

# DEVTEC PROPERTIES LTD



FIRS FARM, COPTHORNE COMMON ROAD, WEST SUSSEX, RH10 3LF

## Flood Risk Assessment and Drainage Strategy

June 2025  
(Revised July 2025)



eas ltd  
Environmental Assessment Services Ltd

## REPORT DATA SHEET

Requirement	Data
Report Reference	821/DevtecProperties/FirsFarm/Flood&Drainage
Date	June 2025
Client	Devtec Properties
Report type	Flood Risk Assessment and Drainage Strategy
Purpose	Planning
Revisions	July 2025
Prepared by	Eur Ing Malcolm McKemey BSc (Hons), CEng, Cenv, MICE, MCIWEM, MIEnvSc  Signed
Approved by	Xanthe Lyford BSc (Hons)  Signed

## **DEVTEC PROPERTIES LTD**

**FIRS FARM, COPTHORNE COMMON ROAD, WEST SUSSEX, RH10 3LF**

### **Flood Risk Assessment and Drainage Strategy**

June 2025  
(Revised July 2025)

## **CONTENTS**

1. BACKGROUND, EXISTING SITE & PROPOSED DEVELOPMENT
2. GEOLOGY & HYDROGEOLOGICAL CONSIDERATIONS
3. FLOOD RISK ASSESSMENT
4. EXISTING SITE DRAINAGE
5. SURFACE WATER DRAINAGE OPTIONS
6. PROPOSED FOUL DRAINAGE
7. DRAINAGE DESIGN SUMMARY
8. OPERATION & MAINTENANCE OF THE SYSTEM
9. SUMMARY OF CONCLUSIONS

### **APPENDIX A: FIGURES AND DRAWINGS**

- Figure 1: Site Location
- Figure 2: Site as Existing and Testing Locations
- Figure 3: Proposed Development
- Figure 4: Suggested Drainage Arrangement
- Figure 5: Constraints Plan

### **APPENDIX B: ENVIRONMENT AGENCY FLOOD RISK SUMMARY**

### **APPENDIX C: H R WALLINGFORD GREENFIELD FLOW**

### **APPENDIX D: OUTPUT FROM DRAINAGE DESIGN SOFTWARE**

### **APPENDIX E: PHOTOGRAPHS**

### **APPENDIX F: SOUTHERN WATER SEWER PLAN**

### **APPENDIX G: MSDC FLOOD & DRAINAGE CHECKLIST**

## DEVTEC PROPERTIES LTD

FIRS FARM, COPTHORNE COMMON ROAD, WEST SUSSEX, RH10 3LF

### Flood Risk Assessment and Drainage Strategy

June 2025  
(Revised July 2025)

#### 1. BACKGROUND, EXISTING SITE & PROPOSED DEVELOPMENT

- 1.1 The site lies within a mixed semi-rural area, located to the south of the A264 and some 2 km south of the village of Copthorne. There is a small industrial estate (Dukes Business Park) immediately to the south of the site. The Ordnance Survey Grid reference for the centre of the site is TQ 3342 3907. The site elevation is approximately + 95 m OD. See Figure 1 in Appendix A for the Site Location.
- 1.2 The site currently comprises a former farmyard containing seven buildings (former stables, barns, animal enclosures and a disused prefabricated residence), an area laid to lawn, a variety of paved areas and an access driveway. The site area is 4370 m<sup>2</sup>. See Figure 2 in Appendix A for the existing site layout.
- 1.3 It is proposed to redevelop the site to provide 5 dwelling houses with associated amenity space and parking; hard and soft landscaping; cycle and refuse storage; change of use of land to residential garden for existing dwelling house and associated access works. See Figure 3 in Appendix A for the proposed development plan.

#### 2. GEOLOGY & HYDROGEOLOGICAL CONSIDERATIONS

- 2.1 According to the BGS Geological Survey, the site lies on Cretaceous Upper Tunbridge Wells Sand (sandstone & siltstone) (UTWS). The DEFRA MAGIC site describes the soil at the site as “*slightly acid loamy & clayey soils with impeded drainage*”. The site lies on a Secondary A aquifer. It is in a high groundwater vulnerability area but is not in a groundwater protection zone. Trial pits excavated on site revealed 0.15 m of friable loamy topsoil over silty clay (UTWS)

#### 3. FLOOD RISK ASSESSMENT

- 3.1 The Environment Agency’s Flood Map for Planning shows the site lying within Flood Zone 1 (low risk of fluvial flooding, less than 0.1% chance of flooding in any year).
- 3.2 The site is shown to be at very low risk of surface water flooding. An area to the south of the site is shown to be at some risk of surface water flooding.

3.3 Flooding from groundwater or reservoirs is considered unlikely in this area. There does not appear to be any history of sewer flooding at the site.

3.4 See Appendix B: for the Environment Agency's Flood Risk Maps.

#### 4 EXISTING SITE DRAINAGE

4.1 The site was visited on Thursday 26 June 2025.

4.2 There appears to be no formal surface water drainage at the site beyond gutters and downpipes on the various buildings. The site drains by surface runoff following the fall of the land to the south and west. Residents adjacent to the site stated that the location drains satisfactorily and has not flooded in their memory. There are no established watercourses or ditches in the immediate vicinity of the site.

4.3 There is a public foul sewer in the highway immediately to the north of the site. It is assumed that the existing residence adjacent to the site drains to this sewer. See Appendix F for the Southern Water sewer map for the site.

#### 5 SURFACE WATER DRAINAGE OPTIONS

5.1 There is a general requirement that new drainage systems should be sustainable (SuDS) and that flow leaving the site should not exceed the Greenfield flow rate, including both surface water and sewage effluent.

5.2 The area of impermeable surface will be reduced by the proposed redevelopment. The existing area of impermeable surface is approximately 2100 m<sup>2</sup> and the redeveloped site impermeable surfacing will have an area of approximately 1400 m<sup>2</sup>. This is largely due to the replacement of much of the farmyard surface with the gardens of three of the proposed houses. This represents betterment in terms of sustainability.

5.3 The Greenfield runoff rate for the site has been calculated using the UK SuDS tools, the results are shown in See Appendix C and summarised in Table 5.1 below:

TABLE 5.1  
GREENFIELD RUNOFF RATES

Return period	Flow rates (l/s)
1 in 1 year	2.2
1 in 2 year	2.2
1 in 10 year	4.1
1 in 30 year	5.8
1 in 100 year	8.1
1 in 200 year	9.5

5.4 The current non-statutory guidance indicates that the maximum discharge permitted to leave the site from the drained area post development should not exceed the 1 in 1 year return period flow rate (2.2 l/s), or as near as practicable. See Appendix C for the HR Greenfield Flow Rate Tool Data.

5.5 The preferred sustainable (SuDS) surface water drainage options are:

- i. Re-use (including rainwater harvesting).
- ii. Discharge to soakaway (where no flow leaves the site).
- iii. Attenuation storage with controlled flow to a watercourse.
- iv. Attenuation storage with controlled flow to a sewer.

5.6 Rainwater harvesting for garden irrigation, and possibly lavatory flushing, should be considered.

5.7 Discharge to soakaway requires suitably permeable ground. To establish the suitability of ground for soakaway requires percolation testing. This was carried out at two locations across the site (see Figure 2). The test pits revealed a layer (150 mm) of friable topsoil over dense silty clay. Infiltration was minimal below the topsoil and indicated a permeability coefficient of  $<1\times10^{-6}$  m/s. This suggested that the underlying soil type is not suitable for drainage to soakaway.

5.8 The alternative to drainage to soakaway is drainage to attenuation storage where excess surface water is stored on site, either in a pond, gully, swale or underground attenuation storage unit. The surface water is allowed to discharge at a maximum of the Greenfield flow rate (2.2 l/s) via a flow-control vortex valve or orifice plate into a nearby watercourse (in this case there is no nearby watercourse or drainage ditch and discharge of surface water to the nearby foul sewer in the highway is unlikely to be an option). A hybrid solution with attenuation storage in an underground storage tank (AquaCell Core or similar) under the access road and controlled discharge via a seepage trench, to mirror the present drainage pattern has been deemed appropriate in this instance. The use of permeable paving in the paved areas would further reduce the surface water runoff rate and make the development more sustainable.

5.9 The NPPF states: "*Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control the flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible facilitating improvements in water quality and biodiversity*" Additional SuDS measures to mitigate the impact of the development by decreasing the runoff flow rates and increasing sustainability could include a rain garden or pond.

5.10 An attenuation storage volume of 104 m<sup>3</sup> has been calculated using the MasterDrain drainage network model. An underground tank located beneath the east end of the access road would be suitable for the attenuation storage of surface water on this site. The proposed drainage layout is shown in Figure 4. Please note that, in the absence of a topographical survey of the site, the levels given in the outline design are provisional. Output from the drainage design model can be seen in Appendix D.

## 5.11 Design Storm

5.11.1 The surface water drainage system has been designed for the 30-year return period event 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 A, Figure 4 for the proposed drainage design and Appendix D for pipe and chamber layout and sizing of the attenuation storage from the MasterDrain model.

## 5.12 Drainage Design Model

5.12.1 The drainage has been designed to accommodate the 1 in 30 year storm event plus a 35% allowance for climate change and checked for surcharge against the 1 in 100-year return period storm event plus a 45% allowance for climate change. Attenuation storage has been designed to accommodate the 1 in 100-year return period storm event plus a 45% allowance for climate change. The flow control device in the flow control chamber will be a vortex valve set for a maximum flow rate of 2.2 l/s or a 52 mm diameter orifice plate.

5.12.2 The attenuation store should be located not less than 5 m from the edge of the nearest building and 2.5 m from the nearest boundary. The attenuation storage can be in the form of swales, ponds or underground crates. In this case it is convenient to divide the attenuation storage into two parts on each side of the access driveway. See Figure 4 in Appendix A for the suggested drainage arrangement.

5.12.3 In the absence of any distinct watercourses, ditches or surface water sewers, the flow control devices will discharge to seepage trenches. These are level stone filled trenches resembling French drains that initially absorb the controlled flow and take advantage of the small amount of soakage in the topsoil. Once the trenches are full, the excess water will seep out at the controlled flow rate and discharge across the land to the southwest as per the existing situation, but at a lower flow rate.

5.12.4 The drainage arrangement has been designed using the MasterDrain network drainage model. The levels given in the design are provisional subject to a topographic survey of the site (with levels reduced to Ordnance Datum).

## 5.13 Hydrogeological Data

5.13.1 Hydrological data for the site as used in the MasterDrain model is given in Appendix D.

## 5.14 Extreme Event

5.14.1 An extreme event, which overwhelmed the drainage system, would probably result in water following the existing course and flowing west southwest across the surface of the ground as per the existing arrangement.

## 6 PROPOSED FOUL DRAINAGE

- 6.1 It is proposed to drain the foul sewage from the proposed residences into the foul sewer managed by Southern Water to the east of chamber 3101 in Copthorne Common Road, which lies to the north of the site. In order to connect to the foul water sewer, the developer will need to apply for a Wastewater Connection Application (Section 106).
- 6.2 Southern Water has not supplied any level information for their sewer in Copthorne Common Road and it is not possible to assess whether a gravity connection will be practicable or whether a small pumping station may be required at the site. We have assumed that a small pumping station will be required in the outline design for the suggested drainage arrangement
- 6.3 See Appendix F for the Southern Water Sewer Plans for the site and Figure 4 in Appendix A for the suggested drainage layout.

## 7. DRAINAGE DESIGN SUMMARY

- 7.1 No further detailed design of the drainage can be carried out until there is a topographical survey of the site (with levels reduced to Ordnance Datum). The invert levels of the public foul sewer in Copthorne Common Road and Southern Water chamber 3101 are also required to permit the detailed design of the foul sewerage.
- 7.2 The surface water chamber sizes, invert levels and pipe sizes from the MasterDrain model are summarised in Table 7.1 below:

TABLE 7.1  
SURFACE WATER CHAMBERS

No.	Dia (mm)	Cover level (mAOD)	Invert level (mAOD)	Pipe dia in (mm)	Pipe dia out (mm)
SW1	450	95.20	94.70	-	100
SW2	450	95.00	94.50	100	150
SW3	600	94.50	94.00	150	225
SW4	450	94.80	94.30	-	100
SW5	900	94.80	93.92	100 + 225	225
SW6	450	93.50	93.00	-	150
SW7	600	93.40	92.86	150	225
Atten	16000*	93.85	92.79	225 + 225	224
SW8	1200	93.60	92.69	225	100
Trench	N/A	93.20	92.20	100	-

\*equivalent attenuation volume for use in the model

- 7.3 The foul sewerage chamber sizes, invert levels and pipe sizes are given in Table 7.2 below:

**TABLE 7.2**  
**FOUL SEWERAGE CHAMBERS**

No.	Dia (mm)	Cover level (mAOD)	Invert level (mAOD)	Pipe dia in (mm)	Pipe dia out (mm)
F1	450	94.50	94.00	-	100
F2	450	94.40	93.86	100	100
F3	450	94.00	93.50	-	100
F4	600	94.20	93.40	2 x 100	100
F5	450	94.50	94.00	-	100
F6	450	94.00	93.50	-	100
F7	600	94.40	93.20	3 x 100	100
F8	1200	93.70	92.87	100	Rising main
F9	900	96.00	95.50	Rising main	100
3101	Not known	Not known	Not known	100	225

## 8 OPERATION & MAINTENANCE OF THE SYSTEM

8.1 The drainage system will generally require minimal operational input once construction has been completed. However, it will require some regular maintenance.

8.2 Items requiring maintenance will include:

- The flow control chambers, particularly the flow control device. This will require regular removal of any debris likely to obstruct the orifice or vortex valve. Maintenance should be carried out at the time of year after most leaf fall has occurred.
- Any gullies, pipes and channels will need occasional removal of accumulated debris and silt.
- The sewage pumping station required to pump the foul sewage to the public foul sewer in Copthorne Common Road will require annual maintenance from a specialist contractor.

## 9. SUMMARY OF CONCLUSIONS

9.1 The site currently comprises a former farmyard containing seven buildings (former stables, barns, animal enclosures and a disused prefabricated residence), an area laid to lawn, a variety of paved areas and an access driveway.

9.2 It is proposed to redevelop the site to provide 5 dwellinghouses with associated amenity space and parking; hard and soft landscaping; cycle and refuse storage; change of use of land to residential garden for existing dwelling house and associated access works.

9.3 The underlying geology is Cretaceous Upper Tunbridge Wells Sand (UTWS) (sandstone & siltstone). There are no superficial deposits. The site lies on a Secondary A aquifer. It is in a high groundwater vulnerability area but is not in a groundwater protection zone.

9.4 The Environment Agency's Flood Map for Planning shows the site lying within Flood Zone 1 (low risk of fluvial flooding, less than 0.1% chance of flooding in any year). The site is shown to be at very low risk of surface water flooding, an area to the south is shown at some risk of surface water flooding. Flooding from groundwater or reservoirs is considered unlikely in this area. There does not appear to be any history of sewer flooding at the site. See Appendix B.

9.5 The preferred sustainable drainage method is drainage to soakaway. This requires a suitably permeable underlying geology. The UTWS tends to have low permeability and this was confirmed by percolation testing conducted at the site on Thursday 26 June. The presence of self-sustaining ponds within the immediate area also tends to confirm this. The alternative SuDS preferred method for the draining surface water is drainage to attenuation storage with outflow limited to Greenfield flow discharged to an existing watercourse or drainage ditch.

9.6 The attenuation storage may be provided in the form of swales (depressions in the ground which are normally dry), freeboard in ponds or underground storage crates. Discharge control would be in the form of a vortex valve or orifice plate. See drainage design in Appendix A, Figure 4. In this case, underground storage crates beneath the east end of the access road would appear to be the only practicable option.

9.7 The use of permeable paving for the areas of hardstanding in the proposed redevelopment, and rainwater harvesting comprising water butts from drainpipe downpipes for use in garden watering and/or storing rainwater for lavatory flushing, would reduce the surface water runoff and would make the development more sustainable.

9.8 An extreme event overtopping the system would likely follow the existing flow pattern, draining across the surface of the ground to the fields to the west-southwest.

9.9 There are no significant ditches or watercourses within the vicinity to which the controlled flow may be discharged. This is partially due to the site being towards the top of a slope and flows from the north being intercepted by the highway drainage and flows across the site being minimal. The flow control devices will discharge to seepage trenches, having the appearance of French drains with horizontal upper profiles, which would allow extreme storm flows to mimic the existing, largely laminar, flow patterns, but at a lower flow.

9.10 Foul sewage will discharge to the public foul sewer in the highway. However, it is most likely that a small pumping station will be required to achieve this.

---

9.11 No further detailed design of the drainage can be carried out until there is a topographical survey of the site (with levels reduced to Ordnance Datum) and the invert level of the public foul sewer in the adjacent highway is known.



## APPENDIX A:

- Figure 1: Site Location
- Figure 2: Site as Existing and Testing Locations
- Figure 3: Proposed Development
- Figure 4: Suggested Drainage Arrangement
- Figure 5: Constraints Plan



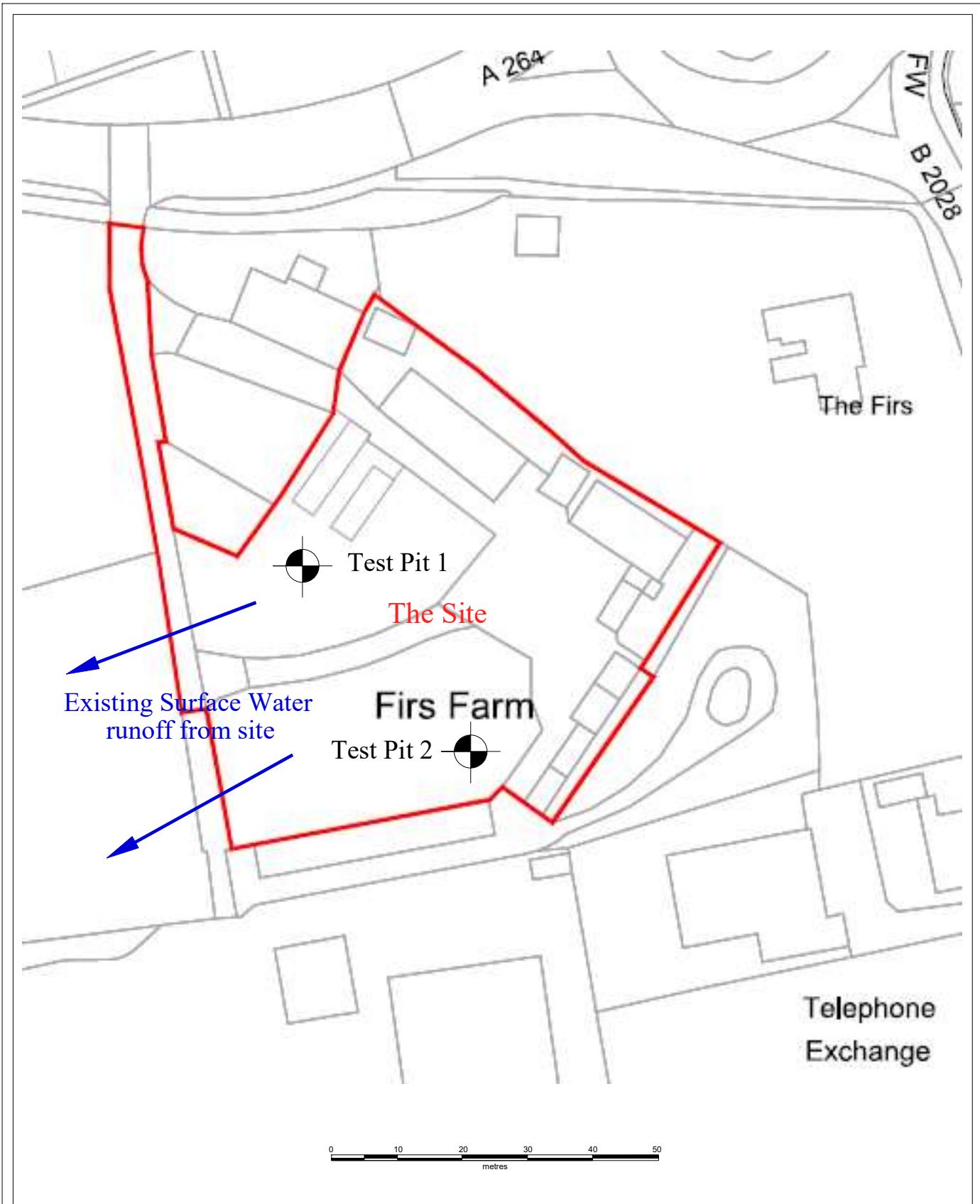
Scale as shown

**DEVTEC PROPERTIES LTD**



**FIRS FARM, COPTHORNE COMMON ROAD, WEST SUSSEX**

**Figure 1: Site Location**



DEVTEC PROPERTIES LTD  
FIRS FARM, COPTHORNE COMMON ROAD, WEST SUSSEX

**Figure 2: Site as Existing and Testing Locations**

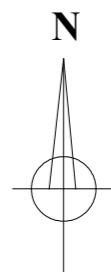
DEVTEC PROPERTIES LTD

FIRS FARM, COPTHORNE COMMON ROAD, WEST SUSSEX

**Figure 3: Proposed Development**

July 2025

Scale as shown



0 10 20 30 40 50  
metres



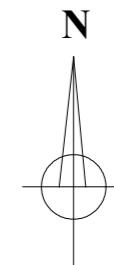
# DEVTEC PROPERTIES LTD

## FIRS FARM, COPTHORNE COMMON ROAD, WEST SUSSEX

**Figure 4: Suggested Drainage Arrangement**

July 2025

Scale as shown



## - Foul Sewerage

— Surface water

metres

Public Foul Sewer



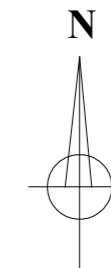
DEVTEC PROPERTIES LTD

FIRS FARM, COPTHORNE COMMON ROAD, WEST SUSSEX

Figure 5: Drainage Constraints Plan

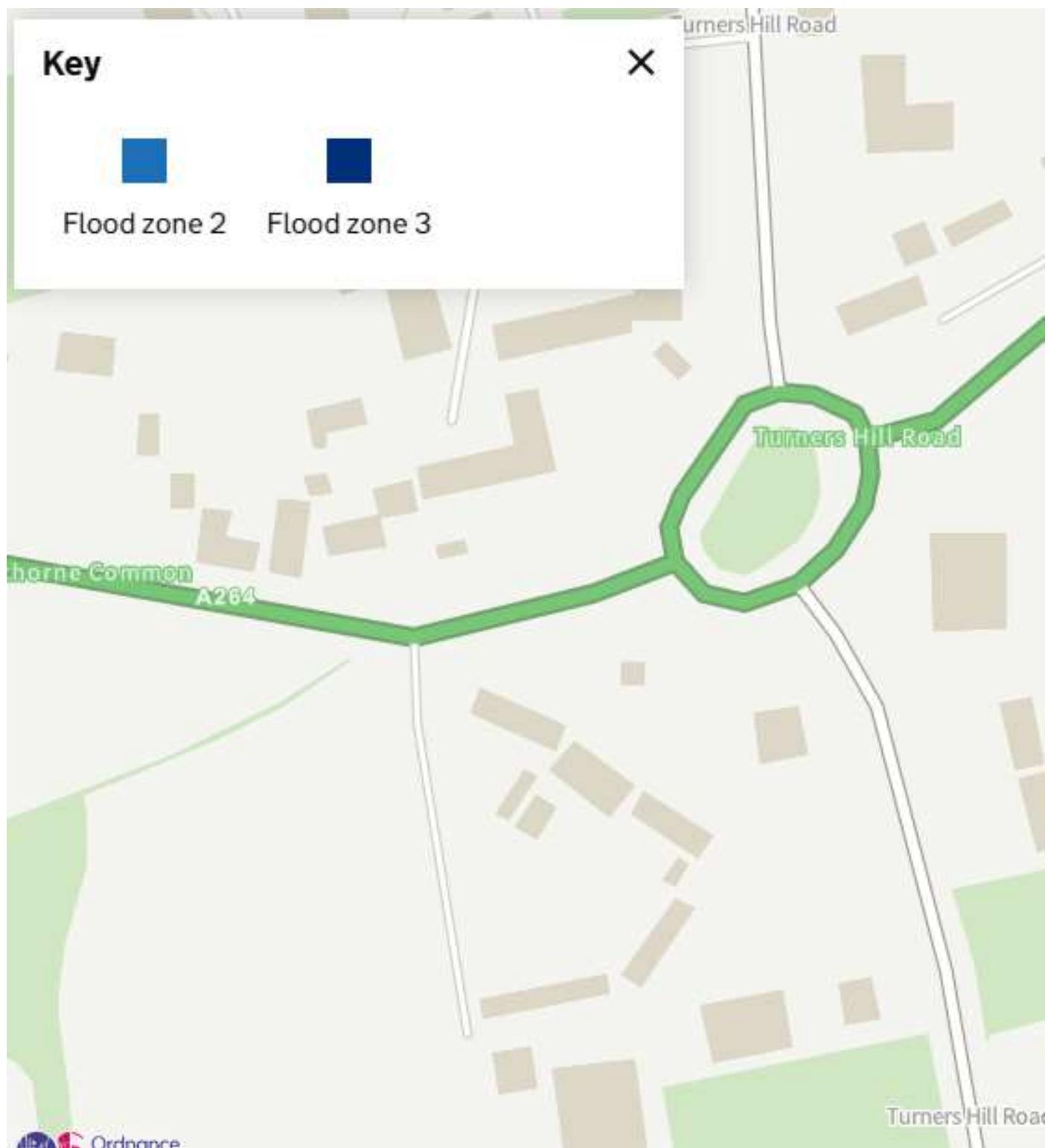
July 2025

Scale as shown

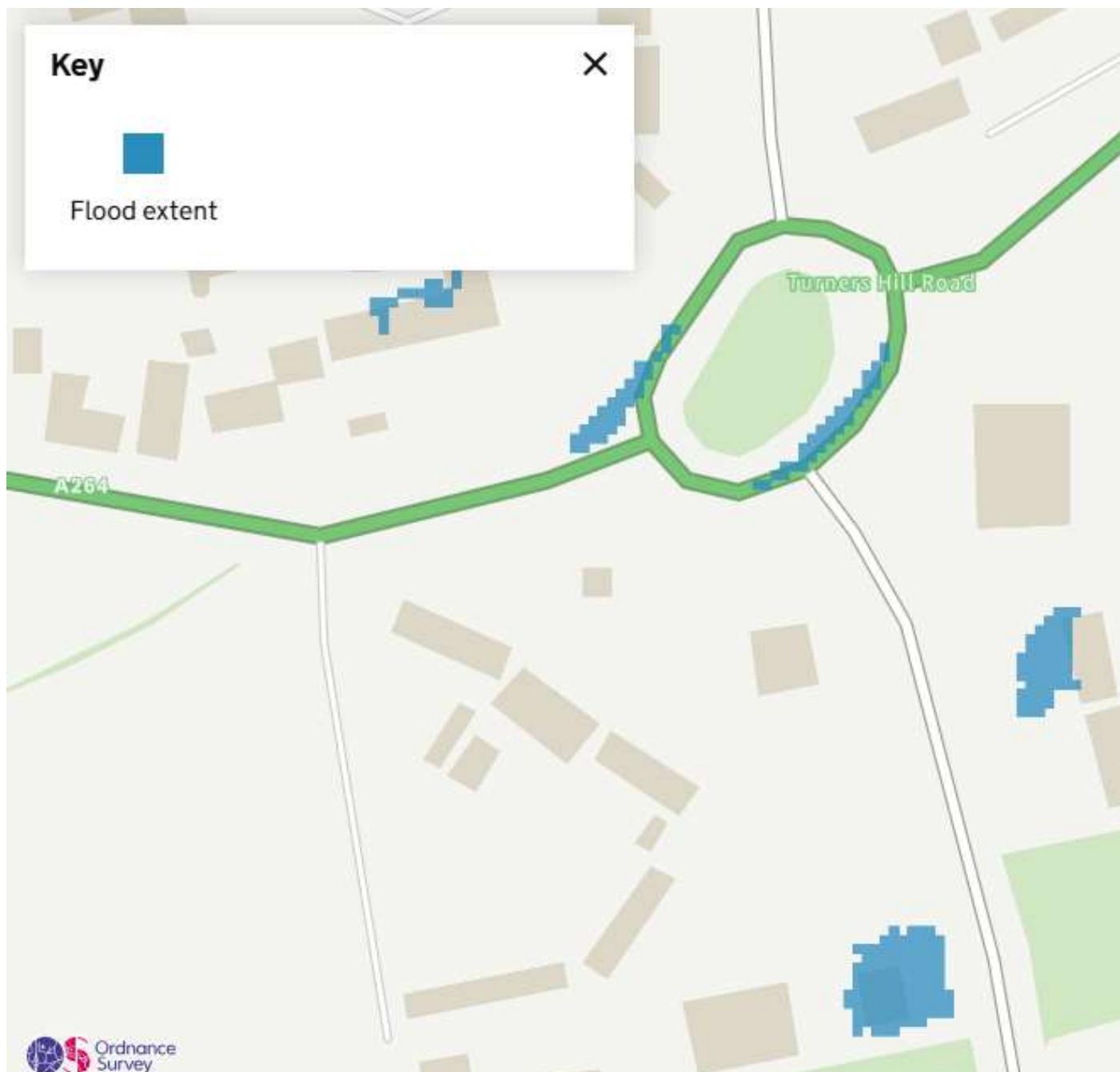


---

**APPENDIX B:**  
**ENVIRONMENT AGENCY FLOOD RISK SUMMARY**



Environment Agency Flood Map for Planning



Environment Agency Surface Water Flood Map

## APPENDIX C:

### HR WALLINGFORD GREENFIELD FLOW

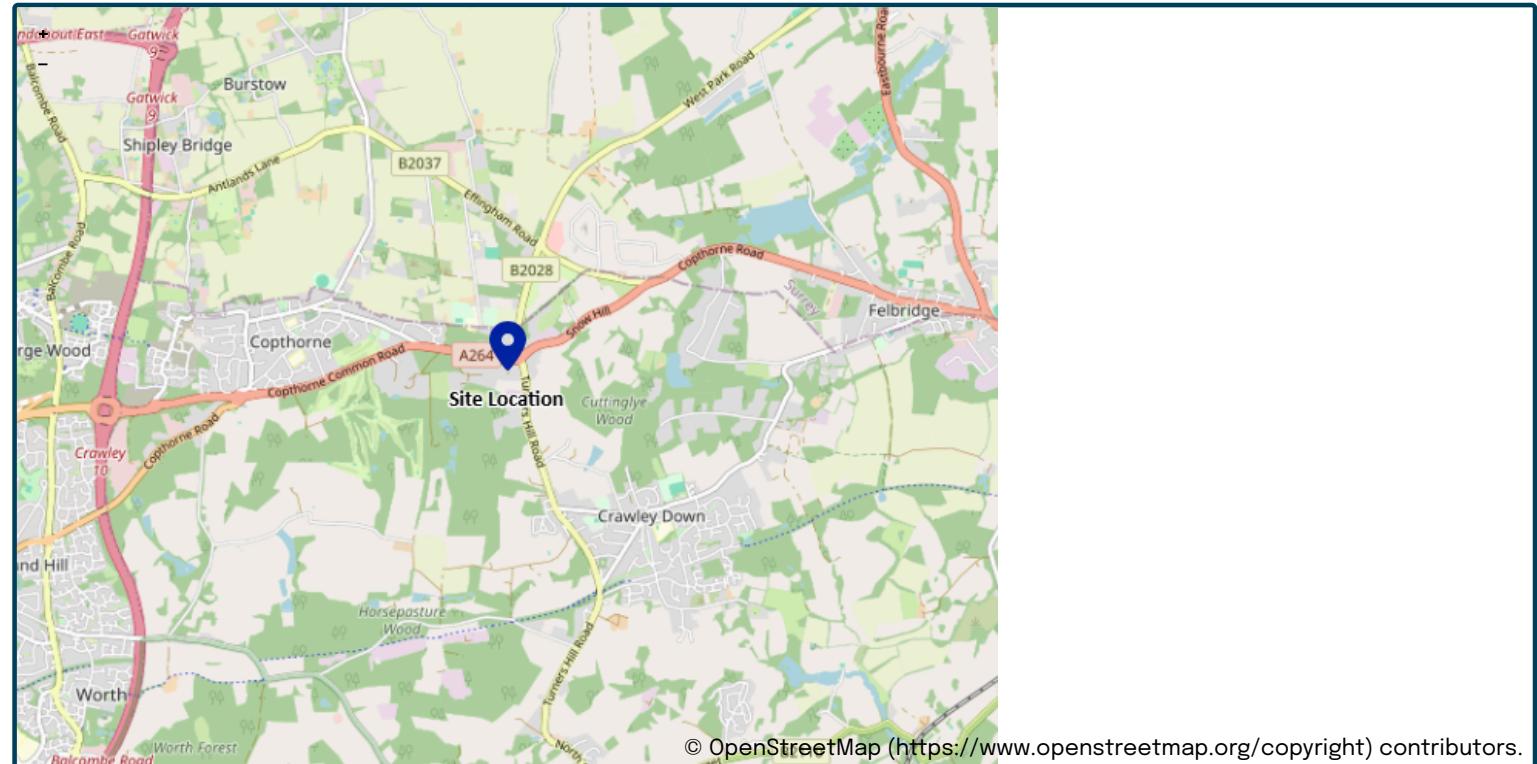
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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	27/06/2025
Calculated by	MDM
Reference	821
Model version	2.0.1

## Location

Site name	Firs Farm
Site location	Copthorne Common



Site easting	533414
Site northing	138904

## Site details

Total site area (ha)	0.4367	ha
----------------------	--------	----

# Greenfield runoff

## Method

Method	IH124
--------	-------

### IH124

	<u>My value</u>	<u>Map value</u>
SAAR (mm)	819	mm
How should SPR be derived?	WRAP soil type	
WRAP soil type	4	
SPR	0.47	
QBar (IH124) (l/s)	2.5	l/s

## Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	6	
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

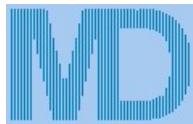
Method	IH124
Flow rate 1 year (l/s)	2.2
Flow rate 2 year (l/s)	2.2
Flow rate 10 years (l/s)	4.1
Flow rate 30 years (l/s)	5.8
Flow rate 100 years (l/s)	8.1
Flow rate 200 years (l/s)	9.5

### Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.0.1) developed by HR Wallingford and available at [uksuds.com](https://www.eksuds.com/) (<https://www.eksuds.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.eksuds.com/terms-conditions) (<https://www.eksuds.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 UNDERGROUND ATTENUATION STORAGE CALCULATIONS



# Environmental Assessment Services Ltd

http://www.eas ltd.co.uk

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

Job No.

812A

Sheet no.

1

Date

16/07/25

MasterDrain  
SW

Project  
Firs Farm Revised

By  
MDM

Checked

Reviewed

Title  
Hydrograph storage analysis (Winter profile) for Copthorne

Data:-

Location	= Copthorne	Grid reference	= TQ3139
M5-60 (mm)	= 20	r	= 0.35
Soil index	= 0.45	SAAR (mm/yr)	= 820
Return period	= 100	WRAP	= 4
UCWI	= 0.0	Climate change	= +45%

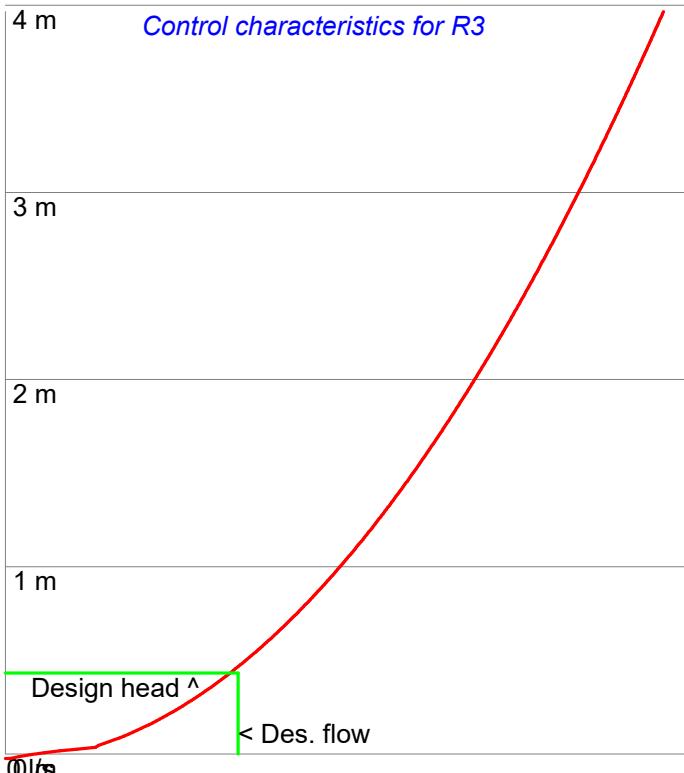
Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

Percentage runoff = 95.0% (manual setting)

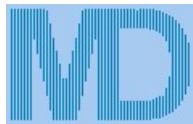
Imperv. area	= 1400 m <sup>2</sup>	Pervious area	= 0 m <sup>2</sup>
Total area	= 1400 m <sup>2</sup>	Equiv area	= 1330 m <sup>2</sup> (Tot. area x % runoff).
Total runoff	= 143.3 m <sup>3</sup>	Discharge rate	= 2.200 l/s

Design Head	= 0.5m	Peak flow	= 2.20 l/s
Control device	= R3	Orifice diam	= 49.3 mm
Max. calc. depth	= 0.5 m	Available depth	= 0.0 m <sup>3</sup>
Mean discharge	= 0.98 l/s		

Available system storage = 0.00 m<sup>3</sup> under a system plane at the design head level.  
Offline storage = 0.0 m<sup>3</sup>  
Total storage = 104.0 m<sup>3</sup> Peak input flow = 9.95 l/s



Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.01	0.05	2.01	4.41
0.05	0.52	2.05	4.45
0.10	0.98	2.10	4.51
0.15	1.20	2.15	4.56
0.20	1.39	2.20	4.61
0.25	1.56	2.25	4.67
0.30	1.70	2.30	4.72
0.35	1.84	2.35	4.77
0.40	1.97	2.40	4.82
0.45	2.09	2.45	4.87
0.50	2.20	2.50	4.92
0.55	2.31	2.55	4.97
0.60	2.41	2.60	5.02
0.65	2.51	2.65	5.06
0.70	2.60	2.70	5.11
0.75	2.69	2.75	5.16
0.80	2.78	2.80	5.21
0.85	2.87	2.85	5.25
0.90	2.95	2.90	5.30
0.95	3.03	2.95	5.34
1.00	3.11	3.00	5.39
1.05	3.19	3.05	5.43
1.10	3.26	3.10	5.48
1.15	3.34	3.15	5.52
1.20	3.41	3.20	5.57
1.25	3.48	3.25	5.61
1.30	3.55	3.30	5.65
1.35	3.61	3.35	5.69
1.40	3.68	3.40	5.74
1.45	3.75	3.45	5.78
1.50	3.81	3.50	5.82
1.55	3.87	3.55	5.86
1.60	3.94	3.60	5.90
1.65	4.00	3.65	5.94
1.70	4.06	3.70	5.98
1.75	4.12	3.75	6.02
1.80	4.17	3.80	6.06
1.85	4.23	3.85	6.10
1.90	4.29	3.90	6.14
1.95	4.34	3.95	6.18
2.00	4.40	4.00	6.22



MasterDrain  
SW

# 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.

812A

Sheet no.

2

Date

16/07/25

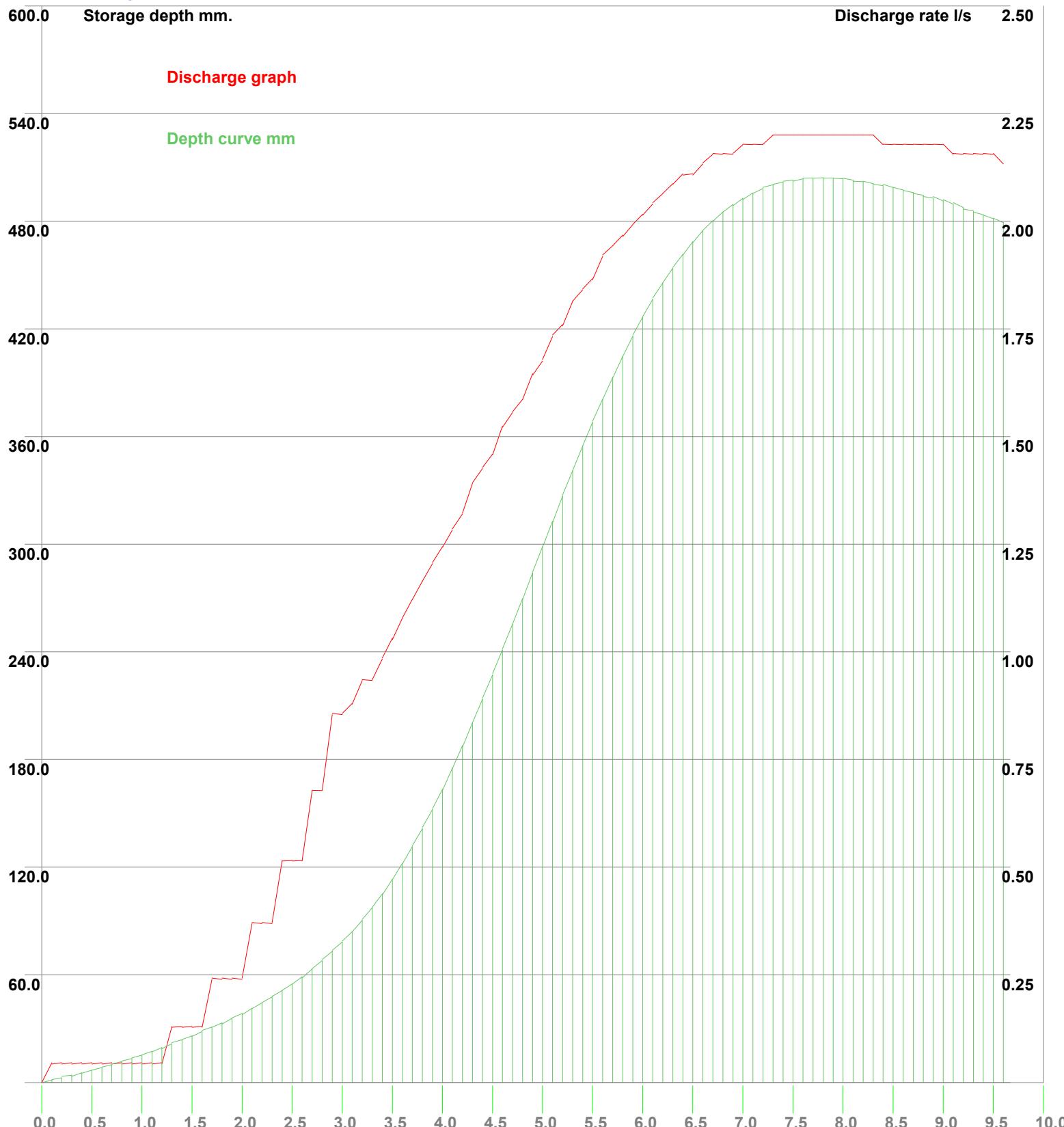
Project  
**Firs Farm Revised**

Title  
**Hydrograph storage analysis (Winter profile) for Copthorne**

By  
**MDM**

Checked  
Reviewed

Storage curves for a 10 hours storm.





# Environmental Assessment

## Services Ltd

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

London Rd, Hickstead  
Hastings, East Sussex, RH17 5LZ  
Tel: 01444 882552  
email: info@easltd.co.uk

Job No.  
**812A**

Sheet no.  
**3**

Date  
**16/07/25**

MasterDrain  
SW

Project	<b>Firs Farm Revised</b>	By	
Title	<b>Hydrograph storage analysis (Winter profile) for Copthorne</b>	MDM	Checked Reviewed

Incremental rainfall figures.

Storm Mins	Storage Depth mm	Control Flow l/s	Storm Mins	Storage Depth mm	Control Flow l/s
6.0	1.4	0.05	306.0	312.8	1.73
12.0	2.7	0.05	312.0	327.0	1.76
18.0	4.0	0.05	318.0	341.0	1.81
24.0	5.4	0.05	324.0	354.7	1.84
30.0	6.8	0.05	330.0	368.0	1.87
36.0	8.4	0.05	336.0	380.8	1.92
42.0	9.9	0.05	342.0	393.1	1.94
48.0	11.6	0.05	348.0	404.8	1.97
54.0	13.4	0.05	354.0	416.0	1.99
60.0	15.3	0.05	360.0	426.6	2.02
66.0	17.4	0.05	366.0	436.5	2.04
72.0	19.5	0.05	372.0	445.5	2.06
78.0	21.7	0.13	378.0	453.9	2.09
84.0	23.8	0.13	384.0	461.6	2.11
90.0	26.1	0.13	390.0	468.5	2.11
96.0	28.5	0.13	396.0	474.7	2.13
102.0	30.9	0.24	402.0	480.3	2.16
108.0	33.3	0.24	408.0	485.2	2.16
114.0	35.8	0.24	414.0	489.3	2.16
120.0	38.4	0.24	420.0	492.8	2.18
126.0	41.4	0.37	426.0	495.8	2.18
132.0	44.4	0.37	432.0	498.3	2.18
138.0	47.7	0.37	438.0	500.3	2.20
144.0	51.3	0.52	444.0	501.8	2.20
150.0	55.0	0.52	450.0	502.9	2.20
156.0	59.0	0.52	456.0	503.7	2.20
162.0	63.4	0.68	462.0	504.1	2.20
168.0	68.0	0.68	468.0	504.2	2.20
174.0	73.1	0.85	474.0	504.1	2.20
180.0	78.4	0.85	480.0	503.6	2.20
186.0	84.1	0.88	486.0	502.9	2.20
192.0	90.5	0.93	492.0	502.0	2.20
198.0	97.5	0.93	498.0	501.0	2.20
204.0	105.1	0.98	504.0	499.9	2.18
210.0	113.3	1.03	510.0	498.7	2.18
216.0	122.1	1.08	516.0	497.4	2.18
222.0	131.5	1.12	522.0	496.0	2.18
228.0	141.5	1.16	528.0	494.5	2.18
234.0	152.1	1.20	534.0	492.9	2.18
240.0	163.4	1.24	540.0	491.3	2.18
246.0	175.3	1.28	546.0	489.5	2.16
252.0	187.7	1.32	552.0	487.6	2.16
258.0	200.5	1.39	558.0	485.7	2.16
264.0	213.6	1.43	564.0	483.6	2.16
270.0	227.2	1.46	570.0	481.5	2.16
276.0	241.2	1.52	576.0	479.3	2.13
282.0	255.3	1.56	582.0	477.0	2.13
288.0	269.7	1.59	588.0	474.8	2.13
294.0	284.1	1.65	594.0	472.5	2.13
300.0	298.5	1.68	600.0	470.2	2.13

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.

Project **Firs Farm Revised**Title **Hydrograph storage analysis (Winter profile) for Copthorne**

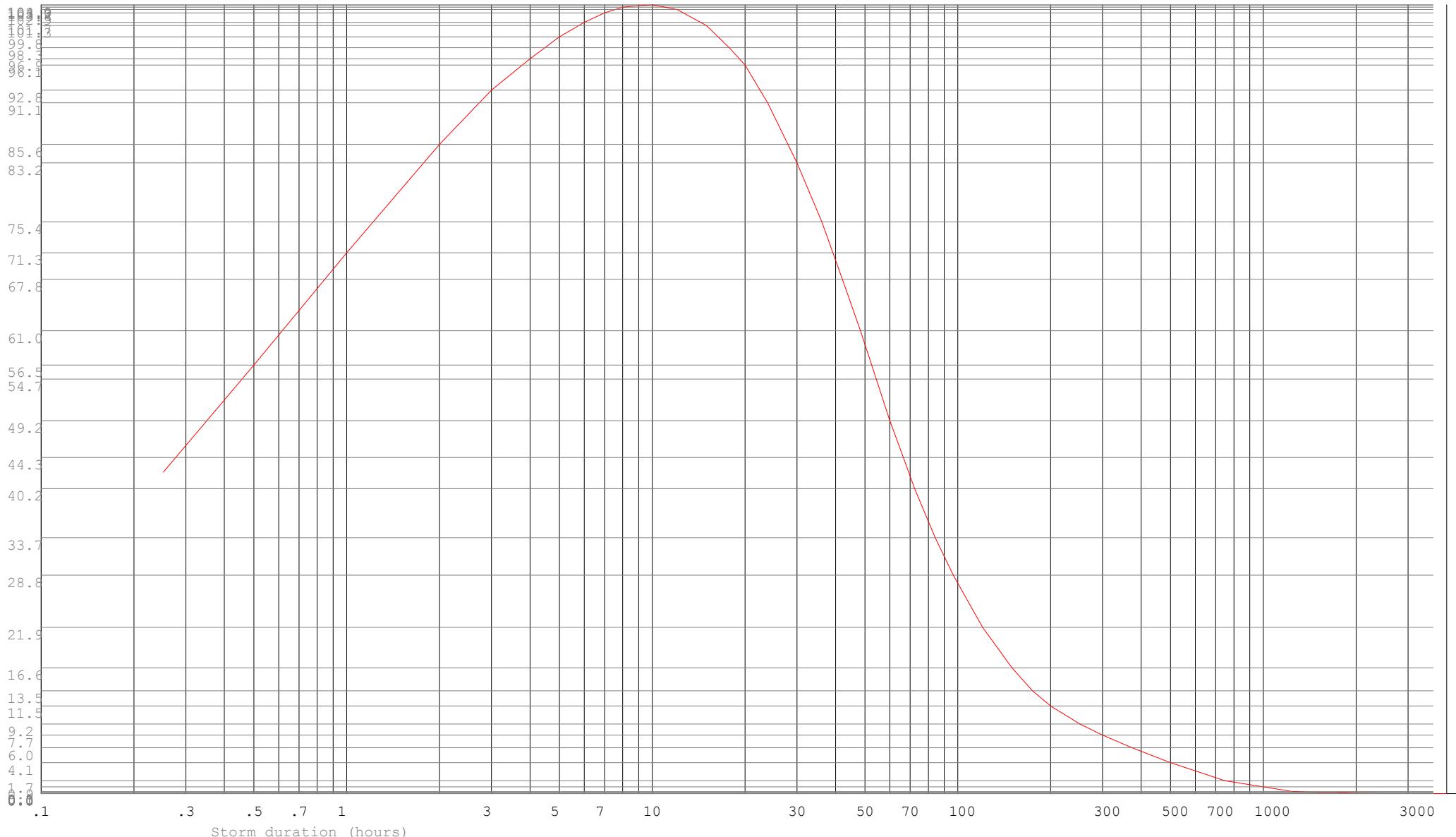
By

MDM

Checked

Reviewed

Sequential storage volume at specific storm durations.

m<sup>3</sup>

<b>Environmental Assessment Services Ltd</b> <a href="http://www.easltd.co.uk">http://www.easltd.co.uk</a>												Job No. <b>821A</b>
												Sheet no. <b>1</b>
Date <b>16/07/25 16:39</b>												
Project <b>Firs Farm (Revised)</b>												
Title <b>Manhole printout for FIRS FARM REVISED.SW</b>							By <b>MDM</b>	Checked	Reviewed			

Manhole ref.	X ref	Y ref	Form	Cham or length	diam. width	Rect.	Chamb. height	Shaft height	MH Volume	Exit Diam	Exit Crown	Exit Invert	Chamb const	Slab level	Cover Level	Dwnstr MH
SW1	62.33	84.5	circ	450	N/A	0.50			0.08	100	94.825	94.700	N/A	94.650	95.200	SW2
SW2	68.21	69.38	circ	450	N/A	0.50			0.08	150	94.675	94.500	N/A	94.450	95.000	SW3
SW3	79.81	59.98	circ	600	N/A	0.50			0.14	225	94.250	94.000	N/A	93.950	94.500	SW5
SW4	88.47	52.93	circ	450	N/A	0.50			0.08	100	94.425	94.300	N/A	94.250	94.800	SW5
SW5	82.60	53.37	circ	900	N/A	0.88			0.56	225	94.170	93.920	N/A	93.870	94.800	Atten
SW6	45.3	33.85	circ	450	N/A	0.50			0.08	150	93.175	93.000	N/A	92.950	93.500	SW7
SW7	57.19	26.21	circ	600	N/A	0.54			0.15	225	93.110	92.860	N/A	92.810	93.400	Atten
Atten	74.59	34.36	circ	16000	N/A	1.06			213.13	225	93.040	92.790	N/A	92.740	93.850	SW8
SW8	67.18	24.15	circ	1200	N/A	0.91			1.03	225	92.940	92.690	N/A	92.640	93.600	Trench

All manholes to be as per 'Sewers for Adoption'

**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.  
**821A**

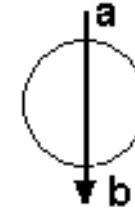
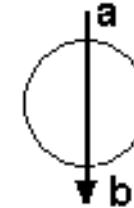
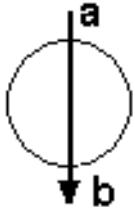
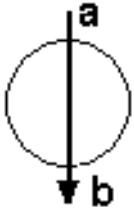
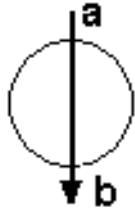
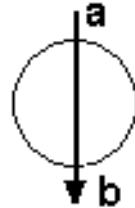
Sheet no.  
**2**

Date  
**16/07/25 16:39**

Project  
**Firs Farm (Revised)**

Title **Manhole printout for FIRS FARM REVISED.SW**

By  
**MDM**      Checked      Reviewed



MH = SW1  
a=head  
b = 100

MH = SW2  
a= 100  
b = 150

MH = SW3  
a= 150  
b = 225

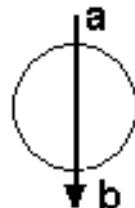
MH = SW4  
a=head  
b = 100

MH = SW5  
a= 225  
b = 225  
c = 100  
d = 225

MH = SW6  
a=head  
b = 150

MH = SW7  
a= 150  
b = 225  
c = 225  
d = 225

MH = Atten  
a= 225  
b = 225  
c = 225  
d = 225



MH = SW8  
a= 225  
b = 225

<b>Environmental Assessment Services Ltd</b> <a href="http://www.easltd.co.uk">http://www.easltd.co.uk</a>		London Rd, Hickstead Haywards Heath, West Sussex, RH17 5LZ Tel: 01444 882552 email: info@easltd.co.uk	Job No. <b>821A</b>
		Sheet no.	<b>3</b>
		Date	<b>16/07/25 16:39</b>
Project	<b>Firs Farm (Revised)</b>	By	Checked
Title	<b>Manhole printout for FIRS FARM REVISED.SW</b>	MDM	Reviewed

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



**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.  
**821A**

Sheet no.  
**1**

Date  
**16/07/25**

MasterDrain  
SW

Project														
Title	Surcharge calcs (Sized at 30 yrs storm) for FIRS FARM REVISED.SW CCF = 45%													

Free flowing outlet

Return period = 100 yrs

Climate change factor = 45

**PEAK hydrograph values printed**

Storm duration = 30 mins

No offline storage

Mean rain intens. 122.00 mm/hr

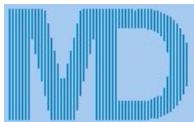
Storm profile = Summer

Using FSR data

Peak rain intens. 478.24 mm/hr

Sample period = 15.0 secs.

Entry	SECT.:	MANHOLE :	PIPE	RATE :	PIPE	CHAMBER	INVERT:	WATER :	GRND :	SURCHARGE	EXCESS	FLOODED	DRAINED	STATUS	
No.	No.:	REF	CAPACITY	FLOW :	SIZE	:DIAM/LxW	LEVEL :	LEVEL :	LEVEL :	fract.	Depth	FLOW	VOL	:AREA (m <sup>2</sup> ):	
				1/s	1/s	mm	mm	m	m			1/s	m <sup>3</sup>	:x FACTOR :	
1	I	1.01	SW1	6.7	1.9	100	450	94.70	94.73	95.20	0.29	0.03	0.00	0.000	33 OK
2	I	1.02	SW2	32.6	10.2	150	450	94.50	94.55	95.00	0.31	0.05	0.00	0.000	178 OK
3	I	1.03	SW3	54.8	18.5	225	600	94.00	94.08	94.50	0.34	0.08	0.00	0.000	322 OK
4	B	2.01	SW4	15.7	11.0	100	450	94.30	94.37	94.80	0.70	0.07	0.00	0.000	192 OK
5	I	1.04	SW5	123.1	29.6	225	900	93.92	93.99	94.80	0.24	0.07	0.00	0.000	514 OK
6	B	3.01	SW6	17.6	8.3	150	450	93.00	93.07	93.50	0.47	0.07	0.00	0.000	144 OK
7	B	3.02	SW7	31.1	16.6	225	600	92.86	92.98	93.40	0.53	0.12	0.00	0.000	289 OK
8	I	1.05	Atten†	46.2	78.6	225	16000	92.79	93.02	93.85	1.70	0.23	32.42	0.000	1367 Surch.
9	I	1.06	SW8	70.2	78.6	225	1200	92.69	93.03	93.60	1.12	0.34	8.41	0.000	1367 Surch.



MasterDrain  
SW

<b>Environmental Assessment Services Ltd</b> <a href="http://www.easltd.co.uk">http://www.easltd.co.uk</a>		London Rd, Hickstead Haywards Heath, West Sussex, RH17 5LZ Tel: 01444 882552 email: info@easltd.co.uk	Job No. <b>821A</b> Sheet no. <b>2</b> Date <b>16/07/25</b>
Project  <b>Title</b> <b>Surcharge calcs (Sized at 30 yrs storm) for FIRS FARM REVISED.SW CCF = 45%</b>		By <b>MDM</b>	Checked 
			Reviewed

## 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 - Atten

Restrictor flowrate - 2.2 l/s

### Flood volumes

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



**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.  
**821A**

Sheet no.  
**3**

Date  
**16/07/25**

MasterDrain  
SW

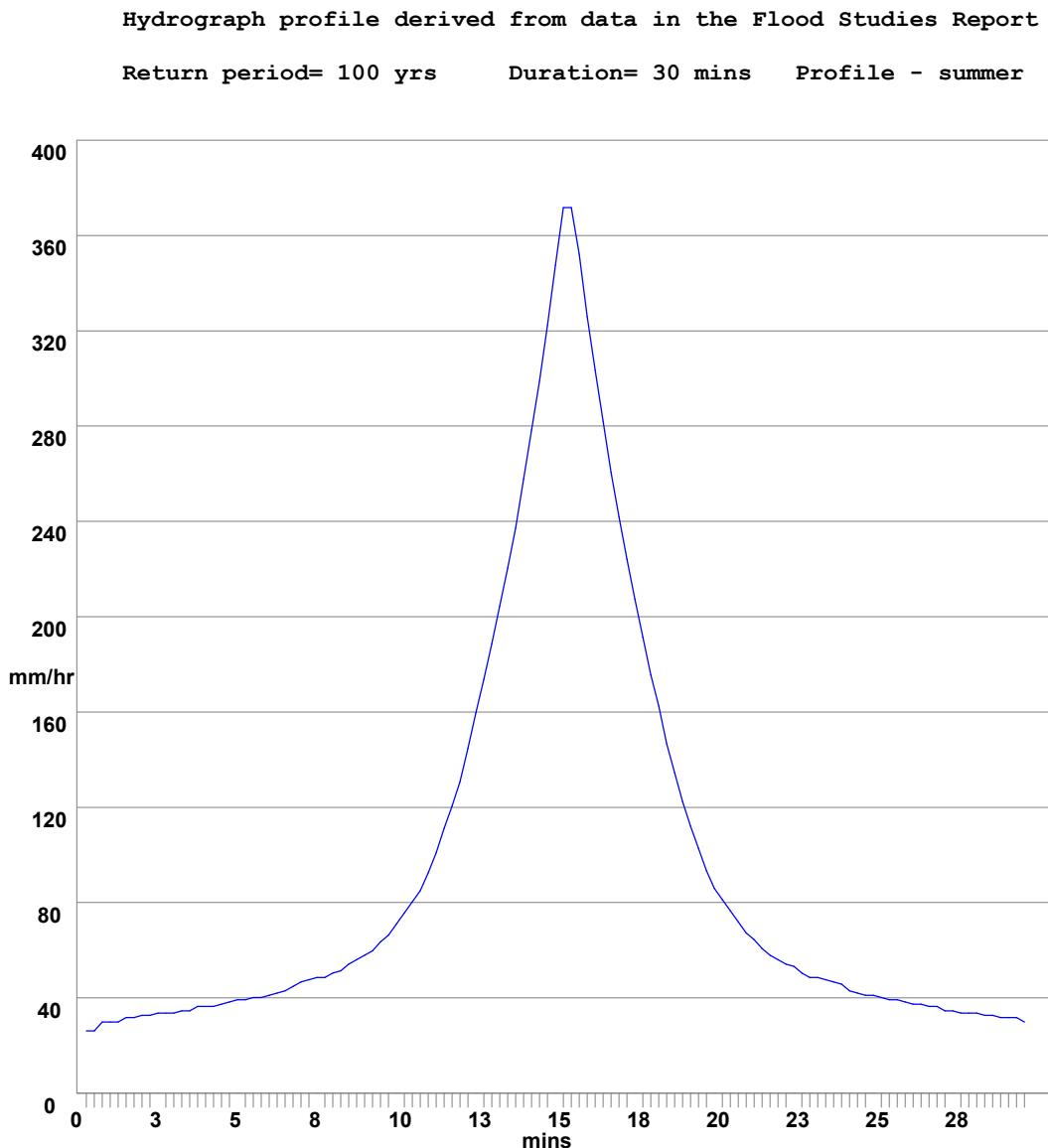
Project					
Title	Surcharge calcs (Sized at 30 yrs storm) for FIRS FARM REVISED.SW CCF = 45%				

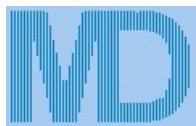
By  
**MDM**

Checked

Reviewed

Time mins	Rain mm/hr	Time mins	Rain mm/hr	Time mins	Rain mm/hr
0:15	28.43	10:15	81.24	20:15	87.34
0:30	28.43	10:30	86.32	20:30	82.26
0:45	32.50	10:45	91.40	20:45	77.18
1:00	32.50	11:00	98.51	21:00	72.10
1:15	32.50	11:15	107.65	21:15	69.06
1:30	33.51	11:30	118.82	21:30	64.99
1:45	33.51	11:45	128.97	21:45	61.95
2:00	34.53	12:00	140.14	22:00	59.92
2:15	34.53	12:15	155.38	22:15	57.89
2:30	35.54	12:30	170.61	22:30	56.87
2:45	35.54	12:45	185.84	22:45	53.82
3:00	35.54	13:00	202.09	23:00	51.79
3:15	36.56	13:15	219.35	23:15	51.79
3:30	36.56	13:30	235.60	23:30	50.78
3:45	38.59	13:45	253.88	23:45	49.76
4:00	38.59	14:00	276.22	24:00	48.75
4:15	38.59	14:15	297.55	24:15	45.70
4:30	39.61	14:30	319.89	24:30	44.68
4:45	40.62	14:45	345.28	24:45	43.67
5:00	41.64	15:00	371.68	25:00	43.67
5:15	41.64	15:15	398.09	25:15	42.65
5:30	42.65	15:30	398.09	25:30	41.64
5:45	42.65	15:45	376.76	25:45	41.64
6:00	43.67	16:00	349.34	26:00	40.62
6:15	44.68	16:15	324.97	26:15	39.61
6:30	45.70	16:30	301.61	26:30	39.61
6:45	47.73	16:45	279.27	26:45	38.59
7:00	49.76	17:00	258.96	27:00	38.59
7:15	50.78	17:15	239.67	27:15	36.56
7:30	51.79	17:30	222.40	27:30	36.56
7:45	51.79	17:45	205.14	27:45	35.54
8:00	53.82	18:00	187.87	28:00	35.54
8:15	54.84	18:15	173.66	28:15	35.54
8:30	57.89	18:30	157.41	28:30	34.53
8:45	59.92	18:45	144.21	28:45	34.53
9:00	61.95	19:00	131.00	29:00	33.51
9:15	63.98	19:15	119.83	29:15	33.51
9:30	68.04	19:30	109.68	29:30	33.51
9:45	71.09	19:45	99.52	29:45	32.50
10:00	76.16	20:00	92.41	30:00	32.50





**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.  
**821A**

Sheet no.  
**4**

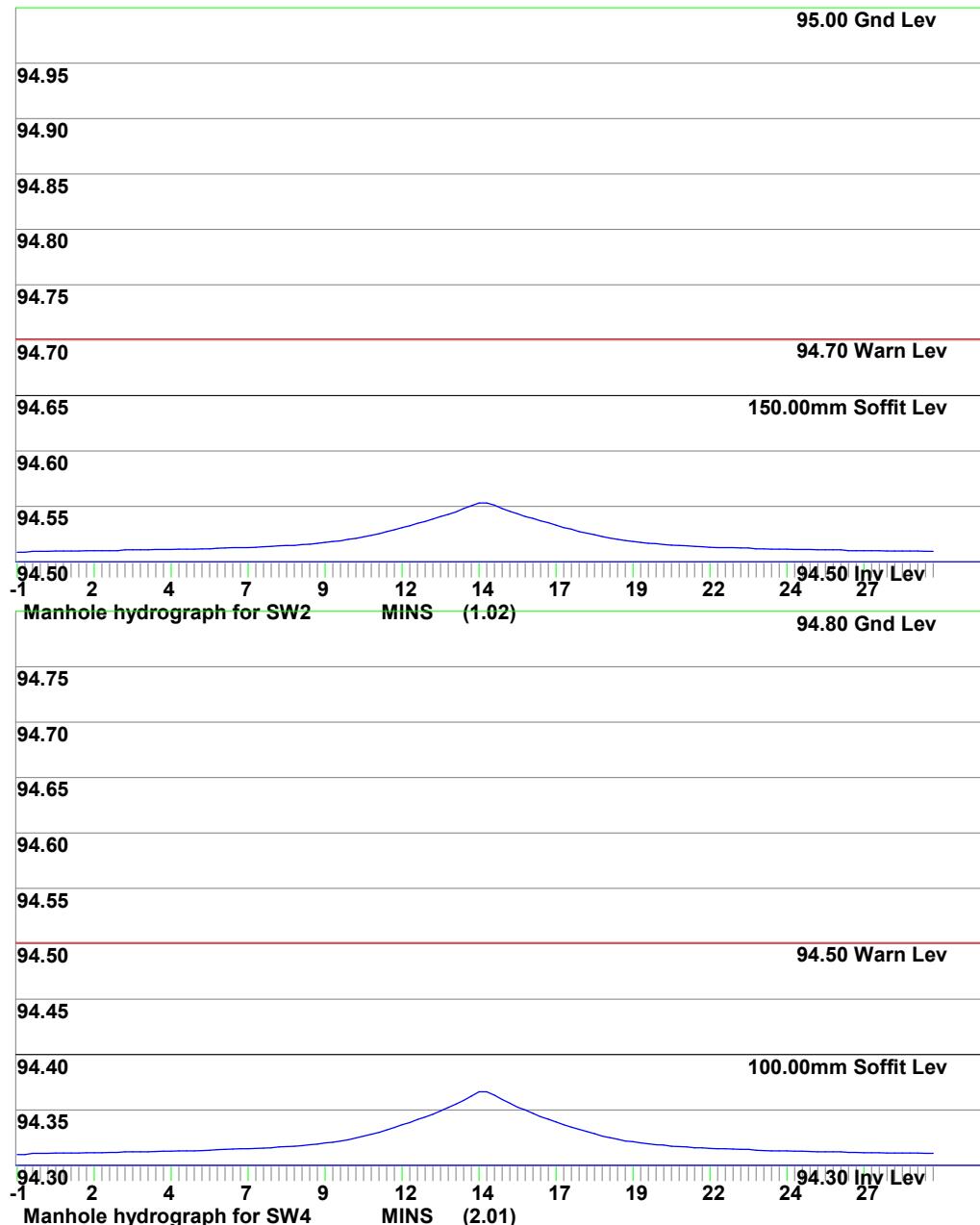
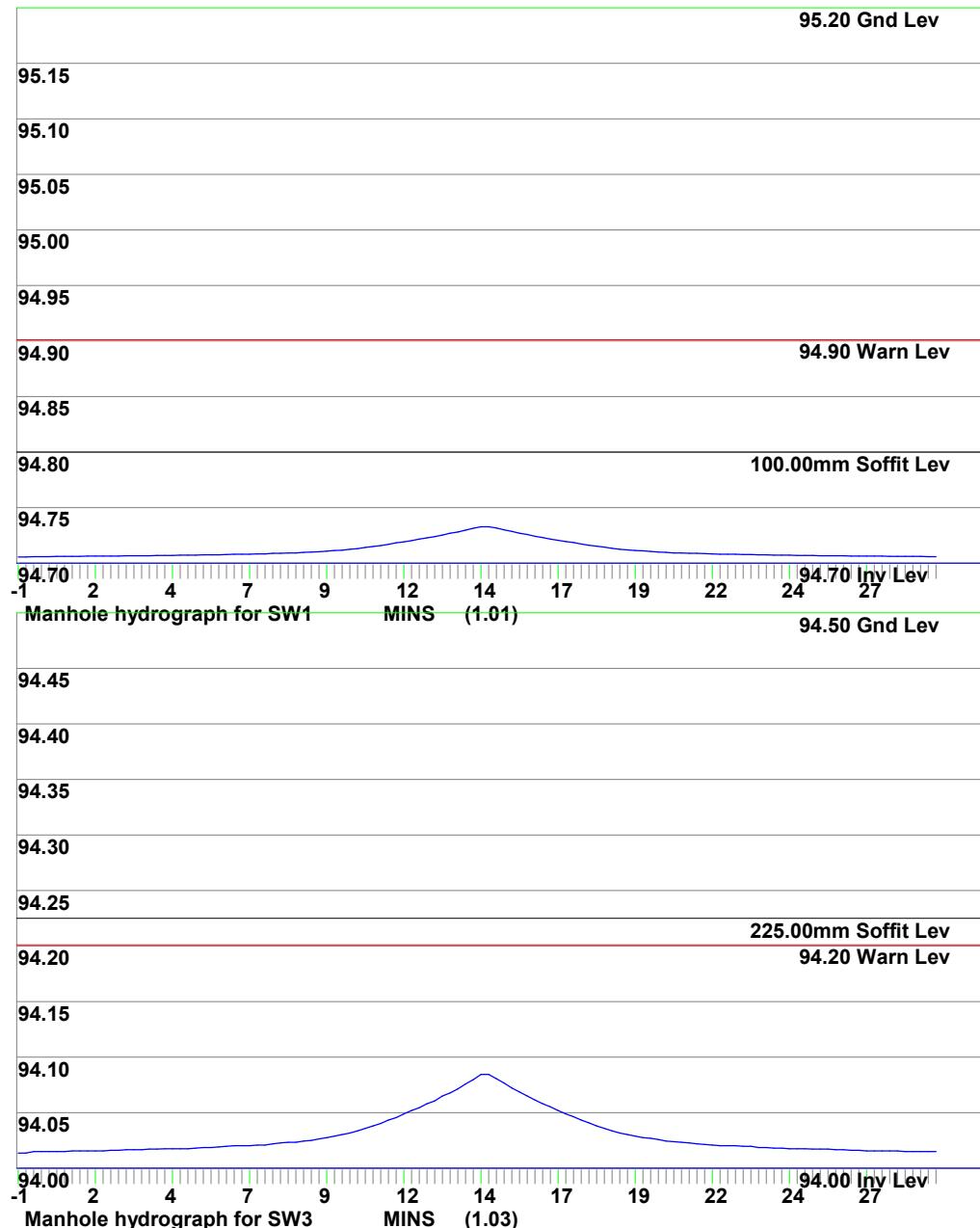
Date  
**16/07/25**

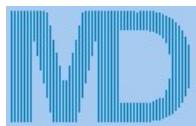
MasterDrain  
SW

Project

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

By  
**MDM**      Checked      Reviewed





**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.  
**821A**

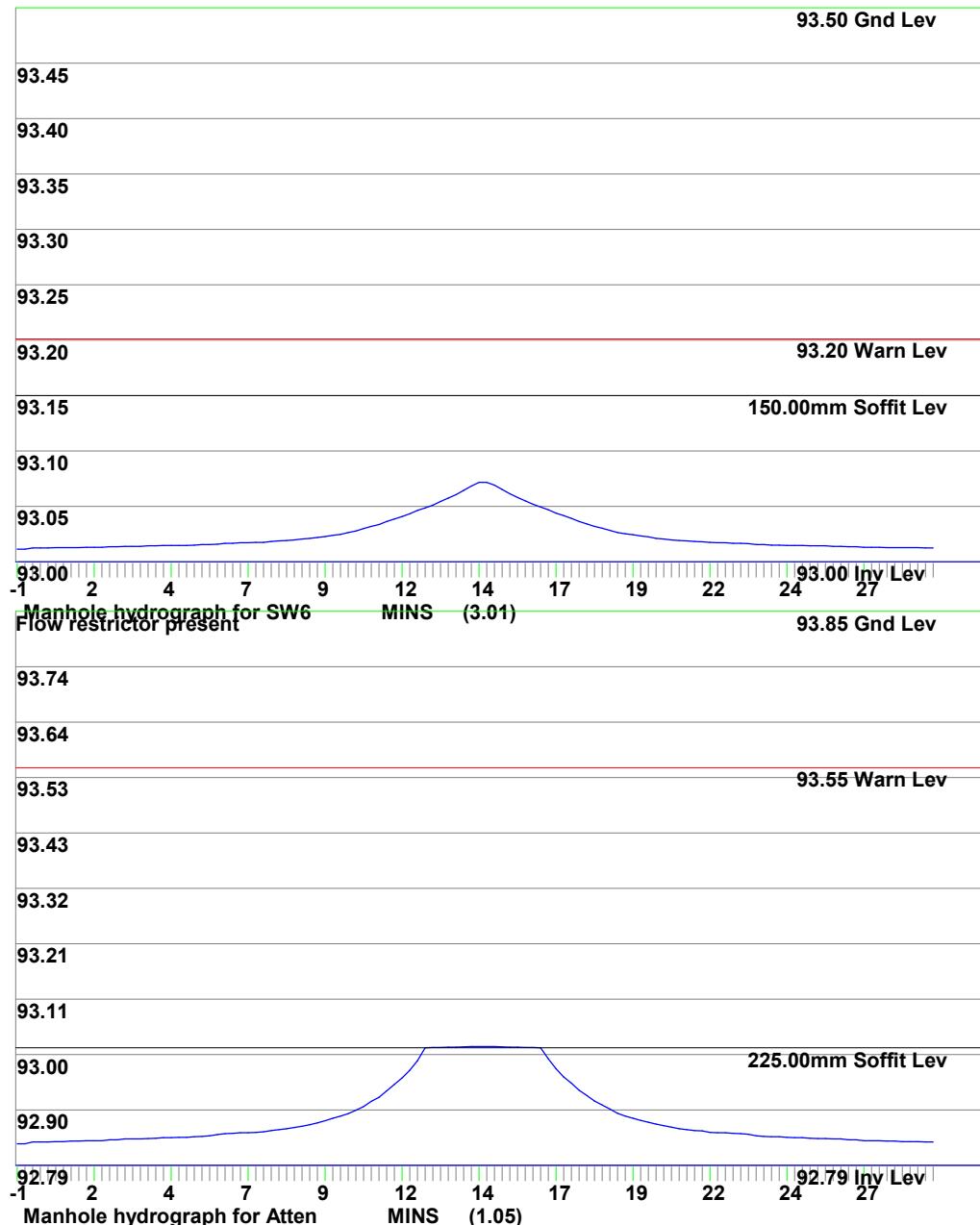
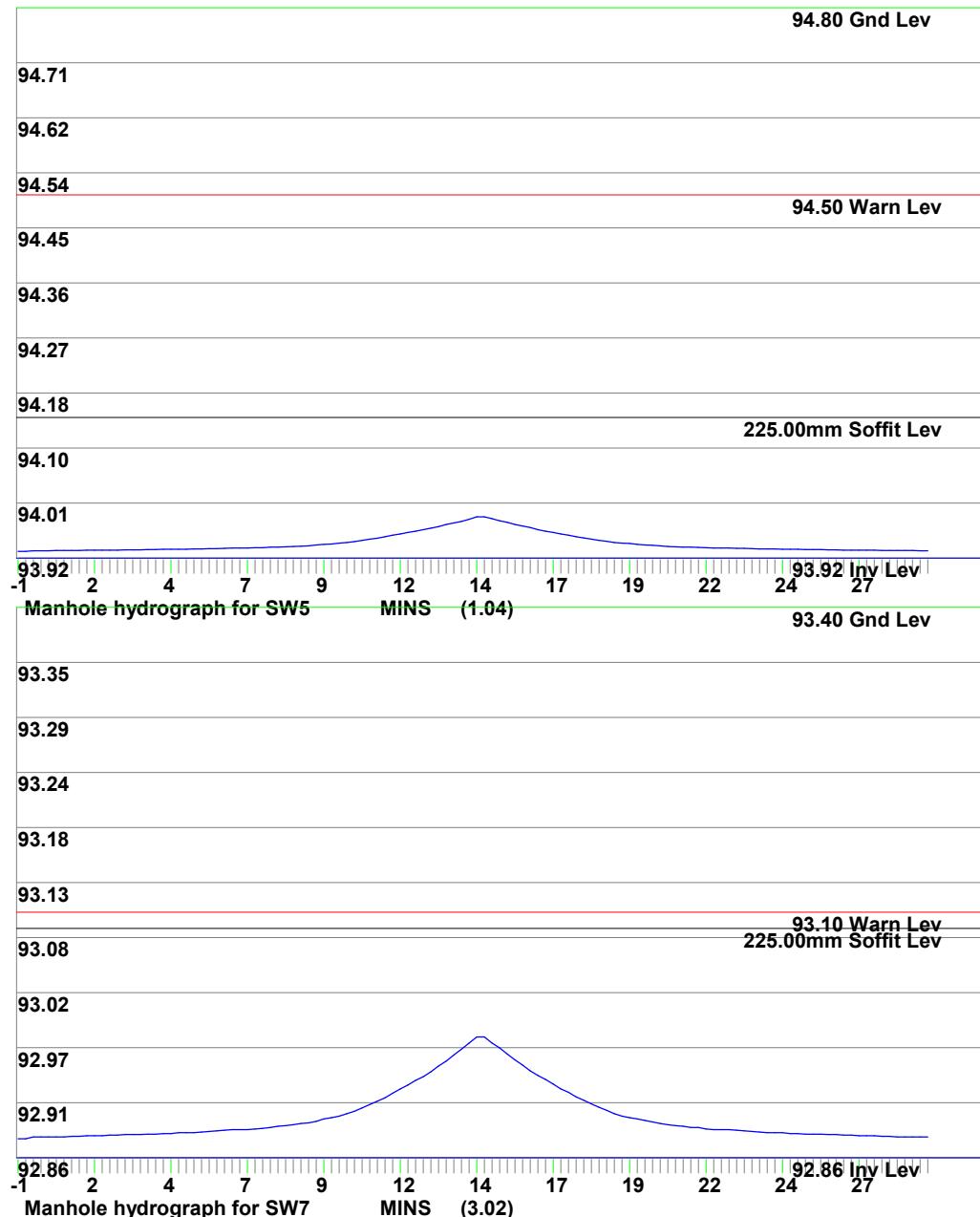
Sheet no.  
**5**

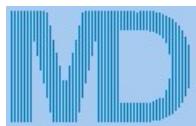
Date  
**16/07/25**

MasterDrain  
SW

Project  
Title **Surcharge calcs (Sized at 30 yrs storm) for FIRS FARM REVISED.SW CCF = 45%**

By  
**MDM**      Checked      Reviewed





**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.  
**821A**

Sheet no.  
**6**

Date  
**16/07/25**

MasterDrain  
SW

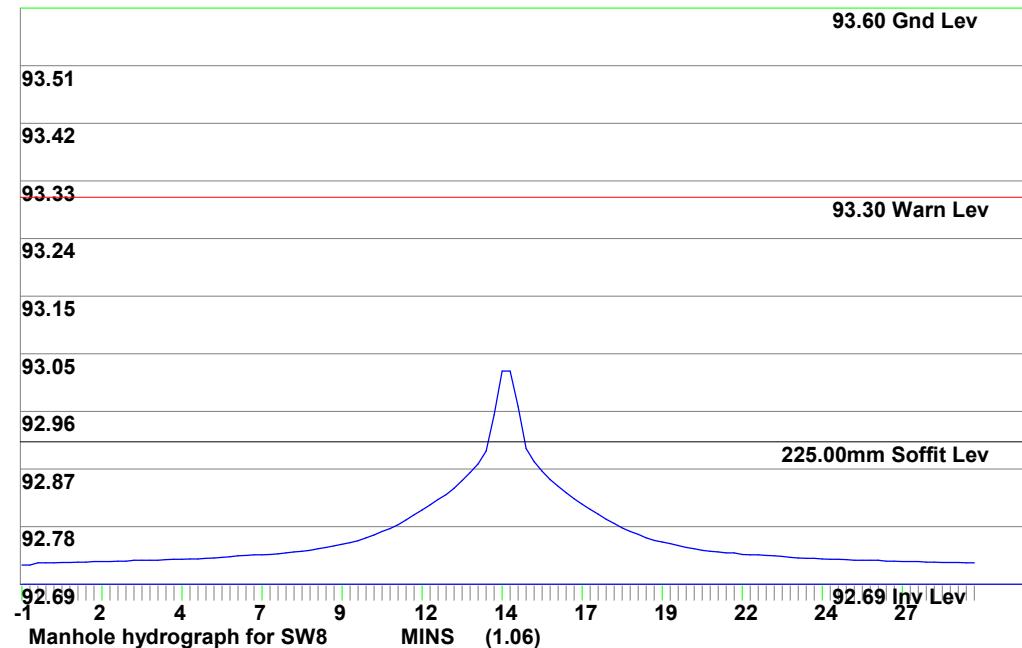
Project

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

By  
**MDM**

Checked

Reviewed





**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.  
**821A**

Sheet no.  
**1**

Date  
**16/07/25**

MasterDrain  
SW

Project														
Title	Surcharge calcs (Sized at 30 yrs storm) for FIRS FARM REVISED.SW CCF = 45%													

Free flowing outlet

Return period = 100 yrs

Climate change factor = 45

**PEAK hydrograph values printed**

Storm duration = 60 mins

No offline storage

Mean rain intens. 76.00 mm/hr

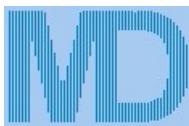
Storm profile = Summer

Using FSR data

Peak rain intens. 297.92 mm/hr

Sample period = 30.0 secs.

Entry	SECT.:	MANHOLE :	PIPE	RATE :	PIPE	CHAMBER	INVERT:	WATER :	GRND :	SURCHARGE	EXCESS	FLOODED	DRAINED	STATUS	
No.	No.:	REF	CAPACITY	FLOW :	SIZE	:DIAM/LxW	LEVEL :	LEVEL :	LEVEL :	fract.	Depth	FLOW	VOL	:AREA (m <sup>2</sup> ):	
				1/s	1/s	mm	mm	m	m			1/s	m <sup>3</sup>	:x FACTOR :	
1	I	1.01	SW1	6.7	1.2	100	450	94.70	94.72	95.20	0.18	0.02	0.00	0.000	33 OK
2	I	1.02	SW2	32.6	6.4	150	450	94.50	94.54	95.00	0.20	0.04	0.00	0.000	178 OK
3	I	1.03	SW3	54.8	11.6	225	600	94.00	94.06	94.50	0.21	0.06	0.00	0.000	322 OK
4	B	2.01	SW4	15.7	6.9	100	450	94.30	94.35	94.80	0.44	0.05	0.00	0.000	192 OK
5	I	1.04	SW5	123.1	18.5	225	900	93.92	93.97	94.80	0.15	0.05	0.00	0.000	514 OK
6	B	3.01	SW6	17.6	5.2	150	450	93.00	93.05	93.50	0.30	0.05	0.00	0.000	144 OK
7	B	3.02	SW7	31.1	10.4	225	600	92.86	92.94	93.40	0.33	0.08	0.00	0.000	289 OK
8	I	1.05	Atten†	46.2	49.3	225	16000	92.79	93.02	93.85	1.07	0.23	3.09	0.000	1367 Surch.
9	I	1.06	SW8	70.2	49.3	225	1200	92.69	92.84	93.60	0.70	0.15	0.00	0.000	1367 OK



**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.  
**821A**

Sheet no.  
**3**

Date  
**16/07/25**

MasterDrain  
SW

Project

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

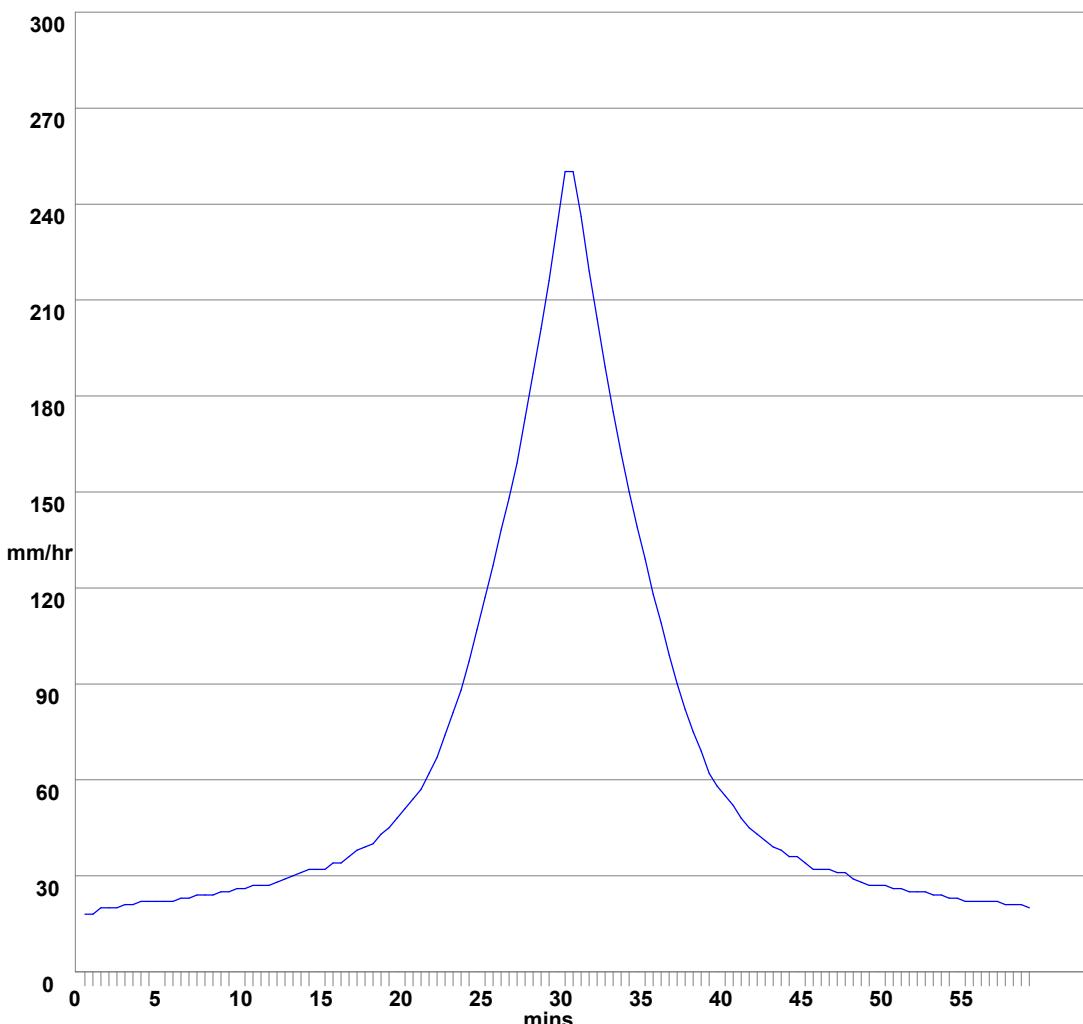
By  
**MDM**

Checked  
Reviewed

Time mins	Rain mm/hr	Time mins	Rain mm/hr	Time mins	Rain mm/hr
0:30	17.83	20:30	50.93	40:30	54.75
1:00	17.83	21:00	54.11	41:00	51.57
1:30	20.37	21:30	57.30	41:30	48.38
2:00	20.37	22:00	61.75	42:00	45.20
2:30	20.37	22:30	67.48	42:30	43.29
3:00	21.01	23:00	74.49	43:00	40.74
3:30	21.01	23:30	80.85	43:30	38.83
4:00	21.65	24:00	87.86	44:00	37.56
4:30	21.65	24:30	97.41	44:30	36.29
5:00	22.28	25:00	106.95	45:00	35.65
5:30	22.28	25:30	116.50	45:30	33.74
6:00	22.28	26:00	126.69	46:00	32.47
6:30	22.92	26:30	137.51	46:30	32.47
7:00	22.92	27:00	147.70	47:00	31.83
7:30	24.19	27:30	159.16	47:30	31.20
8:00	24.19	28:00	173.17	48:00	30.56
8:30	24.19	28:30	186.53	48:30	28.65
9:00	24.83	29:00	200.54	49:00	28.01
9:30	25.47	29:30	216.46	49:30	27.38
10:00	26.10	30:00	233.01	50:00	27.38
10:30	26.10	30:30	249.56	50:30	26.74
11:00	26.74	31:00	249.56	51:00	26.10
11:30	26.74	31:30	236.19	51:30	26.10
12:00	27.38	32:00	219.00	52:00	25.47
12:30	28.01	32:30	203.72	52:30	24.83
13:00	28.65	33:00	189.08	53:00	24.83
13:30	29.92	33:30	175.07	53:30	24.19
14:00	31.20	34:00	162.34	54:00	24.19
14:30	31.83	34:30	150.25	54:30	22.92
15:00	32.47	35:00	139.42	55:00	22.92
15:30	32.47	35:30	128.60	55:30	22.28
16:00	33.74	36:00	117.78	56:00	22.28
16:30	34.38	36:30	108.86	56:30	22.28
17:00	36.29	37:00	98.68	57:00	21.65
17:30	37.56	37:30	90.40	57:30	21.65
18:00	38.83	38:00	82.13	58:00	21.01
18:30	40.11	38:30	75.12	58:30	21.01
19:00	42.65	39:00	68.76	59:00	21.01
19:30	44.56	39:30	62.39	59:30	20.37
20:00	47.75	40:00	57.93	60:00	20.37

Hydrograph profile derived from data in the Flood Studies Report

Return period= 100 yrs Duration= 60 mins Profile - summer





**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.  
**821A**

Sheet no.  
**4**

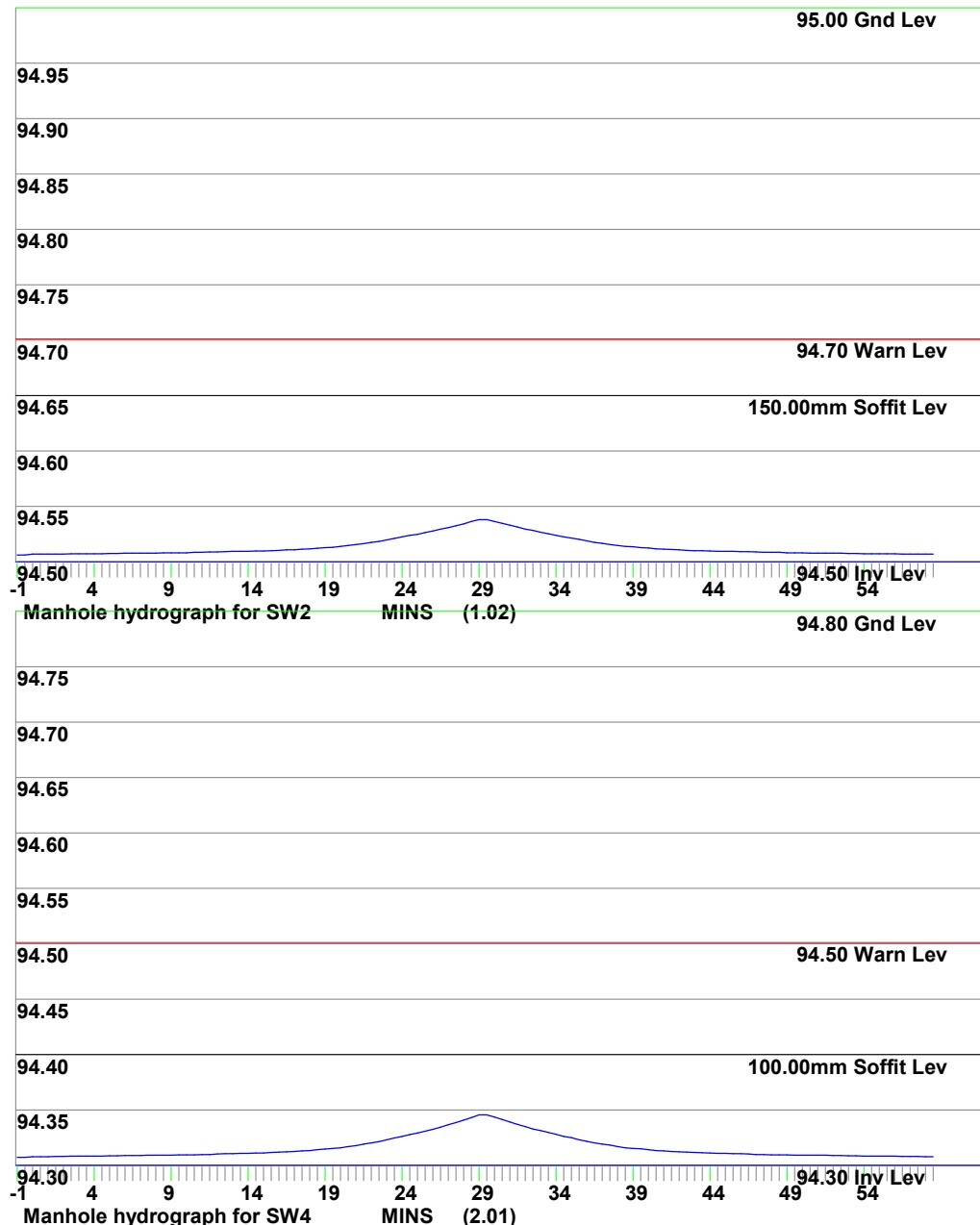
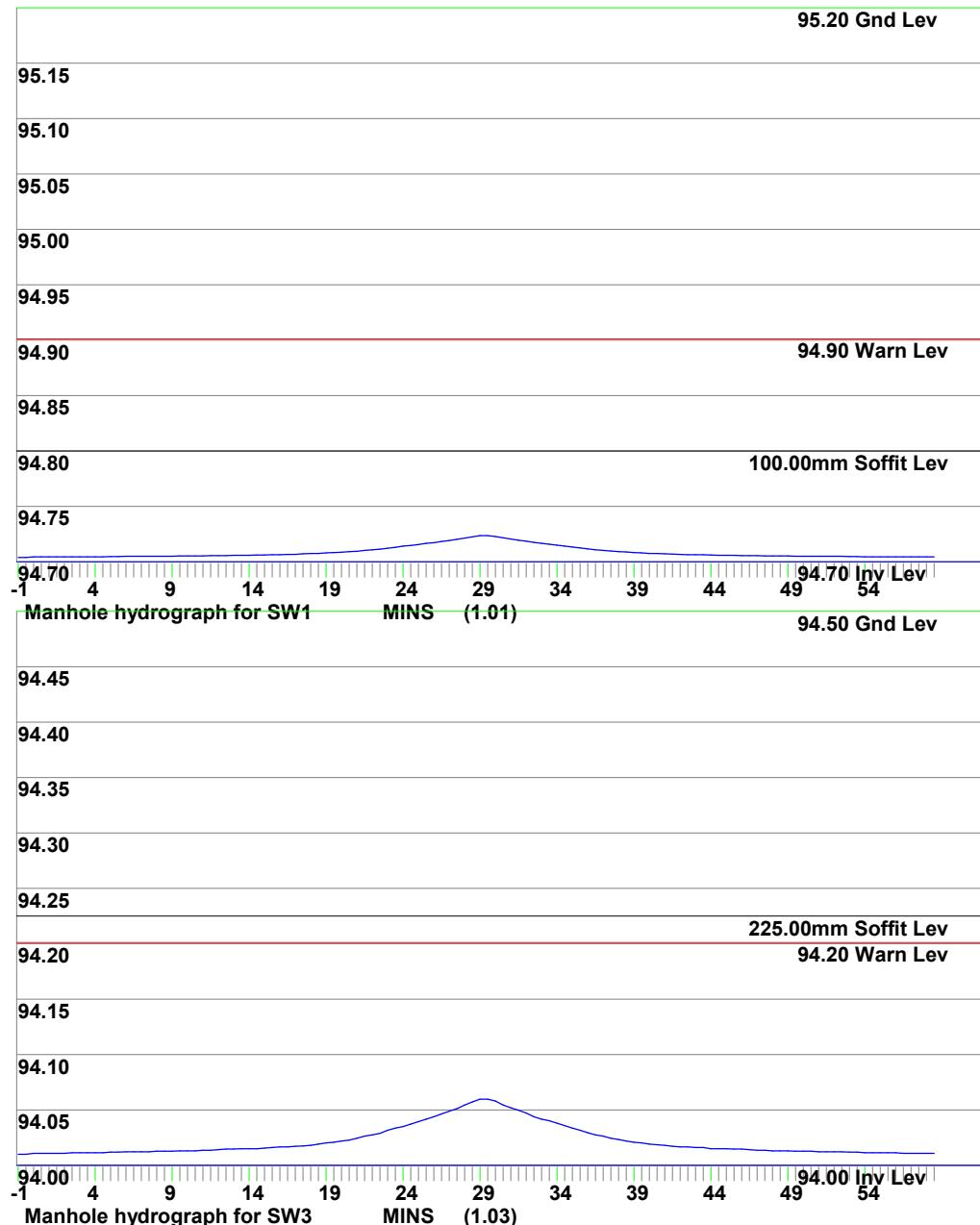
Date  
**16/07/25**

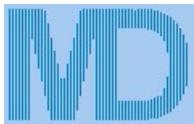
MasterDrain  
SW

Project

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

By  
**MDM**      Checked      Reviewed





**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.  
**821A**

Sheet no.  
**5**

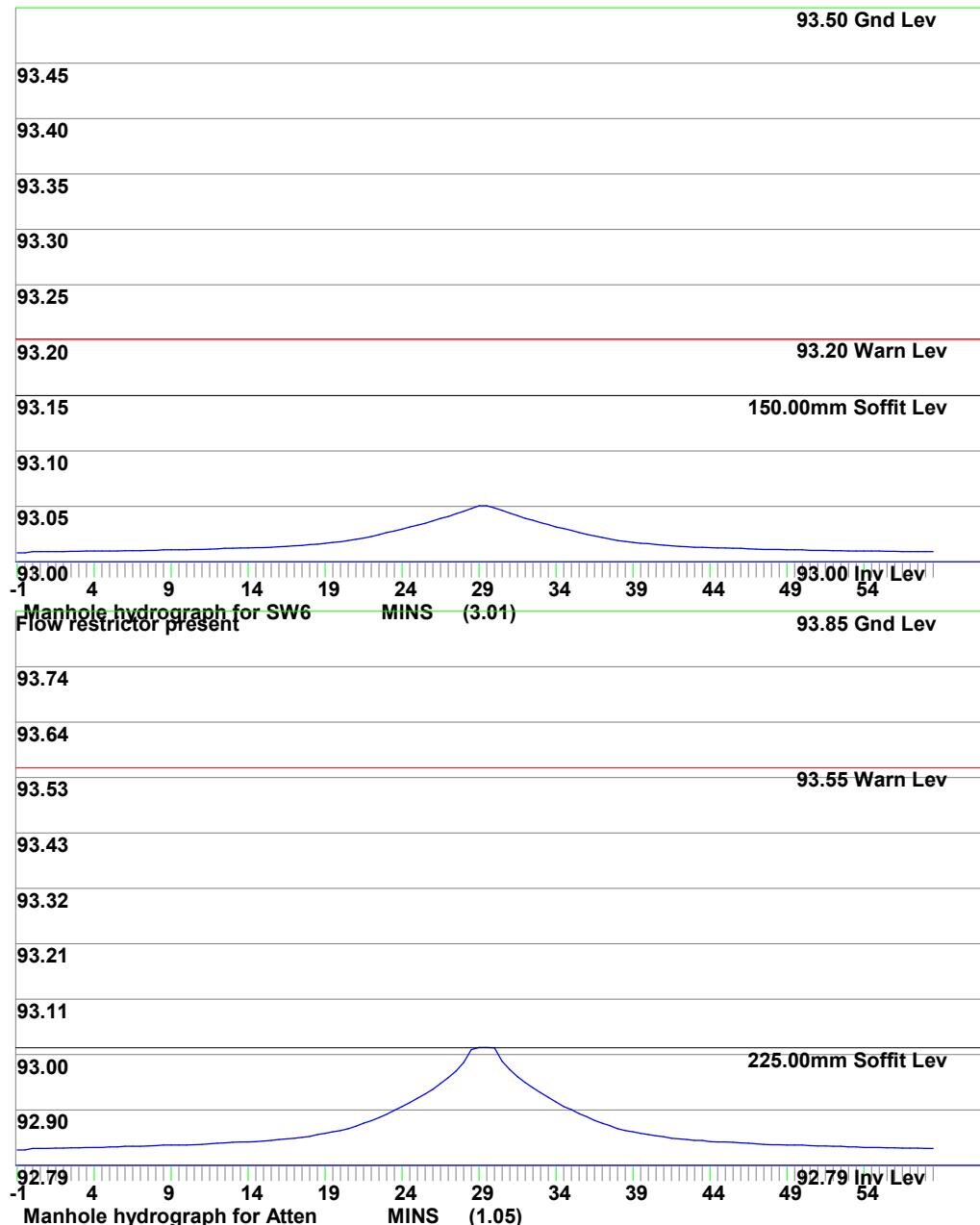
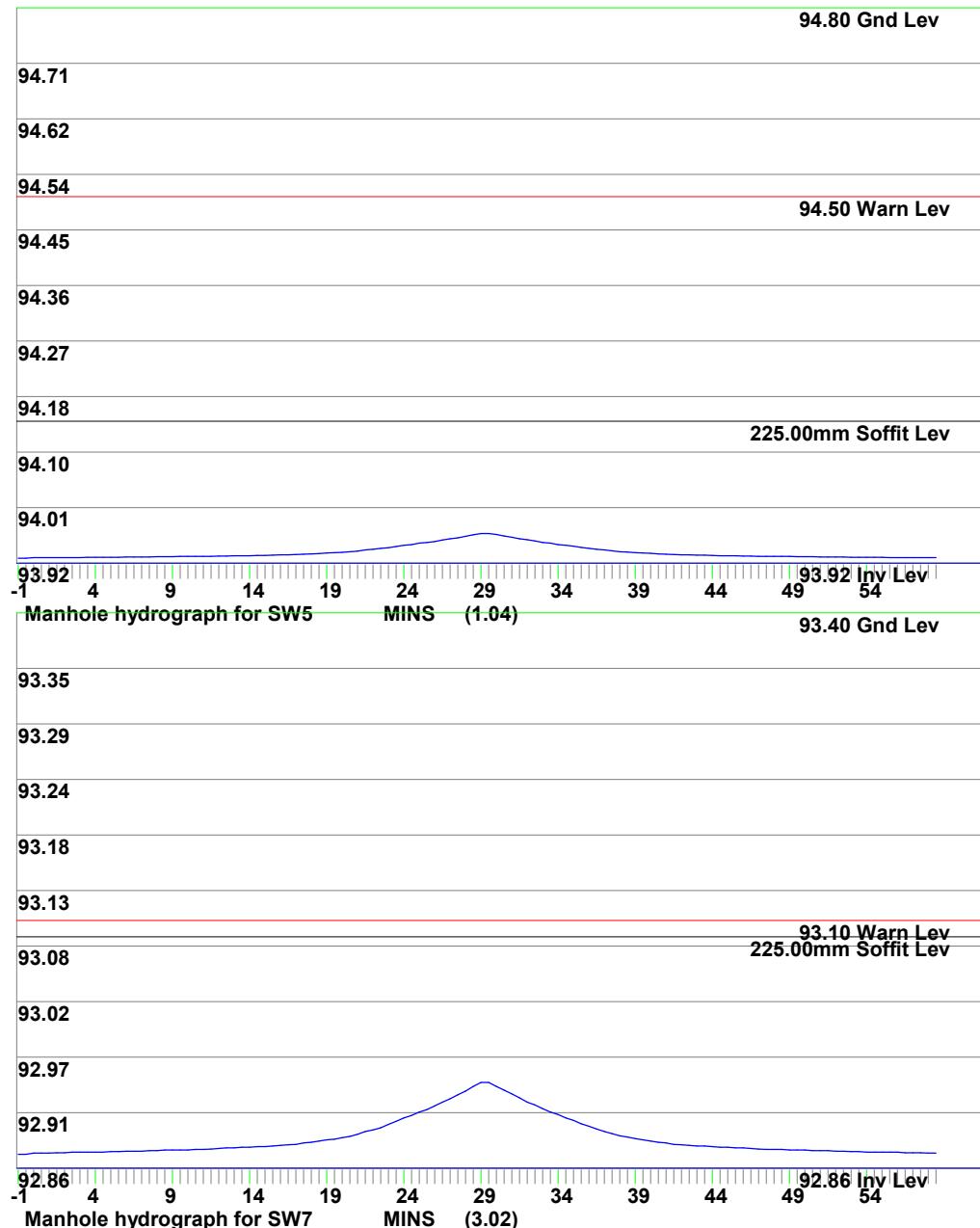
Date  
**16/07/25**

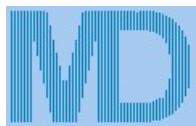
MasterDrain  
SW

Project

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

By  
**MDM**      Checked      Reviewed





**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.  
**821A**

Sheet no.  
**6**

Date  
**16/07/25**

MasterDrain  
SW

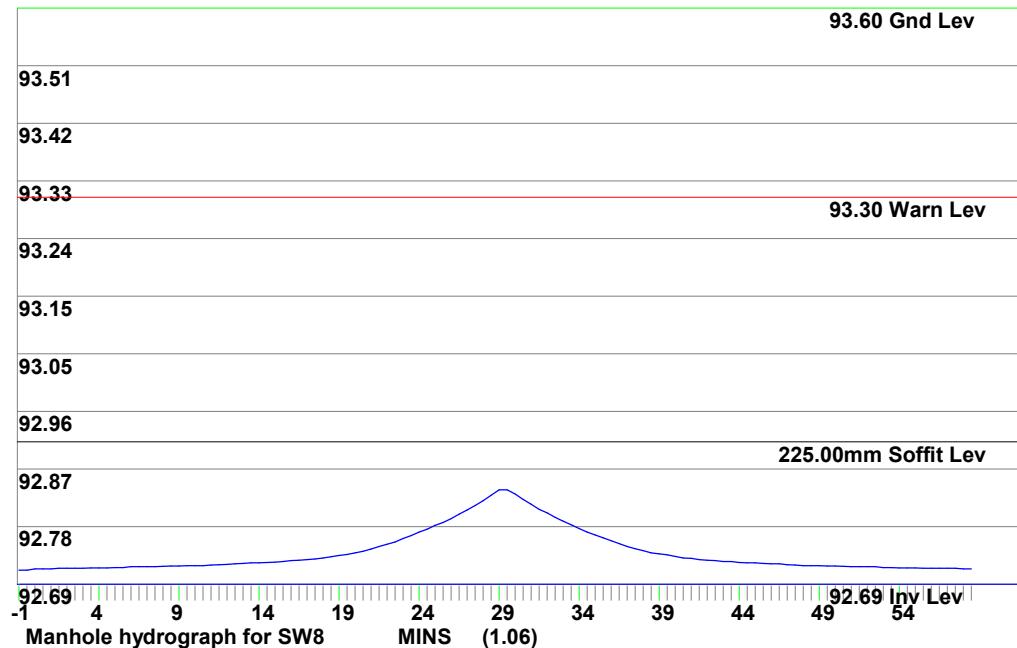
Project

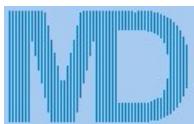
Title **Surcharge calcs (Sized at 30 yrs storm) for FIRS FARM REVISED.SW CCF = 45%**

By  
**MDM**

Checked

Reviewed





MasterDrain  
SW

**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.  
**821A**

Sheet no.

**7**

Date

**16/07/25**

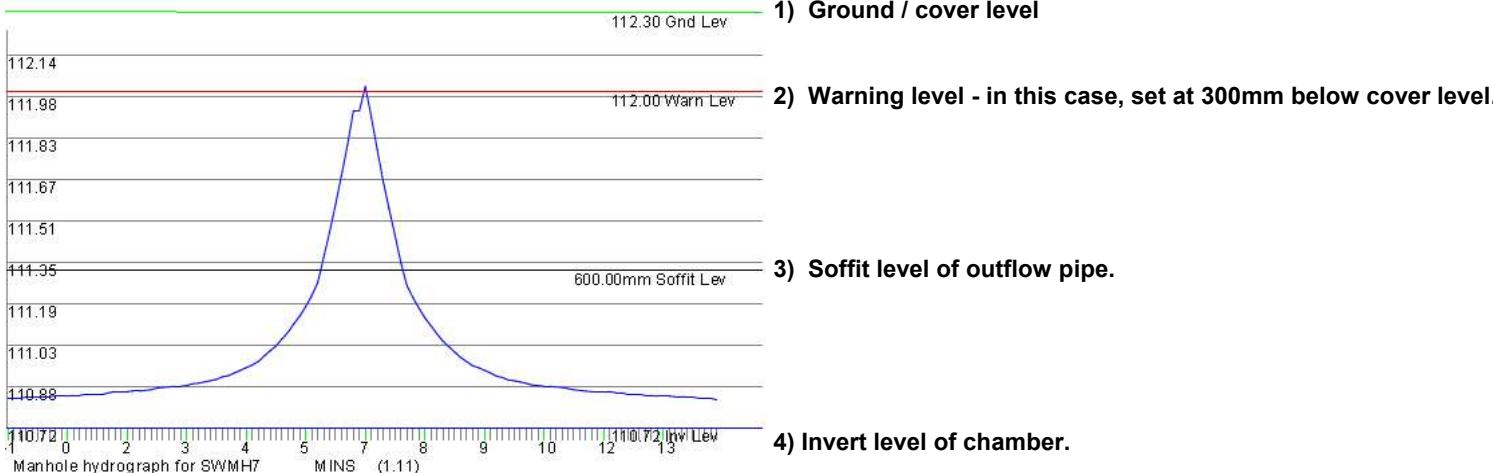
Project

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

By  
**MDM**

Checked

Reviewed



**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.



MasterDrain  
Foul 11.5

**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.  
**821A**

Sheet no.  
**0**

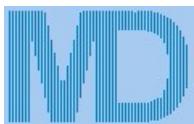
Date  
**16/07/25**

Project	Firs Farm (Revised)													By <b>MDM</b>	Checked	Reviewed
Title	Manhole printout for FIRS FARM REVISED.FL															

Manhole ref.	Form	Cham or length	diam. width	Rect. height	Chamb. height	Shaft height	MH Volume	Ent. Diam	Ent. Crown	Ent. Invert	Exit Diam	Exit Crown	Exit Invert	Chamb const	Cover Level	Dwnstr MH
F1	circ	450	N/A	0.50			0.08	Head	----	----	100	94.125	94.000	N/A	94.500	F2
F2	circ	450	N/A	0.54			0.09	100	0.000	0.000	100	93.985	93.860	N/A	94.400	F4
F3	circ	450	N/A	0.50			0.08	Head	----	----	100	93.625	93.500	N/A	94.000	F4
F4	circ	600	N/A	0.80			0.23	100	0.000	0.000	100	93.525	93.400	N/A	94.200	F7
F5	circ	450	N/A	0.50			0.08	Head	----	----	100	94.125	94.000	N/A	94.500	F7
F6	circ	450	N/A	0.50			0.08	Head	----	----	100	93.625	93.500	N/A	94.000	F7
F7	circ	600	N/A	1.20			0.34	100	0.000	0.000	100	93.325	93.200	N/A	94.400	F8
F8	circ	1200	N/A	0.83			0.94	100	0.000	0.000	100	92.995	92.870	N/A	93.700	F9

All manholes to be as per 'Sewers for Adoption'

Levels calculated for level invert



MasterDrain  
Foul 11.5

<b>Environmental Assessment Services Ltd</b> <a href="http://www.easltd.co.uk">http://www.easltd.co.uk</a>		London Rd, Hickstead Haywards Heath, West Sussex, RH17 5LZ Tel: 01444 882552 email: info@easltd.co.uk	Job No. <b>821A</b>
Project <b>Firs Farm (Revised</b>		Sheet no. <b>0</b>	
Title <b>Manhole printout for FIRS FARM REVISED.FL</b>		Date <b>16/07/25</b>	
By <b>MDM</b>	Checked	Reviewed	

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

---

APPENDIX E:  
PHOTOGRAPHS



Photo 1: Test Hole 1.



Photo 2: Test Hole 2.

## APPENDIX F

### **Southern Water Sewer Plan**



(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122

Data updated: 20/05/25

Scale: 1:1250

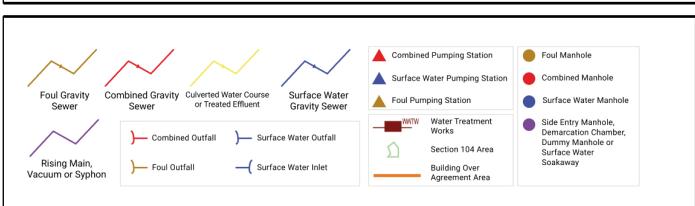
Map Centre: 533429, 139134

Date: 27/06/25

Our Ref: 1810373 - 1

Wastewater Plan A4

Powered by digdat



malcolm@easlt.co.uk
Firs Farm



The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



## APPENDIX G

### **MSDC Flood & Drainage Checklist**

## Flood Risk and Drainage Information Check List – Application Stage

This checklist is designed to support applicants within the planning process provide the information required by the flood risk and drainage team for them to provide a consultation response. This is not the complete planning validation list, however much of the information is also included with the validation list.

The level of detail provided to address each information point should reflect the scale and complexity of the development.

Receipt of this information does not guarantee the flood risk and drainage team will support an application or does it prevent a request for further information. It does, however, ensure the team has sufficient information to undertake a full review and provide detailed consultation response.

**Table 1 - Application details**

Application number	DM/25/0708
Site address	Firs Farm RH10 3LF
Site co-ordinates	TQ 3342 3907
Site area in hectares	0.437
Existing site usage	Farm yard (disused)
Proposed development description	Residential
Block plan	Figures 1 & 2
Existing site plan	Figure 2
Proposed development plan	Figure 3

**Table 2 - Flood Risk**

Flood zone(s)	1
Surface water flood risk(s)	Very low
Flood risk assessment provided	Yes

The Environment Agency and the Department for Environment, Food and Rural Affairs (DEFRA) states that a Flood Risk Assessment is required for all development:

- within flood zones 2, 3 or 3b
- within flood zone 1 with a site area of 1 hectare or more
- within areas with critical drainage problems
- within flood zone 1 where your LPA's SFRA shows it will be at risk of flooding from rivers or the sea in future
- that increases the vulnerability classification and is in flood zone 1 where your LPA's SFRA shows it is at risk from other sources of flooding

Mid Sussex District Council's Strategic Flood Risk Assessment (SFRA) utilises the latest flood maps from the Environment Agency to determine flood risk.

## Surface Water Drainage

At application stage the applicant must show that surface water drainage can, in principle be achieved on the site. The minimum information required is shown in Table 3.

If an applicant wishes to avoid a drainage condition, then full detailed drainage design is required at application stage. Details of the information needed for a detailed drainage design are set out in the Discharge of Conditions checklist.

**Table 3 - Surface water drainage - minimum information**

Proposed means of drainage	Attenuation storage
Infiltration potential on site	Minimal - zero
Drainage constraints plan <i>(showing any areas drainage cannot be located such as root protection zones, main sewer buffers etc)</i>	Figure 5
Acknowledgement of design criteria <i>(sized to cater for 1 in 100-year plus climate change storm, any off-site discharge restricted to the Greenfield QBar rate for all events up to and including the 1 in 100-year plus climate change storm)</i>	1 in 100 year return period storm + 45% climate change allowance
Water Authority's agreement in principle to connect surface water to public sewer. <i>(if applicable)</i>	N/A
Drainage strategy plan	Figure 4

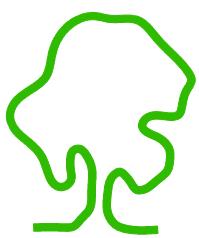
## Foul Water Drainage

At application stage the applicant must show that foul water drainage can, in principle be achieved on the site.

If an applicant wishes to avoid a drainage condition, then full detailed drainage design is required at application stage. Details of the information needed for a detailed drainage design are set out in the Discharge of Conditions checklist.

**Table 4 - Foul water drainage - minimum information**

Proposed means of drainage	Public foul sewer
Public sewer records plan	Appendix F
Drainage constraints plan <i>(showing any areas drainage cannot be located such as root protection zones, main sewer buffers etc)</i>	Figure 5
Drainage strategy plan	Figure 4
Outline on how non-mains drainage will meet Environment Agency's General Binding Rules for non-mains drainage. <i>(if applicable)</i>	N/A



**eas ltd**

**Environmental Assessment Services Ltd**

Unit 4B, The Courtyard, Holmsted Farm, Staplefield Road, Cuckfield,  
West Sussex, RH17 5JT

Phone : +44 (0) 1444 882552

web site : [www.easlt.co.uk](http://www.easlt.co.uk)

email : [info@easlt.co.uk](mailto:info@easlt.co.uk)