

Blockley Village Co-Operative Store



Flood Risk Assessment

For

Blockley Village Co-Operative Store

Issue 1 – January 2011




FAIRHURST

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CONTROL SHEET

CLIENT: Blockley Village Co-Operative Store
PROJECT TITLE: Blockley Village Co-Operative Store
REPORT TITLE: Flood Risk Assessment
REPORT REFERENCE: 86943-100

Issue and Approval Schedule:

ISSUE 1	Name	Signature	Date
Final			
Prepared by	M Hayward		21/01/2011
Reviewed by	P Tesh		21/01/2011
Approved by	P Tesh		21/01/2011

Revision Record:

Issue	Date	Status	Description	By	Chk	App
2						
3						
4						
5						
6						
7						

This report has been prepared in accordance with procedure OP/P03 of W A Fairhurst & Partners' Quality Assurance System.

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1. Introduction

- 1.1 W. A. Fairhurst & Partners have been commissioned by Blockley Village Co-Operative Store to undertake a Flood Risk Assessment for the proposed construction of a new Village Co-Operative Store on a piece of land adjacent to the current store in Blockley, Gloucestershire.
- 1.2 This FRA has been compiled in accordance with Planning Policy Statement, 25: Development and Flood Risk (PPS 25) and CIRIA C624: Development and Flood Risk Guidance.

2 Site Location and Description

- 2.1 The approximately 180m² site is located at NGR SP164349. It is approximately rectangular in shape.
- 2.2 The Site Location Plan is shown in Appendix A
- 2.3 The site is bounded to the south, north and east by stone walls and to the west by High Street.
- 2.4 The site is nominally flat and currently consists of a stone built public conveniences on the west boundary with the remainder being soft landscaped with some play equipment. Mature trees and shrubs are located on the south and east boundaries.
- 2.5 The site surrounded to the south by a church yard, the west by High Street and residential properties, north by a garage then open space and east by a pond and residential properties.
- 2.6 The British Geological Survey Geological Mapping indicates that the site is at the interface of the Whitby Mudstone Formation and Dyrham Formation with no superficial deposits. Both of these strata consist of mudstone and siltstone.

2.7 A stream is culverted across the site in a 450mm diameter pipe and runs just inside the northern boundary. This starts at the Thames Water covered reservoir to the west of the site and discharges to the pond adjacent to the east boundary. At the time of the site visit in December 2010 the flow was an estimated 100mm depth.

2.8 The topographical survey by Chris Magson Surveying services is shown in Appendix B.

3 Development Proposals

3.1 The proposed development consists of a single storey building which will effectively cover the whole site.

3.2 The initial indicative proposals are shown in Appendix C – Leslie Burton Architects drawing 480-LJB-100.

4 Flood History and Records

4.1 The EA's indicative flood map shows that the site has less than a 0.1% or 1 in 1000 year annual probability of fluvial flooding and therefore falls within Flood Zone 1 (Low Probability). A 0.1% probability of flooding is within acceptable limits and no special features as part of the development are proposed to mitigate fluvial flooding.

4.2 The Environment Agency flood map for the area is shown in Appendix D.

4.3 Discussions with a drainage engineer at North Cotswold District Council (Mr Simon Mirams) ascertained that there had not been any recorded flooding in the area of the site from either the pond to the east or the culverted stream.

5 Flood Risk and Mitigation Measures

5.1 There are a number of potential flooding sources that could affect the proposed development, in this case:-

- Fluvial – The site has less than a 0.1% or 1 in 1000 year annual probability of fluvial flooding from a main river. The adjacent pond water level is approximately 1.2m below the site and the general ground levels particularly at the eastern end of the pond are substantially below the site level so if the pond did overtop it would not affect the site. It is understood that there are no records of the piped stream flooding even after abnormal rainfall which has caused flooding in the main rivers further east.
- Surface Water Runoff – There is a residual risk of flooding when extreme rainfall events occur that are in excess of the design capacity of the surface water drainage system. As building floor levels are generally set 150mm above the surrounding area it is highly unlikely that the buildings would be affected.
- Infrastructure Failure – There is a residual risk of flooding if a high pressure water main collapses or bursts or a sewer becomes blocked.

6 Existing and Proposed Drainage

- 6.1 The drainage from the public conveniences has been traced and it has been shown that both foul and surface water drain to an adjacent combined sewer.
- 6.2 The proposed site area (which is the same as the building footprint) is 180m². The existing buildings are 35m² which means the existing soft area is 145m² (180-35m²).
- 6.3 Using the industry standard Micro Drainage Software the run off from the existing building has been calculated as 0.7l/s for a 1 in 1 year storm using a nominal 10m run of pipe. Based on 5 l/s/ha for greenfield run off for the soft area of 145m² the run off equates to 0.07 l/s.
- 6.4 This gives a total existing run off of 0.77 l/s for a 1 in 1 year storm.
- 6.5 As the underlying geology is siltstone and mud stone which are generally classed as impermeable it is considered that infiltration techniques to dispose of the proposed surface water is not a viable option.
- 6.6 Whenever possible SUDS techniques for disposing of surface water should be investigated for a proposed development to endeavour to reduce the impact a

development will have on flood risk to the site and surrounding areas and to maintain or improve the quality of the discharged water.

- 6.7 As the building footprint will occupy the entire site the provision of land take SUDS features such as swales, filter strips etc are not possible. There will not be any paving so porous paving is not possible either. A water butt could be provided but as there will not be any landscaped areas there will not be any on site use for the water. Similarly rainwater harvesting would not be viable due to the relatively small catchment area and no external space for locating a tank and minimal potential for its' use.
- 6.8 The site lies within Blockley Conservation Area where new developments have to be in keeping with their surroundings. It is unlikely that the Local Planning Authority would allow a green roof as it would not be in keeping with the surrounding buildings and the conservation area in general.
- 6.9 However calculations have been undertaken to ascertain the run off from a green roof for critical events up to the 100 year event and this shows the run off from a green roof would be a maximum 2.5 l/s for the critical 30 minute winter 1 in 100 year storm event.
- 6.10 Micro Drainage Software has again been used to calculate the proposed run off. This gives a rate of 2.4 l/s for a 1 in 1 year storm. Running the storm wizard to calculate proposed run off for other critical storms (i.e. 1 in 1 to 1 in 100 year events) the maximum discharge from the site is 7.2 l/s for the 1 in 100 year event and 5.7 l/s for a 1 in 30 year event.
- 6.11 Normal practice is to restrict flows from a development site to the existing 1 in 1 year event and make provision for storing the excess surface water which is generated by the 1 in 100 year plus climate change event on site.
- 6.12 However in this case it is considered that the increase in runoff will have negligible impact on the downstream sewerage system. In addition it is acknowledged within the drainage profession that trying to utilise a flow control device to restrict flows to less than 10 l/s are ineffective and can lead to the blocking of the drainage system and increased flood risk due to the small size of the orifice in the flow control device.

6.13 Hence it is proposed to either utilise a green roof if the Local Planning Authority will permit its' use or failing that allow the proposed development to drain unrestricted to the sewer system.

6.14 Calculations are given in Appendix D.

7 Conclusion

7.1 The site currently consists of a small building and a soft landscaped area and the proposal is to develop it into a village co-operative store.

7.2 The Environment Agency's indicative flood map shows that the site has a low probability of fluvial flooding as it lies in Zone 1.

7.3 From published geological mapping the use of infiltration techniques to BRE365 are precluded.

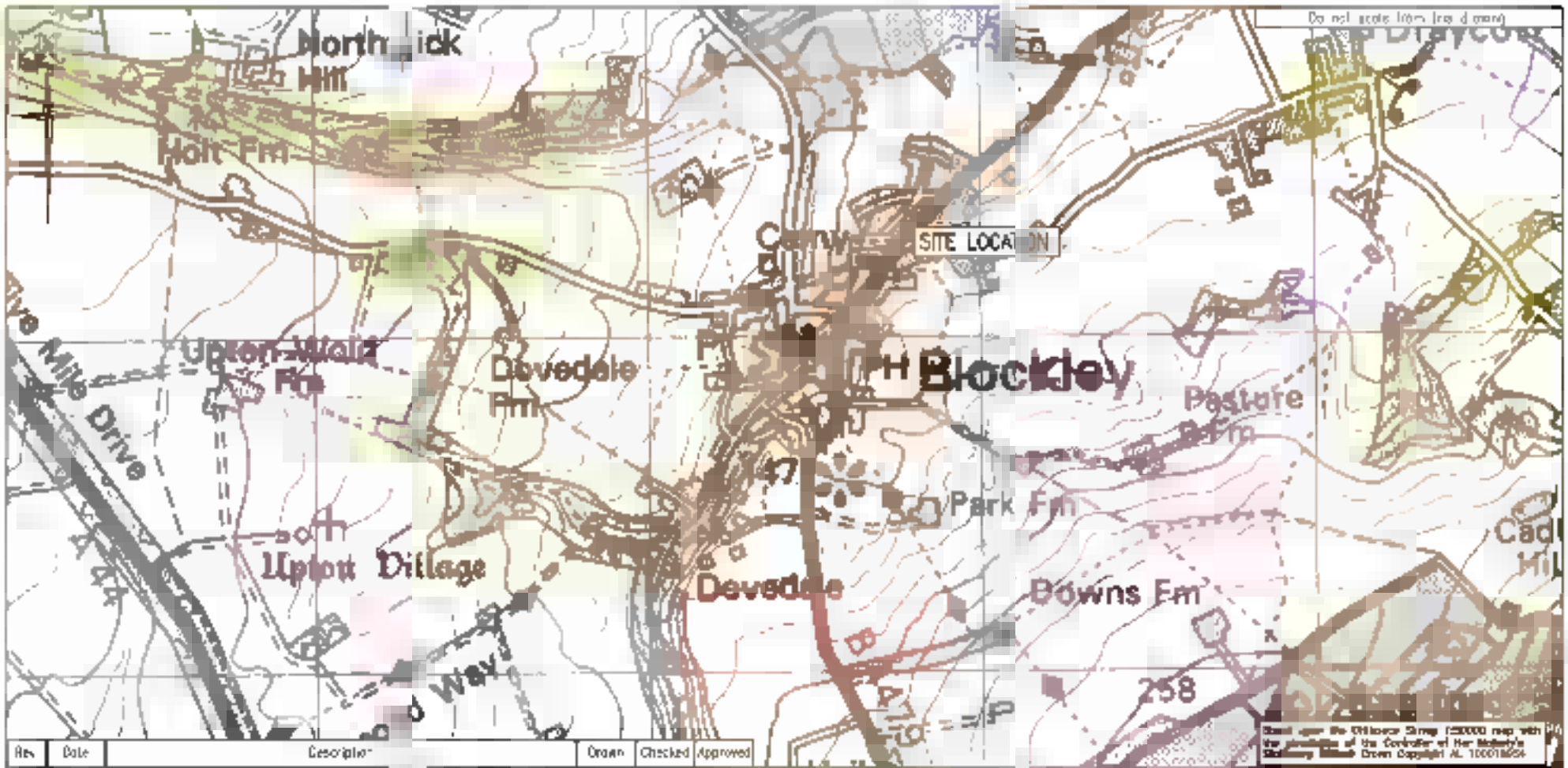
7.4 The development site is brownfield and at 180m² very small. It is considered that the increase in runoff from the proposed development is negligible and trying to restrict the flows to the current levels would be impractical. Hence it is proposed to either utilise a green roof if the Local Planning Authority will permit its' use or failing that allow the proposed development to drain unrestricted to the sewer system.

7.5 This PPS25 compliant FRA has considered the impact of the proposed development on flooding within and outside of the site boundaries and found that the proposals for the site will not adversely affect its future occupants or downstream areas.

7.6 Based on the above factors is considered that there are no reasons why the development should not proceed from a flood risk basis.

Appendix A

Site Location Plan



Do not scale from this drawing

Rev.	Date	Description	Drawn	Checked	Approved

Project Title:
BLOCKLEY VILLAGE STORE

FAIRHURST

100, Colmore Row, Birmingham, B3 2AB
 0121 772 2200
 Fax: 0121 772 2201

Drawing Title:
SITE LOCATION PLAN

Scale: 1:100	Notes:
M15	For Information

Drawn	Checked	Approved
JS	NH	MM
Date:	Date:	Date:
13/12/10	14/12/2010	14/12/2010

Drawing No.	Project No.
86943/1001	-

Appendix B

Topographical Survey

Chris Magson Surveying Services
 57 High Street, Ticknall.
 Derbyshire. DE73 7JH.
 Tel 01332 863059



TOPOGRAPHIC SURVEY
 BELL LANE, BLOCKLEY

SCALE 1:100

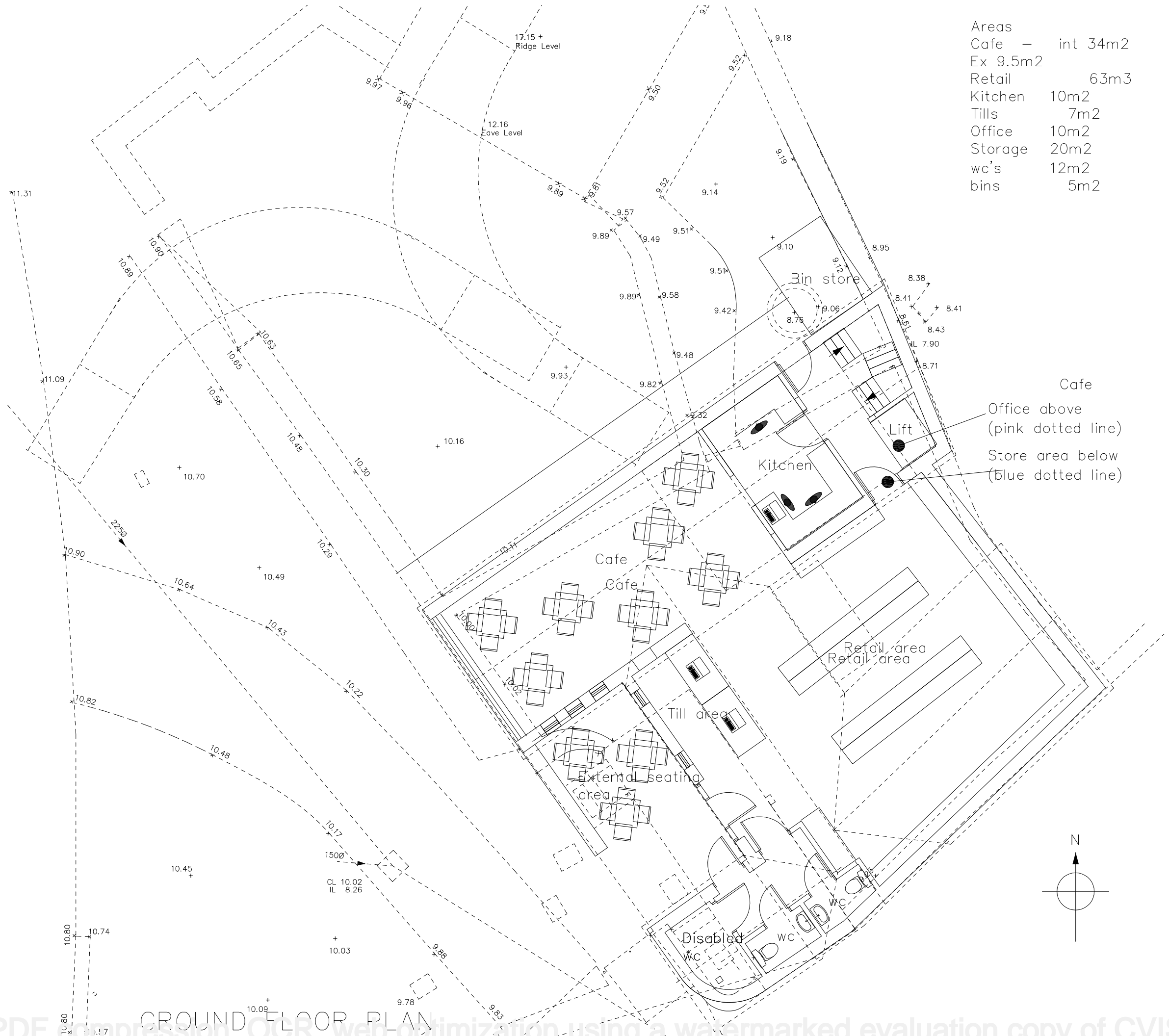
NOV 2010

LEVELS BASED ON ARBITRARY SITE DATUM. MANHOLE FRAME GIVEN VALUE 10.00m (see plan)

Appendix C

Proposed Layout

Areas	
Cafe - int	34m ²
Ex	9.5m ²
Retail	63m ³
Kitchen	10m ²
Tills	7m ²
Office	10m ²
Storage	20m ²
wc's	12m ²
bins	5m ²



Cafe
Office above
(pink dotted line)
Store area below
(blue dotted line)

rev:		date:	
drawn:	TC	checked:	

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CLIENT:
Blockley co-op

PROJECT:
Blockley co-op

DRWG TITLE:
Proposed Plan
Ground

date: APRIL 2018 scale: 1:100

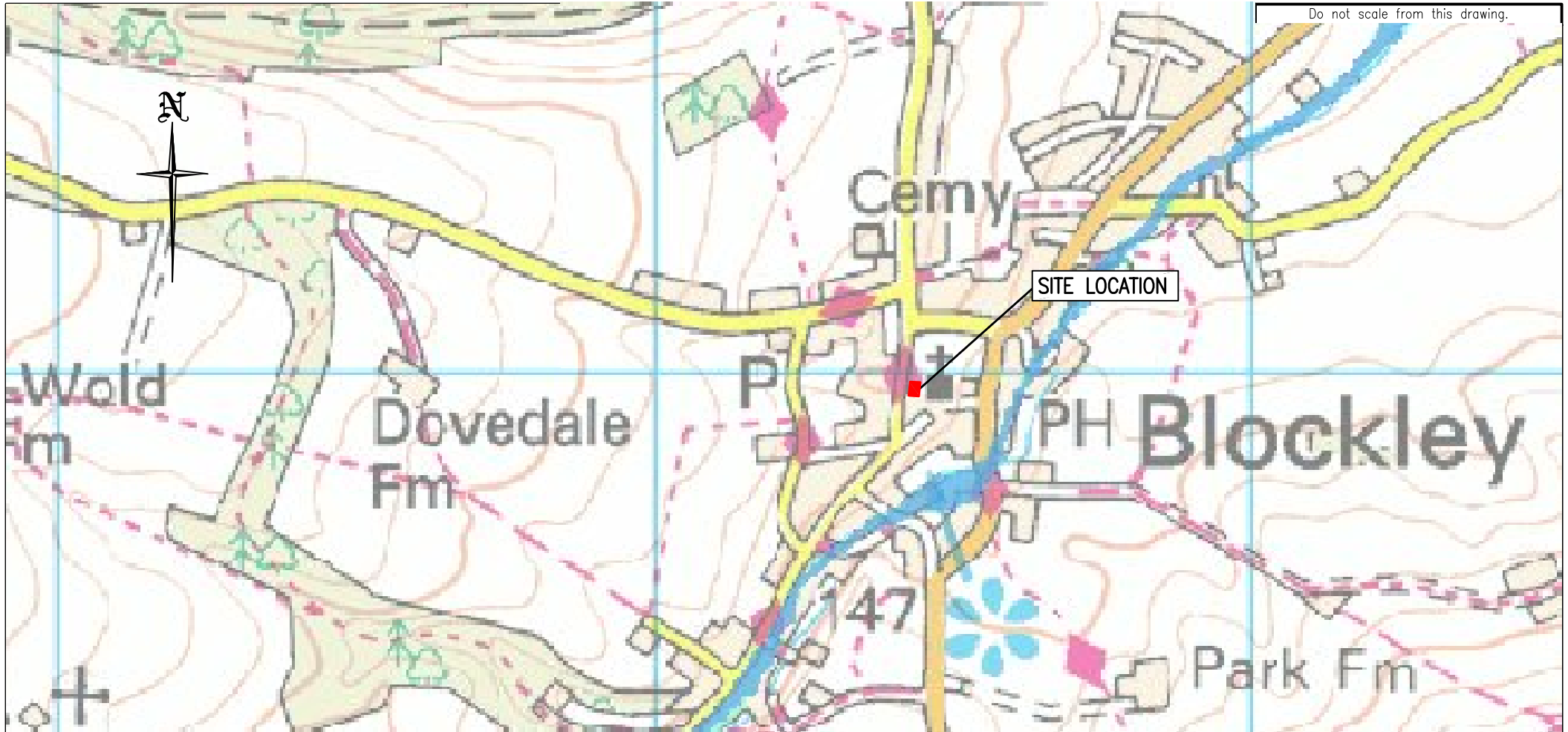
JOB NO:
480-LJB-100

GROUND FLOOR PLAN

Appendix D

EA Flood Maps

Do not scale from this drawing.



Rev.	Date	Description	Drawn	Checked	Approved
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Project Title: BLOCKLEY VILLAGE STORE
Drawing Title: ENVIRONMENT AGENCY FLOOD MAP

FAIRHURST		
<small>W.A. Fairhurst & Partners Wellesbourne House, Walton Road, WELLESBOURNE, CV35 9JB Tel: 01789 470 512 Fax: 01789 470 619</small>		
Scale at A4: NTS	Status: For Information	
Drawn: JS	Checked: MH	Approved: MH
Date: 13/12/10	Date: 14/12/2010	Date: 14/12/2010
Drawing No.: 86943/1002		Revision: -

Appendix E

Run Off Calculations

11 Woodside Terrace
Glasgow
G3 7XQ

New Co-operative Store
Blockley



Date January 2011
File

Designed By mh
Checked By

Micro Drainage

System 11.2

STORM SEWER DESIGN by the Modified Rational Method

Global Variables

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

Location - England & Wales

Return Period (years)	1
MS-60 (mm)	19.000
Ratio R	0.365
Maximum Rainfall (mm/hr)	50
Foul Sewage (l/s/ha)	0.00
Overflow Setting ('Foul only)	0
Volumetric Runoff Coeff.	0.75
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
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)	300
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)	DWP (l/s)	k (mm)	HYD SECT	DIA (mm)
1 000	50.00	0.855	58.5	0.018	5.00	0.0	0.600	0	100
2 000	50.00	0.855	58.5	0.005	5.00	0.0	0.600	0	100

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWP (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	GAP (l/s)	Flow (l/s)
1.000	46.5	5.8	0.000	0.018	0.0	0.0	0.0	1.01	7.9	2.3
2.000	46.5	5.8	0.000	0.005	0.0	0.0	0.0	1.01	7.9	0.6

1.000 = proposed run off for 1:1 year storm
2.000 = Existing run off from building for 1:1 year storm

Green Roof Calculations

M A Fairhurst & Partners				Page 1	
11 Woodside Terrace Glasgow G3 7XQ		Blockley Village Store			
Date January 2011		Designed By mh			
File roof.srcx		Checked By			
Micro Drainage		Source Control W.12.5			
Summary of Results for 100 year Return Period					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	100.054	0.054	1.7	0.1	OK
30 min Summer	100.062	0.062	2.2	0.1	OK
60 min Summer	100.061	0.061	2.1	0.1	OK
120 min Summer	100.057	0.057	1.9	0.1	OK
180 min Summer	100.053	0.053	1.6	0.1	OK
240 min Summer	100.050	0.050	1.5	0.1	OK
360 min Summer	100.046	0.046	1.2	0.1	OK
480 min Summer	100.042	0.042	1.0	0.0	OK
600 min Summer	100.039	0.039	0.9	0.0	OK
720 min Summer	100.037	0.037	0.9	0.0	OK
960 min Summer	100.034	0.034	0.7	0.0	OK
1440 min Summer	100.029	0.029	0.5	0.0	OK
2160 min Summer	100.025	0.025	0.4	0.0	OK
2880 min Summer	100.023	0.023	0.3	0.0	OK
4320 min Summer	100.018	0.018	0.2	0.0	OK
5760 min Summer	100.016	0.016	0.2	0.0	OK
7200 min Summer	100.015	0.015	0.2	0.0	OK
8640 min Summer	100.014	0.014	0.1	0.0	OK
10080 min Summer	100.013	0.013	0.1	0.0	OK
Storm Event	Rain (mm/hr)	Time-Peak (mins)			
15 min Summer	86.963	17			
30 min Summer	58.621	22			
60 min Summer	37.768	38			
120 min Summer	25.528	68			
180 min Summer	17.574	109			
240 min Summer	14.185	126			
360 min Summer	10.444	190			
480 min Summer	8.401	256			
600 min Summer	7.094	318			
720 min Summer	6.174	382			
960 min Summer	4.953	504			
1440 min Summer	3.624	734			
2160 min Summer	2.646	1100			
2880 min Summer	2.114	1468			
4320 min Summer	1.537	2204			
5760 min Summer	1.225	2896			
7200 min Summer	1.026	3680			
8640 min Summer	0.889	4400			
10080 min Summer	0.787	5080			
©1982-2010 Micro Drainage Ltd					

11 Woodside Terrace
Glasgow
G3 7XD

Blockley Village Store



Date January 2011

Designed By mh

File roof.srxk

Checked By

Micro Drainage

Source Control W.12.5

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Inlet Volume (m ³)	Status
15 min Winter	100.059	0.059	2.0	0.1	OK
30 min Winter	100.067	0.067	2.5	0.1	OK
60 min Winter	100.062	0.062	2.2	0.1	OK
120 min Winter	100.056	0.056	1.8	0.1	OK
180 min Winter	100.052	0.052	1.6	0.1	OK
240 min Winter	100.048	0.048	1.3	0.1	OK
360 min Winter	100.042	0.042	1.0	0.0	OK
480 min Winter	100.038	0.038	0.8	0.0	OK
600 min Winter	100.035	0.035	0.7	0.0	OK
720 min Winter	100.033	0.033	0.7	0.0	OK
960 min Winter	100.029	0.029	0.5	0.0	OK
1440 min Winter	100.025	0.025	0.4	0.0	OK
2160 min Winter	100.021	0.021	0.3	0.0	OK
2880 min Winter	100.018	0.018	0.2	0.0	OK
4320 min Winter	100.015	0.015	0.2	0.0	OK
5760 min Winter	100.013	0.013	0.1	0.0	OK
7200 min Winter	100.012	0.012	0.1	0.0	OK
8640 min Winter	100.012	0.012	0.1	0.0	OK
10080 min Winter	100.011	0.011	0.1	0.0	OK

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	86.865	16
30 min Winter	52.611	21
60 min Winter	37.780	38
120 min Winter	23.529	74
180 min Winter	17.574	106
240 min Winter	14.185	142
360 min Winter	9.444	194
480 min Winter	8.404	250
600 min Winter	7.094	324
720 min Winter	6.174	376
960 min Winter	4.953	506
1440 min Winter	3.624	720
2160 min Winter	2.646	1132
2880 min Winter	2.114	1444
4320 min Winter	1.537	2164
5760 min Winter	1.225	2886
7200 min Winter	1.026	3744
8640 min Winter	0.889	4232
10080 min Winter	0.787	4904

Run Off For Critical Storms up to 1:100 year Event

W A Fairhurst & Partners

Page 1

11 Woodside Terrace
Glasgow
G3 7XQ

New Co-operative Store
Blockley



Date January 2011
File BLOCKLEY.SUM

Designed By mh
Checked By

Micro Drainage

Simulation W.11.2

Global Variables

Region	FSR - England & Wales
Return Period (yrs)	1
N5-60 (mm)	19.000
Ratio R	0.365
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 * 10m ² /ha Storage	2.000
Foul Sewage/Hectare (l/s)	0.00
Additional Flow - % of Total Flow	0
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	0

Starting Storm file name

Y:\85000-89999\86943 - BLOCKLEY CO-OP\WINDES\BLOCKLEY SHS

Freely Discharging Outfalls

Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)
1.000		8.085	7.685	1200	0
2.000		9.360	7.685	200	0

Appendix E

Photographs



Photo 1 – Site looking from the west



Photo 2 – Site looking from the north



Photo 3 – Rear of existing building



Photo 4 – Pond to rear of site



Photo 5 – 450mm diameter pipe discharging to pond

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