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Sent: 13 June 2016 12:05:08
To: John Ashley
Cc:
Subject: Drainage at Yew Tree Farm South - Planning ref 16/00347/FUL
Attachments: 16136 SWDS final June 2016.pdf

John

Drainage at Yew Tree Farm South - Planning ref 16/00347/FUL

David Claxton at Windle Beech Winthrop asked us to carry out some percolation tests at Yew Tree Farm South and to look at a suitable drainage strategy for the site.

Although The percolation tests showed the ground conditions are not ideal for a traditional soakaway solution, we consider infiltration methods can still be utilised to improve the current drainage situation and to ensure any surface water run off from the site can be dramatically reduced.

Attached is a copy of our drainage strategy report, please give me a call if you wish to discuss any of our proposals.

Regards

Paul Beeley

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Surface Water Drainage Strategy

**Yew Tree Farm
Middleton**

Project Number: 16136

June 2016

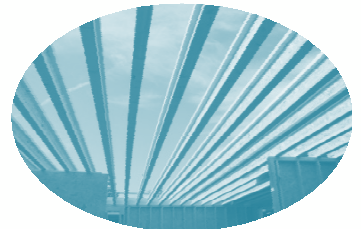
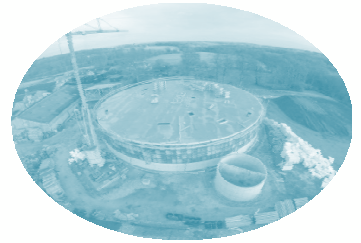


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Surface Water Drainage Strategy

Yew Tree Farm

Middleton

1.0 Introduction

The proposals are to convert a range of existing agricultural outbuildings into 3 no. habitable dwellings with associated driveways.

We attended site on 31 May 2016 to review the site and to carry out a series of percolations tests to assess a suitable drainage strategy for the development.

2.0 Site Description

The existing agricultural buildings currently have a mixture of stone, slate and fibre cement roofs.

The western elevation drains directly onto the concrete yard area. There is no positive drainage in this yard area. The run-off from the site drains out onto the shared access road.

The yard area to the east of the barns is partly surfaced with bitumen macadam. The run-off from this areas drains towards the shared access road.

3.0 Site Investigations

Initially two test pits were formed:

Test pit 1 measured 1.4m x 0.35m x 0.95 deep

Test pit 2 measured 1.35m x 0.35m x 1.00m deep

The underlying strata consist of 250mm topsoil over yellow sandy, silty clay. Both tests pits were filled with 300mm of water and the water level drops were recorded over a two hour period.

In test pit 1 the water level drop was 20mm, and 25mm in test pit 2.

Based on this initial drop the infiltration rate is 4.803×10^{-6} M/S.

This is a very low figure and therefore the ground is not particularly suited for infiltration devices. A further test pit was excavated in the neighbouring field (test pit 3) down to 1.6m deep and the ground conditions were shown to be consistent.

Along the northern site boundary there is a land drain below the hedgeline. This land drain outfalls through the wall into the western courtyard (see photographs in Appendix A). An old bath is used as a water butt.

The outfall from this water butt drains to a pipe which runs away from the site down the lane in a westerly direction.

Some of the existing run-off from the eastern yard area will be intercepted by this land drain prior to reaching the access lane.

4.0 Drainage Proposals

The run-off from the existing impermeable areas currently drains onto the access lane with some being intercepted by the land drain.

There is no significant increase in impermeable area created by the re-development however the current situation with run-off onto third party land is not ideal.

To limit the extent of the proposed impermeable area the external hardstanding areas will be formed from porous materials.

As the infiltration rates are very low, in severe storm events there may be some run-off from the hardstanding areas therefore we propose incorporating an infiltration trench along the eastern boundary of the driveway.

This will be linked to another infiltration trench formed at a low spot on the site which will cater for the roof water run-off (see attached marked up drawing in Appendix B).

The roof catchment area measures 300m^2 , the hardstanding areas measure 505m^2 , however this will be formed from a porous material so we have taken a potential 30% run-off rate from this area.

We have calculated that based on the low infiltration rate an infiltration trench measuring 50m² x 1m² deep with 30% voids will cater for all storm events up to and including the 1 in 100 year event (see Microdrainage calculations in Appendix F).

This can be achieved by forming a 43m x 0.6m x 1.0m trench alongside the hardstanding and an additional trench measuring 12m 2m x 1.0m deep in the soft landscaped area (see Appendix E).

Although this is only catering for the 1 in 10 year storm event, we believe this is still a considerable improvement on the current drainage arrangement and will ensure that the proposed re-development of the site will have a positive effect on the surrounding infrastructure limiting any offsite/downstream flows.

Prepared by

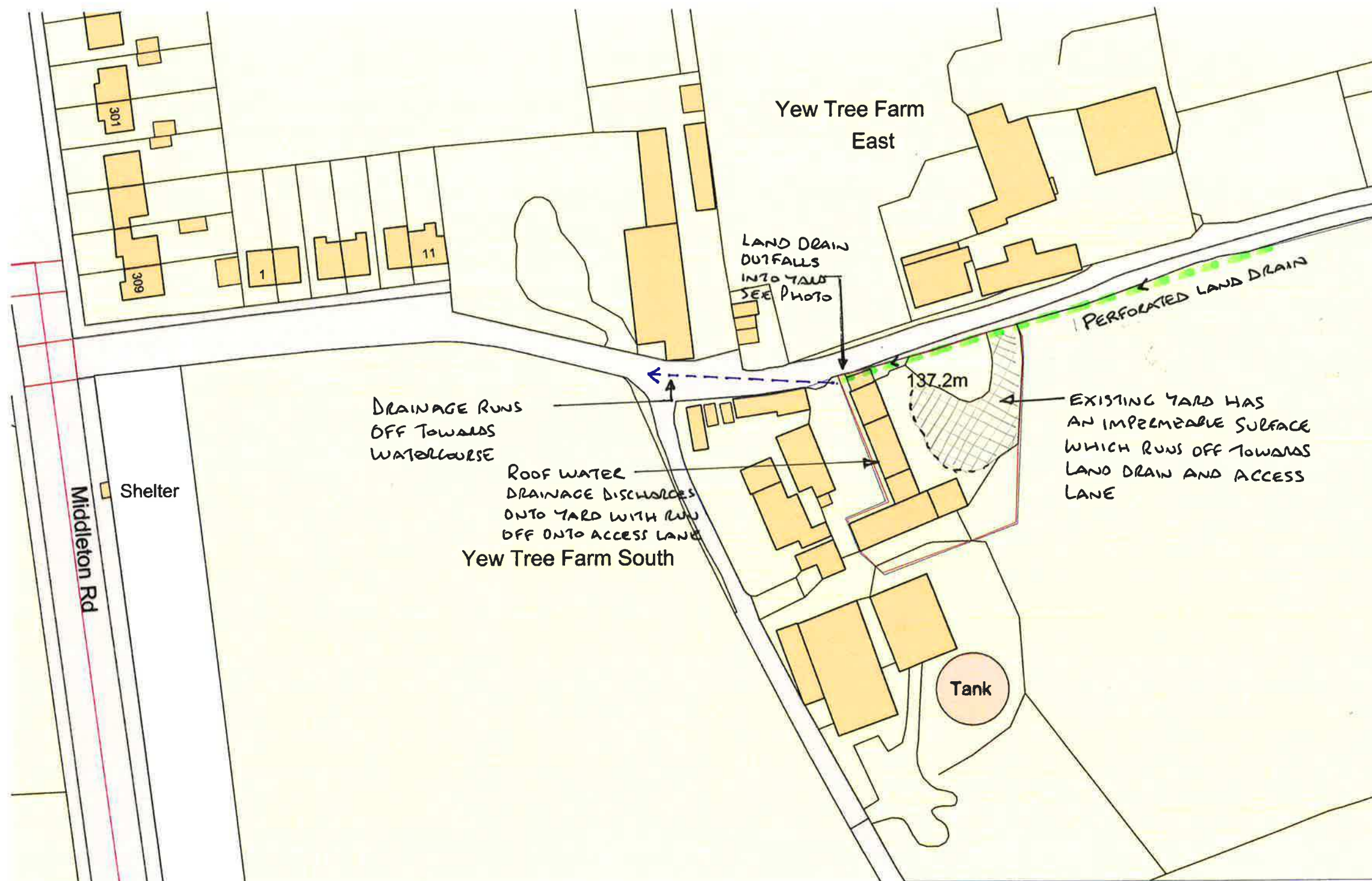


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Paul Beeley

Appendix A

Plan Showing Existing Drainage Arrangements



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scale 1:1000



Appendix B

Photographs



Trial Pit 1



Trial Pit 2



Trial Pit 3



Neighbouring property free discharge
onto access lane



Eastern yard area with run-off onto
access lane



Land drain outfall into yard



Access lane adjacent to the site



Eastern yard area with run-off onto access lane

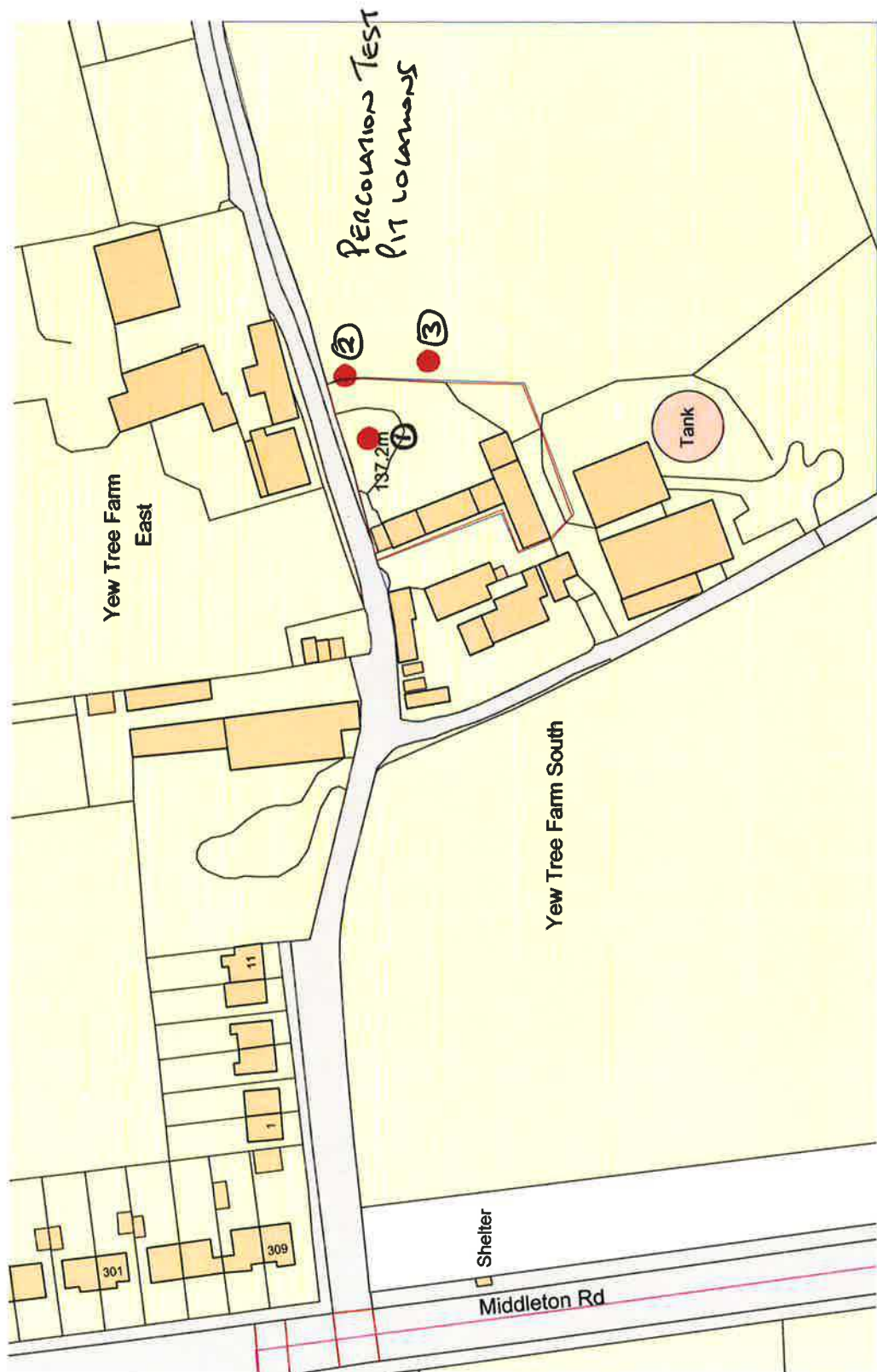
Western yard area roof water drainage discharges directly onto the yard and falls to access lane



Western yard area roof water drainage discharges directly onto the yard and falls to access lane

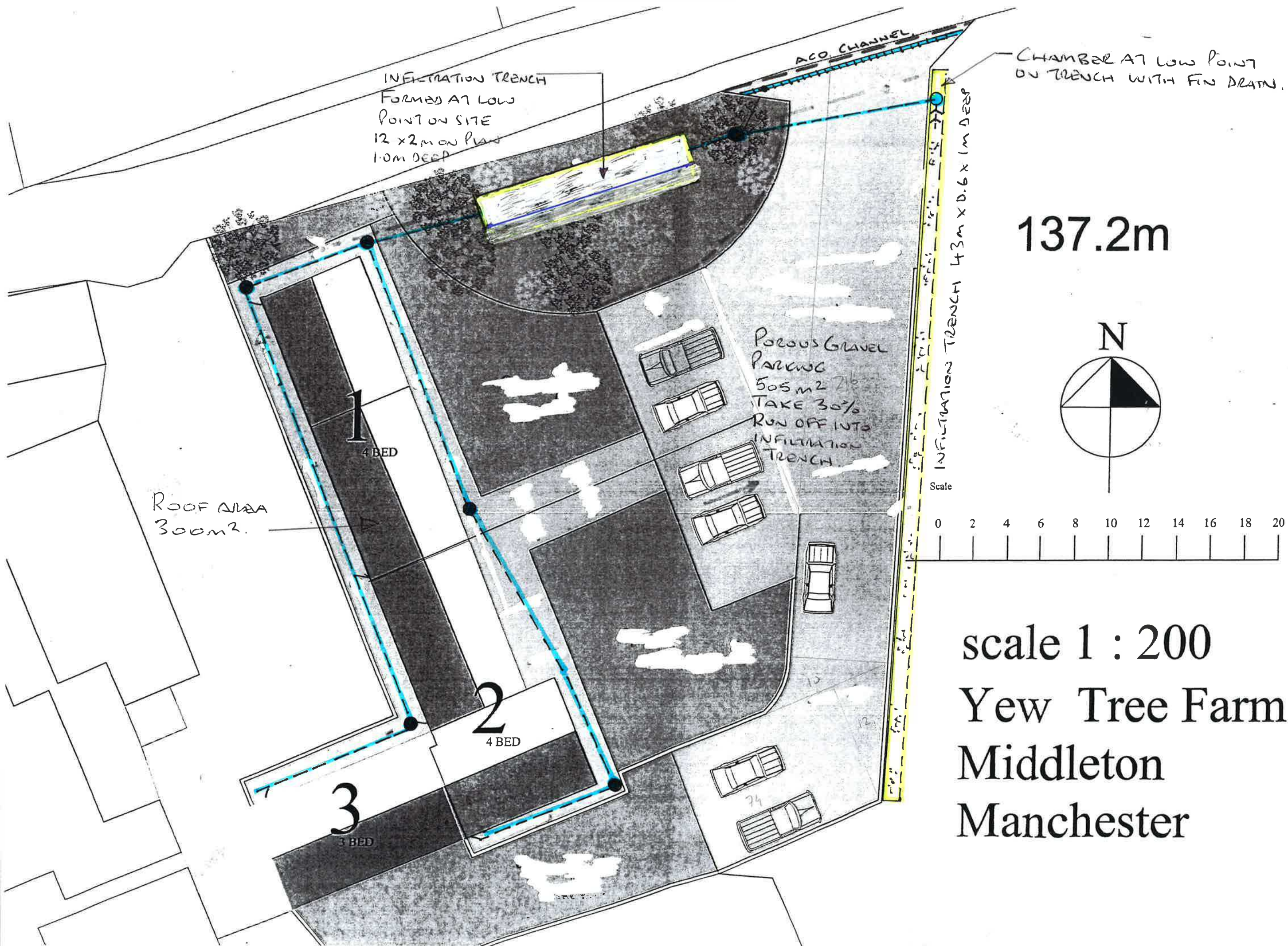
Appendix C

Percolation Test Pit Locations



Appendix D

Proposed Drainage Plan

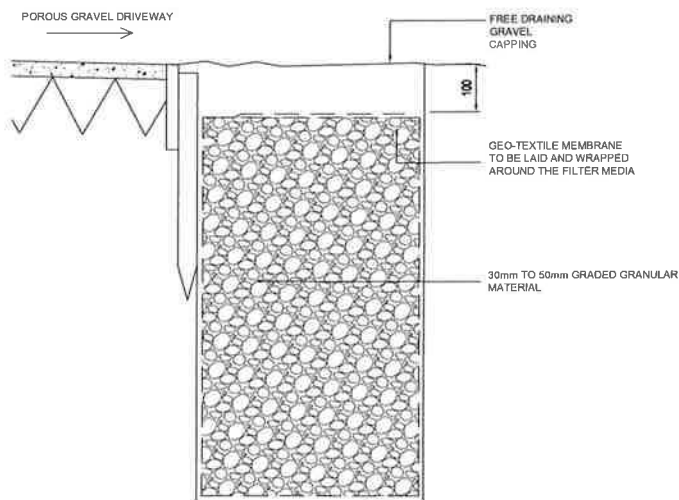


Appendix E

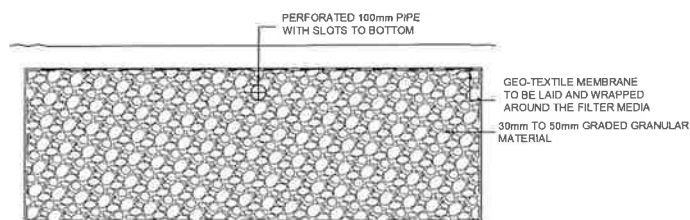
Proposed Infiltration Trench Details

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers Drawings.
2. It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.



SECTION THROUGH INFILTRATION TRENCH (1:20)



SECTION THROUGH LARGER INFILTRATION TRENCH (1:50)

Client	Project Yew Tree Farm Middleton			
Drawing title Infiltration Trench Detail	Drawn PB	Chkd	Date June 2016	Scale var
	Job No. 16136		Drg No. C-50	Revision



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Appendix F

Micro Drainage calculations

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Micro Drainage	Source Control 2015.1	

Summary of Results for 10 year Return Period

Half Drain Time : 498 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	99.343	0.343	0.2	4.2	O K
30 min Summer	99.432	0.432	0.2	5.5	O K
60 min Summer	99.525	0.525	0.2	6.9	O K
120 min Summer	99.615	0.615	0.2	8.3	O K
180 min Summer	99.661	0.661	0.2	9.0	O K
240 min Summer	99.686	0.686	0.2	9.4	O K
360 min Summer	99.707	0.707	0.2	9.7	Flood Risk
480 min Summer	99.714	0.714	0.2	9.8	Flood Risk
600 min Summer	99.717	0.717	0.2	9.8	Flood Risk
720 min Summer	99.716	0.716	0.2	9.8	Flood Risk
960 min Summer	99.709	0.709	0.2	9.7	Flood Risk
1440 min Summer	99.684	0.684	0.2	9.3	O K
2160 min Summer	99.640	0.640	0.2	8.7	O K
2880 min Summer	99.595	0.595	0.2	8.0	O K
4320 min Summer	99.512	0.512	0.2	6.7	O K
5760 min Summer	99.439	0.439	0.2	5.7	O K
7200 min Summer	99.377	0.377	0.2	4.7	O K
8640 min Summer	99.324	0.324	0.2	3.9	O K
10080 min Summer	99.278	0.278	0.1	3.2	O K
15 min Winter	99.378	0.378	0.2	4.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	51.909	0.0	26
30 min Summer	34.590	0.0	40
60 min Summer	22.185	0.0	68
120 min Summer	13.889	0.0	126
180 min Summer	10.477	0.0	184
240 min Summer	8.551	0.0	242
360 min Summer	6.408	0.0	352
480 min Summer	5.218	0.0	408
600 min Summer	4.447	0.0	472
720 min Summer	3.902	0.0	536
960 min Summer	3.173	0.0	672
1440 min Summer	2.368	0.0	952
2160 min Summer	1.766	0.0	1364
2880 min Summer	1.434	0.0	1764
4320 min Summer	1.068	0.0	2556
5760 min Summer	0.866	0.0	3304
7200 min Summer	0.736	0.0	4040
8640 min Summer	0.645	0.0	4760
10080 min Summer	0.576	0.0	5464
15 min Winter	51.909	0.0	26

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Micro Drainage	Source Control 2015.1	

Summary of Results for 10 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	99.479	0.479	0.2	6.2	O K
60 min Winter	99.585	0.585	0.2	7.8	O K
120 min Winter	99.690	0.690	0.2	9.4	O K
180 min Winter	99.744	0.744	0.2	10.2	Flood Risk
240 min Winter	99.776	0.776	0.2	10.7	Flood Risk
360 min Winter	99.807	0.807	0.2	11.2	Flood Risk
480 min Winter	99.816	0.816	0.2	11.3	Flood Risk
600 min Winter	99.816	0.816	0.2	11.3	Flood Risk
720 min Winter	99.815	0.815	0.2	11.3	Flood Risk
960 min Winter	99.803	0.803	0.2	11.1	Flood Risk
1440 min Winter	99.763	0.763	0.2	10.5	Flood Risk
2160 min Winter	99.691	0.691	0.2	9.4	O K
2880 min Winter	99.621	0.621	0.2	8.4	O K
4320 min Winter	99.496	0.496	0.2	6.5	O K
5760 min Winter	99.393	0.393	0.2	5.0	O K
7200 min Winter	99.308	0.308	0.2	3.7	O K
8640 min Winter	99.239	0.239	0.1	2.7	O K
10080 min Winter	99.184	0.184	0.1	1.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	34.590	0.0	40
60 min Winter	22.185	0.0	68
120 min Winter	13.889	0.0	124
180 min Winter	10.477	0.0	182
240 min Winter	8.551	0.0	238
360 min Winter	6.408	0.0	350
480 min Winter	5.218	0.0	454
600 min Winter	4.447	0.0	492
720 min Winter	3.902	0.0	566
960 min Winter	3.173	0.0	722
1440 min Winter	2.368	0.0	1028
2160 min Winter	1.766	0.0	1472
2880 min Winter	1.434	0.0	1904
4320 min Winter	1.068	0.0	2720
5760 min Winter	0.866	0.0	3472
7200 min Winter	0.736	0.0	4248
8640 min Winter	0.645	0.0	4928
10080 min Winter	0.576	0.0	5560

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.329	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.045

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.015	4 8	0.015	8 12	0.015

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Date June 2016 File soakaway.srcx	Designed by PB Checked by																					
Micro Drainage Source Control 2015.1																						
<u>Model Details</u> Storage is Online Cover Level (m) 100.000 <u>Infiltration Trench Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.01730</td> <td>Trench Width (m)</td> <td>2.0</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.01730</td> <td>Trench Length (m)</td> <td>25.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>200.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>0.800</td> </tr> <tr> <td>Invert Level (m)</td> <td>99.000</td> <td>Cap Infiltration Depth (m)</td> <td>0.800</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.01730	Trench Width (m)	2.0	Infiltration Coefficient Side (m/hr)	0.01730	Trench Length (m)	25.0	Safety Factor	2.0	Slope (1:X)	200.0	Porosity	0.30	Cap Volume Depth (m)	0.800	Invert Level (m)	99.000	Cap Infiltration Depth (m)	0.800
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