

Anchor Hannover
St Andrew's Park, Uxbridge

Perega Responses - Planning Condition 10

Prior to commencement (excluding demolition and site clearance) a scheme for the provision of sustainable water management shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall follow the strategy set out in SKM _2581908021370 Rev 01 dated 2nd August. The scheme shall clearly demonstrate how it, Manages Water and demonstrate ways of controlling the surface water on site by providing information on:

a) Suds Features

i. incorporating sustainable urban drainage (SuDs) in accordance with the hierarchy set out in Policy 5.13 of the London Plan. Where the proposal does not utilise the most sustainable solution, justification must be provided

SUDS is provided in the form of rainwater discharge to sewer/drain via an attenuation tank/hydrobrake (Policy 5.13, Hierarchy No 4). [NB - Hierarchy No 1 Water Storage – not possible due to insufficient space on site; No 2 Infiltration - not possible due to clay sub-soils; No 3 Attenuate in ponds/open water features – none specified on site due to lack of space]

ii. calculations showing storm period and intensity and volume of storage required to control surface water and size of features to control that volume to Greenfield run off rates at a variety of return periods including 1 in 1 year, 1 in 30, 1 in 100, and 1 in 100 plus Climate change

Microdrainage calculations are attached – note SW discharge rate is set to 6.4 l/s as identified in the Sellers Specification (attached)

iii. where identified in an area at risk of surface water flooding, include additional provision within calculations for surface water from off site

Not applicable - the site-wide drainage strategy prepared by Atkins does not identify any areas of the site as at risk from surface water flooding

iv. where it is intended to have above ground storage, overland flooding should be mapped, both designed and exceedance routes above the 100, plus climate change, including flow paths depths and velocities identified as well as any hazards, (safe access and egress must be demonstrated)

Not applicable – there is no above ground storage of surface water

b) Capacity of Receptors

i. Demonstration that the proposals connect into a proper and functioning Thames Water network, ie that the point a proposal connects into is part of a wider network, and the applicant provides details of the approval and any appropriate upgrades will be undertaken from Thames Waters free pre planning service

Refer to attached Atkins drawings for details of wider sewer network. S106 approvals for the FW & SW connections from the site have not yet been made. These will be made by the appointed Contractor

ii. Where infiltration techniques (soakaway) or a basement are proposed a site investigation must be provided to establish the level of groundwater on the site, and to demonstrate the suitability of infiltration techniques proposed on the site. (This should be undertaken at the appropriate time of year as groundwater levels fluctuate)

Not applicable - infiltration is not proposed for this site

iii. Where groundwater is found within the site and a basement is proposed suitable mitigation methods must be provided to ensure the risk to others is not increased

The basement construction is waterproof. The ground conditions are impermeable London Clay and as such the presence of a basement will not adversely affect groundwater around the site

iv. identify vulnerable receptors, ie WFD status and prevent pollution of the receiving groundwater and/or surface waters through appropriate methods

Not applicable – discharge is to public sewer. Permeable paving is provided in order to achieve water quality requirements, as agreed with the LLFA

c) Minimise Water Use

i. incorporate water saving measures and equipment

Water saving is achieved via the specification of the sanitaryware, taps & cisterns etc – please refer to the appropriate consultant's details

ii. provide details of how rain and or grey water will be recycled and reused in the development

Not applicable – no rainwater/grey water recycling is proposed for the site

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XP Solutions	Network 2018.1.1	

Existing Network Details for Storm

* - Indicates pipe has been modified outside of System 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	10.061	0.171	59.0	0.005	5.00	0.600	o	100	Pipe/Conduit
1.001	9.895	0.299	33.1	0.025	0.00	0.600	o	100	Pipe/Conduit
1.002	9.008	0.090	100.0	0.012	0.00	0.600	o	100	Pipe/Conduit
1.003	21.784	0.590	36.9	0.013	0.00	0.600	o	150	Pipe/Conduit
2.000	4.690	0.090	52.1	0.002	5.00	0.600	o	100	Pipe/Conduit
1.004	15.450	0.160	95.6	0.021	0.00	0.600	o	225	Pipe/Conduit
1.005	0.930	0.006	169.0	0.000	0.00	0.600	o	225	Pipe/Conduit
3.000	4.270	0.240	17.8	0.001	5.00	0.600	o	100	Pipe/Conduit
3.001	11.970	0.203	59.0	0.006	0.00	0.600	o	100	Pipe/Conduit
3.002	21.530	0.215	100.0	0.027	0.00	0.600	o	150	Pipe/Conduit
4.000	34.240	1.038	33.0	0.009	5.00	0.600	o	100	Pipe/Conduit
3.003	28.080	0.166	169.0	0.017	0.00	0.600	o	225	Pipe/Conduit
5.000	4.540	0.080	56.8	0.036	5.00	0.600	o	100	Pipe/Conduit
5.001	5.930	0.035	169.0	0.020	0.00	0.600	o	225	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
1.000	S1	49.510	48.510	0.900	49.440	48.339	1.001		1200
1.001	S2	49.440	48.339	1.001	48.740	48.040	0.600		1200
1.002	S3	48.740	47.990	0.600	48.790	47.900	0.740		1200
1.003	S4	48.790	47.900	0.740	48.360	47.310	0.900		1200
2.000	S5	48.450	47.450	0.900	48.360	47.360	0.900		1200
1.004	S6	48.360	47.235	0.900	48.200	47.075	0.900		1200
1.005	S6a	48.200	46.416	1.559	48.110	46.410	1.475		1200
3.000	RE3	48.130	47.430	0.600	47.890	47.190	0.600		1200
3.001	S7	47.890	47.190	0.600	48.510	46.987	1.423		1200
3.002	S8	48.510	46.937	1.423	48.490	46.722	1.618		1200
4.000	RE4	48.510	47.810	0.600	48.490	46.772	1.618		1200
3.003	S9	48.490	46.647	1.618	48.590	46.481	1.884		1200
5.000	S10	48.510	47.760	0.600	48.430	47.680	0.600		1200
5.001	S11	48.430	47.605	0.600	48.590	47.570	0.795		1200

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
3.004	1.540	0.071	21.7	0.000	0.00	0.600	o	225	Pipe/Conduit
6.000	5.680	0.057	20.0	0.049	5.00	0.600	o	150	Pipe/Conduit
7.000	19.190	0.325	55.0	0.017	5.00	0.600	o	100	Pipe/Conduit
6.001	2.890	0.100	28.9	0.000	0.00	0.600	o	225	Pipe/Conduit
1.006	2.640	0.078	34.0	0.000	0.00	0.600	o	100	Pipe/Conduit
* 1.007	22.210	0.653	34.0	0.000	0.00	0.600	o	250	Pipe/Conduit
* 1.008	19.640	0.569	34.5	0.000	0.00	0.600	o	150	Pipe/Conduit
8.000	30.420	1.463	20.8	0.005	5.00	0.600	o	100	Pipe/Conduit
8.001	1.200	0.058	20.8	0.000	0.00	0.600	o	100	Pipe/Conduit
9.000	8.830	0.150	59.0	0.005	5.00	0.600	o	100	Pipe/Conduit
9.001	1.220	0.021	59.0	0.000	0.00	0.600	o	100	Pipe/Conduit
8.002	1.470	0.025	59.0	0.000	0.00	0.600	o	100	Pipe/Conduit
8.003	9.110	0.315	28.9	0.000	0.00	0.600	o	200	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
3.004	S12	48.590	46.481	1.884	48.110	46.410	1.475		1200
6.000	S13	48.290	47.540	0.600	48.270	47.483	0.637		1200
7.000	RE1	47.000	46.300	0.600	48.270	45.975	2.195		1200
6.001	S14	48.270	45.850	2.195	48.110	45.750	2.135		1200
1.006	AT1	48.110	45.360	2.450	48.260	45.282	2.678	Hydro-Brake®	1200
* 1.007	S15	48.260	45.282	2.828	46.910	44.629	2.131		1200
* 1.008	S16	46.910	44.629	2.131	45.760	44.060	1.550		1200
8.000	RE2	46.670	45.970	0.600	45.940	44.508	1.333		1200
8.001	S17	45.940	44.508	1.333	45.770	44.450	1.220		1200
9.000	RE5	45.621	44.621	0.900	45.670	44.471	1.099		1200
9.001	S18	45.670	44.471	1.099	45.770	44.450	1.220		1200
8.002	AT2	45.770	44.450	1.220	45.810	44.425	1.285	Hydro-Brake®	1200
8.003	S19	45.810	44.425	1.285	45.760	44.110	1.550		1200

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
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* 1.009	6.663	0.067	99.4	0.000	0.00	0.600	o	150	Pipe/Conduit
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PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
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* 1.009	S20	45.760	44.060	1.550	45.956	41.893	1.813		1200
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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	48.510	1.000	Open Manhole	1200	1.000	48.510	100				
S2	48.440	1.101	Open Manhole	1200	1.001	48.339	100	1.000	48.339	100	
S3	48.740	0.750	Open Manhole	1200	1.002	47.990	150	1.001	48.040	100	
S4	48.790	0.890	Open Manhole	1200	1.003	47.900	150	1.002	47.900	150	
S5	48.450	1.000	Open Manhole	1200	2.000	47.450	100				
S6	48.360	1.125	Open Manhole	1200	1.004	47.235	225	1.003	47.310	150	
								2.000	47.360	100	
S6a	48.200	1.784	Open Manhole	1200	1.005	46.416	225	1.004	47.075	225	100
RE3	48.130	0.700	Open Manhole	1200	3.000	47.430	100				
S7	47.890	0.700	Open Manhole	1200	3.001	47.190	100	3.000	47.190	100	
S8	48.510	1.573	Open Manhole	1200	3.002	46.937	150	3.001	46.987	100	
RE4	48.510	0.700	Open Manhole	1200	4.000	47.810	100				
S9	48.490	1.843	Open Manhole	1200	3.003	46.647	225	3.002	46.722	150	
								4.000	46.772	100	
S10	48.510	0.750	Open Manhole	1200	5.000	47.760	150				
S11	48.430	0.825	Open Manhole	1200	5.001	47.605	225	5.000	47.680	150	
S12	48.590	2.109	Open Manhole	1200	3.004	46.481	225	3.003	46.481	225	
								5.001	47.570	225	100
S13	48.290	0.750	Open Manhole	1200	6.000	47.540	150				
RE1	47.000	0.700	Open Manhole	1200	7.000	46.300	100				
S14	48.270	2.420	Open Manhole	1200	6.001	45.850	225	6.000	47.483	150	100
								7.000	45.975	100	
AT1	48.110	2.750	Open Manhole	1200	1.006	45.360	300	1.005	46.410	225	975
								3.004	46.410	225	975
								6.001	45.750	225	315
S15	48.260	2.978	Open Manhole	1200	1.007	45.282	150	1.006	45.282	300	
S16	48.910	2.281	Open Manhole	1200	1.008	44.629	150	1.007	44.629	150	
S17	48.670	0.700	Open Manhole	1200	8.000	44.590	100				
S17	45.940	1.433	Open Manhole	1200	8.001	44.508	100	8.000	44.508	100	
S18	45.621	1.000	Open Manhole	1200	9.000	44.621	100				
S18	45.670	1.199	Open Manhole	1200	9.001	44.471	100	9.000	44.471	100	
AT2	45.770	1.320	Open Manhole	1200	8.002	44.450	100	8.001	44.450	100	
								9.001	44.450	100	
S19	45.810	1.385	Open Manhole	1200	8.003	44.425	100	8.002	44.425	100	
S20	45.760	1.700	Open Manhole	1200	1.009	44.060	150	1.008	44.060	150	
								8.003	44.110	100	
Ex S1	45.956	1.963	Open Manhole	0		OUTFALL		1.009	43.950	150	

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: AT1, DS/PN: 1.006, Volume (m³): 3.2

Unit Reference	MD-SHE-0105-5400-1320-5400
Design Head (m)	1.320
Design Flow (l/s)	5.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	103
Invert Level (m)	45.360
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.320	5.4
Flush-Flo™	0.388	5.4
Kick-Flo®	0.811	4.3
Mean Flow over Head Range	-	4.7

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	3.5	1.200	5.2	3.000	7.9	7.000	11.9
0.200	5.0	1.400	5.5	3.500	8.5	7.500	12.3
0.300	5.3	1.600	5.9	4.000	9.1	8.000	12.6
0.400	5.4	1.800	6.2	4.500	9.6	8.500	13.0
0.500	5.3	2.000	6.6	5.000	10.1	9.000	13.4
0.600	5.2	2.200	6.9	5.500	10.6	9.500	13.7
0.800	4.4	2.400	7.1	6.000	11.0		
1.000	4.7	2.600	7.4	6.500	11.4		

Hydro-Brake® Optimum Manhole: AT2, DS/PN: 8.002, Volume (m³): 1.5

Unit Reference	MD-SHE-0035-1000-0350-1000
Design Head (m)	0.350
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	56
Invert Level (m)	44.450
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: AT2, DS/PN: 8.002, Volume (m³): 1.5

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.350	1.0
Flush-Flo™	0.101	1.0
Kick-Flo®	0.244	0.9
Mean Flow over Head Range	-	0.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	1.200	1.7	3.000	2.6	7.000	4.0
0.200	0.9	1.400	1.9	3.500	2.8	7.500	4.1
0.300	0.9	1.600	2.0	4.000	3.0	8.000	4.3
0.400	1.1	1.800	2.1	4.500	3.2	8.500	4.4
0.500	1.2	2.000	2.2	5.000	3.4	9.000	4.5
0.600	1.3	2.200	2.3	5.500	3.6	9.500	4.7
0.800	1.4	2.400	2.4	6.000	3.7		
1.000	1.6	2.600	2.5	6.500	3.9		

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Storage Structures for Storm

Cellular Storage Manhole: AT1, DS/PN: 1.006

Invert Level (m) ~~1.320~~ Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	94.0	0.0	1.321	0.0	0.0
~~1.320~~	94.0 ✓	0.0			

Cellular Storage Manhole: AT2, DS/PN: 8.002

Invert Level (m) ~~4.350~~ Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	4.4	0.0	0.351	0.0	0.0
~~0.350~~	4.4 ✓	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 Coefficient 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 FSR Ratio R 0.402
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320, 5760,
7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 40, 40, 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	S1	15 Winter	1	+40%	30/15 Summer				48.534
1.001	S2	15 Winter	1	+40%	30/15 Summer				48.391
1.002	S3	15 Winter	1	+40%	30/15 Summer				48.062
1.003	S4	15 Winter	1	+40%	100/15 Summer				47.960
2.000	S5	15 Winter	1	+40%					47.465
1.004	S6	15 Winter	1	+40%					47.316
1.005	S6a	15 Winter	1	+40%	30/15 Summer				46.520
3.000	RE3	15 Winter	1	+40%					47.438
3.001	S7	15 Winter	1	+40%	100/15 Summer				47.217
3.002	S8	15 Winter	1	+40%	30/15 Winter				46.997
4.000	RE4	15 Winter	1	+40%					47.838
3.003	S9	15 Winter	1	+40%	30/15 Winter				46.727
5.000	S10	15 Winter	1	+40%	100/15 Summer				47.826
5.001	S11	15 Winter	1	+40%	100/15 Summer				47.697
3.004	S12	15 Winter	1	+40%	30/15 Summer				46.598
6.000	S13	15 Winter	1	+40%	30/15 Summer				47.629
7.000	RE1	15 Winter	1	+40%	30/15 Winter				46.346
6.001	S14	15 Winter	1	+40%	30/30 Winter				45.933
1.006	AT	120 Winter	1	+40%	30/15 Summer				45.647

≤ 46.64
tank
soffit

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

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	S1	-0.076	0.000	0.13		1.0	OK	
1.001	S2	-0.048	0.000	0.52		5.1	OK	
1.002	S3	-0.079	0.000	0.45		7.1	OK	
1.003	S4	-0.090	0.000	0.33		9.3	OK	
2.000	S5	-0.085	0.000	0.05		0.4	OK	
1.004	S6	-0.144	0.000	0.28		13.1	OK	
1.005	S6a	-0.121	0.000	0.44		13.1	OK	
3.000	RE3	-0.092	0.000	0.02		0.2	OK	
3.001	S7	-0.073	0.000	0.16		1.2	OK	
3.002	S8	-0.090	0.000	0.34		5.6	OK	
4.000	RE4	-0.072	0.000	0.17		1.7	OK	
3.003	S9	-0.145	0.000	0.27		10.1	OK	
5.000	S10	-0.084	0.000	0.39		7.0	OK	
5.001	S11	-0.133	0.000	0.34		10.3	OK	
3.004	S12	-0.107	0.000	0.54		20.3	OK	
6.000	S13	-0.061	0.000	0.64		9.5	OK	
7.000	RE1	-0.054	0.000	0.43		3.3	OK	
6.001	S14	-0.142	0.000	0.29		12.8	OK	
1.006	AT1	-0.013	0.000	0.08		✓ 5.3	OK	

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XP Solutions		Network 2018.1.1

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S15	120 Winter	1	+40%					45.325
1.008	S16	120 Winter	1	+40%					44.672
8.000	RE2	15 Winter	1	+40%					45.988
8.001	S17	15 Winter	1	+40%	30/15 Summer				44.533
9.000	RE5	15 Winter	1	+40%	100/30 Summer				44.645
9.001	S18	30 Winter	1	+40%	30/15 Summer				44.525
8.002	AT2	30 Winter	1	+40%	30/15 Summer				44.524
8.003	S19	30 Winter	1	+40%					44.443
1.009	S20	60 Winter	1	+40%					44.125

		Surcharged		Flooded		Pipe		Level	
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Exceeded	
1.007	S15	-0.107	0.000	0.18		5.3	OK		
1.008	S16	-0.107	0.000	0.19		5.3	OK		
8.000	RE2	-0.082	0.000	0.07		1.0	OK		
8.001	S17	-0.075	0.000	0.15		1.0	OK		
9.000	RE5	-0.076	0.000	0.13		1.0	OK		
9.001	S18	-0.046	0.000	0.18		0.7	OK		
8.002	AT2	-0.026	0.000	0.18		0.8	OK		
8.003	S19	-0.082	0.000	0.08		0.8	OK		
1.009	S20	-0.085	0.000	0.39		5.9	OK		

≤ 44.76
tenk
solid

NO
FLOODING
✓

≤ 6.4
allowable

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

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	S1	0.061	0.000	0.43		3.2	SURCHARGED	
1.001	S2	0.215	0.000	1.27		12.5	SURCHARGED	
1.002	S3	0.025	0.000	1.15		18.0	SURCHARGED	
1.003	S4	-0.040	0.000	0.86		24.0	OK	
2.000	S5	-0.076	0.000	0.13		0.9	OK	
1.004	S6	-0.075	0.000	0.75		35.1	OK	
1.005	S6a	0.049	0.000	1.18		35.2	SURCHARGED	
3.000	RE3	-0.087	0.000	0.04		0.5	OK	
3.001	S7	-0.051	0.000	0.48		3.5	OK	
3.002	S8	0.000	0.000	1.00		16.7	SURCHARGED	
4.000	RE4	-0.055	0.000	0.41		4.2	OK	
3.003	S9	0.000	0.000	0.76		28.2	SURCHARGED	
5.000	S10	-0.031	0.000	0.97		17.1	OK	
5.001	S11	-0.054	0.000	0.91		27.1	OK	
3.004	S12	0.067	0.000	1.46		54.6	SURCHARGED	
6.000	S13	0.082	0.000	1.57		23.1	SURCHARGED	
7.000	RE1	0.007	0.000	1.01		7.7	SURCHARGED	
6.001	S14	0.211	0.000	0.22		9.9	SURCHARGED	
1.006	AT1	0.625	0.000	0.08		5.4	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S15	960 Winter	30	+40%					45.326
1.008	S16	15 Summer	30	+40%					44.673
8.000	RE2	15 Winter	30	+40%					45.999
8.001	S17	30 Winter	30	+40%	30/15 Summer				44.670
9.000	RE5	30 Winter	30	+40%	100/30 Summer				44.674
9.001	S18	30 Winter	30	+40%	30/15 Summer				44.670
8.002	AT2	30 Winter	30	+40%	30/15 Summer				44.669
8.003	S19	30 Summer	30	+40%					44.445
1.009	S20	60 Winter	30	+40%					44.128

		Surcharged		Flooded	Pipe			
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S15	-0.106	0.000	0.19		5.4	OK	
1.008	S16	-0.106	0.000	0.19		5.4	OK	
8.000	RE2	-0.071	0.000	0.18		2.4	OK	
8.001	S17	0.063	0.000	0.22		1.4	SURCHARGED	
9.000	RE5	-0.047	0.000	0.26		1.9	OK	
9.001	S18	0.099	0.000	0.34		1.4	SURCHARGED	
8.002	AT2	0.119	0.000	0.22		1.0	SURCHARGED	
8.003	S19	-0.080	0.000	0.09		1.0	OK	
1.009	S20	-0.082	0.000	0.42		6.4	OK	

NO
FLOWING
✓

≤ 6.4
allowable ✓

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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 Coefficient 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 FSR Ratio R 0.402
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320, 5760,
7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	100	+40%	30/15 Summer				48.929
1.001	S2	15 Winter	100	+40%	30/15 Summer				48.914
1.002	S3	15 Winter	100	+40%	30/15 Summer				48.236
1.003	S4	15 Winter	100	+40%	100/15 Summer				48.069
2.000	S5	15 Winter	100	+40%					47.478
1.004	S6	15 Winter	100	+40%					47.405
1.005	S6a	15 Winter	100	+40%	30/15 Summer				46.718
3.000	RE3	15 Winter	100	+40%					47.444
3.001	S7	15 Winter	100	+40%	100/15 Summer				47.330
3.002	S8	15 Winter	100	+40%	30/15 Winter				47.280
4.000	RE4	15 Winter	100	+40%					47.863
3.003	S9	15 Winter	100	+40%	30/15 Winter				46.995
5.000	S10	15 Winter	100	+40%	100/15 Summer				47.974
5.001	S11	15 Winter	100	+40%	100/15 Summer				47.847
3.004	S12	15 Winter	100	+40%	30/15 Summer				46.853
6.000	S13	15 Winter	100	+40%	30/15 Summer				47.868
7.000	RE1	180 Winter	100	+40%	30/15 Winter				46.643
6.001	S14	180 Winter	100	+40%	30/30 Winter				46.640
1.006	AT1	180 Winter	100	+40%	30/15 Summer				46.639

≤ 46.64
tank
solid ✓

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

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)			Flow (l/s)		
1.000	S1	0.319	0.000	0.58		4.3	SURCHARGED	
1.001	S2	0.474	0.000	1.50		14.7	SURCHARGED	
1.002	S3	0.095	0.000	1.34		21.0	SURCHARGED	
1.003	S4	0.019	0.000	1.02		28.3	SURCHARGED	
2.000	S5	-0.072	0.000	0.17		1.2	OK	
1.004	S6	-0.055	0.000	0.92		42.9	OK	
1.005	S6a	0.077	0.000	1.43		42.8	SURCHARGED	
3.000	RE3	-0.086	0.000	0.05		0.6	OK	
3.001	S7	0.040	0.000	0.59		4.4	SURCHARGED	
3.002	S8	0.193	0.000	1.15		19.2	SURCHARGED	
4.000	RE4	-0.047	0.000	0.53		5.5	OK	
3.003	S9	0.123	0.000	0.91		33.6	SURCHARGED	
5.000	S10	0.064	0.000	1.25		22.1	SURCHARGED	
5.001	S11	0.017	0.000	1.14		34.0	SURCHARGED	
3.004	S12	0.147	0.000	1.80		67.4	SURCHARGED	
6.000	S13	0.178	0.000	2.04		29.9	SURCHARGED	
7.000	RE1	0.243	0.000	0.33		2.5	SURCHARGED	
6.001	S14	0.565	0.000	0.21		9.2	SURCHARGED	
1.006	AT1	0.979	0.000	0.08		5.4	SURCHARGED	



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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S15	30 Winter	100	+40%					45.326
1.008	S16	30 Summer	100	+40%					44.673
8.000	RE2	15 Winter	100	+40%					46.003
8.001	S17	30 Winter	100	+40%	30/15 Summer				44.756
9.000	RE5	30 Winter	100	+40%	100/30 Summer				44.760
9.001	S18	30 Winter	100	+40%	30/15 Summer				44.756
8.002	AT2	30 Winter	100	+40%	30/15 Summer				44.755
8.003	S19	15 Summer	100	+40%					44.445
1.009	S20	60 Winter	100	+40%					44.128

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S15	-0.106	0.000	0.19		5.4	OK	
1.008	S16	-0.106	0.000	0.19		5.4	OK	
8.000	RE2	-0.067	0.000	0.24		3.1	OK	
8.001	S17	0.149	0.000	0.27		1.8	SURCHARGED	
9.000	RE5	0.039	0.000	0.33		2.4	SURCHARGED	
9.001	S18	0.185	0.000	0.43		1.7	SURCHARGED	
8.002	AT2	0.206	0.000	0.22		1.0	SURCHARGED	
8.003	S19	-0.079	0.000	0.09		1.0	OK	
1.009	S20	-0.082	0.000	0.42		6.4	OK	

≤ 44.76
+calc
solid /

NO
FLOODING
✓

≤ 6.0
allowable

Seller's Works Specification

1. Demolition

The removal of all buildings and structures has been undertaken on behalf of VSM Estates (Uxbridge) Limited. Known foundations and basements have been broken out and removed to a depth of 2m below pre-existing ground level.

Excavations formed by removal of foundations and/or below ground structures have been backfilled. The resultant voids were filled using appropriate validated crushed arisings, deposited and compacted by the contractor in accordance with the methods specified in the Manual of Contract Documents for Highway Works. Materials placed were tested by the contractor to confirm a bearing capacity of at least 80kPa and a California Bearing Ratio (CBR) of at least 5% as confirmed in Cuddy's Operational and Maintenance Manual (App 9).

Based on existing services records known existing drainage has been removed and existing services disconnected.

2. Remediation and Reclamation

The remediation of the site has been undertaken in accordance with the planning conditions and Remediation Verification Report (App 4). The Remediation Verification Report has been approved by the regulators and the planning conditions have been discharged.

The Seller has provided a Land Quality Statement (LQS) (App 10). The LQS will summarise the underlying geology, works undertaken and considerations (such as clean cover and gas protection measures) for the proposed development of the site by the Buyer.

3 Earthworks

The levels of the Site are as shown in the Topographical Survey (App 6) and re-profiling was carried out post remediation and reclamation works. A summary of the materials and available geo-environmental and geotechnical information relating to the placement of material onto the site is contained in Atkins Summary of Geo-Environmental Information for Earthworks Materials (App 5).

4 Access

The closest permanent access to the Site from the surrounding road network will be from Chippendale Way Roundabout and then onto St Andrews Road.

The vehicle access point into the Site will be directly off St Andrews Road (noted as SCA2 refer to drawing number 5105977-ATK-UXB-CAH-DR-0100 (App 1)).

An indicative location of a compound for the Buyer is shown adjacent to St Andrews Road and accessed via SCA1. The exact location and size of the compound to be agreed with the Buyer.

5 Drainage

5.1. Surface Water

The following table provides a summary of the surface water drainage outfall for the Extra Care Phase. Refer to ATKINS drawing number 5105977-ATK-UXB-CAH-DR-0100 (App 1) for discharge location and App 11 for as built drawings and App 12 for design drawings.

The connection location and depth are subject to planning approval and technical approval and therefore subject to change.

Table 1. Extra Care Phase -

Surface Water Design Criteria

Design Criteria	Discharge Point SW5A (Design)
Discharge Point Invert Level (tolerance +/- 50mm)	43.993
Pipe Diameter (mm)	225
Final Discharge Location	River Pinn
Discharge Rate (l/s)	6.38

The outfall will discharge into the storm water network in St Andrews Road and then connect to an attenuation pond in the District Park. The pond discharges into the River Pinn. The Seller will retain the ability to charge residents for surface water.

5.2. Foul Water

The following is a summary of the foul water drainage requirements for the Extra Care Phase. Refer to Akins drawing number 5105977-ATK-UXB-CAH-DR-0100 (App 1) for discharge location and App 11 for as built drawings and App 12 for design drawings.

The connection location and depth are subject to planning approval and technical approval and therefore subject to change.

Table 2. Extra Care Phase

Foul Water Design Criteria

Design Criteria	Discharge Point FW5A (Design)
Discharge Point Invert Level (tolerance +/- 50mm)	43.512
Pipe Diameter (mm)	150
Final Discharge Location	Western (Spine Road)
Max No of dwellings	77
Max Discharge Rate (at 4000 l/day/dwelling) (l/day)	308,000

The outfall will discharge into the foul water network in St Andrews Road and then into the foul water network in Grays Road. This network connects into

Churchill Road to the south of the Site before connecting to the Thames Water network.

The whole on site network has been offered to Thames Water for adoption under S104 of the Water Industry Act.

6. Roads

St Andrews Road has been constructed by the Seller and has been adopted. The Seller will procure the Phase 5 Access Road. This will be constructed to base course by August 2019, subject to planning and all necessary approvals.

7. Utilities

The Seller will provide the following to the boundary of the Site (refer to drawing number 5105977-ATK-UXB-CAH-DR-0100 (App 1)).

- Electric, gas and potable water services
- BT and Virgin Media ducts
- District Heat System

The Seller will provide the following capacities to the to the Buyer:

- Electric – 300kVA (which will necessitate an on plot substation enclosure which will be provided by the Seller)
- Gas – 75kW
- Water – 15 m³/day; 2.6l/s

The Seller has procured Matrix to provide the electricity, Affinity Water the potable water and Metropolitan Infrastructure Limited the district heat system. The Buyer will use these providers for on Site supplies. Contact details are:

- Affinity Water – Vasu Shah - 01707 398878
- Gas SSE – Kevin Fender – 078108 58471
- Electric Matrix – Annmarie Maffitt - 0844 740 0074
- BT – Contact through BT new sites – newsite.romford@openreach.co.uk.
- Virgin Media – Paul Rosi - 07985 807162
- District Heat System – Metropolitan Infrastructure Limited – Paul Daikin

8 Responsibilities and Seller's Programme

The following refers to the responsibilities of the Seller and Buyer and the construction dates for works to be carried out by the Seller.

Extra Care – Responsibilities and Seller's Programme

Task	Strategy	Design	Construction	Anticipated Date for Works to be Constructed
Phase 5 Access Road (to basecourse) and SW 5A and FW 5A outfall stubs	Seller	Seller	Seller	1 Aug 2019
Water, Gas, BT, Virgin Media and District Heat Network	Seller	Seller	Seller	1 Aug 2019
Energised sub station	Seller	Seller	Seller	Jan 2020

Appended Documents

App 1 – Drawing number 5105977-ATK-UXB-CAH-DR-0100 Revision P6

App 2 – Uxbridge Drainage Strategy dated November 2012 ref: 5105977 / UXB / GD / 003

App 3 – Atkins St Andrew's Park – Northern Access - Remediation and Reclamation Strategy dated September 2013 ref: 5105977-UXB-OUT-0621

App 4 – St Andrew's Park Remediation Verification Report– Northern Access dated May 2014 ref: 5105977-UXB-OUT-0784

App 5 –Care Home – Summary of Geo-Environmental Information for Earthworks Materials dated Nov 16 ref: 5105977-UXB-OUT-0936

App 6 – Topographical Survey ref: 22994-T Rev 0

App 7 – Tree Survey ref: 2152_TS_02_03PNOD_Phases_A_B_rev A

App 8 – District Heat System Developer's Pack

App 9 - Cuddy Operational and Maintenance/Health and Safety File for Phase B Works (Spine Road) Uxbridge V1.0

App 10 – Land Quality Statement ref: 5105977-UXB-OUT-0979

App 11 – St Andrews Road As Built Drawings

App 12 – Phase 5 Access Road Design Drawings (to be completed)

