Drainage Strategy Report

J2680 317 Finchley Road, London

Ref: J2680-Doc-02
Revision: X3

Webb Yates Engineers Ltd
48-50 Scrutton Street
London. EC2A 4HH
020 3696 1550
info@webbyates.co.uk
www.webbyates.co.uk

CONTENTS

GENERAL NOTES

Only construction status documentation is to be constructed from. If you do not have a construction issue document and you are about to build something, please contact Webb Yates Engineers. Ensure that you have the latest revision prior to construction.

REVISION HISTORY

Revisions indicated with line in margin.

Revision status: P = Preliminary, T = Tender, C = Construction, X = For Information

Revision	Status	Date	Author	Reviewer	Description
X1	Information	16/03/16	MJ	GP-D	Issued for Information
X2	Information	06/05/16	MJ	GP-D	Issued for Information
X3	Information	23/01/23	GP-D	GP-D	Reissued for Information

1 INTRODUCTION

Webb Yates Engineers have been appointed by 317 Finchley Road Ltd. to undertake civil and structural engineering design services for the proposed redevelopment at 317 Finchley Road. The mixed used development will provide a 7 to 10 storey building plus basement comprising of 22 apartments and a new retail space. This drainage strategy report has been prepared on behalf of 317 Finchley Road Ltd in respect to this development.

The purpose of this report is to consider the various drainage strategy options and determine the preferred option for the new development.

The site is bounded by; the A41 Finchley Road to the North East; Billy Fury Way, a pedestrian passageway, to the South; and Finchley Road & Frognal railway station, which lies on the London Overground, to the North.

This document has been prepared with reference to:

- London Borough of Camden Strategic Flood Risk Assessment (SFRA) July 2014.
- Camden Core Strategy November 2010
- National Planning Policy Framework (NPPF) 20 July 2021.
- National Planning Practice Guidance (NPPG) July 2018
- SSG Appendix C - Design and construction guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code"). Approved Version 2.2. 29 June 2022
- Environment Agency Flood Maps (http://maps.environment-agency.gov.uk/)
- Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems April 2015.
- The London Plan (www.london.gov.uk) 2011.
- The London Supplementary Planning Guidance (SPG) – Sustainable Design and Construction (www.london.gov.uk) 2014.
- SuDS Manual, Ciria 2015.
- Rainfall Runnoff Management for Developments Report – SC030219, Environment Agency 2013
- British Geological Survey (BGS) maps

2 SITE DESCRIPTORS

317 Finchley Road's approximate National Grid reference is TQ 26935 85230. Located in North West London, within the Borough of Camden, the site is situated between Hampstead Village to the North East and West Hampstead in the South West. The site's postal code is NW3 6EP and covers an area of roughly 677m^2.

The site is bounded to the North East by the A41, Finchley Road; the A41 links London to Birckenhead. To the South Billy Fury Way, a pedestrian passageway, bounds the site and runs from Finchley Road to West End Lane (B510) and Lithos Road. To the North the North London Line serving the London Overground bounds the site. Finchley Road & Frognal railway station is found directly adjacent to the site. Traveling East on the London Overground Stratford can be reached whilst Willesden Junction, Clapham Junction and Richmond can be found to travelling West.

The existing site is currently occupied by a former public house fronting Finchley Road, with a beer garden to the rear. The existing building is currently unoccupied and has remained vacant since 2010. The only access to the site is from Finchley Road to the front.

Figure 1: Map of Local Area with site marked in red boundary.

Figure 2: Finchley Road Street View

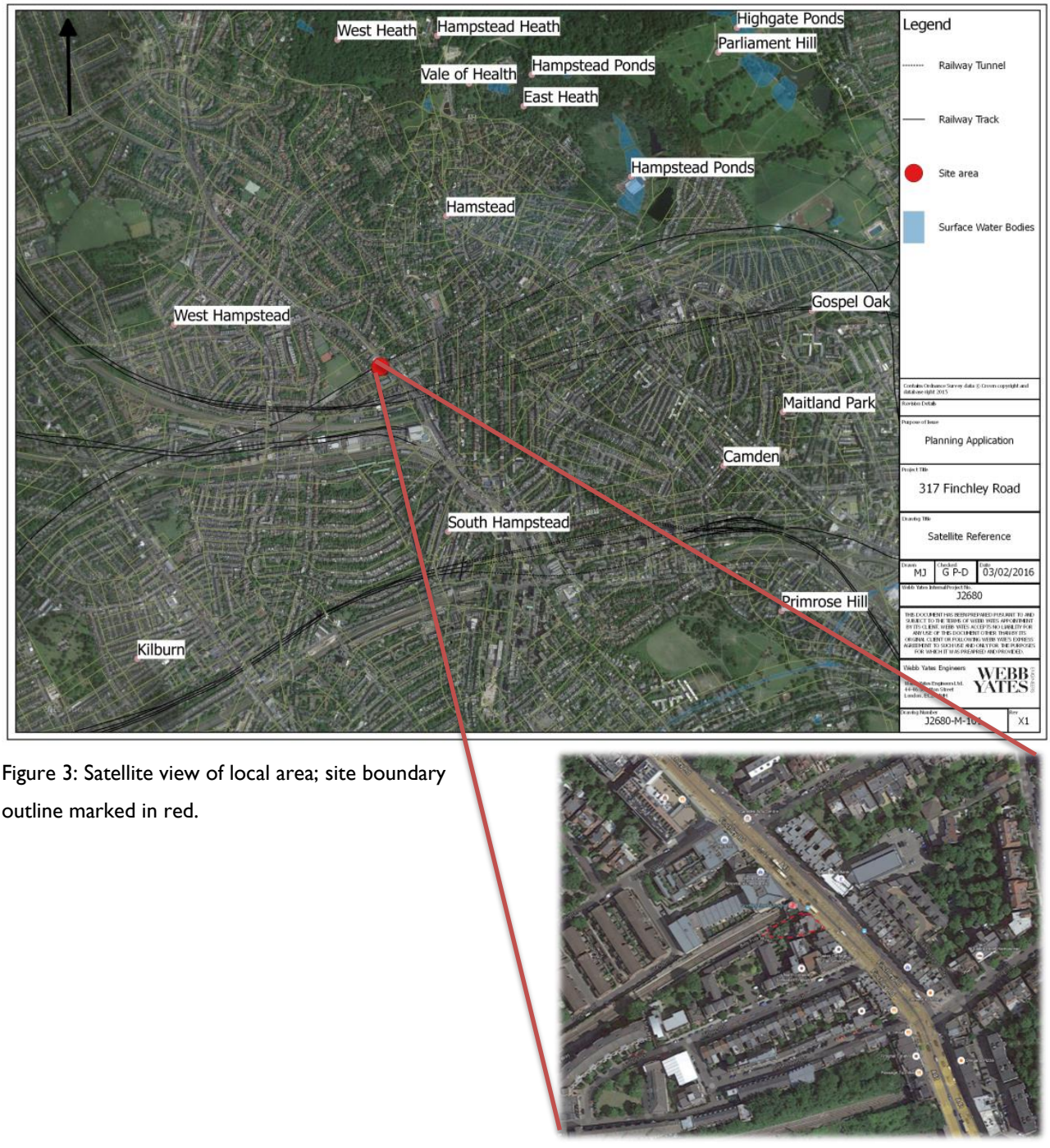


Figure 3: Satellite view of local area; site boundary outline marked in red.

3 SITE CONTEXT

3.1 TOPOGRAPHY

The site topography is sloped from East to West in the downward direction. The highest topographic point, on site, is found on Finchley Road at 60.68mAOD. The lowest topographic point is found on the Western tip along Billy Fury Way passageway and is 56.64mAOD. This gives a slope of 1 in 13.

3.2 GEOLOGY

According to British Geological Society data, 317 Finchley Road is situated on London Clay Formation; the most common bedrock geology found within London region. London Clay was formed during the Ypresian Age (Lower Eocene) around 56 – 49 million years ago. Its small particle size distribution means it has a low hydraulic conductivity and hence reduced permeability.

On site investigations identified the lithological description of the London Clay Formation was stiff, closely fissured, brown mottled clay with selenite crystals and in parts relict roots. The London Clay was found within the range of 1.80m and 3.90m Below Ground Level (BGL).

The site showed no Superficial Deposits according to the British Geological Society data. This was confirmed via on site investigations. Made Ground presumed down to the London Clay Formation bedrock, and was in the range of coarse sand and gravel particle size distribution.

3.3 GROUNDWATER

On site investigation identified groundwater in 1 out of 3 boreholes. Standing water was found at 3.60mBGL in the beer garden of the existing property.

3.4 HYDROLOGY

There are no nearby waterbodies which effect the site. The nearest water bodies include the spring ponds found on Hampstead heath and the Grand Union Canal which runs South of the site. The site lies within a Flood Risk Zone 1 (low risk).

3.5 HYDROLOGEOLOGY

The bedrock geology (London Clay Formation) is an aquiclude. An aquiclude is a geological formation that absorbs and holds water but does not allow transmission of water. It is classified by the Environment Agency as "unproductive strata".

3.6 EXISTING SURFACE WATER DRAINAGE

The existing drainage within the local vicinity of the site include a combined sewer for both surface water and foul water.

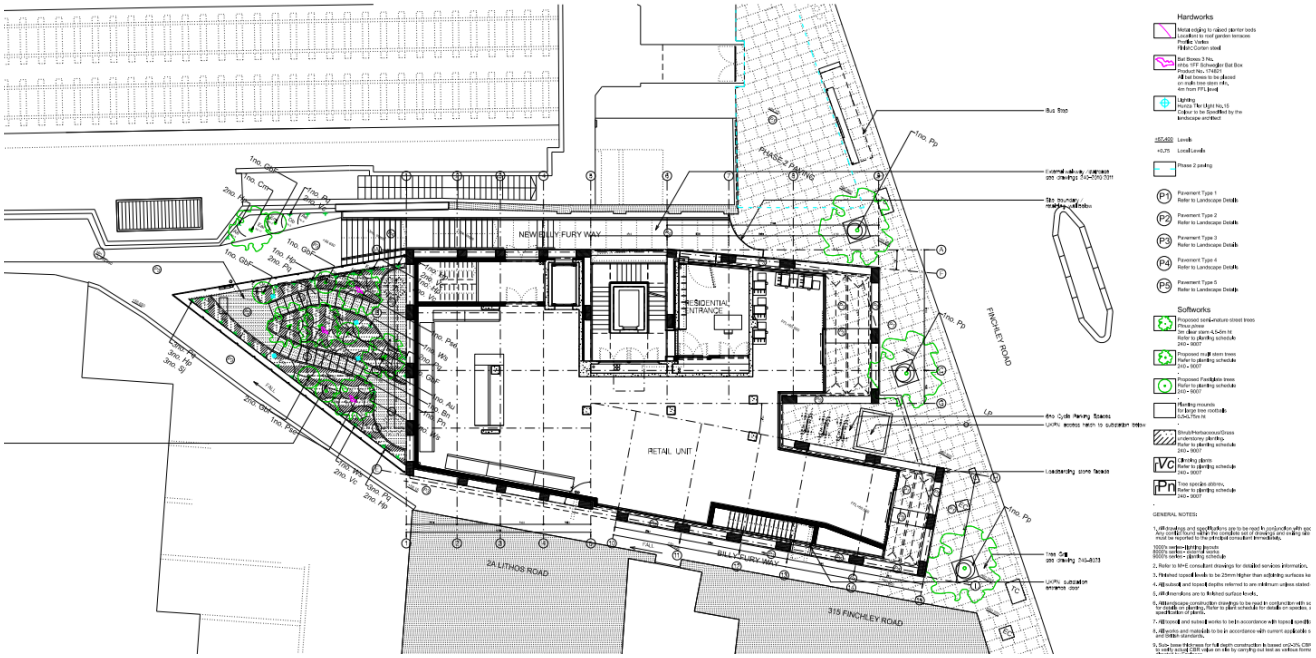


Figure 4: Layout of the proposed development Ground Floor.

4 DESIGN ASSUMPTIONS, CONSTRAINTS AND PARAMETERS

4.1 SPATIAL CONSTRAINTS

Onsite above ground drainage storage options such as swales, ponds and detention basins are not considered a viable solution due to spatial constraints inhibiting for open water features with sufficient capacity.

4.2 CLIMATE CHANGE EFFECTS

In accordance with the National Planning Policy Framework (NPPF) 2012, the effects of climate change are included within the assessment to reduce future flood risk. Following the recommended contingency allowances from the 19th February 2016, the following allowances should be made for the proposed development:

- **Peak Rainfall Intensity**: +40% (Upper End Allowance) for 2070 to 2115
- **Peak Rainfall Intensity**: +20% (Central Allowance) for 2070 to 2115

The new surface water drainage systems for the site will include SUDS and will be designed to accommodate increases in peak rainfall intensity.

4.3 ASSUMED IMPERMEABLE AREAS

The table below identifies the total area of the site and the respective surface areas belonging to hard and soft landscaping.

Table 1: Table of impermeable areas

		Existing Area (m^2)	Proposed Area (m^2)	Difference (m^2)
Hard Landscaping	Building Footprint	311	369	+58
	External Hardstanding	217	201	-16
	Total	**528**	**570**	**+42**
Soft Landscaping	Total	**149**	**107**	**-42**
Site Area	Total	**677**	**677**	**0**

Although the impermeable area has increased slightly, the amenity and biodiversity area has increased due two terrace roof gardens providing both a social space and vegetation within container gardens.

4.4 INFILTRATION RATES

Borehole investigations taken on site have identified that the site is underlain by made ground which sits on London Clay. Initial infiltration tests carried out on site have shown that the site has a very low infiltration rate due to the high water table and as such soakaways and other infiltration approaches are not likely to be appropriate or sustainable methods to drain surface water runoff from the site.

4.5 HYDROLOGICAL PARAMETERS

The drainage design has assumed the following hydrological parameters found in table 2.

Table 2: Hydrological Parameters

Hydrological Character	Parameter	Unit	Value
Rainfall Model			FSR Rainfall
Hydrological Region		-	6
M5-60		mm	21
Ration	R	R	0.438
Rainfall intensity	M_1 , Z_2	mm , -	12.8 , 0.64
	M_{30} , Z_2	mm , -	30.8 , 1.54
	M_{100} , Z_2	mm , -	40.6 , 2.03
Summer Volumetric Run-off Coefficient	-	-	0.750
Winter Volumetric Run-off Coefficient	-	-	0.840

5 DRAINAGE DESIGN CRITERIA AND PRINCIPLES

5.1 EXISTING DRAINAGE

The existing drainage system for 317 Finchley Road drains into a combined sewer owned by Thames Water. The combined sewer is used to convey both surface water and foul water. The figure below has been adopted from a Thames Water Asset search and identifies the nearby sewage services to the site. The nearest connection manhole is 1002 which has a cover level of 61.45m and an invert level of 55.76m.

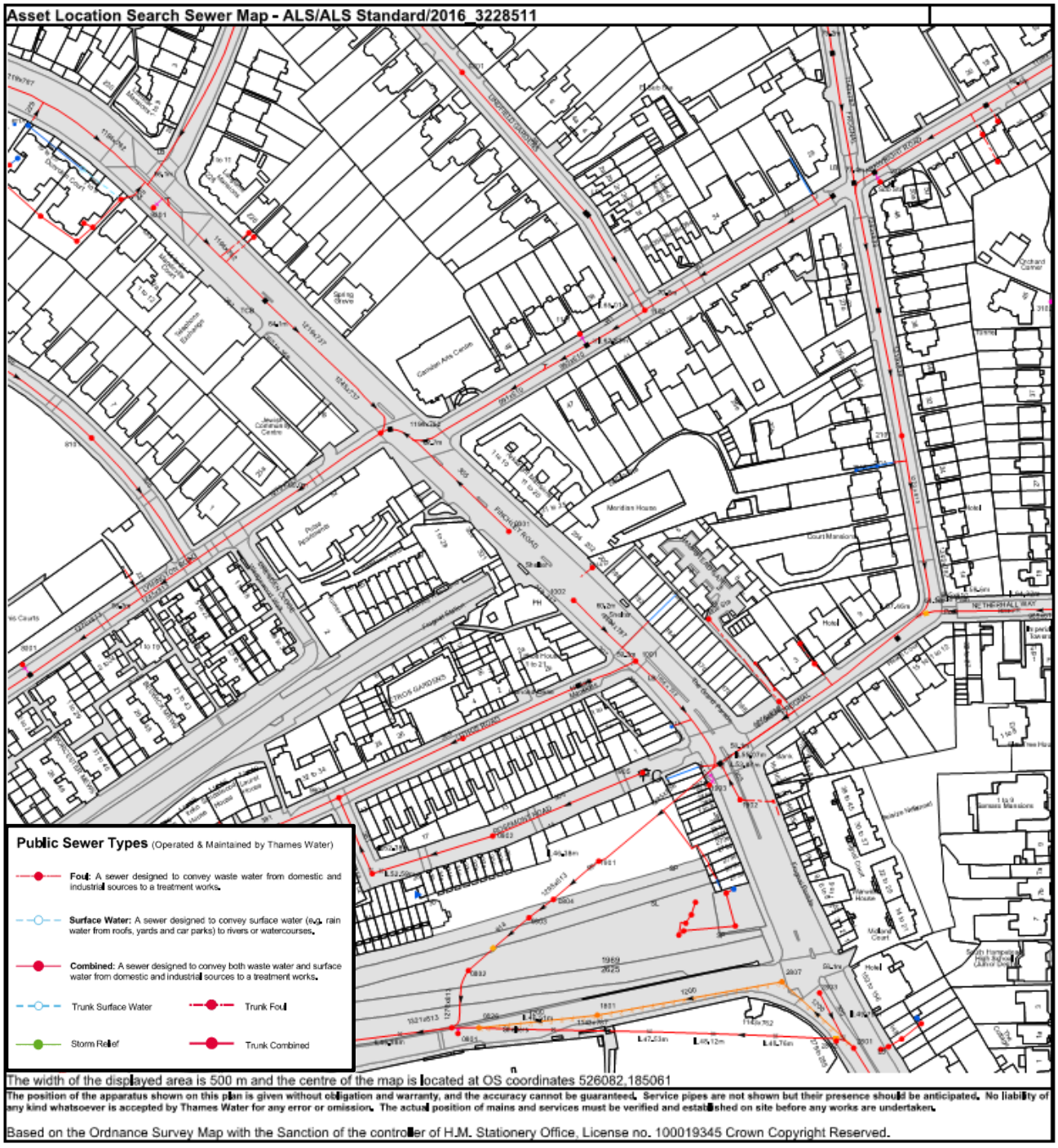


Figure 5: Thames Water Asset Search Map

The existing peak surface water flow draining into the Thames Water system has been calculated to be 12.77 l/s for the 100 year plus 30% climate change. The existing foul water draining into the combined sewer should be minimal as the site has been disused and remained derelict for a number of years.

5.2 PROPOSED DRAINAGE SYSTEM DESIGN

The proposed drainage system will provide separate foul and surface water systems which will confluence at the last manhole on-site within a demarcation chamber before entering the Thames Water Combined Sewer on Finchley Road.

This will allow ease to mutually exclude the surface water from the foul system if a separate surface water sewer was to be constructed by Thames Water within the vicinity of the site.

5.3 SURFACE WATER DESIGN

The surface water disposal system has been designed to ensure the drainage hierarchy has been implemented in the most practical and viable approach to benefit to the site; as per the SuDS Manual 2015. Furthermore, the design has considered the Non Statutory Technical standards for sustainable drainage systems, and ensured these standards have been addressed.

Due to the sites topography and the positioning of the Thames Water combined sewer, a pumped surface water system is required. The pump ensures a maximum flow rate of 5l/s for all return periods up to and including the 100 year event plus 40% climate change. This flow rate is as reasonable practicable to the Greenfield runoff rate due to mechanical malfunctions of most flow controls under 5l/s. Furthermore, this flow rate achieves a betterment of greater than 50% of the existing flow rate. Please refer to table 3.

Table 3: Discharge Rates

Return Period	Greenfield Runoff (l/s)	Existing Rates (l/s)	Proposed Mitigated Rates (l/s)	Percentage reduction of flowrates between existing and proposed flowrates (%)
Greenfield QBAR	0.44	N/A	N/A	N/A
1 in 1	0.38	8.0	5.0	37.5
1 in 30	1.02	19.6	5.0	74.5
1 in 100	1.41	25.5	5.0	80.4
1 in 100 plus Climate change (20%)	N/A	30.6	5.0	83.7
1 in 100 plus Climate change (40%)	N/A	35.7	5.0	86.6

A geocelluar storage unit with a capacity of 20m^3 will be positioned upstream of the pump unit. The geocellular storage unit will have enough capacity to attenuate for the additional volume of water leaving the site up to a 1 in 100 year plus climate change event; as per the London Borough of Camden Drainage Statement pro-forma (table 3).

Table 4: Additional Volumes and Storage Capacities

Return period	Existing Volume (M^3)	Proposed Volume (M^3)	Long term and Attenuation Storage Capacity (M^3)
100 year 6 hour event	8.64	10.05	20

The building roofs are designed to provide amenity and biodiversity via the implementation of two roof terrace container gardens. This also increases the interception storage available via evapotranspiration.

An infiltration based system has not been considered due to the sites geological restrains. Surface water control bodies have not be considered due to the sites spatial limitations.

5.4 FLOOD ROUTING ANAYLSIS

In the unlikely event that the surface water system floods, then this is most likely to occur through a flooding of manhole SPC1.0. The cause of this would be due to rainfall intensity and volume exceeding the pumping flow rate and storage volume within system. Any flood water would be diverted down Billy Fury Way pedestrian footpath due to the topographic levels and funnelling effect of the site and surrounding buildings/structures. This would not cause any detrimental effects to emergency services.

5.5 FOUL WATER DESIGN

It is proposed that the new foul drainage connects to the existing Thames Water combined sewer. The foul water system will provide for 22 residential units and 1 commercial unit within the building. Similarly to the surface water system, the foul system will require a pump chamber due to the topography of the site and the positioning of the Thames Water combined sewer.

The peak foul flowrate has been calculated using a fixed Dry Weather Flow (DWF) multiple of 6 as per British standards. The DWF has been calculated using the following equation:

$$DWF = P \cdot G + I + E$$

Where:

DWF = Dry Weather Flow
P = Population Served
G = Average per capita domestic water consumption (litres/day)
I = Infiltration (Litres/day)
E = Industrial effluent discharge in 24 hours (litres/day)

$$DWF = 66 \cdot 110 + 0 + 450$$
$$DWF = 7710\ l/day$$

Therefore the Peak Flow is:

$$Q_p = \frac{6 \cdot DWF}{24 \cdot 3600}$$

$$Q_p = 0.535\ l/s$$

Assumptions:

1. Population of the building has been assumed to be 3 people per apartment. There are 22 apartments in total giving a total population of 66 residents.
2. Infiltration is excluded due to better investment of assets ensuring high standards of pipe manufacturing, installation and testing.
3. The average per capita domestic water consumption has been assumed to be 110 l/day as per the London plan
4. Non-domestic flows have been assumed to be 300 l/day/100m^2

6 MAINTENANCE

The drainage system will be designed to minimise maintenance requirements, however, a full maintenance scheme will be established for those elements not being offered for adoption. The private storm and foul drains, below ground attenuation tank, and pump chamber will be maintained by 317 Finchley Road Ltd. to the manufacturer's recommendations as part of their property maintenance programme. The downstream public sewer will be maintained by Thames Water as part of their maintenance works.

6.1 BELOW GROUND DRAINAGE PIPED SYSTEMS

The below ground piped system (based on assessed flood risk) should be inspected every 10 years as a minimum and repaired and cleansed where necessary.

6.2 GULLIES AND CHANNEL DRAINS

Gullies and channel drains should be cleaned out very six months or when required.

6.3 FOUL AND SURFACE WATER PUMP CHAMBERS

These will be maintained as per the manufacturer's recommendations

7 DESIGN STANDARDS AND REFERENCES

The works are to be designed to the requirements of the following British Standards and documents:

- BS EN 752:2017Drain and Sewer Systems Outside Buildings

- The Wallingford Procedure: Design and Analysis of Urban Storm Drainage
- Building Regulations 2015 Part H: Drainage and Waste Disposal.
- CIRIA Report C753: The SuDS Manual
- National Planning Policy Framework
- Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems April 2015.

8 DRAINAGE DRAWINGS & CALCULATIONS

Refer to Appendix B for the drawings and Appendices C and D for the drainage calculations.

9 CONCULSION

To conclude the designed proposal is for a pumped, separated surface water and foul system that confluences at the ultimate manhole on site before entering the Thames Water combined sewer found on Finchley Road.

The proposed surface water system will control the flow rate to 5l/s via the pumping chamber. This achieves a betterment of greater than 50% runoff from the existing site and also achieve as reasonable practical the Greenfield runoff rate. A geocelluar storage tank with a capacity of $20m^3$ has been implemented upstream of the pump chamber to withhold the attenuation volume and the additional volume subjected from the proposed development. Infiltration methods and surface water body methods have not been considered for this site due to geological inhibitors and spatial site restriction. The terrace roof container gardens also increase the interception storage available for the site via increased evapotranspiration.

The foul drainage system has been designed with a pump system to provide for 22 residential units and 1 commercial unit. The calculated foul water flow rate is 0.535l/s and will be confirmed with Thames Water via a pre-development enquiry.

The overall benefit of this development would relieve pressure on the existing public sewer network and also increase both public and private amenity and biodiversity.

10 APPENDIX A: EXISTING TOPOGRAPHIC SURVEY

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	FH	Fire Hydrant	RSJ	Rolled Steel Joist
AR	Assumed Route	FBD	Floor Board Direction	SI	Sign Post
AV	Air Valve	FH	Fire Hydrant	SP	Arch Spring Point Height
BB	Bellsha Beacon	FL	Floor Level	SV	Stop Valve
BH	Bore Hole	FP	Flag Pole	SW	Surface Water
BL	Bed Level	FW	Foul Water	SY	Stay
BO	Bollard	GG	Gully Grate	Tac	Tactile Paving
BrP	Brace Post	GV	Gas Valve	TC	Telecom Cover
BS	Bus Stop	HH	Head Height	TH	Tidal Pit
BU	Bush	IC	Inspection Cover	THL	Threshold Level
BW	Barbed Wire Fence	IL	Invert Level	TL	Traffic Light
BX	Box (Utilities)	IR	Iron Railings	ToW	Top of Wall
CB	Close Board Fence	KO	Kerb Outlet	TP	Telegraph Pole
CH	Cill Height	LP	Lamp Post	TV	Cable TV Cover
CL	Cover Level	MH	Manhole	UB	Universal Beam
CiL	Chain Link Fence	MP	Marker Post	UC	Unknown Cover
C-Lev	Ceiling Level	NB	Name Board	UK	Unknown Tree
Col	Column	OHL	Overhead Line (approx)	USB	Under Side Beam
CP	Chestnut Palling Fence	Pan	Panel Fence	UTL	Unable To Lift
CR	Castle Riser	PB	Post Box	VP	Vent Pipe
DC	Drainage Channel	PM	Parking Meter	WB	Waste Bin
DH	Door Head Height	PO	Post	WH	Weep Hole
DP	Down Pipe	P/R	Post & Rail Fence	WL	Water Level
DR	Drain	P/W	Post & Wire Fence	WM	Water Meter
EL	Eaves Level	P/Wall	Partition Wall	WO	Wash Out
EP	Electric Pole	RE	Roadding Eye		Floor to Ceiling Height
ER	Earth Rod	RL	Ridge Level		
ET	EP+Transformer	RP	Reflector Post		F/C Floor to False Ceiling Ht
FB	Flower Bed	RS	Road Sign		
FBD	Floor Board Direction	RSD	Roller Shutter Door		Survey Control Station

DRAWING NOTE

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including: sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

Cill heights are measured as floor to the cill and head heights are measured from cill to the top of window.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

Do not scale from this drawing.

SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST01	526076.129	185048.927	61.192	HN Nail
ST02	526088.294	185042.765	60.713	HN Nail
ST03	526102.656	185056.633	60.741	HN Nail
ST04	526098.377	185031.136	60.388	HN Nail
ST05	526068.265	185021.464	58.170	HN Nail
ST06	526051.920	185024.769	57.274	HN Nail
ST07	526071.228	185034.539	60.540	HN Nail
ST08	526062.009	185031.104	58.152	HN Nail
ST09	526067.375	185037.210	58.246	HN Nail
ST10	526073.226	185038.935	58.417	HN Nail

SURVEY GRID AND LEVEL DATUM

The co-ordinate system established for this survey is related to Ordnance Survey (OS) national grid at a single point using GPS Smartnet, then orientated to Grid North with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies, any co-ordinated data used in conjuction with this survey must be derived directly from this control data.

REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

Ipswich Coventry Yeovil Norwich Perth Nottingham Brentwood

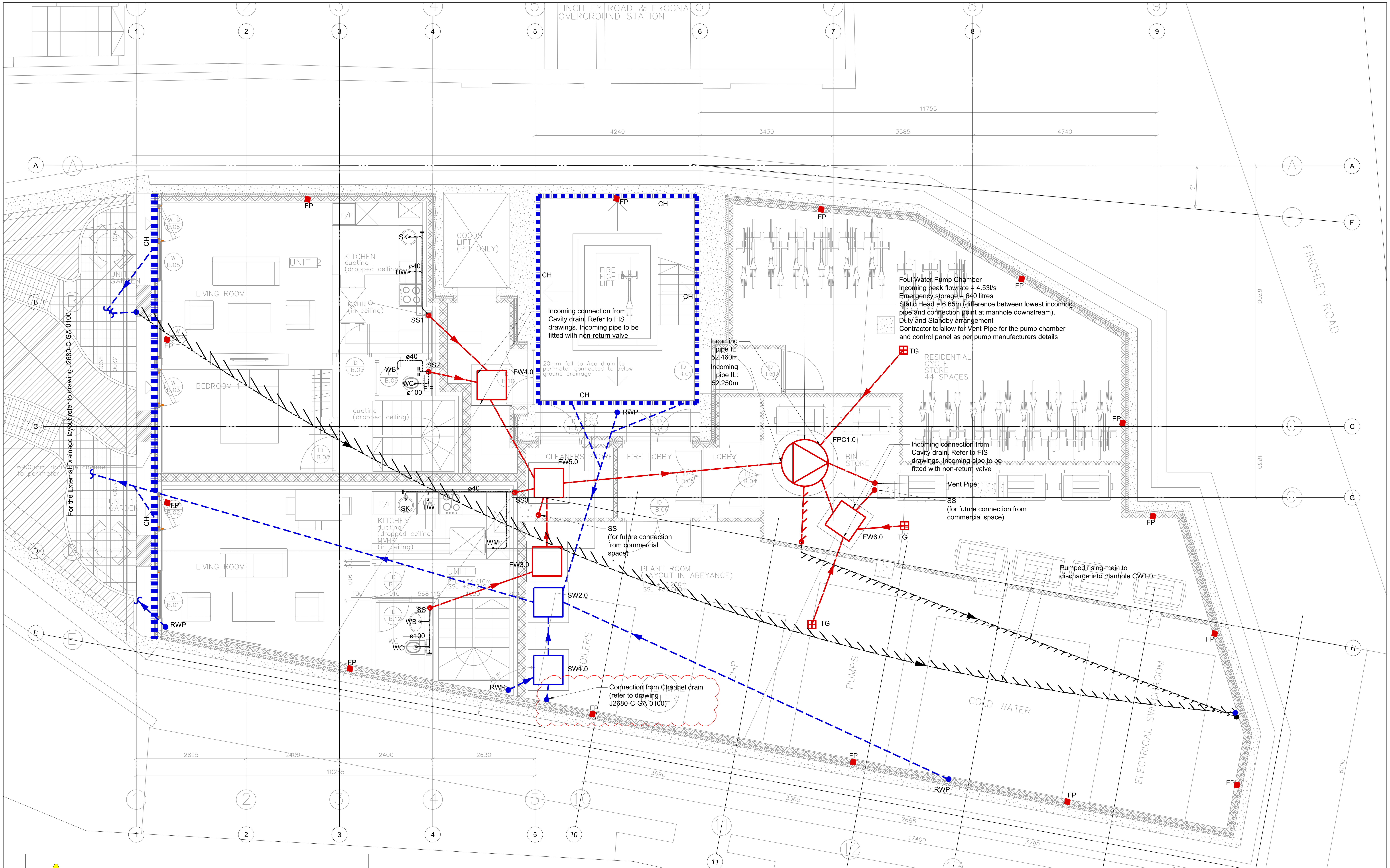
Tel No: 0845 0405 969
Fax No: 0845 0405 970
www.survey-solutions.co.uk
enquiries@survey-solutions.co.uk

LAND SURVEYING BUILDING SURVEYING UNDERGROUND SURVEYING

PROJECT TITLE: FINCHLEY BELL, 317 FINCHLEY ROAD, LONDON, NW3 6EP.				
DRAWING DETAIL: TOPOGRAPHICAL SURVEY Sheet 1 of 1				
CLIENT: STARK INVEST				SCALE: 1:200
SURVEYOR: ADK	SURVEY DATE: 17/09/2015	CHECKED BY: RM	APPROVED BY: DJB	DWG STATUS: FINAL
DRAWING NUMBER: 15658se-02			REVISION:	ISSUE DATE: 18/09/2015

Original Sheet Size A1H

11 APPENDIX B –CIVIL DRAINAGE DRAWINGS

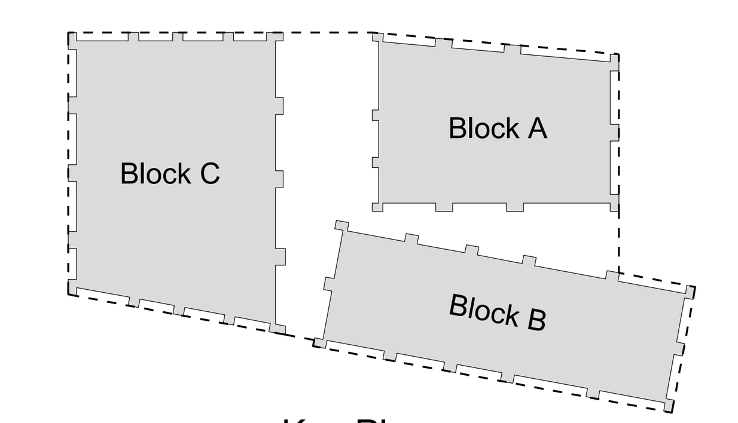


Notes

1. Do not scale the drawing
2. All dimensions are in millimetres unless noted otherwise
3. Any discrepancies between structural and architectural setting out dimensions must be brought to the attention of the Architect and Engineers
4. Refer to structural drawings for setting out of manhole chambers within the slab
5. All Foul drains to be Ø100mm @ 1:40 gradient (UNO) and all Surface water drains to be Ø150mm @1:100 (UNO)

General Notes to Drainage

1. This drawing is to be read in conjunction with the drainage details and other relevant Architects and Engineers drawings and specifications.
2. Comply with technical standards and British standards as detailed in the specification.
3. All pipework is to be installed to the recommended falls with suitable provision for venting and cleaning as required by the British standards.
4. Refer to Webb Yates drawing J2680-C-100 for details of below ground drainage.
5. Allow for rodding access points in all locations to conform to specification. Notify contractor and architect of places where access in required to these rodding points in addition to those shown on plans.
6. Provide 25mm foil face mineral wool insulation to all RWPs & SVPs.
7. Provide rodding points to RWPs and SVPs before the below ground connection.
8. Appliances connecting to the drainage system shall be installed with a trap to prevent escape of foul air into the building.
9. Appliances, pipes and fittings shall comply with relevant European standards where applicable.
10. Any part of the existing drainage system retained as part of the new scheme shall be cleaned and inspected. Any defects shall be reported to the Engineer.
11. Existing drainage connectivity & condition to be confirmed by Contractor. Before starting work, check invert levels & positions of existing drains, sewers, inspection chambers & manholes against drawings. Report discrepancies.
12. Ventilating pipes open to outside air should finish at least 900mm above any opening into the the building within 3m and should be finished with a wire cage or other perforated cover, fixed to the end of the ventilating pipe, which does not restrict the flow of air.
13. Private foul water and surface water drainage is to be constructed in accordance with the building regulations part H (2015), BS EN 12056-2:2002 (inside buildings), BS EN 752:2017 (outside buildings) and all relevant agreement certificates.
14. All rodding eyes and access points shall be of 'double-seal' type.
15. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation. Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.
16. HEALTH AND SAFETY: Care should be taken to locate services prior to any excavation.



Key Plan

Rev	Date	Description	Drn	App
06	0811.21	Revised where Shown Reissued for Construction	GP-D	GP-D
05	15.09.21	Notes added Issued for Construction	GP-D	GP-D
04	24.05.21	General layout amended Reissued for Comment	GP-D	GP-D
03	06.05.21	General layout amended Issued for Comment	GP-D	GP-D

A maximum allowance of 3WCs, 3WBs, 3SKs and 1 DW has been made for the commercial space into the pump chamber

IMPORTANT NOTE: ARCHITECT TO CONFIRM POSITION OF RAINWATER PIPES, CHANNELS AND GULLIES

IMPORTANT NOTE: DRAINAGE SCHEME IS SUBJECT TO CONFIRMATION THAT THE EXISTING SYSTEM AT THE POSITION OF THE PROPOSED CONNECTION IS FUNCTIONAL.

IMPORTANT H&S NOTE: BURIED SERVICES - REFER TO SURVEYS & STATS DRAWINGS FOR DETAILS. ALWAYS FOLLOW GOOD PRACTICE TO AVOID STRIKING BURIED SERVICES.

A maximum allowance of 3WCs, 3WBs, 3SKs and 1 DW has been made for the commercial space into the pump chamber

Above Ground Drainage Key

Symbol	Description	Abbrev.	Description
(solid line)	Pipe Transfer at High Level	SH	Shower (Ø40mm)
(solid line)	Pipe Transfer at Low Level	BH	Bath (Ø40mm)
(dashed line)	Pipe Transfer Beneath the Floor	DW	Dish Washer (Ø40mm)
SVP	Soil Vent Pipe/*Vented To Atmosphere	WM	Washing Machine (Ø40mm)
SS	Stub Stack	SK	Sink (Ø40mm)
VP	Vent Pipe	WC	Toilet (Ø100mm)
RWP	Rain Water Pipe	WB	Wash Basin (Ø40mm)
TG	Trapped Gully	R/E	Rodding Eye
	Air Admittance Valve (AAV)	F/A	From Above
	Rodding Eye	T/B	To Below

Below Ground Drainage Key

Symbol	Description
(blue dashed line with arrow)	Proposed Surface Water Drain
(red dash-dot line with arrow)	Proposed Foul Drain
CH	Proposed Channel
S#.# / F#.#	Proposed Manhole Surface Water / Foul
FP	Flushing Points shown indicitively. Refer to FIS drawings for positions.

Refer to Webb Yates drawing J2680-C-GA-0100 for the full below-ground drainage layout and manhole schedule.

WEBB YATES ENGINEERS
48-50 Scrutton Street
London EC2A 4HH
020 3696 1550
www.webbyates.co.uk
info@webbyates.co.uk

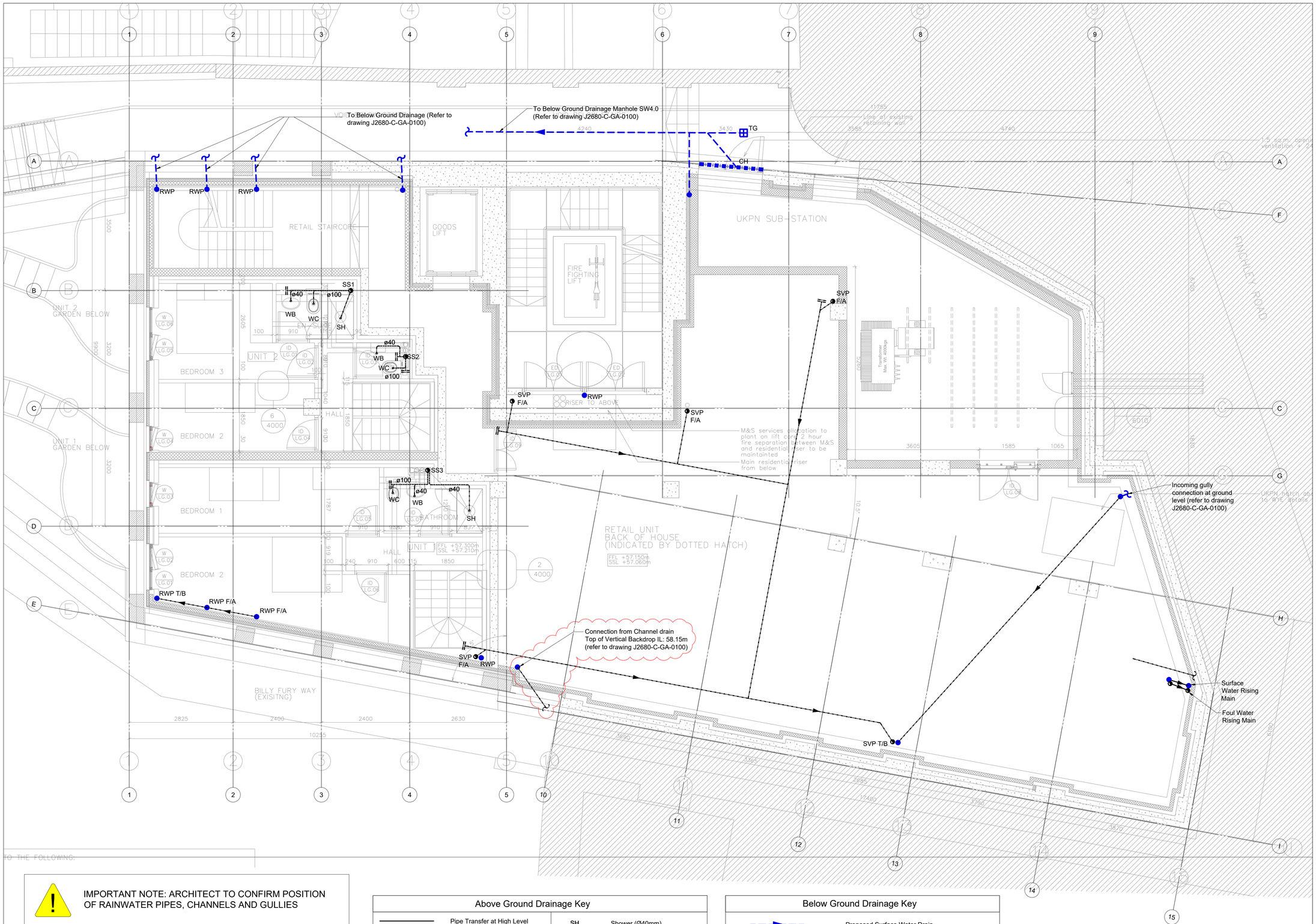
Project: 317 Finchley Road

Drawing Title: Internal Drainage Layout Basement -2 Level

Drawing Status: Construction

Drawn by	Checked by	Sheet size	Scale	Rev status
DN	GP-D	A1	1:50	S5

Drawing Number	Revision
J2680-C-GA-1098	06



TO THE FOLLOWING:

IMPORTANT NOTE: ARCHITECT TO CONFIRM POSITION OF RAINWATER PIPES, CHANNELS AND GULLIES

IMPORTANT NOTE: DRAINAGE SCHEME IS SUBJECT TO CONFIRMATION THAT THE EXISTING SYSTEM AT THE POSITION OF THE PROPOSED CONNECTION IS FUNCTIONAL.

IMPORTANT H&S NOTE: BURIED SERVICES - REFER TO SURVEYS & STATS DRAWINGS FOR DETAILS. ALWAYS FOLLOW GOOD PRACTICE TO AVOID STRIKING BURIED SERVICES.

Above Ground Drainage Key

	Pipe Transfer at High Level	SH	Shower (Ø40mm)
	Pipe Transfer at Low Level	BH	Bath (Ø40mm)
	Pipe Transfer Beneath the Floor	DW	Dish Washer (Ø40mm)
SVP	Soil Vent Pipe/*Vented To Atmosphere	WM	Washing Machine (Ø40mm)
SS	Stub Stack	SK	Sink (Ø40mm)
VP	Vent Pipe	WC	Toilet (Ø100mm)
RWP	Rain Water Pipe	WB	Wash Basin (Ø40mm)
TG	Trapped Gully	R/E	Rodding Eye
	Air Admittance Valve (AAV)	F/A	From Above
	Rodding Eye	T/B	To Below

Below Ground Drainage Key

	Proposed Surface Water Drain
	Proposed Foul Drain
CH	Proposed Channel
S#.# F#.#	Proposed Manhole Surface Water / Foul

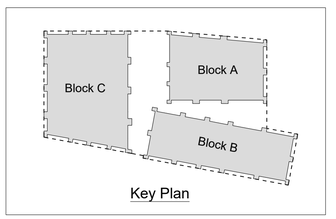
Refer to Webb Yates drawing J2680-C-GA-0100 for the full below-ground drainage layout and manhole schedule.

Notes

1. Do not scale the drawing
2. All dimensions are in millimetres unless noted otherwise
3. Any discrepancies between structural and architectural setting out dimensions must be brought to the attention of the Architect and Engineers
4. Refer to structural drawings for setting out of manhole chambers within the slab
5. All Foul drains to be Ø100mm @ 1:40 gradient (UNO) and all Surface water drains to be Ø150mm @1:100 (UNO)

General Notes to Drainage

1. This drawing is to be read in conjunction with the drainage details and other relevant Architects and Engineers drawings and specifications.
2. Comply with technical standards and British standards as detailed in the specification.
3. All pipework is to be installed to the recommended falls with suitable provision for venting and cleaning as required by the British standards.
4. Refer to Webb Yates drawing J2680-C-100 for details of below ground drainage.
5. Allow for rodding access points in all locations to conform to specification. Notify contractor and architect of places where access in required to these rodding points in addition to those shown on plans.
6. Provide 25mm foil face mineral wool insulation to all RWPs & SVPs.
7. Provide rodding points to RWPs and SVPs before the below ground connection.
8. Appliances connecting to the drainage system shall be installed with a trap to prevent escape of foul air into the building.
9. Appliances, pipes and fittings shall comply with relevant European standards where applicable.
10. Any part of the existing drainage system retained as part of the new scheme shall be cleaned and inspected. Any defects shall be reported to the Engineer.
11. Existing drainage connectivity & condition to be confirmed by Contractor. Before starting work, check invert levels & positions of existing drains, sewers, inspection chambers & manholes against drawings. Report discrepancies.
12. Ventilating pipes open to outside air should finish at least 900mm above any opening into the the building within 3m and should be finished with a wire cage or other perforated cover, fixed to the end of the ventilating pipe, which does not restrict the flow of air.
13. Private foul water and surface water drainage is to be constructed in accordance with the building regulations part H (2015), BS EN 12056-2:2002 (inside buildings), BS EN 752:2017 (outside buildings) and all relevant agreement certificates.
14. All rodding eyes and access points shall be of 'double-seal' type.
15. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation. Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.
16. HEALTH AND SAFETY: Care should be taken to locate services prior to any excavation.



Key Plan

Rev	Date	Description	Drn	App
04	08.11.21	Revised where Shown Reissued for Construction	GP-D	GP-D
03	15.09.21	Gully added Issued for Construction	GP-D	GP-D
02	06.05.21	General layout amended Issued for Comment	GP-D	GP-D
01	01.05.18	General layout amended Issued for Technical Design	DN	GP-D

WEBB YATES ENGINEERS
48-50 Scrutton Street
London EC2A 4HH
020 3696 1550
www.webbyates.co.uk
info@webbyates.co.uk

Project
317 Finchley Road

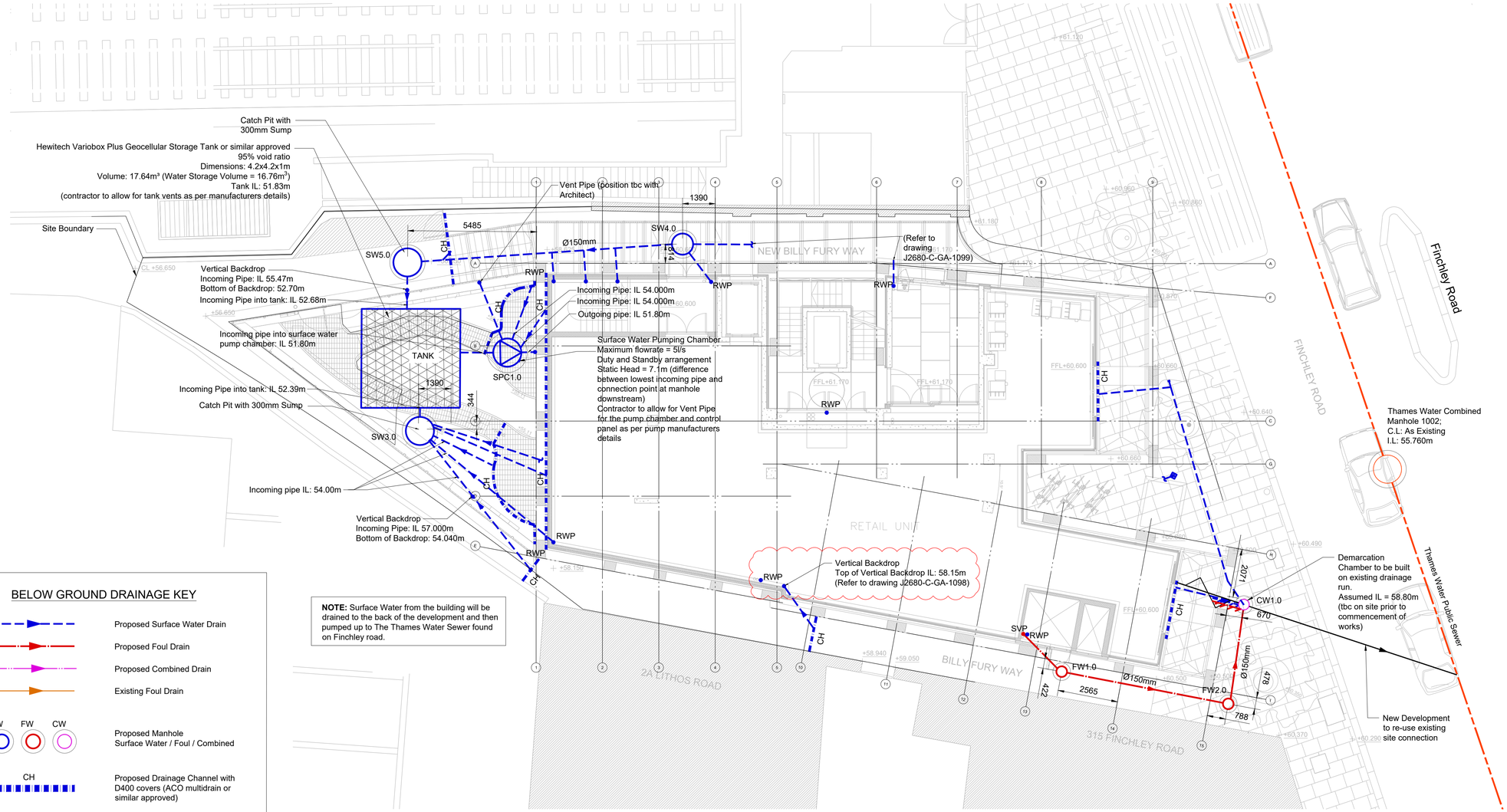
Drawing Title
Internal Drainage Layout Basement -1 Level

Drawing Status
Construction

Drawn by	Checked by	Sheet size	Scale	Rev status
DN	GP-D	A1	1:50	S5

Drawing Number
J2680-C-GA-1099

Revision
04



BELOW GROUND DRAINAGE KEY

- Proposed Surface Water Drain
- Proposed Foul Drain
- Proposed Combined Drain
- Existing Foul Drain
- SW FW CW — Proposed Manhole Surface Water / Foul / Combined
- CH — Proposed Drainage Channel with D400 covers (ACO multidrain or similar approved)
- Geo Cellular Storage Tank
- Proposed Pumped Surface Water Drain
- Proposed Pumped Foul Water Drain
- Proposed Pumped Manhole Surface Water / Foul

NOTE: Surface Water from the building will be drained to the back of the development and then pumped up to The Thames Water Sewer found on Finchley road.

IMPORTANT NOTE: CONTRACTOR TO APPLY FOR A HIGHWAYS SECTION 50 LICENCE FOR WORKS WITHIN THE PUBLIC PAVEMENT.

IMPORTANT NOTE: ARCHITECT TO CONFIRM POSITION OF RAINWATER PIPES, CHANNELS AND GULLIES

IMPORTANT NOTE: DRAINAGE SCHEME IS SUBJECT TO CONFIRMATION THAT THE EXISTING SYSTEM AT THE POSITION OF THE PROPOSED CONNECTION IS FUNCTIONAL.

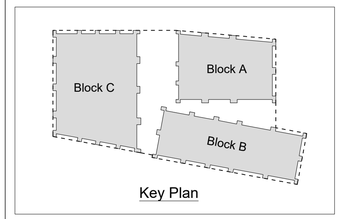
IMPORTANT H&S NOTE: BURIED SERVICES - REFER TO SURVEYS & STATS DRAWINGS FOR DETAILS. ALWAYS FOLLOW GOOD PRACTICE TO AVOID STRIKING BURIED SERVICES.

Notes

1. Do not scale the drawing
2. All dimensions are in millimetres unless noted otherwise
3. Any discrepancies between structural and architectural setting out dimensions must be brought to the attention of the Architect and Engineers
4. Refer to structural drawings for setting out of manhole chambers within the slab
5. All Foul drains to be Ø100mm @ 1:40 gradient (UNO) and all Surface water drains to be Ø150mm @1:100 (UNO)

General Notes to Drainage

1. This drawing is to be read in conjunction with the drainage details and other relevant Architects and Engineers drawings and specifications.
2. Comply with technical standards and British standards as detailed in the specification.
3. All pipework is to be installed to the recommended falls with suitable provision for venting and cleaning as required by the British standards.
4. Refer to Webb Yates drawing J2680-C-DE-400 to 403 for details of below ground drainage.
5. Allow for rodding access points in all locations to conform to specification. Notify contractor and architect of places where access in required to these rodding points in addition to those shown on plans.
6. Provide 25mm foil face mineral wool insulation to all RWPs & SVPs.
7. Provide rodding points to RWPs and SVPs before the below ground connection.
8. Appliances connecting to the drainage system shall be installed with a trap to prevent escape of foul air into the building.
9. Appliances, pipes and fittings shall comply with relevant European standards where applicable.
10. Any part of the existing drainage system retained as part of the new scheme shall be cleaned and inspected. Any defects shall be reported to the Engineer.
11. Existing drainage connectivity & condition to be confirmed by Contractor. Before starting work, check invert levels & positions of existing drains, sewers, inspection chambers & manholes against drawings. Report discrepancies.
12. Ventilating pipes open to outside air should finish at least 900mm above any opening into the the building within 3m and should be finished with a wire cage or other perforated cover, fixed to the end of the ventilating pipe, which does not restrict the flow of air.
13. Private foul water and surface water drainage is to be constructed in accordance with the building regulations part H (2015), BS EN 12056-2:2002 (inside buildings), BS EN 752:2008 (outside buildings) and all relevant agreement certificates.
14. All rodding eyes and access points shall be of 'double-seal' type.
15. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation. Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.
16. HEALTH AND SAFETY: Care should be taken to locate services prior to any excavation.



Key Plan

Rev	Date	Description	Drn	App
06	08.11.21	Revised where Shown Reissued for Construction	GP-D	GP-D
05	15.09.21	Notes added Issued for Construction	GP-D	GP-D
04	24.05.21	General layout amended Reissued for Comment	GP-D	GP-D
03	06.05.21	General layout amended Issued for Comment	GP-D	GP-D

WEBB YATES ENGINEERS
48-50 Scrutton Street
London EC2A 4HH
020 3696 1550
www.webbyates.co.uk
info@webbyates.co.uk

Project
317 Finchley Road

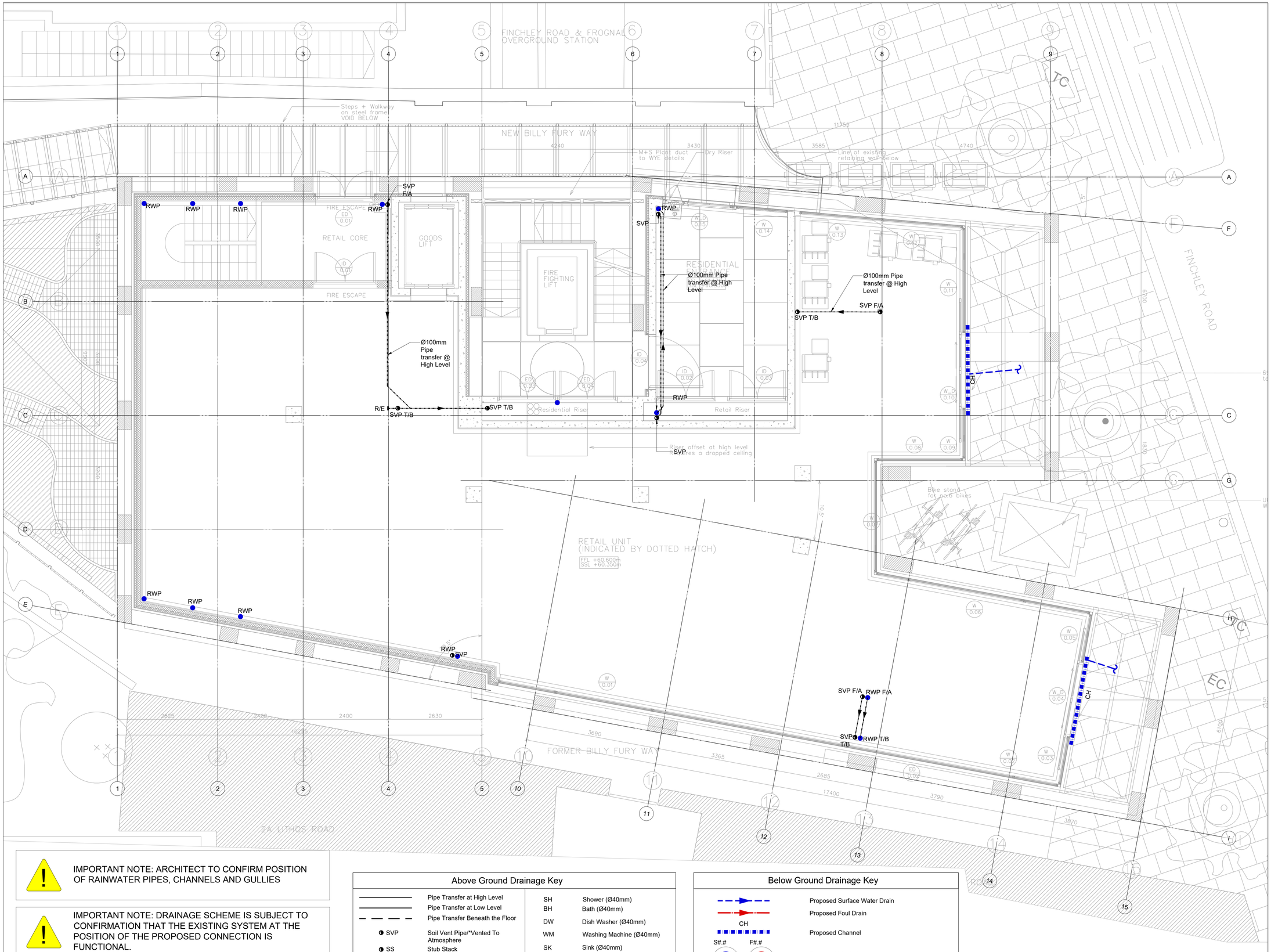
Drawing Title
External Drainage Layout
Ground Level GA

Drawing Status
Construction

Drawn by	Checked by	Sheet size	Scale	Rev status
DN	GP-D	A1	1:100	S5

Drawing Number
J2680-C-GA-0100

Revision
06

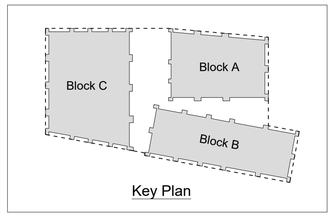


Notes

1. Do not scale the drawing
2. All dimensions are in millimetres unless noted otherwise
3. Any discrepancies between structural and architectural setting out dimensions must be brought to the attention of the Architect and Engineers

General Notes to Drainage

1. This drawing is to be read in conjunction with the drainage details and other relevant Architects and Engineers drawings and specifications.
2. Comply with technical standards and British standards as detailed in the specification.
3. All pipework is to be installed to the recommended falls with suitable provision for venting and cleaning as required by the British standards.
4. Refer to Webb Yates drawing J2680-C-100 for details of below ground drainage.
5. Allow for rodding access points in all locations to conform to specification. Notify contractor and architect of places where access in required to these rodding points in addition to those shown on plans.
6. Provide 25mm foil face mineral wool insulation to all RWPs & SVPs.
7. Provide rodding points to RWPs and SVPs before the below ground connection.
8. Appliances connecting to the drainage system shall be installed with a trap to prevent escape of foul air into the building.
9. Appliances, pipes and fittings shall comply with relevant European standards where applicable.
10. Any part of the existing drainage system retained as part of the new scheme shall be cleaned and inspected. Any defects shall be reported to the Engineer.
11. Existing drainage connectivity & condition to be confirmed by Contractor. Before starting work, check invert levels & positions of existing drains, sewers, inspection chambers & manholes against drawings. Report discrepancies.
12. Ventilating pipes open to outside air should finish at least 900mm above any opening into the the building within 3m and should be finished with a wire cage or other perforated cover, fixed to the end of the ventilating pipe, which does not restrict the flow of air.
13. Private foul water and surface water drainage is to be constructed in accordance with the building regulations part H (2015), BS EN 12056-2:2002 (inside buildings), BS EN 752:2017 (outside buildings) and all relevant agreement certificates.
14. All rodding eyes and access points shall be of 'double-seal' type.
15. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation. Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.
16. HEALTH AND SAFETY: Care should be taken to locate services prior to any excavation.



Key Plan

IMPORTANT NOTE: ARCHITECT TO CONFIRM POSITION OF RAINWATER PIPES, CHANNELS AND GULLIES

IMPORTANT NOTE: DRAINAGE SCHEME IS SUBJECT TO CONFIRMATION THAT THE EXISTING SYSTEM AT THE POSITION OF THE PROPOSED CONNECTION IS FUNCTIONAL.

IMPORTANT H&S NOTE: BURIED SERVICES - REFER TO SURVEYS & STATS DRAWINGS FOR DETAILS. ALWAYS FOLLOW GOOD PRACTICE TO AVOID STRIKING BURIED SERVICES.

Above Ground Drainage Key

	Pipe Transfer at High Level	SH	Shower (Ø40mm)
	Pipe Transfer at Low Level	BH	Bath (Ø40mm)
	Pipe Transfer Beneath the Floor	DW	Dish Washer (Ø40mm)
SVP	Soil Vent Pipe/*Vented To Atmosphere	WM	Washing Machine (Ø40mm)
SS	Stub Stack	SK	Sink (Ø40mm)
VP	Vent Pipe	WC	Toilet (Ø100mm)
RWP	Rain Water Pipe	WB	Wash Basin (Ø40mm)
TG	Trapped Gully	R/E	Rodding Eye
	Air Admittance Valve (AAV)	F/A	From Above
	Rodding Eye	T/B	To Below

Below Ground Drainage Key

	Proposed Surface Water Drain
	Proposed Foul Drain
CH	Proposed Channel
S#.# F#.#	Proposed Manhole Surface Water / Foul

Refer to Webb Yates drawing J2680-C-GA-0100 for the full below-ground drainage layout and manhole schedule.

Rev	Date	Description	Drn	App
02	06.05.21	General layout amended Issued for Comment	GP-D	GP-D
01	01.05.18	General layout amended Issued for Technical Design	DN	GP-D
00	09.02.18	Issued for Information	DN	GP-D

WEBB YATES ENGINEERS
48-50 Scrutton Street
London EC2A 4HH
020 3696 1550
www.webbyates.co.uk
info@webbyates.co.uk

Project
317 Finchley Road

Drawing Title
Internal Drainage Layout Ground Level 00

Drawing Status
Information

Drawn by	Checked by	Sheet size	Scale	Rev status
DN	GP-D	A1	1:50	S9

Drawing Number
J2680-C-GA-1100

Revision
02

12 APPENDIX C –MICRODRAINAGE EXISTING FLOWRATE CALCULATIONS

Existing Network Details for Storm

- Indicates pipe length does not match coordinates

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	8.067	0.081	99.6	0.053	5.00	0.0	0.600	o	300	Pipe/Conduit
1.001	10.000#	0.100	100.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	54.000	0.053	0.0	1.58	111.4
1.001	53.919	0.053	0.0	1.57	111.1

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Storm Duration (mins)	30
Ratio R	0.438		

1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.438
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%					54.067
1.001	2	15 Winter	1	+0%					53.983

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.233	0.000	0.11			7.9	FLOOD RISK	
1.001	2	-0.236	0.000	0.10			8.0	OK	

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.438
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%					54.108
1.001	2	15 Winter	30	+0%					54.020

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.192	0.000	0.27			19.4	FLOOD RISK	
1.001	2	-0.199	0.000	0.25			19.6	OK	

100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.438
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+0%					54.125
1.001	2	15 Winter	100	+0%					54.037

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.175	0.000	0.36			25.4	FLOOD RISK	
1.001	2	-0.182	0.000	0.32			25.5	OK	

Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR Ratio R	0.438
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+20%					54.138
1.001	2	15 Winter	100	+20%					54.049

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.162	0.000	0.43			30.4	FLOOD RISK	
1.001	2	-0.170	0.000	0.39			30.6	OK	

Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 21.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.438 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
1.000	1	15 Winter	100	+40%					54.152	-0.148	0.000	0.50			35.5
1.001	2	15 Winter	100	+40%					54.062	-0.157	0.000	0.45			35.7

PN	US/MH Name	Status	Level Exceeded
1.000	1	FLOOD RISK	
1.001	2	FLOOD RISK	

13 APPENDIX D – GREENFIELD RUNOFF RATES

Print | Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Guy Parker-Dennison
Site name:	Finchley Road
Site location:	London

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:	51.55010° N
Longitude:	0.18288° W
Reference:	980144624
Date:	Jan 23 2023 08:51

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.1

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):	650	650
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):	0.44	0.44
1 in 1 year (l/s):	0.38	0.38
1 in 30 years (l/s):	1.02	1.02
1 in 100 year (l/s):	1.41	1.41
1 in 200 years (l/s):	1.66	1.66

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

14 APPENDIX E – MICRODRAINAGE PROPOSED NETWORK CALCULATIONS

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	1.802	0.025	72.1	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit
S1.001	16.039	0.210	76.4	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit
S1.002	2.982	0.610	4.9	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit
S2.000	11.733	1.060	11.1	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit
S2.001	4.166	2.690	1.5	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit
S1.003	3.595	0.030	119.8	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit
S1.004	33.022	-7.000	-4.7	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit

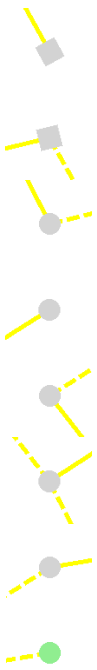
Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	52.675	0.021	0.0	1.19	21.0
S1.001	52.650	0.036	0.0	1.15	20.3
S1.002	52.440	0.046	0.0	4.59	81.1
S2.000	56.550	0.010	0.0	3.05	53.8
S2.001	55.490	0.010	0.0	8.16	144.3
S1.003	51.830	0.056	0.0	0.92	16.2
S1.004	51.800	0.059	0.0	0.00	0.0

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	53.260	0.585	Open Manhole	750 x 750	S1.000	52.675	150				
S2	53.260	0.610	Open Manhole	750 x 750	S1.001	52.650	150	S1.000	52.650	150	
S3	55.860	3.420	Open Manhole	1200	S1.002	52.440	150	S1.001	52.440	150	
S4	58.250	1.700	Open Manhole	900	S2.000	56.550	150				
S5	56.650	1.160	Open Manhole	1200	S2.001	55.490	150	S2.000	55.490	150	
STank	55.860	4.030	Open Manhole	100	S1.003	51.830	150	S1.002	51.830	150	
								S2.001	52.800	150	970
SSPC1	55.110	3.310	Open Manhole	1200	S1.004	51.800	150	S1.003	51.800	150	
S	60.400	1.600	Open Manhole	0		OUTFALL		S1.004	58.800	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	526075.970	185026.900	526075.970	185026.900	Required	
S2	526075.094	185028.475	526075.094	185028.475	Required	
S3	526059.512	185024.672	526059.512	185024.672	Required	
S4	526065.491	185036.926	526065.491	185036.926	Required	
S5	526055.598	185030.616	526055.598	185030.616	Required	
STank	526058.159	185027.330	526058.159	185027.330	Required	
SSPC1	526061.172	185029.291	526061.172	185029.291	Required	
S	526093.723	185034.844			No Entry	



Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.021	0.021	0.021
1.001	User	-	100	0.015	0.015	0.015
1.002	User	-	100	0.007	0.007	0.007
	User	-	100	0.002	0.002	0.009
2.000	User	-	100	0.001	0.001	0.001
	User	-	100	0.005	0.005	0.006
	User	-	100	0.001	0.001	0.007
	User	-	100	0.003	0.003	0.010
2.001	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.001	0.001	0.001
1.004	User	-	100	0.003	0.003	0.003
				Total	Total	Total
				0.059	0.059	0.059

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.004	S	60.400	58.800	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.500	Storm Duration (mins)	30
Ratio R	0.438		

Online Controls for Storm

Pump Manhole: SSPC1, DS/PN: S1.004, Volume (m³): 3.8

Invert Level (m) 51.800

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0000	0.900	5.0000	1.700	5.0000	2.500	5.0000
0.200	5.0000	1.000	5.0000	1.800	5.0000	2.600	5.0000
0.300	5.0000	1.100	5.0000	1.900	5.0000	2.700	5.0000
0.400	5.0000	1.200	5.0000	2.000	5.0000	2.800	5.0000
0.500	5.0000	1.300	5.0000	2.100	5.0000	2.900	5.0000
0.600	5.0000	1.400	5.0000	2.200	5.0000	3.000	5.0000
0.700	5.0000	1.500	5.0000	2.300	5.0000		
0.800	5.0000	1.600	5.0000	2.400	5.0000		

Storage Structures for Storm

Cellular Storage Manhole: STank, DS/PN: S1.003

Invert Level (m) 51.830 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	17.6	17.6	1.300	0.0	34.4
0.100	17.6	19.3	1.400	0.0	34.4
0.200	17.6	21.0	1.500	0.0	34.4
0.300	17.6	22.6	1.600	0.0	34.4
0.400	17.6	24.3	1.700	0.0	34.4
0.500	17.6	26.0	1.800	0.0	34.4
0.600	17.6	27.7	1.900	0.0	34.4
0.700	17.6	29.3	2.000	0.0	34.4
0.800	17.6	31.0	2.100	0.0	34.4
0.900	17.6	32.7	2.200	0.0	34.4
1.000	17.6	34.4	2.300	0.0	34.4
1.001	0.0	34.4	2.400	0.0	34.4
1.200	0.0	34.4	2.500	0.0	34.4

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.438
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	1	+0%	100/15 Summer				52.730
S1.001	S2	15 Winter	1	+0%	100/15 Summer				52.703
S1.002	S3	15 Winter	1	+0%	100/15 Winter				52.475
S2.000	S4	15 Winter	1	+0%					56.567
S2.001	S5	15 Winter	1	+0%					55.500
S1.003	STank	15 Winter	1	+0%	30/15 Summer				51.922
S1.004	SSPC1	15 Winter	1	+0%	30/15 Summer				51.915

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.095	0.000	0.28			3.1	OK	
S1.001	S2	-0.097	0.000	0.26			5.0	OK	
S1.002	S3	-0.115	0.000	0.13			6.1	OK	
S2.000	S4	-0.133	0.000	0.03			1.5	OK	
S2.001	S5	-0.140	0.000	0.01			1.4	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.003	STank	-0.058	0.000	0.45		7	4.9	OK	
S1.004	SSPC1	-0.035	0.000	0.98			5.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.438
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	30	+0%	100/15 Summer				52.769
S1.001	S2	15 Winter	30	+0%	100/15 Summer				52.745
S1.002	S3	15 Winter	30	+0%	100/15 Winter				52.501
S2.000	S4	15 Winter	30	+0%					56.577
S2.001	S5	15 Winter	30	+0%					55.508
S1.003	STank	30 Winter	30	+0%	30/15 Summer				52.200
S1.004	SSPC1	30 Winter	30	+0%	30/15 Summer				52.193

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.056	0.000	0.70			7.6	OK	
S1.001	S2	-0.055	0.000	0.71			13.4	OK	
S1.002	S3	-0.089	0.000	0.34			16.8	OK	
S2.000	S4	-0.123	0.000	0.07			3.6	OK	
S2.001	S5	-0.132	0.000	0.03			3.5	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.003	STank	0.220	0.000	0.50		17	5.5	SURCHARGED	
S1.004	SSPC1	0.243	0.000	0.98			5.0	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.438
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	100	+40%	100/15 Summer				52.951
S1.001	S2	15 Winter	100	+40%	100/15 Summer				52.906
S1.002	S3	30 Winter	100	+40%	100/15 Winter				52.694
S2.000	S4	15 Winter	100	+40%					56.586
S2.001	S5	15 Winter	100	+40%					55.515
S1.003	STank	30 Winter	100	+40%	30/15 Summer				52.688
S1.004	SSPC1	30 Winter	100	+40%	30/15 Summer				52.681

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.126	0.000	1.25			13.6	SURCHARGED	
S1.001	S2	0.106	0.000	1.22			23.1	SURCHARGED	
S1.002	S3	0.104	0.000	0.48			23.3	SURCHARGED	
S2.000	S4	-0.114	0.000	0.13			6.5	OK	
S2.001	S5	-0.125	0.000	0.06			6.4	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.003	STank	0.708	0.000	0.47		31	5.1	SURCHARGED	
S1.004	SSPC1	0.731	0.000	0.98			5.0	SURCHARGED	