutral Assessment has been completed which compares the Development against the relevant building emissions benchmarks to determine whether the Development is Air Quality Neutral. This concludes the Development would be Air Quality Neutral and that no further mitigation measures are required. Details are provided in **Appendix 9.4**; and
- identification of mitigation measures, where appropriate.

9.10 The Environmental Protection UK and Institute of Air Quality Management (EPUK/IAQM) Planning Development Guidance[1] sets out criteria for when an air quality assessment is required to accompany a planning development. The EPUK/IAQM guidance states an air quality assessment is required if there is a change of more than 100 Light Duty Vehicles (LDV's) or 25 Heavy Duty Vehicles (HDV's) in Annual Average Daily Traffic (AADT) for developments within or adjacent to an AQMA. The Development would result in a change of less than 100 LDV's and 25 HDV's, which is below the EPUK/IAQM criteria. The Development is therefore not expected to give rise to air quality impacts from road traffic emissions, and road traffic emissions have not been considered further.

The Works

Dust Emissions

9.11 In line with the Mayor of London Control of Dust and Emissions Supplementary Planning Guidance (SPG)[2], the assessment of the effects of the activities undertaken during the Works in relation to dust has been based on the IAQM's Guidance on the Assessment of Dust from Demolition and Construction[3] and the following:

- Consideration of planned construction activities and their phasing; and
- A review of the sensitive uses in the area immediately surrounding the Site in relation to their distance from the Site.

9.12 The SPG identifies receptors within 350m of the Site boundary, and within 50m of construction routes would be sensitive to emissions and nuisance dust from construction activities. **Figure 9.1** shows the area surrounding the Site where sensitive receptors could be affected. For clarification, **Table 9.3** presents the location of individual sensitive receptors assessed for the operational phase of the Development.

9.13 Following the SPG, construction activities can be divided into the following four distinct activities:

- Demolition - any activity involved in the removal of an existing building, including any deconstruction;
- Earthworks – the excavation, haulage, tipping and stockpiling of material, but may also involve levelling the site and landscaping;
- Construction – any activity involved with the provision of a new structure; and
- Trackout – the movement of vehicles from unpaved ground on a site, where they can accumulate mud and dirt, onto the public road network where dust might be deposited.

9.14 The SPG considers three separate dust effects, within proximity of sensitive receptors being taken into consideration for:

- annoyance due to dust soiling;
- potential effects on human health due to significant increase in exposure to PM_{10}; and
- harm to ecological receptors.

9.15 In accordance with the SPG, to determine the risk of the Works phase, the following four step process, as set out in **Table 9.1**, has been undertaken.

Table 9.1: Summary of the Guidance for Undertaking a Construction Dust Assessment

Step		Description
1.	Screen the Need for a Detailed Assessment	Simple distance based criteria are used to determine the requirement for a detailed dust assessment. An assessment would normally be required where there are 'human receptors' within 50m of the boundary of the site and / or within 50m of the route(s) used by construction vehicles on public highway, up to 350m from the site entrance or 'ecological receptors' within 50m of the boundary of the site and/or within 50m of the route(s) used by construction vehicles on public highway, up to 500m from the site entrance.

Step		Description
2.	Assess the Risk of Dust Impacts	The risk of dust arising in sufficient quantities to cause annoyance and/or health or ecological effects should be determined using four risk categories: insignificant, low, medium and high based on the following factors: • the scale and nature of the works, which determines the risk of dust arising (i.e. the magnitude of potential dust emissions) classed as small, medium or large; and • the sensitivity of the area to dust effects, considered separately for ecological and human receptors (i.e. the potential for effects) defined as low, medium or high.
	a. Define the potential Dust Emission Magnitude	Classify the magnitude of the likely risk as small, medium or large for the four activities.
	b. Define the Sensitivity of the Areas	Define the sensitivity of receptors as High, Medium or Low. Define sensitivity of people to Dust Soiling Effects and define the sensitivities of people to the health effects of PM10.
	c. Define the Risk of Impacts	Combine the magnitude (as detailed in 2a) and the sensitivity (in 2b) to determine the risk of impacts with no mitigation applied. Summarise the risk of dusts impacts for the four activities in a table

9.16 Following the above air quality dust risk assessment, appropriate dust and pollution measures are provided to ensure the air quality impacts of construction are minimised and any mitigation measures employed are effective.

9.17 The potential impacts and effects of construction activities on local air quality were based on professional judgement and reference to the criteria set out in the SPG. This includes an assessment of the risk of dust effects arising from the likely construction activities, based on the magnitude of potential dust emissions and the sensitivity of the area.

Construction Vehicle Exhaust Emissions

9.18 The IAQM guidance on assessing construction effects states that:

"Experience of assessing the exhaust emissions from on-site plant and site traffic suggests that they are unlikely to make a significant effect on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed."

9.19 The Applicant's construction advisors have stated the peak daily number of Heavy Goods Vehicles (HGVs) trips during construction are likely to be 28 but could be 44 during excavation and piling. However, this would be temporary, and the average number of construction vehicles would be significantly less. As such, in line with the EPUK/IAQM guidance, it is considered that a quantitative assessment of the exhaust emissions from construction traffic is not required, and a qualitative assessment is appropriate.

Construction Plant Emissions

9.20 In accordance with Part 7 of the Mayor of London Control of Dust and Emissions SPG, all construction plant would need to adhere to the emissions standards for NO_2 and PM_{10} set out for

Non-Road Mobile Machinery (NRMM). As such, in line with the IAQM guidance on assessing construction effects, it is considered that an assessment is not required.

Completed and Operational Development

9.21 The likely effects on local air quality from heating and energy plant emissions generated from the completed and operational Development were assessed using the atmospheric dispersion model ADMS. **Appendix 9.2** presents the details of the air quality modelling.

9.22 The ADMS model predicts how emissions from stack sources combine with local background pollution levels (including vehicle emissions), taking account of meteorological conditions, to affect local air quality. The modelling was carried out for the year 2017, considered to represent a worst-case assessment scenario, as current guidance suggests that there is a progressive reduction in background concentrations for future years associated with technological advances in vehicle emissions.

9.23 Data relating to the proposed heating plant for the Development were provided by the Applicant's Building Services Engineers (Chapman BDSP). As described in **Appendix 9.2**, the proposed heating plant includes five 665kW gas-fired boilers, and two 124kw gas fired water heaters. The boilers specified meet the emission standard of <40mg/kWh as specified in the Greater London Authority, 'Sustainable Design and Construction - Supplementary Planning Guidance'[4].

9.24 The main pollutants of concern from the combustion of natural gas are oxides of nitrogen (NO_x), which consist of nitric oxides (NO) and nitrogen dioxide (NO_2). Particulate matter (PM) emissions due to the combustion of natural gas are typically insignificant and have therefore not been considered further.

9.25 Of the NO_x emissions, it is NO_2 that is the main pollutant of concern due to its adverse effects on human health. Typically, the proportion of NO_2 in NO_x exhaust emissions from boilers is small, as NO_x is mostly emitted as NO. However, once released in the atmosphere, additional NO_2 is formed due to chemical reactions between emitted NO and atmospheric ozone (O_3). This assessment, therefore, focuses on NO_2.

Pollutant Concentrations

9.26 To estimate the total concentrations due to the contribution of any other nearby sources of pollution, the nearest diffusion tube monitor to the Site (SDT81 on Borough High Street) has been used to establish background pollutant concentrations and traffic emissions. Full details of the background pollution data used within the air quality assessment are included in **Appendix 9.2.**

UK Air Quality Strategy Objectives

9.27 Air pollutants at high concentrations can give rise to adverse effects on the health of humans and ecosystems. European Union (EU) legislation on air quality forms the basis for UK legislation and policy on air quality. The EU Framework Directive[5] on ambient air quality assessment and management came into force in May 2008 and was implemented by Member States, including the UK, by June 2010[6]. The Directive aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

9.28 The current UK AQS, which was published in July 2007, sets out objectives for local authorities in undertaking their Local Air Quality Management (LAQM) duties. The UK AQS objectives in relation to air pollutants relevant to this assessment are summarised in **Table 9.2**.

Table 9.2: National Air Quality Strategy Objectives

Pollutant	Objective		Date by Which Objective is to be Met
	Concentration	Measured As	
Nitrogen Dioxide (NO_2)	200µg/m^3	1-hour mean not to be exceeded more than 18 times per year	31/12/2005
	40µg/m^3	Annual Mean	31/12/2005

Potentially Sensitive Receptors

9.29 The approach adopted by the UK AQS is to focus on locations at, and close to, ground level where members of the public (in a non-workplace area) are likely to be exposed over the averaging time of the objective in question (i.e. over 1-hour, 24-hour or annual periods). Objective exceedances principally relate to the annual mean NO_2 and concentrations, so that associated potentially sensitive locations relate mainly to residential properties and other sensitive locations (such as schools) where the public may be exposed for prolonged periods.

9.30 **Table 9.3** presents existing (R) and proposed (P) sensitive receptors selected due to their proximity to the location of the proposed heating plant flues. The locations of the selected receptors assessed are presented in **Figure 9.2**.

Table 9.3: Selected Receptor Locations

Receptor		Classification	Grid Reference	Height Above Ground (m)	Distance and Direction from Stack
ID	Address				
R1	Orchard Lisle House	Student	532749, 180109	20	30m South
R2	Orchard Lisle House	Student	532708, 180105	20	50m South
R3	St. Thomas Street	Student	532760, 180097	20.4	40m South
R4	Boland House	Student	532821, 180095	18.4	85m Southeast
R5	Guy's Hospital	Hospital	532857, 180054	124	135m Southeast
R6	The Shard	Residential	532863, 180114	310	115m East
R7	Nuffield House	Residential	532724, 179952	22.5	190m South
R8	26 Park Street	Residential	532472, 180261	11.6	280m West
R9	21 Park Street	Residential	532475, 180218	14.4	265m West
R10	31-41 Park Street	Residential	532446, 180288	9.1	315m West
R11	St. Thomas Church	Residential	532748,180184	28.3	15m North
R12	2 St. Thomas Street	Residential	532714,180174	21.6	5m West

Receptor		Classification	Grid Reference	Height Above Ground (m)	Distance and Direction from Stack
ID	Address				
P1^	Proposed: West Tower	Office	532717, 180152	137.7	-
P2^	Georgian Terrace	Office	532733, 180162	21.6	-

Note: The heights presented in Table 9.3 are taken from Promap (www.promap.co.uk) and represent the roof level of the buildings, the closest point to the heating plant emissions. The floor heights of the receptors in Table 9.3 are modelled at 3m intervals

Significance Criteria

The Works

Dust Emissions

9.31 The potential effects of construction activities on local air quality were based on professional judgement and with reference to the criteria in the Mayor of London Control of Dust and Emissions (SPG) set out in **Appendix 9.2**. Details of the assessor's experience and competence to undertake the dust assessment is provided in **Appendix 9.2**.

9.32 The assessment of the risk of dust effects arising from each of the construction activities as part of the Works, as identified by the SPG, is based on the magnitude of potential dust emission and the sensitivity of the area. The risk category matrix for each of the construction activity types, taken from the criteria set out in the SPG, are presented in **Table 9.4** to **Table 9.7**. Examples of the magnitude of potential dust emissions for each construction activity and factors defining the sensitivity of an area are provided in **Appendix 9.2**.

Table 9.4: Risk Category from Demolition Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Insignificant

Table 9.5: Risk Category from Earthworks Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Insignificant

Table 9.6: Risk Category from Construction Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Insignificant

Table 9.7: Risk Category from Trackout Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Insignificant
Low	Low Risk	Low Risk	Insignificant

9.33 The risk category determined for each of the construction activity types is used to define the appropriate and Site-specific mitigation measures that should be applied. The IAQM guidance recommends that significance is only assigned to the effect after considering mitigation because it assumes that all actions to avoid or reduce the environmental effects are an inherent part of the Development, and that, in the case of demolition / construction, mitigation measures (secured through planning conditions, legal requirements or required by regulations) would ensure that likely significant adverse residual effects would not occur.

9.34 However, to maintain consistency with the structure of this EIA and ES, as outlined in **Chapter 2: EIA Methodology**, pre-mitigation significance criteria as outlined in **Table 9.8** have been applied which are based on professional judgement.

Table 9.8: Pre-Mitigation Significance Criteria for the Works

Significance Criteria	Definition
Adverse effect of major significance	Receptor is less than 20m from an active construction or demolition site.
Adverse effect of moderate significance	Receptor is 20m to 100m from an active construction or demolition site.
Adverse effect of minor significance	Receptor is between 100m and 350m from an active construction or demolition site.
Insignificant	Receptor is over 350m from an active construction or demolition site.

9.35 IAQM outlines that experience of implementing mitigation measures for construction activities demonstrates that total mitigation is normally possible such that residual effects would not be 'significant'. Therefore, it follows that, within this assessment, no post-mitigation matrix of significance criteria are provided for the likely residual effects of the Works.

Construction Vehicle Exhaust Emissions

9.36 The significance of the effects from construction vehicle exhaust emissions on air quality were based on the EPUK / IAQM methodology described below under the Completed and Operational Development methodology below.

Construction Plant Emissions

9.37 The significance of the effects from construction plant emissions on air quality is also based on professional judgement, because all construction plant is required to meet the NRMM emissions standards for NO_2 and PM_{10} as set out in Part 7 of the Mayor of London Control of Dust and Emissions SPG.

Completed and Operational Development

9.38 The EPUK / IAQM guidance provides an approach to assigning the magnitude of changes because of a development as a proportion of a relevant assessment level, followed by examining this change in the context of the new total concentration and its relationship with the assessment criterion to provide a description of the impact at selected receptor locations.

9.39 **Table 9.9** presents the IAQM framework for describing the impacts (the change in concentration of an air pollutant) at individual receptors. The term Air Quality Assessment Level (AQAL) is used to include air quality objectives or limit values, where these exist.

Table 9.9: Impact Descriptors for Individual Receptors for Annual Mean Objective

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Insignificant	Insignificant	Minor	Moderate
76-94% of AQAL	Insignificant	Minor	Moderate	Moderate
95-102% of AQAL	Minor	Moderate	Moderate	Major
103-109% of AQAL	Moderate	Moderate	Major	Major
110% or more of AQAL	Moderate	Major	Major	Major

Note: AQAL may be an air quality objective, EU limit value, or an Environment Agency ‘Environmental Assessment Level (EAL)’
The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers. Changes of 0% (i.e. less than 0.5%) are described as Insignificant.
The table is only to be used with annual mean concentrations

9.40 For the determination of the short-term impact, the EPUK / IAQM guidance considers that the threshold criterion, as used by the Environment Agency, of 10% of the short term AQAL (200µg/m^3) is a reasonable value to take for defining an impact that is sufficiently small in magnitude to be regarded as having an insignificant effect. The criteria in **Table 9.10** have been used to describe the impact on the short-term concentrations.

Table 9.10: Impact Descriptors for Individual Receptors of the Short-Term Objective

% Change in concentration relative to Air Quality Assessment Level (AQAL)			
≤10	11-20	21-50	≥51
Insignificant	Minor	Moderate	Major

9.41 The approach set out in the EPUK / IAQM Guidance provides a method for describing the impact magnitude at individual receptors only. The Guidance outlines that this change may have an effect on the receptor depending on the severity if the impact and other factors that may need to be considered. The assessment framework for describing impacts can be used as a starting point to make a judgement on significance of effect. However, whilst there may be 'slight', 'moderate' or 'substantial' impacts described at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances.

9.42 Following the approach to assessing significance outlined in the EPUK / IAQM Guidance, the significance of likely residual effects of the completed Development on air quality has been established through professional judgement and the consideration of the following factors:

- the geographical extent (local, district or regional) of effects;
- their duration (temporary or long term);
- their reversibility (reversible or permanent);
- the magnitude of changes in pollution concentrations;
- the exceedance of standards (e.g. AQS objectives); and
- changes in pollutant exposure.

Limitations and Assumptions

9.43 For the purposes of the assessment of dust nuisance during the Works it has been assumed that the works would be carried out at the boundary of the Site to provide a worst-case assessment.

9.44 Currently there is no methodology to assess and determine the impact of a development against the EU Limit Values. In addition, compliance with the EU Limit Values is the UK Government's responsibility given that national measures (such as vehicle scrappage schemes and increased diesel fuel prices) would be required to meet compliance. As such the effect of the Development has been assessed against the UK AQS objectives rather than the EU Limit Values. To demonstrate that the Development would have a positive influence on air quality, a summary of measures which are likely to lead to a benefit to air quality have been outlined.

9.45 There is no standard or recognised methodology to predict the reduction in pollutant concentrations from all air quality mitigation measures or measures likely to have a positive impact on local air quality (such as cycle spaces, electric charging points, sustainable transport options, green infrastructure etc) as these measures are either based on holistic behavioural changes and/or there is a lack of real-world quantifiable data (in $\mu g/m^3$). However, the mitigation measure and measures to benefit air quality proposed as part of the Development are consistent with those identified by SC in their Air Quality Action Plan (discussed below) and Defra's Air Quality Plan[7]. As such the results presented in the assessment do not consider the potential reduction from these mitigation measures and are therefore considered to be worst-case.

Baseline Conditions

London Borough of Southwark's Review and Assessment of Existing Air Quality

9.46 Because of work undertaken to date as part of their review and assessment of air quality process, SC has declared the entire northern part of its Borough, from the A205 north to the boundary with the River Thames, as an Air Quality Management Area (AQMA)[1] for both annual mean NO_2 and 24-hour mean PM_{10} which are attributable to road traffic emissions. The Site is located within this AQMA.

London Borough of Southwark's Local Air Quality Monitoring

9.47 SC currently undertakes monitoring of NO_2 and PM_{10} at one roadside location and one urban background location within the Borough using automatic monitors. NO_2 is also measured at 45 locations by SC using diffusion tubes. The nearest monitor to the Site is the kerbside diffusion tube on Borough High Street (ID – SDT81), located approximately 0.08km from the Site. The 2017 mean monitored NO_2 concentration at the SDT18 Borough High Street diffusion tube was 82.3µg/m^3, indicating the annual mean NO_2 objective of 40µg/m^3 was exceeded at the diffusion tube closest to the Site in 2017.

Assessment of Likely Significant Effects

The Works

Nuisance Dust

9.48 The following construction dust assessment follows the methodology set out in **Table 9.1**.

Step 1- Site Evaluation / Screen the Need

9.49 The nearest sensitive receptors are residential properties on Borough High Street and student accommodation at White Hart Yard, located within 20m of the Site boundary. There are also residential and commercial receptors located further afield and Guy's Hospital is located approximately 100m to the east of the Site boundary. Therefore, in accordance with **Table 9.1** the assessment would proceed to detailed assessment. There are no ecological receptors within 50m of the Site boundary or the routes used by construction vehicles, therefore ecological effects have not been considered further.

Step 2 - Potential Dust Emission Magnitude

9.50 The risk of dust impacts from the Works phase has been considered based upon the magnitude of works as detailed in **Table A1** in **Appendix 9.2**. This includes:

- Demolition and deconstruction – It is estimated the total volume of building to be demolished would be between 20,000m^3 and 50,000m^3. Based on this and considering the criteria in **Table A1** in **Appendix 9.2**, the potential dust emissions during demolition activities would be of medium magnitude.
- Earthworks – **ES Chapter 6** states an approximate total of 13,450m^3 of excavated material is expected to be removed from the Site. Based on this and considering the criteria in **Table A1**

[1] AQMA's are declared if a local authority finds any places where the national air quality objectives are not likely to be achieved

in **Appendix 9.2**, the potential dust emissions during earthworks activities would be of large magnitude.

- Construction– the total volume of building to be constructed is greater than 100,000m^3. Based on the criteria in **Table A1** in **Appendix 9.2**, the potential dust emissions during construction activities would be of large magnitude.
- Trackout – Gardiner & Theobald estimated the number of HGV trips during the construction period would peak at 22 outward daily trips. Based on this and considering the criteria in **Table A1** in **Appendix 9.2**, the potential for dust emissions due to trackout activities would be of medium magnitude.

9.51 A summary of the potential dust emission magnitude is presented in **Table 9.11**.

Table 9.11: Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Medium
Earthworks	Large
Construction	Large
Trackout	Medium

Step 3 - Sensitivity of the Area

9.52 In accordance with the Mayor of London Control of Dust and Emissions SPG (paragraph 4.36 of the SPG, Step 2B: Define the Sensitivity of the Area), the sensitivity of the area has taken account of the following factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- the local background PM_{10} concentration; and
- Site-specific factors, such as whether there are trees or other vegetation to reduce the risk of wind-blown dust.

Step 4- Sensitivity of the Area to Dust and Soiling Effects on People and Property

9.53 As discussed above, the nearest sensitive receptors are residential properties located within 20m of the Site boundary. Based on **Table A3** in **Appendix 9.2**, given that there are 10-100 high sensitivity receptors within 50m, it is considered the area would be of medium sensitivity to dust and soiling effects on people and property.

9.54 The summary of the sensitivity of people to dust and soiling effects is detailed in **Table 9.12**.

Table 9.12: Sensitivity of the Area to Dust and Soiling Effects on People and Property

Activity	Sensitivity of Area to Dust and Soiling Effects
Demolition	Medium
Earthworks	Medium

Activity	Sensitivity of Area to Dust and Soiling Effects
Construction	Medium
Trackout	Medium

Step 5 - Sensitivity of the Area to Human Health Impacts

9.55 As shown in **Table A8** of **Appendix 9.2**, the annual mean PM_{10} concentration at the Old Kent Road monitor, the closest monitoring location to the Site, was 22.0µg/m^3 in 2017. This is below the annual mean AQS objective for PM_{10} of 40ug/m^3.

9.56 Based on **Table A4** in **Appendix 9.2**, given that there are estimated to be 10-100 receptors within 50m and that PM_{10} concentrations are 22ug/m^3, it is considered the area is of low sensitivity to human health impacts.

9.57 The summary of the sensitivity of people to the health effects of particulate matter is detailed in **Table 9.13** below.

Table 9.13: Sensitivity of the Area to Human Health Effects

Activity	Sensitivity of Area to Human Health Effects
Demolition and deconstruction	Low
Earthworks	Low
Construction and refurbishment	Low
Trackout	Low

Step 6 - Risk of Impacts

9.58 Based on the dust emissions magnitude as set out in **Table 9.11** and taking account of the sensitivity of the area as detailed in **Tables 9.12** and **9.13**, the overall risk impacts have been identified and presented in **Table 9.14**. This is based on the matrices set out in **Tables 9.4** to **9.7**. The predicted risks are prior to, and do not take account of, mitigation applied.

Table 9.14: Summary of Risk

Potential Effect	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Medium Risk	Medium Risk	Low Risk
Human Health	Low Risk	Low Risk	Low Risk	Low Risk

9.59 As outlined in **Table 9.14**, the Site is a **medium risk** site, due to dust soiling effects. Therefore, Site specific mitigation measures would be required to ensure that there are no adverse effects from the Works. However, based on the criteria in **Table 9.8**, in the absence of mitigation, the worst-case nuisance dust from the Works would give rise to:

- short-term, local effects of major adverse significance at receptors within 20m from the Site boundary;

- short-term, local effects of moderate adverse significance at receptors between 20m and 100m of the Site boundary;
- short-term, local effects of minor adverse significance at receptors between 100m and 350m of the Site boundary; and
- insignificant effects at receptors over 350m from the Site boundary.

Construction Vehicle Exhaust Emissions

9.60 Emissions from construction traffic (44 HGVs peak daily) would be relatively small compared to existing road traffic emissions on St. Thomas Street (6,874 daily vehicles including 8.2% HDVs) and on Borough High Street (25,930 daily vehicles including 14.9% HDVs)[8]. Therefore the likely effect of construction vehicles entering and egressing the Site on air quality would be **insignificant** during the Works.

Construction Plant Emissions

9.61 In accordance with Part 7 of the Mayor of London Control of Dust and Emissions SPG, all construction plant would need to adhere to the emissions standards for NO_2 and PM_{10} set out for NRMM. It is therefore considered the likely effect of construction plant on local air quality would be **insignificant**.

Completed and Operational Development

Annual Mean NO_2 Concentrations

9.62 The results of the dispersion modelling of emissions from the proposed heating plant are presented in **Table 9.15**. This presents the contribution from the proposed heating plant at each receptor location for annual mean concentrations.

Table 9.15: Results of the Detailed Air Quality Modelling at Sensitive Receptors - Annual Mean

ID	Receptor	Change in Annual Mean Concentration (µg/m^3)	% Change in Annual Mean Concentration relative to Air Quality Assessment Level (AQAL)	Long term average Concentration at receptor in assessment year[(a)]	Impact Descriptor
R1	Orchard Lisle House	0.04	0	>110%	Insignificant
R2	Orchard Lisle House	0.06	0	>110%	Insignificant
R3	St. Thomas Street	0.01	0	>110%	Insignificant
R4	Boland House	0.01	0	>110%	Insignificant
R5	Guy’s Hospital	0.05	0	>110%	Insignificant
R6	The Shard	0.22	0	>110%	Insignificant
R7	Nuffield House	0.01	0	>110%	Insignificant
R8	26 Park Street	0.00	0	>110%	Insignificant

ID	Receptor	Change in Annual Mean Concentration (µg/m^3)	% Change in Annual Mean Concentration relative to Air Quality Assessment Level (AQAL)	Long term average Concentration at receptor in assessment year[a]	Impact Descriptor
R9	21 Park Street	0.00	0	>110%	Insignificant
R10	31-41 Park Street	0.00	0	>110%	Insignificant
R11	St. Thomas Church	0.05	0	>110%	Insignificant
R12	2 St. Thomas Street	0.00	0	>110%	Insignificant

Note: [a] As a worst-case assumption concentrations are assumed to be similar to those presented in Table A9 i.e. >110% of the annual mean (i.e. >44µg/m^3) to calculate the Impact Descriptor as set out in Table 9.9

9.63 Using the impact descriptors outlined in **Table 9.9**, the Development is predicted by the model to result in an ‘insignificant’ impact at all 12 receptor locations.

9.64 However, the ‘major’ impact at Receptor 6 is considered unlikely, as it assumes the air quality concentrations at a height of 315m would be the same as they are at ground level and close to car exhaust emissions. In other words, the assessment does not take account of the improvement in air quality above the ground due to the dispersion of pollutants and dilution of traffic emissions. Additionally, the Shard includes sealed windows on all floors for safety purposes. Based on the severity of the impacts, the concentrations predicted at the sensitive receptors, the geographical extent of the impacts and that a worst-case assessment has been predicted (which considers roadside concentrations in the background and that concentrations would not decrease with height) it is considered (using professional judgement), that the overall effect of the Development on local air quality is **insignificant**.

1-Hour Mean NO_2 Concentrations

9.65 The results of the dispersion modelling of emissions from the proposed heating plant are presented in **Table 9.16**. This presents the contribution from the proposed heating plant at each receptor location for 1-hour mean concentrations. The predicted hourly mean NO_2 concentrations at other heights are presented in Table A2 and Table A4 of **Appendix 9.3**.

Table 9.16: Results of the Detailed Air Quality Modelling at Sensitive Receptors- 1-Hour Mean

ID	Without Development (µg/m^3)	With Development (µg/m^3)	Change (µg/m^3)	% Change in Annual Mean Concentration relative to Air Quality Assessment Level (AQAL)	Impact Descriptor
R1	164.6	165.1	0.5	0	Insignificant
R2	164.6	165.2	0.6	0	Insignificant
R3	164.6	164.9	0.3	0	Insignificant
R4	164.6	164.7	0.1	0	Insignificant
R5	164.6	165.0	0.4	0	Insignificant

ID	Without Development ($\mu g/m^3$)	With Development ($\mu g/m^3$)	Change ($\mu g/m^3$)	% Change in Annual Mean Concentration relative to Air Quality Assessment Level (AQAL)	Impact Descriptor
R6	164.6	168.2	3.6	2	Insignificant
R7	164.6	164.7	0.1	0	Insignificant
R8	164.6	164.6	0.0	0	Insignificant
R9	164.6	164.6	0.0	0	Insignificant
R10	164.6	164.6	0.0	0	Insignificant
R11	164.6	165.1	0.5	0	Insignificant
R12	164.6	164.8	0.2	0	Insignificant
P1	-	165.2	-	-	-
P2	-	165.1	-	-	-

9.66 Using the impact descriptors outlined in **Table 9.10**, the Development is predicted by the model to have a 'insignificant' impact at the all receptor locations. **Figure 9.3** shows the extent of the Development's impact on air quality at ground level. Using professional judgement and based on the severity of the impacts, the concentrations predicted at the sensitive receptors, the geographical extent of the impacts and that a worst-case assessment has been predicted (which considers roadside concentrations in the background and that concentrations would not decrease with height) it is considered that the overall effect of the Development on local air quality is **insignificant**.

Mitigation Measures and Likely Residual Effects

The Works

Nuisance Dust

9.67 An outline Construction Management Plan (CMP) has been submitted to support planning that commits the Main Contractor to dust mitigation measures. A Site Environmental Management Plan (SEMP) will be issued to any demolition or construction contractors and in line with best practice on construction sites a range of environmental management controls would be implemented. The controls, with reference to the IAQM guidance relating to medium risk sites, are set out in **Table 9.17**.

Table 9.17: Works Phase Mitigation Measures

Communications
Develop and implement a stakeholder communications plan that includes community engagement before work commences on Site.
Display the name and contact details of person(s) accountable for air quality and dust issues on the Site boundary. This may be the environment manager/engineer or the site manager.

Display the head or regional office contact information.
Dust Management
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by SC. The level of detail would depend on the risk and should include as a minimum the recommended measures as set out in this Table.
Site Management
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
Make the complaints log available to the local authority when asked.
Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.
Hold regular liaison meetings with other high-risk construction sites within 500m of the Site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.
Monitoring
Monitoring during the Works as required by the Scoping Opinion. Monitoring could include dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Agree monitoring approach and locations with SC.
Preparing and maintaining the site
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
Erect solid screens or barriers around dusty activities or the Site boundary that are at least as high as any stockpiles on Site.
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
Avoid Site runoff of water and mud.
Keep site fencing, barriers and scaffolding clean using wet methods.
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on Site. If they are being re-used on-site cover as described below.
Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicle/machinery and sustainable travel

Ensure all vehicles switch off engines when stationary – no idling vehicles.
Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Operations
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
Use enclosed chutes and conveyors and covered skips.
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the evet using wet cleaning methods.
Waste Management
Avoid bonfires and burning of waste materials.
Demolition
Ensure effective water suppression is used during demolition operations.
Avoid explosive blasting, use appropriate manual or mechanical alternatives.
Bag and remove any biological debris or damp down such material before demolition.
Construction
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Trackout
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
Avoid dry sweeping of large areas.
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.

Record all inspections of hauls routes and any subsequent action in a site log book.
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
Implement a wheel washing system, with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
Access gates to be located at least 10m from receptors where possible.

9.68 Such measures are routinely and successfully applied to major construction projects throughout the UK and are proven to reduce significantly the potential for adverse nuisance dust effects associated with the various stages of construction work. Therefore, it is considered that **residual effects** due to fugitive emissions would be **insignificant**.

Construction Vehicle Exhaust Emissions

9.69 All construction traffic logistics would be agreed with SC, as set out in **Chapter 8: Transportation and Access**. Consideration would also be given to the avoidance (or limited) use of roads during peak hours, where practicable. However, it is anticipated that the likely residual effect of construction vehicles entering and egressing the Site to air quality would remain as per the likely impact. That is, during the construction period the likely worst-case residual impact, given the impacts would be temporary, is **insignificant**.

Construction Plant Emissions

9.70 In accordance with Part 7 of the Mayor of London Control of Dust and Emissions SPG, all construction plant would need to adhere to the emissions standards for NO_2 and PM_{10} set out for NRMM. It is therefore considered the likely residual effects of construction plant on local air quality would be **insignificant**.

Completed and Operational Development

9.71 As identified earlier in this chapter, even in the absence of mitigation, the Development is predicted to have an insignificant effect on local air quality. Accordingly, mitigation measures would not be required so residual effects would remain as **insignificant**.

9.72 The Development incorporates a number of measures that would benefit local air quality. These include:

- ability to accommodate a new entrance/exit to the London Underground, which would reduce pedestrian footfall on Borough High Street and encourage the use of public transport;
- new open space surrounding the area identified as a potential new entrance /exit to the London Bridge Underground Station, which would be would be planted with medium and tall trees which would absorb carbon dioxide and vehicle and heating plant emissions;
- the provision of 1,322 cycle spaces, 70 showers and 447 lockers, to encourage sustainable forms of transport;

- implementation of a Delivery, Servicing and Waste Management Plan (DSWMP) to manage the arrival and departure of delivery and servicing vehicles and their activities when on-site; and
- implementation of a Travel Plan to encourage employees to move up within the sustainable transport hierarchy.

9.73 Table 9.20 summarises the likely significant effects, mitigation measures and likely residual effects identified within this chapter.

Table 9.18: Summary of Likely Significant Effects, Mitigation Measures and Likely Residual Effects

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
The Works			
Dust emissions arising from the demolition and construction works	**Insignificant**	None required. However, some of the routine management controls prescribed in the SEMP would relate to good practice measures to limit the impacts of construction traffic and the use of plant and machinery	**Insignificant**
Emissions from demolition and construction vehicles	**Insignificant**	None required. However, some of the routine management controls prescribed in the SEMP would relate to good practice measures to limit the impacts of construction traffic and the use of plant and machinery	**Insignificant**
Emissions from demolition and construction plant	**Insignificant**	Plant to meet standards set for NRMM	**Insignificant**
Completed and Operational Development			
Emissions from heating plant associated with the Development	**Insignificant**	None required.	**Insignificant**

Monitoring

9.74 Monitoring would be undertaken during the Works as required by the Scoping Opinion. Monitoring could include dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

9.75 Regular site inspections to be carried out to monitor compliance with the Dust Management Plan (DMP), record inspection results, and make an inspection log available to the local authority when asked.

9.76 The frequency of Site inspections would be increased by the person accountable for air quality and dust issues on Site when activities with a high potential to produce dust were being carried out and during prolonged dry or windy conditions.

9.77 The monitoring approach and locations for monitoring would be agreed with SC.

References

1 Environmental Protection UK & Institute of Air Quality Management (IAQM) (2017), 'Land-use Planning & Development Control: Planning for Air Quality.' January 2017. IAQM, London

2 Greater London Authority (2014), 'Sustainable Design and Construction - Supplementary Planning Guidance', Greater London Authority, London.

3 Institute of Air Quality Management, 2014, 'Guidance on the Assessment of dust from demolition and construction.

4 Greater London Authority (2014), 'Sustainable Design and Construction - Supplementary Planning Guidance', Greater London Authority, London.

5 Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe.

6 Defra (2010); 'The Air Quality Standards (England) Regulations'.

7 Defra (2017) 'Air quality plan for nitrogen dioxide (NO2) in UK (2017)'

8 https://www.dft.gov.uk/traffic-counts/cp.php?la=Southwark#37699

10. Archaeology

Introduction

10.1 This chapter, which was prepared by MOLA (Museum of London Archaeology), presents an assessment of the likely archaeology effects of the Development.

10.2 This chapter provides a description of the assessment methodology; a description of the relevant baseline conditions of the Site and surrounding area; and an assessment of the likely significant effects of the Development, that could arise during demolition, deconstruction, refurbishment and construction. Where appropriate, mitigation measures are identified to avoid, reduce or offset adverse effects and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

10.3 Please note that the demolition, deconstruction, refurbishment, and construction works are referred to as 'the Works'. Where required in this ES chapter, reference to the deconstruction and refurbishment works will be made.

10.4 As agreed in the EIA Scoping Opinion (**Appendix 2.2**), an assessment of operational effects has been scoped out on the basis that once the Development has been completed, no further ground disturbance would occur and consequently there would be no additional impacts or resulting environmental effects upon buried heritage assets.

10.5 The assessment deals solely with the archaeological implications of the Development and does not cover built heritage issues except where buried parts of historic fabric are likely to be affected. The effects on 'above ground' heritage assets are covered in **Part 3 Townscape, Visual Impact and Built Heritage Assessment**.

10.6 This chapter is accompanied by the following appendices, presented in **ES Part 4**:

- **Appendix 10.1**: New City Court – Historic Environment Assessment
- **Appendix 10.2**: Letter from MOLA to Southwark Council's Archaeological Officer, dated 4 October 2018

Assessment Methodology and Significance Criteria

Assessment Methodology

10.7 The assessment has been undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF)[1], the London Plan[2] and draft New London Plan[3], the Southwark Plan, 2007[4] and the Southwark Core Strategy, 2011[5]. It conforms to standards specified by the Chartered Institute for Archaeologists[6 7], and the Greater London Archaeological Advisory Service of Historic England (GLAAS)[8] .

Consultation

10.8 The archive of the excavation carried out on the Site by the Southwark and Lambeth Archaeological Excavation Committee from October 1982 to January 1983 was examined[9] as part of the preparation of the Historic Environmental Assessment (**Appendix 10.1**). Derek Seeley, now a MOLA Senior Project Manager, was present during the excavation and for the purposes of the Historic Environmental Assessment has advised on the nature and scale of the work, the findings and their significance as well as current likely survival of archaeological remains on the Site.

10.9 Archaeology was included in the EIA Scoping Report submitted in August 2018 (included as **Appendix 2.1**) as a topic to be scoped-in, proposing that consultation with Southwark Council's (SC) archaeological advisor would be undertaken in order to develop an appropriate archaeological mitigation strategy.

10.10 Pre-application meetings were held regarding archaeology on the 6th and 24th of August 2018, attended by representatives from SC and Derek Seeley, MOLA Senior Project Manager. Correspondence has also taken place between Derek Seeley and SC's Archaeological Advisor. It has been agreed by SC's Archaeological Advisor that due to the current access constraints on the Site, the scale of the investigation which took place in 1982–3, and the extent and depth of ground disturbance caused by the construction of the current basement and underlying pile caps, further archaeological evaluation pre-determination will not be required and that the archaeological interest of the Site can be secured through appropriate planning conditions. Derek Seeley's letter[10] to SC's Archaeological Officer (**Appendix 10.2**) and MOLA's Historic Environment Assessment (**Appendix 10.1**) are both being submitted to support the planning application.

10.11 The EIA Scoping Opinion, dated 4 October 2018, requested that a colour-coded plan indicating the archaeological potential of the different areas of the Site be included in the HEA. This is included as Figure 22 of the HEA and **Figure 10.2** of the ES.

Establishing Baseline Conditions

Study Area

10.12 Details of known historic environment features within a study area extending 50m from the Site outline were obtained from the primary repositories of such information within Greater London (the Greater London Historic Environment Record (GLHER) and the Museum of London Archaeological Archive). This provides archaeological and historical context and a baseline characterisation of the Site. The study area is considered sufficient in size and level of information to support a robust baseline and assessment of asset significance.

10.13 *Baseline Characterisation*

10.14 The methodology and sources consulted for the baseline characterisation are set out in detail in **Appendix 10.1**. In summary, this entailed:

- Collating information on known historic environment features in the study area (and if appropriate beyond it), in order to set the Site into its archaeological and historic context;
- Consultation of a broad range of relevant documentary and cartographic sources, including published histories and journals, British Geological Survey data, available geotechnical data and historic maps; and
- A visit to the Site, undertaken on the 30th of July 2016 by a MOLA Archaeologist in order to determine the topography of the Site and the nature of the existing buildings, and to provide further information on areas of potential past ground disturbance and general historic environment potential.

Assessment of Likely Significant Archaeology Effects

10.15 The methodology used in this assessment entailed the following:

- Consideration of the potential for an archaeological asset to be present in the Site, i.e. the likelihood of its presence, by examining the baseline conditions on the Site using the above methodology, and taking into account factors which may have compromised asset survival (e.g. past land use and development);
- Evaluation of the significance (i.e. sensitivity) of buried heritage assets (based on existing designations; and professional judgement where such resources have no formal designation;
- Prediction of the magnitude of likely impacts upon the known or potential significance of buried heritage assets;
- Consideration of any inherent mitigation measures that have been included with the development proposals (and any additional mitigation that might be required in the design and construction or operational lifetime of the Development) in order to reduce or eliminate any significant adverse effects upon heritage assets; and
- Quantification of residual effects (those that might remain after mitigation).

The Works

10.16 Impacts on archaeological remains occur during the Works where ground disturbance takes place. They are limited to the area of the physical impact, and are permanent. Such impacts and their resulting effects are assessed below.

Significance Criteria

Significance (sensitivity) of Heritage Assets

10.17 In line with NPPF[11], for the purposes of this ES Chapter, archaeological 'resources' or 'receptors' are referred to as 'buried heritage assets', and heritage 'significance' is used in place of 'sensitivity'. The use of heritage 'significance' and 'significance of (environmental) effect' are clearly differentiated throughout.

10.18 Significance lies in the value of a heritage asset to this and future generations because of its heritage interest, which may be archaeological, architectural, artistic or historic. **Table 10.1** below sets out the significance of such assets, on a scale typically used in Environmental Impact Assessment[12], based on statutory designation and/or professional judgement against four values set out in English Heritage's (now Historic England) Conservation Principles[13]:

- **Evidential value**: the potential of the physical remains to yield evidence of past human activity. This might take into account date; rarity; state of preservation; diversity/complexity; contribution to published priorities; supporting documentation; collective value and comparative potential;
- **Aesthetic value**: this derives from the ways in which people draw sensory and intellectual stimulation from the heritage asset, taking into account what other people have said or written;

- **Historical value**: the ways in which past people, events and aspects of life can be connected through heritage assets to the present, such a connection often being illustrative or associative; and
- **Communal value**: this derives from the meanings of a heritage asset for the people who know about it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical, particularly associative, and aesthetic values, along with educational, social or economic values.

10.19 There is no single defining criterion that dictates the overall asset significance; each asset has to be evaluated using professional judgement against the range of criteria listed above on a case by case basis. Unless the nature and exact extent of buried archaeological remains within any given area has been determined through prior investigation, significance may be uncertain.

10.20 **Table 10.1** describes the significance of designated and non-designated buried heritage assets as applied in this assessment.

Table 10.1 Significance (sensitivity) of Buried Heritage Assets

Asset significance	Asset description
Very high	World Heritage Sites Scheduled Monuments Grade I and II* Registered parks and gardens Non-designated sites, settlements and landscapes of equivalent – national – status (exceptional heritage value).
High	Burial grounds Grade II Registered parks and gardens Designated battlefields Non-designated sites, settlements and landscapes of equivalent – regional or county – status (rare and well-preserved examples).
Medium	Non-designated sites, settlements and landscapes with a district value or interest for education or cultural appreciation (good preservation, sufficient for comparative study and educational/cultural appreciation
Low	Resources assets with a local (e. g. parish) value or interest for education or cultural appreciation.
Negligible	Insignificant and/or badly damaged resources of little appreciable value.
Uncertain	Resources that have a clear potential, but for which current knowledge is insufficient to allow significance to be determined.

Magnitude of Change

10.21 Determination of magnitude of change upon the significance of known or potential buried heritage assets is based on the severity of the physical impact, taking into consideration any mitigation measures integral to the Development proposals. **Table 10.2** describes the criteria used in this assessment to determine the magnitude of change.

Table 10.2 Magnitude of Change Criteria

Magnitude	Description
High	Complete removal of asset; or, Change to asset significance resulting in a fundamental change in our ability to understand and appreciate the resource and its historical context, character and setting. The transformation of an asset's setting in a way that fundamentally compromises its ability to be understood or appreciated. The scale of change would be such that it could result in a designated asset being undesignated or having its level of designation lowered.
Medium	Change to asset significance resulting in a considerable change in our ability to understand and appreciate the asset and its historical context, character and setting. Notable alterations to the setting of an asset that affect our appreciation of it and its significance; or the unrecorded loss of archaeological interest.
Low	Change to asset significance resulting in a small change in our ability to understand and appreciate the asset and its historical context, character and setting.
Negligible	Negligible change or no material change to asset significance. No real change in our ability to understand and appreciate the asset and its historical context, character and setting.
Uncertain	Level of survival/condition of resource in specific locations is not known: magnitude of impact is therefore not known.

Significance of Environmental Effect

10.22 The significance of the likely environmental effect is determined by comparing the significance value of the baseline heritage asset with the magnitude of impact (change) upon that asset as a result of the Development and are presented initially without mitigation. The likely significant effects may be either adverse (negative) or beneficial (positive). The results are presented in **Table 10.3**. Where information is insufficient to quantify that the asset significance or magnitude of change, the significance of the effect is given as uncertain.

Table 10.3: Significance of Environmental Effect (prior to mitigation)

	Heritage Asset Significance					
Magnitude of Change	**Very High**	**High**	**Medium**	**Low**	**Negligible**	**Uncertain**
High	Major	Major	Major	Moderate	Minor	Uncertain
Medium	Major	Major	Moderate	Minor	Insignificant	Uncertain
Low	Moderate	Moderate	Minor	Minor	Insignificant	Uncertain
Negligible	Minor	Minor	Insignificant	Insignificant	Insignificant	Uncertain
Uncertain	Uncertain	Uncertain	Uncertain	Uncertain	Uncertain	Uncertain

Mitigation Measures and Residual Effects

10.23 An appropriate mitigation strategy would aim to reduce or offset any adverse effect. Measures to mitigate effects would normally consist of design adjustments, to allow significant resources to be protected and retained (preservation in situ) or, where this is not feasible, investigation and recording before and during development, with dissemination at an appropriate level (preservation by record).

10.24 As heritage assets are an irreplaceable resource it is generally considered as standard practice within the planning system to implement mitigation measures in order to offset any level of adverse effect on a heritage asset, including minor adverse. This is to ensure that finite remains are not removed/lost without record. The level of mitigation proposed is, in each case, proportionate to the significance of the asset being affected.

10.25 The residual effect reflects the success rating for the recommended mitigation strategy. **Table 10.4** defines the significance of residual effects.

Table 10.4 Significance of Residual Effect

Significance of Effect	Description
Major Adverse	Substantial harm to, or loss of, significance of an asset of very high, high or medium heritage significance, as a result of changes to its physical form or setting.
Moderate Adverse	Less than substantial harm to the significance of an asset of very high, high or medium heritage significance, as a result of changes to its physical form or setting.
Minor Adverse	Limited harm to the significance of an asset of very high, high or medium heritage significance, as a result of changes to its physical form or setting, or substantial harm to, or the loss of, significance of an asset of low or negligible heritage significance.
Insignificant	No appreciable change to an asset’s significance.
Uncertain	Significance of effect uncertain due to lack of information on buried heritage asset significance.

Significance of Effect	Description
Minor Beneficial	Limited improvement of an asset's significance as a result of changes to its physical form or setting.
Moderate Beneficial	Notable enhancement of an asset's significance as a result of changes to its physical form or setting.
Major Beneficial	Substantial enhancement of an asset's significance as a result of changes to its physical form or setting.

Limitations and Assumptions

10.26 The assessment relies on available data, and best endeavours have been made to ensure that the data is accurate and up to date. It is assumed that information on the GLHER database is accurate. Whilst compiling the baseline a process of review and validation of the GLHER data has taken place (for example ensuring assets are correctly located, and undertaking further research, where appropriate, into GLHER entries with little information).

10.27 The main limitation to the assessment is the nature of the archaeological resource – i.e. buried and not visible – which means it can be difficult to predict accurately the presence and likely significance of archaeological assets, and consequently the impact upon them, using primarily desk-based sources. Although archaeological investigation has taken place on the Site previously, this was conducted prior to the inclusion of archaeology as a material factor in the planning system, when there was often insufficient resource and time to fully excavate and create as comprehensive an archive as would be expected now. Nevertheless, the archived results, along with appropriate consultation and background research, are considered sufficient to inform the archaeological baseline of the Site.

10.28 Notwithstanding these limitations, the methodology is considered robust, utilising reasonably available information, and conforms to the requirements of local and national guidance and planning policy. Typically, appropriate standard archaeological prospection and evaluation techniques are utilised to reduce the uncertainties inherent in any desk-based assessment, as part of an overall EIA mitigation strategy.

Baseline Conditions

Designated Heritage Assets

10.29 Historic England's National Heritage List for England includes no specifically archaeological heritage assets in the Site. The terrace of early 19th century townhouses at numbers 4–8 and 12–16 St Thomas Street in the northern part of the Site are Grade II listed buildings (List Entry number 1385871).

10.30 The Site is currently within the *Borough, Bermondsey and Rivers Archaeological Priority Zone*, as designated by SC. As part of the new Southwark Plan Evidence Base[14], archaeological priority zones (APZs) in the borough will be renamed as archaeological priority areas (APAs) and have been reviewed in line with a London-wide review of such areas by GLAAS, which includes a ‘tiered’ system of sensitivity with Tier 1 being the most sensitive. Once adopted by SC, the Site will be within the Tier 1 *North Southwark and Roman Roads* APA.

10.31 The south-eastern part of the Site includes the area of the former St Thomas’ Hospital burial ground, although the precise extent of this is uncertain. Archaeological excavation on part of the Site in 1982–3 found undated human remains in the foundations of a medieval building[15]. These, and the overlying post-medieval burials, were removed by a graveyard clearance contractor (Necropolis – now known as British Graveyard Services). It is, however, possible that occasional disarticulated bone is still present, which can only be excavated once the appropriate permission has been obtained.

Archaeological background

Natural Geology

10.32 The geology of the area comprises Kempton Park Terrace Gravels. The Site is located on the south-eastern edge of a dry gravel eyot (island) surrounded by (now buried) alluvium in a network of former river channels, which influenced the prehistoric use and historic development of the area.

Past Archaeological Investigation

10.33 In 1982–3, an archaeological ‘rescue’ excavation by professional archaeologists took place in the central and western part of the Site prior to construction of the existing New City Court building (number 1c in **Figure 10.1**). This was before the inclusion of archaeology as a material consideration in the planning process, and the investigation was carried out under challenging circumstances. Large areas of the Site were subject to machine excavation whilst archaeologists were absent, and because of the difficult conditions, there is some uncertainty as to the exact areas investigated, and the general depth of truncation. One large archaeological trench (Trench 1) and two smaller trenches (Trenches 2 and 3) to the south-west are identified in the archive records, and shown in Figure 5 of the Historic Environment Assessment, although the area between Trenches 1 and 3 was subsequently excavated and Trench 1 was extended eastwards during the course of the investigation. Trench 1 was excavated down to natural (geological) deposits where possible. i.e. all archaeological remains removed.

10.34 Multi-period remains were recorded including pits with Iron Age pottery, and evidence of Roman buildings. A possible medieval chapel likely to have been associated with St Thomas’ Hospital was recorded, along with post-medieval buildings, and human remains associated with the burial ground of the Hospital in the south-east of the Site[16].

Chronological Summary

10.35 For the prehistoric period (800,000 BC–AD 43), evidence of scattered pits and ditches suggests occupation of the eyot on which the Site is located during this period, and some late-prehistoric pottery was recovered during the archaeological excavation on the Site in 1982–3 (number 1c in **Figure 10.1**). Any more permanent settlement was probably on the high gravel terrace on the north side of the Thames.

10.36 In the Roman period (AD 43–410), a substantial settlement grew up in Southwark on the south side of the Thames, directly opposite the Roman city of Londinium and connected to it by a bridge. The excavation on the Site itself in 1982–3 (number 1c on Figure 10.1) revealed evidence of Roman buildings associated with wells and pits and several early Roman ditches running north-south through the Site. At least seven buildings were recorded on the Site, with internal floors and external ditches, pits, wells and possible boundary divisions. The lowest level of building remains was at *c* 0.1m above Ordnance Datum (OD), with timber pile foundations extending to a maximum depth of –0.5m OD. 4.2.13 Deep wells and cess pits were found across the Site although many pits were concentrated in the north-east corner of Trench 1. A well pre-dating one of the Roman buildings extended to –0.7m OD.

10.37 Following the withdrawal of the Roman army from England in the early 5th century AD, Londinium and the Southwark suburb were apparently abandoned, and early-medieval remains (AD 410–1066) are scarce in the area. The archaeological excavation on the Site in 1982 revealed that, in the places accessible for investigation, Roman remains were sealed by 'dark earth', indicating that the area of the Site probably fell into disuse and became agricultural land or waste ground after the Roman period. However it is possible that ephemeral Saxon features such as pits and ditches were missed.

10.38 In the later medieval period (AD 1066–1485), the riverside settlement at Southwark developed into a thriving commercial suburb with a dock, trading shore and fishery; away from the river the generally low-lying topography tended to concentrate occupation on the higher ground of the eyots. From the 12th century, however, the number of ecclesiastic and secular houses in the area grew, and with the construction in stone of a new London Bridge in 1209, north Southwark was opened up for development. In 1212, the hospital of St Thomas the Martyr was relocated from its original position (close to the River Thames) to the east side of Borough High Street within a precinct which included all or most of the Site: its boundary wall ran along the southern and western edges of the Site, on a line later followed by the parish boundary of St Thomas shown on historic maps. The hospital buildings were located on the north side of present St Thomas Street, *c* 15m to the north of the Site, and the hospital's burial ground was probably in the southern part of the precinct, within the Site. During the archaeological excavation in 1982–3, a later medieval or post-medieval stone building was exposed in the north side of the excavated area and subsequently removed by machine. It was interpreted as a possible chapel. A significant number of burials were removed from the Site, and although at the time assumed to be of a later date, considering the location it is possible that some may have been medieval.

10.39 Maps (included as Figures in **Appendix 10.1**) show that during the early part of the post-medieval period (AD 1485–the present), the Site was open land, but was progressively built up in the 17th and 18th century, although St Thomas' burial ground remained open land in the south-east part, persisting into the mid-20th century. The Site was occupied by a mix of terraced houses, office and light industrial buildings and gardens. Except for the terrace of Grade II listed buildings (number 1a on **Figure 10.1**) and the facade of Keats House, the majority of the Site, including part of the post-medieval burial ground which lay within it, was cleared for the construction of New City Court in 1982/3. As much archaeology as possible was excavated down to natural deposits within the trenches on the Site.

Factors affecting archaeological survival

10.40 It is recorded in the Site archive that during construction for the current building, most parts of the Site were excavated by machine to a depth of 1.0m OD; nothing is therefore expected to survive above that level in the areas affected, and there may have been further ground reduction after the archaeologists left the Site.

10.41 All archaeological remains will have been removed within the footprint of each piled foundation for the current New City Court building, and piling plans show that the caps and beams extend much deeper and vary between 0.7m OD to –1.3m OD[17].

10.42 Compensation grouting for the Jubilee Line extension was undertaken beneath the Georgian Terrace. However, compensation grouting generally takes place between 3m and 7m below the interface of the Gravels and London Clay, in this case it took place at least 15.5m below ground level which is too deep to have any impact on archaeological remains on the Site.

Statement of significance

10.43 Archaeological survival is considered to be very limited, as shown on Figure 22 in the Historic Environment Assessment and included as **Figure 10.2** of this ES. There is unlikely to be any surviving archaeology beneath the New City Court building other than any very deeply cut features such as timber piles or wells. However, there is a possibility of greater survival beneath the listed Georgian terrace (of townhouses). Pile caps in the south-eastern corner of the Site are shallower, but this area may also have been subject to the same depth of ground reduction to 1.0m OD as for construction of the current building.

10.44 The Site has a low to moderate potential to contain very localised and truncated prehistoric remains. It was on a gravel eyot and could have supported settlement and agriculture, close to the resources of the River Thames and former subsidiary channels. Prehistoric pottery and stone tools were discovered in pits on the Site, and further such remains may be present in any areas where development has had a lesser impact. Isolated cut features such as pits and ditches would be of medium significance, derived from their evidential value; residual finds would be of low significance.

10.45 The Site has a low to moderate potential to contain very localised Roman remains. A substantial Roman settlement was established in this area with many archaeological investigations, including those on the Site itself, showing evidence of roadside settlement of clay and timber and stone buildings. There is potential for truncated bases of Roman ditches, pits or foundations, of medium significance; isolated residual finds would be of low significance, based on their evidential value.

10.46 The Site has a low potential to contain medieval remains. Evidence of medieval buildings was recorded prior to their removal by the 1980s construction, and further such remains are very unlikely to survive.

10.47 The Site has a moderate very localised potential to contain truncated post-medieval rubbish and cess pits and possible evidence of small-scale industrial activity beneath the listed Georgian terrace. It is possible that occasional disarticulated human bone is still present, especially around the south-eastern edges of the Site. Such remains would be of low significance.

Assessment of Likely Significant Effects

Inherent Mitigation

10.48 Development affecting any former burial ground is regulated by statute, principally the *Burial Act 1857*, the *Disused Burial Grounds Act 1884* and *1981*, and the *Pastoral Measure 1983*. The exhumation of any human remains requires approval from either the Secretary of State or the Church of England, depending on whether the land is subject to the Church of England's jurisdiction. Under the *Town and Country Planning (Churches, Places of Religious Worship and Burial Grounds) Regulations 1950*, the removal and re-interment of human remains would be in accordance with the direction of the local Environmental Health Officer.

The Works

10.49 Aspects of the Development which will potentially have an effect on buried heritage assets are those which involve ground disturbance beyond the extent and depth of current truncation, e.g. the excavation to a basement formation level of at least –5.0m OD and the insertion of underpinning to account for the increased basement depth, and will take place during the Works, i.e. short and medium-term. However, all effects on archaeological remains are permanent.

10.50 Physical impacts will truncate or remove entirely any archaeological remains within the area affected in the Site, i.e. locally. **Table 10.5** sets out the predicted significance of effect, without mitigation.

Table 10.5 Significance of Effect (Without Mitigation)

Buried Heritage Asset	Asset Significance	Magnitude of Change	Significance of Effect (Without Mitigation)
Isolated and truncated prehistoric cut features	Medium	High (lowered basement or new foundations)	Adverse effect of major significance
Residual (redeposited) prehistoric flint	Low	High (lowered basement or new foundations)	Adverse effect of moderate significance
Isolated and truncated Roman cut features	Medium	High (lowered basement or new foundations)	Adverse effect of major significance
Residual (redeposited) Roman artefacts	Low	High (lowered basement or new foundations)	Adverse effect of moderate significance
Truncated post-medieval remains beneath the listed terrace	Low	High (lowered basement or new foundations or underpinning)	Adverse effect of moderate significance
Disarticulated human bone	Low	High (lowered basement or new foundations)	Adverse effect of moderate significance

Mitigation Measures and Likely Residual Effects

10.51 The nature and extent of any planning requirement (e.g. planning condition, or preservation in situ) necessary to mitigate the impact of a development scheme, should be proportional to the known significance of the assets affected, and the predicted reduction / loss of significance that would result from the proposals. There is normally a presumption for the preservation in situ of known heritage assets of Very High (national) significance, whether designated or not.

The Works

10.52 It has been agreed with Southwark Council's Archaeological Officer that the archaeological interest of the Site can be secured through appropriate planning conditions.

10.53 Archaeological survival potential at the Site is very limited, and no buried heritage assets of Very High or High significance are anticipated which would merit a mitigation strategy of permanent preservation in situ. It is therefore considered that the likely adverse effects of Moderate to Major significance can be successfully mitigated by a suitable programme of archaeological investigation before demolition (monitoring of any initial ground investigations, e.g. geotechnical test pits) and / or during groundworks (archaeological trenched evaluation followed by targeted excavation and/or watching brief), to advance understanding of asset significance and achieve preservation by record.

10.54 Archaeological monitoring of any initial ground investigations would help to clarify the potential for archaeological survival should the scale of any ground disturbance in this area require it. As outlined in **Chapter 6 Development Programme, Demolition, Deconstruction, Refurbishment and Construction** the Georgian Terrace would have its existing 1980's under pinning strengthened. Given the depth of the existing basements it is likely that archaeology has survived in this area and the insertion of the underpinning should be monitored. Elsewhere in the Site, evaluation trial pits or trenches will be excavated once the basement slab is removed. If the results of these investigations indicate that it is necessary, mitigation will comprise targeted excavation and recording, and / or a watching brief during groundworks under a planning condition to secure preservation by record.

10.55 Any archaeological work would need to be undertaken in accordance with a Written Scheme of Investigation (WSI) approved by SC's Archaeological Advisor. Appropriate consent and reburial would be required if human remains are disturbed.

10.56 The residual environmental effect following mitigation would be **insignificant**.

10.57 **Table 10. 6** summarises the likely significant effects, mitigation measures and likely residual effects identified within this Chapter.

Table 10. 6: Summary of Likely Significant Effects, Mitigation Measures and Likely Residual Effects

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
The Works			
Archaeological remains of Medium (District) significance, i.e. isolated and truncated prehistoric and/or Roman cut features.	***Direct, permanent, local adverse effects of major significance***	*Implementation of an agreed phased programme of archaeological investigation under a planning condition to secure preservation by record. This will comprise evaluation (if feasible this will be combined with any geotechnical works) following removal of the basement slab. The results will inform the need and scope for any necessary subsequent targeted excavation and recording, and/or a watching brief during ground reduction, as appropriate.*	***Insignificant***
Archaeological remains of Low (local) significance, i.e. redeposited prehistoric and/or Roman artefacts, truncated post-medieval remains, and disarticulated human bone.	***Direct, permanent, local adverse effects of moderate significance***	*Implementation of an agreed phased programme of archaeological investigation under a planning condition to secure preservation by record. This will comprise evaluation (if feasible this will be combined with any geotechnical works) following removal of the basement slab. The results will inform the need and scope for any necessary subsequent targeted excavation and recording, and/or a watching brief during ground reduction, as appropriate.*	***Insignificant***

References

[1] Ministry of Housing, Communities and Local Government, (2018); National planning Policy Framework.

[2] Greater London Authority, (2016); The London Plan. Spatial Development Strategy for Greater London.

[3] Greater London Authority, (2017); London Plan [draft]. London. https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/draft-new-london-plan/GLA draft new London Plan.

[4] London Borough of Southwark (2007); Southwark Plan.

[5] London Borough of Southwark, (2011); Core Strategy.

[6] Chartered Institute for Archaeologists, (2014); Standards and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment, Reading.

[7] Chartered Institute for Archaeologists, (2014); Standards and guidance for historic environment desk-based assessment, Reading.

[8] Greater London Archaeological Advisory Service, (2015); Guidelines for Archaeological Projects in Greater London. Historic England.

[9] Museum of London Archaeological Archive, site code 4STS82.

[10] Derek Seeley, MOLA, to Gillian King, Southwark Senior Planner Archaeology, 4th October 2018.

[11] Ministry of Housing, Communities and Local Government, (2018); National planning Policy Framework.

[12] Design Manual for Roads and Bridges: Volume 11.

[13] English Heritage, 2008 Conservation principles, policies and guidance. Swindon.

[14] London Borough of Southwark, (2017); New Southwark Plan Evidence Base: Archaeological Priority Areas (APAs). Design & Conservation: Archaeology.

[15] Cowan C, Seeley F, Wardle A, Westman A, and Wheeler L, (2009); Roman Southwark Settlement and Economy, Excavations in Southwark 1973–91, MOLA Monograph 42, page 254

[16] Museum of London Archaeological Archive, site code 4STS82.

[17] Depths of the piles, pile caps and beams and service runs as shown on the 1982 foundation plan (Bowden, Sillet and Partners, dwg 1527/505) as reconstructed by Allford Hall Monaghan Morris Architects (Proj. 14032, SK, dwg 0273, Rev A, 30/08/17).

Waterman

11. Water Resources and Flood Risk

Introduction

11.1 This chapter, which was prepared by Waterman Infrastructure & Environment (WIE), presents an assessment of the likely effects of the Development on flood risk and surface water drainage, together with the likely significant effects of the Development on the capacity of foul sewerage and potable water supply infrastructure.

11.2 This chapter provides a description of the assessment methodology, a description of the relevant baseline conditions of the Site and surrounding area and an assessment of the likely significant effects of the Development that could arise during demolition, deconstruction, refurbishment and construction and once the Development is completed and operational. Where appropriate, mitigation measures are identified to avoid, reduce or offset adverse effects and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

11.3 This chapter is accompanied by the following appendices, presented in **ES Part 4:**

- **Appendix 11.1: Flood Risk Assessment**, prepared by AKT II Ltd; and
- **Appendix 11.2: Drainage Strategy**, prepared by AKT II Ltd,

11.4 Please note that for the purposes of this ES chapter, the demolition, deconstruction, refurbishment and construction works will be referred to as 'the Works'.

Assessment Methodology and Significance Criteria

Assessment Methodology

Consultation

11.5 The EIA Scoping Opinion (**Appendix 2.2**), considered that Water Resources and Flood Risk should be scoped into the ES owing to the potential for flood risk to the Site, the existing surface water drainage and foul sewer network capacity and demand for potable water.

11.6 The EIA Scoping Opinion requests that 10% freeboard is added to any attenuation tanks to comply with the Southwark Strategic Flood Risk Assessment (SFRA) but there is no such requirement in the SFRA. This additional capacity requirement may be appropriate for a pumped solution to non-combined sewers, but as the drainage design is for gravity discharge and overflow connections to the combined sewer (which are a normal practice for the blue roofs) the additional 10% attenuation seems inappropriate for this design. This would be discussed further with Southwark Council (SC) post submission.

Establishing Baseline Conditions

11.7 The relevant baseline conditions of the Site and surroundings were established using the following sources of information:

- the Environment Agency's (EA) online flood maps and hydraulic base modelling for the River Thames[1];

- Ordnance Survey (OS) maps, topographical surveys and British Geological Society (BGS) maps and borehole logs;
- the Preliminary Environmental Risk Assessment (PERA) in relation to ground conditions and contamination prepared by WIE (submitted as an Appendix to the EIA Scoping Report, see **Appendix 2.1**)[2];
- consultation with the EA and Thames Water to obtain historical reports on flooding incidents and sewer records; and
- a review of SC's Strategic Sequential Test[3], Strategic Flood Risk Assessment (SFRA)[4] and other relevant local planning policy documents.

Assessment of Likely Significant Effects

11.8 The Flood Risk Assessment (FRA) and the Drainage Strategy were used to inform the baseline conditions of the Site and likely significant effects of the Development on surface water resources and flood risk, as detailed below.

Flood Risk Assessment

11.9 The FRA has been undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF)[5] and the accompanying technical guidance[6]. The purpose of the FRA is to identify all potential sources of flooding at the Site, determine the risk posed by these flooding sources to the Development and to predict the likely effect on flood risk that the Development poses to surrounding receptors. Tidal, fluvial, pluvial (surface water), sewer, groundwater and artificial flood risks have been considered in the FRA, with allowances made for the likely effects of climate change, where relevant.

Drainage Strategy

11.10 The Drainage Strategy sets out the proposed surface water runoff rates, together with the type and volume of attenuation proposed. The Drainage Strategy has been used to inform the FRA and the qualitative assessment presented in this chapter, which has been based on professional judgement.

11.11 Based on the calculated foul water discharge rates of the Development a qualitative assessment has been undertaken using professional judgement to assess the likely significant effects of the Development on foul water capacity.

Potable Water Demand

11.12 A qualitative assessment of the likely significant effects of increased demand on the capacity of potable water supply infrastructure at the Site has been undertaken. The assessment is based upon available published information from Thames Water and calculations of the Development's likely potable water demand prepared by the Applicant's Building Services Engineers (Chapman BDSP).

Significance Criteria

11.13 In accordance with **Chapter 2: EIA Methodology**, the relative significance of the likely and residual effects considered in this chapter are based upon the scale of significance presented in **Table 11.1**.

Table 11.1: Significance Criteria

Significance Criteria	Description of Criteria
Beneficial effect of major significance.	Significant local-scale or moderate to significant regional-scale reductions in flood risk. Major permanent reduction in demand on surface and / or foul water infrastructure. Permanent regional scale reduction in water supply demand and permanent increase in the capacity of existing infrastructure.
Beneficial effect of moderate significance.	Moderate local-scale or minor regional scale reduction in flood risk. Minor permanent reduction in demand on surface and / or foul water infrastructure. Permanent local scale reduction in water supply demand and permanent increase in the capacity of existing infrastructure.
Beneficial effect of minor significance.	Minor local-scale reduction in flood risk. Temporary local scale reduction in demand on surface and / or foul water infrastructure. Temporary local scale reduction in water supply demand and temporary increase in the capacity of existing infrastructure.
Insignificant.	No appreciable change in flood risk. No change to demand surface and/or foul water infrastructure. No change to demand on the capacity of water supply and the existing water supply infrastructure.
Adverse effect of minor significance.	Minor local-scale increases in flood risk. Increase in surface and / or foul water discharge which would require modifications to existing infrastructure. Increase in water supply which would place additional pressure on existing local supplies and existing water supply infrastructure.
Adverse effect of moderate significance.	Moderate local-scale or minor regional-scale increases in flood risk. Increase in surface and / or foul water discharge which would place undue pressure on existing infrastructure. Increase in water supply which would place undue pressure on existing local supplies and existing water supply infrastructure.
Adverse effect of major significance.	Significant local-scale or moderate to significant regional-scale increases in flood risk. Increase in surface and / or foul water discharge which would require new infrastructure. Increase in water supply which would exceed the water resource capacity of the region and therefore require new sources e.g. application of an abstraction licence.

Limitations and Assumptions

11.14 The assessment relies on available data, and best endeavours have been made to ensure that the data is accurate and up to date. It is assumed that information received from the EA and Thames Water is accurate and up to date. Notwithstanding this, the methodology is considered robust, utilising reasonably available information, and conforms to the requirements of local and national guidance and planning policy.

Baseline Conditions

Topography

11.15 The levels adjacent to the Site boundary range from approximately 5.38m Above Ordnance Datum (AOD), at the north east corner of the Site, to 3.46m AOD at the south east corner of the Site on King's Head Yard/ White Hart Yard. The elevation of Borough High Street parallel to the Site on the western side ranges from 5.34m AOD to 4.96m AOD with a slope towards the south. St. Thomas Street to the north ranges from 5.19m AOD to 4.07m AOD with a slope in westerly direction, towards Borough High Street.

Geology

11.16 The geology beneath the Site, summarised in **Table 11.2**, has been established from the British Geological Survey (BGS) 1:50,000 scale Geological Map, Sheet 256 (North London, Solid and Drift Edition), BGS boreholes TQ38-SW-2159, TQ38-SW-2157, TQ38-SW-2156, TQ38-SW-2160 and the BGS website.

Table 11.2: Geological Sequence Beneath the Site

Stratum	Area Covered	Depth to Base of Stratum (m)	Typical Description
Made Ground	Areas not excavated by the lower ground floor	3.3 – 5	Brown, silty, very sandy clay with fine to coarse gravel-sized brick, concrete and flint, wax, shell fragments and brick cobbles.
Alluvium	May be locally absent in northeast of Site and beneath the lower ground floor	4.2 – 5.1	Firm orange-brown clay with occasional roots and fine-coarse gravel.
Kempton Park Gravel Formation	Whole Site	10.1 – 11.8	Orange-brown fine to coarse sand with rounded flints and chalk gravel, and occasional cobbles.
London Clay Formation	Whole Site	28 – 32	Firm, stiff orange-brown clay with occasional silt beds.
Lambeth Group	Whole Site	43	Very stiff red-brown mottled clay with very silty, sandy clay.
Thanet Formation	Whole Site	60	Green sands and gravel with flints and occasional clay beds.

Stratum	Area Covered	Depth to Base of Stratum (m)	Typical Description
Chalk Group	Whole Site	-	White chalk with flints.

Hydrology and Hydrogeology

11.17 The nearest surface water to the Site is the River Thames, approximately 200m north and running west to east.

11.18 According to the EA online dataset, the geological deposits underlying the Site are classified as per **Table 11.3**.

Table 11.3: Summary of Hydrogeological Properties of the Main Geological Strata

Stratum	EA Classification	Hydrogeological Significance
Made Ground	Not classified	Likely to be of negligible significance for water supply or base flow.
Alluvium	Secondary (Undifferentiated) Aquifer	May be important in supporting local abstractions or in providing baseflow to rivers and streams
Kempton Park Gravel Formation	Secondary A Aquifer	May be important in supporting local abstractions or in providing baseflow to rivers and streams
London Clay Formation	Unproductive Strata	Contains insignficant quantities of vertally or laterally extensive groundwater
Lambeth Group	Secondary A Aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale.
Thanet Formation	Secondary A Aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale.
Chalk Group	Principal Aquifer	High intergranular and/ or fracture permeability – meaning they usually provide a high level of water storage and likely to be used for potable water abstraction.

11.19 The Site is not located within a groundwater Source Protection Zone.

11.20 According to the BGS borehole information (refer to the PERA), groundwater is likely to be encountered in the Alluvium at approximately 4.6-5.3m, and in the Kempton Park Gravel Formation at approximately 9m. It is anticipated groundwater flow will be in a northerly direction, towards the River Thames.

Flood Risk

Tidal and Fluvial Flood Risk

11.21 Fluvial flooding is caused by rivers, watercourses or ditches overflowing. Tidal flooding is caused by elevated sea levels or overtopping by wave action. In estuarine areas such as London, flooding might arise from either fluvial or tidal flooding, or a combination of the two.

11.22 Based on the EA's 'Flood Risk from Rivers or the Sea'[7], the Site is at very low risk - an area assessed as having less than 0.1% annual probability (1 in 1000 annual probability) of river or sea flooding (refer to Figure 6.2 of **Appendix 11.1**).

11.23 The EA have confirmed that the Site is within an area benefiting from flood defences. The EA data contained in Appendix E of **Appendix 11.1** confirms that the flood defences in the area are maintained in good condition and are inspected twice a year to ensure they remain fit for purpose. The Southwark SFRA also confirms that the flood defences in the area are maintained in good condition and are therefore unlikely to fail.

11.24 Using all the available evidence it is therefore considered that the Site has a very low probability of flooding from fluvial and tidal sources.

Breach of Tidal Defences

11.25 Despite the Site being defended from tidal flooding, the EA require assessment of the residual risk of flooding to the Site should the defences fail (breach).

11.26 The EA have provided the modelled flood extents from their 'Thames Tidal Upriver Breach Inundation Modelling Study 2017' completed by Atkins Ltd in May 2017. Those levels are based upon the Thames defences being breached.

11.27 The modelled breach extent confirms that the Site is impacted by the breach of the flood defences and the resulting maximum flood level is 4.75m AOD.

11.28 Comparison of the Site topographic survey and the modelled inundation flood level of 4.75m AOD indicates that the Site would be impacted by a maximum depth of flood water of 1.2m in King's Head Yard.

Flooding from Sewers

11.29 Sewer and highway drainage flooding occurs when the capacity of systems are exceeded, or the function of the system is impeded, which results in surcharging of the system and water being forced to the surface via gullies, manholes, foul water appliances such as toilets or other dedicated overflows.

11.30 The available Thames Water record plan indicates that there are a number of large combined public sewers in the vicinity of the Site (see below section on drainage for further details). As all the drainage infrastructure in the area is combined, the consequences of sewer flooding may be high due to the limited inflow capacity of road drains in the event of an extreme storm. This may be worsened by blocked drains or gullies. However, the Southwark SFRA indicates that the Borough's drainage infrastructure is regularly cleaned and maintained.

11.31 Map A2 in Appendix B of **Appendix 11.1** - 'Flooding History' in the Southwark SFRA indicates that there has been a 'localised flooding incident' close to the Site. However as a more detailed check, a Sewer Flooding History Enquiry has been lodged with Thames Water who have confirmed that there is no recorded history of sewer flooding at the Site (refer to Appendix C of **Appendix 11.1**).

11.32 Using all the available evidence it is therefore considered that the Site has a low probability of flooding from sewers and the local drainage network, as long as they continue to be adequately maintained in the future.

Surface Water (Pluvial) Flood Risk

11.33 Surface water flooding can occur as a result of either overland flow or ponding. Overland flow occurs following heavy or prolonged rainfall, snow melt, or where intense rainfall is unable to soak into the ground or enter drainage systems due to blockages or capacity issues. Unless it is channelled elsewhere, the run-off travels overland, following the gradient of the land. Ponding occurs as the overland flow reaches low lying areas in the local topography. These flood events tend to have a short duration and depend on a number of factors such as geology, topography, rainfall, saturation, extent of urbanisation and vegetation.

11.34 As the surrounding area is highly developed, it almost entirely comprises of impermeable hardstanding area, which during high intensity storms will generate large surface water runoff flows. Map A4 'Flood Map for Surface Water' of the Southwark SFRA (Appendix B of **Appendix 11.1**) shows that the Site is located within an area identified as a Critical Drainage Area and the Site appears to be located within an area identified as a low to medium risk of flooding (between 1 in 100 years (1%) and 1 in 1000 years (0.1%)).

11.35 The EA's Risk of Flooding from Surface Water map breaks down the flood risk for the Site into probabilities ranging from “High” to “Very Low” risk of occurring:

- In the high-probability scenario, there is potential for a small patch of slow moving water (less than 300mm deep and less than 0.25 m/s) on King's Head Yard/ White Hart Yard at the lowest point south east of the Site (refer to Figures 6.6 and 6.7 of **Appendix 11.1**).
- In the medium-probability scenario (each year this area has a chance of flooding of between 1% and 3.3%), localised flooding on the Site occurs in the existing internal courtyard (which would be the New Yard in the Development). The extent of flooding on King's Head Yard/White Hart Yard in this probability is larger in extent and exceeds 300mm in depth with the velocity more than 0.25m/s but the water is expected to run parallel to the Site in King’s Head Yard/White Hart Yard (refer to Figures 6.8 and 6.9 of **Appendix 11.1**).
- The low-probability scenario (each year this area has a chance of flooding of between 0.1% and 1%) shows further increase in flooding on the surrounding roads with potential for a small patch of water extending onto the south east corner of the Site. There is also surface water flooding alongside the eastern Site boundary which appears to be associated with the existing lightwell. A small patch of water is evident on St. Thomas Street; however, it is believed to be associated with existing lightwells as the extent of surface water flooding on the adjacent highway does not appear to be as severe. The main pluvial flood risk to the Site is from King's Head Yard where the surface water flooding exceeds a depth of 900mm with a velocity greater than 0.25m/s and flows towards the Site because of the additional flows from Collingwood Street in this scenario (refer to Figures 6.10 and 6.11 of **Appendix 11.1**).

Groundwater Flood Risk

11.36 Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata and is often highly localised and complex. After a prolonged period of rainfall, a considerable rise in the water table can result in inundation for extended periods of time.

11.37 Map A5 in Appendix B - 'Areas at Risk of Flooding from Groundwater' in the Southwark SFRA confirms that the Site is located within an area with potential for groundwater flooding of any property situated below ground level. This, however, is based on large scale mapping intended to provide a strategic overview of the susceptibility to groundwater flooding and should not be used to assess the flood risk for individual sites. It is also worth noting that no historic records of groundwater flooding were provided by any of the stakeholders in the production of the Southwark SFRA.

Flood Risk from Artificial Sources

11.38 Where infrastructure retains, transmits or controls the flow of water; flooding may result if there is a structural, hydraulic, geotechnical or mechanical failure of the infrastructure.

11.39 Although unlikely, a water main can burst at any time which can result in the flooding of nearby properties. A number of water mains surround the Site (refer to the Potable Water Supply and Demand section below for further details). Thames Water are currently replacing the Victorian water mains across London which would reduce the probability of water mains bursting and therefore reduce the risk of flooding to the Site.

11.40 The topography of the surrounding roads suggests that flooding due to any burst will continue to flow southward along Borough High Street and westward along St. Thomas Street rather than entering the Site.

11.41 There are no other artificial sources of flooding in the immediate vicinity of the Site. The EA’s Flood Map for Reservoirs indicates that the Site is not at risk from flooding associated with reservoirs or artificial sources (refer to Figure 6.5 of **Appendix 11.1**).

11.42 Based on this information it is therefore considered that the Site is at low risk of flooding from artificial sources. Consequently, flood risk from artificial sources has not been considered further in this chapter.

Drainage

11.43 The available Thames Water record plans (refer to Figure 6.3 of **Appendix 11.1**) indicate that the closest combined public sewers to the Site are:

- A 1143 x 762 mm combined sewer running under St. Thomas Street to the north of the Site;
- A 300 mm combined water sewer running under the Keats House to the east of the Site; and
- A 375mm diameter combined water sewer in King's Head Yard to the south of the Site.

11.44 It is believed that all surface and foul water from the existing building currently discharges directly to one or more of these public sewers without any form of attenuation but it is not clear which one and it is therefore recommended that a CCTV survey of the existing Site drainage network is undertaken to confirm the location, size and condition of all existing outfalls from the Site.

11.45 For the peak 1-in-1-year return period storm event, the existing surface water discharge rate from the Site has been calculated as 29.1 litres per second (l/s) and for the peak 1-in-100-year return period storm event this gives an existing surface water discharge rate from the Site of 92.7 l/s.

11.46 Based on existing plans of the Tower, Keats House and the Georgian Terrace, the total existing foul flow from the Site has been calculated as 8.5l/s.

Potable Water Supply and Demand

11.47 Thames Water is responsible for public water supply within and in the locality of the Site. The Thames Water Asset Map (refer to Figure 6.4 of **Appendix 11.1**) indicates that there are 800mm diameter trunk and 250mm diameter distribution mains running parallel to the Site in St. Thomas Street, they both then turn into Borough High Street and increase in diameter to 900mm and 300mm, respectively. Additionally, a 180mm diameter distribution main is located south of the Site in King's Head Yard.

11.48 Based on historic water meter data provided by GPE, the daily water usage for the existing Site buildings is estimated to be around $50m^3$ per day.

Assessment of Likely Significant Effects

The Works

Tidal and Fluvial Flood Risk

11.49 As detailed earlier in this chapter, and within the FRA (refer to **Appendix 12.1**), due to the presence of the Thames Tidal Defences, the risk of flooding from tidal and fluvial events is considered to be low. This would remain the case during the Works. In the unlikely event of a breach, construction workers would be able to walk westward from the Site in order to reach dry ground on Borough High Street or Bedale Street. As such, the risk of flooding of the Site from tidal and fluvial sources during the Works is likely to be **insignificant**.

Groundwater Flooding

11.50 With reference to **Chapter 5: The Development** and **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**, the proposed basement would be two storeys deep and confined by secant piling retaining walls, extending to -6m Ordnance Datum (OD) under the footprint of the Tower and -5m OD under the public realm and Keats House (the level of the ground would be at approximately 5.0m Above Ordnance Datum (AOD)), with the pile caps and lift pits extending further down.

11.51 The secant piling is generally 600mm in diameter, extending to 900mm along the east side of the building in relation to the Tower footprint. Bearing piles and plunge columns would be installed from basement Level B2 and would be Continuous Flight Auger (CFA) piles 900mm diameter. The bearing piles for the public realm and Keats House would be 900mm deep. The pile caps underneath the columns and the core of Keats House would be 1,350mm deep.

11.52 As noted above, the groundwater in the Site is expected to be relatively shallow, as according to the BGS borehole information (refer to the PERA), groundwater is likely to be encountered in the

Alluvium at approximately 4.6-5.3m below ground level (approximately 0.00m AOD), and in the Kempton Park Gravel Formation at approximately 9m below ground level (bgl).

11.53 In view of the above, perched groundwater is likely to be encountered during the excavation works required to construct the basement. This could lead to the ingress of groundwater and potential flooding of excavated areas. The potential effect from increased flood risk from groundwater during construction, however, would be temporary and highly localised on-Site. It is therefore not considered likely that the excavation works would lead to an increase in flood risk from groundwater beyond the Site. Taking a precautionary approach, it is anticipated that during excavation of the basement within the Site in the absence of mitigation there would be a **temporary**, **short** to **medium-term**, **local**, **adverse effect** of **minor significance** in respect of groundwater flooding.

Surface Water (Pluvial) Flood Risk

11.54 Construction works, including earthworks, storage of waste stockpiles, sewer diversions and temporary Site drainage, would have the potential to give rise to changes in the surface water run-off regimes particularly during periods of heavy rainfall. The existing A 375mm Thames Water sewer to the south eastern boundary of the Site would require diverting to allow for basement construction and connection to a suitable location. The sewer diversions would need to be undertaken prior to the commencement of the basement construction and would require formal liaison with Thames Water.

11.55 In the absence of mitigation, the risk of surface water flooding from overland sources could increase, as discharge rates may not be controlled, and overland surface water run-off could potentially be diverted away from the existing sewers and towards areas at higher risk of surface water flooding (such as the King’s Head Yard). A temporary change in Site conditions, and in surface water drainage regimes, could give rise to a **temporary**, **short to medium term**, **local**, **adverse effect** of **minor significance**.

Effects to Controlled Waters from Ground Contamination

11.56 During the Works, it is likely that new sources of contamination would be introduced and stored on the Site (for example, diesel fuel, oils, chemicals and other construction materials). As a result, there would be a risk of leaks and spills to occur directly or indirectly to the ground and underlying aquifers. Potential pathways include surface water drains, preferential pathways created by surface water run-off, and migration within the groundwater. Contaminated surface water run-off pathways could come from activities such as wheel washing, dust suppression and the washing down of construction areas.

11.57 Despite the above, the Works would be undertaken in accordance with the Control of Substances Hazardous to Human Health (COSHH) Regulations 2002[8], and in-line with best practice methods. This would act to reduce the potential for contamination leaks or spills. As such, the likely effect is considered to be **temporary**, **short** to **medium-term**, **local, adverse** and of **minor significance**.

Foul and Potable Water Infrastructure Capacity

11.58 Wastewater generation from the Works would include effluent from retained sanitary facilities, as well as sediment-laden water from excavations, washing down and wheel wash facilities. It is expected that foul water generated at the Site during excavation and construction would be drained via the existing Thames Water combined sewers in the surrounding area. However, this is not expected to result in an increase in foul water flows compared to the existing Site and due to the low volumes anticipated, this is expected to be **insignificant**.

11.59 The Works may require significant volumes of water supply for wheel washing, dust suppression and the washing down of construction areas. However, this is not expected to be more than the existing water supply demand rate for the Site and therefore the effect on water supply and demand is considered to be **insignificant** and at worst to have a **temporary**, **short** to **medium term**, **local**, **adverse effect** of **minor significance**.

Completed and Operational Development

Tidal and Fluvial Flood Risk

11.60 As detailed earlier in this chapter, and within the FRA (refer to **Appendix 11.1**), due to the presence of the Thames Tidal Defences, the risk of flooding from tidal and fluvial events is considered to be low.

11.61 In the unlikely event of a breach of the flood defences, the Site would be impacted by a maximum depth of flood water of 4.75m AOD. To address this, the Development has been designed to ensure the safety of the occupiers and users of the buildings. There would be no habitable areas at ground floor and basement levels. The occupiers could safely evacuate to a 1st floor level and safely remain inside the building.

11.62 Without mitigation, flood water could enter the ground and basement levels of the Development (including the UKPN sub-station in the basement), however it should be noted that these levels would not be used for habitation. As such, the Development is likely to result in an **insignificant** to **long-term, local adverse** effect of **minor significance** effect in respect of flood risk from tidal and fluvial sources on occupiers.

Flooding from Sewers

11.63 As discussed earlier, there is a lack of flooding history from sewers in the vicinity of the Site and the existing risk of flooding to the Site from surcharged sewers is low. This is unlikely to change with the Development in place as it is assumed the sewers would continue to be adequately maintained and regularly cleaned. Accounting for the above, the Development would have an **insignificant** effect on sewer surcharging flooding.

Surface Water (Pluvial) Flooding

11.64 There are two areas identified as at risk from surface water flooding. Firstly the existing courtyard area (to be New Yard) however this would be permeable paving in the Development rather than impermeable ground as in the existing situation. The second area is the eastern lightwell of Keats House which would be mitigated as it is planned to be removed as part of the Development.

11.65 Without mitigation, there remains a residual risk of surface water flooding in areas less than 4.9m AOD in the Development along King's Head Yard, however it should be noted that this area would not be used for habitation.

11.66 Occupiers could safely remain in the buildings during any flood in the surrounding area without endangering themselves. Should occupiers wish to leave the Site during flood events, the occupiers could exit the building on St. Thomas Street which would be subject to shallow flood water (less than 300mm deep on the lowest level of flood level classification) representing a very low hazard to people and walk westward in order to reach dry ground on Borough High Street or Bedale Street (refer to **Figure 6.13** of Appendix 11.1).

11.67 In addition to the escape route, Map A9 of the Southwark SFRA confirms that the Site is located within a Flood Warning / Flood Alert area meaning that occupiers would be given advance warning by the building management team of potential flood events and therefore an escape route is determined prior to the event.

11.68 As per Appendix 1 Schematic SuDS Strategy in **Appendix 11.2** it is proposed to provide a combination of permeable paving (150m^3 of storage volume discharging surface water run-off at 3.75 l/s) at podium level and a blue roof system on the Tower's roof (800m^2, equivalent to 40m^3 of storage volume, discharging surface water run-off at 1.25 l/s) to achieve a total attenuation volume of 190 m^3 in order to limit the surface water discharge rate of the Development to 5 l/s (the greenfield rate under the 1-in-100 years plus 40% climate change storm event). In addition, it is proposed to utilise a rainwater harvesting system. Water for sub-surface irrigation would be supplied by the building's greywater recycling stems, with additional treatment to ensure public health and safety. A pre-planning enquiry response from Thames Water has confirmed that should policy 5.13 of the London Plan[9] and Policy 3.4 of the Supplementary Planning Guidance (Sustainable Design and Construction)[10] be met for the Development – i.e. attenuate the surface water flows to Greenfield run-off rates (5 l/s/hectare of the total site area or if the site is less than hectare in size then the flows should be reduced by 95% of existing flows, as demonstrated above), Thames Water would envisage no infrastructure capacity concerns with regards to surface water for the Site. It is proposed to re-use the existing drainage connections to discharge surface water to the public sewers, subject to the findings of the CCTV survey.

11.69 The inclusion of the Sustainable Drainage Systems (the blue roof system and permeable paving) would result in a reduction in the volume and peak rate of surface water runoff from the Site and hence a reduction in flood risk elsewhere compared to the current situation. Safe escape routes in the event of a surface water flooding event would ensure that the occupants of the Development would be safe. Without mitigation, there remains a residual risk of surface water flooding where the finished floor level is less than 4.9m AOD (although these areas are not used for habitation). As such, the Development is likely to result in an **insignificant** to **long-term, local adverse** and of **minor significance** effect in respect of surface water flooding. Mitigation is therefore required at King's Head Yard.

Groundwater Flooding

11.70 As described previously, groundwater in the Site is expected to be relatively shallow (expected between 4.6m – 5.3m bgl in the Alluvium and 9m bgl in the Kempton Gravel Formation) and the proposed basement would sit within and below the groundwater level (the existing basement would be extended to a two-storey basement to 9.65m bgl). As such, the basement would be designed to be suitably waterproofed for the lifetime of the Development, ensuring the Development itself remains safe. A summary of the work undertaken to date in assessing the impact of the proposed basement is provided in a Basement Impact Assessment submitted as a standalone planning document.

11.71 The effect of the Development on groundwater flooding is therefore considered to be **insignificant**.

Change in Foul Water Drainage Capacity

11.72 As set out in **Appendix 11.2**, the proposed peak foul water rate has been calculated as 18.4 l/s for the Main Building and the refurbished Keats House and 0.5 l/s for the refurbished Georgian Terrace. This would result in an increase in flow rate of approximately 12 l/s into the public sewer.

11.73 Any foul water drainage from ground floor level and above would be drained by gravity in order to minimise the amount of pumping required. Foul water from below the basement level slab would require pumping to allow it to discharge by gravity to the public sewer. As with the surface water drainage, due to the depth of the public sewers it is recommended that, if possible, the existing drainage connection(s) should be reused, subject to the findings of the CCTV survey.

11.74 The proposed foul drainage would be designed in accordance with BS EN 752 - Drain and Sewer Systems Outside Buildings[11], BS EN 12056 - Gravity Drainage Systems Inside Buildings[12], and Approved Document H of Building Regulations[13]. If new connections are required, these would be secured under Section 106 of the Water Industry Act 1991(separate from a planning S106 agreement)[14].

11.75 The Pre-Development enquiry submitted to Thames Water has confirm that the existing public sewer network has the capacity to accommodate the foul and surface water flows from the Development and the Site.

11.76 Accordingly, it is considered likely that the Development would have an **insignificant** effect upon the capacity of foul water drainage infrastructure and sewage treatment works.

Change in Potable Water Demand

11.77 The proposed building mains water demand rate of the Development has been calculated by Chapman BDSP as 159m^3 daily with a peak flow of 4.1l/s. This represents an increase in potable water demand on the Site than existing, which was estimated to be 50m^3 daily. It was not possible to accurately measure the existing peak flow, however based on daily water usage volume of 50m^3 and size of the incoming main (80mm Ø), the existing peak flow would be no greater than the proposed 4.1l/s.

11.78 Water use can be minimised by installing water efficient equipment and appliances and increasing awareness of water consumption. The Development would incorporate water efficient fittings in line with the BREEAM ‘Wat 01’ water credits, and therefore include the following inherent mitigation measures:

- a water meter with a pulsed output would be provided for the water supply of the building and for each tenancy;
- flow control devices that regulate the supply of water to each WC area/facility according to demand would be installed (therefore minimising water leaks and wastage from sanitary fittings);

- combined rainwater and greywater harvesting system. Greywater from the building's showers and wash basins would be treated and would provide a non-potable boosted cold water service to the WCs and urinals;
- a major leak detection system would be installed on the incoming cold water main directly after Thames Waters utility meter to within the building via 2 pulsed meters; and
- the proposed landscape design and associated irrigation strategy would be designed to be water efficient and would include drip-fed subsurface irrigation incorporating soil moisture sensors. Subject to the quality of the water required for irrigation this could be served from the grey water recycling system, as noted previously.

11.79 The Thames Water 'Water Resource Management Plan 2015-2040' (December 2013)[15] indicates that over a forecast period to 2040, there is likely to be a significant demand on water supply in the London catchment (the London Water Resource Zone (WRZ) in the Thames Water supply area). To address this, Thames Water has prepared a detailed plan which aims to ensure that sufficient supply is available to meet demand during the plan period. This involves a variety of measures including the replacement of Victorian Water Mains to reduce leakage, compulsory metering and encouraging the use of water efficiency measures. Developing new water resources would also be required and schemes planned by Thames Water comprise a number of small groundwater schemes, aquifer recharge schemes, aquifer storage and recovery schemes, and water reuse schemes. In addition, in extreme periods, bulk water transfers from neighbouring water companies and further afield may be required to ensure availability of supply.

11.80 As a result of the above measures, the demand supply forecast provided by Thames Water which takes into account an increase in population within the London WRZ states that demand should be met within London until at least 2040. Thus, the additional demand on water resources resulting from the Development is anticipated to be adequately accommodated. Consequently, the likely effect of the Development on potable water demand has been assessed to be **insignificant**.

Mitigation Measures and Likely Residual Effects

The Works

Tidal and Fluvial Flood Risk

11.81 The likely effect of flood risk from tidal and fluvial sources during the Works would be insignificant. As such, no mitigation measures are required and the residual effect would remain **insignificant**.

Groundwater Flooding

11.82 The extension and construction of the basement within the Site would involve excavation to below likely groundwater levels. Groundwater management measures would be set out within the Site-specific Environmental Management Plan (SEMP). Appropriate dewatering and disposal, using standard techniques such as sumps and pumps would likely be required. This would mitigate the risk of groundwater flooding during excavation works and result in an **insignificant** likely residual effect.

Surface Water (Pluvial) Flood Risk

11.83 The SEMP developed for the Works (refer to **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**) would include temporary measures to control surface water runoff from the Site. Such measures would include the provision of adequate drainage to manage surface water run-off. Construction of the drainage system should be designed and managed to comply with BS 6031:2009 'The British Standard Code of Practice for Earthworks'[16], which details methods that should be considered for the general control of drainage on construction sites. Discharge rates and volumes of water discharged would be agreed with the EA and Thames Water.

11.84 Following the implementation of these measures, the anticipated likely residual effect of surface water flooding during the Works would be **insignificant**.

Effects to Controlled Waters from Ground Contamination

11.85 The Works would be undertaken in accordance with the SEMP to negate adverse risks to Controlled Waters. Protective measures would include:

- Handling and storing any potential hazardous liquids/materials in accordance with relevant legislation and Environment Agency (EA) pollution prevention guidance;
- The use of appropriately tanked and bunded storage areas for fuels, oils and other chemicals;
- Procedures for the management of materials, spillage and spill clean-up, use of best practice construction methods and monitoring;
- Surface drainage would pass via settlement and oil interception facilities, where required, and discharge arrangements would be agreed with the EA and Thames Water Utilities Limited (TWUL);
- The provision of adequate drainage to manage surface water run-off and minimise contaminated water reaching the groundwater;
- The stockpiling of contaminated materials would be avoided, wherever possible. Stockpiles would be located on areas of hard standing or on plastic sheeting to prevent mobile contaminants infiltrating into the underlying ground; and
- Potentially hazardous liquids on the Site, such as fuels and chemicals, would be managed and stored in accordance with best practice guidance, such as that published by the EA. Storage tank and container facilities would be appropriately bunded with designated areas and located away from surface water drains.

11.86 Following the implementation and adherence to the above measures, the contamination risk to the underlying aquifers and surface water features surrounding the Site would be mitigated, and thus the likely residual effect would be **insignificant**.

Foul and Potable Water Infrastructure Capacity

11.87 The likely effects of the Works upon wastewater were identified as being insignificant. Therefore, no mitigation measures are considered necessary and the likely residual effect would remain as per the likely effect; that is, **insignificant**.

11.88 To reduce the water demand of the Development during the Works, all relevant contractors would be required to investigate opportunities to minimise and reduce the use of water in accordance with the SEMP. These would include:

- selection and specification of equipment;
- implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use;
- use of recycling water systems in functions such as wheel washes and toilets; and
- where possible, water from excavation would be used for dust suppression during construction.

11.89 Water consumption throughout the Works would be monitored, either through sub-metering or utility bills to allow a comparison against best practice benchmarks. With these control measures in place, the likely residual effects of the Work upon potable water supply would be **insignificant**.

Completed and Operational Development

Tidal and Fluvial Flood Risk

11.90 As previously described, the Development has been designed to ensure occupants are safe from tidal and fluvial flooding. The ground and basement levels require mitigation to protect against the risk of residual flooding (although it should be noted that these areas would not be used for habitation) (as per Appendix F of **Appendix 11.1**):

- the inclusion of demountable flood resilient barriers at the building entrances in order to prevent flood water entering the property capable of protection level of up to 4.8m AOD;
- permanent flood barrier to prevent ingress into the basement, capable of protecting to a minimum level of 4.8m AOD. It may be automated or manually operated, and its use could be triggered by alerts received from a Flood Warning System; and
- demountable barriers or transformers to be on plinths for the UKPN sub-station. The level of protection is to be agreed with UKPN during the next design stage.

11.91 In view of the above, the likely residual effect of tidal and fluvial flooding on the occupants of the Development would be **insignificant**.

11.92 Furthermore, the building managers would be registered with the EA Flood Warning System and a Flood Warning and Evacuation Plan (which can be secured through an appropriately worded planning condition), would be developed to ensure the Development is operated safely and that people are evacuated in a safe manner in the unlikely event that the defences fail in the River Thames.

Flooding from Sewers

11.93 As stated previously, the risk of flooding from surcharging sewers would be insignificant and no mitigation would be required. The likely residual effect of flooding from surcharging sewers once the Development is completed and operational would therefore be **insignificant**.

Surface Water (Pluvial) Flooding

11.94 The inclusion of the Sustainable Drainage Systems would result in a reduction in the volume and peak rate of surface water runoff from the Site and hence a reduction in flood risk elsewhere compared to the current situation.

11.95 The risk of surface water flooding from the ponding of water in the low point in levels along King's Head Yard would be mitigated through the use of demountable and permanent flood barriers within the Development (refer to Tidal and Fluvial text above). The design of the proposed flood barriers would be determined during the detailed design stage.

11.96 The inclusion of flood barriers to a level of 4.45m AOD at the pedestrian entrances and basement access and safe escape routes in the event of a surface water flooding event would ensure the occupants of the Development would be safe. Therefore, the likely residual effect would be **insignificant** in respect of surface water flooding.

Groundwater Flooding

11.97 Given that the proposed basement would be appropriately waterproofed no further mitigation measures are considered necessary. Consequently, the likely residual effects of the Development once completed and occupied would be **insignificant** in respect of groundwater flooding.

Change in Foul Water Drainage Capacity

11.98 The Development is likely to result in an insignificant effect in respect of the capacity of foul water drainage infrastructure and sewage treatment works. As such, no mitigation measures are required and the residual effect would remain as per the likely effect. That is, **insignificant**.

Change in Potable Water Demand

11.99 The Development is likely to result in an insignificant effect in respect of potable water demand. As such, no mitigation measures are required and the residual effect would remain as per the likely effect. That is, **insignificant**.

11.100 In addition to the water conservation measures detailed above, future occupants of the Development would be encouraged to adopt a more responsible attitude to water use. They would be provided with a non-technical guide which details the operation and performance of the building, including information on water efficient fittings, recommendations for their most efficient usage, and details on external water use.

11.101 **Table 11.4** summarises the likely significant effects, mitigation measures and likely residual effects identified within this Chapter.

Table 11.4: Summary of Likely Significant Effects, Mitigation Measures and Likely Residual Effects

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
The Works			

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Tidal and fluvial flood risk.	**Insignificant**	None required	**Insignificant**
Groundwater flooding.	**Temporary**, **short** to **medium-term**, **local**, **adverse effect** of **minor significance**	Appropriate dewatering and disposal, using standard techniques such as sumps and pumps	**Insignificant**
Surface water (pluvial) flooding.	**Temporary**, **short to medium term**, **local**, **adverse effect** of **minor significance**	Implementation of SEMP including adequate temporary drainage	**Insignificant**
Effects to Controlled Waters from ground contamination.	**Temporary**, **short to medium term**, **local**, **adverse effect** of **minor significance**	Implementation of SEMP detailing protective measures	**Insignificant**
Foul and potable water infrastructure.	**Insignificant (foul)** **Insignificant to temporary**, **short to medium term**, **local**, **adverse effect** of **minor significance at worst (potable water)**	None required (foul) Implementation of SEMP including measures to minimise and reduce water use (potable water)	**Insignificant**
Completed and Operational Development			
Tidal and fluvial flood risk	**Insignificant** to **long-term, local adverse** effect of **minor significance**	Permanent flood barrier for basement access and demountable flood barrier system for pedestrian entrances	**Insignificant**
Flooding from sewers	**Insignificant**	None required	**Insignificant**
Surface water (pluvial) flooding	**Insignificant** to **long-term, local adverse** effect of **minor significance**	Permanent flood barrier for basement access and demountable flood barrier system for pedestrian entrances	**Insignificant**
Groundwater flooding	**Insignificant**	None required	**Insignificant**
Change in foul Water drainage capacity	**Insignificant**	None required	**Insignificant**
Change in potable water demand	**Insignificant**	None required	**Insignificant**

Monitoring

11.102 Water consumption throughout the Works would be monitored, either through sub-metering or utility bills to allow a comparison against best practice benchmarks.

11.103 Procedures for the management of materials, spillage and spill clean-up, use of best practice construction methods and monitoring.

References

1 Environment Agency (2017); 'Thames Tidal Upriver Breach Inundation Modelling Study 2017, Atkins Ltd, May 2017.

2 Waterman IE (2018); 'Preliminary Environmental Risk Assessment', ref: WIE11375-100-R-2-1-6-RJM.

3 Southwark Council (2010); 'CDB8. Strategic Flood Risk Sequential Test', March 2010.

4 Southwark Council (2017); 'London Borough of Southwark Strategic Flood Risk Assessment', January 2017, Conway AECOM, Southwark Council.

5 Ministry of Housing, Communities & Local Government (2018); 'National Planning Policy Framework'.

6 Department for Communities and Local Government (2015): 'Planning Practice Guidance – Flood Risk and Coastal Change'.

7 Environment Agency (2018); 'Flood Risk from Rivers or the Sea' (accessible online: https://flood-map-for-planning.service.gov.uk/).

8 Control of Substances Hazardous to Health Regulations 2002, The Stationery Office.

9 Greater London Authority, (2016); 'The London Plan. Spatial Development Strategy for Greater London'.

10 Great London Authority (2014); 'Sustainable Design and Construction, Supplementary Planning Guidance', April 2014, London plan 2011 Implementation Framework.

11 British Standards (2008): BS EN 752:2008 'Drain and Sewer Systems Outside Buildings'.

12 British Standards (2000): BS EN 12056-4:2000 'Gravity Drainage Systems Inside Buildings'.

13 Department for Communities and Local Government (2010): 'Drainage and waste disposal: approved Document H', Approved Documents and Building regulation.

14 The Stationery Office (1991): Water Industry Act 1991, The Stationery Office, Norwich.

15 Thames Water (2013): 'Water Resources Management Plan 2015-2040, December 2013.

16 British Standards (2009): BS 6031:2009 'The British Standard Code of Practice for Earthworks', December 2009.

12. Wind Microclimate

Introduction

12.1 This chapter, which was prepared by Wirth Research, presents an assessment of the likely wind microclimate effects of the Development. In particular, consideration is given to the likely significant effects of wind upon pedestrian comfort and safety.

12.2 This chapter provides a description of the assessment methodology; a description of the relevant baseline conditions of the Site and surrounding area; and an assessment of the likely significant effects of the Development, that could arise during demolition, deconstruction, refurbishment and construction, and once the Development is completed and operational. Where appropriate, mitigation measures are identified to avoid, reduce or offset adverse effects and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

12.3 This chapter is accompanied by the following appendices, presented in **ES Part 4**:

- **Appendix 12-1**: New City Court Wind Study.

12.4 Please note that for the purposes of this ES chapter, the demolition, deconstruction, refurbishment and construction phase or works will be referred to as ‘the Works’.

Assessment Methodology and Significance Criteria

Assessment Methodology

12.5 The assessment was performed using Wirth Research’s high-resolution Computational Fluid Dynamics (CFD) modelling.

12.6 CFD is a computer-based modelling technique, which simulates the effect of wind on the built environment. The air is divided into hundreds of millions of “cells”, within which the equations of motion are solved. Wirth Research use a high-performance supercomputer, 500 times faster than a standard desktop, to achieve market leading accuracy. The CFD modelling delivers a detailed assessment of wind conditions in and around a site for all wind directions in terms of pedestrian comfort and strong winds.

12.7 Wirth Research use an in-house method to account for gusts, which has been correlated against world leading wind tunnels, which ensures that the effect of gusts is predicted.

Consultation

12.8 The EIA Scoping Opinion issued on 4 October 2018 states that the radius of the CFD model should be at least 300m, that the long term meteorological data should include over 20 years’ worth of data, that the wind comfort is assessed using the Lawson Comfort Criteria and that wind effects during the works are assessed. The Scoping Opinion also states that a qualitative assessment of the works, using CFD results of the baseline and completed and operational Development is acceptable. The points above have been addressed within the assessment reported in this chapter.

12.9 During the public consultation concerns were also raised about the effect of the Development on the wind microclimate around Southwark Cathedral, so this will also be considered within the assessment.

Establishing Baseline Conditions

12.10 Baseline conditions were established using a high resolution CFD model, encompassing a 500m radius of the Site and surrounding area. The extent of the model is shown in **Figure 12-1**.

12.11 The on-site model was constructed from 3D CAD planning application drawings provided by Alford Hall Monaghan Morris (AHMM).

12.12 The surrounding context model was constructed from 3D CAD provided by Zmapping on 26 May 2017, when the CFD studies commenced. This model is anticipated to be materially the same as the surrounding context once the Works commence, with the exception of Shard Place and the cumulative schemes, models of which were added.

12.13 Models of Shard Place and the cumulative schemes were constructed from drawings sourced from the planning portal.

12.14 Additional detail was added to the Shard and London Bridge Place in accordance with 3D CAD provided by Miller Hare.

12.15 A model of the Development was included within the CFD model and tested to determine the conditions at and around the Site. This model includes the external terraces of the Development (on Levels 3 and 5 and on the hub Levels 21 and 22).

12.16 The model included the internal space within the London Underground Ltd (LUL) London Bridge station, from the Borough High Street ticket office up to the entrances on Borough High Street and the proposed on-site entrance. The LUL station model is shown in **Figure 12-2**.

12.17 The model was run at full scale from 18 wind angles, spaced using 10° or 30° increments such that no sector contributes more than 10% of the annual wind. The wind angles which were run are indicated in **Figure 12-3**. The use of 18 wind angles is in line with industry best practice such as the 2018 City of London microclimate guidelines. The method described in this chapter gives a maximum sectoral contribution of 8.9% of the annual wind, compared to 10.2% if equally spaced angles were used. This further reduces the level of risk with regards to providing appropriate coverage of the full range of wind angles.

12.18 Wind speeds were measured at 1.5m above any surfaces expected to be used for pedestrian activity, across the entire extent of the model.

12.19 On-site and local wind speeds were combined with 30 years-worth of weather data obtained from the UK Meteorological Office for a “superstation” (consisting of Heathrow airport, Gatwick airport and Stansted airport), corrected for terrain local to the airport and the Site, to obtain annual and seasonal frequency and magnitude of wind speeds across the model. This allows the ‘grading’ of the pedestrian level winds according to the Lawson Comfort Criteria, which are explained later in this chapter.

12.20 A wind rose for the airports is shown in **Figure 12-3**.

12.21 The correction factors between the airport 'superstation' (measured 10m above ground) and the Site (at a reference height of 120m) are shown in Table **12-1**. It should be noted that the terrain analysis has been performed using sectors of 30°, which is presented here.

Table 12-1: Site Wind Correction Factors

Direction (°N)	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Corr. Factor	1.45	1.42	1.40	1.54	1.46	1.43	1.38	1.37	1.38	1.36	1.43	1.45

12.22 The wind microclimate effects are assessed annually, for the summer months (June, July, August) and for the 'windiest season' (winter in this case, consisting of December, January and February).

Assessment of Likely Significant Wind Microclimate Effects

Lawson Comfort Criteria

12.23 Likely significant wind microclimate effects were assessed using the Lawson Comfort Criteria. This is a long-established criterion, which predicts the reaction of an average pedestrian to a given wind speed, depending on their level of activity.

12.24 There are numerous variants of the Lawson Criteria which can be used; this assessment uses the City of London variant, which is the most conservative variant. This differs from other variants in that it categorises wind which is unsuitable for anything above leisurely walking as 'uncomfortable', and also that it differentiates between long-term sitting (e.g. cafes) and occasional sitting (e.g. benches).

12.25 The Lawson criteria also accounts for the potential impact of very strong winds on pedestrian safety; these are winds that are rarer than those which cause discomfort, but strong enough to potentially cause accidents which could endanger pedestrians.

12.26 The classifications of the Lawson comfort criteria, along with the colour key corresponding to the presentation of the results of the CFD analysis (presented later in this chapter) are shown in **Table 12-2**. The comfort criteria categorises according to which wind speed is exceeded for 5% of the year or season.

Table 12-2: Lawson Comfort Criteria

Key	Comfort Category	Mean Wind Speed (5% exceedance)	Description
	Frequent (long term) Sitting	2.5 m/s	Acceptable for outdoor sitting use (e.g. cafes)
	Occasional Sitting	4 m/s	Acceptable for occasional outdoor sitting use (e.g. benches, balconies)
	Standing	6 m/s	Acceptable for main building entrances, pick-up / drop-off points and bus stops
	Walking (leisure)	8 m/s	Acceptable for external pavements, walkways

Key	Comfort Category	Mean Wind Speed (5% exceedance)	Description
	Uncomfortable	>8 m/s	Not comfortable for regular pedestrian access

12.27 The classifications of the Lawson safety criteria, along with the colour key corresponding to the presentation of the results of the CFD analysis (presented later in this chapter) are shown in **Table 12-3.** The safety criteria restricts strong winds to occurrences of less than 2 hours per year (0.022%).

Table 12-3: Lawson Safety Criteria

Key	Safety Category	Mean Wind Speed (0.022% exceedance)	Description
	Unsafe	15 m/s	Presents a safety risk, especially to more vulnerable members of the public and cyclists.

Target Wind Conditions

12.28 For a mixed-use urban area within which the Site is located, the desired wind microclimate would typically need to have areas acceptable for sitting, standing (including at entrances of buildings) and walking use. A description of the comfort categories to classify wind conditions in accordance with is given below.

12.29 Any areas which show up as either unsafe (annually) or uncomfortable (for the windiest season) would require mitigation, unless they are in locations where pedestrian access can be controlled in the event of strong winds. This applies to all thoroughfares (for pedestrians) and roads (for cyclists) around the Development.

12.30 The target for the LUL station is to be suitable for standing (entrance use) during the windiest season. The Lawson criteria does not specifically set targets for railway ticket offices, but both bus stops and covered walkways are classified as standing, and it could reasonably be expected that the LUL station would be subject to similar expectations as either of these activities.

12.31 The target for the upper level terraces is to be suitable for a mixture of occasional sitting and standing during the summer months. This would allow user to choose to sit in “calmer” areas of the terrace and engage in more active pursuits in “windier” areas.

12.32 There are areas of the public realm around the Site which would be required to be suitable for sitting during the summer months, these are highlighted in **Figure 12-4** and are;

- The St. Thomas Street entrance to the north of the Site, which includes shallow steps suitable for casual seating;
- Seating at the west end of the New Yard; and
- Seating on the northern side of the Main Courtyard.

12.33 The areas immediately outside any building entrances should be suitable for standing use during the windiest season to provide a “buffer” between the still conditions in interior spaces and the general thoroughfare. If an entrance is within a recess, then this can reasonably be assumed to provide the buffer, and walking is acceptable (unless the recess is explicitly modelled in the CFD analysis).

12.34 In relation to the effect of the Development on the wind microclimate around Southwark Cathedral, the target for this area is for conditions to be suitable for standing in the grounds of the Cathedral during the windiest season (and suitable for walking on local thoroughfares).

The Works

12.35 The wind microclimate assessment of the Works phase has not been assessed using CFD simulations, as the massing would progressively change throughout this stage of the Development. The microclimate conditions could reasonably be expected to progressively change from the Site (as existing) baseline conditions to those of the completed and operational Development. Therefore, the CFD results for these phases have been used, in conjunction with professional judgement, to provide a qualitative assessment of the Works wind microclimate conditions during the Works.

Completed and Operational Development

12.36 The conditions for the completed and operational Development were assessed using the same high resolution CFD model as the baseline conditions. Overall, the following configurations were tested:

- Configuration 1: The Site (as existing) with the baseline conditions surrounding the Site;
- Configuration 2: The completed and operational Development with the baseline conditions surrounding the Site;
- Configuration 3: The completed and operational Development with the baseline and cumulative schemes;
- Configuration 4: The completed and operational Development with landscaping and mitigation measures, with the baseline and cumulative schemes.

12.37 As noted above, configurations were tested to assess the cumulative effects of the Development in combination with other developments. The results of this cumulative assessment are reported separately within **Chapter 15: Cumulative Effects** although the effectiveness of the mitigation measures are reported within this chapter in order to demonstrate that the adverse effects have been appropriately mitigated.

12.38 It should be noted that Shard Place has been included in the baseline surrounds (and hence all configurations) as the scheme is under construction and is progressing to completion in 2019.

12.39 Following the testing of Configurations 1, 2 and 3, mitigation measures were developed through a consultative process in collaboration between Wirth Research and AHMM. The mitigation measures were then included within Configuration 4.

12.40 The proposed soft landscaping scheme for the completed and operational Development was not included in Configurations 1, 2 and 3 to ensure a conservative result. These were, however, included in Configuration 4, as they can be considered inherent to the completed and operational Development and are included within the landscaping proposals applied for.

12.41 An additional configuration, Configuration 5, is reported in **Appendix 12-1** as this relates to the conditions within a semi-enclosed space within the Development, which can be controlled during the operation of the completed Development and is therefore a design issue and not relevant for inclusion in the ES.

Significance Criteria

12.42 Wind effects can be considered significant if they change the classification of any pedestrian area either to or from the desired target wind conditions (see paragraphs 12.28 to 12.34).

12.43 Effects that change conditions so that they meet the target conditions are considered **beneficial**.

12.44 Effects that change conditions so that they no longer meet the target conditions are considered **adverse**.

12.45 The wind microclimate assessment significance criteria are shown in **Table 12.4** scaling in accordance with the grades of the Lawson Comfort Criteria.

Table 12-4: Wind Microclimate Assessment Significance Criteria

Modelled Wind Microclimate Criteria	Effect Classification and Significance
Wind Conditions are 3-grades 'calmer' / 'windier' than desired.	Major beneficial / adverse
Wind Conditions are 2-grades 'calmer' / 'windier' than desired	Moderate beneficial / adverse
Wind Conditions are 1-grade 'calmer' / 'windier' than desired	Minor beneficial / adverse
Wind Conditions are the same or similar to those desired.	Insignificant

12.46 All effects for the completed and operational Development are considered long term and local.

12.47 All effects for the Works phase are considered either short or medium term and local.

Limitations and Assumptions

12.48 The accuracy of the results are dependent upon the accuracy of the CAD used to construct the model.

12.49 There is an inherent assumption that on-site wind speeds would scale linearly with the measured wind speeds at the airport 'superstation'.

12.50 There is an inherent assumption that the wind speed statistics for the past 30 years would remain applicable for the foreseeable future.

12.51 It should be noted that the above assumptions would also be true of a wind tunnel based assessment.

Baseline Conditions

General Meteorological Conditions

12.52 The meteorological data obtained for London (**Figure 12-3**) indicates that the prevailing wind throughout the year is from the south-west (i.e. 210 to 240 degrees on the compass). This is typical for many areas of southern England. There is a secondary peak from the north-east during the late spring and early summer. The winds from the north-east are not as strong as the prevailing winds from the south-west.

The Existing Site with Surrounding Buildings

12.53 Summer Comfort, Winter Comfort and Annual Safety for the Site, LUL station and local area, for Configuration 1 (under baseline conditions), are shown in **Figures 12-5**, **12-6** and **12-7**. Regions of interest are marked with lettered regions.

12.54 The wind microclimate conditions throughout and surrounding the Site are generally as would be expected within an urban environment, ranging from acceptable for long-term sitting to walking use during the windiest season. There are, however, some localised regions (described in paragraph 12.57) where wind speeds exceed what would usually be expected.

On-Site Ground Level Conditions

12.55 Conditions for the Site (as existing) are suitable for either long term sitting in summer, or a mixture of long term sitting and occasional sitting in winter.

LUL Station Conditions

12.56 Conditions at the LUL station are suitable for either long term sitting in summer, or a mixture of long term sitting and occasional sitting in winter.

Local Area Ground Level Conditions

12.57 Across the wider local area there are less favourable conditions in some areas. Of particular significance is in the region between the Shard, Shard Place and London Bridge Place there are 3 areas where winds are classified as uncomfortable (marked A, B and C on **Figure 12-6**), 1 of which (marked C on **Figure 12-7**) is also classified unsafe.

12.58 Winter conditions in the grounds of Southwark Cathedral are classified as suitable for long term sitting, occasional sitting or standing. There is a small region which is suitable for walking (marked D on **Figure 12-6**) on Cathedral Road to the west of the grounds.

Assessment of Likely Significant Effects

The Works

12.59 During the Works, it could reasonably be expected that on-site wind conditions would be calm for the demolition phase, given the relatively calm conditions of the existing Site and the relative low height of the existing buildings on Site (meaning they would not be providing shelter for any leeward buildings).

12.60 During the construction phase of the Works there would be a short term **adverse effect of minor significance** in the Main Courtyard (as described in paragraph 12.63). This effect would be due to downwash from the southern face of the Development, which is intrinsically linked to the building height. Therefore this effect would only become significant during the final stages of construction, once a certain height has been exceeded (50% of the total height could be considered a conservative estimate). This effect would be mitigated once the tree planting in the Main Courtyard is complete (see paragraph 12.83). This would ensure a comfortable and safe wind environment for the intended usage.

Completed and Operational Development

12.61 Summer Comfort, Winter Comfort and Annual Safety for the Site, hub terraces, Level 5 terraces, LUL station and local area, for Configuration 3 (completed and operational Development with baseline and cumulative schemes), are shown in **Figures 12-8**, **12-9** and **12-10**. Areas of interest are marked with lettered regions. This Configuration is shown as this is the configuration on which wind mitigation measures have been applied, but these are unchanged from the comfort levels for Configuration 2 (completed and operational Development with baseline surrounds).

On-Site Ground Level Conditions

12.62 Winter conditions for the on-site region vary between occasional sitting, standing and walking across the majority of the region. Summer conditions vary between frequent sitting, occasional sitting and standing.

12.63 The Main Courtyard near the corner of the Development (marked E in **Figure 12-9**) is classified as having uncomfortable winter winds which is one category winder than desired. This represents an adverse **effect of minor significance** and requires mitigation. Mitigation measures, to render this effect insignificant, are described below.

12.64 This area described above is suitable for walking in summer conditions, which is windier than might be desired, but not a significant effect.

12.65 Each of the proposed entrances to the Development are located within areas which are classified as suitable for standing or calmer. Conditions are appropriate for their intended use and the likely effects are **insignificant**.

12.66 One of the proposed entrances to the Georgian Terrace is located in proximity to an area which is classified as suitable for walking. The rest are located within areas which are classified as suitable for standing or calmer. As the Georgian Terrace entrances would be recessed, walking can be considered suitable. Conditions are appropriate for their intended use and the likely effects are **insignificant**.

12.67 The St Thomas Street entrance contains an area which is classified as suitable for standing in summer winds (marked F in **Figure 12-8**), which is one category windier than desired. This represents an **adverse effect of minor significance** and requires mitigation. Mitigation measures, to render this effect insignificant, are described below.

12.68 The seating at the west end of the New Yard contains a region which is classified as suitable for standing in summer winds (marked G in **Figure 12-8**), which is one category windier than desired. This represents an **adverse effect of minor significance** and requires mitigation. Mitigation measures, to render this effect insignificant, are described below.

12.69 The seating on the north side of the Main Courtyard is classified as suitable for occasional sitting in summer conditions, and as such meets the target conditions for this area and the effect is **insignificant**.

LUL Station Conditions

12.70 Winter conditions for the LUL station range from frequent sitting to standing. The conditions are appropriate for their intended use and the likely effects are **insignificant**.

Local Area Ground Level Conditions

12.71 There is a **beneficial effect of minor significance** to the east of London Bridge Place (marked A in **Figure 12-9**), where an area of uncomfortable winter winds have been reclassified as suitable for walking.

12.72 There is also an adverse effect on the northern side of St Thomas Street, across the road from the Development (marked H in **Figure 12-9**), which is shown to have uncomfortable winter winds. This is one category winder than desired (walking conditions) and would represent an adverse effect of minor significance, if considered in isolation. Analysis contained in **Appendix 12-1**, however, shows that this adverse effect is intrinsically linked to the beneficial effect described above, and beyond the scope of any realistic mitigation options on the Development. Given the relative extents of these effects (spread across a wide area of pedestrian access by London Bridge Place, restricted to the immediate near wall region on St Thomas Street) and the relative expected usage levels (a busy public transport hub by London Bridge Place and a thoroughfare with little incentive for stopping on St Thomas Street), the combination of these effects can be considered a net benefit and mitigation is not required (i.e. the adverse effect can be treated as insignificant).

12.73 Winter conditions in the grounds of Southwark Cathedral are classified as suitable for long term sitting, occasional sitting or standing. The area which is suitable for walking (marked D in **Figure 12-9**), on Cathedral Road to the west of the grounds, covers a wider area than in the baseline conditions. This effect is **insignificant** as it is appropriate for the intended use.

Level 3 Terrace Conditions

12.74 Summer conditions on the Level 3 terrace show an area that is suitable for walking rather than being suitable for standing and therefore one category winder than desired, representing an **adverse effect of minor significance**. This region is marked I in **Figure 12-8**. Mitigation is therefore required, which is considered below and renders this effect insignificant. It should be noted that this effect is limited only to the extremities of the terrace.

Level 5 Terrace Conditions

12.75 Summer conditions on the Level 5 terrace show an area that is suitable for walking rather than being suitable for standing and therefore one category winder than desired, representing an adverse effect of minor significance. There is also an area that is classified as being uncomfortable rather than being suitable for standing and therefore two categories windier than desired, representing an **adverse effect of moderate significance**. These regions are marked J in **Figure 12-8**. Mitigation is therefore required, which is considered below and renders this effect insignificant.

12.76 This area also carries a risk with regards to annual wind safety (marked J in **Figure 12-10**). There is a region of approximately 15 square metres with approximately 6 hours exceedance of 15m/s per year, and a peak of 19 hours per year exceeding 15m/s. This is considerably above the 2 hours per year limit, and mitigation is therefore required, which is considered below and renders this effect insignificant.

Hub Terrace Conditions

12.77 Summer conditions on the hub level terrace show areas suitable for walking rather than being suitable for standing and therefore are one category windier than desired, representing an adverse effect of minor significance (marked K and L in **Figure 12-8**). There is also an area within the western hub terrace classified as uncomfortable rather than being suitable for standing, representing an **adverse effect of moderate significance** (marked K in **Figure 12-8**). Mitigation is therefore required, which is considered below and renders this effect insignificant.

12.78 The region on the western hub terrace (marked K in **Figure 12-10**) also carries a risk with regards to annual wind safety. There is a region of approximately 15 square metres with approximately 10 hours exceedance of 15m/s per year, and a peak of 21 hours per year exceeding 15m/s. This is considerably above the 2 hours per year limit, and mitigation is therefore required, which is considered below and renders this effect insignificant.

Mitigation Measures and Likely Residual Effects

12.79 To mitigate the significant adverse effects outlined above, the following mitigation measures have been identified. These were tested within the CFD assessment as part of Configuration 4:

- Plant trees in the ground level public realm, in accordance with the plans included within the landscaping proposals applied for.
- The addition of extension screens to the southern edge of the hub terraces, extended such that their highest extent is 2.5m above the floor level on the terrace (shown in **Figure 12-11**).
- Installing 1.5m wide vertical glass screens across the southern edge of the Level 5 terrace, angled at 25° to maintain the experience of the terrace being "open" (shown in **Figure 12-12**).
- Restricting access to the extremities of the Level 3 terrace, through means of a perforate hand rail), so that the effect on this terrace is no longer within a publicly accessible space.

The Works

12.80 All of the mitigation measures proposed are likely to be implemented towards the end of the Works phase. As such, they cannot reasonably be expected to impact significantly upon the wind microclimate during the Works.

12.81 The short-term adverse effect of minor significance, described in paragraph 12.60, is an issue of comfort rather than safety, therefore the conditions can reasonably be expected to be suitable for busy construction workers and conditions are suitable. If, however, public access is required on Site during the works phase, it is recommended that steps are taken to restrict access to the affected area, especially on windy days, once the building is beyond 50% of its height, in order to mitigate against this effect.

Completed and Operational Development

12.82 Summer Comfort, Winter Comfort and Annual Safety for the Site, hub terraces, Level 5 terraces, LUL station and local area, for Configuration 4 (completed and operational Development with landscaping and mitigation measures, with baseline and cumulative schemes), are shown in **Figures 12-13**, **12-14** and **12-15**. Areas of interest are marked with lettered regions.

On-Site Ground Level Conditions

12.83 With the inclusion of landscaping in the public realm areas, during winter winds (marked E in **Figure 12-14**), the wind conditions are suitable for their intended use. There is an area in the ground floor public realm which remain uncomfortable (within the region marked E), but this is restricted to a small area which is flush against the western exoskeleton of the Development and separated from the main routes into the Main Courtyard by the planting for the pleached trees, and as such can be considered outside of pedestrian usage. The residual effects are therefore **insignificant** and would not require any further mitigation.

12.84 With the inclusion of landscaping in the public realm areas, the St Thomas Street entrance is suitable for occasional sitting during summer conditions and is therefore suitable for the intended entrance use; part of this area was only suitable for standing when the landscaping and mitigation were not present. The residual effects at the St Thomas Street entrance are **insignificant**.

12.85 With the inclusion of landscaping in the public realm areas, the seating area at the west end of the New Yard is suitable for occasional sitting during summer conditions and is therefore suitable for the intended use; part of this area was only suitable for standing when the landscaping mitigation was not present. The residual effects at the New Yard are therefore **insignificant**.

Level 3 Terrace Conditions

12.86 The inclusion of mitigation has restricted access to a small part of the Level 3 terrace such that the areas with adverse effects of minor significance are no longer accessible to the general public. As the proposed mitigation is a perforated hand rail (to restrict access to the area with adverse effects), it can reasonably be expected not to affect the wind conditions, so no significant adverse residual effects would be felt elsewhere on the terrace. The residual effects are, therefore, **insignificant**.

Level 5 Terrace Conditions

12.87 With the inclusion of 1.5m wide, 25° angled screens on the southern edge of the Level 5 terrace, the Level 5 terrace is suitable for a mixture of occasional sitting and standing during summer conditions and is therefore suitable for the intended use; part of this area was only suitable for walking in summer conditions when the mitigation was not present. There are still some extremely localised regions classified suitable for “walking” during summer winds (or “uncomfortable” during winter winds), but these are restricted to a small enough area that they can be easily avoided by users of the terrace that are more sensitive to wind. Therefore the conditions on the terrace are suitable for their intended use and the residual effects at the Level 5 terrace are **insignificant**.

12.88 The inclusion of 1.5m wide, 25° angled screens on the southern edge of the Level 5 terrace has effectively mitigated against the risk with regards to annual wind safety on the Level 5 terrace with the wind in exceedance of the 15m/s limit only 0.31 hours per year (at the point of maximum exceedance), well within the 2 hour per year limit.

Hub Terrace Conditions

12.89 With the inclusion of 2.5m high screens on the southern edge of the hub terraces, the hub terraces are suitable for a mixture of occasional sitting and standing during summer conditions and is therefore suitable for the intended use; part of this area was only suitable for walking in summer conditions when the mitigation was not present. The residual effects at the hub terrace are **insignificant**.

12.90 The inclusion of the 2.5m high screens on the southern edge of the hub terraces has effectively mitigated against the risk with regards to annual wind safety) on the western hub terrace, with the wind in exceedance of the 15m/s limit only 0.12 hours per year (at the point of maximum exceedance), well within the 2 hour per year limit.

Table 12-5: Summary of Likely Significant Effects, Mitigation Measures and Likely Residual Effects

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
The Works			
Wind effects on and around the Site during the Works	**Short-term, local, adverse effect of minor significance**	The effect is entirely within the site boundary and not publicly accessible during the Works. Mitigation developed for the completed Development should be provided around buildings as they are occupied.	**Insignificant**
Completed and Operational Development			
Wind effects on off-site local thoroughfares	**Insignificant (LUL station entrance, Southwark Cathedral) to long-term, local, beneficial effect of minor significance (between London Bridge Place and the Shard)**	None required as there is a significant benefit in the area near London Bridge Place.	**Insignificant**
Wind effects on on-site public realm	**Long-term, local, adverse effect of minor significance (in the Main Courtyard)**	Tree planting in the ground level public realm in accordance with the plans as submitted.	**Insignificant**
	Long-term, local, adverse effect of minor significance (in St. Thomas Street entrance)	Tree planting in the ground level public realm in accordance with the plans as submitted.	**Insignificant**
	Long-term, local, adverse effect of minor significance (in New Yard)	Tree planting in the ground level public realm in accordance with the plans as submitted.	**Insignificant**

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Wind effects on on-site amenity spaces	**Long-term, local, adverse effect of moderate significance (on hub terrace)**	Install screens on south edge of hub terrace up to 2.5m from floor.	**Insignificant**
	Long-term, local, adverse effect of moderate significance (on Level 5 terrace)	Install 1.5m wide vertical screens, angled 25°, along the south edge of Level 5 terrace.	**Insignificant**
	Long-term, local, adverse effect of minor significance (on Level 3 terrace)	Restrict access to the extremities of the Level 3 terrace by a perforated hand rail.	**Insignificant**

13. Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution

Introduction

13.1 This chapter, prepared by GIA, presents an assessment of the likely effects of the Development on the daylight and sunlight amenity to the occupiers of neighbouring sensitive properties and overshadowing to existing amenity areas in the vicinity of the Site.

13.2 A solar glare assessment has also been undertaken due to the Development's proximity to multiple road junctions and rail tracks to and from London Bridge mainline station. In addition, a light pollution assessment has been carried out to identify any potential effects to surrounding sensitive receptors.

13.3 This chapter contains a description of the methods used to assess the effects and a description of the relevant baseline conditions of the Site and its surrounding area. This is followed by an assessment of the likely significant effects of the Development during the demolition and construction works and once the Development is complete and operational. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any adverse effects identified, and a description is provided of the nature and significance of likely residual effects.

13.4 This chapter is supplemented by the following documents:

- **Appendix 13.1**: Plan of a Model of the Existing Site and the Development;
- **Appendix 13.2**: Daylight and Sunlight Results to surrounding sensitive receptors;
- **Appendix 13.3**: Overshadowing Results;
- **Appendix 13.4**: Solar Glare Results; and
- **Appendix 13.5**: Light Pollution Results.

13.5 Please note that for the purposes of this ES chapter, the demolition, deconstruction, refurbishment and construction works will be referred to as 'the Works'.

Assessment Methodology and Significance Criteria

13.6 The non-mandatory Building Research Establishment (BRE) Guidelines suggest that residential properties have the highest requirement for daylight and sunlight and state that *"the guidelines are intended for use for rooms in adjoining dwellings where light is required, including living rooms, kitchens and bedrooms"*. Therefore, this chapter focuses on those residential buildings and other sensitive receptors such as hospitals surrounding the Site which would have the potential to be affected by the Development. The uses of nearby buildings, in terms of commercial and residential, were established using external observations and Valuation Office Agency (VOA) checks. The BRE Guidelines are the industry recognised standard for assessing all matters related to daylight, sunlight and overshadowing, and the primary reference within all national and local policy.

13.7 When determining whether changes in light condition are in line with policy and guidance, it is important to give consideration to other contextual matters, such as instances where the existing light levels within neighbouring properties are already low, or where the proposed residual values are commensurate with that which one would expect to find in surrounding urban areas of similar density. Furthermore, daylight and sunlight impacts of a development should be balanced against the improvements and benefits which the scheme will bring to the area.

Baseline characterisation

13.8 Baseline characterisation was completed by firstly undertaking a review of the surrounding land uses using information and data sourced from the VOA website. This review was undertaken for all surrounding properties in close enough proximity to the Site to be affected by the Development, to identify any residential or other sensitive properties (such as hospital facilities) to be assessed as potential sensitive receptors.

13.9 It should be noted that buildings with transient use such as classrooms, hospitals and student accommodation have a lower requirement for daylight and sunlight, and are therefore given a lower sensitivity than permanent residential properties.

13.10 This was followed by a Site visit during November 2018 to confirm the existing conditions around the Site remain accurate to those modelled. The conditions recorded are not considered to have changed from the day of the Site visit to the time of writing this ES chapter.

13.11 Based on the above, a three dimensional (3D) AutoCAD model was developed for the existing surrounding properties and existing buildings on-Site using a full topographical survey, photogrammetric survey and site photographs.

Scenarios Assessed

13.12 The following scenarios have been considered and are reported within this chapter of the ES:

- Baseline;
- Demolition and Construction ('the Works'); and
- Complete and Operational Development;

Baseline

13.13 This scenario has considered the current baseline condition (as at the time of writing) at identified sensitive receptors. It is depicted on drawings 8684/01/01/001 (**Appendix 13.1**).

13.14 As noted in paragraph 13.6, the BRE Guidelines state that residential properties have the highest requirement for daylight and sunlight. In addition, the BRE Guidelines state that other uses such as hospitals and schools may also have a requirement for daylight and sunlight.

13.15 Accordingly, existing residential and hospital receptors adjoining or in proximity to the Site have been considered within this assessment. In addition, classrooms associated with the London School of Commerce have been included.

13.16 It should be noted that Shard Place has been included in the baseline scenario as construction is well underway, and the superstructure is very likely to be completed before work starts on the proposed Development; the scheme is due to be completed in 2019.

13.17 With regard to Sun Hours on Ground, as sun exposure is predominantly within southern facing aspects of the Site due to the path of the sun, only the neighbouring amenity areas located to the north of the Site have been considered within this assessment. For transient overshadowing, all neighbouring amenity areas to the north of the Site in close enough proximity to experience overshadowing from the Development have been considered.

Complete and Operational Development

13.18 The complete and operational Development scenario consists of the detailed Development in the context of the surrounding existing environment. This scenario assesses the potential daylight, sunlight, overshadowing, solar glare and light pollution effects of the Development on the surrounding receptors and amenity spaces as well as sensitive road junctions and train lines.

13.19 This scenario is illustrated on drawing number 8684/03/01/001 within **Appendix 13.1**.

Sensitive Receptors

Daylight and Sunlight

13.20 As set out in the assessment methodology, existing residential, hospital and educational receptors are considered to be sensitive receptors that may be affected by the Development. In addition, future residential receptors within Shard Place have been included in the assessment as they are in very close proximity to the Site and construction of Shard Place is well underway and is expected to be complete prior to the Works commencing on New City Court.

13.21 As shown in **Figure 13.1** and **Table 13.1**, the following residential properties, Guy's Hospital and the London School of Commerce have been considered due to their proximity to the Site.

Table 13.1: Daylight and Sunlight Receptor Locations

Receptor Location
6 London Bridge Street
43 Borough High Street
51 Borough High Street
53-55 Borough High Street
57 Borough High Street
59-61 Borough High Street
63a Borough High Street
3 Kings Head Yard
The Old King's Head Public House
22 Southwark St
St. Thomas Church
Bunch of Grapes Public House, 2 St. Thomas Street
Iris Brook House - Talbot Yard (Student Accommodation)
Orchard Lisle House - Talbot Yard (Student Accommodation)
Chaucer House - White Hart Yard – London School of Commerce
Shard Place
Guy's Hospital – Tower Wing
Guy's Hospital – Southwark Wing

Overshadowing

13.22 Owing to the southerly location of the sun path, only the amenity areas located to the north of the Site have the potential to have experience alteration is sunlight with the Development implemented. Therefore, only amenity areas located from northward of the Site from due east to due west have been considered. Due to the scale of the Development and the nature of the surrounding area, the amenity area in proximity to the Site that is considered sensitive in terms of overshadowing is shown on **Figure 13.2**.

13.23 In addition to existing amenity area, the new amenity areas created by the Development have been assessed using Sun Hours on Ground to determine the quantum of sunlight they would receive. As the amenity areas are new, a comparison against a baseline is not possible. Therefore, the amenity areas are assessed in absolute terms.

Solar Glare

13.24 Solar glare is not a comparative assessment; the fact it may occur in the baseline does not necessarily justify its occurrence as a result of a Development. Therefore, the assessment considers the effect of the Development in absolute terms and not against the baseline.

13.25 Nearby railway lines and roads have also been assessed for solar glare, and the locations assessed can be seen in **Figure 13.3**.

Light Pollution

13.26 The following properties were considered sensitive in regard to light pollution due to their close proximity to the Site:

- 2 St. Thomas Street;
- 3 Kings Head Yard;
- 45 Borough High Street (The Old King's Head);
- 43, 51, 53, 55, 57, 59, 63 and 63a Borough High Street;
- Orchard Lisle House; and
- Shard Place.

13.27 An assessment has been undertaken on the effects on these properties caused by the proposed Development.

13.28 All other sensitive receptors are considered too far from the Site to be affected by the Development in terms of light pollution.

Methodology for Determining Effects During the Works

13.29 Owing to the evolving and changing nature of the Works, the assessment of potential effects during demolition and construction of the Development on daylight, sunlight and overshadowing to surrounding receptors has not been modelled. Instead, a qualitative assessment has been undertaken using professional judgement and experience.

13.30 The potential daylight, sunlight and overshadowing effects relating to demolition and construction works would vary throughout the construction programme and gradually increase to the potential effects identified for the completed Development. It is considered that the completed Development represents the worst-case assessment in terms of likely effects on levels of daylight, sunlight and overshadowing received by sensitive receptors.

Methodology for Determining Complete and Operational Effects

13.31 The methodologies set out below have been used to determine the effects of the complete and operational Development.

Approach for Daylight, Sunlight, Overshadowing and Solar Glare Assessments

13.32 The technical analyses carried out to inform the assessments have been undertaken by creating a digital 3D model of the existing Site, and the complete and operational Development, based on measured survey data.

Daylight

13.33 The BRE Guidelines specify two primary methods for assessing daylight within an existing sensitive receptor:

- Vertical Sky Component (VSC); and
- No Sky Line (NSL) Method.

13.34 These are presented in further detail below.

Vertical Sky Component (VSC) Method

13.35 The VSC method of assessment is defined in the BRE Guidelines as the:

"ratio of that part of illuminance at a point on a given vertical plane that is received directly from a CIE standard overcast sky, to illuminate on a horizontal plane due to an unobstructed hemisphere of this sky".

13.36 The 3D model uses a Waldram Diagram to establish the VSC and 3D geometric calculations for daylight distribution. This model (which is orientated to north by the use of Ordnance Survey (OS) information) enables the path of the sun to be tracked throughout the year to establish the shadow cast by existing and proposed buildings, and thus calculate the sun hours on ground in each scenario and how the Development would affect the amount of daylight being received at surrounding sensitive receptors.

13.37 Only those surrounding properties which have windows facing towards the Site were included in the assessment. If a nearby property has no windows facing the Site, these properties would not be affected by the Development in terms of light.

13.38 The assessment is calculated from the centre of a window on the outward face and measures the amount of light available on a vertical wall or window following the introduction of visible barriers, such as buildings.

13.39 Regarding existing trees, these may be ignored unless they form dense continuous belts. As stated within the BRE "where the effect of a new building on existing building is being analysed, it is usual to ignore the effect of existing trees. This is because daylight is at its scarcest and most valuable in winter when most trees will not be in leaf." There are no "dense continuous belts" of trees within the Site, and as such, trees are excluded from the assessment as per the BRE Guidelines.

13.40 The maximum VSC value is 39.9% for a completely unobstructed vertical wall or window. In terms of assessment criteria, the BRE Guidelines state that:

"If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected. This will be the case if either:

- *the VSC measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value* *the area of the working plane in a room which can receive direct skylight is reduced to less than 0.8 times its former value."*

13.41 It is acknowledged that the values in the BRE Guidelines are predicated against a 2-3 storey suburban model, therefore the application of its guidelines in inner urban environments should be treated flexibly. This form of assessment does not take account of context or detailed matters such as window size, room use, room size, window number or dual aspect rooms. This assessment also assumes that all obstructions to the sky are 100% non-reflective. It should be noted that the BRE Guidelines acknowledges this and states, in paragraph 2.2.3;

2.2.3 'The numerical values given here are purely advisory. Different criteria may be used based on the requirements for daylighting in an area viewed against other site layout constraints.'

13.42 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. GIAs experience in daylight and sunlight matters in dense urban environments suggest that weight should also be given to the retained values rather than just the percentage change. Our experience in the field would suggest that a more realistic VSC level in a dense urban environment would be considered to be around 15%.

13.43 GIA's view on retained VSC levels is supported by the Greater London Authority's hearing report for the Monmouth House and Featherstone Street development (application reference: P2015/3136/FUL) where it was considered in Para 120, Page 31:

'For general guidance, whilst the BRE guidelines recommend a target value of 27% VSC when measured on an absolute scale, that value is derived from a low density suburban housing model. In an inner city urban environment, VSC values in excess of 20% should be considered as reasonably good, and VSC in the mid-teens should be acceptable.'

No Sky Line (NSL) Method

13.44 The NSL method is a measure of the distribution of daylight at the 'working plane' within a room. The 'working plane' is a horizontal plane 0.85m above finished floor level for residential properties. The NSL divides those areas of the working plane which can receive direct sky light from those which cannot. If a significant area of the working plane lies beyond the NSL (i.e. it receives no direct sky light), then the distribution of daylight in the room may be poor and supplementary electric lighting may be required.

13.45 Where actual room layouts were available, these have been considered in the modelling of the internal layouts within the surrounding properties. Obtaining these room layouts enables precise evaluation of the diffuse levels of daylight within each of the rooms via the NSL. Where layout information was not available assumptions have been made as to the use and internal configuration of the rooms (from external observations) behind the fenestration observed. In such cases a standard 4.2m (14 ft) room depth has been assumed, unless the building form dictated otherwise. This is common practice where access to buildings for surveying is unavailable.

13.46 The potential effects of daylighting distribution in an existing building can be found by plotting the NSL in each of the main rooms. For houses, this would include living rooms, dining rooms and kitchens. Bedrooms should also be analysed, although they are less important. The BRE Guidelines identify that if the area of a room that does receive direct sky light is reduced to less than 0.8 times its former value, then this would be noticeable to its occupants.

13.47 British Standard (BS) 8206 Part 2 Lighting for Buildings, Code of Practice for Daylighting also states that the:

"uniformity of daylight is considered to be unsatisfactory if a significant part of the working plane (normally more than 20%) lies behind the no-sky line".

13.48 Therefore, an NSL of at least 80% would be considered satisfactory.

13.49 In relation to deep rooms lit by windows on one side, the BRE Guidelines state in paragraph 2.2.20:

"If an existing building contains rooms lit from one side only and greater than 5m deep, then a greater movement of the no sky line may be unavoidable."

Sunlight

Annual Probable Sunlight Hours (APSH)

13.50 The APSH is a measure of sunlight that a given window may expect over the period of a year, and where there is no obstruction, equates to a maximum of 1,486 hours. Sunlight is measured using a sun indicator which contains 100 spots, each representing 1% of APSH (i.e. 14.86 hours of the total APSH).

13.51 The number of spots is calculated for all scenarios during the year and also during the winter period, and a comparison made between the two. This provides a percentage of APSH for each of the time periods for each window assessed.

13.52 The BRE Guidelines note on page 14 that:

- *"In housing, the main requirement for sunlight is in living rooms, where it is valued at any time of day, but especially in the afternoon."*
- *"all main living rooms of dwellings…should be checked if they have a window facing within 90° of due south. Kitchens and bedrooms are less important, although care should be taken not to block too much sun".*
- *"If the main living room to a dwelling has a main window facing within 90° of due north, but a secondary window facing within 90° of due south, sunlight to the secondary window should be checked."*
- *"…a south facing window will, in general, receive most sunlight, while a north facing one will receive it only on a handful of occasions. East and west facing windows will receive sunlight only at certain times of day".*

13.53 In regard to existing surrounding receptors, the BRE Guidelines provide that a window may be adversely affected if a point at the centre of the window receives for the whole year, less than 25% of the APSH, including at least 5% of the APSH during the winter months (21 September to 21 March) and less than 0.8 times its former sunlight hours during either period, and if there is a reduction in total APSH which is greater than 4%.

13.54 BS 8206 Part 2 states that:

- *"Provided that the entry of sunlight is properly controlled, it is generally welcome in most buildings in the UK. Dissatisfaction can arise as much from the permanent exclusion of sunlight as from its excess. The provision of sunlight is important in dwellings, particularly during winter months. Sunlight is especially valued in habitable rooms used for long periods during the day."*
- *"Interiors in which the occupants have a reasonable expectation of direct sunlight should receive at least 25% of probable sunlight hours (see 2.10.2). At least 5% of probable sunlight*

hours should be received during the winter months, between 21 September and 21 March. Sunlight is taken to enter an interior when it reaches one or more window reference points."

13.55 It is often not possible to determine the room uses within each of the neighbouring properties, nor is it clear which windows should be considered as the 'main windows'. Therefore, regardless of use, all the rooms with windows facing the Site and within 90 degrees of due south have been considered in the assessment.

Summary of Criteria for Daylight and Sunlight

13.56 **Table 13.2** provides a summary of the criteria set out within the BRE Guidelines for daylight and sunlight.

Table 13.2: Summary of Daylight and Sunlight Assessment Criteria

Method	BRE Criteria
VSC	A window may be adversely affected if its VSC measured at the centre of the window is less than 27% and less than 0.8 times is former value.
NSL	A room may be adversely affected if the daylight distribution (NSL) is reduced beyond 0.8 times its existing area.
APSH	A window may be adversely affected if a point at the centre of the window received for the whole year, less than 25% of the APSH including at least 5% of the APSH during the winter months (21 September to 21 March) and less than 0.8 times its former sunlight hours during either period, and for existing neighbouring buildings, if there is a reduction in total APSH which is greater than 4%.

Overshadowing

Transient overshadowing

13.57 The BRE Guidelines suggests that where large buildings are proposed that may affect a number of gardens or open spaces, it is useful to plot a shadow plan to illustrate the location of shadows at different times of the day and year. For the purpose of this assessment the hourly shadows were mapped for the following three key dates in the year:

- 21 March (Spring Equinox);
- 21 June (Summer Solstice); and
- 21 December (Winter Solstice).

13.58 21 September (Autumn Equinox) provides the same overshadowing images as March 21 (Spring Equinox) as the sun follows the same path at these corresponding times of year. Therefore, 21 March is used within the overshadowing assessment.

13.59 The transient overshadowing has been calculated at hourly intervals throughout the day from 08:00 to 19:00, and visual representations are provided in **Appendix 13.3**. Where there are gaps in timings in **Appendix 13.3**, this is because the sun would not be present during these times (for example. from approximately 16:00 onwards on 21 December) and thus no shadow can be cast. On December 21, the sun is at its lowest point causing long shadows to be cast and represents the worst-case scenario in terms of overshadowing.

Sun Hours on Ground

13.60 The BRE Guidelines suggest that Sun Hours on Ground assessments should be undertaken on the equinox (21 March or 21 September). Using specialist software, the path of the sun is tracked to determine where the sun would reach the ground and where it would not.

13.61 It is recommended that at least half of a garden or amenity area should receive at least two hours of sunlight on 21st March or the area which receives 2 hours of direct sunlight should not be reduced to less than 0.8 times its former value (i.e. there should be no more than a 20% reduction).

Solar Glare

13.62 Solar glare is particularly important at pedestrian crossings, road junctions and train lines, where glare can reduce visibility for drivers or pedestrians. Typically, elements considered to be reflective are either glazed apertures or metal cladding.

13.63 The BRE Guidelines includes the following statement in regard to the potential for reflected solar glare from a new development:

"Glare or solar dazzle can occur when sunlight is reflected from a glazed façade. This can affect road users outside and the occupants of adjoining buildings. The problem can occur either when there are large areas of reflective glass or cladding on the façade, or when there are areas of glass or cladding which slope back so that high altitude sunlight can be reflected along the ground. Thus solar dazzle is only a long term problem only for some heavily glazed (or mirror clad) buildings…"

13.64 Solar glare is not a comparative assessment; the fact it may occur in the baseline does not justify its occurrence as a result of a Development. Therefore, the assessment presented in this chapter considers the effect of the Development in absolute terms, by reference to the relevant guidance levels.

Viewpoints for Road Users and Pedestrians

13.65 As indicated previously, the assessment considers potentially sensitive viewpoints for road users and pedestrians surrounding the Site. The viewpoints are generally located at the minimum stopping distance (see paragraph 13.68 of this chapter for further information) and at the driver's eye level. The focal point is a relevant traffic element, such as signals or incoming traffic.

13.66 Identifying the viewpoints based on the stopping distance is calculated as the combination of thinking and braking distances, using the following formula:

$$D_{total} = D_{thinking} + D_{braking} = V*T + V^2/(2\mu*g)$$

13.67 Where each component is:

- V = Relevant vehicle speed, typically the road speed limit;
- T = Thinking time (0.67 seconds);
- µ = Braking effort (considered 0.65 for cars and 0.5 for buses); and
- g = Gravity acceleration.

13.68 The height of the viewpoint is considered to be 1.5m for cars and 2.0m for buses. **Figure 13.3** identifies the typical stopping distance range for a car travelling at different speeds. Therefore, a viewpoint for a car driving at 20mph (32km/h) (i.e. speed limit for a dense urban location) would be placed at 12m from a traffic light and 1.5m above the ground.

13.69 The assessment also considers a driver's / pedestrian's field of vision which takes the angular extent seen at any given time, which for humans facing forwards is approximately 180 degrees.

Railway lines

13.70 In addition to road users, instances of solar reflection also have the potential to effect train drivers and their view of traffic signals. Due to the proximity of the Site to the railway line running to and from London Bridge Mainline Station, an assessment has been undertaken from these viewpoints.

Solar Glare Technical Assessment

13.71 The potential for reflected solar glare or dazzle from glazed or reflective façades from the Development has been assessed using specialist lighting software. The assessment shows the path of the sun for the entire year around the Development. From this, two computer generated angular images have been produced for each selected viewpoint, indicating the area which sees the reflection of the sunpath at any point during the year. A modified diagram portraying a standardised extent of human vision is then overlaid onto the image.

13.72 The assessment has been undertaken on the basis that the fovea centralis (also generally known as the fovea) is a part of the eye, located in the centre of the macula region of the retina. The fovea is responsible for sharp central vision (also called foveal vision), which is necessary in humans for reading, watching television, driving, and any activity where visual detail is of primary importance. The macula corresponds to the central 13° of the visual field; the fovea to the central 3°.

13.73 **Figure 13.4** highlights the degrees of vision corresponding to the foveal view, with a red circle of 3° of angle in order to identify the area most sensitive to reflected solar glare. Another red circle represents the incidence of the 30° radius of our typical field of view in order to identify a secondary area of sensitivity to potential reflected glare instances.

13.74 The degrees of vision provide a reference from which significant effects can be identified. At 3°, the potential for the reflected glare to cause a hazard is high and mitigation would be required. Between 3° and 30°, there is the potential that there could be an issue and mitigation may be necessary.

13.75 As stated in the Commission Internationale de L'Eclairage guidance CIE 146:2002, occurrences at angles beyond 30° would be of little significance in most situations, but may be relevant in exceptional circumstances. When seated in a driving seat of a typical car, for example, the limits of the windscreen would generally obstruct the driver's view at angles beyond 30° from the line of sight. Therefore, the risk of reflective solar glare causing a hazard is reduced and, as such, mitigation would make only a minor difference.

13.76 The methodology for solar glare is not aimed at addressing the intensity of an instance of reflected solar glare, but rather its occurrence, duration throughout the year and the location of this occurrence in respect of an individual's line of sight. It is also to be noted that the hours presented reflect solar time and therefore do not take Daylight Saving Hours into account.

Light Pollution

13.77 Light pollution is defined as any light emitting from artificial sources into spaces where it is unwanted, such as spillage of light from office or commercial buildings onto residential accommodation, where this would cause nuisance to the occupants. The ILP Guidance Notes[1] provide suggested lighting level values to ascertain the acceptability of lighting levels of light pollution.

13.78 It should be noted that artificial light is not always perceived as being negative, particularly in areas of high crime where good street lighting and light into street environments is seen as a positive attribute. Adverse effects caused as a result of electric lighting include the intrusion of light into sensitive locations such as adjacent residential accommodation, areas of special night-time interest, or needless spillage into the night sky.

13.79 It should also be noted that the ILP Guidance relates and refers to external luminaires. However, commercial buildings with large areas of glazing and possible night-time usage can sometimes cause light intrusion from their internal luminaires. For this reason, quantitative light pollution assessments can be undertaken in relation to these internal luminaires.

13.80 Potential light pollution effects of a new development are typically assessed in relation to four specific criteria:

- Sky Glow is the brightening of the night sky over our towns, cities and countryside. It can be quantified by measuring the Upward Light Ratio (ULR), which is the maximum permitted percentage (%) of luminaire flux for the total installation that goes directly into the sky;
- Light Intrusion is the spilling of light beyond the boundary of a proposed development. It is assessed as vertical illuminance in lux (Ev) measured flat at the centre of the sensitive receptor;
- Luminaire Intensity is the uncomfortable brightness of a light source when viewed against a dark background. It is applied to each source visible from a sensitive receptor and is measured as source intensity (I) (kcd); and
- Building Luminance which can cause an increase in the brightness of a general area and is measured in cd per metre squared (L) as an average over the building facade caused only by external lighting.

Light Intrusion Methodology

13.81 Light pollution is not a comparative assessment; the fact it may occur in the baseline does not necessarily justify its occurrence as a result of the proposed Development. Therefore, the assessment considers the effect of the Development in absolute terms, by reference to the relevant guidance levels.

13.82 The assessment has been undertaken by preparing a computer generated 3D model of the Development and using specialist lighting simulation software. The light fittings used for this lighting simulation represent typical recessed office luminaires regularly spaced on the proposed office ceilings within the proposed commercial building in order to achieve an average illuminance of 500 lux across the working plane. This assessment assumes that all luminaires are switched on at once and no blinds or shading devices are deployed for the purpose of the light pollution assessment. For this reason, it should be considered a worst-case scenario.

13.83 Table 13.3 below sets out the environmental zones as per the ILP Guidance which have been applied in this assessment.

Table 13.3 ILP Light Pollution Criteria for Environmental Zones

Environmental Zone	Sky Glow ULR (Max %) (1)	Light Intrusion (into windows) Ev (Lux) (2)		Luminaire Intensity (candelas) (3)		Building Luminance Pre-curfew (4)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average L[cd/m^2]
E0 – Dark areas (e.g. UNESCO Starlight Reserves, IDA Dark Sky Parks)	0	0	0	0	0	0
E1- Intrinsically dark areas (e.g. National Parks, areas of outstanding natural beauty)	0	2	0 (1*)	2,500	0	0
E2- Low district brightness (e.g. rural or small village locations)	2.5	5	1	7,500	500	5
E3- Medium district brightness (e.g. small town centres or urban locations)	5.0	10	2	10,000	1,000	10
E4- High district brightness (e.g. town/city centres with high levels of night time activity)	15.0	25	5	25,000	2,500	25

Notes:

ULR = Upward Light Ratio of the Installation is the maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky

Ev = Vertical Illuminance in Lux and is measure flat on the glazing at the centre of the window

I = Light Intensity in Cd

L = Luminance in Cd/m^2

Curfew = The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by the planning authority. If not otherwise stated – 23.00 hrs is suggested.

* = From Public road lighting installations only.

13.84 With reference to

13.85 **Table** 13.3, taken from the ILP guidance, the Site is classified as environmental zone E4. This zone allows for a maximum pre-curfew light intrusion level of 25 lux and a maximum post-curfew light intrusion level of 5 lux.

Significance Criteria

Effect Significance Terminology Overview

13.86 In terms of sensitivity, surrounding properties are considered highly sensitive to daylight and sunlight levels, and specifically habitable rooms within the properties such as living rooms, kitchens and bedrooms, in accordance with the BRE Guidelines. All existing residential receptors, assessed within this chapter are considered highly sensitive due to the expectation of natural light and given equal weighting, and therefore each individual receptor is not assigned a level of sensitivity as per the usual EIA methodology i.e. high, medium, low or very low. However, buildings with transient occupants such as student accommodation, educational facilities and hospitals are considered lower sensitivity as they are not permanent residences and are transient in nature.

13.87 For transient overshadowing, all public areas of open space such as parks, squares and private gardens in proximity to the Site are considered highly sensitive and are considered within the assessment.

13.88 The key terminology to be used to describe the magnitude of effects is as follows and is further described in the below sections of this chapter:

- Major;
- Moderate;
- Minor; and
- Insignificant.

13.89 The nature of the effects may be either adverse (negative) or beneficial (positive).

13.90 Following the classification of an effect using this methodology, a clear statement is then made as to whether the effect is significant or not significant. As a general rule, in relation to sunlight, daylight, overshadowing and solar glare the following criteria is applied:

- ‘Minor’, ‘Moderate’ or ‘Major’ effects are deemed to be ‘significant’;
- ‘Insignificant’ effects are considered to be ‘not significant’.

Evaluating Effects and Significance – Daylight, Sunlight and Overshadowing

Daylight and Sunlight

13.91 For daylight and sunlight, the BRE Guidelines outline the approach within the accompanying Appendix I, in terms of assigning criteria to assess the effects:

- Section 3 of Appendix I states: “*Adverse impacts occur when there is a significant decrease in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space… The assessment of impact will depend on a combination of factors, and there is no simple rule of thumb that can be applied*.”
- Paragraph 5 of Appendix I states: “*Where the loss of skylight or sunlight fully meets the guidelines, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space*

lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines and a larger number of windows or open space are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space."

- Paragraph 6 of Appendix I states: "*Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or long-term, local, adverse of major significance. Factors tending towards a minor adverse impact include*:
  - *Only a small number of windows or limited area of open space are affected;*
  - *The loss of light is only marginally outside the guidelines;*
  - *An affected room has other sources of skylight or sunlight; and*
  - *The affected building or open space only has a low level of requirement for skylight or sunlight."*

13.92 The classification of major adverse is documented within Paragraph 7 of the BRE Guidelines:

"Factors tending towards a major adverse impact include:

- *a large number of windows or large area of open space are affected;*
- *the loss of light is substantially outside the guidelines;*
- *all the windows in a particular property are affected; and*
- *the affected indoor or outdoor spaces have a particular strong requirement for skylight or sunlight, e.g. a living room in a dwelling or a children's playground".*

13.93 Where the BRE Guidelines are met, the effects would be considered insignificant.

13.94 With regard to the BRE Guidelines, professional judgement has been used to determine whether the potential effects would result in adverse or beneficial effects. The initial numerical criteria for determining the category of effect is based on percentage alterations, as follows:

- 0 – 19.9% alteration = Insignificant;
- 20 - 29.9% alteration = Minor;
- 30 - 39.9% alteration = Moderate; and
- Greater than 40% alteration = Major.

13.95 For instances where existing VSC, NSL and APSH levels within a property are low, any alteration may result in a disproportionate percentage change, whereby the actual change in daylight or sunlight within the property experienced by the occupant may not be as noticeable as the percentage change would suggest. This is one example of when professional judgement is taken into account.

13.96 Therefore, when assigning an overall significance per property, consideration has been given to the proportion of rooms / windows affected, as well as the percentage alterations, absolute changes, and any other relevant factors, such as there may be mitigating factors such as balconies, overhangs or design features which may also affect the determination of assigning the criteria.

13.97 Where room uses are unknown, all rooms assessed within the property or building are considered habitable to give the worst-case scenario for potential daylight and sunlight effects caused by the Development.

13.98 Where the scale of VSC levels and NSL levels within a property differ, professional judgement has also been used to determine an overall significance. In addition, if the scale of total APSH and Winter PSH differ greatly, professional judgement has also been used to determine the significance of the effect. This has been based on the factors previously stated.

Overshadowing

Transient Overshadowing

13.99 The BRE Guidelines do not include criteria for the significance of transitory overshadowing other than to identify the different times of the day and year when shadow would be cast over a surrounding area.

13.100 The assessment of potential effects as a result of transient overshadowing is therefore based on professional judgement, taking into consideration the conditions of the existing Site and surrounding area, and comparing these conditions against the effect of the transient overshadowing arising from the Development.

Sun Hours on Ground

13.101 It is suggested in the BRE guidelines that for an area to appear adequately sunlit throughout the year, at least half (50%) of any assessment area should see direct sunlight for at least two hours on the 21st March. If, as a result of new development, an existing assessment area will not meet BRE guidelines and the area which can receive two hours of direct sunlight on the 21st March is reduced to less than 0.8 times its former area, then the loss of sunlight is likely to be noticeable.

13.102 Where the results show compliance with the BRE guidelines criteria, the occupants are unlikely to experience any noticeable change to their sunlight amenity levels. For the purposes of this assessment, such an effect would be considered insignificant. Should the relevant criteria not be achieved, a judgment has to be made as to the significance of the effect based on the level of loss, retained sunlight levels and the relevant baseline scenario.

13.103 The table below sets out the numerical criteria adopted in relation to the sun on ground assessment.

Table 13.4 Sun on ground Significance Criteria

Significance	**Numerical criteria on 21 March**
Insignificant	Over 50% of the amenity area will receive 2 hours of sunlight or less than 20% alteration in area which receives 2 hours of direct sunlight.
Minor adverse	20-29.9% reduction in the area which receives 2 hours of direct sunlight (and below 50% retained area).
Moderate adverse	30-39.9% reduction in the area which receives 2 hours of direct sunlight (and below 50% retained area).
Major adverse	40%+ reduction in the area which receives 2 hours of direct sunlight (and below 50% retained area).

Internal Overshadowing Assessment

13.104 The purpose of the internal overshadowing assessment is to ascertain whether the Development would provide associated amenity space considered acceptable in terms of overshadowing. It is not considered appropriate to ascribe significance as there is no 'baseline' against which the internal overshadowing conditions can be considered and assessed. Relevant consideration has however been given as to whether good levels of sunlight can be achieved within the new amenity areas created by the proposed Development, using the assessment criteria as set out in the BRE criteria.

Solar Glare

13.105 There are no quantitative criteria within the BRE Guidelines or elsewhere regarding acceptable levels of solar glare. Generally, however, solar reflections at high altitudes are less likely to cause nuisance or distraction as one has to look upwards to see it.

13.106 Professional judgement has therefore been applied to assign the significance of solar glare arising from the Development and to determine the criteria for assessing the significance of solar glare set out in **Table 13.5.**

13.107 Multiple viewpoints may be chosen for each of the traffic lanes, train line or signals affected. In terms of significance criteria however, professional judgement has been used to determine the effect at the location rather than the individual perspectives at a signal traffic junction. Factors that could influence the significance of effect may include:

- sunlight availability probability;
- area of façade off which reflections are visible;
- period of time reflections are visible;
- angle at which reflections are visible from line of sight;
- views of the development being obscured for example by trees; and
- the time of day at which the solar reflection will occur for example during peak traffic times.

13.108 Initially, the following guide will be used to ascertain the possible significance for each view and the factors listed above will then be taken into consideration to determine the overall significance for the designated viewpoint.

Table 13.5 Criteria Used for Determining the Effect of Solar Glare

Significance guidance	Possible factors
Insignificant	No reflections are visible or if visible all occur at angles greater than 30° from the driver's line of sight and so, as stated by the CIE, will be of "little significance"
Minor	Solar reflections are visible within 30° to 10° or between 10° to 5° of the driver's line of sight for a short period of time
Moderate	Solar reflections are visible within 10° and 5° of the driver's line of sight occurring for a long period of time.
Major	Solar reflections are visible within 5° of a driver's line of sight.

Note – mitigating factors such as alternative and unaffected signals/traffic lights and car visor angle may result in the assignment of significance which differs from the above.

Light Pollution

13.109 The ILP Guidance Notes do not provide details on assigning of significance of effects for light pollution, therefore this is based on professional judgement considering the extent of the residential façade adversely affected as well as the extent to which the thresholds set out in the guidance are exceeded. Table 13.6 highlights the criteria used to assign a specific significance.

Table 13.6 Criteria Used for Determining the Effect of Light Pollution

Significance	Description
Insignificant	A small alteration from the existing scenario which is unlikely to be noticeable to the receptor. This may involve a small number of technical infringements of the numerical level suggested in the appropriate guidelines which should also be viewed in the context of the urban character of the area.
Minor	An alteration from the existing scenario which may be marginally noticeable to the sensitive receptor. This may include a number of marginal infringements of the numerical level suggested in the appropriate guidelines which should be viewed in the context of the urban character of the area.
Moderate	An alteration from the existing scenario which may cause a moderate noticeable change to the sensitive receptor. This may consist of a large proportion of marginal infringements of the numerical values suggested in the relevant guidelines and/or a small percentage of significant infringements.
Major	An alteration from the existing scenario which may cause a major noticeable change to the sensitive receptor. This may consist of a large proportion of significant infringements of the numerical values suggested within the relevant guidelines.

Assumptions and Limitations

13.110 Where actual room layouts were available, these have been considered when modelling the internal layouts of surrounding properties. Where layout information was not available assumptions have been made as to the use and internal configuration of the rooms (from external observations) behind the fenestration observed. In such cases a standard 4.2m (14ft) room depth has been assumed, unless the building form dictated otherwise. This is common practice where access to buildings for surveying is unavailable. Obtaining these room layouts enables precise evaluation of the diffuse levels of daylight within each of the rooms via the NSL.

13.111 Floor levels have been assumed for surrounding properties where access has not been obtained. With the working plane located 850mm above the finished floor level, this has the potential to affect the assessment of NSL.

13.112 For solar glare, although great care is taken in identifying the most likely sensitive viewpoints, this does not guarantee that there are no additional sensitive locations where reflected solar glare could present a particular risk. This assessment is based on the assumption that in an urban environment moving traffic represents the biggest risk factor and so viewpoints and focus points are selected accordingly. For practical reasons the area of assessment is limited to the area surrounding the Development as viewpoints within this area are the most sensitive in terms of solar glare. At greater distances, the view of the Development in a driver's line of sight would likely be partially obscured by surrounding schemes and only the upper portion of the building would be visible, which would typically be located above the driver's visor cut-off line. As such, the occurrence of reflected solar glare at greater distances is not the subject of this assessment.

13.113 In addition, the methodology for solar glare is not aimed at addressing the intensity of an instance of reflected solar glare, but rather its occurrence, duration throughout the year, and the location of this occurrence in respect of an individual's line of sight. It is also be noted that the hours presented reflect solar time and therefore do not take Daylight Saving Hours into account.

Baseline Conditions

Existing Baseline

13.114 The study area comprises an urban area with buildings of multiple tenures and scales ranging from three storey buildings to the larger buildings of the News Building, The Shard and Guy's Hospital in close proximity to the Site to the north, north-east and east respectively.

13.115 The existing baseline is shown in Drawings 8684/01/01/001 in **Appendix 13.1**.

Existing Daylight and Sunlight to Surrounding Sensitive Receptors

13.116 The baseline daylight and sunlight conditions for the 18 identified surrounding sensitive receptors have been assessed, as summarised in Table 13.7.

Table 13.7 Summary of Baseline Daylight and Sunlight Levels

Address	Total No. Windows that meet VSC criteria (>27%)		Total No. of Rooms that receive NSL in excess of 80%		Total No. of Rooms that meet APSH criteria	
	Total Assessed	Total that meet criteria	Total Assessed	Total that meet criteria	Total Assessed	Total that meet criteria
6 London Bridge Street	12	0	12	3	12	4
43 Borough High Street	9	3	8	7	8	7
51 Borough High Street	2	1	2	2	2	2
53-55 Borough High Street	5	2	4	4	4	4
57 Borough High Street	3	0	3	3	3	2
59-61 Borough High Street	17	11	8	8	8	7
63a Borough High Street	20	1	15	6	5	2
3 Kings Head Yard	8	0	3	3	1	1
The Old Kings Head (Residential element)	23	0	8	3	2	1
22 Southwark St	28	14	24	17	12	12
St. Thomas Church (Residential element)	8	4	4	4	4	4
Iris Brook House - Talbot Yard (Student Accommodation)	71	11	61	37	19	6
Orchard Lisle House - Talbot Yard (Student Accommodation)	131	43	110	67	0	0
Guy's Campus - Tower Wing (Hospital)	1083	78	240	235	23	0
Guy's Campus - Southwark Wing (Hospital)	103	25	29	20	5	5
Bunch of Grapes Pub (Residential element)	3	3	3	0	3	3
Chaucer House - White Hart Yard (London School of Commerce)	82	44	20	20	0	0
Shard Place (Residential Element)	519	412	221	201	144	113
TOTAL	**2127**	**652**	**775**	**640**	**255**	**173**

13.117 Of the 18 properties considered as sensitive receptors, a total of 2,127 windows serving 775 rooms were assessed for daylight and 255 rooms were assessed for sunlight.

13.118 For daylight in the baseline condition, 652 of the 2,127 (31%) windows assessed for VSC and 640 of the 775 (83%) rooms assessed for NSL would meet BRE criteria for daylight of 27% VSC and 80% NSL. For sunlight, 173 of the 255 (68%) rooms assessed meet BRE criteria of 25% Total APSH and 5% Winter APSH.

13.119 Low existing daylight and sunlight levels can be attributed to the dense urban location and architectural features such as balconies, large roof overhangs and recessed windows. These reasons may reduce a property's daylight availability, resulting in low existing daylight and sunlight levels. Owing to these low existing levels, any development on the Site would lead to disproportionate adverse effects.

Existing Overshadowing to Sensitive Surrounding Amenity Areas

13.120 The existing Transient Overshadowing images can be seen within **Appendix 13.4**.

13.121 Due to the relative lack of neighbouring amenity areas, the existing overshadowing is considered low. The amenity areas associated with Southwark Cathedral are largely only affected in early mornings and late evenings in the baseline scenario.

Internal Overshadowing Assessment

13.122 The purpose of the internal overshadowing assessment is to ascertain whether the Development would provide associated amenity space considered acceptable in terms of overshadowing. As amenity areas associated with the Development are new there is no baseline against which the internal overshadowing conditions can be considered and assessed. Relevant consideration has however been given as to whether good levels of sunlight can be achieved within the new amenity area created by the Proposed Development, using the assessment criteria as set out in the BRE criteria.

Assessment of Likely Significant Effects

The Works

13.123 The likely effects in relation to the daylight and sunlight amenity and overshadowing for the surrounding properties and amenity areas would vary throughout the demolition and construction works, depending on the level of obstruction caused. The effects would almost certainly be less than that of the completed Development, given that the extent of permanent massing would increase throughout the construction stage, until the buildings are complete.

13.124 The effects to daylight, sunlight and overshadowing during demolition would be beneficial until the point of construction. As construction works would steadily increase in magnitude as the superstructure is built and then clad. Those effects that are perceptible, as the superstructure and cladding progress, would be similar to those once the Development is complete and operational, as presented below. It is therefore considered that the completed Development represents the worst-case assessment in terms of likely daylight, sunlight and overshadowing effects.

13.125 During the Works, a number of tall cranes are likely to be present on-site, however their size and temporary presence would lead to generally imperceptible effects of a temporary nature. As such, the overall effect would range from being **insignificant** at the start of the works to effects ranging from **insignificant** to **long-term, permanent**, **adverse of major significance**, once the

Development is complete, as set out in the assessment of the complete and operational Development below.

Completed and Operational Development

Daylight

13.126 The full daylight assessment for the Development can be found within **Appendix 13.2** and is summarised in **Table 13.8**.

13.127 In terms of daylight and sunlight, measures including massing alterations were implemented during the design process to minimise the impacts on daylight to surrounding sensitive receptors as much as possible while still ensuring the provision of a viable scheme. These design interventions are included within the assessment, and constitute iterative design as opposed to mitigation measures.

13.128 Overall, of the 2,121 windows assessed for VSC 1,751 (83%) would meet BRE criteria. Of the 770 rooms assessed for NSL, 638 (83%) would meet BRE criteria.

13.129 The three properties highlighted in grey in **Table 13.8** would experience no or little alteration (below 20%), and the effect on daylight to these properties would therefore be insignificant.

13.130 The remaining affected properties are discussed in detail in the following paragraphs.

Table 13.8 Effects to VSC and NSL to Surrounding Sensitive Receptors

Address	VSC						NSL					
			Below BRE Guidelines						Below BRE Guidelines			
	Total No. Of Windows	No. Windows That Meet BRE Criteria	20-29.9% Reduction	30-39.9% Reduction	>40% Reduction	Total	Total No. Of Rooms	No. Rooms That Meet The 0.8 Times Former Value Criteria	20-29.9% Reduction	30-39.9% Reduction	>40% Reduction	Total
6 London Bridge Street	12	3	5	4	0	9	12	12	0	0	0	0
43 Borough High Street	9	2	6	1	0	7	8	5	3	0	0	3
51 Borough High Street	2	0	2	0	0	2	2	0	0	1	1	2
53-55 Borough High Street	5	1	4	0	0	4	4	4	0	0	0	0
57 Borough High Street	3	0	2	1	0	3	3	2	1	0	0	1
59-61 Borough High Street	17	16	1	0	0	1	8	8	0	0	0	0
63a Borough High Street	20	9	7	2	2	11	15	12	0	1	2	3
3 Kings Head Yard	8	8	0	0	0	0	3	3	0	0	0	0
The Old Kings Head	23	21	0	2	0	2	8	8	0	0	0	0
22 Southwark St	28	28	0	0	0	0	24	24	0	0	0	0
St. Thomas Church	8	6	0	0	2	2	4	4	0	0	0	0
Iris Brook House Talbot Yard	48	18	0	22	8	30	48	18	9	9	5	23
Orchard Lisle House - Talbot Yard	107	1	28	2	78	108	97	32	0	1	64	65
Guys Campus (Tower Wing)	1083	1080	2	0	1	3	240	240	0	0	0	0
Guys Campus (Southwark Wing)	103	102	1	0	0	1	29	29	0	0	0	0
Bunch of Grapes Pub	3	3	0	0	0	0	3	3	0	0	0	0

Address	VSC						NSL					
			Below BRE Guidelines						Below BRE Guidelines			
	Total No. Of Windows	No. Windows That Meet BRE Criteria	20-29.9% Reduction	30-39.9% Reduction	>40% Reduction	Total	Total No. Of Rooms	No. Rooms That Meet The 0.8 Times Former Value Criteria	20-29.9% Reduction	30-39.9% Reduction	>40% Reduction	Total
Chaucer House - White Hart Yard (London School of Commerce)	82	37	19	20	6	45	20	20	0	0	0	0
Shard Place	519	412	39	41	27	107	221	201	11	0	9	20
TOTAL	**2127**	**1753**	**127**	**107**	**140**	**374**	**775**	**643**	**27**	**13**	**92**	**132**

6 London Bridge Street (Residential)

13.131 A total of 12 windows serving 12 rooms were assessed for daylight within this building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.132 For VSC, three of the 12 (25%) windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.133 Of the affected windows, five would experience an alteration in VSC levels of 20-29.9 % which is considered a Minor Adverse effect. The remaining four affected windows would experience an alteration between 30-39.9% which is considered a moderate adverse effect. It should be noted that three of these affected windows (W1/F01, W1/F02 and W1/F03) have low existing VSC values of 5.1%, 7.6% and 11% respectively (against a BRE target of 27%) meaning the percentage losses are exaggerated. The actual loss in VSC to these windows ranges between 1.5% and 2.5%. The remaining affected window W1/F04, which is located further up the building, will enjoy an existing VSC of 18.9% and experience a reduction of 32.8% of the total VSC.

13.134 For NSL, all 12 rooms comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.135 Overall and based on professional judgement, the effect to daylight within this building would be **long-term, local, adverse** of **moderate significance**.

63a Borough High Street (Residential)

13.136 A total of 20 windows serving 15 rooms were assessed for daylight within this building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.137 For VSC, nine of the 20 (45%) windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.138 Of the 11 affected windows, seven would experience an alteration in VSC levels of 20-29.9% which is considered a minor adverse effect and two affected windows would experience an alteration between 30-39.9% which is considered a moderate adverse effect. The two windows experiencing a moderate adverse effect (W1/F01 and W4/F02) have low existing VSC levels of 10.7% and 3% in the existing scenario meaning the actual change has the ability to become exaggerated in percentage terms. The windows will undergo an absolute loss of 3.3% and 0.9% respectively. The remaining two windows, W2/F01 and W2/F02, would experience an alteration in excess of 40% which is considered a major adverse effect, however, similarly they both have low existing VSC values of 5.4% and 6.8% respectively, and the absolute loss to these levels would be 3.1% in both instances.

13.139 For NSL, 12 of the 15 rooms comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.140 Of the three affected rooms, one would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The remaining two rooms would experience an effect in excess of 40% which is considered a major adverse effect.

13.141 It should also be noted that this building is heavily obstructed by 59-61 Borough High Street, which largely results in low existing levels of light.

13.142 Overall and based on professional judgement, the effect to daylight within this building would be **long-term, local, adverse** of **moderate significance**.

53-55 Borough High Street and 57 Borough High Street (Two Buildings - Residential)

13.143 A total of eight windows serving seven rooms were assessed for daylight within these buildings. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.144 For VSC, one of the eight windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.145 Of the affected windows, six would experience an alteration in VSC levels of 20-29.9 % which is considered a Minor Adverse effect and one would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect.

13.146 For NSL, six of the seven of the rooms comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.147 The one affected room would experience and alteration between 20-29.9% which is considered a minor adverse effect.

13.148 Overall and based on professional judgement, the effect to daylight within these buildings would be **long-term, local, adverse of minor significance**.

59-61 Borough High Street (Residential)

13.149 A total of 17 windows serving eight rooms were assessed for daylight within these buildings. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.

13.150 For VSC, 16 of the 17 windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.151 The one affected window (W4/F01) serves a bedroom and would experience an alteration in VSC levels of 21.5 % which is considered a minor adverse effect.

13.152 For NSL, all eight rooms comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.153 Overall and based on professional judgement, the effect to daylight within these buildings would be **insignificant**.

The Old King's Head (Residential Element)

13.154 A total of 23 windows serving eight rooms were assessed for daylight within these buildings. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology. Whilst this is a mainly commercial building, it has not been possible to determine precisely where the residential element is located, therefore, all windows/ rooms within the building have been assessed.

13.155 For VSC, 21 of the 23 (93%) windows assessed would meet BRE Guideline criteria which would represent an insignificant effect. It should be noted that 19 of these 21 windows would experience improvements in VSC of between 1% and 43% VSC.

13.156 The two adversely affected windows, W19/F01 and W17/F02, would experience an alteration in VSC levels of 34% and 34.4% respectively, which is considered a moderate adverse effect.

13.157 For NSL, all eight rooms comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.158 Overall and based on professional judgement, the effect to daylight within these buildings would be **insignificant**.

St. Thomas Church (Residential Element)

13.159 A total of eight windows serving four rooms were assessed for daylight within these buildings. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.

13.160 For VSC, six of the eight windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.161 The two affected window would experience an alteration in VSC levels in excess of 40% which is considered a major adverse effect, however, these rooms are within the steeple of the former church building and each room is served by four windows facing in different directions.

13.162 Although both affected windows would experience a major adverse effect, it should be noted that both windows retain levels of VSC of 15% and are accompanied by unaffected windows serving the same room.

13.163 For NSL, all four rooms fully comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.164 Overall and based on professional judgement, the effect to daylight within this building would be **insignificant**.

Iris Brook House - Talbot Yard (Student Accommodation)

13.165 A total of 48 windows serving 48 rooms were assessed for daylight within this student accommodation building. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.

13.166 For VSC, 18 of the 48 (37%) windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.167 Of the affected windows, 22 would experience an alteration in VSC levels of between 30-39.9% which is considered a moderate adverse effect. The remaining eight windows would experience an alteration in excess of 40% which is considered a major adverse effect.

13.168 For NSL, 25 out of 48 (52%) of the rooms comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.169 Of the affected rooms, nine affected rooms would experience and alteration between 20-29.9% which is considered a minor adverse effect and nine would experience an alteration of between 30-39.9% which is considered a moderate adverse effect. The remaining five rooms would experience an alteration in excess of 40% which is considered a major adverse effect.

13.170 Overall, based on professional judgement, and due to the temporary nature of student accommodation, the effect to daylight within these buildings would be **long-term, local, adverse of moderate significance.**

Orchard Lisle House – Talbot Yard (Student Accommodation)

13.171 A total of 107 windows serving 97 rooms were assessed for daylight within this student accommodation building. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.

13.172 For VSC, one of the 107 (<1%) windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.173 Of the affected windows, 28 would experience an alteration in VSC levels of 20-29.9 % which is considered a minor adverse effect and two would experience an alteration between 30-39.9% which is considered a moderate adverse effect. The remaining 78 windows would experience an alteration in excess of 40% which is considered major adverse effect.

13.174 For NSL, 32 of the 97 (33%) of the rooms comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.175 Of the affected rooms, one affected room would experience and alteration between 30-39.9% which is considered a moderate adverse effect. The remaining 64 rooms would experience an alteration in excess of 40% which is considered a major adverse effect.

13.176 Overall, based on professional judgement, and due to the temporary nature and resulting lower sensitivity of student accommodation, the effect to daylight within these buildings would be **long-term, local, adverse of moderate significance.**

Guy's Campus – Tower Wing (Hospital)

13.177 A total of 1,083 windows serving 240 rooms were assessed for daylight within this hospital building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.178 For VSC, 1,080 of the 1,083 (99%) windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.179 Of the affected windows, two (W9/F00 and E11/F04) would experience an alteration in VSC levels of 26 and 20.3% respectively, which is considered a minor adverse effect and one would experience an alteration in excess of 40% which is considered a major adverse effect.

13.180 It should be noted that the window that would experience a major adverse effect has a very low existing VSC value of 0.2%. Therefore, any alteration would result in a disproportionate percentage change, that in reality, is unlikely to be noticeable.

13.181 For NSL, all 240 of the rooms comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.182 Overall, based on professional judgement, and due to the temporary nature and resulting lower sensitive of a hospital, the effect to daylight within these buildings would be **insignificant.**

Guy's Campus – Southwark Wing (Hospital)

13.183 A total of 103 windows serving 29 rooms were assessed for daylight within this hospital building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.184 For VSC, 102 of the 103 (99%) windows assessed would meet BRE Guideline criteria which would represent an **insignificant** effect.

13.185 The affected window, W9/F04, would experience an alteration in VSC levels of 24.8 % which is considered a minor adverse effect.

13.186 For NSL, all 29 of the rooms fully comply with BRE Guideline criteria and are therefore considered to experience an **insignificant** effect.

13.187 Overall, based on professional judgement, and due to the temporary nature and resulting lower sensitivity, the effect to daylight within these buildings would be **insignificant.**

43 Borough High Street (Residential)

13.188 A total of nine windows serving eight rooms were assessed for daylight within this residential building. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.

13.189 For VSC, two of the nine windows assessed would meet BRE Guideline criteria.

13.190 Of the affected windows, six would experience an alteration in VSC levels of between 20-29.9% which is considered minor adverse effect, and the remaining window would experience an alteration between 30-39.9% which is considered a moderate adverse effect.

13.191 For NSL, five of the eight rooms fully comply with BRE Guideline criteria.

13.192 Of the affected rooms, all three would experience and alteration between 20-29.9 % which is considered a minor adverse effect.

13.193 It is important to note that this property is recessed between two buildings on either side, creating flank walls which would limit the amount of daylight available from oblique angles.

13.194 Overall, based on professional judgement, the effect to daylight within this building would be **long-term, local, adverse of minor significance.**

51 Borough High Street (Residential)

13.195 A total of two windows serving two rooms were assessed for daylight within this residential building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.196 For VSC, none of the windows assessed would meet BRE Guideline criteria.

13.197 The affected windows, W1/F04 and W2/F04, would experience an alteration in VSC levels of 25% and 28.4% respectively, which is considered a minor adverse effect. Furthermore, both windows retain in excess of 18% VSC.

13.198 For NSL, none of the rooms fully comply with BRE Guideline criteria.

13.199 Of the affected rooms, one (R1/F04) would experience an alteration of 34% which is considered a moderate adverse effect. The remaining room would experience an alteration of 42% which is considered a major adverse effect.

13.200 Overall, based on professional judgement, the effect to daylight within this building would be **long-term, local, adverse of minor significance.**

Chaucer House (London School of Commerce - Educational)

13.201 A total of 82 windows serving 20 rooms were assessed for daylight within this educational building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.202 For VSC, 37 of the 82 (45%) windows assessed would meet BRE Guideline criteria.

13.203 Of the affected windows, 19 would experience and alteration between 20-29.9 % which is considered a minor adverse effect and 20 would experience an alteration between 30-39.9% which is considered a moderate adverse effect. The remaining six windows would experience an alteration in excess of 40% which is considered a major adverse effect.

13.204 For NSL, all 20 rooms fully comply with BRE Guideline criteria and are considered to experience an **insignificant** effect.

13.205 It is important to note that these are windows and rooms associated with the London School of Commerce and are not residential. The use of the rooms would be transient and likely to rely on artificial lighting as is the case with most educational buildings and would have a lower requirement for daylight. Therefore, due to the educational use, this building has a lower sensitivity to daylight.

13.206 Overall, based on professional judgement and the lower sensitivity to daylight, the effect to daylight within these buildings would be **long-term, local, adverse of minor significance.**

Shard Place (Residential Element)

13.207 A total of 519 windows serving 221 rooms were assessed for daylight within this part retail part residential building.

13.208 For VSC, 412 of the 519 (79%) windows assessed would meet BRE Guideline criteria.

13.209 Of the affected windows, 39 would experience and alteration between 20-29.9 % which is considered a minor adverse effect and 41 would experience an alteration between 30-39.9% which is considered a moderate adverse effect. The remaining 27 windows would experience an alteration in excess of 40% which is considered a major adverse effect.

13.210 Of the 27 major adverse impacts recorded, 10 will be localised to bedrooms, which are considered to be less sensitive by virtue of their use. The reaming 17 major adverse impacts will all be recorded within LKDs which pass the NSL methodology, due to the presence of multiple additional windows serving the same room.

13.211 For NSL, 201 of the 221 rooms fully comply with BRE Guideline criteria.

13.212 Of the affected rooms, 11 would experience and alteration between 20-29.9 % which is considered a minor adverse effect. The remaining nine rooms would experience an alteration in excess of 40% which is considered a major adverse effect, however, all 20 rooms serve bedrooms, which are considered to be less sensitive.

13.213 Overall, based on professional judgement, the effect to daylight within these buildings would be **long-term, local, adverse of moderate significance.**

Sunlight

13.214 The full sunlight assessment can be found in **Appendix 13.2** of this ES and the summary results are presented in **Table 13.9**.

13.215 Of the 255 rooms assessed for sunlight, 216 (85%) would meet the BRE criteria for both total and Winter PSH and are therefore considered an **insignificant** effect.

13.216 The 14 buildings highlighted in grey in **Table 13.9** experience little or no change in sunlight levels with the completed Development in place and are therefore considered an insignificant effect.

13.217 The remaining affected properties are discussed in detail following **Table 13.9**.

Table 13.9 Effects to APSH to Surrounding Sensitive Receptors

Address	Total No. of Rooms	No. Rooms that meet BRE criteria	Total APSH			Winter APSH		
			Below BRE Guidelines			Below BRE Guidelines		
			20-29.9% Reduction	30-39.9% Reduction	>40% Reduction	20-29.9% Reduction	30-39.9% Reduction	>40% Reduction
6 London Bridge Street	12	4	3	1	3	0	0	2
63a Borough High Street	5	5	0	0	0	0	0	0
53-55 Borough High Street	4	4	0	0	0	0	0	0
57 Borough High Street	3	3	0	0	0	0	0	0
59-61 Borough High Street	8	8	0	0	0	0	0	0
3 Kings Head Yard	1	1	0	0	0	0	0	0
The Old Kings Head Pub	2	2	0	0	0	0	0	0
22 Southwark St	12	12	0	0	0	0	0	0
St. Thomas Church	4	4	0	0	0	0	0	0
Iris Brook House - Talbot Yard	19	19	0	0	0	0	0	0
Guys Campus (Tower Wing)	23	23	0	0	0	0	0	0
Guys Campus (Southwark Wing)	5	5	0	0	0	0	0	0
Bunch Of Grapes Pub, 2 Southwark Street	3	3	0	0	0	0	0	0
43 Borough High Street	8	8	0	0	0	0	0	0
51 Borough High Street	2	2	0	0	0	0	0	0
Shard Place	144	113	4	16	11	0	0	12
TOTAL	**255**	**216**	**7**	**17**	**14**	**0**	**1**	**14**

6 London Bridge Street (Residential)

13.218 A total of 12 rooms were assessed for sunlight within this building.

13.219 Four (33%) of the 12 rooms assessed would meet BRE criteria for both total and winter PSH, which is therefore considered to equate to an **insignificant** effect.

13.220 Of the affected rooms for winter PSH, two would experience an alteration in excess of 40% which is considered a major adverse effect.

13.221 For total APSH, three rooms would experience alterations between 20-29.9% which is considered a minor adverse effect, and one would experience an alteration between 30-39.9% which is considered a moderate adverse effect. The remaining three rooms would experience an alteration in excess of 40% which is considered a major adverse effect.

13.222 Overall, based on professional judgment, the effect to these buildings is considered to be **long-term, local, adverse of moderate significance**.

Shard Place (Residential Element)

13.223 A total of 144 rooms were assessed for sunlight within this building.

13.224 113 of the 144 (78%) rooms assessed would meet BRE criteria for both total and winter PSH.

13.225 Of the affected rooms for winter PSH, 12 would experience an alteration in excess of 40% which is considered a major adverse effect.

13.226 For total APSH, one rooms would experience alterations between 30-39.9% which is considered a moderate adverse effect. The remaining two rooms would experience an alteration in excess of 40% which is considered a major adverse effect.

13.227 Overall, based on professional judgment, the effect to these buildings is considered to be **long-term, local, adverse of moderate significance**.

Overshadowing

13.228 Full details of the Transient Overshadowing assessment can be found within **Appendix 13.3** and the results are summarised below.

13.229 The commentary below should be read in conjunction with the Transient Overshadowing and Sun Hours on Ground images presented within the full assessment provided in **Appendix 13.3**.

13.230 The Transient Overshadowing assessment has been used to identify any area of public or private amenity space which may be significantly affected by the Development. The areas affected are discussed below.

Public & Communal Amenity

Amenity space associated with Southwark Cathedral

21 March (equinox)

13.231 There is the potential for slight additional shadow on the southern section of cathedral amenity areas for one hour from 11:00 GMT on the 21 March up to 12:00 GMT. The additional shadow from the Development would not affect the amenity areas to the north of the Cathedral.

13.232 It should be noted that on March 21st, from 12:00 GMT onwards, the cathedral's amenity areas would be not be affected by any shadow and would experience approximately six hours of direct sunlight.

21 June (summer solstice)

13.233 This area would not be affected by the Development at this time of year.

21 December (winter solstice)

13.234 This area would not be affected by the Development at this time of year.

13.235 Overall, the effect from overshadowing as a result of the Development is considered **insignificant**.

Amenity space associated with Guy's Hospital Courtyard

21 March (equinox), 21 June (summer solstice) and 21 December (winter solstice)

13.236 This area would not be affected by the Development at any point throughout the year.

13.237 Overall, the effect from overshadowing as a result of the Development is considered **insignificant**.

Sun Hours on Ground

12.1 For both amenity areas assessed there would be no additional shadow cast by the Development and therefore both areas are fully in line with BRE Guidelines and the effect of overshadowing is considered **insignificant**.

Overshadowing within the Site

13.238 In addition to amenity areas external to the Site, an assessment was conducted to assess the sunlight availability for the proposed amenity areas within the Site.

13.239 The main amenity area associated with the Development is fully BRE compliant, and would receive sunlight on 78% of its area for approximately three to four hours.

Solar Glare

13.240 The full solar glare assessment is provided at **Appendix 13.4**.

13.241 The assessment has been undertaken from signalised road junctions, pedestrian crossings and railway tracks near to the Site which are considered sensitive in terms of solar glare (noted by the road name reference BH_1, ST_1, etc.). The receptor locations are shown in **Figure 13.5**. A total of 27 locations have been assessed in terms of solar glare.

13.242 All solar glare assessments consider a worst-case scenario, assuming clear sky conditions.

13.243 In accordance with the solar glare significance criteria presented in paragraphs 13.71 - 13.76, solar reflections occurring at angles greater than 30° from the driver's line of sight will not affect the driver's responsiveness and therefore can be considered insignificant. In addition, viewpoints where the portion of the façade of the Development visible is very small and the distance is greater than 15° of a driver's line of sight are also considered insignificant. The list of the locations from where this applies, and therefore the Development is considered to have an **insignificant** effect are the eight listed below:

- BH_1;
- BH_2;
- BH_4;
- BH_5;
- BH_6;
- LB_1;
- CR; and
- TLB_E_2.

13.244 The number of locations to be considered further is therefore reduced to 19 locations.

13.245 Of the remaining 19 locations, 15 are considered to have a **long term, local, adverse effect of minor significance**. This is because solar reflections occur within 30° to 10° or between 10° to 5° of the driver's line of sight for a short period of time. In addition, the minor adverse significance is due to mitigating factors such as reflections occurring from a small section of façade, potential reflections occurring over a short period of time, unaffected traffic signals and being able to deploy a car visor which would shield the majority of reflections. The junctions considered Minor Adverse are listed below:

- US;
- SW_1;
- SW_3;
- SS;
- LB_2;
- LB_3;
- ST_1;
- ST_3;
- ST_4;
- TLB_E_1_A;
- TLB_E_1_B;
- TLB_N_1_A;
- TLB_N_1_C;
- TLB_W_1_A; and
- TLB_W_1_B.

13.246 The remaining four locations assessed are discussed in further detail in subsequent paragraphs. The effects at two of the locations would be adverse and of minor significance, but these are considered below as the solar reflections occur within 5° or less of the driver's line of sight.

Borough High Street BH_3 (Northbound)

13.247 From viewpoint BH_3 instances of solar reflection may be visible on the façade of the Development from 5° to 8° of a driver's line of sight. The reflections closest to the driver's line of sight would occur between 11:00 to 12:00 GMT from mid-November to mid-January.

13.248 Although the solar reflections from this viewpoint BH_3 occur from 5° of a driver's line of sight at times, all solar reflections would occur above the driver's visor cut-off line.

13.249 It should be noted that as solar reflections would occur during the winter months, the probability of clear skies and direct sunlight hitting the façade during the one hour, is 30%.

13.250 Overall, owing to the brief periods of solar reflections potentially occurring and the low probability of direct sunlight, the effect of solar glare at this junction is considered to be **long term, local, adverse effect of minor significance**.

Southwark Street SW_2 (Eastbound)

13.251 From viewpoint SW_2 instances of solar reflection may be visible on the façade of the Development from 4° to 16° of a driver's line of sight. The reflections closest to the driver's line of sight would occur between 18:00 to 19:00 GMT from mid-March to mid-September and Mid-October to Mid-February.

13.252 Although the solar reflections from this viewpoint SW_2 occur from 4° of a driver's line of sight at times, the largest sections of solar reflections would occur above the driver's visor cut-off line. Any potential solar reflections occurring below the driver's visor cut off line occur on very small sections of the façade resulting in reflections lasting short periods of time and only between 18:00 and 19:00 GMT.

13.253 The potential solar reflections above the driver's visor cut off line would occur between 9:00 and 11:00 and 18:00 to 19:00 GMT.

13.254 Overall, owing to the brief periods of solar reflections potentially occurring below the driver's visor cut off line, the effect of solar glare at this junction is considered to be **long term, local, adverse effect of moderate significance.**

London Bridge Station – Track North view 2 TLB_N_1

13.255 From viewpoint TLB_N_1 instances of solar reflection may be visible on the façade of the Development from 5° to 13° of a train driver's line of sight. Potential reflections would occur between 18:00 to 20:00 GMT from mid-April to mid-August.

13.256 It should be noted that from this viewpoint, there are no signals directly in front of the Developments facade, and therefore the effect is considered lower. This is because any obstruction would not prevent the driver from seeing signal changes.

13.257 Furthermore, solar reflections are by definition less intense when compared to the direct view of the sun. For this viewpoint the driver is travelling south-east and therefore may expect to have a direct view of the sun in the sky. Without the building in place, the driver would have direct view of the sun in the early morning throughout most of the year and therefore the building would be shading the direct view of the sun for a portion of the day.

13.258 Overall, based on professional judgement, the effect of solar glare at this section of track is considered to be **long term, local, adverse effect of moderate significance**.

London Bridge Station – Track West view 1 TLB_W_1

13.259 From viewpoint TLB_W_1 instances of solar reflection may be visible on the façade of the Development from 3° to 16° of a train driver's line of sight. Potential reflections would occur between 10:00 to 11:00 and 18:00 to 20:00 GMT from mid-February to mid-April and Mid-August to Mid-October, and Mid-November to Mid-January.

13.260 Although the solar reflections from viewpoint TLB_W_1 occur from 3° of a train driver's line of sight at times, the largest sections of solar reflections would occur at the top levels of the proposed building. Any potential solar reflections occurring on the lower portion of the building would be very small and last only for a short periods of time and between 18:00 and 19:00 GMT.

13.261 Overall, based on professional judgement, the effect of solar glare at this junction is considered to be **long term, local, adverse effect of minor significance**.

Overshadowing internal to the proposed Development

13.262 The full Sun Hours on Ground assessment can be seen in **Appendix 13.3**.

13.263 The assessment indicates that the Main Courtyard associated with the Development would receive two or more hours of direct sunlight on 78% of its areas on March 21st. The new amenity area is therefore fully BRE compliant.

Light Pollution

13.264 Both light pollution assessments can be found in **Appendix 13.5** and are discussed in detail below.

Light Intrusion

13.265 The most sensitive receptors for light intrusion are considered to be residential buildings, highlighted in the map presented in **Figure 13.1**.

13.266 The residential receptors assessed due to their close proximity to the Development are as follows:

- Bunch of Grapes Pub (Residential element);
- 3 Kings Head Yard;
- The Old King's Head Pub (Residential element);
- 43, 51, 53-55, 57, 59-61 and 63a Borough High Street;
- Orchard Lisle House; and
- Shard Place.

13.267 The results of the assessment indicate that pre-curfew (before 11pm), the levels of light trespass would be very limited and well within the 25 lux level suggested by the ILP for a city centre location for the residential buildings assessed.

13.268 The assessment also indicates that post-curfew (after 11pm), the levels of light trespass would be well below the 5 lux level suggested by the ILP for a city centre location for the property assessed. As such, the effect of light pollution for all sensitive receptors assessed (pre and post curfew) is considered **insignificant**.

Mitigation Measures and Likely Residual Effects

13.269 **Table 13.10** summarises the likely significant effects, mitigation measures and likely residual effects identified within this chapter.

Table 13.10 Summary of Likely Significant Effects, Mitigation Measures and Likely Residual Effects

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
The Works			
Daylight, sunlight and overshadowing effects during demolition.	**Temporary, beneficial effects considered likely during demolition.**	None proposed.	**Temporary, beneficial effects considered likely during demolition.**
Solar glare effects during demolition.	**Temporary, beneficial effects considered likely during demolition.**	None proposed.	**Temporary, beneficial effects considered likely during demolition.**
Daylight, sunlight and overshadowing during construction.	**Effects would gradually change from beneficial to those expected once the Development is complete and operational.**	None proposed.	**Effects would gradually change from beneficial to those expected once the Development is complete and operational.**

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Solar glare during construction.	**Effects would gradually change from beneficial to those expected once the Development is complete and operational.**	None proposed.	**Effects would gradually change from beneficial to those expected once the Development is complete and operational.**
Light pollution during demolition.	**Temporary, beneficial effects considered likely during demolition.**	None proposed.	**Temporary, beneficial effects considered likely during demolition.**
Completed and Operational Development			
Daylight	**Long term, local, insignificant** to 8 properties**, minor adverse** to 5 properties, **moderate adverse** to 5 properties.	None proposed.	**Long term, local, insignificant** to 8 properties**, minor adverse** to 5 properties, **moderate adverse** to 5 properties.
Sunlight	**Long term, local, insignificant** to 14 properties**, moderate adverse** to 2 properties.	None proposed.	**Long term, local, insignificant** to 14 properties**, moderate adverse** to 2 properties.
Overshadowing	**Insignificant** to all amenity areas.	None proposed.	**Insignificant** to all amenity areas.
Solar Glare	**Long term, local, insignificant** to 8 locations, **minor adverse** to 17 locations, **moderate adverse** to 2 locations.	None proposed	**Long term, local, insignificant** to 8 locations, **minor adverse** to 17 locations, **moderate adverse** to 2 locations.
Light Pollution	**Insignificant** to all properties.	None proposed.	**Insignificant** to all properties.

13.270 As part of the design process, the massing and façade details of the Development were informed by the potential daylight and sunlight effects. However, owing to the scale of the Development in comparison to the existing buildings, its close proximity and low existing daylight and sunlight levels, changes in conditions would be unavoidable.

References

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- British Standards Institution (BSI) (2008); BS8206-2: 2008 Lighting for buildings; Code of Practice for Daylighting. BSI, 2008.
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- (Robert H. Spector (1990). Clinical Methods: The History, Physical, and Laboratory Examinations, 3rd edition, Chapter 3 - www.ncbi.nlm.nih.gov/books/NBK220/)
- Commission Internationale de L'Eclairage (CIE), 2002, 146:2002 & CIE 147:2002 Collection on glare, 2002.
- Institute of Lighting Practitioners (ILP): The Guidance Notes for the Reduction of Obtrusive Light, 2011.

14. Cumulative Effects

Introduction

14.1. This chapter presents an assessment of the likely significant cumulative effects of the Development in relation to interactions between the various environmental effects of the Development and the likely significant environmental effects of the Development in combination with those arising from consented and ‘reasonably foreseeable’ schemes near the Site.

14.2. This chapter has been written by Waterman Infrastructure & Environment (Waterman IE) with input from all other consultants and specialists who have contributed to this Environmental Statement (ES). The Chapter has been informed by all preceding technical chapters of this ES (**Chapter 7** to **Chapter 13**) including **Part 3: Townscape, Visual Impact and Built Heritage Assessment**.

14.3. Please note that for the purposes of this ES chapter, the demolition, deconstruction, refurbishment and construction works will be referred to as ‘the Works’.

Assessment Methodology

14.4. The Chapter considers two types of cumulative effects:

- **Type 1 Cumulative Effects:** the combination of individual likely significant environmental effects resulting from the Development in isolation upon sensitive receptors, e.g. combination of noise, dust and visual effects on a particular receptor such as residents; and
- **Type 2 Cumulative Effects:** the combined effects arising from consented and ‘reasonably foreseeable’ schemes (collectively known as ‘cumulative schemes’), which individually might be insignificant, but when considered together, could create a significant cumulative effect.

Type 1 Effects

14.5. Likely significant Type 1 cumulative effects have been identified and qualitatively assessed using the findings of all technical assessments reported within this ES, together with professional judgement.

14.6. Type 1 cumulative effects likely to arise from the Development have been considered in the context of both the Works and once the Development is complete and operational.

14.7. In consideration of the comprehensive range of environmental management controls and other mitigation measures committed to by the Applicant, as reported in this ES, Type 1 cumulative effects have only been considered in relation to the likely residual effects of the Development, as identified in **Chapter 7** to **Chapter 13** of this ES and within **Part 3: Townscape, Visual Impact and Built Heritage Assessment**. The Type 1 cumulative effects for the Works were therefore assessed qualitatively using professional judgement based on the findings of the assessments of this ES.

Type 2 Effects

14.8. Although there is no formal guidance as to what should be considered a cumulative scheme, criteria for defining a scope of assessment for Type 2 cumulative effects was developed using professional experience and expert judgement and was stated in the EIA Scoping Report (**Appendix 2.1**). To determine which cumulative schemes are likely to give rise to significant cumulative effects in combination with the Development, consideration was given to the following criteria:

- Schemes within 1km of the Site and with a valid planning permission which have a floorspace uplift of greater than 10,000 sqm Gross External Area (GEA); and
- Schemes within 1km of the Site and with a valid planning permission, which have a floorspace uplift in GEA of less than 10,000 sqm but would introduce sensitive receptors near to the Site.

14.9. Likely significant Type 2 cumulative effects have been assessed for each of the environmental topics scoped into the EIA. The likely significance of Type 2 cumulative effects have been assessed through a combination of quantitative and qualitative means, as appropriate. Where likely significant Type 2 cumulative effects are not anticipated, justification is provided. As for Type 1 cumulative effects, only the likely residual effects are considered within this assessment since it is a reasonable assumption that all mitigation and enhancement measures recommended for the Development such as the Site-specific Environmental Management Plan (as set out in this ES) and cumulative schemes would be implemented.

14.10. **Table 14.1** provides the details of all the cumulative schemes which have been considered in this assessment. A plan showing the location of the cumulative schemes in relation to the Site is presented as **Figure 14.1**. The cumulative schemes to be included in the assessment were agreed through consultation with Southwark Council (SC).

Table 14.1 List of Cumulative Schemes Assessed

Ref. (Figure 14.1)	Cumulative Scheme	Planning Reference Number (Borough)	Summary Description
1	185 Park Street	17/AP/1944 (SC)	Minor material amendment to planning permission 14/AP/3842. Demolition of existing buildings and redevelopment to provide a mixed use development providing three new buildings comprising basement, lower ground and ground floor plus part 8, 14 and 18 storeys (maximum height 19 storeys) containing 163 residential units (Class C3), Office (Class B1), Retail (Class A1/A3/A4), Cultural facility (Class D1/A1/A3/A4); provision of hard and soft landscaping and the provision of parking, servicing and plant areas
2	Tower Bridge Magistrates Court and Police Station, 209-211 Tooley Street	15/AP/3303 (SC)	Part demolition, alteration and extension of existing building, construction of new build floorspace, excavation and change of use of the site from magistrates' court (use class D1) and police station (use class Sui Generis) to provide a seven storey building for hotel use (use class C1) at lower ground, ground, mezzanine and 1st to 5th floors (198 bedrooms), delicatessen (use class A1), restaurant and cafe use (use class A3), hotel bar use (use class A4), and leisure use (use class D2) with associated vehicle and cycle parking, landscaping, plant and engineering works'
3	Capital House	14/AP/4640 (SC)	Demolition of Capital House, and erection of a 21 and 31 storey building (1 basement Level plus ground and 30 upper storeys) to a maximum height 108.788m to provide 119 residential units (C3), retail/cafe units (flexible Class A1, A3 Use) at ground floor level, 199 cycle parking spaces, 2 disabled car parking spaces, associated refuse and recycling, and an area of public open space.
4	Shard Place (Fielden	17/AP/4008 (SC)	Minor material amendment to planning permission 14-AP-1302. Demolition of existing buildings and erection of part 26 and part

Ref. (Figure 14.1)	Cumulative Scheme	Planning Reference Number (Borough)	Summary Description
	House) 28-42 St Thomas Street		16 storeys to provide 176 apartments (141 Use Class C3 and 35 flexible use C1/C3), with 1,800sqm (gross) of flexible retail space (Classes A1, A2, A3 and A4) at St. Thomas Street and London Bridge Street (Concourse) levels, service area, one level of basement including car parking (4 spaces) and associated hard and soft landscaping, amenity spaces and alterations to existing highways adjoining
5	25-29 Harper Road	15/AP/3886 (SC)	Demolition of the existing former Sorting Office and Former Court building and redevelopment to provide 64 residential units (2 studios, 20 x 1b2p, 29 x 2b4p, 8 x 3b5p, 4 x 4b5p, 1 x 4b6p) in three blocks of 4, 5 and 7-storeys in height plus lower ground floor; 299sqm of B1 floorspace together with associated amenity space, landscaping and related ancillary works.
6	Isis House, 67-69 Southwark Street	13/AP/2075 (SC)	Demolition of existing building and erection of a part 13, part 16 storey building comprising a retail unit on the ground floor (Use Class A1) and 9 self-contained residential units above (Use Class C3).
7	153-159 Borough High Street	15/AP/4980 (SC)	Demolition of 153-159 Borough High Street, and erection of 7-storey hotel (with basement), comprising 50 bedrooms and roof terrace, top 2 floors set back; and A1/A3 use at basement and ground floor level.
8	175-179 Long Lane	15/AP/4072 (SC)	Redevelopment of site to provide a part 6, part 7 and part 8 storey building comprising commercial units at ground and mezzanine level (Use Class B1) with 94 residential units above (Use Class C3) (39 x 1 bed, 39 x 2 bed and 16 x 3 bed), associated car and cycle parking, landscaping, gymnasium, podium garden at first floor level and other associated works.
9	Lavington House, 25 Lavington Street	16/AP/2668 (SC)	Demolition of existing buildings and redevelopment of the site to provide a 10 storey (plus basement) commercial building with two flexible A1/A3/B1 units at ground/basement level and B1 floorspace on all upper levels and accessible parking/vehicular access and servicing from Ewer Street; 170 apartments in three residential buildings at 8, 13 and 21 storeys (plus basement, including roof plant) with a flexible A1/A3/B1 unit at basement/ground floor level; parking/vehicular access from Lavington Street; 3 mews houses (3 storeys); new public realm; hard and soft landscaping; pedestrian routes; alterations to the public highways including widened footways, relocated parking and service bays, tree planting, resurfacing and associated works.
10	19-23 Harper Street, 325 Borough High Street and 1-5 and 7-11 Newington Causeway	18/AP/0657 (SC)	Demolition of existing buildings and redevelopment to provide a hotel-led mixed use development comprising construction of a part single, part 5, part 7, part 8 and part 14-storey building (maximum height 51m AOD) plus basement, providing 427 hotel rooms (Use Class C1) 6 no. residential dwellings (Use Class C3), office use (Class B1), retail use (Class A1-A3) and flexible use (Class B1/D1), 4 no. car parking spaces together with access, cycle parking, hard and soft landscaping and other associated works incidental to the development.
11	133 Park Street	16/AP/4569 (SC)	Demolition of existing buildings and redevelopment to provide two Class B1 office buildings of nine storeys and ten storeys plus plant (41m AOD on Sumner Street and 42.85m AOD on Park Street). The development will include the creation of a new

Ref. (Figure 14.1)	Cumulative Scheme	Planning Reference Number (Borough)	Summary Description
			basement; new public realm; provision of a retail (Class A1/A3/A5) kiosk; hard and soft landscaping and other associated works.
12	Southwark Fire Station, 94 Southwark Bridge Road;	17/AP/0367 (SC)	Redevelopment of the site including alterations and extensions to listed buildings for a mixed use scheme to provide a new secondary school with 6th form (up to 1150 pupils), 199 residential units in buildings up the 10 storeys in height, 234 sqm of flexible commercial or community use (Class A1, A3, B1, D1, D2), a 139 sqm Gym, associated landscape and public realm works, cycle parking, disabled parking and servicing access; and the redevelopment of land at Grotto Place for the provision of a new sports hall (1,452sqm) and external multi use games facility and landscaping.
13	1-5 Paris Garden and 16-19 Hatfields	17/AP/4230 (SC)	Phased redevelopment comprising: Phase 1: Demolition of 4-5 Paris Garden and 18-19 Hatfields to create a part 23 and part 26 storey tower building (+ double basement)(up to 115.75m AOD) to be used for offices (Class B1), above a new public space with flexible retail/professional services/restaurant uses (Classes A1/A2/A3) at ground floor level and restaurant/bar uses (Classes A3/A4) at third floor level; Phase 2: Partial demolition, refurbishment and extensions to 16-17 Hatfields and 1-3 Paris Garden for continued use as offices (Class B1) with flexible use of the ground floor level (Classes A1/A2/A3/A4/B1) and restaurant/bar uses (Classes A3/A4) at part fifth floor level; creation of a new public, landscaped roof terrace at part fifth floor level and green roof at sixth floor level; lowering of existing basement slab; new landscaping and public realm; reconfigured vehicular and pedestrian access; associated works to public highway; cycle parking; ancillary servicing and plant and other associated works.
14	Sampson House, 64 Hopton Street	17/AP/2286 (SC)	Variation of Condition 2, approved plans, of planning permission 12-AP-3940 for "Demolition of existing buildings and the construction of a mixed use development totalling 144,622 sq.metres GEA comprising 489 flats (Class C3), 45,378 sqm (including basement) of offices (Class B1), 2,627sqm of retail (Classes A1-A5), 1,969sqm of community uses (Class D1) and 1,014sqm of gym (Class D2). New open space including formation of two new east-west routes, new public square, reconfigured vehicular and pedestrian access and works to the public highway with associated works including landscaping and basement car park for 200 cars (including 54 disabled car parking spaces) plus servicing and plant areas. Change of use of the railway arches from a nightclub to retail, gym and community uses. Configuration of the toilet block for retail uses and toilets. The development contains of 9 new buildings: Ludgate A: 13 storeys (62.08m AOD), Ludgate B: 49 storeys (169.60m AOD), Ludgate C: 15 storeys (73m AOD), Sampson A: 17 storeys (62.85m AOD), Sampson B: 31 storeys, (112.10m AOD), Sampson C: 27 storeys (98.30m AOD), Sampson D: 14 storeys (60.80m AOD), Sampson E: 5 storeys (24.6m AOD), Sampson F: 6 storeys (28.9m AOD)"
15	1 Bank End	15/AP/3066 (SC)	Redevelopment of 1 Bank End, including reuse of railway arches and rebuilding and extension of the rear of Thames House, Park Street (behind retained facade); remodelling of Wine Wharf building on Stoney Street and development of a two storey building at 16 Park Street, all to provide a development reaching

Ref. (Figure 14.1)	Cumulative Scheme	Planning Reference Number (Borough)	Summary Description
			a maximum height of 6 storeys (maximum building height 27.419m AOD) comprising retail units (flexible class A1 shops, A3 cafes/restaurants and A4 drinking establishments use) at ground and first floor levels, a gallery (Class D1 use) at ground floor level, office floorspace (Class B1 use) at ground up to fifth floor level, a cinema (Class D2 use) at ground floor and basement level, associated cycle parking spaces at basement, associated refuse and recycling with new public access routes and public open space.

14.11. Five other applications were reviewed but excluded from the list of schemes, as follows:

- 127-143 Borough High Street (13/AP/1714) – it is completed and operational as a hotel and so forms part of the baseline;
- 59-61 Borough High Street (14/AP/4623) – comprises four residential units and so is too small to have cumulative effects, but the occupants have been included as sensitive receptors;
- 43 Borough High Street (15/AP/3224) - comprises four residential units and so is too small to have cumulative effects, but the occupants have been included as sensitive receptors;
- Boland House – this is a change in use from a restaurant to a museum which is not considered to be significant enough to require inclusion;
- London Bridge Station works – these are ongoing works and complete enough to be included in the baseline.

14.12. It should be noted that Shard Place (reference 4 in **Table14.1**) forms part of the baseline for the assessments. This is because the physical mass of Shard Place is already built and the scheme is due for completion in 2019, prior to the commencement of the Works on Site. This was agreed with SC. Shard Place is in close proximity to the Site and therefore has the potential to affect the baseline situation for these disciplines. Shard Place along with five other committed developments are part of the 'future baseline' traffic model (as outlined in paragraph 14.21) and so are 'baseline' schemes for transport and the associated air quality, noise and vibration effects.

14.13. As Shard Place will be constructed before the Works start there are no demolition or construction cumulative effects between the Development and Shard Place. Shard Place is a Sensitive Receptor (SR) for baseline and cumulative assessments as it will be present by the time the Works on New City Court commence.

14.14. The consented scheme for Capital House has been used, even though a planning application has been submitted for a different scheme on the site. The revised application was submitted on 20 March 2018 and validated on 18 April 2018 (ref: 18/AP/0900) but is yet to be determined and it is considered that the scheme may be subject to change as a result of consultation. Therefore, the consented scheme was used for the cumulative assessment.

14.15. The visual impact assessment includes some cumulative developments outside of the criteria stated above, principally that they are further away from the Site than 1km. The reason is that long distance views are included in the visual impact assessment and therefore these other schemes are relevant to the assessment. These schemes are identified in **Part 3: Townscape, Visual Impact and Built Heritage Assessment** and were discussed and agreed with SC**.**

14.16. The above cumulative schemes comprise a combination of consented and 'reasonably foreseeable' schemes which have yet to be determined. A description and reasoning for the selection of these cumulative schemes are provided below.

14.17. Design information for the cumulative schemes have been based upon readily available public information at the time of undertaking the assessment. Where construction programmes and completion dates for the cumulative schemes are not known, for the purposes of the assessment, it is assumed that some may overlap with the Development as a worst case.

Assessment of Type 1 Cumulative Effects

The Works

14.18. The likely Type 1 cumulative effects for various sensitive receptors and land uses (identified in **Chapter 7 to Chapter 13**) in the vicinity of the Site are listed in **Table 14.2**. **Table 14.2** also identifies the anticipated effect interactions during each of the key stages of the Works. In accordance with **Chapter 6: Development Programme, Demolition, Deconstruction, Refurbishment and Construction**, the Works activities have been outlined, some of which would overlap in terms of programme and timescales.

14.19. In view of the assessment methodology and the findings of the technical assessments reported within this ES, the most significant Type 1 cumulative effects interactions during the Works phase of the Development are likely to result from:

- **Temporary**, **local, adverse effects** of **moderate to major significance** on heritage receptors (e.g. Grade II Georgian Terrace and Borough High Street Conservation Area) and a **short** to **medium** term, **local** to **regional, adverse effect** of **minor** to **moderate** to **major significance** on Townscape Character Areas (refer to **Part 3: Townscape, Visual Impact and Built Heritage Assessment)**;
- **Temporary**, **local**, **adverse effects** of **minor** to **major significance** on nearby residents in relation to noise generated from activities such as demolition, earth works, piling, concreting and pavement works (refer to **Chapter 8: Noise and Vibration**);
- **Temporary, local, beneficial effects to local**, **adverse effects** of **minor** to **major significance** in relation to daylight, sunlight and overshadowing reflecting the gradual change from demolition (beneficial) to a situation where the effects will be as per the completed Development (see **Chapter 13: Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution**).

14.20. Within **Table 14.2**, the likely sensitive receptors have been grouped together according to land use and / or key receptors.

Table 14.2 Type 1 Effect Interactions During the Works of the Development

Sensitive Receptor / Land Use	Demolition	Excavation/ Piling	Substructure	Superstructure and Envelope	Fitting-Out	Landscaping and External Works
Future and existing surrounding residential occupants to the south of the Development including Nos. 51-55 Borough High Street, 22 Southwark Street,	L, LP, N	L, LP, N	L, LP	TH, TC, D, N	TH, TC, D	D
Future and existing surrounding residential occupants to the west, north and east of the Development including Bunch of Grapes Public House, 43 Borough High Street[i], Shard Place and 6 London Bridge Street.	L, LP, N	L, LP, N	L, LP	TH, TC, D, N	TH, TC, D	D
Iris Brook House and Orchard Lisle House	L, LP, N	L, LP, N	L, LP	TH, TC, D, N	TH, TC, D	VE, D
Existing and future pedestrians, cyclists and road / rail users.	TH, TC, N, L, SG	TH, TC, N, L, SG	TH, TC, N, L, SG	TH, TC, N, D, L	TH, TC, N, D	N, D
Site construction workers	N	N	N	N	×	×
Guy's Hospital patients	L, LP, N	L, LP, N	L, LP	N	×	N
Listed Buildings/ non-designated heritage assets	TH, TC	TH, TC	TH, TC	TH, TC	TH, TC	×

Notes: TH - temporary, local, adverse effects of moderate to major significance on heritage receptors.
TC - short to medium term, local to regional, adverse effect of minor to moderate to major significance on Townscape Character Areas
N - temporary, local, adverse effects of moderate to major significance in relation to noise generated from activities.
D - local, adverse effects of minor to moderate significance in relation to daylight, sunlight and overshadowing
L – temporary, local, beneficial effects of minor to moderate significance in relation to daylight, sunlight and overshadowing
LP – temporary, local, beneficial effect of minor significance due to reduced light pollution
SG – temporary, beneficial effect from reduced solar glare
× - No interactive effects

[i] The loss of daylight and sunlight from 43 Borough High Street is considered an adverse effect of major significance. However it is important to note that this property is recessed between two buildings on either side, creating flank walls which would limit the amount of daylight available from oblique angles.

Type 2 Effects

Transportation and Access

14.21. In order to assess the cumulative effects of the Development and other committed developments on users of the road network, public transport users, pedestrians and cyclists surrounding the Site, a cumulative assessment has been undertaken. As described within **Chapter 7: Transportation and Access** of this ES, there are 15 developments in the vicinity of the Development with the potential to result in cumulative effects. The Transport Assessment included those committed developments which are currently under construction and are expected to be completed by the Development opening year within a Future Baseline scenario. These included:

- Tower Bridge Magistrates Court and Police Station (15/AP/3303);
- 175-179 Long Lane (15/AP/4072);
- 25-29 Harper Road (15/AP/3886);
- Isis House, 67-69 Southwark Street;
- 1 Bank End (15/AP/3066); and
- Shard Place (Fielden House) (17/AP/4008).

14.22. The remaining developments were included within the cumulative scenario, which is reported below.

The Works

14.23. Should construction works of the Development and the cumulative schemes overlap, there would be an increase in construction vehicle movements on the surrounding road network, compared to the Development in isolation. However, given that there is an uncertainty over when the various committed developments would come forward in the area, the methods of construction that would be employed; the management measures that would be adopted at each site and the periods of peak construction vehicle movement, it is difficult to predict the cumulative impacts of construction activities, particularly where the intensive operations are of short duration. Capital House construction vehicles could be expected to use St. Thomas Street to access the site, as the Development does. Beyond this the cumulative schemes may use the A2 and A201 but these are main roads and have large traffic volumes on them already given their strategic importance. The A2 carries in excess of 15,508 vehicles a day of which over 1,000 are HGVs. The A201 has a daily flow of over 25,000 vehicles including 2,000 HGVs.

14.24. It is anticipated that each site coming forward would be required to develop their own SEMP and construction logistics plan (CLP) and therefore agree vehicular numbers and vehicular routes with SC and TfL. It is therefore considered that on this basis and subject to the implementation of best practice construction traffic management measures, the residual cumulative effects on all users of the local transport network would be **insignificant**.

Completed Developments

Effect on Pedestrian Movement, Capacity, Severance, Delay, Fear and Intimidation, Amenity

14.25. Each of the committed developments would generate their individual number of pedestrian trips, but as with the Development, they would be required to deliver schemes that would enable easy pedestrian movement, not restrict capacity, provide high environmental and design quality and improved public realm. Some of the pedestrian links in the vicinity of the Site are forecast to have poor pedestrian comfort as a result of additional developments in the area with Borough High Street predicted to experience very uncomfortable conditions, (see the 'do nothing 2031 future baseline scenario' set out in Space Syntax report).

14.26. The additional permeability and the improved public realm as part of the Development significantly improves the pedestrian comfort around the site and takes away pressure off Borough High Street.

14.27. Therefore, when the committed developments are considered together with the Development, the resultant cumulative effects are assessed as **insignificant** to **moderate beneficial** on pedestrians in respect of movement, capacity, severance, delay, fear, intimidation and amenity.

Effect on Cyclists

14.28. Each of the committed developments would establish the individual number of cycling trips generated by the scheme, but similar to the Development, they would be required to deliver schemes of high environmental and design quality, improved public realm and sufficient cycle parking provision for occupants and visitors in accordance with SC and TfL requirements.

14.29. These would translate as mitigation measures and when considered collectively would be expected to result in an **insignificant** effect on cyclists.

Effect on Bus Users

14.30. As part of current TfL guidance, developers are required to assess and report the likely bus trip generation associated with their site. TfL subsequently undertake their own capacity analysis based on their current and proposed level of services to meet predicted demand levels. Therefore the cumulative effects on bus users would be **insignificant.**

Effect on London Underground Services

14.31. The passenger numbers on the Jubilee and the Northern Line for the future baseline have been established based on growth assumptions supplied by TfL. These take into account changes to line loads and Crossrail. In order to assess the cumulative effects on the assessment baseline, the predicted Underground trips from the committed developments have been added to the Proposed Development trips. These trips have been obtained from the committed developments' respective Transport Assessments. From the review of the transport reports, it has been found that each of the committed development proposals involve redeveloping brownfield land whereby the proposed development replaces an existing use allowing for the trips to be offset against the existing sites the committed developments seek to replace. Accordingly, the net additional

Underground trips are incognisant as shown on **Table 14.3** which sets out the cumulative effects on the Jubilee and Northern Lines.

14.32. Additionally, it has been noted that it is understood that there are proposals to enhance the capacity of both the Jubilee and the Northern Line by increasing the peak hour frequencies to 36 and 30 services per hour respectively although there is no guarantee at present that these improvements would be implemented by the Development opening year and therefore have not been taken into account.

Table 14.3 Cumulative Assessment on Underground Capacity

Direction		Future Planning Capacity (pphd)	Future Assessment Baseline Loads 2026	Ratio of Demand to Capacity	Cumulative Loads + Development	Ratio of Demand to Capacity	% Change
Jubilee Line	From Bermondsey	24,828	24,828	86.21%	24,921	86.5%	0.3%
	To Southwark	24,688	24,688	85.72%	24,698	85.8%	0.0%
	From Southwark	20,313	20,313	70.53%	20,477	71.1%	0.6%
	To Bermondsey	21,214	21,214	73.66%	21,219	73.7%	0.0%
Northern Line	From Borough	15,402	15,402	77.01%	15,468	77.3%	0.3%
	To Bank	18,094	18,094	90.47%	18,110	90.6%	0.1%
	From Bank	12,243	12,243	66.54%	12,511	68.0%	1.5%
	To Borough	6,353	6,353	34.53%	6,357	34.5%	0.0%

14.33. From the above table, it can be seen that the additional passenger loads as a result of the cumulative assessment would be less than 2% resulting in an **insignificant** effect.

Effect on National Rail Services and Users

14.34. Developers are required to provide the likely rail trip generation associated with their site together with an associated trip purpose and distribution analysis. Rail operators subsequently undertake their own capacity analysis based on their current and proposed level of services to meet predicted demand levels. The additional demand of the committed developments on rail services would be mitigated directly by these schemes through service enhancements secured as planning contributions. Therefore residual cumulative effect would be **insignificant**.

Effect on Traffic Flows and Road Vehicle Users

14.35. The cumulative baseline traffic flows have been estimated based on the trip generation set out in each of the committed developments' Transport Assessments which have been obtained from SC. From the review of the transport reports, it has been found that each of the committed development proposals involve redeveloping brownfield land whereby the proposed development replaces an existing use. All schemes have been designed to exclude general car parking in order to comply with the current transport guidance and additionally many of the developments replace sites with car parking provision. As a result, the majority of the committed developments are reported not to result in additional traffic on the highway network. For those developments where an increase in traffic is predicted the increases are **insignificant** and these have been added to the baseline flows to generate the cumulative baseline flows.

14.36. **Table 14.4** provides details of the effects of the committed developments in combination with the Development on the local highway network.

Table 14.4 Cumulative Assessments of Traffic Flows

Link	Future Baseline Flows		Cumulative Baseline + Development		Percentage Difference	
	AM	PM	AM	PM	AM	PM
London Bridge to the north of Tooley Street	1,294	1,108	1,309	1,120	1.1%	1.0%
Borough High Street to the south of London Bridge	2,347	2,525	2,362	2,537	0.6%	0.5%
St. Thomas Street	258	213	263	218	1.7%	2.1%
White Hart Yard	4	2	8	6	100.0%	200.0%
Southwark Street to the east of Southwark Bridge Road	413	381	431	393	4.4%	3.1%
Southwark Street to the west of Southwark Bridge Road	890	741	908	753	2.0%	1.6%
Southwark Bridge Road	759	623	762	626	0.3%	0.4%
Marshalsea Road	763	755	766	758	0.3%	0.3%
Borough High Street to the north of Union Street	862	837	886	851	2.8%	1.7%
Long Lane	683	570	684	571	0.1%	0.1%
Tower Bridge Road to the south of Druid Lane	1392	1160	1,392	1,160	0.0%	0.0%
Tooley Street	537	460	537	460	0.0%	0.0%

14.37. As can be seen from the above assessment, when the cumulative baseline plus the Development traffic flows are compared with the baseline flows, White Hart Yard is predicted to experience increases in traffic flows which exceed the Rule 1 threshold with major adverse significance. This is as the direct result of the completed Development and has been assessed in **ES Chapter 7 Transportation and Access** with mitigation measures proposed. This assessment showed that in real terms, the resultant traffic flows on White Hart Yard will continue to be well within the 'low traffic volumes' threshold for when pedestrians treat a street as a space to be occupied and not a road based on advice provided within the Manual for Streets. Additionally, the proposed pedestrian and public realm enhancements are expected encourage pedestrians to divert onto King's Head Yard instead. Therefore, the cumulative effect is expected to be **insignificant** to **adverse and of minor significance**.

14.38. All other links would experience an increase of traffic of less than 10% during both the AM and PM peak. Therefore, the cumulative effect is assessed as being **insignificant** across the wider road network.

Noise and Vibration

The Works

14.39. Potential cumulative noise and vibration effects may be expected where construction sites are within 100m of each other and noisy or vibration-inducing operations occur concurrently. It is clear that each of the cumulative schemes are located at a distance greater than 100m with the exception of Shard Place which is be completed by the time the Works start on the Site and therefore its construction works will not overlap with the Works. Given the screening between the cumulative sites from intervening buildings it is considered that the potential for Type 2 cumulative noise and vibration effects during the Works is **insignificant** with the implementation of a SEMP and CLP by each site.

14.40. Cumulative effects resultant from construction traffic, generated by cumulative schemes within beyond 100m of the Site but which are passing by the Site, would have the potential to cause Type 2 cumulative effects from road traffic noise, should the construction phases of each cumulative scheme and the Development overlap. However, each cumulative scheme (as per the Development) would be required to implement its own CLP including consideration of concurrent construction schemes to minimise the combined effects of construction traffic. A combined management strategy shared by all developers may also be used, as far as reasonably practicable, to minimise cumulative adverse effects. Consequently, the likely Type 2 cumulative residual effects from construction traffic noise are likely to be **insignificant**.

Completed and Operational Development

14.41. Noise from fixed plant associated with the Development would be subject to a standard planning condition based upon the guidance provided in BS 4142. Such a planning condition would limit noise generated by fixed mechanical plant and building services to 10 dB (A) below the minimum background noise level. It is expected that other schemes would adhere to the same noise policy. As such, noise from fixed plant from all cumulative schemes and the Development would be **insignificant**.

14.42. All other noise and vibration from operation of the Development is insignificant, as is the noise and vibration from Shard Place. All other committed developments are too distant from the sensitive receptors around the Development to cause significant Type 2 cumulative residual impacts in terms of noise and vibration.

14.43. It is considered that noise associated with the cumulative schemes and the Development in relation to deliveries and servicing noise would be **insignificant**.

Air Quality

The Works

14.44. The main effects on air quality during the construction phase of the cumulative developments are in relation to dust. Owing to the typical dispersal and deposition rates of dust with distance from their source and assuming that as per the Development, all other cumulative schemes would implement their own SEMPs in order to mitigate dust nuisance effects as far as practicable possible, it is considered that Type 2 cumulative dust effects would likely be an issue for those cumulative schemes within 100m of the Site, and only if they were to be constructed at the same time.

14.45. One of the 15 cumulative schemes is located within 100m of the Site, Shard Place to the north-east of the Site. However this scheme will be completed by the time the Development starts on Site. Cumulative dust effects are therefore considered to be **insignificant**.

14.46. Construction vehicle exhaust emissions from the combined construction traffic of the Development and the cumulative schemes could give rise to cumulative residual effects on local air quality. However, this would depend upon the extent to which the implementation of the Development and the cumulative schemes overlap. In the worst-case scenario, the demolition and construction of the cumulative schemes would overlap with the Works, and use the same construction traffic routes. It is considered that the Works' traffic would add a very small proportion of additional traffic to the local highway network around the Site. In addition, it is considered that appropriate traffic management measures would be implemented to reduce the generation of cumulative construction traffic on the local road network. Based on professional judgement, with the implementation of appropriate CLP for the cumulative schemes, the residual cumulative effect of construction vehicles is considered to have a **short-term**, **local adverse effect** of **minor significance**.

14.47. Exhaust emissions from plant operating on the Site and cumulative scheme sites concurrently would be **insignificant**, even in a combined situation, in the context of the existing adjacent road traffic and exhaust emissions.

Completed and Operational Development

14.48. The main effect of the cumulative Developments on air quality is linked to associated changes in traffic flows. The Development has two blue badge parking spaces and would not generate significant traffic. Effects on local air quality from traffic movements generated from the Development were therefore scoped out of the assessment.

14.49. The cumulative traffic data would be considered in their respective assessments, where applicable. Therefore, is it considered that the likely Type 2 cumulative residual effects of traffic emissions upon local air quality from the Development and cumulative schemes would be **insignificant.**

Archaeology

The Works

14.50. This assessment considers the effect of other developments affecting the same buried heritage assets as the Development. Buried heritage assets (archaeological remains) are generally site-specific, and only one nearby development scheme, Shard Place is located within the study area used for the archaeological assessment of the Site. Shard Place and the Development have no specific shared resource other than a general potential for Roman, medieval, post-medieval remains. Since the Works are subject to an appropriate programme of mitigation (reviewed and agreed by the local planning authority and its archaeological advisors), and given the limited archaeological potential of the Site, it is considered that with the implementation of a successful programme of mitigation at the Site, there would be an **insignificant** cumulative effect with regard to buried heritage assets. From a wider perspective however, and particularly within the archaeological priority areas, any development project that has an impact on archaeology contributes to the cumulative erosion of this resource.

Completed and Operational Development

14.51. As for the Development, none of the cumulative schemes are likely to give rise to any additional intrusive ground works or activities over and above those required for the implementation of the cumulative schemes once completed and operational. It is therefore considered that there would be **no cumulative effects** on archaeology once the Development and all cumulative schemes are completed.

Water Resources and Flood Risk

The Works

14.52. Flood risk effects associated with demolition and construction are typically of local significance. The only scheme near enough to cause a flood risk during construction is Shard Place (Fielden House) but this will have reduced surface water discharge to Thames Water's combined sewer by 10% due to the proposed 50% betterment in surface water runoff before commencement of the Works and hence there are not expected to be any cumulative effects.

14.53. The Works are unlikely to significantly alter or displace groundwater flows and surface water runoff from the sites would be controlled through the implementation of management plans, where required. It can therefore be concluded that there will be no Type 2 cumulative effects.

14.54. The demolition and construction of cumulative schemes, alongside the Development, is unlikely to increase pressure on potable water demand, and as such, it is considered there would be **insignificant** effects.

Completed and Operational Development

14.55. With regard to flood risk, this assessment has assumed that in order for an applicant to submit a planning application and gain planning permission, cumulative schemes have or will be approved by the Local Lead Flood Authority and Environment Agency. This would mean that as per the Development, each cumulative scheme in isolation, and combined, would not increase flood risk within the area.

14.56. Similarly, in line with planning policy requirements, it has been assumed that cumulative schemes would increase surface water attenuation, where required. Should some or all of the cumulative schemes adhere to the Mayor's London Plan Supplementary Planning Guidance on Sustainable Design and Construction[1], then reductions to at least 50% of existing surface water runoff have the potential to result in significant beneficial effects to flood risk. Consequently, the overall likely cumulative effect in relation to flood risk is considered to range from **insignificant** to **long-term**, **local**, **beneficial** and of **minor significance**.

14.57. Where necessary, the cumulative schemes would include diversion and upgrading of sewers, which would be undertaken in agreement with Thames Water. The upgrade / upsizing of sewers would ensure that there is adequate capacity to accommodate these schemes, together with the

Development. The likely cumulative effects on foul water drainage capacity and potable water demand are therefore anticipated to be **insignificant**.

Wind

14.58. Based on professional judgement Wirth Research consider it unlikely that there would be cumulative effects during demolition given the relatively calm conditions of the existing Site and the relative low height of the existing buildings to be demolished on Site.

14.59. As construction of the Development and cumulative schemes progress, the likely wind microclimate would gradually adjust to that identified for the Development and cumulative schemes, once completed and operational, as reported below.

14.60. As reported in **Chapter 12: Wind Microclimate**, Computational Fluid Dynamics (CFD) has been used to assess the pedestrian conditions at and around the Site. Configurations 3 and 4, as described in **Chapter 12** included relevant cumulative schemes that would be reasonably expected to result in potential cumulative effects. These include Capital House (not started yet) and 153-159 Borough High Street (not started yet). Shard Place (Fielden House) is included in the baseline surrounds for wind microclimate assessments as the physical mass that affects wind is already completed for this development.

14.61. Comparison of the completed and operational development with baseline surrounds and the completed and operational development with baseline and cumulative schemes shows the same strength and pattern of wind effects at every level analysed (see **Appendix 12-1**). Therefore, same as for the Development an insignificant effect on wind microclimate is expected.

14.62. Capital house is located 120° (from north) relative to the Development, which is a highly uncommon wind direction, perpendicular to the prevailing winds. 153-159 Borough High Street is upwind from the Development from 210°, which is a dominant wind direction, but is only 7 storeys high and 250m from the Development. Thus, it is to be expected that the choice between baseline and cumulative surrounds would not have an effect upon wind conditions on or around these cumulative sites.

14.63. It can be concluded that the cumulative effects on wind microclimate are **insignificant**.

Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution

14.64. Shard Place (Fielden House) was included in the baseline assessment as reported within **Chapter 13: Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution** as the physical mass that affects daylight, sunlight and overshowing measures is already present**.** The other cumulative schemes are too distant from the Site to result in any cumulative daylight, sunlight, overshadowing effects, therefore a separate cumulative effects assessment has not been undertaken.

Townscape, Visual Impact and Built Heritage

14.65. The full cumulative assessment for townscape, visual and built heritage effects is provided in **Part 3: Townscape, Visual Impact and Built Heritage Assessment** and not reproduced within this chapter. This approach enables the reader to view the Accurate Visual Representations (AVRs) of the Development alongside the committed developments together with the resulting cumulative assessment. This approach also restricts this chapter from becoming overly long.

14.66. As for previous topics, Shard Place (Fielden House) was included in the baseline assessment as its physical mass was present in the AVRs.

References

1 Greater London Authority (2014), 'Sustainable Design and Construction - Supplementary Planning Guidance', Greater London Authority, London.

15. Residual Effects and Monitoring

Introduction

15.1. The likely significant residual effects of the Development and the proposed monitoring to be undertaken are described in detail in the preceding technical chapters (**Chapters 7** to **13**) and **Part 3 Townscape, Visual Impact and Built Heritage Assessment** of this ES, following the implementation of mitigation measures. For ease of reference, **Table 15.1** presents a summary of all potential effects, mitigation measures and subsequent likely residual effects of the Development, and a summary of the monitoring arrangements post mitigation is also provided in this chapter.

Table 15.1: Potential Effects, Mitigation Measures and Likely Residual Effects of the Development

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Transport and Access: The Works			
Effects of traffic flows from construction vehicle movements upon the local highway network users.	Adverse effect of major significance on St Thomas Street (HGVs only) insignificant on all other links.	Site Environmental Management Plan (SEMP) and Construction Logistics Plan (CLP) prior to commencement.	Insignificant
Effects of construction activities on pedestrians in terms of movement and capacity, severance, delay, fear and intimidation, amenity.	Adverse effect of moderate significance to insignificant.	Management of walkways, any temporary closures and routing would be agreed with Southwark Council (SC) through the CLP and SEMP post-planning and prior to commencement.	Insignificant
Dust and dirt.	Insignificant	Dust and dirt to be prevented and managed as set out in SEMP.	Insignificant
Effects of construction on cyclists.	Insignificant	Management of road closures and routing would be agreed with the SC through the CLP and SEMP post-planning and prior to commencement.	Insignificant
Effects of increased number of public transport trips as a result of construction workers' travel on public transport users.	Insignificant	None required.	Insignificant
Transport and Access: Completed and Operational Development			
Effects of the Development on pedestrians in respect of pedestrian movement and capacity.	Beneficial effect of moderate significance. adverse effect of moderate significance on White Hart Yard only.	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from	beneficial effect of moderate significance. adverse effect of minor significance on White Hart Yard.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
		White Hart Yard. Delivery, Waste and Servicing Management Plan (DSWMP) minimising servicing vehicles on White Hart Yard during peak periods.	
Effects of the Development on pedestrian severance.	Beneficial effect of moderate significance. Insignificant on White Hart Yard	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from White Hart Yard.	Beneficial effect of moderate significance. Insignificant on White Hart Yard
Effects of the Development on pedestrian delay.	Beneficial effect of moderate significance. adverse effect of minor significance on White Hart Yard.	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from White Hart Yard. DSMP minimising servicing vehicles on White Hart Yard during peak periods.	Beneficial effect of moderate significance. adverse effect of minor significance on White Hart Yard.
Effects of the Development on pedestrian fear and intimidation.	Beneficial effect of minor significance. insignificant on White Hart Yard.	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from White Hart Yard.	Beneficial effect of minor significance. Insignificant on White Hart Yard.
Effects of the Development on pedestrian amenity.	Beneficial effect of major significance. Insignificant on White Hart Yard.	New pedestrian connection through the Site and public realm enhancements to encourage diversion of pedestrian movements onto King's Head Yard from White Hart Yard.	Beneficial effect of major significance. Insignificant on White Hart Yard.
Effects of the Development cycle trips on cyclists using the local cycle network.	Insignificant.	None required.	Insignificant.
Effects of the Development bus services on bus users.	Insignificant.	None required.	Insignificant.
Effects of the Development underground trips on Underground passengers.	Insignificant.	None required.	Insignificant.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Effects of the Development Rail trips on train passengers.	Insignificant.	None required.	Insignificant.
Effects of the Development Traffic Flows on road users on the local highway network.	Adverse effect of major significance on White Hart Yard. Insignificant on all other links.	DSMP minimising servicing vehicles on White Hart Yard during peak periods.	Adverse effect of minor significance on White Hart Yard. Insignificant on all other links.
Noise and Vibration: The Works			
Noise *SR A*	Insignificant.	Adoption of BPM mitigation measures which would be outlined in the SEMP as well as noise and vibration limits. The SEMP is expected to be secured by planning condition. Monitoring of Site vibration levels when piling within 10m of listed buildings, utilities or LUL lines.	Insignificant.
SR B	Local, temporary, short to medium term effects of minor to major adverse significance.		Insignificant.
SR C	Local, temporary, short to medium term effects of major adverse significance.		Insignificant to local, temporary, short to medium term effects of moderate adverse significance.
SR D	Local, temporary, short to medium term effects of major adverse significant.		Insignificant to local, temporary, short to medium term effects of moderate adverse significance.
SR E	Insignificant, except during demolition where local, temporary, short to medium-term effects of moderate adverse significance.		Insignificant.
SR F	Local, temporary, short to medium term effects of major adverse significance.		Insignificant to local, temporary, short to medium term effects of moderate adverse significance.
SR G	Insignificant.		Insignificant.
SR H	Insignificant.		Insignificant.
SR I	Insignificant.		Insignificant.
SR J	Insignificant.		Insignificant.
Vibration	Insignificant to local, temporary, short to medium term effects of minor adverse significance.		Insignificant.
Traffic Noise	Insignificant.	Adoption of a CLP.	Insignificant.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Noise and Vibration: Completed and Operational Development			
Building Services Plant Noise.	Insignificant.	Plant noise limit secured through planning condition.	Insignificant.
Commercial Uses and Servicing Noise.	Insignificant.	Building envelope and Delivery, Servicing and Waste Management Plan (DSWMP)	Insignificant.
Air Quality: The Works			
Dust emissions arising from the demolition and construction works.	Insignificant.	None required. However, some of the routine management controls prescribed in the SEMP would relate to good practice measures to limit the impacts of construction traffic and the use of plant and machinery.	Insignificant.
Emissions from demolition and construction vehicles.	Insignificant.		Insignificant.
Emissions from demolition and construction plant.	Insignificant.	Plant to meet standards set for NRMM.	Insignificant.
Air Quality: Completed and Operational Development			
Emissions from heating plant associated with the Development.	Insignificant.	None required.	Insignificant.
Archaeology (Buried Heritage): The Works			
Archaeological remains of medium (District) significance, i.e. isolated and truncated prehistoric and/or Roman cut features.	Direct, permanent, local adverse effects of major significance.	Implementation of an agreed phased programme of archaeological investigation under a planning condition to secure preservation by record. This would comprise evaluation (if feasible this would be combined with any geotechnical works) following removal of the basement slab. The results would inform the need and scope for any necessary subsequent targeted excavation and recording, and/or a watching brief during ground reduction, as appropriate.	Insignificant.
Archaeological remains of Low (local) significance, i.e. redeposited prehistoric and/or Roman artefacts, truncated post-medieval remains, and disarticulated human bone.	Direct, permanent, local adverse effects of moderate significance.		Insignificant.
Archaeology (Buried Heritage): Completed and Operational Development			
Likely effects to archaeology would only result from intrusive ground works resulting from the demolition and construction of the Development. Therefore, there would be no archaeological effects associated with the complete and operational Development.			

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Water Resources and Flood Risk: The Works			
Tidal and fluvial flood Risk.	Insignificant.	None required.	Insignificant.
Groundwater flooding.	Temporary, short to medium-term, local, adverse effect of minor significance.	Appropriate dewatering and disposal, using standard techniques such as sumps and pumps.	Insignificant.
Surface water (pluvial) flooding.	Temporary, short to medium term, local, adverse effect of minor significance.	Implementation of SEMP including adequate temporary drainage.	Insignificant.
Effects to Controlled Waters from ground contamination.	Temporary, short to medium term, local, adverse effect of minor significance.	Implementation SEMP detailing protective measures.	Insignificant.
Foul and potable water infrastructure.	Insignificant (foul) Insignificant to temporary, short to medium term, local, adverse effect of minor significance at worst (potable water).	None required (foul). Implementation of SEMP including measures to minimise and reduce water use (potable water).	Insignificant.
Water Resources and Flood Risk: Completed and Operational Development			
Tidal and fluvial flood risk	Insignificant to long-term, local adverse effect of minor significance.	Permanent flood barrier for basement access and demountable flood barrier system for pedestrian entrances.	Insignificant.
Flooding from sewers	Insignificant.	None required.	Insignificant.
Surface water (pluvial) flooding	Insignificant to long-term, local adverse effect of minor significance.	Permanent flood barrier for basement access and demountable flood barrier system for pedestrian entrances.	Insignificant.
Groundwater flooding	Insignificant.	None required.	Insignificant.
Change in foul Water drainage capacity	Insignificant.	None required.	Insignificant.
Change in potable water demand	Insignificant.	None required.	Insignificant.
Wind Microclimate: The Works			
Wind effects on and around the Site during the Works.	Short-term, local, adverse effect of minor significance.	The effect is entirely within the site boundary and not publicly accessible during the Works. Mitigation developed for the completed Development	Insignificant.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
		should be provided around buildings as they are occupied.	
Wind Microclimate: Completed and Operational Development			
Wind effects on off-site local thoroughfares.	Insignificant (LUL station entrance, Southwark Cathedral) to long-term, local, beneficial effect of minor significance (between London Bridge Place and the Shard).	None required as there is a significant benefit in the area near London Bridge Place.	Insignificant.
Wind effects on on-site public realm.	Long-term, local, adverse effect of minor significance (in the Main Courtyard).	Tree planting in the ground level public realm in accordance with the plans as submitted.	Insignificant.
	Long-term, local, adverse effect of minor significance (in St. Thomas Street entrance).	Tree planting in the ground level public realm in accordance with the plans as submitted.	Insignificant.
	Long-term, local, adverse effect of minor significance (in New Yard).	Tree planting in the ground level public realm in accordance with the plans as submitted.	Insignificant.
Wind effects on on-site amenity spaces.	Long-term, local, adverse effect of moderate significance (on hub terrace).	Install screens on south edge of hub terrace up to 2.5m from floor.	Insignificant.
	Long-term, local, adverse effect of moderate significance (on level 5 terrace).	Install 1.5m wide vertical screens, angled 25°, along the south edge of Level 5 terrace.	Insignificant.
	Long-term, local, adverse effect of minor significance (on level 3 terrace).	Restrict access to the extremities of the Level 3 terrace by a perforated hand rail.	Insignificant.
Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution: The Works			
Daylight, sunlight and overshadowing effects during demolition.	Temporary, beneficial effects considered likely during demolition.	None proposed.	Temporary, beneficial effects considered likely during demolition.
Solar glare effects during demolition.	Temporary, beneficial effects considered likely during demolition.	None proposed.	Temporary, beneficial effects considered likely during demolition.
Daylight, sunlight and overshadowing during construction.	Effects would gradually change from beneficial to those expected once the	None proposed.	Effects would gradually change from beneficial to those expected once

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
	Development is complete and operational.		the Development is complete and operational.
Solar glare during construction.	Effects would gradually change from beneficial to those expected once the Development is complete and operational.	None proposed.	Effects would gradually change from beneficial to those expected once the Development is complete and operational.
Light pollution during demolition.	Temporary, beneficial effects considered likely during demolition.	None proposed.	Temporary, beneficial effects considered likely during demolition.
Daylight, Sunlight, Overshadowing and Solar Glare: Complete and Operational Development			
Daylight	Long term, local, Insignificant to 8 properties, minor adverse to 5 properties, moderate adverse to 5 properties.	None proposed.	Long term, local, Insignificant to 8 properties, minor adverse to 5 properties, moderate adverse to 5 properties.
Sunlight	Long term, local, Insignificant to 14 properties, moderate adverse to 2 properties.	None proposed.	Long term, local, Insignificant to 14 properties, moderate adverse to 2 properties.
Overshadowing	Insignificant to all amenity areas.	None proposed.	Insignificant to all amenity areas.
Solar Glare	Long term, local, insignificant to 8 locations, minor adverse to 17 locations, moderate adverse to 1 location, and major adverse to 1 location.	None proposed	Long term, local, insignificant to 8 locations, minor adverse to 17 locations, moderate adverse to 2 locations.
Light Pollution	Insignificant to all properties.	None proposed.	Insignificant to all properties.
Townscape, Visual Impact and Built Heritage: The Works			
Views	No effect or short to medium term, local to regional, adverse or neutral effect of minor / insignificant to major significance.	Hoarding.	No effect or short to medium term, local to regional, adverse effect of minor / insignificant to major significance.
Townscape Character Areas (TCA)	Short to medium term, local to regional, adverse or neutral	Hoarding.	Short to medium term, local to regional, adverse

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
	effect of minor to moderate to major significance.		effect of minor to moderate to major significance.
Townscape, Visual Impact and Built Heritage: Complete and Operational Development			
Views			
View 1. LVMF 1A.1 Alexandra Palace: the viewing terrace – south-western section	Long-term, regional, neutral effect of moderate significance.	None required.	Long-term, regional, neutral effect of moderate significance.
View 2. LVMF 1A.2 Alexandra Palace: the viewing terrace – approaching from the north-eastern car park	Long-term, regional, neutral effect of moderate significance.	None required.	Long-term, regional, neutral effect of moderate significance.
View 3. LVMF 2A.1 Parliament Hill: the summit - looking toward St Paul's Cathedral.	Long-term, regional, neutral effect of moderate significance.	None required.	Long-term, regional, neutral effect of moderate significance.
View 4. LVMF 2B.1 Parliament Hill: east of the summit – at the prominent oak tree	Long-term, regional, neutral effect of minor significance.	None required.	Long-term, regional, neutral effect of minor significance.
View 5. LVMF 3A.1 Kenwood: the viewing gazebo - in front of the orientation board	Long-term, regional, neutral effect of moderate significance.	None required.	Long-term, regional, neutral effect of moderate significance.
View 6. LVMF 4A.1 Primrose Hill: the summit - looking towards St Paul's Cathedral	Long-term, regional, neutral effect of moderate significance.	None required.	Long-term, regional, neutral effect of moderate significance.
View 7. LVMF 5A.2 Greenwich Park: the General Wolfe statue - north-east of the statue	Long-term, regional, neutral effect of minor/insignificant significance.	None required.	Long-term, regional, neutral effect of minor/insignificant significance.
View 8. LVMF 6A.1 Blackheath Point - near the orientation board	Long-term, regional, neutral effect of minor significance.	None required.	Long-term, regional, neutral effect of minor significance.
View 9. LBS Borough View 1 - North facing view from One Tree Hill	Long-term, district, neutral effect of moderate significance.	None required.	Long-term, district, neutral effect of moderate significance.
View 10. LBS Borough View 2 – St Paul's Cathedral from Nunhead Cemetery	Long-term, district, neutral effect of moderate significance.	None required.	Long-term, district, neutral effect of moderate significance.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
View 11. LBS Borough view 3 - St Paul's Cathedral along Camberwell Road	No effect	None required.	No effect
View 12. LVMF 10A.1 Tower Bridge: Upstream - the North Bastion	Long-term, regional, beneficial effect of moderate significance.	None required.	Long-term, regional, beneficial effect of moderate significance.
View 13. St Katharine's Dock, at Girl with a Dolphin Fountain	Long-term, regional, neutral effect of minor to moderate significance.	None required.	Long-term, regional, neutral effect of minor to moderate significance.
View 14. LVMF 12B.1 Southwark Bridge: downstream - close to the City of London bank	Long-term, regional, beneficial effect of moderate to major significance.	None required.	Long-term, regional, beneficial effect of moderate to major significance.
View 15. Millennium Bridge (centre)	Long-term, district, neutral effect of minor to moderate significance.	None required.	Long-term, district, neutral effect of minor to moderate significance.
View 16. LVMF 15B.1 Waterloo Bridge: downstream - close to the Westminster bank	Long-term, regional, neutral effect of minor/insignificant significance.	None required.	Long-term, regional, neutral effect of minor/insignificant significance.
View 17. LVMF 15B.2 Waterloo Bridge: downstream - at the centre of the bridge	Long-term, regional, neutral effect of minor/insignificant significance.	None required.	Long-term, regional, neutral effect of minor/insignificant significance.
View 18. LVMF 17B.1 Golden Jubilee/Hungerford Footbridges: downstream - crossing the Westminster bank	Long-term, regional, neutral effect of moderate significance.	None required.	Long-term, regional, neutral effect of moderate significance.
View 19. LVMF 17B.2 Golden Jubilee/Hungerford Footbridges: downstream close to the Westminster bank	Long-term, regional, neutral effect of moderate significance.	None required.	Long-term, regional, neutral effect of moderate significance.
View 20. LVMF 26A.1 St James' Park Footbridge, centre of the bridge	No effect	None required.	No effect
View 21. LVMF 20B.1 Victoria Embankment: between Waterloo and Hungerford Bridges - at Cleopatra's Needle	No effect	None required.	No effect

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
View 22. Victoria Embankment, opposite Temple Gardens	Long-term, regional, beneficial effect of minor to moderate significance.	None required.	Long-term, regional, beneficial effect of minor to moderate significance.
View 23. Gracechurch Street, corner with Lombard Street	Long-term, regional, neutral effect of moderate to major significance.	None required.	Long-term, regional, neutral effect of moderate to major significance.
View 24. London Bridge: upstream - at the City of London bank	Long-term, regional, beneficial effect of moderate to major significance.	None required.	Long-term, regional, beneficial effect of moderate to major significance.
View 25. Old Billingsgate Walk	Long-term, regional, beneficial effect of moderate significance.	None required.	Long-term, regional, beneficial effect of moderate significance.
View 26. Tower of London: Inner Curtain Wall Walkway	Long-term, regional, beneficial effect of moderate to major significance.	None required.	Long-term, regional, beneficial effect of moderate to major significance.
View 27. Tower of London: Inner Ward, north of the White Tower	Long-term, regional, neutral effect of moderate to major significance.	None required.	Long-term, regional, neutral effect of moderate to major significance.
View 28. Tower of London Setting Study View 1: Tower Green, Inner Ward	No effect.	None required.	No effect.
View 29. Tower of London Setting Study View 8: The Royal Mint	Long-term, regional, neutral effect of minor to moderate significance.	None required.	Long-term, regional, neutral effect of minor to moderate significance.
View 30. Queen's Walk / City Hall	Long-term, local, neutral effect of minor to moderate significance.	None required.	Long-term, local, neutral effect of minor to moderate significance.
View 31. Tower Bridge Road / Queen Elizabeth Street	Long-term, district, neutral effect of minor significance.	None required.	Long-term, district, neutral effect of minor significance.
View 32. Saint Mary Magdalen Churchyard	Long-term, local, neutral effect of minor/insignificant significance.	None required.	Long-term, local, neutral effect of minor/insignificant significance.
View 33. Leathermarket Gardens	Long-term, local, neutral effect of minor/insignificant significance.	None required.	Long-term, local, neutral effect of minor/insignificant significance.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
View 34. Weston Street / Guy Street	Long-term, local, neutral effect of minor significance.	None required.	Long-term, local, neutral effect of minor significance.
View 35. Tabard Gardens	Long-term, district, neutral effect of minor to moderate significance.	None required.	Long-term, district, neutral effect of minor to moderate significance.
View 36. Borough High Street / Great Suffolk Street	Long-term, district, neutral effect of minor to moderate significance.	None required.	Long-term, district, neutral effect of minor to moderate significance.
View 37. Southwark Bridge Road outside no.92	Long-term, district, neutral effect of moderate significance.	None required.	Long-term, district, neutral effect of moderate significance.
View 38. Red Cross Garden (middle)	Long-term, district, beneficial effect of moderate to major significance.	None required.	Long-term, district, beneficial effect of moderate to major significance.
View 39. Borough High Street / Borough London Underground Station	Long-term, district, neutral effect of moderate to major significance.	None required.	Long-term, district, neutral effect of moderate to major significance.
View 40. Borough High Street / Mermaid Court	Long-term, district, neutral effect of moderate to major significance.	None required.	Long-term, district, neutral effect of moderate to major significance.
View 41. Southwark Street / Southwark Bridge Road	Long-term, district, neutral effect of moderate to major significance.	None required.	Long-term, district, neutral effect of moderate to major significance.
View 42. Southwark Street - east of the railway bridge	Long-term, district, neutral effect of moderate to major significance.	None required.	Long-term, district, neutral effect of moderate to major significance.
View 43. Borough High Street, St Saviours Southwark War Memorial	Long-term, district, adverse effect of moderate to major significance.	None required.	Long-term, district, adverse effect of moderate to major significance.
View 44. Southwark Street / Stoney Street	Long-term, district, adverse effect of moderate to major significance.	None required.	Long-term, district, adverse effect of moderate to major significance.
View 45. King’s Head Yard, outside King’s Head	Long-term, local, beneficial effect of moderate to major significance.	None required.	Long-term, local, beneficial effect of moderate to major significance.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
View 46. George Inn Yard	Long-term, local, neutral effect of moderate to major significance.	None required.	Long-term, local, neutral effect of moderate to major significance.
View 47. Guy's Hospital: West Wing Quad	Long-term, local, adverse effect of major significance.	None required.	Long-term, local, adverse effect of major significance.
View 48. Guys Courtyard – near the War Memorial	Long-term, local, neutral effect of moderate to major significance.	None required.	Long-term, local, neutral effect of moderate to major significance.
View 49. Guy's Hospital: North Quad	Long-term, local, adverse effect of major significance.	None required.	Long-term, local, adverse effect of major significance.
View 50. St Thomas Street / London Bridge Street	Long-term, local, adverse effect of major significance.	None required.	Long-term, local, adverse effect of major significance.
View 51. St Thomas Street, opposite Guy's Hospital	Long-term, local, beneficial effect of major significance.	None required.	Long-term, local, beneficial effect of major significance.
View 52. St Thomas Street, outside St Thomas' Church	Long-term, local, beneficial effect of major significance.	None required.	Long-term, local, beneficial effect of major significance.
View 53. Bedale Street / Borough Market	Long-term, district, neutral effect of moderate to major significance.	None required.	Long-term, district, neutral effect of moderate to major significance.
View 54. Borough High Street / Bedale Street	Long-term, district, neutral effect of moderate to major significance.	None required.	Long-term, district, neutral effect of moderate to major significance.
View 55. Cathedral Street / Winchester Walk	Long-term, district, neutral effect of moderate significance. Long-term, district, neutral effect of moderate to major significance in winter.	None required.	Long-term, district, neutral effect of moderate significance. Long-term, district, neutral effect of moderate to major significance in winter.
View 56.1. Southwark Cathedral, west	Long-term, district, neutral effect of moderate significance.	None required.	Long-term, district, neutral effect of moderate significance.
View 56.2. Southwark Cathedral, north-west corner 1	Long-term, district, adverse effect of	None required.	Long-term, district, adverse effect of

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
	moderate to major significance.		moderate to major significance.
View 56.3. Southwark Cathedral, north-west corner 2	Long-term, district, adverse effect of moderate to major significance.	None required.	Long-term, district, adverse effect of moderate to major significance.
View 56.4. Southwark Cathedral, north	Long-term, district, neutral effect of moderate to major significance.	None required.	Long-term, district, neutral effect of moderate to major significance.
View 56.5 Southwark Cathedral, entrance gates to Millennium Courtyard	Long-term, district, neutral effect of major significance.	None required.	Long-term, district, neutral effect of major significance.
View 56.6 Southwark Cathedral, Millennium Courtyard	Long-term, district, neutral effect of major significance.	None required.	Long-term, district, neutral effect of major significance.
View 57. London Bridge, outside Glazier's Hall	Long-term, local, beneficial effect of moderate to major significance.	None required.	Long-term, local, beneficial effect of moderate to major significance.
View 58. Islington Local View 4: Farringdon Lane, near Ray Street Bridge	Long-term, regional, neutral effect of minor significance.	None required.	Long-term, regional, neutral effect of minor significance.
View 59. Ray Street Bridge, corner with Farringdon Lane	Long-term, regional, neutral effect of minor significance.	None required.	Long-term, regional, neutral effect of minor significance.
View 60. Islington Local View 3: Vine Street Bridge	Long-term, regional, neutral effect of minor significance.	None required.	Long-term, regional, neutral effect of minor significance.
View 61. Islington Local View 1: Clerkenwell Road, bridge across Farringdon	Long-term, regional, neutral effect of minor significance.	None required.	Long-term, regional, neutral effect of minor significance.
View 62. Trinity Church Square, south-west corner	Long-term, district, neutral effect of moderate significance.	None required.	Long-term, district, neutral effect of moderate significance.
Townscape Character Area (TCA)			
TCA 1 – Bankside, Borough and Potters Fields	Long-term, local to regional, beneficial effect of moderate to major significance.	None required.	Long-term, district, beneficial effect of moderate to major significance.
TCA 2 – Newington	Long-term, district, neutral effect of minor significance.	None required.	Long-term, district, neutral effect of minor significance.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
TCA 3– Bermondsey	Long-term, local to district, neutral effect of minor significance.	None required.	Long-term, local to district, neutral effect of minor significance.
TCA 4 - Tower	Long-term, regional, neutral effect of minor significance.	None required.	Long-term, regional, neutral effect of minor significance.
TCA 5 – North Bank	Long-term, regional, neutral effect of minor significance.	None required.	Long-term, regional, neutral effect of minor significance.

Monitoring

15.2. In compliance with Schedule 4(7) of the EIA Regulations, this section outlines monitoring arrangements post mitigation to cover both the Works and operational phases.

Transport

15.3. The Development would be subject to a Travel Plan which would be expected to be subject to planning condition or Section 106 Obligation for discharge post-planning, prior to first occupation. As part of the Travel Plan, staff travel patterns would be monitored by means of a travel survey in accordance with Southwark Council (SC) and Transport for London (TfL) requirements. The usage of the cycle parking facilities would also be monitored as part of the Travel Plan.

15.4. The Development would also be subject to a Delivery, Servicing and Waste Management Plan as part of which, monitoring would be undertaken of the delivery and servicing vehicles in terms of arrival profile and dwell times.

Noise and Vibration

15.5. Monitoring of Site of vibration should be undertaken when piling works are being carried out within 10m of listed buildings, utilities and LUL lines. Monitoring will ensure vibration at these assets does not exceed 10mm/s.

15.6. The Development would be subject to a SEMP which is anticipated to be secured by means of a planning condition. The SEMP, which would be agreed prior to the commencement of the work with SC, is expected to include a requirement for ongoing noise and vibration monitoring during the Works.

15.7. It is anticipated that there would be a planning condition which would state the plant noise limits and requires monitoring, to ensure these limits are adhered to.

15.8. As stated in **Chapter 7: Transportation and Access**, monitoring would be undertaken of the delivery and servicing vehicles in terms of arrival profile and dwell times.

Air Quality

15.9. Monitoring would be undertaken during the Works, as required by the EIA Scoping Opinion. Monitoring could include dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

15.10. Regular site inspections would be carried out to monitor compliance with the Dust Management Plan (DMP), record inspection results, and make an inspection log available to SC when asked.

15.11. During the Works the frequency of dust monitoring would be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

15.12. Monitoring approach and locations to be agreed with SC.

Archaeology

15.13. Monitoring of any initial ground investigations (e.g. geotechnical test pits) is required to clarify the potential for archaeological survival, should the scale of any ground disturbance in each area require it.

15.14. The investigation would specifically include the south east corner of the Site, that does not contain an existing basement, where there is potential for the area to have been a burial ground.

15.15. The insertion of the underpinning under the Georgian Terrace would be monitored. Elsewhere in the Site, evaluation trial pits or trenches should be excavated once the basement slab is removed. If the results of these investigations indicate that it is necessary, mitigation will comprise targeted excavation and recording, and / or a watching brief during groundworks to secure preservation by record.

Water Resources and Flood Risk

15.16. Water consumption throughout the Works would be monitored, either through sub-metering or utility bills to allow a comparison against best practice benchmarks. If required, the effectiveness of spill clean-up would be monitored to inform best practice construction methods for future incidents and construction schemes.

Wind

15.17. Once the Development is completed and mitigation measures are implemented, on a windy day, the suitability of areas for sitting or standing should be monitored to see if additional mitigation is required.

Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution

15.18. No specific daylight, sunlight, overshadowing, solar glare and light pollution monitoring has been identified.

Townscape, Visual Impact and Built Heritage Assessment

15.19. No specific TBHVIA monitoring has been identified.

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Glossary of Terms

Above Ordnance Datum (AOD)	Land levels in the UK are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as 'Ordnance Datum'. Benchmarks, spot heights and contours on UK Ordnance Survey maps show heights above Ordnance Datum in metres.
Accuracy	A measure of how well a set of data fits the true value.
Adverse	Having a negative / harmful effect on a receptor.
Air Quality Strategy Objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Air Quality Standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
AKT II	The structural and civil engineering consultants
Alluvium	Sediment laid down by a river. Can range from sands and gravels deposited by fast flowing water and clays that settle out of suspension during overbank flooding. Other deposits found on a valley floor are usually included in the term alluvium (e.g. peat).
Ambient	The totally encompassing sound in a given situation.
Amenity	An element of a location or neighbourhood that helps to make it attractive or enjoyable for residents and visitors.
AADF/T Annual Average Daily Flow/Total	A daily total traffic flow (24 hours), expressed as a mean daily flow across all 365 days of the year.
Annual Mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
Aquifer	A below ground, water-bearing layer of soil or rock.
AQMA	Air Quality Management Area. Designated under the Local Air Quality Management regime for areas currently, or forecast, to exceed National Air Quality Strategy objectives. Areas declared if a local authority finds any places where the national air quality objectives are not likely to be achieved.
Archaeology	The scientific study of ancient or historic physical remains of human activity, both above and below ground.
Archaeological interest	There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.

Archaeological Priority Zone	Defined zones or areas where, according to existing information, there is significant known archaeological interest or particular potential for new discoveries. Set out within London boroughs' local plans, these areas inform the practical use of national and local planning policies for the recognition and conservation of archaeological interest.
Baseline	Existing environmental conditions present on, or near, a site against which future changes may be measured or predicted.
Borehole sampling	Using a hydraulic, high frequency percussive drilling ring, the borehole window sampling technique obtains soil samples by driving a narrow steel tube with a viewing slot down its side (the window) into the ground.
Built Heritage	Upstanding structure of historic interest.
Conservation	The preservation or enhancement of a species or building/structure.
Conservation Area	An area designated under Planning (Listed Buildings and Conservation Areas) Act 1990 as being of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance.
Contaminated Land	"*any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that -* *a. significant harm is being caused or there is a significant possibility of such harm being caused; or* *b. pollution of controlled waters is being, or is likely to be caused;…"* as defined by section 78A(2) Part IIA of the Environmental Protection Act 1990.
Contamination	Contamination is the addition, or the result of addition, or presence of a material or materials to, or in, another substance to such a degree as to render it unfit for its intended purpose.
Cumulative Effects	The total effects on a receptor when effects from all sources are considered, including in-combination effects and from other surrounding schemes.
Cut Feature	Archaeological feature such as a pit, ditch or well, which has been cut into the then-existing ground surface.
Designated heritage asset	A World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.
Decibel (dB)	The ratio of sound pressures, which we can hear, is a ratio of 10^6 (one million: one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (Lp) and the associated measurement is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.
Deeproot Silva Cell	A modular building block for containing unlimited amounts of healthy soil beneath paving while supporting traffic loads and accommodating surrounding utilities. The Silva Cell is filled with high-quality, uncompacted soil to grow trees and manage the rate, quality and volume of storm water.
Directive	European Commission (EC) Directives impose legal obligations on European Member States. They are binding as to the results to be achieved, but allow individual states the right to decide the form and methods used to achieve the results.

Dust	Fine particles of solid materials ranging in size from 1 to 75µm (micrometres or microns - millionths of a metre) diameter (see British Standard 3405) capable of being re-suspended in air and settling only slowly under the influence of gravity where it may cause nuisance.
Early Medieval	AD 410–1066. Also referred to as the Saxon period.
Environmental Impact Assessment (EIA)	A technique for ensuring that the likely effects of new development on the environment are fully understood and taken into account before the development is allowed to go ahead. It provides a focus for public scrutiny of the project and enables the importance of the predicted effects, and the scope for modifying or mitigating them, to be properly evaluated by the decision-making authority.
EIA Development	Development that falls under the Schedule 1 or 2 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended 2015) as requiring an EIA.
Emission	A material that is expelled or released to the environment. Usually applied to gaseous or odorous discharges to the atmosphere.
Emission Rate	The quantity of a pollutant released from a source over a given period.
Environmental Statement	Document that reports the findings of an Environmental Impact Assessment.
Evaluation (archaeological)	A limited programme of non–intrusive and/or intrusive fieldwork which determines the presence or absence, and significance of archaeological features, structures, deposits, artefacts or ecofacts within a specified area.
Excavation (archaeological)	A programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological remains, retrieves artefacts, ecofacts and other remains within a specified area. The records made and objects gathered are studied and the results published in detail appropriate to the project design.
Exceedence	Where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard over a given period.
Find Spot	Chance find/antiquarian discovery of artefact. The artefact has no known context, is either residual or indicates an area of archaeological activity.
Grade I listed building	A listed building of exceptional interest.
Grade II listed building	Buildings of special architectural or historic interest.
Grade II* listed building	Particularly significant buildings of more than local interest.
Geotechnical	Ground investigation, typically in the form of boreholes and/or trial/test pits, carried out for engineering purposes to determine the nature of the subsurface deposits.
Groundwater	Water associated with soil or rocks below the ground surface but is usually taken to mean water in the saturated zone.
Habitat	The living place of an organism characterised by its physical or biotic properties.

Heritage asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest.
Historic environment Assessment	A written document whose purpose is to determine, as far as is reasonably possible from existing records, the nature of the historic environment resource/heritage assets within a specified area.
Historic environment	All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.
Historic Environment Record (HER)	A source of information for planning, development-control work, and land management, a HER is an information service that provides access to resources relating to the archaeological and historic built environment of a defined geographic area. Information contained includes details on local archaeological sites and finds, historic buildings and landscapes.
Iron Age	600 BC–AD 43.
Lawson Comfort Criteria	Scale for assessing the wind suitability of the Development in the built environment.
Later Medieval	AD 1066 – 1500
L_{A10}	The noise level exceeded for 10% of the measurement period. It has been used in the UK for the assessment of road traffic noise.
L_{A90}	The noise level exceeded for 90% of the measurement period. It is generally used to quantify the background noise level, the underlying level of noise which is present even during the quieter parts of the measurement period.
$L_{Aeq, T}$	The A-weighted sound pressure level of the steady sound which contains the same acoustic energy as the noise being assessed over a specific time period, T.
L_{AMAX}	Maximum value that the A-weighted sound pressure level reaches during a measurement period. $L_{Amax\ F}$, or Fast, is averaged over 0.125 of a second and $L_{Amax\ S}$, or Slow, is averaged over 1 second. Maximum noise levels were all monitored using the Fast response.
Listed Building	A building included in a statutory list produced by the Secretary of State for Culture, Media and Sport. It comprises buildings and other structures that are of special architectural or historic interest and are protected under the terms of the Planning (Listed Buildings and Conservation Areas) Act 1990.
Locally Listed Building	A structure of architectural and/or historical interest. These are included on the Secretary of State's list, which affords statutory protection. These are subdivided into Grades I, II* and II (in descending importance).
Made Ground	Artificial deposit. An archaeologist would differentiate between modern made ground, containing identifiably modern inclusion such as concrete (but not brick or tile), and undated made ground, which may potentially contain deposits of archaeological interest.
Mesolithic	12,000 – 4,000 BC
Mitigation (measure)	The measures put forward to prevent, reduce and where possible, offset any adverse effects on the environment.

Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
National Planning Policy Framework	The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.
National Planning Policy Statement	National Planning Policy Statement (PPS) notes set out the Government's policies on different aspects of planning. Local planning authorities must take their content into account in preparing their development plans and the guidance may also be material to decisions on individual planning applications and appeals.
Neolithic	4,000 – 2,000 BC
Non-Technical Summary (NTS)	A summary of the Environmental Statement in non-technical language providing a concise, yet comprehensive summary of the likely effects of the project on the environment.
Ordinance Datum	A vertical datum used by Ordnance Survey as the basis for deriving altitudes on maps.
Paleolithic	700,000–12,000 BC
Post Medieval	AD 1500-Present
Particulate matter	Discrete particles in ambient air, sizes ranging between nanometres (nm, billionths of a metre) to tens of micrometres or microns.
Peak Particle Velocity (PPV)	Peak Particle Velocity is the parameter normally used to assess ground vibration measured in mm/s. Peak particle velocity refers to the maximum speed of a particular particle as it oscillates about a point of equilibrium.
Permanent	Long-lasting or non-fading.
Permavoid	A modular interlocking plastic void-former. It has high strength, is lightweight and the open subbase can be used for water storage.
Planning Policy Guidance	Statements of the Government's national policy and principles towards certain aspects of the town planning framework. These policy documents have been replaced by Planning Policy Statements (see below).
Planning Policy Statement	A document issued by central government to replace the existing Planning Policy Guidance notes under the provisions of the Planning and Compulsory Purchase Act 2004. They are statements of the British Government's national policy regarding aspects of the town planning framework. They apply only in England.
Preservation by record	Archaeological mitigation strategy where archaeological remains are fully excavated and recorded archaeologically and the results published. For remains of lesser significance, preservation by record might comprise an archaeological watching brief.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
Public Transport Accessibility Level (PTAL)	A measure which rates locations by distance from frequent public transport services.

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Qualitative	Pertaining to or concerned with quality or qualities.
Quantitative	Of or pertaining to the describing or measuring of quantity.
(Sensitive) Receptor	Receptors comprise anything that may be affected by an environmental effect, be this human beings, socio-economic activity, habitats, species, controlled waters, landscape or cultural heritage.
Residual	When used to describe archaeological artefacts, this means not in situ, i.e. Found outside the context in which it was originally deposited.
Residual effects	Environmental effects remaining after mitigation measures have been implemented.
Risk assessment	An assessment of the likelihood and severity of an occurrence.
Road Link	A length of road which is considered to have the same flow of traffic along it. Usually, a link is the road from one junction to the next.
Roman	AD 43-410
Safeguarding Zone	A protection zone around an asset where there are restrictions on development in close proximity to it.
Scheduled Monument	An ancient monument or archaeological deposits designated by the Secretary of State as a 'Scheduled Ancient Monument' and protected under the Ancient Monuments Act.
Schedule 2 (development)	Development project types under the EIA Regulations where EIA is not mandatory in all cases but may be required, depending on the size, nature and scale of the development and the potential for significant environmental effects to arise.
Scoping	An initial stage in determining the nature and potential scale of environmental effects arising as a result of a development, and an assessment of what further studies are required to establish their significance.
Section 106 obligation	A mechanism which make a development proposal acceptable in planning terms, that would not otherwise be acceptable. They are focused on site specific mitigation of the impact of development.
SEMP	Site-specific Environmental Management Plan
Sensitivity	The capacity of an organ or organism to respond to stimulation.
Setting	The context in which a building or area can be appreciated.
Significant	Important; of consequence
Site code	Unique identifying code allocated to archaeological fieldwork sites, e.g. evaluation, excavation, or watching brief sites.
Source	Location from which contamination is, or was, derived.
Study area:	Defined area surrounding a site in which archaeological data is collected and analysed in order to set a site into its archaeological and historical context.
Sustainable Development	Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.
Sustainable Drainage Systems	Blue roof system and permeable paving.
Temporary	Lasting existing, serving, or effective for a time only; not permanent.

Threshold	The minimum value that will produce a response or specified effect.
Truncate	Partially or wholly remove. In archaeological terms remains may have been truncated by previous construction activity.
Topography	The natural or artificial features, level and surface form of the ground surface.
Type 1 effect	The cumulative effect of at least two interacting aspects of a proposed scheme (e.g. the combined effect of adverse noise, air quality and water quality effects on a habitat).
Type 2 effect	The cumulative effect caused by the combination of a proposed scheme and other existing or future projects.
µg/m^3 micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1µg/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
Use Class A1	Class of land use as set out in Town and Country Planning (Use Classes) Order 1987, and its subsequent amendments. Use Class A1 relates to shops, retail warehouses, hairdressers, undertakers, travel and ticket agencies, post offices, pet shops, sandwich bars, showrooms, domestic hire shops, dry cleaners, funeral directors and internet cafes.
Use Class A2	Class of land use as set out in Town and Country Planning (Use Classes) Order 1987, and its subsequent amendments. Use Class A2 relates to financial services such as banks and building societies, professional services (other than health and medical services) and including estate and employment agencies.
Use Class A3	Class of land use as set out in Town and Country Planning (Use Classes) Order 1987, and its subsequent amendments. Use Class A3 relates to the sale of food and drink for consumption on the premises - restaurants, snack bars and cafes.
Use Class B1	Class of land use as set out in Town and Country Planning (Use Classes) Order 1987, and its subsequent amendments. Use Class B1 relates to offices (other than those that fall within A2), research and development of products and processes, light industry appropriate in a residential area.
Use Class D1	Class of land use as set out in Town and Country Planning (Use Classes) Order 1987, and its subsequent amendments. Use Class D1 relates to non-residential institutions such as clinics, health centres, crèches, day nurseries, day centres, schools, art galleries (other than for sale or hire), museums, libraries, halls, places of worship, church halls, law court. Non-residential education and training centres.
Use Class D2	Class of land use as set out in Town and Country Planning (Use Classes) Order 1987, and its subsequent amendments. Use Class D2 relates to assembly and leisure, such as Cinemas, music and concert halls, bingo and dance halls (but not night clubs), swimming baths, skating rinks, gymnasiums or area for indoor or outdoor sports and recreations.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.

Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements.
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.
Vibration	A to-and-fro motion; a motion which oscillates about a fixed equilibrium position.
Vibration Dose Value (VDV)	Vibration Dose Value is a measure of vibration exposure.
Watching Brief	Formal programme of observation and investigation conducted during any operational phase carried out for non-archaeological reasons. This will be within a specific area or site on land, inter-tidal zone or underwater, whether there is the possibility that archaeological deposits may be disturbed or destroyed.
The Works	The collective name for the demolition, deconstruction, refurbishment and construction works for the Development

waterman

Abbreviations

AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekly Traffic
ADF	Average Daylight Factor
AHMM	Allford Hall Monaghan Morris
ANC	Association of Noise Consultants
AOD	Above Ordnance Datum
APSH	Annual Probable Sunlight Hours
APZ	Archaeological Priority Zone
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ATC	Automatic Traffic Count
AVRs	Accurate Visual Representations
BAP	Biodiversity Action Plan
BCT	Bat Conservation Trust
BID	Business Improvement District
bgl	below ground level
BGS	British Geological Society
BMU	Building Maintenance Unit
BOH	Back of House
BPM	Best Practicable Means
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
BS	British Standard
BSI	British Standards Institution
CABE	Commission for Architecture and the Built Environment
CCS	Considerate Constructors Scheme
CCTV	Closed-Circuit Television
CDA	Critical Drainage Area
CDM	Construction (Design and Management)
CFA	Continuous Flight Auger
CFD	Computational Fluid Dynamics
CHP	Combined Heat and Power
CIBSE	Chartered Institute of Building Services Engineers

CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIL	Community Infrastructure Levy
CLP	Construction and Logistics Plan
CMP	Construction Management Plan
COSHH	Control of Substances Hazardous to Health
CoL	City of London
CRTN	Calculation of Road Traffic Noise
DAS	Design Access Statement
dB	Decibel
DCLG	Department for Communities and Local Government
DEFRA	Department for the Environmental Food and Rural Affairs
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DSWMP	Delivery Servicing and Waste Management Plan
EA	Environmental Agency
EH	English Heritage
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EPO	Environmental Protection Officer
EPUK	Environmental Protection UK
ES	Environmental Statement
EU	European Union
FFL	Finished Floor Level
FRA	Flood Risk Assessment
FTE	Full Time Equivalent
GEA	Gross External Area
GIA	Gross Internal Area
GiGL	Greenspace Information for Greater London
GLA	Greater London Authority
GLAAS	Greater London Archaeology Advisory Services
GLHER	Greater London Historic Environment Record
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GWP	Global Warming Potential
ha	Hectare(s)
HCA	Home and Communities Agency

HDV	Heavy Duty Vehicle
HE	Historic England
HGV	Heavy Goods Vehicle
HMSO	Her Majesty's Stationery Office
HSE	Health and Safety Executive
HTVIA	Heritage, Townscape and Visual Impact Assessment
HUDU	Health Urban Development Unit
IAQM	Institute of Air Quality Management
IEFs	Important Ecological Features
IEMA	Institute of Environmental Management and Assessment
ILP	Institute of Lighting Practitioners
IPPC	Integrated Pollution, Prevention and Controls
JNCC	Joint Nature Conservation Committee
l/s	Litres per second
LAARC	London Archaeological Archive and Research Centre
LAPPC	Local Authority Pollution, Prevention and Controls
LAQM	Local Air Quality Management
LDF	Local Development Framework
LFEPA	London Fire and Emergency Planning Authority
LIA	Local Impact Area
LISI	London Invasive Species Initiative
LNR	Local Nature Reserve
LPA	Local Planning Authority
LTHW	Low Temperature Heating Water
LUL	London Underground Limited
LVMF	London View Management Framework
m	metre(s)
MCW	Management of Construction Work
MEWP	Mobile elevated working platform
MMA	Minor Material Amendment
NBN	National Biodiversity Network
NE	Natural England
NHLE	National Heritage List for England
NHS	National Health Service
NIA	Net Internal Area
NMR	National Monuments Record

NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NPG	National Planning Guidance
NPPF	National Planning Policy Framework
NRMM	Non-road mobile machinery
NRPB	National Radiological Protection Board
NSC	No Sky Line Contour
NSL	No Sky Line
NTS	Non-Technical Summary
OS	Ordnance Survey
PAHs	Polycyclic aromatic hydrocarbons
PAN	Planning Advice Note
PCL	Pedestrian Comfort Levels
PEP	Project Environmental Plan
PM_{10}	Particulate Matter 10 micrometers or less in diameter
$PM_{2.5}$	Particulate matter 2.5 micrometers or less in diameter
PPE	Personal Protective Equipment
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
PTAL	Public Transport Accessibility Level
RAMs	Risk Assessments and Method Statements
RC	Reinforced Concrete
RMA	Reserved Matters Application
RPC	Respiratory Protective Equipment
SBD	Secured by Design
SC	Southwark Council
SEMP	Site Environmental Management Plan
SFP	Specific Fan Power
SFRA	Strategic Flood Risk Assessment
SI	Site Investigation
SINC	Site of Importance for Nature Conservation
SMR	Sites and Monument Record
SPG	Supplementary Planning Guidance
SPZ	Source Protection Zone
SR	Sensitive Receptor

SSSI	Site of Special Scientific Interest
SUDS	Sustainable Drainage Systems
SWMP	Site Waste Management Plan
TA	Transport Assessment
TfL	Transport for London
TMP	Traffic Management Plan
TP	Travel Plan
TPH	Total Petroleum Hydrocarbons
TPP	Transport Planning Professionals
TS	Transport Statement
TVIBHA	Townscape, Visual Impact and Built Heritage assessment
TWUL	Thames Water Utilities Limited
UK	United Kingdom
UKPN	UK Power Networks
UXO	Unexploded Ordnance
VDV	Vibration Dose Value
VOC	Volatile Organic Compounds
VRF	Variable refrigerant flow
VSC	Vertical Sky Component
WAC	Waste Acceptance Criteria
WHS	World Heritage Sites
WHO	World Health Organisation
WIE	Waterman Infrastructure & Environment
WRZ	Water Resource Zone
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

UK and Ireland Office Locations