

Our ref: 64120 – 05 A

27 April 2026

Planning Ref: 251984

Site Land South of Bridge Farm, Reading Road, Arborfield, Wokingham, RG2 9HT

PRP Northampton
The Drummonds, Unit 11
Spring Hill Office Park
Harborough Road
Pitsford NN6 9AA

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Our comments are provided below for the list of comments the Lead Local Flood Authority has made towards Pre commencement of reserved matters condition 3 (*in italic, bold*): PRP Responses in [Blue](#)

3. Drainage Strategy

Notwithstanding the details submitted, prior to the commencement of development, a detailed surface water drainage strategy shall be submitted to and approved in writing by Local Planning Authority. The strategy shall:

- a) Identify existing and proposed discharge points, including connection to the drainage ditch to the northwest or other approved watercourse/sewer;***
- b) Include runoff modelling (e.g., causeway flow, 1 in 100-year storm plus climate change) demonstrating that post-development surface water flows will not increase flood risk on or off site;***
- c) Provide details of attenuation measures (e.g., swales, ponds, storage tanks) compatible with the high soil saturation, ponding, and River Terrace Deposits identified;***
- d) Provide details of how the landscaping will integrate with the surface water drainage features.***
- e) Provide details of groundwater and excavation management.***

Reason: To prevent increased flood risk from surface water run-off. Relevant policy: NPPF Section 14 (Meeting the Challenge of Climate Change, Flooding and Coastal Change), Core Strategy policy CP1 and Managing Development Delivery Local Plan policies CC09 and CC10.

This statement has been prepared to demonstrate compliance with Condition 3 of the planning permission and confirms that the proposed development will not increase flood risk on site or off site. The drainage strategy accords with the requirements of NPPF Section 14, Core Strategy Policy CP1, and Managing Development Delivery Local Plan Policies CC09 and CC10.

- a) The application site is currently agricultural land with no formal surface water drainage infrastructure. Surface water runoff presently flows overland via existing ground contours to local low points, adjoining field areas and surrounding drainage ditches. There are no direct connections from the site to any adopted surface water sewer.

The proposed development will introduce a controlled surface water drainage system directing all runoff to the existing drainage ditch located to the north-west of the site, which forms the agreed point of discharge.

For the proposed link road, surface water runoff will be conveyed via filter drains and outlet kerbs to newly reprofiled and contained ditch sections. These ditches will provide both treatment and attenuation prior to controlled discharge into the downstream ditch network. Runoff from the link road will be restricted to **2.0 l/s**, with approximately **172 m³** of attenuation storage provided within the reprofiled ditch, delivering significant betterment over the existing uncontrolled situation.

27 April 2026

Surface water runoff from the main development area will be collected and conveyed to the north-west ditch via a flow-restricted, gravity-fed attenuated system. A total storage volume of approximately **916 m³** is provided through a combination of underground attenuation tanks and an attenuation basin. Discharge from the main site will be limited to **5.3 l/s**. All discharge points are shown and detailed on the accompanying drainage drawings.

- b) Surface water drainage calculations have been prepared and are enclosed in support of this submission. These calculations assess both proposed discharge routes and confirm compliance with agreed greenfield runoff rates.

The drainage system has been designed to accommodate rainfall events up to and including the **1 in 100-year storm plus 40% allowance for climate change**, in line with current national and local policy guidance. During these events, all surface water will be contained within the designed drainage features on site, with no on-site flooding.

Exceedance flow routes have been identified and shown on the drainage drawings, demonstrating that in the unlikely event of rainfall exceeding the design capacity, overland flows would be safely routed away from buildings and critical infrastructure. Emergency access routes will remain operational, and no increased flood risk will arise on or off site.

- c) The proposed attenuation measures comprise reprofiled drainage ditches, an attenuation basin, and underground attenuation tanks, the details of which are provided on the enclosed drawings.

Ground investigations indicate that the site experiences perched water following prolonged rainfall, due to low-permeability River Terrace Deposits beneath the surface rather than a shallow regional groundwater table. Infiltration drainage (such as soakaways) has therefore been excluded from the design.

The proposed drainage strategy ensures that surface water runoff is collected, attenuated, and discharged at a controlled low rate, significantly reducing peak flows compared to the existing greenfield condition. As a result, the volume of water entering the underlying strata during rainfall events will be reduced, minimising the potential for localised saturation or ponding.

- d) The surface water drainage strategy has been fully integrated with the proposed landscaping design. Soft landscaped areas have been graded to promote controlled surface water conveyance towards SuDS features and to provide additional exceedance storage where required.

Planting proposals, including tree pits within parking areas, have been designed to receive runoff from adjacent hardstanding, supporting evapotranspiration and enhancing water quality. In exceedance events, landscaped areas will allow for temporary surface water storage, gradual infiltration where possible, evaporation, and uptake by vegetation without causing damage to planting or site infrastructure.

- e) The attenuation basin, reprofiled ditches, flow control structures, and discharge connections will be constructed at an early stage of the development to facilitate effective surface water management during the construction phase.

Temporary construction drainage will be managed through designated low points, trenches, and sumps, with runoff directed to the formed attenuation features. Appropriate pollution prevention measures, including silt control (e.g. hay bales, filters, and proprietary silt separation units), will be employed prior to any pumped

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discharge. This will ensure that runoff is adequately treated and that discharge rates do not exceed the agreed planning limits.

No long-term groundwater abstraction or drawdown is required, and excavations will be managed to avoid adverse impacts on local ground conditions or adjacent drainage networks.

The proposed surface water drainage strategy demonstrates that the development will not increase flood risk on site or off site. The scheme provides controlled discharge, adequate attenuation, integrated SuDS and landscaping, and robust construction-phase drainage management, fully satisfying the requirements of Condition 3.

Prepared by



Gareth Flower
Project Civil Engineer



Himanshu Patel
MEng
Director

Enc. [64120 - 101 - P1 - Drainage Plan Sheet 1](#)
[64120 - 102 - P1 - Drainage Plan Sheet 2](#)
[64120 - 103 - P1 - Drainage Plan Sheet 3](#)
[64120 - 104 - P1 - Drainage Plan Sheet 4](#)
[64120 - 105 - P1 - Drainage Plan Sheet 5](#)
[64120 – 106 – P1 – Drainage SuDS Details](#)
[64120 - SW Model - 2026.04.23](#)
[L - 64120-03-A-2025.11.18 - Observer Park - LLFA Response](#)

Unit 6 FFL: 49.400 +/- 500mm
Subject to final cut and fill requirements

Unit 7 FFL: 49.450 +/- 500mm
Subject to final
cut and fill requirements

Drainage Legend:

- New Surface Water
- New Foul Water
- New Rising Sewer
- Gully
- Channel Drain
- Filter Drain
- New SW Perforated Pipes
- Overland Flow Route
- Plastic Inspection Chamber
- Pre-Cast Concrete Manhole
- Brick Chamber/Manhole
- Catchpit
- Restricted Access Cover
- Permeable Asphalt Vehicular

Basin / Ditch Legend:

- 233mm Freeboard / Grading to top of pond
- Designed Extent of Storage Area
- 500mm Flat area for fence
- Designed Extent of Storage Area

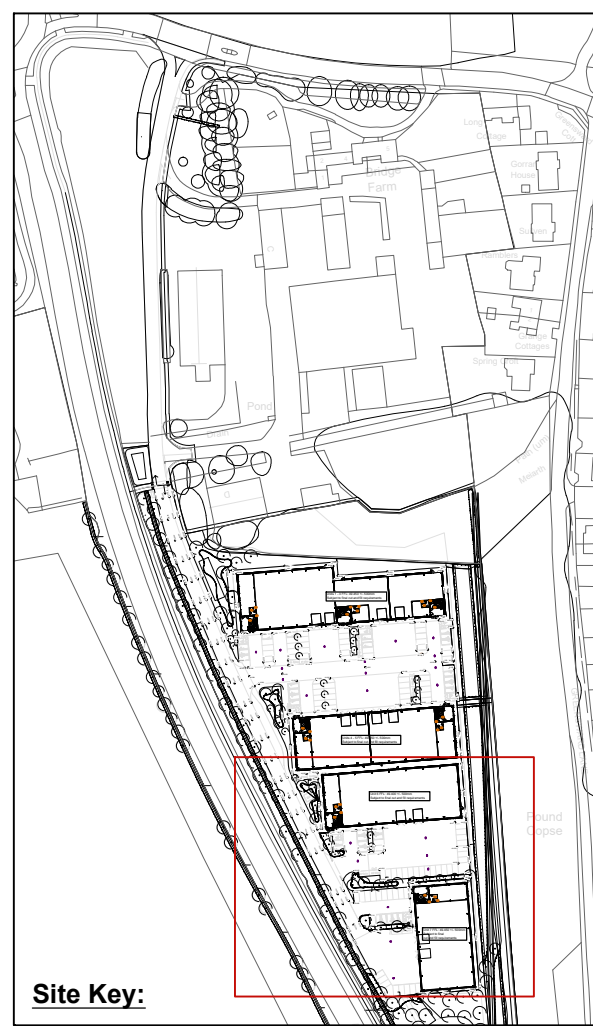
Notes:

- DO NOT SCALE FROM THIS DRAWING.
- All dimensions are in millimetres Unless Noted Otherwise (u.n.o.)
- Drawing is to be read in conjunction with all relevant architect's drawings. Any inconsistencies should be reported to PRP immediately.
- All levels and dimensions are to be checked on site before any work commences.

Drawing Reference Note:

This drawing is based on drawings provided by others:

- Topographical Survey: By Woods Hardwick Drawing reference No: 18959-7-851
- Site Plan: by HTC Architects. ; Drawing reference No: 3389 P403 Rev P



Site Key:

P1	27/04/2026	Issued for comments	GF / NH
Rev	Date	Description	By / Chk



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Client:
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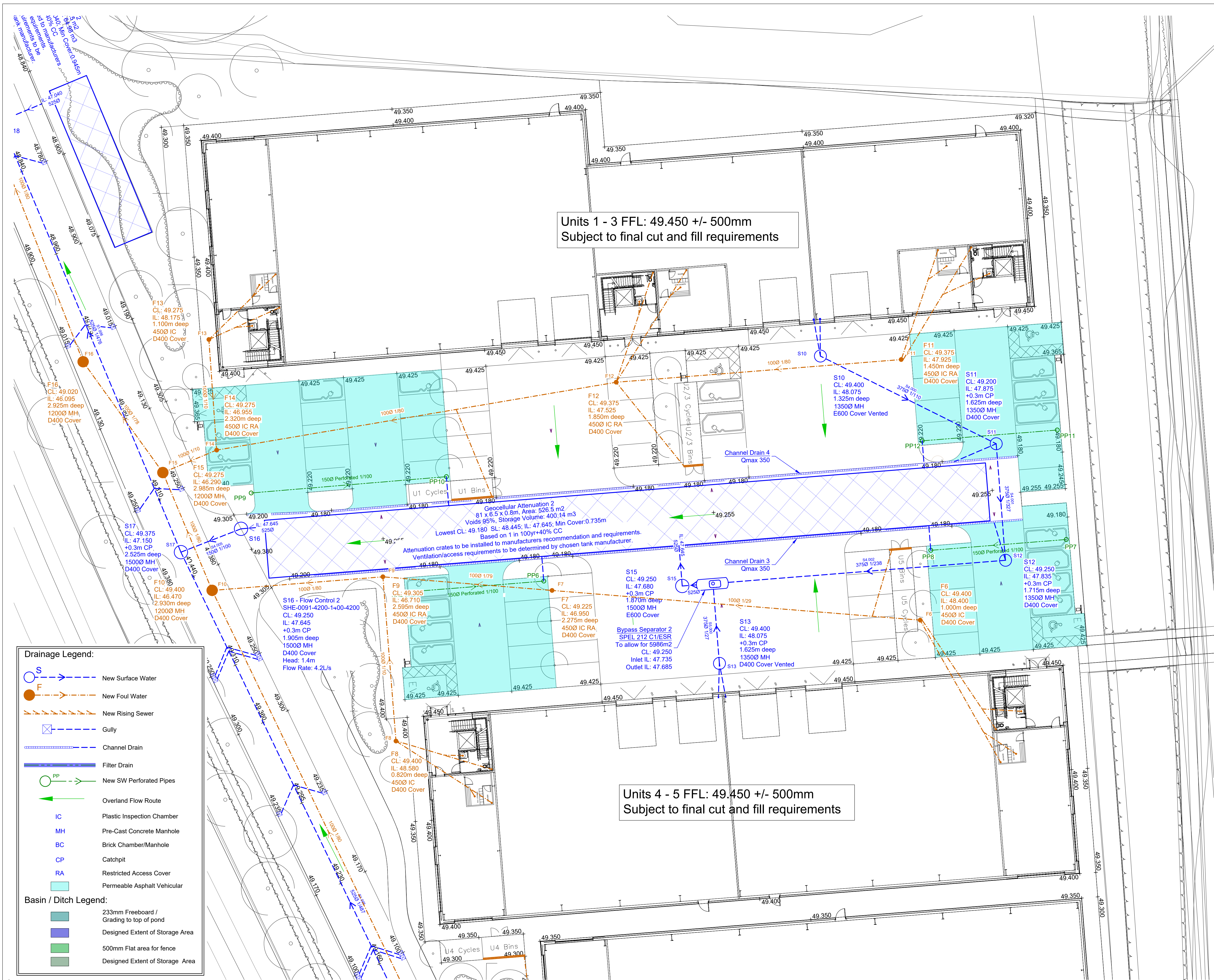
Architect:
HTC Architects

Project:
Observer Park, Reading

Title:
Drainage Plan
Sheet 1

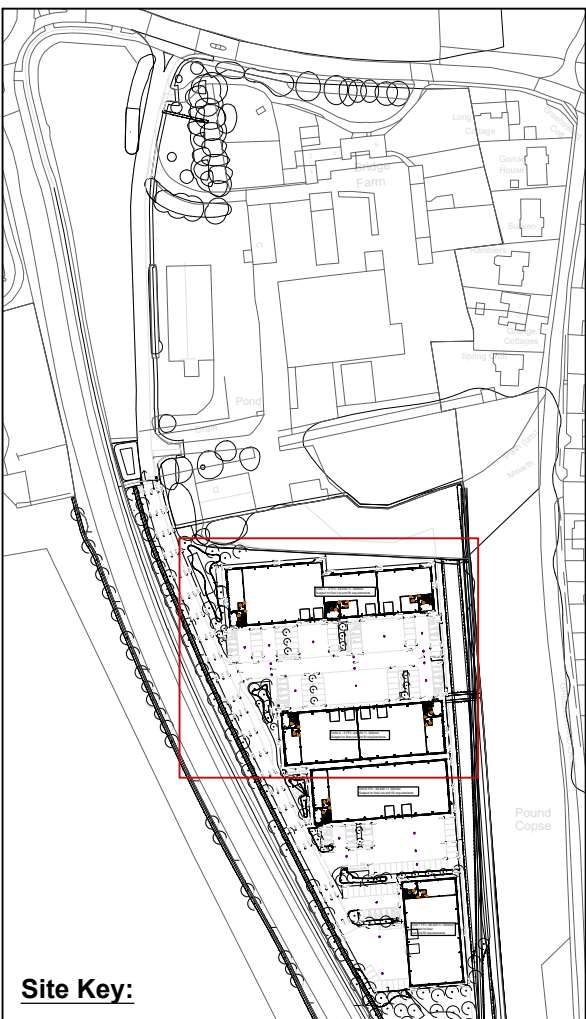
Status:
PLANNING

Engineer:	GF	Date:	April 2026
Drawn:	GF	Scales @ A1:	
Checked:	NH	1:200	
Project No:	64120	Drg No:	101
		Rev:	P1



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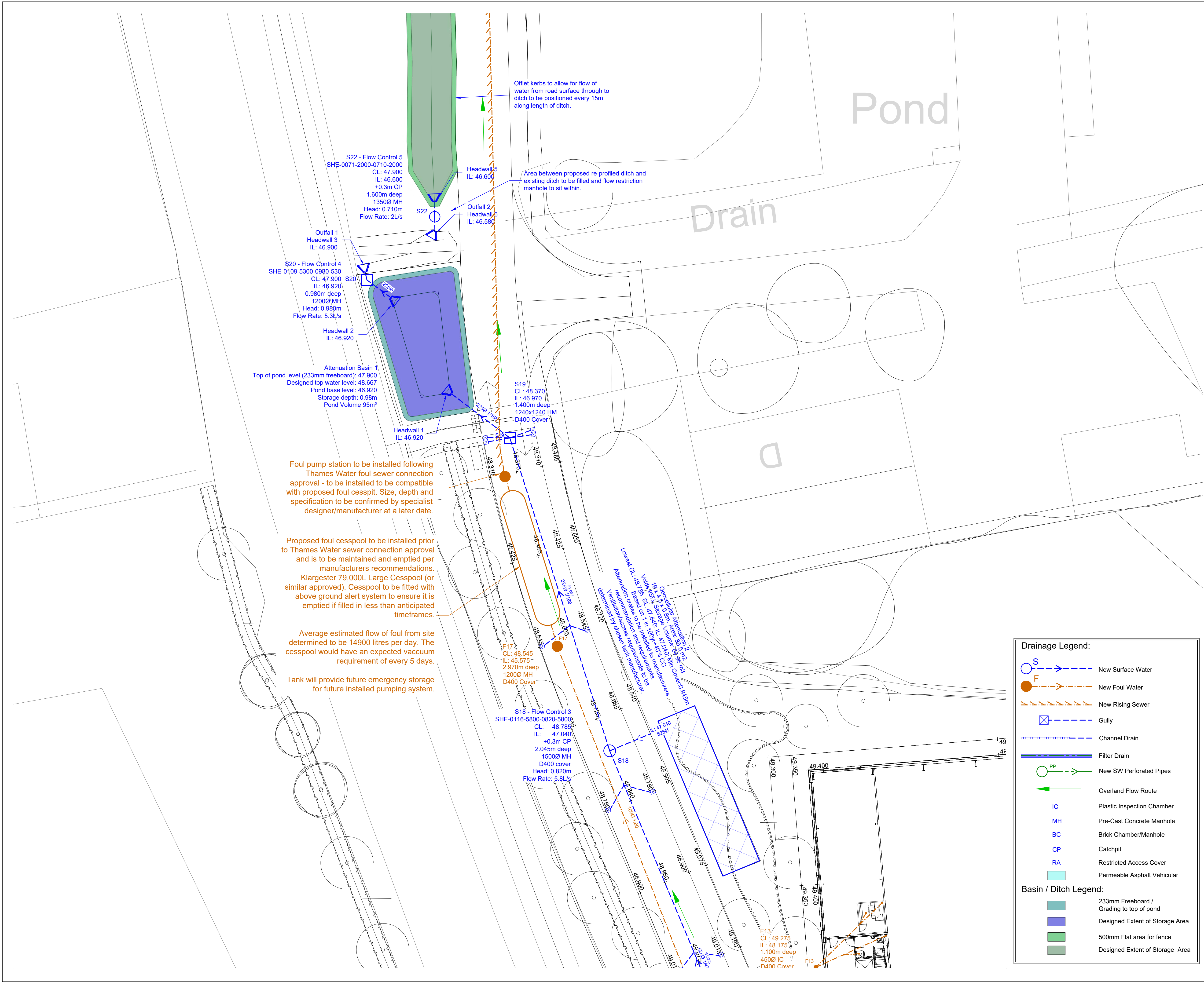
Client:
Tungsten Dev Co 4 Limited

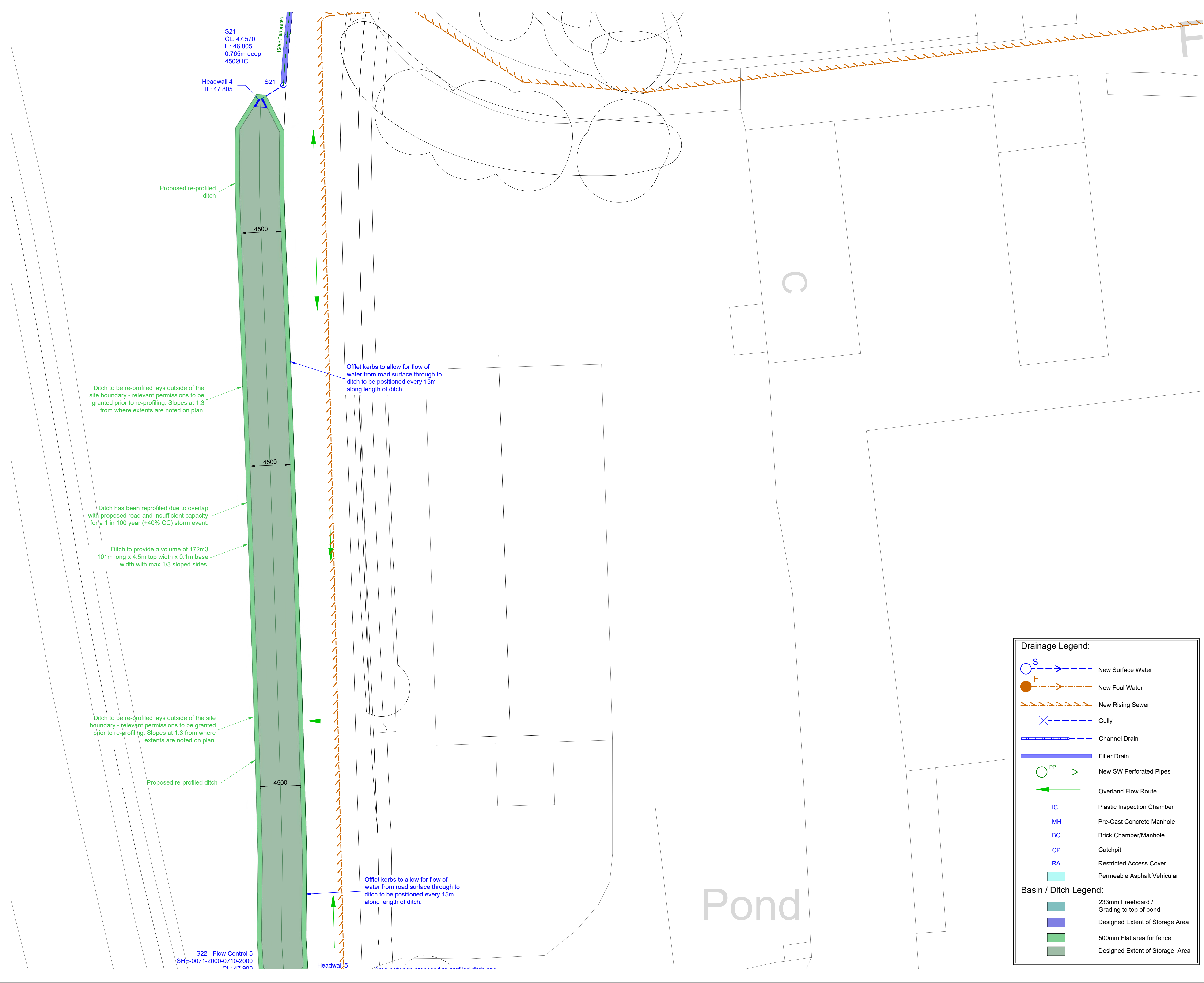
Architect:
HTC Architects

Project:
Observer Park, Reading

Title:
Drainage Plan
Sheet 2

Status:	PLANNING		
Engineer:	GF	Date:	April 2026
Drawn:	GF	Scales @ A1:	1:200
Checked:	NH		
Project No:	64120	Drg No:	102
		Rev:	P1





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- 500mm Flat area for fence
- Designed Extent of Storage Area

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Rev	Date	Description	By / Chk
 PRP consulting engineers & surveyors Catherine House Harborough Road Brinsworth NN6 9BX Telephone: 01604 889 870 northampton@prp.uk.com www.prp.uk.com Leicester Northampton London engineering excellence creating advantage			
Client: Tungsten Dev Co 4 Limited			
Architect: HTC Architects			
Project: Observer Park, Reading			
Title: Drainage Plan Sheet 4			
Status: PLANNING			
Engineer:	GF	Date:	April 2026
Drawn:	GF	Scales @ A1:	1:200
Checked:	NH		
Project No:	64120	Drg No:	104
		Rev:	P1

PRP		Page 1
Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
Date 24/04/2026	Designed by GF	
File 64120 - SW MODEL - 2026.04.23...	Checked by NH	
Micro Drainage		Network 2020.1.3

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.200	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	110	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

- Indicates pipe length does not match coordinates

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	11.549	0.050	231.0	0.114	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	20.212	0.165	122.5	0.113	0.00	0.0	0.600	o	375	Pipe/Conduit	
S2.000	19.252	0.060	320.9	0.147	5.00	0.0	0.600	o	375	Pipe/Conduit	
S2.001	27.842	0.085	327.6	0.123	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.002	4.640	0.060	77.3	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.003	6.000#	0.010	600.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.004	22.364	0.132	169.4	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	17.742	0.177	100.2	0.025	5.00	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)
S1.000	110.00	5.19	48.005	0.114	0.0	0.0	0.0	1.03	72.8	33.9
S1.001	110.00	5.39	47.880	0.227	0.0	0.0	0.0	1.64	180.7	67.6
S2.000	110.00	5.32	47.860	0.147	0.0	0.0	0.0	1.01	111.1	43.7
S2.001	110.00	5.79	47.800	0.269	0.0	0.0	0.0	1.00	110.0	80.2
S1.002	110.00	5.82	47.715	0.496	0.0	0.0	0.0	2.06	227.8	147.9
S1.003	110.00	5.94	47.655	0.496	0.0	0.0	0.0	0.82	130.8«	147.9
S1.004	110.00	6.32	47.645	0.516	0.0	0.0	0.0	1.00	39.8«	153.8
S3.000	110.00	5.29	47.755	0.025	0.0	0.0	0.0	1.00	17.7	7.3

PRP		Page 2
Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
Date 24/04/2026	Designed by GF	
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Micro Drainage		Network 2020.1.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	90.021	0.185	486.6	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S4.000	22.003	0.200	110.0	0.208	5.00	0.0	0.600	o	375	Pipe/Conduit	
S4.001	13.092	0.040	327.3	0.120	0.00	0.0	0.600	o	375	Pipe/Conduit	
S4.002	32.839	0.100	328.4	0.097	0.00	0.0	0.600	o	375	Pipe/Conduit	
S5.000	9.071	0.340	26.7	0.168	5.00	0.0	0.600	o	375	Pipe/Conduit	
S4.003	3.473	0.055	63.1	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S4.004	10.000#	0.035	285.7	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S4.005	7.220	0.072	100.3	0.134	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	52.326	0.110	475.7	0.082	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.007	37.140	0.220	168.8	0.041	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	5.000#	0.050	100.0	0.037	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.009	1.832	0.020	91.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.000	5.000#	0.205	24.4	0.058	5.00	0.0	0.600	o	225	Pipe/Conduit	
S6.001	1.576	0.020	78.8	0.101	0.00	0.0	0.600	o	225	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)
S1.005	110.00	7.80	47.485	0.541	0.0	0.0	0.0	1.01	218.3	161.2
S4.000	110.00	5.21	48.075	0.208	0.0	0.0	0.0	1.73	190.7	62.0
S4.001	110.00	5.43	47.875	0.328	0.0	0.0	0.0	1.00	110.0	97.6
S4.002	110.00	5.98	47.835	0.425	0.0	0.0	0.0	0.99	109.8«	126.6
S5.000	110.00	5.04	48.075	0.168	0.0	0.0	0.0	3.52	388.8	50.0
S4.003	110.00	6.00	47.735	0.593	0.0	0.0	0.0	2.56	407.4	176.6
S4.004	110.00	6.13	47.680	0.593	0.0	0.0	0.0	1.32	285.8	176.6
S4.005	110.00	6.25	47.645	0.727	0.0	0.0	0.0	1.00	17.7«	216.5
S1.006	110.00	8.66	47.150	1.349	0.0	0.0	0.0	1.02	220.9«	402.0
S1.007	110.00	9.28	47.190	1.390	0.0	0.0	0.0	1.00	39.9«	414.1
S1.008	110.00	9.34	46.970	1.427	0.0	0.0	0.0	1.31	52.0«	425.2
S1.009	110.00	9.36	46.920	1.427	0.0	0.0	0.0	1.37	54.3«	425.2
S6.000	110.00	5.03	46.805	0.058	0.0	0.0	0.0	2.66	105.8	17.2
S6.001	110.00	5.05	46.600	0.159	0.0	0.0	0.0	1.47	58.6	47.2

PRP		Page 3
Catherine House Old Harborough Road Brixworth NN6 9BX		64120 - Obersrver Park 1 in 100 yr + 40cc
Date 24/04/2026 File 64120 - SW MODEL - 2026.04.23...		Designed by GF Checked by NH
Micro Drainage		Network 2020.1.3



Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	49.255	1.250	Open Manhole	1350	S1.000	48.005	300				
S2	49.425	1.545	Open Manhole	1350	S1.001	47.880	375	S1.000	47.955	300	
S3	49.350	1.490	Open Manhole	1350	S2.000	47.860	375				
S4	49.250	1.450	Open Manhole	1350	S2.001	47.800	375	S2.000	47.800	375	
S5	49.250	1.535	Open Manhole	1350	S1.002	47.715	375	S1.001	47.715	375	
								S2.001	47.715	375	
S6	49.250	1.595	Open Manhole	1350	S1.003	47.655	450	S1.002	47.655	375	
S7	49.200	1.555	Open Manhole	1350	S1.004	47.645	225	S1.003	47.645	450	
S8	49.005	1.250	Open Manhole	1350	S3.000	47.755	150				
S9	49.075	1.590	Open Manhole	1500	S1.005	47.485	525	S1.004	47.513	225	
								S3.000	47.578	150	
S10	49.400	1.325	Open Manhole	1350	S4.000	48.075	375				
S11	49.200	1.325	Open Manhole	1350	S4.001	47.875	375	S4.000	47.875	375	
S12	49.250	1.415	Open Manhole	1350	S4.002	47.835	375	S4.001	47.835	375	
S13	49.400	1.325	Open Manhole	1350	S5.000	48.075	375				
Separator 2	49.250	1.515	Open Manhole	1350	S4.003	47.735	450	S4.002	47.735	375	
								S5.000	47.735	375	
S15	49.250	1.570	Open Manhole	1500	S4.004	47.680	525	S4.003	47.680	450	
S16	49.250	1.605	Open Manhole	1500	S4.005	47.645	150	S4.004	47.645	525	
S17	49.375	2.225	Open Manhole	1500	S1.006	47.150	525	S1.005	47.300	525	150
								S4.005	47.573	150	48
S18	48.785	1.745	Open Manhole	1500	S1.007	47.190	225	S1.006	47.040	525	
S19	48.370	1.400	Open Manhole	1240 x 1240	S1.008	46.970	225	S1.007	46.970	225	
S20	47.900	0.980	Open Manhole	1240 x 1240	S1.009	46.920	225	S1.008	46.920	225	
S	47.900	1.000	Open Manhole	0		OUTFALL		S1.009	46.900	225	
S21	47.570	0.765	Open Manhole	450	S6.000	46.805	225				
S22	47.900	1.300	Open Manhole	1350	S6.001	46.600	225	S6.000	46.600	225	
S	47.900	1.320	Open Manhole	0		OUTFALL		S6.001	46.580	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	475021.872	167154.993	475021.872	167154.993	Required	
S2	475032.676	167159.075	475032.676	167159.075	Required	
S3	475057.223	167200.628	475057.223	167200.628	Required	

64120 - Obersrver Park
1 in 100 yr + 40cc

Designed by GF

Checked by NH



Network 2020.1.3

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S4	475058.823	167181.442	475058.823	167181.442	Required	
S5	475031.070	167179.223	475031.070	167179.223	Required	
S6	475026.443	167178.866	475026.443	167178.866	Required	
S7	475015.155	167183.988	475015.155	167183.988	Required	
S8	475001.022	167169.831	475001.022	167169.831	Required	
S9	474992.848	167185.578	474992.848	167185.578	Required	
S10	475025.268	167288.583	475025.268	167288.583	Required	
S11	475044.958	167278.763	475044.958	167278.763	Required	
S12	475045.997	167265.713	475045.997	167265.713	Required	
S13	475013.966	167254.166	475013.966	167254.166	Required	
Separator 2	475013.254	167263.209	475013.254	167263.209	Required	
S15	475009.801	167262.833	475009.801	167262.833	Required	
S16	474960.394	167269.240	474960.394	167269.240	Required	
S17	474953.665	167266.624	474953.665	167266.624	Required	
S18	474933.477	167314.899	474933.477	167314.899	Required	
S19	474922.194	167350.284	474922.194	167350.284	Required	
S20	474906.049	167368.130	474906.049	167368.130	Required	

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Catherine House Old Harborborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
Date 24/04/2026	Designed by GF	
File 64120 - SW MODEL - 2026.04.23...	Checked by NH	
Micro Drainage		Network 2020.1.3

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S	474905.640	167369.916			No Entry	
S21	474913.517	167479.961	474913.517	167479.961	Required	
S22	474913.698	167375.285	474913.698	167375.285	Required	
S	474913.723	167373.709			No Entry	

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Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
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Micro Drainage		Network 2020.1.3

PIPELINE SCHEDULES for Storm

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S1	49.255	48.005	0.950	Open Manhole	1350
S1.001	o	375	S2	49.425	47.880	1.170	Open Manhole	1350
S2.000	o	375	S3	49.350	47.860	1.115	Open Manhole	1350
S2.001	o	375	S4	49.250	47.800	1.075	Open Manhole	1350
S1.002	o	375	S5	49.250	47.715	1.160	Open Manhole	1350
S1.003	o	450	S6	49.250	47.655	1.145	Open Manhole	1350
S1.004	o	225	S7	49.200	47.645	1.330	Open Manhole	1350
S3.000	o	150	S8	49.005	47.755	1.100	Open Manhole	1350
S1.005	o	525	S9	49.075	47.485	1.065	Open Manhole	1500
S4.000	o	375	S10	49.400	48.075	0.950	Open Manhole	1350
S4.001	o	375	S11	49.200	47.875	0.950	Open Manhole	1350
S4.002	o	375	S12	49.250	47.835	1.040	Open Manhole	1350
S5.000	o	375	S13	49.400	48.075	0.950	Open Manhole	1350
S4.003	o	450	Separator 2	49.250	47.735	1.065	Open Manhole	1350

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)
S1.000	11.549	231.0	S2	49.425	47.955	1.170	Open Manhole	1350
S1.001	20.212	122.5	S5	49.250	47.715	1.160	Open Manhole	1350
S2.000	19.252	320.9	S4	49.250	47.800	1.075	Open Manhole	1350
S2.001	27.842	327.6	S5	49.250	47.715	1.160	Open Manhole	1350
S1.002	4.640	77.3	S6	49.250	47.655	1.220	Open Manhole	1350
S1.003	6.000#	600.0	S7	49.200	47.645	1.105	Open Manhole	1350
S1.004	22.364	169.4	S9	49.075	47.513	1.337	Open Manhole	1500
S3.000	17.742	100.2	S9	49.075	47.578	1.347	Open Manhole	1500
S1.005	90.021	486.6	S17	49.375	47.300	1.550	Open Manhole	1500
S4.000	22.003	110.0	S11	49.200	47.875	0.950	Open Manhole	1350
S4.001	13.092	327.3	S12	49.250	47.835	1.040	Open Manhole	1350
S4.002	32.839	328.4	Separator 2	49.250	47.735	1.140	Open Manhole	1350
S5.000	9.071	26.7	Separator 2	49.250	47.735	1.140	Open Manhole	1350
S4.003	3.473	63.1	S15	49.250	47.680	1.120	Open Manhole	1500

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Micro Drainage		Network 2020.1.3

PIPELINE SCHEDULES for Storm

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)
S4.004	o	525	S15	49.250	47.680	1.045	Open Manhole	1500
S4.005	o	150	S16	49.250	47.645	1.455	Open Manhole	1500
S1.006	o	525	S17	49.375	47.150	1.700	Open Manhole	1500
S1.007	o	225	S18	48.785	47.190	1.370	Open Manhole	1500
S1.008	o	225	S19	48.370	46.970	1.175	Open Manhole	1240 x 1240
S1.009	o	225	S20	47.900	46.920	0.755	Open Manhole	1240 x 1240
S6.000	o	225	S21	47.570	46.805	0.540	Open Manhole	450
S6.001	o	225	S22	47.900	46.600	1.075	Open Manhole	1350

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)
S4.004	10.000#	285.7	S16	49.250	47.645	1.080	Open Manhole	1500
S4.005	7.220	100.3	S17	49.375	47.573	1.652	Open Manhole	1500
S1.006	52.326	475.7	S18	48.785	47.040	1.220	Open Manhole	1500
S1.007	37.140	168.8	S19	48.370	46.970	1.175	Open Manhole	1240 x 1240
S1.008	5.000#	100.0	S20	47.900	46.920	0.755	Open Manhole	1240 x 1240
S1.009	1.832	91.6	S	47.900	46.900	0.775	Open Manhole	0
S6.000	5.000#	24.4	S22	47.900	46.600	1.075	Open Manhole	1350
S6.001	1.576	78.8	S	47.900	46.580	1.095	Open Manhole	0

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Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
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Micro Drainage		Network 2020.1.3

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.073	0.073	0.073
	User	-	100	0.041	0.041	0.114
1.001	User	-	100	0.113	0.113	0.113
2.000	User	-	100	0.147	0.147	0.147
2.001	User	-	100	0.123	0.123	0.123
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	User	-	100	0.020	0.020	0.020
3.000	User	-	100	0.025	0.025	0.025
1.005	-	-	100	0.000	0.000	0.000
4.000	User	-	100	0.208	0.208	0.208
4.001	User	-	100	0.046	0.046	0.046
	User	-	100	0.035	0.035	0.081
	User	-	100	0.039	0.039	0.120
4.002	User	-	100	0.064	0.064	0.064
	User	-	100	0.033	0.033	0.097
5.000	User	-	100	0.168	0.168	0.168
4.003	-	-	100	0.000	0.000	0.000
4.004	-	-	100	0.000	0.000	0.000
4.005	User	-	100	0.042	0.042	0.042
	User	-	100	0.032	0.032	0.073
	User	-	100	0.033	0.033	0.106
	User	-	100	0.028	0.028	0.134
1.006	User	-	100	0.017	0.017	0.017
	User	-	100	0.065	0.065	0.082
1.007	User	-	100	0.041	0.041	0.041
1.008	User	-	100	0.037	0.037	0.037
1.009	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.058	0.058	0.058
6.001	User	-	100	0.101	0.101	0.101
				Total	Total	Total
				1.586	1.586	1.586

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S1.009	S	47.900	46.900	0.000	0	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S6.001	S	47.900	46.580	0.000	0	0
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Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc																					
Date 24/04/2026	Designed by GF																					
File 64120 - SW MODEL - 2026.04.23...	Checked by NH																					
Micro Drainage		Network 2020.1.3																				
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coeffiecient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 5 Number of Storage Structures 5 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Profile Type</td> <td>Summer</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>18.200</td> <td>Storm Duration (mins)</td> <td>30</td> </tr> <tr> <td>Ratio R</td> <td>0.400</td> <td></td> <td></td> </tr> </table>			Rainfall Model	FSR	Profile Type	Summer	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	18.200	Storm Duration (mins)	30	Ratio R	0.400		
Rainfall Model	FSR	Profile Type	Summer																			
Return Period (years)	100	Cv (Summer)	0.750																			
Region	England and Wales	Cv (Winter)	0.840																			
M5-60 (mm)	18.200	Storm Duration (mins)	30																			
Ratio R	0.400																					
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Micro Drainage		Network 2020.1.3

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.004, Volume (m³): 3.0

Unit Reference MD-SHE-0066-1900-0965-1900
Design Head (m) 0.965
Design Flow (l/s) 1.9
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 66
Invert Level (m) 47.645
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.965	1.9	Kick-Flo®	0.587	1.5
Flush-Flo™	0.289	1.9	Mean Flow over Head Range	-	1.7

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)	Depth (m)	Flow (l/s)
0.100	1.6	0.800	1.7	2.000	2.6	4.000	3.6	7.000	4.7
0.200	1.8	1.000	1.9	2.200	2.8	4.500	3.9	7.500	4.9
0.300	1.9	1.200	2.1	2.400	2.9	5.000	4.0	8.000	5.0
0.400	1.8	1.400	2.2	2.600	3.0	5.500	4.2	8.500	5.2
0.500	1.7	1.600	2.4	3.000	3.2	6.000	4.4	9.000	5.3
0.600	1.5	1.800	2.5	3.500	3.4	6.500	4.6	9.500	5.5

Hydro-Brake® Optimum Manhole: S16, DS/PN: S4.005, Volume (m³): 4.7

Unit Reference MD-SHE-0091-4200-1400-4200
Design Head (m) 1.400
Design Flow (l/s) 4.2
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 91
Invert Level (m) 47.645
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	4.2	Kick-Flo®	0.814	3.3
Flush-Flo™	0.398	4.1	Mean Flow over Head Range	-	3.6

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

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Micro Drainage		Network 2020.1.3

Hydro-Brake® Optimum Manhole: S16, DS/PN: S4.005, Volume (m³): 4.7

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.9	0.800	3.3	2.000	5.0	4.000	6.9	7.000	8.9
0.200	3.8	1.000	3.6	2.200	5.2	4.500	7.2	7.500	9.2
0.300	4.0	1.200	3.9	2.400	5.4	5.000	7.6	8.000	9.5
0.400	4.1	1.400	4.2	2.600	5.6	5.500	8.0	8.500	9.8
0.500	4.0	1.600	4.5	3.000	6.0	6.000	8.3	9.000	10.1
0.600	3.9	1.800	4.7	3.500	6.4	6.500	8.6	9.500	10.3

Hydro-Brake® Optimum Manhole: S18, DS/PN: S1.007, Volume (m³): 13.8

Unit Reference	MD-SHE-0116-5800-0820-5800
Design Head (m)	0.820
Design Flow (l/s)	5.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	116
Invert Level (m)	47.190
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.820	5.8	Kick-Flo®	0.551	4.8
Flush-Flo™	0.246	5.8	Mean Flow over Head Range	-	5.0

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)	Depth (m)	Flow (l/s)
0.100	4.1	0.800	5.7	2.000	8.8	4.000	12.2	7.000	16.0
0.200	5.8	1.000	6.4	2.200	9.2	4.500	12.9	7.500	16.5
0.300	5.8	1.200	6.9	2.400	9.6	5.000	13.6	8.000	17.0
0.400	5.6	1.400	7.4	2.600	10.0	5.500	14.2	8.500	17.5
0.500	5.2	1.600	7.9	3.000	10.7	6.000	14.8	9.000	18.0
0.600	5.0	1.800	8.4	3.500	11.5	6.500	15.4	9.500	18.5

Hydro-Brake® Optimum Manhole: S20, DS/PN: S1.009, Volume (m³): 1.7

Unit Reference	MD-SHE-0109-5300-0980-5300
Design Head (m)	0.980
Design Flow (l/s)	5.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	109
Invert Level (m)	46.920
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

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Micro Drainage		Network 2020.1.3

Hydro-Brake® Optimum Manhole: S20, DS/PN: S1.009, Volume (m³): 1.7

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.980	5.3	Kick-Flo®	0.631	4.3
Flush-Flo™	0.290	5.3	Mean Flow over Head Range	-	4.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	0.800	4.8	2.000	7.4	4.000	10.3	7.000	13.4
0.200	5.2	1.000	5.3	2.200	7.7	4.500	10.8	7.500	13.8
0.300	5.3	1.200	5.8	2.400	8.1	5.000	11.4	8.000	14.3
0.400	5.2	1.400	6.3	2.600	8.4	5.500	11.9	8.500	14.7
0.500	5.0	1.600	6.7	3.000	9.0	6.000	12.4	9.000	15.1
0.600	4.6	1.800	7.0	3.500	9.6	6.500	12.9	9.500	15.5

Hydro-Brake® Optimum Manhole: S22, DS/PN: S6.001, Volume (m³): 2.0

Unit Reference	MD-SHE-0071-2000-0710-2000
Design Head (m)	0.710
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	71
Invert Level (m)	46.600
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.710	2.0	Kick-Flo®	0.457	1.6
Flush-Flo™	0.212	2.0	Mean Flow over Head Range	-	1.7

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 calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	0.800	2.1	2.000	3.2	4.000	4.4	7.000	5.8
0.200	2.0	1.000	2.3	2.200	3.4	4.500	4.7	7.500	6.0
0.300	2.0	1.200	2.5	2.400	3.5	5.000	4.9	8.000	6.2
0.400	1.8	1.400	2.7	2.600	3.6	5.500	5.1	8.500	6.3
0.500	1.7	1.600	2.9	3.000	3.9	6.000	5.4	9.000	6.5
0.600	1.9	1.800	3.1	3.500	4.2	6.500	5.6	9.500	6.7

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Micro Drainage		Network 2020.1.3

Storage Structures for Storm

Cellular Storage Manhole: S7, DS/PN: S1.004

Invert Level (m) 47.645 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	468.0	468.0	0.800	468.0	549.6	0.801	0.0	549.6

Cellular Storage Manhole: S16, DS/PN: S4.005

Invert Level (m) 47.645 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	526.5	526.5	0.800	526.5	666.5	0.801	0.0	666.5

Cellular Storage Manhole: S18, DS/PN: S1.007

Invert Level (m) 47.190 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	85.5	85.5	0.800	85.5	123.1	0.801	0.0	123.1

Tank or Pond Manhole: S20, DS/PN: S1.009

Invert Level (m) 46.920

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	49.0	0.980	154.0

Swale Manhole: S22, DS/PN: S6.001

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	101.4
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	46.600	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.1	Include Swale Volume	Yes

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Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
Date 24/04/2026	Designed by GF	
File 64120 - SW MODEL - 2026.04.23...	Checked by NH	
Micro Drainage		Network 2020.1.3

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 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 (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
S1.000	S1	15 Winter	1	+0%	30/15 Summer				48.106	-0.199
S1.001	S2	15 Winter	1	+0%	30/15 Summer				47.986	-0.269
S2.000	S3	15 Winter	1	+0%	30/15 Summer				47.993	-0.242
S2.001	S4	15 Winter	1	+0%	30/15 Summer				47.961	-0.214
S1.002	S5	15 Winter	1	+0%	30/15 Summer				47.907	-0.183
S1.003	S6	15 Winter	1	+0%	100/15 Summer				47.880	-0.225
S1.004	S7	600 Winter	1	+0%	30/60 Summer				47.790	-0.080
S3.000	S8	15 Winter	1	+0%	100/120 Winter				47.799	-0.106
S1.005	S9	15 Winter	1	+0%	100/240 Winter				47.524	-0.486
S4.000	S10	15 Winter	1	+0%	100/15 Summer				48.176	-0.274
S4.001	S11	15 Winter	1	+0%	30/15 Summer				48.061	-0.189
S4.002	S12	15 Winter	1	+0%	30/15 Summer				48.021	-0.189
S5.000	S13	15 Winter	1	+0%	100/15 Summer				48.152	-0.298
S4.003	Separator 2	15 Winter	1	+0%	100/15 Summer				47.932	-0.253
S4.004	S15	15 Winter	1	+0%	100/15 Summer				47.896	-0.309
S4.005	S16	360 Winter	1	+0%	1/180 Winter				47.805	0.010
S1.006	S17	600 Winter	1	+0%	30/600 Winter				47.375	-0.300
S1.007	S18	600 Winter	1	+0%	30/60 Summer				47.373	-0.042
S1.008	S19	720 Winter	1	+0%	1/600 Winter				47.200	0.005
S1.009	S20	720 Winter	1	+0%	1/240 Winter				47.196	0.051
S6.000	S21	15 Winter	1	+0%	100/15 Winter				46.856	-0.174
S6.001	S22	60 Winter	1	+0%	1/30 Summer				46.844	0.019

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Date 24/04/2026	Designed by GF	
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Micro Drainage		Network 2020.1.3

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

PN	US/MH Name	Flooded		Half Drain		Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)			
S1.000	S1	0.000	0.24		14.2	OK		
S1.001	S2	0.000	0.17		26.3	OK		
S2.000	S3	0.000	0.19		17.9	OK		
S2.001	S4	0.000	0.31		29.8	OK		
S1.002	S5	0.000	0.52		55.4	OK		
S1.003	S6	0.000	0.50		55.6	OK		
S1.004	S7	0.000	0.05	470	1.7	OK		
S3.000	S8	0.000	0.18		3.1	OK		
S1.005	S9	0.000	0.02		3.2	OK		
S4.000	S10	0.000	0.16		26.1	OK		
S4.001	S11	0.000	0.47		38.4	OK		
S4.002	S12	0.000	0.49		47.6	OK		
S5.000	S13	0.000	0.09		21.2	OK		
S4.003	Separator 2	0.000	0.40		67.1	OK		
S4.004	S15	0.000	0.36		67.4	OK		
S4.005	S16	0.000	0.24	294	3.6	SURCHARGED		
S1.006	S17	0.000	0.03		6.2	OK		
S1.007	S18	0.000	0.15	280	5.7	OK		
S1.008	S19	0.000	0.19		5.8	SURCHARGED		
S1.009	S20	0.000	0.18		5.3	SURCHARGED		
S6.000	S21	0.000	0.11		7.3	OK		
S6.001	S22	0.000	0.07	52	2.0	SURCHARGED		

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Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
Date 24/04/2026	Designed by GF	
File 64120 - SW MODEL - 2026.04.23...	Checked by NH	
Micro Drainage		Network 2020.1.3

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 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 (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level
									(m)
S1.000	S1	15 Winter	30	+0%	30/15 Summer				48.420
S1.001	S2	15 Winter	30	+0%	30/15 Summer				48.350
S2.000	S3	15 Winter	30	+0%	30/15 Summer				48.334
S2.001	S4	15 Winter	30	+0%	30/15 Summer				48.283
S1.002	S5	15 Winter	30	+0%	30/15 Summer				48.203
S1.003	S6	15 Winter	30	+0%	100/15 Summer				48.105
S1.004	S7	600 Winter	30	+0%	30/60 Summer				48.005
S3.000	S8	15 Winter	30	+0%	100/120 Winter				47.827
S1.005	S9	1440 Winter	30	+0%	100/240 Winter				47.730
S4.000	S10	15 Winter	30	+0%	100/15 Summer				48.380
S4.001	S11	15 Winter	30	+0%	30/15 Summer				48.308
S4.002	S12	15 Winter	30	+0%	30/15 Summer				48.260
S5.000	S13	15 Winter	30	+0%	100/15 Summer				48.196
S4.003	Separator 2	15 Winter	30	+0%	100/15 Summer				48.104
S4.004		15 Winter	30	+0%	100/15 Summer				48.065
S4.005		360 Winter	30	+0%	1/180 Winter				48.049
S1.006	S17	1440 Winter	30	+0%	30/600 Winter				47.730
S1.007	S18	1440 Winter	30	+0%	30/60 Summer				47.728
S1.008	S19	1440 Winter	30	+0%	1/600 Winter				47.579
S1.009	S20	1440 Winter	30	+0%	1/240 Winter				47.575
S6.000	S21	120 Winter	30	+0%	100/15 Winter				46.999
S6.001	S22	120 Winter	30	+0%	1/30 Summer				46.998

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Date 24/04/2026	Designed by GF	
File 64120 - SW MODEL - 2026.04.23...	Checked by NH	
Micro Drainage	Network 2020.1.3	

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

PN	US/MH Name	Surcharged Flooded		Half Drain Pipe		Time (mins)	Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)				
S1.000	S1	0.115	0.000	0.56			32.5	SURCHARGED	
S1.001	S2	0.095	0.000	0.41			62.0	SURCHARGED	
S2.000	S3	0.099	0.000	0.44			40.8	SURCHARGED	
S2.001	S4	0.108	0.000	0.72			69.7	SURCHARGED	
S1.002	S5	0.113	0.000	1.10			117.9	SURCHARGED	
S1.003	S6	0.000	0.000	1.05			117.6	OK	
S1.004	S7	0.135	0.000	0.05			1.9	SURCHARGED	
S3.000	S8	-0.078	0.000	0.45			7.5	OK	
S1.005	S9	-0.280	0.000	0.01			2.2	OK	
S4.000	S10	-0.070	0.000	0.37			60.5	OK	
S4.001	S11	0.058	0.000	1.15			94.1	SURCHARGED	
S4.002	S12	0.050	0.000	1.21			118.5	SURCHARGED	
S5.000	S13	-0.254	0.000	0.23			51.9	OK	
S4.003	Separator 2	-0.081	0.000	0.98			165.5	OK	
S4.004	S15	-0.140	0.000	0.88			166.7	OK	
S4.005	S16	0.254	0.000	0.27			4.1	SURCHARGED	
S1.006	S17	0.055	0.000	0.03			6.9	SURCHARGED	
S1.007	S18	0.313	0.000	0.15		888	5.8	SURCHARGED	
S1.008	S19	0.384	0.000	0.20			6.2	SURCHARGED	
S1.009	S20	0.430	0.000	0.18			5.3	SURCHARGED	
S6.000	S21	-0.031	0.000	0.09			5.5	OK	
S6.001	S22	0.173	0.000	0.07		148	2.0	SURCHARGED	

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Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
Date 24/04/2026	Designed by GF	
File 64120 - SW MODEL - 2026.04.23...	Checked by NH	
Micro Drainage	Network 2020.1.3	

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 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 (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	100	+40%	30/15 Summer				48.893
S1.001	S2	15 Winter	100	+40%	30/15 Summer				48.815
S2.000	S3	15 Winter	100	+40%	30/15 Summer				48.932
S2.001	S4	15 Winter	100	+40%	30/15 Summer				48.855
S1.002	S5	15 Winter	100	+40%	30/15 Summer				48.684
S1.003	S6	960 Winter	100	+40%	100/15 Summer				48.414
S1.004	S7	960 Winter	100	+40%	30/60 Summer				48.413
S3.000	S8	960 Winter	100	+40%	100/120 Winter				48.350
S1.005	S9	960 Winter	100	+40%	100/240 Winter				48.349
S4.000	S10	15 Winter	100	+40%	100/15 Summer				49.307
S4.001	S11	15 Winter	100	+40%	30/15 Summer				49.171
S4.002	S12	600 Winter	100	+40%	30/15 Summer				49.031
S5.000	S13	600 Winter	100	+40%	100/15 Summer				49.029
S4.003	Separator 2	600 Winter	100	+40%	100/15 Summer				49.029
S4.004	S15	600 Winter	100	+40%	100/15 Summer				49.029
S4.005	S16	600 Winter	100	+40%	1/180 Winter				49.028
S1.006	S17	960 Winter	100	+40%	30/600 Winter				48.350
S1.007	S18	960 Winter	100	+40%	30/60 Summer				48.347
S1.008	S19	2880 Winter	100	+40%	1/600 Winter				47.896
S1.009	S20	2880 Winter	100	+40%	1/240 Winter				47.892
S6.000	S21	240 Winter	100	+40%	100/15 Winter				47.163
S6.001	S22	240 Winter	100	+40%	1/30 Summer				47.163

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Catherine House Old Harborough Road Brixworth NN6 9BX	64120 - Obersrver Park 1 in 100 yr + 40cc	
Date 24/04/2026	Designed by GF	
File 64120 - SW MODEL - 2026.04.23...	Checked by NH	
Micro Drainage	Network 2020.1.3	

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)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)						
S1.000	S1	0.588	0.000	1.01			58.9	SURCHARGED	
S1.001	S2	0.560	0.000	0.77			116.5	SURCHARGED	
S2.000	S3	0.697	0.000	0.80			73.9	SURCHARGED	
S2.001	S4	0.680	0.000	1.38			132.7	SURCHARGED	
S1.002	S5	0.594	0.000	2.31			247.6	SURCHARGED	
S1.003	S6	0.309	0.000	0.15			16.8	SURCHARGED	
S1.004	S7	0.543	0.000	0.05			1.9	SURCHARGED	
S3.000	S8	0.445	0.000	0.05			0.9	SURCHARGED	
S1.005	S9	0.339	0.000	0.01			2.6	SURCHARGED	
S4.000	S10	0.857	0.000	0.63			101.9	FLOOD RISK	
S4.001	S11	0.921	0.000	1.92			157.5	FLOOD RISK	
S4.002	S12	0.821	0.000	0.21			21.1	FLOOD RISK	
S5.000	S13	0.579	0.000	0.04			8.8	SURCHARGED	
S4.003	Separator 2	0.844	0.000	0.17			29.4	FLOOD RISK	
S4.004	S15	0.824	0.000	0.16			29.4	FLOOD RISK	
S4.005	S16	1.233	0.000	0.27			4.1	FLOOD RISK	
S1.006	S17	0.675	0.000	0.04			8.3	SURCHARGED	
S1.007	S18	0.932	0.000	0.15			5.8	SURCHARGED	
S1.008	S19	0.701	0.000	0.20			6.3	SURCHARGED	
S1.009	S20	0.747	0.000	0.18			5.3	FLOOD RISK	
S6.000	S21	0.133	0.000	0.10			6.1	SURCHARGED	
S6.001	S22	0.338	0.000	0.07		340	2.0	SURCHARGED	

Our ref: 64120 – 03 A

18 November 2025

Planning Ref: 251984

Land south of Bridge Farm, Reading Road, Arborfield, Berkshire, RG2 9HT

Our comments are provided below for the list of comments the Lead Local Flood Authority has made towards Reserved Matters Conditions (*in italic, bold*): PRP Responses in [Blue](#)

PRP Northampton
The Drummonds, Unit 11
Spring Hill Office Park
Harborough Road
Pitsford NN6 9AA

Telephone: 01604 889870

northampton@prp.uk.com
www.prp.uk.com

LLFA received this application for approval of Reserved Matters pursuant to Outline Planning Consent 223083 (as varied by 243190) for the erection of up to 11 no. commercial units to provide 6,986sqm GIA commercial / employment development predominantly within Class B8 and/or Class E (g) uses with supporting facilities within Class E uses comprising ancillary offices, trade counters and food/drink facilities with highway works and strategic landscaping. Details of appearance and landscaping to be considered on 28th August 2025. LLFA provided following comments.

Flood Zone and Surface Water Management

- ***Flood Zone Status:*** Based on local knowledge and Environment Agency mapping, the site appears to be within Flood Zone 1 (low probability of flooding). However, the site's historic marshy ground conditions and persistent waterlogging indicate local surface water flood risk due to poor natural drainage, not fluvial flooding.
- ***Surface Water Drainage:*** The ground investigation report confirms that the site overlies largely impermeable London Clay, with a high groundwater table and indications of marshy, waterlogged conditions. This will severely restrict infiltration-based drainage options (e.g., soakaways) and necessitates a well-designed attenuation and outfall system.
- ***SuDS Strategy:*** Sustainable Drainage Systems (SuDS) must prioritize:
 - Attenuation basins or balancing ponds to manage surface water runoff volumes and rates.
 - Conveyance features (swales, channels) to manage and direct flow.
 - Pollution control measures given commercial land use and proximity to a classified minor (secondary A) aquifer and Source Protection Zone (Zone 2 GSPZ).
- ***Groundwater Considerations:*** The presence of high groundwater and waterlogged soils means groundwater monitoring and careful design of drainage infrastructure to prevent groundwater flooding or contamination are essential.

2. Geotechnical and Ground Condition Implications for Drainage

- ***Impermeable London Clay:*** The clay substrate will hinder infiltration and require engineered surface water management. SuDS relying solely on infiltration will likely be unsuitable.
- ***Waterlogging & Marshy Ground:*** The existing site conditions with semi-permanent waterlogged areas and marsh grasses indicate a naturally high water table, which may fluctuate seasonally. Drainage design must accommodate this variability.

18 November 2025

- **Contamination Risks:** *Historical use as a construction compound and tipped material including demolition debris near the northern boundary raise concerns for contamination migration via surface water runoff or groundwater pathways. The design should ensure any drainage discharges comply with pollution prevention guidelines.*
- **Structural Considerations:** *High sulphate levels and volume changes in clay soils may impact the integrity of buried drainage structures. Appropriate material specifications and design standards (BRE SD1, BS 8500) should be followed to avoid premature deterioration.*

3. Further Information required

- *Develop a detailed Surface Water Drainage Strategy:*
 - *Avoid soakaways; provide attenuation and controlled discharge to existing watercourses or drainage systems.*
 - *Incorporate SuDS features tailored to commercial land use and high groundwater conditions.*
 - *Include pollution control and maintenance regimes.*
- *Undertake groundwater monitoring to inform drainage design and manage any risks of flooding or contamination.*
- *Ensure geotechnical and contamination risks are mitigated through coordinated ground investigation and remediation as required prior to construction.*

The site's surface water drainage requires careful, engineered solutions given the impermeable soils, high groundwater, and contamination potential.

Point 3.1 – A detailed drainage strategy report was submitted as part of these reserved matters consultation. This has been enclosed with this response document for clarity.

Point 3.1.1 – as per clause 5 in the aforementioned report the site is underlain by the London Clay formation, made ground and the poor infiltration found due to the ponding of water following heavy rainfall, the use of soakaways is not viable for this scheme and as such alternative collection, storing and restricted discharge into surrounding field water systems has been proposed.

Point 3.1.2 - Incorporated SuDS using crate attenuation storage, separators and basin have been proposed. These are shown within the drainage strategy drawing and proposed in clause 7 of the enclosed report.

Point 3.1.3 – Pollution control has been considered through the use of tanked permeable paving, separators and basin. The maintenance of these and all surface water items were proposed as part of Clause 8 and Appendix VIII of the enclosed drainage strategy report.

Point 3.2 and 3.3 - The original Ground Investigation Report (GIR) recommended groundwater monitoring; however, it was issued prior to the development of the scheme design. During the design process, the GIR was reviewed, and it was determined that the groundwater encountered in lower areas of the site was perched due to ground levels being flat and falls not directed to the field drainage water systems, resulting from the poor infiltration characteristics of the underlying London Clay. Given the proposed change in land use from agricultural to developed, with hardstanding areas and a formal surface water drainage system, perched groundwater exacerbated by rainfall will be effectively captured, controlled, and treated prior to discharge into the surrounding field drainage network.

With respect to contamination, the GIR did not identify any confirmed sources of contamination. While made ground was observed across the site, the proposed drainage strategy does not include infiltration-based techniques such as soakaways, thereby significantly reducing the potential for contaminant migration. On this basis, the risk posed by contaminated soils is considered negligible.

18 November 2025

Prepared by



Gareth Flower
Project Civil Engineer
PRP UK Ltd



Himanshu Patel
MEng
Director

Enc. [R - 64120-02-B-2025.07.30 - Observer Park - DS](#)

Foul and Storm Water Drainage Strategy for Observer Park, Arborfield

On behalf of:

Tungsten Dev Co 4 Limited

Date	Issued	Revision
6 June 2025	Planning Issue	A
30 July 2025	Site Plan amended	B

Reference: 64120-02

Prepared by:



Harry Wintle
BEng
Civil Engineer

Approved by:



Himanshu Patel
MEng
Director

EXECUTIVE SUMMARY

This drainage strategy has been prepared on behalf of Tungsten Dev Co 4 Limited, in support of their planning application for the proposed development of a parcel of land situated off the Reading Road, Arborfield.

A sustainable drainage system (SuDS) scheme is proposed, incorporating permeable paving, catchpits, geocellular attenuation and an attenuation basin. The geocellular attenuation will provide sufficient storage for all storms up to and including the 1 in 100-year, plus 40% for climate change.

As per Lead Local Flood Authority (LLFA) guidance, for a 1 in 100-year storm (plus 40% climate change) the drainage installed on site will restrict discharge rates to the 1 in 1-year greenfield runoff rate (7.3l/s). The site is classified as a greenfield development, with an area of approximately 2.99ha. As the site is being developed on greenfield land the scheme will aim to make use of SuDS elements where reasonably possible in conjunction with discharge rates being sufficiently limited.

Due to the underlying strata and presence of groundwater, soakaways have been deemed not viable for this site.

It is proposed to discharge surface water flows into the watercourse adjacent to the eastern boundary of the site via two connections. The Thames Water (TW) asset map is shown in Appendix V. The connections will be subject to agreement from the LLFA (in absence of a local Internal Drainage Board, this will be Wokingham Borough Council). It is proposed to discharge at a maximum of the greenfield runoff rate of 7.3l/s for a 1 in 100-year storm event (plus 40% climate change).

To ensure the surface water drainage scheme remains effective, a maintenance plan is proposed. The key here is to prevent silt and other debris from entering the important SuDS features.

Considering all of the above, it can be seen that SuDS principles have been fully taken into account for the proposed surface water drainage system.

Foul drainage from the proposed development will indirectly connect into the existing TW foul water sewer, subject to TW approval.

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APPENDICES

I	Proposed Site Layout
II	Topographical Survey
III	Ground Investigation Information
IV	TW Asset Plans and Developer Enquiry Response
V	Proposed Drainage Layouts
VI	Proposed Drainage Calculations
VII	Maintenance and Management Plan
VIII	Separator Operation and Maintenance
IX	Surface Water Quality Assessment
X	General Conditions

1. INTRODUCTION

- 1.1 This drainage strategy has been prepared on behalf of Tungsten Dev Co 4 Limited in support of their planning application for the proposed site off Reading Road in Arborfield.
- 1.2 At the time of writing, the site consists of one access road and a large greenfield space.
- 1.3 The purpose of the report is to establish the best means of providing surface and foul water drainage to the new development, considering statutory requirements.

2. THE SCOPE OF THE ASSESSMENT

- 2.1 The purpose of this strategy is to investigate and make recommendations as to the best way to deal with the discharge of foul and surface water drainage from the proposed development at the land situated off Reading Road, Arborfield.
- 2.2 To achieve the above, the following have been carried out:
 - Investigations into existing drainage systems at the site
 - Assessment of present and future surface water flows
 - Assessment of future foul water flows
 - Assessment of the permeability of the underlying geology
- 2.3 The following specific additional considerations will be applied to the surface water drainage design:
 - SuDS principles are to be adopted generally
 - Allowances for climate change are to be incorporated into the scheme
 - A surface water drainage layout and calculations are to be provided
 - A maintenance plan will be provided
- 2.4 The purpose of the above is to contain, as far as is reasonably practical, surface water drainage within the site and to not have an adverse effect on neighbouring properties during exceptional rainfall events.
- 2.5 A foul water drainage layout will be produced showing how the foul drainage will be discharged.

3. **EXISTING CONDITIONS AND THE LOCAL ENVIRONMENT**

- 3.1 The site's current land use at the time of writing is greenfield land and an access road.
- 3.2 The existing land use around the site is predominantly residential and industrial/commercial. The site is located at grid reference easting: 475018, northing: 167211. Levels are generally relatively flat where the commercial units are proposed, with levels along the proposed access road generally falling from south to north. Levels where units are proposed are generally around 49.100m AOD with levels to the end of the access road joining Reading Road being around 47.600m AOD.
- 3.3 The site has an area of approximately 2.99ha and is broadly rectangular in shape; a site plan is included in Appendix I.
- 3.4 The immediate surrounding land uses are:

Boundary	Boundary Construction	Adjacent Land Use	Proximal Land Use
North	Fence	Commercial/Industrial	Highway (Reading Road)
East	Fence	Forest/Greenfield	Residential/Agriculture
South	Fence	Highway (A327)	Agriculture
West	Fence	Highway (A327)	Agriculture

4. **THE DEVELOPMENT PROPOSALS**

- 4.1 It is proposed to construct 7 commercial units, together with areas of hardstanding (yards, roads and car parking) and soft landscaping. A proposed site plan is appended.
- 4.2 The proposed development is classified as a less vulnerable development by the Flood Risk Vulnerability Classification (Annex 3) in the National Planning Policy Framework (NPPF). Therefore, in line with the flood risk vulnerability and flood zone compatibility table (table 3) in the NPPF, the development is appropriate on a flood zone 1 site.

5. SITE INVESTIGATIONS

- 5.1 A topographical survey of the existing development is shown in Appendix II.
- 5.2 Within the accuracy of the available geological information (British Geological Survey (BGS) Geology of Britain at a scale of 1:50,000) the 'solid' geology beneath the site is indicated to comprise the London Clay formation, described as slightly calcareous, silty to very silty clay. Superficial deposits beneath the site are said to be made up of river terrace deposits (with no description available on Geoindex).
- 5.3 Historical boreholes sunk within the vicinity of the site have recorded a topsoil underlain by river terrace deposits described as clayey sandy gravel to 2.5m below ground level over a layer of London Clay described as firm and grey to a depth of 3.8m before the borehole log is stopped. Given the confirmation of the presence of London Clay in the local vicinity, the soils beneath the site are anticipated to have a low permeability.
- 5.4 A geo-environmental assessment was carried out at the site in May 2024, and gives the ground conditions as made ground followed by river terrace deposits (both clays and sands) all underlain by London Clay. Groundwater was encountered within the river terrace deposits and further groundwater monitoring has been recommended. For further information with regards to borehole testing and groundwater, refer to Appendix VIII.
- 5.5 The site is located in Source Protection Zone 3, with approximately half of the access road (the northern half) lying within Source Protection Zone 2. The end of the access road joining Reading Road is approximately 400m away from Source Protection Zone 1.
- 5.6 Based on the underlying strata and the risk presented by groundwater, soakaways will not be viable, and BRE 365 testing would not be required to determine the feasibility of soakaways.

6. FOUL WATER DRAINAGE SYSTEM

- 6.1 A survey has been undertaken by Claydon on the private drainage that the proposed foul is to discharge into. This shows existing drainage that will serve the site and confirms that it connects to the TW sewer in Greensward Lane (hence the need for an indirect connection application).
- 6.2 TW asset plans confirm that there are no public foul water sewers within this proposed development. The proposed development will therefore require one foul drainage connection to the existing private drainage (with the relevant permissions), which means the existing TW foul sewer in Greensward Lane will indirectly serve the proposed site.

- 6.3 There are generally three methods for dealing with foul effluent that is produced from a commercial development:
- A) Public sewers – always the preferred option since they are relatively maintenance-free and require no additional area to discharge the foul water.
 - B) Septic tank – quite simply a tank, usually buried below ground, which collects the foul effluent and is periodically emptied; occasionally it also has a herringbone drainage system fitted for removing the ‘clean’ water that collects in the upper layers of the tank. These are seldom used in a commercial context as they require high levels of maintenance and can produce foul odours if not maintained correctly. A septic tank would be unsuitable for a development of this type for several reasons including lack of available space within a densely occupied area. The Environment Agency (EA) is also preventing the installation of new septic tanks and encouraging the installation of small treatment stations where other proposals are not suitable or not available.
 - C) A small treatment works – used where there is no public sewer within the vicinity, but only if the General Binding Rules for Small Sewage Discharges are met, or if a permit is obtained from the EA. Small treatment works discharge either to the ground or to surface water. Treatment works are seldom used where foul sewers are available for connections.
- 6.4 As stated above, method A will be used by connecting the foul water drainage into the existing private drainage and connecting to the TW foul water sewer in Greensward Lane by one indirect connection, subject to a S106 connection agreement. A pre-planning enquiry has been opened with regards to this connection (reference DS6098066) with TW having confirmed that they are to undertake upgrade works to serve the development. It is proposed that should reinforcement works not be completed by TW prior to the development, a cesspool is temporarily used. When the upgrade works are complete the foul water will be pumped from the cesspool.

7. SURFACE WATER DRAINAGE SYSTEM

- 7.1 Per LLFA requirements the runoff rate of the development is restricted to the 1 in 1-year greenfield runoff rate with an impermeable area of 1.67ha having a restricted rate of 7.3L/s up to and including the 1 in 100 year with a 40% climate change allowance.
- 7.2 For the reasons outlined in section 5 of this report, soakaways are not viable for this site due to the underlying strata and presence of perched groundwater.

7.3 Government directives in the form of the Building Regulations Part H, Planning Practice Guidance and the GLA indicate that the following hierarchy should be adopted as a means of disposing of the surface water runoff:

- Rainwater re-use (rainwater harvesting/greywater recycling)
- Discharge rainwater into a soakaway
- Attenuate rainwater by storing it in tanks such as green roofs, blue roofs or below ground attenuation tanks and releasing it gradually over time into:
 - Nearby watercourses
 - Surface water sewers
 - Combined sewers

7.4 In accordance with The SuDS Manual, the design of the surface water system should consider water quantity, water quality, amenity and biodiversity and this report considers each category. An outline drainage strategy plan for the development is appended.

7.5 Water Quantity

7.5.1 The quantity of surface water discharging will be controlled by a flow control device serving the network within the site limiting flow to a maximum of 4.6l/s which is to be agreed with the LLFA. This will be achieved by utilising geocellular storage. The greenfield runoff calculations are shown in Appendix VI.

7.5.2 The proposed point of discharge is into the watercourse adjacent to the eastern site boundary.

7.5.3 The following drainage principles have been applied: no surcharging is to be present in the 1 in 1 year (100% AEP) storm event; however, due to flow control restrictions, surcharging can be expected within the final pipe runs due to the restricted flow. No flooding is to occur in the 1 in 30-year (3.3% AEP) storm event. Flooding can occur for 1 in 100-year (1% AEP) storm event with climate change allowance of 40% but with with designed exit routes, however, in this case there is no flooding for this storm event anyway (see calculations in appendix VI).

7.5.4 There will be 1.67ha of positively drained area on the developed site. The drainage layout will be designed based on the critical event for a 1 in 100-year return period with a 40% allowance for climate change. Geocellular attenuation with a total storage volume of 864m³ will be provided, as well as a pond and swale. Supporting calculations demonstrating discharge and storage can be found in Appendix VI.

7.5.5 The supporting calculations have been split up into two sets, the first being all units with their associated yards and parking as well as the adjacent proposed road (calculation set 1 - 1.49ha), and the second for the upper part of the road where the existing road arrangement is to be replaced (calculation set 2 - 0.18ha). The main site area where the units reside (represented on calculation set 1) has a final outfall rate of 5.3l/s. The upper portion of the access road (represented on calculation set 2) has a final outfall rate of 2l/s. With both areas combined the final rate coming off site will be 7.3l/s in line with greenfield runoff rate calculations.

7.6 Water Quality

7.6.1 Consideration is also given to water quality. SuDS techniques are discussed below. With reference to the architect's site layout drawings and table 4.3 of the SuDS Manual, the pollution hazard level is low for most of the site. Infiltration systems have been deemed not viable due to the nature of the underlying strata, as discussed in section 5 of this report.

7.6.2 It is proposed to construct the car parking spaces across the development with permeable block paving and a porous sub-base consisting of Open Graded Crushed Rock (OGCR) which provides 30% void space. Runoff from the car parking will drain via the permeable paving.

7.6.3 All yard areas will drain down via linear channel drainage which will then go through a full retention or bypass separator.

7.6.4 There is a medium potential hazard for pollutants from this site generated by the external yard areas; therefore, a bypass or full retention separator will be utilised to treat the runoff from service yards before entering the main system. The separators specified provide high level treatment which will reduce pollutants from all sources to a low risk.

7.6.5 The measures described above provides the level of treatment required as per the simple indexing method. A breakdown of this treatment train is as follows:

Surface	Treatment 1	Treatment 2
Yards	Separator	Pond
Parking	Permeable Paving	Pond
Main Roof (excluding Units 5-6)	Separator	Pond
Main Access Road (Lower)	Pond	
Main Access Road (Upper)	Swale	

7.6.6 A surface water quality assessment using the simple indexing method is appended; it should be noted that some roof space from units 5-6 does not enter a separator. It should also be noted that in Appendix IX the worst-case scenario has been considered for each surface based on the drainage layout when considering pollution indices. Unit 5-6 not entering a separator should not be an issue as the pond provides a sufficient level of treatment to the water prior to it being discharged into the watercourse.

7.7 Amenity and Biodiversity

7.7.1 Amenity is defined as “a useful or pleasant facility or service” in the SuDS Manual. The nature of commercial developments means the opportunity for providing amenity is low, however the soft landscaped areas and protected green spaces will offer some amenity and biodiversity.

7.8 Design Consideration of Exceedance

7.8.1 No flooding is expected to occur for a 1 in 100-year event plus 40% for climate change. It is also possible that exceedance of the surface water drainage system could occur during an exceptional rainfall event, that is with a return period of over 100 years, or in the event of a system failure. Should this occur, the water would back up into the drainage network's spare capacity.

7.8.2 The kerb lines and proposed levels on the site will ensure runoff from the units is retained within the site, and runoff from the roads is contained within the road area preventing flows onto neighbouring land and the public highway. Excess water will drain into the proposed system as the water level drops.

7.8.3 In the event of any drainage blockages occurring at the flow control devices (if required), the water will back up into the geocellular attenuation pipes and then pond within the yard areas. This ponding will signal that maintenance to or investigation of the drainage system is required.

7.8.4 The external levels will generally be set 50mm lower than the ground floor slab. Although level thresholds will be provided, levels will be designed to fall away from these locations. This will further reduce the propensity for any runoff to enter the buildings in the event of exceedance occurring.

7.8.5 Overland flows have been shown on the appended drainage strategy drawing. These flows will travel away from the units with external levels being designed to fall away. Flows then would be directed towards the proposed road before eventually making their way north and into the watercourse on site.

- 7.8.6 This means that overland flows will end up where they would have done anyway in the event exceedance occurs (which is unlikely due to no flooding being present in calculations up to and including the 1 in 100-year storm event plus 40% climate change). Retaining exceedance flows within the site and maintaining the existing overland flow pathway will make sure that no additional risk to others in the surrounding areas is created because of this development.
- 7.8.7 The measures described above will be sufficient to provide time for employees and residents to exit the buildings in the event of an abnormal flood occurring.

8. MAINTENANCE OF THE SURFACE WATER DRAINAGE SYSTEM

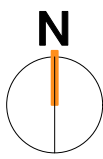
- 8.1 The surface water drainage system has been designed with future maintenance in mind. Catchpits will trap most of the silt to prevent entry into the attenuation systems.
- 8.2 A maintenance and management plan has been proposed and is appended. The measures are suggestions, and the frequency of maintenance should be adjusted as necessary to suit levels of silt build-up and defects in the system. The plan will be included in the Operation and Maintenance manual for future reference.
- 8.3 A maintenance plan for the bypass separator is included in Appendix VIII.

9. CONCLUSIONS

- 9.1 The development utilises a SuDS-compliant design in accordance with the NPPF, GLA, and Wokingham Borough Council requirements.
- 9.2 Water quality improvements can be achieved across the development with the use of permeable paving, catchpits and gulleys/channel drainage with adequate silt traps, sumps, and bypass separators.
- 9.3 Surface water from the development will be restricted to a total of 4.6l/s for all storm events up to and including the 1 in 100 year (1% AEP) with a 40% climate change allowance per LLFA requirements.
- 9.4 Provided the recommendations of this report are retained during the detailed design of the development's drainage system, the development should be allowed to proceed.

APPENDIX I

PROPOSED SITE LAYOUT



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DO NOT SCALE!
ALL DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE WORK COMMENCES

SITE LAYOUT KEY	
	Boundary Line
	Cycle Path
	Access From A327
	Existing Footpath (FP22)
	A327 road adjacent
	Proposed Pathways
	Mezzanine level
	Covered bicycle parking
	Bin store
	Foul pumping station
	Unit pedestrian entry
	Unit vehicular entry
	New tree planting

Rev.	Date	Description	Drawn
K	23/07/25	Substation added for reserved matters	LA
J	01/07/25	Unit floor plans coordinated with the site plan	LA
H	11/12/2024	Unit 6 loading bays repositioned to coordinate with ADC tracking drawing	PH
G	09/12/2024	Hedgerow to Western edge of Observer Way reinstated, coordinated with landscaping scheme	PH
F	02/12/2024	Existing trees adjacent entrance amended following discussion with planning consultant	PH
E	02/12/2024	Updated to incorporate latest landscaping scheme received 29.11.24	PH
D	02/12/2024	Landscaping scheme amended to include specialist consultant information	DW

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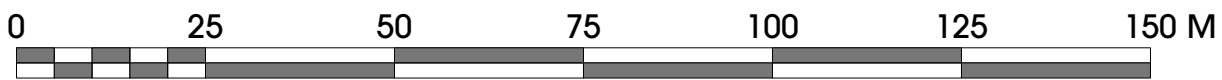
Client
Tungsten Properties

Project
Observer Park, Arborfield,
Reading

Drawing Title
Illustrative Masterplan

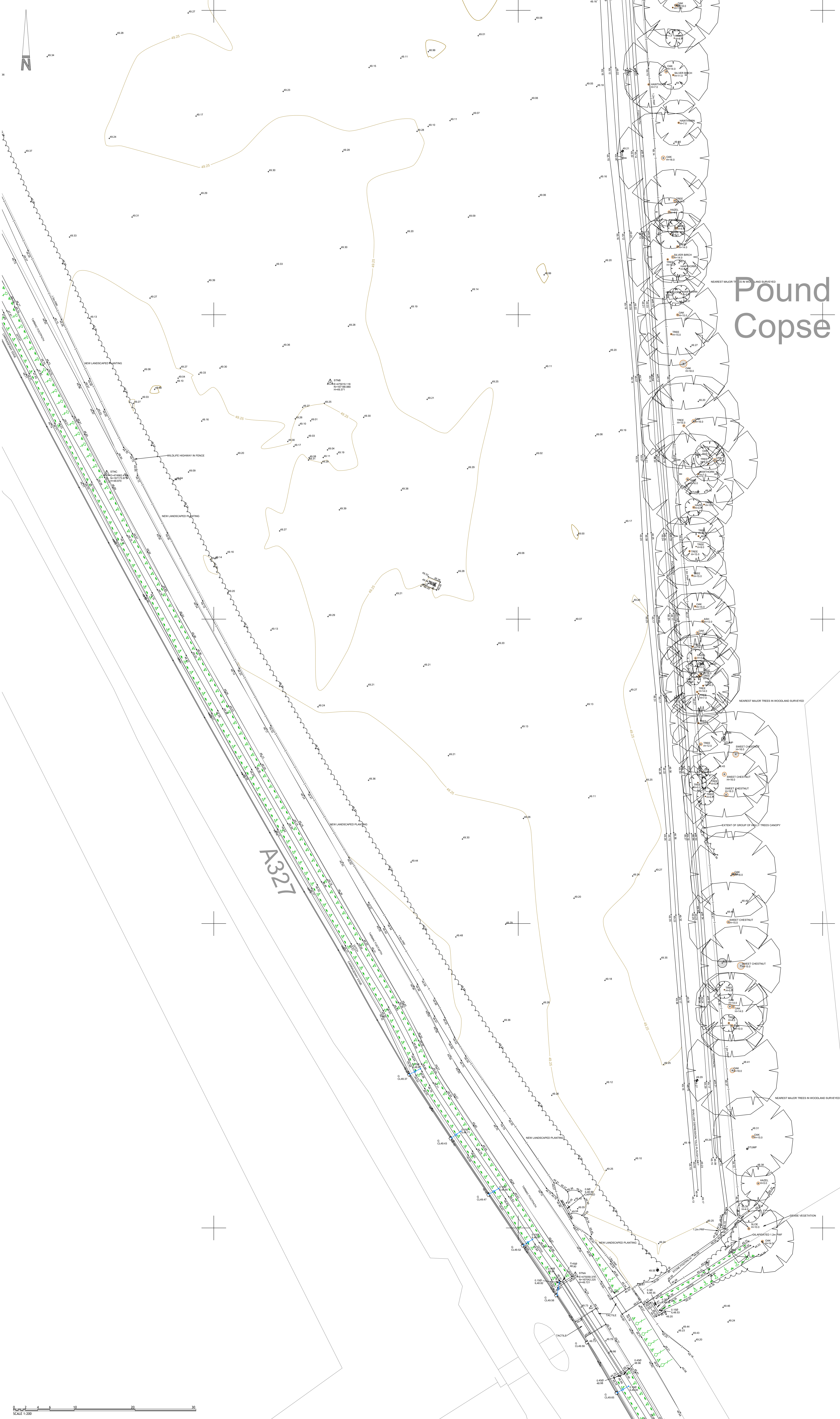
Date 20/08/2024
Status PLANNING
Scale 1:1000 Size A1
Drawn PH Checked DW
Job no. 3389 Dwg no. P403 Rev. K

- Pedestrian Crossing
- Highlighted Red elements to be removed / amended to facilitate new access road
- Pedestrian Crossing
- Existing ditch to be realigned / culverted to accommodate new access road
- Existing access road (with improvements)
- Pedestrian Crossing
- Attenuation basin
- Connection to cycle path
- Foul pump station
- Proposed native hedgerow and native tree planting. Refer to landscape proposals
- Red line indicates site boundary
- Existing cycle path
- Lorry loading bay
- Existing relief road strategic planting
- Enhanced soft landscaping zone
- Soft landscaped amenity (picninc) space



APPENDIX II

TOPOGRAPHICAL SURVEY
& UTILITIES SURVEY



- NOTES
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KEY

SURVEY STATION

BANKING

DITCH

WESSE SPREADS

FELDA

TREES

GATE

ROAD WITH GULLY AND KEYS (LEFT)

BRIDGE KEYS

HAZEL

SPOT LEVEL

SEVER DETAILS

SEVER FID

SEVER STOM

COVER LEVEL

INVERT LEVEL

BACKDROP INVERT

SPURWAY

CATCHMENT INVERT

SOFFIT LEVEL

GENERAL ABBREVIATIONS

GENERAL ABBREVIATIONS

FENCE ABBREVIATIONS

WALL ABBREVIATIONS

ORDNATE SYSTEM

CONTROL TABLE LINKED TO NATIONAL GPS NETWORK OF 1000

Name	Easting	Northing	Height
STNA	47060.370	107562.220	40.771
STND	47060.110	107560.800	40.971
STNE	47060.430	107510.870	40.890
STNF	47060.850	107540.040	42.890
STNG	47060.170	107560.290	40.150
STNH	47060.400	107511.000	47.708
STNI	47060.800	107507.027	47.915
STNJ	47060.800	107507.100	47.890
STNK	47060.200	107500.000	47.020
STNL	47060.200	107500.000	47.020
STNM	47060.200	107500.000	47.020
STNN	47060.200	107500.000	47.020
STNO	47060.200	107500.000	47.020
STNP	47060.200	107500.000	47.020
STNS	47060.490	107540.230	47.007

REV DESCRIPTION DRN CHD DATE

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☐ CONSTRUCTION ☐ AS BUILT

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TITLE LAND OFF READING ROAD ARBORFIELD

DETAILS TOPOGRAPHIC SURVEY SHEET 1 of 6

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LAND OFF READING ROAD
ARBORFIELD

TOPOGRAPHIC SURVEY

TOPOGRAPHIC SURVEY
SHEET 2 of 6

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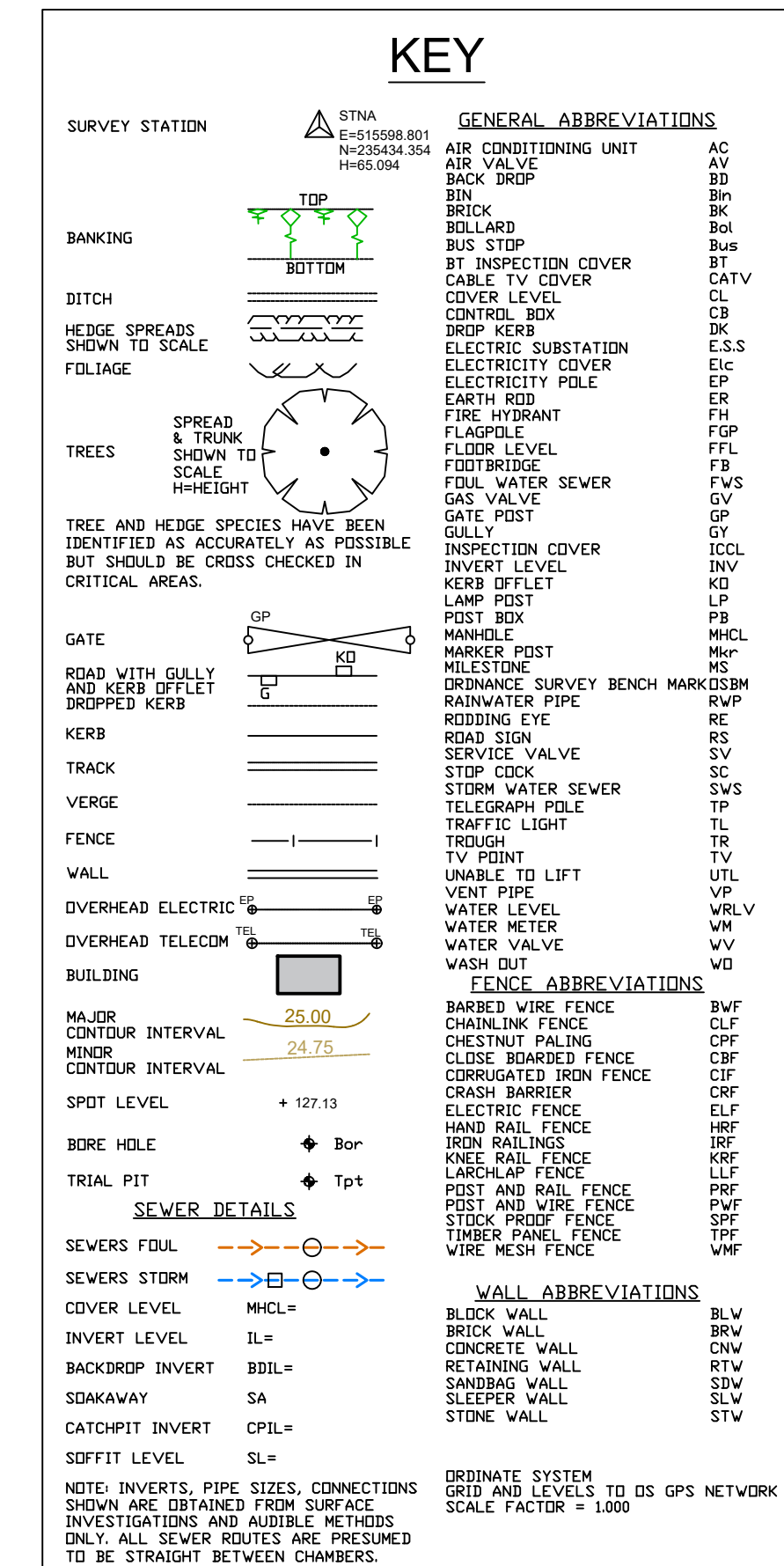
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Name	Easting	Northing	Height
STHA	475059.370	507042.225	48.722
STHB	475016.118	507188.880	48.376
STHC	474802.410	507173.875	48.375
STHD	474847.700	507137.372	48.375
STHE	474600.804	507348.945	47.855
STHF	474620.173	507348.945	47.855
STHG	474800.436	507417.887	47.710
STHH	474802.805	507417.887	47.710
STHI	474613.460	507348.945	47.855
STHK	474626.259	507330.464	47.522
STHL	474844.205	507540.900	47.960
STHM	474605.721	507348.945	47.855
STHN	474605.749	507371.594	47.622
STHO	474620.177	507348.945	47.855
STHQ	474601.495	507545.236	48.369

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☒ PRELIMINARY	☐ INFORMATION	☐ TENDER		
☐ CONSTRUCTION	☐ AS BUILT			

SCALE 1:200 @ A0 DATE APRIL 2022

DRAWN	NC	CHK	N
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TITLE LAND OFF READING ROAD
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DETAILS

TOPOGRAPHIC SURVEY
SHEET 3 of 6

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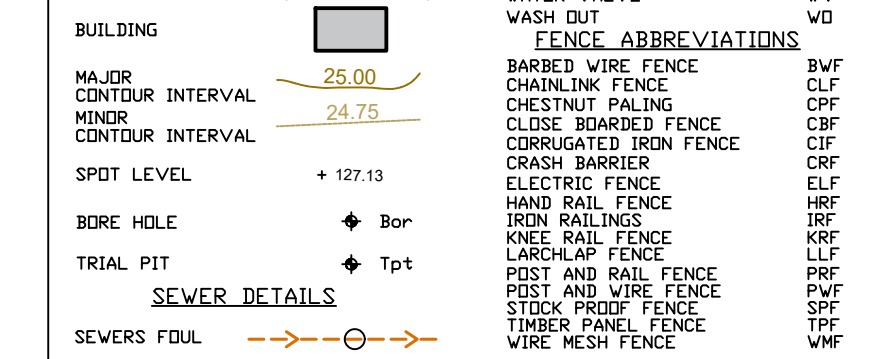
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Station	Year	Value	Year	Value
STNA	470590.370	907940.225	48	907940.225
STNB	470510.118	907940.225	49	907940.225
STNC	470602.415	907173.875	50	907173.875
STND	470447.700	907246.312	51	907246.312
STNE	470600.304	907346.945	52	907346.945
STNF	470620.173	907346.945	53	907346.945
STNG	470600.436	907417.887	54	907417.887
STNH	470602.905	907460.927	55	907460.927
STNJ	470913.466	907491.703	56	907491.703
STNK	470603.359	907491.703	57	907491.703
STNL	470944.205	907500.909	58	907500.909
STNM	470606.721	907549.491	59	907549.491
STNN	470606.788	907321.524	60	907321.524
STNO	470606.177	907426.312	61	907426.312
STNQ	470911.405	907456.236	62	907456.236

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ARBORFIELD

DETAILS TOPOGRAPHIC SURVEY

SHEET 4 of 6

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DRAWN	NC	CHK	NC		
DRAWING NO.	18959-7-855	REV	.		
TITLE	LAND OFF READING ROAD ARBORFIELD				
DETAILS	TOPOGRAPHIC SURVEY SHEET 5 of 6				

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