

Appendix C

Sewer Survey Results

CCTV Survey

Client : JMP CONSULTANTS
Project : FIELDS END LANE, HEMEL HEMPTSEAD
Survey No : 468867

Unit N, Groundwell Industrial Estate, Hargreaves Road, Swindon, SN25 5AZ
Tel: 01793 706 747 Fax: 01793 707 919
Email: info@onsite.co.uk

WEBSITE: www.onsite.co.uk **EMAIL:** solutions@onsite.co.uk



Project-information / Inspection: 1

Project name :
468867-140512-OSSL

Project Number :

Contact :

Date :
14/05/2012

Client: **JMP CONSULTING**
 Contact Name: **CHRIS HUGHES**
 Department:
 Road: **85 - 89 COLMORE ROW**
 Town: **BIRMINGHAM**
 County: **B3 2BB**
 Telephone: **01212 306 017**
 Fax: **01212 306 011**
 Mobile:
 E-mail: **chris.hughes@jmp.co.uk**

Site: **468867**
 Contact Name:
 Department:
 Road: **FIELDS END LANE**
 Town: **HEMEL HEMPSTEAD**
 County:
 Telephone:
 Fax:
 Mobile:
 E-mail:

Contractor **ONSITE CENTRAL LTD**
 Contact Name: **GAVIN HOTCHIN**
 Department: **UNIT E3 LARKFIELD TRADING ESTATE**
 Road: **NEW HYTHE LANE**
 Town: **LARKFIELD, MAIDSTONE**
 County: **KENT, ME20 6SW**
 Telephone: **01622 792 404**
 Fax: **01622 793 072**
 Mobile:
 E-mail:

Defect Grade Description / Inspection: 1

Project Name :
468867-140512-OSSL

Project number :

Contact :

Date :
14/05/2012

1: Brick: No Structural Defects
Pipe: No Structural Defects

Acceptable Structural Condition

2: Brick: Minor cracking, Surface mortar loss, Spalling slight, wear slight
Pipe: Circumferential crack, Moderate joint defects, Spalling slight, Wear slight

Minor collapse risk in short term but potential for further deterioration

3: Brick: Total mortarloss without other defects, single brick displaced. Deformation up to 5%, Spalling medium, Wear medium
Pipe: Fractures with deformation up to 5%, Longitudinal cracking or multiple cracking, Minor loss of level, More severe joint

! Collapse unlikely in near future but future deterioration likely !

4: Brick: Total mortarloss with deformation greater than 10%, Deformation up to 10% and fractured, Displaced/hanging brickwork, Small number of missing bricks
Pipe: Broken, Deformation up to 10% and broken, Fractured with deformation 5 - 10%, Multiple

!! Collapse likely in foreseeable future !!

5: Brick: Already Collapsed, Missing invert, Deformation over 10% and fractured, Displaced/hanging brickwork and deformation over 10%, Extensive missing bricks
Pipe: Already collapsed, Deformation over 10% and broken, Extensive areas of fabric missing

!!! Collapsed or collapse imminent !!!

Place :



ONSITE CENTRAL LTD
NEW HYTHE LANE
Street : LARKFIELD, MAIDSTONE
Tel: 01622 792 404
Fax: 01622 793 072
Email:

Inspection report / Inspection: 1

Date : 14/05/2012	Job number : TBC	Weather : rain	Operator : OS SL	Section number : 1	PLR SUFFIX: X
Weather rain	Vehicle : KM10GNZ	Camera : KRA 75 ORPEOUS	Preset :	Cleaned : no	Operator : OS SL

Place : Road : Location Inspection	HEMEL HEMPSTEAD LONG CHAUDEN ROAD A footway beside a road MH3 (U/S) MH2	Location details: Catchment: Z Tape number : Pipe Length 2.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH2 5.9 MH3 6.5
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Direction Use:	Surface water	Pipe shape :	Circular
Year laid :	Z	Pipe size :	675 mm
Purpose :	Sample survey to determin asset condition	Pipe material :	Concrete
Total length :	17.60 m	Lining :	

Comment :

1:50 Position Code Observation Grade
Depth: 6.5

	0.00	MH	Start node type, manhole, reference number : MH3	0
	0.00	WL	Water level, 5% of the vertical dimension	0
	0.00	REM	General remark Remarks: STEPPED CASCADE	0
	0.00	SA	Survey abandoned Remarks: UNABLE TO PASS CASCADE	0



0 m

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Place :



ONSITE CENTRAL LTD
NEW HYTHE LANE
LARKFIELD, MAIDSTONE
Tel: 01622 792 404
Fax: 01622 793 072
Email:

Inspection pictures / Inspection: 1

Place : HEMEL HEMPSTEAD	Road : LONG CHAUDEN ROAD	Date : 14/05/2012	Section number : 1	PLR Suffix : X
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Photo: 1_3A, 00:01:31
0m, General remark

Place :



ONSITE CENTRAL LTD
NEW HYTHE LANE
Street : LARKFIELD, MAIDSTONE
Tel: 01622 792 404
Fax: 01622 793 072
Email:

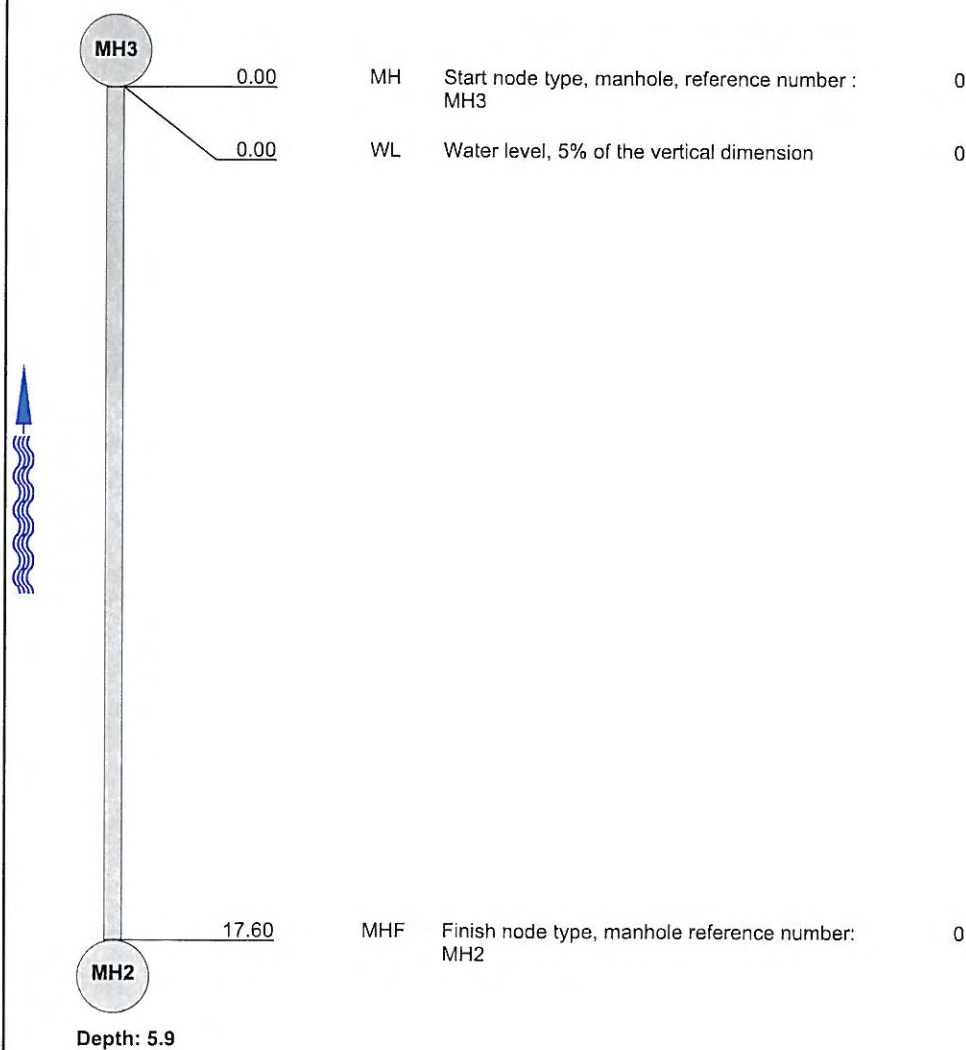
Inspection report / Inspection: 1

Date : 14/05/2012	Job number : TBC	Weather : rain	Operator : OS SL	Section number : 2	PLR SUFFIX: X
Weather rain	Vehicle : KM10GNZ	Camera : KRA 75 ORPEOUS	Preset :	Cleaned : no	Operator : OS SL

Place : Road : Location Inspection	HEMEL HEMPSTEAD LONG CHAULDEN ROAD A footway beside a road MH3 (U/S) MH2	Location details: Catchment: Z Tape number : Pipe Length 2.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH2 5.9 MH3 6.5
Direction Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determin asset condition 17.60 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 675 mm Concrete	

Comment :

1:150 Position Code Observation Grade
Depth: 6.5



STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Place :



ONSITE CENTRAL LTD
 NEW HYTHE LANE
 Street : LARKFIELD, MAIDSTONE
 Tel: 01622 792 404
 Fax: 01622 793 072
 Email:

Inspection report / Inspection: 1

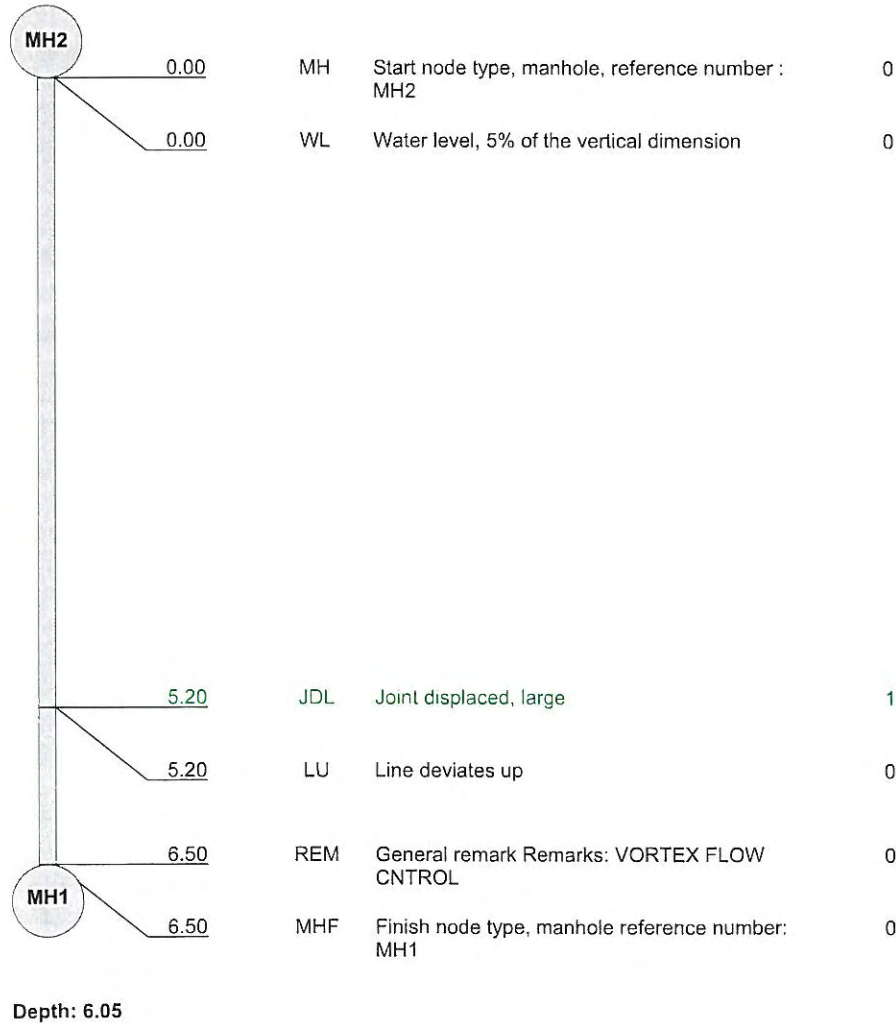
Date : 15/05/2012	Job number : TBC	Weather : rain	Operator : OS SL	Section number : 3	PLR SUFFIX: X
Weather rain	Vehicle : KM10GNZ	Camera : KRA 75 ORPEOUS	Preset :	Cleaned : no	Operator : OS SL

Place : Road : Location Inspection	HEMEL HEMPSTEAD LONG CHAULDEN ROAD Fields MH2 (U/S) MH1	Location details: Catchment: Z Tape number : Pipe Length 0.70 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH1 6.05 MH2 5.9
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Direction Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determin asset condition 6.50 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 300 mm Polyvinyl chloride
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Comment :

1:60 Position Code Observation Grade
 Depth: 5.9



STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
1	0	0	0	1	0	0	0	0	1

Place :



ONSITE CENTRAL LTD
NEW HYTHE LANE
LARKFIELD, MAIDSTONE
Tel: 01622 792 404
Fax: 01622 793 072
Email:

Inspection pictures / Inspection: 1

Place : HEMEL HEMPSTEAD	Road : LONG CHAUDEN ROAD	Date : 15/05/2012	Section number : 3	PLR Suffix : X
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Photo: 3_3A, 00:00:55
5.2m, Joint displaced, large



Photo: 3_5A, 00:01:42
6.5m, General remark

Place :



ONSITE CENTRAL LTD
NEW HYTHE LANE
Street : LARKFIELD, MAIDSTONE
Tel: 01622 792 404
Fax: 01622 793 072
Email:

Inspection report / Inspection: 1

Date : 15/05/2012	Job number : TBC	Weather : rain	Operator : OS SL	Section number : 4	PLR SUFFIX: X
Weather rain	Vehicle : KM10GNZ	Camera : KRA 75 ORPEOUS	Preset :	Cleaned : no	Operator : OS SL

Place : Road : Location Inspection	HEMEL HEMPSTEAD LONG CHAULDEN ROAD Fields POND (D/S) MH1	Location details: Catchment: Z Tape number : Pipe Length 0.70 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	POND 0 MH1 1.8
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Direction Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determin asset condition 3.00 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 300 mm Polyvinyl chloride
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Comment :

1:50 Position Code Observation Grade
Depth: 0

0.00	MH	Start node type, manhole, reference number : POND	0
0.00	WL	Water level, 5% of the vertical dimension	0
0.00	REM	General remark Remarks: BOLTED TRASH SCREEN	0
0.00	REM	General remark Remarks: STILL PHOTOS TAKEN	0
0.00	SA	Survey abandoned Remarks: UNABLE TO INSTALL CAMERA	0

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Place :



ONSITE CENTRAL LTD
 NEW HYTHE LANE
 Street : LARKFIELD, MAIDSTONE
 Tel: 01622 792 404
 Fax: 01622 793 072
 Email:

Inspection report / Inspection: 1

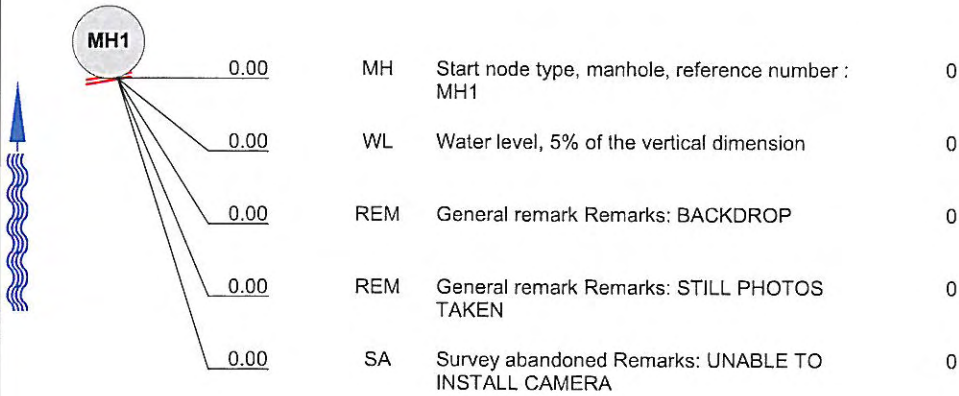
Date : 15/05/2012	Job number : TBC	Weather : rain	Operator : OS SL	Section number : 5	PLR SUFFIX: X
Weather rain	Vehicle : KM10GNZ	Camera : KRA 75 ORPEOUS	Preset :	Cleaned : no	Operator : OS SL

Place : Road : Location Inspection	HEMEL HEMPSTEAD LONG CHAUDEN ROAD Fields MH1 (U/S) POND	Location details: Catchment: Z Tape number : Pipe Length 0.70 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	POND 0 MH1 1.8
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Direction Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determin asset condition 3.00 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 300 mm Polyvinyl chloride
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Comment :

1:50 Position Code Observation Grade
 Depth: 1.8



STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

MANHOLE RECORD CARD

CLIENT REFERENCE **FIELDS END LANE**

MH REFERENCE **1402**

LOCATION **GRASS AREA END OF CAMPION RD**

SURVEYED DATE

YEAR LAID **Z** STATUS **PU** FUNCTION **S** NODE TYPE **M**

TEAM LEADER **S LAPWORTH**

COVER	SHAPE S	HINGED	N	LOCK	N	DUTY	M	SIZE (mm)	620 x	TOXIC ATMOSPHERE	N
SHAFT	SIDE ENTRY N	REGULAT COURSE	6	DEPTH (m)	0.76			SIZE (mm)	600 x	EVIDENCE OF VERMIN	N
CHAMBER	SOFFIT S	STEPS	8	LADDERS		LNDGS N		SIZE (mm)	2500 x	CONSTRUCT CODE	C

DEPTH OF FLOW (mm)		DEPTH OF SILT (mm)	200	HEIGHT SURCH (mm)		COVER LEVEL (m)	
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	URSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE (mm)		BACKDROP DIAM(mm)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (m)	INVERT LEVEL (m)
INCOMING PIPE	A	UNK	C	150 x		VC		1.75	-1.75
	B	UNK	C	1675 x		CO		3.69	-3.69
	C	UNK	C	100 x		PVC		1.57	-1.57
	D	UNK	C	300 x		VC		1.59	-1.59
	E			x					
	F			x					

	DOWNSTREAM REFERENCE	COND	CRITY					
OUTGOING PIPE	X	UNK	850 x				3.72	-3.72
	Y		x					

CONDITION (Y if attention required) COVER **N** IRONS/LADDERS **N** SHAFT **N** CHAMBER **N** BENCHING **N** OTHER **N**

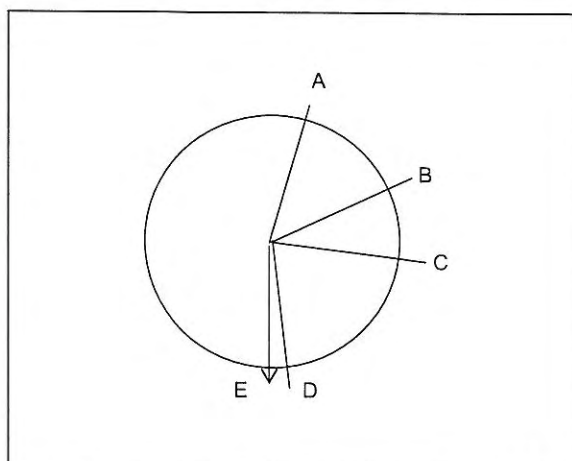
REMARKS

LOCATION SKETCH



Not to scale

INTERNAL SKETCH



Not to scale

MANHOLE RECORD CARD

CLIENT REFERENCE **FIELDS END LANE**

MH REFERENCE **MH1**

LOCATION **FIELD OFF LONG CHAULEN ROAD**

SURVEYED DATE

YEAR LAID **Z** STATUS **PR** FUNCTION **S** NODE TYPE **M**

TEAM LEADER **S LAPWORTH**

COVER	SHAPE	S	HINGED	N	LOCK	N	DUTY	H	SIZE (mm)	750 x 750	TOXIC ATMOSPHERE	N
SHAFT	SIDE ENTRY	N	REGULAT COURSE	4	DEPTH (m)	0.65			SIZE (mm)	720 x	EVIDENCE OF VERMIN	N
CHAMBER	SOFFIT	S	STEPS		LADDERS	1	LNDGS	N	SIZE (mm)	2000 x	CONSTRUCT CODE	C

DEPTH OF FLOW (mm)		DEPTH OF SILT (mm)		HEIGHT SURCH (mm)		COVER LEVEL (m)	
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	URSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE (mm) (diam)	BACKDROP DIAM(mm)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (m)	INVERT LEVEL (m)
INCOMING PIPE	A	POND	C	x		PVC	1.80	-1.80
	B			x				
	C			x				
	D			x				
	E			x				
	F			x				

	DOWNSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE (mm) (diam)	COND	CRITY	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (m)	INVERT LEVEL (m)
OUTGOING PIPE	X	MH2	C	300	x		PVC	6.05	-6.05
	Y				x				

CONDITION (Y if attention required) COVER **N** IRONS/LADDERS **N** SHAFT **N** CHAMBER **N** BENCHING **N** OTHER **N**

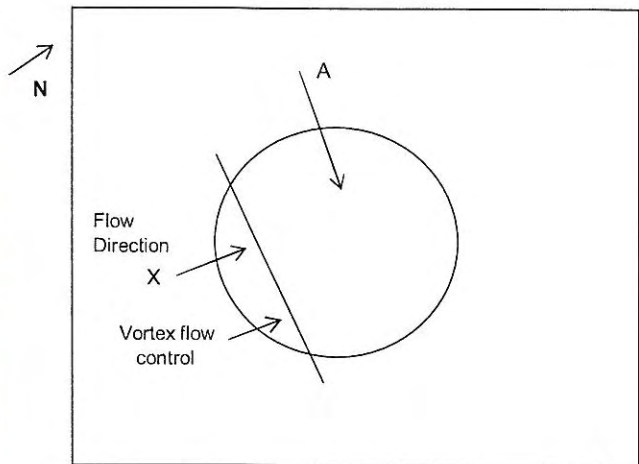
REMARKS

LOCATION SKETCH



Not to scale

INTERNAL SKETCH



Not to scale

MANHOLE RECORD CARD

CLIENT REFERENCE **FIELDS END LANE**

MH REFERENCE **MH2**

LOCATION **FIELD OFF LONG CHAUDEN ROAD**

SURVEYED DATE

YEAR LAID **Z** STATUS **PR** FUNCTION **S** NODE TYPE **M**

TEAM LEADER **S LAPWORTH**

COVER	SHAPE S	HINGED	N	LOCK	N	DUTY	H	SIZE (mm)	750 x 750	TOXIC ATMOSPHERE	N
SHAFT	SIDE ENTRY N	REGULAT COURSE	5	DEPTH (m)	2.95			SIZE (mm)	720 x 720	EVIDENCE OF VERMIN	N
CHAMBER	SOFFIT S	STEPS		LADDERS	1	LNDGS N		SIZE (mm)	1200 x 1200	CONSTRUCT CODE	C
DEPTH OF FLOW (mm)		DEPTH OF SILT (mm)		HEIGHT SURCH (mm)						COVER LEVEL (m)	

	URSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE (mm) (diam)		BACKDROP DIAM(mm)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (m)	INVERT LEVEL (m)
INCOMING PIPE	A	MH1	C	300	x		PVC		5.90 / -5.90
	B				x				
	C				x				
	D				x				
	E				x				
	F				x				

	DOWNSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE (mm) (diam)		COND	CRITY	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (m)	INVERT LEVEL (m)
OUTGOING PIPE	X	MH3	C	675	x		CO		5.90	-5.90
	Y				x					

CONDITION (Y if attention required) COVER **N** IRONS/LADDERS **N** SHAFT **N** CHAMBER **N** BENCHING **N** OTHER **N**

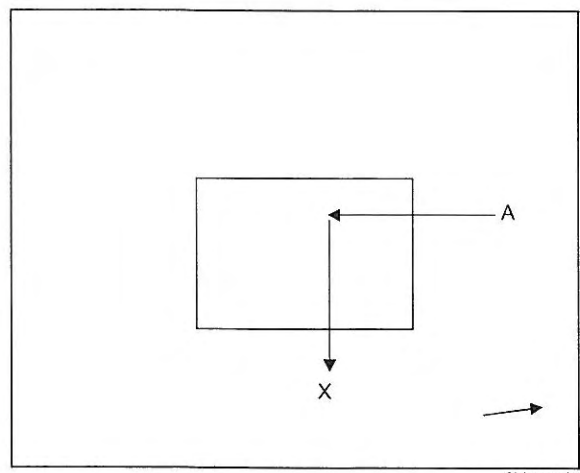
REMARKS

LOCATION SKETCH



Not to scale

INTERNAL SKETCH



Not to scale

JMP CONSULTANTS



MANHOLE RECORD CARD

CLIENT REFERENCE

FIELDS END LANE

MH REFERENCE

MH3

LOCATION

PAVEMENT ALONG CHAUDEN ROAD

SURVEYED DATE

YEAR LAID

Z

STATUS

PU

FUNCTION

S

NODE TYPE

M

TEAM LEADER

S LAPWORTH

COVER

SHAPE

C

HINGED

N

LOCK

N

DUTY

M

SIZE (mm)

630

X

TOXIC ATMOSPHERE

N

SHAFT

SIDE ENTRY

N

REGULAT COURSE

9

DEPTH (m)

0.78

SIZE (mm)

740

X

660

EVIDENCE OF VERMIN

N

CHAMBER

SOFFIT

S

STEPS

16

LADDERS

LNDGS

N

SIZE (mm)

2500

X

1000

CONSTRUCT CODE

B

DEPTH OF FLOW (mm)

DEPTH OF SILT (mm)

HEIGHT SURCH (mm)

COVER LEVEL (m)

	URSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE (mm) (diam)		BACKDROP DIAM(mm)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (m)	INVERT LEVEL (m)
INCOMING PIPE	A	UNK	C	150	x		PVC	0.68	-0.68
	B	UNK	C	300	x		VC	5.90	-5.90
	C	MH2	C	675	x		CO	4.90	-4.90
	D	UNK	C	300	x		VC	3.65	-3.65
	E				x				
F				x					

	DOWNSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE (mm) (diam)		BACKDROP DIAM(mm)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (m)	INVERT LEVEL (m)
OUTGOING PIPE	X	UNK	C	675	x		CO	6.50	-6.50
	Y				x				

CONDITION (Y if attention required)

COVER **N** IRONS/LADDERS **N** SHAFT **N** CHAMBER **N** BENCHING **N** OTHER **N**

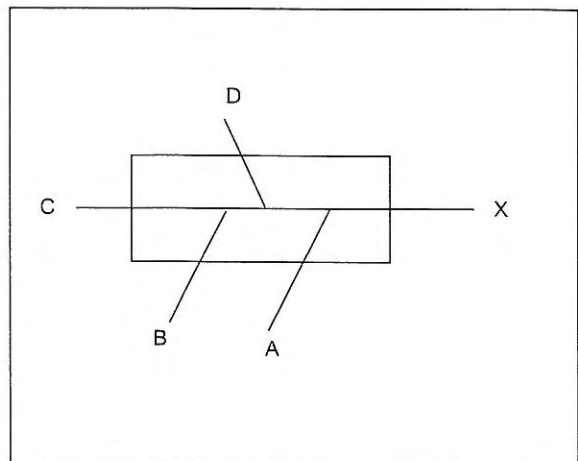
REMARKS

LOCATION SKETCH



Not to scale

INTERNAL SKETCH



Not to scale

Surface Water Storage Calculations

Latchford House
Shenstone Business Park
Lichfield WS14 0SB

Land West of Hemel Hempstead
MID3160
Development catchment 1

Date 04.07.12
File Development catchment 1.srcx

Designed By PJB
Checked By



Micro Drainage

Source Control W.12.4.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.611	0.611	40.0	1317.2	O K
30 min Summer	0.692	0.692	40.0	1491.5	O K
60 min Summer	0.772	0.772	40.0	1663.4	O K
120 min Summer	0.838	0.838	40.0	1806.5	O K
180 min Summer	0.862	0.862	40.0	1857.4	O K
240 min Summer	0.867	0.867	40.0	1867.8	O K
360 min Summer	0.848	0.848	40.0	1828.2	O K
480 min Summer	0.821	0.821	40.0	1769.4	O K
600 min Summer	0.795	0.795	40.0	1713.1	O K
720 min Summer	0.770	0.770	40.0	1659.3	O K
960 min Summer	0.706	0.706	40.0	1521.2	O K
1440 min Summer	0.596	0.596	40.0	1283.6	O K
2160 min Summer	0.458	0.458	40.0	986.8	O K
2880 min Summer	0.346	0.346	40.0	744.9	O K
4320 min Summer	0.200	0.200	40.0	430.5	O K
5760 min Summer	0.119	0.119	40.0	256.8	O K
7200 min Summer	0.093	0.093	37.3	200.9	O K
8640 min Summer	0.081	0.081	32.5	175.0	O K
10080 min Summer	0.072	0.072	28.9	155.6	O K
15 min Winter	0.687	0.687	40.0	1481.3	O K
30 min Winter	0.779	0.779	40.0	1679.5	O K
60 min Winter	0.872	0.872	40.0	1879.4	O K
120 min Winter	0.954	0.954	40.0	2055.4	Flood Risk
180 min Winter	0.987	0.987	40.0	2127.5	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	201.638	30
30 min Summer	115.474	44
60 min Summer	66.129	72
120 min Summer	37.871	130
180 min Summer	27.333	186
240 min Summer	21.688	244
360 min Summer	15.653	356
480 min Summer	12.420	406
600 min Summer	10.380	466
720 min Summer	8.964	528
960 min Summer	7.001	660
1440 min Summer	4.942	926
2160 min Summer	3.488	1316
2880 min Summer	2.724	1680
4320 min Summer	1.962	2380
5760 min Summer	1.555	3008
7200 min Summer	1.298	3680
8640 min Summer	1.120	4408
10080 min Summer	0.988	5144
15 min Winter	201.638	30
30 min Winter	115.474	44
60 min Winter	66.129	72
120 min Winter	37.871	128
180 min Winter	27.333	184

Latchford House
Shenstone Business Park
Lichfield WS14 0SB

Land West of Hemel Hempstead
MID3160
Development catchment 1

Date 04.07.12
File Development catchment 1.srcx

Designed By PJB
Checked By



Micro Drainage

Source Control W.12.4.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
240 min Winter	0.999	0.999	40.0	2153.5	Flood Risk
360 min Winter	0.992	0.992	40.0	2136.8	Flood Risk
480 min Winter	0.962	0.962	40.0	2073.8	Flood Risk
600 min Winter	0.925	0.925	40.0	1994.0	Flood Risk
720 min Winter	0.894	0.894	40.0	1926.0	O K
960 min Winter	0.808	0.808	40.0	1741.6	O K
1440 min Winter	0.650	0.650	40.0	1400.2	O K
2160 min Winter	0.446	0.446	40.0	961.4	O K
2880 min Winter	0.284	0.284	40.0	611.9	O K
4320 min Winter	0.107	0.107	40.0	230.3	O K
5760 min Winter	0.082	0.082	32.9	177.4	O K
7200 min Winter	0.069	0.069	27.7	148.8	O K
8640 min Winter	0.060	0.060	23.9	128.5	O K
10080 min Winter	0.053	0.053	21.1	113.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
240 min Winter	21.688	240
360 min Winter	15.653	352
480 min Winter	12.420	458
600 min Winter	10.380	502
720 min Winter	8.964	568
960 min Winter	7.001	718
1440 min Winter	4.942	1008
2160 min Winter	3.488	1408
2880 min Winter	2.724	1764
4320 min Winter	1.962	2300
5760 min Winter	1.555	2952
7200 min Winter	1.298	3680
8640 min Winter	1.120	4408
10080 min Winter	0.988	5144

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 1



Date 04.07.12
 File Development catchment 1.srcx

Designed By PJB
 Checked By

Micro Drainage

Source Control W.12.4.1

Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.315	Cv (Winter)	0.840
Return Period (years)	100	E (1km)	0.322	Shortest Storm (mins)	15
Site Location		F (1km)	2.448	Longest Storm (mins)	10080
C (1km)	-0.027	Summer Storms	Yes	Climate Change %	+30
D1 (1km)	0.320	Winter Storms	Yes		
D2 (1km)	0.265	Cv (Summer)	0.750		

Time / Area Diagram

Total Area (ha) 3.630

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.908	4-8	0.908	8-12	0.907	12-16	0.907

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 1



Date 04.07.12
 File Development catchment 1.srcx

Designed By PJB
 Checked By

Micro Drainage

Source Control W.12.4.1

Model Details

Storage is Online Cover Level (m) 1.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	2155.0	1.000	2155.0

Depth/Flow Relationship Outflow Control

Invert Level (m) 0.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	40.0000	0.900	40.0000	1.700	40.0000	2.500	40.0000
0.200	40.0000	1.000	40.0000	1.800	40.0000	2.600	40.0000
0.300	40.0000	1.100	40.0000	1.900	40.0000	2.700	40.0000
0.400	40.0000	1.200	40.0000	2.000	40.0000	2.800	40.0000
0.500	40.0000	1.300	40.0000	2.100	40.0000	2.900	40.0000
0.600	40.0000	1.400	40.0000	2.200	40.0000	3.000	40.0000
0.700	40.0000	1.500	40.0000	2.300	40.0000		
0.800	40.0000	1.600	40.0000	2.400	40.0000		

Latchford House
Shenstone Business Park
Lichfield WS14 0SB

Land West of Hemel Hempstead
MID3160
Development catchment 2

Date 04.07.2012
File Development catchment 2.srcx

Designed By PJB
Checked By



Micro Drainage

Source Control W.12.4.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.559	0.559	30.0	1504.9	O K
30 min Summer	0.635	0.635	30.0	1710.7	O K
60 min Summer	0.715	0.715	30.0	1925.6	O K
120 min Summer	0.792	0.792	30.0	2131.3	O K
180 min Summer	0.829	0.829	30.0	2232.9	O K
240 min Summer	0.850	0.850	30.0	2287.9	O K
360 min Summer	0.864	0.864	30.0	2326.8	O K
480 min Summer	0.860	0.860	30.0	2314.5	O K
600 min Summer	0.845	0.845	30.0	2274.1	O K
720 min Summer	0.828	0.828	30.0	2229.5	O K
960 min Summer	0.780	0.780	30.0	2099.3	O K
1440 min Summer	0.699	0.699	30.0	1880.8	O K
2160 min Summer	0.596	0.596	30.0	1605.6	O K
2880 min Summer	0.508	0.508	30.0	1368.4	O K
4320 min Summer	0.379	0.379	30.0	1019.1	O K
5760 min Summer	0.274	0.274	30.0	738.7	O K
7200 min Summer	0.196	0.196	30.0	528.3	O K
8640 min Summer	0.142	0.142	30.0	381.7	O K
10080 min Summer	0.108	0.108	30.0	291.2	O K
15 min Winter	0.628	0.628	30.0	1690.1	O K
30 min Winter	0.714	0.714	30.0	1922.9	O K
60 min Winter	0.806	0.806	30.0	2168.9	O K
120 min Winter	0.896	0.896	30.0	2411.1	O K
180 min Winter	0.942	0.942	30.0	2536.4	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	201.638	30
30 min Summer	115.474	45
60 min Summer	66.129	74
120 min Summer	37.871	132
180 min Summer	27.333	190
240 min Summer	21.688	248
360 min Summer	15.653	366
480 min Summer	12.420	482
600 min Summer	10.380	584
720 min Summer	8.964	628
960 min Summer	7.001	746
1440 min Summer	4.942	996
2160 min Summer	3.488	1396
2880 min Summer	2.724	1792
4320 min Summer	1.962	2556
5760 min Summer	1.555	3280
7200 min Summer	1.298	3960
8640 min Summer	1.120	4584
10080 min Summer	0.988	5240
15 min Winter	201.638	30
30 min Winter	115.474	44
60 min Winter	66.129	72
120 min Winter	37.871	130
180 min Winter	27.333	186

Latchford House
Shenstone Business Park
Lichfield WS14 0SB

Land West of Hemel Hempstead
MID3160
Development catchment 2

Date 04.07.2012
File Development catchment 2.srcx

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Checked By



Micro Drainage

Source Control W.12.4.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
240 min Winter	0.969	0.969	30.0	2609.7	Flood Risk
360 min Winter	0.994	0.994	30.0	2675.6	Flood Risk
480 min Winter	0.997	0.997	30.0	2683.4	Flood Risk
600 min Winter	0.988	0.988	30.0	2659.2	Flood Risk
720 min Winter	0.972	0.972	30.0	2615.5	Flood Risk
960 min Winter	0.907	0.907	30.0	2442.8	Flood Risk
1440 min Winter	0.803	0.803	30.0	2161.7	O K
2160 min Winter	0.658	0.658	30.0	1771.0	O K
2880 min Winter	0.528	0.528	30.0	1421.1	O K
4320 min Winter	0.333	0.333	30.0	895.8	O K
5760 min Winter	0.188	0.188	30.0	505.5	O K
7200 min Winter	0.105	0.105	30.0	283.0	O K
8640 min Winter	0.089	0.089	26.6	239.4	O K
10080 min Winter	0.079	0.079	23.6	211.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
240 min Winter	21.688	244
360 min Winter	15.653	358
480 min Winter	12.420	472
600 min Winter	10.380	584
720 min Winter	8.964	690
960 min Winter	7.001	806
1440 min Winter	4.942	1084
2160 min Winter	3.488	1524
2880 min Winter	2.724	1940
4320 min Winter	1.962	2692
5760 min Winter	1.555	3352
7200 min Winter	1.298	3824
8640 min Winter	1.120	4488
10080 min Winter	0.988	5152

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 2



Date 04.07.2012
 File Development catchment 2.srcx

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Micro Drainage

Source Control W.12.4.1

Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.315	Cv (Winter)	0.840
Return Period (years)	100	E (1km)	0.322	Shortest Storm (mins)	15
Site Location		F (1km)	2.448	Longest Storm (mins)	10080
C (1km)	-0.027	Summer Storms	Yes	Climate Change %	+30
D1 (1km)	0.320	Winter Storms	Yes		
D2 (1km)	0.265	Cv (Summer)	0.750		

Time / Area Diagram

Total Area (ha) 4.090

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.023	4-8	1.023	8-12	1.022	12-16	1.022

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 2



Date 04.07.2012
 File Development catchment 2.srcx

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Micro Drainage

Source Control W.12.4.1

Model Details

Storage is Online Cover Level (m) 1.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	2692.0	1.000	2692.0

Depth/Flow Relationship Outflow Control

Invert Level (m) 0.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	30.0000	0.900	30.0000	1.700	30.0000	2.500	30.0000
0.200	30.0000	1.000	30.0000	1.800	30.0000	2.600	30.0000
0.300	30.0000	1.100	30.0000	1.900	30.0000	2.700	30.0000
0.400	30.0000	1.200	30.0000	2.000	30.0000	2.800	30.0000
0.500	30.0000	1.300	30.0000	2.100	30.0000	2.900	30.0000
0.600	30.0000	1.400	30.0000	2.200	30.0000	3.000	30.0000
0.700	30.0000	1.500	30.0000	2.300	30.0000		
0.800	30.0000	1.600	30.0000	2.400	30.0000		

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 3



Date 04.07.2012
 File Development catchment 3.srcx

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Micro Drainage

Source Control W.12.4.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.549	0.549	30.0	1644.8	O K
30 min Summer	0.625	0.625	30.0	1871.0	O K
60 min Summer	0.704	0.704	30.0	2109.2	O K
120 min Summer	0.782	0.782	30.0	2341.6	O K
180 min Summer	0.821	0.821	30.0	2460.4	O K
240 min Summer	0.844	0.844	30.0	2528.4	O K
360 min Summer	0.864	0.864	30.0	2586.6	O K
480 min Summer	0.864	0.864	30.0	2588.3	O K
600 min Summer	0.854	0.854	30.0	2558.4	O K
720 min Summer	0.839	0.839	30.0	2512.7	O K
960 min Summer	0.793	0.793	30.0	2375.7	O K
1440 min Summer	0.717	0.717	30.0	2146.6	O K
2160 min Summer	0.621	0.621	30.0	1859.3	O K
2880 min Summer	0.538	0.538	30.0	1611.5	O K
4320 min Summer	0.416	0.416	30.0	1244.5	O K
5760 min Summer	0.314	0.314	30.0	939.0	O K
7200 min Summer	0.233	0.233	30.0	697.3	O K
8640 min Summer	0.172	0.172	30.0	516.5	O K
10080 min Summer	0.130	0.130	30.0	388.3	O K
15 min Winter	0.617	0.617	30.0	1846.8	O K
30 min Winter	0.702	0.702	30.0	2102.3	O K
60 min Winter	0.793	0.793	30.0	2374.3	O K
120 min Winter	0.884	0.884	30.0	2646.5	O K
180 min Winter	0.932	0.932	30.0	2791.1	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	201.638	30
30 min Summer	115.474	45
60 min Summer	66.129	74
120 min Summer	37.871	132
180 min Summer	27.333	190
240 min Summer	21.688	248
360 min Summer	15.653	366
480 min Summer	12.420	484
600 min Summer	10.380	600
720 min Summer	8.964	670
960 min Summer	7.001	772
1440 min Summer	4.942	1018
2160 min Summer	3.488	1416
2880 min Summer	2.724	1820
4320 min Summer	1.962	2596
5760 min Summer	1.555	3336
7200 min Summer	1.298	4032
8640 min Summer	1.120	4672
10080 min Summer	0.988	5336
15 min Winter	201.638	30
30 min Winter	115.474	44
60 min Winter	66.129	72
120 min Winter	37.871	130
180 min Winter	27.333	188

Latchford House
Shenstone Business Park
Lichfield WS14 0SB

Land West of Hemel Hempstead
MID3160
Development catchment 3

Date 04.07.2012
File Development catchment 3.srcx

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Micro Drainage

Source Control W.12.4.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
240 min Winter	0.961	0.961	30.0	2879.1	Flood Risk
360 min Winter	0.991	0.991	30.0	2966.8	Flood Risk
480 min Winter	0.999	0.999	30.0	2990.7	Flood Risk
600 min Winter	0.995	0.995	30.0	2978.8	Flood Risk
720 min Winter	0.983	0.983	30.0	2944.7	Flood Risk
960 min Winter	0.927	0.927	30.0	2776.2	Flood Risk
1440 min Winter	0.828	0.828	30.0	2479.7	O K
2160 min Winter	0.694	0.694	30.0	2079.8	O K
2880 min Winter	0.573	0.573	30.0	1716.1	O K
4320 min Winter	0.387	0.387	30.0	1160.1	O K
5760 min Winter	0.240	0.240	30.0	719.1	O K
7200 min Winter	0.138	0.138	30.0	413.0	O K
8640 min Winter	0.097	0.097	29.0	289.3	O K
10080 min Winter	0.086	0.086	25.7	256.4	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
240 min Winter	21.688	244
360 min Winter	15.653	360
480 min Winter	12.420	474
600 min Winter	10.380	586
720 min Winter	8.964	696
960 min Winter	7.001	896
1440 min Winter	4.942	1104
2160 min Winter	3.488	1548
2880 min Winter	2.724	1968
4320 min Winter	1.962	2768
5760 min Winter	1.555	3456
7200 min Winter	1.298	4032
8640 min Winter	1.120	4488
10080 min Winter	0.988	5152

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 3



Date 04.07.2012
 File Development catchment 3.srcx

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Micro Drainage

Source Control W.12.4.1

Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.315	Cv (Winter)	0.840
Return Period (years)	100	E (1km)	0.322	Shortest Storm (mins)	15
Site Location		F (1km)	2.448	Longest Storm (mins)	10080
C (1km)	-0.027	Summer Storms	Yes	Climate Change %	+30
D1 (1km)	0.320	Winter Storms	Yes		
D2 (1km)	0.265	Cv (Summer)	0.750		

Time / Area Diagram

Total Area (ha) 4.460

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.115	4-8	1.115	8-12	1.115	12-16	1.115

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 3



Date 04.07.2012
 File Development catchment 3.srcx

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Micro Drainage

Source Control W.12.4.1

Model Details

Storage is Online Cover Level (m) 1.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	2995.0	1.000	2995.0

Depth/Flow Relationship Outflow Control

Invert Level (m) 0.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	30.0000	0.900	30.0000	1.700	30.0000	2.500	30.0000
0.200	30.0000	1.000	30.0000	1.800	30.0000	2.600	30.0000
0.300	30.0000	1.100	30.0000	1.900	30.0000	2.700	30.0000
0.400	30.0000	1.200	30.0000	2.000	30.0000	2.800	30.0000
0.500	30.0000	1.300	30.0000	2.100	30.0000	2.900	30.0000
0.600	30.0000	1.400	30.0000	2.200	30.0000	3.000	30.0000
0.700	30.0000	1.500	30.0000	2.300	30.0000		
0.800	30.0000	1.600	30.0000	2.400	30.0000		

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 4



Date 04.07.2012
 File Development catchment 4.srcx

Designed By PJB
 Checked By

Micro Drainage

Source Control W.12.4.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.592	0.592	93.0	3595.7	O K
30 min Summer	0.671	0.671	93.0	4078.4	O K
60 min Summer	0.752	0.752	93.0	4566.1	O K
120 min Summer	0.823	0.823	93.0	5000.4	O K
180 min Summer	0.853	0.853	93.0	5183.4	O K
240 min Summer	0.865	0.865	93.0	5255.5	O K
360 min Summer	0.861	0.861	93.0	5231.6	O K
480 min Summer	0.839	0.839	93.0	5099.4	O K
600 min Summer	0.817	0.817	93.0	4965.5	O K
720 min Summer	0.796	0.796	93.0	4835.0	O K
960 min Summer	0.739	0.739	93.0	4486.8	O K
1440 min Summer	0.640	0.640	93.0	3889.9	O K
2160 min Summer	0.517	0.517	93.0	3138.8	O K
2880 min Summer	0.413	0.413	93.0	2506.4	O K
4320 min Summer	0.267	0.267	93.0	1619.9	O K
5760 min Summer	0.169	0.169	93.0	1024.2	O K
7200 min Summer	0.113	0.113	93.0	685.0	O K
8640 min Summer	0.094	0.094	87.2	569.4	O K
10080 min Summer	0.084	0.084	77.9	507.8	O K
15 min Winter	0.665	0.665	93.0	4041.2	O K
30 min Winter	0.755	0.755	93.0	4588.9	O K
60 min Winter	0.848	0.848	93.0	5152.8	O K
120 min Winter	0.934	0.934	93.0	5675.0	Flood Risk
180 min Winter	0.974	0.974	93.0	5915.7	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	201.638	30
30 min Summer	115.474	44
60 min Summer	66.129	72
120 min Summer	37.871	130
180 min Summer	27.333	188
240 min Summer	21.688	246
360 min Summer	15.653	362
480 min Summer	12.420	444
600 min Summer	10.380	500
720 min Summer	8.964	560
960 min Summer	7.001	684
1440 min Summer	4.942	950
2160 min Summer	3.488	1348
2880 min Summer	2.724	1732
4320 min Summer	1.962	2432
5760 min Summer	1.555	3112
7200 min Summer	1.298	3752
8640 min Summer	1.120	4416
10080 min Summer	0.988	5144
15 min Winter	201.638	30
30 min Winter	115.474	44
60 min Winter	66.129	72
120 min Winter	37.871	128
180 min Winter	27.333	186

Latchford House
Shenstone Business Park
Lichfield WS14 0SB

Land West of Hemel Hempstead
MID3160
Development catchment 4

Date 04.07.2012
File Development catchment 4.srcx

Designed By PJB
Checked By



Micro Drainage

Source Control W.12.4.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
240 min Winter	0.993	0.993	93.0	6031.4	Flood Risk
360 min Winter	0.999	0.999	93.0	6071.3	Flood Risk
480 min Winter	0.984	0.984	93.0	5977.5	Flood Risk
600 min Winter	0.957	0.957	93.0	5816.2	Flood Risk
720 min Winter	0.926	0.926	93.0	5628.1	Flood Risk
960 min Winter	0.854	0.854	93.0	5187.7	O K
1440 min Winter	0.717	0.717	93.0	4358.2	O K
2160 min Winter	0.536	0.536	93.0	3253.8	O K
2880 min Winter	0.382	0.382	93.0	2320.7	O K
4320 min Winter	0.177	0.177	93.0	1074.8	O K
5760 min Winter	0.096	0.096	89.0	580.8	O K
7200 min Winter	0.080	0.080	74.6	487.5	O K
8640 min Winter	0.070	0.070	64.9	422.3	O K
10080 min Winter	0.062	0.062	57.4	373.7	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
240 min Winter	21.688	242
360 min Winter	15.653	356
480 min Winter	12.420	466
600 min Winter	10.380	570
720 min Winter	8.964	604
960 min Winter	7.001	740
1440 min Winter	4.942	1036
2160 min Winter	3.488	1456
2880 min Winter	2.724	1832
4320 min Winter	1.962	2504
5760 min Winter	1.555	2992
7200 min Winter	1.298	3688
8640 min Winter	1.120	4408
10080 min Winter	0.988	5136

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 4



Date 04.07.2012
 File Development catchment 4.srcx

Designed By PJB
 Checked By

Micro Drainage

Source Control W.12.4.1

Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.315	Cv (Winter)	0.840
Return Period (years)	100	E (1km)	0.322	Shortest Storm (mins)	15
Site Location		F (1km)	2.448	Longest Storm (mins)	10080
C (1km)	-0.027	Summer Storms	Yes	Climate Change %	+30
D1 (1km)	0.320	Winter Storms	Yes		
D2 (1km)	0.265	Cv (Summer)	0.750		

Time / Area Diagram

Total Area (ha) 9.850

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	2.463	4-8	2.463	8-12	2.462	12-16	2.462

Latchford House
 Shenstone Business Park
 Lichfield WS14 0SB

Land West of Hemel Hempstead
 MID3160
 Development catchment 4



Date 04.07.2012
 File Development catchment 4.srcx

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 Checked By

Micro Drainage

Source Control W.12.4.1

Model Details

Storage is Online Cover Level (m) 1.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	6075.0	1.000	6075.0

Depth/Flow Relationship Outflow Control

Invert Level (m) 0.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	93.0000	0.900	93.0000	1.700	93.0000	2.500	93.0000
0.200	93.0000	1.000	93.0000	1.800	93.0000	2.600	93.0000
0.300	93.0000	1.100	93.0000	1.900	93.0000	2.700	93.0000
0.400	93.0000	1.200	93.0000	2.000	93.0000	2.800	93.0000
0.500	93.0000	1.300	93.0000	2.100	93.0000	2.900	93.0000
0.600	93.0000	1.400	93.0000	2.200	93.0000	3.000	93.0000
0.700	93.0000	1.500	93.0000	2.300	93.0000		
0.800	93.0000	1.600	93.0000	2.400	93.0000		