

Drawings

The following drawings are attached to support this report:

Drawing No. 14001-A-PL-01-RevA	Exiting Site Layout
Drawing No. 14001-A-PL-02-RevC	Proposed Site Layout
Drawing No. 14001-A-PL-04-RevB	Location Plan

Flood Risk

The site is indicated on the attached Location Plan and is shown to lie in Flood Zone 1 on the Environment Agency's flood map. It is therefore at low risk from both tidal and fluvial flooding. There is a low risk of flooding from all other external sources and the concern with the development of the site is to ensure that adequate foul and surface water drainage systems are provided to protect the site itself from flooding and to ensure that they do not increase the risk of flooding elsewhere.

Foul Water Drainage

There is a private foul water sewerage system serving The Vinery to which a connection could be made but it is not proposed to provide separate foul drainage facilities to the new building.

Surface Water Drainage

It is not known whether ground conditions here are suitable for infiltration drainage but at present all surface water drains off-site to local watercourses which flow south to Decoy Ponds, Black Ditch and the River Arun. In due course, percolation tests to BRE 365 will be undertaken to determine whether SuDS solutions incorporating infiltration can be used. The local geology comprises Head Deposits over River Terrace and these strata can be a mixture of sand, silt and clay with some gravel and can be very variable in their proportions and ability to accept infiltration. Groundwater is not thought likely to be an issue here but this will need assessing if infiltration drainage is proposed.

The proposed development comprises new commercial/ industrial buildings with associated access and parking and this will increase the impermeable area of the site by around 700 sq.m. as areas of existing gravel and grass will be lost. If infiltration drainage is assessed as being suitable, or partially suitable, concrete ring soakaways or geocells can be used and there is sufficient area under the proposed parking to accommodate this. If percolation rates are low, then a high level overflow could be provided discharging through a hydrobrake or similar device to limit the flow to the existing undeveloped rate, subject to a minimum of 5 litres/second. The gravel areas are likely to discharge more than this on 1 in 100 year rainfall event but a detailed analysis has not been carried out at this stage. If infiltration rates are low, then additional storage can be provided under the parking areas to suit. Should it be decided to hard surface the gravel parking at a later date, then additional concrete ring soakaways or geocells could be added to the system.

By way of example, the attached Windes calculations show how 3 linked concrete ring soakaways or 22m of geocells could be used to drain the site using a low infiltration rate of 2×10^{-6} m/s with a high level overflow discharging a maximum of 5 litres/second off-site.

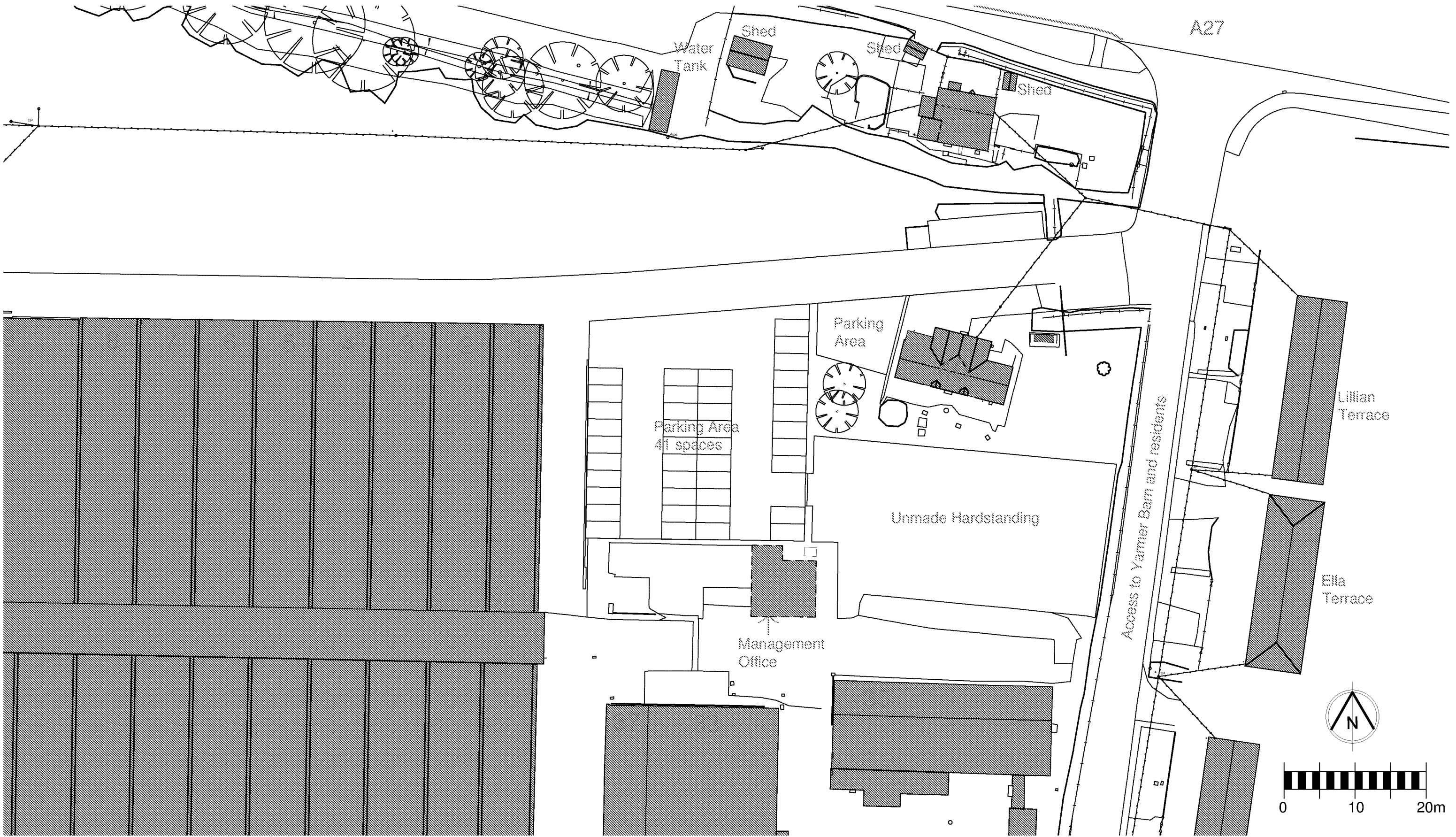
1610-R1

23 March 2015

Robert Clark Associates Ltd
Chartered Civil Engineers

tel: 

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Registered in England No. 3894620; VAT No. 750 3527 48



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MODEL FILE REFERENCE- 14001-A-P-PL

A	Notes amended- Planning Issue	14.11.14	AJC	AJC
P1	Preliminary Issue.	14.11.14	AJC	AJC
rev.	description	date	by	ch

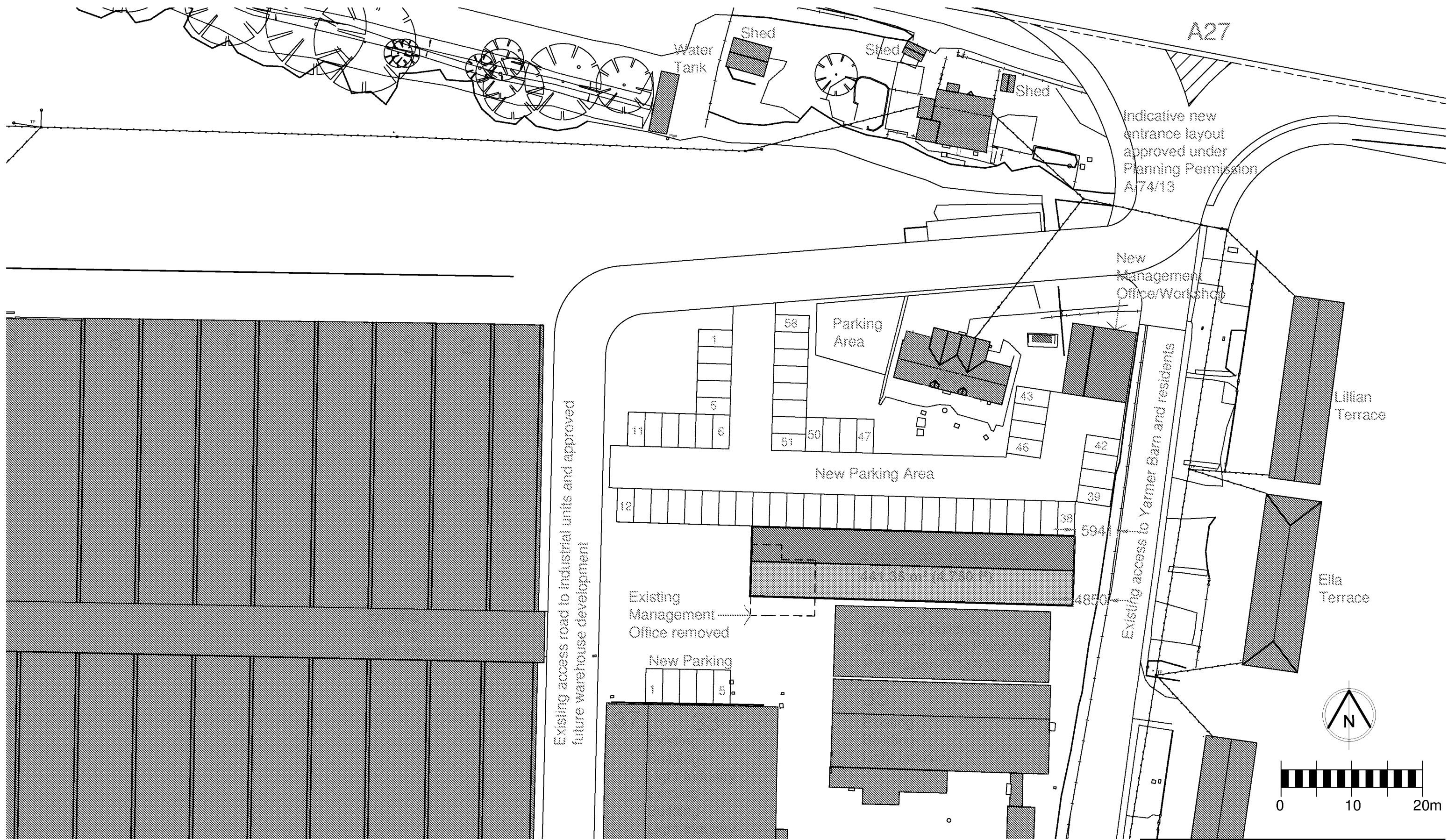
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date:	November 2014	project:	The Vinery, Arundel Road, Poling, Arundel, West Sussex. BN18 9PY.
drawn:	AJC	drawing:	Existing Site Layout
checked:	AJC	status:	PLANNING

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drawing No: 14001-A-PL01revision: A

ARUN DISTRICT COUNCIL A/5/15/PL



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MODEL FILE REFERENCE- 14001-A-P-PL

C	Amended to reflect comments	22.01.15	AJC	AJC
B	Management Office amended	21.01.15	AJC	AJC
A	Planning Issue.	14.11.14	AJC	AJC
P1	Preliminary Issue.	14.11.14	AJC	AJC
rev.	description	date	by	ch

scale: 1:500 @ A3

date: November 2014

drawn: AJC

checked: AJC

client: Vinery Management Limited

project: The Vinery, Arundel Road, Poling, Arundel, West Sussex. BN18 9PY.

drawing: Proposed Site Layout

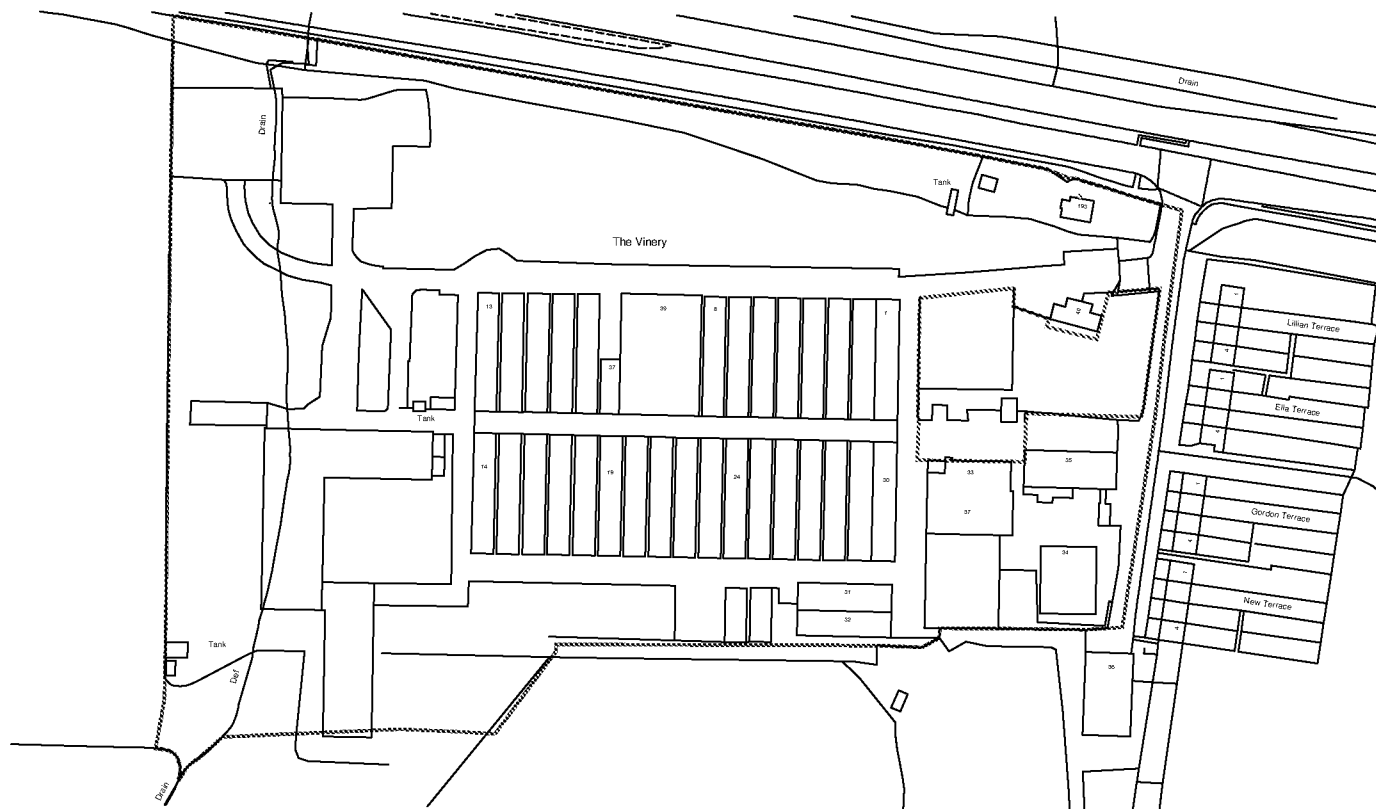
status: PLANNING

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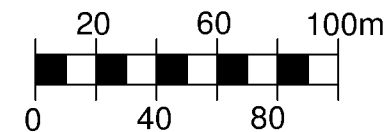
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drawing No: **14001-A-PL02** revision: **C**



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B Blue line added-PLANNING ISSUE
A PLANNING ISSUE
rev description

22.01.15 AJC
22.01.15 AJC
date by ch.

scale: 1:2500 @ A4

client: Vinery Management Limited

date: January 2015

project: The Vinery, Arundel Road, Arundel, West Sussex, BN18 9PY.

drawn: AJC

drawing: Site Location Plan

checked: AJC

status: PLANNING

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drawing No: **14001-A-PL04**

revision: **B**

Robert Clark Associates							Page 1	
Willow Cottage Herne Lane Rustington BN16 3EE				Unit 35B, The Vinery Poling Sokaways option				
Date 23 March 2015 File Concrete ring soakaways2.srcx				Designed by RTFC Checked by				
Micro Drainage				Source Control 2014.1.1				
<u>Summary of Results for 100 year Return Period (+30%)</u> Half Drain Time : 87 minutes.								
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer		1.542	1.542	0.1	0.9	1.0	15.8	O K
30 min Summer		1.760	1.760	0.1	4.9	5.0	18.1	O K
60 min Summer		2.024	2.024	0.1	4.9	5.0	20.8	O K
120 min Summer		2.239	2.239	0.1	4.9	5.0	23.0	Flood Risk
180 min Summer		2.264	2.264	0.1	4.9	5.0	23.3	Flood Risk
240 min Summer		2.210	2.210	0.1	4.9	5.0	22.7	Flood Risk
360 min Summer		1.992	1.992	0.1	4.9	5.0	20.5	O K
480 min Summer		1.808	1.808	0.1	4.9	5.0	18.6	O K
600 min Summer		1.696	1.696	0.1	4.8	4.9	17.4	O K
720 min Summer		1.639	1.639	0.1	4.5	4.6	16.8	O K
960 min Summer		1.605	1.605	0.1	3.7	3.8	16.5	O K
15 min Winter		1.640	1.640	0.1	4.5	4.6	16.8	O K
30 min Winter		1.996	1.996	0.1	4.9	5.0	20.5	O K
60 min Winter		2.312	2.312	0.1	4.9	5.0	23.8	Flood Risk
120 min Winter		2.424	2.424	0.1	4.9	5.0	24.9	Flood Risk
180 min Winter		2.348	2.348	0.1	4.9	5.0	24.1	Flood Risk
240 min Winter		2.198	2.198	0.1	4.9	5.0	22.6	O K
360 min Winter		1.794	1.794	0.1	4.9	5.0	18.4	O K
480 min Winter		1.640	1.640	0.1	4.5	4.6	16.8	O K
600 min Winter		1.609	1.609	0.1	3.9	4.0	16.5	O K
720 min Winter		1.596	1.596	0.1	3.4	3.5	16.4	O K
960 min Winter		1.580	1.580	0.1	2.7	2.8	16.2	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer		121.761	0.0	5.1	18			
30 min Summer		81.796	0.0	10.5	27			
60 min Summer		52.391	0.0	19.8	46			
120 min Summer		32.351	0.0	26.2	80			
180 min Summer		24.014	0.0	29.9	114			
240 min Summer		19.302	0.0	32.5	146			
360 min Summer		14.207	0.0	36.5	204			
480 min Summer		11.411	0.0	39.4	258			
600 min Summer		9.619	0.0	41.8	314			
720 min Summer		8.361	0.0	43.7	370			
960 min Summer		6.696	0.0	46.7	488			
15 min Winter		121.761	0.0	7.0	16			
30 min Winter		81.796	0.0	13.1	30			
60 min Winter		52.391	0.0	23.1	48			
120 min Winter		32.351	0.0	30.3	86			
180 min Winter		24.014	0.0	34.5	122			
240 min Winter		19.302	0.0	37.4	158			
360 min Winter		14.207	0.0	41.9	206			
480 min Winter		11.411	0.0	45.2	252			
600 min Winter		9.619	0.0	47.8	306			
720 min Winter		8.361	0.0	50.0	366			
960 min Winter		6.696	0.0	53.5	484			
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Willow Cottage Herne Lane Rustington BN16 3EE	Unit 35B, The Vinery Poling Sokaways option	
Date 23 March 2015 File Concrete ring soakaways2.srcx	Designed by RTFC Checked by	
Micro Drainage		Source Control 2014.1.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.900	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	960
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.070

Time (mins)	Area
From: To:	(ha)
0 4	0.070

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Willow Cottage Herne Lane Rustington BN16 3EE	Unit 35B, The Vinery Poling Sokaways option	
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Micro Drainage	Source Control 2014.1.1	

Model Details

Storage is Online Cover Level (m) 2.500

Lined Soakaway Structure

Infiltration Coefficient Base (m/hr) 0.00000
 Infiltration Coefficient Side (m/hr) 0.00720
 Safety Factor 1.5
 Porosity 0.30
 Invert Level (m) 0.000
 Ring Diameter (m) 1.50
 Pit Multiplier 1.8
 Number Required 3
 Cap Volume Depth (m) 0.000
 Cap Infiltration Depth (m) 0.000

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0105-5000-1000-5000
 Design Head (m) 1.000
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Diameter (mm) 105
 Invert Level (m) 1.500
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.0
Flush-Flo™	0.295	4.9
Kick-Flo®	0.636	4.0
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	3.6	1.200	5.4	3.000	8.3	7.000	12.4
0.200	4.8	1.400	5.8	3.500	8.9	7.500	12.8
0.300	4.9	1.600	6.2	4.000	9.5	8.000	13.2
0.400	4.9	1.800	6.5	4.500	10.1	8.500	13.6
0.500	4.7	2.000	6.9	5.000	10.6	9.000	14.0
0.600	4.3	2.200	7.2	5.500	11.1	9.500	14.4
0.800	4.5	2.400	7.5	6.000	11.5		
1.000	5.0	2.600	7.8	6.500	12.0		

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Willow Cottage Herne Lane Rustington BN16 3EE	Unit 35B, The Vinery Poling Geocells option	
Date 23 March 2015 File Geocells22.srcx	Designed by RTFC Checked by	
Micro Drainage	Source Control 2014.1.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 34 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.901	0.601	0.1	4.9	5.0	12.6	O K
30 min Summer	1.026	0.726	0.1	4.9	5.0	15.2	O K
60 min Summer	1.068	0.768	0.1	4.9	5.0	16.1	O K
120 min Summer	1.004	0.704	0.1	4.9	5.0	14.7	O K
180 min Summer	0.900	0.600	0.1	4.9	5.0	12.5	O K
240 min Summer	0.799	0.499	0.1	4.9	5.0	10.4	O K
360 min Summer	0.643	0.343	0.1	4.9	5.0	7.2	O K
480 min Summer	0.541	0.241	0.0	4.8	4.9	5.0	O K
600 min Summer	0.479	0.179	0.0	4.6	4.6	3.7	O K
720 min Summer	0.440	0.140	0.0	4.3	4.3	2.9	O K
960 min Summer	0.409	0.109	0.0	3.7	3.7	2.3	O K
15 min Winter	0.990	0.690	0.1	4.9	5.0	14.4	O K
30 min Winter	1.143	0.843	0.1	4.9	5.0	17.6	O K
60 min Winter	1.183	0.883	0.1	4.9	5.0	18.5	O K
120 min Winter	1.089	0.789	0.1	4.9	5.0	16.5	O K
180 min Winter	0.911	0.611	0.1	4.9	5.0	12.8	O K
240 min Winter	0.754	0.454	0.1	4.9	5.0	9.5	O K
360 min Winter	0.548	0.248	0.0	4.8	4.9	5.2	O K
480 min Winter	0.450	0.150	0.0	4.4	4.4	3.1	O K
600 min Winter	0.414	0.114	0.0	3.9	3.9	2.4	O K
720 min Winter	0.399	0.099	0.0	3.4	3.4	2.1	O K
960 min Winter	0.383	0.083	0.0	2.7	2.8	1.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	121.761	0.0	16.0	16
30 min Summer	81.796	0.0	21.5	30
60 min Summer	52.391	0.0	27.5	46
120 min Summer	32.351	0.0	34.0	80
180 min Summer	24.014	0.0	37.8	112
240 min Summer	19.302	0.0	40.5	144
360 min Summer	14.207	0.0	44.7	204
480 min Summer	11.411	0.0	47.9	260
600 min Summer	9.619	0.0	50.5	316
720 min Summer	8.361	0.0	52.7	374
960 min Summer	6.696	0.0	56.2	490
15 min Winter	121.761	0.0	17.9	17
30 min Winter	81.796	0.0	24.0	30
60 min Winter	52.391	0.0	30.8	50
120 min Winter	32.351	0.0	38.0	88
180 min Winter	24.014	0.0	42.4	122
240 min Winter	19.302	0.0	45.4	152
360 min Winter	14.207	0.0	50.1	208
480 min Winter	11.411	0.0	53.7	260
600 min Winter	9.619	0.0	56.6	312
720 min Winter	8.361	0.0	59.0	370
960 min Winter	6.696	0.0	63.0	490

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Willow Cottage Herne Lane Rustington BN16 3EE	Unit 35B, The Vinery Poling Geocells option	
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Micro Drainage		Source Control 2014.1.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.900	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	960
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.070

Time (mins)	Area
From: To:	(ha)
0 4	0.070

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