



Notes:

- All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
- This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION

MAINTENANCE / CLEANING

DECOMMISSIONING / DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

NOTES

- SURVEY INFORMATION BASED ON MALCOLM HUGHES LAND SURVEYORS DRAWINGS 16473-1
- PLOT LAYOUT BASED ON MSA ARCHITECTS DRAWING 9903-SS-25
- FFL ASSUMED TO BE 3.00m.
- CONTOURS SHOWN AT 100MM AND 500MM
- FOR DETAILS OF CUT/FILL ANALYSIS REFER TO DRAWING C1443/201
- NUMERICAL VALUES SHOWN ARE PROPOSED LEVELS ADD

P2	18-06-2014	POND AMENDED	MB	PMA
Rev	Date	Description	By	Ckd
Architect :				
Client :				
Hydrock Consultants Ltd 21 Baddley's Hall 20 Ashley Road Hale, Cheshire WALTON Tel: +44 (0)1457 233 0746 www.hydrock.com				
Drawing Title:				
OLDLANDS FARM BOGNOR REGIS				
Drawing Title:				
PROPOSED FINISHED FLOOR LEVEL AND CONTOURS (FFL 3.00M)				
Drawing Status:				
PRELIMINARY				
Hydrock Job No:				
C14443				
Drawn:	Checked:	Scale (if A1):	Date:	Issue Date:
MJB	PMA	1:1000	12.06.2014	12.06.14
Drawing Number:				Revision:
200				P2



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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

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CONSTRUCTION

MAINTENANCE / CLEANING

DECOMMISSIONING / DEMOLITION

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NOTES

- SURVEY INFORMATION BASED ON MALCOLM HUGHES LAND SURVEYORS DRAWINGS 16473-1
- PLOT LAYOUT BASED ON MSA ARCHITECTS DRAWING 9903-SS-25
- TOPSOIL STRIP ASSUMED TO 300mm ACROSS AREA OF SITE VOL = 27, 460 cu m
- IT IS ASSUMED STABILISATION WILL BE POSSIBLE OF EXISTING GROUND THEREFORE NO CAPPING IS REQUIRED
- FLL ASSUMED TO BE 3.00m
- CONSTRUCTION THICKNESS ASSUMED TO BE 300mm FOR BUILDING SLAB, EXTERNAL YARD AND CAR PARKS
- CONSTRUCTION THICKNESS OF ACCESS ROAD ASSUMED TO BE 450mm AND ACCESS FOOTWAY 300mm
- VOLUMES
 - CUT = 1, 400 cu m
 - FILL = 108, 200 cu m
 - FILL REQUIRED = 106, 800 cu m

SURFACE LEVEL DATA			
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	CLOUR
1	-3.00	-2.00	Red
2	-2.00	-1.00	Orange
3	-1.00	0.00	Yellow
4	0.00	1.00	Light Green
5	1.00	2.00	Green
6	2.00	3.00	Dark Green

P2	18-06-2014	POND AMENDED VOLUMES UPDATED	MB	PMA
Rev	Date	Description	By	Ckd

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Client:

Project Title:

**OLDLANDS FARM
BOGNOR REGIS**

Drawing Title:

**PROPOSED DEPTHS OF CUT
AND FILL (FLL 3.00M)**

Drawing Status:

PRELIMINARY

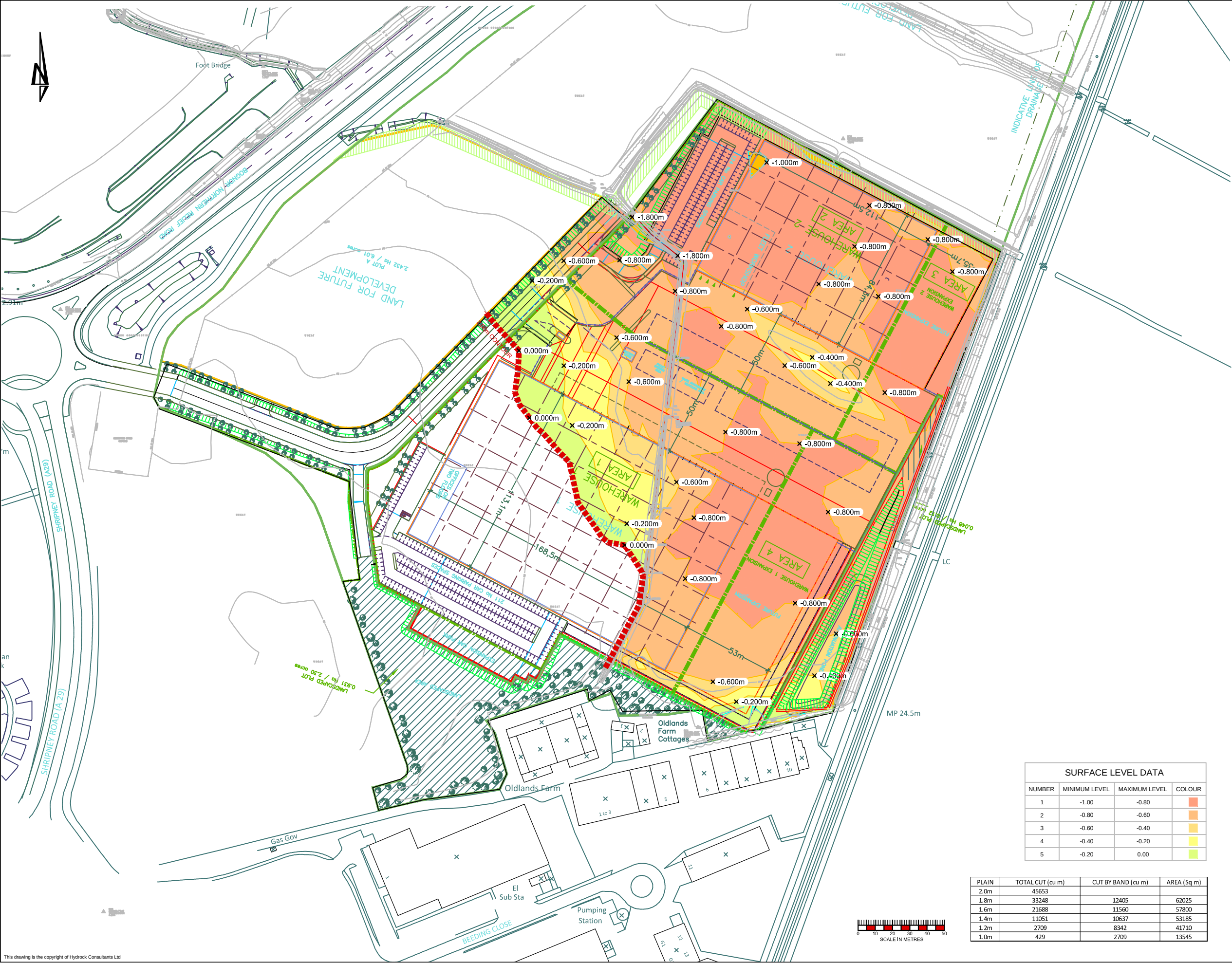
Hydrock Job No:

C14443

Drawn	Checked	Scale (if A1)	Date	Issue Date
MJB	PMA	1:1000	12.06.2014	12.06.14

Drawing Number:	Revision:
201	P2





Notes:

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION

MAINTENANCE / CLEANING

DECOMMISSIONING / DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

NOTES

- SURVEY INFORMATION BASED ON MALCOLM HUGHES LAND SURVEYORS DRAWINGS 16473-1
- CUT ANALYSIS COMPARES EXISTING GROUND TO A PLAINS AT 2.00m AOD AND Banded AT 200mm INTERVALS, IN ORDER COMPENSATION CAN BE PROVIDED.
- NUMERICAL VALUES SHOWN ARE DEPTH OF CUT, COMPARED TO A PLAIN AT 2.00m AOD

P2	18-06-2014	TABLE CORRECTED	PMA	SEB
Rev	Date	Description	By	Ckd

Architect :

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Client:

Project Title:

**OLDLANDS FARM
BOGNOR REGIS**

Drawing Title:

**EXISTING FLOOD PLAIN
AND 200mm BANDING**

Drawing Status:

PRELIMINARY

Hydrock Job No:

C14443

Drawn:	Checked:	Scale (or A1):	Date:	Issue Date:
MJB	PMA	1:1000	12.06.2014	12.06.14

Drawing Number:

202

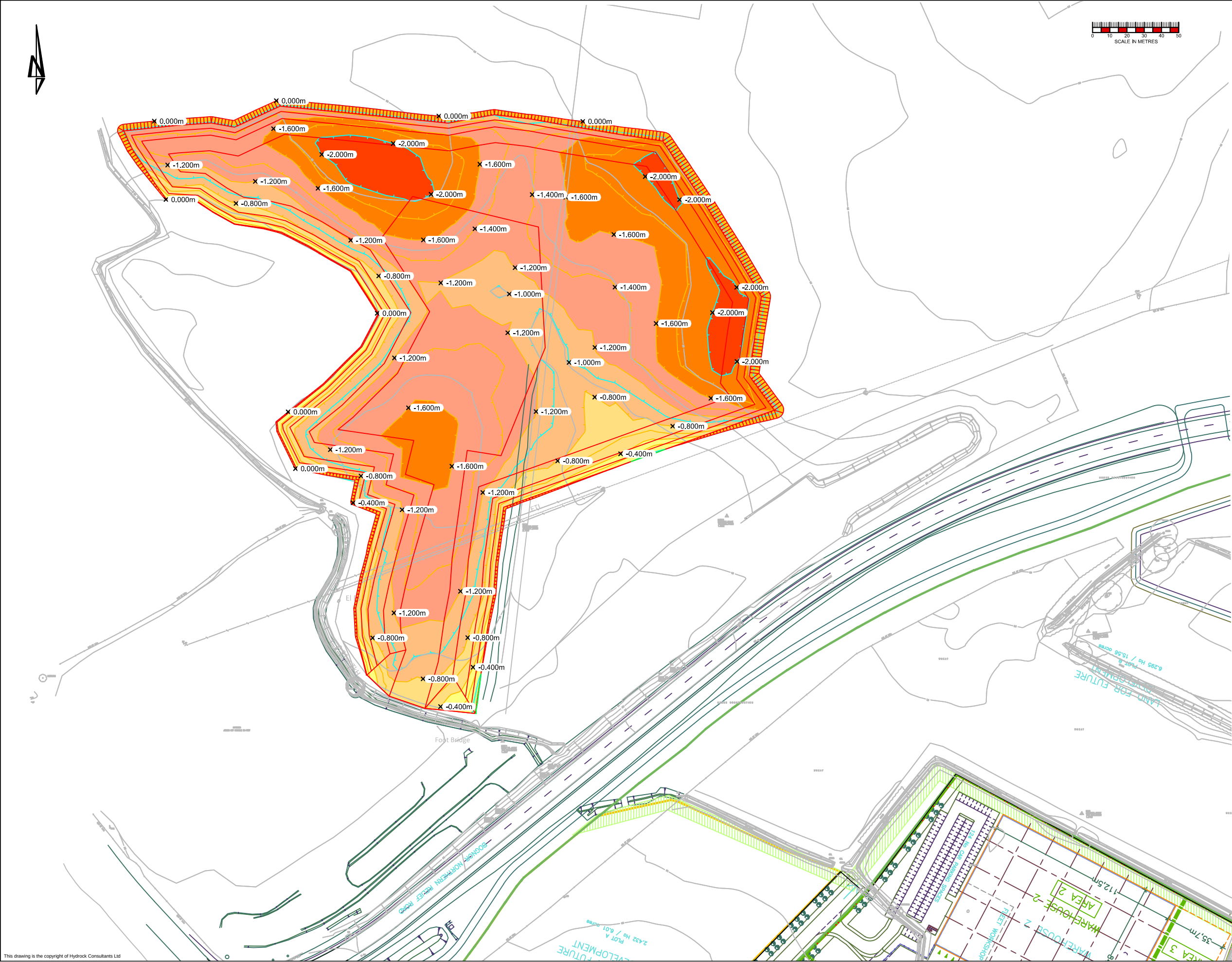
Revision:

P2

SURFACE LEVEL DATA			
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR
1	-1.00	-0.80	
2	-0.80	-0.60	
3	-0.60	-0.40	
4	-0.40	-0.20	
5	-0.20	0.00	

PLAIN	TOTAL CUT (cu m)	CUT BY BAND (cu m)	AREA (Sq m)
2.0m	45653		
1.8m	33248	12405	62025
1.6m	21688	11560	57800
1.4m	11051	10637	53185
1.2m	2709	8342	41710
1.0m	429	2709	13545





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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION

PROPOSED FLOOD PLAIN IS UNDER EXISTING OVERHEAD LINES. DURING CONSTRUCTION APPROPRIATE MEASURE/RESTRICTIONS WILL NEED TO BE IN PLACE TO ENSURE LINES ARE NOT STRUCK BY PLANT

MAINTENANCE / CLEANING

DECOMMISSIONING / DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

NOTES

- SURVEY INFORMATION BASED ON MALCOLM HUGHES LAND SURVEYORS DRAWINGS 16473-1
- FOR DETAILS OF EXISTING FLOOD PLAIN AND QUANTITIES LOST DUE TO DEVELOPMENT REFER TO DRAWINGS C14490-201
- NUMERIC VALUES SHOWN ARE DEPTH OF CUT
- FLOOD PLAIN TOPSOIL STRIP ASSUMED TO BE 300mm. VOLUME - 19, 800 cu m
- PLOT TOPSOIL STRIP ASSUMED TO BE 300mm. VOLUME - 27, 460 cu m
- IT IS PROPOSED TO OVER-DIG THE BASE OF THE PROPOSED FLOOD PLAIN, AS A BORROW PIT FOR DISPOSAL OF TOPSOIL & WINNING OF SUBSOIL. TOTAL TOPSOIL 'SWAPPED' FOR SUBSOIL - 49, 110 cu m
- VOLUMES
 - SUBSOIL 'SWAPPED' - 47, 260cu m
 - SUBSOIL CUT FLOOD PLAIN - 66, 350 cu m
 - TOTAL STRIPPED AND CUT - 113, 610 cu m
 - TOTAL FILL REQUIRED FOR PLOT - 106, 781 cu m

SURFACE LEVEL DATA			
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR
1	-4.00	-3.60	
2	-3.60	-3.20	
3	-3.20	-2.80	
4	-2.80	-2.40	
5	-2.40	-2.00	
6	-2.00	-1.60	
7	-1.60	-1.20	
8	-1.20	-0.80	
9	-0.80	-0.40	
10	-0.40	0.00	
11	0.00	0.40	

P2	18-06-2014	FLOOD AREA REVISED	PMA	SEB
Rev	Date	Description	By	Ckd
Architect :				

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Client:

Project Title:

OLDLANDS FARM
BOGNOR REGIS

Drawing Title:

PROPOSED FLOOD PLAIN
DEPTHS OF CUT AND FILL

Drawing Status:

PRELIMINARY

Hydrock Job No:

C14443

Drawn:	Checked:	Scale:	Date:	Issue Date:
MJB	PMA	1:1000	12.06.2014	12.06.14
Drawing Number:				Revision:
204				P2

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APPENDIX F – HYDROCK HYDRAULIC CALCULATIONS

Proposed Drainage

Design Criteria used

Network Design Table

Manhole and Pipeline Schedules

Simulation Global Variables

Online Controls

Storage Structures

30 year summary wizard 'Rank 1' simulation model results

100 year summary wizard 'Rank 1' simulation model results (Including the 30% allowance
for Climate Change)

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239 Ashley Road Hale Cheshire WA15 9NE	Bericote Properties L... Oldlands Farm Bognor Regis	
Date 20th June 2014 File WARE1.MDX	Designed by JH Checked by	
Micro Drainage Network 2013.1.1		

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.348	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm at outfall (pipe 1.002)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	5.030	4-8	1.414

Total Area Contributing (ha) = 6.444

Total Pipe Volume (m³) = 149.516

Time Area Diagram at outfall (pipe 5.000)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.020	4-8	0.003

Total Area Contributing (ha) = 0.023

Total Pipe Volume (m³) = 0.424

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	28.100	0.575	48.9	1.041	4.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.16	1.825	1.041	0.0	0.0	0.0	2.91	463.4	141.0

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Network Design Table for Storm											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)		
2.000	63.000	0.335	188.1	1.280	4.00	0.0	0.600	o	600		
1.001	31.500	0.080	393.8	0.000	0.00	0.0	0.600	o	600		
3.000	16.000	0.050	320.0	0.613	4.00	0.0	0.600	o	600		
3.001	64.000	0.183	349.7	0.000	0.00	0.0	0.600	o	600		
3.002	60.000	0.230	260.9	1.280	0.00	0.0	0.600	o	600		
3.003	31.000	0.487	63.7	0.000	0.00	0.0	0.600	o	600		
4.000	100.000	1.000	100.0	2.230	4.00	0.0	0.600	o	900		
1.002	10.000	0.100	100.0	0.000	0.00	0.0	0.600	o	900		
5.000	24.000	0.143	167.8	0.023	4.00	0.0	0.600	o	150		
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
2.000	50.00	4.59	1.650	1.280	0.0	0.0	0.0	1.77	501.1	173.3	
1.001	50.00	5.02	1.250	2.321	0.0	0.0	0.0	1.22	345.2	314.3	
3.000	50.00	4.20	2.000	0.613	0.0	0.0	0.0	1.36	383.4	83.0	
3.001	50.00	5.02	1.650	0.613	0.0	0.0	0.0	1.30	366.5	83.0	
3.002	50.00	5.68	1.467	1.893	0.0	0.0	0.0	1.50	425.0	256.3	
3.003	50.00	5.85	1.237	1.893	0.0	0.0	0.0	3.06	864.0	256.3	
4.000	50.00	4.53	1.450	2.230	0.0	0.0	0.0	3.13	1993.5	302.0	
1.002	50.00	5.91	0.450	6.444	0.0	0.0	0.0	3.13	1993.5	872.6	
5.000	50.00	4.52	0.000	0.023	0.0	0.0	0.0	0.77	13.7	3.1	
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Micro Drainage				Network 2013.1.1							
Manhole Schedules for Storm											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	
1	2.625	0.800	Open Manhole	1350	1.000	1.825	450				
2	2.850	1.200	Open Manhole	1500	2.000	1.650	600				
3	2.210	0.960	Open Manhole	1500	1.001	1.250	600	1.000	1.250	450	
								2.000	1.315	600	
4	2.800	0.800	Open Manhole	1500	3.000	2.000	600				
5	2.850	1.200	Open Manhole	1500	3.001	1.650	600	3.000	1.950	600	
6	2.900	1.433	Open Manhole	1500	3.002	1.467	600	3.001	1.467	600	
7	2.900	1.663	Open Manhole	1500	3.003	1.237	600	3.002	1.237	600	
9	3.200	1.750	Open Manhole	1800	4.000	1.450	900				
10	2.400	1.950	Open Manhole	1800	1.002	0.450	900	1.001	1.170	600	
								3.003	0.750	600	
								4.000	0.450	900	
	2.400	2.050	Open Manhole	0		OUTFALL		1.002	0.350	900	
10	2.071	2.071	Open Manhole	1200	5.000	0.000	150				
	2.524	2.667	Open Manhole	0		OUTFALL		5.000	-0.143	150	
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PIPELINE SCHEDULES for Storm Upstream Manhole <table><thead><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>1.000</td><td>o</td><td>450</td><td>1</td><td>2.625</td><td>1.825</td><td>0.350</td><td>Open Manhole</td><td>1350</td></tr><tr><td>2.000</td><td>o</td><td>600</td><td>2</td><td>2.850</td><td>1.650</td><td>0.600</td><td>Open Manhole</td><td>1500</td></tr><tr><td>1.001</td><td>o</td><td>600</td><td>3</td><td>2.210</td><td>1.250</td><td>0.360</td><td>Open Manhole</td><td>1500</td></tr><tr><td>3.000</td><td>o</td><td>600</td><td>4</td><td>2.800</td><td>2.000</td><td>0.200</td><td>Open Manhole</td><td>1500</td></tr><tr><td>3.001</td><td>o</td><td>600</td><td>5</td><td>2.850</td><td>1.650</td><td>0.600</td><td>Open Manhole</td><td>1500</td></tr><tr><td>3.002</td><td>o</td><td>600</td><td>6</td><td>2.900</td><td>1.467</td><td>0.833</td><td>Open Manhole</td><td>1500</td></tr><tr><td>3.003</td><td>o</td><td>600</td><td>7</td><td>2.900</td><td>1.237</td><td>1.063</td><td>Open Manhole</td><td>1500</td></tr><tr><td>4.000</td><td>o</td><td>900</td><td>9</td><td>3.200</td><td>1.450</td><td>0.850</td><td>Open Manhole</td><td>1800</td></tr><tr><td>1.002</td><td>o</td><td>900</td><td>10</td><td>2.400</td><td>0.450</td><td>1.050</td><td>Open Manhole</td><td>1800</td></tr><tr><td>5.000</td><td>o</td><td>150</td><td>10</td><td>2.071</td><td>0.000</td><td>1.921</td><td>Open Manhole</td><td>1200</td></tr></tbody></table> Downstream Manhole <table><thead><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>1.000</td><td>28.100</td><td>48.9</td><td>3</td><td>2.210</td><td>1.250</td><td>0.510</td><td>Open Manhole</td><td>1500</td></tr><tr><td>2.000</td><td>63.000</td><td>188.1</td><td>3</td><td>2.210</td><td>1.315</td><td>0.295</td><td>Open Manhole</td><td>1500</td></tr><tr><td>1.001</td><td>31.500</td><td>393.8</td><td>10</td><td>2.400</td><td>1.170</td><td>0.630</td><td>Open Manhole</td><td>1800</td></tr><tr><td>3.000</td><td>16.000</td><td>320.0</td><td>5</td><td>2.850</td><td>1.950</td><td>0.300</td><td>Open Manhole</td><td>1500</td></tr><tr><td>3.001</td><td>64.000</td><td>349.7</td><td>6</td><td>2.900</td><td>1.467</td><td>0.833</td><td>Open Manhole</td><td>1500</td></tr><tr><td>3.002</td><td>60.000</td><td>260.9</td><td>7</td><td>2.900</td><td>1.237</td><td>1.063</td><td>Open Manhole</td><td>1500</td></tr><tr><td>3.003</td><td>31.000</td><td>63.7</td><td>10</td><td>2.400</td><td>0.750</td><td>1.050</td><td>Open Manhole</td><td>1800</td></tr><tr><td>4.000</td><td>100.000</td><td>100.0</td><td>10</td><td>2.400</td><td>0.450</td><td>1.050</td><td>Open Manhole</td><td>1800</td></tr><tr><td>1.002</td><td>10.000</td><td>100.0</td><td></td><td>2.400</td><td>0.350</td><td>1.150</td><td>Open Manhole</td><td>0</td></tr><tr><td>5.000</td><td>24.000</td><td>167.8</td><td></td><td>2.524</td><td>-0.143</td><td>2.517</td><td>Open Manhole</td><td>0</td></tr></tbody></table>									PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	1.000	o	450	1	2.625	1.825	0.350	Open Manhole	1350	2.000	o	600	2	2.850	1.650	0.600	Open Manhole	1500	1.001	o	600	3	2.210	1.250	0.360	Open Manhole	1500	3.000	o	600	4	2.800	2.000	0.200	Open Manhole	1500	3.001	o	600	5	2.850	1.650	0.600	Open Manhole	1500	3.002	o	600	6	2.900	1.467	0.833	Open Manhole	1500	3.003	o	600	7	2.900	1.237	1.063	Open Manhole	1500	4.000	o	900	9	3.200	1.450	0.850	Open Manhole	1800	1.002	o	900	10	2.400	0.450	1.050	Open Manhole	1800	5.000	o	150	10	2.071	0.000	1.921	Open Manhole	1200	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	1.000	28.100	48.9	3	2.210	1.250	0.510	Open Manhole	1500	2.000	63.000	188.1	3	2.210	1.315	0.295	Open Manhole	1500	1.001	31.500	393.8	10	2.400	1.170	0.630	Open Manhole	1800	3.000	16.000	320.0	5	2.850	1.950	0.300	Open Manhole	1500	3.001	64.000	349.7	6	2.900	1.467	0.833	Open Manhole	1500	3.002	60.000	260.9	7	2.900	1.237	1.063	Open Manhole	1500	3.003	31.000	63.7	10	2.400	0.750	1.050	Open Manhole	1800	4.000	100.000	100.0	10	2.400	0.450	1.050	Open Manhole	1800	1.002	10.000	100.0		2.400	0.350	1.150	Open Manhole	0	5.000	24.000	167.8		2.524	-0.143	2.517	Open Manhole	0
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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	1.041	1.041	1.041
2.000	-	-	100	1.280	1.280	1.280
1.001	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.613	0.613	0.613
3.001	-	-	100	0.000	0.000	0.000
3.002	-	-	100	1.280	1.280	1.280
3.003	-	-	100	0.000	0.000	0.000
4.000	-	-	100	2.230	2.230	2.230
1.002	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.023	0.023	0.023
				Total	Total	Total
				6.467	6.467	6.467

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		2.400	0.350	0.200	0	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
5.000		2.524	-0.143	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs		0	Number of Storage Structures
Number of Online Controls		1	Number of Time/Area Diagrams
Number of Offline Controls		0	Number of Real Time Controls

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.348
Return Period (years)	100	Profile Type	Summer
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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Synthetic Rainfall Details Storm Duration (mins) 30		
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Online Controls for Storm

Complex Manhole: 10, DS/PN: 1.002, Volume (m³): 84.2

Hydro-Brake®

Design Head (m) 1.200 Hydro-Brake® Type Md9 Invert Level (m) 0.450
Design Flow (l/s) 30.0 Diameter (mm) 191

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.9	1.200	29.9	3.000	47.3	7.000	72.2
0.200	11.3	1.400	32.3	3.500	51.0	7.500	74.7
0.300	14.9	1.600	34.5	4.000	54.6	8.000	77.2
0.400	17.3	1.800	36.6	4.500	57.9	8.500	79.6
0.500	19.3	2.000	38.6	5.000	61.0	9.000	81.9
0.600	21.1	2.200	40.5	5.500	64.0	9.500	84.1
0.800	24.4	2.400	42.3	6.000	66.8		
1.000	27.3	2.600	44.0	6.500	69.6		

Orifice

Diameter (m) 0.214 Discharge Coefficient 0.600 Invert Level (m) 1.250

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Storage Structures for Storm

Tank or Pond Manhole: 10, DS/PN: 1.002

Invert Level (m) 0.450

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	843.4	2.800	0.0	5.600	0.0	8.400	0.0
0.400	940.6	3.200	0.0	6.000	0.0	8.800	0.0
0.800	1038.7	3.600	0.0	6.400	0.0	9.200	0.0
1.200	1220.7	4.000	0.0	6.800	0.0	9.600	0.0
1.600	1321.0	4.400	0.0	7.200	0.0	10.000	0.0
2.000	1421.9	4.800	0.0	7.600	0.0		
2.400	1492.7	5.200	0.0	8.000	0.0		

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Summary of Critical Results by Maximum Level (Rank 1) for Storm							
Simulation Criteria							
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow		0.000	
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage		2.000	
Hot Start Level (mm)		0		Inlet Coeffiecient		0.800	
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day)		0.000	
Foul Sewage per hectare (l/s)		0.000					
Number of Input Hydrographs		0		Number of Storage Structures		1	
Number of Online Controls		1		Number of Time/Area Diagrams		0	
Number of Offline Controls		0		Number of Real Time Controls		0	
Synthetic Rainfall Details							
Rainfall Model		FSR		Ratio R		0.350	
Region England and Wales		Cv (Summer)		0.750			
M5-60 (mm)		19.000		Cv (Winter)		0.840	
Margin for Flood Risk Warning (mm)		300.0		DVD Status		OFF	
Analysis Timestep		Fine		Inertia Status		OFF	
DTS Status		ON					
Profile(s)				Summer and Winter			
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960					
Return Period(s) (years)		1, 30, 100					
Climate Change (%)		0, 0, 30					
PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z O/F Overflow Act.	Lvl Exc.
1.000	15 Winter	100	+30%	30/15 Summer	100/15 Summer		5
2.000	15 Winter	100	+30%	30/15 Summer	100/15 Summer		2
1.001	240 Winter	100	+30%	30/15 Summer	100/15 Summer		22
3.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer		2
3.001	15 Winter	100	+30%	100/15 Summer			
3.002	15 Winter	100	+30%	30/15 Summer			
3.003	240 Winter	100	+30%	30/120 Winter			
4.000	240 Winter	100	+30%	100/120 Winter			
1.002	240 Winter	100	+30%	30/15 Winter	100/120 Winter		7
5.000	15 Winter	100	+30%				
Water							
PN	US/MH Name	Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	Pipe O'flow (l/s)	Pipe Flow (l/s) Status
1.000	1	2.665	0.390	40.172	0.86	0.0	338.0 FLOOD
2.000	2	2.857	0.607	7.006	1.35	0.0	608.5 FLOOD
1.001	3	2.525	0.675	314.691	0.79	0.0	223.6 FLOOD
3.000	4	2.812	0.212	12.446	0.99	0.0	272.9 FLOOD
3.001	5	2.779	0.529	0.000	0.78	0.0	255.5 FLOOD RISK
3.002	6	2.726	0.659	0.000	1.95	0.0	740.0 FLOOD RISK
3.003	7	2.524	0.687	0.000	0.26	0.0	183.8 SURCHARGED
4.000	9	2.520	0.170	0.000	0.13	0.0	229.7 SURCHARGED
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>								
		Water		Flooded			Pipe	
	US/MH	Level	Surch'ed	Volume	Flow /	O'flow	Flow	
PN	Name	(m)	Depth (m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.002	10	2.514	1.164	161.561	0.15	0.0	142.0	FLOOD
5.000	10	0.119	-0.031	0.000	0.97	0.0	12.6	OK

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.348	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm at outfall (pipe 1.002)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	5.030	4-8	1.414

Total Area Contributing (ha) = 6.444

Total Pipe Volume (m³) = 149.516

Time Area Diagram at outfall (pipe 5.000)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.020	4-8	0.003

Total Area Contributing (ha) = 0.023

Total Pipe Volume (m³) = 0.424

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	28.100	0.575	48.9	1.041	4.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.16	1.825	1.041	0.0	0.0	0.0	2.91	463.4	141.0

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