



Hampshire
County Council

MOORLAND PRIMARY SCHOOL EXPANSION, READING, BERKSHIRE

DRAINAGE STATEMENT

Prepared by: Colin Pocock

Signed:  Date: 23.01.2018....

Checked by: Joseph Ozkan

Signed: Date: 23.01.2018....

Approved by: David Ryder

Signed:  Date: 23.01.2018....

Rev	Date	Originator	Checked	Approved	Description
-	23.01.2018	CP	JO	DR	Issued For Planning

Job No: E03153



 **engineering**
CONSULTANCY

Stuart Jarvis, BSc DipTP FCIHT MRTPI, Director of Environment, The Castle, Winchester

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1 Introduction

Hampshire County Council Engineering Consultancy has been commissioned to carry out a proposed foul and surface water drainage strategy on behalf of Hampshire County Council Property Services for Reading Borough Council to accompany the planning application for the proposed development of Moorlands Primary School located at Church End Lane, Reading, Berkshire, RG30 4UN.

Under the proposals there will be four new teaching blocks consisting of between 1-4 teaching rooms with associated toilet and sink facilities. The new blocks will be located to the north, west and south of the existing school building and will cover an area of 912sqm. Refer to Appendix A for the existing topographical survey drawing which also includes the radar survey. This drawing details the existing layout of the foul and surface water drainage systems. Refer to Appendix C for the existing and proposed layout drawing.

In addition to this there will be proposed hard standing play areas and footpaths (1316sqm), an area of synthetic grass (183sqm), a grasscrete emergency access (186sqm) and two areas of increased parking. The first of the parking areas will be located adjacent to the existing car park to the south of the school building and will be constructed of Bodpave or similar permeable grass pavers (482sqm) and the second area will be constructed of tarmac or similar construction (608sqm), and is located off site, to the west, adjacent to an existing parking area by two tennis courts. Refer to Appendix A for the existing topographical survey drawing and Appendix C for the existing and proposed layout drawing.

2 Foul Water Drainage

After reviewing the existing private foul water drainage network and the public sewer records it has been confirmed that the existing foul water drainage from the school site discharges to the public foul water manhole number MH6301 which is located to the east of the school vehicular entrance in a soft landscaped area within the school boundary, via a 150mm diameter pipe. The public foul sewer is a 225mm diameter pipe. Refer to Appendix G for public sewer records.

The existing school currently has 420 pupils and 59 staff. Based on 90l/day/per person the existing foul flow from the school equates to:-

$$\text{DWF} = 90 \times 479/24/3600 = 0.499\text{l/s}$$

$$\text{Existing peak foul flow} = 6\text{DWF} + 10\% \text{ DWF} = 6 \times 0.499 + 0.0499 = 3.044\text{l/s}$$

Under the proposals there will be an additional 240 pupils and 14 staff which equates to an additional 254 persons. Based on 90l/s the increased foul flow equates to:-

$$\text{Additional DWF} = 90 \times 254/24/3600 = 0.265\text{l/s}$$

Using the above figures the total peak flow from the school after the construction of the new expansion will be:-

$$90 \times 733/24/3600 = 0.764\text{l/s}$$

$$\text{Total Peak foul flow} = 6\text{DWF} + 10\% \text{ DWF} = 6 \times 0.764 + 0.0764 = 4.66\text{l/s}.$$

Due to the levels of the existing private foul drainage network on site it is not possible to connect "teaching block 1" and "teaching block 2" to the existing network via gravity, it is therefore proposed to connect the foul drainage for these two blocks together and direct them to a new foul pump chamber on site, and then pump the flows back in to the existing private drainage network prior to entering the public foul sewer at MH6301.

Final discharge rates for the proposed foul sewer have yet to be confirmed but it is envisaged that to achieve self-cleansing velocity, the pump chamber will pump at 3.5l/s. The pump will discharge the proposed flows back in to the existing manhole as shown on drawing number EC/E03153-003 (Proposed foul and surface water drainage strategy sheet 1 of 2), Appendix D.

At the time of writing this report a Section 106 application has been submitted to Thames Water in respect of connecting the proposed foul flows from the development to the public sewer as described above.

3 Surface Water Drainage

After reviewing the existing private surface water drainage network and the public sewer records it has been confirmed that the existing surface water drainage from the school site discharges to the public surface water manhole number MH6351 which is located to the east of the school vehicular entrance in a soft landscaped area within the school boundary, next to foul water manhole MH6301. The private surface water drainage pipes connecting to this manhole are 225mm/ 300mm diameter. The public surface water sewer is a 225mm diameter pipe, increasing to 375mm diameter immediately downstream. Refer to Appendix G for public sewer records.

The school site appears to discharge at an unrestricted rate to the public sewer.

A site investigation was carried out which shows that the site is underlain by clays and gravels. Two number infiltration tests were carried out but due to the underlying geology of the site, infiltration rates were unable to be calculated. Refer to Appendix E for borehole logs, infiltration test results and geo technical engineer's response.

It is therefore proposed to have an attenuated discharge system, and the overall discharge rate will be limited to the existing surface water run-off rate for the site.

In order that the total flows to the public sewer are not increased, the surface water drainage strategy will take 2 existing areas that currently drain to the existing private network (refer to Appendix B for the existing drainage catchment areas drawing) and redirect them into the proposed drainage network to produce an allowable flow rate.

Using the equation $Q=2.78CIA$ where:-

C=permeability coefficient of 0.8

I=rainfall intensity

A= impermeable area 1618sqm (0.1618Ha)

The peak discharge rate from the existing combined area for the 1 in 1 year return period is $2.78 \times 0.8 \times 57.94 \times 0.1618 \text{Ha} (\text{Area 1 and Area 2}) = 20.84 \text{l/s}$

Existing Run Off Rates From Combined Area 1 and 2

20.85l/s 1 in 1 year return period

49.66l/s 1 in 30 year return period

63.08l/s 1 in 100 year return period

The proposed drainage strategy will utilize 4 attenuation tanks (refer to Appendix D for the proposed foul and surface water drainage strategy and appendix H for the preliminary attenuation tank calculations), and it is proposed to limit each attenuation tank to a discharge rate of 5l/s ($4 \times 5 \text{l/s} = 20 \text{l/s}$) which is a betterment of 0.84l/s over the existing system.

To provide even more betterment it is proposed to restrict the discharge from each tank to 5l/s for all storm events.

The first three tanks will connect to the existing private drainage network on site. The fourth tank will connect directly to the public sewer.

The proposed grasscrete emergency access will use shallow infiltration to ground techniques to replicate the nature of the existing grass on which it will be constructed.

The proposed surface water drainage design will focus on the capture and management of all surface water generated by the proposed development within the existing site boundary and will prevent the likelihood of flooding to adjacent sites, in line with SuDS guidance and the National Planning Policy Framework (NPPF)

The proposed surface water drainage systems will be capable of draining the site, without flooding for all storm durations up to 1 in 30 years, whilst storms above this period and up to 1 in 100 years plus 40% climate change will be stored within the site boundary without putting buildings and thirty party properties at risk from flooding.

It is envisaged that overland flood storage can be safely managed on site and thus the proposed attenuation tanks has been sized to store the 1 in 30 year return period storm plus 20% climate change. Refer to appendix H for the preliminary drainage calculations.

At the time of writing this report a Section 106 application has been submitted to Thames Water in respect of connecting the proposed surface water flows from the development in to the public sewer as described above.

4 Flood Risk Assessment

Environment Agency Flood maps indicate that the site lies within Flood Zone 1 where the lowest annual probability of flooding occurs, that being less than 1 in 1000 for any given year. As the site lies within Flood Zone 1 and the proposed development area is less than 1Ha, no site specific Flood Risk Assessment has been compiled in respect of the planning application. Refer to appendix F for Flood Map.

The Environment Agency Flood Maps show that the site does not lie within a groundwater source protection zone.

The site investigation has shown that groundwater was encountered within SA1 and WS1 at depths of 2.90m and 3.0m respectively. In light of this the risk of flooding from groundwater is considered to be low.

5 Water Quality

In order to maintain water quality the proposed surface water drainage system will contain catchpits, trapped gullies and channel drains with sump units to intercept contaminants. In addition the two increased areas of parking will be fitted with bypass separators in case of spillage from vehicles.

6 Maintenance

The proposed foul and surface water drainage system will be maintained in accordance with the SuDS manual and to Reading Borough Councils standard maintenance requirements.

Appendix A – Existing Topographical Survey Drawing

Drawing number E03153-TOPO

Appendix B – Existing Drainage Catchment Areas

Drawing number E03153-001

Appendix C – Existing and Proposed Layout

Drawing number E03153-002

Appendix D – Proposed Drainage Strategy

Drawing number E03153-003 and 004

Appendix E – Infiltration Rates and Engineers Response

Test location plan

Borehole logs

Infiltration tests

Email from Kirsten (geotechnical Engineer)



Window Sample Hole

Trial Pit Hole

CBR Test Location

Project Name Moorlands Primary School		Project No. 5846	Date 30/05/2017 to 30/05/2017		Hole Type IP
Client Hampshire County Council		Co-ords E: N: L:	Water Strike Details		Logged By SR
			Depth Strike	Remarks	
Contractor 360 Drilling Ltd	Plant Used Hand Tools				Approved By PS
					Scale 1:50

Samples and Results			Depth, (Thickness)	Level	Stratum Description	Legend
Results	Depth	Type				
			(0.20)		MADE GROUND	
			0.20		Asphalt	
			(0.60)		MADE GROUND	
			0.80		Soft to firm, brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine to coarse of brick, ash, flint and concrete.	
					End of Trial Pit at 0.80m	
				1		
				2		
				3		
				4		

Remarks	0.40m 0.40m Final Depth 0.80m
Pit Stability	
Relatively stable	
Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.	



Consulting Geo-Technical & Geo-Environmental Engineers
Site Investigation Contractors

The Pump House, 44 Marlborough Road
Exeter, Devon, EX2 4LL
01392 438982
www.terrafirmasouth.co.uk

Borehole No.

HDP2

Sheet 1 of 1

Project Name

Moorlands Primary School

Project No.

5846

Date

30/05/2017 to 30/05/2017

Hole Type

IP

Client

Hampshire County Council

Co-ords

E:

N:

L:

Water Strike Details

Depth Strike

Remarks

Logged By

SR

Approved By

PS

Scale 1:50

Contractor

360 Drilling Ltd

Plant Used

Hand Tools

Samples and Results

Results

Depth

Type

**Depth,
(Thickness)**

Level

Stratum Description

Legend

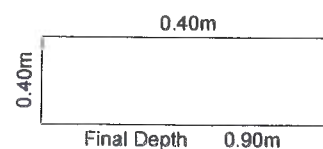
	0.30	ES	(0.20) 0.20		MADE GROUND Asphalt	
			(0.70)		MADE GROUND Soft to firm, brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine to coarse of brick, ash, flint and concrete.	
			0.90		End of Trial Pit at 0.90m	
			1			
			2			
			3			
			4			

Remarks

Pit Stability

Relatively stable.

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.



Project Name Moorlands Primary School		Project No. 5846	Date 31/05/2017 to 31/05/2017		Hole Type IP
Client Hampshire County Council		Co-ords E: N: L:	Water Strike Details		Logged By SR
			Depth Strike	Remarks	
Contractor 360 Drilling Ltd	Plant Used Hand Tools				Approved By PS
					Scale 1:50

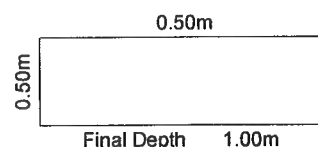
Samples and Results			Depth, (Thickness)	Level	Stratum Description	Legend
Results	Depth	Type				
			(0.90)		MADE GROUND Firm, brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine to coarse or brick, flint and concrete.	
			0.90	1	End of Trial Pit at 1.00m	
				2		
				3		
				4		

Remarks

Pit Stability

Relatively stable

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.



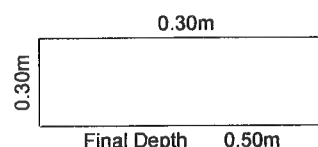
Project Name Moorlands Primary School		Project No. 5846	Date 31/05/2017 to 31/05/2017		Hole Type IP
Client Hampshire County Council		Co-ords E: N: L:	Water Strike Details		Logged By SR
			Depth Strike	Remarks	
Contractor 360 Drilling Ltd	Plant Used Hand Tools				Approved By PS
					Scale 1:50

Samples and Results			Depth, (Thickness)	Level	Stratum Description	Legend
Results	Depth	Type				
	0.30	ES	(0.50) 0.50		Soft to firm, dark-brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine to coarse of flint	
					End of Trial Pit at 0.50m	
				1		
				2		
				3		
				4		

Remarks

Pit Stability
Relatively stable

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.



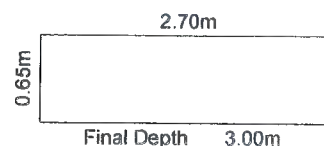
Project Name Moorlands Primary School	Project No. 5846	Date 31/05/2017 to 31/05/2017	Hole Type TP
Client Hampshire County Council	Co-ords E: N: L:	Water Strike Details Depth Strike 3.00	Logged By SR
Contractor John Stacey Plant Hire	Plant Used JCB 3CX		Approved By PS
			Scale 1:50

Samples and Results			Depth, (Thickness)	Level	Stratum Description	Legend
Results	Depth	Type				
	0.20	ES	(0.30)		MADE GROUND Grass over soft to firm, dark-brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine to coarse of flint and brick	
	0.60	B			Firm, brown, slightly gravelly sandy CLAY. Gravels are subangular to subrounded, fine to coarse of flint.	
			1 (1.40)			
			1.70			
	1.90	B		2	Firm to stiff, orange-brown, slightly gravelly to gravelly sand CLAY. Gravels are subangular to subrounded, fine to coarse of flint.	
			(1.30)			
			3 3.00			
					End of Trial Pit at 3.00m	
				4		

Remarks
Pit Stability

Relatively stable

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.



Hole Type
TP

Logged By
SR

Approved By
PS
Scale 1:50

2.60m

0.65m

Final Depth 3.00m

Depth Strike	Time Elapsed	Rose To
2.90	0	0.00

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

[illegible]

Remarks	Borehole Diameter		
	Base Depth	Diameter	Remarks
Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.			

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Project Name Moorlands Primary School		Project No. 5846	Date 30/05/2017 to 30/05/2017			Sheet 1 of 1 Hole Type WLS
Client Hampshire County Council		Co-ords E: N: L:	Water Strike Details			Logged By SR
			Depth Strike	Time Elapsed	Rose To	
Contractor 360 Drilling Ltd	Plant Used Competitor Dart					Approved By PS
						Scale 1:50

Samples and Results			Depth, (Thickness)	Level	Stratum Description	Legend	Well
Depth	Type	Results					
0.30	ES		(0.40)		MADE GROUND		
0.50 - 1.00	B		0.40		Soft, dark-brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine of brick, flint and ash.		
1.00	SPT(C)	N=20 (5,6/6,6,4,4)		1	Firm, brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine to coarse of flint.		
1.50 - 2.00	B		(2.60)				
2.00	SPT(C)	N=31 (7,7/9,7,7,8)		2			
3.00	SPT(C)	50 (12,13/50 for 210mm)		3			
				4			
				5			
				6			
					End of Borehole at 3.00m		

Remarks
Borehole Diameter

Base Depth	Diameter	Remarks

Scale 1:50

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.



Consulting Geo-Technical & Geo-Environmental Engineers
Site Investigation Contractors

The Pump House, 44 Marlborough Road
Exeter, Devon EX2 4LT
01392 328882
www.terrafirmasouth.co.uk

Borehole No.

WS5

Sheet 1 of 1

Project Name

Moorlands Primary School

Project No.

5846

Date

30/05/2017 to 30/05/2017

Hole Type

WLS

Client

Hampshire County Council

Co-ords

E:

N:

L:

Water Strike Details

Depth Strike

Time Elapsed

Rose To

Logged By

SR

Approved By

PS

Scale 1:50

Contractor

360 Drilling Ltd.

Plant Used

Competitor Dart

Samples and Results			Depth, (Thickness)	Level	Stratum Description	Legend	Well
Depth	Type	Results					
0.25	ES		(0.35) 0.35		Soft, dark-brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine to coarse of flint and concrete.		
1.00	SPT(C)	N=18 (3,3/3,5,5,5)	1 (1.15)		Firm, orange-brown, slightly gravelly sandy CLAY. Gravels are subangular to subrounded, fine to coarse of flint.		
1.50 - 2.00	B		1.50 (0.30) 1.80		Medium dense to dense, orange brown, clayey SAND.		
2.00	SPT(C)	N=32 (7,7/7,7,8,10)	2 (1.20)		Firm to stiff, orange-brown, sandy gravelly CLAY. Gravels are subangular to subrounded, fine to coarse of flint.		
3.00	SPT(C)	N=49 (2,8/14,12,13,10)	3 3.00		Medium dense, dark-brown, clayey gravelly SAND. Gravels are subangular to subrounded, fine of flint.		
3.50 - 4.00	B						
4.00	SPT(C)	N=25 (2,6/5,6,6,8)	4 (2.00)				
5.00	SPT(C)	N=21 (4,4/5,5,5,6)	5 5.00		End of Borehole at 5.00m		
5.50	SPT(C)	N=35 (7,7/7,9,9,10)	6				

Remarks

Borehole Diameter

Base Depth

Diameter

Remarks

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Site Name:	Moorlands Primary School	Job No.: 5846	Date Undertaken: 31/05/2017
Trial Pit No.:	SA1	Test No.: 1	

(Top of test / effective depth - 100%)

Depth to Water (m)	Time (Mins)
0.37	0
0.355	1
0.55	24
0.68	73
0.75	114
0.91	215
3.000	

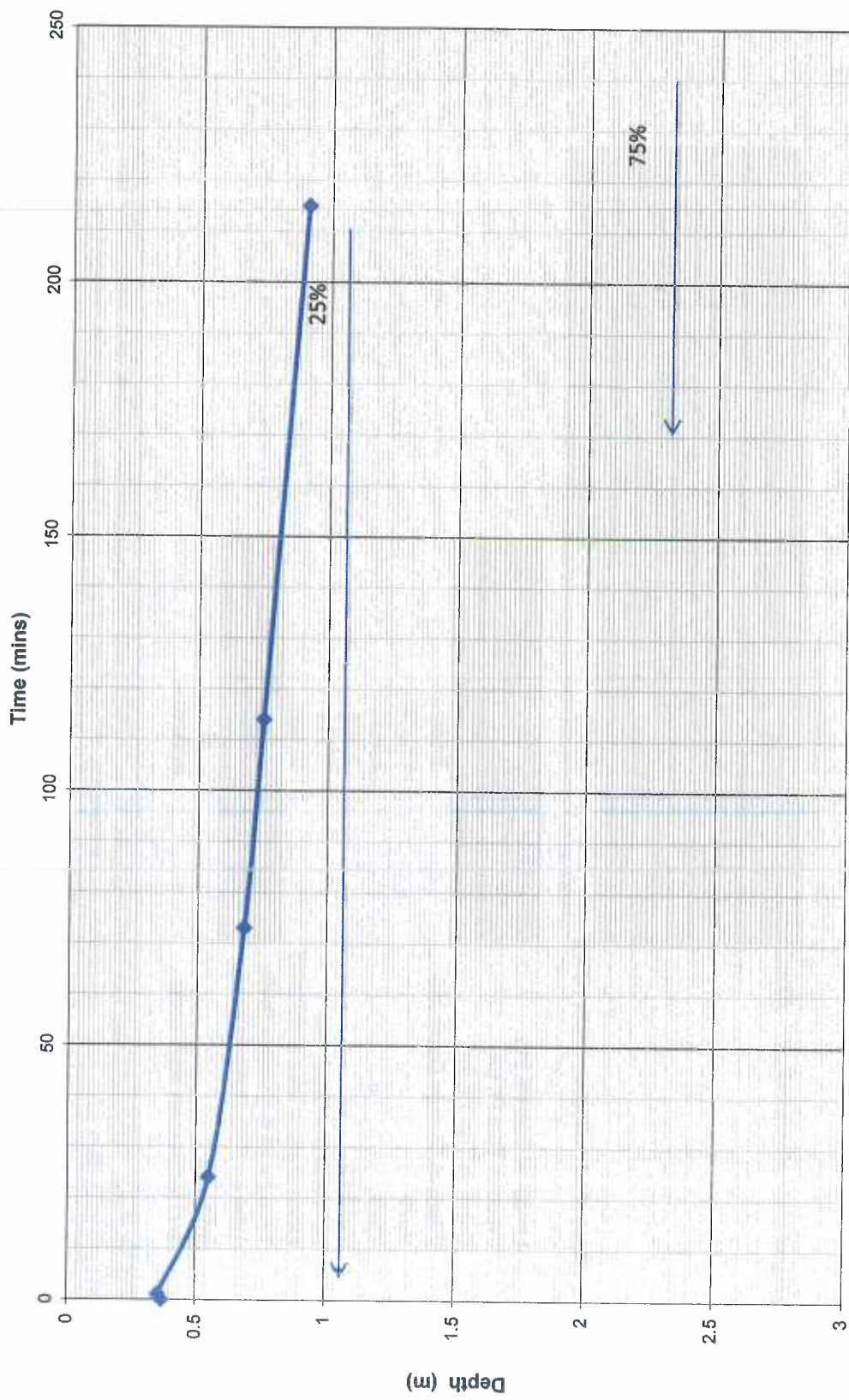
(Base of pit / effective depth - 0%)

Length of Trial Pit (m)	2.7
Width of Trial Pit (m)	0.85
Depth of Trial Pit (m)	3
Effective Storage Depth (m)	2.630
Vp25	1.0275
Vp75	2.3425
Vp75-25	2.308
50% effective depth (m)	1.315
Mean Surface area ap50 (m2)	10.566

Time for 25% Outflow (tp25)	
Time for 75% Outflow (tp75)	
tp75 - 25	0
Soil Infiltration Rate (m/s)	#DIV/0!

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BRE Digest 365- September 1991'. This worksheet can be used to determine soil infiltration rates from trial pit field measurements. Worksheet options are identified by a green background

Soil Infiltration Measurements - SA1, Test 1



Site Name:	Moorlands Primary School	Job No.: 5846	Date Undertaken: 31/05/2017
Trial Pit No.:	SA2	Test No.: 1	

(Top of test / effective depth - 100%)

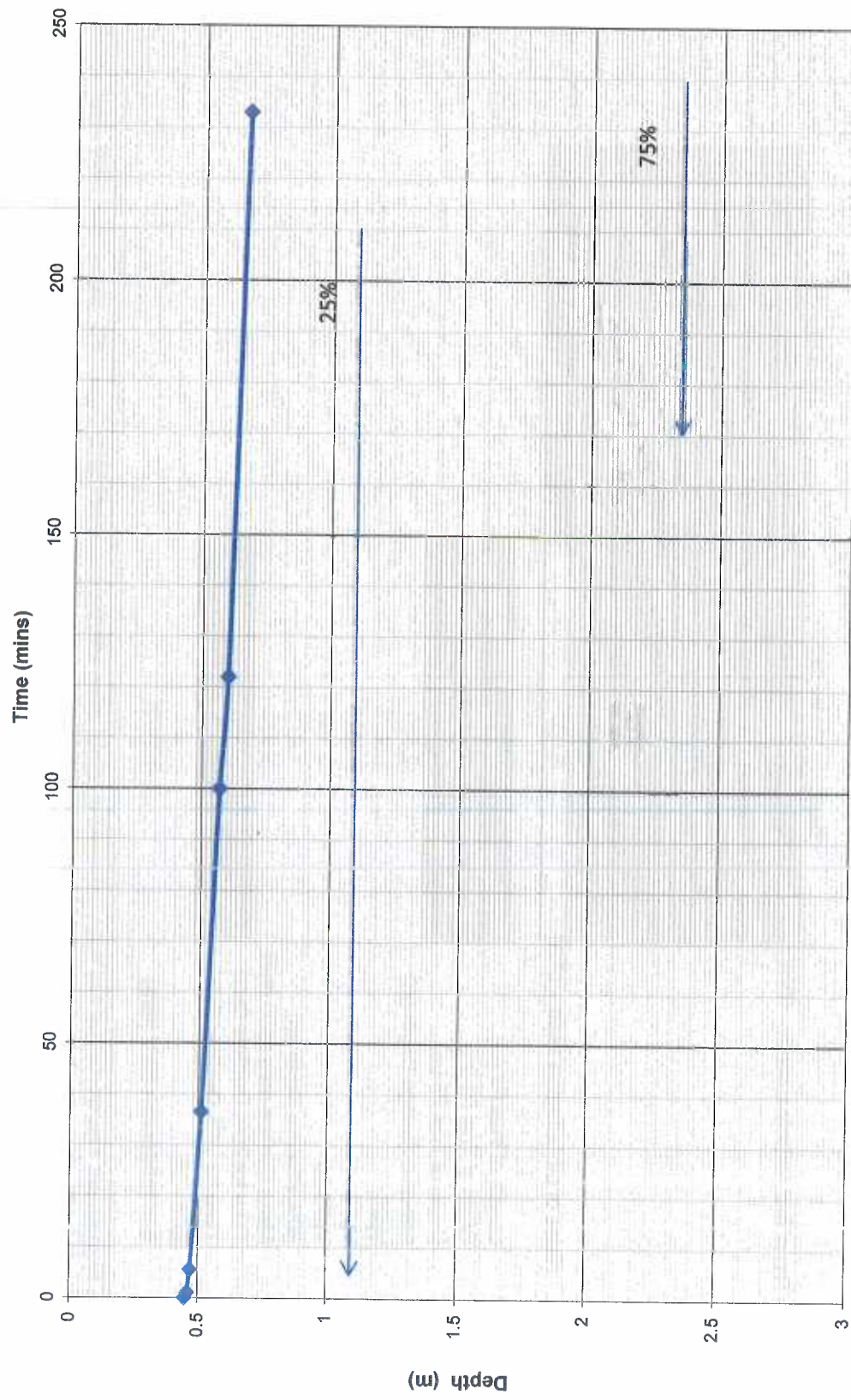
Depth to Water (m)	Time (Mins)
0.45	0
0.45	1
0.47	5.0
0.51	36.0
0.57	100
0.6	122
0.67	233
3.000	

(Base of pit / effective depth - 0%)

Length of Trial Pit (m)	2.6
Width of Trial Pit (m)	0.65
Depth of Trial Pit (m)	3
Effective Storage Depth (m)	2.550
Vp25	1.0875
Vp75	2.3625
Vp75-25	2.155
50% effective depth (m)	1.275
Mean Surface area ap50 (m2)	9.978
Time for 25% Outflow (tp25)	
Time for 75% Outflow (tp75)	
tp75 - 25	0
Soil Infiltration Rate (m/s)	#DIV/0!

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BRE Digest 365- September 1991'. This worksheet can be used to determine soil infiltration rates from trial pit field measurements. Worksheet options are identified by a green background

Soil Infiltration Measurements - SA2, Test 1



From: Fairall, Kirsten
Sent: 08 June 2017 11:00
To: Daymond, Helen; Lyon, Hugh; Ozkan, Joseph
Subject: Draft Information Moorlands Infant and Junior School
Attachments: Exploratory Hole Logs.pdf; Hole Location Plan.pdf; SA's Combined.pdf

copy

All

Please find attached draft logs and soakaway information from the works undertaken at Moorlands Infant and Junior School. Please treat this as preliminary at this stage.

Ground conditions look reasonable for conventional foundations although they comprise predominantly clay and therefore will require consideration to any nearby trees. Unfortunately soakaways do not appear to be viable – the soakage was so poor that no infiltration rate was obtained.

Please do not hesitate to contact me if you have any queries.

Regards
Kirsten

Kirsten Fairall
Senior Geotechnical Engineer
Engineering Consultancy
Hampshire County Council
The Castle
Winchester
SO23 8UD
01962 847029

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<http://www3.hants.gov.uk/sharedexpertise.htm>

Appendix F – Environment Agency Flood Map

EA Flood map for planning



Environment
Agency

Flood map for planning

Your reference
Moorland

Location
467566/173466

Scale
1:3125

Created
22 Jan 2018 4:04



Development location

Flood zone 3



Flood zone 3: areas
benefitting from flood
defences

Flood zone 2



Flood zone 1



Flood defence



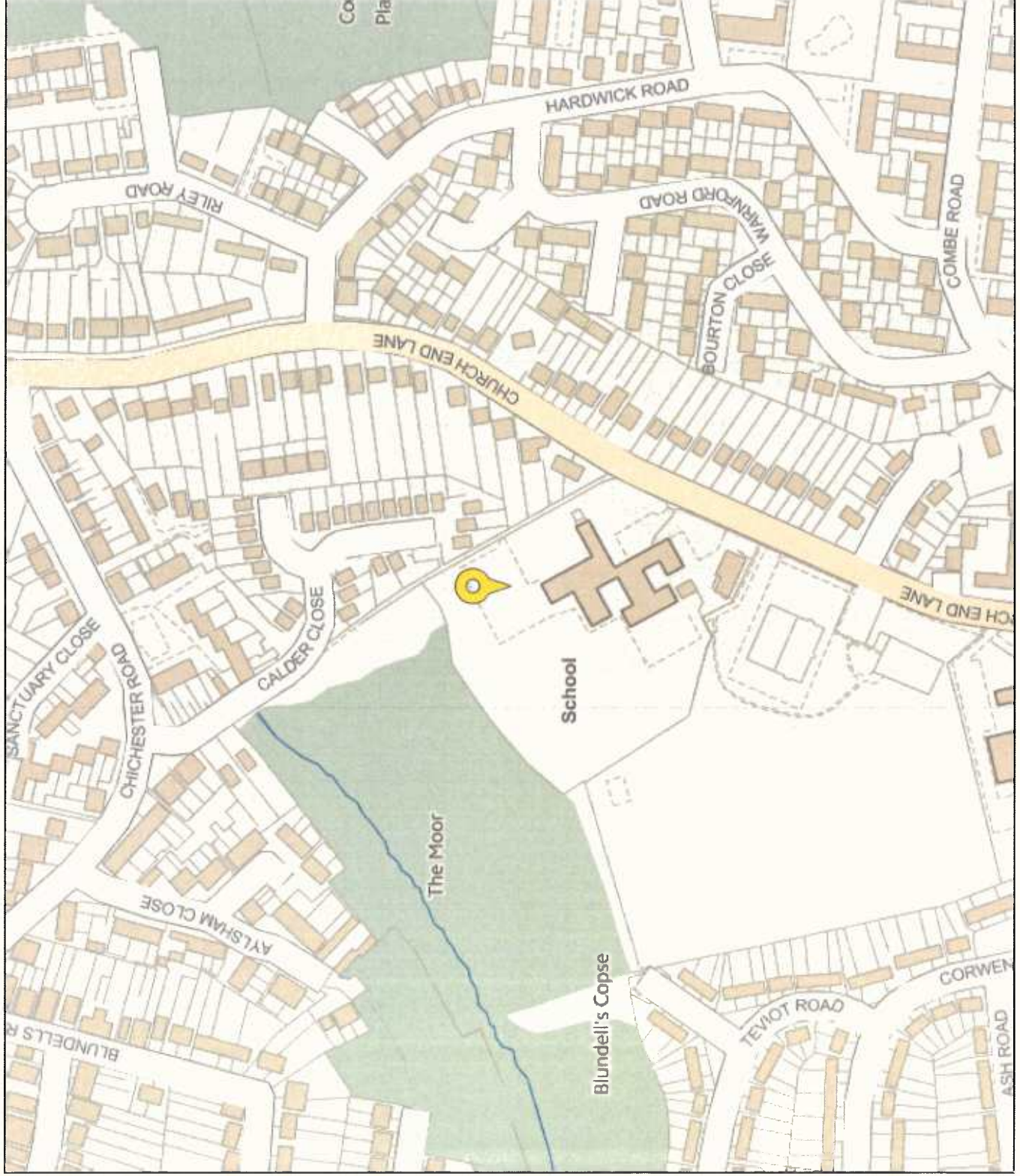
Main river



Flood storage area

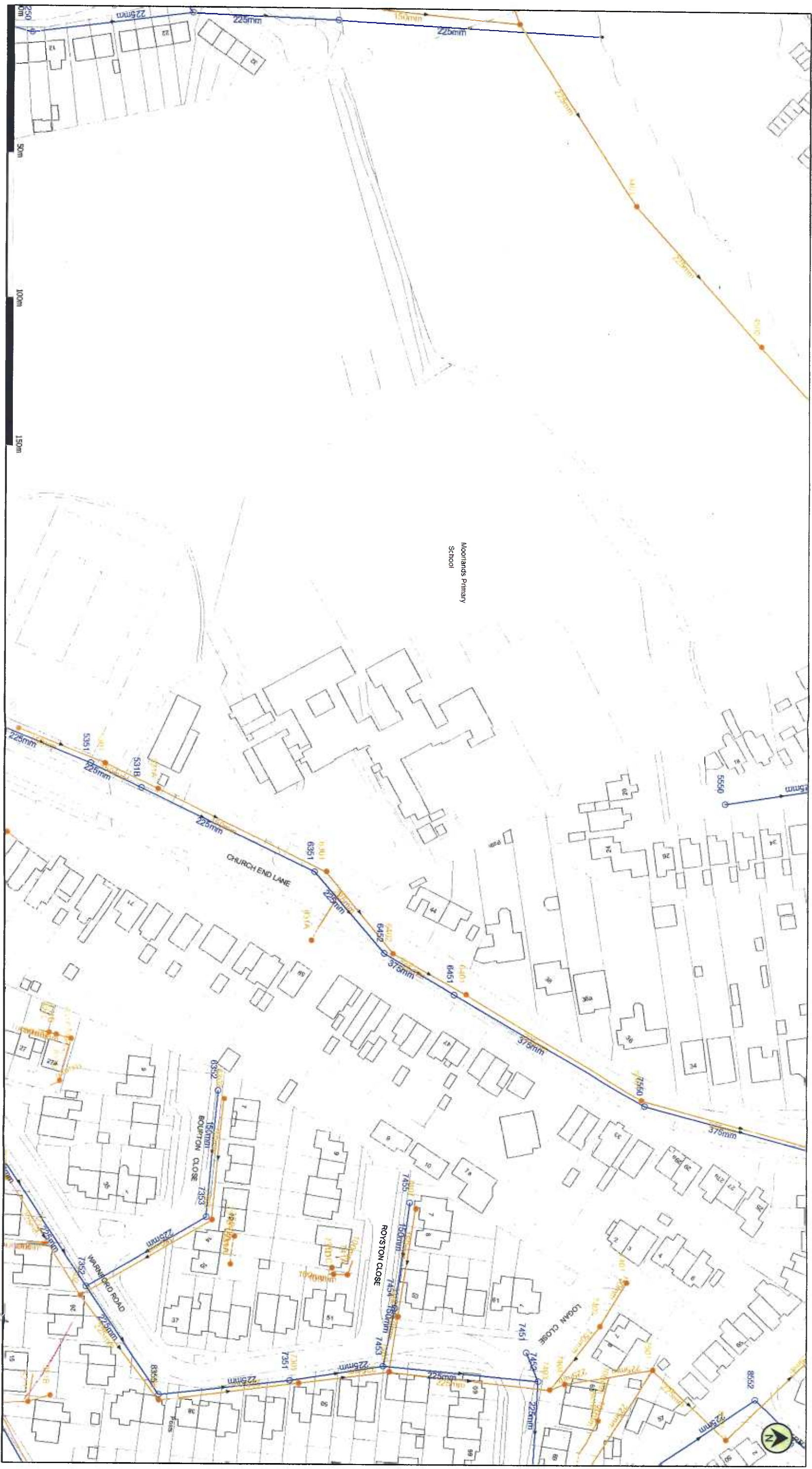


Page 2 of 2



Appendix G – Public Sewer Records

Public sewer records



(c) Crown copyright and database rights 2017 Ordnance Survey 100019345

Date: 16/03/17

Scale: 1:1250

Map Centre: 467514, 173420

Data updated: 01/02/17

Wastewater Plan A3

This plan is produced by Thames Water Utilities Ltd (c) Crown copyright and database rights 2017 Ordnance Survey 100019345. This map is to be used for the purposes of viewing the location of Thames Water plant only. Any other uses of the map data or further copies are not permitted. The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. This information is valid for the date printed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified on site before any works are undertaken.

Foul Sewer	Orange line	Foul Manhole	Orange circle
Surface Sewer	Blue line	Surface Manhole	Blue circle
Combined Sewer	Red line	Combined Manhole	Red circle
Abandoned Sewer	Yellow line	Abandoned Manhole	Yellow circle
Pressure Main	Thick black line	Other Manhole	Black circle
Private Asset (Colour denotes effluent type)	Thin black line	End Item	Thin black circle
Proposed Asset (Colour denotes effluent type)	Dashed black line	S104 Boundary	Dashed black line

rachel.brockway@hants.gov.uk



Appendix H – Preliminary Windes Calculations

Preliminary storage for 4No tanks

Ashburton Court West
The Castle
Winchester SO23 8UD

Moorlands Primary School
Tank1 30yr+20% SF2
2120sqm 5l-s



Date 23/01/2018 15:04

Designed by C.P

File Attenuation Tank1 30yr+...

Checked by J.O

Micro Drainage

Source Control 2017.1

Summary of Results for 30 year Return Period (+20%)

Half Drain Time : 122 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	99.864	0.164	0.0	3.5	3.5	31.2	O K
30 min Summer	99.907	0.207	0.0	4.0	4.0	39.3	Flood Risk
60 min Summer	99.941	0.241	0.0	4.4	4.4	45.7	Flood Risk
120 min Summer	99.958	0.258	0.0	4.6	4.6	49.0	Flood Risk
180 min Summer	99.962	0.262	0.0	4.6	4.6	49.8	Flood Risk
240 min Summer	99.960	0.260	0.0	4.6	4.6	49.5	Flood Risk
360 min Summer	99.951	0.251	0.0	4.5	4.5	47.7	Flood Risk
480 min Summer	99.939	0.239	0.0	4.4	4.4	45.4	Flood Risk
600 min Summer	99.926	0.226	0.0	4.2	4.2	43.0	Flood Risk
720 min Summer	99.914	0.214	0.0	4.1	4.1	40.8	Flood Risk
960 min Summer	99.893	0.193	0.0	3.8	3.8	36.7	O K
1440 min Summer	99.860	0.160	0.0	3.4	3.4	30.3	O K
2160 min Summer	99.827	0.127	0.0	2.9	2.9	24.1	O K
2880 min Summer	99.806	0.106	0.0	2.6	2.6	20.2	O K
4320 min Summer	99.787	0.087	0.0	2.1	2.1	16.4	O K
5760 min Summer	99.776	0.076	0.0	1.7	1.7	14.4	O K
7200 min Summer	99.768	0.068	0.0	1.4	1.4	13.0	O K
8640 min Summer	99.763	0.063	0.0	1.3	1.3	11.9	O K
10080 min Summer	99.759	0.059	0.0	1.1	1.1	11.1	O K
15 min Winter	99.884	0.184	0.0	3.7	3.7	35.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	84.972	0.0	32.8	24
30 min Summer	55.357	0.0	43.0	37
60 min Summer	34.516	0.0	54.4	62
120 min Summer	20.914	0.0	66.0	100
180 min Summer	15.448	0.0	73.1	132
240 min Summer	12.410	0.0	78.4	166
360 min Summer	9.064	0.0	85.9	234
480 min Summer	7.256	0.0	91.7	302
600 min Summer	6.101	0.0	96.4	368
720 min Summer	5.294	0.0	100.4	432
960 min Summer	4.229	0.0	106.9	558
1440 min Summer	3.078	0.0	116.6	804
2160 min Summer	2.238	0.0	127.8	1168
2880 min Summer	1.784	0.0	135.7	1512
4320 min Summer	1.295	0.0	147.4	2216
5760 min Summer	1.031	0.0	157.1	2944
7200 min Summer	0.863	0.0	164.4	3680
8640 min Summer	0.747	0.0	170.6	4408
10080 min Summer	0.661	0.0	175.7	5144
15 min Winter	84.972	0.0	36.8	24

Hampshire County Council		Page 2
Ashburton Court West The Castle Winchester SO23 8UD	Moorlands Primary School Tank1 30yr+20% SF2 2120sqm 5l-s	
Date 23/01/2018 15:04 File Attenuation Tank1 30yr+...	Designed by C.P Checked by J.O	
Micro Drainage		
Source Control 2017.1		

Summary of Results for 30 year Return Period (+20%)

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	99.933	0.233	0.0	4.3	4.3	44.2	Flood Risk
60 min Winter	99.972	0.272	0.0	4.7	4.7	51.6	Flood Risk
120 min Winter	99.990	0.290	0.0	4.9	4.9	55.1	Flood Risk
180 min Winter	99.992	0.292	0.0	4.9	4.9	55.4	Flood Risk
240 min Winter	99.987	0.287	0.0	4.9	4.9	54.5	Flood Risk
360 min Winter	99.969	0.269	0.0	4.7	4.7	51.1	Flood Risk
480 min Winter	99.950	0.250	0.0	4.5	4.5	47.5	Flood Risk
600 min Winter	99.931	0.231	0.0	4.3	4.3	43.9	Flood Risk
720 min Winter	99.914	0.214	0.0	4.1	4.1	40.6	Flood Risk
960 min Winter	99.884	0.184	0.0	3.7	3.7	35.0	O K
1440 min Winter	99.842	0.142	0.0	3.2	3.2	26.9	O K
2160 min Winter	99.805	0.105	0.0	2.6	2.6	20.0	O K
2880 min Winter	99.789	0.089	0.0	2.2	2.2	16.9	O K
4320 min Winter	99.773	0.073	0.0	1.6	1.6	13.8	O K
5760 min Winter	99.763	0.063	0.0	1.3	1.3	12.0	O K
7200 min Winter	99.757	0.057	0.0	1.1	1.1	10.8	O K
8640 min Winter	99.752	0.052	0.0	0.9	0.9	9.9	O K
10080 min Winter	99.748	0.048	0.0	0.8	0.8	9.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	55.357	0.0	48.2	37
60 min Winter	34.516	0.0	61.0	62
120 min Winter	20.914	0.0	74.0	104
180 min Winter	15.448	0.0	82.0	140
240 min Winter	12.410	0.0	87.9	178
360 min Winter	9.064	0.0	96.3	252
480 min Winter	7.256	0.0	102.8	322
600 min Winter	6.101	0.0	108.0	390
720 min Winter	5.294	0.0	112.5	458
960 min Winter	4.229	0.0	119.8	586
1440 min Winter	3.078	0.0	130.7	832
2160 min Winter	2.238	0.0	143.1	1176
2880 min Winter	1.784	0.0	152.1	1528
4320 min Winter	1.295	0.0	165.3	2248
5760 min Winter	1.031	0.0	176.0	2992
7200 min Winter	0.863	0.0	184.2	3680
8640 min Winter	0.747	0.0	191.1	4416
10080 min Winter	0.661	0.0	196.9	5152

Hampshire County Council		Page 3
Ashburton Court West The Castle Winchester SO23 8UD	Moorlands Primary School Tank1 30yr+20% SF2 2120sqm 5l-s	
Date 23/01/2018 15:04 File Attenuation Tank1 30yr+...	Designed by C.P Checked by J.O	
Micro Drainage		Source Control 2017.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region England and Wales		Cv (Winter)	0.840
M5-60 (mm)	18.700	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+20

Time Area Diagram

Total Area (ha) 0.212

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.071		4 8 0.071		8 12 0.070	

Hampshire County Council		Page 4
Ashburton Court West The Castle Winchester SO23 8UD	Moorlands Primary School Tank1 30yr+20% SF2 2120sqm 5l-s	
Date 23/01/2018 15:04	Designed by C.P	
File Attenuation Tank1 30yr+...	Checked by J.O	
Micro Drainage		Source Control 2017.1

Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 99.700 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	200.0	200.0	1.300	0.0	217.0
0.100	200.0	205.7	1.400	0.0	217.0
0.200	200.0	211.3	1.500	0.0	217.0
0.300	200.0	217.0	1.600	0.0	217.0
0.301	0.0	217.0	1.700	0.0	217.0
0.500	0.0	217.0	1.800	0.0	217.0
0.600	0.0	217.0	1.900	0.0	217.0
0.700	0.0	217.0	2.000	0.0	217.0
0.800	0.0	217.0	2.100	0.0	217.0
0.900	0.0	217.0	2.200	0.0	217.0
1.000	0.0	217.0	2.300	0.0	217.0
1.100	0.0	217.0	2.400	0.0	217.0
1.200	0.0	217.0	2.500	0.0	217.0

Orifice Outflow Control

Diameter (m) 0.068 Discharge Coefficient 0.600 Invert Level (m) 99.700

Moorlands Primary School
Tank2 30yr+20% SF2
1330sqm 5l-s



Designed by C.P

Checked by J.O

Source Control 2017.1

Half Drain Time : 60 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	99.863	0.163	0.0	3.9	3.9	17.0	O K
	30 min Summer	99.900	0.200	0.0	4.2	4.2	20.9	Flood Risk
	60 min Summer	99.917	0.217	0.0	4.3	4.3	22.7	Flood Risk
	120 min Summer	99.911	0.211	0.0	4.2	4.2	22.0	Flood Risk
	180 min Summer	99.898	0.198	0.0	4.1	4.1	20.7	O K
	240 min Summer	99.884	0.184	0.0	4.0	4.0	19.3	O K
	360 min Summer	99.859	0.159	0.0	3.8	3.8	16.6	O K
	480 min Summer	99.837	0.137	0.0	3.6	3.6	14.3	O K
	600 min Summer	99.817	0.117	0.0	3.5	3.5	12.2	O K
	720 min Summer	99.800	0.100	0.0	3.3	3.3	10.5	O K
	960 min Summer	99.773	0.073	0.0	3.0	3.0	7.6	O K
	1440 min Summer	99.737	0.037	0.0	2.6	2.6	3.8	O K
	2160 min Summer	99.708	0.008	0.0	2.2	2.2	0.8	O K
	2880 min Summer	99.700	0.000	0.0	1.9	1.9	0.0	O K
	4320 min Summer	99.700	0.000	0.0	1.4	1.4	0.0	O K
	5760 min Summer	99.700	0.000	0.0	1.1	1.1	0.0	O K
	7200 min Summer	99.700	0.000	0.0	0.9	0.9	0.0	O K
	8640 min Summer	99.700	0.000	0.0	0.8	0.8	0.0	O K
10080 min	Summer	99.700	0.000	0.0	0.7	0.7	0.0	O K
	15 min Winter	99.886	0.186	0.0	4.0	4.0	19.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	84.972	0.0	21.2	23
30 min Summer	55.357	0.0	27.6	34
60 min Summer	34.516	0.0	34.5	56
120 min Summer	20.914	0.0	41.6	88
180 min Summer	15.448	0.0	46.0	124
240 min Summer	12.410	0.0	49.4	158
360 min Summer	9.064	0.0	54.1	224
480 min Summer	7.256	0.0	57.8	288
600 min Summer	6.101	0.0	60.8	352
720 min Summer	5.294	0.0	63.3	414
960 min Summer	4.229	0.0	67.5	536
1440 min Summer	3.078	0.0	73.7	772
2160 min Summer	2.238	0.0	80.3	1116
2880 min Summer	1.784	0.0	85.4	0
4320 min Summer	1.295	0.0	93.0	0
5760 min Summer	1.031	0.0	98.7	0
7200 min Summer	0.863	0.0	103.3	0
8640 min Summer	0.747	0.0	107.3	0
10080 min Summer	0.661	0.0	110.7	0
15 min Winter	84.972	0.0	23.7	23

Hampshire County Council		Page 3
Ashburton Court West	Moorlands Primary School	
The Castle	Tank2 30yr+20% SF2	
Winchester SO23 8UD	1330sqm 5l-s	
Date 23/01/2018 14:55	Designed by C.P	
File Attenuation Tank2 30yr+...	Checked by J.O	
Micro Drainage		Source Control 2017.1
<u>Rainfall Details</u>		
Rainfall Model	FSR	Winter Storms Yes
Return Period (years)	30	Cv (Summer) 0.750
Region England and Wales		Cv (Winter) 0.840
M5-60 (mm)	18.700	Shortest Storm (mins) 15
Ratio R	0.400	Longest Storm (mins) 10080
Summer Storms	Yes	Climate Change % +20
<u>Time Area Diagram</u>		
Total Area (ha) 0.133		
Time (mins)	Area	Time (mins)
From: To: (ha)	From: To: (ha)	From: To: (ha)
0 4 0.044	4 8 0.044	8 12 0.045
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Hampshire County Council		Page 4
Ashburton Court West The Castle Winchester SO23 8UD	Moorlands Primary School Tank2 30yr+20% SF2 1330sqm 5l-s	
Date 23/01/2018 14:55	Designed by C.P	
File Attenuation Tank2 30yr+...	Checked by J.O	
Micro Drainage		Source Control 2017.1

Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 99.700 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	110.0	110.0	1.300	0.0	122.6
0.100	110.0	114.2	1.400	0.0	122.6
0.200	110.0	118.4	1.500	0.0	122.6
0.300	110.0	122.6	1.600	0.0	122.6
0.301	0.0	122.6	1.700	0.0	122.6
0.401	0.0	122.6	1.800	0.0	122.6
0.600	0.0	122.6	1.900	0.0	122.6
0.700	0.0	122.6	2.000	0.0	122.6
0.800	0.0	122.6	2.100	0.0	122.6
0.900	0.0	122.6	2.200	0.0	122.6
1.000	0.0	122.6	2.300	0.0	122.6
1.100	0.0	122.6	2.400	0.0	122.6
1.200	0.0	122.6	2.500	0.0	122.6

Orifice Outflow Control

Diameter (m) 0.062 Discharge Coefficient 0.600 Invert Level (m) 99.600

Hampshire County Council

Ashburton Court West

The Castle

Winchester SO23 8UD

Date 24/01/2018 11:41

File ATTENUATION TANK3 30YR+...

Micro Drainage

Moorlands Primary School

Tank3 30yr+20% SF2

1284sqm 5l-s

Designed by C.P

Checked by J.O

Source Control 2017.1

Page 1



Summary of Results for 30 year Return Period (+20%)

Half Drain Time : 64 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	99.709	0.509	0.0	3.9	3.9	17.4	O K
30 min Summer	99.826	0.626	0.0	4.4	4.4	21.4	O K
60 min Summer	99.889	0.689	0.0	4.6	4.6	23.5	O K
120 min Summer	99.895	0.695	0.0	4.6	4.6	23.8	O K
180 min Summer	99.867	0.667	0.0	4.5	4.5	22.8	O K
240 min Summer	99.829	0.629	0.0	4.4	4.4	21.5	O K
360 min Summer	99.755	0.555	0.0	4.1	4.1	19.0	O K
480 min Summer	99.693	0.493	0.0	3.9	3.9	16.9	O K
600 min Summer	99.641	0.441	0.0	3.6	3.6	15.1	O K
720 min Summer	99.597	0.397	0.0	3.4	3.4	13.6	O K
960 min Summer	99.528	0.328	0.0	3.1	3.1	11.2	O K
1440 min Summer	99.437	0.237	0.0	2.6	2.6	8.1	O K
2160 min Summer	99.363	0.163	0.0	2.1	2.1	5.6	O K
2880 min Summer	99.322	0.122	0.0	1.8	1.8	4.2	O K
4320 min Summer	99.282	0.082	0.0	1.3	1.3	2.8	O K
5760 min Summer	99.268	0.068	0.0	1.1	1.1	2.3	O K
7200 min Summer	99.260	0.060	0.0	0.9	0.9	2.0	O K
8640 min Summer	99.255	0.055	0.0	0.8	0.8	1.9	O K
10080 min Summer	99.251	0.051	0.0	0.7	0.7	1.7	O K
15 min Winter	99.774	0.574	0.0	4.2	4.2	19.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	84.972	0.0	20.5	22
30 min Summer	55.357	0.0	26.7	34
60 min Summer	34.516	0.0	33.4	54
120 min Summer	20.914	0.0	40.5	86
180 min Summer	15.448	0.0	44.8	120
240 min Summer	12.410	0.0	48.0	154
360 min Summer	9.064	0.0	52.6	220
480 min Summer	7.256	0.0	56.1	284
600 min Summer	6.101	0.0	59.0	346
720 min Summer	5.294	0.0	61.4	408
960 min Summer	4.229	0.0	65.4	530
1440 min Summer	3.078	0.0	71.4	770
2160 min Summer	2.238	0.0	77.9	1128
2880 min Summer	1.784	0.0	82.8	1480
4320 min Summer	1.295	0.0	90.2	2204
5760 min Summer	1.031	0.0	95.7	2936
7200 min Summer	0.863	0.0	100.2	3672
8640 min Summer	0.747	0.0	104.0	4336
10080 min Summer	0.661	0.0	107.3	5080
15 min Winter	84.972	0.0	23.0	23

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Hampshire County Council		Page 3
Ashburton Court West	Moorlands Primary School	
The Castle	Tank3 30yr+20% SF2	
Winchester SO23 8UD	1284sqm 5l-s	
Date 24/01/2018 11:41	Designed by C.P	
File ATTENUATION TANK3 30YR+...	Checked by J.O	
Micro Drainage		Source Control 2017.1
<u>Rainfall Details</u>		
Rainfall Model	FSR	Winter Storms Yes
Return Period (years)	30	Cv (Summer) 0.750
Region	England and Wales	Cv (Winter) 0.840
M5-60 (mm)	18.700	Shortest Storm (mins) 15
Ratio R	0.400	Longest Storm (mins) 10080
Summer Storms	Yes	Climate Change % +20
<u>Time Area Diagram</u>		
Total Area (ha) 0.129		
Time (mins)	Area	Time (mins)
From: To: (ha)	From: To: (ha)	From: To: (ha)
0 4 0.044	4 8 0.043	8 12 0.042
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Hampshire County Council		Page 4
Ashburton Court West	Moorlands Primary School	
The Castle	Tank3 30yr+20% SF2	
Winchester SO23 8UD	1284sqm 5l-s	
Date 24/01/2018 11:41	Designed by C.P	
File ATTENUATION TANK3 30YR+...	Checked by J.O	
Micro Drainage	Source Control 2017.1	

Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 99.200 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	36.0	36.0	1.300	0.0	55.2
0.100	36.0	38.4	1.400	0.0	55.2
0.200	36.0	40.8	1.500	0.0	55.2
0.300	36.0	43.2	1.600	0.0	55.2
0.400	36.0	45.6	1.700	0.0	55.2
0.500	36.0	48.0	1.800	0.0	55.2
0.600	36.0	50.4	1.900	0.0	55.2
0.700	36.0	52.8	2.000	0.0	55.2
0.800	36.0	55.2	2.100	0.0	55.2
0.801	0.0	55.2	2.200	0.0	55.2
1.000	0.0	55.2	2.300	0.0	55.2
1.100	0.0	55.2	2.400	0.0	55.2
1.200	0.0	55.2	2.500	0.0	55.2

Orifice Outflow Control

Diameter (m) 0.052 Discharge Coefficient 0.600 Invert Level (m) 99.200

Hampshire County Council		Page 1
Ashburton Court West		Moorlands Primary School
The Castle		Tank4 30yr+20% SF2
Winchester SO23 8UD		608sqm 5l-s
Date 24/01/2018 11:54		Designed by C.P
File ATTENUATION TANK4 30YR+...		Checked by J.O
Micro Drainage		Source Control 2017.1

Summary of Results for 30 year Return Period (+20%)

Half Drain Time : 23 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	99.748	0.548	0.0	4.1	4.1	7.3	O K
30 min Summer	99.825	0.625	0.0	4.4	4.4	8.3	O K
60 min Summer	99.835	0.635	0.0	4.4	4.4	8.4	O K
120 min Summer	99.765	0.565	0.0	4.1	4.1	7.5	O K
180 min Summer	99.691	0.491	0.0	3.8	3.8	6.5	O K
240 min Summer	99.628	0.428	0.0	3.6	3.6	5.7	O K
360 min Summer	99.533	0.333	0.0	3.1	3.1	4.4	O K
480 min Summer	99.468	0.268	0.0	2.8	2.8	3.6	O K
600 min Summer	99.422	0.222	0.0	2.5	2.5	3.0	O K
720 min Summer	99.389	0.189	0.0	2.3	2.3	2.5	O K
960 min Summer	99.343	0.143	0.0	1.9	1.9	1.9	O K
1440 min Summer	99.296	0.096	0.0	1.5	1.5	1.3	O K
2160 min Summer	99.269	0.069	0.0	1.1	1.1	0.9	O K
2880 min Summer	99.259	0.059	0.0	0.9	0.9	0.8	O K
4320 min Summer	99.249	0.049	0.0	0.7	0.7	0.6	O K
5760 min Summer	99.243	0.043	0.0	0.5	0.5	0.6	O K
7200 min Summer	99.238	0.038	0.0	0.4	0.4	0.5	O K
8640 min Summer	99.234	0.034	0.0	0.4	0.4	0.5	O K
10080 min Summer	99.231	0.031	0.0	0.3	0.3	0.4	O K
15 min Winter	99.819	0.619	0.0	4.3	4.3	8.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	85.935	0.0	9.8	17
30 min Summer	55.979	0.0	12.8	27
60 min Summer	34.895	0.0	16.0	44
120 min Summer	21.135	0.0	19.3	76
180 min Summer	15.605	0.0	21.4	108
240 min Summer	12.533	0.0	22.9	140
360 min Summer	9.154	0.0	25.1	202
480 min Summer	7.326	0.0	26.8	262
600 min Summer	6.160	0.0	28.2	320
720 min Summer	5.345	0.0	29.3	380
960 min Summer	4.270	0.0	31.2	500
1440 min Summer	3.108	0.0	34.1	738
2160 min Summer	2.259	0.0	37.2	1100
2880 min Summer	1.801	0.0	39.5	1468
4320 min Summer	1.307	0.0	43.0	2192
5760 min Summer	1.040	0.0	45.7	2920
7200 min Summer	0.871	0.0	47.8	3592
8640 min Summer	0.754	0.0	49.6	4376
10080 min Summer	0.666	0.0	51.2	5096
15 min Winter	85.935	0.0	11.0	18

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Moorlands Primary School
Tank4 30yr+20% SF2
608sqm 5l-s



Designed by C.P
Checked by J.O

Source Control 2017.1

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
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Duration	Season	99.906	0.706	0.0	4.7	4.7	9.4	Flood Risk
30 min	Winter	99.899	0.699	0.0	4.6	4.6	9.3	O K
120 min	Winter	99.784	0.584	0.0	4.2	4.2	7.8	O K
180 min	Winter	99.677	0.477	0.0	3.8	3.8	6.3	O K
240 min	Winter	99.593	0.393	0.0	3.4	3.4	5.2	O K
360 min	Winter	99.477	0.277	0.0	2.8	2.8	3.7	O K
480 min	Winter	99.408	0.208	0.0	2.4	2.4	2.8	O K
600 min	Winter	99.364	0.164	0.0	2.1	2.1	2.2	O K
720 min	Winter	99.334	0.134	0.0	1.9	1.9	1.8	O K
960 min	Winter	99.298	0.098	0.0	1.5	1.5	1.3	O K
1440 min	Winter	99.269	0.069	0.0	1.1	1.1	0.9	O K
2160 min	Winter	99.256	0.056	0.0	0.8	0.8	0.7	O K
2880 min	Winter	99.248	0.048	0.0	0.6	0.6	0.6	O K
4320 min	Winter	99.240	0.040	0.0	0.5	0.5	0.5	O K
5760 min	Winter	99.234	0.034	0.0	0.4	0.4	0.4	O K
7200 min	Winter	99.230	0.030	0.0	0.3	0.3	0.4	O K
8640 min	Winter	99.228	0.028	0.0	0.3	0.3	0.4	O K
10080 min	Winter	99.227	0.027	0.0	0.2	0.2	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	55.979	0.0	14.3	28
60 min Winter	34.895	0.0	17.9	46
120 min Winter	21.135	0.0	21.7	82
180 min Winter	15.605	0.0	24.0	114
240 min Winter	12.533	0.0	25.7	146
360 min Winter	9.154	0.0	28.1	206
480 min Winter	7.326	0.0	30.0	266
600 min Winter	6.160	0.0	31.6	324
720 min Winter	5.345	0.0	32.9	384
960 min Winter	4.270	0.0	35.0	502
1440 min Winter	3.108	0.0	38.2	738
2160 min Winter	2.259	0.0	41.7	1100
2880 min Winter	1.801	0.0	44.3	1468
4320 min Winter	1.307	0.0	48.2	2160
5760 min Winter	1.040	0.0	51.2	2968
7200 min Winter	0.871	0.0	53.6	3736
8640 min Winter	0.754	0.0	55.6	4488
10080 min Winter	0.666	0.0	57.4	4992

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Ashburton Court West The Castle Winchester SO23 8UD	Moorlands Primary School Tank4 30yr+20% SF2 608sqm 5l-s																																					
Date 24/01/2018 11:54 File ATTENUATION TANK4 30YR+...	Designed by C.P Checked by J.O																																					
Micro Drainage Source Control 2017.1																																						
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Date 24/01/2018 11:54	Designed by C.P	
File ATTENUATION TANK4 30YR+...	Checked by J.O	
Micro Drainage		Source Control 2017.1

Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 99.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	14.0	14.0	1.300	0.0	26.0
0.100	14.0	15.5	1.400	0.0	26.0
0.200	14.0	17.0	1.500	0.0	26.0
0.300	14.0	18.5	1.600	0.0	26.0
0.400	14.0	20.0	1.700	0.0	26.0
0.500	14.0	21.5	1.800	0.0	26.0
0.600	14.0	23.0	1.900	0.0	26.0
0.700	14.0	24.5	2.000	0.0	26.0
0.800	14.0	26.0	2.100	0.0	26.0
0.801	0.0	26.0	2.200	0.0	26.0
1.000	0.0	26.0	2.300	0.0	26.0
1.100	0.0	26.0	2.400	0.0	26.0
1.200	0.0	26.0	2.500	0.0	26.0

Orifice Outflow Control

Diameter (m) 0.052 Discharge Coefficient 0.600 Invert Level (m) 99.200