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STRUCTURAL DESIGN
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IVY FARM

WEST YATTON

SN14 7EW

Proposed New Access Drive to A420

Provision for Surface Water Drainage

Summary of Proposals

1. It is proposed to make a new access to Ivy Farm from the A420 as shown on proposed drawings by Messrs Badingham which form part of this submission.

2. The proposed access meets the highway at a level of about 125.0m AOD. The track will then slope slightly downhill as it enters the site, reaching a low of about 124.70m AD about 8m from the highway boundary.

3. To the west of the drive the ground drops to about 124.0m AOD. The highway verge is at a level of about 124.9m AOD opposite this area. On the east side of the drive the ground level is lightly higher, typically 124.8m. The highway verge on this side is correspondingly higher as well.

4. To avoid the risk of run-off from the east side washing over the drive it is proposed to form a ditch along the eastern side of the drive, and to run land drains under it, discharging to the lower area on the west side where a dry pond is formed, largely by the natural contours of the land.

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5. The dry pond will attenuate stormwater and allow it to infiltrate the surface naturally, as it does at present. There is no history of flooding on the site.

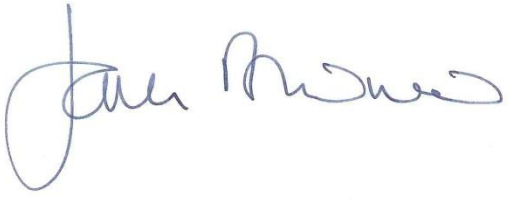
6. Shallow percolation tests were carried out to assess the rate of infiltration and these show satisfactory results. The test results and calculations are attached.

7. A plan is also attached showing the overland exceedance flow routes for storms greater than 1 in 100 years, plus 40% climate change uplift.

8. The attachments demonstrate that there is no risk of surface water flooding onto the highway even in extreme storm conditions, and that run-off from the track will not cause flooding on the site.

9. The drains under the drive will be inspected and cleared as necessary by the landowner at 6 monthly intervals. The dry pond will be grazed or cut twice a year to prevent it from becoming overgrown.

10. The contractor will prepare a construction management plan to demonstrate mitigation of groundwater pollution and flood risks, during construction of the new drive.



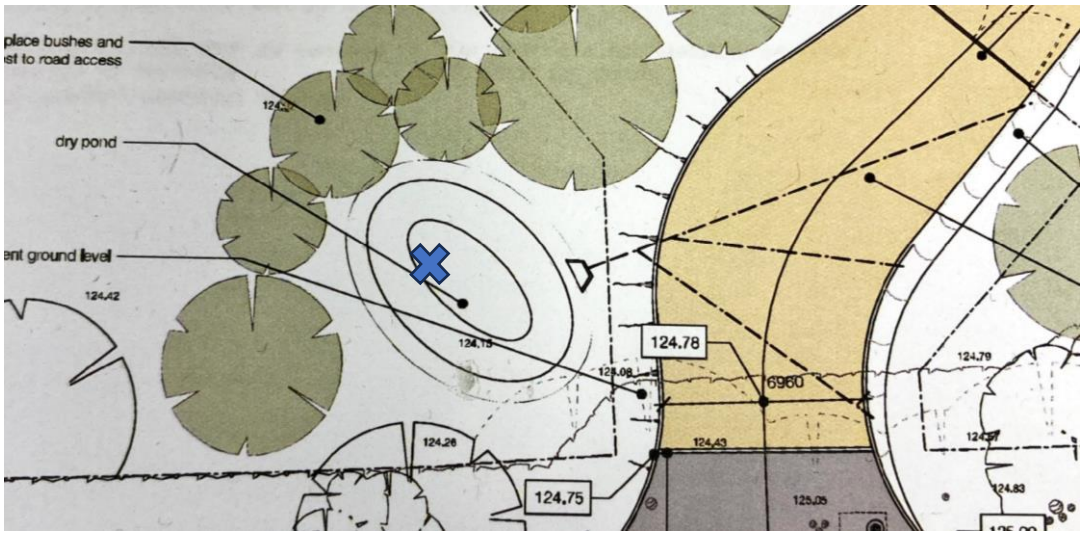
James Birdwood
MA CEng FIStructE MICE

19 December 2023

ES QA 32	PERCOLATION TEST	earthstone construction
In accordance with BS 6297:2007		

Client	Stonewood Builders	**Contract**	Ivy Farm
Location	Proposed dry pond within Oak Lodge	**Operative**	S. Crocker / D. Streciwilk

Extract of drawing showing location of percolation test.



Grid Reference	ST 85919 74773	What 3 Words	///helper.truffles.taxpayers

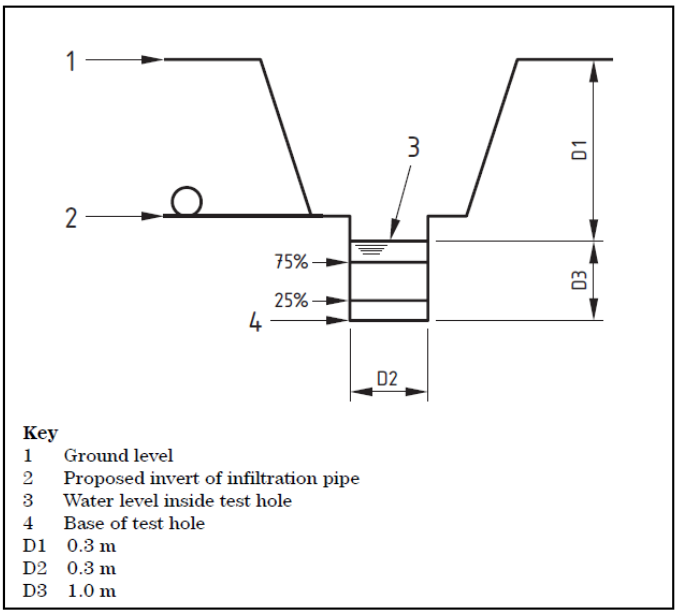
Hole No.	Test Date	Test No.	Start Time	Finish Time	Elapsed time			Vp (s/mm)
					Hours / minutes	Minutes	Seconds	Seconds divided by 150mm
1	22/8/2023	1	8:48	9:14	*0 Hrs 26 Mins*	26	1560	10.4
	22/8/2023	2	9:39	10:15	*0 Hrs 36 Mins*	36	2160	14.4
	22/8/2023	3	10:50	11:35	*0 Hrs 45 Mins*	45	2700	18
							Average VP for Hole 1	14.26
2			:	:	*Hrs Mins*			
			:	:	*Hrs Mins*			
			:	:	*Hrs Mins*			
							Average VP for Hole 2	
3			:	:	*Hrs Mins*			
			:	:	*Hrs Mins*			
			:	:	*Hrs Mins*			
							Average VP for Hole 3	

Test method

The percolation test should be carried out as follows.

- Excavate at least two holes 300 mm square to a depth at least 300 mm below the proposed invert level (bottom of pipe) of the infiltration pipe, spacing them along the proposed line of the subsurface irrigation system. While digging the hole, note and record changes in soil characteristics at measured depths and the position of the water table if reached.
- Saturate the local soil by filling each hole with water to a depth of at least 300 mm and allow this to seep away completely.
- If the water drains rapidly (within 10 minutes) the hole should be refilled up to a maximum of 10 times. If the water continues to drain away rapidly the ground is unsuitable.
- If the water has not soaked away within 6 hours the area is not suitable.
- Determine the percolation rate by refilling each hole with water to a depth of at least 300 mm and observe the time in seconds for the water to seep away from 75% full to 25% full (i.e. a depth of 150 mm).
- Divide this time in seconds by 150. This gives the average time in seconds required for the water to drop 1mm.
- Repeat the test at least three times in each hole in the location of the proposed trench(es).
- Take the average figure from the tests to produce the percolation value Vp (in seconds).
- Obtain the average figure for the percolation value (Vp) by summing all the values and dividing by the number of values used.
- The results from the percolation test should be tabulated as set out in Figure 3. It is advisable to retain this information for the future property owner.

Cross-section of typical percolation test hole and trial hole



Key

1	Ground level
2	Proposed invert of infiltration pipe
3	Water level inside test hole
4	Base of test hole
D1	0.3 m
D2	0.3 m
D3	1.0 m

PROGRESS PHOTOS	
	
	

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

Half Drain Time : 204 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	99.601	0.351	0.5	6.6	O K
30 min Summer	99.669	0.419	0.5	8.6	O K
60 min Summer	99.725	0.475	0.6	10.5	Flood Risk
120 min Summer	99.758	0.508	0.6	11.7	Flood Risk
180 min Summer	99.772	0.522	0.7	12.2	Flood Risk
240 min Summer	99.782	0.532	0.7	12.6	Flood Risk
360 min Summer	99.792	0.542	0.7	13.0	Flood Risk
480 min Summer	99.793	0.543	0.7	13.0	Flood Risk
600 min Summer	99.788	0.538	0.7	12.9	Flood Risk
720 min Summer	99.781	0.531	0.7	12.6	Flood Risk
960 min Summer	99.761	0.511	0.6	11.8	Flood Risk
1440 min Summer	99.717	0.467	0.6	10.2	Flood Risk
2160 min Summer	99.657	0.407	0.5	8.2	O K
2880 min Summer	99.608	0.358	0.5	6.8	O K
4320 min Summer	99.534	0.284	0.4	4.9	O K
5760 min Summer	99.483	0.233	0.3	3.7	O K
7200 min Summer	99.448	0.198	0.3	3.0	O K
8640 min Summer	99.424	0.174	0.3	2.5	O K
10080 min Summer	99.406	0.156	0.3	2.2	O K
15 min Winter	99.630	0.380	0.5	7.4	O K
30 min Winter	99.702	0.452	0.6	9.7	Flood Risk
60 min Winter	99.762	0.512	0.6	11.8	Flood Risk
120 min Winter	99.799	0.549	0.7	13.3	Flood Risk
180 min Winter	99.815	0.565	0.7	13.9	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	126.959	0.0	18
30 min Summer	85.109	0.0	33
60 min Summer	54.501	0.0	62
120 min Summer	33.546	0.0	120
180 min Summer	25.442	0.0	152
240 min Summer	20.951	0.0	182
360 min Summer	15.935	0.0	250
480 min Summer	13.063	0.0	320
600 min Summer	11.141	0.0	388
720 min Summer	9.748	0.0	456
960 min Summer	7.830	0.0	594
1440 min Summer	5.657	0.0	854
2160 min Summer	4.011	0.0	1236
2880 min Summer	3.133	0.0	1612
4320 min Summer	2.210	0.0	2336
5760 min Summer	1.738	0.0	3056
7200 min Summer	1.470	0.0	3752
8640 min Summer	1.297	0.0	4496
10080 min Summer	1.180	0.0	5240
15 min Winter	126.959	0.0	18
30 min Winter	85.109	0.0	32
60 min Winter	54.501	0.0	60
120 min Winter	33.546	0.0	116
180 min Winter	25.442	0.0	168

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	99.823	0.573	0.7	14.3	Flood Risk
360 min Winter	99.831	0.581	0.7	14.6	Flood Risk
480 min Winter	99.829	0.579	0.7	14.5	Flood Risk
600 min Winter	99.820	0.570	0.7	14.2	Flood Risk
720 min Winter	99.809	0.559	0.7	13.7	Flood Risk
960 min Winter	99.780	0.530	0.7	12.5	Flood Risk
1440 min Winter	99.720	0.470	0.6	10.3	Flood Risk
2160 min Winter	99.641	0.391	0.5	7.7	O K
2880 min Winter	99.579	0.329	0.4	6.0	O K
4320 min Winter	99.490	0.240	0.3	3.9	O K
5760 min Winter	99.432	0.182	0.3	2.7	O K
7200 min Winter	99.395	0.145	0.2	2.0	O K
8640 min Winter	99.369	0.119	0.2	1.6	O K
10080 min Winter	99.351	0.101	0.2	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.951	0.0	190
360 min Winter	15.935	0.0	268
480 min Winter	13.063	0.0	344
600 min Winter	11.141	0.0	420
720 min Winter	9.748	0.0	492
960 min Winter	7.830	0.0	636
1440 min Winter	5.657	0.0	908
2160 min Winter	4.011	0.0	1296
2880 min Winter	3.133	0.0	1672
4320 min Winter	2.210	0.0	2380
5760 min Winter	1.738	0.0	3112
7200 min Winter	1.470	0.0	3824
8640 min Winter	1.297	0.0	4576
10080 min Winter	1.180	0.0	5248

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 385961 174767 ST 85961 74767
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.029

Time (mins) From:	To:	Area (ha)
0	4	0.029

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m) 99.250 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.06667 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.06667

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	11.1	0.750	55.6

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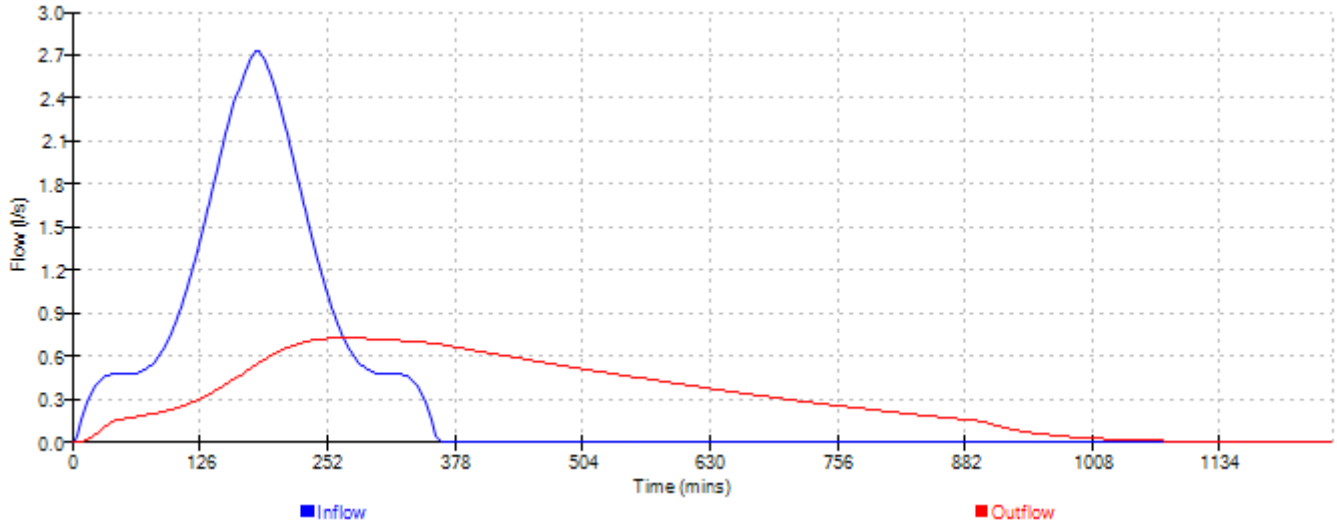
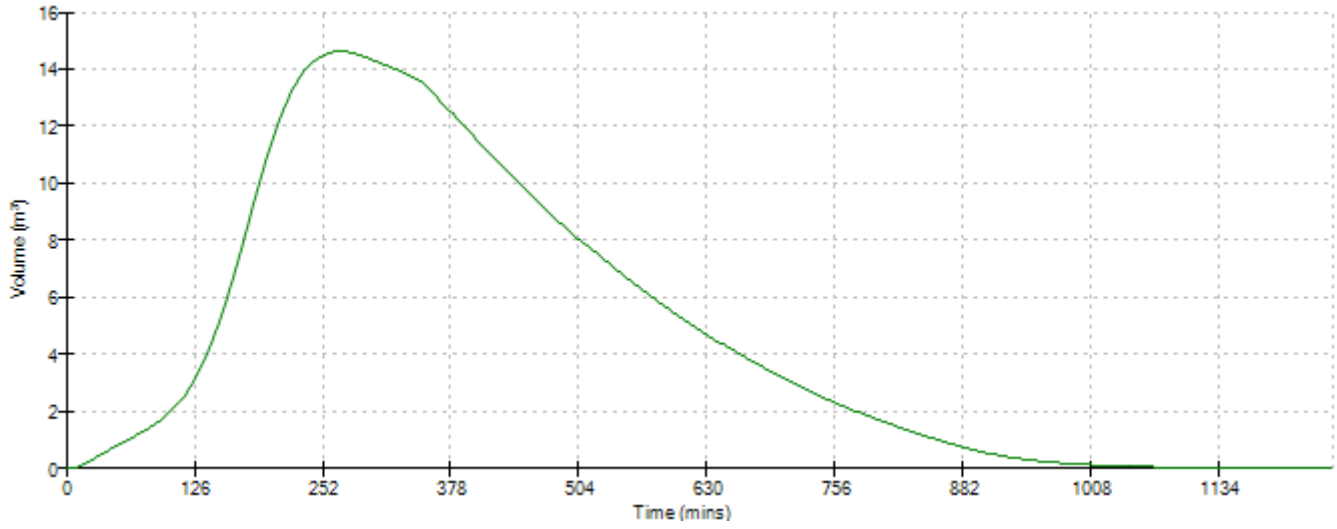
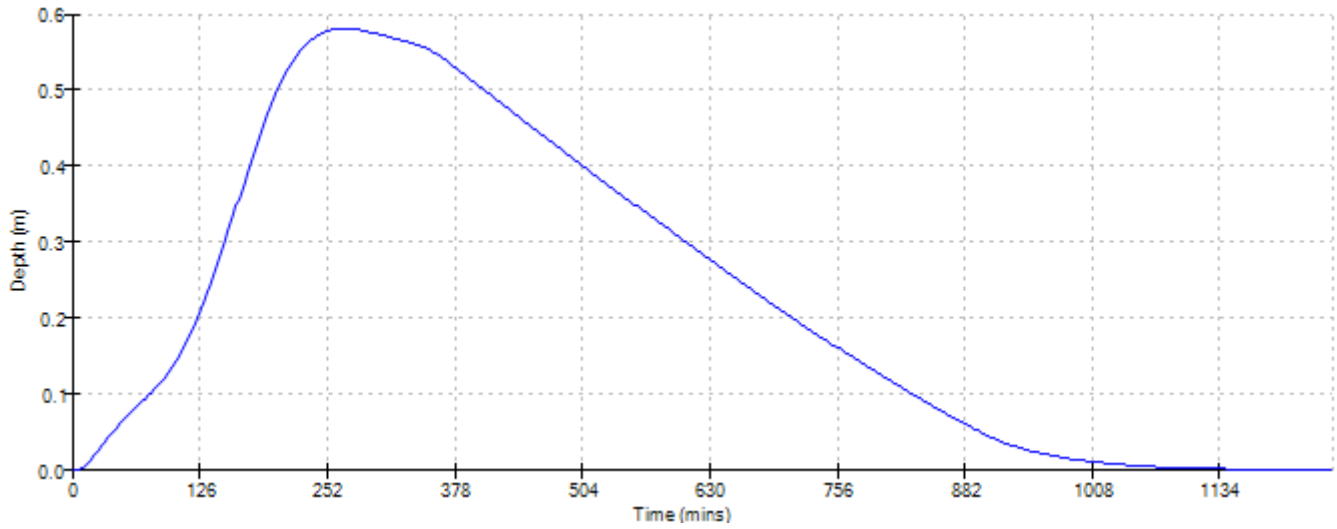
Event: 360 min Winter







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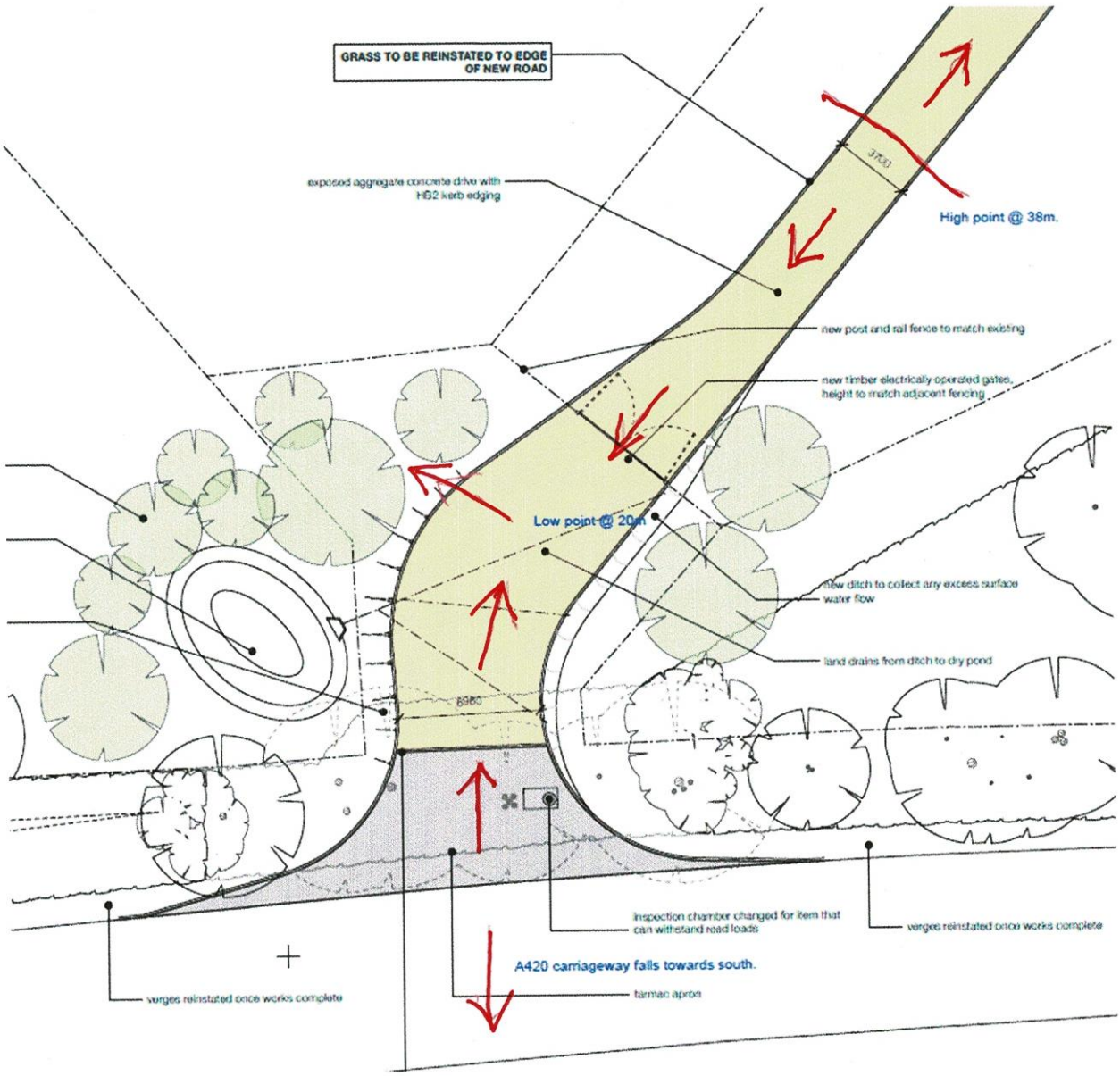
IVY FARM
WEST YATTON



OVERLAND EXCEEDENCE
FLOW ROUTES

(FOR FLOWS GREATER THAN 1 IN 100 YEAR RAINFALL PLUS 40 %)