HPK/2012/0537

atkinson peck consulting engineers

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Our Ref: JSD/C16492

26 July 2012
(Revision A)

Drainage Assessment – Site at Hawkshead Mill, Hawkshead Road, Glossop

This assessment is to be read in conjunction with the Flood Risk Assessment report prepared by Michael Lambert Associates, dated 23 July 2012 and provides a drainage strategy to support the Planning application for the proposed residential development on the site.

Context

Seddon Homes Ltd propose to redevelop the site with residential properties served by a looped access road from existing Hawkshead Road. The development will consist of 36 dwellings. Significant gradients and retaining structures will be required on this site due to the nature of the existing levels around the site perimeter. An existing watercourse crosses the site, Blackshaw Brook and is currently culverted within the middle of the site beneath the existing main factory mill building. Foul drainage is present on site serving toilet blocks to the previous factory and offices.

Existing Drainage Survey

An initial survey of the existing drainage has been carried out by Jet-Rod (Manchester South) Ltd and their report dated 28 June 2012 is appended. The main purpose of the survey was to confirm the presence of foul drainage serving the site for potential re-use in the re-development.

Foul drainage has been confirmed running from the exiting factory buildings and joining drainage serving adjacent properties (Hawkshead House) where the shared drainage will probably become public sewerage, serving more than one dwelling. This foul drain runs down Hope Street (North to South) and has been confirmed connecting to the foul sewer in Hope Street (East to West).

HIGH PEAK BOROUGH COUNCIL
GLOSSOP SITE
RECEIVED
1 SEP 2012
FILE REF
REPLY REQUIRED

ace consultancy engineering business environment
constructionline
ISO 9001 REGISTERED FIRM

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Watson House, 45 Waterloo Road, Stockport, Cheshire, SK1 3BJ
Telephone: +44 (0)161 480 2833 Facsimile: +44 (0)161 477 3939
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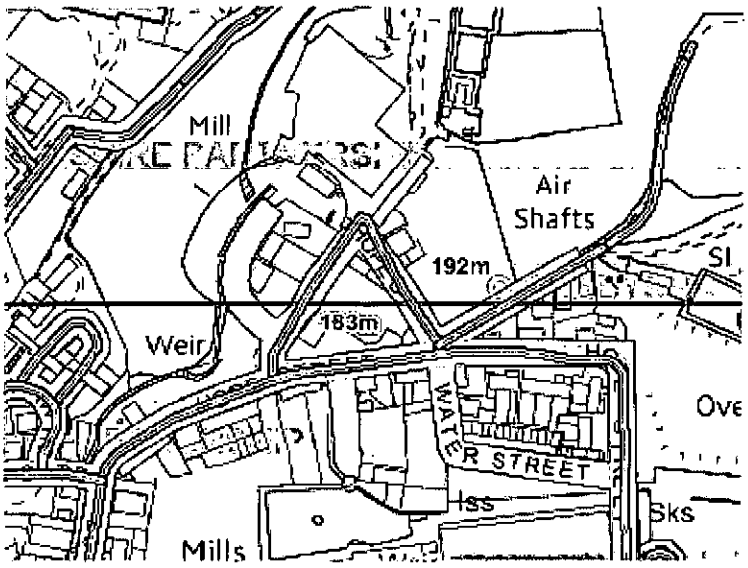


It can be seen in the above extract from Derbyshire County Council's website detailing adopted highways that Hope Street (running North to South) is an adopted highway.

Some surface water was also confirmed in front of the main factory which appeared to run towards the boundary retaining wall. Other surface water drainage (served by numerous rainwater downpipes) is present on site but not surveyed at this time.

Foul Water Assessment

36 dwellings discharging foul sewage at a rate of 4000 l/dwelling/day (Sewers for Adoption 6th Edition)

Foul flow = 36 x 4000/(24x60x60) = 1.7 l/s

Building Regulation flows would result in a maximum design flow of 6.5l/s

Therefore a minimum 150mm diameter drain at its flattest gradient of 1:150 would have a capacity of 15.0l/s.

Due to the shallow nature of the existing foul drainage adjacent to the site, new drainage would require to either be pumped or some new sewerage work would be required in Hope Street or Hawkshead Road to provide a deeper sewerage connection. A pumped solution would also require an emergency pump shutdown facility of temporary foul water storage based on 150l/head/day. For the proposed development, a mixture of 2, 3, 4 & 5 bedroomed dwellings, the 'population' would be in the order of 200 which would equate to 30cu.m storage (i.e. 3.1m x 3.1m x 3.1m). Such a storage structure could be constructed in one of the car park areas, although the alternative of new sewerage works in Hope Street or Hawkshead Road may be the more economic and practical foul drainage solution.

Attached drawings C16492/03 indicates a pumped foul water scheme and C16492/03A indicates a gravity foul scheme.

Any adopted sewerage and new connections should be agreed with the sewerage undertaker for this area, United Utilities and following preliminary discussions with their Wastewater Engineer, Mr I Crossley, no particular or significant concerns have been raised.

Surface Water Assessment

The Flood Risk Assessment has established and existing positively drained site area of 6,410sq.m and the proposed drained area of 5,760sq.m. i.e. approximately a 10% reduction. With reference to SR744 new limiting runoff rates are to be as follows :-

1 in 1 year = 14l/s
1 in 30 year = 55l/s
1 in 100 year = 78l/s

In accordance with the National Planning Policy Framework, the drainage assessment takes account of climate change over the longer term i.e. a 30% increase in rainfall intensity allowance plus a 10% increase in flows for 'urban creep' i.e. future increase in drained areas from such as addition of conservatories etc.

With reference to the Desktop Study report by Brownfield Solutions Ltd dated July 2012, negligible drift material is likely on the site overlying Kinderscout Grit which is commonly made up of sandstones and shales. Whilst it is unlikely that soakaways are feasible due to anticipated poor infiltration rates meaning the most appropriate form of SUDS would be storage and attenuation, percolation testing should be carried out as part of the site investigation works. Should adequate infiltration rates be confirmed then soakaways and/or permeable paving could then be considered.

A preliminary design has been carried out and is appended which demonstrates that reasonable storage in the form of oversized pipework and manholes together with Hydrobrake flow controls can limit peak rate flows to those defined in the Flood Risk Assessment. Attached calculations and drawing C16492/03 and 03A indicates the drainage scheme and details.

A detailed drainage design should be carried out as part of overall scheme development to comply with Environment Agency, United Utilities and the Local Authority (including building Control). The design parameters set out in the Flood Risk Assessment and this document should however be adhered to.

The construction of suitable headwalls to the watercourse would be required, which noting the likely limited flow would use a 225mm pipe which could be to the Environment Agency standards, i.e. drawing TPOS/2 – Typical Pipe Outfall Structure (Pipes up to 225mm Dia).

The sensitivity of receiving waters should also be considered with the surface water discharge and appropriate levels of treatment provided to ensure water quality.

Adoption of the new surface water sewerage system should also be considered in conjunction with the highway serving the new development as agreed with the sewerage undertaker for this area, United Utilities and Derbyshire County Council Highways Department.

Conclusions

The above Drainage Assessment (in conjunction with the Flood Risk Assessment) has established that a suitable foul and surface water drainage scheme is feasible for the proposed development. Detailed design should therefore be carried out following appropriate further site drainage and investigations and finalisation of levels.



J S Dickinson
B.Eng., C.Eng., M.I.Struct.E.

Head Office: **Jet-Rod (Manchester South) Ltd**
Whin House, Leek Road, Bosley, Macclesfield SK11 0PN
24 hr Emergency Service / Accounts / Enquiries: **01260 223756** Fax: **01260 222920**

28th June 2012
WHJ/adm

Mr J.S.Dickinson
Atkinson Peck Consulting Engineers
Watson House
45 Waterloo Road
Stockport
Cheshire
SK1 3BJ

Dear James,

Drain Survey Report – Hawkshead Mill, Hawkshead Road, Glossop, SK13 7SS.

As requested we attended the above address to carry out a CCTV survey on the foul and surface water drainage leaving the site, our findings are as follows.

(Please refer to Survey Detail sheets and drawings)

Surface Water Drainage.

Survey 1 was carried out in a downstream direction from MHS1 for a distance of 10.5 metres. The survey showed the pipeline to have a heavy flow of ground water with the camera going under water at 9.1 metres before it entered another manhole at 10.5 metres, due to a build up of silt the survey was the abandoned.

The location of the second manhole appears to be on the neighbouring property and we would require permission to access the land to try and find the chamber or carry out any dye tests.

Foul Water Drainage.

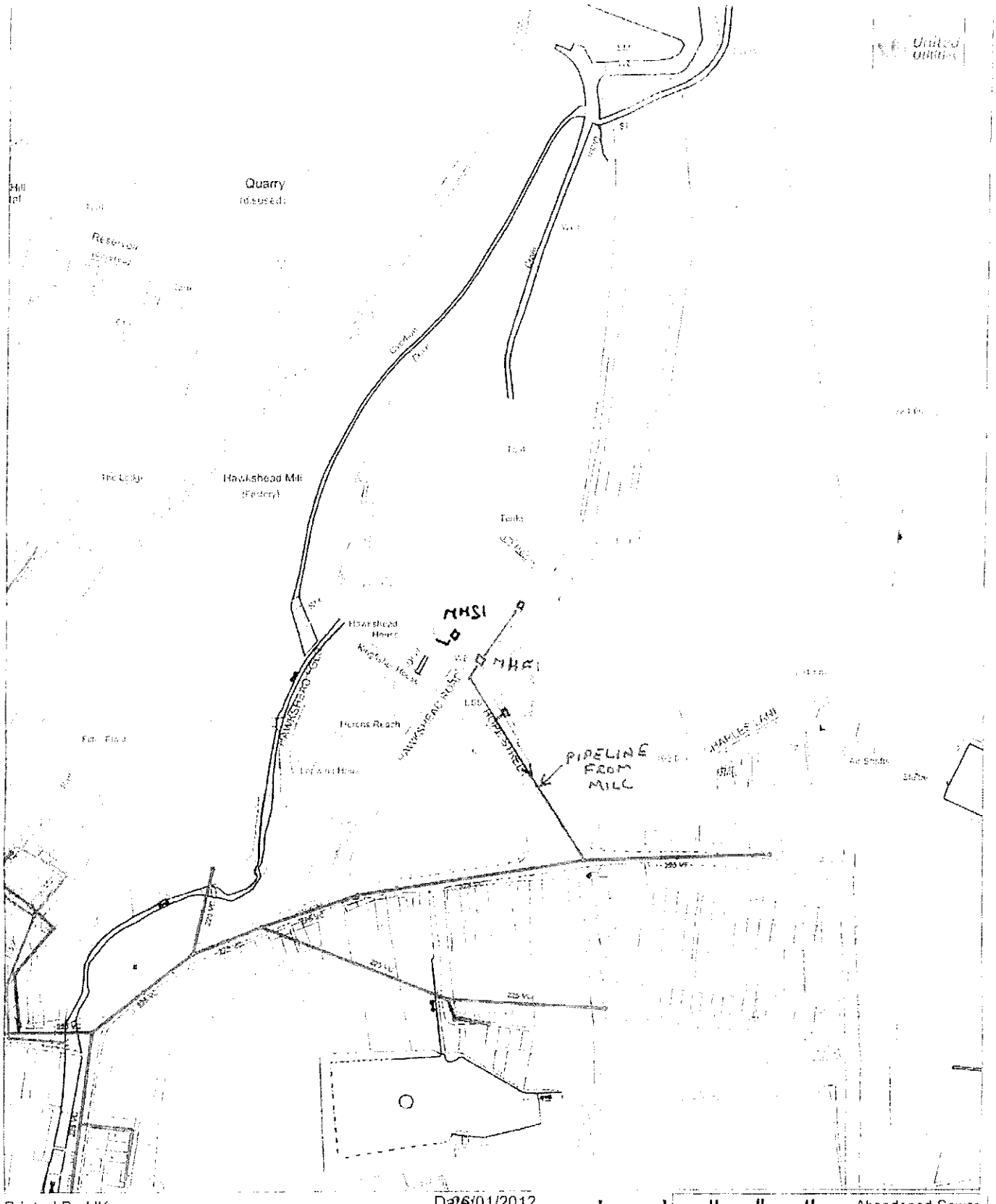
Survey 2 was carried out in a downstream direction from MHF1 for a distance of 7.6 metres where we had to abandon the survey due to a large piece of stone and debris in the pipeline which we could not pass with the camera.

We did manage to dye test the pipeline and found that its discharges into a main sewer manhole which I have marked on the United Utilities drawing supplied, the manhole in the roadway was found to be 2.0 metres to invert level.

I hope the above is sufficient but should you have any queries please do not hesitate to give me a call.

Yours sincerely,

Bill Mayer
Jet Rod Ltd.



Printed By HK Date 26/01/2012

Extract From Map of Public Sewers

Hawkshead Mill Old Glossop

Legend

- Abandoned Sewer
- Public Sewer
- Highway Drain
- Private Sewer
- Pumping Main
- Section 104 Sewer

Refer to colour guide for content of pipe

Red or Brown - Foul Sewers Blue - Surface Water Sewers

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes are not recorded. United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown.

©United Utilities 2001. The plan is based upon the Ordnance Survey Map with the sanction of the Controller of H.M.Stationery Office. Crown and United Utilities Water copyrights are reserved. Unauthorised reproduction will infringe these copyrights.

Job Details

Job Number: 5436

Client: Atkinson Peck
Watson House
45 Waterloo Rd
Stockport SK1 3BJ Tel 0161 480 2833

Site Address: Hawkshead Mill
Hawkshead Road
Glossop
SK13 7SS

Date: 25/06/2012

Engineer: Bill Mayer

Survey Details - Survey No: 1

From: MHS1 I/L: 2.1 metres

To: MH at 10.5 metres I/L: metres

Direction: Downstream Date: 25/06/2012

Size: 150 (mm)

Duty: Surface water

Material: Vitrified clay

0.00 metres - ST - Start of Survey Length

0.00 metres - IC - Start node type, inspection chamber, reference number MHS1

0.00 metres - WL - Water level 0% height/diameter

5.0 metres - LR - Line of drain/sewer deviates right half

9.1 metres - CU - Camera under water

10.5 metres - MHF - Finish node type, manhole, reference number MH on neighbouring property

9.8 metres - Survey in reverse

0.0 metres - Back at MHS1

JET ROD DRAINFORCE

Head Office: Jet-Rod (Manchester South) Ltd
Wain House, Leek Road, Bosley, Macclesfield SK11 0PN
24 hr Emergency Service / Accounts / Enquiries: 01260 223756 Fax: 01260 222920

Job Details

Job Number: 5436

Client: Atkinson Peck
Watson House
45 Waterloo Rd
Stockport SK1 3BJ Tel 0161 480 2833

Site Address: Hawkshead Mill
Hawkshead Road
Glossop
SK13 7SS

Date: 25/06/2012

Engineer: Bill Mayer

Survey Details - Survey No: 2

From: MH I/L: 0.450 metres
To: Debris at 7.6 metres I/L: metres
Direction: Downstream Date: 25/06/2012
Size: 150 (mm)
Duty: Foul
Material: Vitrified clay

0.00 metres - ST - Start of Survey Length

0.00 metres - IC - Start node type, inspection chamber, reference number MH

0.00 metres - WL - Water level 0% height/diameter

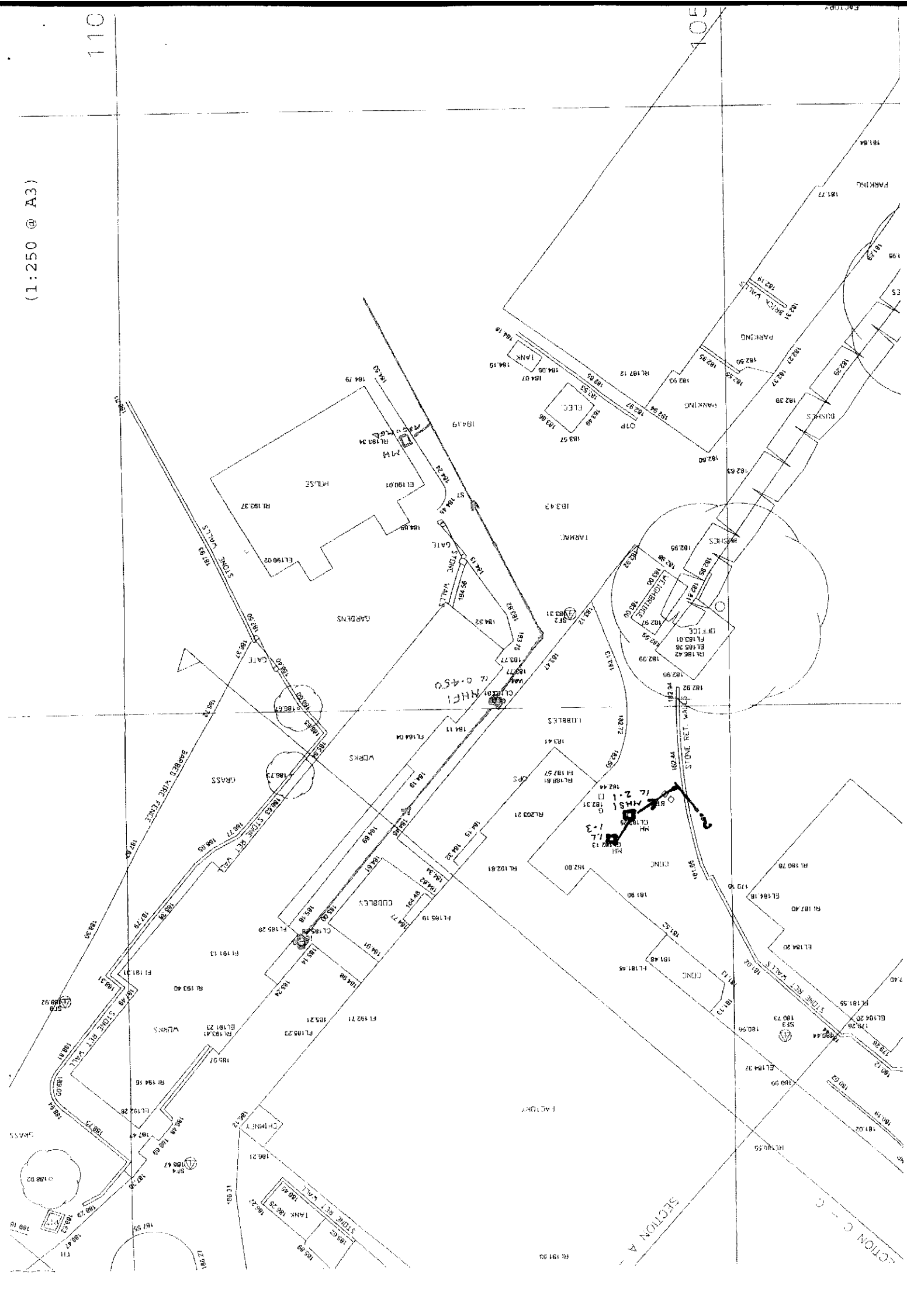
0.7 metres - Hairline fracture

2.8 metres - FC - Fracture, circumferential from 3 to 7 o'clock

3.8 metres - LL - Line of drain/sewer deviates left full

7.6 metres - Debris in line, unable to pass

7.6 metres - SA - Survey abandoned


(1:250 @ A3)
SECTION A
SECTION C
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STONE RET. WALL
STONE WALLS
TANK
CHIMNEY
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HOUSE
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Atkinson Peck Ltd		Page 1
Watson House 45 Waterloo Road Stockport SK1 3BJ		
Date 26/07/2012 21:06	Designed by jsd	
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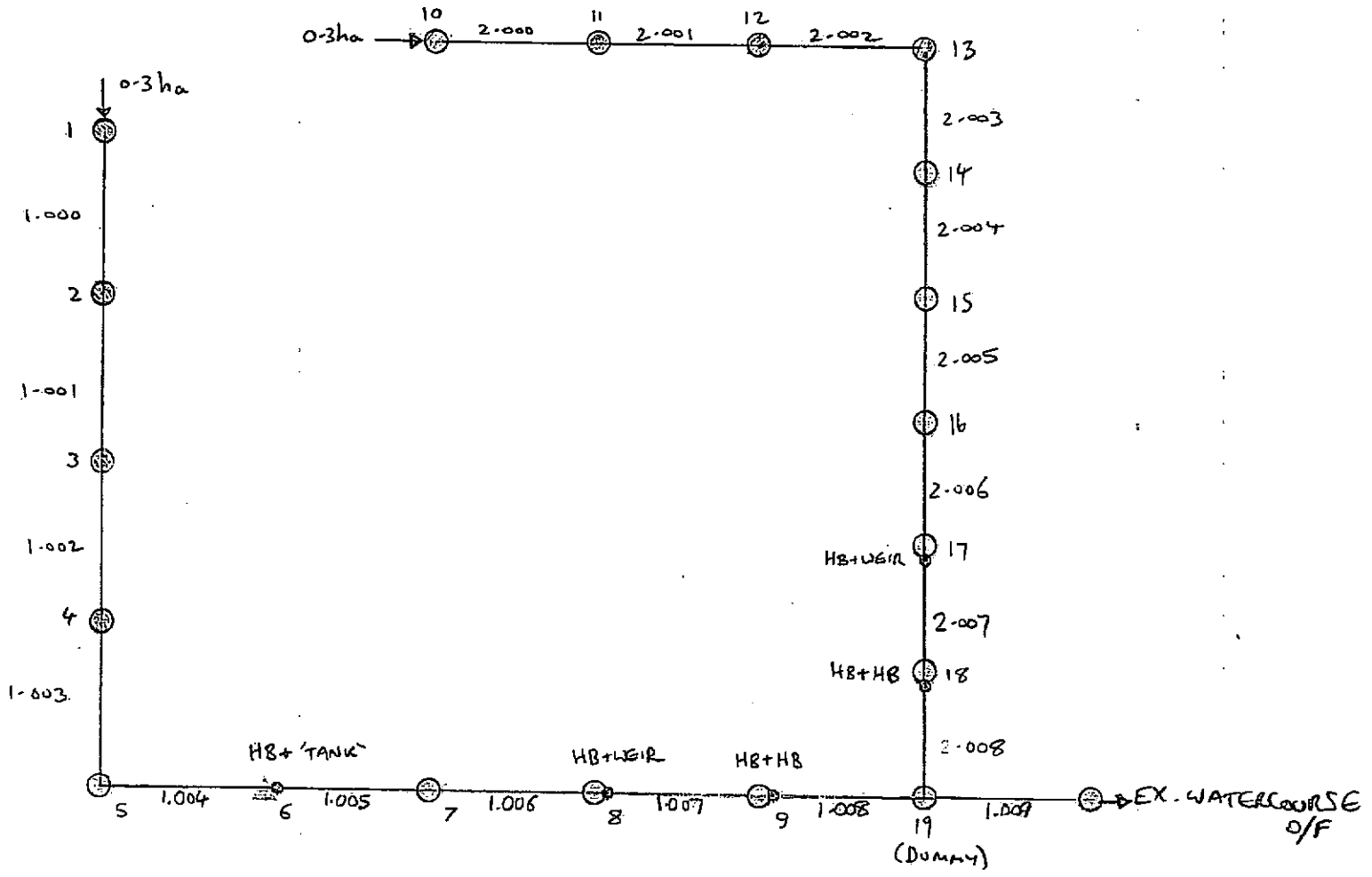

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	10
M5-60 (mm)	19.600	Minimum Backdrop Height (m)	0.200
Ratio R	0.291	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	15.000	1.100	13.6	0.300	4.00	0.0	0.600	o	225
1.001	11.000	0.900	12.2	0.000	0.00	0.0	0.600	o	225
1.002	26.000	2.100	12.4	0.000	0.00	0.0	0.600	o	600
1.003	13.000	1.200	10.8	0.000	0.00	0.0	0.600	o	1200
1.004	11.000	0.900	12.2	0.000	0.00	0.0	0.600	o	1200
1.005	30.000	1.800	16.7	0.000	0.00	0.0	0.600	o	1200
1.006	2.000	0.100	20.0	0.000	0.00	0.0	0.600	o	225
1.007	2.000	0.100	20.0	0.000	0.00	0.0	0.600	o	225
1.008	3.000	0.225	13.3	0.000	0.00	0.0	0.600	o	225
2.000	30.000	2.200	13.6	0.300	4.00	0.0	0.600	o	225
2.001	30.000	2.400	12.5	0.000	0.00	0.0	0.600	o	225
2.002	6.000	1.000	6.0	0.000	0.00	0.0	0.600	o	1200
2.003	16.000	0.800	20.0	0.000	0.00	0.0	0.600	o	1200
2.004	14.000	0.900	15.6	0.000	0.00	0.0	0.600	o	1200
2.005	17.000	0.300	56.7	0.000	0.00	0.0	0.600	o	1200
2.006	2.000	0.100	20.0	0.000	0.00	0.0	0.600	o	225

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	50.00	4.07	186.800	0.300	0.0	0.0	4.1	3.56	141.6	44.7
1.001	50.00	4.12	185.700	0.300	0.0	0.0	4.1	3.76	149.6	44.7
1.002	50.00	4.18	184.425	0.300	0.0	0.0	4.1	6.95	1963.8	44.7
1.003	50.00	4.20	181.725	0.300	0.0	0.0	4.1	11.39	12887.1	44.7
1.004	50.00	4.22	180.525	0.300	0.0	0.0	4.1	10.73	12132.0	44.7
1.005	50.00	4.27	179.625	0.300	0.0	0.0	4.1	9.18	10387.0	44.7
1.006	50.00	4.28	177.825	0.300	0.0	0.0	4.1	2.94	116.9	44.7
1.007	50.00	4.29	177.725	0.300	0.0	0.0	4.1	2.94	116.9	44.7
1.008	50.00	4.31	177.625	0.300	0.0	0.0	4.1	3.60	143.3	44.7
2.000	50.00	4.14	186.400	0.300	0.0	0.0	4.1	3.56	141.6	44.7
2.001	50.00	4.27	184.200	0.300	0.0	0.0	4.1	3.72	148.0	44.7
2.002	50.00	4.28	180.825	0.300	0.0	0.0	4.1	15.32	17321.8	44.7
2.003	50.00	4.31	179.825	0.300	0.0	0.0	4.1	8.38	9480.7	44.7
2.004	50.00	4.34	179.025	0.300	0.0	0.0	4.1	9.51	10752.1	44.7
2.005	50.00	4.39	178.125	0.300	0.0	0.0	4.1	4.97	5626.3	44.7
2.006	50.00	4.41	177.825	0.300	0.0	0.0	4.1	2.94	116.9	44.7

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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)
2.007	2.000	0.100	20.0	0.000	0.00	0.0	0.600	o	225
2.008	3.000	0.225	13.3	0.000	0.00	0.0	0.600	o	225
1.009	13.000	0.600	21.7	0.000	0.00	0.0	0.600	o	1200

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)
2.007	50.00	4.42	177.725	0.300	0.0	0.0	4.1	2.94	116.9	44.7
2.008	50.00	4.43	177.625	0.300	0.0	0.0	4.1	3.60	143.3	44.7
1.009	50.00	4.46	176.425	0.600	0.0	0.0	8.1	8.05	9108.2	89.4

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backd (mm
1	188.800	2.000	Open Manhole	1200	1.000	186.800	225				
2	187.700	2.000	Open Manhole	1200	1.001	185.700	225	1.000	185.700	225	
3	186.800	2.375	Open Manhole	2100	1.002	184.425	600	1.001	184.800	225	
4	184.700	2.975	Open Manhole	2100	1.003	181.725	1200	1.002	182.325	600	
5	183.500	2.975	Open Manhole	2100	1.004	180.525	1200	1.003	180.525	1200	
6	182.600	2.975	Open Manhole	2100	1.005	179.625	1200	1.004	179.625	1200	
7	180.800	2.975	Open Manhole	2100	1.006	177.825	225	1.005	177.825	1200	
8	180.700	2.975	Open Manhole	2100	1.007	177.725	225	1.006	177.725	225	
9	180.600	2.975	Open Manhole	2100	1.008	177.625	225	1.007	177.625	225	
10	188.400	2.000	Open Manhole	1200	2.000	186.400	225				
11	186.200	2.000	Open Manhole	1200	2.001	184.200	225	2.000	184.200	225	
12	183.800	2.975	Open Manhole	1200	2.002	180.825	1200	2.001	181.800	225	
13	182.800	2.975	Open Manhole	1200	2.003	179.825	1200	2.002	179.825	1200	
14	182.000	2.975	Open Manhole	1200	2.004	179.025	1200	2.003	179.025	1200	
15	181.100	2.975	Open Manhole	2100	2.005	178.125	1200	2.004	178.125	1200	
16	180.800	2.975	Open Manhole	2100	2.006	177.825	225	2.005	177.825	1200	
17	180.700	2.975	Open Manhole	2100	2.007	177.725	225	2.006	177.725	225	
18	180.600	2.975	Open Manhole	2100	2.008	177.625	225	2.007	177.625	225	
dummy 19	180.500	4.075	Open Manhole	150	1.009	176.425	1200	1.008	177.400	225	
								2.008	177.400	225	
ex. watercourse	179.900	4.075	Open Manhole	2000 x 2000		OUTFALL		1.009	175.825	1200	

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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	225	1	188.800	186.800	1.775	Open Manhole	1200
1.001	o	225	2	187.700	185.700	1.775	Open Manhole	1200
1.002	o	600	3	186.800	184.425	1.775	Open Manhole	2100
1.003	o	1200	4	184.700	181.725	1.775	Open Manhole	2100
1.004	o	1200	5	183.500	180.525	1.775	Open Manhole	2100
1.005	o	1200	6	182.600	179.625	1.775	Open Manhole	2100
1.006	o	225	7	180.800	177.825	2.750	Open Manhole	2100
1.007	o	225	8	180.700	177.725	2.750	Open Manhole	2100
1.008	o	225	9	180.600	177.625	2.750	Open Manhole	2100
2.000	o	225	10	188.400	186.400	1.775	Open Manhole	1200
2.001	o	225	11	186.200	184.200	1.775	Open Manhole	1200
2.002	o	1200	12	183.800	180.825	1.775	Open Manhole	1200
2.003	o	1200	13	182.800	179.825	1.775	Open Manhole	1200
2.004	o	1200	14	182.000	179.025	1.775	Open Manhole	1200
2.005	o	1200	15	181.100	178.125	1.775	Open Manhole	2100
2.006	o	225	16	180.800	177.825	2.750	Open Manhole	2100
2.007	o	225	17	180.700	177.725	2.750	Open Manhole	2100
2.008	o	225	18	180.600	177.625	2.750	Open Manhole	2100
1.009	o	1200	dummy 19	180.500	176.425	2.875	Open Manhole	150

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	15.000	13.6	2	187.700	185.700	1.775	Open Manhole	1200
1.001	11.000	12.2	3	186.800	184.800	1.775	Open Manhole	2100
1.002	26.000	12.4	4	184.700	182.325	1.775	Open Manhole	2100
1.003	13.000	10.8	5	183.500	180.525	1.775	Open Manhole	2100
1.004	11.000	12.2	6	182.600	179.625	1.775	Open Manhole	2100
1.005	30.000	16.7	7	180.800	177.825	1.775	Open Manhole	2100
1.006	2.000	20.0	8	180.700	177.725	2.750	Open Manhole	2100
1.007	2.000	20.0	9	180.600	177.625	2.750	Open Manhole	2100
1.008	3.000	13.3	dummy 19	180.500	177.400	2.875	Open Manhole	150
2.000	30.000	13.6	11	186.200	184.200	1.775	Open Manhole	1200
2.001	30.000	12.5	12	183.800	181.800	1.775	Open Manhole	1200
2.002	6.000	6.0	13	182.800	179.825	1.775	Open Manhole	1200
2.003	16.000	20.0	14	182.000	179.025	1.775	Open Manhole	1200
2.004	14.000	15.6	15	181.100	178.125	1.775	Open Manhole	2100
2.005	17.000	56.7	16	180.800	177.825	1.775	Open Manhole	2100
2.006	2.000	20.0	17	180.700	177.725	2.750	Open Manhole	2100
2.007	2.000	20.0	18	180.600	177.625	2.750	Open Manhole	2100
2.008	3.000	13.3	dummy 19	180.500	177.400	2.875	Open Manhole	150
1.009	13.000	21.7	ex. watercourse	179.900	175.825	2.875	Open Manhole	2000 x 2000

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)
1.009	ex. watercourse	179.900	175.825	177.900	2000	2000

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 5 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.600	Storm Duration (mins)	30
Ratio R	0.291		

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Online Controls for Storm

Hydro-Brake® Manhole: 6, DS/PN: 1.005, Volume (m³): 20.4

Design Head (m) 1.500 Hydro-Brake® Type Md4 Invert Level (m) 179.625
Design Flow (l/s) 35.0 Diameter (mm) 191

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	4.3	0.800	26.5	2.000	40.2	4.000	56.9	7.000	75.2
0.200	16.3	1.000	28.6	2.200	42.2	4.500	60.3	7.500	77.9
0.300	27.9	1.200	31.2	2.400	44.0	5.000	63.6	8.000	80.4
0.400	31.8	1.400	33.6	2.600	45.8	5.500	66.7	8.500	82.9
0.500	29.8	1.600	36.0	3.000	49.2	6.000	69.6	9.000	85.3
0.600	27.2	1.800	38.1	3.500	53.2	6.500	72.5	9.500	87.6

Complex Manhole: 8, DS/PN: 1.007, Volume (m³): 10.3

Hydro-Brake®

Design Head (m) 1.500 Hydro-Brake® Type Md6 SW Only Invert Level (m) 177.725
Design Flow (l/s) 7.0 Diameter (mm) 100

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	5.1	2.000	8.1	4.000	11.4	7.000	15.1
0.200	4.7	1.000	5.7	2.200	8.5	4.500	12.1	7.500	15.6
0.300	4.6	1.200	6.3	2.400	8.8	5.000	12.8	8.000	16.1
0.400	4.4	1.400	6.8	2.600	9.2	5.500	13.4	8.500	16.6
0.500	4.4	1.600	7.2	3.000	9.9	6.000	14.0	9.000	17.1
0.600	4.6	1.800	7.7	3.500	10.7	6.500	14.5	9.500	17.6

Weir

Discharge Coef 0.590 Width (m) 2.100 Invert Level (m) 179.400

Complex Manhole: 9, DS/PN: 1.008, Volume (m³): 10.3

Hydro-Brake®

Design Head (m) 1.500 Hydro-Brake® Type Md4 Invert Level (m) 177.625
Design Flow (l/s) 34.3 Diameter (mm) 189

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	4.3	0.800	25.9	2.000	39.4	4.000	55.7	7.000	73.6
0.200	16.2	1.000	28.0	2.200	41.3	4.500	59.0	7.500	76.2
0.300	27.4	1.200	30.5	2.400	43.1	5.000	62.2	8.000	78.7
0.400	31.0	1.400	32.9	2.600	44.9	5.500	65.3	8.500	81.2
0.500	28.9	1.600	35.2	3.000	48.2	6.000	68.2	9.000	83.5
0.600	26.4	1.800	37.3	3.500	52.1	6.500	71.0	9.500	85.8

Hydro-Brake®

Design Head (m) 1.500 Hydro-Brake® Type Md5 SW Only Invert Level (m) 178.700
Design Flow (l/s) 31.0 Diameter (mm) 204

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Hydro-Brake®

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	7.2	0.800	23.9	2.000	35.4	4.000	50.1	7.000	66.3
0.200	16.8	1.000	25.6	2.200	37.2	4.500	53.1	7.500	68.6
0.300	22.0	1.200	27.6	2.400	38.8	5.000	56.0	8.000	70.8
0.400	23.5	1.400	29.7	2.600	40.4	5.500	58.7	8.500	73.0
0.500	23.5	1.600	31.7	3.000	43.4	6.000	61.4	9.000	75.1
0.600	23.3	1.800	33.6	3.500	46.9	6.500	63.9	9.500	77.2

Complex Manhole: 17, DS/PN: 2.007, Volume (m³): 10.3

Hydro-Brake®

Design Head (m) 1.500 Hydro-Brake® Type Md6 SW Only Invert Level (m) 177.725
Design Flow (l/s) 7.0 Diameter (mm) 100

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	5.1	2.000	8.1	4.000	11.4	7.000	15.1
0.200	4.7	1.000	5.7	2.200	8.5	4.500	12.1	7.500	15.6
0.300	4.6	1.200	6.3	2.400	8.8	5.000	12.8	8.000	16.1
0.400	4.4	1.400	6.8	2.600	9.2	5.500	13.4	8.500	16.6
0.500	4.4	1.600	7.2	3.000	9.9	6.000	14.0	9.000	17.1
0.600	4.6	1.800	7.7	3.500	10.7	6.500	14.5	9.500	17.6

Weir

Discharge Coef 0.590 Width (m) 2.100 Invert Level (m) 179.000

Complex Manhole: 18, DS/PN: 2.008, Volume (m³): 10.3

Hydro-Brake®

Design Head (m) 1.500 Hydro-Brake® Type Md4 Invert Level (m) 177.625
Design Flow (l/s) 34.3 Diameter (mm) 189

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	4.3	0.800	25.9	2.000	39.4	4.000	55.7	7.000	73.6
0.200	16.2	1.000	28.0	2.200	41.3	4.500	59.0	7.500	76.2
0.300	27.4	1.200	30.5	2.400	43.1	5.000	62.2	8.000	78.7
0.400	31.0	1.400	32.9	2.600	44.9	5.500	65.3	8.500	81.2
0.500	28.9	1.600	35.2	3.000	48.2	6.000	68.2	9.000	83.5
0.600	26.4	1.800	37.3	3.500	52.1	6.500	71.0	9.500	85.8

Hydro-Brake®

Design Head (m) 1.500 Hydro-Brake® Type Md5 SW Only Invert Level (m) 178.700
Design Flow (l/s) 31.0 Diameter (mm) 204

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	7.2	0.800	23.9	2.000	35.4	4.000	50.1	7.000	66.3
0.200	16.8	1.000	25.6	2.200	37.2	4.500	53.1	7.500	68.6
0.300	22.0	1.200	27.6	2.400	38.8	5.000	56.0	8.000	70.8
0.400	23.5	1.400	29.7	2.600	40.4	5.500	58.7	8.500	73.0
0.500	23.5	1.600	31.7	3.000	43.4	6.000	61.4	9.000	75.1
0.600	23.3	1.800	33.6	3.500	46.9	6.500	63.9	9.500	77.2

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Storage Structures for Storm

Tank or Pond Manhole: 6, DS/PN: 1.005

Invert Level (m) 179.625

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	4.5	2.650	4.5	2.750	0.0

(2.4m ø MH)

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

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
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 (%) 30, 30, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	1	+30%	30/15 Summer				
1.001	15 Winter	1	+30%	30/15 Summer				
1.002	15 Summer	1	+30%					
1.003	15 Winter	1	+30%					
1.004	15 Winter	1	+30%	30/30 Winter				
1.005	60 Summer	1	+30%	30/15 Summer				
1.006	15 Summer	1	+30%	1/15 Summer				
1.007	60 Winter	1	+30%	1/15 Summer				
1.008	60 Winter	1	+30%	30/15 Summer				
2.000	15 Winter	1	+30%	30/15 Summer				
2.001	15 Winter	1	+30%	100/15 Summer				
2.002	15 Summer	1	+30%					
2.003	15 Winter	1	+30%					
2.004	15 Winter	1	+30%	100/30 Winter				
2.005	15 Summer	1	+30%	30/15 Summer				
2.006	15 Summer	1	+30%	1/15 Summer				
2.007	120 Winter	1	+30%	1/15 Summer				
2.008	120 Winter	1	+30%	30/15 Summer				
1.009	120 Winter	1	+30%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	186.906	-0.119	0.000	0.45	0.0	56.4	OK
1.001	2	185.805	-0.120	0.000	0.45	0.0	56.4	OK
1.002	3	184.501	-0.524	0.000	0.04	0.0	56.5	OK
1.003	4	181.799	-1.126	0.000	0.01	0.0	56.4	OK
1.004	5	180.609	-1.116	0.000	0.01	0.0	55.9	OK
1.005	6	180.062	-0.763	0.000	0.01	0.0	31.7	OK
1.006	7	178.919	0.869	0.000	0.28	0.0	12.6	SURCHARGED
1.007	8	179.330	1.380	0.000	0.16	0.0	7.2	SURCHARGED
1.008	9	177.753	-0.097	0.000	0.11	0.0	7.2	OK
2.000	10	186.502	-0.123	0.000	0.43	0.0	56.4	OK
2.001	11	184.300	-0.125	0.000	0.41	0.0	56.4	OK
2.002	12	180.906	-1.119	0.000	0.01	0.0	56.5	OK
2.003	13	179.916	-1.109	0.000	0.02	0.0	56.4	OK
2.004	14	179.109	-1.116	0.000	0.01	0.0	56.0	OK
2.005	15	178.612	-0.713	0.000	0.02	0.0	49.5	OK
2.006	16	178.612	0.562	0.000	0.26	0.0	11.8	SURCHARGED
2.007	17	178.914	0.964	0.000	0.14	0.0	6.2	SURCHARGED
2.008	18	177.745	-0.105	0.000	0.09	0.0	6.2	OK
1.009	dummy 19	176.449	-1.176	0.000	0.00	0.0	13.4	OK

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

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
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 (%) 30, 30, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Summer	30	+30%	30/15 Summer				
1.001	15 Winter	30	+30%	30/15 Summer				
1.002	15 Summer	30	+30%					
1.003	15 Summer	30	+30%					
1.004	15 Winter	30	+30%	30/30 Winter				
1.005	30 Winter	30	+30%	30/15 Summer				
1.006	30 Winter	30	+30%	1/15 Summer				
1.007	30 Winter	30	+30%	1/15 Summer				
1.008	240 Summer	30	+30%	30/15 Summer				
2.000	15 Summer	30	+30%	30/15 Summer				
2.001	15 Winter	30	+30%	100/15 Summer				
2.002	15 Winter	30	+30%					
2.003	15 Winter	30	+30%					
2.004	15 Summer	30	+30%	100/30 Winter				
2.005	15 Summer	30	+30%	30/15 Summer				
2.006	30 Winter	30	+30%	1/15 Summer				
2.007	30 Winter	30	+30%	1/15 Summer				
2.008	240 Winter	30	+30%	30/15 Summer				
1.009	240 Winter	30	+30%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	187.215	0.190	0.000	1.05	0.0	130.4	SURCHARGED
1.001	2	185.980	0.055	0.000	1.03	0.0	130.5	SURCHARGED
1.002	3	184.546	-0.479	0.000	0.09	0.0	130.4	OK
1.003	4	181.860	-1.065	0.000	0.03	0.0	130.1	OK
1.004	5	181.637	-0.088	0.000	0.03	0.0	117.0	OK
1.005	6	181.736	0.911	0.000	0.01	0.0	41.3	SURCHARGED
1.006	7	179.886	1.836	0.000	0.67	0.0	30.0	SURCHARGED
1.007	8	179.804	1.854	0.000	0.65	0.0	28.9	SURCHARGED
1.008	9	177.961	0.111	0.000	0.42	0.0	27.9	SURCHARGED
2.000	10	186.714	0.089	0.000	1.01	0.0	133.9	SURCHARGED
2.001	11	184.377	-0.048	0.000	0.97	0.0	133.6	OK
2.002	12	180.967	-1.058	0.000	0.03	0.0	134.1	OK
2.003	13	179.974	-1.051	0.000	0.04	0.0	134.3	OK
2.004	14	179.344	-0.881	0.000	0.04	0.0	134.3	OK
2.005	15	179.343	0.018	0.000	0.04	0.0	92.6	SURCHARGED
2.006	16	179.818	1.768	0.000	1.02	0.0	45.6	SURCHARGED
2.007	17	179.735	1.785	0.000	0.81	0.0	36.2	SURCHARGED
2.008	18	177.960	0.110	0.000	0.42	0.0	27.8	SURCHARGED
1.009	dummy 19	176.526	-1.099	0.000	0.02	0.0	55.2	OK

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

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
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 (%) 30, 30, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+30%	30/15 Summer				
1.001	15 Winter	100	+30%	30/15 Summer				
1.002	15 Winter	100	+30%					
1.003	15 Winter	100	+30%					
1.004	15 Summer	100	+30%	30/30 Winter				
1.005	30 Winter	100	+30%	30/15 Summer				
1.006	30 Winter	100	+30%	1/15 Summer				
1.007	60 Winter	100	+30%	1/15 Summer				
1.008	60 Winter	100	+30%	30/15 Summer				
2.000	15 Winter	100	+30%	30/15 Summer				
2.001	15 Winter	100	+30%	100/15 Summer				
2.002	15 Winter	100	+30%					
2.003	15 Winter	100	+30%					
2.004	15 Summer	100	+30%	100/30 Winter				
2.005	15 Summer	100	+30%	30/15 Summer				
2.006	15 Summer	100	+30%	1/15 Summer				
2.007	60 Winter	100	+30%	1/15 Summer				
2.008	60 Winter	100	+30%	30/15 Summer				
1.009	60 Winter	100	+30%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	188.049	1.024	0.000	1.24	0.0	154.4	SURCHARGED
1.001	2	186.357	0.432	0.000	1.21	0.0	152.9	SURCHARGED
1.002	3	184.555	-0.470	0.000	0.11	0.0	153.5	OK
1.003	4	182.258	-0.667	0.000	0.04	0.0	153.9	OK
1.004	5	181.961	0.236	0.000	0.03	0.0	122.3	SURCHARGED
1.005	6	182.530	1.705	0.000	0.01	0.0	48.4	FLOOD RISK
1.006	7	180.281	2.231	0.000	0.73	0.0	32.5	SURCHARGED
1.007	8	180.436	2.486	0.000	0.68	0.0	30.4	FLOOD RISK
1.008	9	178.728	0.878	0.000	0.45	0.0	30.3	SURCHARGED
2.000	10	187.637	1.012	0.000	1.14	0.0	150.6	SURCHARGED
2.001	11	184.820	0.395	0.000	1.08	0.0	149.0	SURCHARGED
2.002	12	180.974	-1.051	0.000	0.04	0.0	149.0	OK
2.003	13	179.991	-1.034	0.000	0.04	0.0	148.9	OK
2.004	14	179.774	-0.451	0.000	0.04	0.0	143.7	OK
2.005	15	179.772	0.447	0.000	0.04	0.0	95.0	SURCHARGED
2.006	16	179.771	1.721	0.000	1.23	0.0	54.7	SURCHARGED
2.007	17	180.291	2.341	0.000	1.19	0.0	53.2	SURCHARGED
2.008	18	178.964	1.114	0.000	0.79	0.0	52.6	SURCHARGED
1.009	dummy 19	176.552	-1.073	0.000	0.03	0.0	78.4	OK

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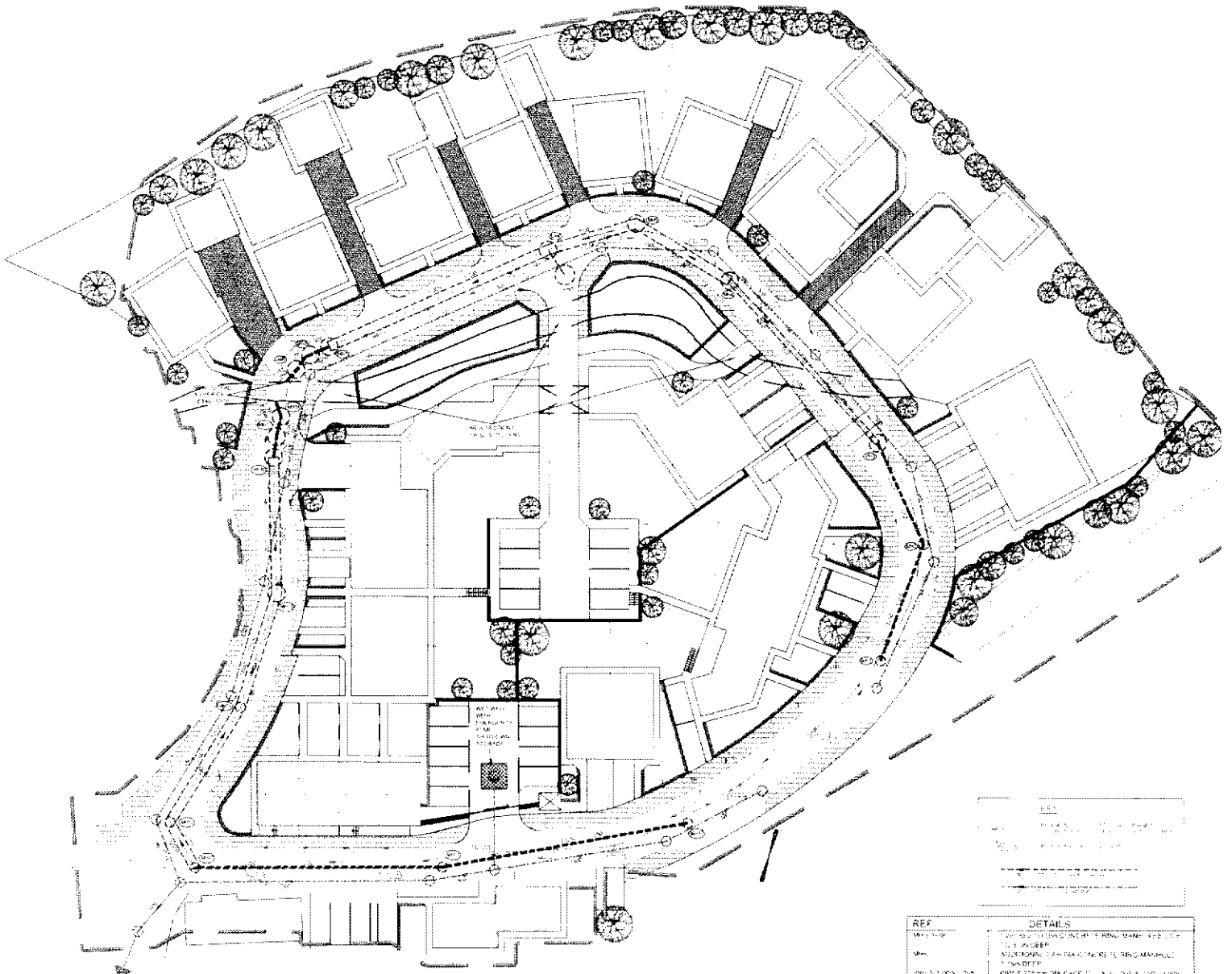


NOTE - LEVELS INDICATED ARE INDICATIVE ONLY

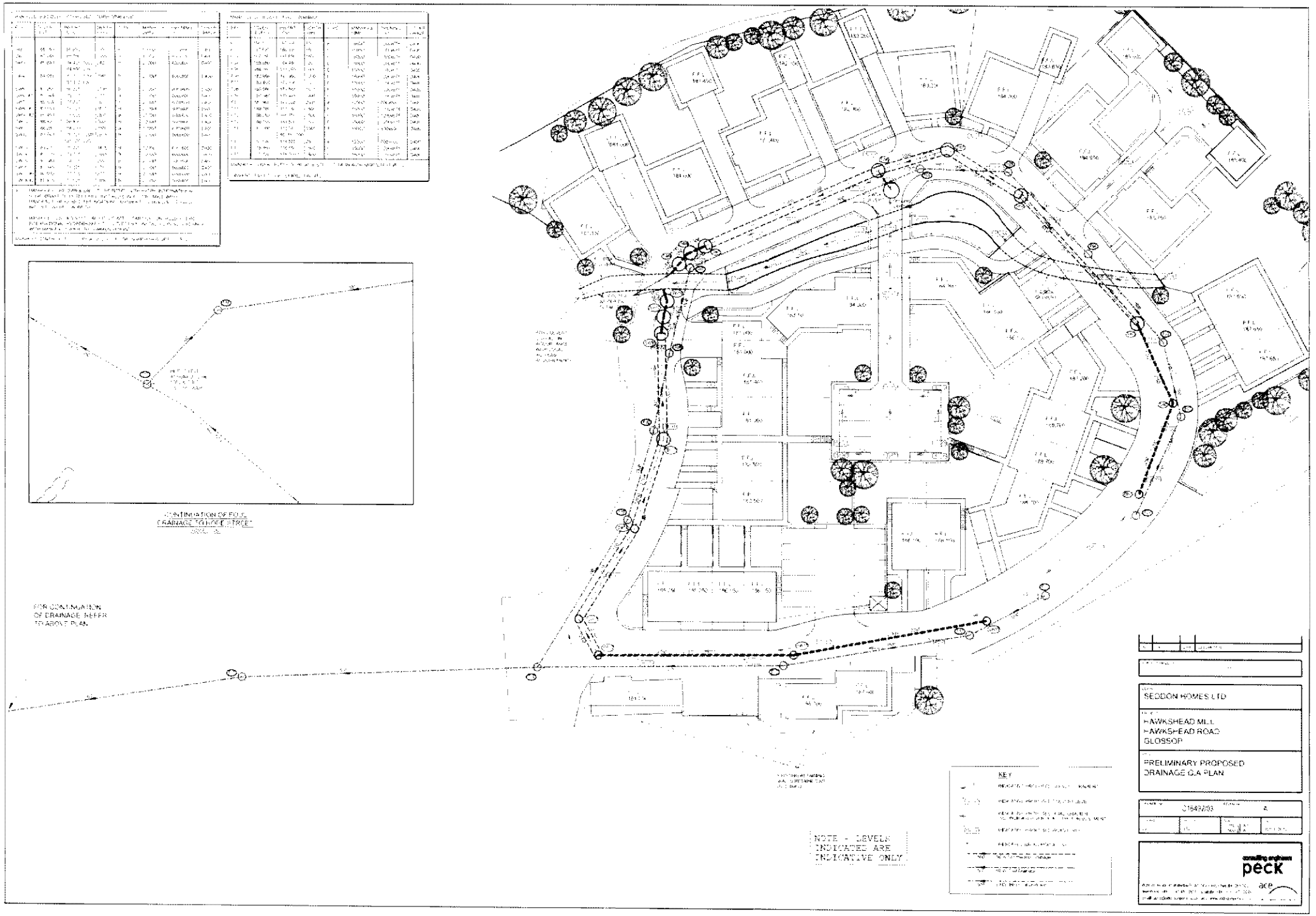
REF	DETAILS

SEDDON HOMES LTD

HAWKSHEAD MILL
HAWKSHEAD ROAD
GLOSSOP

PRELIMINARY PROPOSED
SURFACE WATER DRAINAGE
G.A PLAN & DETAILS

consulting engineers
peck
ace


CONTINUATION OF FOUL DRAINAGE TO MAGE STREET
FOR CONTINUATION OF DRAINAGE REFER TO ABOVE PLAN.
NOTE - LEVELS INDICATED ARE INDICATIVE ONLY
KEY
SEDDON HOMES LTD
HAWKSHEAD MILL
HAWKSHEAD ROAD
GLOSSOP
PRELIMINARY PROPOSED
DRAINAGE G.A PLAN
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