**PROW PLANNING**

**PENTLAND**



NEW HALL LANE, SMALL DOLE, WEST SUSSEX, BN5 9YH

# Drainage Strategy

March 2024

eas ltd
Environmental Assessment Services Ltd

# REPORT DATA SHEET

| **Requirement** | **Data** |
|---|---|
| Report Reference | 683/PRowePlanning/Pentland/Drainage |
| Date | March 2024 |
| Client | Mayoss & Co Builders Ltd |
| Report type | Drainage Strategy |
| Purpose | Planning |
| Revisions | - |
| Prepared by | Xanthe Lyford BSc (Hons)<br> |
| Approved by | Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MCIWEM, MIEnvSc<br> |

# MAYOSS & CO BUILDERS LTD

PENTLAND, NEW HALL LANE, SMALL DOLE, HENFIELD, BN5 9YH

## Drainage Strategy

March 2024

**CONTENTS**

1. BACKGROUND, EXISTING SITE & PROPOSED DEVELOPMENT

2. FLOOD RISK ASSESSMENT

3. EXISTING SITE DRAINAGE

4. PROPOSED SITE DRAINAGE

5. DRAINAGE DESIGN

6. FOUL DRAINAGE

7. OPERATION & MAINTENANCE OF THE SYSTEM

8. SUMMARY & CONCLUSIONS

APPENDIX A: FIGURES AND DRAWINGS

Figure 1: Site Location
Figure 2: Site as Existing
Figure 3: Proposed Development
Figure 4: Suggested Drainage Design
Figure 5: Permeable Paving Detail
Figure 6: Location of Percolation Testing
Figure 7: Site Photographs
Figure 8: Southern Water Sewer Maps

APPENDIX B: FLOOD RISK DATA

APPENDIX C: H R WALLINGFORD GREENFIELD FLOW

APPENDIX D: OUTPUT FROM DRAINAGE DESIGN SOFTWARE

# MAYOSS & CO BUILDERS LTD

PENTLAND, NEW HALL LANE, SMALL DOLE, HENFIELD, BN5 9YH

## Drainage Strategy

March 2024

## 1. BACKGROUND, EXISTING SITE & PROPOSED DEVELOPMENT

1.1 The site currently comprises an area of lawn adjacent to the main house at Pentland (which is to remain). At the time of the visit the proposed building was already under construction. The rest of the site is laid to grass with an unsurfaced track leading from the parking area associated with the main house to the proposed development. The site lies off an unadopted road within the village of Small Dole, with residential properties to either side. The total site area is approximately 0.06 ha. The Ordnance Survey (OS) map reference for the centre of the site is TQ 21184 13308. The site elevation is approximately +14 m OD. The site elevation falls slightly to the north. See Figure 1 for the site location and Figure 2 for the existing site layout.

1.2 According to the British Geological Survey (BGS), the site lies on Lower Greensand Group – Sandstone, Silty Over Sedimentary bedrock. The site lies on a Principal bedrock aquifer and a Secondary A superficial drift aquifer. It lies in a medium - high groundwater vulnerability area. The site does not lie within a groundwater Source Protection Zone.

1.3 It is proposed to redevelop the site by constructing a two-storey, three-bedroom dwelling within the southwest corner of the garden of the existing property. See Figure 3 for the proposed development.

1.4 The proposed redevelopment will require both surface water and foul drainage. The development will introduce new impermeable areas and it will be necessary to incorporate Sustainable Drainage System (SuDS) measures to ensure that surface water leaving the site does not exceed the Greenfield flow rate. Foul water from the proposed development will be drained to the existing Southern Water public foul sewer, via an existing manhole on the site of the main house, adjacent to the boundary hedge with New Hall Lane. This report provides an evaluation of the SuDS options available in respect of the site and an outline strategy for drainage of foul and surface water arising from the proposed development.

## 2. FLOOD RISK ASSESSMENT

2.1 The site lies in Flood Zone 1, at low risk of flooding from fluvial sources. This means that in any year the location has a less than 0.1% chance of flooding from rivers or the sea. See Appendix B for the Environment Agency Flood maps.

2.2 The site is shown to be at low - very low risk of surface water flooding.

© Environmental Assessment Services Limited

2.3 The site is not at risk of flooding from reservoirs and there do not appear to be any other significant flood risks affecting the site.

2.4 As the site lies within Flood Zone 1, is less than 1 ha in area and is not likely to be affected by any alternative sources of flooding, there would not be a planning requirement for a site-specific Flood Risk Assessment. The Sequential Test will be satisfied for a location in Flood Zone 1. There are no specific flood related risks to buildings or proposed occupants and dry access and egress is available on to the nearby A2037 Henfield Road.

2.5 The environment agency requires that surface water drainage from the proposed development should avoid increasing flood risk downstream.

## 3. EXISTING SITE DRAINAGE

3.1 The site was visited on Thursday 15 March 2024. The main house (adjacent to the site) is understood to drain surface water to a soakaway. Otherwise, surface water runoff drains directly into the ground or across the surface into the ditch that runs to the south of the site along New Hall Lane. The site is presently laid to grass and drains as greenfield.

3.2 The existing house foul sewage drains to the Southern Water public foul sewer, and it is proposed to drain the foul sewage from the new development into the existing main sewer connection via the existing manhole situated close to the site entrance on the site of the main house. At the time of the visit the connection to the main sewer for the proposed new house was complete. See Figure 7 for photographs of the connection to the Southern Water public foul sewer and Figure 8 for the Southern Water public foul sewer map.

3.3 The Greenfield runoff rate for the site has been calculated using the UK SuDS tools (See Appendix C). The results are summarised in Table 3.1 below:

TABLE 3.1
GREENFIELD RUNOFF RATES

| Return period | Flow rates (l/s) |
|---|---|
| Qbar | 0.06 |
| 1 in 1 year | 0.51 |
| 1 in 30 year | 1.38 |
| 1 in 100 year | 1.91 |
| 1 in 200 year | 2.24 |

3.4 The maximum discharge permitted to leave the site from the drained area, post development, should not exceed Qbar (0.06 l/s). The foul sewage should also be allowed for in the permitted off-site discharge flow rate. The foul sewage design flow from the proposed redevelopment has been estimated at 0.046 l/s (based on the Sewers for Adoption recommendations for a single residence).

© Environmental Assessment Services Limited

# 4. PROPOSED SITE DRAINAGE

4.1 Surface water drainage is required for the proposed dwelling and associated parking area.

4.2 The proposed development of the site will require the installation of a new drainage system. In line with current local planning authority policy, new development should seek to incorporate Sustainable Drainage Systems (SuDS).

4.3 Horsham District Council requires that the drainage design of the developed site should retain onsite flows up to the 1 in 100-year return period event, including a 45% allowance for climate change.

## 4.4 Drainage to Soakaway

4.4.1 Drainage to soakaway (infiltration) is the preferred solution in the SuDS hierarchy. Soakaway drainage is likely to be suitable in this case due to the high permeability of the Lower Greensand Group substrate and the current use of a soakaway to drain surface water from the existing house. In order to calculate the permeability of the site and the suitability of drainage to soakaway, percolation testing was carried out on 21 March 2024. The results are shown below.

## 4.5 Percolation Testing Results

4.5.1 Percolation testing was carried out at the site on 21 March 2024. A test pit was excavated more than 5 m from the edge of the proposed dwelling and filled with water. The percolation testing was carried out in accordance with the recommendations of BRE Digest 365.

4.5.2 The percolation testing revealed an infiltration rate of (*f*) of 3.54 x $10^{-6}$ m/s for the site. This is just within the range for a practicable soakaway and indicated that drainage of excess surface water (after rainwater harvesting) to soakaway is the preferred solution.

4.5.3 Drainage to soakaway will also ensure that there will be no discharge from the site up to 5mm of rainfall (as required in current guidance).

4.5.4 It is proposed to provide a soakaway for the proposed dwelling. The soakaway size has been calculated based on the apparent impermeable area of 122.9 $m^2$ for the dwellings using the MasterDrain model. Soakaways have been designed for the 1 in 100 return period event plus a 45% allowance for climate change and a factor of safety of 2. This would give a soakaway size of 6 m x 5 m x 0.4 m deep (assuming a “milk crate” or AquaCell type construction). The soakaway inlet chamber will incorporate a silt trap. The soakaway to be provided, a high-level overflow to the nearby drainage ditch. See Appendix A Figure 4 for the drainage Design and Appendix D for the output from the Drainage Software.

## 4.6 Attenuation Storage

4.6.1 The alternative to drainage to soakaway would be attenuation storage, where surface water flows exceeding Qbar, are stored and only released at a rate limited to the equivalent Greenfield flow for the site (0.06 l/s). Flow control could be achieved using an orifice plate or a vortex valve. As drainage to soakaway has been proved to be practicable and thus the preferred surface water drainage strategy, this alternative was not investigated further.

## 4.7 **Foul Sewerage**

4.7.1 Foul sewage from the proposed development will be drained to an existing foul sewer chamber to the east of the site, which is connected to the Southern Water public foul sewer in New Hall Lane. The sewer connection was already in place at the time of the site visit, and it is understood that this has passed inspection by Building Control.

# 5. DRAINAGE DESIGN

## 5.1 **Design Philosophy**

5.1.1 The proposed dwelling design uses water from rainwater harvesting for toilet flushing. The rainwater from the roof and gullies of the dwelling is collected and stored in a subterranean tank for use as grey water for household amenities. At the time of visit the harvest storage tank (7500l capacity) was already in place. See Figure 7 for the photographs of the rainwater storage tank. The overflow from this tank will flow into the soakaway located greater than 5 m from the edge of the building. The preferred sustainable drainage strategy for the excess surface water is drainage to soakaway.

## 5.2 **Design Storm**

5.2.1 The surface water drainage system has been designed for the 30-year return period event plus 40% climate change allowance and tested for surcharge for the 1 in 100-year return period event (1% Annual Exceedance Probability) plus a 45% allowance for climate change.

## 5.3 **Hydrological Data**

5.3.1 Hydrological data for the site used in the Drainage Software model (MasterDrain) is given in Appendix D.

## 5.4 **Design Layout**

5.4.1 A suggested drainage arrangement is shown in Figure 4 in Appendix A.

## 5.5 **Other SuDS Options**

5.5.1 The principal SuDS option, which will limit the volume of surface water runoff, will be rainwater harvesting used for toilet flushing. However, the design storm may occur when the tank is full, and all flow will discharge through the overflow.

5.5.2 Other SuDS options will include permeable paving laid over drainage blankets in the parking and driveway areas and/or a raingarden in the planted areas. See Figure 5 for permeable paving details.

5.6 **Extreme Event**

5.6.1 An extreme event, which overwhelmed the drainage system, would result in water following the existing drainage pattern for the area and flowing across ground to the drainage ditches at the southern or northeastern boundaries of the site.

6. FOUL DRAINAGE

6.1 The proposed development will require foul drainage (see Section 4.7.1 above).

6.2 The only permissible option where a public foul sewer is available within a reasonable distance of the site, is to connect into it. In this case, there is a public foul sewer within practicable reach of the site in New Hall Lane to which the existing house (Pentland) presently drains via a chamber at the boundary with the road to the east of the site. At the time of visit the foul sewage connection was already complete. See Figure 7 for the photographs of the foul sewer connection and manhole.

6.3 The foul drainage arrangement, is shown in Figure 4 Appendix A, it has been modelled using the MasterDrain model, see Appendix D for the MasterDrain data and Figure 8 for the Southern Water Sewer Maps.

7. OPERATION & MAINTENANCE OF THE SYSTEM

7.1 The surface water drainage system should require minimal operational input once construction has been completed. However, it will require regular maintenance.

7.2 Items requiring maintenance will include:

- Gullies, strip drains and channels.
- Chambers.
- Permeable paving.
- Silt trap.

8. SUMMARY & CONCLUSIONS

8.1 According to the Environment Agency flood mapping, the site lies within Flood Zone 1, at low risk of flooding from fluvial sources. The surface water flood risk mapping shows the site to be at low risk of surface water flooding. The site is not at risk of flooding from reservoirs.

8.2 The site lies on Lower Greensand Group – Sandstone and silt over sedimentary bedrock. The results of the percolation testing showed an infiltration rate within the range acceptable for drainage to soakaway.

© Environmental Assessment Services Limited

8.3 Drainage to soakaway is the chosen strategy for the disposal of surface water. The amount of surface water leaving the site will tend to be reduced by the inclusion of a rainwater harvesting system in the design. Other SuDS recommended methods of reducing surface water include permeable paving for the areas of hardstanding and/or a raingarden.

8.4 The proposed development will require foul sewerage. There is a public foul sewer operated by Southern Water within a practicable distance of the site in New Hall Lane and the existing house is already connected to it. Therefore, connection to the public foul sewer is the preferred strategy for the disposal of foul sewage.

☆ ☆ ☆ ☆ ☆ ☆ ☆

© Environmental Assessment Services Limited

# APPENDIX A

Figure 1: Site Location
Figure 2: Site as Existing
Figure 3: Proposed Development
Figure 4: Suggested Drainage Arrangement
Figure 5: Permeable Paving Details
Figure 6: Percolation Testing Locations
Figure 7: Site Photographs
Figure 8: Southern Water Sewer Maps

Figure 1: Site Location

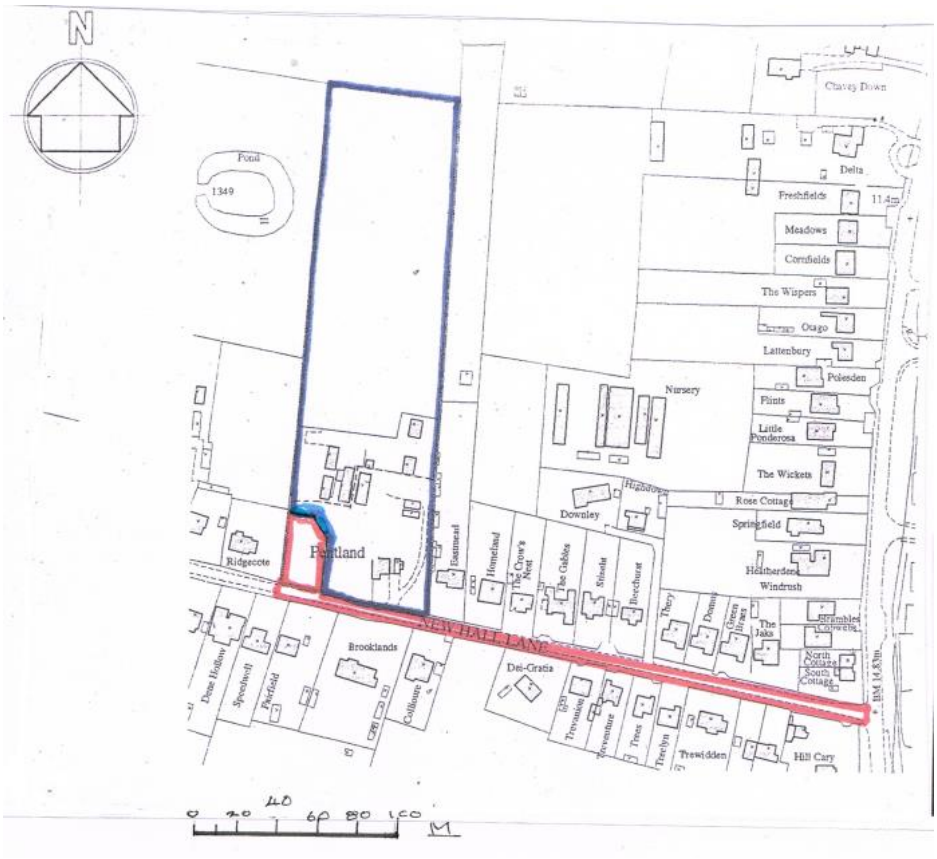
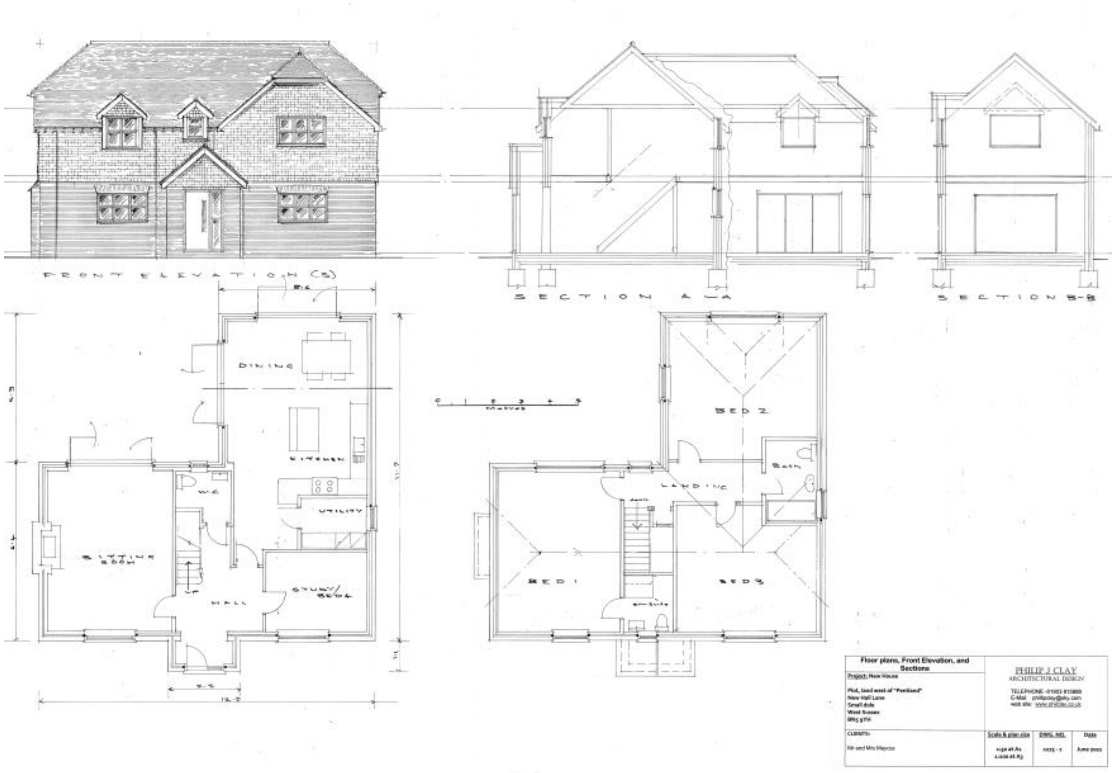
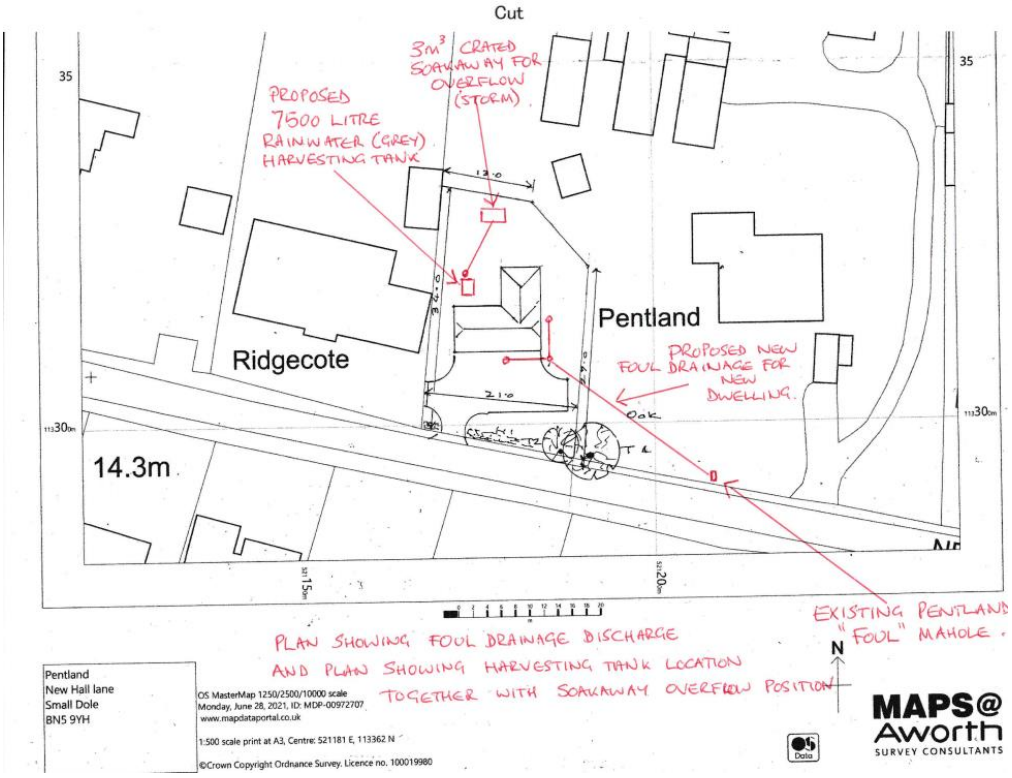



Figure 2: Site as Existing



Figure 3: Proposed Development



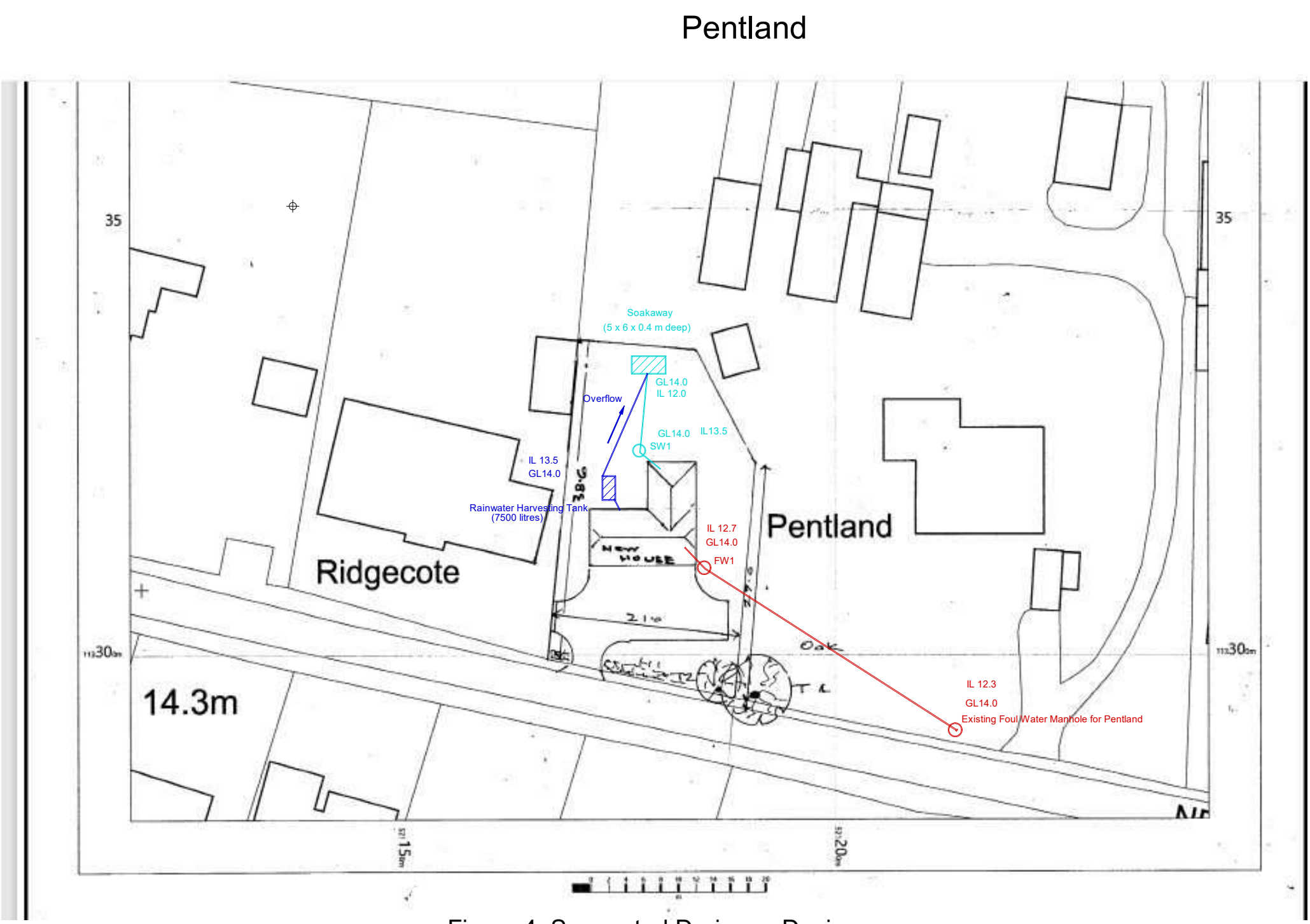



Figure 4: Suggested Drainage Design

Figure 5: Permeable Paving Design

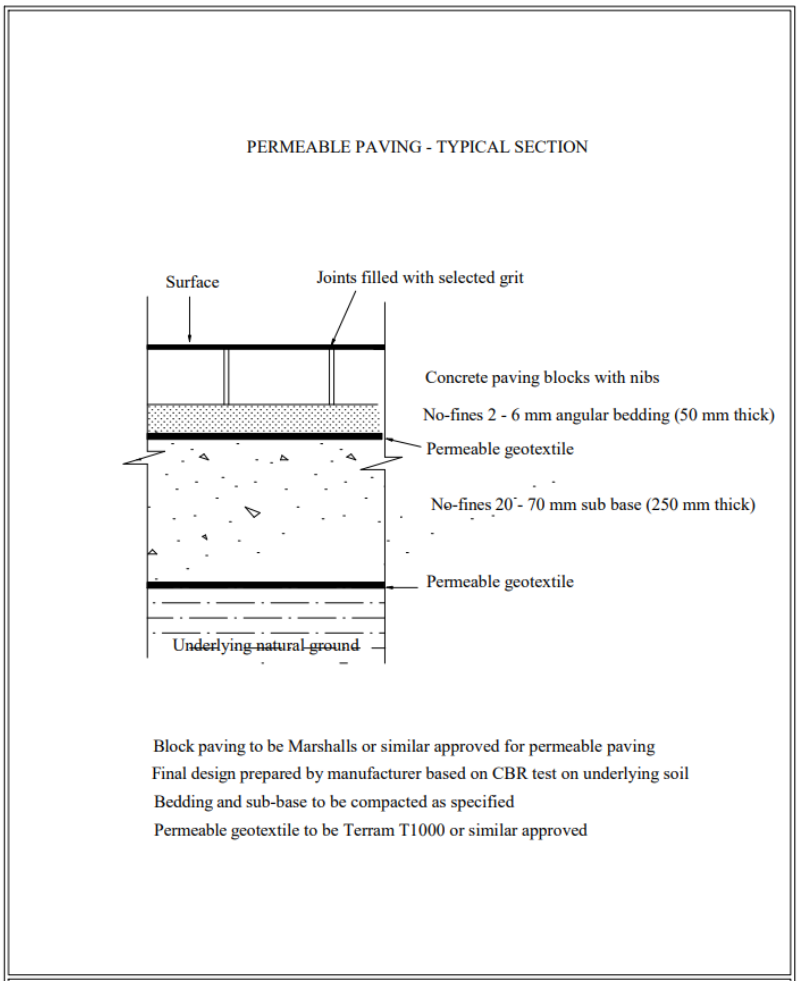


Figure 6: Percolation testing location

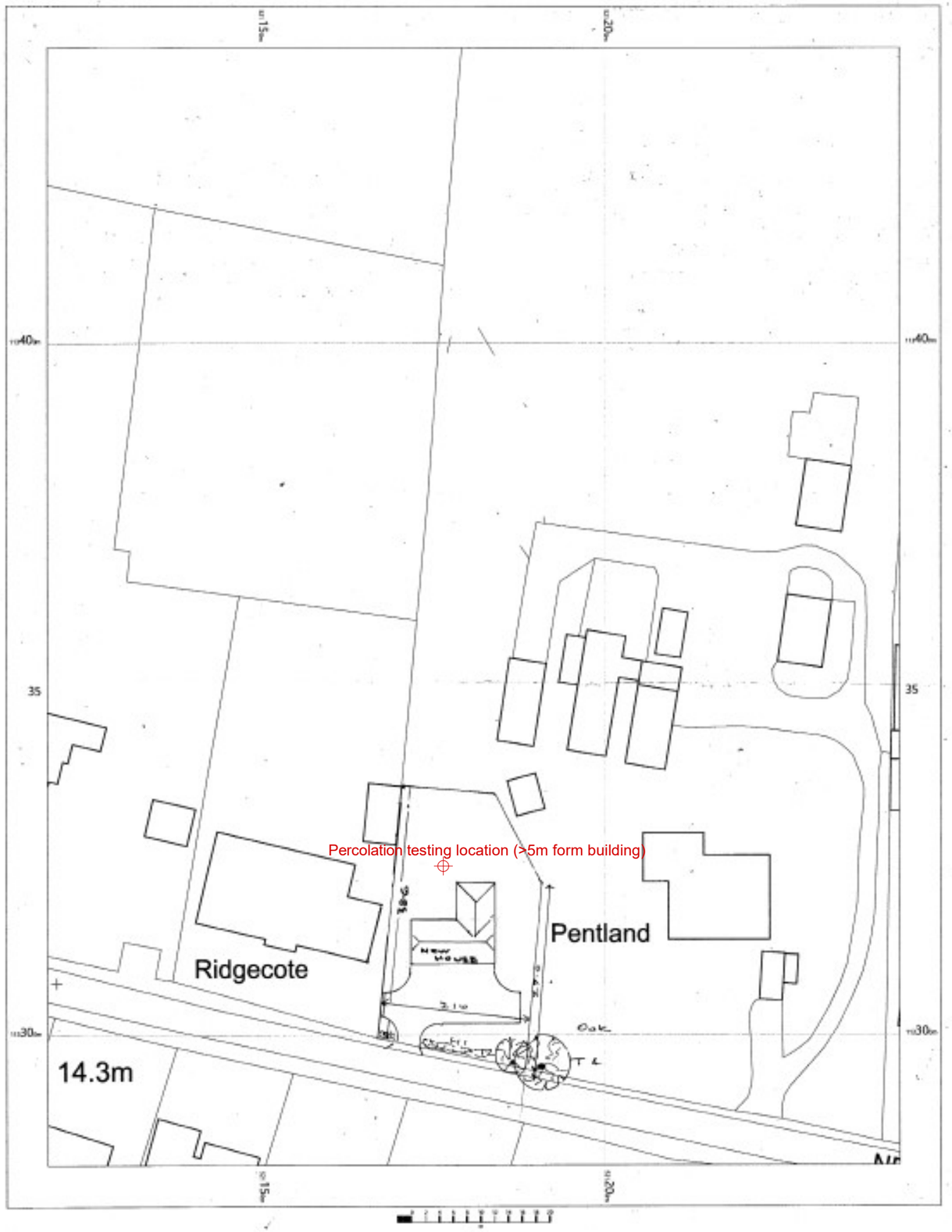


Figure 7: Site Photographs

Proposed Dwelling



Dwelling showing site of foul chamber under board in centre of photograph



Track showing path of foul sewer line



Southern Water Foul Sewer manhole on boundary of site



Foul Water connection in manhole



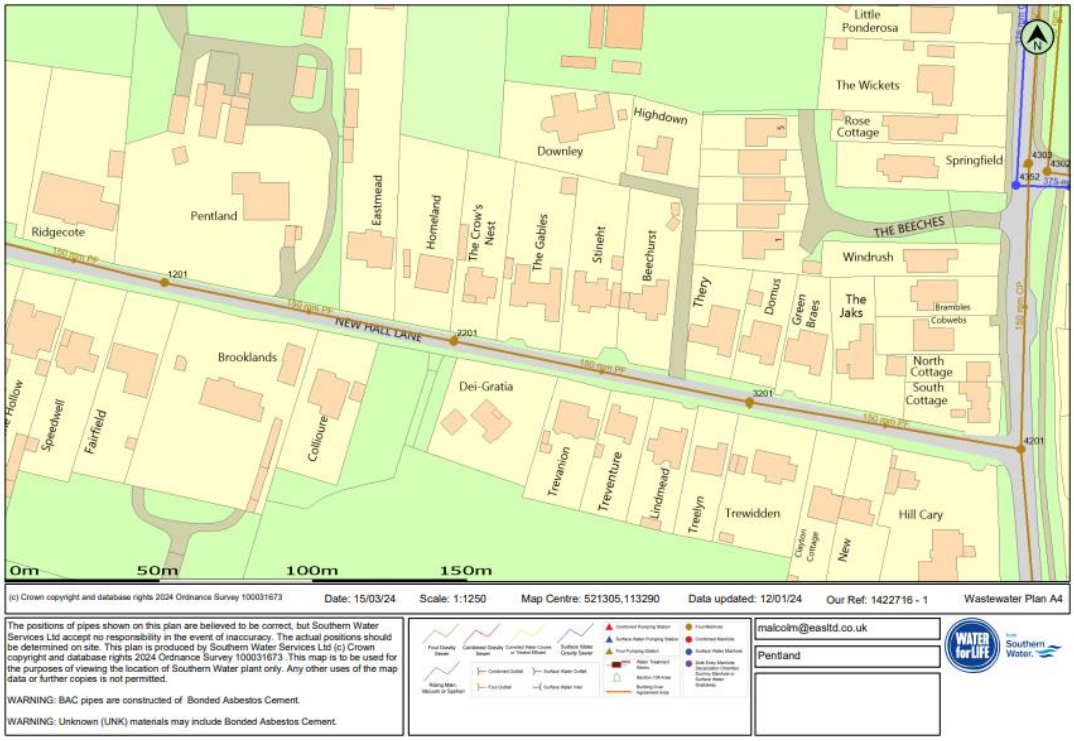
Rainwater Collection tank



Ditch along New Hall Lane



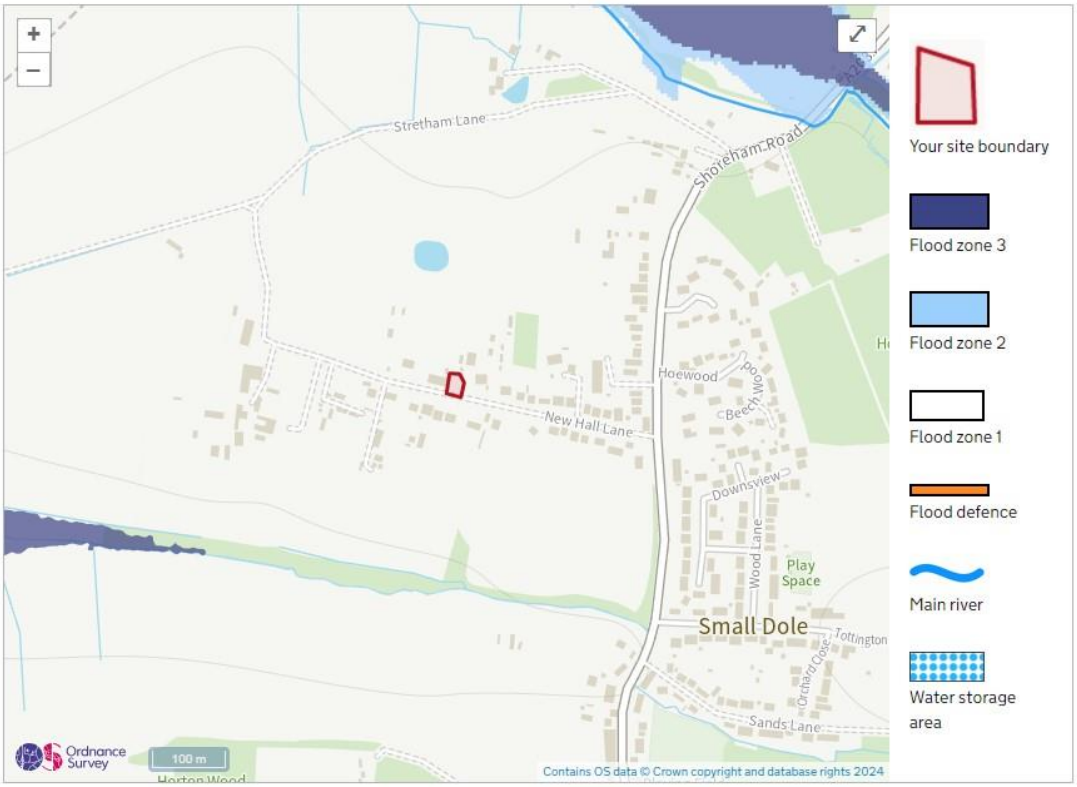
Figure 8: Southern Water Sewer Maps



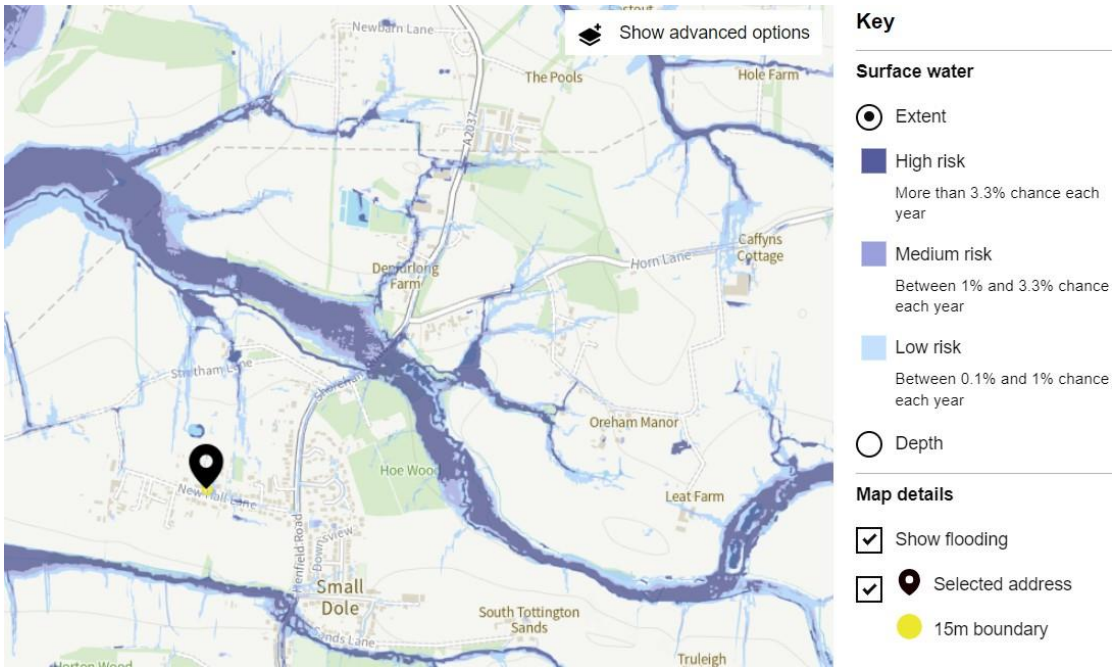
# APPENDIX B

# FLOOD RISK DATA

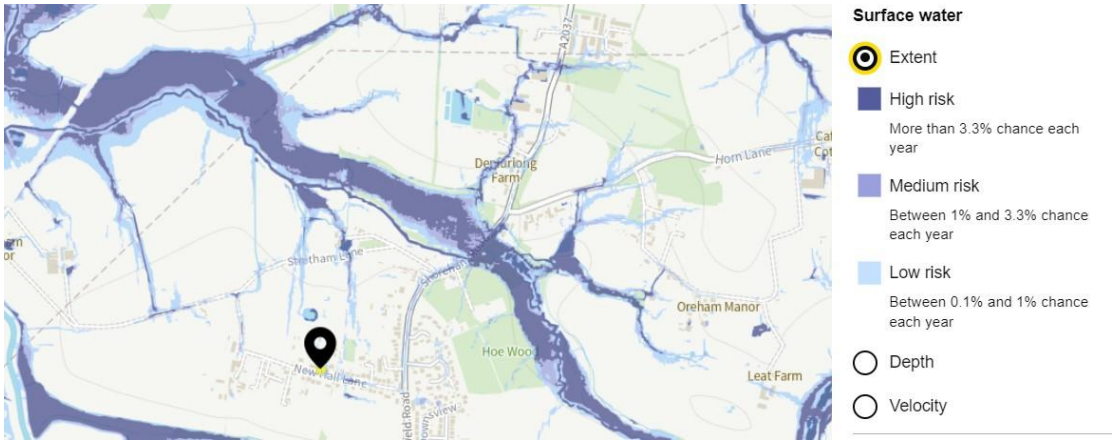
## Flood Map for Planning



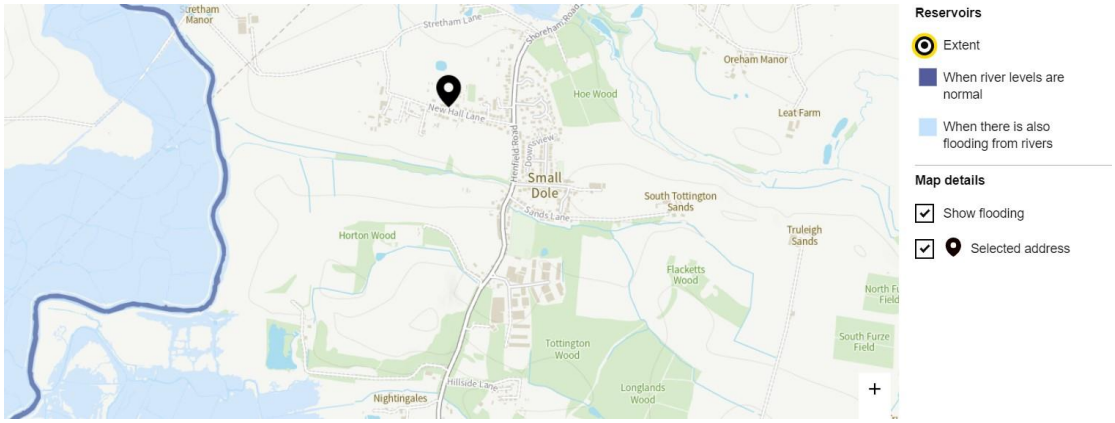

## Surface Water Flood Map



## Surface Water Extent Flood Map




## Reservoir Flood Map



# APPENDIX C:

# HR WALLINGFORD GREENFIELD FLOW

hr wallingford

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| Calculated by: | Xanthe Lyford |
| Site name: | Pentland |
| Site location: | Small Dole |

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). The information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| Latitude: | 50.90641° N |
| Longitude: | 0.27748° W |
| Reference: | 241869406 |
| Date: | Mar 12 2024 16:30 |

## Runoff estimation approach

IH124

## Site characteristics

Total site area (ha): 0.1

### Methodology

| | |
|---|---|
| $Q_{BAR}$ estimation method: | Calculate from SPR and SAAR |
| SPR estimation method: | Calculate from SOIL type |

### Soil characteristics

| | Default | Edited |
|---|---|---|
| SOIL type: | 4 | 4 |
| HOST class: | N/A | N/A |
| SPR/SPRHOST: | 0.47 | 0.47 |

### Hydrological characteristics

| | Default | Edited |
|---|---|---|
| SAAR (mm): | 841 | 841 |
| Hydrological region: | 7 | 7 |
| Growth curve factor 1 year: | 0.85 | 0.85 |
| Growth curve factor 30 years: | 2.3 | 2.3 |
| Growth curve factor 100 years: | 3.19 | 3.19 |
| Growth curve factor 200 years: | 3.74 | 3.74 |

## Notes

(1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | 0.6 | 0.6 |
| 1 in 1 year (l/s): | 0.51 | 0.51 |
| 1 in 30 years (l/s): | 1.38 | 1.38 |
| 1 in 100 year (l/s): | 1.91 | 1.91 |
| 1 in 200 years (l/s): | 2.24 | 2.24 |

# APPENDIX D:

# OUTPUT FROM DRAINAGE DESIGN SOFTWARE

**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

MasterDrain SW

| | | | |
|---|---|---|---|
| Job No. 683 | | | |
| Sheet no. 1 | | | |
| Date 28/03/24 | | | |
| Project Pentland | By XL | Checked | Reviewed |
| Title Surcharge calcs (Sized at 30 yrs storm) for PENTLAND SW.SW CCF = 45% | | | |

Free flowing outlet
Return period = 100 yrs
Climate change factor = 45

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

Mean rain intens. 137.00 mm/hr
Storm profile = Summer
Using FSR data

Peak rain intens. 537.04 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. | SURCHARGE Depth | EXCESS FLOW l/s | FLOODED VOL m³ | DRAINED AREA (m²) x FACTOR | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | I | 1.01 | SW1 | 9.6 | 7.6 | 100 | 600 | 13.50 | 13.57 | 14.00 | 0.79 | 0.07 | 0.00 | 0.000 | 117 | OK |
| 2 | B | 2.01 | sing Tank | 19.3 | 0.0 | 100 | 900 | 13.50 | 13.50 | 14.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0 | 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

MasterDrain SW

| | | | |
|---|---|---|---|
| Job No. 683 | | | |
| Sheet no. 2 | | | |
| Date 28/03/24 | | | |
| Project Pentland | By XL | Checked | Reviewed |
| Title Surcharge calcs (Sized at 30 yrs storm) for PENTLAND SW.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%)

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

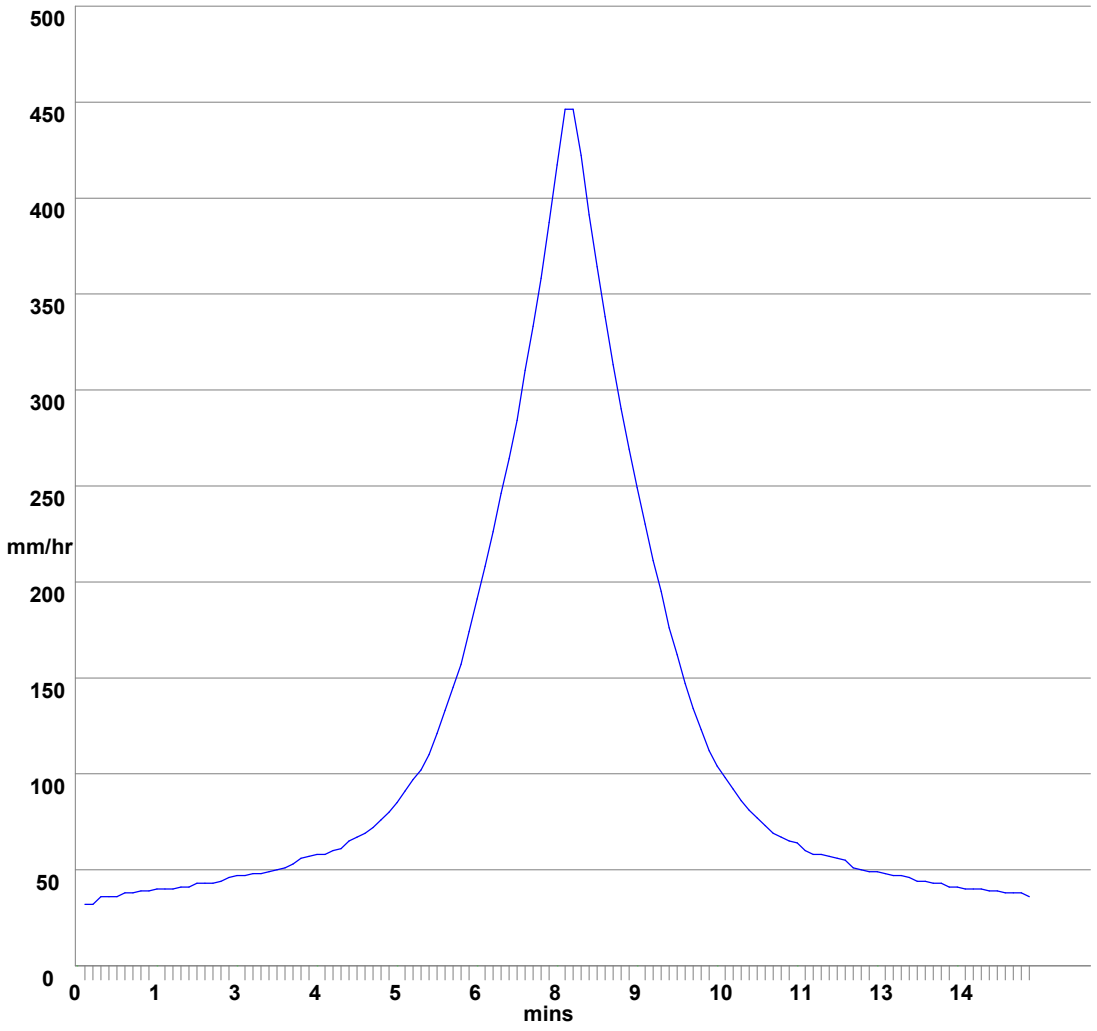
| | |
|---|---|
| Job No. | 683 |
| Sheet no. | 3 |
| Date | 28/03/24 |
| Project | Pentland |
| By | XL |
| Checked | |
| Reviewed | |

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

| Time mins | Rain mm/hr | Time mins | Rain mm/hr | Time mins | Rain mm/hr |
|---|---|---|---|---|---|
| 0:08 | 31.86 | 5:08 | 91.04 | 10:08 | 97.87 |
| 0:15 | 31.86 | 5:15 | 96.73 | 10:15 | 92.18 |
| 0:22 | 36.42 | 5:22 | 102.42 | 10:22 | 86.49 |
| 0:30 | 36.42 | 5:30 | 110.39 | 10:30 | 80.80 |
| 0:38 | 36.42 | 5:38 | 120.63 | 10:38 | 77.38 |
| 0:45 | 37.55 | 5:45 | 133.15 | 10:45 | 72.83 |
| 0:52 | 37.55 | 5:52 | 144.53 | 10:52 | 69.42 |
| 1:00 | 38.69 | 6:00 | 157.04 | 11:00 | 67.14 |
| 1:08 | 38.69 | 6:08 | 174.11 | 11:08 | 64.87 |
| 1:15 | 39.83 | 6:15 | 191.18 | 11:15 | 63.73 |
| 1:22 | 39.83 | 6:22 | 208.25 | 11:22 | 60.31 |
| 1:30 | 39.83 | 6:30 | 226.46 | 11:30 | 58.04 |
| 1:38 | 40.97 | 6:38 | 245.81 | 11:38 | 58.04 |
| 1:45 | 40.97 | 6:45 | 264.02 | 11:45 | 56.90 |
| 1:52 | 43.24 | 6:52 | 284.50 | 11:52 | 55.76 |
| 2:00 | 43.24 | 7:00 | 309.54 | 12:00 | 54.62 |
| 2:08 | 43.24 | 7:08 | 333.43 | 12:08 | 51.21 |
| 2:15 | 44.38 | 7:15 | 358.47 | 12:15 | 50.07 |
| 2:22 | 45.52 | 7:22 | 386.92 | 12:22 | 48.93 |
| 2:30 | 46.66 | 7:30 | 416.51 | 12:30 | 48.93 |
| 2:38 | 46.66 | 7:38 | 446.10 | 12:38 | 47.80 |
| 2:45 | 47.80 | 7:45 | 446.10 | 12:45 | 46.66 |
| 2:52 | 47.80 | 7:52 | 422.20 | 12:52 | 46.66 |
| 3:00 | 48.93 | 8:00 | 391.47 | 13:00 | 45.52 |
| 3:08 | 50.07 | 8:08 | 364.16 | 13:08 | 44.38 |
| 3:15 | 51.21 | 8:15 | 337.99 | 13:15 | 44.38 |
| 3:22 | 53.49 | 8:22 | 312.95 | 13:22 | 43.24 |
| 3:30 | 55.76 | 8:30 | 290.19 | 13:30 | 43.24 |
| 3:38 | 56.90 | 8:38 | 268.57 | 13:38 | 40.97 |
| 3:45 | 58.04 | 8:45 | 249.22 | 13:45 | 40.97 |
| 3:52 | 58.04 | 8:52 | 229.88 | 13:52 | 39.83 |
| 4:00 | 60.31 | 9:00 | 210.53 | 14:00 | 39.83 |
| 4:08 | 61.45 | 9:08 | 194.60 | 14:08 | 39.83 |
| 4:15 | 64.87 | 9:15 | 176.39 | 14:15 | 38.69 |
| 4:22 | 67.14 | 9:22 | 161.60 | 14:22 | 38.69 |
| 4:30 | 69.42 | 9:30 | 146.80 | 14:30 | 37.55 |
| 4:38 | 71.69 | 9:38 | 134.28 | 14:38 | 37.55 |
| 4:45 | 76.25 | 9:45 | 122.90 | 14:45 | 37.55 |
| 4:52 | 79.66 | 9:52 | 111.52 | 14:52 | 36.42 |
| 5:00 | 85.35 | 10:00 | 103.56 | 15:00 | 36.42 |

Hydrograph profile derived from data in the Flood Studies Report

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



**Environmental Assessment Services Ltd**
http://www.easltd.co.uk

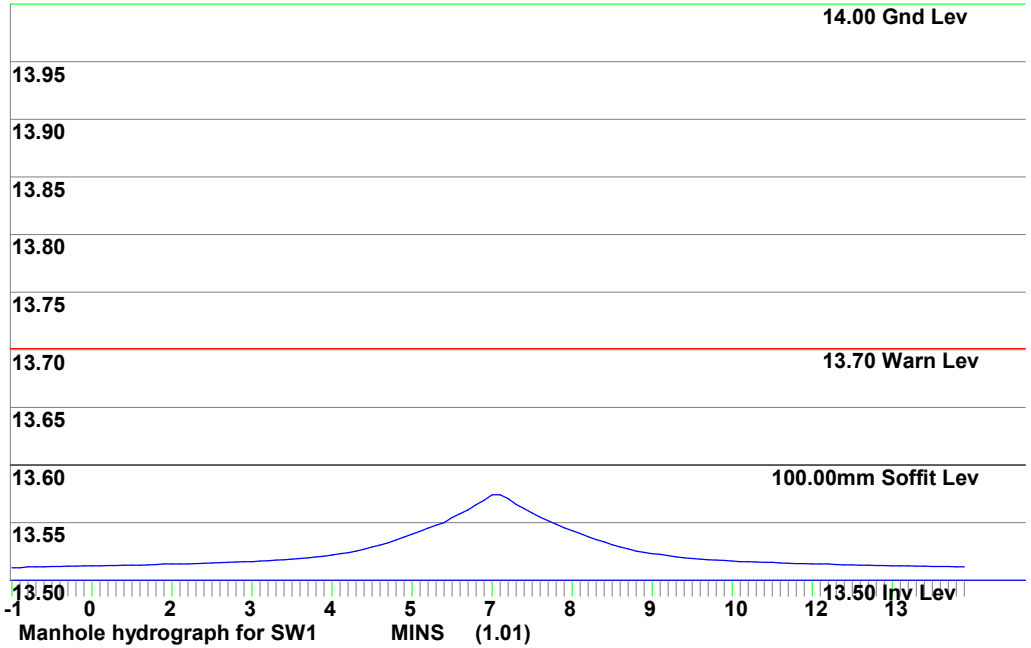
London Rd, Hickstead
Haywards Heath,
West Sussex, RH17 5LZ
Tel: 01444 882552
email: info@easltd.co.uk

| Job No. | Sheet no. | Date | By | Checked | Reviewed |
|---|---|---|---|---|---|
| 683 | 4 | 28/03/24 | XL | | |

MasterDrain SW

Project: Pentland

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





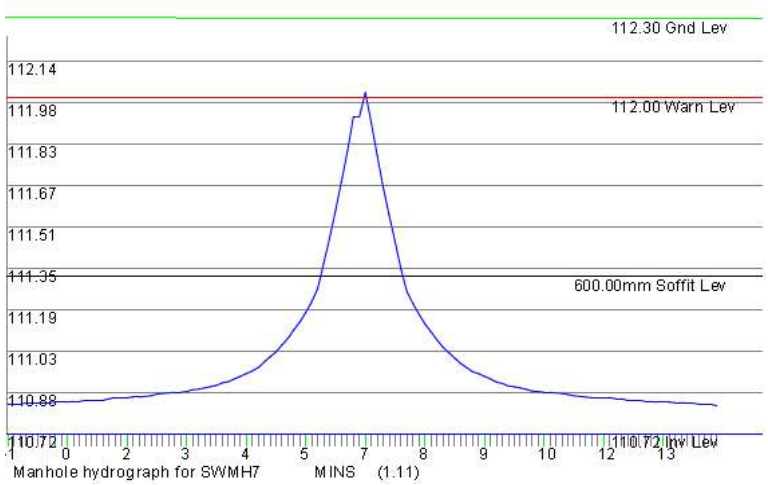

**Environmental Assessment Services Ltd**
http://www.easltd.co.uk

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

MasterDrain SW

| | | | |
|---|---|---|---|
| Job No. 683 | | | |
| Sheet no. 5 | | | |
| Date 28/03/24 | | | |
| Project Pentland | By XL | Checked | Reviewed |
| Title Surcharge calcs (Sized at 30 yrs storm) for PENTLAND SW.SW CCF = 45% | | | |

.




**1) Ground / cover level**

**2) Warning level - in this case, set at 300mm below cover level.**

**3) Soffit level of outflow pipe.**

**4) Invert level of chamber.**

**Notes**

**a) Lower section of the graph shows the water depth filling the channel. Channel is assumed to be a full pipe diameter in depth.**

**b) 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.**

**c) The top of the graph clips the warning level and would be marked thus on the printout.**

**d) 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.**

**e) The diagram above is a general one and is not part of the current calculation.**

**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. 683 | | | |
| Sheet no. 1 | | | |
| Date 28/03/24 10:41 | | | |
| Project Pentland SW | By XL | Checked | Reviewed |
| Title Manhole printout for PENTLAND SW.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 | 99.48 | 27.6 | circ | 600 | N/A | 0.50 | | 0.14 | 100 | 13.625 | 13.500 | N/A | 13.450 | 14.000 | Soakaway |
| vesing Tank | 35.83 | 32.29 | circ | 900 | N/A | 0.50 | | 0.32 | 100 | 13.625 | 13.500 | N/A | 13.450 | 14.000 | Soakaway |

All manholes to be as per 'Sewers for Adoption'

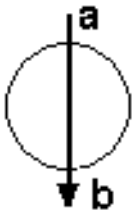
**Environmental Assessment Services Ltd**
http://www.easltd.co.uk

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

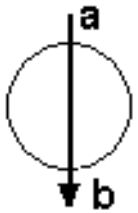
| | |
|---|---|
| Job No. | 683 |
| Sheet no. | 2 |
| Date | 28/03/24 10:41 |

| Project | By | Checked | Reviewed |
|---|---|---|---|
| Pentland SW | XL | | |

Title **Manhole printout for PENTLAND SW.SW**




**MH = SW1**
**a=head**
**b = 100**




**MH = Harvesing Tank**
**a=head**
**b = 100**

**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. | 683 |
| Sheet no. | 3 |
| Date | 28/03/24 10:41 |

| Project | By | Checked | Reviewed |
|---|---|---|---|
| Pentland SW | XL | | |

Title: **Manhole printout for PENTLAND SW.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

**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. | Sheet no. | Date |
|---|---|---|
| 683 | 1 | 22/03/24 |

MasterDrain
SW 16.54

| Project | By | Checked | Reviewed |
|---|---|---|---|
| Pentland, Small Dole | XL | | |

Title: **Filled pit soakaway calculations for Small Dole**

**Data:-**

*Location hydrological data (FSR):-*

| | | | |
|---|---|---|---|
| Location | = Small Dole | Grid reference | = TQ2113 |
| M5-60 (mm) | = 20.0 | r | = 0.35 |
| Soil index | = 0.45 | SAAR (mm/yr) | = 860 |
| WRAP | = 4 | Area = England and Wales | |

Soil classification for WRAP type 4
Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

**Design data:-**

Safety factor = 2.0 - Minor inconvenience (SF=2)
Fill porosity = 0.95 - Plastic cells (porosity = 0.95)

Equivalent porosity (n1) = 0.95

Pit dimensions= 5.0 x 6.0 metres

Area drained = 120 m²

Infiltration coefficient = 0.012744 m/hr
Effective inf.coeff (q) = 0.006372

Return period = 100 yrs

Climate change factor = 45%

**Calculations :-**

Filled Excavation:-

Perimeter of pit = (2 x Excavation Width)+(2 x Excavation Length)
Area of base = Excavation Width x Excavation Length
Infiltration area = (Area of base)+(Perimeter of pit x Hmax)
Temporary constant 'a'
= (Area of base / perimeter)-((AreaDrained x Rainfall depth /1000)/(Perimeter/Inf. coeff))
Temporary constant 'b' = (Perimeter/Inf. coeff) / (Area of base x porosity)
Hmax = a*((EXP(-1 x b x Duration of storm))-1)

Note: The Hmax calculation is iterated to a maximum value of Hmax.

Note: Duration of storm in hours, Rainfall depth in mm/hr x Climate Change factor.

**Results :-**

Emptying time to 50% volume = 23:37 (hr:min)
hMax (Depth) = 0.38 metres
Time to maximum = 0:15 hr:min
Rainfall at maximum = 8.01mm/hr
Width (m) = 5.0

Length (m) = 6.0

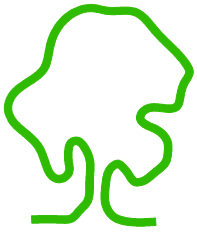
Total Infiltration area = 38.4m² (base area + sidewall area).

Total available volume = 10.92m³

N.B. The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure. Formulae and methods from CIRIA 156.

MasterDrain
SW 16.54

| | | | | |
|---|---|---|---|---|
| **Environmental Assessment Services Ltd**<br>http://www.easltd.co.uk | London Rd, Hickstead<br>Haywards Heath,<br>West Sussex, RH17 5LZ<br>Tel: 01444 882552<br>email: info@easltd.co.uk | Job No. 683 | | |
| | | Sheet no. 2 | | |
| | | Date 22/03/24 | | |
| Project Pentland, Small Dole | | By XL | Checked | Reviewed |
| Title **Worst case soakaway times to empty.** | | | | |



eas ltd
Environmental Assessment Services Ltd
Unit 4B, The Courtyard, Holmsted Farm, Staplefield Road, Cuckfield,
West Sussex, RH17 5JT
Phone : +44 (0) 1444 882552 email : info@easltd.co.uk
web site : www.easltd.co.uk