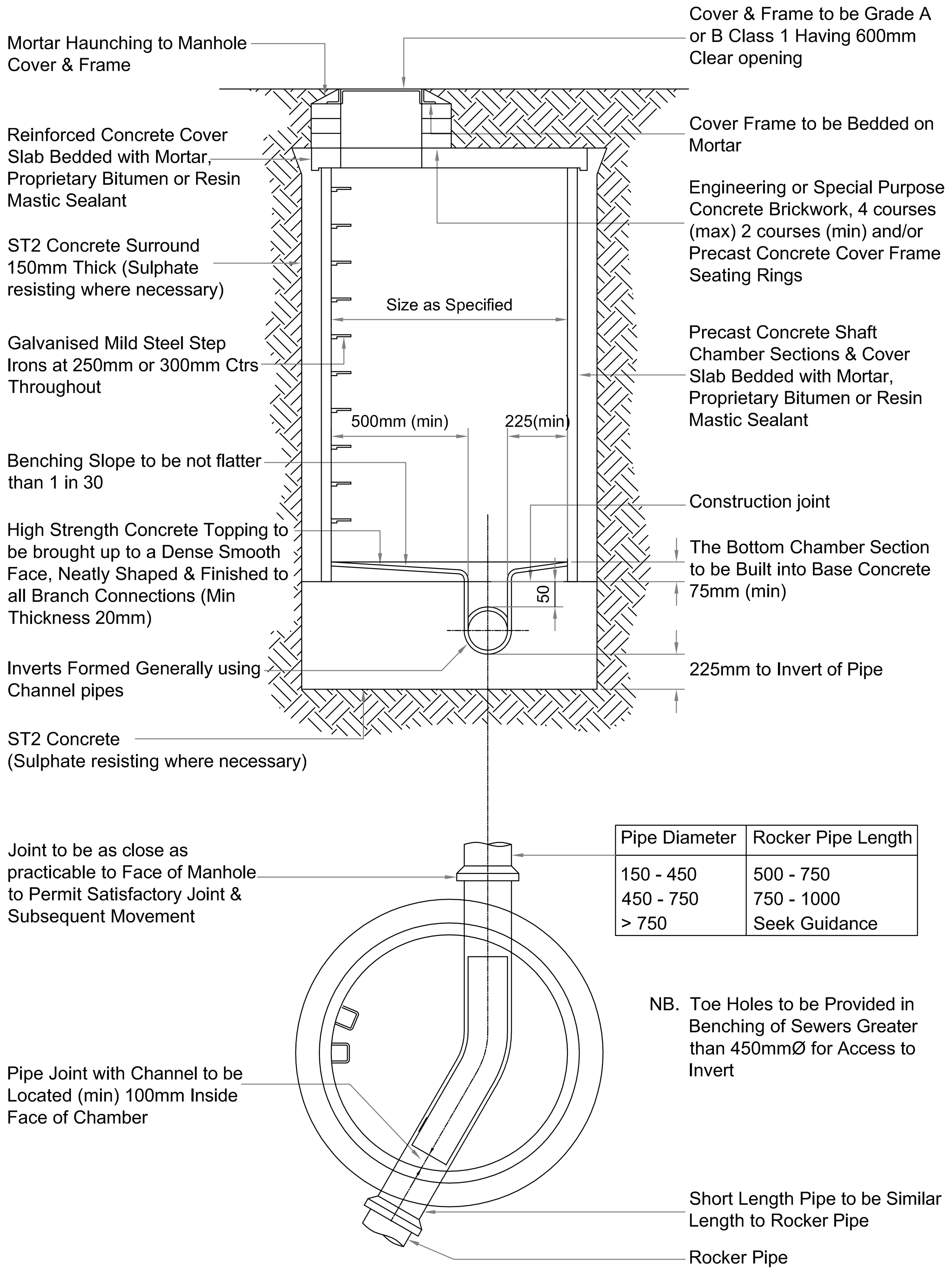
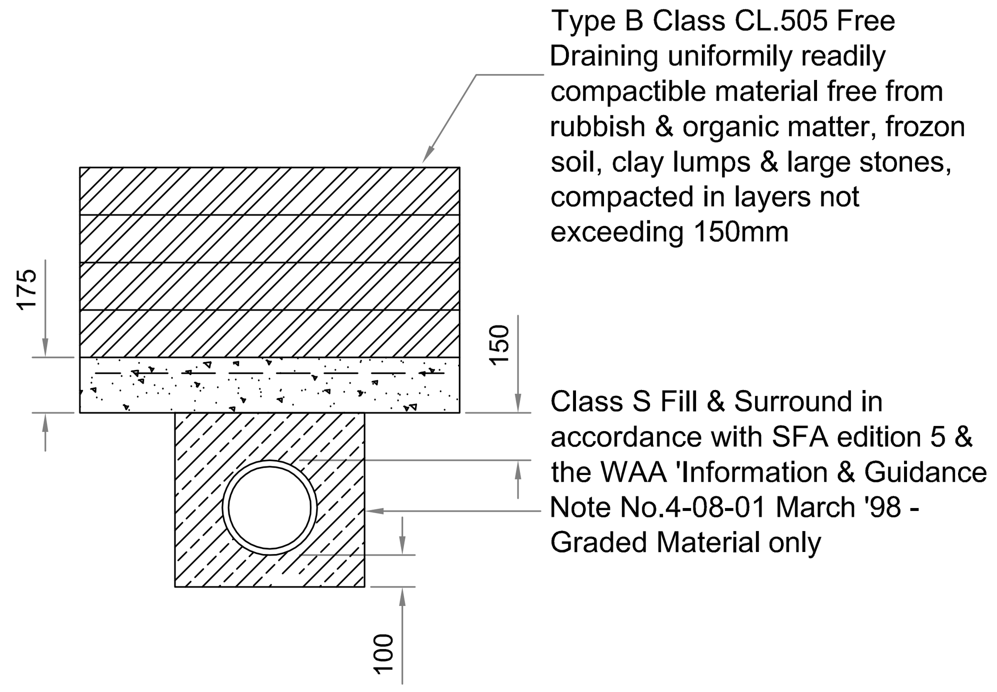


Pipe Diameter	Rocker Pipe Length
150 - 450	500 - 750
450 - 750	750 - 1000
> 750	Seek Guidance

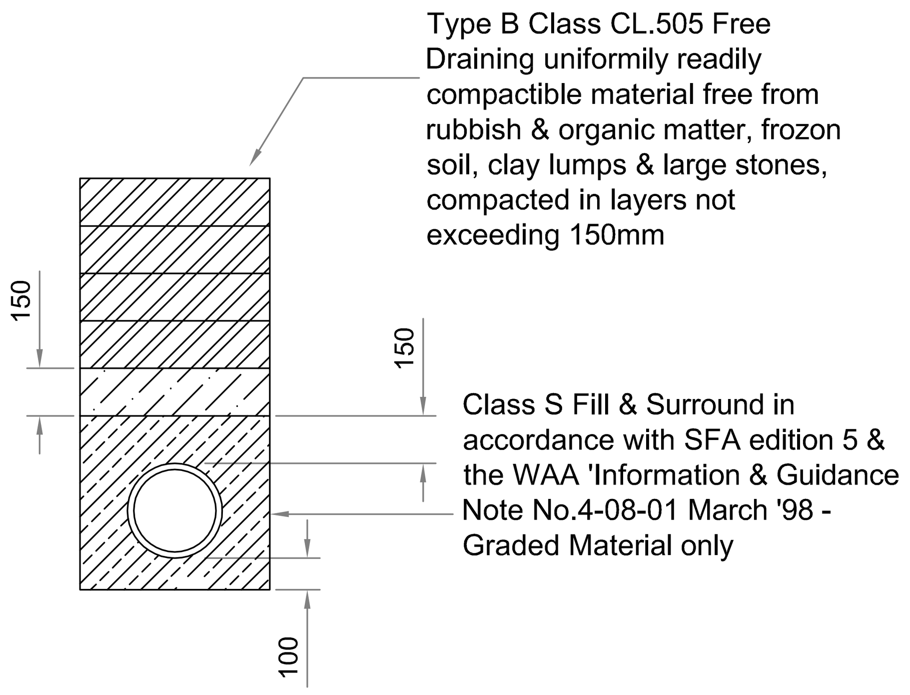
TYPICAL MANHOLE DETAILS Depth to suit Soffit 1.35 - 3.0m

Scale 1:20



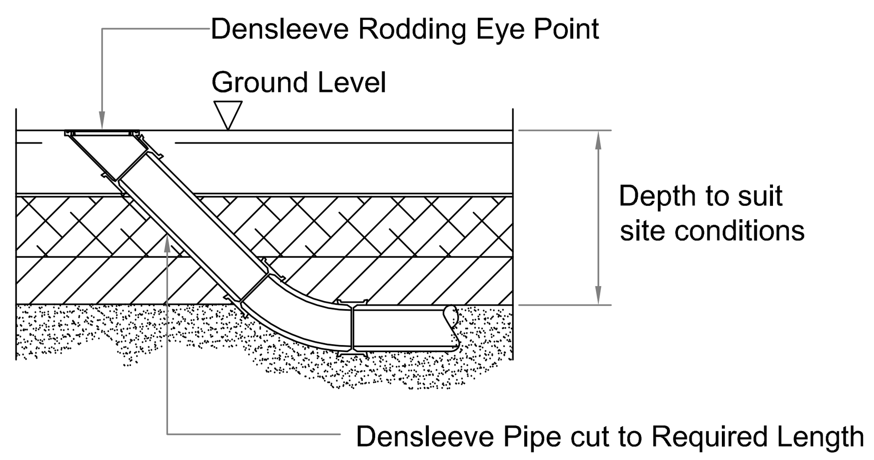
CONCRETE PROTECTION DETAIL

Scale 1:20



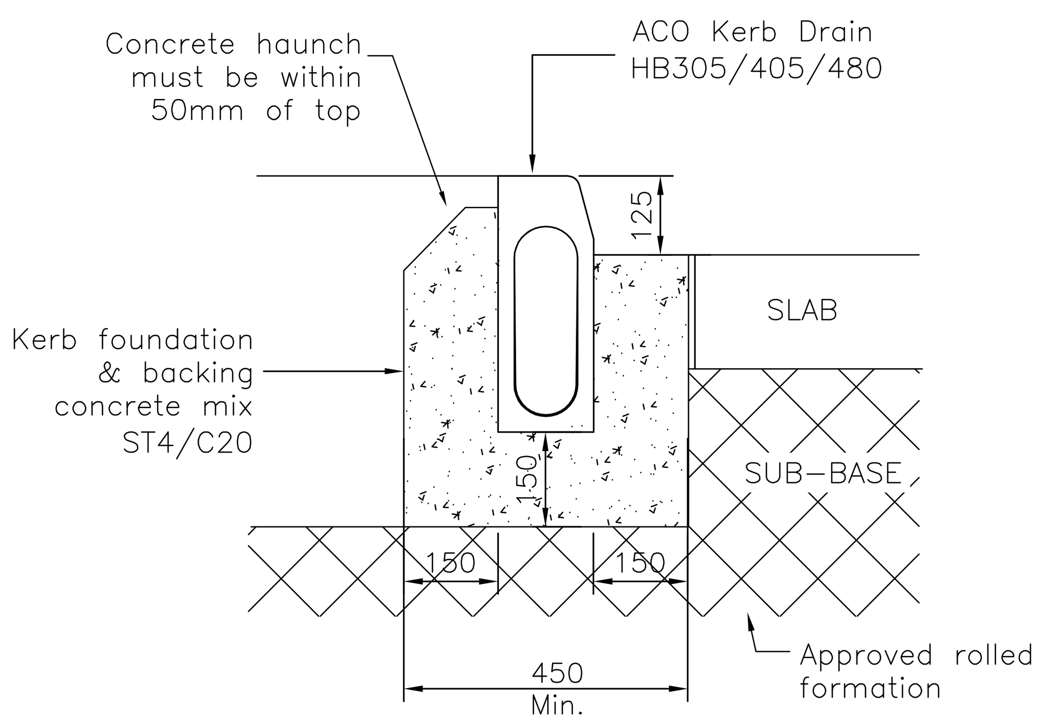
STANDARD BEDDING DETAIL

Scale 1:20



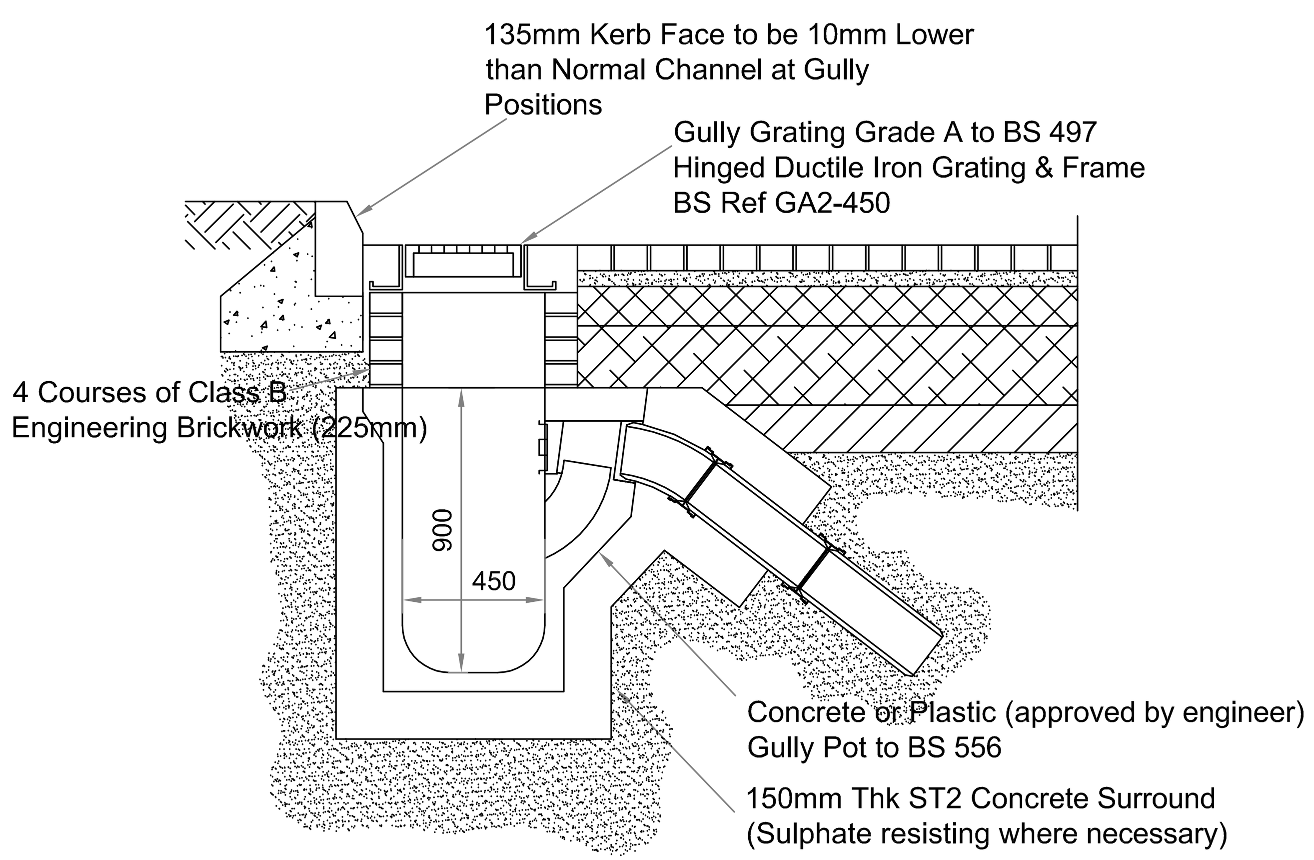
RODDING POINT DETAIL

Scale 1:20



TYPICAL KERB DRAIN DETAILS

Scale 1:10



TYPICAL GULLY DETAILS

Scale 1:20

Hardstanding notes:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND BAILEY JOHNSON HAYES DRAWINGS AND SPECIFICATIONS
2. ALL TOPSOILS, SUBSOILS AND DELETERIOUS MATERIAL IS TO BE STRIPPED FROM BENEATH THE BUILDING ZONE FOR FORMATION LEVELS. THE EXPOSED FORMATION TO BE PROOF ROLLED WITH A TWIN WHEELED VIBRATORY ROLLER WITH A STATIC LOAD OF NOT LESS THAN 35KG/25MM WIDTH. ROLLING IS TO CONTINUE UNTIL THERE IS NO NOTICABLE DEFORMATION UNDER THE ACTION OF THE ROLLER, (MINIMUM OF 8 NO. PASSES)
3. ANY SOFT SPOTS ARE TO BE EXCAVATED OUT AS INSTRUCTED BY BJH AND FILLED/ROLLED WITH ACCEPTABLE SAND/GRAVEL FROM SITE EXCAVATIONS IN LAYERS NOT EXCEEDING 150MM THICK
4. SLABS TO BEAR UPON 1200 GAUGE VISQUEEN WHICH IS TO BE FULLY LAPPED/SEALED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS
5. ALL CONCRETE IS TO BE GRADE C35 TO BS8110, MIN CEMENT CONTENT 330KG/M3 OPC MAXIMUM FREE WATER CEMENT RATIO 0.6 MAXIMUM AGGREGATE SIZE 20MM + 5% AIR ENTRAINED.
6. THE SLAB IS TO BE LAID IN LONG BAY FASHION IN ASSOCIATION WITH THE CONCRETE SOCIETY RECOMMENDATIONS TO RECEIVE A LIGHT BRUSH FINISH
7. MINIMUM MESH LAPS 300MM SIDE AND ENDS: MINIMUM VISQUEEN LAP 300MM
8. IT IS ESSENTIAL THAT ALL TRANSVERSE JOINTS ARE CUT WITHIN 24 HOURS OF CASTING
9. ALL JOINTS ARE TO BE SEALED USING THIOFLEX 600 OR SIMILAR APPROVED
10. SLAB POURING PROGRAMME SHOULD ALLOW 72 HOURS CLEAR BETWEEN CASTING ADJACENT BAYS

Drainage notes:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS & ENGINEERS DRAWINGS & SPECIFICATIONS.
2. DRAINS TO BE PLASTIC HEPWORTH SUPERSLEEVE OR NAYLOR DENSLEEVE: LAID ON CLASS N GRANULAR BEDDING TO BS 882: TABLE 4 OR TO BS 8301: 1985 APPENDIX D. CONCRETE ENCASED PIPES IDENTIFIED ON BJH DRAWINGS.
3. ALL TRENCHES WITHIN TRAFFICKED AREAS TO BE BACKFILLED WITH 75MM DOWNGRADED STONE FILL, PLACED & COMPACTED IN LAYERS OF 150MM. ALL PIPES IN ROADWAYS / PARKING, LESS THAN 900MM DEEP TO BE ENCASED IN CONCRETE. PROVIDE FLEXIBLE JOINTS AT 3000MM CENTRES.
4. MANHOLES TO BE CONSTRUCTED OF PRECAST CONCRETE RINGS TO BS 5911-PART 1. RINGS TO BE BEDDED IN SEALANT STRIPS.
5. MANHOLES BENEATH ROADS & PARKING AREAS TO BE CASED IN 150MM CONCRETE SURROUND.
6. ALL CONNECTIONS TO RAIN WATER PIPES TO BE PROVIDED WITH RODDING ACCESS.
7. ROAD GULLIES TO BE HEPWORTH ROAD GULLIES REF: 213 WITH 150MM DIAMETER OUTLET OR SIMILAR APPROVED. GULLIES TO BE ENCASED IN 150MM MINIMUM CONCRETE. PLASTIC GULLY'S CAN BE USED IN YARDS AND CAR PARKS IN CONSULTATION WITH ENGINEER
8. DRAWINGS TO BE ISSUED TO HE & LOCAL AUTHORITY WELL IN ADVANCE OF COMMENCEMENT OF DRAINAGE CONSTRUCTION.
9. EXISTING MANHOLES IN ROADS TO HAVE INVERT LEVELS CONFIRMED PRIOR TO DRAINAGE CONSTRUCTION.
10. ROADS TO BE REINSTATED TO STANDARD REQUESTED BY LOCAL AUTHORITY WHERE DRAINAGE CROSSES CARRIDGEWAY.

- Allow for all Soft Spots.
- Allow for all Removal if existing Hedges / Trees & Additional Construction Depth as necessary.
- All Earth Batters Remaining to be not steeper than 1 in 2.5.
- Allow for use of Terram as Necessary in softer areas.

PRELIMINARY

Rev	Date	Revision Description

Revision Schedule

Project Title: Axis J9 - Bicester

Client: ALBION LAND

Drawing Title: PHASE 3 Typical Drainage Details

BAILEY JOHNSON HAYES
Consulting Engineers
ST.ALBANS: Suite 4, Phoenix House, 63 Campfield Rd, ST.ALBANS, Herts AL1 5FL
MANCHESTER: Grange House, John Dalton Street, MANCHESTER, M2 6FW

Scale: 1:20,10 @A1
Date: 23.08.21
Drawn: JNG
Drawing Number: S1209-PH3-05

PROPOSED COMMERICAL DEVELOPMENT, AXIS J9, HOWES LANE, BICESTER - PHASE 3

APPENDIX D

BJH DRAINAGE CALCULATIONS:

S1209 dated August 2021

Bailey Johnson Hayes
Suite 4, Phoenix House, 63 Campfield Road
St Albans, Hertfordshire. AL1 5FL
Tel: 01727 841172 Fax: 01727 841085
Web: www.bjh.co.uk

Calculations

PROPOSED DEVELOPMENT,

PHASE 3, AXIS J9, HOWES LANE, BICESTER.

SURFACE WATER DRAINAGE CALCULATIONS

1.0 INTRODUCTION

The following calculations have been prepared to justify the design of a below-ground drainage system to serve the above development. This Rev 0 of the calculations is prepared to review the design of the Phase 3 drainage network to in co-ordination with the existing Axis J9 Phase 1 & 2 which are now nearing completion.

The drainage scheme for the site has been developed in accordance with BJH SSFRA (Issue 1), to attenuate surface water outflows from the proposed development site to a ditch off Howes Lane to a peak figure of 30 litres/second for design rainfall up to and including 100year +CC events. For further details of the existing drainage arrangements & calculations can be found in Rev 4 of the Phase 1 & 2, Axis J9 calculations package.

2.0 DRAINAGE DESIGN

Development of the entire site has created a series of plots to accommodate industrial/commercial buildings, including associated external service yards, access roads, and car parking. Three retention basins/swales have already been constructed within the landscaped areas to the southeast of the development plots. Within the Phase 3 proposals another further industrial/commercial plots are proposed with two further basins/swales to be constructed. Sketch drawings of each basin are appended.

The drainage is designed using the Microdrainage WinDes software package and adopting FEH design rainfall.

Appended to these calculations are drawings as follows:

- S1209-PH3-DD01 Phases 3 Drained Areas.
- S1209-PH3-DD02 Phases 3 Network Design.
- S1209-PH3-DD03 Phase 3 Swales 1 - 2.

The below-ground drainage system is modelled in the System 1 module of WinDes, and then exported into the Simulation module where the two retention basins and two Hydrobrake flow control are included. For the purpose of drainage design zero infiltration flow has been considered, in which case the results are conservative. The Phase 3 site has two separate systems which are modelled as the East site and the West Site for clarity.

3.0 DRAINAGE DESIGN RESULTS

3.1 Phase 3 (East Site)

Microdrainage calculation page 1 presents results of the quick storage estimates where it is predicted that between 607 and 833 m^3 of attenuation volume is required. Microdrainage calculation pages 2-5 present details of the existing network inputs. This is followed by pages 6-14, which presents summary of results for the critical storm event in the 1-year, 30-year and 100-year + 40% return periods. Allowable discharge from the east part of the site has been calculated on page 15 based on a greenfield run off estimation that generates a QBAR of 5.95 l/s. An allowable discharge of 3 l/s for selected based on engineering judgement due to parts of the site remaining as soft landscaping and to reduce downstream effects on Phase 1 & 2.

By inspection no surface flooding is predicted during 1, 30, 100 year + 40% design storms. The maximum water level in the Swale was 82.051m which represents a depth of 826mm.

3.2 Phase 3 (West Site)

Microdrainage calculation page 16 presents results of the quick storage estimates where it is predicted that between 2080 and 2769 m^3 of attenuation volume is required. Microdrainage calculation pages 17-21 present details of the existing network inputs. This is followed by pages 22-30, which presents summary of results for the critical storm event in the 1-year, 30-year and 100-year + 40% return periods. Allowable discharge from the east part of the site has been calculated on page 31 based on a greenfield run off estimation that generates a QBAR of 16.16 l/s. An allowable discharge of 7 l/s for selected based on engineering judgement due to parts of the site remaining as soft landscaping and to reduce downstream effects on Phase 1 & 2.

By inspection no surface flooding is predicted during 1, 30, 100 year + 40% design storms. The maximum water level in the Swale was 82.876m which represents a depth of 1251mm.

4.0 Exceedance events

The buildings are elevated above the lower-lying attenuation basins and therefore safeguarded against flooding in the event of exceedance.

APPENDIX A

BAILEY JOHNSON HAYES DRAWINGS

S1209-PH3-DD01 – Phase 3 Drained Areas

S1209-PH3-DD02 – Phase 3 Network Design

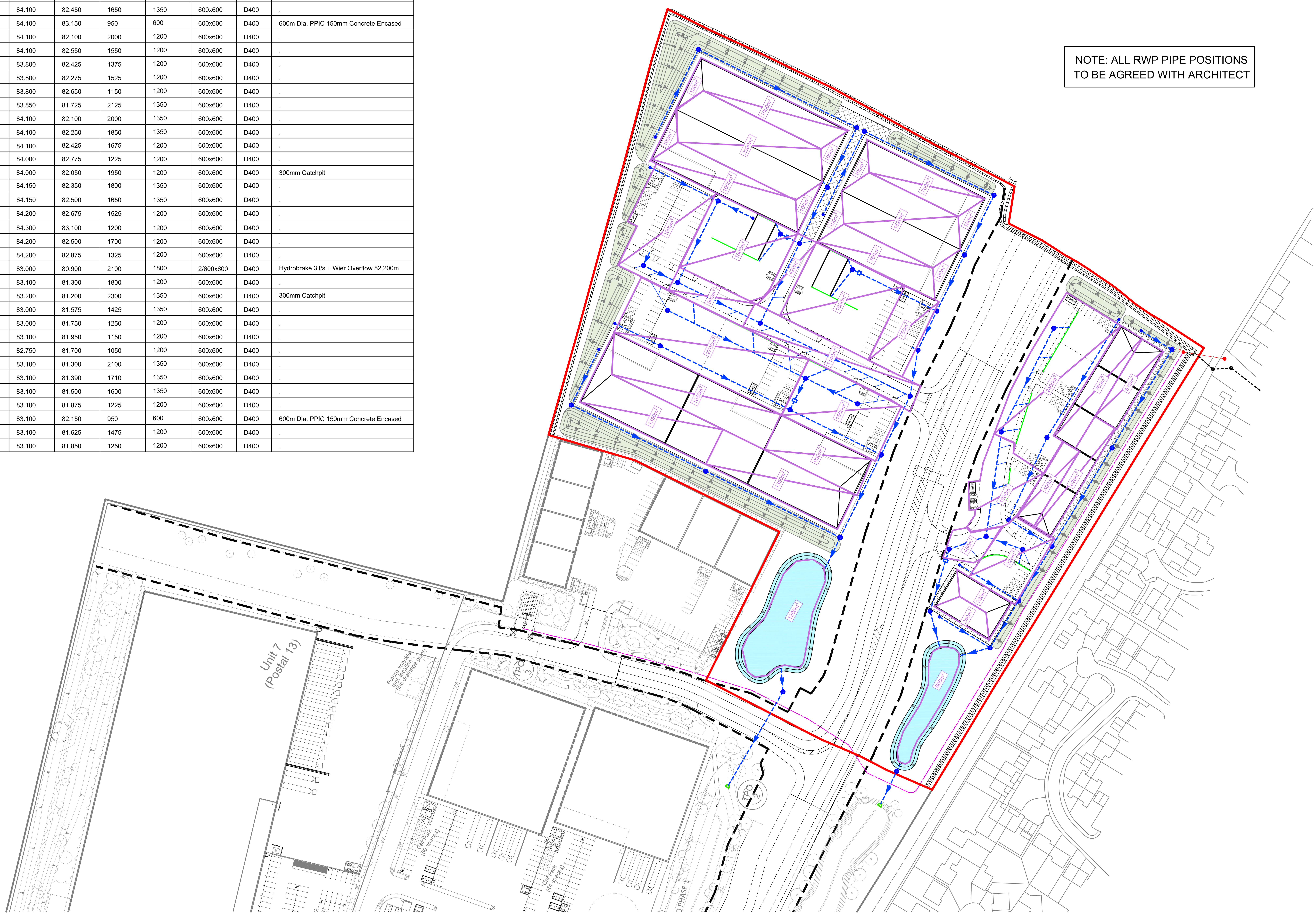
S1209-PH3-DD03 – Phase 3 Swales 1-2

SURFACE WATER MANHOLE / INSPECTION CHAMBER SCHEDULE

MH REF	CL	IL	DEPTH	DIA	OPENING	COVER	COMMENTS
S1	83.450	81.250	2200	1800	2/600x600	D400	Hydrobrake 7 l/s + Wier Overflow 82.850m
S2	84.100	81.700	2700	1800	600x600	D400	300mm Catchpit
S3	84.100	81.850	2250	1800	600x600	D400	.
S4	83.600	81.950	1650	1800	600x600	D400	.
S5	83.700	82.200	1500	1500	600x600	D400	.
S6	83.700	82.425	1275	1350	600x600	D400	.
S7	83.700	82.525	1175	1200	600x600	D400	300mm Catchpit
S8	84.100	82.450	1650	1350	600x600	D400	.
S9	84.100	83.150	950	600	600x600	D400	600m Dia. PPIC 150mm Concrete Encased
S10	84.100	82.100	2000	1200	600x600	D400	.
S11	84.100	82.550	1550	1200	600x600	D400	.
S12	83.800	82.425	1375	1200	600x600	D400	.
S13	83.800	82.275	1525	1200	600x600	D400	.
S14	83.800	82.650	1150	1200	600x600	D400	.
S15	83.850	81.725	2125	1350	600x600	D400	.
S16	84.100	82.100	2000	1350	600x600	D400	.
S17	84.100	82.250	1850	1350	600x600	D400	.
S18	84.100	82.425	1675	1200	600x600	D400	.
S19	84.000	82.775	1225	1200	600x600	D400	.
S20	84.000	82.050	1950	1200	600x600	D400	300mm Catchpit
S21	84.150	82.350	1800	1350	600x600	D400	.
S22	84.150	82.500	1650	1350	600x600	D400	.
S23	84.200	82.675	1525	1200	600x600	D400	.
S24	84.300	83.100	1200	1200	600x600	D400	.
S25	84.200	82.500	1700	1200	600x600	D400	.
S26	84.200	82.875	1325	1200	600x600	D400	.
S27	83.000	80.900	2100	1800	2/600x600	D400	Hydrobrake 3 l/s + Wier Overflow 82.200m
S28	83.100	81.300	1800	1200	600x600	D400	.
S29	83.200	81.200	2300	1350	600x600	D400	300mm Catchpit
S30	83.000	81.575	1425	1350	600x600	D400	.
S31	83.000	81.750	1250	1200	600x600	D400	.
S32	83.100	81.950	1150	1200	600x600	D400	.
S33	82.750	81.700	1050	1200	600x600	D400	.
S34	83.100	81.300	2100	1350	600x600	D400	.
S35	83.100	81.390	1710	1350	600x600	D400	.
S36	83.100	81.500	1600	1350	600x600	D400	.
S37	83.100	81.875	1225	1200	600x600	D400	.
S38	83.100	82.150	950	600	600x600	D400	600m Dia. PPIC 150mm Concrete Encased
S39	83.100	81.625	1475	1200	600x600	D400	.
S40	83.100	81.850	1250	1200	600x600	D400	.

NOTE: ALL DRAINAGE IS INVERT TO INVERT MANHOLE DESIGN

NOTE: ALL RWP PIPE POSITIONS TO BE AGREED WITH ARCHITECT



Phase 3 Drained Areas 1:1000

A1

DRAINAGE NOTES

1 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND BAILEY JOHNSON HAYES DRAWINGS AND SPECIFICATIONS.

2 DRAINS TO BE 'HEPWORTH SUPERSLEEVE' LAID IN CLASS S BEDDING TO BS 882 1983: TABLE 4, OR TO BS 8301 1985: APPENDIX D. 450 DIA DRAINS AND ABOVE TO BE HEPWORTH CONCRETE PIPES CLASS H . OR EQUAL APPROVED
DRAINS WITHIN THE SITE MAY BE THERMOPLASTIC STRUCTURED WALL PIPE IN ACCORDANCE WITH CLAUSE E2.22 OF SFA 8th EDITION

3 ALL TRENCHES WITHIN TRAFFICKED AREAS TO BE BACKFILLED WITH 75 MM DOWN GRADED STONE FILL, PLACED AND COMPACTED IN 150 MM LAYERS. ALL PIPES IN ROADWAYS, SERVICE YARDS AND CARPARKS LESS THAN 1200 MM DEEP TO BE ENCASED IN CONCRETE. PROVIDE FLEXIBLE JOINTS AT 3 METRE CENTRES.

4 MANHOLES TO BE CONSTRUCTED IN PRECAST CONCRETE RINGS TO BS 5911: PART 1. RINGS TO BE BEDDED IN SEALANT STRIPS.

5 MANHOLES IN FOOTPATHS OR LANDSCAPED AREAS TO BE BACKFILLED WITH 40 MM DOWN GRADED STONE FILL, COMPACTED IN LAYERS NOT EXCEEDING 150 MM THICK. MANHOLES BENEATH ROADS AND PARKING AREAS TO BE CASED IN 150 MM CONCRETE SURROUND.

6 ALL CONNECTIONS TO RAIN WATER PIPES TO BE PROVIDED WITH RODDING ACCESS.

7 ALL ROAD GULLIES TO BE HEPWORTH ROAD GULLIES., REF RGR4, WITH 150 MM DIAMETER OUTLETS. GULLIES TO BE ENCASED IN 150 MM MINIMUM CONCRETE.

8 DRAINS UNDER BUILDING AND WITHIN 300 MM OF THE UNDERSIDE OF FLOORSLAB TO BE ENCASED IN 150 MM CONCRETE. CASING TO INCORPORATE FLEXIBLE FIBRE BOARD JOINTS AT SPACINGS AS RECOMMENDED BY THE PIPE MANUFACTURER. DRAINS UNDER BUILDINGS GENERALLY TO HAVE MIN 100 FULL GRANULAR SURROUND TO CLASS S BS8301

9 WHERE PIPES RUN THROUGH GROUND BEAMS, FLEXIBLE JOINT CASINGS AT EACH FACE OF THE GROUND BEAM ARE TO BE PROVIDED. PIPES WHICH RUN UNDER GROUND BEAMS TO BE PROTECTED WITH 50 MM MINIMUM POLYSTYRENE PLACED OVER THE CROWN OF THE PIPE.

10 ALL WORK TO EXISTING PUBLIC SEWERS TO BE IN ACCORDANCE WITH SEWERS FOR ADOPTION 8TH EDITION AND BS 8301 : CODE OF PRACTICE FOR BUILDING DRAINAGE

11 WHERE DRAINS RUN CLOSE TO BUILDINGS AND INVERT LEVELS ARE BELOW FOUNDATIONS THE DRAINS SHOULD BE ENCASED AS FOLLOWS:-

(a) WHERE THE DRAIN TRENCH IS WITHIN 1M OF THE BUILDING THE TRENCH SHOULD BE FILLED WITH CONCRETE UP TO FOUNDATION FORMATION LEVEL or

(b) WHERE THE DRAIN TRENCH IS FURTHER THAN 1M OF THE BUILDING THE TRENCH SHOULD BE FILLED WITH CONCRETE TO A LEVEL BELOW FOUNDATION FORMATION EQUAL TO THE DISTANCE FROM THE BUILDING LESS 150mm.

KEY:

- o INDICATES GULLIES
- ● INDICATES SURFACE WATER MANHOLES
- — INDICATES NEW PIPE RUNS
- — INDICATES LINE DRAIN RUNS
- □ INDICATES EXISTING MANHOLES

ALL PIPES CONNECTED DIRECTY INTO GULLIES TO BE 150MM DIAMETER

20m 10m 0 20m 40m 60m

Scale 1:1000 @A1

INFORMATION

Rev	Date	Revision Description

Revision Schedule

Project Title

Axis J9 - Bicester

Client

ALBION LAND

Drawing Title

PHASE 3
Drained Areas

BAILEY JOHNSON HAYES
Consulting Engineers

ST.ALBANS: Suite 4, Phoenix House, 63 Campfield Rd, ST.ALBANS, Herts AL1 5FL
MANCHESTER: Grange House, John Dalton Street, MANCHESTER, M2 6FW

Scale	1:1000 @A1	Drawing Number
Date	23.08.21	S1209-PH3-DD01
Drawn	JNG	

SURFACE WATER MANHOLE / INSPECTION CHAMBER SCHEDULE

MH REF	CL	IL	DEPTH	DIA	OPENING	COVER	COMMENTS
S1	83.450	81.250	2200	1800	2/600x600	D400	Hydrobrake 7 l/s + Wier Overflow 82.850m
S2	84.100	81.700	2700	1800	600x600	D400	300mm Catchpit
S3	84.100	81.850	2250	1800	600x600	D400	.
S4	83.600	81.950	1650	1800	600x600	D400	.
S5	83.700	82.200	1500	1500	600x600	D400	.
S6	83.700	82.425	1275	1350	600x600	D400	.
S7	83.700	82.525	1175	1200	600x600	D400	300mm Catchpit
S8	84.100	82.450	1650	1350	600x600	D400	.
S9	84.100	83.150	950	600	600x600	D400	600m Dia. PPIC 150mm Concrete Encased
S10	84.100	82.100	2000	1200	600x600	D400	.
S11	84.100	82.550	1550	1200	600x600	D400	.
S12	83.800	82.425	1375	1200	600x600	D400	.
S13	83.800	82.275	1525	1200	600x600	D400	.
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S20	84.000	82.050	1950	1200	600x600	D400	300mm Catchpit
S21	84.150	82.350	1800	1350	600x600	D400	.
S22	84.150	82.500	1650	1350	600x600	D400	.
S23	84.200	82.675	1525	1200	600x600	D400	.
S24	84.300	83.100	1200	1200	600x600	D400	.
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S29	83.200	81.200	2300	1350	600x600	D400	300mm Catchpit
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NOTE: ALL DRAINAGE IS INVERT TO INVERT MANHOLE DESIGN

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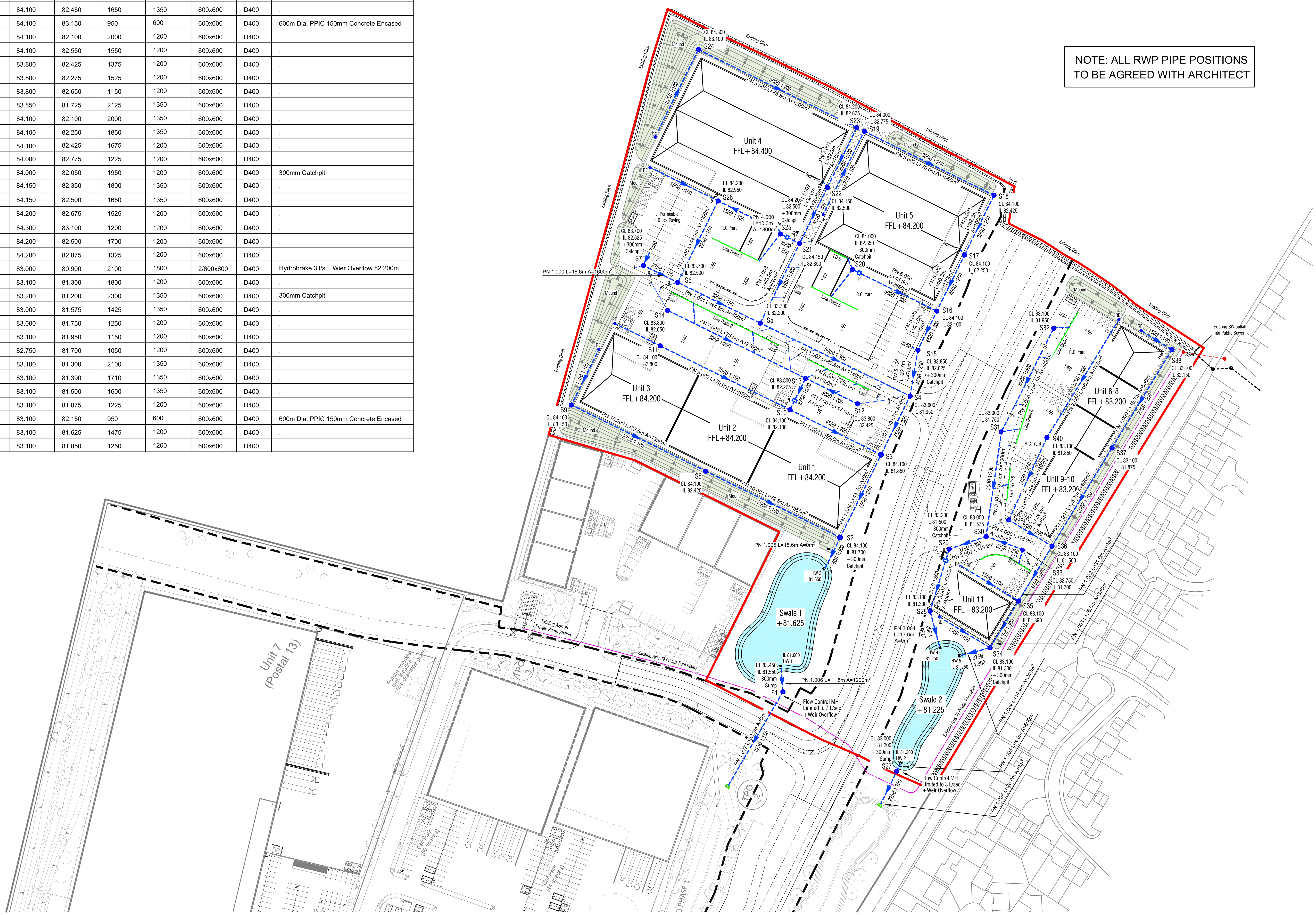

MicroDrainage Network Design 1:1000

A1

DRAINAGE NOTES

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KEY:

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- INDICATES LINE DRAIN RUNS
- □ INDICATES EXISTING MANHOLES

ALL PIPES CONNECTED DIRECTY INTO GULLIES TO BE 150MM DIAMETER

20m 10m 0 20m 40m 60m

Scale 1:1000 @A1

PRELIMINARY

Rev	Date	Revision Description

Revision Schedule

Project Title

Axis J9 - Bicester

Client

ALBION LAND

Drawing Title

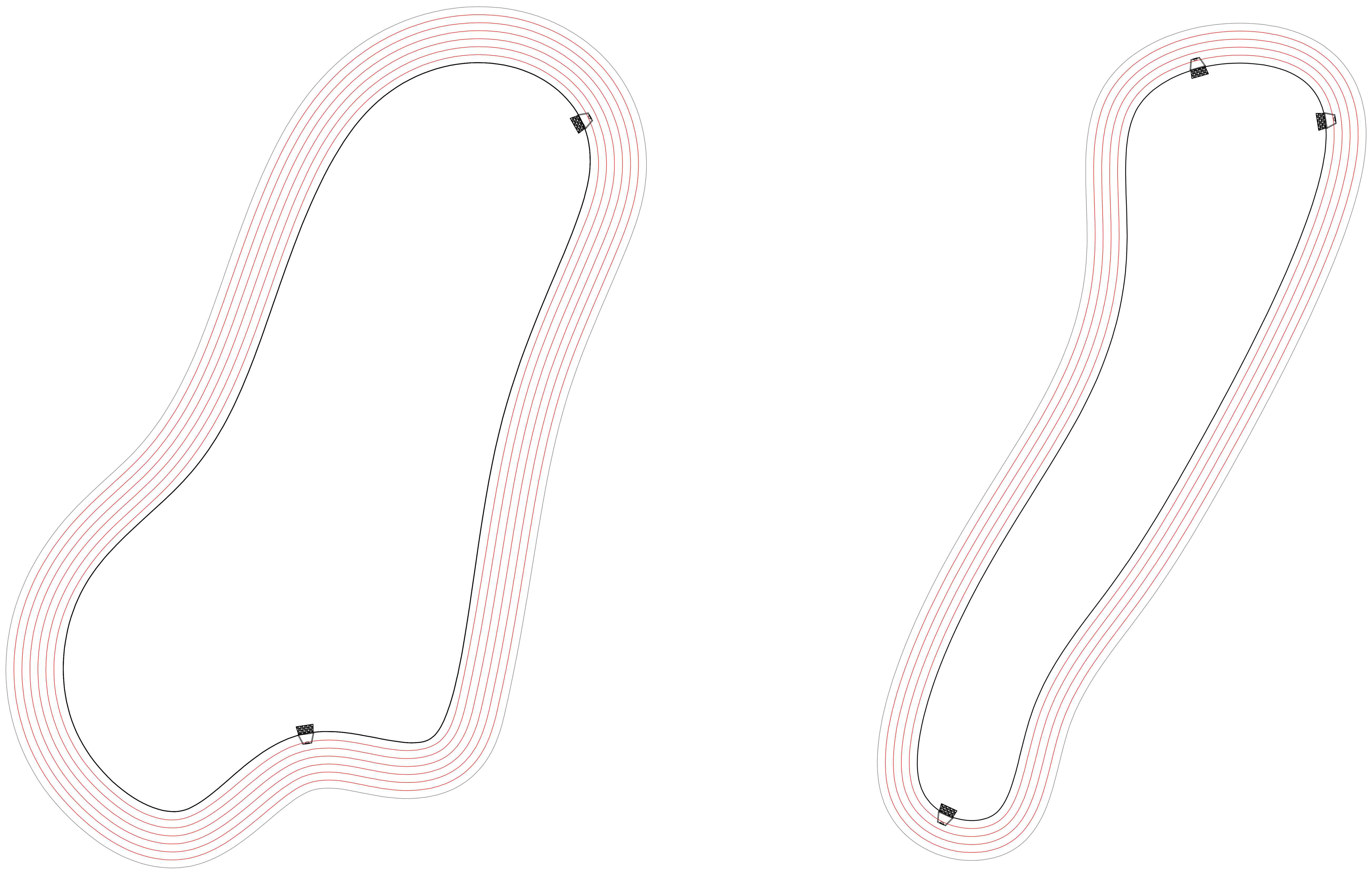
PHASE 3
MicroDrainage Network Design

BAILEY JOHNSON HAYES
Consulting Engineers

ST.ALBANS: Suite 4, Phoenix House, 63 Campfield Rd, ST.ALBANS, Herts AL1 5FL
MANCHESTER: Grange House, John Dalton Street, MANCHESTER, M2 6FW

Scale	1:1000 @A1	Drawing Number
Date	23.08.21	S1209-PH3-DD02
Drawn	JNG	

A1



Swale 1 A=1537m2
81.625 ave IL

Depth = 0 Area = 1190m2
Depth = 0.2 Area = 1283m2
Depth = 0.4 Area = 1377m2
Depth = 0.6 Area = 1474m2
Depth = 0.8 Area = 1573m2
Depth = 1.0 Area = 1674m2
Depth = 1.2 Area = 1777m2
Depth = 1.4 Area = 1883m2

Swale 2 A=1537m2
81.225 ave IL

Depth = 0 Area = 594m2
Depth = 0.2 Area = 677m2
Depth = 0.4 Area = 763m2
Depth = 0.6 Area = 861m2
Depth = 0.8 Area = 941m2
Depth = 1.0 Area = 1033m2

N

Swale 1 & 2 Plan 1:250

INFORMATION

Rev	Date	Revision Description

Revision Schedule

Project Title

Axis J9 - Bicester

Client

ALBION LAND

Drawing Title

PHASE 3
Swale 1 & 2

BAILEY JOHNSON HAYES
Consulting Engineers

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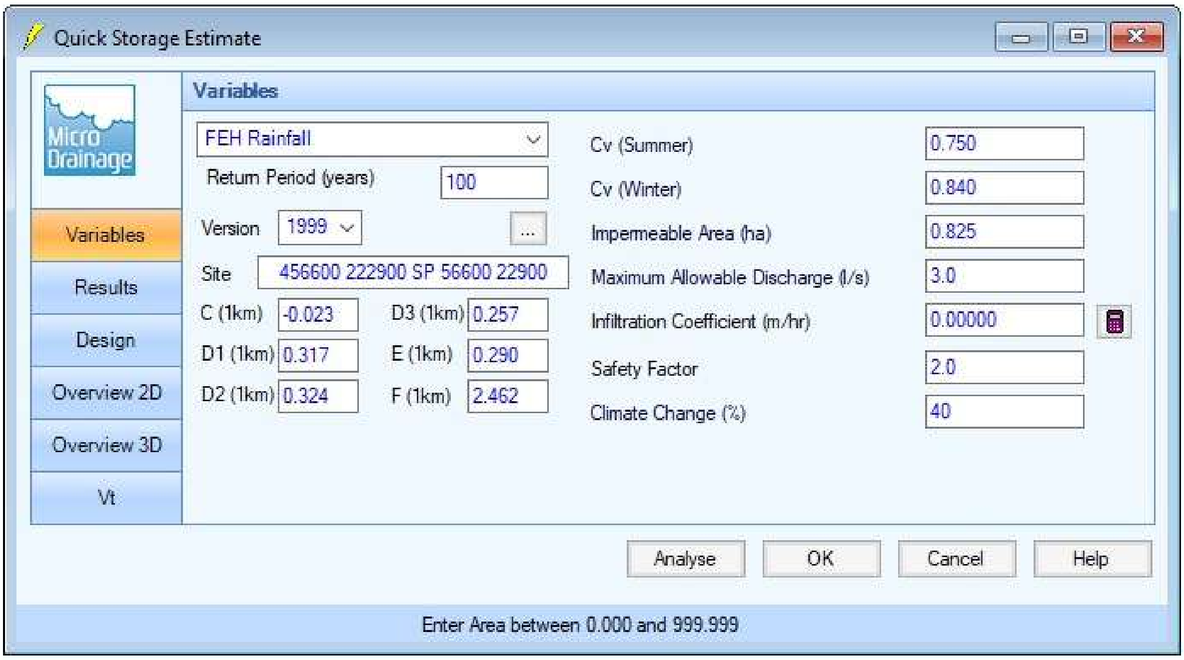
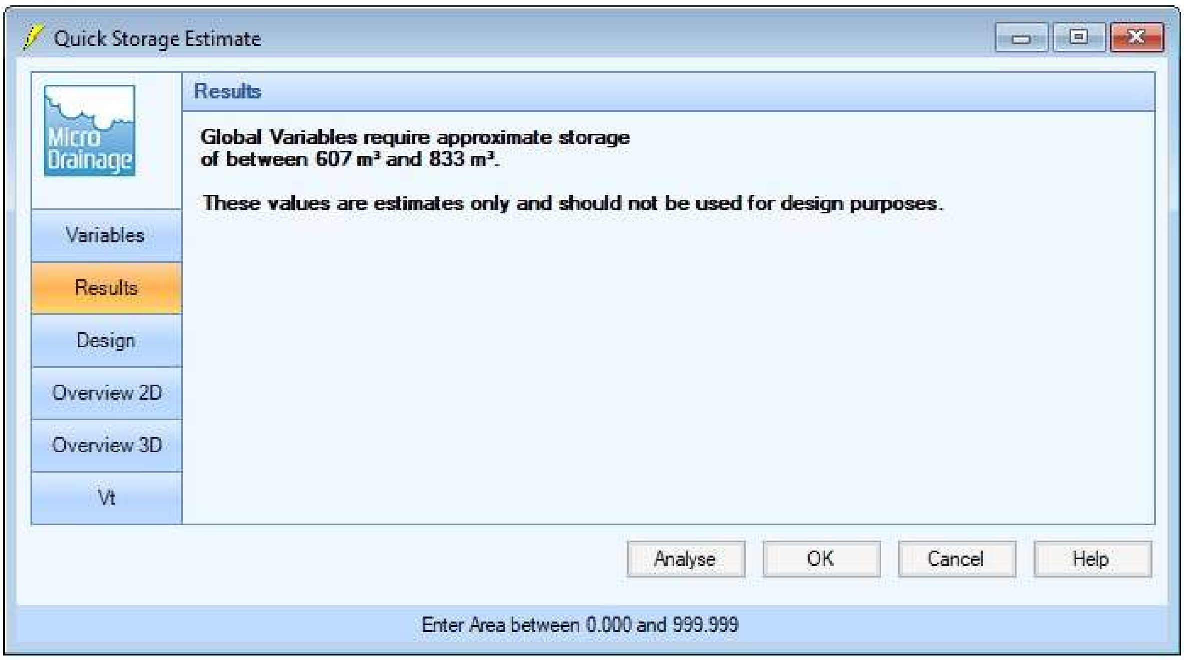
Scale	1:1000 @A1	Drawing Number
Date	23.08.21	S1209-PH3-DD03
Drawn	JNG	

APPENDIX B

MICRODRAINAGE CALCULATIONS PHASE 3

East Site Sub-Catchment – Quick Storage Estimates
100-year + 40% Initial Calculations





STORM SEWER DESIGN by the Modified Rational Method

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
1.000	55.700	0.275	202.5	0.053	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	55.700	0.375	148.5	0.062	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	66.800	0.350	190.9	0.076	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	44.000	0.225	195.6	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	24.500	0.125	196.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	31.000	0.110	281.8	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.003	26.500	0.090	294.4	0.033	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	14.400	0.050	288.0	0.024	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	56.300	0.200	281.5	0.240	5.00	0.0	0.600	o	375	Pipe/Conduit	
3.001	51.200	0.175	292.6	0.100	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.000	18.900	0.125	151.2	0.092	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.002	18.900	0.075	252.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.003	32.000	0.200	160.0	0.045	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.004	17.600	0.050	352.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	4.000	0.050	80.0	0.060	0.00	0.0	0.600	o	450	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	122.08	6.01	82.150	0.053	0.0	0.0	0.0	0.92	36.4	17.5
1.001	112.34	6.74	81.875	0.115	0.0	0.0	0.0	1.29	91.0	35.0
2.000	119.66	6.18	82.200	0.076	0.0	0.0	0.0	0.94	37.5	24.6
2.001	111.13	6.83	81.850	0.116	0.0	0.0	0.0	1.12	79.2	34.9
2.002	106.97	7.20	81.625	0.116	0.0	0.0	0.0	1.12	79.1	34.9
1.002	102.00	7.68	81.500	0.231	0.0	0.0	0.0	1.07	118.7	63.8
1.003	98.09	8.10	81.390	0.264	0.0	0.0	0.0	1.05	116.0	70.1
1.004	96.12	8.33	81.300	0.288	0.0	0.0	0.0	1.06	117.4	75.0
3.000	124.24	5.87	81.950	0.240	0.0	0.0	0.0	1.07	118.7	80.8
3.001	112.99	6.68	81.750	0.340	0.0	0.0	0.0	1.05	116.4	104.0
4.000	134.03	5.30	81.700	0.092	0.0	0.0	0.0	1.06	42.2	33.4
3.002	110.02	6.93	81.575	0.432	0.0	0.0	0.0	1.28	203.0	128.7
3.003	106.30	7.26	81.500	0.477	0.0	0.0	0.0	1.60	255.2	137.3
3.004	103.46	7.53	81.300	0.477	0.0	0.0	0.0	1.08	171.4	137.3
1.005	95.88	8.36	81.250	0.825	0.0	0.0	0.0	2.27	361.8	214.2

STORM SEWER DESIGN by the Modified Rational Method

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
1.006	20.000	0.090	222.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.006	92.78	8.74	81.200	0.825	0.0	0.0	0.0	0.87	34.7«	214.2

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	Exitsing Swale	82.900	81.110	0.000	0	0

Online Controls for Storm

Complex Manhole: S27, DS/PN: 1.006, Volume (m^3): 3.1

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0082-3000-1000-3000
Design Head (m)	1.000
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	81.200
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.0	Kick-Flo®	0.623	2.4
Flush-Flo™	0.297	3.0	Mean Flow over Head Range	-	2.6

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	2.4	1.200	3.3	3.000	5.0	7.000	7.4
0.200	2.9	1.400	3.5	3.500	5.4	7.500	7.7
0.300	3.0	1.600	3.7	4.000	5.7	8.000	7.9
0.400	2.9	1.800	3.9	4.500	6.0	8.500	8.2
0.500	2.8	2.000	4.1	5.000	6.3	9.000	8.4
0.600	2.5	2.200	4.3	5.500	6.6	9.500	8.6
0.800	2.7	2.400	4.5	6.000	6.9		
1.000	3.0	2.600	4.7	6.500	7.2		

Weir

Discharge Coef 0.544 Width (m) 1.800 Invert Level (m) 82.200

Storage Structures for Storm

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

Invert Level (m) 81.250

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	575.0	1.200	1100.0	1.201	0.0

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

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	456600 222900 SP 56600 22900
C (1km)	-0.023
D1 (1km)	0.317
D2 (1km)	0.324
D3 (1km)	0.257
E (1km)	0.290
F (1km)	2.462
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S38	30 Summer	1	+0%					82.212
1.001	S37	30 Summer	1	+0%					81.948
2.000	RE	30 Summer	1	+0%	100/30 Summer				82.273
2.001	S40	30 Summer	1	+0%	100/30 Summer				81.930
2.002	S39	30 Summer	1	+0%	100/30 Summer				81.706
1.002	S36	30 Summer	1	+0%	100/30 Summer				81.617
1.003	S35	30 Summer	1	+0%	100/30 Summer				81.515
1.004	S34	30 Summer	1	+0%	100/30 Summer				81.435
3.000	S32	30 Summer	1	+0%	100/30 Summer				82.075
3.001	S31	30 Summer	1	+0%	100/30 Summer				81.896
4.000	S33	30 Summer	1	+0%	30/30 Summer				81.779
3.002	S30	30 Summer	1	+0%	100/30 Summer				81.731
3.003	S29	30 Summer	1	+0%	100/30 Summer				81.639
3.004	S28	30 Summer	1	+0%	100/30 Summer				81.480

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S38	-0.163	0.000	0.16		5.7	OK	
1.001	S37	-0.227	0.000	0.13		11.4	OK	
2.000	RE	-0.152	0.000	0.22		8.1	OK	
2.001	S40	-0.220	0.000	0.16		11.6	OK	
2.002	S39	-0.219	0.000	0.16		11.6	OK	
1.002	S36	-0.258	0.000	0.21		22.4	OK	
1.003	S35	-0.250	0.000	0.24		24.7	OK	
1.004	S34	-0.240	0.000	0.28		26.3	OK	
3.000	S32	-0.250	0.000	0.23		25.9	OK	
3.001	S31	-0.229	0.000	0.32		34.2	OK	
4.000	S33	-0.146	0.000	0.27		10.3	OK	
3.002	S30	-0.294	0.000	0.26		42.6	OK	
3.003	S29	-0.311	0.000	0.21		45.9	OK	
3.004	S28	-0.270	0.000	0.34		45.7	OK	

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)
1.005	SWALE	480 Winter	1	+0%	100/30 Summer				81.411
1.006	S27	480 Winter	1	+0%	30/30 Summer				81.421

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	SWALE	-0.289	0.000	0.02		3.4	OK	
1.006	S27	-0.004	0.000	0.09		2.9	OK	

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

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	456600 222900 SP 56600 22900
C (1km)	-0.023
D1 (1km)	0.317
D2 (1km)	0.324
D3 (1km)	0.257
E (1km)	0.290
F (1km)	2.462
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S38	30 Summer	30	+0%					82.259
1.001	S37	30 Summer	30	+0%					82.009
2.000	RE	30 Summer	30	+0%	100/30 Summer				82.333
2.001	S40	30 Summer	30	+0%	100/30 Summer				81.996
2.002	S39	30 Summer	30	+0%	100/30 Summer				81.775
1.002	S36	30 Summer	30	+0%	100/30 Summer				81.717
1.003	S35	720 Winter	30	+0%	100/30 Summer				81.670
1.004	S34	720 Winter	30	+0%	100/30 Summer				81.669
3.000	S32	30 Summer	30	+0%	100/30 Summer				82.178
3.001	S31	30 Summer	30	+0%	100/30 Summer				82.038
4.000	S33	30 Summer	30	+0%	30/30 Summer				81.952
3.002	S30	30 Summer	30	+0%	100/30 Summer				81.867
3.003	S29	30 Summer	30	+0%	100/30 Summer				81.749
3.004	S28	720 Winter	30	+0%	100/30 Summer				81.669

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S38	-0.116	0.000	0.46		16.0	OK	
1.001	S37	-0.166	0.000	0.40		34.5	OK	
2.000	RE	-0.092	0.000	0.63		22.7	OK	
2.001	S40	-0.154	0.000	0.46		34.0	OK	
2.002	S39	-0.150	0.000	0.47		33.4	OK	
1.002	S36	-0.158	0.000	0.63		65.8	OK	
1.003	S35	-0.095	0.000	0.07		7.2	OK	
1.004	S34	-0.006	0.000	0.08		7.6	OK	
3.000	S32	-0.147	0.000	0.66		72.8	OK	
3.001	S31	-0.087	0.000	0.91		97.8	OK	
4.000	S33	0.027	0.000	0.71		26.9	SURCHARGED	
3.002	S30	-0.158	0.000	0.75		121.8	OK	
3.003	S29	-0.201	0.000	0.58		129.2	OK	
3.004	S28	-0.081	0.000	0.10		13.0	OK	

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)
1.005	SWALE	720 Winter	30	+0%	100/30 Summer				81.668
1.006	S27	720 Winter	30	+0%	30/30 Summer				81.676

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	SWALE	-0.032	0.000	0.02		3.6	OK	
1.006	S27	0.251	0.000	0.09		3.0	SURCHARGED	

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

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	456600 222900 SP 56600 22900
C (1km)	-0.023
D1 (1km)	0.317
D2 (1km)	0.324
D3 (1km)	0.257
E (1km)	0.290
F (1km)	2.462
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S38	30 Summer	100	+40%					82.350
1.001	S37	30 Summer	100	+40%					82.129
2.000	RE	30 Summer	100	+40%	100/30 Summer				82.657
2.001	S40	30 Summer	100	+40%	100/30 Summer				82.184
2.002	S39	30 Summer	100	+40%	100/30 Summer				82.058
1.002	S36	1440 Winter	100	+40%	100/30 Summer				82.053
1.003	S35	1440 Winter	100	+40%	100/30 Summer				82.052
1.004	S34	1440 Winter	100	+40%	100/30 Summer				82.052
3.000	S32	30 Summer	100	+40%	100/30 Summer				83.037
3.001	S31	30 Summer	100	+40%	100/30 Summer				82.755
4.000	S33	30 Summer	100	+40%	30/30 Summer				82.486
3.002	S30	30 Summer	100	+40%	100/30 Summer				82.268
3.003	S29	30 Summer	100	+40%	100/30 Summer				82.107
3.004	S28	1440 Winter	100	+40%	100/30 Summer				82.052

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S38	-0.025	0.000	0.92		32.2	OK	
1.001	S37	-0.046	0.000	0.79		67.9	OK	
2.000	RE	0.232	0.000	1.20		43.6	SURCHARGED	
2.001	S40	0.034	0.000	0.83		61.8	SURCHARGED	
2.002	S39	0.133	0.000	0.77		54.6	SURCHARGED	
1.002	S36	0.178	0.000	0.07		6.9	SURCHARGED	
1.003	S35	0.287	0.000	0.08		7.8	SURCHARGED	
1.004	S34	0.377	0.000	0.09		8.5	SURCHARGED	
3.000	S32	0.712	0.000	1.17		129.8	FLOOD RISK	
3.001	S31	0.630	0.000	1.63		175.8	FLOOD RISK	
4.000	S33	0.561	0.000	1.34		50.9	FLOOD RISK	
3.002	S30	0.243	0.000	1.38		224.6	SURCHARGED	
3.003	S29	0.157	0.000	1.10		242.4	SURCHARGED	
3.004	S28	0.302	0.000	0.11		14.4	SURCHARGED	

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.	Water Level (m)
1.005	SWALE	1440 Winter	100	+40%	100/30 Summer				82.051
1.006	S27	960 Winter	100	+40%	30/30 Summer				82.077

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	SWALE	0.351	0.000	0.02		3.7	SURCHARGED	
1.006	S27	0.652	0.000	0.09		3.0	SURCHARGED	

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	James Griffiths
Site name:	Axis J9 - Phase 3 (East)
Site location:	Bicester

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.90376° N
Longitude:	1.17967° W
Reference:	322838550
Date:	Aug 23 2021 09:34

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 1.4

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	1	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	628	628
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

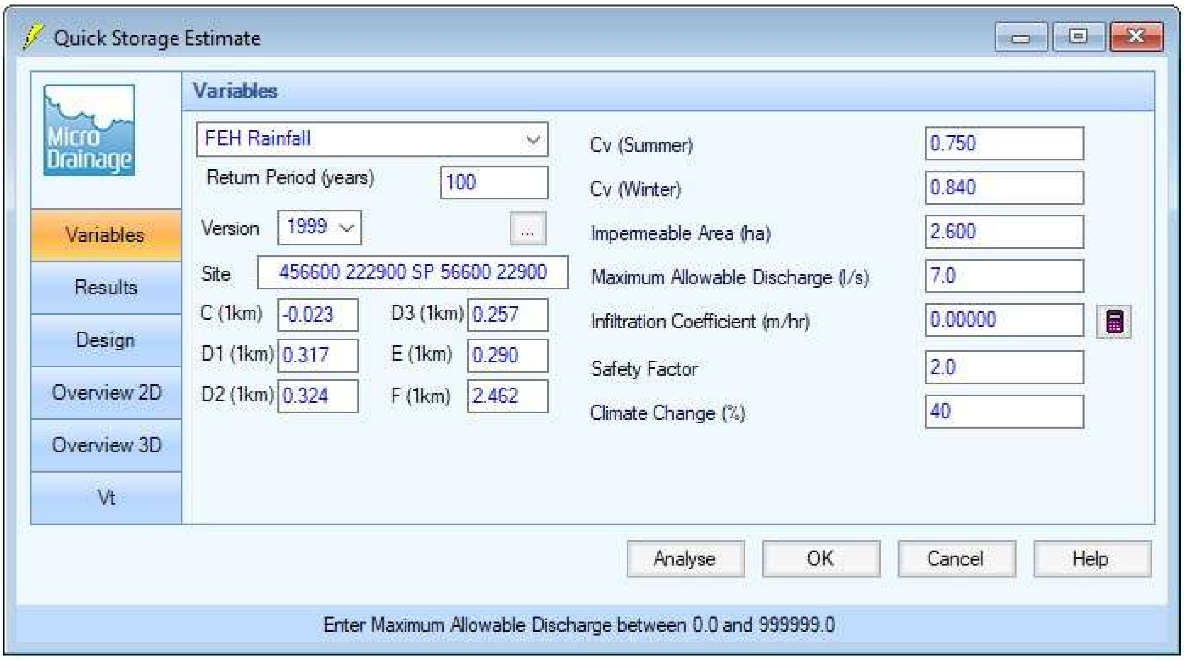
(3) Is SPR/SPRHOST ≤ 0.3?

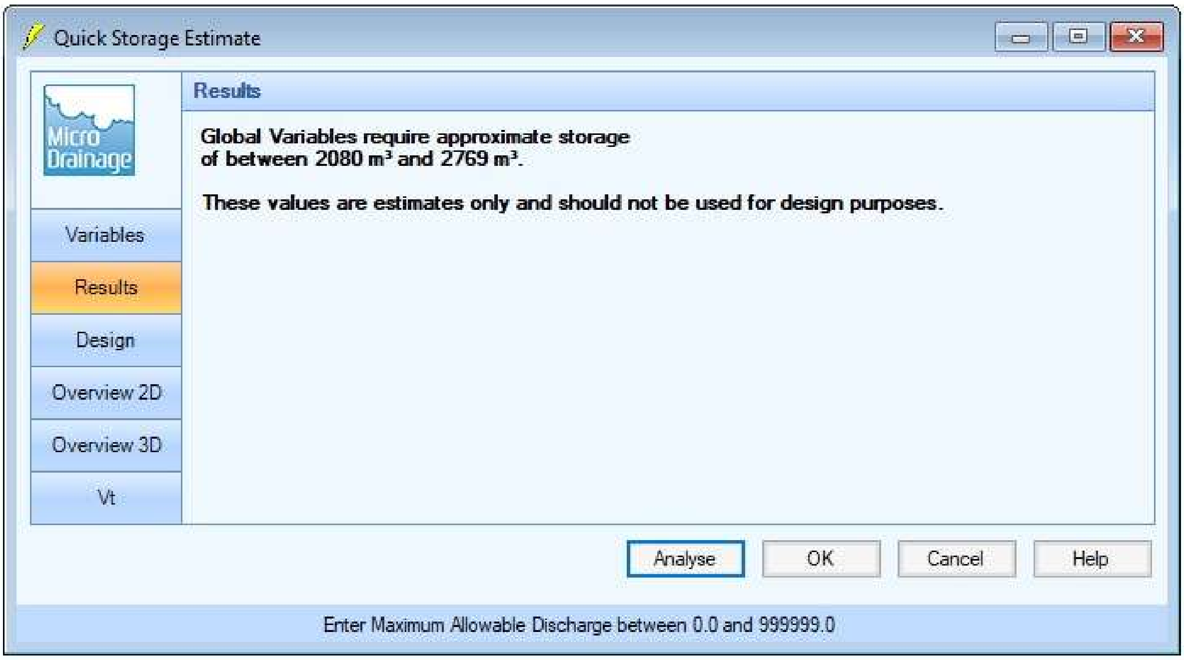
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.21	5.95
1 in 1 year (l/s):	0.18	5.06
1 in 30 years (l/s):	0.48	13.69
1 in 100 year (l/s):	0.66	18.99
1 in 200 years (l/s):	0.77	22.26

West Site Sub-Catchment – Quick Storage Estimates
100-year + 40% Initial Calculations





STORM SEWER DESIGN by the Modified Rational Method

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
1.000	20.000	0.100	200.0	0.160	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	45.000	0.450	100.0	0.100	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	45.000	0.225	200.0	0.050	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	85.800	0.425	201.9	0.120	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	32.300	0.175	184.6	0.010	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	30.600	0.150	204.0	0.200	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.000	10.300	0.150	68.7	0.180	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.003	43.000	0.150	286.7	0.042	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.002	80.000	0.250	320.0	0.114	0.00	0.0	0.600	o	600	Pipe/Conduit	
5.000	70.000	0.350	200.0	0.106	5.00	0.0	0.600	o	300	Pipe/Conduit	
5.001	32.300	0.175	184.6	0.010	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.002	30.000	0.150	200.0	0.170	0.00	0.0	0.600	o	375	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	103.34	5.30	82.525	0.160	0.0	0.0	0.0	1.11	78.3	44.8
2.000	99.68	5.57	82.875	0.100	0.0	0.0	0.0	1.31	52.0	27.0
1.001	92.77	6.16	82.425	0.310	0.0	0.0	0.0	1.28	141.1	77.9
3.000	91.33	6.30	83.100	0.120	0.0	0.0	0.0	1.10	78.0	29.7
3.001	86.76	6.76	82.675	0.130	0.0	0.0	0.0	1.15	81.6	30.5
3.002	83.23	7.17	82.500	0.330	0.0	0.0	0.0	1.26	139.7	74.4
4.000	106.38	5.09	82.500	0.180	0.0	0.0	0.0	1.90	134.3	51.9
3.003	78.04	7.84	82.350	0.552	0.0	0.0	0.0	1.07	117.6	116.7
1.002	71.70	8.82	82.200	0.976	0.0	0.0	0.0	1.36	383.4	189.5
5.000	93.95	6.05	82.775	0.106	0.0	0.0	0.0	1.11	78.3	27.0
5.001	89.08	6.52	82.425	0.116	0.0	0.0	0.0	1.15	81.6	28.0
5.002	85.43	6.91	82.250	0.286	0.0	0.0	0.0	1.28	141.1	66.2

STORM SEWER DESIGN by the Modified Rational Method

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
6.000	45.000	0.150	300.0	0.266	5.00	0.0	0.600	o	375	Pipe/Conduit	
5.003	21.000	0.075	280.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.004	22.700	0.075	302.7	0.075	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.003	31.700	0.100	317.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
7.000	75.000	0.375	200.0	0.270	5.00	0.0	0.600	o	375	Pipe/Conduit	
8.000	30.000	0.150	200.0	0.150	5.00	0.0	0.600	o	300	Pipe/Conduit	
7.001	17.000	0.175	97.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
9.000	70.000	0.450	155.6	0.165	5.00	0.0	0.600	o	300	Pipe/Conduit	
7.002	50.000	0.250	200.0	0.093	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	45.000	0.150	300.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
10.000	72.500	0.725	100.0	0.135	5.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
6.000	97.84	5.72	82.250	0.266	0.0	0.0	0.0	1.04	115.0	70.5
5.003	82.95	7.20	82.100	0.552	0.0	0.0	0.0	1.21	192.4	124.0
5.004	80.36	7.53	82.025	0.627	0.0	0.0	0.0	1.16	185.0	136.5
1.003	69.52	9.21	81.950	1.603	0.0	0.0	0.0	1.36	385.2	301.8
7.000	94.79	5.98	82.650	0.270	0.0	0.0	0.0	1.28	141.1	69.3
8.000	101.28	5.45	82.425	0.150	0.0	0.0	0.0	1.11	78.3	41.1
7.001	93.08	6.13	82.275	0.420	0.0	0.0	0.0	1.84	203.1	105.9
9.000	95.38	5.93	82.550	0.165	0.0	0.0	0.0	1.26	88.9	42.6
7.002	87.22	6.71	82.100	0.678	0.0	0.0	0.0	1.43	228.1	160.2
1.004	67.10	9.68	81.850	2.281	0.0	0.0	0.0	1.61	711.5	414.5
10.000	95.41	5.92	83.150	0.135	0.0	0.0	0.0	1.31	52.0	34.9

STORM SEWER DESIGN by the Modified Rational Method

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
10.001	72.500	0.725	100.0	0.135	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	18.600	0.050	372.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.006	11.500	0.050	230.0	0.120	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	52.000	0.350	148.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
10.001	87.42	6.69	82.425	0.270	0.0	0.0	0.0	1.57	111.1	63.9
1.005	66.05	9.89	81.700	2.551	0.0	0.0	0.0	1.44	638.4	456.3
1.006	65.37	10.03	81.650	2.671	0.0	0.0	0.0	1.34	212.5«	472.9
1.007	61.83	10.84	81.600	2.671	0.0	0.0	0.0	1.07	42.6«	472.9

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)
1.007	Existing Swale	82.800	81.250	0.000	0	0

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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	5
FEH Rainfall Version	1999
Site Location	456600 222900 SP 56600 22900
C (1km)	-0.023
D1 (1km)	0.317

Synthetic Rainfall Details

D2 (1km)	0.324
D3 (1km)	0.257
E (1km)	0.290
F (1km)	2.462
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

Online Controls for Storm

Complex Manhole: S1, DS/PN: 1.007, Volume (m^3): 4.2

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0120-7000-1250-7000
Design Head (m)	1.250
Design Flow (l/s)	7.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	120
Invert Level (m)	81.600
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.250	7.0
Flush-Flo™	0.366	7.0
Kick-Flo®	0.783	5.6
Mean Flow over Head Range	-	6.1

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	4.3	1.200	6.9	3.000	10.6	7.000	15.8
0.200	6.6	1.400	7.4	3.500	11.4	7.500	16.3
0.300	7.0	1.600	7.9	4.000	12.1	8.000	16.9
0.400	7.0	1.800	8.3	4.500	12.8	8.500	17.4
0.500	6.9	2.000	8.7	5.000	13.5	9.000	17.8
0.600	6.7	2.200	9.1	5.500	14.1	9.500	18.3
0.800	5.7	2.400	9.5	6.000	14.7		
1.000	6.3	2.600	9.9	6.500	15.3		

Weir

Discharge Coef 0.544 Width (m) 1.800 Invert Level (m) 82.850

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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	456600 222900 SP 56600 22900
C (1km)	-0.023
D1 (1km)	0.317
D2 (1km)	0.324
D3 (1km)	0.257
E (1km)	0.290
F (1km)	2.462
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S7	60 Summer	1	+0%	100/60 Summer				82.614
2.000	S26	60 Summer	1	+0%	100/60 Summer				82.936
1.001	S6	60 Summer	1	+0%	100/60 Summer				82.537
3.000	S24	60 Summer	1	+0%	100/60 Summer				83.172
3.001	S23	60 Summer	1	+0%	100/60 Summer				82.749
3.002	S22	60 Summer	1	+0%	100/60 Summer				82.615
4.000	S25	60 Summer	1	+0%	30/60 Summer				82.578
3.003	S21	60 Summer	1	+0%	100/60 Summer				82.513
1.002	S5	60 Summer	1	+0%	100/60 Summer				82.387
5.000	S19	60 Summer	1	+0%	100/60 Summer				82.843

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S7	-0.211	0.000	0.19		13.2	OK	
2.000	S26	-0.164	0.000	0.17		8.2	OK	
1.001	S6	-0.263	0.000	0.19		25.0	OK	
3.000	S24	-0.228	0.000	0.13		9.6	OK	
3.001	S23	-0.226	0.000	0.14		10.3	OK	
3.002	S22	-0.260	0.000	0.20		25.1	OK	
4.000	S25	-0.222	0.000	0.15		14.9	OK	
3.003	S21	-0.212	0.000	0.39		42.2	OK	
1.002	S5	-0.413	0.000	0.21		73.6	OK	
5.000	S19	-0.232	0.000	0.11		8.6	OK	

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)
5.001	S18	60 Summer	1	+0%	30/60 Summer				82.495
5.002	S17	60 Summer	1	+0%	30/60 Summer				82.356
6.000	S20	60 Summer	1	+0%	30/60 Summer				82.366
5.003	S16	60 Summer	1	+0%	30/60 Summer				82.282
5.004	S15	60 Summer	1	+0%	30/60 Summer				82.247
1.003	S4	60 Summer	1	+0%	100/60 Summer				82.219
7.000	S14	60 Summer	1	+0%	100/60 Summer				82.752
8.000	S12	60 Summer	1	+0%	100/60 Summer				82.509
7.001	S13	60 Summer	1	+0%	100/60 Summer				82.390
9.000	S11	60 Summer	1	+0%	100/60 Summer				82.630
7.002	S10	60 Summer	1	+0%	100/60 Summer				82.256
1.004	S3	60 Summer	1	+0%	100/60 Summer				82.140
10.000	S9	60 Summer	1	+0%	100/60 Summer				83.221
10.001	S8	60 Summer	1	+0%	100/60 Summer				82.516
1.005	S2	60 Summer	1	+0%	100/60 Summer				82.030
1.006	SWALE	960 Winter	1	+0%	30/60 Winter				81.930
1.007	S1	960 Winter	1	+0%	1/60 Winter				81.928

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.001	S18	-0.230	0.000	0.12		9.3	OK	
5.002	S17	-0.269	0.000	0.18		22.0	OK	
6.000	S20	-0.259	0.000	0.21		21.7	OK	
5.003	S16	-0.268	0.000	0.26		41.3	OK	
5.004	S15	-0.228	0.000	0.30		45.2	OK	
1.003	S4	-0.331	0.000	0.36		115.0	OK	
7.000	S14	-0.273	0.000	0.16		21.9	OK	
8.000	S12	-0.216	0.000	0.17		12.4	OK	
7.001	S13	-0.260	0.000	0.21		34.1	OK	
9.000	S11	-0.220	0.000	0.16		13.4	OK	
7.002	S10	-0.294	0.000	0.26		53.9	OK	
1.004	S3	-0.460	0.000	0.27		161.2	OK	
10.000	S9	-0.154	0.000	0.22		11.0	OK	
10.001	S8	-0.209	0.000	0.20		21.0	OK	
1.005	S2	-0.420	0.000	0.40		177.9	OK	
1.006	SWALE	-0.170	0.000	0.04		6.9	OK	
1.007	S1	0.103	0.000	0.17		6.8	SURCHARGED	

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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	456600 222900 SP 56600 22900
C (1km)	-0.023
D1 (1km)	0.317
D2 (1km)	0.324
D3 (1km)	0.257
E (1km)	0.290
F (1km)	2.462
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S7	60 Summer	30	+0%	100/60 Summer				82.679
2.000	S26	60 Summer	30	+0%	100/60 Summer				82.980
1.001	S6	60 Summer	30	+0%	100/60 Summer				82.619
3.000	S24	60 Summer	30	+0%	100/60 Summer				83.223
3.001	S23	60 Summer	30	+0%	100/60 Summer				82.804
3.002	S22	60 Summer	30	+0%	100/60 Summer				82.743
4.000	S25	60 Summer	30	+0%	30/60 Summer				82.819
3.003	S21	60 Summer	30	+0%	100/60 Summer				82.696
1.002	S5	60 Summer	30	+0%	100/60 Summer				82.550
5.000	S19	60 Summer	30	+0%	100/60 Summer				82.890

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S7	-0.146	0.000	0.52		35.3	OK	
2.000	S26	-0.120	0.000	0.44		22.0	OK	
1.001	S6	-0.181	0.000	0.52		67.3	OK	
3.000	S24	-0.177	0.000	0.34		25.7	OK	
3.001	S23	-0.171	0.000	0.37		27.3	OK	
3.002	S22	-0.132	0.000	0.54		66.6	OK	
4.000	S25	0.019	0.000	0.39		37.9	SURCHARGED	
3.003	S21	-0.029	0.000	1.00		107.4	OK	
1.002	S5	-0.250	0.000	0.54		188.3	OK	
5.000	S19	-0.185	0.000	0.30		22.9	OK	

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)
5.001	S18	60 Summer	30	+0%	30/60 Summer				82.773
5.002	S17	60 Summer	30	+0%	30/60 Summer				82.752
6.000	S20	60 Summer	30	+0%	30/60 Summer				82.734
5.003	S16	60 Summer	30	+0%	30/60 Summer				82.643
5.004	S15	60 Summer	30	+0%	30/60 Summer				82.549
1.003	S4	60 Summer	30	+0%	100/60 Summer				82.457
7.000	S14	60 Summer	30	+0%	100/60 Summer				82.825
8.000	S12	60 Summer	30	+0%	100/60 Summer				82.569
7.001	S13	60 Summer	30	+0%	100/60 Summer				82.506
9.000	S11	60 Summer	30	+0%	100/60 Summer				82.687
7.002	S10	60 Summer	30	+0%	100/60 Summer				82.463
1.004	S3	60 Summer	30	+0%	100/60 Summer				82.380
10.000	S9	60 Summer	30	+0%	100/60 Summer				83.275
10.001	S8	60 Summer	30	+0%	100/60 Summer				82.585
1.005	S2	960 Winter	30	+0%	100/60 Summer				82.340
1.006	SWALE	960 Winter	30	+0%	30/60 Winter				82.336
1.007	S1	960 Winter	30	+0%	1/60 Winter				82.359

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.001	S18	0.048	0.000	0.29		21.7	SURCHARGED	
5.002	S17	0.127	0.000	0.43		53.3	SURCHARGED	
6.000	S20	0.109	0.000	0.51		53.6	SURCHARGED	
5.003	S16	0.093	0.000	0.55		86.3	SURCHARGED	
5.004	S15	0.074	0.000	0.61		93.6	SURCHARGED	
1.003	S4	-0.093	0.000	0.85		270.2	OK	
7.000	S14	-0.200	0.000	0.44		58.4	OK	
8.000	S12	-0.156	0.000	0.46		33.1	OK	
7.001	S13	-0.144	0.000	0.54		88.7	OK	
9.000	S11	-0.163	0.000	0.42		35.7	OK	
7.002	S10	-0.087	0.000	0.64		132.5	OK	
1.004	S3	-0.220	0.000	0.66		389.0	OK	
10.000	S9	-0.100	0.000	0.58		29.2	OK	
10.001	S8	-0.140	0.000	0.54		58.0	OK	
1.005	S2	-0.110	0.000	0.12		54.5	OK	
1.006	SWALE	0.236	0.000	0.05		7.5	SURCHARGED	
1.007	S1	0.534	0.000	0.17		6.8	SURCHARGED	

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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	456600 222900 SP 56600 22900
C (1km)	-0.023
D1 (1km)	0.317
D2 (1km)	0.324
D3 (1km)	0.257
E (1km)	0.290
F (1km)	2.462
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S7	60 Summer	100	+40%	100/60 Summer				83.642
2.000	S26	60 Summer	100	+40%	100/60 Summer				83.778
1.001	S6	60 Summer	100	+40%	100/60 Summer				83.555
3.000	S24	60 Summer	100	+40%	100/60 Summer				84.174
3.001	S23	60 Summer	100	+40%	100/60 Summer				84.044
3.002	S22	60 Summer	100	+40%	100/60 Summer				83.945
4.000	S25	60 Summer	100	+40%	30/60 Summer				83.959
3.003	S21	60 Summer	100	+40%	100/60 Summer				83.834
1.002	S5	60 Summer	100	+40%	100/60 Summer				83.404
5.000	S19	60 Summer	100	+40%	100/60 Summer				83.762

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S7	0.817	0.000	0.83		56.4	FLOOD RISK	
2.000	S26	0.678	0.000	0.74		36.5	SURCHARGED	
1.001	S6	0.755	0.000	0.81		105.5	FLOOD RISK	
3.000	S24	0.774	0.000	0.55		41.6	FLOOD RISK	
3.001	S23	1.069	0.000	0.59		43.9	FLOOD RISK	
3.002	S22	1.070	0.000	0.85		105.5	FLOOD RISK	
4.000	S25	1.159	0.000	0.67		64.8	FLOOD RISK	
3.003	S21	1.109	0.000	1.68		180.5	SURCHARGED	
1.002	S5	0.604	0.000	0.90		317.7	FLOOD RISK	
5.000	S19	0.687	0.000	0.49		36.8	FLOOD RISK	

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.	Water Level (m)
5.001	S18	60 Summer	100	+40%	30/60 Summer				83.663
5.002	S17	60 Summer	100	+40%	30/60 Summer				83.563
6.000	S20	60 Summer	100	+40%	30/60 Summer				83.581
5.003	S16	60 Summer	100	+40%	30/60 Summer				83.457
5.004	S15	60 Summer	100	+40%	30/60 Summer				83.342
1.003	S4	60 Summer	100	+40%	100/60 Summer				83.196
7.000	S14	60 Summer	100	+40%	100/60 Summer				83.600
8.000	S12	60 Summer	100	+40%	100/60 Summer				83.494
7.001	S13	60 Summer	100	+40%	100/60 Summer				83.400
9.000	S11	60 Summer	100	+40%	100/60 Summer				83.475
7.002	S10	60 Summer	100	+40%	100/60 Summer				83.252
1.004	S3	60 Summer	100	+40%	100/60 Summer				82.917
10.000	S9	60 Summer	100	+40%	100/60 Summer				83.932
10.001	S8	60 Summer	100	+40%	100/60 Summer				83.225
1.005	S2	960 Winter	100	+40%	100/60 Summer				82.878
1.006	SWALE	960 Winter	100	+40%	30/60 Winter				82.876
1.007	S1	240 Winter	100	+40%	1/60 Winter				82.877

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.001	S18	0.938	0.000	0.52		38.7	SURCHARGED	
5.002	S17	0.938	0.000	0.77		95.5	SURCHARGED	
6.000	S20	0.956	0.000	0.94		99.7	SURCHARGED	
5.003	S16	0.907	0.000	1.23		193.3	SURCHARGED	
5.004	S15	0.867	0.000	1.42		217.2	SURCHARGED	
1.003	S4	0.646	0.000	1.67		529.8	SURCHARGED	
7.000	S14	0.575	0.000	0.73		97.2	FLOOD RISK	
8.000	S12	0.769	0.000	0.77		54.9	SURCHARGED	
7.001	S13	0.750	0.000	0.92		151.0	SURCHARGED	
9.000	S11	0.625	0.000	0.72		61.3	SURCHARGED	
7.002	S10	0.702	0.000	1.16		240.3	SURCHARGED	
1.004	S3	0.317	0.000	1.29		765.0	SURCHARGED	
10.000	S9	0.557	0.000	0.98		49.4	FLOOD RISK	
10.001	S8	0.500	0.000	0.89		95.0	SURCHARGED	
1.005	S2	0.428	0.000	0.23		102.7	SURCHARGED	
1.006	SWALE	0.776	0.000	0.11		16.7	SURCHARGED	
1.007	S1	1.052	0.000	0.19		7.7	SURCHARGED	

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	James Griffiths
Site name:	Axis J9 - Phase 3 (West)
Site location:	Bicester

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.90433° N
Longitude:	1.18071° W
Reference:	391029554
Date:	Aug 23 2021 10:13

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	3.80

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	1	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	628	628
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.56	16.16
1 in 1 year (l/s):	0.48	13.73
1 in 30 years (l/s):	1.29	37.16
1 in 100 year (l/s):	1.79	51.54
1 in 200 years (l/s):	2.1	60.43

APPENDIX E

AXIS J9 PHASES 1 & 2 PLAN:

S1209-PH2-C16(0) – Full Site Scheme Drainage Layout