JPC Environmental Services
(A Division of J P Chick & Partners Ltd)
Consulting Civil & Structural Engineers

Travelodge
Drury Lane, London

Level 1 FRA & Drainage Strategy Report

Report: IE23/006/DS
01 February 2024
Rev. 04

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References

British Standards Institution (BSI). (2013). *Code of practice for surface water management for development sites.* BSI.

Department for Environment, Food and Rural Affairs. (2015). *Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems.* Crown.

HM Government. (2015). *The Building Regulations 2010 - Approved Document H - Drainage and waste disposal.*

Woods Ballard, B, Wilson, S, Udale-Clarke, H, Illman, S, Scott, T, Ashley, R, Kellagher, R. (2015). *The SuDS Manual (C753F).* CIRIA.

Ministry of Housing Communities & Local Government. (2021). *National Planning Policy Framwork.* Crown.

Ministry of Housing Communities & Local Government. (2021). *National Design Guide - Planning practice guidance for beautiful, enduring and successful places.*

Resources

Indicative fluvial/tidal flood mapping (GOV.UK website).
Surface water flood mapping (GOV.UK website).
The London Plan (2021).
MD2339 Drain London & the London Sustainable Drainage Action Plan (2018)
Managing flood risk in Camden – The London Borough of Camden flood risk management strategy
Camden Local Plan 2017
Camden Planning Guidance – Water and flooding – March 2019
Camden SFRA – 2014
Camden Planning Guidance – Basements – January 2021
Thames Water Asset Map – (CON29DW Commercial Report)
As Build Drawings provided by the Client/Architect

EXECUTIVE SUMMARY

Site Name / Address:	10 Drury Ln, High Holborn, London WC2B 5RE
Client:	Travelodge Hotels
Contractor:	Barnes Construction
Architect:	JWA Architects Ltd
Local Planning Authority:	Camden Council
Application Type:	Full Planning Application
Present Site Use:	Travelodge Hotel – Service/undercroft areas
Proposed Site Use:	55 Extra bedrooms and new reception area
Maintenance Responsibility	Travelodge

Objectives:

- To identify the potential sources and risk of flooding.
- To explore potential methods of sustainably managing surface water
- To propose above ground SuDS where appropriate
- To provide evidence of an effective, compliant SuDS system
- To adopt (as far as reasonably practicable) Local Policies relating to the Management of Surface Water

Findings:

General

- The site is at LOW risk from either tidal or fluvial flooding.
- The risk of flooding from surcharging sewers is considered to be LOW.
- Groundwater flooding is considered to represent a Low risk to the site and/or the development.
- The risk of pluvial flooding is considered to be LOW across the site.
- According to the Environment Agency's indicative flood mapping, the site is located within **Flood Zone 1** and therefore has a **very low probability of flooding** (<0.1% annually).
- There are no surface water features within 500m of the site.
- The site is not located within a groundwater Source Protection Zone.
- BGS mapping shows the site to be underlain by Lynch Hill Gravel Member - Sand And Gravel, with bedrock geology indicating London Clay Formation - Clay, Silt and Sand. Localised borehole logs indicate that there may be a significant depth of Made Ground up to 3.5m.

Site Use

- The site is 100% impermeable covered in concrete hardstanding and buildings and is currently utilised as a hotel.

Planning

- In planning terms, the NPPF considers the proposed site use as 'More Vulnerable', in terms of sensitivity to flood risk. These uses are considered appropriate for flood zone 1 and therefore passes the Sequential Test. The Exception Test does not need to be applied.

Existing Drainage

- We understand that the current hotel, has an existing area of green roof, which attenuates and treats surface water before discharging into the existing system. The remainder of the surface water from roofs and hardstanding areas is discharged via traditional pipework to a pair of basement storage tanks. These tanks then discharge via a pumping station into the combined sewer within Short's Gardens at a stepped rate of pump 1 = 2.04 l/s and pump 2 = 4.60 l/s, with a capacity of up 12.0 l/s.

- Foul drainage is a fully piped system which discharges to a storage tank, which is then pumped into the combined sewer also within Short's Gardens. The current foul system (at point of connection) has a dual pump system.

Future Drainage

- This SuDS compliant surface water drainage strategy has been developed for the site following extension and remodelling of areas of the hotel.
- Where possible roof areas will be laid to green and blue roofs which will store the water within an attenuation void beneath the roof surface.
- This water will then be discharged at a restricted rate to the existing storage tanks within the basement, before being discharged via a pumping station to the Thames Water combined sewer.
- The additional foul water associated with the new bedrooms will discharge to the Thames Water combined sewer via the existing points of connection. An additional storage tank will be constructed to provide 24-hour storage in case of pump failure.

Recommendations:

Based on the findings of our desk-based research, a review of the development proposal and the JP Chick drainage design, we would advise as follows:

- The proposed drainage design has been developed on the basis of the strategy contained in this report. The new blue/green roof will provide additional storage capacity within the surface water system delaying the arrival of run-off to the basement tanks.
- The rate of discharge adopted as part of this design will not change from the existing restricted rate.
- A detailed schedule of routine maintenance is outlined within the appendices.
- A Section 106 Agreement will need to be in place for the foul water connection.
- Long term management and maintenance of the drainage system will be the responsibility of the client (Travelodge).

2.0 INTRODUCTION

2.01 Brief

2.01.1 JPC Environmental Services were appointed by Travelodge Hotels to produce a Level 1 Flood Risk Assessment and Drainage Strategy in relation to an extension to Travelodge, Drury Lane, Covent Garden, WC2B 5RE (hereafter to be referred to as 'the site').

2.01.2 This report has been written in accordance with, and meeting the requirements of, planning policy currently guided by:

National Legislation/Codes

- *National Planning Policy framework (NPPF) (Ministry of Housing Communities & Local Government, 2021)*
- *Ciria 753 – The SuDS Manual (Woods Ballard, B, Wilson, S, Udale-Clarke, H, Illman, S, Scott, T, Ashley, R, Kellagher, R, 2015)*
- *Defra's non-statutory technical Standards (Department for Environment, Food and Rural Affairs, 2015)*
- *Building Regulations – Approved Document H (HM Government, 2015)*
- *BS8582:2013 – Code of Practice for Surface Water Management for Development Sites (British Standards Institution (BSI), 2013)*
- *National Design guide, Planning Practise Guidance for beautiful, enduring and successful Places (Ministry of Housing Communities & Local Government)*

Local Policy

- *The London Plan 2021 - Policy SI13*
- *MD2339 Drain London & the London Sustainable Drainage Action Plan (2018)*
- *Managing flood risk in Camden – The London Borough of Camden flood risk management strategy*
- *Camden SFRA – 2014*
- *Camden Local Plan 2017*
- *Camden Planning Guidance – Water and flooding – March 2019*
- *Camden's Local Area Requirements for Planning Applications (2018)*
- *Camden's Flood risk Management Strategy 2022-2027 (Consultation Draft Document)*

2.01.3 In producing this report, we have exercised all the reasonable skill, care and diligence to be expected of an appropriately qualified and competent consultant, experienced in carrying out equivalent services for similar developments.

2.01.4 This report shall be for private and confidential use of Travelodge Hotels., JWA Architects and Barnes Construction. It should not be reproduced in whole or in part or relied upon by a third party for any use without the express written authority of JPC Environmental Services.

2.02 Scope

2.02.1 This strategy has been produced in line with the policies outlined above. The purpose of this report is to:

- Identify any extant potential risk of flooding from off-site sources;
- Explore the potential impact of the planned development;
- Enhance the existing Drainage System to improve water quality and where possible the volume discharged

2.03 Location

Address:	10 Drury Lane, High Holborn, London WC2B 5RE	
Grid references:	Easting: 530273m,	Northing: 181320m

2.03.1 A detailed existing location plan is presented within the appendices.

2.04 Site Description

2.04.1 The site is a Travelodge Hotel which is located at No.10 Drury Lane, London. The site is currently occupied by a substantial property, containing between seven to eleven floors.

2.04.2 The main access to the site is gained via Drury Lane to the East. The site is bounded to the West by mixed-use developments, Shorts Garden lies to the South while the High Holborn Road (A40) lies to the North.

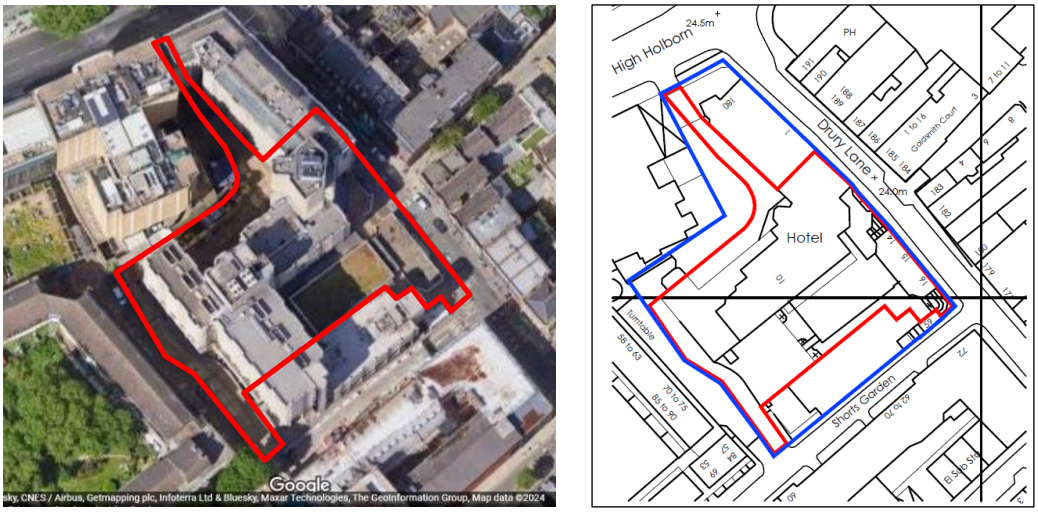

Figure 1 - Extract from Google Maps - Site Location

2.05 Development Proposal

2.05.1 The proposal will create an additional 55 bedrooms by converting existing under croft car park area over 4 floors, which will be linked into the existing Travelodge Hotel. Other improvements are also planned for the entrance to enhance the reception area.

2.05.2 Level 1 and 2 (under croft areas) are being converted to accommodate hotel bedrooms, the Level 3 is being remodelled and extended, and at Level 4 there will be new roof areas to the new entrance and covered bar/restaurant area.

2.05.3 Extracts from the development layouts are shown in the figures below, while the full-scale drawings are included in the appendices.

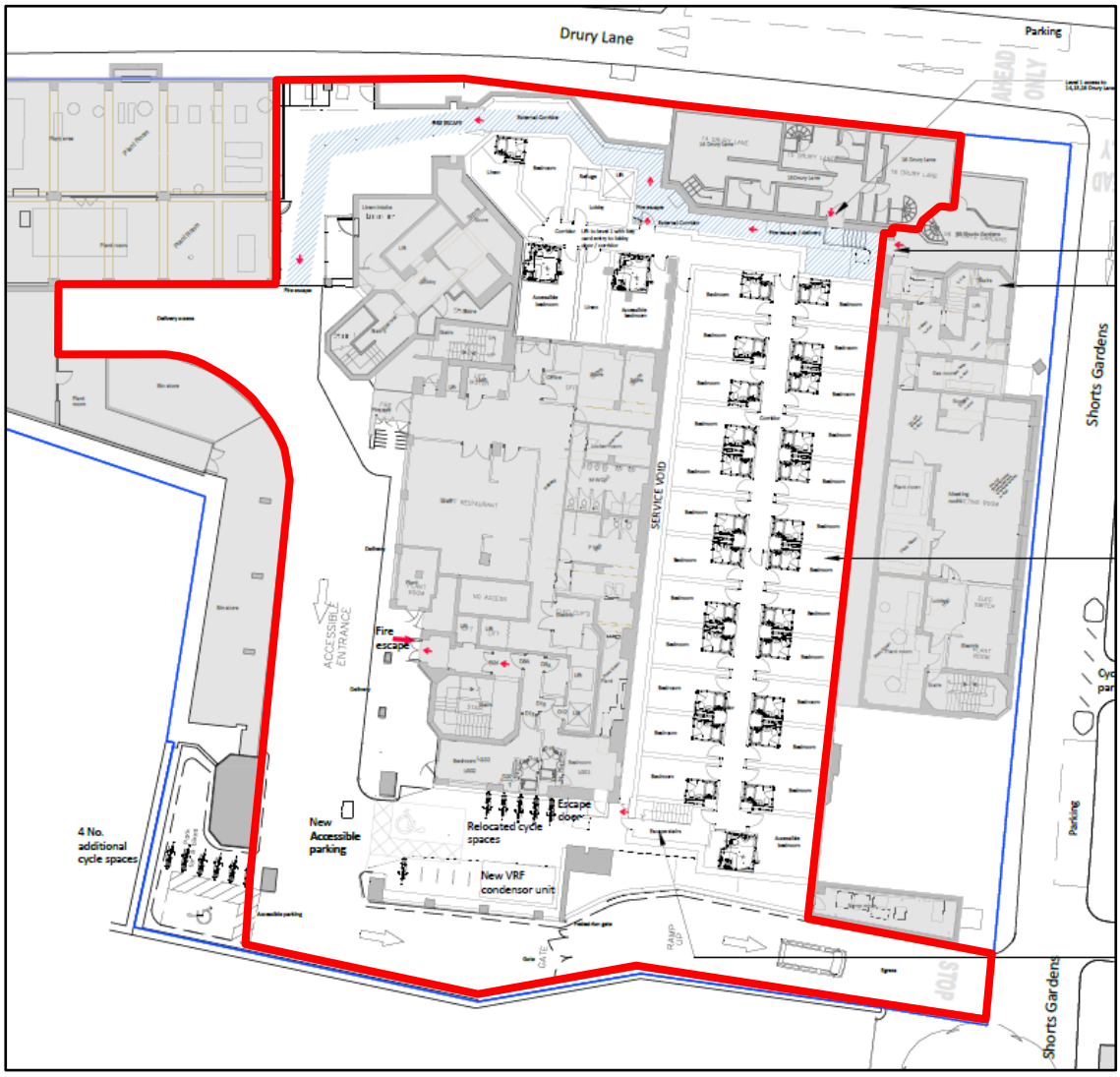

Figure 2 - Extract of Architect's Proposed Layout –Level 1

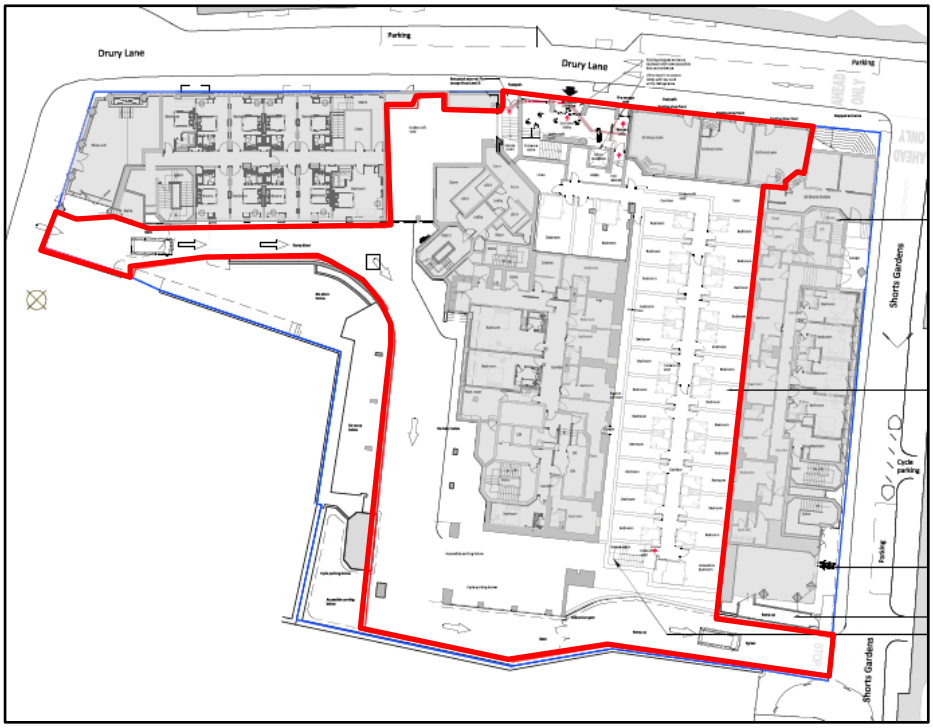

Figure 3 - Extract of Architect's Proposed Layout –Level 2

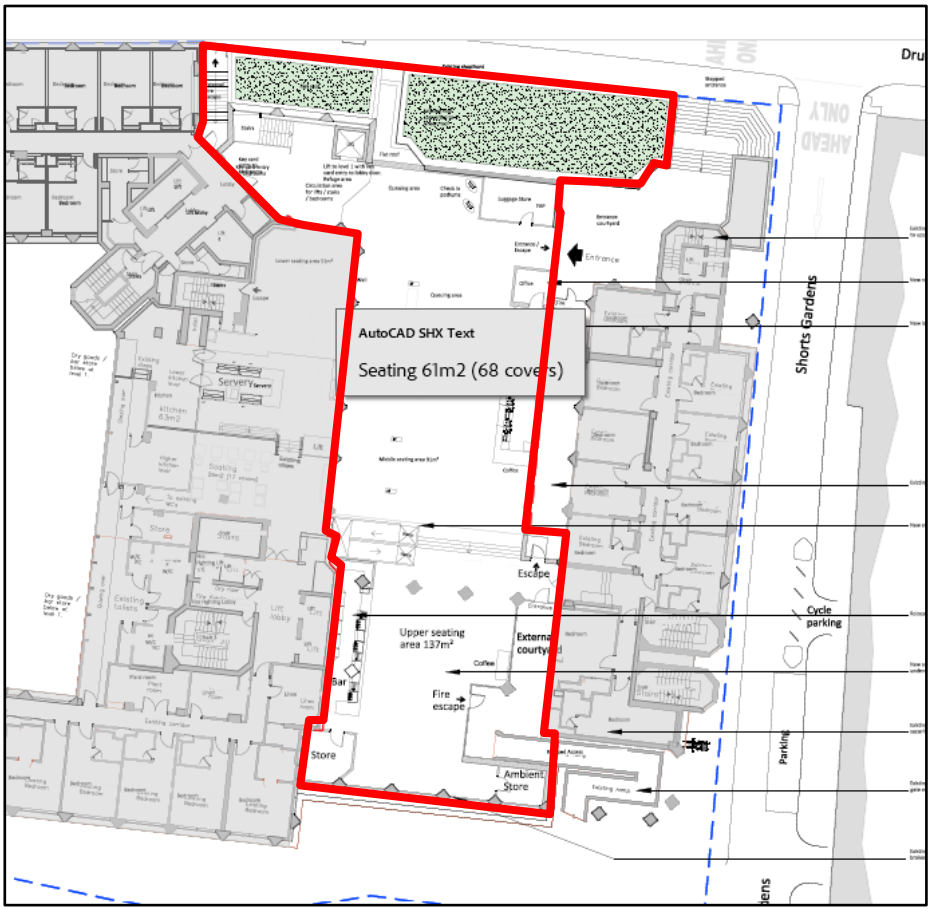

Figure 4 - Extract of Architect's Proposed Layout – Level 3

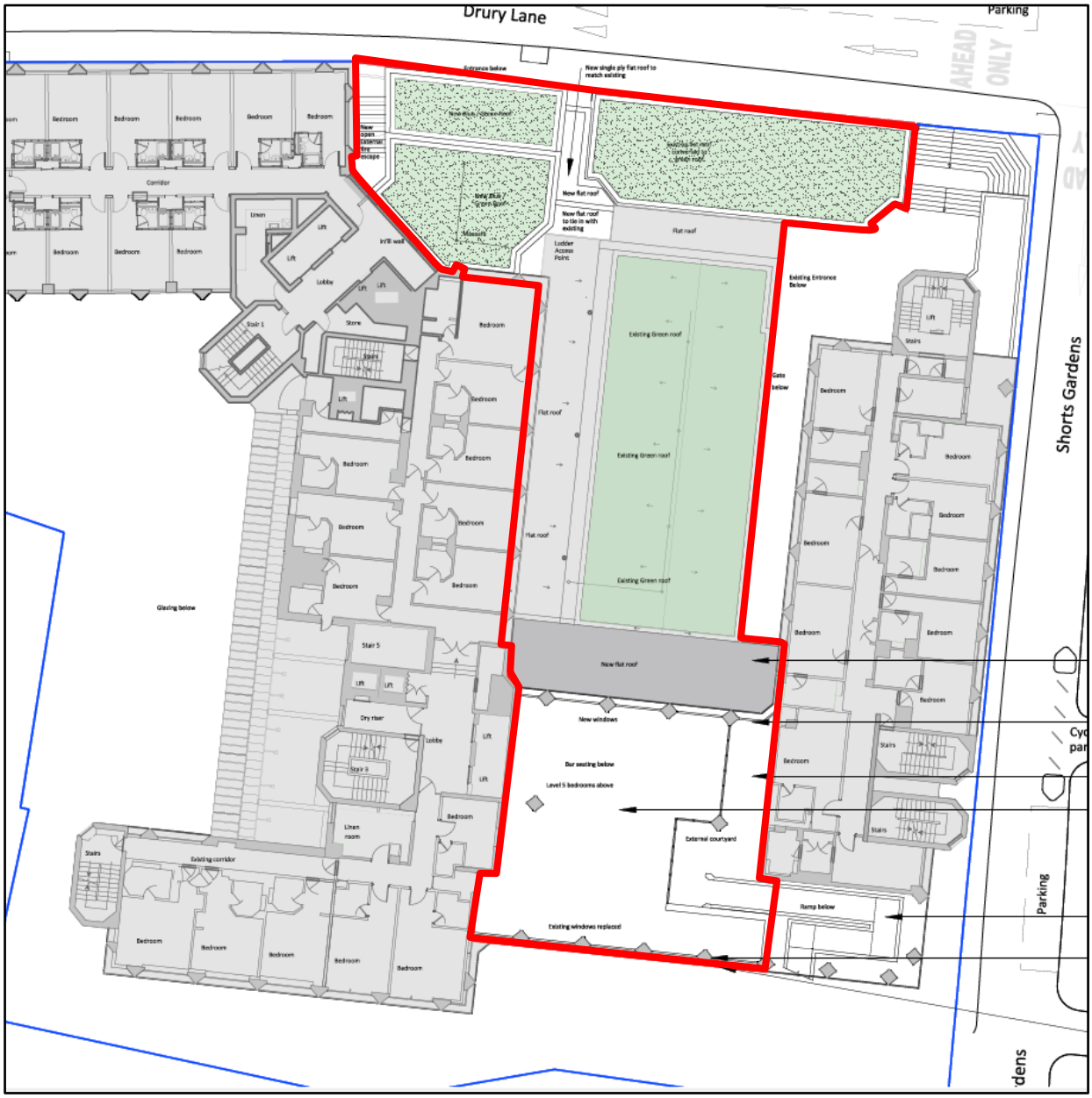

Figure 5 - Extract of Architect's Proposed Layout – Level 4

3.0 BACKGROUND TO FLOOD RISK AND REGULATORY CONTEXT

3.01 National Guidance

3.01.1 In relation to flood risk, planning policy in England is currently guided by the National Planning Policy Framework (NPPF) and the associated guidance relating to flood risk (revised 2021). The purpose of this planning framework is to ensure that flood risk issues are taken into account at every stage of the planning process and that new development is steered towards less vulnerable locations in preference to higher risk areas.

3.01.2 At all levels this policy relies on a series of predicted flood zones, which are defined by the EA. These zones are: -

- **Flood Zone 1** – Low Probability – less than 0.1% annual probability (AEP) of fluvial or tidal flooding. (shown as 'clear' on the flood Map for Planning – all land outside ones 2, 3a and 3b)
- **Flood Zone 2** – Medium Probability – between 1% to 0.1% AEP of fluvial flooding or land having between a 0.5% to 0.1% AEP of tidal flooding. (Land shown in light blue on the Flood Map)
- **Flood Zone 3a** – High Probability – 1% AEP or greater of fluvial flooding or land having a 0.5% AEP or greater of annual tidal flooding (Land shown in dark blue on the Flood Map)
- **Flood Zone 3b** – This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:
    - land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
    - land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).
    - Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)
- Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

3.01.3 In addition to exploring the potential risk and impact of flooding on the development, site specific FRAs are required to assess the potential impact of the development itself on existing sites and the local hydrology. This is designed to ensure that new developments, which typically include extensive areas of impermeable surfacing, do not exacerbate flooding elsewhere.

3.01.4 The design of an appropriate SuDS compliant drainage strategy is guided by the CIRIA hierarchy with a justification required where less sustainable solutions are advocated. The destination for surface water run-off, that is not collected for re-use, should be prioritised as follows:

- Infiltration to ground,
- Restricted discharge to a surface watercourse,
- Restricted discharge to a surface water sewer,

3.01.5 Discharge to a foul sewer is considered a last resort by local water companies.

3.01.6 Where roof run-off is to be discharged to a surface water or combined sewer, the sewerage undertaker should be consulted as to whether any additional criteria/limiting discharge rates are required. Where run-off is to be discharged to an Ordinary Watercourse, the Lead Local Flood Authority should be consulted, while works undertaken within 8.0m (16.0m) of a Fluvial (Tidal) Main River will be subject to an Environmental Permit from the Environment Agency.

3.02 Sequential / Exception Tests

3.02.1 The NPPF advises local authorities, developers and consultants to follow a sequential, risk-based approach to identifying land suitable for development. The proposal comprises the extension of an existing hotel.

3.02.2 A hotel, such as this, is classified as 'More Vulnerable' due to the continuous period of time when the building is occupied, although there is the ability for management to evacuate the building should a flood warning be issued. More Vulnerable development is considered appropriate in Flood Zone 1. Thus, the Sequential Test has been passed and the Exception Test need not be applied.

Table 1 - Vulnerability Table

Flood Risk Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Sone 3a	Exception test required	✓	X	Exception test required	✓
Zone 3b	Exception test required	✓	X	X	X
✓ **Development is appropriate**			X **Development should not be permitted**		
`					

3.03 Lead Local Flood Authority (LLFA) Minimum Planning Application Requirements

3.03.1 The table below contains a list of documents required for Drainage Strategies involved with planning applications by the Lead Local Flood Authority for this site.

Table 2 - LLFA Minimum Planning Requirements

Proforma Requirements	JPC Comments
1 Project Details	Within this document and appendices as well as within London Sustainable Drainage Proforma v2019.02
2. Proposed Discharge Arrangements 2a *Infiltration Feasibility* *2b Drainage Hierarchy* *2c Proposed Discharge Details*	Within this document and appendices as well as within London Sustainable Drainage Proforma v2019.02
3. Drainage Strategy *3a Discharge Rates and Required Storage* *3b Principal Method of Flow Control* *Proposed SuDS Measures*	Within this document and appendices as well as within London Sustainable Drainage Proforma v2019.02
4. Supporting Information *4a Discharge & Drainage Strategy* *4b Other Supporting Details*	Within this document and appendices as well as within London Sustainable Drainage Proforma v2019.02
Large Scale Developments (Full and Outline) Planning will require the following:	
Connections to foul and storm water sewers	Yes – See appendices
Connection to water supply	Yes – See appendices
Consultation with the service provider	Yes – See appendices
SuDS should aim to achieve greenfield run-off rates in line with the following drainage hierarchy:	
1. store rainwater for later use	No-
2. use infiltration techniques, such as porous surfaces in non-clay areas	No – There are no porous surfaces on site.
3. attenuate rainwater in ponds or open water features for gradual release	No – there are no open areas for SuDS features other than the roof.
4. attenuate rainwater by storing in tanks or sealed water features for gradual release	Yes – Blue roof. Yes – Surface water existing storage tanks in the basement.
5. discharge rainwater direct to a watercourse	No watercourse nearby
6. discharge rainwater to a surface water sewer/drain	No
7. discharge rainwater to the combined sewer.	Yes – at the existing restricted rate.

4.0 DESK STUDY

4.01 Geology

4.01.1 Reference to the 1:50,000 BGS Geological Mapping indicates that the site is underlain by superficial deposits of Lynch Hill Gravel Member - Sand And Gravel – This is defined by the BGS as Sand and gravel, locally with lenses of silt, clay or peat. The underlying bedrock geology comprises London Clay Formation - Clay, Silt and Sand. See figure below.

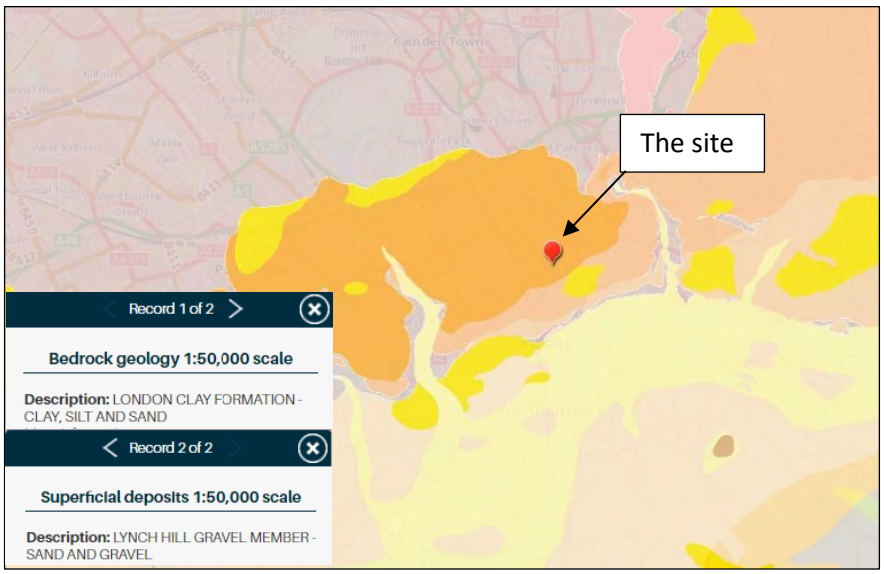

Figure 6 - Extract from British Geological Survey

4.01.2 In addition to the geological mapping, we have reviewed the BGS database for nearby boreholes. The nearest borehole with a log of the underlying soils is [TQ38SW5474] within Short's Gardens. This borehole records the underlying geology as comprising significant quantities of Made Ground to 2.90m. Groundwater was not recorded within the log. The log is included within the appendices.

4.02 Hydrogeology

4.02.1 With reference to the groundwater mapping presented on DEFRA's MAGIC map, the superficial deposits are described as Secondary A, while the underlying bedrock geology is described as Unproductive.

4.02.2 The Environment Agency divides significant groundwater catchments into three Source Protection Zones (SPZ's). With reference to the source protection zones on DEFRA's MAGIC map the site is not located within a Source Protection Zone.

4.02.3 In terms of groundwater vulnerability, the site is classified as Low on the Environment Agency's groundwater vulnerability mapping.

4.02.4 The site is not located within a drinking water safeguard zone.

4.03 Infiltration Testing

4.03.1 As the site is 100% impermeable and the proposed alterations will be within the existing impermeable footprint, there has been no ground investigation/infiltration testing undertaken in this instance.

4.04 Topography

4.04.1 On reviewing the England topographic map together with the Survey Solutions topographic survey, we note that the site is sloping down towards the River Thames to the Southwest, a general overview has been shown in the extract below:

Figure 7 - Extract from England Topographic Maps

4.05 Potential Sources of Flooding

4.05.1 In line with the recommendations contained in the NPPF, we have explored the various potential sources of flooding, which could potentially impact the site both before and after the proposed development. This assessment will evaluate the following sources of potential flood risk:

- Tidal/Fluvial flooding,
- Surface water (pluvial) flooding,
- Groundwater flooding,
- Reservoir/Artificial flooding,
- Sewer flooding.

London Borough of Camden Council - Level 1 Strategic Flood Risk Assessment (2014)

4.05.2 In 2014, Camden Council commissioned URS Infrastructure & Environment UK Ltd to produce a Strategic Flood Risk Assessment. The aim of the SFRA is to collate and analyse the most up-to-date flood risk information from all sources. This aims to ensure flood risk is taken into account when

considering development options, in the preparation of strategic land use policies and for decision taking in relation to planning applications.

4.05.3 The SFRA also provides clear directions on the management of surface run-off arising from development sites. These should use a combination of specific and strategic SuDS measures, to sustainably manage surface water encouraging the control of water at the source where possible. It should be demonstrated through a Surface Water Drainage Strategy, that the proposed drainage scheme, and site layout and design, will protect properties and critical infrastructure from surface water flooding in a 1 in 100-year event allowing for climate change both on and off site.

4.05.5 There were no recorded historic instances of flooding in this location within the SFRA.

Camden Local Plan – Policy CC3 Water and Flooding

4.05.6 The Council will seek to ensure that development does not increase flood risk and reduces the risk of flooding where possible.

Camden will require development to:

- Incorporate water efficiency measures.
- Avoid harm to the water environment and improve water quality.
- Consider the impact of development in areas at risk of flooding (including drainage).
- Incorporate flood resilient measures in areas prone to flooding.
- Utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and
- Not locate vulnerable development in flood-prone areas.

Camden Flood Risk Management Strategy 2022-2027 (Consultation Draft)

4.05.7 This document is an intended update of the Flood risk Management Strategy of 2013. The Strategy aims to contribute to the creation of a climate resilient Camden, able to adapt to the changing climate and increasingly severe rainfall events.

4.05.8 The site was not identified within the document for the areas of historic severe flood events, which occurred in Camden in 1975, 2002 and 2021.

Fluvial/Tidal flood risk

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4.05.9 With reference to the Indicative Flood Map for Planning, the site is located entirely within Flood Zone 1 and thus at less than 0.1% chance of flooding in any given year from either fluvial or tidal sources. See Figure below. A larger scale version of the Flood Map for Planning is included within the appendices.

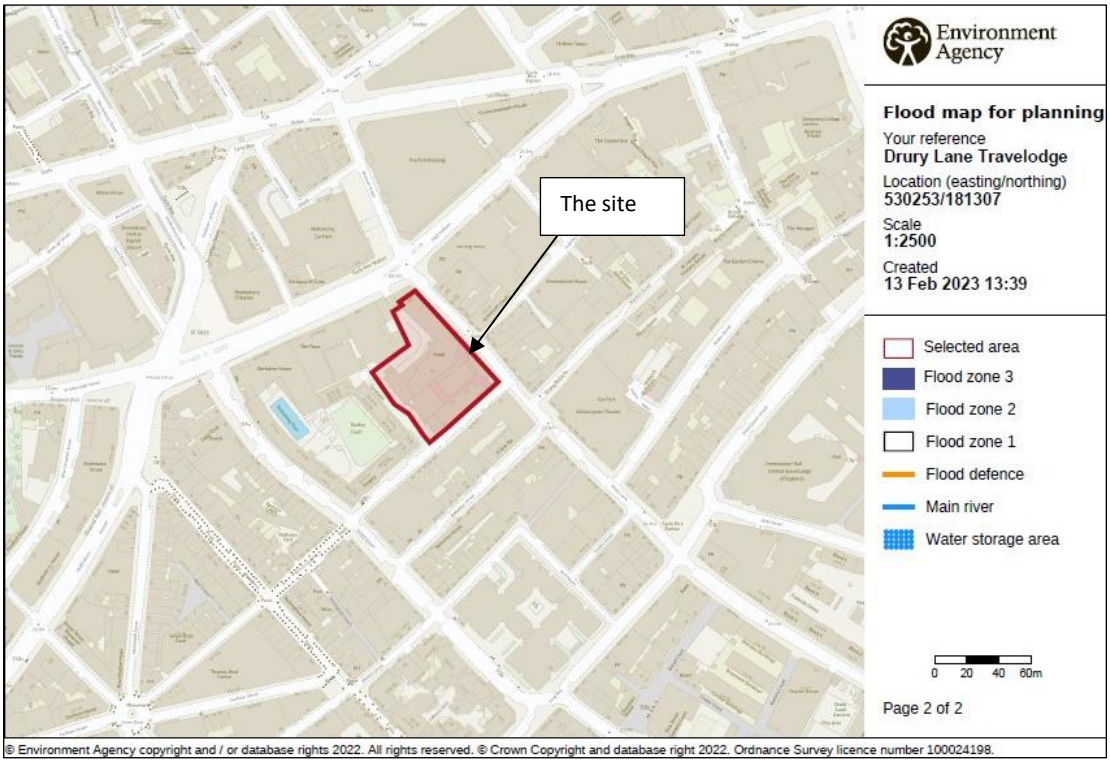

Figure 8 - Extract of Flood Map for Planning (Gov.UK)

4.05.10 The remote proximity of the coast, combined with the site levels, leads use to conclude that there is negligible risk of flooding from this source. As a result, this will not be considered further within this report.

Surface Water (Pluvial) Flooding

4.05.11 Pluvial (surface water) flooding typically occurs when intense rainfall is experienced within a catchment to such an extent that it is unable to be absorbed at which point it makes its way to the nearest watercourse /surface water sewer. Due to the anticipated effects of climate change this is expected to be a more frequent and increasing source of flood risk, particularly in built up areas.

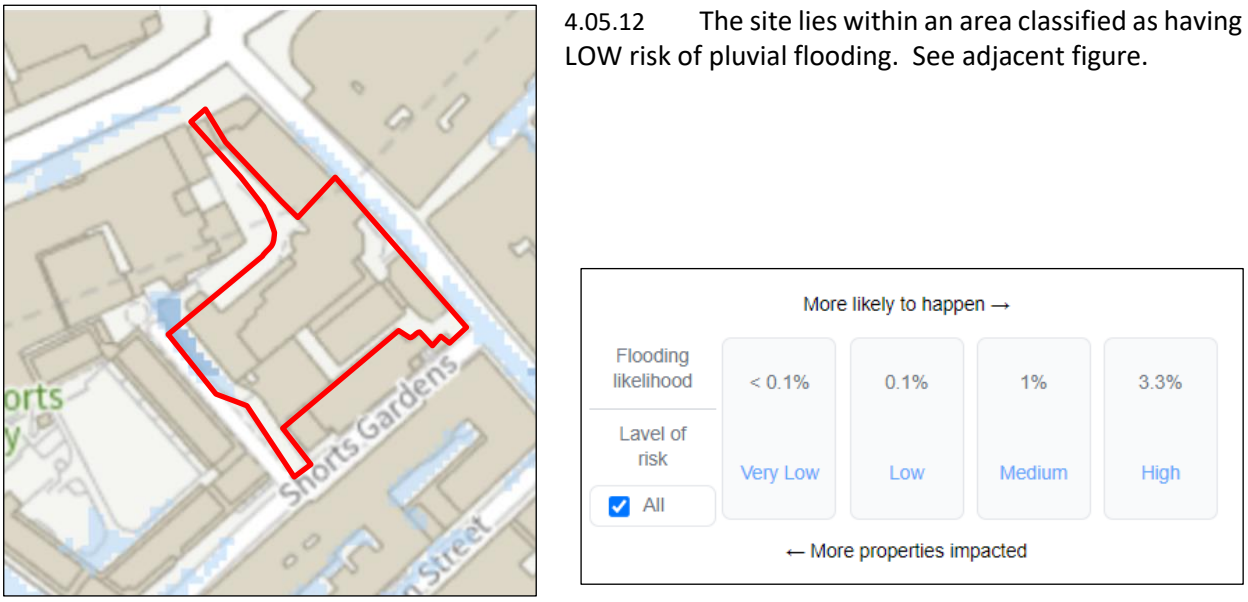

Figure 9 - Extract of Environment Agency Surface Water Flooding - Extent

4.05.12 The site lies within an area classified as having a VERY LOW risk of pluvial flooding. See adjacent figure.

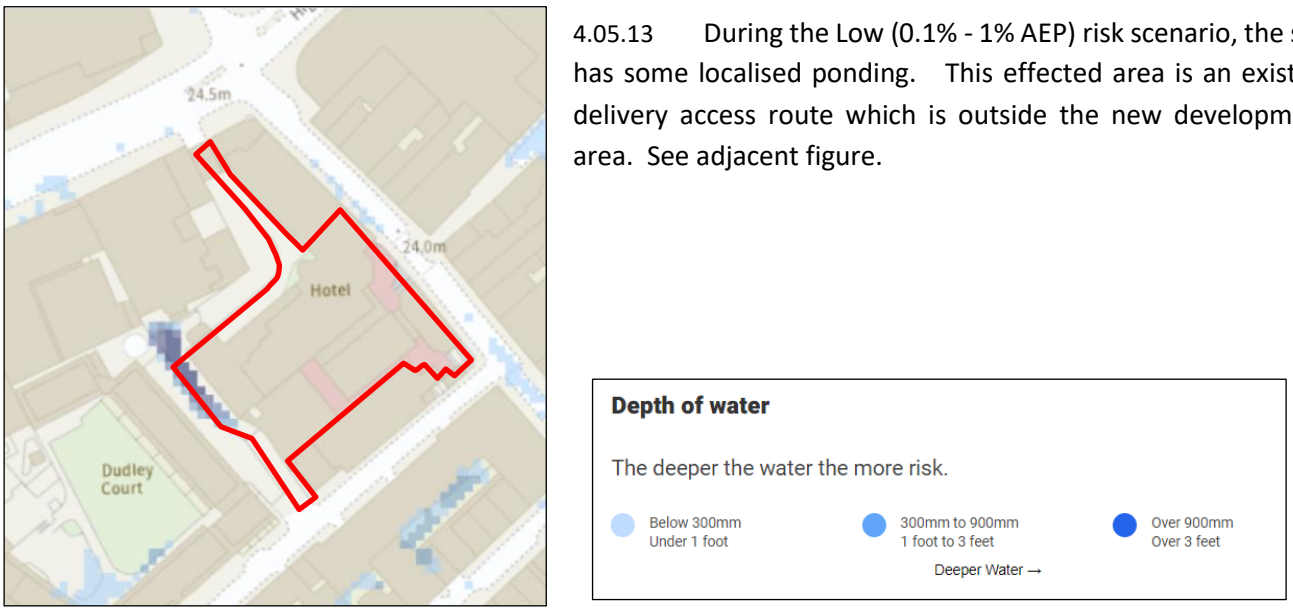

Figure 10 - Extract of Environment Agency Surface Water – Low Risk Depth

4.05.13 During the Low (0.1% - 1% AEP) risk scenario, the site has some localised ponding. This effected area is an existing delivery access route which is outside the new development area. See adjacent figure.

4.05.12 Overall, we consider that pluvial flooding presents a **Very Low** risk to the proposed development.

4.05.13 The extent of impermeable surfacing will not increase significantly following completion of the proposed development. However, the management of surface water carefully considered, to ensure that the risk of surface water flooding does not increase as a result of the development.

Groundwater flood risk

4.05.14 Groundwater flooding is closely associated with heavy rainfall events and pluvial flooding. Depending on the nature of the underlying geology and the seasonal depth of groundwater, periods of abnormally high rainfall can result in groundwater flooding of basements and the emergence of groundwater at the surface, causing damage to property and infrastructure.

4.05.15 Camden Council – Flood risk management strategy has published the Environment Agency groundwater risk map in their appendices. This shows that the site is within the groundwater vulnerability area:

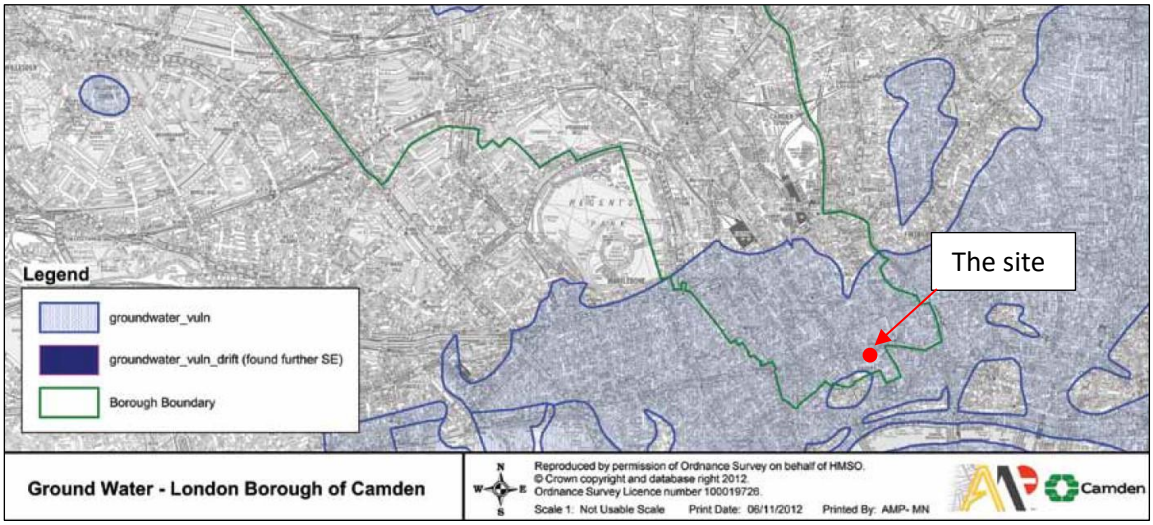

Figure 11 - Extract from Camden Flood Strategy - Appendix 5 map 4

Sewer flood risk

4.05.16 J P Chick & Partners Ltd, have commissioned a CON29DW Commercial report to enable us to review Thames Water drainage system and how the site connects to it**.** This report states that the property is not at risk of internal flooding due to overloaded public sewers.

London Borough of Camden - Strategic Flood Risk Assessment

4.05.17 In 2014, London Borough of Camden commissioned URS Infrastructure & Environment UK Ltd to produce a Strategic Flood Risk Assessment. The aim of the SFRA is to collate and analyse the most up-to-date flood risk information from all sources. This aims to ensure flood risk is taken into account

when considering development options, in the preparation of strategic land use policies and for decision taking in relation to planning applications.

4.05.18 The site lies within the London Critical Drainage Area Group3_005, but not within Camden's Local flood risk zone. Shown in the figure below:

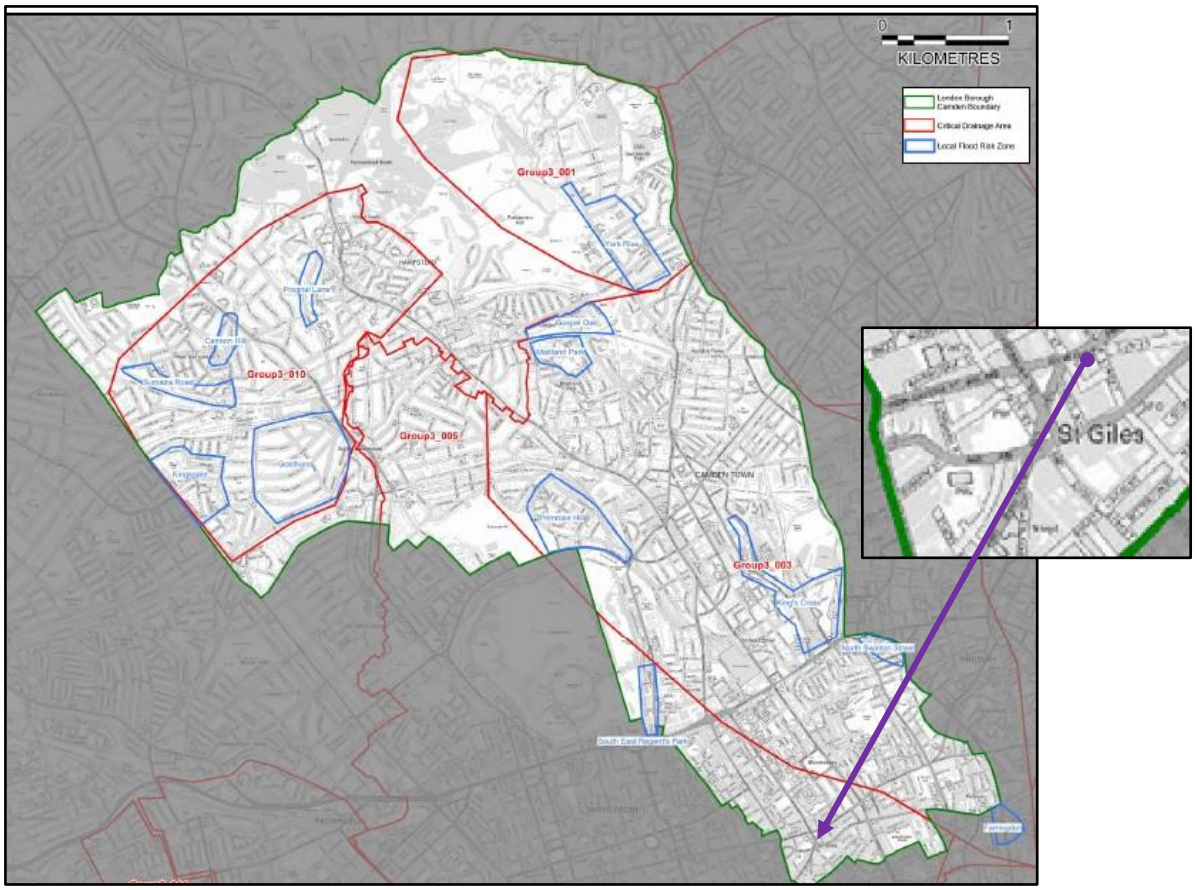

Figure 12 - Critical Drainage Area – Extract from Flood Risk Management Strategy

5.0 EXISTING SITE DRAINAGE

5.01 Current drainage strategy

5.01.1 The development area is currently a large hotel complex with accommodation arranged over many levels. Surface water from roofs and areas of hardstanding is being captured by a combination of green roofs, gullies and downpipes. Runoff is then routed through a network of pipes to a number of existing detention tanks, which discharge through a surface water pumping station to the combined sewer within Short's Gardens, at a restricted rate.

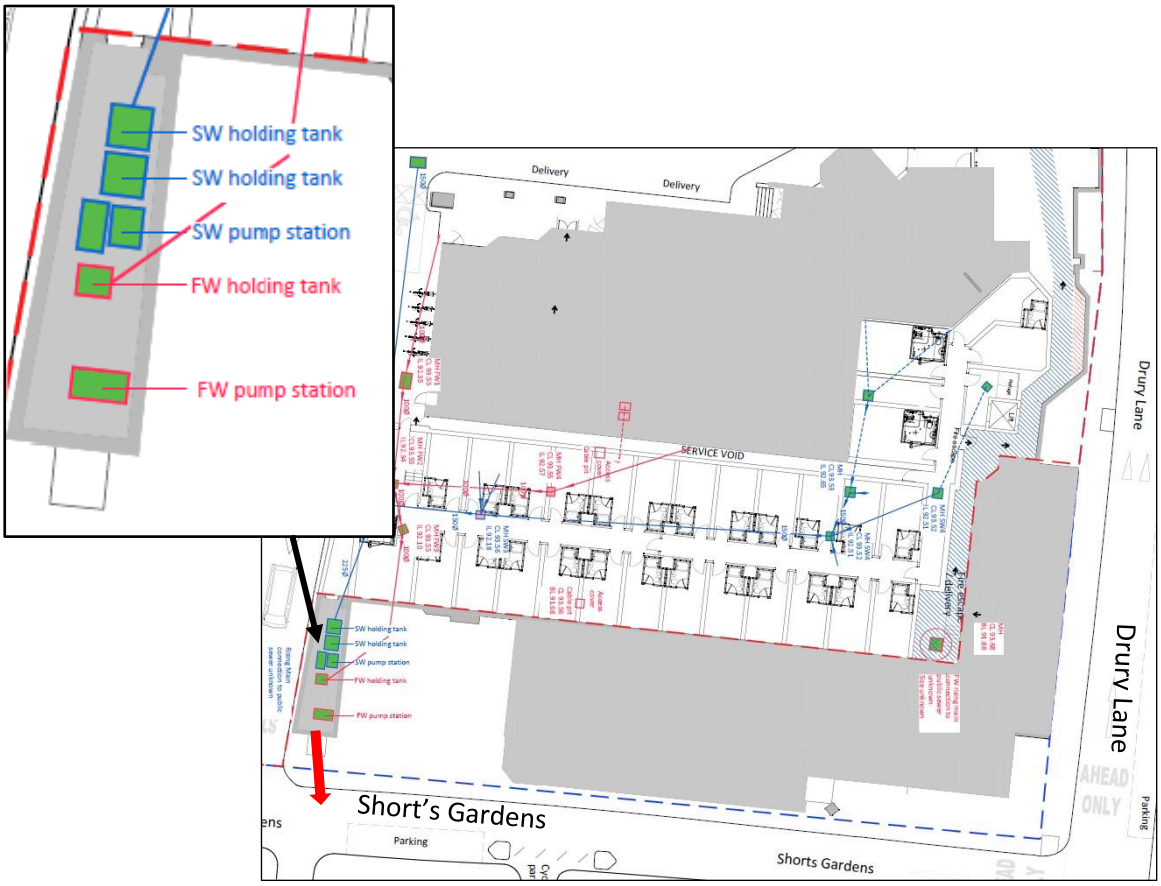

Figure 13 – Extract from JWA Architect overlay of CCTV and historic information showing surface water and foul water storage tank locations.

5.01.2 The existing foul water discharge is collected and routed through a separate system before being discharged to the combined sewer (within Shorts Gardens) with its own dedicated pumping station, with associated storage. An extract of the Thames Water asset map is shown in the figure below. A CCTV survey of the foul and surface water drainage has recently been undertaken and these can be seen within the appendices. A separate report on the foul and surface water pumping stations is also provided.

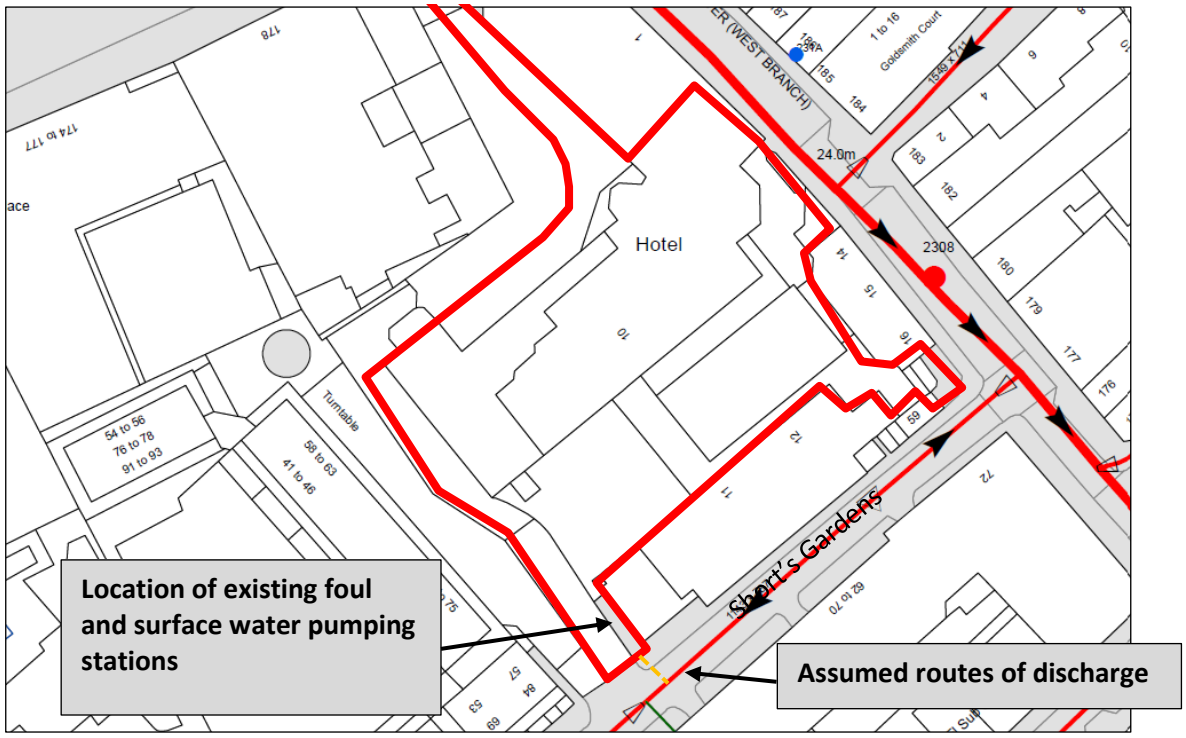

Figure 14 - Extract of Thames Water Asset Map

5.02 Consultation with the Regulator

5.02.1 To assist in the design of a suitable and sustainable drainage strategy, as part of this flood risk assessment, we have utilised the Camden Council's (Lead Local Flood Authority) Local Plan policy CC3. – "Surface water should be managed as close to its source as possible, in line with the drainage hierarchy in the London Plan. Where it is not possible to achieve greenfield run-off rates it should be as close to this as possible (a greenfield run-off rate is one that reflects the natural rate of water run-off from a site before it was developed)".

5.02.2 The Developers Guide to Section 106 agreements encourages the use of Sustainable Drainage Systems (SuDS).

5.02.3 We have completed the Camden Drainage Proforma 2019 v2, which can be found within the appendices.

5.02.4 Thames Water cannot confirm capacity until a Section 106 application is submitted, which requires a planning permission reference number.

5.03 Camden Planning guidance – Basements – January 2021

5.03.1 In January 2021 Camden introduced planning guidance on basements, this guidance was in support of Camden's Local Plan.

5.03.2 Basements are a popular feature of the Central London part of Camden and used for various purposes including commercial, retail and leisure uses. However, while basement developments can help to make efficient use of the borough's limited land, they have the potential to cause harm to the amenity of neighbours, affect the stability of buildings, cause drainage or flooding problems, or damage the character of areas and the natural environment.

5.03.3 Although part of this development is situated below adjacent road levels, the space has already been formed and is in use as an under-croft car park / service area. The space is currently accessed via an existing ramp. The proposed project is a conversion of this existing area and therefore will not include any basement excavations. We would therefore conclude that the area of development does not require a basement impact Assessment.

5.03.4 We have however reviewed the proposal in line with the guidance document and confirm that it will not impact on neighbouring properties, ground stability, groundwater flow or surface water flooding.

5.04 Surface Water Run-off Rates / Volume

Existing Rates

Table 3 – Surface Water Run-off Rates Pre-Development – See Appendices

	Hardstanding Pre-Development (Developed area only) - 0.03ha
Q 1 year	3.740 l/s
Q 30 year	7.856 l/s
Q 100 year	10.216 l/s
Based on 15minute storm	

5.04.1 As the area has remained the same but is now laid to a blue/green roofs, the proposed volume will be less than the existing however we cannot accurately quantify the reduction. Any 'discount' or reduction from the existing volume, will be a product of evapotranspiration, which in turn is dictated by plant choice, outside temperature and seasonal fluctuation.

5.04.2 The development proposal will not result in an increase in the total area of impermeable surfacing as the site is currently 100% impermeable. We have however, taken the opportunity to review the current drainage arrangement, with a view to increasing biodiversity, improving water quality and enhancing on-site storage, in line with the 4 pillars of SuDS.

5.04.3 As the development proposal will not alter the external footprint of the building, the post development runoff rates will remain unchanged prior to mitigation.

5.04.4 There are a number of potential measures that can be introduced into the design of the new development in order to meet local policy and obtain the agreement of Thames Water. These are discussed in Section 6 below.

6.0 FOUR PILLARS OF SUDS

6.01 Ciria 753 SuDS Manual

6.01.1 The Construction Industry Research and Information Association (CIRIA) published SuDS Manual, sets out the four pillars of SuDS design - water quantity, water quality, amenity and biodiversity. The SuDS Manual guidance promotes the early consideration of the criteria in the design process to obtain the best multi-functional outcome. Well implemented SuDS design can have very positive impacts on visual amenity, biodiversity and land value. Green Spaces & Promotion of Biodiversity.

Figure 15 - 4 Pillars of SuDS

6.02 Water Quantity

6.02.1 SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to convey surface water, slow runoff down (attenuate) before it enters watercourses. They can also provide areas to store water in natural contours and allow water to infiltrate into the ground.

6.02.2 The site area is currently 100% impermeable due to its historic use. The total site is approximately 0.030ha.

6.02.3 The building footprint will not change and therefore impermeable areas will remain the same, however, the proposal to incorporate blue/roofs will slow the flow of surface water prior to collection and discharge to the existing surface water sewer.

6.03 Water Quality

6.03.1 Everyday activities can lead to pollutants or contaminants to be washed into sewers and eventually watercourse in surface water runoff, making it difficult to comply with water quality standards.

6.03.2 Suds components provide water quality improvements by reducing the sediment and contaminants from runoff either through settlement or biological breakdown of pollutants. This can improve the quality of downstream water bodies such as watercourses, rivers, lakes and estuaries.

6.03.3 The soil matrix will also provide an opportunity for natural treatment of rainwater and eliminate the risk of picking up new contaminants from sheet roofing products.

6.04 Biodiversity

6.04.1 There are a number of SuDS components that can make a significant contribution to the biodiversity (ecological) value of an area (e.g. green roofs, ponds, swales, wetlands and trees).

6.01.1 A green roof absorbs rainwater by the water buffering in the plants, substrate and drainage layer, water also evaporating through the plants.

6.01.2 Sedums, herbs, grasses or host plants that are included in the green roof promote and encourages biodiversity in the city. This encourages the habitat of birds, butterflies and insects, especially in the city environment which is mainly concrete and asphalt.

6.01.3 A green roof acts as a sound barrier to the building. It absorbs sound and thus provides a quieter environment, both inside and outside.

6.01.4 A green roof absorbs rainwater by the water buffering in the plants, substrate and drainage layer, water also evaporating through the plants.

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6.01.6 A green roof acts as a sound barrier to the building. It absorbs sound and thus provides a quieter environment, both inside and outside.

6.05 Amenity Value

6.05.1 SuDS provide opportunities to create visually attractive green (vegetated and landscaped) and blue (water) corridors in developments connecting people to water. The amenity value of a project needs to show public benefit, improvement or contribution that can enhance the quality of life for a community in the short and long-term. Examples may be improving local infrastructure, economy benefits, reduction in crime rates, training and employment opportunities.

6.01.1 The principal structure will support new green roofs which will significantly improve the visual amenity for hotel guests and for residents in the flats to the northeast of Drury Lane. This structure will also create a new fully DDA compliant step free access to the hotel for guests direct from Drury Lane.

6.01.2 The proposal will increase the capacity of the hotel by 55 bedrooms, this will help Travelodge cater to an increasing number of guests who stay at the hotel for a variety of reasons, business and tourist

travellers looking for nearby tourist attractions, who will be bringing money into the local economy. This proposal will also increase the employment opportunities within the local area.

7.0 PROPOSED DEVELOPMENT DRAINAGE

7.01 Surface Water

7.01.1 We have conducted a review of the principal drainage techniques recognised as part of the sustainable drainage hierarchy in decreasing order of sustainability as follows:

Table 4 - Appropriateness of SuDS options

SuDS Element	*Appropriate?*	*Reason*
Rainwater Harvesting (RWH) Units	*No*	*The project is a small percentage of the whole building and would be cost prohibitive due to the challenges associated with installation and changes to existing pipework. As any storage must be assumed to be at full capacity for design purposes other methods have been considered.*
Infiltration to Ground	*No*	*The site is totally impermeable and located within a heavily urbanised location, with established buildings against each boundary.*
Attenuation (Above or Below Ground)	*Yes*	*Surface water run-off from the new development will be captured via green/blue roof and stored temporarily within a void (blue roof). Together with existing basement attenuation tanks, which discharge to the combined sewer at a restricted rate, via a pumping station.* *See drawings and supporting calculations in the Appendices.*
Discharge into a Watercourse	*No*	*No watercourse in close proximity*
Discharge into a Surface Water Sewer	*No*	*No available surface water sewer*
Discharge into a Combined/Foul Sewer	*Yes*	Once surface water has been attenuated it will be discharged to the combined sewer in the same way it does now, at a restricted rate.

7.01.1 Within the design we have allowed for a 40% increase in rainfall due to climate change (in accordance with https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall.)

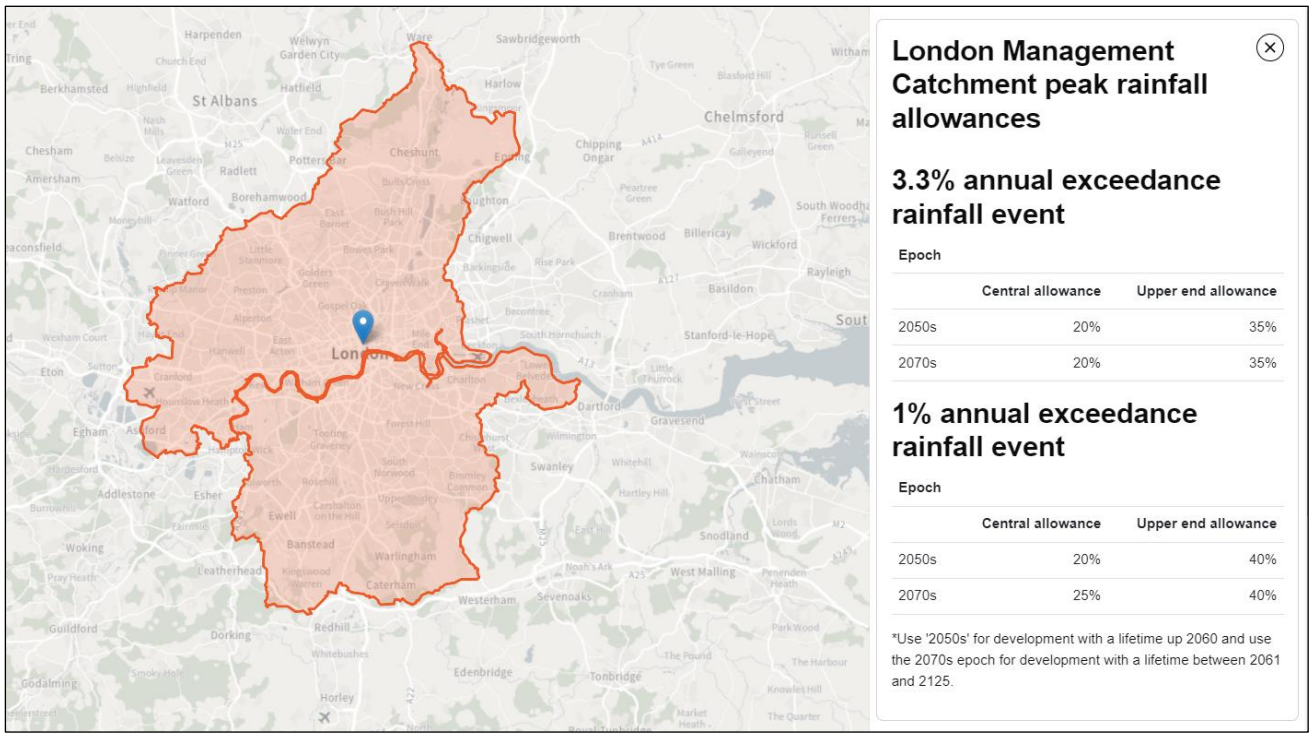


Figure 16 - Extract from Department for Environment Food & Rural Affairs - Hydrology

7.01.2 The surface water system has been designed not to flood during any of the modelled storm events and also achieve the half drain requirements.

7.01.3 We have documented the existing potential sources of flood risk, which have all been assessed as low risk. The depth of the blue/green roof has been determined by specialist design, but due to the small surface area is only able to provide 5.6m^3 of storage.

7.01.4 In the event of a conveyance / pipe failure this will likely result in medium term ponding on the roof, which doesn't pose a risk to staff, guests or the structure, although we would not recommend that this situation permitted to continue for long. Remedial repairs / maintenance should be enacted as soon as the issue is noted (from a hotel bedroom window).

7.01.5 With regard to the surface water pumps, we cannot calculate the extent of flooding associated with a pump failure, as this would depend on how long the pump was down for.

7.01.6 A drawing showing the updated drainage layout (IG22/185/200-201), along with the associated supporting calculations, are included in the appendices.

7.01.7 Due to the remodelling of under croft areas, together with conversion of existing service areas to bedrooms, the surface water catchment area has not increased.

7.01.8 Surface water run-off arising from the entrance extension and covered bar will be managed via a new roof area constructed as green/blue roof.

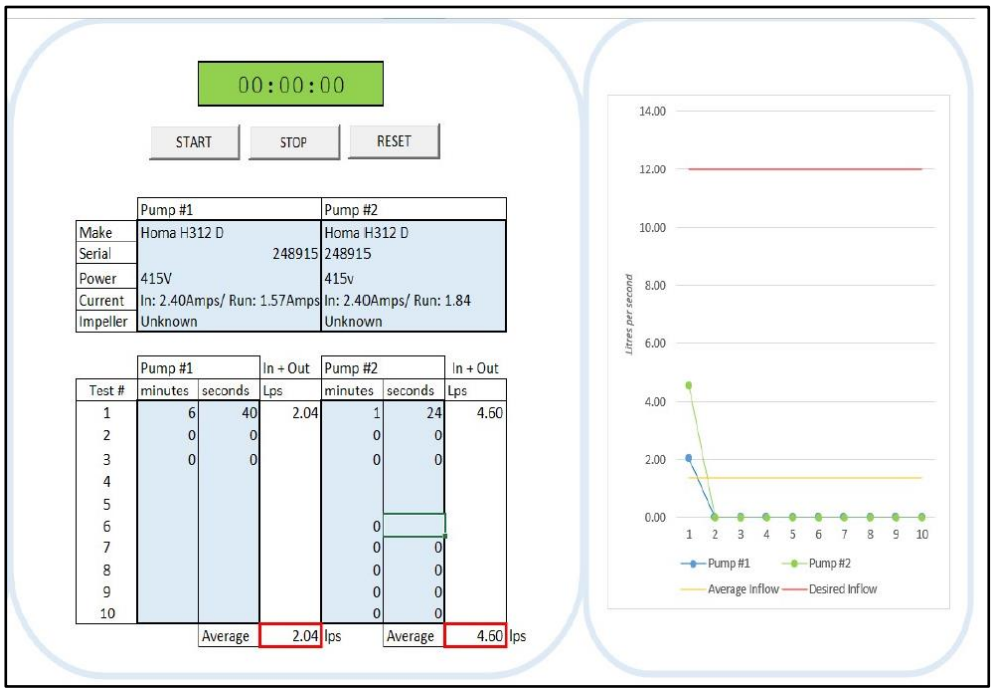
7.01.9 The roof of the new reception extension has a catchment area of 106m^2. Surface water run-off will be attenuated with the maximum runoff restricted to 0.5 l/s. The Greenfield run-off rate for an area of less than 1,000m^2 the run-off rate is likely to be <0.01 litres/second, therefore meaningless when exploring potential methods of matching it. The new blue/green roof will capture and control surface water during a storm event, and it will have a half drain time of 20 minutes. This roof will slow the flow of surface water in comparison to the existing hardstanding surfaces, where run-off is captured by a series of gullies, and discharges at an unrestricted rate. A copy of the specialist Design package, which includes construction depth and make-up, is included within the appendices.

7.01.10 During pre-application discussions consultees expressed a desire to see further greening of the location. To address this the architect has shown a third area of blue/green roof, above the existing retail premises that form part of the hotel frontage. This area is currently laid to concrete paving slabs, which drain via a series of shallow channels and periodic gullies. The current proposal will replace the majority of this roof with a blue/green roofing system. This will extend to ~101m^2 and have a restricted discharge rate of 0. 5l/s. When combined, the 3No. blue green roofs will have a combined discharge rate of 1.5 l/s.

7.01.11 While a further area of new roof will be constructed between the existing green roof and the main accommodation block to the south, this will be relatively narrow and require stepped construction. This does not lend itself to the installation of a blue/green roof.

7.01.12 The remainder of the surface water from roofs and hardstanding areas is discharged via traditional pipework to a pair of basement storage tanks. These tanks then discharge via a pumping station into the combined sewer within Short's Gardens at a stepped rate of pump 1 = 2.04 l/s and pump 2 = 4.60 l/s, with a capacity of up 12.0 l/s.

7.01.13 A Survey was undertaken by Willow Pumps of all the pumping stations on the site, to determine the capacity of the existing storage tanks and the flow ratings on each pump. See figure below the full report is within the appendices.



	Pump #1	Pump #2
Make	Homa H312 D	Homa H312 D
Serial	248915	248915
Power	415V	415v
Current	In: 2.40Amps/ Run: 1.57Amps	In: 2.40Amps/ Run: 1.84
Impeller	Unknown	Unknown

	Pump #1		In + Out	Pump #2		In + Out
Test #	minutes	seconds	Lps	minutes	seconds	Lps
1	6	40	2.04	1	24	4.60
2	0	0		0	0	
3	0	0		0	0	
4						
5						
6				0		
7				0	0	
8				0	0	
9				0	0	
10				0	0	
		Average	2.04 lps		Average	4.60 lps

Figure 17 - Extract from Willow Pumps Report of Surface Water Pumps

7.01.14 The JPC drainage proposal is based on the same discharge rate as the existing as there are no plans to change the pumping station.

7.01.15 As rainwater runoff will not be in contact with any potential sources of contamination, there will not be a requirement for any treatment prior to discharge to the sewer system. However, the green and blue roof will provide a degree of filtration. There will also be some opportunity for evapotranspiration which will reduce the volume of water discharged. However, this benefit will be small.

7.01.16 The blue/green roof design calculations can be viewed within the appendices, along with the product brochure, which provides further information on the precise construction.

7.02 Post Development Run-off Rates

7.02.1 If 300m^2 currently discharges @ 10.216 l/s the new blue green roof will reduce the overall rate to:

- $\frac{10.216}{300}$ = 0.03405 x 93m^2 = 3.167 l/s (retained impermeable – roof)
- New blue/green roof = 207m^2 with combined discharge of 1.5 l/s.
- Post development discharge = 3.167 + 1.5 = 4.667 l/s (effected roof areas only)

7.02.2 This is a reduction of >50%.

7.03 Exceedance Flows

7.03.1 If the overflow mechanism or rainwater down pipe from the blue/green roof become blocked the water will pond on the roof. ABG have stated in their design that the "Additional 'tell-tale'/emergency parapet overflow outlets, may also be added by the architect." If no additional outlets are installed, the water will accumulate within the blue/green roof construction and pond on the surface. There will be no exceedance flows as there is a parapet around all three areas of blue/green roof.

7.04 Foul Drainage

7.04.1 The National Planning Guidance and Building Regulations Approved Document H provide a hierarchy of drainage options that must be considered and discounted in the following order: a connection to the public sewer, a package treatment plant, a septic tank and finally a cesspool.

7.04.2 The existing foul water is collected and being discharged via a piped system, discharging into the existing combined sewer via a series of pumping stations.

7.04.3 There will be no change to the foul pump rate, and additional foul storage unit will be provided to accommodate the additional storage requirements. The surface water volume will be less, due to evapotranspiration experienced by the blue/green roofs. This will help to off-set, to a small degree, the additional foul volume, associated with the new bedroom accommodation.

7.04.4 The additional foul water associated with the new bedrooms will discharge to the Thames Water combined sewer via the existing points of connection. An additional storage tank will be constructed to provide 24-hour storage in case of pump failure. This will discharge into the combined sewer within Short's Garden.

7.04.5 A Survey was undertaken by Willow Pumps of all the pumping stations on the site, to determine the capacity of the existing storage tanks and the flow ratings on each pump. See figure below the full report is within the appendices.

00:00:00

START STOP RESET

	Pump #1	Pump #2
Make	Flygt 3102.181	Flygt 3102.181
Serial	1111064	1111064
Power	415V	415v
Current	In: 6.8Amps/ Run: 3.2Amps	In: 6.8Amps/ Run: 3.3Amps
Impeller	181	181

	Pump #1		In + Out	Pump #2		In + Out
Test #	minutes	seconds	Lps	minutes	seconds	Lps
1	0	18.2	39.98	0	22.8	32.59
2	0	0		0	0	
3	0	0		0	0	
4						
5						
6				0		
7				0	0	
8				0	0	
9				0	0	
10				0	0	
		Average	39.98 lps		Average	32.59 lps

Figure 18 - Extract from Willow Pumps Report of Foul Water Pumps

7.04.6 A Section 106 Agreement will be required due to the increased volume of foul discharge.

7.04.7 As part of the design process, J P Chick and Partners commissioned a CON29DW Commercial report. This summarises the location of public sewers and water pipework, confirming that the property is already connected to the combined sewer with Shorts Road. The report can be found within the appendices of this document.

8.0 POLLUTION MITIGATION

8.01.1 In accordance with the CIRIA SuDS Manual v.6 (2015, 2016, 2018, 2019), we have assessed the risk posed by surface water run-off to groundwater/surface water using the simple index approach. To deliver adequate treatment, the drainage proposal should have a total pollution mitigation index that equals or exceeds the pollution hazard index for each contaminant type.

8.01.2 The surface water design is generally split into three areas based upon where the run-off originates from.

8.01.3 The water quality will not be impacted by parked vehicles or industrial processes as it will all arise from areas of roof. Due to this and its discharge route (combined Thames Water Sewer) no pre-treatment is required. However, by incorporating a blue/green roof, the quality of surface water discharges will be improved.

9.0 DESIGNERS RISK ASSESSMENT

9.01.1 We have undertaken a design risk assessment for the design of the surface water drainage system. This assessment covers all the elements laid out in drawings IG22/185/200-201. The details can be found within the appendices.

9.01.2 During this exercise it came to light that if all surface water pumps failed during an extreme storm event, that there could be the possibility of water ingress to Level 1, therefore we recommend that a Sensor-based Water Detection System is put in place within the pump rooms to alert reception that 'an escape of water' which could lead to water ingress, to Level 1.

Flood Risk Emergency Plan

9.01.3 While the 'City of London' requires all developments to have a Flood Risk Emergency Plan, we could not find a similar requirement in the Camden guidance. We have also checked the London Plan and there is no mention of any requirement for a Flood Risk Emergency Plans in low-risk locations, which is how we have assessed the Drury Lane site. However, we have included a flood response checklist within the appendices, to ass Travelodge in developing a response procedure in the event of pump failure during an extreme storm event. See appendices.

10.0 MAINTENANCE

10.01.1 SuDS are a modern environmentally friendly approach to managing rainfall that uses landscape features and control structures to deal with surface water. SuDS aim to:

- Control the flow, volume and frequency of water leaving a development area.
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces.
- Provide attractive surroundings for the community.
- Create opportunities for wildlife.

10.01.2 The site is owned by Falkerstone and leased to Travelodge Hotels. Travelodge maintain all the drainage infrastructure within the footprint of their lease. This includes the foul pumping station that serves the adjacent retail units.

10.01.3 There is little maintenance required by the client/landowner other than to:

- Occasional tasks – weeding and monitoring of vegetation.
- Remedial work - repairing damage where necessary.

10.01.4 Further, more detailed information on maintenance for the design can be found within appendices.

11.0 CONCLUSIONS & RECOMMENDATIONS

11.01 Drainage Summary

11.01.1 The following is a summary of the current and proposed drainage situation in tabular format.

Table 5 - Summary of Current and Proposed Drainage

	Existing	***Proposed***
Impermeable Area	*Impermeable areas - 100%*	*Improvement - Partially Permeable / Partially Impermeable 300m^2.*
Surface Water Drainage	*Restricted discharge to combined sewer.*	*Roof surface water run-off from new roof areas will be collected within blue/green roof structures and discharged via piped system to existing storage tanks within the basement which in turn will discharge* to Thames Water combined sewer.

11.01.2 The proposed development of the site has a Low risk of flooding from external sources.

11.01.3 The proposed development will have a slightly reduced impermeable footprint, due to the additions of a green/blue roofs.

11.01.4 In line with national and local policies a SuDS complaint surface water drainage scheme has been produced, which will capture roof and surface water run-off. This will ensure that there is no increased risk of flooding, either on or off site.

11.01.5 The further areas of green roofs will improve the biodiversity of the existing environment, by absorbing pollutants and emit oxygen, improving air quality.

11.02 Recommendations

11.02.1 Based on the information gathered as part of this desk-based screening study JPC Environmental Services recommends the following:

- The proposed drainage design has been developed on the basis of the strategy contained in this report. The new blue/green roof will provide additional storage capacity within the surface water system delaying the arrival of run-off to the basement tanks.
- The rate of discharge adopted as part of this design will not change from the existing restricted rate.
- A detailed schedule of routine maintenance is outlined within the appendices.
- A Section 106 Agreement will need to be in place for the foul water connection.

- Long term management and maintenance of the drainage system will be the responsibility of the client (Travelodge).

11.02.2 The opinions and recommendations expressed within this report are based on the results of desk-based research and information provided by third party agencies. No additional hydraulic modelling has been undertaken.

11.0 APPENDICES

Appendix A – Location Map

Appendix B – Architectural Layout

Appendix C – Flood Map for Planning

Appendix D – COMMERCIALDW Report

Appendix E – Topographical Survey

Appendix F – BGS borehole log

Appendix G– CCTV Survey & Willow Pumps Report

Appendix H – Drainage Design Package plus Runoff Rates

Appendix I – Maintenance

Appendix J – Designers Risk Assessment

Appendix K – Camden Drainage Proforma v2019.02

Appendix L – Flood Risk Emergency Plan

Appendix A – Site Location Plan

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General

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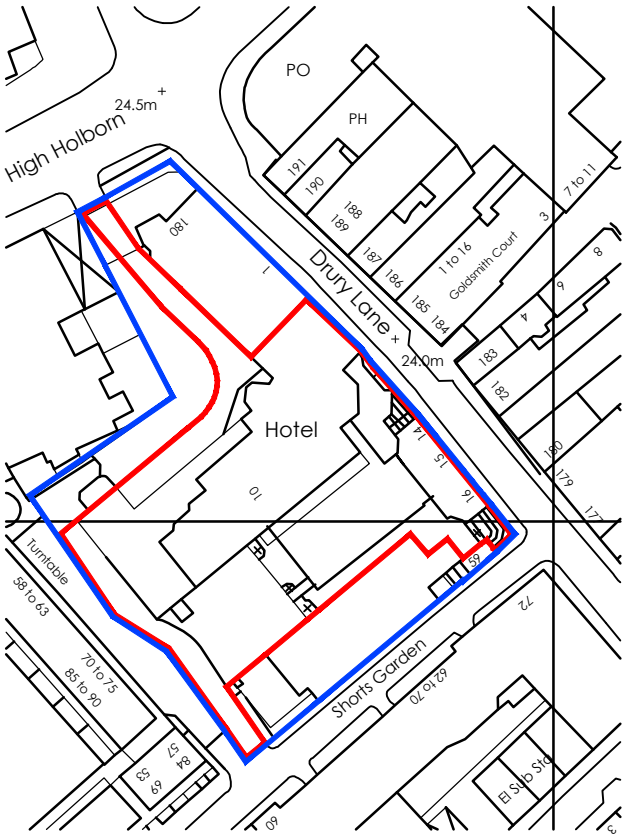
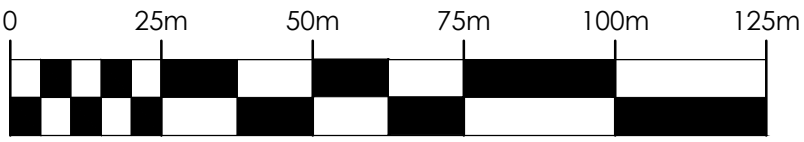
A	16.02.23	APPLICATION BOUNDARY AMENDED	SPB
B	27.01.23	APPLICATION BOUNDARY AMENDED	HR
C	02.03.23	DO NOT SCALE TEXT REMOVED	SPB
D	14.12.23	APPLICATION BOUNDARY AMENDED	NB



A 19 SITE LOCATION PLAN
1:1250@A4

OWNERSHIP BOUNDARY
APPLICATION BOUNDARY



PLANNING

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Client: Travelodge

Project: TRAVELODGE
DRURY LANE
COVENT GARDEN

Drawing: SITE LOCATION PLAN

Purpose:	PLANNING	Date:	20.01.23
Scale:	1:1250 @ A4	Drawn:	HR
Dwg. No:	J9348/19	Revision:	D