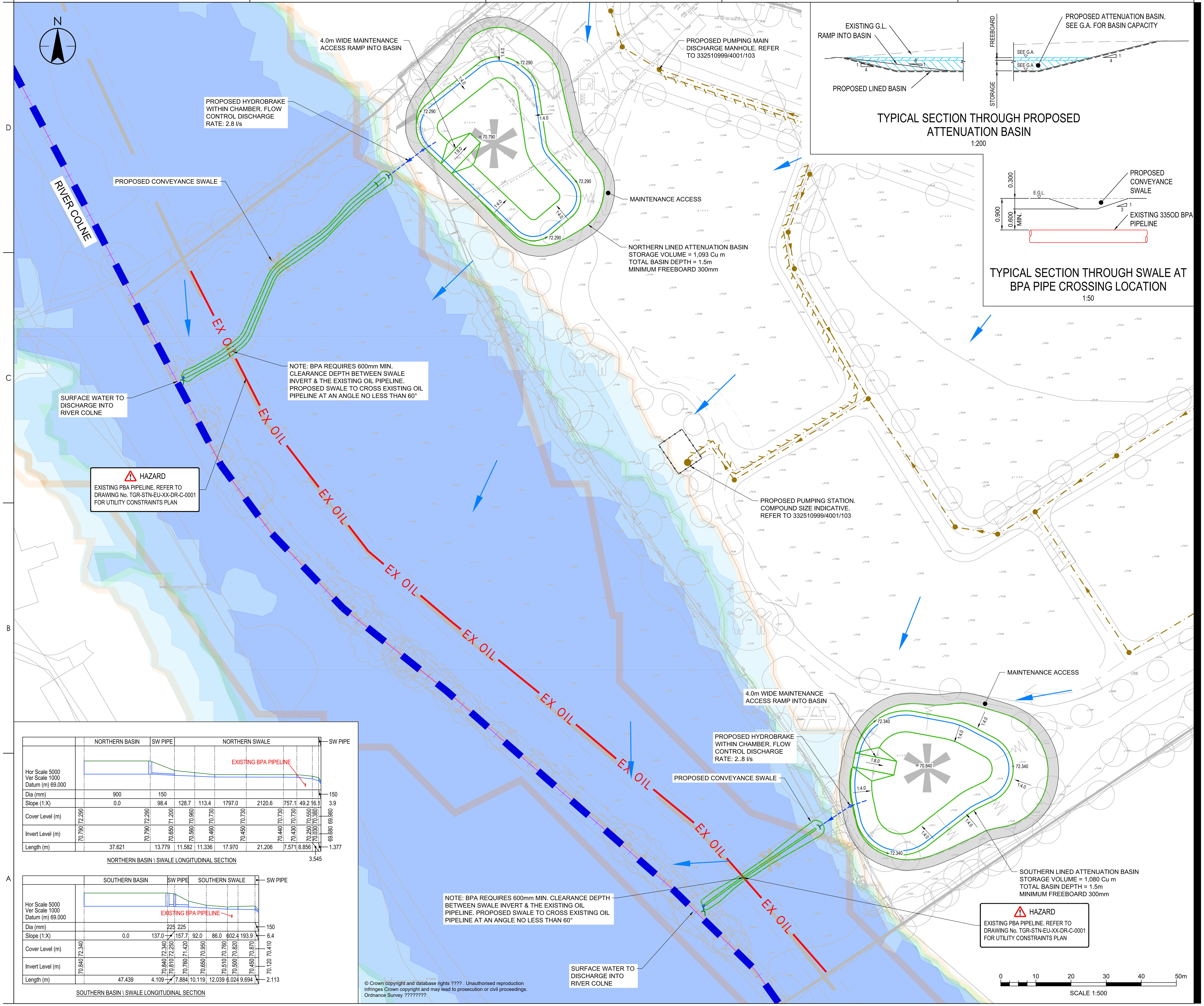
Appendix G Surface and foul water drainage strategy

- Land at Tollgate Road - Colney Heath, Outline Drainage Strategy, Sheet 1 (Drawing no: 332510999/4001/102, dated 28/06/2022)
- Land at Tollgate Road - Colney Heath, Outline Drainage Strategy, Sheet 2 (Drawing no: 332510999/4001/103, dated 28/06/2022)



NORTHERN BASIN \ SWALE LONGITUDINAL SECTION

Hor Scale 5000, Ver Scale 1000, Datum (m) 69.000

	NORTHERN BASIN	SW PIPE	NORTHERN SWALE								SW PIPE
Dia (mm)	900	150									150
Slope (1:X)	0.0	98.4	128.7	113.4	1797.0	2120.6	757.1	49.2	16.1		3.9
Cover Level (m)	72.290 / 72.290	71.200	70.960	70.730	70.730	70.730	70.730	70.550	70.380		69.980
Invert Level (m)	70.790 / 70.790	70.650	70.560	70.460	70.450	70.440	70.430	70.250	70.030		69.680
Length (m)	37.621	13.779	11.582	11.336	17.970	21.206	7.571	8.856	3.545		1.377

SOUTHERN BASIN \ SWALE LONGITUDINAL SECTION

Hor Scale 5000, Ver Scale 1000, Datum (m) 69.000

	SOUTHERN BASIN		SW PIPE		SOUTHERN SWALE				SW PIPE
Dia (mm)		225	225						150
Slope (1:X)	0.0	137.0	157.7	92.0	86.0	602.4	193.9		6.4
Cover Level (m)	72.340 / 72.340	72.250	71.420	70.950	70.760	70.820	70.870		70.410
Invert Level (m)	70.840 / 70.840	70.810	70.760	70.650	70.510	70.500	70.450		70.120
Length (m)	47.439	4.109	7.884	10.119	12.039	6.024	9.694		2.113

EXISTING BPA PIPELINE

Stantec

Stantec UK Limited
CAMBRIDGE
50/60 Station Road, Cambridge, CB1 2JH
Tel: +44 1223 882 000
www.stantec.com/uk

NOTES

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LEGEND

- RIVER COLNE
- 20 YR FLOOD EVENT EXTENTS
- 100YR FLOOD EVENT EXTENTS
- 100YR + 20%CC FLOOD EVENT EXTENTS
- 1000YR FLOOD EVENT EXTENTS
- EX OIL — EXISTING OIL PIPELINE
- EA FLOOD ZONE 2
- EA FLOOD ZONE 3
- PROPOSED S.W. DRAIN. SIZE TBC
- PROPOSED HEADWALL
- PROPOSED S.W. CHAMBER
- PROPOSED F.W. DRAIN. SIZE TBC
- PROPOSED F.W. CHAMBER
- PROPOSED F.W. PUMPING MAIN . SIZE TBC
- OVERLAND FLOW ARROW

	RPW	CB	AS	2202.06.28
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Issue Status

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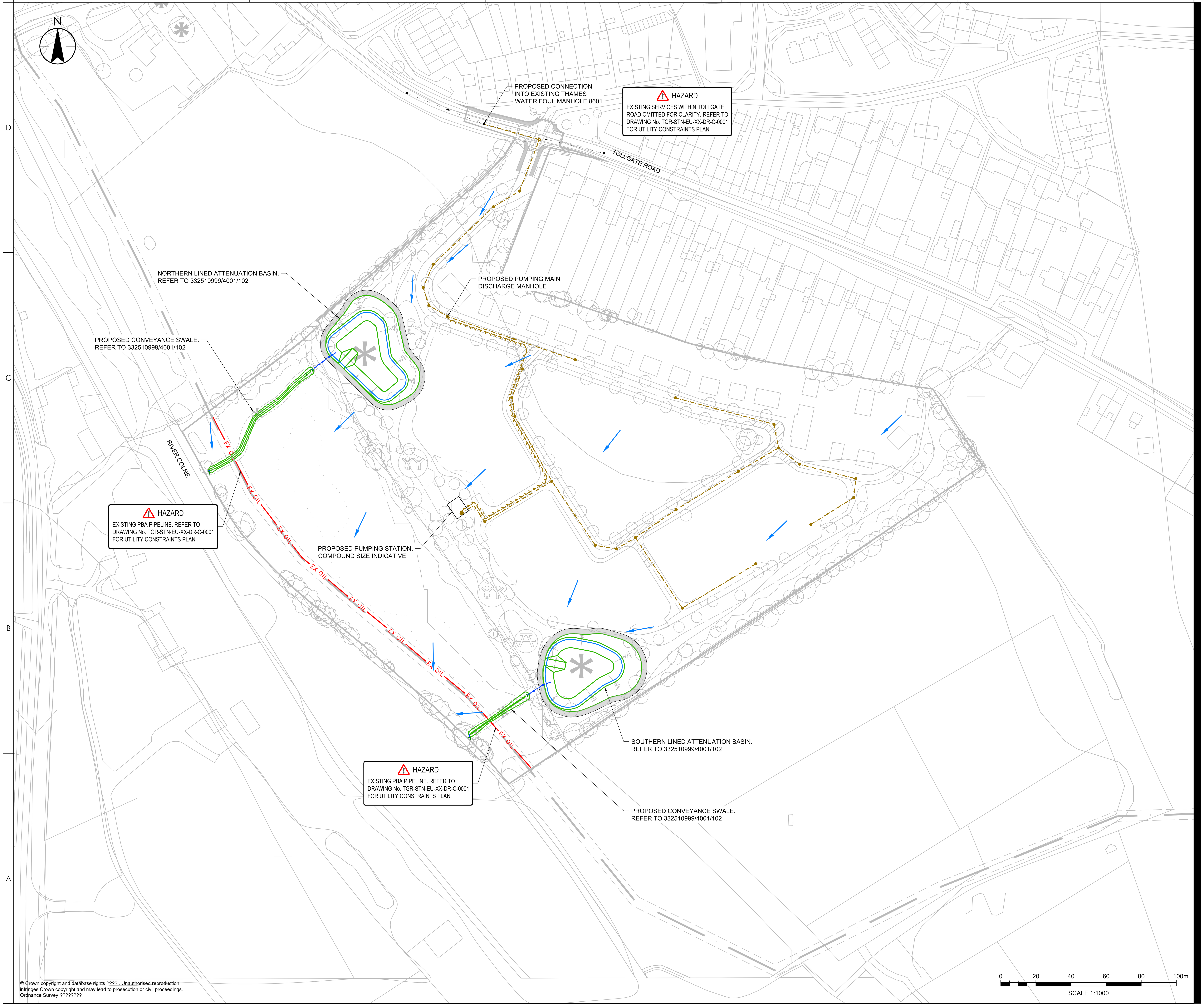
LAND AT TOLLGATE ROAD, COLNEY HEATH

Title
OUTLINE DRAINAGE STRATEGY
SHEET 1

Project No.	Scale
332510999	1:500 @A1

Revision	Drawing No.
-	332510999/4001/102

Plotted: 28.06.2022 2022.06.28 6:22:51 PM By: Soderberg, Asa
ORIGINAL SHEET - ISOA1 \\cam-vfps-001\cam\projects\332510999 land at tollgate road, colney heath\cad\dwgs\4001_hyd\332510999_4001_102_outline drainage strategy



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2. ALL LEVELS ARE IN METRES RELATIVE TO ORDNANCE DATUM NEWLYN UNLESS NOTED OTHERWISE.
3. ALL COORDINATES ARE IN METRES RELATIVE TO ORDNANCE SURVEY NATIONAL GRID.
4. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK OR PREPARING SHOP DRAWINGS.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS AND ARCHITECTS DRAWINGS AND SPECIFICATIONS.

LEGEND

- PROPOSED S.W. DRAIN. SIZE TBC
- PROPOSED HEADWALL
- PROPOSED S.W. CHAMBER
- PROPOSED F.W. DRAIN. SIZE TBC
- PROPOSED F.W. CHAMBER
- PROPOSED F.W. PUMPING MAIN . SIZE TBC
- EXISTING F.W. SEWER
- OVERLAND FLOW ARROW

RPW	CB	AS	2022.06.28
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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LAND AT TOLLGATE ROAD,
COLNEY HEATH

Title
OUTLINE DRAINAGE STRATEGY
SHEET 2

Project No.	Scale
332510999	1:1000 @A1

Revision	Drawing No.
-	332510999/4001/103

Appendix H Calculations

- Greenfield runoff calculations
- Microdrainage results

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Christina Bakopoulou
Site name:	Tollgate Road
Site location:	Colney Heath

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.73517° N
Longitude:	0.25024° W
Reference:	240952387
Date:	May 25 2022 21:25

Runoff estimation approach FEH Statistical

Site characteristics

Total site area (ha): 1.0

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.5
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.14

Hydrological characteristics	Default	Edited
SAAR (mm):	663	659
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):		2.82
1 in 1 year (l/s):		2.4
1 in 30 years (l/s):		6.49
1 in 100 year (l/s):		9.01
1 in 200 years (l/s):		10.56

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Surface Water

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	37.621	0.000	0.0	0.000	5.00	0.0	0.600		o	900	Pipe/Conduit	
1.001	13.779	0.140	98.4	1.090	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.002	11.582	0.090	128.7	0.000	0.00	0.0		0.030	-1	-1	Pipe/Conduit	
1.003	11.336	0.100	113.4	0.000	0.00	0.0		0.030	-5	-5	Pipe/Conduit	
1.004	17.970	0.010	1797.0	0.000	0.00	0.0		0.030	-2	-2	Pipe/Conduit	
1.005	21.206	0.010	2120.6	0.000	0.00	0.0		0.030	-3	-3	Pipe/Conduit	
1.006	7.571	0.010	757.1	0.000	0.00	0.0		0.030	-3	-3	Pipe/Conduit	
1.007	8.856	0.180	49.2	0.000	0.00	0.0		0.030	-4	-4	Pipe/Conduit	
1.008	3.545	0.220	16.1	0.000	0.00	0.0		0.030	-4	-4	Pipe/Conduit	
1.009	1.377	0.350	3.9	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
2.000	47.439	0.000	0.0	0.000	5.00	0.0	0.600		o	900	Pipe/Conduit	
2.001	4.109	0.030	137.0	1.080	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.002	7.884	0.050	157.7	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.003	10.119	0.110	92.0	0.000	0.00	0.0		0.030	-5	-5	Pipe/Conduit	
2.004	12.039	0.140	86.0	0.000	0.00	0.0		0.030	-4	-4	Pipe/Conduit	
2.005	6.024	0.010	602.4	0.000	0.00	0.0		0.030	-6	-6	Pipe/Conduit	
2.006	9.694	0.050	193.9	0.000	0.00	0.0		0.030	-4	-4	Pipe/Conduit	
2.007	2.113	0.330	6.4	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	55.01	7.06	70.790	0.000	0.0	0.0	0.0	0.30	193.9	0.0
1.001	54.11	7.28	70.790	1.090	0.0	0.0	0.0	1.01	17.9«	159.7
1.002	53.54	7.43	70.650	1.090	0.0	0.0	0.0	1.30	1968.0	159.7
1.003	52.92	7.60	70.560	1.090	0.0	0.0	0.0	1.13	1243.3	159.7
1.004	48.37	8.96	70.460	1.090	0.0	0.0	0.0	0.22	163.0	159.7
1.005	43.89	10.63	70.450	1.090	0.0	0.0	0.0	0.21	168.9	159.7
1.006	43.06	10.99	70.440	1.090	0.0	0.0	0.0	0.35	282.7	159.7
1.007	42.82	11.09	70.430	1.090	0.0	0.0	0.0	1.42	1173.2	159.7
1.008	42.77	11.12	70.250	1.090	0.0	0.0	0.0	2.48	2049.8	159.7
1.009	42.76	11.12	70.030	1.090	0.0	0.0	0.0	5.12	90.4«	159.7
2.000	52.94	7.59	70.840	0.000	0.0	0.0	0.0	0.30	193.9	0.0
2.001	52.71	7.66	70.840	1.080	0.0	0.0	0.0	1.12	44.3«	154.2
2.002	52.25	7.78	70.810	1.080	0.0	0.0	0.0	1.04	41.3«	154.2
2.003	51.77	7.92	70.760	1.080	0.0	0.0	0.0	1.25	1380.2	154.2
2.004	51.13	8.10	70.650	1.080	0.0	0.0	0.0	1.08	887.4	154.2
2.005	50.20	8.38	70.510	1.080	0.0	0.0	0.0	0.36	247.8	154.2
2.006	49.47	8.61	70.500	1.080	0.0	0.0	0.0	0.72	591.0	154.2
2.007	49.44	8.62	70.450	1.080	0.0	0.0	0.0	4.01	70.8«	154.2

PIPELINE SCHEDULES for Surface Water

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	900	N1.0	72.290	70.790	0.600	Junction	
1.001	o	150	N1.1	72.290	70.790	1.350	Open Manhole	1800
1.002	-1	-1	N1.2	71.200	70.650	0.000	Junction	
1.003	-5	-5	N1.3	70.960	70.560	0.000	Junction	
1.004	-2	-2	N1.4	70.730	70.460	0.000	Junction	
1.005	-3	-3	N1.5	70.730	70.450	-0.010	Junction	
1.006	-3	-3	N1.6	70.730	70.440	0.000	Junction	
1.007	-4	-4	N1.7	70.730	70.430	0.000	Junction	
1.008	-4	-4	N1.8	70.550	70.250	0.000	Junction	
1.009	o	150	N1.9	70.380	70.030	0.200	Junction	
2.000	o	900	S2.0	72.340	70.840	0.600	Junction	
2.001	o	225	S2.1	72.340	70.840	1.275	Open Manhole	1800
2.002	o	225	S2.2	72.250	70.810	1.215	Open Manhole	1200
2.003	-5	-5	S2.3	71.420	70.760	0.260	Junction	
2.004	-4	-4	S2.4	70.950	70.650	0.000	Junction	
2.005	-6	-6	S2.5	70.760	70.510	0.000	Junction	
2.006	-4	-4	S2.6	70.820	70.500	0.020	Junction	
2.007	o	150	S2.7	70.870	70.450	0.270	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	37.621	0.0	N1.1	72.290	70.790	0.600	Open Manhole	1800
1.001	13.779	98.4	N1.2	71.200	70.650	0.400	Junction	
1.002	11.582	128.7	N1.3	70.960	70.560	-0.150	Junction	
1.003	11.336	113.4	N1.4	70.730	70.460	-0.130	Junction	
1.004	17.970	1797.0	N1.5	70.730	70.450	0.010	Junction	
1.005	21.206	2120.6	N1.6	70.730	70.440	0.000	Junction	
1.006	7.571	757.1	N1.7	70.730	70.430	0.010	Junction	
1.007	8.856	49.2	N1.8	70.550	70.250	0.000	Junction	
1.008	3.545	16.1	N1.9	70.380	70.030	0.050	Junction	
1.009	1.377	3.9		69.980	69.680	0.150	Open Manhole	0
2.000	47.439	0.0	S2.1	72.340	70.840	0.600	Open Manhole	1800
2.001	4.109	137.0	S2.2	72.250	70.810	1.215	Open Manhole	1200
2.002	7.884	157.7	S2.3	71.420	70.760	0.435	Junction	
2.003	10.119	92.0	S2.4	70.950	70.650	-0.100	Junction	
2.004	12.039	86.0	S2.5	70.760	70.510	-0.050	Junction	
2.005	6.024	602.4	S2.6	70.820	70.500	0.070	Junction	
2.006	9.694	193.9	S2.7	70.870	70.450	0.120	Junction	
2.007	2.113	6.4		70.410	70.120	0.140	Open Manhole	0

Free Flowing Outfall Details for Surface Water

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009		69.980	69.680	0.000	0	0

Free Flowing Outfall Details for Surface Water

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
2.007		70.410	70.120	0.000	0	0

Online Controls for Surface Water

Hydro-Brake® Optimum Manhole: N1.1, DS/PN: 1.001, Volume (m³): 27.2

Unit Reference	MD-SHE-0077-2800-1200-2800
Design Head (m)	1.200
Design Flow (l/s)	2.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	77
Invert Level (m)	70.790
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.8
Flush-Flo™	0.336	2.7
Kick-Flo®	0.683	2.2
Mean Flow over Head Range	-	2.4

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	2.1	1.200	2.8	3.000	4.3	7.000	6.4
0.200	2.6	1.400	3.0	3.500	4.6	7.500	6.6
0.300	2.7	1.600	3.2	4.000	4.9	8.000	6.8
0.400	2.7	1.800	3.4	4.500	5.2	8.500	7.0
0.500	2.6	2.000	3.5	5.000	5.4	9.000	7.2
0.600	2.4	2.200	3.7	5.500	5.7	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.1		

Hydro-Brake® Optimum Manhole: S2.1, DS/PN: 2.001, Volume (m³): 33.4

Unit Reference	MD-SHE-0077-2800-1200-2800
Design Head (m)	1.200
Design Flow (l/s)	2.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	77
Invert Level (m)	70.840
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Hydro-Brake® Optimum Manhole: S2.1, DS/PN: 2.001, Volume (m³): 33.4

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.8
Flush-Flo™	0.336	2.7
Kick-Flo®	0.683	2.2
Mean Flow over Head Range	-	2.4

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	2.1	1.200	2.8	3.000	4.3	7.000	6.4
0.200	2.6	1.400	3.0	3.500	4.6	7.500	6.6
0.300	2.7	1.600	3.2	4.000	4.9	8.000	6.8
0.400	2.7	1.800	3.4	4.500	5.2	8.500	7.0
0.500	2.6	2.000	3.5	5.000	5.4	9.000	7.2
0.600	2.4	2.200	3.7	5.500	5.7	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.1		

Storage Structures for Surface Water

Tank or Pond Manhole: N1.1, DS/PN: 1.001

Invert Level (m) 70.790

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	644.0	1.500	2077.0

Tank or Pond Manhole: S2.1, DS/PN: 2.001

Invert Level (m) 70.840

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	660.0	1.500	1366.0

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

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	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 520872 205521 TL 20872 05521
Data Type	Point
Cv (Summer)	0.850
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	N1.0	1440	72.290	71.690	0.000	0.000	0.929	0.0	SURCHARGED*
1.001	N1.1	960	72.290	71.733	0.793	0.000	987.185	2.7	SURCHARGED
1.002	N1.2	30	71.200	70.660	-0.540	0.000	0.008	2.7	OK
1.003	N1.3	4320	70.960	70.572	-0.388	0.000	0.039	2.7	OK
1.004	N1.4	10080	70.730	70.506	-0.224	0.000	0.269	2.7	OK
1.005	N1.5	10080	70.730	70.493	-0.247	0.000	0.632	2.7	OK
1.006	N1.6	7200	70.730	70.472	-0.258	0.000	0.495	2.7	OK
1.007	N1.7	5760	70.730	70.440	-0.290	0.000	0.033	2.7	OK
1.008	N1.8	8640	70.550	70.256	-0.294	0.000	0.002	2.7	OK
1.009	N1.9	10080	70.380	70.056	-0.124	0.000	0.040	2.7	OK*
2.000	S2.0	1440	72.340	71.740	0.000	0.000	1.042	0.0	SURCHARGED*
2.001	S2.1	960	72.340	71.900	0.835	0.000	971.339	2.7	SURCHARGED
2.002	S2.2	960	72.250	70.854	-0.181	0.000	0.057	2.7	OK
2.003	S2.3	960	71.420	70.771	-0.389	0.000	0.011	2.7	OK
2.004	S2.4	960	70.950	70.663	-0.287	0.000	0.043	2.7	OK
2.005	S2.5	960	70.760	70.539	-0.221	0.000	0.135	2.7	OK
2.006	S2.6	960	70.820	70.519	-0.281	0.000	0.095	2.7	OK

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
2.007	S2.7	960	70.870	70.477	-0.123	0.000	0.189	2.7	OK*

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Surface Water

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	37.621	0.000	0.0	0.000	5.00	0.0	0.600		o	900	Pipe/Conduit	
1.001	13.779	0.140	98.4	1.090	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.002	11.582	0.090	128.7	0.000	0.00	0.0		0.030	-1	-1	Pipe/Conduit	
1.003	11.336	0.100	113.4	0.000	0.00	0.0		0.030	-5	-5	Pipe/Conduit	
1.004	17.970	0.010	1797.0	0.000	0.00	0.0		0.030	-2	-2	Pipe/Conduit	
1.005	21.206	0.010	2120.6	0.000	0.00	0.0		0.030	-3	-3	Pipe/Conduit	
1.006	7.571	0.010	757.1	0.000	0.00	0.0		0.030	-3	-3	Pipe/Conduit	
1.007	8.856	0.180	49.2	0.000	0.00	0.0		0.030	-4	-4	Pipe/Conduit	
1.008	3.545	0.220	16.1	0.000	0.00	0.0		0.030	-4	-4	Pipe/Conduit	
1.009	1.377	0.350	3.9	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
2.000	47.439	0.000	0.0	0.000	5.00	0.0	0.600		o	900	Pipe/Conduit	
2.001	4.109	0.030	137.0	1.080	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.002	7.884	0.050	157.7	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.003	10.119	0.110	92.0	0.000	0.00	0.0		0.030	-5	-5	Pipe/Conduit	
2.004	12.039	0.140	86.0	0.000	0.00	0.0		0.030	-4	-4	Pipe/Conduit	
2.005	6.024	0.010	602.4	0.000	0.00	0.0		0.030	-6	-6	Pipe/Conduit	
2.006	9.694	0.050	193.9	0.000	0.00	0.0		0.030	-4	-4	Pipe/Conduit	
2.007	2.113	0.330	6.4	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	55.01	7.06	70.790	0.000	0.0	0.0	0.0	0.30	193.9	0.0
1.001	54.11	7.28	70.790	1.090	0.0	0.0	0.0	1.01	17.9«	159.7
1.002	53.54	7.43	70.650	1.090	0.0	0.0	0.0	1.30	1968.0	159.7
1.003	52.92	7.60	70.560	1.090	0.0	0.0	0.0	1.13	1243.3	159.7
1.004	48.37	8.96	70.460	1.090	0.0	0.0	0.0	0.22	163.0	159.7
1.005	43.89	10.63	70.450	1.090	0.0	0.0	0.0	0.21	168.9	159.7
1.006	43.06	10.99	70.440	1.090	0.0	0.0	0.0	0.35	282.7	159.7
1.007	42.82	11.09	70.430	1.090	0.0	0.0	0.0	1.42	1173.2	159.7
1.008	42.77	11.12	70.250	1.090	0.0	0.0	0.0	2.48	2049.8	159.7
1.009	42.76	11.12	70.030	1.090	0.0	0.0	0.0	5.12	90.4«	159.7
2.000	52.94	7.59	70.840	0.000	0.0	0.0	0.0	0.30	193.9	0.0
2.001	52.71	7.66	70.840	1.080	0.0	0.0	0.0	1.12	44.3«	154.2
2.002	52.25	7.78	70.810	1.080	0.0	0.0	0.0	1.04	41.3«	154.2
2.003	51.77	7.92	70.760	1.080	0.0	0.0	0.0	1.25	1380.2	154.2
2.004	51.13	8.10	70.650	1.080	0.0	0.0	0.0	1.08	887.4	154.2
2.005	50.20	8.38	70.510	1.080	0.0	0.0	0.0	0.36	247.8	154.2
2.006	49.47	8.61	70.500	1.080	0.0	0.0	0.0	0.72	591.0	154.2
2.007	49.44	8.62	70.450	1.080	0.0	0.0	0.0	4.01	70.8«	154.2

Conduit Sections for Surface Water

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m^2)
-1	-1	5000	550			1.179	1.513
-2	-2	5000	270			0.590	0.743
-3	-3	5000	290			0.633	0.798
-4	-4	5000	300			0.655	0.825
-5	-5	5000	400			0.868	1.100
-6	-6	5000	250			0.547	0.688

PIPELINE SCHEDULES for Surface Water

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	900	N1.0	72.290	70.790	0.600	Junction	
1.001	o	150	N1.1	72.290	70.790	1.350	Open Manhole	1800
1.002	-1	-1	N1.2	71.200	70.650	0.000	Junction	
1.003	-5	-5	N1.3	70.960	70.560	0.000	Junction	
1.004	-2	-2	N1.4	70.730	70.460	0.000	Junction	
1.005	-3	-3	N1.5	70.730	70.450	-0.010	Junction	
1.006	-3	-3	N1.6	70.730	70.440	0.000	Junction	
1.007	-4	-4	N1.7	70.730	70.430	0.000	Junction	
1.008	-4	-4	N1.8	70.550	70.250	0.000	Junction	
1.009	o	150	N1.9	70.380	70.030	0.200	Junction	
2.000	o	900	S2.0	72.340	70.840	0.600	Junction	
2.001	o	225	S2.1	72.340	70.840	1.275	Open Manhole	1800
2.002	o	225	S2.2	72.250	70.810	1.215	Open Manhole	1200
2.003	-5	-5	S2.3	71.420	70.760	0.260	Junction	
2.004	-4	-4	S2.4	70.950	70.650	0.000	Junction	
2.005	-6	-6	S2.5	70.760	70.510	0.000	Junction	
2.006	-4	-4	S2.6	70.820	70.500	0.020	Junction	
2.007	o	150	S2.7	70.870	70.450	0.270	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	37.621	0.0	N1.1	72.290	70.790	0.600	Open Manhole	1800
1.001	13.779	98.4	N1.2	71.200	70.650	0.400	Junction	
1.002	11.582	128.7	N1.3	70.960	70.560	-0.150	Junction	
1.003	11.336	113.4	N1.4	70.730	70.460	-0.130	Junction	
1.004	17.970	1797.0	N1.5	70.730	70.450	0.010	Junction	
1.005	21.206	2120.6	N1.6	70.730	70.440	0.000	Junction	
1.006	7.571	757.1	N1.7	70.730	70.430	0.010	Junction	
1.007	8.856	49.2	N1.8	70.550	70.250	0.000	Junction	
1.008	3.545	16.1	N1.9	70.380	70.030	0.050	Junction	
1.009	1.377	3.9		69.980	69.680	0.150	Open Manhole	0
2.000	47.439	0.0	S2.1	72.340	70.840	0.600	Open Manhole	1800
2.001	4.109	137.0	S2.2	72.250	70.810	1.215	Open Manhole	1200
2.002	7.884	157.7	S2.3	71.420	70.760	0.435	Junction	
2.003	10.119	92.0	S2.4	70.950	70.650	-0.100	Junction	
2.004	12.039	86.0	S2.5	70.760	70.510	-0.050	Junction	
2.005	6.024	602.4	S2.6	70.820	70.500	0.070	Junction	
2.006	9.694	193.9	S2.7	70.870	70.450	0.120	Junction	
2.007	2.113	6.4		70.410	70.120	0.140	Open Manhole	0

Surcharged Outfall Details for Surface Water

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009		69.980	69.680	0.000	0	0

Datum (m) 69.830 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
5	1.900	210	1.900	415	1.900	620	1.900	825	1.900	1030	1.900
10	1.900	215	1.900	420	1.900	625	1.900	830	1.900	1035	1.900
15	1.900	220	1.900	425	1.900	630	1.900	835	1.900	1040	1.900
20	1.900	225	1.900	430	1.900	635	1.900	840	1.900	1045	1.900
25	1.900	230	1.900	435	1.900	640	1.900	845	1.900	1050	1.900
30	1.900	235	1.900	440	1.900	645	1.900	850	1.900	1055	1.900
35	1.900	240	1.900	445	1.900	650	1.900	855	1.900	1060	1.900
40	1.900	245	1.900	450	1.900	655	1.900	860	1.900	1065	1.900
45	1.900	250	1.900	455	1.900	660	1.900	865	1.900	1070	1.900
50	1.900	255	1.900	460	1.900	665	1.900	870	1.900	1075	1.900
55	1.900	260	1.900	465	1.900	670	1.900	875	1.900	1080	1.900
60	1.900	265	1.900	470	1.900	675	1.900	880	1.900	1085	1.900
65	1.900	270	1.900	475	1.900	680	1.900	885	1.900	1090	1.900
70	1.900	275	1.900	480	1.900	685	1.900	890	1.900	1095	1.900
75	1.900	280	1.900	485	1.900	690	1.900	895	1.900	1100	1.900
80	1.900	285	1.900	490	1.900	695	1.900	900	1.900	1105	1.900
85	1.900	290	1.900	495	1.900	700	1.900	905	1.900	1110	1.900
90	1.900	295	1.900	500	1.900	705	1.900	910	1.900	1115	1.900
95	1.900	300	1.900	505	1.900	710	1.900	915	1.900	1120	1.900
100	1.900	305	1.900	510	1.900	715	1.900	920	1.900	1125	1.900
105	1.900	310	1.900	515	1.900	720	1.900	925	1.900	1130	1.900
110	1.900	315	1.900	520	1.900	725	1.900	930	1.900	1135	1.900
115	1.900	320	1.900	525	1.900	730	1.900	935	1.900	1140	1.900
120	1.900	325	1.900	530	1.900	735	1.900	940	1.900	1145	1.900
125	1.900	330	1.900	535	1.900	740	1.900	945	1.900	1150	1.900
130	1.900	335	1.900	540	1.900	745	1.900	950	1.900	1155	1.900
135	1.900	340	1.900	545	1.900	750	1.900	955	1.900	1160	1.900
140	1.900	345	1.900	550	1.900	755	1.900	960	1.900	1165	1.900
145	1.900	350	1.900	555	1.900	760	1.900	965	1.900	1170	1.900
150	1.900	355	1.900	560	1.900	765	1.900	970	1.900	1175	1.900
155	1.900	360	1.900	565	1.900	770	1.900	975	1.900	1180	1.900
160	1.900	365	1.900	570	1.900	775	1.900	980	1.900	1185	1.900
165	1.900	370	1.900	575	1.900	780	1.900	985	1.900	1190	1.900
170	1.900	375	1.900	580	1.900	785	1.900	990	1.900	1195	1.900
175	1.900	380	1.900	585	1.900	790	1.900	995	1.900	1200	1.900
180	1.900	385	1.900	590	1.900	795	1.900	1000	1.900	1205	1.900
185	1.900	390	1.900	595	1.900	800	1.900	1005	1.900	1210	1.900
190	1.900	395	1.900	600	1.900	805	1.900	1010	1.900	1215	1.900
195	1.900	400	1.900	605	1.900	810	1.900	1015	1.900	1220	1.900
200	1.900	405	1.900	610	1.900	815	1.900	1020	1.900	1225	1.900
205	1.900	410	1.900	615	1.900	820	1.900	1025	1.900	1230	1.900

Surcharged Outfall Details for Surface Water

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1235	1.900	1270	1.900	1305	1.900	1340	1.900	1375	1.900	1410	1.900
1240	1.900	1275	1.900	1310	1.900	1345	1.900	1380	1.900	1415	1.900
1245	1.900	1280	1.900	1315	1.900	1350	1.900	1385	1.900	1420	1.900
1250	1.900	1285	1.900	1320	1.900	1355	1.900	1390	1.900	1425	1.900
1255	1.900	1290	1.900	1325	1.900	1360	1.900	1395	1.900	1430	1.900
1260	1.900	1295	1.900	1330	1.900	1365	1.900	1400	1.900	1435	1.900
1265	1.900	1300	1.900	1335	1.900	1370	1.900	1405	1.900	1440	1.900

Surcharged Outfall Details for Surface Water

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
2.007		70.410	70.120	0.000	0	0

Datum (m) 70.270 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
5	1.570	145	1.570	285	1.570	425	1.570	565	1.570	705	1.570
10	1.570	150	1.570	290	1.570	430	1.570	570	1.570	710	1.570
15	1.570	155	1.570	295	1.570	435	1.570	575	1.570	715	1.570
20	1.570	160	1.570	300	1.570	440	1.570	580	1.570	720	1.570
25	1.570	165	1.570	305	1.570	445	1.570	585	1.570	725	1.570
30	1.570	170	1.570	310	1.570	450	1.570	590	1.570	730	1.570
35	1.570	175	1.570	315	1.570	455	1.570	595	1.570	735	1.570
40	1.570	180	1.570	320	1.570	460	1.570	600	1.570	740	1.570
45	1.570	185	1.570	325	1.570	465	1.570	605	1.570	745	1.570
50	1.570	190	1.570	330	1.570	470	1.570	610	1.570	750	1.570
55	1.570	195	1.570	335	1.570	475	1.570	615	1.570	755	1.570
60	1.570	200	1.570	340	1.570	480	1.570	620	1.570	760	1.570
65	1.570	205	1.570	345	1.570	485	1.570	625	1.570	765	1.570
70	1.570	210	1.570	350	1.570	490	1.570	630	1.570	770	1.570
75	1.570	215	1.570	355	1.570	495	1.570	635	1.570	775	1.570
80	1.570	220	1.570	360	1.570	500	1.570	640	1.570	780	1.570
85	1.570	225	1.570	365	1.570	505	1.570	645	1.570	785	1.570
90	1.570	230	1.570	370	1.570	510	1.570	650	1.570	790	1.570
95	1.570	235	1.570	375	1.570	515	1.570	655	1.570	795	1.570
100	1.570	240	1.570	380	1.570	520	1.570	660	1.570	800	1.570
105	1.570	245	1.570	385	1.570	525	1.570	665	1.570	805	1.570
110	1.570	250	1.570	390	1.570	530	1.570	670	1.570	810	1.570
115	1.570	255	1.570	395	1.570	535	1.570	675	1.570	815	1.570
120	1.570	260	1.570	400	1.570	540	1.570	680	1.570	820	1.570
125	1.570	265	1.570	405	1.570	545	1.570	685	1.570	825	1.570
130	1.570	270	1.570	410	1.570	550	1.570	690	1.570	830	1.570
135	1.570	275	1.570	415	1.570	555	1.570	695	1.570	835	1.570
140	1.570	280	1.570	420	1.570	560	1.570	700	1.570	840	1.570

Surcharged Outfall Details for Surface Water

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
845	1.570	945	1.570	1045	1.570	1145	1.570	1245	1.570	1345	1.570
850	1.570	950	1.570	1050	1.570	1150	1.570	1250	1.570	1350	1.570
855	1.570	955	1.570	1055	1.570	1155	1.570	1255	1.570	1355	1.570
860	1.570	960	1.570	1060	1.570	1160	1.570	1260	1.570	1360	1.570
865	1.570	965	1.570	1065	1.570	1165	1.570	1265	1.570	1365	1.570
870	1.570	970	1.570	1070	1.570	1170	1.570	1270	1.570	1370	1.570
875	1.570	975	1.570	1075	1.570	1175	1.570	1275	1.570	1375	1.570
880	1.570	980	1.570	1080	1.570	1180	1.570	1280	1.570	1380	1.570
885	1.570	985	1.570	1085	1.570	1185	1.570	1285	1.570	1385	1.570
890	1.570	990	1.570	1090	1.570	1190	1.570	1290	1.570	1390	1.570
895	1.570	995	1.570	1095	1.570	1195	1.570	1295	1.570	1395	1.570
900	1.570	1000	1.570	1100	1.570	1200	1.570	1300	1.570	1400	1.570
905	1.570	1005	1.570	1105	1.570	1205	1.570	1305	1.570	1405	1.570
910	1.570	1010	1.570	1110	1.570	1210	1.570	1310	1.570	1410	1.570
915	1.570	1015	1.570	1115	1.570	1215	1.570	1315	1.570	1415	1.570
920	1.570	1020	1.570	1120	1.570	1220	1.570	1320	1.570	1420	1.570
925	1.570	1025	1.570	1125	1.570	1225	1.570	1325	1.570	1425	1.570
930	1.570	1030	1.570	1130	1.570	1230	1.570	1330	1.570	1430	1.570
935	1.570	1035	1.570	1135	1.570	1235	1.570	1335	1.570	1435	1.570
940	1.570	1040	1.570	1140	1.570	1240	1.570	1340	1.570	1440	1.570

Online Controls for Surface Water

Hydro-Brake® Optimum Manhole: N1.1, DS/PN: 1.001, Volume (m³): 27.2

Unit Reference	MD-SHE-0077-2800-1200-2800
Design Head (m)	1.200
Design Flow (l/s)	2.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	77
Invert Level (m)	70.790
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.8
Flush-Flo™	0.336	2.7
Kick-Flo®	0.683	2.2
Mean Flow over Head Range	-	2.4

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	2.1	1.200	2.8	3.000	4.3	7.000	6.4
0.200	2.6	1.400	3.0	3.500	4.6	7.500	6.6
0.300	2.7	1.600	3.2	4.000	4.9	8.000	6.8
0.400	2.7	1.800	3.4	4.500	5.2	8.500	7.0
0.500	2.6	2.000	3.5	5.000	5.4	9.000	7.2
0.600	2.4	2.200	3.7	5.500	5.7	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.1		

Hydro-Brake® Optimum Manhole: S2.1, DS/PN: 2.001, Volume (m³): 33.4

Unit Reference	MD-SHE-0077-2800-1200-2800
Design Head (m)	1.200
Design Flow (l/s)	2.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	77
Invert Level (m)	70.840
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Hydro-Brake® Optimum Manhole: S2.1, DS/PN: 2.001, Volume (m³): 33.4

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.8
Flush-Flo™	0.336	2.7
Kick-Flo®	0.683	2.2
Mean Flow over Head Range	-	2.4

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	2.1	1.200	2.8	3.000	4.3	7.000	6.4
0.200	2.6	1.400	3.0	3.500	4.6	7.500	6.6
0.300	2.7	1.600	3.2	4.000	4.9	8.000	6.8
0.400	2.7	1.800	3.4	4.500	5.2	8.500	7.0
0.500	2.6	2.000	3.5	5.000	5.4	9.000	7.2
0.600	2.4	2.200	3.7	5.500	5.7	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.1		

Storage Structures for Surface Water

Tank or Pond Manhole: N1.1, DS/PN: 1.001

Invert Level (m) 70.790

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	644.0	1.500	2077.0

Tank or Pond Manhole: S2.1, DS/PN: 2.001

Invert Level (m) 70.840

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	660.0	1.500	1366.0

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

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	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 520872 205521 TL 20872 05521
Data Type	Point
Cv (Summer)	0.850
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	N1.0	1440	72.290	71.690	0.000	0.000	0.930	0.0	SURCHARGED*
1.001	N1.1	960	72.290	71.734	0.794	0.000	987.804	2.7	SURCHARGED
1.002	N1.2	30	71.200	70.660	-0.540	0.000	0.008	2.7	OK
1.003	N1.3	720	70.960	70.576	-0.384	0.000	0.060	2.7	OK
1.004	N1.4	720	70.730	70.558	-0.172	0.000	0.604	2.7	OK
1.005	N1.5	720	70.730	70.557	-0.183	0.000	1.777	2.7	OK
1.006	N1.6	720	70.730	70.557	-0.173	0.000	2.445	2.7	OK
1.007	N1.7	720	70.730	70.557	-0.173	0.000	1.137	2.7	OK
1.008	N1.8	720	70.550	70.557	0.007	7.426	11.665	2.6	FLOOD
1.009	N1.9	720	70.380	70.558	0.378	177.547	179.762	0.0	FLOOD
2.000	S2.0	1440	72.340	71.740	0.000	0.000	1.043	0.0	SURCHARGED*
2.001	S2.1	960	72.340	71.901	0.836	0.000	971.909	2.7	SURCHARGED
2.002	S2.2	1440	72.250	70.895	-0.140	0.000	0.116	2.7	OK
2.003	S2.3	1440	71.420	70.892	-0.268	0.000	0.255	2.7	OK
2.004	S2.4	1440	70.950	70.892	-0.058	0.000	3.297	3.3	OK
2.005	S2.5	1440	70.760	70.892	0.132	132.269	136.757	32.1	FLOOD

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
2.006	S2.6	1440	70.820	70.892	0.092	72.367	76.824	44.2	FLOOD
2.007	S2.7	1440	70.870	70.893	0.293	22.500	30.913	48.7	FLOOD

Appendix I Ground investigation locations, ground investigation results and soakage test results

- Site plan, Land at Tollgate Road
- Ground Investigation logs, Land at Tollgate Road, Colney Heath
- Soakage test results, Tollgate Road, Colney Heath

Key

- Locations By Type - Empty
- Locations By Type - CP
- Locations By Type - TP
- Locations By Type - WS

Stantec

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CAMBRIDGE

Client

Vistry Group

Land of Tollgate Road, Colney Heath

Site Plan

Date	dd.mm.yyyy
A4 Scale	1:2500
Drawn by	XX
Checked by	XX

Figure Number

1

Project Name	Project No:		BOREHOLE
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**BH01**
Client	Start Date / End Date		
Vistry Group	**03/05/2022** **03/05/2022**		
Contractor	Ground Level		
A F Howlands	**75.09m OD**		
Method/Plant / Energy Ratio	Coordinates	Logged By: **MRG**	Sheet 1 of 1
Cable Percussion Rig **79 %**	**520925 E** **205562 N**	Checked By: **LT**	Scale 1:50

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
						(0.30) 0.30	74.79	TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
1	1.00	C	54 (6,6/54 for 150mm)			(1.30) 1.60	73.49	Dense orangish brown sandy fine to medium rounded flint GRAVEL [Kesgrave Catchment Subgroup]	
2	2.00	C	N=5					Firm orangish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravels are fine to medium rounded flints [Kesgrave Catchment Subgroup]	
3	3.10	C	N=7			(3.10)			
4	4.00	C	N=9						
						4.70	70.39	Stiff dark grey CLAY with occasional coarse sand sized fragments of white chalk [Lowestoft Formation Boulder Clay]	
5	5.10	U1	Ublow=34						
6	6.40	S	N=26			(3.10)			
7									
						7.80	67.29	Medium dense to dense grey fine SAND [Lowestoft Formation Boulder Clay]	
8	8.10	S	N=23						
9	9.50	S	N=32			(2.20)			
10						10.00	65.09	End of Borehole at 10.00m	

General Remarks

1. CAT Scanned prior to excavation. 2. Hand dug starter pit to 1.2m bgl

Boring Progress			Water Strike			Chiselling		
Date/Time	Depth	Cas. Depth	Strike	Time (mins)	Rose To	From	To	Duration

Project Name	Project No:		BOREHOLE
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**BH02**
Client	Start Date / End Date		
Vistry Group	**03/05/2022** / **04/05/2022**		
Contractor	Ground Level		
A F Howlands	**74.06m OD**		
Method/Plant / Energy Ratio	Coordinates	Logged By: **MRG**	Sheet 1 of 1
Cable Percussion Rig / **79 %**	**520905 E** **205396 N**	Checked By: **LT**	Scale 1:50

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
						(0.35)		TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						0.35	73.71	Medium dense orangish brown slightly clayey sandy fine to medium rounded flint GRAVEL [Kesgrave Catchment Subgroup]	
1	1.20	C	N=17						
						(2.35)			
2	2.00	C	N=16						
						2.70	71.36	Medium dense orangish brown gravelly fine to coarse SAND. Gravels are fine to medium rounded flints [Kesgrave Catchment Subgroup]	
3	3.00	C	N=19						
4	4.10	C	N=31						
5	5.20	C	N=28			(5.20)			
6									
	6.50	C	N=25						
7									
						7.90	66.16	Medium dense mid brown fine to medium SAND [Kesgrave Catchment Subgroup]	
8	8.10	C	N=16						
						(1.40)			
9									
						9.30	64.76	Stiff dark grey CLAY with occasional coarse sand sized fragments of white chalk [Lowestoft Formation Boulder Clay]	
	9.60	S	N=28			(0.70)			
10						10.00	64.06	End of Borehole at 10.00m	

General Remarks

1. CAT Scanned prior to excavation. 2. Hand dug starter pit to 1.2m bgl

Boring Progress			Water Strike			Chiselling		
Date/Time	Depth	Cas. Depth	Strike	Time (mins)	Rose To	From	To	Duration

Project Name	Project No:		BOREHOLE
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**BH03**
Client	Start Date / End Date		
Vistry Group	**04/05/2022** / **04/05/2022**		
Contractor	Ground Level		
A F Howlands	**71.13m OD**		
Method/Plant / Energy Ratio	Coordinates	Logged By: **MRG**	Sheet 1 of 1
Cable Percussion Rig / **79 %**	**520752 E** **205502 N**	Checked By: **LT**	Scale 1:50

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
						(0.15) 0.15	70.98	TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						(0.65) 0.80	70.33	Firm grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium rounded flint. [Kesgrave Catchment Subgroup]	
1	1.20	C	N=24			(0.50) 1.30	69.83	Mid brown slightly sandy fine to medium rounded flint GRAVEL [Kesgrave Catchment Subgroup]	
2	2.10	C	N=7			(1.50) 2.80	68.33	Firm grey and greyish brown sandy CLAY with occasional fine gravel sized chalk fragments. Sand is fine to coarse. [Kesgrave Catchment Subgroup]	
3	3.10	C	N=12					Firm to stiff grey CLAY with rare to occasioanl fine gravel sized chalk fragments. [Lowestoft Formation Boulder Clay]	
4	4.00	S	N=7			(2.90) 5.70	65.43		
5	5.00	U1	Ublow=18						
6	6.40	S	N=19					Medium dense becoming dense greyish brown slightly gravelly fine to medium SAND. Gravels are fine to medium subrounded flint. [Lowestoft Formation Boulder Clay]	
7									
8	8.10	S	N=27			(4.30) 10.00	61.13	End of Borehole at 10.00m	
9									
10	9.70	S	N=41						

General Remarks

1. CAT Scanned prior to excavation. 2. Hand dug starter pit to 1.2m bgl

Boring Progress			Water Strike			Chiselling		
Date/Time	Depth	Cas. Depth	Strike	Time (mins)	Rose To	From	To	Duration

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**SA01**
Client	Start Date / End Date		
Vistry Group	**04/05/2022** **04/05/2022**		
Contractor	Ground Level		
A F Howlands	**75.23m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520995 E** **205463 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.10	ES ES1				(0.30)		TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						0.30	74.93	*Very gravelly below 0.2m*	
1						(1.20)		Orangish brown slightly clayey very gravelly fine to coarse SAND. Gravels are fine to medium round flints [Kesgrave Catchment Subgroup]	
						1.50	73.73	Firm grey sandy CLAY with localised orangish brown mottling. Sand is fine to medium. [Kesgrave Catchment Subgroup]	
2						(1.50)			
3						3.00	72.23	End of Trial Pit at 3.00m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water
Strike
Standing
Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**SA02**
Client	Start Date / End Date		
Vistry Group	**04/05/2022** **04/05/2022**		
Contractor	Ground Level		
A F Howlands	**72.40m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520868 E** **205400 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.10	ES ES1				(0.30)		TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						0.30	72.10		
	0.50	ES2				(0.30)		MADE GROUND: Grey slightly gravelly clayey fine to medium SAND with occasional pieces of plastic. Gravels are fine to medium rounded flints. (reworked topsoil)	
						0.60	71.80		
1						(0.50)		Grey slightly gravelly slightly silty fine to medium SAND . Gravels are fine to medium rounded flints. [Kesgrave Catchment Subgroup]	
						1.10	71.30		
						(0.70)		Firm brown sandy CLAY. [Kesgrave Catchment Subgroup] *Clay filled land drain*	
						1.80	70.60		
2						(1.40)		Firm grey slightly sandy silty CLAY [Kesgrave Catchment Subgroup] *band of dark brown fibrous peat with strong organic odour*	
3						3.20	69.20	End of Trial Pit at 3.20m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water
Strike
Standing
Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**SA03**
Client	Start Date / End Date		
Vistry Group	**04/05/2022** **04/05/2022**		
Contractor	Ground Level		
A F Howlands	**74.11m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520823 E** **205509 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.20	ES ES1				(0.25)		TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						0.25	73.86	Orangish brown slightly clayey very gravelly fine to coarse SAND. Gravels are fine to medium round flints [Kesgrave Catchment Subgroup]	
1									
								Side walls unstable below 1.5m	
						(2.75)			
2									
3						3.00	71.11	End of Trial Pit at 3.00m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water
Strike
Standing
Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**TP01**
Client	Start Date / End Date		
Vistry Group	**05/05/2022** **05/05/2022**		
Contractor	Ground Level		
A F Howlands	**75.54m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**521042 E** **205528 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.10	ES ES1				(0.15) 0.15	75.39	TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
	0.30	ES2				(0.40)		Firm greyish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium rounded flint. [Kesgrave Catchment Subgroup]	
						0.55	74.99		
1	1.00	B3				(1.65)		Orangish brown clayey gravelly fine to coarse SAND. Gravel is fine to medium rounded flint [Kesgrave Catchment Subgroup]	
2						2.20	73.34		
						(0.80)		Firm brown CLAY [Kesgrave Catchment Subgroup]	
3						3.00	72.54	End of Trial Pit at 3.00m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water

Strike

Standing

Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**TP02**
Client	Start Date / End Date		
Vistry Group	**05/05/2022** **05/05/2022**		
Contractor	Ground Level		
A F Howlands	**73.50m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520890 E** **205370 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.10	ES ES1				(0.20) 0.20	73.30	TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
	0.40	ES ES2						Firm orangish brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium rounded flint [Kesgrave Catchment Subgroup]	
	0.80	D3				(1.30)			
1						1.50	72.00	Firm grey CLAY with frequent sand sized chalk fragments present [Lowestoft Formation Boulder Clay]	
2	2.00	D4				(1.45)		*Cobble of white chalk*	
3						2.95	70.55	End of Trial Pit at 2.95m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water
Strike
Standing
Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**TP03**
Client	Start Date / End Date		
Vistry Group	**05/05/2022** **05/05/2022**		
Contractor	Ground Level		
A F Howlands	**75.16m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520919 E** **205463 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.10	ES ES1				(0.15) 0.15	75.01	TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
	0.50	ES2						Orangish brown gravelly to very gravelly fine to coarse SAND. Gravels are fine to medium rounded flints [Kesgrave Catchment Subgroup]	
1									
	1.50	B3				(2.65)			
2									
						2.80	72.36	Firm grey sandy CLAY. Sand is fine to medium [Kesgrave Catchment Subgroup]	
						(0.20)			
3						3.00	72.16	End of Trial Pit at 3.00m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water
Strike
Standing
Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**TP04**
Client	Start Date / End Date		
Vistry Group	**05/05/2022** **05/05/2022**		
Contractor	Ground Level		
A F Howlands	**75.29m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520918 E** **205514 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.10	ES ES1				(0.20)		TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						0.20	75.09		
	0.30	ES ES2						Orangish brown slightly clayey very gravelly fine to coarse SAND. Gravels are fine to medium round flints [Kesgrave Catchment Subgroup]	
						(0.90)			
1						1.10	74.19		
								Orangish brown slightly gravelly clayey fine to coarse SAND. Gravels are fine to medium rounded flints [Kesgrave Catchment Subgroup]	
	1.50	B3							
						(1.70)			
2									
						2.80	72.49	Firm grey sandy CLAY. Sand is fine to medium [Kesgrave Catchment Subgroup]	
						(0.30)			
3						3.10	72.19	End of Trial Pit at 3.10m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water

Strike

Standing

Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**TP05**
Client	Start Date / End Date		
Vistry Group	**05/05/2022** **05/05/2022**		
Contractor	Ground Level		
A F Howlands	**75.02m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520831 E** **205590 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.20	ES ES1				(0.30)		TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						0.30	74.72		
	0.60	ES ES2						Orangish brown gravelly to very gravelly fine to coarse SAND. Gravels are fine to medium rounded flints [Kesgrave Catchment Subgroup]	
1	1.00	B3				(1.45)			
						1.75	73.27		
2	2.00	D4						Firm greyish brown slightly sandy to sandy CLAY [Kesgrave Catchment Subgroup]	
						(1.25)			
3						3.00	72.02	End of Trial Pit at 3.00m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water

Strike 2.80 m

Standing 2.80 m

Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**TP06**
Client	Start Date / End Date		
Vistry Group	**05/05/2022** **05/05/2022**		
Contractor	Ground Level		
A F Howlands	**71.09m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520788 E** **205446 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.10	ES ES1				(0.25)		TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						0.25	70.84		
	0.40	ES2						Grey slightly clayey sandy fine to medium rounded flint GRAVEL. [Kesgrave Catchment Subgroup]	
	0.50	B3				(0.60)			
						0.85	70.24		
1	1.00	D4						Firm grey mottled brown slightly sandy silty CLAY [Kesgrave Catchment Subgroup]	
2						(2.10)			
3						2.95	68.14	End of Trial Pit at 2.95m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water

Strike

Standing

Flow

Stability:

Pit Dimensions

Project Name	Project No:		TRIAL PIT
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**TP7**
Client	Start Date / End Date		
Vistry Group	**05/05/2022** **05/05/2022**		
Contractor	Ground Level		
A F Howlands	**71.10m OD**		
Method/Plant	Coordinates	Logged By: **MRG**	Sheet 1 of 1
JCB 3CX	**520741 E** **205511 N**	Checked By: **LT**	Scale 1:25

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.10	ES ES1				(0.40)		TOPSOIL: Grey slightly gravelly clayey fine to medium SAND. Gravels are fine to medium rounded flints.	
						0.40	70.70		
	0.50	ES ES2				(0.75)		Grey sandy fine to medium rounded flint GRAVEL [Kesgrave Catchment Subgroup] *damp*	
1	1.00	B3		▼		1.15	69.95		
	1.50	D4				(1.80)		Firm slightly gravelly CLAY. Gravels are fine to medium rounded flints. [Kesgrave Catchment Subgroup] *sandy with orangish brown mottling*	
2									
3						2.95	68.15	End of Trial Pit at 2.95m	
4									
5									

General Remarks

1. CAT Scanned Prior to excavation

Water

Strike 1.15 m

Standing

Flow

Stability:

Pit Dimensions

Project Name	Project No:		DYNAMIC SAMPLE
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**WS1**
Client	Start Date / End Date		
Vistry Group	**03/05/2022** **03/05/2022**		
Contractor	Ground Level		
A F Howlands	**75.20m OD**		
Method/Plant / Energy Ratio	Coordinates	Logged By: **LHT**	Sheet 1 of 1
Dando Terrier **70 %**	**520816 E** **205650 N**	Checked By: **LT**	Scale 1:40

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.30	ES ES1				(0.50)		MADE GROUND: Grass over brown and grey sandy gravel with rootlets.	
						0.50	74.70	Dense brown becoming light brown and brown sandy fine to medium subangular to rounded flint GRAVEL. [Kesgrave Catchment Subgroup]	
1	1.20	S	50 (7,12/50 for 170mm)			(1.35)			
						1.85	73.35	Firm brown silty becoming very silty CLAY. [Kesgrave Catchment Subgroup]	
2	2.00	S	N=8						
3	3.00	S	N=13			(2.15)			
4	4.00	S	N=13			4.00	71.20	End of Window Sample at 4.00m	
5									
6									
7									
8									

General Remarks

1. CAT Scanned prior to excavation. 2. Hand dug starter pit to 1.2m bgl

Water Strike			Window Sample Run			
Strike	Time (mins)	Rose to	Start	End	Dia. (mm)	Rec. %

Project Name	Project No:		DYNAMIC SAMPLE
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**WS2**
Client	Start Date / End Date		
Vistry Group	**04/05/2022** **04/05/2022**		
Contractor	Ground Level		
A F Howlands	**74.63m OD**		
Method/Plant / Energy Ratio	Coordinates	Logged By: **LHT**	Sheet 1 of 1
Dando Terrier **70 %**	**520794 E** **205624 N**	Checked By: **LT**	Scale 1:40

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
	0.20	ES ES1				(0.70)		MADE GROUND: Grass and weeds over brown and grey sandy gravel with rootlets.	
	0.80	ES2				0.70	73.93	Firm brown slightly sandy gravelly CLAY. Gravel is subangular to rounded flint. [Kesgrave Catchment Subgroup]	
1	1.20	S	N=19			(0.70)			
						1.40	73.23	Medium dense light brown sandy fine to medium subangular to rounded flint GRAVEL. [Kesgrave Catchment Subgroup]	
						(0.50)			
2	2.00	S	N=13			1.90	72.73	Firm brown slightly sandy gravelly CLAY. Gravel is subangular to rounded flint. [Kesgrave Catchment Subgroup]	
						(1.55)			
3	3.00	S	N=23						
						3.45	71.18	Medium dense brown silty fine to medium SAND. [Kesgrave Catchment Subgroup]	
4						(1.55)			
5						5.00	69.63	End of Window Sample at 5.00m	
6									
7									
8									

General Remarks

1. CAT Scanned prior to excavation. 2. Hand dug starter pit to 1.2m bgl

Water Strike			Window Sample Run			
Strike	Time (mins)	Rose to	Start	End	Dia. (mm)	Rec. %
4.50	20	-				

Project Name	Project No:		DYNAMIC SAMPLE
Land of Tollgate Road, Colney Heath	**332510999**	Stantec	**WS3**
Client	Start Date / End Date		
Vistry Group	**05/05/2022** **05/05/2022**		
Contractor	Ground Level		
A F Howlands	**72.62m OD**		
Method/Plant / Energy Ratio	Coordinates	Logged By: **LHT**	Sheet 1 of 1
Dando Terrier **70 %**	**520732 E** **205578 N**	Checked By: **LT**	Scale 1:40

(m)	Samples and Insitu Tests			Water	Legend	Depth (Thickness)	Level (m OD)	Stratum Description	Instrumentation /Backfill
	Depth	Type	Results						
						(0.20) 0.20	72.42	Grass and weeds over dark brown very clayey sand TOPSOIL.	
						(1.35)		Brown slightly silty sandy rounded fine to medium occasionally coarse flint GRAVEL/ gravelly SAND. [Kesgrave Catchment Subgroup]	
1	1.20	S	N=17			1.55	71.07		
						(0.40)		Stiff light grey and brown CLAY. [Kesgrave Catchment Subgroup]	
2	2.00	S	N=5			1.95 (0.35)	70.67	Loose brown sandy flint GRAVEL. [Kesgrave Catchment Subgroup]	
						2.30 (0.80)	70.32	Firm grey slightly gravelly to gravelly CLAY. Gravel is fine to medium chalk. [Kesgrave Catchment Subgroup]	
3	3.00	S	N=3	▼		3.10 (0.30)	69.52	Loose (wet) brown very clayey slightly gravelly SAND. [Kesgrave Catchment Subgroup]	
						3.40 (0.30)	69.22	Firm brown sandy CLAY. [Kesgrave Catchment Subgroup]	
						3.70 (0.30)	68.92	Stiff light grey gravelly CLAY. Gravel is fine to medium chalk. [Lowestoft Formation Boulder Clay]	
4	4.00	S	N=17			4.00 (0.60)	68.62	Medium dense grey very clayey fine to medum SAND. [Lowestoft Formation Boulder Clay]	
						4.60	68.02	End of Window Sample at 4.60m	
5									
6									
7									
8									

General Remarks

1. CAT Scanned prior to excavation. 2. Hand dug starter pit to 1.2m bgl

Water Strike			Window Sample Run			
Strike	Time (mins)	Rose to	Start	End	Dia. (mm)	Rec. %
3.00	20	-				

Soakage Test (BRE Digest 365)

Site : Tollgate Road, Colney Heath

Client : Stantec (UK) Ltd

Engineer :

Job Number 22.045

Sheet 1 / 3

Location	Date	Level	Location
SA01	04/05/2022	75.23 mOD	E: 520995 N: 205463

Pit Width (m)	0.50
Pit Depth (m)	3.00
Pit Length (m)	2.20

Soil type at test level	SAND over CLAY
Groundwater	2.95m
Drain discharge depth	Not known
Sidewall stability	Stable
Stone filled or open pit	Stone filled

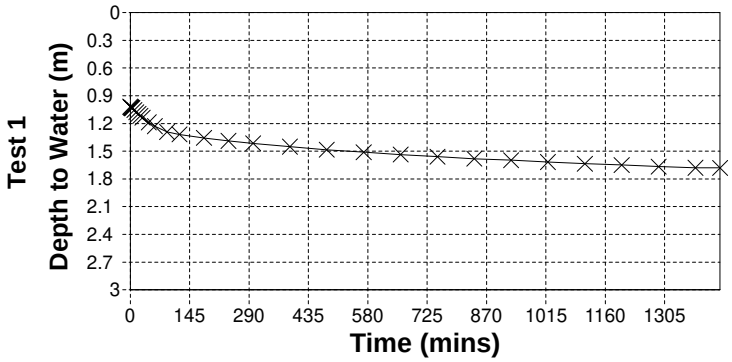
	1
Effective depth (m)	1.98
Volume outflowing between 75% & 25% (m3)*	
Mean surface area through which outflow occurs (m2)	
Time for outflow between 75% & 25% (min)	
SOIL INFILTRATION RATE (ms-1), f	Test Failed

Remarks

1. Soakage test undertaken between 1.0 and 3.0m
2. Datalogger serial no. 10109050
3. Groundwater encountered at 2.95m
4. Test failed due to insufficient drainage over a 24 hour monitoring period

* Volume outflowing reduced to account for granular backfill used during testing (30 % of free volume assumed).

Elapsed time (mins)	Depth to Water Test 1
0	1.018
1	1.023
2	1.028
3	1.031
4	1.033
5	1.035
10	1.055
15	1.079
20	1.097
25	1.116
30	1.137
45	1.188
60	1.229
90	1.292
120	1.318
180	1.357
240	1.389
300	1.415
390	1.451
480	1.484
570	1.511
660	1.537
750	1.559
840	1.582
930	1.598
1020	1.617
1110	1.635
1200	1.65
1290	1.667
1380	1.68
1440	1.681



Soakage Test (BRE Digest 365)

Site : Tollgate Road, Colney Heath

Client : Stantec (UK) Ltd

Engineer :

Job Number 22.045

Sheet 2 / 3

Location	Date	Level	Location
SA02	04/05/2022	72.40 mOD	E: 520868 N: 205400

Pit Width (m)	0.50
Pit Depth (m)	3.00
Pit Length (m)	2.20

Soil type at test level	SAND over CLAY
Groundwater	2.99m
Drain discharge depth	Not known
Sidewall stability	Stable
Stone filled or open pit	Stone filled

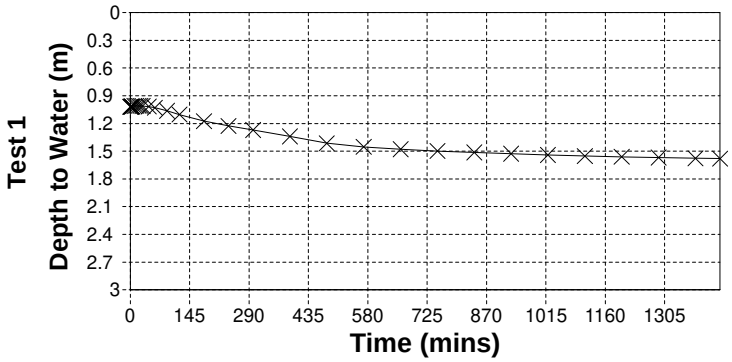
	1
Effective depth (m)	1.98
Volume outflowing between 75% & 25% (m3)*	
Mean surface area through which outflow occurs (m2)	
Time for outflow between 75% & 25% (min)	
SOIL INFILTRATION RATE (ms-1), f	Test Failed

Remarks

1. Soakage test undertaken between 1.0 and 3.0m
2. Datalogger serial no. 10109030
3. Groundwater encountered at 2.99m
4. Test failed due to insufficient drainage over a 24 hour monitoring period

* Volume outflowing reduced to account for granular backfill used during testing (30 % of free volume assumed).

Elapsed time (mins)	Depth to Water Test 1
0	1.02
1	1.019
2	1.018
3	1.017
4	1.016
5	1.015
10	1.011
15	1.009
20	1.01
25	1.01
30	1.011
45	1.017
60	1.03
90	1.063
120	1.104
180	1.175
240	1.227
300	1.271
390	1.34
480	1.414
570	1.453
660	1.479
750	1.499
840	1.513
930	1.527
1020	1.541
1110	1.553
1200	1.561
1290	1.569
1380	1.577
1440	1.58



A F Howland Associates
Geotechnical Engineers

Soakage Test (BRE Digest 365)

Site : Tollgate Road, Colney Heath

Client : Stantec (UK) Ltd

Engineer :

Job Number 22.045

Sheet 3 / 3

Location	Date	Level	Location
SA03	04/05/2022	74.11 mOD	E: 520823 N: 205510

Pit Width (m)	0.50
Pit Depth (m)	2.70
Pit Length (m)	2.20

Soil type at test level	SAND with CLAY pockets
Groundwater	2.58m
Drain discharge depth	Not known
Sidewall stability	Unstable
Stone filled or open pit	Stone filled

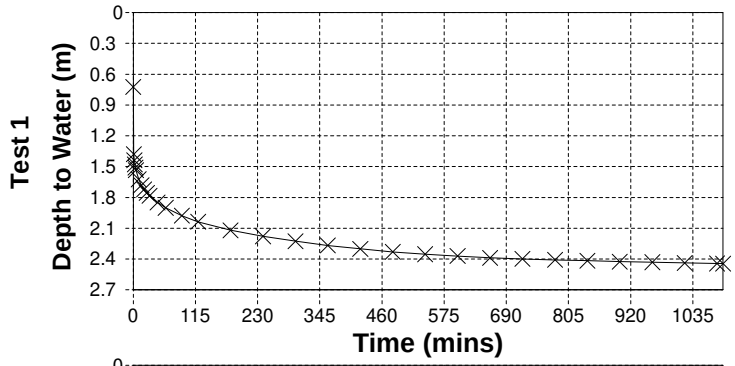
	1	2	3
Effective depth (m)	1.98	1.95	1.90
Volume outflowing between 75% & 25% (m3)*	0.33	0.32	0.31
Mean surface area through which outflow occurs (m2)	6.45	6.37	6.23
Time for outflow between 75% & 25% (min)	273.72	304.74	401.46
SOIL INFILTRATION RATE (ms-1), f	3.08E-6	2.76E-6	2.09E-6

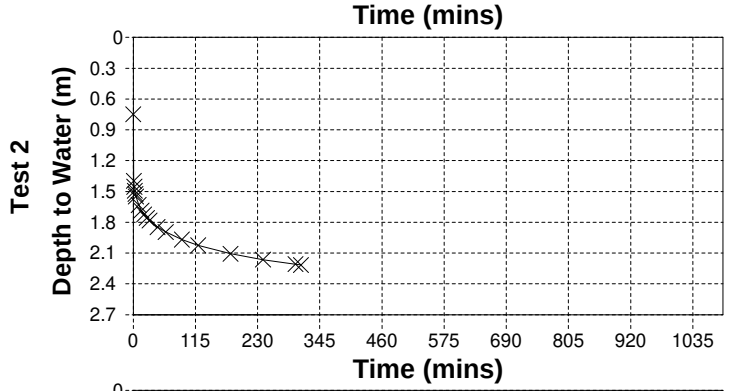
Remarks

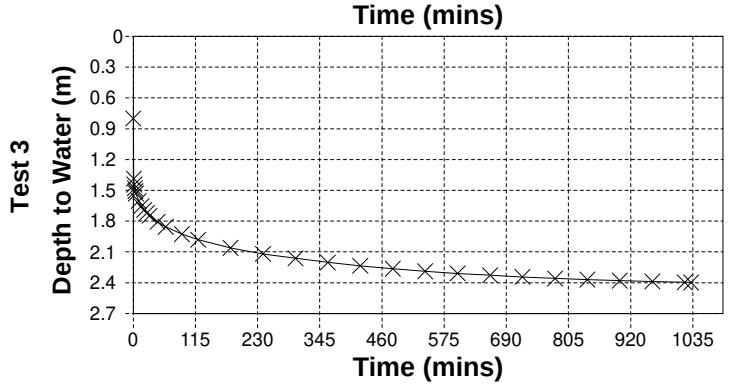
1. Soakage test undertaken between 0.7 and 2.7m
2. Datalogger serial no. 10259030
3. Groundwater encountered at 2.58m
4. Test 1 undertaken on 4/5/22 and tests 2 & 3 undertaken on 5/5/22.

* Volume outflowing reduced to account for granular backfill used during testing (30 % of free volume assumed).

Elapsed time (mins)	Depth to Water Test 1	Depth to Water Test 2	Depth to Water Test 3
0	0.724	0.749	0.801
1	1.379	1.396	1.386
2	1.439	1.454	1.444
3	1.478	1.493	1.48
4	1.511	1.525	1.508
5	1.536	1.549	1.531
10	1.624	1.632	1.605
15	1.682	1.686	1.654
20	1.723	1.725	1.691
25	1.757	1.758	1.721
30	1.785	1.784	1.747
45	1.849	1.847	1.808
60	1.901	1.895	1.855
90	1.978	1.969	1.927
120	2.037	2.025	1.981
180	2.121	2.107	2.061
240	2.179	2.164	2.119
300	2.226	2.208	2.162
310.333		2.216	
360	2.268		2.202
420	2.301		2.235
480	2.33		2.264
540	2.353		2.289
600	2.371		2.309
660	2.388		2.327
720	2.399		2.344
780	2.408		2.358
840	2.417		2.37
900	2.426		2.379
960	2.431		2.387
1020	2.438		2.396
1031.667			2.398
1080	2.444		
1090.833	2.445		







Key:

- Borehole location and reference
- Trial pit location and reference
- Soakaway test location and reference

Rev	Date	Revision Description	Drwn	Chkd

A F Howland Associates
Geotechnical Engineers

A F Howland Associates Ltd
The Old Exchange
Newmarket Road
Cringleford
Norwich
NR4 6UF

Tel: 01603 250754 Fax: 01603 250749

web: www.howland.co.uk
mail: admin@howland.co.uk

Client: Stantec (UK) Ltd

Site:
Tollgate Road, Colney Heath

Job No.: 22.045

Drawing Title:
EXPLORATORY HOLE LOCATION PLAN

Date: June 2022

Drawing No: 22.045/02

Scale: 1:2000 @ A4

Appendix J Thames Water Asset Location Search

Asset location search

Property Searches

Stantec
Lakeside house
Blackbrook Park Ave
TAUNTON
TA1 2PX

Search address supplied 42
Tollgate Road
Colney Heath
St. Albans
AL4 0PY

Your reference tollgate road

Our reference ALS/ALS Standard/2022_4590852

Search date 16 March 2022

Knowledge of features below the surface is essential for every development

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

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

Contact us to find out more.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Asset location search

Property Searches

Search address supplied: 42, Tollgate Road, Colney Heath, St. Albans, AL4 0PY

Dear Sir / Madam

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

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

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

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

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

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

Contact Us

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

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

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

Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

TL2105SW
TL2105NW
TL2005SE
TL2005NE

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

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

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

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

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

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

Following examination of our statutory maps, Thames Water has been unable to find any plans of water mains within this area. If you require a connection to the public water supply system, please write to:

New Connections / Diversions
Thames Water
Network Services Business Centre
Brentford
Middlesex
TW8 0EE

Tel: 0845 850 2777
Fax: 0207 713 3858
Email: developer.services@thameswater.co.uk

The following quartiles have not been printed as they are out of Thames' water catchment area. For details of the assets requested please contact the water company indicated below:

TL2105SW	Affinity Water
TL2105NW	Affinity Water
TL2005SE	Affinity Water
TL2005NE	Affinity Water

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ

Tel: 0345 3572401

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

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

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

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

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

Clean Water queries

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

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

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

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4590852 | **TL2105SW**

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 521250,205250

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.

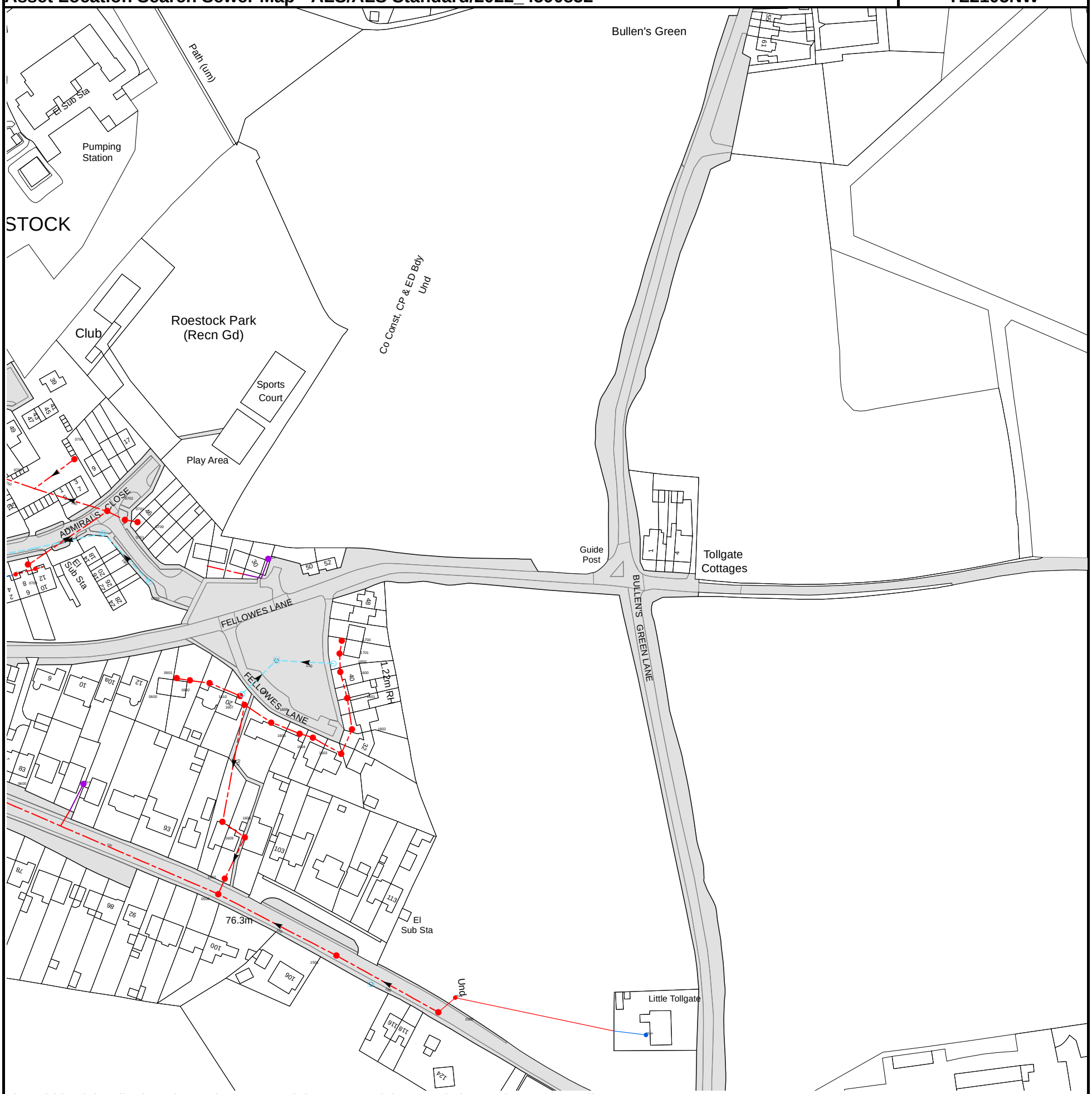
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
n/a	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.

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4590852

TL2105NW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 521250,205750

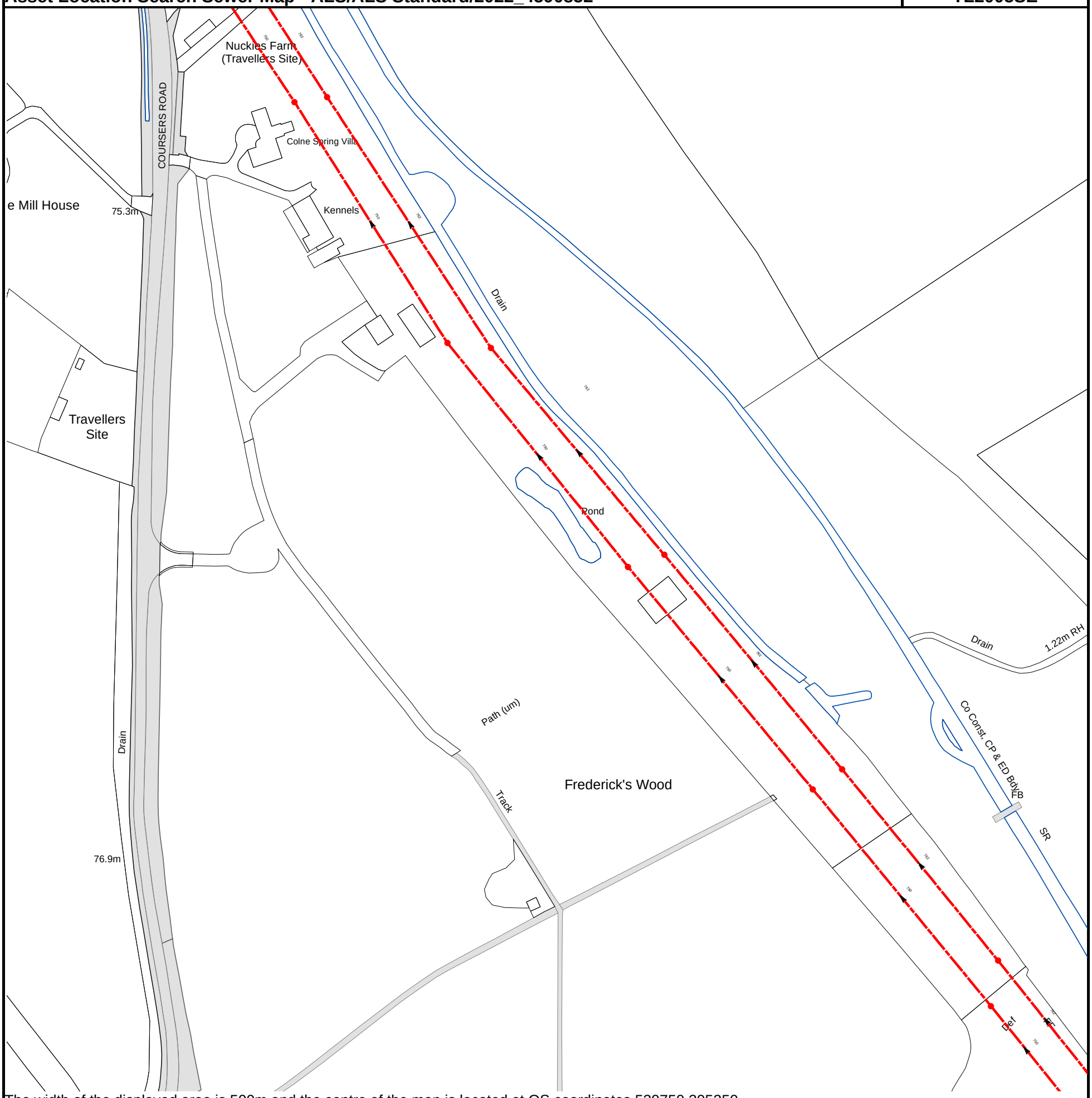
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual 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
251A	n/a	n/a
1500	76.88	75.03
251B	n/a	n/a
1550	n/a	75.97
1501	76.54	74.59
1603	75.93	75.06
1602	75.74	75.14
1601	75.78	75.24
1600	75.77	75.27
1650	75.9	74.9
1701	75.88	75.33
1700	75.88	75.38
171A	n/a	n/a
0751	75.82	74.47
0700	76.01	74.56
0701	75.89	74.44
0702	75.78	74.34
0704	75.99	74.98
071A	n/a	n/a
0703	76.06	74.82
071B	n/a	n/a
061A	n/a	n/a
0750	76	74.98
0600	75.72	75.07
0601	75.73	74.99
0602	75.76	74.91
0500	76.37	74.31
1608	76.34	74.6
1502	76.31	74.41
1610	75.75	74.85
1651	75.72	74.82
1607	75.79	74.78
1609	76.42	74.52
1606	75.77	74.84
1652	n/a	74.54
1605	75.79	74.89
1604	75.89	74.94

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.

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4590852 | **TL2005SE**



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520750,205250

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
CC125	72.48	67.42
C125	71.79	67.4
CC126	72.04	67.54
C126	71.57	67.52
CC127	72	67.66
C127	71.84	67.65
CC128	72.91	67.78
C128	72.22	67.78
CC129	72.6	67.91
C129	72.41	67.9

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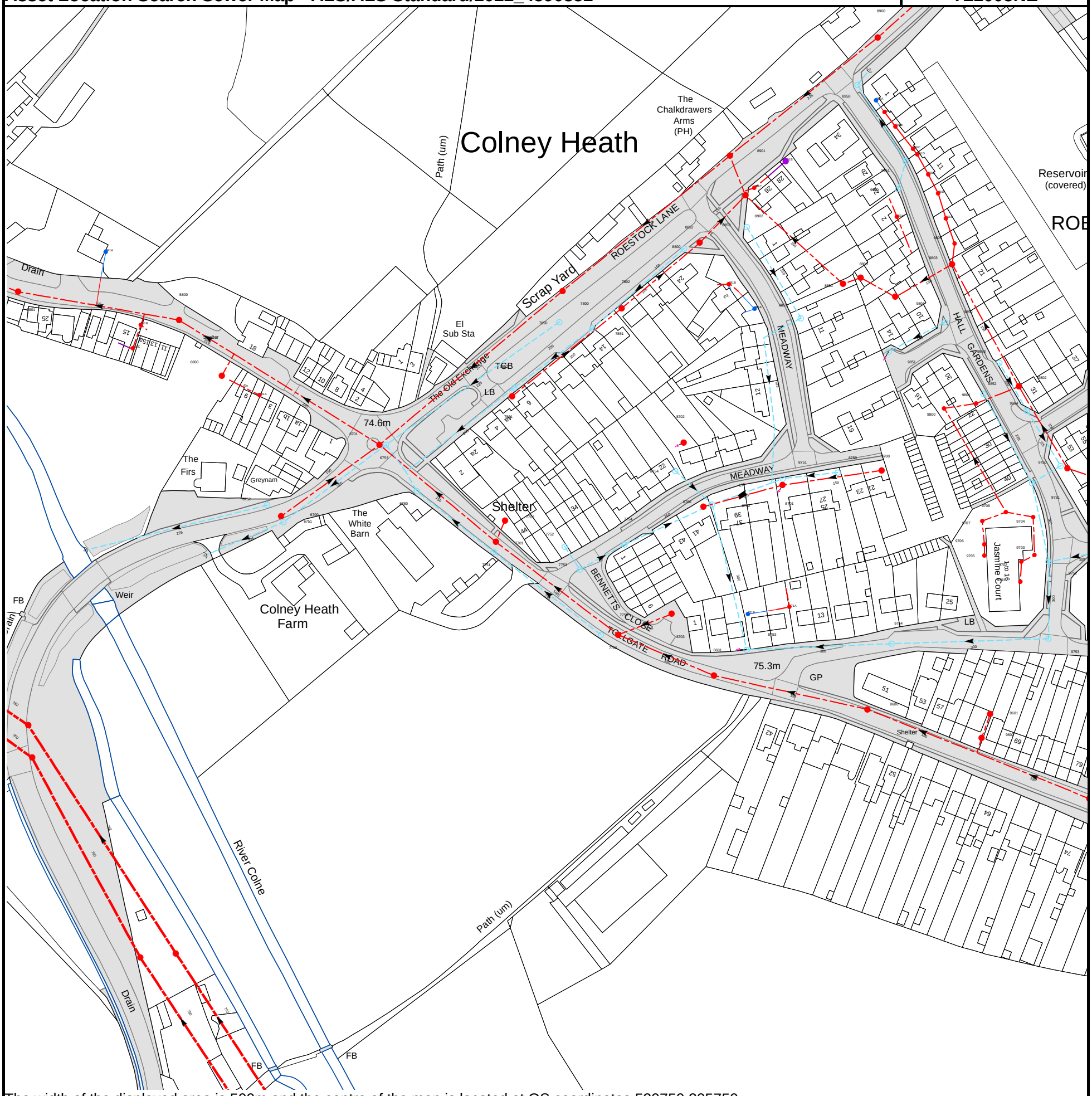
Asset Location Search Sewer Map - ALS/ALS Standard/2022_4590852 | **TL2005NE**



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520750,205750

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
581C	n/a	n/a
581B	n/a	n/a
8950	74.46	73.94
8900	74.18	71.81
9853	75.48	74.54
9851	75.62	74.06
9850	75.35	74.31
8851	75.46	73.87
881A	n/a	n/a
9804	75.33	73.16
881B	n/a	n/a
8801	75.4	73.05
8803	n/a	n/a
9803	75.19	73.36
9805	75.26	73.86
8850	75.29	74.2
991G	n/a	n/a
991H	n/a	n/a
8902	75.13	72.02
991F	n/a	n/a
9950	74.85	74.24
891C	n/a	n/a
991E	n/a	n/a
891B	n/a	n/a
9951	74.72	74.06
8901	74.85	71.65
991D	n/a	n/a
991C	n/a	n/a
991B	n/a	n/a
991A	n/a	n/a
891A	n/a	n/a
5801	73.08	70.25
581A	n/a	n/a
5800	73.35	70.56
6800	73.62	72.26
681A	n/a	n/a
6752	73.82	72.22
6700	74.03	71.37
6751	74.09	72.14
6701	74.66	70.94
6753	n/a	n/a
6750	74.75	73.27
7751	74.99	73.74
7701	74.92	72.07
7702	75.25	73.5
7801	75.1	73.9
7852	75.24	74.18
7850	74.97	74.12
7800	75	71.29
7752	74.98	74.45
7851	75.42	74.4
7802	75.47	73.41
7754	75.11	73.58
8754	75.31	73.79
8702	75.41	73.71
8852	n/a	n/a
8800	75.42	72.78
9702	76.1	75.04
9705	76.05	74.91
9703	76.07	74.93
9706	76.06	74.81
9707	76.06	74.59
9704	76.04	74.64
9708	75.91	74.24
8700	75.56	74.36
8752	75.38	73.18
8701	75.56	74.04
9751	76	74.02
8751	75.54	73.48
8750	75.69	73.74
9700	75.61	74.42
9709	75.85	73.77
9750	75.9	74.18
9854	75.78	74.38
9800	75.88	73.93
9801	75.73	73.64
9852	75.57	74.26
9802	75.69	73.6
C123	70.64	67.13
CC123	71.73	67.17
CC124	71.65	67.29
C124	71.61	67.27
7753	75.08	74.06
7750	75.56	74.3
7700	75.42	72.42
8703	75.35	73.85
8601	74.49	72.63
8753	75.46	72.98
871B	n/a	n/a
871A	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8600	75.64	72.97
9754	75.54	73.4
9602	75.84	74.67
9601	75.99	75.06
9701	76.07	75.27
9753	75.8	73.83
9752	76.05	73.86
9600	76.25	73.65
961A	n/a	n/a

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Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

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

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

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

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

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

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

Sewer Fittings

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

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

Operational Controls

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

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

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

- Inlet
- Outfall
- Undefined End

Other Symbols

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

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

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement

Ducts may contain high voltage cables. Please check with Thames Water.

- Conduit Bridge
- Subway
- Tunnel

Notes:

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

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

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

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