

Project Cornerstone

Drainage Strategy

University of Chichester

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Quality information

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1. Drainage Strategy

In order to prevent any increased surface water or sewer flood risk either to the Site or to adjacent sites due to the Proposed Development, an outline drainage strategy has been developed for the Site. The drainage strategy specifies the mitigation measures that can be used to manage surface water flood risk.

1.1 Background

The NPPF states that as well as assessing risk to a development, an FRA should consider the risk of flooding arising from a development.

Greenfield and undeveloped sites rely on natural drainage to convey or absorb rainfall. In general, site development reduces the permeability of the site, increasing the rate of water running off the site to nearby watercourses, potentially increasing flood risk to downstream areas. Therefore appropriate drainage arrangements are required for new developments to ensure that flood risk to others is not increased.

According to the Flood Risk and Coastal Change Planning Practice Guidance, the surface water arrangements for any development site should be such that the peak flow rates of surface water leaving a developed site are no greater than the rates prior to the Proposed Development, unless specific off-site arrangements are made and result in the same net effect. In addition, surface water arising from a development site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the Proposed Development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account. The following sections of the drainage strategy establish the hydraulic capacity of the existing outfalls that serve the Site and provide details of SuDS that are required to ensure that the Proposed Development will not increase the peak rate of surface water discharged from the Site.

Building Regulations Part H 2015 states that surface water shall be discharged by one of the following methods listed in order of priority:

- a. An adequate soakaway or some other adequate infiltration system: or where that is not reasonably practicable,
- b. a watercourse: or, where that is not reasonable practicable,
- c. a sewer.

Where possible, this hierarchy has been followed as described in the following sections.

1.2 Disposal of surface water via Infiltration

The information contained within the WSP| Parsons Brinckerhoff UK (WSP) Ground Investigation Report (GI) indicates the presence of shallow ground water at approx. 0.55m to 2.54m below ground level. In general the soil types that are typically unsuitable for infiltration features, including Lambeth Clay with overlying superficial deposits and made ground. The GI also included two infiltration tests, both of which stopped at 180 minutes which showed a very slow infiltration rate for the first 20 minutes, showing a reduction in water depth of approx. 30mm, after which no further infiltration or reduction in the water depth was noted. Based on these results the Drainage Strategy will preclude the use of infiltration drainage features.

The surface water drainage strategy has therefore progressed on the basis of providing positive outfalls to suitable existing surface water sewer or watercourse.

1.3 Proposed Discharge Rates and Greenfield Rates

The Proposed Development occupies an area of the existing Chichester University site that is currently undeveloped. It is expected that the existing Site drains via natural processes, with an element of the runoff being absorbed into the ground while the remainder of the runoff is able to escape the Site along paths most conducive to surface water flow. This is generally expected to be from north to south toward an existing surface water ditch which runs along the southern perimeter of the Site. The existing site predominately falls at 1:300 to the south with 1:400 fall towards the eastern perimeter where an existing cut off ditch is present. Both drainage ditches

convey runoff to the southeast corner of the Site where the ditch crosses beneath the B2259 and discharges to the River Lidsey Rife.

Based on the existing site conditions, in order to ensure that the proposed development mimics the existing regime and does not result in an increase in surface water drainage discharged, the proposed discharge rates will be limited to the Greenfield rates.

The total area within the Site boundary is 0.43ha. However the total impermeable drained area is 0.21ha, comprising of a proposed student accommodation building, a lined detention basin, adjacent soft landscaping and a provision for a future accommodation block. The remainder of the Site area will either stay as undeveloped landscaped surfaces or have a negligible surface area therefore will drain to the permeable landscaping and any resultant flows will be intercepted by the existing ditch, as per the undeveloped regime.

Existing Greenfield runoff rates have been calculated for the Site using the Source Control module of MicroDrainage software (ICP SUDS – FSR Method). The model has been subjected to simulated rainfall events for the 1 in 1, 1 in 30 and 1 in 100 year events.

The Greenfield rate calculation results are tabulated in the following table:

Table 1-0: Greenfield Runoff Rates for the Site

Return Period (Years)	Greenfield Runoff Rates (l/s)
1	0.8*
30	2.1*
100	3.0*
QBAR	0.9*

To meet the BREEAM excellent criteria, the proposed runoff rates for the surface water drainage networks must be restricted to the QBAR Greenfield runoff rates. However Section 12, Pol03 of the BREEAM Technical Manual states 'where the limiting discharge flow rate would require a flow rate of less than 5l/s at a discharge point, a flow rate of up to 5l/s may be used where required to reduce the risk of blockage'. Following discussions with Arun District Council, the flow rate of 2 l/s will be adopted to meet their request and exceed the BREEAM requirement. By using a vortex flow control device, the risk of blockage will be minimised as the orifice size will be maximized for the given flow rate.

Details of the calculations are included within Appendix A.

1.4 Proposed Surface Water Infrastructure

A preliminary proposed drainage network has been developed to determine the feasibility of draining the proposed student accommodation buildings and achieving an outfall into the existing surface water ditch located south of the site. A network has not been developed for the future student accommodation building, however the estimated runoff produced by the building area will be included in the attenuation calculations to future proof the drainage strategy.

The networks will be designed to cater for all storms up to and including the 100 year events with an allowance of 40% additional runoff for climate change. The networks will include attenuation in the form of a detention basin to allow the runoff rates to be limited to 2l/s.

The proposed drainage network will include pipes and chambers laid around the perimeter of the proposed building, accepting surface water flows from the rainwater pipes. The network has been designed to allow the appropriate cover to all pipes for protection against expecting loading and the gradients to achieve self-cleansing velocities of at least 1m/s under full bore flow conditions. Drawings included within Appendix B show the indicative layouts of the proposed network.

The surface water flow from the proposed drainage network will be controlled with a vortex flow control chamber to limit the surface water discharged from the site to the rate stated in Section 1.3 above.

As the source of the surface water run off accepted by the proposed drainage network is from roof areas, the use of pollution prevention features is not required. However it is recommended the proposed drainage network includes catchpits downstream of the detention basin to intercept silt, thereby reducing the risk of blockages in the downstream network, particularly the vortex flow control chamber.

The proposed surface water network has been modelled in Micro Drainage applying sufficient attenuation and the results showed that there is no flooding for any of the design storms.

1.5 Attenuation

Attenuation features will be implemented within the drainage networks to achieve the following:

1. Provide sufficient volume to store the balance of runoff between that generated from the critical storm event and the discharge rates set in section 1.3.
2. Provide filtration to the runoff in order to ensure that silt and pollutants are intercepted as far as practicable prior to release of the runoff to offsite sewers.
3. Provide amenity space that encourages residents to use the outdoor space safely.
4. Provide a means to develop the biodiversity credentials of the Site.

Typically the site falls towards the southern boundary with an average gradient of 1:300 and is therefore, favourable to open water features such as swales and detention basins. By utilising a vegetated open water feature the proposed drainage strategy can achieve all the objectives outlined above. From a technical perspective, by incorporating an open water feature the attenuation can be positioned high in the ground allowing the site to achieve an outfall into the very shallow existing surface water ditch.

The total impermeable drained area including the proposed student accommodation, future student accommodation and the proposed basin area has been estimated at 2100m². Using the rate in section 1.3 the attenuation requirement has been calculated providing an approximate volume of up to 164m³ (using Microdrainage software to produce the Hydraulic Model) as detailed in the calculations contained within Appendix A.

This volume is provided within a single detention basin located south of the proposed student accommodation building. The base level of the proposed detention basin has been set at approximately 0.110m AOD to provide sufficient fall from the upstream-proposed network. Low flow channels have been designed to prevent erosion at the inlet and to route the last remaining run-off to the outlet. The level of the low flow channel has been set at 100mm below the bottom of the detention basin.

The proposed drainage network has been modelled using Microdrainage software and shows a water depth of approximately 0.8m in the 1 in 100 year event with climate change creating an associated freeboard of approximately 0.5m assuming an adjacent ground level of 1.300m AOD. Refer to Calculations in Appendix A. The FRA has identified a flood compensation volume of 20m³, with a proposed total depth of 1.30m the basin is capable of attenuating approximately 502.8m³ and there is therefore, adequate capacity within the attenuation pond to contain both displaced floodwater and surface water from the proposed development keeping a freeboard higher than 300mm. For details of the flood compensation volume calculations, refer to the FRA.

The FRA has identified a high groundwater table. It is therefore recommended that the basin will be lined with an impermeable membrane to avoid the ingress of ground water. Any associated earthworks will be designed with average side slopes of 1:4 but no steeper than 1:3 at any point to facilitate access for maintenance as well as use by residents during dry spells. Future design of the detention basin will be progressed in a manner to protect the liner from flotation.

1.6 Maintenance and Adoption

The proposed surface water drainage infrastructure serves one curtilage and therefore is unlikely to be adopted. With this in mind the drainage shall be designed in accordance with Building Regulations Part H and the relevant British Standards to provide drainage systems that are suitable the Proposed Development and can be accessed and maintained as required.

Gullies and linear channels will include sump units to capture silt and reduce the likelihood of blockages further downstream. The chambers at strategic locations along the network will also include sumps. The flow control devices will include bypass doors that can be activated in the event of a blockage.

The detention basin will require maintenance as detailed in the extract from the SuDS Manual below:

TABLE 22.1 Operation and maintenance requirements for detention basins			
22.1	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 bankside, 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		Re-seed 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 re-seeding 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

1.7 Proposed Surface Water Outfall and Offsite Drainage

The proposed drainage network described within Section 1.4 will outfall into an existing surface pipe located southeast of the proposed accommodation building. The connection will be made by construction a new chamber onto the existing pipe as shown on drawing UOCC-ACM-XX-05-DR-DR-00001 within Appendix B. The existing pipe is 300mm diameter laid at 1:300 providing a design capacity of 60l/s. As shown on WSP drawing 0938-D-106-B the existing surface water drainage network is limited via a flow control device upstream of the proposed connection point. WSP drawing 0938-D-106-B indicates the peak flow is restricted to 5l/s. The proposed flow control serving the proposed surface water network restricts to a peak rate of 2l/s, therefore the combined flow through the existing 300mm pipe will be 7l/s peak, confirming that the existing pipe can accept the proposed flows arising from the Proposed Development.

Upon review of the topographical survey, the existing 300mm pipe discharges to an existing surface water ditch located along the southern boundary of the Site. From this outfall it is understood that the existing surface water ditch will convey flows east towards the B2259. It is assumed that the ditch enters a culvert below the B2259,

which then discharges back into a ditch east of the highway. The ditch appears to convey runoff east, ultimately discharging into the River Lidsey Rife.

It is recommended that a survey is undertaken to assess the condition of the existing surface water ditch and the culvert running beneath the B2259 to determine if any remedial works are required to improve capacity and conveyance to reduce the flood risk.

In order to ensure that the hydraulic model used in this drainage strategy is robust a surcharged outfall condition of 1.2m deep has been adopted for the outlet at the ditch. The results of the simulation are included in Appendix A and demonstrate that the attenuation volume, flow control device and the associated pipe network can adequately operate under this outfall condition.

1.8 Foul Water Drainage

1.8.1 Existing Infrastructure

The Site has an existing foul water sewer running from west to east along the southern boundary. At the southeast corner of the Site the existing foul sewer turns south leaving the Proposed Development. The existing foul water pipe is owned by Southern Water therefore consent to connect and a pre development enquiry will be required to confirm the connection point and the capacity of the existing sewer.

1.8.2 Foul Water Discharge Connection Point

The proposed connection point to serve the foul water network is manhole S106/SWFW 4604 which is south of the proposed building at National Grid Reference SZ944996. The existing connection manhole has a cover level of 1.380m and an invert level of 0.180m.

1.8.3 Proposed Infrastructure

The proposed foul drainage network will include pipes and chambers around the perimeter of the proposed building, accepting soil vent pipes (SVP). The network has been designed to allow the appropriate cover to all pipes for protection against expected loading and the gradients to achieve the required self-cleansing velocities. A preliminary assessment of the drainage invert levels and gradients has been undertaken that shows the proposed foul water drainage network can drain via gravity to the existing network on site. Drawings included within Appendix B show the indicative layout of the proposed foul water network.

2. Summary

The Drainage strategy has concluded the following:

- In accordance with the flood risk vulnerability table, the Proposed Development is classified as 'More Vulnerable' and is permitted within Flood Zone 3a therefore requiring a 40% climate change factor.
- The Proposed Development has a high groundwater table therefore infiltration features have not been considered.
- QBAR runoff is 0.9l/s therefore the Proposed Development will use 2l/s, the minimum practical discharge rate via a vortex flow control device.
- The Proposed Development will cause the impermeable area within the Site to be increased. Sustainable Drainage Systems will be required to ensure that the Proposed Development will not cause the peak rate of surface water discharge from the Site to be increased. An outline drainage strategy has been developed in order to demonstrate that sufficient space is available within the development to attenuate within a detention basin and discharge at 2l/s for all events up to and including the 1 in 100 year event with a 40% allowance for climate change. The SuDS features that have been selected include a detention basin in order to maximise opportunities for landscape and ecological enhancement. The attenuated discharge will be conveyed to the provide 300mm pipe southeast of the proposed building.
- The proposed foul drainage network which serves the Proposed Development will include pipes and chambers around the perimeter of the proposed building and will be discharging to S106/SWFW 4604 manhole which is south of the proposed building.

- The proposed detention basin has been designed with additional capacity in order to accept overland flood flows above the design criteria of a 100 year storm event + 40% for climate change. If the capacity of the detention basin were to be exceeded, the ground levels fall from north to south, away from the proposed buildings, directing exceedance flows to an existing ditch along the southern boundary of the Proposed Development. Levels around the proposed buildings should be designed to direct overland flows towards the detention basin.
- A Pre-Planning Enquiry will be required to assess the capacity of the existing foul water sewer.
- Capacity within the existing sewers cannot be reserved, therefore it is recommended that as the Proposed Development and foul water drainage design evolves, Southern Water should be consulted to confirm the acceptability of the proposed rates, capacity of the receiving existing sewer and the most suitable connection location. The same consideration should be given to the surface water connections and capacity checks.

Appendix A Calculations

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Midpoint Alencon Link Basingstoke, RG21 7PP		
Date 03/03/2022 11:25 File	Designed by Borja.Trigueros Checked by	
Innovyze Source Control 2020.1		

ICP SUDS Mean Annual Flood

Input

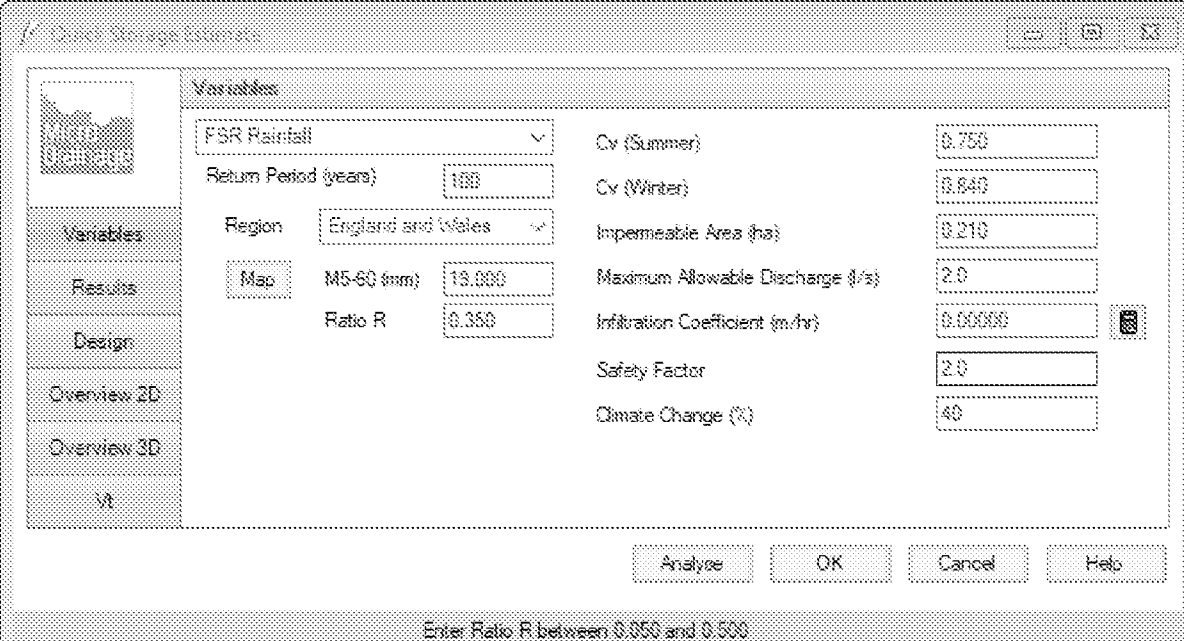
Return Period (years)	100	SAAR (mm)	714	Urban	0.000
Area (ha)	0.267	Soil	0.400	Region Number	Region 6

Results 1/s

QBAR Rural	0.9
QBAR Urban	0.9
Q100 years	3.0
Q1 year	0.8
Q30 years	2.1
Q100 years	3.0

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Project Cornerstone – Quick Storage Calculation

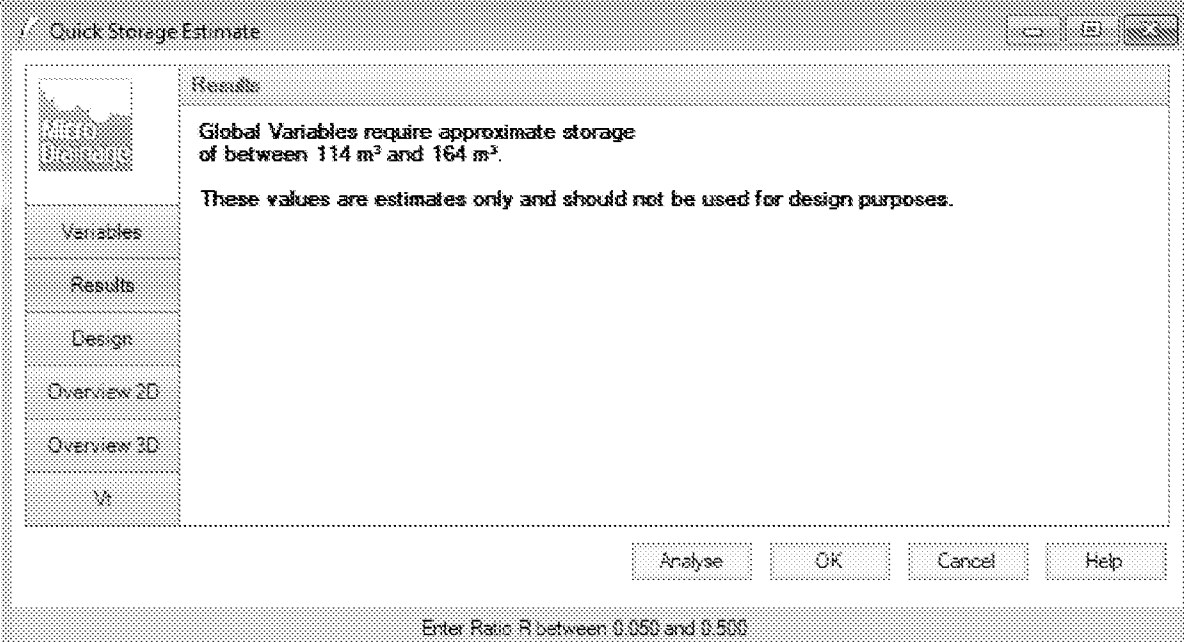


The 'Quick Storage Estimate' dialog box is shown with the 'Variables' tab selected. The left sidebar contains a 'Map' icon and a list of tabs: Variables, Results, Design, Overview 2D, Overview 3D, and Vt. The main area is titled 'Variables' and contains the following fields:

Variable	Value
FSR Rainfall	[Dropdown]
Return Period (years)	100
Region	England and Wales
Map	M5-60 (mm)
Ratio R	0.350
Cv (Summer)	0.750
Cv (Winter)	0.640
Impervious Area (ha)	0.210
Maximum Allowable Discharge (l/s)	2.0
Infiltration Coefficient (m/hr)	0.00000
Safety Factor	2.0
Climate Change (%)	40

Buttons at the bottom: Analyse, OK, Cancel, Help.

Enter Ratio R between 0.050 and 0.500



The 'Quick Storage Estimate' dialog box is shown with the 'Results' tab selected. The left sidebar contains a 'Map' icon and a list of tabs: Variables, Results, Design, Overview 2D, Overview 3D, and Vt. The main area is titled 'Results' and contains the following text:

Global Variables require approximate storage of between 114 m³ and 164 m³.

These values are estimates only and should not be used for design purposes.

Buttons at the bottom: Analyse, OK, Cancel, Help.

Enter Ratio R between 0.050 and 0.500

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File Surface water model_v6.mdx	Checked by	
Innovyze	Network 2020.1	

Existing Network Details for Existing

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	41.423	0.518	80.0	0.027	5.00	0.0	0.600	o	225	Pipe/Conduit
1.001	20.607	0.092	224.0	0.007	0.00	0.0	0.600	o	225	Pipe/Conduit
1.002	15.803	0.070	225.0	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit
1.003	16.872	0.080	210.9	0.000	0.00	0.0	0.600	o	400	Pipe/Conduit
1.004	16.249	0.080	203.1	0.127	0.00	0.0	0.600	o	400	Pipe/Conduit
1.005	7.763	0.052	150.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
1.006	24.541	0.164	150.0	0.014	0.00	0.0	0.600	o	300	Pipe/Conduit
2.000	25.198	0.168	150.0	0.020	1.00	0.0	0.600	o	150	Pipe/Conduit
1.007	15.081	0.101	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
1.008	6.588	0.066	99.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	0.770	0.027	0.0	1.46	58.2
1.001	0.352	0.033	0.0	0.87	34.6
1.002	0.180	0.049	0.0	0.87	34.5
1.003	0.050	0.049	0.0	1.30	162.8
1.004	0.615	0.176	0.0	1.32	166.0
1.005	0.070	0.176	0.0	1.28	90.6
1.006	0.127	0.190	0.0	1.28	90.6
2.000	0.110	0.020	0.0	0.82	14.5
1.007	0.384	0.210	0.0	0.83	14.5
1.008	0.387	0.210	0.0	1.01	17.8

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Manhole Schedules for Existing

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SW01	1.435	0.665	Open Manhole	600	1.000	0.770	225				
SW02	1.435	1.183	Open Manhole	600	1.001	0.753	225	1.000	0.252	225	
SW04	2.750	2.590	Open Manhole	600	1.002	0.160	225	1.001	0.160	225	
INLET	1.300	1.210	Open Manhole	600	1.003	0.090	225	1.002	0.090	225	
Pond (Dummy)	1.300	1.290	Junction		1.004	0.010	400	1.003	0.010	400	
OUTLET	1.300	1.370	Open Manhole	600	1.005	-0.070	300	1.004	-0.070	400	
SW05	1.300	1.422	Open Manhole	600	1.006	-0.122	300	1.005	-0.122	300	
SW06	1.835	1.553	Open Manhole	600	2.000	-0.122	150				
SW07	1.300	1.586	Open Manhole	1800	1.007	-0.286	150	1.006	-0.286	300	
								2.000	-0.286	150	
SW08	2.355	2.437	Open Manhole	1200	1.008	-0.387	150	1.007	-0.387	150	
	2.355	2.503	Open Manhole	1200		OUTFALL		1.008	-0.453	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW01	494415.963	99706.886	494415.963	99706.886	Required	✳
SW02	494382.835	99731.754	494382.835	99731.754	Required	✳
SW04	494369.768	99715.821	494369.768	99715.821	Required	✳
INLET	494376.014	99701.304	494376.014	99701.304	Required	✳
Pond (Dummy)	494384.749	99686.869			No Entry	○
OUTLET	494384.355	99670.624	494384.355	99670.624	Required	✳
SW05	494385.172	99662.905	494385.172	99662.905	Required	✳
SW06	494412.957	99677.991	494412.957	99677.991	Required	✳
SW07	494407.769	99653.333	494407.769	99653.333	Required	✳
SW08	494422.661	99650.947	494422.661	99650.947	Required	✳
	494421.547	99644.454			No Entry	✳

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Area Summary for Existing

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Roof	100	0.007	0.007	0.007
	Classification	Roof	100	0.013	0.013	0.020
	Classification	Roof	100	0.007	0.007	0.027
1.001	Classification	Roof	100	0.007	0.007	0.007
1.002	Classification	Roof	100	0.016	0.016	0.016
1.003	-	-	100	0.000	0.000	0.000
1.004	Classification	Roof	100	0.029	0.029	0.029
	Classification	Roof	100	0.023	0.023	0.052
	Classification	Pond	100	0.064	0.064	0.116
	Classification	Landscape	20	0.026	0.005	0.122
	Classification	Landscape	20	0.028	0.006	0.127
1.005	-	-	100	0.000	0.000	0.000
1.006	Classification	Roof	100	0.014	0.014	0.014
2.000	Classification	Roof	100	0.008	0.008	0.008
	Classification	Roof	100	0.007	0.007	0.015
	Classification	Roof	100	0.005	0.005	0.020
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.254	0.210	0.210

Surcharged Outfall Details for Existing

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		2.050	-0.453	0.000	1200	0
Datum (m)		-0.453 Offset (mins) 0				

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
15	1.200	555	1.200	1095	1.200	1635	1.200	2175	1.200	2715	1.200	3255	1.200	3795	1.200
30	1.200	570	1.200	1110	1.200	1650	1.200	2190	1.200	2730	1.200	3270	1.200	3810	1.200
45	1.200	585	1.200	1125	1.200	1665	1.200	2205	1.200	2745	1.200	3285	1.200	3825	1.200
60	1.200	600	1.200	1140	1.200	1680	1.200	2220	1.200	2760	1.200	3300	1.200	3840	1.200
75	1.200	615	1.200	1155	1.200	1695	1.200	2235	1.200	2775	1.200	3315	1.200	3855	1.200
90	1.200	630	1.200	1170	1.200	1710	1.200	2250	1.200	2790	1.200	3330	1.200	3870	1.200
105	1.200	645	1.200	1185	1.200	1725	1.200	2265	1.200	2805	1.200	3345	1.200	3885	1.200
120	1.200	660	1.200	1200	1.200	1740	1.200	2280	1.200	2820	1.200	3360	1.200	3900	1.200
135	1.200	675	1.200	1215	1.200	1755	1.200	2295	1.200	2835	1.200	3375	1.200	3915	1.200
150	1.200	690	1.200	1230	1.200	1770	1.200	2310	1.200	2850	1.200	3390	1.200	3930	1.200
165	1.200	705	1.200	1245	1.200	1785	1.200	2325	1.200	2865	1.200	3405	1.200	3945	1.200
180	1.200	720	1.200	1260	1.200	1800	1.200	2340	1.200	2880	1.200	3420	1.200	3960	1.200
195	1.200	735	1.200	1275	1.200	1815	1.200	2355	1.200	2895	1.200	3435	1.200	3975	1.200
210	1.200	750	1.200	1290	1.200	1830	1.200	2370	1.200	2910	1.200	3450	1.200	3990	1.200
225	1.200	765	1.200	1305	1.200	1845	1.200	2385	1.200	2925	1.200	3465	1.200	4005	1.200
240	1.200	780	1.200	1320	1.200	1860	1.200	2400	1.200	2940	1.200	3480	1.200	4020	1.200
255	1.200	795	1.200	1335	1.200	1875	1.200	2415	1.200	2955	1.200	3495	1.200	4035	1.200
270	1.200	810	1.200	1350	1.200	1890	1.200	2430	1.200	2970	1.200	3510	1.200	4050	1.200
285	1.200	825	1.200	1365	1.200	1905	1.200	2445	1.200	2985	1.200	3525	1.200	4065	1.200
300	1.200	840	1.200	1380	1.200	1920	1.200	2460	1.200	3000	1.200	3540	1.200	4080	1.200
315	1.200	855	1.200	1395	1.200	1935	1.200	2475	1.200	3015	1.200	3555	1.200	4095	1.200
330	1.200	870	1.200	1410	1.200	1950	1.200	2490	1.200	3030	1.200	3570	1.200	4110	1.200
345	1.200	885	1.200	1425	1.200	1965	1.200	2505	1.200	3045	1.200	3585	1.200	4125	1.200
360	1.200	900	1.200	1440	1.200	1980	1.200	2520	1.200	3060	1.200	3600	1.200	4140	1.200
375	1.200	915	1.200	1455	1.200	1995	1.200	2535	1.200	3075	1.200	3615	1.200	4155	1.200
390	1.200	930	1.200	1470	1.200	2010	1.200	2550	1.200	3090	1.200	3630	1.200	4170	1.200
405	1.200	945	1.200	1485	1.200	2025	1.200	2565	1.200	3105	1.200	3645	1.200	4185	1.200
420	1.200	960	1.200	1500	1.200	2040	1.200	2580	1.200	3120	1.200	3660	1.200	4200	1.200
435	1.200	975	1.200	1515	1.200	2055	1.200	2595	1.200	3135	1.200	3675	1.200	4215	1.200
450	1.200	990	1.200	1530	1.200	2070	1.200	2610	1.200	3150	1.200	3690	1.200	4230	1.200
465	1.200	1005	1.200	1545	1.200	2085	1.200	2625	1.200	3165	1.200	3705	1.200	4245	1.200
480	1.200	1020	1.200	1560	1.200	2100	1.200	2640	1.200	3180	1.200	3720	1.200	4260	1.200
495	1.200	1035	1.200	1575	1.200	2115	1.200	2655	1.200	3195	1.200	3735	1.200	4275	1.200
510	1.200	1050	1.200	1590	1.200	2130	1.200	2670	1.200	3210	1.200	3750	1.200	4290	1.200
525	1.200	1065	1.200	1605	1.200	2145	1.200	2685	1.200	3225	1.200	3765	1.200	4305	1.200
540	1.200	1080	1.200	1620	1.200	2160	1.200	2700	1.200	3240	1.200	3780	1.200	4320	1.200

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Innovyze	Network 2020.1	

Surcharged Outfall Details for Existing

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
4875	1.200	5970	1.200	7065	1.200	8160	1.200	9255	1.200	10350	1.200	11445	1.200	12540	1.200
4890	1.200	5985	1.200	7080	1.200	8175	1.200	9270	1.200	10365	1.200	11460	1.200	12555	1.200
4905	1.200	6000	1.200	7095	1.200	8190	1.200	9285	1.200	10380	1.200	11475	1.200	12570	1.200
4920	1.200	6015	1.200	7110	1.200	8205	1.200	9300	1.200	10395	1.200	11490	1.200	12585	1.200
4935	1.200	6030	1.200	7125	1.200	8220	1.200	9315	1.200	10410	1.200	11505	1.200	12600	1.200
4950	1.200	6045	1.200	7140	1.200	8235	1.200	9330	1.200	10425	1.200	11520	1.200	12615	1.200
4965	1.200	6060	1.200	7155	1.200	8250	1.200	9345	1.200	10440	1.200	11535	1.200	12630	1.200
4980	1.200	6075	1.200	7170	1.200	8265	1.200	9360	1.200	10455	1.200	11550	1.200	12645	1.200
4995	1.200	6090	1.200	7185	1.200	8280	1.200	9375	1.200	10470	1.200	11565	1.200	12660	1.200
5010	1.200	6105	1.200	7200	1.200	8295	1.200	9390	1.200	10485	1.200	11580	1.200	12675	1.200
5025	1.200	6120	1.200	7215	1.200	8310	1.200	9405	1.200	10500	1.200	11595	1.200	12690	1.200
5040	1.200	6135	1.200	7230	1.200	8325	1.200	9420	1.200	10515	1.200	11610	1.200	12705	1.200
5055	1.200	6150	1.200	7245	1.200	8340	1.200	9435	1.200	10530	1.200	11625	1.200	12720	1.200
5070	1.200	6165	1.200	7260	1.200	8355	1.200	9450	1.200	10545	1.200	11640	1.200	12735	1.200
5085	1.200	6180	1.200	7275	1.200	8370	1.200	9465	1.200	10560	1.200	11655	1.200	12750	1.200
5100	1.200	6195	1.200	7290	1.200	8385	1.200	9480	1.200	10575	1.200	11670	1.200	12765	1.200
5115	1.200	6210	1.200	7305	1.200	8400	1.200	9495	1.200	10590	1.200	11685	1.200	12780	1.200
5130	1.200	6225	1.200	7320	1.200	8415	1.200	9510	1.200	10605	1.200	11700	1.200	12795	1.200
5145	1.200	6240	1.200	7335	1.200	8430	1.200	9525	1.200	10620	1.200	11715	1.200	12810	1.200
5160	1.200	6255	1.200	7350	1.200	8445	1.200	9540	1.200	10635	1.200	11730	1.200	12825	1.200
5175	1.200	6270	1.200	7365	1.200	8460	1.200	9555	1.200	10650	1.200	11745	1.200	12840	1.200
5190	1.200	6285	1.200	7380	1.200	8475	1.200	9570	1.200	10665	1.200	11760	1.200	12855	1.200
5205	1.200	6300	1.200	7395	1.200	8490	1.200	9585	1.200	10680	1.200	11775	1.200	12870	1.200
5220	1.200	6315	1.200	7410	1.200	8505	1.200	9600	1.200	10695	1.200	11790	1.200	12885	1.200
5235	1.200	6330	1.200	7425	1.200	8520	1.200	9615	1.200	10710	1.200	11805	1.200	12900	1.200
5250	1.200	6345	1.200	7440	1.200	8535	1.200	9630	1.200	10725	1.200	11820	1.200	12915	1.200
5265	1.200	6360	1.200	7455	1.200	8550	1.200	9645	1.200	10740	1.200	11835	1.200	12930	1.200
5280	1.200	6375	1.200	7470	1.200	8565	1.200	9660	1.200	10755	1.200	11850	1.200	12945	1.200
5295	1.200	6390	1.200	7485	1.200	8580	1.200	9675	1.200	10770	1.200	11865	1.200	12960	1.200
5310	1.200	6405	1.200	7500	1.200	8595	1.200	9690	1.200	10785	1.200	11880	1.200	12975	1.200
5325	1.200	6420	1.200	7515	1.200	8610	1.200	9705	1.200	10800	1.200	11895	1.200	12990	1.200
5340	1.200	6435	1.200	7530	1.200	8625	1.200	9720	1.200	10815	1.200	11910	1.200	13005	1.200
5355	1.200	6450	1.200	7545	1.200	8640	1.200	9735	1.200	10830	1.200	11925	1.200	13020	1.200
5370	1.200	6465	1.200	7560	1.200	8655	1.200	9750	1.200	10845	1.200	11940	1.200	13035	1.200
5385	1.200	6480	1.200	7575	1.200	8670	1.200	9765	1.200	10860	1.200	11955	1.200	13050	1.200
5400	1.200	6495	1.200	7590	1.200	8685	1.200	9780	1.200	10875	1.200	11970	1.200	13065	1.200
5415	1.200	6510	1.200	7605	1.200	8700	1.200	9795	1.200	10890	1.200	11985	1.200	13080	1.200
5430	1.200	6525	1.200	7620	1.200	8715	1.200	9810	1.200	10905	1.200	12000	1.200	13095	1.200
5445	1.200	6540	1.200	7635	1.200	8730	1.200	9825	1.200	10920	1.200	12015	1.200	13110	1.200
5460	1.200	6555	1.200	7650	1.200	8745	1.200	9840	1.200	10935	1.200	12030	1.200	13125	1.200
5475	1.200	6570	1.200	7665	1.200	8760	1.200	9855	1.200	10950	1.200	12045	1.200	13140	1.200
5490	1.200	6585	1.200	7680	1.200	8775	1.200	9870	1.200	10965	1.200	12060	1.200	13155	1.200
5505	1.200	6600	1.200	7695	1.200	8790	1.200	9885	1.200	10980	1.200	12075	1.200	13170	1.200
5520	1.200	6615	1.200	7710	1.200	8805	1.200	9900	1.200	10995	1.200	12090	1.200	13185	1.200
5535	1.200	6630	1.200	7725	1.200	8820	1.200	9915	1.200	11010	1.200	12105	1.200	13200	1.200
5550	1.200	6645	1.200	7740	1.200	8835	1.200	9930	1.200	11025	1.200	12120	1.200	13215	1.200
5565	1.200	6660	1.200	7755	1.200	8850	1.200	9945	1.200	11040	1.200	12135	1.200	13230	1.200
5580	1.200	6675	1.200	7770	1.200	8865	1.200	9960	1.200	11055	1.200	12150	1.200	13245	1.200
5595	1.200	6690	1.200	7785	1.200	8880	1.200	9975	1.200	11070	1.200	12165	1.200	13260	1.200
5610	1.200	6705	1.200	7800	1.200	8895	1.200	9990	1.200	11085	1.200	12180	1.200	13275	1.200
5625	1.200	6720	1.200	7815	1.200	8910	1.200	10005	1.200	11100	1.200	12195	1.200	13290	1.200
5640	1.200	6735	1.200	7830	1.200	8925	1.200	10020	1.200	11115	1.200	12210	1.200	13305	1.200
5655	1.200	6750	1.200	7845	1.200	8940	1.200	10035	1.200	11130	1.200	12225	1.200	13320	1.200
5670	1.200	6765	1.200	7860	1.200	8955	1.200	10050	1.200	11145	1.200	12240	1.200	13335	1.200
5685	1.200	6780	1.200	7875	1.200	8970	1.200	10065	1.200	11160	1.200	12255	1.200	13350	1.200
5700	1.200	6795	1.200	7890	1.200	8985	1.200	10080	1.200	11175	1.200	12270	1.200	13365	1.200
5715	1.200	6810	1.200	7905	1.200	9000	1.200	10095	1.200	11190	1.200	12285	1.200	13380	1.200
5730	1.200	6825	1.200	7920	1.200	9015	1.200	10110	1.200	11205	1.200	12300	1.200	13395	1.200
5745	1.200	6840	1.200	7935	1.200	9030	1.200	10125	1.200	11220	1.200	12315	1.200	13410	1.200
5760	1.200	6855	1.200	7950	1.200	9045	1.200	10140	1.200	11235	1.200	12330	1.200	13425	1.200
5775	1.200	6870	1.200	7965	1.200	9060	1.200	10155	1.200	11250	1.200	12345	1.200	13440	1.200
5790	1.200	6885	1.200	7980	1.200	9075	1.200	10170	1.200	11265	1.200	12360	1.200	13455	1.200
5805	1.200	6900	1.200	7995	1.200	9090	1.200	10185	1.200	11280	1.200	12375	1.200	13470	1.200
5820	1.200	6915	1.200	8010	1.200	9105	1.200	10200	1.200	11295	1.200	12390	1.200	13485	1.200
5835	1.200	6930	1.200	8025	1.200	9120	1.200	10215	1.200	11310	1.200	12405	1.200	13500	1.200
5850	1.200	6945	1.200	8040	1.200	9135	1.200	10230	1.200	11325	1.200	12420			

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Innovyze				Network 2020.1			



Surcharged Outfall Details for Existing

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
14730	1.200	15345	1.200	15960	1.200	16575	1.200	17190	1.200	17805	1.200	18420	1.200	19035	1.200
14745	1.200	15360	1.200	15975	1.200	16590	1.200	17205	1.200	17820	1.200	18435	1.200	19050	1.200
14760	1.200	15375	1.200	15990	1.200	16605	1.200	17220	1.200	17835	1.200	18450	1.200	19065	1.200
14775	1.200	15390	1.200	16005	1.200	16620	1.200	17235	1.200	17850	1.200	18465	1.200	19080	1.200
14790	1.200	15405	1.200	16020	1.200	16635	1.200	17250	1.200	17865	1.200	18480	1.200	19095	1.200
14805	1.200	15420	1.200	16035	1.200	16650	1.200	17265	1.200	17880	1.200	18495	1.200	19110	1.200
14820	1.200	15435	1.200	16050	1.200	16665	1.200	17280	1.200	17895	1.200	18510	1.200	19125	1.200
14835	1.200	15450	1.200	16065	1.200	16680	1.200	17295	1.200	17910	1.200	18525	1.200	19140	1.200
14850	1.200	15465	1.200	16080	1.200	16695	1.200	17310	1.200	17925	1.200	18540	1.200	19155	1.200
14865	1.200	15480	1.200	16095	1.200	16710	1.200	17325	1.200	17940	1.200	18555	1.200	19170	1.200
14880	1.200	15495	1.200	16110	1.200	16725	1.200	17340	1.200	17955	1.200	18570	1.200	19185	1.200
14895	1.200	15510	1.200	16125	1.200	16740	1.200	17355	1.200	17970	1.200	18585	1.200	19200	1.200
14910	1.200	15525	1.200	16140	1.200	16755	1.200	17370	1.200	17985	1.200	18600	1.200	19215	1.200
14925	1.200	15540	1.200	16155	1.200	16770	1.200	17385	1.200	18000	1.200	18615	1.200	19230	1.200
14940	1.200	15555	1.200	16170	1.200	16785	1.200	17400	1.200	18015	1.200	18630	1.200	19245	1.200
14955	1.200	15570	1.200	16185	1.200	16800	1.200	17415	1.200	18030	1.200	18645	1.200	19260	1.200
14970	1.200	15585	1.200	16200	1.200	16815	1.200	17430	1.200	18045	1.200	18660	1.200	19275	1.200
14985	1.200	15600	1.200	16215	1.200	16830	1.200	17445	1.200	18060	1.200	18675	1.200	19290	1.200
15000	1.200	15615	1.200	16230	1.200	16845	1.200	17460	1.200	18075	1.200	18690	1.200	19305	1.200
15015	1.200	15630	1.200	16245	1.200	16860	1.200	17475	1.200	18090	1.200	18705	1.200	19320	1.200
15030	1.200	15645	1.200	16260	1.200	16875	1.200	17490	1.200	18105	1.200	18720	1.200	19335	1.200
15045	1.200	15660	1.200	16275	1.200	16890	1.200	17505	1.200	18120	1.200	18735	1.200	19350	1.200
15060	1.200	15675	1.200	16290	1.200	16905	1.200	17520	1.200	18135	1.200	18750	1.200	19365	1.200
15075	1.200	15690	1.200	16305	1.200	16920	1.200	17535	1.200	18150	1.200	18765	1.200	19380	1.200
15090	1.200	15705	1.200	16320	1.200	16935	1.200	17550	1.200	18165	1.200	18780	1.200	19395	1.200
15105	1.200	15720	1.200	16335	1.200	16950	1.200	17565	1.200	18180	1.200	18795	1.200	19410	1.200
15120	1.200	15735	1.200	16350	1.200	16965	1.200	17580	1.200	18195	1.200	18810	1.200	19425	1.200
15135	1.200	15750	1.200	16365	1.200	16980	1.200	17595	1.200	18210	1.200	18825	1.200	19440	1.200
15150	1.200	15765	1.200	16380	1.200	16995	1.200	17610	1.200	18225	1.200	18840	1.200	19455	1.200
15165	1.200	15780	1.200	16395	1.200	17010	1.200	17625	1.200	18240	1.200	18855	1.200	19470	1.200
15180	1.200	15795	1.200	16410	1.200	17025	1.200	17640	1.200	18255	1.200	18870	1.200	19485	1.200
15195	1.200	15810	1.200	16425	1.200	17040	1.200	17655	1.200	18270	1.200	18885	1.200	19500	1.200
15210	1.200	15825	1.200	16440	1.200	17055	1.200	17670	1.200	18285	1.200	18900	1.200	19515	1.200
15225	1.200	15840	1.200	16455	1.200	17070	1.200	17685	1.200	18300	1.200	18915	1.200	19530	1.200
15240	1.200	15855	1.200	16470	1.200	17085	1.200	17700	1.200	18315	1.200	18930	1.200	19545	1.200
15255	1.200	15870	1.200	16485	1.200	17100	1.200	17715	1.200	18330	1.200	18945	1.200	19560	1.200
15270	1.200	15885	1.200	16500	1.200	17115	1.200	17730	1.200	18345	1.200	18960	1.200	19575	1.200
15285	1.200	15900	1.200	16515	1.200	17130	1.200	17745	1.200	18360	1.200	18975	1.200	19590	1.200
15300	1.200	15915	1.200	16530	1.200	17145	1.200	17760	1.200	18375	1.200	18990	1.200	19605	1.200
15315	1.200	15930	1.200	16545	1.200	17160	1.200	17775	1.200	18390	1.200	19005	1.200	19620	1.200
15330	1.200	15945	1.200	16560	1.200	17175	1.200	17790	1.200	18405	1.200	19020	1.200	19635	1.200

Simulation Criteria for Existing

Volumetric Runoff Coeff	0.840	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	1200
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	10
Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	2	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.000	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.350	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Winter Storm	Duration (mins)	600

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Midpoint Alencon Link Basingstoke, RG21 7PP	Project Cornerstone Surface Water	
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Online Controls for Existing

Hydro-Brake® Optimum Manhole: SW07, DS/PN: 1.007, Volume (m³): 6.1

Unit Reference	MD-SHE-0066-2000-1056-2000	Sump Available	Yes
Design Head (m)	1.056	Diameter (mm)	66
Design Flow (l/s)	2.0	Invert Level (m)	-0.286
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	100
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.056	2.0	Kick-Flo®	0.592	1.5
Flush-Flo™	0.291	1.9	Mean Flow over Head Range	-	1.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	0.600	1.5	1.600	2.4	2.600	3.0	5.000	4.1	7.500	5.0
0.200	1.9	0.800	1.8	1.800	2.6	3.000	3.2	5.500	4.3	8.000	5.1
0.300	1.9	1.000	2.0	2.000	2.7	3.500	3.5	6.000	4.5	8.500	5.3
0.400	1.9	1.200	2.1	2.200	2.8	4.000	3.7	6.500	4.6	9.000	5.4
0.500	1.8	1.400	2.3	2.400	2.9	4.500	3.9	7.000	4.8	9.500	5.5

Non Return Valve Manhole: SW08, DS/PN: 1.008, Volume (m³): 3.0

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Midpoint Alencon Link Basingstoke, RG21 7PP	Project Cornerstone Surface Water	
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Storage Structures for Existing

Tank or Pond Manhole: Pond (Dummy), DS/PN: 1.004

Invert Level (m) 0.010

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	15.0	0.100	20.0	0.101	217.0	0.770	440.0	1.300	644.0

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Midpoint Alencon Link Basingstoke, RG21 7PP	Project Cornerstone Surface Water	
Date 11/03/2022	Designed by BT	
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Innovyze	Network 2020.1	

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

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 Coefficient 0.800
 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 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	SW01	15 Winter	1	+0%					0.806	-0.189	0.000	0.06
1.001	SW02	4320 Winter	1	+0%	30/1440 Winter				0.383	-0.094	0.000	0.00
1.002	SW04	4320 Winter	1	+0%	30/360 Winter				0.383	-0.002	0.000	0.01
1.003	INLET	4320 Winter	1	+0%	30/1440 Winter				0.383	-0.107	0.000	0.00
1.004	Pond (Dummy)	4320 Winter	1	+0%	30/600 Winter				0.383	-0.027	0.000	0.00
1.005	OUTLET	4320 Winter	1	+0%	1/360 Winter				0.384	0.154	0.000	0.00
1.006	SW05	4320 Winter	1	+0%	1/120 Summer				0.385	0.207	0.000	0.00
2.000	SW06	4320 Winter	1	+0%	1/15 Summer				0.386	0.354	0.000	0.01
1.007	SW07	4320 Winter	1	+0%	1/15 Summer				0.386	0.522	0.000	0.01
1.008	SW08	4320 Winter	1	+0%	1/15 Summer				0.384	0.621	0.000	0.00

PN	US/MH Name	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01			3.3	OK	
1.001	SW02			0.1	OK	
1.002	SW04			0.2	OK	
1.003	INLET			0.2	OK	
1.004	Pond (Dummy)			0.4	OK*	
1.005	OUTLET			0.3	SURCHARGED	
1.006	SW05			0.2	SURCHARGED	
2.000	SW06			0.1	SURCHARGED	
1.007	SW07			0.1	SURCHARGED	
1.008	SW08			0.0	SURCHARGED	

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Midpoint Alencon Link Basingstoke, RG21 7PP	Project Cornerstone Surface Water	
Date 11/03/2022	Designed by BT	
File Surface water model_v6.mdx	Checked by	
Innovyze	Network 2020.1	

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

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 Coefficient 0.800
 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 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	SW01	15 Winter	30	+0%					0.828	-0.167	0.000	0.15
1.001	SW02	4320 Winter	30	+0%	30/1440 Winter				0.599	0.122	0.000	0.01
1.002	SW04	4320 Winter	30	+0%	30/360 Winter				0.599	0.214	0.000	0.01
1.003	INLET	4320 Winter	30	+0%	30/1440 Winter				0.599	0.109	0.000	0.00
1.004	Pond (Dummy)	4320 Winter	30	+0%	30/600 Winter				0.599	0.189	0.000	0.05
1.005	OUTLET	4320 Winter	30	+0%	1/360 Winter				0.611	0.381	0.000	0.09
1.006	SW05	4320 Winter	30	+0%	1/120 Summer				0.634	0.456	0.000	0.05
2.000	SW06	4320 Winter	30	+0%	1/15 Summer				0.649	0.617	0.000	0.03
1.007	SW07	4320 Winter	30	+0%	1/15 Summer				0.649	0.785	0.000	0.02
1.008	SW08	4320 Winter	30	+0%	1/15 Summer				0.613	0.850	0.000	0.00

PN	US/MH Name	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01			8.1	OK	
1.001	SW02			0.2	SURCHARGED	
1.002	SW04			0.3	SURCHARGED	
1.003	INLET			0.3	SURCHARGED	
1.004	Pond (Dummy)			6.0	SURCHARGED*	
1.005	OUTLET			5.7	SURCHARGED	
1.006	SW05			3.7	SURCHARGED	
2.000	SW06			0.4	SURCHARGED	
1.007	SW07			0.3	SURCHARGED	
1.008	SW08			0.0	SURCHARGED	

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Midpoint Alencon Link Basingstoke, RG21 7PP	Project Cornerstone Surface Water	
Date 11/03/2022	Designed by BT	
File Surface water model_v6.mdx	Checked by	
Innovyze	Network 2020.1	

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

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 Coefficient 0.800
 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 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia Status ON

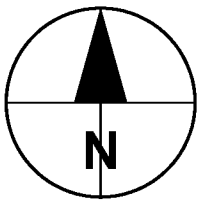
Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	SW01	15 Winter	100	+40%					0.850	-0.145	0.000	0.27
1.001	SW02	4320 Winter	100	+40%	30/1440 Winter				0.780	0.303	0.000	0.01
1.002	SW04	4320 Winter	100	+40%	30/360 Winter				0.780	0.395	0.000	0.02
1.003	INLET	4320 Winter	100	+40%	30/1440 Winter				0.780	0.290	0.000	0.00
1.004	Pond (Dummy)	4320 Winter	100	+40%	30/600 Winter				0.780	0.370	0.000	0.06
1.005	OUTLET	4320 Winter	100	+40%	1/360 Winter				0.793	0.563	0.000	0.11
1.006	SW05	4320 Winter	100	+40%	1/120 Summer				0.817	0.639	0.000	0.06
2.000	SW06	4320 Winter	100	+40%	1/15 Summer				0.831	0.799	0.000	0.04
1.007	SW07	4320 Winter	100	+40%	1/15 Summer				0.831	0.967	0.000	0.06
1.008	SW08	2880 Winter	100	+40%	1/15 Summer				0.751	0.988	0.000	0.05

PN	US/MH Name	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01			14.7	OK	
1.001	SW02			0.4	SURCHARGED	
1.002	SW04			0.6	SURCHARGED	
1.003	INLET			0.6	SURCHARGED	
1.004	Pond (Dummy)			6.9	SURCHARGED*	
1.005	OUTLET			6.7	SURCHARGED	
1.006	SW05			4.5	SURCHARGED	
2.000	SW06			0.5	SURCHARGED	
1.007	SW07			0.8	SURCHARGED	
1.008	SW08			0.8	SURCHARGED	

Appendix B Drawings

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY
AND MUST NOT BE READ AS A CONSTRUCTION ISSUE.
IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO
AMENDMENT DURING FINAL DESIGN DEVELOPMENT.



AECOM

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KEY

- EXISTING FOUL SEWER
- PROPOSED FOUL WATER DRAINAGE MANHOLE
- PROPOSED SURFACE WATER DRAINAGE MANHOLE
- PROPOSED FOUL WATER PIPE
- PROPOSED SURFACE WATER PIPE
- PROPOSED ALTHON HEADWALL OR EQUAL APPROVED
- LIMIT OF DESIGN RESPONSIBILITY
- RAINWATER PIPES
- SOIL VENT PIPES

NOTES

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS AND SPECIFICATION.
- ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN THESE DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ARCHITECT AND / OR THE ENGINEER FOR CLARIFICATION.
- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
- DO NOT SCALE THIS DRAWING.
- ANY CHANGES TO THE LOCATION OF SVPs AND RWP's ARE TO BE PROVIDED TO AECOM AND WILL REQUIRE ADDITIONAL DESIGN INPUT. THIS MAY RESULT IN ADDITIONAL CONSTRUCTION COSTS.
- DRAINAGE CONSTRUCTION WORKS ARE TO BE IN ACCORDANCE WITH BUILDING REGULATIONS PART H.
- WHERE DRAINAGE PIPEWORK IS PLASTIC I.e. PVC-U, IT SHALL BE TO BS EN 1401-1 (CLASS SN4) OSMA OR EQUIVALENT APPROVED.
- ALL CONCRETE PIPEWORK, MANHOLES AND FITTINGS SHALL BE TO BS 5911 (ALL RELEVANT PARTS). LOAD CLASS M UNLESS INDICATED OTHERWISE.
- WHERE DRAINS PASS THROUGH FOUNDATIONS OR CONNECT TO MANHOLES, FLEXIBLE PIPE JOINTS ARE TO BE PROVIDED WITHIN 150mm OF THE FACE OF THE STRUCTURE AND WITHIN A FURTHER 600mm (OR ADEQUATE LENGTH SUBJECT TO PIPE SIZE - SEE DETAIL DRAWINGS) TO FORM A ROCKER PIPE.
- WHERE PIPES PASS THROUGH SCREEN WALLS, FOOTINGS OR RETAINING WALLS, LINTELS ARE TO BE PROVIDED.
- WHERE PIPES ARE IN CLOSE PROXIMITY TO EXISTING OR PROPOSED TREES, TREE ROOT PROTECTION MEMBRANES MAY BE REQUIRED WITHIN DRAINAGE TRENCHES TO AVOID PIPE DAMAGE THROUGH ROOT INGRESS IN ACCORDANCE WITH BUILDING REGULATION PART H.
- TREE ROOT BARRIERS TO BE INSTALLED WITH ALL EXCAVATIONS WHERE TREE ROOTS ARE LIKELY TO AFFECT DRAINAGE INFRASTRUCTURE. TREE ROOT BARRIERS SHALL BE INSTALLED IN ACCORDANCE WITH RECOMMENDATIONS OF SEWERS FOR ADOPTION CLAUSES C8.6 and C3.1.13.
- DRAINAGE IN CLOSE PROXIMITY TO FOUNDATIONS, PIPES WITH A DISTANCE OF LESS THAN 1m HORIZONTALLY OR LESS THAN 150mm VERTICALLY, SHALL BE PROTECTED WITH CLASS 2 BEDDING AND SURROUND IN ACCORDANCE WITH BUILDING REGULATIONS H, DIAGRAM 8.
- IT SHOULD BE NOTED THAT DRAINAGE IS VERY SHALLOW IN AREAS TO ENSURE GRAVITY DISCHARGE.

ISSUE/REVISION

NO	DATE	DESCRIPTION
P03	11.03.2022	UPDATED LAYOUT SECTION 73
P02	07.02.2019	ADC COMMENTS
P01	19.11.2018	DRAINAGE LAYOUT
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

60580070

SHEET TITLE

PROPOSED DRAINAGE LAYOUT

SHEET NUMBER

60580070-ACM-00-00-SHT-C-00001

