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Havant Thicket Reservoir Project

Drainage Management Plan (Phase 1 - Northern Access Reserved Matters Application and Planning Conditions Hybrid Consent APP/20/00990 & 51680/001)

Portsmouth Water Ltd.

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Document history

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1. Introduction

1.1. Scheme Background

This drainage management plan supports an application to Havant Borough Council (HBC) and East Hampshire District Council (EHDC) on behalf of Portsmouth Water for Reserved Matters and the discharge of Planning Conditions relating to the Northern Access Junction and Northern Access Route in connection with the Hybrid Planning Permission (references APP/20/00990 and 51680/001) for a Reservoir and associated infrastructure (the Approved Scheme) on land at Havant Thicket, adjacent to Sir George Staunton Country Park and Middle Park Way, Havant.

As part of the Hybrid consent, full planning permission was granted for the Northern Access Junction, subject to Planning Conditions, and outline planning permission was granted for the Northern Access Route to the reservoir site, subject to Reserved Matters Application and Planning Conditions. The access junction on and adjoining the B2149 is subject to a Section 278 Agreement with Hampshire County Council as this will become adopted Highway. The access area adjoining this and the access route to the reservoir comprise Phase 1 of the approved reservoir scheme. This report supports the submission of this Reserved Matters Application and Planning Conditions applications (Phase 1 Application) to HBC and EHDC. All proposed works are within the footprint and red line boundary of the Approved Reservoir Scheme.

The design of the drainage works along the B2149 which are part of the s278 Agreement are inextricably linked to the Phase 1 Scheme and are discussed as part of this strategy.

1.2. Site Location

The Phase 1 Application Site, comprising the Northern Access and the Northern Access Route down into the reservoir site, is located to the north of the town of Havant, in the county of Hampshire. Phase 1 lies within the two local planning authorities of HBC and EHDC. The boundary of the South Downs National Park (SDNP) lies to the northeast.

The Northern Access Junction is located on the B2149 Manor Lodge Road between A3(M) Junction 2 and Rowlands Castle. The boundary of the SDNP lies on the north side of the B2149 at this location, directly opposite the junction, with Stein Wood located further to the northeast. Rowlands Castle Golf Club lies to the east, Havant Thicket to the south and Blendworth Common to the west. The Northern Access runs in a south westerly direction and skirts around the western edge of Havant Thicket utilising an existing Forestry England track for a distance of approximately 1,407 metres(m) to reach the north west corner of the reservoir site where the future car park and visitor centre will be located as part of the Approved Scheme.

Figure 1.0 shows the location of the Approved Scheme and its surroundings, including the proposed Northern Access Junction and Access Route.

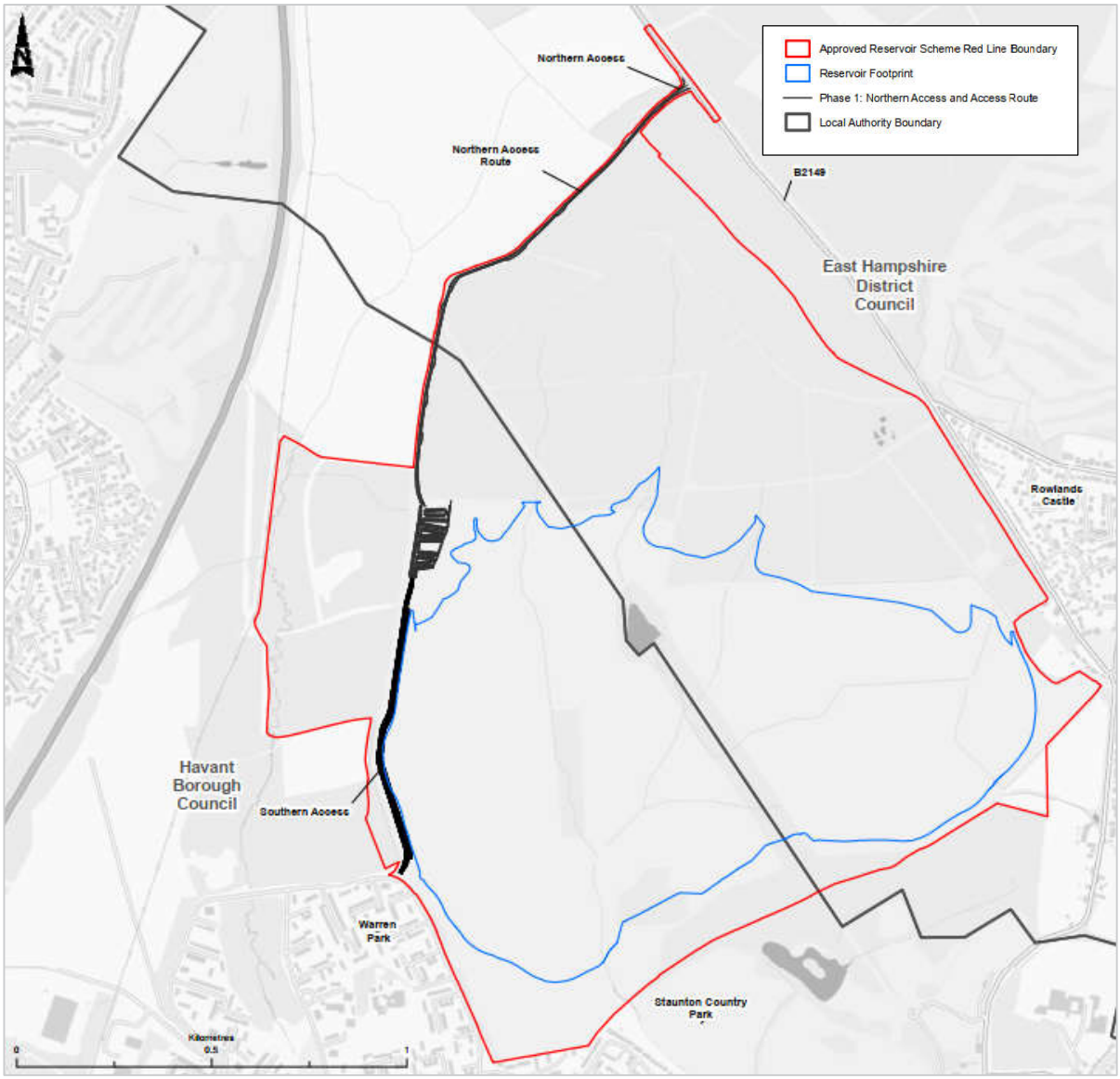


Figure 1.0: Scheme Location

1.3. Scope of Report

This report is intended to provide a summary of the overall drainage design strategy for the access works along the B2149 and the Phase 1 Scheme, outlining a comprehensive and systematic approach for road drainage design aspects. This report does not include designs for other elements of the scheme, such as the visitor centre car park and Southern Access Road.

Proposed drainage designs will be carried out to current best practice guidance and based on the available information for the existing site.

2. Description of the Site

2.1. General

The B2149 approaches to the Northern Access junction are wooded on both sides and lined with trees and low-level scrub. The location where the junction will be developed, is currently demarked by a steel five bar gate, which leads into an area of woodland vegetation.

The Phase 1 Scheme passes through an area of woodland habitat known as the Blendworth Fragment. The remainder of the route then joins an existing track along the western edge of Havant Thicket woodland which is wide and open, aligned with trees and scrub.

2.2. Existing Hydrological Features

Within the Approved Scheme site, but to the south of the Northern Access Route, there are two Environment Agency defined main rivers, the Hermitage Stream and the Riders Lane Stream.The Northern Access Route broadly runs along a ridge that defines the watershed between two ordinary watercourse catchments to the east and west. These ordinary watercourses connect to the main watercourses downstream, within Havant. Figure 2.0 indicates the layout of the watercourses at the site.

With reference to the Environment Agency flood map in Appendix A, the access works along the B2149 and the Phase 1 Scheme are located entirely within Flood Zone 1, defined as an area with less than a 1 in 1000 probability of flooding in any given year (river or sea flooding).

The Environment Agency surface water flood risk map, Appendix A, indicates that the land to the south of and against the B2149 is at risk of surface water flooding from 1 in 30, 1 in 100 and 1 in 1000 year rainfall events. The accuracy of the Environment Agency model has not been confirmed, for example, if any culverts have been included in the model that would allow runoff to flow to the north of the highway.

The Environment Agency source protection zones mapping indicates that the junction and route are located entirely within Zone I (inner protection zone to the north at the junction and subsurface activity south of the junction). This zone is defined as having a 50 day travel time of pollutant to source with a 50 metres default minimum radius.

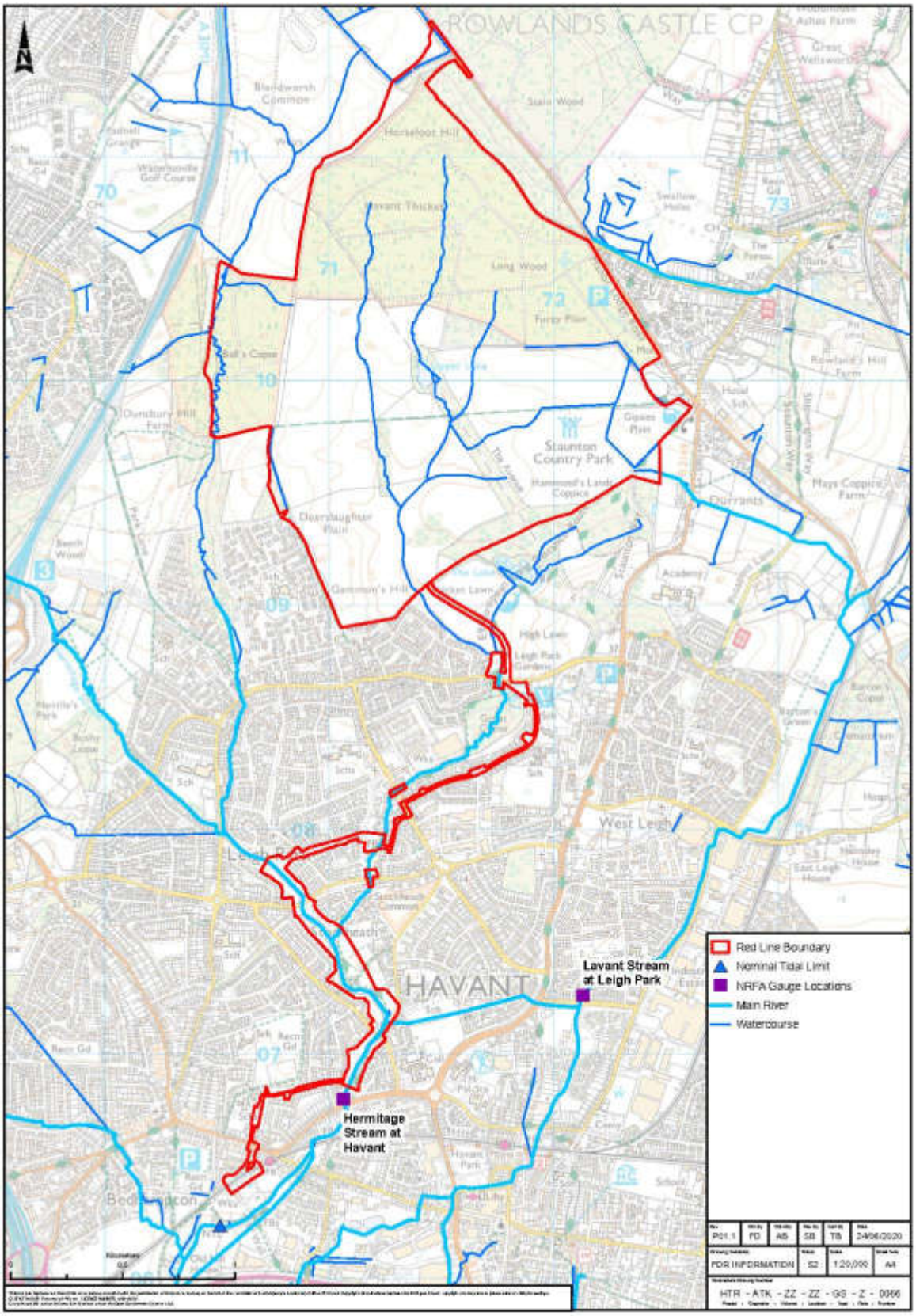


Figure 2.0: Map showing main rivers and ordinary watercourses in proximity to the Northern Access Road Scheme Location

2.3. Existing Drainage

An understanding of the existing drainage assets has been developed using available drainage survey data, topographical and GPR surveys, Ordinance Survey mapping and Google Street View. Plans were obtained from the Hampshire County Council Geographical Information System, but show limited information is available, identifying only locations of highway gullies and catchpits.

An incomplete CCTV and manhole survey of the existing drainage on the B2149 was received from DRAINLINE on 12/04/2022 with additional survey results received on 13/05/2022 and 15/06/2022. The survey identified a number of highway gullies and an existing carrier drain running in the verge of the northbound side of the highway. The carrier drain connects to a culvert taking flows across to the opposite side of the B2149. This culvert has collapsed and is not functioning at present.

There is a ditch system running parallel to and on the south side of the B2149 which receives runoff from the adjacent field. It is not clear if this ditch connects to the above-mentioned culvert or whether a separate culvert exists to take flows to the opposite side of the highway.

The existing Forestry England track that forms the Northern Access Route is currently understood to drain to both sides of the track into existing ditches which discharge flows to the nearby ordinary watercourses.

2.4. Assumptions

The following assumptions have been made in the development of the drainage design:

- Where drainage surveys were incomplete, connectivity has been assumed based on engineering judgement as appropriate.
- The presence of a culvert near a natural low point was identified in the CCTV survey. The dimensions have been confirmed in the CCTV survey as 300mm diameter. A collapse was identified within the CCTV survey and therefore it has been assumed that a full replacement will be required.
- CCTV surveys confirmed the presence of a 225mm carrier pipe running along the verge on the south-east side of the proposed junction. The proposed ditch is shown to connect back to the carrier pipe at chainage 470. It has been assumed that the system downstream of this point is in good condition.
- The survey identified that some of the highway gullies on the south-bound carriageway are connected via pipe crossings to the system in the north-bound side verge. As no works are planned to increase impermeable areas on the south-bound side of the carriageway, for the purpose of the calculations it is assumed that these gullies discharge directly to the land to the north. Rather than reconnect these gullies via crossing pipes to the system on the south side it is proposed to remove the existing gullies and create grips in the verge.

2.5. Constraints

Key site constraints are as follows:

- The proposed works along the B2149 and within the Phase 1 boundary are within ancient woodland. A key aim of the design is to reduce the amount of ancient woodland loss and vegetation clearance. There is therefore limited space for drainage features outside the access route.

- Availability of land. It has not been possible to acquire further land outside the current red line boundary for drainage features.

- The existing highway contains a significant number of services, which may affect the constructability of new drainage assets.

3. Proposed Drainage Strategy

3.1. Design Criteria

The proposed Phase 1 Scheme represents an increase in the impermeable footprint of the site, which will create additional flows and volumes at the outfalls compared to the existing. Therefore, the proposed surface water drainage strategy will seek to cater for additional flows and volumes from proposed additional impermeable areas.

Surface water collection systems, including swales and a kerb and gully arrangement are proposed to serve new impermeable areas.

The conveyance systems will consist of gravity drainage networks (pipes, swales and ditches), which will convey flows to existing outfall locations and existing watercourses.

Storage will be provided in the form of ditches with check dams, and an attenuation basin.

Infiltration features will be utilised where appropriate.

The drainage design will be undertaken in accordance with the following design standards and guidance:

- CD 525 – Surface and sub-surface drainage systems for highways
- CD 526 – Spacing of road gullies
- LA 113 – Road drainage and the water environment
- CD 524 – Edge of pavement details
- CIRIA C753 SuDS (Sustainable Drainage systems) Manual
- CG 501 – Design of highway drainage systems
- CD 523 – Determination of pipe roughness and assessment of sediment deposition to aid pipeline design
- CD 521 – Hydraulic design of road edge surface water channels and outlets
- CD 534 – Chamber tops and gully tops for road drainage and services

MicroDrainage, industry standard software, has been used to model the conditions / parameters and calculate the drainage requirements for the scheme. Results can be found in Appendix B and Appendix C. Appendix D includes results for the proposed hydraulic models with a 40% climate change allowance applied.

Proposed drainage systems will be designed in accordance with the following criteria:

- No surcharge in the system for rainfall of 1-year return period with additional 20% climate change allowance.
- No flooding for rainfall of 5-year return period with 20% climate change for carrier drains.
- Maximum velocity at outfall pipes is 3m/s.

- Orifice plates or smaller diameter pipes within check dams will be used for flow control on the Hampshire County Council network. Orifices should be a minimum diameter of 75mm.
- The ditch serving the B2149 and northern section of the Phase 1 Scheme networks will be designed for up to a 100-year return period with 20% climate change allowance.
- The attenuation basin serving the southern end of the Northern Access Route network will be designed for up to a 100-year return period with 20% climate change allowance.
- A test for a 100-year return period storm with 40% climate change allowance will be applied to the networks and attenuation features in order to consider exceedance flows and the risk of flooding.
- For new impermeable catchments (widened B2149 and tarmacked areas of the Phase 1 Scheme) peak outflows will be controlled to existing peak runoff rates or QBAR, as appropriate, for 1 in 1, 1 in 5 and 1 in 100-year return periods.
- Ditches should not flood for a rainfall of 5-year return period.
- Percentage impermeable (PIMP) values for paved areas will be taken as 1.0 (highway / asphalt) and 0.8 (existing Forestry England tracks), unpaved areas (verge, earthworks fields and ancient woodland) as 0.21.
- Colebrook-white roughness co-efficient for carrier pipe is 0.600 and 1.500 for filter pipes.
- Manning's roughness co-efficient should be taken as 0.05 for ditches. Flow velocity within ditches should be kept below 1.0m/sec.

Hydraulic design parameters for the modelling will be as per table 1 below.

Table 1 - Design Criteria

Sl. No.	Particulars	Value	Units
1.	Flood Studies Report (FSR) rainfall data will be used	-	-
2.	Return period	2	Year
3.	M5-60	19.700	Mm
4.	R	0.334	
5.	Global time of entry	5	Mins
6.	Maximum rainfall	250	mm/hr
7.	Minimum Velocity	0.75	m/sec
8.	Maximum backdrop height	1	m

Design parameters for gully spacing calculations are as below:

- Gully arrangement to be designed as per CD526

- Gully Grating – Type R/Q
- Return period – 5 years as per HD33/16
- Manning's Co-efficient – 0.017
- Maintenance factor – 1.0
- 2MinM5 – 3.5mm
- Critical Storm Duration – 5 minutes
- Climate Change – 20%

Note that the fundamental elements of the design criteria such as design return periods and climate change allowances have been agreed in principle with the Lead Local Flood Authority (LLFA) at Hampshire County Council, however it is noted that the details will still need to be approved now the design has been developed.

3.2. B2149 Works (s278)

The proposed collection system for the Hampshire County Council B2149 public highway takes the form of a kerb and gully arrangement.

As a result of the junction proposal and associated widening of the north-bound carriageway, the existing gullies will need to be replaced along the new kerb line. The new gullies will discharge directly to a new widened B2149 roadside ditch which will contain check dams at regular intervals to restrict flow rates as necessary. Outflows will be restricted to the existing rates (existing B2149) and QBAR (new impermeable area) up to the 1 in 100 year event plus 20% allowance for climate change (with a check for 40%).

Existing gullies on the south-bound side of the carriageway will be removed and new grips will be introduced in the verge as per the HCC standard detail drawing HCC10/D/130.

Refer to drainage layout drawing HTR-ATK-AR-ZZ-SK-D-0018 and check dam detail drawing HTR-ATK-AR-ZZ-SK-D-0033 for details. Greenfield runoff rate calculations and gully spacing calculations have been included in Appendix E.

The design for the B2149 works has been submitted to Hampshire County Council as Local Highways Authority and will be approved as part of the s278 highway agreement.

3.3. Phase 1 Scheme – CH0m to CH160m

The northern section of the Phase 1 Scheme between chainage 0m and chainage 160m is proposed as an impermeable asphalt surface. As a result of the steep gradient of this section, it was not considered feasible to use the “Cellweb®” no dig, permeable solution that is proposed elsewhere on the route.

Due to limited space outside the route footprint within the ancient woodland for drainage features, the proposed collection system for this section is a kerb and gully arrangement. A new carrier drain is proposed centrally to the road to decrease the risk of clashes with tree roots. The system discharges to the new widened B2149 roadside ditch on the west side of the junction. Outflows will be restricted from the ditches, along with the flows from the B2149, via check dams, and through the replaced culvert. These flows are restricted to QBAR (added to the B2149 flows).

Refer to drainage layout drawings HTR-ATK-AR-ZZ-SK-D-0018 - 19 and check dam detail drawing HTR-ATK-AR-ZZ-SK-D-0033 for details. Gully spacing calculations have been included in Appendix E.

3.4. Phase 1 Scheme – CH160m to CH1210m

The central section of the Phase 1 Scheme between chainage 160m and chainage 1210m is proposed to be constructed of the “Cellweb®” no dig solution (or similar approved). This construction is permeable and therefore allows rainfall to discharge to ground at source. The construction consists of 150mm of type 3 subbase to SHW clause 805, 200mm of “Cellweb®” cellular confinement system infilled with 4/20 angular stone, with geotextile membranes at interfaces to clause 609. It also includes a “Treetex™” pollution control geotextile which performs as a hydrocarbon control measure in accordance with BS5837.

At chainage 800m to 850m there is a pronounced low point at a bend and superelevated section. A filter drain is proposed on the inside of the bend with a pipe crossing to the opposite side of the highway to ensure this area is adequately drained.

Refer to drainage layout drawings HTR-ATK-AR-ZZ-SK-D-0019 - 20 and typical pavement cross sections drawing HTR-ATK-AR-RE-DR-D-0072 for details.

3.5. Phase 1 Scheme – CH1210m to CH1407m

The southern section of the Northern Access Route from chainage 1210m to chainage 1407m is proposed as an impermeable asphalt surface. As a result of the steep gradient of this section, it was not considered feasible to use the “Cellweb®” no dig, permeable solution that is proposed elsewhere on the route.

It is proposed to provide a centre-crowned arrangement on this section of the route to allow over-the-edge drainage to the ditch on both sides. The existing retained ditch on the western side conveys flows to an attenuation basin at chainage 1380m (see table 2 below for basin details). Outflows from the basin are restricted using a smaller diameter pipe to the continuation of the ditch downstream. The proposed ditch on the eastern side of the track is piped across to the attenuation basin at chainage 1370m. The remaining section of the route, between chainage 1370m and 1407m will form a 1% adverse camber to discharge runoff into the ditch system to combine with the flows from the basin with flow control provided via check dams. The system has an outfall to the existing pond and watercourse on the west side of the Northern Access Route.

The outflow rate with a hydrobrake at the outfall limits flow below the existing runoff rates. Existing and proposed discharge rates are indicated in Table 3 and 4.

Refer to the drainage layout drawing GCCM5J10-ATK-HDG-J5-DR-CD-000001 for details. Existing highway peak runoff rate calculations are included in Appendix E.

Table 2 - Proposed Basin Details

Basin location	Proposed Basin Volume (including freeboard) (m^3)	Basin Top Area (m^2)	Basin Base Area (m^2)	Basin Depth (including freeboard) (m)	Side slopes	Freeboard (m)
470.845, 110.378	10.16	25	10	0.5	1 in 2	0.3

3.6. Existing Discharge Rates

The existing flowrates are generated from the hydraulic model of the existing system (model reference HTR-ATK-SR-RE-M3-Z-0001) and are given in Table 3 below. An export of the model can be found in Appendix B. Existing catchment plans can be found in Appendix F.

Table 3 - Existing Flow Rates

Outfall	1 year (l/s)	5 year (l/s)	30 year (l/s)	100 year (l/s)
B2149 & Phase 1 CH0-160 (outfall to north-western culvert)	56.7 + 0.7 (QBAR)	94.3 + 0.7 (QBAR)	137.5 + 0.7 (QBAR)	173.5 + 0.7 (QBAR)
B2149 (outfall to south-eastern culvert)	64.6	107.6	166	215.3
Phase 1 CH1210-1407 (outfall to existing watercourse)	7.7	12.7	22.3	28.6

3.7. Proposed Discharge Rates

The proposed discharge rates have been taken from the hydraulic model of the proposed system (model reference HTR-ATK-SR-RE-M3-Z-0002 and 0003) and are given in Table 4 below. Exports of the models can be found in Appendix C. Proposed catchment plans can be found in Appendix G. Appendix D includes exports of the model with an allowance of 40% for climate change for consideration of exceedance.

Table 4 - Proposed Flow Rates

Outfall	1 year (l/s)	5 year (l/s)	30 year (l/s)	100 year (l/s)
B2149 & Phase 1 CH0-160 (outfall to north-western culvert)	25	38.4	54.6	73.7
B2149 (outfall to south-eastern carrier pipe)	8.4	8.5	8.8	8.9
Phase 1 CH1210-1407 (outfall to existing watercourse)	4.1	5.4	7.1	8.6

3.8. Surface Water Treatment

There will be little routine runoff contamination and very low spillage risk due to very low traffic volumes on the Northern Access Route, particularly with a low-speed limit and low heavy goods vehicle traffic. Any increase in traffic on the B2149 associated with the development will not constitute a material increase.

It is therefore not considered appropriate or feasible to undertake an assessment as per DMRB LA 113, Highways England Water Risk Assessment Tool (HEWRAT).

Notwithstanding this the proposal incorporates SuDS features for water quality as much as is reasonably practicable within the site constraints. Table 5 below summarises a water quality assessment as per the simple index approach outlined in the SuDS Manual (CIRIA C753).

Table 5 - Simple Index Approach (CIRIA C753) Summary

Site location	SuDS system provided	Pollution hazard index (TSS)	Mitigation index (TSS)	Pollution hazard index (Metals)	Mitigation index (Metals)	Pollution hazard index (Hydro-carbons)	Mitigation index (Hydro-carbons)	Remarks
B2149 & Phase 1 CH0-160	Ditches with checkdams	0.5	0.5	0.4	0.6	0.4	0.6	Ditch assumed as swale index value
Permeable Phase 1 CH160-1210	Cellweb / Treetex (or similar approved)	0.5	0.7	0.4	0.6	0.4	0.7	Assumed as per permeable pavement value
Phase 1 CH1210-1407	Ditches with checkdams / basin	0.5	0.5	0.4	0.6	0.4	0.6	Ditch assumed as swale index value

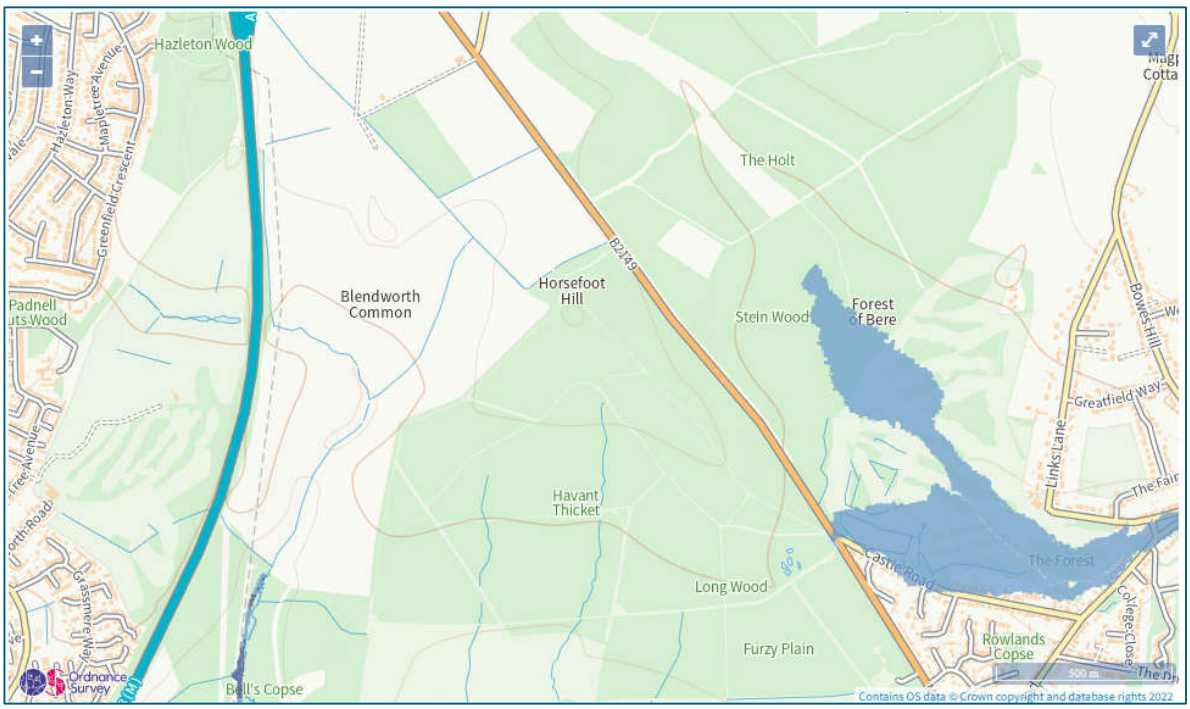
3.9. Maintenance

The highway drainage on the B2419 will be adopted by Hampshire County Council and will be maintained by them thereafter. This includes the ditches that run alongside the southern side of the highway that form part of the storage requirements for the highway and part of the northern access route. The ditches outside this area along the B2419 will remain subject to riparian ownership. See appendix H for details of typical maintenance requirements for these features taken from CIRIA C573.

The new northern access road and associated drainage infrastructure will be in Portsmouth-owned land and Portsmouth Water will be responsible for its maintenance. Portsmouth Water is also responsible for maintenance of any part of the Havant Thicket reservoir project which is in adjoining Forestry England and Hampshire County Council land. See Appendix H for details of maintenance requirements for these features taken from CIRIA C573.

Appendices

Appendix A. Environment Agency Flood Maps



Environment Agency extent of flooding from rivers or sea map

Environment Agency extent of flooding from surface water map

Appendix B. Existing MicroDrainage Models

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Havant

Pipe Sizes Havant Manhole Sizes Havant

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	10.000
M5-60 (mm)	19.800	Volumetric Runoff Coeff.	0.840	Min Design Depth for Optimisation (m)	0.000
Ratio R	0.322	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	250	Add Flow / Climate Change (%)	40	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.000	20.000	0.181	110.5	0.058	5.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-1.001	19.998	0.302	66.3	0.000	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-1.002	19.998	0.468	42.7	0.000	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-1.003	20.000	0.319	62.8	0.296	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-1.004	25.599	0.231	111.0	0.000	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-1.005	25.073	0.500	50.1	0.131	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-2.000	32.479	1.419	22.9	0.036	5.00	0.0	0.030	[]	-4	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)
PR-1.000	60.70	5.32	60.300	0.058	0.0	0.0	4.3	1.05	1100.7	14.9
PR-1.001	59.60	5.56	60.119	0.058	0.0	0.0	4.3	1.35	1421.4	14.9
PR-1.002	58.74	5.76	59.817	0.058	0.0	0.0	4.3	1.69	1770.0	14.9
PR-1.003	57.75	6.00	59.349	0.354	0.0	0.0	24.8	1.39	1460.5	86.8
PR-1.004	56.15	6.41	59.031	0.354	0.0	0.0	24.8	1.05	1098.1	86.8
PR-1.005	55.15	6.68	58.800	0.485	0.0	0.0	32.4	1.56	1633.9	113.6
PR-2.000	61.08	5.24	59.719	0.036	0.0	0.0	2.7	2.30	2418.5	9.3

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.006	15.489	0.127	122.0	0.000	0.00	0.0	0.030	o	-3	Pipe/Conduit	
PR-1.007	1.581	0.010	154.9	0.000	0.00	0.0	0.030	o	-3	Pipe/Conduit	
PR-3.000	28.251	0.196	144.1	0.093	5.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-3.001	20.741	0.995	20.8	0.003	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-3.002	20.741	0.880	23.6	0.000	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-3.003	24.157	0.407	59.3	0.001	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-3.004	24.157	0.520	46.4	0.516	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-3.005	19.684	0.465	42.3	0.000	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-3.006	19.684	1.110	17.7	0.000	0.00	0.0	0.030	[]	-4	Pipe/Conduit	
PR-3.007	12.078	0.074	163.2	0.000	0.00	0.0	0.030	o	-2	Pipe/Conduit	
PR-3.008	1.962	0.013	154.9	0.000	0.00	0.0	0.030	o	-2	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)
PR-1.006	53.94	7.02	58.300	0.521	0.0	0.0	34.1	0.75	148.2	119.3
PR-1.007	53.81	7.06	58.173	0.521	0.0	0.0	34.1	0.67	131.5	119.3
PR-3.000	59.82	5.51	59.800	0.093	0.0	0.0	6.8	0.92	963.8	23.7
PR-3.001	59.20	5.66	59.604	0.097	0.0	0.0	6.9	2.41	2534.1	24.3
PR-3.002	58.55	5.81	58.609	0.097	0.0	0.0	6.9	2.27	2382.7	24.3
PR-3.003	57.39	6.09	57.730	0.098	0.0	0.0	6.9	1.43	1502.6	24.3
PR-3.004	56.42	6.34	57.322	0.614	0.0	0.0	42.0	1.62	1698.2	147.0
PR-3.005	55.69	6.53	56.802	0.614	0.0	0.0	42.0	1.69	1778.1	147.0
PR-3.006	55.22	6.66	56.337	0.614	0.0	0.0	42.0	2.62	2747.6	147.0
PR-3.007	54.53	6.85	55.227	0.614	0.0	0.0	42.0	1.04	813.2	147.0
PR-3.008	54.42	6.88	55.153	0.614	0.0	0.0	42.0	1.06	834.7	147.0

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PIPELINE SCHEDULES for Havant

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)
PR-1.000	[]	-4	PR-2	61.000	60.300	0.000	Junction	
PR-1.001	[]	-4	PR-3	60.819	60.119	0.000	Junction	
PR-1.002	[]	-4	PR-4	60.517	59.817	0.000	Junction	
PR-1.003	[]	-4	PR-5	60.049	59.349	0.000	Junction	
PR-1.004	[]	-4	PR-6	59.731	59.031	0.000	Junction	
PR-1.005	[]	-4	PR-7	59.500	58.800	0.000	Junction	
PR-2.000	[]	-4	PR-23	60.419	59.719	0.000	Junction	
PR-1.006	o	-3	PR-24	59.740	58.300	1.140	Junction	
PR-1.007	o	-3	PR-26	59.614	58.173	1.141	Junction	
PR-3.000	[]	-4	PR-27	60.500	59.800	0.000	Junction	
PR-3.001	[]	-4	PR-28	60.304	59.604	0.000	Junction	
PR-3.002	[]	-4	PR-33	59.309	58.609	0.000	Junction	
PR-3.003	[]	-4	PR-29	58.430	57.730	0.000	Junction	

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)
PR-1.000	20.000	110.5	PR-3	60.819	60.119	0.000	Junction	
PR-1.001	19.998	66.3	PR-4	60.517	59.817	0.000	Junction	
PR-1.002	19.998	42.7	PR-5	60.049	59.349	0.000	Junction	
PR-1.003	20.000	62.8	PR-6	59.731	59.031	0.000	Junction	
PR-1.004	25.599	111.0	PR-7	59.500	58.800	0.000	Junction	
PR-1.005	25.073	50.1	PR-24	59.740	58.300	0.740	Junction	
PR-2.000	32.479	22.9	PR-24	59.740	58.300	0.740	Junction	
PR-1.006	15.489	122.0	PR-26	59.614	58.173	1.141	Junction	
PR-1.007	1.581	154.9	PR-	59.017	58.163	0.554	Open Manhole	0
PR-3.000	28.251	144.1	PR-28	60.304	59.604	0.000	Junction	
PR-3.001	20.741	20.8	PR-33	59.309	58.609	0.000	Junction	
PR-3.002	20.741	23.6	PR-29	58.430	57.730	0.000	Junction	
PR-3.003	24.157	59.3	PR-35	58.022	57.322	0.000	Junction	

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PIPELINE SCHEDULES for Havant

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)
PR-3.004	[]	-4	PR-35	58.022	57.322	0.000	Junction	
PR-3.005	[]	-4	PR-30	57.502	56.802	0.000	Junction	
PR-3.006	[]	-4	PR-37	57.037	56.337	0.000	Junction	
PR-3.007	o	-2	PR-35	56.727	55.227	1.275	Junction	
PR-3.008	o	-2	PR-36	56.653	55.153	1.275	Junction	

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)
PR-3.004	24.157	46.4	PR-30	57.502	56.802	0.000	Junction	
PR-3.005	19.684	42.3	PR-37	57.037	56.337	0.000	Junction	
PR-3.006	19.684	17.7	PR-35	56.727	55.227	0.800	Junction	
PR-3.007	12.078	163.2	PR-36	56.653	55.153	1.275	Junction	
PR-3.008	1.962	154.9	PR-	56.258	55.140	0.893	Open Manhole	0

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Hardstanding	100	0.048	0.048	0.048
	Classification	Cuttings	21	0.046	0.010	0.058
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	Classification	Cuttings	21	1.411	0.296	0.296
1.004	-	-	100	0.000	0.000	0.000
1.005	Classification	Cuttings	21	0.623	0.131	0.131
2.000	Classification	Hardstanding	100	0.027	0.027	0.027
	Classification	Cuttings	21	0.021	0.004	0.031
	Classification	Cuttings	21	0.023	0.005	0.036
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
3.000	Classification	Hardstanding	100	0.060	0.060	0.060
	Classification	Cuttings	21	0.012	0.003	0.062
	Classification	Cuttings	21	0.148	0.031	0.093
3.001	Classification	Cuttings	21	0.016	0.003	0.003
3.002	-	-	100	0.000	0.000	0.000
3.003	Classification	Cuttings	21	0.006	0.001	0.001
3.004	Classification	Cuttings	21	0.006	0.001	0.001
	Classification	Cuttings	21	2.359	0.495	0.497
	Classification	Cuttings	21	0.091	0.019	0.516
3.005	-	-	100	0.000	0.000	0.000
3.006	-	-	100	0.000	0.000	0.000
3.007	-	-	100	0.000	0.000	0.000
3.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				4.896	1.134	1.134

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Network Classifications for Havant

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
PR-1.000	PR-2	-4	0.000	0.058	Unclassified				Junction
PR-1.001	PR-3	-4	0.000	0.022	Unclassified				Junction
PR-1.002	PR-4	-4	0.000	0.069	Unclassified				Junction
PR-1.003	PR-5	-4	0.000	0.012	Unclassified				Junction
PR-1.004	PR-6	-4	0.000	0.034	Unclassified				Junction
PR-1.005	PR-7	-4	0.000	0.740	Unclassified				Junction
PR-2.000	PR-23	-4	0.000	0.740	Unclassified				Junction
PR-1.006	PR-24	-3	1.140	1.244	Unclassified				Junction
PR-1.007	PR-26	-3	0.554	1.141	Unclassified				Junction
PR-3.000	PR-27	-4	0.000	0.193	Unclassified				Junction
PR-3.001	PR-28	-4	0.000	0.000	Unclassified				Junction
PR-3.002	PR-33	-4	0.000	0.063	Unclassified				Junction
PR-3.003	PR-29	-4	0.000	0.011	Unclassified				Junction
PR-3.004	PR-35	-4	0.000	0.000	Unclassified				Junction
PR-3.005	PR-30	-4	0.000	0.000	Unclassified				Junction
PR-3.006	PR-37	-4	0.000	0.800	Unclassified				Junction
PR-3.007	PR-35	-2	1.275	1.345	Unclassified				Junction
PR-3.008	PR-36	-2	0.893	1.275	Unclassified				Junction

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-1.007	PR-	59.017	58.163	0.000	0	0

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-3.008	PR-	56.258	55.140	0.000	0	0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-2	15 Winter	1	+0%					60.329	-0.671	0.000	0.01			7.3	OK*	
PR-1.001	PR-3	15 Winter	1	+0%					60.142	-0.677	0.000	0.01			7.4	OK*	
PR-1.002	PR-4	15 Winter	1	+0%					59.835	-0.682	0.000	0.00			7.4	OK*	
PR-1.003	PR-5	15 Winter	1	+0%					59.438	-0.612	0.000	0.03			39.2	OK*	
PR-1.004	PR-6	15 Winter	1	+0%					59.132	-0.598	0.000	0.04			39.0	OK*	
PR-1.005	PR-7	15 Winter	1	+0%					58.897	-0.603	0.000	0.03			52.7	OK*	
PR-2.000	PR-23	15 Winter	1	+0%					59.727	-0.692	0.000	0.00			4.6	OK*	
PR-1.006	PR-24	15 Winter	1	+0%	30/15 Summer				58.429	-0.171	0.000	0.38			56.9	OK*	
PR-1.007	PR-26	15 Winter	1	+0%					58.310	-0.163	0.000	0.41			56.7	OK*	
PR-3.000	PR-27	15 Winter	1	+0%					59.854	-0.646	0.000	0.01			11.9	OK*	
PR-3.001	PR-28	15 Winter	1	+0%					59.625	-0.679	0.000	0.01			12.3	OK*	
PR-3.002	PR-33	15 Winter	1	+0%					58.631	-0.678	0.000	0.01			12.2	OK*	
PR-3.003	PR-29	15 Winter	1	+0%					57.766	-0.664	0.000	0.01			12.4	OK*	
PR-3.004	PR-35	15 Winter	1	+0%					57.427	-0.595	0.000	0.04			64.6	OK*	
PR-3.005	PR-30	15 Winter	1	+0%					56.904	-0.598	0.000	0.04			64.5	OK*	
PR-3.006	PR-37	15 Winter	1	+0%					56.420	-0.617	0.000	0.03			64.4	OK*	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.007	PR-35	15 Winter	1	+0%					55.267	-0.185	0.000	0.08			64.6	OK*	
PR-3.008	PR-36	15 Winter	1	+0%					55.192	-0.186	0.000	0.08			64.6	OK*	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-2	15 Winter	5	+0%					60.349	-0.651	0.000	0.01			12.2	OK*	
PR-1.001	PR-3	15 Winter	5	+0%					60.157	-0.662	0.000	0.01			12.4	OK*	
PR-1.002	PR-4	15 Winter	5	+0%					59.847	-0.670	0.000	0.01			12.3	OK*	
PR-1.003	PR-5	15 Winter	5	+0%					59.465	-0.585	0.000	0.05			65.4	OK*	
PR-1.004	PR-6	15 Winter	5	+0%					59.165	-0.565	0.000	0.06			64.9	OK*	
PR-1.005	PR-7	15 Winter	5	+0%					58.927	-0.573	0.000	0.05			87.2	OK*	
PR-2.000	PR-23	15 Winter	5	+0%					59.733	-0.686	0.000	0.00			7.7	OK*	
PR-1.006	PR-24	15 Winter	5	+0%	30/15 Summer				58.476	-0.124	0.000	0.64			94.6	OK*	
PR-1.007	PR-26	15 Winter	5	+0%					58.362	-0.111	0.000	0.69			94.3	OK*	
PR-3.000	PR-27	15 Winter	5	+0%					59.878	-0.622	0.000	0.02			19.8	OK*	
PR-3.001	PR-28	15 Winter	5	+0%					59.639	-0.665	0.000	0.01			20.6	OK*	
PR-3.002	PR-33	15 Winter	5	+0%					58.646	-0.663	0.000	0.01			20.6	OK*	
PR-3.003	PR-29	15 Winter	5	+0%					57.789	-0.640	0.000	0.01			20.7	OK*	
PR-3.004	PR-35	15 Winter	5	+0%					57.462	-0.560	0.000	0.06			108.1	OK*	
PR-3.005	PR-30	15 Winter	5	+0%					56.938	-0.564	0.000	0.07			108.0	OK*	
PR-3.006	PR-37	15 Winter	5	+0%					56.444	-0.593	0.000	0.04			107.7	OK*	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.007	PR-35	15 Winter	5	+0%					55.280	-0.172	0.000	0.14			107.6	OK*	
PR-3.008	PR-36	15 Winter	5	+0%					55.205	-0.173	0.000	0.14			108.0	OK*	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-2	15 Winter	30	+0%					60.371	-0.629	0.000	0.02			17.9	OK*	
PR-1.001	PR-3	15 Winter	30	+0%					60.174	-0.645	0.000	0.01			18.2	OK*	
PR-1.002	PR-4	15 Winter	30	+0%					59.861	-0.657	0.000	0.01			18.1	OK*	
PR-1.003	PR-5	15 Winter	30	+0%					59.510	-0.539	0.000	0.09			115.2	OK*	
PR-1.004	PR-6	15 Winter	30	+0%					59.223	-0.508	0.000	0.10			113.2	OK*	
PR-1.005	PR-7	15 Winter	30	+0%					58.982	-0.518	0.000	0.09			154.3	OK*	
PR-2.000	PR-23	15 Winter	30	+0%					59.739	-0.680	0.000	0.00			11.3	OK*	
PR-1.006	PR-24	15 Winter	30	+0%	30/15 Summer				58.663	0.063	0.000	0.99			145.9	SURCHARGED*	
PR-1.007	PR-26	15 Summer	30	+0%					58.473	0.000	0.000	1.00			137.5	SURCHARGED*	
PR-3.000	PR-27	15 Winter	30	+0%					59.894	-0.606	0.000	0.03			29.0	OK*	
PR-3.001	PR-28	15 Winter	30	+0%					59.657	-0.647	0.000	0.01			30.4	OK*	
PR-3.002	PR-33	15 Winter	30	+0%					58.664	-0.645	0.000	0.01			30.4	OK*	
PR-3.003	PR-29	15 Winter	30	+0%					57.807	-0.623	0.000	0.02			30.7	OK*	
PR-3.004	PR-35	15 Winter	30	+0%					57.507	-0.515	0.000	0.10			166.6	OK*	
PR-3.005	PR-30	15 Winter	30	+0%					56.981	-0.521	0.000	0.11			166.9	OK*	
PR-3.006	PR-37	15 Winter	30	+0%					56.473	-0.564	0.000	0.07			166.7	OK*	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.007	PR-35	15 Winter	30	+0%					55.296	-0.156	0.000	0.21			166.0	OK*	
PR-3.008	PR-36	15 Winter	30	+0%					55.221	-0.157	0.000	0.21			165.8	OK*	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-2	15 Winter	100	+0%					60.379	-0.621	0.000	0.02			23.2	OK*	
PR-1.001	PR-3	15 Winter	100	+0%					60.190	-0.629	0.000	0.02			23.4	OK*	
PR-1.002	PR-4	15 Winter	100	+0%					59.874	-0.643	0.000	0.01			23.5	OK*	
PR-1.003	PR-5	15 Winter	100	+0%					59.539	-0.510	0.000	0.11			149.6	OK*	
PR-1.004	PR-6	15 Winter	100	+0%					59.253	-0.478	0.000	0.13			146.9	OK*	
PR-1.005	PR-7	15 Winter	100	+0%					59.014	-0.486	0.000	0.12			200.1	OK*	
PR-2.000	PR-23	15 Winter	100	+0%					59.745	-0.674	0.000	0.01			14.6	OK*	
PR-1.006	PR-24	15 Winter	100	+0%	30/15 Summer				58.812	0.212	0.000	1.21			179.7	SURCHARGED*	
PR-1.007	PR-26	15 Summer	100	+0%					58.473	0.000	0.000	1.26			173.5	SURCHARGED*	
PR-3.000	PR-27	15 Winter	100	+0%					59.907	-0.593	0.000	0.04			37.5	OK*	
PR-3.001	PR-28	15 Winter	100	+0%					59.672	-0.632	0.000	0.02			39.4	OK*	
PR-3.002	PR-33	15 Winter	100	+0%					58.680	-0.629	0.000	0.02			39.4	OK*	
PR-3.003	PR-29	15 Winter	100	+0%					57.816	-0.613	0.000	0.03			39.7	OK*	
PR-3.004	PR-35	15 Winter	100	+0%					57.538	-0.484	0.000	0.13			215.5	OK*	
PR-3.005	PR-30	15 Winter	100	+0%					57.014	-0.488	0.000	0.14			216.3	OK*	
PR-3.006	PR-37	15 Winter	100	+0%					56.496	-0.541	0.000	0.09			216.2	OK*	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.007	PR-35	15 Winter	100	+0%					55.305	-0.147	0.000	0.28			215.3	OK*	
PR-3.008	PR-36	15 Winter	100	+0%					55.231	-0.147	0.000	0.28			214.4	OK*	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Havant

Pipe Sizes Havant Manhole Sizes Havant

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	10.000
M5-60 (mm)	19.700	Volumetric Runoff Coeff.	0.840	Min Design Depth for Optimisation (m)	0.000
Ratio R	0.334	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	250	Add Flow / Climate Change (%)	40	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Havant

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.000	10.923	0.516	21.2	0.000	5.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.001	20.558	1.017	20.2	0.001	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.002	10.696	0.714	15.0	0.002	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.003	14.401	0.992	14.5	0.001	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.004	11.427	0.452	25.3	0.001	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.005	9.488	0.735	12.9	0.001	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.006	16.301	0.743	21.9	0.001	0.00	0.0	0.030		[]	-5	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)
PR-1.000	62.67	5.08	48.546	0.000	0.0	0.0	0.0	2.28	1278.7	0.0
PR-1.001	61.96	5.23	48.030	0.001	0.0	0.0	0.1	2.34	1308.3	0.3
PR-1.002	61.64	5.29	47.013	0.003	0.0	0.0	0.2	2.71	1520.0	0.8
PR-1.003	61.24	5.38	46.300	0.004	0.0	0.0	0.3	2.76	1543.9	1.0
PR-1.004	60.81	5.47	45.308	0.005	0.0	0.0	0.4	2.09	1170.0	1.4
PR-1.005	60.57	5.52	44.856	0.006	0.0	0.0	0.4	2.92	1637.3	1.5
PR-1.006	60.02	5.65	44.121	0.007	0.0	0.0	0.5	2.24	1256.0	1.7

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.007	12.095	0.743	16.3	0.001	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.008	17.862	0.915	19.5	0.001	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.009	28.263	1.125	25.1	0.001	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.010	9.361	0.033	283.7	0.003	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.011	10.808	0.100	108.1	0.017	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.012	12.401	0.172	72.1	0.003	0.00	0.0	0.600		o	300	Pipe/Conduit	
PR-2.000	26.146	1.000	26.1	0.000	5.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.001	26.146	1.600	16.3	0.002	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.002	26.146	1.703	15.4	0.002	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.003	26.146	2.510	10.4	0.002	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.004	18.028	1.118	16.1	0.002	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.005	18.028	0.540	33.4	0.002	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.006	22.164	0.200	110.8	0.002	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.007	5.986	0.480	12.5	0.004	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-1.013	8.173	0.001	13076.8	0.023	0.00	0.0		0.030	[]	-1	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)
PR-1.007	59.68	5.72	41.887	0.008	0.0	0.0	0.6	2.60	1458.1	2.0
PR-1.008	59.14	5.85	41.887	0.009	0.0	0.0	0.6	2.38	1331.6	2.3
PR-1.009	58.20	6.07	40.971	0.010	0.0	0.0	0.7	2.10	1173.7	2.5
PR-1.010	57.19	6.32	39.846	0.013	0.0	0.0	0.9	0.62	349.3	3.1
PR-1.011	56.49	6.50	39.813	0.030	0.0	0.0	2.1	1.01	565.9	7.3
PR-1.012	56.07	6.61	39.638	0.033	0.0	0.0	2.2	1.85	131.0	7.8
PR-2.000	61.25	5.38	48.500	0.000	0.0	0.0	0.0	1.16	104.3	0.0
PR-2.001	59.90	5.67	47.500	0.002	0.0	0.0	0.2	1.47	132.0	0.6
PR-2.002	58.66	5.96	45.900	0.005	0.0	0.0	0.4	1.51	136.2	1.2
PR-2.003	57.69	6.20	44.198	0.007	0.0	0.0	0.5	1.84	165.3	1.8
PR-2.004	56.88	6.40	41.688	0.010	0.0	0.0	0.7	1.48	132.9	2.4
PR-2.005	55.76	6.69	40.570	0.012	0.0	0.0	0.8	1.03	92.3	2.7
PR-2.006	53.44	7.35	40.030	0.013	0.0	0.0	0.9	0.56	50.7	3.0
PR-2.007	53.25	7.41	39.830	0.017	0.0	0.0	1.1	1.68	151.1	3.9
PR-1.013	45.93	10.04	39.350	0.073	0.0	0.0	4.1	0.05	4.7«	14.3

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.014	8.173	0.001	8173.0	0.012	0.00	0.0	0.030	[]		-1	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)
PR-1.014	41.69	12.12	39.249	0.085	0.0	0.0	4.3	0.07	5.9«	15.0

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PIPELINE SCHEDULES for Havant

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)
PR-1.000	[]	-5	PR-1	49.246	48.546	0.000	Junction	
PR-1.001	[]	-5	PR-2	48.730	48.030	0.000	Junction	
PR-1.002	[]	-5	PR-3	47.713	47.013	0.000	Junction	
PR-1.003	[]	-5	PR-4	47.000	46.300	0.000	Junction	
PR-1.004	[]	-5	PR-5	46.008	45.308	0.000	Junction	
PR-1.005	[]	-5	PR-6	45.556	44.856	0.000	Junction	
PR-1.006	[]	-5	PR-7	44.821	44.121	0.000	Junction	
PR-1.007	[]	-5	PR-8	42.587	41.887	0.000	Junction	
PR-1.008	[]	-5	PR-9	42.587	41.887	0.000	Junction	
PR-1.009	[]	-5	PR-10	41.671	40.971	0.000	Junction	
PR-1.010	[]	-5	PR-11	40.547	39.846	0.001	Junction	
PR-1.011	[]	-5	PR-12	40.750	39.813	0.237	Junction	
PR-1.012	o	300	PR-13	40.774	39.638	0.836	Junction	
PR-2.000	[]	-1	PR-16	49.000	48.500	0.000	Junction	
PR-2.001	[]	-1	PR-17	48.000	47.500	0.000	Junction	

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)
PR-1.000	10.923	21.2	PR-2	48.730	48.030	0.000	Junction	
PR-1.001	20.558	20.2	PR-3	47.713	47.013	0.000	Junction	
PR-1.002	10.696	15.0	PR-4	47.000	46.299	0.001	Junction	
PR-1.003	14.401	14.5	PR-5	46.008	45.308	0.000	Junction	
PR-1.004	11.427	25.3	PR-6	45.556	44.856	0.000	Junction	
PR-1.005	9.488	12.9	PR-7	44.821	44.121	0.000	Junction	
PR-1.006	16.301	21.9	PR-8	42.587	43.378	-1.491	Junction	
PR-1.007	12.095	16.3	PR-9	42.587	41.144	0.743	Junction	
PR-1.008	17.862	19.5	PR-10	41.671	40.972	-0.001	Junction	
PR-1.009	28.263	25.1	PR-11	40.547	39.846	0.001	Junction	
PR-1.010	9.361	283.7	PR-12	40.750	39.813	0.237	Junction	
PR-1.011	10.808	108.1	PR-13	40.774	39.713	0.361	Junction	
PR-1.012	12.401	72.1	PR-24	39.850	39.466	0.084	Junction	
PR-2.000	26.146	26.1	PR-17	48.000	47.500	0.000	Junction	
PR-2.001	26.146	16.3	PR-18	46.400	45.900	0.000	Junction	

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PIPELINE SCHEDULES for Havant

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)
PR-2.002	[]	-1	PR-18	46.400	45.900	0.000	Junction	
PR-2.003	[]	-1	PR-19	44.700	44.198	0.002	Junction	
PR-2.004	[]	-1	PR-20	42.190	41.688	0.002	Junction	
PR-2.005	[]	-1	PR-21	41.070	40.570	0.000	Junction	
PR-2.006	[]	-1	PR-22	40.530	40.030	0.000	Junction	
PR-2.007	[]	-1	PR-23	40.330	39.830	0.000	Junction	
PR-1.013	[]	-1	PR-24	39.850	39.350	0.000	Junction	
PR-1.014	[]	-1	PR-23	39.840	39.249	0.091	Junction	

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)
PR-2.002	26.146	15.4	PR-19	44.700	44.197	0.003	Junction	
PR-2.003	26.146	10.4	PR-20	42.190	41.688	0.002	Junction	
PR-2.004	18.028	16.1	PR-21	41.070	40.570	0.000	Junction	
PR-2.005	18.028	33.4	PR-22	40.530	40.030	0.000	Junction	
PR-2.006	22.164	110.8	PR-23	40.330	39.830	0.000	Junction	
PR-2.007	5.986	12.5	PR-24	39.850	39.350	0.000	Junction	
PR-1.013	8.173	13076.8	PR-23	39.840	39.349	-0.009	Junction	
PR-1.014	8.173	8173.0	PR-	39.840	39.248	0.092	Open Manhole	0

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	User	-	80	0.001	0.001	0.001
1.002	User	-	80	0.002	0.002	0.002
1.003	User	-	80	0.001	0.001	0.001
1.004	User	-	80	0.002	0.001	0.001
1.005	User	-	80	0.001	0.001	0.001
1.006	User	-	80	0.001	0.001	0.001
1.007	User	-	80	0.001	0.001	0.001
1.008	User	-	80	0.001	0.001	0.001
1.009	User	-	80	0.001	0.001	0.001
1.010	User	-	80	0.003	0.003	0.003
1.011	User	-	80	0.002	0.001	0.001
	User	-	21	0.077	0.016	0.017
1.012	User	-	80	0.003	0.002	0.002
	User	-	21	0.001	0.000	0.003
2.000	-	-	100	0.000	0.000	0.000
2.001	User	-	80	0.003	0.002	0.002
2.002	User	-	80	0.003	0.002	0.002
2.003	User	-	80	0.003	0.002	0.002
2.004	User	-	80	0.003	0.002	0.002
2.005	User	-	80	0.002	0.002	0.002
2.006	User	-	80	0.002	0.002	0.002
2.007	User	-	80	0.005	0.004	0.004
1.013	User	-	80	0.002	0.001	0.001
	User	-	21	0.103	0.022	0.023
1.014	User	-	21	0.005	0.001	0.001
	User	-	80	0.005	0.004	0.005
	User	-	21	0.007	0.001	0.007
	User	-	80	0.006	0.005	0.012
				Total	Total	Total
				0.249	0.085	0.085

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Network Classifications for Havant

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
PR-1.000	PR-1	-5	0.000	0.181	Unclassified				Junction
PR-1.001	PR-2	-5	0.000	0.000	Unclassified				Junction
PR-1.002	PR-3	-5	0.000	0.146	Unclassified				Junction
PR-1.003	PR-4	-5	0.000	0.043	Unclassified				Junction
PR-1.004	PR-5	-5	0.000	0.279	Unclassified				Junction
PR-1.005	PR-6	-5	0.000	0.000	Unclassified				Junction
PR-1.006	PR-7	-5	0.000	0.000	Unclassified				Junction
PR-1.007	PR-8	-5	0.000	0.743	Unclassified				Junction
PR-1.008	PR-9	-5	0.000	0.064	Unclassified				Junction
PR-1.009	PR-10	-5	0.000	0.071	Unclassified				Junction
PR-1.010	PR-11	-5	0.001	1.051	Unclassified				Junction
PR-1.011	PR-12	-5	0.237	0.539	Unclassified				Junction
PR-1.012	PR-13	300	0.084	0.838	Filter				Junction
PR-2.000	PR-16	-1	0.000	0.000	Unclassified				Junction
PR-2.001	PR-17	-1	0.000	0.000	Unclassified				Junction
PR-2.002	PR-18	-1	0.000	0.003	Unclassified				Junction
PR-2.003	PR-19	-1	0.002	0.002	Unclassified				Junction
PR-2.004	PR-20	-1	0.001	0.002	Unclassified				Junction
PR-2.005	PR-21	-1	0.000	0.000	Unclassified				Junction
PR-2.006	PR-22	-1	0.000	0.000	Unclassified				Junction
PR-2.007	PR-23	-1	0.000	0.000	Unclassified				Junction
PR-1.013	PR-24	-1	0.000	0.000	Unclassified				Junction
PR-1.014	PR-23	-1	0.091	0.092	Unclassified				Junction

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-1.014	PR-	39.840	39.248	0.000	0	0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Summer	1	+0%					48.546	-0.700	0.000	0.00			0.0	OK	
PR-1.001	PR-2	8640 Winter	1	+0%					48.031	-0.699	0.000	0.00			0.0	OK	
PR-1.002	PR-3	5760 Winter	1	+0%					47.014	-0.699	0.000	0.00			0.0	OK	
PR-1.003	PR-4	120 Summer	1	+0%					46.301	-0.698	0.000	0.00			0.2	OK	
PR-1.004	PR-5	8640 Winter	1	+0%					45.309	-0.699	0.000	0.00			0.0	OK	
PR-1.005	PR-6	8640 Winter	1	+0%					44.857	-0.699	0.000	0.00			0.0	OK	
PR-1.006	PR-7	15 Winter	1	+0%					44.123	-0.698	0.000	0.00			0.7	OK	
PR-1.007	PR-8	7200 Summer	1	+0%					41.889	-0.698	0.000	0.00			0.0	OK	
PR-1.008	PR-9	8640 Summer	1	+0%					41.888	-0.699	0.000	0.00			0.0	OK	
PR-1.009	PR-10	7200 Winter	1	+0%					40.972	-0.699	0.000	0.00			0.0	OK	
PR-1.010	PR-11	15 Winter	1	+0%					39.849	-0.697	0.000	0.00			0.4	OK	
PR-1.011	PR-12	15 Winter	1	+0%					39.823	-0.690	0.000	0.00			2.3	OK	
PR-1.012	PR-13	15 Winter	1	+0%					39.677	-0.261	0.000	0.04			2.6	OK*	
PR-2.000	PR-16	15 Summer	1	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	1	+0%					47.502	-0.498	0.000	0.00			0.3	OK	
PR-2.002	PR-18	15 Winter	1	+0%					45.904	-0.496	0.000	0.00			0.5	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	1	+0%					44.203	-0.495	0.000	0.00			0.8	OK	
PR-2.004	PR-20	15 Winter	1	+0%					41.697	-0.491	0.000	0.01			1.1	OK	
PR-2.005	PR-21	15 Winter	1	+0%					40.584	-0.486	0.000	0.01			1.3	OK	
PR-2.006	PR-22	15 Winter	1	+0%					40.059	-0.471	0.000	0.03			1.4	OK	
PR-2.007	PR-23	15 Winter	1	+0%					39.843	-0.487	0.000	0.01			1.8	OK	
PR-1.013	PR-24	15 Winter	1	+0%					39.547	-0.303	0.000	0.30			6.7	OK	
PR-1.014	PR-23	15 Winter	1	+0%					39.462	-0.287	0.000	0.34			7.7	OK	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Summer	5	+0%					48.546	-0.700	0.000	0.00			0.0	OK	
PR-1.001	PR-2	10080 Summer	5	+0%					48.031	-0.699	0.000	0.00			0.0	OK	
PR-1.002	PR-3	8640 Winter	5	+0%					47.014	-0.699	0.000	0.00			0.0	OK	
PR-1.003	PR-4	15 Winter	5	+0%					46.301	-0.699	0.000	0.00			0.7	OK	
PR-1.004	PR-5	15 Winter	5	+0%					45.310	-0.698	0.000	0.00			1.0	OK	
PR-1.005	PR-6	15 Winter	5	+0%					44.857	-0.698	0.000	0.00			1.1	OK	
PR-1.006	PR-7	15 Winter	5	+0%					44.124	-0.697	0.000	0.00			1.2	OK	
PR-1.007	PR-8	15 Winter	5	+0%					41.890	-0.697	0.000	0.00			1.5	OK	
PR-1.008	PR-9	8640 Winter	5	+0%					41.888	-0.699	0.000	0.00			0.0	OK	
PR-1.009	PR-10	4320 Winter	5	+0%					40.972	-0.699	0.000	0.00			0.0	OK	
PR-1.010	PR-11	15 Winter	5	+0%					39.852	-0.694	0.000	0.00			0.7	OK	
PR-1.011	PR-12	15 Winter	5	+0%					39.830	-0.683	0.000	0.01			3.9	OK	
PR-1.012	PR-13	15 Winter	5	+0%					39.689	-0.249	0.000	0.07			4.4	OK*	
PR-2.000	PR-16	15 Summer	5	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	5	+0%					47.504	-0.496	0.000	0.00			0.4	OK	
PR-2.002	PR-18	15 Winter	5	+0%					45.907	-0.493	0.000	0.01			0.9	OK	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	5	+0%					44.207	-0.491	0.000	0.01			1.4	OK	
PR-2.004	PR-20	15 Winter	5	+0%					41.702	-0.486	0.000	0.01			1.8	OK	
PR-2.005	PR-21	15 Winter	5	+0%					40.594	-0.476	0.000	0.02			2.1	OK	
PR-2.006	PR-22	15 Winter	5	+0%					40.079	-0.451	0.000	0.05			2.4	OK	
PR-2.007	PR-23	15 Winter	5	+0%					39.851	-0.479	0.000	0.02			3.0	OK	
PR-1.013	PR-24	15 Winter	5	+0%					39.607	-0.243	0.000	0.48			10.9	OK	
PR-1.014	PR-23	15 Winter	5	+0%					39.529	-0.220	0.000	0.56			12.7	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Summer	30	+0%					48.546	-0.700	0.000	0.00			0.0	OK	
PR-1.001	PR-2	8640 Winter	30	+0%					48.031	-0.699	0.000	0.00			0.0	OK	
PR-1.002	PR-3	15 Winter	30	+0%					47.015	-0.698	0.000	0.00			1.0	OK	
PR-1.003	PR-4	15 Winter	30	+0%					46.302	-0.698	0.000	0.00			1.3	OK	
PR-1.004	PR-5	15 Summer	30	+0%					45.311	-0.696	0.000	0.00			1.8	OK	
PR-1.005	PR-6	15 Summer	30	+0%					44.859	-0.697	0.000	0.00			2.0	OK	
PR-1.006	PR-7	15 Summer	30	+0%					44.126	-0.695	0.000	0.00			2.3	OK	
PR-1.007	PR-8	15 Winter	30	+0%					41.892	-0.695	0.000	0.00			2.7	OK	
PR-1.008	PR-9	10080 Winter	30	+0%					41.888	-0.699	0.000	0.00			0.1	OK	
PR-1.009	PR-10	7200 Winter	30	+0%					40.972	-0.699	0.000	0.00			0.1	OK	
PR-1.010	PR-11	15 Summer	30	+0%					39.859	-0.687	0.000	0.00			1.3	OK	
PR-1.011	PR-12	15 Winter	30	+0%					39.845	-0.668	0.000	0.01			7.2	OK	
PR-1.012	PR-13	15 Winter	30	+0%					39.722	-0.216	0.000	0.12			7.8	OK*	
PR-2.000	PR-16	15 Summer	30	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	30	+0%					47.507	-0.493	0.000	0.01			0.8	OK	
PR-2.002	PR-18	15 Winter	30	+0%					45.913	-0.487	0.000	0.01			1.7	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	30	+0%					44.214	-0.484	0.000	0.02			2.5	OK	
PR-2.004	PR-20	15 Summer	30	+0%					41.714	-0.474	0.000	0.02			3.3	OK	
PR-2.005	PR-21	15 Winter	30	+0%					40.614	-0.456	0.000	0.04			3.8	OK	
PR-2.006	PR-22	15 Winter	30	+0%					40.103	-0.427	0.000	0.09			4.3	OK	
PR-2.007	PR-23	15 Winter	30	+0%					39.868	-0.462	0.000	0.04			5.5	OK	
PR-1.013	PR-24	15 Winter	30	+0%					39.704	-0.146	0.000	0.86			19.4	FLOOD RISK*	
PR-1.014	PR-23	15 Winter	30	+0%					39.636	-0.113	0.000	0.99			22.3	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Summer	100	+0%					48.546	-0.700	0.000	0.00			0.0	OK	
PR-1.001	PR-2	5760 Summer	100	+0%					48.031	-0.699	0.000	0.00			0.0	OK	
PR-1.002	PR-3	15 Winter	100	+0%					47.015	-0.698	0.000	0.00			1.3	OK	
PR-1.003	PR-4	15 Winter	100	+0%					46.302	-0.697	0.000	0.00			1.7	OK	
PR-1.004	PR-5	15 Summer	100	+0%					45.313	-0.695	0.000	0.00			2.3	OK	
PR-1.005	PR-6	15 Summer	100	+0%					44.860	-0.696	0.000	0.00			2.6	OK	
PR-1.006	PR-7	15 Summer	100	+0%					44.127	-0.694	0.000	0.00			3.0	OK	
PR-1.007	PR-8	15 Winter	100	+0%					41.893	-0.694	0.000	0.00			3.5	OK	
PR-1.008	PR-9	960 Winter	100	+0%					41.888	-0.699	0.000	0.00			0.2	OK	
PR-1.009	PR-10	8640 Winter	100	+0%					40.972	-0.699	0.000	0.00			0.1	OK	
PR-1.010	PR-11	15 Winter	100	+0%					39.866	-0.680	0.000	0.00			1.7	OK	
PR-1.011	PR-12	15 Winter	100	+0%					39.854	-0.659	0.000	0.02			9.3	OK	
PR-1.012	PR-13	15 Winter	100	+0%					39.763	-0.175	0.000	0.15			9.4	OK*	
PR-2.000	PR-16	15 Summer	100	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	100	+0%					47.509	-0.491	0.000	0.01			1.1	OK	
PR-2.002	PR-18	15 Winter	100	+0%					45.917	-0.483	0.000	0.02			2.2	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	100	+0%					44.219	-0.479	0.000	0.02			3.2	OK	
PR-2.004	PR-20	15 Summer	100	+0%					41.722	-0.466	0.000	0.03			4.2	OK	
PR-2.005	PR-21	15 Winter	100	+0%					40.624	-0.446	0.000	0.05			4.9	OK	
PR-2.006	PR-22	15 Winter	100	+0%					40.117	-0.413	0.000	0.11			5.6	OK	
PR-2.007	PR-23	15 Winter	100	+0%					39.880	-0.450	0.000	0.05			7.1	OK	
PR-1.013	PR-24	15 Winter	100	+0%					39.757	-0.093	0.000	1.09			24.7	FLOOD RISK*	
PR-1.014	PR-23	15 Winter	100	+0%					39.694	-0.055	0.000	1.26			28.6	FLOOD RISK*	

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Appendix C. Proposed MicroDrainage Models

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Havant

Pipe Sizes Havant Manhole Sizes Havant

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	10.000
M5-60 (mm)	19.800	Volumetric Runoff Coeff.	0.840	Min Design Depth for Optimisation (m)	0.000
Ratio R	0.322	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	250	Add Flow / Climate Change (%)	40	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Havant

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.000	20.000	0.181	110.5	0.084	5.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.001	19.998	0.300	66.6	0.000	0.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.002	19.998	0.458	43.6	0.000	0.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.003	20.000	0.337	59.4	0.296	0.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.004	30.338	0.229	132.6	0.000	0.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.005	20.333	0.190	107.0	0.000	0.00	0.0	0.030		[]	-4	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)
PR-1.000	60.70	5.32	60.300	0.084	0.0	0.0	6.2	1.05	1100.7	21.7
PR-1.001	59.59	5.56	60.119	0.084	0.0	0.0	6.2	1.35	1418.3	21.7
PR-1.002	58.73	5.76	59.819	0.084	0.0	0.0	6.2	1.67	1751.7	21.7
PR-1.003	57.77	6.00	59.360	0.380	0.0	0.0	26.7	1.43	1501.5	93.3
PR-1.004	55.71	6.53	59.023	0.380	0.0	0.0	26.7	0.96	1004.8	93.3
PR-1.005	54.56	6.84	58.795	0.380	0.0	0.0	26.7	1.07	1118.5	93.3

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-2.000	29.992	2.024	14.8	0.060	5.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.001	26.964	1.979	13.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.002	40.331	2.960	13.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.003	37.641	2.657	14.2	0.067	0.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.004	14.421	0.125	115.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.005	18.975	0.598	31.8	0.056	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-2.006	18.975	0.597	31.8	0.000	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-1.006	15.439	0.100	154.4	0.131	0.00	0.0	0.600		o	300	Pipe/Conduit	
PR-1.007	2.351	0.005	470.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
PR-3.000	8.248	0.087	94.8	0.050	5.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.001	28.251	0.140	201.6	0.037	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.002	20.741	1.051	19.7	0.027	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.003	20.741	0.880	23.6	0.000	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.004	26.616	0.407	65.3	0.017	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.005	3.231	0.520	6.2	0.374	0.00	0.0		0.030	o	225	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)
PR-2.000	61.50	5.15	69.546	0.060	0.0	0.0	4.4	3.42	135.8	15.6
PR-2.001	60.91	5.27	67.522	0.060	0.0	0.0	4.4	3.56	141.7	15.6
PR-2.002	60.05	5.46	65.543	0.060	0.0	0.0	4.4	3.56	141.7	15.6
PR-2.003	59.26	5.64	62.583	0.127	0.0	0.0	9.1	3.50	139.0	32.0
PR-2.004	58.43	5.84	59.925	0.127	0.0	0.0	9.1	1.22	48.4	32.0
PR-2.005	57.76	6.00	59.800	0.184	0.0	0.0	12.9	1.96	2053.2	45.1
PR-2.006	57.11	6.16	59.202	0.184	0.0	0.0	12.9	1.95	2052.7	45.1
PR-1.006	53.85	7.05	58.605	0.695	0.0	0.0	45.4	1.26	89.3«	158.9
PR-1.007	53.66	7.10	58.505	0.695	0.0	0.0	45.4	0.72	50.8«	158.9
PR-3.000	61.62	5.12	59.887	0.050	0.0	0.0	3.7	1.13	1188.4	13.0
PR-3.001	58.89	5.73	59.800	0.087	0.0	0.0	6.2	0.78	815.0	21.7
PR-3.002	58.30	5.87	59.660	0.113	0.0	0.0	8.0	2.48	2604.2	28.1
PR-3.003	57.68	6.02	58.609	0.113	0.0	0.0	8.0	2.27	2382.7	28.1
PR-3.004	56.39	6.35	57.730	0.130	0.0	0.0	8.9	1.36	1431.5	31.2
PR-3.005	56.29	6.37	57.322	0.504	0.0	0.0	34.4	1.96	78.1«	120.5

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PIPELINE SCHEDULES for Havant

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)
PR-1.000	[]	-4	PR-10	61.000	60.300	0.000	Junction	
PR-1.001	[]	-4	PR-11	60.819	60.119	0.000	Junction	
PR-1.002	[]	-4	PR-12	60.519	59.819	0.000	Junction	
PR-1.003	[]	-4	PR-13	60.060	59.360	0.000	Junction	
PR-1.004	[]	-4	PR-14	59.723	59.023	0.000	Junction	
PR-1.005	[]	-4	PR-15	59.495	58.795	0.000	Junction	
PR-2.000	o	225	PR-1	70.671	69.546	0.900	Open Manhole	1050
PR-2.001	o	225	PR-2	68.647	67.522	0.900	Open Manhole	1050
PR-2.002	o	225	PR-3	66.668	65.543	0.900	Open Manhole	1050
PR-2.003	o	225	PR-4	63.708	62.583	0.900	Open Manhole	1050
PR-2.004	o	225	PR-5	61.050	59.925	0.900	Open Manhole	1050
PR-2.005	[]	-4	PR-6	60.500	59.800	0.000	Junction	
PR-2.006	[]	-4	PR-13	60.180	59.202	0.278	Junction	
PR-1.006	o	300	PR-17	59.740	58.605	0.835	Junction	

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)
PR-1.000	20.000	110.5	PR-11	60.819	60.119	0.000	Junction	
PR-1.001	19.998	66.6	PR-12	60.519	59.819	0.000	Junction	
PR-1.002	19.998	43.6	PR-13	60.060	59.360	0.000	Junction	
PR-1.003	20.000	59.4	PR-14	59.723	59.023	0.000	Junction	
PR-1.004	30.338	132.6	PR-15	59.495	58.795	0.000	Junction	
PR-1.005	20.333	107.0	PR-17	59.740	58.605	0.435	Junction	
PR-2.000	29.992	14.8	PR-2	68.647	67.522	0.900	Open Manhole	1050
PR-2.001	26.964	13.6	PR-3	66.668	65.543	0.900	Open Manhole	1050
PR-2.002	40.331	13.6	PR-4	63.708	62.583	0.900	Open Manhole	1050
PR-2.003	37.641	14.2	PR-5	61.050	59.925	0.900	Open Manhole	1050
PR-2.004	14.421	115.0	PR-6	60.500	59.800	0.475	Junction	
PR-2.005	18.975	31.8	PR-13	60.180	59.202	0.278	Junction	
PR-2.006	18.975	31.8	PR-17	59.740	58.605	0.435	Junction	
PR-1.006	15.439	154.4	PR-18	59.634	58.505	0.829	Junction	

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PIPELINE SCHEDULES for Havant

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)
PR-1.007	o	300	PR-18	59.634	58.505	0.829	Junction	
PR-3.000	[]	-4	PR-19	60.587	59.887	0.000	Junction	
PR-3.001	[]	-4	PR-20	60.500	59.800	0.000	Junction	
PR-3.002	[]	-4	PR-21	60.360	59.660	0.000	Junction	
PR-3.003	[]	-4	PR-22	59.309	58.609	0.000	Junction	
PR-3.004	[]	-4	PR-23	58.430	57.730	0.000	Junction	
PR-3.005	o	225	PR-24	58.022	57.322	0.475	Junction	

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)
PR-1.007	2.351	470.1	PR-Outfall-1	59.740	58.500	0.940	Open Manhole	0
PR-3.000	8.248	94.8	PR-20	60.500	59.800	0.000	Junction	
PR-3.001	28.251	201.6	PR-21	60.360	59.660	0.000	Junction	
PR-3.002	20.741	19.7	PR-22	59.309	58.609	0.000	Junction	
PR-3.003	20.741	23.6	PR-23	58.430	57.730	0.000	Junction	
PR-3.004	26.616	65.3	PR-24	58.022	57.322	0.000	Junction	
PR-3.005	3.231	6.2	PR-25	57.502	56.802	0.475	Open Manhole	0

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Hardstanding	100	0.072	0.072	0.072
	Classification	Verge	21	0.013	0.003	0.074
	Classification	Cuttings	21	0.009	0.002	0.076
	Classification	HardstandingCC	20	0.026	0.005	0.082
	Classification	VergeCC	20	0.013	0.003	0.084
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	Classification	Cuttings	21	1.411	0.296	0.296
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
2.000	Classification	Hardstanding	100	0.028	0.028	0.028
	Classification	Verge	21	0.005	0.001	0.030
	Classification	Hardstanding	100	0.018	0.018	0.047
	Classification	Verge	21	0.005	0.001	0.048
	Classification	HardstandingCC	20	0.018	0.004	0.052
	Classification	HardstandingCC	20	0.028	0.006	0.058
	Classification	VergeCC	20	0.005	0.001	0.059
	Classification	VergeCC	20	0.005	0.001	0.060
2.001	-	-	100	0.000	0.000	0.000
2.002	Classification	Default	100	0.000	0.000	0.000
2.003	Classification	Hardstanding	100	0.021	0.021	0.021
	Classification	Verge	21	0.005	0.001	0.022
	Classification	Cuttings	21	0.002	0.000	0.023
	Classification	HardstandingCC	20	0.021	0.004	0.027
	Classification	VergeCC	20	0.005	0.001	0.028
	Classification	Hardstanding	100	0.031	0.031	0.058
	Classification	Verge	21	0.006	0.001	0.060
	Classification	HardstandingCC	20	0.031	0.006	0.066
	Classification	VergeCC	20	0.006	0.001	0.067
2.004	Classification	Cuttings	21	0.001	0.000	0.000
2.005	Classification	Hardstanding	100	0.049	0.049	0.049
	Classification	Verge	21	0.004	0.001	0.049
	Classification	Cuttings	21	0.002	0.001	0.050
	Classification	HardstandingCC	20	0.030	0.006	0.056
	Classification	VergeCC	20	0.004	0.001	0.056
2.006	-	-	100	0.000	0.000	0.000
1.006	Classification	Cuttings	21	0.623	0.131	0.131
1.007	-	-	100	0.000	0.000	0.000
3.000	Classification	Cuttings	21	0.004	0.001	0.001
	Classification	Cuttings	21	0.004	0.001	0.002
	Classification	Cuttings	21	0.089	0.019	0.020

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	Classification	Cuttings	21	0.002	0.000	0.021
	Classification	Hardstanding	100	0.029	0.029	0.050
3.001	Classification	Cuttings	21	0.010	0.002	0.002
	Classification	Cuttings	21	0.148	0.031	0.033
	Classification	Verge	21	0.002	0.000	0.034
	Classification	HardstandingCC	20	0.014	0.003	0.036
	Classification	VergeCC	20	0.002	0.000	0.037
3.002	Classification	Hardstanding	100	0.023	0.023	0.023
	Classification	Verge	21	0.004	0.001	0.024
	Classification	HardstandingCC	20	0.008	0.002	0.026
	Classification	VergeCC	20	0.004	0.001	0.027
3.003	-	-	100	0.000	0.000	0.000
3.004	Classification	Hardstanding	100	0.015	0.015	0.015
	Classification	Verge	21	0.004	0.001	0.016
	Classification	HardstandingCC	20	0.001	0.000	0.016
	Classification	VergeCC	20	0.004	0.001	0.017
3.005	Classification	Hardstanding	100	0.018	0.018	0.018
	Classification	Verge	21	0.005	0.001	0.019
	Classification	VergeCC	20	0.005	0.001	0.020
	User	-	21	1.686	0.354	0.374
				Total	Total	Total
				4.578	1.199	1.199

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Network Classifications for Havant

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
PR-1.000	PR-10	-4	0.000	0.058	Ditch				Junction
PR-1.001	PR-11	-4	0.000	0.025	Ditch				Junction
PR-1.002	PR-12	-4	0.000	0.071	Ditch				Junction
PR-1.003	PR-13	-4	0.000	0.000	Ditch				Junction
PR-1.004	PR-14	-4	0.000	0.000	Ditch				Junction
PR-1.005	PR-15	-4	0.000	0.435	Ditch				Junction
PR-2.000	PR-1	225	0.900	1.017	Carrier	1050	0	0.900	Type 7
PR-2.001	PR-2	225	0.900	0.907	Carrier	1050	0	0.900	Type 7
PR-2.002	PR-3	225	0.900	0.911	Carrier	1050	0	0.900	Type 7
PR-2.003	PR-4	225	0.846	0.900	Carrier	1050	0	0.900	Type 7
PR-2.004	PR-5	225	0.475	0.900	Carrier	1050	0	0.900	Type 7
PR-2.005	PR-6	-4	0.000	0.278	Ditch				Junction
PR-2.006	PR-13	-4	0.278	0.435	Ditch				Junction
PR-1.006	PR-17	300	0.829	1.331	Carrier				Junction
PR-1.007	PR-18	300	0.239	0.940	Carrier				Junction
PR-3.000	PR-19	-4	0.000	0.000	Ditch				Junction
PR-3.001	PR-20	-4	0.000	0.139	Ditch				Junction
PR-3.002	PR-21	-4	0.000	0.000	Ditch				Junction
PR-3.003	PR-22	-4	0.000	0.061	Ditch				Junction
PR-3.004	PR-23	-4	0.000	0.011	Ditch				Junction
PR-3.005	PR-24	225	0.458	0.475	Ditch				Junction

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-1.007	PR-Outfall-1	59.740	58.500	0.000	0	0

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-3.005	PR-25	57.502	56.802	0.000	0	0

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Online Controls for Havant

Orifice Manhole: PR-11, DS/PN: PR-1.001, Volume (m³): 21.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 60.119

Orifice Manhole: PR-12, DS/PN: PR-1.002, Volume (m³): 21.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 59.819

Orifice Manhole: PR-13, DS/PN: PR-1.003, Volume (m³): 21.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 59.360

Orifice Manhole: PR-14, DS/PN: PR-1.004, Volume (m³): 21.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 59.023

Orifice Manhole: PR-15, DS/PN: PR-1.005, Volume (m³): 31.9

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 58.795

Orifice Manhole: PR-13, DS/PN: PR-2.006, Volume (m³): 19.9

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 59.202

Orifice Manhole: PR-20, DS/PN: PR-3.001, Volume (m³): 8.7

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 59.800

Orifice Manhole: PR-21, DS/PN: PR-3.002, Volume (m³): 29.7

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 59.660

Orifice Manhole: PR-22, DS/PN: PR-3.003, Volume (m³): 21.8

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 58.609

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Orifice Manhole: PR-23, DS/PN: PR-3.004, Volume (m³): 21.8

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 57.730

Orifice Manhole: PR-24, DS/PN: PR-3.005, Volume (m³): 27.9

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 57.322

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Offline Controls for Havant

Weir Manhole: PR-11, DS/PN: PR-1.001, Loop to PN: PR-1.002

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 60.619

Weir Manhole: PR-12, DS/PN: PR-1.002, Loop to PN: PR-1.003

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 60.317

Weir Manhole: PR-13, DS/PN: PR-1.003, Loop to PN: PR-1.004

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 59.849

Weir Manhole: PR-14, DS/PN: PR-1.004, Loop to PN: PR-1.005

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 59.531

Weir Manhole: PR-15, DS/PN: PR-1.005, Loop to PN: PR-1.006

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 59.295

Weir Manhole: PR-13, DS/PN: PR-2.006, Loop to PN: PR-1.006

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 59.702

Weir Manhole: PR-20, DS/PN: PR-3.001, Loop to PN: PR-3.002

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 60.300

Weir Manhole: PR-21, DS/PN: PR-3.002, Loop to PN: PR-3.003

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 60.104

Weir Manhole: PR-22, DS/PN: PR-3.003, Loop to PN: PR-3.004

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 59.109

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Weir Manhole: PR-23, DS/PN: PR-3.004, Loop to PN: PR-3.005

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 58.230

Weir Manhole: PR-24, DS/PN: PR-3.005, Loop to PN: None

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 57.822

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 11 Number of Time/Area Diagrams 0
Number of Online Controls 11 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-10	15 Winter	1	+0%					60.358	-0.642	0.000	0.01			10.3	OK	
PR-1.001	PR-11	15 Winter	1	+0%			100/15 Winter	5	60.344	-0.475	0.000	0.00	0.0		5.1	OK	
PR-1.002	PR-12	30 Winter	1	+0%				0	60.052	-0.467	0.000	0.00	0.0		4.5	OK	
PR-1.003	PR-13	30 Winter	1	+0%			1/15 Summer	80	59.893	-0.167	0.000	0.01	16.8		8.2	FLOOD RISK*	
PR-1.004	PR-14	60 Winter	1	+0%			1/30 Winter	74	59.561	-0.163	0.000	0.01	6.2		8.2	FLOOD RISK*	
PR-1.005	PR-15	120 Winter	1	+0%			5/30 Summer	56	59.182	-0.312	0.000	0.01	0.0		6.9	OK	
PR-2.000	PR-1	15 Winter	1	+0%					69.582	-0.189	0.000	0.06			7.6	OK	
PR-2.001	PR-2	15 Winter	1	+0%					67.559	-0.189	0.000	0.06			7.5	OK	
PR-2.002	PR-3	15 Winter	1	+0%					65.578	-0.190	0.000	0.06			7.6	OK	
PR-2.003	PR-4	15 Winter	1	+0%					62.633	-0.174	0.000	0.11			14.9	OK	
PR-2.004	PR-5	15 Winter	1	+0%	30/15 Summer				60.035	-0.115	0.000	0.48			15.0	OK	
PR-2.005	PR-6	15 Winter	1	+0%					59.844	-0.656	0.000	0.01			21.0	OK	
PR-2.006	PR-13	30 Winter	1	+0%			1/15 Summer	50	59.730	-0.172	0.000	0.00	5.4		8.2	OK	
PR-1.006	PR-17	30 Winter	1	+0%	30/15 Summer				58.757	-0.148	0.000	0.50			24.9	OK*	
PR-1.007	PR-18	30 Winter	1	+0%					58.682	-0.123	0.000	0.65			25.0	OK*	
PR-3.000	PR-19	15 Winter	1	+0%					60.052	-0.535	0.000	0.01			5.0	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.001	PR-20	15 Winter	1	+0%			30/15 Summer	17	60.052	-0.448	0.000	0.01	0.0		5.3	OK	
PR-3.002	PR-21	30 Winter	1	+0%			100/30 Winter	4	59.855	-0.505	0.000	0.00	0.0		4.7	OK	
PR-3.003	PR-22	30 Winter	1	+0%			100/60 Winter	1	58.799	-0.510	0.000	0.00	0.0		4.6	OK	
PR-3.004	PR-23	60 Winter	1	+0%			100/30 Winter	9	58.051	-0.379	0.000	0.00	0.0		5.0	OK	
PR-3.005	PR-24	30 Winter	1	+0%	1/15 Summer		1/15 Summer	89	57.869	0.322	0.000	0.13	20.0		8.4	FLOOD RISK*	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 11 Number of Time/Area Diagrams 0
Number of Online Controls 11 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-10	30 Winter	5	+0%					60.445	-0.555	0.000	0.01			13.4	OK	
PR-1.001	PR-11	30 Winter	5	+0%			100/15 Winter	5	60.444	-0.375	0.000	0.00	0.0		6.3	OK	
PR-1.002	PR-12	30 Winter	5	+0%				0	60.115	-0.403	0.000	0.00	0.0		5.5	OK	
PR-1.003	PR-13	15 Winter	5	+0%			1/15 Summer	80	59.914	-0.146	0.000	0.01	43.3		8.3	FLOOD RISK*	
PR-1.004	PR-14	30 Winter	5	+0%			1/30 Winter	74	59.589	-0.134	0.000	0.01	34.7		8.4	FLOOD RISK*	
PR-1.005	PR-15	60 Winter	5	+0%			5/30 Summer	56	59.337	-0.158	0.000	0.01	15.6		8.3	FLOOD RISK*	
PR-2.000	PR-1	15 Winter	5	+0%					69.594	-0.177	0.000	0.10			12.8	OK	
PR-2.001	PR-2	15 Winter	5	+0%					67.571	-0.177	0.000	0.10			12.6	OK	
PR-2.002	PR-3	15 Winter	5	+0%					65.590	-0.178	0.000	0.09			12.6	OK	
PR-2.003	PR-4	15 Winter	5	+0%					62.650	-0.158	0.000	0.19			24.8	OK	
PR-2.004	PR-5	15 Winter	5	+0%	30/15 Summer				60.079	-0.071	0.000	0.80			25.0	OK	
PR-2.005	PR-6	15 Winter	5	+0%					59.872	-0.628	0.000	0.02			35.1	OK	
PR-2.006	PR-13	15 Winter	5	+0%			1/15 Summer	50	59.755	-0.147	0.000	0.00	26.2		8.4	OK	
PR-1.006	PR-17	30 Winter	5	+0%	30/15 Summer				58.897	-0.008	0.000	0.83			40.9	OK*	
PR-1.007	PR-18	30 Winter	5	+0%					58.805	0.000	0.000	1.00			38.4	SURCHARGED*	
PR-3.000	PR-19	30 Winter	5	+0%					60.221	-0.366	0.000	0.01			6.9	OK	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.001	PR-20	30 Winter	5	+0%			30/15 Summer	17	60.221	-0.279	0.000	0.01	0.0		6.4	OK	
PR-3.002	PR-21	60 Winter	5	+0%			100/30 Winter	4	59.928	-0.432	0.000	0.00	0.0		5.6	OK	
PR-3.003	PR-22	60 Winter	5	+0%			100/60 Winter	1	58.868	-0.441	0.000	0.00	0.0		5.5	OK	
PR-3.004	PR-23	60 Winter	5	+0%			100/30 Winter	9	58.129	-0.300	0.000	0.00	0.0		5.9	OK	
PR-3.005	PR-24	15 Winter	5	+0%	1/15 Summer		1/15 Summer	89	57.891	0.344	0.000	0.13	51.6		8.5	FLOOD RISK*	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 11 Number of Time/Area Diagrams 0
Number of Online Controls 11 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-10	30 Winter	30	+0%					60.563	-0.437	0.000	0.02			19.4	OK	
PR-1.001	PR-11	30 Winter	30	+0%			100/15 Winter	5	60.562	-0.257	0.000	0.01	0.0		7.4	OK	
PR-1.002	PR-12	60 Winter	30	+0%				0	60.174	-0.344	0.000	0.00	0.0		6.1	OK	
PR-1.003	PR-13	15 Summer	30	+0%			1/15 Summer	80	59.937	-0.123	0.000	0.01	93.3		8.4	FLOOD RISK*	
PR-1.004	PR-14	15 Winter	30	+0%			1/30 Winter	74	59.612	-0.111	0.000	0.01	83.6		8.5	FLOOD RISK*	
PR-1.005	PR-15	30 Winter	30	+0%			5/30 Summer	56	59.365	-0.129	0.000	0.01	54.6		8.1	FLOOD RISK*	
PR-2.000	PR-1	15 Winter	30	+0%					69.604	-0.167	0.000	0.15			18.7	OK	
PR-2.001	PR-2	15 Winter	30	+0%					67.581	-0.167	0.000	0.15			18.5	OK	
PR-2.002	PR-3	15 Winter	30	+0%					65.599	-0.169	0.000	0.14			18.6	OK	
PR-2.003	PR-4	15 Winter	30	+0%					62.670	-0.138	0.000	0.31			40.8	OK	
PR-2.004	PR-5	15 Winter	30	+0%	30/15 Summer				60.233	0.082	0.000	1.29			40.2	SURCHARGED	
PR-2.005	PR-6	15 Winter	30	+0%					59.891	-0.609	0.000	0.03			57.9	OK	
PR-2.006	PR-13	15 Summer	30	+0%			1/15 Summer	50	59.769	-0.133	0.000	0.00	49.2		8.5	OK	
PR-1.006	PR-17	30 Winter	30	+0%	30/15 Summer				59.204	0.299	0.000	1.45			71.6	SURCHARGED*	
PR-1.007	PR-18	15 Summer	30	+0%					58.805	0.000	0.000	1.42			54.6	SURCHARGED*	
PR-3.000	PR-19	30 Winter	30	+0%					60.336	-0.251	0.000	0.01			10.6	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.001	PR-20	30 Winter	30	+0%			30/15 Summer	17	60.336	-0.164	0.000	0.01	9.8		7.2	FLOOD RISK*	
PR-3.002	PR-21	60 Winter	30	+0%			100/30 Winter	4	60.039	-0.321	0.000	0.00	0.0		6.9	OK	
PR-3.003	PR-22	60 Winter	30	+0%			100/60 Winter	1	58.965	-0.344	0.000	0.00	0.0		6.6	OK	
PR-3.004	PR-23	60 Winter	30	+0%			100/30 Winter	9	58.223	-0.206	0.000	0.00	0.0		7.0	OK	
PR-3.005	PR-24	15 Winter	30	+0%	1/15 Summer		1/15 Summer	89	57.919	0.371	0.000	0.14	120.3		8.8	FLOOD RISK*	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 11 Number of Time/Area Diagrams 0
Number of Online Controls 11 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-10	30 Winter	100	+0%					60.647	-0.353	0.000	0.03			25.3	OK	
PR-1.001	PR-11	30 Winter	100	+0%			100/15 Winter	5	60.645	-0.174	0.000	0.01	4.7		8.1	FLOOD RISK*	
PR-1.002	PR-12	60 Winter	100	+0%				0	60.237	-0.281	0.000	0.00	0.0		6.8	OK	
PR-1.003	PR-13	15 Summer	100	+0%			1/15 Summer	80	59.945	-0.115	0.000	0.01	123.4		8.3	FLOOD RISK*	
PR-1.004	PR-14	15 Winter	100	+0%			1/30 Winter	74	59.626	-0.097	0.000	0.01	115.9		8.4	FLOOD RISK*	
PR-1.005	PR-15	30 Winter	100	+0%			5/30 Summer	56	59.451	-0.043	0.000	0.01	91.1		8.1	FLOOD RISK*	
PR-2.000	PR-1	15 Winter	100	+0%					69.613	-0.158	0.000	0.19			24.2	OK	
PR-2.001	PR-2	15 Winter	100	+0%					67.590	-0.157	0.000	0.19			24.0	OK	
PR-2.002	PR-3	15 Winter	100	+0%					65.608	-0.160	0.000	0.18			24.0	OK	
PR-2.003	PR-4	15 Winter	100	+0%					62.683	-0.125	0.000	0.40			52.8	OK	
PR-2.004	PR-5	15 Winter	100	+0%	30/15 Summer				60.378	0.228	0.000	1.67			52.1	SURCHARGED	
PR-2.005	PR-6	15 Winter	100	+0%					59.904	-0.596	0.000	0.04			74.6	OK	
PR-2.006	PR-13	15 Winter	100	+0%			1/15 Summer	50	59.778	-0.125	0.000	0.00	66.7		8.6	OK	
PR-1.006	PR-17	30 Winter	100	+0%	30/15 Summer				59.416	0.511	0.000	1.77			87.7	SURCHARGED*	
PR-1.007	PR-18	15 Summer	100	+0%					58.805	0.000	0.000	1.92			73.7	SURCHARGED*	
PR-3.000	PR-19	15 Winter	100	+0%					60.352	-0.235	0.000	0.02			18.9	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.001	PR-20	15 Winter	100	+0%			30/15 Summer	17	60.351	-0.149	0.000	0.01	23.1		7.4	FLOOD RISK*	
PR-3.002	PR-21	60 Winter	100	+0%			100/30 Winter	4	60.134	-0.226	0.000	0.00	6.9		7.8	OK	
PR-3.003	PR-22	60 Winter	100	+0%			100/60 Winter	1	59.131	-0.178	0.000	0.00	3.1		8.2	FLOOD RISK*	
PR-3.004	PR-23	60 Winter	100	+0%			100/30 Winter	9	58.258	-0.172	0.000	0.01	5.1		7.2	FLOOD RISK*	
PR-3.005	PR-24	15 Summer	100	+0%	1/15 Summer		1/15 Summer	89	57.933	0.386	0.000	0.14	157.4		8.9	FLOOD RISK*	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Havant

Pipe Sizes Havant Manhole Sizes Havant

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	10.000
M5-60 (mm)	19.700	Volumetric Runoff Coeff.	0.840	Min Design Depth for Optimisation (m)	0.000
Ratio R	0.334	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	250	Add Flow / Climate Change (%)	40	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.000	10.923	0.516	21.2	0.018	5.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.001	20.558	1.017	20.2	0.000	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.002	10.696	0.714	15.0	0.000	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.003	14.401	0.992	14.5	0.007	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.004	11.427	0.452	25.3	0.007	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.005	9.488	0.735	12.9	0.000	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.006	16.235	1.487	10.9	0.000	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.007	12.102	0.748	16.2	0.008	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.008	17.862	0.915	19.5	0.005	0.00	0.0	0.030		[]	-5	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)
PR-1.000	62.67	5.08	48.546	0.018	0.0	0.0	1.4	2.28	1278.7	4.7
PR-1.001	61.96	5.23	48.030	0.018	0.0	0.0	1.4	2.34	1308.3	4.7
PR-1.002	61.64	5.29	47.013	0.018	0.0	0.0	1.4	2.71	1520.0	4.7
PR-1.003	61.24	5.38	46.300	0.025	0.0	0.0	1.9	2.76	1543.9	6.6
PR-1.004	60.81	5.47	45.308	0.032	0.0	0.0	2.4	2.09	1170.0	8.4
PR-1.005	60.57	5.52	44.856	0.032	0.0	0.0	2.4	2.92	1637.3	8.4
PR-1.006	60.19	5.61	44.121	0.032	0.0	0.0	2.4	3.18	1780.2	8.4
PR-1.007	59.84	5.69	42.634	0.041	0.0	0.0	3.0	2.61	1462.6	10.4
PR-1.008	59.30	5.81	41.887	0.046	0.0	0.0	3.3	2.38	1331.6	11.6

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.009	28.263	1.125	25.1	0.011	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.010	9.361	0.033	283.7	0.008	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.011	10.808	0.010	1080.8	0.000	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.012	12.401	0.003	4133.8	0.000	0.00	0.0	0.600		oo	-3	Pipe/Conduit	
PR-2.000	26.146	1.000	26.1	0.000	5.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.001	26.146	1.600	16.3	0.008	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.002	26.146	1.703	15.4	0.009	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.003	26.146	2.510	10.4	0.010	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.004	18.028	1.118	16.1	0.010	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.005	18.028	0.540	33.4	0.006	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.006	22.164	0.200	110.8	0.006	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.007	5.986	0.030	199.5	0.008	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-1.013	8.067	0.050	161.3	0.001	0.00	0.0		0.030	[]	-7	Pipe/Conduit	
PR-1.014	6.434	0.050	128.7	0.001	0.00	0.0		0.030	[]	-7	Pipe/Conduit	
PR-1.015	3.453	0.050	69.1	0.000	0.00	0.0		0.030	[]	-7	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)
PR-1.009	58.35	6.04	40.971	0.057	0.0	0.0	4.0	2.10	1173.7	14.1
PR-1.010	57.33	6.29	39.846	0.065	0.0	0.0	4.6	0.62	349.3	15.9
PR-1.011	55.19	6.85	39.813	0.066	0.0	0.0	4.6	0.32	178.9	15.9
PR-1.012	53.01	7.48	39.803	0.066	0.0	0.0	4.6	0.33	128.9	15.9
PR-2.000	61.25	5.38	48.500	0.000	0.0	0.0	0.0	1.16	104.3	0.0
PR-2.001	59.90	5.67	47.500	0.008	0.0	0.0	0.6	1.47	132.0	2.1
PR-2.002	58.66	5.96	45.900	0.018	0.0	0.0	1.3	1.51	136.2	4.4
PR-2.003	57.69	6.20	44.198	0.027	0.0	0.0	1.9	1.84	165.3	6.7
PR-2.004	56.88	6.40	41.688	0.037	0.0	0.0	2.6	1.48	132.9	9.0
PR-2.005	55.76	6.69	40.570	0.043	0.0	0.0	2.9	1.03	92.3	10.3
PR-2.006	53.44	7.35	40.030	0.050	0.0	0.0	3.2	0.56	50.7	11.3
PR-2.007	52.66	7.59	39.830	0.058	0.0	0.0	3.7	0.42	37.8	12.9
PR-1.013	52.13	7.75	39.800	0.125	0.0	0.0	7.9	0.82	470.7	27.6
PR-1.014	51.77	7.87	39.750	0.126	0.0	0.0	7.9	0.92	527.1	27.6
PR-1.015	51.62	7.92	39.700	0.126	0.0	0.0	7.9	1.25	719.5	27.6

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-3.000	10.527	0.200	52.6	0.000	5.00	0.0	0.030		[]	-7	Pipe/Conduit	
PR-3.001	5.638	0.050	112.8	0.000	0.00	0.0	0.030		[]	-7	Pipe/Conduit	
PR-3.002	9.757	0.050	195.1	0.002	0.00	0.0	0.030		[]	-7	Pipe/Conduit	
PR-1.016	1.561	0.025	62.4	0.023	0.00	0.0	0.030		[]	-8	Pipe/Conduit	
PR-1.017	3.086	0.065	47.5	0.000	0.00	0.0	0.030		[]	-8	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)
PR-3.000	62.46	5.12	39.950	0.000	0.0	0.0	0.0	1.43	824.2	0.0
PR-3.001	62.00	5.22	39.750	0.000	0.0	0.0	0.0	0.98	563.1	0.0
PR-3.002	60.97	5.44	39.700	0.002	0.0	0.0	0.2	0.74	428.0	0.6
PR-1.016	51.57	7.93	39.650	0.151	0.0	0.0	9.4	1.40	1157.8	33.0
PR-1.017	51.47	7.97	39.625	0.151	0.0	0.0	9.4	1.61	1327.6	33.0

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PIPELINE SCHEDULES for Havant

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)
PR-1.000	[]	-5	PR-1	49.246	48.546	0.000	Junction	
PR-1.001	[]	-5	PR-2	48.730	48.030	0.000	Junction	
PR-1.002	[]	-5	PR-3	47.713	47.013	0.000	Junction	
PR-1.003	[]	-5	PR-4	47.000	46.300	0.000	Junction	
PR-1.004	[]	-5	PR-5	46.008	45.308	0.000	Junction	
PR-1.005	[]	-5	PR-6	45.556	44.856	0.000	Junction	
PR-1.006	[]	-5	PR-7	44.821	44.121	0.000	Junction	
PR-1.007	[]	-5	PR-8	43.334	42.634	0.000	Junction	
PR-1.008	[]	-5	PR-9	42.587	41.887	0.000	Junction	
PR-1.009	[]	-5	PR-10	41.671	40.971	0.000	Junction	
PR-1.010	[]	-5	PR-11	40.547	39.846	0.001	Junction	
PR-1.011	[]	-5	PR-12	40.750	39.813	0.237	Junction	
PR-1.012	oo	-3	PR-13	40.774	39.803	0.671	Junction	
PR-2.000	[]	-1	PR-16	49.000	48.500	0.000	Junction	
PR-2.001	[]	-1	PR-17	48.000	47.500	0.000	Junction	

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)
PR-1.000	10.923	21.2	PR-2	48.730	48.030	0.000	Junction	
PR-1.001	20.558	20.2	PR-3	47.713	47.013	0.000	Junction	
PR-1.002	10.696	15.0	PR-4	47.000	46.299	0.001	Junction	
PR-1.003	14.401	14.5	PR-5	46.008	45.308	0.000	Junction	
PR-1.004	11.427	25.3	PR-6	45.556	44.856	0.000	Junction	
PR-1.005	9.488	12.9	PR-7	44.821	44.121	0.000	Junction	
PR-1.006	16.235	10.9	PR-8	43.334	42.634	0.000	Junction	
PR-1.007	12.102	16.2	PR-9	42.587	41.886	0.001	Junction	
PR-1.008	17.862	19.5	PR-10	41.671	40.972	-0.001	Junction	
PR-1.009	28.263	25.1	PR-11	40.547	39.846	0.001	Junction	
PR-1.010	9.361	283.7	PR-12	40.750	39.813	0.237	Junction	
PR-1.011	10.808	1080.8	PR-13	40.774	39.803	0.271	Junction	
PR-1.012	12.401	4133.8	PR-24	40.320	39.800	0.220	Junction	
PR-2.000	26.146	26.1	PR-17	48.000	47.500	0.000	Junction	
PR-2.001	26.146	16.3	PR-18	46.400	45.900	0.000	Junction	

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PIPELINE SCHEDULES for Havant

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)
PR-2.002	[]	-1	PR-18	46.400	45.900	0.000	Junction	
PR-2.003	[]	-1	PR-19	44.700	44.198	0.002	Junction	
PR-2.004	[]	-1	PR-20	42.190	41.688	0.002	Junction	
PR-2.005	[]	-1	PR-21	41.070	40.570	0.000	Junction	
PR-2.006	[]	-1	PR-22	40.530	40.030	0.000	Junction	
PR-2.007	[]	-1	PR-23	40.330	39.830	0.000	Junction	
PR-1.013	[]	-7	PR-24	40.320	39.800	0.020	Junction	
PR-1.014	[]	-7	PR-29	40.310	39.750	0.060	Junction	
PR-1.015	[]	-7	PR-28	40.320	39.700	0.120	Junction	
PR-3.000	[]	-7	PR-25	40.450	39.950	0.000	Junction	
PR-3.001	[]	-7	PR-26	40.120	39.750	-0.130	Open Manhole	1
PR-3.002	[]	-7	PR-27	40.120	39.700	-0.080	Open Manhole	1
PR-1.016	[]	-8	PR-28	39.900	39.650	0.000	Open Manhole	1

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)
PR-2.002	26.146	15.4	PR-19	44.700	44.197	0.003	Junction	
PR-2.003	26.146	10.4	PR-20	42.190	41.688	0.002	Junction	
PR-2.004	18.028	16.1	PR-21	41.070	40.570	0.000	Junction	
PR-2.005	18.028	33.4	PR-22	40.530	40.030	0.000	Junction	
PR-2.006	22.164	110.8	PR-23	40.330	39.830	0.000	Junction	
PR-2.007	5.986	199.5	PR-24	40.320	39.800	0.020	Junction	
PR-1.013	8.067	161.3	PR-29	40.310	39.750	0.060	Junction	
PR-1.014	6.434	128.7	PR-28	40.320	39.700	0.120	Junction	
PR-1.015	3.453	69.1	PR-28	39.900	39.650	-0.250	Open Manhole	1
PR-3.000	10.527	52.6	PR-26	40.120	39.750	-0.130	Open Manhole	1
PR-3.001	5.638	112.8	PR-27	40.120	39.700	-0.080	Open Manhole	1
PR-3.002	9.757	195.1	PR-28	39.900	39.650	-0.250	Open Manhole	1
PR-1.016	1.561	62.4	PR-29	39.890	39.625	0.015	Open Manhole	1

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PIPELINE SCHEDULES for Havant

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)
PR-1.017	[]	-8	PR-29	39.890	39.625	0.015	Open Manhole	1

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)
PR-1.017	3.086	47.5	PR-	39.850	39.560	0.040	Open Manhole	0

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.018	0.018	0.018
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.003	0.003	0.003
	User	-	21	0.014	0.003	0.005
	User	-	20	0.010	0.002	0.007
1.004	User	-	100	0.006	0.006	0.006
	User	-	21	0.004	0.001	0.007
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	User	-	100	0.003	0.003	0.003
	User	-	21	0.024	0.005	0.008
1.008	User	-	100	0.005	0.005	0.005
	User	-	21	0.003	0.001	0.005
1.009	User	-	100	0.010	0.010	0.010
	User	-	21	0.004	0.001	0.011
1.010	Classification	Hardstanding	100	0.006	0.006	0.006
	User	-	21	0.005	0.001	0.007
	User	-	20	0.006	0.001	0.008
1.011	User	-	21	0.002	0.000	0.000
1.012	User	-	21	0.002	0.000	0.000
2.000	-	-	100	0.000	0.000	0.000
2.001	User	-	100	0.006	0.006	0.006
	User	-	21	0.011	0.002	0.008
2.002	User	-	100	0.007	0.007	0.007
	User	-	21	0.013	0.003	0.009
2.003	User	-	100	0.007	0.007	0.007
	User	-	21	0.014	0.003	0.010
2.004	User	-	100	0.007	0.007	0.007
	User	-	21	0.015	0.003	0.010
2.005	User	-	100	0.004	0.004	0.004
	User	-	21	0.010	0.002	0.006
2.006	User	-	100	0.005	0.005	0.005
	User	-	21	0.007	0.002	0.006
2.007	User	-	100	0.005	0.005	0.005
	User	-	21	0.009	0.002	0.007
	User	-	20	0.004	0.001	0.008
1.013	User	-	21	0.003	0.001	0.001
1.014	User	-	21	0.004	0.001	0.001
1.015	User	-	21	0.001	0.000	0.000
3.000	-	-	100	0.000	0.000	0.000

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
3.001	-	-	100	0.000	0.000	0.000
3.002	User	-	20	0.011	0.002	0.002
1.016	User	-	100	0.022	0.022	0.022
	User	-	21	0.004	0.001	0.023
1.017	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.293	0.151	0.151

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Network Classifications for Havant

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
PR-1.000	PR-1	-5	0.000	0.181	Unclassified				Junction
PR-1.001	PR-2	-5	0.000	0.000	Unclassified				Junction
PR-1.002	PR-3	-5	0.000	0.146	Unclassified				Junction
PR-1.003	PR-4	-5	0.000	0.043	Unclassified				Junction
PR-1.004	PR-5	-5	0.000	0.279	Unclassified				Junction
PR-1.005	PR-6	-5	0.000	0.000	Unclassified				Junction
PR-1.006	PR-7	-5	0.000	0.126	Unclassified				Junction
PR-1.007	PR-8	-5	0.000	0.001	Unclassified				Junction
PR-1.008	PR-9	-5	0.000	0.064	Unclassified				Junction
PR-1.009	PR-10	-5	0.000	0.071	Unclassified				Junction
PR-1.010	PR-11	-5	0.001	1.051	Unclassified				Junction
PR-1.011	PR-12	-5	0.237	0.479	Unclassified				Junction
PR-1.012	PR-13	-3	0.220	0.671	Unclassified				Junction
PR-2.000	PR-16	-1	0.000	0.000	Unclassified				Junction
PR-2.001	PR-17	-1	0.000	0.000	Unclassified				Junction
PR-2.002	PR-18	-1	0.000	0.003	Unclassified				Junction
PR-2.003	PR-19	-1	0.002	0.002	Unclassified				Junction
PR-2.004	PR-20	-1	0.001	0.002	Unclassified				Junction
PR-2.005	PR-21	-1	0.000	0.000	Unclassified				Junction
PR-2.006	PR-22	-1	0.000	0.000	Unclassified				Junction
PR-2.007	PR-23	-1	0.000	0.020	Unclassified				Junction
PR-1.013	PR-24	-7	0.020	0.060	Unclassified				Junction
PR-1.014	PR-29	-7	0.060	0.120	Unclassified				Junction
PR-1.015	PR-28	-7	0.120	0.120	Unclassified				Junction
PR-3.000	PR-25	-7	0.000	0.000	Unclassified				Junction
PR-3.001	PR-26	-7	-0.130	-0.130	Unclassified	1	0	-0.130	Type 8
PR-3.002	PR-27	-7	-0.080	-0.080	Unclassified	1	0	-0.080	Type 8
PR-1.016	PR-28	-8	0.000	0.015	Unclassified	1	0	0.000	Type 8
PR-1.017	PR-29	-8	0.015	0.040	Unclassified	1	0	0.015	Type 8

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-1.017	PR-	39.850	39.560	0.000	0	0

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Online Controls for Havant

Orifice Manhole: PR-2, DS/PN: PR-1.001, Volume (m³): 6.1

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 48.030

Orifice Manhole: PR-3, DS/PN: PR-1.002, Volume (m³): 11.5

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 47.013

Orifice Manhole: PR-4, DS/PN: PR-1.003, Volume (m³): 6.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 46.300

Orifice Manhole: PR-5, DS/PN: PR-1.004, Volume (m³): 8.1

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 45.308

Orifice Manhole: PR-6, DS/PN: PR-1.005, Volume (m³): 6.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 44.856

Orifice Manhole: PR-7, DS/PN: PR-1.006, Volume (m³): 5.3

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 44.121

Orifice Manhole: PR-8, DS/PN: PR-1.007, Volume (m³): 9.1

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 42.634

Orifice Manhole: PR-9, DS/PN: PR-1.008, Volume (m³): 6.8

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 41.887

Orifice Manhole: PR-10, DS/PN: PR-1.009, Volume (m³): 10.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 40.971

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Orifice Manhole: PR-11, DS/PN: PR-1.010, Volume (m³): 15.8

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.846

Orifice Manhole: PR-12, DS/PN: PR-1.011, Volume (m³): 5.2

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.813

Orifice Manhole: PR-17, DS/PN: PR-2.001, Volume (m³): 2.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 47.500

Orifice Manhole: PR-18, DS/PN: PR-2.002, Volume (m³): 2.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 45.900

Orifice Manhole: PR-19, DS/PN: PR-2.003, Volume (m³): 2.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 44.198

Orifice Manhole: PR-20, DS/PN: PR-2.004, Volume (m³): 2.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 41.688

Orifice Manhole: PR-21, DS/PN: PR-2.005, Volume (m³): 1.6

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 40.570

Orifice Manhole: PR-22, DS/PN: PR-2.006, Volume (m³): 1.6

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 40.030

Orifice Manhole: PR-23, DS/PN: PR-2.007, Volume (m³): 2.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 39.830

Orifice Manhole: PR-24, DS/PN: PR-1.013, Volume (m³): 5.4

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.800

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Orifice Manhole: PR-29, DS/PN: PR-1.014, Volume (m³): 4.6

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.750

Orifice Manhole: PR-26, DS/PN: PR-3.001, Volume (m³): 6.1

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.750

Orifice Manhole: PR-27, DS/PN: PR-3.002, Volume (m³): 3.2

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.700

Orifice Manhole: PR-28, DS/PN: PR-1.016, Volume (m³): 7.6

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.650

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Offline Controls for Havant

Weir Manhole: PR-2, DS/PN: PR-1.001, Loop to PN: PR-1.002

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 48.530

Weir Manhole: PR-3, DS/PN: PR-1.002, Loop to PN: PR-1.003

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 47.513

Weir Manhole: PR-4, DS/PN: PR-1.003, Loop to PN: PR-1.004

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 46.800

Weir Manhole: PR-5, DS/PN: PR-1.004, Loop to PN: PR-1.005

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 45.808

Weir Manhole: PR-6, DS/PN: PR-1.005, Loop to PN: PR-1.006

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 45.356

Weir Manhole: PR-7, DS/PN: PR-1.006, Loop to PN: PR-1.007

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 44.621

Weir Manhole: PR-8, DS/PN: PR-1.007, Loop to PN: PR-1.008

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 43.150

Weir Manhole: PR-9, DS/PN: PR-1.008, Loop to PN: PR-1.009

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 42.439

Weir Manhole: PR-10, DS/PN: PR-1.009, Loop to PN: PR-1.010

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 41.471

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Weir Manhole: PR-11, DS/PN: PR-1.010, Loop to PN: PR-1.011

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 40.347

Weir Manhole: PR-17, DS/PN: PR-2.001, Loop to PN: PR-2.002

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 47.800

Weir Manhole: PR-18, DS/PN: PR-2.002, Loop to PN: PR-2.003

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 46.200

Weir Manhole: PR-19, DS/PN: PR-2.003, Loop to PN: PR-2.004

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 44.500

Weir Manhole: PR-20, DS/PN: PR-2.004, Loop to PN: PR-2.005

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 41.990

Weir Manhole: PR-21, DS/PN: PR-2.005, Loop to PN: PR-2.006

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 40.870

Weir Manhole: PR-22, DS/PN: PR-2.006, Loop to PN: PR-2.007

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 40.330

Weir Manhole: PR-23, DS/PN: PR-2.007, Loop to PN: PR-1.013

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 40.130

Weir Manhole: PR-29, DS/PN: PR-1.014, Loop to PN: PR-1.015

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 40.110

Weir Manhole: PR-28, DS/PN: PR-1.015, Loop to PN: PR-1.016

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 40.190

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Weir Manhole: PR-26, DS/PN: PR-3.001, Loop to PN: PR-3.002

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 39.920

Weir Manhole: PR-27, DS/PN: PR-3.002, Loop to PN: PR-1.016

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 39.980

Weir Manhole: PR-28, DS/PN: PR-1.016, Loop to PN: PR-1.017

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 39.900

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Storage Structures for Havant

Tank or Pond Manhole: PR-24, DS/PN: PR-1.013

Invert Level (m) 39.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	10.0	0.500	25.0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 22 Number of Time/Area Diagrams 0
Number of Online Controls 23 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Winter	1	+0%					48.551	-0.695	0.000	0.00			2.3	OK	
PR-1.001	PR-2	15 Winter	1	+0%				0	48.117	-0.613	0.000	0.00	0.0		2.3	OK	
PR-1.002	PR-3	15 Winter	1	+0%				0	47.099	-0.614	0.000	0.00	0.0		2.2	OK	
PR-1.003	PR-4	15 Winter	1	+0%				0	46.403	-0.597	0.000	0.00	0.0		2.9	OK	
PR-1.004	PR-5	15 Winter	1	+0%				0	45.430	-0.577	0.000	0.00	0.0		3.4	OK	
PR-1.005	PR-6	15 Winter	1	+0%				0	44.972	-0.584	0.000	0.00	0.0		3.3	OK	
PR-1.006	PR-7	15 Winter	1	+0%				0	44.234	-0.587	0.000	0.00	0.0		3.2	OK	
PR-1.007	PR-8	15 Winter	1	+0%				0	42.767	-0.567	0.000	0.00	0.0		3.6	OK	
PR-1.008	PR-9	30 Winter	1	+0%				0	42.028	-0.559	0.000	0.00	0.0		3.8	OK	
PR-1.009	PR-10	30 Winter	1	+0%				0	41.139	-0.532	0.000	0.00	0.0		4.2	OK	
PR-1.010	PR-11	30 Winter	1	+0%			30/60 Winter	11	40.109	-0.437	0.000	0.01	0.0		3.8	OK	
PR-1.011	PR-12	30 Winter	1	+0%					40.019	-0.494	0.000	0.02			3.3	OK	
PR-1.012	PR-13	60 Winter	1	+0%	30/60 Winter				39.951	-0.152	0.000	0.01			2.7	OK*	
PR-2.000	PR-16	15 Summer	1	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	1	+0%				0	47.547	-0.453	0.000	0.01	0.0		0.9	OK	
PR-2.002	PR-18	15 Winter	1	+0%			100/15 Summer	2	45.976	-0.424	0.000	0.01	0.0		1.8	OK	

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Woodcoste Grove Ashley Road, Epsom Surrey, KT18 5BW	HTC Northern Access Route South Proposed Model
Date 07/10/2022 File South proposed 20cc.MDX	Designed by BV Checked by WB
Innovyze	Network 2020.1.3

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	1	+0%			30/15 Summer	9	44.298	-0.400	0.000	0.02	0.0		2.8	OK	
PR-2.004	PR-20	15 Winter	1	+0%			30/15 Summer	12	41.820	-0.368	0.000	0.03	0.0		3.6	OK	
PR-2.005	PR-21	15 Winter	1	+0%			30/15 Summer	14	40.723	-0.347	0.000	0.04	0.0		4.0	OK	
PR-2.006	PR-22	30 Winter	1	+0%			5/15 Winter	25	40.202	-0.328	0.000	0.08	0.0		4.0	OK	
PR-2.007	PR-23	30 Winter	1	+0%			5/15 Winter	39	40.069	-0.261	0.000	0.10	0.0		3.6	OK	
PR-1.013	PR-24	60 Winter	1	+0%					39.951	-0.349	0.000	0.01			3.7	OK	
PR-1.014	PR-29	60 Winter	1	+0%				0	39.854	-0.396	0.000	0.01	0.0		3.7	OK	
PR-1.015	PR-28	60 Winter	1	+0%				0	39.755	-0.445	0.000	0.01	0.0		3.7	OK	
PR-3.000	PR-25	15 Summer	1	+0%					39.950	-0.500	0.000	0.00			0.0	OK	
PR-3.001	PR-26	120 Winter	1	+0%				0	39.755	-0.495	0.000	0.00	0.0		0.0	OK	
PR-3.002	PR-27	120 Winter	1	+0%				0	39.755	-0.445	0.000	0.00	0.0		0.1	OK	
PR-1.016	PR-28	60 Winter	1	+0%				0	39.755	-0.145	0.000	0.01	0.0		4.1	FLOOD RISK	
PR-1.017	PR-29	60 Winter	1	+0%					39.627	-0.248	0.000	0.01			4.1	OK	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 22 Number of Time/Area Diagrams 0
Number of Online Controls 23 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Winter	5	+0%					48.554	-0.692	0.000	0.00			3.8	OK	
PR-1.001	PR-2	15 Winter	5	+0%				0	48.159	-0.571	0.000	0.00	0.0		3.5	OK	
PR-1.002	PR-3	15 Winter	5	+0%				0	47.133	-0.580	0.000	0.00	0.0		3.4	OK	
PR-1.003	PR-4	15 Winter	5	+0%				0	46.470	-0.530	0.000	0.00	0.0		4.3	OK	
PR-1.004	PR-5	15 Winter	5	+0%				0	45.519	-0.489	0.000	0.01	0.0		4.9	OK	
PR-1.005	PR-6	15 Winter	5	+0%				0	45.044	-0.511	0.000	0.00	0.0		4.6	OK	
PR-1.006	PR-7	15 Winter	5	+0%				0	44.300	-0.520	0.000	0.00	0.0		4.4	OK	
PR-1.007	PR-8	30 Winter	5	+0%				0	42.834	-0.500	0.000	0.00	0.0		4.7	OK	
PR-1.008	PR-9	30 Winter	5	+0%				0	42.106	-0.481	0.000	0.00	0.0		5.0	OK	
PR-1.009	PR-10	30 Winter	5	+0%				0	41.235	-0.436	0.000	0.00	0.0		5.6	OK	
PR-1.010	PR-11	60 Winter	5	+0%			30/60 Winter	11	40.232	-0.314	0.000	0.01	0.0		4.9	OK	
PR-1.011	PR-12	60 Winter	5	+0%					40.122	-0.391	0.000	0.02			4.2	OK	
PR-1.012	PR-13	60 Winter	5	+0%	30/60 Winter				40.023	-0.080	0.000	0.02			3.9	OK*	
PR-2.000	PR-16	15 Summer	5	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	5	+0%				0	47.567	-0.433	0.000	0.01	0.0		1.5	OK	
PR-2.002	PR-18	15 Winter	5	+0%			100/15 Summer	2	46.008	-0.392	0.000	0.02	0.0		3.1	OK	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	5	+0%			30/15 Summer	9	44.379	-0.319	0.000	0.03	0.0		4.4	OK	
PR-2.004	PR-20	15 Winter	5	+0%			30/15 Summer	12	41.946	-0.242	0.000	0.04	0.0		5.5	OK	
PR-2.005	PR-21	15 Winter	5	+0%			30/15 Summer	14	40.862	-0.208	0.000	0.06	0.0		5.9	OK	
PR-2.006	PR-22	30 Winter	5	+0%			5/15 Winter	25	40.345	-0.185	0.000	0.10	1.2		5.2	FLOOD RISK*	
PR-2.007	PR-23	30 Winter	5	+0%			5/15 Winter	39	40.147	-0.183	0.000	0.13	1.5		5.0	FLOOD RISK*	
PR-1.013	PR-24	60 Winter	5	+0%					40.023	-0.277	0.000	0.01			5.1	OK	
PR-1.014	PR-29	60 Winter	5	+0%				0	39.900	-0.350	0.000	0.01	0.0		5.0	OK	
PR-1.015	PR-28	60 Winter	5	+0%				0	39.778	-0.422	0.000	0.01	0.0		5.1	OK	
PR-3.000	PR-25	15 Summer	5	+0%					39.950	-0.500	0.000	0.00			0.0	OK	
PR-3.001	PR-26	120 Winter	5	+0%				0	39.766	-0.484	0.000	0.00	0.0		0.0	OK	
PR-3.002	PR-27	120 Winter	5	+0%				0	39.776	-0.424	0.000	0.00	0.0		0.1	OK	
PR-1.016	PR-28	60 Winter	5	+0%				0	39.778	-0.122	0.000	0.01	0.0		5.4	FLOOD RISK	
PR-1.017	PR-29	60 Winter	5	+0%					39.628	-0.247	0.000	0.01			5.4	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 22 Number of Time/Area Diagrams 0
Number of Online Controls 23 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Winter	30	+0%					48.557	-0.689	0.000	0.01			5.6	OK	
PR-1.001	PR-2	15 Winter	30	+0%				0	48.235	-0.495	0.000	0.00	0.0		4.8	OK	
PR-1.002	PR-3	15 Winter	30	+0%				0	47.190	-0.523	0.000	0.00	0.0		4.4	OK	
PR-1.003	PR-4	15 Winter	30	+0%				0	46.537	-0.463	0.000	0.00	0.0		5.2	OK	
PR-1.004	PR-5	15 Winter	30	+0%				0	45.599	-0.409	0.000	0.01	0.0		5.9	OK	
PR-1.005	PR-6	30 Winter	30	+0%				0	45.109	-0.446	0.000	0.01	0.0		5.5	OK	
PR-1.006	PR-7	30 Winter	30	+0%				0	44.362	-0.459	0.000	0.00	0.0		5.3	OK	
PR-1.007	PR-8	30 Winter	30	+0%				0	42.902	-0.432	0.000	0.01	0.0		5.6	OK	
PR-1.008	PR-9	30 Winter	30	+0%				0	42.183	-0.404	0.000	0.01	0.0		6.0	OK	
PR-1.009	PR-10	30 Winter	30	+0%				0	41.335	-0.336	0.000	0.01	0.0		6.7	OK	
PR-1.010	PR-11	60 Winter	30	+0%			30/60 Winter	11	40.367	-0.179	0.000	0.02	1.1		5.8	FLOOD RISK*	
PR-1.011	PR-12	60 Winter	30	+0%					40.249	-0.264	0.000	0.03			5.7	OK	
PR-1.012	PR-13	60 Winter	30	+0%	30/60 Winter				40.120	0.017	0.000	0.02			5.4	SURCHARGED*	
PR-2.000	PR-16	15 Summer	30	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	30	+0%				0	47.600	-0.400	0.000	0.02	0.0		2.7	OK	
PR-2.002	PR-18	15 Winter	30	+0%			100/15 Summer	2	46.126	-0.274	0.000	0.04	0.0		5.0	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	30	+0%			30/15 Summer	9	44.518	-0.180	0.000	0.04	1.2		6.2	FLOOD RISK*	
PR-2.004	PR-20	15 Winter	30	+0%			30/15 Summer	12	42.016	-0.172	0.000	0.05	3.5		6.3	FLOOD RISK*	
PR-2.005	PR-21	15 Winter	30	+0%			30/15 Summer	14	40.898	-0.172	0.000	0.07	5.0		6.3	FLOOD RISK*	
PR-2.006	PR-22	15 Winter	30	+0%			5/15 Winter	25	40.362	-0.168	0.000	0.11	7.8		5.6	FLOOD RISK*	
PR-2.007	PR-23	15 Winter	30	+0%			5/15 Winter	39	40.164	-0.166	0.000	0.15	8.1		5.6	FLOOD RISK*	
PR-1.013	PR-24	60 Winter	30	+0%					40.120	-0.180	0.000	0.01			6.8	OK	
PR-1.014	PR-29	60 Winter	30	+0%				0	39.967	-0.283	0.000	0.01	0.0		6.7	OK	
PR-1.015	PR-28	120 Winter	30	+0%				0	39.816	-0.384	0.000	0.01	0.0		6.5	OK	
PR-3.000	PR-25	15 Summer	30	+0%					39.950	-0.500	0.000	0.00			0.0	OK	
PR-3.001	PR-26	180 Winter	30	+0%				0	39.776	-0.474	0.000	0.00	0.0		0.0	OK	
PR-3.002	PR-27	180 Winter	30	+0%				0	39.806	-0.394	0.000	0.00	0.0		0.1	OK	
PR-1.016	PR-28	120 Winter	30	+0%				0	39.816	-0.084	0.000	0.01	0.0		7.1	FLOOD RISK	
PR-1.017	PR-29	120 Winter	30	+0%					39.629	-0.246	0.000	0.01			7.1	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 22 Number of Time/Area Diagrams 0
Number of Online Controls 23 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Winter	100	+0%					48.560	-0.686	0.000	0.01			7.3	OK	
PR-1.001	PR-2	15 Winter	100	+0%				0	48.301	-0.429	0.000	0.00	0.0		5.6	OK	
PR-1.002	PR-3	15 Winter	100	+0%				0	47.236	-0.477	0.000	0.00	0.0		5.1	OK	
PR-1.003	PR-4	30 Winter	100	+0%				0	46.597	-0.403	0.000	0.00	0.0		6.0	OK	
PR-1.004	PR-5	30 Winter	100	+0%				0	45.676	-0.332	0.000	0.01	0.0		6.8	OK	
PR-1.005	PR-6	30 Winter	100	+0%				0	45.174	-0.382	0.000	0.01	0.0		6.2	OK	
PR-1.006	PR-7	30 Winter	100	+0%				0	44.424	-0.397	0.000	0.00	0.0		6.0	OK	
PR-1.007	PR-8	30 Winter	100	+0%				0	42.959	-0.375	0.000	0.01	0.0		6.3	OK	
PR-1.008	PR-9	30 Winter	100	+0%				0	42.249	-0.338	0.000	0.01	0.0		6.7	OK	
PR-1.009	PR-10	30 Winter	100	+0%				0	41.417	-0.254	0.000	0.01	0.0		7.5	OK	
PR-1.010	PR-11	60 Winter	100	+0%			30/60 Winter	11	40.401	-0.145	0.000	0.02	6.0		6.2	FLOOD RISK*	
PR-1.011	PR-12	60 Winter	100	+0%					40.370	-0.143	0.000	0.04			6.9	OK	
PR-1.012	PR-13	120 Winter	100	+0%	30/60 Winter				40.223	0.120	0.000	0.02			5.9	SURCHARGED*	
PR-2.000	PR-16	15 Summer	100	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	100	+0%				0	47.625	-0.375	0.000	0.03	0.0		3.4	OK	
PR-2.002	PR-18	15 Winter	100	+0%			100/15 Summer	2	46.211	-0.189	0.000	0.04	0.2		6.1	FLOOD RISK*	

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Woodcoste Grove Ashley Road, Epsom Surrey, KT18 5BW	HTC Northern Access Route South Proposed Model
Date 07/10/2022 File South proposed 20cc.MDX	Designed by BV Checked by WB
Innovyze	Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Summer	100	+0%			30/15 Summer	9	44.524	-0.174	0.000	0.04	3.2		6.3	FLOOD RISK*	
PR-2.004	PR-20	15 Summer	100	+0%			30/15 Summer	12	42.022	-0.166	0.000	0.05	6.8		6.4	FLOOD RISK*	
PR-2.005	PR-21	15 Winter	100	+0%			30/15 Summer	14	40.906	-0.164	0.000	0.07	9.6		6.4	FLOOD RISK*	
PR-2.006	PR-22	15 Winter	100	+0%			5/15 Winter	25	40.370	-0.160	0.000	0.11	13.4		5.6	FLOOD RISK*	
PR-2.007	PR-23	120 Winter	100	+0%			5/15 Winter	39	40.230	-0.100	0.000	0.11	6.7		4.2	FLOOD RISK*	
PR-1.013	PR-24	120 Winter	100	+0%					40.223	-0.077	0.000	0.02			8.2	FLOOD RISK*	
PR-1.014	PR-29	120 Winter	100	+0%				0	40.046	-0.204	0.000	0.02	0.0		8.0	OK	
PR-1.015	PR-28	120 Winter	100	+0%				0	39.870	-0.330	0.000	0.02	0.0		8.0	OK	
PR-3.000	PR-25	15 Summer	100	+0%					39.950	-0.500	0.000	0.00			0.0	OK	
PR-3.001	PR-26	360 Summer	100	+0%				0	39.776	-0.474	0.000	0.00	0.0		0.0	OK	
PR-3.002	PR-27	180 Winter	100	+0%				0	39.856	-0.344	0.000	0.00	0.0		0.2	OK	
PR-1.016	PR-28	120 Winter	100	+0%				0	39.869	-0.031	0.000	0.01	0.0		8.6	FLOOD RISK	
PR-1.017	PR-29	120 Winter	100	+0%					39.629	-0.246	0.000	0.01			8.6	OK	

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Appendix D. Proposed MicroDrainage Models with 40%cc applied

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Havant

Pipe Sizes Havant Manhole Sizes Havant

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	10.000
M5-60 (mm)	19.800	Volumetric Runoff Coeff.	0.840	Min Design Depth for Optimisation (m)	0.000
Ratio R	0.322	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	250	Add Flow / Climate Change (%)	40	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Havant

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.000	20.000	0.181	110.5	0.092	5.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.001	19.998	0.300	66.6	0.000	0.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.002	19.998	0.458	43.6	0.000	0.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.003	20.000	0.337	59.4	0.296	0.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.004	30.338	0.229	132.6	0.000	0.00	0.0	0.030		[]	-4	Pipe/Conduit	
PR-1.005	20.333	0.190	107.0	0.000	0.00	0.0	0.030		[]	-4	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)
PR-1.000	60.70	5.32	60.300	0.092	0.0	0.0	6.8	1.05	1100.7	23.7
PR-1.001	59.59	5.56	60.119	0.092	0.0	0.0	6.8	1.35	1418.3	23.7
PR-1.002	58.73	5.76	59.819	0.092	0.0	0.0	6.8	1.67	1751.7	23.7
PR-1.003	57.77	6.00	59.360	0.388	0.0	0.0	27.2	1.43	1501.5	95.2
PR-1.004	55.71	6.53	59.023	0.388	0.0	0.0	27.2	0.96	1004.8	95.2
PR-1.005	54.56	6.84	58.795	0.388	0.0	0.0	27.2	1.07	1118.5	95.2

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-2.000	29.992	2.024	14.8	0.071	5.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.001	26.964	1.979	13.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.002	40.331	2.960	13.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.003	37.641	2.657	14.2	0.080	0.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.004	14.421	0.125	115.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
PR-2.005	18.975	0.598	31.8	0.063	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-2.006	18.975	0.597	31.8	0.000	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-1.006	15.439	0.100	154.4	0.131	0.00	0.0	0.600		o	300	Pipe/Conduit	
PR-1.007	2.351	0.005	470.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
PR-3.000	8.248	0.087	94.8	0.050	5.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.001	28.251	0.140	201.6	0.040	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.002	20.741	1.051	19.7	0.029	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.003	20.741	0.880	23.6	0.000	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.004	26.616	0.407	65.3	0.018	0.00	0.0		0.030	[]	-4	Pipe/Conduit	
PR-3.005	3.231	0.520	6.2	0.375	0.00	0.0		0.030	o	225	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)
PR-2.000	61.50	5.15	69.546	0.071	0.0	0.0	5.3	3.42	135.8	18.5
PR-2.001	60.91	5.27	67.522	0.071	0.0	0.0	5.3	3.56	141.7	18.5
PR-2.002	60.05	5.46	65.543	0.071	0.0	0.0	5.3	3.56	141.7	18.5
PR-2.003	59.26	5.64	62.583	0.151	0.0	0.0	10.8	3.50	139.0	37.9
PR-2.004	58.43	5.84	59.925	0.151	0.0	0.0	10.8	1.22	48.4	37.9
PR-2.005	57.76	6.00	59.800	0.214	0.0	0.0	15.0	1.96	2053.2	52.5
PR-2.006	57.11	6.16	59.202	0.214	0.0	0.0	15.0	1.95	2052.7	52.5
PR-1.006	53.85	7.05	58.605	0.733	0.0	0.0	47.9	1.26	89.3«	167.7
PR-1.007	53.66	7.10	58.505	0.733	0.0	0.0	47.9	0.72	50.8«	167.7
PR-3.000	61.62	5.12	59.887	0.050	0.0	0.0	3.7	1.13	1188.4	13.0
PR-3.001	58.89	5.73	59.800	0.090	0.0	0.0	6.4	0.78	815.0	22.6
PR-3.002	58.30	5.87	59.660	0.119	0.0	0.0	8.4	2.48	2604.2	29.5
PR-3.003	57.68	6.02	58.609	0.119	0.0	0.0	8.4	2.27	2382.7	29.5
PR-3.004	56.39	6.35	57.730	0.137	0.0	0.0	9.4	1.36	1431.5	32.8
PR-3.005	56.29	6.37	57.322	0.512	0.0	0.0	35.0	1.96	78.1«	122.3

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PIPELINE SCHEDULES for Havant

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)
PR-1.000	[]	-4	PR-10	61.000	60.300	0.000	Junction	
PR-1.001	[]	-4	PR-11	60.819	60.119	0.000	Junction	
PR-1.002	[]	-4	PR-12	60.519	59.819	0.000	Junction	
PR-1.003	[]	-4	PR-13	60.060	59.360	0.000	Junction	
PR-1.004	[]	-4	PR-14	59.723	59.023	0.000	Junction	
PR-1.005	[]	-4	PR-15	59.495	58.795	0.000	Junction	
PR-2.000	o	225	PR-1	70.671	69.546	0.900	Open Manhole	1050
PR-2.001	o	225	PR-2	68.647	67.522	0.900	Open Manhole	1050
PR-2.002	o	225	PR-3	66.668	65.543	0.900	Open Manhole	1050
PR-2.003	o	225	PR-4	63.708	62.583	0.900	Open Manhole	1050
PR-2.004	o	225	PR-5	61.050	59.925	0.900	Open Manhole	1050
PR-2.005	[]	-4	PR-6	60.500	59.800	0.000	Junction	
PR-2.006	[]	-4	PR-13	60.180	59.202	0.278	Junction	
PR-1.006	o	300	PR-17	59.740	58.605	0.835	Junction	

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)
PR-1.000	20.000	110.5	PR-11	60.819	60.119	0.000	Junction	
PR-1.001	19.998	66.6	PR-12	60.519	59.819	0.000	Junction	
PR-1.002	19.998	43.6	PR-13	60.060	59.360	0.000	Junction	
PR-1.003	20.000	59.4	PR-14	59.723	59.023	0.000	Junction	
PR-1.004	30.338	132.6	PR-15	59.495	58.795	0.000	Junction	
PR-1.005	20.333	107.0	PR-17	59.740	58.605	0.435	Junction	
PR-2.000	29.992	14.8	PR-2	68.647	67.522	0.900	Open Manhole	1050
PR-2.001	26.964	13.6	PR-3	66.668	65.543	0.900	Open Manhole	1050
PR-2.002	40.331	13.6	PR-4	63.708	62.583	0.900	Open Manhole	1050
PR-2.003	37.641	14.2	PR-5	61.050	59.925	0.900	Open Manhole	1050
PR-2.004	14.421	115.0	PR-6	60.500	59.800	0.475	Junction	
PR-2.005	18.975	31.8	PR-13	60.180	59.202	0.278	Junction	
PR-2.006	18.975	31.8	PR-17	59.740	58.605	0.435	Junction	
PR-1.006	15.439	154.4	PR-18	59.634	58.505	0.829	Junction	

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PIPELINE SCHEDULES for Havant

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)
PR-1.007	o	300	PR-18	59.634	58.505	0.829	Junction	
PR-3.000	[]	-4	PR-19	60.587	59.887	0.000	Junction	
PR-3.001	[]	-4	PR-20	60.500	59.800	0.000	Junction	
PR-3.002	[]	-4	PR-21	60.360	59.660	0.000	Junction	
PR-3.003	[]	-4	PR-22	59.309	58.609	0.000	Junction	
PR-3.004	[]	-4	PR-23	58.430	57.730	0.000	Junction	
PR-3.005	o	225	PR-24	58.022	57.322	0.475	Junction	

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)
PR-1.007	2.351	470.1	PR-Outfall-1	59.740	58.500	0.940	Open Manhole	0
PR-3.000	8.248	94.8	PR-20	60.500	59.800	0.000	Junction	
PR-3.001	28.251	201.6	PR-21	60.360	59.660	0.000	Junction	
PR-3.002	20.741	19.7	PR-22	59.309	58.609	0.000	Junction	
PR-3.003	20.741	23.6	PR-23	58.430	57.730	0.000	Junction	
PR-3.004	26.616	65.3	PR-24	58.022	57.322	0.000	Junction	
PR-3.005	3.231	6.2	PR-25	57.502	56.802	0.475	Open Manhole	0

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Hardstanding	100	0.072	0.072	0.072
	Classification	Verge	21	0.013	0.003	0.074
	Classification	Cuttings	21	0.009	0.002	0.076
	Classification	HardstandingCC	40	0.026	0.010	0.087
	Classification	VergeCC	40	0.013	0.005	0.092
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	Classification	Cuttings	21	1.411	0.296	0.296
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
2.000	Classification	Hardstanding	100	0.028	0.028	0.028
	Classification	Verge	21	0.005	0.001	0.030
	Classification	Hardstanding	100	0.018	0.018	0.047
	Classification	Verge	21	0.005	0.001	0.048
	Classification	HardstandingCC	40	0.018	0.007	0.055
	Classification	HardstandingCC	40	0.028	0.011	0.067
	Classification	VergeCC	40	0.005	0.002	0.069
	Classification	VergeCC	40	0.005	0.002	0.071
2.001	-	-	100	0.000	0.000	0.000
2.002	Classification	Default	100	0.000	0.000	0.000
2.003	Classification	Hardstanding	100	0.021	0.021	0.021
	Classification	Verge	21	0.005	0.001	0.022
	Classification	Cuttings	21	0.002	0.000	0.023
	Classification	HardstandingCC	40	0.021	0.008	0.031
	Classification	VergeCC	40	0.005	0.002	0.033
	Classification	Hardstanding	100	0.031	0.031	0.064
	Classification	Verge	21	0.006	0.001	0.065
	Classification	HardstandingCC	40	0.031	0.012	0.077
	Classification	VergeCC	40	0.006	0.002	0.080
2.004	Classification	Cuttings	21	0.001	0.000	0.000
2.005	Classification	Hardstanding	100	0.049	0.049	0.049
	Classification	Verge	21	0.004	0.001	0.049
	Classification	Cuttings	21	0.002	0.001	0.050
	Classification	HardstandingCC	40	0.030	0.012	0.062
	Classification	VergeCC	40	0.004	0.001	0.063
2.006	-	-	100	0.000	0.000	0.000
1.006	Classification	Cuttings	21	0.623	0.131	0.131
1.007	-	-	100	0.000	0.000	0.000
3.000	Classification	Cuttings	21	0.004	0.001	0.001
	Classification	Cuttings	21	0.004	0.001	0.002
	Classification	Cuttings	21	0.089	0.019	0.020

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	Classification	Cuttings	21	0.002	0.000	0.021
	Classification	Hardstanding	100	0.029	0.029	0.050
3.001	Classification	Cuttings	21	0.010	0.002	0.002
	Classification	Cuttings	21	0.148	0.031	0.033
	Classification	Verge	21	0.002	0.000	0.034
	Classification	HardstandingCC	40	0.014	0.006	0.039
	Classification	VergeCC	40	0.002	0.001	0.040
3.002	Classification	Hardstanding	100	0.023	0.023	0.023
	Classification	Verge	21	0.004	0.001	0.024
	Classification	HardstandingCC	40	0.008	0.003	0.027
	Classification	VergeCC	40	0.004	0.002	0.029
3.003	-	-	100	0.000	0.000	0.000
3.004	Classification	Hardstanding	100	0.015	0.015	0.015
	Classification	Verge	21	0.004	0.001	0.016
	Classification	HardstandingCC	40	0.001	0.000	0.016
	Classification	VergeCC	40	0.004	0.002	0.018
3.005	Classification	Hardstanding	100	0.018	0.018	0.018
	Classification	Verge	21	0.005	0.001	0.019
	Classification	VergeCC	40	0.005	0.002	0.021
	User	-	21	1.686	0.354	0.375
				Total	Total	Total
				4.578	1.245	1.245

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Network Classifications for Havant

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
PR-1.000	PR-10	-4	0.000	0.058	Ditch				Junction
PR-1.001	PR-11	-4	0.000	0.025	Ditch				Junction
PR-1.002	PR-12	-4	0.000	0.071	Ditch				Junction
PR-1.003	PR-13	-4	0.000	0.000	Ditch				Junction
PR-1.004	PR-14	-4	0.000	0.000	Ditch				Junction
PR-1.005	PR-15	-4	0.000	0.435	Ditch				Junction
PR-2.000	PR-1	225	0.900	1.017	Carrier	1050	0	0.900	Type 7
PR-2.001	PR-2	225	0.900	0.907	Carrier	1050	0	0.900	Type 7
PR-2.002	PR-3	225	0.900	0.911	Carrier	1050	0	0.900	Type 7
PR-2.003	PR-4	225	0.846	0.900	Carrier	1050	0	0.900	Type 7
PR-2.004	PR-5	225	0.475	0.900	Carrier	1050	0	0.900	Type 7
PR-2.005	PR-6	-4	0.000	0.278	Ditch				Junction
PR-2.006	PR-13	-4	0.278	0.435	Ditch				Junction
PR-1.006	PR-17	300	0.829	1.331	Carrier				Junction
PR-1.007	PR-18	300	0.239	0.940	Carrier				Junction
PR-3.000	PR-19	-4	0.000	0.000	Ditch				Junction
PR-3.001	PR-20	-4	0.000	0.139	Ditch				Junction
PR-3.002	PR-21	-4	0.000	0.000	Ditch				Junction
PR-3.003	PR-22	-4	0.000	0.061	Ditch				Junction
PR-3.004	PR-23	-4	0.000	0.011	Ditch				Junction
PR-3.005	PR-24	225	0.458	0.475	Ditch				Junction

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-1.007	PR-Outfall-1	59.740	58.500	0.000	0	0

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-3.005	PR-25	57.502	56.802	0.000	0	0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 11 Number of Time/Area Diagrams 0
Number of Online Controls 11 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-10	15 Winter	1	+0%					60.367	-0.633	0.000	0.01			11.1	OK	
PR-1.001	PR-11	15 Winter	1	+0%			100/15 Winter	7	60.357	-0.462	0.000	0.00	0.0		5.3	OK	
PR-1.002	PR-12	30 Winter	1	+0%				0	60.058	-0.461	0.000	0.00	0.0		4.6	OK	
PR-1.003	PR-13	30 Winter	1	+0%			1/15 Summer	82	59.893	-0.167	0.000	0.01	17.1		8.3	FLOOD RISK*	
PR-1.004	PR-14	60 Winter	1	+0%			1/30 Winter	74	59.561	-0.162	0.000	0.01	6.9		8.2	FLOOD RISK*	
PR-1.005	PR-15	120 Winter	1	+0%			5/30 Summer	58	59.196	-0.298	0.000	0.01	0.0		7.1	OK	
PR-2.000	PR-1	15 Winter	1	+0%					69.586	-0.185	0.000	0.07			9.1	OK	
PR-2.001	PR-2	15 Winter	1	+0%					67.563	-0.185	0.000	0.07			9.0	OK	
PR-2.002	PR-3	15 Winter	1	+0%					65.581	-0.186	0.000	0.07			9.1	OK	
PR-2.003	PR-4	15 Winter	1	+0%					62.638	-0.170	0.000	0.13			17.7	OK	
PR-2.004	PR-5	15 Winter	1	+0%	30/15 Summer				60.047	-0.103	0.000	0.57			17.8	OK	
PR-2.005	PR-6	15 Winter	1	+0%					59.852	-0.648	0.000	0.01			24.5	OK	
PR-2.006	PR-13	15 Winter	1	+0%			1/15 Summer	58	59.740	-0.162	0.000	0.00	11.3		8.3	OK	
PR-1.006	PR-17	30 Winter	1	+0%	5/15 Winter				58.778	-0.127	0.000	0.62			30.7	OK*	
PR-1.007	PR-18	30 Winter	1	+0%					58.710	-0.095	0.000	0.81			30.9	OK*	
PR-3.000	PR-19	30 Winter	1	+0%					60.061	-0.526	0.000	0.00			4.2	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.001	PR-20	30 Winter	1	+0%			30/15 Summer	20	60.061	-0.439	0.000	0.01	0.0		5.1	OK	
PR-3.002	PR-21	30 Winter	1	+0%			100/30 Summer	6	59.862	-0.498	0.000	0.00	0.0		4.8	OK	
PR-3.003	PR-22	30 Winter	1	+0%			100/30 Winter	3	58.805	-0.504	0.000	0.00	0.0		4.7	OK	
PR-3.004	PR-23	60 Winter	1	+0%			30/60 Winter	12	58.057	-0.373	0.000	0.00	0.0		5.0	OK	
PR-3.005	PR-24	30 Winter	1	+0%	1/15 Summer		1/15 Summer	91	57.869	0.322	0.000	0.13	20.3		8.4	FLOOD RISK*	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 11 Number of Time/Area Diagrams 0
Number of Online Controls 11 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-10	30 Winter	5	+0%					60.466	-0.534	0.000	0.01			14.4	OK	
PR-1.001	PR-11	30 Winter	5	+0%			100/15 Winter	7	60.466	-0.353	0.000	0.01	0.0		6.5	OK	
PR-1.002	PR-12	60 Winter	5	+0%				0	60.126	-0.392	0.000	0.00	0.0		5.5	OK	
PR-1.003	PR-13	15 Winter	5	+0%			1/15 Summer	82	59.914	-0.146	0.000	0.01	43.4		8.3	FLOOD RISK*	
PR-1.004	PR-14	30 Winter	5	+0%			1/30 Winter	74	59.589	-0.134	0.000	0.01	35.1		8.4	FLOOD RISK*	
PR-1.005	PR-15	60 Winter	5	+0%			5/30 Summer	58	59.338	-0.157	0.000	0.01	16.8		8.2	FLOOD RISK*	
PR-2.000	PR-1	15 Winter	5	+0%					69.598	-0.173	0.000	0.12			15.1	OK	
PR-2.001	PR-2	15 Winter	5	+0%					67.575	-0.173	0.000	0.12			15.0	OK	
PR-2.002	PR-3	15 Winter	5	+0%					65.593	-0.175	0.000	0.11			15.0	OK	
PR-2.003	PR-4	15 Winter	5	+0%					62.656	-0.152	0.000	0.22			29.4	OK	
PR-2.004	PR-5	15 Winter	5	+0%	30/15 Summer				60.100	-0.051	0.000	0.95			29.7	OK	
PR-2.005	PR-6	15 Winter	5	+0%					59.877	-0.623	0.000	0.02			40.9	OK	
PR-2.006	PR-13	15 Winter	5	+0%			1/15 Summer	58	59.759	-0.144	0.000	0.00	32.0		8.4	OK	
PR-1.006	PR-17	30 Winter	5	+0%	5/15 Winter				58.936	0.031	0.000	0.86			42.8	SURCHARGED*	
PR-1.007	PR-18	15 Summer	5	+0%					58.805	0.000	0.000	1.00			38.4	SURCHARGED*	
PR-3.000	PR-19	30 Winter	5	+0%					60.235	-0.352	0.000	0.01			6.9	OK	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.001	PR-20	30 Winter	5	+0%			30/15 Summer	20	60.235	-0.265	0.000	0.01	0.0		6.4	OK	
PR-3.002	PR-21	60 Winter	5	+0%			100/30 Summer	6	59.938	-0.421	0.000	0.00	0.0		5.8	OK	
PR-3.003	PR-22	60 Winter	5	+0%			100/30 Winter	3	58.879	-0.431	0.000	0.00	0.0		5.7	OK	
PR-3.004	PR-23	60 Winter	5	+0%			30/60 Winter	12	58.138	-0.291	0.000	0.00	0.0		6.1	OK	
PR-3.005	PR-24	15 Winter	5	+0%	1/15 Summer		1/15 Summer	91	57.891	0.344	0.000	0.13	51.9		8.5	FLOOD RISK*	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 11 Number of Time/Area Diagrams 0
Number of Online Controls 11 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-10	30 Winter	30	+0%					60.592	-0.408	0.000	0.02			21.0	OK	
PR-1.001	PR-11	30 Winter	30	+0%			100/15 Winter	7	60.591	-0.228	0.000	0.01	0.0		7.7	OK	
PR-1.002	PR-12	60 Winter	30	+0%				0	60.188	-0.330	0.000	0.00	0.0		6.3	OK	
PR-1.003	PR-13	15 Summer	30	+0%			1/15 Summer	82	59.937	-0.123	0.000	0.01	93.4		8.4	FLOOD RISK*	
PR-1.004	PR-14	15 Winter	30	+0%			1/30 Winter	74	59.612	-0.111	0.000	0.01	83.8		8.5	FLOOD RISK*	
PR-1.005	PR-15	30 Winter	30	+0%			5/30 Summer	58	59.366	-0.129	0.000	0.01	56.2		8.1	FLOOD RISK*	
PR-2.000	PR-1	15 Winter	30	+0%					69.610	-0.161	0.000	0.18			22.2	OK	
PR-2.001	PR-2	15 Winter	30	+0%					67.587	-0.161	0.000	0.18			22.0	OK	
PR-2.002	PR-3	15 Winter	30	+0%					65.605	-0.163	0.000	0.16			22.1	OK	
PR-2.003	PR-4	15 Winter	30	+0%					62.678	-0.130	0.000	0.37			48.4	OK	
PR-2.004	PR-5	15 Winter	30	+0%	30/15 Summer				60.321	0.170	0.000	1.53			47.8	SURCHARGED	
PR-2.005	PR-6	15 Winter	30	+0%					59.899	-0.601	0.000	0.04			67.2	OK	
PR-2.006	PR-13	15 Winter	30	+0%			1/15 Summer	58	59.774	-0.128	0.000	0.00	59.3		8.6	OK	
PR-1.006	PR-17	30 Winter	30	+0%	5/15 Winter				59.241	0.336	0.000	1.51			74.7	SURCHARGED*	
PR-1.007	PR-18	15 Summer	30	+0%					58.805	0.000	0.000	1.53			58.7	SURCHARGED*	
PR-3.000	PR-19	15 Winter	30	+0%					60.339	-0.248	0.000	0.01			12.2	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.001	PR-20	15 Winter	30	+0%			30/15 Summer	20	60.338	-0.162	0.000	0.01	10.0		7.3	FLOOD RISK*	
PR-3.002	PR-21	60 Winter	30	+0%			100/30 Summer	6	60.061	-0.299	0.000	0.00	0.0		7.1	OK	
PR-3.003	PR-22	60 Winter	30	+0%			100/30 Winter	3	58.982	-0.328	0.000	0.00	0.0		6.8	OK	
PR-3.004	PR-23	60 Winter	30	+0%			30/60 Winter	12	58.236	-0.193	0.000	0.00	0.1		7.1	FLOOD RISK*	
PR-3.005	PR-24	15 Winter	30	+0%	1/15 Summer		1/15 Summer	91	57.919	0.371	0.000	0.14	120.8		8.8	FLOOD RISK*	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 11 Number of Time/Area Diagrams 0
Number of Online Controls 11 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
Region England and Wales Ratio R 0.322 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-10	30 Winter	100	+0%					60.656	-0.344	0.000	0.03			27.7	OK	
PR-1.001	PR-11	30 Winter	100	+0%			100/15 Winter	7	60.654	-0.165	0.000	0.01	10.0		8.1	FLOOD RISK*	
PR-1.002	PR-12	60 Winter	100	+0%				0	60.286	-0.233	0.000	0.00	0.0		7.1	OK	
PR-1.003	PR-13	15 Summer	100	+0%			1/15 Summer	82	59.945	-0.115	0.000	0.01	123.5		8.3	FLOOD RISK*	
PR-1.004	PR-14	15 Winter	100	+0%			1/30 Winter	74	59.626	-0.097	0.000	0.01	115.9		8.4	FLOOD RISK*	
PR-1.005	PR-15	30 Winter	100	+0%			5/30 Summer	58	59.491	-0.004	0.000	0.01	88.7		8.1	FLOOD RISK*	
PR-2.000	PR-1	15 Winter	100	+0%					69.619	-0.152	0.000	0.23			28.8	OK	
PR-2.001	PR-2	15 Winter	100	+0%					67.596	-0.151	0.000	0.23			28.5	OK	
PR-2.002	PR-3	15 Winter	100	+0%					65.614	-0.154	0.000	0.21			28.5	OK	
PR-2.003	PR-4	15 Winter	100	+0%					62.694	-0.114	0.000	0.48			62.7	OK	
PR-2.004	PR-5	15 Winter	100	+0%	30/15 Summer				60.525	0.374	0.000	1.98			61.9	SURCHARGED	
PR-2.005	PR-6	15 Winter	100	+0%					59.913	-0.587	0.000	0.05			86.5	OK	
PR-2.006	PR-13	15 Winter	100	+0%			1/15 Summer	58	59.783	-0.120	0.000	0.00	78.9		8.6	OK	
PR-1.006	PR-17	30 Winter	100	+0%	5/15 Winter				59.460	0.555	0.000	1.83			90.8	SURCHARGED*	
PR-1.007	PR-18	15 Summer	100	+0%					58.805	0.000	0.000	2.01			77.1	SURCHARGED*	
PR-3.000	PR-19	15 Winter	100	+0%					60.353	-0.234	0.000	0.02			19.2	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-3.001	PR-20	15 Winter	100	+0%			30/15 Summer	20	60.352	-0.148	0.000	0.01	25.9		7.4	FLOOD RISK*	
PR-3.002	PR-21	60 Winter	100	+0%			100/30 Summer	6	60.139	-0.221	0.000	0.00	9.2		7.8	OK	
PR-3.003	PR-22	60 Winter	100	+0%			100/30 Winter	3	59.140	-0.169	0.000	0.00	6.9		8.2	FLOOD RISK*	
PR-3.004	PR-23	60 Winter	100	+0%			30/60 Winter	12	58.264	-0.165	0.000	0.01	8.3		7.2	FLOOD RISK*	
PR-3.005	PR-24	15 Summer	100	+0%	1/15 Summer		1/15 Summer	91	57.933	0.386	0.000	0.14	157.9		8.9	FLOOD RISK*	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Havant

Pipe Sizes Havant Manhole Sizes Havant

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	10.000
M5-60 (mm)	19.700	Volumetric Runoff Coeff.	0.840	Min Design Depth for Optimisation (m)	0.000
Ratio R	0.334	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	250	Add Flow / Climate Change (%)	40	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.000	10.923	0.516	21.2	0.018	5.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.001	20.558	1.017	20.2	0.000	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.002	10.696	0.714	15.0	0.000	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.003	14.401	0.992	14.5	0.010	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.004	11.427	0.452	25.3	0.007	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.005	9.488	0.735	12.9	0.000	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.006	16.235	1.487	10.9	0.000	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.007	12.102	0.748	16.2	0.008	0.00	0.0	0.030		[]	-5	Pipe/Conduit	
PR-1.008	17.862	0.915	19.5	0.005	0.00	0.0	0.030		[]	-5	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)
PR-1.000	62.67	5.08	48.546	0.018	0.0	0.0	1.4	2.28	1278.7	4.7
PR-1.001	61.96	5.23	48.030	0.018	0.0	0.0	1.4	2.34	1308.3	4.7
PR-1.002	61.64	5.29	47.013	0.018	0.0	0.0	1.4	2.71	1520.0	4.7
PR-1.003	61.24	5.38	46.300	0.027	0.0	0.0	2.0	2.76	1543.9	7.1
PR-1.004	60.81	5.47	45.308	0.034	0.0	0.0	2.5	2.09	1170.0	8.9
PR-1.005	60.57	5.52	44.856	0.034	0.0	0.0	2.5	2.92	1637.3	8.9
PR-1.006	60.19	5.61	44.121	0.034	0.0	0.0	2.5	3.18	1780.2	8.9
PR-1.007	59.84	5.69	42.634	0.043	0.0	0.0	3.1	2.61	1462.6	10.9
PR-1.008	59.30	5.81	41.887	0.048	0.0	0.0	3.5	2.38	1331.6	12.1

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-1.009	28.263	1.125	25.1	0.011	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.010	9.361	0.033	283.7	0.010	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.011	10.808	0.010	1080.8	0.000	0.00	0.0		0.030	[]	-5	Pipe/Conduit	
PR-1.012	12.401	0.003	4133.8	0.000	0.00	0.0	0.600		oo	-3	Pipe/Conduit	
PR-2.000	26.146	1.000	26.1	0.000	5.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.001	26.146	1.600	16.3	0.008	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.002	26.146	1.703	15.4	0.009	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.003	26.146	2.510	10.4	0.010	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.004	18.028	1.118	16.1	0.010	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.005	18.028	0.540	33.4	0.006	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.006	22.164	0.200	110.8	0.006	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-2.007	5.986	0.030	199.5	0.009	0.00	0.0		0.030	[]	-1	Pipe/Conduit	
PR-1.013	8.067	0.050	161.3	0.001	0.00	0.0		0.030	[]	-7	Pipe/Conduit	
PR-1.014	6.434	0.050	128.7	0.001	0.00	0.0		0.030	[]	-7	Pipe/Conduit	
PR-1.015	3.453	0.050	69.1	0.000	0.00	0.0		0.030	[]	-7	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)
PR-1.009	58.35	6.04	40.971	0.059	0.0	0.0	4.2	2.10	1173.7	14.7
PR-1.010	57.33	6.29	39.846	0.069	0.0	0.0	4.8	0.62	349.3	16.7
PR-1.011	55.19	6.85	39.813	0.069	0.0	0.0	4.8	0.32	178.9	16.7
PR-1.012	53.01	7.48	39.803	0.070	0.0	0.0	4.8	0.33	128.9	16.7
PR-2.000	61.25	5.38	48.500	0.000	0.0	0.0	0.0	1.16	104.3	0.0
PR-2.001	59.90	5.67	47.500	0.008	0.0	0.0	0.6	1.47	132.0	2.1
PR-2.002	58.66	5.96	45.900	0.018	0.0	0.0	1.3	1.51	136.2	4.4
PR-2.003	57.69	6.20	44.198	0.027	0.0	0.0	1.9	1.84	165.3	6.7
PR-2.004	56.88	6.40	41.688	0.037	0.0	0.0	2.6	1.48	132.9	9.0
PR-2.005	55.76	6.69	40.570	0.043	0.0	0.0	2.9	1.03	92.3	10.3
PR-2.006	53.44	7.35	40.030	0.050	0.0	0.0	3.2	0.56	50.7	11.3
PR-2.007	52.66	7.59	39.830	0.059	0.0	0.0	3.7	0.42	37.8	13.1
PR-1.013	52.13	7.75	39.800	0.129	0.0	0.0	8.1	0.82	470.7	28.5
PR-1.014	51.77	7.87	39.750	0.130	0.0	0.0	8.1	0.92	527.1	28.5
PR-1.015	51.62	7.92	39.700	0.130	0.0	0.0	8.1	1.25	719.5	28.5

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Network Design Table for Havant

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
PR-3.000	10.527	0.200	52.6	0.000	5.00	0.0	0.030		[]	-7	Pipe/Conduit	
PR-3.001	5.638	0.050	112.8	0.000	0.00	0.0	0.030		[]	-7	Pipe/Conduit	
PR-3.002	9.757	0.050	195.1	0.005	0.00	0.0	0.030		[]	-7	Pipe/Conduit	
PR-1.016	1.561	0.025	62.4	0.023	0.00	0.0	0.030		[]	-8	Pipe/Conduit	
PR-1.017	3.086	0.065	47.5	0.000	0.00	0.0	0.030		[]	-8	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)
PR-3.000	62.46	5.12	39.950	0.000	0.0	0.0	0.0	1.43	824.2	0.0
PR-3.001	62.00	5.22	39.750	0.000	0.0	0.0	0.0	0.98	563.1	0.0
PR-3.002	60.97	5.44	39.700	0.005	0.0	0.0	0.3	0.74	428.0	1.2
PR-1.016	51.57	7.93	39.650	0.157	0.0	0.0	9.8	1.40	1157.8	34.4
PR-1.017	51.47	7.97	39.625	0.157	0.0	0.0	9.8	1.61	1327.6	34.4

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PIPELINE SCHEDULES for Havant

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)
PR-1.000	[]	-5	PR-1	49.246	48.546	0.000	Junction	
PR-1.001	[]	-5	PR-2	48.730	48.030	0.000	Junction	
PR-1.002	[]	-5	PR-3	47.713	47.013	0.000	Junction	
PR-1.003	[]	-5	PR-4	47.000	46.300	0.000	Junction	
PR-1.004	[]	-5	PR-5	46.008	45.308	0.000	Junction	
PR-1.005	[]	-5	PR-6	45.556	44.856	0.000	Junction	
PR-1.006	[]	-5	PR-7	44.821	44.121	0.000	Junction	
PR-1.007	[]	-5	PR-8	43.334	42.634	0.000	Junction	
PR-1.008	[]	-5	PR-9	42.587	41.887	0.000	Junction	
PR-1.009	[]	-5	PR-10	41.671	40.971	0.000	Junction	
PR-1.010	[]	-5	PR-11	40.547	39.846	0.001	Junction	
PR-1.011	[]	-5	PR-12	40.750	39.813	0.237	Junction	
PR-1.012	oo	-3	PR-13	40.774	39.803	0.671	Junction	
PR-2.000	[]	-1	PR-16	49.000	48.500	0.000	Junction	
PR-2.001	[]	-1	PR-17	48.000	47.500	0.000	Junction	

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)
PR-1.000	10.923	21.2	PR-2	48.730	48.030	0.000	Junction	
PR-1.001	20.558	20.2	PR-3	47.713	47.013	0.000	Junction	
PR-1.002	10.696	15.0	PR-4	47.000	46.299	0.001	Junction	
PR-1.003	14.401	14.5	PR-5	46.008	45.308	0.000	Junction	
PR-1.004	11.427	25.3	PR-6	45.556	44.856	0.000	Junction	
PR-1.005	9.488	12.9	PR-7	44.821	44.121	0.000	Junction	
PR-1.006	16.235	10.9	PR-8	43.334	42.634	0.000	Junction	
PR-1.007	12.102	16.2	PR-9	42.587	41.886	0.001	Junction	
PR-1.008	17.862	19.5	PR-10	41.671	40.972	-0.001	Junction	
PR-1.009	28.263	25.1	PR-11	40.547	39.846	0.001	Junction	
PR-1.010	9.361	283.7	PR-12	40.750	39.813	0.237	Junction	
PR-1.011	10.808	1080.8	PR-13	40.774	39.803	0.271	Junction	
PR-1.012	12.401	4133.8	PR-24	40.320	39.800	0.220	Junction	
PR-2.000	26.146	26.1	PR-17	48.000	47.500	0.000	Junction	
PR-2.001	26.146	16.3	PR-18	46.400	45.900	0.000	Junction	

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PIPELINE SCHEDULES for Havant

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)
PR-2.002	[]	-1	PR-18	46.400	45.900	0.000	Junction	
PR-2.003	[]	-1	PR-19	44.700	44.198	0.002	Junction	
PR-2.004	[]	-1	PR-20	42.190	41.688	0.002	Junction	
PR-2.005	[]	-1	PR-21	41.070	40.570	0.000	Junction	
PR-2.006	[]	-1	PR-22	40.530	40.030	0.000	Junction	
PR-2.007	[]	-1	PR-23	40.330	39.830	0.000	Junction	
PR-1.013	[]	-7	PR-24	40.320	39.800	0.020	Junction	
PR-1.014	[]	-7	PR-29	40.310	39.750	0.060	Junction	
PR-1.015	[]	-7	PR-28	40.320	39.700	0.120	Junction	
PR-3.000	[]	-7	PR-25	40.450	39.950	0.000	Junction	
PR-3.001	[]	-7	PR-26	40.120	39.750	-0.130	Open Manhole	1
PR-3.002	[]	-7	PR-27	40.120	39.700	-0.080	Open Manhole	1
PR-1.016	[]	-8	PR-28	39.900	39.650	0.000	Open Manhole	1

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)
PR-2.002	26.146	15.4	PR-19	44.700	44.197	0.003	Junction	
PR-2.003	26.146	10.4	PR-20	42.190	41.688	0.002	Junction	
PR-2.004	18.028	16.1	PR-21	41.070	40.570	0.000	Junction	
PR-2.005	18.028	33.4	PR-22	40.530	40.030	0.000	Junction	
PR-2.006	22.164	110.8	PR-23	40.330	39.830	0.000	Junction	
PR-2.007	5.986	199.5	PR-24	40.320	39.800	0.020	Junction	
PR-1.013	8.067	161.3	PR-29	40.310	39.750	0.060	Junction	
PR-1.014	6.434	128.7	PR-28	40.320	39.700	0.120	Junction	
PR-1.015	3.453	69.1	PR-28	39.900	39.650	-0.250	Open Manhole	1
PR-3.000	10.527	52.6	PR-26	40.120	39.750	-0.130	Open Manhole	1
PR-3.001	5.638	112.8	PR-27	40.120	39.700	-0.080	Open Manhole	1
PR-3.002	9.757	195.1	PR-28	39.900	39.650	-0.250	Open Manhole	1
PR-1.016	1.561	62.4	PR-29	39.890	39.625	0.015	Open Manhole	1

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PIPELINE SCHEDULES for Havant

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)
PR-1.017	[]	-8	PR-29	39.890	39.625	0.015	Open Manhole	1

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)
PR-1.017	3.086	47.5	PR-	39.850	39.560	0.040	Open Manhole	0

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.018	0.018	0.018
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.003	0.003	0.003
	User	-	21	0.014	0.003	0.005
	User	-	40	0.010	0.004	0.010
1.004	User	-	100	0.006	0.006	0.006
	User	-	21	0.004	0.001	0.007
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	User	-	100	0.003	0.003	0.003
	User	-	21	0.024	0.005	0.008
1.008	User	-	100	0.005	0.005	0.005
	User	-	21	0.003	0.001	0.005
1.009	User	-	100	0.010	0.010	0.010
	User	-	21	0.004	0.001	0.011
1.010	Classification	Hardstanding	100	0.006	0.006	0.006
	User	-	21	0.005	0.001	0.007
	User	-	40	0.006	0.003	0.010
1.011	User	-	21	0.002	0.000	0.000
1.012	User	-	21	0.002	0.000	0.000
2.000	-	-	100	0.000	0.000	0.000
2.001	User	-	100	0.006	0.006	0.006
	User	-	21	0.011	0.002	0.008
2.002	User	-	100	0.007	0.007	0.007
	User	-	21	0.013	0.003	0.009
2.003	User	-	100	0.007	0.007	0.007
	User	-	21	0.014	0.003	0.010
2.004	User	-	100	0.007	0.007	0.007
	User	-	21	0.015	0.003	0.010
2.005	User	-	100	0.004	0.004	0.004
	User	-	21	0.010	0.002	0.006
2.006	User	-	100	0.005	0.005	0.005
	User	-	21	0.007	0.002	0.006
2.007	User	-	100	0.005	0.005	0.005
	User	-	21	0.009	0.002	0.007
	User	-	40	0.004	0.002	0.009
1.013	User	-	21	0.003	0.001	0.001
1.014	User	-	21	0.004	0.001	0.001
1.015	User	-	21	0.001	0.000	0.000
3.000	-	-	100	0.000	0.000	0.000

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Area Summary for Havant

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
3.001	-	-	100	0.000	0.000	0.000
3.002	User	-	40	0.011	0.005	0.005
1.016	User	-	100	0.022	0.022	0.022
	User	-	21	0.004	0.001	0.023
1.017	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.293	0.157	0.157

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Network Classifications for Havant

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
PR-1.000	PR-1	-5	0.000	0.181	Unclassified				Junction
PR-1.001	PR-2	-5	0.000	0.000	Unclassified				Junction
PR-1.002	PR-3	-5	0.000	0.146	Unclassified				Junction
PR-1.003	PR-4	-5	0.000	0.043	Unclassified				Junction
PR-1.004	PR-5	-5	0.000	0.279	Unclassified				Junction
PR-1.005	PR-6	-5	0.000	0.000	Unclassified				Junction
PR-1.006	PR-7	-5	0.000	0.126	Unclassified				Junction
PR-1.007	PR-8	-5	0.000	0.001	Unclassified				Junction
PR-1.008	PR-9	-5	0.000	0.064	Unclassified				Junction
PR-1.009	PR-10	-5	0.000	0.071	Unclassified				Junction
PR-1.010	PR-11	-5	0.001	1.051	Unclassified				Junction
PR-1.011	PR-12	-5	0.237	0.479	Unclassified				Junction
PR-1.012	PR-13	-3	0.220	0.671	Unclassified				Junction
PR-2.000	PR-16	-1	0.000	0.000	Unclassified				Junction
PR-2.001	PR-17	-1	0.000	0.000	Unclassified				Junction
PR-2.002	PR-18	-1	0.000	0.003	Unclassified				Junction
PR-2.003	PR-19	-1	0.002	0.002	Unclassified				Junction
PR-2.004	PR-20	-1	0.001	0.002	Unclassified				Junction
PR-2.005	PR-21	-1	0.000	0.000	Unclassified				Junction
PR-2.006	PR-22	-1	0.000	0.000	Unclassified				Junction
PR-2.007	PR-23	-1	0.000	0.020	Unclassified				Junction
PR-1.013	PR-24	-7	0.020	0.060	Unclassified				Junction
PR-1.014	PR-29	-7	0.060	0.120	Unclassified				Junction
PR-1.015	PR-28	-7	0.120	0.120	Unclassified				Junction
PR-3.000	PR-25	-7	0.000	0.000	Unclassified				Junction
PR-3.001	PR-26	-7	-0.130	-0.130	Unclassified	1	0	-0.130	Type 8
PR-3.002	PR-27	-7	-0.080	-0.080	Unclassified	1	0	-0.080	Type 8
PR-1.016	PR-28	-8	0.000	0.015	Unclassified	1	0	0.000	Type 8
PR-1.017	PR-29	-8	0.015	0.040	Unclassified	1	0	0.015	Type 8

Free Flowing Outfall Details for Havant

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PR-1.017	PR-	39.850	39.560	0.000	0	0

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Online Controls for Havant

Orifice Manhole: PR-2, DS/PN: PR-1.001, Volume (m³): 6.1

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 48.030

Orifice Manhole: PR-3, DS/PN: PR-1.002, Volume (m³): 11.5

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 47.013

Orifice Manhole: PR-4, DS/PN: PR-1.003, Volume (m³): 6.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 46.300

Orifice Manhole: PR-5, DS/PN: PR-1.004, Volume (m³): 8.1

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 45.308

Orifice Manhole: PR-6, DS/PN: PR-1.005, Volume (m³): 6.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 44.856

Orifice Manhole: PR-7, DS/PN: PR-1.006, Volume (m³): 5.3

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 44.121

Orifice Manhole: PR-8, DS/PN: PR-1.007, Volume (m³): 9.1

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 42.634

Orifice Manhole: PR-9, DS/PN: PR-1.008, Volume (m³): 6.8

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 41.887

Orifice Manhole: PR-10, DS/PN: PR-1.009, Volume (m³): 10.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 40.971

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Orifice Manhole: PR-11, DS/PN: PR-1.010, Volume (m³): 15.8

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.846

Orifice Manhole: PR-12, DS/PN: PR-1.011, Volume (m³): 5.2

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.813

Orifice Manhole: PR-17, DS/PN: PR-2.001, Volume (m³): 2.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 47.500

Orifice Manhole: PR-18, DS/PN: PR-2.002, Volume (m³): 2.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 45.900

Orifice Manhole: PR-19, DS/PN: PR-2.003, Volume (m³): 2.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 44.198

Orifice Manhole: PR-20, DS/PN: PR-2.004, Volume (m³): 2.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 41.688

Orifice Manhole: PR-21, DS/PN: PR-2.005, Volume (m³): 1.6

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 40.570

Orifice Manhole: PR-22, DS/PN: PR-2.006, Volume (m³): 1.6

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 40.030

Orifice Manhole: PR-23, DS/PN: PR-2.007, Volume (m³): 2.0

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 39.830

Orifice Manhole: PR-24, DS/PN: PR-1.013, Volume (m³): 5.4

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.800

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Orifice Manhole: PR-29, DS/PN: PR-1.014, Volume (m³): 4.6

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.750

Orifice Manhole: PR-26, DS/PN: PR-3.001, Volume (m³): 6.1

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.750

Orifice Manhole: PR-27, DS/PN: PR-3.002, Volume (m³): 3.2

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.700

Orifice Manhole: PR-28, DS/PN: PR-1.016, Volume (m³): 7.6

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.650

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Offline Controls for Havant

Weir Manhole: PR-2, DS/PN: PR-1.001, Loop to PN: PR-1.002

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 48.530

Weir Manhole: PR-3, DS/PN: PR-1.002, Loop to PN: PR-1.003

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 47.513

Weir Manhole: PR-4, DS/PN: PR-1.003, Loop to PN: PR-1.004

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 46.800

Weir Manhole: PR-5, DS/PN: PR-1.004, Loop to PN: PR-1.005

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 45.808

Weir Manhole: PR-6, DS/PN: PR-1.005, Loop to PN: PR-1.006

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 45.356

Weir Manhole: PR-7, DS/PN: PR-1.006, Loop to PN: PR-1.007

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 44.621

Weir Manhole: PR-8, DS/PN: PR-1.007, Loop to PN: PR-1.008

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 43.150

Weir Manhole: PR-9, DS/PN: PR-1.008, Loop to PN: PR-1.009

Discharge Coef 0.544 Width (m) 2.550 Invert Level (m) 42.439

Weir Manhole: PR-10, DS/PN: PR-1.009, Loop to PN: PR-1.010

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 41.471

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Weir Manhole: PR-11, DS/PN: PR-1.010, Loop to PN: PR-1.011

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 40.347

Weir Manhole: PR-17, DS/PN: PR-2.001, Loop to PN: PR-2.002

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 47.800

Weir Manhole: PR-18, DS/PN: PR-2.002, Loop to PN: PR-2.003

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 46.200

Weir Manhole: PR-19, DS/PN: PR-2.003, Loop to PN: PR-2.004

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 44.500

Weir Manhole: PR-20, DS/PN: PR-2.004, Loop to PN: PR-2.005

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 41.990

Weir Manhole: PR-21, DS/PN: PR-2.005, Loop to PN: PR-2.006

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 40.870

Weir Manhole: PR-22, DS/PN: PR-2.006, Loop to PN: PR-2.007

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 40.330

Weir Manhole: PR-23, DS/PN: PR-2.007, Loop to PN: PR-1.013

Discharge Coef 0.544 Width (m) 2.500 Invert Level (m) 40.130

Weir Manhole: PR-29, DS/PN: PR-1.014, Loop to PN: PR-1.015

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 40.110

Weir Manhole: PR-28, DS/PN: PR-1.015, Loop to PN: PR-1.016

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 40.190

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Weir Manhole: PR-26, DS/PN: PR-3.001, Loop to PN: PR-3.002

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 39.920

Weir Manhole: PR-27, DS/PN: PR-3.002, Loop to PN: PR-1.016

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 39.980

Weir Manhole: PR-28, DS/PN: PR-1.016, Loop to PN: PR-1.017

Discharge Coef 0.544 Width (m) 1.150 Invert Level (m) 39.900

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 22 Number of Time/Area Diagrams 0
Number of Online Controls 23 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Winter	1	+0%					48.551	-0.695	0.000	0.00			2.3	OK	
PR-1.001	PR-2	15 Winter	1	+0%				0	48.117	-0.613	0.000	0.00	0.0		2.3	OK	
PR-1.002	PR-3	15 Winter	1	+0%				0	47.099	-0.614	0.000	0.00	0.0		2.2	OK	
PR-1.003	PR-4	15 Winter	1	+0%				0	46.407	-0.592	0.000	0.00	0.0		3.1	OK	
PR-1.004	PR-5	15 Winter	1	+0%				0	45.439	-0.569	0.000	0.00	0.0		3.6	OK	
PR-1.005	PR-6	15 Winter	1	+0%				0	44.977	-0.579	0.000	0.00	0.0		3.4	OK	
PR-1.006	PR-7	15 Winter	1	+0%				0	44.239	-0.582	0.000	0.00	0.0		3.3	OK	
PR-1.007	PR-8	15 Winter	1	+0%				0	42.771	-0.563	0.000	0.00	0.0		3.7	OK	
PR-1.008	PR-9	30 Winter	1	+0%				0	42.033	-0.554	0.000	0.00	0.0		3.9	OK	
PR-1.009	PR-10	30 Winter	1	+0%				0	41.144	-0.527	0.000	0.00	0.0		4.3	OK	
PR-1.010	PR-11	30 Winter	1	+0%			30/30 Winter	15	40.119	-0.427	0.000	0.01	0.0		4.0	OK	
PR-1.011	PR-12	60 Winter	1	+0%					40.026	-0.487	0.000	0.02			3.2	OK	
PR-1.012	PR-13	60 Winter	1	+0%	30/60 Winter				39.955	-0.148	0.000	0.01			2.8	OK*	
PR-2.000	PR-16	15 Summer	1	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	1	+0%				0	47.547	-0.453	0.000	0.01	0.0		0.9	OK	
PR-2.002	PR-18	15 Winter	1	+0%			100/15 Summer	2	45.976	-0.424	0.000	0.01	0.0		1.8	OK	

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Woodcoste Grove Ashley Road, Epsom Surrey, KT18 5BW	HTC Northern Access Route South Proposed Model (40%cc)
Date 07/10/2022 File South proposed 40cc.MDX	Designed by BV Checked by WB
Innovyze	Network 2020.1.3

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	1	+0%			30/15 Summer	9	44.298	-0.400	0.000	0.02	0.0		2.8	OK	
PR-2.004	PR-20	15 Winter	1	+0%			30/15 Summer	12	41.820	-0.368	0.000	0.03	0.0		3.6	OK	
PR-2.005	PR-21	15 Winter	1	+0%			30/15 Summer	14	40.723	-0.347	0.000	0.04	0.0		4.0	OK	
PR-2.006	PR-22	30 Winter	1	+0%			5/15 Summer	26	40.204	-0.326	0.000	0.08	0.0		3.9	OK	
PR-2.007	PR-23	30 Winter	1	+0%			5/15 Winter	40	40.072	-0.258	0.000	0.10	0.0		3.6	OK	
PR-1.013	PR-24	60 Winter	1	+0%					39.955	-0.345	0.000	0.01			3.8	OK	
PR-1.014	PR-29	60 Winter	1	+0%				0	39.856	-0.394	0.000	0.01	0.0		3.8	OK	
PR-1.015	PR-28	120 Winter	1	+0%				0	39.757	-0.443	0.000	0.01	0.0		3.6	OK	
PR-3.000	PR-25	15 Summer	1	+0%					39.950	-0.500	0.000	0.00			0.0	OK	
PR-3.001	PR-26	120 Winter	1	+0%				0	39.757	-0.493	0.000	0.00	0.0		0.0	OK	
PR-3.002	PR-27	120 Winter	1	+0%				0	39.760	-0.440	0.000	0.00	0.0		0.1	OK	
PR-1.016	PR-28	120 Winter	1	+0%				0	39.757	-0.143	0.000	0.01	0.0		4.2	FLOOD RISK	
PR-1.017	PR-29	120 Winter	1	+0%					39.627	-0.248	0.000	0.01			4.2	OK	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 22 Number of Time/Area Diagrams 0
Number of Online Controls 23 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Winter	5	+0%					48.554	-0.692	0.000	0.00			3.8	OK	
PR-1.001	PR-2	15 Winter	5	+0%				0	48.159	-0.571	0.000	0.00	0.0		3.5	OK	
PR-1.002	PR-3	15 Winter	5	+0%				0	47.133	-0.580	0.000	0.00	0.0		3.4	OK	
PR-1.003	PR-4	15 Winter	5	+0%				0	46.487	-0.513	0.000	0.00	0.0		4.5	OK	
PR-1.004	PR-5	15 Winter	5	+0%				0	45.532	-0.475	0.000	0.01	0.0		5.1	OK	
PR-1.005	PR-6	15 Winter	5	+0%				0	45.057	-0.499	0.000	0.00	0.0		4.7	OK	
PR-1.006	PR-7	15 Winter	5	+0%				0	44.310	-0.511	0.000	0.00	0.0		4.6	OK	
PR-1.007	PR-8	30 Winter	5	+0%				0	42.843	-0.491	0.000	0.00	0.0		4.9	OK	
PR-1.008	PR-9	30 Winter	5	+0%				0	42.112	-0.475	0.000	0.00	0.0		5.1	OK	
PR-1.009	PR-10	30 Winter	5	+0%				0	41.240	-0.431	0.000	0.00	0.0		5.6	OK	
PR-1.010	PR-11	60 Winter	5	+0%			30/30 Winter	15	40.243	-0.303	0.000	0.01	0.0		5.0	OK	
PR-1.011	PR-12	60 Winter	5	+0%					40.131	-0.382	0.000	0.02			4.4	OK	
PR-1.012	PR-13	60 Winter	5	+0%	30/60 Winter				40.029	-0.074	0.000	0.02			4.1	OK*	
PR-2.000	PR-16	15 Summer	5	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	5	+0%				0	47.567	-0.433	0.000	0.01	0.0		1.5	OK	
PR-2.002	PR-18	15 Winter	5	+0%			100/15 Summer	2	46.008	-0.392	0.000	0.02	0.0		3.1	OK	

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5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	5	+0%			30/15 Summer	9	44.379	-0.319	0.000	0.03	0.0		4.4	OK	
PR-2.004	PR-20	15 Winter	5	+0%			30/15 Summer	12	41.946	-0.242	0.000	0.04	0.0		5.5	OK	
PR-2.005	PR-21	15 Winter	5	+0%			30/15 Summer	14	40.862	-0.208	0.000	0.06	0.0		5.9	OK	
PR-2.006	PR-22	30 Winter	5	+0%			5/15 Summer	26	40.345	-0.185	0.000	0.10	1.2		5.2	FLOOD RISK*	
PR-2.007	PR-23	30 Winter	5	+0%			5/15 Winter	40	40.147	-0.183	0.000	0.13	1.7		5.0	FLOOD RISK*	
PR-1.013	PR-24	60 Winter	5	+0%					40.028	-0.272	0.000	0.01			5.2	OK	
PR-1.014	PR-29	60 Winter	5	+0%				0	39.904	-0.346	0.000	0.01	0.0		5.1	OK	
PR-1.015	PR-28	60 Winter	5	+0%				0	39.780	-0.420	0.000	0.01	0.0		5.2	OK	
PR-3.000	PR-25	15 Summer	5	+0%					39.950	-0.500	0.000	0.00			0.0	OK	
PR-3.001	PR-26	60 Winter	5	+0%				0	39.769	-0.481	0.000	0.00	0.0		0.0	OK	
PR-3.002	PR-27	60 Winter	5	+0%				0	39.782	-0.418	0.000	0.00	0.0		0.3	OK	
PR-1.016	PR-28	60 Winter	5	+0%				0	39.780	-0.120	0.000	0.01	0.0		5.6	FLOOD RISK	
PR-1.017	PR-29	60 Winter	5	+0%					39.628	-0.247	0.000	0.01			5.6	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 22 Number of Time/Area Diagrams 0
Number of Online Controls 23 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Winter	30	+0%					48.557	-0.689	0.000	0.01			5.6	OK	
PR-1.001	PR-2	15 Winter	30	+0%				0	48.235	-0.495	0.000	0.00	0.0		4.8	OK	
PR-1.002	PR-3	15 Winter	30	+0%				0	47.190	-0.523	0.000	0.00	0.0		4.4	OK	
PR-1.003	PR-4	15 Winter	30	+0%				0	46.564	-0.436	0.000	0.00	0.0		5.6	OK	
PR-1.004	PR-5	15 Winter	30	+0%				0	45.619	-0.389	0.000	0.01	0.0		6.1	OK	
PR-1.005	PR-6	30 Winter	30	+0%				0	45.126	-0.430	0.000	0.01	0.0		5.7	OK	
PR-1.006	PR-7	30 Winter	30	+0%				0	44.377	-0.444	0.000	0.00	0.0		5.5	OK	
PR-1.007	PR-8	30 Winter	30	+0%				0	42.913	-0.421	0.000	0.01	0.0		5.8	OK	
PR-1.008	PR-9	30 Winter	30	+0%				0	42.189	-0.398	0.000	0.01	0.0		6.0	OK	
PR-1.009	PR-10	30 Winter	30	+0%				0	41.339	-0.332	0.000	0.01	0.0		6.8	OK	
PR-1.010	PR-11	60 Winter	30	+0%			30/30 Winter	15	40.372	-0.174	0.000	0.02	1.8		5.9	FLOOD RISK*	
PR-1.011	PR-12	60 Winter	30	+0%					40.264	-0.249	0.000	0.03			5.9	OK	
PR-1.012	PR-13	60 Winter	30	+0%	30/60 Winter				40.130	0.027	0.000	0.02			5.7	SURCHARGED*	
PR-2.000	PR-16	15 Summer	30	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	30	+0%				0	47.600	-0.400	0.000	0.02	0.0		2.7	OK	
PR-2.002	PR-18	15 Winter	30	+0%			100/15 Summer	2	46.126	-0.274	0.000	0.04	0.0		5.0	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Winter	30	+0%			30/15 Summer	9	44.518	-0.180	0.000	0.04	1.2		6.2	FLOOD RISK*	
PR-2.004	PR-20	15 Winter	30	+0%			30/15 Summer	12	42.016	-0.172	0.000	0.05	3.5		6.3	FLOOD RISK*	
PR-2.005	PR-21	15 Winter	30	+0%			30/15 Summer	14	40.898	-0.172	0.000	0.07	5.0		6.3	FLOOD RISK*	
PR-2.006	PR-22	15 Winter	30	+0%			5/15 Summer	26	40.362	-0.168	0.000	0.11	7.9		5.6	FLOOD RISK*	
PR-2.007	PR-23	15 Winter	30	+0%			5/15 Winter	40	40.164	-0.166	0.000	0.15	8.2		5.6	FLOOD RISK*	
PR-1.013	PR-24	60 Winter	30	+0%					40.130	-0.170	0.000	0.01			7.0	FLOOD RISK*	
PR-1.014	PR-29	60 Winter	30	+0%				0	39.973	-0.277	0.000	0.01	0.0		6.9	OK	
PR-1.015	PR-28	120 Winter	30	+0%				0	39.821	-0.379	0.000	0.01	0.0		6.6	OK	
PR-3.000	PR-25	15 Summer	30	+0%					39.950	-0.500	0.000	0.00			0.0	OK	
PR-3.001	PR-26	60 Summer	30	+0%				0	39.776	-0.474	0.000	0.00	0.0		0.0	OK	
PR-3.002	PR-27	120 Winter	30	+0%				0	39.823	-0.377	0.000	0.00	0.0		0.4	OK	
PR-1.016	PR-28	120 Winter	30	+0%				0	39.821	-0.079	0.000	0.01	0.0		7.3	FLOOD RISK	
PR-1.017	PR-29	120 Winter	30	+0%					39.629	-0.246	0.000	0.01			7.3	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.500
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 22 Number of Time/Area Diagrams 0
Number of Online Controls 23 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
Region England and Wales Ratio R 0.334 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 200.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 5, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-1.000	PR-1	15 Winter	100	+0%					48.560	-0.686	0.000	0.01			7.3	OK	
PR-1.001	PR-2	15 Winter	100	+0%				0	48.301	-0.429	0.000	0.00	0.0		5.6	OK	
PR-1.002	PR-3	15 Winter	100	+0%				0	47.236	-0.477	0.000	0.00	0.0		5.1	OK	
PR-1.003	PR-4	15 Winter	100	+0%				0	46.629	-0.370	0.000	0.01	0.0		6.3	OK	
PR-1.004	PR-5	30 Winter	100	+0%				0	45.703	-0.305	0.000	0.01	0.0		7.0	OK	
PR-1.005	PR-6	30 Winter	100	+0%				0	45.191	-0.365	0.000	0.01	0.0		6.4	OK	
PR-1.006	PR-7	30 Winter	100	+0%				0	44.438	-0.383	0.000	0.00	0.0		6.2	OK	
PR-1.007	PR-8	60 Winter	100	+0%				0	42.971	-0.363	0.000	0.01	0.0		6.4	OK	
PR-1.008	PR-9	60 Winter	100	+0%				0	42.257	-0.330	0.000	0.01	0.0		6.8	OK	
PR-1.009	PR-10	60 Winter	100	+0%				0	41.422	-0.249	0.000	0.01	0.0		7.5	OK	
PR-1.010	PR-11	60 Winter	100	+0%			30/30 Winter	15	40.411	-0.135	0.000	0.02	6.2		6.4	FLOOD RISK*	
PR-1.011	PR-12	60 Winter	100	+0%					40.383	-0.130	0.000	0.04			7.0	OK	
PR-1.012	PR-13	120 Winter	100	+0%	30/60 Winter				40.235	0.132	0.000	0.03			6.1	SURCHARGED*	
PR-2.000	PR-16	15 Summer	100	+0%					48.500	-0.500	0.000	0.00			0.0	OK	
PR-2.001	PR-17	15 Winter	100	+0%				0	47.625	-0.375	0.000	0.03	0.0		3.4	OK	
PR-2.002	PR-18	15 Winter	100	+0%			100/15 Summer	2	46.211	-0.189	0.000	0.04	0.2		6.1	FLOOD RISK*	

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Woodcoste Grove Ashley Road, Epsom Surrey, KT18 5BW	HTC Northern Access Route South Proposed Model (40%cc)
Date 07/10/2022 File South proposed 40cc.MDX	Designed by BV Checked by WB
Innovyze	Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Havant

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PR-2.003	PR-19	15 Summer	100	+0%			30/15 Summer	9	44.524	-0.174	0.000	0.04	3.2		6.3	FLOOD RISK*	
PR-2.004	PR-20	15 Summer	100	+0%			30/15 Summer	12	42.022	-0.166	0.000	0.05	6.8		6.4	FLOOD RISK*	
PR-2.005	PR-21	15 Winter	100	+0%			30/15 Summer	14	40.906	-0.164	0.000	0.07	9.6		6.4	FLOOD RISK*	
PR-2.006	PR-22	15 Winter	100	+0%			5/15 Summer	26	40.370	-0.160	0.000	0.11	13.5		5.6	FLOOD RISK*	
PR-2.007	PR-23	120 Winter	100	+0%			5/15 Winter	40	40.241	-0.089	0.000	0.11	6.8		4.1	FLOOD RISK*	
PR-1.013	PR-24	120 Winter	100	+0%					40.235	-0.065	0.000	0.02			8.3	FLOOD RISK*	
PR-1.014	PR-29	120 Winter	100	+0%				0	40.056	-0.194	0.000	0.02	0.0		8.1	OK	
PR-1.015	PR-28	120 Winter	100	+0%				0	39.876	-0.324	0.000	0.02	0.0		8.1	OK	
PR-3.000	PR-25	15 Summer	100	+0%					39.950	-0.500	0.000	0.00			0.0	OK	
PR-3.001	PR-26	30 Summer	100	+0%				0	39.776	-0.474	0.000	0.00	0.0		0.1	OK	
PR-3.002	PR-27	120 Winter	100	+0%				0	39.878	-0.322	0.000	0.00	0.0		0.4	OK	
PR-1.016	PR-28	120 Winter	100	+0%				0	39.876	-0.024	0.000	0.01	0.0		8.7	FLOOD RISK	
PR-1.017	PR-29	120 Winter	100	+0%					39.630	-0.245	0.000	0.01			8.7	OK	

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Appendix E. Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.123	Urban	0.000
SAAR (mm)	829	Region Number	Region 7

Results	**l/s**
QBAR Rural	0.7
QBAR Urban	0.7
Q100 years	2.1
Q1 year	0.6
Q30 years	1.5
Q100 years	2.1

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Havant Thicket Detailed Design

Gully Spacing Spreadsheet

Table 1:

Parameter		Value	Unit	Reference
Return Period N		5	years	5 year return period on trunk roads, clause 7.2, HD 33/16
Critical storm duration T		5	minutes	5 minutes suggested as a general guide, Section 5.22, HA 102/17
2 min/45		3.5	mm/hr	See Figure 3, HA 102/17
Climate Change		20	%	Usually 20%, Refer to clause 7.4, HD 33/16
Mannings n		0.017		See table 1, HA 102/17
Gully grating type		R		P, Q, R, S or T. Refer to Table B2, HA 102/17
Time taken for water to travel from the furthest point on the road surface to the kerb, ts		3	minutes	Section 5.23, HA 102/17
Gully pot outlet diameter		150	mm	Section 5.24, HA 102/17
Maintenance factor m		1		Baseline condition m = 1, Roads subject to substantial leaf falls or vehicle spillages =0.8 Sag points on road gradients =0.7, As per Table 2, HA 102/17
Kerb upstand		125	mm	Input from Highway model
Chainage order		Increasing		Eg: Select "Increasing" if HP is at Ch 50 and Lp is at Ch 100. Select "Decreasing" if HP is at 50 and LP is at Ch 10.

Key	
	Data entry required
	Automatically generated cells
	Forced Input
	Final Gully Spacing Result

Notes:

1. Reference for Gully spacing formula is Equation 5.15 of HA 102/17 (where long slope is 1:300 or above
2. Referecne for Gully spacing formula is Section 9(b) & 14.2 of LR 602 (where long slope is below 1:300
3. The coefficient B in the LR 602 formula is calculated using the Table 11 of LR 602
4. Design rainfall intensity calculated as per HA 102/17 + 30% to allow for climate change

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Table 2:

Flow Width Design (Section 5.1, HA 102/17)	
Situation	
Road with hard shoulder	1.5m
Road with hard strip	No encroachment into running lane allowed.
Road adjacent to footway	0.5m

Table 3:

Calculation	Value	unit	Ref
Design rainfall Intensity I	91.428	mm/hr	Eq. 5.13.1, CD 526
Grating parameter Gd	60.000	s/m2	Table A.2, CD 526

Table 4: Design Table

DIRECTION/LOCATION	Start Chainage	End Chainage at which gully should be placed (m)	Required Length (m)	Distance b/w chainages	Width of Carriage way (PAVED) (m)	Equivalent Width (other than Carriage way) (m)	Total Effective Catchment width (m)	Crossfall (at 1m upstream to the gully point) (%)	Crossfall (at 1m upstream to the gully point)	Longfall	Gully Position	Flow Width (m) Ref. Table 2	Water depth against kerb H (m) (Eq. 6, HA 102/17)	Cross sectional area of flow Af (m2) (Eq. 7, HA 102/17)	Hydraulic radius of the channel R (m) (Eq. 8, HA 102/17)	Flow rate Q_i (m3/s) (Eq. 9, HA 102/17)	Efficiency (%) (Eq. 10, HA 102/17)	Theorical Gully Spacing (See Notes 1 & 2 for reference) (m)	Flow Velocity V (m/s) (Sec 5.23 Eq. 16, HA 102/17)	Time along the kerb to gully tg (min) (Sec 5.23 Eq. 16, HA 102/17)	Critical Storm Duration T (min) (Sec 5.23 Eq. 15, HA 102/17)	Critical Storm Check (Sec 5.23 Eq. 15, HA 102/17)	Revised Critical Storm Duration T (min) (Sec 5.23 Eq. 15, HA 102/17)	Revised rainfall Intensity I (mm/hr)	Revised Gully Spacing (m)	Efficiency Check (Section 5.25, HA 102/17)	Lengh check	Flow capacity of Gully pots (Section 5.24, HA 102/17)	Kerb Upstand Check	No. of Gratings (No.)	Suggestion Tracker	Comments / Notes	Total catchment area contrubuting to gully	Goalseek
	189.000	201.000	12.000	12.000	4.696	0.000	4.696	2.490	0.025	0.014	Intermediate	0.669	0.017	0.006	0.008	0.002	94.388	13.060	0.280	0.778	3.778	PASS	3.778	101.627	11.749	PASS	PASS	PASS	PASS	1.000	Gullies	HP	56	-0.251
	201.000	213.000	12.000	12.000	5.107	0.000	5.107	2.500	0.025	0.013	Intermediate	0.706	0.018	0.006	0.009	0.002	93.945	13.060	0.286	0.761	3.761	PASS	3.761	101.794	11.730	PASS	PASS	PASS	PASS	1.000	Gullies		61	-0.270
	213.000	225.000	12.000	12.000	5.419	0.000	5.419	2.500	0.025	0.011	Intermediate	0.746	0.019	0.007	0.009	0.002	93.874	13.059	0.274	0.796	3.796	PASS	3.796	101.456	11.769	PASS	PASS	PASS	PASS	1.000	Gullies		65	-0.231
	225.000	235.000	10.000	10.000	5.741	0.000	5.741	2.490	0.025	0.010	Intermediate	0.734	0.018	0.007	0.009	0.002	94.408	10.884	0.254	0.714	3.714	PASS	3.714	102.267	9.730	PASS	PASS	PASS	PASS	1.000	Gullies		57	-0.270
	235.000	245.000	10.000	10.000	6.124	0.000	6.124	2.500	0.025	0.009	Intermediate	0.766	0.019	0.007	0.009	0.002	94.399	10.883	0.244	0.744	3.744	PASS	3.744	101.966	9.769	PASS	PASS	PASS	PASS	1.000	Gullies		61	-0.241
	245.000	255.000	10.000	10.000	6.492	0.000	6.492	2.500	0.025	0.007	Intermediate	0.808	0.020	0.008	0.010	0.002	94.375	10.883	0.232	0.782	3.782	PASS	3.782	101.592	9.794	PASS	PASS	PASS	PASS	1.000	Gullies		65	-0.206
	255.000	265.000	10.000	10.000	6.739	0.000	6.739	2.490	0.025	0.005	Intermediate	0.875	0.022	0.010	0.011	0.002	94.578	10.884	0.206	0.879	3.879	PASS	3.879	100.650	9.887	PASS	PASS	PASS	PASS	1.000	Gullies		67	-0.113
	265.000	275.000	10.000	10.000	6.750	0.000	6.750	2.490	0.025	0.004	Intermediate	0.931	0.023	0.011	0.011	0.002	94.896	10.884	0.183	0.993	3.993	PASS	3.993	99.570	9.994	PASS	PASS	PASS	PASS	1.000	Gullies		68	-0.006
	275.000	285.000	10.000	10.000	6.750	0.000	6.750	2.490	0.025	0.003	Intermediate	0.818	0.020	0.008	0.010	0.001	96.575	10.475	0.140	1.251	4.251	PASS	4.251	97.260	10.000	PASS	PASS	PASS	PASS	1.000	Gullies		68	0.000
	285.000	295.000	10.000	10.000	6.750	0.000	6.750	2.490	0.025	0.001	Intermediate	0.806	0.020	0.008	0.010	0.001	97.850	10.066	0.089	1.887	4.887	PASS	4.887	92.236	10.000	PASS	PASS	PASS	PASS	1.000	Gullies		68	0.000

Table 4: Design Table

DIRECTION/LOCATION	Start Chainage	End Chainage at which gully should be placed (m)	Required Length (m)	Distance b/w chainages	Width of Carriage way (PAVED) (m)	Equivalent Width (other than Carriage way) (m)	Total Effective Catchment width (m)	Crossfall (at 1m upstream to the gully point) (%)	Crossfall (at 1m upstream to the gully point)	Longfall	Gully Position	Flow Width (m) Ref. Table 2	Water depth against kerb H (m) (Eq. 6, HA 102/17)	Cross sectional area of flow Af (m2) (Eq. 7, HA 102/17)	Hydraulic radius of the channel R (m) (Eq. 8, HA 102/17)	Flow rate Q_i (m3/s) (Eq. 9, HA 102/17)	Efficiency (%) (Eq. 10, HA 102/17)	Revised Gully Spacing (m)	Efficiency Check (Section 5.25, HA 102/17)	Lengh check	Flow capacity of Gully pots (Section 5.24, HA 102/17)	Kerb Upstand Check	No. of Gratings (No.)	Suggestion Tracker	Comments / Notes	Total catchment area contrubuting to gully	Goalseek
	350.000	340.000	10.000	10.000	6.750	0.000	6.750	2.530	0.025	0.002	Intermediate	0.969	0.025	0.012	0.012	0.002	96.871	15.496	PASS	PASS	PASS	PASS	1.000	Gullies	HP	68	5.496
	340.000	330.000	10.000	10.000	6.750	0.000	6.750	2.490	0.025	0.005	Intermediate	0.898	0.022	0.010	0.011	0.002	96.062	10.198	PASS	PASS	PASS	PASS	1.000	Gullies		68	0.198
	330.000	320.000	10.000	10.000	6.750	0.000	6.750	2.490	0.025	0.004	Intermediate	0.817	0.020	0.008	0.010	0.001	96.878	7.151	PASS	PASS	PASS	PASS	1.000	Gullies		68	-2.849
	320.000	310.000	10.000	10.000	6.750	0.000	6.750	2.490	0.025	0.002	Intermediate	0.813	0.020	0.008	0.010	0.001	97.566	9.871	PASS	PASS	PASS	PASS	1.000	Gullies		68	-0.129
	310.000	300.000	10.000	10.000	6.750	0.000	6.750	2.500	0.025	0.001	Intermediate	0.649	0.016	0.005	0.008	0.000	98.922	5.987	PASS	PASS	PASS	PASS	1.000	Gullies		68	-4.013

Havant Thicket Detailed Design

Gully Spacing Spreadsheet

Table 1:

Parameter		Value	Unit	Reference
Return Period N		5	years	5 year return period on trunk roads, clause 7.2, HD 33/16
Critical storm duration T		5	minutes	5 minutes suggested as a general guide, Section 5.22, HA 102/17
2 minM5		3.5	mm/hr	See Figure 3, HA 102/17
Climate Change		20	%	Usually 20%, Refer to clause 7.4, HD 33/16
Mannings n		0.017		See table 1, HA 102/17
Gully grating type		Q		P, Q, R, S or T. Refer to Table B2, HA 102/17
Time taken for water to travel from the furthest point on the road surface to the kerb, ts		3	minutes	Section 5.23, HA 102/17
Gully pot outlet diameter		150	mm	Section 5.24, HA 102/17
Maintenance factor m		1		Baseline condition m = 1, Roads subject to substantial leaf falls or vehicle spillages =0.8 Sag points on road gradients =0.7, As per Table 2, HA 102/17
Kerb upstand		125	mm	Input from Highway model
Chainage order		Decreasing		Eg: Select "Increasing" if HP is at Ch 50 and Lp is at Ch 100. Select "Decreasing" if HP is at 50 and LP is at Ch 10.

Key	
	ata entry requirec
	atically generatec
	Forced Input
	Gully Spacing R

Table 2:

Flow Width Design (Section 5.1, HA 102/17)	
Situation	
Road with hard shoulder	1.5m
Road with hard strip	No encroachment into running lane allowed.
Road adjacent to footway	0.5m

Notes:

1. Reference for Gully spacing formula is Equation 5.15 of HA 102/17 (where long slope is 1:300 or above)
2. Referecne for Gully spacing formula is Section 9(b) & 14.2 of LR 602 (where long slope is below 1:300)
3. The coefficient B in the LR 602 formula is calculated using the Table 11 of LR 602
4. Design rainfall intensity calculated as per HA 102/17 + 30% to allow for climate change
5. Do no delete the rows 27 & 28, drag only from row 28.

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Table 3:

Calculation
Design rainfall Intensity I
Grating parameter Gd

Table 4: Design Table

DIRECTION/LOCATION	Start Chainage	End Chainage at which gully should be placed (m)	Required Length (m)	Distance b/w chainages	Width of Carriage way (PAVED) (m)	Equivalent Width (other than Carriage way) (m)	Total Effective Catchment width (m)	Crossfall (at 1m upstream to the gully point) (%)	Crossfall (at 1m upstream to the gully point)	Longfall	Gully Position	Flow Width (m) Ref. Table 2	Water depth against kerb H (m) (Eq. 6, HA 102/17)	Cross sectional area of flow Af (m2) (Eq. 7, HA 102/17)	Hydraulic radius of the channel R (m) (Eq. 8, HA 102/17)	Flow rate Q_i (m3/s) (Eq. 9, HA 102/17)	Efficiency (%) (Eq. 10, HA 102/17)	Revised Gully Spacing (m)	Efficiency Check (Section 5.25, HA 102/17)	Lengh check	Flow capacity of Gully pots (Section 5.24, HA 102/17)	Kerb Upstand Check	No. of Gratings (No.)	Suggestion Tracker	Comments / Notes	Total catchment area contrubuting to gully	Goalseek
	65.000	35.000	30.000	30.000	4.212	0.000	4.212	2.444	0.024	0.076	Intermediate	0.665	0.016	0.005	0.008	0.003	90.334	30.000	PASS	PASS	PASS	PASS	1.000	Gullies	HP	126	0.000
	35.000	20.000	15.000	15.000	8.357	0.000	8.357	2.500	0.025	0.061	Intermediate	0.731	0.018	0.007	0.009	0.004	89.705	15.000	PASS	PASS	PASS	PASS	1.000	Gullies		125	0.000

1. Reference for Gully spacing formula is Equation 5.15 of HA 102/17 (where long slope is 1:300 or above)
2. Referecne for Gully spacing formula is Section 9(b) & 14.2 of LR 602 (where long slope is below 1:300)
3. The coefficient B in the LR 602 formula is calculated using the Table 11 of LR 602
4. Design rainfall intensity calculated as per HA 102/17 + 30% to allow for climate change
5. Do no delete the rows 27 & 28, drag only from row 28.

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Table 3:

Calculation
Design rainfall Intensity I
Grating parameter Gd

Table 4: Design Table

DIRECTION/LOCATION	Start Chainage	End Chainage at which gully should be placed (m)	Required Length (m)	Distance b/w chainages	Width of Carriage way (PAVED) (m)	Equivalent Width (other than Carriage way) (m)	Total Effective Catchment width (m)	Crossfall (at 1m upstream to the gully point) (%)	Crossfall (at 1m upstream to the gully point)	Longfall	Gully Position	Flow Width (m) Ref. Table 2	Water depth against kerb H (m) (Eq. 6, HA 102/17)	Cross sectional area of flow Af (m2) (Eq. 7, HA 102/17)	Hydraulic radius of the channel R (m) (Eq. 8, HA 102/17)	Flow rate Q_i (m3/s) (Eq. 9, HA 102/17)	Efficiency (%) (Eq. 10, HA 102/17)	Revised Gully Spacing (m)	Efficiency Check (Section 5.25, HA 102/17)	Lengh check	Flow capacity of Gully pots (Section 5.24, HA 102/17)	Kerb Upstand Check	No. of Gratings (No.)	Suggestion Tracker	Comments / Notes	Total catchment area contrubuting to gully	Goalseek
	160.000	125.000	35.000	35.000	3.800	0.250	4.050	2.477	0.025	0.067	Intermediate	0.705	0.017	0.006	0.009	0.004	89.900	35.000	PASS	PASS	PASS	PASS	1.000	Gullies	HP	142	0.000
	125.000	105.000	20.000	20.000	6.916	0.250	7.166	2.490	0.025	0.073	Intermediate	0.720	0.018	0.006	0.009	0.004	89.056	20.000	PASS	PASS	PASS	PASS	1.000	Gullies		143	0.000
	105.000	76.000	29.000	29.000	4.770	0.250	5.020	2.493	0.025	0.073	Intermediate	0.728	0.018	0.007	0.009	0.005	88.837	29.001	PASS	PASS	PASS	PASS	1.000	Gullies		146	0.001
	76.000	63.000	13.000	13.000	3.650	0.250	3.900	2.493	0.025	0.073	Intermediate	0.543	0.014	0.004	0.007	0.002	93.157	13.001	PASS	PASS	PASS	PASS	1.000	Gullies		51	0.001
	63.000	43.000	20.000	20.000	2.830	0.012	2.842	1.796	0.018	0.072	Intermediate	0.622	0.011	0.003	0.005	0.002	93.111	20.000	PASS	PASS	PASS	PASS	1.000	Gullies		57	0.000
	43.000	26.000	17.000	17.000	3.264	0.000	3.264	1.520	0.015	0.069	Intermediate	0.687	0.010	0.004	0.005	0.002	92.884	17.001	PASS	PASS	PASS	PASS	1.000	Gullies		55	0.001

Havant Thicket Detailed Design

Gully Spacing Spreadsheet

Table 1:

Parameter		Value	Unit	Reference
Return Period N		5	years	5 year return period on trunk roads, clause 7.2, HD 33/16
Critical storm duration T		5	minutes	5 minutes suggested as a general guide, Section 5.22, HA 102/17
2 minM5		3.5	mm/hr	See Figure 3, HA 102/17
Climate Change		20	%	Usually 20%, Refer to clause 7.4, HD 33/16
Mannings n		0.017		See table 1, HA 102/17
Gully grating type		Q		P, Q, R, S or T. Refer to Table B2, HA 102/17
Time taken for water to travel from the furthest point on the road surface to the kerb, ts		3	minutes	Section 5.23, HA 102/17
Gully pot outlet diameter		150	mm	Section 5.24, HA 102/17
Maintenance factor m		1		Baseline condition m = 1, Roads subject to substantial leaf falls or vehicle spillages =0.8 Sag points on road gradients =0.7, As per Table 2, HA 102/17
Kerb upstand		125	mm	Input from Highway model
Chainage order		Increasing		Eg: Select "Increasing" if HP is at Ch 50 and Lp is at Ch 100. Select "Decreasing" if HP is at 50 and LP is at Ch 10.

Key	
	ata entry requirec
	atically generatec
	Forced Input
	Gully Spacing R

Table 2:

Flow Width Design (Section 5.1, HA 102/17)	
Situation	
Road with hard shoulder	1.5m
Road with hard strip	No encroachment into running lane allowed.
Road adjacent to footway	0.5m

Notes:

1. Reference for Gully spacing formula is Equation 5.15 of HA 102/17 (where long slope is 1:300 or above)
2. Referecne for Gully spacing formula is Section 9(b) & 14.2 of LR 602 (where long slope is below 1:300)
3. The coefficient B in the LR 602 formula is calculated using the Table 11 of LR 602
4. Design rainfall intensity calculated as per HA 102/17 + 30% to allow for climate change
5. Do no delete the rows 27 & 28, drag only from row 28.

Table 3:

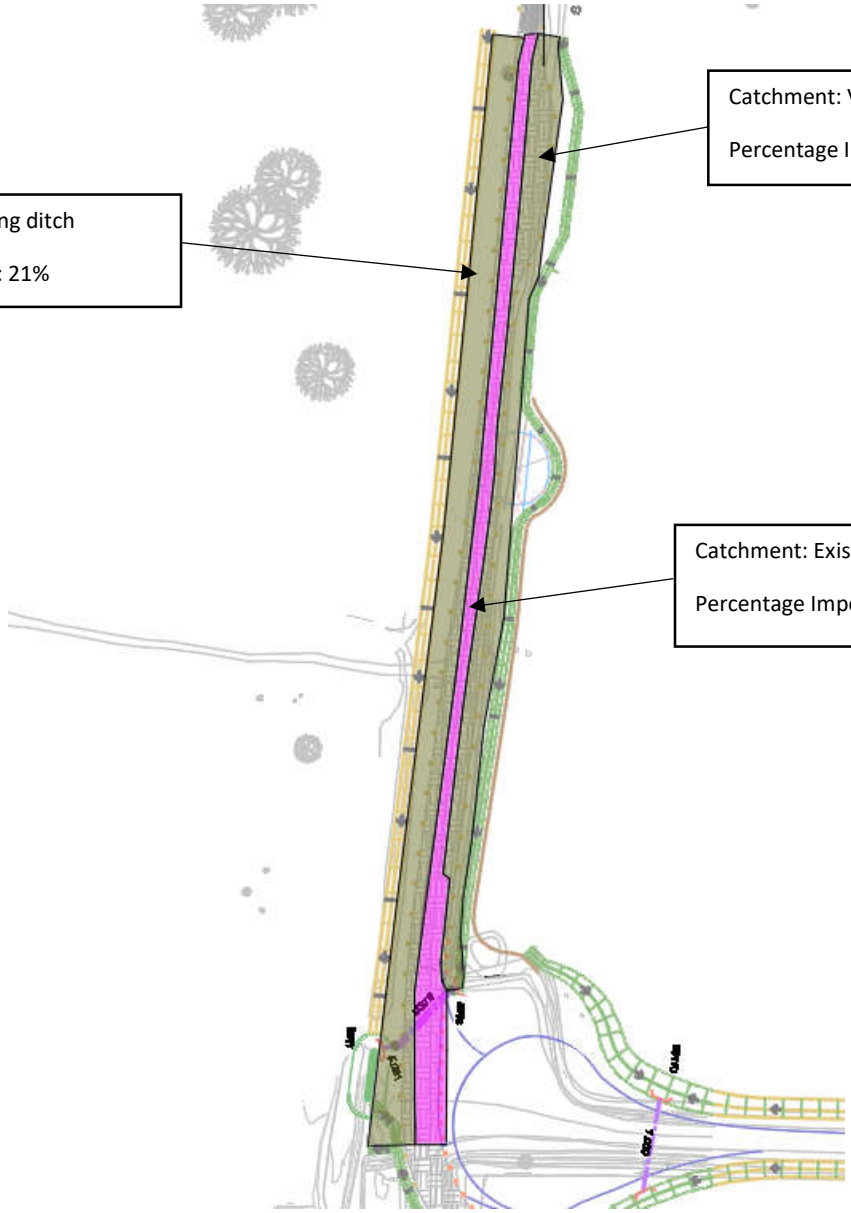
Calculation
Design rainfall Intensity I
Grating parameter Gd

Table 4: Design Table

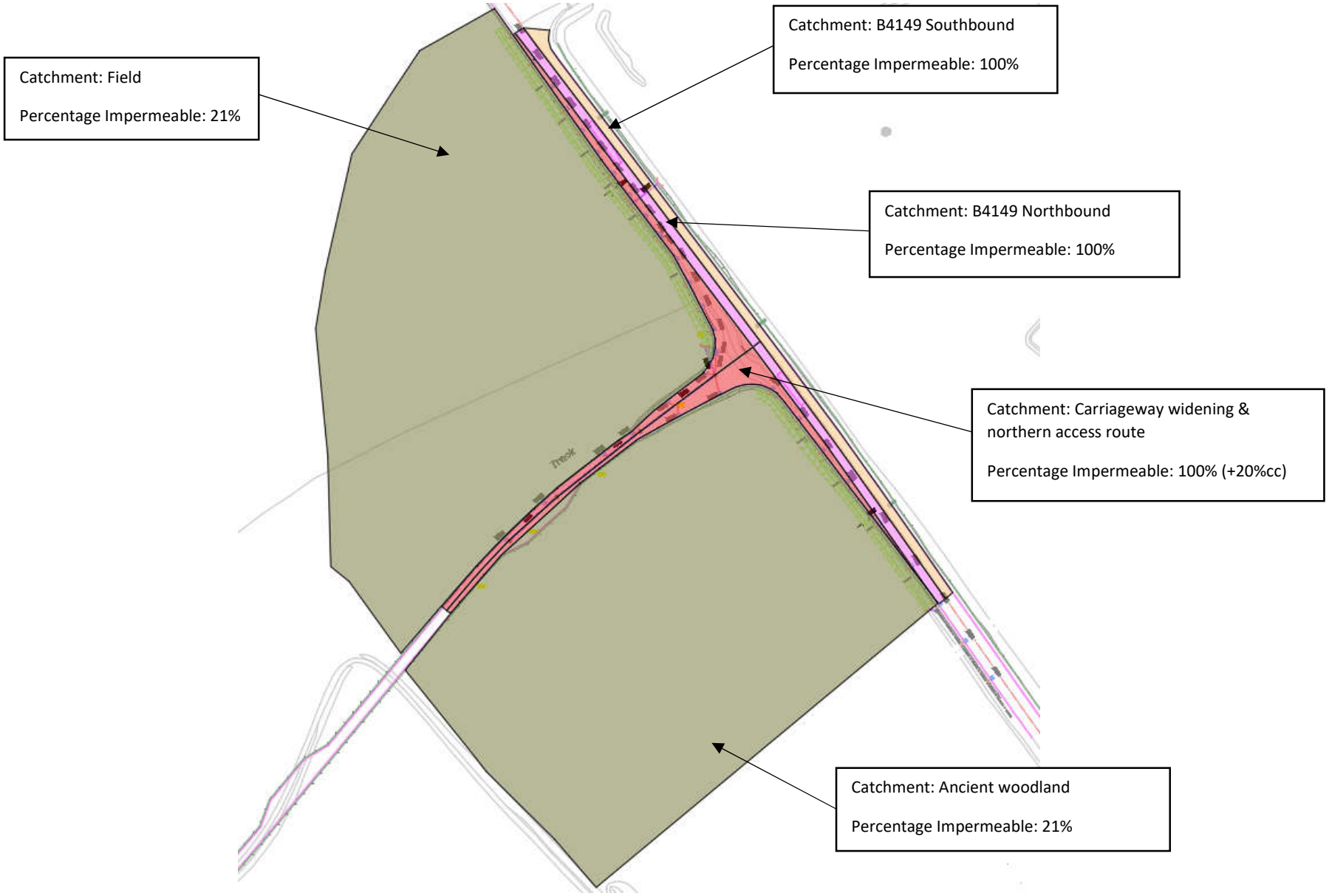
DIRECTION/LOCATION	Start Chainage	End Chainage at which gully should be placed (m)	Required Length (m)	Distance b/w chainages	Width of Carriage way (PAVED) (m)	Equivalent Width (other than Carriage way) (m)	Total Effective Catchment width (m)	Crossfall (at 1m upstream to the gully point) (%)	Crossfall (at 1m upstream to the gully point)	Longfall	Gully Position	Flow Width (m) Ref. Table 2	Water depth against kerb H (m) (Eq. 6, HA 102/17)	Cross sectional area of flow Af (m2) (Eq. 7, HA 102/17)	Hydraulic radius of the channel R (m) (Eq. 8, HA 102/17)	Flow rate Q_f (m3/s) (Eq. 9, HA 102/17)	Efficiency (%) (Eq. 10, HA 102/17)	Revised Gully Spacing (m)	Efficiency Check (Section 5.25, HA 102/17)	Lengh check	Flow capacity of Gully pots (Section 5.24, HA 102/17)	Kerb Upstand Check	No. of Gratings (No.)	Suggestion Tracker	Comments / Notes	Total catchment area contrubuting to gully	Goalseek
	351.000	366.000	15.000	15.000	6.751	0.000	6.751	2.500	0.025	0.003	Intermediate	0.965	0.024	0.012	0.012	0.002	96.573	15.000	PASS	PASS	PASS	PASS	1.000	Gullies	HP	101	0.000
	366.000	381.000	15.000	15.000	6.689	0.000	6.689	2.510	0.025	0.008	Intermediate	0.927	0.023	0.011	0.011	0.003	94.529	15.000	PASS	PASS	PASS	PASS	1.000	Gullies		100	0.000
	381.000	396.000	15.000	15.000	6.400	0.000	6.400	2.550	0.026	0.013	Intermediate	0.826	0.021	0.009	0.010	0.003	94.003	15.001	PASS	PASS	PASS	PASS	1.000	Gullies		96	0.001
	396.000	411.000	15.000	15.000	5.976	0.000	5.976	2.500	0.025	0.019	Intermediate	0.769	0.019	0.007	0.009	0.003	93.809	15.000	PASS	PASS	PASS	PASS	1.000	Gullies		90	0.000
	411.000	431.000	20.000	20.000	5.442	0.000	5.442	2.500	0.025	0.023	Intermediate	0.790	0.020	0.008	0.010	0.003	92.772	20.000	PASS	PASS	PASS	PASS	1.000	Gullies		109	0.000
	431.000	451.000	20.000	20.000	4.700	0.000	4.700	2.490	0.025	0.023	Intermediate	0.759	0.019	0.007	0.009	0.003	93.267	20.000	PASS	PASS	PASS	PASS	1.000	Gullies		94	0.000
	451.000	471.000	20.000	20.000	3.859	0.000	3.859	2.510	0.025	0.023	Intermediate	0.701	0.018	0.006	0.009	0.002	94.054	20.000	PASS	PASS	PASS	PASS	1.000	Gullies		77	0.000
	471.000	491.000	20.000	20.000	3.523	0.000	3.523	2.490	0.025	0.024	Intermediate	0.672	0.017	0.006	0.008	0.002	94.389	20.001	PASS	PASS	PASS	PASS	1.000	Gullies		70	0.001
	491.000	510.000	19.000	19.000	3.500	0.000	3.500	2.500	0.025	0.024	Terminal	0.654	0.016	0.005	0.008	0.002	97.309	19.000	PASS	PASS	PASS	PASS	2.000	Gullies		66	0.000

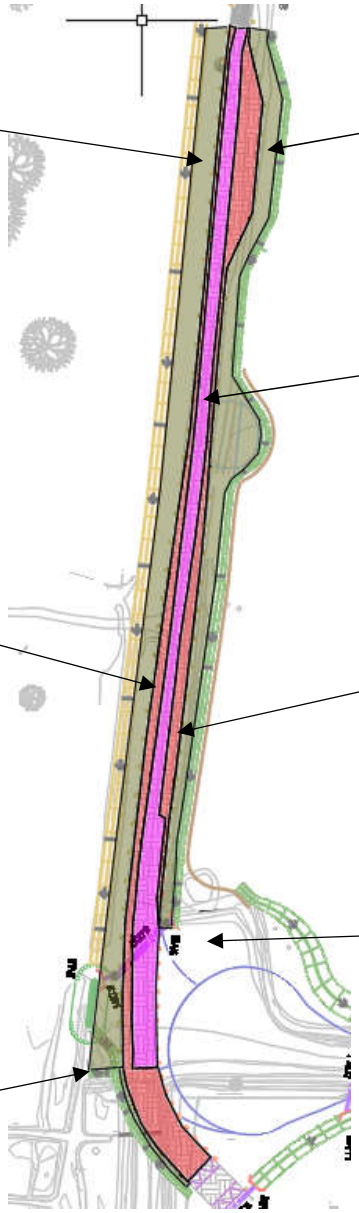
Appendix F. Existing Catchment Plans

Catchment: Field
Percentage Impermeable: 21%
Catchment: B4149 Southbound
Percentage Impermeable: 100%
Catchment: B4149 Northbound
Percentage Impermeable: 100%
Catchment: Ancient woodland (footprint of northern access route)
QBAR applied to allowable rate only (0.7l/s)
Track
Catchment: Ancient woodland
Percentage Impermeable: 21%


Catchment: Verge / existing ditch
Percentage Impermeable: 21%
Catchment: Existing Forestry England track
Percentage Impermeable: 80%
Catchment: Verge / existing ditch
Percentage Impermeable: 21%

Appendix G. Proposed Catchment Plans


Catchment: Field
Percentage Impermeable: 21%
Catchment: B4149 Southbound
Percentage Impermeable: 100%
Catchment: B4149 Northbound
Percentage Impermeable: 100%
Catchment: Carriageway widening & northern access route
Percentage Impermeable: 100% (+20%cc)
Catchment: Ancient woodland
Percentage Impermeable: 21%


Catchment: Verge / existing ditch
Percentage Impermeable: 21%
Catchment: Verge / proposed ditch
Percentage Impermeable: 21%
Catchment: Northern access route (existing Forestry England track footprint)
Percentage Impermeable: 100%
Catchment: Northern access route (widened / additional)
Percentage Impermeable: 100% (+20%cc)
Catchment: Northern access route (widened / additional)
Percentage Impermeable: 100% (+20%cc)
Note: existing Forestry England turning area outside proposed circular turning area to be returned to grass / woodland
Outfall to existing ditch system

Appendix H. Maintenance Schedules

TABLE 16.1 Operation and maintenance requirements for filter drains

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

TABLE 17.1 Operation and maintenance requirements for swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

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