

December 2024

The Aylesham Centre, Peckham

Drainage Impact Assessment

Document reference: AC24A



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DRAINAGE IMPACT ASSESSMENT AND FOUL WATER DRAINAGE STRATEGY THE AYLESHAM CENTRE, PECKHAM

Document Reference: AC24A

December 2024

Document Reference: \\192.168.1.176\walsh\Projects\5609\Documents\Reports\Drainage\5609-WAL-ZZ-XX-RP-C-0300-
Rev1.docx

Revision: P02



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DRAINAGE IMPACT ASSESSMENT AND FOUL DRAINAGE STRATEGY REPORT

THE AYLESHAM CENTRE

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Revision	Date	Notes	Prepared by	Checked by	Approved by
P01	28/06/24	Stage 2+ level information	WR	JK	JK
P02	29/11/24	Addendum reference in Executive summary, Accommodation schedule has been updated with corresponding changes in; 7. Foul water Drainage Strategy; Appendix D Peak Foul Flows; Appendix C Proposed Drainage Strategy drawings (Architectural plans updated). LBS comments addressed in following sections; 8.3 Surface Water Network Design section notes Hydrobrake; Method of restriction to Phase 1 added on section 6.8.1. Paragraph 5. Appendix C drawing ASPC-WAL-ZZ-ZZ-DGA-C-003001 updated to show discharge rates; Phase 1 and Phase 2 timeframes referenced in section 6.8.1. Paragraph 1. Clarification on discrepancies between storage volume proposed and hydraulic model are noted in Section 6.8.3 Paragraph 6 and Table 6.4. Hydraulic calculations in Appendix H amended to match the storage volumes in Table 6.4 and results for 1:30, 1:100 and 1:100+40% included; Maintenance plans added for site specific SUDS in section 9.2 with frequencies and responsibility given In Tables 9.1-9.6.	WR		

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EXECUTIVE SUMMARY

Walsh have been appointed by Berkeley Homes (Capital) Plc as the Structural and Civil Engineers for the proposed addendum to the development Aylesham Centre, Hanover Park, Peckham.

This report aims to outline the existing and proposed below ground drainage strategies and SUDS opportunities in support of amendments to the planning application ref. 24/AP/2074 for full planning permission of the Aylesham Centre. This report has been updated following amendments made to the proposed development. This report will present the sitewide drainage strategy in line with the relevant policies of the London Borough of Southwark and the London Plan.

The Site is located within Peckham town centre within the administrative boundary of the London Borough of Southwark. Rye Lane bounds the Site to the west, Hanover Park to the south and Mckerrell Road to the east. Peckham Bus Station, fronting onto Peckham High Street, bounds the Site to the North.

The existing site covering an area of 2.7ha accommodates the Aylesham Centre alongside an associated surface car park (353 spaces), service yard and petrol filling station. The Aylesham Centre comprises of retail units fronting on to Rye Lane with additional retail units within a covered mall, including a Morrison supermarket.

The Proposed Development will involve the demolition of existing buildings and phased redevelopment to provide a replacement supermarket and associated service yard and car parking (Use Class E(a)); flexible retail, leisure (including drinking establishment), and commercial accommodation (Use Class E/Sui Generis); dwellings (Use Class C3); landscaping; and associated works.

The surface water drainage strategy proposes to make use of the existing connections to the Thames Water combined public sewer system surrounding Rye Lane and Peckham High Street. It is proposed to restrict surface water discharge to greenfield run-off rates in the permanent condition in line with the London Plan and Policy P68 of The Southwark Plan. The greenfield run-off will be restricted to 6.3 l/s split between two outfalls to the west and north-west of the site. To achieve run-off restrictions, it is proposed to provide 1,083m³ of green/blue roof and 2800m³ of below ground geocellular storage as primary attenuation measures. It is proposed to further explore the use of rain gardens/bioretention systems, permeable paving, and ground infiltration as secondary drainage management measures.

The development will be separated into two Phases. It is proposed to deliver the new supermarket and associated residential buildings L, M, N, Q and P which form Phase 1, prior to decommissioning the existing Aylesham Centre and Morrisons. A dual-phase drainage strategy has been provided to inform the requirements for Phase 1 in the temporary situation during construction of Phase 2, and for the full site post completion of Phase 2.

Proposed peak foul flow rates have been submitted to Thames Water in a pre-planning enquiry and Thames Water has confirmed that their network has capacity for the Proposed Development peak discharge rates.

1. Introduction

This Drainage Impact Assessment has been prepared by Walsh to accompany an application for full planning permission being submitted by the Applicant, Berkeley Homes (Capital) Plc, to the London Borough of Southwark (LBS).

This document aims to outline the site specific below ground drainage and SUDS strategy in support of the proposed application for The Aylesham Centre, Peckham, and has been produced in coordination with the Flood Risk Assessment undertaken by RMA Environmental.

This report has been prepared by Winston Rollings, a Walsh Project Engineer with 4 years professional experience and under the direction and approval of Jacqui Kantor, a Walsh Associate Director with over 19 years professional experience working on projects in all aspects of the public and private realm and proven experience in flood risk and SUDS design.

Within this report flood risk is expressed in terms of a return period (1:x years) as well as an Annual Exceedance Probability (AEP) which is the percentage likelihood of an event occurring in any given year.

Figure 1.1– Site Location Plan

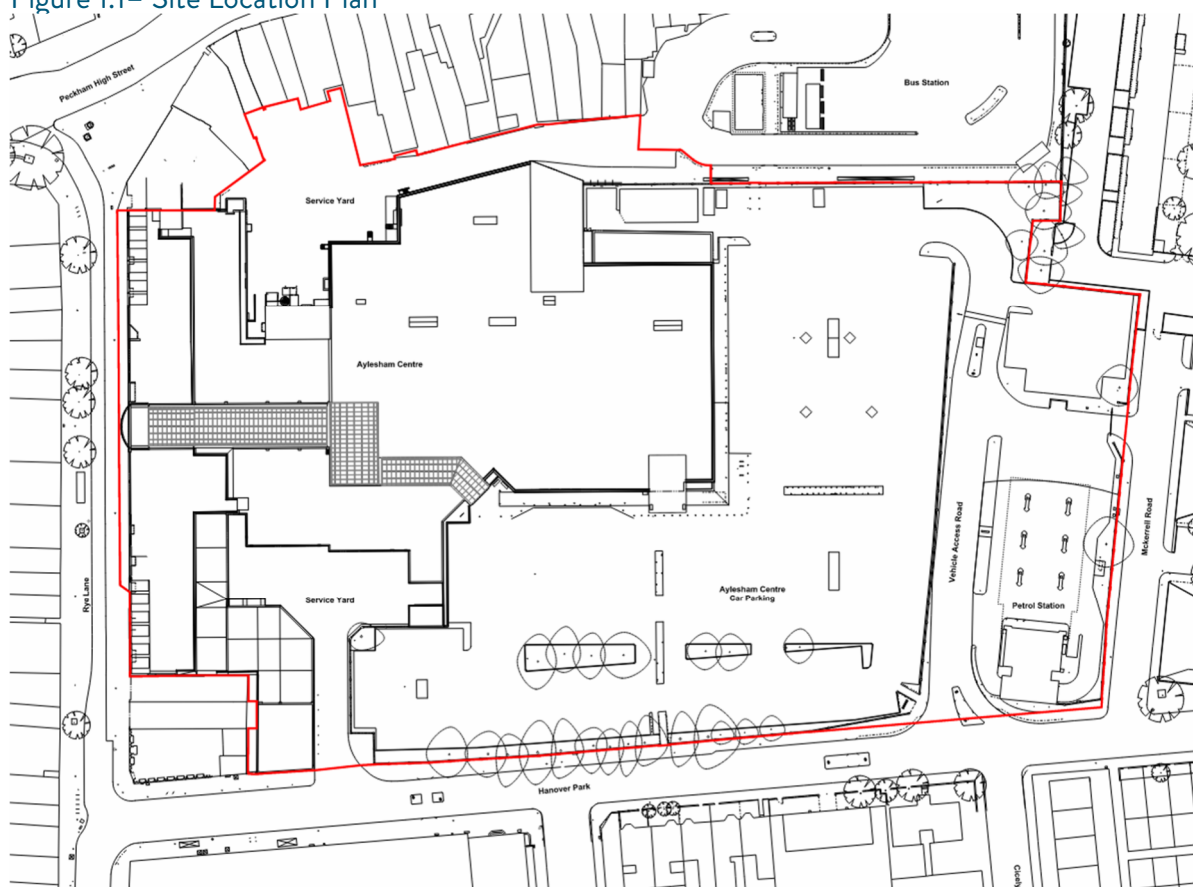


Figure 1.2– Site aerial view



1.1. Glossary of Terms

As referred to multiple times throughout this report the following acronyms are defined as follows:

AEP	Annual exceedance probability, <i>this is the percentage probability that a given event could occur in any given year.</i>
AOD	Above Ordnance Datum (also OD), <i>This is a height level measured above a reference point at sea level.</i>
BGS	British Geological Survey, <i>a UK research and innovation centre providing geoscientific data, information and knowledge for public and governmental use.</i>
CC	Climate Change, <i>reference to long term shifts in temperature and weather patterns.</i>
DEFRA	Department for Environmental Flood and Rural Affairs, <i>the governing ministerial department responsible for improving and protecting the environment</i>
FWMA	Flood and Water Management Act 2010, <i>a UK act of parliament aiming to reduce the flood risk associated with extreme weather compounded by climate change.</i>
LBS	London Borough of Southwark, <i>Local Authority for the Development.</i>
TW	Thames Water, <i>Water and Sewerage Company for the local area.</i>
LiDAR	Light Detection and Ranging, <i>Used for measuring topographies/distances</i>
LLFA	Lead Local Flood Authority, <i>are responsible for developing, maintaining and applying a strategy for local flood risk management in their areas and for maintaining a register of flood risk assets.</i>

NPPF	National Planning Policy Framework, <i>a framework within which locally prepared plans for developments can be produced.</i>
SFRA	Strategic Flood Risk Assessment, <i>Flood Risk Assessment at the District Level outlining known flood risk within the borough and Council Strategies for addressing flood risk.</i>
SI	Site Investigation, <i>a report used to enable geotechnical and geo-environmental assessment of ground condition and analysis of a Proposed Development.</i>
SPZ	Groundwater Source Protection Zone, <i>The Environment Agencies identified zones which show the level of risk to the source from contamination.</i>
SUDS	Sustainable Urban Drainage Systems, <i>methods to capture, store, treat, control and discharge surface water in urban environment using sustainable techniques.</i>
Topo	Topographical Survey, <i>a survey representing the 3-dimensional world which may include contour lines, vegetation, physical attributes and utilities.</i>
WIA	Water Industry Act 1991, <i>An act that consolidates enactments relating to the supply of water and provision of sewerage services.</i>

2. Background

2.1. General

The Aylesham Centre is a 2.7ha site located within Peckham town centre within the administrative boundary of the London Borough of Southwark ('LBS') (the Local Planning Authority ('LPA')) Rye Lane bounds the Site to the west, Hanover Park to the south and McKerrell Road to the east. Peckham Bus Station, fronting onto Peckham High Street, bounds the Site to the north.

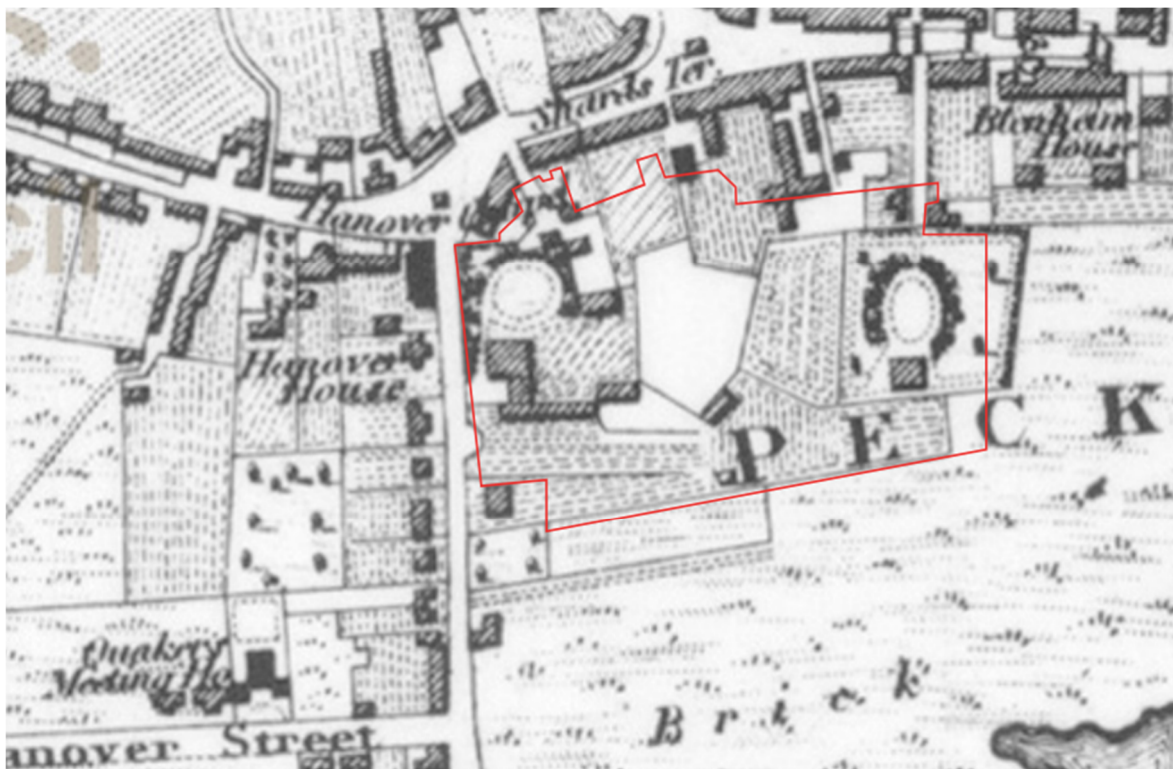
The Site accommodates the Aylesham Centre alongside an associated surface car park (353 spaces), service yard, and petrol filling station. The Aylesham Centre comprises retail units fronting on to Rye Lane with additional retail units within a covered mall, including a Morrison supermarket.

The existing site is a brownfield site, currently commercial use consisting of 'The Aylesham Centre' a shopping centre facing Rye Lane, with a thoroughfare to a Morrisons supermarket and adjacent carpark and petrol filling station. To the north-east is access to the Peckham bus depot via the existing carpark and located at national grid reference number TQ342766.

2.2. Site History

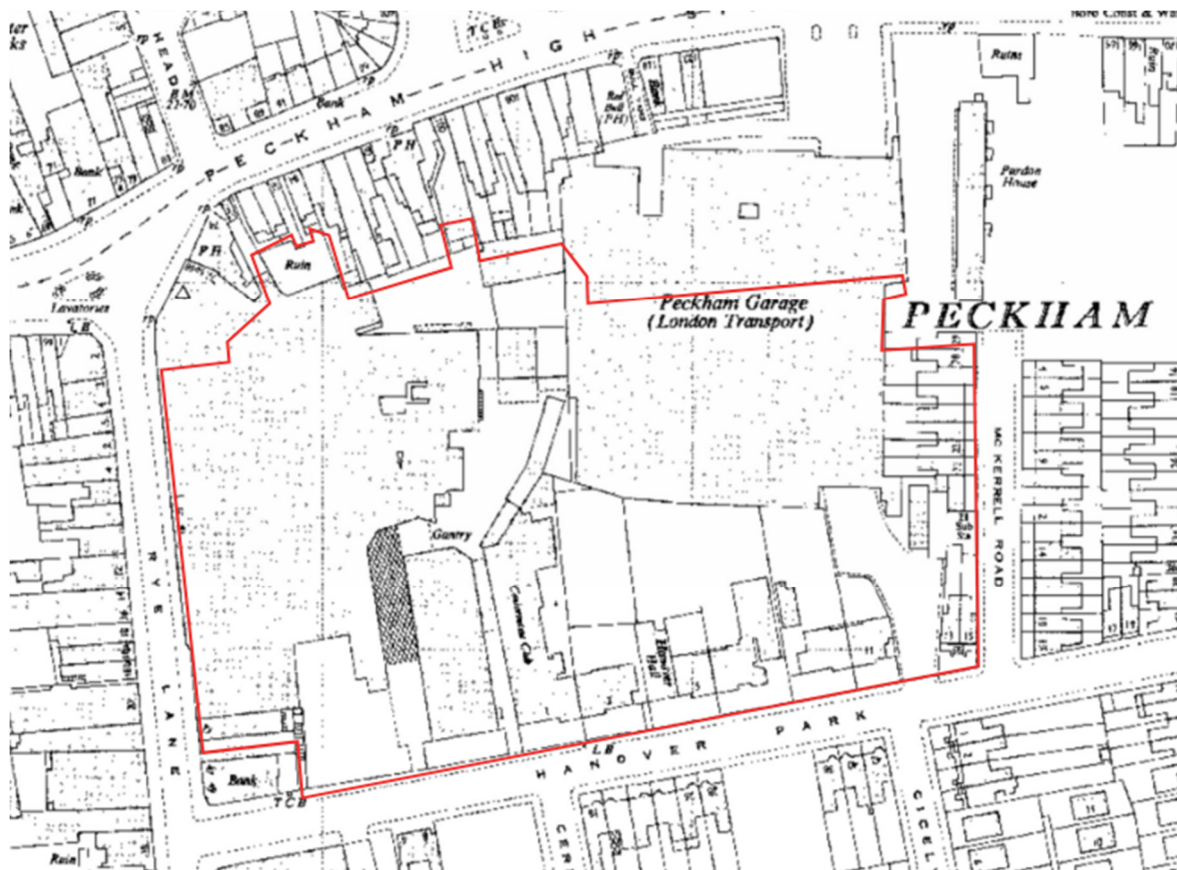
Historic maps of the site area indicate that during the early 19th Century the 'Site' consisted of arable land to the south and east of the site whereas the site itself was primarily market gardens with some large houses closer to the adjoining north and west high streets. These market gardens were used for supply of fruit and vegetables to the local community.

Figure 2.1– Area map 1830



Further development in the late 19th and early 20th century presents the Site as a significant hub for high street shops and markets with 'Jones and Higgins' forming the early foundations of the Aylesham Centre. Advent of WWII much of the existing structure was damaged and reconstruction of the site introduced a London transport garage to the northeast. The Site east of the current Aylesham centre was later converted to a Morrisons supermarket, carpark and petrol filling station.

Figure 2.2– Area map 1964



2.3. Topography

The following observations have been made on the existing sitewide topography:

- The Site levels vary between 6.90m AOD and 9.2m AOD with low point located to the north-west of the site by the existing Morrisons exterior service yard.
- Levels generally rise to 7.8m AOD moving east along the north boundary to the bus depot and remain reasonably flat within the north of the car park.
- An elevation difference along the bus depot boundary by bus stop E is approx. 1m lower by the depot where the existing car-park wall to the north of Morrisons is retained by a wall.
- The Morrisons carpark has consistent flat levels with slight rises to the south up to 9.0m AOD to the south boundary.
- The south service yard of the Aylesham centre has slight falls between the vehicular entrance at 8.33m AOD falling to 7.8m AOD at the building entrance.
- The internal shopping centre remains reasonably flat between levels of 7.82m AOD at the Rye Lane entrance rising to 7.95m AOD at the eastern exit adjacent to the Morrisons supermarket.

- An existing vault basement exists beneath the shop fronts to the north of Rye Lane, the basement floor levels are approximately 4.9m AOD.

2. 4. Geology and Hydrogeology

BGS data notes that the site is underlain by Interglacial Lacustrine Deposits over the Woolwich and Reading Beds with Chalk at depth. The site is noted to also be within an area of 'Artificial Ground'.

JER 9700 V1, R1, Desktop Study and Review of Existing Reports review of developments local to the Aylesham Centre have been used to inform borehole data at the Aylesham site. The study notes Geotechnical report that groundwater was recorded to the north of the site at a level of between 3-4.5m AOD however this is likely perched water levels local to these positions and that regional groundwater from deeper boreholes is likely to be closer to 0m AOD within the Kempton Park Gravels. Groundwater monitoring will provide a more detailed understanding of the local hydrogeology.

2. 5. Proposed Development

The Proposed Development covers an area of 2.7ha situated within the existing Aylesham Centre, Morrisons supermarket and Morrisons car-park and petrol filling station.

The development is highlighted in the New Southwark Plan for residential-led mixed use development. It is proposed to demolish the existing buildings and phase the redevelopment to provide a replacement supermarket and associated service yard and car parking (Use Class E(a)); flexible retail, leisure (including drinking establishment), and commercial accommodation (Use Class E/Sui Generis); dwellings (Use Class C3); landscaping and associated works.

3. Current Policy and Guidance

This report has been undertaken with reference to the following national and strategic level planning and borough specific guidance adopted by the relevant authorities.

3.1. National Planning Policy Framework 2023 (NPPF)

The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate, and necessary to do so. The NPPF states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, that is should be made safe without increasing flood risk elsewhere.

The NPPF is set out so that Local Plans should be supported by a Strategic Flood Risk Assessment and develop policies to manage flood risk from all sources, taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as lead local flood authorities and internal drainage boards. The policies in the Local Plans should outline the consideration to be given to flood risk and the associated issues, whilst also recognizing the uncertainties associated with predicting flood risk. The impact of climate change must also be considered and its effect on increasing flood risk.

The NPPF states that Local Plans should apply a sequential, risk-based approach to the location of development to avoid, where possible, flood risk to people and property and manage any residual risk, taking account of the impacts of climate change.

3.2. London Plan 2021

The London Plan is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years. The document brings together the geographic and locational aspects of the Mayor's other strategies, including those dealing with transport, economic development, housing, culture, social and environmental issues, and as an essential part of achieving sustainable development. The latest version of the London Plan, was adopted in early 2021.

The key policies of The New London Plan applicable to this report are Policy SI.12 Flood Risk Management and Policy SI.13 Sustainable Drainage.

3.3. The Southwark Plan 2019-2036

The Southwark Plan is placed to set out the development and policies that affect the area of Southwark, planning decisions must be made in accordance with the policies set out in the development plan unless other material considerations indicate otherwise.

The Southwark plan 2022 has to be in general conformity with the adopted London Plan and must be consistent with the National Planning Policy Framework.

The policy relevant to this drainage strategy report is Policy P68: Reducing Flood Risk.

Require major development reduces surface water run-off to greenfield run-off rates, through the application of water sensitive urban design and SuDS, in accordance with the following drainage hierarchy:

1. Store rainwater for later use; then
2. Use infiltration techniques; then
3. Attenuate rainwater in ponds or open water features for gradual release; then
4. Discharge rainwater direct to a watercourse; then
5. Discharge rainwater to a surface water sewer/drain; then
6. Discharge rainwater to the combined sewer; and
7. Hard surfacing of any gardens is permeable.

3. 4. London Borough of Southwark – Guidance Documents

LBS provides guidance documents for use by developers proposing new development within their borough. These outline strategies for the mitigation of flood risk, management of surface water including the implementation of Sustainable urban Drainage Systems (SuDS) on new developments, with allowances for the impact of climate change. The relevant documents are as follows:

1. London Borough of Southwark Surface Water Management Plan (SWMP)
2. London Borough of Southwark Strategic Flood Risk Assessment (SFRA)
3. Southwark Council Developer's Guide for Surface Water Management

4. Flood Risk Overview

A Flood Risk Assessment (FRA) has been prepared by RMA Environmental Limited in May 2024. Findings from the FRA have been extracted and are noted below.

- *The Site is located within Flood Zone 1 (low risk) and therefore has little or no flood risk from rivers and or the sea.*
- *It is considered that food risk to the Site from reservoirs is negligible to low.*
- *Overall the risk of flooding from sewers is considered to be low.*
- *Surface water flood risk mapping identifies that the majority of the Site has a very low surface water flood risk, however mapping indicates that there is an area of ponding with up to a high surface water flood risk. During a low and medium surface water flood risk event the area in the central western part of the Site has up to 600mm flooding, During a high surface water flood event this area of ponding has up to 300mm depth of flooding.*
- *When assessing against the Proposed Development, this area of localized ponding is situated where Aylesham Garden is located and external ground levels around Block F and within the Gardens is recommended to be lowered to ensure that should any surface water pond within this location it ponds within the gardens and away from any building as per the existing scenario.*
- *Post-development, it is considered that any ponding of surface water in extreme rainfall events will be re-distributed to the new low points within the Site (I.e. areas of open space, the proposed public dock and roads) and managed as part of the Sustainable Drainage System.*

The FRA notes that for the pre-development conditions there is a negligible to low risk of flooding from all sources of water with the exception to a localized high risk of surface water ponding over the location proposed to be Aylesham Gardens. A high-risk event is classified as an event with more than 3.3% chance each year. The drainage network has been designed with an allowance of up to and including 1% + 40% climate change. Therefore, it is considered that the high-risk surface water flooding in the existing case will be managed as part of the drainage design.

5. Existing Drainage

5.1. Existing Sewer Connections

An existing drainage survey has been requested to confirm the line, level, location and condition of all the surface and foul water outfalls from the development area.

Thames Water Asset plans indicate the following:

- 1143x762mm combined water trunk sewer bearing North along Rye Lane
- 1143x762mm combined water trunk sewer (downstream from Rye Lane) bearing from west to east along Peckham High Street
- 305mm combined water sewer bearing west along Hanover Park (branching into Rye Lane sewer)
- 305mm combined water sewer bearing north along Mckerrell Road

A Topographical and Utility survey produced by Plowman Craven in December 2017 shows some of the on-site private drainage network. While the survey does not clearly define the outfalls from the site into the public sewers, the existing outfalls have been inferred and are noted in Appendix A.

The following lists the inferred existing connections to the public sewer.

- It is assumed that an existing foul/combined drain connects to Thames Waters combined trunk sewer on Rye Lane at TWMH1601 via a 300Ø pipe. The outfall manhole is believed to be located in the existing basement floor beneath the proposed block B.
- It is assumed that an existing foul/combined drain connects to Thames Waters combined trunk sewer on Peckham High Street opposite Peckham Square by junction connection via a 300Ø pipe. The outfall manhole is believed to be located in the Morrisons service yard carpark.
- It is assumed that an existing combined drain connects to Thames Waters combined trunk sewer on Peckham High Street opposite the Peckham Bus Stand by junction connection via a 225Ø (or larger) pipe. The outfall manhole is believed to be located in the soft landscape bound between; the north-east corner of the existing Morrisons carpark, the south-east of the bus depot and the carpark serving Purdon House.
- It is assumed that an existing foul water drain connects to Thames Water manhole TWMH3602 on Mckerrell Road via a 150Ø pipe. The outfall manhole is believed to be located on the eastern side of the existing Morrisons petrol filling station vehicular access route.

Subject to confirmation via the CCTV drainage survey, it is proposed to re-use existing drainage connections to the public sewer. Remediation should be carried out in accordance with recommendations of the survey where required, with new connections to the public sewer considered as a last resort.

5.2. Existing Discharge Rate

5.2.1. Surface Water

The existing peak discharge rates of surface water run-off have been estimated based on Infodrainage modelling of a 100% impervious site area of 2.7ha. The results below show that for a 15-minute winter storm with a 1% AEP + 0% CC and 3.3% AEP + 0% CC respectively the peak existing run-off is 579 l/s and 364 l/s as seen in Figure 5.1 and Figure 5.2.

Figure 5.1– Flow graph for peak existing sitewide run-off based on FEH: 1% AEP +0% CC 15-minute winter rainfall

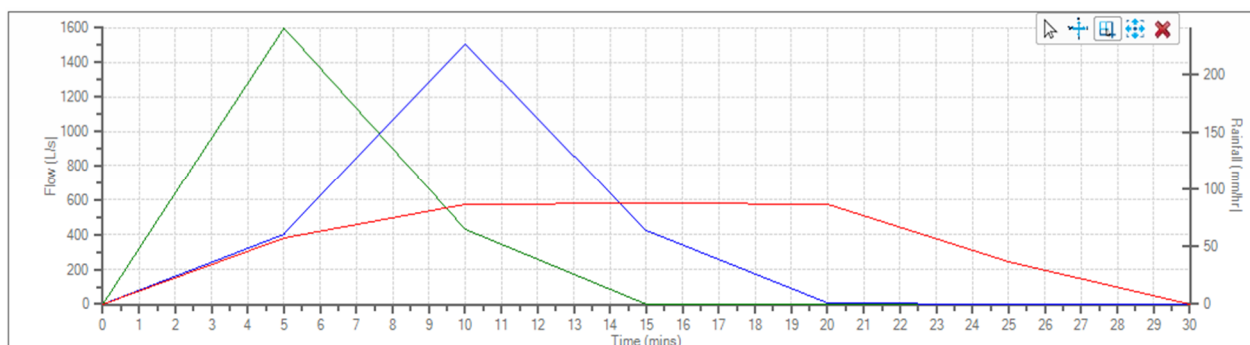
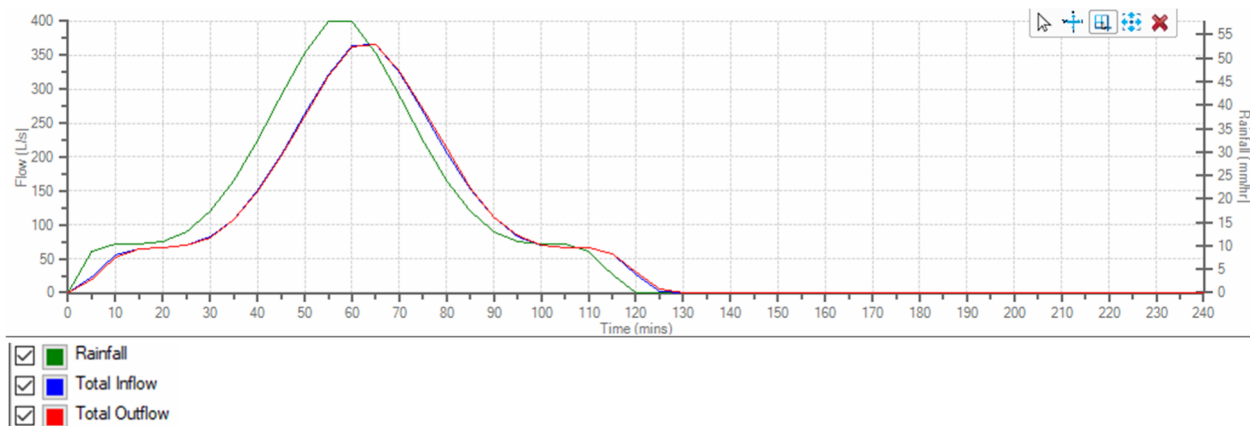


Figure 5.2– Flow graph for peak existing sitewide run-off based on FEH: 3.3% AEP +0% CC 15-minute winter rainfall



5.2.2. Foul Water

The existing site comprises of 4975.7m² GIA of supermarket space (Use Class E(a)), 5109.2m² GIA of retail, leisure, commercial space (Use Class E(a, b) and Sui Generis), 1392m² of internal mall/atrium space and a 98m² petrol station(Sui Generis). It is estimated, based on the population method, that the total peak foul flow rates from the site is 7.9 l/s in the existing condition. Calculations used to determine this estimate can be found in Appendix D.

6. Surface Water Drainage & SUDS Strategy

The proposed drainage design has been assessed against the requirements set out in national and local planning guidance and in particular with regard to The Southwark Plan 2010-2036, policy P68 Reducing Flood Risk.

Appropriate sustainable urban drainage systems (SuDS) have been incorporated in accordance with the London Plan Hierarchy (Policy SI 13) and local plan policy P68. The proposed surface water drainage system will be designed to convey surface water only, with foul water being discharged separately to the same combined sewer.

In line with London Plan Policy SI 13 and Local Plan Policy P68, the following hierarchy of surface water disposal should be adhered to, in decreasing order of preference.

1. Store rainwater for later use; then
2. Use infiltration techniques; then
3. Attenuate rainwater in ponds or open water features for gradual release; then
4. Discharge rainwater direct to a watercourse; then
5. Discharge rainwater to a surface water sewer/drain; then
6. Discharge rainwater to the combined sewer; and
7. Hard surfacing of any gardens is permeable.

6.1. Store Rainwater for Later Use

Rainwater harvesting tanks (RWH) are proposed to be included for the Phase 1 works which will collect discharged water from the blue roofs. Following Phase 1 the intention to store rainwater will be provided by way of rain gardens and bioretention systems.

6.2. Use Infiltration Techniques

A geotechnical desk study suggests the ground conditions are variable across the site from sandy gravels to sandy clays. Infiltration tests will be carried out on-site to BRE365, to confirm suitability for ground infiltration during detailed design. However, it is anticipated that ground infiltration will not be sufficient (if feasible) to solely manage the discharge of surface water from the site due to the site constraints, therefore this would be considered as an ancillary method of surface water disposal if proved feasible and the current strategy has assumed storage volumes based on no infiltration at this time.

6.3. Attenuate Rainwater in Ponds or Open Water Features for Gradual Release

Introduction of sitewide green roofs, rain gardens and bioretention will be included as part of the landscaping and drainage strategy. Above ground storage and gradual release of surface water into the below ground drainage system will provide additional attenuation to the sitewide drainage network.

6.4. Discharge Rainwater Direct to a Watercourse

The nearest surface water body to the site is the river Thames which is situated approximately 3.1km from the site, therefore discharge to surface water is not considered to be feasible.

6.5. Discharge to Surface Water Sewer

Thames Water asset plans confirm that the site is surrounded by combined trunk sewers, however there are no designated surface water sewers in the vicinity of the site, therefore this option is not considered feasible.

6.6. Discharge Rainwater to Combined Sewer

Thames Water asset plans confirm that the site is surrounded by 1143x762 combined trunk sewers. A pre-planning enquiry response from Thames Water has confirmed that there is sufficient capacity to discharge surface water to the combined sewer if restricted to greenfield runoff rate. Greenfield runoff is further discussed in section. It is proposed to discharge surface water to the combined sewer surrounding the Aylesham Centre as the primary method of surface water disposal following confirmation by pre-planning enquiry to Thames Water.

6.7. Sustainable Drainage Systems SUDS

A SUDS assessment has been undertaken, Table 6.1 outlines the SUDS opportunities for the development based on the four pillars of sustainable drainage; reduce surface water run-off rate and volume, improving water quality, amenity, and biodiversity.

Table 6.6-1 – SUDS techniques

Component type	Description	Collection mechanism	Design Criteria					
			Water Quantity			Water Quality	Amenity	Biodiversity
			Peak runoff rate	Runoff Volumes				
				Small events (Interception)	Large events			
Rainwater harvesting systems	Systems that collect runoff from the roof of a building or other paved surface for use	P		●	●		●	
Green roofs	Planter soil layers on the roof of buildings that slow and store runoff	S	○	●		●	●	●
Infiltration systems	Systems that collect and store runoff, allowing it to infiltrate into the ground	P	●	●	●	●	●	●
Proprietary treatment systems	Subsurface structures designed to provide treatment of runoff	P				●		
Filter strips	Grass strips that promote sedimentation and filtration as runoff is conveyed over the surface	L		●		●	○	○
Filter drains	Shallow stone-filled trenches that provide attenuation, conveyance and treatment of runoff	L	●	○		●	○	○
Swales	Vegetated channels (sometimes planted) used to convey and treat runoff	L	●	●	●	●	●	●
Bioretention Systems	Shallow landscaped depressions that allow runoff to pond temporarily on the surface.	P	●	●	●	●	●	●

	before filtering through vegetation and underlying soils						
Trees	Trees within soil-filled tree pits, tree planters or structural soils used to collect, store and treat runoff	P	●	●		●	●
Pervious Pavements	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	S	●	●	●	○	○
Attenuation Storage Tanks	Large, below-ground voided spaces used to temporarily store runoff before infiltration, controlled release or use	P	●				
Detention Basins	Vegetated depressions that store and treat runoff	P	●	●		●	●
Ponds and Wetlands	Permanent pools of water used to facilitate treatment of runoff - runoff can also be stored in an attenuation zone above the pool	P	●			●	●

Key:

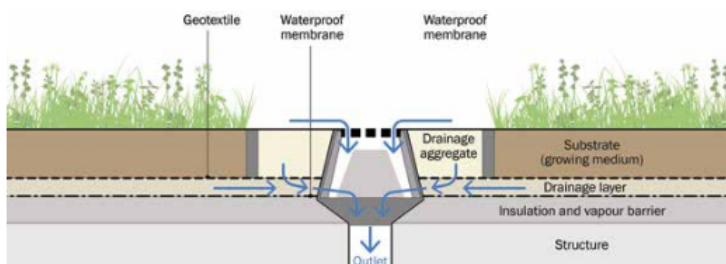
P- Point, L – Lateral, S – Surface, ● – Likely valuable contribution to delivery of design criterion, ○ – Some potential contribution to delivery of design criterion, if specifically included in the design.

Rainwater Harvesting Systems ✓

Rainwater harvesting systems reduce the annual average rate of runoff from the site by reusing water for non-potable uses e.g. irrigation, toilet flushing, etc.

RWH systems are proposed during the development of Phase 1.

Green Roofs ✓



Green Roofs provide soft landscaping at roof level which captures and reduces surface water runoff.

The current proposal will include Green Roofs across the site.

Infiltration Systems ✕

Infiltration Systems store surface water runoff from the site allowing for gradual percolation to the underlying ground via natural infiltration.

Geotechnical assessments suggest that infiltration may be possible, however further soakaway tests are required to confirm this, therefore design will currently progress on the basis that these will not be used until confirmation is received.

Proprietary Treatment Systems ✖

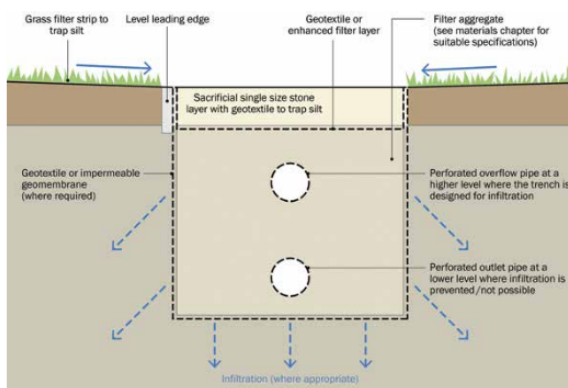
Proprietary Treatment systems are manufactured products that are installed on sites as a device to remove specified pollutants from surface water runoff.

Proprietary Treatment Systems are not required at this stage to reduce pollution to the local sewer and therefore not proposed.

Filter Strips ✖

Filter Strips direct surface water runoff over areas of soft graded vegetation to promote filtration and reduce surface water runoff volumes and velocities.

Filter Drains ✖

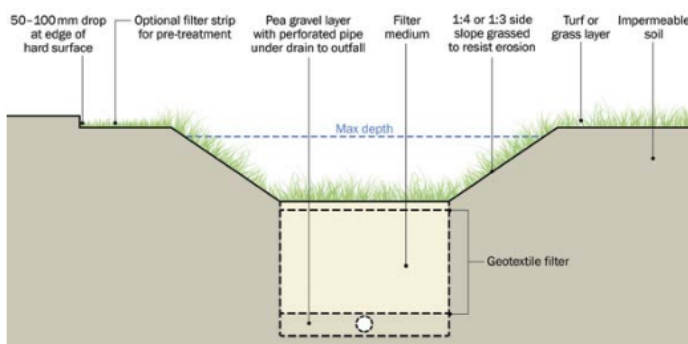


Filter strips are not being considered in this development where surface water is encouraged to route direct to soft planting.

Filter Drains are shallow trenches filled with stone/gravel to create temporary subsurface storage for attenuation, conveyance, and filtration of surface water runoff.

Filter drains are not being considered in this development where surface water is

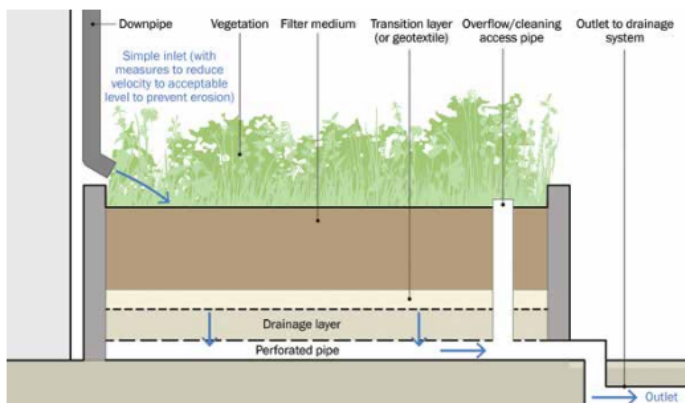
encouraged to route direct to soft planting.



Swales ✖

Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat and often attenuate surface water runoff.

Swales are not being considered on this development.



Bioretention Systems ✓

Bioretention Systems are shallow landscaped depressions that are often proposed to reduce runoff rates and volumes.

Bioretention in form of rain gardens are proposed in external amenity landscaped areas where feasible.

Trees ✓

Trees, hedges, and their associated planting structures provide benefits to surface water management via transpiration, interception, infiltration, and phytoremediation.

The current proposal includes areas of Tree planting and other green spaces. Phase 1 will make use of tree pit cell attenuation crates which intend to feed into the below ground geocellular attenuation tanks.

Pervious Pavements ✓

Pervious Pavements provide a pavement suitable for pedestrian or vehicle traffic while allowing rainwater to infiltrate through to the underlying structural layers. This provides filtration, conveyance, attenuation, and interception.

Permeable paving has been agreed to be included in the hardscape strategy and will be used as a water quality SUDS feature.

Attenuation Storage Tanks ✓

Attenuation Storage Tanks are used to create a below-ground void space for the temporary storage of surface water drainage before discharging via infiltration, controlled release, or use.

Attenuation Storage Tanks are proposed to attenuate the rate of water discharging to the local public sewer network.

Detention Basins ✓

Detention basins are depressed areas of landscaping that are intended to flood during a storm event, these features provide filtration, attenuation, interception, and conveyance in some instances.

Detention basins will be included in areas where lawn and perennial planting may be depressed to act as a backup storage during low probability storm events.

Ponds and Wetlands ✕

Ponds and Wetlands are features with a permanent pool of water that provide attenuation and filtration of surface water runoff. Ponds and Wetlands bring significant Amenity and Biodiversity benefits to a site.

The current proposal does not include any Ponds or Wetlands.

6. 8. Proposed Surface Water Drainage Strategy

In accordance with BS EN 752 and BS EN 19633-2:2017 a surface water drainage network will be provided for the control and management of surface water within the development. The surface water drainage network will be designed so as not to cause risk to person or property for storms up to and including the 1% AEP with an allowance of 40% for climate change.

6. 8. 1. Phase 1 (Temporary)

The Proposed Development will be carried out in two separate phases. It is intended for Phase 1 to be constructed and operational by the year 2031 prior to the demolition and construction of the Phase 2 area within 12 months of Phase 1 completion. A temporary Phase 1 drainage strategy has therefore been developed and proposed to be constructed within the Phase 1 boundary extents, to enable the remaining site construction to take place whilst Phase 1 is operational. This strategy will see Phase 1 discharge surface water to the existing outfall on the north-east boundary by the bus depot, in the temporary condition, with flows 'turned' into the wider development network in the permanent condition discussed in section 6.8.2.

The existing run-off rate for the north-east outfall has been estimated based on a catchment area of 6770m² (See Table 6.2). The available utility survey of the drainage presents a 225Ø pipe with an indicative 1:40 gradient leading up to the outfall manhole by the site boundary. For a 50% AEP storm based on FEH data, Infodrainage modelling presents a peak flow of 104 l/s to this outfall in the existing condition.

Of the existing catchment area discharging to the north-east outfall, it is estimated that 1920m² of the 6770m² is directed from Phase 2 area and 4850m² comes from the Phase 1 area.

Following construction of Phase 1, it is proposed to maintain the catchment serving the existing Phase 2 area until the existing site is demolished. Infodrainage modelling indicates that this area discharges a peak flow of 31.5 l/s for a 50% AEP storm.

In the temporary condition, it is proposed to drain the Phase 1 surface water catchment of 9030m², to the north-east outfall at a restricted rate of 30 l/s for the 1% AEP storm event (or less severe) by way of hydrobrake flow control device or similar, this can be seen in Appendix D drawing ASPC-WAL-MX-XX-DGA-C-003000. The surface water generated by the Phase 2 catchment will discharge at the existing unrestricted rate. It is therefore estimated that a combined rate of 61.5 l/s will discharge to the public sewer via the north-east outfall, for a 50% AEP storm +0% CC), serving a total catchment area of 10,950m². This equates to a 59% reduction of peak flow rate when compared to the existing case. A 225Ø pipe at 1:40 gradient has an 82 l/s capacity when discharged under normal conditions. Therefore, with the total 61.5 l/s proposed surface water discharge there is still over 20l/s capacity for foul water discharge. Foul water peak flows are discussed in section 7.

To attenuate the surface water to the proposed rates green/blue roof, below ground geocellular storage and tree pit attenuation will be utilized, this is further discussed in section 6.8.3.

Table 6.2– Existing and proposed catchment areas and peak flows for 50% AEP + 0%CC storm into the north-east outfall for temporary Phase 1 condition

	Estimated existing from Phase 2	Estimated existing from Phase 1	Estimated Existing Total	Phase 1 only	Proposed Phase 1 and existing from Phase 2	Percentage reduction of peak flow
Catchment Area (m ²)	1,920	4,850	<u>6,770</u>	9,030	<u>10,950</u>	
Peak Flows (l/s)	31.5	76.2	<u>104</u>	30	<u>61.5</u>	40.8%

6.8.2. Phase 2

Following the construction of Phase 2 the sitewide drainage layout will be amended such that all drainage from the site is discharged via the outfalls to the east onto Rye Lane and to the north-west onto Peckham High Street. The combined Phase 2 discharge rates will be restricted to greenfield runoff rate. A drainage survey will be carried out to assess the condition, line and level of the existing connections to the mains sewers and remedial works carried out where necessary.

The outfall provided at the north-east of the site for the Phase 1 works will become disused for surface water, with flows ‘turned’ into the wider development network, although it is proposed to retain the connection for discharge of Phase 1 foul water.

Greenfield Runoff Rate

It is proposed to restrict the surface water discharge to sewers from the total site area of 2.733ha to the calculated greenfield run-off rate QBAR of 6.32 l/s as calculated using the FEH statistical approach (See Appendix F).

It is proposed to split the discharge rate from each of the two outfalls to 3.15 l/s.

A pre-planning enquiry for capacity has been submitted to Thames Water for the sitewide discharge rates and Thames Water have confirmed the following, also noted in Appendix E:

“If the surface water hierarchy has been followed and if the flows are restricted as described above for all storms up to and including 1:100+40%CC, then Thames Water would not have any objections to the proposal.”

6.8.3. Storage Requirements

The proposed plots on the development have been identified as being suitable for blue roof storage and where feasible this will be provided to high level roof areas, restricting run-off at source prior to discharging to the below ground drainage network. The assumed blue roof and estimated rate of restrictions have been included in Appendix C.

Table 6.3 – Proposed Blue Roof Catchment, Area, Depth and Peak discharge rates

Block	Catchment Area (m ²)	Total Blue Roof Area (m ²)	Blue Roof Depth (mm)	Assumed Discharge Rate (l/s)
A	158	113	100	0.5
B	512	462	100	0.8
C	421	355	100	0.6
D	260	227	100	0.4
E	419	316	100	1.2
F	490	411	100	1.1
G	562	460	100	1.4
H	680	568	100	1.8
J1	581	503	100	1.1
J2	396	254	100	1.8
K	871	641	100	3.6
L	973	839	100	2.5
M	872	719	100	2.1
N	682	590	100	1.2
P	648	511	100	2.1
Q	676	578	100	1.6
G/K PODIUM	847	765	100	1.7
SUPERMARKET PODIUM	3402	3127	100	5.8
TOTAL	14,986	11,439		31.3
USABLE STORAGE VOLUME		1086m ³		

50m³ of below ground storage crates are proposed to sit beneath tree pit attenuation crates – which will provide additional storage; and 556m³ of the proposed green/blue roof storage for the sitewide development will be provided for the Phase 1 works to aid in restricting the Phase 1 catchment into the north-east outfall to 30 l/s. Following construction of Phase 2 it is proposed to redirect flow from the Phase 1 outfall to the wider development network and permanent outfalls within the Phase 2 area. It is proposed to make use of the Phase 1 below ground storage in addition to the introduction of new below ground storage tanks in the Phase 2 area.

Raingardens have been proposed around the 'site' in form of shrubs and perennial planting with a plan area of approximately 1600m². There is an estimated 160m³ storage achieved from this based on 100mm depth storage.

Approximately 900m³ of porous sub-base storage will be provided beneath permeable surfaces across the development. This is discussed further in Section 6.8.4.

It is estimated that circa 2800m³ of storage volume is required across the full development site to restrict discharge to greenfield runoff for the 1% AEP storm event + 40% allowance for climate change.

A summary of the proposed storage volumes which will be provided following the completion of Phase 2 can be seen in Table 6.4. A hydraulic model has been developed using Infodrainage software which has been produced without permeable paving due to limited information on the details and depths of build-up. Following design development it is proposed to include the volume of permeable paving in the hydraulic model and optimize the volume of below ground attenuation storage. The infodrainage model demonstrates that there is no flooding for storm events up to and including the 1% AEP and no flooding that would cause damage to person or property for the 1% AEP + 40% climate change as noted in Section 8.3. It is therefore considered that the volume proposed will be sufficient to achieve a betterment against the assessed storm criteria. Drainage modelling results can be found in Appendix H.

Table 6.4 – Summary of Storage

Type of storage	Volume proposed m ³	Volume modelled m ³
Green/Blue roof	1086	1086
Below ground attenuation	2772	2772
Permeable paving	900	-
Raingardens	160	160
Total	<u>4943</u>	<u>3968</u>

6. 8. 4. Permeable Areas

Table 6.6 presents proposed permeable area plan within the site boundary. When compared to the existing permeable area in Table 6.5 plan there is a 5.28% increase of soft landscaping (not including the addition of green roof and permeable hardscape paving). The increase of soft landscaped areas will provide a greater rate of infiltration into the ground and reduce the overall peak flow into the drainage system.

Surface water network drainage provision for permeable areas will be decided in accordance with building regulations part H, landscaping requirements and geotechnical data provided.

It is proposed to introduce approximately 10,000m² of permeable block paving and resin bound gravel to areas of the surrounding site. Surface water can be conveyed from these permeable areas into the surrounding surface water network by way of filter drains and where possible infiltration into the ground will be provided. Estimated storages achieved through permeable paving is based on 300mm depth of a porous sub-base aggregate with 30% void ratio.

While the proposed site will have an overall reduced hardstanding when compared to the existing, the drainage modelling has been undertaken assuming 100% of the site footprint is impervious.

Table 6.5 – Areal breakdown of existing hardstanding and soft landscaping

Hardstanding and soft landscaping	Area (m ²)
Existing soft landscaping	994
Existing hardstanding area	26,334
Total	27,328
Percentage soft landscaping	3.63%

Table 6.6 – Areal breakdown of proposed hardstanding and soft landscaping

Hardstanding and soft landscaping	Area (m ²)
Proposed soft landscaping	2,437
Proposed hardstanding area	24,891
Total	27,328
Percentage soft landscaping (excluding green roof)	8.91%

6. 8. 5. Exceedance Flow Routes

An exceedance event is considered an event where the below ground drainage system is not able to operate as designed – this could be caused by a storm intensity greater than the design storm, a surcharged public sewer, or a local failure in the drainage system which may result in overland flow.

Exceedance flow routes have been checked in conjunction with the FRA report produced by RMA Environmental and landscape levels produced by Gillespies. Surface water from the site wide catchment will be collected within the private drainage network for storm events up to and including the 1% AEP + 40% climate change. Overland flow routes have been mapped for exceedance events and can be seen in Appendix D.

Based on the existing and proposed site topography, the general routing of over land flow during exceedance event will direct surface flow to the surrounding roads and north-east toward Peckham bus depot and ultimately toward Peckham High Street and north-west toward the thoroughfare north of building A and onto Rye Lane. Areas of depressed land which would locally pond have been identified prior to overtopping to the overland flow routes. A lower lying area within the existing north service yard has no designated overland flow route, therefore a high point is proposed to be introduced to prevent additional overland flow to route to this area. Landscape levels will be

designed so that surfaces will fall away from building thresholds and be directed towards general external circulation space so as not to mitigate risk to person and property.

6.9. SuDS Water Quality Design Criteria

The Site Surface Water system has been designed in accordance with SuDS Management Train outlined in the CIRIA SuDS Manual (section 26.8). Surface water mitigation measures will be implemented via SuDS features in order to reduce the surface water pollution hazard indices discharging from the site to the public combined sewers.

The Simple Index Approach has been used to determine whether the proposed water quality measures are sufficient for the site, which measures the pollution hazard through the use of indices ranging from 0 to 1, 'no pollution hazard for the contaminant type' to 'high pollution hazard for the contaminant type' respectively.

Table 6.7 assesses the pollution hazard indices based on the catchments land use and details the indicative mitigation indices for discharges to surface waters that the proposed SuDS features could achieve.

Table 6.7 - Pollution Hazard Indices, Ref CIRIA SuDS Manual 2015, Table 26.2

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Car Park/Low traffic Road (including general access roads)	Low	0.5	0.4	0.4
Residential Roofs	Very Low	0.2	0.2	0.05

In line with Table 4.3 of the CIRIA SuDS Manual 'the discharge of clean roof water to the ground is acceptable provided that (a) all roof water downpipes are sealed against pollutants entering the system from polluted surface runoff, effluent disposal or other forms of discharge and (b) gross sediments and silts area removed upstream of the infiltration component.' As such the application of the Simple Index Approach is not required for this catchment.

Table 6.8 below outlines the mitigation indices for SuDS components when discharging to groundwater as outlined in Table 26.4 of the CIRIA SuDS Manual. Table 6.9 below shows the post treatment pollution hazard indices and identifies that the proposed SuDS features will provide sufficient mitigation of the pollution hazard for discharging surface water to a watercourse.

Table 6.8 - SuDS Mitigation Indices for discharge to ground water, Ref CIRIA SuDS Manual 2015, Table 26.4

Type of Suds Component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Permeable Paving and Blue roof	0.7	0.6	0.7
Raingarden/Bioretention System	0.8	0.8	0.8

Table 6.9 – Treatment of Shared Surfaces

Pollutant	Permeable Pavement		
	Pretreatment levels	Treatment Mitigation Indices	Post Treatment Levels
Total Suspended Solids (TSS)	0.5	0.7	0.0
Metals	0.4	0.6	0.0
Hydrocarbons	0.4	0.7	0.0

It is noted that the indicated mitigation indices noted on Table 6.7 are only delivered by the SuDS component so long as they are constructed and maintained in line with CIRIA guidance. Section 9 outlines the minimum operation and maintenance requirements across the site.

7. Foul Water Drainage Strategy

In accordance with BS EN 752, independent foul water network(s) will be provided for the sanitary disposal of foul water generated by the development.

It is proposed to discharge all foul water generated from the development via gravity into local existing public infrastructure running north along Rye Lane and east along Peckham High Street via 4 no outfalls to be agreed following sewer surveys. Foul water from basement level will be pumped to high level and discharge via gravity to the private drainage system prior to discharging to the public sewer.

The estimated peak foul water flow from the development is; 31.9/s based on 867 residential dwellings varying between 1 and 6 inhabitants per unit with a maximum total habitants of 2899 and 125l/day/person discharged over a 24 hour period with a dry weather flow factor of 6, 6535m² flexible retail, leisure, commercial and workspace of use class E(a-g) an (excluding supermarket) and 4436m² of supermarket retail space with a combined designed usage of 400l/day/100m² discharged over a 10 hour period with a DWF of 4. The above is based on the proposed accommodation schedule document ASCP-DRM-ZZ-ZZ-LSH-A-000210.

A pre-planning application has been submitted to Thames Water in order to verify that suitable capacity exists within the local public network for the Proposed Development flows. Based on accommodation schedules submitted in July 2024, Thames Water have responded noting confirmation that there is sufficient sewerage capacity within their network to accommodate the foul flows generated from the Proposed Development. An addendum with updated accommodation schedules has been provided in November 2024. Calculations in Appendix D show that the addendum has increased the peak flow rates from 31.3l/s to 31.9l/s and likely to be a negligible impact to Thames Waters capacity confirmation.

Any further increase of foul flow load to the above will require further consultation with Thames Water to confirm that sufficient capacity exists within the trunk sewer. It is noted that the confirmation of capacity is valid for 12 months or for the life of any planning approval that uses the confirmation of capacity to a maximum of 3 years. All connections to the public sewer will be subject to approval by Thames Water under Section 106 of the Water Industry Act.

An outline foul drainage strategy layout including foul flow rates and discharge locations are included in Appendix C.

8. Design Criteria

8.1. Drainage Design Standards

Eurocodes

BS EN 752:2017	Drain and sewer systems outside buildings. Sewer system management
BS EN 16933-2:2017	Drain and sewer systems outside buildings. Design. Hydraulic design
BS EN 12056-2:2000	Gravity drainage systems inside buildings. Sanitary pipework, layout & calculation

8.2. General References

CIRIA Report C753	The SuDS Manual
Water UK	Code for Adoptions
The Building Regulations Approved Document H	Drainage and waste disposal
Greater London Authority	The London Plan 2016
DEFRA	Non-statutory technical standards for sustainable drainage systems

8.3. Surface Water Network Design

When designing the below ground surface water drainage network, it should be assessed against the following criteria to comply with British and European Standards BS EN 752:2017 and BS EN 16933-2:2017.

- No significant surcharging (gravity flow only) for storm flows with a 50% AEP
- No flooding within the site for storm flows with a 3.3% AEP
- No flooding off-site or flooding that would present a risk to person or property for storms with a 1% AEP.
- 40% allowance for climate change will be applied to all calculations for network design.
- The network will be checked against the effects of 40% climate change to check there is no significant flooding that could cause risk to person or property.

Based on the above assessment, the volume of storage required on site has been determined using the Infodrainage analysis software based on the following input variables.

- Storm Water Return Periods – 1 in 2 year, 1 in 30 year & 1 in 100 years and 1 in 100 years + 40% CC
- FEH rainfall data – obtained from the Flood Estimation Handbook Service
- Site location – to determine other rainfall hyetograph characteristics.

- Pipe network volume – calculated by the automated process.

Out flow control devices – Vortex flow control (Hydrobrake or similar) or orifice plate.

Drainage modelling results can be found in Appendix H.

8. 4. Foul Water Network Design

Foul water drainage design will be in accordance with BS EN 752:2017 and BS EN 16933-2:2017.

Flow rates will be based on the following:

- The frequency factor will be determined by the buildings use. (Table 3 BS EN 12056-2:2000)
- The volume of discharge will be determined by the number of appliances. (Table 2 BS EN 12056-2:2000)

The value of the summation of discharge units is then converted into a flow rate using where applicable cl 6.3.3 of BS EN 12056-2:2000. Where the flow rate requires the use of a sewer greater than 150mmØ, the Population Method will be used based on flows of 0.015 l/s/person. For peak flow, the maximum proportional depth is to be no more than 0.75.

Minimum gradients to achieve self-cleansing velocities will be in accordance with BS EN 16933-2:2017 NA.5.2.4. Where it is not possible to achieve self-cleansing velocities, the following table will be used.

Table NA.7 — Minimum recommended gradients for foul drains and sewers

Peak flow [l/s] ^a	Pipe size [mm]	Minimum gradient ^{b,c,d}
<1	75	1 in 40
	100	1 in 40
>1	75	1 in 80
	100	1 in 80 ^e
	150	1 in 150 ^{f,g}
^a Peak flows should be based on probability flow calculation methods. ^b These gradients have been empirically demonstrated on the basis of 6 l WC flush volumes. Further research is necessary to evaluate the recommended gradients for use in systems with very low WC flush volumes. ^c Exceptionally, where the length of drain or sewer serving a small number of properties is very long, steeper gradients may be required. ^d Where ground settlement is expected, steeper gradients are recommended. ^e Minimum of one WC connected. ^f Minimum of five WCs connected. ^g Exceptionally, where a 150 mm diameter pipe is used to carry flows from fewer than five WCs, the minimum gradient should be 1 in 60.		

It may be possible to use flatter gradients if standards of design and workmanship are high, and where buildings are close together so that the lengths of drain or sewer are short. Exceptionally, where the length of drain or sewer serving a small number of properties is very long, steeper gradients may be required.

8. 5. Provision for Maintenance

Foul drainage has been designed to promote self-cleansing velocities. The surface water system which is designed to surcharge in heavy rainfall events will reduce the likelihood of siltation. Attenuation features have been situated with access and capability for jet cleaning. Where possible drainage infrastructure has been located in areas accessible by public roadway.

9. Operation and Maintenance Requirements

9.1. Introduction

All below ground drainage and SUDS components on the development are to be inspected regularly and maintained to ensure design flow conditions are maintained.

All drainage and SuDS features are to remain as privately owned and will not be offered for adoption. Inspection and maintenance will be the responsibility of the Clients appointed building management company.

A detailed operations, maintenance and health & safety manual will be produced by the Contractor/Developer as part of the project handover documents. The manual will include important information specific to the final below ground drainage system including product information, specialised maintenance requirements and Health & Safety Standards. It is expected that the manual will cover general operation, maintenance activities and their frequency.

9.2. Maintenance Plan

The purpose of a Maintenance Plan is to ensure that the drain and sewer system is kept in such a condition that it can perform its function satisfactorily and meet the performance requirements. A maintenance plan should cover:

- Pipelines including inspection chambers, manholes and outfalls, considering the gradient and/or velocity.
- Pumping installations, according to potential risk and type of equipment.
- Overflows and detention tanks, considering storm frequency.
- Flow controls/inverted siphons, depending on risk of blockage and potential consequences.
- Separators, according to technical requirements.
- Grit chambers, gullies etc., considering storm frequency, capacity, and land use.
- Sustainable Drainage features, according to specific requirements of each feature.

Reference should be made to Section 6.0 of BS EN 752:2017 and The SuDS Manual (CIRIA) but in general maintenance activities are likely to comprise of:

- | | |
|------------------------|---|
| 1. Regular Maintenance | - Litter collection, gardening to control vegetation growth, inlet checks. |
| 2. Occasional Tasks | - Checking the drainage & SuDS features and removing any silt that builds up. |
| 3. Remedial Work | - Repairing damage where necessary. |

For all attenuation and rainwater harvesting systems, proprietary treatment systems, backflow prevention devices and pumps the above maintenance plan is to be read in conjunction with any specific inspection and maintenance requirements set by product manufacturers.

The Maintenance Plan shall considered any site specific and special circumstances including:

- Special inspection and immediate appraisal may be required in the event of a structural accident, fire, flooding, reported structural distress or suspected inadequacy.
- It is recommended that in situations where an expected severe storm is to hit that all gullies, drainage channels and manhole sumps are cleared of any debris material.
- Refer to the manufactures of all attenuation systems and flow control devices for their specific inspection regime requirements for their products.
- All inspections should be carried out by the appropriate persons and they should be confined space trained if entering below ground structures such as manholes or attenuation tanks.

It is recommended that the above Below Ground Drainage Maintenance Plan be adopted and undertaken for the development and incorporated into the wider Integrated Operations and Management Plan for the entire development and overseen by suitable facilities management personnel.

A Maintenance Plan has been included in this report, for inclusion with the Contractor/Developer's detailed operations, maintenance and health & safety manual.

The below list is not extensive and is to be read in conjunction with any specific inspection and maintenance requirements set by product manufacturers.

Table 9.1– Below Ground Drainage Maintenance Tasks

Regular Maintenance	Frequency	Responsibility
The inspection of drainage channels, gullies, and sumps in manholes. All traps should be topped up with water where unused to prevent drying out.	Monthly. More regular in warm weather.	Site Maintenance Contractor
Inspect below ground drainage components from the surface, removing obstructions and silt, as necessary. Check there is no physical damage.	6 Monthly.	Site Maintenance Contractor
Regular sweeping or blowing or pavement to remove any debris that can clog.	Monthly.	Site Maintenance Contractor
Inspection of flow control device to identify any areas that are not operating correctly and clear out and debris from chamber.	Monthly for first 3 months then every 6 months.	Site Maintenance Contractor
Inspect inlet structures such as RWP's, channel drains and gullies removing silt, as necessary. Check for any physical damage.	Monthly.	Site Maintenance Contractor
Inspect and identify any areas of pipework that is not operating correctly, undertake remedial works if required.	Monthly for first 3 months then annually.	Site Maintenance Contractor
Maintain vegetation to designed limits within the vicinity of all below ground drainage structures and pipes.	Annually or as required.	Site Maintenance Contractor

Remove debris from catchment surface where it presents a risk to the performance of the below ground drainage system.	Monthly or as required.	Site Maintenance Contractor
Occasional Tasks	Frequency	Responsibility
Inspect drainage runs using CCTV technology and undertaking cleaning when required with a high-powered jet cleaner.	Every 6-8 Years.	Specialist Maintenance Contractor
Sweep and vacuum permeable pavement to prevent silt blockage.	As required.	Specialist Maintenance Contractor
Remove covers on inspection chambers and inspect, ensure that water is flowing freely and is unobstructed. Remove debris and silt as required.	Annually.	Site Maintenance Contractor
Remedial Work	Frequency	Responsibility
Monitor the effectiveness of areas of permeable paving, where water pools and does not infiltrate immediately advise Client of any remedial action required.	As required	Site Maintenance Contractor
Remedial works to be undertaken as necessary on below ground drainage systems following observations from regular and occasional maintenance tasks.	As required	Specialist Maintenance Contractor

Table 9.2 - Filter Drain Maintenance Tasks

Regular Maintenance	Frequency	Responsibility
Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)	Site Maintenance Contractor
Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly	Site Maintenance Contractor
Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six Monthly	Site Maintenance Contractor
Remove sediment from pre-treatment devices	Six monthly, or as required	Site Maintenance Contractor
Occasional Tasks	Frequency	Responsibility
Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (e.g. NJUG, 2007 or BS 3998:2010)	As required	Site Maintenance Contractor
At locations with high pollution loads, remove surface	Five yearly, or as	Special Maintenance

geotextile and replace, and wash or replace overlying filter medium	required	Contractor
Clear perforated pipework of blockages	As required	Site Maintenance Contractor

Table 9.3- Green Roof System Maintenance Tasks

Regular Maintenance	Frequency	Responsibility
Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required	Site Maintenance Contractor
During establishment (i.e. year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)	Site Maintenance Contractor
Post establishment, replace dead plants as required (where >5% of coverage)	Annually (in autumn)	Site Maintenance Contractor
Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required	Site Maintenance Contractor
Remove nuisance and invasive vegetation, including weeds	Six monthly or as required	Site Maintenance Contractor
Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required	Site Maintenance Contractor
Remove debris and litter from roof outlets to prevent clogging	Three monthly or as required	Site Maintenance Contractor
Occasional Tasks	Frequency	Responsibility
Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability.	Annually and after severe storms	Site Maintenance Contractor
Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms	Site Maintenance Contractor
Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms	Site Maintenance Contractor
Inspect underside of roof for evidence of leakage	Annually and after severe storms	Site Maintenance Contractor
Remedial Work	Frequency	Responsibility

If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required	Site Maintenance Contractor
If drain inlet has settled, cracked, or moved, investigate and repair as appropriate	As required	Site Maintenance Contractor

Table 9.4 Permeable/Porous Block Paving Maintenance Tasks

Regular Maintenance	Frequency	Responsibility
Brushing and vacuuming (general sweep over whole surface).	Annually	Site Maintenance Contractor
Occasional Tasks	Frequency	Responsibility
Stabilise and mow contributing and adjacent areas.	As required	Site Maintenance Contractor
Removal of weeds (ideally through non-spray techniques e.g. glyphosate application).	As required	Site Maintenance Contractor
Remedial Work	Frequency	Responsibility
Remediate and landscaping which, through vegetation maintenance or soil slip, has been raised above pavement level (min 50mm).	As required	Site Maintenance Contractor
Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	Annually	Specialist Maintenance Contractor
Rehabilitation of surface and upper structure by remedial suction sweeping.	Every 10-15 years or as required.	Specialist Maintenance Contractor
Initial inspection.	Monthly for three months after construction.	Site Maintenance Contractor
Inspect for evidence of poor operations and/or weed growth.	Three monthly, 48hrs after large storms and in the first six months.	Site Maintenance Contractor
Inspect silt accumulation rates (use to define brushing frequency).	Annually	Specialist Maintenance Contractor
Monitor the effectiveness of areas of permeable paving, where water pools and does not infiltrate immediately advise Client of any remedial action required.	Annually	Specialist Maintenance Contractor

Monitor inspection chambers.	Annually	Site Maintenance Contractor
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Table 9.5 Bioretention Maintenance Tasks

Regular Inspection	Frequency	Responsibility
Inspection infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Every 3 months	Site Maintenance Contractor
Check operation of underdrains by inspection of flows after rain	Annually	Site Maintenance Contractor
Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Every 3 months	Site Maintenance Contractor
Inspect inlets and outlets for blockage	Every 3 months	Site Maintenance Contractor
Regular Maintenance	Frequency	Responsibility
Remove litter and surface debris and weeds	Every 3 months	Site Maintenance Contractor
Cut grass – to retain grass height within specified design range	Monthly (during growing season). Or as required	Site Maintenance Contractor
Manage other vegetation and remove nuisance plants	Monthly at start, then as required	Site Maintenance Contractor
Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly	Site Maintenance Contractor
Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for >48 hours	Monthly, or when required	Site Maintenance Contractor
Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly	Site Maintenance Contractor
Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly	Site Maintenance Contractor
Occasional Tasks	Frequency	Responsibility
Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale	Site Maintenance Contractor

	treatment area	
Remedial Work	Frequency	Responsibility
Repair erosion or other damage by re-turfing or reseeding	As required	Site Maintenance Contractor
Relevel uneven surfaces and reinstate design levels	As required	Site Maintenance Contractor
Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required	Site Maintenance Contractor
Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required	Site Maintenance Contractor
Remove and dispose of oils or petrol residues using safe standard practices.	As required	Site Maintenance Contractor
Clear perforated pipework of blockages	As required	Site Maintenance Contractor

Table 9.6 Attenuation Storage Tank Maintenance Tasks

Regular Maintenance	Frequency	Responsibility
Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually	Site Maintenance Contractor
Remove debris from the catchment surface (where it may cause risk to performance)	Monthly	Site Maintenance Contractor
For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually	Site Maintenance Contractor
Remove sediment from pre-treatment structures and/or internal forebays	Annually or as required	Site Maintenance Contractor
Remedial Actions	Frequency	Responsibility
Repair/rehabilitate inlets, outlets, overflows and vents	As required	Site Maintenance Contractor
Monitoring	Frequency	Responsibility
Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually	Site Maintenance Contractor

9.3. Additional Maintenance Recommendations

The above is not an exhaustive list and is a guide on the minimum expected inspection to be undertaken on the below ground drainage and sustainable drainage features. Additional or more frequent inspections can be undertaken to ensure the below ground drainage network operates appropriately and is maintained to a level suitable to accommodate the peak design flows.

For all attenuation systems, proprietary treatment systems, and backflow prevention devices the above maintenance plan is to be read in conjunction with any specific inspection and maintenance requirements set by product manufacturers.

Further specific maintenance guidance for SuDS features to enable continuous operational performance is available in the CIRIA SuDS Manual (C753).

In addition to the regular, occasional and remedial maintenance tasks the following site and special circumstances shall be considered, including:

- Special inspection and immediate appraisal may be required in the event of a structural accident, fire, flooding, reported structural distress or suspected inadequacy.
- It is recommended that in situations where an expected severe storm is to hit that all gullies, drainage channels and manhole sumps are cleared of any debris material.
- Refer to the manufactures of all attenuation & rainwater harvesting systems and flow control devices for their specific inspection regime requirements for their products.

All inspections should be carried out by the appropriate persons and they should be confined space trained if entering below ground structures such as manholes or attenuation tanks.

10. Conclusion

This drainage impact assessment has been prepared in accordance with best practice and in consideration of the submitted FRA undertaken by RMA Environmental in support of planning submission to The London Borough of Southwark. This strategy demonstrates that the proposed drainage strategy is in accordance with the national and local planning guidance.

Assessments of the existing site have indicated that the current drainage discharges to the Thames Water combined sewers on Rye Lane, Mckerrell Road and Peckham High Street. Soakaway tests have been requested to confirm whether infiltrating surface water into the ground is feasible as a secondary method of surface water management, however due to the size of the site and available space, discharge to the combined sewer is proposed to be the primary method of surface water discharge. It is therefore proposed to re-use the existing outfalls connecting to Thames Water trunk sewers on Rye Lane and Peckham High Street.

In line with the London Plan and London Borough of Southwark policies, the Proposed Development will restrict surface water runoff to a greenfield QBAR calculated at 6.3 l/s for the sitewide area.

The site will be constructed in two phases. Due to sequencing, a temporary connection to Peckham High Street north-east connection will be made and proposes to drain any Phase 2 catchment area to existing discharge rates. All of the Phase 1 catchment area will be restricted to 30 l/s. The combined discharge rates of the existing Phase 2 and new Phase 1 catchment will not exceed the estimated existing pipe discharge rates. Following Phase 2 construction the drainage for the whole site will be restricted to greenfield run-off.

Surface water storage systems are proposed across the site to help restrict surface water discharge to greenfield runoff rate. Use of blue/green roofs are maximised where possible to manage surface water run-off at source. External surfaces will be designed to direct surface water runoff to raingardens and bioretention areas where possible and tanked permeable paving will be implemented across the site. Additional below ground geocellular storage crates will be provided to further manage the peak discharge rate to greenfield runoff. A total estimated volume of 3880m³ of stormwater attenuation will be required to manage surface runoff to greenfield rates.

Exceedance routes have been considered to manage flows through the site and mitigate risk to person and property.

Foul water drainage will discharge via gravity to the local combined sewer outfalls within the site boundary. Foul water from basement level will be pumped to high level and discharge via gravity to the private drainage system. Thames Water have confirmed that there is sufficient capacity for foul water within the local sewer network for the Proposed Development.

Appendix A Existing Topographical and Utility Surveys



SERVICE ABBREVIATIONS

(AC)	Assumed Connection	HV	High Voltage
(AC)	Assumed Tests	Inv	Insert Level
BR	Break Over Limit	LV	Low Voltage
CBL	Cable Loss	(NF)	No further information
D	Depth of service (pipes)	D	Depth to base of pipe
DE	Depth to top of dirt	(R)	From Records
D1	Discussing Item	(S)	Service cable
JH	Gravel Duct	SD	Service Depth
ERL	Electric Effect	SV	Static Voltage
FL	Free-Run Alert	(UPC)	Under Pinned Core
FR	Free Pathway	U	Unable to find any damage
GPR	Gas Pipe Finder	(UT)	Unable to Trace
GV	Gas Valve	WD	Wet Duct
HAB	Habit Box		

Electro-detection techniques have been used in the location of underground services. The results are not infallible and trial excavations must be carried out to confirm service identification, position and particularly depths.

Although at reasonable effort has been made in searching available record drawings the completeness of the underground services information cannot be guaranteed.

Unless otherwise stated, drainage pipes are 100mm diameter.

LEGEND

	Star/step arrows point up
	Sloping ceiling arrows point up
	Roof arrows point down
	Assumed detail

This drawing has been produced for the purpose of the original commissioning agent. Ploverman Craven Limited will accept no responsibility for details that are subsequently found to be the consequence of undisclosed facts or that were obscured from view at the time of survey or that have been altered since the survey.

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ISSUES & REVISIONS			
Issue	Details	By	Date
A	Original Issue	PCL	18/01/17
B	Underground Services Added	KAS	23/01/17

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