

WILBURY PLANNING

LAND TO REAR OF POOKLANDS, POOKBOURNE LANE,
SAYERS COMMON, HASOCKS BN6 9HD

Drainage Design Strategy

May 2026
(Revised July 2026)



eas ltd

Environmental Assessment Services Ltd

REPORT DATA SHEET

Requirement	Data
Report Reference	902/WilburyPlanning/Pooklands/DDS
Date	May 2026
Client	Sarah Pullen
Report type	Drainage Design Strategy
Purpose	Planning
Revisions	July 2026
Prepared by	Daniel Milford BSc (Hons)  Signed
Approved by	Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MCIWEM, MIEEnvSc  Signed

SARAH PULLEN

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Drainage Design Strategy

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1. EXISTING SITE & PROPOSED DEVELOPMENT

- 1.1 The site comprises of five barns west of Pookbourne Lane (stabling and equipment storage) with grass lawn area and hardstanding parking area. The site area is approximately 0.25 ha. The Ordnance Survey (OS) map reference for the site is TQ 27209 19949. The site elevation is approximately +22 m OD. See Appendix A, Site Location Plan.
- 1.2 According to the British Geological Survey (available online), the site lies on Weald Clay Formation – Mudstone and Sandstone. Online Environment Agency (EA) groundwater mapping identifies the site to lie on a secondary A aquifer (sandstone) and unproductive strata (mudstone). The site does not lie within a groundwater source protection zone.
- 1.3 The proposed development comprises the installation of a three-bedroom mobile home to the southwest of the site with associated crushed aggregate driveway.
- 1.4 The site lies adjacent to a riding school and pastoral fields utilised for horse grazing. Pook Bourne, a tributary of the River Adur, flows westward approximately 135 m south of the site. A drainage ditch identified east of Pookbourne Lane which flows southward and discharges into the tributary.

2. FLOOD RISK ASSESSMENT

- 2.1 According to the EA online Flood Map for Planning, the site lies within Flood Zone 1. The nearest area within Flood Zones 2 and 3 are located approximately 60 m southeast of the site, associated with a tributary of the River Adur.
- 2.2 The EA online Risk of Flooding from Surface Water map shows that the site is not at risk of surface water flooding.
- 2.3 As the site is less than 1 ha in area and lies within Flood Zone 1, there is no requirement for a flood risk assessment under the National Planning Policy Framework (NPPF) and associated guidance documents.

3. EXISTING DRAINAGE

- 3.1 The site was visited on 28 April 2026 in order to examine the existing drainage and take site levels. Ground levels at site have been estimated based on levels taken and data from Ordnance Survey mapping. See Appendix B: Site Photographs.
- 3.2 Formal surface water drainage on the site, as existing, comprises surface water being drained offsite and discharged into the drainage ditch east of Pookbourne Lane.
- 3.3 As required by Mid Sussex District Council, the flow permitted to leave the developed site should not exceed the QBar Greenfield flow rate. The Greenfield runoff rate for the site has therefore been estimated using the UK Sustainable Drainage (UKSuDS) Greenfield Runoff Estimation Tool. The runoff rates are given for scenarios up to (and including) the 1 in 100-year storm event, as summarised in Table 3.1 below and provided in Appendix D.

TABLE 3.1
GREENFIELD RUNOFF RATES

Return period	Flow rates (l/s)
QBar	1.8
1 in 1 year	1.6
1 in 10 year	3.0
1 in 30 year	4.2
1 in 100 year	5.9

- 3.4 According to the DEFRA non-statutory technical standards for sustainable drainage systems, the maximum discharge permitted to leave the whole site post development should not exceed 1.8 l/s. However, the minimum flow practicably achievable with commercially available flow control devices is 2.0 l/s.

4. PROPOSED DRAINAGE

- 4.1 The proposed residential development will increase the impermeable area of the site compared to its former use, which could increase the peak flow following a rainfall event. It has been estimated that following development, 0.17 ha of the site will comprise hardstanding and the rest (0.08 ha) will comprise permeable surfacing including crushed aggregate and soft landscaping. Permeable surfacing will still discharge informally as Greenfield (as existing) and only the controlled drainage from the impermeable areas will be subject to SuDS measures.
- 4.2 The drainage design for the developed site should retain onsite flows up to the 1 in 100-year return period event, including an allowance for climate change and an increase in impermeable area as 10 % urban creep. The ways in which this can be achieved are discussed in 4.3 and 4.4 below.

4.3 Drainage to Soakaway

- 4.3.1 Drainage to soakaway (infiltration) is the preferred Sustainable Urban Drainage System (SUDS) solution. The underlying Weald Clay is not considered a suitable medium for soakaway as it is known to have an exceptionally low or no infiltration value.

4.4 Attenuation Storage

- 4.4.1 The alternative to soakaway drainage would be attenuation storage onsite, with discharge limited to the Greenfield flow for the impermeable areas (in this case 1.8 l/s). This would require a point of discharge into a neighbouring watercourse.
- 4.4.2 Using the UKSuDS Surface Water Storage Requirements model, the total storage volume required for the site, for the 1 in 100 year plus climate change scenario, has been calculated as 6.5 m³. See Appendix D.
- 4.4.3 Attenuation storage could be provided in the form of ponds, swales, a detention basin or an underground geocellular/modular system wrapped in a geomembrane. Due to the volume which is required, and the slope of the site, ponds, swales or a detention basin are not thought to be practicable. An underground geocellular/modular system is considered to be the most appropriate for the site.
- 4.4.4 A suitable location for the geocellular/modular system to discharge surface water would be the ditch north of the riding school. The ditch discharges into the drainage ditch along Pookbourne Lane and then flows south to discharge into Pook Bourne.
- 4.4.5 Due to the slope of the site, it is considered most practicable for the underground geocellular/modular system to be no more than 1 m in depth, allowing for 0.25 m of topsoil to lay above to provide suitable planting depth. In order to provide the required storage volume for the site, and with a depth of 0.4 m, the dimensions of the geocellular/modular system would need to be 4.5 m x 4.0 m. See Appendix A for suggested drainage design.

4.5 Other Sustainable Urban Drainage System (SUDS) Options

- 4.5.1 Additional SUDS options could include rainwater harvesting, via water butts connected to roof downpipes. Rainwater could be used for irrigation purposes within the garden.
- 4.5.2 It may be possible to incorporate a green roof into the proposed design. Green roofs reduce the volume and rate of runoff, as well as improve the quality of the surface water leaving the site. Green roofs can be low maintenance, generally requiring bi-annual maintenance visits.

4.6 Extreme event

- 4.6.1 If an extreme storm event overwhelmed the surface water drainage system at the site, and/or if the drainage system were to fail, ground levels would indicate that surface water would discharge across the southern field and into the Pook Bourne, as per the present situation.

5. SURFACE WATER DRAINAGE DESIGN

5.1 Design Philosophy

- 5.1.1 The drainage strategy is for surface water to be drained into attenuation storage, comprising a geocellular/modular system, before being discharged into the existing drainage ditch to the north of the site. Discharge would be limited to the QBar/1 in 1 year flow rate for the site (1.8 l/s), however the lowest commercially available vortex valve has a flow rate of 2.0 l/s. See Appendix A for the suggested drainage arrangement.

5.2 Design Storm

- 5.2.1 The surface water drainage system has been designed for the 1 in 30-year return period event with 10% urban creep, plus a 35% allowance for climate change and tested for surcharge for the 1 in 100-year return period event (1% Annual Exceedance Probability) plus a 45% allowance for climate change. See Appendix D for pipe and chamber layout and sizing of the attenuation storage from the MasterDrain model.

5.3 Drainage Design Model

- 5.3.1 The attenuation storage has been designed to accommodate the 1 in 100-year return period storm event plus a 45% allowance for climate change using the MasterDrain network model.
- 5.3.2 An appropriate attenuation storage size has been calculated as 4.5 m length, 4.0 m width and 0.4 m depth.

5.4 Hydrogeological Data

- 5.4.1 Hydrological data based on FEH22 rainfall data for the site and applied to the MasterDrain model is given in Appendix C. The chamber details, pipe sizes and levels are shown in Appendix D and summarised in Table 5.1 below:

TABLE 5.1
SURFACE WATER DRAINAGE

Ref.	Dia (mm)	Cover level (mAOD)	Invert level (mAOD)	Pipe dia in (mm)	Pipe dia out (mm)
SW1	450	21.00	20.50	-	150
Storage	-	21.00	20.43	150	100
SW2	450	22.00	20.04	100	100

6. FOUL SEWERAGE

- 6.1 Foul sewerage for the proposed development comprises installation of a 4000 gallon cesspool holding tank, located south of the tractor barn, presently occupied by an existing muck heap.
- 6.2 The results of the sewerage design from the MasterDrain Foul analysis given in Appendix D are summarised in Table 6.1 below, and illustrated in Appendix A:

TABLE 6.1
FOUL SEWERAGE

Ref.	Dia (mm)	Cover level (mAOD)	Invert level (mAOD)	Pipe dia in (mm)	Pipe dia out (mm)
FW1	450	21.00	20.50	-	100
Cesspool Tank	-	21.00	20.32	100	100

7. OPERATION AND MAINTENANCE

- 7.1 The drainage system will generally require minimal operational input once construction has been completed. However, it will require some regular maintenance. The maintenance of the drainage system will be the responsibility of the owners of the residence.
- 7.2 Required maintenance will include:
- The chambers, gullies, gutters and channels will require regular removal of any silt or other debris. Maintenance should be carried out at the time of year after most leaf fall has occurred.
 - The cesspool tank is emptied regularly (for example once a month) and inspected for signs of damage to prevent a leak or overflow.

- 7.3 In accordance with the CIRIA SuDS Manual (C753) the pollution hazard level for the development is considered to be very low for the residential roof. It is advised to remove gross solids and sediments as and when necessary to satisfy requirements.

8. CONCLUSIONS

- 8.1 The site comprises of five barns west of Pookbourne Lane (stabling and equipment storage) with grass lawn area and hardstanding parking area. It is proposed to construct a three bedroom mobile home on the western grass lawn area. It is required that all surface water runoff for the 1 in 100 year flood event, plus allowance for climate change and urban growth, will be managed on site, and that the discharge from the proposed development will be restricted to Greenfield run-off rate.
- 8.2 The site lies within Flood Zone 1, at low risk of tidal and fluvial flooding, and is also shown to not be at risk of surface water flooding.
- 8.3 No formal surface water drainage was identified on site during the assessment. Surface water from the site either soaks into the ground or flows south across the adjacent fields and drains into the watercourse, Pook Bourne, located south of site.
- 8.4 It is considered that the proposed development will result in an increase in the impermeable area of the site compared to its current use. This will increase the peak flow following a rainfall event and may increase the flood risk elsewhere. It is estimated that following development 0.17 ha of the site will comprise impermeable surface, and the rest (0.08 ha) will comprise soft landscaping and permeable surfacing.
- 8.5 The underlying Weald Clay is not considered a suitable medium for soakaway as it is known to have an exceptionally low or no infiltration value. As such drainage to soakaway would not be a practicable option for the site.
- 8.6 The alternative SuDS method for surface water drainage would be attenuation storage. This would require a discharge point, of which the most practical option would be to the drainage ditch located along the site's northern boundary, within the blue line boundary of the wider site.
- 8.7 The total storage volume required to retain the 1 in 100 year plus climate change flood event on site has been calculated as 6.5 m³, based on the HR Wallingford UK SuDS Model. The Greenfield run-off rate for the whole site has been calculated as 1.8 l/s.
- 8.8 The most feasible attenuation storage option for the proposed site layout would be a geocellular/modular system, wrapped in a geomembrane.

- 8.9 It is considered that a geocellular storage system providing the required storage volume of 6.5 m³, 4.5 m x 4.0 m and 0.4 m in depth, could be located to the immediate east of the proposed dwelling. The discharge into the drainage ditch lying along the site's northern boundary should be limited to <1.8 l/s. However, the lowest practicable controlled flow is 2.0 l/s with a vortex valve or 5.0 l/s with an orifice plate. It is recommended that the maximum flow should be limited to 2.0 l/s using a vortex valve.
- 8.10 Additional SUDS options which could be incorporated into the development include rainwater harvesting for garden irrigation purposes, via the provision of water butts, and potentially a green roof on the dwelling.
- 8.11 No existing foul sewerage was identified on site. The foul sewerage drainage scheme for the dwelling proposes for the installation of a 4000 gallon cesspool tank, south of the nearby tractor barn.

9. RECOMMENDATIONS

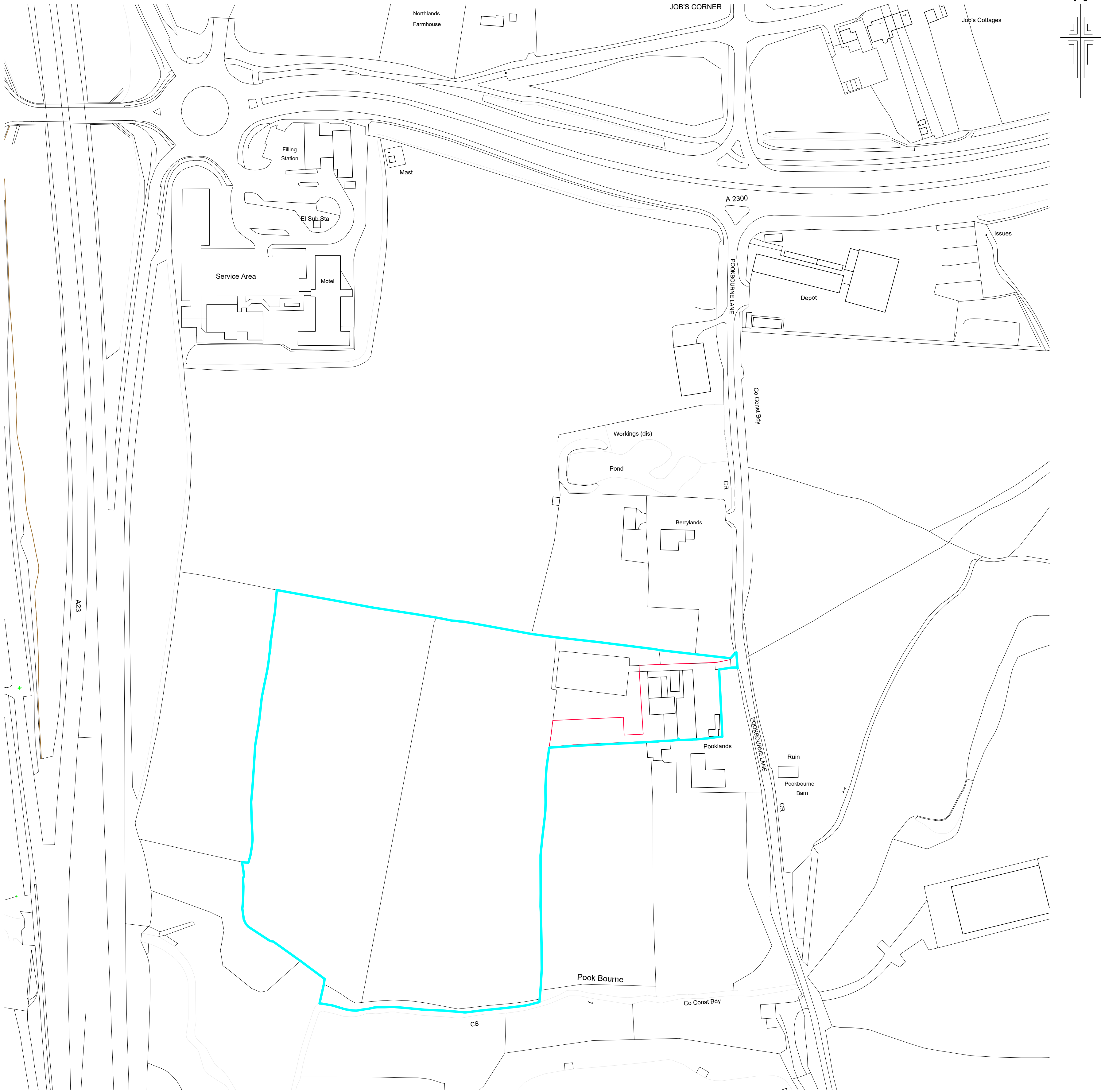
- 9.1 The drainage system will generally require minimal operational input once construction has been completed. However, it will require some regular maintenance:
- The geocellular/modular system and all chambers, gutters and gullies are to be kept clear of debris and build ups of silt to ensure working order and prevent loss of maximum capacity.
 - The cesspool tank will require regular maintenance including emptying on a regular basis as well as visual inspections for damage, wear and corrosion as well as overall security to prevent leaks or overflow.
 - It is advised to remove gross solids and sediments from the roof as and when necessary.

☆ ☆ ☆ ☆ ☆ ☆ ☆

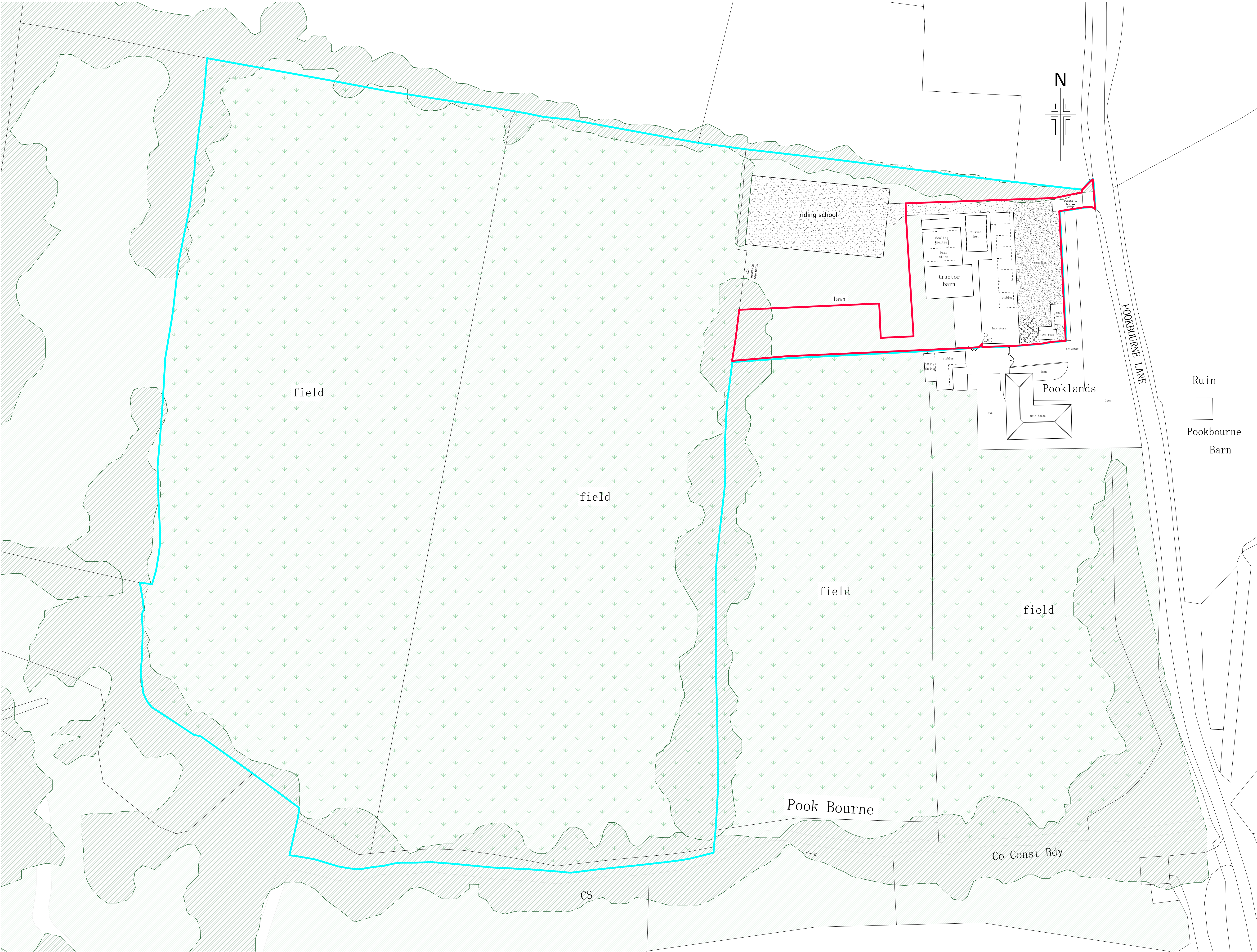
APPENDIX A

Figures

Site Location Plan
Existing Block Plan
Proposed Block Plan
Suggested Drainage Design

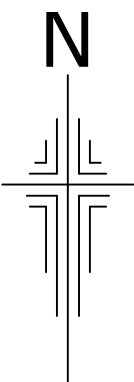
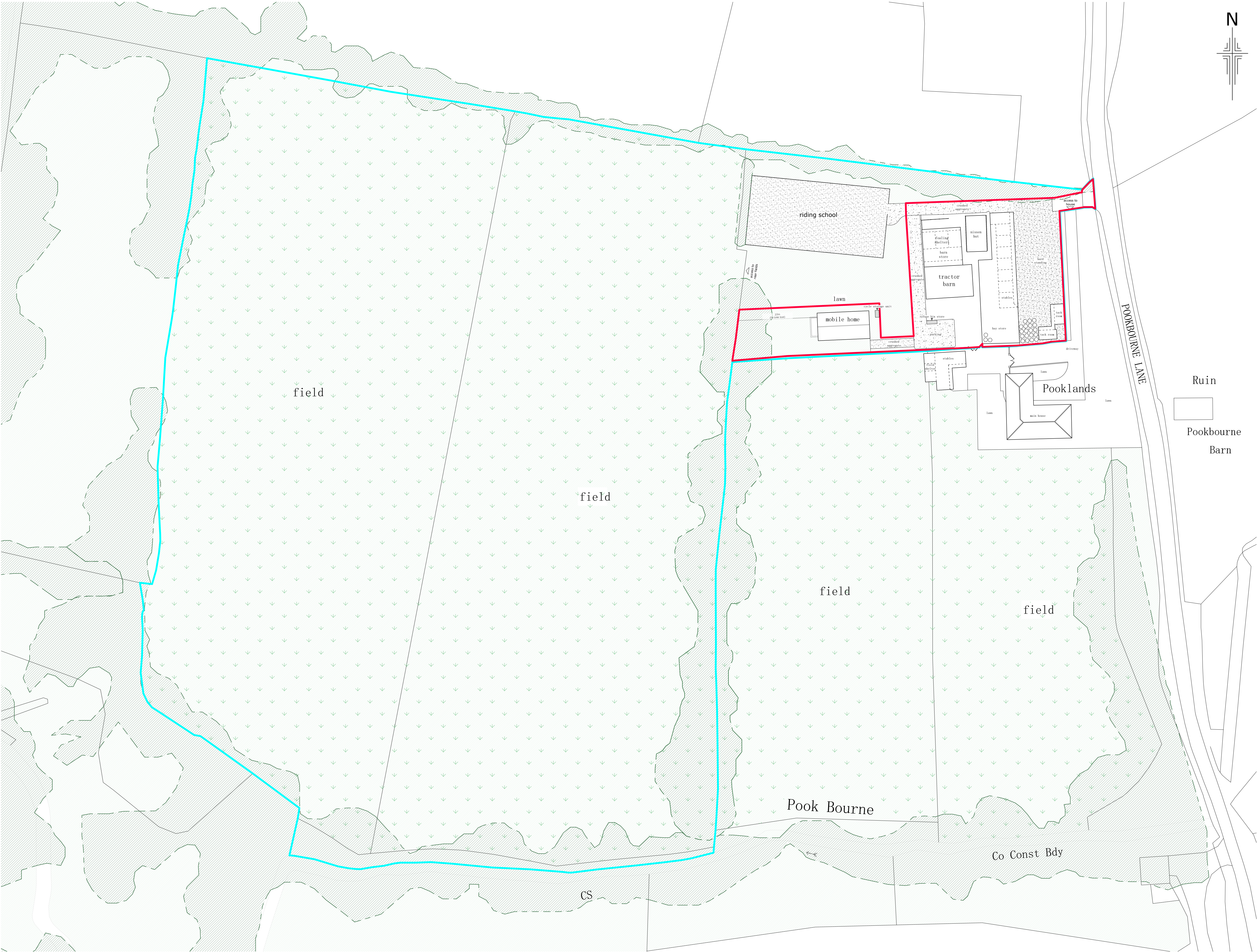


Stage			
Existing			
Client			
Sarah Pullen			
Site address			
Land to rear of Pooklands			
Pookbourne Lane			
Sayers Common			
Hassocks, BN6 9HD			
Drawing title			
Existing: Location Plan			
Scale:	Paper size:	Drawn:	Checked:
In drawing	A1	B Garrish	Director
Project No:	Drawing No:	Revision:	Date:
111	E. 01		08/05/2026



Stage			
Existing			
Client			
Sarah Pullen			
Site address			
Land to rear of Pooklands			
Pookbourne Lane			
Sayers Common			
Hassocks, BN6 9HD			
Drawing title			
Existing: Block Plan			
Scale:	Paper size:	Drawn:	Checked:
In drawing	A1	B Garrish	Director
Project No:	Drawing No:	Revision:	Date:
111	E. 02		08/05/2026





Stage

Proposed

Client

Sarah Pullen

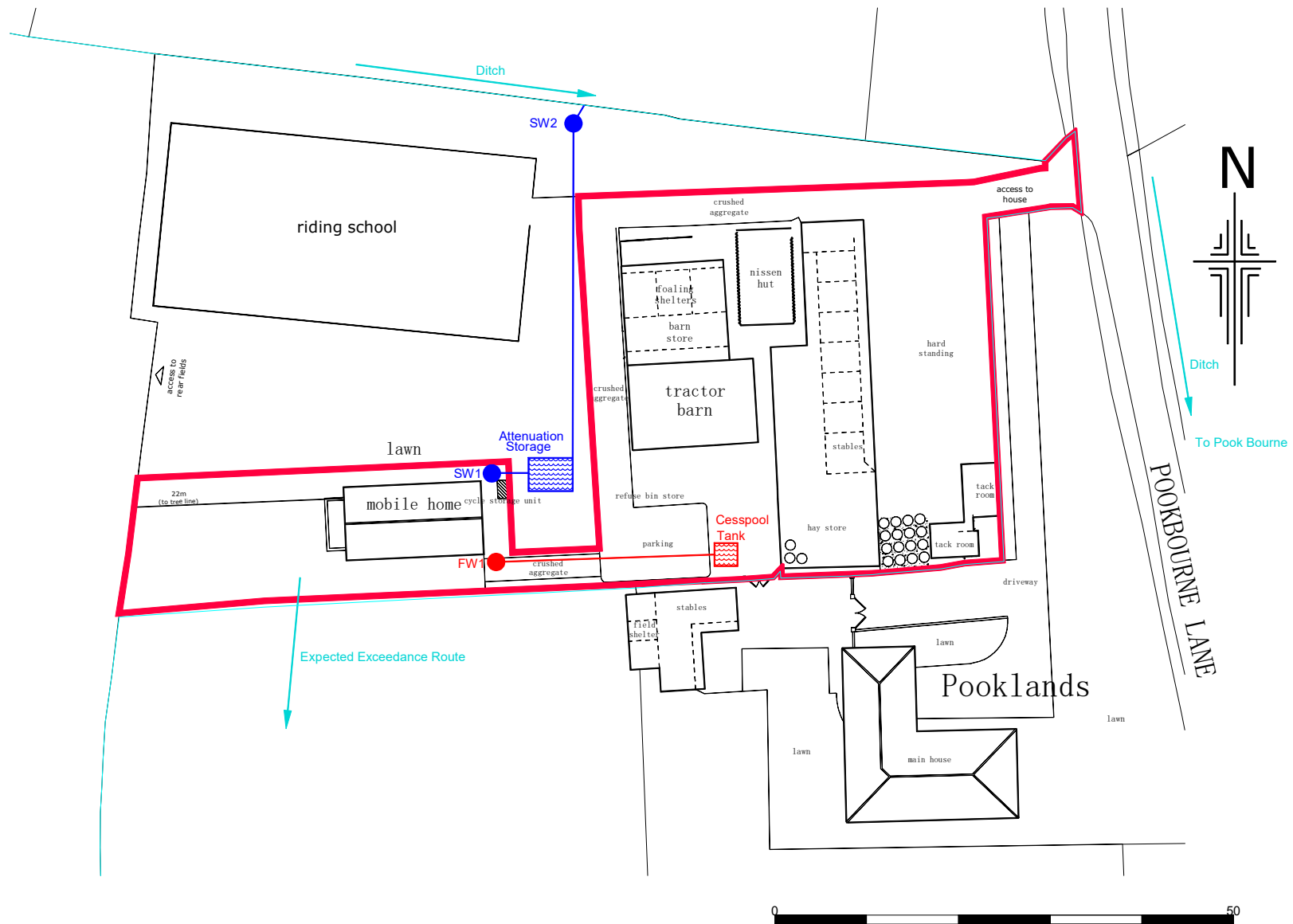
Site address
Land to rear of Pooklands
Pookbourne Lane
Sayers Common
Hassocks, BN6 9HD

Drawing title

Proposed: Block Plan

Scale:	Paper size:	Drawn:	Checked:
In drawing	A1	B Garrish	Director
Project No:	Drawing No:	Revision:	Date:
111	P.02		08/05/2026





SARAH PULLEN

Scale as shown

LAND TO REAR OF POOKLANDS, POOKBOURNE LANE,
SAYERS COMMON, HASSOCKS BN6 9HD

Suggested Drainage Design

July 2026



APPENDIX B

Site Photographs

Proposed mobile home location



Fields south of development site



Pook Bourne



Ditch at northern site boundary



APPENDIX C

UK Sustainable Drainage Calculations (Greenfield Runoff Rate)

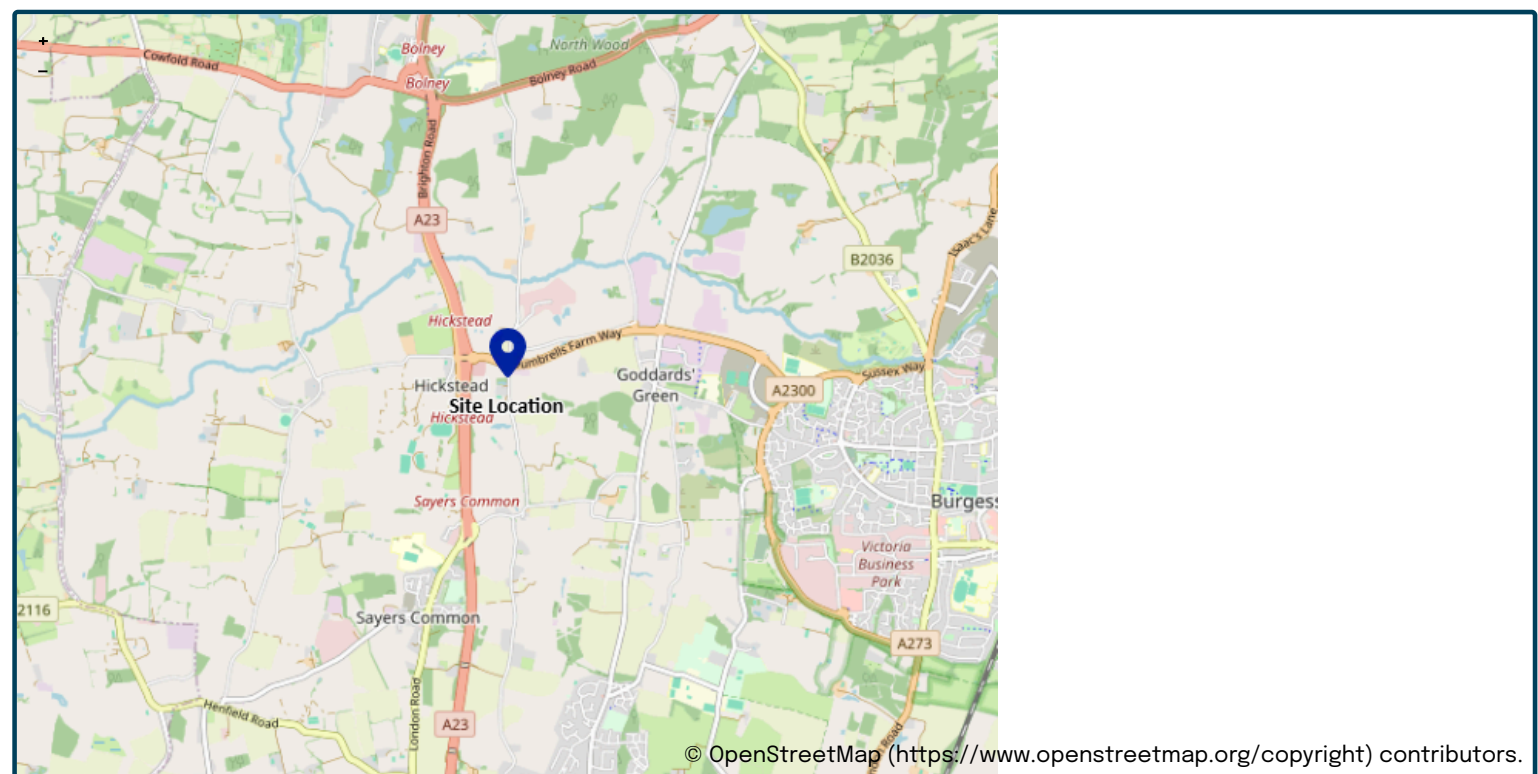
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	28/05/2026
Calculated by	EAS Ltd
Reference	902
Model version	2.2.3

Location

Site name	Pooklands
Site location	Hassocks



Site easting (British National Grid)	527283
Site northing (British National Grid)	119956

Site details

Total site area (ha)	0.25	ha
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Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	909	mm
BFIHOST19scaled	0.402	
QMed-QBar conversion	1.136	1.136
QMed (l/s)	1.6	l/s
QBar (FEH statistical 2025) (l/s)	1.8	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	7	7
1 year growth factor	0.85	
2 year growth factor	0.88	
10 year growth factor	1.62	
30 year growth factor	2.3	
100 year growth factor	3.19	
200 year growth factor	3.74	

Results

Method	FEH statistical (2025)
Flow rate 1 year (l/s)	1.6
Flow rate 2 year (l/s)	1.6
Flow rate 10 years (l/s)	3.0
Flow rate 30 years (l/s)	4.2
Flow rate 100 years (l/s)	5.9
Flow rate 200 years (l/s)	6.9

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

APPENDIX D

Output From Drainage Design Software and Attenuation Storage Calculations



MasterDrain
HY 11.0

Environmental Assessment Services Ltd

<http://www.easltd.co.uk>

London Rd, Hickstead
Haywards Heath,
West Sussex, RH17 5LZ
Tel: 01444 882552
email: info@easltd.co.uk

Job No. 902		
Sheet no. 1		
Date 28/05/26		
By EAS	Checked	Reviewed

Project
Pooklands

Title
Hydrological data for Pooklands

Data:-

FSR values

Location = Pooklands

Grid reference = TQ3015

M5-60 (mm) = 20.4

SAAR (mm/yr) = 910

r = 0.35

Soil = 0.45

Long reference = 530115

Area = England and Wales

Hydrological area = 7

Hydrological zone = 7

Soil classification for WRAP type 4

Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

FEH values

c = -0.027

d1 = 0.379

d2 = 0.305

d3 = 0.427

e = 0.315

f = 2.480



Environmental Assessment Services



MasterDrain
HY 11.0

Environmental Assessment Services Ltd

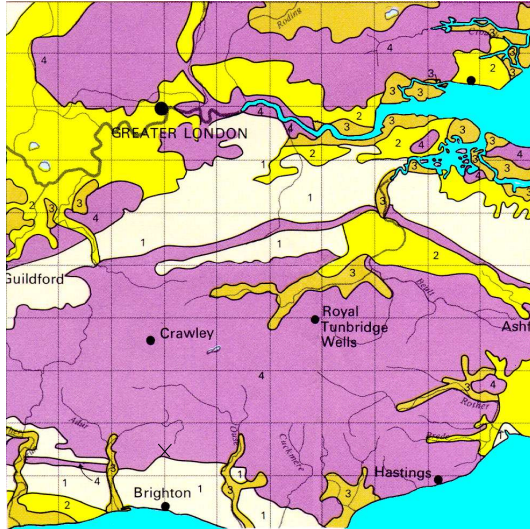
<http://www.easitd.co.uk>

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Job No. 902		
Sheet no. 2		
Date 28/05/26		
By EAS	Checked	Reviewed

Project
Pooklands

Title
Hydrological data for Pooklands



<- Soil

M5-60 ->



<- SAAR

r x 100 ->



Map extracts reproduced by permission of H R Wallingford.



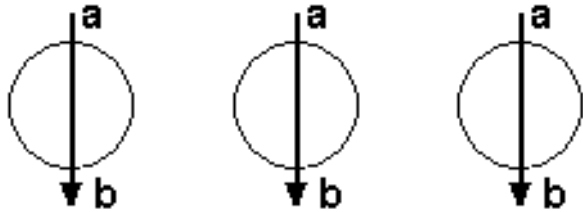
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Environmental Assessment Services Ltd http://www.easltd.co.uk		London Rd, Hickstead Haywards Heath, West Sussex, RH17 5LZ Tel: 01444 882552 email: info@easltd.co.uk		Job No. 902		
				Sheet no. 1		
				Date 04/06/26 14:58		
Project Pooklands				By	Checked	Reviewed
Title Manhole printout for POOKLANDS.SW						

Manhole ref.	X ref	Y ref	Form	Cham diam. or length	Rect. width	Chamb. height	Shaft height	MH Volume	Exit Diam	Exit Crown	Exit Invert	Chamb const	Slab level	Cover Level	Dwnstr MH
SW1	15.8	9.4	circ	450	N/A	0.50		0.08	150	20.675	20.500	N/A	20.450	21.000	STORAGE
STORAGE	22	9.4	circ	1905	N/A	0.57		1.62	100	20.555	20.430	N/A	20.380	21.000	SW2
SW2	24.6	47.6	circ	450	N/A	1.96		0.31	100	20.165	20.040	N/A	19.990	22.000	DITCH

All manholes to be as per 'Sewers for Adoption'

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				Sheet no. 2		
				Date 04/06/26 14:58		
Project Pooklands				By	Checked	Reviewed
Title Manhole printout for POOKLANDS.SW						



MH = SW1	MH = STORAGE	MH = SW2
a=head	a= 100	a= 100
b = 150	b = 100	b = 100

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		Sheet no. 3		
		Date 04/06/26 14:58		
Project Pooklands	By 		Checked 	Reviewed
Title Manhole printout for POOKLANDS.SW				

These explanatory notes should be read in conjunction with the Manhole printout

- 1) Manhole ref - the reference for the manhole in question
- 2) Form - either circular or rectangular
- 3) Chamber diam or length - diameter of chamber if circular, or length if rectangular - in metres
- 4) Rectangular width - if form is rectangular, this gives the width of the chamber
- 5) Chamber height - height of chamber from invert
- 6) Shaft height - height of access shaft if applicable, from top of chamber to ground level
- 7) Manhole volume - cubic capacity of manhole chamber
- 8) Exit diameter - diameter of pipe leaving this manhole
- 9) Exit crown - crown level of pipe leaving this manhole
- 10) Exit invert - invert level of pipe leaving this manhole
- 11) Chamb const - manhole construction :-
 - N/A - not specified
 - Conc - concrete rings
 - Poly - polypropylene rings surrounded by selected fill
 - Poly/conc - polypropylene rings surrounded by concrete
 - Brick - brick built with waterproof render
 - In situ - concrete cast in situ
- 12) Slab level - surface level of base slab (if no sump, this is placed at 50mm below exit invert to allow levels manipulation).
- 13) Manhole diameters of 9999 have exceeded the sizes available in SfA
- 14) Manhole diameters may have to be modified due to the number of branches



MasterDrain
SW

Environmental Assessment Services Ltd

<http://www.easitd.co.uk>

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Job No. 902			
Sheet no. 1			
Date 28/05/26			
By EAS	Checked	Reviewed	

Project Pooklands	
Title Hydrograph storage analysis (Winter profile) for Pooklands	

Data:-

FEH Hydrology:-

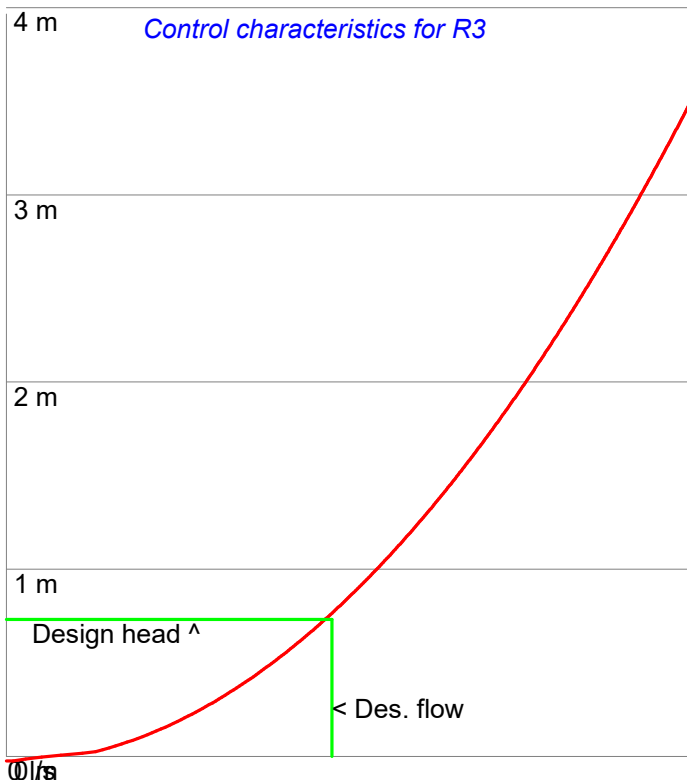
Location = Pooklands Grid reference = TQ3015
 c = -0.0266 d1 = 0.3788 d2 = 0.3047
 d3 = 0.4270 e = 0.3150 f = 2.4803
 Return period = 100 Climate change = 45%

Percentage runoff = 100.0% (manual setting)

Imperv. area = 130 m² Pervious area = 0 m²
 Total area = 130 m² Equiv area = 130 m² (Tot. area x % runoff).
 Total runoff = 9.6 m³ Discharge rate = 1.760 l/s

Design Head = 0.8m Peak flow = 1.76 l/s
 Control device = R3 Orifice diam = 39.2 mm
 Max. calc. depth = 0.8 m Available depth = 0.0 m³
 Mean discharge = 1.47 l/s

Available system storage = 0.00 m³ under a system plane at the design head level.
 Offline storage = 0.0 m³
 Total storage = 6.5 m³ Peak input flow = 6.66 l/s



Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.01	0.04	2.01	2.79
0.05	0.41	2.05	2.82
0.10	0.62	2.10	2.85
0.15	0.76	2.15	2.89
0.20	0.88	2.20	2.92
0.25	0.98	2.25	2.95
0.30	1.08	2.30	2.98
0.35	1.16	2.35	3.02
0.40	1.24	2.40	3.05
0.45	1.32	2.45	3.08
0.50	1.39	2.50	3.11
0.55	1.46	2.55	3.14
0.60	1.52	2.60	3.17
0.65	1.59	2.65	3.20
0.70	1.65	2.70	3.23
0.75	1.70	2.75	3.26
0.80	1.76	2.80	3.29
0.85	1.81	2.85	3.32
0.90	1.87	2.90	3.35
0.95	1.92	2.95	3.38
1.00	1.97	3.00	3.41
1.05	2.02	3.05	3.44
1.10	2.06	3.10	3.46
1.15	2.11	3.15	3.49
1.20	2.16	3.20	3.52
1.25	2.20	3.25	3.55
1.30	2.24	3.30	3.57
1.35	2.29	3.35	3.60
1.40	2.33	3.40	3.63
1.45	2.37	3.45	3.65
1.50	2.41	3.50	3.68
1.55	2.45	3.55	3.71
1.60	2.49	3.60	3.73
1.65	2.53	3.65	3.76
1.70	2.57	3.70	3.79
1.75	2.60	3.75	3.81
1.80	2.64	3.80	3.84
1.85	2.68	3.85	3.86
1.90	2.71	3.90	3.89
1.95	2.75	3.95	3.91
2.00	2.78	4.00	3.94

Calculation data provided by Crown Water Ltd, SL5 7NT



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Job No.	902		
Sheet no.	2		
Date	28/05/26		
By	EAS	Checked	Reviewed

Project **Pooklands**
Title **Hydrograph storage analysis (Winter profile) for Pooklands**

Storage curves for a 1 hours storm.

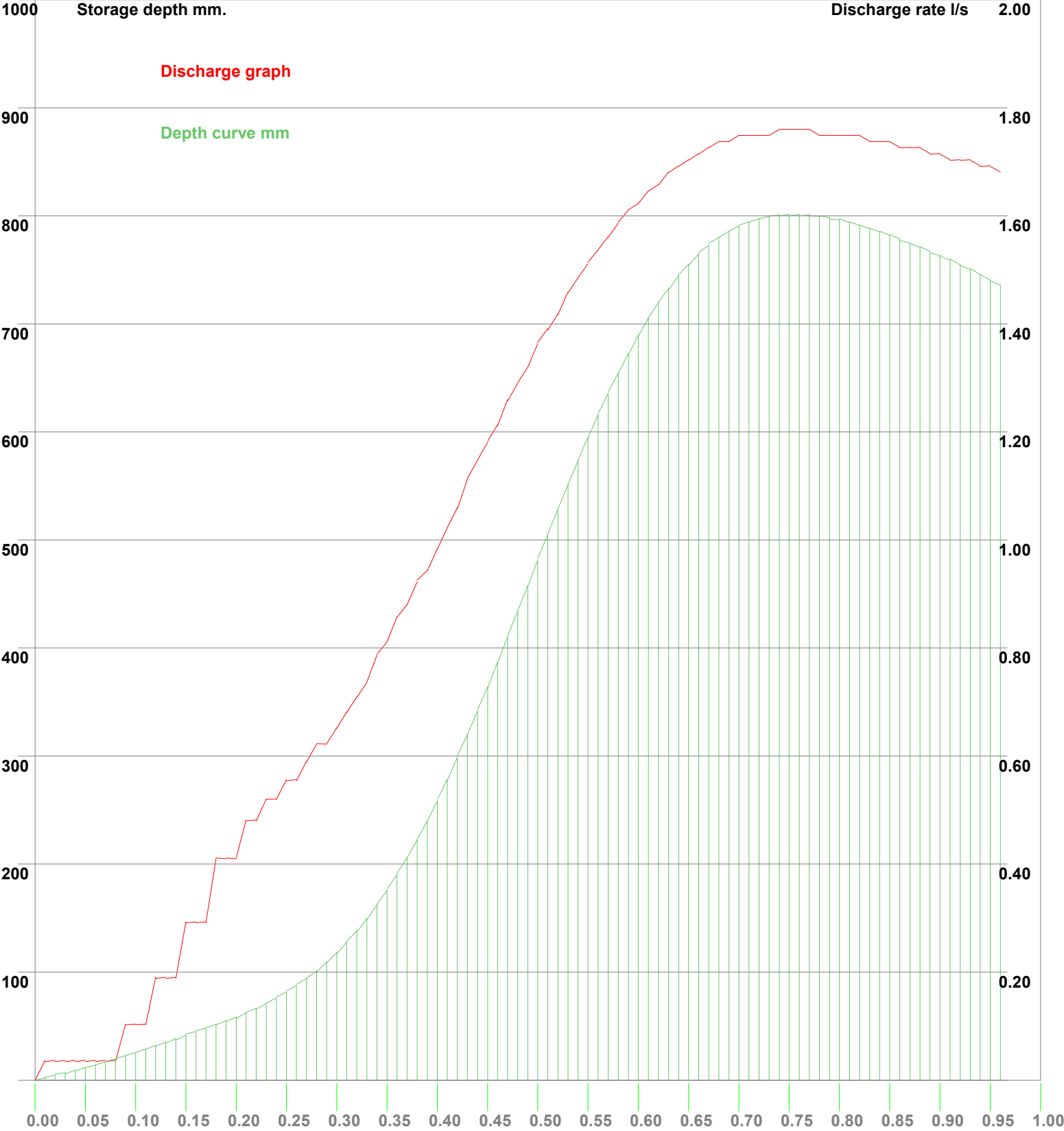
Storage depth mm.

Discharge rate l/s

2.00

Discharge graph

Depth curve mm





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				Sheet no. 3
				Date 28/05/26
Project	Pooklands	By EAS	Checked	Reviewed
Title	Hydrograph storage analysis (Winter profile) for Pooklands			

Incremental rainfall figures.

Storm Mins	Storage Depth mm	Control Flow l/s	Storm Mins	Storage Depth mm	Control Flow l/s
0.6	2.4	0.04	30.6	505.0	1.39
1.2	4.6	0.04	31.2	528.2	1.42
1.8	6.9	0.04	31.8	551.2	1.46
2.4	9.2	0.04	32.4	573.5	1.49
3.0	11.6	0.04	33.0	595.2	1.51
3.6	14.2	0.04	33.6	616.0	1.54
4.2	16.8	0.04	34.2	635.8	1.56
4.8	19.7	0.04	34.8	654.7	1.59
5.4	22.8	0.10	35.4	672.7	1.61
6.0	25.7	0.10	36.0	689.7	1.62
6.6	28.9	0.10	36.6	705.4	1.65
7.2	32.3	0.19	37.2	719.7	1.66
7.8	35.3	0.19	37.8	732.7	1.68
8.4	38.5	0.19	38.4	744.6	1.69
9.0	41.9	0.29	39.0	755.3	1.70
9.6	45.1	0.29	39.6	764.6	1.72
10.2	48.4	0.29	40.2	773.0	1.73
10.8	51.8	0.41	40.8	780.1	1.74
11.4	54.9	0.41	41.4	785.8	1.74
12.0	58.4	0.41	42.0	790.5	1.75
12.6	62.4	0.48	42.6	794.3	1.75
13.2	66.5	0.48	43.2	797.3	1.75
13.8	71.1	0.52	43.8	799.5	1.75
14.4	76.1	0.52	44.4	800.8	1.76
15.0	81.6	0.56	45.0	801.4	1.76
15.6	87.5	0.56	45.6	801.4	1.76
16.2	94.1	0.59	46.2	800.9	1.76
16.8	101.4	0.62	46.8	799.8	1.75
17.4	109.4	0.62	47.4	798.3	1.75
18.0	118.2	0.65	48.0	796.4	1.75
18.6	127.7	0.68	48.6	793.9	1.75
19.2	138.1	0.71	49.2	791.1	1.75
19.8	149.7	0.74	49.8	788.1	1.74
20.4	162.4	0.79	50.4	785.0	1.74
21.0	175.8	0.81	51.0	781.8	1.74
21.6	190.4	0.86	51.6	778.4	1.73
22.2	205.9	0.88	52.2	774.7	1.73
22.8	222.4	0.92	52.8	771.0	1.73
23.4	239.9	0.94	53.4	767.1	1.72
24.0	258.7	0.98	54.0	763.1	1.72
24.6	278.4	1.02	54.6	759.0	1.70
25.2	298.9	1.06	55.2	754.6	1.70
25.8	320.0	1.11	55.8	750.1	1.70
26.4	341.7	1.15	56.4	745.4	1.69
27.0	364.2	1.18	57.0	740.6	1.69
27.6	387.1	1.21	57.6	735.7	1.68
28.2	410.6	1.26	58.2	730.7	1.68
28.8	434.2	1.29	58.8	725.8	1.67
29.4	457.9	1.32	59.4	720.7	1.67
30.0	481.6	1.36	60.0	715.7	1.66

Using the Get Max button causes the program to step through a series of storm durations until a maximum volume is obtained.

Each duration is sampled 600 times and the results recorded. The storm durations (hrs) are:-

0.25, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 42, 48, 54, 60, 66, 72, 84, 96, 120, 150, 175, 200, 250, 300, 375, 500, 750, 1000, 1250, 1500, 1570, 2000, 2500, 3000, 3500, 4000

It should be noted that the six hour storm frequently requested rarely demonstrates the worst case for storage.



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Date

28/05/26

By

EAS

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Project

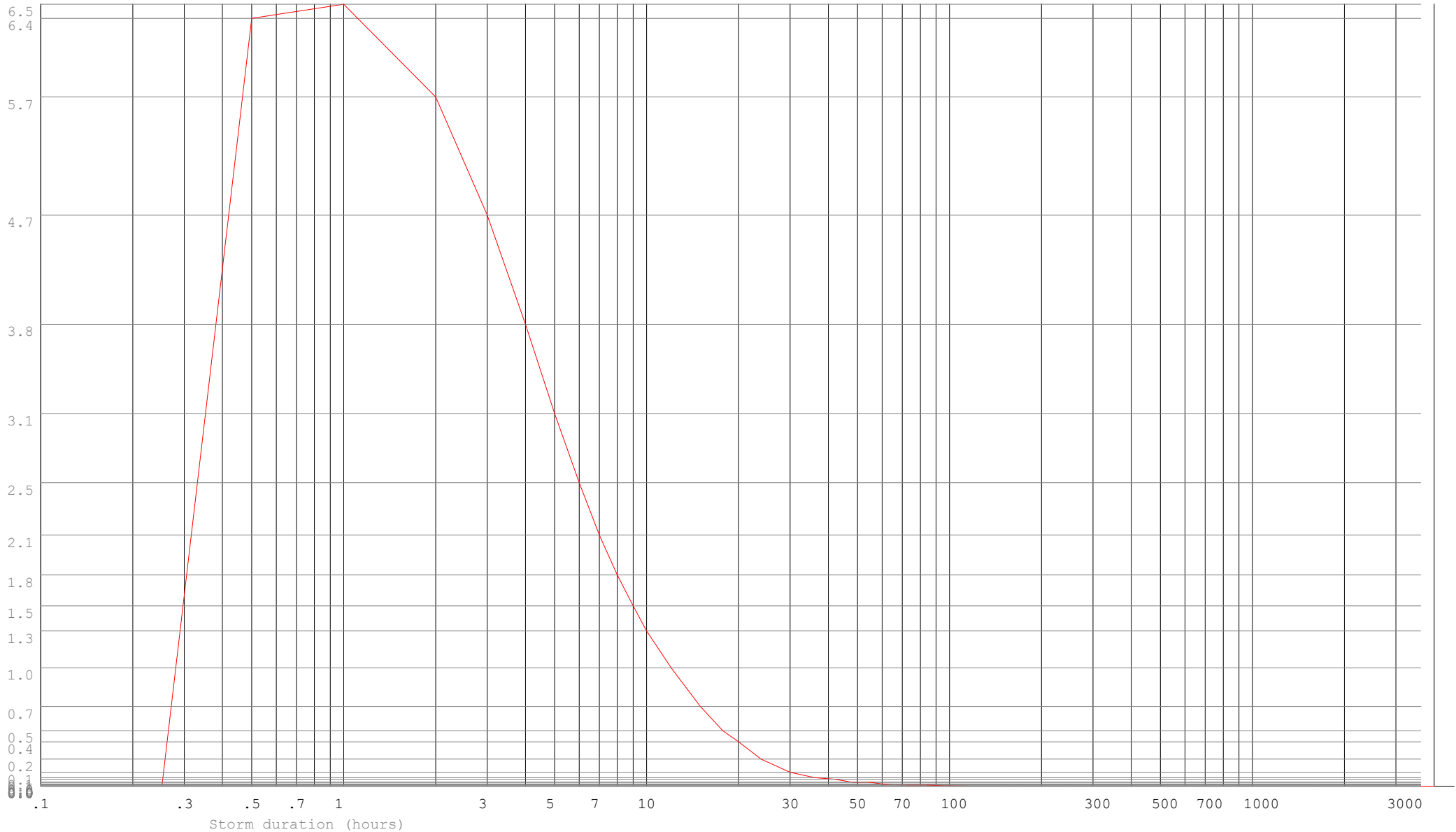
Pooklands

Title

Hydrograph storage analysis (Winter profile) for Pooklands

Sequential storage volume at specific storm durations.

m³





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Job No. 902		
Sheet no. 1		
Date 04/06/26		
By	Checked	Reviewed

Project Pooklands	By	Checked	Reviewed
Title Surcharge calcs (Sized at 30 yrs storm) for POOKLANDS.SW CCF = 45%			

Using in-line restrictors
Return period = 100 yrs
Climate change factor = 45

PEAK hydrograph values printed
Storm duration = 15 mins
No offline storage

Mean rain intens. 300.00 mm/hr
Storm profile = Summer
Using FEH data

Peak rain intens. 1176.00 mm/hr
Sample period = 7.5 secs.

Entry No.	SECT. No.	MANHOLE REF	PIPE CAPACITY l/s	RATE FLOW l/s	PIPE SIZE mm	CHAMBER DIAM/LxW mm	INVERT LEVEL m	WATER LEVEL m	GRND LEVEL m	SURCHARGE fract.	Depth	EXCESS FLOW l/s	FLOODED VOL m³	DRAINED AREA (m²) :x FACTOR	STATUS
1	I	1.01 SW1	18.8	19.1	150	450	20.50	20.66	21.00	1.01	0.16	0.27	0.000	133	Surch.
2	I	1.02 STORAGE#	6.1	2.0	100	1905	20.43	20.47	21.00	0.33	0.04	0.00	0.000	133	OK
3	I	1.03 SW2	6.3	2.0	100	450	20.04	20.08	22.00	0.32	0.04	0.00	0.000	133	OK



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Sheet no. 2		
Date 04/06/26		
By	Checked	Reviewed

Project	Pooklands
Title	Surcharge calcs (Sized at 30 yrs storm) for POOKLANDS.SW CCF = 45%

Notes

Printout headings

- | | | |
|---|---|--|
| 1) Entry no - position in file | 2) Section no - pipe identifier | 3) Manhole ref - Manhole identifier |
| 4) Pipe cap - full bore capacity of that pipe | 5) Rate of flow - calculated flow rate (l/s) ‡ = flow restrictor. | 6) Pipe diam - outlet pipe diameter (mm) |
| 7) Chamber diam - chamber diam. at base of MH | 8) Invert level - invert level of manhole | 9) Water level - calculated peak water level. |
| 10) Grnd level - ground / cover level | 11) Surch. fract - calc.flow/pipe capacity | 12) Surch. depth - surcharge level above soffit |
| 13) Overflow - surcharged flow rate (l/s) | 14) Flooded vol - volume of water above cover | 15) Upstrm Vol - upstream pipe vol to previous manhole(s) |
| 16) Status - OK - outlet not surcharged | 17) Status - Surcharged - outlet surcharged | 18) Status - Warning - water level within 299mm of cover level |
| 19) Status - Flooded - cover over-topped | 20) § against diameter indicates throttle pipe used. | |

Title box

Hydrograph data

- | | | |
|---|--------------------------------------|--|
| 1) Ret. period - that used to calculate profile | 2) Duration - length of storm (mins) | 3) Profile - either Winter (75%) or Summer (50%) |
|---|--------------------------------------|--|

Flow restrictors

Manhole reference - STORAGE

Restrictor flowrate - 2 l/s

Flood volumes

Check that the upstream storage of the manhole is adequate to take the flood volume - see Upstrm Vol above.



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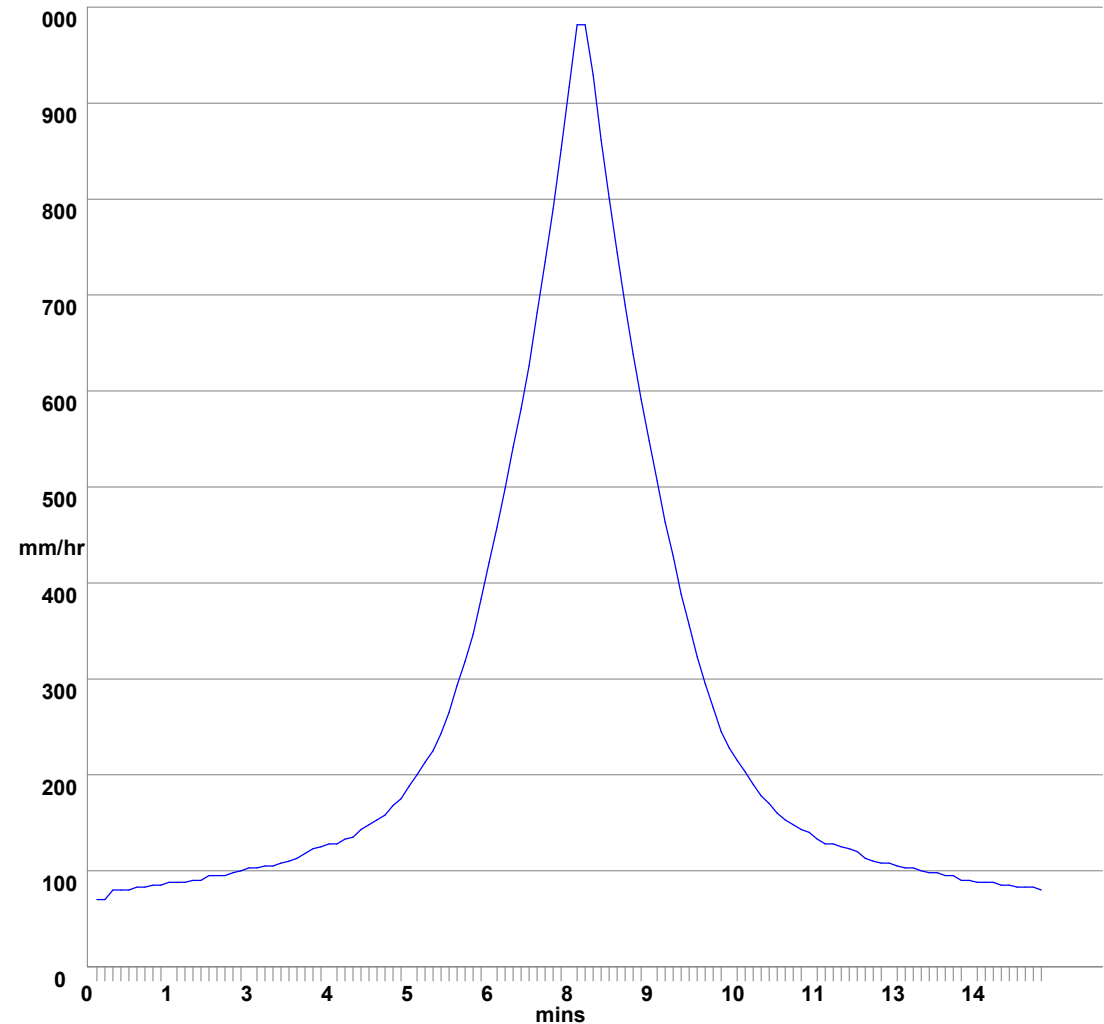
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Project Pooklands
Title Surcharge calcs (Sized at 30 yrs storm) for POOKLANDS.SW CCF = 45%

Time mins	Rain mm/hr	Time mins	Rain mm/hr	Time mins	Rain mm/hr
0:08	70.10	5:08	200.29	10:08	215.31
0:15	70.10	5:15	212.81	10:15	202.80
0:22	80.12	5:22	225.33	10:22	190.28
0:30	80.12	5:30	242.86	10:30	177.76
0:38	80.12	5:38	265.39	10:38	170.25
0:45	82.62	5:45	292.93	10:45	160.23
0:52	82.62	5:52	317.97	10:52	152.72
1:00	85.12	6:00	345.51	11:00	147.72
1:08	85.12	6:08	383.06	11:08	142.71
1:15	87.63	6:15	420.62	11:15	140.21
1:22	87.63	6:22	458.17	11:22	132.69
1:30	87.63	6:30	498.23	11:30	127.69
1:38	90.13	6:38	540.79	11:38	127.69
1:45	90.13	6:45	580.85	11:45	125.18
1:52	95.14	6:52	625.92	11:52	122.68
2:00	95.14	7:00	681.00	12:00	120.18
2:08	95.14	7:08	733.57	12:08	112.66
2:15	97.64	7:15	788.65	12:15	110.16
2:22	100.15	7:22	851.25	12:22	107.66
2:30	102.65	7:30	916.34	12:30	107.66
2:38	102.65	7:38	981.44	12:38	105.15
2:45	105.15	7:45	981.44	12:45	102.65
2:52	105.15	7:52	928.86	12:52	102.65
3:00	107.66	8:00	861.26	13:00	100.15
3:08	110.16	8:08	801.17	13:08	97.64
3:15	112.66	8:15	743.59	13:15	97.64
3:22	117.67	8:22	688.51	13:22	95.14
3:30	122.68	8:30	638.43	13:30	95.14
3:38	125.18	8:38	590.86	13:38	90.13
3:45	127.69	8:45	548.30	13:45	90.13
3:52	127.69	8:52	505.74	13:52	87.63
4:00	132.69	9:00	463.18	14:00	87.63
4:08	135.20	9:08	428.13	14:08	87.63
4:15	142.71	9:15	388.07	14:15	85.12
4:22	147.72	9:22	355.52	14:22	85.12
4:30	152.72	9:30	322.97	14:30	82.62
4:38	157.73	9:38	295.43	14:38	82.62
4:45	167.75	9:45	270.40	14:45	82.62
4:52	175.26	9:52	245.36	14:52	80.12
5:00	187.77	10:00	227.83	15:00	80.12

Hydrograph profile derived from data in the Flood Studies Report

Return period= 100 yrs Duration= 15 mins Profile - summer





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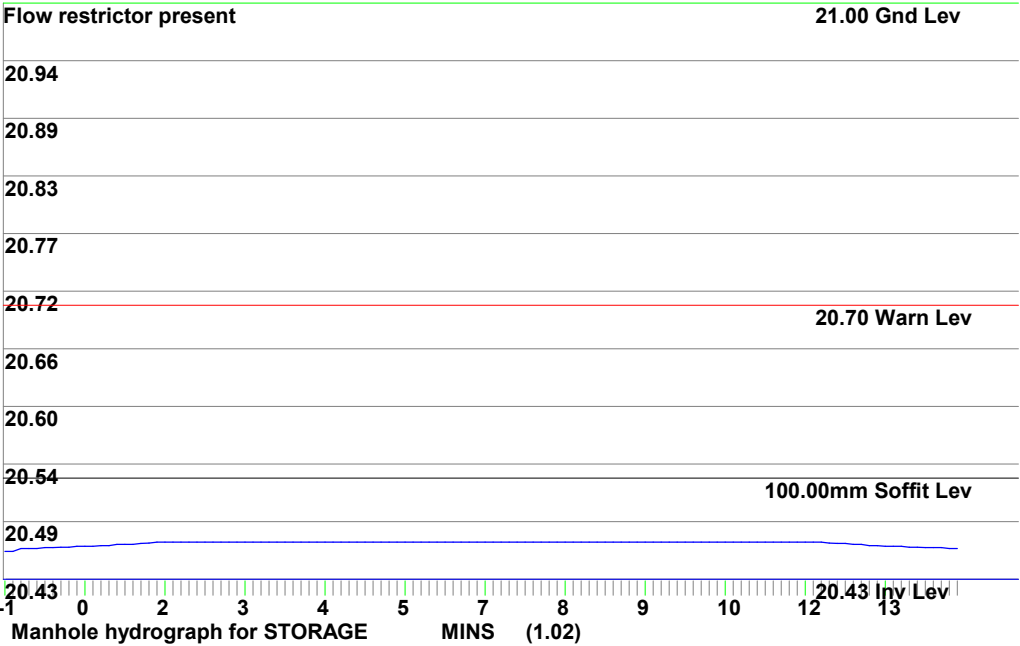
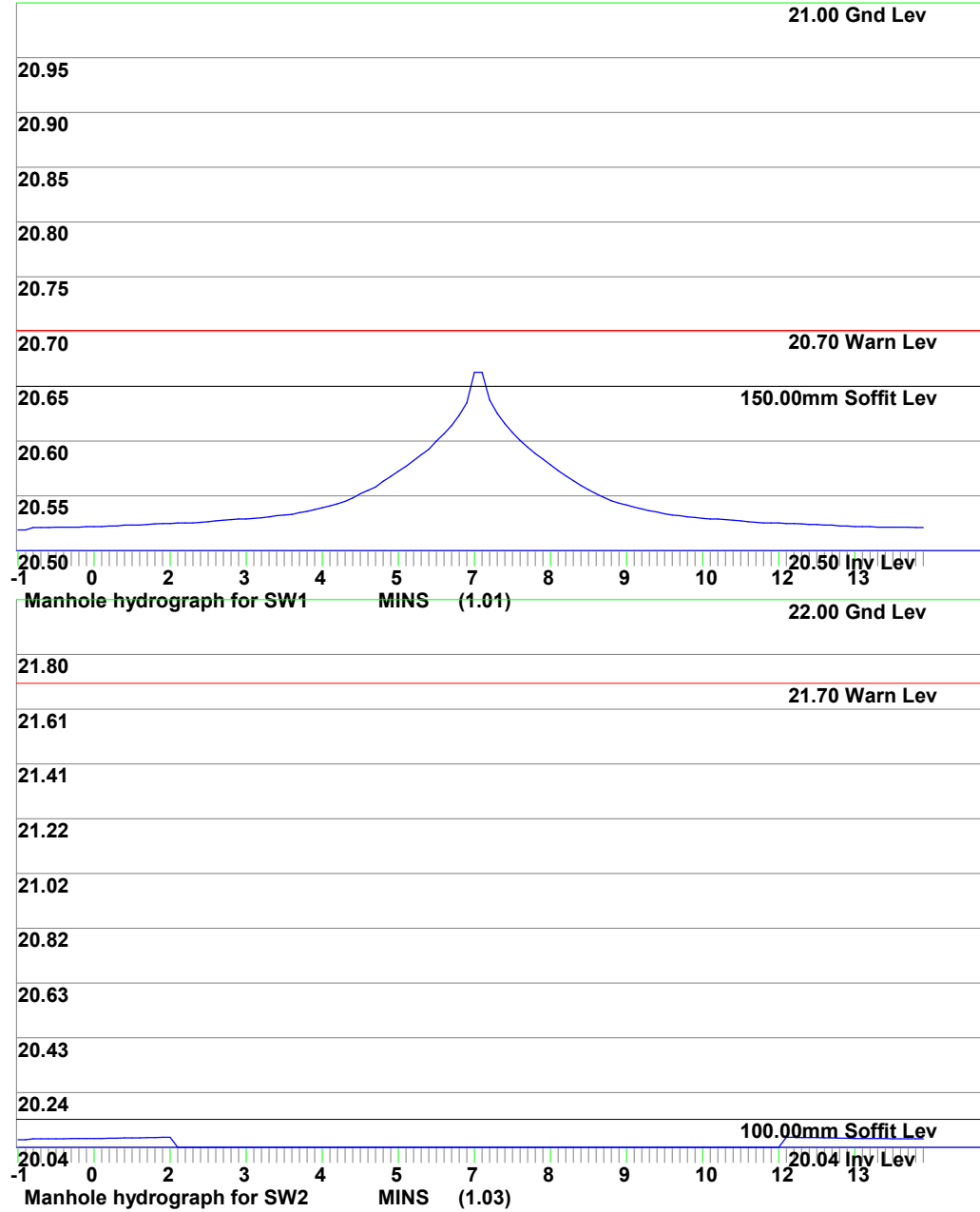
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Project **Pooklands**

Title **Surcharge calcs (Sized at 30 yrs storm) for POOKLANDS.SW CCF = 45%**





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Project Pooklands				By	Checked	Reviewed
Title Surcharge calcs (Sized at 30 yrs storm) for POOKLANDS.SW CCF = 45%						



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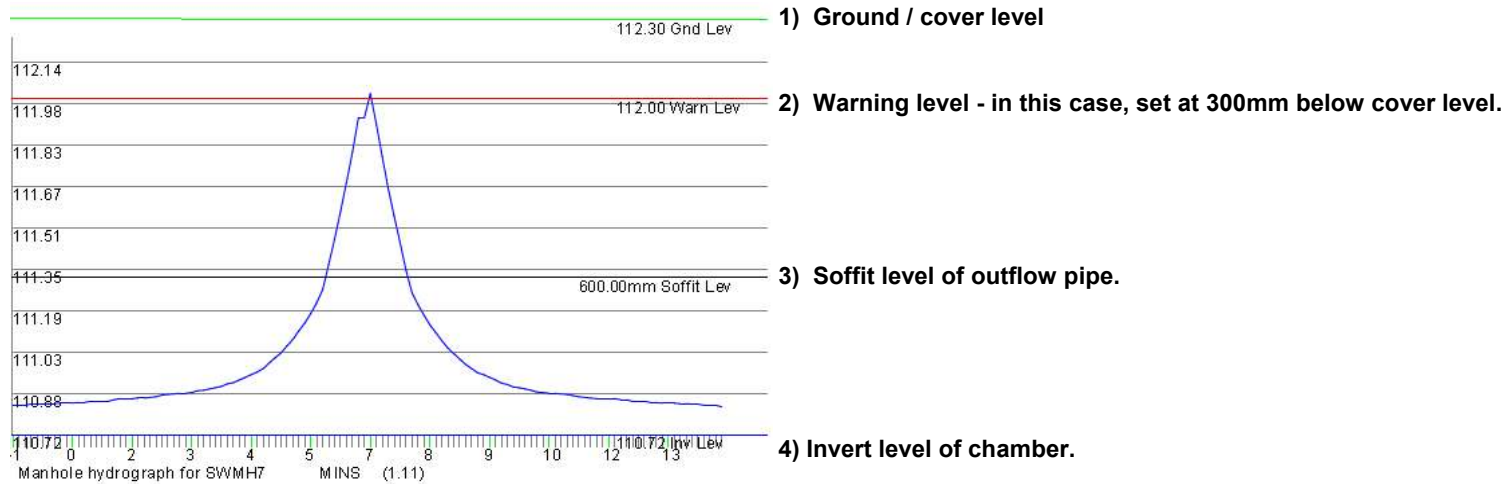
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Project
Pooklands

Title
Surcharge calcs (Sized at 30 yrs storm) for POOKLANDS.SW CCF = 45%



Notes

- Lower section of the graph shows the water depth filling the channel. Channel is assumed to be a full pipe diameter in depth.
- Upper section of the graph shows the water depth filling the chamber. Chamber has a greater width/diameter than the channel, so increases in depth are proportionally less.
- The top of the graph clips the warning level and would be marked thus on the printout.
- In many cases the invert of the offline storage is required to enter at the channel soffit level, meaning that the pipe will still surcharge but flooding risk reduced.
- The diagram above is a general one and is not part of the current calculation.



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Foul 11.5

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				Date 29/07/26		
Project Pooklands				By	Checked	Reviewed
Title Manhole printout for POOKLANDS						

Manhole ref.	Form	Cham diam. or length	Rect. width	Chamb. height	Shaft height	MH Volume	Ent. Diam	Ent. Crown	Ent. Invert	Exit Diam	Exit Crown	Exit Invert	Chamb const	Cover Level	Dwnstr MH
FW1	circ	450	N/A	0.50		0.08	Head	----	----	100	20.625	20.500	N/A	21.000	Cesspool

All manholes to be as per 'Sewers for Adoption'

Levels calculated for level inverts



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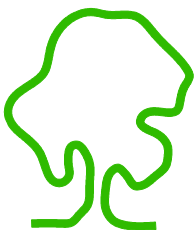
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Project Pooklands			
Title Manhole printout for POOKLANDS			

These explanatory notes should be read in conjunction with the Manhole printout

- 1) Manhole ref - the reference for the manhole in question
- 2) Form - either circular or rectangular
- 3) Chamber diam or length - diameter of chamber if circular, or length if rectangular - in metres
- 4) Rectangular width - if form is rectangular, this gives the width of the chamber
- 5) Chamber height - height of chamber from invert
- 6) Shaft height - height of access shaft if applicable, from top of chamber to ground level
- 7) Manhole volume - cubic capacity of manhole chamber
- 8) Exit diameter - diameter of pipe leaving this manhole
- 9) Exit crown - crown level of pipe leaving this manhole
- 10) Exit invert - invert level of pipe leaving this manhole
- 11) Manhole diameters of 9999 have exceeded the sizes available in Sfa
- 12) Manhole diameters may have to be modified due to the number of branches



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