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STATION ROAD, SOUTHWOLD

Southwold Town Council
Job No. 304529

Drainage Strategy

Author: [redacted]
Checked by: [redacted]
Date: 09th May 2018
Status: For Planning

CONTENTS

1.0 INTRODUCTION

This report has been prepared in support of a full planning application for proposed demolition and development works of a brownfield site at Station Road, Southwold within the borough of Waveney District Council.

Southwold is located along the eastern Suffolk coastline with the North Sea.

The site is located at 1 Station Road, Southwold, Suffolk, IP18 6AX or can be located by National Grid Reference; TM 50475 76616.

This report should be read in conjunction with all other plans and documentation submitted with the planning application.

Proposed Development

The proposed development is for the demolition of the existing retail and vehicle repair garage and associated external courtyard.

Development is for the construction of 2No. buildings of mixed use development providing retail, office units and public toilets at ground floor with additional office units and residential apartments at first floor.

The courtyard is to be reconstructed to provide an open public amenity space of block paved finish with planters and green walls proposed.

Existing pedestrian accesses are to be retained from Station Road and Blyth Road.

The area of proposed total hardstanding is approximately 995.0m² in footprint. This is to replace the existing buildings and impermeable hardstanding of the brownfield site.

Flood risk vulnerability and flood zone 'compatibility'

The site is wholly located in Flood Zone 1. Land having a less than 1 in 1,000 annual probability of river or sea flooding.

Refer to Appendix C for the flood zone map.

The ground floor retail and commercial use is classified as 'less vulnerable' development.

Flood Zone	Flood Risk vulnerability classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test	✓	✓	✓
Zone 3A	Exception Test	✗	Exception Test	✓	✓
Zone 3B (Functional Floodplain)	Exception Test	✗	✗	✗	✓

Key:
✓ Development is considered appropriate
✗ Development not permitted

2.0 SITE HYDROLOGY

Geology

Bedrock geology is recorded to be Crag Group with reference from the British Geological Society's (BGS) online maps.

"A suite of shallow-water marine and estuarine sands, gravels, silts and clays deposited on the southwest flank of the North Sea Basin. The sands are characteristically dark green from glauconite but weather bright orange with haematite 'iron pans'. The gravels in the lower part of the group are almost entirely composed of flint. Those higher in the group include up to 10% of quartzite from the Midlands, igneous rocks from Wales, and chert from the Upper Greensand of southeastern England."

Superficial geology is unrecorded with reference from the British Geological Society's (BGS) online maps.

Climate Change

The design life for the development type is in the order of a maximum of 100 years for the residential use development. Accordingly, provision for climate change should be made in line with the requirements of the National Planning Policy Framework (NPPF) and the Environment Agency (EA) guidance.

With reference to the EA's Table 2; peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline), an allowance of 40% for the upper end should be considered to be the maximum provision that could be applied.

Therefore, in assessing the volume of water to be controlled within the surface water management plan for the proposed development works, an application of a climate change allowance of an additional 40% is to be applied.

3.0 SURFACE WATER MANAGEMENT

SuDS Proposals

The Building Regulations Approved Document H : Drainage and waste disposal, requires runoff is disposed of in the order of preference:

1. Discharge into the ground.
2. Discharge to a watercourse.
3. Discharge to a sewer.

Given the existing and proposed site uses, the siting of soakaways to provide a minimum 5.0m clearance from all structures is not possible.

A watercourse is not readily available for direct discharge of surface water flows despite the site proximity to the North Sea.

The existing surface water sewer within Station Road is shown to discharge to watercourse adjacent to Mights Bridge.

It is proposed to form a new connection to this sewer for outfall from the site.

Attenuation

Storage is proposed to be provided within the depth of hardstanding construction. This is to provide source control by facilitating conveyance of surface water runoff for storage within the sub-base below.

The sub-base is proposed to be a Coarse Graded Aggregate of minimum depth 500mm for the hydraulic design.

Refer to Appendix D for design calculations.

The formation is to be shaped to falls to facilitate conveyance towards the proposed outfall. This will promote conveyance across the plan area to direct flows to the modular geocellular units at the perimeter with Blyth Road to suit means of collection and conveyance.

Outfall

A new connection to the public surface water sewer is proposed. This is to be controlled by orifice plate to a maximum 1.0 L/s as a nominal greenfield rate of runoff.

This will include a built in debris guard within the inspection chamber to ensure protection from blockages occurring and provision of maintenance access.

Any works conveying new flow to the public sewer may be subject to a Section 106 agreement under the Water Industry Act 1991 for discharge to the public sewer.

Refer to Appendix E for the drainage schematic.

Surface Water Treatment

Given the former site use of a vehicular repair garage it is considered there is a high risk for groundwater contamination. Pathways should therefore be avoided to protect receiving groundwaters.

The greatest level of hazard for effective treatment of proposed surface water runoff is noted to be nominal given the source of runoff from the development area of outdoor sports pitches.

Porous paving construction will provide appropriate and localised protection with the suspension of silts and separation from any contaminated ground that may be encountered.

Buried modular geocellular units used for collection are to be wrapped in permeable membrane to protect from the migration of granular material through the proposed drainage system.

Exceedance

The proposed drainage layout mitigates exceedance associated to the development works by providing adequate attenuation within the porous paving system.

The minimum depth of sub-base provides freeboard within the depth of construction for exceedance flows. Due to the nature of the works, the formation of the hardstanding area is to be shaped to falls providing increasing depth of sub-base across the area and in turn increasing freeboard for exceedance flows.

4.0 FOUL WATER MANAGEMENT

Existing Arrangement

2No. existing public combined water sewers run east to west within Blyth Road to the northern boundary of the site.

These are recorded by the Water Authority as 450mm and 375mm diameter sewers serving the existing residential area. These combine downstream into a larger 1050mm diameter trunk sewer.

The depth of the closest manhole to site is MH 4604 is recorded to be 1.118m.

Refer to Appendix B for the sewer records.

Proposed Arrangement

It is anticipated the site benefits from existing outfall(s) that are assumed to be drained by gravity with outfall to the public sewer.

It is proposed to reuse existing outfalls for the discharge of foul wastewater flows.

The position, level and condition of all drainage connections for reuse are to be confirmed by CCTV survey prior to undertaking any drainage works.

Reuse of the final connection to the public sewer will be subject to a Section 106 agreement under the Water Industry Act 1991 for the flow discharge to the public sewer.

It is assumed new connections into retained private foul water sewer(s) will be possible and mean the foul water drainage will remain in private ownership.

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APPENDIX A: Architectural Site Plan

00-Level Proposed Site Plan

1 : 100

Rev	Comment	Date	Chk	Apr
P2	Client Updates	18/04/18		
P1	First Drawing Issue	10/04/18		

Project No: 304529 | Scale @ A1: 1 : 100 | Drawn By:

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Vision, form and function

Project:
Proposed Mixed Use Development
Station Road
Southwold

Client:
Southwold Town Council

Title:
Proposed Site Plan

Drawing Number:
304529-IW-DR-A-2401

Status:	Purpose of Issue:	Revision:
S2	Information	P2

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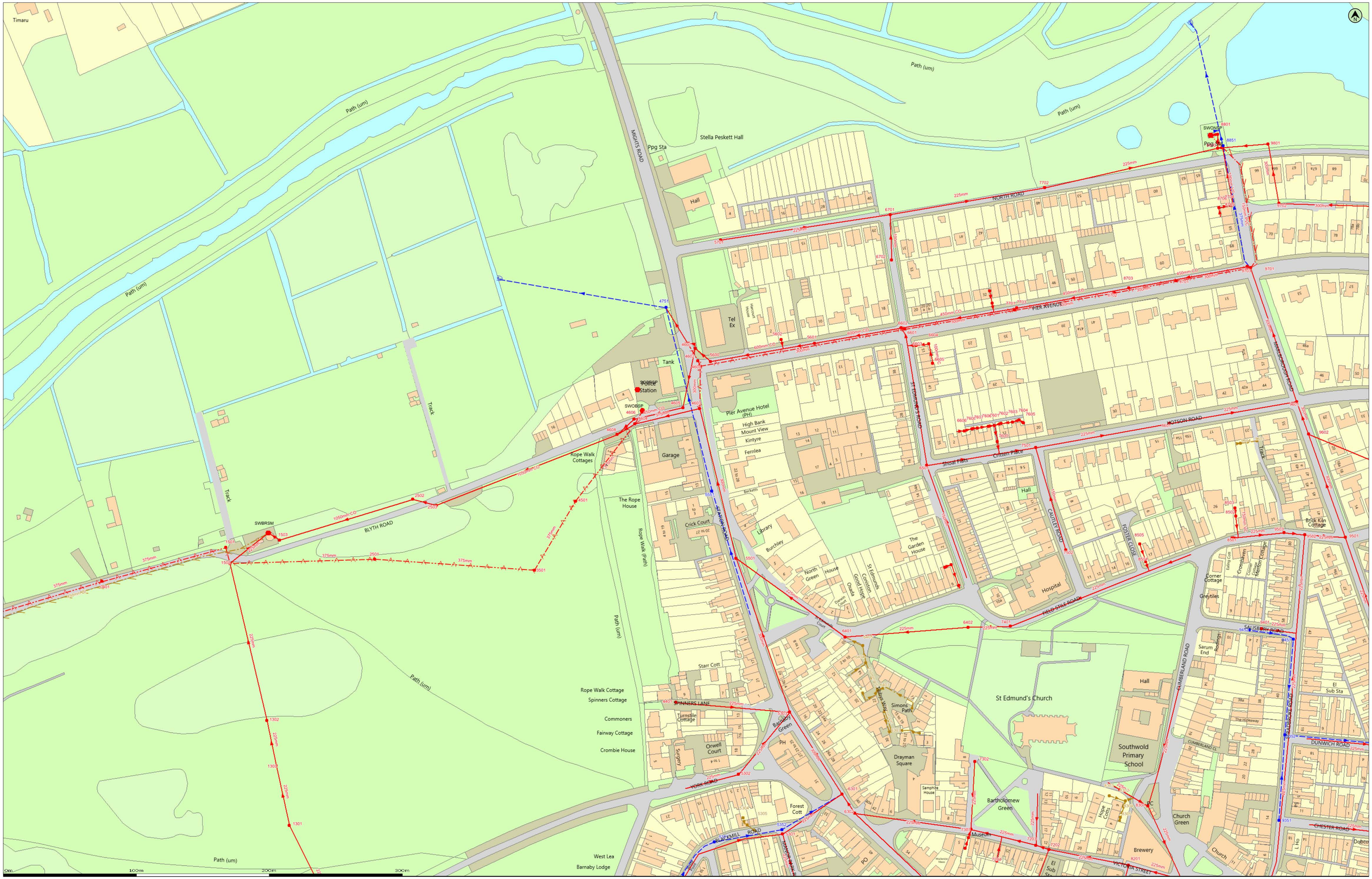
APPENDIX B: Water Authority Sewer Records



(c) Crown copyright and database rights 2018 Ordnance Survey 100022432 | Date: 30/04/18 | Scale: 1:1250 | Map Centre: 650486,276604 | Data updated: 13/03/18 | Our Ref: 262437 - 1 | Wastewater Plan A1

Foul Sewer	Outfall*	Sewage Treatment Works	
Surface Sewer			
Combined Sewer		Public Pumping Station	
Final Effluent	Inlet*		
Rising Main*		Decommissioned Pumping Station	
Private Sewer*	Manhole*	*(Colour denotes effluent type)	
Decommissioned Sewer*			

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304529

love every drop anglianwater

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0401	650047	276498	C	-	-	-
1301	650188	276314	C	10.182	7.24	2.942
1302	650171	276393	C	9.33	3.188	6.142
1303	650178	276359	C	-	-	-
1501	650140	276523	C	4.038	2.669	1.369
1502	650143	276511	C	4.588	3.188	1.4
1503	650181	276528	C	4.64	0.596	4.044
2501	650252	276514	C	4.334	3.188	1.146
2502	650281	276559	C	3.75	1.121	2.629
2503	650298	276555	C	4.02	1.247	2.773
3501	650372	276506	C	6.587	3.464	3.123
4401	650478	276407	C	10.17	8	2.17
4501	650403	276558	C	4.464	3.604	0.86
4601	650497	276659	C	4.739	3.977	0.762
4602	650495	276663	C	4.601	2.791	1.81
4603	650496	276627	C	5.487	3.832	1.655
4604	650447	276616	C	4.722	3.604	1.118
4605	650484	276628	C	5.087	2.836	2.251
4606	650447	276619	C	4.573	2.053	2.52
4607	650493	276672	C	4.69	2.986	1.704
4608	650434	276608	C	4.414	1.905	2.509
5301	650558	276308	C	12.087	8.534	3.553
5302	650525	276353	C	11.09	8	3.09
5303	650564	276399	C	10.7	8	2.7
5501	650523	276515	C	8.276	3.977	4.299
5600	650504	276662	C	4.825	3.005	1.82
5601	650583	276676	C	5.988	3.408	2.58
5602	650557	276679	C	-	-	-
5701	650512	276754	C	3.188	2.088	1.1
6301	650603	276338	C	11.42	8	3.42
6302	650613	276323	C	11.58	8.534	3.046
6401	650605	276456	C	10.717	8.967	1.75
6402	650698	276463	C	-	8.967	-
6501	650667	276585	C	9.071	4.64	4.431
6601	650650	276687	C	6.418	4.184	2.234
6602	650648	276688	C	6.383	3.698	2.685
6603	650659	276674	C	-	-	-
6604	650668	276676	C	-	-	-
6605	650671	276661	C	-	-	-
6606	650695	276610	C	-	-	-
6701	650639	276773	C	3.368	0.781	2.587
6702	650640	276739	C	4.631	3.266	1.365
7202	650758	276296	C	12.169	9.419	2.75
7203	650749	276299	C	12.174	9.114	3.06
7204	650719	276288	C	-	-	-
7302	650703	276362	C	12.176	9.114	3.062
7303	650700	276311	C	12.1	8.631	3.469
7401	650729	276464	C	11.187	8.967	2.22
7501	650749	276598	C	8.55	6.31	2.24
7502	650771	276521	C	10.397	8.642	1.755
7600	650720	276602	C	-	-	-
7601	650718	276615	C	-	-	-
7602	650723	276616	C	-	-	-
7603	650731	276617	C	-	-	-
7604	650736	276619	C	-	-	-
7605	650739	276616	C	-	-	-
7606	650713	276614	C	-	-	-
7607	650705	276613	C	-	-	-
7608	650701	276612	C	-	-	-
7701	650733	276701	C	6.743	4.64	2.103
7702	650755	276793	C	3.211	0.781	2.43
7703	650734	276703	C	6.711	4.081	2.63
8201	650818	276284	C	12.43	9.419	3.011
8301	650833	276329	C	12.519	10.051	2.468
8501	650896	276530	C	11.87	10.45	1.42
8502	650899	276546	C	-	-	-
8503	650898	276553	C	-	-	-
8504	650831	276512	C	-	-	-
8505	650827	276526	C	-	-	-
8601	650849	276616	C	8.24	5.725	2.515
8701	650854	276723	C	6.908	5.45	1.458
8702	650808	276714	C	-	-	-
8703	650819	276718	C	6.97	4.565	2.405
8704	650897	276781	C	-	-	-
8705	650896	276780	C	-	-	-
8706	650886	276778	C	-	-	-
8800	650885	276823	C	-	-0.038	-
8801	650885	276833	C	-	-	-
9401	650918	276462	C	12.415	9.672	2.743
9501	650981	276530	C	11.625	5.87	5.755
9502	650951	276532	C	11.972	9.672	2.3
9503	650935	276534	C	11.969	10.114	1.855
9601	650945	276632	C	7.845	5.45	2.395
9602	650954	276608	C	8.725	5.725	3
9701	650910	276733	C	6.779	5.416	1.363
9702	650931	276781	C	3.114	-0.038	3.152
9703	650907	276734	C	6.785	5.416	1.369
9801	650923	276826	C	2.802	-0.038	2.84
5304	650529	276320	F	-	-	-
5305	650532	276315	F	-	-	-
6303	650640	276385	F	-	-	-
6403	650630	276416	F	-	-	-
6404	650621	276436	F	-	-	-
6405	650619	276449	F	-	-	-
8302	650816	276333	F	-	-	-
8303	650804	276336	F	-	-	-
8304	650815	276328	F	-	-	-
8305	650812	276320	F	-	-	-
9603	650915	276603	F	-	-	-
9604	650903	276601	F	-	-	-
4751	650471	276703	S	-	-	-
5351	650507	276302	S	-	-	-
5352	650558	276311	S	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
5551	650505	276565	S	-	-	-
8851	650889	276824	S	-	-	-
9351	650931	276318	S	-	-	-
9352	650936	276382	S	-	-	-
9451	650942	276454	S	-	-	-
9452	650909	276461	S	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

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APPENDIX C: Flood Zone Map

Flood map for planning

Your reference	Location (easting/northing)	Created
304529	**650472/276592**	**9 May 2018 2:28**

Your selected location is in flood zone 1, an area with a low probability of flooding.

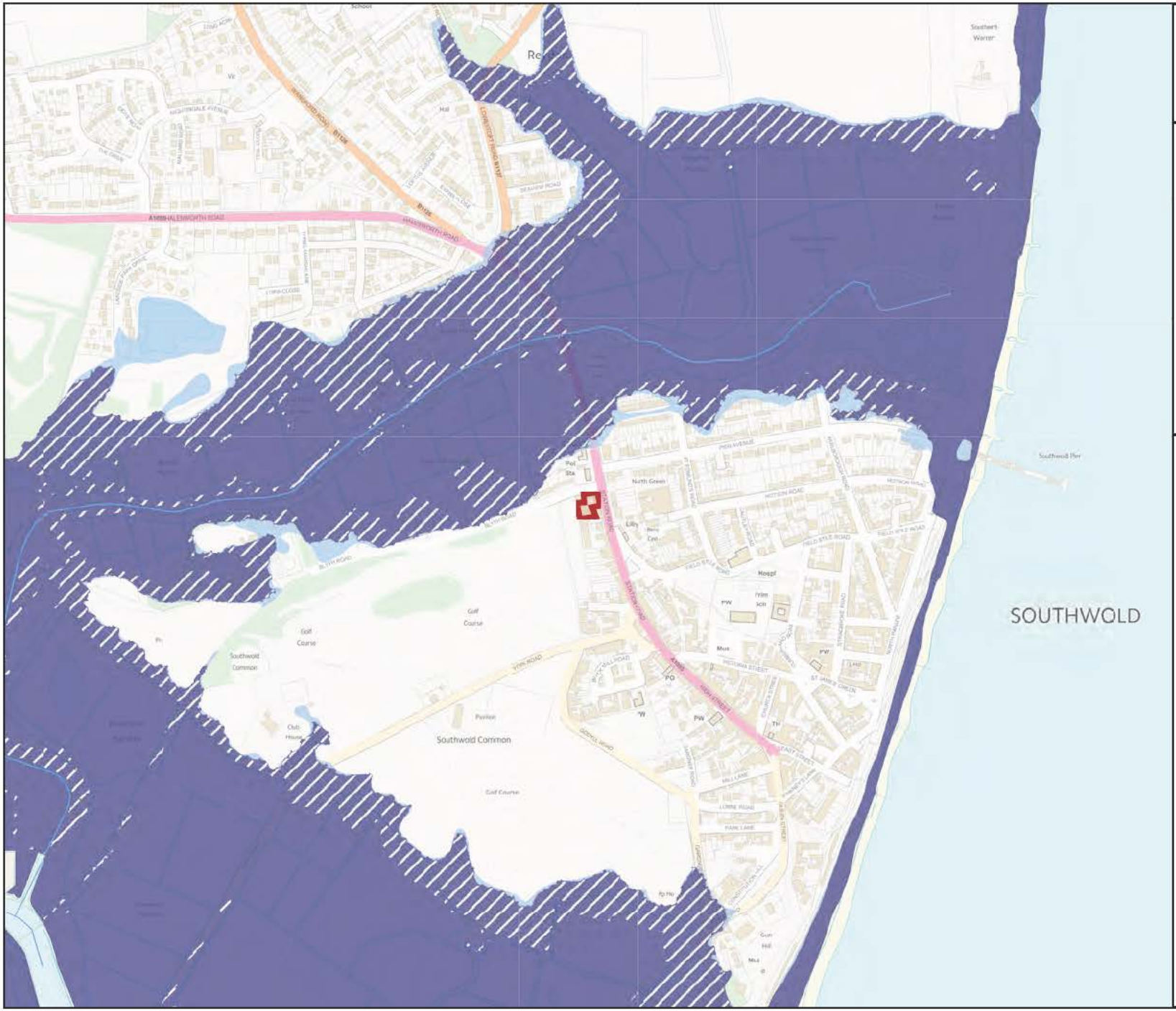
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
304529

Location (easting/northing)
650472/276592

Scale
1:10000

Created
9 May 2018 2:28

- Selected area
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 100 200 300m

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APPENDIX D: Surface Water Design Calculations

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

Half Drain Time : 571 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	5.715	0.245	0.0	0.7	0.7	22.1	O K
30 min Summer	5.795	0.325	0.0	0.7	0.7	29.3	O K
60 min Summer	5.874	0.404	0.0	0.8	0.8	36.3	Flood Risk
120 min Summer	5.943	0.473	0.0	0.8	0.8	42.6	Flood Risk
180 min Summer	5.975	0.505	0.0	0.9	0.9	45.4	Flood Risk
240 min Summer	5.990	0.520	0.0	0.9	0.9	46.8	Flood Risk
360 min Summer	5.996	0.526	0.0	0.9	0.9	47.3	Flood Risk
480 min Summer	5.991	0.521	0.0	0.9	0.9	46.9	Flood Risk
600 min Summer	5.986	0.516	0.0	0.9	0.9	46.4	Flood Risk
720 min Summer	5.978	0.508	0.0	0.9	0.9	45.8	Flood Risk
960 min Summer	5.962	0.492	0.0	0.9	0.9	44.3	Flood Risk
1440 min Summer	5.925	0.455	0.0	0.8	0.8	40.9	Flood Risk
2160 min Summer	5.876	0.406	0.0	0.8	0.8	36.6	Flood Risk
2880 min Summer	5.835	0.365	0.0	0.8	0.8	32.8	Flood Risk
4320 min Summer	5.765	0.295	0.0	0.7	0.7	26.6	O K
5760 min Summer	5.709	0.239	0.0	0.7	0.7	21.6	O K
7200 min Summer	5.665	0.195	0.0	0.6	0.6	17.5	O K
8640 min Summer	5.628	0.158	0.0	0.6	0.6	14.2	O K
10080 min Summer	5.598	0.128	0.0	0.5	0.5	11.5	O K
15 min Winter	5.748	0.278	0.0	0.7	0.7	25.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	129.843	0.0	22.8	30
30 min Summer	85.337	0.0	30.4	44
60 min Summer	53.483	0.0	38.5	74
120 min Summer	32.428	0.0	47.0	132
180 min Summer	23.896	0.0	52.1	190
240 min Summer	19.136	0.0	55.7	248
360 min Summer	13.890	0.0	60.7	362
480 min Summer	11.074	0.0	64.6	428
600 min Summer	9.283	0.0	67.7	488
720 min Summer	8.033	0.0	70.3	552
960 min Summer	6.389	0.0	74.5	684
1440 min Summer	4.620	0.0	80.7	960
2160 min Summer	3.335	0.0	87.1	1372
2880 min Summer	2.644	0.0	91.8	1768
4320 min Summer	1.904	0.0	98.6	2560
5760 min Summer	1.506	0.0	103.3	3296
7200 min Summer	1.256	0.0	106.9	4040
8640 min Summer	1.082	0.0	109.9	4768
10080 min Summer	0.953	0.0	112.3	5464
15 min Winter	129.843	0.0	25.7	30

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
30 min Winter	5.837	0.367	0.0	0.8	0.8	33.1	Flood Risk
60 min Winter	5.926	0.456	0.0	0.8	0.8	41.1	Flood Risk
120 min Winter	6.007	0.537	0.0	0.9	0.9	48.3	Flood Risk
180 min Winter	6.045	0.575	0.0	0.9	0.9	51.8	Flood Risk
240 min Winter	6.064	0.594	0.0	0.9	0.9	53.5	Flood Risk
360 min Winter	6.076	0.606	0.0	0.9	0.9	54.5	Flood Risk
480 min Winter	6.074	0.604	0.0	0.9	0.9	54.4	Flood Risk
600 min Winter	6.065	0.595	0.0	0.9	0.9	53.6	Flood Risk
720 min Winter	6.057	0.587	0.0	0.9	0.9	52.8	Flood Risk
960 min Winter	6.037	0.567	0.0	0.9	0.9	51.0	Flood Risk
1440 min Winter	5.988	0.518	0.0	0.9	0.9	46.7	Flood Risk
2160 min Winter	5.916	0.446	0.0	0.8	0.8	40.2	Flood Risk
2880 min Winter	5.856	0.386	0.0	0.8	0.8	34.8	Flood Risk
4320 min Winter	5.759	0.289	0.0	0.7	0.7	26.0	O K
5760 min Winter	5.685	0.215	0.0	0.6	0.6	19.3	O K
7200 min Winter	5.628	0.158	0.0	0.6	0.6	14.2	O K
8640 min Winter	5.585	0.115	0.0	0.5	0.5	10.3	O K
10080 min Winter	5.550	0.080	0.0	0.5	0.5	7.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	85.337	0.0	34.3	44
60 min Winter	53.483	0.0	43.3	72
120 min Winter	32.428	0.0	52.8	130
180 min Winter	23.896	0.0	58.6	186
240 min Winter	19.136	0.0	62.6	242
360 min Winter	13.890	0.0	68.2	354
480 min Winter	11.074	0.0	72.6	462
600 min Winter	9.283	0.0	76.0	556
720 min Winter	8.033	0.0	79.0	578
960 min Winter	6.389	0.0	83.7	732
1440 min Winter	4.620	0.0	90.7	1036
2160 min Winter	3.335	0.0	98.0	1480
2880 min Winter	2.644	0.0	103.2	1904
4320 min Winter	1.904	0.0	110.9	2696
5760 min Winter	1.506	0.0	116.3	3464
7200 min Winter	1.256	0.0	120.5	4192
8640 min Winter	1.082	0.0	123.9	4936
10080 min Winter	0.953	0.0	126.7	5656

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)	18.900	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.100

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.017	4	8	0.016	8	12	0.034	12	16	0.033

Model Details

Storage is Online Cover Level (m) 6.100

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1	Length (m)	50.0
Max Percolation (l/s)	0.1	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	5.470	Cap Volume Depth (m)	0.000

Orifice Outflow Control

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 5.350

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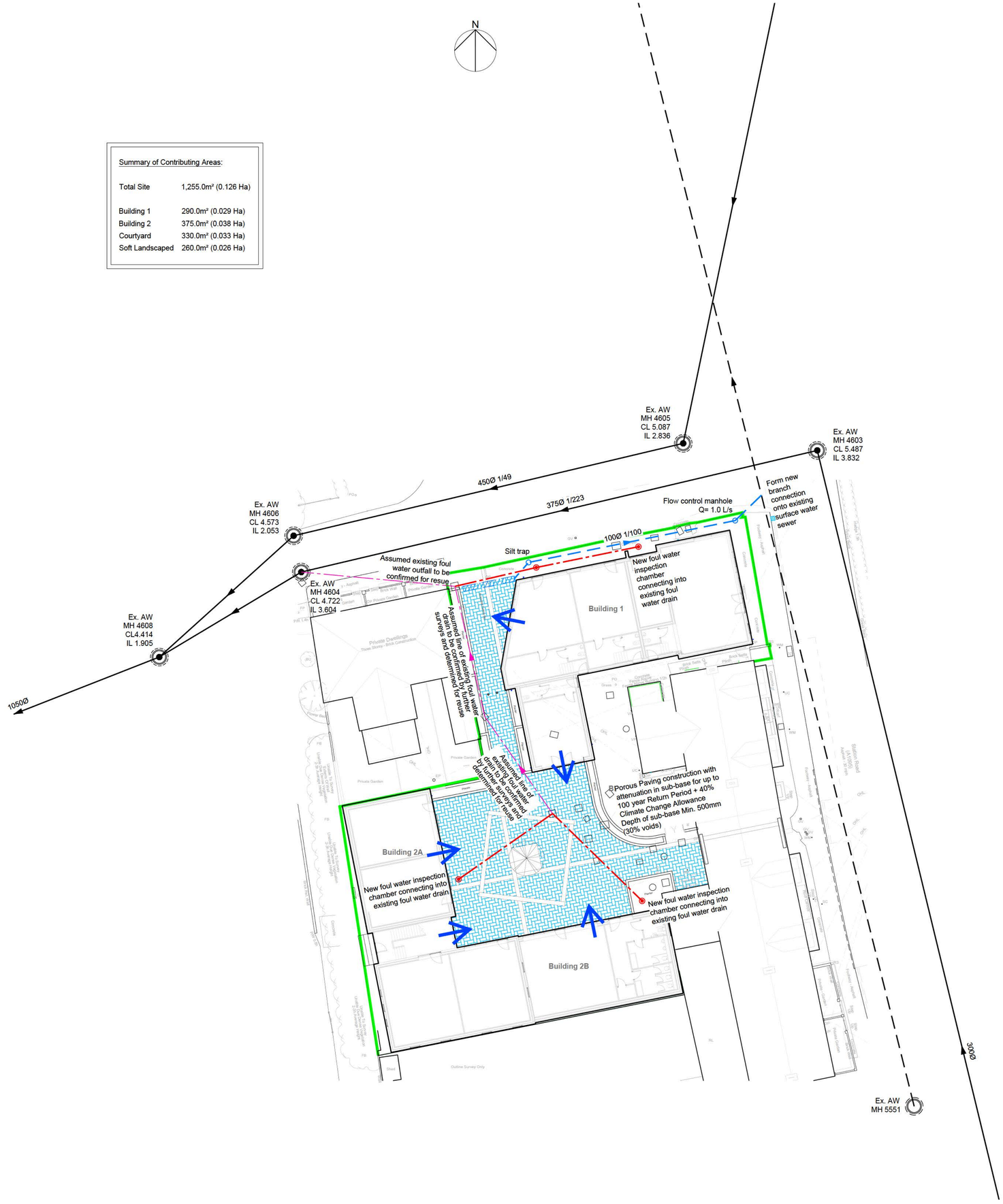
APPENDIX E: Drainage Schematic

Summary of Contributing Areas:

Total Site	1,255.0m² (0.126 Ha)
Building 1	290.0m² (0.029 Ha)
Building 2	375.0m² (0.038 Ha)
Courtyard	330.0m² (0.033 Ha)
Soft Landscaped	260.0m² (0.026 Ha)



Site wide surface water drainage strategy:

1. Roof drainage is to be collected for conveyance to the local sub-base of the adjacent porous paving construction.
2. Access and courtyard construction is to be of permeable paving type to capture and convey runoff. This will provide site wide storage of all surface water runoff, and provide passive surface water treatment prior to discharge.
3. Outfall to the public sewer is proposed via a newly constructed branch connection at a controlled rate of discharge.

LEGEND:

- Existing combined water sewer
- Ex. Anglian Water combined water manhole
- Existing surface water sewer
- Ex. Anglian Water surface water manhole
- Indicative existing foul water drain
- Proposed foul water drain
- Proposed foul water inspection chamber
- Surface water drain
- Surface water inspection chamber
- Modular geocellular units for collection
- Routing of roof drainage to sub-base
- Porous block paving

Porous Paving Construction Notes;
- Depth of construction is sized for the hydraulic design to accommodate the 100 year Return Period with an allowance of 40% climate change.
- Minimum depth of sub-base to be 350mm for the structural performance on an assumed CBR value of 5.0%. This must be confirmed by in-situ testing to determine the depth in accordance with BS 7533-13 : 2009.
- Sub-base granular material is based on a 4/20mm or 4/40mm Coarse Graded Aggregate with a design 30% void ratio.

Rev	Description	Date	Chk	Apr
P1	First issue.	09/05/18	-	

Project No: 304529 | Scale @ A1: 1:200 | Drawn By:

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Vision, form and function

Project:
Station Road,
Southwold,
Suffolk,
IP18 6AX

Client:
Southwold Town Council

Title:
Drainage Schematic

Drawing Number:
304529 - IW - XX - XX - DR - C - 6000

Status:	Purpose of Issue:	Revision:
S2	Preliminary	P1