whitby wood

4-8 Sedgemere Road

Drainage Strategy Report

Abbey Wood Sedgemere Limited

Date: 29/07/2025

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1 INTRODUCTION

This Drainage Strategy Report (DSR) has been prepared in accordance with National Planning Policy Framework (NPPF) in support of the detailed planning being submitted by Abbey Wood Sedgemere Limited ('the Applicant'). The application will be submitted to the London Borough of Bexley ('LBB') for the proposed development at 4-8 Sedgemere Road, Abbey Wood, London, SE2 9SW ('the Site'). This report has been undertaken to ascertain the constraint of flooding in order to redevelop the site and allow the introduction of Sustainable Urban Drainage Systems (SuDS) to act as the key aspect of flood mitigation.

1.1 Sources of Information

A review of the relevant information from a range of sources has been undertaken and includes the following:

- Ministry of Housing Communities & Local Government, National Planning Policy Framework (NPPF) (2024);
- Bexley Council, Local Plan (2023);
- Bexley Council, Strategic Flood Risk Assessment (2020);
- The London Plan (2021);
- British Geology Survey [Accessed February 2024];
- Greenhatch Group GPR survey (2023);
- Thames Water Drainage and Water Enquiry (December 2023);
- CIRIA, The SuDs Manual (2016);
- Building Regulations Part H;
- Design and Construction Guidance (DCG) – Sewerage Sector Guidance (for adopted connections);
- BS EN12056-2:2000, Gravity drainage systems inside buildings (2010);
- BS EN 752:2017, Drainage & Sewer Systems Outside Buildings; and
- Whitby Wood 4-8 Sedgemere Road Flood Risk Assessment (2024).

1.2 Site Location

The Site falls within the Abbey Wood and South Thamesmead Opportunity Area, identified for significant housing and job creation within the London Plan.

The Site extends to approximately 0.272 hectares (ha). The Site is located in the Thamesmead East ward.

The Site is bordered by Harrow Manorway to the west, Overton Road, a BP Garage to the north and Sedgemere Road to the east. To the southern boundary there are a collection of trees and residential buildings, further beyond is the Station Car Park.

The area to the east of the Site is made up of predominantly residential buildings, to the west is a mixture of residential, office, a supermarket and Abbey Wood Station.

The Site is currently being used as a trade counter, car repair garage, workshop and ancillary storage space. The Site is accessed from Sedgemere Road and currently fenced off from Harrow Manorway. The Site is largely level but the Harrow Manorway to the west does begin to incline significantly in front of the Site giving

the appearance of the site being sunken. There is an existing footpath between the Site and the wall of the road.

A site location plan has been included in Figure 1, which can also be found in **Appendix A**.

FIGURE 1 - SITE LOCATION PLAN

1.3 Existing Drainage

An initial measured survey has been conducted to establish the scope of the existing drainage on site, as shown in **Appendix B.** This has confirmed that the existing on-site foul and surface water drainage currently discharge unrestricted to the 150mm diameter foul network within Sedgemere Road.

A Thames Water Asset Map has been obtained and indicates that there are foul networks located within both Harrow Manorway and Sedgemere Road. However, the asset mapping shows that public surface water systems are discharging directly to these networks and as such indicating it receives combined flows, as shown in **Appendix C**.

At a later stage, a diversion or abandonment application will be made to ensure that all Thames Water assets onsite are not being impeded or obstructed by the proposed development. Furthermore, a detailed CCTV survey will be conducted to determine the onsite drainage networks and existing connections to the Thames Water sewer system.

1.4 Geology and Hydrogeology

Information published by the BGS indicates that the site is directly underlain by Alluvium (clay, silt, sand and peat) superficial deposits, overlying the Thanet Formation (sand) bedrock as shown in Figure 2.

Made Ground is not mapped across the site or wider area however given the developed nature of the site it is likely to be present at varying thicknesses. BGS historical borehole logs in the southwest of the site (ref: TQ47NE/157) from February 1970 indicates Made Ground of very sandy clay with some stone ash down to 0.60m below ground level (bgl), overlying Alluvium comprising soft brown silty clay to 3.90m bgl, with black peat to 7.00m bgl with brown sand and gravel deposits (likely River Terrace Deposits) to 13.70m bgl. The Thanet Formation recorded as a grey silty fine sand was recorded to a depth of 19.65m bgl with Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation beneath.

The site is not indicated to be within a source protection zone.

FIGURE 2 – BRITISH GEOLOGY SURVEY MAP

1.5 Proposed development

The demolition of the existing commercial buildings and phased redevelopment for residential use (Use Class C3) and ancillary amenity, including basement, ground floor non-residential unit (Use Class E(a), E(b), E(c), E(c)i, E(c)ii, E(c)iii, E(e), E(g)i, E(g)ii, F2(b), boundary treatment, soft and hard landscaping, public realm improvements, highways works, cycle and car parking infrastructure and associated works.

2 DRAINAGE DESIGN POLICIES

The following design guidance will need to be adhered to for the proposed foul and surface water drainage system that will serve the site.

- Building Regulations Part H;
- National Planning Policy Framework (NPPF);
- Design and Construction Guidance (DCG) – Sewerage Sector Guidance (for adopted connections);
- BS EN 752:2017, Drainage & Sewer Systems Outside Buildings; and
- BS EN 12056-1:2000, Gravity Drainage Inside Buildings.

2.1 Overall Site Drainage Requirements

There are a range of requirements which the proposed drainage system is expected to meet. These have been set out by various guidance documents and stakeholders. The main requirements from each guidance document or stakeholder have been set out in Table 1 below.

TABLE 1 - REQUIREMENTS FOR THE PROPOSED DRAINAGE SYSTEM

Source/Stakeholder	Requirements
DEFRA Non-statutory technical standards for sustainable drainage systems	• Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (i below) and volume control technical standards (ii below) need not apply. i) For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100-year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event. ii) Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event. • The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event. • The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement); or in

	any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development. • The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.
Design and Construction Guidance – Sewerage Sector Guidance Appendix C (2020)	• Where a component is designed to convey or store flows in excess of the 1 in 30-year return period event, the designer should demonstrate that the upstream system (including any inlets such as gullies or pervious paving) has the capacity to allow the flows to reach the component. • Where an overland flow route is used, it should not be designed to operate more frequently than in a 1 in 30-year return period design rainfall event. • Design foul water peak flow rates should be 4000L per dwelling per day.
Building Regulations Approved Document H	• Surface water shall discharge to one of the following listed in order of priority: a) An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable, b) A watercourse; or where that is not reasonably practicable, c) A sewer.
Sewerage Undertaker (Thames Water)	• A pre-development application is required to check the public sewer has capacity for the proposed discharge rates. At the time of writing a Thames Water pre-planning application has been submitted and waiting approval to confirm discharge rates. • A section 106 application to connect to the public sewer will need to be submitted for any new connections to the public sewer. • If the network is to be adopted, then a S104 application will need to be made in this instance. • If any existing sewers require diverting, then an application to Thames Water to divert a public sewer under section 185 will need to be made. • A section 116 application for the removal of public sewers will be required for any abandoned public sewers. • A build-over agreement is required to build over any existing assets.
London Borough of Bexley (LLFA)	• Acting as the LLFA, any guidelines and policies outlined in the local Surface Water Management Plan or Local Plan should be adhered to. • Where possible the proposed discharge rates should be discussed and approved with the LLFA as early as possible.

2.2 Planning Policy Requirements

The National Planning Policy Framework (NPPF) specifies that surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development. Opportunities to reduce the flood risk to the site itself and elsewhere, taking climate change into account, should be investigated. The drainage proposals within this strategy have been prepared to meet planning policy requirements.

2.3 London Plan

The London Plan is a framework which should be used for all developments within London. Policy SI of the London Plan 2021 is specific to flood risk management and all development proposals should adhere to; the policy has been reproduced below.

1) Current and expected flood risk from all sources (as defined in paragraph 9.2.12) across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers.
2) Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should cooperate and jointly address cross-boundary flood risk issues including with authorities outside London.
3) Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.
4) Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.
5) Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.
6) Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.
7) Natural flood management methods should be employed in development proposals due to their multiple benefits including increasing flood storage and creating recreational areas and habitat.

2.4 Local Plan

Within the LBB Local Plan are relevant sections that are associated with flood risk and drainage. These sections can be found below.

Policy DP32 Flood Risk Management

1) In areas at risk of flooding, as identified in the Bexley Strategic Flood Risk Assessment (SFRA), development proposals must:
   a) Be within a Sustainable Development Location, designated industrial location or the Thamesmead and Abbey Wood Opportunity Area if the site is within Flood Zones 2 and 3a, except for householder

development above defined flood levels, and the development type is acceptable within the flood zone, as only these locations have passed the Local Plan sequential test;

b) Apply the exception test, where required, to sites within Flood Zones 2 and 3a that have met the requirements of part 1a;

c) Comply with the guidance and recommendations set out in the Bexley SFRA Level 1 and Level 2;

d) Apply the sequential approach advocated in the NPPF to all sources of flooding, not just tidal and fluvial;

e) Be used as an opportunity to reduce the causes and impact of flooding;

f) Make as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and,

g) Provide floodplain storage capacity as close to the development as possible, where the proposed development will reduce this capacity.

2) Habitable rooms in residential development within the fluvial flood zones, should be set 300mm above the predicted 1 in 100 year plus climate change peak flood water level, and within the tidal flood zones, should be set at the predicted 1 in 200 year annual probability.

3) Development in areas designated as Functional Floodplain (as identified in the SFRA Level 1 and the Policies Map) will not be permitted outside of water-compatible development, as defined in the NPPF.

4) All proposals for development in Flood Zones 2 and 3, and all proposals on sites of 0.25 hectares or larger regardless of what flood zone the site is in, must include a site-specific flood risk assessment (FRA), including a drainage impact assessment.

5) New developments in riverside locations are required to help reduce flood risk now and into the future.

6) Development proposals located within 100 metres of the Thames tidal flood defences should demonstrate consideration of and act on the recommendations of the TE2100 Plan and be designed in such a way as to easily facilitate the raising and re-engineering of the tidal flood defences.

7) Basements will not be permitted in Flood Zones 2 or 3.

8) Development must not increase flood risk on-site or off-site, and exceedance flows must be considered and appropriately managed.

9) All basement developments should include, within their proposal, protection to the property by installing, for example, a non-return valve or other suitable device to avoid the risk of backflow at a later date, on the assumption that the sewerage network may surcharge to ground level during storm conditions.

10) New developments below the predicted flood water level should include a detailed evacuation plan that clearly outlines how people can easily leave to safety or move upwards from the lower floors to safety.

11) Site design in floodplains must facilitate safe escape, access and egress. Only in exceptional circumstances where this cannot be demonstrated should the emergency plan be to reside in situ and escape upwards in a building.

12) All development that is intended to be occupied below the predicted flood water level must provide internal safe refuge above the design flood level.

Policy DP33 Sustainable drainage systems

1) All development proposals, whether increasing or decreasing the impermeable area of the site, will be required to manage surface water through sustainable drainage systems (SuDS) in line with all national, regional and local policies and related guidance, in order to minimise flood risk, improve water quality and enhance biodiversity and amenity.
2) In addition, all development proposals will be required to demonstrate that:
    a) The drainage for the site achieves greenfield runoff rates for flood events up to and including 1 in 100 years plus 40% climate change;
    b) Surface water run-off has been reduced by sustainably managing run-off on site;
    c) Permeable paving has been used for hardstanding areas (e.g. car parks);
    d) The nature of water flow (both surface water and groundwater) across a steeply sloping site has been considered in order to provide suitable SuDS; and,
    e) water reuse mechanisms have been included for either indoor or outdoor purposes.
3) Development proposals on sites of 0.25 hectares or greater require a drainage strategy, which must be accompanied by a suitable maintenance management plan.

3 SURFACE WATER MANAGEMENT

3.1 Greenfield Runoff Rates and Volumes

Greenfield runoff rates have been calculated using FEH-22 method and a 6-hour rainfall event, these can be found in **Appendix D**. The table below shows the greenfield runoff rates for the whole site and factored to provide a runoff rate per hectare. The table also illustrates the current discharge rates based on existing site conditions. The existing discharge rates have been calculated using the Modified Rational Method. A percentage of impermeable area (PIMP) of 100% and a time of concentration of 5 minutes were assumed. A runoff coefficient of 1 has been used as the existing site is almost entirely impermeable.

TABLE 2 - GREENFIELD RUNOFF AND EXISTING DISCHARGE RATES

Return Period	Greenfield runoff rates		Existing Discharge Rates (l/s)
	Drained Area [0.272 ha] (l/s)	Per hectare (l/s/ha)	
QBAR	0.2	0.74	-
1-year	-	-	53.8
2-year	0.2	0.74	69.1
30-year	0.6	2.21	127.1
100-year	0.8	2.94	161.1

3.2 Proposed Discharge Rates

As shown in the table above, the existing discharge rates for the site area have been calculated for the specified return periods. The proposed development should aim to achieve discharge rates as close to greenfield as possible. A discharge rate of 1 l/s will be the proposed discharge rate for surface water which is greater than a 98% betterment from the existing 1-year discharge rate, while maintaining a self-cleansing velocity.

These rates have been coordinated with Thames Water through a pre-planning enquiry, and they have confirmed capacity within the public network as shown in **Appendix E**.

3.3 Storage Requirements

It is proposed that surface water is discharged at 1 l/s. The hydraulic calculations have been provided within **Appendix F**. The output estimates that between 279-324 m^3 of attenuation will be required. This is based on no flooding of the network or site up to and including the 1 in 100-year storm event plus a 40% allowance for climate change. The storage requirements are subject to change upon development of the design and impermeable areas. The attenuation proposals are presented in more detail in section 4 of the report.

3.4 Delivering a SuDS Scheme

The philosophy of SuDS is about maximising the benefits and minimising the negative impacts of surface water runoff from developed areas. The 'four pillars' of SuDS design as described by the SuDS Manual are;

- Water Quantity;
- Water Quality;
- Amenity; and

- Biodiversity.

SuDS deliver high quality drainage while supporting areas to cope better with severe rainfall both now and in the future. SuDS can improve the quality of life in developments by making them more vibrant, visually attractive, sustainable and more resilient to change, by improving urban air quality, regulating building temperatures, reducing noise and delivering recreation and education opportunities.

SuDS design should maximise the use of the available space by delivering efficient drainage together with other functions to help meet the objectives of the site. The SuDS design should, as much as possible, be based around the following;

- Using surface water runoff as a resource;
- Managing rainwater close to where it falls;
- Managing runoff on the surface;
- Allowing rainfall to soak into the ground;
- Promoting evapotranspiration;
- Slowing and storing runoff to mimic natural runoff characteristics;
- Reducing contamination of runoff through pollution prevention and controlling the runoff at source; and
- Treating runoff to reduce the risk of urban contaminants causing environmental pollution.

Any proposed development on the site has the potential to maximise SuDS and conform to SuDS best practice. Ultimately a well designed and constructed SuDS scheme will provide a robust and reliable surface water drainage network, whilst providing increased amenity and biodiversity.

3.4.1 SuDS Component Performance

The effectiveness of SuDS components in improving development surface water run-off quality is summarised in the table below. Combinations of treatments can be used to reduce potential pollutants from reaching the receiving course.

TABLE 3 - SUDS TREATMENT TRAIN

SuDS Component	Interception	Peak flow control: Low	Peak flow control: High	Volume reduction	Volume control	Gross sediments	Fine sediments	Hydrocarbons/PAHs	Metals	Nutrients
Rainwater Harvesting	Y	Y	S	Y	N	N	N	N	N	N
Pervious Pavement	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varies
Filter Strips	Y	N	N	N	N	Y	N	Y	Y	Varies
Swales	Y	Y	S	Y (*)	N	Y	Y (+)	Y	Y	Y (-)
Trenches	Y	Y	S	Y (*)	N	N	N	Y	Y	Y (-)
Detention Basins	Y	Y	Y	N	Y	Y	Y (+)	Y	Y	Varies
Ponds	N	Y	Y	N	Y	N (~)	Y	Limited	Y	Varies
Wetlands	N	Y	S	N	Y	N (~)	Y	Limited	Y	Y
Green Roofs	Y	Y	N	N	N	N	N	Y	N	N

Bioretention Systems	Y	Y	S	Y (*)	N	N (~)	Y	Y	Y	Y
Proprietary Treatment Systems	N	N	N	N	N	Y	Y	Y (!)	Y (!)	Y (!)
Subsurface Storage	N	Y	Y	N	Y	N (~)	N	N	N	N
Subsurface Conveyance Pipes	N	N	N	N	Y	N (~)	N	N	N	N

Notes:

- S: Not normally with standard designs, but possible where space is available and designs mitigate impact of high flow rates.
- Y (*): Where infiltration is facilitated by the design.
- N (~): Gross sediment retention is possible, but not recommended due to negative maintenance and performance implications.
- Y (+): Where designs minimise the risk of fine sediment mobilisation during larger events.
- Y (!): Where designs specifically promote the trapping and breakdown of soils and PAH based constituents.
- Y (“): Where subsurface soil structure facilitates the trapping and breakdown of oils and PAH based constituents.
- Varies: The nutrient removal performance is variable, and can be negative in some situations.
- Y (~): Good nutrient removal performance where subsurface bio-filtration system with a permanently saturated zone included within the design.

3.4.2 Hydraulic Design Criteria

The below outlines the best practice criteria for hydraulic control required for interception, runoff rate control and volume control.

- Interception

To fulfil the requirements for Interception, there should normally be no runoff from the site for an initial depth of rainfall, usually 5mm. This is usually achieved through the use of infiltration, evapotranspiration, or rainwater harvesting. Introducing soft landscaping to brownfield sites will also help achieve this.

- Flow and Volume Control

Discharge rates for all storm events should be restricted to current Greenfield run-off rates or as close as is reasonably practicable.

- Attenuation and hydraulic controls will be used to manage flow rates

Rainwater harvesting, or the use of Long-Term Storage can be used to achieve runoff volume control. 275m^3 of attenuation for surface water flooding up to and including 1 in 100 + 40% climate change allowances will be provided.

- Water Quality Design Criteria

Current best practice takes a risk-based approach to managing discharges of surface runoff to the receiving environment. The following text provides guidance on the extent of water quality management likely to be appropriate for the site.

- Hazard Classification

Runoff from clean roof surfaces (i.e. not metal roofs, roofs close to polluted atmospheric discharges, or roofs close to populations of flocking birds) is classified as Low in terms of hazard status.

Runoff from roads, parking and other areas of residential, commercial and industrial sites (that are not contaminated with waste, high levels of hydrocarbons, or other chemicals) is classified as Medium in terms of hazard status.

- Treatment requirements for disposal to surface water systems

As the site is brownfield, roof runoff will require at least 1 treatment stage prior to discharge. Runoff from other parts of this site such as roads, parking and other areas will require ideally 2 treatment stages prior to discharge.

4 DRAINAGE DESIGN PROPOSALS

4.1 Surface Water

The design of a surface water drainage system to serve the new development considers both water treatment and on-site attenuation in accordance with CIRIA C753. The proposed SuDS components aim to emulate the natural drainage system of the site through attenuation of flows and imitating natural percolation where possible. This has the added benefit of alleviating water quality issues associated with urban drainage runoff.

The current proposals for the surface water drainage strategy network include blue/green roof system and a below ground attenuation tank located under the parking area alongside rain gardens and permeable paving across the site. These measures will provide a total attenuation volume of 275m^3 for all associated runoff up to and including the 100-year storm event plus a 40% allowance for climate change. The controlled discharge of rainwater will be restricted to 1 l/s. The proposed drainage strategy and hydraulic model can be found in **Appendix G**.

The existing surface water outfall location leading from the site onto Sedgemere Road will be abandoned as the drainage run extends below the footprint of the proposed building. The proposed outfall will be a gravity connection into Thames Water manhole 3201 in Harrow Manorway, which is a 950mm diameter network at the point of connection. The Thames Water sewer within Harrow Manorway is a foul sewer, that has surface water flows entering it. As such, Thames Water granted connection rights as per the pre-planning consent referenced within **Appendix E**. Evidence of Surface Water flows entering the system has been obtained directly from Thames Water and shown on their Asset Records in **Appendix C**.

4.1.1 Drainage Hierarchy

The drainage hierarchy that should be considered for any new development. The following list details these requirements and which elements can be achieved for this site. Where possible elements as high up the hierarchy have been selected:

- Rainwater use as a resource (for example rainwater harvesting, green roofs for irrigation);
    - This is the current strategy with the incorporation of a rainwater butts, a green roof and rain garden features.
- Rainwater infiltration to ground at or close to source;
    - Infiltration is not currently deemed feasible due to the presence of London Clay, high groundwater levels and spatial constraints not allowing for 5 meters between the building and an infiltration structure.
- Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens);
    - This is the current strategy with rain garden features at ground floor level and green roof elements on the roof.
- Attenuate rainwater by storing in tanks or sealed water features for gradual release;

- This is the current strategy with a below ground attenuation tank, blue roofs, permeable paving and rain gardens being utilised in the external area providing a total attenuation volume of 275m³.

- Discharge rainwater direct to a watercourse;
  - This is deemed unfeasible due to the requirement of excavation across third party land to the nearest watercourse.
- Discharge rainwater to a surface water sewer/drain;
  - There are no local Thames Water surface water sewers within close proximity to The Site. The closest Thames Water sewer with capacity is 250 meters away and would involve extensive dig through highway land and include an adoptable pumping station with a minimum discharge rate of 5l/s.
- Discharge rainwater to the combined sewer;
  - This is the proposed strategy to connect to the existing Thames Water sewer within Harrow Manorway, which as confirmed by the asset mapping has surface and foul water flows entering the system.

4.1.2 Water Cycle

The water cycle strategy puts emphasis on four key areas of interest:

- Consumption;
- Quality;
- Re-use; and
- Re-cycle.

Rainwater will be heavily treated through its discharge process by passing through the green roofs and rain gardens. Planting will help remove sediments and pollutants from the runoff.

4.2 Foul Water

Foul wastewater is to increase from the existing development due to the increase in number of units and change in building use. Foul water design flow rates have been calculated at this time using 0.05 litres per second per dwelling, with a peak flow of 9.85l/s. The proposed foul water connection is into the Thames Water sewer in Harrow Manorway. Further coordination is required with the MEP engineers at the next design stage in relation to the foul water layout and discharge rates. A pre-planning enquiry has been submitted, and Thames Water have confirmed capacity consent.

4.3 Internal Drainage

Foul water stacks and rainwater pipes dropping below slab level internal to the building will be picked up by inspection chambers situated outside the building. Where this is not possible, due to site constraints and building foundations, inspection chambers may need to be positioned internally. In this instance, the chambers will be double sealed and situated within areas that are publicly accessible to ensure the system can be inspected or accessed at all times. Any internal chambers will be positioned at the next design stage once a set of frozen MEP drawings are available.

5 ADOPTION AND MAINTENANCE

It is assumed that drainage on site will not be adopted by Thames Water. However, where applicable, drainage will be designed to adoptable standards set out by the Design and Construction Guidance; Sewerage Sector Guidance Appendix C.

5.1 Typical SuDS Maintenance Schedule

The CIRIA SuDS manual has been reviewed and the operation and maintenance guidance for different surface water systems has been extracted and is provided in the following tables.

5.1.1 Blue and Green Roofs

A blue roof is a roof design that is explicitly intended to store water. This storage can be designed as attenuation storage (with water released in a controlled manner), as storage for use such as irrigation (potentially of adjacent green roof areas), cooling water (for use in reducing the temperature of the roof on hot days, or for internal cooling plant) or non-potable use within the building, and/or for recreational opportunities. Blue roofs can include open water surfaces, storage within or beneath a porous medium or modular surface, or below a raised decking surface or impermeable cover. A green roof is a roof design with a layer of living vegetation or planting to provide a range of benefits such as improving thermal performance, visual benefit, and ecological value. It is possible to combine a blue and green roof by having a layer of storage sat beneath the vegetation which maximises benefits, however for this site, only green roofs are proposed. The table below has been extracted from table 12.5 - operation and maintenance requirements for green roofs from the SuDS Manual.

TABLE 4 - MAINTENANCE REQUIREMENTS FOR GREEN/BLUE ROOFS

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	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
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or a required
	During establishment (i.e. year one), replace dead plant as required	Monthly (but usually responsibility of manufacturer)

	Post establishment, replace dead plants as required (where>5% coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation including weeds	Six monthly or as required
	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
Remedial Actions	If erosion channels are evident, these should be established with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlets has settled, cracked, or moved, investigate and repair as appropriate	As required

5.1.2 Attenuation Tank

Attenuation storage tanks are used to create a below-ground void space for the temporary storage of surface water before infiltration, controlled release or use. The table below is extracted from table 21.3 of the SuDS manual and provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive, and some actions may not always be required.

TABLE 5 - MAINTENANCE REQUIREMENTS FOR ATTENUATION STORAGE TANKS

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface water or filter for blockage by sediment, algae, or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and / internal forebays.	Annually, or as required.
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually.
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

5.1.3 Permeable Paving

Permeable paving can be in the form of either porous paving, which allows water to filter though the block itself, or paving blocks with gaps between that allow water to filter between blocks. The former is preferred as a greater area of the paving is porous. Water can then be stored in the sub-base and either allowed to infiltrate into the ground if possible or collected by a perforated pipe and drained into the system. To preserve the infiltration capacity of pervious paving, regular inspection is important for the effective operation of pervious pavements. Table 6 has been extracted from table 20.15 of the CIRIA C753 SuDS manual.

TABLE 6 - MAINTENANCE REQUIREMENTS FOR PERMEABLE PAVING

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or Reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the paving	As required
	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	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/ or weed growth – if required take remedial action	Three-monthly, 48 h after large storms in first six months

	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

5.1.4 Pipework

In addition to the above pipework should usually be jetted and cleaned as and when blockages appear to have occurred. Pipes should be checked for build-up of debris and other waste that could cause blockages or damage to the pipework. Occasional maintenance should be carried out annually or as required.

5.1.5 Flow Controls

Maintenance is required within the Flow Control. Experience has shown that if blockages occur, they do so at the intake. Maintenance for the pumping station should be in alignment to manufacturers recommendations. It is recommended that a service and maintenance contract is taken out with the provider.

Following the installation of the Flow Control it is vitally important that any extraneous material i.e. building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced contact the manufacturer so that an investigation may be made.

All Flow Control units are typically manufactured from grade 304 Stainless Steel, and if required they can also be manufactured in grade 316 Stainless Steel. Both materials have an estimated life span in excess of the design life of drainage systems.

5.1.6 Timetable

Maintenance should be carried out and timetabled from the date of installation. Each SuDS feature and component has a recommended and typical frequency for inspection which should be adhered to as close as practically possible. Where not adopted, the landowner or private management company are responsible for its implementation.

6 RISKS AND UNCERTAINTIES

The following outlines the current uncertainties and associated risks for aspects related to drainage for this development.

- **MEP coordination** – The proposed drainage layout is subject to change upon receipt of a proposed above ground drainage plan from the appointed MEP engineer. Any amendments made to the above ground drainage design is likely to cause subsequent changes to the below ground drainage design.
- **External Levels** - At this stage of the project, the external level designs haven't been coordinated. For the purpose of this drainage strategy, the existing topography levels have been used. At the next stage more detailed analysis will be undertaken to ensure threshold and channel drains are appropriately placed to deal with exceedance flow paths during storm events.
- **Thames Water Assets** – Existing public assets are currently located on site. A further survey will be conducted to confirm their location and if any diversion/abandonment applications are required.

7 GREATER LONDON AUTHORITY COMMENTS

The table below provides a summary of the responses to the comments provided by the GLA on the 14/07/25, relating to the proposed drainage strategy for The Site.

TABLE 7 – GLA DRAINAGE STRATEGY EVIDENCE

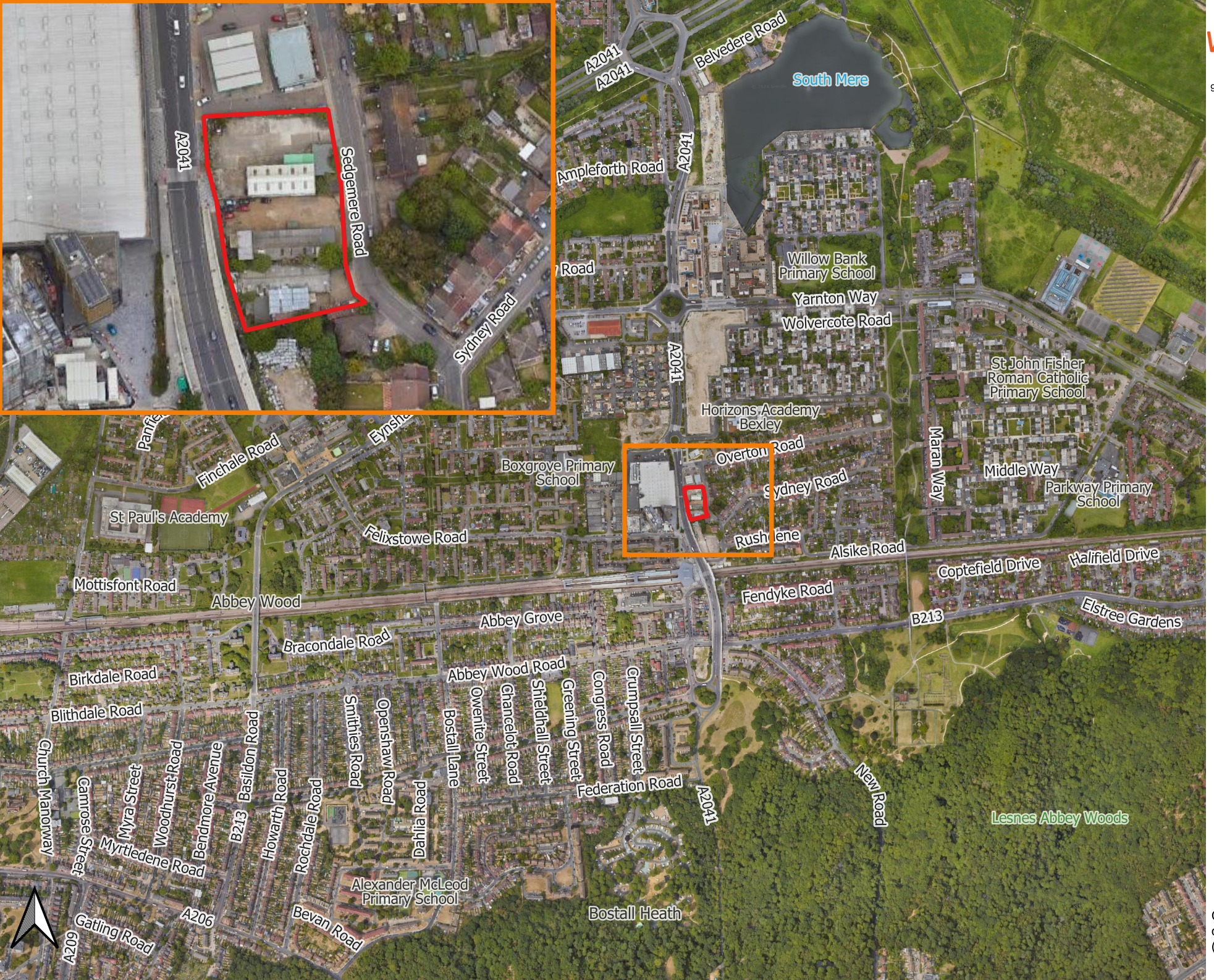
GLA Comment	Whitby Wood Evidence
Updated drainage strategy and supporting calculations to show that the drainage measures can achieve the total 1 l/s discharge rate stated by Thames Water.	The updated drainage strategy drawings and associated calculations have been provided within **Appendix G**. This confirms that the discharge rate has been reduced to 1l/s and quantity of attenuation increased to 275m^3.
Confirmation of existing and proposed sewer invert levels to show that a gravity connection can be achieved to the Thames Water 950 dia sewer.	Confirmation of the existing levels of the Thames Water sewer within Harrow Manorway have been provided within the Asset Mapping included within **Appendix C**. The proposed drainage strategy has been included within **Appendix G**, which confirms a gravity connection is achievable.
Confirmation from Thames Water that the 950 dia sewer is a combined sewer. Please continue to follow up with Thames Water directly in relation to this.	The Thames Water sewer is a foul sewer, that has surface water flows entering it. As such, Thames Water granted connection rights as per the pre-planning consent (DS-6119937) included within **Appendix E.** Evidence of Surface Water flows entering the system has been obtained directly from Thames Water and shown on their Asset Records in **Appendix C**.
Evidence that the site previously connected to the 950 dia sewer. A CCTV survey is referred to in the technical note but not provided. If the site previously connected into the 150dia sewer in Sedgemere Road, please provide evidence that this ultimately connects to the 950 dia sewer in Harrow Manorway.	The CCTV Survey has now been provided in **Appendix B**. This shows a surface water outfall to the east towards the Thames Water foul sewer in Sedgemere Road. Due to the sewer being 150mm in diameter and minimal capacity we have followed the same regime and connected into the larger foul sewer in Harrow Manorway. It is believed that the Thames Water foul sewer located within Sedgemere Road discharges to Harrow Manorway as no other public foul assets are located downstream of this drainage run as shown in **Appendix C**.

8 CONCLUSIONS AND RECOMMENDATIONS

The main conclusions from this drainage strategy report are detailed below.

- The current proposals for the surface water network includes the use of rainwater butts, blue/green roofs, rain garden features, permeable paving and an attenuation tank to attenuate all associated runoff up to the 100-year event plus an allowance of 40% for climate change.
- It is proposed that the surface water is to discharge at a rate of 1 l/s, achieving a betterment of more than 98% from the existing 1-year discharge rate.
- Foul water is to be discharge at a rate of 9.85l/s.
- 275m^3 of attenuation will be provided within green/blue roofs, permeable paving, an attenuation tank and rain gardens.
- Surface and foul water will discharge into the existing Thames Water network via gravity within Harrow Manorway. Capacity consent has been provided by Thames Water.

Appendix A – SITE LOCATION PLAN



whitby wood

91-94 Lower Marsh, London, SE1 7AB

SEDGEMERE ROAD
ABBEY WOOD
P451519
FEBRUARY 2024

SITE LOCATION PLAN

Legend

Site Boundary

1:1,500
1:10,000

Appendix B – GPR SURVEY

N

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	547413.610	179222.132	1.070
GH2	547420.802	179172.432	0.877
GH3	547400.659	179284.588	1.423
GH4	547344.344	179269.689	1.750
GH5	547350.348	179212.701	2.056

OS Note:

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigation Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid and datum.

Some services may have been omitted due to parked vehicles.

Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Top of bank, Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge, Bottom of bank, Station and Name, Station Level, Tree / Bush / Sapling, Area of Undergrowth, Woodland, R: Ridge Level, E: Eaves Level, F: Flat Roof Level, Gate

Fence types: IW Interwoven, IR Iron Railings, WM Wire Mesh, P/R Post & Rail, P/W Post & Wire, CL Chain Link, WP Wooden Panels, CB Close Boarded, S/P Steel Palisade

CVR	Cover (generic)	D/Duct	Drainage duct		
IC	Inspection chamber	Bo	Bollard		
PInv	Pipe invert	IB	Illuminated bollard		
Gy	Gully	Bin	Rubbish bin		
Bg	Back gully	Vp	Vent pipe		
Dp	Down pipe	Grl	Ground light		
Pipe	Pipe above ground	Lbox	Letter box		
MH	Manhole	Stmp	Tree Stump		
WL	Water level	Sty	Stile		
Fl	Flood light	IFL	Internal floor level		
Lp	Lamp post	THL	Threshold level		
Tp	Telegraph post	Sp	Sign post		
Ep	Electricity post	TH	Triahole		
Tl	Traffic light	BH	Borehole		
Bus	Bus stop	ELC	Electric		
Sv	Stop valve	BT	British Telecom		
St	Stop tap	C'box	Control box		
Er	Earth rod	TT	Tactile		
Wm	Water meter	BP	Brick paved		
Gas	Gas valve	CPS	Concrete paving slabs		
Av	Air valve	CVR	Cover		
ICU	Unidentified inspection	R/wall	Retaining wall		
Wo	Wash out	TWL	Top of Wall Level		
Re	Rodding eye	TCL	Tree canopy level		
BB	Belisha beacon	G:	Girth		
CTV	Cable tv	MG	Multi girth		
Mkr	Marker post	IC	Inspection chamber		
Gmkr	Gas marker post	CL:	Cover level		
So	Soffit	IL:	Invert level		
Fh	Fire hydrant	UTR	Unable to raise		

Rev	Date	Description	Drawn	Q. Ref.

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- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

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CLIENT
Abbey Wood Sedgemere Ltd

PROJECT
Abbey Wood
London
SE2 9SW

TITLE
Topographical Survey

SCALE	DATE SURVEYED
A1@ 1: 200	25.09.23
DRAWN: JK2	QUALITY REF: GH18454

Level datum	See note
Grid orientation	See note
Job number	48563
Drawing No.	48563_T
Rev.	0

Comments
This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Contruction works at time of survey

A2041

HARROW MANORWAY

SEDGEMERE ROAD

BUS STOP

Outfall A/G

Petrol Station Canopy extent

Concrete block wall

Barrier ht 0.6m.

Broken concrete

Concrete (dense vegetation)

Stacked containers

Dense vegetation

Tarmac

Concrete

Grass

Decking

Container

Duct

Brick wall

Pipes Vp

Gas SL0.05d UTT-N/S

63 PE TFR GAS(B4)

Ø100 S/C

Ø100 HL S/S

Ø150 OSA

Ø100 HLB

Ø100 HLA

0.65d

0.70d

0.10d

0.40d

0.35d

0.30d

0.45d

0.55d

0.50d

0.25d

0.15d

BL0.68d UTT-N/S

BL0.38d UTT-N/S

ToV0.23d BL0.32d UTT-N/S

HLA1.45 HLB1.20 SL1.41 NVE

IL0.10 HL0.66

IL0.04 BD0.73 HL0.80

NVE Flooded

NVE Silted

UTT-N/S

UTT Parked On

UTT Broken

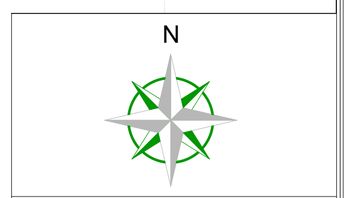
UTT Dense Vegetation

UTT No Access

UTT No Signal

179280N
179260N
179240N
179220N
179200N
179180N
179160N
179140N
179120N

547340E
547360E
547380E
547400E
547420E



NOTES

In all cases please call the BT Dial before you dig service to mark their own plant before any site works commence
0800 917 3863
Always consult utility plans

1. *Drainage Information provided has been determined without man entry into the chambers. Whilst every effort has been made to correctly identify the duty/pipes/chamber detail, it is recommended that this information should be checked in areas that are critical to the future proposal/development.*
2. *All sewer runs are presumed to be straight line connections between chambers unless proven otherwise by the use of a scope or CCTV survey.*
3. *All desktop information should be treated as historical as the buried assets present might have changed since the drawing/record was last updated.*
4. *Poor GPR results due to reinforced concrete thoughout the survey area.*
5. *Unable to raise covers within the middle compound due to multiple parked vehicles.*

UTILITY LINETYPES

Air Line AIR
British Telecom BT
British Telecom Overhead OHT
CCTV / Cable Television
Communication Cable COM
Drainage - Combined Water
Drainage - Foul Water
Drainage - Storm Water
Drainage - Unknown Water
Drainage - Trade Effluent Water
Drainage - Combined Water - Assumed/TYE
Drainage - Foul Water - Assumed/TYE
Drainage - Storm Water - Assumed/TYE
Drainage - Unknown Water - Assumed/TYE
Drainage - Trade Effluent Water - Assumed/TYE
Drainage - Approximate Pipe Size/Events
Earth Cable
Empty Duct ED
Electric & Comms E&C
Electric Low Voltage LV
Electric High Voltage HV
Electric / Unknown Voltage EV
Electric Overhead OHV
Fibre Optic FO
Fuel Line FUEL
Gas Line GAS
Gauge Line PE
GPR Line GPR
Heating Pipes HTG
Offset Fills OF
Oil Pipe OIL
Rising Main RM
Telecom TEL
Traffic Light Signals TL
Trench Scar
Unknown UNK
Vapour Recovery VR
Vent Line VP
Water WTR

UTILITY SURVEY INFORMATION

Contracted Survey Area
Depth to Top of Service (m) 0.454
End of Trace / Record EOT
Head of Run INJR
Weak Signal WS
Taken From Records TFR
Off Survey Area OSA
Back Drop BD
Silt Level SL
Above Ground A/G
Unable to Locate UTL
Unable to Survey UTS
Unable to Raise (cover) UTR
Unable to Trace UTT
Unable to Survey
Chamber Extents
Assumed Route AR
Assumed Connection ACP
Sound Connection SC
Bonds Stopped S/S
No Visible Access NVA
No Visible Exit NVE
No Visible Pipes NVP
No Visible Services NVS
No Depth Indicated NDI
Base Level BL
High Level HL
Top of Pipe / Top of Valve T.o.P / T.o.V
Landing Level LL
Rubble Level RL
Approximate Location
GPR Anomaly
Multiple Services Route

LEGEND

Buildings; Wall; Kerb line; Line marking; Drop kerb; Centre line; Top of bank; Overhead Cable; Concrete edge; Tarmac edge; Grass verge; Canopy/Overhang; Verge; Bottom of bank
1 100.000 Station and Name; Station Level
Tree / Bush / Sapling; Area of Undergrowth; Woodland
R: Ridge Level; E: Eaves Level; F: Flat Roof Level; Gate
Fence types: IW Interwoven; IR Iron Railings; WM Wire Mesh; PR Post & Rail; PW Post & Wire; CL Chain Link; WP Wooden Panels; CB Close Boarded; SP Steel Palisade

IC Inspection chamber; PInv Pipe invert; Gy Gully; Bg Back gully; Dp Down pipe; Pipe Pipe above ground; MH Manhole; WL Water level; Fl Flood light; Lp Lamp post; Tp Telegraph post; Ep Electricity post; Tl Traffic light; Bus Bus stop; Sv Stop valve; St Stop tap; Er Earth rod; Wm Water meter; Gas Gas valve; Av Air valve; ICU Unidentified Inspection; Wo Wash out; Re Rodding eye; BB Bellsha beacon; CTV Cable tv; Mkr Marker post; Gmkr Gas marker post; So Soffit; Fh Fire hydrant
Bo Bollard; IB Illuminated bollard; Bin Rubbish bin; Vp Vent pipe; Grt Ground light; Lbox Letter box; Stmp Tree Stump; Sty Stile; IFL Internal floor level; THL Threshold level; Sp Sign post; TH Trialhole; BH Borehole; ELC Electric; BT British Telecom; C'box Control box; TT Tactile; BP Brick paved; CPS Concrete paving slabs; CVR Cover; R/wall Retaining wall; TWL Top of Wall Level; TCL Tree canopy level; Gi: Girth; MG Multi girth; IC: Inspection chamber; CL: Cover level; IL: Invert level; UTL Unable to locate

PAS 128 : 2022 LEVEL B SURVEY

QUALITY LEVEL	CRITERIA USED IN THE DETERMINATION OF QUALITY LEVEL	LOCATION ACCURACY
QL-D0	A UTILITY SEGMENT WHICH IS SUSPECTED TO EXIST (EITHER ON QL-C OR QL-C) BUT HAS NOT BEEN DETECTED OR RECORDED AS KNOWN AS AN ASSUMED ROUTE. (NO DETECTION POSSIBLE)	UNDEFINED
QL-B/D/E/F	HORIZONTAL LOCATION ONLY OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES USED. (EML OR GPR DETECTION WITH LIMITED CONFIDENCE IN DEPTH)	+/- 500mm HORIZONTAL LOCATE UNDEFINED VERTICAL LOCATE
QL-A/C/D/F	HORIZONTAL & VERTICAL LOCATION OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES. (EML OR GPR DETECTION WITH CONFIDENCE IN DEPTH)	+/- 250mm HORIZONTAL LOCATE +/- 40% VERTICAL LOCATE
QL-A/B/C/D/E/F	POSITION AND DEPTH OF THE UTILITY DETECTED BY MULTIPLE GEOPHYSICAL TECHNIQUES. (EML + GPR DETECTION)	+/- 100mm HORIZONTAL LOCATE +/- 15% VERTICAL LOCATE

DISCLAIMER

Whilst every effort has been taken in the preparation of this drawing, the original land marks/apparatus configuration may have been altered since the survey/drawing was produced. The user shall make further enquiries and investigations to satisfy himself as to the accuracy of this drawing and position of the apparatus. The exact positions of the apparatus should be verified by the use of suitable detection devices and safe digging practices in accordance with HSG47, further advice on the location of apparatus should be recommended by the owner. No representation is made by Greenhatch Group, its agents or servants as to the accuracy, completeness, and sufficiency or otherwise of this drawing and the position of the apparatus.
All apparatus shall be treated as live unless proved otherwise by the owner. It is the users responsibility to ensure that the information on the location of apparatus is provided to all persons (either direct labour or contractors) working in proximity to the apparatus.

Rev	Date	Description	Drawn	Q. Ref.

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Abbey Wood Sedgemere Ltd

PROJECT
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London
SE2 9SW

TITLE
Utility Survey

SCALE	DATE
A1@ 1: 200	04.10.2023
DRAWN: JB	QUALITY REF: GH18664
Level datum	
Grid orientation	
Job number	48563
Drawing No.	Rev.
48563_UG	0

Comments
This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.
All dimensions should be checked on site prior to design and construction.
Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

UTILITY LINETYPES

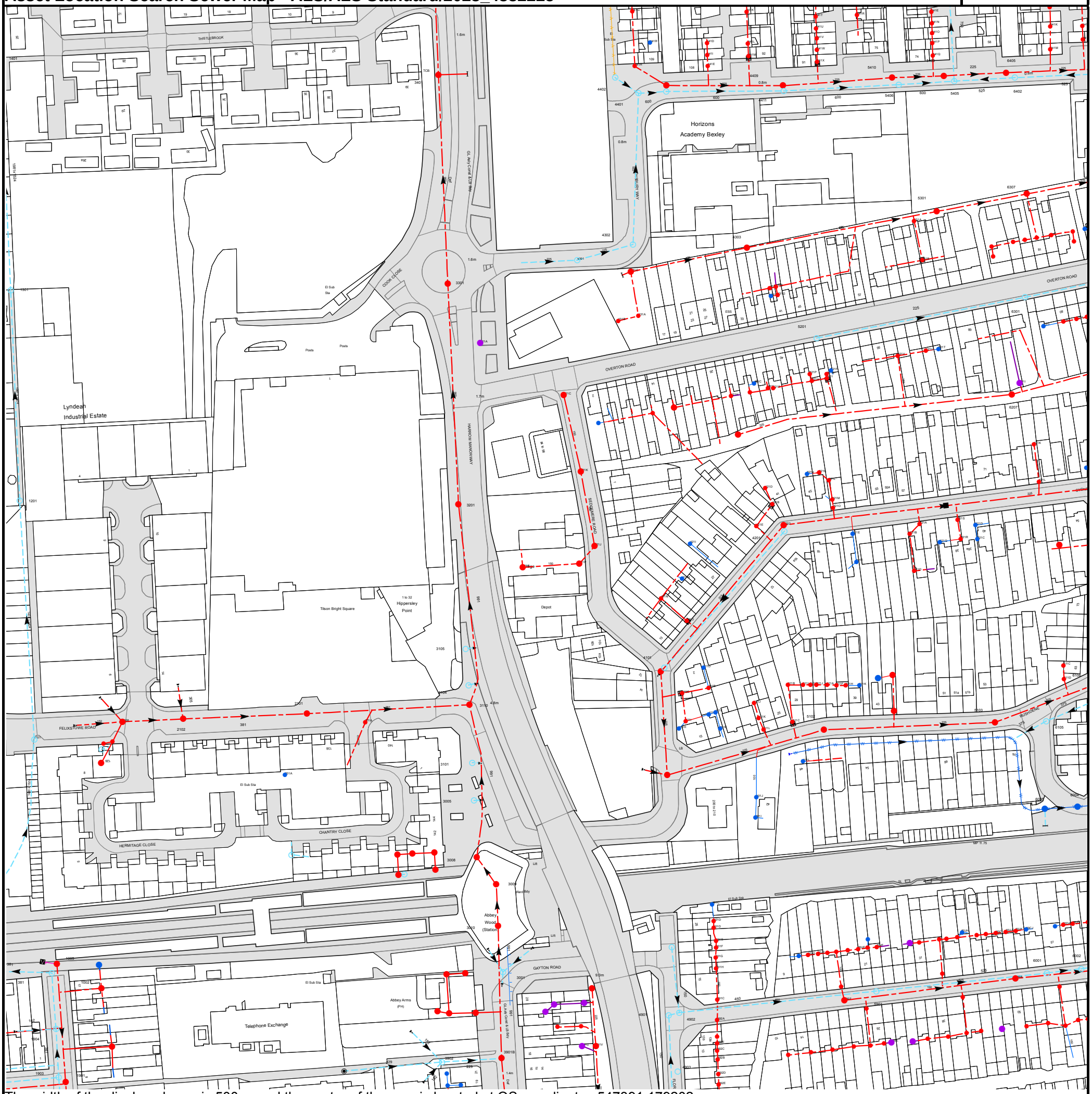
Air Line	AIR
British Telecom	BT
British Telecom Overhead	O/H
CCTV / Cable Television	TV
Communication Cable	COM
Drainage - Combined Water	Ø150
Drainage - Foul Water	Ø150
Drainage - Storm Water	Ø150
Drainage - Unknown Water	Ø150
Drainage - Trade Effluent Water	Ø150
Drainage - Combined Water - Assumed/TFR	Ø150
Drainage - Foul Water - Assumed/TFR	Ø150
Drainage - Storm Water - Assumed/TFR	Ø150
Drainage - Unknown Water - Assumed/TFR	Ø150
Drainage - Trade Effluent Water - Assumed/TFR	Ø150
Drainage - Approximate Pipe Size/Extents	
Earth Cable	ETH
Empty Duct	ED
Electric & Comms	E&C
Electric Low Voltage	LV
Electric High Voltage	HV
Electric - Unknown Voltage	E
Electric Overhead	O/H
Fibre Optic	FO
Fuel Line	FL
Gas Line	GAS
Gauge Line	GL
GPR Line	GPR
Heating Pipes	HTG
Offset Fills	OF
Oil Pipe	OIL
Rising Main	>>
Telecom	TEL
Traffic Light Signals	TL
Trench Scar	
Unknown	UKN
Vapour Recovery	VR
Vent Line	VP
Water	WTR

UTILITY SURVEY INFORMATION

Contracted Survey Area	SVY AREA
Depth to Top of Service (m)	0.40d
End of Trace	EOT
Head of Run	HoR
Weak Signal	WS
Taken From Records	TFR
Off Survey Area	OSA
Back Drop	BD
Silt Level	SL
Above Ground	A/G
Unable to Locate	UTL
Unable to Survey	UTS
Unable to Raise (cover)	UTR
Unable to Trace	UTT
Unable to Survey	
Chamber Extents	
Assumed Route	AR
Assumed Connection	ACP
Sound Connection	S/C
Sonde Stopped	S/S
No Visible Access	NVA
No Visible Exit	NVE
No Visible Pipes	NVP
No Visible Services	NVS
No Depth Indicated	NDI
Base Level	BL
High Level	HL
Top of Pipe / Top of Valve	T.o.P / T.o.V
Landing Level	LL
Rubble Level	RL
Approximate Location	
GPR Anomaly	
Multiple Services Route	

Appendix C – THAMES WATER ASSET MAP

Asset Location Search Sewer Map - ALS/ALS Standard/2023_4882225



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 547391,179202

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
541C	n/a	n/a
541R	n/a	n/a
541E	n/a	n/a
541N	n/a	n/a
541O	n/a	n/a
541P	n/a	n/a
641J	n/a	n/a
641K	n/a	n/a
641M	n/a	n/a
641G	n/a	n/a
641H	n/a	n/a
641N	n/a	n/a
441G	n/a	n/a
441H	n/a	n/a
441R	n/a	n/a
441D	n/a	n/a
441I	n/a	n/a
441E	n/a	n/a
441K	n/a	n/a
441L	n/a	n/a
441M	n/a	n/a
541T	n/a	n/a
541U	n/a	n/a
541V	n/a	n/a
541W	n/a	n/a
541X	n/a	n/a
3401	1.69	-2.31
3301	1.88	-2.18
4301	1.08	-.44
4402	n/a	n/a
431C	n/a	n/a
4302	1.08	-.51
4401	n/a	n/a
441A	n/a	n/a
441B	.91	-1.57
4303	1.14	.09
431D	n/a	n/a
431F	n/a	n/a
431E	n/a	n/a
431G	n/a	n/a
4409	.91	-1.79
4411	n/a	n/a
631A	n/a	n/a
6301	1.68	.13
531B	n/a	n/a
5302	n/a	n/a
5303	n/a	n/a
6303	n/a	n/a
6308	n/a	n/a
6304	n/a	n/a
6305	n/a	n/a
6306	n/a	n/a
6309	n/a	n/a
631H	n/a	n/a
531A	n/a	n/a
5301	1.12	-.33
6307	n/a	n/a
5406	n/a	n/a
5405	n/a	n/a
6402	n/a	n/a
5410	.92	-1.97
5409	.9	-2.1
6405	.93	-2.17
541Q	n/a	n/a
321A	n/a	n/a
321C	n/a	n/a
42CJ	n/a	n/a
431B	n/a	n/a
431A	n/a	n/a
42CC	n/a	n/a
42CE	n/a	n/a
421H	n/a	n/a
421A	.94	-.02
42ED	n/a	n/a
421C	n/a	n/a
421L	n/a	n/a
421F	n/a	n/a
521P	n/a	n/a
521H	n/a	n/a
5201	n/a	n/a
521K	n/a	n/a
521G	n/a	n/a
521I	n/a	n/a
521L	n/a	n/a
521F	n/a	n/a
521V	n/a	n/a
521U	n/a	n/a
521T	n/a	n/a
6207	1.12	-.33
621I	n/a	n/a
621K	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
621L	n/a	n/a
631I	n/a	n/a
631J	n/a	n/a
631K	n/a	n/a
621H	n/a	n/a
3201	1.63	-1.94
3105	1.4	-.05
311B	n/a	n/a
411P	n/a	n/a
421K	n/a	n/a
421J	n/a	n/a
411A	1.47	.05
411N	n/a	n/a
4101	1.55	.03
411M	n/a	n/a
411O	n/a	n/a
421I	n/a	n/a
411D	n/a	n/a
421E	n/a	n/a
421D	n/a	n/a
421B	n/a	n/a
4202	1.7	.51
4201	1.45	.05
521J	n/a	n/a
521M	n/a	n/a
521O	n/a	n/a
521E	n/a	n/a
511E	n/a	n/a
51AB	n/a	n/a
51AE	n/a	n/a
521B	n/a	n/a
511D	n/a	n/a
521A	n/a	n/a
521Q	n/a	n/a
521S	n/a	n/a
521R	n/a	n/a
521D	n/a	n/a
521C	n/a	n/a
62BI	n/a	n/a
611C	n/a	n/a
611D	n/a	n/a
62BH	n/a	n/a
411F	n/a	n/a
411E	n/a	n/a
411J	n/a	n/a
401I	n/a	n/a
401J	n/a	n/a
411K	n/a	n/a
411L	n/a	n/a
511B	n/a	n/a
511C	n/a	n/a
511I	n/a	n/a
511G	n/a	n/a
511J	n/a	n/a
5102	.82	-.63
511A	n/a	n/a
511F	n/a	n/a
511H	n/a	n/a
511K	n/a	n/a
311A	n/a	n/a
30XW	n/a	n/a
30YR	n/a	n/a
30YS	n/a	n/a
30YT	n/a	n/a
3104	1.4	-.05
3110	1.38	-1.91
3101	1.36	-.09
3005	1.41	n/a
3008	1.6	-1.81
401A	1.14	-.19
411H	n/a	n/a
411C	n/a	n/a
411I	n/a	n/a
411B	n/a	n/a
411G	n/a	n/a
69FD	n/a	n/a
69FA	n/a	n/a
69FC	n/a	n/a
69EJ	n/a	n/a
69JA	n/a	n/a
69FB	n/a	n/a
6001	1.18	-.57
59FI	n/a	n/a
59FH	n/a	n/a
59ZL	n/a	n/a
59FF	n/a	n/a
59FA	n/a	n/a
59EJ	n/a	n/a
59EH	n/a	n/a
59EG	n/a	n/a
59EF	n/a	n/a
59FB	n/a	n/a
5901	1.32	-.43

Manhole Reference	Manhole Cover Level	Manhole Invert Level
6008	1.26	-.31
50CF	n/a	n/a
6002	1.24	-.56
50JF	n/a	n/a
50CD	n/a	n/a
50CJ	n/a	n/a
5001	n/a	n/a
50CE	n/a	n/a
50JK	n/a	n/a
50CG	n/a	n/a
50CH	n/a	n/a
50JI	n/a	n/a
50CI	n/a	n/a
50JH	n/a	n/a
60JJ	n/a	n/a
60JK	n/a	n/a
60CJ	n/a	n/a
60DA	n/a	n/a
60DA	n/a	n/a
60JG	n/a	n/a
60JF	n/a	n/a
60DB	n/a	n/a
6005	n/a	n/a
6004	n/a	n/a
5103	.64	-.94
6105	n/a	n/a
51AF	n/a	n/a
492E	n/a	n/a
492D	n/a	n/a
492B	n/a	n/a
59GD	n/a	n/a
59GC	n/a	n/a
59GB	n/a	n/a
59GA	n/a	n/a
59FJ	n/a	n/a
5907	1.26	.61
491C	n/a	n/a
50DD	n/a	n/a
50BI	n/a	n/a
50JD	n/a	n/a
50JC	n/a	n/a
50BJ	n/a	n/a
50CA	n/a	n/a
50CB	n/a	n/a
50JE	n/a	n/a
50CC	n/a	n/a
511L	n/a	n/a
4903	1.5	n/a
492C	n/a	n/a
491V	n/a	n/a
491Z	n/a	n/a
49DE	n/a	n/a
492B	n/a	n/a
4913	n/a	n/a
492A	n/a	n/a
4901	1.39	.16
4902	1.4	.78
492A	n/a	n/a
n/a	n/a	n/a
401H	n/a	n/a
401G	n/a	n/a
401F	n/a	n/a
401B	1.34	.64
401E	n/a	n/a
401D	n/a	n/a
401D	n/a	n/a
401C	n/a	n/a
39XQ	n/a	n/a
39WZ	n/a	n/a
39YU	n/a	n/a
3902	1.02	-1.16
3901B	1.16	-1.77
3910	n/a	n/a
39XV	n/a	n/a
39XT	n/a	n/a
391C	n/a	n/a
39XU	n/a	n/a
391D	n/a	n/a
30YU	n/a	n/a
30YV	n/a	n/a
3001	.85	-.32
3010	1.44	-1.84
3009	1.59	-1.87
30XX	n/a	n/a
30XV	n/a	n/a
1301	1.26	n/a
1201	1.36	-.43
1101	1.87	-.49
11UY	n/a	n/a
11VQ	n/a	n/a
11UW	n/a	n/a
11UX	n/a	n/a
1108	1.56	-.3

Manhole Reference	Manhole Cover Level	Manhole Invert Level
2102	1.47	-.36
201A	n/a	n/a
20ZX	n/a	n/a
2101	1.32	-.64
1901	1.69	-.14
1903	1.7	.17
19US	n/a	n/a
1904	1.37	.1
19WQ	n/a	n/a
1002	.73	-.26
10WT	n/a	n/a
1005	.71	-.13

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement

Ducts may contain high voltage cables. Please check with Thames Water.

- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Appendix D – GREENFIELD AND EXISTING RUNOFF RATE CALCULATION SHEETS

Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	FEH
Positively Drained Area (ha)	0.272
SAAR (mm)	556
Host	1
BFIHost	0.669
Region	6
QBar/QMed conversion factor	1.136
Betterment (%)	0
QMed (l/s)	0.2
QBar (l/s)	0.2

Load

Calc

Return Period (years)	Growth Factor	Q (l/s)
2	0.88	0.2
30	2.40	0.6
100	3.19	0.8

PROPOSED RATES

Pre-development discharge

Site Makeup	Brownfield
Brownfield Method	MRM
Contributing Area (ha)	0.272
PIMP (%)	100
CV	1.000
Time of Concentration (mins)	5.00
Betterment (%)	0

Calc

Return Period (years)	Q (l/s)
1	53.8
2	69.1
30	127.1
100	161.1

EXISITING DISCHARGE RATES - 0% BETTERMENT

Pre-development discharge

Site Makeup	Brownfield
Brownfield Method	MRM
Contributing Area (ha)	0.272
PIMP (%)	100
CV	1.000
Time of Concentration (mins)	5.00
Betterment (%)	50

Calc

Return Period (years)	Q (l/s)
1	26.9
2	34.5
30	63.6
100	80.6

DISCHARGE RATES - 50% BETTERMENT

Pre-development discharge

Site Makeup	Brownfield
Brownfield Method	MRM
Contributing Area (ha)	0.272
PIMP (%)	100
CV	1.000
Time of Concentration (mins)	5.00
Betterment (%)	98

Calc

Return Period (years)	Q (l/s)
1	1.1
2	1.4
30	2.5
100	3.2

GREENFIELD DISCHARGE RATES - > 98% BETTERMENT

SEDGEMERE ROAD
PRE-DEVELOPMENT EXISTING DISCHARGE RATES
P451519
28.07.2025

whitby wood

Appendix E – THAMES WATER PRE PLANNNG CONSENT

Tom Tosetti

Whitby Wood
91-94 Lower Marsh
Waterloo
London SE1 7AB

Wastewater pre-planning
Our ref DS6119937

11 December 2024

Pre-planning enquiry: Confirmation of sufficient capacity

Site: ABBEY WOOD, SEDGEMERE ROAD, LONDON, SE2 9SW

Dear Tom,

Thank you for providing information on your development.

Proposed site (0.272ha): Demolishment of the existing car repair shop and other units and construction of a residential building up to 228 flats.

Proposed foul water and surface water (2720m2) to discharge by gravity to manhole TQ47793201. Surface water restricted to 2 l/s.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.
This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

Where feasible Surface water should discharge to a surface sewer in preference. The requirement to pass through third party land does not preclude this requirement. Thames Water would expect the developer to engage with any third party to pursue this option.

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

When developing a site, policy SI 13 of the London Plan states "Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as

close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:"

The disposal hierarchy being:

1. rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2. rainwater infiltration to ground at or close to source
3. rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4. rainwater discharge direct to a watercourse (unless not appropriate)
5. controlled rainwater discharge to a surface water sewer or drain
6. controlled rainwater discharge to a combined sewer

Where connection to the public sewerage network is still required to manage surface water flows, we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

Thames Water would request the developer aim for a discharge rate of 2 l/s/ha where feasible or 1 l/s total. Provided the above 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, provided approved by the LLFA, then Thames Water would not have any objections to the proposal.

Please see the attached 'Planning your wastewater' leaflet for additional information.

Combined connections & trade effluent

Foul and surface water must not be combined. This will only be permitted when a combined public sewerage system exists. When it is proposed to connect to a combined public sewer, the site drainage should be separate and combined at the final manhole nearest the boundary. Connections are not permitted for the removal of Ground Water. The discharge of non-domestic effluent is not permitted until a valid trade effluent consent has been issued by Thames Water. If anything other than domestic sewage is discharged into the public sewers without the above agreement an offence is committed and the applicant will be liable to the penalties contained in Section 109(1) (WIA 1991). Applicants should contact Trade Effluent prior to seeking a connection approval, to discuss trade effluent consent and conditions of discharge. A Trade Effluent reference number should be obtained and included in the relevant box of the attached application form. The address for Trade Effluent is - Thames Water Utilities Limited, Waste Water Quality, Crossness Sewage Treatment Works, Belvedere Road, Abbeywood, London. SE2 9AQ. Alternatively you can telephone them on 020 8507 4321.

Diversion

Where there are any existing public sewers crossing the site, new buildings will need to be kept between 3 and 6.5m away from existing sewer depending on the size and depth of the sewer. Alternatively, it may be possible for sewers to be diverted around the new development. If you wish us to review a diversion proposal, please submit this via a Section 185 Diversion application. On some occasions it may be possible to abandon existing public sewers. Please contact us for further information on this process.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

The views expressed by Thames Water in this letter are in response to this pre-planning enquiry at this time and do not represent our final views on any future planning applications made in relation to this site.

If you have any further questions, please contact me on 0800 009 3921.

Best Regards

James Kitching
Development Engineer
Developer Services – Sewer Adoptions Team

Appendix F – STORAGE ESTIMATE

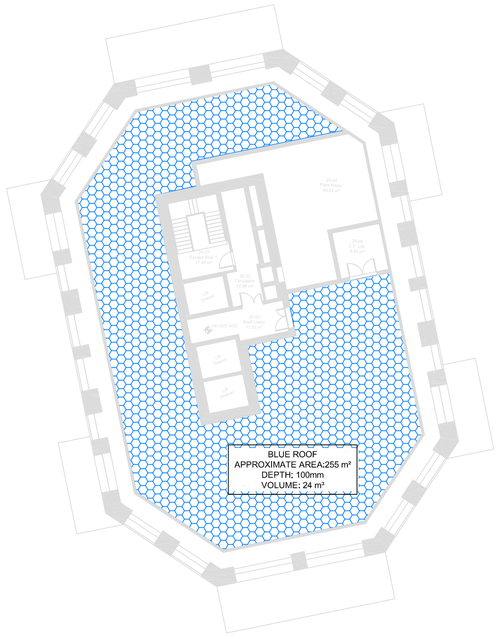
Storage Estimate

Return Period (years)	100
Climate Change (%)	40
Impermeable Area (ha)	0.272
Peak Discharge (l/s)	1.000
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	
Required Storage (m^3)	Calc
from	279
to	324

SEDGEMERE ROAD
ESTIMATED STORAGE RATES
P451519
28.07.2025

whitby wood

Appendix G – PROPOSED DRAINAGE STRATEGY



ROOF LEVEL

FIRST FLOOR

0 5 10 15 20m

1 : 200

HEALTH AND SAFETY INFORMATION

CONSTRUCTION
THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

MAINTENANCE/CLEANING/OPERATION.
MAINTENANCE OF SUDS FEATURES AND THE DRAINAGE SYSTEM SHOULD BE CARRIED OUT IN ACCORDANCE WITH THE CIRIA SUDS MANUAL AND MANUFACTURERS SPECIFICATIONS

DECOMMISSIONING/DEMOLITION.
REFER TO DRAWING FOR EXTENT OF EXISTING SITE DRAINAGE TO BE ABANDONED/REMOVED

NOTES

1. DO NOT SCALE FROM THIS DRAWING. ONLY FIGURED DIMENSIONS ARE TO BE USED.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. ALL FOUL AND SURFACE WATER PIPEWORK TO BE LAID AT MINIMUM GRADIENTS OF 1:40 AND 1:100 RESPECTIVELY UNLESS NOTED OTHERWISE.
6. ALL PIPEWORK TO BE 100mm DIAMETER UNLESS NOTED OTHERWISE.
7. ROCKER PIPES TO BE INSTALLED AT CONNECTION POINTS TO STRUCTURES TO ALLOW FOR MOVEMENT CAUSED BY SETTLEMENT.
8. ALL DRAINAGE IS DESIGNED TO ADOPTABLE STANDARDS WHERE POSSIBLE, AND BUILDING REGULATIONS PART H.

KEY

BLUE / GREEN ROOF

REV	DESCRIPTION	DRN	CHK	APP	DATE
P2	REVISED FOR ARHCITECT PLANS	TT	SM	RW	12.09.2024
P1	STAGE ISSUE	TT	RW	RW	24.06.2024

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whitbywood.com
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+44 (0)20 7442 2216

CLIENT
ABBEY WOOD SEDGEMERE ROAD LIMITED

PROJECT
4-8 SEDGEMERE ROAD

PRELIMINARY

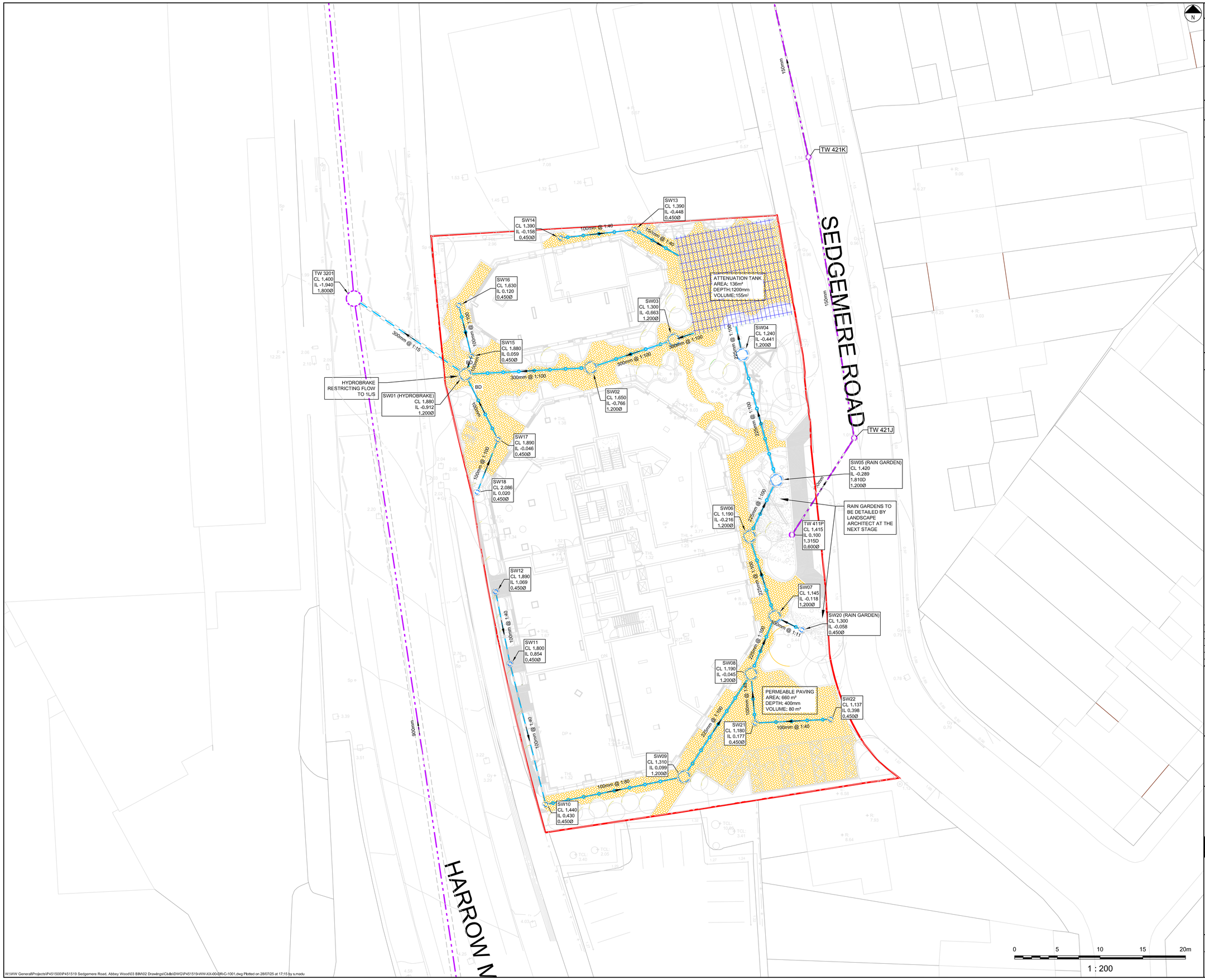
DRAWING TITLE
PROPOSED DRAINAGE LAYOUT
ROOF LEVEL

DATE	SCALES @ A1	DRAWN BY	CHECKED	APPROVED
24.06.24	1:200	TT	RW	RW

DRAWING NUMBER
P451519-WW-XX-RF-DR-C-1001

REVISION
P2

W:\WW General\Projects\P451500\P451519 Sedgemere Road, Abbey Wood\03 BIM\02 Drawings\Civil\DWG\P451519-WW-XX-RF-DR-C-1001.dwg Plotted on 28/07/25 at 17:17 by s.madu



HEALTH AND SAFETY INFORMATION

CONSTRUCTION
THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

MAINTENANCE/CLEANING/OPERATION.
MAINTENANCE OF SUDS FEATURES AND THE DRAINAGE SYSTEM SHOULD BE CARRIED OUT IN ACCORDANCE WITH THE CIRIA SUDS MANUAL AND MANUFACTURERS SPECIFICATIONS

DECOMMISSIONING/DEMOLITION.
REFER TO DRAWING FOR EXTENT OF EXISTING SITE DRAINAGE TO BE ABANDONED/REMOVED

NOTES

1. DO NOT SCALE FROM THIS DRAWING. ONLY FIGURED DIMENSIONS ARE TO BE USED.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. ALL FOUL AND SURFACE WATER PIPEWORK TO BE LAID AT MINIMUM GRADIENTS OF 1:40 AND 1:100 RESPECTIVELY UNLESS NOTED OTHERWISE.
6. ALL PIPEWORK TO BE 100mm DIAMETER UNLESS NOTED OTHERWISE.
7. ROCKER PIPES TO BE INSTALLED AT CONNECTION POINTS TO STRUCTURES TO ALLOW FOR MOVEMENT CAUSED BY SETTLEMENT.
8. ALL DRAINAGE IS DESIGNED TO ADOPTABLE STANDARDS WHERE POSSIBLE, AND BUILDING REGULATIONS PART H.
9. COVER LEVELS BASED OFF EXISTING TOPO LEVELS. EXTERNAL LEVELS TO BE CONFIRMED BY LANDSCAPE ARCHITECT.
10. FOR INVERT AND PIPE GRADIENTS REFER TO CAUSEWAY FLOW MODEL RESULTS

KEY

- RED LINE BOUNDARY
- EXISTING COMBINED SEWER
- PROPOSED SURFACE WATER SEWER
- PROPOSED PERFORATED PIPE
- ATTENUATION TANK
- PERMEABLE PAVING
- EXISTING MANHOLE
- SURFACE WATER MANHOLE

AC	-	ACCESS FITTING/CHAMBER	IC	-	INSPECTION CHAMBER
CL	-	COVER LEVEL	IL	-	INVERT LEVEL
C	-	COMBINED WATER	MH	-	MANHOLE
CP	-	CATCHPIT	S	-	SURFACE WATER
EXT	-	EXISTING	SL	-	SOFFIT LEVEL
F	-	FOUL WATER	TBC	-	TO BE CONFIRMED

REV	DESCRIPTION	DRN	CHK	APP	DATE
P5	REVISED ATTENUATION SCHEME/OUTFALL LOCATION	SCM	SM	SM	28.07.25
P4	CHANGE OF OUTFALL LOCATION	TT	SM	RW	25.03.25
P3	REVISED FOR LANDSCAPE	TT	SM	RW	12.09.24
P2	STAGE ISSUE	TT	RW	RW	28.06.24
P1	STAGE ISSUE	TT	RW	RW	24.06.24

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+44 (0)20 7442 2216

CLIENT
ABBEY WOOD SEDGEMERE LIMITED

PROJECT
4-8 SEDGEMERE ROAD

PRELIMINARY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT
GROUND FLOOR

DATE	SCALES @ A1	DRAWN BY	CHECKED	APPROVED
28.07.2025	1:200	SCM	SM	SM

DRAWING NUMBER
P451519-WW-XX-00-DR-C-1001

REVISION
P5

W:\WW General\Projects\P451500\P451519 Sedgemere Road, Abbey Wood\03 BIM\02 Drawings\CAM\DWG\P451519-WW-XX-00-DR-C-1001.dwg Plotted on 28/07/25 at 17:15 by s.madu

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	40	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Outfall			2.200	1200	547353.785	179218.798	4.140
Blue roof - roof level	0.053	5.00	69.625	1200	547385.852	179187.097	0.150
Attenuation tank			1.360	1200	547397.090	179221.392	1.984
SW21	0.008	5.00	1.180	450	547400.712	179169.148	1.003
SW05	0.006	5.00	1.420	1200	547403.193	179197.558	1.709
SW10	0.007	5.00	1.440	450	547376.216	179159.618	1.010
SW09	0.014	5.00	1.310	1200	547392.373	179162.868	1.211
SW07	0.004	5.00	1.145	1200	547403.000	179181.607	1.263
SW18	0.003	5.00	2.086	450	547368.199	179196.161	2.066
SW11	0.007	5.00	1.800	450	547372.039	179176.059	0.946
SW17	0.014	5.00	1.890	450	547370.618	179202.311	1.936
SW01	0.005	5.00	1.880	1200	547366.796	179209.929	2.793
SW22	0.011	5.00	1.137	450	547409.540	179169.590	0.739
SW20	0.002	5.00	1.300	1200	547406.170	179180.040	1.110
SW03	0.013	5.00	1.300	1200	547391.194	179213.976	1.963
SW08	0.007	5.00	1.190	1200	547400.225	179174.898	1.235
SW16	0.006	5.00	1.630	450	547366.050	179217.993	1.510
SW15	0.006	5.00	1.880	450	547367.528	179212.046	1.821
SW14	0.008	5.00	1.390	450	547377.944	179225.881	1.300
SW13	0.016	5.00	1.390	450	547386.595	179226.852	1.518
Blue roof - L01	0.008	5.00	6.560	1200	547380.431	179166.702	1.300
SW04	0.013	5.00	1.240	1200	547399.191	179212.247	1.756
SW02	0.007	5.00	1.650	1200	547381.462	179210.730	2.416
SW06	0.006	5.00	1.190	1200	547400.040	179190.974	1.406
SW12	0.006	5.00	1.890	450	547370.360	179184.491	0.821

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.002	SW10	SW09	16.481	0.600	0.430	0.224	0.206	80.0	100	5.67	50.0
1.003	SW09	SW08	14.366	0.600	0.099	-0.045	0.144	99.8	225	5.85	50.0
6.000	SW18	SW17	6.609	0.600	0.020	-0.046	0.066	100.0	100	5.14	50.0
1.001	SW11	SW10	16.963	0.600	0.854	0.430	0.424	40.0	100	5.35	50.0
6.001	SW17	SW01	8.523	0.600	-0.046	-0.131	0.085	100.0	100	5.33	50.0
1.012	SW01	Outfall	15.746	0.600	-0.912	-1.940	1.028	15.3	300	6.93	50.0
1.009	Attenuation tank	SW03	9.474	0.600	-0.624	-0.663	0.039	242.9	300	6.60	50.0
1.010	SW03	SW02	10.259	0.600	-0.663	-0.766	0.103	100.0	300	6.71	50.0
3.000	SW22	SW21	8.839	0.600	0.398	0.177	0.221	40.0	100	5.12	50.0
3.001	SW21	SW08	5.771	0.600	0.177	0.033	0.144	40.0	100	5.20	50.0
1.004	SW08	SW07	7.260	0.600	-0.045	-0.118	0.073	99.5	225	5.94	50.0
4.000	SW20	SW07	3.536	0.600	0.190	-0.118	0.308	11.5	100	5.03	50.0
5.001	SW13	Attenuation tank	11.830	0.600	-0.128	-0.424	0.296	40.0	100	5.28	50.0
7.000	SW16	SW15	6.128	0.600	0.120	0.059	0.061	100.0	100	5.13	50.0
7.001	SW15	SW01	2.240	0.600	0.059	0.037	0.022	100.0	100	5.18	50.0
1.000	SW12	SW11	8.598	0.600	1.069	0.854	0.215	40.0	100	5.12	50.0
2.000	Blue roof - roof level	Blue roof - L01	21.103	0.600	69.475	6.410	63.065	0.3	100	5.03	50.0
5.000	SW14	SW13	8.705	0.600	0.090	-0.128	0.218	40.0	100	5.12	50.0
1.008	SW04	Attenuation tank	9.383	0.600	-0.516	-0.555	0.039	240.6	300	6.44	50.0
2.001	Blue roof - L01	SW09	12.542	0.600	5.260	0.224	5.036	2.5	100	5.07	50.0
1.007	SW05	SW04	15.224	0.600	-0.289	-0.441	0.152	100.2	300	6.29	50.0
1.011	SW02	SW01	14.688	0.600	-0.766	-0.913	0.147	100.0	300	6.86	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.002	0.861	6.8	5.2	0.910	0.986	0.020	0.0
1.003	1.308	52.0	23.9	0.986	1.010	0.094	0.0
6.000	0.769	6.0	0.8	1.966	1.836	0.003	0.0
1.001	1.223	9.6	3.4	0.846	0.910	0.013	0.0
6.001	0.769	6.0	4.4	1.836	1.911	0.017	0.0
1.012	4.037	285.3	58.2	2.492	3.840	0.230	0.0
1.009	1.004	71.0	44.5	1.684	1.663	0.176	0.0
1.010	1.572	111.1	47.8	1.663	2.116	0.189	0.0
3.000	1.223	9.6	2.8	0.639	0.903	0.011	0.0
3.001	1.223	9.6	5.0	0.903	1.057	0.020	0.0
1.004	1.310	52.1	30.7	1.010	1.038	0.121	0.0
4.000	2.293	18.0	0.4	1.010	1.163	0.002	0.0
5.001	1.223	9.6	6.0	1.418	1.684	0.024	0.0
7.000	0.769	6.0	1.5	1.410	1.721	0.006	0.0
7.001	0.769	6.0	3.1	1.721	1.743	0.012	0.0
1.000	1.223	9.6	1.5	0.721	0.846	0.006	0.0
2.000	13.496	106.0	13.4	0.050	0.050	0.053	0.0
5.000	1.223	9.6	2.1	1.200	1.418	0.008	0.0
1.008	1.009	71.3	38.5	1.456	1.615	0.152	0.0
2.001	4.939	38.8	15.3	1.200	0.986	0.061	0.0
1.007	1.570	111.0	35.3	1.409	1.381	0.140	0.0
1.011	1.572	111.1	49.5	2.116	2.493	0.196	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.005	SW07	SW06	9.824	0.600	-0.118	-0.216	0.098	100.2	300	6.05	50.0
1.006	SW06	SW05	7.300	0.600	-0.216	-0.289	0.073	100.0	300	6.12	50.0
1.000	SW12	SW11	8.676	0.600	0.717	0.517	0.200	43.4	100	5.12	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.005	1.570	111.0	32.1	0.963	1.106	0.127	0.0
1.006	1.572	111.1	33.7	1.106	1.409	0.133	0.0
1.000					1.183		

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.002	16.481	80.0	100	Circular	1.440	0.430	0.910	1.310	0.224	0.986
1.003	14.366	99.8	225	Circular	1.310	0.099	0.986	1.190	-0.045	1.010
6.000	6.609	100.0	100	Circular	2.086	0.020	1.966	1.890	-0.046	1.836
1.001	16.963	40.0	100	Circular	1.800	0.854	0.846	1.440	0.430	0.910
6.001	8.523	100.0	100	Circular	1.890	-0.046	1.836	1.880	-0.131	1.911
1.012	15.746	15.3	300	Circular	1.880	-0.912	2.492	2.200	-1.940	3.840
1.009	9.474	242.9	300	Circular	1.360	-0.624	1.684	1.300	-0.663	1.663
1.010	10.259	100.0	300	Circular	1.300	-0.663	1.663	1.650	-0.766	2.116
3.000	8.839	40.0	100	Circular	1.137	0.398	0.639	1.180	0.177	0.903
3.001	5.771	40.0	100	Circular	1.180	0.177	0.903	1.190	0.033	1.057
1.004	7.260	99.5	225	Circular	1.190	-0.045	1.010	1.145	-0.118	1.038
4.000	3.536	11.5	100	Circular	1.300	0.190	1.010	1.145	-0.118	1.163
5.001	11.830	40.0	100	Circular	1.390	-0.128	1.418	1.360	-0.424	1.684
7.000	6.128	100.0	100	Circular	1.630	0.120	1.410	1.880	0.059	1.721
7.001	2.240	100.0	100	Circular	1.880	0.059	1.721	1.880	0.037	1.743
1.000	8.598	40.0	100	Circular	1.890	1.069	0.721	1.800	0.854	0.846
2.000	21.103	0.3	100	Circular	69.625	69.475	0.050	6.560	6.410	0.050

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	SW10	450	Manhole	Adoptable	SW09	1200	Manhole	Adoptable
1.003	SW09	1200	Manhole	Adoptable	SW08	1200	Manhole	Adoptable
6.000	SW18	450	Manhole	Adoptable	SW17	450	Manhole	Adoptable
1.001	SW11	450	Manhole	Adoptable	SW10	450	Manhole	Adoptable
6.001	SW17	450	Manhole	Adoptable	SW01	1200	Manhole	Adoptable
1.012	SW01	1200	Manhole	Adoptable	Outfall	1200	Manhole	Adoptable
1.009	Attenuation tank	1200	Manhole	Adoptable	SW03	1200	Manhole	Adoptable
1.010	SW03	1200	Manhole	Adoptable	SW02	1200	Manhole	Adoptable
3.000	SW22	450	Manhole	Adoptable	SW21	450	Manhole	Adoptable
3.001	SW21	450	Manhole	Adoptable	SW08	1200	Manhole	Adoptable
1.004	SW08	1200	Manhole	Adoptable	SW07	1200	Manhole	Adoptable
4.000	SW20	1200	Manhole	Adoptable	SW07	1200	Manhole	Adoptable
5.001	SW13	450	Manhole	Adoptable	Attenuation tank	1200	Manhole	Adoptable
7.000	SW16	450	Manhole	Adoptable	SW15	450	Manhole	Adoptable
7.001	SW15	450	Manhole	Adoptable	SW01	1200	Manhole	Adoptable
1.000	SW12	450	Manhole	Adoptable	SW11	450	Manhole	Adoptable
2.000	Blue roof - roof level	1200	Manhole	Adoptable	Blue roof - L01	1200	Manhole	Adoptable

Pipeline Schedule

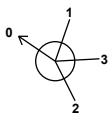
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
5.000	8.705	40.0	100	Circular	1.390	0.090	1.200	1.390	-0.128	1.418
1.008	9.383	240.6	300	Circular	1.240	-0.516	1.456	1.360	-0.555	1.615
2.001	12.542	2.5	100	Circular	6.560	5.260	1.200	1.310	0.224	0.986
1.007	15.224	100.2	300	Circular	1.420	-0.289	1.409	1.240	-0.441	1.381
1.011	14.688	100.0	300	Circular	1.650	-0.766	2.116	1.880	-0.913	2.493
1.005	9.824	100.2	300	Circular	1.145	-0.118	0.963	1.190	-0.216	1.106
1.006	7.300	100.0	300	Circular	1.190	-0.216	1.106	1.420	-0.289	1.409
1.000	8.676	43.4	100			0.717		1.800	0.517	1.183

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.000	SW14	450	Manhole	Adoptable	SW13	450	Manhole	Adoptable
1.008	SW04	1200	Manhole	Adoptable	Attenuation tank	1200	Manhole	Adoptable
2.001	Blue roof - L01	1200	Manhole	Adoptable	SW09	1200	Manhole	Adoptable
1.007	SW05	1200	Manhole	Adoptable	SW04	1200	Manhole	Adoptable
1.011	SW02	1200	Manhole	Adoptable	SW01	1200	Manhole	Adoptable
1.005	SW07	1200	Manhole	Adoptable	SW06	1200	Manhole	Adoptable
1.006	SW06	1200	Manhole	Adoptable	SW05	1200	Manhole	Adoptable
1.000					SW11	450	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Outfall	547353.785	179218.798	2.200	4.140	1200	1	1.012	-1.940	300
Blue roof - roof level	547385.852	179187.097	69.625	0.150	1200	0	2.000	69.475	100
Attenuation tank	547397.090	179221.392	1.360	1.984	1200	1	5.001	-0.424	100
						2	1.008	-0.555	300
						0	1.009	-0.624	300
SW21	547400.712	179169.148	1.180	1.003	450	1	3.000	0.177	100
						0	3.001	0.177	100
SW05	547403.193	179197.558	1.420	1.709	1200	1	1.006	-0.289	300
						0	1.007	-0.289	300
SW10	547376.216	179159.618	1.440	1.010	450	1	1.001	0.430	100
						0	1.002	0.430	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW09	547392.373	179162.868	1.310	1.211	1200		1	2.001	0.224	100
							2	1.002	0.224	100
							0	1.003	0.099	225
SW07	547403.000	179181.607	1.145	1.263	1200		1	4.000	-0.118	100
							2	1.004	-0.118	225
							0	1.005	-0.118	300
SW18	547368.199	179196.161	2.086	2.066	450		0	6.000	0.020	100
SW11	547372.039	179176.059	1.800	0.946	450		1	1.000	0.854	100
							0	1.001	0.854	100
SW17	547370.618	179202.311	1.890	1.936	450		1	6.000	-0.046	100
							0	6.001	-0.046	100
SW01	547366.796	179209.929	1.880	2.793	1200		1	7.001	0.037	100
							2	6.001	-0.131	100
							3	1.011	-0.913	300
							0	1.012	-0.912	300
SW22	547409.540	179169.590	1.137	0.739	450		0	3.000	0.398	100
SW20	547406.170	179180.040	1.300	1.110	1200		0	4.000	0.190	100
SW03	547391.194	179213.976	1.300	1.963	1200		1	1.009	-0.663	300
							0	1.010	-0.663	300
SW08	547400.225	179174.898	1.190	1.235	1200		1	3.001	0.033	100
							2	1.003	-0.045	225
							0	1.004	-0.045	225
SW16	547366.050	179217.993	1.630	1.510	450		0	7.000	0.120	100
SW15	547367.528	179212.046	1.880	1.821	450		1	7.000	0.059	100
							0	7.001	0.059	100
SW14	547377.944	179225.881	1.390	1.300	450		0	5.000	0.090	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW13	547386.595	179226.852	1.390	1.518	450	1	5.000	-0.128	100
						0	5.001	-0.128	100
Blue roof - L01	547380.431	179166.702	6.560	1.300	1200	1	2.000	6.410	100
						0	2.001	5.260	100
SW04	547399.191	179212.247	1.240	1.756	1200	1	1.007	-0.441	300
						0	1.008	-0.516	300
SW02	547381.462	179210.730	1.650	2.416	1200	1	1.010	-0.766	300
						0	1.011	-0.766	300
SW06	547400.040	179190.974	1.190	1.406	1200	1	1.005	-0.216	300
						0	1.006	-0.216	300
SW12	547370.360	179184.491	1.890	0.821	450	0	1.000	1.069	100

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	35	0	0
100	40	0	0

Node SW01 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.012	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0038-1000-2400-1000
Invert Level (m)	-0.912	Min Outlet Diameter (m)	0.075
Design Depth (m)	2.400	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.0		

Node Blue roof - roof level Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	69.475	Design Flow (l/s)	3.7
Replaces Downstream Link	✓	Design Depth (m)	0.150		

Depth (m)	Flow (l/s)
0.150	3.700

Node Blue roof - L01 Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	5.260	Design Flow (l/s)	3.2
Replaces Downstream Link	✓	Design Depth (m)	0.150		

Depth (m)	Flow (l/s)
0.150	3.200

Node Attenuation tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	-0.624
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	136.0	0.0	1.200	136.0	0.0	1.201	0.0	0.0

Node Blue roof - L01 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	5.260
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	216

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	81.0	0.0	0.100	81.0	0.0	0.101	0.0	0.0

Node Blue roof - roof level Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	69.475
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	340.0	0.0	0.100	340.0	0.0	0.101	0.0	0.0

Node SW22 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.600	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	8.000	Inf Depth (m)	
Porosity	0.30	Length (m)	10.000		

Node SW09 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.750	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	6.000	Inf Depth (m)	
Porosity	0.30	Length (m)	2.000		

Node SW10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.760	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	2.000	Inf Depth (m)	
Porosity	0.30	Length (m)	6.000		

Node SW21 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	4.000		

Node SW08 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.800	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	2.000		

Node SW07 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.490	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	2.000	Inf Depth (m)	
Porosity	0.30	Length (m)	5.000		

Node SW04 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.690	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	2.000		

Node SW03 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.790	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	2.000		

Node SW16 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.870	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	105	Depth (m)	0.400
Safety Factor	2.0	Width (m)	2.000	Inf Depth (m)	
Porosity	0.30	Length (m)	2.000		

Node SW15 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.780	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	7.000	Inf Depth (m)	
Porosity	0.30	Length (m)	2.000		

Node SW17 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.790	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	2.000	Inf Depth (m)	
Porosity	0.30	Length (m)	7.000		

Node SW01 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.780	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	4.000	Inf Depth (m)	
Porosity	0.30	Length (m)	4.000		

Node SW02 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.800	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	2.000	Inf Depth (m)	
Porosity	0.30	Length (m)	4.000		

Node SW06 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.490	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	2.000	Inf Depth (m)	
Porosity	0.30	Length (m)	3.000		

Node SW05 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.600	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	16.000		

Node SW20 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.800	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	2.000		

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.70%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Outfall	464	-1.930	0.010	0.5	0.0000	0.0000	OK
360 minute summer	Blue roof - roof level	240	69.499	0.024	2.3	7.9512	0.0000	OK
480 minute winter	Attenuation tank	464	-0.371	0.253	3.6	33.0275	0.0000	OK
15 minute summer	SW21	10	0.221	0.044	3.5	0.0145	0.0000	OK
15 minute summer	SW05	11	-0.215	0.074	13.5	0.0889	0.0000	OK
15 minute summer	SW10	11	0.482	0.052	3.5	0.0155	0.0000	OK
15 minute summer	SW09	10	0.150	0.051	5.9	0.0685	0.0000	OK
15 minute summer	SW07	11	-0.049	0.069	11.4	0.0826	0.0000	OK
15 minute winter	SW18	11	0.039	0.019	0.5	0.0037	0.0000	OK
15 minute summer	SW11	10	0.887	0.033	2.3	0.0105	0.0000	OK
15 minute summer	SW17	10	0.006	0.052	3.0	0.0158	0.0000	OK
480 minute winter	SW01	464	-0.371	0.542	1.1	0.6324	0.0000	SURCHARGED
15 minute summer	SW22	10	0.429	0.031	2.0	0.0143	0.0000	OK
15 minute winter	SW20	11	0.199	0.009	0.3	0.0105	0.0000	OK
480 minute winter	SW03	464	-0.371	0.292	1.2	0.3696	0.0000	OK
15 minute summer	SW08	11	0.029	0.074	10.4	0.0920	0.0000	OK
15 minute summer	SW16	11	0.148	0.028	1.0	0.0066	0.0000	OK
15 minute summer	SW15	11	0.104	0.045	2.1	0.0104	0.0000	OK
15 minute summer	SW14	10	0.117	0.027	1.5	0.0076	0.0000	OK
15 minute summer	SW13	10	-0.080	0.048	4.2	0.0174	0.0000	OK
240 minute winter	Blue roof - L01	224	5.288	0.028	0.8	2.2065	0.0000	OK
480 minute winter	SW04	464	-0.371	0.145	2.5	0.1854	0.0000	OK
480 minute winter	SW02	464	-0.371	0.395	1.2	0.4686	0.0000	SURCHARGED
15 minute summer	SW06	11	-0.142	0.074	12.5	0.0899	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	Blue roof - roof level	Depth/Flow	Blue roof - L01	0.6				
480 minute winter	Attenuation tank	1.009	SW03	1.0	0.370	0.015	0.6320	
15 minute summer	SW21	3.001	SW08	3.4	1.073	0.359	0.0185	
15 minute summer	SW05	1.007	SW04	13.5	1.044	0.122	0.1973	
15 minute summer	SW10	1.002	SW09	3.5	0.853	0.510	0.0667	
15 minute summer	SW09	1.003	SW08	5.8	0.652	0.111	0.1288	
15 minute summer	SW07	1.005	SW06	11.5	0.897	0.104	0.1260	
15 minute winter	SW18	6.000	SW17	0.5	0.210	0.083	0.0164	
15 minute summer	SW11	1.001	SW10	2.3	0.719	0.237	0.0540	
15 minute summer	SW17	6.001	SW01	2.9	0.741	0.487	0.0338	
480 minute winter	SW01	1.012	Outfall	0.5	0.786	0.002	0.0103	18.7
15 minute summer	SW22	3.000	SW21	2.0	0.736	0.207	0.0239	
15 minute winter	SW20	4.000	SW07	0.3	0.113	0.017	0.0103	
480 minute winter	SW03	1.010	SW02	1.1	0.381	0.010	0.7200	
15 minute summer	SW08	1.004	SW07	10.4	0.966	0.200	0.0784	
15 minute summer	SW16	7.000	SW15	1.0	0.389	0.166	0.0159	
15 minute summer	SW15	7.001	SW01	2.1	0.652	0.348	0.0072	
15 minute summer	SW14	5.000	SW13	1.5	0.559	0.154	0.0233	
15 minute summer	SW13	5.001	Attenuation tank	4.1	1.148	0.431	0.0426	
240 minute winter	Blue roof - L01	Depth/Flow	SW09	0.6				
480 minute winter	SW04	1.008	Attenuation tank	2.5	0.477	0.035	0.3719	
480 minute winter	SW02	1.011	SW01	0.6	0.072	0.006	1.0343	
15 minute summer	SW06	1.006	SW05	12.5	0.934	0.113	0.0981	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.70%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW12	11	1.091	0.022	1.0	0.0066	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW12	1.000	SW11	1.0	0.578	0.104	0.0152	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 98.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Outfall	825	-1.928	0.012	0.8	0.0000	0.0000	OK
240 minute summer	Blue roof - roof level	168	69.551	0.076	9.8	25.1149	0.0000	OK
720 minute winter	Attenuation tank	810	0.442	1.066	11.5	138.9682	0.0000	SURCHARGED
15 minute summer	SW21	11	0.448	0.271	12.7	0.0888	0.0000	SURCHARGED
720 minute winter	SW05	795	0.442	0.731	5.6	0.8811	0.0000	SURCHARGED
15 minute summer	SW10	13	0.864	0.434	12.3	0.4510	0.0000	SURCHARGED
720 minute winter	SW09	795	0.444	0.345	2.8	0.4672	0.0000	SURCHARGED
720 minute winter	SW07	765	0.445	0.563	4.9	0.6734	0.0000	SURCHARGED
720 minute winter	SW18	765	0.444	0.424	0.2	0.0806	0.0000	SURCHARGED
15 minute summer	SW11	12	1.168	0.314	8.9	0.0992	0.0000	SURCHARGED
720 minute winter	SW17	765	0.443	0.489	0.9	0.1492	0.0000	SURCHARGED
720 minute winter	SW01	765	0.442	1.355	1.7	1.5800	0.0000	SURCHARGED
15 minute summer	SW22	11	0.602	0.204	7.9	0.0961	0.0000	SURCHARGED
720 minute winter	SW20	795	0.444	0.254	0.2	0.2948	0.0000	SURCHARGED
720 minute winter	SW03	810	0.442	1.105	1.9	1.3966	0.0000	SURCHARGED
720 minute winter	SW08	765	0.445	0.490	4.2	0.6108	0.0000	SURCHARGED
720 minute winter	SW16	765	0.442	0.322	0.3	0.0766	0.0000	SURCHARGED
720 minute winter	SW15	765	0.441	0.382	0.6	0.0875	0.0000	SURCHARGED
15 minute summer	SW14	12	0.463	0.373	5.8	0.1072	0.0000	SURCHARGED
720 minute winter	SW13	810	0.443	0.571	1.2	0.2077	0.0000	SURCHARGED
240 minute winter	Blue roof - L01	228	5.348	0.088	2.4	6.8497	0.0000	OK
720 minute winter	SW04	795	0.442	0.958	6.6	1.2220	0.0000	SURCHARGED
720 minute winter	SW02	825	0.442	1.208	1.6	1.4311	0.0000	SURCHARGED
720 minute winter	SW06	780	0.444	0.660	6.0	0.8035	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute summer	Blue roof - roof level	Depth/Flow	Blue roof - L01	1.9				
720 minute winter	Attenuation tank	1.009	SW03	-1.8	0.340	-0.026	0.6672	
15 minute summer	SW21	3.001	SW08	12.5	1.594	1.299	0.0447	
720 minute winter	SW05	1.007	SW04	6.0	0.655	0.054	1.0721	
15 minute summer	SW10	1.002	SW09	10.4	1.330	1.539	0.1276	
720 minute winter	SW09	1.003	SW08	2.8	0.620	0.054	0.5714	
720 minute winter	SW07	1.005	SW06	4.5	0.738	0.041	0.6918	
720 minute winter	SW18	6.000	SW17	0.2	0.185	0.038	0.0517	
15 minute summer	SW11	1.001	SW10	7.5	0.964	0.785	0.1327	
720 minute winter	SW17	6.001	SW01	0.9	0.545	0.149	0.0667	
720 minute winter	SW01	1.012	Outfall	0.8	0.885	0.003	0.0137	35.6
15 minute summer	SW22	3.000	SW21	7.1	0.910	0.741	0.0692	
720 minute winter	SW20	4.000	SW07	0.2	0.094	0.012	0.0277	
720 minute winter	SW03	1.010	SW02	1.6	0.350	0.014	0.7224	
720 minute winter	SW08	1.004	SW07	4.6	0.791	0.088	0.2887	
720 minute winter	SW16	7.000	SW15	0.3	0.291	0.054	0.0479	
720 minute winter	SW15	7.001	SW01	0.6	0.470	0.099	0.0175	
15 minute summer	SW14	5.000	SW13	5.2	0.668	0.544	0.0681	
720 minute winter	SW13	5.001	Attenuation tank	1.2	0.734	0.125	0.0926	
240 minute winter	Blue roof - L01	Depth/Flow	SW09	1.9				
720 minute winter	SW04	1.008	Attenuation tank	8.4	0.433	0.118	0.6607	
720 minute winter	SW02	1.011	SW01	1.3	0.068	0.012	1.0343	
720 minute winter	SW06	1.006	SW05	5.3	0.716	0.048	0.5141	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 98.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW12	12	1.201	0.132	4.2	0.0402	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW12	1.000	SW11	3.9	0.784	0.408	0.0673	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Outfall	975	-1.927	0.013	0.9	0.0000	0.0000	OK
240 minute summer	Blue roof - roof level	160	69.617	0.142	13.3	33.6193	0.0000	FLOOD RISK
960 minute winter	Attenuation tank	975	1.080	1.704	11.0	157.0316	0.0000	FLOOD RISK
960 minute winter	SW21	990	1.082	0.905	1.1	2.3568	0.0000	FLOOD RISK
960 minute winter	SW05	975	1.080	1.369	9.1	18.9579	0.0000	SURCHARGED
960 minute winter	SW10	1005	1.082	0.652	1.1	1.3007	0.0000	SURCHARGED
960 minute winter	SW09	1005	1.082	0.983	3.5	2.5091	0.0000	FLOOD RISK
960 minute winter	SW07	1005	1.082	1.200	7.1	2.6016	0.0000	FLOOD RISK
960 minute winter	SW18	975	1.080	1.060	0.2	0.2015	0.0000	SURCHARGED
15 minute summer	SW11	12	1.429	0.575	10.4	0.1818	0.0000	SURCHARGED
960 minute winter	SW17	975	1.080	1.126	1.0	1.4908	0.0000	SURCHARGED
960 minute winter	SW01	975	1.080	1.993	1.8	3.7173	0.0000	SURCHARGED
960 minute winter	SW22	990	1.082	0.684	1.3	9.3310	0.0000	FLOOD RISK
960 minute winter	SW20	1005	1.082	0.892	0.2	1.8658	0.0000	FLOOD RISK
960 minute winter	SW03	975	1.080	1.743	1.9	3.0585	0.0000	FLOOD RISK
960 minute winter	SW08	1005	1.082	1.127	4.8	3.0650	0.0000	FLOOD RISK
960 minute winter	SW16	975	1.081	0.961	0.3	0.4761	0.0000	SURCHARGED
960 minute winter	SW15	975	1.080	1.021	0.6	1.4743	0.0000	SURCHARGED
960 minute winter	SW14	975	1.081	0.991	0.4	0.2844	0.0000	SURCHARGED
960 minute winter	SW13	975	1.081	1.209	1.2	0.4400	0.0000	SURCHARGED
240 minute summer	Blue roof - L01	172	5.729	0.469	4.0	8.3193	0.0000	SURCHARGED
960 minute winter	SW04	975	1.079	1.595	6.3	4.3417	0.0000	FLOOD RISK
960 minute winter	SW02	975	1.080	1.846	1.6	2.8370	0.0000	SURCHARGED
960 minute winter	SW06	975	1.080	1.296	5.2	2.2866	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute summer	Blue roof - roof level	Depth/Flow	Blue roof - L01	3.5				
960 minute winter	Attenuation tank	1.009	SW03	-1.9	0.375	-0.026	0.6672	
960 minute winter	SW21	3.001	SW08	1.1	0.775	0.116	0.0452	
960 minute winter	SW05	1.007	SW04	5.6	0.625	0.050	1.0721	
960 minute winter	SW10	1.002	SW09	1.1	0.630	0.163	0.1290	
960 minute winter	SW09	1.003	SW08	3.3	0.630	0.063	0.5714	
960 minute winter	SW07	1.005	SW06	4.9	0.704	0.044	0.6918	
960 minute winter	SW18	6.000	SW17	0.2	0.189	0.033	0.0517	
15 minute summer	SW11	1.001	SW10	8.9	1.142	0.931	0.1327	
960 minute winter	SW17	6.001	SW01	0.9	0.543	0.149	0.0667	
960 minute winter	SW01	1.012	Outfall	0.9	0.930	0.003	0.0156	50.2
960 minute winter	SW22	3.000	SW21	-1.0	0.562	-0.104	0.0692	
960 minute winter	SW20	4.000	SW07	0.2	0.092	0.010	0.0277	
960 minute winter	SW03	1.010	SW02	1.6	0.325	0.015	0.7224	
960 minute winter	SW08	1.004	SW07	6.5	0.769	0.124	0.2887	
960 minute winter	SW16	7.000	SW15	0.4	0.291	0.063	0.0479	
960 minute winter	SW15	7.001	SW01	0.6	0.470	0.103	0.0175	
960 minute winter	SW14	5.000	SW13	0.4	0.404	0.042	0.0681	
960 minute winter	SW13	5.001	Attenuation tank	1.1	0.675	0.118	0.0926	
240 minute summer	Blue roof - L01	Depth/Flow	SW09	3.2				
960 minute winter	SW04	1.008	Attenuation tank	8.1	0.398	0.114	0.6607	
960 minute winter	SW02	1.011	SW01	1.5	0.071	0.014	1.0343	
960 minute winter	SW06	1.006	SW05	8.8	0.694	0.079	0.5141	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW12	12	1.475	0.406	5.6	0.1233	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW12	1.000	SW11	4.2	0.746	0.438	0.0673	

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