# 4 SITE INVESTIGATION RESULTS

## 4.1 Encountered ground conditions

The sequence of strata encountered within each of the trial pits is described in Appendix B.

In summary, no obvious Made Ground was observed within any of the trial pits. The encountered lithology included an upper topsoil layer comprising a c. 0.3 m thickness of slightly gravelly fine sand with roots, typically underlain by slightly clayey slightly gravelly fine sand to depths of around 1.0 m. The material observed below c. 1.0 m predominantly comprised slightly gravelly sandy silt and slightly gravelly sandy clay. Friable dark grey mudstone was observed at the base of several trial pits.

No shallow groundwater was identified in any of the trial pits.

## 4.2 Infiltration test results

Four of the trial pits (TP01, TP02, TP03 and TP04) were subjected to infiltration testing.

The infiltration testing results are presented in Appendix C; these results indicate that no appreciable infiltration was observed at any of the trial pits (reflecting the fine grained nature of the encountered soils). As such, no representative infiltration rates have been calculated.

## 4.3 Other site observations

Salient observations made during the site investigation works included:

- The Site was covered by short grass (see Photographs 1 and 2 in Appendix A).
- No standing water was observed across the Site at the time of the infiltration testing.
- The modest drainage ditch present along the south-western Site boundary (see Figure 3.1) contained appreciable vegetation and was observed to be dry (see Photograph 3 in Appendix A).
- The drainage ditch present along the eastern Site boundary (see Figure 3.1) contained some vegetation and was also observed to be dry (see Photograph 8 in Appendix A).
- The stream channel located adjacent to the western Site boundary (see Figure 3.1) contained variable amounts of vegetation; ponded water was present within the channel to the south-west of the Site whereas the stream section adjacent to the central-western Site area was dry (see Photographs 4 to 6 in Appendix A).
- The stream section adjacent to the north-western part of the Site was culverted (see Figure 3.1).
- The culverted stream section ended in a small depression located close to the north-western corner of the Site (see Figure 3.1 and also Photograph 7 in Appendix A). A second culvert, which passes beneath the northern part of the Site, also discharges into this depression. The outflow from the depression is via a large diameter (c. 0.8 m wide) concrete pipe.

# 5 REFERENCES

**BGS, 2022.** Geology of Britain Viewer. https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/. Accessed 19th July 2022.

**BRE, 2016.** BRE Digest 365. Soakaway design.

**KRS, 2022**. Newfields Farm, Wetley Rocks, Stoke on Trent, ST9 9LA. Flood Risk & Surface Water Drainage Assessment. Report ref: KRS.0612.002.R.001.B, dated March 2022.

# APPENDICES

# APPENDIX A

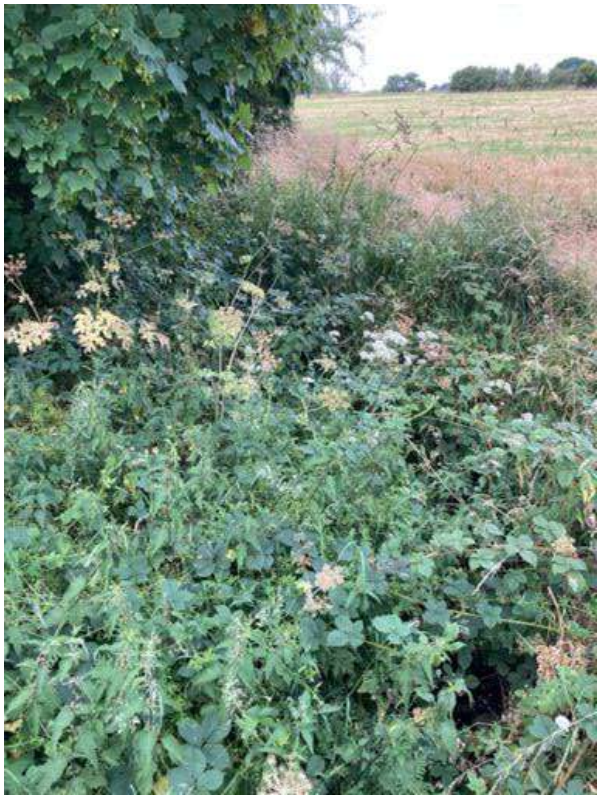
## Site photographs

## Selected photograph locations:

**Photograph 1** **Description:** View across the Site from Newfield Farm; looking to the west
**Date:** 20/07/2022

**Photograph 2** **Description:** View across the Site from Newfield Farm; looking to the north
**Date:** 20/07/2022

**Photograph 3** **Description:** View of shallow drainage ditch along the south-western Site boundary; looking to the south-east
**Date:** 20/07/2022



**Photograph 4** **Description:** View of stream directly adjacent to the south-western Site boundary
**Date:** 20/07/2022

**Photograph 5** **Description:** View of stream directly adjacent to the western Site boundary
**Date:** 20/07/2022

**Photograph 6** **Description:** View of stream (dry river bed) directly adjacent to the western Site boundary
**Date:** 20/07/2022

**Photograph 7** **Description:** Culverted drainage sections located directly beyond the north-western corner of the Site
**Date:** 20/07/2022

**Photograph 8** **Description:** View of drainage ditch (dry) directly adjacent to the eastern Site boundary
**Date:** 20/07/2022


**Photograph 9** **Description:** Excavation at trial pit TP01
**Date:** 20/07/2022

**Photograph 10** **Description:** Trial pit TP01
**Date:** 20/07/2022

**Photograph 11** **Description:** Soil layer excavated from trial pit TP01
**Date:** 20/07/2022

**Photograph 12** **Description:** Spoil excavated from TP01
**Date:** 20/07/2022

**Photograph 13** **Description:** Discharge of water into trial pit TP01
**Date:** 20/07/2022

**Photograph 14** **Description:** Water level monitoring at trial pit TP01
**Date:** 20/07/2022

**Photograph 15** **Description:** Trial pit TP01; water level c. 5 hours after infilling
**Date:** 20/07/2022

**Photograph 16** **Description:** Trial pit TP02
**Date:** 20/07/202

**Photograph 17** **Description:** Soil layer excavated from trial pit TP02
**Date:** 20/07/2022

**Photograph 18** **Description:** Spoil excavated from TP02
**Date:** 20/07/2022

**Photograph 19** **Description:** Trial pit TP02; water level directly after infilling
**Date:** 20/07/2022

**Photograph 20** **Description:** Trial pit TP02; water level c. 4.5 hours after infilling
**Date:** 20/07/2022

**Photograph 21** **Description:** Trial pit TP03
**Date:** 20/07/2022

**Photograph 22** **Description:** Trial pit TP03; water level directly after infilling
**Date:** 20/07/2022

**Photograph 23** **Description:** Trial pit TP03; water level c. 4 hours after infilling
**Date:** 20/07/2022

**Photograph 24** **Description:** Trial pit TP04
**Date:** 20/07/2022

**Photograph 25** **Description:** Trial pit TP04; water level c. 4 hrs after infilling
**Date:** 20/07/2022

**Photograph 26** **Description:** Trial pit TP05
**Date:** 20/07/2022

**Photograph 27** **Description:** Trial pit TP06
**Date:** 20/07/2022

# APPENDIX B

## Trial pit soil descriptions

| Depth: m bgl | Soil description | Comments |
|---|---|---|
| **TP01** | | |
| 0.0 – 0.3 | Mid brown slightly gravelly fine sand with roots. Gravel is fine to medium and sub rounded to sub angular. | Ground is dry; no shallow groundwater observed<br>Stable trial pit faces<br>No odours or staining recorded |
| 0.3 – 0.65 | Tan to orange-brown slightly clayey slightly gravelly fine sand with some medium sand inclusions. Gravel is fine to coarse and sub rounded to sub angular with some sub angular to sub rounded sandstone cobbles. | |
| 0.65 – 1.2 | Mid brown to orange slightly clayey slightly gravelly fine sand. Gravel is fine to coarse and rounded to sub angular with occasional sub angular to sub rounded sandstone cobbles. | |
| 1.2 – 2.4+ | Dark brown slightly gravelly sandy silt. Sand is fine. Gravel is fine to coarse and predominantly sub angular. Some sub angular to sub rounded cobbles and occasional sub angular boulders. | |
| **TP02** | | |
| 0.0 – 0.3 | Mid brown slightly gravelly fine sand with roots. Gravel is fine to coarse and sub rounded to sub angular. One ceramic fragment. | Ground is dry; no shallow groundwater observed<br>Stable trial pit faces<br>No odours or staining recorded |
| 0.3 – 1.1 | Grey to orange gravelly clayey fine to medium sand with pockets of fine sandy clay. Gravel is fine to coarse and rounded to sub angular with some sub angular to sub rounded sandstone cobbles. | |
| 1.1 – 1.6 | Soft to firm grey to brown slightly gravelly sandy clay. Sand is fine. Gravel is fine to coarse and rounded to sub angular with some sub rounded to rounded cobbles. | |
| 1.6 – 2.3+ | Friable dark grey mudstone. | |
| **TP03** | | |
| 0.0 – 0.3 | Mid brown slightly gravelly fine sand with roots. Gravel is fine to coarse and sub rounded to sub angular. | No shallow groundwater observed; some moisture below 0.7 m<br>Stable trial pit faces<br>No odours or staining recorded |
| 0.3 – 1.0 | Loose orange-red gravelly fine to medium sand. Gravel is fine to coarse and rounded to sub angular with some sub angular to sub rounded sandstone cobbles and occasional sub rounded boulders. | |
| 1.0 – 2.1+ | Mid to dark brown slightly gravelly slightly clayey sandy silt. Sand is fine. Gravel is fine to coarse and sub rounded to sub angular. Some sub angular to sub rounded cobbles and occasional sub rounded to sub angular boulders. | |

| Depth: m bgl | Soil description | Comments |
|---|---|---|
| **TP04** | | |
| 0.0 – 0.2 | Mid brown slightly gravelly fine sand with roots. Gravel is fine to coarse and sub rounded to sub angular. Occasional sub rounded cobbles. | Ground is dry; no shallow groundwater observed<br>Stable trial pit faces<br>No odours or staining recorded |
| 0.2 – 1.0 | Brown to orange and grey gravelly clayey fine sand with some pockets of soft grey-brown clay and fine sandy clay plus occasional pockets of medium sand. Gravel is fine to coarse and rounded to sub angular with some sub angular to sub rounded cobbles. | |
| 1.0 – 1.9 | Soft to firm grey to brown slightly gravelly sandy clay. Sand is fine. Gravel is fine to coarse and rounded to sub angular with some sub rounded to rounded cobbles. | |
| 1.9 – 2.2 | Dark brown slightly gravelly slightly clayey sandy silt. Sand is fine. Gravel is fine to coarse and sub rounded to sub angular. Some sub angular to sub rounded cobbles and occasional sub rounded to sub angular boulders. | |
| 2.2 – 2.3+ | Friable dark grey mudstone. | |
| **TP05** | | |
| 0.0 – 0.2 | Mid brown slightly gravelly fine sand with roots. Gravel is fine to medium and sub rounded to sub angular. | Ground is dry; no shallow groundwater observed<br>Stable trial pit faces<br>No odours or staining recorded |
| 0.2 – 0.24 | Light grey gravelly fine to medium sand. Gravel is fine to coarse and sub rounded to angular. | |
| 0.24 – 1.2 | Soft to firm orange to brown slightly gravelly slightly sandy clay. Sand is fine. Gravel is fine to coarse and rounded to sub angular with some sub rounded to sub angular cobbles. | |
| 1.2 – 2.1+ | Dark brown slightly gravelly sandy silt. Sand is fine. Gravel is fine to coarse and predominantly sub angular. Some sub angular to angular cobbles and occasional sub angular boulders. | |
| **TP06** | | |
| 0.0 – 0.2 | Mid brown slightly gravelly fine sand with roots. Gravel is fine to medium and sub rounded to sub angular. | Ground is dry; no shallow groundwater observed<br>Stable trial pit faces<br>No odours or staining recorded |
| 0.2 – 0.3 | Light grey sand and gravel. Sand is fine to medium. Gravel is fine to coarse and sub rounded to angular. | |
| 0.3 – 1.3 | Soft to firm orange to brown slightly gravelly slightly sandy clay. Sand is fine. Gravel is fine to coarse and rounded to sub angular with some sub rounded to sub angular cobbles. | |
| 1.3 – 2.1 | Dark brown to purple slightly gravelly sandy silt. Sand is fine. Gravel is fine to coarse and predominantly sub angular. Some sub angular to angular cobbles and occasional sub angular boulders. | |
| 2.1 – 2.2+ | Friable dark grey mudstone. | |

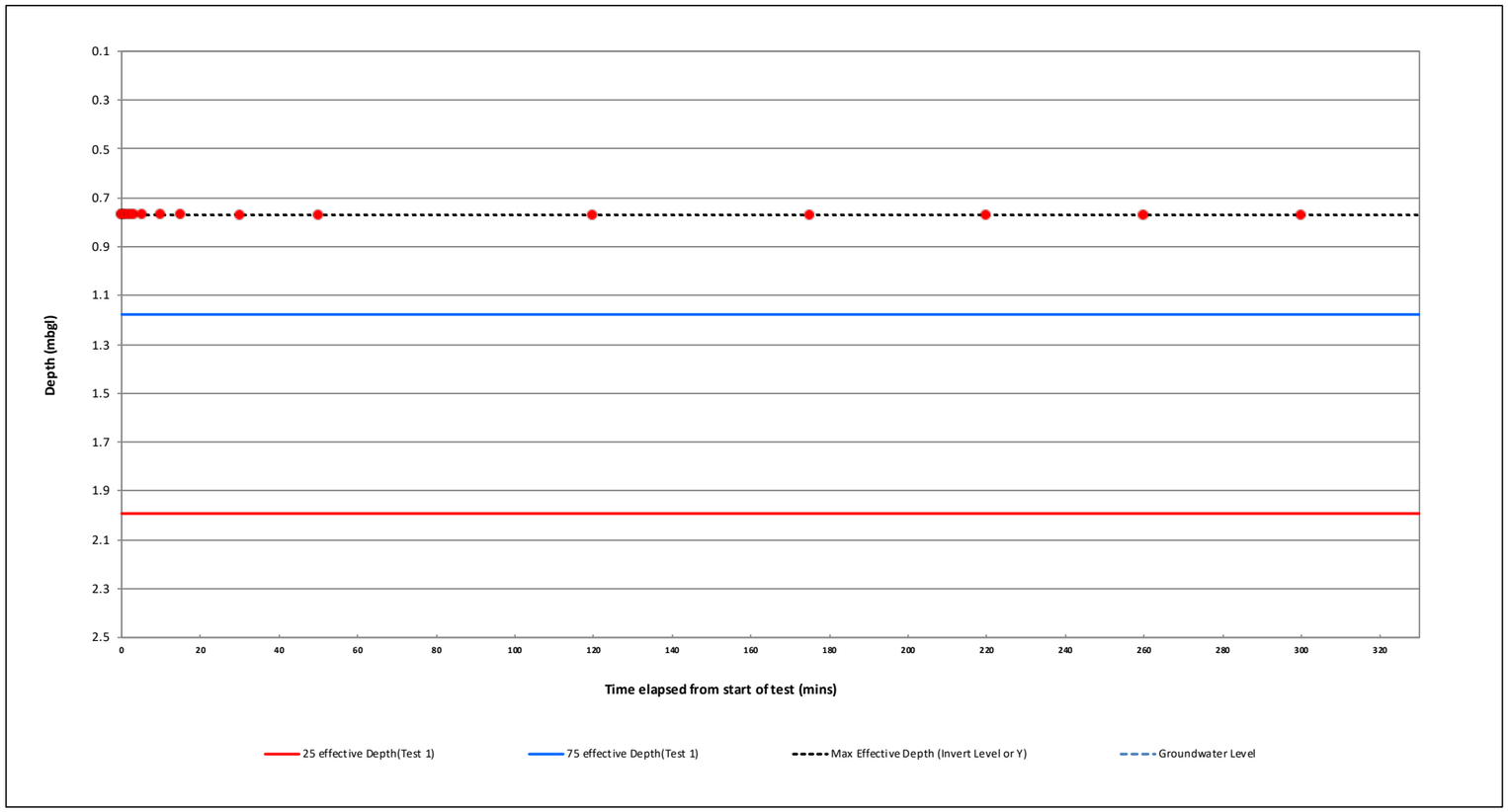
# APPENDIX C

## Infiltration test results

| | | | | | | |
|---|---|---|---|---|---|---|
| **Pit reference:** | TP01 | **Parameters:** | | | | |
| **Project:** | 4272 | Trial pit length (m): | 1.3 | *( L )* | Assumed invert level (m): | c. 0.8 |
| **Date of infiltration test:** | 20/07/2022 | Trial pit width (m): | 0.6 | *( W )* | | |
| **Method:** | BRE365 | Trial pit depth (m): | 2.4 | *( D )* | | |
| **Date of calculation:** | 21/07/2022 | Depth to groundwater (m): | DRY | | | |
| **Completed by:** | AJS | Datum (mbgl): | 0 | *( Z )* | | |

**TEST 1**

| Time | Elapsed (min) | Water dip (mbgl) | Depth of water in pit (m) |
|---|---|---|---|
| 08:30:00 | 0.0 | 0.770 | 1.630 |
| | 0.5 | 0.770 | 1.630 |
| | 1.0 | 0.770 | 1.630 |
| | 2.0 | 0.770 | 1.630 |
| | 3.0 | 0.770 | 1.630 |
| | 5.0 | 0.770 | 1.630 |
| | 10.0 | 0.770 | 1.630 |
| | 15.0 | 0.770 | 1.630 |
| | 30.0 | 0.775 | 1.625 |
| | 50.0 | 0.775 | 1.625 |
| | 120.0 | 0.775 | 1.625 |
| | 175.0 | 0.775 | 1.625 |
| | 220.0 | 0.775 | 1.625 |
| | 260.0 | 0.775 | 1.625 |
| | 300.0 | 0.775 | 1.625 |
| | | | |
| | | | |
| | | | |
| | | | |




| | | | | |
|---|---|---|---|---|
| Test effective depth | 1.63 | m (Water depth at t=0) | | |
| 75% effective depth: | 1.22 | m | *1.18* | *m bgl* |
| 50% effective depth: | 0.82 | m | *1.59* | *m bgl* |
| 25% effective depth: | 0.41 | m | *1.99* | *m bgl* |
| t75 | N/A | min | | |
| t50 | N/A | min | | |
| t25 | N/A | min | | |
| Vp75-25 | 0.64 | m3 | | |
| ap50 | 3.88 | m2 | | |
| tp75-25 | N/A | secs | | |
| Soil infiltration rate (f): | N/A | m/s | | |

**Test failed**

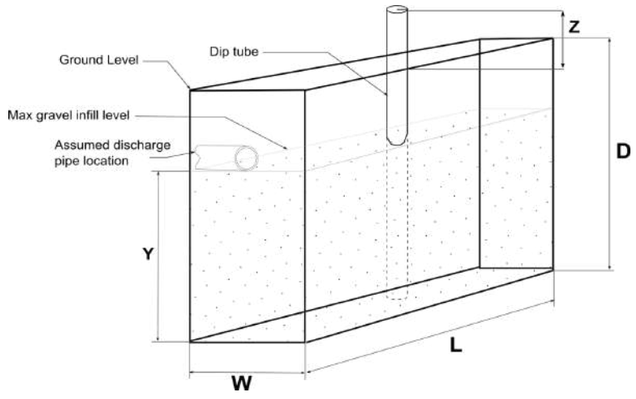
Soil infiltration rate, $f = \dfrac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

where:

$V_{p75-25}$ = the effective storage volume of water in the trial pit between 75% and 25% effective depth;

$a_{p50}$ = the internal surface area of the trial pit up to 50% effective depth and including the base area;

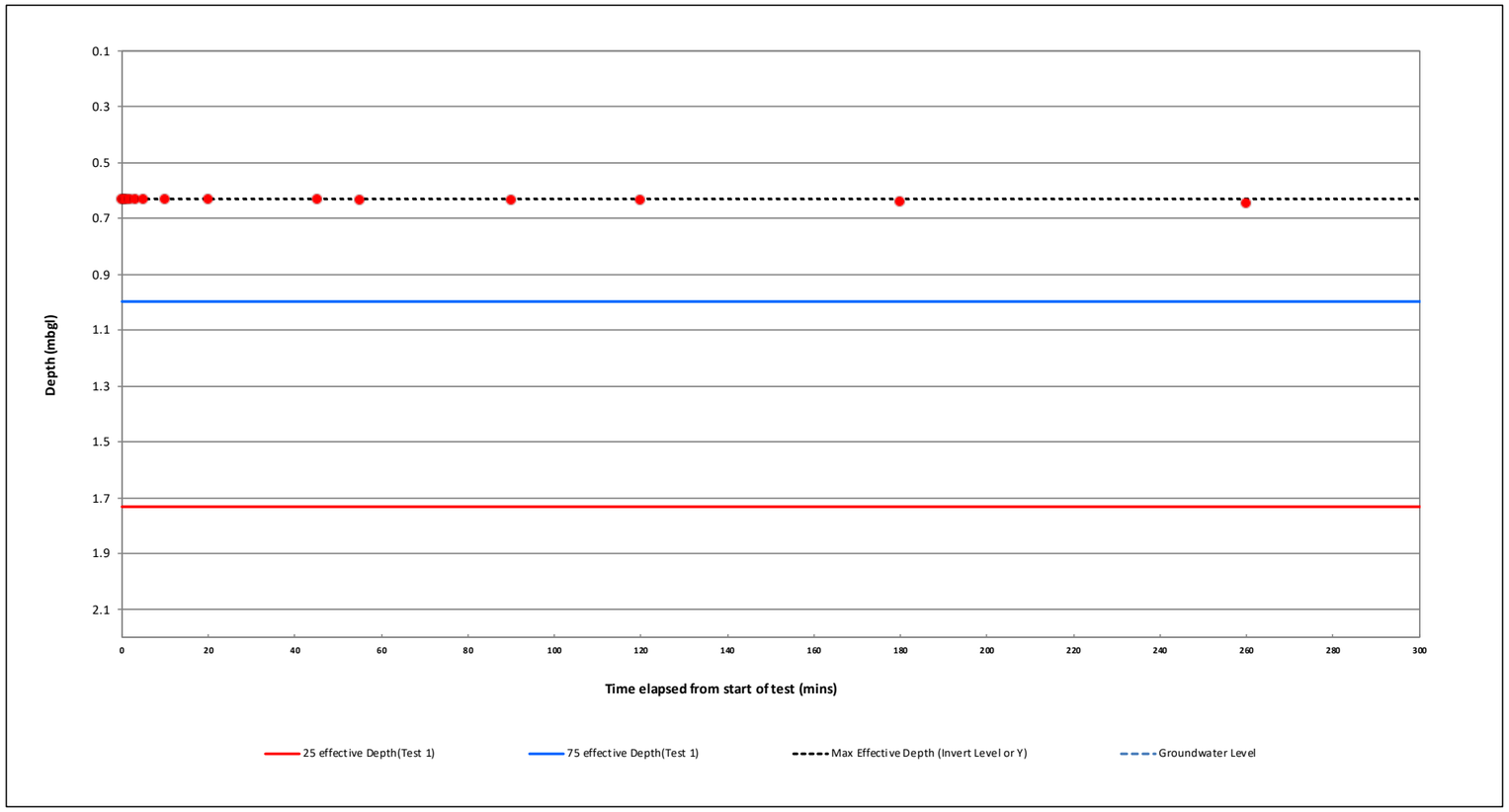
$t_{p75-25}$ = the time for the water level to fall from 75% to 25% effective depth.



| | | | | | | |
|---|---|---|---|---|---|---|
| **Pit reference:** | TP02 | **Parameters:** | | | | |
| **Project:** | 4272 | Trial pit length (m): | 1.4 | *( L )* | Assumed invert level (m): | c. 0.6 |
| **Date of infiltration test:** | 20/07/2022 | Trial pit width (m): | 0.6 | *( W )* | | |
| **Method:** | BRE365 | Trial pit depth (m): | 2.1 | *( D )* | | |
| **Date of calculation:** | 21/07/2022 | Depth to groundwater (m): | DRY | | | |
| **Completed by:** | AJS | Datum (mbgl): | 0 | *( Z )* | | |

**TEST 1**

| Time | Elapsed (min) | Water dip (mbgl) | Depth of water in pit (m) |
|---|---|---|---|
| 09:00:00 | 0.0 | 0.630 | 1.470 |
| | 0.5 | 0.630 | 1.470 |
| | 1.0 | 0.630 | 1.470 |
| | 2.0 | 0.630 | 1.470 |
| | 3.0 | 0.630 | 1.470 |
| | 5.0 | 0.630 | 1.470 |
| | 10.0 | 0.630 | 1.470 |
| | 20.0 | 0.630 | 1.470 |
| | 45.0 | 0.630 | 1.470 |
| | 55.0 | 0.635 | 1.465 |
| | 90.0 | 0.635 | 1.465 |
| | 120.0 | 0.635 | 1.465 |
| | 180.0 | 0.640 | 1.460 |
| | 260.0 | 0.645 | 1.455 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |




| | | | | |
|---|---|---|---|---|
| Test effective depth | 1.47 | m (Water depth at t=0) | | |
| 75% effective depth: | 1.10 | m | *1.00* | *m bgl* |
| 50% effective depth: | 0.74 | m | *1.37* | *m bgl* |
| 25% effective depth: | 0.37 | m | *1.73* | *m bgl* |
| t75 | N/A | min | | |
| t50 | N/A | min | | |
| t25 | N/A | min | | |
| Vp75-25 | 0.62 | m3 | | |
| ap50 | 3.78 | m2 | | |
| tp75-25 | N/A | secs | | |
| Soil infiltration rate (f): | N/A | m/s | | |

**Test failed**

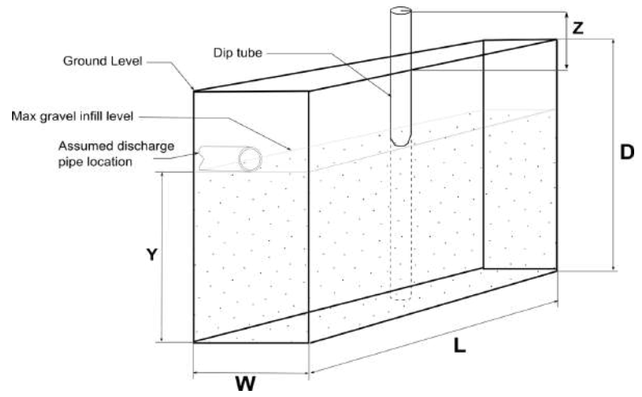
Soil infiltration rate, $f = \dfrac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

where:

$V_{p75-25}$ = the effective storage volume of water in the trial pit between 75% and 25% effective depth;

$a_{p50}$ = the internal surface area of the trial pit up to 50% effective depth and including the base area;

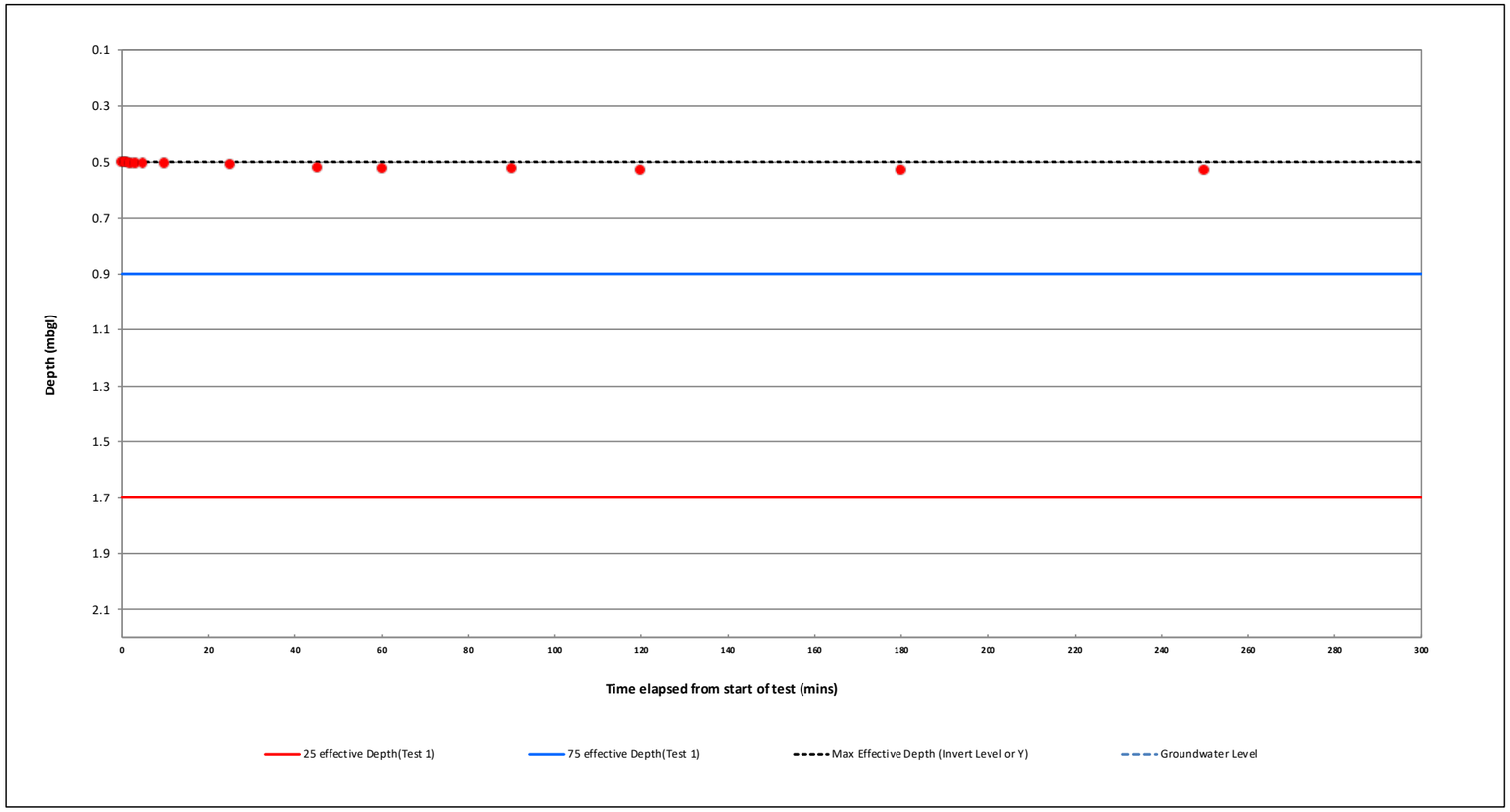
$t_{p75-25}$ = the time for the water level to fall from 75% to 25% effective depth.



| | | | | | | |
|---|---|---|---|---|---|---|
| **Pit reference:** | TP03 | **Parameters:** | | | | |
| **Project:** | 4272 | Trial pit length (m): | 1.4 | *( L )* | Assumed invert level (m): | c. 0.5 |
| **Date of infiltration test:** | 20/07/2022 | Trial pit width (m): | 0.6 | *( W )* | | |
| **Method:** | BRE365 | Trial pit depth (m): | 2.1 | *( D )* | | |
| **Date of calculation:** | 21/07/2022 | Depth to groundwater (m): | DRY | | | |
| **Completed by:** | AJS | Datum (mbgl): | 0 | *( Z )* | | |

**TEST 1**

| Time | Elapsed (min) | Water dip (mbgl) | Depth of water in pit (m) |
|---|---|---|---|
| 09:40:00 | 0.0 | 0.500 | 1.600 |
| | 0.5 | 0.500 | 1.600 |
| | 1.0 | 0.500 | 1.600 |
| | 2.0 | 0.505 | 1.595 |
| | 3.0 | 0.505 | 1.595 |
| | 5.0 | 0.505 | 1.595 |
| | 10.0 | 0.508 | 1.592 |
| | 25.0 | 0.510 | 1.590 |
| | 45.0 | 0.520 | 1.580 |
| | 60.0 | 0.525 | 1.575 |
| | 90.0 | 0.527 | 1.573 |
| | 120.0 | 0.528 | 1.572 |
| | 180.0 | 0.528 | 1.572 |
| | 250.0 | 0.528 | 1.572 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |




| | | | | |
|---|---|---|---|---|
| Test effective depth | 1.60 | m (Water depth at t=0) | | |
| 75% effective depth: | 1.20 | m | *0.90* | *m bgl* |
| 50% effective depth: | 0.80 | m | *1.30* | *m bgl* |
| 25% effective depth: | 0.40 | m | *1.70* | *m bgl* |
| t75 | N/A | min | | |
| t50 | N/A | min | | |
| t25 | N/A | min | | |
| Vp75-25 | 0.67 | m3 | | |
| ap50 | 4.04 | m2 | | |
| tp75-25 | N/A | secs | | |
| Soil infiltration rate (f): | N/A | m/s | | |

**Test failed**

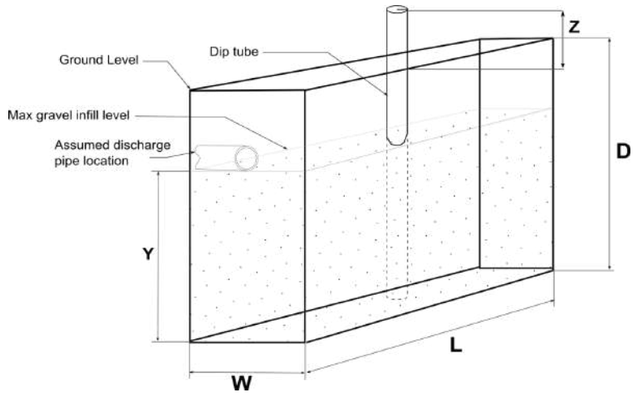
Soil infiltration rate, $f = \dfrac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

where:

$V_{p75-25}$ = the effective storage volume of water in the trial pit between 75% and 25% effective depth;

$a_{p50}$ = the internal surface area of the trial pit up to 50% effective depth and including the base area;

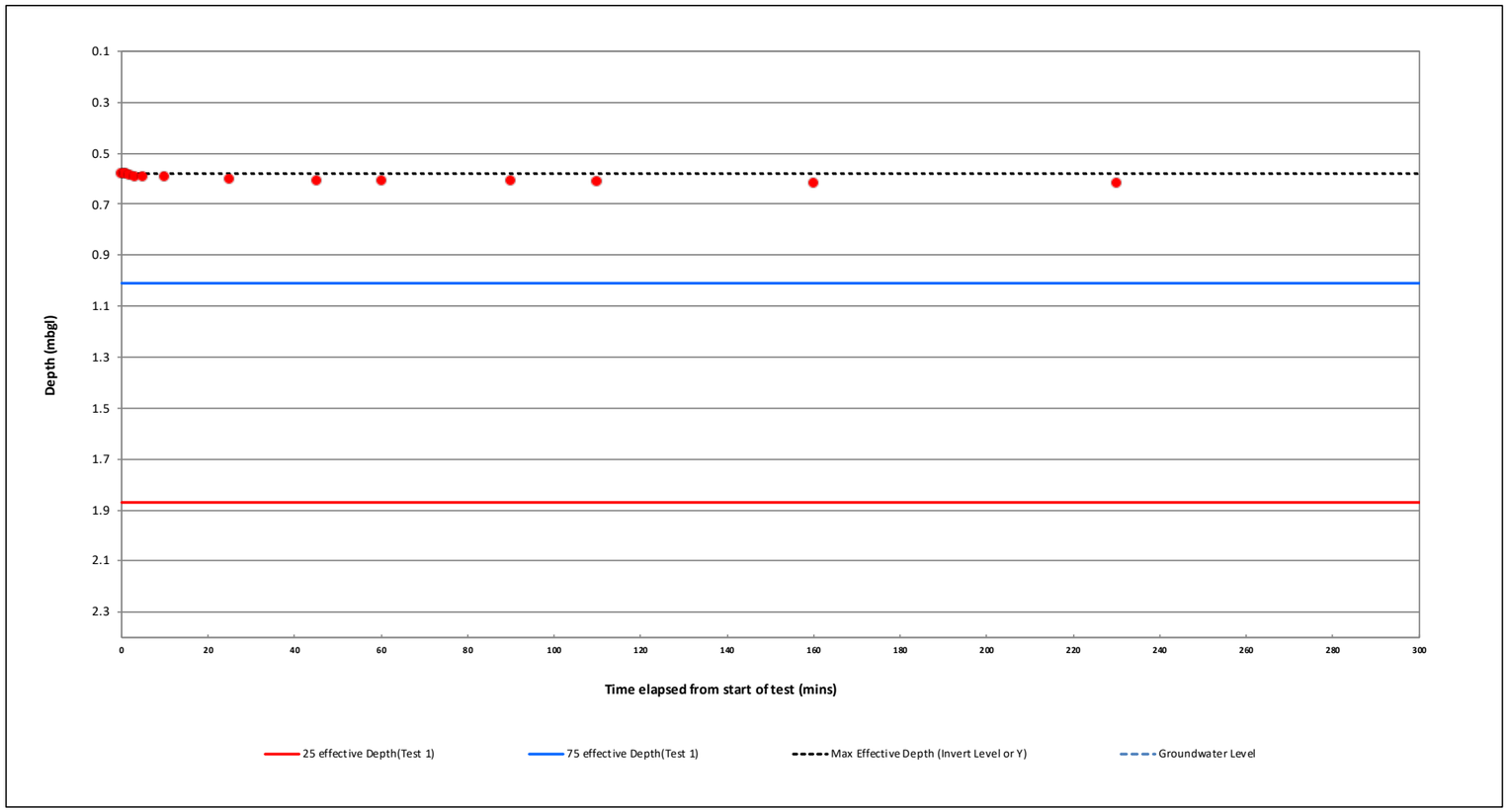
$t_{p75-25}$ = the time for the water level to fall from 75% to 25% effective depth.



| | | | | | | |
|---|---|---|---|---|---|---|
| **Pit reference:** | TP04 | **Parameters:** | | | | |
| **Project:** | 4272 | Trial pit length (m): | 1.2 | *( L )* | Assumed invert level (m): | c. 0.6 |
| **Date of infiltration test:** | 20/07/2022 | Trial pit width (m): | 0.6 | *( W )* | | |
| **Method:** | BRE365 | Trial pit depth (m): | 2.3 | *( D )* | | |
| **Date of calculation:** | 21/07/2022 | Depth to groundwater (m): | DRY | | | |
| **Completed by:** | AJS | Datum (mbgl): | 0 | *( Z )* | | |

**TEST 1**

| Time | Elapsed (min) | Water dip (mbgl) | Depth of water in pit (m) |
|---|---|---|---|
| 10:00:00 | 0.0 | 0.580 | 1.720 |
| | 0.5 | 0.580 | 1.720 |
| | 1.0 | 0.580 | 1.720 |
| | 2.0 | 0.585 | 1.715 |
| | 3.0 | 0.590 | 1.710 |
| | 5.0 | 0.590 | 1.710 |
| | 10.0 | 0.590 | 1.710 |
| | 25.0 | 0.600 | 1.700 |
| | 45.0 | 0.610 | 1.690 |
| | 60.0 | 0.610 | 1.690 |
| | 90.0 | 0.610 | 1.690 |
| | 110.0 | 0.615 | 1.685 |
| | 160.0 | 0.620 | 1.680 |
| | 230.0 | 0.620 | 1.680 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |




| | | | | |
|---|---|---|---|---|
| Test effective depth | 1.72 | m (Water depth at t=0) | | |
| 75% effective depth: | 1.29 | m | *1.01* | *m bgl* |
| 50% effective depth: | 0.86 | m | *1.44* | *m bgl* |
| 25% effective depth: | 0.43 | m | *1.87* | *m bgl* |
| t75 | N/A | min | | |
| t50 | N/A | min | | |
| t25 | N/A | min | | |
| | | | | |
| Vp75-25 | 0.62 | m3 | | |
| ap50 | 3.82 | m2 | | |
| tp75-25 | N/A | secs | | |
| Soil infiltration rate (f): | N/A | m/s | | |

**Test failed**

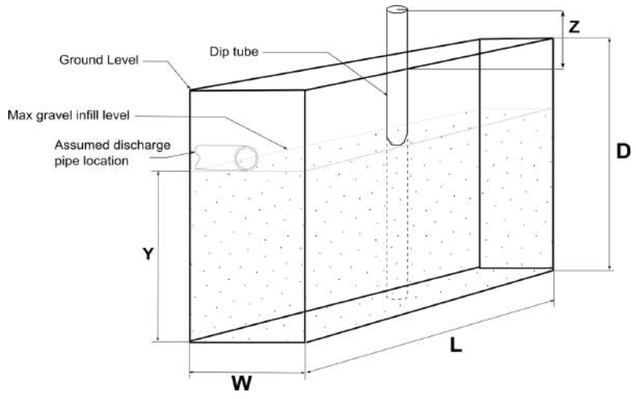
Soil infiltration rate, $f = \dfrac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

where:

$V_{p75-25}$ = the effective storage volume of water in the trial pit between 75% and 25% effective depth;

$a_{p50}$ = the internal surface area of the trial pit up to 50% effective depth and including the base area;

$t_{p75-25}$ = the time for the water level to fall from 75% to 25% effective depth.



# APPENDIX 4 – SuDS Strategy


Notes

To be constructed in accordance with local authority drainage design guidelines or to latest version of sewers for adoption in the absence of any local authority guidelines'

Contractor is to confirm, on site, all information given relating to existing services and drainage connections etc. Prior to commencing the works and any discrepancies reported immediately to the engineer.

Allow for hand dig around existing services where necessary.

Existing flows in watercourses, sewers and land drainage shall be maintained at all times during the works or handled accordingly.

Any gradients of drains are indicative only and the contractor shall install drains to the invert levels shown for each manhole, or check with the engineer if any doubt.

All covers and gratings to be class B where in access or can be class A where away from access and any vehicle paths

Cover levels of the manholes are provisional and subject to adjustment to suit the finished ground levels.

Unless noted otherwise, all manhole invert levels are to the lowest (outgoing) pipe. All incoming pipework to be laid soffits level.

Ground levels shown are existing topographic survey and will not apply to the design but probably to much of the surrounding area. On drawing for guide purposes only

All external levels to be checked against latest architects drawings.

All drainage outlet positions, (rainwater pipes and soil stacks), to be checked against latest architects drawings.

The attenuation tank as per drawing detail and manufacturers design. Dimensions can vary if needed so long as the overall volume is not less than in the design

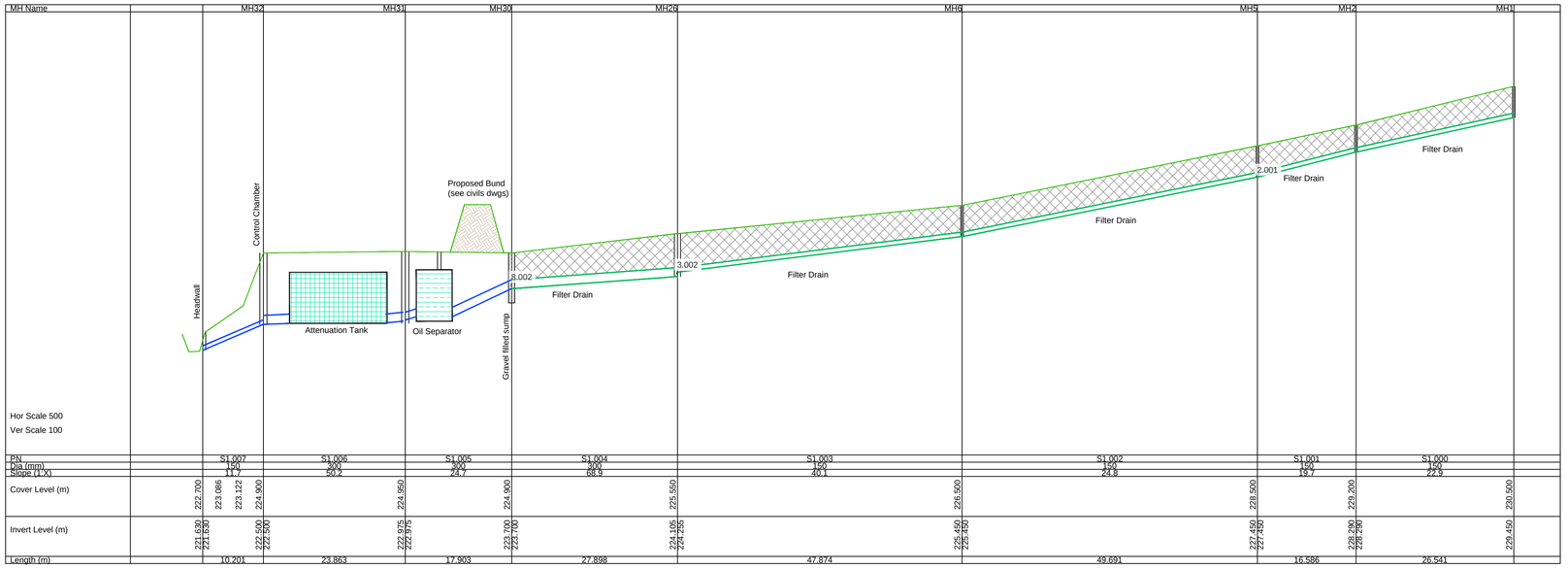
## KEY

- SITE BOUNDARY
- PROPOSED SURFACE WATER DRAIN
- PROPOSED FILTER DRAIN
- HEADWALL
- MH 1 - 33
- EXCEEDANCE FLOOD FLOW PATHS
- ATTENUATION TANK
- OIL SEPARATOR
- STONE ACCESS TRACK - 70% Impermeable
- PLANT AREAS (mix impermeable/stone/grass) - 50% Impermeable
- GRASSES AREAS- 5% Impermeable

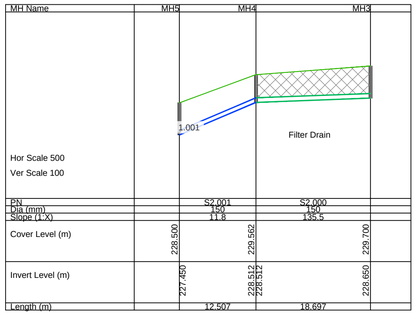
**KRS ENVIRONMENTAL**

TEL: 01484 437420 MOBILE: 07857264376
3 PRINCES SQUARE PRINCES STREET
MONTGOMERY POWYS SY15 6PZ

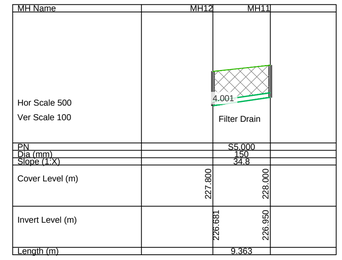
| | |
|---|---|
| Job: | NEWFIELDS FARM BESS |
| Client: | RE PROJECTS DEVELOPMENT LTD |
| Drawing Title: | PROPOSED DRAINAGE |
| Date: | JANUARY 2024 |
| Drawing No: | KRS.0612.002 revision: E |
| Scale: | 1:350 @ A1 |
| Drawn: | PM |
| Status: | |



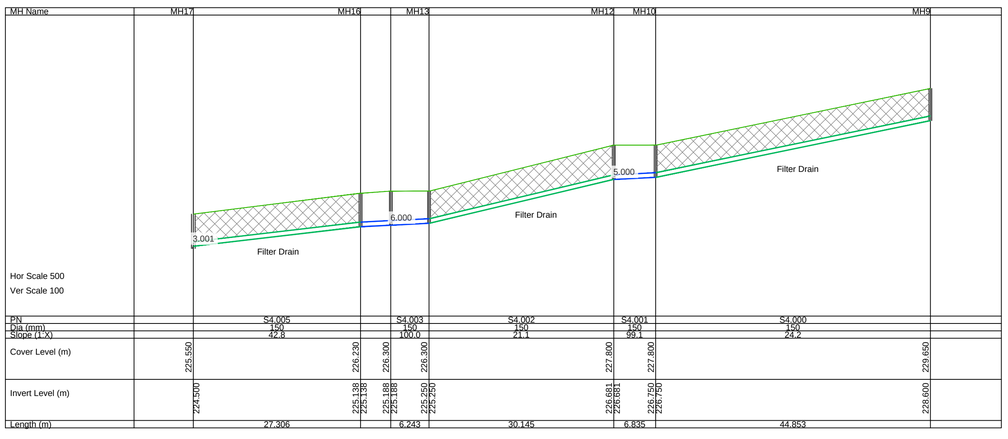

| MH Name | | MH32 | | MH31 | | MH30 | | MH26 | | MH6 | | MH5 | | MH2 | | MH1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PN | | S1.007 | | S1.006 | | S1.005 | | S1.004 | | S1.003 | | S1.002 | | S1.001 | | S1.000 |
| Dia (mm) | | 150 | | 300 | | 300 | | 300 | | 150 | | 150 | | 150 | | 150 |
| Slope (1:X) | | 11.7 | | 50.2 | | 24.7 | | 68.9 | | 40.1 | | 24.8 | | 19.7 | | 22.9 |
| Cover Level (m) | 222.700 | | 224.900 | | 224.950 | | 224.900 | | 225.500 | | 226.500 | | 228.500 | | 229.200 | 230.500 |
| Invert Level (m) | 221.630 | 223.086 | 222.500 | 223.122 | 222.975 | 222.975 | 223.700 | 223.700 | 224.105 | 224.255 | 225.450 | 225.450 | 227.450 | 227.450 | 228.290 | 229.450 |
| Length (m) | | 10.201 | | 23.863 | | 17.903 | | 27.898 | | 47.874 | | 49.691 | | 16.586 | | 26.541 |



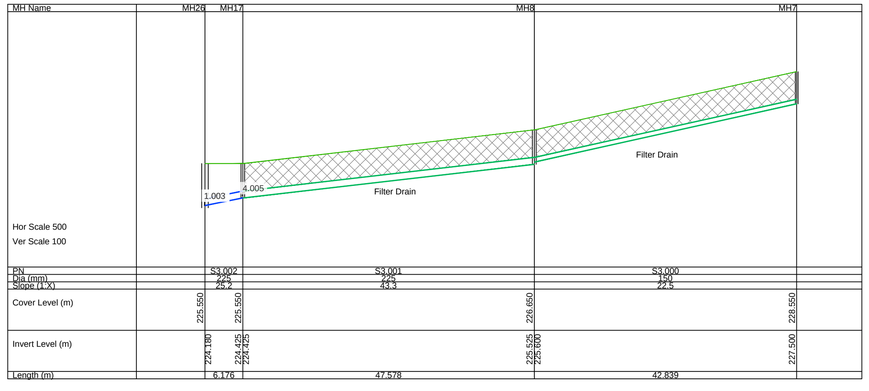

| MH Name | | MH5 | | MH4 | | MH3 |
|---|---|---|---|---|---|---|
| PN | | | | S2.001 | | S2.000 |
| Dia (mm) | | | | 150 | | 150 |
| Slope (1:X) | | | | 11.8 | | 135.5 |
| Cover Level (m) | 228.500 | | 229.562 | | 229.700 | |
| Invert Level (m) | 227.450 | | 228.512 | 228.512 | 228.650 | |
| Length (m) | | | 12.507 | | 18.697 | |



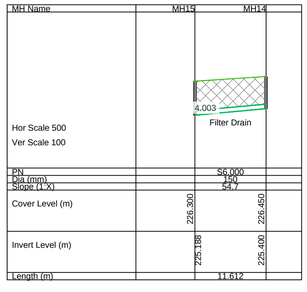

| MH Name | | MH12 | | MH11 | |
|---|---|---|---|---|---|
| PN | | | | S5.000 | |
| Dia (mm) | | | | 150 | |
| Slope (1:X) | | | | 54.8 | |
| Cover Level (m) | 227.800 | | 228.000 | | |
| Invert Level (m) | 226.681 | 226.750 | 226.950 | | |
| Length (m) | | | 9.363 | | |



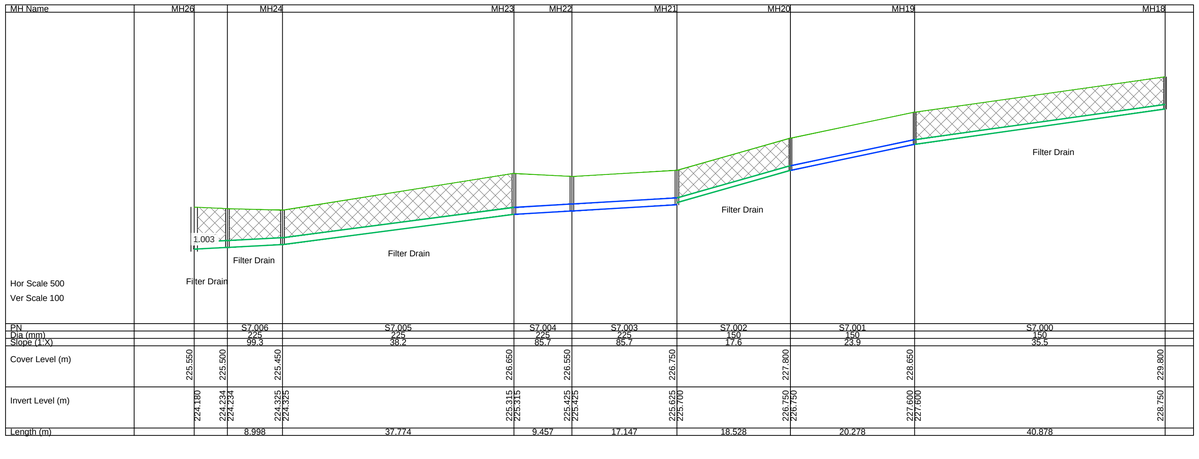

| MH Name | | MH17 | | MH16 | | MH13 | | MH12 | MH10 | | MH9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PN | | S4.005 | | | S4.003 | | S4.002 | | S4.001 | | S4.000 | |
| Dia (mm) | | 150 | | | 150 | | 150 | | 150 | | 150 | |
| Slope (1:X) | | 42.8 | | | 100.0 | | 21.1 | | 99.1 | | 24.2 | |
| Cover Level (m) | 225.550 | | 226.230 | 226.900 | | 226.300 | | 227.800 | | 227.800 | | 229.650 |
| Invert Level (m) | 224.500 | | 225.138 | 225.188 | 225.188 | 225.250 | 225.250 | 226.681 | 226.681 | 226.750 | 226.750 | 228.600 |
| Length (m) | | 27.306 | | | 6.243 | | 30.145 | | 6.835 | | 44.853 | |



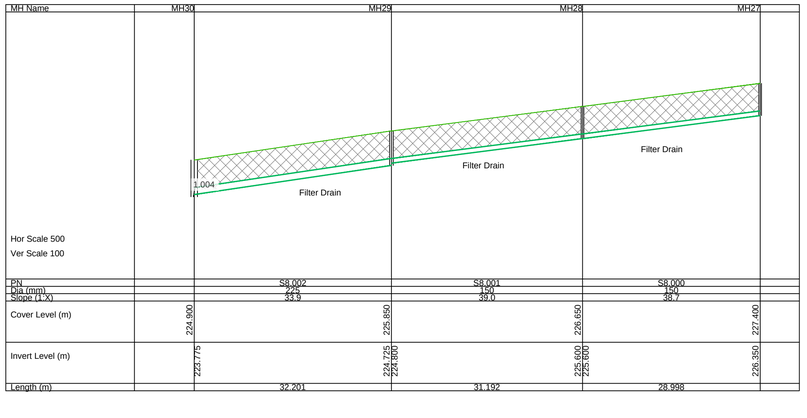

| MH Name | | MH26 | MH17 | | MH8 | | MH7 | |
|---|---|---|---|---|---|---|---|---|
| PN | | | S3.002 | | S3.001 | | S3.000 | |
| Dia (mm) | | | 225 | | 225 | | 150 | |
| Slope (1:X) | | | 25.2 | | 43.3 | | 22.5 | |
| Cover Level (m) | 225.550 | | 225.550 | | 226.650 | | 228.550 | |
| Invert Level (m) | 224.180 | 224.425 | 224.425 | | 225.525 | 225.600 | 227.500 | |
| Length (m) | | 6.176 | | | 47.578 | | 42.839 | |




| MH Name | | MH15 | | MH14 | |
|---|---|---|---|---|---|
| PN | | | | S6.000 | |
| Dia (mm) | | | | 150 | |
| Slope (1:X) | | | | 54.7 | |
| Cover Level (m) | 226.300 | | 226.450 | | |
| Invert Level (m) | 225.188 | | 225.400 | | |
| Length (m) | | | 11.612 | | |




| MH Name | | MH28 | | MH24 | | MH23 | MH22 | MH21 | MH20 | MH19 | | MH18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PN | | | S7.006 | | S7.005 | | S7.004 | S7.003 | S7.002 | S7.001 | S7.000 | |
| Dia (mm) | | | 225 | | 225 | | 225 | 225 | 150 | 150 | 150 | |
| Slope (1:X) | | | 99.3 | | 38.2 | | 85.7 | 85.7 | 17.6 | 23.9 | 35.5 | |
| Cover Level (m) | 225.550 | 225.500 | 225.450 | | | 226.650 | 226.550 | 226.750 | 227.800 | 228.650 | | 229.800 |
| Invert Level (m) | 224.180 | 224.234 | 224.234 | 224.325 | 224.325 | 225.315 | 225.425 | 225.425 | 226.675 | 226.750 | 227.600 | 228.750 |
| | | | | | | | | | | 226.750 | 227.600 | |
| Length (m) | | 8.998 | | 37.774 | | 9.457 | 17.147 | | 18.528 | 20.278 | 40.878 | |




| MH Name | | MH30 | | MH29 | | MH28 | | MH27 |
|---|---|---|---|---|---|---|---|---|
| PN | | S8.002 | | S8.001 | | S8.000 | | |
| Dia (mm) | | 225 | | 150 | | 150 | | |
| Slope (1:X) | | 33.9 | | 39.0 | | 38.7 | | |
| Cover Level (m) | 224.900 | | 225.850 | | 226.650 | | 227.400 | |
| Invert Level (m) | 223.775 | | 224.725 | 224.800 | 225.600 | 225.600 | 226.350 | |
| Length (m) | | 32.201 | | 31.192 | | 28.998 | | |

**KRS ENVIRONMENTAL**

TEL: 01484 437420 MOBILE: 07857264376
3 PRINCES SQUARE PRINCES STREET
MONTGOMERY POWYS SY15 6PZ

| | |
|---|---|
| Job: | NEWFIELDS FARM BESS |
| Client: | RE PROJECTS DEVELOPMENT LTD |
| Drawing Title: | PROPOSED SW DRAINAGE DESIGN PROFILES |
| Date: | JANUARY 2024 |
| Drawing No: | KRS.0612.002.1 revision: E |
| Scale: | As @ A1 |
| Drawn: | PM |
| Status: | |

| Manhole Name | Cover Level (m) | MH Depth (m) | Manhole Connection | Manhole Diam.,L*W (mm) | Pipe Out PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| MH1 | 230.500 | 1.050 | Open Manhole | 450 | S1.000 | 229.450 | 150 | | | |
| MH2 | 229.200 | 0.910 | Open Manhole | 450 | S1.001 | 228.290 | 150 | S1.000 | 228.290 | 150 |
| MH3 | 229.700 | 1.050 | Open Manhole | 450 | S2.000 | 228.650 | 150 | | | |
| MH4 | 229.050 | 0.538 | Open Manhole | 450 | S2.001 | 228.512 | 150 | S2.000 | 228.512 | 150 |
| MH5 | 228.500 | 1.050 | Open Manhole | 450 | S1.002 | 227.450 | 150 | S1.001 | 227.450 | 150 |
| | | | | | | | | S2.001 | 227.450 | 150 |
| MH6 | 226.500 | 1.050 | Open Manhole | 450 | S1.003 | 225.450 | 150 | S1.002 | 225.450 | 150 |
| MH7 | 228.550 | 1.050 | Open Manhole | 450 | S3.000 | 227.500 | 150 | | | |
| MH8 | 226.650 | 1.125 | Open Manhole | 600 | S3.001 | 225.525 | 225 | S3.000 | 225.600 | 150 |
| MH9 | 229.650 | 1.050 | Open Manhole | 450 | S4.000 | 228.600 | 150 | | | |
| MH10 | 227.800 | 1.050 | Open Manhole | 450 | S4.001 | 226.750 | 150 | S4.000 | 226.750 | 150 |
| MH11 | 228.000 | 1.050 | Open Manhole | 450 | S5.000 | 226.950 | 150 | | | |
| MH12 | 227.800 | 1.119 | Open Manhole | 450 | S4.002 | 226.681 | 150 | S4.001 | 226.681 | 150 |
| | | | | | | | | S5.000 | 226.681 | 150 |
| MH13 | 226.300 | 1.050 | Open Manhole | 450 | S4.003 | 225.250 | 150 | S4.002 | 225.250 | 150 |
| MH14 | 226.450 | 1.050 | Open Manhole | 450 | S6.000 | 225.400 | 150 | | | |
| MH15 | 226.300 | 1.112 | Open Manhole | 450 | S4.004 | 225.188 | 150 | S4.003 | 225.188 | 150 |
| | | | | | | | | S6.000 | 225.188 | 150 |
| MH16 | 226.230 | 1.092 | Open Manhole | 450 | S4.005 | 225.138 | 150 | S4.004 | 225.138 | 150 |
| MH17 | 225.550 | 1.125 | Open Manhole | 600 | S3.002 | 224.425 | 225 | S3.001 | 224.425 | 225 |
| | | | | | | | | S4.005 | 224.500 | 150 |
| MH18 | 229.800 | 1.050 | Open Manhole | 450 | S7.000 | 228.750 | 150 | | | |
| MH19 | 228.650 | 1.050 | Open Manhole | 450 | S7.001 | 227.600 | 150 | S7.000 | 227.600 | 150 |
| MH20 | 227.800 | 1.050 | Open Manhole | 450 | S7.002 | 226.750 | 150 | S7.001 | 226.750 | 150 |
| MH21 | 226.750 | 1.125 | Open Manhole | 600 | S7.003 | 225.625 | 225 | S7.002 | 225.700 | 150 |
| MH22 | 226.550 | 1.125 | Open Manhole | 600 | S7.004 | 225.425 | 225 | S7.003 | 225.425 | 225 |
| MH23 | 226.650 | 1.335 | Open Manhole | 600 | S7.005 | 225.315 | 225 | S7.004 | 225.315 | 225 |
| MH24 | 225.450 | 1.125 | Open Manhole | 600 | S7.006 | 224.325 | 225 | S7.005 | 224.325 | 225 |
| MH25 | 225.500 | 1.266 | Open Manhole | 600 | S7.007 | 224.234 | 225 | S7.006 | 224.234 | 225 |
| MH26 | 225.550 | 1.445 | Open Manhole | 1050 | S1.004 | 224.105 | 300 | S1.003 | 224.255 | 150 |
| | | | | | | | | S3.002 | 224.180 | 225 |
| | | | | | | | | S7.007 | 224.180 | 225 |
| MH27 | 227.400 | 1.050 | Open Manhole | 450 | S8.000 | 226.350 | 150 | | | |
| MH28 | 226.650 | 1.050 | Open Manhole | 450 | S8.001 | 225.600 | 150 | S8.000 | 225.600 | 150 |
| MH29 | 225.850 | 1.125 | Open Manhole | 600 | S8.002 | 224.725 | 225 | S8.001 | 224.800 | 150 |
| MH30 | 224.900 | 1.200 | Open Manhole | 1050 | S1.005 | 223.700 | 300 | S1.004 | 223.700 | 300 |
| | | | | | | | | S8.002 | 223.775 | 225 |
| MH31 | 224.950 | 1.975 | Open Manhole | 1200 | S1.006 | 222.975 | 300 | S1.005 | 222.975 | 300 |
| MH32 | 224.900 | 2.400 | Control Chamber | 1200 | S1.007 | 222.500 | 150 | S1.006 | 222.500 | 300 |
| MH33 Headwall | 222.700 | 1.070 | Headwall | | | | | S1.007 | 221.630 | 150 |

# APPENDIX 5 – MicroDrainage Calculations

## STORM SEWER DESIGN by the Modified Rational Method

### Design Criteria for Storm

Pipe Sizes SLS-1 Manhole Sizes 600mm +

FSR Rainfall Model - England and Wales

| | | | | | |
|---|---|---|---|---|---|
| Return Period (years) | 2 | Foul Sewage (l/s/ha) | 0.000 | Maximum Backdrop Height (m) | 1.500 |
| M5-60 (mm) | 18.100 | Volumetric Runoff Coeff. | 0.750 | Min Design Depth for Optimisation (m) | 0.900 |
| Ratio R | 0.353 | PIMP (%) | 100 | Min Vel for Auto Design only (m/s) | 1.00 |
| Maximum Rainfall (mm/hr) | 50 | Add Flow / Climate Change (%) | 0 | Min Slope for Optimisation (1:X) | 500 |
| Maximum Time of Concentration (mins) | 30 | Minimum Backdrop Height (m) | 0.500 | | |

Designed with Level Soffits

### Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | 26.541 | 1.160 | 22.9 | 0.007 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S1.001 | 16.586 | 0.840 | 19.7 | 0.007 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S2.000 | 18.697 | 0.138 | 135.5 | 0.008 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |

### Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | 50.00 | 5.21 | 229.450 | 0.007 | 0.0 | 0.0 | 0.0 | 2.11 | 37.4 | 0.9 |
| S1.001 | 50.00 | 5.33 | 228.290 | 0.013 | 0.0 | 0.0 | 0.0 | 2.28 | 40.2 | 1.8 |
| S2.000 | 50.00 | 5.36 | 228.650 | 0.008 | 0.0 | 0.0 | 0.0 | 0.86 | 15.2 | 1.1 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S2.001 | 12.507 | 1.062 | 11.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S1.002 | 49.691 | 2.000 | 24.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S1.003 | 47.874 | 1.195 | 40.1 | 0.018 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S3.000 | 42.839 | 1.900 | 22.5 | 0.072 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S3.001 | 47.578 | 1.100 | 43.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S4.000 | 44.853 | 1.850 | 24.2 | 0.002 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S4.001 | 6.835 | 0.069 | 99.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S5.000 | 9.363 | 0.269 | 34.8 | 0.005 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S2.001 | 50.00 | 5.43 | 228.512 | 0.008 | 0.0 | 0.0 | 0.0 | 2.95 | 52.2 | 1.1 |
| S1.002 | 50.00 | 5.84 | 227.450 | 0.022 | 0.0 | 0.0 | 0.0 | 2.03 | 35.8 | 3.0 |
| S1.003 | 50.00 | 6.34 | 225.450 | 0.040 | 0.0 | 0.0 | 0.0 | 1.59 | 28.2 | 5.4 |
| S3.000 | 50.00 | 5.34 | 227.500 | 0.072 | 0.0 | 0.0 | 0.0 | 2.13 | 37.6 | 9.7 |
| S3.001 | 50.00 | 5.73 | 225.525 | 0.072 | 0.0 | 0.0 | 0.0 | 1.99 | 79.3 | 9.7 |
| S4.000 | 50.00 | 5.36 | 228.600 | 0.002 | 0.0 | 0.0 | 0.0 | 2.05 | 36.3 | 0.3 |
| S4.001 | 50.00 | 5.48 | 226.750 | 0.002 | 0.0 | 0.0 | 0.0 | 1.01 | 17.8 | 0.3 |
| S5.000 | 50.00 | 5.09 | 226.950 | 0.005 | 0.0 | 0.0 | 0.0 | 1.71 | 30.2 | 0.6 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S4.002 | 30.145 | 1.431 | 21.1 | 0.019 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S4.003 | 6.243 | 0.062 | 100.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S6.000 | 11.612 | 0.212 | 54.7 | 0.010 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S4.004 | 4.940 | 0.050 | 99.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S4.005 | 27.306 | 0.638 | 42.8 | 0.012 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S3.002 | 6.176 | 0.245 | 25.2 | 0.056 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S7.000 | 40.878 | 1.150 | 35.5 | 0.013 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S7.001 | 20.278 | 0.850 | 23.9 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S7.002 | 18.528 | 1.050 | 17.6 | 0.010 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S4.002 | 50.00 | 5.70 | 226.681 | 0.026 | 0.0 | 0.0 | 0.0 | 2.20 | 39.0 | 3.5 |
| S4.003 | 50.00 | 5.81 | 225.250 | 0.026 | 0.0 | 0.0 | 0.0 | 1.00 | 17.8 | 3.5 |
| S6.000 | 50.00 | 5.14 | 225.400 | 0.010 | 0.0 | 0.0 | 0.0 | 1.36 | 24.1 | 1.4 |
| S4.004 | 50.00 | 5.89 | 225.188 | 0.036 | 0.0 | 0.0 | 0.0 | 1.01 | 17.8 | 4.8 |
| S4.005 | 50.00 | 6.19 | 225.138 | 0.048 | 0.0 | 0.0 | 0.0 | 1.54 | 27.3 | 6.5 |
| S3.002 | 50.00 | 6.22 | 224.425 | 0.175 | 0.0 | 0.0 | 0.0 | 2.62 | 104.1 | 23.7 |
| S7.000 | 50.00 | 5.40 | 228.750 | 0.013 | 0.0 | 0.0 | 0.0 | 1.69 | 29.9 | 1.8 |
| S7.001 | 50.00 | 5.57 | 227.600 | 0.013 | 0.0 | 0.0 | 0.0 | 2.07 | 36.6 | 1.8 |
| S7.002 | 50.00 | 5.69 | 226.750 | 0.024 | 0.0 | 0.0 | 0.0 | 2.41 | 42.6 | 3.2 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S7.003 | 17.147 | 0.200 | 85.7 | 0.006 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S7.004 | 9.457 | 0.110 | 85.7 | 0.007 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S7.005 | 37.774 | 0.990 | 38.2 | 0.014 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S7.006 | 8.998 | 0.091 | 99.3 | 0.004 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S7.007 | 5.422 | 0.055 | 99.3 | 0.001 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S1.004 | 27.898 | 0.405 | 68.9 | 0.032 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S8.000 | 28.998 | 0.750 | 38.7 | 0.044 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S8.001 | 31.192 | 0.800 | 39.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S8.002 | 32.201 | 0.950 | 33.9 | 0.077 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S1.005 | 17.903 | 0.725 | 24.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S7.003 | 50.00 | 5.90 | 225.625 | 0.030 | 0.0 | 0.0 | 0.0 | 1.41 | 56.2 | 4.0 |
| S7.004 | 50.00 | 6.01 | 225.425 | 0.036 | 0.0 | 0.0 | 0.0 | 1.41 | 56.2 | 4.9 |
| S7.005 | 50.00 | 6.30 | 225.315 | 0.050 | 0.0 | 0.0 | 0.0 | 2.12 | 84.5 | 6.7 |
| S7.006 | 50.00 | 6.42 | 224.325 | 0.054 | 0.0 | 0.0 | 0.0 | 1.31 | 52.2 | 7.2 |
| S7.007 | 50.00 | 6.49 | 224.234 | 0.055 | 0.0 | 0.0 | 0.0 | 1.31 | 52.2 | 7.4 |
| S1.004 | 50.00 | 6.73 | 224.105 | 0.302 | 0.0 | 0.0 | 0.0 | 1.90 | 134.1 | 40.9 |
| S8.000 | 50.00 | 5.30 | 226.350 | 0.044 | 0.0 | 0.0 | 0.0 | 1.62 | 28.7 | 5.9 |
| S8.001 | 50.00 | 5.62 | 225.600 | 0.044 | 0.0 | 0.0 | 0.0 | 1.62 | 28.6 | 5.9 |
| S8.002 | 50.00 | 5.86 | 224.725 | 0.121 | 0.0 | 0.0 | 0.0 | 2.25 | 89.7 | 16.4 |
| S1.005 | 50.00 | 6.83 | 223.700 | 0.423 | 0.0 | 0.0 | 0.0 | 3.18 | 224.6 | 57.2 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.006 | 23.863 | 0.475 | 50.2 | 0.000 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S1.007 | 10.201 | 0.870 | 11.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S1.008 | 4.871 | 0.100 | 48.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S1.006 | 50.00 | 7.00 | 222.975 | 0.423 | 0.0 | 0.0 | 0.0 | 2.22 | 157.2 | 57.2 |
| S1.007 | 50.00 | 5.06 | 222.500 | 0.000 | 5.0 | 0.0 | 0.0 | 2.96 | 52.3 | 5.0 |
| S1.008 | 50.00 | 5.11 | 221.630 | 0.000 | 5.0 | 0.0 | 0.0 | 1.45 | 25.5 | 5.0 |

## Manhole Schedules for Storm

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam.,L*W (mm) | Pipe Out PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MH1 | 230.500 | 1.050 | Open Manhole | 450 | S1.000 | 229.450 | 150 | | | | |
| MH2 | 229.200 | 0.910 | Open Manhole | 450 | S1.001 | 228.290 | 150 | S1.000 | 228.290 | 150 | |
| MH3 | 229.700 | 1.050 | Open Manhole | 450 | S2.000 | 228.650 | 150 | | | | |
| MH4 | 229.050 | 0.538 | Open Manhole | 450 | S2.001 | 228.512 | 150 | S2.000 | 228.512 | 150 | |
| MH5 | 228.500 | 1.050 | Open Manhole | 450 | S1.002 | 227.450 | 150 | S1.001 | 227.450 | 150 | |
| | | | | | | | | S2.001 | 227.450 | 150 | |
| MH6 | 226.500 | 1.050 | Open Manhole | 450 | S1.003 | 225.450 | 150 | S1.002 | 225.450 | 150 | |
| MH7 | 228.550 | 1.050 | Open Manhole | 450 | S3.000 | 227.500 | 150 | | | | |
| MH8 | 226.650 | 1.125 | Open Manhole | 600 | S3.001 | 225.525 | 225 | S3.000 | 225.600 | 150 | |
| MH9 | 229.650 | 1.050 | Open Manhole | 450 | S4.000 | 228.600 | 150 | | | | |
| MH10 | 227.800 | 1.050 | Open Manhole | 450 | S4.001 | 226.750 | 150 | S4.000 | 226.750 | 150 | |
| MH11 | 228.000 | 1.050 | Open Manhole | 450 | S5.000 | 226.950 | 150 | | | | |
| MH12 | 227.800 | 1.119 | Open Manhole | 450 | S4.002 | 226.681 | 150 | S4.001 | 226.681 | 150 | |
| | | | | | | | | S5.000 | 226.681 | 150 | |
| MH13 | 226.300 | 1.050 | Open Manhole | 450 | S4.003 | 225.250 | 150 | S4.002 | 225.250 | 150 | |
| MH14 | 226.450 | 1.050 | Open Manhole | 450 | S6.000 | 225.400 | 150 | | | | |
| MH15 | 226.300 | 1.112 | Open Manhole | 450 | S4.004 | 225.188 | 150 | S4.003 | 225.188 | 150 | |
| | | | | | | | | S6.000 | 225.188 | 150 | |
| MH16 | 226.230 | 1.092 | Open Manhole | 450 | S4.005 | 225.138 | 150 | S4.004 | 225.138 | 150 | |
| MH17 | 225.550 | 1.125 | Open Manhole | 600 | S3.002 | 224.425 | 225 | S3.001 | 224.425 | 225 | |
| | | | | | | | | S4.005 | 224.500 | 150 | |
| MH18 | 229.800 | 1.050 | Open Manhole | 450 | S7.000 | 228.750 | 150 | | | | |
| MH19 | 228.650 | 1.050 | Open Manhole | 450 | S7.001 | 227.600 | 150 | S7.000 | 227.600 | 150 | |

## Manhole Schedules for Storm

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam.,L*W (mm) | Pipe Out PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MH20 | 227.800 | 1.050 | Open Manhole | 450 | S7.002 | 226.750 | 150 | S7.001 | 226.750 | 150 | |
| MH21 | 226.750 | 1.125 | Open Manhole | 600 | S7.003 | 225.625 | 225 | S7.002 | 225.700 | 150 | |
| MH22 | 226.550 | 1.125 | Open Manhole | 600 | S7.004 | 225.425 | 225 | S7.003 | 225.425 | 225 | |
| MH23 | 226.650 | 1.335 | Open Manhole | 600 | S7.005 | 225.315 | 225 | S7.004 | 225.315 | 225 | |
| MH24 | 225.450 | 1.125 | Open Manhole | 600 | S7.006 | 224.325 | 225 | S7.005 | 224.325 | 225 | |
| MH25 | 225.500 | 1.266 | Open Manhole | 600 | S7.007 | 224.234 | 225 | S7.006 | 224.234 | 225 | |
| MH26 | 225.550 | 1.445 | Open Manhole | 1050 | S1.004 | 224.105 | 300 | S1.003 | 224.255 | 150 | |
| | | | | | | | | S3.002 | 224.180 | 225 | |
| | | | | | | | | S7.007 | 224.180 | 225 | |
| MH27 | 227.400 | 1.050 | Open Manhole | 450 | S8.000 | 226.350 | 150 | | | | |
| MH28 | 226.650 | 1.050 | Open Manhole | 450 | S8.001 | 225.600 | 150 | S8.000 | 225.600 | 150 | |
| MH29 | 225.850 | 1.125 | Open Manhole | 600 | S8.002 | 224.725 | 225 | S8.001 | 224.800 | 150 | |
| MH30 | 224.900 | 1.200 | Open Manhole | 1050 | S1.005 | 223.700 | 300 | S1.004 | 223.700 | 300 | |
| | | | | | | | | S8.002 | 223.775 | 225 | |
| MH31 | 224.950 | 1.975 | Open Manhole | 1200 | S1.006 | 222.975 | 300 | S1.005 | 222.975 | 300 | |
| MH32 | 224.900 | 2.400 | Open Manhole | 1200 | S1.007 | 222.500 | 150 | S1.006 | 222.500 | 300 | |
| MH33 Headwall | 222.700 | 1.070 | Open Manhole | 1000 | S1.008 | 221.630 | 150 | S1.007 | 221.630 | 150 | |
| MHDummy | 223.040 | 1.510 | Open Manhole | 1200 | | OUTFALL | | S1.008 | 221.530 | 150 | |

## Manhole Schedules for Storm

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---|---|---|---|---|---|---|
| MH1 | 394401.275 | 349035.194 | 394401.275 | 349035.194 | Required | |
| MH2 | 394382.227 | 349053.677 | 394382.227 | 349053.677 | Required | |
| MH3 | 394412.256 | 349070.711 | 394412.256 | 349070.711 | Required | |
| MH4 | 394393.559 | 349070.691 | 394393.559 | 349070.691 | Required | |
| MH5 | 394381.061 | 349070.222 | 394381.061 | 349070.222 | Required | |
| MH6 | 394381.148 | 349119.913 | 394381.148 | 349119.913 | Required | |
| MH7 | 394386.944 | 349077.377 | 394386.944 | 349077.377 | Required | |
| MH8 | 394387.075 | 349120.216 | 394387.075 | 349120.216 | Required | |
| MH9 | 394414.680 | 349074.805 | 394414.680 | 349074.805 | Required | |
| MH10 | 394414.635 | 349119.658 | 394414.635 | 349119.658 | Required | |

## Manhole Schedules for Storm

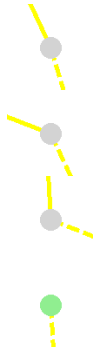
| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---|---|---|---|---|---|---|
| MH11 | 394424.058 | 349126.363 | 394424.058 | 349126.363 | Required | |
| MH12 | 394414.696 | 349126.492 | 394414.696 | 349126.492 | Required | |
| MH13 | 394414.536 | 349156.637 | 394414.536 | 349156.637 | Required | |
| MH14 | 394426.099 | 349162.951 | 394426.099 | 349162.951 | Required | |
| MH15 | 394414.487 | 349162.880 | 394414.487 | 349162.880 | Required | |
| MH16 | 394414.542 | 349167.820 | 394414.542 | 349167.820 | Required | |
| MH17 | 394387.236 | 349167.793 | 394387.236 | 349167.793 | Required | |
| MH18 | 394416.663 | 349073.483 | 394416.663 | 349073.483 | Required | |
| MH19 | 394426.480 | 349113.164 | 394426.480 | 349113.164 | Required | |
| MH20 | 394429.522 | 349133.213 | 394429.522 | 349133.213 | Required | |

## Manhole Schedules for Storm

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---|---|---|---|---|---|---|
| MH21 | 394429.660 | 349151.740 | 394429.660 | 349151.740 | Required | |
| MH22 | 394429.936 | 349168.884 | 394429.936 | 349168.884 | Required | |
| MH23 | 394427.830 | 349178.104 | 394427.830 | 349178.104 | Required | |
| MH24 | 394390.056 | 349178.226 | 394390.056 | 349178.226 | Required | |
| MH25 | 394382.783 | 349172.927 | 394382.783 | 349172.927 | Required | |
| MH26 | 394381.059 | 349167.786 | 394381.059 | 349167.786 | Required | |
| MH27 | 394353.553 | 349075.442 | 394353.553 | 349075.442 | Required | |
| MH28 | 394353.739 | 349104.440 | 394353.739 | 349104.440 | Required | |
| MH29 | 394354.049 | 349135.630 | 394354.049 | 349135.630 | Required | |
| MH30 | 394353.161 | 349167.819 | 394353.161 | 349167.819 | Required | |

## Manhole Schedules for Storm

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---|---|---|---|---|---|---|
| MH31 | 394348.049 | 349184.977 | 394348.049 | 349184.977 | Required | |
| MH32 | 394337.941 | 349206.594 | 394337.941 | 349206.594 | Required | |
| MH33 Headwall | 394328.438 | 349210.302 | 394328.438 | 349210.302 | Required | |
| MHDummy | 394328.162 | 349215.165 | | | No Entry | |



## PIPELINE SCHEDULES for Storm

### Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S1.000 | o | 150 | MH1 | 230.500 | 229.450 | 0.900 | Open Manhole | 450 |
| S1.001 | o | 150 | MH2 | 229.200 | 228.290 | 0.760 | Open Manhole | 450 |
| S2.000 | o | 150 | MH3 | 229.700 | 228.650 | 0.900 | Open Manhole | 450 |
| S2.001 | o | 150 | MH4 | 229.050 | 228.512 | 0.388 | Open Manhole | 450 |
| S1.002 | o | 150 | MH5 | 228.500 | 227.450 | 0.900 | Open Manhole | 450 |
| S1.003 | o | 150 | MH6 | 226.500 | 225.450 | 0.900 | Open Manhole | 450 |
| S3.000 | o | 150 | MH7 | 228.550 | 227.500 | 0.900 | Open Manhole | 450 |
| S3.001 | o | 225 | MH8 | 226.650 | 225.525 | 0.900 | Open Manhole | 600 |

### Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S1.000 | 26.541 | 22.9 | MH2 | 229.200 | 228.290 | 0.760 | Open Manhole | 450 |
| S1.001 | 16.586 | 19.7 | MH5 | 228.500 | 227.450 | 0.900 | Open Manhole | 450 |
| S2.000 | 18.697 | 135.5 | MH4 | 229.050 | 228.512 | 0.388 | Open Manhole | 450 |
| S2.001 | 12.507 | 11.8 | MH5 | 228.500 | 227.450 | 0.900 | Open Manhole | 450 |
| S1.002 | 49.691 | 24.8 | MH6 | 226.500 | 225.450 | 0.900 | Open Manhole | 450 |
| S1.003 | 47.874 | 40.1 | MH26 | 225.550 | 224.255 | 1.145 | Open Manhole | 1050 |
| S3.000 | 42.839 | 22.5 | MH8 | 226.650 | 225.600 | 0.900 | Open Manhole | 600 |
| S3.001 | 47.578 | 43.3 | MH17 | 225.550 | 224.425 | 0.900 | Open Manhole | 600 |

## PIPELINE SCHEDULES for Storm

### Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S4.000 | o | 150 | MH9 | 229.650 | 228.600 | 0.900 | Open Manhole | 450 |
| S4.001 | o | 150 | MH10 | 227.800 | 226.750 | 0.900 | Open Manhole | 450 |
| S5.000 | o | 150 | MH11 | 228.000 | 226.950 | 0.900 | Open Manhole | 450 |
| S4.002 | o | 150 | MH12 | 227.800 | 226.681 | 0.969 | Open Manhole | 450 |
| S4.003 | o | 150 | MH13 | 226.300 | 225.250 | 0.900 | Open Manhole | 450 |
| S6.000 | o | 150 | MH14 | 226.450 | 225.400 | 0.900 | Open Manhole | 450 |
| S4.004 | o | 150 | MH15 | 226.300 | 225.188 | 0.962 | Open Manhole | 450 |
| S4.005 | o | 150 | MH16 | 226.230 | 225.138 | 0.942 | Open Manhole | 450 |

### Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S4.000 | 44.853 | 24.2 | MH10 | 227.800 | 226.750 | 0.900 | Open Manhole | 450 |
| S4.001 | 6.835 | 99.1 | MH12 | 227.800 | 226.681 | 0.969 | Open Manhole | 450 |
| S5.000 | 9.363 | 34.8 | MH12 | 227.800 | 226.681 | 0.969 | Open Manhole | 450 |
| S4.002 | 30.145 | 21.1 | MH13 | 226.300 | 225.250 | 0.900 | Open Manhole | 450 |
| S4.003 | 6.243 | 100.0 | MH15 | 226.300 | 225.188 | 0.962 | Open Manhole | 450 |
| S6.000 | 11.612 | 54.7 | MH15 | 226.300 | 225.188 | 0.962 | Open Manhole | 450 |
| S4.004 | 4.940 | 99.7 | MH16 | 226.230 | 225.138 | 0.942 | Open Manhole | 450 |
| S4.005 | 27.306 | 42.8 | MH17 | 225.550 | 224.500 | 0.900 | Open Manhole | 600 |

## PIPELINE SCHEDULES for Storm

### Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S3.002 | o | 225 | MH17 | 225.550 | 224.425 | 0.900 | Open Manhole | 600 |
| S7.000 | o | 150 | MH18 | 229.800 | 228.750 | 0.900 | Open Manhole | 450 |
| S7.001 | o | 150 | MH19 | 228.650 | 227.600 | 0.900 | Open Manhole | 450 |
| S7.002 | o | 150 | MH20 | 227.800 | 226.750 | 0.900 | Open Manhole | 450 |
| S7.003 | o | 225 | MH21 | 226.750 | 225.625 | 0.900 | Open Manhole | 600 |
| S7.004 | o | 225 | MH22 | 226.550 | 225.425 | 0.900 | Open Manhole | 600 |
| S7.005 | o | 225 | MH23 | 226.650 | 225.315 | 1.110 | Open Manhole | 600 |
| S7.006 | o | 225 | MH24 | 225.450 | 224.325 | 0.900 | Open Manhole | 600 |
| S7.007 | o | 225 | MH25 | 225.500 | 224.234 | 1.041 | Open Manhole | 600 |

### Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S3.002 | 6.176 | 25.2 | MH26 | 225.550 | 224.180 | 1.145 | Open Manhole | 1050 |
| S7.000 | 40.878 | 35.5 | MH19 | 228.650 | 227.600 | 0.900 | Open Manhole | 450 |
| S7.001 | 20.278 | 23.9 | MH20 | 227.800 | 226.750 | 0.900 | Open Manhole | 450 |
| S7.002 | 18.528 | 17.6 | MH21 | 226.750 | 225.700 | 0.900 | Open Manhole | 600 |
| S7.003 | 17.147 | 85.7 | MH22 | 226.550 | 225.425 | 0.900 | Open Manhole | 600 |
| S7.004 | 9.457 | 85.7 | MH23 | 226.650 | 225.315 | 1.110 | Open Manhole | 600 |
| S7.005 | 37.774 | 38.2 | MH24 | 225.450 | 224.325 | 0.900 | Open Manhole | 600 |
| S7.006 | 8.998 | 99.3 | MH25 | 225.500 | 224.234 | 1.041 | Open Manhole | 600 |
| S7.007 | 5.422 | 99.3 | MH26 | 225.550 | 224.180 | 1.145 | Open Manhole | 1050 |

## PIPELINE SCHEDULES for Storm

### Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S1.004 | o | 300 | MH26 | 225.550 | 224.105 | 1.145 | Open Manhole | 1050 |
| S8.000 | o | 150 | MH27 | 227.400 | 226.350 | 0.900 | Open Manhole | 450 |
| S8.001 | o | 150 | MH28 | 226.650 | 225.600 | 0.900 | Open Manhole | 450 |
| S8.002 | o | 225 | MH29 | 225.850 | 224.725 | 0.900 | Open Manhole | 600 |
| S1.005 | o | 300 | MH30 | 224.900 | 223.700 | 0.900 | Open Manhole | 1050 |
| S1.006 | o | 300 | MH31 | 224.950 | 222.975 | 1.675 | Open Manhole | 1200 |
| S1.007 | o | 150 | MH32 | 224.900 | 222.500 | 2.175 | Open Manhole | 1200 |
| S1.008 | o | 150 | MH33 Headwall | 222.700 | 221.630 | 0.920 | Open Manhole | 1000 |

### Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S1.004 | 27.898 | 68.9 | MH30 | 224.900 | 223.700 | 0.900 | Open Manhole | 1050 |
| S8.000 | 28.998 | 38.7 | MH28 | 226.650 | 225.600 | 0.900 | Open Manhole | 450 |
| S8.001 | 31.192 | 39.0 | MH29 | 225.850 | 224.800 | 0.900 | Open Manhole | 600 |
| S8.002 | 32.201 | 33.9 | MH30 | 224.900 | 223.775 | 0.900 | Open Manhole | 1050 |
| S1.005 | 17.903 | 24.7 | MH31 | 224.950 | 222.975 | 1.675 | Open Manhole | 1200 |
| S1.006 | 23.863 | 50.2 | MH32 | 224.900 | 222.500 | 2.100 | Open Manhole | 1200 |
| S1.007 | 10.201 | 11.7 | MH33 Headwall | 222.700 | 221.630 | 0.845 | Open Manhole | 1000 |
| S1.008 | 4.871 | 48.7 | MHDummy | 223.040 | 221.530 | 1.360 | Open Manhole | 1200 |

## Area Summary for Storm

| Pipe Number | PIMP Type | PIMP Name | PIMP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) |
|---|---|---|---|---|---|---|
| 1.000 | User | - | 70 | 0.010 | 0.007 | 0.007 |
| 1.001 | User | - | 70 | 0.010 | 0.007 | 0.007 |
| 2.000 | User | - | 70 | 0.012 | 0.008 | 0.008 |
| 2.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.002 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.003 | User | - | 70 | 0.026 | 0.018 | 0.018 |
| 3.000 | User | - | 50 | 0.143 | 0.072 | 0.072 |
| 3.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 4.000 | User | - | 5 | 0.040 | 0.002 | 0.002 |
| 4.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 5.000 | User | - | 70 | 0.007 | 0.005 | 0.005 |
| 4.002 | User | - | 50 | 0.038 | 0.019 | 0.019 |
| 4.003 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 6.000 | User | - | 70 | 0.008 | 0.005 | 0.005 |
| | User | - | 50 | 0.009 | 0.005 | 0.010 |
| 4.004 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 4.005 | User | - | 50 | 0.025 | 0.012 | 0.012 |
| 3.002 | User | - | 50 | 0.111 | 0.056 | 0.056 |
| 7.000 | User | - | 70 | 0.019 | 0.013 | 0.013 |
| 7.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 7.002 | User | - | 70 | 0.015 | 0.010 | 0.010 |
| 7.003 | User | - | 70 | 0.008 | 0.006 | 0.006 |
| 7.004 | User | - | 70 | 0.009 | 0.007 | 0.007 |
| 7.005 | User | - | 70 | 0.004 | 0.002 | 0.002 |
| | User | - | 70 | 0.016 | 0.011 | 0.014 |
| 7.006 | User | - | 70 | 0.003 | 0.002 | 0.002 |
| | User | - | 5 | 0.029 | 0.001 | 0.004 |
| 7.007 | User | - | 70 | 0.002 | 0.001 | 0.001 |
| 1.004 | User | - | 70 | 0.022 | 0.016 | 0.016 |
| | User | - | 50 | 0.032 | 0.016 | 0.032 |
| 8.000 | User | - | 50 | 0.088 | 0.044 | 0.044 |
| 8.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 8.002 | User | - | 50 | 0.092 | 0.046 | 0.046 |

## Area Summary for Storm

| Pipe Number | PIMP Type | PIMP Name | PIMP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) |
|---|---|---|---|---|---|---|
| | User | - | 50 | 0.062 | 0.031 | 0.077 |
| 1.005 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.006 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.007 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.008 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| | | | | Total | Total | Total |
| | | | | 0.840 | 0.423 | 0.423 |

## Simulation Criteria for Storm

| | | | | | |
|---|---|---|---|---|---|
| Volumetric Runoff Coeff | 0.750 | Manhole Headloss Coeff (Global) | 0.500 | Inlet Coeffiecient | 0.800 |
| Areal Reduction Factor | 1.000 | Foul Sewage per hectare (l/s) | 0.000 | Flow per Person per Day (l/per/day) | 0.000 |
| Hot Start (mins) | 0 | Additional Flow - % of Total Flow | 0.000 | Run Time (mins) | 60 |
| Hot Start Level (mm) | 0 | MADD Factor * 10m³/ha Storage | 0.000 | Output Interval (mins) | 1 |

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

## Synthetic Rainfall Details

| | | | | | |
|---|---|---|---|---|---|
| Rainfall Model | FSR | M5-60 (mm) | 18.100 | Cv (Summer) | 0.750 |
| Return Period (years) | 2 | Ratio R | 0.353 | Cv (Winter) | 0.840 |
| Region | England and Wales | Profile Type | Summer | Storm Duration (mins) | 30 |

## Online Controls for Storm

### Hydro-Brake® Optimum Manhole: MH32, DS/PN: S1.007, Volume (m³): 4.3

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0097-5000-1600-5000 | Sump Available | Yes |
| Design Head (m) | 1.600 | Diameter (mm) | 97 |
| Design Flow (l/s) | 5.0 | Invert Level (m) | 222.500 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 150 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1200 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 1.600 | 5.0 | Kick-Flo® | 0.865 | 3.8 |
| Flush-Flo™ | 0.425 | 4.7 | Mean Flow over Head Range | - | 4.2 |

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 3.1 | 0.600 | 4.6 | 1.600 | 5.0 | 2.600 | 6.3 | 5.000 | 8.5 | 7.500 | 10.3 |
| 0.200 | 4.3 | 0.800 | 4.1 | 1.800 | 5.3 | 3.000 | 6.7 | 5.500 | 8.9 | 8.000 | 10.7 |
| 0.300 | 4.6 | 1.000 | 4.0 | 2.000 | 5.5 | 3.500 | 7.2 | 6.000 | 9.3 | 8.500 | 11.0 |
| 0.400 | 4.7 | 1.200 | 4.4 | 2.200 | 5.8 | 4.000 | 7.7 | 6.500 | 9.7 | 9.000 | 11.3 |
| 0.500 | 4.7 | 1.400 | 4.7 | 2.400 | 6.0 | 4.500 | 8.1 | 7.000 | 10.0 | 9.500 | 11.6 |