CIVIL & STRUCTURAL ENGINEERING

DRAINAGE & FLOOD RISK STATEMENT

Proposed Residential Development

Bank End Road

Barnsley

Reference	**AMF/DFS/4222.v1**
Date	**May 2014**
Version	**1**

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CONTENTS

Confidentiality Statement

Document History

1.0	**Introduction**	**1**
2.0	**The Site**	**2**
3.0	**Existing Drainage/Sewer Network**	**2**
4.0	**Development Proposals**	**2**
5.0	**Flood Risk Assessment**	**3**
6.0	**Surface and Foul Water Drainage**	**3**
6.1	Surface Water Drainage	3
6.2	Foul Water Drainage	4
7.0	**Conclusions**	**4**

APPENDICES

Appendix A Site Location Plan and Aerial Photograph

Appendix B Topographincal Survey

Appendix C Yorkshire Water Correspondence

Appendix D Proposed Site Layout Plan

Appendix E National Flood Risk Assessment (NaFRA) Flood Map

Appendix F Windes Microdrainage Calculations

Appendix G Drainage Layout Drawing

CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

Erris Homes Limited
Unit 11 Acorn Business Park
Killingbeck Drive
Leeds
LS14 6UF

This report has been prepared for the sole use and reliance of the above named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of JPG (Leeds) Limited. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

DOCUMENT HISTORY

VERSION	PURPOSE/DESCRIPTION	DATE
1	Final – For issue to Client	May 2014

1.0 INTRODUCTION

JPG (Leeds) Limited has been instructed by Erris Homes Ltd to carry out a Drainage and Flood Risk Statement for a proposed residential development at Bank End Road, Barnsley.

The report will review the drainage and flood risk issues associated with the proposed development and recommend any mitigation which should take place as part of the development.

This document is prepared in accordance with the requirements of and in response to the National Planning Policy Framework (NPPF) which states that those proposing particular developments are responsible for:

- Providing an assessment of whether any proposed development is likely to be affected by flooding and whether it will increase the flood risk elsewhere and of the measures proposed to deal with these effects and risks, and
- Satisfying the local planning authority that any flood risk to the development or additional risk arising from the proposal will be successfully managed with the minimum environmental effect, to ensure that the site can be developed and occupied safely.

NPPF defines flood zones as follows:

- Zone 1 – Low Probability – less than 1 in 1000 annual probability (< 0.1%) of river or sea flooding in any year.
- Zone 2 – Medium Probability – between a 1 in 100 and 1 in 1000 annual probability (1% - 0.1%) of river flooding or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- Zone 3a – High Probability – 1 in 100 or greater annual probability (> 1%) of river flooding or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b – Functional Floodplain – 1 in 20 or greater annual probability (5%) of river flooding in any year. This is land on which water has to flow or be stored in times of flood.

A Flood Risk Assessment is required for all sites in excess of 1ha within Zone 1 and all sites within Zones 2 and 3.

In accordance with NPPF guidelines, sites within Flood Zone 1 need only consider the vulnerability to flooding from sources other than river and/or sea and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of new development on surface water runoff.

2.0 THE SITE

The site comprises an area of land located approximately 3km to the south east of Barnsley Town Centre. It is situated on the north side of Bank End Road near to the junction of High Street in the Worsbrough Bridge district of Barnsley. The approximate location of the site is at NGR 435850, 404341.

The site is approximately 0.80ha in area and is approximately square in shape. The site ranges in level from approximately 105m AOD adjacent to the southern boundary of the site to a level of approximately 125m AOD in the northwest corner of the site.

Most of the site, with the exception of a small area in the eastern part of the site has been stripped of vegetation and subjected to earthworks.

The site comprises a series of benches, with mounds of vegetation and sandstone spoil comprising boulders.

The southern boundary of the site is formed by a stone wall, adjacent to Bank End Road. The western boundary to the site is formed by a stepped footpath, beyond which is the graveyard to St Thomas's Church.

Beyond the northern boundary are gardens to a housing development along Yews Avenue. An area of overgrown sloping ground lies beyond the eastern boundary of the site.

A topographical survey of the site is provided in Appendix B.

3.0 EXISTING DRAINAGE/SEWER NETWORK

A pre-planning sewer enquiry response has been received from Yorkshire Water which identifies a 300mm combined public sewer is recorded in Bank End Road/High Street adjacent the site.

A copy of pre-planning enquiry response is provided in Appendix C.

4.0 DEVELOPMENT PROPOSALS

It is proposed to develop the site for residential use with 16No. units as shown on the plan which is referenced below and a copy is contained in Appendix D.

- Kilmartin Plowman & Partners – Proposed Site Plan - 1613-220A.

5.0 FLOOD RISK ASSESSMENT

A flood risk assessment has been undertaken using publicly available information on flooding obtained from the Environment Agency (EA) website database (the National Flood Risk Assessment (NaFRA) flood map).

The site is indicated to fall within Flood Zone 1 which comprises land assessed as at a low risk of flooding from watercourse and/or sea with less than a 1:1000 annual probability of river or sea flooding.

NPPF Technical Guidance states all uses of land are appropriate in Flood Zone 1.

As the site area is less than 1ha and is located in Flood Zone 1 a formal flood risk assessment is not required for planning purposes.

6.0 SURFACE AND FOUL WATER DRAINAGE

The proposed site drainage will comprise of a separate surface and foul water drainage system.

It is proposed that the foul and surface water drainage systems will to be put forward for adoption by Yorkshire Water under a Section 104 agreement.

The following summarises the requirements for the discharge of surface and foul water from the site.

6.1 Surface Water Drainage

Yorkshire Water have advised surface water may discharge to the existing 300mm combined public recorded in Bank End Road/High Street, restricted to not greater than 5 (five) litres/second.

The site discharge rate will therefore be 5.0 litres/second. Surface water attenuation will be required due to the restricted discharge rate. A detailed drainage model has been carried out on Windes Microdrainage which indicates a volume of attenuation of circa 104m3 will be required, it is proposed this will be provided in concrete box culverts. A copy of the calculations are provided in Appendix F with a drainage layout drawing (ref: 4222-D1A) provided in Appendix G.

The proposed on site drainage network has been designed in accordance with the requirements of Sewers for Adoption and demonstrates that:

- No surcharge of pipes occurs in the 1 in 2 year rainfall event.
- No surface flooding occurs in the 1 in 30 year rainfall event.
- No flooding to buildings and adjacent properties occurs in the 1 in 100 year rainfall event (including an allowance of 30% for the effects of future climate change), as defined in NPPF Technical Guidance.

6.2 Foul Water Drainage

Yorkshire Water have advised domestic foul water may discharge to the existing 300mm combined public recorded in Bank End Road/High Street at a point approximately 15 metres from the site.

7.0 CONCLUSIONS

This assessment has looked at the drainage and flood risk issues to support a planning application for a residential development at Bank End Road, Barnsley.

The site is indicated to fall within Flood Zone 1 which comprises land assessed as at a low risk of flooding from watercourse and/or sea with less than a 1:1000 annual probability of river or sea flooding. NPPF Technical Guidance states all uses of land are appropriate in Flood Zone 1.

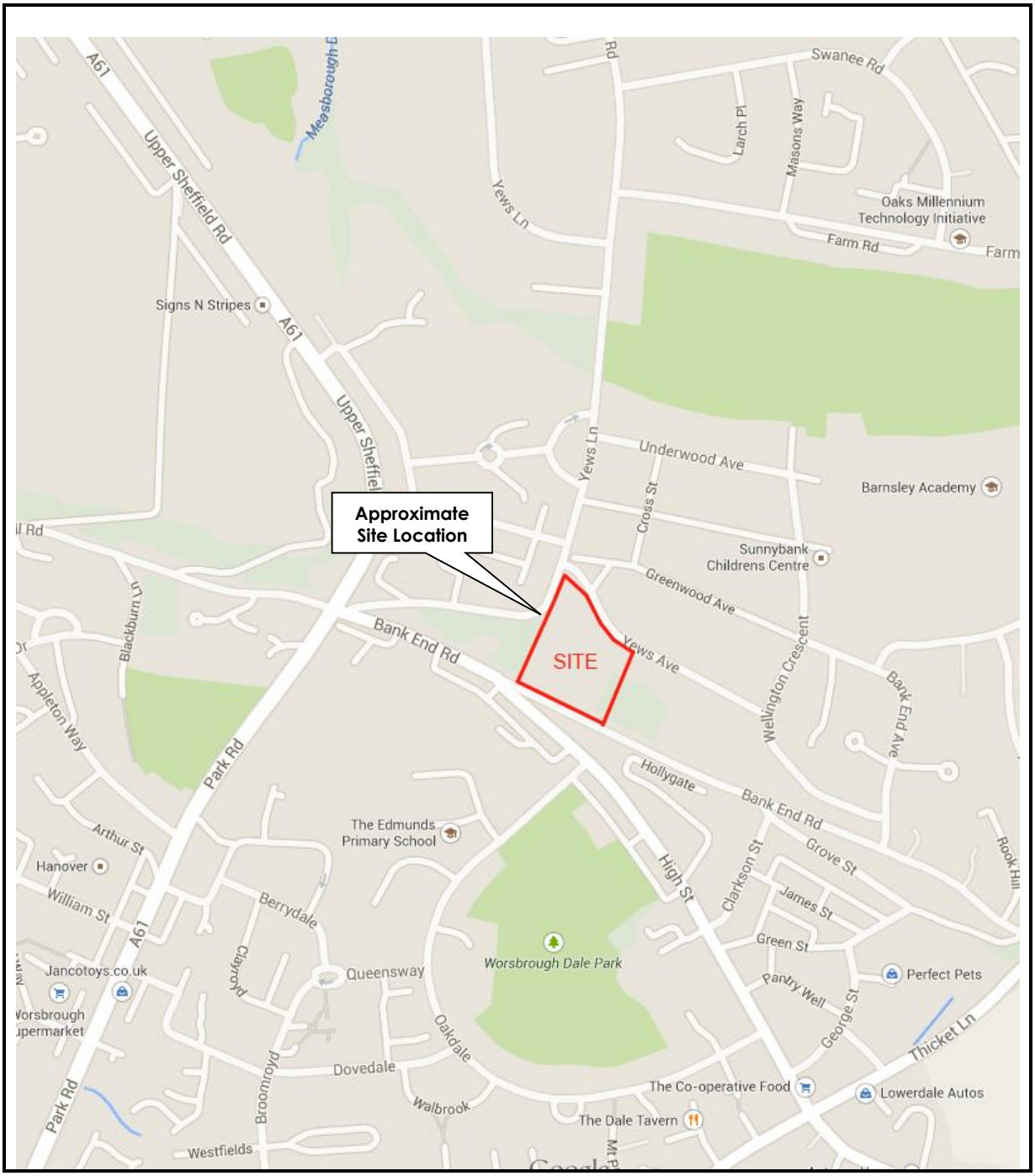
Surface water shall discharge to the existing 300mm combined public recorded in Bank End Road/High Street, restricted to not greater than 5 (five) litres/second, with attenuation provided on site as required.

Foul water shall discharge to the existing 300mm combined public recorded in Bank End Road/High Street at a point approximately 15 metres from the site.



Andrew Fairburn
For and behalf of JPG (Leeds) Limited
May 2014

Appendix A Site Location Plan and Aerial Photograph

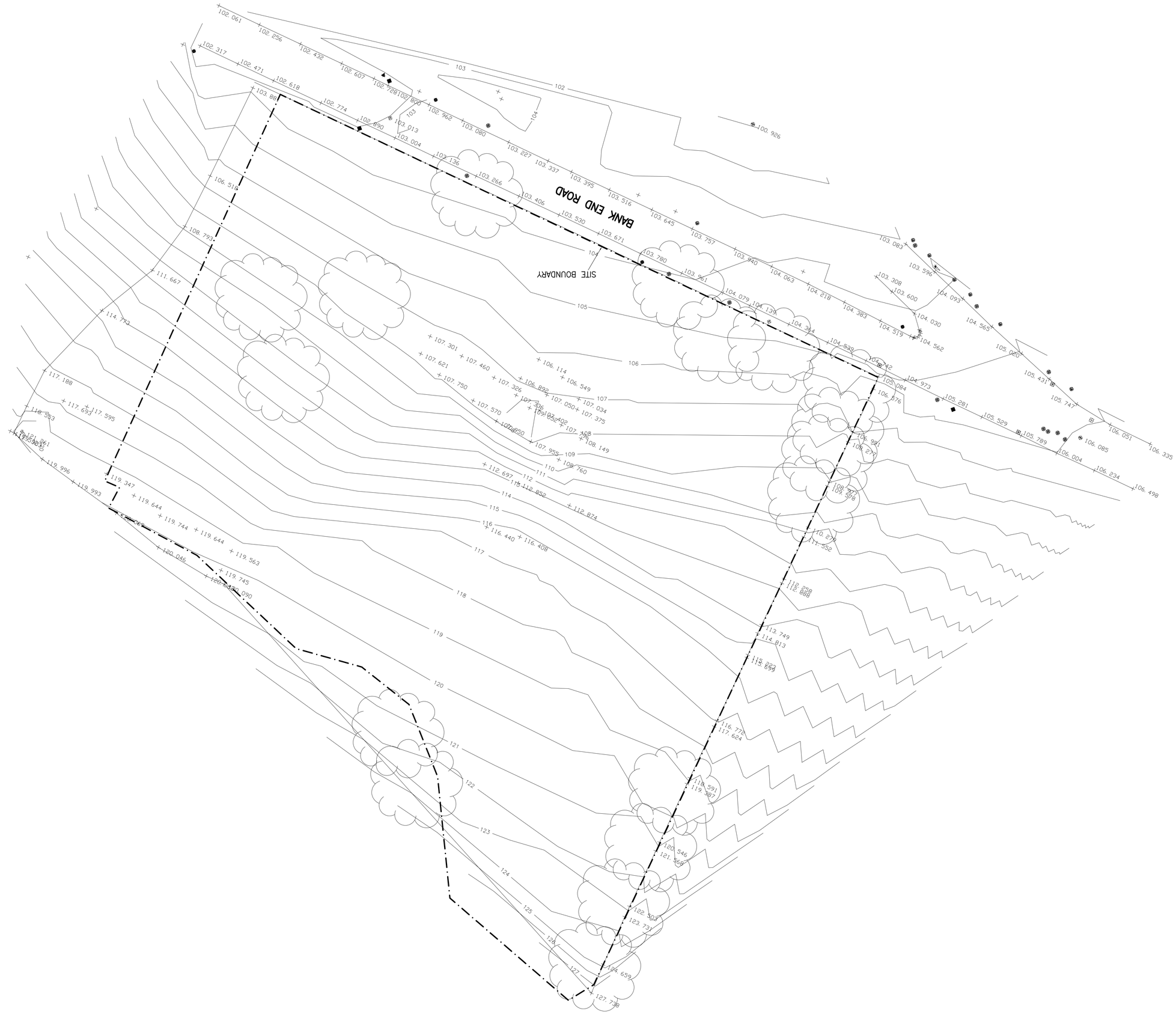


Site Location Plan	
Site	**Residential Development, Barnsley**
Client	**Erris Homes Limited**
Job Number	**4222**
Scale	**NTS**



Aerial Photograph	
Site	**Residential Development, Barnsley**
Client	**Erris Homes Limited**
Job Number	**4222**
Scale	**NTS**

Appendix B Topographical Survey


BANK END ROAD
SITE BOUNDARY

Appendix C Yorkshire Water Correspondence

YorkshireWater

4222

RECEIVED
29 APR 2009

Yorkshire Water
New Development Team Sewerage
Western House
Halifax Road
PO Box 500
Bradford
BD6 2LZ

Tel: (0845)1242424
Fax: (01274) 372 834

Email:
Planning.Sewerage@yorkshirewater.co.uk

For telephone enquiries ring:

Kashif Khan on (0845)1242424

JPG (Holdings) Limited
5 John Charles Way
LEEDS
LS12 6QD

For the attention of Mr A Fairburn

Your Ref: 4222
Our Ref: K002493

24th April 2009

Dear Sir,

Bank End Road Worsborough - Pre-Planning Sewerage Enquiry - Residential

Thank you for your enquiry received 22nd April 2009. Our charge of £60.00 (plus VAT) will be added to your account with us, reference JGP027. You will receive an invoice for your account in due course.

Please find enclosed a complimentary extract from the Statutory Sewer Map. This indicates the recorded position of the public sewers. The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site:

Development of the site should take place with separate systems for foul and surface water drainage on site, with a combined sewer off site.

Foul water should discharge to the 300mm diameter public combined sewer recorded in Bank End Road/High Street, at a point approximately 15 metres from the site.

The developer's attention is drawn to Requirement H3 of the Building Regulations 2000. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SUDS), for example the use of soakaways and/or permeable hardstanding etc., may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SUDS in this instance from the appropriate authorities.

Where appropriate, soakaways, swales and infiltration trenches (SUDS) may be adopted as part of the public sewer network. For general conditions for the adoption of SUDS please see the attached sheet. Further information may be seen in the DEFRA publication 'Interim Code of Practice for Sustainable Drainage Systems' (ISBN 0-86017-904-4). If the developer is considering adoption of SUDS he should contact our New Development Team at Sheffield on 0845 124 24 24.

Alternatively, surface water may discharge to the 300mm diameter public combined sewer recorded in Bank End Road/High Street, at a point approximately 15 metres from the site.

The surface water discharge from the site to be restricted to not greater than 5 (five) litres/second.

INVESTING IN VOLUNTEERS FOR EMPLOYERS
CHARTER MARK

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority/Internal Drainage Board, with regard to surface water disposal from the site.

Off-site sewerage may be required which may be provided by the developer and considered for adoption under Section 104 of the Water Industry Act 1991. Please telephone 0845 124 24 24 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water Industry Act 1991 for which an application must be made in writing. For further information, please telephone 0845 124 24 24.

Prospectively adoptable sewers must be designed and constructed in accordance with the WRc publication "Sewers for Adoption - a design and construction guide for developers" 6th Edition as supplemented by Yorkshire Water's requirements, pursuant to an agreement under Section 104 of the Water Industry Act 1991. An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our New Development Team at Sheffield (telephone 0845 124 24 24) for further information.

The public sewer network is for domestic sewage purposes. This generally means foul water for domestic purposes and, where a suitable surface water or combined sewer is available, surface water from the roofs of buildings together with surface water from paved areas of land appurtenant to those buildings. Land and highway drainage have no right of connection to the public sewer network. Highway drainage, however, may be accepted under certain circumstances; for instance, if SUDS are not a viable option and there is no highway drain available and if capacity is available within the public sewer network. In this event, the developer will be required to enter into a formal agreement with Yorkshire Water Services under Section 115 Water Industry Act 1991 to discharge non-domestic flows into the public sewer network.

No land drainage to be connected/discharged to public sewer.

Any new connection to an existing public sewer will require the approval of Yorkshire Water. You may obtain an application form by telephoning 0845 124 24 24.

All the above comments are based upon the information and records available at the present time. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours faithfully



New Development Team



435678 : 404216	Map Name : SE3504SE	Title	Partial Key
		Notes	Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS
YorkshireWater	Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : K KHAN Contact Tel :	(Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2004. All rights reserved Ordnance Survey Licence number 100019559	Date Req : 24/04/2009, 12:38:13 Source : Sewer Network Enquiry

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connection

Date Gen : 24/04/2009, 12:38:14

UPN: Undefined Originator: K KHAN, New Development - Waste Water,

Appendix D Proposed Site Layout Plan

COPYRIGHT

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WORK AND MATERIALS MUST COMPLY WITH THE CURRENT BUILDING REGULATIONS AND CODES OF PRACTICE AND BE READ IN CONJUNCTION WITH BUILDING SPECIFICATIONS AND OTHER SUB CONTRACTORS INFORMATION.

KPP ARCHITECTS
KILMARTIN PLOWMAN & PARTNERS LIMITED

NEW WOODLAND AREA SEE SEPARATE PLANTING LAYOUT AND MANAGEMENT PROPOSALS

TREE PROTECTION FENCING TO BE 2.3m IN HEIGHT AND A MINIMUM OF 600mm INTO THE GROUND AND WILL FULLY COMPLY WITH BS 5837:2005 AND WILL REMAIN IN PLACE THROUGH-OUT THE DEVELOPMENT

TREE PROTECTION FENCING TO BE 2.3m IN HEIGHT AND A MINIMUM OF 600mm INTO THE GROUND AND WILL FULLY COMPLY WITH BS 5837:2005 AND WILL REMAIN IN PLACE THROUGH-OUT THE DEVELOPMENT

EXISTING ROCK FACE RETAINING WALLS TO HAVE TIMBER PANELLING AT LOW LEVEL WITH TRAILING LANDSCAPING OVER AND WITHIN

NORTH

PROPOSED 1.8m HIGH CLOSE BOARDED TIMBER FENCING

PLOT 10

TYPE A

1.2m HIGH POST AND 2 RAIL TIMBER FENCE

PLOT 11

TYPE A

EXISTING ROCK FACE RETAINING WALLS TO HAVE TIMBER PANELLING AT LOW LEVEL WITH TRAILING LANDSCAPING OVER AND WITHIN

RETAINING WALL

PLOT 12

TYPE A

RETAINING WALLS

PLOT 13

TYPE A

RETAINING WALL

PLOT 14

1.2m HIGH POST AND 2 RAIL TIMBER FENCE

TIMBER CRIB RETAINING WALL

PLOT 15

PROPOSED 1.8m HIGH CLOSE BOARDED TIMBER FENCING

TYPE A

PROPOSED FENCING SET BACK BY 1m AND TO HAVE LOW LEVEL DENSE LANDSCAPING, REFER TO LANDSCAPING SCHEME FOR INFORMATION

RETAINING WALL

TYPE B

PLOT 16

RETAINING WALL

TREE PROTECTION FENCING TO BE 2.3m IN HEIGHT AND A MINIMUM OF 600mm INTO THE GROUND AND WILL FULLY COMPLY WITH BS 5837:2005 AND WILL REMAIN IN PLACE THROUGH-OUT THE DEVELOPMENT

TYPE C1

TYPE C1

TYPE C1

TYPE C1

TYPE B

PLOT 9

RETAINING WALL

PLOT 8

RETAINING WALL

PLOT 7

RETAINING WALL

PLOT 6

PLOT 5

RETAINING WALL

EXISTING ROCK FACE RETAINING WALLS TO HAVE TIMBER PANELLING AT LOW LEVEL WITH TRAILING LANDSCAPING OVER AND WITHIN

PROPOSED 1.8m HIGH CLOSE BOARDED TIMBER FENCING

PROPOSED 1.8m HIGH CLOSE BOARDED TIMBER FENCING

TYPE D

TYPE C

TYPE C

TYPE B

PLOT 1

PROPOSED 1.8m HIGH CLOSE BOARDED TIMBER FENCING

PLOT 2

1.2m HIGH POST AND 2 RAIL TIMBER FENCE

PLOT 3

RETAINING WALL

PLOT 4

TREE PROTECTION FENCING TO BE 2.3m IN HEIGHT AND A MINIMUM OF 600mm INTO THE GROUND AND WILL FULLY COMPLY WITH BS 5837:2005 AND WILL REMAIN IN PLACE THROUGH-OUT THE DEVELOPMENT

PROPOSED STONE RETAINING WALL

EXISTING STONE WALL TO BE MADE GOOD WITH HEDGE BEHIND TO GIVE MIN. 1.8m SCREEN HEIGHT FROM BANK END ROAD

NEW STONE WALL TO MATCH EXISTING HEIGHTS AND MATERIALS

RELOCATE EXISTING LAMPPOST

2.4m x 70m VISIBILITY SPLAY

NEW STONE WALL TO MATCH EXISTING HEIGHTS AND MATERIALS

REMOVE EXISTING WALL TO FORM VISIBILITY SPLAY

BANK END ROAD

HIGH STREET

HOUSE SCHEDULE:

TYPE A - 3 BED SEMI DETACHED	= 890 sq.ft.	6No.
TYPE B - 4 BED DETACHED	= 1,320 sq.ft.	3No.
TYPE C - 3 BED SEMI DETACHED / TERRACE	= 895 sq.ft.	6No.
TYPE D - 3 BED DETACHED	= 1,040 sq.ft.	1No.

TOTAL NUMBER OF HOUSES = 16No.

KEY:

- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED
- 1.8m HIGH CLOSE BOARDED TIMBER FENCING
- 1.2m HIGH POST AND 2 RAIL TIMBER FENCE
- INDICATIVE LANDSCAPED AREAS REFER TO LANDCARE LANDSCAPE DESIGNERS DRAWING FOR LAYOUT
- STONE RETAINING WALLS BETWEEN PLOTS
- 5.5m WIDE MEDIUM DUTY TARMACADAM MEWS COURT WITH 600mm WIDE BLOCK PAVED MARGINS
- BLOCK PAVING

REV	DRAWN	DATE	DESCRIPTION
A	JM	APR '14	GENERAL ALTERATIONS

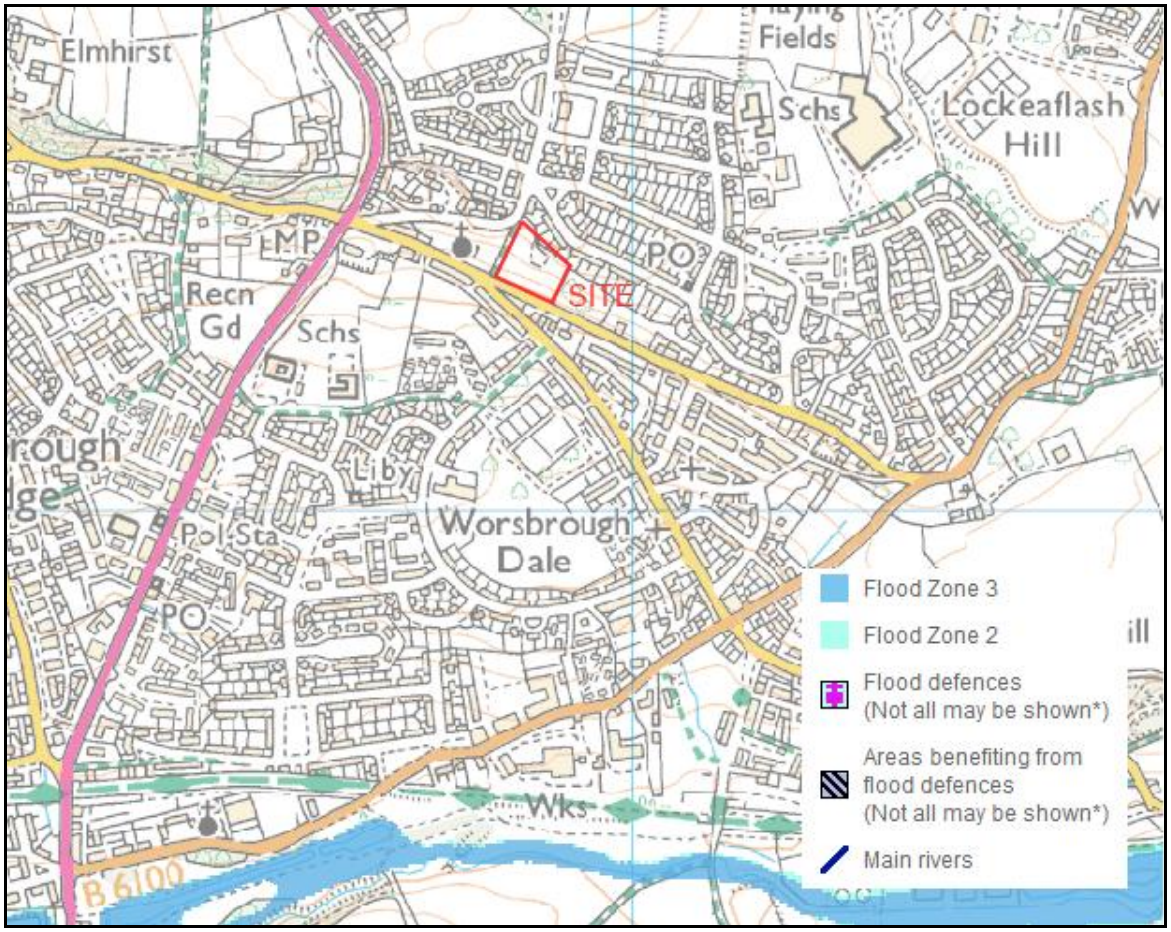
KPP ARCHITECTS
KILMARTIN PLOWMAN & PARTNERS LIMITED
LODGE HOUSE 12 TOWN STREET
HORSFORTH LEEDS LS18 4RJ
T : 0113 239 0460 F : 0113 239 0475
E : architects@kpp-leeds.co.uk
W : www.kpp-leeds.co.uk

PROJECT TITLE: PROPOSED HOUSING DEVELOPMENT
BANK END ROAD
BARNSLEY

TITLE: PROPOSED SITE PLAN

STATUS	PLANNING	SCALE	1:200 @A1
FILE	P:\PROJECTS\2\	DRAWN	JM
		DATE	FEB '11
PROJECT	1613	DRAWING	220
		REVISION	A

Appendix E National Flood Risk Assessment (NaFRA) Flood Map



Flood Map obtained from Environment Agency website

Appendix F Windes Microdrainage Calculations

DRAINAGE CALCULATIONS

JORDAN PRITCHARD GORMAN

Consulting Civil and Structural Engineers

Residential Development

Worsbrough

Surface Water Drainage Calculations

Report Reference	**4222/AMF**
Date	**30.04.09**

JPG (Holdings) Limited
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Contents

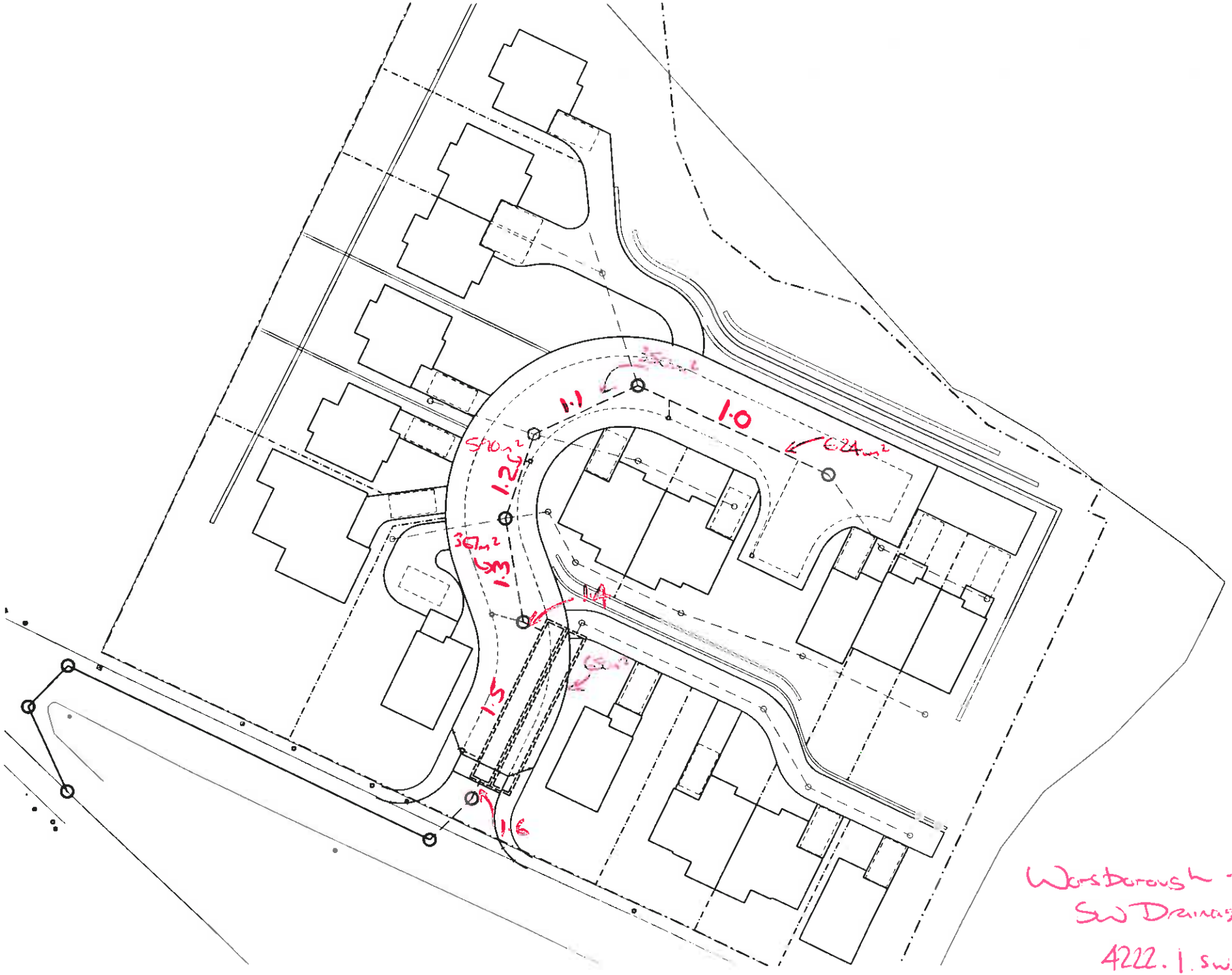
1.0 Storm Input Data

2.0 Simulations Results – 1:30 Year (+30% CC) Summer Storm

3.0 Simulations Results – 1:30 Year (+30% CC) Winter Storm

4.0 Simulations Results – 1:100 Year (+30% CC) Summer Storm

5.0 Simulations Results – 1:100 Year (+30% CC) Winter Storm



Worsborough - 4222
SW Drainage
4222.1.SWS

Jordan Pritchard Gorman Ltd	
5 John Charles Way	RESI DEVELOPMENT
Wortley	WORSBOROUGH
Leeds LS12 6QD	
Date AMF	Designed By 30.04.08
File 4222.1.SWS	Checked By
Micro Drainage	System1 W.11.4 net

STORM SEWER DESIGN by the Modified Rational Method

Global Variables

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP
Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - England & Wales

Return Period (years)	2
M5-60 (mm)	19.000
Ratio R	0.350
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.84
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.001
Maximum Backdrop Height (m)	1.500
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	1.00
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	0.000
Outfall Manhole Name	
Outfall Manhole Dia/Length (mm)	0
Outfall Manhole Width (mm)	0

Designed with Level Soffits

Network Design Table

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	22.00	1.841	12.0	0.063	5.00	0.0	0.600	o	225
1.001	12.03	1.127	10.7	0.035	0.00	0.0	0.600	o	225
1.002	9.43	0.882	10.7	0.059	0.00	0.0	0.600	o	225
1.003	11.02	1.971	5.6	0.036	0.00	0.0	0.600	o	225
1.004	2.10	0.021	100.0	0.000	0.00	0.0	0.600	o	225
1.005	16.00	0.016	1000.0	0.065	0.00	0.0	0.600	[]	-1
1.006	3.60	0.036	100.0	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	61.8	5.1	108.485	0.063	0.0	0.0	0.0	3.81	151.3	11.8
1.001	61.6	5.1	106.644	0.098	0.0	0.0	0.0	4.03	160.2	18.3
1.002	61.4	5.2	105.517	0.157	0.0	0.0	0.0	4.02	160.0	29.2
1.003	61.2	5.2	104.635	0.193	0.0	0.0	0.0	5.57	221.5	35.8
1.004	61.1	5.2	102.664	0.193	0.0	0.0	0.0	1.31	52.0	35.8
1.005	60.4	5.4	101.216	0.258	0.0	0.0	0.0	1.80	11643.8	47.3
1.006	60.2	5.4	101.200	0.258	0.0	0.0	0.0	1.31	52.0	47.3

©1982-2009 Micro Drainage

Jordan Pritchard Gorman Ltd		
5 John Charles Way	RESI DEVELOPMENT	
Wortley	WORSBOROUGH	
Leeds LS12 6QD		
Date AMF	Designed By 30.04.08	
File 4222.1.SWS	Checked By	
Micro Drainage	System1 W.11.4 net	

The following hydraulic sections have been used in this network

NOTE: 'Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from the file 4222.1.SEC

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m^2)
-1	[]	3600	1800			2.400	6.480

©1982-2009 Micro Drainage

DRAINAGE CALCULATIONS

JORDAN PRITCHARD GORMAN

Consulting Civil and Structural Engineers

Residential Development

Worsbrough

Simulation Results – 1:30 Year + 30% cc Summer Event

Report Reference	**4222/AMF**
Date	**30.04.09**

JPG (Holdings) Limited
5 John Charles Way
LEEDS
LS12 6QD

Tel: 0113 263 1155
Fax: 0113 263 0405
name@jpgleeds.com
www.jpgleeds.com

Global Variables

Region	FSR - England & Wales
Return Period (yrs)	30
M5-60 (mm)	19.000
Ratio R	0.350
Volumetric Runoff Coef	0.750
Profile Type	Summer
PIMP (%)	100
Areal Reduction Factor	1.000
Storm Duration (mins)	15
Hot Start (mins)	0
Hot Start Level (mm)	0
Manhole Headloss Coefficient	0.500
MADD Factor * 10m³/ha Storage	2.000
Foul Sewage/Hectare (l/s)	0.00
Additional Flow - % of Total Flow	30
Number of Input Hydrographs	0
Number of Time/Area Diagrams	0
Number of Bifurcations	0
Number of Overflows	0
Number of Off-Line Controls	0
Number of On-Line Controls	1

Starting Storm file name

O:\MICRODRAIN\DATA-FILES\4222.1.SWS

Freely Discharging Outfalls

Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)
1.006		101.689	101.164	1200	0

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Jordan Pritchard Gorman Ltd 5 John Charles Way Wortley Leeds LS12 6QD	RESI DEVELOPMENT WORSBOROUGH
Date AMF File 4222.1.SWS Micro Drainage	Designed By 30.04.08 Checked By Simulation W.11.4 net

On-Line Controls (Head/Flow)

US/PN	Volume (m^3)	Ctrl MH Name	Invert (m)	Headloss (m)	Flow (l/s)
1.005	84.240	7	101.200	0.2	1.6670
				0.4	2.3570
				0.6	2.6350
				0.8	3.3330
				1.0	3.7270
				1.4	4.4100
				1.8	5.0000
				2.2	5.5280
				2.6	6.0090
				3.0	6.4550

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The following hydraulic sections have been used in this network

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from the file 4222.1.SEC

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m^2)
-1	[]	3600	1800			2.400	6.480

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Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	15	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.551	-0.159	0.000	0.19	0.0	24.2	O K
1.001	106.726	-0.143	0.000	0.29	0.0	39.1	O K
1.002	105.628	-0.114	0.000	0.49	0.0	64.3	O K
1.003	104.738	-0.122	0.000	0.43	0.0	79.6	O K
1.004	103.180	0.291	0.000	2.68	0.0	78.9	SURCH'ED
1.005	102.009	-1.007	0.000	0.03	0.0	92.3	O K
1.006	102.009	0.584	0.000	0.11	0.0	3.4	SURCH'ED

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5 John Charles Way	WORSBOROUGH
Wortley	
Leeds LS12 6QD	
Date AMF	Designed By 30.04.08
File 4222.1.SWS	Checked By
Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	30	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.548	-0.162	0.000	0.17	0.0	22.3	O K
1.001	106.722	-0.147	0.000	0.26	0.0	35.0	O K
1.002	105.621	-0.121	0.000	0.43	0.0	56.7	O K
1.003	104.732	-0.128	0.000	0.38	0.0	70.2	O K
1.004	103.116	0.227	0.000	2.41	0.0	70.8	SURCH'ED
1.005	102.203	-0.813	0.000	0.03	0.0	83.3	O K
1.006	102.203	0.778	0.000	0.12	0.0	3.7	SURCH'ED

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Leeds LS12 6QD

RESI DEVELOPMENT
WORSBOROUGH

Date AMF
File 4222.1.SWS
Micro Drainage

Designed By 30.04.08
Checked By
Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	60	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.539	-0.171	0.000	0.13	0.0	16.5	O K
1.001	106.711	-0.158	0.000	0.19	0.0	25.9	O K
1.002	105.605	-0.137	0.000	0.32	0.0	41.8	O K
1.003	104.716	-0.144	0.000	0.27	0.0	51.2	O K
1.004	102.999	0.110	0.000	1.70	0.0	50.2	SURCH'ED
1.005	102.378	-0.638	0.000	0.02	0.0	59.2	O K
1.006	102.378	0.953	0.000	0.13	0.0	4.0	SURCH'ED

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Wortley		
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File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	120	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.529	-0.181	0.000	0.09	0.0	10.9	O K
1.001	106.696	-0.173	0.000	0.12	0.0	17.0	O K
1.002	105.586	-0.156	0.000	0.21	0.0	27.1	O K
1.003	104.699	-0.161	0.000	0.18	0.0	33.3	O K
1.004	102.913	0.024	0.000	1.13	0.0	33.3	SURCH'ED
1.005	102.489	-0.527	0.000	0.01	0.0	39.5	O K
1.006	102.489	1.064	0.000	0.14	0.0	4.2	SURCH'ED

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Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	180	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.523	-0.187	0.000	0.07	0.0	8.7	O K
1.001	106.691	-0.178	0.000	0.10	0.0	13.5	O K
1.002	105.578	-0.164	0.000	0.16	0.0	21.5	O K
1.003	104.691	-0.169	0.000	0.14	0.0	26.4	O K
1.004	102.832	-0.057	0.000	0.89	0.0	26.3	O K
1.005	102.516	-0.500	0.000	0.01	0.0	31.3	O K
1.006	102.516	1.091	0.000	0.14	0.0	4.3	SURCH'ED

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File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	240	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.519	-0.191	0.000	0.06	0.0	7.1	O K
1.001	106.686	-0.183	0.000	0.08	0.0	11.0	O K
1.002	105.571	-0.171	0.000	0.13	0.0	17.6	O K
1.003	104.686	-0.174	0.000	0.12	0.0	21.6	O K
1.004	102.808	-0.081	0.000	0.73	0.0	21.6	O K
1.005	102.518	-0.498	0.000	0.01	0.0	25.8	O K
1.006	102.518	1.093	0.000	0.14	0.0	4.3	SURCH'ED

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Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	360	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.514	-0.196	0.000	0.04	0.0	5.2	O K
1.001	106.679	-0.190	0.000	0.06	0.0	8.1	O K
1.002	105.564	-0.178	0.000	0.10	0.0	13.0	O K
1.003	104.679	-0.181	0.000	0.09	0.0	16.0	O K
1.004	102.782	-0.107	0.000	0.54	0.0	16.0	O K
1.005	102.498	-0.518	0.000	0.01	0.0	19.2	O K
1.006	102.498	1.073	0.000	0.14	0.0	4.2	SURCH'ED

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Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	480	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.512	-0.198	0.000	0.03	0.0	4.2	O K
1.001	106.675	-0.194	0.000	0.05	0.0	6.6	O K
1.002	105.559	-0.183	0.000	0.08	0.0	10.5	O K
1.003	104.674	-0.186	0.000	0.07	0.0	12.9	O K
1.004	102.768	-0.121	0.000	0.44	0.0	12.9	O K
1.005	102.464	-0.552	0.000	0.00	0.0	15.6	O K
1.006	102.464	1.039	0.000	0.14	0.0	4.2	SURCH'ED

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Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	600	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.510	-0.200	0.000	0.03	0.0	3.6	O K
1.001	106.673	-0.196	0.000	0.04	0.0	5.6	O K
1.002	105.555	-0.187	0.000	0.07	0.0	8.9	O K
1.003	104.670	-0.190	0.000	0.06	0.0	11.0	O K
1.004	102.759	-0.130	0.000	0.37	0.0	11.0	O K
1.005	102.426	-0.590	0.000	0.00	0.0	13.3	O K
1.006	102.426	1.001	0.000	0.14	0.0	4.1	SURCH'ED

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Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	720	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.509	-0.201	0.000	0.02	0.0	3.1	O K
1.001	106.671	-0.198	0.000	0.04	0.0	4.9	O K
1.002	105.552	-0.190	0.000	0.06	0.0	7.8	O K
1.003	104.668	-0.192	0.000	0.05	0.0	9.6	O K
1.004	102.752	-0.137	0.000	0.32	0.0	9.6	O K
1.005	102.383	-0.633	0.000	0.00	0.0	11.6	O K
1.006	102.383	0.958	0.000	0.14	0.0	4.0	SURCH'ED

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Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	960	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.506	-0.204	0.000	0.02	0.0	2.5	O K
1.001	106.669	-0.200	0.000	0.03	0.0	3.9	O K
1.002	105.548	-0.194	0.000	0.05	0.0	6.3	O K
1.003	104.664	-0.196	0.000	0.04	0.0	7.7	O K
1.004	102.742	-0.147	0.000	0.26	0.0	7.7	O K
1.005	102.329	-0.687	0.000	0.00	0.0	9.5	O K
1.006	102.329	0.904	0.000	0.13	0.0	3.9	SURCH'ED

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Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	1440	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.500	-0.210	0.000	0.01	0.0	1.9	O K
1.001	106.666	-0.203	0.000	0.02	0.0	2.9	O K
1.002	105.544	-0.198	0.000	0.03	0.0	4.6	O K
1.003	104.661	-0.199	0.000	0.03	0.0	5.7	O K
1.004	102.731	-0.158	0.000	0.19	0.0	5.7	O K
1.005	102.175	-0.841	0.000	0.00	0.0	7.0	O K
1.006	102.175	0.750	0.000	0.12	0.0	3.7	SURCH'ED

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DRAINAGE CALCULATIONS

JORDAN PRITCHARD GORMAN

Consulting Civil and Structural Engineers

Residential Development

Worsbrough

Simulation Results – 1:30 Year + 30% cc Winter Event

Report Reference	**4222/AMF**
Date	**30.04.09**

JPG (Holdings) Limited
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Jordan Pritchard Gorman Ltd 5 John Charles Way Wortley Leeds LS12 6QD	RESI DEVELOPMENT WORSBOROUGH	
Date AMF File 4222.1.SWS Micro Drainage	Designed By 30.04.08 Checked By Simulation W.11.4 net	

Global Variables

Region	FSR - England & Wales
Return Period (yrs)	30
M5-60 (mm)	19.000
Ratio R	0.350
Volumetric Runoff Coef	0.840
Profile Type	Winter
PIMP (%)	100
Areal Reduction Factor	1.000
Storm Duration (mins)	15
Hot Start (mins)	0
Hot Start Level (mm)	0
Manhole Headloss Coefficient	0.500
MADD Factor * 10m³/ha Storage	2.000
Foul Sewage/Hectare (l/s)	0.00
Additional Flow - % of Total Flow	30
Number of Input Hydrographs	0
Number of Time/Area Diagrams	0
Number of Bifurcations	0
Number of Overflows	0
Number of Off-Line Controls	0
Number of On-Line Controls	1

Starting Storm file name

O:\MICRODRAIN\DATA-FILES\4222.1.SWS

Freely Discharging Outfalls

Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)
1.006		101.689	101.164	1200	0

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On-Line Controls (Head/Flow)

US/PN	Volume (m^3)	Ctrl MH Name	Invert (m)	Headloss (m)	Flow (l/s)
1.005	84.240	7	101.200	0.2	1.6670
				0.4	2.3570
				0.6	2.6350
				0.8	3.3330
				1.0	3.7270
				1.4	4.4100
				1.8	5.0000
				2.2	5.5280
				2.6	6.0090
				3.0	6.4550

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The following hydraulic sections have been used in this network

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from the file 4222.1.SEC

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m^2)
-1	[]	3600	1800			2.400	6.480

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File 4222.1.SWS
Checked By
Micro Drainage
Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	15	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.553	-0.157	0.000	0.20	0.0	25.4	O K
1.001	106.728	-0.141	0.000	0.29	0.0	40.2	O K
1.002	105.630	-0.112	0.000	0.49	0.0	65.3	O K
1.003	104.739	-0.121	0.000	0.43	0.0	80.6	O K
1.004	103.189	0.300	0.000	2.71	0.0	79.8	SURCH'ED
1.005	102.092	-0.924	0.000	0.03	0.0	93.3	O K
1.006	102.092	0.667	0.000	0.12	0.0	3.5	SURCH'ED

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Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	30	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.544	-0.166	0.000	0.16	0.0	20.2	O K
1.001	106.717	-0.152	0.000	0.23	0.0	31.4	O K
1.002	105.614	-0.128	0.000	0.38	0.0	50.5	O K
1.003	104.725	-0.135	0.000	0.33	0.0	62.3	O K
1.004	103.057	0.168	0.000	2.13	0.0	62.6	SURCH'ED
1.005	102.314	-0.702	0.000	0.02	0.0	73.7	O K
1.006	102.314	0.889	0.000	0.13	0.0	3.9	SURCH'ED

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Wortley	WORSBOROUGH	
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File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	60	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.534	-0.176	0.000	0.11	0.0	13.5	O K
1.001	106.703	-0.166	0.000	0.15	0.0	21.1	O K
1.002	105.595	-0.147	0.000	0.26	0.0	33.9	O K
1.003	104.707	-0.153	0.000	0.22	0.0	41.7	O K
1.004	102.946	0.057	0.000	1.41	0.0	41.4	SURCH'ED
1.005	102.516	-0.500	0.000	0.01	0.0	49.0	O K
1.006	102.517	1.092	0.000	0.14	0.0	4.3	SURCH'ED

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Date AMF	Designed By 30.04.08	
File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	120	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.523	-0.187	0.000	0.07	0.0	8.6	O K
1.001	106.691	-0.178	0.000	0.10	0.0	13.3	O K
1.002	105.577	-0.165	0.000	0.16	0.0	21.4	O K
1.003	104.691	-0.169	0.000	0.14	0.0	26.3	O K
1.004	102.830	-0.059	0.000	0.89	0.0	26.3	O K
1.005	102.658	-0.358	0.000	0.01	0.0	31.2	O K
1.006	102.658	1.233	0.000	0.15	0.0	4.5	SURCH'ED

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Jordan Pritchard Gorman Ltd		
5 John Charles Way	RESI DEVELOPMENT	
Wortley	WORSBOROUGH	
Leeds LS12 6QD		
Date AMF	Designed By 30.04.08	
File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	180	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.517	-0.193	0.000	0.05	0.0	6.5	O K
1.001	106.684	-0.185	0.000	0.07	0.0	10.1	O K
1.002	105.569	-0.173	0.000	0.12	0.0	16.2	O K
1.003	104.684	-0.176	0.000	0.11	0.0	19.9	O K
1.004	102.800	-0.089	0.000	0.67	0.0	19.8	O K
1.005	102.684	-0.332	0.000	0.01	0.0	23.7	O K
1.006	102.684	1.259	0.000	0.15	0.0	4.5	SURCH'ED

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File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	240	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.514	-0.196	0.000	0.04	0.0	5.3	O K
1.001	106.679	-0.190	0.000	0.06	0.0	8.2	O K
1.002	105.564	-0.178	0.000	0.10	0.0	13.1	O K
1.003	104.679	-0.181	0.000	0.09	0.0	16.1	O K
1.004	102.783	-0.106	0.000	0.55	0.0	16.1	O K
1.005	102.685	-0.331	0.000	0.01	0.0	19.4	O K
1.006	102.685	1.260	0.000	0.15	0.0	4.5	SURCH'ED

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File 4222.1.SWS	Checked By
Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	360	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.511	-0.199	0.000	0.03	0.0	3.9	O K
1.001	106.674	-0.195	0.000	0.04	0.0	6.1	O K
1.002	105.557	-0.185	0.000	0.07	0.0	9.7	O K
1.003	104.672	-0.188	0.000	0.06	0.0	11.9	O K
1.004	102.763	-0.126	0.000	0.41	0.0	11.9	O K
1.005	102.652	-0.364	0.000	0.00	0.0	14.5	O K
1.006	102.652	1.227	0.000	0.15	0.0	4.5	SURCH'ED

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File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	480	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.509	-0.201	0.000	0.02	0.0	3.1	O K
1.001	106.671	-0.198	0.000	0.04	0.0	4.9	O K
1.002	105.552	-0.190	0.000	0.06	0.0	7.8	O K
1.003	104.668	-0.192	0.000	0.05	0.0	9.6	O K
1.004	102.752	-0.137	0.000	0.33	0.0	9.6	O K
1.005	102.598	-0.418	0.000	0.00	0.0	11.8	O K
1.006	102.598	1.173	0.000	0.15	0.0	4.4	SURCH'ED

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Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	600	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.507	-0.203	0.000	0.02	0.0	2.7	O K
1.001	106.670	-0.199	0.000	0.03	0.0	4.1	O K
1.002	105.549	-0.193	0.000	0.05	0.0	6.6	O K
1.003	104.665	-0.195	0.000	0.04	0.0	8.2	O K
1.004	102.744	-0.145	0.000	0.28	0.0	8.2	O K
1.005	102.537	-0.479	0.000	0.00	0.0	10.0	O K
1.006	102.538	1.113	0.000	0.14	0.0	4.3	SURCH'ED

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Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	720	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.504	-0.206	0.000	0.02	0.0	2.3	O K
1.001	106.668	-0.201	0.000	0.03	0.0	3.6	O K
1.002	105.547	-0.195	0.000	0.04	0.0	5.8	O K
1.003	104.663	-0.197	0.000	0.04	0.0	7.1	O K
1.004	102.739	-0.150	0.000	0.24	0.0	7.1	O K
1.005	102.475	-0.541	0.000	0.00	0.0	8.8	O K
1.006	102.475	1.050	0.000	0.14	0.0	4.2	SURCH'ED

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Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	960	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.501	-0.209	0.000	0.01	0.0	1.9	O K
1.001	106.667	-0.202	0.000	0.02	0.0	2.9	O K
1.002	105.544	-0.198	0.000	0.04	0.0	4.7	O K
1.003	104.661	-0.199	0.000	0.03	0.0	5.7	O K
1.004	102.731	-0.158	0.000	0.19	0.0	5.7	O K
1.005	102.354	-0.662	0.000	0.00	0.0	7.1	O K
1.006	102.354	0.929	0.000	0.13	0.0	4.0	SURCH'ED

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Summary of Results

Return Period (years)	30	Analysis Time Step	Fine
Storm Duration (mins)	1440	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.497	-0.213	0.000	0.01	0.0	1.4	O K
1.001	106.661	-0.208	0.000	0.02	0.0	2.1	O K
1.002	105.541	-0.201	0.000	0.03	0.0	3.4	O K
1.003	104.658	-0.202	0.000	0.02	0.0	4.2	O K
1.004	102.720	-0.169	0.000	0.14	0.0	4.2	O K
1.005	102.298	-0.718	0.000	0.00	0.0	5.4	O K
1.006	102.298	0.873	0.000	0.13	0.0	3.9	SURCH'ED

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DRAINAGE CALCULATIONS

JORDAN PRITCHARD GORMAN

Consulting Civil and Structural Engineers

Residential Development

Worsbrough

Simulation Results – 1:100 Year + 30% cc Summer Event

Report Reference	**4222/AMF**
Date	**30.04.09**

JPG (Holdings) Limited
5 John Charles Way
LEEDS
LS12 6QD

Tel: 0113 263 1155
Fax: 0113 263 0405
name@jpgleeds.com
www.jpgleeds.com

Global Variables

Region	FSR - England & Wales
Return Period (yrs)	100
M5-60 (mm)	19.000
Ratio R	0.350
Volumetric Runoff Coef	0.750
Profile Type	Summer
PIMP (%)	100
Areal Reduction Factor	1.000
Storm Duration (mins)	15
Hot Start (mins)	0
Hot Start Level (mm)	0
Manhole Headloss Coefficient	0.500
MADD Factor * 10m³/ha Storage	2.000
Foul Sewage/Hectare (l/s)	0.00
Additional Flow - % of Total Flow	30
Number of Input Hydrographs	0
Number of Time/Area Diagrams	0
Number of Bifurcations	0
Number of Overflows	0
Number of Off-Line Controls	0
Number of On-Line Controls	1

Starting Storm file name

O:\MICRODRAIN\DATA-FILES\4222.1.SWS

Freely Discharging Outfalls

Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)
1.006		101.689	101.164	1200	0

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On-Line Controls (Head/Flow)

US/PN	Volume (m^3)	Ctrl MH Name	Invert (m)	Headloss (m)	Flow (l/s)
1.005	84.240	7	101.200	0.2	1.6670
				0.4	2.3570
				0.6	2.6350
				0.8	3.3330
				1.0	3.7270
				1.4	4.4100
				1.8	5.0000
				2.2	5.5280
				2.6	6.0090
				3.0	6.4550

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The following hydraulic sections have been used in this network

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from the file 4222.1.SEC

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m^2)
-1	[]	3600	1800			2.400	6.480

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	15	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.561	-0.149	0.000	0.25	0.0	31.3	O K
1.001	106.739	-0.130	0.000	0.37	0.0	50.5	O K
1.002	105.647	-0.095	0.000	0.63	0.0	83.1	O K
1.003	104.755	-0.105	0.000	0.55	0.0	103.0	O K
1.004	103.397	0.508	0.000	3.46	0.0	101.8	SURCH'ED
1.005	102.211	-0.805	0.000	0.04	0.0	119.1	O K
1.006	102.211	0.786	0.000	0.13	0.0	3.7	SURCH'ED

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Wortley	WORSBOROUGH	
Leeds LS12 6QD		
Date AMF	Designed By 30.04.08	
File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	30	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.557	-0.153	0.000	0.23	0.0	29.1	O K
1.001	106.734	-0.135	0.000	0.33	0.0	45.8	O K
1.002	105.640	-0.102	0.000	0.56	0.0	74.0	O K
1.003	104.748	-0.112	0.000	0.49	0.0	91.6	O K
1.004	103.297	0.408	0.000	3.14	0.0	92.6	SURCH'ED
1.005	102.480	-0.536	0.000	0.03	0.0	108.6	O K
1.006	102.480	1.055	0.000	0.14	0.0	4.2	SURCH'ED

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Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	60	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.547	-0.163	0.000	0.17	0.0	21.6	O K
1.001	106.721	-0.148	0.000	0.25	0.0	34.0	O K
1.002	105.620	-0.122	0.000	0.42	0.0	54.9	O K
1.003	104.730	-0.130	0.000	0.36	0.0	67.3	O K
1.004	103.102	0.213	0.000	2.23	0.0	65.8	SURCH'ED
1.005	102.731	-0.285	0.000	0.02	0.0	77.7	O K
1.006	102.731	1.306	0.000	0.15	0.0	4.6	SURCH'ED

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Wortley		
Leeds LS12 6QD		
Date AMF	Designed By 30.04.08	
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Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	120	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.535	-0.175	0.000	0.11	0.0	14.3	O K
1.001	106.704	-0.165	0.000	0.16	0.0	22.3	O K
1.002	105.596	-0.146	0.000	0.27	0.0	35.7	O K
1.003	104.709	-0.151	0.000	0.23	0.0	43.8	O K
1.004	102.954	0.065	0.000	1.49	0.0	43.8	SURCH'ED
1.005	102.903	-0.113	0.000	0.02	0.0	51.8	O K
1.006	102.903	1.478	0.000	0.16	0.0	4.9	SURCH'ED

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Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	180	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.530	-0.180	0.000	0.09	0.0	11.4	O K
1.001	106.698	-0.171	0.000	0.13	0.0	17.6	O K
1.002	105.588	-0.154	0.000	0.21	0.0	28.2	O K
1.003	104.701	-0.159	0.000	0.18	0.0	34.6	O K
1.004	102.941	0.052	0.000	1.17	0.0	34.4	SURCH'ED
1.005	102.939	-0.077	0.000	0.01	0.0	40.9	O K
1.006	102.939	1.514	0.000	0.16	0.0	4.9	SURCH'ED

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Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	240	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.525	-0.185	0.000	0.07	0.0	9.2	O K
1.001	106.692	-0.177	0.000	0.10	0.0	14.3	O K
1.002	105.580	-0.162	0.000	0.17	0.0	23.0	O K
1.003	104.693	-0.167	0.000	0.15	0.0	28.2	O K
1.004	102.945	0.056	0.000	0.96	0.0	28.2	SURCH'ED
1.005	102.943	-0.073	0.000	0.01	0.0	33.6	O K
1.006	102.943	1.518	0.000	0.16	0.0	4.9	SURCH'ED

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File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	360	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.518	-0.192	0.000	0.05	0.0	6.8	O K
1.001	106.685	-0.184	0.000	0.08	0.0	10.6	O K
1.002	105.570	-0.172	0.000	0.13	0.0	16.9	O K
1.003	104.685	-0.175	0.000	0.11	0.0	20.8	O K
1.004	102.922	0.033	0.000	0.71	0.0	20.8	SURCH'ED
1.005	102.920	-0.096	0.000	0.01	0.0	24.9	O K
1.006	102.921	1.496	0.000	0.16	0.0	4.9	SURCH'ED

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RESI DEVELOPMENT
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Micro Drainage

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Checked By
Simulation W.11.4 net

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	480	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.515	-0.195	0.000	0.04	0.0	5.5	O K
1.001	106.680	-0.189	0.000	0.06	0.0	8.5	O K
1.002	105.565	-0.177	0.000	0.10	0.0	13.6	O K
1.003	104.680	-0.180	0.000	0.09	0.0	16.7	O K
1.004	102.882	-0.007	0.000	0.57	0.0	16.7	O K
1.005	102.880	-0.136	0.000	0.01	0.0	20.1	O K
1.006	102.880	1.455	0.000	0.16	0.0	4.8	SURCH'ED

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5 John Charles Way
Wortley
Leeds LS12 6QD

RESI DEVELOPMENT
WORSBOROUGH

Date AMF
File 4222.1.SWS
Micro Drainage

Designed By 30.04.08
Checked By
Simulation W.11.4 net

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	600	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.512	-0.198	0.000	0.04	0.0	4.6	O K
1.001	106.677	-0.192	0.000	0.05	0.0	7.1	O K
1.002	105.561	-0.181	0.000	0.09	0.0	11.5	O K
1.003	104.676	-0.184	0.000	0.08	0.0	14.1	O K
1.004	102.834	-0.055	0.000	0.48	0.0	14.1	O K
1.005	102.832	-0.184	0.000	0.01	0.0	17.0	O K
1.006	102.832	1.407	0.000	0.16	0.0	4.8	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	720	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.511	-0.199	0.000	0.03	0.0	4.0	O K
1.001	106.675	-0.194	0.000	0.05	0.0	6.2	O K
1.002	105.558	-0.184	0.000	0.08	0.0	10.0	O K
1.003	104.672	-0.188	0.000	0.07	0.0	12.2	O K
1.004	102.782	-0.107	0.000	0.42	0.0	12.2	O K
1.005	102.780	-0.236	0.000	0.00	0.0	14.8	O K
1.006	102.780	1.355	0.000	0.16	0.0	4.7	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	960	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.509	-0.201	0.000	0.03	0.0	3.2	O K
1.001	106.672	-0.197	0.000	0.04	0.0	5.0	O K
1.002	105.553	-0.189	0.000	0.06	0.0	8.0	O K
1.003	104.668	-0.192	0.000	0.05	0.0	9.8	O K
1.004	102.753	-0.136	0.000	0.33	0.0	9.8	O K
1.005	102.681	-0.335	0.000	0.00	0.0	12.0	O K
1.006	102.681	1.256	0.000	0.15	0.0	4.5	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	1440	DTS Status	ON
Profile Type	Summer	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.505	-0.205	0.000	0.02	0.0	2.3	O K
1.001	106.668	-0.201	0.000	0.03	0.0	3.6	O K
1.002	105.547	-0.195	0.000	0.04	0.0	5.8	O K
1.003	104.663	-0.197	0.000	0.04	0.0	7.2	O K
1.004	102.739	-0.150	0.000	0.24	0.0	7.2	O K
1.005	102.490	-0.526	0.000	0.00	0.0	8.9	O K
1.006	102.490	1.065	0.000	0.14	0.0	4.2	SURCH'ED

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DRAINAGE CALCULATIONS

JORDAN PRITCHARD GORMAN

Consulting Civil and Structural Engineers

Residential Development

Worsbrough

Simulation Results – 1:100 Year + 30% cc Winter Event

Report Reference	**4222/AMF**
Date	**30.04.09**

JPG (Holdings) Limited
5 John Charles Way
LEEDS
LS12 6QD

Tel: 0113 263 1155
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name@jpgleeds.com
www.jpgleeds.com

Global Variables

Region	FSR - England & Wales
Return Period (yrs)	100
M5-60 (mm)	19.000
Ratio R	0.350
Volumetric Runoff Coef	0.840
Profile Type	Winter
PIMP (%)	100
Areal Reduction Factor	1.000
Storm Duration (mins)	15
Hot Start (mins)	0
Hot Start Level (mm)	0
Manhole Headloss Coefficient	0.500
MADD Factor * 10m³/ha Storage	2.000
Foul Sewage/Hectare (l/s)	0.00
Additional Flow - % of Total Flow	30
Number of Input Hydrographs	0
Number of Time/Area Diagrams	0
Number of Bifurcations	0
Number of Overflows	0
Number of Off-Line Controls	0
Number of On-Line Controls	1

Starting Storm file name

O:\MICRODRAIN\DATA-FILES\4222.1.SWS

Freely Discharging Outfalls

Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)
1.006		101.689	101.164	1200	0

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On-Line Controls (Head/Flow)

US/PN	Volume (m^3)	Ctrl MH Name	Invert (m)	Headloss (m)	Flow (l/s)
1.005	84.240	7	101.200	0.2	1.6670
				0.4	2.3570
				0.6	2.6350
				0.8	3.3330
				1.0	3.7270
				1.4	4.4100
				1.8	5.0000
				2.2	5.5280
				2.6	6.0090
				3.0	6.4550

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The following hydraulic sections have been used in this network

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from the file 4222.1.SEC

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m^2)
-1	[]	3600	1800			2.400	6.480

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	15	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.563	-0.147	0.000	0.26	0.0	32.8	O K
1.001	106.740	-0.129	0.000	0.38	0.0	52.0	O K
1.002	105.649	-0.093	0.000	0.64	0.0	84.5	O K
1.003	104.756	-0.104	0.000	0.56	0.0	104.2	O K
1.004	103.413	0.524	0.000	3.50	0.0	102.9	SURCH'ED
1.005	102.318	-0.698	0.000	0.04	0.0	120.3	O K
1.006	102.318	0.893	0.000	0.13	0.0	3.9	SURCH'ED

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Wortley	WORSBOROUGH
Leeds LS12 6QD	
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File 4222.1.SWS	Checked By
Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	30	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.554	-0.156	0.000	0.21	0.0	26.3	O K
1.001	106.728	-0.141	0.000	0.30	0.0	41.1	O K
1.002	105.630	-0.112	0.000	0.50	0.0	66.0	O K
1.003	104.739	-0.121	0.000	0.44	0.0	81.4	O K
1.004	103.198	0.309	0.000	2.78	0.0	81.8	SURCH'ED
1.005	102.624	-0.392	0.000	0.03	0.0	96.1	O K
1.006	102.625	1.200	0.000	0.15	0.0	4.4	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	60	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.541	-0.169	0.000	0.14	0.0	17.8	O K
1.001	106.713	-0.156	0.000	0.20	0.0	27.8	O K
1.002	105.607	-0.135	0.000	0.34	0.0	44.6	O K
1.003	104.718	-0.142	0.000	0.29	0.0	54.8	O K
1.004	103.012	0.123	0.000	1.85	0.0	54.4	SURCH'ED
1.005	102.910	-0.106	0.000	0.02	0.0	64.3	O K
1.006	102.910	1.485	0.000	0.16	0.0	4.9	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	120	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.530	-0.180	0.000	0.09	0.0	11.3	O K
1.001	106.697	-0.172	0.000	0.13	0.0	17.5	O K
1.002	105.587	-0.155	0.000	0.21	0.0	28.1	O K
1.003	104.700	-0.160	0.000	0.18	0.0	34.5	O K
1.004	103.153	0.264	0.000	1.17	0.0	34.5	SURCH'ED
1.005	103.151	0.135	0.000	0.01	0.0	41.0	SURCH'ED
1.006	103.151	1.726	0.000	0.17	0.0	5.2	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	180	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.523	-0.187	0.000	0.07	0.0	8.5	O K
1.001	106.691	-0.178	0.000	0.10	0.0	13.2	O K
1.002	105.577	-0.165	0.000	0.16	0.0	21.2	O K
1.003	104.691	-0.169	0.000	0.14	0.0	26.0	O K
1.004	103.226	0.337	0.000	0.88	0.0	26.0	SURCH'ED
1.005	103.224	0.208	0.000	0.01	0.0	31.0	SURCH'ED
1.006	103.224	1.799	0.000	0.18	0.0	5.3	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	240	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.518	-0.192	0.000	0.05	0.0	6.9	O K
1.001	106.686	-0.183	0.000	0.08	0.0	10.7	O K
1.002	105.571	-0.171	0.000	0.13	0.0	17.1	O K
1.003	104.685	-0.175	0.000	0.11	0.0	21.0	O K
1.004	103.214	0.325	0.000	0.71	0.0	21.0	SURCH'ED
1.005	103.212	0.196	0.000	0.01	0.0	25.2	SURCH'ED
1.006	103.212	1.787	0.000	0.18	0.0	5.3	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	360	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.514	-0.196	0.000	0.04	0.0	5.0	O K
1.001	106.679	-0.190	0.000	0.06	0.0	7.9	O K
1.002	105.563	-0.179	0.000	0.10	0.0	12.6	O K
1.003	104.678	-0.182	0.000	0.08	0.0	15.5	O K
1.004	103.167	0.278	0.000	0.53	0.0	15.5	SURCH'ED
1.005	103.165	0.149	0.000	0.01	0.0	18.7	SURCH'ED
1.006	103.165	1.740	0.000	0.17	0.0	5.2	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	480	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.511	-0.199	0.000	0.03	0.0	4.1	O K
1.001	106.675	-0.194	0.000	0.05	0.0	6.3	O K
1.002	105.558	-0.184	0.000	0.08	0.0	10.1	O K
1.003	104.673	-0.187	0.000	0.07	0.0	12.4	O K
1.004	103.091	0.202	0.000	0.42	0.0	12.4	SURCH'ED
1.005	103.090	0.074	0.000	0.00	0.0	15.1	SURCH'ED
1.006	103.090	1.665	0.000	0.17	0.0	5.1	SURCH'ED

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File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	600	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.509	-0.201	0.000	0.03	0.0	3.4	O K
1.001	106.672	-0.197	0.000	0.04	0.0	5.3	O K
1.002	105.554	-0.188	0.000	0.06	0.0	8.5	O K
1.003	104.669	-0.191	0.000	0.06	0.0	10.5	O K
1.004	103.002	0.113	0.000	0.36	0.0	10.5	SURCH'ED
1.005	103.000	-0.016	0.000	0.00	0.0	12.8	O K
1.006	103.000	1.575	0.000	0.17	0.0	5.0	SURCH'ED

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Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	720	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.508	-0.202	0.000	0.02	0.0	3.0	O K
1.001	106.671	-0.198	0.000	0.03	0.0	4.6	O K
1.002	105.551	-0.191	0.000	0.06	0.0	7.4	O K
1.003	104.667	-0.193	0.000	0.05	0.0	9.1	O K
1.004	102.925	0.036	0.000	0.31	0.0	9.1	SURCH'ED
1.005	102.923	-0.093	0.000	0.00	0.0	11.2	O K
1.006	102.923	1.498	0.000	0.16	0.0	4.9	SURCH'ED

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Micro Drainage	Simulation W.11.4 net

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	960	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m^3)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.505	-0.205	0.000	0.02	0.0	2.4	O K
1.001	106.668	-0.201	0.000	0.03	0.0	3.7	O K
1.002	105.547	-0.195	0.000	0.05	0.0	5.9	O K
1.003	104.663	-0.197	0.000	0.04	0.0	7.3	O K
1.004	102.776	-0.113	0.000	0.25	0.0	7.3	O K
1.005	102.774	-0.242	0.000	0.00	0.0	9.1	O K
1.006	102.774	1.349	0.000	0.16	0.0	4.7	SURCH'ED

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File 4222.1.SWS	Checked By	
Micro Drainage	Simulation W.11.4 net	

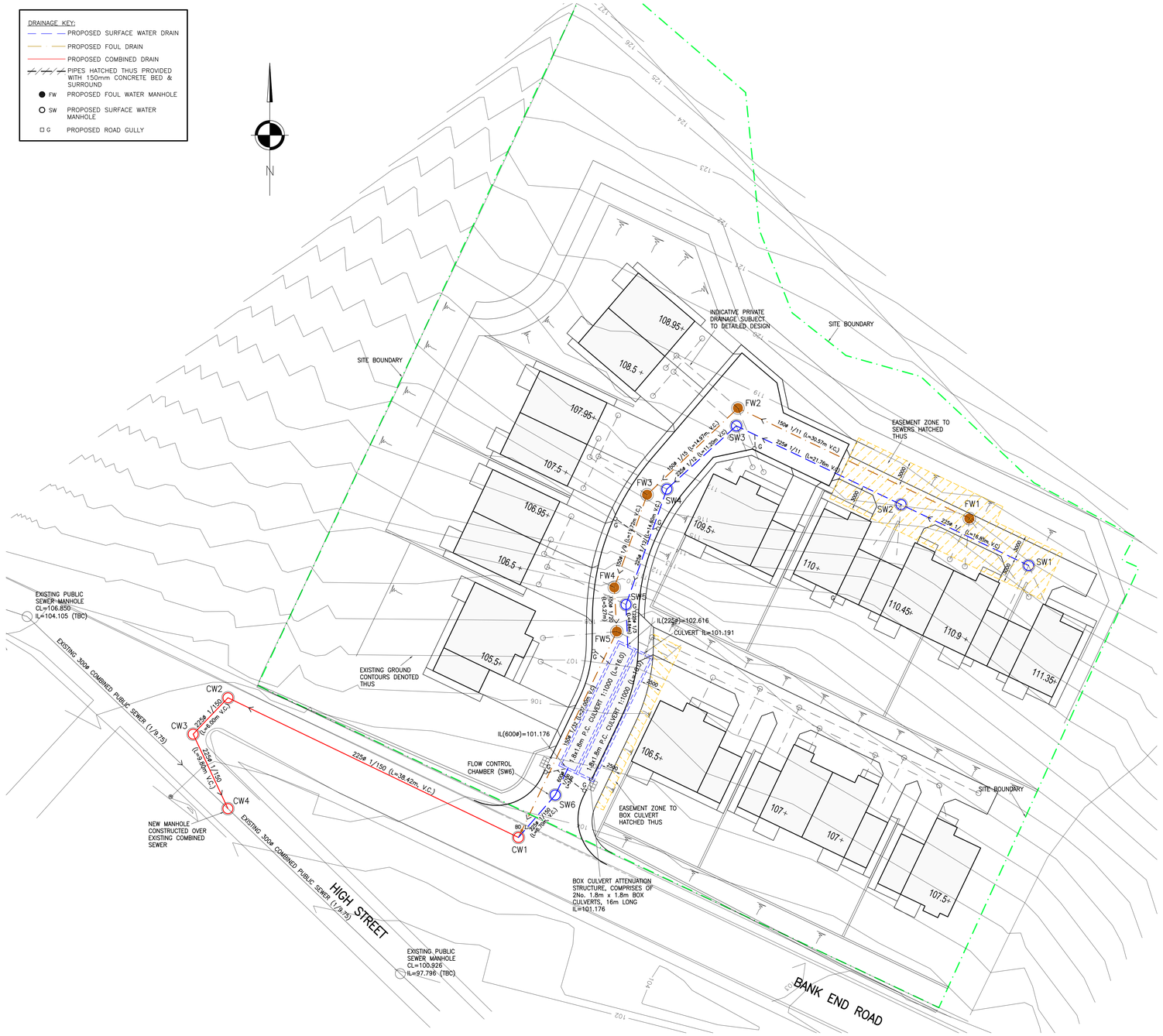
Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	1440	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	108.500	-0.210	0.000	0.01	0.0	1.7	O K
1.001	106.665	-0.204	0.000	0.02	0.0	2.7	O K
1.002	105.543	-0.199	0.000	0.03	0.0	4.3	O K
1.003	104.660	-0.200	0.000	0.03	0.0	5.3	O K
1.004	102.728	-0.161	0.000	0.18	0.0	5.3	O K
1.005	102.505	-0.511	0.000	0.00	0.0	6.7	O K
1.006	102.505	1.080	0.000	0.14	0.0	4.2	SURCH'ED

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Appendix G Drainage Layout Drawing



MH REF.	INVERT LEVELS	COVER LEVELS	DEPTH TO SOFFIT	TYPE	SIZE	COVER TYPE	SET-OUT COORDINATES
FW1	150ø 108.825	110.700	1.650	B	1500ø CONC.	D400	
FW2	150ø 105.925	107.980	1.830	B	1200ø CONC.	D400	
FW3	150ø 104.955	106.750	1.570	B	1200ø CONC.	D400	
FW4	150ø 103.695	105.785	1.865	B	1200ø CONC.	D400	
FW5	150ø 103.432	105.323	1.433	E	1500ø CONC.	D400	
THE POSITION OF THE INTERNAL FACE OF ANY DRAIN/SEWER OR RISING MAIN SHALL NOT DEVIATE FROM THE DESIGN LINE AND LEVEL BY MORE THAN +/- 20mm, PROVIDED THAT NO DRAIN/SEWER SHALL HAVE A REVERSE GRADIENT.							

FOUL WATER MANHOLE SCHEDULE

MH REF.	INVERT LEVELS	COVER LEVELS	DEPTH TO SOFFIT	TYPE	SIZE	COVER TYPE	SET-OUT COORDINATES
SW1	225ø 110.075	111.500	1.250	E	1200ø CONC.	D400	
SW2	225ø 108.425	109.900	1.250	E	1200ø CONC.	D400	
SW3	225ø 106.375	107.850	1.250	E	1500ø CONC.	D400	
SW4	225ø 105.405	106.880	1.250	E	1200ø CONC.	D400	
SW5	225ø 104.145	105.620	1.250	E	1200ø CONC.	D400	
SW6 FLOW CONTROL CHAMBER	600ø 101.140 225ø 101.140	103.984	2.140	B	1800ø CONC.	D400	CHAMBER FITTED WITH A FLOW CONTROL TO GIVE A RESTRICTED DISCHARGE OF 5 litres/second WITH A HEAD OF 1.8m
THE POSITION OF THE INTERNAL FACE OF ANY DRAIN/SEWER OR RISING MAIN SHALL NOT DEVIATE FROM THE DESIGN LINE AND LEVEL BY MORE THAN +/- 20mm, PROVIDED THAT NO DRAIN/SEWER SHALL HAVE A REVERSE GRADIENT.							

SURFACE WATER MANHOLE SCHEDULE

MH REF.	INVERT LEVELS	COVER LEVELS	DEPTH TO SOFFIT	TYPE	SIZE	COVER TYPE	SET-OUT COORDINATES
CW1	225ø 101.095 225ø 102.595 (B-DROP)	103.630	2.285	B	1200ø CONC.	D400	
CW2	225ø 100.839	104.875	3.811	A	1200ø CONC.	D400	
CW3	225ø 100.799	104.426	3.402	A	1200ø CONC.	D400	
CW4	EXISTING 300ø 100.730 225ø 100.730	103.350	2.395	B	1500ø CONC.	D400	
THE POSITION OF THE INTERNAL FACE OF ANY DRAIN/SEWER OR RISING MAIN SHALL NOT DEVIATE FROM THE DESIGN LINE AND LEVEL BY MORE THAN +/- 20mm, PROVIDED THAT NO DRAIN/SEWER SHALL HAVE A REVERSE GRADIENT.							

COMBINED MANHOLE SCHEDULE

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DO NOT SCALE

N O T E S

YORKSHIRE WATER NOTES:

1. ALL ADOPTABLE SEWER WORKS AND MATERIAL TO BE IN ACCORDANCE WITH 'SEWERS FOR ADOPTION 6th EDITION' AND YORKSHIRE WATER'S REQUIREMENTS AND KITEMARKED.

2. MANHOLE COVERS MUST/SHALL HAVE A CLEAR OPENING OF 600mm AND SHALL BE CLASS D400 TO BS EN 124 WITH 150mm DEEP FRAMES IN HIGHWAYS

3. FILLED GROUND MUST BE FILLED AND CONSOLIDATED UNDER THE SUPERVISION AND TO THE SATISFACTION OF YORKSHIRE WATER BEFORE ANY WORKS ARE CARRIED OUT

4. THE ADOPTABLE SEWERS SHOULD BE A MINIMUM OF 1m AND MANHOLES 0.5m FROM KERB FACES AND SERVICE MARGINS

5. SEWERS MUST HAVE 5m CLEARANCE FROM TREES AND HEDGES, WHERE IT IS NOT POSSIBLE TO ACHIEVE THIS CLEARANCE CONCRETE BED AND SURROUND IS REQUIRED

6. SEWERS TO BE LAID IN CLASS 'S' BEDDING (150mm GRANULAR BED AND SURROUND). WHERE DEPTH OF COVER TO TOP OF SEWER IS LESS THAN 1.2m IN HIGHWAYS AND VERGES (OR LESS THAN 900mm IN NON VEHICULAR ACCESS AREAS) THEN A CONCRETE SLAB SHOULD BE PROVIDED ABOVE THE GRANULAR BED & SURROUND.

7. THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION IN THEM MAY NEED TO BE INCREASED AN INCREMENT TO ACCOMMODATE THE CONNECTIONS AND BENDS

8. YORKSHIRE WATER POLICY IS TO NOT ACCEPT TYPE 'C' BRICK MANHOLES AND 1050mmø RINGS. INSTEAD IT IS PREFERRED THAT YOU USE A TYPE 'B' MANHOLE WITH 1200mmø OR 1500mmø RINGS WITH THE OPENING SITED OVER THE CHANNEL WHERE DEPTH OF COVER TO PIPE SOFFIT IS 1-1.5m

9. YORKSHIRE WATER IS NOT OBLIGED TO ACCEPT FILTER DRAIN/LAND DRAINAGE RUN-OFF INTO THE PUBLIC SEWER NETWORK OR ADOPTABLE DRAINAGE SYSTEM (DIRECTLY OR IN-DIRECTLY). AN ALTERNATIVE METHOD OF DISPOSAL OF THE LAND DRAINAGE RUN-OFF WILL THEREFORE BE REQUIRED, LIAISON WITH THE LOCAL AUTHORITY, LAND DRAINAGE SECTION MAY BE REQUIRED WITH REGARD TO THE DISPOSAL OF THE FILTER DRAIN/LAND DRAINAGE RUN-OFF.

10. COVERS SLABS MUST CARRY THE BSI KITEMARK OR WILL BE REJECTED BY THE YORKSHIRE WATER INSPECTOR. WHERE THE CLEAR OPENING OF A KITEMARKED PRODUCT IS DIFFERENT TO THAT OF THE COVER AND FRAME, A LOADING BEARING SLAB SHOULD BE FITTED ABOVE THE COVER SLAB TO BRING THE SIZE DOWN TO 600x600mm FOR THE YORKSHIRE WATER SPECIFIED COVER SIZE. PLEASE REFER TO JPG DRAWING No. 3336.1.010 FOR DETAILS. COVER SLABS TO MANHOLES SHOULD COMPLY WITH BS5911 PART 3/BS EN 1917:2002.

11. SUPLHATE RESISTANT CEMENT (C20-0C2 MINIMUM) AND PRECAST CONCRETE PRODUCTS MUST BE USED OR A LABORATORY REPORT PROVIDED PROVING SUCH PRECAUTIONS ARE NOT NECESSARY.

12. SEWERS MUST HAVE 5m CLEARANCE FROM HEDGES AND BUSHES

PRELIMINARY
SUBJECT TO YORKSHIRE WATER APPROVAL

REV	DESCRIPTION	DATE	BY
A	UPDATED TO SUIT LATEST SITE PLAN	03.03.11	AMF

Job Title
RESIDENTIAL DEVELOPMENT
BANK END ROAD
WORSBOROUGH

Drawing Title.
SECTION 104
DRAINAGE LAYOUT

Architect
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