SUDS REPORT FOR FLAT 1, 123 GOLDHURST TERRACE, LONDON, NW6 3EX

DOCUMENT NUMBER.: C2554-R1-REV-B

PREPARED BY

Nimbus
ENGINEERING CONSULTANTS

Contents

APPENDICES

1. INTRODUCTION

1.1 Appointment

Nimbus Engineering have been appointed by Mr Shahil Kotecha to provide a solution on the management of Surface Water run-off and to ensure that there is no risk of flooding caused by the proposed single storey side extension and rear extension at 123 Goldhurst Terrace, London, NW6 3EX.

The London Borough of Camden have imposed the following planning condition, relating to surface water:

"Prior to commencement, full details demonstrating how the development would minimise water consumption, pressure on the combined sewer network and risk of flooding, shall be submitted to and approved in writing by the local planning authority. The details shall include the following measures:

a) *The incorporation of water efficient features and equipment's and capturing, retaining, and re-using surface water and grey water on-site:*

b) *the limitation of the amount and rate of run-off and wastewater entering the combined storm water and sewer network through the methods outlined in part a) and other sustainable urban drainage methods to reduce the risk of flooding; and*

c) the reduction of the pressure placed on the combined storm water and sewer network from foul water and surface water run-off and ensuring development in the areas identified as being at risk of surface water flooding are designed to cope with the potential flooding.

The submitted details shall demonstrate how the methods outlined in a), b) and c) will be incorporated to ensure there is no additional strain on adjoining sites or the existing drainage infrastructure and how the development will resist flooding and cope with being flooded

The development shall be carried out in accordance with the details thus approved."

1.2 Objectives

This report will address the concerns raised by the Borough and provide details on a suitable Sustainable Urban Drainage System (SuDS) in order to reduce the surface water run-off leaving the site and show that the proposed development will not increase Flood Risk at the site or elsewhere.

1.3 Limitations

The general limitations of this report are:

- A number of data and information sources have been used to prepare this report. Whilst Nimbus Engineering believes them to be trustworthy, Nimbus Engineering is unable to guarantee the accuracy of data and information that has been provided by others;

- This report has been prepared using the best data and information that was available at the time of writing. There is the potential for further information or data to become available, leading to changes in the conclusions drawn by this report, for which Nimbus Engineering cannot be held responsible.

2. GEOLOGY OF THE AREA

According to, the British geological survey, there are no superficial deposits at the site as shown in Figure 1, below. The bedrock in the area is the London Clay Formation –Clay, Silt and Sand, as shown in Figure 2, overleaf.

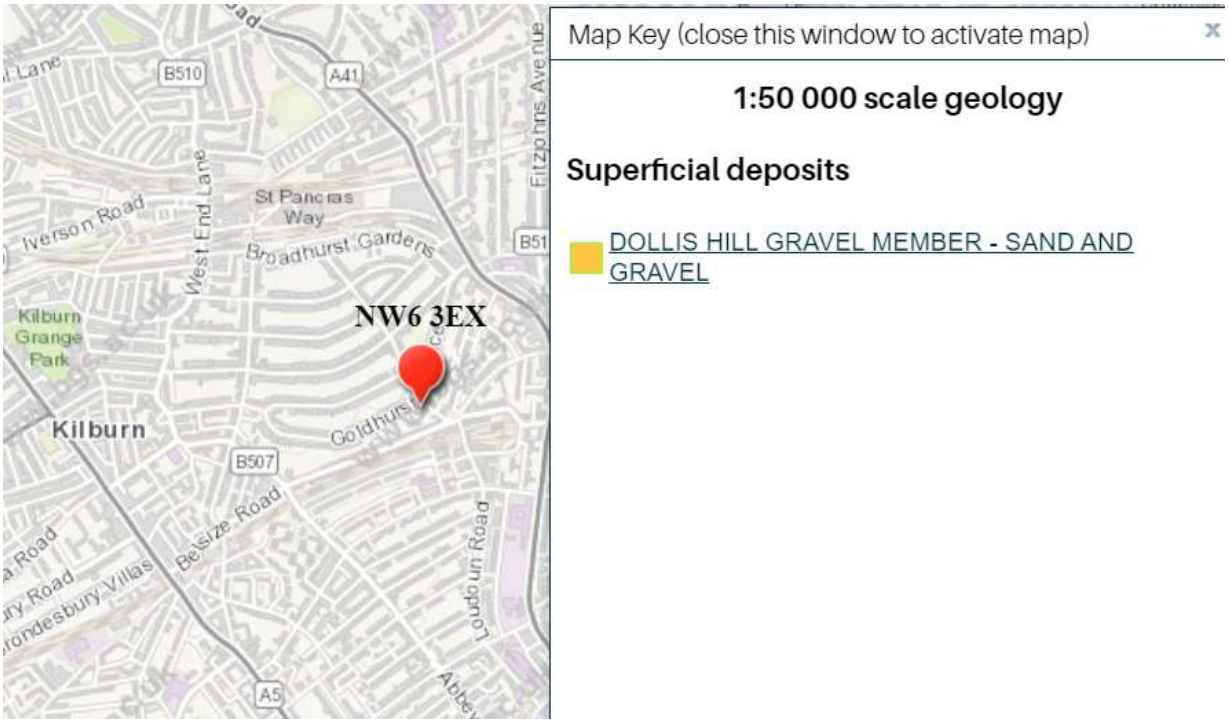

Figure 1- Superficial deposits at the site. (Source: British Geological Society Website (Contains British Geological Survey materials © URKI [2021]. Base mapping is provided by ESRI)).

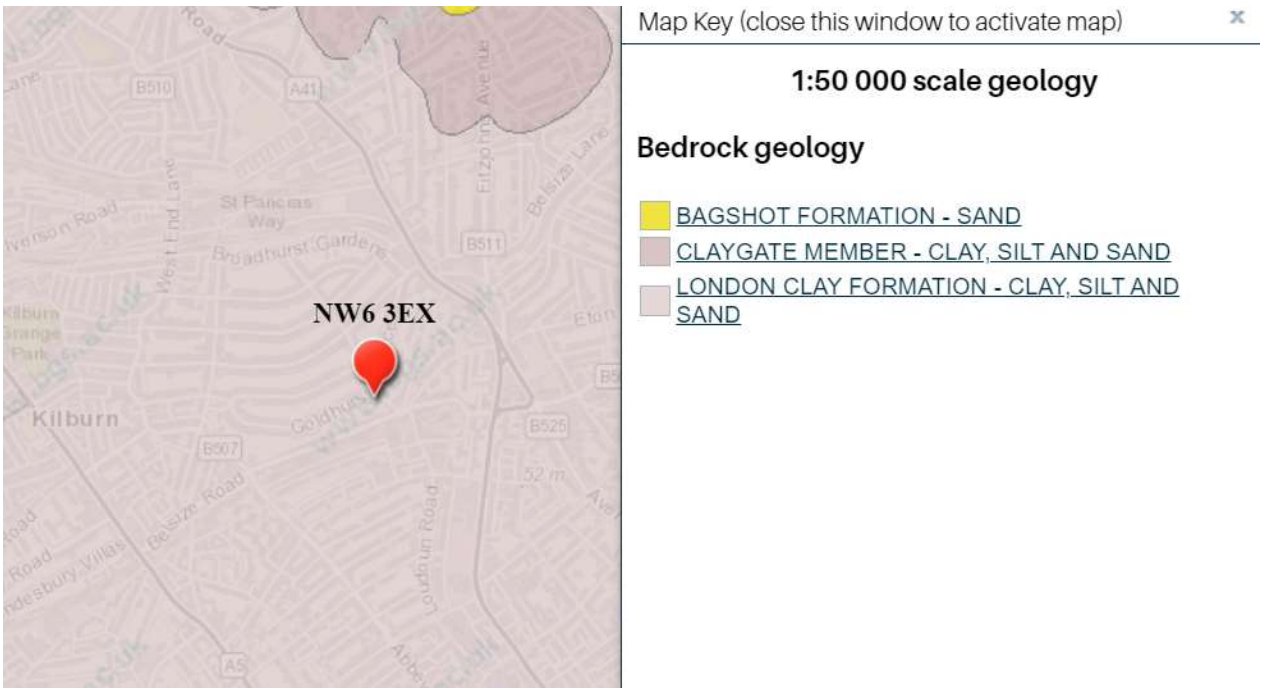

Figure 2- Bedrock at the site. (Source: British Geological Society Website (Contains British Geological Survey materials © URKI [2021]. Base mapping is provided by ESRI))

Due to the bedrock geology in the area consisting of London Clay and the combined sewer manhole on site, it was deemed infiltration was not suitable.

3. SUSTAINABLE URBAN DRAINAGE SYSTEMS

Surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

Reducing the rate of surface water discharge from urban sites is one of the most effective ways of reducing and managing flood risk.

Traditional piped surface water systems work by removing surface water from our developments as quickly as possible, however this can cause various adverse impacts:

- Increased downstream flooding, and sudden rises in flow rates and water levels in local water courses.

- Reduction in groundwater levels and dry weather flows in watercourses.

- Reduce amenity and adversely affect biodiversity due to the surface water run-off containing contaminants such as oil, organic matter and toxic materials.

SuDS are defined as a sequence of management principles and control structures designed to drain surface water in a more sustainable fashion than conventional piped drainage techniques. SuDS should utilise the natural landscape of an area which as well as slowing down the rate of runoff provides a number of environmental, ecological and social benefits.

These include:

Protection and enhancement of water quality. As well as providing on-site attenuation, SuDS treat the water, resulting in an improved quality of water leaving the site. This is achieved when the water passes through fine soils and the roots of specially selected plants. Pollutants washed off the hard landscaping by rainfall will be safely removed before the water reaches the natural receiving water course.

- A sympathetic approach to the environmental setting by providing opportunities to create habitats for flora and fauna in urban watercourses and open spaces.

- Meeting the amenity and social needs of the local community and residents in the creation of attractive green spaces.

The various types of SuDS include:

Permeable paving	
Soakaways;	
Swales and basins;	
Bioretention/ rain gardens;	
Green roofs and rainwater re-use;	

Preferably a combination of these techniques should be used as part of the surface water management train, and it is important for all stakeholders, such as developers, architects, landscape architects and engineers to work in order to determine a feasible solution.

The SuDS management train is shown below, and this has been followed when proposing the proposed Sustainable Urban Drainage Systems for this site.

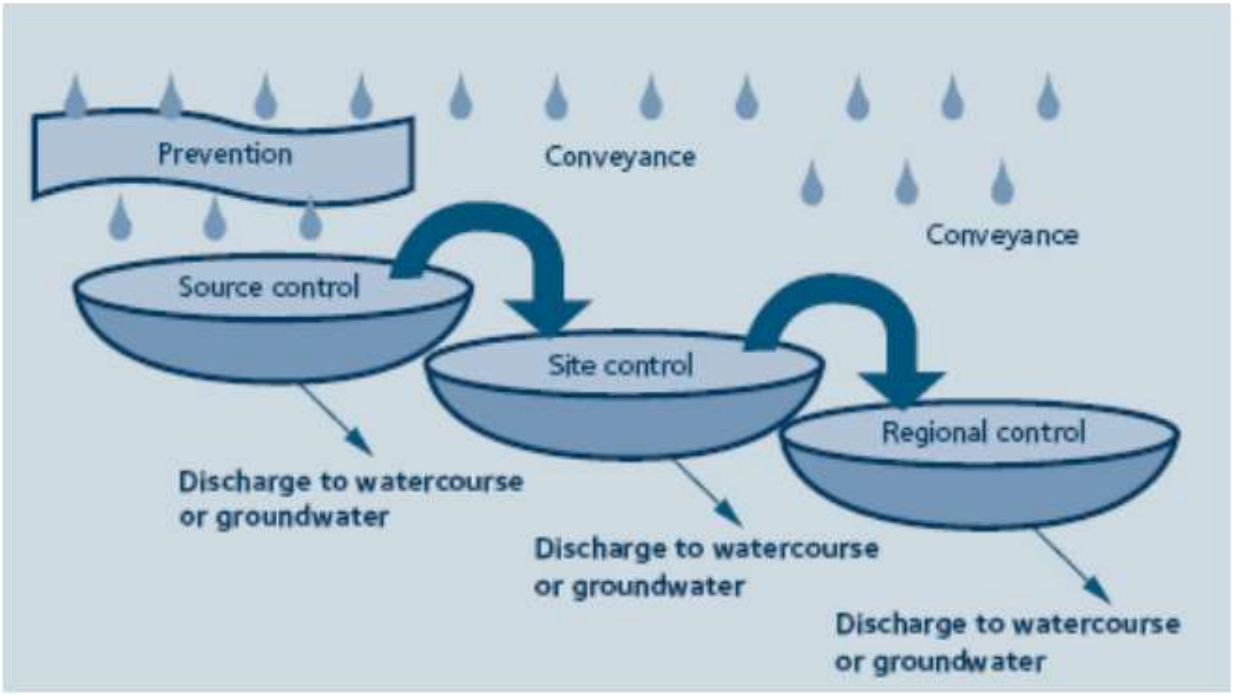

Figure 3 – SuDS Management Train

4. SuDS PROPOSALS FOR DEVELOPMENT

In accordance with the CIRIA SuDS Manual C753 and Policy SI 13 of the London Plan, the SuDS hierarchy has been considered in relation to the site-specific constraints and its surroundings. Table 1 below outlines the hierarchical approach considered for the development at 123 Goldhurst Terrace.

Sustainable Drainage Proposal	Description	Constraints/Comments	Appropriate
Rainwater Use as a Resource	Use of rainwater runoff for reuse, e.g. Rainwater harvesting tanks, Blue Roofs for irrigation	Not applicable for new extension due to RWPs terminating at lower ground floor level. Wall mounted rainwater harvesting tanks to be installed below existing RWPs if feasible.	Yes
Rainwater Full Infiltration to Ground (Source Control)	Infiltration devices and/or soakaways. Surface water runoff stored on site and gradually percolating into receiving ground	Due to bedrock geology consisting of London Clay formation and the combined sewer manhole on site, full infiltration was deemed as a non-appropriate option	No
Rainwater Partial Infiltration to Ground (Source Control)	Installation of permeable/porous surfacing	Permeable Paving is proposed on all hardstanding areas throughout the site to allow for partial infiltration in low intensity storm events	Yes
Rainwater attenuation in green infrastructure features for gradual release	The onsite storage of all surface water runoff which can then be gradually conveyed to a nearby watercourse, sewer or infiltration into the ground. Forms of green infrastructure features: Green Roofs,	Due to spatial constraints on site and location of development, above ground attenuation features were deemed not feasible. Green roofs not feasible due to pitched roof. All RWPs discharging to lower ground floor level	No

	Raingardens, Ponds, Swales, Detention basins, Infiltration Trenches, Raingarden Planters		
Rainwater discharge direct to a watercourse	All surface water runoff on site discharged at a restricted rate to a nearby watercourse	Consultation of EA Maps and survey information shows no nearby watercourses to site	No
Controlled rainwater discharge to a surface water sewer or drain	All surface water runoff on site discharged at a restricted rate to a nearby surface water sewer or drain, all rainwater runoff stored in below ground attenuation features. e.g. oversized pipes, geo-cellular tanks or oversized inspection chambers	As per consultation with Thames Water Asset plan, no surface water sewers within the area only a combined network. All surface water runoff will be stored in a below ground attenuation tank, sized for a 1 in 100 Year Storm Event + 40% CC with a restricted discharge rate.	No
Controlled rainwater discharge to a combined sewer	All surface water runoff on site discharged at a restricted rate to a nearby combined sewer all rainwater runoff stored in below ground attenuation features. e.g. oversized pipes, geo-cellular tanks or oversized inspection chambers	As per site investigation and consultation of Thames Water Asset Plans All surface water runoff will be stored within the proposed new network, sized for a 1 in 100 Year Storm Event + 40% CC with a restricted discharge rate.	Yes

Table 1: SuDS Control Measures for Development

5. PROPOSED SOLUTION

The total site area is 214m^2, with the impermeable areas at the existing site being 155m^2. Following the development at this site, there will be an additional 33m^2 of impermeable areas.

Due to the underlying geology, the bedrock consisting of clay and the existing combined sewer on site, infiltration was deemed not suitable.

Therefore, all surface water run off had to be attenuated and discharged at 1.0l/s.

As both RWPs for the new extension were at lower ground floor level and the tie-in manhole on site being at a shallower depth, a pumping station had to be installed within the front lightwell, therefore a hydraulic model was built to ensure a feasible solution was proposed. A detailed hydraulic model was built, using Infodrainage, to simulate rainfall events for a 1 in 100 year storm event, with a 40% allowance for climate change with a restricted flow discharging at 1.0l/s. The results of the hydraulic model can be found in Appendix A.

In order to ensure that the SuDS management train has been considered fully, the new rear patio hardstanding area will be formed of permeable surfacing, in order to deal with as much of the surface water run off at source, with the surface water run off

from all sloped area to be caught by slot drains.

A wall mounted rainwater harvesting tank will be installed below the existing building's rainwater down pipes to promote rainwater re-use, if spatially feasible.

The surface water runoff from the site will be held within the upstream manholes and pumping station within the lower ground floor pumping station, as per the results of the hydraulic model in Appendix A, there is sufficient storage for a 1 in 100 year plus 40% climate change storm event, with a flow restriction set to 1.0l/s, the total storage within the pumping station and the upstream chambers equate to 1.43m³.

This restricted surface water run off will be conveyed by gravity from an upstream manhole "S5" on site to an existing combined manhole onsite, as shown on drawing number C2554-01, in Appendix B. The existing combined manhole then discharges into the Thames Water combined sewer in Goldhurst Terrace which can be seen in the Thames Water Asset Plans in Appendix C.

We believe the Sustainable Urban Drainage System hierarchy has been considered fully with respect to the type of development, the proposals will reduce flood risk at the site and elsewhere. The proposed SuDS layout and details are shown on drawing number C2554-01 and C2554-02 in Appendix B. All surface water run off calculations have been provided in Appendix A.

6. TIMESCALE AND MAINTENANCE OF WORKS

All drainage works shall be completed prior to first occupation and there shall be no adoption of any of the drainage works within the site, and the homeowner will be responsible to oversee the long-term maintenance of their drains. The following outline maintenance strategy sets out recommended timescales for maintenance of the proposed drainage works, in line with CIRIA SuDS Design Guide:

- Regular inspection will comprise the inspection and cleaning of catchment and gutters, to reduce the likelihood of contamination, this is recommended to be carried out every 3 to 6 months.

- Periodic inspections & removal of debris from slot drains that represent blockage risks

- Jet washing of permeable surfaces should be undertaken every 3 to 6 months in order to ensure that the system works properly

- The catchpit chamber and pumping station should be checked and emptied regularly for the accumulation of debris/silt in order to ensure that there are no blockages

The following table outlines the maintenance requirements for the porous 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 or clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this is the most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm 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 significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in six months
	Inspect slit accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 2: Operation and maintenance requirements for porous paving.

The following table outlines the maintenance requirements for RWH systems:

Maintenance schedule	Required action	Typical Frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdraw devices, overflow areas, pumps, filters	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters. Withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional maintenance	Cleaning and/ or replacement of any filters	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

Table 3: Operation and maintenance requirement for RWH systems.

7. CONCLUSIONS

The purpose of this report and associated drawings, is to satisfy the planning condition relating to surface water flows arising due to the development at this site.

As requested, SuDS have been incorporated into this design, in the form of:

1) All new uncovered hardstanding surfaces being formed of permeable paving

2) All surface water runoff from the new extension being restricted and attenuated within the new network with a restricted discharge of 1.0l/s into the existing combined manhole onsite.

3) A new wall mounted rainwater harvesting tank installed below an existing rainwater down pipe

This proposed development will greatly reduce the surface water run off leaving the site, and therefore reduce flood risk at the site and elsewhere.

The timetable of works is to complete all drainage prior to occupation of dwellings, and maintenance requirements are also included in this report, therefore it is considered that all requirements of the planning condition by London Borough of Camden have been met, and therefore can be discharged.

APPENDIX A –
INFODRAINAGE HYDRAULIC MODELLING REPORT

Project:	Date:		
123 Goldhurst Terrace 1 in 100 Year Storm Event +40% CC Drainage Model	09/06/2021		
	Designed by:	Checked by:	Approved By:
	RH	SL	SL
Report Details: Type: Inflow Summary Storm Phase: Phase	Kemp House: 152 City Road London EC1V 2NX		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area (1)	S3-CATCHPIT		Time of Concentration	0.000	100	0	100	0.000
Catchment Area (3)	S2		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (6)	S1		Time of Concentration	0.001	100	0	100	0.001
TOTAL		**0.0**		**0.003**				**0.003**

Project:	Date:		
123 Goldhurst Terrace 1 in 100 Year Storm Event +40% CC Drainage Model	09/06/2021		
	Designed by:	Checked by:	Approved By:
	RH	SL	SL
Report Title: Analysis Criteria	Kemp House: 152 City Road London EC1V 2NX		

Runoff Type	Dynamic
Output Interval (mins)	15
Time Step	Default
Urban Creep (%)	0
Junction Flood Risk Margin (mm)	150
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England and Wales
M5-60 (mm)	21.0
Ratio R	0.434
Summer	☐
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	40

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200

Project:	Date:		
123 Goldhurst Terrace 1 in 100 Year Storm Event +40% CC Drainage Model	09/06/2021		
	Designed by: RH	Checked by: SL	Approved By: SL
Report Details: Type: Junctions Summary Storm Phase: Phase	Kemp House: 152 City Road London EC1V 2NX		

S1

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter	-0.30	-3.63	-3.62	0.01	0.2	0.003	0.000	0.2	0.283	OK
FSR: 100 years: Increase Rainfall (%): +40: 30 mins: Winter	-0.30	-3.63	-3.61	0.02	0.4	0.005	0.000	0.4	0.364	OK
FSR: 100 years: Increase Rainfall (%): +40: 60 mins: Winter	-0.30	-3.63	-3.62	0.01	0.3	0.004	0.000	0.3	0.449	OK
FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter	-0.30	-3.63	-3.62	0.01	0.2	0.003	0.000	0.2	0.521	OK
FSR: 100 years: Increase Rainfall (%): +40: 180 mins: Winter	-0.30	-3.63	-3.62	0.01	0.1	0.003	0.000	0.1	0.581	OK
FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter	-0.30	-3.63	-3.62	0.01	0.1	0.003	0.000	0.1	0.611	OK
FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter	-0.30	-3.63	-3.62	0.01	0.1	0.002	0.000	0.1	0.653	OK
FSR: 100 years: Increase Rainfall (%): +40: 480 mins: Winter	-0.30	-3.63	-3.62	0.01	0.1	0.002	0.000	0.1	0.695	OK
FSR: 100 years: Increase Rainfall (%): +40: 600 mins: Winter	-0.30	-3.63	-3.62	0.01	0.0	0.002	0.000	0.1	0.731	OK

Project:	Date:		
123 Goldhurst Terrace 1 in 100 Year Storm Event +40% CC Drainage Model	09/06/2021		
	Designed by: RH	Checked by: SL	Approved By: SL
Report Details: Type: Junctions Summary Storm Phase: Phase	Kemp House: 152 City Road London EC1V 2NX		

S2

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter	-2.98	-3.71	-3.65	0.06	0.6	0.016	0.000	0.7	0.900	OK
FSR: 100 years: Increase Rainfall (%): +40: 30 mins: Winter	-2.98	-3.71	-3.68	0.03	1.2	0.008	0.000	1.2	1.167	OK
FSR: 100 years: Increase Rainfall (%): +40: 60 mins: Winter	-2.98	-3.71	-3.69	0.02	0.9	0.007	0.000	0.9	1.426	OK
FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter	-2.98	-3.71	-3.69	0.02	0.6	0.005	0.000	0.6	1.685	OK
FSR: 100 years: Increase Rainfall (%): +40: 180 mins: Winter	-2.98	-3.71	-3.69	0.02	0.4	0.005	0.000	0.4	1.853	OK
FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter	-2.98	-3.71	-3.69	0.02	0.3	0.004	0.000	0.3	1.949	OK
FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter	-2.98	-3.71	-3.70	0.01	0.2	0.004	0.000	0.2	2.099	OK
FSR: 100 years: Increase Rainfall (%): +40: 480 mins: Winter	-2.98	-3.71	-3.70	0.01	0.2	0.003	0.000	0.2	2.213	OK
FSR: 100 years: Increase Rainfall (%): +40: 600 mins: Winter	-2.98	-3.71	-3.70	0.01	0.2	0.003	0.000	0.2	2.333	OK

Project:	Date:		
123 Goldhurst Terrace 1 in 100 Year Storm Event +40% CC Drainage Model	09/06/2021		
	Designed by: RH	Checked by: SL	Approved By: SL
Report Details: Type: Junctions Summary Storm Phase: Phase	Kemp House: 152 City Road London EC1V 2NX		

S3-CATCHPIT

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter	-3.14	-3.81	-3.65	0.15	0.8	0.024	0.000	0.9	1.051	Surcharged
FSR: 100 years: Increase Rainfall (%): +40: 30 mins: Winter	-3.14	-3.81	-3.73	0.08	1.4	0.012	0.000	1.1	1.369	OK
FSR: 100 years: Increase Rainfall (%): +40: 60 mins: Winter	-3.14	-3.81	-3.73	0.07	1.1	0.011	0.000	0.9	1.670	OK
FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter	-3.14	-3.81	-3.75	0.05	0.7	0.008	0.000	0.6	1.983	OK
FSR: 100 years: Increase Rainfall (%): +40: 180 mins: Winter	-3.14	-3.81	-3.77	0.04	0.5	0.006	0.000	0.5	2.163	OK
FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter	-3.14	-3.81	-3.78	0.03	0.4	0.005	0.000	0.4	2.284	OK
FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter	-3.14	-3.81	-3.79	0.02	0.3	0.003	0.000	0.3	2.474	OK
FSR: 100 years: Increase Rainfall (%): +40: 480 mins: Winter	-3.14	-3.81	-3.79	0.01	0.2	0.002	0.000	0.2	2.620	OK
FSR: 100 years: Increase Rainfall (%): +40: 600 mins: Winter	-3.14	-3.81	-3.79	0.01	0.2	0.002	0.000	0.2	2.746	OK

Project:	Date:		
123 Goldhurst Terrace 1 in 100 Year Storm Event +40% CC Drainage Model	09/06/2021		
	Designed by: RH	Checked by: SL	Approved By: SL
Report Details: Type: Junctions Summary Storm Phase: Phase	Kemp House: 152 City Road London EC1V 2NX		

S4-Pumping Station

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter	-3.14	-3.82	-3.65	0.16	0.9	0.046	0.000	1.0	1.042	Surcharged
FSR: 100 years: Increase Rainfall (%): +40: 30 mins: Winter	-3.14	-3.82	-3.73	0.09	1.1	0.025	0.000	0.9	1.368	OK
FSR: 100 years: Increase Rainfall (%): +40: 60 mins: Winter	-3.14	-3.82	-3.73	0.08	0.9	0.023	0.000	0.8	1.670	OK
FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter	-3.14	-3.82	-3.75	0.06	0.6	0.017	0.000	0.6	1.983	OK
FSR: 100 years: Increase Rainfall (%): +40: 180 mins: Winter	-3.14	-3.82	-3.77	0.05	0.5	0.013	0.000	0.5	2.163	OK
FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter	-3.14	-3.82	-3.78	0.04	0.4	0.011	0.000	0.4	2.284	OK
FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter	-3.14	-3.82	-3.79	0.03	0.3	0.008	0.000	0.3	2.476	OK
FSR: 100 years: Increase Rainfall (%): +40: 480 mins: Winter	-3.14	-3.82	-3.79	0.02	0.2	0.006	0.000	0.2	2.620	OK
FSR: 100 years: Increase Rainfall (%): +40: 600 mins: Winter	-3.14	-3.82	-3.80	0.02	0.2	0.005	0.000	0.2	2.746	OK

Project:	Date:		
123 Goldhurst Terrace 1 in 100 Year Storm Event +40% CC Drainage Model	09/06/2021		
	Designed by: RH	Checked by: SL	Approved By: SL
Report Details: Type: Junctions Summary Storm Phase: Phase	Kemp House: 152 City Road London EC1V 2NX		

S5

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter	0.00	-1.80	-1.79	0.01	1.0	0.003	0.000	1.0	1.038	OK
FSR: 100 years: Increase Rainfall (%): +40: 30 mins: Winter	0.00	-1.80	-1.79	0.01	0.9	0.003	0.000	0.9	1.368	OK
FSR: 100 years: Increase Rainfall (%): +40: 60 mins: Winter	0.00	-1.80	-1.79	0.01	0.8	0.003	0.000	0.8	1.670	OK
FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter	0.00	-1.80	-1.79	0.01	0.6	0.002	0.000	0.6	1.983	OK
FSR: 100 years: Increase Rainfall (%): +40: 180 mins: Winter	0.00	-1.80	-1.79	0.01	0.5	0.002	0.000	0.5	2.163	OK
FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter	0.00	-1.80	-1.79	0.01	0.4	0.002	0.000	0.4	2.283	OK
FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter	0.00	-1.80	-1.79	0.01	0.3	0.002	0.000	0.3	2.475	OK
FSR: 100 years: Increase Rainfall (%): +40: 480 mins: Winter	0.00	-1.80	-1.79	0.01	0.2	0.002	0.000	0.2	2.619	OK
FSR: 100 years: Increase Rainfall (%): +40: 600 mins: Winter	0.00	-1.80	-1.79	0.01	0.2	0.001	0.000	0.2	2.745	OK

Project:	Date:		
123 Goldhurst Terrace 1 in 100 Year Storm Event +40% CC Drainage Model	09/06/2021		
	Designed by: RH	Checked by: SL	Approved By: SL
Report Details: Type: Junctions Summary Storm Phase: Phase	Kemp House: 152 City Road London EC1V 2NX		

Existing Combined Manhole

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter	0.00	-3.00	-2.90	0.10	1.0	0.000	0.000	1.0	1.038	OK
FSR: 100 years: Increase Rainfall (%): +40: 30 mins: Winter	0.00	-3.00	-2.90	0.10	0.9	0.000	0.000	0.9	1.368	OK
FSR: 100 years: Increase Rainfall (%): +40: 60 mins: Winter	0.00	-3.00	-2.90	0.10	0.8	0.000	0.000	0.8	1.670	OK
FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter	0.00	-3.00	-2.90	0.10	0.6	0.000	0.000	0.6	1.983	OK
FSR: 100 years: Increase Rainfall (%): +40: 180 mins: Winter	0.00	-3.00	-2.93	0.07	0.5	0.000	0.000	0.5	2.163	OK
FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter	0.00	-3.00	-2.94	0.06	0.4	0.000	0.000	0.4	2.283	OK
FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter	0.00	-3.00	-2.95	0.05	0.3	0.000	0.000	0.3	2.475	OK
FSR: 100 years: Increase Rainfall (%): +40: 480 mins: Winter	0.00	-3.00	-2.96	0.04	0.2	0.000	0.000	0.2	2.619	OK
FSR: 100 years: Increase Rainfall (%): +40: 600 mins: Winter	0.00	-3.00	-2.96	0.04	0.2	0.000	0.000	0.2	2.745	OK

Nimbus Engineering Consultants Ltd
www.nimbusengineering.co.uk

Kemp House,
152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

Job No.	C2554
Sheet no.	1
Date	10/06/21

MasterDrain
HY 10.01

Project	By	Checked	Reviewed
Flat 1, 123 Goldhurst Terrace, London, NW6 3EX	S.L		
Title: Pre & post SW Calcs			

Data:-

Hydrology (FSR):-

Location = Camden (G.London)		WRAP	= 4
Long reference = 525185		Grid reference	= TQ2585
M5-60 (mm)	= 21.1	SAAR (mm/yr)	= 650
r	= 0.44	Soil	=0.47
Hyd. area	= 6	Hyd. zone	= 8
Hydrograph	= Winter	Area = England & Wales	

Site values used in design:-

Total site area	= 0.0033 ha	Climate change factor	= 40%
Pre-dev area drained	= 0.0033 ha	Post-dev area drained	= 0.0033 ha
Imperm runoff factor	= 100%	Perm runoff factor	= 20%

Pre-development

Area to soakaways	= 0.0000 ha	Area to other SUDS	= 0.0000 ha
Perv. area to SUDS	= 0.0000 ha	Pre-dev flow to drain	= 0.00 l/s

Post-development

Area to soakaways	= 0.0000 ha	Area to other SUDS	= 0.0000 ha
Perv. area to SUDS	= 0.0000 ha	Post-dev flow to drain	= 0.00 l/s

Calculations:-

Revised Post-dev Imperm. area = 0.003 ha
Equiv. Post-dev Imperm. area = 0.003 ha
Equiv. Post-dev Perm. area = 0.000 ha
Total Pre-dev equiv. area ha = 0.003 ha
Total Post-dev equiv. area ha = 0.003 ha
100 yr 6 hour mean intensity = 10.51mm/hr

Results:-

Pre-dev peakflow runoff (l/s) (m^3/s)

R.P.	15	30	60	120	240	360	480	600	Max	CCF	Final	R.P.
1	0.8	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.8	N/A	0.8	1
30	1.9	1.2	0.7	0.4	0.3	0.2	0.1	0.1	1.9	N/A	1.9	30
100	2.5	1.6	1.0	0.6	0.3	0.2	0.2	0.2	2.5	N/A	2.5	100

Post-dev peakflow runoff (l/s)

R.P.	15	30	60	120	240	360	480	600	Max	CCF	Final	R.P.
1	0.8	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.8	40	1.1	1
30	1.9	1.2	0.7	0.4	0.3	0.2	0.1	0.1	1.9	40	2.7	30
100	2.5	1.6	1.0	0.6	0.3	0.2	0.2	0.2	2.5	40	3.5	100

100 year 6 hour (x Climate Change Factor) storm gives:-
Pre-dev runoff volume m^3 = 2.1m^3
Post-dev rainfall volume = 2.9m^3
Post-dev volume m^3 (excess above SUDS) = 2.9m^3
100 yr 6 hour mean intensity = 10.51mm/hr
Pre-dev volume to drain at 0 l/s = 0.0 m^3
Post-dev volume to drain at 0 l/s = 0.0 m^3
Post-dev storage volume = 2.9m^3
Post-dev 5mm imperm volume = 0.2 m^3
Post-dev 5mm perm volume = 0.0 m^3

$Q_{BAR(rural)}$ = 0.015 l/s or 4.427 l/s/ha or 0.000 cumecs - from IoH 124.

The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.

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Job No.	C2554
Sheet no.	2
Date	10/06/21

MasterDrain
HY 10.01

Project	Flat 1, 123 Goldhurst Terrace, London, NW6 3EX	By	S.L
Title	Pre & post SW Calcs	Checked	
		Reviewed	

Data summary.

Use the data below for the SUR1 form

Site areas:-

Total site area =	0.0033 ha	;33.0 m² [3A]
Pre-development impermeable area =	0.0033 ha	[3B]
Pre-development permeable area =	0.0000 ha	
Post-development impermeable area =	0.0033 ha	[3C]
Post-development permeable area =	0.0000 ha	

Peak runoff:-

Pre-development 1 year storm (15min) =	0.8 l/s	[6A]
Pre-development 100 year storm (15min) =	2.5 l/s	[6C]
Post-development 1 year storm (15min) =	0.8 l/s	[6B]
Post-development 100 year storm (15min)=	2.48 l/s	[6D]

Greenfield runoff:-

$Q_{BAR(rural)}$ = 0.015 l/s or 4.427 l/s/ha or 0.000 cumecs – from IoH 124.

Climate change factor:-

CCF = 40%

Volumes:-

Pre-development 100 yr/6hr storm [12A]= 2.9m³
Post-development 100 yr/6hr storm (add. volume with no SUDS) [12B]= 2.9m³
Post-development 100 yr/6hr storm (add. volume with SUDS) = 2.9m³
Post-development add. predicted volume (No SUDS) [12C] = 0.0m³

You may also require

Data relating to the infiltration test calculations (if applicable)
Evidence to show runoff reduction (if applicable)
Information on calculation methods (if applicable see next sheet)

Note

Numbers in square brackets relate to the
Nov. 2010 v1.1 / issued 11/02/10 copy of SUR1

Nimbus Engineering Consultants Ltd
www.nimbusengineering.co.uk

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152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

Job No.	C2554
Sheet no.	3
Date	10/06/21

MasterDrain
HY 10.01

Project	Flat 1, 123 Goldhurst Terrace, London, NW6 3EX	By	S.L
Title	Pre & post SW Calcs	Checked	
		Reviewed	

Definitions and methods

Hydrology

The hydrological constants are derived from the Wallingford maps. They are used to calculate location specific rainfall figures.

Site values and factors

Areas of the site should be entered in hectares (10000 m²). If the Pre-development site is a green field, this box is blank.
Climate Change Factor is initially set at 20% - this may be changed as required.
Greenfield runoff is calculated using the method described in IoH 124.
Runoff factors

The impermeable runoff factor is initially set at 98%
The permeable runoff factor is initially set at 20%

Note: the CCF and the runoff factors may be changed by the user to suit the development
The areas draining to soakaways and other SUDS are entered in the appropriate box (in hectares)

Calculations

The post-development area is reduced by subtracting the areas that drain to soakaways or other SUDS, to give a revised figure.
All areas are then multiplied by the appropriate runoff factor to give an equivalent area with 100% runoff.
These are then summated.
This gives a total pre-development equivalent area, and a similar figure for the post-development area.
The 'Post-dev volume to drain (no SUDS)' gives the total runoff to drain if no SUDS were used.

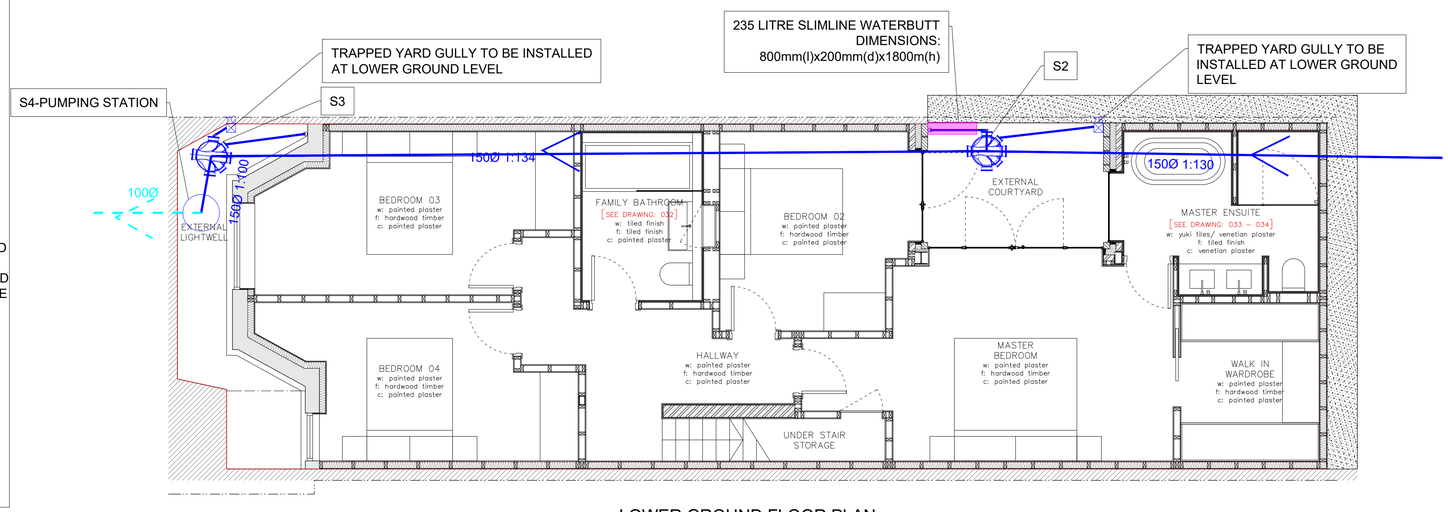
Results

The pre- and post-development areas are subjected to 1,30 and 100 year return period storms with a duration of 15 to 600 minutes.
The Revised Post-dev Imperm. area is the area (in ha) that is not going to SUDS x impervious runoff factor.
The runoff rates are calculated for the chosen hydrograph (Summer or Winter) as l/s. Figures in red indicate m³/s
The peak value is measured, multiplied by the CCF and the total maximum rate is shown.
The pre- and post-development volumes for a 100 year / 6 hour storm are calculated from the area under the hydrograph curve.
Post-dev volume (i.e. excess above SUDS) is that volume produced by the drained area that does not go to SUDS.
Qbar(rural) is calculated in accordance with the procedure laid down in IoH 124

APPENDIX B – DRAWINGS

NOTES:

1. SURFACE WATER DRAINS ARE TO BE 150mm NOMINAL DIAMETER LAID AT A GRADIENT NOT FLATTER THAN 1/150, UNLESS STATED OTHERWISE.
2. DRAINS ARE TO BE CONSTRUCTED USING UPVC PIPES TO BS4660, ALL WITH FLEXIBLE JOINTS, BEDDED AND BACKFIELD IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND BS8301. SEE NIMBUS GENERAL DETAILS OF DRAINAGE WORKS.
3. FLEXIBLE PIPES WITH LESS THAN 600mm COVER IN TRAFFICKED AREAS ARE TO BE SURROUNDED WITH CONCRETE, OR TO HAVE CONCRETE PAVING SLABS LAID AS BRIDGING ABOVE THE PIPE.
4. COVERS AND FRAMES FOR MANHOLES/INSPECTION CHAMBERS MUST COMPLY WITH BS EN 124, CLASS C250, EXCEPT FOR COVERS IN TRAFFICKED AREAS WHICH ARE TO COMPLY WITH CLASS D400.
5. ALL RAINWATER PIPES SHOULD BE PROVIDED WITH RODDABLE ACCESS.
6. ALL PIPE SOFFITS TO BE LAID LEVEL UNLESS NOTED OTHERWISE.
7. ALL COVER LEVELS ARE BASED UPON TOPOGRAPHICAL SURVEY
8. RAINWATER PIPES TO BE 450mm BELOW FFL UNLESS STATED OTHERWISE.
9. ALL DRAINAGE IS TO BE TESTED AND THOROUGHLY CLEANED ON COMPLETION. EXISTING DRAINAGE WHERE RE-USED, IN THE SYSTEM, IS TO BE JETTED THROUGH.
10. 100mm(w) SLOT DRAINS TO BE INSTALLED INFRONT OF ALL LEVEL ENTRANCES OR WHERE HARDSTANDING RUNS TOWARDS DOOR OPENINGS.
11. PERMEABLE PAVING TO BE INSTALLED IN ALL NEW HARDSTANDING AREAS.
12. FOR ALL MANHOLES <1.2m REFER TO TURTLE ENVIRO PRODUCT CATALOGUE OR OSMADRAIN PRODUCTS (OR SIMILARLY APPROVED PRODUCT).
13. REFER TO DWG: C2554-02 FOR DRAINAGE DETAILS.



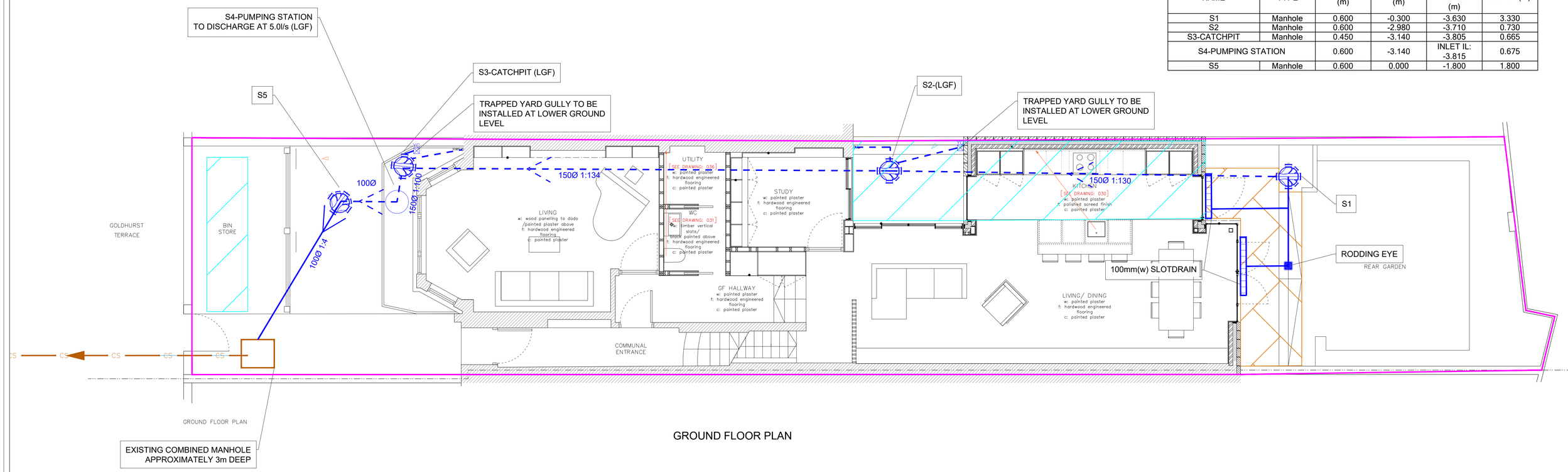
LOWER GROUND FLOOR PLAN

KEY

- SURFACE WATER UPVC PIPES
- SURFACE WATER INSPECTION CHAMBERS
- ROOF AREAS
- PERMEABLE PAVING
- 235 LITRE SLIMLINE RAINWATER HARVESTING TANK
- CS — COMBINED WATER UPVC PIPES
- SLOT DRAINS
- SITE BOUNDARY
- LOWER LEVEL SURFACE WATER UPVC PIPES
- UPPER LEVEL SURFACE WATER UPVC PIPES
- YG — TRAPPED YARD GULLY WITH 100mmØ OUTLET

SCHEDULE OF COMBINED MANHOLE CHAMBERS
*COVER LEVELS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION

NAME	TYPE	DIAMETER (m)	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH (m)
S1	Manhole	0.600	-0.300	-3.630	3.330
S2	Manhole	0.600	-2.980	-3.710	0.730
S3-CATCHPIT	Manhole	0.450	-3.140	-3.805	0.665
S4-PUMPING STATION		0.600	-3.140	INLET IL: -3.815	0.675
S5	Manhole	0.600	0.000	-1.800	1.800



GROUND FLOOR PLAN

REV	DATE	DRAWN	DESCRIPTION	CHECK	APPR.
B	03-11-21	FG	For Information	RH	SL
A	09-06-21	FG	For Information	RH	SL

CHECKED BY:	DATE:	APPROVED BY:	DATE:
R.H	09-06-21	S.L	09-06-21
DRN BY:	SCALE:	DRAWING NUMBER:	REV:
F.G	1:100	C2554-01	B
DATE:	SIZE:		
09-06-21	A1		

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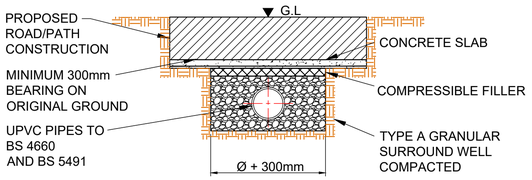
CLIENT: SHAHIL KOTECHA

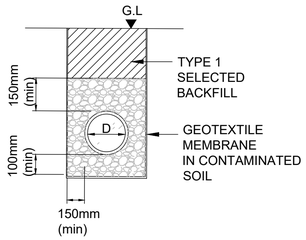
PROJECT: 123 GOLDHURST TERRACE

TITLE: SURFACE WATER NETWORK & SuDS LAYOUT PLAN

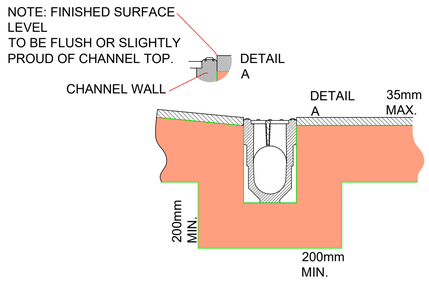
1:50
1m 0 1m 2m 3m 4m 5m



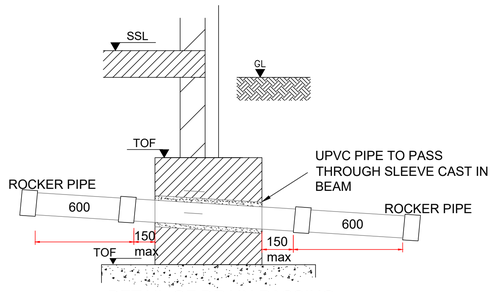
PROTECTION FOR PIPES LAID AT SHALLOW DEPTHS (UPVC PIPES)



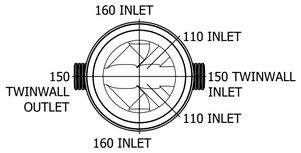
FULL GRANULAR SURROUND CLASS S

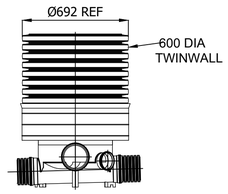


ACO ROAD DRAIN DETAIL (FOR USE IN PRIVATE LAND)

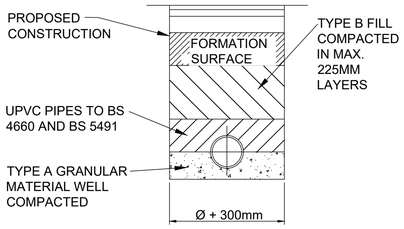


DETAIL OF DRAIN PASSING THROUGH GROUND BEAM OR OTHER STRUCTURE

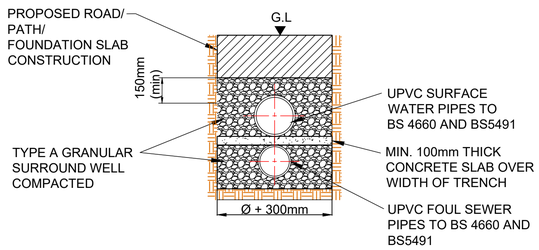




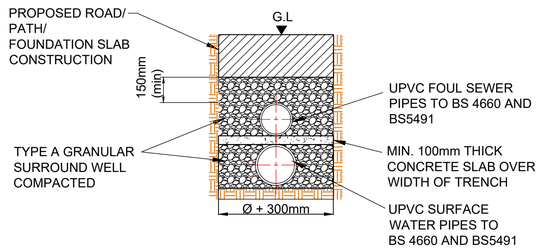
*CHAMBERs CONFIGURATION SHOWN ABOVE IS BASED UPON TURTLE ENVIRO TECHNICAL GUIDANCE. OTHER MANUFACTURERS PRODUCTS CAN BE USED.



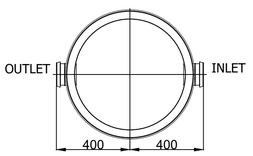
TYPICAL PIPE BEDDING DETAIL (UPVC PIPES)



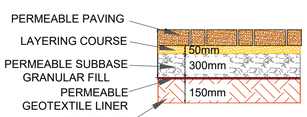
PROTECTION FOR SURFACE WATER SEWER CROSSINGS ABOVE FOUL SEWERS (UPVC PIPES)



PROTECTION FOR FOUL SEWER CROSSINGS ABOVE SURFACE WATER SEWERS (UPVC PIPES)



CATCHPIT CHAMBER PLAN

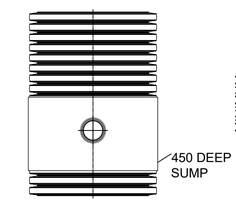


PERMEABLE PAVING CROSS-SECTION (WITHOUT STORAGE)

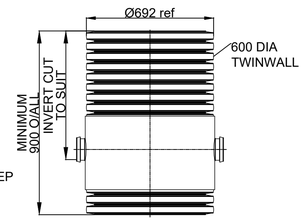
TRENCH BEDDING AND FILL MATERIALS

GRANULAR BEDDING TYPE A

TYPE	USE FOR NOMINAL PIPE (DIA.)	% PASSING BY MASS BS 410 SIEVE SIZES (mm)						
		63	37.5	20	14	10	5	2.36
A40	>1350	100	85-100	0-25	–	0-5	–	–
A20	600-1350	–	100	85-100	–	0-25	0-5	–
A14	300-525	–	–	100	85-100	0-50	0-10	–
A10	<300	–	–	–	100	85-100	0-25	0-5



CATCHPIT CHAMBER ELEVATION



CATCHPIT CHAMBER ELEVATION

REV	DATE	DRAWN	DESCRIPTION	CHECK	APPR.
A	09-06-21	FG	For Information	RH	SL

CHECKED BY: R.H	DATE: 09-06-21	APPROVED BY: S.L	DATE: 09-06-21
DRN BY: F.G	SCALE: NTS	DRAWING NUMBER: C2554-02	REV: A
DATE: 09-06-21	SIZE: A1		

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info@nimbusengineering.co.uk

CLIENT: SHAHIL KOTECHA

PROJECT: 123 GOLDHURST TERRACE

TITLE: SURFACE WATER NETWORK & SuDS DETAILS

APPENDIX C – THAMES WATER ASSET PLANS

Asset location search

Property Searches

Nimbus Engineering Consultants LTD
Kemp House
152City road
LONDON
EC1V 2NX

Search address supplied 123
Goldhurst Terrace
London
NW6 3EX

Your reference c2554

Our reference ALS/ALS Standard/2021_4441998

Search date 2 June 2021

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.

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

Asset location search

Property Searches

Search address supplied: 123, Goldhurst Terrace, London, NW6 3EX

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Asset location search

Thames Water Property Searches

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- 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.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- 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.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

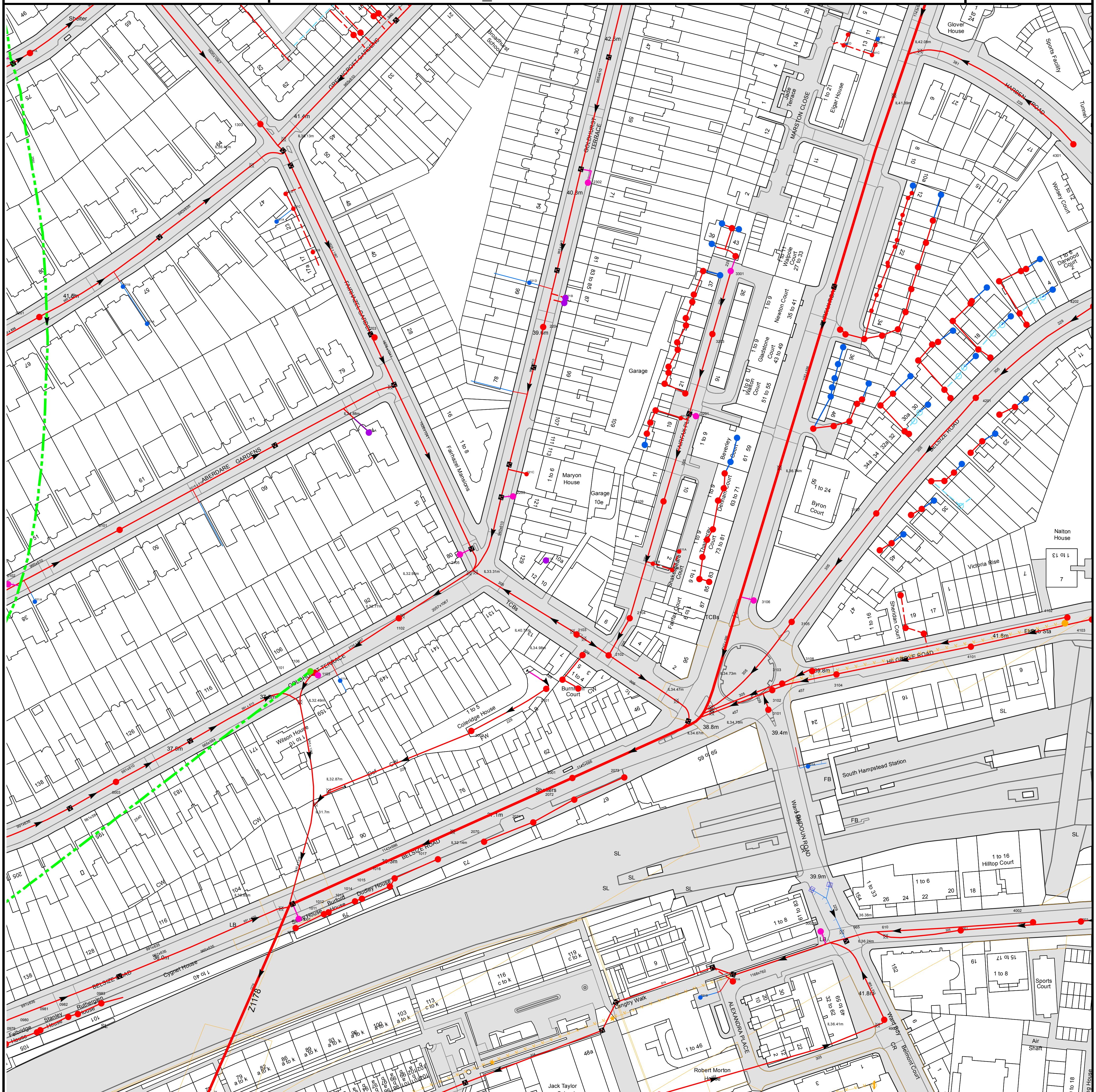
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2021_4441998



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 526249,184177

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
42AE	n/a	n/a
42EG	n/a	n/a
42BJ	n/a	n/a
42BI	n/a	n/a
42EI	n/a	n/a
42AF	n/a	n/a
43AE	n/a	n/a
42HG	n/a	n/a
43AD	n/a	n/a
42AG	n/a	n/a
42BA	n/a	n/a
43AC	n/a	n/a
42AJ	n/a	n/a
42AI	n/a	n/a
4202	45.5	42.73
41AH	n/a	n/a
41AG	n/a	n/a
4001	42.74	36.44
4101	41.5	35.2
4002	44.72	39.77
4102	43.27	n/a
4003	45.34	36.75
4103	38.24	35.86
42CD	n/a	n/a
42CC	n/a	n/a
32DG	n/a	n/a
42IC	n/a	n/a
42CA	n/a	n/a
42CB	n/a	n/a
42IB	n/a	n/a
42BE	n/a	n/a
42IA	n/a	n/a
32EC	n/a	n/a
42BD	n/a	n/a
42BC	n/a	n/a
32EB	n/a	n/a
42HJ	n/a	n/a
42BB	n/a	n/a
32EA	n/a	n/a
43BA	n/a	n/a
43BJ	n/a	n/a
43BI	n/a	n/a
43BH	n/a	n/a
43AJ	n/a	n/a
43BG	n/a	n/a
43BF	n/a	n/a
43AI	n/a	n/a
43BE	n/a	n/a
43BD	n/a	n/a
43AH	n/a	n/a
42GJ	n/a	n/a
42HD	n/a	n/a
42HC	n/a	n/a
42HB	n/a	n/a
42FA	n/a	n/a
42EJ	n/a	n/a
42GC	n/a	n/a
42HH	n/a	n/a
42GB	n/a	n/a
42GD	n/a	n/a
42GE	n/a	n/a
32AG	n/a	n/a
42GF	n/a	n/a
32EF	n/a	n/a
32EE	n/a	n/a
42CG	n/a	n/a
4201	42.62	39.96
42FJ	n/a	n/a
42CF	n/a	n/a
32DJ	n/a	n/a
42FI	n/a	n/a
42CI	n/a	n/a
42CJ	n/a	n/a
42CE	n/a	n/a
42BG	n/a	n/a
42DA	n/a	n/a
42BF	n/a	n/a
31DE	n/a	n/a
31DD	n/a	n/a
31DC	n/a	n/a
31DF	n/a	n/a
31DB	n/a	n/a
31DA	n/a	n/a
391A	n/a	n/a
3106	n/a	n/a
3101	39.22	37.69
3102	39.39	34.97
3103	39.44	35.71
3105	39.68	35.93
301A	n/a	n/a
3108	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3002B	n/a	n/a
3104	40.01	35.09
3107	40.91	38.37
31BE	n/a	n/a
4901	41.88	36.21
41BG	n/a	n/a
4107	n/a	n/a
41BF	n/a	n/a
4106	n/a	n/a
41AJ	n/a	n/a
41AI	n/a	n/a
4105	n/a	n/a
341D	n/a	n/a
341E	n/a	n/a
341C	n/a	n/a
341B	n/a	n/a
341A	n/a	n/a
43BC	n/a	n/a
43BB	n/a	n/a
4301	46.94	42.94
32CJ	n/a	n/a
32DB	n/a	n/a
32DC	n/a	n/a
3201	n/a	n/a
33AF	n/a	n/a
33BB	n/a	n/a
3203	n/a	n/a
33AG	n/a	n/a
33AJ	n/a	n/a
32GF	n/a	n/a
32GE	n/a	n/a
32GD	n/a	n/a
3301	41.51	39.42
33AI	n/a	n/a
33BF	n/a	n/a
32GC	n/a	n/a
33AH	n/a	n/a
32EI	n/a	n/a
32FD	n/a	n/a
32FC	n/a	n/a
32EH	n/a	n/a
32FB	n/a	n/a
32FA	n/a	n/a
32ED	n/a	n/a
32EJ	n/a	n/a
32DH	n/a	n/a
32EG	n/a	n/a
21DG	n/a	n/a
221A	n/a	n/a
221B	n/a	n/a
2001	37.43	33.06
2072	n/a	n/a
2103	38.04	n/a
21DF	n/a	n/a
21DH	n/a	n/a
2102	38.22	34.86
2073	n/a	n/a
2104	38.31	35.39
22CA	n/a	n/a
22CB	n/a	n/a
22CC	n/a	n/a
211B	n/a	n/a
22CD	n/a	n/a
3109	n/a	n/a
22CE	n/a	n/a
32BG	n/a	n/a
32CH	n/a	n/a
311B	n/a	n/a
32CI	n/a	n/a
32BF	n/a	n/a
311A	n/a	n/a
321A	n/a	n/a
32DD	n/a	n/a
32DA	n/a	n/a
131D	n/a	n/a
2302	n/a	n/a
1303	41.29	36.03
041A	n/a	n/a
1403	n/a	n/a
1404	n/a	n/a
1405	n/a	n/a
1406	n/a	n/a
1017	n/a	n/a
2070	n/a	n/a
2071	n/a	n/a
0003	n/a	n/a
2002	36.69	35.48
2101	37.29	36.23
111A	n/a	n/a
1103	37.52	n/a
1106	37.52	32.57
1101	37.5	28.05
1102	37.68	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
011A	n/a	n/a
0102	n/a	n/a
211A	n/a	n/a
2105	38.25	n/a
0101	39.58	35.4
2203	n/a	n/a
221C	38.73	36.13
121A	n/a	n/a
1203	n/a	n/a
2204	n/a	n/a
021A	n/a	n/a
0201	41.49	37.06
021B	n/a	n/a
221D	n/a	n/a
131B	n/a	n/a
131A	n/a	n/a
131C	n/a	n/a
9905	n/a	n/a
0979	n/a	n/a
0980	n/a	n/a
0981	n/a	n/a
0982	n/a	n/a
0983	n/a	n/a
1010	0	0
1001	n/a	n/a
1011	n/a	n/a
1012	n/a	n/a
1013	n/a	n/a
1014	n/a	n/a
1015	n/a	n/a
1016	n/a	n/a
391B	n/a	n/a

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ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

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

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

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

Control Valve

Drop Pipe

Ancillary

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.

Outfall

Undefined End

Inlet

Other Symbols

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

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate 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 level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. 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 present on the plan, please contact a member of Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2021_4441998

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 526249, 184177.

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.

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

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

16" — **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.

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

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

3" METERED — **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.

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

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')

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.

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 Thames Water Utilities Ltd 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. Thames Water 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 the discretion of the company for increased administration costs.

A copy of Thames Water'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 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0800 009 4540** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.