Coulston Estates Ltd

Southview Farm, Trowbridge

Drainage Strategy

Drainage Strategy

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Remarks	First issue	Updated Issue		
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Checked by	Paul Sloan	Paul Sloan		
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1 INTRODUCTION

Tumu Consulting have been instructed by Coulston Estates Ltd to prepare a drainage strategy to accompany the planning permission for the demolition of redundant stone barns and the conversion and extension of the farmhouse at Southview Farm, Drynham Lane, Trowbridge BA14 0PL, into a co-working hub (class E), erection of convenience store (Class E) and associated access and landscaping works.

This surface water drainage strategy provides details of the proposed drainage scheme based on sustainable drainage principles taking into account national and local guidance by Wiltshire Council (WC) who are the Lead Local Flood Authority (LLFA).

1.1 Site location

The site has an area of approximately 0.42ha and is located to the southeast of Trowbridge at approximate grid reference 385950, 156800, as shown in Figure 1-1. The site is bounded by the Cardiff-Portsmouth railway line to the east, Drynham Lane to the west, an arable field associated with Southview Farmhouse to the south and existing residential areas to the north and west.

Land to the south of the site has secured planning permission under application reference 19/11459/OUT for the erection of up to 261-dwellings and erection of multi-use community facility.

Access to the site is via Drynham Lane to the north and Bradley Road to the west.

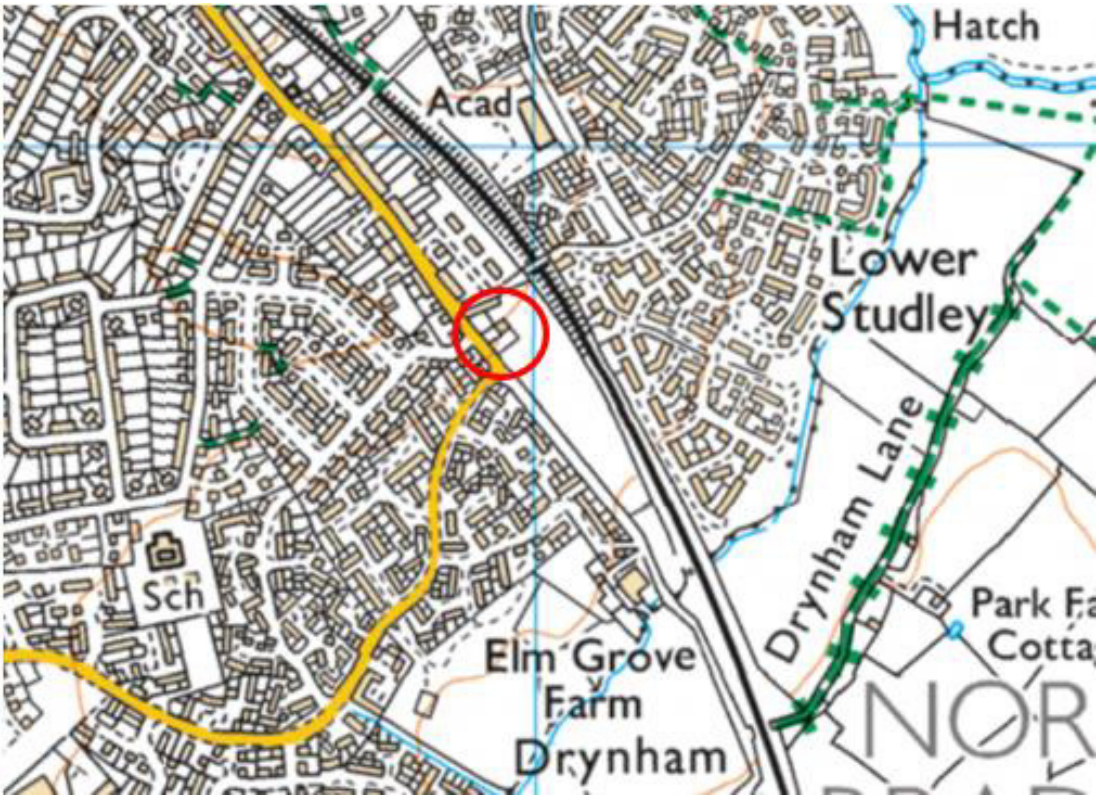

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Figure 1-1 Site Location Plan

1.2 Topography

A topographic survey of the site has been undertaken by Anthony Brookes Surveys Ltd in October 2018. There have been no significant changes to levels since this time. The survey was undertaken to Ordnance Survey Benchmark datum and grid.

The site falls from 47.0m AOD in the north to 45m AOD in the south. The topographic survey is provided as Appendix A.

The site currently comprises South View Farmhouse and associated disused agricultural barns.

1.3 Hydrology

There are no watercourses within the site boundary. The closest watercourse, the Drynham Brook, which is a tributary of the River Biss, is located 300m to the south of the site. This is classified as an ordinary watercourse and is therefore the responsibility of the LLFA.

1.4 Geology and Hydrogeology

The British Geological Survey mapping indicates that the site is underlain by bedrock geology of Oxford Clay Formation – mudstone. There are no superficial deposits shown to be present beneath the site.

The site is not shown to be located within a groundwater Source Protection Zone (SPZ).

1.5 Existing Drainage

Wessex Water sewer records are provided as Appendix B, with these showing that there are existing surface water and foul water public sewers within the vicinity of the site.

The existing farmhouse is fully serviced, and the topographical survey indicates that there is an existing foul sewer which runs approximately 300m south of the site across the fields to discharge into the public foul sewer system at MH 1501. The existing foul sewer is 150mm diameter up to the point where it connects to the public sewer system, where it increases to 1050mm diameter. sewer records appear to indicate a connection from the site into MH9803 to the north of the site. Given the age of the existing buildings on site it is likely that there is also some existing surface water discharged connected to this sewer.

The existing site is primarily brownfield therefore the Modified Rational Method has been used to calculate the pre-development surface water rate. The average rainfall intensity has been derived from a 15-minute storm for each return period, which is appropriate given the time of concentration that would be anticipated for the small site area. The parameters used in the calculation and results are summarised in Table 1.

Parameter	Value	Unit
Area	0.073	ha
Rainfall intensity (i_1)	31.29	mm
Rainfall intensity (i_{30})	76.78	mm
Rainfall intensity (i_{100})	99.69	mm
1 year runoff	6.35	l/s
30-year runoff	10.00	l/s
100-year runoff	12.95	l/s

Table 1 Modified Rational Approach for runoff from areas of existing hardstanding

1.6 Flood Risk

Flood Map for Planning – Fluvial/Tidal Flood Risk

The site is less than 1ha in area and is shown on the Flood Map for Planning, provided as Figure 1-2, to be located within Flood Zone 1, corresponding to a low risk of fluvial or tidal flooding. In accordance with the NPPF, a Flood Risk Assessment is therefore not required.

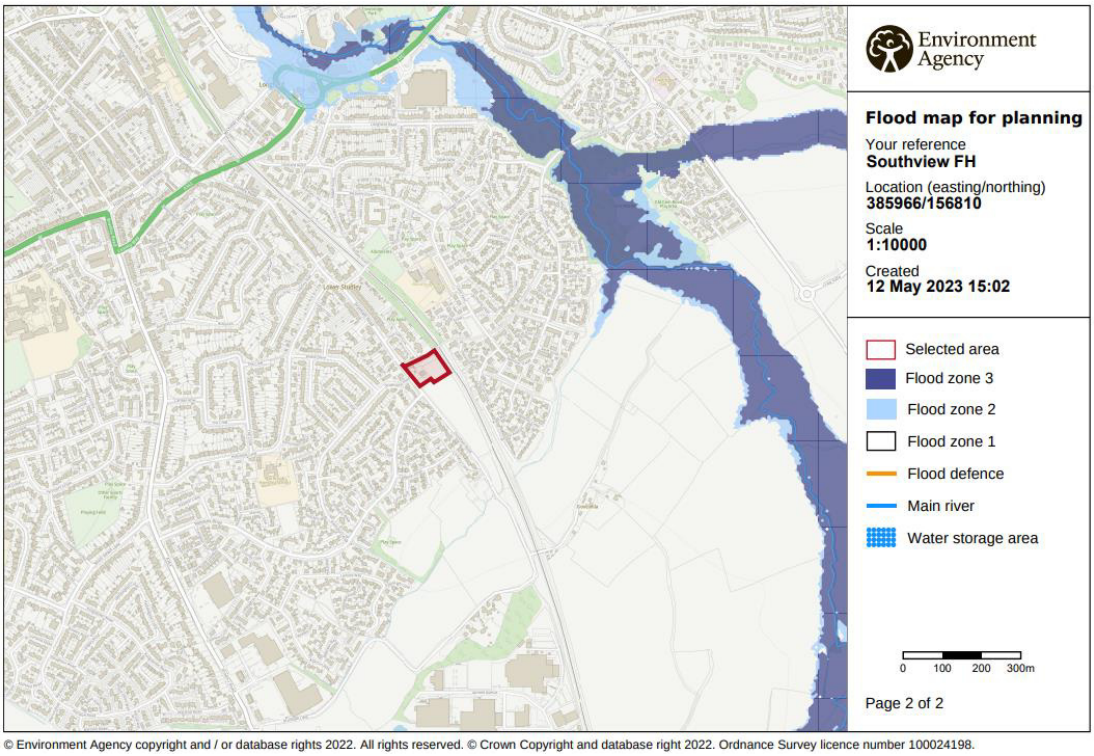

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Figure 1-2 Flood Map for Planning

Surface Water Flooding

The UK Government surface water flood risk mapping, an extract of which is provided as Figure 1-3, identifies that the majority of the site is at a very low risk of surface water flooding, corresponding to a chance of flooding of less than 0.1% each year.

There is a small portion of the northern portion of the site that is at a low risk of surface water flooding, corresponding to a chance of flooding of between 0.1% and 1% each year.

Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. In addition, it is worth noting that the maps do not take into account existing underground drainage features, therefore the extents shown are conservative.

The surface water drainage strategy provided in Section 3 outlines how post development surface water will be managed to ensure there is no increase in surface water flood risk as part of the proposals.



Figure 1-3 Long term flood risk map

2 DEVELOPMENT PROPOSALS

The proposals are for the demolition of redundant stone barns and the conversion and extension of the farmhouse into a co-working hub and children's nursery at the ground floor (Class E) and conversion of first floor to a single residential apartment (Class C3), erection of a convenience store (Class E) and associated access and landscaping works. The proposals are shown on the layout plan provided as Appendix C.

The proposals will lead to an increase in impermeable area from 730m^2 to 2160m^2.

3 SURFACE WATER DRAINAGE STRATEGY

This drainage statement provides details of the proposed drainage scheme based on sustainable drainage principles taking into account national and local guidance in the Wiltshire Council drainage guidance.

The drainage proposals shall ensure that in the critical storm events for the 1 in 100-year return period (plus 40% allowance for future climate change climate change) there will be no flooding of any buildings within the site boundary and ensure that properties off site are not exposed to an increase in flood risk as a consequence.

Final design requirements are dependent upon the site layout and drainage arrangements, both of which are subject to detailed design.

3.1 Discharge Hierarchy

In accordance with the Wiltshire SuDS guide, surface water runoff from a development should be disposed of in the following order of preference:

i) Infiltration
ii) Surface water body
iii) Surface water sewer, highway drain or other drainage system
iv) Combined sewer

Infiltration testing was undertaken as part of the Flood Risk Assessment (FRA) for the site to the south of the site (19/11459/OUT). This testing was undertaken to BRE 365 and concluded that infiltration is not a viable means of disposal. Given that BGS data indicates that the geology does not vary between this site and the application to the south, infiltration has been discounted.

The closest watercourse is the Drynham Brook which is over 300m from the site and not within the application boundary. However, the topographical survey indicates that there is an existing drainage ditch adjacent to the southwest corner of the site.

There is a public surface water sewer approximately 35m to the southwest of the site. Given that the existing drainage ditch is preferable according to the hierarchy and closer to the site it is proposed to connect into this ditch at a restricted rate.

3.2 Proposed Rates

In accordance with Wiltshire requirements, the proposed rate for all events up to and including the 1 in 100-year event, including a 40% climate change allowance will be restricted to a 40% betterment over the 1-year brownfield rate, equating to 3.8 l/s.

3.3 Proposed Drainage Strategy

Due to the restricted runoff rate, attenuation will be required within the site to accommodate up to and including the 1 in 100 year plus 40% climate change event.

Permeable Paving

It is proposed that all car parking bays will be constructed using permeable paving. The car parking bays will accommodate runoff from the car parking bays themselves, the access road and the majority of the building roof areas.

A Hydrobrake flow control (or similar approved) at the outfall of the permeable paving will ensure rates are restricted before being conveyed to the existing drainage ditch.

Calculations demonstrating that this is achievable are provided as Appendix D with the parameters summarised in Table 2.

Parameters	Unit
Impermeable Area	0.216ha
Permeable Paving Area	770m^2
Depth of coarse graded aggregate (void ratio 0.3)	0.475m
Volume required to accommodate 100yr plus 40% climate change	110m^3

Table 2 Permeable paving (per plot) Parameters

Swale

There will be a swale along the southern boundary of the site which the permeable paving will outfall into at an attenuated maximum flow rate of 3.8l/s.

Swales are shallow, flat bottomed, vegetated open channels which replace conventional pipework as a means of conveying runoff. In addition to providing conveyance of flows, the swale will provide interception benefits, which is the removal of runoff for the majority of smaller rainfall events. The water soaks into the surface vegetated soil layers and into the underlying soils and is then removed by evapotranspiration and infiltration. The swale will also offer amenity and biodiversity benefits.

The drainage strategy proposals are shown on Tumu drawing reference 19682-PDL-01, provided as Appendix E.

3.4 Management and Maintenance

The site is within private ownership, therefore the maintenance of all shared features, including the permeable paving and swales will be undertaken by the developer or by a third-party management company to be instructed by the developer.

The operation and maintenance requirements for permeable paving and swales as specified by the SuDS Manual (CIRIA C753), are provided in Table 3 and Table 4.

The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

Maintenance schedule	Required action	Typical frequency
Regular inspections	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Removal of weeds	As required – once per year on less frequently used pavements.
Remedial action	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 3 Maintenance schedule for pervious pavements

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut grass – to retain grass height within specified design range	Monthly (during growing season),or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, records areas where water is ponding more than 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months. Quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Reseed areas of poor vegetation growth, alter plant types to better suit conditions if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practises	As required

Table 4 Operation and maintenance requirements for swales

The operation and maintenance requirements for inlets, outlets (including the overflow), controls and inspection chambers (including rodding eyes) in accordance with the SuDS Manual are provided in Table 5.

Maintenance schedule	Required action	Typical frequency
	Inspect surface structures, removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
Regular Maintenance	Remove cover and inspect, ensuring water is flowing freely and that the exit route for water is unobstructed. Remove any debris and silt Undertake inspection after leaf fall in autumn.	Annually
	Jet the pipes leading from overflow structures and check water is going through the overflow	Annually
Remedial actions	Repair physical damage	As required

Table 5 Maintenance requirements for inlets, outlets, controls and inspection chambers

3.5 Foul Drainage Strategy

It is proposed to retain the existing connection to the public foul sewer from the site that runs across the fields to the south.

All foul drainage will be designed and constructed in accordance with Building Regulations Part H and will be privately maintained.

4 CONCLUSION

Tumu Consulting have been instructed by Coulston Estates Ltd to prepare a drainage strategy to accompany the planning permission for the demolition of redundant stone barns and the conversion and extension of the farmhouse at Southview Farm, Drynham Lane, Trowbridge BA14 0PL, into a co-working hub (class E), erection of convenience store (Class E) and associated access and landscaping works.

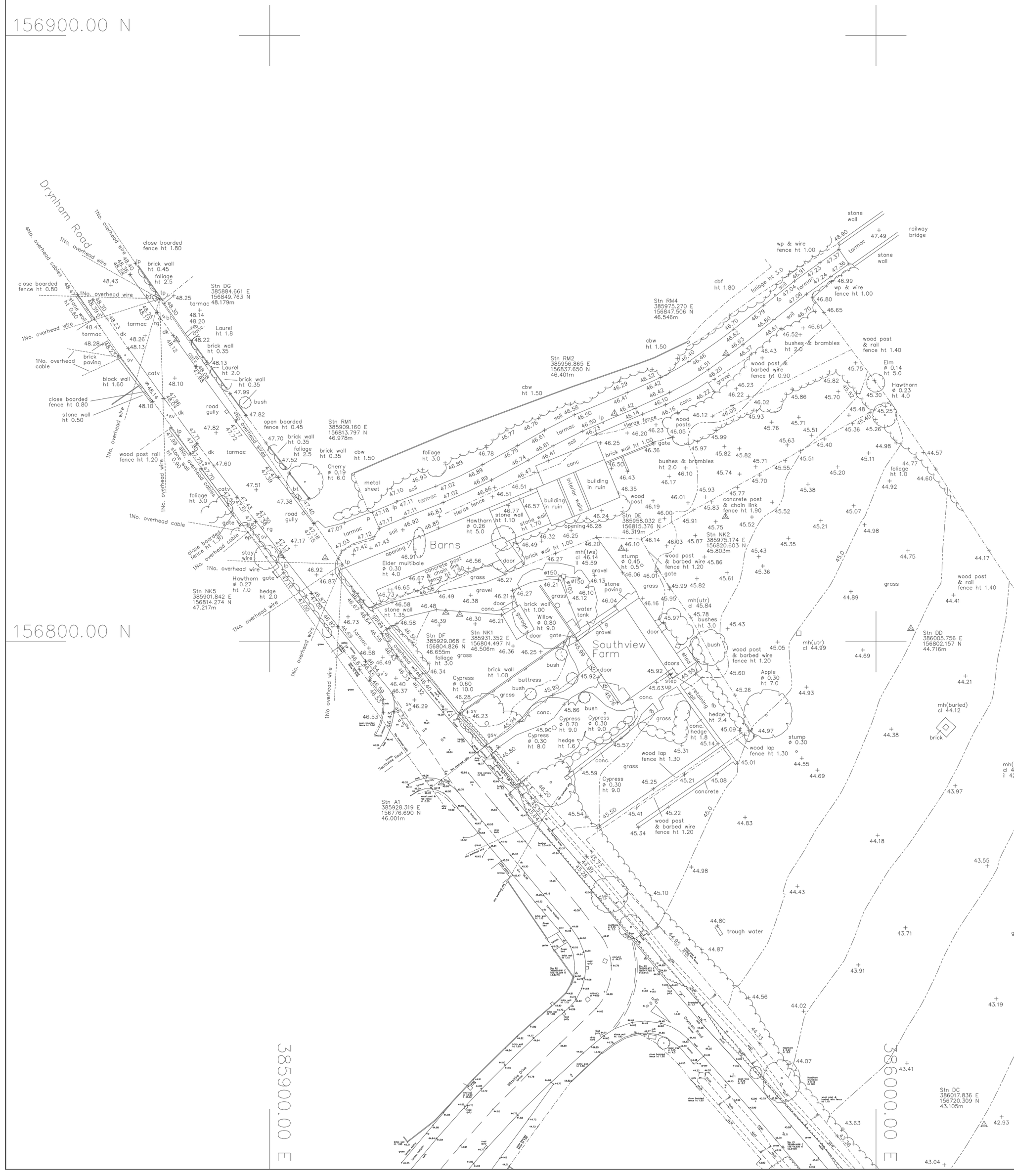
There will be an increase in impermeable area as part of the proposals, therefore a Sustainable Drainage Strategy comprising permeable paving and a swale is proposed to ensure that proposed runoff rates are restricted as close as is practicable to the greenfield runoff rates.

There is an existing foul connection into the public foul sewer network from the farmhouse. This will be retained as part of the proposals.

It is concluded that the development can be undertaken in a sustainable manner without increasing the flood risk to the site or to third parties and proposing a significant betterment over the existing drainage regime. It also reduces the risk of flooding to existing properties/systems.

Appendix A

Topographic Survey



ABBREVIATIONS

bb	belisha beacon	ko	kerb outlet
bl	bollard	lp	lamp post
brw	brick ret. wall	mh	manhole
bs	bus stop	mk	marker post
bt	telecoms cover	np	nameplate (road)
bw	brick wall	obf	open boarded fence
catv	cable TV cover	p	post
cbf	closeboarded fence	pb	post box
cbrw	conc block ret. wall	ret.	retaining wall
cbw	conc block wall	re	rodding eye
cl	cover level	rg	road gully
clf	chainlink fence	rs	road sign
conc	concrete	rwp	rainwater pipe
cp	concrete post	sp	signpost
cws	combined sewer	srw	stone ret. wall
dk	drop kerb	sv	stop valve
ep	electricity pole	svp	soil vent pipe
ESS	Elec. Sub-Station	sw	stone wall
fb	flower bed	s/w	stay wire
fh	fire hydrant	sws	storm water sewer
fl	floor level	tcb	telephone callbox
fws	foul water sewer	tl	traffic light
g	gully	tp	telegraph pole
gsv	gas valve	utr	unable to raise
ic	inspection cover	vp	vent pipe
il	invert level	w'lap	woodlap fence
irf	iron railing fence	wm	water meter
jb	junction box	wp	wood post

Notes

1. This survey has been computed and drawn about the Ordnance Survey National Grid.
2. All levels are in metres and relate to the mean of the nearest five Ordnance Survey active GPS stations.
3. This survey was measured for a scale of 1:500, any subsequent enlargements should be verified on site.

Revisions

8. Public cyclepath added October 2018.

Anthony Brookes Surveys Ltd
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Surveyed	R McArdell	Date	Oct 2018
Drawn	R McArdell	Checked	Oct 2018

Drawing Title: Topographical Survey
Southview Farmhouse
Elm Grove, Drynham Lane
Trowbridge

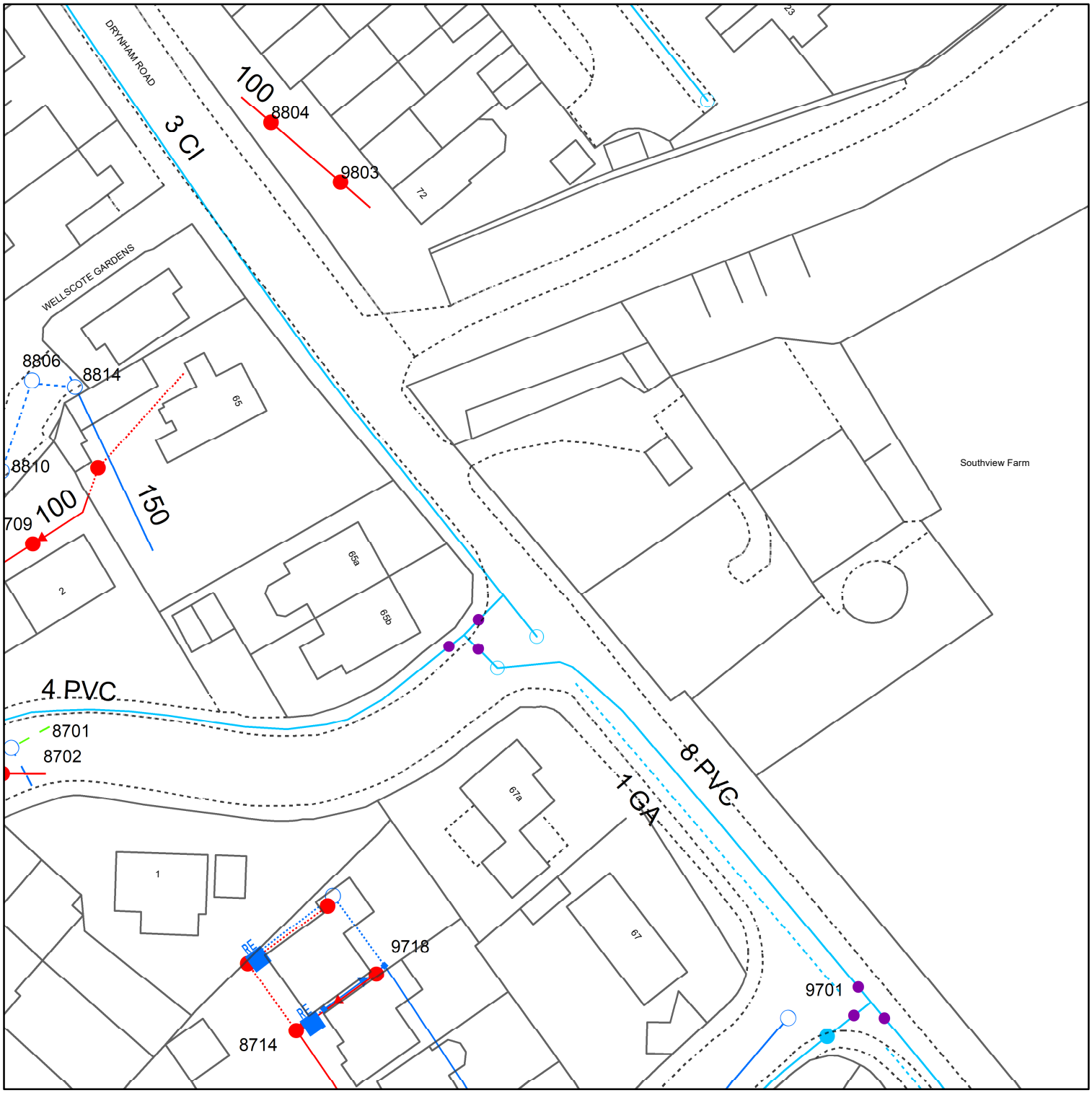
Client: Coulston Estates Ltd
Titsey Estate Office
Pilgrims Lane
Oxsted, Surrey

Drawing No.	Rev	Scale A2 @
A768/8434/8		1:500

Appendix B

Sewer Records

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet
- Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- EDM — Effluent Disposal
- Overflow
- S — Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW — Culverted Watercourse
- H — Highway Drain
- ? — Use Unknown
- SU — Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

Wessex Water
YTL GROUP

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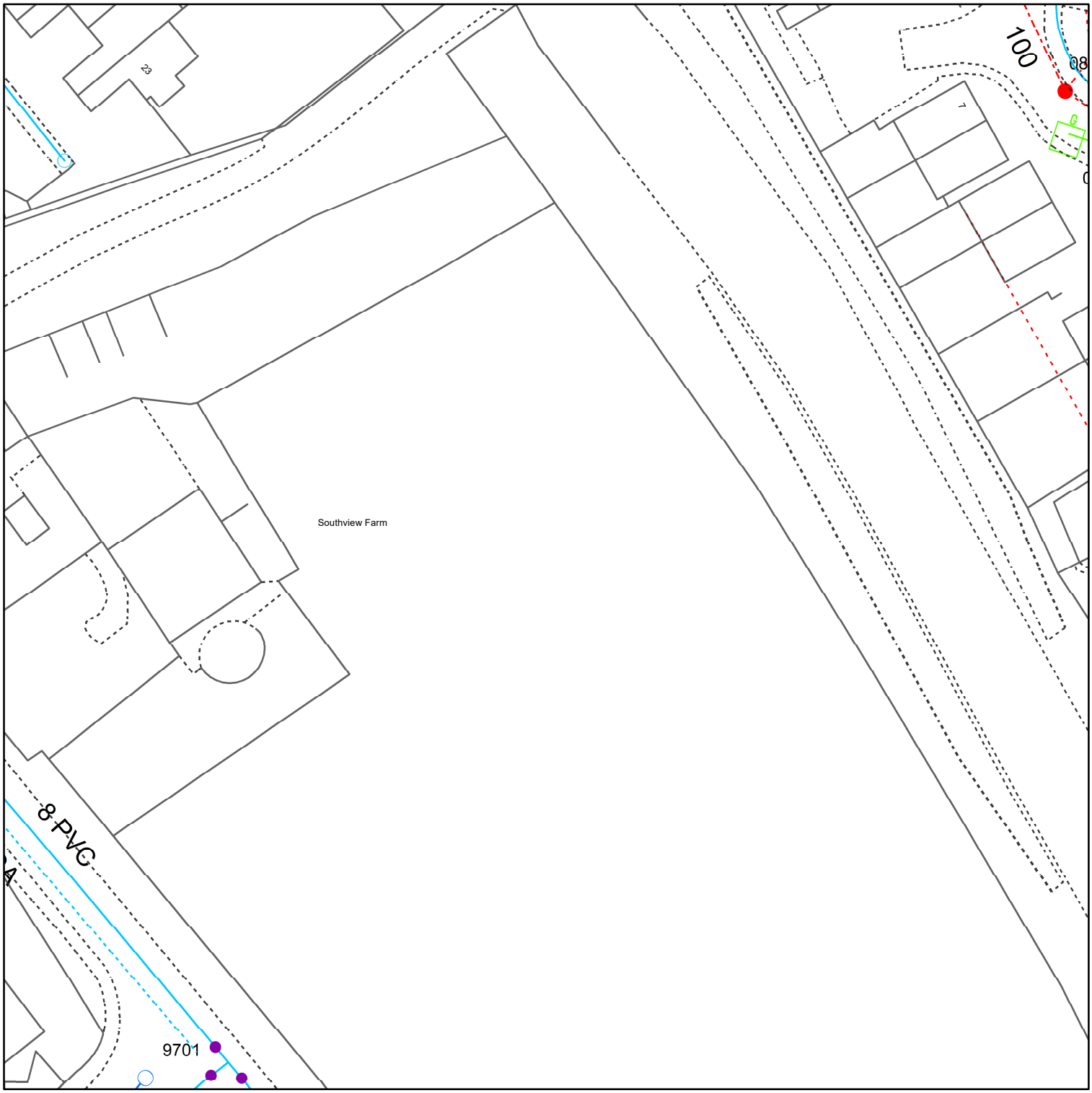
Wessex Water Network Map



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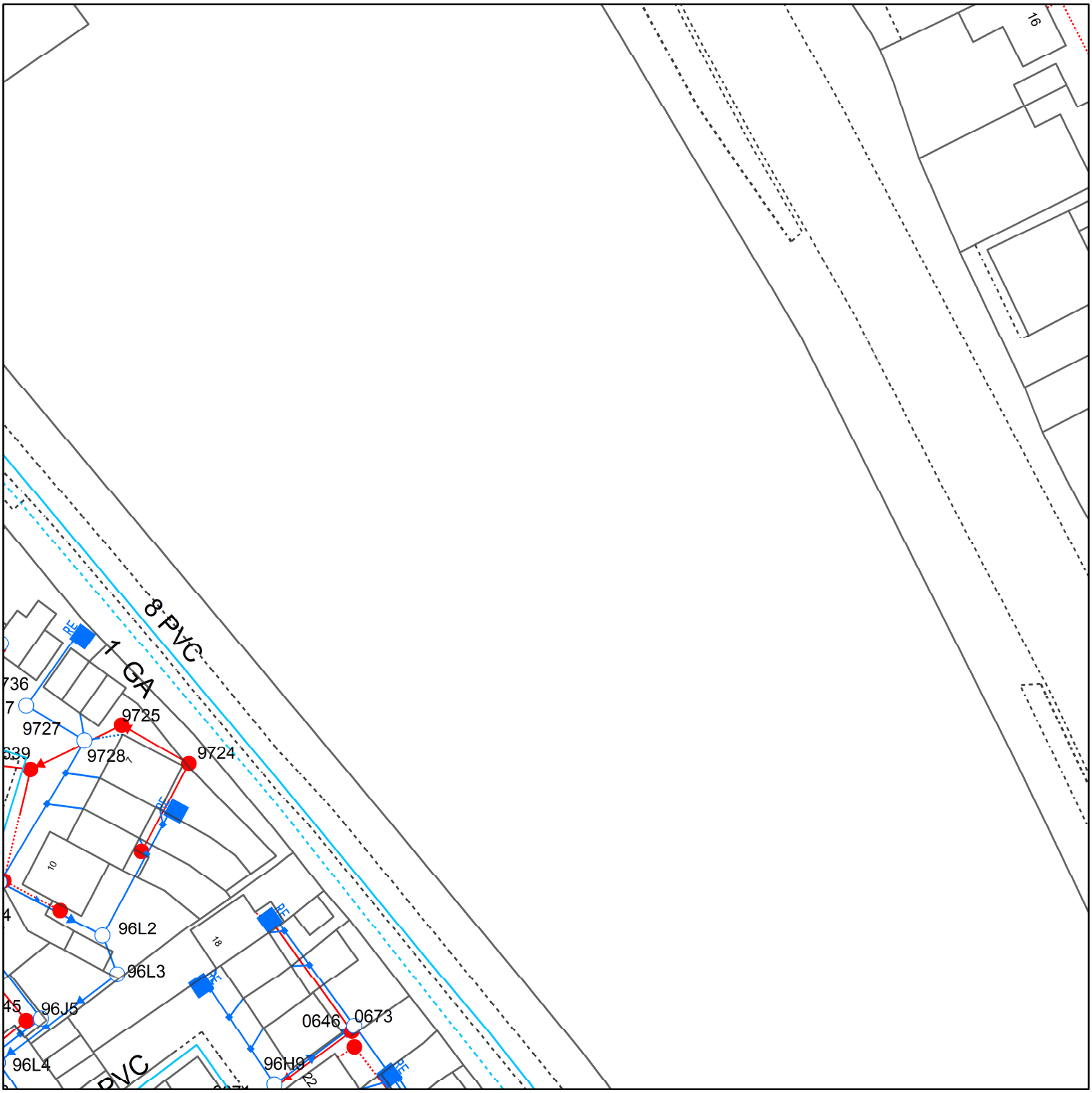
N W E S

Wessex Water Network Map



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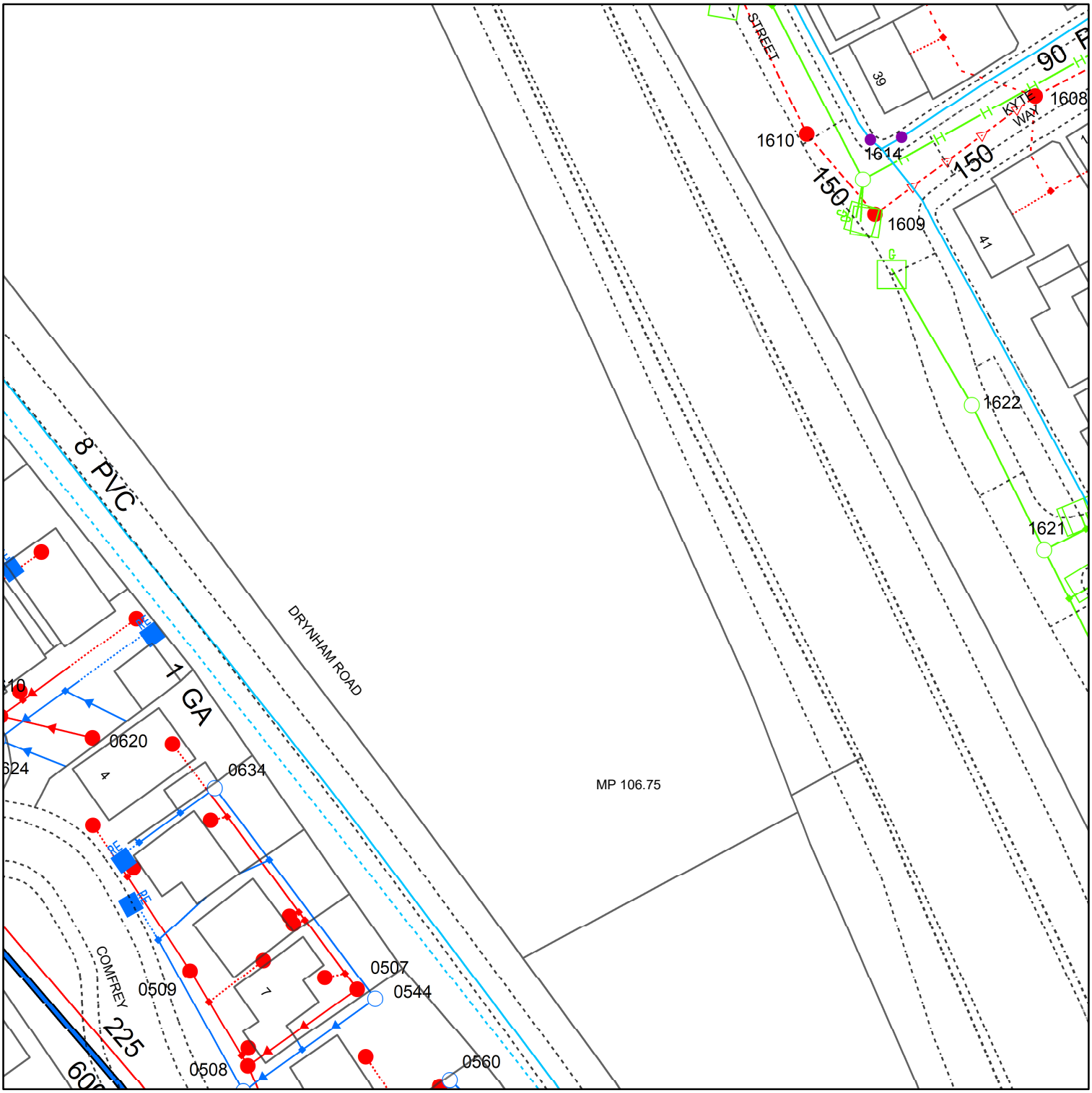

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Surface				
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Abandoned				

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- Manhole - Combined
- Inlet — Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- X Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- EDM Effluent Disposal
- Overflow
- S Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW Culverted Watercourse
- H Highway Drain
- ? Use Unknown
- SU Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

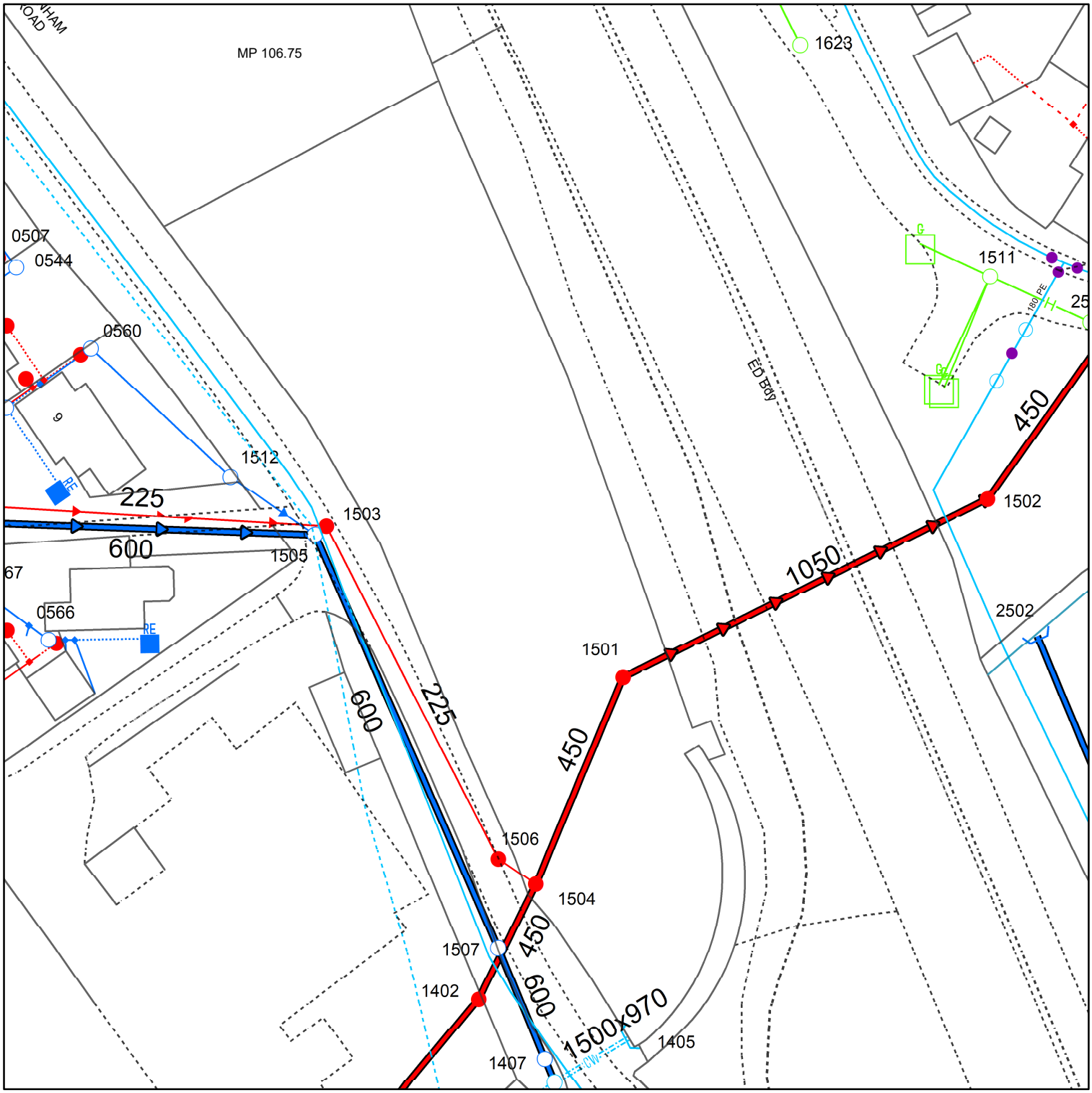
Wessex Water
YTL GROUP

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526333 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

Date: 07/06/2023
Centre: 386102, 156631
Scale: 1:625
(when printed at A4 size)

N
W E
S

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet
- Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- Effluent Disposal
- Overflow
- Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- Culverted Watercourse
- Highway Drain
- Use Unknown
- Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

Wessex Water
YTL GROUP

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526333 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

Date: 07/06/2023
Centre: 386143, 156547
Scale: 1:625
(when printed at A4 size)

Appendix C

Proposed Layout

To be read in conjunction with all relevant Architect's, Structural Engineer's and Services Engineer's drawings and details.

Do not scale from drawings. All construction information should be taken from written dimensions only. All dimensions in millimetres unless otherwise stated.

Any variations or supplementary drawings are to be commented on by the Architect.

All dimensions and conditions are to be checked on site prior to preparing drawings or commencing any work.

Please report any discrepancies before proceeding.

0 5m 10m SCALE BAR 1:200

N

REV	DATE	DETAILS
G	15.11.23	Retail amendments
F	13.07.23	Amended boundary
E	27.06.23	Amended landscaping
D	07.06.23	Amended landscaping
C	19.05.23	Amended landscaping
B	12.05.23	Amended landscaping
A	10.05.23	Amended landscaping

MITCHELL
ELEY
GOULD

SOUTHVIEW FARM
MIXED USE - RETAIL, OFFICES, AND FLAT
PROPOSED SITE PLAN

PLANNING JULY 23 1:200@A1 NJ RM

2226 AL(0)10 G

© MITCHELL ELEY GOULD ARCHITECTS
01225 789033
THE ICE HOUSE G/F NORTH OFFICE 124-126 WALCOT STREET BATH BA1 5BG

USE FIGURED DIMENSIONS ONLY

0 20 40 60 80 100

Appendix D

Microdrainage Calculations

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 244 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	45.309	0.214	0.0	3.8	3.8	49.5	O K
30 min Summer	45.379	0.284	0.0	3.8	3.8	65.7	O K
60 min Summer	45.445	0.350	0.0	3.8	3.8	80.8	Flood Risk
120 min Summer	45.492	0.397	0.0	3.8	3.8	91.8	Flood Risk
180 min Summer	45.503	0.408	0.0	3.8	3.8	94.2	Flood Risk
240 min Summer	45.500	0.405	0.0	3.8	3.8	93.5	Flood Risk
360 min Summer	45.491	0.396	0.0	3.8	3.8	91.5	Flood Risk
480 min Summer	45.478	0.383	0.0	3.8	3.8	88.5	Flood Risk
600 min Summer	45.463	0.368	0.0	3.8	3.8	85.1	Flood Risk
720 min Summer	45.447	0.352	0.0	3.8	3.8	81.3	Flood Risk
960 min Summer	45.410	0.315	0.0	3.8	3.8	72.9	Flood Risk
1440 min Summer	45.346	0.251	0.0	3.8	3.8	57.9	O K
2160 min Summer	45.270	0.175	0.0	3.8	3.8	40.4	O K
2880 min Summer	45.221	0.126	0.0	3.8	3.8	29.0	O K
4320 min Summer	45.181	0.086	0.0	3.3	3.3	19.8	O K
5760 min Summer	45.165	0.070	0.0	2.7	2.7	16.1	O K
7200 min Summer	45.155	0.060	0.0	2.3	2.3	13.9	O K
8640 min Summer	45.148	0.053	0.0	2.0	2.0	12.3	O K
10080 min Summer	45.143	0.048	0.0	1.8	1.8	11.2	O K
15 min Winter	45.339	0.244	0.0	3.8	3.8	56.3	O K
30 min Winter	45.418	0.323	0.0	3.8	3.8	74.6	Flood Risk
60 min Winter	45.492	0.397	0.0	3.8	3.8	91.8	Flood Risk
120 min Winter	45.548	0.453	0.0	3.8	3.8	104.6	Flood Risk
180 min Winter	45.562	0.467	0.0	3.8	3.8	108.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	140.565	0.0	52.9	25
30 min Summer	92.679	0.0	71.0	39
60 min Summer	58.167	0.0	90.2	68
120 min Summer	35.212	0.0	109.9	124
180 min Summer	25.870	0.0	121.5	182
240 min Summer	20.648	0.0	129.4	218
360 min Summer	15.060	0.0	141.8	280
480 min Summer	12.018	0.0	151.0	346
600 min Summer	10.081	0.0	158.4	414
720 min Summer	8.728	0.0	164.5	484
960 min Summer	6.947	0.0	174.6	614
1440 min Summer	5.029	0.0	189.2	868
2160 min Summer	3.633	0.0	204.5	1220
2880 min Summer	2.882	0.0	215.5	1560
4320 min Summer	2.076	0.0	231.2	2244
5760 min Summer	1.643	0.0	242.3	2944
7200 min Summer	1.370	0.0	250.8	3672
8640 min Summer	1.180	0.0	257.6	4408
10080 min Summer	1.041	0.0	263.2	5144
15 min Winter	140.565	0.0	59.8	25
30 min Winter	92.679	0.0	80.1	39
60 min Winter	58.167	0.0	101.5	66
120 min Winter	35.212	0.0	123.6	122
180 min Winter	25.870	0.0	136.5	178

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	45.561	0.466	0.0	3.8	3.8	107.6	Flood Risk
360 min Winter	45.546	0.451	0.0	3.8	3.8	104.3	Flood Risk
480 min Winter	45.529	0.434	0.0	3.8	3.8	100.3	Flood Risk
600 min Winter	45.508	0.413	0.0	3.8	3.8	95.5	Flood Risk
720 min Winter	45.485	0.390	0.0	3.8	3.8	90.1	Flood Risk
960 min Winter	45.433	0.338	0.0	3.8	3.8	78.1	Flood Risk
1440 min Winter	45.331	0.236	0.0	3.8	3.8	54.5	O K
2160 min Winter	45.227	0.132	0.0	3.8	3.8	30.4	O K
2880 min Winter	45.186	0.091	0.0	3.5	3.5	21.0	O K
4320 min Winter	45.161	0.066	0.0	2.6	2.6	15.2	O K
5760 min Winter	45.149	0.054	0.0	2.1	2.1	12.5	O K
7200 min Winter	45.142	0.047	0.0	1.7	1.7	10.8	O K
8640 min Winter	45.136	0.041	0.0	1.5	1.5	9.5	O K
10080 min Winter	45.132	0.037	0.0	1.3	1.3	8.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	20.648	0.0	145.5	232
360 min Winter	15.060	0.0	159.4	292
480 min Winter	12.018	0.0	169.7	370
600 min Winter	10.081	0.0	178.0	446
720 min Winter	8.728	0.0	184.9	524
960 min Winter	6.947	0.0	196.2	672
1440 min Winter	5.029	0.0	212.7	924
2160 min Winter	3.633	0.0	229.9	1244
2880 min Winter	2.882	0.0	242.4	1536
4320 min Winter	2.076	0.0	260.3	2248
5760 min Winter	1.643	0.0	273.0	2944
7200 min Winter	1.370	0.0	282.8	3672
8640 min Winter	1.180	0.0	290.7	4408
10080 min Winter	1.041	0.0	297.3	5144

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.500	Shortest Storm (mins)	15
Ratio R	0.389	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.216

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.072	4	8	0.072	8	12	0.072

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Model Details

Storage is Online Cover Level (m) 45.700

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.0
Membrane Percolation (mm/hr)	1000	Length (m)	70.0
Max Percolation (l/s)	213.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	45.095	Cap Volume Depth (m)	0.475

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0100-3800-0500-3800
Design Head (m)	0.500
Design Flow (l/s)	3.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	45.080
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)	0.500	3.8	Kick-Flo®	0.361	3.3
Flush-Flo™	0.165	3.8	Mean Flow over Head Range	-	3.2

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	3.3	0.800	4.7	2.000	7.2	4.000	10.1	7.000	13.2
0.200	3.8	1.000	5.2	2.200	7.6	4.500	10.6	7.500	13.7
0.300	3.6	1.200	5.7	2.400	7.9	5.000	11.2	8.000	14.1
0.400	3.4	1.400	6.1	2.600	8.2	5.500	11.7	8.500	14.5
0.500	3.8	1.600	6.5	3.000	8.8	6.000	12.2	9.000	15.0
0.600	4.1	1.800	6.9	3.500	9.4	6.500	12.7	9.500	15.4

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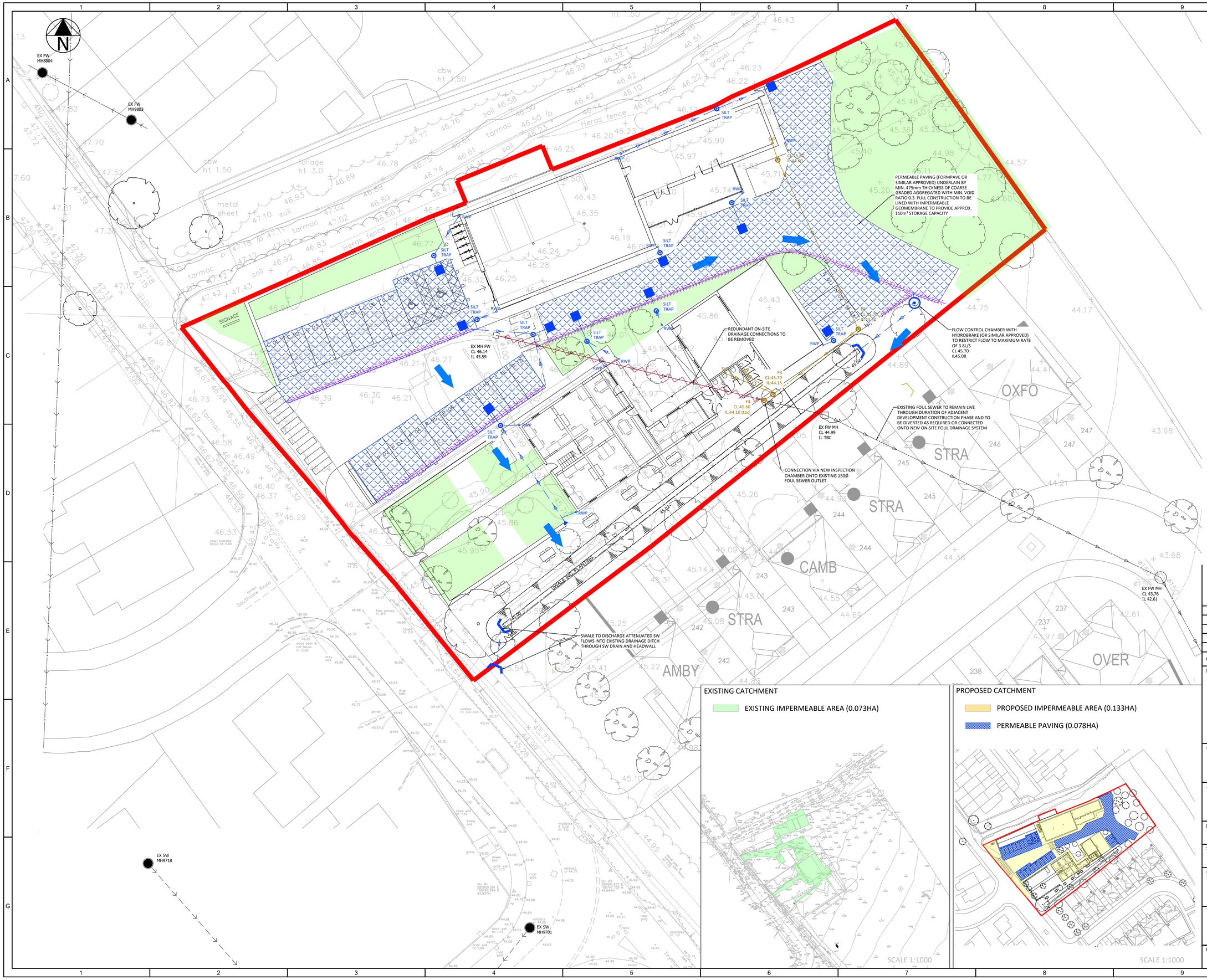
Appendix E

Surface Water Drainage Layout



KEY

EXISTING DRAINAGE

- PUBLIC FOUL WATER SEWER (SHOWN INDICATIVELY AS PER WESSEX WATER MAPPING)
- EXISTING PRIVATE FOUL SEWER
- REDUNDANT DRAINAGE PIPEWORK TO BE REMOVED

PROPOSED PRIVATE DRAINAGE

- FOUL WATER DRAIN
- SURFACE WATER DRAIN
- INSPECTION CHAMBER
- RODDING EYE
- FIN DRAIN
- RAINWATER PIPE
- SOIL VENT PIPE
- EXCEEDANCE FLOW PATHWAY/OVERLAND FLOOD FLOW ROUTE
- CONTROL CHAMBER
- LANDSCAPED AREAS
- PERMEABLE PAVING
- DISTRIBUTION TANK
- SWALE

NOTES:

1. ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BSEN752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
2. EXACT LOCATION OF ALL INTERNAL DRAINAGE POINTS TO BE CONFIRMED BY ARCHITECT.
3. CONTRACTOR TO VERIFY LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT & ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION/LOWERING WORKS AS REQUIRED.
4. THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND INFORMATION IS SUBJECT TO CHANGE AT DETAILED DESIGN STAGE.
5. LINE AND LEVELS OF EXISTING OUTLETS TO BE CONFIRMED BY CONTRACTOR ON SITE.

EXISTING CATCHMENT

EXISTING IMPERMEABLE AREA (0.073HA)

PROPOSED CATCHMENT

PROPOSED IMPERMEABLE AREA (0.133HA)

PERMEABLE PAVING (0.078HA)

REV.	DESCRIPTION	Date	BY	CHK
E	UPDATED TO SUIT NEW SITE LAYOUT	09.01.24	TH	RP
D	UPDATED IN LINE WITH REVISED LANDSCAPE PLAN	14.06.23	RP	JE
C	ISSUED WITH REPORT FOR APPROVAL	07.6.23	TS	PS
B	DRAWING STATUS CHANGED TO DRAFT	02.06.23	MH	PS
A	FIRST ISSUE	26.05.23	TH	JE

DESIGN BY:

tumu

CLIENT: COULSTON ESTATES LTD

ARCHITECT: MITCHELL ELEY GOULD

DRAWING STATUS: PLANNING APPLICATION

SCALE @ A1: 0 1:200 10 metres

PROJECT: SOUTHVIEW FARMHOUSE

TITLE: DRAINAGE STRATEGY

PROJECT No:	DRAWING No:	REV:
19682	PDL-01	E