100 Chalk Farm Road

Sustainable Drainage Report

Prepared by Pell Frischmann

Submitted on behalf of Regal Chalk Farm Ltd

January 2024

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Ref. reference. Rev revision. Suit suitability.

Prepared for

Regal Chalk Farm Ltd

4-5 Coleridge Gardens
London
NW6 3QH

Prepared by

Pell Frischmann

Suite 4.2 – 1 The Poynt
Wollaton Street
Nottingham
NG1 5FW

Pell Frischmann

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1 Introduction

1.1 Project Brief

1.1.1 Pell Frischmann has been appointed by Regal Chalk Farm Ltd to develop a drainage strategy to support a planning application for the redevelopment of a site located at 100 Chalk Farm Road (The Site), within the London Borough of Camden (LBC), London.

1.1.2 This Sustainable Drainage Report (SDR) sets out the principles of the chosen drainage strategy and demonstrates how the local and national guidance has been considered. This includes justification of; specific flow rates, the volume of attenuation required and sustainable drainage systems to be included.

1.2 Sources of Information

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

- National Planning Policy Framework (NPPF), September 2023;
- Planning Practice Guidance (PPG) in respect of Flood Risk and Coastal Change, August 2022;
- Non-statutory technical standard for sustainable drainage systems, March 2015;
- Water UK Design and Construction Guidance, 2021;
- Water UK Sewerage Sector Guidance; October 2019;
- CIRIA SuDS Manual C753, 2015;
- HM Government, The Building Regulations 2010, Drainage and Water Disposal (Part H); 2015
- London Borough of Camden Strategic Flood Risk Assessment, July 2014
- London Borough of Camden Local Plan, 2017
- The London Plan, 2021
- Camden Planning Guidance Water and Flooding, March 2019
- London Sustainable Drainage Action Plan, December 2016

1.2.2 The NPPF specifies that surface water arising from a developed site should, as far as 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.

1.2.3 In their role as Lead Local Flood Authority (LLFA), London Borough of Camden have prepared the 'Camden Planning Guidance; Water and Flooding' document which outlines specific requirements for surface water drainage in new developments and provides advice and guidance on the use of suitable SuDS. This document will be referenced throughout this SDR where appropriate.

1.3 Site Location

1.3.1 The site is located at 100 Chalk Farm Road, Camden, London. A site location plan is included for reference as **Figure 1.1**. In total, the site covers approximately 0.28ha.

1.3.2 The northern boundary is formed by Chalk Farm Road, beyond which are several commercial developments. To the east is further commercial development comprising a temporary Morrisons supermarket (which forms part of wider Camden Goods Yard redevelopment). The southern boundary is formed by the North London Line railway line, beyond which is an extensive network of railway lines including the; London Euston to Crewe Line, West Coast Main Line, and the Watford DC Line. To the west of the site is the Camden Roundhouse Theatre.

1.3.3 The entire site is currently occupied by existing buildings and associated hardstanding. It is therefore considered that the existing site is subject to an engineered regime of drainage involving the positive drainage of large areas of impermeable surfacing and roof footprint.

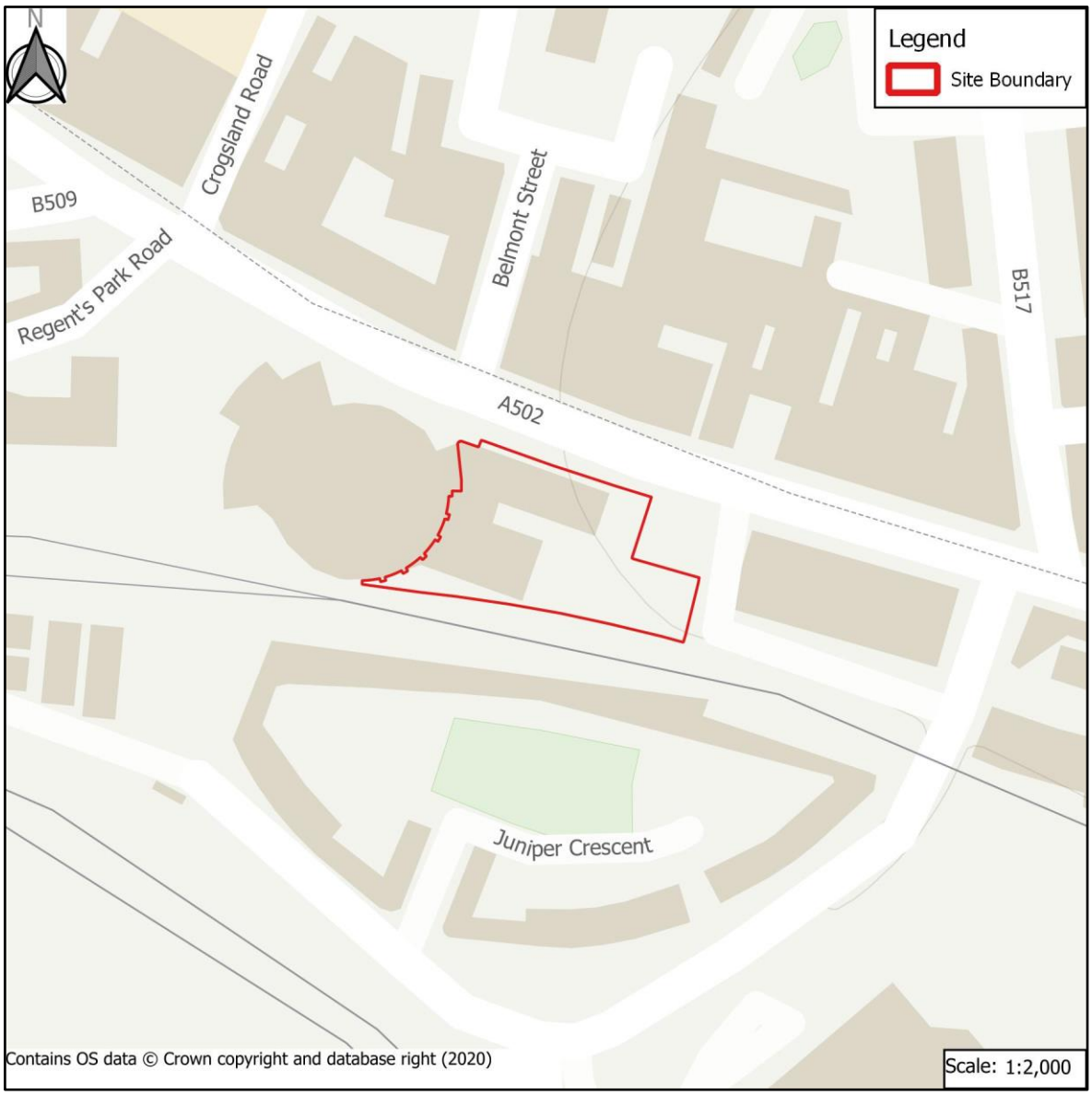


Figure 1.1 Site Location Plan

1.4 Topography

1.4.1 A topographic survey, included as **Appendix A**, suggests that the site generally falls from north to south with maximum elevations of approximately 28.41mAOD in the north entrance to the site, rising to a maximum elevation of approximately 34.50mAOD in the southwest corner of the site.

1.4.2 LiDAR data, provided by DEFRA, covering the wider area shown in **Figure 1.2**, provides a general overview of the site, suggesting the site does not contain major changes in elevation, apart from the small rise in elevation towards the north presented above. Generally, north of the site falls in elevation, whilst south of the site falls in elevation.

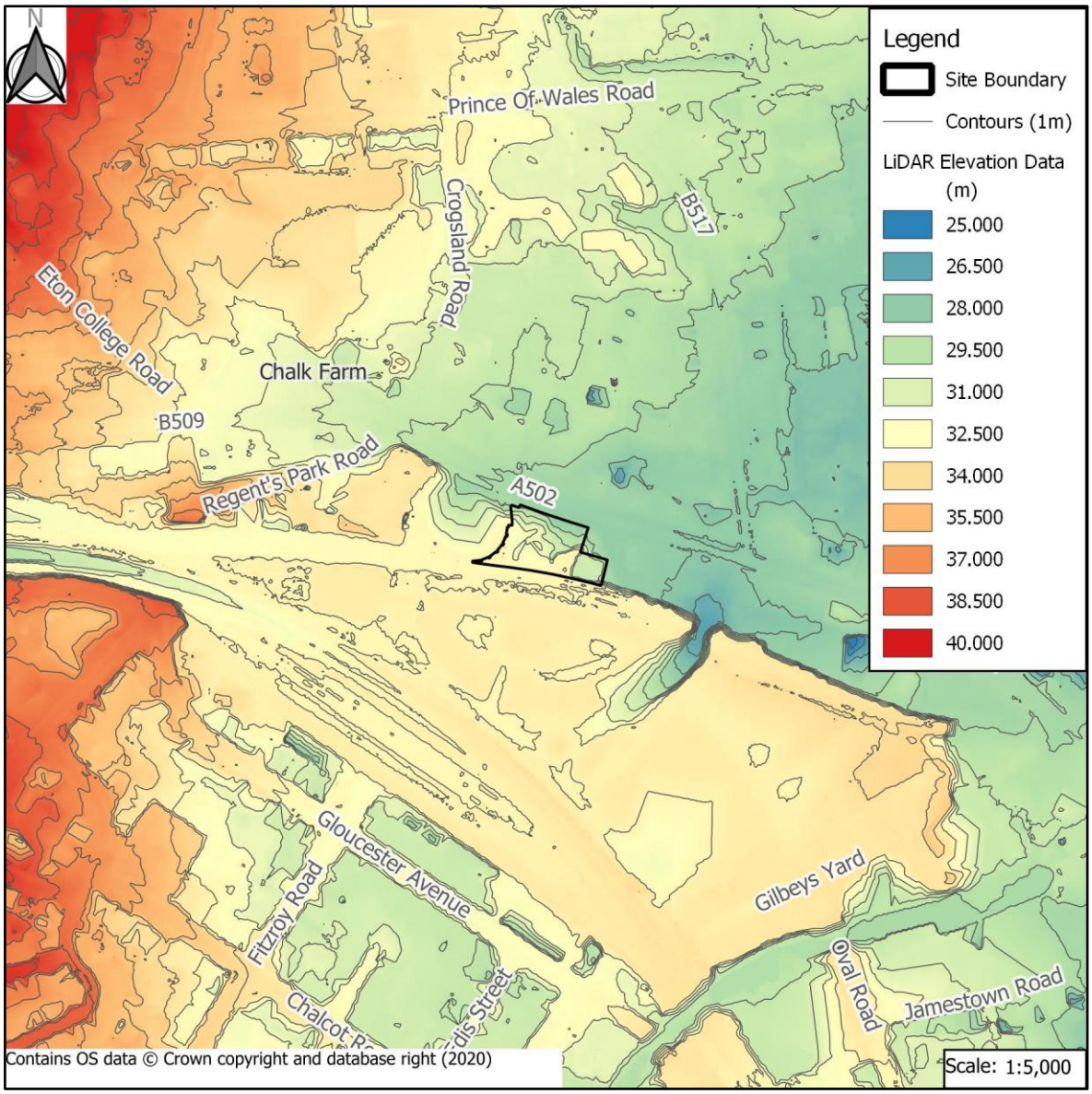


Figure 1.2 LiDAR Elevation Data

1.5 Proposed Development

1.5.1 The development proposal comprises of the demolition of existing building and redevelopment of the site to provide two buildings ranging in height from 6 to 12 storeys containing purpose-built student accommodation (PBSA) with 265 rooms, associated amenity and ancillary space (Sui Generis), 24 affordable residential homes (Class C3), ground floor commercial space (Class E) together with public realm access, servicing, and other associated works.

2 Existing Conditions

2.1 Existing Site

2.1.1 The existing site is wholly comprised of areas of hardstanding and buildings. There are no watercourses nearby as confirmed by the OS OpenRivers dataset. With the nearest being Regents Canal, approximately 350m to the south of the site. The River Thames is found approximately 4.5km to the south of the site. The former River Fleet may be located towards the east of the site, now running below-ground in culverts and other infrastructure.

2.1.2 **Figure 2.1** shows the location of local watercourses for context.

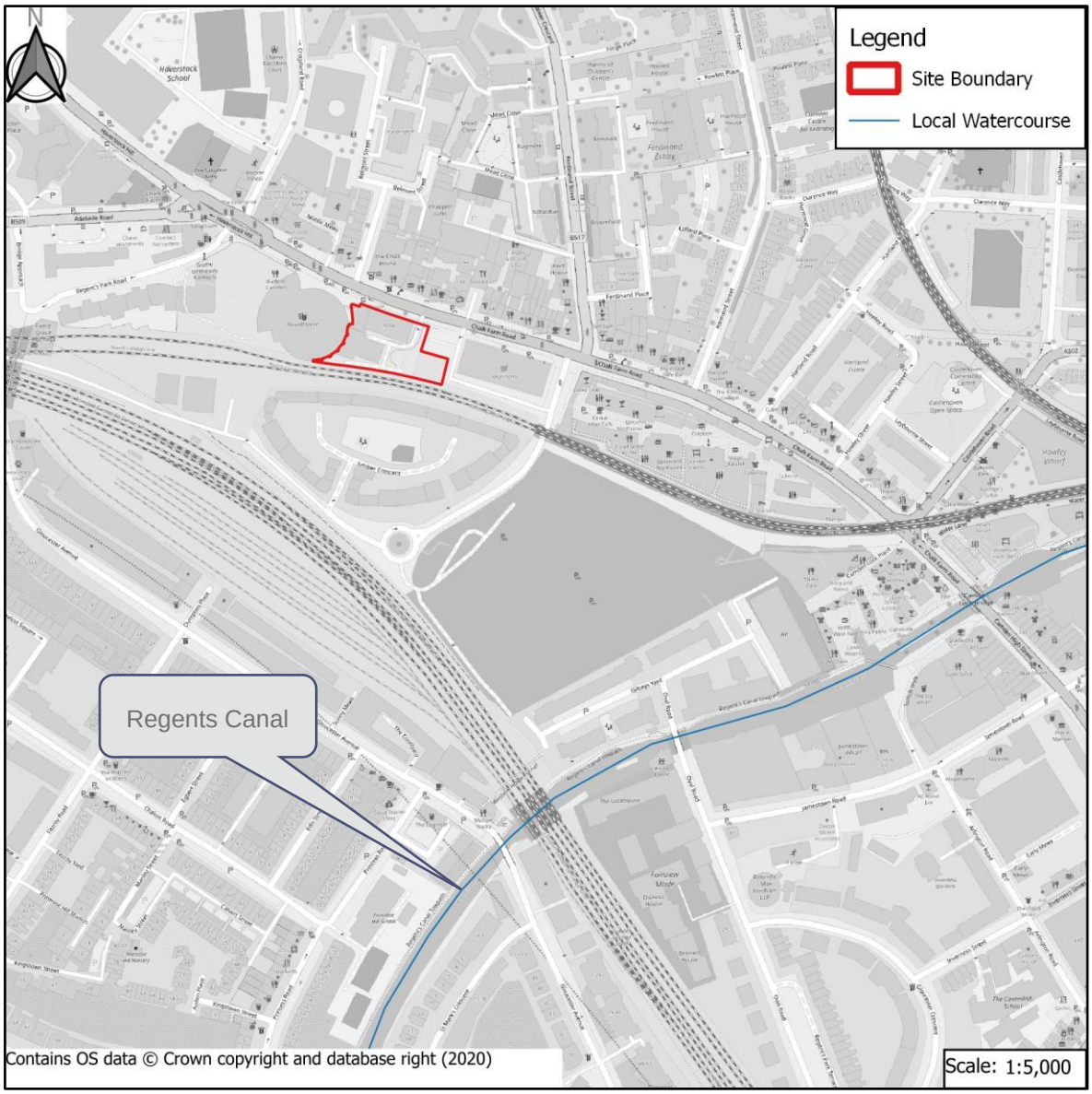


Figure 2.1 Local Watercourses

2.1.3 The entire site is occupied by existing buildings and associated hardstanding. It is therefore considered that the existing site is subject to an engineered regime of drainage involving the positive drainage of large areas of impermeable surfacing and roof footprint.

2.1.4 British Geological Survey (BGS) mapping suggests the site has no recorded superficial geology.

2.1.5 The site is wholly underlain by a bedrock geology comprising London Clay Formation – Clay, Silt, and Sand.

2.1.6 The mapped underlying bedrock geology suggests a low infiltration potential across the majority of the site due to the low permeability of clay. As the site has no recorded superficial geology, the infiltration potential of the underlying geology is unknown.

2.1.7 Borehole information available via the BGS GeoIndex for several boreholes found within the site boundary has been summarised in **Table 2.1**.

Table 2.1 Borehole Information

Borehole Reference	Date Drilled	Depth (mbgl)	Water Struck (mbgl)
TQ28SE2032	January 1972	18.28	Not Recorded
TQ28SE2033	January 1972	12.49	5.4
TQ28SE2034	January 1972	21.33	5.4
TQ28SE2035	January 1972	18.28	4.5

2.1.8 Aquifer designations by DEFRA show the both the superficial drift and bedrock classifications to be Unproductive. This is defined as rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

2.1.9 Overall, this suggests a limited amount of water available within the superficial and bedrock strata.

2.1.10 The site does not fall within a Source Protection Zone (SPZ), with the nearest Zone II – Outer Protection Zone found approximately 500m to the southwest of the site.

2.2 Existing Runoff Rate

2.2.1 The overall site boundary is approximately 0.28ha.

2.2.2 An assessment of the equivalent greenfield surface water runoff rate from the whole site has been undertaken using the Source Control module within MicroDrainage and is summarised within **Table 2.2**. The equivalent greenfield runoff rate equates to a rate of 1.2l/s/ha, with full outputs from HR Wallingford Greenfield Runoff Rate Estimation tool included for reference as **Appendix B**.

Table 2.2 Runoff Rate

Development Area (ha)	Return Period			
	1-year (l/s)	QBAR (l/s)	30 (l/s)	100 (l/s)
1 (pro-rated)	1.0	1.2	2.8	3.9

2.2.3 As the site area is 0.28ha, the equivalent greenfield runoff rate is too low for the proposed drainage strategy to function and for the pipes required to convey runoff to reach self-cleansing velocity. As such, in line with LBC policy and general best practice, the QBAR has been reduced as far as reasonably possible, whilst also ensuring the drainage strategy will function.

2.2.4 The maximum allowable discharge rate has been set as 2.0l/s for any individual flow control device.

2.3 Existing Runoff Volume

2.3.1 An assessment of the existing surface water runoff volume from the site has been made for a 1 in 100-year 6-hour storm.

2.3.2 As the land is wholly developed, the equivalent greenfield runoff volume has been calculated, using the Greenfield Volume calculator within the Source Control module within MicroDrainage. For the site, the

greenfield runoff volume has been calculated to be equivalent to 175.34m^3/ha. Calculations have been included as **Appendix C**.

2.3.3 Factored down for the size of the site, this equates to a greenfield runoff volume of approximately 49.09m^3.

3 Surface Water Drainage Strategy

3.1 Drainage Hierarchy

3.1.1 Prevailing local and national guidance suggests that surface water runoff from ta development should be disposed of as high up the following hierarchy as reasonably practicable;

- Water reuse, where a need is identified
- Into the ground (infiltration), where ground conditions permit
- To a surface water body
- To a surface water sewer, highway drain, or another drainage system
- To a combined sewer

3.1.2 The aim of this approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

3.1.3 Water reuse should be considered as a drainage feature, as long as there is an identified need for such drainage method.

3.1.4 British Geological Survey mapping suggests the site has no recorded superficial geology. This means is it not possible to determine the potential for water to move within the strata. Large areas of made ground are anticipated due to the fully developed nature of the site in its current form.

3.1.5 The site is underlain by a bedrock geology of London Clay Formation. This is formed of laminated clay layers, which suggests that there are no large quantities of water stored within the strata.

3.1.6 There are four boreholes within the site boundary. Information provided in **Table 2.1**

3.1.7 Due to the absence of site-specific infiltration resting, the site is mostly comprised of hardstanding and buildings, and the presence of Clay in the bedrock strata, it is assumed that discharge of surface water via infiltration will not be feasible.

3.1.8 Furthermore, due to the location of the site, there are no nearby surface water bodies or surface water drains that would provide a suitable and practicable outfall for the surface water runoff generated by the development.

3.1.9 However, due to the topography of the site, is assumed that there are positive drainage features which connect the site to the public sewer network. After a review of sewer records provided by Thames Water, it shows an existing combined sewer running along Chalk Farm Road and serving the Roundhouse Theatre. Sewer records are shown for reference in **Appendix D**.

3.1.10 It is therefore proposed to discharge into the local public combined sewer network in line with the drainage hierarchy. Whilst this is not the preferred method it should be noted that the development discharge rates are proposed to be restricted as close to the equivalent greenfield runoff rate, as the current discharge rate for the site is too low to be able to effectively drain the site and maintain and reduce blockages within the surface water network and therefore presents a significant benefit to the current unrestricted discharge from the site.

3.1.11 The proposed discharge point for the site likely required a connection to the existing Thames Water trunk sewer located in Chalk Farm Road. If a direct connection is required, the works are likely required to be undertaken directly by Thames Water. A pre-planning enquiry has been submitted to Thames Water requesting the feasibility of surface and foul water connections.

3.2 Surface Water Attenuation

3.2.1 The overall site area is approximately 0.28ha. This includes development space, open space, associated road infrastructure, and the existing buildings on site. The planning layout has an approximate impermeable area of 0.28ha.

3.2.2 As a runoff rate restriction is required, it is necessary to provide surface water attenuation to balance the excess volume in a safe manner. Sufficient storage is provided for events up to the 1 in 100-year storm with a 40% allowance for climate change, in line with Environmental Agency guidance on peak rainfall.

3.2.3 To balance the excess surface water runoff generated by the proposed development in a sustainable way, storage will be provided through a mixture of cellular storage tanks and blue roofs. The breakdown of impermeable area, corresponding discharge rates and approximate attenuation volumes is provided in **Table 3.1**.

Table 3.1 Plot Area, Runoff Rates and Volume of Attenuation

Total Area (ha)	Resultant Impermeable Area (ha)	Discharge Rate (l/s)	Peak Volume of Attenuation (m^3) Under Critical 100-year Event Including Climate Change Allowance
0.28	0.28	4.00	242

3.2.4 The cellular storage tanks will be below-ground in public open space to attenuate surface water runoff from the proposed development. Two tanks have been proposed, one located in the north-eastern corner underneath proposed green open space, and the other in the north-western corner located in open space. The two tanks have been designed to be 2m in depth and both assumed to have a 95% void capacity.

3.2.5 The blue roof will be situated underneath the permeable paving, which is found on the amenity space at the rear of the development. The total area of permeable paving is approximately 433m^2, an assumed 70% of this total area can be used as storage for the proposed blue roof. The blue roof has been designed to a depth of 0.2m and an assumed void capacity of 95%.

3.2.6 The combination of cellular storage tanks, permeable paving and blue roofs across the development providing suitable storage capacity for the site and treats water by filtering out contaminants. This achieves all four pillars of good SuDS design.

3.2.7 Calculations for the permeable paving and cellular storage tanks are shown for reference in **Appendix E**.

3.3 Runoff Volume Control

3.3.1 The DEFRA Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6 states that where reasonably practical, the runoff volume from a development for the 1 in 100-year 6-hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previous developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume.

3.3.2 As the proposed strategy seeks to restrict runoff to as close to greenfield QBAR rate for all return periods, the runoff volume criteria of the non-statutory technical standards for sustainable drainage systems are met, and the provision of long-term storage is not required.

3.4 SuDS Features

3.4.1 The proposed strategy is based on sustainable drainage principles, employing SuDS features to manage surface water runoff across the site. This includes the implementation of; cellular storage tanks,

permeable paving, green roofs, tree pits and blue roofs to provide surface water attenuation and provide a water quality provision in line with the SuDS management train.

3.4.2 A wide variety of other SuDS features can also be implemented across the development as the design progresses and this could include, but is not limited to;

- Water Butts
- Rainwater Harvesting Systems
- Filter Drains

3.4.3 A surface water management plan (document ref: 106885-PEF-ZZ-XX-DR-CD-0500), provided in **Appendix F**, shows typical extents of SuDS features in line with the design masterplan, included as **Appendix G**.

3.4.4 A summary of SuDS features and suitability for implementation as part of the drainage strategy for the site is shown in **Table 3.2**.

Table 3.2 SuDS Features Appraisal

SuDS Technique	Applicable to Site? (Y/N/TBC)	Included in current strategy? (Y/N/TBC)	Comments
Rainwater Harvesting	Y	N	Rainwater harvesting is to be considered to retain rainwater for re-use in irrigation purposes
Blue Roofs	Y	Y	Included within architect plans to provide runoff quality improvements prior to attenuation storage tanks.
Green Roofs	Y	Y	Included within architect plans to provide runoff quality improvements prior to attenuation storage tanks.
Rain Gardens	Y	Y	Rain Gardens used in conjunction with permeable paving to provide water quality improvements from surface water runoff in external areas.
Infiltration Systems	N	N	The feasibility of infiltration as a means of surface water disposal is assumed to be unviable, but a targeted infiltration test will be undertaken as part of construction works.
Filter Strips	N	N	There are limited areas of appropriate open space adjacent to hardstanding surfaces to be used for filter strip purpose.
Filter Drains	N	N	Not included as alternatives such as permeable paving should considered for parking areas and private roads.
Swales	N	N	Site layout and spatial constraints mean swales are not appropriate in this case.
Pervious Pavements	Y	Y	Pervious paving is proposed in the strategy to limit the impermeable area of the site draining to any proposed attenuation/infiltration feature. This feature will require lining.
Detention Basins	N	N	The lack of suitable open space near the outfall means a basin is an inappropriate means of attenuation
Wetlands	N	N	Constrained nature of site means wetlands are not appropriate in this case
Bioretention Systems	Y	Y	The strategy has deemed tree pits may be suitable to provide conveyance into the blue roofs
Attenuation Storage Tanks	Y	Y	The strategy has deemed above ground storage to be unfeasible due to site constraints, so below-ground attenuation is provided in line with prevailing SuDS guidance.

3.5 Water Quality

3.5.1 The Simple Index Approach for assessing pollution prevention outlined in the SuDS Manual has been used to quantify the water quality impacts of the proposed SuDS solution to determine their effectiveness.

3.5.2 The proposed use of the development would be a 'medium' pollution hazard level, so pollution index values have been copied from the SuDS Manual and compared to the mitigation index values. **Table 3.3** and **Table 3.4** show the index values and mitigation indices for Roofs PHI (Pollution Hazard Index) and External Areas PHI respectively. A summary of the Simple Index Approach is included for reference as **Appendix H**.

Table 3.3 SuDS Mitigation Indices (from CIRIA SuDS Manual) - Roof PHI

SuDS Component	Mitigation Indices		
	Total Suspended Solids	*Metals*	*Hydrocarbons*
Green Roof (bioretention system)	0.8	0.8	0.8
Cellular Storage	-*	-*	-*
SuDS Mitigation Index	**0.8**	**0.8**	**0.8**
Pollution Hazard Index Other Roofs (commercial)	0.3	0.2	0.05
Mitigation Requirement Met?	Yes	Yes	Yes

***N.B.: Some treatment value may be provided, based on the proprietary systems specified at detailed design**

Table 3.4 SuDS Mitigation Indices (from CIRIA SuDS Manual) - External Areas PHI

SuDS Component	Mitigation Indices		
	Total Suspended Solids	*Metals*	*Hydrocarbons*
Permeable Paving	0.7	0.6	0.7
Tree Pits (bioretention system)	0.8	0.8	0.8
SuDS Mitigation Calculation	1.1	1	1.1
SuDS Mitigation Index	**0.8**	**0.8**	**0.8**
Pollution Hazard Index External Areas	0.7	0.6	0.7
Mitigation Requirement Met?	Yes	Yes	Yes

***N.B.: Some treatment value may be provided, based on the proprietary systems specified at detailed design**

3.5.3 Therefore, the green roofs proposed are considered suitable SuDS features to manage the surface water pollution potential expected from the roof areas of the site and the permeable paving, rain gardens and the tree pits which form part of the wider drainage system are considered suitable SuDS features to manage the surface water pollution potential expected from external areas.

3.5.4 The previously mentioned SuDS mitigation measures will allow the Proposed Development to ensure suitable water quality standards throughout the system.

3.6 Maintenance and Adoption

3.6.1 For the proposed surface water drainage system to function correctly, it will need to be appropriately maintained. There are several possibilities for these maintenance responsibilities, they are;

- Thames Water, as the local sewerage undertaker.
- The LLFA or SuDS Approval Body (SAB) (if section 3 of the FWM Act 2010 is enacted)
- A private management company.

3.6.2 Furthermore, there are 3 discrete components to the system – the pipe network, the principal SuDS (below-ground attenuation tanks) and ancillary SuDS (green roofs, permeable paving, tree planters etc).

A situation may arise whereby one of the bodies adopts a specific part of the network (the pipe network for example) but not one of the other components. In this case, it is assumed that a maintenance company will be appointed to maintain all components.

3.6.3 The maintenance schedule for the network must be comprehensive and detail the specific maintenance requirements for each element of the drainage system. The CIRIA SuDS Manual has extensive information relating to the maintenance of SuDS which should be consulted when specifying the requirements.

3.6.4 For pipes, manholes, and gullies, both general best practice and specific manufacturer maintenance protocols should be followed. Example maintenance activities and frequencies for the proposed SuDS features including; green roofs and blue roofs (**Table 3.5**), attenuation tanks (**Table 3.6**), tree pits (**Table 3.7**), permeable paving (**Table 3.8**), and drainage infrastructure (**Table 3.9**).

Table 3.5 Operation and Maintenance Requirements for Green Roofs & Blue Roofs

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annual (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Table 3.6 Operation and 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 of 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/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, 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

Table 3.7 Operation and Maintenance Requirements for Bioretention Systems (Tree Pits)

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect infiltration surface for sitting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plant for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlet for blockage	Quarterly
Regular Maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to bi-annually
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial Actions	Remove and replace filter medium and vegetation above	As required, but likely to be >20 years

Table 3.8 Operation and 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 most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and 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 level 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 significance clogging)
	Initial inspection	Monthly for three months after infiltration

Monitoring	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 3.9 Operation and Maintenance Requirements for Drainage Infrastructure

Drainage Item	General Requirements	Frequency
Channel Drains	Clean litter/debris from surface	3 Monthly
	Clean and jet as required	12 Monthly
Hydrobrake Manholes	Check of all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	12 Monthly
Gullies	Clean litter/debris from surface	3 Monthly
	Clean and jet as required	12 Monthly
Drainage pipework	Clean and jet as required	12-18 Monthly
Inspection Chambers / Catchpits / Manholes / Rodding Eyes	Remove cover to check for any sign of blockage and clean/jet as required. Empty sumps of all sediment / debris.	12 Monthly

4 Foul Water Drainage

4.1.1 The site is understood to be currently served by existing foul drainage infrastructure, due to its developed nature.

4.1.2 For the foul strategy, it is proposed to use foul gravity sewers to discharge foul flows from the site, via connections to the existing combined sewer network to the north of the site. A conceptual drainage strategy is shown in **Appendix F**, which shows connection to drainage in Chalk Farm Road.

4.1.3 It is proposed to connect to an existing public combined sewer found between Chalk Farm Road and the Roundhouse Theatre. A gravity connection is considered feasible for the site at this stage as the invert levels of nearby manholes is approximately 23.5m AOD. However, the exact size and route of the existing drainage along with any invert levels will need to be verified via a drainage survey to inform the design.

4.1.4 All foul connections to the existing public sewerage system will need to be approved by Thames Water in accordance with Section 106 of the Water Industry Act. An application for the connections will need to be submitted to Thames Water in due course to obtain approvals for the connection prior to commencement of works.

4.1.5 The current iteration of the development includes provision of c. 265 purpose build student accommodation units, 24 social rent affordable residential units, 824m² of commercial space.

4.1.6 To calculate the potential peak flows, it is assumed that the average occupancy of the student bedrooms is 1 persons/bedroom, and the affordable social rent residential units are assumed to have an average occupancy of 2.4 persons/dwelling, in line with prevailing guidance found in Flows and Loads 4.

4.1.7 This would result in a population equivalent of 265 persons for the student accommodation which equates to a total flow rate for the student bedrooms of 0.43l/s based on an average water use of 150 litres/per head/per day.

4.1.8 The population equivalent for the affordable social rent accommodation would be 58 persons. This would equate to a total flow rate of 0.20l/s based on an average water usage of 150 litres/per head/per day.

4.1.9 In order to calculate the peak foul drainage flow for the domestic element of the development, the total flows are multiplied by a factor of 6. This is calculated using the below equation.

No of Dwellings * Average Occupancy * 150l/person/day / 86,400 seconds * 6 DWF = Peak Flow Rate

4.1.10 Table 4.1 below presents the result of the calculations for each domestic development type.

Table 4.1 Domestic Peak Flow Rate Calculations

Development Type	No of Dwellings	Average Occupancy	Water Usage (l/person/day)	Time (seconds)	DWF Factor	Peak Foul Flow Rate (l/s)
Student Bedrooms	265	1.0	150	86,400	6	2.76
Affordable Social Rent	24	2.4	150	86,400	6	0.6

4.1.11 This equates to a combined domestic development peak foul drainage flow rate of 3.36l/s.

4.1.12 It is understood the development will also contain a commercial element. With an approximate quantum for the commercial development unit's additional peak foul flow capacity should be reserved in line with calculations based on those provided within Sewers for Adoption. This calculation includes the relevant scaling factor to account for a peak flow rate.

4.1.13 The conservative commercial peak foul flow calculations is calculated using the below equation based on a total non-residential Gross Internal Area (GIA) of approximately 824m^2. It should be noted that the proposed development does not incorporate any trade effluent flow demand.

Domestic Design Flow + Trade Effluent Design Flow * Total Area = Peak Foul Flow

4.1.14 **Table 4.2** shows the calculations for the commercial peak foul flow rate.

Table 4.2 Commercial Peak Foul Flow Rate Calculations

Development Type	Total Impermeable Area (Ha)	Domestic Design Flow (l/s)	Trade Effluent Design Flow (l/s)	Peak Foul Flow Rate
Commercial	0.0824	0.6	0.0	0.05 l/s

4.1.15 This equates to a conservative commercial peak foul flow rate of 0.05l/s.

4.1.16 Therefore, in total, the site is likely to have a combined peak foul flow rate of 3.41l/s.

5 Summary

5.1.1 This report and supporting appendices demonstrate than an appropriate surface water drainage strategy has been developed for the site based on sustainable drainage principles in line with relevant local, national and BREAM polices and standards. A gravity-based foul drainage solution is also considered possible at this stage given the available information, connecting to the existing public sewer network.

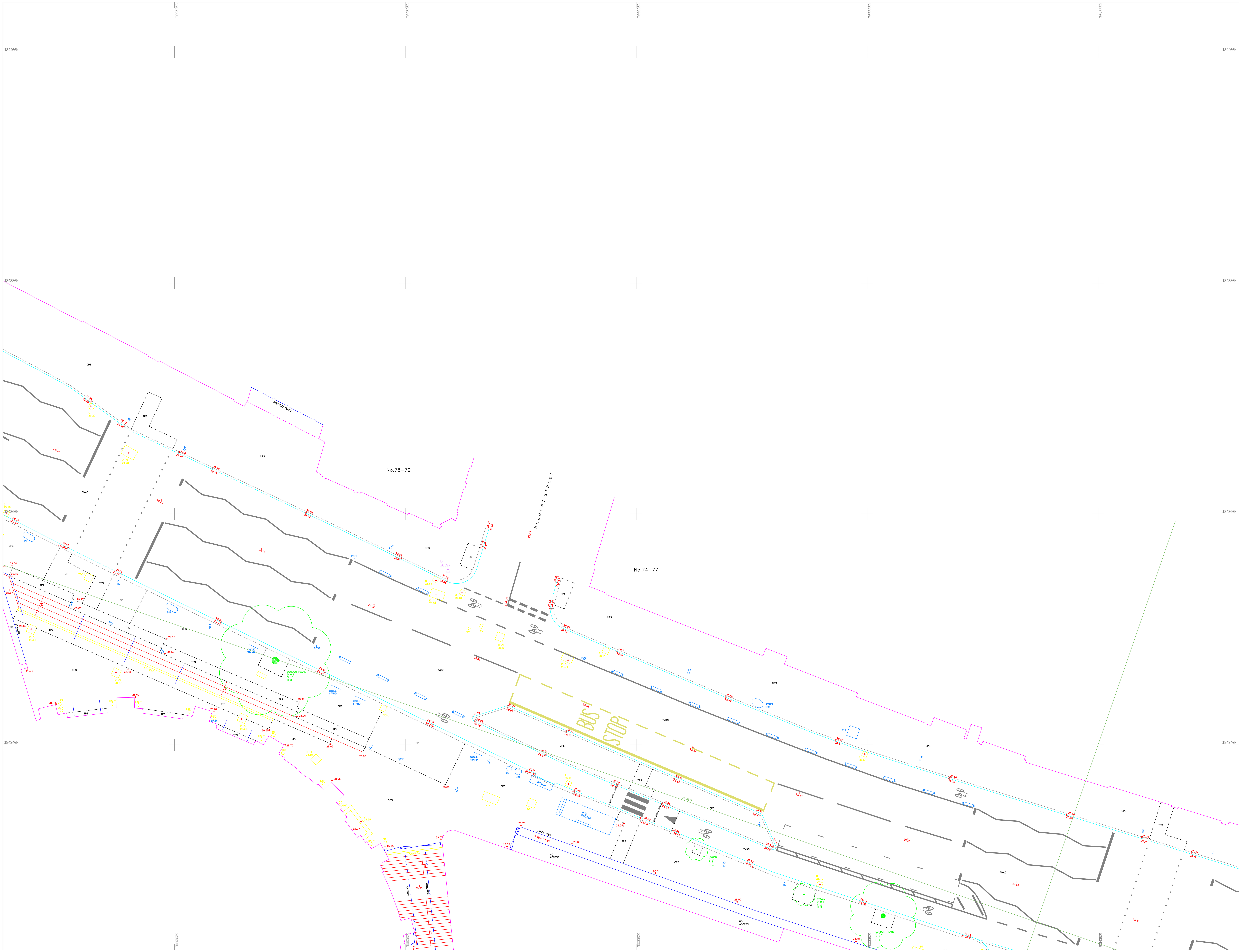
5.1.2 This Sustainable Drainage Report is intended to support an outline planning application and as such the level of detail included is commensurate with the nature of the proposals. **Table 5.1** provides a summary of key information included within this report.

Table 5.1 Summary of Key Information

Topic	Existing Site		Proposed Development
Site Area (hectares)	0.28		0.28
Impermeable Area (hectares)	0.28		0.28
Number of Sub-Catchments	-		1
Outfall Location(s)	Combined Sewer		Combined Sewer – TW Trunk Sewer in Chalk Farm Road
Peak Runoff Rate (l/s/ha)	1 in 1-year	1.3	4.0 (minimum required flow for system to reach self-cleansing velocity)
	QBAR	1.5	
	1 in 30-year	3.4	
	1 in 100-year	4.9	
	1 in 100-year + CC	-	
Proposed Storage Volume (m^3)	-		242
SuDS Features	-		Permeable paving Tree Pits Rain Gardens Green Roofs Blue Roofs Cellular Attenuation Tanks
Maintenance Responsibilities	Landowner Maintenance Company		Landowner Thames Water LLFA (as SAB) Maintenance Company

5.1.3 As the site is within the London Borough of Camden, the London SuDS proforma is required to summarise the key outputs from the strategy. This has been included for reference as **Appendix I**. In accordance with the National Planning Policy Framework and local guidance this Sustainable Drainage Report has demonstrated that the development can proceed, as it demonstrates that both surface and foul water are suitably delt with. The SDR also lays out a range of approved SuDS which are used to store surface water.

Appendix A Topographical Survey



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BB	Belisha Beacon	ELEC	Electricity	RAD	Radiator
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Top / Bottom — Banks
Drop Kerbs
Overhead Detail
Change in Elevation
Fences
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Change in Surface
Edge of Vegetation

3.28 — Floor to Ceiling Height
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Combined Sewer

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COORDINATE SCHEDULE

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C	528441.034	184303.315	28.003
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E	528320.985	184306.994	47.789

NOTES

For Elevations see Dwg 0994-E

SHEET LAYOUT

1	2	3
4	5	6

Rev	Amendment	Date

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ISO 9001 Certificate No. GB2005880

Cloud 10 Ltd, 27 Old Gloucester Street, London, WC1N 3AX
T: 020 4537 5522 E: info@cloud10ltd.co.uk
www.cloud10ltd.com

Title
Topographical Survey (Sheet 2 of 6)

Project
100 Chalk Farm Road
London

Client
Regal Chalk Farm Ltd

Scale
1:100 @ A0

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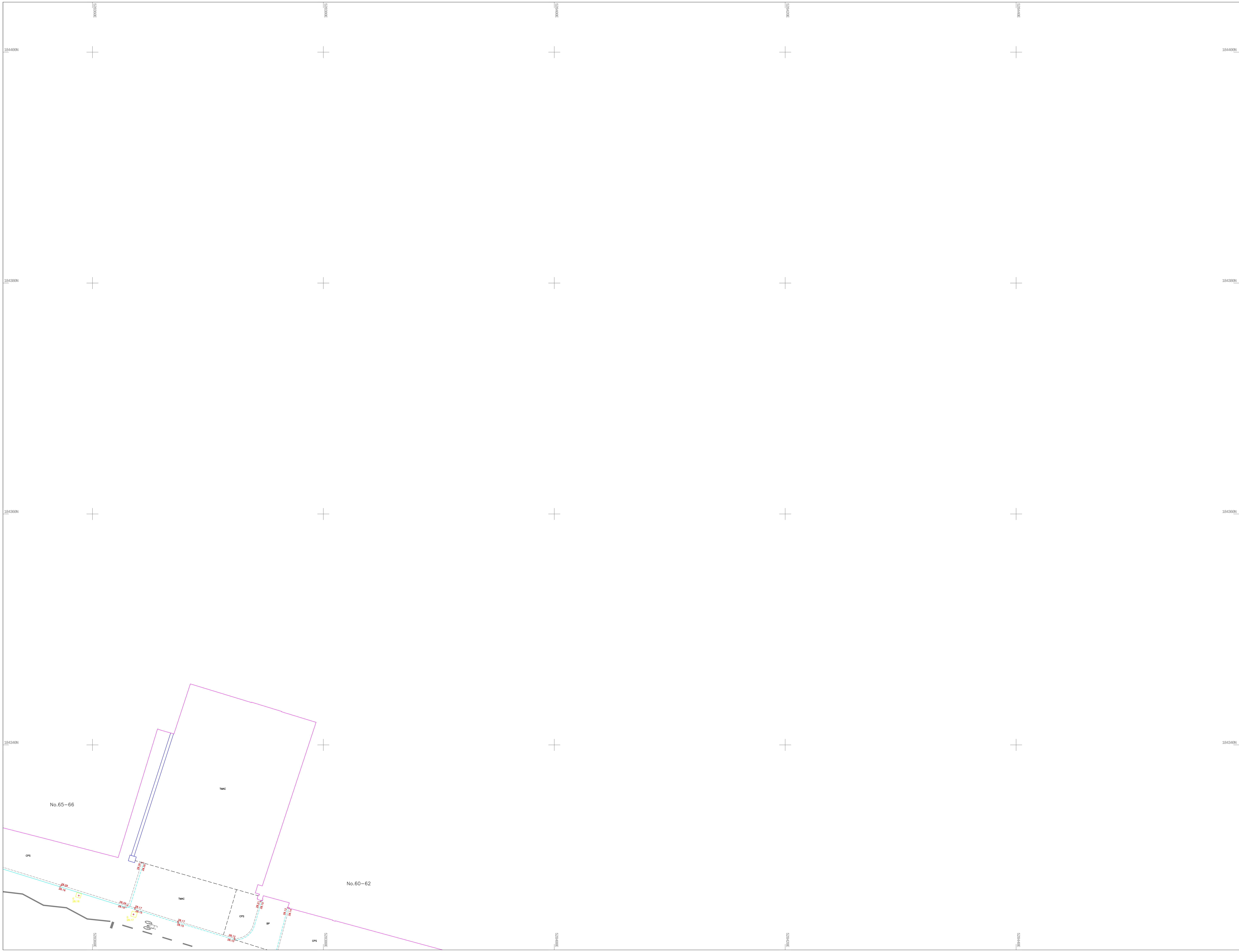
Drawing Name
0994 - T(2)



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Cloud 10 Ltd, 27 Old Gloucester Street, London, WC1N 3AX
T: 020 4537 5522 E: info@cloud10ltd.co.uk
www.cloud10ltd.com

Title: Topographical Survey (Sheet 3 of 6)

Project: 100 Chalk Farm Road, London

Client: Regal Chalk Farm Ltd

Scale: 1:100 @ A0

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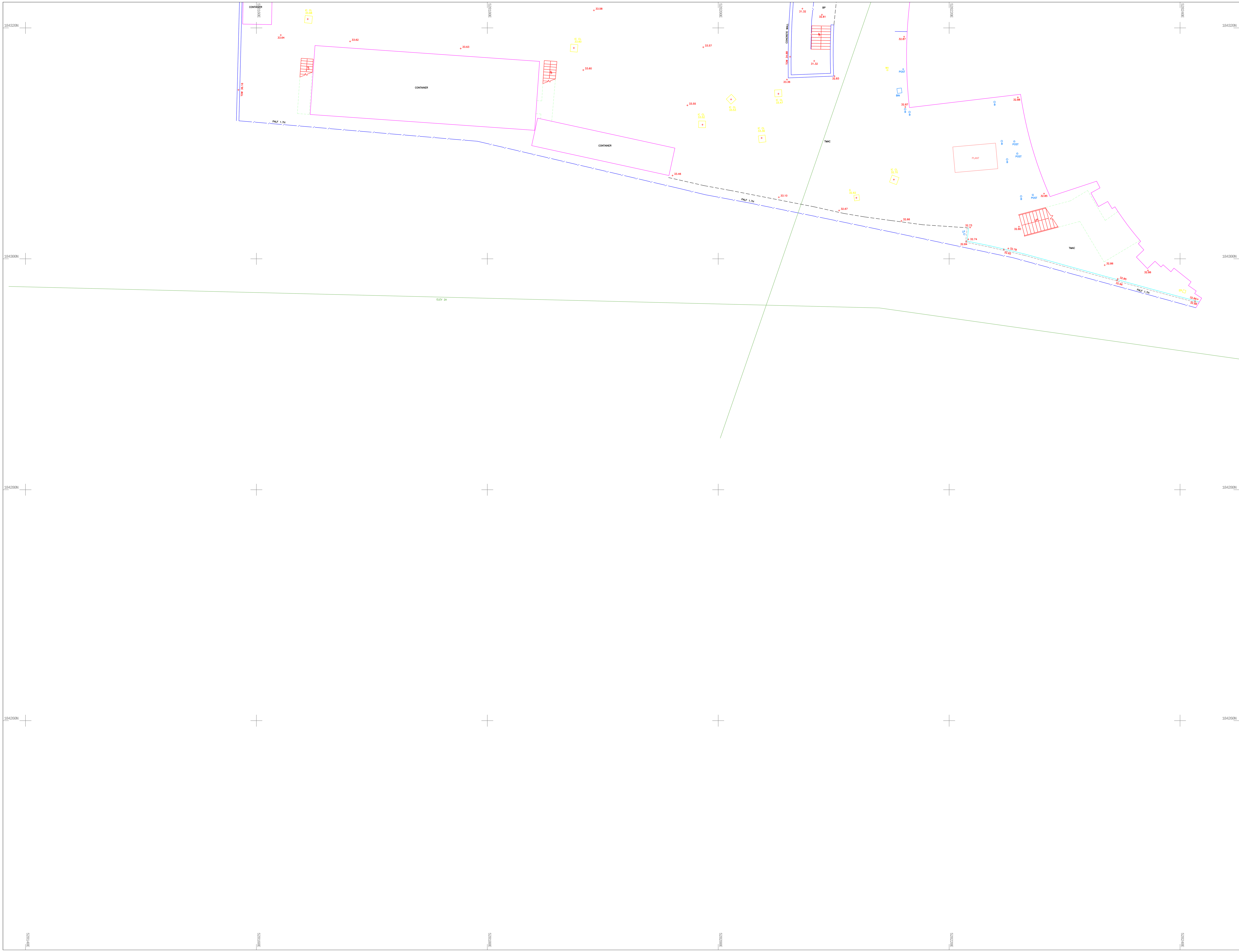

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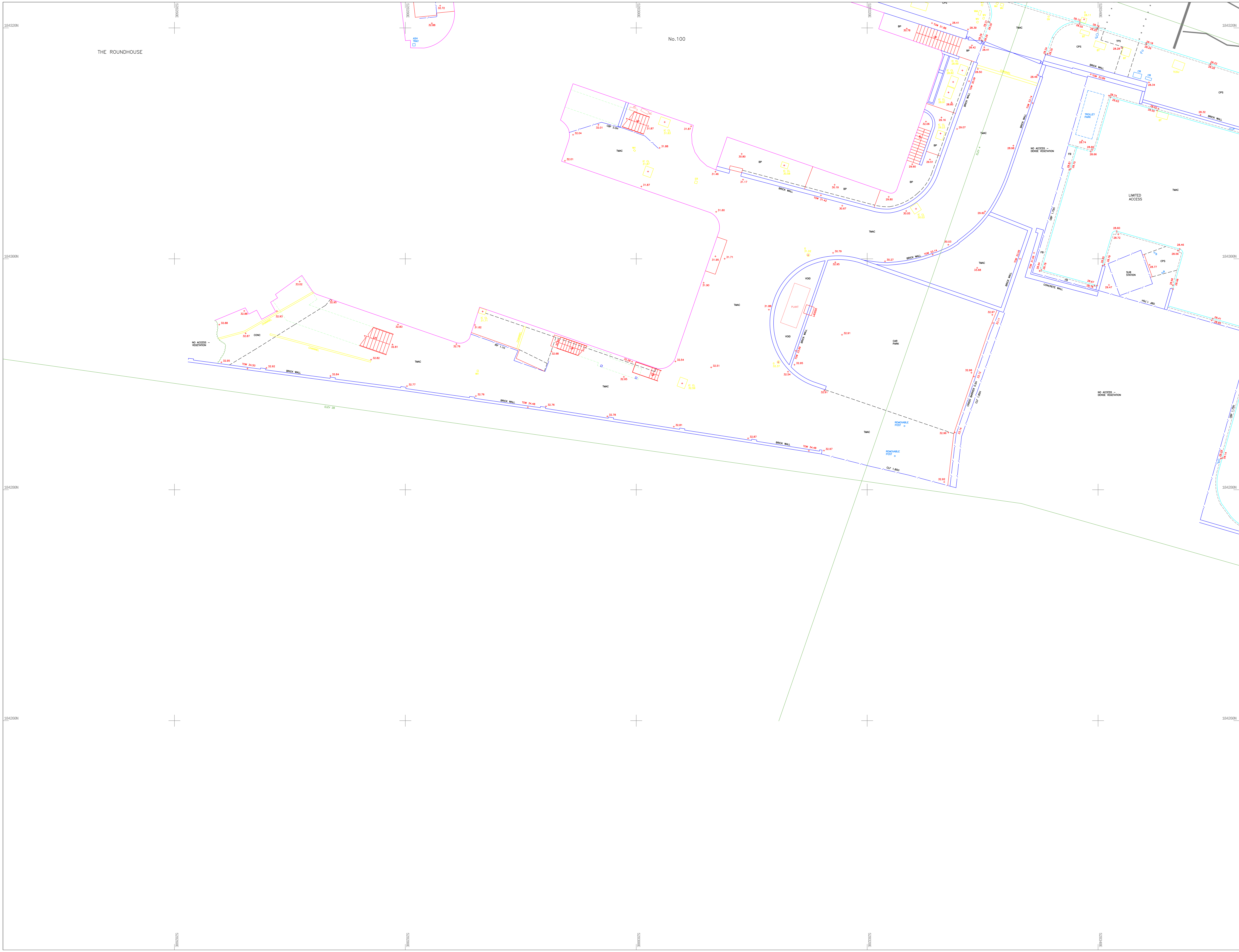

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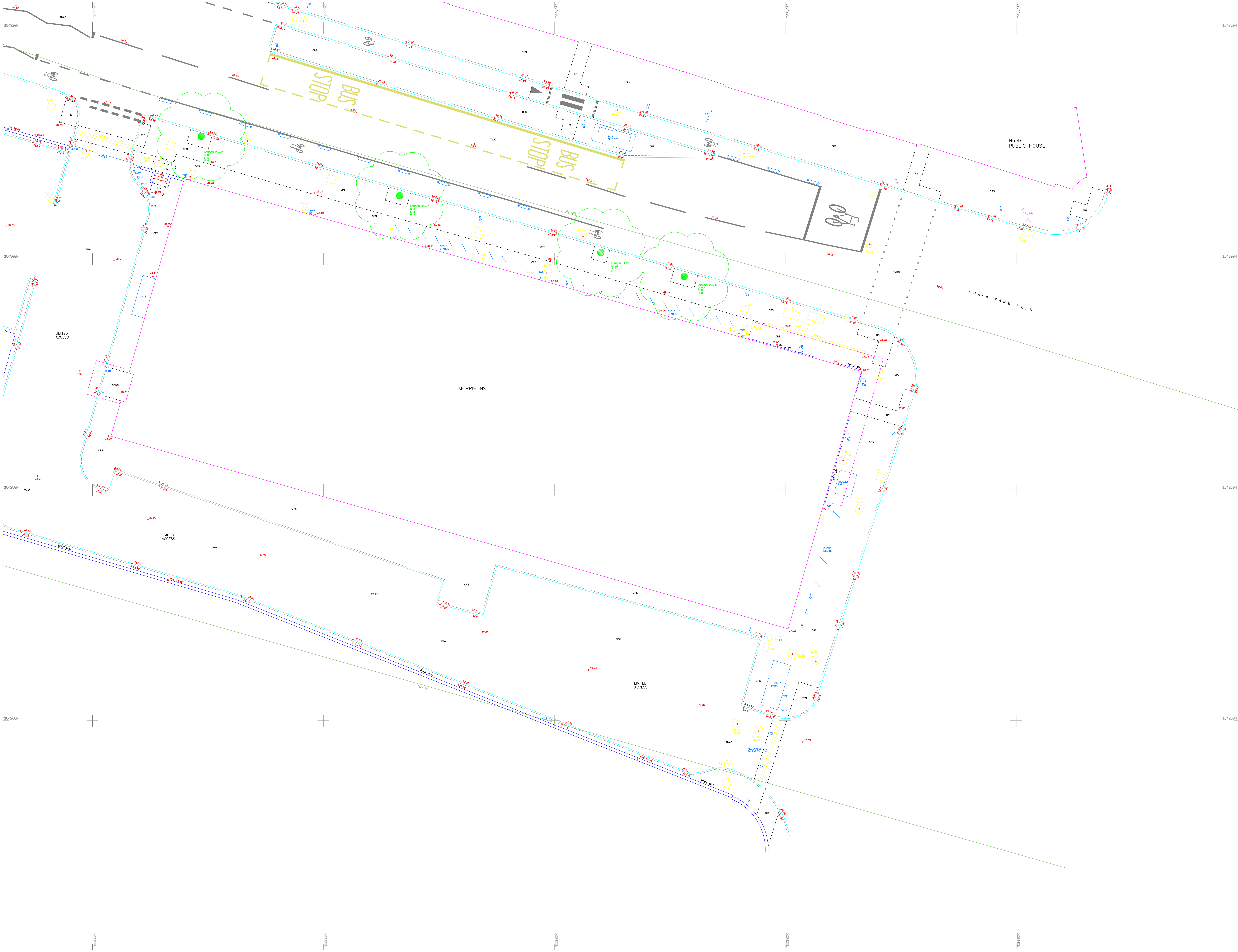

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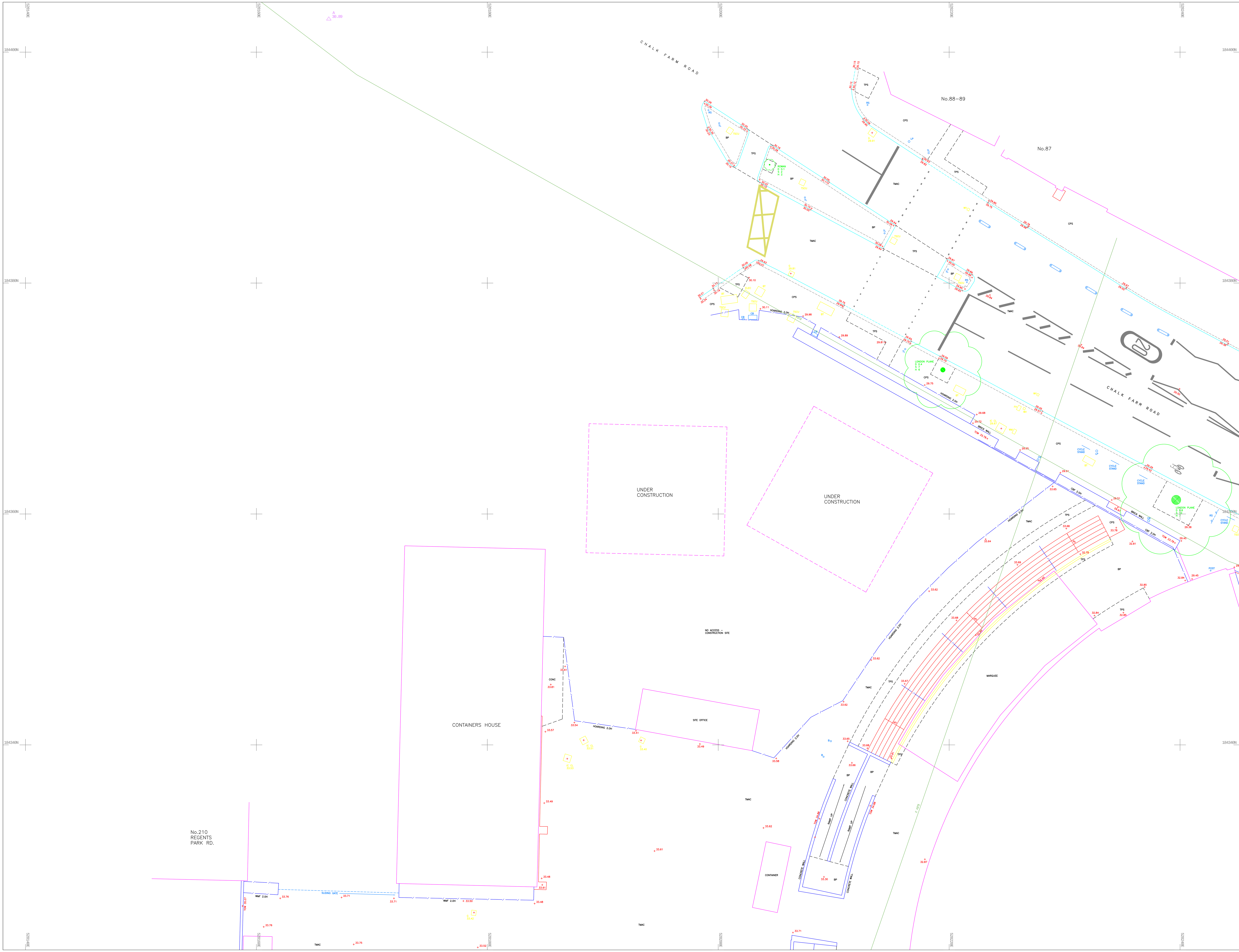

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Drawing Name
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Appendix B QBAR Calculation

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Matthew Fox
Site name:	100 CFR
Site location:	

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.54318° N
Longitude:	0.15111° W
Reference:	554675278
Date:	Jun 22 2023 10:55

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.2835

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	633	633
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	1.22	1.22
1 in 1 year (l/s):	1.03	1.03
1 in 30 years (l/s):	2.8	2.8
1 in 100 year (l/s):	3.88	3.88
1 in 200 years (l/s):	4.55	4.55

Appendix C Greenfield Runoff Volume

Greenfield Runoff Volume

FEH Data

Return Period (years)	100
Storm Duration (mins)	360
FEH Rainfall Version	2013
Site Location	GB 528304 184308 TQ 28304 84308
Data Type	Point
Areal Reduction Factor	1.00
Area (ha)	1.000
SAAR (mm)	600
CWI	87.000
SPR Host	0.000
URBEXT (1990)	0.5000

Results

Percentage Runoff (%)	19.70
Greenfield Runoff Volume (m^3)	175.341

Appendix D Sewer Asset Plans Thames Water

CommercialDW
Multisite Drainage & Water Enquiry

Thames Water Property Searches

TM Property Service Ltd.
1200, Delta Business Park
Swindon
SN5 7XZ

Search address supplied	MULTISITESEARCH, 100, Chalk Farm Road, London, NW1 8EH
Your reference	23474141
Our reference	CDWS/CDWS Standard/2022_4661568
Received date	8 June 2022
Search date	13 June 2022

Keeping you up-to-date

Commercial Drainage and Water Enquiry

The Commercial Drainage and Water Enquiry is specifically designed for those purchasing or leasing land or commercial property.

With comprehensive information regarding water and sewerage services and infrastructure assets, combined with an appropriate guarantee for commercial property and land transactions, the Commercial Drainage and Water Enquiry mitigates risk and provides peace of mind for commercial property professionals and their advisers.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

CON29DW COMMERCIAL DRAINAGE & WATER SEARCH

DRAINAGE + WATER SEARCHES NETWORK DWSN

Search address supplied: MULTISITESEARCH, 100, Chalk Farm Road, London, NW1 8EH

Any new owner or occupier will need to contact Thames Water on 0800 316 9800 or log onto our website www.thameswater.co.uk and complete our online form to change the water and drainage services bills to their name.

The following records were searched in compiling this report: - the map of public sewers, the map of waterworks, water and sewer billing records, adoption of public sewer records, building over public sewer records, the register of properties subject to internal foul flooding, the register of properties subject to poor water pressure and the drinking water register. Thames Water Utilities Ltd (TWUL) holds all of these.

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched

(ii) any negligent or incorrect interpretation of the records searched

(iii) any negligent or incorrect recording of that interpretation in the search report

(iv) and compensation payments

Maps

1.1 Where relevant, please include a copy of an extract from the public sewer map.

A copy of an extract of the public sewer map is included, showing the public sewers, disposal mains and lateral drains in the vicinity of the properties.

1.2 Where relevant, please include a copy of an extract from the map of waterworks.

A copy of an extract from the map of waterworks is included, showing water mains, resource mains or discharge pipes in the vicinity of the properties.

Drainage

2.1 Does foul water from the properties drain to a public sewer?

Records indicate that foul water from all of the properties drains to a public sewer.

2.2 Does surface water from the properties drain to a public sewer?

Records indicate that surface water from all of the properties drains to a public sewer.

2.3 Is a surface water drainage charge payable?

Records confirm that a surface water drainage charge is applicable for the following properties:
100, Chalk Farm Road, London, NW1 8EH
Records indicate that Thames Water does not levy charges direct to the following properties, a third party is billed for the water and/or sewerage charges. It is recommended therefore that the charging situation is checked with the vendor:
Subsiduary, 100, Chalk Farm Road, London, NW1 8EH
Third Floor Office, 100, Chalk Farm Road, London, NW1 8EH
Fourth Floor Office, 100, Chalk Farm Road, London, NW1 8EH
First Floor (Part East), 100, Chalk Farm Road, London, NW1 8EH
First Floor (Part West), 100, Chalk Farm Road, London, NW1 8EH

2.4 Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundaries of the properties?

The public sewer map included indicates that there is a public sewer, disposal main or lateral drain within the boundaries of the property. However, from the 1st October 2011 there may be additional public sewers, disposal mains or lateral drains which are not recorded on the public sewer map but which may further prevent or restrict development of the property.

2.4.1 Does the public sewer map indicate any public pumping station or any other ancillary apparatus within the boundaries of the property?

The public sewer map included indicates that there is no public pumping station within the boundaries of the property.

2.5 Does the public sewer map indicate any public sewer within 30.48 metres (100 feet) of any buildings within the properties?

The public sewer map included indicates that there is a public sewer within 30.48 metres (100 feet) of a building within the property.

2.5.1 Does the public sewer map indicate any public pumping station or any other ancillary apparatus within 50 metres of any buildings within the property?

The public sewer map included indicates that there is no public pumping station within 50 metres of any buildings within the property.

2.6 Are any sewers or lateral drains serving or which are proposed to serve the properties the subject of an existing adoption agreement or an application for such an agreement?

Records confirm that Foul sewers serving the development, of which the property forms part are not the subject of an existing adoption agreement or an application for such an agreement.

The Surface Water sewer(s) and/or Surface Water lateral drain(s) are not the subject of an adoption agreement.

2.7 Has a sewerage undertaker approved or been consulted about any plans to erect a building or extension on the properties over or in the vicinity of a public sewer, disposal main or drain?

There are no records in relation to any approval or consultation about plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain. However, the sewerage undertaker might not be aware of a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain.

2.8 Is the building which is or forms part of the properties, at risk of internal flooding due to overloaded public sewers?

The property is not recorded as being at risk of internal flooding due to overloaded public sewers.

From the 1st October 2011 most private sewers, disposal mains and lateral drains were transferred into public ownership It is therefore possible that a property may be at risk of internal flooding due to an overloaded public sewer which the sewerage undertaker is not aware of. For further information it is recommended that enquiries are made of the vendor.

2.9 Please state the distance from the property to the nearest boundary of the nearest sewage treatment works.

The nearest sewage treatment works is OLYMPIC PARK BLACKWATER PLANT which is 9.023 kilometres to the east of the property.

Water

3.1 Are the properties connected to mains water supply?

Records indicate that all of the properties are connected to the mains water supply.

3.2 Are there any water mains, resource mains or discharge pipes within the boundaries of the properties?

The map of waterworks indicates that there are water mains, resource mains or discharge pipes within the boundaries of the property.

3.3 Is any water main or service pipe serving or which is proposed to serve the properties the subject of an existing adoption agreement or an application for such an agreement?

Records confirm that water mains or service pipes serving all of the properties are not the subject of an existing adoption agreement or an application for such an agreement.

3.4 Are the properties at risk of receiving low water pressure or flow?

Records confirm that the property is not recorded on a register kept by the water undertaker as being at risk of receiving low water pressure or flow.

3.5 What is the classification of the water supply for the property?

The water supplied to the property has an average water hardness of 109.2mg/l calcium which is defined as HARD by ThamesWater.

3.6 Is there a meter installed at this property?

Records indicate that there is a no meter installed at the following properties:
Subsiduary, 100, Chalk Farm Road, London, NW1 8EH
Third Floor Office, 100, Chalk Farm Road, London, NW1 8EH
Fourth Floor Office, 100, Chalk Farm Road, London, NW1 8EH
First Floor (Part East), 100, Chalk Farm Road, London, NW1 8EH
Records indicate that there is a meter installed at the following properties:
100, Chalk Farm Road, London, NW1 8EH
First Floor (Part West), 100, Chalk Farm Road, London, NW1 8EH

3.7 Please include details of the location of any water meter serving the properties.

Records indicate that the following properties are not served by a water meter.
Subsiduary, 100, Chalk Farm Road, London, NW1 8EH
Third Floor Office, 100, Chalk Farm Road, London, NW1 8EH
Fourth Floor Office, 100, Chalk Farm Road, London, NW1 8EH
First Floor (Part East), 100, Chalk Farm Road, London, NW1 8EH
Records indicate that the following properties are served by a water meter, which is not located within the property.
100, Chalk Farm Road, London, NW1 8EH
First Floor (Part West), 100, Chalk Farm Road, London, NW1 8EH

Charging

4.1.1 – Who is responsible for providing the sewerage services for the property?

Thames Water Utilities Limited, Clearwater Court, Reading, RG1 8DB is the sewerage undertaker for the area.

4.1.2 – Who is responsible for providing the water services for the property?

Thames Water Utilities Limited, Clearwater Court, Reading, RG1 8DB is the water undertaker for the area.

4.2 Who bills the properties for sewerage services?

If you wish to know who bills the sewerage services for this property then you will need to contact the current owner. For a list of all potential retailers of sewerage services for the property please visit www.open-water.org.uk

4.3 Who bills the properties for water services?

If you wish to know who bills the water services for this property then you will need to contact the current owner. For a list of all potential retailers of water services for the property please visit www.open-water.org.uk

Trade Effluent

5.1 Are there any trade effluent consents relating to this site/property for disposal of chemically enhanced waste?

The following properties do not have a trade effluent consent:
100, Chalk Farm Road, London, NW1 8EH
Subsidiary, 100, Chalk Farm Road, London, NW1 8EH
Third Floor Office, 100, Chalk Farm Road, London, NW1 8EH
Fourth Floor Office, 100, Chalk Farm Road, London, NW1 8EH
First Floor (Part East), 100, Chalk Farm Road, London, NW1 8EH
First Floor (Part West), 100, Chalk Farm Road, London, NW1 8EH

Wayleaves, Easements, Manhole Cover and Invert levels

6.1 Is there a wayleave/easement agreement giving Thames Water the right to lay or maintain assets or right of access to pass through private land in order to reach the Company's assets?

No.

6.2 On the copy extract from the public sewer map, please show manhole cover,depth and invert levels where the information is available.

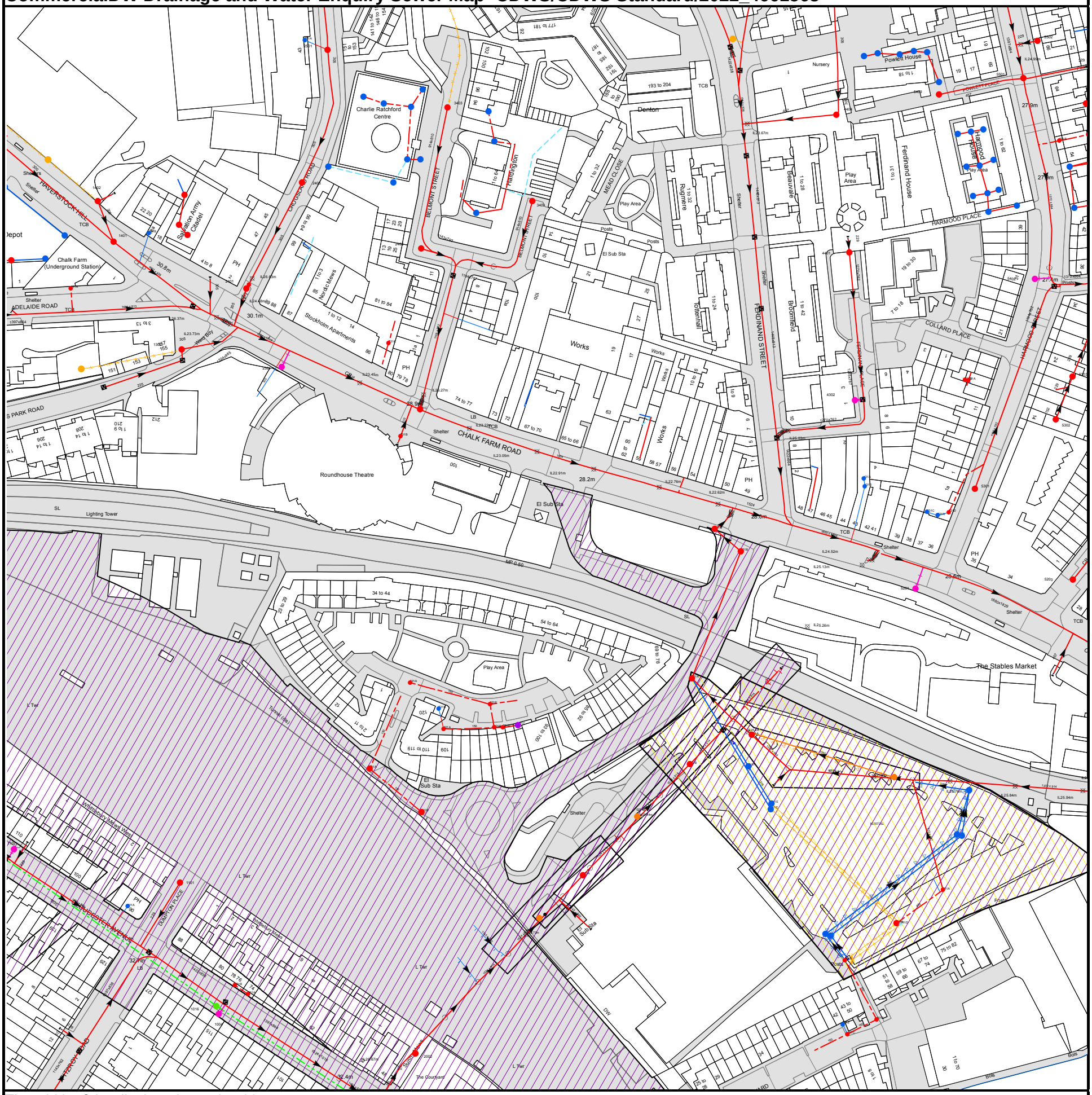
Details of any manhole cover and invert levels application to this site are enclosed.

Payment for this Search

A charge will be added to your suppliers account.

Please note that none of the charge made for this report relate to the provision of ordnance Survey mapping information

CommercialDW Drainage and Water Enquiry Sewer Map- CDWS/CDWS Standard/2022_4661568



The width of the displayed area is 500m

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 no survey information is available.

Manhole Reference	Manhole Cover Level	Manhole Invert Level
411C	n/a	n/a
411E	n/a	n/a
421B	n/a	n/a
421C	n/a	n/a
n/a	n/a	n/a
211B	n/a	n/a
211A	n/a	n/a
411F	n/a	n/a
411B	33.14	25.1
411A	33.52	25.39
321A	n/a	n/a
321B	n/a	n/a
321D	n/a	n/a
321C	n/a	n/a
221B	n/a	n/a
321E	n/a	n/a
221A	n/a	n/a
421A	n/a	n/a
2301	n/a	n/a
231A	n/a	n/a
231B	n/a	n/a
231C	n/a	n/a

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.

Con29DW Commercial Drainage and Water 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

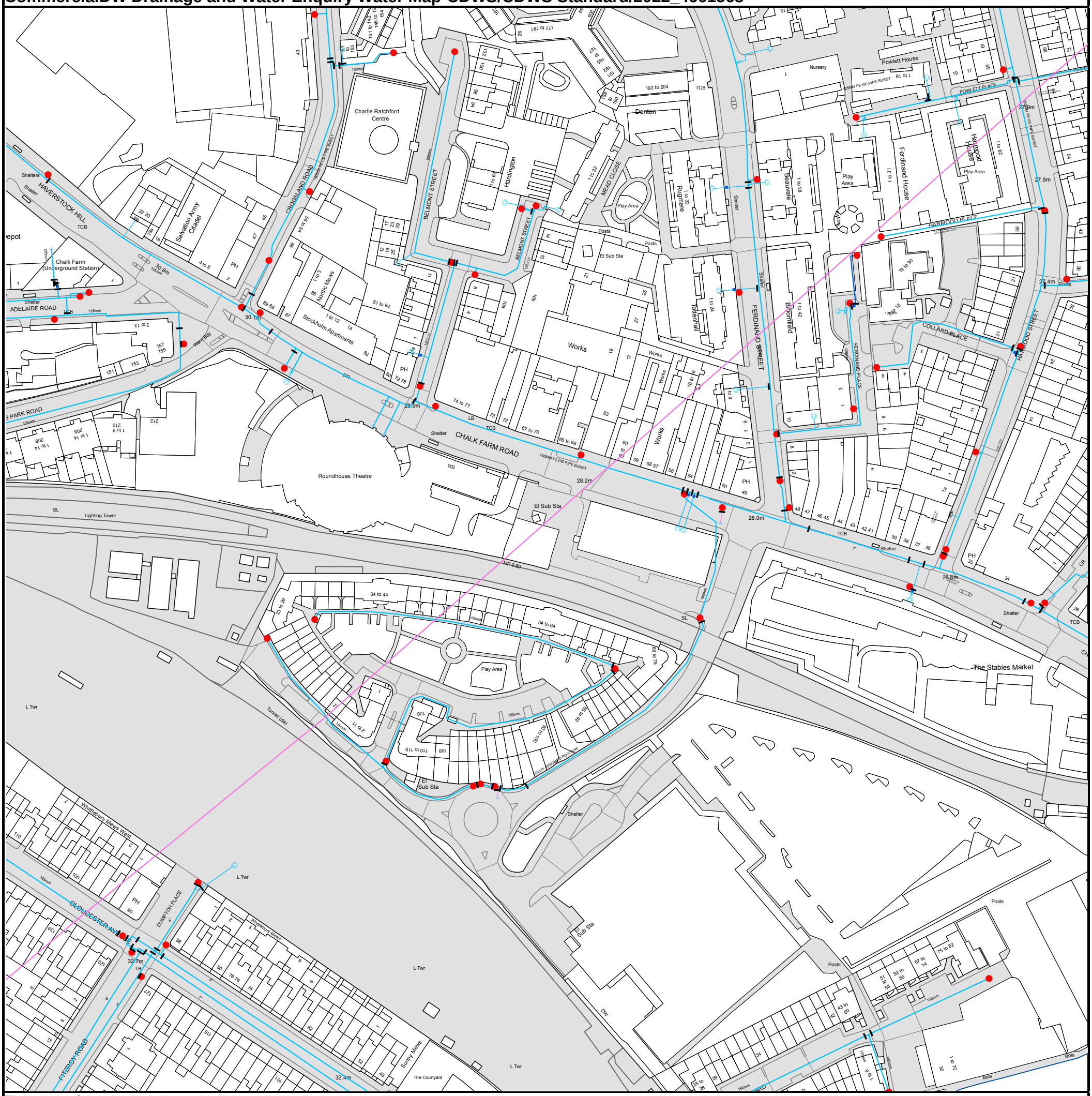
Notes:

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.

Thames Water Utilities Ltd, Property Searches, PO Box 3189, Slough SL1 4W, DX 151280 Slough 13
T 0800 009 4540 **E** searches@thameswater.co.uk **I** www.thameswater-propertysearches.co.uk

CommercialDW Drainage and Water Enquiry Water Map-CDWS/CDWS Standard/2022_4661568



The width of the displayed area is 500m

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.

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

Con29DW Commercial Drainage and Water Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

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

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Thames Water Utilities Ltd, Property Searches, PO Box 3189, Slough SL1 4W, DX 151280 Slough 13
T 0800 009 4540 **E** searches@thameswater.co.uk **I** www.thameswater-propertysearches.co.uk

For your guidance:

- Thames Water Property Searches Complaints Procedure:
  - Thames Water Property Searches offers a robust complaints procedure. Complaints can be made by telephone, in writing, by email (searches@thameswater.co.uk) or through our website (www.thameswater-propertysearches.co.uk)

As a minimum standard Thames Water Property Searches will:

- endeavour to resolve any contact or complaint at the time of receipt. If this isn't possible, we will advise of timescales;
- investigate and research the matter in detail to identify the issue raised (in some cases third party consultation will be required);
- provide a response to the customer within 10 working days of receipt of the complaint;
- provide compensation, if no response or acknowledgment that we are investigating the case is given within 10 working days of receipt of the complaint;
- keep you informed of the progress and, depending on the scale of investigation required, update with new timescales as necessary;
- provide an amended search, free of charge, if required;
- provide a refund if we find your complaint to be justified; take the necessary action within our power to put things right.

If you want us to liaise with a third party on your behalf, just let us know.

If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager, for resolution, who will respond again within 5 working days.

If you remain dissatisfied with our final response you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk

Question 1.1

For your guidance:

- The Water Industry Act 1991 defines Public Sewers as those which Thames Water have responsibility for. Other assets and rivers, watercourses, ponds, culverts or highway drains may be shown for information purposes only.
- The company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.
- Assets other than public sewers may be shown on the copy extract, for information.

Question 1.2

For your guidance:

- The “water mains” in this context are those, which are vested in and maintainable by the water company under statute.
- Assets other than public water mains may be shown on the plan, for information only.
- Water companies are not responsible for private supply pipes connecting the property to the public water main and do not hold details of these. These may pass through land outside of the control of the seller, or may be shared with adjacent properties. The buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Question 2.1

For your guidance:

- Water companies are not responsible for any private drains that connect the property to the public sewerage system and do not hold details of these. The property owner will normally have sole responsibility for private drains serving the property. These may pass through land outside the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- If foul water does not drain to the public sewerage system, the property may have private facilities in the form of a cesspit, septic tank or other type of treatment plant.
- An extract from the public sewer map is enclosed. This will show known public sewers in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or sewers connecting the property to the public sewerage system.

Question 2.2

For your guidance:

- Sewerage Undertakers are not responsible for any private drains that connect the property to the public sewerage system, and do not hold details of these.
- The property owner will normally have sole responsibility for private drains serving the property. These private drains may pass through land outside of the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- In some cases, 'Sewerage Undertakers' records do not distinguish between foul and surface water connections to the public sewerage system.
- At the time of privatisation in 1989, Sewerage Undertakers were sold with poorly-kept records of sewerage infrastructure. The records did not always show which properties were connected for surface water drainage purposes. Accordingly, billing records have been used to provide an answer for this element of the drainage and water search.
- Due to the potential inadequacy of 'Sewerage Undertakers' infrastructure records with respect to surface water drainage, it is the customer's responsibility to inform the Sewerage Undertaker that they do not receive the surface water drainage service. If on inspection, the buyer finds that surface water from the property does not drain to a public sewer, then the property may be eligible for a rebate of the surface water drainage charge. If you wish to know who bills the sewerage services for this property then you will need to contact the current owner. For a list of all potential retailers of sewerage services for the property please visit www.open-water.org.uk.
- If surface water from the property does not drain to the public sewerage system, the property may have private facilities in the form of a soakaway or private connection to a watercourse.
- An extract from the public sewer map is enclosed. This will show known public sewers in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or sewers connecting the property to the public sewerage system.

Question 2.3

For your guidance:

- If surface water from the property drains to a public sewer, then a surface water drainage charge is payable.
- Where a surface water drainage charge is currently included in the property's water and sewerage bill but, on inspection, the buyer finds that surface water from the property does not drain to a public sewer, then the property may be eligible for a rebate of the surface water drainage charge. If you wish to know who bills the sewerage services for this property then you will need to contact the current owner. For a list of all potential retailers of sewerage services for the property please visit www.open-water.org.uk.

Question 2.4

For your guidance:

- Thames Water has a statutory right of access to carry out work on its assets. Employees of Thames Water or its contractors may, therefore, need to enter the property to carry out work.
- Please note if the property was constructed after 1st July 2011 any sewers and/or lateral drain within the boundary of the property are the responsibility of the householder.
- The approximate boundary of the property has been determined by reference to the Ordnance Survey Record or the map supplied.
- The presence of a public sewer running within the boundary of the property may restrict further development. The Company has a statutory right of access to carry out work on its assets, subject to notice. This may result in employees of the Company, or its contractors, needing to enter the property to carry out work.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Question 2.4.1

For your guidance:

- Private pumping stations installed before 1st July 2011 will be transferred into the ownership of the sewerage undertaker.
- From the 1st October 2016 private pumping stations which serve more than one property have been transferred into public ownership but may not be recorded on the public sewer map.
- The approximate boundary of the property has been determined by reference to the Ordnance Survey Record or the map supplied.
- The presence of a public pumping station within the boundary of the property may restrict further development. The company has a statutory right of access to carry out work on its assets, subject to notice. This may result in employees of the company, or its contractors, needing to enter the property to carry out work.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Question 2.5

For your guidance:

- From the 1st October 2011 there may be additional lateral drains and/or public sewers which are not recorded on the public sewer map but are also within 30.48 metres (100 feet) of a building within the property.
- The presence of a public sewer within 30.48 metres (100 feet) of the building(s) within the property can result in the local authority requiring a property to be connected to the public sewer.
- The measurement is estimated from the Ordnance Survey record, between the building(s) within the boundary of the property and the nearest public sewer.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Question 2.5.1

For your guidance:

- Private pumping stations installed before 1st July 2011 will be transferred into the ownership of the sewerage undertaker.
- From the 1st October 2016 private pumping stations which serve more than one property have been transferred into public ownership but may not be recorded on the public sewer map.
- The presence of a public pumping station within 50 metres of the building(s) within the property can result in the local authority requiring a property to be connected to the public sewer.
- The measurement is estimated from the Ordnance Survey record, between the building(s) within the boundary of the property and the nearest public sewer.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Question 2.6

For your guidance:

- Any sewers and/or lateral drains within the boundary of the property are not the subject of an adoption agreement and remain the responsibility of the householder. Adoptable sewers are normally those situated in the public highway.
- This enquiry is of interest to purchasers who will want to know whether or not the property will be linked to a public sewer.
- Where the property is part of a very recent or ongoing development and the sewers are not the subject of an adoption application, buyers should consult with the developer to ascertain the extent of private drains and sewers for which they will hold maintenance and renewal liabilities.
- Final adoption is subject to the developer complying with the terms of the adoption agreement under Section 104 of the Water Industry Act 1991 and meeting the requirements of 'Sewers for Adoption' 6th Edition.

Question 2.7

For your guidance:

- From the 1st October 2011 most private sewers, disposal mains and lateral drains were transferred into public ownership and the sewerage undertaker may not have been approved or consulted about any plans to erect a building or extension on the property over or in the vicinity of these.
- Buildings or extensions erected over a sewer in contravention of building controls may have to be removed or altered.

Question 2.8

For your guidance:

- For reporting purposes buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- "At Risk" properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company's reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water Utilities Ltd on Tel: 0800 316 9800 or website www.thameswater.co.uk

Question 2.9

For your guidance:

- The nearest sewage treatment works will not always be the sewage treatment works serving the catchment within which the property is situated.
- The sewerage undertaker's records were inspected to determine the nearest sewage treatment works.
- It should be noted that there may be a private sewage treatment works closer than the one detailed above that has not been identified.
- As a responsible utility operator, Thames Water Utilities Ltd seeks to manage the impact of odour from operational sewage works on the surrounding area. This is done in accordance with the Code of Practice on Odour Nuisance from Sewage Treatment Works issued via the Department of Environment, Food and Rural Affairs (DEFRA). This Code recognises that odour from sewage treatment works can have a detrimental impact on the quality of the local environment for those living close to works. However DEFRA also recognises that sewage treatment works provide important services to communities and are essential for maintaining standards in water quality and protecting aquatic based environments. For more information visit www.thameswater.co.uk

Question 3.1

For your guidance:

- The Company does not keep details of private supplies. The situation should be checked with the current owner of the property.

Question 3.2

For your guidance:

- The boundary of the property has been determined by reference to the plan supplied. Where a plan was not supplied, the Ordnance Survey Record was used. If the Water undertaker mentioned in Question 4.1.2 is not Thames Water Utilities Ltd the boundary of the property has been determined by the Ordnance Survey.
- The presence of a public water main within the boundary of the property may restrict further development within it. Water companies have a statutory right of access to carry out work on their assets, subject to notice. This may result in employees of the Company, or its contractors, needing to enter the property to carry out work.

Question 3.3

For your guidance:

- This enquiry is of interest to purchasers who will want to know whether or not the property will be linked to the mains water supply.

Question 3.4

For your guidance:

- "Low water pressure" means water pressure below the regulatory reference level, which is the minimum pressure when demand on the system is not abnormal.
- Water Companies are required to include in the Regulatory Register that is presented annually to the Director General of Water Services, properties receiving pressure below the reference level, provided that allowable exclusions do not apply (i.e. events which can cause pressure to temporarily fall below the reference level)
- The reference level of service is a flow of 9 litres/minute at a pressure of 10metres / head on the customer's side of the outside stop valve (osv). The reference level of service must be applied on the customer's side of a meter or any other company fittings that are on the customer's side of the main stop tap. The reference level applies to a single property. Where more than one property is served by a common service pipe, the flow assumed in the reference level must be appropriately increased to take account of the total number of properties served. For two properties, a flow of 18 litres/minute at a pressure of 10metres/head on the customers' side of the osv is appropriate. For three or more properties the appropriate flow should be calculated from the standard loadings provided in BS806-3 or the Institute of Plumbing handbook.
- **Allowable exclusions** The Company is required to include in the Regulatory Register properties receiving pressure below the reference level, provided that allowable exclusions listed below do not apply.
- **Abnormal demand:** This exclusion is intended to cover abnormal peaks in demand and not the daily, weekly or monthly peaks in demand, which are normally expected. Companies should exclude from the reported figures properties which are affected by low pressure only on those days with the highest peak demands. During the report year companies may exclude, for each property, up to five days of low pressure caused by peak demand.
- **Planned maintenance:** Companies should not report low pressures caused by planned maintenance. It is not intended that companies identify the number of properties affected in each instance. However, companies must maintain sufficiently accurate records to verify that low-pressure incidents that are excluded because of planned maintenance are actually caused by maintenance.
- **One-off incidents:** This exclusion covers a number of causes of low pressure; mains bursts; failures of company equipment (such as pressure reducing valves or booster pumps); firefighting; and action by a third party. However, if problems of this type affect a property frequently, they cannot be classed as one-off events and further investigation will be required before they can be excluded.
- **Low-pressure incidents of short duration:** Properties affected by low pressure, which only occur for a short period, and for which there is evidence that incidents of a longer duration would not occur during the course of the year, may be excluded from the reported figures.
- Please contact your water undertaker mentioned in Question 4.1.2 if you require further information on water pressure.

Question 3.5

For your guidance:

- Water hardness can be expressed in various indices for example the hardness settings for dishwashers are commonly expressed in Clark's degrees, but check with the manufacturer as there are also other units. The following table shows the normal ranges of hardness.

Thames Water Hardness Category	Calcium (mg/l)	Calcium Carbonate (mg/l)	English Clarke degrees	French degrees	General/ German degrees
Soft	0 to 40	0 to 100	0 to 7	0 to 10	0 to 5.6
Medium	41 to 80	101 to 200	8 to 14	11 to 20	5.7 to 11.2
Hard	Over 80	Over 200	Over 14	Over 20	over 11.2

- Please contact your water undertaker mentioned in Question 4.1.2 if you require further information on water hardness.

Question 3.6

For your guidance:

- The Water Industry Act 1991 Section 150, The Water Resale Order 2001 provides protection for people who buy their water or sewerage services from a person or company instead of directly from a water or sewerage company. Details are available from the Office of Water Services (OFWAT) website is www.ofwat.gov.uk.
- The Company may install a meter at the premises where a buyer makes a change of use of the property or where the buyer uses water for:
  - Watering the garden other than by hand (this includes the use of sprinklers).
  - Automatically replenishing a pond or swimming pool with a capacity greater than 10,000 litres.
  - A bath with a capacity in excess of 230 litres.
  - A reverse osmosis unit Where a meter does not serve the property and the customer wishes to consider this method of charging, they should contact the current owner if they wish to know who bills the sewerage and water services for this property. For a list of all potential retailers of sewerage and water services for the property please visit www.open-water.org.uk.

Question 3.7

For your guidance:

- Where a meter does not serve the property and the customer wishes to consider this method of charging, they should contact the current owner if they wish to know who bills the water services for this property. For a list of all potential retailers of water services for the property please visit www.open-water.org.uk.

Question 5.1

For your guidance:

- If a Trade effluent consent applies to the premises which are the subject of this search, it is for the applicant to satisfy itself as to the suitability of the consent for its client's requirements. The occupier of any trade premises in the area of a sewerage undertaker may discharge any trade effluent proceeding from those premises into the undertaker's public sewers if he does so with the undertaker's consent. If, in the case of any trade premises, any trade effluent is discharged without such consent or other authorisation, the occupier of the premises shall be guilty of an offence.
- Please note any existing consent is dependent on the business being carried out at the property and will not transfer automatically upon change of ownership.
- For further information regarding Trade Effluent consents please contact: Trade Effluent Control, Crossness STW, Belvedere Road, Abbey Wood London SE2 9AQ.

Question 6.1

For your guidance:

- This question relates only to private agreements between the water company acting in a private capacity and a landowner. Such contracts may often be part of a conveyance or land transfer, or a deed of grant of easement.
- If there is no formal easement, then a sewer or water main may have been constructed following the service of notice under the provisions of the Public Health Act 1936, Water Act 1945,Water Act 1989 or Water Industry Act 1991 as applicable. The company does not hold copies of these notices. However, in the absence of evidence to the contrary there is a legal presumption that all matters were properly dealt with. All rights and obligations relating to sewers and water mains are now covered by the Water Industry Act 1991. Where rights exist at the boundary of the property, but we are not sure of the exact correlation, we will answer “Yes” to this question. A documentary right can exist even if the physical asset itself has not yet been laid, or has been moved, or removed. Likewise the position of the right and of the asset may differ.
- You may also find that an asset is protected both with contractual rights and statutory rights. Please consult your solicitor as to why this may happen, and its effects.
- We refer to “defined” assets for the following reasons: Often a contract may give the water company an expressed right to install and maintain assets within an area but without stating the exact position or route of such assets. Also, the law may imply rights where none have been mentioned specifically in a related contract, such as a conveyance. Finally, rights may come into being through long use. In any of these cases the rights are undefined, and although the water company may need to rely on them from time to time, as we cannot map the rights accurately, we will answer “no” to this question.
- Information obtainable from physical inspection (including Trial Bore Holes) overrides information contained in the report.
- Any error in answering this question is not to be regarded as a waiver of the water company’s rights or title, or an agreement or representation that the water company is prepared to vary or discharge any of its rights or title.

Customer and Clients are asked to note these terms, which govern the basis on which this CommercialDW Drainage & Water Enquiry is supplied

Definitions

'Client' means the person, company or body who is the intended recipient of the Report with an actual or potential interest in the Property.
'Company' means a water service company or their data service provider producing the Report.
'Customer' means the person, company, firm or other legal body placing the Order, either on their own behalf as Client, or, as an agent for a Client.
'Order' means any request completed by the Customer requesting the Report.
'Property' means the address or location supplied by the Customer in the Order.
'Report' means the drainage and/or water report prepared by The Company in respect of the Property.
'Thames Water" means Thames Water Utilities Limited registered in England and Wales under number 2366661 whose registered office is at Clearwater Court, Vastern Road, Reading, Berks, RG1 8DB;

Agreement

1 Thames Water agrees to supply the Report to the Customer and the Client subject to these terms. The scope and limitations of the Report are described in paragraph 2 of these terms. Where the Customer is acting as an agent for the Client then the Customer shall be responsible for bringing these terms to the attention of the Client. The Customer and Client agree that the placing of an Order for a Report indicates their acceptance of these terms.

The Report

2. Whilst Thames Water will use reasonable care and skill in producing the Report, it is provided to the Customer and the Client on the basis that they acknowledge and agree to the following:-

2.1 The information contained in the Report can change on a regular basis so Thames Water cannot be responsible to the Customer and the Client for any change in the information contained in the Report after the date on which the Report was produced and sent to the Client.

2.2 The Report does not give details about the actual state or condition of the Property nor should it be used or taken to indicate or exclude actual suitability or unsuitability of the Property for any particular purpose, or relied upon for determining saleability or value, or used as substitute for any physical investigation or inspection. Further advice and information from appropriate experts and professionals should always be obtained.

2.3 The information contained in the Report is based upon the accuracy, completeness and legibility of the address and other information supplied by the Customer or Client.

2.4 The Report provides information as to the location and connection of existing services and should not be relied on for any other purpose. The Report may contain opinions or general advice to the Customer and the Client and Thames Water cannot ensure that any such opinion or general advice is accurate, complete or valid and accepts no liability therefore.

2.5 The position and depth of apparatus shown on any maps attached to the Report are approximate, and are furnished as a general guide only, and no warranty as to its correctness is given or implied. The exact positions and depths should be obtained by excavation trial holes and the maps must not be relied on in the event of excavation or other works made in the vicinity of apparatus shown on any maps.

Liability

3 Thames Water shall not be liable to the Client for any failure, defect or non-performance of its obligations arising from any failure of, or defect in any machine, processing system or transmission link or anything beyond Thames Water's reasonable control or the acts or omissions of any party for whom Thames Water are not responsible.

3.1 Where the Customer sells this report to a Client (other than in the case of a bona fide legal adviser recharging the cost of the Report as a disbursement) Thames Water shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) be liable for any loss or damage whatsoever and the Customer shall indemnify Thames Water in respect of any claim by the Client.

3.2 Where a report is requested for an address falling within a geographical area where Thames Water and another Company separately provide Water and Sewerage Services, then it shall be deemed that liability for the information given by Thames Water or the Company as the case may be will remain with Thames Water or the Company as the case may be in respect of the accuracy of the information supplied. Where Thames Water is supplying information which has been provided to it by another Company for the purposes outlined in this agreement Thames Water will therefore not be liable in any way for the accuracy of that information and will supply that information as agent for the Company from which the information was obtained.

3.3 Except in respect of death or personal injury caused by negligence, or as expressly provided in these Terms:

3.3.1 The entire liability of Thames Water or the Company as the case may be in respect of all causes of action arising under or in connection with the Report (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) shall not exceed £2,000,000 (two million pounds); and

3.3.2 Thames Water shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) be liable for any loss of profit, loss of goodwill, loss of reputation, loss of business or any indirect, special or consequential loss, damage or other claims, costs or expenses;

Copyright and Confidentiality

4. The Customer and the Client acknowledge that the Report is confidential and is intended for the personal use of the Client. The copyright and any other intellectual property rights in the Report shall remain the property of Thames Water or the Company as the case may be. No intellectual or other property rights are transferred or licensed to the Customer or the Client except to the extent expressly provided

4.1 The Customer or Client is entitled to make copies of the Report but is not permitted to copy any maps contained in, or attached to the Report

4.2 The maps contained in the Report are protected by Crown Copyright and must not be used for any purpose outside the context of the Report.

4.3 The Customer and Client agree (in respect of both the original and any copies made) to respect and not to alter any trademark, copyright notice or other property marking which appears on the Report.

Payment

5. Unless otherwise stated all prices are inclusive of VAT. The Customer shall pay for the price of the Report specified by Thames Water, without any set off, deduction or counterclaim.

5.1 Unless payment has been received in advance, Customers shall be invoiced for the agreed fee once their request has been processed. Any such invoice must be paid within 14 days. Where the Customer has an account with Thames Water, payment terms will be as agreed with Thames Water.

5.2 No payment shall be deemed to have been received until Thames Water has received cleared funds.

5.3 If the Customer fails to pay Thames Water any sum due Thames Water shall be entitled but not obliged to charge the Customer interest on the sum from the due date for payment at the annual rate of 2% above the base lending rate from time to time of Natwest Bank, accruing on a daily basis until payment is made. Thames Water reserves the right to claim interest under the Late Payment of Commercial Debts (Interest) Act 1998.

5.4 Thames Water reserves the right to increase fees on reasonable prior written notice at any time.

Cancellations or Alterations

6. Once an Order is placed, Thames Water shall not be under any obligation to accept any request to cancel that Order and payment for the Order shall still be due upon completion of the Report. In cases where an error has been made in the original Order (e.g. the Customer has supplied an incorrect address), the Customer will need to place a second Order, detailing the correct information, and shall be liable to pay a second charge in accordance with clause 5 above.

Delivery

7. On receiving your order the reports will be posted to you within 10 working days from receipt.

7.1 Delivery is subject to local post conditions and regulations. All items should arrive within 12 working days, but Thames Water cannot be held responsible should delays be caused by local post conditions, postal strikes or other causes beyond the control of Thames Water.

General

8. If any provision of these terms is or becomes invalid or unenforceable, it will be taken to be removed from the rest of these terms to the extent that it is invalid or unenforceable. No other provision of these terms shall be affected.

8.1 These terms shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts.

8.2 Nothing in this notice shall in any way restrict the Customer or Clients statutory or any other rights of access to the information contained in the Report.

These Terms & Conditions are available in larger print for those with impaired vision.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of TWUL until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. TWUL does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at TWUL's discretion for increased administration costs.

A copy of TWUL's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800.

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the goods or services covered by this invoice falls under the regulation of the Water Industry Act 1991, and you remain dissatisfied you can refer your complaint to CC Water on 0845 039 2837 (it will cost you the same as a local call) or write to them at 11 Belgrave Road, London SW1V 1RB.

Ways to pay your bill

By Post – Cheque only, made payable to 'Thames Water Utilities Ltd' writing your Thames Water account number on the back. Please fill in the payment slip below and send it with your cheque to Thames Water Utilities Ltd., PO Box 223, Swindon SN38 2TW	**By BACS Payment** direct to our bank on account number 90478703, sort code 60-00-01 may be made. A remittance advice must be sent to Thames Water Utilities Ltd., PO Box 223, Swindon SN38 2TW. Or fax to 01793 424599 or email: cashoperations@thameswater.co.uk	**Telephone Banking** By calling your bank and quoting your invoice number and the Thames Water`s bank account number 90478703 and sort code 60-00-01	**By Swift Transfer** You may make your payment via SWIFT by quoting **NWBKGB2L** together with our bank account number 90478703, sort code 60-00-01 and invoice number

Appendix E Permeable Paving & Cellular Storage Tank Calculations

Permeable Paving Draining the Western Half of the Site

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	32.033	0.033	0.5	7.2	O K
30 min Summer	32.041	0.041	0.7	8.9	O K
60 min Summer	32.047	0.047	0.9	10.2	O K
120 min Summer	32.054	0.054	1.1	11.6	O K
180 min Summer	32.057	0.057	1.2	12.2	O K
240 min Summer	32.058	0.058	1.2	12.5	O K
360 min Summer	32.057	0.057	1.2	12.4	O K
480 min Summer	32.056	0.056	1.2	12.1	O K
600 min Summer	32.054	0.054	1.1	11.6	O K
720 min Summer	32.052	0.052	1.0	11.2	O K
960 min Summer	32.048	0.048	0.9	10.4	O K
1440 min Summer	32.043	0.043	0.8	9.2	O K
2160 min Summer	32.037	0.037	0.6	8.0	O K
2880 min Summer	32.033	0.033	0.5	7.2	O K
4320 min Summer	32.028	0.028	0.4	6.1	O K
5760 min Summer	32.025	0.025	0.3	5.4	O K
7200 min Summer	32.023	0.023	0.3	5.0	O K
8640 min Summer	32.022	0.022	0.2	4.7	O K
10080 min Summer	32.020	0.020	0.2	4.4	O K
15 min Winter	32.037	0.037	0.6	8.0	O K
30 min Winter	32.046	0.046	0.9	10.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	182.029	0.0	6.5	25
30 min Summer	116.883	0.0	8.6	38
60 min Summer	71.267	0.0	11.2	62
120 min Summer	45.802	0.0	14.6	98
180 min Summer	34.749	0.0	16.6	130
240 min Summer	28.271	0.0	18.1	162
360 min Summer	20.770	0.0	20.0	230
480 min Summer	16.496	0.0	21.2	296
600 min Summer	13.714	0.0	22.0	362
720 min Summer	11.754	0.0	22.6	426
960 min Summer	9.160	0.0	23.5	552
1440 min Summer	6.395	0.0	24.5	800
2160 min Summer	4.440	0.0	26.0	1172
2880 min Summer	3.428	0.0	26.7	1536
4320 min Summer	2.388	0.0	27.7	2260
5760 min Summer	1.857	0.0	29.2	3000
7200 min Summer	1.536	0.0	30.1	3744
8640 min Summer	1.322	0.0	31.0	4488
10080 min Summer	1.169	0.0	31.8	5160
15 min Winter	182.029	0.0	7.4	25
30 min Winter	116.883	0.0	9.8	37

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	32.053	0.053	1.1	11.4	O K
120 min Winter	32.060	0.060	1.3	12.9	O K
180 min Winter	32.062	0.062	1.4	13.4	O K
240 min Winter	32.062	0.062	1.4	13.5	O K
360 min Winter	32.060	0.060	1.3	13.1	O K
480 min Winter	32.058	0.058	1.2	12.5	O K
600 min Winter	32.055	0.055	1.1	11.8	O K
720 min Winter	32.052	0.052	1.0	11.2	O K
960 min Winter	32.047	0.047	0.9	10.2	O K
1440 min Winter	32.041	0.041	0.7	8.8	O K
2160 min Winter	32.034	0.034	0.5	7.4	O K
2880 min Winter	32.030	0.030	0.4	6.5	O K
4320 min Winter	32.025	0.025	0.3	5.5	O K
5760 min Winter	32.022	0.022	0.2	4.8	O K
7200 min Winter	32.020	0.020	0.2	4.4	O K
8640 min Winter	32.019	0.019	0.2	4.1	O K
10080 min Winter	32.018	0.018	0.2	3.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	71.267	0.0	12.6	62
120 min Winter	45.802	0.0	16.4	100
180 min Winter	34.749	0.0	18.7	136
240 min Winter	28.271	0.0	20.3	174
360 min Winter	20.770	0.0	22.4	244
480 min Winter	16.496	0.0	23.8	312
600 min Winter	13.714	0.0	24.7	380
720 min Winter	11.754	0.0	25.4	446
960 min Winter	9.160	0.0	26.4	576
1440 min Winter	6.395	0.0	27.5	826
2160 min Winter	4.440	0.0	29.2	1200
2880 min Winter	3.428	0.0	30.0	1568
4320 min Winter	2.388	0.0	31.1	2332
5760 min Winter	1.857	0.0	32.7	3056
7200 min Winter	1.536	0.0	33.8	3760
8640 min Winter	1.322	0.0	34.8	4504
10080 min Winter	1.169	0.0	35.7	5152

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 528304 184308 TQ 28304 84308
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.022

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.007	4	8	0.007	8	12	0.007

Model Details

Storage is Online Cover Level (m) 32.700

Tank or Pond Structure

Invert Level (m) 32.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	216.5	0.200	216.5	0.201	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0078-2000-0200-2000
Design Head (m)	0.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	78
Invert Level (m)	32.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.200	2.0
Flush-Flo™	0.107	2.0
Kick-Flo®	0.169	1.9
Mean Flow over Head Range	-	1.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0	1.200	4.6	3.000	7.0	7.000	10.8
0.200	2.0	1.400	4.9	3.500	7.6	7.500	11.2
0.300	2.4	1.600	5.2	4.000	8.1	8.000	11.5
0.400	2.7	1.800	5.5	4.500	8.6	8.500	11.9
0.500	3.0	2.000	5.8	5.000	9.1	9.000	12.3
0.600	3.3	2.200	6.0	5.500	9.6	9.500	12.6
0.800	3.8	2.400	6.3	6.000	10.0		
1.000	4.2	2.600	6.5	6.500	10.4		

Cellular Storage Tank Draining the Western Half of Site

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	26.209	0.719	1.3	44.6	O K
30 min Summer	26.404	0.914	1.4	56.7	O K
60 min Summer	26.578	1.088	1.5	67.5	O K
120 min Summer	26.831	1.341	1.7	83.1	O K
180 min Summer	26.956	1.466	1.7	90.9	O K
240 min Summer	27.019	1.529	1.8	94.8	O K
360 min Summer	27.046	1.556	1.8	96.5	O K
480 min Summer	27.017	1.527	1.8	94.7	O K
600 min Summer	26.977	1.487	1.7	92.2	O K
720 min Summer	26.932	1.442	1.7	89.4	O K
960 min Summer	26.841	1.351	1.7	83.8	O K
1440 min Summer	26.680	1.190	1.6	73.8	O K
2160 min Summer	26.487	0.997	1.5	61.8	O K
2880 min Summer	26.331	0.841	1.3	52.1	O K
4320 min Summer	26.080	0.590	1.3	36.6	O K
5760 min Summer	25.831	0.341	1.3	21.2	O K
7200 min Summer	25.705	0.215	1.3	13.3	O K
8640 min Summer	25.638	0.148	1.3	9.2	O K
10080 min Summer	25.600	0.110	1.2	6.8	O K
15 min Winter	26.298	0.808	1.3	50.1	O K
30 min Winter	26.518	1.028	1.5	63.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	182.029	0.0	45.9	26
30 min Summer	116.883	0.0	59.0	40
60 min Summer	71.267	0.0	72.1	70
120 min Summer	45.802	0.0	92.7	128
180 min Summer	34.749	0.0	105.5	186
240 min Summer	28.271	0.0	114.4	244
360 min Summer	20.770	0.0	126.1	360
480 min Summer	16.496	0.0	133.5	428
600 min Summer	13.714	0.0	138.7	488
720 min Summer	11.754	0.0	142.7	550
960 min Summer	9.160	0.0	148.3	682
1440 min Summer	6.395	0.0	155.2	956
2160 min Summer	4.440	0.0	161.8	1368
2880 min Summer	3.428	0.0	166.6	1764
4320 min Summer	2.388	0.0	174.0	2560
5760 min Summer	1.857	0.0	180.4	3224
7200 min Summer	1.536	0.0	186.6	3824
8640 min Summer	1.322	0.0	192.7	4504
10080 min Summer	1.169	0.0	198.7	5152
15 min Winter	182.029	0.0	51.4	26
30 min Winter	116.883	0.0	66.0	40

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	26.717	1.227	1.6	76.0	O K
120 min Winter	27.009	1.519	1.8	94.2	O K
180 min Winter	27.159	1.669	1.8	103.5	O K
240 min Winter	27.238	1.748	1.9	108.4	O K
360 min Winter	27.286	1.796	1.9	111.4	O K
480 min Winter	27.265	1.775	1.9	110.0	O K
600 min Winter	27.213	1.723	1.9	106.8	O K
720 min Winter	27.161	1.671	1.8	103.6	O K
960 min Winter	27.050	1.560	1.8	96.7	O K
1440 min Winter	26.838	1.348	1.7	83.6	O K
2160 min Winter	26.572	1.082	1.5	67.1	O K
2880 min Winter	26.355	0.865	1.4	53.7	O K
4320 min Winter	25.950	0.460	1.3	28.5	O K
5760 min Winter	25.682	0.192	1.3	11.9	O K
7200 min Winter	25.596	0.106	1.2	6.6	O K
8640 min Winter	25.568	0.078	1.1	4.8	O K
10080 min Winter	25.557	0.067	0.9	4.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	71.267	0.0	80.8	68
120 min Winter	45.802	0.0	103.8	126
180 min Winter	34.749	0.0	118.1	182
240 min Winter	28.271	0.0	128.1	240
360 min Winter	20.770	0.0	141.2	352
480 min Winter	16.496	0.0	149.5	458
600 min Winter	13.714	0.0	155.4	554
720 min Winter	11.754	0.0	159.8	576
960 min Winter	9.160	0.0	166.0	728
1440 min Winter	6.395	0.0	173.8	1032
2160 min Winter	4.440	0.0	181.3	1472
2880 min Winter	3.428	0.0	186.6	1904
4320 min Winter	2.388	0.0	194.9	2720
5760 min Winter	1.857	0.0	202.1	3224
7200 min Winter	1.536	0.0	209.0	3816
8640 min Winter	1.322	0.0	215.8	4408
10080 min Winter	1.169	0.0	222.6	5104

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 528304 184308 TQ 28304 84308
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.135

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.045	4	8	0.045	8	12	0.045

Model Details

Storage is Online Cover Level (m) 28.690

Tank or Pond Structure

Invert Level (m) 25.490

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	62.0	2.000	62.0	2.001	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0057-2000-2000-2000
Design Head (m)	2.000
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	57
Invert Level (m)	25.490
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	2.0
Flush-Flo™	0.247	1.3
Kick-Flo®	0.506	1.1
Mean Flow over Head Range	-	1.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.2	1.200	1.6	3.000	2.4	7.000	3.6
0.200	1.3	1.400	1.7	3.500	2.6	7.500	3.7
0.300	1.3	1.600	1.8	4.000	2.7	8.000	3.8
0.400	1.3	1.800	1.9	4.500	2.9	8.500	3.9
0.500	1.1	2.000	2.0	5.000	3.0	9.000	4.0
0.600	1.2	2.200	2.1	5.500	3.2	9.500	4.1
0.800	1.3	2.400	2.2	6.000	3.3		
1.000	1.5	2.600	2.3	6.500	3.4		

Permeable Paving Draining the Eastern Half of the Site

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	32.033	0.033	0.5	7.2	O K
30 min Summer	32.041	0.041	0.7	8.9	O K
60 min Summer	32.047	0.047	0.9	10.2	O K
120 min Summer	32.054	0.054	1.1	11.6	O K
180 min Summer	32.057	0.057	1.2	12.2	O K
240 min Summer	32.058	0.058	1.2	12.5	O K
360 min Summer	32.057	0.057	1.2	12.4	O K
480 min Summer	32.056	0.056	1.2	12.1	O K
600 min Summer	32.054	0.054	1.1	11.6	O K
720 min Summer	32.052	0.052	1.0	11.2	O K
960 min Summer	32.048	0.048	0.9	10.4	O K
1440 min Summer	32.043	0.043	0.8	9.2	O K
2160 min Summer	32.037	0.037	0.6	8.0	O K
2880 min Summer	32.033	0.033	0.5	7.2	O K
4320 min Summer	32.028	0.028	0.4	6.1	O K
5760 min Summer	32.025	0.025	0.3	5.4	O K
7200 min Summer	32.023	0.023	0.3	5.0	O K
8640 min Summer	32.022	0.022	0.2	4.7	O K
10080 min Summer	32.020	0.020	0.2	4.4	O K
15 min Winter	32.037	0.037	0.6	8.0	O K
30 min Winter	32.046	0.046	0.9	10.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	182.029	0.0	6.5	25
30 min Summer	116.883	0.0	8.6	38
60 min Summer	71.267	0.0	11.2	62
120 min Summer	45.802	0.0	14.6	98
180 min Summer	34.749	0.0	16.6	130
240 min Summer	28.271	0.0	18.1	162
360 min Summer	20.770	0.0	20.0	230
480 min Summer	16.496	0.0	21.2	296
600 min Summer	13.714	0.0	22.0	362
720 min Summer	11.754	0.0	22.6	426
960 min Summer	9.160	0.0	23.5	552
1440 min Summer	6.395	0.0	24.5	800
2160 min Summer	4.440	0.0	26.0	1172
2880 min Summer	3.428	0.0	26.7	1536
4320 min Summer	2.388	0.0	27.7	2260
5760 min Summer	1.857	0.0	29.2	3000
7200 min Summer	1.536	0.0	30.1	3744
8640 min Summer	1.322	0.0	31.0	4488
10080 min Summer	1.169	0.0	31.8	5160
15 min Winter	182.029	0.0	7.4	25
30 min Winter	116.883	0.0	9.8	37

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	32.053	0.053	1.1	11.4	O K
120 min Winter	32.060	0.060	1.3	12.9	O K
180 min Winter	32.062	0.062	1.4	13.4	O K
240 min Winter	32.062	0.062	1.4	13.5	O K
360 min Winter	32.060	0.060	1.3	13.1	O K
480 min Winter	32.058	0.058	1.2	12.5	O K
600 min Winter	32.055	0.055	1.1	11.8	O K
720 min Winter	32.052	0.052	1.0	11.2	O K
960 min Winter	32.047	0.047	0.9	10.2	O K
1440 min Winter	32.041	0.041	0.7	8.8	O K
2160 min Winter	32.034	0.034	0.5	7.4	O K
2880 min Winter	32.030	0.030	0.4	6.5	O K
4320 min Winter	32.025	0.025	0.3	5.5	O K
5760 min Winter	32.022	0.022	0.2	4.8	O K
7200 min Winter	32.020	0.020	0.2	4.4	O K
8640 min Winter	32.019	0.019	0.2	4.1	O K
10080 min Winter	32.018	0.018	0.2	3.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	71.267	0.0	12.6	62
120 min Winter	45.802	0.0	16.4	100
180 min Winter	34.749	0.0	18.7	136
240 min Winter	28.271	0.0	20.3	174
360 min Winter	20.770	0.0	22.4	244
480 min Winter	16.496	0.0	23.8	312
600 min Winter	13.714	0.0	24.7	380
720 min Winter	11.754	0.0	25.4	446
960 min Winter	9.160	0.0	26.4	576
1440 min Winter	6.395	0.0	27.5	826
2160 min Winter	4.440	0.0	29.2	1200
2880 min Winter	3.428	0.0	30.0	1568
4320 min Winter	2.388	0.0	31.1	2332
5760 min Winter	1.857	0.0	32.7	3056
7200 min Winter	1.536	0.0	33.8	3760
8640 min Winter	1.322	0.0	34.8	4504
10080 min Winter	1.169	0.0	35.7	5152

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 528304 184308 TQ 28304 84308
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.022

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.007	4	8	0.007	8	12	0.007

Model Details

Storage is Online Cover Level (m) 32.700

Tank or Pond Structure

Invert Level (m) 32.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	216.5	0.200	216.5	0.201	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0078-2000-0200-2000
Design Head (m)	0.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	78
Invert Level (m)	32.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.200	2.0
Flush-Flo™	0.107	2.0
Kick-Flo®	0.169	1.9
Mean Flow over Head Range	-	1.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0	1.200	4.6	3.000	7.0	7.000	10.8
0.200	2.0	1.400	4.9	3.500	7.6	7.500	11.2
0.300	2.4	1.600	5.2	4.000	8.1	8.000	11.5
0.400	2.7	1.800	5.5	4.500	8.6	8.500	11.9
0.500	3.0	2.000	5.8	5.000	9.1	9.000	12.3
0.600	3.3	2.200	6.0	5.500	9.6	9.500	12.6
0.800	3.8	2.400	6.3	6.000	10.0		
1.000	4.2	2.600	6.5	6.500	10.4		

Cellular Storage Tank Draining the Eastern Half of Site

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	25.620	0.630	1.3	33.4	O K
30 min Summer	25.789	0.799	1.3	42.4	O K
60 min Summer	25.935	0.945	1.4	50.1	O K
120 min Summer	26.142	1.152	1.6	61.0	O K
180 min Summer	26.235	1.245	1.6	66.0	O K
240 min Summer	26.274	1.284	1.6	68.1	O K
360 min Summer	26.271	1.281	1.6	67.9	O K
480 min Summer	26.238	1.248	1.6	66.1	O K
600 min Summer	26.195	1.205	1.6	63.9	O K
720 min Summer	26.151	1.161	1.6	61.5	O K
960 min Summer	26.064	1.074	1.5	56.9	O K
1440 min Summer	25.911	0.921	1.4	48.8	O K
2160 min Summer	25.722	0.732	1.3	38.8	O K
2880 min Summer	25.563	0.573	1.3	30.4	O K
4320 min Summer	25.274	0.284	1.3	15.1	O K
5760 min Summer	25.150	0.160	1.3	8.5	O K
7200 min Summer	25.095	0.105	1.2	5.6	O K
8640 min Summer	25.071	0.081	1.1	4.3	O K
10080 min Summer	25.060	0.070	1.0	3.7	O K
15 min Winter	25.698	0.708	1.3	37.5	O K
30 min Winter	25.889	0.899	1.4	47.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	182.029	0.0	34.7	26
30 min Summer	116.883	0.0	44.6	40
60 min Summer	71.267	0.0	54.5	68
120 min Summer	45.802	0.0	70.0	126
180 min Summer	34.749	0.0	79.7	184
240 min Summer	28.271	0.0	86.5	242
360 min Summer	20.770	0.0	95.3	330
480 min Summer	16.496	0.0	100.9	388
600 min Summer	13.714	0.0	104.9	452
720 min Summer	11.754	0.0	107.8	518
960 min Summer	9.160	0.0	112.1	654
1440 min Summer	6.395	0.0	117.3	928
2160 min Summer	4.440	0.0	122.3	1340
2880 min Summer	3.428	0.0	125.9	1736
4320 min Summer	2.388	0.0	131.5	2384
5760 min Summer	1.857	0.0	136.3	3048
7200 min Summer	1.536	0.0	141.0	3688
8640 min Summer	1.322	0.0	145.6	4408
10080 min Summer	1.169	0.0	150.1	5136
15 min Winter	182.029	0.0	38.9	26
30 min Winter	116.883	0.0	49.9	40

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	26.057	1.067	1.5	56.6	O K
120 min Winter	26.299	1.309	1.6	69.4	O K
180 min Winter	26.413	1.423	1.7	75.4	O K
240 min Winter	26.466	1.476	1.7	78.3	O K
360 min Winter	26.479	1.489	1.7	78.9	O K
480 min Winter	26.435	1.445	1.7	76.6	O K
600 min Winter	26.386	1.396	1.7	74.0	O K
720 min Winter	26.331	1.341	1.7	71.1	O K
960 min Winter	26.217	1.227	1.6	65.0	O K
1440 min Winter	26.007	1.017	1.5	53.9	O K
2160 min Winter	25.743	0.753	1.3	39.9	O K
2880 min Winter	25.494	0.504	1.3	26.7	O K
4320 min Winter	25.156	0.166	1.3	8.8	O K
5760 min Winter	25.073	0.083	1.1	4.4	O K
7200 min Winter	25.057	0.067	0.9	3.5	O K
8640 min Winter	25.047	0.057	0.8	3.0	O K
10080 min Winter	25.041	0.051	0.7	2.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	71.267	0.0	61.0	68
120 min Winter	45.802	0.0	78.4	124
180 min Winter	34.749	0.0	89.3	180
240 min Winter	28.271	0.0	96.8	238
360 min Winter	20.770	0.0	106.7	346
480 min Winter	16.496	0.0	113.0	440
600 min Winter	13.714	0.0	117.4	474
720 min Winter	11.754	0.0	120.8	552
960 min Winter	9.160	0.0	125.5	706
1440 min Winter	6.395	0.0	131.4	1004
2160 min Winter	4.440	0.0	136.9	1436
2880 min Winter	3.428	0.0	141.0	1880
4320 min Winter	2.388	0.0	147.3	2384
5760 min Winter	1.857	0.0	152.7	2952
7200 min Winter	1.536	0.0	157.9	3672
8640 min Winter	1.322	0.0	163.1	4408
10080 min Winter	1.169	0.0	168.2	5136

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 528304 184308 TQ 28304 84308
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.102

Time From: (mins)	To:	Area (ha)	Time From: (mins)	To:	Area (ha)	Time From: (mins)	To:	Area (ha)
0	4	0.034	4	8	0.034	8	12	0.034

Model Details

Storage is Online Cover Level (m) 28.274

Tank or Pond Structure

Invert Level (m) 24.990

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	53.0	2.000	53.0	2.001	0.0

Hydro-Brake® Optimum Outflow Control

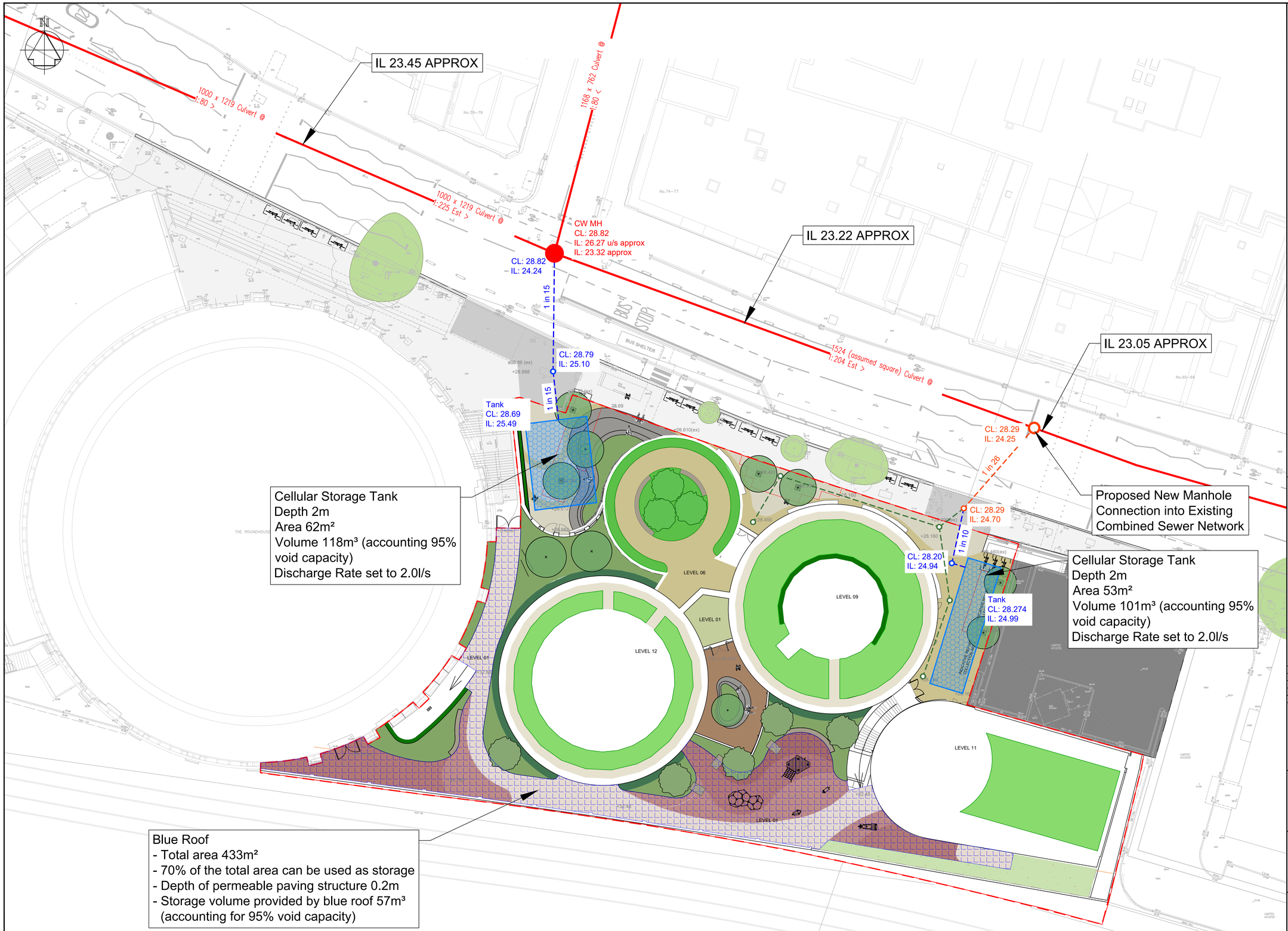
Unit Reference	MD-SHE-0057-2000-2000-2000
Design Head (m)	2.000
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	57
Invert Level (m)	24.990
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	2.0
Flush-Flo™	0.247	1.3
Kick-Flo®	0.506	1.1
Mean Flow over Head Range	-	1.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.2	1.200	1.6	3.000	2.4	7.000	3.6
0.200	1.3	1.400	1.7	3.500	2.6	7.500	3.7
0.300	1.3	1.600	1.8	4.000	2.7	8.000	3.8
0.400	1.3	1.800	1.9	4.500	2.9	8.500	3.9
0.500	1.1	2.000	2.0	5.000	3.0	9.000	4.0
0.600	1.2	2.200	2.1	5.500	3.2	9.500	4.1
0.800	1.3	2.400	2.2	6.000	3.3		
1.000	1.5	2.600	2.3	6.500	3.4		

Appendix F Surface Water Management Strategy



GENERAL NOTES

G1. DO NOT SCALE THIS DRAWING.

G2. ANY DIMENSIONAL DISCREPANCIES SHOULD BE NOTIFIED TO THE ENGINEER IMMEDIATELY.

G3. ALL DIMENSIONS ARE IN MILLIMETRES - (mm)
ALL LEVELS ARE IN METRES - (m) AND ARE ABOVE ORDNANCE DATUM AT NEWLYN, CORNWALL UNLESS NOTED OTHERWISE.

G4. NORTH SHOWN INDICATIVE ONLY

G5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT; SPECIFICATIONS; DRAWINGS; DETAILS AND OTHER DESIGN INFORMATION.

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G8. WHERE THE CONTRACTOR UNDERTAKES OR ENGAGES A THIRD PARTY TO UNDERTAKE TEMPORARY WORKS DESIGN, OR VARIES THE PELL FRISCHMANN DESIGN IN ANY WAY, THEN THE CONTRACTOR WILL TAKE FULL RESPONSIBILITY AND LIABILITY FOR ALL DESIGN ASPECTS, INCLUDING A DESIGN RISK ASSESSMENT. THE CONTRACTOR SHALL INFORM PELL FRISCHMANN OF ANY PROPOSED VARIANCES TO THE DESIGN.

G9. TOTAL DISCHARGE RATE SET TO 4l/s BASED ON MINIMUM DISCHARGE RATE OF 2 l/s AT EACH NEW OUTFALL FROM PROPOSED DEVELOPMENT.

G10. TOTAL ATTENUATION REQUIREMENT FOR SITE IS 242m³. VOLUMETRIC PROVISION SHOWN ON STRATEGY DRAWING IS 276m³. EXACT VOLUME AND FINAL LOCATIONS TO DETERMINED AS PART OF DETAILED DESIGN STAGE.

G11. ASSUMED THAT ENTIRE SITE CATCHMENT OF 0.28ha IS IMPERMEABLE FOR THE PURPOSE OF ANY CALCULATION.

Key:

- Site Boundary
- Cellular Storage Tank
- Blue Roof - at podium level
- Green Roof - extents to be confirmed
- Existing Thames Water Combined Sewer
- Proposed Combined Sewer
- Proposed Foul Sewer
- Proposed Surface Water Sewer

REV	DESCRIPTION	DRN	CHK	APP	DATE
P04	UPDATES TO PERMEABLE PAVING	SP	MF	MF	01.02.24
P03	UPDATED MASTERPLAN	SP	MF	MF	03.01.24
P02	UPDATED LAYOUT	SP	MF	MF	11.12.23
P01	FIRST ISSUE	SP	MF	MF	22.11.23

Pell Frischmann
4th FLOOR, THE POYNT, WOLLATON STREET, NOTTINGHAM NG1 5FW
Telephone +44 (0)115 784 8960
Email: pfnottingham@pellfrischmann.com
www.pellfrischmann.com

Architect/Client/Contractor

Project
100 CHALK FARM
RAD

Drawing Title
INITIAL CONCEPT
DRAINAGE STRATEGY

Drawing Status
FOR INFRMATION

	Name	Date	Status Code
Drawn	S.PAOLI	21.11.23	S2
Designed	S.PAOLI	21.11.23	Scale 1:200
Eng Chk	M.FOX	21.11.23	Revision P03
Approved	M.FOX	21.11.23	

Drawing No.
106885 - PEF - ZZ - XX - DR - CD - 0500

Appendix G Masterplan / Layout Options

KEY:

site boundary

3m network rail boundary

+28.480(ex) existing levels

+28.480 proposed levels

1:60 proposed gradient

PLANTING

proposed trees, medium size

proposed trees, medium-small size

ornamental planting in raised planters

privacy shrub planting

species-rich grass mix

supported vertical climbing plants
vertical structure assumed to be 2m high

intensive green roof

MATERIALS

stone pavers on pedestals

concrete pavers on pedestals

permeable poured play safety surface

FURNITURE

bench with backrest and armrest

timber chaise long

pedestrian gate to residents private terraces

pedestrian gate for emergency escape route only

PLAY EQUIPMENT

multiplay unit
for ages 5-11

hexagonal climbing blocks
for ages 5-11

doorsrep play: timber horse & cart
for ages 0-4

doorstep play: wood sheep and pig
for ages 0-4

DRAFT 22.01.24

FOR PLANNING

CDM :
In addition to the hazards / risks normally associated with the types of work detailed on this drawing, note the following:

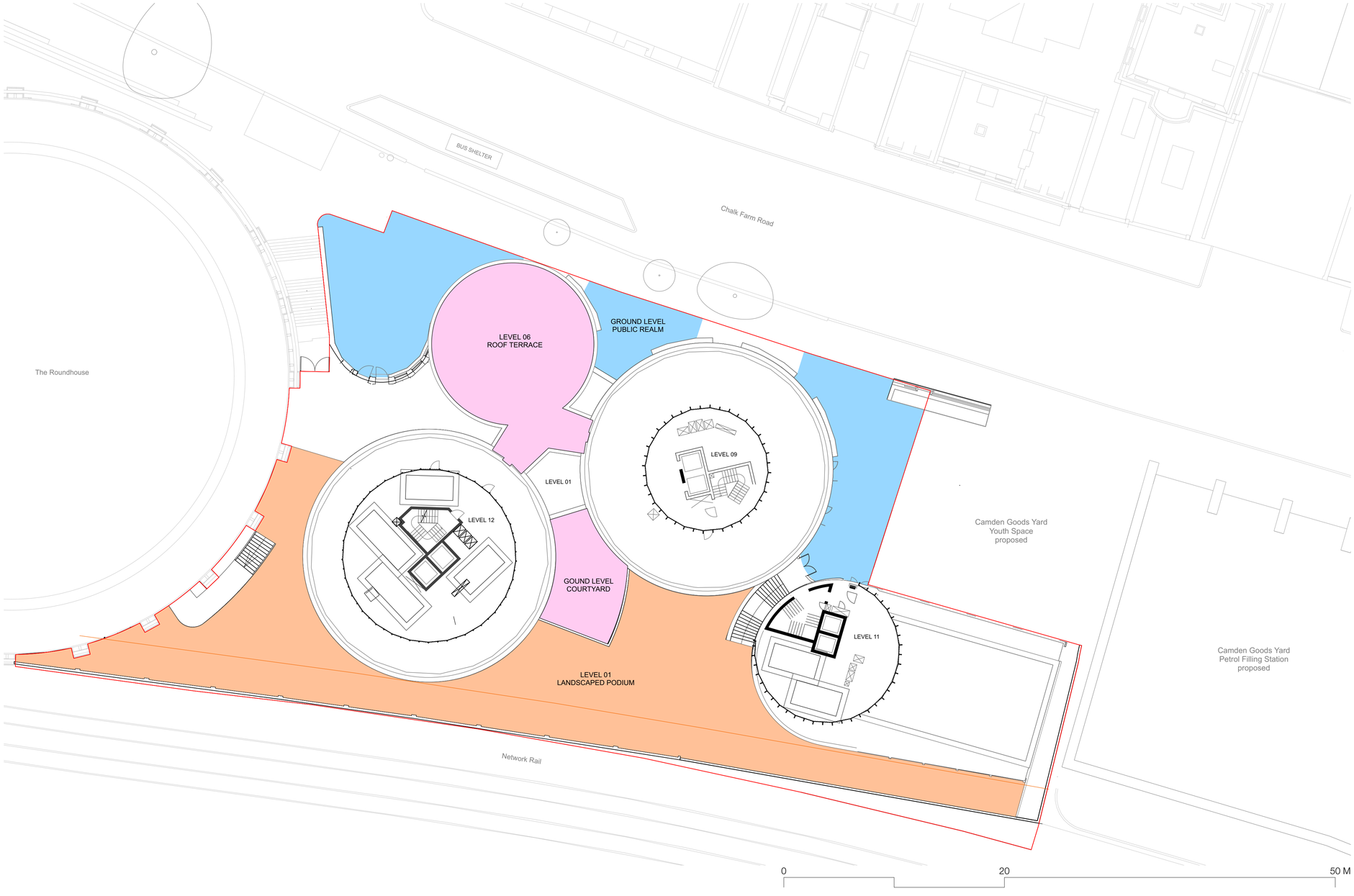
1. xxxxx

BBUK LANDSCAPE ARCHITECTURE
BBUK Studio Ltd
unit 10, The Dove Centre
109 Bartholomew Road
London NW5 2BJ
t : +44 (0)207 4854649
e : info@bbukstudio.com
www.bbukstudio.com

project	drawing	drawing nr	date	scale	rev	work stage	drawn	checked
100 Chalk Farm Road	Proposed Landscape GA Plan - Upper Levels	22226-BBUK-XX-ZZ-DR-L-0110	Jan'24	200@A1 400@A3	P01	2	as/km	mb

KEY:

- site boundary
- 3m network rail boundary
- public open space 337 sq m
- outdoor amenity accessed by C3 housing and PBSA residents 470 sq m
- outdoor amenity space accessed by PBSA residents 260 sq m



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e : info@bbukstudio.com
www.bbukstudio.com

project	drawing	drawing nr	date	scale	rev	work stage	drawn	checked
100 Chalk Farm Road	Open Space & Amenity Space Plan	22226-BBUK-XX-ZZ-DR-L-0700	Jan'24	200@A1 400@A3	P01	2	as/km	mb

KEY:

site boundary

3m network rail boundary

+28.480 proposed levels

+28.480(ex) existing levels

PLANTING

existing trees

proposed trees, medium size

ornamental planting in public realm

supported vertical climbing plants

MATERIALS

St George Youth Space,
design proposal to be co-ordinated

existing public footway flag paving

natural stone setts for vehicular access to match existing setts on Chalk Farm Road, to be secured under separate S278 application

paving flags in natural stone

smooth setts in natural stone

clay pavers to match internal reception paving

cast stone planters and steps

FURNITURE

paver-filled tree grille

proposed cycle stands, to be installed as part of S278 agreement

existing bicycle stands

WT listed water trough, location does not form part of the development but will be secured under a separate application for consent

DRAFT 22.01.24

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unit 10, The Dove Centre
109 Bartholomew Road
London NW5 2BJ
t : +44 (0)207 4854649
e : info@bbukstudio.com
www.bbukstudio.com

project	drawing	drawing nr	date	scale	rev	work stage	drawn	checked
100 Chalk Farm Road	Proposed Landscape GA Plan - Ground Level	22226-BBUK-XX-00-DR-L-0100	Jan'24	200@A1 400@A3	P01	2	as/km	mb

Appendix H Simple Index Approach

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)				
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.5				
Metals	0.4				
Hydrocarbons	0.4				
SuDS components proposed					
Component 1	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.5				
Metals	0.5				
Hydrocarbons	0.6				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.5	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.5				
Hydrocarbons	0.6				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

Appendix I Camden SuDS Proforma

The London Sustainable Drainage Proforma

Introduction

This proforma is intended to accompany a drainage strategy prepared for a planning application where required by national or local planning policy. It should be used to summarise the key outputs from the strategy to allow assessing officers at the Lead Local Flood Authority (LLFA) to quickly assess compliance with sustainable drainage (SuDS) planning

The proforma is divided into 4 sections, which are intended to be used as follows:

1. Site and project information - Provide summary details of the development, site and drainage
2. Proposed discharge arrangement – Summarise site ground conditions to determine potential for infiltration. Select a surface water discharge method (or mix of methods) following the hierarchical approach set out in the London Plan.
3. Drainage strategy – Prioritise SuDS measures that manage runoff as close to source as possible and contribute to the four main pillars of SuDS; amenity, biodiversity, water quality and water quantity.
4. Supporting information – Provide cross references to the page or section of the drainage strategy report where the detailed information to support each element can be found. This may be more than one reference for each

Policy

Drainage strategies for developments in the London Borough of [insert borough] need to comply with the following policies on SuDS:

1. Camden Local Plan Policy CC3
2. London Plan policy 5.13 and draft New London Plan policy SI13
3. The National Planning Policy Framework (NPPF)

Technical Guidance

- Post-development surface water discharge rate should be limited to greenfield runoff rates. Proposals for higher discharge rates should be agreed with the LLFA ahead of submission of the Planning Application. Clear evidence should be provided with the Planning Application to show why greenfield rates cannot be achieved.
- Greenfield runoff rate is the runoff rate from a site in its natural state, prior to any development. This should be calculated using one of the runoff estimation methods set out in Table 24.1 of CIRIA C753 The SuDS Manual.
- Attenuation storage volumes required to reduce post-development discharge rates to greenfield rates should be calculated using one of the runoff estimation methods set out in Table 24.1 of CIRIA C753 The SuDS Manual.
- 'CC' refers to climate change allowance from the current Environment Agency guidance.
- An operation and maintenance strategy for proposed SuDS measures should be submitted with the Planning Application and include the details set out in section 32.2 of CIRIA C753 The SuDS Manual. The manual should be site-specific and not directly reproduce parts of The SuDS Manual.
- Other useful sources of guidance are:
  - Camden Planning Guidance 'Water and Flooding'
  - The London Plan Sustainable Design and Construction SPG
  - DEFRA non-statutory technical standards for sustainable drainage
  - Environment Agency climate change guidance
  - CIRIA C753 The SuDS Manual
  - Camden's 'SuDS in planning applications' webpage

Camden

GREATER**LONDON**AUTHORITY

LoDEG

1. Project & Site Details		
	Project / Site Name (including sub-catchment / stage / phase where appropriate)	100 Chalk Farm Road, Camden, London
	Address & post code	100 Chalk Farm Road, Camden, London, NW1 8EH
	OS Grid ref. (Easting, Northing)	E 528303
		N 184315
	LPA reference (if applicable)	
	Brief description of proposed work	The development proposal comprises of the demolition of existing building and redevelopment of the site to provide two buildings ranging in height from 6 to 12 storeys containing purpose-built student accommodation (PBSA) with 265 rooms,
	Total site Area	2800 m^2
	Total existing impervious area	2800 m^2
	Total proposed impervious area	2800 m^2
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	No
	Existing drainage connection type and location	Combined
	Designer Name	Santino Paoli
	Designer Position	Graduate Civil Engineer
	Designer Company	Pell Frischmann

2. Proposed Discharge Arrangements			
	2a. Infiltration Feasibility		
	Superficial geology classification	No recorded superficial geology (Unproductive Aquifier)	
	Bedrock geology classification	London Clay Formation (Unproductive Aquifier)	
	Site infiltration rate	0	m/s
	Depth to groundwater level	5.4	m below ground level
	Is infiltration feasible?	No	
	2b. Drainage Hierarchy		
		Feasible (Y/N)	*Proposed (Y/N)*
	1 store rainwater for later use	Y	N
	2 use infiltration techniques, such as porous surfaces in non-clay areas	N	N
	3 attenuate rainwater in ponds or open water features for gradual release	N	N
	4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
	5 discharge rainwater direct to a watercourse	N	N
	6 discharge rainwater to a surface water sewer/drain	Y	Y
	7 discharge rainwater to the combined sewer.	Y	Y
	2c. Proposed Discharge Details		
	Proposed discharge location	nto an existing manhole and a new propose	
	Has the owner/regulator of the discharge location been consulted?	nning enquiry application has been sent to T	

Camden

GREATERLONDONAUTHORITY

LoDEG

3. Drainage Strategy

3a. Discharge Rates & Required Storage

	Greenfield (GF) runoff rate (l/s)	*Existing discharge rate (l/s)*	*Required storage for GF rate (m^3)*	*Proposed discharge rate (l/s)*
Qbar	1.5			
1 in 1	1.3		265	4
1 in 30	3.4		2051	4
1 in 100	4.9		3048	4
1 in 100 + CC			4605	4
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Hydrobrake Manhole		

3c. Proposed SuDS Measures

	Catchment area (m^2)	*Plan area (m^2)*	*Storage vol. (m^3)*
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	0	0	0
Blue roofs	433	433	57
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	0	0	0
Pervious pavements	0	0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	2367		219
Total	**2800**	**433**	**276**

4. Supporting Information

4a. Discharge & Drainage Strategy	*Page/section of drainage report*
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Section 3 Surface Water Drainage Strategy
Drainage hierarchy (2b)	Section 3.1 Drainage Hierarchy
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Section 2.2
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 3.2
Proposed SuDS measures & specifications (3b)	Section 3.4 & 3.6
4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	Appendix F
Detailed drainage design drawings, including exceedance flow routes	Appendix E
Detailed landscaping plans	Appendix F
Maintenance strategy	Section 3.6
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	Section 3.5
b) biodiversity?	Section 3.5
c) amenity?	Section 3.5