AtkinsRéalis

Drainage Design Report

Haringey Borough Council

1 February 2024
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CCCG TOTTENHAM NEW TEACHING BUILDING

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This document has 61 pages including the cover.

Document history

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1. Introduction

1.1 General

AtkinsRéalis has been commissioned to prepare a drainage strategy to support the planning application for the proposed redevelopment of a section of the existing main building at the College of Haringey, Enfield and Northeast London Tottenham Campus, N154RU, National Grid reference TQ 533598 189294. The proposed works involves the demolition of a section of the existing main building and the construction a new four-storey building.

This report reviews the existing surface water and foul sewer drainage networks around the proposed development. From the outcome of the drainage review, the report proposes an appropriate drainage strategy for the proposed development.

1.2 The Site

The entire college site area is 1.19 hectares, this is defined by redline boundary as shown in Figure 1-1. The section of site that is proposed for redevelopment is 620m^2, this is defined by the yellow boundary in figure 1-1. Access to the site is through the existing Town Hall Approach Road which leads to the High Road.

The proposed design consists of a new four-storey building that will comprise of construction workshops (carpentry, joinery, fabrication and welding, heating, and plumbing and electrical installation) along with science and ICT classrooms.

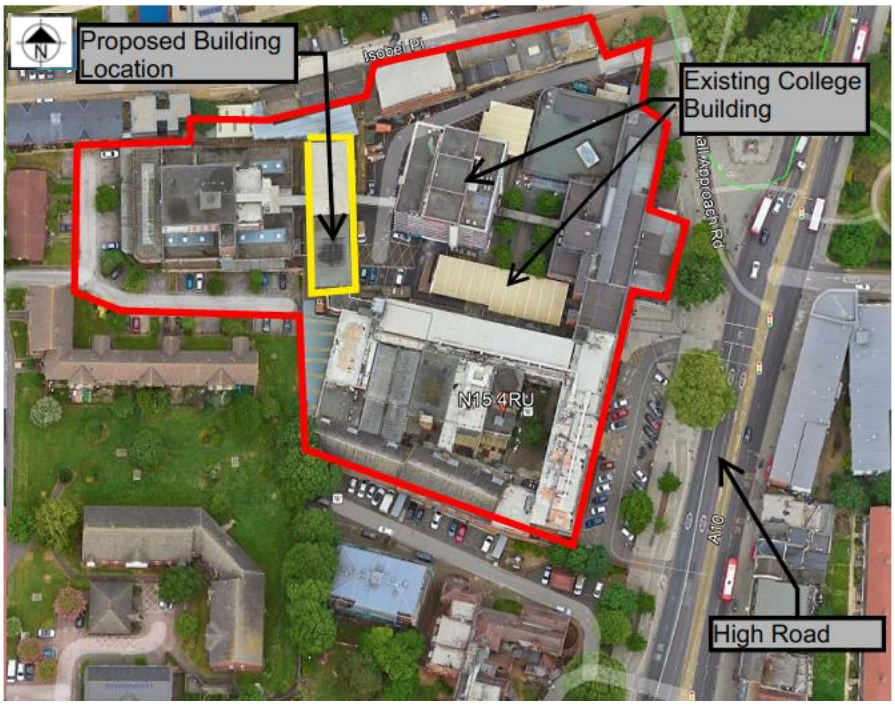


Figure 1-1 - Site Location Plan (Ref: Google Map)

2. Existing Site Features

2.1 Topography

The site is flat with levels ranging approximately from 14.40m Above Ordnance Datum (AOD) at the north of the site to 14.63m AOD to the south of the site (Refer Appendix A.3). The site is mainly made up of hardstanding area with pedestrian and vehicular parking provisions close the development. There is an existing Tower Block to the east of the development and existing Building Block to the west of the development, the primary access to the section of site that is being redeveloped is through the existing Town Hall Approach Road.

2.2 Ground Investigation

A geo-environmental and geotechnical assessment was carried out by RSK Geosciences in May 2023(Ref: 1922791-01(00)). The study indicates that the site comprises of London Clay and made ground.
The made ground, extends to a depth of 2.8m Below Ground Level (bgl), it is understood this is made up of a cohesive matrix with brick, asphalt, concrete and ceramic. The made ground is underline by London Clay which extends to a depth of 28m below the existing made ground.

The site is identified as being in zone 2 of the groundwater source protection zone (SPZ).

2.3 Existing Drainage and Discharge rates

A drainage condition and connectivity survey (CCTV) was undertaken by Laser Surveys in June 2023 (Ref: 1879/2, Appendix A.1). From the outcome of the CCTV survey, there is a surface water drainage network that runs from west to east of the site. This discharges to an existing manhole located in the eastern section of the site (MH SW128, Cover Level (CL) 14.35m AOD, Invert level (IL) 12.27m AOD, Refer Appendix A.1).

A review of the foul water drainage network shows a similar route where the foul water discharges into an existing combined sewer manhole (MH CW132, CL 14.32m AOD) in the eastern section of the college's site boundary. It was noted in the CCTV Survey that an existing 150mm foul water pipe which runs underneath the existing main building at southern side of the proposed development was incomplete (Appendix A.1).

From the utility search report (Ref: 424990 A.2) obtained, there is an existing Thames Water (TW) surface water network within the college boundary. The surface water network discharges into existing Thames Water sewer TWMH 6326 (CL 14.11m AOD, IL 12.12m AOD) located within Town Hall Approach Road. The existing foul water network discharges into existing Thames Water manhole TWMH 6327 (CL 13.94m AOD, IL 9.88m AOD) in Town Hall Approach Road (Appendix A.2).

A high-level hydraulic model was prepared to assess existing discharge rates from the existing building. The following criteria were used for the development of the model.

- Impermeable area of 620 $m^{2,}$
- For simulations FEH data used,
- Cv value of 0.75 and 0.84 is used for summer and winter rainfall events.

Table 2-1 summarises the rates for surface water runoff rate events. It is noted that existing flows are discharged unattenuated into the existing drainage network. Refer to Appendix F for the hydraulic model output of the existing surface water model.

Table 2-1 – Existing Runoff Rates

Design Events	Existing runoff rates (l/sec)
1 in 1	8.2
1 in 30	17.1
1 in 100	21.3
1 in 100 + 40% CC	21.9

3. Proposed Drainage Strategy

3.1 Overview

This section provides details of the justification for the selected surface water drainage strategy. A completed Haringey Council drainage proforma as also been included in Appendix D.

3.2 Planning Legislations

The following local plans/polices/guidance and regulations have been reviewed and considered within the proposed Drainage Strategy.

3.2.1 National Planning Policy Framework (NPPF) 2023

The National Planning Policy Framework sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced.
It states that developments should incorporate sustainable drainage systems, unless there is clear evidence that this would be inappropriate (Clause 173).

3.2.2 DEFRA Non-statutory Technical Standards for Sustainable Drainage Systems (2015)

This document sets out non-statutory technical standards for sustainable drainage systems. They should be used in conjunction with the National Planning Policy Framework and Planning Practice Guidance.

1. *S5: Where reasonably practicable, for developments which have been previously developed,* ***the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event*** *but should never exceed the runoff volume from the development site prior to redevelopment for that event.*
2. *S6: Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.*
3. *S7: The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design,* ***flooding does not occur on any part of the site for a 1 in 30-year rainfall event.***
4. *S8: The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding* ***does not occur during a 1 in 100-year rainfall event in any part*** *of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.*
5. *S9: The design of the site must ensure that, so far as is reasonably practicable,* ***flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes*** *that minimise the risks to people and property.*

3.2.3 Haringey London: SuDS Design Requirements for LLFA Technical Assessment

The Haringey London SuDS Design Requirements for LLFA Technical Assessment states:

6. *S4.1:* ***Source control*** *– Runoff should be dealt with as close as possible to where it falls.*

   Keeping runoff at or near the surface *– Careful consideration is required when determining how runoff will be collected and conveyed through the site.*

   Controlling flow *– Flow controls should be designed so that they can be simply understood and easily accessible. No minimum threshold is set for the control of flows, however design should ensure that the flow control is protected from blockage.*
7. *S4.5: To decrease the risk of flooding and environmental impact, applicants should seek to minimise the quantity of runoff from a site. Applicants should consider all potential means for reuse and minimisation of discharge of flows from a site.*
8. *S4.7: Any rainfall on the site which does not infiltrate will occur as runoff. As rainfall intensities increase the rate of runoff increases. The rate of runoff from developed impermeable areas will be significantly greater than pre-development permeable areas. In accordance with Haringey Development DPD Policy DM25, developments should ensure that there is no increase in flood elsewhere and should seek to achieve Greenfield (GF) rates of runoff.*
9. *S4.7: In applying the 50% betterment approach, the applicant should seek to establish the capacity of the existing drainage network (where this solely serves the site), with the aim of reducing flows discharging from the site via the drainage infrastructure by 50%. Where the existing capacity of the storm sewer network serving the site cannot determined then runoff rates should be limited to a maximum of 3 x GF rate for the respective return period.*
10. *S4.9.2:* ***Climate Change*** *- To account for climate change, rainfall intensities should be increased by intensity relevant at the time of submission with allowance made within conveyance and storage calculations. At the time of issue LBoH would recommend making allowance for 30% increase in rainfall intensities to allow for Climate Change with sensitivity testing carried out using 40% increase in rainfall intensities. Any reduction from DEFRA recommendations current at the time of making the application should be agreed as part of the pre-application discussion.* Hence, 40% CC is considered for all further calculations.
11. ***SuDS Flows and Volumes – LLFA Technical Assessment Proforma:*** *Storage for the 1 in 30 year must be fully contained within the SuDS components. Note that standing water within SuDS components such as ponds, basins and swales is not classified as flooding. Storage should be calculated for the critical duration rainfall event.*
12. ***SuDS Flows and Volumes – LLFA Technical Assessment Proforma*** *: Runoff generated from rainfall events up to the 1 in 100 year will not be allowed to leave the site in an uncontrolled way. Temporary flooding of specified areas to shallow depths (150-300mm) may be permitted in agreement with the LLFA.*

3.2.4 Other Design Standards

The surface water drainage system has been designed to the following design criteria in accordance with CIRIA C753 SuDS Manual:

- No surcharging in a 1 in 1-year storm event (Sewerage Sector Guidance, C 6.4, Page No 59).
- Minimum pipework self-cleaning velocity is 1m/s (BS EN 752:2017).
- Maximum allowed distance between manholes is 90m. (BS EN 752:2017, Table NA.4).
- Where possible, the excess runoff generated by the proposed development during the 1 in 100-year, 6-hour storm even shall be attenuated onsite.
- The following impermeable factors (PIMP) shall be used:
    - Access roads, hardstanding, parking and roofs: 100%
    - Landscape area: 0% (Sewerage Sector Guidance, C 6.1, Page No 57)

- For simulations, Cv value of 0.75 and 0.84 shall be used for summer and winter rainfall events.
- FEH data shall be used for simulation.

3.3 SuDS Evaluation

A full suite of the SuDS options was evaluated for the surface water drainage system. The evaluation considered the following:

- Attenuation, amenity, biodiversity, and treatment properties of each SuDS element.
- Planning legislation (as described in Section 3.2).
- Site spatial constraints; accessibility, maintenance, and ownership arrangements (which affect the implementation of SuDS).

The results of the evaluation and proposed solution are summarised in Table 3-1

Table 3-1 - SuDS Evaluation

SuDS Type	Evaluation Comments	Conclusion
Rainwater Harvesting	Rainwater harvesting is a viable option for recycling surface water runoff from rainfall events, however due to the intermittent nature of rainfall events throughout the year this methodology is considered not to be sustainable	Not proposed.
Green/Blue Roofs	A Green Roof is proposed on the rooftop (fourth floor) to provide biodiversity benefits. A blue roof is not proposed as it increases building loads, and the continuous movement of water within the membrane presents unquantifiable structural challenges.	Green Roof is proposed on the roof of the fourth floor.
Infiltration Systems	Infiltration systems are assumed not viable due to the makeup of the site's geology. It is understood that the London Clay formation at the site extends to a depth of 28m below the made ground. London Clay formation is considered impermeable in nature and not suitable for infiltration systems.	Not viable.
Proprietary Treatment Systems	Not deemed to be required to the surface water drainage system.	Not proposed.
Filter Strips	Space constraints and low permeability of the site prevents the use of filter strips.	Not viable.
Filter Drains	Space constraints limit the use of filter drains.	Not viable.
Dry/Wet Swales	Space constraints limit the use of swales.	Not viable.

Bio Retention Gardens	Space constraints limit the use of swales.	Not viable.
Tree Pit Drainage	Trees are not proposed within the development boundary due to area constraints.	Not proposed.
Porous Pavements	Most of the site is built up with buildings and hardstanding area, hence limited provision for porous pavements.	Not viable.
Attenuation Storage Tanks	Attenuation Tanks are considered as viable options to provide sufficient attenuation storage and manage surface water discharge into the drainage network.	Viable – Proposed.
Detention Basins	Insufficient space on site.	Not viable.
Ponds/Wetlands	Most of the site is currently covered with buildings and hardstanding and therefore this will limit the provision of pond / wetlands due to space constraints.	Not viable.

3.4 Outfall Strategy

The CIRIA C753 Drainage Hierarchy was assessed and is summarised in Table 3-2.

Table 3-2 - CIRIA C753 Outfall Hierarchy Evaluation

Hierarchy	Evaluation Comments
1. Infiltration	Infiltration systems are assumed not viable due to London Clay formation at shallow depths with approximate thickness of 28m below the made ground. London Clay formation is not suitable for infiltration systems since it is impervious by nature.
2. Discharge to Surface Waters	No watercourses in the vicinity of the site.
3. Discharge to surface water sewer, highway drain, or another drainage system	Proposed surface water discharge into existing Thames Water drainage network.

4. Discharge to a combined sewer	Not applicable.

The outcome of evaluation concludes that the viable option is to discharge surface water runoff to the existing drainage network, which discharges into the existing Thames Water's drainage network within the site.

The Lead Local Flood Authority (LLFA) has been engaged and it has been agreed with the LLFA to discharge surface water into the existing Thames Water drainage network.

The proposed surface water runoff from the new building will be attenuated in an underground attenuation tank. It is proposed to pump the attenuated surface water into an existing inspection chamber (IC SW 16, Ref- N 1879/3 Drainage condition and connectivity survey, CL 14.23m, IL 13.43m OAD) located at the northeast corner of the new building. The drainage network from the inspection chamber discharges into an existing manhole (MH SW 128, Ref- N 1879/3 Drainage condition and connectivity survey, CL 14.35m, IL 12.27m OAD, Refer Appendix A.1). Results from the hydraulic model is provided in Appendix G. A Section 106 indirect connection agreement will be required to discharge to Thames Water sewer network.

3.5 Proposed Discharge Rate

The greenfield flow rate for the site has been estimated using the Environment Agency (EA) guidance 'Rainfall runoff management for developments – Report – SC030219' using the 'Institute of Hydrology Report No. 124 (IH124) methodology for the Flood Estimation for Small Catchments'. The greenfield equivalent run-off rates have been calculated using the 'Interim Code of Practice for Sustainable Drainage Design variant of IH124'. The calculated greenfield rate is 0.24l/s (Appendix B).

In order to avoid blockage and to achieve self-cleansing velocity a practicable minimum discharge rate of 2l/s is proposed. This has been agreed with the London Borough of Haringey. The drainage strategy proposed involves discharging surface water from the proposed development into an existing surface water manhole located within the site boundary at a rate of 2l/s. The proposed discharge rate will provide betterment to the existing runoff. The rates of betterment are shown in Table 3-3.

Table 3-3 – Q_{BAR} Greenfield Run-Off Rates (lps)

Discharge rates(l/s)	Q1 year	Q30 year	Q100 year	Q100 year+40%cc
Pre-redevelopment existing rates	8.2	17.1	21.3	21.9
Proposed rates	2	2	2	2
% Betterment	75.60%	88.30%	90.61%	90.86%

3.6 Proposed Drainage Solution

The proposed drainage strategy is designed to reduce peak flows using the following viable SuDS features below:

- Green Roofs
- Attenuation Storage Tanks

Green Roofs

A green roof is proposed for biodiversity on the fourth floor roof of the new building with a plan area of 273m^2.

The green roof will have an area of living vegetation, installed on the roof of the building. This will provide biodiversity benefits with ecological value as well as reduction in the rate of surface water runoff.

There are two types of a green roof:

- Intensive: deeper substrates that can support a wide variety of planting.
- Extensive: low substrate depths, simple planting with low maintenance requirements.

The key principles for these systems include:

- The green roof does not only create a biodiverse habitat but also will absorb the first 5mm of rainfall.
- The green roof systems are recommended to have zero fall along the subgrade which is appropriate for structural roof finish.
- Improvement of water quality by retaining the first 5mm of rainfall onsite. Contaminants and silts are often mobilised by the first flush rainfall event (5mm). Thus, by retaining this 5mm of rainfall, contaminants are managed upstream whereby reducing the likelihood of polluting downstream watercourses. Some contaminants can also be filtered out or broken down by bacteria living in the green roof substrate.

Attenuation Storage Tank

The attenuation tanks are proposed to be a geo-cellular units construction such as the Polystorm modular cell system (or similar approved), see Figure 3-1. The attenuation strategy and the upstream green roof catchments will contribute to the reduction of silt build-up in the network.

The proposed attenuation tank is proposed to have a storage volume of 36.5m^3, plan area of 32m^2 and depth of 1.20m (with 95% voids).

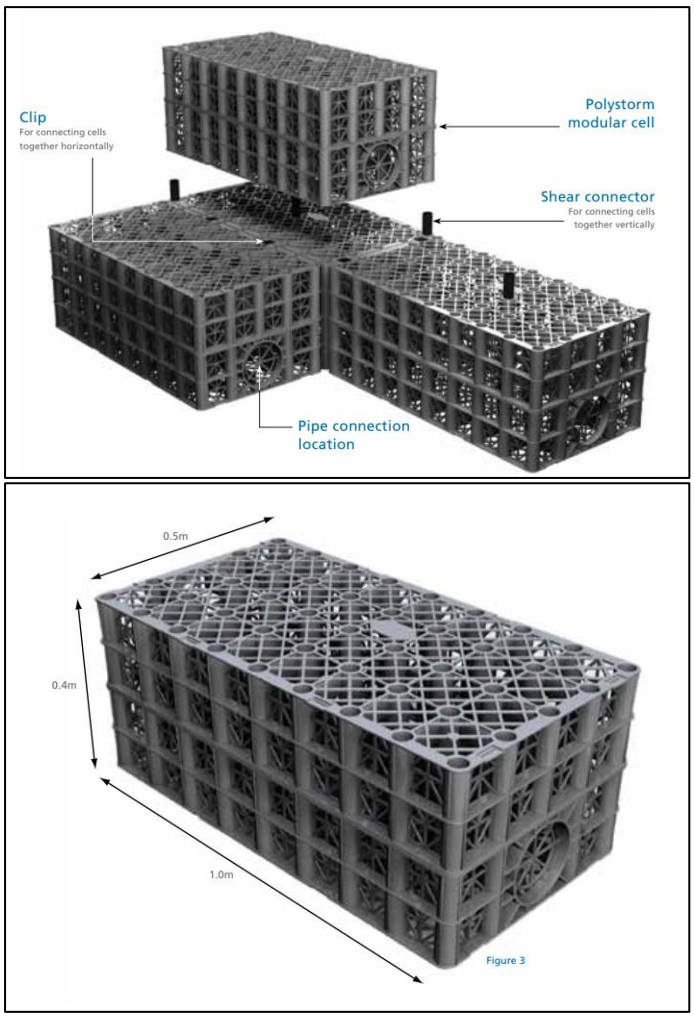


Figure 3-1 – Polystorm Attenuation Crates (Ref: Polystorm Technical Guide, May 2011, pg. 17)

3.7 Water Quality

As noted in Section 3.3 SuDS are proposed for the drainage strategy of the development, and will enhance the water quality as follows:

- Green Roofs: Treatment is provided as the rainwater percolates through the Green Roofs substrata (including physical, biological, and chemical treatment through the soil and root up-take zone).

The interception of surface water runoff from the Green Roof will be for the first 5mm of a rainfall event, whereby improving water quality from the site. This benefit is also identified in CIRIA C753.

3.8 Amenity and Biodiversity

Table 3-4 summarises the amenity and biodiversity benefits achieved through implementation of the currently proposed SuDS features. Landscape design is encouraged to propose any additional elements where possible to maximise the amenity and biodiversity of the site.

Table 3-4 – Amenity and Biodiversity Factors

SuDS Type	Amenity Benefits	Biodiversity Benefits
Green Roofs	Green Roofs provide valuable amenity if the roof is to be accessed or overlooked. They also improve the thermal efficiency of the building, improve air quality, and reduce noise levels.	Green Roofs provide high ecological value. They can help to conserve valuable habitat and biodiversity and can provide an oasis of life in an urban environment.
Attenuation Storage Tanks	Attenuation tanks do not provide any direct amenity benefits.	Attenuation tanks do not provide any direct biodiversity benefits.

3.9 Exceedance Assessment

As per Haringey council's SuDS design guidance, the design must ensure that extreme flows i.e. rainfall in excess of a 1 in 100-year (+CC% allowance) can be managed in a safe and predictable manner. Haringey LLFA advocates the distribution of storage within sub catchments across the site layout and design of the site must ensure that flows resulting from rainfall in excess of a 1 in 100-year (+CC allowance) rainfall event are managed in exceedance routes that minimise the risks to people and property, and do not increase flood risk off site. The current design ensures that no flooding occurs during 1 in 100-year (+40% climate change) rainfall event.

4. Foul Drainage

An existing 150mm foul sewer line and 100mm combined sewer was identified as running along the existing building. The construction of the proposed building will show these drainage lines running underneath the proposed building's footprint (Refer Figure 4-1).

It is proposed to divert these sewers over the extent of the new building footprint and reconnect them to the existing drainage network outside the footprint of the proposed building.

The foul sewer will be connected through a new inspection chamber IC FW13 (CL 12.90m, IL 11.55m OAD) built on the line of the existing drainage route (Appendix C). The combined sewer will be connected to existing combined sewer manhole (Appendix C).

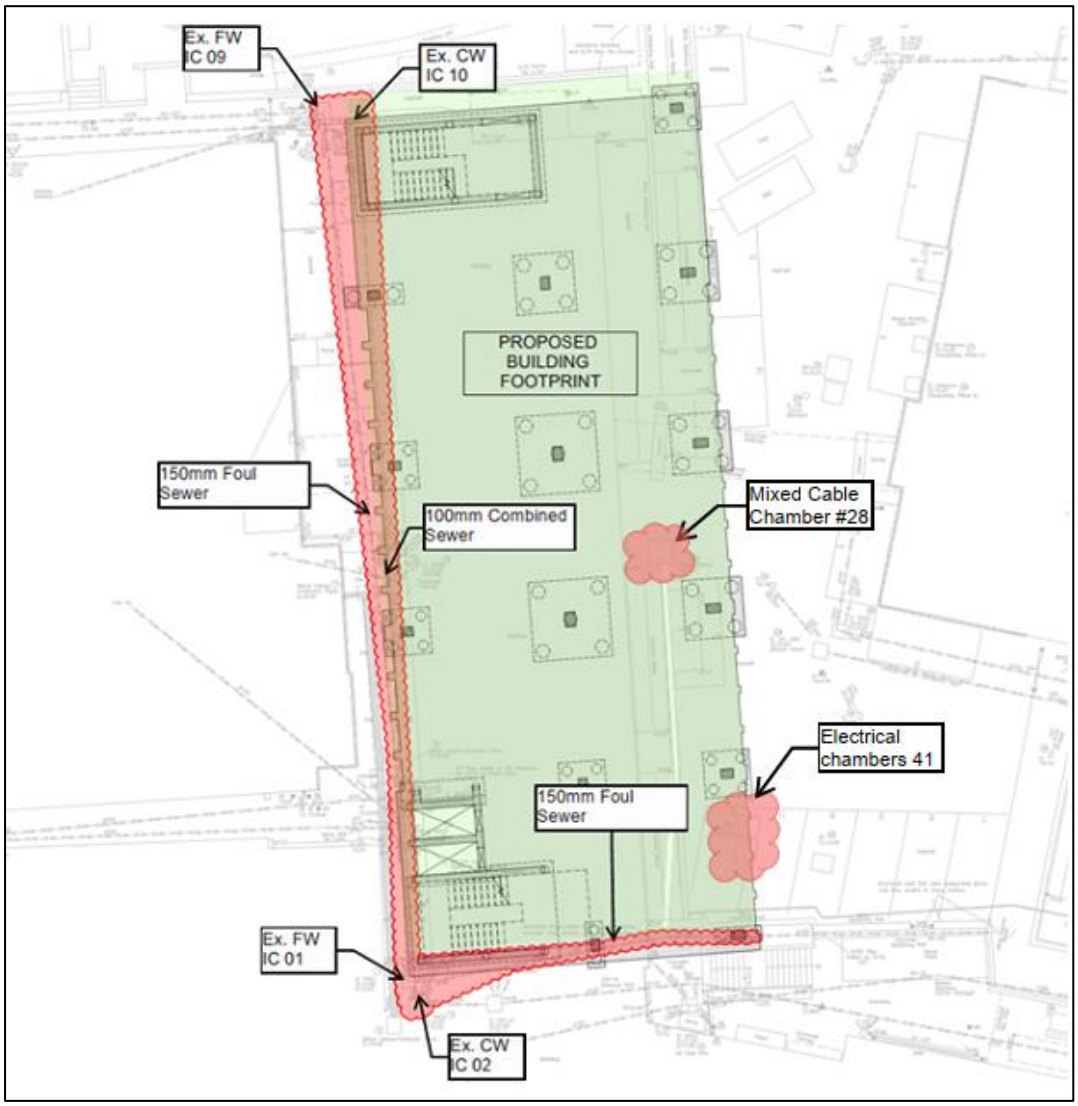


Figure 4-1 – Existing Utilities and Proposed Building Footprint Overlay.

The foul discharge generated from the new building is proposed to drain by gravity in accordance with BS EN 752:2017. Considering the number of toilets and washbasins proposed for the building, the anticipated discharge rate from the building is 3.76l/sec. A new 150mm diameter network is proposed to carry foul water from the new building, this will be connected to the existing re-routed foul water

network. It is noted in the CCTV survey there is limited trace of the foul network (Appendix A.1), hence, invert levels of the section diverted foul sewer have been computed based on assumed self-cleansing slope values. The proposed foul drainage strategy is provided in Appendix C.

A Section 106 indirect connection agreement to discharge to the public sewer network will be required in advance of any works. Thames Water has confirmed adequate capacity within the network to manage foul water discharge from the proposed development (Appendix E).

5. Maintenance and Operation

The maintenance of the proposed drainage systems are summarised below:

- Pipework system: Litter, debris removal and periodical jetting. The surface water and foul water drainage has been designed for a self-cleansing velocity of 1m/s.

- Green Roofs (Table 12.5 in CIRIA C753): This will require biannual or annual maintenance, except in the establishment stage (first 12 to 15 months) where more regular maintenance will be required. All maintenance at roof level should comply with strict health and safety requirements.

- Attenuation tank (Table no 21.3 in CIRIA C753): Monthly maintenance will be required to clear out any debris from the catchment where it may cause risk to performance. A unit has been selected that has full maintenance access to allow the unit to be flushed out.

- The pump equipment must be maintained at intervals of four times per year in commercial premises and in accordance with the manufacturer's recommendation (specification for the surface water pumping station, Quote no:MM1316R1, Refer Appendix F).

It is the responsibility of the contractor to ensure the integrity of the drainage system is maintained during construction works. The contractor is to manage the drainage runoff including any pollutants until the drainage system becomes fully operational.

6. Conclusion

The proposed development involves demolition of a section of the existing main building and construction of a new teaching building at The College of Haringey, Enfield and Northeast London Tottenham Campus.

The surface water flows from new building is proposed to attenuate in an underground attenuation tank and pumped into an existing inspection chamber (IC SW 16, Ref- N 1879/3 Drainage condition and connectivity survey, CL 14.23m, IL 13.43m OAD) at a controlled rate of 2l/s, located at the northeast corner of the new building. The existing inspection chamber ultimately discharges into the existing Thames Water (TW) manhole (MH SW 128, Ref- N 1879/3 Drainage condition and connectivity survey, CL 14.35m, IL 12.27m OAD).

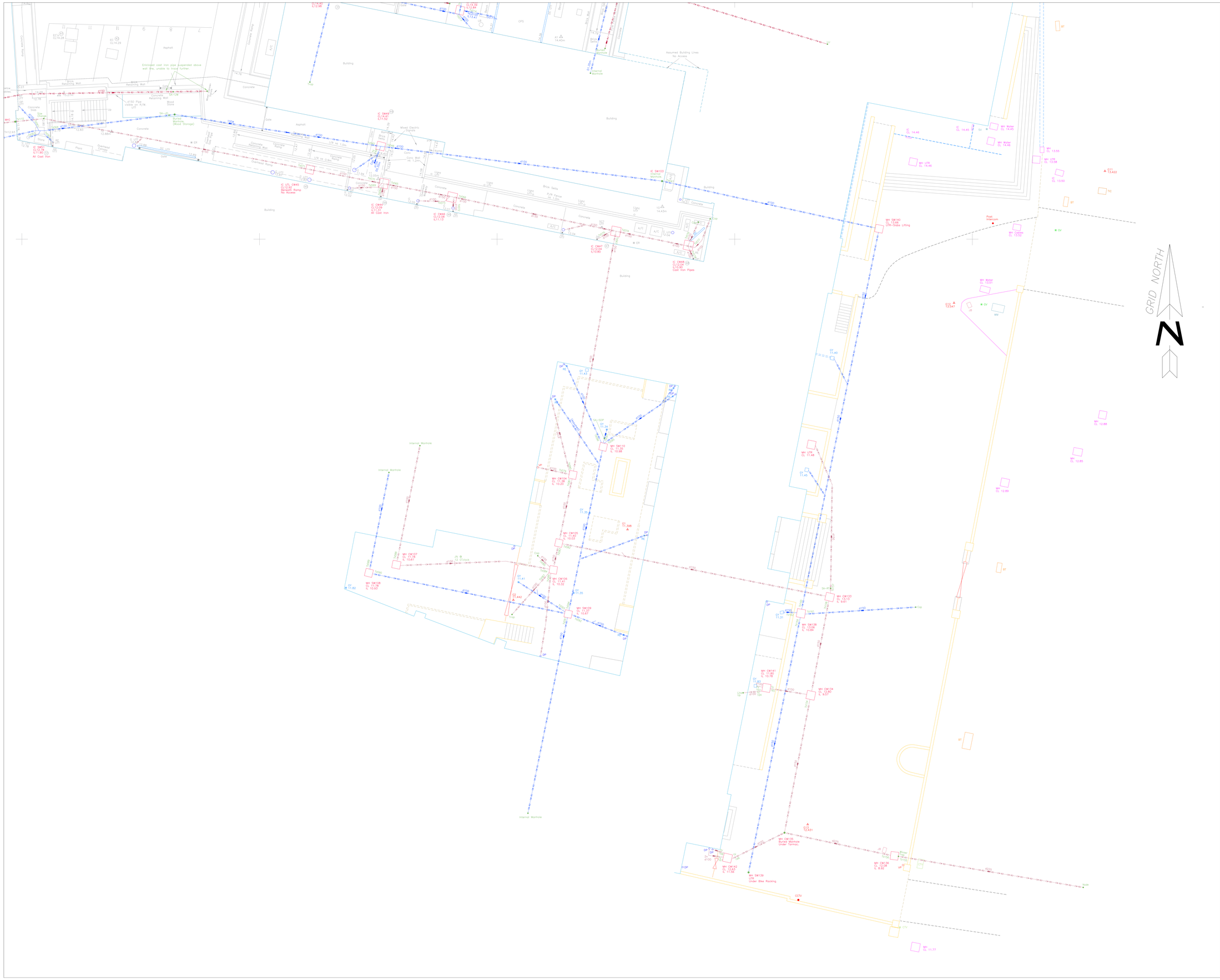
Existing foul water drainage and a combined network present to the west of the existing building was identified to clash with the footprint of proposed building. It is proposed to be rerouted to avoid the identified clashes (Appendix C). The foul discharge generated from the new building is proposed to be drained by gravity to a new 150mm diameter drainage network which will convey foul drainage from the new building and proposed to be connected to the existing rerouted foul water network with a new manhole IC FW11 (CL 14.20m, IL 12.70m OAD). Refer to Appendix C for the foul and storm water drainage strategy.

A Section 106 indirect connection agreement will be required to discharge to Thames Water sewer network. Thames water has confirmed there is adequate capacity within their network to accommodate the proposed foul water discharge from the new development.

APPENDICES

Appendix A. Existing Information

A.1 CCTV Condition Survey



LASER SURVEYS

LAND AND BUILDING SURVEYS, UNDERGROUND SERVICES LOCATION, CCTV DRAINAGE SURVEYS.

Established 1975. Member of The Survey Association.

OPEN SPACE, LEIGH SINTON ROAD, UPPER INSTEFIELDS, MALVERN, WR14 1UT
TEL: 01886 833173 email: worcester@laserserveys.com

THE OLD DAIRY, STUBBERS FARM, MOUNTNESSING ROAD, BLACKMORE, ESSEX, CM4 0NX
TEL: 01277 821355 email: london@laserserveys.com

DATUM NOTES

CO-ORDINATES USED ARE BASED ON ORDNANCE SURVEY NATIONAL GRID, OBTAINED USING THE ACTIVE GPS NETWORK AND ADJUSTED TO A LOCAL GRID WITH A SCALE FACTOR OF 1.0000.

LEVELS ARE RELATED TO :- ORDNANCE SURVEY ACTIVE GPS NETWORK.

SURVEY CONTROL STATIONS SHOWN

ABBREVIATONS (where applicable)

(A)	Assumed/Approximate	OH	Overhead
A	Arch Ht	PAV	Paving
AC	Air-Con Unit	PB	Post Box
AG	Above Ground	PD	Pit Depth
B	Bend Ht	PF	Post
B	Beam Ht	PL	PS Level
BL	Backdrop Invert Level	PM	Parking Meter
BK	Brick	P/R	Post and Rail
BL	Bollard	PSC	Size Change
BS	Bus Stop	PT	Post
BSU	Beam Slopes Up	P/W	Post and Wire
BT	British Telecom	RE	Rodding Eye
C	Ceiling Ht	RET	Retaining
C/B	Close Boarded	RS	Road Sign
C/F	Coverfast	RSJ	Rolled Steel Joist
CL	Cover Level	S	Sill Ht
CLK	Chainlink	SA=	Survey Abandoned=
CN	Connection	-BE	-Stuck at Bend
CO	Column	-CXI	-Intruding Connection
Conc	Concrete	-DA	-Debris Attached
CP	Catch Pit	-DS	-Debris Settled
CPS	Concrete Paving Slabs	-JO	-Joint Opened
CSU	Ceiling Slopes Up	-LT	-Loss of Tradition
CTV	Cable Television	-OB	-Obstruction
CW	Combined Water	-OL	-Operating Limit
DC	Drainage Channel	-RT	-Roots
D	Depth	-SDP	-Small Diameter Pipe
D	Door Ht	-ST	-Camera Stuck
DP	Drain Pipe	-UW	-Under Water
EP	Electricity Pole	S/C	Surcharged
ER	Earthing Rod	SD	Silt Depth
FC	False Ceiling Ht	SK	Soakaway
FB	Flower Bed	SL	Silt Level
FE	Fence	SP	Spring Ht
FH	Fire Hydrant	SPT	Septic Tank
FL	Floor Level	ST	Silt Trap
FP	Flag Pole	SV	Stop Valve
FW	Foul Water	SVG	Security Video Camera
GP	Gate Post	SW	Storm Water
GV	Gas Valve	TCB	Telephone Call Box
G/G	Ground Level	TL	Threshold Level
H	Head Ht	TL	Traffic Light
HL	High Level Invert	TK	Tank
HT	Height	TP	Telegraph Pole
IC	Inspection Cover	TVxx	Item Number in CCTV Report
IL	Invert Level	UG	Underground
INLNT	Interceptor	UTC=	Unable to Camera=
I/R	Iron Railings	-A	-No Access
JB	Junction Box	-D	-Debris
JN	Junction	-DRP	-Drop Pipe
KO	Kerb Outlet	-F	-Flow/Water Level
LB	Litter Bin	-RT	-Roots
LU	Line Up	-S/C	-Surcharged
MC	Material Change	UTF	Unable to Trace Further
MG	Multi Girth Tree	UTL	Unable to Locate
MH	Manhole Cover	UTR	Unable to Raise
MK	Marker	UTT	Unable to Trace
NDP	No Depths Possible	W	Water
NPV	No Pipes Visible	WL	Water Level
NOPV	No Other Pipes Visible	WM	Water Meter
NVV	No Valve Visible	WO	Wash Out

NOTES

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- Kerb levels have been taken in the bottom of the channel.

SHEET LAYOUT
(NOT TO SCALE)

3	2
	1

COLLEGE OF HARINGEY HIGH ROAD TOTTENHAM N15 4RU

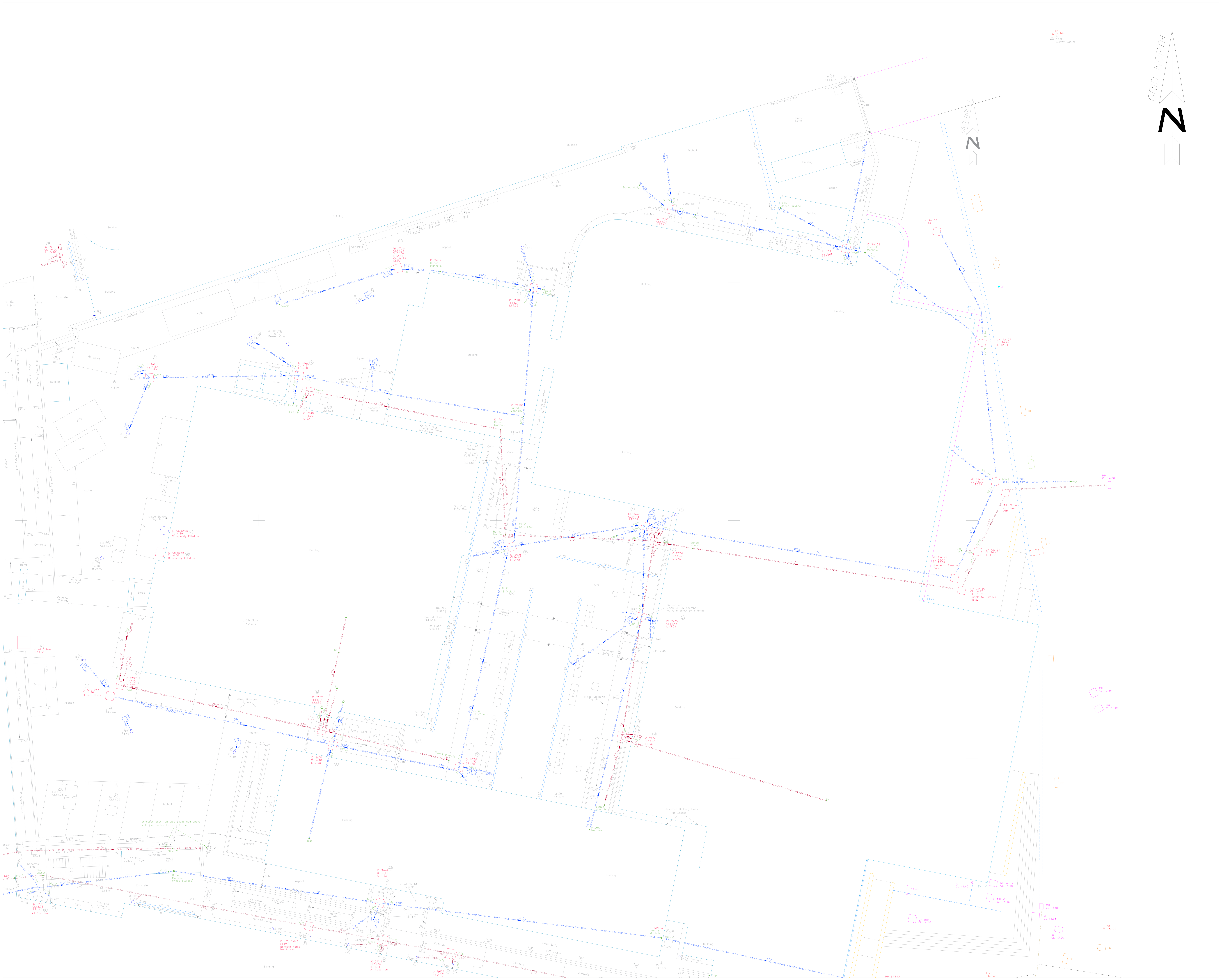
DRAINAGE CONDITION & CONNECTIVITY SURVEY

SURVEYED FOR: CAPITAL CITY COLLEGE GROUP, PO BOX 541, TELFORD, TF2 2LN

SURVEYOR: S.L. / P.J
DATE: 07.06.2023

NO	DATE	REVISION

DRAWING NO	N 1879/1	REV 0
SCALE	1 : 100	
SEE ALSO DWG NOS	11378-E	
SHEET	1 OF 3	
REF NO	N 1879	



LASER SURVEYS

LAND AND BUILDING SURVEYS, UNDERGROUND SERVICES LOCATION, CCTV DRAINAGE SURVEYS.
Established 1975. Member of The Survey Association.
OPEN SPACE, LEIGH SINTON ROAD, UPPER INTERFIELDS, MALVERN, WR14 1UT
TEL: 01886 833173 email: worcester@lasersurveys.com
THE OLD DAIRY, STUBBERS FARM, MOUNTNESSING ROAD, BLACKMORE, ESSEX, CM4 0NX
TEL: 01277 821555 email: london@lasersurveys.com

DATUM NOTES

CO-ORDINATES USED ARE BASED ON ORDNANCE SURVEY NATIONAL GRID, OBTAINED USING THE ACTIVE GPS NETWORK AND ADJUSTED TO A LOCAL GRID WITH A SCALE FACTOR OF 1.0000.

LEVELS ARE RELATED TO :- ORDNANCE SURVEY ACTIVE GPS NETWORK.

SURVEY CONTROL STATIONS SHOWN △

ABBREVIATIONS (where applicable)

(A)	Assumed/Approximate	OH	Overhead
A	Arch Ht	PAV	Paving
AC	Air-Con Unit	PB	Post Box
AG	Above Ground	PD	Pit Depth
AV	Air Valve	PE	Pipe
B	Beam Ht	PL	Pit Level
BIL	Backdrop Invert Level	PM	Parking Meter
BK	Brick	P/R	Post and Rail
BL	Bollard	PSC	Size Change
BS	Bus Stop	PT	Post
BSU	Beam Slopes Up	P/W	Post and Wire
BT	British Telecom	RE	Rodding Eye
C	Ceiling Ht	RET	Retaining
C/B	Close Boarded	RS	Road Sign
C/F	Coverfast	RSJ	Rolled Steel Joist
CL	Cover Level	S	Sill Ht
CLK	Chainlink	SA-	Survey Abandoned-
CN	Connection	-BE	-Stuck at Bend
CO	Column	-CXI	-Intruding Connection
Conc	Concrete	-DA	-Debris Attached
CP	Catch Pit	-DS	-Debris Settled
CPS	Concrete Paving Slabs	-JD	-Joint Displaced
CSU	Ceiling Slopes Up	-LT	-Loss of Traction
CTV	Cable Television	-OB	-Obstruction
CW	Combined Water	-OL	-Operating Limit
DC	Drainage Channel	-RT	-Roots
D	Depth	-SDP	-Small Diameter Pipe
D	Door Ht	-ST	-Camera Stuck
DP	Drain Pipe	-UW	-Under Water
EP	Electricity Pole	S/C	Surcharged
ER	Earthing Rod	SD	Silt Depth
FC	False Ceiling Ht	SK	Sookaway
FB	Flower Bed	SL	Silt Level
FE	Fence	SP	Spring Ht
FH	Fire Hydrant	SPT	Septic Tank
FL	Floor Level	ST	Silt Trap
FP	Flag Pole	SV	Stop Valve
FW	Foul Water	SVC	Security Video Camera
GP	Gate Post	SW	Storm Water
GV	Gas Valve	TCB	Telephone Call Box
GY,G	Gully	THL	Threshold Level
H	Head Ht	TL	Traffic Light
HIL	High Level Invert	TK	Tank
HT	Height	TP	Telegraph Pole
IC	Inspection Cover	TVxx	Item Number in CCTV Report
IL	Invert Level	UG	Underground
IN,INT	Interceptor	UTC-	Unable to Camera-
I/R	Iron Railings	-A	-No Access
JB	Junction Box	-D	-Debris
JN	Junction	-DRP	-Drop Pipe
KO	Kerb Outlet	-F	-Flow/Water Level
LB	Litter Bin	-RT	-Roots
LU	Line Up	-S/C	-Surcharged
MC	Material Change	UTF	Unable to Trace Further
MG	Multi Girth Tree	UTL	Unable to Locate
MH	Manhole Cover	UTR	Unable to Raise
MK	Marker	UTT	Unable to Trace
NDP	No Depths Possible	VP	Vent Pipe
NPV	No Pipes Visible	WL	Water Level
NOPV	No Other Pipes Visible	WM	Water Meter
NVV	No Valve Visible	WO	Wash Out

NOTES

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* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

SHEET LAYOUT
(NOT TO SCALE)

COLLEGE OF HARINGEY HIGH ROAD TOTTENHAM N15 4RU

DRAINAGE CONDITION & CONNECTIVITY SURVEY

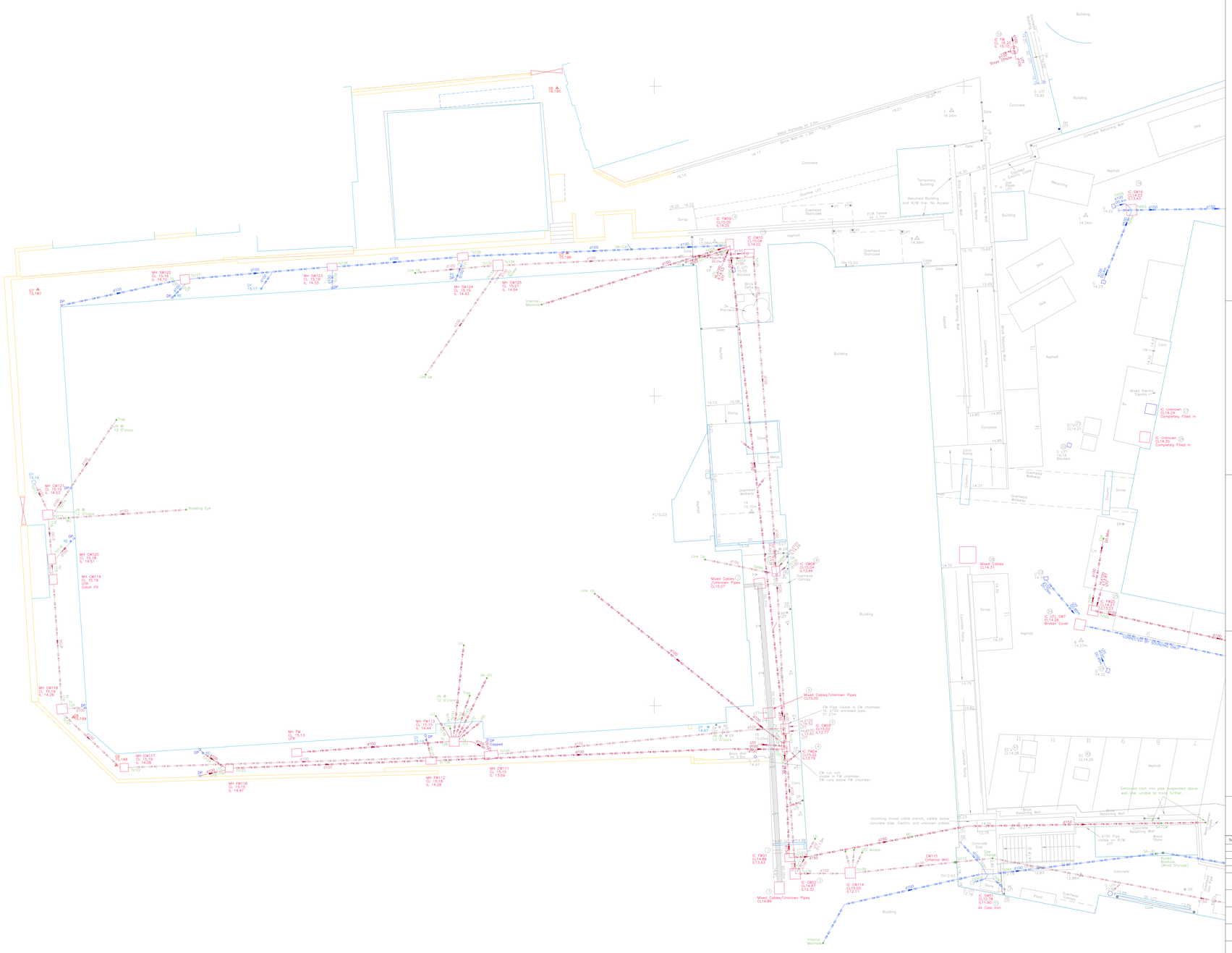
SURVEYED FOR: CAPITAL CITY COLLEGE GROUP, PO BOX 541, TELFORD, TF2 2LN

SURVEYOR: S.L. / P.J

DATE: 07.06.2023

NO	DATE	REVISION

DRAWING NO	N 1879/2	REV 0
SCALE	1 : 100	
SEE ALSO DWG NOS	11378-E	
SHEET	2 OF 3	
REF NO	N 1879	



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SHEET LAYOUT
(NOT TO SCALE)

COLLEGE OF HARINGEY HIGH ROAD TOTTENHAM N15 4RU

DRAINAGE CONDITION & CONNECTIVITY SURVEY

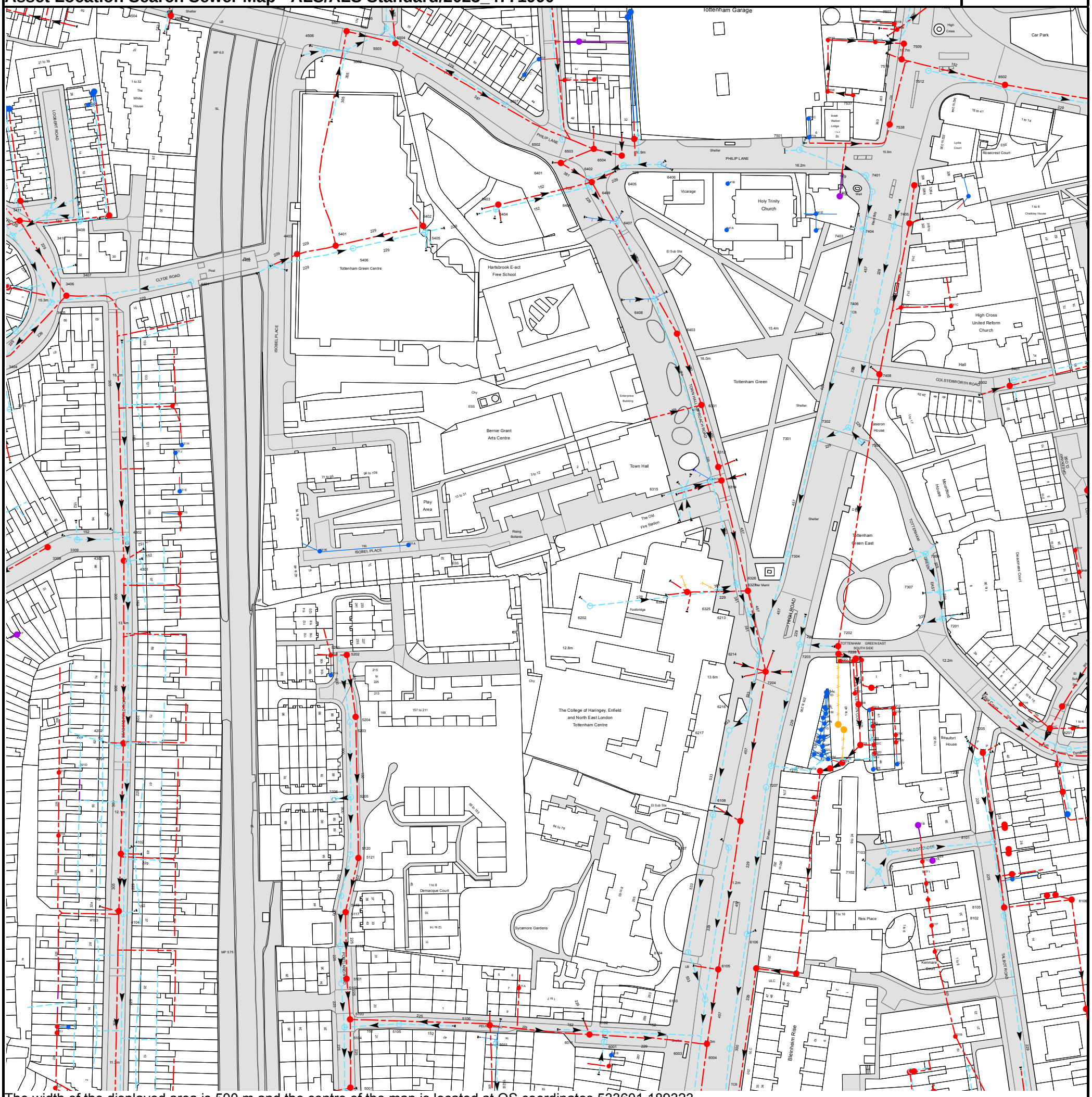
SURVEYED FOR	CAPITAL CITY COLLEGE GROUP PO BOX 541 TELFORD TF2 2LN	SURVEYOR	S.L. / P.J
		DATE	07.06.2023

NO	DATE	REVISION

DRAWING NO	N 1879/3	REV 0
SCALE	1 : 100	
SEE ALSO DWG NOS	11378-E	
SHEET	3 OF 3	
REF NO	N 1879	

A.2 Utility Search Maps

Asset Location Search Sewer Map - ALS/ALS Standard/2023_4771990



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 533601,189323

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

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
751C	n/a	n/a
751A	n/a	n/a
7536	n/a	n/a
7539	n/a	n/a
7537	n/a	n/a
751D	n/a	n/a
7538	n/a	n/a
751B	n/a	n/a
7508	15.5	12.89
7510	15.7	14.09
7509	15.46	14.14
7507	15.27	13.71
7512	n/a	n/a
7506	15.12	12.3
8502	15.51	13.28
631A	15.7	12.56
6301	15.62	10.94
8302	14.8	13.24
8401	14.78	13.49
7408	14.73	12.56
6403	15.96	11.33
7407	14.89	13.67
7406	14.77	13.38
741D	n/a	n/a
741C	n/a	n/a
6408	16.24	14.49
741F	n/a	n/a
641A	n/a	n/a
7403	n/a	n/a
7404	15.25	13.5
7405	15.54	13.62
6407	16.6	14.78
741E	n/a	n/a
74XR	n/a	n/a
741A	n/a	n/a
7402	15.61	14.56
6404	16.85	14.98
741B	n/a	n/a
641B	n/a	n/a
6409	16.86	12.35
6402	16.9	15.01
7401	15.65	14.62
831C	n/a	n/a
831I	n/a	n/a
821E	n/a	n/a
831F	n/a	n/a
831G	n/a	n/a
6217	12.87	11.29
6216	12.76	11.31
7207	11.58	10.09
721C	n/a	10.27
721Q	n/a	n/a
721R	n/a	n/a
722N	n/a	n/a
721I	n/a	n/a
721H	n/a	n/a
7233	12.41	n/a
721S	n/a	n/a
721G	n/a	n/a
721T	n/a	n/a
721P	n/a	n/a
721F	n/a	n/a
721O	n/a	n/a
722L	n/a	n/a
721N	n/a	n/a
721E	n/a	n/a
721M	n/a	n/a
721D	n/a	n/a
721L	n/a	n/a
721J	n/a	n/a
721K	n/a	n/a
722M	n/a	n/a
7232	12.4	n/a
7229	12.38	10.27
721U	n/a	n/a
722Q	n/a	n/a
7238	12.63	10.72
7228	12.13	10.41
722F	n/a	n/a
722G	n/a	n/a
722H	n/a	n/a
722A	n/a	n/a
722I	n/a	n/a
722J	n/a	n/a
722B	n/a	n/a
722K	n/a	n/a
722C	n/a	n/a
722D	n/a	n/a
721Z	n/a	n/a
721Y	n/a	n/a
721X	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
721W	n/a	n/a
721V	n/a	n/a
7206	11.55	10.61
7205	11.55	10
821H	n/a	n/a
821C	n/a	n/a
82XQ	n/a	n/a
82WY	n/a	n/a
821G	n/a	n/a
82XR	n/a	n/a
6104	10.75	10.09
711D	n/a	n/a
6106	10.57	9.14
711F	n/a	n/a
8102	10.51	9.63
8105	n/a	n/a
71XT	n/a	n/a
8113	n/a	n/a
8103	n/a	n/a
711E	n/a	n/a
8108	n/a	n/a
8107	n/a	n/a
7102	11.2	10.58
711C	n/a	n/a
711A	n/a	n/a
8110	n/a	n/a
7103	11.28	10.42
8109	n/a	n/a
6107	11.15	9.98
8101	11.04	9.82
8112	n/a	n/a
711B	n/a	n/a
8111	n/a	n/a
6108	11.28	8.61
6201	11.77	10.54
82XT	n/a	n/a
721A	n/a	n/a
8201	11.2	8.82
82WZ	n/a	n/a
8106	n/a	n/a
8104	n/a	n/a
7111	n/a	n/a
70TS	n/a	n/a
70RZ	n/a	n/a
70TT	n/a	n/a
70TP	n/a	n/a
701B	n/a	n/a
70VT	n/a	n/a
4504	16.65	14.46
4505	16.66	14.47
4506	17.01	16.04
5502	16.8	15.82
5501	16.85	14.06
5505	16.88	15.31
5504	16.91	15.33
5503	16.94	13.8
551A	n/a	n/a
551D	n/a	n/a
35WP	n/a	n/a
35WR	n/a	n/a
351C	n/a	n/a
35WW	n/a	n/a
35VY	n/a	n/a
6405	16.89	15.14
6406	16.74	15.24
6401	16.99	12.61
6504	16.97	14.92
7501	16.3	15.19
6503	17.09	14.32
6502	16.93	13.75
65WS	n/a	n/a
65WX	n/a	n/a
5507	17.22	15.52
651C	n/a	n/a
651B	n/a	n/a
551C	n/a	n/a
551F	n/a	n/a
651A	n/a	n/a
65WW	n/a	n/a
65WZ	n/a	n/a
34SS	n/a	n/a
34VQ	n/a	n/a
3412	15.61	13.82
34RZ	n/a	n/a
34WT	n/a	n/a
3411	15.79	13.38
34WR	n/a	n/a
34SR	n/a	n/a
3410	15.71	14.13
3409	15.84	14.67
3405	15.34	13.6
3407	15.28	14.35
3406	15.39	12.37

Manhole Reference	Manhole Cover Level	Manhole Invert Level
34WW	n/a	n/a
3408	16.1	14.89
34WX	n/a	n/a
34WP	n/a	n/a
4401	16.8	14.88
4402	17.12	15.52
4403	16.98	15.6
5401	17.04	15.46
5406	17.09	16.08
5402	17.11	15.73
5405	17.15	16.31
5404	16.98	15.74
5403	16.97	14.37
3311	n/a	n/a
321F	n/a	n/a
3308	13.96	11.9
3309	14.02	13.31
4303	13.92	11.07
4302	14.01	13.13
4301	13.83	12.99
431I	n/a	n/a
431J	n/a	n/a
431G	n/a	n/a
431E	n/a	n/a
431H	n/a	n/a
431K	n/a	n/a
521B	n/a	n/a
521A	n/a	n/a
5201	n/a	10.08
5202	14.61	13.15
531A	n/a	n/a
7237	n/a	n/a
7204	12.95	9.43
722O	n/a	n/a
722P	n/a	n/a
7236	n/a	n/a
7227	12.8	10.98
6214	13.34	11.91
7226	12.9	11.06
7202	12.97	11.14
7203	13.09	11.08
7201	12.79	11.74
6213	13.9	12.1
6202	14.72	12.24
6324	14.47	12.63
7307	13.42	12.36
6325	14.38	12.67
6327	13.94	9.88
6326	14.11	12.12
7306	13.7	12.89
7304	13.67	12.28
6315	15.35	12.23
6314	15.05	10.47
6313	15.15	12.47
6312	15.14	10.54
7301	14.39	12.93
7303	14.51	13.73
7302	14.84	13.15
311I	n/a	n/a
311J	n/a	n/a
311H	n/a	n/a
4104	11.76	10.6
4103	11.8	9.86
4101	11.97	10.1
4102	11.93	10.94
311K	n/a	n/a
321C	n/a	n/a
321D	n/a	n/a
4201	12.41	11.51
4202	12.5	10.37
4203	12.48	11.49
5002	10.99	9.61
5001	11.01	9.2
5011	10.58	9.71
5104	11.1	9.05
5106	10.64	8.64
5105	10.74	9.94
5103	11.1	9.75
511A	n/a	n/a
5102	11.16	9.33
5101	11.13	9.83
5118	11.25	9.42
5117	11.4	9.98
5119	11.5	9.5
5121	12.15	10.13
5120	12.15	9.63
5206	n/a	n/a
5205	12.85	9.76
5203	13.79	9.93
5204	13.8	10.6
301F	n/a	n/a
6011	10.44	8.39
6001	10.35	9.8

Manhole Reference	Manhole Cover Level	Manhole Invert Level
6102	10.37	9.41
601A	n/a	n/a
601B	n/a	n/a
6103	10.5	9.26
6003	10.35	7.75
6105	10.41	7.89
6004	10.36	9.05
6118	n/a	n/a

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Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

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

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

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

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

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

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

Sewer Fittings

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

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

Operational Controls

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

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

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

- Inlet
- Outfall
- Undefined End

Other Symbols

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

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

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

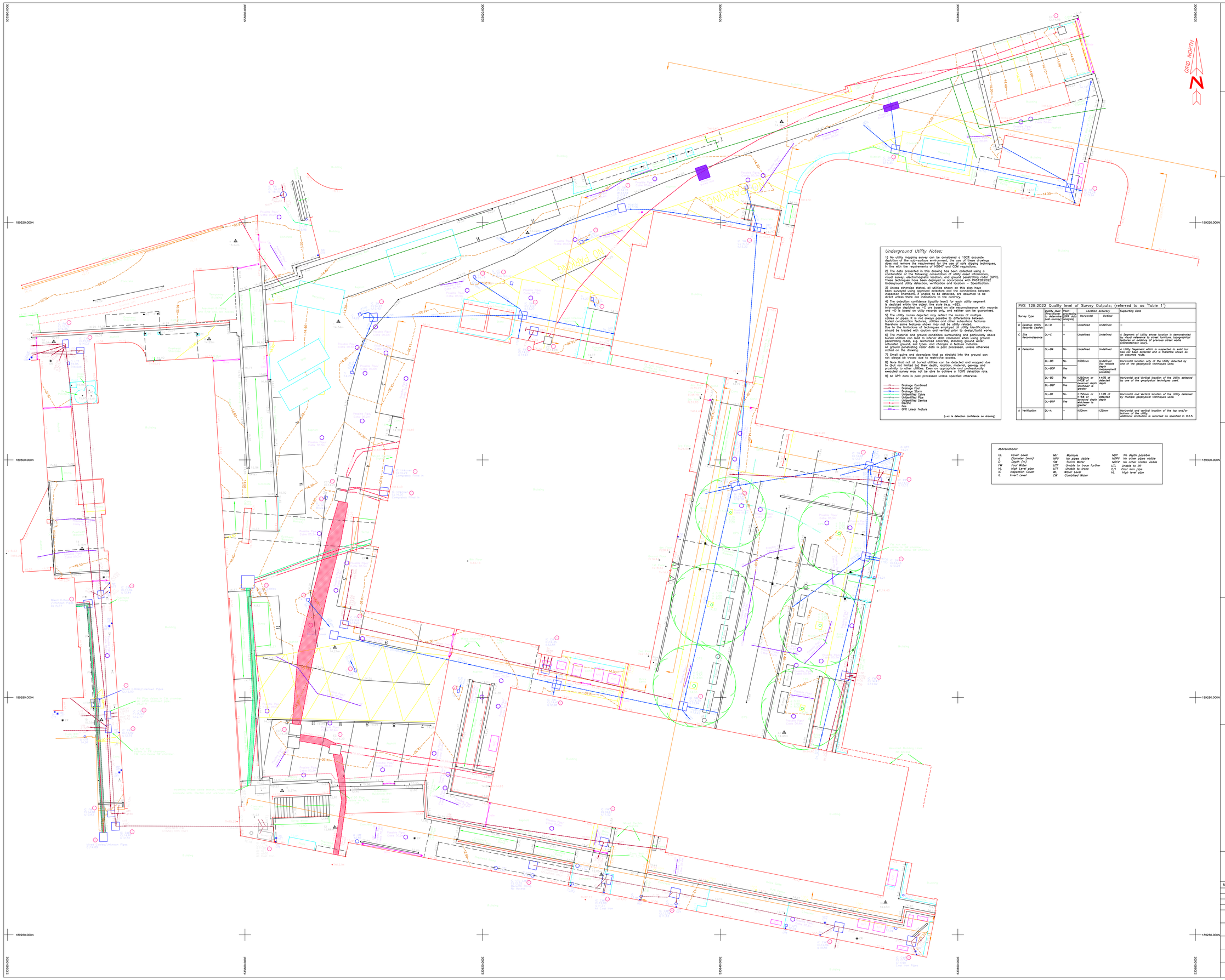
Ducts or Crossings

- Casement — Ducts may contain high voltage cables. Please check with Thames Water.
- Conduit Bridge
- Subway
- Tunnel

Notes:

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

A.3 Topographical Survey



Underground Utility Notes;

1) No utility mapping survey can be considered a 100% accurate depiction of the sub-surface environment, the use of these drawings should be treated with caution and only used in the following techniques, in line with the requirements of HSG47 and CDM regulations.

2) The data presented in this drawing has been collected using a combination of the following; consultation of utility asset information, visual survey, electromagnetic location, and ground penetrating radar (GPR). These techniques have been deployed in accordance with PAS128:2022 Underground utility detection, verification and location – Specification.

3) Unless otherwise stated, all utilities shown on this plan have been surveyed using approved detectors and the connections between surface features and buried services, are assumed to be direct unless there are indications to the contrary.

4) The detection confidence (quality level) for each utility segment is depicted within the object line style (e.g. -B2). Information depicted as -C are based on site reconnaissance with records and -D is based on utility records only, and neither can be guaranteed.

5) The utility routes depicted may reflect the routes of multiple cables or pipes. It is not always possible to differentiate between buried construction features, utilities and other subsurface features during data processing and interpretation of GPR survey data. Due to the limitations of techniques employed all utility identifications should be treated with caution and verified prior to design/build works.

6) The material and ground conditions surrounding and particularly above buried utilities can lead to inferior data resolution when using ground penetrating radar, e.g. reinforced concrete, standing ground water, saturated ground, soil types, and changes in feature material. Therefore, interpretation of radar data is post processed, unless otherwise stated on the drawing.

7) Small gullys and downpipes that go straight into the ground can not always be traced due to restrictive access.

8) Note that not all buried utilities can be detected and mapped due to (but not limited by) their depth, location, material, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate.

9) All GPR data is post processed unless specified otherwise.

PAS 128:2022 Quality level of Survey Outputs; (referred to as 'Table 1')					
Survey Type	Quality level (Traditional processing, post-survey)	Quality level (Modern processing, post-survey)	Horizontal	Vertical	Supporting Data
D Desktop Utility Records Search	QL-D	–	Undefined	Undefined	–
C Site Reconnaissance	QL-C	–	Undefined	Undefined	A Segment of Utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works (reinstatement scar)
B Detection	QL-B4	No	Undefined	Undefined	A Utility Segment which is suspected to exist but has not been detected and is therefore shown as an assumed route
	QL-B3	No	±500mm	Undefined (No reliable measurement possible)	Horizontal location only of the Utility detected by one of the geophysical techniques used
	QL-B3P	Yes			
	QL-B2	No	±250mm or ±10% of detected depth whichever is greater	±40% of detected depth	Horizontal and Vertical location of the Utility detected by one of the geophysical techniques used.
	QL-B2P	Yes			
	QL-B1	No	±150mm or ±15% of detected depth whichever is greater	±15% of detected depth	Horizontal and Vertical location of the Utility detected by multiple geophysical techniques used.
	QL-B1P	Yes			
A Verification	QL-A	–	±50mm	±25mm	Horizontal and vertical location of the top and/or bottom of the utility. Additional attribution is recorded as specified in 9.2.5.

Abbreviations:

CL	Cover Level	MH	Manhole	NDP	No depth possible
d	Diameter (mm)	NPV	No pipes visible	NOPV	No other pipes visible
D	Depth (m)	SW	Storm Water	NOCV	No other cables visible
FW	Foul Water	UTF	Unable to trace further	UTL	Unable to lift
HL	High Level pipe	UTT	Unable to trace	C/I	Cast iron pipe
IC	Inspection Cover	WL	Water Level	HL	High level pipe
IL	Invert Level	CW	Combined Water		

LASER SURVEYS

LAND AND BUILDING SURVEYS, UNDERGROUND SERVICES LOCATION, CCTV DRAINAGE SURVEYS.
Established 1975. Member of The Survey Association.

OPEN SPACE, UPPER INTERFIELDS, LEIGH SINTON ROAD, MALVERN, WORCESTERSHIRE, WR14 1UT
TEL 01886 833173 email: worcester@lasersurveys.com

THE OLD DAIRY, STUBBERS FARM, MOUNTNESSING ROAD, BLACKMORE, CM4 0NX
TEL 01277 821555 email: london@lasersurveys.com

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DATUM NOTES

GRID IS BASED UPON SURVEY CONTROL STATION 4, FIXED TO THE ORDNANCE SURVEY NATIONAL GRID BY GPS SATELLITE ACTIVE NETWORK

LEVELS ARE RELATED TO :- ORDNANCE SURVEY GPS ACTIVE NETWORK AND TRANSFORMED USING THE OSGM15 & OSTN15 MODEL.

BENCH MARK USED IS LOCATED AT :-
SURVEY CONTROL STATION 4 AS SHOWN ON THE DRAWING

VALUE GIVEN AS 14.89m (NEWLYN DATUM)

SURVEY CONTROL STATIONS SHOWN

ABBREVIATIONS (where applicable)

AV	Air Valve	MH	Manhole Cover
BK	Brick	MK	Marker
BL	Bollard	MS	Milestone
BS	Bus Stop	MT	Meter
BT	British Telecom	MY	Mercury
CB	Control Box	OH	Overhead
C/B	Close Boarded	PAV	Paving
CL	Cover Level	PB	Post Box
CLK	Chainlink	PE	Pipe
CO	Column	PM	Parking Meter
Conc	Concrete	P/R	Post and Rail
CP	Catch Pit	PT	Post
CPS	Concrete Paving Slabs	P/W	Post and Wire
CATV	Cable Television	RE	Rodding Eye
DC	Drainage Channel	RET	Retaining
DP	Drain Pipe	RS	Road Sign
EC	Electricity Cover	RSJ	Rolled Steel Joist
ER	Earthing Rod	SC	Stop Cock
EB	Electric Box	SK	Soakaway
FE	Fence	SP	Signpost
FH	Fire Hydrant	SV	Sluice Valve
FL	Floor Level	ST	Stop Valve
FP	Flag Pole	SVC	Security Video Camera
GP	Gate Post	TCB	Telephone Call Box
GV	Gas Valve	TK	Tank
GY/G	Gully	TL	Traffic Light
HT	Height	TP	Telegraph Pole
IC	Inspection Cover	UG	Underground
IL	Invert Level	UTF	Unable To Trace Further
IN	Interceptor	UTL	Unable To Lift
I/R	Iron Railings	VP	Vent Pipe
KO	Kerb Outlet	WL	Water Level
LB	Litter Bin	WM	Water Meter
LP	Lamp Post	WO	Wash Out

NOTES

- Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.
- Tree species (where shown) should be treated with caution and expert identification is advised.
- Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphical scale of mapping as specified. Care should be exercised when working to larger scales.
- Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legaly conveyed ownership.
- Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.
- Kerb levels have been taken in the bottom of the channel.
- Areas of dense undergrowth cannot be surveyed in detail, these areas will be shown in outline only and marked as "dense undergrowth" on the plan.

SHEET LAYOUT
NOT TO SCALE

COLLEGE OF HARINGEY HIGH ROAD TOTTENHAM N15 4RU

TOPOGRAPHICAL SURVEY
UNDERGROUND SERVICE TRACE
GPR SURVEY

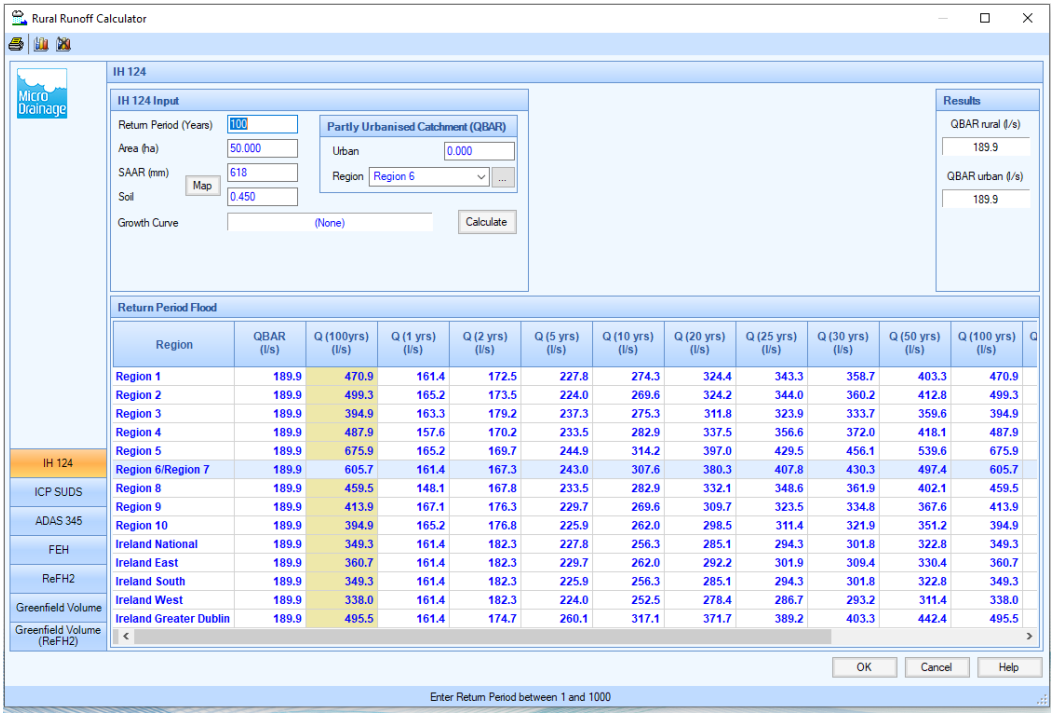
SURVEYED FOR: CAPITAL CITY COLLEGE GROUP, PO BOX 541, TELFORD, TF2 2LN

SURVEYOR: S.L.
DATE: 25.01.2023

NO	DATE	REVISION

DRAWING NO	L 11378–2D	REV 0
SCALE	1 : 100	
SEE ALSO DWG NOS	11378–E	
SHEET	1 OF 1	
REF NO	L 11378	

Appendix B. Micro drainage Source Control Calculations



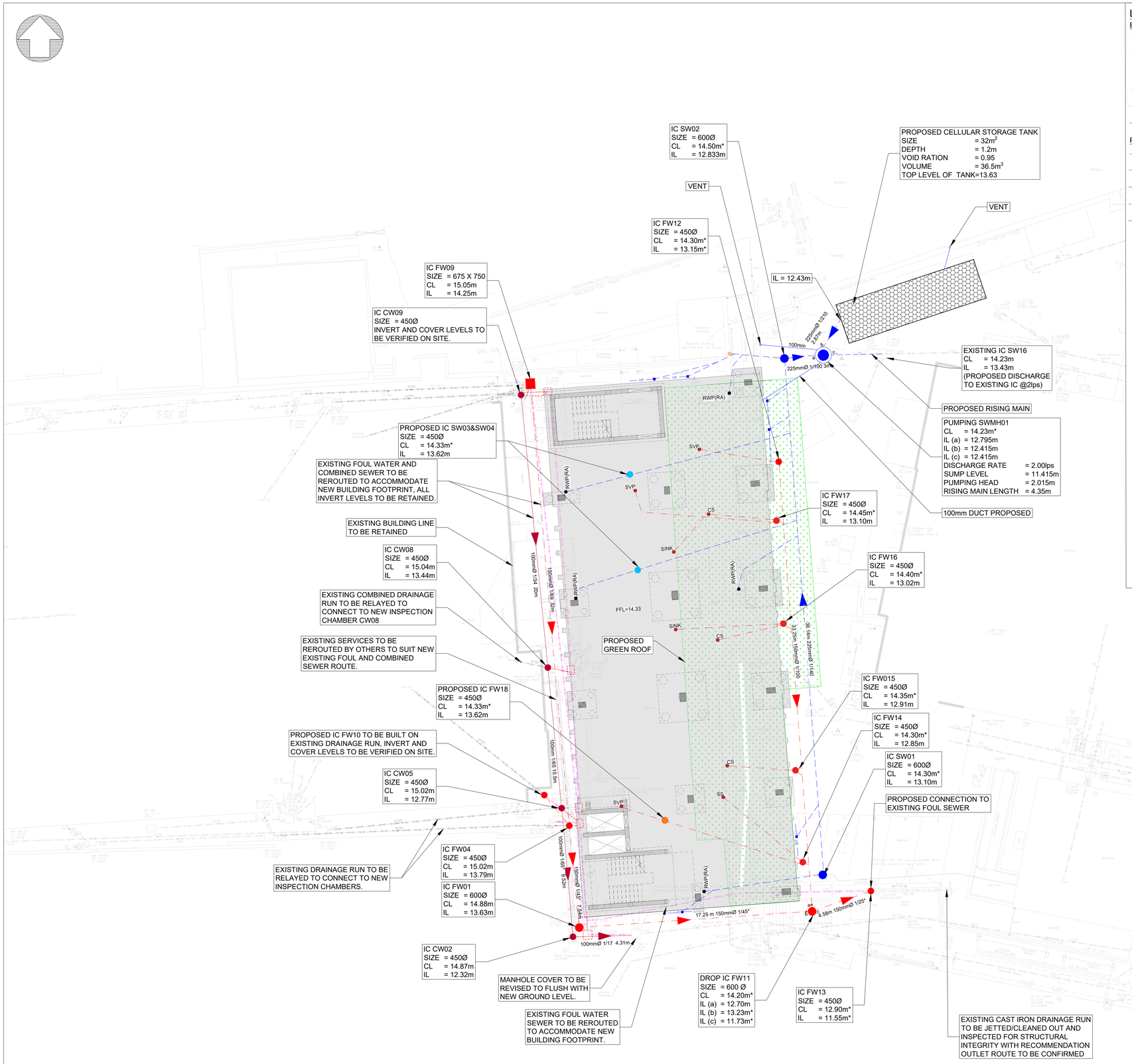
Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (2 yrs) (l/s)	Q (5 yrs) (l/s)	Q (10 yrs) (l/s)	Q (20 yrs) (l/s)	Q (25 yrs) (l/s)	Q (30 yrs) (l/s)	Q (50 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	189.9	470.9	161.4	172.5	227.8	274.3	324.4	343.3	358.7	403.3	470.9
Region 2	189.9	499.3	165.2	173.5	224.0	269.6	324.2	344.0	360.2	412.8	499.3
Region 3	189.9	394.9	163.3	179.2	237.3	275.3	311.8	323.9	333.7	359.6	394.9
Region 4	189.9	487.9	157.6	170.2	233.5	282.9	337.5	356.6	372.0	418.1	487.9
Region 5	189.9	675.9	165.2	169.7	244.9	314.2	397.0	429.5	456.1	539.6	675.9
Region 6/Region 7	189.9	605.7	161.4	167.3	243.0	307.6	380.3	407.8	430.3	497.4	605.7
Region 8	189.9	459.5	148.1	167.8	233.5	282.9	332.1	348.6	361.9	402.1	459.5
Region 9	189.9	413.9	167.1	176.3	229.7	269.6	309.7	323.5	334.8	367.6	413.9
Region 10	189.9	394.9	165.2	176.8	225.9	262.0	298.5	311.4	321.9	351.2	394.9
Ireland National	189.9	349.3	161.4	182.3	227.8	256.3	285.1	294.3	301.8	322.8	349.3
Ireland East	189.9	360.7	161.4	182.3	229.7	262.0	292.2	301.9	309.4	330.4	360.7
Ireland South	189.9	349.3	161.4	182.3	225.9	256.3	285.1	294.3	301.8	322.8	349.3
Ireland West	189.9	338.0	161.4	182.3	224.0	252.5	278.4	286.7	293.2	311.4	338.0
Ireland Greater Dublin	189.9	495.5	161.4	174.7	260.1	317.1	371.7	389.2	403.3	442.4	495.5

QBAR rural for 50ha: = 189.9l/s

QBAR rural for 1ha: = 3.8l/s

QBAR rural for .062ha: = 0.24l/s

Appendix C. Proposed Drainage Strategy Layout



LEGEND :

EXISTING :

- EXISTING FOUL WATER SEWER
- EXISTING COMBINED SEWER
- EXISTING SURFACE WATER DRAINAGE
- EXISTING FOUL WATER NETWORK TO BE DIVERTED
- EXISTING COMBINED SEWER TO BE DIVERTED
- TO BE DEMOLISHED

PROPOSED :

- PROPOSED/DIVERTED FOUL WATER NETWORK
- DIVERTED COMBINED SEWER
- PROPOSED SURFACE WATER NETWORK
- PROPOSED RISING MAIN FOR SURFACE WATER
- PROPOSED VENT PIPE (100Ø)
- PROPOSED CELLULAR STORAGE TANK POLYSTORM ATTENUATION TANK OR SIMILAR APPROVED
- PROPOSED SURFACE WATER PUMPING MANHOLE
- PROPOSED SURFACE WATER INSPECTION CHAMBER
- PROPOSED FOUL WATER INSPECTION CHAMBER
- PROPOSED SURFACE WATER INSPECTION CHAMBER INSIDE BUILDING
- PROPOSED FOUL WATER INSPECTION CHAMBER INSIDE BUILDING
- PROPOSED VENT (100 X 100)
- CL — COVER LEVEL
- IL — INVERT LEVEL
- * — REFER NOTE 7
- RWP(RA)
- RODDING EYE
- BACKDROP
- SVP — SOIL VENT PIPE
- SS — STUB STACK
- CHANNEL DRAIN

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

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

MAINTENANCE/CLEANING

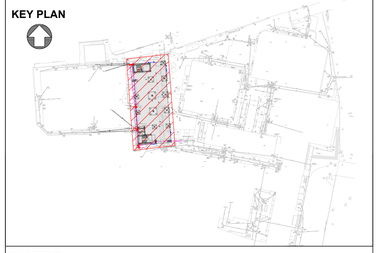
1. POSSIBILITY OF MULTIPLE BURIED SERVICES.

DECOMMISSIONING/DEMOLITION

1. POSSIBILITY OF MULTIPLE BURIED SERVICES.

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.

KEY PLAN



NOTES:

1. PIPE DIAMETERS ARE NOT TO SCALE.
2. ALL DIMENSIONS AND PIPE DIAMETERS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. DRAINAGE LAYOUT IS DEPENDENT ON AGREEMENT FROM LEAD LOCAL FLOOD AUTHORITY AND EARLY ENGAGEMENT SHOULD BE ENSURED.
4. THE DRAINAGE NETWORK DESIGN SHOWN IS IN LINE WITH APPROVED DOCUMENT 'H'. CONTRACTOR TO ENSURE THE EXTERNAL DRAINAGE DESIGN ALIGNS WITH THE FINAL BUILDING SERVICES DESIGN BEFORE CONSTRUCTION.
5. LOCATION OF RAINWATER PIPES AND FOUL CONNECTIONS TO BE READ FROM BUILDING SERVICES/PUBLIC HEALTH DRAWINGS AS APPLICABLE.
6. SLOPES, COVER AND INVERT LEVELS MENTIONED ARE ASSUMED. VALUES TO BE CONFIRMED AND ADJUSTED ON SITE TO MEET DESIGN REQUIREMENTS.
7. LOCATION OF PROPOSED CHAMBERS AND PIPES TO BE COORDINATED AND REVISED AS REQUIRED ONCE EXTERNAL SITE LEVELS ARE RECEIVED.
8. IMPERMEABLE 1MM HDPE MEMBRANE WITH WOVEN GEOTEXTILE LINER TO BE PROVIDED BELOW ATTENUATION STORAGE TANK.
9. THE MEP DRAINAGE NETWORK SHOWN INSIDE BUILDING IS INDICATIVE ONLY.

Rev.	Date	Description	By	Chk'd	App'd
P01	29/01/2024	FOR STAGE 3 APPROVAL	SK	AG	PO

Drawing Suitability: FOR STAGE APPROVAL

Status: S3

AtkinsRéalis
Nova North
11 Bressenden Place
Victoria
London
SWIE 5BY
Tel: +44 1454 662000
www.atkinsrealis.com
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Client: CAPITAL CITY COLLEGES GROUP

Project Title: CCCG TOTTENHAM NEW TEACHING BUILDING

Drawing Title: DRAINAGE STRATEGY LAYOUT

Scale	Designed	Drawn	Checked	Authorised
1:150	SK	KNS	AG	PO
Original Size: A1	Date: 15/01/2024	Date: 15/01/2024	Date: 15/01/2024	Date: 29/01/2024

Drawing Number: 5219902-ATK-XX-XX-DR-CI-00001

Revision: P01

Atkins Project Number: 5219902

Appendix D. Haringey Council SuDS Proforma

SuDS Flows and Volumes – LLFA Technical Assessment Proforma

This form identifies the information required by Haringey LLFA to enable technical assessment of flows and volumes determined as part of drainage / SuDS calculations.

*Note : * means delete as appropriate; Numbers in brackets refer to accompanying notes.*

SITE DETAILS

1.1 Planning application reference …CCCG TOTTENHAM, NEW TEACHING BUILDING ……

1.2 Site name: ...CCCG TOTTENHAM, NEW TEACHING BUILDING...

1.3 Total application site area (1) ……620…m ^{2} ……0.062…ha

VOLUME AND FLOW DESIGN INPUTS

2.1 Site area which is positively drained by SuDS (2) …620…m ^{2}

2.2 Impermeable area drained pre development (3) ……620m ^{2} …

2.3 Impermeable area drained post development (3) …620…m ^{2}

2.4 Additional impermeable area (2.3 minus 2.2) …0…m ^{2}

2.5 Predevelopment use (4) ~~Greenfield~~ /-Brownfield / ~~Mixed~~*

2.6 Method of discharge (5) ~~Infiltration / waterbody~~ / storm sewer / ~~combined sewer~~*

2.7 Infiltration rate (where applicable) ……N/A

2.8 Influencing factors on infiltration ……N/A.....

2.9 Depth to highest known ground water table……NA……

2.10 Coefficient of runoff (Cv) (6) ……Cv of 100% for impermeable area……

2.11 Justification for Cv used ……Sewer for Adoption

2.12 FEH rainfall data used (Note that FSR is no longer the preferred rainfall calculation method) Y/~~N~~

2.13 Will storage be subject to surcharge by elevated water levels in watercourse / sewer Y/~~N~~

2.14 Invert level at outlet (invert level of final flow control) ……12.415…mAOD

2.15 Design level used for surcharge water level at point of discharge(14)…Not available…mAOD

SuDS Flows and Volumes – LLFA Technical Assessment Proforma

CALCULATION OUTPUTS

Sections 3 and 4 refer to site where storage is provided by attenuation and / or partial infiltration. Where all flows are infiltrated to ground omit Sections 3 -5 and complete Section 6.

3.0 Defining rate of runoff from the site

3.1 Max. discharge for 1 in 5 year rainfall …32.25…l/s/ha, …2…l/s for the site

3.2 Max. discharge for Q_{med} rainfall …32.25……l/s/ha, …2…l/s for the site

3.3 Max. discharge for 1 in 30 year rainfall ……32.25…l/s/ha, …2……l/s for the site

3.4 Max. discharge for 1 in 100 year rainfall …32.25…l/s/ha, …2……l/s for the site

3.5 Max. discharge for 1 in 100 year plus 30%CC ……32.25…l/s/ha, ……2…l/s for the site

4.0 Attenuation storage to manage peak runoff rates from the site

4.1 Storage - 1 in 5 year 9m ^{3} …0.014m^3/m^2 (of developed impermeable area)

4.2 Storage - 1in 30 year (7) 15m ^{3} …0.024m^3/m^2

4.3 Storage - 1in 100 year (8) 21m ^{3} …0.034m^3/m^2

4.4 Storage - 1 in 100 year plus 40%CC (9) 28.5m ^{3} …0.051m^3/m^2

5.0 Controlling volume of runoff from the site

5.1 Pre development runoff volume(10) …N/A for the site

5.2 Post development runoff volume (unmitigated) (10) …NA for the site

5.3 Volume to be controlled/does not leave site (5.2 - 5.1)…NA for the site

5.4 Volume control provided by
- Interception losses(11) NA
- Rain harvesting(12) NA
- Infiltration (even at very low rates) NA
- Separate area designated as long term storage(13) NA
- Attenuation 36.5m^3

5.5 Total volume control (sum of inputs for 5.4) 36.5m^3

SuDS Flows and Volumes – LLFA Technical Assessment Proforma

Notes

1. All area with the proposed application site boundary to be included.
2. The site area which is positively drained includes all green areas which drain to the SuDS system and area of surface SuDS features. It excludes large open green spaces which do not drain to the SuDS system.
3. Impermeable area should be measured pre and post development. Impermeable surfaces includes, roofs, pavements, driveways and paths where runoff is conveyed to the drainage system.
4. Predevelopment use may impact on the allowable discharge rate. The LLFA will seek for reduction in flow rates to GF status in all instances. The design statement and drawings explain / demonstrate how flows will be managed from the site.
5. Runoff may be discharge via one or a number of means.
6. Sewers for Adoption 6th Edition recommends a Cv of 100% when designing drainage for impermeable area (assumes no loss of runoff from impermeable surfaces) and 0% for permeable areas. Where lower Cv's are used the application should justify the selection of Cv.
7. Storage for the 1 in 30 year must be fully contained within the SuDS components. Note that standing water within SuDS components such as ponds, basins and swales is not classified as flooding. Storage should be calculated for the critical duration rainfall event.
8. Runoff generated from rainfall events up to the 1 in 100 year will not be allowed to leave the site in an uncontrolled way. Temporary flooding of specified areas to shallow depths (150-300mm) may be permitted in agreement with the LLFA.
9. Climate change is specified as 30% increase to rainfall intensity, unless otherwise agreed with the LLFA / EA.
10. To be determined using the 100 year return period 6 hour duration rainfall event.
11. Where Source Control is provided Interception losses will occur. An allowance of 5mm rainfall depth can be subtracted from the net inflow to the storage calculation where interception losses are demonstrated. The Applicant should demonstrate use of subcatchments and source control techniques.
12. Please refer to Rain harvesting BS for guidance on available storage.
13. Flow diverted to Long term storage areas should be infiltrated to the ground, or where this is not possible, discharged to the receiving water at slow flow rates (maximum 2 l/s/ha). LT storage would not be allowed to empty directly back into attenuation storage and would be expected to drain away over 5-10 days. Typically LT storage may be provided on multi-functional open space or sacrificial car parking areas.
14. Careful consideration should be used for calculations where flow control / storage is likely to be influenced by surcharged sewer or peak levels within a watercourse. Storm sewers are designed for pipe full capacity for 1 in 1 to 1 in 5year return period. Beyond this, the pipe network will usually be in conditions of surcharge. Where information cannot be gathered from Thames Water, engineering judgement should be used to evaluate potential impact (using sensitivity analysis for example).
15. In controlling the volume of runoff the total volume from mitigation measures should be greater than or equal to the additional volume generated.

SAMPLE

Appendix E. Confirmation from Thames Water & LLFA on Capacity and proposed rates

To: Leung, Ka Po <KaPo.Leung@atkinsrealis.com>
Cc: Salako, Ade <Ade.Salako@atkinsrealis.com>
Subject: RE: New Engineering Building at the College of Haringey, Enfield and North East London

Hi Ka,

I hope you are well. It was nice seeing you and Ade this morning.

I am happy with the methodology, Discharge rates and as the strategy proposed within your email below.

Thank you again.

Best Regards,

Pankit Shah PG Dip, B.Eng, MCIHT
Flood & Water Management Lead

Haringey London
4th Floor Alexandra House, 10 Station Road, Wood Green, London N22 7TR

Mob: 07974620315
E. Pankit.Shah@haringey.gov.uk

www.haringey.gov.uk
twitter@haringeycouncil
facebook.com/haringeycouncil

Haringey LONDON

Please consider the environment before printing this email.

susdrain
Highly commended 2020 LINK

From: Leung, Ka Po <KaPo.Leung@atkinsrealis.com>
Sent: Thursday, December 14, 2023 11:44 AM
To: Pankit Shah <Pankit.Shah@haringey.gov.uk>
Cc: Salako, Ade <Ade.Salako@atkinsrealis.com>
Subject: RE: New Engineering Building at the College of Haringey, Enfield and North East London

Hi Pankit,

As discussed in the pre-application meeting regarding the new engineering building for the College of Haringey, Enfield and North East London, please could Haringey Council confirm they are in agreement with the following discussion points from the outcome of meeting:

- A minimum discharge rate of 2 l/s will be applied to discharge into existing surface water sewer.
- The strategy will manage rainfall event of 1 in 100-year +40% climate change onsite.
- Hydraulic calculations will be provided within the drainage strategy to show required onsite storage volumes.
- Green roof will provide biodiversity and reduces the rate of surface water runoff.
- Attenuation will be provided by an underground geocelluar storage tank northeast of the proposed development to attenuate surface water runoff from the proposed development.

Warm regards,

Ka Po Leung MEng GMICE

Graduate Civil Engineer
Design & Advanced Technology
AtkinsRéalis
Nova North | 11 Bressenden Place
London, SW1E 5BY, UK

From: Natalya Bacon <Natalya.Bacon@thameswater.co.uk>
Sent: 04 October 2023 10:02
To: Salako, Ade <Ade.Salako@atkinsrealis.com>
Subject: RE: DS6107911: Pre-Planning Enquiry College of Haringey, Enfield and East London

Hi Ade,

Thanks for your email.
Is the area highlighted in purple only the area you propose to redevelop?
Since the number of students is not changing there should be no issues with a foul water capacity. The proposed point of the connection you have chosen is between TWMH7204 and 6105. I cannot locate MH6105.
However. When there is any re-development proposed we would expect to see a reduction in surface water discharge rates.
Please confirm if the area you have provided for overall college site or only for the area you are redeveloping?
What is the proposed surface water discharge rate?
Management of surface water from new developments should follow London Plan Policy SI 13 Sustainable drainage, subsection B (the drainage hierarchy). Typically, greenfield run off rates of 5l/s/ha should be aimed for using the drainage hierarchy.
The hierarchy lists the preference for surface water disposal as follows;

- Store Rainwater for later use
- Use infiltration techniques, such as porous surfaces in non-clay areas
- Attenuate rainwater in ponds or open water features for gradual release
- Discharge rainwater direct to a watercourse > Discharge rainwater direct to a surface water sewer/drain
- Discharge rainwater to the combined sewer.

If possible, prioritise green SuDS such as tree pits and green roofs [rain gardens and swales for small sites] that are more effective in low-return period storms, as opposed to attenuation tanks. The proposed 5l/s is too high for the size of the proposed development.
Please also provide the total surface water run-offs data (flows) for existing vs. proposed site for various range of storms (1:1yr, 1:30yr & 1:100yr).

	Existing Runoff (l/s)	Proposed Runoff (l/s)
1 in 1		
1 in 30		
1 in 100		
1 in 100yr+40%CC		

Once the above information has been received, I will proceed with further review and provide feedback on the capacity within the foul and surface water network.
Should you have any queries please do not hesitate to contact me.

Thanks
Natalya

Appendix F. MicroDrainage Output for existing surface water network

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 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	FEH
FEH Rainfall Version	2013
Site Location	GB 533635 189276 TQ 33635 89276
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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	S3	15 Winter	2	+0%	30/15 Summer				13.605
S2.000	S1	15 Winter	2	+0%	30/15 Summer	100/15 Summer			13.587
S1.001	S3	15 Winter	2	+0%	2/15 Summer	100/15 Winter			13.561
S1.002	S5	15 Winter	2	+0%	2/15 Summer				13.548

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	S3	-0.170	0.000	0.13			5.8	OK	
S2.000	S1	-0.093	0.000	0.30			4.0	OK	4

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

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
S1.001	S3	0.128	0.000	0.77			8.3	SURCHARGED	1
S1.002	S5	0.054	0.000	1.71			8.2	SURCHARGED	

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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 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	FEH
FEH Rainfall Version	2013
Site Location	GB 533635 189276 TQ 33635 89276
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 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	S3	15 Winter	30	+0%	30/15 Summer				13.936
S2.000	S1	15 Winter	30	+0%	30/15 Summer	100/15 Summer			13.942
S1.001	S3	15 Winter	30	+0%	2/15 Summer	100/15 Winter			13.912
S1.002	S5	15 Winter	30	+0%	2/15 Summer				13.834

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	S3	0.161	0.000	0.25			11.1	SURCHARGED	
S2.000	S1	0.262	0.000	0.54			7.1	SURCHARGED	4

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

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
S1.001	S3	0.479	0.000	1.59			17.3	FLOOD RISK	1
S1.002	S5	0.340	0.000	3.55			17.1	SURCHARGED	

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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 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 FEH
FEH Rainfall Version 2013
Site Location GB 533635 189276 TQ 33635 89276
Data Type Point
Cv (Summer) 0.750
Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 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	S3	15 Winter	100	+40%	30/15 Summer				14.272
S2.000	S1	15 Winter	100	+40%	30/15 Summer	100/15 Summer			14.281
S1.001	S3	15 Winter	100	+40%	2/15 Summer	100/15 Winter			14.202
S1.002	S5	15 Winter	100	+40%	2/15 Summer				14.084

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	S3	0.497	0.000	0.61			26.4	FLOOD RISK	
S2.000	S1	0.601	0.732	0.93			12.4	FLOOD	4

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

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
S1.001	S3	0.769	1.944	2.14			23.2	FLOOD	1
S1.002	S5	0.590	0.000	4.56			21.9	FLOOD RISK	

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Appendix G. MicroDrainage Output for Proposed surface water network

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	100
FEH Rainfall Version	2013
Site Location GB 533635 189276 TQ 33635 89276	
Data Type	Point
Maximum Rainfall (mm/hr)	250
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	0.900
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

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	Auto Design
S1.000	36.298	0.267	135.9	0.070	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	3.755	0.038	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	1.980	0.034	57.5	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.001	3.042	0.015	208.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	198.78	5.54	13.100	0.070	0.0	0.0	0.0	1.12	44.5	37.8
S1.001	198.12	5.59	12.833	0.070	0.0	0.0	0.0	1.31	52.0	37.8
S2.000	206.33	5.02	13.640	0.000	0.0	0.0	0.0	1.33	23.5	0.0
S2.001	205.45	5.08	12.430	0.000	0.0	0.0	0.0	0.90	35.9	0.0

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Network Design Table 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	Auto Design
S1.002	4.360	0.048	90.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.002	197.17	5.66	12.415	0.070	0.0	0.0	0.0	1.06	18.7«	37.8

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	14.300	1.200	Open Manhole	600	S1.000	13.100	225				
S2	14.500	1.667	Open Manhole	600	S1.001	12.833	225	S1.000	12.833	225	
S3	14.230	0.590	Junction		S2.000	13.640	150				
SAT	14.230	1.800	Open Manhole	1200	S2.001	12.430	225	S2.000	13.606	150	1101
SOutfall	14.230	1.815	Open Manhole	1200	S1.002	12.415	150	S1.001	12.795	225	455
								S2.001	12.415	225	
S	14.230	1.863	Open Manhole	660 x 660		OUTFALL		S1.002	12.367	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	533605.681	189275.597	533605.681	189275.597	Required	
S2	533602.753	189311.777	533602.753	189311.777	Required	
S3	533609.564	189315.178			No Entry	
SAT	533607.613	189314.840	533607.613	189314.840	Required	
SOutfall	533606.500	189312.008	533606.500	189312.008	Required	
S	533610.860	189312.055			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	14.300	13.100	0.975	Open Manhole	600
S1.001	o	225	S2	14.500	12.833	1.442	Open Manhole	600
S2.000	o	150	S3	14.230	13.640	0.440	Junction	
S2.001	o	225	SAT	14.230	12.430	1.575	Open Manhole	1200
S1.002	o	150	SOutfall	14.230	12.415	1.665	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	36.298	135.9	S2	14.500	12.833	1.442	Open Manhole	600
S1.001	3.755	100.0	SOutfall	14.230	12.795	1.210	Open Manhole	1200
S2.000	1.980	57.5	SAT	14.230	13.606	0.474	Open Manhole	1200
S2.001	3.042	208.2	SOutfall	14.230	12.415	1.590	Open Manhole	1200
S1.002	4.360	90.0	S	14.230	12.367	1.713	Open Manhole	660 x 660

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.043	0.043	0.043
	User	-	100	0.018	0.018	0.061
	User	-	100	0.009	0.009	0.070
1.001	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.000	0.000	0.000
2.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.070	0.070	0.070

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SOutfall, DS/PN: S1.002, Volume (m³): 2.2

Unit Reference	MD-SHE-0064-2000-1200-2000
Design Head (m)	1.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	64
Invert Level (m)	12.415
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.0	Kick-Flo®	0.573	1.4
Flush-Flo™	0.282	1.8	Mean Flow over Head Range	-	1.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	1.200	2.0	3.000	3.0	7.000	4.5
0.200	1.7	1.400	2.1	3.500	3.3	7.500	4.7
0.300	1.8	1.600	2.3	4.000	3.5	8.000	4.8
0.400	1.7	1.800	2.4	4.500	3.7	8.500	5.0
0.500	1.6	2.000	2.5	5.000	3.9	9.000	5.1
0.600	1.5	2.200	2.6	5.500	4.0	9.500	5.2
0.800	1.7	2.400	2.7	6.000	4.2		
1.000	1.8	2.600	2.8	6.500	4.4		

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Storage Structures for Storm

Cellular Storage Manhole: SAT, DS/PN: S2.001

Invert Level (m) 12.430 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	32.0	32.0	1.201	0.0	59.2
1.200	32.0	59.2			

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

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 533635 189276 TQ 33635 89276
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 5, 30, 100
Climate Change (%)	0, 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	180 Winter	100	+40%	100/15 Summer				13.575
S1.001	S2	180 Winter	100	+40%	100/15 Summer				13.570
S2.000	S3	15 Summer	2	+0%					13.640
S2.001	SAT	180 Winter	100	+40%	30/15 Summer				13.568
S1.002	SOutfall	180 Winter	100	+40%	2/15 Summer				13.568

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

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	0.250	0.000	0.32			13.4	SURCHARGED	
S1.001	S2	0.512	0.000	0.41			12.2	SURCHARGED	
S2.000	S3	-0.150	0.000	0.00			0.0	OK*	
S2.001	SAT	0.913	0.000	0.07		211	1.8	SURCHARGED	
S1.002	SOutfall	1.003	0.000	0.14			2.0	SURCHARGED	

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AtkinsRéalis

Ade Salako
AtkinsRéalis
Nova North
11 Bressenden Place
Victoria
London
SWIE 5BY

Tel: +44 1454 662000

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