Blythe Valley Innovation Centre Central Boulevard Solihull Birmingham B90 8AJ United Kingdom T +44 (0)121 5069040 E birmingham@hydrock.com



Technical Note

Date 12th September 2017

Project: C161279 JDE factory site – Surface Water Drainage of Proposed Development and Culverting of Birds Brook

Background

Please refer to drawing C161279-HYD-XX-XX-DR-C-200 - Site Location plan

The link building shown on the above mentioned plan has been demolished, the existing floor slab remains. A link road is to be constructed over the slab which join the existing eastern and western roads. A HGV parking area shall be incorporated within this development. The parking area shall be located in place of the previous link building.

This technical note has been produced in support of the Land Drainage consent application that is required to culvert a section of Birds Brook. It is also intended to support of the planning application which is required to gain consent for the surface water drainage strategy.

The Existing Site Drainage

Please refer to drawing C161279-HYD-XX-XX-DR-C-201 – Existing drainage layout.

The surface water drainage from the link building roof drained via rainwater downpipes to Birds Brook.

The existing road to the west of the link building drained via road gullies to Birds Brook. Within the site pipes of various sizes from the JDE premises discharge into Birds Brook. These are shown on the above drawing. The full bore capacities of each of these pipes are also shown. The capacities have been calculated using the Wallingford tables based on their gradient and size. A Ks value of 0.15 has been assumed for concrete pipes and 0.06 for clay pipes.

Proposed Drainage Strategy

Please refer to drawing C161279-HYD-XX-XX-DR-C-102 – Proposed Drainage Plan and C161279-HYD-XX-XX-DR-C-202 - Drainage Catchment Areas.

To enable the construction of the HGV parking area and link road a section of the Birds Brook shall require culverting as shown on the attached plans. The section of birds brook sits within an existing soft landscape area which shall become impermeable as part of the development. This shall increase the catchment by 1118m2.

An additional impermeable area shall be created to the east of the development, this shall increase the impermeable area by 391m2. Therefore, overall this scheme shall result in an additional catchment of 1509m2 draining to Birds Brook.

It is proposed to drain an area of 2975m2 to Point B (referred to on the catchment area plan) with no flow restriction, this is the equivalent area of the existing link building. The unrestricted flow rates shall be as follows (the Microdrainage calculations can be found within Appendix A of this note):

Return Period	Flow Rate I/s
1 in 2 yr	49.2
1 in 30 yr	92.6
1 in 100 yr + 40 % CC	145.9

An area equivalent to the total additional catchment shall drain at the greenfield QBAR rate to Point A (as referred to on the catchment area plan). This run off rate shall be in addition to the current run off rate generated by the western roadway (1134m2).

The QBAR greenfield runoff rate from the additional catchment has been calculated using Microdrainage and is effectively 0.0l/s. Using the Modified Rational Method the existing runoff from the western roadway can be calculated using the different rainfall intensities for each event. The results are as tabulated below.

Q = 2.78 x A(ha) x i(mm/hr)

Where A = area = 1134m2

Return Period	Rainfall intensity I	QBAR runoff	Proposed
	(mm/hr)	from additional	discharge rate
		catchment I/s	at Point A (I/s)
QBAR	44.1	0.0	13.9
1 in 30 yr	74.9	0.0	23.6
1 in 100 yr	97.1	0.0	30.6
1 in 100 yr + 40% CC	135.95	0.0	42.9

In restricting the flow rate at point A to the above figures attenuation shall be required. Refer to Appendix A for the Microdrainage calcualtions showing compliance with the above proposals. The results show no flooding occurs during any of the storm events within Network A. Only minor flooding occurs within Network B (0.005m3) which is insignificant.

The existing surrounding buildings that drain to the brook shall continue to drain as they do currently through connections provided for them into the proposed culvert.

Culverting of Birds Brook

Previous correspondence with OCC dated 18/7/2017 has stated the culverting of this section of Birds Brook to be acceptable in principle.

The ReFH Flood modelling software has been used to calculate the expected flows through Birds Brook where located in the site using catchments generated from the FEH CD ROM. The catchment drawing and full calculations for this can be found within Appendix B.

In summary, the flow rates were found to be:

Return Period	Resulting Flow
	rate m3/s
1 in 2 year	0.34
1 in 30 year	0.77
1 in 100 year	1.07
1 in 1000 year	2.04

As shown on drawing 0201, the existing twin 900mm diameter pipes which are upstream of the proposed culvert have a capacity of 3.88m3/s while the four 600mm diameter pipes downstream have a capacity of 2.06m3/s. This may elude to the downstream pipes acting as a flow restriction thereby making the watercourse at this point act as storage. However, the above table shows that even the flow during the 1 in 1000 year event would not exceed the capacity of downstream pipes, this confirms that the four 600mm diameter pipes therefore do not act as a flow restriction.

With the above in mind the capacity of the proposed culvert should be no less than the capacity of the four 600mm diameter pipes - 2.06m3/s.

With an available gradient of 1 in 79 which allows the existing upstream and downstream pipes to be connected (refer long section) a culvert of internal dimensions 1.8m wide and 1m high shall be sufficient to provide a capacity in excess of 4.0m3/s. This is based on a Ks value of 0.3. While this capacity is well in excess of that required the width allows the transition from the upstream pipes in a more efficient manner.

In conclusion a culvert of 1m high x 1.8m wide is proposed, this provides a capacity in excess of 4.0m3/s which is greater than the 2.06m3/s required. This additional capacity shall prevent detrimental effects upstream.

Pollution Control

There shall be two drainage networks, both of which shall drain through catchpits and trapped gullies before passing through full retention interceptors.

Access and Maintenance

Access shall be provided at each end of the culvert. The access shall be into rectangular chambers which allow the transition between the existing pipes upstream and downstream.

To enable the water treatment process to occur as intended the drainage network shall require maintenance. The maintenance strategy and responsibilities are as set out in the table below.

Component to be maintained	Actions	Frequency	Responsibility of:
Site wide external areas	Site to be generally kept free from litter and debris which may enter the drainage system.	On-going	JDE
On site below ground attenuation	Check inlets /outlets for condition and repair if needed	Annually	JDE
	CCTV survey the attenuation internally, remove sediment as required	Every 5 years	

APPENDIX A

MICRODRAINAGE RESULTS

Hydrock	Cons	sultar	nts L	td							P	age	1
•					J	DE Separa	tion N	Works			-	age	-
					N	etwork A						4	
• 2												5	7 ~
Date 130	0917				D	opignod h						Mirr	n
File JDI	E (Kr	afte	- 01/	(1270) W		esigned L	у ЈН					Icai	nan
VD Colut	tiona	arts	- 016	512/9)W	· · · C	necked by	GW					ווטוע	iuy
AF SOLU	LIONS				N	etwork 20	16.1						
		STOR	M SEW	IER DES	IGN by	the Modi	fied H	Ratio	nali	Metho	bd		
				Des	ian Cr	riteria f	or Sto	2000			<u> </u>		
				200	<u>- 911</u> C1		51 510	<u>1111</u>					
			Pi	pe Sizes	STANDA	ARD Manhole	Sizes	STANE	ARD				
				FSR Rair	nfall Mo	odel - Engl	and and	1 Wale	s				
		Retu	irn Per	ciod (yea	ars)	100	Add	Flow /	/ Clim	nate C	hange	(%)	0
				M5-60	(mm) 19	.700	Mi	nimum	Backo	lrop H	leight	(m)	0.200
	M	aximum	Raint	all (mm)	(hr)	.409	Ma:	ximum	Backo	lrop H	leight	(m)	1.500
Maximum	Time	of Con	centra	ation (mi	ins)	30 Min	1 Vel f	or Aut	or or	vian o	ation	(m)	1.200
		Fou	1 Sewa	ge (1/s/	/ha) 0	.000	in Slo	pe for	Opti	misat	ion (1	·X)	1.00
	V	olumet	ric Ru	noff Coe	eff. 0	.750			21901		(1		500
				Des	signed w	with Level	Soffits	5					
										1			
		#	- Ind	icates p	ipe len	ath does no	t mato	h cool	dinat				
		#	- Ind	icates p « - In	ipe len dicates	gth does no pipe capao	ot matc city <	h coor flow	dinat	es			
PN Le	ength (m)	# Fall (m)	- Ind Slope (1:X)	icates p « - In • I.Area (ha)	ipe len dicates T.E. (mins)	gth does no pipe capao Base Flow (1/s)	bt matc city < k (mm)	h coor flow HYD SECT	DIA (mm)	sect:	ion Tyj	pe A De	Auto
PN L	ength (m) 2.410	# Fall (m) 0.200	- Ind Slope (1:X) 62.1	icates p « - In I.Area (ha) 0.225	ipe len dicates T.E. (mins) 5.00	gth does no pipe capao Base Flow (1/s) 0.0	t matc ty < k (mm)	h coor flow HYD SECT	DIA (mm)	Sect:	ion Tyj	pe A De	Auto esign
PN L 31.000 12 31.001 3	ength (m) 2.410 .000#	# Fall (m) 0.200 0.050	- Ind Slope (1:X) 62.1 60.0	icates p « - In • I.Area (ha) 0.225 0.000	ipe len dicates T.E. (mins) 5.00 0.00	gth does no pipe capao Base Flow (1/s) 0.0	bt matc city < k (mm) 0 0.600 0 0.600	h coor flow HYD SECT o o	DIA (mm) 300 300	Sect: Pipe, Pipe,	ion Tyj /Condu: /Condu:	pe A De it	auto esign
PN Lo 51.000 12 51.001 3 51.002 3	ength (m) 2.410 .000# .000#	# Fall (m) 0.200 0.025	- Ind Slope (1:X) 62.1 60.0 120.0	icates p « - In I.Area (ha) 0.225 0.000 0.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00	gth does no pipe capao Base Flow (1/s) 0.0 0.0	k (mm) 0.600 0.600 0.600	h coor flow HYD SECT o o o o	DIA (mm) 300 300 300	Sect: Pipe, Pipe, Pipe,	ion Tyj /Condu: /Condu: /Condu:	pe A De it it	auto sign
PN L 31.000 12 51.001 3 51.002 3 51.003 3 51.003 4	ength (m) 2.410 .000# 3.152 3.971	# Fall (m) 0.200 0.050 0.025 0.025	- Ind Slope (1:X) 62.1 60.0 120.0 126.1	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0	k (mm) 0.600 0.600 0.600 0.600	h coor flow HYD SECT 0 0 0 0	DIA (mm) 300 300 225	Sect: Pipe, Pipe, Pipe, Pipe,	/Condu: /Condu: /Condu: /Condu:	pe A De it it it	Auto esign
PN L 1.000 12 1.001 3 1.002 3 1.003 3 1.004 3	ength (m) 2.410 .000# 3.152 3.971	# Fall (m) 0.200 0.050 0.025 0.025 0.050	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00	gth does no pipe capao Base Flow (1/s) 0.0 0.0 0.0 0.0	k (mm) 0.600 0.600 0.600 0.600 0.600	h coor flow HYD SECT 0 0 0 0 0	DIA (mm) 300 300 225 225	Sect: Pipe, Pipe, Pipe, Pipe, Pipe, Pipe,	ion Ty /Condu: /Condu: /Condui /Condui /Condui	pe A De it it it	Auto ssign
PN L 1.000 12 1.001 3 1.002 3 1.003 3 1.004 3	ength (m) 2.410 .000# 3.152 3.971	# Fall (m) 0.200 0.050 0.025 0.025 0.050	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000 0.000 0.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00	gth does no pipe capa Base Flow (1/s) 0.(0.(0.(0.(0.(0.(0.(0.(0.(<pre>bt matc city <</pre>	h coor flow HYD SECT 0 0 0 0 0	DIA (mm) 300 300 225 225	Sect: Pipe, Pipe, Pipe, Pipe, Pipe,	ion Tyj /Condu: /Condu: /Condu: /Condui	pe A De it it it it	Auto sign
PN L 1.000 12 1.001 3 1.002 3 1.003 3 1.004 3 PN	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/)	# Fall (m) 0.200 0.025 0.025 0.025 0.050 n T	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C.	icates p « - In (ha) 0.225 0.000 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	gth does no pipe capao Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>bt matc city <</pre>	HYD SECT 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225	Sect: Pipe, Pipe, Pipe, Pipe, Pipe, Vel	ion Tyj /Condu: /Condu: /Condui /Condui	pe A De it it it it Flo	uto sign
PN L 31.000 12 31.001 3 31.002 3 31.003 3 1.004 3 PN	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H	# Fall (m) 0.200 0.025 0.025 0.050 n T ar) (m	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins)	icates p « - In (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> (m)	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 etwork I.Area (ha)	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 0.600 0.600 0.600 0.600 0.600 0.600 Table Foul (1/s)	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 225 Flow s)	Sect: Pipe, Pipe, Pipe, Pipe, Vel (m/s)	/Condu: /Condu: /Condu: /Condui /Condui /Condui (1/s)	pe A De it it it it (1/s	Auto esign e e e e e e e e
PN L 31.000 12 31.001 3 31.002 3 31.003 3 31.004 3 PN S1.000	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162.	# Fall (m) 0.200 0.050 0.025 0.025 0.050 n T mr) (m 03	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 9	icates p « - In (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E (m)	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 etwork I.Area (ha) 0.225	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 Results Σ Base Flow (1/s) 0.0	k (mm) 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 Table Foul (1/s) 0 0.0	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0	Sect: Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.00	ion Tyr /Condu: /Condu: /Condui /Condui /Condui /Condui /Condui /Londu	pe A De it it it it it (1/s 98.	www.s)
PN L 1.000 12 1.001 3 1.002 3 1.003 3 1.004 3 PN S1.000 S1.001 S1.001	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161.	# Fall (m) 0.200 0.025 0.025 0.050 n T ir) (m 03 74 22	- Ind Slope (1:X) 62.1 60.0 126.1 79.4 .C. ins) 5.10 9 5.10 9	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL <u>E</u> (m) 95.350 5.150	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 etwork I.Area (ha) 0.225 0.225	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 Results E Base Flow (1/s) 0.0 0.0	k (mm) 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 Table Foul (1/s) 0 0.0	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0	<pre>Sect: Pipe, Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.00 2.03</pre>	ion Tyr /Condu: /Condu: /Condui /Condui /Condui /Condui /Lap (1/s) 141.3 143.7	pe A De it it it it (1/s 98. 98.	w 7 7
PN L 1.000 12 1.001 3 1.002 3 1.003 3 1.004 3 PN S1.000 S1.001 S1.002 S1.002 S1.002	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161.	# Fall (m) 0.200 0.025 0.025 0.025 0.050 n T mr) (m 03 74 33 81	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 9 5.13 9 5.13 9	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 <u>Ne</u> US/IL E (m) 25.350 25.100 5.100	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 etwork I.Area (ha) 0.225 0.225 0.225	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 Results Σ Base Flow (1/s) 0.0 0.0	<pre>bt matc: city <</pre>	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0	Sect: Pipe, Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.00 2.03 1.43	ion Tyr /Condu: /Condu: /Condui /Condui /Condui /Condui /1/s) 141.3 143.7 101.4	pe A De it it it it (1/s 98. 98. 98.	w 7 7
PN L 1.000 12 1.001 3 1.002 3 1.003 3 1.004 3 PN S1.000 S1.001 S1.002 S1.003 S1.003 S1.004	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161. 160.	<pre># Fall (m) 0.200 0.025 0.025 0.025 0.050 n T nr) (m 03 74 33 81 29</pre>	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 § 5.13 § 5.13 § 5.13 § 5.13 § 5.13 §	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E (m) 25.350 25.150 5.100 5.050	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 Results Σ Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>bt matc city <</pre>	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0 0.0	Sect: Pipe, Pipe, Pipe, Pipe, Pipe, 2.00 2.03 1.43 1.16	ion Tyj /Condu: /Condu: /Condui /Condui /Condui /Condui /1/5) 141.3 143.7 101.4 46.2*	pe A De it it it (1/s 98. 98. 98. 98.	w 7 7 7 7
PN L 1.000 12 1.001 3 1.002 3 1.003 3 1.004 3 PN S1.000 S1.001 S1.002 S1.003 S1.004	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161. 160. 160.	<pre># Fall (m) 0.200 0.050 0.025 0.025 0.050 n T ir) (m 03 74 33 81 29 </pre>	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 9 5.13 9 5.16 9 5.21 9	icates p « - In (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E (m) 95.350 5.150 5.100 5.050 5.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	gth does no pipe capad Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 Results Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>bt matc city <</pre>	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0 0.0 0.0 0.0	<pre>Sect: Pipe, Pipe, Pipe, Pipe, Pipe, 2.00 2.03 1.43 1.16 1.47</pre>	ion Tyj /Condu: /Condu: /Condui /Condui /Condui /Condui /Condui / 141.3 143.7 101.4 46.2« 58.4«	pe A De it it it (1/s 98. 98. 98. 98. 98.	w sign 7 7 7 7 7 7 7
PN L 31.000 12 31.001 3 31.002 3 31.003 3 31.004 3 PN S1.000 S1.001 S1.002 S1.001 S1.002 S1.003 S1.004	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161. 160. 160.	# Fall (m) 0.200 0.050 0.025 0.025 0.050 n T r) (m 03 74 33 81 29	- Ind Slope (1:x) 62.1 60.0 120.0 126.1 79.4 .C. ins 5.10 5.10 5.13 5.16 5.21 9 5.25 9	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E (m) 25.350 25.150 25.100 25.050 5.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 Results E Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 Foul (1/s) 0 0.0 0 0.0 0 0.0 0 0.0	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0 0.0 0.0 0.0	<pre>sect: Sect: Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.000 2.03 1.43 1.16 1.47</pre>	ion Tyj /Condu: /Condu: /Condui /Condui /Condui /Condui / 141.3 143.7 101.4 46.2« 58.4«	pe A De it it it (1/s 98. 98. 98. 98. 98.	w s) 7 7 7 7 7 7 7
PN L 31.000 12 31.001 3 31.002 3 31.003 3 31.004 3 PN S1.000 S1.001 S1.002 S1.003 S1.003 S1.004	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161. 160. 160.	# Fall (m) 0.200 0.025 0.025 0.025 0.050 n T nr) (m 03 74 33 81 29	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 5.10 5.13 5.16 5.21 9 5.25 9	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E (m) 95.350 95.150 95.150 95.050 5.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 Results E Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 0 0.600 Table Foul (1/s) 0 0.0 0 0.0 0 0.0 0 0.0	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0	<pre>ses Sect: Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.00 2.03 1.43 1.16 1.47</pre>	ion Tyr /Condu: /Condu: /Condu: /Condui /Condui /Condui /141.3 143.7 141.3 143.7 101.4 46.2« 58.4«	pe A De it it it (1/s 98. 98. 98. 98. 98. 98.	wy 7 7 7 7 7
PN L 31.000 12 31.001 3 31.002 3 31.003 3 31.004 3 PN S1.000 S1.001 S1.002 S1.003 S1.004	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161. 160. 160.	# Fall (m) 0.200 0.050 0.025 0.025 0.050 n T nr) (m 03 74 33 81 29	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 5.10 5.10 5.13 5.16 5.25 9	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E (m) 95.350 95.150 95.150 95.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 E Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>bt matc city <</pre>	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0	<pre>ses Sect: Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.00 2.03 1.43 1.16 1.47</pre>	ion Tyr /Condu: /Condu: /Condu: /Condu: /Condui /Condui /Condui / 141.3 143.7 101.4 46.2« 58.4«	pe A De it it it it (1/s 98. 98. 98. 98. 98.	www.s)
PN Lo S1.000 12 S1.001 3 S1.002 3 S1.003 3 S1.004 3 PN \$ S1.001 \$ S1.002 \$ S1.004 \$ S1.001 \$ S1.002 \$ S1.001 \$ S1.002 \$ S1.003 \$ S1.003 \$	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161. 160. 160.	# Fall (m) 0.200 0.025 0.025 0.050 n T mr) (m 03 74 33 81 29	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 9 5.10 9 5.13 9 5.16 9 5.21 9 5.25 9	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E (m) 95.350 95.150 95.150 95.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 Results E Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	k (mm) 0 0.600 0 0.000 0 0.0000 0 0.0000 0 0.0000 0 0.0000 0 0.00000000	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0 0.0 0.0 0.0	<pre>ses Sect: Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.00 2.03 1.43 1.16 1.47</pre>	ion Tyr /Condu: /Condu: /Condui /Condui /Condui /Condui /1/s) 141.3 143.7 101.4 46.2« 58.4«	pe A De it it it it (1/s 98. 98. 98. 98. 98.	w 7 7 7 7 7
PN Lo \$1.000 12 \$1.001 3 \$1.002 3 \$1.003 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161. 160. 160.	# Fall (m) 0.200 0.025 0.025 0.025 0.050 n T mr) (m 03 74 33 81 29	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 9 5.13 9 5.21 9 5.25 9	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 <u>Ne</u> US/IL <u>E</u> (m) 25.350 25.150 25.100 5.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 Results Σ Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	k (mm) 0 0.600 0 0.000 0 0.0000 0 0.0000 0 0.00000000	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0 0.0 0.0 0.0	Sect: Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.00 2.03 1.43 1.16 1.47	ion Tyj /Condu: /Condu: /Condui /Condui /Condui /Condui /1/s) 141.3 143.7 101.4 46.2« 58.4«	pe A De it it it it (1/s 98. 98. 98. 98. 98.	w 7 7 7 7 7 7
PN Lo \$1.000 12 \$1.001 3 \$1.002 3 \$1.003 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.004 3 \$1.001 \$1.001 \$1.002 \$1.003 \$1.003 \$1.004	ength (m) 2.410 .000# 3.152 3.971 Rai (mm/H 162. 161. 161. 160. 160.	# Fall (m) 0.200 0.050 0.025 0.025 0.050 n T nr) (m 03 74 33 81 29	- Ind Slope (1:X) 62.1 60.0 120.0 126.1 79.4 .C. ins) 5.10 9 5.13 9 5.13 9 5.21 9	icates p « - In I.Area (ha) 0.225 0.000 0.000 0.000 0.000 <u>Ne</u> US/IL E (m) 95.350 95.150 95.100 5.000	ipe len dicates T.E. (mins) 5.00 0.00 0.00 0.00 0.00 0.00 etwork I.Area (ha) 0.225 0.225 0.225 0.225 0.225	gth does no pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 Results Σ Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	<pre>bt matc city <</pre>	h coor flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Cdinat DIA (mm) 300 300 225 225 Flow s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sect: Pipe, Pipe, Pipe, Pipe, Vel (m/s) 2.00 2.03 1.43 1.16 1.47	ion Tyj /Condu: /Condu: /Condui /Condui /Condui /Condui / 141.3 143.7 101.4 46.2« 58.4«	pe A De it it it (1/s 98. 98. 98. 98. 98.	w s) 7 7 7 7 7 7

+

©1982-2016 XP Solutions

Hydrock Consultants Ltd		Page 2
•	JDE Separation Works Network A	Micro
Date 130917	Designed by JH	Dcaipago
File JDE (Krafts - C161279)W	Checked by GW	Diginaria
XP Solutions	Network 2016.1	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow 0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage 2.000
Hot Start (mins)	0	Inlet Coeffiecient 0.800
Hot Start Level (mm)	0	Flow per Person per Day (1/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		FSR		Profi	le Type	Summer
Return	Period (years)		100		Cv (Summer)	0.750
	Region	England	and Wales		Cv (Winter)	0.840
	M5-60 (mm)		19.700	Storm	Duration	(mins)	30
	Ratio R		0.409				

yurock cons	ultants	Ltd					Page 3
			JDE :	Separati	on Works		
			Netwo	ork A			14
ate 130917			Deci				- Mirro
ile IDU (W	C 1 C		Desig	gnea by .	JH		Desinar
ILE JDE (Kra	aits - C	161279)W	. Check	ced by GI	Ŵ		Digitid
P Solutions			Netwo	ork 2016	.1		
		Onlin	e Contr	ols for	Storm		
Hydro-B	rake Opt	imum® Manh	ole: S4	DS/PN.	S1 002	Volume (m	
			<u></u>	/ 00/11.	51.003,	vorume (n	(3): 2.4
		Un	it Refere	ence MD_qu	E-0179 130	0.0200 1000	
		Des	ign Head	(m)	D 01/9-139(0-0300-1390	
		Desig	n Flow (]	() L/s)		12 0	
		5	Flush-E	Flom		Calculated	
			Object	ive Mini	mise upstre	am storage	
			Applicat	ion	1	Surface	
		Sur	mp Availa	ble		Yes	
		Di	lameter ((mm)		179	
		Inve	t Level	(m)		95.050	
	Minimum Ou	itlet Pipe Di	lameter (mm)		225	
	Suggeste	ed Manhole Di	ameter (mm)		1200	
		Control P	oints	Head (m) Flow (1	/s)	
	De	sign Point (Calculate	ad) 0.3	0.0 1.		
		j 01110 ((Flush-Fl		29 1	3.9	
			Kick-Fl	0.2 0 [®] 0.2	87 1	3.9 9.6	
	Mea	an Flow over	Head Ran	ige 0.2	- (2.0	
				-90	-		
The hydrologic	cal calcul	ations have	been bas	ed on the	Head/Disch	arge relati	onship for the
Hydro-Brake OF	otimum® as	specified.	Should	another ty	pe of cont	rol device	other than a
invalidated	bcimum® be	utilised th	en these	storage 1	outing cal	culations w	ill be
Depth (m) Flo	w (1/s) D	epth (m) Flo	w (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
		1,200	26.9	3.000	41.8	7.000	63 5
0.100	6.3						
0.100 0.200	6.3 13.8	1.400	29.0	3.500	44.6	7.500	65.8
0.100 0.200 0.300	6.3 13.8 13.9	1.400	29.0 30.9	3.500 4.000	44.6 47.8	7.500 8.000	65.8 68.0
0.100 0.200 0.300 0.400	6.3 13.8 13.9 15.9	1.400 1.600 1.800	29.0 30.9 32.7	3.500 4.000 4.500	44.6 47.8 50.7	7.500 8.000 8.500	65.8 68.0 70.1
0.100 0.200 0.300 0.400 0.500	6.3 13.8 13.9 15.9 17.7	1.400 1.600 1.800 2.000	29.0 30.9 32.7 34.4	3.500 4.000 4.500 5.000	44.6 47.8 50.7 53.5	7.500 8.000 8.500 9.000	65.8 68.0 70.1 72.1
0.100 0.200 0.300 0.400 0.500 0.600	6.3 13.8 13.9 15.9 17.7 19.3	1.400 1.600 1.800 2.000 2.200	29.0 30.9 32.7 34.4 36.0	3.500 4.000 4.500 5.000 5.500	44.6 47.8 50.7 53.5 56.2	7.500 8.000 8.500 9.000 9.500	65.8 68.0 70.1 72.1 74.1
0.100 0.200 0.300 0.400 0.500 0.600 0.800	6.3 13.8 13.9 15.9 17.7 19.3 22.1	1.400 1.600 1.800 2.000 2.200 2.400	29.0 30.9 32.7 34.4 36.0 37.5	3.500 4.000 4.500 5.000 5.500 6.000	44.6 47.8 50.7 53.5 56.2 58.7	7.500 8.000 8.500 9.000 9.500	65.8 68.0 70.1 72.1 74.1
0.100 0.200 0.300 0.400 0.500 0.600 0.800 1.000	6.3 13.8 13.9 15.9 17.7 19.3 22.1 24.6	1.400 1.600 1.800 2.000 2.200 2.400 2.600	29.0 30.9 32.7 34.4 36.0 37.5 39.0	3.500 4.000 4.500 5.000 5.500 6.000 6.500	44.6 47.8 50.7 53.5 56.2 58.7 61.2	7.500 8.000 8.500 9.000 9.500	65.8 68.0 70.1 72.1 74.1
0.100 0.200 0.300 0.400 0.500 0.600 0.800 1.000	6.3 13.8 13.9 15.9 17.7 19.3 22.1 24.6	1.400 1.600 1.800 2.000 2.200 2.400 2.600	29.0 30.9 32.7 34.4 36.0 37.5 39.0	3.500 4.000 4.500 5.000 5.500 6.000 6.500	44.6 47.8 50.7 53.5 56.2 58.7 61.2	7.500 8.000 8.500 9.000 9.500	65.8 68.0 70.1 72.1 74.1
0.100 0.200 0.300 0.400 0.500 0.600 0.800 1.000	6.3 13.8 13.9 15.9 17.7 19.3 22.1 24.6	1.400 1.600 1.800 2.000 2.200 2.400 2.600	29.0 30.9 32.7 34.4 36.0 37.5 39.0	3.500 4.000 4.500 5.000 5.500 6.000 6.500	44.6 47.8 50.7 53.5 56.2 58.7 61.2	7.500 8.000 8.500 9.000 9.500	65.8 68.0 70.1 72.1 74.1

Hydrock Consultants Ltd		Page 4
•	JDE Separation Works Network A	Micco
Date 130917	Designed by JH	Desinado
File JDE (Krafts - C161279)W	Checked by GW	Diamaye
XP Solutions	Network 2016.1	

Storage Structures for Storm

Cellular Storage Manhole: S3, DS/PN: S1.002

Invert Level (m) 95.100 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000

Depth	(m)	Area	(m²)	Inf.	Area	(m²)	Depth	(m)	Area	(m²)	Inf.	Area	(m²)
0.	000		60.0			0.0	0	.801		0.0			0.0
0.	800		60.0			0.0							

©1982-2016 XP Solutions

Hydrock Consultants Ltd		Page 5
•	JDE Separation Works	
·	Network A	4
		1 m
Date 130917	Designed by JH	Micro
File JDE (Krafts - C161279)W.	Checked by GW	Drainage
XP Solutions	Network 2016 1	J
	Network 2016.1	
2 year Return Period Summary	of Critical Results by Maximum Lave	(Papk 1)
	for Storm	(Rallk I)
	Simulation Criteria	
Areal Reduction Factor	1.000 Additional Flow - % of Total Flo	0.000 w
Hot Start Level (mm)	0 MADD Factor * 10m³/ha Storag	Je 2.000
Manhole Headloss Coeff (Global)	0.500 Flow per Person per Day (1/per/day	7) 0.000
Foul Sewage per hectare (l/s)	0.000	
Number of Input Hudro	avanha o Number of a	
Number of Online Co	atrols 1 Number of Time/Area Diagrams 0	
Number of Offline Co	ntrols 0 Number of Real Time Controls 0	
Synt	hetic Rainfall Details	
Rainiali Model Region E	FSR Ratio R 0.408	
M5-60 (mm)	19.700 Cv (Winter) 0.840	
Margin for Flood Risk Wa	rning (mm) 250.0	D
Analysi	s Timestep 2.5 Second Increment (Extended)	1
	DVD Status	N T
Iner	tia Status Of	3
Profile(s)	Cummor and Wint	
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 60	
	720, 960, 1440, 2160, 2880, 4320, 576	
Poturn Doried(a) (manual)	7200, 8640, 100	80
Climate Change (%)	2, 30, 1	.00
	0, 0,	40
		Water
US/MH Return Clima	te First (X) First (Y) First (Z) Over:	flow Level
FN Name Storm Period Chan	ge Surcharge Flood Overflow Act	t. (m)
S1.000 S1 15 Winter 2 +	0% 30/30 Winter	95.475
S1.001 S3 15 Winter 2 +	0% 30/15 Summer	95.329
SI.002 S3 30 Winter 2	0% 30/15 Summer	95.309
C1 002 C1 20 Winter 0	0% 2/15 Summer	0
S1.003 S4 30 Winter 2 4 S1.004 S6 30 Winter 2	1170	95.309
S1.003 S4 30 Winter 2 4 S1.004 S6 30 Winter 2 4		95.309 95.104
S1.003 S4 30 Winter 2 + S1.004 S6 30 Winter 2 +	0 *	95.309 95.104
S1.003 S4 30 Winter 2 4 S1.004 S6 30 Winter 2 4 Surcharged Floor	led Pipe	95.309 95.104
S1.003 S4 30 Winter 2 4 S1.004 S6 30 Winter 2 4 Surcharged Flood US/MH Depth Volu	ded Pipe me Flow / Overflow Flow Lev	95.309 95.104
S1.003 S4 30 Winter 2 4 S1.004 S6 30 Winter 2 4 Surcharged Flood US/MH Depth Volu PN Name (m) (m ³	ded Pipe me Flow / Overflow Flow Lev) Cap. (l/s) (l/s) Status Exce	95.309 95.104 vel eded
S1.003 S4 30 Winter 2 4 S1.004 S6 30 Winter 2 4 Surcharged Flood US/MH Depth Volu PN Name (m) (m ³ S1.000 S1 -0.175 0.0	ded Pipe me Flow / Overflow Flow Lev) Cap. (1/s) (1/s) Status Exce	95.309 95.104 rel eded
S1.003 S4 30 Winter 2 4 S1.004 S6 30 Winter 2 4 S1.004 S1 -0.175 0.005 S1 -0.121 0.005 S1 -0.005 S1 -0	ded Pipe me Flow / Overflow Flow Lev) Cap. (1/s) (1/s) Status Exce 000 0.36 40.0 OK 000 0.65 39.7 OK	95.309 95.104 rel eded
S1.003 S4 30 Winter 2 4 S1.004 S6 30 S1 -0.175 0.0 S1.001 S3 -0.121 0.0 S1.002 S3 -0.091 0.0	ded Pipe me Flow / Overflow Lev O Cap. (1/s) (1/s) Status Exce 000 0.36 40.0 OK OK	95.309 95.104 rel eded
S1.003 S4 30 Winter 2 4 S1.004 S6 30 Winter 2 4 S1.004 S6 30 Winter 2 4 S1.004 S6 30 Winter 2 4 Surcharged Flood US/MH Depth Volu PN Name (m) (m ³ S1.000 S1 -0.175 0.0 S1.001 S3 -0.121 0.0 S1.002 S3 -0.091 0.0 S1.003 S4 0.034 0.0 S1.004 S6 -0.121 0.0	ded Pipe me Flow / Overflow Flow Lex O Cap. (1/s) (1/s) Status Exce 000 0.36 40.0 OK 000 0.65 39.7 OK 000 0.24 13.9 OK 000 0.46 13.7 SURCHARGED	95.309 95.104 vel eded

.

Hydrock Consultants Ltd		Page 6
•	JDE Separation Works	
•	Network A	Ly m
Data 120017	Designed by TI	Micro
	Designed by JH	Drainage
File JDE (Krafts - C161279)W	Checked by GW	Brainacje
XP Solutions	Network 2016.1	
30 year Return Period Summary	of Critical Results by Maximum Leve	l (Rank 1)
	for Storm	
	imulation Criteria	
Areal Reduction Factor	1.000 Additional Flow - % of Total Flow	w 0.000
Hot Start (mins)	0 MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0 Inlet Coefficient	2 0.800
Foul Sewage per hectare (1/s)	0.500 Flow per Person per Day (1/per/day)	0.000
J- F (., ., .,		
Number of Input Hydrog	graphs 0 Number of Storage Structures 1	
Number of Online Cor Number of Offline Cor	atrols 1 Number of Time/Area Diagrams 0	
	Stander of fight fine concrete 0	
Syntl	netic Rainfall Details	
Rainfall Model	FSR Ratio R 0.408	
M5-60 (mm)	19.700 Cv (Winter) 0.840	
Margin for Flood Risk War	ming (mm) 250.0	0
Analysis	Timestep 2.5 Second Increment (Extended)	
Ĩ	DVD Status ON	
Inert	ia Status ON	
		1 m
Profile(s)	Summer and Winte	er
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 60	Ο,
	720, 960, 1440, 2160, 2880, 4320, 576	0,
Return Period(s) (years)	2, 30, 1	00
Climate Change (%)	0, 0,	40
		Water
US/MH Return Clima	te First (X) First (Y) First (Z) Overf	low Level
PN Name Storm Period Chan	ge Surcharge Flood Overflow Act	. (m)
S1.000 S1 30 Winter 30	-0% 30/30 Winter	95.710
S1.001 S3 30 Winter 30	-0% 30/15 Summer	95.607
S1.002 S3 30 Winter 30 +	0% 30/15 Summer	95.552
S1.003 S4 30 Winter 30 +	-0% 2/15 Summer	95.549
51.004 56 30 Winter 30 4	-U 6	95.115
Surcharged Floo	ded Pipe	
US/MH Depth Volu	me Flow / Overflow Flow Lev	rel
PN Name (m) (m ³) Cap. (l/s) (l/s) Status Exce	eded
S1.000 S1 0.060 0.	000 0.53 58.9 SURCHARGED	
S1.001 S3 0.157 0.	000 0.93 57.1 SURCHARGED	
S1.002 S3 0.152 0.	000 0.30 16.9 SURCHARGED	
S1.003 $S4$ 0.274 $0.S1.004$ $S6$ -0.110 0	000 0.54 16.2 SURCHARGED 000 0.52 16.3 ΟΚ	
©1982	2-2016 XP Solutions	

	Cons	sultants	Ltd						Pag	e 7
					JDE Se	paratio	n Work	S		
•					Networ	k A			4	
									N.H	un
Date 130	0917				Design	ed by J	Н			ЦU
File JDF	E (Kı	afts - C	161279) W	Checke	d by GW			Dra	ainage
XP Solut	cions	3			Networl	k = 2016	1			
							-			
100 yea	ar R	eturn Per	riod Su	ummary o	of Crit	cical Re	esults	by Maximu	um Level	(Rank
				1) for	Storm				(1101111
				_						
		Amonal Dod		<u>Sim</u>	lation	Criteria				
		Hot.	Start (mins)	0000 A	MADD	I Flow Factor	- % of Tota * 10m³/ba S	I Flow 0.	000
		Hot Sta	rt Level	(mm)	0	INADD	ractor I:	nlet Coeffi	ecient 0.	800
Manh	nole H	Headloss C	oeff (Gl	obal) 0.	.500 Flc	w per Pe	rson pe	r Day (l/pe	er/day) 0.	000
Fc	oul Se	ewage per 1	hectare	(1/s) 0.	.000					
		Number of	Input	Hydrogram	ohs 0 M	umber of	Storage	Structurer	- 1	
		Number	of Onlin	ne Contro	ols 1 Nu	umber of	Time/Ar	ea Diagrams	5 D	
		Number c	of Offlin	ne Contro	ols 0 Nu	umber of	Real Ti	me Controls	s 0	
				a						
		Rain	fall Mor	Synthet	ic Rainf	FCP	uils Rotio	P 0 400		
		Rain	Req:	ion Engla	and and	Wales Cv	(Summe	r = 0.408		
			M5-60 (r	nm)	1	L9.700 Cv	(Winte	(r) 0.840		
	Ma	rgin for F	lood Ri	sk Warnin	ng (mm)		1 -		250.0	
			Alla	alysis T DTS	Status	2.5 Seco	ond Incr	ement (Exte	ended)	
				DVD	Status				ON	
				Inertia	Status				ON	
			Profile	(s)				Summer and	Winter	
		Duration	Profile n(s) (min	(s) ns) :	15, 30,	60, 120,	180, 2	Summer and 40, 360, 48	Winter 80, 600,	
		Duration	Profile 1(s) (min	(s) ns) :	15, 30, 720, 9	60, 120, 960, 1440	180, 2 , 2160,	Summer and 40, 360, 48 2880, 4320	Winter 80, 600, 9, 5760,	
	Retu	Duration	Profile	(s) ns) :	15, 30, 720, 9	60, 120, 960, 1440	180, 2 , 2160,	Summer and 40, 360, 48 2880, 4320 7200, 8640	Winter 0, 600, 0, 5760, 0, 10080	
	Retu	Duration rn Period(Climate	Profile 1(s) (min (s) (yea: Change	(s) ns) : rs) .	15, 30, 720, 9	60, 120, 960, 1440	180, 2 , 2160,	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0	Winter 60, 600, 9, 5760, 9, 10080 30, 100 0, 40	
	Retu	Duration rn Period(Climate	Profile n(s) (min s) (yea: Change	(s) ns) : rs) .	15, 30, 720, 9	60, 120, 960, 1440	180, 2 , 2160,	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0	Winter 60, 600, 7, 5760, 10080 30, 100 0, 0, 40	
	Retu	Duration rn Period(Climate	Profile n(s) (min s) (yea: Change	(s) ns) : rs) (%)	15, 30, 720, 9	60, 120, 960, 1440	180, 2 , 2160,	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0	Winter 0, 600, 0, 5760, 0, 10080 30, 100 0, 0, 40	
	Retu	Duration rn Period(Climate	Profile n(s) (min s) (yea: Change	(s) ns) : rs) (%)	15, 30, 720, 9	60, 120, 60, 1440	180, 2 , 2160,	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0	Winter 0, 600, 0, 5760, 0, 10080 30, 100 0, 0, 40	Water
DN	Retu JS/MH	Duration rn Period(Climate	Profile n(s) (min s) (yea: Change Return	(s) ns) : rs) (%) Climate	15, 30, 720, 9 First	60, 120, 960, 1440 (X) Fi	180, 2 , 2160, rst (Y)	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z)	Winter 0, 600, 0, 5760, 0, 10080 30, 100 0, 0, 40 Overflow	Water Level
U PN 1	Retu JS/MH Name	Duration rn Period(Climate Storm	Profile n(s) (min s) (yea: Change Return Period	(s) ns) : rs) (%) Climate Change	15, 30, 720, 9 First Surcha	60, 120, 960, 1440 (X) Fi arge	180, 2 , 2160, rst (Y) Flood	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	Winter 30, 600, 30, 5760, 30, 100 30, 100 0, 0, 40 Overflow Act.	Water Level (m)
U PN 1 S1.000	Retu US/MH Name Sl	Duration rn Period(Climate Storm 60 Winter	Profile n(s) (min s) (yea: Change Return Period 100	<pre>(s) ns) rs) (%) Climate Change +40%</pre>	15, 30, 720, 9 First Surcha 30/30 W	60, 120, 960, 1440 (X) Fi arge	180, 2 , 2160, .rst (Y) Flood	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	Winter 0, 600, 0, 5760, 0, 10080 30, 100 0, 0, 40 Overflow Act.	Water Level (m) 96.739
PN 1 S1.000 S1.001	Retu DS/MH Name S1 S3	Duration rn Period(Climate Storm 60 Winter 60 Winter	Profile n(s) (min s) (yea: Change Return Period 100	(s) ns) :: (%) Climate Change +40% +40%	15, 30, 720, 9 First Surch 30/30 W 30/15 S	60, 120, 960, 1440 (X) Fi arge Jinter	180, 2 , 2160, rst (Y) Flood	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	Winter 0, 600, 0, 5760, 0, 10080 30, 100 0, 0, 40 Overflow Act.	Water Level (m) 96.739 96.670
PN 1 S1.000 S1.001 S1.002 S1.003	Retu US/MH Name S1 S3 S3	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter	Profile n(s) (min s) (yea: Change Return Period 100 100 100	(s) ns) : (%) Climate Change +40% +40% +40%	First 30/30 W 30/15 S 2/15 S	60, 120, 60, 1440 (X) Fi arge Jinter Summer Summer	180, 2 , 2160, rst (Y) Flood	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	Winter 0, 600, 0, 5760, 0, 10080 30, 100 0, 0, 40 Overflow Act.	Water Level (m) 96.739 96.670 96.585
PN 2 S1.000 S1.001 S1.002 S1.003 S1.004	Retu Name S1 S3 S3 S4 S6	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 60 Winter	Profile (s) (min (s) (yea: Change Return Period 100 100 100 100	(s) ns) :: (%) Climate Change +40% +40% +40% +40% +40%	First Surcha 30/30 W 30/15 S 2/15 S	60, 120, 260, 1440 (X) Fi arge Jinter Summer Summer	180, 2 , 2160, rst (Y) Flood	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	Winter 30, 600, 30, 5760, 30, 100 30, 100 0, 0, 40 Overflow Act.	Water Level (m) 96.739 96.670 96.585 96.506 95.166
U PN 1 S1.000 S1.001 S1.002 S1.003 S1.004	Retu SS/MH Name S1 S3 S3 S4 S6	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 60 Winter	Profile n(s) (min s) (yea: Change Return Period 100 100 100 100 100	<pre>(s) ns) climate Change +40% +40% +40% +40% +40%</pre>	<pre>15, 30, 720, 9 First Surcha 30/30 W 30/15 S 30/15 S 2/15 S</pre>	60, 120, 960, 1440 (X) Fi arge Jinter Summer Summer	180, 2 , 2160, .rst (Y) Flood	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	Winter 60, 600, 7760, 70080 30, 100 70, 40 Overflow Act.	Water Level (m) 96.739 96.670 96.585 96.506 95.166
U PN 1 S1.000 S1.001 S1.002 S1.003 S1.004	Retu Name S1 S3 S4 S6	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 60 Winter	Profile n(s) (min s) (yea: Change Return Period 100 100 100 100	(s) ns) (%) Climate Change +40% +40% +40% +40%	First Surcha 30/30 W 30/15 S 2/15 S	60, 120, 960, 1440 (X) Fi arge Vinter Summer Summer Summer	180, 2 , 2160, .rst (Y) Flood	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	<pre>A Winter 0, 600, 0, 5760, 0, 10080 30, 100 0, 0, 40 Overflow Act.</pre>	Water Level (m) 96.739 96.670 96.585 96.506 95.166
U PN 1 S1.000 S1.001 S1.002 S1.003 S1.004	Retu DS/MH Name S1 S3 S3 S4 S6	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 60 Winter	Profile n(s) (min s) (yea: Change Return Period 100 100 100 100 100	(s) ns) :: (%) Climate Change +40% +40% +40% +40% +40%	<pre>15, 30, 720, 9 First Surcha 30/30 W 30/15 S 30/15 S 2/15 S</pre>	60, 120, 960, 1440 (X) Fi arge Jinter Summer Summer	180, 2 , 2160, rst (Y) Flood Pipe	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	<pre>A Winter 0, 600, 0, 5760, 0, 10080 30, 100 0, 0, 40 Overflow Act.</pre>	Water Level (m) 96.739 96.670 96.585 96.506 95.166
PN P S1.000 S1.001 S1.002 S1.003 S1.004	Retu Name S1 S3 S4 S6	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 60 Winter 80 Winter	Profile (s) (min (s) (yea: Change Return Period 100 100 100 100 100 100	(s) ns) :: (%) Climate Change +40% +40% +40% +40% Flooded Volume	<pre>15, 30, 720, 9 First Surcha 30/15 S 30/15 S 2/15 S</pre>	60, 120, 60, 1440 (X) Fi arge Jinter Summer Summer Summer	180, 2 , 2160, rst (Y) Flood Pipe v Flow	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow	<pre>Winter 0, 600, , 5760, , 10080 30, 100 , 0, 40 Overflow Act. Level</pre>	Water Level (m) 96.739 96.670 96.585 96.506 95.166
U PN 1 S1.000 S1.001 S1.002 S1.003 S1.004	Retu Name S1 S3 S4 S6 PN	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 80 Winter 80 Winter	Profile (s) (min (s) (yea: Change Return Period 100 100 100 100 100 100 100 100	<pre>(s) ns) climate Change</pre>	First Surcha 30/30 W 30/15 S 2/15 S Flow / Cap.	60, 120, 60, 1440 (X) Fi arge Jinter Summer Summer Summer Overflow (1/s)	180, 2 , 2160, rst (Y) Flood Pipe v Flow (1/s)	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow Status	<pre>A Winter 60, 600, 7, 5760, 7, 10080 30, 100 7, 0, 40 Overflow Act. Level Exceeded</pre>	Water Level (m) 96.739 96.670 96.585 96.506 95.166
U PN 1 S1.000 S1.001 S1.002 S1.003 S1.004	Retu Name S1 S3 S4 S6 PN	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 80	Profile (s) (min (s) (yea: Change Return Period 100 100 100 100 100 100 100 100 100 10	<pre>(s) ns) Climate Change +40% +40% +40% +40% Flooded Volume (m³) 0.000</pre>	<pre>15, 30, 720, 9 First Surcha 30/30 W 30/15 S 30/15 S 2/15 S Flow / Cap. 0.61</pre>	60, 120, 960, 1440 (X) Fi arge Jinter Summer Summer Summer Overflow (1/s)	180, 2 , 2160, .rst (Y) Flood Pipe v Flow (1/s) 68.3	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow Status FLOOD RISK	<pre>A Winter 60, 600, 7, 5760, 7, 10080 30, 100 7, 0, 40 Overflow Act. Level Exceeded</pre>	Water Level (m) 96.739 96.670 96.585 96.506 95.166
U PN 1 S1.000 S1.001 S1.002 S1.003 S1.004	Retu Name S1 S3 S3 S4 S6 PN 1.000	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 60 Winter 80	Profile (s) (min (s) (yea: Change Return Period 100 100 100 100 100 100 100 100 100 10	(s) ns) (%) Climate Change +40% +40% +40% +40% Flooded Volume (m ³) 0.000 0.000	<pre>15, 30, 720, 9 First Surcha 30/30 W 30/15 S 30/15 S 2/15 S Flow / Cap. 0.61 1.10</pre>	60, 120, 960, 1440 (X) Fi arge Jinter Summer Summer Summer Overflow (1/s)	<pre>180, 2 , 2160,</pre>	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow Status FLOOD RISK	<pre>A Winter 0, 600, , 5760, , 10080 30, 100 , 0, 40 Overflow Act. Level Exceeded</pre>	Water Level (m) 96.739 96.670 96.585 96.506 95.166
U PN 1 S1.000 S1.001 S1.002 S1.003 S1.004 S1 S1 S1 S1	Retu JS/MH Name S1 S3 S3 S4 S6 PN 1.000 1.000	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 60 Winter 80 Winter 81 Sur 83 Sur 83 Sur	Profile n(s) (min s) (yea: Change Return Period 100 100 100 100 100 100 100 10	(s) ns) (%) Climate Change +40% +40% +40% +40% +40% Flooded Volume (m ³) 0.000 0.0000 0.0000	<pre>15, 30, 720, 9 First Surcha 30/30 W 30/15 S 30/15 S 2/15 S Flow / Cap. 0.61 1.10 0.51</pre>	60, 120, 60, 1440 (X) Fi arge Jinter Summer Summer Overflow (1/s)	<pre>180, 2 , 2160,</pre>	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow Status FLOOD RISK SURCHARGED SURCHARGED	<pre>A Winter 50, 600, 5760, 10080 30, 100 0, 0, 40 Overflow Act. Level Exceeded</pre>	Water Level (m) 96.739 96.670 96.585 96.506 95.166
U PN 1 S1.000 S1.001 S1.002 S1.003 S1.004 S1 S1 S1 S1 S1 S1 S1 S1	Retu Name S1 S3 S3 S4 S6 PN 1.000 1.001 1.002 1.003	Duration rn Period(Climate Storm 60 Winter 60 Winter 60 Winter 60 Winter 80 Winter 80 Winter 80 Winter 81 Sur 83 83 83 84 86	Profile (s) (min (s) (yea: Change Return Period 100 100 100 100 100 100 100 10	<pre>(s) ns) rrs) (%) Climate Change +40% +40% +40% +40% Flooded Volume (m³) 0.000 0.000 0.000 0.000</pre>	<pre>15, 30, 720, 9 First Surcha 30/30 W 30/15 S 30/15 S 2/15 S Flow / Cap. 0.61 1.10 0.51 0.95 0.90</pre>	60, 120, 60, 1440 (X) Fi arge Jinter Summer Summer Overflow (1/s)	<pre>180, 2 , 2160, rst (Y) Flood Flood Flow (1/s) 68.3 67.3 29.5 28.2 28.2 28.3</pre>	Summer and 40, 360, 48 2880, 4320 7200, 8640 2, 0 First (Z) Overflow Status FLOOD RISK SURCHARGED SURCHARGED	<pre>A Winter 30, 600, 5760, 30, 10080 30, 100 0, 0, 40 Overflow Act. Level Exceeded</pre>	Water Level (m) 96.739 96.670 96.585 96.506 95.166

		Page 1
· JDE separation	Works	
· Network B		r.
		Micro
Date 13.09.17 Designed by JH		
File JDE (Krafts - C161279) Checked by GW		Diamatje
XP Solutions Network 2016.1		
STORM SEWER DESIGN by the Modified	Rational Method	
Design Criteria for St	corm	
Pipe Sizes STANDARD Manhole Size	s STANDARD	
FSR Rainfall Model - England a	nd Wales	
Return Period (years) 2 Add	d Flow / Climate Chan	ge (%) 0
M5-60 (mm) 19.700	Minimum Backdrop Heig	ht (m) 0.200
Maximum Rainfall (mm/hr) 500 Min Design	Depth for Optimisati	ht (m) 1.500
Maximum Time of Concentration (mins) 30 Min Vel	for Auto Design only	(m/s) 1.00
Foul Sewage (1/s/ha) 0.000 Min SI	lope for Optimisation	(1:X) 500
VOLUMEETIC RUNOII COEII. 0.750		
Designed with Level Soffi	its	
Network Design Table for	Storm	
PN Length Fall Slope I.Area T.E. Base k	HYD DIA Section	Type Auto
(m) (m) (I:x) (nd) (mins) FIOW (I/s) (mi	n) SECT (mm)	Design
S1.000 6.216 1.490 4.2 0.190 5.00 0.0 0.6	00 o 225 Pipe/Con	nduit 🔒
S1.001 21.688 0.420 51.6 0.000 0.00 0.0 0.0 0.6	00 o 225 Pipe/Con	nduit 🔒
S1.003 5.733 0.098 58.5 0.000 0.00 0.00 0.0 0.6	00 0 225 Pipe/Con 00 0 300 Pipe/Con	nduit 👸
Notwork Bogulta Tabl		
PN Poin T.C. WO/M. R.J. N. R. R.		12-110
(mm/hr) (mins) (m) (ha) Flow (l/s) (l/	ul Add Flow Vel C 's) (l/s) (m/s) (l	ap Flow /s) (l/s)
S1.000 69.91 5.02 96.190 0.190 0.0 0	0.0 0.0 6.45 25	6.5 36.0
S1.002 68 43 5 27 94 280 0 200 0.0 0	0.0 0.0 1.82 7	2.5 36.0
S1.002 68.17 5.32 94.080 0.290 0.0 0	0.0 0.0 2.16 8	6.1 53.7 5 6 53 7
	2.00 14	5.0 55.7
Simulation Criteria for	Storm	
Volumetric Runoff Coeff 0.750 Additional	Flow - % of Total Flo	ow 0.000
Areal Reduction Factor 1.000 MADD Fa	ctor * 10m³/ha Storag	re 2.000
Hot Start (mins) 0	Inlet Coeffiecien	t 0.800
Manhole Headloss Coeff (Global) 0.500	on per Day (1/per/day Run Time (mine	(0.000)
Foul Sewage per hectare (1/s) 0.000	Output Interval (mins) 1
Number of Trout Vision and Andrews	Oxago Ctwingtuing 0	
Number of Input Hydrographs 0 Number of St Number of Online Controls 0 Number of Ti	me/Area Diagrama	
Number of Input Hydrographs 0 Number of St Number of Online Controls 0 Number of Ti Number of Offline Controls 0 Number of Re	me/Area Diagrams 0 al Time Controls 0	
Number of Input Hydrographs 0 Number of St Number of Online Controls 0 Number of Ti Number of Offline Controls 0 Number of Re	ine/Area Diagrams 0 al Time Controls 0	
Number of Input Hydrographs 0 Number of St Number of Online Controls 0 Number of Ti Number of Offline Controls 0 Number of Re <u>Synthetic Rainfall Deta</u>	ils	
Number of Input Hydrographs 0 Number of St Number of Online Controls 0 Number of Ti Number of Offline Controls 0 Number of Re <u>Synthetic Rainfall Deta</u>	ils	

ı

Hydrock Consultants Ltd		Page 2	
	JDE separation Works Network B	L.	
Date 13.09.17 File JDE (Krafts - C161279)	Designed by JH Checked by GW	Micro Drainage	
XP Solutions	Network 2016.1		

,

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)	19.700	Storm Duration (mins)	30
Ratio R	0.409		

Hydrock Consultants Ltd		Page 3
•	JDE separation Works	
	Network B	<u>Y</u>
		Micco
Date 13.09.17	Designed by JH	
File JDE (Krafts - C161279)	Checked by GW	Diamaye
XP Solutions	Network 2016.1	
2 year Return Period Summary of	Critical Deculta ha Maniana I	1 (5 1 -)
2 year Recard Ferrod Summary of	for Storm	el (Rank 1)
Areal Reduction Factor	nulation Criteria	
Hot Start (mins)	0 MADD Factor * 10m ³ /ha Storad	ow 0.000 me 2.000
Hot Start Level (mm)	0 Inlet Coefficien	nt 0.800
Manhole Headloss Coeff (Global) (Foul Sewage per bectare (1/s) (0.500 Flow per Person per Day (l/per/day	7) 0.000
Tour bewage per nectare (1/s) (
Number of Input Hydrogra	aphs 0 Number of Storage Structures 0	
Number of Online Contr Number of Offline Contr	rols 0 Number of Time/Area Diagrams 0	
	tors o Number of Real Time Controls o	
Synthe	tic Rainfall Details	
Rainfall Model Region Eng	FSR Ratio R 0.409	
M5-60 (mm)	19.700 Cv (Winter) 0.840	
Margin for Flood Disk B		
Analys	aining (mm) 250.0 DVD Status ON Bis Timestep Fine Inertia Status ON	
	DTS Status ON	
Profile(s)	Summer and Wint	ter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 60	00,
	720, 960, 1440, 2160, 2880, 4320, 576 7200, 8640, 100	50,
Return Period(s) (years)	2, 30, 1	100
Climate Change (%)	0, 0,	40
US/MH Return Climat	e First (X) First (Y) First (Z) Overflow
IN Name Storm Period Change	e Surcharge Flood Overflow	Act.
S1.000 S1 15 Winter 2 +0	% 100/15 Summer	
S1.001 S2 15 Winter 2 +0 S1.002 S3 15 Winter 2 +0	8 30/15 Summer 100/15 Wintor	
S1.003 S4 15 Winter 2 +0	% 30/15 Summer	
Water Surcharged F	looded	
US/MH Level Depth V	Jolume Flow / Overflow Flow I	evel
PN Name (m) (m)	(m ³) Cap. (1/s) (1/s) Status Ex	ceeded
S1.000 S1 96.258 -0 157	0.000 0.20 33.9 07	
S1.001 S2 94.815 -0.110	0.000 0.51 33.5 OK	
S1.002 S3 94.432 -0.073	0.000 0.78 49.0 OK	1
51.003 54 94.253 -0.127	0.000 0.63 49.2 OK	
©1982_2	2016 XP Solutions	
	JULO AP SOLUCIONS	

Hydrock Consultants Ltd		Page 4
•	JDE separation Works	
	Network B	4
Date 13.09.17	Designed by JH	MILIU
File JDE (Krafts - C161279)	Checked by GW	Drainage
XP Solutions	Network 2016.1	
30 year Return Period Summary of	Critical Results by Maximum Leve	el (Rank 1)
	for Storm	
Sin	ulation Criteria	
Areal Reduction Factor 1	.000 Additional Flow - % of Total Flo	ow 0.000
Hot Start (mins)	0 MADD Factor * 10m ³ /ha Storag	ge 2.000
Hot Start Level (mm)	0 Inlet Coefficien	nt 0.800
Foul Sewage per hectare (1/s) (.000 Flow per Person per Day (1/per/day	/) 0.000
F (1, 2, 2, 2,		
Number of Input Hydrogra	aphs 0 Number of Storage Structures 0	
Number of Online Contr Number of Offline Contr	cols 0 Number of Time/Area Diagrams 0	
Number of offittie cont	OIS 0 Multiper of Real Time Conclors 0	
Synthe	tic Rainfall Details	
Rainfall Model	FSR Ratio R 0.409	
M5-60 (mm)	19.700 Cv (Winter) 0.840	
	,	
Margin for Flood Risk W	Marning (mm) 250.0 DVD Status ON	
Analys	DTS Status ON	
	DID Status ON	
Profile(s) Duration(s) (mins)	Summer and Win 15 30 60 120 180 240 360 480 6	ter
paracron(b) (mrnb)	720, 960, 1440, 2160, 2880, 4320, 57	60,
	7200, 8640, 10	080
Return Period(s) (years)	2, 30, 1	100
crimate change (a)	0, 0,	40
PN Name Storm Period Chang	te First (X) First (Y) First (Z e Surcharge Flood Overfloo) Overflow
In name booth forrow chang	e burenarge Flood Overflood	Act.
S1.000 S1 15 Winter 30 +(0% 100/15 Summer	
S1.001 S2 15 Winter 30 +(30/15 Summer 100/15 Winter	
S1.003 S4 15 Winter 30 +0	0% 30/15 Summer	
Waton Gunstenned Th	odod Di	
US/MH Level Depth Vo	lume Flow / Overflow Flow	Level
PN Name (m) (m) (m ³) Cap. (1/s) (1/s) Status	Exceeded
S1.000 S1 96.286 -0.129 (0.000 0.37 64.3 OK	
S1.002 S3 94.853 0.348 (0.000 1.48 93.4 SURCHARGED	1
S1.003 S4 94.409 0.029 (0.000 1.18 92.6 SURCHARGED	
©1982-	2016 XP Solutions	

Hydrock Consultants Ltd		Page 5
•	JDE separation Works	
•	Network B	4
•		1 mm
Date 13.09.17	Designed by JH	Micro
File JDE (Krafts - C161279)	Checked by GW	Drainage
XP Solutions	Network 2016 1	
100 year Return Period Summary	of Critical Results by Maximum I.	evel (Rank
	1) for Storm	
Areal Peduation Factor	mulation Criteria	
Hot Start (mins)	Additional Flow - % of Total Flo	DW 0.000
Hot Start Level (mm)	0 Inlet Coefficien	Je 2.000
Manhole Headloss Coeff (Global)	0.500 Flow per Person per Day (1/per/day	/) 0.000
Foul Sewage per hectare (1/s)	0.000	
Number of Input Hydrogr	apple 0 Number of Changes Changes	
Number of Online Cont	rols 0 Number of Time/Area Diagrams 0	
Number of Offline Cont	rols 0 Number of Real Time Controls 0	
Synthe	tic Rainfall Details	
Rainiali Model Region Eng	FSR Ratio R 0.409	
M5-60 (mm)	19.700 Cv (Winter) 0.840	
Margin for Flood Risk	Warning (mm) 250.0 DVD Status ON	
Analy	sis Timestep Fine Inertia Status ON	
	DIS Status ON	
Profile(s)	Summer and Wint	er
Duracion(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 60	00,
	720, 500, 1440, 2160, 2880, 4320, 576	50, 180
Return Period(s) (years)	2, 30, 1	.00
Climate Change (%)	0, 0,	40
US/MH Return Climat	te First (X) First (Y) First (Z) Overflow
PN Name Storm Period Chang	e Surcharge Flood Overflow	Act.
S1.000 S1 15 Winter 100 +40	100/15 Cummon	
S1.001 S2 15 Winter 100 +4(30/15 Summer	
S1.002 S3 15 Winter 100 +40		
S1.003 S4 15 Winter 100 +40	0% 30/15 Summer 100/15 Winter	
	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer	
	0% 30/15 Summer 100/15 Winter 30/15 Summer	
Water Surcharged El	0% 30/15 Summer 100/15 Winter 30/15 Summer	
Water Surcharged Flc US/MH Level Depth Vo	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer poded Pipe	Level 1
Water Surcharged Flo US/MH Level Depth Vo PN Name (m) (m) (1	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer poded Pipe lume Flow / Overflow Flow m ³) Cap. (1/s) (1/s) Status D	Level
Water Surcharged Flo US/MH Level Depth Vo. PN Name (m) (m) (n	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer boded Pipe lume Flow / Overflow Flow m ³) Cap. (1/s) (1/s) Status 1	Level Exceeded
Water Surcharged Flo US/MH Level Depth Vo PN Name (m) (m) (n S1.000 S1 97.083 0.668 0 S1.001 S2 96 592 1.667 0	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 100/15 Winter 9/10 Pipe 100 P	Level Exceeded
Water Surcharged Flor US/MH Level Depth Vo. PN Name (m) (m) (m) \$1.000 \$1 97.083 0.6668 0 \$1.001 \$2 96.592 1.667 0 \$1.002 \$3 95.710 1.205 0	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer ooded Pipe hume Flow / Overflow Flow m³) Cap. (1/s) (1/s) Status 0.000 0.57 97.2 FLOOD RISK 0.000 1.51 99.7 FLOOD RISK 0.005 2.32 146.2 DECODER	Level Exceeded
Water Surcharged Flc US/MH Level Depth Voi PN Name (m) (m) (m) S1.000 S1 97.083 0.668 00 S1.001 S2 96.592 1.667 00 S1.002 S3 95.710 1.205 0 S1.003 S4 94.611 0.231 0	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer boded Pipe lume Flow / Overflow Flow m ³) Cap. (1/s) (1/s) Status D .000 0.57 97.2 FLOOD RISK .000 1.51 99.7 FLOOD RISK .005 2.32 146.3 FLOOD .000 1.86 145.9 SURCHAPCED	Level Exceeded
Water Surcharged Fic US/MH Level Depth Vol PN Name (m) (m) (m) S1.000 S1 97.083 0.6668 00 S1.001 S2 96.592 1.667 00 S1.002 S3 95.710 1.205 00 S1.003 S4 94.611 0.231 0	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 100 Pipe 100 Pipe	Level Exceeded
Water Surcharged Fic US/MH Level Depth Vo. PN Name (m) (m) (m) S1.000 S1 97.083 0.6668 0 S1.001 S2 96.592 1.667 0 S1.002 S3 95.710 1.205 0 S1.003 S4 94.611 0.231 0	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer 0% 30/15 Winter 0% 30/15 Summer 0% 30/15	Level Exceeded
Water Surcharged Fic US/MH Level Depth Vo. PN Name (m) (m) (m) \$1.000 \$1 97.083 0.6668 0 \$1.001 \$2 96.592 1.667 0 \$1.002 \$3 95.710 1.205 0 \$1.003 \$4 94.611 0.231 0	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 0 00ded Pipe 1 1 1 1 1 1 1 1 1 1 1 1 1	Level Exceeded
Water Surcharged Fic US/MH Level Depth Voi PN Name (m) (m) (m) S1.000 S1 97.083 0.668 0 S1.001 S2 96.592 1.667 0 S1.002 S3 95.710 1.205 0 S1.003 S4 94.611 0.231 0	0% 30/15 Summer 100/15 Winter 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 0% 30/15 Summer 100 Pipe 100 Pipe	Level Exceeded

APPENDIX B

ReFH MODELLING RESULTS



Generated on Monday, September 11, 2017 4:40:38 PM by simonmirams Printed from the ReFH Flood Modelling software package, version 2.2.6029.28099

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details

Checksum: 6606-5B23

Site name: Catchment Descriptors Easting: 445050 Northing: 241550 Country: England, Wales or Northern Ireland Catchment Area (km²): 2.24 Using plot scale calculations: No Site description: None

Model run: 2 year

Summary of results

Rainfall - FEH 1999 (mm):	21.10	Total runoff (ML):	4.60
Total Rainfall (mm):	13.43	Total flow (ML):	5.69
Peak Rainfall (mm):	3.65	Peak flow (m ³ /s):	0.34

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.

* Indicates that the user locked the duration/timestep

Name	Value	User-defined?
Duration (hh:mm:ss)	04:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.66	No
ARF (Areal reduction factor)	0.97	No
Seasonality	Winter	n/a
Loss model parameters		
Name	Value	User-defined?
Cini (mm)	41.74	No
Cmax (mm)	1093.69	No
Use alpha correction factor	Yes	No
Alpha correction factor	1	No
Routing model parameters		

Name	Value	User-defined?
Tp (hr)	3.01	No
Up	0.65	No
Uk	0.8	No
Baseflow model parameters		
Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	53.53	No
BR	2.22	No
Urbanisation parameters		
Name	Value	User-defined?
Urban area (km²)	1.24	No
Urbext 2000	0.35	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes

Generated on Monday, September 11, 2017 4:40:10 PM by simonmirams Printed from the ReFH Flood Modelling software package, version 2.2.6029.28099

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details

Checksum: 6606-5B23

Site name: Catchment Descriptors Easting: 445050 Northing: 241550 Country: England, Wales or Northern Ireland Catchment Area (km²): 2.24 Using plot scale calculations: No Site description: None

Model run: 30 year

Summary of results

Rainfall - FEH 1999 (mm):	46.81	Total runoff (ML):	10.55
Total Rainfall (mm):	29.79	Total flow (ML):	13.31
Peak Rainfall (mm):	8.10	Peak flow (m ³ /s):	0.77

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.

* Indicates that the user locked the duration/timestep

Name	Value	User-defined?
Duration (hh:mm:ss)	04:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.66	No
ARF (Areal reduction factor)	0.97	No
Seasonality	Winter	n/a
Loss model parameters		
Name	Value	User-defined?
Cini (mm)	41.74	No
Cmax (mm)	1093.69	No
Use alpha correction factor	Yes	No
Alpha correction factor	0.97	No
Routing model parameters		

Name	Value	User-defined?
Tp (hr)	3.01	No
Up	0.65	No
Uk	0.8	No
Baseflow model parameters		
Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	53.53	No
BR	2.22	No
Urbanisation parameters		
Name	Value	User-defined?
Urban area (km²)	1.24	No
Urbext 2000	0.35	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes

Generated on Monday, September 11, 2017 4:40:00 PM by simonmirams Printed from the ReFH Flood Modelling software package, version 2.2.6029.28099

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details

Checksum: 6606-5B23

Site name: Catchment Descriptors Easting: 445050 Northing: 241550 Country: England, Wales or Northern Ireland Catchment Area (km²): 2.24 Using plot scale calculations: No Site description: None

Model run: 100 year

Summary of results

Rainfall - FEH 1999 (mm):	64.54	Total runoff (ML):	14.82
Total Rainfall (mm):	41.07	Total flow (ML):	18.88
Peak Rainfall (mm):	11.17	Peak flow (m ³ /s):	1.07

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.

* Indicates that the user locked the duration/timestep

Name	Value	User-defined?
Duration (hh:mm:ss)	04:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.66	No
ARF (Areal reduction factor)	0.97	No
Seasonality	Winter	n/a
Loss model parameters		
Name	Value	User-defined?
Cini (mm)	41.74	No
Cmax (mm)	1093.69	No
Use alpha correction factor	Yes	No
Alpha correction factor	0.92	No
Routing model parameters		

Name	Value	User-defined?
Tp (hr)	3.01	No
Up	0.65	No
Uk	0.8	No
Baseflow model parameters		
Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	53.53	No
BR	2.22	No
Urbanisation parameters		
Name	Value	User-defined?
Urban area (km²)	1.24	No
Urbext 2000	0.35	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes

Generated on Monday, September 11, 2017 4:39:38 PM by simonmirams Printed from the ReFH Flood Modelling software package, version 2.2.6029.28099

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details

Checksum: 6606-5B23

Site name: Catchment Descriptors Easting: 445050 Northing: 241550 Country: England, Wales or Northern Ireland Catchment Area (km²): 2.24 Using plot scale calculations: No Site description: None

Model run: 1000 year

Summary of results

Rainfall - FEH 1999 (mm):	118.68	Total runoff (ML):	28.67
Total Rainfall (mm):	75.53	Total flow (ML):	37.54
Peak Rainfall (mm):	20.54	Peak flow (m ³ /s):	2.04

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.

* Indicates that the user locked the duration/timestep

Name	Value	User-defined?
Duration (hh:mm:ss)	04:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.66	No
ARF (Areal reduction factor)	0.97	No
Seasonality	Winter	n/a
Loss model parameters		
Name	Value	User-defined?
Cini (mm)	41.74	No
Cmax (mm)	1093.69	No
Use alpha correction factor	Yes	No
Alpha correction factor	0.77	No
Routing model parameters		

Name	Value	User-defined?
Tp (hr)	3.01	No
Up	0.65	No
Uk	0.8	No
Baseflow model parameters		
Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	53.53	No
BR	2.22	No
Urbanisation parameters		
Name	Value	User-defined?
Urban area (km²)	1.24	No
Urbext 2000	0.35	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes