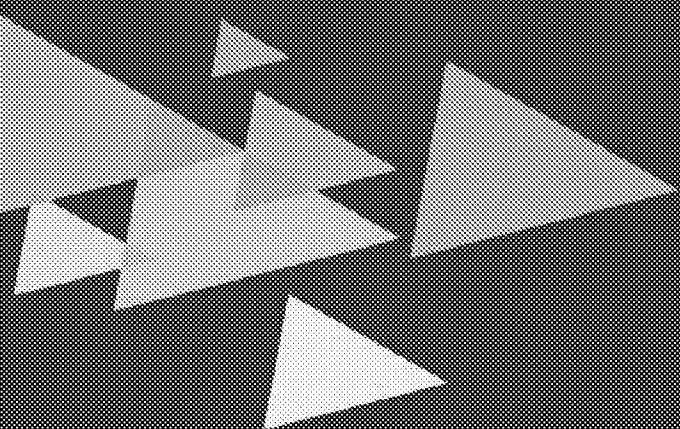




Proposed Residential Development
Hook Lane, Westergate

Drainage Statement

For

Whitgift Estates

Document Control Sheet

Drainage Statement

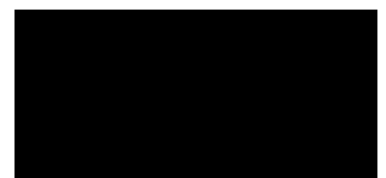
Hook Lane, Westergate

Whitgift Estates

This document has been issued and amended as follows:

Date	Issue	Prepared by	Approved by
14/12/15	1 st Draft	CW	NJ
22/01/16	Final	CW	NJ
29/07/16	Final Rev A	CW	NJ

Motion
232 High Street
Guildford
Surrey



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1.0 Introduction

- 1.1 This Drainage Statement has been produced by Motion to support a planning application by Whitgift Estates (BHL) for a proposed residential development at Hook Lane, Aldingbourne.
- 1.2 This report has been prepared in accordance with the requirements of the National Planning Policy Framework with due regard to DEFRA's technical standards for sustainable drainage systems as well as other relevant flood risk legislation and policy.
- 1.3 The following sources of information were utilised in establishing the baseline conditions and preparing this report:
- ✧ Environment Agency (EA) website www.environment-agency.gov.uk
 - ✧ British Geological Survey website www.bgs.ac.uk
 - ✧ Proposed Site Layout (OSP Architecture, 2014)
 - ✧ Topographical Survey (Groundsurveys Limited, October 2013)
 - ✧ Southern Water Sewer Record Mapping (Southern Water, 2013)
 - ✧ The Kent Design Guide 'Making it Happen – sustainability (drainage systems)' (Kent County Council, 2000)
 - ✧ The Soakaway Design Guide (Kent County Council, 2000)
 - ✧ The SuDS Manual (Ciria, 2015)
- 1.4 Motion's Drainage Statement is based upon available information as listed above, and takes into account the proposed land use and design features.

2.0 Development Setting

Site Location and Description

- 2.1 The site is located south west of the village of Aldingbourne and to the west of Westergate in West Sussex. The OS grid reference for the site is SU 93363 04653 and a nearby postcode is PO20 3TE. It is bound by residential properties to the north and south and Hook Lane is east of the site. A site location plan is presented in Appendix A.
- 2.2 The existing site consists of approximately 6 structures comprising of garages, workshops and sheds. The structures located on the western part of the site are surrounded by dense vegetation. Vehicular access to the structures is provided off an access along the northern boundary of the site.
- 2.3 The site covers a total area of circa 0.9 ha comprising approximately 5% hardstanding consisting of the access road and existing structures.

Topography

- 2.4 The topography at the site is gently sloping with a general fall from north to south. The ground levels, based on the topographical survey provided fall approximately 0.3m from the northern boundary down towards the southern boundary. This represents an average gradient of approximately 1 in 177 across the site. Refer to Appendix B.

Development Proposals

- 2.5 The development proposals are for the development of 8 no. residential units with a new vehicular access. The proposals consist of large detached homes with associated garages, on-plot parking and private amenity space.

3.0 Baseline Conditions

Existing Drainage Regime

- 3.1 The topographical survey of the existing site identifies a pond in the south west corner of the site, this is connected to a watercourse which is south of the site.
- 3.2 Southern Water sewer records do not show surface water public sewers in the vicinity of the site, removing the possibility of an existing connection to a public surface water sewer.
- 3.3 The topography of the site and nearby watercourse strongly suggests that the site and existing structures discharge via a combination of overland flow into the pond and infiltration.
- 3.4 With regard to foul water disposal, Southern Water records show a 150mm diameter foul public sewer network in Hook Lane to the east of the site. Existing manholes are shown to be in line with the northern and southern boundaries of the site. Therefore it is highly likely that all existing dwellings in the surrounding area drain into the Southern Water foul network. Refer to Appendix E.

Hydrology

- 3.5 The Environment Agency's online flood map shows the site to be located outside the floodplain associated with the River Bourne, in Flood Zone 1 defined as low risk of fluvial flooding.

Geology

- 3.6 The British Geological Survey (BGS) online Geoindex Mapping identifies the underlying bedrock geology comprising of London Clay Formation, consisting of Clay, Silt and Sand. The nearest BGS borehole log [SU 90 NW 72] is located approximately 0.5km north of the site identifying a 1.5m thick layer of Clay overlying 3.8m of Gravel which overlays a Clay substratum. Nearby boreholes in the area show similar stratum, refer to appendix D for borehole records.

Hydrogeology

- 3.7 The EA's online mapping shows that the site falls outside Flood Zones 2 and 3. The risk of flooding from Surface Water maps show a very low risk of flooding from surface water over the majority of the site, with a low risk of flooding in the south east corner of the site. The EA flood maps show that the site is outside any groundwater source protection zone.
- 3.8 The site is shown to be underlain with a Minor Aquifer High Groundwater Vulnerability Zones and a Secondary A Superficial Deposits on the BGS Aquifer Map.
- 3.9 The aforementioned BGS borehole records indicate water struck at 5.9m, 1.4m and 3m below the surface level.
- 3.10 At present no infiltration tests have been carried out on site and therefore no site specific data regarding infiltration rates are available. The site is underlain by gravel and clay and is likely to have a high water table due to the high rest water level recorded in the borehole records and the clay substratum. This suggests that the site may be unsuitable for effective disposal of surface water through infiltration.

4.0 Surface Water Drainage Strategy

Sustainable Drainage Overview & Hierarchy

- 4.1 Current planning policy and Environment Agency guidance requires developments to employ SuDS techniques wherever feasible. Careful design of SuDS features can ensure that the site surface water drainage closely reflects the natural hydrology and hydrogeology of the site.
- 4.2 Source control systems treat water close to the point of collection, in features such as soakaways, permeable paving and dry swales. As source control measures generally rely upon the infiltration of surface water to the ground, it is a pre-requisite that the ground conditions are appropriate. Based on our desktop study, the site is shown to be underlain by thick layers of clay and gravel, which could mean that the site is unsuitable for infiltration techniques.
- 4.3 SuDS will attenuate and treat surface water run-off quantities at source (source control) in line with National Planning Policy Framework and Environment Agency (EA) policies.
- 4.4 The key benefits of SuDS are as follows:
- » Improving water quality over a conventional piped system by removing pollutants from diffuse pollutant sources (e.g. roads)
 - » Improving amenity through the provision of open green space and wildlife habitat
 - » Enabling a natural drainage regime which recharges groundwater (where possible)
- 4.5 SuDS provide a flexible approach to drainage, with a wide range of components from house soakaways to large-scale basins or ponds. The individual techniques should be used where possible in a management train which mimics the natural pre-development pattern of drainage. The Interim Code of Practice for SuDS sets out the hierarchy of techniques. These are:
1. Prevention – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution
 2. Source control – control of runoff at or very near its source (such as permeable paving or soakaways for individual houses).
 3. Site control – management of water from several sub-catchments (including routing water from roofs and car parks to one large soakaway or infiltration basin for the whole site).
 4. Regional control – management of runoff from several sites, typically in a detention pond or wetland.

Proposed Sustainable Drainage Strategy

- 4.6 The proposed sustainable drainage strategy will ensure that the proposed development does not increase surface water volumes and runoff rates leaving the site. The proposed residential development will incorporate Sustainable Drainage Systems into the surface water drainage strategy. Please refer to Appendix G for the proposed drainage strategy.
- 4.7 As the site is underlain by clay and is likely to have a high water table, the site is unsuitable for infiltration. There is a watercourse connected to the downstream side of the pond located in the south west part of the site.
- 4.8 Based on the aforementioned available information, the underlying geology is therefore deemed unsuitable for infiltration drainage techniques at the site. It is recommended that soakage test to BRE365 are undertaken to confirm the rate of infiltration prior to detailed design.

- 4.9 It is proposed to utilise permeable paving for the access road to provide storage for the access road and a proportion of the building rooftop and hardstanding area, this includes the necessary pollution prevention (hydrocarbon removal via filtration) as well as a proposed flow control prior to discharge into the existing watercourse. The flow into the watercourse will be limited to a practical minimum of 5 l/s. This approach meets the first two SuDS techniques set out in the Interim Code of Practice, described above.
- 4.10 With regard to the remaining clean roof runoff, it is proposed to drain the roof areas into 2 x dry swales with filter drains. The dry swales will be positioned in rear gardens, set as shallow as practically possible and positioned as far away from buildings as possible with a preferred clearance of 5m. The surface water drainage strategy is shown in Appendix G.
- 4.11 The implications of the return periods greater than the 1 in 30 year rainfall event shall be reviewed at the detailed design stage and will ensure that any overland flow during this event is managed onsite through the manipulation of finished levels to divert flood waters away from buildings to areas of sacrificial flood.

Design calculations

Catchment Area	QBAR (l/s)	1 in 1 year Runoff Rate (l/s)	1 in 30 year Runoff Rate (l/s)	1 in 100 year Runoff Rate (l/s)	Max allowable discharge (practical minimum) (l/s)
0.965 ha (Site)	2.0	1.7	4.5	6.3	5

Table 4.1 - Greenfield Runoff Rates

- 4.12 The preliminary design calculations have assumed that infiltration is not feasible. As the site requires a restricted outflow, the surface water runoff rates will be limited to a practical minimum of 5 l/s. The storage required is given in the table below.

Catchment Area	Max Allowable Discharge (l/s)	Storage Required (m ³)
0.023 ha (buildings draining towards the south)	0.77	11
0.020 ha (buildings draining towards the west)	0.67	10
0.107 ha (draining towards the permeable paving road and the road itself)	3.56	52
0.150 ha (Site)	5.0	73

Table 4.2 – Summary of Microdrainage Storage Calculations

The southern side of the buildings located at the south of the site will drain into a dry swale located near to the southern site boundary, this will run towards the proposed flow control manhole. Similarly, the western side of the buildings located on the west of the site will drain towards a dry swale which will drain towards the flow control manhole.

The remaining hardstanding area will drain towards the permeable paving, the permeable paving will then drain towards the flow control manhole which will restrict the flow to the watercourse at 5 l/s. Refer to Appendix G for the proposed drainage strategy.

Detailed Design Requirements

- 4.13 At the detailed design stage it is recommended that a qualified Geotechnical Engineer is commissioned to explore and provide engineering recommendations for the following elements:

- ✧ An infiltration test should be undertaken to either confirm that the site is unsuitable for infiltration or if the drainage design should incorporate infiltration. Infiltration tests should be undertaken in accordance with BRE365. As part of this test, the groundwater level should be recorded (if encountered) to record whether that there is a suitable unsaturated zone between the base of any infiltration drainage system to the groundwater level, in order to minimise the risk of contamination of the underlying Major Aquifer and ensure effective operation of any infiltration systems.

5.0 Foul Water Drainage Strategy

- 5.1 The domestic flow has been based on Sewers for Adoption 7th Edition design flow of 4000 litres/dwelling/day. There are 8 dwellings for the peak discharge is:

$$8 \text{ dwellings} \times 0.046 \text{ l/s} = 0.368 \text{ l/s peak discharge}$$

- 5.2 Using the tables for the hydraulic design of pipes and sewers, the 150mm Ø sewer in Hook Lane has a peak capacity of 17.65 l/s. Therefore the sewer in Hook Lane has the capacity for 384 houses.
- 5.3 The foul water drainage proposals for the development is for 1 no. gravity connection into the existing Southern Water network west of the site. A new manhole is to be constructed online with the existing foul sewer. The sewer records are shown in Appendix E and the foul water drainage strategy is shown in Appendix G.
- 5.4 The proposed connections will be undertaken in accordance with Section 106 of the Water Industry Act (WIA) which enables developers the 'right to connect' developments into the nearest public sewer.
- 5.5 Until Section 42 of the Flood and Water Management Act (FWMA) is in place, it is not mandatory for sewers serving more than 1 property to be offered for adoption under Section 104 WIA, and therefore it is not mandatory the proposed sewers are designed in accordance with Sewers for Adoption 7th Edition.
- 5.6 On this basis, it is proposed to design and construct the foul water drainage system in accordance with Building Regulations standards at this stage.
- 5.7 In any case, it is worth noting that a short period after Section 42 of the FWMA is in place, we understand a second phase of transferring of private sewers to public sewers will be undertaken (as previously implemented in October 2011) which will effectively enable the onsite private sewers serving the proposed development to be transferred to Southern Water ownership and maintenance.

6.0 Summary and Conclusions

- 6.1 This Drainage Statement has been produced by Motion on behalf of Whitgift Estates to support the reserved matters application for a proposed 8 unit residential redevelopment at Hook Lane, Westergate, Chichester. This report demonstrates that the redevelopment drainage proposals satisfy the appropriate design requirements and accord with the necessary government and planning policy standing advice.
- 6.2 The proposed Sustainable Drainage Strategy utilises SuDS techniques in the form of permeable paving and dry swales providing on-site attenuation and treatment prior to discharge into the watercourse in the south west corner of the site. The flow to the watercourse will be limited to a practical minimum of 5 l/s. The existing watercourse will drain the surface water in a southerly direction away from the site at a controlled rate.
- 6.3 It is recommended that appropriate geotechnical investigations are carried out at the design stage to verify the drainage strategy taking into account recorded infiltration rates.
- 6.4 The proposed foul drainage allows for gravity connections into the nearby Southern Water foul water network under the provisions of Section 106 of the Water Industry Act.
- 6.5 Overall this report concludes that the proposed development can deliver a suitable sustainable drainage strategy both for surface water and foul water disposal. The proposals do not represent an impediment to the development of the site, and therefore should not constrain grant of planning approval.

Appendix A
Site Location Plan

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of drawings printed by third parties.

All dimensions are in mm unless otherwise stated.

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Any clarification and/or additions that are required appertaining
to such information should be sought from the relevant
profession or their appointment representative as listed below.

LIST OF INFORMANTS :

ORDNANCE SURVEY

-
-
-
-

REVISIONS	DATE	DRN	REV
DESCRIPTION	DATE	SIG	REV

PLANNING APPLICATION
BOUNDARY



WESTERGATE



MountfordPigott

SITE LOCATION PLAN
AS EXISTING
1265-X01

1:1250 @ A3

DRAWN BY: APR

04.16

ARUN DISTRICT COUNCIL AL/83/16/OUT

Appendix B

Topographical Survey

PLANNING APPLICATION BOUNDARY

STRUCTURES TO BE DEMOLISHED
INDICATED THUS

Barnside

HOOK LANE

Pond

HOOK LANE WESTERGATE

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LIST OF INFORMANTS:
ORDNANCE SURVEY
SE SURVEYING

REVISIONS	DATE	DN	REV
DESCRIPTION		SIG	REV



0 2m 4m 6m 8m 10m

MountfordPigott

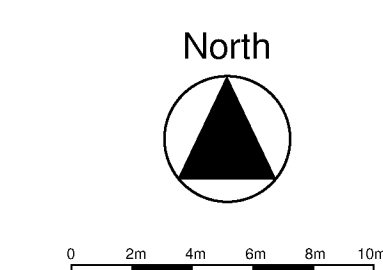
SITE PLAN AS EXISTING
SHOWING DEMOLITION
1265-X02

1:200 @ A1
DRAWN BY: ARR

ARUN DISTRICT COUNCIL ALU8316/OUT 04.16

Appendix C

Proposed Site Plan



HOOK LANE WESTERGATE

Appendix D

Borehole Records

ST 90 NW T3

8339 8881

Westergate

Block

Surface level +10.6 m
 Water struck at +7.8 m
 September 1981

Overburden 3.2
 Mineral 3.8
 Bedrock 8.8

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Brickearth	Silt, brown	0.4	0.7
	Clay, silty, brown, with a few pebbles near base	1.5	2.2
Head Gravel	a 'Very clayey' gravel Gravel: fine with coarse, angular to subrounded; flint, some white and porous Sands: coarse with fine and medium Fines: clay	0.8	3.8
Raised Beach Deposits (younger)	b 'Clayey' pebbly sand Gravel: coarse and fine, angular to subrounded; flint, some white and porous Sands: fine with traces of medium and coarse; quartz Fines: silt, brown	3.0	6.8
	c Sandy gravel Gravel: fine and coarse, angular to well rounded; flint (some white and porous), chalk and other rock fragments Sands: fine with coarse and medium; quartz	1.0	8.8
London Clay	Clay, stiff, dark olive grey with a few rounded flint pebbles	0.8*	9.6

GRADING

	Mean for deposit percentages			Depth below surface (m)	Percentages						
	Fines	Sand	Gravel		Fines	Sand	Gravel				
					-4	+4 -1	+1 -1	+1 -4	+4 -18	+18 -84	+84 mm
a	37	17	46	2.2-3.0	37	5	4	3	28	17	0
b	15	78	8	3.0-4.0	15	70	1	1	8	7	0
				4.0-5.0	15	84	1	0	0	0	0
				Mean	15	77	1	1	3	3	0
c	3	56	41	5.0-6.0	3	41	7	3	18	22	0
b+c	11	72	17	3.0-6.0	11	66	3	3	8	9	0
a+b+c	15	60	24	2.2-6.0	15	53	3	4	13	11	0

COMMERCIAL IN CONFIDENCE

11/8 0324 (1150) 2100 1/76

Institute of Geological Sciences

Sheet 1 of

Borehole Reg No: SU 90NW/72	Classification of ground	Thickness m	Nature
Temp. borehole No: SU90/36	O.B.	to 2.2	silty clay
Nat Grid Ref: SU93890501	Min	2.25 to 6.0	variable fine to clayey gravel, & gray London Cl
Locality: Colt Nursery, Westgate	BR.	6.0 to 6.8	
Surface level: 10.8 m O.D. (10.0.D.)			
Drilled by: Sordadores			
Drill type:			
Hole diameter:			
Depth(s) bailed:			
Date started: 8/9/81			
Date finished: "			
Recorded by: PHAN			

Remarks

Explanation	▽ Groundwater depth first encountered	— Casing depth	U, sample; solid ome shows fraction recovered		
▲ Morning water level	— Borehole depth	W Water sample	Spot disturbed sample		
▼ Evening water level			Bulk sample		
			SPT: Standard Penetration Test		
Geological Classification	Description of Strata	Sampling	Sample Nos	Water level	Drill and Ca progr
	Soil				
	dry brown silt				
Brickearth	brown silty clay	1	CCB 176		
	brown pebbly silty clay	2	CCB 178		
Gr	clayey gravel 20 cgr } flint 30 cgr } 10 cs 40 fines	2.2 to 3.0	CCB 095		
Marine Sand + gravel	Sandy gravel < 20 cgr + a few lge flint cobbles > 10 cgr } 60 cgr } (flint) 10 fines	3.0 to 4.0	CCB 096		30
	95% sand > 95% f. - no coarser material < 5% fines (silty)	4.0 to 5.0	CCB 097		
	Sandy gravel 30 cgr } 30 cgr } 10 cs } 30 cgr }	5.0 to 6.0	CCB 098		
London Clay	dark olive grey stiff clay with a few flint pebbles	6	CCB 177		end
		7			
		8			

SU 90 SW 45 9283 8488

Park Farm, Aldingbourne

Sheet

Surface level +8.8 m
Water struck at +2.1 m
August 1981

Overburden
Mineral
Bedrock

LOG

Geological classification	Lithology	Thickness Dm
Soil		0.4
Brickearth	Silt, mottled orange brown and grey-brown, with fine sand, some small flint pebbles and lignite fragments	8.7
Raised Beach Deposits (younger)	'Very clayey' sand with a few rounded flint pebbles at base Sand: fine with traces of medium and coarse Fines: silt, brown	1.4
London Clay	Clay, silty, greyish olive brown, with fine mica flakes and a few shell fragments	1.0+

GRADING

Mean for deposit percentages			Depth below surface (m)	Percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/2	+1/2 -1	+1 -1	+1 -4	+4 -16	+16 -64	+64 mm
30	70	0	1.1-2.1	31	68	0	1	0	0	0
			2.1-2.5	27	70	1	1	1	0	0
			Mean	30	68	1	1	Trace	0	0

SU 98 SW 48

1191 8386

Beachons Farm

Block

Surface level +8.8 m
 Water struck at +7.4 m
 September 1981

Overburden 1
 Mineral 2
 Bedrock 1

LOG

Geological classification	Lithology	Thickness m	De m
Soil		0.4	
Brickearth	Clay, silty, brown	1.0	
Raised Beach Deposits (younger)	a 'Very clayey' sand Sand: fine with traces of medium and coarse Fines: silt	2.0	
	b Pebbly sand Gravel: fine with coarse; flint (some white and porous) with a few chalk and sandstone pebbles Sand: fine with some medium and coarse Fines: silt	1.5	
London Clay	Clay, brown and with pebbles near top, grey below	1.0+	

GRADING

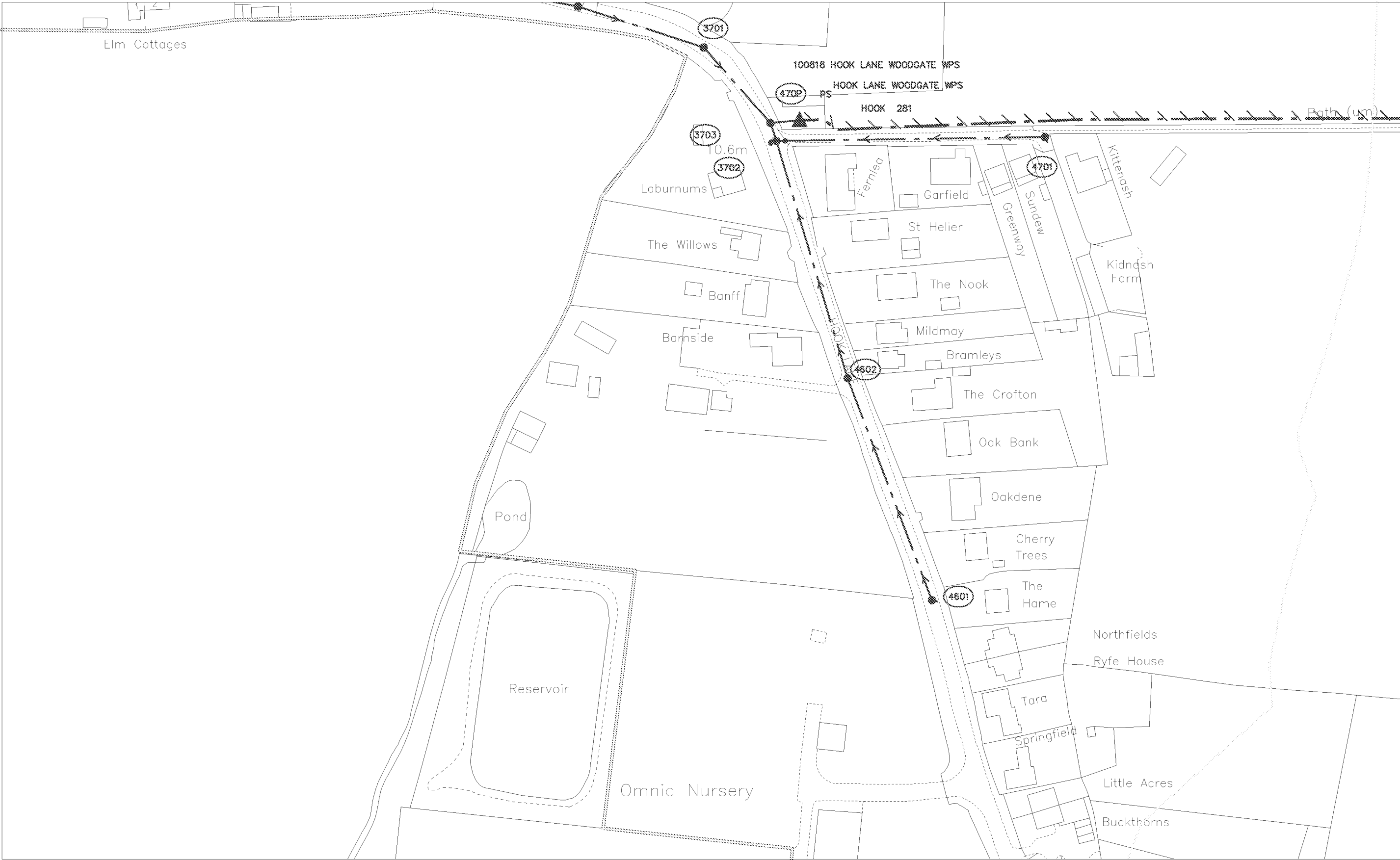
	Mean for deposit percentages			Depth below surface (m)	Percentages								
	Fines	Sand	Gravel										
					Fines			Sand				Gravel	
					- $\frac{1}{2}$	$+\frac{1}{2}$ - 1	+1 - 2	+2 - 4	+4 - 8	+8 - 16	+16 - 64	+64 mm	
a	24	76	0	1.4-2.4	37	60	1	2	0	0	0		
				2.4-3.4	11	89	0	0	0	0	0		
				Mean	24	74	1	1	0	0	0		
b	4	78	20	3.4-4.4	3	40	20	15	15	7	0		
				4.4-4.9	5	43	23	13	11	5	0		
				Mean	4	41	21	14	14	6	0		
a+b	15	76	9	1.4-4.9	15	58	8	7	8	3	0		

Appendix E

Sewer Record Mapping

SEWER RECORDS PAGE 1 OF 2

104807



104519

493134 O.S. REF. SU9304NW	Drawn by: yadavsa	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.	N
	Scale: 1:1250		
	Title: 207139_Hook Lane, Aldingbourne		

493606

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
3701X	10.51	7.5	150	VC	CIRC																		
3702X	10.58	7.39	150	VC	CIRC																		
3703X	10.64	7.26	150	VC	CIRC																		
3801X	10.49	7.82	150	VC	CIRC																		
4601X	10.28	8.95	150	VC	CIRC																		
4602X	10.48	7.99	150	VC	CIRC																		
4701X	10.67	9.06	150	VC	CIRC																		
470PX	10.99	10.98	100	PE	CIRC																		

LINE STYLES / COLOURS

Brown	-----	Foul
	-----	Foul Syphon Sewer
	-----	Foul Vacuum Main
	-----	Foul Rising Main
Red	-----	Combined
	-----	Combined Syphon Sewer
	-----	Combined Rising Main
	-----	Lateral Drain
Orange	-----	Building Over Agreement Area
Dark Blue	-----	Treated Effluent
Purple	-----	Sludge
	-----	Sewer Catchment
	-----	Section 104 Area
Light Blue	-----	Surface Water
	-----	Surface Water Rising Main
Yellow	-----	Private
Green	-----	Access Shaft
	-----	Decommissioned

MATERIALS

AK	Alkaline
BAC	Bonded Asbestos Cement
BRD	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRD	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry In regular Courses
MAR	Masonry In random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Victrol Clay
XXX	Other
ZZZ	Unknown

Manhole (SW)
Manhole (F&C)
Lamp hole (SW)
Lamp hole (F&C)
Pumping Station (SW)
Pumping Station (F&C)
Side entry manhole (SW)
Side entry manhole (F&C)
Blind shaft (SW)
Blind shaft (F&C)
Ejector station (SW)
Ejector station (F&C)
Watertight door (SW)
Watertight door (F&C)
Flushing ch. Min-e (SW)
Flushing ch. Min-e (F&C)
Flushing ch. No-e (SW)
Flushing ch. No-e (F&C)
Damascene Chamber

LEGEND - SEWERS

Washout (SW)
Washout (F&C)
Rodding Eye (SW)
Rodding Eye (F&C)
Gauging point (SW)
Gauging point (F&C)
Intercept chamber (SW)
Intercept chamber (F&C)
Storm Tank (SW)
Storm Tank (F&C)
Vortex chamber (SW)
Vortex chamber (F&C)
Label ellipse
Dummy/S24 manhole
Outfall
Penstock chamber
Demiboards
Storm Overflow
Backdrop manhole
Other (s)
Other
Change In sewer (s)
Change In sewer
Rafflux valve
Flap valve
Cascade
Anode
Valve
Closed Valve
Air Valve
Hatch box (SW)
Hatch box (F&C)
Direction arrow
Emptying valve
Catchpit
Soakaway
Inlet
Balancing Pond

Wastewater treatment works
Marine treatment works
Outfall headworks
Vent
Vent column
Tidal storage tank
Blank end
Head of Public Sewer
Micro Pumping Station
SHAPES (S)
A Arched
B Barrel
C Circular
E Egg
H Horseshoe
R Rectangular
S Square
T Trapezoidal
U U Shape
X Other

NODE REFERENCING SYSTEM
1st digit: hundred metre easting identifier
2nd digit: hundred metre northing identifier
3rd digit: sewer type identifier
4th digit: next sequential node

Drawn by:	yadavs	
Title:	207139_Hook Lane, Aldingbourne	
Date:	16/12/2015	

Appendix F

Environment Agency Flood Maps

Enter a postcode or place name:

Other topics for this area...

Flood Map for Planning (Rivers and Sea)

PO20 3TF



Flood Map for Planning (Rivers and Sea)

Map legend

Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in.

☒ Flood Map for Planning (Rivers and Sea)

Flood Zone 3

Flood Zone 2

Flood defences (Not all may be shown*)

Areas benefiting from flood defences (Not all may be shown*)

☒ Main River Line

Main River Line

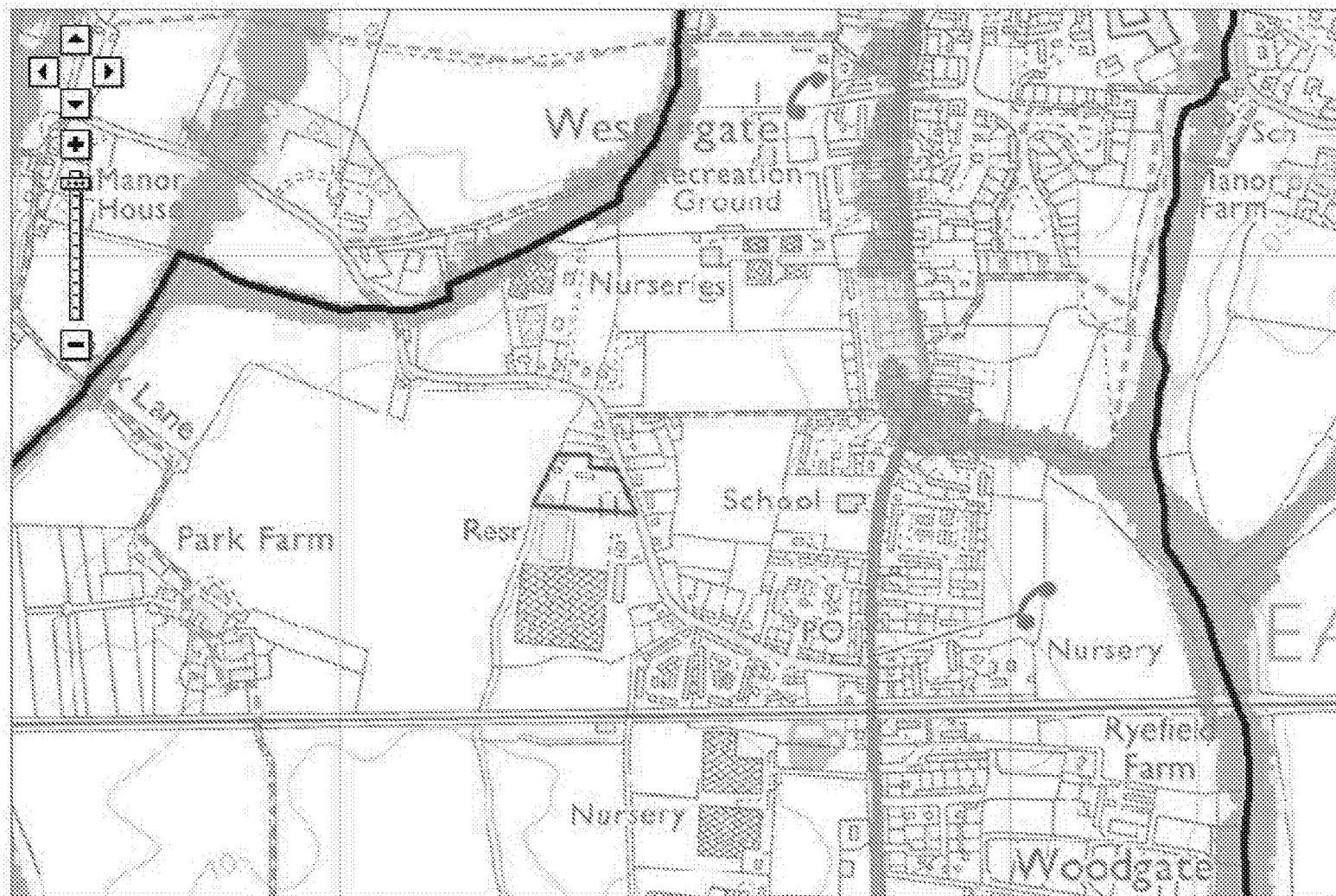
☒ Other national environmental organisations

Natural Resources Wales Area of responsibility

Scottish Environment Protection Agency Area of responsibility

PO20 3TF at scale 1:10 000

Other maps Data search Text only version





Enter a postcode or place name:

Other topics for this area...

Groundwater

PO20 3TF



Groundwater

Map legend	
	Groundwater source protection zones ⓘ
	BGS Aquifer Maps - Superficial Deposits Designation ⓘ
	BGS Aquifer Maps - Bedrock Designation ⓘ
	Principal
	Secondary A
	Secondary B
	Secondary (undifferentiated)
	Groundwater Vulnerability Zones ⓘ
	Other national environmental organisations ⓘ
	Natural Resources Wales Area of responsibility
	Scottish Environment Protection Agency Area of responsibility

PO20 3TF at scale 1:75,000

Other maps ⓘ Data search ⓘ Text only version ⓘ



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Enter a postcode or place name:

Other topics for this area...

Groundwater



Groundwater



Map legend

- Groundwater source protection zones
- BCS Aquifer Maps - Superficial Deposits Designation
- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes and landslip)
- BCS Aquifer Maps - Bedrock Designation
- Groundwater Vulnerability Zones
- Other national environmental organisations
- Natural Resources Wales Area of responsibility
- Scottish Environment Protection Agency Area of responsibility

X: 494,162;Y: 105,714 at scale 1:75,000

Other maps Data search Text only version



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Enter a postcode or place name:

Other topics for this area...

Groundwater



Groundwater



Map legend

- ☐ Groundwater source protection zones
- ☐ BGS Aquifer Maps - Superficial Deposits Designation
- ☐ BGS Aquifer Maps - Bedrock Designation
- ☐ Groundwater Vulnerability Zones
- ☒ Other national environmental organisations
- ☐ Natural Resources Wales Area of responsibility
- ☐ Scottish Environment Protection Agency Area of responsibility

X: 435,006;Y: 202,709 at scale 1:2,500,000

Other maps Data search Text only version



Costwaters in Wales - From 1 April 2013 Natural Resources Wales (NRA) has taken over the responsibilities of the Environment Agency in Wales.
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Enter a postcode or place name:

Other topics for this area...

Groundwater



Groundwater



Other maps Data search Text only version

Map legend

Groundwater source protection zones

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1a)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2a)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3a)
- Special interest (Zone 4)

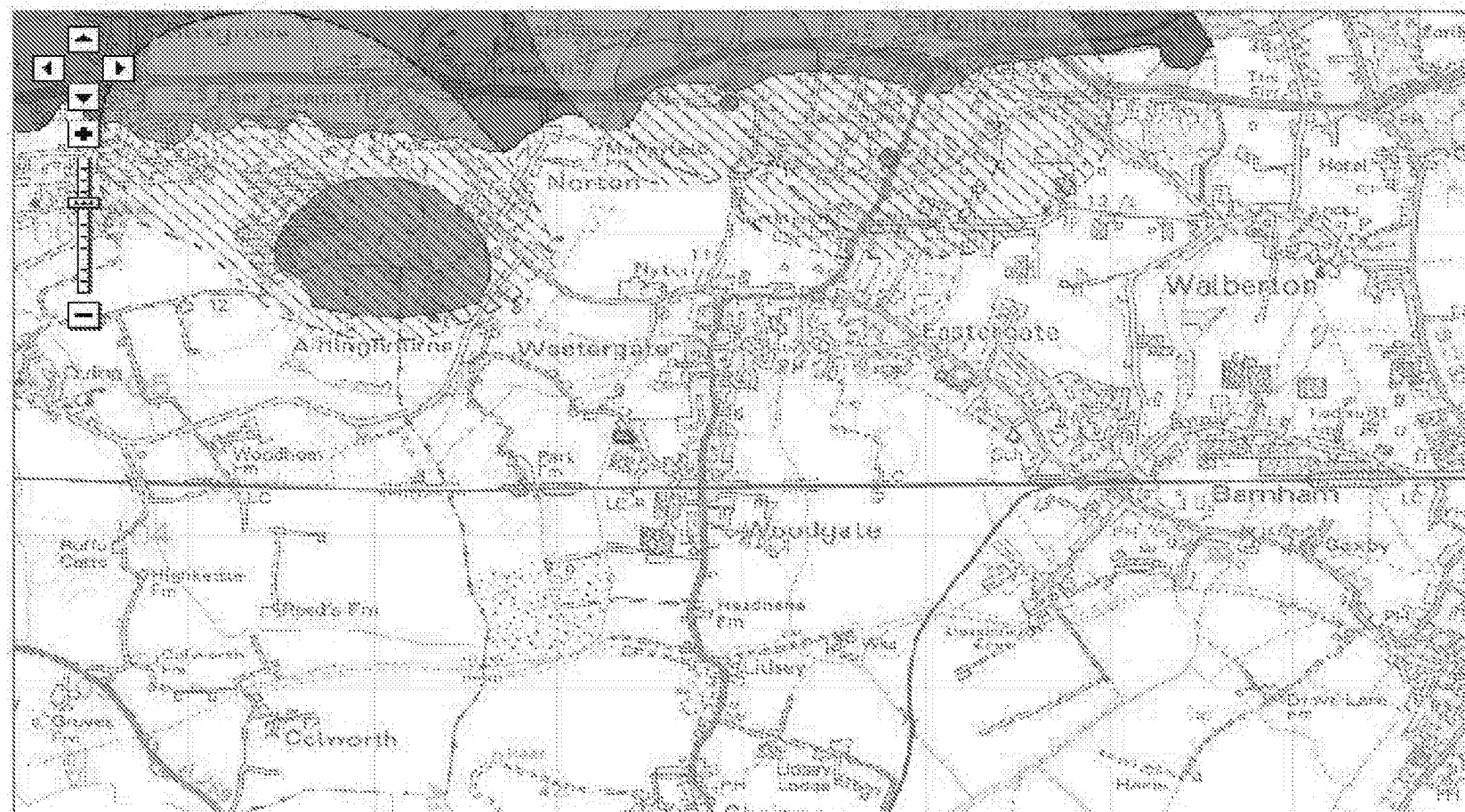
BGS Aquifer Maps - Superficial Deposits Designation

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes and landfills)

BGS Aquifer Maps Bedrock Designation

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)

X: 494,026;Y: 104,809 at scale 1:40,000



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More about Groundwater

Groundwater Source Protection Zones:

Groundwater provides a third of our drinking water. We ensure that your water is safe to drink defining Source Protection Zones. These zones help to monitor the risk of contamination from any activities that might cause pollution in the area.



Enter a postcode or place name:

Other topics for this area...

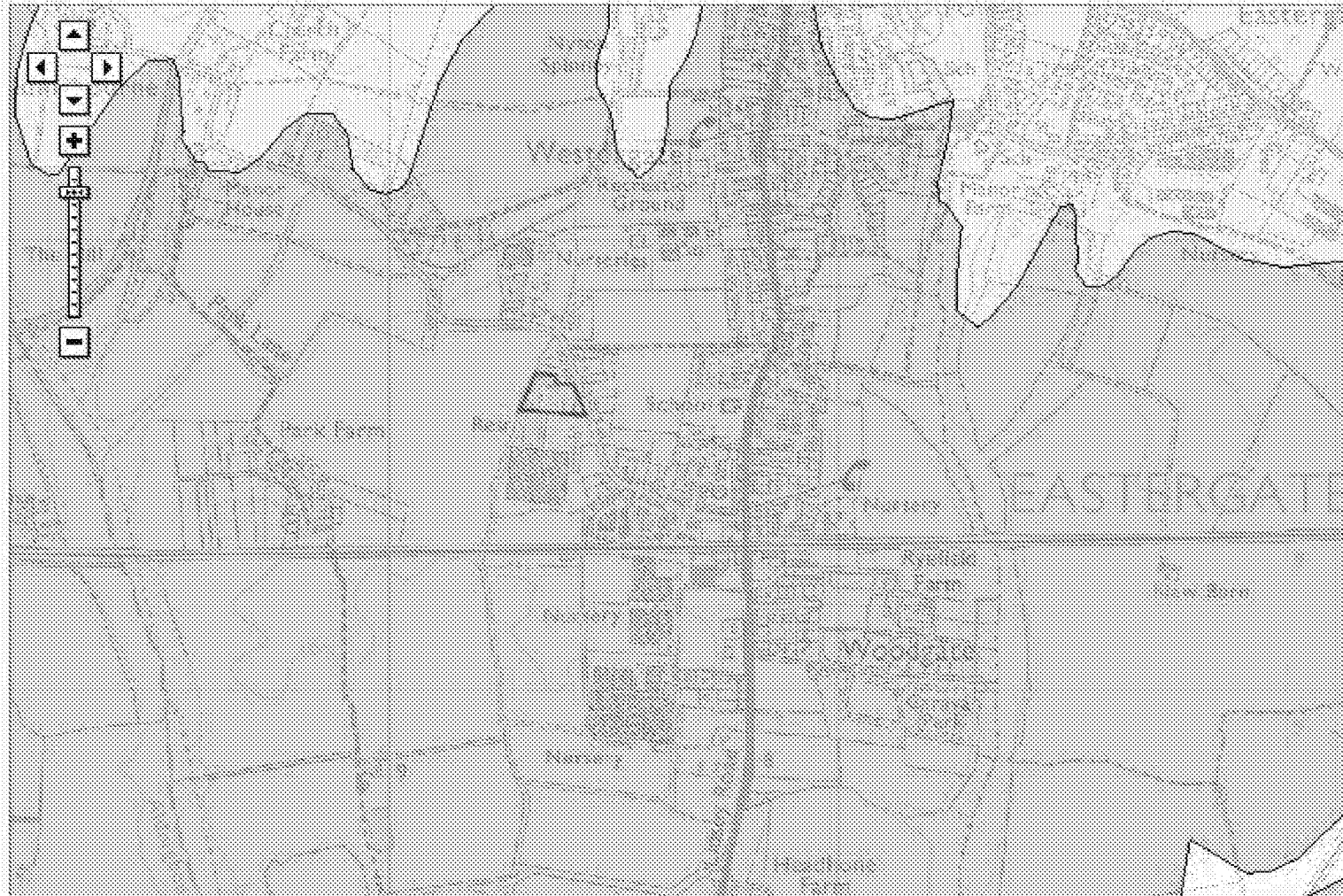
Groundwater



Map legend	
	Groundwater source protection zones
	BCS Aquifer Maps - Superficial Deposits Designation
	BCS Aquifer Maps - Bedrock Designation
	☒ Groundwater Vulnerability Zones
	Major Aquifer High
	Major Aquifer Intermediate
	Major Aquifer Low
	Minor Aquifer High
	Minor Aquifer Intermediate
	Minor Aquifer Low
	☐ Other national environmental organisations
	Natural Resources Wales Area of responsibility
	Scottish Environment Protection Agency Area of responsibility

X: 493,649;Y: 104,527 at scale 1:15,000

Other maps Data search Text only version



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Enter a postcode or place name:

Other topics for this area...



Risk of Flooding from Reservoirs



[View other Interactive Maps](#)

Risk of Flooding from Reservoirs

Reservoir flooding is extremely unlikely to happen.

The shading on the map shows the area that could be flooded if a large reservoir were to fail and release the water it holds. A large reservoir is one that holds over 25,000 cubic metres of water, equivalent to approximately 10 Olympic sized swimming pools. Since this is a worst case scenario, it's unlikely that any actual flood would be this large.

Click on the shading to see details of reservoirs that could cause flooding in this area.

Map legend

- ☒ Risk of Flooding from Reservoirs
- ☒ Maximum extent of flooding
- ☒ Other national environmental organisations
- ☒ Natural Resources Wales Area of responsibility
- ☒ Scottish Environment Protection Agency Area of responsibility

Map of X: 493,743; Y: 104,089 at scale 1:40,000

[Data search](#)



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Enter a postcode or place name:



Other topics for this area...

Risk of Flooding from Rivers and Sea

[View other Interactive Maps](#)

Risk of Flooding from Rivers and Sea

River flooding happens when a river cannot cope with the amount of water draining into it from the surrounding land. Sea flooding happens when there are high tides and stormy conditions.

The shading on the map shows the risk of flooding from rivers and the sea in this particular area.

[Click on the map for a more detailed explanation.](#)

Map of X: 493,506; Y: 104,702 at scale 1:10,000

[Data search](#)

Map legend

☒ Risk of Flooding from Rivers and Sea

☒ Other national environmental organisations

☒ Natural Resources Wales Area of responsibility

☒ Scottish Environment Protection Agency Area of responsibility

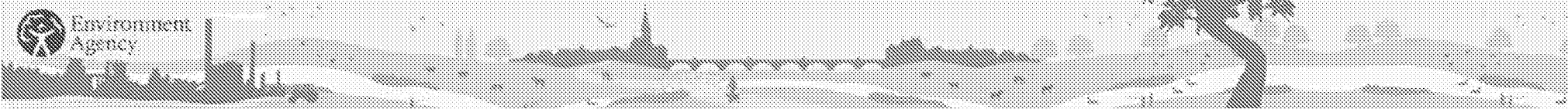
High

Medium

Low

Very Low





Enter a postcode or place name:

Other topics for this area...



Risk of Flooding from Surface Water



[View other Interactive Maps](#)

Risk of Flooding from Surface Water

Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

The shading on the map shows the risk of flooding from surface water in this particular area.

[Click on the map for a more detailed explanation.](#)

Map legend

☒ Risk of Flooding from Surface Water

☒ Other national environmental organisations

☒ Natural Resources Wales Area of responsibility

☒ Scottish Environment Protection Agency Area of responsibility

☒ High

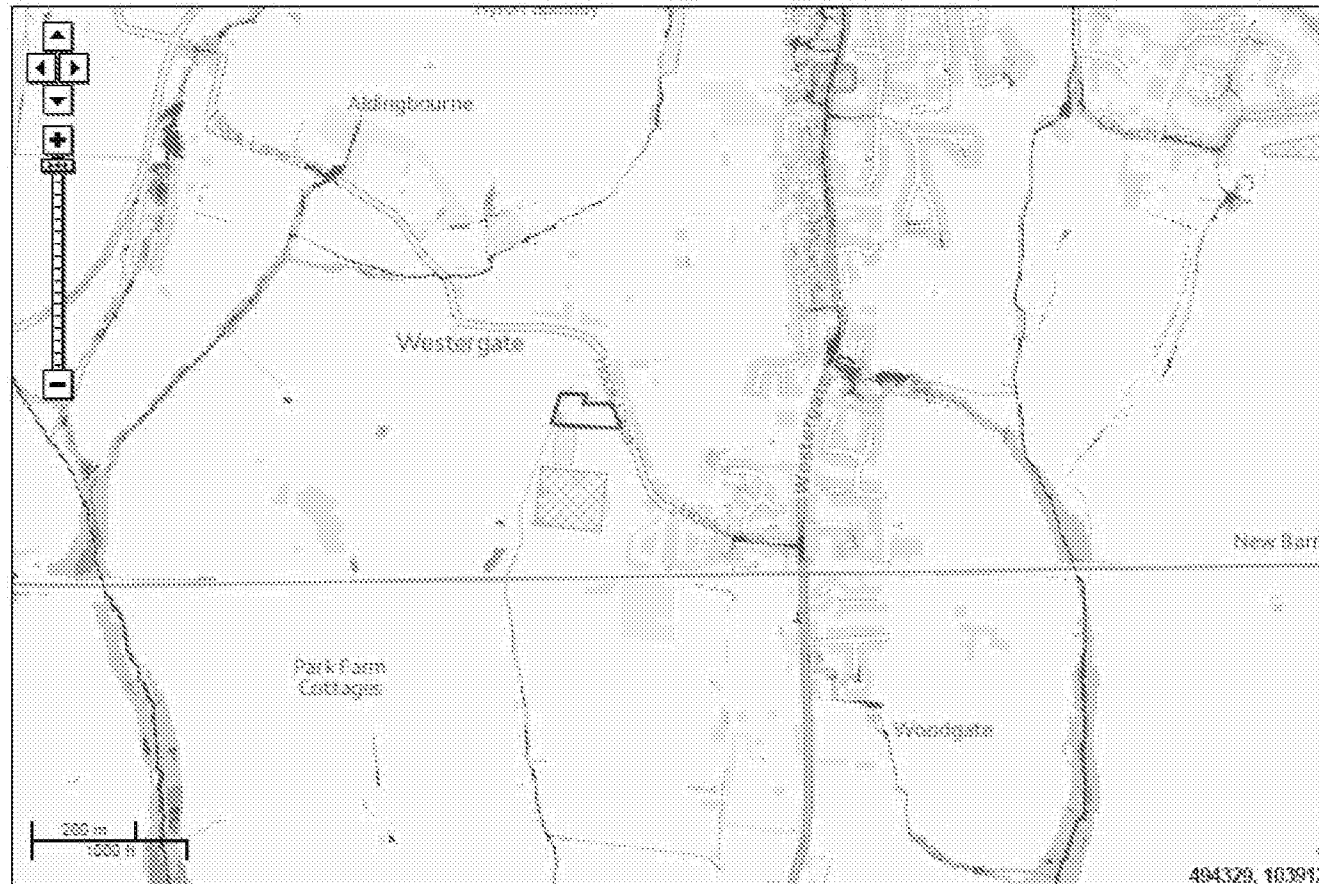
☒ Medium

☒ Low

☒ Very Low

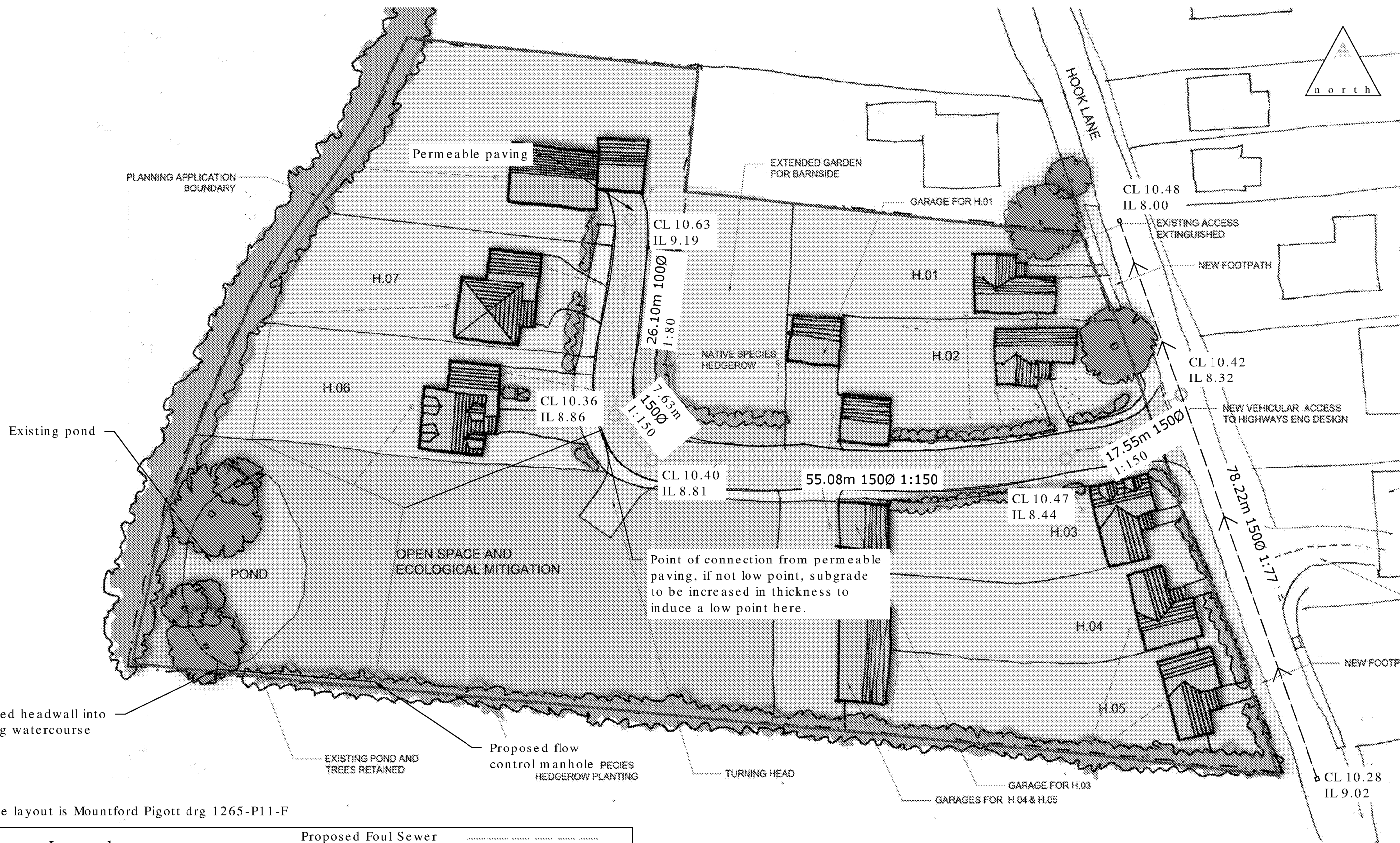
Map of X: 493,531; Y: 104,576 at scale 1:10,000

[Data search](#)



Appendix G

Proposed Drainage Strategy



Proposed site layout is Mountford Pigott drg 1265-P11-F

Legend

- Lined Permeable Road Construction
- Existing Foul Sewer
- Proposed Surface Water Inspection Chamber

- Proposed Foul Sewer
- Proposed Foul Manhole
- Indicative location of proposed surface water sewers
- Proposed dry swale
- Proposed surface water drain

232 High Street
Guildford
Surrey
GU1 3JF
T: 01483 531 300

Golden Cross House
8 Duncannon Street
London
WC2N 4JF
T: 020 7031 8141

www.motion-uk.co.uk

Project: Hook Lane, Westergate		
Title: Drainage Strategy		
Scale: 1:500 (@ A3)		
Notes:		Drawing: 15074-01
		Revision: B

Appendix H
Drainage Calculations

Runoff rate into pond

Rural Runoff Calculator

ICP SUDS

ICP SUDS Input (FSR Method)

Return Period (Years)

Area (ha)

SAAR (mm)

Soil

Growth Curve

Partly Urbanised Catchment (QBAR)

Urban

Region

Results

QBAR rural (l/s)

QBAR urban (l/s)

Return Period Flood

Region	QBAR (l/s)	Q (1yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	2.0	1.7	1.7	3.7	4.9
Region 2	2.0	1.7	1.7	3.8	5.2
Region 3	2.0	1.7	1.7	3.5	4.1
Region 4	2.0	1.8	1.8	3.9	5.1
Region 5	2.0	1.7	1.7	4.2	7.1
Region 6/Region 7	2.0	1.7	1.7	4.5	6.3
Region 8	2.0	1.5	1.5	3.8	4.8
Region 9	2.0	1.7	1.7	3.5	4.3
Region 10	2.0	1.7	1.7	3.4	4.1

OK Cancel Help

Enter Return Period between 1 and 1000

The flow into the pond will be limited to a practical minimum of 5 l/s.

Storage required for buildings draining towards the south

Quick Storage Estimate

Variables

FSR Rainfall:

Return Period (years):

Region:

Map:

Ratio R:

Cv (Summer):

Cv (Winter):

Impermeable Area (ha):

Maximum Allowable Discharge (l/s):

Infiltration Coefficient (m/hr):

Safety Factor:

Climate Change (%):

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Quick Storage Estimate

Results

Global Variables require approximate storage of between 7.6 m³ and 12 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Select required Rainfall Model from the list

Global variables require approximate storage of 11m³

Storage required for buildings draining towards the west.

Quick Storage Estimate

Variables

FSR Rainfall	Cv (Summer)	0.750
Return Period (years)	Cv (Winter)	0.840
Region	Impervious Area (ha)	0.020
Map	Maximum Allowable Discharge (l/s)	0.7
M5-60 (mm)	Infiltration Coefficient (m/hr)	0.00000
Ratio R	Safety Factor	2.0
	Climate Change (%)	40

Buttons: Analyse, OK, Cancel, Help

Enter Climate Change between -100 and 500

Quick Storage Estimate

Results

Global Variables require approximate storage of between 6.6 m³ and 11 m³.

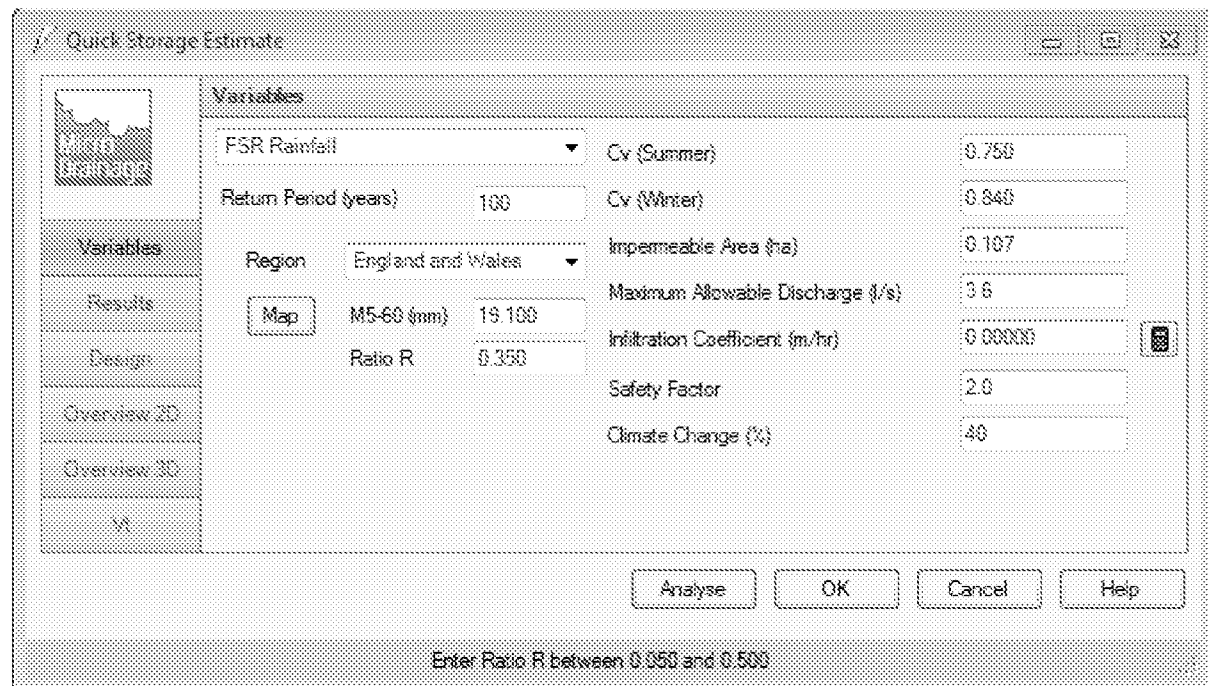
These values are estimates only and should not be used for design purposes.

Buttons: Analyse, OK, Cancel, Help

Select required Rainfall Model from the list

Global variables require approximate storage of 10m³

Storage required for buildings draining towards the permeable paving road and the road itself.



Quick Storage Estimate

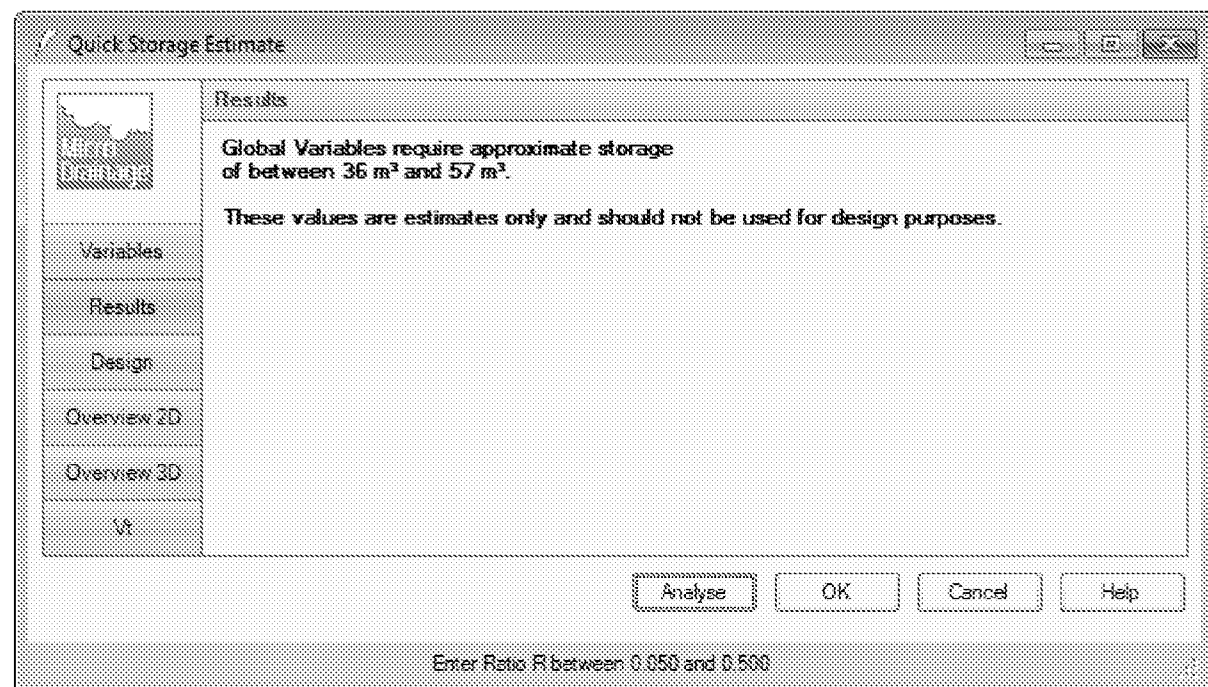
Variables

FSR Rainfall: [Dropdown]
 Return Period (years): 100
 Region: England and Wales [Dropdown]
 Map: M5-60 (mm) 19.100
 Ratio R: 0.350

Cv (Summer): 0.750
 Cv (Winter): 0.840
 Impermeable Area (ha): 0.107
 Maximum Allowable Discharge (l/s): 3.6
 Infiltration Coefficient (m/hr): 0.00000
 Safety Factor: 2.0
 Climate Change (%): 40

Analyse OK Cancel Help

Enter Ratio R between 0.050 and 0.500



Quick Storage Estimate

Results

Global Variables require approximate storage of between 36 m³ and 57 m³.
 These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Ratio R between 0.050 and 0.500

Global variables require approximate storage of 16m³

Storage required in total for all hardstanding areas

Quick Storage Estimate

Variables

Rainfall Model: M5-60

Return Period (years): 100

Region: England and Wales

Map: M5-60 (mm) 19.100

Ratio R: 0.350

Cv (Summer): 0.750

Cv (Winter): 0.840

Impermeable Area (ha): 0.150

Maximum Allowable Discharge (l/s): 5.0

Infiltration Coefficient (m/hr): 0.000000

Safety Factor: 2.0

Climate Change (%): 40

Buttons: Analyse, OK, Cancel, Help

Footer: Select required Rainfall Model from the list

Quick Storage Estimate

Results

Global Variables require approximate storage of between 50 m³ and 80 m³.

These values are estimates only and should not be used for design purposes.

Buttons: Analyse, OK, Cancel, Help

Footer: Select required Rainfall Model from the list

Global variables require approximate storage of 73 m³