Parker House

Planning & Conservation Area Consent Applications

SD12: Flood Risk Assessment (BREEAM)

Prepared for Camden Council & E C Harris

November 2012

paul davis + partners
architects urban designers

11-0188

FLOOD RISK ASSESSMENT (BREEAM)

FOR

EC HARRIS

AT

PARKER STREET, CAMDEN

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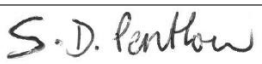
REVISION & ISSUE RECORD

Revision	Date	Name	Position	Signature
/	October 2012	Shaun Pentlow	Senior Project Engineer	
		Andrew Chisem	Director	

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CONTENTS

PREFACE

a) This Risk Assessment and/or opinion has been prepared for the specific purpose stated therein.

b) The Risk Assessment has been prepared for the exclusive use by:-

- EC Harris
- Local Authority (London Borough of Camden)
- Environment Agency
- BREEAM Assessor

c) This document is issued only to the persons stated above and on the understanding that this Practice is not held responsible for the actions of others who obtain any unauthorised disclosure of its contents, or place reliance on any part of its findings, facts or opinions, be they specifically stated or implied.

d) This study is a risk based assessment of potential flooding issues at the study site and the information presented and the conclusions drawn are for guidance only and provide no guarantee against flooding.

1.0 INTRODUCTION

This Flood Risk Assessment has been prepared on behalf of EC Harris to support a BREEAM Assessment for the site and to assess the Flood Risk impact of the development on the surrounding area.

This report has been written and formatted generally in accordance with the requirements outlined in National Planning Policy Framework (NPPF) and its technical guidance.

2.0 SITE SUMMARY

The site is located to the south of Camden. It is bounded by Parker Street to the south and a school to the north and existing developments to the east and west. It is centred on National Grid reference 530419mE, 181334mN. The site is split into two parts with the main section to the north east and the smaller section to the east denoted as current workshop area.

Location plans of the site are included in Appendix A.

3.0 SITE LEVELS – EXISTING AND PROPOSED

3.1 EXISTING LEVELS

From a review of information available, the site levels for the main site generally fall in a north east direction along Parker Street. The workshop area appears to fall in a south west direction towards Parker Mews. It would appear that external levels allow water to flow to existing gullies in the existing roads, Parker Street to the south east and Parker Mews to the south east.

Drawing INF02 in Appendix B indicates the pre-development levels as existing levels together with the proposed site overlay.

3.2 PROPOSED LEVELS

The proposed site levels will be dictated by the existing road levels adjacent to the site which will therefore allow the current above ground surface water flow to be maintained in a north easterly direction off site.

Drawing INF02 in Appendix B indicates the existing and proposed falls, based on the latest site layout, which will be retained in the detailed design.

4.0 EXISTING SITE DRAINAGE SYSTEM

The current topographical survey identifies several manholes within the site and in front of the building along Parker Street within the footway. Existing rainwater pipes and soil vent pipes on the front elevation appear to discharge directly into these existing manholes. It is also likely that the drainage within the footway conveys adjacent sites which under the recent private sewer transfer would allow these to be adopted. A CCTV survey of the drains has not been carried out and it is recommended that this is undertaken prior to detailed design as the majority of the drainage within the site will be demolished as part of the site clearance process. It is anticipated that the site drains both foul and surface water to the existing combined Thames Water sewer that exists within Parker Street. From the Thames Water sewer records this is identified as a1168mm diameter sewer towards the opposite side of Parker Street.

Refer to Appendix B for details of the existing drainage cover locations adjacent to the site as detailed on the survey and Appendix C for the existing Thames Water drainage location adjacent to the site.

5.0 HYDRAULIC INFLUENCES

The key features of the existing site drainage infrastructure, which influence the hydrology of the site are identified below.

5.1 RIVER THAMES

The River Thames is located approximately 500m to the south of the site although due to the current level difference it is not identified as a potential issue. Its floodplain extents are indicated in more detail in section 7.0 below.

5.2 GROUND CONDITIONS

The majority of the site is currently occupied by the building however, the ground conditions have been identified as a substantial made ground make up overlying a mixture of gravel and clay. No ground water was encountered during the investigations therefore based on this information, groundwater flooding is not considered to be a risk.

6.0 IDENTIFICATION OF POTENTIAL FLOODING SOURCES

6.1 TIDAL/COASTAL

Due to the sites location, tidal or coastal flooding is not considered to be an issue.

6.2 WATER COURSES

As indicated in Section 5.0 the River Thames is situated approximately 500m from the site and at a lower level. The River Fleet which now flows as a surface water overflow sewer flows from Hampstead heath to the Thames underneath Blackfriars bridge. It is unlikely therefore that this watercourse would have an effect on the site. There does not appear to be any other watercourses in the vicinity of the site. Therefore flooding from watercourses is considered unlikely to be an issue.

6.3 GROUNDWATER

Groundwater flooding is not known to be an issue historically. The proposed development is underlain by mainly impermeable soils and natural ground water levels were not encountered during the ground investigation works. However ground water monitoring has identified high levels of water and therefore the development will need to consider high ground water levels in the design, particularly the basement. Due to the existing site level and the fall of levels beyond the site, groundwater flooding is considered unlikely to be an issue.

6.4 PONDS/ LAKES

There are no known ponds or lakes adjacent to or in the vicinity of the site. The nearest ponds are those within St. James Park which is located approximately 1km to the south east of the site. Due to the sites proximity to these lakes the risk of flooding is considered unlikely to be an issue.

6.5 ARTIFICIAL SOURCES

There are no other known artificial sources of potential flooding adjacent to the site.

7.0 EXISTING FLOOD RISKS

Included in Appendix D is the Environment Agency's indicative flood plain map which indicates the site to be outside the 1 in 1000 year return period storm event which places it within flood Zone 1. The nearest flood zone 2/3 is the River Thames, approximately 500m to the south. Also included in Appendix D is a map extract indicating the risk of flooding from reservoirs which identifies this to be beyond the site boundary identical to the fluvial flood zone.

With reference to the North London Strategic Flood Risk Assessment dated August 2008 by Mouchel, and the Floods in Camden Report of the Floods Scrutiny Panel London Borough of Camden June 2003, Camden is identified as having no existing fluvial flood risk although there are some areas where historical surface water flooding has been evident. These areas are to the central and west side of Camden and as the development sites location is to the south side of Camden, it does not appear to have suffered from historical surface water flooding. The potential for basement flooding will be considered during detailed design and a precautionary approach applied to limit the potential basement flood risk.

As the proposed development will be within Flood Zone 1 in accordance with NPPF when considered in a sequential context, the proposals lie in the lowest flood zone, making them the most preferential with respect to flood risk.

8.0 ANALYSIS OF PROPOSED DEVELOPMENT AND SITE DRAINAGE SYSTEM

8.1 PROPOSED DEVELOPMENT

The proposed development consists of the demolition (with the exception of the facade) and reconstruction of the existing hostel flats, workshop and ancillary buildings together with the necessary adjustments and reconstruction of the minimal external areas.

8.2 SURFACE WATER DRAINAGE

The existing site drainage system is a combined system which appears to convey both foul and storm drainage to the combined Thames water culvert within Parker Street. Due to the likely impermeable nature of the ground, the presence of made ground following demolition, the potential elevated groundwater levels and the minimal external areas, soakaways are unlikely to be a suitable means of surface water disposal. It is likely that the proposed development will require the existing drainage within the site to be fully reconstructed to provide drainage to the refurbished buildings. This will need to be a separated system where possible with the final connection combined prior to discharging into the existing Thames Water combined sewer via the existing connections.

The basement area is proposed to be tanked or made watertight to ensure that ground water does not enter the building. Therefore the external areas within the basement will require a sump and surface water pumping system to ensure the water is directed to the ground floor surface water drainage system. It is proposed to delay this water from discharging to the outfall in order to limit the peak flow off site and therefore this area is not included in the peak design flow calculations. In accordance with Building regulations, this system will be required to accommodate a 24 hour storage volume should the pumping system fail. It is also recommended that these external areas are sloped away from the doorways to further reduce the potential for flooding of the properties.

Surface water drainage will be required to connect to the existing Thames Water drainage system prior to discharging off site as a combined sewer, where this is possible. Based on the current redevelopment proposals it is likely that the proposed impermeable area of the site will be reduced from the current impermeable areas. However, consideration to the effects of climate change will need to be taken into account which will require up to 30% betterment and the current difference does not appear to be sufficient. Also the London plan requires all new developments to provide a minimum of 50% betterment which will not be accommodated by the reduced impermeable areas. Therefore the surface water drainage system will

require the need for designed above ground storage areas or below ground storage with restricted discharge into the existing system where this is possible.

An assumed drainage system has been used to simulate the areas involved within the system which will need to be confirmed during detailed design. The drainage design criteria will be to limit the peak discharge and volume of discharge from the site to predevelopment conditions with a minimum of 50% betterment where possible. However to comply with BREEAM requirements, the peak discharge flow and volume should be no greater than the predevelopment condition, including an allowance for climate change.

The initial concept details for the surface water storage system for the site is detailed below and identified on INF 10 in Appendix E.

Surface water concept drainage main site

The existing impermeable area for the main site is approximately 1322m^2 and the proposed impermeable area is 1005 m^2. The reduced area is accounted for by the proposed 220 m^2 green roof, basement area and additional area discharging to the adjacent workshop area. The discharge from the green roof has been assumed to be 25% less than that of a standard impermeable roof which is the minimum expected value. The existing and proposed peak discharge rate for the site are identified below,

	1 in 1 yr	1 in 30 yr	1 in 100 + 30%
Existing	17.4	44.7	66.1
Proposed	13.5	35.6	54.2

The above figures provide only 18-22% reduction in peak flow due to the constrained area of the main site. The proposal provides no external areas suitable for storage within the main site and the discharge location is into an existing sewer within the footway directly adjacent to the front of the site. However the green roof reduction of 25% is the minimum value of reduction and during summer storms or where the green roof is not fully absorbent, this value is likely to be much higher. Consideration should be given to increasing the overall area of green roof on the scheme to further reduce the proposed peak flow from the site. The calculations in Appendix E identify the proposed and existing peak discharge rates for the site. The detailed drainage design for the scheme should ensure the peak flow is reduced (as far as practicable by up to 50%) and the volume of discharge is not increased.

Surface water concept drainage workshop site

The existing impermeable area for the workshop site is approximately 385m^2 and the proposed impermeable area is 485 m^2. The increased area is due to the additional area of roof from the main site. The existing and proposed peak discharge rate for the site are identified below,

	1 in 1 yr	1 in 30 yr	1 in 100 + 30%
Existing	5.1	10.8	15.7
Proposed	2.5	3.3	7.8

The calculations in Appendix E identify the proposed and existing peak discharge rates for the site. The detailed drainage design for the scheme should ensure the peak flow is reduced by 50% and the volume of discharge is not increased.

The basis of the current design incorporates a Hydrobrake or similar flow restricting device and cellular storage used to provide the necessary storage. The current proposals identify these to be 0.5m depth tanks throughout which would need to be confirmed during the detailed design process. The proposed drainage system has been simulated for the worst case 1 in 100 year return period storm event (including a 30% additional flow allowance for climate change).

Volume of discharge

The volume of discharge for a 360 minute 100 year storm provides an existing discharge volume of 89 cum (approx.) and a proposed discharge volume of 85 cum (approx.). This is therefore a minor reduction and would be further increased by the additional use of green roofs or other SuDS schemes which should be considered during detailed design. The calculations identifying the existing and proposed discharge volumes are contained in Appendix E.

8.3 CLIMATE CHANGE AND DILAPIDATION

National Planning Policy Framework (which sets out the government requirements for the management and reduction of flood risk in the land use planning process) requires the investigation of climate change on the proposed development. The technical guidance identifies that the storm intensity could be increased by up to 30% by 2115 (Table 5). A 30% climate change allowance has been identified in the calculations in Appendix E and will be included within the detailed storage design. A dilapidation factor should also be applied to the storage system in accordance with best practice which will need to be considered during the detailed design process.

9.0 ASSESSMENT, PROBABILITY AND RATE OF POTENTIAL FLOODING

The development is currently identified above the 1 in 1000 year flood plain extent (in Flood Zone 1). Also the site levels will be designed to ensure that during inundation of the site drainage system, surface water will be directed beyond the building towards the north east and south west. Therefore should any overland flooding occur it would be limited to the external carriageways and based on the existing/proposed levels would limit the flooding depth to approximately 0.25m. Due to the relatively flat nature of the ground, the flow of flood water would be very slow. This would place it in the category of low risk in accordance with figure 3.2 in document Flood Risks to People Phase 2 FD2321/TR1, which is identified below.

Velocity Coefficient C	0.5									
(V+C) * D	Depth									
Velocity	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
0.00	0.13	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.13	1.25
0.50	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
1.00	0.38	0.75	1.13	1.50	1.88	2.25	2.63	3.00	3.38	3.75
1.50	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
2.00	0.63	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25
2.50	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50
3.00	0.88	1.75	2.63	3.50	4.38	5.25	6.13	7.00	7.88	8.75
3.50	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
4.00	1.13	2.25	3.38	4.50	5.63	6.75	7.88	9.00	10.13	11.25
4.50	1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50
5.00	1.38	2.75	4.13	5.50	6.88	8.25	9.63	11.00	12.38	13.75

	From	To	
Class 1	0.75	1.25	Danger for some
Class 2	1.25	2.50	Danger for most
Class 3	2.50	20.00	Danger for all

Figure 3.2: Velocity, depth and flood hazard matrix

10.0 PROPOSED DEVELOPMENT IMPLICATIONS

Following development of the site, the retention and reduction of flow from the proposed drainage system will be sufficient to ensure that the peak flows off site are reduced, following development. Also due to the reduction in impermeable area the volume of discharge will be reduced. Therefore the proposed development implications are likely to result in a net marginal flood risk benefit to the site and surrounding area compared to the current situation.

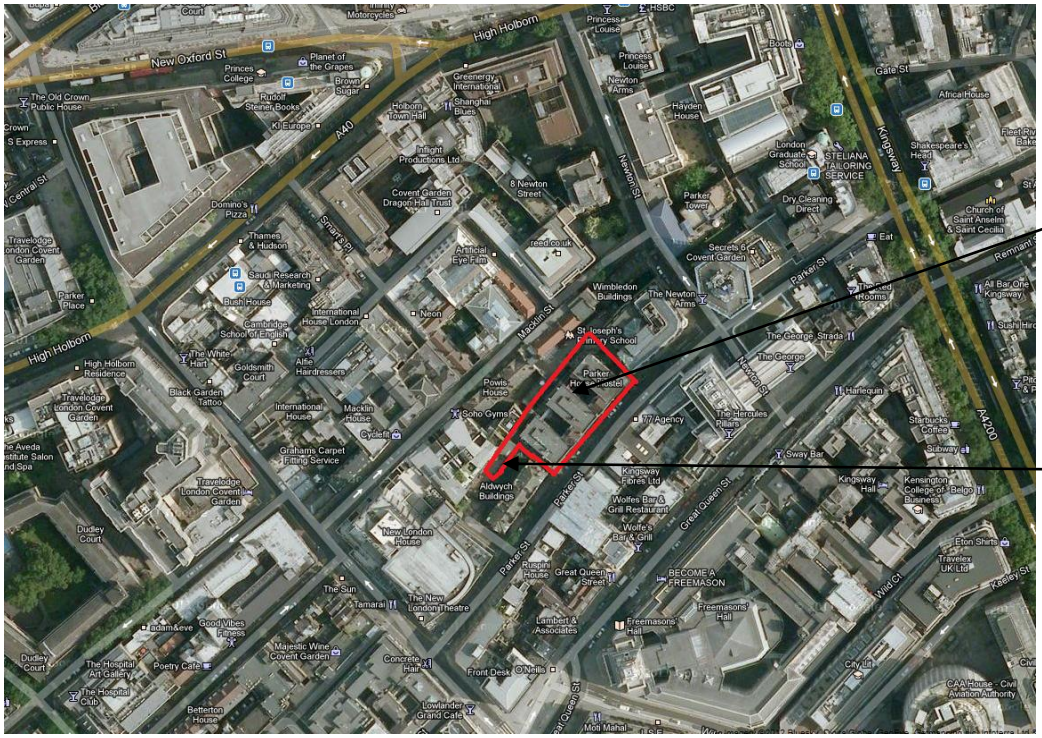
11.0 CONCLUSION

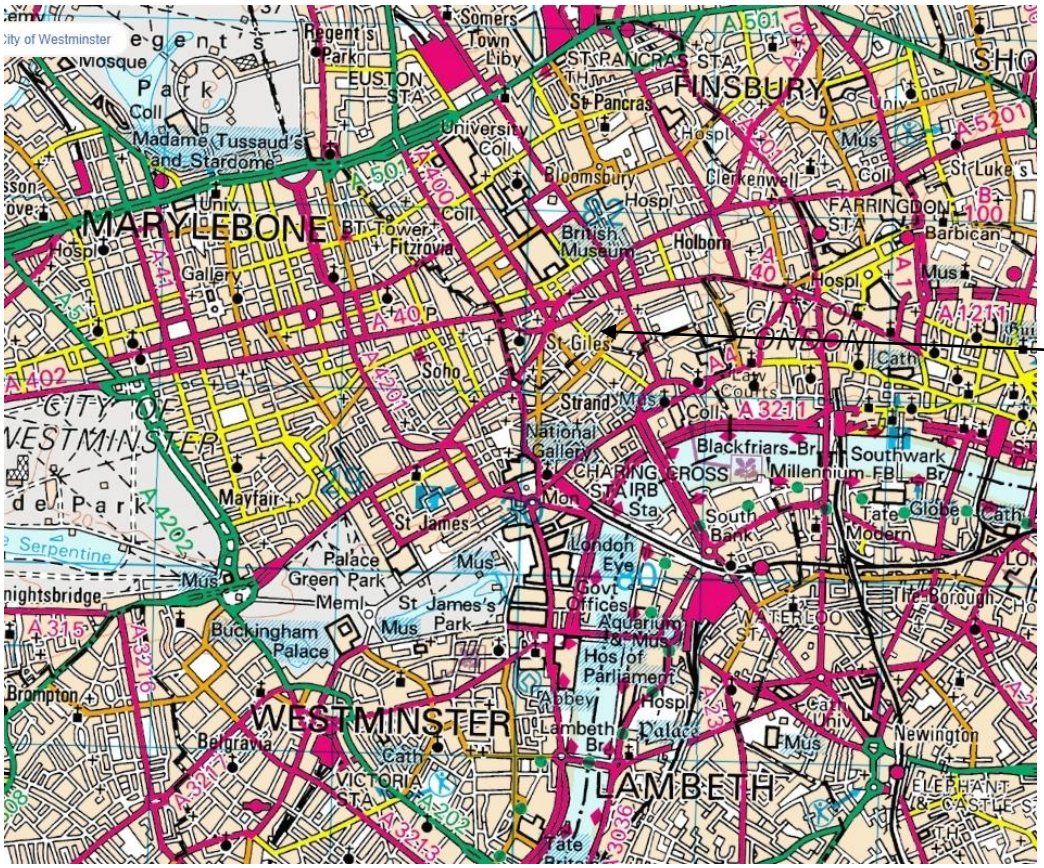
In conclusion, the proposed drainage system will ensure that the site and surrounding area flood risk is marginally reduced. The EA guidelines set out in the document 'preliminary rainfall runoff management for new developments' for surface water discharge and long term storage have been attained for the development as has the essential standard, where site constraints allow, contained in the London plan. The calculations have been provided to reinforce these statements.

12.0 REFERENCES

- National Planning Policy Framework (NPPF) dated March 2012 by Communities and Local Government.
- Technical Guidance to the National Planning Policy Framework dated March 2012 by Communities and Local Government.
- North London Strategic Flood Risk Assessment dated August 2008 by Mouchel
- The Floods in Camden Report of the Floods Scrutiny Panel London Borough of Camden June 2003
- The London plan, Spatial Development Strategy for Greater London July 2011
- Geotechnical and Geo-Environmental Report at 23-37 Parker Street, Covent Garden, London WC2B 5PA by Rolton Group Ltd., October 2012
- EA/DEFRA document W5-074/A/TR/1 revision E 'preliminary rainfall runoff management for new developments' dated January 2012
- EA/DEFRA document Flood Risks to People Phase 2 FD2321/TR1 dated March 2006

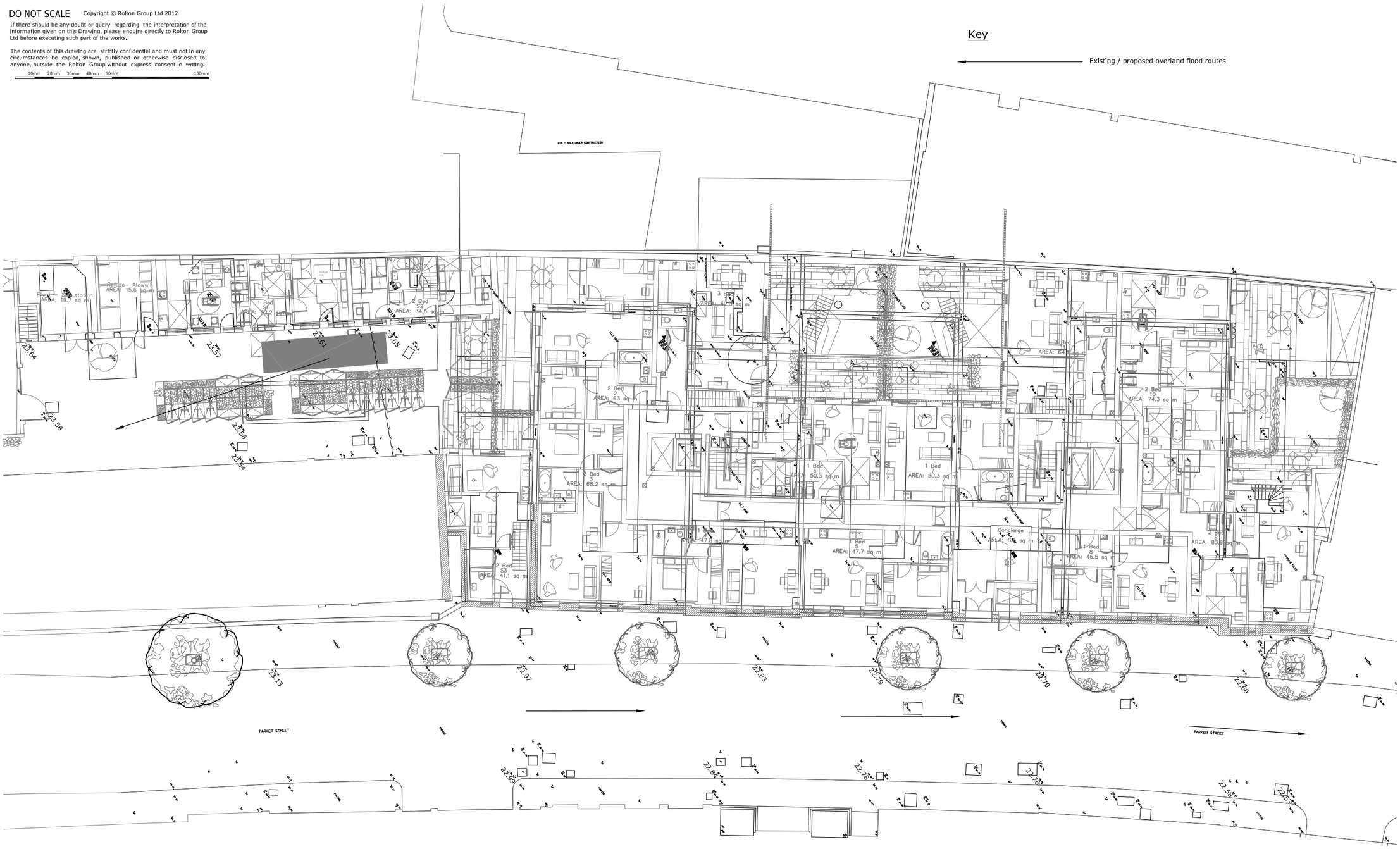
APPENDIX A
LOCATION PLAN





APPENDIX B
SITE LEVELS – PRIOR TO AND AFTER DEVELOPMENT AND FLOOD ROUTING PLAN

10mm 20mm 30mm 40mm 50mm 100mm



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Rev.	Date	Description of Issue	Chkd
P1	29.10.12	Preliminary Issue	SP

Revisions

Issue Purpose:

Project
Parker Street
Hostel
Camden

Drawing Title:
Existing levels
and flood routing plan

Designer's Risk Assessment Reference:
Civils DRA 001

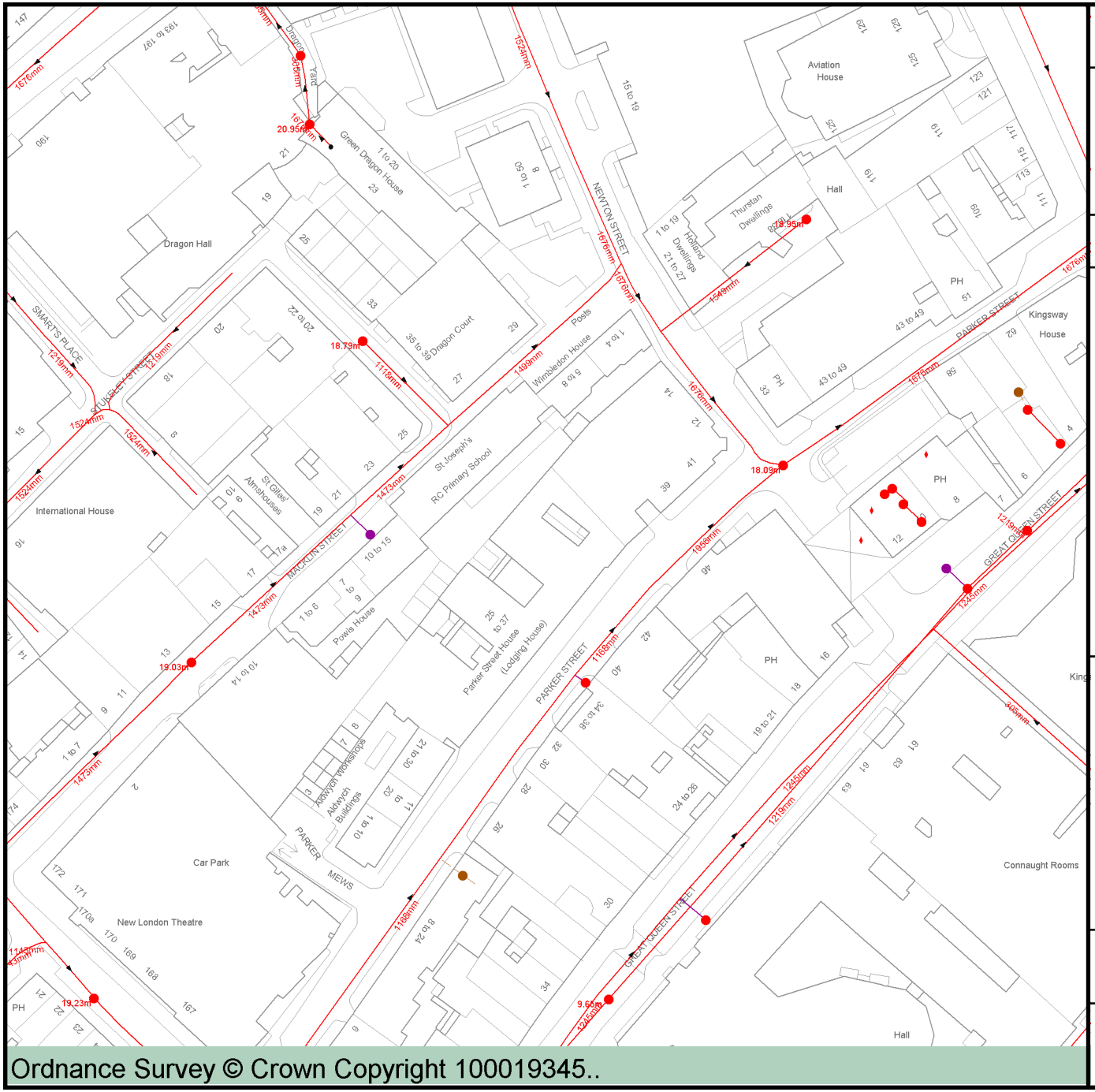
Specification Reference:

Drawn By: AR
Checked By: SP

Scales: 1:125@A1
1:250@A3
Date: 29.10.12

Drawing No. 11-0188/INF02 P1
Rev.

APPENDIX C
EXISTING SITE DRAINAGE SYSTEM



Thames Water - Sewerage

A4 Landscape

Asset data last updated 25/08/2010

Sewerage Legend

- Foul Sewer
- Surface Sewer
- Combined Sewer
- Abandoned Sewer
- Pressure Main
- Private Asset (Colour dependent on effluent type)
- Proposed Asset (Colour dependent on effluent type)

- Foul Manhole
- Surface Manhole
- Combined Manhole
- Other Manhole
- Abandoned Manhole
- End Item
- Probable ex-S24 Property

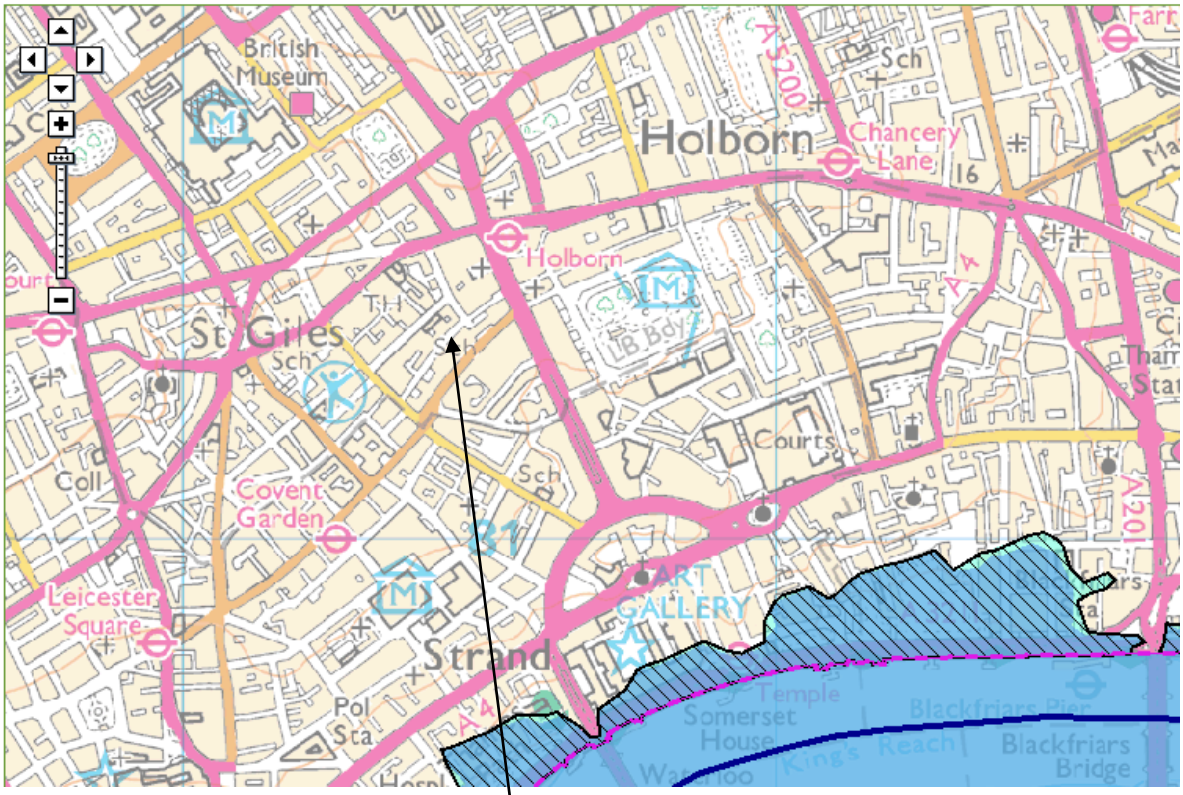
Map Centre:
530430, 181354

Date:
22 Nov 2010

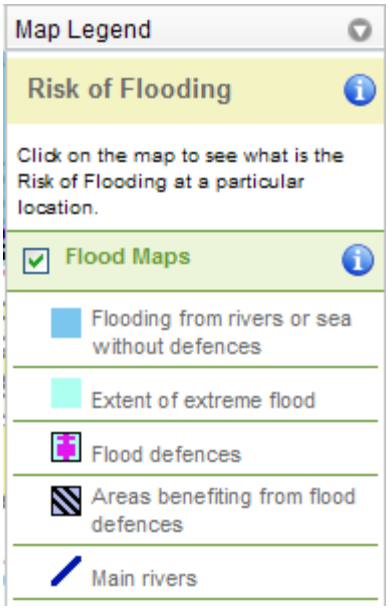
Scale:
1 :1250

APPENDIX D
ENVIRONMENT AGENCY'S INDICATIVE FLOOD PLAIN MAPS

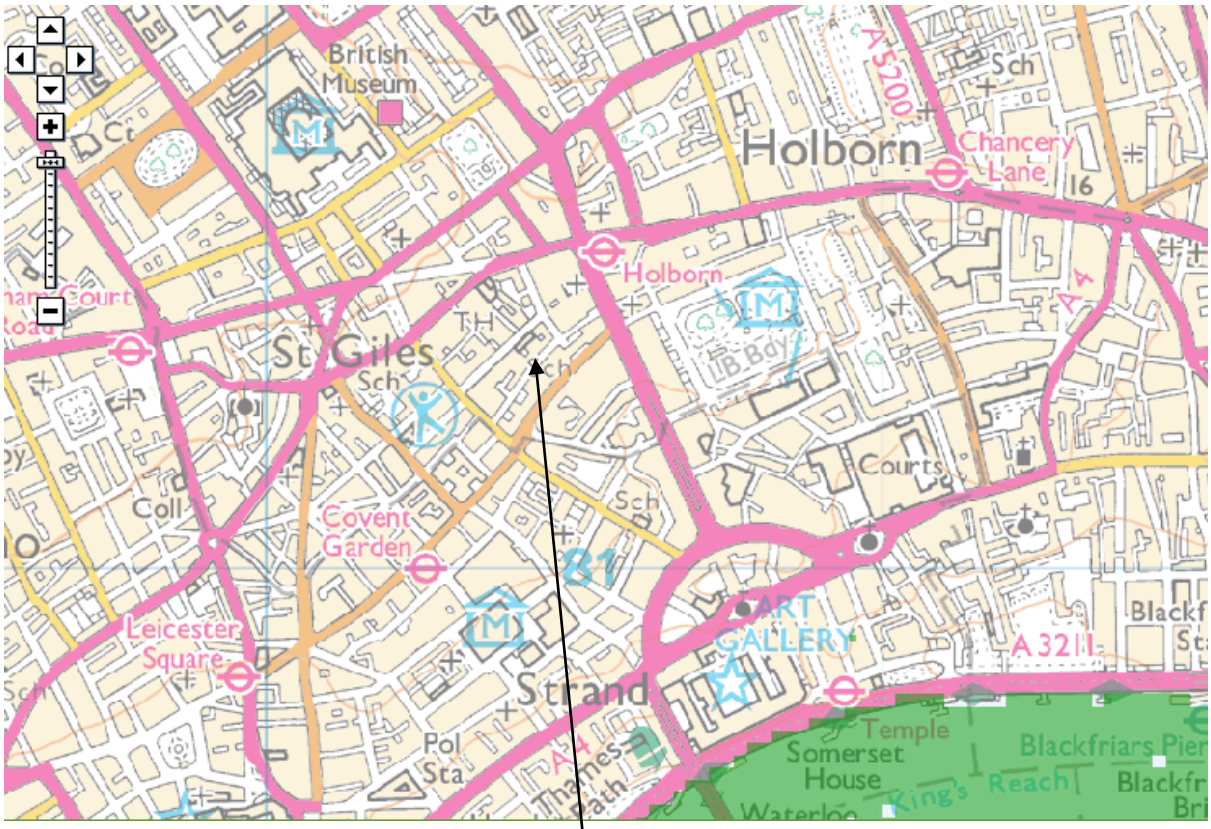
RISK OF FLOODING FROM RIVERS AND SEAS



Approx. site location



RISK OF FLOODING FROM RESERVOIRS

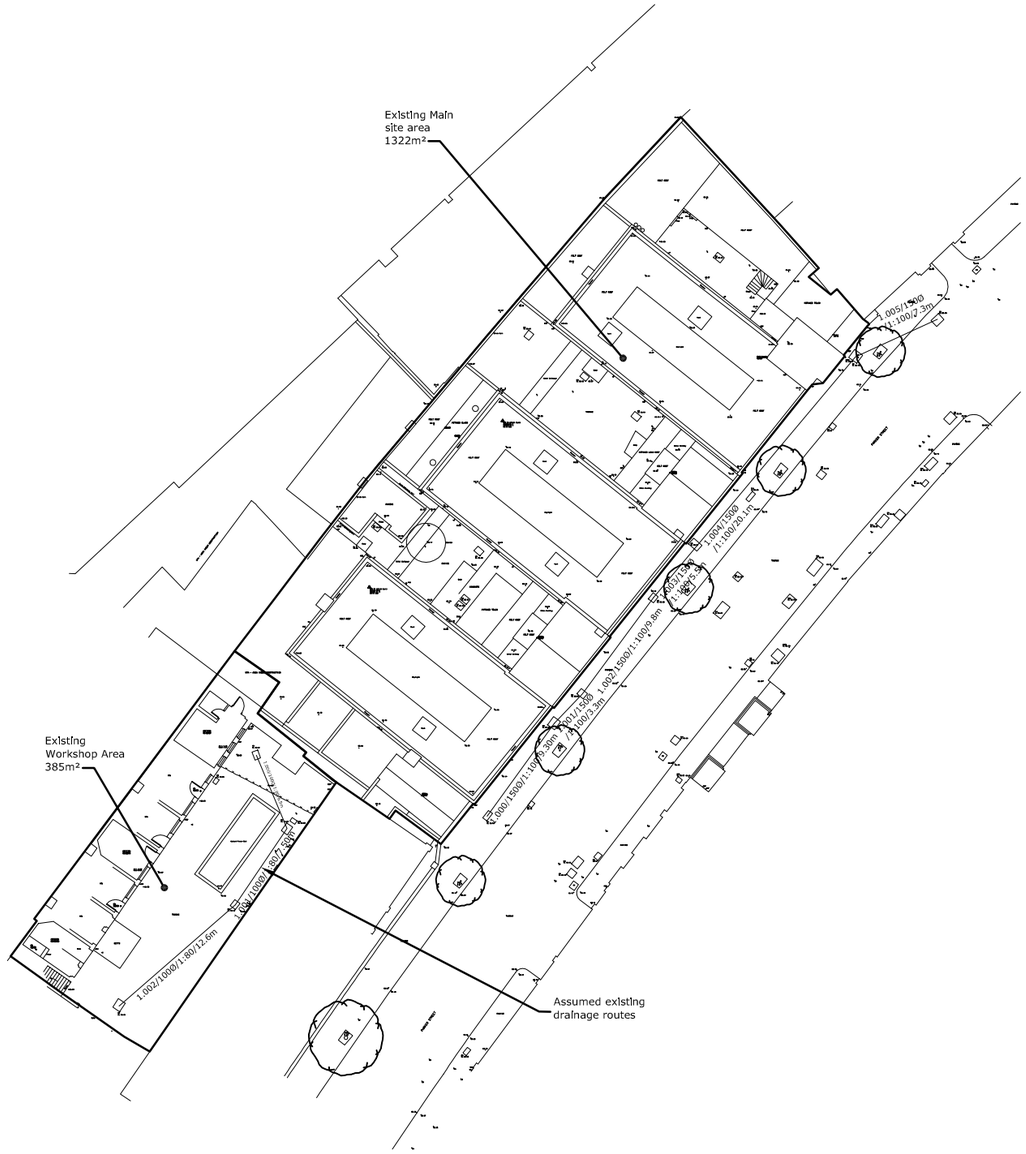


APPENDIX E
PROPOSED DRAINAGE LAYOUT AND CALCULATIONS

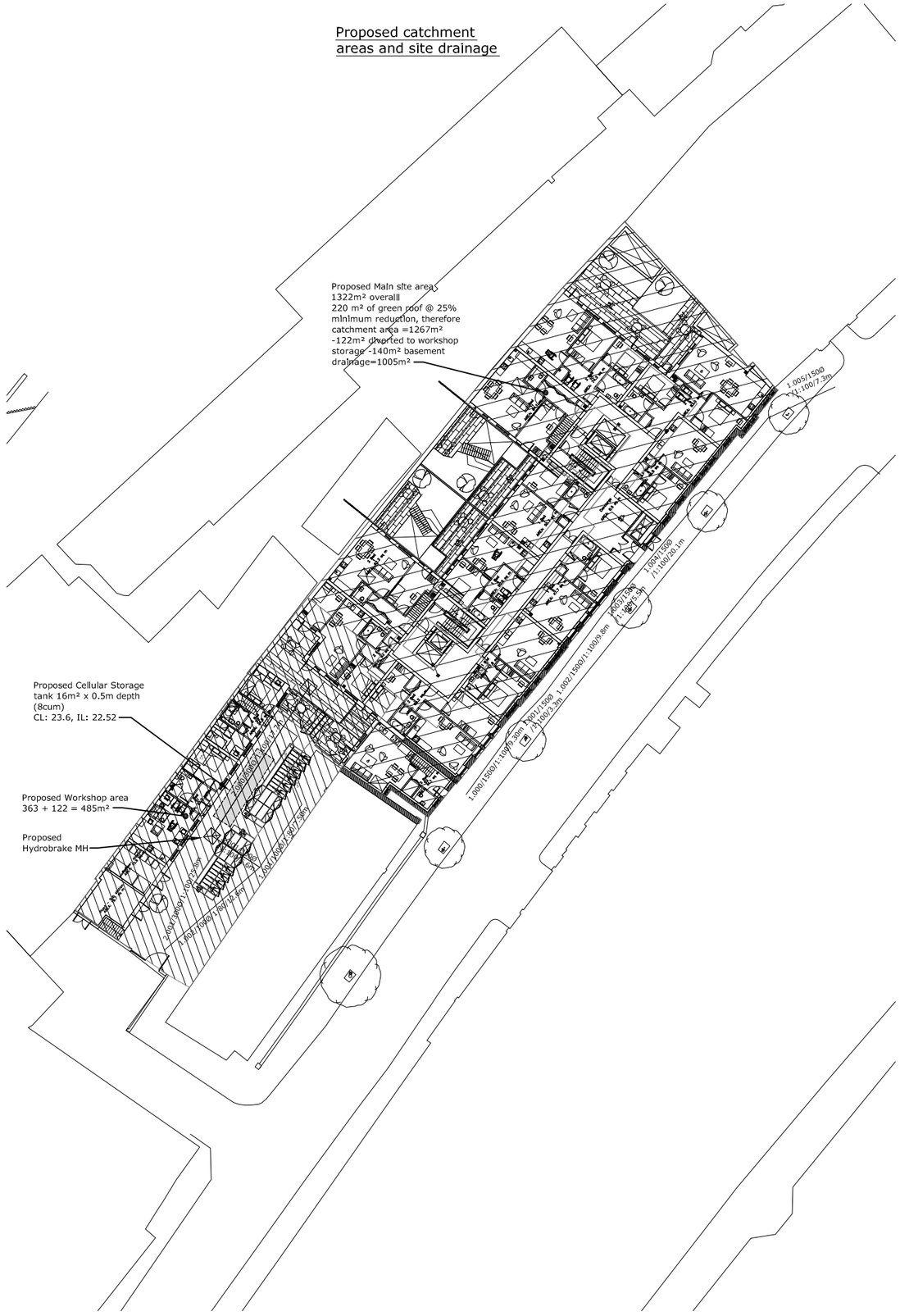
X:\11-0\11\8\8\Design Docs (deliverables)\Drawings and Sketches\Working Drawings\Civil\11-0188 INF 10 Proposed drainage plan.dwg

10mm 20mm 30mm 40mm 50mm 100mm

Existing catchment areas and site drainage



Proposed catchment areas and site drainage



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Scales: 1:250@A1, 1:500@A3
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Drawing No. 11-0188/INF10 P1
Rev.

Rolton Group		Page 1
The Charles Parker Building Midland Road Northants NN10 8DN	Parker Street 11-0188 Main site Existing	
Date 26/10/2012 11:58 File Main site existing.mdx	Designed by SDP Checked by	
Micro Drainage	Network W.12.6.1	

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)	1	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.600	Minimum Backdrop Height (m)	0.200
Ratio R	0.437	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

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)
S1.000	9.300	0.093	100.0	0.026	4.00	0.0	0.600	o	150
S1.001	3.300	0.033	100.0	0.009	0.00	0.0	0.600	o	150
S1.002	9.800	0.098	100.0	0.027	0.00	0.0	0.600	o	150
S1.003	5.500	0.055	100.0	0.015	0.00	0.0	0.600	o	150
S1.004	20.100	0.201	100.0	0.055	0.00	0.0	0.600	o	225
S1.005	7.300	0.073	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)	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)
S1.000	50.00	4.15	22.000	0.026	0.0	0.0	0.0	1.00	17.8	3.5
S1.001	50.00	4.21	21.907	0.035	0.0	0.0	0.0	1.00	17.8	4.7
S1.002	50.00	4.37	21.874	0.062	0.0	0.0	0.0	1.00	17.8	8.4
S1.003	50.00	4.46	21.776	0.077	0.0	0.0	0.0	1.00	17.8	10.4
S1.004	50.00	4.72	21.646	0.132	0.0	0.0	0.0	1.31	52.0	17.9
S1.005	50.00	4.81	21.445	0.132	0.0	0.0	0.0	1.31	52.0	17.9

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	1
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	1	0%					
S1.001	15 Winter	1	0%					
S1.002	15 Winter	1	0%					
S1.003	15 Winter	1	0%					
S1.004	15 Winter	1	0%					
S1.005	15 Winter	1	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.052	-0.098	0.000	0.26	0.0	4.1	OK
S1.001	S2	21.979	-0.078	0.000	0.46	0.0	5.3	OK
S1.002	S3	21.954	-0.070	0.000	0.54	0.0	8.6	OK
S1.003	S4	21.871	-0.055	0.000	0.72	0.0	10.5	OK
S1.004	S5	21.741	-0.130	0.000	0.37	0.0	17.4	OK
S1.005	S6	21.552	-0.118	0.000	0.46	0.0	17.4	OK

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The Charles Parker Building Midland Road Northants NN10 8DN	Parker Street 11-0188 Main site Existing	
Date 26/10/2012 11:59 File Main site existing.mdx	Designed by SDP Checked by	
Micro Drainage	Network W.12.6.1	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	30	0%	30/15 Winter				
S1.001	15 Winter	30	0%	30/15 Winter				
S1.002	15 Winter	30	0%	30/15 Winter				
S1.003	15 Winter	30	0%	30/15 Winter				
S1.004	15 Winter	30	0%	30/15 Winter				
S1.005	15 Winter	30	0%	30/15 Winter				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.270	0.120	0.000	0.55	0.0	8.7	SURCHARGED
S1.001	S2	22.241	0.184	0.000	1.03	0.0	11.8	SURCHARGED
S1.002	S3	22.208	0.184	0.000	1.30	0.0	20.5	SURCHARGED
S1.003	S4	22.043	0.117	0.000	1.75	0.0	25.6	SURCHARGED
S1.004	S5	21.877	0.006	0.000	0.95	0.0	44.7	SURCHARGED
S1.005	S6	21.686	0.016	0.000	1.17	0.0	44.7	SURCHARGED

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The Charles Parker Building Midland Road Northants NN10 8DN	Parker Street 11-0188 Main site Existing	
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Micro Drainage	Network W.12.6.1	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	100
Climate Change (%)	30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	+30%	100/15 Winter				
S1.001	15 Winter	100	+30%	100/15 Winter				
S1.002	15 Winter	100	+30%	100/15 Winter				
S1.003	15 Winter	100	+30%	100/15 Winter				
S1.004	15 Winter	100	+30%	100/15 Winter				
S1.005	15 Winter	100	+30%	100/15 Winter				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	23.025	0.875	0.000	0.78	0.0	12.3	FLOOD RISK
S1.001	S2	22.965	0.908	0.000	1.55	0.0	17.7	FLOOD RISK
S1.002	S3	22.899	0.875	0.000	1.88	0.0	29.7	FLOOD RISK
S1.003	S4	22.558	0.632	0.000	2.55	0.0	37.3	SURCHARGED
S1.004	S5	22.218	0.347	0.000	1.41	0.0	66.4	SURCHARGED
S1.005	S6	21.807	0.137	0.000	1.74	0.0	66.1	SURCHARGED

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Micro Drainage	Network W.12.6.1	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Storm Duration (mins)	360
Ratio R	0.437		

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PN	Discharge Volume (m³)	PN	Discharge Volume (m³)	PN	Discharge Volume (m³)
S1.000	13.525	S1.002	32.240	S1.004	68.623
S1.001	18.202	S1.003	40.033	S1.005	68.593

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Micro Drainage	Network W.12.6.1	

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)	1	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.600	Minimum Backdrop Height (m)	0.200
Ratio R	0.437	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

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)
S1.000	9.300	0.093	100.0	0.019	4.00	0.0	0.600	o	150
S1.001	3.300	0.033	100.0	0.007	0.00	0.0	0.600	o	150
S1.002	9.800	0.098	100.0	0.020	0.00	0.0	0.600	o	150
S1.003	5.500	0.055	100.0	0.012	0.00	0.0	0.600	o	150
S1.004	20.100	0.201	100.0	0.042	0.00	0.0	0.600	o	225
S1.005	7.300	0.073	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)	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)
S1.000	50.00	4.15	22.000	0.019	0.0	0.0	0.0	1.00	17.8	2.6
S1.001	50.00	4.21	21.907	0.026	0.0	0.0	0.0	1.00	17.8	3.5
S1.002	50.00	4.37	21.874	0.046	0.0	0.0	0.0	1.00	17.8	6.2
S1.003	50.00	4.46	21.776	0.058	0.0	0.0	0.0	1.00	17.8	7.9
S1.004	50.00	4.72	21.646	0.100	0.0	0.0	0.0	1.31	52.0	13.5
S1.005	50.00	4.81	21.445	0.100	0.0	0.0	0.0	1.31	52.0	13.5

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	1
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	1	0%					
S1.001	15 Winter	1	0%					
S1.002	15 Winter	1	0%					
S1.003	15 Winter	1	0%					
S1.004	15 Winter	1	0%					
S1.005	15 Winter	1	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.044	-0.106	0.000	0.19	0.0	3.0	OK
S1.001	S2	21.967	-0.090	0.000	0.34	0.0	3.9	OK
S1.002	S3	21.941	-0.083	0.000	0.40	0.0	6.4	OK
S1.003	S4	21.855	-0.071	0.000	0.54	0.0	7.9	OK
S1.004	S5	21.727	-0.144	0.000	0.28	0.0	13.1	OK
S1.005	S6	21.536	-0.134	0.000	0.34	0.0	13.1	OK

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Micro Drainage	Network W.12.6.1	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	30	0%					
S1.001	15 Winter	30	0%	30/15 Winter				
S1.002	15 Winter	30	0%	30/15 Winter				
S1.003	15 Winter	30	0%	30/15 Winter				
S1.004	15 Winter	30	0%					
S1.005	15 Winter	30	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.117	-0.033	0.000	0.43	0.0	6.8	OK
S1.001	S2	22.093	0.036	0.000	0.81	0.0	9.3	SURCHARGED
S1.002	S3	22.078	0.054	0.000	1.02	0.0	16.2	SURCHARGED
S1.003	S4	21.973	0.047	0.000	1.39	0.0	20.4	SURCHARGED
S1.004	S5	21.796	-0.075	0.000	0.76	0.0	35.7	OK
S1.005	S6	21.619	-0.051	0.000	0.94	0.0	35.6	OK

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The Charles Parker Building Midland Road Northants NN10 8DN	Parker Street 11-0188 Main site Proposed	
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Micro Drainage	Network W.12.6.1	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	100
Climate Change (%)	30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	+30%	100/15 Winter				
S1.001	15 Winter	100	+30%	100/15 Winter				
S1.002	15 Winter	100	+30%	100/15 Winter				
S1.003	15 Winter	100	+30%	100/15 Winter				
S1.004	15 Winter	100	+30%	100/15 Winter				
S1.005	15 Winter	100	+30%	100/15 Winter				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.560	0.410	0.000	0.63	0.0	9.9	SURCHARGED
S1.001	S2	22.521	0.464	0.000	1.24	0.0	14.1	SURCHARGED
S1.002	S3	22.473	0.449	0.000	1.54	0.0	24.3	SURCHARGED
S1.003	S4	22.240	0.314	0.000	2.11	0.0	30.9	SURCHARGED
S1.004	S5	22.013	0.142	0.000	1.15	0.0	54.2	SURCHARGED
S1.005	S6	21.733	0.063	0.000	1.42	0.0	54.2	SURCHARGED

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The Charles Parker Building Midland Road Northants NN10 8DN	Parker Street 11-0188 Main site Proposed	
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Micro Drainage	Network W.12.6.1	

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.099	4-8	0.015

Total Area Contributing (ha) = 0.114

Total Pipe Volume (m³) = 1.582

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Storm Duration (mins)	360
Ratio R	0.437		

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PN	Discharge Volume (m³)	PN	Discharge Volume (m³)	PN	Discharge Volume (m³)
S1.000	9.883	S1.002	31.214	S1.004	59.312
S1.001	13.527	S1.003	37.463	S1.005	59.316

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Micro Drainage	Network W.12.6.1	

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)	1	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.600	Minimum Backdrop Height (m)	0.200
Ratio R	0.437	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

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)
S1.000	6.500	0.081	80.2	0.009	4.00	0.0	0.600	o	100
S1.001	7.500	0.094	79.8	0.011	0.00	0.0	0.600	o	100
S1.002	12.600	0.158	79.7	0.018	0.00	0.0	0.600	o	100

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)
S1.000	50.00	4.13	22.500	0.009	0.0	0.0	0.0	0.86	6.8	1.2
S1.001	50.00	4.27	22.419	0.020	0.0	0.0	0.0	0.86	6.8	2.7
S1.002	50.00	4.51	22.325	0.038	0.0	0.0	0.0	0.86	6.8	5.1

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	1
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	1	0%					
S1.001	15 Winter	1	0%					
S1.002	15 Winter	1	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.533	-0.067	0.000	0.24	0.0	1.4	OK
S1.001	S2	22.466	-0.053	0.000	0.45	0.0	2.8	OK
S1.002	S3	22.393	-0.032	0.000	0.79	0.0	5.1	OK

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Micro Drainage	Network W.12.6.1	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	30	0%	30/15 Winter				
S1.001	15 Winter	30	0%	30/15 Winter				
S1.002	15 Winter	30	0%	30/15 Winter				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.818	0.218	0.000	0.45	0.0	2.7	SURCHARGED
S1.001	S2	22.801	0.282	0.000	0.95	0.0	5.8	SURCHARGED
S1.002	S3	22.725	0.300	0.000	1.69	0.0	10.8	SURCHARGED

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Micro Drainage	Network W.12.6.1	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Winter
Duration(s) (mins) 15, 30, 60, 120, 180
Return Period(s) (years) 100
Climate Change (%) 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	+30%	100/15 Winter				
S1.001	15 Winter	100	+30%	100/15 Winter				
S1.002	15 Winter	100	+30%	100/15 Winter				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	23.401	0.801	0.000	0.65	0.0	4.0	FLOOD RISK
S1.001	S2	23.370	0.851	0.000	1.37	0.0	8.5	FLOOD RISK
S1.002	S3	23.227	0.802	0.000	2.45	0.0	15.7	FLOOD RISK

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Micro Drainage	Network W.12.6.1	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Storm Duration (mins)	360
Ratio R	0.437		

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PN	Discharge Volume (m³)	PN	Discharge Volume (m³)	PN	Discharge Volume (m³)
S1.000	4.682	S1.001	10.408	S1.002	19.779

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Micro Drainage	Network W.12.6.1	

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)	1	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.600	Minimum Backdrop Height (m)	0.200
Ratio R	0.437	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

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)
S1.000	6.500	0.081	80.2	0.000	4.00	0.0	0.600	o	100
S1.001	7.500	0.144	52.1	0.000	0.00	0.0	0.600	o	100
S2.000	17.700	0.177	100.0	0.049	4.00	0.0	0.600	o	300
S2.001	5.600	0.248	22.6	0.000	0.00	0.0	0.600	o	100
S1.002	12.600	0.158	79.7	0.000	0.00	0.0	0.600	o	100

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)
S1.000	50.00	4.13	22.500	0.000	0.0	0.0	0.0	0.86	6.8	0.0
S1.001	50.00	4.24	22.419	0.000	0.0	0.0	0.0	1.07	8.4	0.0
S2.000	50.00	4.19	22.700	0.049	0.0	0.0	0.0	1.57	111.1	6.6
S2.001	50.00	4.24	22.523	0.049	0.0	0.0	0.0	1.63	12.8	6.6
S1.002	50.00	4.49	22.275	0.049	0.0	0.0	0.0	0.86	6.8	6.6

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	1
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	120 Winter	1	0%					
S1.001	120 Winter	1	0%					
S2.000	15 Winter	1	0%					
S2.001	30 Winter	1	0%	1/15 Winter				
S1.002	30 Winter	1	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.500	-0.100	0.000	0.00	0.0	0.0	OK
S1.001	S2	22.419	-0.100	0.000	0.00	0.0	0.0	OK
S2.000	S3	22.757	-0.243	0.000	0.08	0.0	7.8	OK
S2.001	S4	22.658	0.035	0.000	0.22	0.0	2.5	SURCHARGED
S1.002	S3	22.318	-0.057	0.000	0.39	0.0	2.5	OK

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The Charles Parker Building Midland Road Northants NN10 8DN	Parker Street 11-0188 Workshop site Proposed	
Date 26/10/2012 18:15 File Workshop site proposed.mdx	Designed by SDP Checked by	
Micro Drainage	Network W.12.6.1	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	120 Winter	30	0%					
S1.001	120 Winter	30	0%					
S2.000	30 Winter	30	0%					
S2.001	30 Winter	30	0%	30/15 Winter				
S1.002	30 Winter	30	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.500	-0.100	0.000	0.00	0.0	0.0	OK
S1.001	S2	22.419	-0.100	0.000	0.00	0.0	0.0	OK
S2.000	S3	22.888	-0.112	0.000	0.14	0.0	13.6	OK
S2.001	S4	22.885	0.262	0.000	0.29	0.0	3.3	SURCHARGED
S1.002	S3	22.326	-0.049	0.000	0.52	0.0	3.3	OK

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The Charles Parker Building Midland Road Northants NN10 8DN	Parker Street 11-0188 Workshop site Proposed	
Date 26/10/2012 18:12 File Workshop site proposed.mdx	Designed by SDP Checked by	
Micro Drainage	Network W.12.6.1	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180
Return Period(s) (years)	100
Climate Change (%)	30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	120 Winter	100	+30%					
S1.001	30 Winter	100	+30%					
S2.000	30 Winter	100	+30%	100/15 Winter				
S2.001	30 Winter	100	+30%	100/15 Winter				
S1.002	30 Winter	100	+30%	100/30 Winter				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	22.500	-0.100	0.000	0.00	0.0	0.0	OK
S1.001	S2	22.434	-0.085	0.000	0.01	0.0	0.1	OK
S2.000	S3	23.464	0.464	0.000	0.23	0.0	21.9	FLOOD RISK
S2.001	S4	23.455	0.832	0.000	0.70	0.0	8.0	FLOOD RISK
S1.002	S3	22.447	0.072	0.000	1.22	0.0	7.8	SURCHARGED

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The Charles Parker Building Midland Road Northants NN10 8DN	Parker Street 11-0188 Workshop site Proposed	Micro Drainage
Date 26/10/2012 18:17 File Workshop site proposed.mdx	Designed by SDP Checked by	
Micro Drainage	Network W.12.6.1	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Storm Duration (mins)	360
Ratio R	0.437		

User Report X:\11-0\3\5\7\Design Docs (deliverables)\Calculations\Discharge volume.spdx for Storm

PN	Discharge Volume (m³)	PN	Discharge Volume (m³)	PN	Discharge Volume (m³)
S1.000	0.000	S2.000	25.486	S1.002	25.315
S1.001	0.000	S2.001	25.356		

APPENDIX F
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