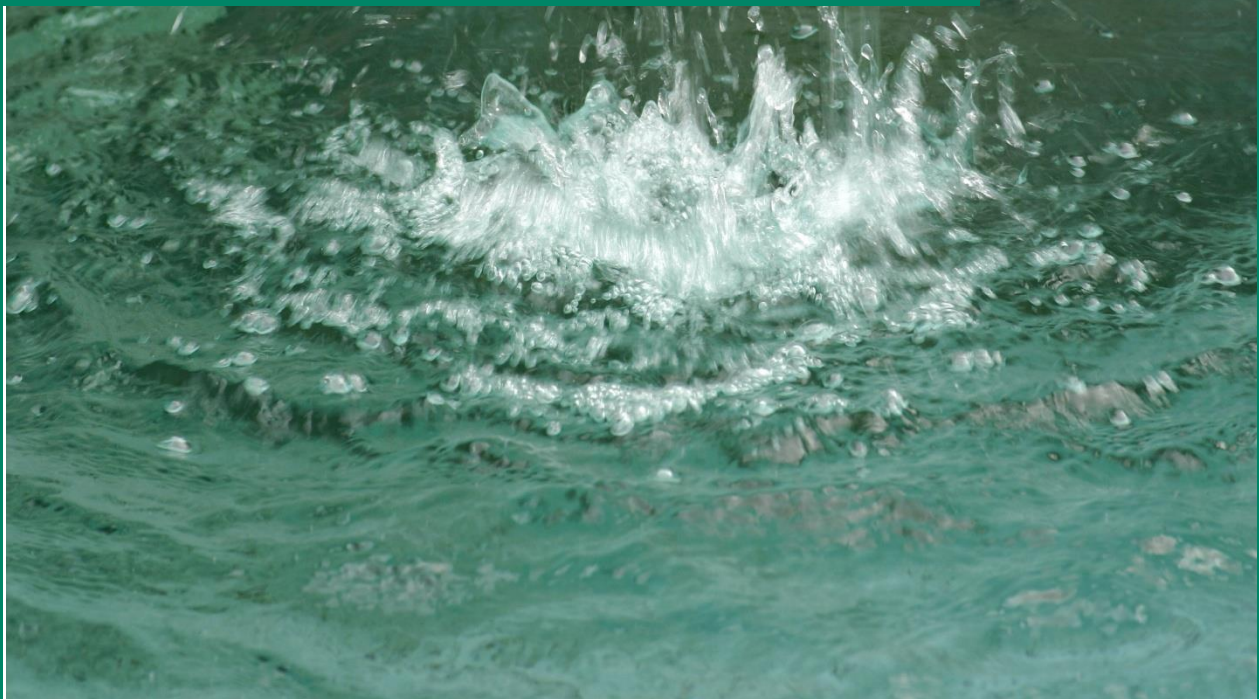


## Institute of Technology, Uxbridge College

Drainage Strategy  
15<sup>th</sup> November 2018



## Report Conditions

This document has been prepared by Capita Property and Infrastructure Limited (Capita) for the titled project (or named part thereof) and should not be relied upon or used for any other project without prior written authorization being obtained from Capita. Capita accepts no responsibility or liability for the consequences of the use of this document, wholly or in part, for any other purpose than that for which it was commissioned. Any persons so using or relying upon this document for such other purpose do so at their own risk.

This report was prepared for the sole use of the named Client, and shall not be relied upon or transferred to any other party without the express written authorisation of Capita. It may contain material subject to copyright or obtained subject to license; unauthorised copying of this report will be in breach of copyright/license.

The findings and opinions provided in this document are given in good faith and are subject to the limitations and constraints imposed by the methods and information sources described in this report. Factual information, including, where stated, a visual inspection of the site, has been obtained from a variety of sources. Capita assumes the third party data to be reliable, but has not independently confirmed this; therefore, Capita cannot and does not guarantee the authenticity or reliability of third party information it has relied upon.

The findings and opinions presented in this report are relevant to the dates when the assessment was undertaken, but should not necessarily be relied upon to represent conditions at a substantially later date. Further information, ground investigation, construction activities, change of site use, or the passage of time may reveal conditions that were not indicated in the data presented and therefore could not have been considered in the preparation of the report. Where such information might impact upon stated opinions, Capita reserves the right to modify the opinions expressed in this report.

Where opinions expressed in this report are based on current available guidelines and legislation, no liability can be accepted by Capita for the effects of any future changes to such guidelines and legislation.

The limitations of liability of Capita for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

## Quality Management

|                       |                                                                                                                   |                      |    |
|-----------------------|-------------------------------------------------------------------------------------------------------------------|----------------------|----|
| <b>Job No</b>         | CS/097204                                                                                                         |                      |    |
| <b>Project</b>        | New Institute of Technology, Uxbridge College                                                                     |                      |    |
| <b>Location</b>       | Uxbridge College, Park Road, Uxbridge UB8 1NQ                                                                     |                      |    |
| <b>Title</b>          | Drainage Strategy                                                                                                 |                      |    |
| <b>Client</b>         | HNW Architects / Uxbridge College                                                                                 |                      |    |
| <b>Document Ref</b>   | CS097204-GM-18-103-R                                                                                              |                      |    |
| <b>File reference</b> | U:\CS-097204 - Institute of Technology, Uxbridge College\Drainage\Drainage Strategy\097204-Drainage_Strategy.docx |                      |    |
| <b>Date</b>           | 15 November 2018                                                                                                  |                      |    |
| <b>Prepared by</b>    | GM                                                                                                                | Signature (for file) | GM |
| <b>Authorised by</b>  | PS                                                                                                                | Signature (for file) | PS |

## Revision Status / History

| Rev | Date     | Issue / Purpose/ Comment                   | Prepared | Authorised |
|-----|----------|--------------------------------------------|----------|------------|
| A   | 15.11.18 | First issue.                               | GM       | PS         |
| B   | 17.10.19 | Updated for issue to Council               | KHK      | PS         |
| C   | 03.02.20 | Updated to incorporate drainage amendments | KHK      | PS         |
| D   | 31.03.20 | Updated following Council comments         | KHK      | PS         |

## Introduction

Capita Property and Infrastructure have been appointed by HNW Architects / Uxbridge College to undertake a sustainable drainage assessment for the proposed development at Park Road, Uxbridge, UB8 1NQ.

## Development Proposal

The proposed development, referred to as the New Institute of Technology building, is to comprise a new freestanding three-storey teaching block. This will be linked to the existing Block 'C' building on the north side of the existing Uxbridge College Campus. The proposal also includes a raised 85 space Car Deck located to the north of the IoT Building in the existing main north Car Park.

## References

'Preliminary Proposals' document incorporating drawings 18035-HNW-XX-00-DR-A-2101, 2201, 2202, 2203 and 2204 by HNW Architects.

Thames Water sewer record (refer to Appendix A of this report).

Flood Risk Assessment, by Capita, dated 15 November 2018.

Preliminary foul and surface water drainage calculations by Capita (refer to Appendix B of this report).

CCTV report of the TW sewer along with surrounding drainage.

## Existing surface water drainage strategy

The current surface water runoff in this area discharges directly into the existing gullies in the south-eastern section of the site. These lead out to the adjacent watercourse (ditch) which then leads out to the River Pinn.

## Proposed surface water drainage strategy

In accordance with the requirements of NPPF (National Planning Policy Framework), and accompanying Planning Practice Guidance, a review of the development site was undertaken for the use of suitable SuDS techniques. In line with Policy 5.13 of the London Plan, infiltration techniques, including permeable paving were investigated, however the Site Investigation conducted has proven that the infiltration rates are negligible, therefore this option is not able to be utilised. Further to this, attenuation in ponds/open water features could not be utilised due to the unavailable space within the development site. As a result, below ground attenuation will be provided in the form of a modular geo-void system, by Environmental Sustainable Solutions Ltd., along with a suitable Hydro-Brake flow control to limit off-site flows to 8 l/sec. Although no additional hardstanding area is being created by this proposal compared to the existing site layout which is typically a tarmac surfaced car park and this approach is in line with previous developments on the college site.

Further to the above, the proposed building has a very limited number of appliances incorporated that could utilise grey water and hence grey water tanks were not considered to be a viable option for the project. Appliances identified below have been specified within the building to ensure that water consumption is minimised and comply with the requirements of credits targeted against BREEAM Wat01 in relation reducing overall water consumption:

- Taps to washbasins are auto shut off and are restricted to a maximum flow rate of 4.5 litres/minute.
- Taps to kitchen sinks are restricted to a maximum flow rate of 5 litres/minute.
- WC cisterns are all dual flush with a maximum flush volume of 4.5 litres.
- Urinals have a maximum flush volume of 1.50 litres/bowl/hour.

The proposed surface water system has been designed to include SuDs as noted above to suit topography and ground conditions and the discharge rate into the existing network has been restricted to 8l/s, as previously agreed with the Planning Authority to mitigate any risk to the existing downstream network. It is understood that as part of the Section 106 Agreement Plan, the council will be implementing SuDS further downstream to allow for flows from the development. This will be within the Persimmon Homes site to the east of the college site as part of a general upgrade by the council.

The surface water drainage network will be a gravity system, designed in accordance with the requirements of BS EN 752:2008, namely no surcharging during a critical storm event of 1 in 2 years return period and no exceedance flooding during a critical storm event of 1 in 30 years return period.

In addition, in accordance with the Environment Agency's requirements, the flows and volumes produced from critical storm events in excess of 1 in 30 years up to 1 in 100 years return period, plus a 40% allowance for climate change, have been assessed and the surface water calculations in Appendix B show that no flooding is expected in this event.

Due to the topography of the developed site it is not possible to contain above ground flood waters over and above a return period of 1 in 30 years. Therefore, the drainage network and below ground storage has been designed to contain critical design storms up to and including a 1 in 100-year return period plus a 40% allowance for climate change.

The calculated below ground storage volume requirement is 60m<sup>3</sup>.

The controlled flow will discharge into the same system as existing, subsequently leading out to the watercourse. CCTV survey information confirms that the existing Thames Water surface water sewer is running and a Build Over Agreement is in place. To assist in this matter, a steelwork superstructure frame supported on piled foundations has been utilised.

Further to the above and based upon the Modified Rational Rainfall Method ( $\text{Rainfall} = 2.78\text{CiA}$ ), the existing peak discharge has been calculated to be 27.8l/s for the 0.2ha impermeable area which is proposed to be collected by the new system. The new system thus includes an attenuation tank to reduce this down to a moderate rate of 8l/s.

## Existing foul water drainage strategy

The current foul water drainage outside this area discharges directly or indirectly into the existing Thames Water foul water sewer which runs west to east through the site. There are no foul flows from the existing site as it is a car park.

## Proposed foul water drainage strategy

The foul water drainage network will be a gravity system and will discharge into a new manhole constructed on-line over the existing public foul water sewer subject to a Section 106 Agreement (direct connection) with Thames Water. The proposed development of the new building will be constructed more than 3m away from the existing foul water sewer in order to not encroach into the easement.

Foul drainage calculations can be found in Appendix 'B' of this report.

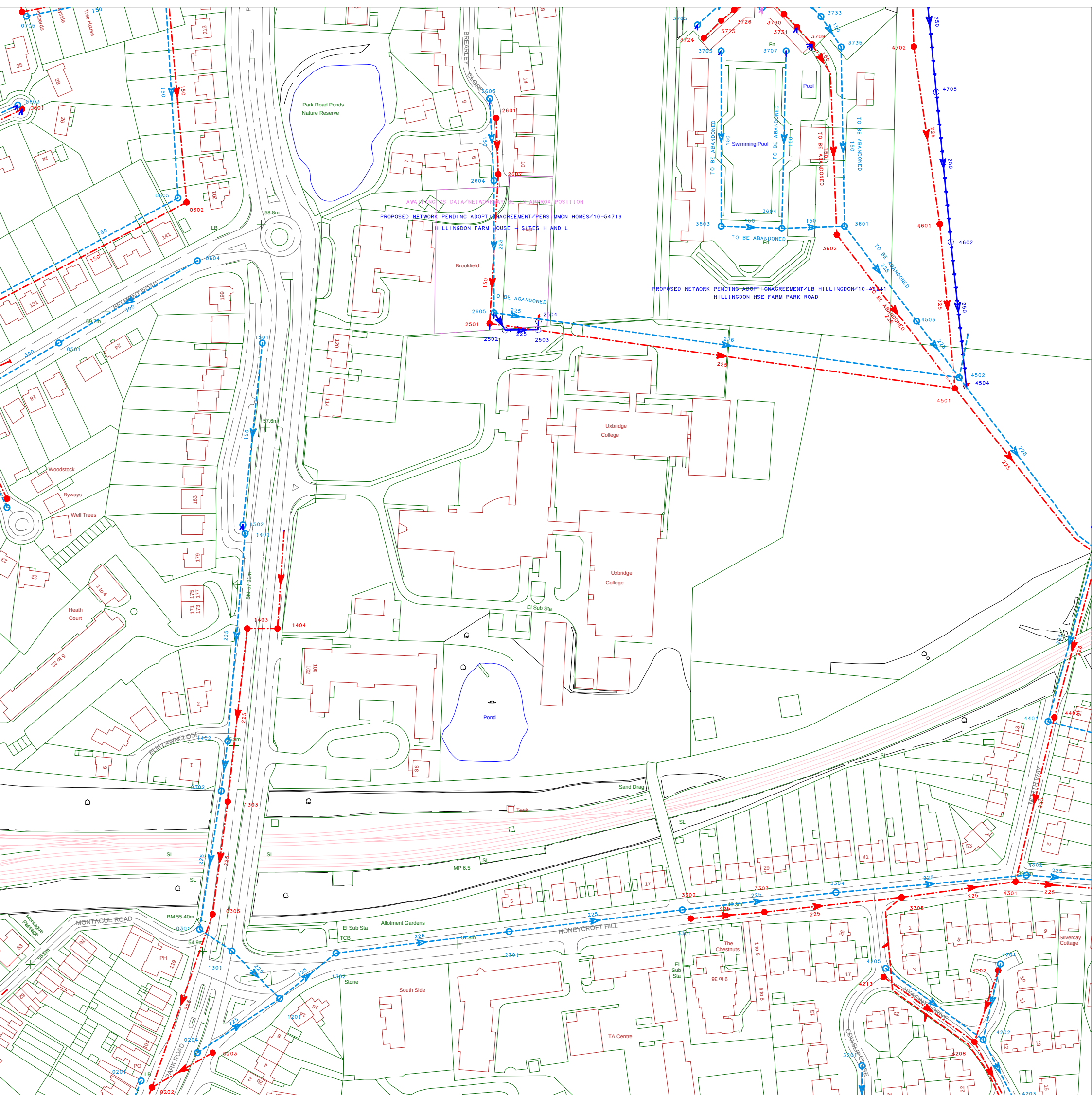
## Easements

Easements will be required for the foul water public sewer. Existing records show this to be 3m clear to either side of the pipe. A Build Over Agreement for the surface water pipe has been submitted and approved.

## Additional information

A Drainage Layout Plan has been provided in Appendix C.

## Appendix A – Thames Water Asset Location Plans



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

100 metre intervals

EAGLE hardcopy facility - Normal Map.  
The plot is centred on ( 506248 , 184489 ), which is in TQ0684SW. Printed on 15 January 2009 at 10:45:04 by A1CLARK.

Comments:  
**SEWERS**

Printbox (505996,184237) -> (506500,184741)  
Central Mapsheet : TQ0684SW  
User : A1CLARK  
Time : Thu Jan 15 10:45:17 2009

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

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

|                    |                                           |        |          |         |          |
|--------------------|-------------------------------------------|--------|----------|---------|----------|
| At (506023,184586) | there is a MANHOLE with SHORT NUMBER=0501 | COVER= | 59.86    | INVERT= | 57.32    |
| At (506006,184694) | there is a MANHOLE with SHORT NUMBER=0601 | COVER= | 59.77    | INVERT= | 58.42    |
| At (506082,184651) | there is a MANHOLE with SHORT NUMBER=0602 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506004,184696) | there is a MANHOLE with SHORT NUMBER=0603 | COVER= | 59.77    | INVERT= | 58.79    |
| At (506087,184624) | there is a MANHOLE with SHORT NUMBER=0604 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506078,184653) | there is a MANHOLE with SHORT NUMBER=0605 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506006,184739) | there is a MANHOLE with SHORT NUMBER=0702 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506008,184737) | there is a MANHOLE with SHORT NUMBER=0705 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506151,184304) | there is a MANHOLE with SHORT NUMBER=1302 | COVER= | 53.42    | INVERT= | 52.04    |
| At (506117,184586) | there is a MANHOLE with SHORT NUMBER=1501 | COVER= | 57.85    | INVERT= | 57.04    |
| At (506108,184502) | there is a MANHOLE with SHORT NUMBER=1502 | COVER= | 57.80    | INVERT= | 57.16    |
| At (506231,184314) | there is a MANHOLE with SHORT NUMBER=2301 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506222,184595) | there is a MANHOLE with SHORT NUMBER=2501 | COVER= | 55.25    | INVERT= | 53.79    |
| At (506229,184592) | there is a MANHOLE with SHORT NUMBER=2502 | COVER= | 55.00    | INVERT= | 52.71    |
| At (506244,184592) | there is a MANHOLE with SHORT NUMBER=2503 | COVER= | 54.40    | INVERT= | 52.30    |
| At (506245,184596) | there is a MANHOLE with SHORT NUMBER=2504 | COVER= | 54.45    | INVERT= | 52.12    |
| At (506225,184690) | there is a MANHOLE with SHORT NUMBER=2601 | COVER= | -9999.00 | INVERT= | 54.70    |
| At (506226,184664) | there is a MANHOLE with SHORT NUMBER=2602 | COVER= | 56.26    | INVERT= | 54.39    |
| At (506222,184699) | there is a MANHOLE with SHORT NUMBER=2603 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506224,184661) | there is a MANHOLE with SHORT NUMBER=2604 | COVER= | 56.24    | INVERT= | 54.69    |
| At (506224,184600) | there is a MANHOLE with SHORT NUMBER=2605 | COVER= | 55.16    | INVERT= | 54.01    |
| At (506394,184252) | there is a MANHOLE with SHORT NUMBER=3201 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506311,184324) | there is a MANHOLE with SHORT NUMBER=3301 | COVER= | 47.62    | INVERT= | 46.37    |
| At (506315,184320) | there is a MANHOLE with SHORT NUMBER=3302 | COVER= | 47.48    | INVERT= | 45.38    |
| At (506349,184323) | there is a MANHOLE with SHORT NUMBER=3303 | COVER= | 45.37    | INVERT= | 43.00    |
| At (506382,184332) | there is a MANHOLE with SHORT NUMBER=3304 | COVER= | 43.40    | INVERT= | 42.13    |
| At (506386,184640) | there is a MANHOLE with SHORT NUMBER=3601 | COVER= | 49.83    | INVERT= | 46.52    |
| At (506382,184636) | there is a MANHOLE with SHORT NUMBER=3602 | COVER= | -9999.00 | INVERT= | -9999.00 |
| At (506329,184640) | there is a MANHOLE with SHORT NUMBER=3603 | COVER= | 51.72    | INVERT= | 49.11    |
| At (506357,184639) | there is a MANHOLE with SHORT NUMBER=3604 | COVER= | 51.67    | INVERT= | 47.58    |
| At (506329,184721) | there is a MANHOLE with SHORT NUMBER=3703 | COVER= | 51.88    | INVERT= | 50.90    |
| At (506318,184733) | there is a MANHOLE with SHORT NUMBER=3705 | COVER= | 52.03    | INVERT= | 50.95    |
| At (506359,184721) | there is a MANHOLE with SHORT NUMBER=3707 | COVER= | 51.77    | INVERT= | 50.81    |
| At (506371,184724) | there is a MANHOLE with SHORT NUMBER=3709 | COVER= | 51.33    | INVERT= | 50.34    |
| At (506321,184727) | there is a MANHOLE with SHORT NUMBER=3724 | COVER= | -9999.00 | INVERT= | -9999.00 |
| At (506329,184735) | there is a MANHOLE with SHORT NUMBER=3725 | COVER= | 52.08    | INVERT= | 50.80    |
| At (506335,184740) | there is a MANHOLE with SHORT NUMBER=3726 | COVER= | 52.05    | INVERT= | 51.15    |
| At (506348,184741) | there is a MANHOLE with SHORT NUMBER=3728 | COVER= | -9999.00 | INVERT= | -9999.00 |
| At (506358,184738) | there is a MANHOLE with SHORT NUMBER=3730 | COVER= | 51.81    | INVERT= | 50.89    |
| At (506364,184732) | there is a MANHOLE with SHORT NUMBER=3731 | COVER= | 51.59    | INVERT= | 50.72    |
| At (506375,184737) | there is a MANHOLE with SHORT NUMBER=3733 | COVER= | -9999.00 | INVERT= | -9999.00 |
| At (506384,184723) | there is a MANHOLE with SHORT NUMBER=3735 | COVER= | -9999.00 | INVERT= | -9999.00 |
| At (506437,184565) | there is a MANHOLE with SHORT NUMBER=4501 | COVER= | 43.91    | INVERT= | 41.90    |
| At (506439,184570) | there is a MANHOLE with SHORT NUMBER=4502 | COVER= | 43.90    | INVERT= | 42.27    |
| At (506419,184596) | there is a MANHOLE with SHORT NUMBER=4503 | COVER= | -9999.00 | INVERT= | -9999.00 |
| At (506442,184566) | there is a MANHOLE with SHORT NUMBER=4504 | COVER= | 43.50    | INVERT= | 42.10    |
| At (506430,184641) | there is a MANHOLE with SHORT NUMBER=4601 | COVER= | 46.03    | INVERT= | 44.38    |
| At (506435,184633) | there is a MANHOLE with SHORT NUMBER=4602 | COVER= | 46.20    | INVERT= | 44.07    |
| At (506418,184723) | there is a MANHOLE with SHORT NUMBER=4702 | COVER= | 47.88    | INVERT= | 45.54    |
| At (506428,184702) | there is a MANHOLE with SHORT NUMBER=4705 | COVER= | 48.10    | INVERT= | 45.41    |
| At (506061,184245) | there is a MANHOLE with SHORT NUMBER=0201 | COVER= | 0.00     | INVERT= | -9999.00 |

Printbox (505996,184237) -> (506500,184741)  
Central Mapsheet : TQ0684SW  
User : A1CLARK  
Time : Thu Jan 15 10:45:17 2009

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

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

|                    |                                           |        |          |         |          |
|--------------------|-------------------------------------------|--------|----------|---------|----------|
| At (506066,184242) | there is a MANHOLE with SHORT NUMBER=0202 | COVER= | 54.02    | INVERT= | 50.51    |
| At (506094,184258) | there is a MANHOLE with SHORT NUMBER=0203 | COVER= | 54.14    | INVERT= | 52.47    |
| At (506087,184258) | there is a MANHOLE with SHORT NUMBER=0204 | COVER= | 54.18    | INVERT= | 52.68    |
| At (506088,184315) | there is a MANHOLE with SHORT NUMBER=0301 | COVER= | 54.72    | INVERT= | 54.02    |
| At (506098,184379) | there is a MANHOLE with SHORT NUMBER=0302 | COVER= | 55.58    | INVERT= | 54.96    |
| At (506094,184322) | there is a MANHOLE with SHORT NUMBER=0303 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506125,184283) | there is a MANHOLE with SHORT NUMBER=1201 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506103,184305) | there is a MANHOLE with SHORT NUMBER=1301 | COVER= | 54.68    | INVERT= | 52.98    |
| At (506101,184374) | there is a MANHOLE with SHORT NUMBER=1303 | COVER= | 55.74    | INVERT= | 53.12    |
| At (506109,184498) | there is a MANHOLE with SHORT NUMBER=1401 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506101,184402) | there is a MANHOLE with SHORT NUMBER=1402 | COVER= | 55.94    | INVERT= | 55.38    |
| At (506110,184454) | there is a MANHOLE with SHORT NUMBER=1403 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506124,184454) | there is a MANHOLE with SHORT NUMBER=1404 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506412,184330) | there is a MANHOLE with SHORT NUMBER=3305 | COVER= | -9999.00 | INVERT= | -9999.00 |
| At (506458,184299) | there is a MANHOLE with SHORT NUMBER=4201 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506450,184264) | there is a MANHOLE with SHORT NUMBER=4202 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506464,184237) | there is a MANHOLE with SHORT NUMBER=4203 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506405,184297) | there is a MANHOLE with SHORT NUMBER=4205 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506457,184296) | there is a MANHOLE with SHORT NUMBER=4207 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506446,184263) | there is a MANHOLE with SHORT NUMBER=4208 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506404,184293) | there is a MANHOLE with SHORT NUMBER=4213 | COVER= | 0.00     | INVERT= | -9999.00 |
| At (506465,184337) | there is a MANHOLE with SHORT NUMBER=4301 | COVER= | 38.61    | INVERT= | 35.73    |
| At (506470,184340) | there is a MANHOLE with SHORT NUMBER=4302 | COVER= | 38.29    | INVERT= | 37.07    |
| At (506480,184411) | there is a MANHOLE with SHORT NUMBER=4401 | COVER= | 38.90    | INVERT= | 36.59    |
| At (506483,184413) | there is a MANHOLE with SHORT NUMBER=4402 | COVER= | 38.81    | INVERT= | 36.14    |
| At (505999,184514) | there is a MANHOLE with SHORT NUMBER=9506 | COVER= | 59.71    | INVERT= | 57.50    |
| At (505999,184510) | there is a MANHOLE with SHORT NUMBER=9509 | COVER= | 58.73    | INVERT= | 57.79    |



# ALS Sewer Map Key

## Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

|                                                                                                                      |                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|  Joint                               |  Trunk Foul                        |
|  Trunk Surface Water                 |  Trunk Combined                    |
|  Storm Relief                        |  Bio-solids (Sludge)               |
|  Vent Pipe                           |  Trade Effluent                    |
|  Proposed Thames Surface Water Sewer |  Proposed Thames Water Foul Sewer  |
|  Gallery                             |  Foul Rising Main                  |
|  Surface Water Rising Main           |  Combined Rising Main              |
|  Sludge Rising Main                  |  Proposed Thames Water Rising Main |
|  Vacuum                              |  Syphon                            |

## 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.

|                                                                                                                            |                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  <b>AV</b> Air Valve                      |  <b>LH</b> Lamp Hole     |
|  <b>BS</b> Blind Shaft                    |  <b>LS</b> Lifting Shaft |
|  <b>CP</b> Catch Pit                      |  <b>ME</b> Meter         |
|  <b>DC</b> Dam Chase                      |  <b>RE</b> Rodding Eye   |
|  <b>DF</b> Double Flushing Tank / Chamber |  <b>VC</b> Vent Column   |
|  <b>SF</b> Single Flushing Tank / Chamber |  <b>VT</b> Vent          |
|  <b>HB</b> Hatch Box                      |  <b>WO</b> Washout       |
|  Other (specified on plan)                |                                                                                                             |

## Operational Controls

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

|                                                                                                              |                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|  <b>BD</b> Backdrop Manhole |  <b>HY</b> Hydrobrake         |
|  <b>BV</b> Butterfly Valve  |  <b>PI</b> Petrol Interceptor |
|  <b>CL</b> Clough           |  <b>PS</b> Penstock           |
|  <b>DB</b> Dam Board        |  <b>RV</b> Reflux Valve       |
|  <b>DP</b> Drop Pipe        |  <b>ST</b> Step               |
|  <b>DS</b> Drop Shaft      |  <b>SV</b> Sluice Valve      |
|  <b>FL</b> Flume          |  <b>TA</b> Tank             |
|  <b>FV</b> Flap Valve     |  <b>WW</b> Weir             |
|  <b>HW</b> Headwall       |  Other (specified on plan)  |

## 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.

|                                                                                                                                                                                                        |                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|  <b>STW</b> Effluent Discharge                                                                                      |  Undefined End   |
|  <b>SA</b> /  <b>SA</b> Soakaway |  <b>GU</b> Gully |
|  Outfall                                                                                                            |  Inlet           |

## Other Symbols

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

|                                                                                                                                                                                                                                                                                                |                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
|  /  /  Public/Private Pumping Station |                                                                                            |
|  Change of characteristic indicator (C.O.C.I.)                                                                                                                                                              |                                                                                            |
|  Sewage Treatment Works                                                                                                                                                                                     |                                                                                            |
|  <b>IL</b> Invert Level                                                                                                                                                                                     |  Summit |

## Areas

Lines denoting areas of underground surveys, etc.

|                                                                                                                                              |                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
|  Building over Case (BOC No.) or Low Lying Land (LLL No.) |                                                                                                                      |
|  Sewage Treatment Works or Pumping Station                |                                                                                                                      |
|  Area under Adoption Agreement                            |  Survey Area                      |
|  Drawing Area or chamber                                  |  Licence Area                     |
|  Area pending Adoption Agreement                        |  Other Area (specified on plan) |

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

|                                                                                                             |                                                                                                           |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
|  Foul Sewer            |  Surface Water Sewer |
|  Combined Sewer        |  Highway Drain       |
|  Culverted Watercourse |  Proposed            |
|  Status Unknown        |  Abandoned Sewer     |

## Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) For symbols referred to as 'Other' on this key, please see the plan for further information.
- 5) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

6) -9999.00 or 0 on a manhole level indicates that data is unavailable.

7) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. When cover and invert levels appear on a plan they are clearly prefixed by 'CL' and 'IL'. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0118 925 1504.

## Appendix B – Preliminary Drainage Calculations (Foul and Surface)

## **CS/097204 – New Institute of Technology, Uxbridge College**

### **Preliminary Foul Drainage Calculations**

(designed by K. Khan)

Page 1

#### **Estimate of peak foul flow**

Ref. BS EN 12056-2:2000 Table 2 (System III) - Page 16 and Table 3 - Page 17).

From Table 2 (System III)

| <u>Appliance</u>             | <u>Discharge Units- DU</u> |
|------------------------------|----------------------------|
| 21 no. WC's                  | 14 x 1.8 = 25.2            |
| 33 no. wash basins           | 19 x 0.3 = 5.7             |
| 6 no. urinals (with cistern) | 4 x 0.4 = 1.6              |
| 3 no. sinks                  | 17 x 1.3 = 22.1            |

Total discharge units 54.6 DU

From Table 3 K = 0.7

Therefore peak flow (Q) discharging

$$= K \times \sqrt{\Sigma DU} = 0.7 \times \sqrt{54} = \underline{\underline{5.17 \text{ l/sec}}}$$

$$\text{DWF} = 5.17 / 6 = 0.862 \text{ l/sec}$$

$$\text{Therefore estimate of daily flow} = 0.862 \times 60 \times 60 \times 8 = \underline{\underline{24,826 \text{ litres}}}$$

# Drainage Design Report

## Flow+

v8.0

Copyright © 1988-2020 Causeway Software Solutions Limited

|                           |                                                                                                       |
|---------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Network</b>            | Storm Network                                                                                         |
| <b>Filename</b>           | U:\CS-097204 - Institute of Technology, Uxbridge College\Design\Drainage\Flow\Flow_Drainage_Calcs.pfd |
| <b>Username</b>           | Kamran Hussain Khan (P10496677@capita.co.uk)                                                          |
| <b>Last analysed</b>      | 31/03/2020 11:10:28                                                                                   |
| <b>Report produced on</b> | 31/03/2020 15:30:11                                                                                   |

### Causeway Sales

|               |                        |
|---------------|------------------------|
| <b>Tel:</b>   | +44(0) 1628 552000     |
| <b>Fax:</b>   | +44(0) 1628 552001     |
| <b>Email:</b> | marketing@causeway.com |
| <b>Web:</b>   | www.causeway.com       |

### Technical support web portal:

<http://support.causeway.com>

|                                             |                   |
|---------------------------------------------|-------------------|
| <b>Rainfall Methodology</b>                 | FSR               |
| <b>Return Period (years)</b>                | 5                 |
| <b>Additional Flow (%)</b>                  | 0                 |
| <b>FSR Region</b>                           | England and Wales |
| <b>M5-60 (mm)</b>                           | 20.000            |
| <b>Ratio-R</b>                              | 0.400             |
| <b>CV</b>                                   | 0.750             |
| <b>Time of Entry (mins)</b>                 | 5.00              |
| <b>Maximum Time of Concentration (mins)</b> | 30.00             |
| <b>Maximum Rainfall (mm/hr)</b>             | 50.0              |
| <b>Minimum Velocity (m/s)</b>               | 1.00              |
| <b>Connection Type</b>                      | Level Soffits     |
| <b>Minimum Backdrop Height (m)</b>          | 0.200             |
| <b>Preferred Cover Depth (m)</b>            | 1.200             |
| <b>Include Intermediate Ground</b>          | ✓                 |
| <b>Enforce best practice design rules</b>   | ✓                 |

|                                            |         |
|--------------------------------------------|---------|
| <b>Node Size</b>                           | ✓       |
| <b>Node Losses</b>                         | ✓       |
| <b>Link Size</b>                           | ✓       |
| <b>Minimum Diameter (mm)</b>               | 150     |
| <b>Link Length</b>                         | ✓       |
| <b>Maximum Length (m)</b>                  | 100.000 |
| <b>Coordinates</b>                         | ✓       |
| <b>Accuracy (m)</b>                        | 1.000   |
| <b>Crossings</b>                           | ✓       |
| <b>Cover Depth</b>                         | ✓       |
| <b>Minimum Cover Depth (m)</b>             |         |
| <b>Maximum Cover Depth (m)</b>             | 3.000   |
| <b>Backdrops</b>                           | ✓       |
| <b>Minimum Backdrop Height (m)</b>         |         |
| <b>Maximum Backdrop Height (m)</b>         | 1.500   |
| <b>Full Bore Velocity</b>                  | ✓       |
| <b>Minimum Full Bore Velocity (m/s)</b>    |         |
| <b>Maximum Full Bore Velocity (m/s)</b>    | 3.000   |
| <b>Proportional Velocity</b>               | ✓       |
| <b>Return Period (years)</b>               |         |
| <b>Minimum Proportional Velocity (m/s)</b> | 0.750   |
| <b>Maximum Proportional Velocity (m/s)</b> | 3.000   |
| <b>Surcharged Depth</b>                    | ✓       |
| <b>Return Period (years)</b>               |         |
| <b>Maximum Surcharged Depth (m)</b>        | 0.100   |
| <b>Flooding</b>                            | ✓       |
| <b>Return Period (years)</b>               | 30      |
| <b>Discharge Rates</b>                     | ✓       |
| <b>1 year (l/s)</b>                        |         |
| <b>30 year (l/s)</b>                       |         |
| <b>100 year (l/s)</b>                      |         |
| <b>Discharge Volume</b>                    | ✓       |



|                          |  |
|--------------------------|--|
| 100 year 360 minute (m³) |  |
|--------------------------|--|

| Results for 1 year Critical Storm Duration. Lowest mass balance: 99.96% |            |             |           |           |              |               |            |        |              |            |               |                |          |               |                    |
|-------------------------------------------------------------------------|------------|-------------|-----------|-----------|--------------|---------------|------------|--------|--------------|------------|---------------|----------------|----------|---------------|--------------------|
| Event                                                                   | US Node ID | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status | Link ID      | DS Node ID | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
| 15 minute winter                                                        | 2          | 10          | 51.768    | 0.068     | 14.1         | 0.0952        | 0.0000     | OK     | 1.000        | 3          | 14.0          | 1.939          | 0.351    | 0.0217        |                    |
| 15 minute winter                                                        | 2_1        | 10          | 51.657    | 0.057     | 11.3         | 0.0846        | 0.0000     | OK     | 2.000        | 3          | 11.2          | 1.584          | 0.105    | 0.0085        |                    |
| 30 minute winter                                                        | 3          | 25          | 51.225    | 0.075     | 19.6         | 8.9405        | 0.0000     | OK     | 1.001        | 1          | 11.3          | 1.083          | 0.153    | 0.0493        |                    |
| 30 minute winter                                                        | 1          | 24          | 51.250    | 0.150     | 11.3         | 0.1707        | 0.0000     | OK     | Hydro-Brake® |            | 7.5           |                |          |               | 14.9               |

| Results for 30 year Critical Storm Duration. Lowest mass balance: 99.96% |            |             |           |           |              |               |            |            |              |            |               |                |          |               |                    |
|--------------------------------------------------------------------------|------------|-------------|-----------|-----------|--------------|---------------|------------|------------|--------------|------------|---------------|----------------|----------|---------------|--------------------|
| Event                                                                    | US Node ID | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     | Link ID      | DS Node ID | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
| 15 minute winter                                                         | 2          | 10          | 51.828    | 0.128     | 34.6         | 0.1809        | 0.0000     | OK         | 1.000        | 3          | 34.4          | 2.316          | 0.860    | 0.0443        |                    |
| 15 minute winter                                                         | 2_1        | 10          | 51.694    | 0.094     | 27.7         | 0.1408        | 0.0000     | OK         | 2.000        | 3          | 27.6          | 1.981          | 0.258    | 0.0167        |                    |
| 60 minute winter                                                         | 3          | 48          | 51.381    | 0.231     | 34.4         | 27.6357       | 0.0000     | SURCHARGED | 1.001        | 1          | 23.2          | 1.074          | 0.314    | 0.0988        |                    |
| 60 minute winter                                                         | 1          | 48          | 51.380    | 0.280     | 23.2         | 0.3170        | 0.0000     | OK         | Hydro-Brake® |            | 7.9           |                |          |               | 46.1               |

| Results for 100 year Critical Storm Duration. Lowest mass balance: 99.96% |            |             |           |           |              |               |            |            |              |            |               |                |          |               |                    |
|---------------------------------------------------------------------------|------------|-------------|-----------|-----------|--------------|---------------|------------|------------|--------------|------------|---------------|----------------|----------|---------------|--------------------|
| Event                                                                     | US Node ID | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     | Link ID      | DS Node ID | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
| 15 minute winter                                                          | 2          | 10          | 51.972    | 0.272     | 44.9         | 0.3830        | 0.0000     | SURCHARGED | 1.000        | 3          | 44.1          | 2.503          | 1.102    | 0.0528        |                    |
| 15 minute winter                                                          | 2_1        | 10          | 51.710    | 0.110     | 35.9         | 0.1644        | 0.0000     | OK         | 2.000        | 3          | 35.8          | 2.109          | 0.335    | 0.0203        |                    |
| 60 minute winter                                                          | 3          | 52          | 51.482    | 0.332     | 43.0         | 39.7488       | 0.0000     | SURCHARGED | 1.001        | 1          | 20.3          | 1.099          | 0.275    | 0.0988        |                    |
| 60 minute winter                                                          | 1          | 52          | 51.481    | 0.381     | 20.3         | 0.4314        | 0.0000     | OK         | Hydro-Brake® |            | 8.0           |                |          |               | 60.7               |

| Results for 100 year +40% Critical Storm Duration. Lowest mass balance: 99.96% |            |             |           |           |              |               |            |            |              |            |               |                |          |               |                    |
|--------------------------------------------------------------------------------|------------|-------------|-----------|-----------|--------------|---------------|------------|------------|--------------|------------|---------------|----------------|----------|---------------|--------------------|
| Event                                                                          | US Node ID | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     | Link ID      | DS Node ID | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
| 60 minute winter                                                               | 2          | 60          | 52.233    | 0.533     | 32.5         | 0.7512        | 0.0000     | SURCHARGED | 1.000        | 3          | 32.5          | 2.306          | 0.813    | 0.0528        |                    |
| 60 minute winter                                                               | 2_1        | 60          | 52.231    | 0.631     | 26.0         | 0.9419        | 0.0000     | SURCHARGED | 2.000        | 3          | 26.0          | 1.952          | 0.243    | 0.0475        |                    |
| 60 minute winter                                                               | 3          | 60          | 52.231    | 1.081     | 58.5         | 59.9099       | 0.0000     | SURCHARGED | 1.001        | 1          | 19.3          | 1.082          | 0.261    | 0.0988        |                    |
| 60 minute winter                                                               | 1          | 60          | 52.230    | 1.130     | 19.3         | 1.2790        | 0.0000     | OK         | Hydro-Brake® |            | 8.0           |                |          |               | 85.1               |

## Appendix C – Preliminary Drainage Layout

18.050m x 7.050m x 0.550m deep `VersaVoid' modular geo-void system, by Environmental Sustainable Solutions Ltd. (ESS) or similar approved, wrapped in an inner non-woven type geotextile membrane, wrapped in a waterproof butyl membrane and protected by a heavyweight, needle punched, non-woven type geotextile membrane all to the manufacturer's recommendations. The membrane is to be sealed at all edges and where the pipe enters and exits the membrane.

If hydrocarbons are present in the soil then additional protection, in the form of Alderprufe HC, will be required.

Cellular blocks are 500mm x 500mm in plan x 250mm deep. 25mm thick outer plates on all external faces of tank.

To be installed strictly in accordance with the manufacturer's requirements and recommendations.

Approx. storage volume = 60m³ based on 8 l/sec allowable off-site discharge.

Cellular storage is to be bedded on min. 100mm thick coarse sand blinding and covered with a 100mm thick coarse sand protection layer.

Compacted backfill in accordance with Capita's specification.

Manufacturer to provide layout and detail drawings for construction which should include details of venting and suitable access points for inspection and maintenance.

Manufacturer to provide calculations proving structural suitability taking cognisance of the applied construction loads (temporary and permanent) and the prevailing ground conditions as detailed in the Site Investigation Report.

Design based on 1:100 year return period +40%CC.

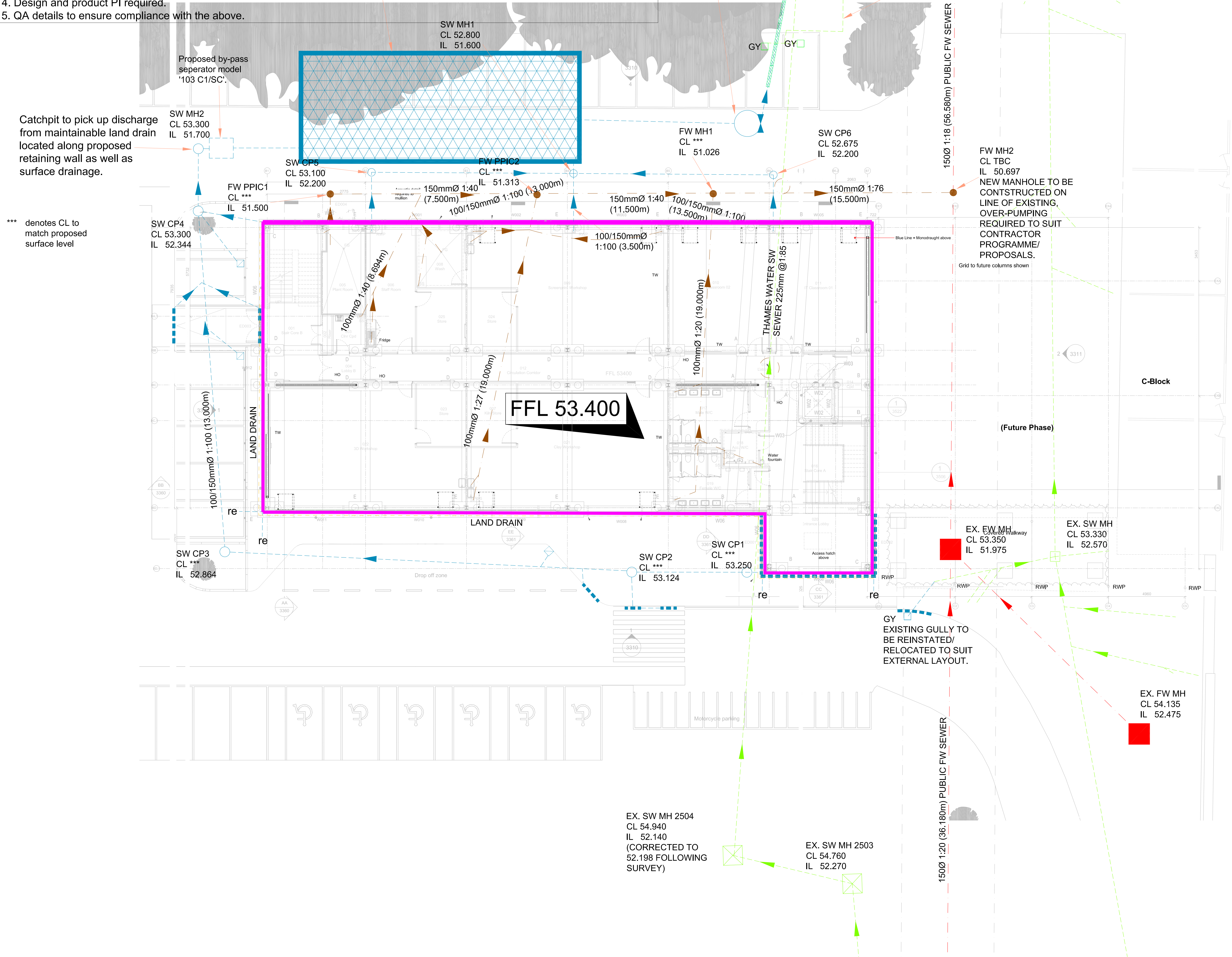
Top of cellular storage = 51.700

Bottom of cellular storage = 51.150

All proposed alternative products to satisfy the following:

1. To be in accordance with the recommendations stated in CIRIA C680 - Structural and geotechnical design of modular geocellular drainage systems.
2. Material partial safety factor of 2.75 to be used in design calculations.
3. Independent load testing certification to be provided including compressive strength, lateral strength and long term creep testing.
4. Design and product PI required.
5. QA details to ensure compliance with the above.

Outlet pipe to MH S3 to have a Hydro-Brake flow regulator by Hydro International, or similar approved, to limit flow to 8 l/sec  
Design Head = 0.550m  
Hydro-Brake type =  
CTL-SHE-0123-8000-1550-8000  
Final diameter of manhole, and any additional sump requirement, to be confirmed by flow regulator specialist.



Drainage Notes:

1. All private drainage works are to be carried out in accordance with BS EN 752:2008 and Building Regulations Part H.
2. All drainage works within adoptable areas are to comply with the requirements of the Water UK/Water Research Centre publication 'Sewers for Adoption' (current edition).
3. All connections to existing public sewers to be in accordance with and to the satisfaction of the Local Authority.
4. Concrete protection (bedding class 'Z') to pipework to be provided as follows:  
(i) all pipework within soft areas with a cover of less than 600mm;  
(ii) all pipework beneath roads, car parks and all other trafficked hardstanding areas with a cover less than 1200mm;  
(iii) all pipework adjacent to existing and proposed trees/dense vegetation in landscaped areas.  
An expansion joint shall be provided at all joint locations.
5. All below ground foul drainage from within building footprint to be 100mm dia. unless stated otherwise. Refer to separate note for recommended minimum gradients.  
All below ground surface water drainage from RWP locations to main carrier drains to match the diameter of the downpipe (to Architect's and specialist contractor's details) unless stated otherwise.  
All below ground drainage from road gullies to be 150mm dia. unless stated otherwise.
6. All pipework in manholes are to be laid soffit to soffit unless noted otherwise. All chamber invert levels, shown on the drawing, are for the outgoing pipe.
7. All internal drainage to be to the Architect's and M & E Engineer's drawings and details.
8. The position and invert levels of all existing drains, sewers and manholes to be confirmed by the contractor prior to the commencement of the proposed works and any discrepancies reported immediately to Capita Property and Infrastructure Ltd.
9. All pipes are to have a class 'S' bed and surround unless noted otherwise (see note 4 above).
10. All concrete pipes are to be high strength and to be in accordance with BS EN 1916 and BS 5911.
11. All vitrified clay pipes are to be in accordance with BS EN 295.
12. Refer to drawing nos. xxxxxx-CA-D-GF-DR-S-xxx and xxx for drainage construction details.
13. For setting out of foul and rainwater outlets refer to the Architect's drawings.
14. This drawing to be read in conjunction with all other relevant Engineer's and Architect's drawings, specifications and documentation.
15. The contractor is to allow for grease traps in the kitchen and other appropriate areas.
16. Drainage channels and silt pits to be designed by a specialist manufacturer for critical storms of 1:5 year return period and 5 minutes duration, to suit site conditions and in accordance with local class requirements as shown on the plan.  
Design to be submitted for comment to Capita Property and Infrastructure Ltd. prior to ordering.
17. All external finished levels and manhole cover levels shown on this drawing are indicative and subject to adjustment on site to suit the finished ground levels. For final levels refer to the Architect's drawings.
18. All levels are in metres and all dimensions are in millimetres unless noted otherwise.
19. Any coordinates provided for manholes or inspection chambers are relevant to the main drainage run intersection and not the centre of the manhole.
20. Chalk and limestone are not to be used as bedding or backfilling material in soils with a pH value less than 7.
21. A CCTV drainage survey is to be carried out both at the pre-commencement of construction and at the completion of the contract to prove the integrity of the as-built drainage systems. At the completion of the contract this is to be carried out prior to the issue of the practical completion certificate.
22. Sewers, manholes, gullies, drainage channels and silt pits should be inspected at 6 monthly intervals and cleaned out at 12 monthly intervals. A full CCTV survey should also be carried out at 10 yearly intervals. Refer also to specialist drainage channel and petrol interceptor manufacturer's information and maintenance requirements.  
In all instances, inspection and cleaning should be carried out only by a specialist contractor and in accordance with the guidelines given in 'Safe Working in Sewers and at Sewage Works' published by National Joint Health and Safety Committee for the Water Services.
23. All pop up locations to be rotable and set out to HNW Architects Drawing(s).

LEGEND

- existing foul water drain with manhole
- existing surface water drain with manhole
- new foul water drain with manhole
- new surface water drain with manhole
- linear drainage channel
- flow regulator
- proposed building outline
- concrete protection to pipework adjacent to tree roots
- Proposed Petrol Interceptor (TBC)
- Proposed Private Land Drain

|      |                                                                                                     |
|------|-----------------------------------------------------------------------------------------------------|
| CL   | Cover Level                                                                                         |
| IL   | Invert level                                                                                        |
| SL   | Sump level                                                                                          |
| S/A  | Soakaway                                                                                            |
| RAI  | Reverse Action Interceptor                                                                          |
| bd   | backdrop                                                                                            |
| re   | rodding eye                                                                                         |
| svp  | soil & vent pipe (rodable)                                                                          |
| wvp  | waste and vent pipe (rodable)                                                                       |
| wp   | waste pipe (rodable)                                                                                |
| ss   | sub stack (rodable)                                                                                 |
| sg   | shower gully (rodable)                                                                              |
| sp   | silt pit (rodable)                                                                                  |
| ra   | rodding access                                                                                      |
| rg   | 4500 x 900 deep precast concrete trapped, rotable, road gully with grating area greater than 900cm² |
|      | floor gully (rodable)                                                                               |
| rwip | rainwater downpipe (rodable)                                                                        |
| psdp | primary siphonic downpipe                                                                           |
| ssdp | secondary siphonic downpipe                                                                         |
| av   | vent pipe (oil separator)                                                                           |
| asv  | air admittance valve                                                                                |
| TOL  | Top of base level                                                                                   |
| Cl   | Cast iron                                                                                           |
| VC   | Vitrified Clay                                                                                      |
| R    | Flexible 'Rocker' joint                                                                             |
| PPIC | Polypropylene inspection chamber                                                                    |

Note: Final setting out of all drainage points at ground level to the Architect's and M & E Engineer's details.  
Refer to the Architect's details for the internal, above ground, drainage layout.  
Recommended minimum gradients for below ground foul drainage connections:  
100 dia. at 1:40,  
100 dia. at 1:80 with min 1 no. wc connection,  
150 dia. at 1:150 with min 5 no. wc connections.  
Final foul drainage connections to be coordinated with the Architect's internal drainage layout plans.

|     |            |     |                                             |    |
|-----|------------|-----|---------------------------------------------|----|
| C04 | 31/03/2020 | KHK | AMENDED FOLLOWING COMMENTS FROM LBN         | PS |
| C03 | 03/02/20   | KHK | AMENDED FOLLOWING DRAINAGE STRATEGY UPDATES | PS |
| C02 | 14/11/19   | KHK | AMENDED FOLLOWING FURTHER INFO.             | PS |
| C01 | 12/11/19   | KHK | FOR CONSTRUCTION.                           | PS |
| P02 | 28/10/19   | KHK | FOR INFORMATION ONLY.                       | PS |
| P01 | 17/10/19   | KHK | FOR INFORMATION ONLY.                       | PS |

|     |      |    |             |     |
|-----|------|----|-------------|-----|
| Rev | Date | By | Description | Rev |
|     |      |    | check       |     |

Drawing status

CONSTRUCTION

Client

UXBRIDGE COLLEGE

Project

IOT BUILDING  
UXBRIDGE CAMPUS

Drawing

DRAINAGE LAYOUT

|                    |                      |         |       |           |      |          |          |
|--------------------|----------------------|---------|-------|-----------|------|----------|----------|
| Scale @ A0         | Drawn                | Checked |       |           |      |          |          |
| 1:100              | KHK                  | PS      |       |           |      |          |          |
| Project No.        | Date                 | Office  |       |           |      |          |          |
| CS/097204          | Oct 2019             | LONDON  |       |           |      |          |          |
| Drawing Identifier | BS1192:2007 / Avanti |         |       |           |      |          |          |
| Project            | origin               | zone    | level | file type | role | number   | revision |
| 097204             | CAP-TB-              | 00      | -     | DR        | -    | C - 5000 | - C04    |

CAPITA

Property and infrastructure  
Consulting Civil, Structural and Geo-environmental Engineers

|                                                                                            |                                                                                                                      |
|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| London<br>Tel: 020 7440 1230<br>Manchester<br>Tel: 0161 275 1000                           | Watford<br>Tel: 01462 511111<br>Bristol<br>Tel: 0117 925 8400                                                        |
| Capita Property and Infrastructure Ltd.<br>Reg. office: 17, Abchurch Lane, London EC4A 3DF | www.capita.co.uk/property<br>Capita Property and Infrastructure Ltd. is a registered company in England No. 01555555 |

Capita Property and Infrastructure Ltd  
1st Floor Oak House  
Reeds Crescent  
Watford  
Hertfordshire

Tel +44 (0)1923 817537  
Fax+44 (0)1923 228516

[www.capita.co.uk](http://www.capita.co.uk)