elliottwood

Oldfield House

Flood Risk Assessment

engineering a better society

		Remarks:	**Issued for Planning**				
Revision:	P1	Prepared by:	Peter Storey	Checked by:	Keri Trimmer	Approved by:	Tim Kenning
Date:	10/04/2019	Signature:	PSt	Signature:	KTr	Signature:	TKe
Revision:	P2	Prepared by:	Tim Kenning	Checked by:	Paul Chance	Approved by:	Paul Chance
Date	11/11/2019	Signature	TKe	Signature:	PCh	Signature:	PCh

Contents

Appendices

One

Terms of Reference

1.1

Elliott Wood has been appointed by The John Lyon School to undertake a Flood Risk Assessment for the proposed development at Oldfield House, Harrow-on-the-Hill, HA2 0HN.

There are areas of low to medium risk of surface water flooding within the site, as defined in the GOV.uk Flood Maps. As confirmed by Harrow Council, the site is located within surface water Flood Zone 3a and therefore will require a site-specific Flood Risk Assessment.

The Flood Risk Assessment has been prepared in accordance with the National Planning Policy Framework (NPPF).

Site Description

1.2

The existing site is located within The John Lyon School Campus, adjacent to Crown Street. The site is currently occupied by the existing Oldfield House building and associated hard play areas.

1.3

The existing site is 55% hardstanding and is approximately 4,175m^2 in size (0.4175ha). The site is shown on the map below. The existing site falls by approximately 8-9m from the south-east to the north-west. Refer to Appendix A for the existing site topographical survey.

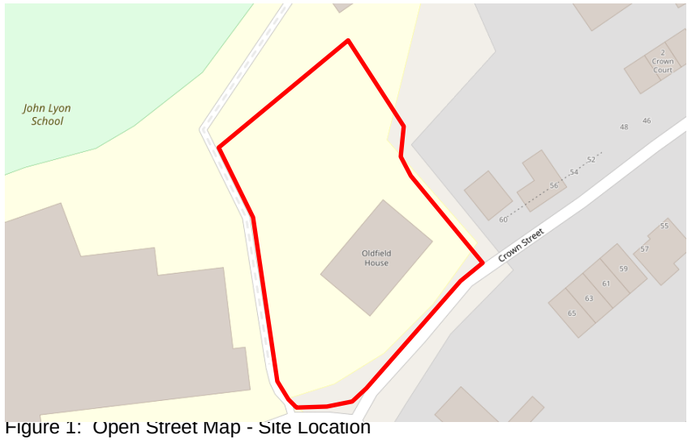

Figure 1: Open Street Map - Site Location

Two

Proposed Development

2.1

The proposed works involve the demolition of the existing Oldfield House building, and the construction of a new four storey school building. Once the new building is constructed, the existing Oldfield House is to be demolished and replaced with amenity space/ hard play area.

2.2

The site is confirmed to have an existing foul water outfall to the Thames Water public sewer which runs through the site. Refer to *2170727-EWP-ZZ-XX-RP-C-0001-SuDS Statement* for further details on the drainage strategy. Thames Water sewer records have also been included in Appendix B.

Three

Flood Risk Assessment

It is important to assess the flood risk posed to the development of this site from all sources of flooding, in accordance with National Planning Policy Framework (NPPF) requirements.

The Flood Risk Mechanisms being considered as part of this Flood Risk Assessment (FRA) are as follows:

- Rivers and Sea
- Groundwater
- Overland Flow
- Infrastructure Failure / Sewer Flooding
- Flooding from Artificial Waterbodies

3.1 Flooding from Rivers and Sea

Based on data from GOV.UK and the Harrow Council Strategic Flood Risk Assessment (SFRA) flood maps the site is considered to be in Flood Zone 1.

Figure 2: GOV.UK Flood Map for Planning – Flood Zone Map

Flood Zone 1 comprises land assessed as having a less than 1 in 1000 annual probability of river or tidal flooding in any year. All uses of land for development are considered appropriate in this zone.

As the site is located in Flood Zone 1, with a low probability of flooding, the risk of flooding from rivers and sea is therefore considered to be **low**.

3.2 Flooding from Groundwater

Groundwater flooding is affected by long periods of increased rainfall causing raising of the groundwater table.

Harrow's Level 1 Strategic Flood Risk Assessment (SFRA) indicates that that there are no records of any groundwater flooding within the development and the nearest incident recorded is approximately 1km from site. Additionally, areas within Harrow which are at risk of groundwater flooding have been highlighted within SFRA however none are in close proximity to the development.

During Site Investigations two boreholes were completed to a depth of 25m below ground level which confirmed underlying site conditions to be London Clay. Groundwater was encountered within one borehole at a depth of 5m. A standpipe was installed within the full depth of the borehole to allow the groundwater level to be monitored, however on the subsequent monitoring visit the standpipe was dry. It was concluded that the groundwater encountered was perched in the sandy/ silty portions of the London Clay.

Therefore, based on the evidence provided, the risk of flooding from Groundwater is considered to be **low**.

3.3 Flooding from Surface Water

Surface water flooding occurs when the rainwater does not drain away through the normal system or infiltrate the ground, but instead lies on or flows over the ground.

Figure 3: GOV.UK Flood Map for Planning – Flood risk from Surface Water

The mapping in Figure 3 shows areas of the site is at low and medium risk from surface water flooding. Areas at low risk, are defined as having a chance of flooding of between 0.1% and 1% (1 in 1000 year and 1 in 100 year) and medium risk between 1% and 3.33% (1 in 100 and 1 in 30 year).

Harrow's Level 1 Strategic Flood Risk Assessment (SFRA) indicates that that there are no reported incidents of surface water flooding (including highways) within the development and the nearest incident recorded is approximately 800m from site.

The proposed levels within the site will be designed to ensure that the existing flow paths across the site are maintained following demolition of the existing Oldfield House. Refer to Appendix C for the existing and proposed surface water flow paths. Proposed levels will also ensure surface water run-off is diverted away from the new building, while the surface water drainage network for the proposed development will be designed for the 1 in 100 year return period plus 40% climate change. Refer to *2170727-EWP-ZZ-XX-RP-C-0001-SuDS Statement* for further details on the drainage strategy.

The site is therefore considered to be at **low** risk of surface water flooding.

3.4 Flooding from Infrastructure/Sewer Failure

Sewer records provided by Thames Water show the local sewer network within the vicinity of the site to be separate foul and surface water networks.

The Harrow Level 1 SFRA indicates that there have been no recorded sewer flooding incidents in close proximity to the site, with the closest incident approximately 700m from the development.

A pre-planning enquiry was submitted to Thames Water to confirm that the local sewer system has sufficient capacity to accommodate the proposed development. Thames Water confirmed that the off-site sewer network has the capacity to accept the proposed flows from the new development. The Thames Water correspondence can be found in Appendix D.

As Thames Water are responsible for maintaining their sewer infrastructure, the likelihood of sewer flooding affecting the site is therefore expected to be **low**.

3.5 Flooding from Artificial Water bodies

Following review of the Risk of Flooding from Reservoirs map located on the GOV.UK website, it can be determined that the site is not located within or near the maximum extent of flooding due to artificial reservoir failure. See figure 4 below.

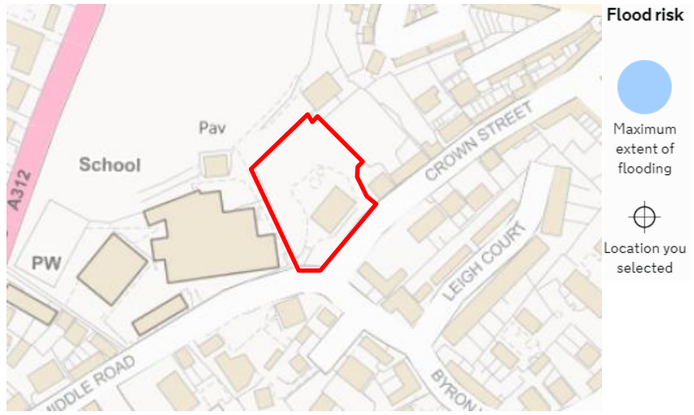

Figure 4: GOV.UK Flood Map for Planning – Flood risk from Reservoirs

Based on the information above, the risk of flooding from this source is considered to be **low**.

3.6 Sequential and Exception Test

All use of land for development is considered appropriate for Flood Zone 1. The sequential test is therefore considered to be passed and the exception test is not required.

Four

Conclusion

4.1

GOV.UK and the Harrow Council Strategic Flood Risk Assessment (SFRA) flood maps show that the site is considered to be in Flood Zone 1. Flood Zone 1 comprises land assessed as having a less than 1 in 1000 annual probability of river or tidal flooding in any year. All uses of land for development are considered appropriate in this zone.

4.2

The GOV.UK flood maps also highlighted areas of and low and medium risk of surface water flooding within the site.

4.3

The proposed levels of the development will be designed to ensure the existing surface water flow paths across the site are maintained while also protecting the new building from surface water ingress. The proposed surface water drainage network for the development will be designed for the 1 in 100 year return period plus 40% climate change. Refer to 2170727-EWP-ZZ-XX-RP-C-0001-SuDS Statement.

4.4

Following review of available information, the development is considered to be at a **low** risk of flooding from all sources.

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Appendices

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A Existing Site Survey

TREE SCHEDULE				
TREE	TRUNKø	HEIGHT	SPREAD	SPECIES
1	0.38	16	12	LONDON PLANE
2	0.4/0.32	17	12	LONDON PLANE
3	0.65	14	9	LONDON PLANE
4	0.26	8	6	HAWTHORN
5	0.26	10	7	HAWTHORN
6	0.3	10	12	BEECH
7	0.4	15	9	HORSE CHESTNUT
8	0.42	15	9	HORSE CHESTNUT
9	0.45/0.45/0.38	20	14	LIME
10	0.55/0.3/0.16	20	10	LIME
11	0.4	18	9	LIME
12	0.4	16	7	LIME
13	0.45	16	12	MAPLE
14	0.25	15	8	MAPLE
15	1.05	12	16	WEEPING WILLOW
16	0.5	16	10	CYPRESS
17	0.3	16	10	CYPRESS
18	0.3	16	10	CYPRESS
19	0.32	16	10	CYPRESS
20	0.3	16	10	CYPRESS
21	0.3	16	10	CYPRESS
22	0.27	16	10	CYPRESS
23	0.24	16	10	CYPRESS
24	0.27	16	10	CYPRESS
25	0.36	16	10	CYPRESS
26	0.54	16	10	CYPRESS
27	0.35	13	10	WHITEBEAM?
28	0.3	13	9	ACACIA?
29	0.4	14	10	HORNBEAM
30	0.3	12	8	WHITEBEAM?
31	0.38	14	10	ACACIA?
32	0.15	6	5	ROWAN
33	0.14	10	3	SILVER BIRCH
34	0.18	12	7	SILVER BIRCH
35	0.58	14	12	HORSE CHESTNUT
36	0.6	11	11	YEW
37	0.75	16	14	HORSE CHESTNUT
38	0.4	14	13	ASH
39	0.52	18	10	CEDAR
40	0.3	16	8	CYPRESS
41	0.35	14	12	SILVER BIRCH

DO NOT SCALE FROM DRAWING
ALL DIMENSIONS TO BE CHECKED ON SITE

NOTES:

ALL MEASUREMENTS TAKEN TO EXISTING SURFACE FINISHES UNLESS STATED OTHERWISE

ALL LEVELS IN METRES

ALL ARROWS POINT UP

SURVEY GRID & LEVELS RELATED TO ORDNANCE SURVEY BY GPS OBSERVATION

LEGEND:

20.00F	FLOOR LEVEL
20.00H	WINDOW HEAD LEVEL
20.00S	WINDOW SILL LEVEL
20.00C	CEILING LEVEL
20.00SC	SUSPENDED CEILING LEVEL
20.00B	BEAM LEVEL
20.00D	DOOR HEAD LEVEL
AB	AIRBRICK
B	BOLLARD
BH	HEIGHT TO BEAM UNDERSIDE
BW	BRICK WALL
BT	BRITISH TELECOM
CATV	CABLE TV
CB	CUPBOARD
CPS	CONCRETE PAVING SLABS
DK	DROP KERB
ER	EARTH ROD
FB	FLOWER BED
FH	FIRE HYDRANT
FW	FOUL WATER
G	GULLY
GV	GAS VALVE
IC	INSPECTION CHAMBER
IL	INVERT LEVEL
LP	LAMP POST
P	POST
RE	RODDING EYE
RG	ROAD GULLY
RS	ROAD SIGN
RWP	RAIN WATER PIPE
SVP	SOIL VENT PIPE
SW	SURFACE WATER
TL	TRAFFIC LIGHT
TOF	TOP OF FENCE LEVEL
TOW	TOP OF WALL LEVEL
TP	TELEGRAPH POLE
V	VENT
VP	VENT PIPE
WM	WATER METER
WP	WASTE PIPE
WSV	WATER STOP VALVE

FENCE TYPES

BW	Barbed Wire	CW	Chicken Wire
CB	Close Board	IW	Interwoven
CI	Corrugated Iron	IR	Iron Railing
CL	Chain Link	OB	Openboard
CPL	Conc Panel	PR	Post and Rail
CP	Chestnut Paling	PW	Post and Wire

All tree details should be checked by Arboriologist

SURVEY CONTROL			
STN	-E-	-N-	-Z-
1	514926.626	187096.604	84.194
2	514922.279	187122.116	82.303
3	514913.562	187148.526	78.898
4	514934.233	187162.980	81.584
5	514951.768	187142.244	84.476
6	514957.150	187119.549	83.615
7	514968.822	187117.376	87.494
8	514956.253	187104.369	86.467
9	514923.806	187078.119	86.025
10	514939.731	187089.863	85.593
11	514951.174	187080.252	87.229

REVISIONS	DATE	BY

matrix SURVEYS
166 Sutton Court Road, London W4 3HR
T-020 8994 0882 E-enquiries@matrixsurveys.co.uk

PROJECT
OLDFIELD HOUSE
JOHN LYON SCHOOL
MIDDLE ROAD
HARROW-ON-THE-HILL
MIDDX. HA2 0HN

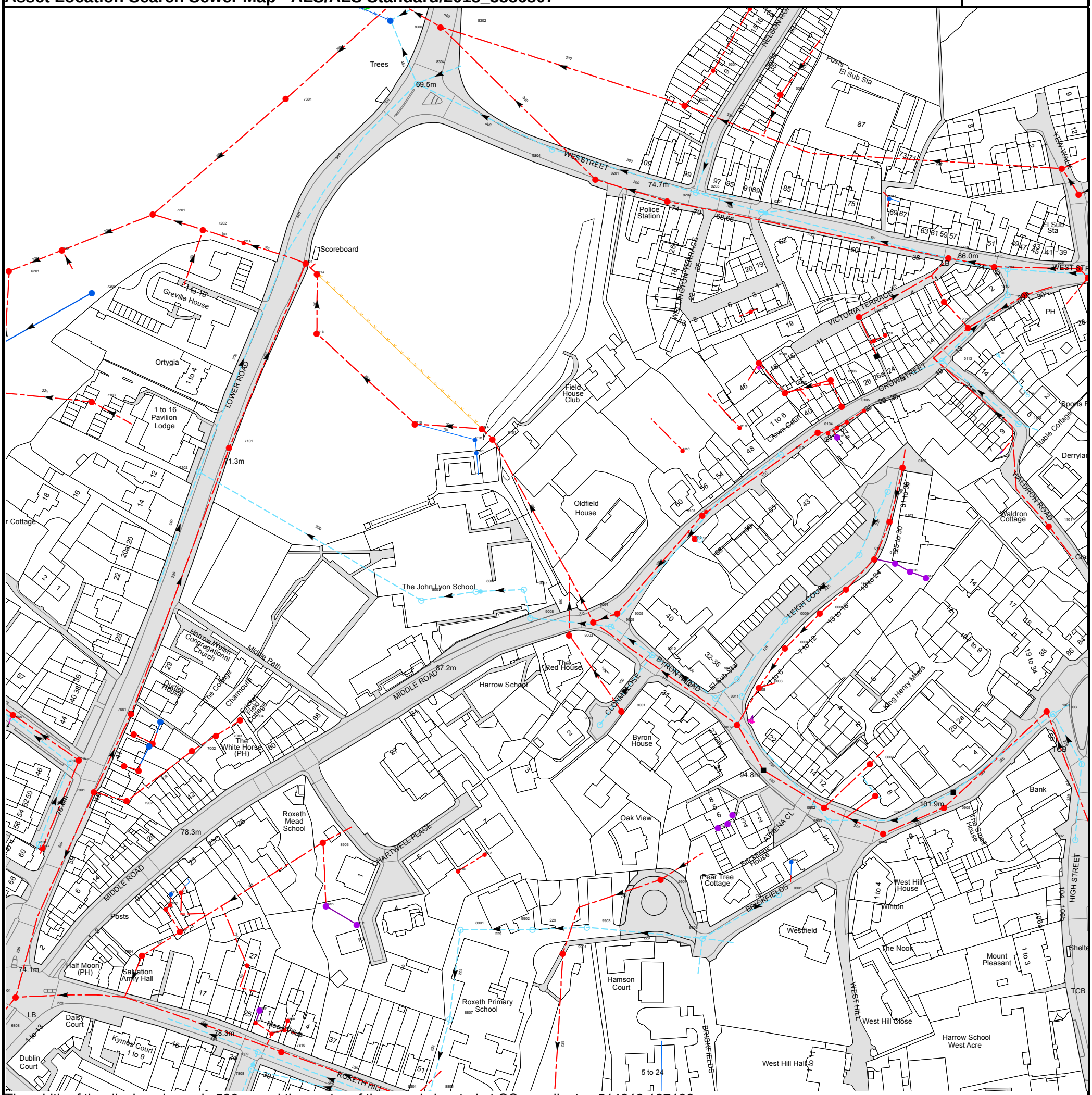
TITLE
TOPOGRAPHICAL SURVEY

AS EXISTING

SCALE 1/200@A1	DATE APR 2018
DRAWN BY DM	CHECKED BY SN
DRAWING No. 01	FILE No. 18/2251

B Thames Water Sewer Records

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3886807



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 514913,187108

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9204	72.47	71.12
8304	69.77	68.41
8302	69.65	67.55
8306	68.88	67.67
121A	n/a	n/a
9203	76.19	73.38
9201	73.52	72.65
1206	87.51	85.98
9302	n/a	n/a
0301	75.74	74.48
9301	n/a	n/a
031A	n/a	n/a
1201	n/a	n/a
0201	n/a	n/a
021D	n/a	n/a
0202	87.64	86.48
1210	90.26	89.16
1202	90.68	89.5
1205	91.88	90.51
1209	88.79	87.46
1204	91.84	90.17
1203	87.96	87
0203	n/a	n/a
0204	77.93	74.88
9202	75.78	74.56
021A	n/a	n/a
7205	n/a	n/a
821A	69.8	67.78
6201	n/a	n/a
8201	69.6	68.13
621A	n/a	n/a
721A	n/a	n/a
7202	n/a	n/a
7201	66.75	65.18
7301	n/a	n/a
0101	97.61	95.84
0110	97.38	95.85
1101	105.45	103.35
0102	98.23	96.69
0111	98.09	96.47
0103	99.09	97.89
0112	n/a	n/a
011F	n/a	n/a
011E	n/a	n/a
0104	91.15	89.73
011G	n/a	n/a
011D	n/a	n/a
1102	97.57	96.46
011C	n/a	n/a
011B	n/a	n/a
0105	91.45	90.04
111A	n/a	n/a
0107	87.64	n/a
0106	90.04	88.84
0108	87.64	85.38
0113	91.32	90.13
111B	n/a	n/a
021C	n/a	n/a
021B	n/a	n/a
6002	73.25	71.42
6001	73.27	71.08
7103	n/a	n/a
7001	74.83	73.42
7102	71.71	70.52
7101	71.39	69.83
1902	106.16	104.65
0904	99.52	97.96
0903	97.03	95.86
0902	96.93	95.07
0905	102.13	100.33
0908	n/a	n/a
0002	99.5	96.65
1004	106.16	n/a
9002	93.38	91.56
1003	104.51	n/a
1001	n/a	n/a
0008	93.23	91.86
0003	93.42	91.66
9012	n/a	n/a
0004	96.51	95.51
0009	95.23	93.34
0005	95.2	94.2
0006	96.52	94.98
001A	n/a	n/a
001B	n/a	n/a
011A	n/a	n/a
821B	70.95	69.46
8903	76.3	71.03
811B	73.25	70.73
8001	n/a	n/a
811D	75.09	74.09

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8002	n/a	n/a
811C	75.17	74.19
811A	74.955	73.665
891A	n/a	n/a
8101	n/a	n/a
9007	82.85	82.05
9008	84.88	83.43
9003	86.73	85.2
9004	86.38	84.57
9013	n/a	n/a
9009	86.83	85.24
9005	86.79	85.06
9001	n/a	n/a
9010	88.97	87.69
911C	n/a	n/a
911A	n/a	n/a
911B	n/a	n/a
9101	88.31	87.06
9011	91.94	90.94
991A	n/a	n/a
991B	n/a	n/a
991C	n/a	n/a
781B	n/a	n/a
891D	n/a	n/a
891C	n/a	n/a
8805	n/a	n/a
8807	n/a	n/a
891B	n/a	n/a
8901	n/a	n/a
9902	n/a	n/a
9901	89.02	87.81
9903	92.01	91.01
9907	93.22	91.82
9906	n/a	n/a
0901	96.57	95.31
091A	n/a	n/a
6901	73.99	72.12
691B	75.53	73.03
691A	75.45	72.83
601B	75.07	72.38
601A	75.07	72.46
7901	75.32	73.7
70BE	n/a	n/a
7902	n/a	n/a
70AI	n/a	n/a
70BD	n/a	n/a
7904	71.32	69.04
70BB	n/a	n/a
70AH	n/a	n/a
70AF	n/a	n/a
791D	n/a	n/a
791C	n/a	n/a
791B	n/a	n/a
791F	n/a	n/a
791E	n/a	n/a
7002	77.88	76.1
7003	78.32	76.5
7004	79.34	77.23
791A	n/a	n/a
7808	79.33	74.73
781E	n/a	n/a
7809	79.87	77.99
781F	n/a	n/a
781D	n/a	n/a
7810	80.39	78.92
781C	n/a	n/a

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

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

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

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

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

Control Valve

Drop Pipe

Ancillary

Weir

End Items

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

Outfall

Undefined End

Inlet

Other Symbols

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

Public/Private Pumping Station

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

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

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

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

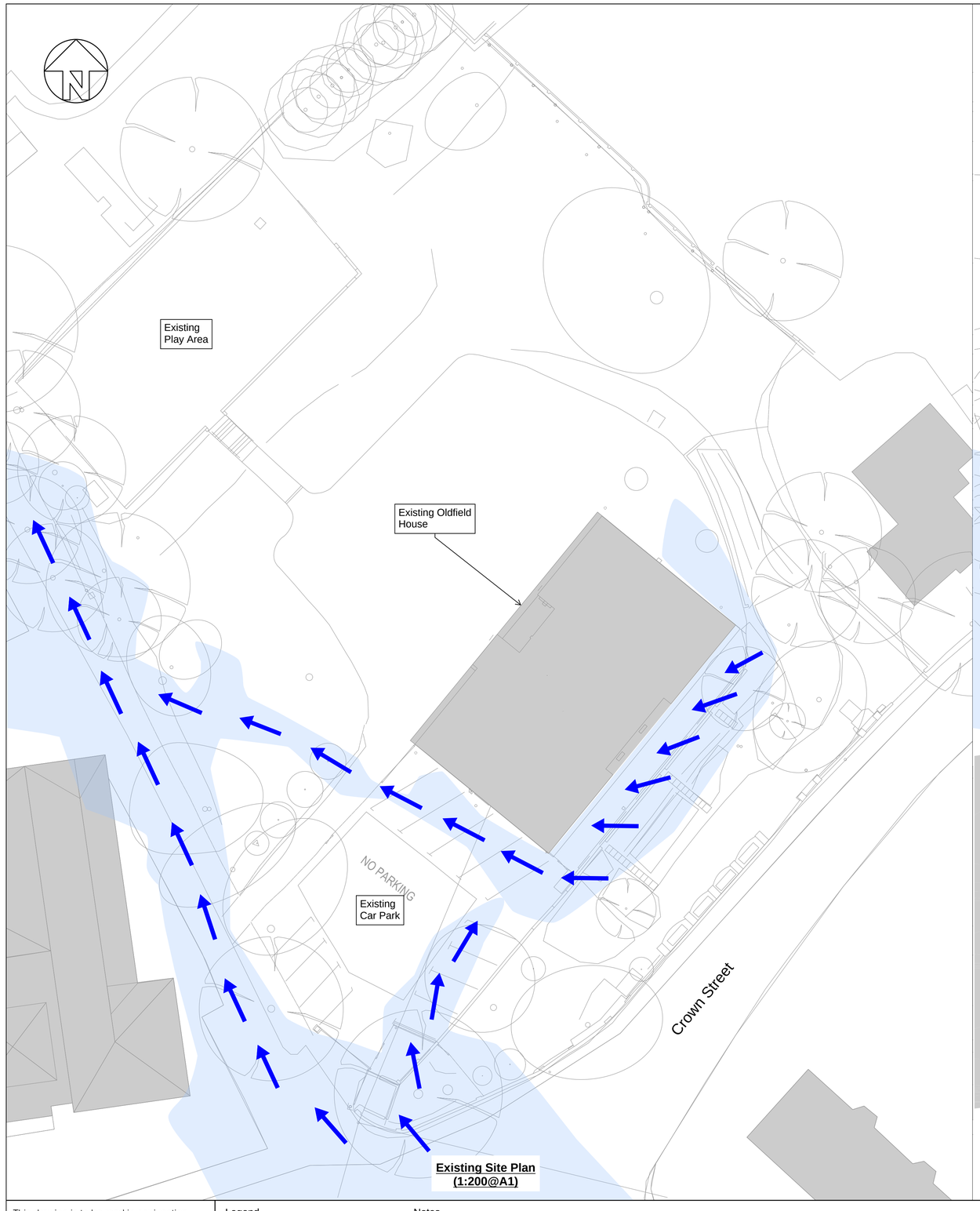
Proposed

Abandoned Sewer

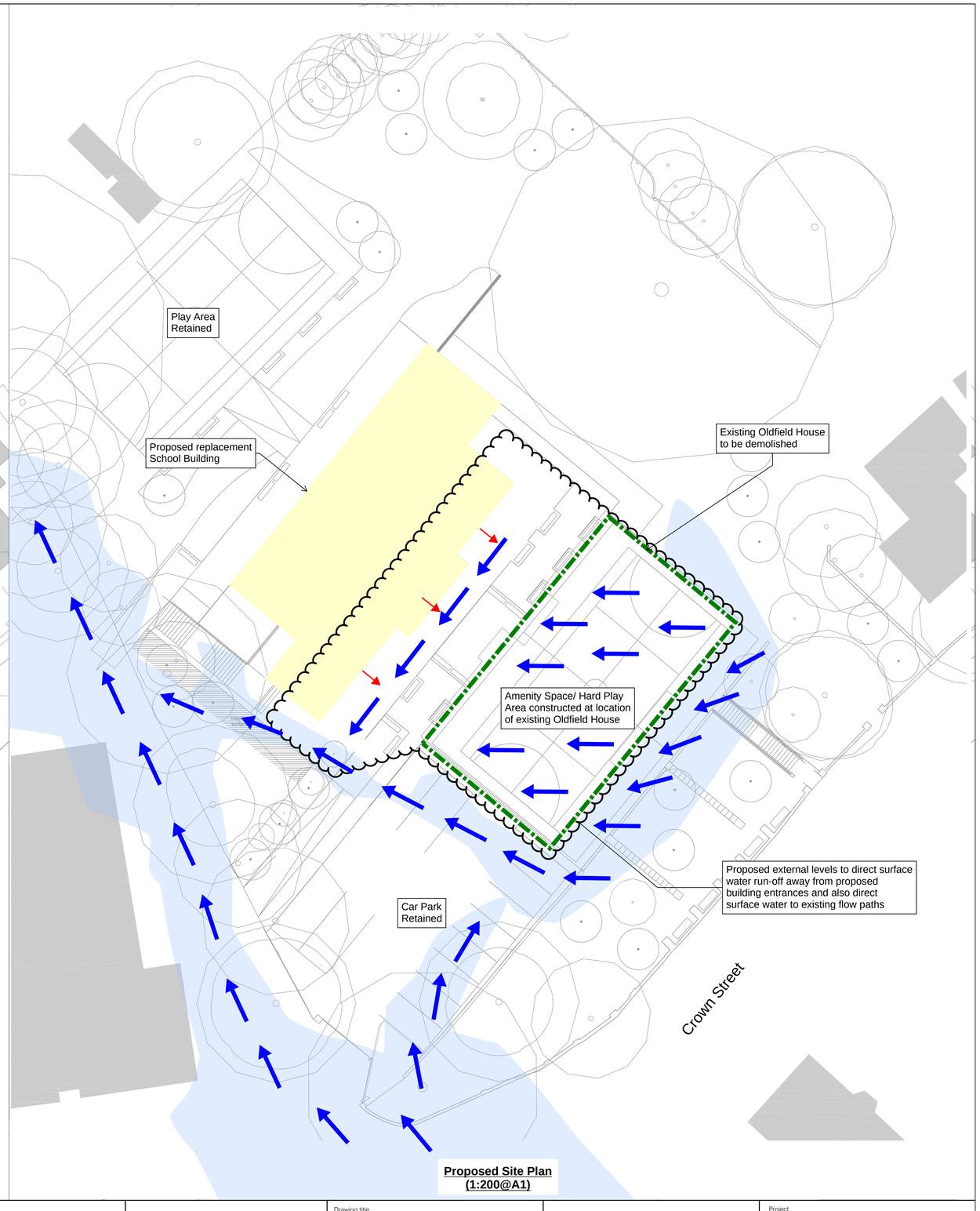
Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

C Existing and Proposed Surface Water Flow Paths



Existing Site Plan (1:200@A1)



Proposed Site Plan (1:200@A1)

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

Legend

- Surface Water Flow Path
- External Falls
- Surface Water Run-off Extents (based on GOV.UK Flood Maps)
- Existing Oldfield House
- New Replacement School Building
- Existing Oldfield House Footprint

Notes

1. Surface Water Run-off Extents based on GOV.UK Flood Maps.
2. Refer to Topographical Survey by Matrix Surveys for existing site levels and to the Proposed Landscape Plan by Planit-IE for proposed site levels.
3. Surface Water Flood Risk has been classified as low for all sources of flooding for the proposed development. Refer to site-specific Flood Risk Assessment *"2170727-EWP-ZZ-XX-RP-C-0002-Flood Risk Assessment"* for further details.

rev	date	by	chk	description
P2	11.11.19	TKe		For Information
P1	10.04.19	PSt	KTr	For Information

Drawing title
Existing and Proposed
Surface Water Flow Paths

scale (s) 1:200@A1, 1:400@A3 | date March 2019 | drawn PSt

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Project
Oldfield House
John Lyon School,
Harrow-on-the-Hill, HA2 0HN

Drawing status: Preliminary | Status S2 | Revision P2

Project no. | Originator | Zone | Level | Type | Role | drg no.
2170727-EWP-ZZ-XX-DR-C-0001

D Thames Water Correspondence

Mr P Storey
Elliot Wood
241 The Broadway
London SW19 1SD

Our ref: DS6054126

0800 009 3921
Monday to Friday, 8am to 5pm

22nd Oct 2018

Pre-planning enquiry: Wastewater Capacity check (Foul Only)

Dear Mr Storey

Thank you for providing details of your development with the Pre-Planning application dated 10th Oct 18' for Oldfeild House Middle rd Harrow- On-The Hill HA2 0HN .

{ Brownfield site (Oldfeild house) re-developed to larger footprint with more classrooms and teaching spaces , with same number of pupils -- Foul Only}.

Foul

If your proposals progress in line with the details you've provided as above, we're pleased to confirm that there will be sufficient sewerage capacity to serve your foul discharges from your development, provided the discharge is by gravity.

Surface Water

NA; Not applied for at present;

General:- Please refer to the attached document titled ''Planning your wastewater'' attached to this letter, specifically to notes relating to surface water.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

Please note that you must keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient sewerage capacity.

What happens next?

Please make sure you submit your connection application, when you are ready, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you've any further questions, please contact me.

Yours sincerely

Siva Sivarajan

Developer Services- Wastewater Adoptions Engineer
Office:0203 577 7752 Mobile: 07747842608
siva.sivarajan@thameswater.co.uk

Thames Water Utilities Ltd, Clearwater Court, Vastern Road, Reading, Berkshire, RG1 8DB
Find us online at developers.thameswater.co.uk

TW internal ref: DTS 59502

Peter Storey

From: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 11 February 2019 09:08
To: Peter Storey
Subject: RE: RE: Oldfield House, John Lyon School, HA2 0HN Pre-planning Enquiry ds6054126 [Filed 11 Feb 2019 09:11]

Dear Sir

i refer to your email query below related to the approval that was given previously for the foul discharges;

I also noted from your original application that the proposal is for an extension to the existing school buildings and the number of pupils is remaining the same, which is the key.

also noted that the other disposal methods will not be feasible at this site due to poor ground conditions, and the non existentence of any watercourses in close proximity to the site.

As such disposal to TW surface water network is acceptable. However as the site is less than 1 Ha you should try and store and attenuate at a rate of 3l/s for the whole site, to the discharge point as detailed in the attchment sent thro'.

regds

Siva Sivarajan
Developer Services- Wastewater Adoptions Engineer
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Original Text

From: Peter Storey <p.storey@elliottwood.co.uk>
To: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:
Sent: 01.02.19 11:07:05
Subject: RE: Oldfield House, John Lyon School, HA2 0HN Pre-planning Enquiry

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Oldfield House

Drainage Strategy and SuDS Statement

engineering a better society

		Remarks:	**Issued for Planning**				
Revision:	P1	Prepared by:	P Storey	Checked by:	K Trimmer	Approved by:	T Kenning
Date:	10/04/2019	Signature:	PSt	Signature:	KTr	Signature:	TKe
Revision:	P2	Prepared by:	P Storey	Checked by:	K Trimmer	Approved by:	T Kenning
Date:	12/04/2019	Signature:	PSt	Signature:	KTr	Signature:	TKe
Revision:	P3	Prepared by:	T Kenning	Checked by:	P Chance	Approved by:	P Chance
Date:	11/11/19	Signature	TKe	Signature:	PCh	Signature:	PCh

Contents

Appendices

One

Introduction

1.1

Elliott Wood Partnership Ltd have been appointed by The John Lyon School to provide a Drainage Strategy and SuDS Statement to support a detailed planning application for the development at Oldfield House, Harrow-on-the-Hill, HA2 0HN.

1.2

The purpose of this report is to explain the approach taken with regards to the below ground drainage strategy. It evaluates the selection of SuDS devices and highlights how the drainage disposal hierarchy has been followed.

1.3

This report has been prepared in accordance with the GOV.UK *Sustainable Drainage Systems: Non-statutory Technical Standards, Harrow Council's Surface Water Management Plan, The West London Strategic Flood Risk Assessment and the London Plan.*

Two

Existing Site

2.1

The existing site is located within The John Lyon School Campus, adjacent to Crown Street. The site is currently occupied by the existing Oldfield House and associated hard play areas.

2.2

The existing site is 55% hardstanding and is approximately 4,175m^2 in size (0.4175ha). The existing site falls by approximately 8-9m from the south-east to the north-west. Refer to Appendix A for the existing site topographical survey.

2.3

Site-specific Investigation works were undertaken to confirm the underlying ground conditions within the site. Two boreholes were completed to a depth of 25m below ground level and confirmed the presence of London Clay to this depth.

Three

Existing Drainage

3.1

Sewer records have been obtained from Thames Water to confirm the location, size and depth of the surrounding sewer network. The records confirm that a 375mm foul water sewer runs alongside the site, beneath Piggy Lane, from south-east to north-west. Sewer records are located in Appendix B.

3.2

A CCTV drainage survey of the existing on-site network has been undertaken by Novum Survey Ltd. The CCTV survey has confirmed that the existing drainage network has separate foul and surface water networks. The survey also confirmed that there is an additional foul sewer which runs through the site adjacent to the existing Oldfield House.

3.3

The foul water from Oldfield House connects into this sewer within the site and the surface water run-off was found to connect into existing soakaways. The CCTV Survey plan can be found in Appendix C.

3.4

The surface water runoff rates for the existing site have been calculated using the Modified Rational Method equation below (based on CIRIA C697) and are shown in Table 1. Calculations have been provided for the existing impermeable area equal to approximately 2,300m^2.

$$Q = 2.78C.i.A$$

Where Q = Existing peak runoff (l/s), C = non-dimensional runoff coefficient=1.3, i = Rainfall intensity (see table 1) and A = total catchment area being drained=0.23ha

Table 1 Existing Surface Water Run-off rates

Return Period	Rainfall Intensity (mm/hr)	Existing run-off (l/s)
1yr	32.8	27.3
30yr	80.6	67.0
100yr	104.9	87.2

Note that the rainfall intensities used in the above calculations have been based on average rainfall intensities for a 15-minute storm using Micro Drainage software.

Four

Proposed Development

4.1

The proposed works involve the demolition of the existing Oldfield House, and the construction of a new four storey school building. Once the new building is constructed the existing Oldfield House is to be demolished and replaced with amenity space/ hard play area.

Proposed Drainage Strategy

4.2

This report has been prepared in accordance with Harrow Council's Surface Water Management Plan and guidance alongside the GOV.UK *Sustainable Drainage Systems: Non-statutory Technical Standards* and Hackney Council's and *Sustainable Drainage Design & Evaluation Guide.*

The following drainage hierarchy has therefore been considered:

- 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
- Attenuate rainwater by storing in tanks or sealed water features for gradual release
- Discharge rainwater direct to a watercourse
- Discharge rainwater to a surface water sewer / drain
- Discharge rainwater to the combined sewer

4.3

When considering rainwater re-use from a sustainability perspective (NPPF principles: environmental, social and economic) this basically translates as an order of priorities; reduce, reuse, recycle. Therefore, it makes much more sense to use less water (by using water efficient appliances) than it does to install a Rainwater Harvesting (RWH) system.

Whilst the principles of RWH are endorsed, for this development it is not considered to be the most environmentally friendly solution, and due to the additional complex drainage installation requirements it is considered that this does not offset the limited quantity of water it removes from the surface water drainage system. Consequently, it would fail to meet the social, environmental and economic tests of the NPPF.

4.4

Maintaining the use of soakaways within the development was explored to confirm whether this disposal method was a viable option. A Site Investigation was undertaken which confirmed the site is underlain by a layer of clay to a depth of 25m (full depth of boreholes) and infiltration testing carried out. This testing confirmed that the ground within the site

had an infiltration rate equal to $1.88x10^{-7}$m/s. Due to the low infiltration rate, the use of soakaways was not considered feasible within the development. It was later identified that the existing soakaways within the site had also failed and surface water was not infiltrating to ground.

4.5

Due to the variance in ground profile and large falls within the site (approximate fall of 8-9m across the site) there are no suitable areas where ponds or open water features could be utilised as part of the drainage scheme.

4.6

There are no nearby accessible water courses to the development however there is a nearby Thames Water surface water sewer network. It is therefore proposed to discharge the surface water run-off from the development site into the Thames Water public surface water sewer network. A direct connection is proposed to the 300mm diameter sewer north-east of the site in the John Lyon School's sports pitches (subject to a Section 106 agreement with Thames Water).

4.7

As infiltration is not considered feasible, it is proposed that the full impermeable area is attenuated and discharged at a restricted rate. Surface water run-off will be attenuated via below ground geocellular crates. Refer to Appendix D for the Proposed Below Ground Drainage Strategy drawing.

4.8

Following liaison with Thames Water, it was deemed appropriate for surface water run-off from this development to be restricted to a maximum rate of 3 l/s up to the 1 in 100 year event plus a 40% climate change allowance. Refer to Appendix E for previous Thames Water correspondence. Microdrainage Calculations of the proposed surface water drainage network have also been included in Appendix F.

4.9

Restricting to a maximum rate of 3 l/s provides a 97% betterment in the 1 in 100 year storm return period. Table 2 details the betterment provided for different storm return periods.

Table 2 Existing Surface Water Run-off rates

Return Period (years)	Existing Run-off (l/s)	Proposed Run-off (l/s)	Run-off Reduction (l/s)	% Reduction of Total site run-off
1	27.3	3.0	24.3	89%
30	67.0	3.0	64.0	96%
100	87.2	3.0	84.2	97%
100 + 40%	N/A	3.0	N/A	>97%

As can be seen in Table 2, the inclusion of the SuDs in this development provides between 89-97% reduction in the peak surface water run off rate. This is deemed to be a significant betterment.

4.10

The evaluation of SuDS is demonstrated in Table 3 below.

Table 3 SuDS Evaluation

SuDS Technique	Y/N	Comment
Green Roofs	N	A green roof system is not feasible within the development as the new school building has a pitched roof.
Rainwater reuse	N	Not considered appropriate within this development.
Basins and ponds	N	There is no feasible location or space where an adequately sized detention basin or pond could be located.
Filter strips and swales	N	There is no feasible location or space where an filter strips or swales could be utilised.
Infiltration devices	N	Infiltration is not deemed feasible for this site as the existing ground conditions are not conducive to infiltration techniques as confirmed through infiltration testing.
Permeable surfaces	N	Infiltration is not deemed feasible for this site, therefore permeable surfaces are not deemed viable for the development.
Tanked systems	**Y**	**Attenuation is to be provided in the form of below ground geocellular crates. Refer to Appendix D for the below ground drainage strategy drawing.**

Five

Maintenance Requirements

5.1

All SuDS will be maintained by the school for the lifetime of the development in accordance with the SuDS Manual as summarised:

Modular Systems – Geo-cellular Storage Crates:

Maintenance Schedule	Required Action	Recommended Frequency
Regular	Inspect and identify any areas that are not operating correctly. If required take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures including catch pits	6 monthly, or as required
Remedial actions	Repair/rehabilitation of inlets, outlets, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms. Include CCTV survey for perforated pipe if excessive silts found in chambers.

Flow Control Device:

Flow control device to be maintained in accordance with the Hydro-Brake Flow Control Maintenance and Safety Data Sheet, included in Appendix G.

Gullies / Linear Channels:

Inspection and removal of debris from silt trap every 3 months; preferably after leaf fall in the autumn. (Timeframe can be adjusted to suit actual site conditions).

Drainage pipes, manholes & Silt traps:

Inspect manholes & silt traps for build-up of silt and general debris (minimum of 6 monthly or to suit site requirements). If silt/debris is building up then clean with jetting lorry / gully sucker and inspect pipe – repeat cleaning if required.

NOTE: Manhole covers can be heavy and suitable lifting equipment / procedures should be used. Where possible, personnel should not enter manholes to carry out maintenance.

Six

Flood Risk and Overland Flows

6.1

As confirmed by Harrow Council, the site is located within surface water Flood Zone 3a and therefore will require a site-specific Flood Risk Assessment (FRA).

For the site-specific FRA refer to separate Elliott Wood report *2170727-EW-ZZ-XX-RP-C-Flood Risk Assessment.*

6.2

The below ground surface water drainage network has been designed to accommodate the 1 in 100 year plus 40% climate change allowance below ground, with no expected exceedance. External levels within the site boundary will be designed to fall away from building entrances and mimic existing surface water flow paths to reduce the risk of flooding to the buildings.

Seven

Summary

7.1

In summary, following the advice and guidance provided by Harrow Council, a SuDS strategy for the planning application associated with Oldfield House, Harrow-on-the-Hill, HA2 0HN has been produced.

7.2

The SuDS Hierarchy has been followed in order to employ the most suitable and practicable SuDS techniques to improve surface water run off rates from the site. The proposed development will restrict surface water run off to the public sewer to 3.0l/s for the site. This provides a betterment on existing of 97% for the 1 in 100-year event.

7.3

The main SuDS method proposed for the development is below ground attenuation. The attenuation system will provide storage to help reduce the peak run off rate from the site. The surface water storage volume has been calculated to store the total of the site's hardstanding impermeable area for events up to and including the 1 in 100-year event + 40% climate change allowance.

7.4

Through the use of SuDS techniques, the surface water management of the proposed site will see a significant betterment from the existing case.

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Appendices

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A Topographic Survey

TREE SCHEDULE				
TREE	TRUNKø	HEIGHT	SPREAD	SPECIES
1	0.38	16	12	LONDON PLANE
2	0.4/0.32	17	12	LONDON PLANE
3	0.65	14	9	LONDON PLANE
4	0.26	8	6	HAWTHORN
5	0.26	10	7	HAWTHORN
6	0.3	10	12	BEECH
7	0.4	15	9	HORSE CHESTNUT
8	0.42	15	9	HORSE CHESTNUT
9	0.45/0.45/0.38	20	14	LIME
10	0.55/0.3/0.16	20	10	LIME
11	0.4	18	9	LIME
12	0.4	16	7	LIME
13	0.45	16	12	MAPLE
14	0.25	15	8	MAPLE
15	1.05	12	16	WEEPING WILLOW
16	0.5	16	10	CYPRESS
17	0.3	16	10	CYPRESS
18	0.3	16	10	CYPRESS
19	0.32	16	10	CYPRESS
20	0.3	16	10	CYPRESS
21	0.3	16	10	CYPRESS
22	0.27	16	10	CYPRESS
23	0.24	16	10	CYPRESS
24	0.27	16	10	CYPRESS
25	0.36	16	10	CYPRESS
26	0.54	16	10	CYPRESS
27	0.35	13	10	WHITEBEAM?
28	0.3	13	9	ACACIA?
29	0.4	14	10	HORNBEAM
30	0.3	12	8	WHITEBEAM?
31	0.38	14	10	ACACIA?
32	0.15	6	5	ROWAN
33	0.14	10	3	SILVER BIRCH
34	0.18	12	7	SILVER BIRCH
35	0.58	14	12	HORSE CHESTNUT
36	0.6	11	11	YEW
37	0.75	16	14	HORSE CHESTNUT
38	0.4	14	13	ASH
39	0.52	18	10	CEDAR
40	0.3	16	8	CYPRESS
41	0.35	14	12	SILVER BIRCH

DO NOT SCALE FROM DRAWING
ALL DIMENSIONS TO BE CHECKED ON SITE

NOTES:

ALL MEASUREMENTS TAKEN TO EXISTING SURFACE FINISHES UNLESS STATED OTHERWISE

ALL LEVELS IN METRES

ALL ARROWS POINT UP

SURVEY GRID & LEVELS RELATED TO ORDNANCE SURVEY BY GPS OBSERVATION

LEGEND:

20.00F	FLOOR LEVEL
20.00H	WINDOW HEAD LEVEL
20.00S	WINDOW SILL LEVEL
20.00C	CEILING LEVEL
20.00SC	SUSPENDED CEILING LEVEL
20.00B	BEAM LEVEL
20.00D	DOOR HEAD LEVEL
AB	AIRBRICK
B	BOLLARD
BH	HEIGHT TO BEAM UNDERSIDE
BW	BRICK WALL
BT	BRITISH TELECOM
CATV	CABLE TV
CB	CUPBOARD
CPS	CONCRETE PAVING SLABS
DK	DROP KERB
ER	EARTH ROD
FB	FLOWER BED
FH	FIRE HYDRANT
FW	FOUL WATER
G	GULLY
GV	GAS VALVE
IC	INSPECTION CHAMBER
IL	INVERT LEVEL
LP	LAMP POST
P	POST
RE	RODDING EYE
RG	ROAD GULLY
RS	ROAD SIGN
RWP	RAIN WATER PIPE
SVP	SOIL VENT PIPE
SW	SURFACE WATER
TL	TRAFFIC LIGHT
TOF	TOP OF FENCE LEVEL
TOW	TOP OF WALL LEVEL
TP	TELEGRAPH POLE
V	VENT
VP	VENT PIPE
WM	WATER METER
WP	WASTE PIPE
WSV	WATER STOP VALVE

FENCE TYPES

BW	Barbed Wire	CW	Chicken Wire
CB	Close Board	IW	Interwoven
CI	Corrugated Iron	IR	Iron Railing
CL	Chain Link	OB	Openboard
CPL	Conc Panel	PR	Post and Rail
CP	Chestnut Paling	PW	Post and Wire

All tree details should be checked by Arboriologist

SURVEY CONTROL			
STN	-E-	-N-	-Z-
1	514926.626	187096.604	84.194
2	514922.279	187122.116	82.303
3	514913.562	187148.526	78.898
4	514934.233	187162.980	81.584
5	514951.768	187142.244	84.476
6	514957.150	187119.549	83.615
7	514968.822	187117.376	87.494
8	514956.253	187104.369	86.467
9	514923.806	187078.119	86.025
10	514939.731	187089.863	85.593
11	514951.174	187080.252	87.229

REVISIONS	DATE	BY

matrix SURVEYS
166 Sutton Court Road, London W4 3HR
T-020 8994 0882 E-enquiries@matrixsurveys.co.uk

PROJECT
OLDFIELD HOUSE
JOHN LYON SCHOOL
MIDDLE ROAD
HARROW-ON-THE-HILL
MIDDX. HA2 0HN

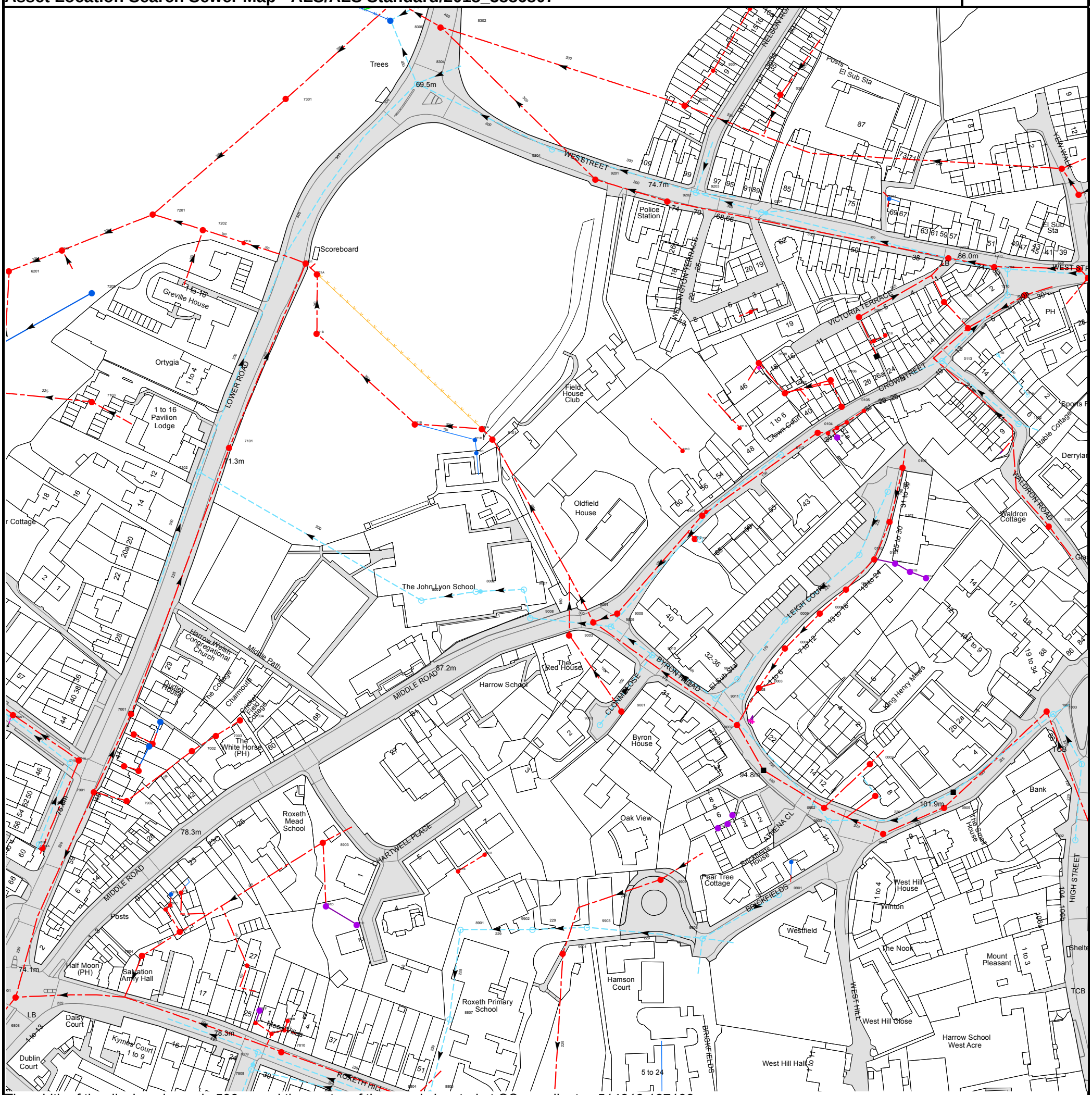
TITLE
TOPOGRAPHICAL SURVEY

AS EXISTING

SCALE 1/200@A1	DATE APR 2018
DRAWN BY DM	CHECKED BY SN
DRAWING No. 01	FILE No. 18/2251

B Thames Water Sewer Records

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3886807



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 514913,187108

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9204	72.47	71.12
8304	69.77	68.41
8302	69.65	67.55
8306	68.88	67.67
121A	n/a	n/a
9203	76.19	73.38
9201	73.52	72.65
1206	87.51	85.98
9302	n/a	n/a
0301	75.74	74.48
9301	n/a	n/a
031A	n/a	n/a
1201	n/a	n/a
0201	n/a	n/a
021D	n/a	n/a
0202	87.64	86.48
1210	90.26	89.16
1202	90.68	89.5
1205	91.88	90.51
1209	88.79	87.46
1204	91.84	90.17
1203	87.96	87
0203	n/a	n/a
0204	77.93	74.88
9202	75.78	74.56
021A	n/a	n/a
7205	n/a	n/a
821A	69.8	67.78
6201	n/a	n/a
8201	69.6	68.13
621A	n/a	n/a
721A	n/a	n/a
7202	n/a	n/a
7201	66.75	65.18
7301	n/a	n/a
0101	97.61	95.84
0110	97.38	95.85
1101	105.45	103.35
0102	98.23	96.69
0111	98.09	96.47
0103	99.09	97.89
0112	n/a	n/a
011F	n/a	n/a
011E	n/a	n/a
0104	91.15	89.73
011G	n/a	n/a
011D	n/a	n/a
1102	97.57	96.46
011C	n/a	n/a
011B	n/a	n/a
0105	91.45	90.04
111A	n/a	n/a
0107	87.64	n/a
0106	90.04	88.84
0108	87.64	85.38
0113	91.32	90.13
111B	n/a	n/a
021C	n/a	n/a
021B	n/a	n/a
6002	73.25	71.42
6001	73.27	71.08
7103	n/a	n/a
7001	74.83	73.42
7102	71.71	70.52
7101	71.39	69.83
1902	106.16	104.65
0904	99.52	97.96
0903	97.03	95.86
0902	96.93	95.07
0905	102.13	100.33
0908	n/a	n/a
0002	99.5	96.65
1004	106.16	n/a
9002	93.38	91.56
1003	104.51	n/a
1001	n/a	n/a
0008	93.23	91.86
0003	93.42	91.66
9012	n/a	n/a
0004	96.51	95.51
0009	95.23	93.34
0005	95.2	94.2
0006	96.52	94.98
001A	n/a	n/a
001B	n/a	n/a
011A	n/a	n/a
821B	70.95	69.46
8903	76.3	71.03
811B	73.25	70.73
8001	n/a	n/a
811D	75.09	74.09

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8002	n/a	n/a
811C	75.17	74.19
811A	74.955	73.665
891A	n/a	n/a
8101	n/a	n/a
9007	82.85	82.05
9008	84.88	83.43
9003	86.73	85.2
9004	86.38	84.57
9013	n/a	n/a
9009	86.83	85.24
9005	86.79	85.06
9001	n/a	n/a
9010	88.97	87.69
911C	n/a	n/a
911A	n/a	n/a
911B	n/a	n/a
9101	88.31	87.06
9011	91.94	90.94
991A	n/a	n/a
991B	n/a	n/a
991C	n/a	n/a
781B	n/a	n/a
891D	n/a	n/a
891C	n/a	n/a
8805	n/a	n/a
8807	n/a	n/a
891B	n/a	n/a
8901	n/a	n/a
9902	n/a	n/a
9901	89.02	87.81
9903	92.01	91.01
9907	93.22	91.82
9906	n/a	n/a
0901	96.57	95.31
091A	n/a	n/a
6901	73.99	72.12
691B	75.53	73.03
691A	75.45	72.83
601B	75.07	72.38
601A	75.07	72.46
7901	75.32	73.7
70BE	n/a	n/a
7902	n/a	n/a
70AI	n/a	n/a
70BD	n/a	n/a
7904	71.32	69.04
70BB	n/a	n/a
70AH	n/a	n/a
70AF	n/a	n/a
791D	n/a	n/a
791C	n/a	n/a
791B	n/a	n/a
791F	n/a	n/a
791E	n/a	n/a
7002	77.88	76.1
7003	78.32	76.5
7004	79.34	77.23
791A	n/a	n/a
7808	79.33	74.73
781E	n/a	n/a
7809	79.87	77.99
781F	n/a	n/a
781D	n/a	n/a
7810	80.39	78.92
781C	n/a	n/a

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

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

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

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

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

Control Valve

Drop Pipe

Ancillary

Weir

End Items

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

Outfall

Undefined End

Inlet

Other Symbols

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

Public/Private Pumping Station

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

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

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

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

C CCTV Survey Plan

TREE SCHEDULE				
TREE	TRUNK⌀	HEIGHT	SPREAD	SPECIES
1	0.38	16	12	LONDON PLANE
2	0.4/0.32	17	12	LONDON PLANE
3	0.65	14	9	LONDON PLANE
4	0.26	8	6	HAWTHORN
5	0.26	10	7	HAWTHORN
6	0.3	10	12	BEECH
7	0.4	15	9	HORSE CHESTNUT
8	0.42	15	9	HORSE CHESTNUT
9	0.45/0.45/0.45/0.28	20	14	LIME
10	0.55/0.53/0.16	20	10	LIME
11	0.4	18	9	LIME
12	0.4	16	7	LIME
13	0.45	16	12	MAPLE
14	0.25	15	8	MAPLE
15	1.05	12	16	WEEPING WILLOW
16	0.5	16	10	CYPRESS
17	0.3	16	10	CYPRESS
18	0.3	16	10	CYPRESS
19	0.32	16	10	CYPRESS
20	0.3	16	10	CYPRESS
21	0.3	16	10	CYPRESS
22	0.27	16	10	CYPRESS
23	0.24	16	10	CYPRESS
24	0.27	16	10	CYPRESS
25	0.36	16	10	CYPRESS
26	0.54	16	10	CYPRESS
27	0.35	13	10	WHITEBEAM?
28	0.3	13	9	ACACIA?
29	0.4	14	10	HORNBEAM
30	0.3	12	8	WHITEBEAM?
31	0.38	14	10	ACACIA?
32	0.15	6	5	ROWAN
33	0.14	10	3	SILVER BIRCH
34	0.18	12	7	SILVER BIRCH
35	0.58	14	12	HORSE CHESTNUT
36	0.6	11	11	YEW
37	0.75	16	14	HORSE CHESTNUT
38	0.4	14	13	ASH
39	0.52	18	10	CEDAR
40	0.3	16	8	CYPRESS
41	0.35	14	12	SILVER BIRCH

DO NOT SCALE FROM DRAWING
ALL DIMENSIONS TO BE CHECKED ON SITE

NOTES:

ALL MEASUREMENTS TAKEN TO EXISTING SURFACE FINISHES UNLESS STATED OTHERWISE

ALL LEVELS IN METRES

ALL ARROWS POINT UP

SURVEY GRID & LEVELS RELATED TO ORDNANCE SURVEY BY GPS OBSERVATION

LEGEND:

20.00F	FLOOR LEVEL
20.00H	WINDOW HEAD LEVEL
20.00S	WINDOW SILL LEVEL
20.00C	CEILING LEVEL
20.00SC	SUSPENDED CEILING LEVEL
20.00B	BEAM LEVEL
20.00D	DOOR HEAD LEVEL
AB	AIRBRICK
B	BOLLARD
BH	HEIGHT TO BEAM UNDERSIDE
BW	BRICK WALL
BT	BRITISH TELECOM
CATV	CABLE TV
CB	CUPBOARD
CPS	CONCRETE PAVING SLABS
DK	DROP KERB
ER	EARTH ROD
FB	FLOWER BED
FH	FIRE HYDRANT
FW	FOUL WATER
G	GULLY
GV	GAS VALVE
IC	INSPECTION CHAMBER
IL	INVERT LEVEL
LP	LAMP POST
P	POST
RE	RODDING EYE
RG	ROAD GULLY
RS	ROAD SIGN
RWP	RAIN WATER PIPE
SVP	SOIL VENT PIPE
SW	SURFACE WATER
TL	TRAFFIC LIGHT
TOF	TOP OF FENCE LEVEL
TOW	TOP OF WALL LEVEL
TP	TELEGRAPH POLE
V	VENT
VP	VENT PIPE
WM	WATER METER
WP	WASTE PIPE
WSV	WATER STOP VALVE

FENCE TYPES

BW	Barbed Wire	CW	Chicken Wire
CB	Close Board	IW	Interwoven
CI	Corrugated Iron	IR	Iron Railing
CL	Chain Link	OB	Openboard
CPL	Conc Panel	PR	Post and Rail
CP	Chestnut Paling	PW	Post and Wire

All tree details should be checked by Arboriologist

SURVEY CONTROL			
STN	-E-	-N-	-Z-
1	514926.626	187096.604	84.194
2	514922.279	187122.116	82.303
3	514912.562	187148.526	78.898
4	514934.233	187162.980	81.584
5	514951.788	187142.244	84.476
6	514957.150	187119.549	83.615
7	514968.822	187117.376	87.494
8	514956.253	187104.369	86.487
9	514923.806	187078.119	86.025
10	514939.731	187089.863	85.593
11	514951.174	187080.252	87.229

REVISIONS	DATE	BY

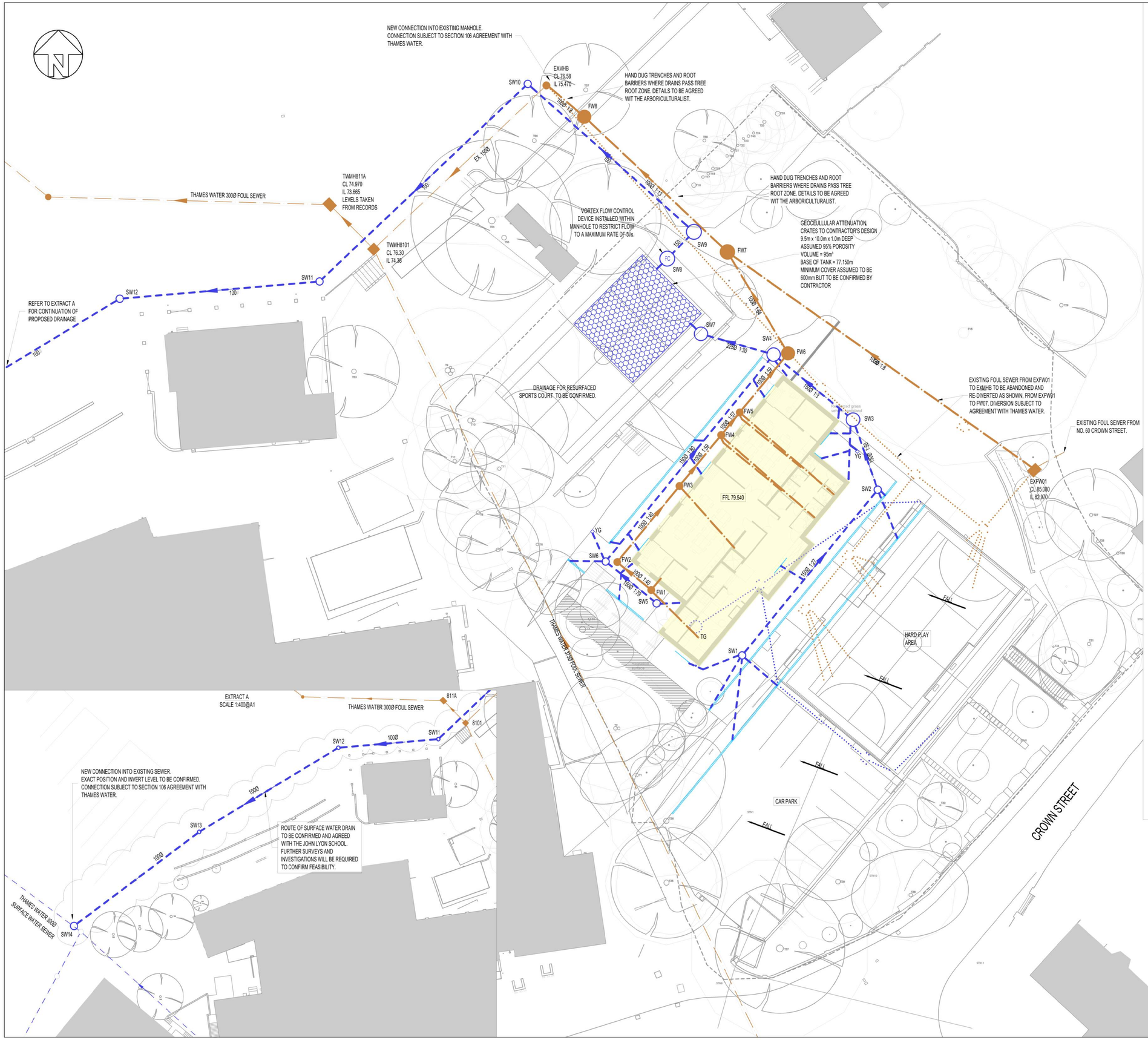
matrix SURVEYS
166 Sutton Court Road, London W4 3HR
T-020 8994 0882 E-enquiries@matrixsurveys.co.uk

PROJECT
OLDFIELD HOUSE
JOHN LYON SCHOOL
MIDDLE ROAD
HARROW-ON-THE-HILL
MIDDX. HA2 0HN

TITLE
TOPOGRAPHICAL SURVEY
AS EXISTING

SCALE 1/200@A1	DATE APR 2018
DRAWN BY DM	CHECKED BY SN
DRAWING No. 01	FILE No. 18/2251

D Proposed Below Ground Drainage Layout and Manhole Schedule



BELOW GROUND DRAINAGE NOTES

1. THE LOCATION AND LEVEL OF EXISTING DRAINAGE CONNECTIONS AND EXISTING SERVICES IS TO BE CHECKED PRIOR TO COMMENCEMENT OF DRAINAGE WORKS. ANY VARIANCE TO THE DETAILS ON THIS DRAWING AND THE SCHEDULE IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
2. THE DESIGN IS BASED ON THE INFORMATION AVAILABLE ON THE DATE OF ISSUE FROM OTHER PARTIES (EG. ARCHITECT AND M & E ENGINEER). IT IS SUBJECT TO CHANGE RESULTING FROM UPDATES TO THE AVAILABLE INFORMATION FROM OTHERS.
3. THE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE NBS SPECIFICATIONS, ASSOCIATED MANHOLE SCHEDULE AND STANDARD DRAINAGE DETAIL DRAWINGS WHERE APPLICABLE.
4. THE POSITIONS OF FOUL AND SURFACE WATER DRAINAGE POINTS ARE INDICATIVE ONLY, REFER TO THE ARCHITECTS DRAWINGS FOR SETTING OUT DETAILS.
5. PRIVATE FOUL AND SURFACE WATER DRAINAGE IS TO BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS PART H, BS EN752 AND BS EN12056.
6. DRAINS AT BASEMENT LEVEL ARE TO BE CONSTRUCTED USING CAST IRON (TIMESAVER OR EQUIVALENT) AND FLEXIBLY JOINTED TO BS 437.
7. DRAINS AT GROUND LEVEL ARE TO BE CONSTRUCTED USING VITRIFIED CLAY PIPES TO BS EN 295-1 SUPER STRENGTH SPECIFICATION (HEPWORTH SUPERSLEVE) OR SIMILAR APPROVED.
8. ALL SOIL CONNECTIONS UNDER BUILDINGS TO BE 100mm DIA LAID AT A MINIMUM GRADIENT OF 1/40 UNLESS NOTED OTHERWISE.
9. ALL SURFACE WATER CONNECTIONS TO BE 100mm DIAMETER AND TO BE LAID AT A MINIMUM GRADIENT OF 1/80 UNLESS NOTED OTHERWISE .
10. ALL SOIL CONNECTIONS AND RAINWATER PIPES SHOULD BE RODDABLE FROM GROUND LEVEL.
11. RAINWATER DOWN PIPES ARE TO CONNECT TO A DRAIN VIA A REST BEND. WHERE DRAINAGE IS COMBINED A 'P' TRAP MUST ALSO BE PROVIDED.
12. IN CASES OF IN SITU CONCRETE FLOOR SLABS, DRAINS ARE TO BE CAST INTEGRAL WITH THE SLAB WHERE PIPE COVER TO THE CROWN IS LESS THAN 300mm. - NOTE SPECIAL PROVISIONS APPLY TO BASEMENT FLOOR SLABS - SEE DETAILED DRAINAGE AND STRUCTURAL DRAWINGS. CONCRETE ENCASEMENT TO BE REINFORCED AS PER DRAINAGE DETAIL.
13. WHERE DRAINS PASS THROUGH FOUNDATIONS OR OTHER RIGID STRUCTURES A LINTEL, OR SLEEVE IS TO BE USED AND PROVISION FOR FLEXIBILITY IS TO BE MADE USING ROCKER PIPES.
14. BACKFILLING OF DRAIN TRENCHES ADJACENT TO BUILDING OR OTHER STRUCTURES IS TO BE IN ACCORDANCE WITH DIAGRAM 8 OF THE BUILDING REGULATIONS.
15. ANY PIPE OR GULLY OR OTHER FITTING OR DUCT PENETRATING THE BASEMENT SLAB OR WALL IS TO BE WATERPROOFED USING HYDROPHILIC STRIPS OR PUDDLE FLANGES TO ENSURE A WATER TIGHT JOINT. CONCRETE SURROUND TO DRAINAGE PIPES AND FITTINGS MAY BE REQUIRED IN CERTAIN CASES - REFER TO DETAILED DRAINAGE DRAWINGS AND RELEVANT STRUCTURAL DETAILS.
16. EXISTING FOUNDATIONS AND RETAINING WALLS MUST NOT BE UNDERMINED BY NEW DRAINAGE RUNS UNLESS AGREED IN WRITING WITH THE STRUCTURAL ENGINEER. CONTRACTOR TO SUBMIT METHOD STATEMENTS AND TEMPORARY WORKS PROPOSALS TO THE STRUCTURAL ENGINEER FOR COMMENT PRIOR TO COMMENCEMENT OF WORKS.
17. ALL DRAINAGE EXCAVATIONS SHOULD BE RISK ASSESSED BY THE CONTRACTOR TO ENSURE TRENCH SAFETY / STABILISATION MEASURES ARE CONSIDERED DURING THE CONSTRUCTION PERIOD. ANY EXCAVATIONS LEFT EXPOSED SHOULD BE INSPECTED BY A COMPETENT PERSON ON A DAILY BASIS. GROUND CONDITIONS SHOULD BE MONITORED AND TOOL BOX TALKS SHOULD INCLUDE SITE INVESTIGATION INFORMATION TO AID THE CONTRACTORS ONGOING RISK ASSESSMENT AND METHOD OF EXCAVATION. ALL EXCAVATIONS SHOULD BE ASSESSED BY A COMPETENT PERSON FOR CONFINED SPACES REQUIREMENTS.
18. THE CONTRACTOR IS TO CONSIDER PHASING OF THE DRAINAGE INSTALLATION AND ARE TO PROVIDE TEMPORARY DRAINAGE MEASURES THEY DETERMINE ARE REQUIRED.
19. SuDS ARE TO BE INSTALLED IN ACCORDANCE WITH THE RECOMMENDATIONS MADE WITHIN THE CIRIA SUDS MANUAL C753 (WITH PARTICULAR ATTENTION DRAWN TO CHAPTER 31) AND CIRIA GUIDANCE ON THE CONSTRUCTION OF SuDS C768. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONSIDER CONSTRUCTION PROGRAMME OF SuDS.
20. DETAILED DESIGN OF GEOCELLULAR ATTENUATION CRATES IS A CDP ITEM AND SHOULD BE BASED ON LEVEL, LAYOUT AND VOLUME DETAILS SHOWN. DETAILED SHOULD BE PROVIDED TO THE ELLIOTT WOOD TO PASS COMMENT.

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

LEGEND

- FOUL WATER MANHOLE
- SURFACE WATER MANHOLE
- EXISTING FOUL WATER
- EXISTING SURFACE WATER
- PROPOSED FOUL WATER
- PROPOSED SURFACE WATER
- FOUL WATER PIPE TO BE ABANDONED
- SURFACE WATER PIPE ABANDONED
- PROPOSED FOUL WATER RISING MAIN
- PROPOSED LINEAR CHANNEL WITH HEELGUARD GRATING
- PROPOSED THRESHOLD DRAIN WITH BRICK SLOT UPSTAND
- RG TRAPPED ROAD GULLY
- YG TRAPPED YARD GULLY
- FOUL DROP POINT
- SVP SOIL VENT PIPE
- RWP RAIN WATER PIPE
- GEOCELLULAR SURFACE WATER ATTENUATION
- FC FLOW CONTRCL CHAMBER
- EXISTING BUILDING
- PROPOSED BUILDING

NOT FOR CONSTRUCTION

P5	07.11.19	TKe	PCh	Revised to suit upcated scheme
P4	03.05.19	TKe		Issued for Stage 3
P3	15.04.19	PSt	KTr	Revised Surface Water Run
P2	12.04.19	PSt	KTr	Updated for Planning
P1	10.04.19	PSt	KTr	Issued for Information
rev	date	by	chk	description

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Consulting Structural and Civil Engineers
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Project

Oldfield House
John Lyon School
Harrow-on-the-Hill, HA2 0HN

Drawing title

Proposed Below Ground Drainage Layout

Scale (s)	Date	Drawn
1:200@ A1; 1:400@ A3	April 2019	PSt

Drawing status: Preliminary — Status S2 — Revision P5

Project no. 2170727 - Originator EWP - Zone ZZ - Level 00 - Type DR - Role C - drg no. 1000

MANHOLE SCHEDULE									
Manhole	Chamber Type	Cover Level (m)	Depth	Chamber Size	Eastings	Northings	Clear Opening	Cover Grade	Comments
FW1	PPIC	CL = 79.525 BASE OF MANHOLE = 78.780 INV OUT = 78.780	0.745	450Ø	514916.341	187120.988	450x450	B125	Recessed Cover
FW2	PPIC	CL = 79.525 BASE OF MANHOLE = 78.660 INV IN = 78.660 INV OUT = 78.660	0.865	450Ø	514912.662	187124.001	450x450	B125	Recessed Cover
FW3	PPIC	CL = 79.525 BASE OF MANHOLE = 78.395 INV IN = 78.395 INV OUT = 78.395	1.130	450Ø	514919.384	187132.208	450x450	B125	Recessed Cover
FW4	PPIC	CL = 79.525 BASE OF MANHOLE = 78.275 INV IN = 78.275 INV OUT = 78.275	1.250	450Ø	514923.878	187137.696	450x450	B125	Recessed cover with reduced access
FW5	PPIC	CL = 79.525 BASE OF MANHOLE = 78.220 INV IN = 78.220 INV OUT = 78.220	1.305	450Ø	514925.878	187140.138	450x450	B125	Recessed cover with reduced access
FW6	PCC	CL = 79.500 BASE OF MANHOLE = 78.080 INV IN = 78.080 INV OUT = 78.080	1.420	1050Ø	514931.096	187146.508	600x600	B125	
FW7	PCC	CL = 80.000 BASE OF MANHOLE = 77.880 INV IN = 77.880 INV IN = 77.880 INV OUT = 77.880	2.120	1200Ø	514924.542	187157.443	600x600	B125	
FW8	PCC	CL = 77.350 BASE OF MANHOLE = 76.200 INV IN = 76.200 INV OUT = 76.200	1.150	1050Ø	514909.108	187172.026	600x600	D400	

MANHOLE SCHEDULE									
Manhole	Chamber Type	Cover Level (m)	Depth	Chamber Size	Eastings	Northings	Clear Opening	Cover Grade	Comments
SW1	PPIC	CL = 83.550 BASE OF MANHOLE = 82.550 INV OUT = 82.550	1.000	450Ø	514926.133	187113.935	450x450	B125	Recessed cover
SW2	PPIC	CL = 83.550 BASE OF MANHOLE = 81.700 INV IN = 81.700 INV OUT = 81.700	1.850	450Ø	514940.769	187131.804	450x450	B125	Recessed cover with reduced access.
SW3	PCC	CL = 83.100 BASE OF MANHOLE = 81.540 INV IN = 81.540 INV OUT = 81.540	1.560	1050Ø	514938.101	187139.358	600x600	D400	
SW4	PCC	CL = 79.500 BASE OF MANHOLE = 78.200 INV IN = 78.275 INV IN = 78.275 INV OUT = 78.200	1.300	1050Ø	514929.532	187146.377	600x600	B125	
SW5	PPIC	CL = 79.525 BASE OF MANHOLE = 78.725 INV OUT = 78.725	0.800	450Ø	514916.925	187119.547	450x450	B125	Recessed cover
SW6	PPIC	CL = 79.525 BASE OF MANHOLE = 78.635 INV IN = 78.635 INV OUT = 78.635	0.890	450Ø	514911.416	187124.060	450x450	B125	Recessed cover
SW7	PCC	CL = 79.050 BASE OF MANHOLE = 77.525 INV IN = 77.925 INV OUT = 77.925	1.525	1050Ø	514921.692	187148.609	600x600	B125	Recessed cover 400mm Sump
SW8	PCC	CL = 78.850 BASE OF MANHOLE = 76.750 INV IN = 77.150 INV OUT = 77.150	2.100	1200Ø	514918.060	187156.720	600x600	B125	Recessed cover Hydrobrake 400mm Sump
SW9	PCC	CL = 79.500 BASE OF MANHOLE = 77.000 INV IN = 77.000 INV OUT = 77.000	2.500	1200Ø	514920.940	187159.608	600x600	B125	
SW10	PPIC	CL = 76.250 BASE OF MANHOLE = 75.050 INV IN = 75.050 INV OUT = 75.050	1.200	450Ø	514903.006	187175.563	450x450	D400	
SW11	PPIC	CL = 75.000 BASE OF MANHOLE = 74.000 INV IN = 74.000 INV OUT = 74.000	1.000	450Ø	514880.536	187154.257	450x450	D400	
SW12	PPIC	CL = 74.500 BASE OF MANHOLE = 73.500 INV IN = 73.500 INV OUT = 73.500	1.000	450Ø	514858.980	187152.396	450x450	D400	
SW13	PPIC	CL = 74.000 BASE OF MANHOLE = 73.050 INV IN = 73.050 INV OUT = 73.050	0.950	450Ø	514828.938	187134.244	450x450	D400	
SW14	PCC	CL = 74.500 BASE OF MANHOLE = 72.600 INV IN = 72.600	1.900	1200Ø	514801.945	187113.970	600x600	D400	

MANHOLE SIZES/DEPTHS AND POSITION SUBJECT TO CONFIRMATION OF SUITABLE DEPTH OF SURFACE WATER SEWER IN VICINITY OF CRICKET PRACTICE NETS

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

NOTES

1. COVER LEVELS ARE APPROXIMATE ONLY. REFER TO LANDSCAPE ARCHITECTS DRAWING FOR EXACT LEVELS.
2. MANHOLE COVERS ARE TO BE RECESSED WHERE LOCATED WITHIN PAVED AREAS. ALL OTHER COVERS ARE TO BE DUCTILE IRON.

NOT FOR CONSTRUCTION

rev	date	by	chk	description
P2	07.11.19	TKe	PCh	Revised to suit updated scheme
P1	03.05.19	TKe	WHu	Issued for Stage 3

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Project

Oldfield House
John Lyon School
Harrow-on-the-Hill
HA2 0HN

Drawing title

Proposed Manhole Schedule

Scale (s)	Date	Drawn
NTS	May 2019	TKe

Drawing status	Status	Revision
Preliminary	S2	P2

Project no.	Originator	Zone	Level	Type	Role	drg no.
2170727	EWP	ZZ	00	DR	C	1100

E Thames Water Correspondence

Mr P Storey
Elliot Wood
241 The Broadway
London SW19 1SD

Our ref: DS6054126

0800 009 3921
Monday to Friday, 8am to 5pm

22nd Oct 2018

Pre-planning enquiry: Wastewater Capacity check (Foul Only)

Dear Mr Storey

Thank you for providing details of your development with the Pre-Planning application dated 10th Oct 18' for Oldfeild House Middle rd Harrow- On-The Hill HA2 0HN .

{ Brownfield site (Oldfeild house) re-developed to larger footprint with more classrooms and teaching spaces , with same number of pupils -- Foul Only}.

Foul

If your proposals progress in line with the details you've provided as above, we're pleased to confirm that there will be sufficient sewerage capacity to serve your foul discharges from your development, provided the discharge is by gravity.

Surface Water

NA; Not applied for at present;

General:- Please refer to the attached document titled ''Planning your wastewater'' attached to this letter, specifically to notes relating to surface water.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

Please note that you must keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient sewerage capacity.

What happens next?

Please make sure you submit your connection application, when you are ready, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you've any further questions, please contact me.

Yours sincerely

Siva Sivarajan

Developer Services- Wastewater Adoptions Engineer
Office:0203 577 7752 Mobile: 07747842608
siva.sivarajan@thameswater.co.uk

Thames Water Utilities Ltd, Clearwater Court, Vastern Road, Reading, Berkshire, RG1 8DB
Find us online at developers.thameswater.co.uk

TW internal ref: DTS 59502

Peter Storey

From: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 11 February 2019 09:08
To: Peter Storey
Subject: RE: RE: Oldfield House, John Lyon School, HA2 0HN Pre-planning Enquiry ds6054126 [Filed 11 Feb 2019 09:11]

Dear Sir

i refer to your email query below related to the approval that was given previously for the foul discharges;

I also noted from your original application that the proposal is for an extension to the existing school buildings and the number of pupils is remaining the same, which is the key.

also noted that the other disposal methods will not be feasible at this site due to poor ground conditions, and the non existentence of any watercourses in close proximity to the site.

As such disposal to TW surface water network is acceptable. However as the site is less than 1 Ha you should try and store and attenuate at a rate of 3l/s for the whole site, to the discharge point as detailed in the attchment sent thro'.

regds

Siva Sivarajan
Developer Services- Wastewater Adoptions Engineer
Office:0203 577 7752 Mobile: 07747642603
siva.sivarajan@thameswater.co.uk

Thames Water Utilities Ltd, Clearwater Court, Vastern Road, Reading, Berkshire, RG1 8DB
Find us online at developers.thameswater.co.uk

Find us online at developers.thameswater.co.uk

Original Text

From: Peter Storey <p.storey@elliottwood.co.uk>
To: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:
Sent: 01.02.19 11:07:05
Subject: RE: Oldfield House, John Lyon School, HA2 0HN Pre-planning Enquiry

F Microdrainage Calculations – Proposed Surface Water Network

Elliott Wood Partnership LTD		Page 1
241 The Broadway London SW19 1SD	Proposed Surface Water Calcs Oldfield House, Harrow-on-the-Hill, HA2 0HN	
Date 11/11/2019 11:28 File SW network 191028.MDX	Designed by PSt Checked by	
Innovyze	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.700	Add Flow / Climate Change (%)	0
Ratio R	0.421	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.145	4-8	0.037

Total Area Contributing (ha) = 0.182

Total Pipe Volume (m³) = 2.127

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
1.000	7.200	0.090	80.0	0.022	6.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	28.743	0.360	79.8	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	22.916	0.575	39.9	0.053	6.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	8.015	0.160	50.0	0.049	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	11.080	3.265	3.4	0.013	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)
1.000	68.25	6.11	78.725	0.022	0.0	0.0	0.0	1.12	19.9	4.1
1.001	66.10	6.53	78.635	0.026	0.0	0.0	0.0	1.13	19.9	4.7
2.000	67.57	6.24	82.550	0.053	0.0	0.0	0.0	1.60	28.3	9.7
2.001	67.09	6.33	81.700	0.102	0.0	0.0	0.0	1.43	25.2	18.5
2.002	66.92	6.37	81.540	0.115	0.0	0.0	0.0	5.51	97.4	20.8

Elliott Wood Partnership LTD		Page 2
241 The Broadway London SW19 1SD	Proposed Surface Water Calcs Oldfield House, Harrow-on-the-Hill, HA2 0HN	
Date 11/11/2019 11:28 File SW network 191028.MDX	Designed by PSt Checked by	
Innovyze	Network 2019.1	

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
1.002	8.151	0.275	29.6	0.001	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	8.885	0.775	11.5	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	4.080	0.150	27.2	0.020	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)
1.002	65.83	6.59	78.200	0.142	0.0	0.0	0.0	2.41	95.9	25.3
1.003	65.65	6.63	77.925	0.162	0.0	0.0	0.0	3.89	154.5	28.8
1.004	68.63	6.04	77.150	0.000	3.0	0.0	0.0	1.94	34.3	3.0

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SW5	79.525	0.800	Open Manhole	450	1.000	78.725	150				
SW6	79.525	0.890	Open Manhole	450	1.001	78.635	150	1.000	78.635	150	
SW1	83.550	1.000	Open Manhole	475	2.000	82.550	150				
SW2	83.550	1.850	Open Manhole	475	2.001	81.700	150	2.000	81.975	150	275
SW3	83.100	1.560	Open Manhole	1050	2.002	81.540	150	2.001	81.540	150	
SW4	79.500	1.300	Open Manhole	1050	1.002	78.200	225	1.001	78.275	150	
								2.002	78.275	150	
SW7	79.050	1.125	Open Manhole	1200	1.003	77.925	225	1.002	77.925	225	
SW8	78.750	1.600	Junction		1.004	77.150	150	1.003	77.150	225	
Outfall	79.000	2.000	Open Manhole	1050		OUTFALL		1.004	77.000	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW5	514916.920	187119.550	514916.920	187119.550	Required	
SW6	514911.420	187124.060	514911.420	187124.060	Required	
SW1	514926.130	187113.940	514926.130	187113.940	Required	
SW2	514940.770	187131.800	514940.770	187131.800	Required	
SW3	514938.101	187139.358	514938.101	187139.358	Required	
SW4	514929.530	187146.380	514929.530	187146.380	Required	
SW7	514921.690	187148.610	514921.690	187148.610	Required	
SW8	514918.060	187156.720			No Entry	
Outfall	514920.940	187159.610			No Entry	

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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	-	-	100	0.022	0.022	0.022
1.001	-	-	100	0.004	0.004	0.004
2.000	-	-	100	0.053	0.053	0.053
2.001	-	-	100	0.049	0.049	0.049
2.002	-	-	100	0.013	0.013	0.013
1.002	-	-	100	0.001	0.001	0.001
1.003	-	-	100	0.020	0.020	0.020
1.004	-	-	100	0.020	0.020	0.020
				Total	Total	Total
				0.182	0.182	0.182

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004	Outfall	79.000	77.000	0.000	1050	0

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW8, DS/PN: 1.004, Volume (m³): 0.3

Unit Reference	MD-SHE-0082-3000-1000-3000
Design Head (m)	1.000
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	77.150
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.0
Flush-Flo™	0.297	3.0
Kick-Flo®	0.623	2.4
Mean Flow over Head Range	-	2.6

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	2.4	1.200	3.3	3.000	5.0	7.000	7.4
0.200	2.9	1.400	3.5	3.500	5.4	7.500	7.7
0.300	3.0	1.600	3.7	4.000	5.7	8.000	7.9
0.400	2.9	1.800	3.9	4.500	6.0	8.500	8.2
0.500	2.8	2.000	4.1	5.000	6.3	9.000	8.4
0.600	2.5	2.200	4.3	5.500	6.6	9.500	8.6
0.800	2.7	2.400	4.5	6.000	6.9		
1.000	3.0	2.600	4.7	6.500	7.2		

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Storage Structures for Storm

Cellular Storage Manhole: SW8, DS/PN: 1.004

Invert Level (m) 77.150 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	95.0	0.0	1.001	0.0	0.0
1.000	95.0	0.0			

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.420
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.700	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, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW5	15 Winter	1	+0%					78.767
1.001	SW6	15 Winter	1	+0%					78.678
2.000	SW1	15 Winter	1	+0%	100/15 Summer				82.603
2.001	SW2	15 Winter	1	+0%	30/15 Summer				81.785
2.002	SW3	15 Winter	1	+0%					81.581
1.002	SW4	15 Winter	1	+0%	100/15 Summer				78.276
1.003	SW7	15 Winter	1	+0%					77.986
1.004	SW8	120 Winter	1	+0%	1/60 Winter				77.313

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW5	-0.108	0.000	0.18		3.0	OK	
1.001	SW6	-0.107	0.000	0.18		3.5	OK	
2.000	SW1	-0.097	0.000	0.27		7.2	OK	
2.001	SW2	-0.065	0.000	0.60		13.2	OK	
2.002	SW3	-0.108	0.000	0.17		14.8	OK	
1.002	SW4	-0.149	0.000	0.25		18.5	OK	
1.003	SW7	-0.164	0.000	0.17		20.9	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	SW8	0.013	0.000	0.12		2.8	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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.420
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.700	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, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW5	15 Winter	30	+0%					78.794
1.001	SW6	15 Winter	30	+0%					78.707
2.000	SW1	15 Winter	30	+0%	100/15 Summer				82.639
2.001	SW2	15 Winter	30	+0%	30/15 Summer				82.122
2.002	SW3	15 Winter	30	+0%					81.612
1.002	SW4	15 Winter	30	+0%	100/15 Summer				78.336
1.003	SW7	15 Winter	30	+0%					78.032
1.004	SW8	120 Winter	30	+0%	1/60 Winter				77.626

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW5	-0.081	0.000	0.43		7.3	OK	
1.001	SW6	-0.078	0.000	0.46		8.7	OK	
2.000	SW1	-0.061	0.000	0.66		17.6	OK	
2.001	SW2	0.272	0.000	1.61		35.2	SURCHARGED	
2.002	SW3	-0.078	0.000	0.46		39.9	OK	
1.002	SW4	-0.089	0.000	0.67		49.3	OK	
1.003	SW7	-0.118	0.000	0.45		56.2	OK	

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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 (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	SW8	0.326	0.000	0.12		3.0	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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.420
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.700	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, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW5	15 Winter	100	+40%					78.825
1.001	SW6	15 Winter	100	+40%					78.741
2.000	SW1	15 Winter	100	+40%	100/15 Summer				83.526
2.001	SW2	15 Winter	100	+40%	30/15 Summer				82.828
2.002	SW3	15 Winter	100	+40%					81.638
1.002	SW4	15 Winter	100	+40%	100/15 Summer				78.475
1.003	SW7	240 Winter	100	+40%					78.140
1.004	SW8	240 Winter	100	+40%	1/60 Winter				78.137

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW5	-0.050	0.000	0.78		13.3	OK	
1.001	SW6	-0.044	0.000	0.83		15.8	OK	
2.000	SW1	0.826	0.000	1.17		31.4	FLOOD RISK	
2.001	SW2	0.978	0.000	2.63		57.6	SURCHARGED	
2.002	SW3	-0.051	0.000	0.75		65.6	OK	
1.002	SW4	0.051	0.000	1.10		81.6	SURCHARGED	
1.003	SW7	-0.009	0.000	0.16		19.3	OK	

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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 (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	SW8	0.837	0.000	0.12		3.0	SURCHARGED*	

G Hydro-Brake Flow Control Maintenance and Safety Data Sheet

HYDRO-BRAKE® FLOW CONTROL

MAINTENANCE AND SAFETY DATA SHEET

MAINTENANCE

Normally, little maintenance is required as there are no moving parts within the Hydro-Brake® Flow Control. Experience has shown that if blockages occur they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size. Hydro-Brake® Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur. The smaller type conical units, below the minimum recommended size, are also supplied with roding facilities or vortex suppressor pipes as standard.

Following installation of the Hydro-Brake® Flow Control it is vitally important that any extraneous material i.e. Building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced please do not hesitate to contact the company so that an investigation may be made.

Hydro-Brake® Flow Controls are typically manufactured from grade 304 Stainless Steel which has an estimated life span in excess of the design life of drainage systems.

COSHH

Hydro-Brake® Flow Controls are manufactured from Stainless Steel, which is not regarded as hazardous to health and exhibits no chemical hazard when used under normal circumstances for the stated applications.

MANUAL HANDLING

The handling of Hydro-Brake® Flow Controls should be in accordance with current legislation and regulations:

- The Health and Safety at Work Act 1972.
- The Management of Health and Safety at Work Regulations 1992.
- The Manual Handling Operations Regulations 1992.

All published and printed by the Health and Safety Executive.

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