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SURFACE WATER DRAINAGE STRATEGY

PROPOSED RESIDENTIAL DEVELOPMENT OFF WIGNALS GATE, HOLBEACH, LINCS.

For D Brown Builders

Issue 2 - July 2018

Introduction

1) New Planning Requirements make it necessary to consider Sustainable Drainage Systems (SuDS) with respect to planning applications of the size and number of dwellings in this instance.

2) It is recognised that the type and scale of this development is what the local planning department is supporting. This being relatively dense use of available land.

3) The site is located to the south of Wignals Gate, and has typical low-lying flat Fenland topography. The proposed development site area is 5.1 hectares.

Discussion

With respect to SuDS, the introduction of a swale/filter drain along the road/pavement was considered. Due to the limited amount of available land and the relatively short length of road, these were considered to be impractical and unreasonable and therefore discounted. Furthermore, the high ground water table and flat topography experienced in the Fenland areas make these features unfeasible. These challenges are highlighted in 'Lincolnshire Development Roads and Sustainable Drainage Design Approach, November 2017 Edition'.

Further thought/discussion was given to providing a permeable road surface throughout and an open stone road base with an impermeable membrane to direct water to the drainage system.

This was considered unworkable since there would be many penetrations in the membrane for the foul sewer and all services.

Furthermore, Lincolnshire County Council would not adopt a permeable road surface in this area due to the high ground water table.

Although an Internal Drainage Board open drain is present to the Eastern side of the site, there is a requirement to minimise rainfall discharge into their system. Consequently the available space for soakaways to accept roof water also needs to be considered.

Ground investigation to determine soil infiltration rates took place on site, the location and results are attached ref 36916/SK02. It can be seen that the soil infiltration rate is poor and although this is acceptable for a 1:10 year event for roof water, soakaways would not be suitable for Lincolnshire County Council 1:30 year event requirement.

With respect to the local plan, it is necessary to provide affordable housing. Consequently, on small sites, it is necessary to have a relatively dense development, giving limited available space for swales, lagoons etc.

Having considered the "Development Road and Sustainable Drainage Specification and Construction". May 2018 Edition, issued by Lincolnshire County Council Highway and Flood Authority, it is clear that the introduction of swales or filter drains, would not comply with the design requirements of the document.

Reference being made to Figure 5/8 Element 12 and Figure 5/12 element 9, where in the Fenland Area the maximum ground water level cannot be achieved, please refer to ground investigation information attached.

Design Proposal

It is intended to discharge surface water from the road only into the existing South Holland Internal Drainage Board system to the east of the site via two separate outfalls.

Both outfalls will have a restricted discharge to 5.0 litres per second via the use of a HydroBrake located in an upstream chamber to the edge of the IDB easement strip. The excess flows over this discharge rate will be stored in the new upstream pipe network, underground storage pipes and open attenuation areas within the public open space.

Surface water from the roofs will be placed in suitable designed soakaways.

Please refer to attached drawing No.d 36916/15 for drainage design and layout of both surface and foul water. This drawing has been prepared in conjunction with MicroDrainage design calculations, also attached.

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Green Area = 0.198ha
Proposed 1:30yr Design Flow 40.1 l/s
Flow Restricted & Attenuated To 5.0 l/s

Purple Area = 0.266ha
Proposed 1:30yr Design Flow 54.1 l/s
Flow Restricted & Attenuated To 5.0 l/s

Approx. Dyke IL 0.700
New Outfall IL 1.223

Approx. Dyke IL 0.700
New Outfall IL 1.312

Chamber To Be Fitted With HydroBrake To Restrict Flows To 5.0 l/s

Chamber To Be Fitted With HydroBrake To Restrict Flows To 5.0 l/s

Attenuation Area Volume = 320m³ @ 0.8m Depth

Attenuation Area Volume = 150m³ @ 0.5m Depth

Existing FW Ref: 7501 CL 3.042 IL -0.500

Existing SW Ref: 7501 CL 3.083 IL 1.153

New F01 IL -0.350 TBC

DYKE Deep unable to obtain bottom level approx 2.2m deep

9m IDB easement

Soft landscaping screening

Soft landscaping

Public Open Space

SUB STATION

WIGNALS GATE

GRASS

TARMAC

TRACK

CULVERT

DYKE

Key:
- Existing Foul Sewer
- Proposed Surface Sewer
- Proposed Foul Sewer
- F01 Proposed Foul Manhole
- Proposed Highway Drain
- HO1 Proposed Highway Manhole
- Proposed Highway Gully
- 3.67 Existing Site Level
- 3.400 Proposed Site Level
- HP Proposed High Point
- LP Proposed Low Point

ALL DRAINAGE FOR PRIVATE ACCESS ROADS, ROOF WATER & DRIVEWAYS TO DISCHARGE TO PRIVATE SOAKAWAYS LOCATED IN REAR GARDENS

Phase 1 (31 dwellings)

Phase 2 (34 dwellings)

Phase 3 (12 dwellings)

Rev	Date	Remarks
A	24.07.18	Refuse Collection Points Added.

Status: FOR PLANNING

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Project: Proposed Residential Development off Wignals Gate, Holbeach, Lincs. For D Brown Builders

Title: Proposed Drainage Strategy

Date	Jul. '18	Scale	1:500	@A1
Drawn	MP	Checked	SRC	
Design	SRC	File Name	36916-15	

DRG No. 36916/15 Rev A

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	75	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm at outfall (pipe 1.006)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.112	4-8	0.152	8-12	0.002

Total Area Contributing (ha) = 0.266

Total Pipe Volume (m³) = 37.015

Time Area Diagram at outfall (pipe 5.006)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.092	4-8	0.105

Total Area Contributing (ha) = 0.198

Total Pipe Volume (m³) = 6.215

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design

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)

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	25.863	0.172	150.4	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	24.652	0.164	150.3	0.030	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	39.506	0.263	150.0	0.054	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	22.790	0.091	250.4	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	11.707	0.052	225.1	0.011	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	10.833	0.049	223.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	24.199	0.161	150.3	0.028	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	16.563	0.110	150.6	0.027	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	30.535	0.204	149.7	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.003	31.894	0.128	250.0	0.053	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.004	37.095	0.148	250.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	40.487	0.162	249.9	0.019	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	33.007	0.066	500.1	0.000	5.00	0.0	0.600	o	900	Pipe/Conduit	
4.001	4.306	0.017	253.3	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	11.344	0.076	149.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	75.00	5.53	2.400	0.019	0.0	0.0	0.0	0.82	14.4	3.9
1.001	75.00	6.03	2.228	0.049	0.0	0.0	0.0	0.82	14.4	9.9
1.002	75.00	6.65	1.989	0.103	0.0	0.0	0.0	1.07	42.4	20.9
2.000	75.00	5.38	1.742	0.000	0.0	0.0	0.0	0.99	69.9	0.0
1.003	75.00	6.84	1.651	0.114	0.0	0.0	0.0	1.04	73.8	23.1
1.004	75.00	7.01	1.596	0.114	0.0	0.0	0.0	1.05	74.1	23.1
3.000	75.00	5.49	2.475	0.028	0.0	0.0	0.0	0.82	14.4	5.6
3.001	75.00	5.83	2.314	0.054	0.0	0.0	0.0	0.82	14.4	11.0
3.002	75.00	6.31	2.129	0.080	0.0	0.0	0.0	1.07	42.4	16.3
3.003	75.00	6.85	1.850	0.133	0.0	0.0	0.0	0.99	70.0	27.1
3.004	75.00	7.47	1.722	0.133	0.0	0.0	0.0	0.99	70.0	27.1
1.005	75.00	8.15	1.550	0.266	0.0	0.0	0.0	0.99	70.0	54.1
4.000	75.00	5.39	1.472	0.000	0.0	0.0	0.0	1.39	887.0	0.0
4.001	75.00	5.46	1.406	0.000	0.0	0.0	0.0	1.13	125.2	0.0
1.006	75.00	8.38	1.388	0.266	0.0	0.0	0.0	0.82	14.5«	54.1

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.000	21.353	0.142	150.4	0.059	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	29.896	0.199	150.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.002	16.163	0.108	149.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.000	24.438	0.163	149.9	0.048	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.003	7.006	0.040	175.2	0.041	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.004	32.613	0.186	175.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.000	45.947	0.306	150.2	0.049	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.005	18.107	0.072	251.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.000	10.122	0.040	253.1	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit	
5.006	11.842	0.079	149.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.000	75.00	5.44	2.200	0.059	0.0	0.0	0.0	0.82	14.4	11.9
5.001	75.00	6.04	2.058	0.059	0.0	0.0	0.0	0.82	14.4	11.9
5.002	75.00	6.37	1.859	0.059	0.0	0.0	0.0	0.82	14.5	11.9
6.000	75.00	5.50	1.914	0.048	0.0	0.0	0.0	0.82	14.5	9.8
5.003	75.00	6.49	1.676	0.148	0.0	0.0	0.0	0.98	39.2	30.1
5.004	75.00	7.04	1.636	0.148	0.0	0.0	0.0	0.98	39.1	30.1
7.000	75.00	5.94	1.831	0.049	0.0	0.0	0.0	0.82	14.5	10.0
5.005	75.00	7.35	1.375	0.198	0.0	0.0	0.0	0.99	69.8	40.1
8.000	75.00	5.17	1.343	0.000	0.0	0.0	0.0	0.98	69.5	0.0
5.006	75.00	7.59	1.302	0.198	0.0	0.0	0.0	0.82	14.5«	40.1

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	3.150	2.400	0.600	Open Manhole	1200
1.001	o	150	2	3.000	2.228	0.622	Open Manhole	1200
1.002	o	225	3	2.825	1.989	0.611	Open Manhole	1200
2.000	o	300	4	2.150	1.742	0.108	Open Manhole	1200
1.003	o	300	4	2.750	1.651	0.799	Open Manhole	1200
1.004	o	300	5	2.800	1.596	0.904	Open Manhole	1200
3.000	o	150	6	3.350	2.475	0.725	Open Manhole	1200
3.001	o	150	7	3.160	2.314	0.696	Open Manhole	1200
3.002	o	225	8	3.050	2.129	0.696	Open Manhole	1200
3.003	o	300	9	2.850	1.850	0.700	Open Manhole	1200
3.004	o	300	10	3.090	1.722	1.068	Open Manhole	1200
1.005	o	300	6	2.925	1.550	1.075	Open Manhole	1200
4.000	o	900	12	3.000	1.472	0.628	Open Manhole	1800
4.001	o	375	13	3.000	1.406	1.219	Open Manhole	1800
1.006	o	150	12	3.000	1.388	1.462	Open Manhole	1350

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)
1.000	25.863	150.4	2	3.000	2.228	0.622	Open Manhole	1200
1.001	24.652	150.3	3	2.825	2.064	0.611	Open Manhole	1200
1.002	39.506	150.0	4	2.750	1.726	0.799	Open Manhole	1200
2.000	22.790	250.4	4	2.750	1.651	0.799	Open Manhole	1200
1.003	11.707	225.1	5	2.800	1.599	0.901	Open Manhole	1200
1.004	10.833	223.0	6	2.925	1.547	1.078	Open Manhole	1200
3.000	24.199	150.3	7	3.160	2.314	0.696	Open Manhole	1200
3.001	16.563	150.6	8	3.050	2.204	0.696	Open Manhole	1200
3.002	30.535	149.7	9	2.850	1.925	0.700	Open Manhole	1200
3.003	31.894	250.0	10	3.090	1.722	1.068	Open Manhole	1200
3.004	37.095	250.0	6	2.925	1.574	1.051	Open Manhole	1200
1.005	40.487	249.9	12	3.000	1.388	1.312	Open Manhole	1350
4.000	33.007	500.1	13	3.000	1.406	0.694	Open Manhole	1800
4.001	4.306	253.3	12	3.000	1.389	1.236	Open Manhole	1350
1.006	11.344	149.3		3.000	1.312	1.538	Open Manhole	0

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.000	o	150	16	3.100	2.200	0.750	Open Manhole	1200
5.001	o	150	17	3.225	2.058	1.017	Open Manhole	1200
5.002	o	150	18	3.140	1.859	1.131	Open Manhole	1200
6.000	o	150	19	2.875	1.914	0.811	Open Manhole	1200
5.003	o	225	19	3.050	1.676	1.149	Open Manhole	1200
5.004	o	225	20	3.100	1.636	1.239	Open Manhole	1200
7.000	o	150	22	3.000	1.831	1.019	Open Manhole	1200
5.005	o	300	21	3.300	1.375	1.625	Open Manhole	1200
8.000	o	300	24	2.000	1.343	0.357	Open Manhole	1200
5.006	o	150	22	3.000	1.302	1.548	Open Manhole	1200

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)
5.000	21.353	150.4	17	3.225	2.058	1.017	Open Manhole	1200
5.001	29.896	150.2	18	3.140	1.859	1.131	Open Manhole	1200
5.002	16.163	149.7	19	3.050	1.751	1.149	Open Manhole	1200
6.000	24.438	149.9	19	3.050	1.751	1.149	Open Manhole	1200
5.003	7.006	175.2	20	3.100	1.636	1.239	Open Manhole	1200
5.004	32.613	175.3	21	3.300	1.450	1.625	Open Manhole	1200
7.000	45.947	150.2	21	3.300	1.525	1.625	Open Manhole	1200
5.005	18.107	251.5	22	3.000	1.303	1.397	Open Manhole	1200
8.000	10.122	253.1	22	3.000	1.303	1.397	Open Manhole	1200
5.006	11.842	149.9		3.000	1.223	1.627	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.019	0.019	0.019
1.001	User	-	100	0.030	0.030	0.030
1.002	User	-	100	0.054	0.054	0.054
2.000	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.011	0.011	0.011
1.004	-	-	100	0.000	0.000	0.000
3.000	User	-	100	0.028	0.028	0.028
3.001	User	-	100	0.027	0.027	0.027
3.002	User	-	100	0.026	0.026	0.026
3.003	User	-	100	0.053	0.053	0.053
3.004	-	-	100	0.000	0.000	0.000
1.005	User	-	100	0.019	0.019	0.019
4.000	-	-	100	0.000	0.000	0.000
4.001	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.059	0.059	0.059
5.001	-	-	100	0.000	0.000	0.000
5.002	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.048	0.048	0.048
5.003	User	-	100	0.041	0.041	0.041
5.004	-	-	100	0.000	0.000	0.000
7.000	User	-	100	0.049	0.049	0.049
5.005	-	-	100	0.000	0.000	0.000
8.000	-	-	100	0.000	0.000	0.000
5.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.464	0.464	0.464

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006		3.000	1.312	1.400	0	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
5.006		3.000	1.223	1.300	0	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 12, DS/PN: 1.006, Volume (m³): 5.4

Unit Reference	MD-SHE-0103-5000-1200-5000
Design Head (m)	1.200
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	103
Invert Level (m)	1.388
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	5.0
Flush-Flo™	0.354	5.0
Kick-Flo®	0.745	4.0
Mean Flow over Head Range	-	4.4

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)
0.100	3.4	1.200	5.0	3.000	7.7	7.000	11.5
0.200	4.7	1.400	5.4	3.500	8.3	7.500	11.8
0.300	5.0	1.600	5.7	4.000	8.8	8.000	12.2
0.400	5.0	1.800	6.0	4.500	9.3	8.500	12.6
0.500	4.9	2.000	6.3	5.000	9.8	9.000	12.9
0.600	4.7	2.200	6.6	5.500	10.2	9.500	13.3
0.800	4.1	2.400	6.9	6.000	10.7		
1.000	4.6	2.600	7.2	6.500	11.1		

Hydro-Brake® Optimum Manhole: 22, DS/PN: 5.006, Volume (m³): 3.7

Unit Reference	MD-SHE-0103-5000-1200-5000
Design Head (m)	1.200
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	103
Invert Level (m)	1.302
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: 22, DS/PN: 5.006, Volume (m³): 3.7

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	5.0
Flush-Flo™	0.354	5.0
Kick-Flo®	0.745	4.0
Mean Flow over Head Range	-	4.4

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)
0.100	3.4	1.200	5.0	3.000	7.7	7.000	11.5
0.200	4.7	1.400	5.4	3.500	8.3	7.500	11.8
0.300	5.0	1.600	5.7	4.000	8.8	8.000	12.2
0.400	5.0	1.800	6.0	4.500	9.3	8.500	12.6
0.500	4.9	2.000	6.3	5.000	9.8	9.000	12.9
0.600	4.7	2.200	6.6	5.500	10.2	9.500	13.3
0.800	4.1	2.400	6.9	6.000	10.7		
1.000	4.6	2.600	7.2	6.500	11.1		

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS 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, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	1	+0%	100/15 Summer			
1.001	2	15 Winter	1	+0%	30/15 Summer			
1.002	3	15 Winter	1	+0%	30/60 Summer			
2.000	4	60 Winter	1	+0%	30/15 Summer	30/30 Summer		
1.003	4	60 Winter	1	+0%	30/15 Summer	30/120 Summer		
1.004	5	60 Winter	1	+0%	30/15 Summer	30/120 Summer		
3.000	6	15 Winter	1	+0%	100/15 Summer			
3.001	7	15 Winter	1	+0%	30/15 Summer			
3.002	8	15 Winter	1	+0%	100/15 Summer			
3.003	9	15 Winter	1	+0%	30/30 Summer	100/120 Summer		
3.004	10	15 Winter	1	+0%	30/15 Summer	100/180 Summer		
1.005	6	60 Winter	1	+0%	30/15 Summer	30/120 Summer		
4.000	12	60 Winter	1	+0%	30/120 Summer	100/1440 Summer		
4.001	13	60 Winter	1	+0%	30/15 Summer	100/180 Winter		
1.006	12	60 Winter	1	+0%	1/15 Summer	30/120 Summer		
5.000	16	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
5.001	17	15 Winter	1	+0%	30/15 Summer			
5.002	18	30 Winter	1	+0%	1/30 Winter			
6.000	19	30 Winter	1	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	2.444	-0.106	0.000	0.18		2.5	OK	
1.001	2	2.296	-0.082	0.000	0.42		5.8	OK	
1.002	3	2.072	-0.142	0.000	0.29		11.6	OK	
2.000	4	1.790	-0.252	0.000	0.00		0.1	OK	37
1.003	4	1.790	-0.161	0.000	0.13		7.5	OK	20
1.004	5	1.788	-0.108	0.000	0.12		7.2	OK	15
3.000	6	2.528	-0.097	0.000	0.26		3.6	OK	
3.001	7	2.388	-0.076	0.000	0.49		6.5	OK	
3.002	8	2.203	-0.151	0.000	0.23		9.2	OK	
3.003	9	1.949	-0.201	0.000	0.23		14.8	OK	
3.004	10	1.819	-0.203	0.000	0.23		14.6	OK	
1.005	6	1.787	-0.063	0.000	0.24		15.3	OK	20
4.000	12	1.780	-0.592	0.000	0.00		0.5	OK	
4.001	13	1.780	-0.001	0.000	0.04		2.8	OK	
1.006	12	1.780	0.242	0.000	0.38		5.0	SURCHARGED	29
5.000	16	2.282	-0.068	0.000	0.56		7.6	OK	5
5.001	17	2.137	-0.071	0.000	0.54		7.4	OK	
5.002	18	2.026	0.017	0.000	0.44		5.9	SURCHARGED	
6.000	19	2.024	-0.040	0.000	0.36		4.9	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.003	19	30 Winter	1	+0%	1/15 Summer				2.018
5.004	20	30 Winter	1	+0%	1/15 Summer				2.049
7.000	22	30 Winter	1	+0%	1/30 Winter				2.011
5.005	21	120 Summer	1	+0%	1/15 Summer				2.112
8.000	24	30 Winter	1	+0%	1/15 Summer	1/30 Winter			1.999
5.006	22	120 Summer	1	+0%	1/15 Summer	30/120 Summer			2.309

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.003	19	0.117	0.000	0.49		14.5	SURCHARGED	
5.004	20	0.188	0.000	0.38		13.8	SURCHARGED	
7.000	22	0.030	0.000	0.35		5.0	SURCHARGED	
5.005	21	0.437	0.000	0.13		7.8	SURCHARGED	
8.000	24	0.356	0.325	0.09		4.8	FLOOD	40
5.006	22	0.857	0.000	0.38		5.0	SURCHARGED	25

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS 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, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	30	+0%	100/15 Summer			
1.001	2	15 Winter	30	+0%	30/15 Summer			
1.002	3	480 Winter	30	+0%	30/60 Summer			
2.000	4	480 Winter	30	+0%	30/15 Summer	30/30 Summer		
1.003	4	480 Winter	30	+0%	30/15 Summer	30/120 Summer		
1.004	5	480 Summer	30	+0%	30/15 Summer	30/120 Summer		
3.000	6	15 Winter	30	+0%	100/15 Summer			
3.001	7	15 Winter	30	+0%	30/15 Summer			
3.002	8	60 Winter	30	+0%	100/15 Summer			
3.003	9	480 Winter	30	+0%	30/30 Summer	100/120 Summer		
3.004	10	180 Summer	30	+0%	30/15 Summer	100/180 Summer		
1.005	6	480 Winter	30	+0%	30/15 Summer	30/120 Summer		
4.000	12	120 Summer	30	+0%	30/120 Summer	100/1440 Summer		
4.001	13	120 Summer	30	+0%	30/15 Summer	100/180 Winter		
1.006	12	480 Winter	30	+0%	1/15 Summer	30/120 Summer		
5.000	16	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
5.001	17	15 Winter	30	+0%	30/15 Summer			
5.002	18	60 Winter	30	+0%	1/30 Winter			
6.000	19	60 Winter	30	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	2.472	-0.078	0.000	0.45		6.2	OK	
1.001	2	2.397	0.019	0.000	1.06		14.5	SURCHARGED	
1.002	3	2.343	0.129	0.000	0.09		3.7	SURCHARGED	
2.000	4	2.166	0.124	18.408	0.12		7.6	FLOOD	37
1.003	4	2.751	0.800	1.858	0.18		10.9	FLOOD	20
1.004	5	2.800	0.904	1.086	0.10		5.8	FLOOD	15
3.000	6	2.572	-0.053	0.000	0.62		8.5	OK	
3.001	7	2.511	0.047	0.000	1.21		16.2	SURCHARGED	
3.002	8	2.283	-0.071	0.000	0.33		13.2	OK	
3.003	9	2.340	0.190	0.000	0.08		5.2	SURCHARGED	
3.004	10	2.859	0.837	0.000	0.17		10.9	FLOOD RISK	
1.005	6	2.926	1.076	2.551	0.12		8.0	FLOOD	20
4.000	12	2.430	0.058	0.000	0.00		2.3	SURCHARGED	
4.001	13	2.442	0.661	0.000	0.12		9.7	SURCHARGED	
1.006	12	3.002	1.464	4.293	0.40		5.2	FLOOD	29
5.000	16	2.608	0.258	0.000	1.19		16.2	SURCHARGED	5
5.001	17	2.488	0.280	0.000	0.92		12.8	SURCHARGED	
5.002	18	2.401	0.392	0.000	0.62		8.4	SURCHARGED	
6.000	19	2.398	0.334	0.000	0.51		7.0	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.003	19	120 Winter	30	+0%	1/15 Summer				2.452
5.004	20	120 Winter	30	+0%	1/15 Summer				2.553
7.000	22	60 Summer	30	+0%	1/30 Winter				2.355
5.005	21	120 Winter	30	+0%	1/15 Summer				2.919
8.000	24	60 Winter	30	+0%	1/15 Summer	1/30 Winter			2.024
5.006	22	480 Summer	30	+0%	1/15 Summer	30/120 Summer			3.001

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.003	19	0.551	0.000	0.48		14.3	SURCHARGED	
5.004	20	0.692	0.000	0.37		13.8	SURCHARGED	
7.000	22	0.374	0.000	0.54		7.6	SURCHARGED	
5.005	21	1.244	0.000	0.31		18.7	SURCHARGED	
8.000	24	0.381	24.718	0.20		10.9	FLOOD	40
5.006	22	1.549	1.370	0.38		5.0	FLOOD	25

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS 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, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	100	+30%	100/15 Summer			
1.001	2	15 Winter	100	+30%	30/15 Summer			
1.002	3	1440 Summer	100	+30%	30/60 Summer			
2.000	4	2160 Summer	100	+30%	30/15 Summer	30/30 Summer		
1.003	4	1440 Summer	100	+30%	30/15 Summer	30/120 Summer		
1.004	5	2160 Summer	100	+30%	30/15 Summer	30/120 Summer		
3.000	6	15 Winter	100	+30%	100/15 Summer			
3.001	7	15 Winter	100	+30%	30/15 Summer			
3.002	8	60 Summer	100	+30%	100/15 Summer			
3.003	9	1440 Summer	100	+30%	30/30 Summer	100/120 Summer		
3.004	10	180 Summer	100	+30%	30/15 Summer	100/180 Summer		
1.005	6	1440 Winter	100	+30%	30/15 Summer	30/120 Summer		
4.000	12	1440 Summer	100	+30%	30/120 Summer	100/1440 Summer		
4.001	13	1440 Summer	100	+30%	30/15 Summer	100/180 Winter		
1.006	12	2160 Summer	100	+30%	1/15 Summer	30/120 Summer		
5.000	16	15 Winter	100	+30%	30/15 Summer	100/15 Summer		
5.001	17	60 Summer	100	+30%	30/15 Summer			
5.002	18	120 Summer	100	+30%	1/30 Winter			
6.000	19	15 Winter	100	+30%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	2.846	0.296	0.000	0.61		8.4	SURCHARGED	
1.001	2	2.787	0.409	0.000	1.40		19.2	FLOOD RISK	
1.002	3	2.603	0.389	0.000	0.07		3.0	FLOOD RISK	
2.000	4	2.292	0.250	146.451	0.15		9.0	FLOOD	37
1.003	4	2.753	0.802	6.644	0.13		7.9	FLOOD	20
1.004	5	2.801	0.905	8.101	0.11		6.4	FLOOD	15
3.000	6	2.917	0.292	0.000	0.91		12.5	SURCHARGED	
3.001	7	2.790	0.326	0.000	1.84		24.7	SURCHARGED	
3.002	8	2.650	0.296	0.000	0.51		20.4	SURCHARGED	
3.003	9	2.786	0.636	0.268	0.06		3.9	FLOOD	
3.004	10	3.023	1.001	0.086	0.30		19.5	FLOOD	
1.005	6	2.927	1.077	7.889	0.14		9.0	FLOOD	20
4.000	12	2.859	0.487	0.673	0.00		1.0	FLOOD	
4.001	13	2.879	1.098	0.970	0.11		8.6	FLOOD	
1.006	12	3.004	1.466	9.371	0.39		5.2	FLOOD	29
5.000	16	3.102	0.752	1.658	1.43		19.5	FLOOD	5
5.001	17	2.956	0.748	0.000	1.02		14.2	FLOOD RISK	
5.002	18	2.755	0.746	0.000	0.79		10.6	SURCHARGED	
6.000	19	2.874	0.810	0.000	1.35		18.5	FLOOD RISK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
5.003	19	180 Winter	100	+30%	1/15 Summer			
5.004	20	180 Summer	100	+30%	1/15 Summer			
7.000	22	15 Winter	100	+30%	1/30 Winter			
5.005	21	960 Summer	100	+30%	1/15 Summer			
8.000	24	1440 Summer	100	+30%	1/15 Summer	1/30 Winter		
5.006	22	480 Summer	100	+30%	1/15 Summer	30/120 Summer		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.003	19	2.764	0.863	0.000	0.70		21.0	FLOOD RISK	
5.004	20	2.871	1.010	0.000	0.66		24.4	FLOOD RISK	
7.000	22	2.890	0.909	0.000	1.47		20.7	FLOOD RISK	
5.005	21	3.049	1.374	0.000	0.14		8.1	FLOOD RISK	
8.000	24	2.309	0.666	317.235	0.08		4.4	FLOOD	40
5.006	22	3.002	1.550	4.591	0.38		5.0	FLOOD	25

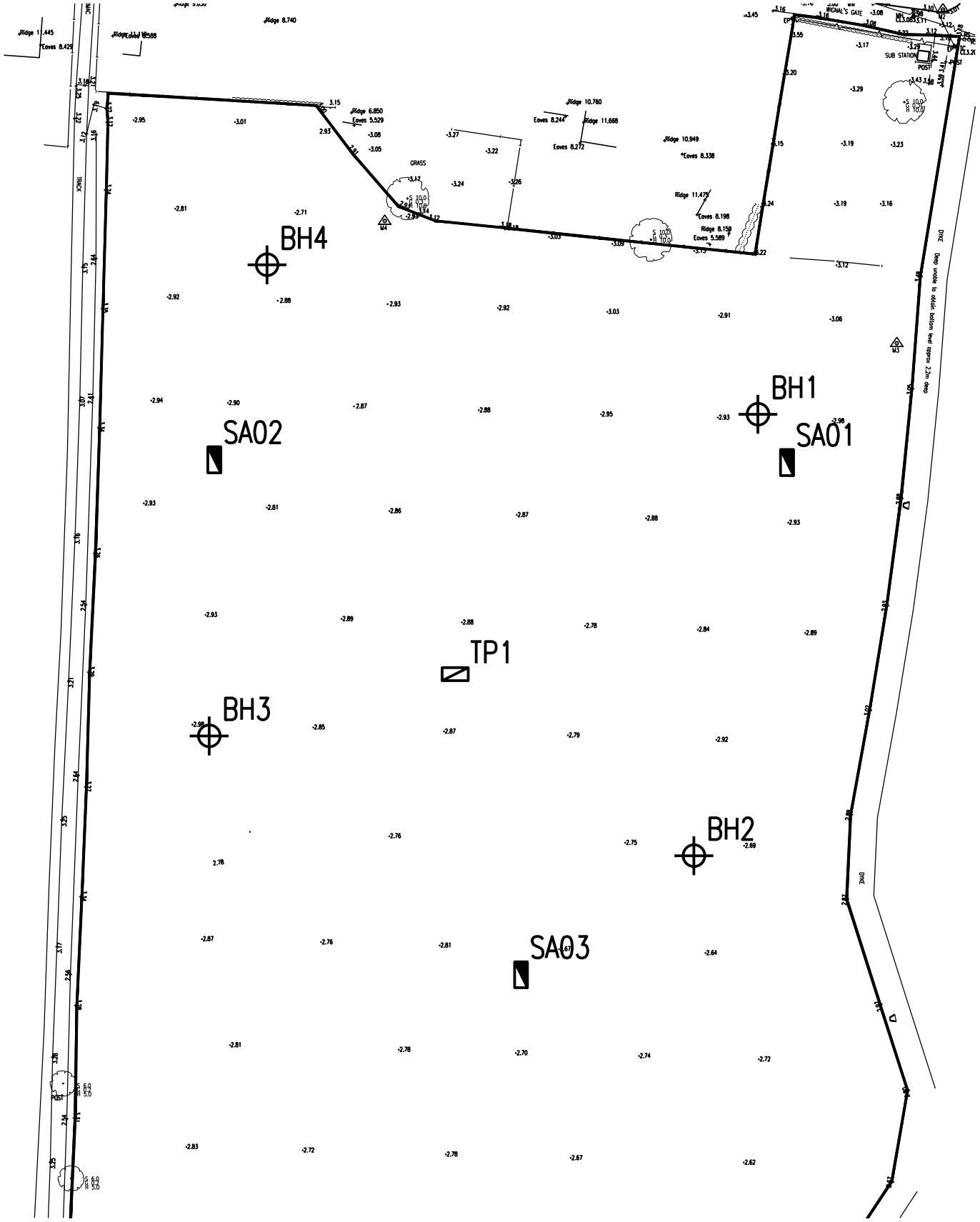
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Sheet No. 36916/SK02				Rev -	
Status FOR INFORMATION					
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale	1:1250	Design	SRC	File Name	36916-SK02

Project: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Title: Plan Showing Ground Investigation Trial Locations



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Sheet No. 36916/BH01					Rev -
Status	FOR INFORMATION				
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale		Design	-	File Name	36916-BH01

Location: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Carried Out For: D Brown Builders

Date Undertaken: 22/03/18

Logged By: MP

Equipment & Methods
100mmø HandAuger
Mackintosh Probe

Site Coordinates:

Ground Level:

Borehole No. 1

Description	Reduced Level	Legend	Depth (Thick)	Samples Depth	Samples Sample Reference	Samples Sample Type	Samples Sample No.	Test Required	M.P.T. Blow Count (Depth)
Topsoil.			450mm						
Mid Brown Moist Fine Sandy Silt.			1200mm (750mm)						0.6m Below G.L. 92 Blows For 300mm Movement
Orangey Brown Moist Silty Sand, Becoming Coarser With Depth.			1700mm (500mm)						1.55m Below G.L. 100 Blows For 230mm Movement
Brown Wet Silty Sand.			1900mm (200mm)						

Remarks
Standing Water @ 1.6m.
Borehole Terminated @ 1.9m Due To Collapse/Strata Washing Out.

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Sheet No. 36916/BH02					Rev -
Status	FOR INFORMATION				
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale		Design	-	File Name	36916-BH02

Location: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Carried Out For: D Brown Builders

Date Undertaken: 22/03/18

Logged By: MP

Equipment & Methods
100mmø HandAuger
Mackintosh Probe

Site Coordinates:

Ground Level:

Borehole No. 2

Description	Reduced Level	Legend	Depth (Thick)	Samples: Depth	Samples: Sample Reference	Samples: Sample Type	Samples: Sample No.	Test Required	M.P.T. Blow Count (Depth)
Topsoil.			450mm						
Orangey Brown Moist Sandy Silt.			1100mm (650mm)						0.6m Below G.L. 103 Blows For 300mm Movement 0.9m Below G.L. 97 Blows For 300mm Movement
Mid Brown Moist Silty Fine Sand, Becoming Sandier With Depth. Very Moist.			2100mm (1000mm)						1.2m Below G.L. 96 Blows For 300mm Movement 1.5m Below G.L. 96 Blows For 300mm Movement
Brown/Grey Wet Silt/Coarse Sand.			2300mm (200mm)						

Remarks
Standing Water @ 1.6m After 1 Hour.
Borehole Terminated @ 2.3m Due To Collapse/Strata Washing Out.

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Sheet No. 36916/BH03					Rev -
Status	FOR INFORMATION				
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale		Design	-	File Name	36916-BH03

Location: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Carried Out For: D Brown Builders

Date Undertaken: 22/03/18

Logged By: MP

Equipment & Methods
100mmø HandAuger
Mackintosh Probe

Site Coordinates:

Ground Level:

Borehole No. 3

Description	Reduced Level	Legend	Depth (Thick)	Samples Depth	Samples Sample Reference	Samples Sample Type	Samples Sample No.	Test Required	M.P.T. Blow Count (Depth)
Topsoil.			500mm						
Orangey Brown Moist Sandy Silt.			1200mm (700mm)						0.6m Below G.L. 123 Blows For 300mm Movement 0.9m Below G.L. 62 Blows For 300mm Movement 1.2m Below G.L.
Orangey Brown Very Moist Silty Sand, Becoming Wetter & Coarser With Depth. @ 1700mm Black Inclusions With Tiny Shells.			2100mm (900mm)						45 Blows For 300mm Movement
Dark Brown Very Wet Silty Sand.			2300mm (200mm)						

Remarks
Standing Water @ 1.4m After 1 Hour.
Borehole Terminated @ 2.3m Due To Collapse/Strata Washing Out.

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Sheet No. 36916/BH04					Rev -
Status	FOR INFORMATION				
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale		Design	-	File Name	36916-BH04

Location: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Carried Out For: D Brown Builders

Date Undertaken: 22/03/18

Logged By: MP

Equipment & Methods
100mmø HandAuger
Mackintosh Probe

Site Coordinates:

Ground Level:

Borehole No. 4

Description	Reduced Level	Legend	Depth (Thick)	Samples Depth	Samples Sample Reference	Samples Sample Type	Samples Sample No.	Test Required	M.P.T. Blow Count (Depth)
Topsoil.			500mm						
Orangey Moist Sand / Silt.			900mm (400mm)						0.6m Below G.L. 104 Blows For 300mm Movement 0.9m Below G.L.
Orangey Moist Silty Sand.			1200mm (300mm)						70 Blows For 300mm Movement 1.2m Below G.L.
Brown Very Moist Fine Sandy Silt.			1600mm (400mm)						34 Blows For 300mm Movement
Brown Wet Sandy Silt.			1800mm (200mm)						

Remarks

Standing Water @ 1.3m After 1 Hour.
Borehole Terminated @ 1.8m Due To Collapse/Strata Washing Out.

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Sheet No. 36916/TP01					Rev -
Status	FOR INFORMATION				
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale	-	Design	-	File Name	36916-TP01

Location: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Carried Out For: D Brown Builders

Date Undertaken: 22/03/18

Logged By: MP

Equipment & Methods

Site Coordinates:

Ground Level:

Trial Pit No. 1

Description	Reduced Level	Legend	Depth (Thick)
Topsoil.			500mm
Mid Brown Moist Fine Sandy Silt.			1200mm (700mm)
Orangey Brown Moist Silty Sand.			2200mm (1000mm)
Very Moist Firm Grey Clayey Silt. Becoming Clayier With Depth.			2900mm (700mm)

Remarks

Trial Pit Terminated @ 2.9m.

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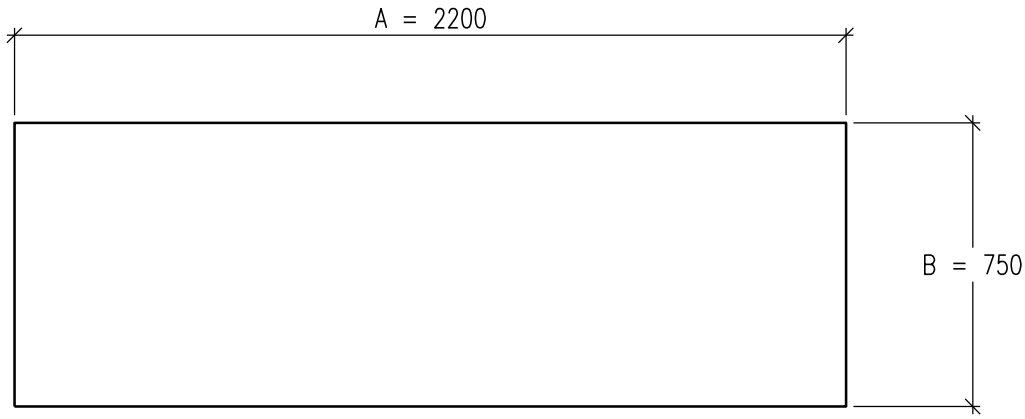
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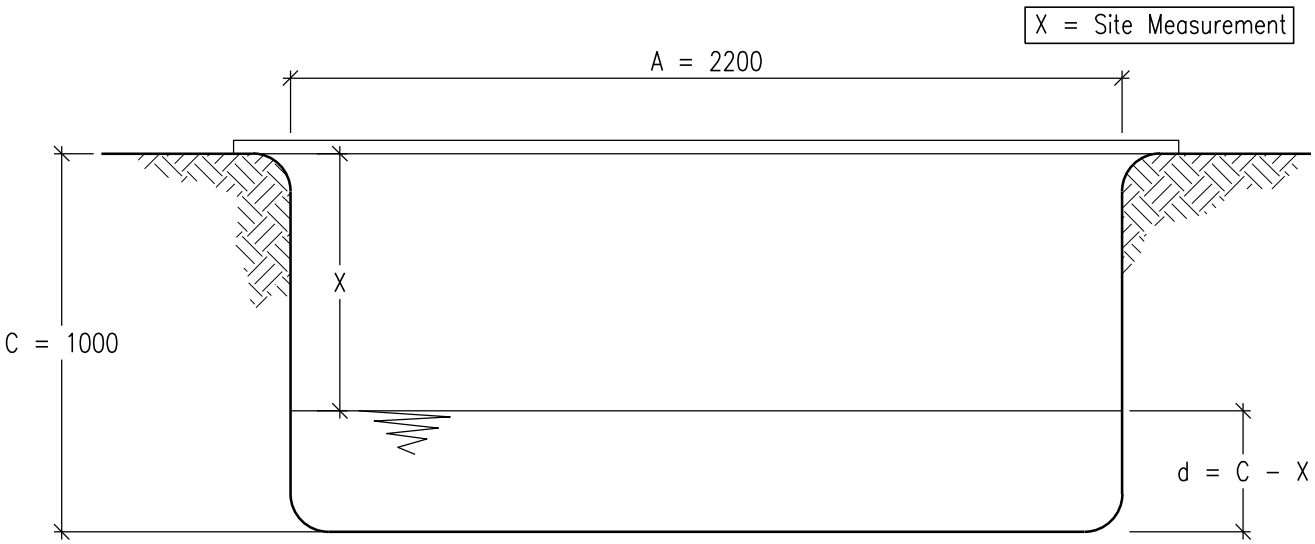
Sheet No. 36916/SA01					Rev -
Status	FOR INFORMATION				
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale	1:20	Design	-	File Name	36916-SA01

Project: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Title: Infiltration Soak Away Sketch



Plan On SA01



Section Through SA01

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Soak-Away Test SA01

Job Reference Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

SA01	
TIME (Mins)	DEPTH mm (d)
0	320
10	310
40	305
70	290
110	290
145	280
180	270
215	260
275	255
320	240

Job No. 36916

Date 22/03/2018

Trial Dimensions

A =	2.2	m
B =	0.75	m
C =	1	m

C.S.Area of SA01 = 1.65 m^2

Total Volume =	0.132	m^3
75% Volume =	0.099	m^3
25%Volume =	0.033	m^3

Time Taken From 75% Volume to 25% Volume

172 Mins

Effective Depth From 75% Volume to 25% Volume

0.04 m

50% Effective Internal Surface Area Including Base area

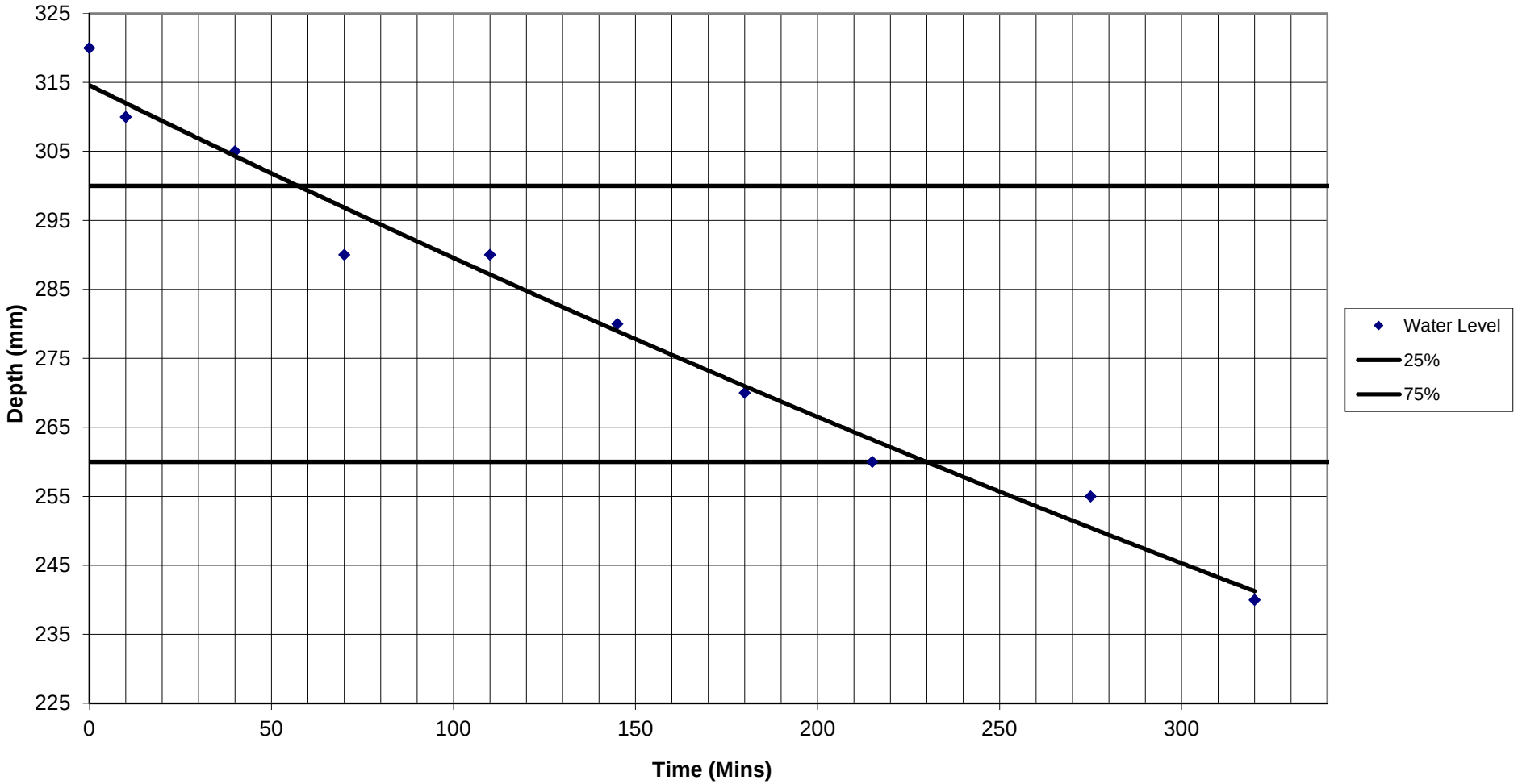
1.886 m^2

Soil Infiltration rate, f

3.39096E-06 m/s

3.39 x 10^ - 3 mm/s

Proposed Residential Development off Wignals Gate, Holbeach, Lincs.
Job No. 36916 22/03/18
Plot showing water level aginst time for SA01

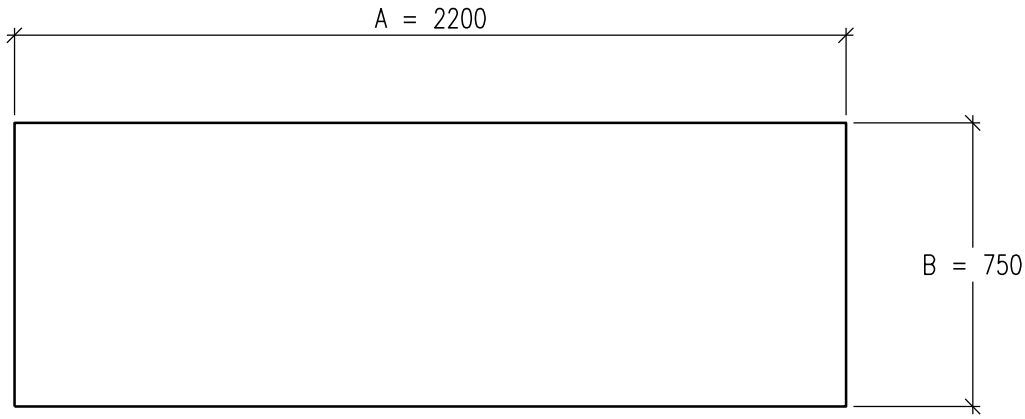


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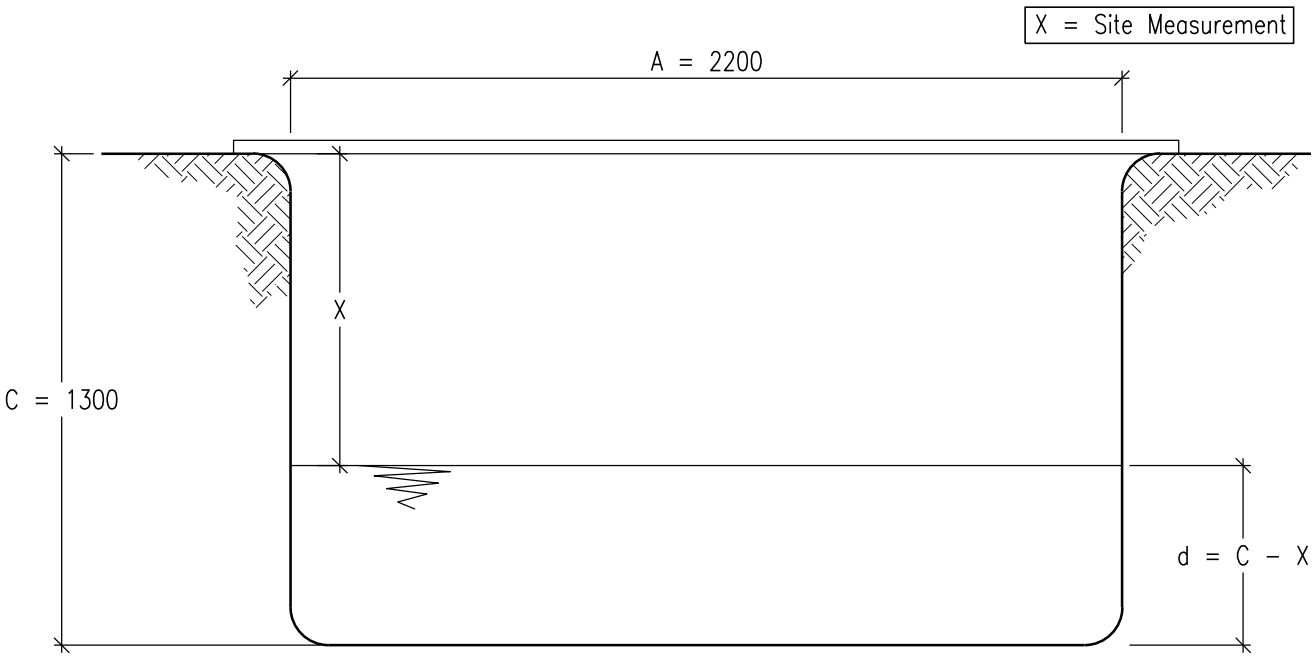
Sheet No. 36916/SA02					Rev -
Status	FOR INFORMATION				
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale	1:20	Design	-	File Name	36916-SA02

Project: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Title: Infiltration Soak Away Sketch



Plan On SA02



Section Through SA02

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Soak-Away Test SA02

Job Reference Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

SA01	
TIME (Mins)	DEPTH mm (d)
0	475
15	430
35	410
80	400
110	385
145	375
180	350
205	340
235	330
275	325

Job No. 36916

Date 22/03/2018

Trial Dimensions

A =	2.2	m
B =	0.75	m
C =	1.3	m

C.S.Area of SA01 = 1.65 m^2

Total Volume =	0.248	m^3
75% Volume =	0.186	m^3
25%Volume =	0.062	m^3

Time Taken From 75% Volume to 25% Volume

150 Mins

Effective Depth From 75% Volume to 25% Volume

0.075 m

50% Effective Internal Surface Area Including Base area

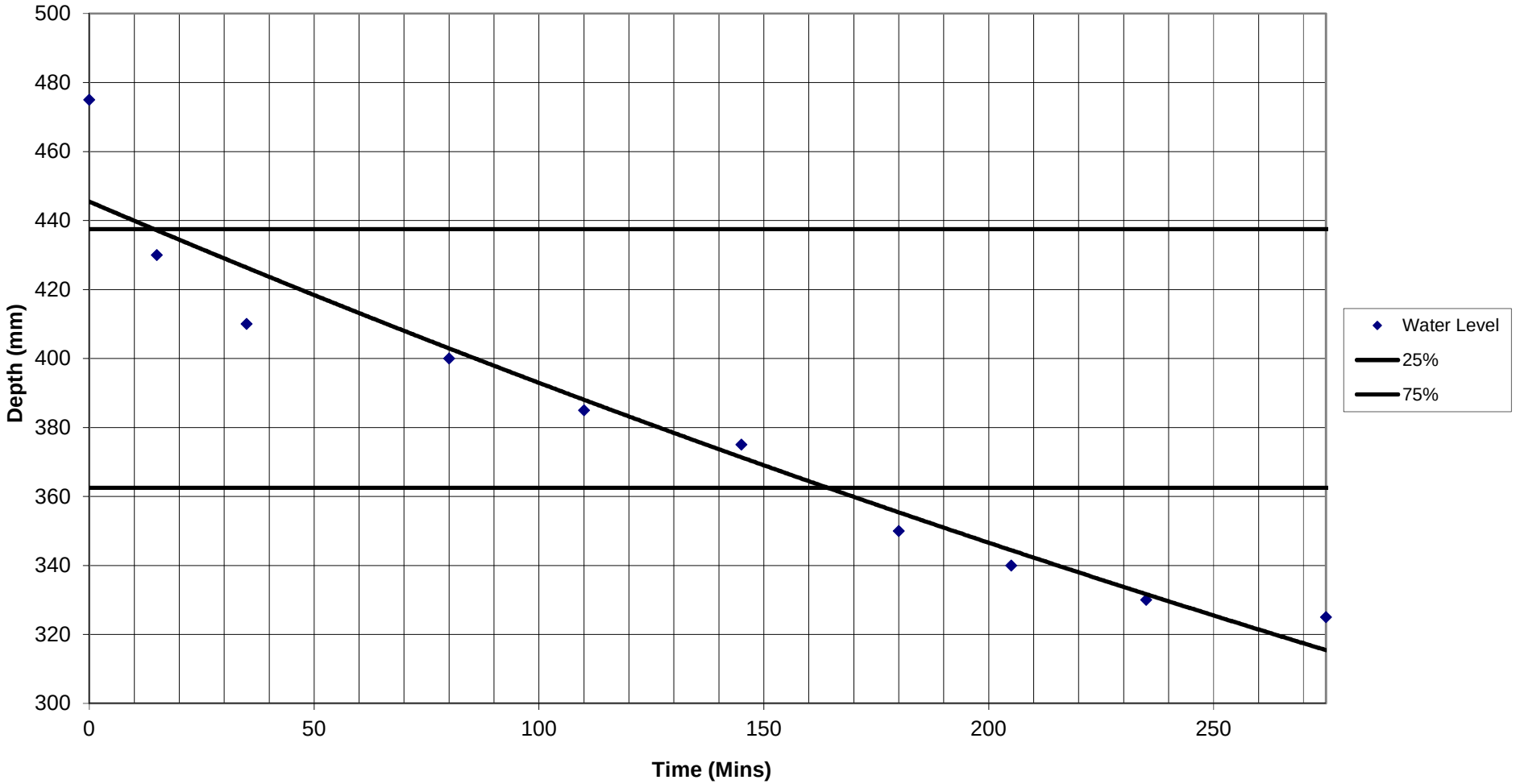
2.0925 m^2

Soil Infiltration rate, f

6.57109E-06 m/s

6.57 x 10^ - 3 mm/s

Proposed Residential Development off Wignals Gate, Holbeach, Lincs.
Job No. 36916 22/03/18
Plot showing water level aginst time for SA02

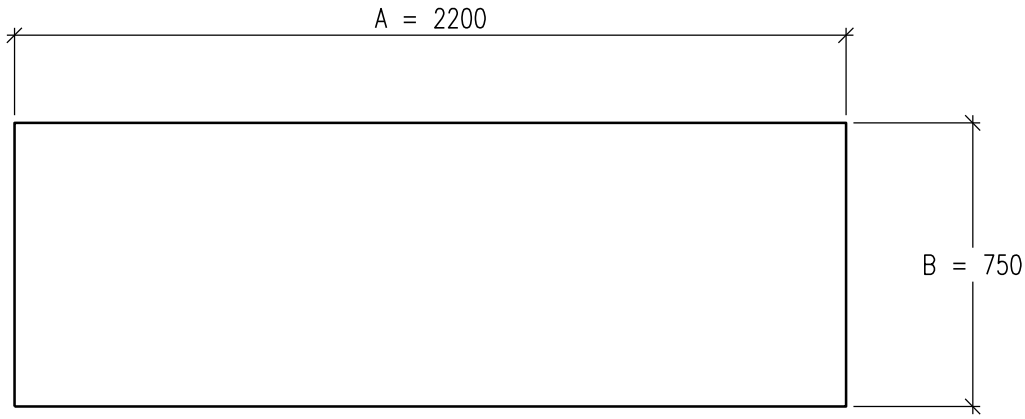


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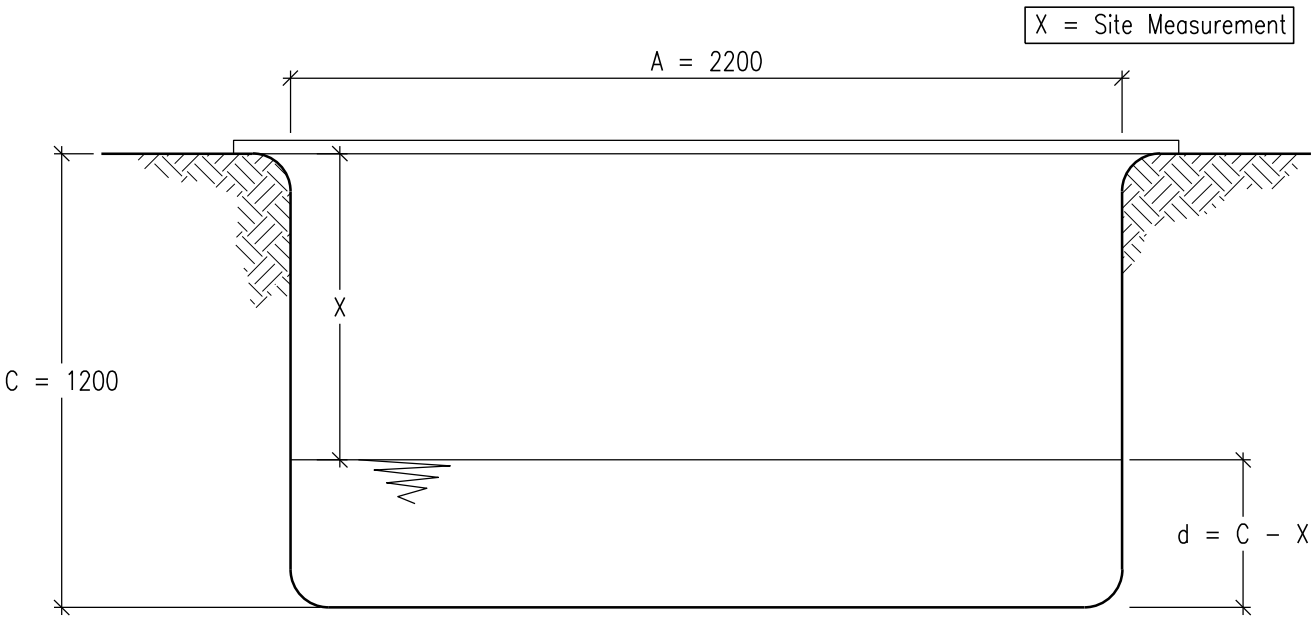
Sheet No. 36916/SA03					Rev -
Status	FOR INFORMATION				
Date	Mar. '18	Drawn	MP	Checked	SRC
Scale	1:20	Design	-	File Name	36916-SA03

Project: Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

Title: Infiltration Soak Away Sketch



Plan On SA03



Section Through SA03

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Soak-Away Test SA03

Job Reference Proposed Residential Development off Wignals Gate, Holbeach, Lincs.

SA01	
TIME (Mins)	DEPTH mm (d)
0	390
25	385
60	380
90	375
130	370
185	365
230	360

Job No. 36916

Date 22/03/2018

Trial Dimensions

A =	2.2	m
B =	0.75	m
C =	1.2	m

C.S.Area of SA01 = 1.65 m^2

Total Volume =	0.050	m^3
75% Volume =	0.037	m^3
25%Volume =	0.012	m^3

Time Taken From 75% Volume to 25% Volume

117 Mins

Effective Depth From 75% Volume to 25% Volume

0.015 m

50% Effective Internal Surface Area Including Base area

1.7385 m^2

Soil Infiltration rate, f

2.02798E-06 m/s

2.03 x 10^ - 3 mm/s

Proposed Residential Development off Wignals Gate, Holbeach, Lincs.
Job No. 36916 22/03/18
Plot showing water level aginst time for SA03

