1.0 Existing Surface Water Drainage

The current site covers an area of 1625m² and is occupied by a single dwelling, which covers 145m², the remainder of the site is either unmade ground or vegetation. The site slopes from Station Road, downhill towards the southern end of the site. From CCTV surveys carried out, it shows that the surface water from the existing dwelling discharges into the public Thames Water main in Station Road. The run-off rate for the existing dwelling was calculated to be 7.6l/s for a 1 in 30 year event.

2.0 Proposed Surface Water Drainage

It is preferable to drain all surface water to a soakaway; however, following a site investigation it was found that the ground conditions are impermeable, and unsuitable for infiltration. Furthermore, for this site it is not feasible to locate one due to the proximity of buildings and/or retaining structures (existing and proposed) being within 5m. There is also a requirement to remain a minimum of 20m from the boundary of Network Rail land, which runs along the south-eastern side of the site.

Therefore, it is proposed to discharge surface water from all areas into the existing Thames Water surface water sewer. This will be via an attenuated discharge rate of 5.0 l/s, subject to agreement by Thames Water.

The proposed strategy layout is shown on GAP drawing 23235-GAP-XX-XX-DR-C-9000, a copy of which is appended to this document. Initial hydraulic calculations have been prepared to size the attenuation tank and connecting pipework using Flow software. The following criteria have been used for the calculations:

Return Period	100 years
Climate Change	+40%
Storm Durations	15,30,60,120,180,240,360,480,600,720,960 & 1,440 minutes
$M_{5\text{-}60}$	20mm
r	0.4
C_v	0.84

Surface water drainage from Plot 1 will fall under gravity with flow controlled using a hydrobrake, excess surface water will be stored using oversized pipework and manhole chambers. Surface water at the lower end of the site by Plots 2 and 3, will be pumped up to a mixing chamber after the Plot 1 hydrobrake. Storage for excess surface water at the lower end will be provided by permeable sub-base within the turning head, and the surface water pumping chamber itself.

The strategy layout has been designed to accommodate a 1 in 100 year (+40% climate change) storm below ground. For events greater than this the system is designed to allow excess surface water to flood from the ACO channel at the top of the access ramp. From there surface water will fall back to the lower end of the site over the turning head outside Plots 2 and 3., where it would then be eventually drained via the surface water pump. For a simulated event of 1 in 200 years (+70% climate change) the turning head would flood by 25mm.

In the event of a surface water pump failure, excess surface water would first be stored within the pump chamber and permeable sub-base within the turning head. This will provide storage for events up to 1 in 30 years (plus 10% climate change) Should the capacity of this be exceeded, then surface water will collect above ground within the turning head to a maximum depth of 50mm. After this depth water will spill over a weir kerb placed between plots 2 and 3, and follow an overland route towards the

south-eastern corner of the site, which was requested by Surrey Heath Borough Council Drainage Officer. From there surface water will follow a path southward along the railway embankment, carried out by Surrey Heath Borough Council. See drawing 23235-GAP-XX-XX-DR-C-9302 for details of the weir kerb, and overland flow route, within the development.

To prevent flooding from the Thames Water mains affecting the site; excess surface water will flood from the mixing chamber at the site entrance. From there water will flow above ground westwards along Station Road. A non-return valve will be placed on the incoming main from the flow control chamber, to prevent water backing up into the private drainage.

3.0 Proposed Foul Water Drainage

The site is served by an existing Thames Water foul water connection, which is shared with the neighbouring property. It is intended to re-use this connection for foul water from Plot 1, where it can fall under gravity from the site.

For plots 2 and 3 a foul pump chamber will be placed within the turning head, to lift foul water into the existing off-site connection. This will be at a rate of 2.0 litres/second to avoid overwhelming the off-site connection. The pump chamber will be designed to accommodate sufficient foul water storage from the 2 properties for a minimum period of 24 hours, should the event of a power, or mechanical, failure to the pumps.

It has also been requested by the local authority, that all foul water chambers will have bolt down covers.

4.0 Maintenance

The conventional piped network and attenuation devices have been designed to facilitate access for regular inspection and maintenance in accordance with Building Regulations and Sewer Sector Guidance. All maintenance operations are to be carried out in accordance with the manufacturer's recommendations. Intervals will not exceed 12 months.

Ongoing maintenance of the surface water drainage infrastructure will be undertaken by a specialist maintenance company, overseen and organised by the managing agent, who will also be responsible for maintaining the foul drainage network and the estate roads on the site.

There will be a separate electricity supply and meter for the drainage pumps, independent of the individual supplies to the three plots. The managing agent will be responsible for organising all inspections, whilst also providing residents with a 24hr contact number for emergencies. Additional 24hr contact details will be provided to each of the residents to enable direct contact with the specialist pump maintenance company should the managing agent be uncontactable.

In the event of a failure of the pump, and warning system will be provided to alert residents, and/or the management company of the alert.

The drainage scheme will be installed and operational before occupation of the dwellings.

On sale of the houses, each new owner will have a legal responsibility to become a shared owner of the estate road and relevant drainage network associated with the dwelling and this responsibility will be transferred with the ownership of the dwelling. This legal responsibility will include all aspects of the maintenance strategy.

See below an example of the proposed maintenance activities:

General Maintenance

Maintenance Activity	Remedial Action	Inspection Frequency
Check the surface and ensure it is free from debris, dirt and the like	Clean surfacing as required and remove detrimental materials	Typically, monthly or as required
Ensure the surface is clear of sediments	Sweep surface clean of silt and deleterious materials, top up joints with sealing grit as required	Typically, monthly or as required
Inspect joints and carry out weed control	Remove weeds and top up joints with sealing grit as required	Typically, 3-4 times per year or as required
Ensure paving dewaters after rain and between storms	Check joints for sedimentation, mechanically clean or jet wash and sweep surface free from silt, etc. Refill joints with sealing grit as required	Typically, annually or as required
Inspect blocks for spalling or deterioration and joints for loss of grit	Replace blocks and top up joints as required	Typically, annually or as required
Check pre-treatment structures (Catchpits / Silt Traps) for sediment	Remove sediment from pre-treatment structures	Monthly in the first year and then annually

Below Ground pipework:

Maintenance Activity	Remedial Action	Inspection Frequency
Lift Inspection chamber covers and check for signs of blockages and silt / debris build up	Jet clean and remove debris as required to ensure correct operation of the system	Typically, annually or as required

System inlets:

Maintenance Activity	Remedial Action	Inspection Frequency
Check gullies, drainage channels, etc. for build-up of silt or other detrimental materials	Ensure all items are clear and operating correctly	Typically, every 6 months or as required

Pre-treatment structures (Catchpits / Silt Traps):

Maintenance Activity	Remedial Action	Inspection Frequency
Inspect for build-up of sediment materials	Remove debris as required to ensure correct operation of system	3-4 times during the first year, then annually or as required thereafter

Flow Controls:

Maintenance Activity	Remedial Action	Inspection Frequency
Check control chamber for build-up of silt or other detrimental materials and nothing is blocking the flow control	Ensure all items are clear and operating correctly	Typically, every 6 months or as required

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.500
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Sump (m)	Easting (m)	Northing (m)	Depth (m)
SW 12	0.018	4.00	62.940	600		0.300	580.358	277.236	1.040
FLOW CONTROL			64.270	1800		0.400	579.607	291.366	2.490
TW SADDLE CONNECTION			64.220				575.604	297.071	2.103
SW 30	0.004	4.00	58.850	150			613.653	222.998	0.650
SW 31	0.002	4.00	58.850	450			609.258	234.735	0.780
SW 21	0.004	4.00	58.850	450			599.648	231.494	0.880
SW PUMP			58.810	1200		1.060	594.043	239.153	2.000
SW 22	0.003	4.00	58.850	450			594.621	229.427	0.650
SW 10	0.008	4.00	63.050	450			588.954	260.440	0.720
SW 11			63.050	450			585.423	274.094	0.810
ACO NODE	0.016	4.00	59.170	450	150		582.419	241.289	0.810
DIFFUSER 01			58.810				587.219	234.651	0.810
MIXING CHAMBER			64.100	450			578.547	291.484	1.920
SW 20	0.006	4.00	58.850	450			604.357	217.690	0.650
ROAD GULLY	0.020	4.00	58.670	450		0.600	599.850	233.863	1.160
DIFFUSER 02			58.810				595.409	234.647	0.810
SW 13			63.320	1800		0.500	579.419	281.090	1.640

Links (Input)

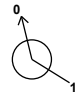
Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.002	SW 12	SW 13	3.967	0.600	62.200	62.190	0.010	396.7	225	4.52	50.0
1.004	FLOW CONTROL	MIXING CHAMBER	1.067	0.600	62.190	62.180	0.010	106.7	100	4.71	50.0
2.000	SW 30	SW 31	12.533	0.600	58.200	58.070	0.130	96.4	150	4.20	50.0
2.001	SW 31	SW 21	10.142	0.600	58.070	57.970	0.100	101.4	150	4.37	50.0
2.002	SW 21	SW PUMP	9.491	0.600	57.970	57.870	0.100	94.9	150	4.53	50.0
4.000	SW 22	SW 21	5.435	0.600	58.200	57.970	0.230	23.6	150	4.04	50.0
1.000	SW 10	SW 11	14.103	0.600	62.330	62.240	0.090	156.7	150	4.29	50.0
1.001	SW 11	SW 12	5.960	0.600	62.240	62.200	0.040	149.0	150	4.41	50.0
5.000	ACO NODE	DIFFUSER 01	8.192	0.600	58.360	58.000	0.360	22.8	150	4.06	50.0
1.005	MIXING CHAMBER	TW SADDLE CONNECTION	6.315	0.600	62.180	62.117	0.063	100.0	100	4.85	50.0
3.000	SW 20	SW 21	14.585	0.600	58.200	57.970	0.230	63.4	150	4.19	50.0
6.000	ROAD GULLY	DIFFUSER 02	4.510	0.600	58.110	58.000	0.110	41.0	150	4.05	50.0
1.003	SW 13	FLOW CONTROL	10.278	0.600	62.180	62.180	0.000	0.0	450	4.69	50.0

Pipeline Schedule

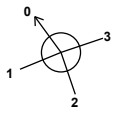
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.002	3.967	396.7	225	Circular_Default Sewer Type	62.940	62.200	0.515	63.320	62.190	0.905
1.004	1.067	106.7	100	Circular_Default Sewer Type	64.270	62.190	1.980	64.100	62.180	1.820
2.000	12.533	96.4	150	Circular_Default Sewer Type	58.850	58.200	0.500	58.850	58.070	0.630
2.001	10.142	101.4	150	Circular_Default Sewer Type	58.850	58.070	0.630	58.850	57.970	0.730
2.002	9.491	94.9	150	Circular_Default Sewer Type	58.850	57.970	0.730	58.810	57.870	0.790
4.000	5.435	23.6	150	Circular_Default Sewer Type	58.850	58.200	0.500	58.850	57.970	0.730
1.000	14.103	156.7	150	Circular_Default Sewer Type	63.050	62.330	0.570	63.050	62.240	0.660
1.001	5.960	149.0	150	Circular_Default Sewer Type	63.050	62.240	0.660	62.940	62.200	0.590
5.000	8.192	22.8	150	Circular_Default Sewer Type	59.170	58.360	0.660	58.810	58.000	0.660
1.005	6.315	100.0	100	Circular_Default Sewer Type	64.100	62.180	1.820	64.220	62.117	2.003
3.000	14.585	63.4	150	Circular_Default Sewer Type	58.850	58.200	0.500	58.850	57.970	0.730
6.000	4.510	41.0	150	Circular_Default Sewer Type	58.670	58.110	0.410	58.810	58.000	0.660
1.003	10.278	0.0	450	Circular_Default Sewer Type	63.320	62.180	0.690	64.270	62.180	1.640

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	SW 12	600		Manhole	Adoptable	SW 13	1800	Manhole	Adoptable
1.004	FLOW CONTROL	1800		Manhole	Adoptable	MIXING CHAMBER	450	Manhole	Adoptable
2.000	SW 30	150		Manhole	Adoptable	SW 31	450	Manhole	Adoptable
2.001	SW 31	450		Manhole	Adoptable	SW 21	450	Manhole	Adoptable
2.002	SW 21	450		Manhole	Adoptable	SW PUMP	1200	Manhole	Adoptable
4.000	SW 22	450		Manhole	Adoptable	SW 21	450	Manhole	Adoptable
1.000	SW 10	450		Manhole	Adoptable	SW 11	450	Manhole	Adoptable
1.001	SW 11	450		Manhole	Adoptable	SW 12	600	Manhole	Adoptable
5.000	ACO NODE	450	150	Manhole	Adoptable	DIFFUSER 01		Junction	
1.005	MIXING CHAMBER	450		Manhole	Adoptable	TW SADDLE CONNECTION		Junction	
3.000	SW 20	450		Manhole	Adoptable	SW 21	450	Manhole	Adoptable
6.000	ROAD GULLY	450		Manhole	Adoptable	DIFFUSER 02		Junction	
1.003	SW 13	1800		Manhole	Adoptable	FLOW CONTROL	1800	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections		Link	IL (m)	Dia (mm)
SW 12	580.358	277.236	62.940	1.040	600			1	1.001	62.200	150
								0	1.002	62.200	225
FLOW CONTROL	579.607	291.366	64.270	2.490	1800			1	1.003	62.180	450
								0	1.004	62.190	100
TW SADDLE CONNECTION	575.604	297.071	64.220	2.103				1	1.005	62.117	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
SW 30	613.653	222.998	58.850	0.650	150			0	2.000	58.200	150
SW 31	609.258	234.735	58.850	0.780	450			1	2.000	58.070	150
								0	2.001	58.070	150
SW 21	599.648	231.494	58.850	0.880	450			1	4.000	57.970	150
								2	3.000	57.970	150
								3	2.001	57.970	150
								0	2.002	57.970	150
SW PUMP	594.043	239.153	58.810	2.000	1200			1	2.002	57.870	150
SW 22	594.621	229.427	58.850	0.650	450			0	4.000	58.200	150
SW 10	588.954	260.440	63.050	0.720	450			0	1.000	62.330	150
SW 11	585.423	274.094	63.050	0.810	450			1	1.000	62.240	150
								0	1.001	62.240	150
ACO NODE	582.419	241.289	59.170	0.810	450	150		0	5.000	58.360	150
DIFFUSER 01	587.219	234.651	58.810	0.810				1	5.000	58.000	150
MIXING CHAMBER	578.547	291.484	64.100	1.920	450			1	1.004	62.180	100
								0	1.005	62.180	100
SW 20	604.357	217.690	58.850	0.650	450			0	3.000	58.200	150
ROAD GULLY	599.850	233.863	58.670	1.160	450			0	6.000	58.110	150
DIFFUSER 02	595.409	234.647	58.810	0.810				1	6.000	58.000	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections		Link	IL (m)	Dia (mm)
SW 13	579.419	281.090	63.320	1.640	1800		0 1	1 0	1.002 1.003	62.190 62.180	225 450

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	720
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x
Analysis Speed	Detailed		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
30	10	0	0
100	40	0	0
200	70	0	0

Node SW PUMP Offline Pump Control

Flap Valve	✓	Design Flow (l/s)	3.0
Loop to Node	MIXING CHAMBER	Switch on depth (m)	1.060
Invert Level (m)	57.000	Switch off depth (m)	0.020
Design Depth (m)	2.000		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.500	3.800	5.000	2.100

Node FLOW CONTROL Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	62.190	Product Number	CTL-SHE-0069-2000-0900-2000
Design Depth (m)	0.900	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node SW PUMP Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Main Channel Length (m)	8.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	58.000	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)	74	Main Channel n	0.025

Inlets

DIFFUSER 01	DIFFUSER 02

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	183.3	129.6	0.500	183.3	129.6	0.501	0.0	129.6

Results for 10 year Critical Storm Duration. Lowest mass balance: 90.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	SW 12	24	62.390	0.190	5.0	0.1472	0.0000	OK
30 minute winter	FLOW CONTROL	24	62.390	0.210	3.0	0.5336	0.0000	SURCHARGED
30 minute winter	TW SADDLE CONNECTION	25	62.182	0.065	4.6	0.0000	0.0000	OK
15 minute winter	SW 30	10	58.226	0.026	1.2	0.0038	0.0000	OK
15 minute winter	SW 31	10	58.101	0.031	1.7	0.0064	0.0000	OK
60 minute winter	SW 21	45	58.096	0.126	2.7	0.0303	0.0000	OK
60 minute winter	SW PUMP	44	58.095	0.225	6.1	0.2553	0.0000	OK
15 minute winter	SW 22	10	58.217	0.017	1.0	0.0045	0.0000	OK
30 minute winter	SW 10	24	62.391	0.061	1.8	0.0240	0.0000	OK
30 minute winter	SW 11	24	62.390	0.150	1.8	0.0239	0.0000	SURCHARGED
15 minute winter	ACO NODE	9	58.396	0.036	4.5	0.0165	0.0000	OK
60 minute winter	DIFFUSER 01	44	58.096	0.096	2.2	0.0000	0.0000	OK
30 minute winter	MIXING CHAMBER	25	62.248	0.068	4.6	0.0108	0.0000	OK
15 minute winter	SW 20	10	58.228	0.028	1.7	0.0094	0.0000	OK
15 minute winter	ROAD GULLY	9	58.159	0.049	5.7	0.0425	0.0000	OK
60 minute winter	DIFFUSER 02	44	58.096	0.096	2.8	0.0000	0.0000	OK
30 minute winter	SW 13	24	62.390	0.210	4.5	0.5336	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	SW 12	1.002	SW 13	4.5	0.360	0.175	0.1448	
30 minute winter	FLOW CONTROL	1.004	MIXING CHAMBER	1.9	0.590	0.317	0.0057	
15 minute winter	SW 30	2.000	SW 31	1.2	0.513	0.066	0.0295	
15 minute winter	SW 31	2.001	SW 21	1.7	0.386	0.095	0.0723	
60 minute winter	SW 21	2.002	SW PUMP	2.5	0.527	0.136	0.1584	
60 minute winter	SW PUMP	Pump	MIXING CHAMBER	2.8				9.8
15 minute winter	SW 22	4.000	SW 21	1.0	0.335	0.027	0.0365	
30 minute winter	SW 10	1.000	SW 11	1.8	0.469	0.125	0.1717	
30 minute winter	SW 11	1.001	SW 12	1.1	0.199	0.076	0.1049	
15 minute winter	ACO NODE	5.000	DIFFUSER 01	4.5	1.506	0.120	0.0405	
60 minute winter	DIFFUSER 01	Flow through pond	SW PUMP	3.6	0.055	0.003	4.9945	
30 minute winter	MIXING CHAMBER	1.005	TW SADDLE CONNECTION	4.6	0.831	0.764	0.0351	12.1
15 minute winter	SW 20	3.000	SW 21	1.7	0.432	0.076	0.1014	
15 minute winter	ROAD GULLY	6.000	DIFFUSER 02	5.7	1.481	0.205	0.0245	
60 minute winter	DIFFUSER 02	Flow through pond	SW PUMP	3.6	0.055	0.003	4.9945	
30 minute winter	SW 13	1.003	FLOW CONTROL	3.0	0.226	0.019	0.7437	

Results for 30 year +10% CC Critical Storm Duration. Lowest mass balance: 90.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	SW 12	25	62.487	0.287	7.0	0.2228	0.0000	SURCHARGED
30 minute winter	FLOW CONTROL	25	62.487	0.307	4.1	0.7814	0.0000	SURCHARGED
60 minute winter	TW SADDLE CONNECTION	46	62.185	0.068	4.9	0.0000	0.0000	OK
15 minute winter	SW 30	10	58.231	0.031	1.7	0.0045	0.0000	OK
60 minute winter	SW 31	48	58.146	0.076	1.2	0.0157	0.0000	OK
60 minute winter	SW 21	47	58.147	0.177	3.7	0.0426	0.0000	SURCHARGED
60 minute winter	SW PUMP	47	58.146	0.276	7.2	0.3127	0.0000	OK
15 minute winter	SW 22	10	58.220	0.020	1.4	0.0053	0.0000	OK
30 minute winter	SW 10	25	62.487	0.157	2.5	0.0617	0.0000	SURCHARGED
30 minute winter	SW 11	25	62.487	0.247	2.4	0.0393	0.0000	SURCHARGED
15 minute winter	ACO NODE	9	58.402	0.042	6.3	0.0191	0.0000	OK
60 minute winter	DIFFUSER 01	46	58.147	0.147	3.1	0.0000	0.0000	OK
60 minute winter	MIXING CHAMBER	46	62.251	0.071	4.9	0.0113	0.0000	OK
15 minute winter	SW 20	10	58.232	0.032	2.3	0.0109	0.0000	OK
15 minute winter	ROAD GULLY	9	58.168	0.058	8.0	0.0505	0.0000	OK
60 minute winter	DIFFUSER 02	46	58.147	0.147	3.9	0.0000	0.0000	OK
30 minute winter	SW 13	25	62.487	0.307	6.4	0.7813	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	SW 12	1.002	SW 13	6.4	0.396	0.247	0.1578	
30 minute winter	FLOW CONTROL	1.004	MIXING CHAMBER	2.0	0.591	0.341	0.0060	
15 minute winter	SW 30	2.000	SW 31	1.7	0.566	0.094	0.0377	
60 minute winter	SW 31	2.001	SW 21	1.2	0.269	0.068	0.1350	
60 minute winter	SW 21	2.002	SW PUMP	3.3	0.533	0.180	0.1671	
60 minute winter	SW PUMP	Pump	MIXING CHAMBER	2.9				14.5
15 minute winter	SW 22	4.000	SW 21	1.4	0.339	0.038	0.0477	
30 minute winter	SW 10	1.000	SW 11	2.4	0.466	0.171	0.2483	
30 minute winter	SW 11	1.001	SW 12	1.5	0.206	0.101	0.1049	
15 minute winter	ACO NODE	5.000	DIFFUSER 01	6.3	1.612	0.168	0.0621	
60 minute winter	DIFFUSER 01	Flow through pond	SW PUMP	4.0	0.057	0.003	7.7803	
60 minute winter	MIXING CHAMBER	1.005	TW SADDLE CONNECTION	4.9	0.840	0.810	0.0368	22.0
15 minute winter	SW 20	3.000	SW 21	2.3	0.449	0.103	0.1329	
15 minute winter	ROAD GULLY	6.000	DIFFUSER 02	8.0	1.574	0.287	0.0363	
60 minute winter	DIFFUSER 02	Flow through pond	SW PUMP	4.0	0.057	0.003	7.7803	
30 minute winter	SW 13	1.003	FLOW CONTROL	4.1	0.358	0.026	1.1843	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 90.24%

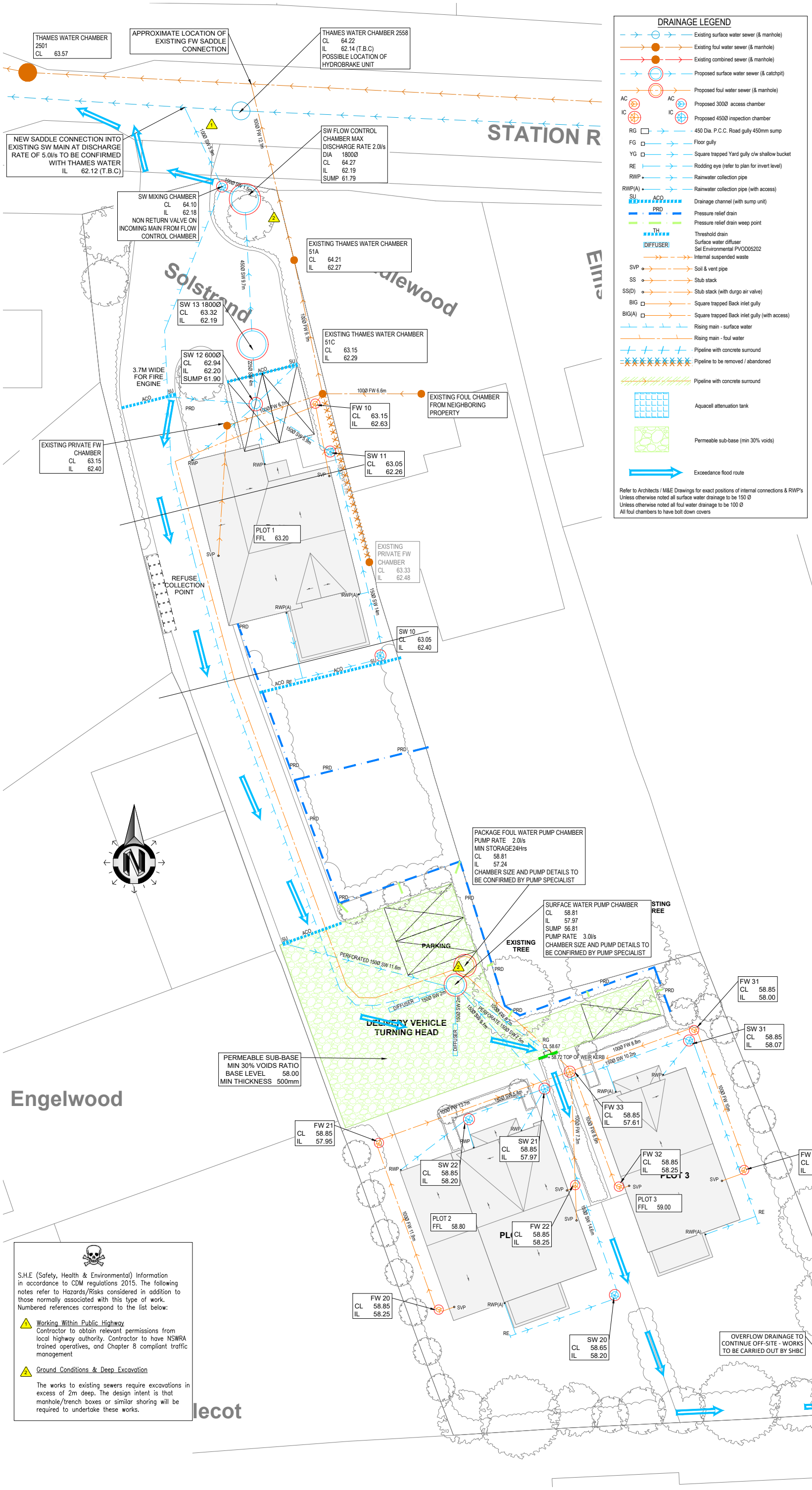
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SW 12	50	62.927	0.727	7.6	0.5638	0.0000	FLOOD RISK
60 minute winter	FLOW CONTROL	50	62.926	0.746	4.5	1.8998	0.0000	SURCHARGED
180 minute winter	TW SADDLE CONNECTION	136	62.188	0.071	5.1	0.0000	0.0000	OK
60 minute winter	SW 30	51	58.272	0.072	1.3	0.0104	0.0000	OK
60 minute winter	SW 31	51	58.272	0.202	1.9	0.0416	0.0000	SURCHARGED
60 minute winter	SW 21	51	58.272	0.302	5.5	0.0727	0.0000	SURCHARGED
60 minute winter	SW PUMP	52	58.271	0.401	10.4	0.4543	0.0000	OK
60 minute winter	SW 22	51	58.272	0.072	1.1	0.0190	0.0000	OK
60 minute winter	SW 10	50	62.927	0.597	2.7	0.2339	0.0000	FLOOD RISK
60 minute winter	SW 11	50	62.927	0.687	2.1	0.1092	0.0000	FLOOD RISK
15 minute winter	ACO NODE	10	58.414	0.054	10.4	0.0245	0.0000	OK
60 minute winter	DIFFUSER 01	52	58.272	0.272	5.1	0.0000	0.0000	OK
180 minute winter	MIXING CHAMBER	136	62.254	0.074	5.1	0.0118	0.0000	OK
60 minute winter	SW 20	50	58.272	0.072	1.9	0.0241	0.0000	OK
60 minute winter	ROAD GULLY	52	58.272	0.162	6.5	0.1406	0.0000	SURCHARGED
60 minute winter	DIFFUSER 02	52	58.272	0.272	6.5	0.0000	0.0000	OK
60 minute winter	SW 13	50	62.926	0.746	7.0	1.8998	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	SW 12	1.002	SW 13	7.0	0.382	0.270	0.1578	
60 minute winter	FLOW CONTROL	1.004	MIXING CHAMBER	2.0	0.578	0.343	0.0062	
60 minute winter	SW 30	2.000	SW 31	1.3	0.494	0.072	0.1627	
60 minute winter	SW 31	2.001	SW 21	1.5	0.249	0.084	0.1785	
60 minute winter	SW 21	2.002	SW PUMP	5.1	0.548	0.281	0.1671	
60 minute winter	SW PUMP	Pump	MIXING CHAMBER	3.2				24.8
60 minute winter	SW 22	4.000	SW 21	1.1	0.289	0.030	0.0704	
60 minute winter	SW 10	1.000	SW 11	2.1	0.406	0.151	0.2483	
60 minute winter	SW 11	1.001	SW 12	1.6	0.211	0.108	0.1049	
15 minute winter	ACO NODE	5.000	DIFFUSER 01	10.4	1.711	0.278	0.0921	
60 minute winter	DIFFUSER 01	Flow through pond	SW PUMP	5.4	0.060	0.004	14.6646	
180 minute winter	MIXING CHAMBER	1.005	TW SADDLE CONNECTION	5.1	0.846	0.851	0.0383	50.0
60 minute winter	SW 20	3.000	SW 21	1.9	0.350	0.085	0.1891	
60 minute winter	ROAD GULLY	6.000	DIFFUSER 02	6.5	0.899	0.233	0.0794	
60 minute winter	DIFFUSER 02	Flow through pond	SW PUMP	5.4	0.060	0.004	14.6646	
60 minute winter	SW 13	1.003	FLOW CONTROL	4.5	0.255	0.028	1.6285	

Results for 200 year +70% CC Critical Storm Duration. Lowest mass balance: 90.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SW 12	34	62.940	0.740	11.7	0.5742	4.9308	FLOOD
30 minute winter	FLOW CONTROL	20	62.949	0.769	7.9	1.9575	0.0000	SURCHARGED
120 minute winter	TW SADDLE CONNECTION	138	62.190	0.073	5.4	0.0000	0.0000	OK
120 minute winter	SW 30	94	58.418	0.218	1.2	0.0315	0.0000	SURCHARGED
120 minute winter	SW 31	94	58.418	0.348	1.6	0.0718	0.0000	SURCHARGED
120 minute winter	SW 21	94	58.418	0.448	4.7	0.1080	0.0000	SURCHARGED
120 minute winter	SW PUMP	94	58.418	0.548	8.4	0.6201	0.0000	OK
120 minute winter	SW 22	94	58.418	0.218	1.0	0.0578	0.0000	SURCHARGED
30 minute winter	SW 10	19	62.955	0.625	6.0	0.2449	0.0000	FLOOD RISK
30 minute winter	SW 11	19	62.948	0.708	4.7	0.1125	0.0000	FLOOD RISK
15 minute winter	ACO NODE	10	58.425	0.065	14.7	0.0296	0.0000	OK
120 minute winter	DIFFUSER 01	94	58.418	0.418	4.5	0.0000	0.0000	OK
120 minute winter	MIXING CHAMBER	138	62.257	0.077	5.4	0.0122	0.0000	OK
120 minute winter	SW 20	94	58.418	0.218	1.6	0.0731	0.0000	SURCHARGED
120 minute winter	ROAD GULLY	94	58.419	0.309	5.7	0.2677	0.0000	FLOOD RISK
120 minute winter	DIFFUSER 02	94	58.418	0.418	5.5	0.0000	0.0000	OK
30 minute winter	SW 13	20	62.946	0.766	13.9	1.9504	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	SW 12	1.002	SW 13	8.8	0.426	0.342	0.1578	
30 minute winter	FLOW CONTROL	1.004	MIXING CHAMBER	2.0	0.592	0.343	0.0064	
120 minute winter	SW 30	2.000	SW 31	1.1	0.424	0.061	0.2206	
120 minute winter	SW 31	2.001	SW 21	1.3	0.248	0.071	0.1785	
120 minute winter	SW 21	2.002	SW PUMP	4.4	0.548	0.242	0.1671	
120 minute winter	SW PUMP	Pump	MIXING CHAMBER	3.6				43.5
120 minute winter	SW 22	4.000	SW 21	1.0	0.343	0.026	0.0957	
30 minute winter	SW 10	1.000	SW 11	4.7	0.493	0.332	0.2483	
30 minute winter	SW 11	1.001	SW 12	4.7	0.264	0.321	0.1049	
15 minute winter	ACO NODE	5.000	DIFFUSER 01	14.7	1.695	0.392	0.1022	
120 minute winter	DIFFUSER 01	Flow through pond	SW PUMP	4.5	0.051	0.003	22.7242	
120 minute winter	MIXING CHAMBER	1.005	TW SADDLE CONNECTION	5.4	0.852	0.891	0.0399	61.0
120 minute winter	SW 20	3.000	SW 21	1.6	0.278	0.071	0.2568	
120 minute winter	ROAD GULLY	6.000	DIFFUSER 02	5.5	0.803	0.197	0.0794	
120 minute winter	DIFFUSER 02	Flow through pond	SW PUMP	4.5	0.051	0.003	22.7242	
30 minute winter	SW 13	1.003	FLOW CONTROL	7.9	0.308	0.050	1.6285	



DRAINAGE LEGEND

- Existing surface water sewer (& manhole)
- Existing foul water sewer (& manhole)
- Existing combined sewer (& manhole)
- Proposed surface water sewer (& catchpit)
- Proposed foul water sewer (& manhole)
- AC / IC — Proposed 300Ø access chamber / Proposed 450Ø inspection chamber
- RG — 450 Dia. P.C.C. Road gully 450mm sump
- FG — Floor gully
- YG — Square trapped Yard gully c/w shallow bucket
- RE — Rodding eye (refer to plan for invert level)
- RWP — Rainwater collection pipe
- RWP(A) — Rainwater collection pipe (with access)
- SU / ACO — Drainage channel (with sump unit)
- PRD — Pressure relief drain
- Pressure relief drain weep point
- TH — Threshold drain
- DIFFUSER — Surface water diffuser Sel Environmental PVOD05202
- Internal suspended waste
- SVP — Soil & vent pipe
- SS — Stub stack
- SS(D) — Stub stack (with durgo air valve)
- BIG — Square trapped Back inlet gully
- BIG(A) — Square trapped Back inlet gully (with access)
- Rising main - surface water
- Rising main - foul water
- Pipeline with concrete surround
- Pipeline to be removed / abandoned
- Pipeline with concrete surround
- Aquacell attenuation tank
- Permeable sub-base (min 30% voids)
- Exceedance flood route

Refer to Architects / M&E Drawings for exact positions of internal connections & RWP's
Unless otherwise noted all surface water drainage to be 150 Ø
Unless otherwise noted all foul water drainage to be 100 Ø
All foul chambers to have bolt down covers

NOTES

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and specifications.
2. All setting out to be in accordance with the Architects drawings. Dimensions must not be scaled from the drawing.
3. All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of Approved Document H of the Building Regulations (2002 edition with 2010 amendments).
4. All adoptable drainage is to be in accordance with 'Sewers for Adoption 7th Edition' - A Design and Construction Guide for Developers and the local Highway Authority requirements where appropriate.
5. Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hepworth 'Supersleve' or equivalent.
6. Where drainage pipework is plastic i.e. pvc-u it shall be to BS EN 1401-1 (class SN8) OSMA or equivalent.
7. All concrete pipework shall be to BS EN 1916 and BS 5911-1 (Load class M unless indicated otherwise). Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
8. Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
9. Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
10. Where pipelines pass within 1m of buildings or walls the foundations are to be taken down below the bottom of the pipe trench.
11. Where connections are to be made to existing manholes/sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately.
12. The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.
13. Drawing annotation is as follows:
    - AC - 300mm Ø polypropylene or vitrified clay access chamber
    - IC - 450mm Ø polypropylene inspection chamber
    - FW - foul water
    - SW - surface water
    - FWD - foul water drain
    - SWD - surface water drain
    - SVP - soil & vent pipe
    - RWP - rainwater pipe
    - YG - yard gully
    - B.I.G - back inlet gully

    (Annotations are indicative only)
14. All pipework connections are to be arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections inside the manhole benching where sufficient room exists or on oblique pipeline connections outside the chamber in order to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable. Where possible the main channel flow shall be from any connections with WC's to ensure a flush flow through the main channel.
15. Where preformed polypropylene manhole bases are used, they are to be orientated such that the main flow is through the main channel of the base. This should be achieved by incorporating long radius bends outside of the manhole.
16. Any connection into a public sewer is to be inspected by the local Water Company and carried out fully in accordance with their requirements. The contractor is to allow for submitting the appropriate 'Connection to a Public Sewer' application forms and paying all necessary fees.
17. The contractor is to allow for obtaining the appropriate Road Opening licenses from the local Highway Authority and paying all necessary fees for any works associated with off-site sewer connections and highway works. All reinstatement works within the public highway are to be carried out in accordance with the requirements of the local Highway Authority.
18. The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.
19. Drainage channel(s) to be ACO Multidrain or equivalent across driveways and footpaths, ACO doorway drain across level accesses or equivalent. For installation guidance refer to the manufacturer's specification. Refer to Landscape Architects details for surfacing treatments around units where applicable. Where channels are indicated as in-built falls the relevant units are to be incorporated to provide the necessary length of channel gradient from the head of the run to the sump unit.

EXISTING DRAINAGE INFORMATION

Any historical drainage information reproduced on GAP drawings, including any drainage information from record drawings or supplied by a Third Party, are in approximate locations. GAP Ltd cannot be held liable for the accuracy of information obtained from record drawings or supplied by Third Parties.
Contractors must undertake their own due diligence with respect to this information.

NOT FOR CONSTRUCTION

S.H.E (Safety, Health & Environmental) Information in accordance to CDM regulations 2015. The following notes refer to Hazards/Risks considered in addition to those normally associated with this type of work. Numbered references correspond to the list below:

1. Working Within Public Highway
   Contractor to obtain relevant permissions from local highway authority. Contractor to have NSWRA trained operatives, and Chapter 8 compliant traffic management
2. Ground Conditions & Deep Excavation
   The works to existing sewers require excavations in excess of 2m deep. The design intent is that manhole/trench boxes or similar shoring will be required to undertake these works.

Rev	Date	Revision Description	Issued by
P02	11.01.24	Lower turning head layout amended	JLB
P01	24.05.23	Preliminary Issue	JLB

Drawing Status: S0 - Work in Progress

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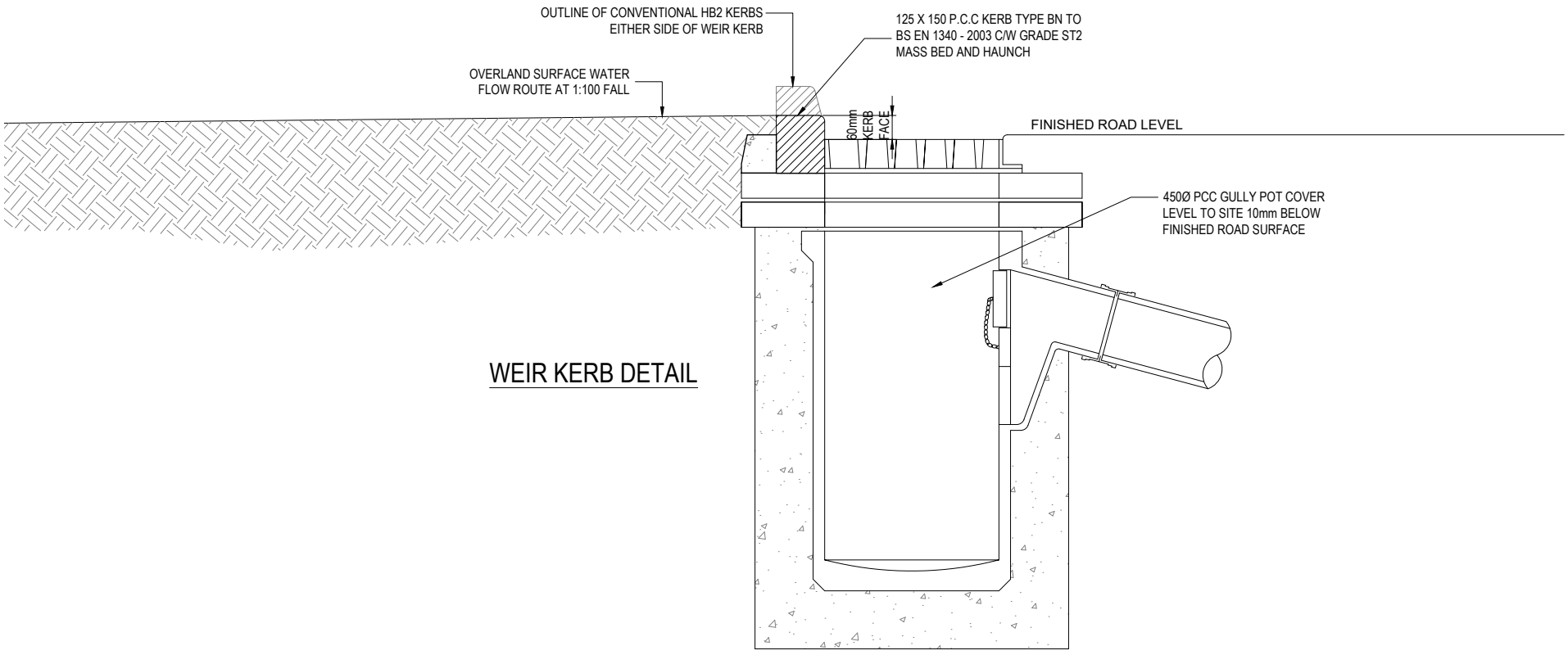
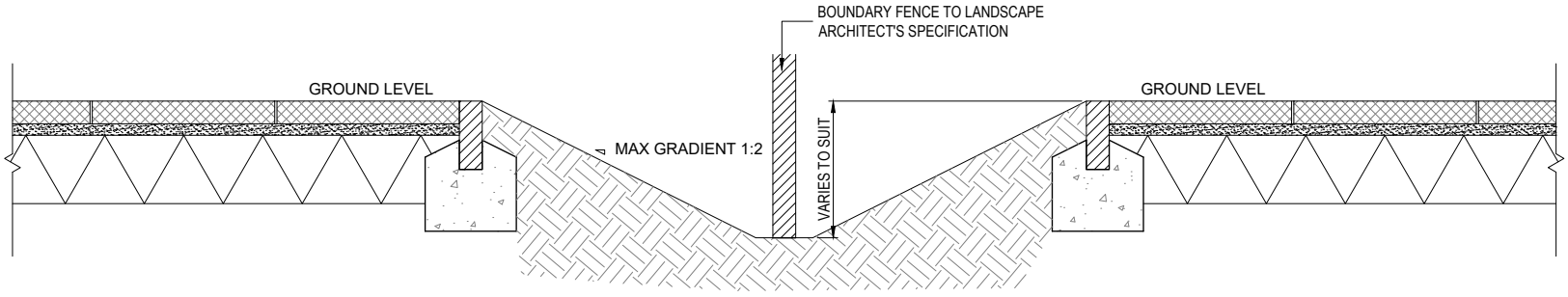
Project: Solstrand, Station Rd, Bagshot
Drawing Title: Drainage Layout

Scale: 1:125@A1 / 1:250@A3 Drawn: JLB Checked: IJW

Project-Originator-Zone-Level-Type-Role: 23235-GAP-XX-XX-DR-C- Drawing No.: 9000 Revision: P02



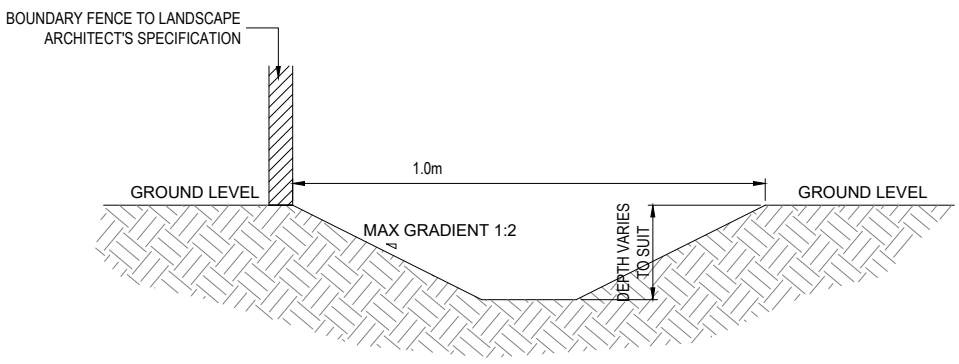
WEIR KERB DETAIL



CROSS SECTION OF OVERLAND SURFACE WATER FLOW ROUTE BETWEEN PLOTS 2 AND 3

NOTE:

1. OVERLAND SURFACE WATER FLOW ROUTE TO BE KEPT CLEAR OF DEBRIS, AND VEGETATION.
2. LONGITUDINAL GRADIENT AT 1:100
3. BOUNDARY FENCE TO BE DESIGNED TO ALLOW THE FLOW OF WATER TO PASS
4. BOUNDARY FENCE WITHIN CHANNEL TO HAVE WATERPROOFING PROTECTIONS



CROSS SECTION OF OVERLAND SURFACE WATER FLOW ROUTE THROUGH REAR OF PLOT 3 GARDEN AREA

NOTE:

1. OVERLAND SURFACE WATER FLOW ROUTE TO BE KEPT CLEAR OF DEBRIS, AND VEGETATION.
2. LONGITUDINAL GRADIENT AT 1:100

NOT FOR CONSTRUCTION

NOTES

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2. All setting out to be in accordance with the Architects drawings. Dimensions must not be scaled from the drawing.

Rev	Date	Revision Description	Issued by
P01	24.05.23	Preliminary Issue	JLB

Drawing Status: S0 - Work in Progress

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Client: Brooklands Homes

Project: Solstrand, Station Rd, Bagshot

Drawing Title: Flood Exceedance Route Construction Details

Scale: N.T.S | Drawn: JLB | Checked: IJW

Project-Originator-Zone-Level-Type-Role: 23235-GAP-XX-XX-DR-C- | Drawing No.: 9302 | Revision: P01