

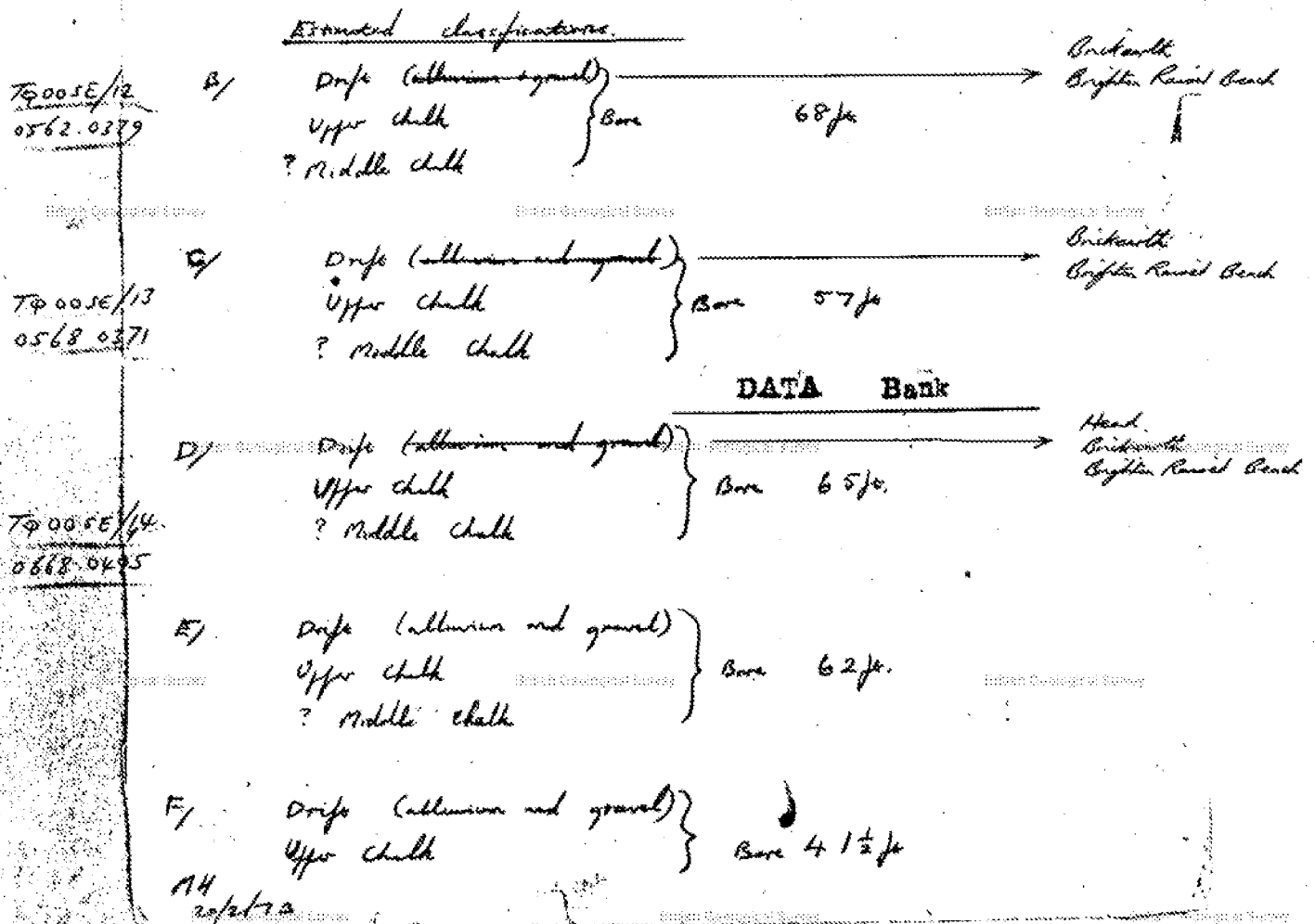
Visited.

- (b) 1. Backhole with wind pump derelict. No R.W.L.
O.D. +25.
- (c) 2 Pump house locked. No information. O.D. +22.
- (a) 3 Pump house north of golf club house locked O.D. +10.
Sited on Sussex 63 SE/W.
- (d) 4 Pump over filled-in well at North Lodge - thought to be
(Not a max - derelict).
a backhole in bottom. O.D. +34. Sited as 317/239 d.
(on old field slip W.L. said to be +4.6 on this well).

15.59 AM.

Monthly Water Level readings Nov. 1957 - Feb. 1961

are plotted on graph tracing paper and are
filed under Chichester Corporation.



R.J. Hyatt

2.11.82

T 0000/99
317 A-F
239

ANGMERING

A. TQ 0588 0389
B. TQ 0562 0379
C. TQ 0568 0371
D. TQ 0668 0405

Ham

Sir H. Fletcher

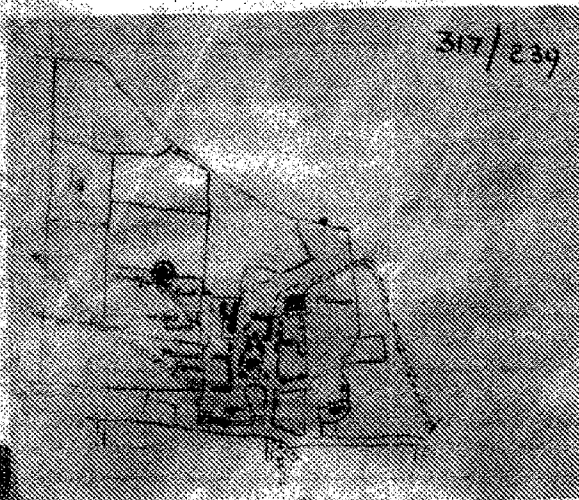
10/1893

Bore Sin.
Depth 116 ft.
Water 19 ft.

estimated classification

Drift } 116 116
U. chalk }
M. chalk }

M.H.
20/10/13



317/239

F.W. Ockenden

Information from F.W.O. records at Basingstoke
May 1941
S.O.A.H.

6" Sussex 68 16 (a)

Occupiers (Harker Estate Ltd) written to 27/8/41 before following records obtained & site

marked by them on tracing may not possibly refer to (a). Used 400 g. ph. using carbon wind pump
over engine power, see letter 4/9/41

Information from Duke & Ockenden per 25/1/39, 4/1 : —

No 1 At Ham House. Bore 116. R.W.L. 19 ft By D & O 1893.

No 2 In Park. Bore 2 in to 57 ft. R.W.L. 16 1/2 ft By D & O 1898.

No 3 Ham Manor, at Lodge. Bore to 65 ft By D & O 1898

(4)
For Sir H.A. Fletcher, 1887. Boring to 62 ft, also boring to 4 1/2 ft
By D & O. 1887.

(b) For Sir H.A. Fletcher, at Ham Manor By D & O. 1898.

Bore to 68 ft lined with 2 in tubes to 32 ft R.W.L. 23 1/2 ft

Sites of 3 boreholes obtained but could not ascertain which was
was which. The one 200 yds north of the Manor (near Golf Club Here)
is used for watering the golf course. Visited 21.12.57 P.T.O.

Visited.

- (b) 1. Borehole with wind pump derelict. No R.W.L.
O.D. +25.
- (c) 2. Pump house locked. No information. O.D. +22.
- (a) 3. Pump house north of golf club house locked. O.D. +10.
Sited on Sussex 63 SE/W.
- (d) 4. Pump over filled-in well at North Lodge - thought to be
a borehole in bottom ^(Not in use - derelict) O.D. +34. Sited as ³¹⁷239 d.
(on old field slip W.L. said to be +4.6 on this well).

18.5.59. ASK.

Monthly Water Level readings Nov. 1957 - Feb. 1961

are plotted on graph tracing paper and are
filed under Chichester Corporation.

Estimated classifications.

B/ Drifts (alluvium and gravel)
Upper chalk } Bore 68 ft.
? Middle chalk

C/ Drifts (alluvium and gravel)
Upper chalk } Bore 57 ft.
? Middle chalk

DATA Bank

D/ Drifts (alluvium and gravel)
Upper chalk } Bore 65 ft.
? Middle chalk

E/ Drifts (alluvium and gravel)
Upper chalk } Bore 62 ft.
? Middle chalk

F/ Drifts (alluvium and gravel)
Upper chalk } Bore 4 1/2 ft.

114
20/2/73

Appendix D Lead Planning Authority and Lead Local Flood Authority Consultation

From: Kevin Macknay [REDACTED]
Sent: 07 December 2018 15:51
To: Mark Akmenkalns
Subject: RE: D1623: Former Chandlers Garage, Water Lane, Angmering, BN16 4EH - FRA & Drainage Strategy Enquiry 07-12-18
Attachments: D1623_Former Chandlers Garage_Existing road gullies.pdf; D1623_Former Chandlers Garage_Existing surface water drains.pdf; D1623_Former Chandlers Garage_Extract from Southern Water report dated March 1985.pdf; D1623_Former Chandlers Garage_Surface water, ground water and EA flood zones.docx

Mark,

Further to your recent enquiry. Please see my reply below:

Flood Zones

- Please confirm the Flood Zones for this area.
The area is within the EA's flood zones 2 and 3. See attached plan.
- Please confirm surface water, reservoir flooding, sewer flooding. Please provide plans and depth data from your GIS UFMSW for 30yr, 100yr & 1000yr as applicable (OS Datum).
The area is susceptible to surface water flooding. In 2012 flood depths in the area was around 1m deep. See attached plan.
- Please confirm mapping and records for any surface water assets owned or maintained.
See attached plans for details of existing highway gullies and existing surface water drains.
- Please confirm if there are any future drainage improvements proposed for this area.
None planned at present.
- Please confirm details of existing or planned flood alleviation and defences in this area.
Currently the EA, Arun DC and WSCC are looking at a project for upstream attenuation to the north of Amgmering. However, it is currently not clear what level of benefit this could deliver and is still about 5 years away.
- Please confirm if you are aware of any historic flooding within the confines of the site.
Yes, in 2012 flood depths in the area was around 1m deep. See also extract from Southern Water report dated March 1985.
- Please confirm if you are aware of any historic flooding in close vicinity and/or on the public highway.
Yes, as above.

Groundwater

- Please confirm details of any groundwater flooding issues in the area, including flood levels, flood extents and any available anecdotal information.
Current JBA groundwater mapping shows the area to be at high risk of groundwater flooding.

Assets

- Please confirm mapping and records for any surface water assets owned or maintained.
See attached plan.
- Please confirm if there are any historic culverted watercourses within or in close vicinity to the site.
Please provide map records where available.

We believe the existing surface water drain in Water Lane may once have been an open watercourse.

- Please can you provide any map records denoting the highway drainage network. Is this a piped system or soakaways?
See attached plans.

Policy/Future

- Please confirm the most recent Strategic Flood Risk Assessment (SFRA).
WSCC SFRA - June 2010.
- Please confirm if there are any future drainage improvements proposed for this area.
See above.
- Please confirm if any drainage studies and/or SWMP have/are being assess for this area.
See above.

Kevin Macknay

Flood Risk Management – Team Leader
Economy, Infrastructure and Environment
Highways and Transport
West Sussex County Council

From: Mark Akmenkalns [REDACTED]
Sent: 07 December 2018 [REDACTED]
To: Kevin Macknay
Subject: D1623: Former Chandlers Garage, Water Lane, Angmering, BN16 4EH - FRA & Drainage Strategy Enquiry 07-12-18

Dear Kevin,

We are preparing a drainage strategy for the above site and would be grateful if you could provide us with any relevant information you have as per our drainage checklist below:

Flood Zones

- Please confirm the Flood Zones for this area.
- Please confirm surface water, reservoir flooding, sewer flooding. Please provide plans and depth data from your GIS UFMSW for 30yr, 100yr & 1000yr as applicable (OS Datum).
- Please confirm mapping and records for any surface water assets owned or maintained.
- Please confirm if there are any future drainage improvements proposed for this area.
- Please confirm details of existing or planned flood alleviation and defences in this area.
- Please confirm if you are aware of any historic flooding within the confines of the site.
- Please confirm if you are aware of any historic flooding in close vicinity and/or on the public highway.

Groundwater

- Please confirm details of any groundwater flooding issues in the area, including flood levels, flood extents and any available anecdotal information.

Assets

- Please confirm mapping and records for any surface water assets owned or maintained.
- Please confirm if there are any historic culverted watercourses within or in close vicinity to the site. Please provide map records where available.
- Please can you provide any map records denoting the highway drainage network. Is this a piped system or soakaways?

Policy/Future

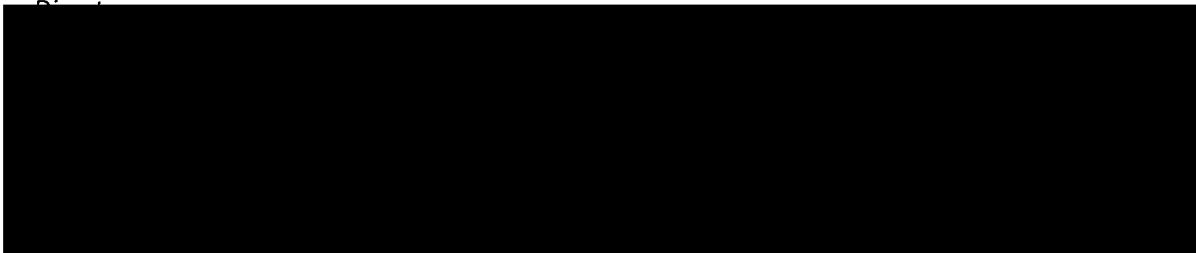
- Please confirm the most recent Strategic Flood Risk Assessment (SFRA).
- Please confirm if there are any future drainage improvements proposed for this area.
- Please confirm if any drainage studies and/or SWMP have/are being assess for this area.

We look forward to hearing from you in due course.

Regards,

Mark Akmenkalns

Director



Transport Planning and Infrastructure Design Consultants

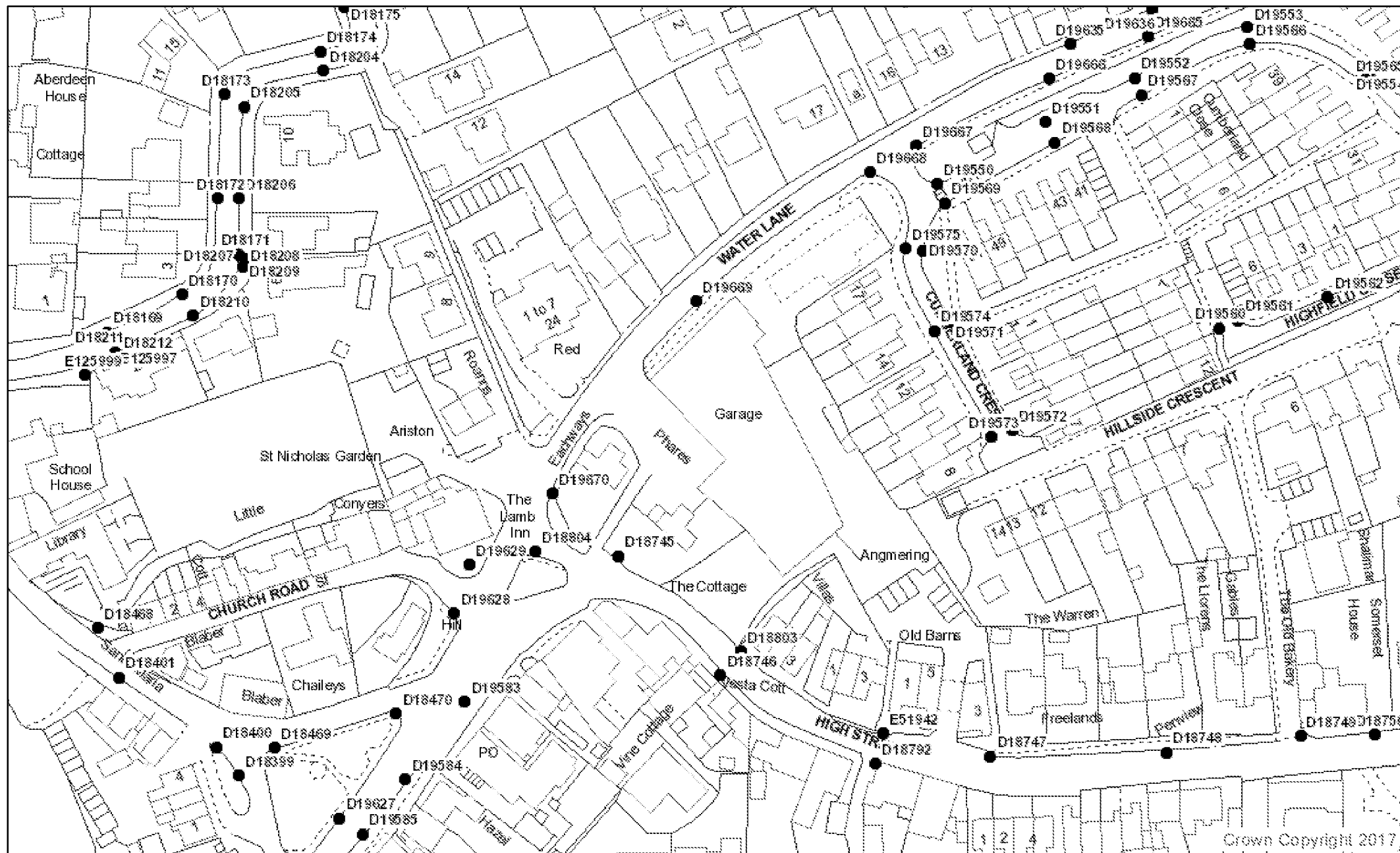
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This is a detailed black and white street map of a residential area in London. The map shows a network of streets including Church Road St, High Street, Water Lane, Hillside Crescent, and Highfield Close. Various buildings and landmarks are labeled, such as Aberdeen House, Cottage, School House, Library, St Nicholas Garden, Little, Conyers, The Lamb Inn, The Cottage, Angmering, Old Barns, The Warren, Freeland, Periwinkle, The Old Bakery, Somerset House, and The Old Bakery. The map also shows numerous numbered plots and buildings, indicating a dense residential area. The map is oriented with North at the top.

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West Sussex County Council
100023447 (2017)

Water Lane, Angmering - Existing Road Gullies



Date: December 2018

Author: K Macknay

Scale 1:1,250

Map Notes:

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West Sussex County Council
100023447 (2017)

2.3 Patching Pond appears to derive its supply directly from rainfall running off the Tertiary clays mainly to the West, and this is substantiated by records of flow out of the Pond which show a quick reaction following a rainstorm. Nonetheless, flows into the Pond from the north will occur under extreme conditions. Water discharging from the disused brickworks pit at Wyatt's Copse, Clapham, flows to a large partially silted swallow hole north of the pond, but as ground water levels in the chalk are at least 10 metres below the ground surface at the chalk/clay intersect, it is not likely that the storm rainfall on to the chalk will contribute to flows in the stream except in most exceptional circumstances. These arise after a prolonged drought or during rapid snowmelt at the end of a long period of sub-zero (C) temperatures when the capacity of the chalk readily to absorb water is temporarily lost.

2.4 The Water Lane Stream flows out of Patching Pond and thence generally in a south-westerly direction to Angmering Village. Through the village, the stream is confined within culverts that run under Water Lane (A.280) and The Square. Below The Square, the stream emerges to flow in open channel as the Black Ditch. The total length of the stream between Patching Pond and the Black Ditch is 1.4 km. The stream is not classified as statutory main river (as defined by Section 8(3) Land Drainage Act 1976) and hence responsibility for maintenance rests in the first instance with the riparian owners. Permissive powers are however, available to the District Council, or in default thereof the County Council, to undertake works against flooding (L.D. Act 1976 S.98).

2.5 The Black Ditch, which is classified main river, flows generally in a westerly direction through the Ham Manor golf course and farmland, eventually to discharge to the tidal River Arun west of Lyminster at a point 6 km. downstream of Angmering.

3.0 History of Flooding

3.1 As the name Water Lane implies, the village has probably experienced periodical flooding since time immemorial.

- 3.2 Over the last three decades, relatively severe flooding occurred during the winter of 1960/61, in November 1974, September and October 1980, and June and August 1981.
- 3.3 Contemporary reports indicated that the 1960/61 floods were amongst the most severe with depths of flood water in the vicinity of the village green reported to be up to 600 mm.
- 3.4 Works to improve the culvert capacity were carried out in 1973 although heavy rainfall on the 22nd November 1974 did give rise to further flooding with the garage showrooms in Water Lane being flooded to a depth of 225 mm.
- 3.5 In 1980, flooding occurred on 20th September, and again three weeks later on 10th/11th October. These events arose from two extraordinarily heavy rainstorms which also caused severe flooding at other locations in the central West Sussex area.
- 3.6 Two more floods were experienced the following year and these happened respectively on the 2nd June and 6th August 1981.

4.0 Extent of flooding

- 4.1 Information as to the extent of flooding and damage caused on each of the four occasions between September 1980 and August 1981 is scant.
- 4.2 The first report received by the Authority of flooding in Water Lane at this time did in fact relate to the June 1981 event.
- 4.3 It might be inferred therefore that the scale of flooding both in September and October 1980 was not particularly large.
- 4.4 On 2nd June 1981 flooding along Water Lane commenced at about 4.30 a.m. and water levels rose sufficiently to flood above ground floor level in at least 13 houses and the garage showroom. Quite apart from damage to domestic furniture and fittings, a total of eight cars were seriously damaged, some apparently to a point beyond economic repair.

- 4.5 Features of the flood noted at the time were that surface water running down Dappers Lane and Weavers Hill was unable to enter the drainage system and as a consequence water flowed on into Water Lane thus adding to the flooding problem.
- 4.6 In addition, the inlets to the two culverts carrying the main stream flow at the junction of Water Lane/Weavers Hill were seriously obstructed by debris.
- 4.7 Manhole covers on the old culvert were observed to have been lifted as a result of surcharging, and it was also noted that at this time the outlet to the culvert downstream of The Square was not flowing full and there was adequate capacity in the receiving watercourse, namely the Black Ditch.
- 4.8 Also at this time water was flowing down Water Lane into The Square, where the maximum water level was reported as being a few inches below the top of a public seat. This points to a depth of flooding in The Square of up to 0.6 metres.
- 4.9 In August 1981 flooding appears to have been confined to The Square together with perhaps the area in the vicinity of the Village Hall.

5.0 Water Lane Culvert

- 5.1 Prior to 1973, the Water Lane Stream was carried under the highway by means of a culvert which varied in cross-section but was generally 1.3 m (4'2") wide x 0.66 m (2'2") high.
- 5.2 As a result of the flooding which regularly took place, a relief culvert was constructed and this comprised a 130 m. long 1.33 m. (4'6") dia. circular pipe between the point of discharge to the Black Ditch and a manhole outside 'Eachways' (Fig. No.2). This was built along the line of the original culvert which was removed.
- 5.3 The new relief culvert was continued upstream of the 'Eachways' manhole, but in 1.2 m dia. circular pipe to a point immediately upstream of the Weavers Hill crossing that is a further distance of 400 m.

Charlotte Burrows

From: Paul Cann
Sent: 18 February 2013 12:57
To: Planningecons; Planning.Responses
Subject: RE: Planning Consultation on: A/15/13/

Engineers comments in respect to surface water drainage:

A significant proportion of the site is located within flood zone 3A as indicated on the Environment Agencies flood maps. Please consult the Environment Agency on this matter.

Since the site is within an area of high flood risk, I would recommend that the application is refused as any proposed drainage system would be inundated with flood water and this would therefore have a detrimental effect on the operation of that system. The applicant does not state how this issue will be addressed.

Should you decide to permit the development, then please apply standard condition ENGD2A & ENGD5A, and the following informatives.

Infiltration rates for soakage structures are to be based on percolation tests undertaken in the winter period and at the location and depth of the proposed structures. The percolation tests and design must be carried out in accordance with BRE 365, CIRIA R156 or a similar approved method and cater for the 1 in 10 year storm between the invert of the entry pipe to the soakaway, and the base of the structure. It must also have provision to ensure that there is capacity in the system to contain below ground level the 1 in 100 year event plus 30% on stored volumes, as an allowance for climate change. Adequate freeboard must be provided between the base of the soakaway structure and the highest recorded annual groundwater level identified in that location.

Any SuDS or soakaway design must include adequate groundwater monitoring data (October to March) to determine the highest winter groundwater table in support of the design.

The applicant will need to demonstrate how the capacity and operation of the proposed drainage system will not be compromised during flood conditions.

According to our records there are two large culverts adjacent to the site, in Water Lane. Both are believed to be classed as critical ordinary watercourses (main river) and therefore managed by the Environment Agency. The applicant must verify the exact location of the culvert which is closest to the site to ensure that the new development has no detrimental effect upon its construction. The applicant should discuss this issue with the Environment Agency.

Regards

Paul Cann
Senior Engineer (Drainage & Coastal)

Sent: 04 February 2013 12:01

To: Brian Holland

Subject: Planning Consultation on: A/15/13/

To: **Engineering Services Manager**

NOTIFICATION FROM ARUN DISTRICT COUNCIL

Town & Country Planning Act 1990 (as amended)

Town and Country Planning (Development Management Procedure) (England) Order 2010 (as amended)

Planning Permission

APPLICATION **A/15/13/**

NO:

Registered: 1st February
2013

Site Address: Chandlers Garage BMW House Water Lane Angmering BN16
4EH

Grid Reference: 506925 104447

Description of Works: Proposed demolition of existing Chandlers BMW dealership and Pharers Courtledge and erection of 22 dwellings (including 7 affordable dwellings) with associated, car parking, access roads and landscaping.

The Council have received the above planning application. I shall be pleased to receive any observations you may wish to make.

[Click here to view the application details](#)

Should you have any comments to make, these should be sent by replying to this email by 07-MAR-13.

You can also monitor the progress of this application through the Council web site:

www.arun.gov.uk/planning

Please be aware that any comments you may make will be available on our website so please do not insert personal details or signatures on your reply.

In the absence of a reply within the period stated, I shall assume that you have no observations to make.

The application will be determined having regard to the development plan policies (if any are relevant) and other material considerations. The development plan can be accessed via the website as can the leaflet which deals with material planning considerations.

Should the application go to appeal the Planning Inspectorate will publish any comments made to the Council on their website:

www.planningportal.gov.uk/planning/appeals/ but they will protect personal details.

The officer dealing with this application is Mr C Cronin who can be contacted on telephone number [REDACTED]

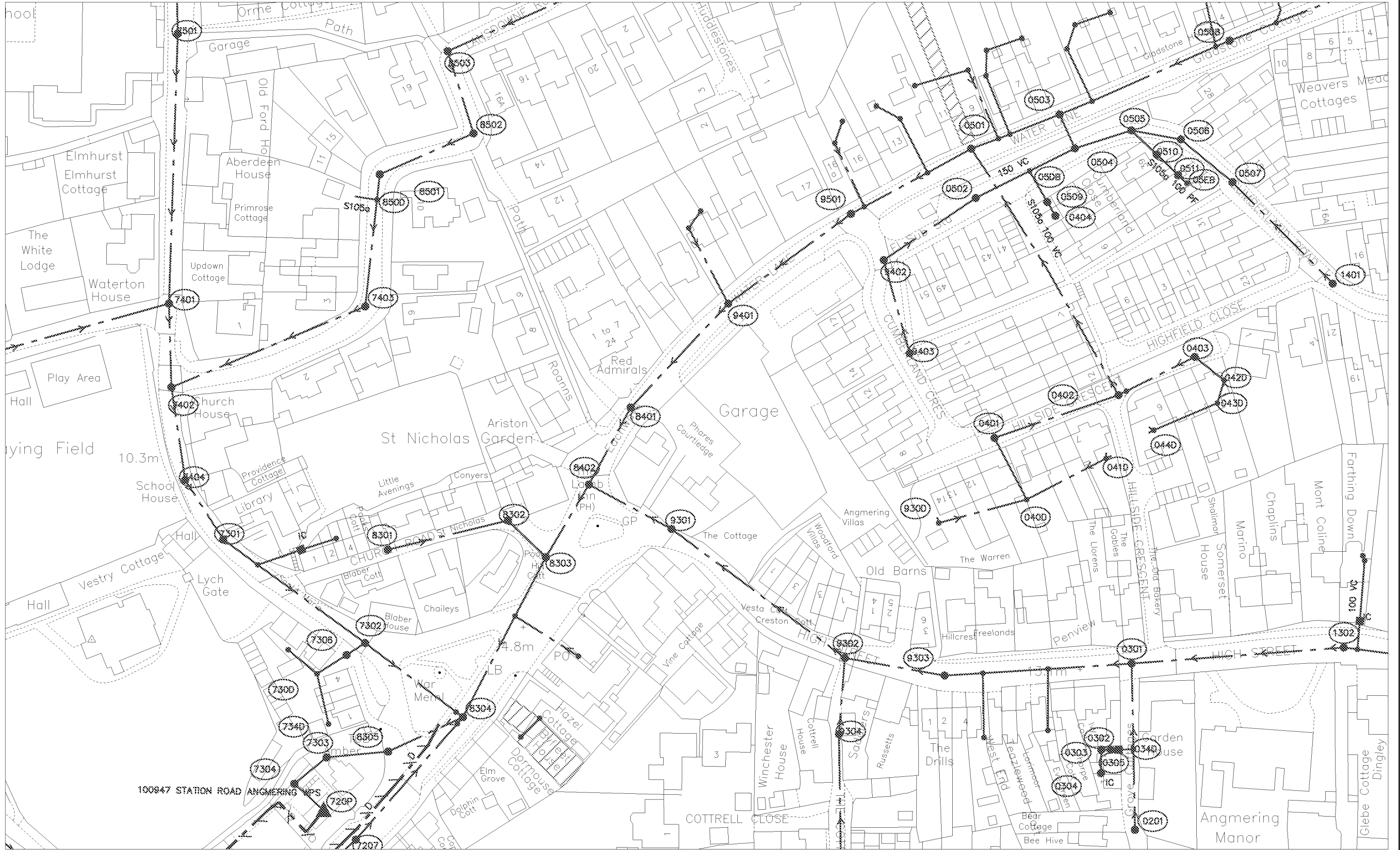
Regards
Planning Officer

consultee_email

Appendix E Public Sewer Records

SEWER RECORDS PAGE 1 OF 2

104572



104284

506676

O.S. REF. TQ0604SE	Drawn by: ahmadr	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. <i>WARNING: BAC pipes are constructed of Bonded Asbestos Cement</i> <i>WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement</i>	 N		507148
	Scale: 1:1250				
Title: 320794_Chandlers BMW Water Lan	Date: 12/12/2018	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.			

BRUN DISTRICT COUNCIL A/45/19/PL

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
0201X	13.66		150	VC	CIRC	7403X	11.8	8.66	150	VC	CIRC												
0301X	13.06	10.04	175	VC	CIRC	7404X	10.19	7.91	175	VC	CIRC												
0302X			UNK	UNK	CIRC	7501X	11.88	8.7	175	VC	CIRC												
0303X			UNK	UNK	CIRC	8301X	5.89	4.35	150	VC	CIRC												
0304X			UNK	UNK	CIRC	8302X	5.22	3.62	150	VC	CIRC												
0305X			UNK	UNK	CIRC	8303X	5.16	2.24	200	VC	CIRC												
030DX			UNK	UNK	UNK	8304X	4.67	1.91	300	VC	CIRC												
031DX			175	VC	CIRC	8305X	4.62	1.39	300	VC	CIRC												
032DX			UNK	UNK	UNK	830DX			UNK	UNK	UNK												
033DX			175	VC	CIRC	831DX			UNK	UNK	UNK												
034DX			150	VC	CIRC	832DX			200	VC	CIRC												
0401X	11.59	9.97	150	VC	CIRC	8401X	5.73	2.58	175	VC	CIRC												
0402X	12.17	9.54	150	VC	CIRC	8402X	5.49	2.46	200	VC	CIRC												
0403X	12.35	10.76	150	VC	CIRC	8501X	12.11	9.06	150	VC	CIRC												
0404X			100	VC	CIRC	8502X	12.43	9.34	150	VC	CIRC												
040DX	11.62	10.49	100	VC	CIRC	8503X	12.78	9.58	150	VC	CIRC												
041DX	12.04	11.7	100	VC	CIRC	850DX			150	VC	CIRC												
042DX	12.46	11.15	100	VC	CIRC	9301X	5.45	3.9	175	VC	CIRC												
043DX	12.54		100	VC	CIRC	9302X	11.62	9.52	175	VC	CIRC												
044DX	12.42		100	VC	CIRC	9303X	12.49	9.75	175	VC	CIRC												
0501X	5.55	3.34	175	VC	CIRC	9304X	13.17	10.47	150	VC	CIRC												
0502X	6.27	4.31	150	VC	CIRC	930DX	11.54	11.07	100	VC	CIRC												
0503X	5.54	3.56	175	VC	CIRC	9401X	5.76	2.83	175	VC	CIRC												
0504X	6.59	3.74	150	VC	CIRC	9402X	6.28	4.48	150	VC	CIRC												
0505X	6.78	4.51	150	VC	CIRC	9403X	7.66	6.06	150	VC	CIRC												
0506X	7.1	5.41	150	VC	CIRC	940DX			UNK	UNK	UNK												
0507X	8.59	7.15	150	VC	CIRC	9501X	5.59	3.11	175	VC	CIRC												
0508X	5.7	3.94	175	VC	CIRC	950BX			175	VC	CIRC												
0509X			100	VC	CIRC	950DX			UNK	UNK	UNK												
050DX			175	VC	CIRC	951BX			UNK	UNK	UNK												
0510X			100	PF	CIRC	951DX			UNK	UNK	UNK												
0511X			100	PF	CIRC	952BX			175	VC	CIRC												
051BX			UNK	UNK	UNK	952DX			UNK	UNK	UNK												
051DX			175	VC	CIRC	953DX			UNK	UNK	UNK												
052BX			175	VC	CIRC	954DX			UNK	UNK	UNK												
052DX			UNK	UNK	UNK																		
053BX			175	VC	CIRC																		
053DX			UNK	UNK	UNK																		
054BX			UNK	UNK	UNK																		
05ABX			UNK	UNK	UNK																		
05BBX			UNK	UNK	UNK																		
05CBX			UNK	UNK	UNK																		
05DBX			150	VC	CIRC																		
05EBX			100	PF	CIRC																		
1302X	13.46	10.33	175	VC	CIRC																		
1303X			100	VC	CIRC																		
131DX			100	VC	CIRC																		
132DX			100	VC	CIRC																		
133DX			175	VC	CIRC																		
1401X	12.65	11.05	150	VC	CIRC																		
151DX			150	VC	CIRC																		
7207X	4.78	3.17	175	VC	CIRC																		
7301Y	8.79	6.99	175	VC	CIRC																		
7302X	4.72	3.09	175	VC	CIRC																		
7303X	4.88	1.03	300	VC	CIRC																		
7304X	4.8	0.86	300	VC	CIRC																		
7305X			UNK	UNK	UNK																		
7306X			UNK	UNK	CIRC																		
730DX			UNK	UNK	UNK																		
731DX			UNK	UNK	UNK																		
732DX			175	VC	CIRC																		
733DX			UNK	UNK	UNK																		
734DX			UNK	UNK	CIRC																		
7401X	11.06	8.24	175	VC	CIRC																		
7402X	10.67	8.06	175	VC	CIRC																		

LINE STYLES / COLOURS

Brown	-----	Foul
Dark Blue	-----	Foul Siphon Sewer
Purple	-----	Foul Vacuum Main
Red	-----	Foul Rising Main
Orange	-----	Combined
Dark Blue	-----	Combined Siphon Sewer
Purple	-----	Combined Rising Main
Light Blue	-----	Lateral Drain
Yellow	-----	Building Over Agreement Area
Green	-----	Treated Effluent
Dark Blue	-----	Sludge
Purple	-----	Sewer Catchment
Light Blue	-----	Section 104 Area
Yellow	-----	Surface Water
Green	-----	Surface Water Rising Main
Dark Blue	-----	Private
Purple	-----	Access Shaft
Light Blue	-----	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
GRP	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	Verified 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)
Demonstration 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
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	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	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: ahmadr

Title: 320794_Chandlers BMW Water Lan

Date: 12/12/2018



Appendix F Environment Agency Product 4 Response

Liam Foord
RGP Design
2, West Barn
Norton Lane
Chichester
PO20 3AF

Our ref: SSD110485
Your ref:
Date: 02/01/2019

Dear Liam,

Enquiry Regarding Product 4 for Flood Risk Assessment for Chandlers Garage, Bmw House, Water Lane, Angmering, BN16 4EH

Thank you for your enquiry which was received on 07 December 2018.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

The information on Flood Zones in the area relating to this address is as follows:

The site is in an area located within Flood Zone 3 as shown on our Flood Map for Planning (Rivers and Sea).

Note - This information relates to the area that the above named property is in and is not specific to the property itself as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.

Flood Zone definitions can be found at www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones

Flood Defences

There are no formal raised flood defences in the vicinity of the site.

Model Information

The model used was the Lower Tidal River Arun Strategy Study which was completed by Atkins in 2010.

Flood History

We hold no record of flooding events affecting this site, but a nearby area was previously flooded in 1980 (Flood Event Code: 2043). The source of the flooding was drainage and the cause was fluvial flooding.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flood Authority, **West Sussex County Council** or the Local Authority, **Arun District Council** for a more comprehensive flood history check.

FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for Chandlers Garage, Bmw House, Water Lane, Angmering, BN16 4EH.
Licence	<u>Open Government Licence</u>
Information Warnings	The majority of our models will not have the new climate change allowances for <u>fluvial</u> flood risk. +20% is not suitable for the majority of planning purposes and the new allowances to use should be checked here: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

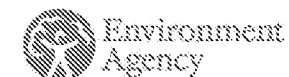
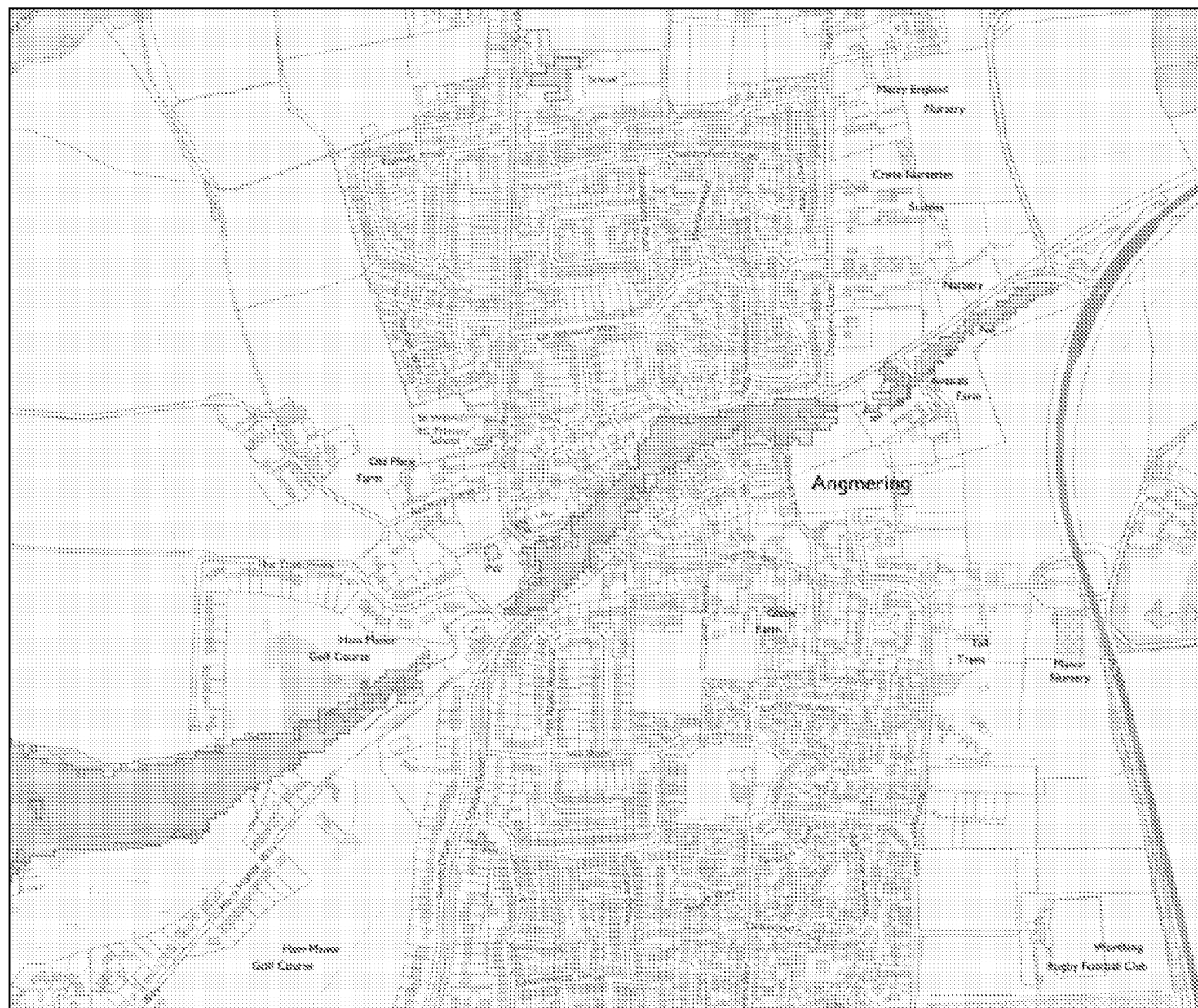
- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#))
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

Eleonora Pilla
Flood and Coastal Risk Management Officer
Partnership & Strategic Overview
West Sussex

Flood Map for Planning (Rivers and Sea) created 02/01/2019.



Scale 1: 10,000



Flood Map for Planning (Rivers & Sea)

- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

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Product 4 Flood Risk Data Requested by: Liam Foord

Site: CHANDLERS GARAGE, BMW HOUSE, WATER LANE, ANGMERING, LITTLEHAMPTON, BN16 4EH

Table 1: Water Levels: Fluvial Undefended

	NGR		Modelled Flood Levels in Metres			
			Undefended Annual Exceedance Probability			
Node Reference	Eastings	Northings	5%	1%	1% Plus Climate Change	0.1%
1	506961	104488	-	6.03	6.08	6.21
2	506897	104427	-	5.63	5.67	5.74
3	506896	104402	-	5.53	5.55	5.63
4	506931	104404	-	-	-	-

Table 2: Water Levels: Fluvial Defended

	NGR		Modelled Flood Levels in Metres					
			Defended Annual Exceedance Probability					
Node Reference	Eastings	Northings	20%	5%	1.3%	1%	1% + CC	0.1%
1	506961	104488	-	-	6.18	6.20	6.23	6.33
2	506897	104427	-	-	5.50	5.52	5.52	5.67
3	506896	104402	-	-	5.46	5.52	5.52	5.62
4	506931	104404	-	-	-	-	-	-

Table 3: Water Depth: Fluvial Undefended

	NGR		Modelled Flood Depth in Metres			
			Undefended Annual Exceedance Probability			
Node Reference	Eastings	Northings	5%	1%	1% Plus Climate Change	0.1%
1	506961	104488	-	0.35	0.41	0.53
2	506897	104427	-	0.08	0.12	0.19
3	506896	104402	-	0.05	0.08	0.15
4	506931	104404	-	-	-	-

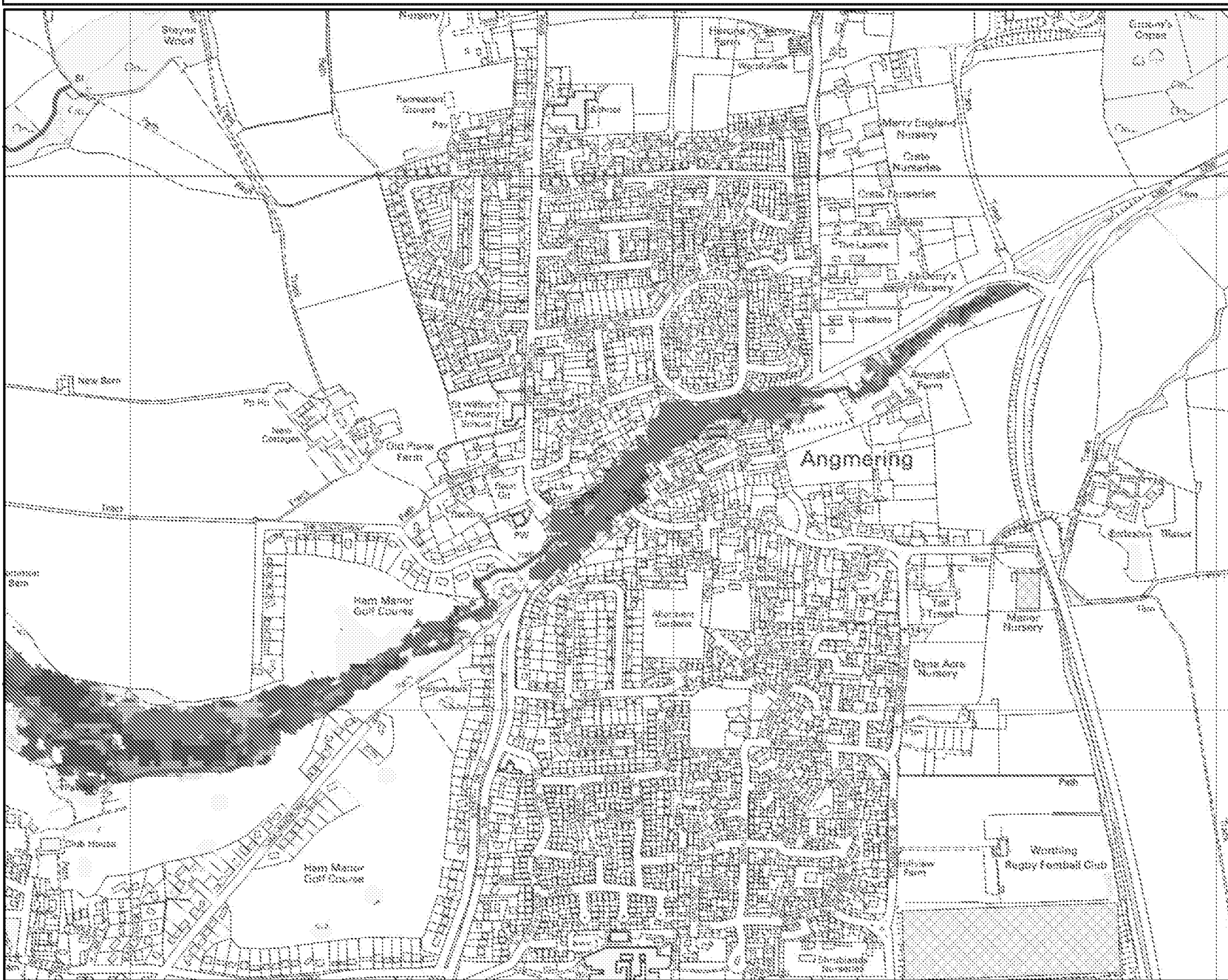
Table 4: Water Depth: Fluvial Defended

	NGR		Modelled Flood Depth in Metres					
			Defended Annual Exceedance Probability					
Node Reference	Eastings	Northings	20%	5%	1.3%	1%	1% + CC	0.1%
1	506961	104488	-	-	0.18	0.19	0.23	0.33
2	506897	104427	-	-	0.03	0.05	0.09	0.20
3	506896	104402	-	-	0.09	0.10	0.15	0.25
4	506931	104404	-	-	-	-	-	-

All levels taken from: Lower Tidal River Arun Strategy Study, completed in 2010 by Atkins

There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

Produced on 02/01/2019



Environment
Agency



N

Legend

- Main River
- 20% AEP (Defended Fluvial)
- 5% AEP (Defended Fluvial)
- 1.3% AEP (Defended Fluvial)
- 1% AEP (Defended Fluvial)
- 1% AEP Plus Climate Change (Defended Fluvial)
- 0.1% AEP (Defended Fluvial)

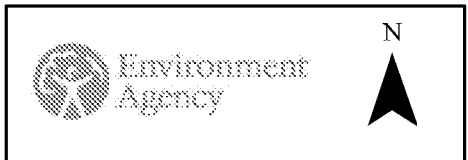
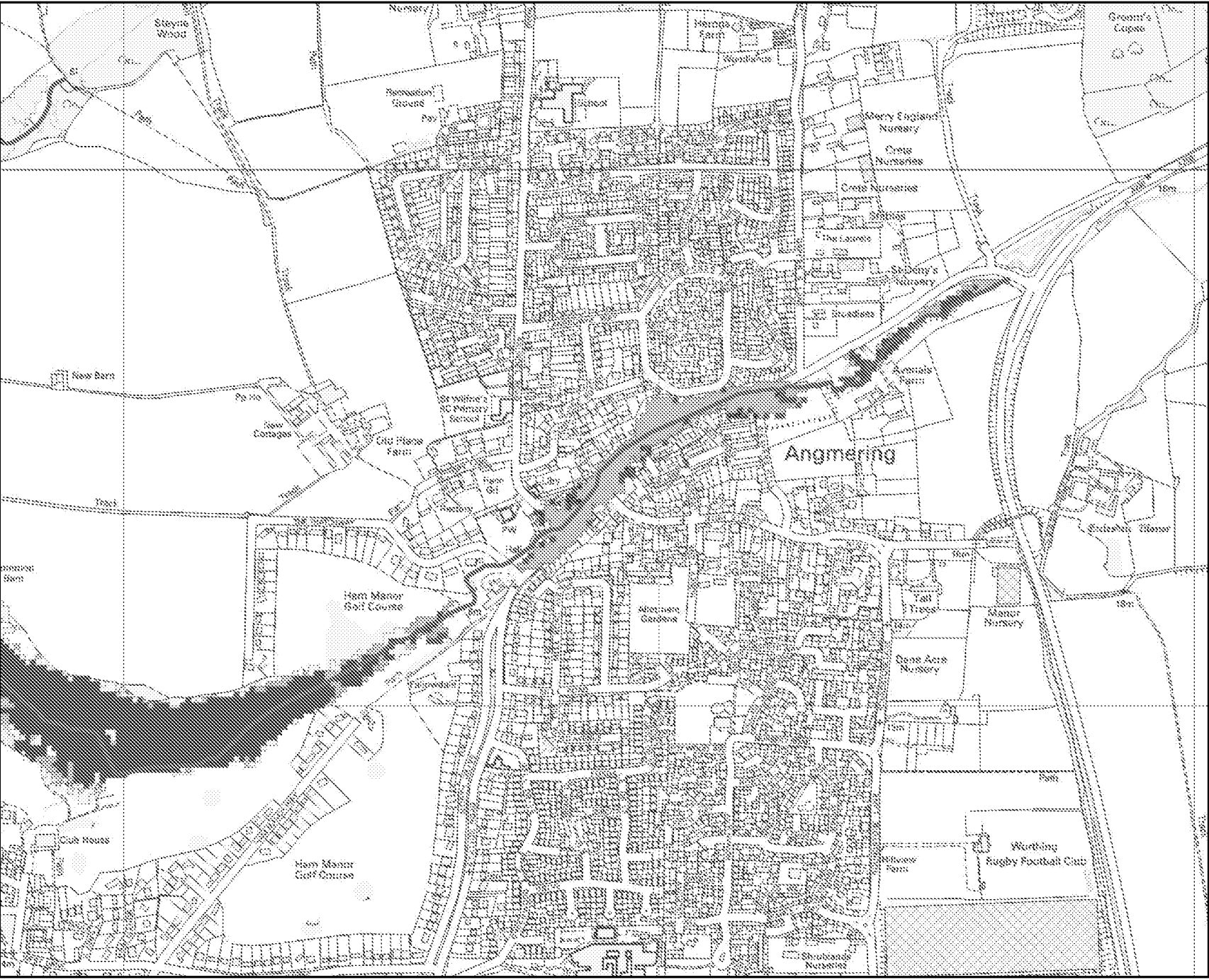
Climate Change (CC) extent based on an increase of 20% in river flows.

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000



0 0.25 0.5
Kilometers



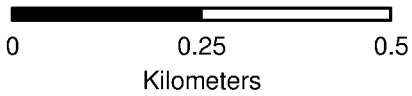
Legend

- Main River
- 5% AEP (Undefended Fluvia)
- 1% AEP (Undefended Fluvia)
- 1% AEP Plus Climate Change (Undefended Fluvia)
- 0.1% AEP (Undefended Fluvia)

Climate Change (CC) extent based on an increase of 20% in river flows.

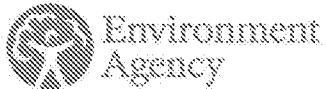
Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000





Recorded Flood Events Outlines



Legend

- Sealed Main Rivers
All recorded flood outlines



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Appendix G MicroDrainage Calculations

RGP Design Limited		Page 1
2 West Barn Norton Lane Chichester PO20 3AF	Greenfield Runoff D1623 Former Chandlers BMW Angmering	
Date 07/01/2018 File	Designed by D Lytton Checked by	
Innovyze	Source Control 2017.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.400
Area (ha)	0.470	Urban	0.000
SAAR (mm)	737	Region Number	Region 7

Results 1/s

QBAR Rural	1.7
QBAR Urban	1.7
Q100 years	5.4
Q1 year	1.4
Q30 years	3.8
Q100 years	5.4

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RGP Design Limited		Page 1
2 West Barn Norton Lane Chichester PO20 3AF	Greenfield Runoff Volume D1623 Former BMW Chandlers Angmering	
Date 07/01/2018 File	Designed by D Lytton Checked by	
Innovyze	Source Control 2017.1	

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.700
Ratio R	0.350
Areal Reduction Factor	1.00
Area (ha)	0.470
SAAR (mm)	732
CWI	109.129
Urban	0.000
SPR	37.000

Results

Percentage Runoff (%)	37.32
Greenfield Runoff Volume (m ³)	114.017

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RGP Design Limited						Page 1																																																																																																																																																																																																																																																																																		
2 West Barn Norton Lane Chichester PO20 3AF			D1623 Drainage Strategy Residential Area Permeable Paving																																																																																																																																																																																																																																																																																					
Date 25/02/2019 File D1623 RESIDENTIAL AREA....			Designed by D Lytton Checked by																																																																																																																																																																																																																																																																																					
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 155 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max E Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>6.078</td><td>0.128</td><td>0.0</td><td>4.7</td><td>4.7</td><td>34.2</td><td>Flood Risk</td></tr><tr><td>30 min Summer</td><td>6.134</td><td>0.184</td><td>0.0</td><td>4.7</td><td>4.7</td><td>49.3</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>6.185</td><td>0.235</td><td>0.0</td><td>4.7</td><td>4.7</td><td>62.8</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>6.215</td><td>0.265</td><td>0.0</td><td>4.7</td><td>4.7</td><td>71.0</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>6.213</td><td>0.263</td><td>0.0</td><td>4.7</td><td>4.7</td><td>70.3</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>6.205</td><td>0.255</td><td>0.0</td><td>4.7</td><td>4.7</td><td>68.1</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>6.189</td><td>0.239</td><td>0.0</td><td>4.7</td><td>4.7</td><td>63.9</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>6.173</td><td>0.223</td><td>0.0</td><td>4.7</td><td>4.7</td><td>59.8</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>6.158</td><td>0.208</td><td>0.0</td><td>4.7</td><td>4.7</td><td>55.6</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>6.142</td><td>0.192</td><td>0.0</td><td>4.7</td><td>4.7</td><td>51.4</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>6.112</td><td>0.162</td><td>0.0</td><td>4.7</td><td>4.7</td><td>43.2</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>6.056</td><td>0.106</td><td>0.0</td><td>4.7</td><td>4.7</td><td>28.4</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>5.987</td><td>0.037</td><td>0.0</td><td>4.7</td><td>4.7</td><td>9.8</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>5.955</td><td>0.005</td><td>0.0</td><td>4.7</td><td>4.7</td><td>1.2</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>5.950</td><td>0.000</td><td>0.0</td><td>3.7</td><td>3.7</td><td>0.0</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>5.950</td><td>0.000</td><td>0.0</td><td>2.9</td><td>2.9</td><td>0.0</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>5.950</td><td>0.000</td><td>0.0</td><td>2.4</td><td>2.4</td><td>0.0</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>5.950</td><td>0.000</td><td>0.0</td><td>2.1</td><td>2.1</td><td>0.0</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>5.950</td><td>0.000</td><td>0.0</td><td>1.9</td><td>1.9</td><td>0.0</td><td>O K</td></tr><tr><td>15 min Winter</td><td>6.099</td><td>0.149</td><td>0.0</td><td>4.7</td><td>4.7</td><td>39.9</td><td>Flood Risk</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>126.074</td><td>0.0</td><td>44.9</td><td>49</td></tr><tr><td>30 min Summer</td><td>84.745</td><td>0.0</td><td>62.0</td><td>59</td></tr><tr><td>60 min Summer</td><td>54.368</td><td>0.0</td><td>80.6</td><td>82</td></tr><tr><td>120 min Summer</td><td>33.674</td><td>0.0</td><td>101.2</td><td>128</td></tr><tr><td>180 min Summer</td><td>25.065</td><td>0.0</td><td>113.2</td><td>170</td></tr><tr><td>240 min Summer</td><td>20.180</td><td>0.0</td><td>121.9</td><td>202</td></tr><tr><td>360 min Summer</td><td>14.839</td><td>0.0</td><td>135.0</td><td>270</td></tr><tr><td>480 min Summer</td><td>11.923</td><td>0.0</td><td>144.7</td><td>338</td></tr><tr><td>600 min Summer</td><td>10.054</td><td>0.0</td><td>152.7</td><td>406</td></tr><tr><td>720 min Summer</td><td>8.741</td><td>0.0</td><td>159.2</td><td>472</td></tr><tr><td>960 min Summer</td><td>7.003</td><td>0.0</td><td>169.9</td><td>606</td></tr><tr><td>1440 min Summer</td><td>5.114</td><td>0.0</td><td>186.0</td><td>860</td></tr><tr><td>2160 min Summer</td><td>3.727</td><td>0.0</td><td>202.8</td><td>1192</td></tr><tr><td>2880 min Summer</td><td>2.973</td><td>0.0</td><td>214.8</td><td>1500</td></tr><tr><td>4320 min Summer</td><td>2.159</td><td>0.0</td><td>232.3</td><td>0</td></tr><tr><td>5760 min Summer</td><td>1.718</td><td>0.0</td><td>244.5</td><td>0</td></tr><tr><td>7200 min Summer</td><td>1.438</td><td>0.0</td><td>253.9</td><td>0</td></tr><tr><td>8640 min Summer</td><td>1.245</td><td>0.0</td><td>261.8</td><td>0</td></tr><tr><td>10080 min Summer</td><td>1.102</td><td>0.0</td><td>268.4</td><td>0</td></tr><tr><td>15 min Winter</td><td>126.074</td><td>0.0</td><td>51.0</td><td>50</td></tr></tbody></table>								Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	6.078	0.128	0.0	4.7	4.7	34.2	Flood Risk	30 min Summer	6.134	0.184	0.0	4.7	4.7	49.3	Flood Risk	60 min Summer	6.185	0.235	0.0	4.7	4.7	62.8	Flood Risk	120 min Summer	6.215	0.265	0.0	4.7	4.7	71.0	Flood Risk	180 min Summer	6.213	0.263	0.0	4.7	4.7	70.3	Flood Risk	240 min Summer	6.205	0.255	0.0	4.7	4.7	68.1	Flood Risk	360 min Summer	6.189	0.239	0.0	4.7	4.7	63.9	Flood Risk	480 min Summer	6.173	0.223	0.0	4.7	4.7	59.8	Flood Risk	600 min Summer	6.158	0.208	0.0	4.7	4.7	55.6	Flood Risk	720 min Summer	6.142	0.192	0.0	4.7	4.7	51.4	Flood Risk	960 min Summer	6.112	0.162	0.0	4.7	4.7	43.2	Flood Risk	1440 min Summer	6.056	0.106	0.0	4.7	4.7	28.4	Flood Risk	2160 min Summer	5.987	0.037	0.0	4.7	4.7	9.8	O K	2880 min Summer	5.955	0.005	0.0	4.7	4.7	1.2	O K	4320 min Summer	5.950	0.000	0.0	3.7	3.7	0.0	O K	5760 min Summer	5.950	0.000	0.0	2.9	2.9	0.0	O K	7200 min Summer	5.950	0.000	0.0	2.4	2.4	0.0	O K	8640 min Summer	5.950	0.000	0.0	2.1	2.1	0.0	O K	10080 min Summer	5.950	0.000	0.0	1.9	1.9	0.0	O K	15 min Winter	6.099	0.149	0.0	4.7	4.7	39.9	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume 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240 min Summer	6.205	0.255	0.0	4.7	4.7	68.1	Flood Risk																																																																																																																																																																																																																																																																																	
360 min Summer	6.189	0.239	0.0	4.7	4.7	63.9	Flood Risk																																																																																																																																																																																																																																																																																	
480 min Summer	6.173	0.223	0.0	4.7	4.7	59.8	Flood Risk																																																																																																																																																																																																																																																																																	
600 min Summer	6.158	0.208	0.0	4.7	4.7	55.6	Flood Risk																																																																																																																																																																																																																																																																																	
720 min Summer	6.142	0.192	0.0	4.7	4.7	51.4	Flood Risk																																																																																																																																																																																																																																																																																	
960 min Summer	6.112	0.162	0.0	4.7	4.7	43.2	Flood Risk																																																																																																																																																																																																																																																																																	
1440 min Summer	6.056	0.106	0.0	4.7	4.7	28.4	Flood Risk																																																																																																																																																																																																																																																																																	
2160 min Summer	5.987	0.037	0.0	4.7	4.7	9.8	O K																																																																																																																																																																																																																																																																																	
2880 min Summer	5.955	0.005	0.0	4.7	4.7	1.2	O K																																																																																																																																																																																																																																																																																	
4320 min Summer	5.950	0.000	0.0	3.7	3.7	0.0	O K																																																																																																																																																																																																																																																																																	
5760 min Summer	5.950	0.000	0.0	2.9	2.9	0.0	O K																																																																																																																																																																																																																																																																																	
7200 min Summer	5.950	0.000	0.0	2.4	2.4	0.0	O K																																																																																																																																																																																																																																																																																	
8640 min Summer	5.950	0.000	0.0	2.1	2.1	0.0	O K																																																																																																																																																																																																																																																																																	
10080 min Summer	5.950	0.000	0.0	1.9	1.9	0.0	O K																																																																																																																																																																																																																																																																																	
15 min Winter	6.099	0.149	0.0	4.7	4.7	39.9	Flood Risk																																																																																																																																																																																																																																																																																	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																				
15 min Summer	126.074	0.0	44.9	49																																																																																																																																																																																																																																																																																				
30 min Summer	84.745	0.0	62.0	59																																																																																																																																																																																																																																																																																				
60 min Summer	54.368	0.0	80.6	82																																																																																																																																																																																																																																																																																				
120 min Summer	33.674	0.0	101.2	128																																																																																																																																																																																																																																																																																				
180 min Summer	25.065	0.0	113.2	170																																																																																																																																																																																																																																																																																				
240 min Summer	20.180	0.0	121.9	202																																																																																																																																																																																																																																																																																				
360 min Summer	14.839	0.0	135.0	270																																																																																																																																																																																																																																																																																				
480 min Summer	11.923	0.0	144.7	338																																																																																																																																																																																																																																																																																				
600 min Summer	10.054	0.0	152.7	406																																																																																																																																																																																																																																																																																				
720 min Summer	8.741	0.0	159.2	472																																																																																																																																																																																																																																																																																				
960 min Summer	7.003	0.0	169.9	606																																																																																																																																																																																																																																																																																				
1440 min Summer	5.114	0.0	186.0	860																																																																																																																																																																																																																																																																																				
2160 min Summer	3.727	0.0	202.8	1192																																																																																																																																																																																																																																																																																				
2880 min Summer	2.973	0.0	214.8	1500																																																																																																																																																																																																																																																																																				
4320 min Summer	2.159	0.0	232.3	0																																																																																																																																																																																																																																																																																				
5760 min Summer	1.718	0.0	244.5	0																																																																																																																																																																																																																																																																																				
7200 min Summer	1.438	0.0	253.9	0																																																																																																																																																																																																																																																																																				
8640 min Summer	1.245	0.0	261.8	0																																																																																																																																																																																																																																																																																				
10080 min Summer	1.102	0.0	268.4	0																																																																																																																																																																																																																																																																																				
15 min Winter	126.074	0.0	51.0	50																																																																																																																																																																																																																																																																																				
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2 West Barn Norton Lane Chichester PO20 3AF			D1623 Drainage Strategy Residential Area Permeable Paving				
Date 25/02/2019 File D1623 RESIDENTIAL AREA....			Designed by D Lytton Checked by				
Innovyze			Source Control 2017.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
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	6.162	0.212	0.0	4.7	4.7	56.9	Flood Risk
60 min Winter	6.220	0.270	0.0	4.8	4.8	72.3	Flood Risk
120 min Winter	6.260	0.310	0.0	4.9	4.9	83.0	Flood Risk
180 min Winter	6.263	0.313	0.0	4.9	4.9	83.7	Flood Risk
240 min Winter	6.251	0.301	0.0	4.9	4.9	80.5	Flood Risk
360 min Winter	6.229	0.279	0.0	4.8	4.8	74.5	Flood Risk
480 min Winter	6.205	0.255	0.0	4.7	4.7	68.3	Flood Risk
600 min Winter	6.181	0.231	0.0	4.7	4.7	61.8	Flood Risk
720 min Winter	6.156	0.206	0.0	4.7	4.7	55.2	Flood Risk
960 min Winter	6.109	0.159	0.0	4.7	4.7	42.6	Flood Risk
1440 min Winter	6.019	0.069	0.0	4.7	4.7	18.5	Flood Risk
2160 min Winter	5.950	0.000	0.0	4.6	4.6	0.0	O K
2880 min Winter	5.950	0.000	0.0	3.7	3.7	0.0	O K
4320 min Winter	5.950	0.000	0.0	2.6	2.6	0.0	O K
5760 min Winter	5.950	0.000	0.0	2.1	2.1	0.0	O K
7200 min Winter	5.950	0.000	0.0	1.8	1.8	0.0	O K
8640 min Winter	5.950	0.000	0.0	1.5	1.5	0.0	O K
10080 min Winter	5.950	0.000	0.0	1.3	1.3	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	84.745	0.0	70.0	61			
60 min Winter	54.368	0.0	91.0	84			
120 min Winter	33.674	0.0	114.0	130			
180 min Winter	25.065	0.0	127.8	178			
240 min Winter	20.180	0.0	137.4	216			
360 min Winter	14.839	0.0	151.6	288			
480 min Winter	11.923	0.0	162.9	364			
600 min Winter	10.054	0.0	171.3	438			
720 min Winter	8.741	0.0	179.0	510			
960 min Winter	7.003	0.0	191.2	648			
1440 min Winter	5.114	0.0	209.2	896			
2160 min Winter	3.727	0.0	228.2	0			
2880 min Winter	2.973	0.0	241.9	0			
4320 min Winter	2.159	0.0	261.7	0			
5760 min Winter	1.718	0.0	275.8	0			
7200 min Winter	1.438	0.0	286.6	0			
8640 min Winter	1.245	0.0	295.8	0			
10080 min Winter	1.102	0.0	303.6	0			
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Date 25/02/2019 File D1623 RESIDENTIAL AREA....	Designed by D Lytton Checked by	
Innovyze	Source Control 2017.1	

Model Details

Storage is Online Cover Level (m) 6.300

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	89.2
Max Percolation (l/s)	247.8	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	5.950	Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	109
Invert Level (m)	5.500
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.241	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

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)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

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2 West Barn Norton Lane Chichester PO20 3AF			D1623 Drainage Strategy Commercial Building Blue Roof - Permavoid 150				
Date 19/02/2019 File D1623 Commercial Buildi...			Designed by D Lytton Checked by				
Innovyze			Source Control 2017.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Half Drain Time : 179 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	10.066	0.066	0.0	1.0	1.0	9.4	Flood Risk
30 min Summer	10.086	0.086	0.0	1.0	1.0	12.3	Flood Risk
60 min Summer	10.103	0.103	0.0	1.0	1.0	14.7	Flood Risk
120 min Summer	10.111	0.111	0.0	1.0	1.0	15.9	Flood Risk
180 min Summer	10.109	0.109	0.0	1.0	1.0	15.6	Flood Risk
240 min Summer	10.106	0.106	0.0	1.0	1.0	15.1	Flood Risk
360 min Summer	10.100	0.100	0.0	1.0	1.0	14.3	Flood Risk
480 min Summer	10.094	0.094	0.0	1.0	1.0	13.4	Flood Risk
600 min Summer	10.088	0.088	0.0	1.0	1.0	12.6	Flood Risk
720 min Summer	10.082	0.082	0.0	1.0	1.0	11.7	Flood Risk
960 min Summer	10.069	0.069	0.0	1.0	1.0	9.9	Flood Risk
1440 min Summer	10.045	0.045	0.0	1.0	1.0	6.4	Flood Risk
2160 min Summer	10.018	0.018	0.0	1.0	1.0	2.6	Flood Risk
2880 min Summer	10.004	0.004	0.0	1.0	1.0	0.6	Flood Risk
4320 min Summer	10.000	0.000	0.0	0.8	0.8	0.0	Flood Risk
5760 min Summer	10.000	0.000	0.0	0.6	0.6	0.0	Flood Risk
7200 min Summer	10.000	0.000	0.0	0.5	0.5	0.0	Flood Risk
8640 min Summer	10.000	0.000	0.0	0.5	0.5	0.0	Flood Risk
10080 min Summer	10.000	0.000	0.0	0.4	0.4	0.0	Flood Risk
15 min Winter	10.075	0.075	0.0	1.0	1.0	10.7	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	126.074	0.0	10.5	23			
30 min Summer	84.745	0.0	14.3	37			
60 min Summer	54.368	0.0	18.3	64			
120 min Summer	33.674	0.0	22.7	122			
180 min Summer	25.065	0.0	25.3	160			
240 min Summer	20.180	0.0	27.1	190			
360 min Summer	14.839	0.0	30.0	256			
480 min Summer	11.923	0.0	32.1	326			
600 min Summer	10.054	0.0	33.9	394			
720 min Summer	8.741	0.0	35.3	462			
960 min Summer	7.003	0.0	37.8	598			
1440 min Summer	5.114	0.0	41.3	844			
2160 min Summer	3.727	0.0	45.2	1188			
2880 min Summer	2.973	0.0	48.1	1504			
4320 min Summer	2.159	0.0	52.5	0			
5760 min Summer	1.718	0.0	55.7	0			
7200 min Summer	1.438	0.0	58.2	0			
8640 min Summer	1.245	0.0	60.5	0			
10080 min Summer	1.102	0.0	62.5	0			
15 min Winter	126.074	0.0	11.8	23			
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Date 19/02/2019 File D1623 Commercial Buildi...			Designed by D Lytton Checked by				
Innovyze			Source Control 2017.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
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	10.098	0.098	0.0	1.0	1.0	14.0	Flood Risk
60 min Winter	10.119	0.119	0.0	1.0	1.0	17.0	Flood Risk
120 min Winter	10.132	0.132	0.0	1.0	1.0	18.8	Flood Risk
180 min Winter	10.131	0.131	0.0	1.0	1.0	18.7	Flood Risk
240 min Winter	10.125	0.125	0.0	1.0	1.0	17.9	Flood Risk
360 min Winter	10.117	0.117	0.0	1.0	1.0	16.7	Flood Risk
480 min Winter	10.108	0.108	0.0	1.0	1.0	15.4	Flood Risk
600 min Winter	10.099	0.099	0.0	1.0	1.0	14.1	Flood Risk
720 min Winter	10.089	0.089	0.0	1.0	1.0	12.7	Flood Risk
960 min Winter	10.069	0.069	0.0	1.0	1.0	9.9	Flood Risk
1440 min Winter	10.032	0.032	0.0	1.0	1.0	4.5	Flood Risk
2160 min Winter	10.001	0.001	0.0	1.0	1.0	0.1	Flood Risk
2880 min Winter	10.000	0.000	0.0	0.8	0.8	0.0	Flood Risk
4320 min Winter	10.000	0.000	0.0	0.6	0.6	0.0	Flood Risk
5760 min Winter	10.000	0.000	0.0	0.5	0.5	0.0	Flood Risk
7200 min Winter	10.000	0.000	0.0	0.4	0.4	0.0	Flood Risk
8640 min Winter	10.000	0.000	0.0	0.3	0.3	0.0	Flood Risk
10080 min Winter	10.000	0.000	0.0	0.3	0.3	0.0	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	84.745	0.0	15.9	37			
60 min Winter	54.368	0.0	20.5	64			
120 min Winter	33.674	0.0	25.4	120			
180 min Winter	25.065	0.0	28.3	174			
240 min Winter	20.180	0.0	30.4	204			
360 min Winter	14.839	0.0	33.6	276			
480 min Winter	11.923	0.0	36.0	354			
600 min Winter	10.054	0.0	38.0	428			
720 min Winter	8.741	0.0	39.6	502			
960 min Winter	7.003	0.0	42.3	646			
1440 min Winter	5.114	0.0	46.3	882			
2160 min Winter	3.727	0.0	50.7	1136			
2880 min Winter	2.973	0.0	53.9	0			
4320 min Winter	2.159	0.0	58.8	0			
5760 min Winter	1.718	0.0	62.3	0			
7200 min Winter	1.438	0.0	65.2	0			
8640 min Winter	1.245	0.0	67.8	0			
10080 min Winter	1.102	0.0	70.0	0			
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Date 19/02/2019 File D1623 Commercial Buildi...	Designed by D Lytton Checked by	
Innovyze	Source Control 2017.1	

Model Details

Storage is Online Cover Level (m) 10.150

Cellular Storage Structure

Invert Level (m) 10.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	150.4	150.4	0.150	150.4	157.8

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0056-1000-0300-1000
Design Head (m) 0.300
Design Flow (l/s) 1.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 56
Invert Level (m) 9.850
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.300	1.0
Flush-Flo™	0.089	1.0
Kick-Flo®	0.214	0.9
Mean Flow over Head Range	-	0.8

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)
0.100	1.0	1.200	1.9	3.000	2.8	7.000	4.3
0.200	0.9	1.400	2.0	3.500	3.1	7.500	4.5
0.300	1.0	1.600	2.1	4.000	3.3	8.000	4.6
0.400	1.1	1.800	2.2	4.500	3.5	8.500	4.8
0.500	1.3	2.000	2.4	5.000	3.7	9.000	4.9
0.600	1.4	2.200	2.5	5.500	3.8	9.500	5.0
0.800	1.5	2.400	2.6	6.000	4.0		
1.000	1.7	2.600	2.7	6.500	4.2		

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