One Central Park
Northampton Road
Manchester

Proposed Commercial Re-Development

Flood Risk and Surface Water Drainage Assessment.

For: Manchester City Council

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Civil Structural Highways Geotechnical Environmental

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1. INTRODUCTION

1.1 Integra Consulting has been commissioned by Manchester City Council to undertake a Flood Risk and Surface Water Drainage Assessment (FRA) for the One Central Park site off Northampton Road, Manchester. This document has been prepared to accompany the planning application for the proposed commercial re-development of the application site.

1.2 The objective of the FRA is to identify potential flooding issues and any consequent implications on the proposed site re-development. Both existing and proposed surface water drainage for the re-development site are considered.

1.3 The FRA has been undertaken in accordance with the pro-forma guidance contained in:

- Department for Communities and Local Government document 'National Planning Practice Guidance: Flood Risk and Coastal Change'
- Manchester City, Salford City and Trafford Councils Levels 1 & 2 Hybrid Strategic Flood Risk Assessment by JBA Consulting March 2010 & March 2011
- Manchester City Council Local Flood Risk Management Strategy
- DEFRA / Environment Agency publication SR744 Preliminary Rainfall Runoff Management for Developments revision E dated January 2012.

1.3 To date, consultations and have been undertaken with the Environment Agency (EA) and MCC FRM Team.

2. STANDARDS AND LIMITATIONS

This report has been prepared solely for use by Manchester City Council. It shall not be relied upon or transferred to any other party without the prior written authorisation of Integra Consulting.

The findings and opinions in the report are based on information derived from a variety of different sources. Integra Consulting do not accept any liability for the accuracy or otherwise of any information provided by third parties.

It should be noted that some of the aspects considered in this study may be subject to change with time. Therefore, if the development is delayed or postponed, consideration may need to be given to reviewing such issues to confirm that no changes have taken place, either at the site or within relevant legislation.

Further consultations with statutory bodies are likely as the scheme progresses. It should be noted that even where responses have been received from Regulators, these could be subject to change at a later date.

3. CURRENT SITUATION

3.1 Site Location and Description

The approx. 1.6 hectare site is located off Northampton Road, Manchester as shown on the site location plan in Appendix 1.

The site is bordered by Northampton Road to the south, Monsall Road to the west, a private road to the east and open land to the north. Vehicular access to the site is currently off Northampton Road.

The site is predominantly level – the existing site building is located on the western side of the site with a surface car park in the east and north, and landscaping to the south. The existing site plan can be found in Appendix 2.

The proposal is essentially to provide a roof over the currently open central courtyard within the overall building envelope. This is evidently a minor change to the building and will have no effect on surface water drainage run off from the site.

3.2 Hydrology and Flooding

Current Environment Agency flood data indicates the site to lie in Flood Zone 1 with less than 1 in 1000 annual probability of flooding (refer to Appendix 3).

A survey of the existing underground drainage infrastructure serving the existing building and associated surface car park has been undertaken and these areas are confirmed to be positively drained.

A microdrainage simulation has been carried out for the existing drainage system (Appendix 7) which confirms that during an enhanced 1 in 100 year event, localised flooding occurs within the eastern side of the car park (<20m3). This is anticipated to be contained above ground within the eastern side of the car park.

Surface runoff currently discharges to the adopted United Utilities surface water sewer beneath Northampton Road (refer to Appendices 4 and 6).

There is no change to the area of drained hardstanding / building roof in the post-development situation.

4. PROPOSED DEVELOPMENT

4.1 Development Proposals

It is proposed to undertake a commercial refurbishment of the existing building at the application site (refer to Appendix 5).

The proposal is to provide a roof over the currently open central courtyard within the overall building envelope. This is evidently a minor change to the building and will have no effect on surface water drained area or associated run off from the site.

A proposed microdrainage simulation has been carried out (Appendix 8) including for any courtyard drainage removed, and any new drainage introduced – this confirms that there is no increase in any on or off site flooding under a 1 in 100 year enhanced (30% climate change) rainfall event.

Access for emergency vehicles in the post development situation would be via the western site entrance off Northampton Road.

4.2 Surface Water Drainage

The issue of surface water drainage to the proposed development has been considered with reference to the hierarchy of surface water disposal as noted in the Building Regulations H3:

i) Sustainable Urban Drainage Systems (SUDS)
ii) Discharge of surface water off site direct to watercourse
iii) Discharge to adopted sewer

SUDS are made up of one or more structures built to manage surface water runoff. They are used in conjunction with good management of the site to prevent flooding and pollution. There are four general methods of control:

- Filter strips and swales
- Filter drains and permeable surfaces
- Infiltration devices
- Basins and Ponds

From the site investigation undertaken, soakaways and permeable surfaces are deemed unsuitable geotechnically due to the presence of underlying low permability glacial till deposits.

The site is an island site with no option to discharge to watercourse.

On the basis of the minor change to the building form which has no impact on the positively drained area of the site or the associated run off and flood volumes in the post-development situation, the proposal is to retain the existing surface water arrangement as existing, with the exception of the amendments to the courtyard drainage whereby existing drainage is grubbed up, and a 300mm dia pipe is included to convey the new roof drainage.

4.3 National Planning Practice Guidance

The commercial development proposals are classed as 'less vulnerable' in Table 2 of the Flood Risk and Coastal Change guidance. 'Less vulnerable' development in Flood Zone 1 is naturally classed as appropriate according to Table 3 of the Flood Risk and Coastal Change guidance.

Proposed post development levels will be engineered in order to protect the development and not provide any increased flood risk elsewhere.

Types of flooding that could affect the site are:

River- the site is in Flood Zone 1
Sea – there is no risk of flooding from the sea
Land – there are no undrained land slopes towards the site
Groundwater – there are no springs or weep areas on the site
Sewers – there have been no local reports of sewer surcharge

4.4 Strategic Flood Risk Assessment & EA Mapping Review

From our review of the Manchester City, Salford City and Trafford Councils Levels 1 & 2 Hybrid Strategic Flood Risk Assessment by JBA Consulting March 2010 & March 2011, the site lies within a Critical Drainage Area.

There are no groundwater protection zones in the vicinity of the site and there is negligible residual fluvial risk. The site is not noted to be within a flood warning area.

4.5 Safe Access and Egress

Safe access / egress from the site in extreme conditions will be via the entrances on Northampton Road and Monsall Road.

5. CONCLUSIONS

5.1 Flooding

Following review of the Environment Agency flood maps and data, it has been confirmed that the site lies wholly within Flood Zone 1.

Simulation calculations demonstrate that the proposed development does not increase flood risk both on or off site with the introduction of the new roof structure and associated internal courtyard drainage (refer to simulation calculations in Appendix 7 & 8).

5.2 Site Surface Water Drainage

It is proposed to discharge post development surface water run-off to the existing adopted UU surface water sewer in Northampton Road (refer to Appendix 6) via the existing site drainage system.

5.3 Flood Risk Management Measures

There will be a site management Health and Safety document prepared in respect of the site.

5.4 Off Site Impacts

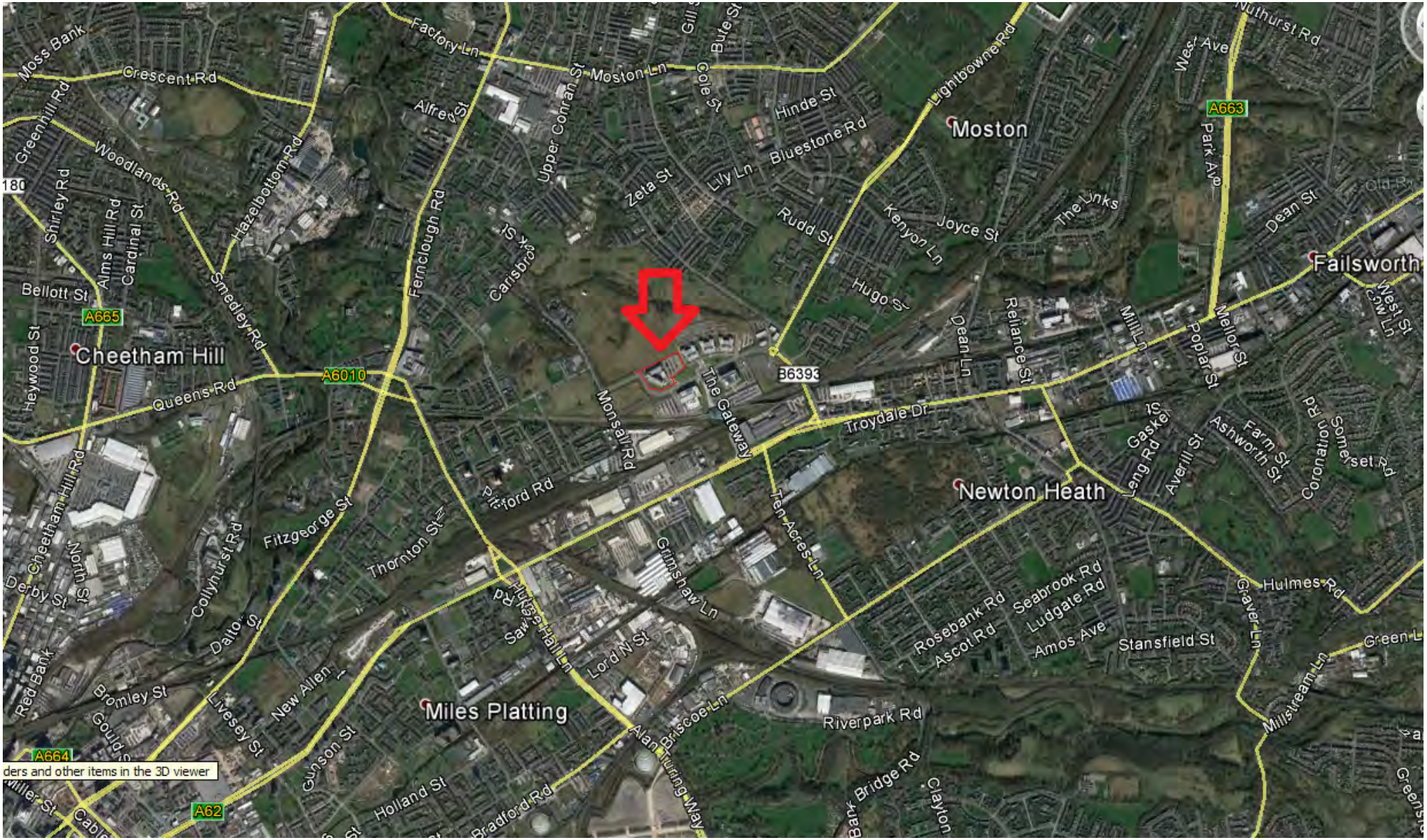
All roofed and paved areas are to be formally drained into the onsite surface water drainage system as per the current arrangement. The design of the on-site surface water system is to remain as existing.

5.5 Residual Risk

Existing site topography is such that a safe emergency access can be maintained at all times post development during an extreme flood event. Emergency access will be from the west entrance on Northampton Road.

APPENDIX 1

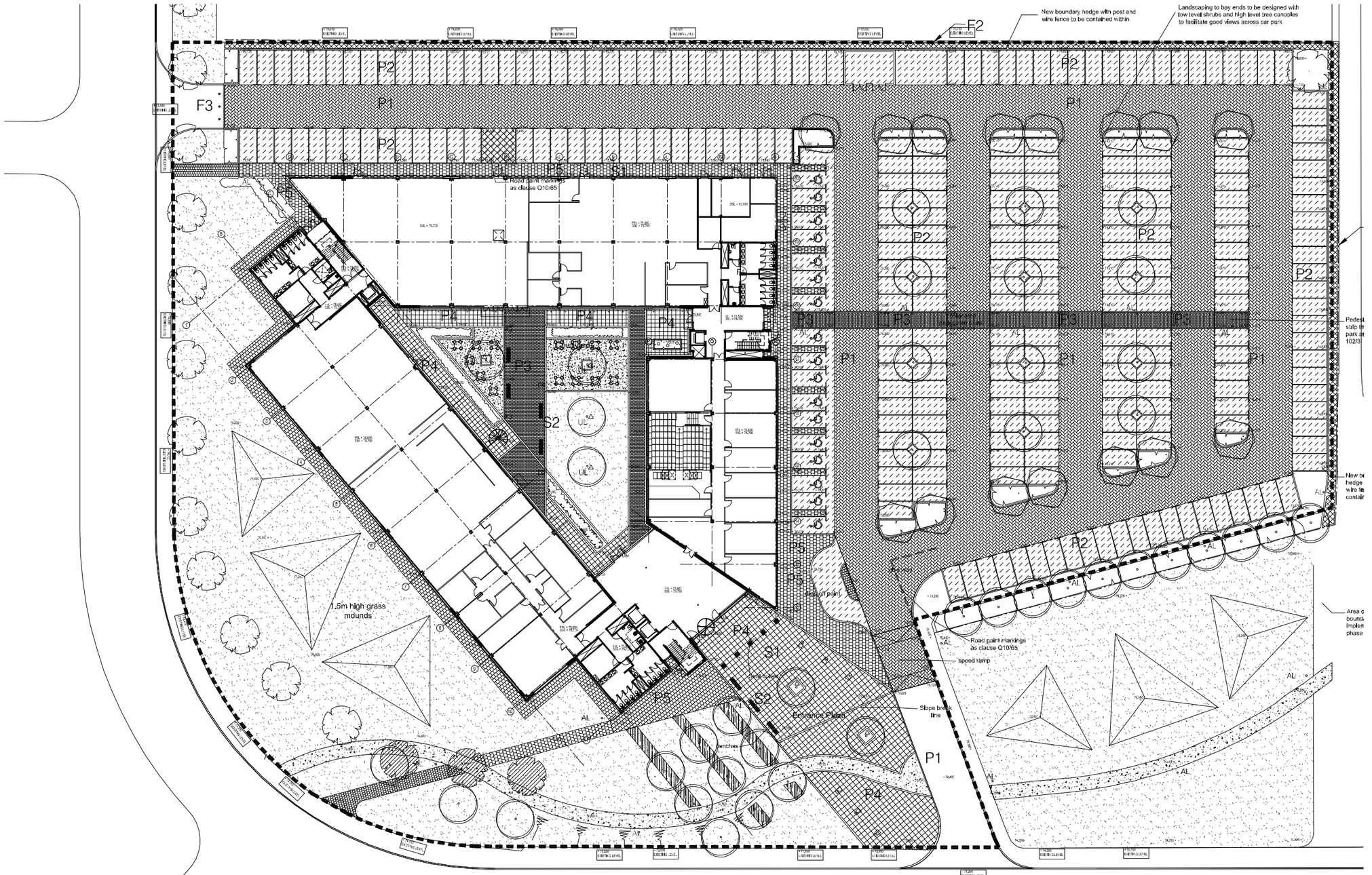
SITE LOCATION PLAN


Moss Bank
Crescent Rd
Factory Ln
Moston Ln
Bute St
Cole St
Hinde St
Bluestone Rd
Lightbowne Rd
Moston
West Ave
Wuthurst Rd
A663
Park Ave
Dean St
Failsworth
Greenhill Rd
Woodlands Rd
Hazelbottom Rd
Alfrey St
Upper Conran St
Zeta St
Lily Ln
Rudd St
Kenyon Ln
Joyce St
The Links
Shirley Rd
Alms Hill Rd
Cardinal St
Carisbrook St
Ferniough Rd
Hugo St
Bellott St
A665
Cheetham Hill
Smedley Rd
Heywood St
A6010
Queens Rd
Monsall Rd
The Gateway
B6393
Dean Ln
Reliance St
Mill Ln
Poplar St
Mellor St
West St
Troydale Dr
Gaskell St
Leng Rd
Averill St
Farm St
Ashworth St
Coronation Rd
Somerset Rd
Newton Heath
Cheetham Hill Rd
North St
Derby St
Collyhurst Rd
Fitzgeorge St
Thornton St
Pilsford Rd
Ten Acres Ln
Grimshaw Ln
Hulme Hall Rd
Lord N St
Rosebank Rd
Ascot Rd
Seabrook Rd
Ludgate Rd
Amos Ave
Stansfield St
Hulmes Rd
Graver Ln
Millstream Ln
Green L
Red Bank
Bromley St
Gould St
Livesey St
New Allen
Miles Platting
Riverpark Rd
Alan Turing Way
Briscoe Ln
A664
A62
Gunson St
Holland St
Bradford Rd
Bank Bridge Rd
Clayton
ders and other items in the 3D viewer


Northampton Rd
The Gateway

APPENDIX 2

EXISTING SITE PLAN



KEY AND NOTES

LINE DENOTES SITE DEVISE BOUNDARY

PROPOSED SITE LEVELS ASSUME SITE AVERAGE CBR RATING OF 4%

THESE ARE TO CONFIRMED IN CONSULTATION WITH CBR SITE INVESTIGATION DATED 20.12.29

IN THE ABSENCE OF FINAL VALIDATION REPORTS ON THE SITE REMEDIATION IT IS ASSUMED SITE LEVELS CAN BE SCULPTED THROUGH A CUT AND FILL STRATEGY

0 1 2 5 10 20

SCALE (in metres)

No	Description	Date	Ch	Ap'd
A	PRE-TENDER ISSUE	19.12.03	CG	GG

Drawn	Date	Ch'd
CG	17.12.03	GG

Aedas

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CLIENT
ASK:AKELER DEVELOPMENTS
MSEC / MANCAT

PROJECT
ONE CENTRAL PARK
CENTRAL PARK

TITLE
SITE PLAN
GENERAL ARRANGEMENT

DRAWING TITLE: SITE PLAN	ISSUE DATE: 19.12.03
PROJECT No: 2001_0546.01	SCALE: 1:200
DRAWING No: AL(2-)P100	REV: A / REVISION: PRE-TENDER

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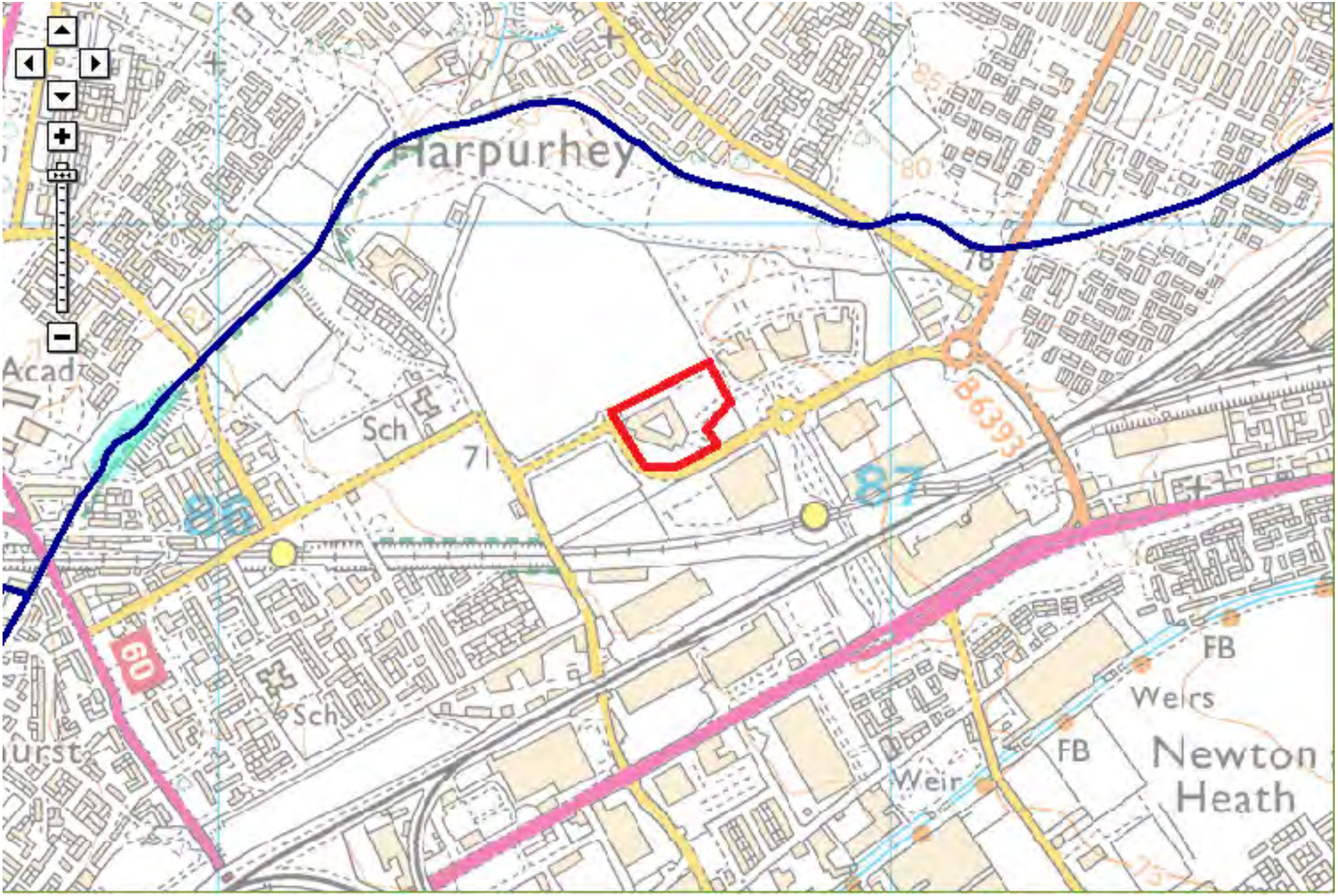
APPENDIX 3

ENVIRONMENT AGENCY FLOOD MAPPING


Harpurhey
Acad
Sch
71
B6393
87
60
Sch
FB
Weirs
FB
Newton
Heath
Weir

APPENDIX 4

UNITED UTILITIES SEWER PLAN

APPENDIX 5

EXISTING & PROPOSED BUILDING LAYOUTS

The contractor is responsible for checking dimensions, tolerances and references. Any discrepancy to be verified with the Architect before proceeding with the works. Where an item is covered by drawings to different scales the larger scale drawing is to be worked to.

Do not scale drawing. Figured dimensions to be worked to in all cases.

CDM REGULATIONS 2015. All current drawings and specifications for the project must be read in conjunction with the Designer's Hazard and Environment Assessment Record

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General Note

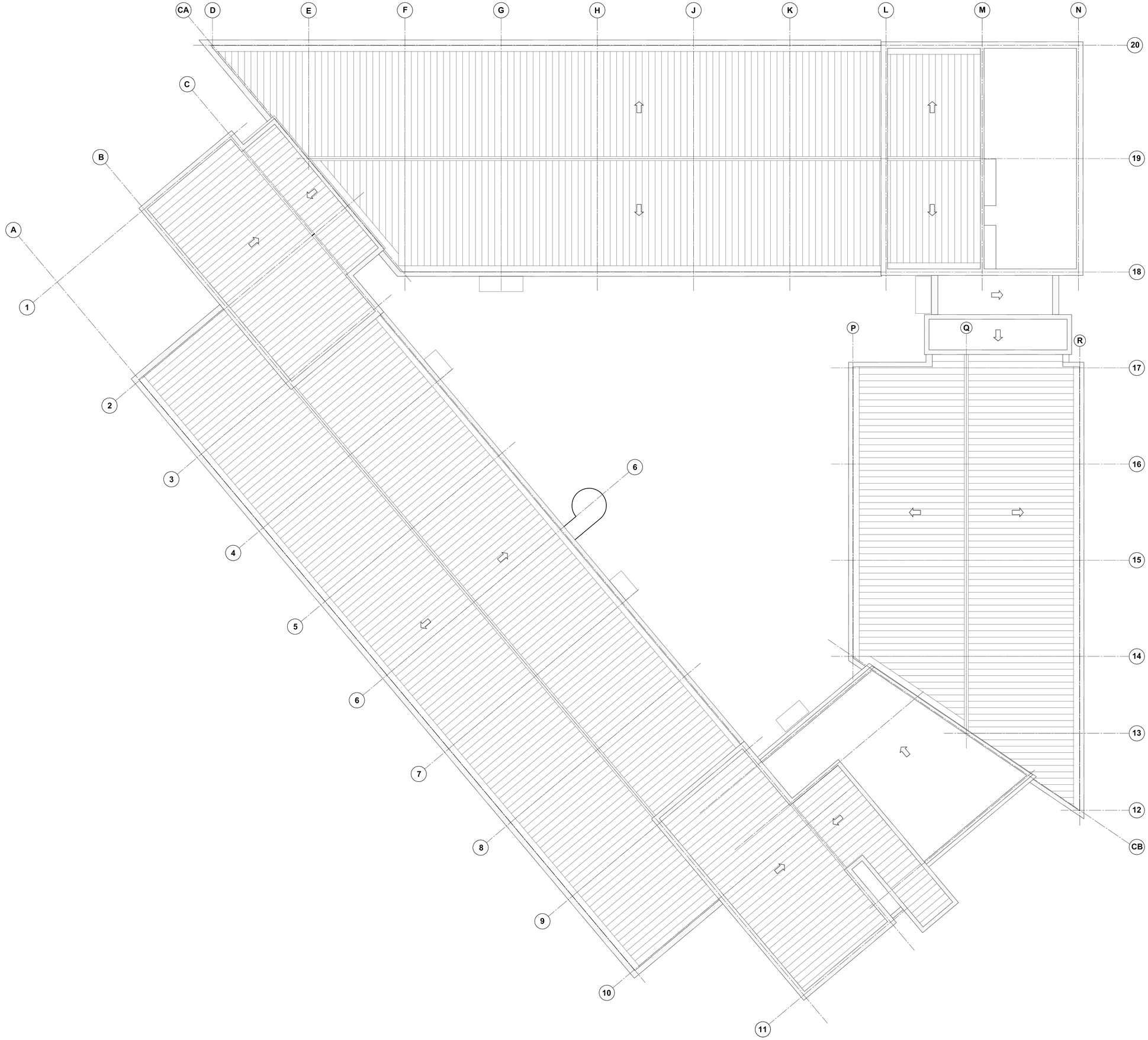
THIS DRAWING HAS BEEN COMPILED USING THE ORIGINAL ARCHITECT'S (AEDAS) AS BUILT DRAWINGS.

BLOCK B

BLOCK C

BLOCK A

BLOCK LOCATION PLAN



Rev Date Description Dwn Ckd

1 CENTRAL PARK (OCP) MCC

EXISTING PLAN
GA ROOF PLAN

AA6525 4005 **-**

STAGE 3+

Drawn SC Checked JH Date 17.05.2017 Scale @ A0 1:100

PRP
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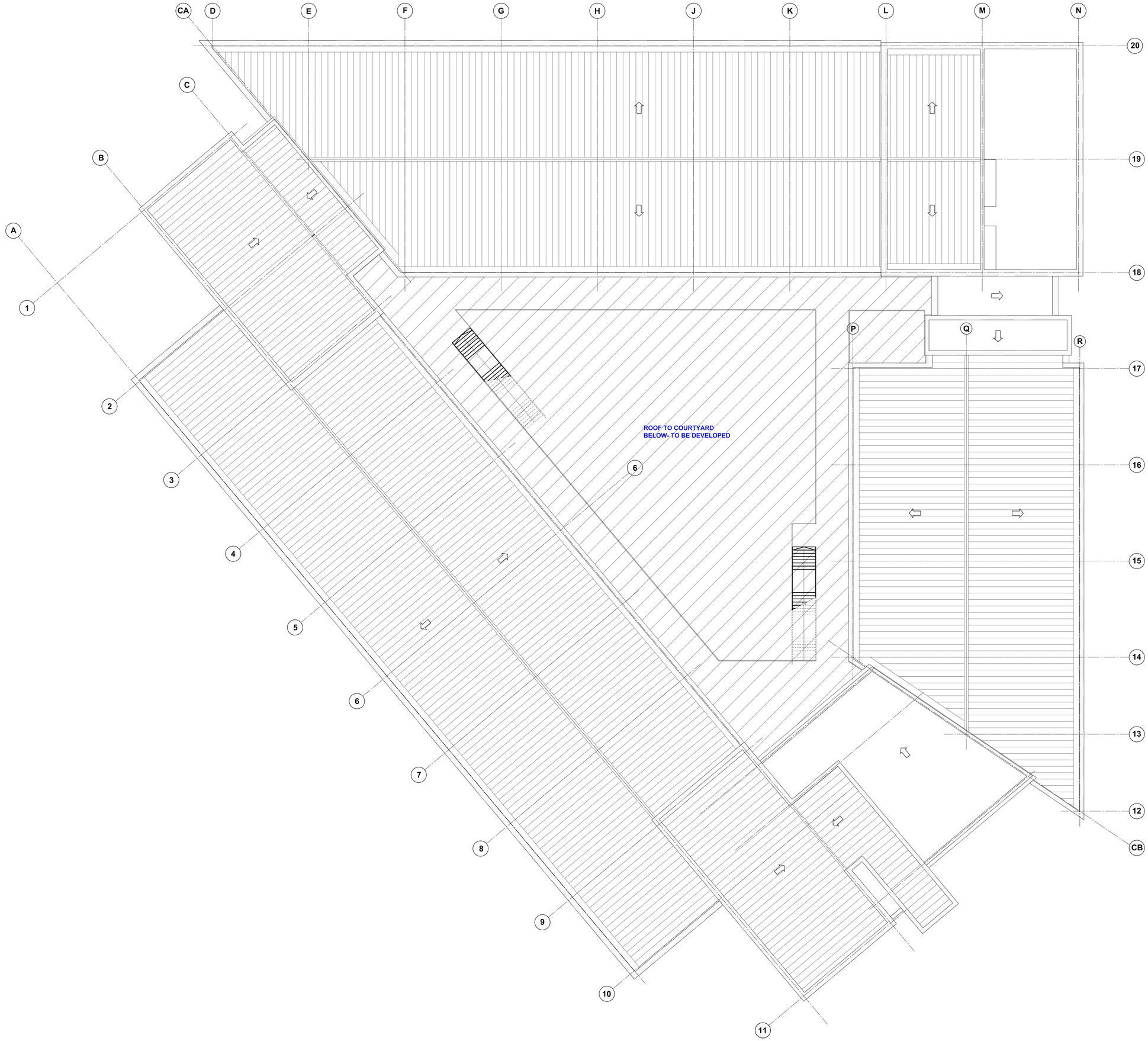
Manchester
0161 242 8950



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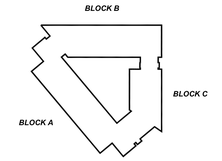

BLOCK LOCATION PLAN

Rev	Date	Description	Dwn	Ckd

1 CENTRAL PARK (OCP) MCC

PROPOSED PLAN
GA ROOF PLAN

AA6525 4025 **-**

STAGE 3+

Drawn SC Checked JH Date 24.05.2017 Scale @ A0 1:100

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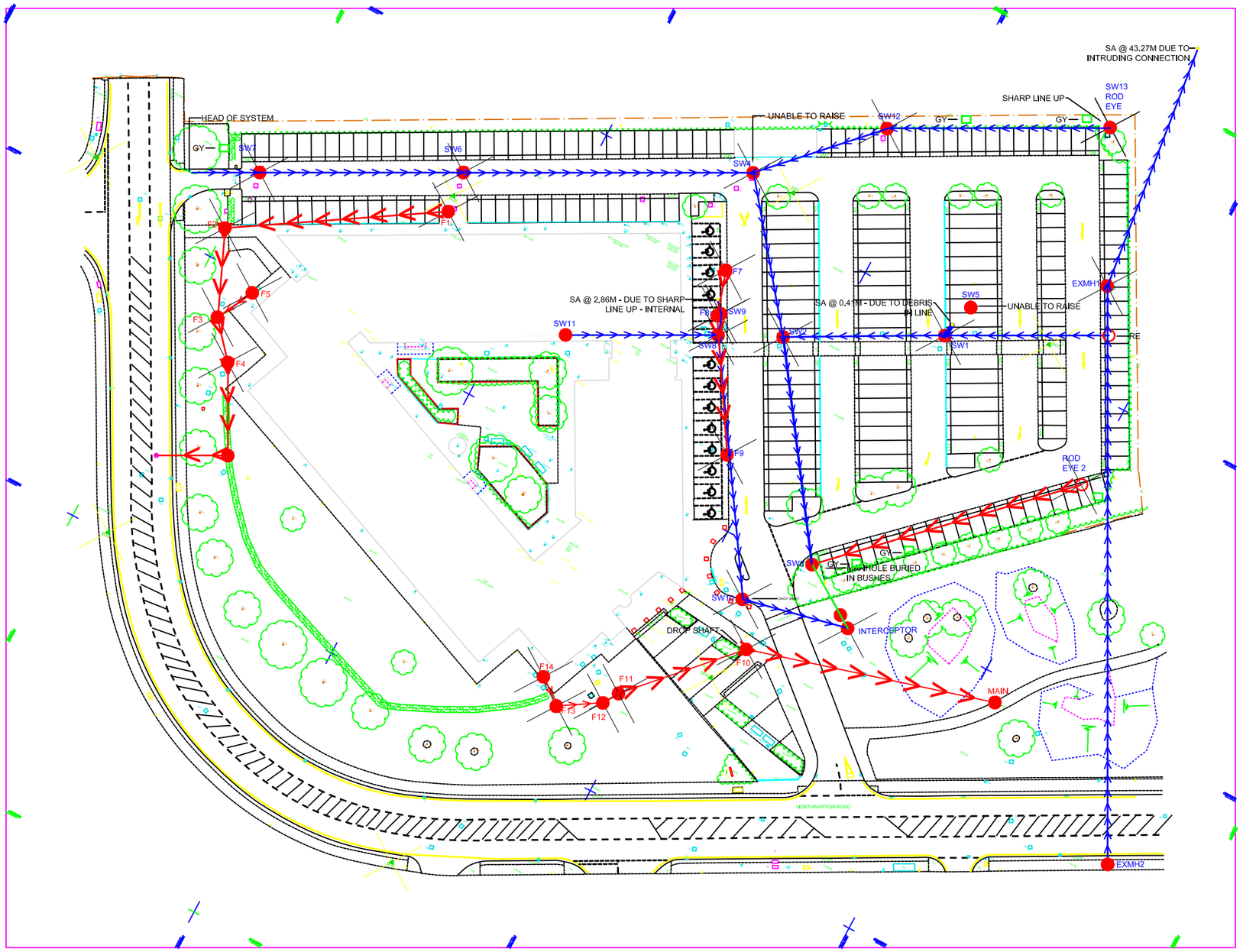
Manchester
0161 242 8950

APPENDIX 6

EXISTING BELOW GROUND DRAINAGE



MANHOLE

GULLY

CONNECTOR NODE

SURVEYED ABANDONED

GRADE 4 DEFECTS

GRADE 5 DEFECTS

SURFACE LINES

FOUL LINES

UN-SURVEYED LINES

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CLIENT NAME: INTEGRA

DRG. TITLE ONE CENTRAL PARK MANCHESTER

DRAWN LS	DATE - 05/07/17	SHEET 1 of 1	
CHECKED BY AP	SCALE 1:XXX @ A3		REV. X
DRG NO 01			

APPENDIX 7
EXISTING MICRODRAINAGE SIMULATION

One Central Park 3010 18.07.17 EXISTING DRAINAGE

Pipe No.	Pipe L [m]	Fall [m]	Area [m2]	US/IL [m]	US/CL [m]	DS/IL [m]	Dia [mm]	MH US dia [m]	E	N	Gradient
1.000	11.810	0.740	33	74.640	75.090	73.900	100	0.15			16
1.001	34.743	0.350	-	73.900	75.900	73.550	150	1.50			99
1.002	49.859	0.250	1337	73.550	75.870	73.300	300	1.50			199
2.000	38.283	0.380	415	73.910	75.350	73.530	150	1.50			101
2.001	23.490	0.230	188	73.530	75.430	73.300	150	1.50			102
1.003	28.952	0.150	-	73.300	75.570	73.150	300	1.50			193
3.000	29.843	0.350	982	73.800	75.150	73.450	150	1.20			85
3.001	27.411	0.300	2918	73.450	75.320	73.150	225	1.50			91
1.004	38.169	0.160	-	73.150	75.480	72.990	375	1.50			239
4.000	52.573	0.980	704	73.970	75.320	72.990	150	1.50			54
1.005	14.067	0.060	-	72.990	75.280	72.930	375	1.50			234
1.006	6.381	0.030	-	72.930	75.420	72.900	375	1.50			213
5.000	14.609	0.420	399	74.800	75.840	74.380	150	1.20			35
5.001	13.800	0.200	113	74.380	75.840	74.180	150	1.50			69
5.002	26.741	0.270	123	74.180	75.850	73.910	150	1.50			99
6.000	3.415	0.140	1675	74.050	75.710	73.910	225	1.50			24
5.003	45.448	0.630	-	73.910	75.740	73.280	225	1.50			72
7.000	25.877	0.310	1602	73.590	75.750	73.280	300	1.50			83
5.004	23.852	0.380	80	73.280	75.630	72.900	400	1.50			63
8.000	14.698	0.360	842	73.260	75.000	72.900	225	1.50			41
1.007	31.244	0.130	-	72.900	75.260	72.770	450	1.50			240
1.008	19.445	0.080	-	72.770	75.240	72.690	450	1.50			243
Outfall					74.080						

M5-60	18.000	mm
R	0.360	

Total Catchment Area: 11411 m2

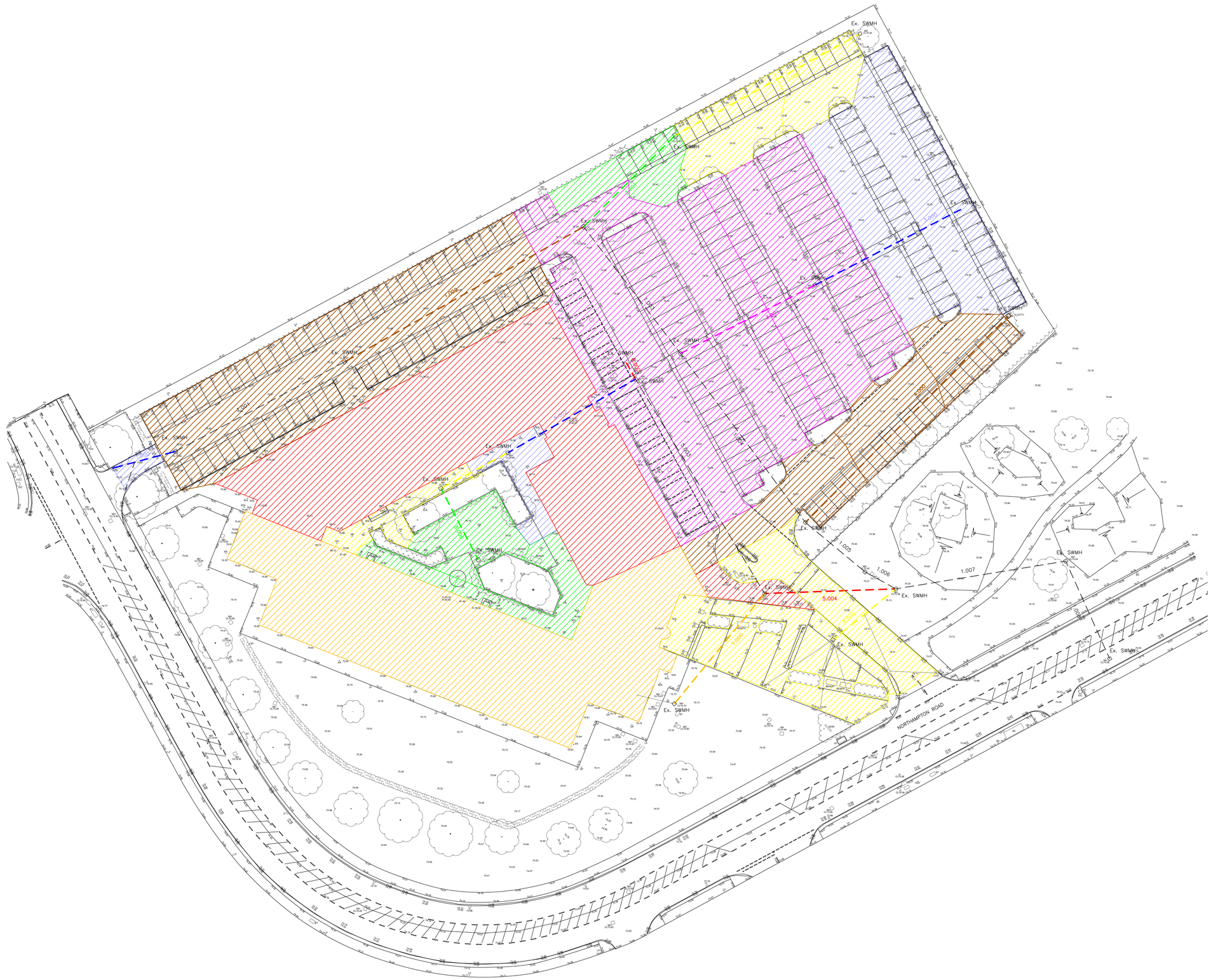
Notes.

1 All dimensions are in millimetres unless noted otherwise.

2 All levels are in metres unless noted otherwise.

3 This drawing is to be read in conjunction with all relevant Architects and Service Engineers drawings.

N



Existing Drainage Catchment Plan
Scale 1:250

0 5m 10m 15m 20m 25m
Scale 1:250

Rev	Drawn	Date	Description

Drawing Status
INFORMATION

Contract
ONE CENTRAL PARK
MANCHESTER CITY COUNCIL

Drawing Title
EXISTING DRAINAGE SURFACE WATER CATCHMENT AREA PLAN

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Scales	1:250 @ A0	Date	07/17
Drawn	JS	Checked	RH
Contract No	3010	Drawing No	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	Add Flow / Climate Change (%)	0
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.360	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.563	4-8	0.578	8-12	0.000

Total Area Contributing (ha) = 1.141

Total Pipe Volume (m³) = 32.779

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	11.810	0.740	16.0	0.003	5.00	0.0	0.600	o	100
1.001	34.743	0.350	99.3	0.000	0.00	0.0	0.600	o	150
1.002	49.859	0.250	199.4	0.134	0.00	0.0	0.600	o	300
2.000	38.283	0.380	100.7	0.042	5.00	0.0	0.600	o	150
2.001	23.490	0.230	102.1	0.019	0.00	0.0	0.600	o	150

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.10	74.640	0.003	0.0	0.0	0.0	1.94	15.3	0.4
1.001	50.00	5.68	73.900	0.003	0.0	0.0	0.0	1.01	17.8	0.4
1.002	50.00	6.42	73.550	0.137	0.0	0.0	0.0	1.11	78.4	18.6
2.000	50.00	5.64	73.910	0.042	0.0	0.0	0.0	1.00	17.7	5.7
2.001	50.00	6.03	73.530	0.061	0.0	0.0	0.0	0.99	17.6	8.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.003	28.952	0.150	193.0	0.000	0.00	0.0	0.600	o	300
3.000	29.843	0.350	85.3	0.098	5.00	0.0	0.600	o	150
3.001	27.411	0.300	91.4	0.292	0.00	0.0	0.600	o	225
1.004	38.169	0.160	238.6	0.000	0.00	0.0	0.600	o	375
4.000	52.573	0.980	53.6	0.070	5.00	0.0	0.600	o	150
1.005	14.067	0.060	234.5	0.000	0.00	0.0	0.600	o	375
1.006	6.381	0.030	212.7	0.000	0.00	0.0	0.600	o	375
5.000	14.609	0.420	34.8	0.040	5.00	0.0	0.600	o	150
5.001	13.800	0.200	69.0	0.011	0.00	0.0	0.600	o	150
5.002	26.741	0.270	99.0	0.012	0.00	0.0	0.600	o	150
6.000	3.415	0.140	24.4	0.168	5.00	0.0	0.600	o	225
5.003	45.448	0.630	72.1	0.000	0.00	0.0	0.600	o	225
7.000	25.877	0.310	83.5	0.160	5.00	0.0	0.600	o	300

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	6.85	73.300	0.198	0.0	0.0	0.0	1.13	79.7	26.8
3.000	50.00	5.46	73.800	0.098	0.0	0.0	0.0	1.09	19.2	13.3
3.001	50.00	5.79	73.450	0.390	0.0	0.0	0.0	1.37	54.4	52.8
1.004	50.00	7.40	73.150	0.588	0.0	0.0	0.0	1.17	129.1	79.6
4.000	50.00	5.64	73.970	0.070	0.0	0.0	0.0	1.38	24.3	9.5
1.005	50.00	7.60	72.990	0.658	0.0	0.0	0.0	1.18	130.2	89.1
1.006	50.00	7.68	72.930	0.658	0.0	0.0	0.0	1.24	136.8	89.1
5.000	50.00	5.14	74.800	0.040	0.0	0.0	0.0	1.71	30.3	5.4
5.001	50.00	5.33	74.380	0.051	0.0	0.0	0.0	1.21	21.4	6.9
5.002	50.00	5.77	74.180	0.063	0.0	0.0	0.0	1.01	17.8	8.5
6.000	50.00	5.02	74.050	0.168	0.0	0.0	0.0	2.66	105.8	22.7
5.003	50.00	6.26	73.910	0.231	0.0	0.0	0.0	1.54	61.3	31.3
7.000	50.00	5.25	73.590	0.160	0.0	0.0	0.0	1.72	121.7	21.7

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
5.004	23.852	0.380	62.8	0.008	0.00	0.0	0.600	o	400
8.000	14.693	0.360	40.8	0.084	5.00	0.0	0.600	o	225
1.007	31.244	0.130	240.3	0.000	0.00	0.0	0.600	o	450
1.008	19.445	0.080	243.1	0.000	0.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.004	50.00	6.43	73.280	0.399	0.0	0.0	0.0	2.39	299.8	54.0
8.000	50.00	5.12	73.260	0.084	0.0	0.0	0.0	2.05	81.7	11.4
1.007	50.00	8.08	72.900	1.141	0.0	0.0	0.0	1.31	207.9	154.5
1.008	50.00	8.33	72.770	1.141	0.0	0.0	0.0	1.30	206.7	154.5

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	75.090	0.450	Open Manhole	150	1.000	74.640	100				
2	75.900	2.000	Open Manhole	1500	1.001	73.900	150	1.000	73.900	100	
3	75.870	2.320	Open Manhole	1500	1.002	73.550	300	1.001	73.550	150	
4	75.350	1.440	Open Manhole	1500	2.000	73.910	150				
5	75.430	1.900	Open Manhole	1500	2.001	73.530	150	2.000	73.530	150	
6	75.570	2.270	Open Manhole	1500	1.003	73.300	300	1.002	73.300	300	
								2.001	73.300	150	
7	75.150	1.350	Open Manhole	1200	3.000	73.800	150				
8	75.320	1.870	Open Manhole	1500	3.001	73.450	225	3.000	73.450	150	
9	75.480	2.330	Open Manhole	1500	1.004	73.150	375	1.003	73.150	300	
								3.001	73.150	225	
10	75.320	1.350	Open Manhole	1500	4.000	73.970	150				
11	75.280	2.290	Open Manhole	1500	1.005	72.990	375	1.004	72.990	375	
								4.000	72.990	150	
12	75.420	2.490	Open Manhole	1500	1.006	72.930	375	1.005	72.930	375	
13	75.840	1.040	Open Manhole	1200	5.000	74.800	150				
14	75.840	1.460	Open Manhole	1500	5.001	74.380	150	5.000	74.380	150	
15	75.850	1.670	Open Manhole	1500	5.002	74.180	150	5.001	74.180	150	
16	75.710	1.660	Open Manhole	1500	6.000	74.050	225				
17	75.740	1.830	Open Manhole	1500	5.003	73.910	225	5.002	73.910	150	
								6.000	73.910	225	
18	75.750	2.160	Open Manhole	1500	7.000	73.590	300				
19	75.630	2.350	Open Manhole	1500	5.004	73.280	400	5.003	73.280	225	
								7.000	73.280	300	
20	75.000	1.740	Open Manhole	1500	8.000	73.260	225				
21	75.260	2.360	Open Manhole	1500	1.007	72.900	450	1.006	72.900	375	
								5.004	72.900	400	
								8.000	72.900	225	
22	75.240	2.470	Open Manhole	1500	1.008	72.770	450	1.007	72.770	450	
	74.080	1.390	Open Manhole	0		OUTFALL		1.008	72.690	450	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	100	1	75.090	74.640	0.350	Open Manhole	150
1.001	o	150	2	75.900	73.900	1.850	Open Manhole	1500
1.002	o	300	3	75.870	73.550	2.020	Open Manhole	1500
2.000	o	150	4	75.350	73.910	1.290	Open Manhole	1500
2.001	o	150	5	75.430	73.530	1.750	Open Manhole	1500
1.003	o	300	6	75.570	73.300	1.970	Open Manhole	1500
3.000	o	150	7	75.150	73.800	1.200	Open Manhole	1200
3.001	o	225	8	75.320	73.450	1.645	Open Manhole	1500
1.004	o	375	9	75.480	73.150	1.955	Open Manhole	1500
4.000	o	150	10	75.320	73.970	1.200	Open Manhole	1500
1.005	o	375	11	75.280	72.990	1.915	Open Manhole	1500
1.006	o	375	12	75.420	72.930	2.115	Open Manhole	1500
5.000	o	150	13	75.840	74.800	0.890	Open Manhole	1200
5.001	o	150	14	75.840	74.380	1.310	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	11.810	16.0	2	75.900	73.900	1.900	Open Manhole	1500
1.001	34.743	99.3	3	75.870	73.550	2.170	Open Manhole	1500
1.002	49.859	199.4	6	75.570	73.300	1.970	Open Manhole	1500
2.000	38.283	100.7	5	75.430	73.530	1.750	Open Manhole	1500
2.001	23.490	102.1	6	75.570	73.300	2.120	Open Manhole	1500
1.003	28.952	193.0	9	75.480	73.150	2.030	Open Manhole	1500
3.000	29.843	85.3	8	75.320	73.450	1.720	Open Manhole	1500
3.001	27.411	91.4	9	75.480	73.150	2.105	Open Manhole	1500
1.004	38.169	238.6	11	75.280	72.990	1.915	Open Manhole	1500
4.000	52.573	53.6	11	75.280	72.990	2.140	Open Manhole	1500
1.005	14.067	234.5	12	75.420	72.930	2.115	Open Manhole	1500
1.006	6.381	212.7	21	75.260	72.900	1.985	Open Manhole	1500
5.000	14.609	34.8	14	75.840	74.380	1.310	Open Manhole	1500
5.001	13.800	69.0	15	75.850	74.180	1.520	Open Manhole	1500

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.002	o	150	15	75.850	74.180	1.520	Open Manhole	1500
6.000	o	225	16	75.710	74.050	1.435	Open Manhole	1500
5.003	o	225	17	75.740	73.910	1.605	Open Manhole	1500
7.000	o	300	18	75.750	73.590	1.860	Open Manhole	1500
5.004	o	400	19	75.630	73.280	1.950	Open Manhole	1500
8.000	o	225	20	75.000	73.260	1.515	Open Manhole	1500
1.007	o	450	21	75.260	72.900	1.910	Open Manhole	1500
1.008	o	450	22	75.240	72.770	2.020	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.002	26.741	99.0	17	75.740	73.910	1.680	Open Manhole	1500
6.000	3.415	24.4	17	75.740	73.910	1.605	Open Manhole	1500
5.003	45.448	72.1	19	75.630	73.280	2.125	Open Manhole	1500
7.000	25.877	83.5	19	75.630	73.280	2.050	Open Manhole	1500
5.004	23.852	62.8	21	75.260	72.900	1.960	Open Manhole	1500
8.000	14.693	40.8	21	75.260	72.900	2.135	Open Manhole	1500
1.007	31.244	240.3	22	75.240	72.770	2.020	Open Manhole	1500
1.008	19.445	243.1		74.080	72.690	0.940	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.003	0.003	0.003
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.134	0.134	0.134
2.000	-	-	100	0.042	0.042	0.042
2.001	-	-	100	0.019	0.019	0.019
1.003	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.098	0.098	0.098
3.001	-	-	100	0.292	0.292	0.292
1.004	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.070	0.070	0.070
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.040	0.040	0.040
5.001	-	-	100	0.011	0.011	0.011
5.002	-	-	100	0.012	0.012	0.012
6.000	-	-	100	0.168	0.168	0.168
5.003	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.160	0.160	0.160
5.004	-	-	100	0.008	0.008	0.008
8.000	-	-	100	0.084	0.084	0.084
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.141	1.141	1.141

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		74.080	72.690	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 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)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model FSR Return Period (years) 30

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Synthetic Rainfall Details

Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840
Ratio R	0.360	Storm Duration (mins)	30
Profile Type	Summer		

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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 OFF
DVD Status ON
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
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.
1.000	15 Winter	30	0%					
1.001	15 Winter	30	0%					
1.002	15 Winter	30	0%	30/15 Summer				
2.000	15 Winter	30	0%	30/15 Winter				
2.001	15 Winter	30	0%	30/15 Summer				
1.003	15 Winter	30	0%	30/15 Summer				
3.000	15 Winter	30	0%	30/15 Summer				
3.001	15 Winter	30	0%	30/15 Summer				
1.004	15 Winter	30	0%	30/15 Summer				
4.000	15 Winter	30	0%	30/15 Winter				
1.005	15 Winter	30	0%	30/15 Summer				
1.006	15 Winter	30	0%	30/15 Summer				
5.000	15 Winter	30	0%					
5.001	15 Winter	30	0%					
5.002	15 Winter	30	0%	30/15 Summer				
6.000	15 Winter	30	0%	30/15 Winter				
5.003	15 Winter	30	0%	30/15 Summer				
7.000	15 Winter	30	0%					
5.004	15 Winter	30	0%					
8.000	15 Winter	30	0%	30/15 Summer				
1.007	15 Winter	30	0%	30/15 Summer				
1.008	15 Winter	30	0%	30/15 Summer				

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
1.000	1	74.656	-0.084	0.000	0.06	0.0	0.9	OK
1.001	2	73.966	-0.084	0.000	0.06	0.0	1.0	OK
1.002	3	73.979	0.129	0.000	0.55	0.0	41.0	SURCHARGED
2.000	4	74.078	0.018	0.000	0.70	0.0	11.9	SURCHARGED
2.001	5	74.015	0.335	0.000	0.80	0.0	13.4	SURCHARGED
1.003	6	73.934	0.334	0.000	0.51	0.0	37.1	SURCHARGED
3.000	7	75.034	1.084	0.000	1.20	0.0	22.1	FLOOD RISK
3.001	8	74.626	0.951	0.000	1.67	0.0	84.4	SURCHARGED
1.004	9	73.839	0.314	0.000	0.93	0.0	109.2	SURCHARGED
4.000	10	74.157	0.037	0.000	0.79	0.0	18.8	SURCHARGED
1.005	11	73.697	0.332	0.000	1.22	0.0	125.5	SURCHARGED

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

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
1.006	12	73.595	0.290	0.000	1.40	0.0	125.2	SURCHARGED
5.000	13	74.868	-0.082	0.000	0.42	0.0	11.8	OK
5.001	14	74.509	-0.021	0.000	0.75	0.0	14.8	OK
5.002	15	74.415	0.085	0.000	0.95	0.0	16.1	SURCHARGED
6.000	16	74.298	0.023	0.000	0.88	0.0	46.4	SURCHARGED
5.003	17	74.176	0.041	0.000	1.02	0.0	59.8	SURCHARGED
7.000	18	73.729	-0.161	0.000	0.43	0.0	46.7	OK
5.004	19	73.580	-0.100	0.000	0.41	0.0	105.5	OK
8.000	20	73.527	0.042	0.000	0.32	0.0	22.6	SURCHARGED
1.007	21	73.494	0.144	0.000	1.28	0.0	229.2	SURCHARGED
1.008	22	73.282	0.062	0.000	1.37	0.0	227.5	SURCHARGED

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	Add Flow / Climate Change (%)	0
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.360	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.563	4-8	0.578	8-12	0.000

Total Area Contributing (ha) = 1.141

Total Pipe Volume (m³) = 32.779

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	11.810	0.740	16.0	0.003	5.00	0.0	0.600	o	100
1.001	34.743	0.350	99.3	0.000	0.00	0.0	0.600	o	150
1.002	49.859	0.250	199.4	0.134	0.00	0.0	0.600	o	300
2.000	38.283	0.380	100.7	0.042	5.00	0.0	0.600	o	150
2.001	23.490	0.230	102.1	0.019	0.00	0.0	0.600	o	150

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.10	74.640	0.003	0.0	0.0	0.0	1.94	15.3	0.4
1.001	50.00	5.68	73.900	0.003	0.0	0.0	0.0	1.01	17.8	0.4
1.002	50.00	6.42	73.550	0.137	0.0	0.0	0.0	1.11	78.4	18.6
2.000	50.00	5.64	73.910	0.042	0.0	0.0	0.0	1.00	17.7	5.7
2.001	50.00	6.03	73.530	0.061	0.0	0.0	0.0	0.99	17.6	8.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.003	28.952	0.150	193.0	0.000	0.00	0.0	0.600	o	300
3.000	29.843	0.350	85.3	0.098	5.00	0.0	0.600	o	150
3.001	27.411	0.300	91.4	0.292	0.00	0.0	0.600	o	225
1.004	38.169	0.160	238.6	0.000	0.00	0.0	0.600	o	375
4.000	52.573	0.980	53.6	0.070	5.00	0.0	0.600	o	150
1.005	14.067	0.060	234.5	0.000	0.00	0.0	0.600	o	375
1.006	6.381	0.030	212.7	0.000	0.00	0.0	0.600	o	375
5.000	14.609	0.420	34.8	0.040	5.00	0.0	0.600	o	150
5.001	13.800	0.200	69.0	0.011	0.00	0.0	0.600	o	150
5.002	26.741	0.270	99.0	0.012	0.00	0.0	0.600	o	150
6.000	3.415	0.140	24.4	0.168	5.00	0.0	0.600	o	225
5.003	45.448	0.630	72.1	0.000	0.00	0.0	0.600	o	225
7.000	25.877	0.310	83.5	0.160	5.00	0.0	0.600	o	300

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	6.85	73.300	0.198	0.0	0.0	0.0	1.13	79.7	26.8
3.000	50.00	5.46	73.800	0.098	0.0	0.0	0.0	1.09	19.2	13.3
3.001	50.00	5.79	73.450	0.390	0.0	0.0	0.0	1.37	54.4	52.8
1.004	50.00	7.40	73.150	0.588	0.0	0.0	0.0	1.17	129.1	79.6
4.000	50.00	5.64	73.970	0.070	0.0	0.0	0.0	1.38	24.3	9.5
1.005	50.00	7.60	72.990	0.658	0.0	0.0	0.0	1.18	130.2	89.1
1.006	50.00	7.68	72.930	0.658	0.0	0.0	0.0	1.24	136.8	89.1
5.000	50.00	5.14	74.800	0.040	0.0	0.0	0.0	1.71	30.3	5.4
5.001	50.00	5.33	74.380	0.051	0.0	0.0	0.0	1.21	21.4	6.9
5.002	50.00	5.77	74.180	0.063	0.0	0.0	0.0	1.01	17.8	8.5
6.000	50.00	5.02	74.050	0.168	0.0	0.0	0.0	2.66	105.8	22.7
5.003	50.00	6.26	73.910	0.231	0.0	0.0	0.0	1.54	61.3	31.3
7.000	50.00	5.25	73.590	0.160	0.0	0.0	0.0	1.72	121.7	21.7

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
5.004	23.852	0.380	62.8	0.008	0.00	0.0	0.600	o	400
8.000	14.693	0.360	40.8	0.084	5.00	0.0	0.600	o	225
1.007	31.244	0.130	240.3	0.000	0.00	0.0	0.600	o	450
1.008	19.445	0.080	243.1	0.000	0.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.004	50.00	6.43	73.280	0.399	0.0	0.0	0.0	2.39	299.8	54.0
8.000	50.00	5.12	73.260	0.084	0.0	0.0	0.0	2.05	81.7	11.4
1.007	50.00	8.08	72.900	1.141	0.0	0.0	0.0	1.31	207.9	154.5
1.008	50.00	8.33	72.770	1.141	0.0	0.0	0.0	1.30	206.7	154.5

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	75.090	0.450	Open Manhole	150	1.000	74.640	100				
2	75.900	2.000	Open Manhole	1500	1.001	73.900	150	1.000	73.900	100	
3	75.870	2.320	Open Manhole	1500	1.002	73.550	300	1.001	73.550	150	
4	75.350	1.440	Open Manhole	1500	2.000	73.910	150				
5	75.430	1.900	Open Manhole	1500	2.001	73.530	150	2.000	73.530	150	
6	75.570	2.270	Open Manhole	1500	1.003	73.300	300	1.002	73.300	300	
								2.001	73.300	150	
7	75.150	1.350	Open Manhole	1200	3.000	73.800	150				
8	75.320	1.870	Open Manhole	1500	3.001	73.450	225	3.000	73.450	150	
9	75.480	2.330	Open Manhole	1500	1.004	73.150	375	1.003	73.150	300	
								3.001	73.150	225	
10	75.320	1.350	Open Manhole	1500	4.000	73.970	150				
11	75.280	2.290	Open Manhole	1500	1.005	72.990	375	1.004	72.990	375	
								4.000	72.990	150	
12	75.420	2.490	Open Manhole	1500	1.006	72.930	375	1.005	72.930	375	
13	75.840	1.040	Open Manhole	1200	5.000	74.800	150				
14	75.840	1.460	Open Manhole	1500	5.001	74.380	150	5.000	74.380	150	
15	75.850	1.670	Open Manhole	1500	5.002	74.180	150	5.001	74.180	150	
16	75.710	1.660	Open Manhole	1500	6.000	74.050	225				
17	75.740	1.830	Open Manhole	1500	5.003	73.910	225	5.002	73.910	150	
								6.000	73.910	225	
18	75.750	2.160	Open Manhole	1500	7.000	73.590	300				
19	75.630	2.350	Open Manhole	1500	5.004	73.280	400	5.003	73.280	225	
								7.000	73.280	300	
20	75.000	1.740	Open Manhole	1500	8.000	73.260	225				
21	75.260	2.360	Open Manhole	1500	1.007	72.900	450	1.006	72.900	375	
								5.004	72.900	400	
								8.000	72.900	225	
22	75.240	2.470	Open Manhole	1500	1.008	72.770	450	1.007	72.770	450	
	74.080	1.390	Open Manhole	0		OUTFALL		1.008	72.690	450	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	100	1	75.090	74.640	0.350	Open Manhole	150
1.001	o	150	2	75.900	73.900	1.850	Open Manhole	1500
1.002	o	300	3	75.870	73.550	2.020	Open Manhole	1500
2.000	o	150	4	75.350	73.910	1.290	Open Manhole	1500
2.001	o	150	5	75.430	73.530	1.750	Open Manhole	1500
1.003	o	300	6	75.570	73.300	1.970	Open Manhole	1500
3.000	o	150	7	75.150	73.800	1.200	Open Manhole	1200
3.001	o	225	8	75.320	73.450	1.645	Open Manhole	1500
1.004	o	375	9	75.480	73.150	1.955	Open Manhole	1500
4.000	o	150	10	75.320	73.970	1.200	Open Manhole	1500
1.005	o	375	11	75.280	72.990	1.915	Open Manhole	1500
1.006	o	375	12	75.420	72.930	2.115	Open Manhole	1500
5.000	o	150	13	75.840	74.800	0.890	Open Manhole	1200
5.001	o	150	14	75.840	74.380	1.310	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	11.810	16.0	2	75.900	73.900	1.900	Open Manhole	1500
1.001	34.743	99.3	3	75.870	73.550	2.170	Open Manhole	1500
1.002	49.859	199.4	6	75.570	73.300	1.970	Open Manhole	1500
2.000	38.283	100.7	5	75.430	73.530	1.750	Open Manhole	1500
2.001	23.490	102.1	6	75.570	73.300	2.120	Open Manhole	1500
1.003	28.952	193.0	9	75.480	73.150	2.030	Open Manhole	1500
3.000	29.843	85.3	8	75.320	73.450	1.720	Open Manhole	1500
3.001	27.411	91.4	9	75.480	73.150	2.105	Open Manhole	1500
1.004	38.169	238.6	11	75.280	72.990	1.915	Open Manhole	1500
4.000	52.573	53.6	11	75.280	72.990	2.140	Open Manhole	1500
1.005	14.067	234.5	12	75.420	72.930	2.115	Open Manhole	1500
1.006	6.381	212.7	21	75.260	72.900	1.985	Open Manhole	1500
5.000	14.609	34.8	14	75.840	74.380	1.310	Open Manhole	1500
5.001	13.800	69.0	15	75.850	74.180	1.520	Open Manhole	1500

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.002	o	150	15	75.850	74.180	1.520	Open Manhole	1500
6.000	o	225	16	75.710	74.050	1.435	Open Manhole	1500
5.003	o	225	17	75.740	73.910	1.605	Open Manhole	1500
7.000	o	300	18	75.750	73.590	1.860	Open Manhole	1500
5.004	o	400	19	75.630	73.280	1.950	Open Manhole	1500
8.000	o	225	20	75.000	73.260	1.515	Open Manhole	1500
1.007	o	450	21	75.260	72.900	1.910	Open Manhole	1500
1.008	o	450	22	75.240	72.770	2.020	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.002	26.741	99.0	17	75.740	73.910	1.680	Open Manhole	1500
6.000	3.415	24.4	17	75.740	73.910	1.605	Open Manhole	1500
5.003	45.448	72.1	19	75.630	73.280	2.125	Open Manhole	1500
7.000	25.877	83.5	19	75.630	73.280	2.050	Open Manhole	1500
5.004	23.852	62.8	21	75.260	72.900	1.960	Open Manhole	1500
8.000	14.693	40.8	21	75.260	72.900	2.135	Open Manhole	1500
1.007	31.244	240.3	22	75.240	72.770	2.020	Open Manhole	1500
1.008	19.445	243.1		74.080	72.690	0.940	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.003	0.003	0.003
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.134	0.134	0.134
2.000	-	-	100	0.042	0.042	0.042
2.001	-	-	100	0.019	0.019	0.019
1.003	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.098	0.098	0.098
3.001	-	-	100	0.292	0.292	0.292
1.004	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.070	0.070	0.070
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.040	0.040	0.040
5.001	-	-	100	0.011	0.011	0.011
5.002	-	-	100	0.012	0.012	0.012
6.000	-	-	100	0.168	0.168	0.168
5.003	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.160	0.160	0.160
5.004	-	-	100	0.008	0.008	0.008
8.000	-	-	100	0.084	0.084	0.084
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.141	1.141	1.141

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		74.080	72.690	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 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)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model FSR Return Period (years) 30

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Synthetic Rainfall Details

Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840
Ratio R	0.360	Storm Duration (mins)	30
Profile Type	Summer		

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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 OFF
DVD Status ON
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
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.
1.000	15 Winter	100	+30%					
1.001	15 Winter	100	+30%	100/15 Summer				
1.002	15 Winter	100	+30%	100/15 Summer				
2.000	15 Winter	100	+30%	100/15 Summer				
2.001	15 Winter	100	+30%	100/15 Summer				
1.003	15 Winter	100	+30%	100/15 Summer				
3.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			6
3.001	15 Winter	100	+30%	100/15 Summer	100/15 Summer			4
1.004	15 Winter	100	+30%	100/15 Summer				
4.000	15 Winter	100	+30%	100/15 Summer				
1.005	15 Winter	100	+30%	100/15 Summer				
1.006	15 Winter	100	+30%	100/15 Summer				
5.000	15 Winter	100	+30%	100/15 Summer				
5.001	15 Winter	100	+30%	100/15 Summer				
5.002	15 Winter	100	+30%	100/15 Summer				
6.000	15 Winter	100	+30%	100/15 Summer				
5.003	15 Winter	100	+30%	100/15 Summer				
7.000	15 Winter	100	+30%	100/15 Summer				
5.004	15 Winter	100	+30%	100/15 Summer				
8.000	15 Winter	100	+30%	100/15 Summer				
1.007	15 Winter	100	+30%	100/15 Summer				
1.008	15 Winter	100	+30%	100/15 Summer				

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
1.000	1	74.661	-0.079	0.000	0.10	0.0	1.5	OK
1.001	2	74.632	0.582	0.000	0.33	0.0	5.6	SURCHARGED
1.002	3	74.625	0.775	0.000	0.69	0.0	50.8	SURCHARGED
2.000	4	74.881	0.821	0.000	0.82	0.0	14.0	SURCHARGED
2.001	5	74.711	1.031	0.000	1.02	0.0	17.1	SURCHARGED
1.003	6	74.527	0.927	0.000	0.74	0.0	53.6	SURCHARGED
3.000	7	75.166	1.216	16.356	2.04	0.0	37.6	FLOOD
3.001	8	75.324	1.649	4.453	2.09	0.0	105.3	FLOOD
1.004	9	74.430	0.905	0.000	1.22	0.0	142.5	SURCHARGED
4.000	10	75.067	0.947	0.000	0.93	0.0	22.0	FLOOD RISK
1.005	11	74.200	0.835	0.000	1.59	0.0	163.3	SURCHARGED

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

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
1.006	12	74.027	0.722	0.000	1.84	0.0	165.1	SURCHARGED
5.000	13	75.346	0.396	0.000	0.64	0.0	17.9	SURCHARGED
5.001	14	75.281	0.751	0.000	0.80	0.0	15.7	SURCHARGED
5.002	15	75.190	0.860	0.000	1.25	0.0	21.3	SURCHARGED
6.000	16	75.203	0.928	0.000	1.22	0.0	64.3	SURCHARGED
5.003	17	75.011	0.876	0.000	1.23	0.0	72.1	SURCHARGED
7.000	18	74.189	0.299	0.000	0.66	0.0	71.6	SURCHARGED
5.004	19	74.049	0.369	0.000	0.52	0.0	131.4	SURCHARGED
8.000	20	73.930	0.445	0.000	0.47	0.0	34.0	SURCHARGED
1.007	21	73.856	0.506	0.000	1.78	0.0	319.5	SURCHARGED
1.008	22	73.437	0.217	0.000	1.92	0.0	318.9	SURCHARGED

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3010	07/17
N/A	JS

Note: Clouded areas indicates location of manholes which flood under 1 in 100 + 30% CC.
Number opposite indicates volume of flood per each manhole.

Note: Flood volume is the same for existing & proposed drainage layout.

16 m³

4 m³

NORTHAMPTON ROAD

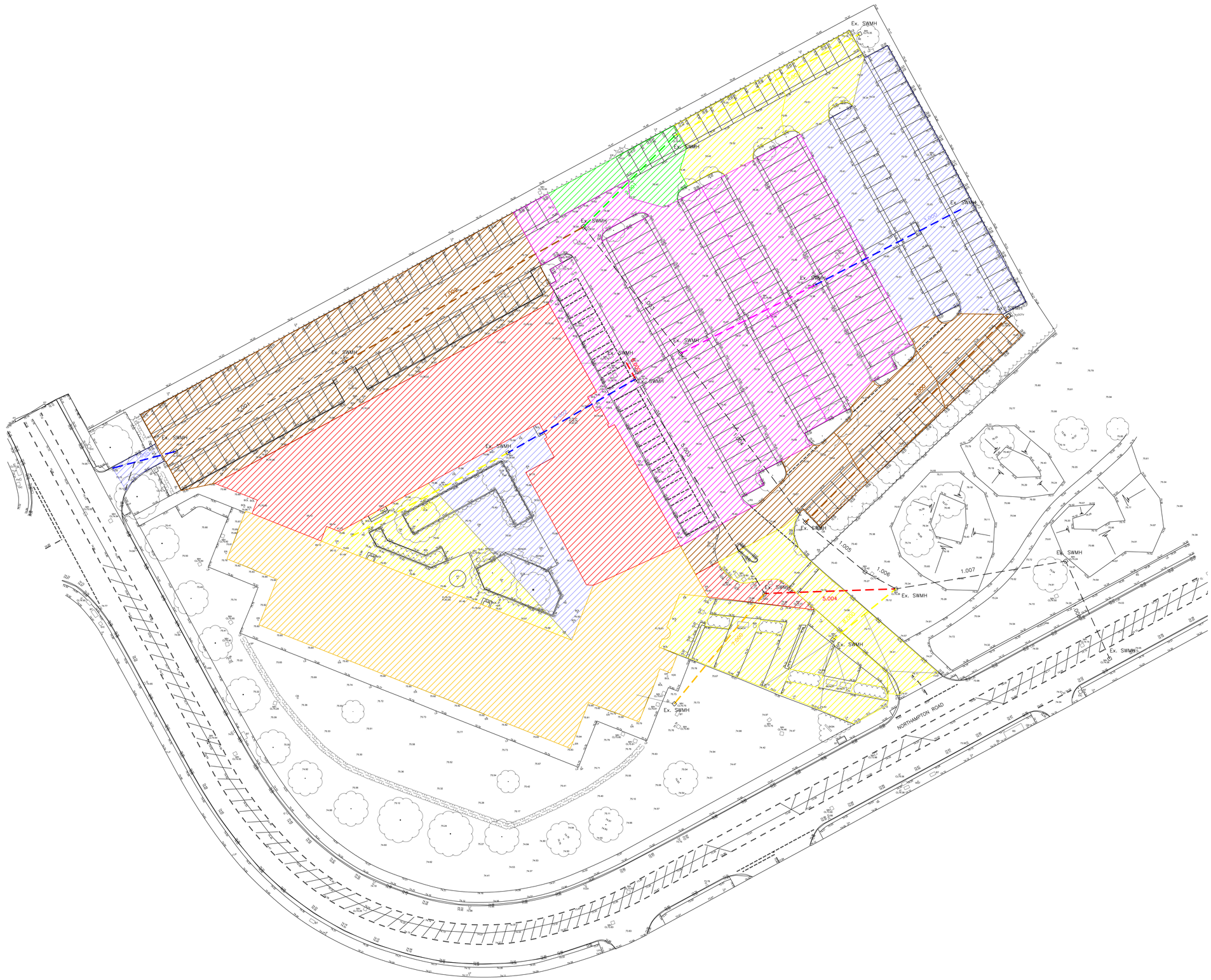
One Central Park

APPENDIX 8
PROPOSED MICRODRAINAGE SIMULATION

One Central Park 3010 18.07.17 PROPOSED DRAINAGE

Pipe No.	Pipe L [m]	Fall [m]	Area [m2]	US/IL [m]	US/CL [m]	DS/IL [m]	Dia [mm]	MH US dia [m]	E	N	Gradient
1.000	11.810	0.740	33	74.640	75.090	73.900	100	0.15			16
1.001	34.743	0.350	-	73.900	75.900	73.550	150	1.50			99
1.002	49.859	0.250	1337	73.550	75.870	73.300	300	1.50			199
2.000	38.283	0.380	415	73.910	75.350	73.530	150	1.50			101
2.001	23.490	0.230	188	73.530	75.430	73.300	150	1.50			102
1.003	28.952	0.150	-	73.300	75.570	73.150	300	1.50			193
3.000	29.843	0.350	982	73.800	75.150	73.450	150	1.20			85
3.001	27.411	0.300	2918	73.450	75.320	73.150	225	1.50			91
1.004	38.169	0.160	-	73.150	75.480	72.990	375	1.50			239
4.000	52.573	0.980	704	73.970	75.320	72.990	150	1.50			54
1.005	14.067	0.060	-	72.990	75.280	72.930	375	1.50			234
1.006	6.381	0.030	-	72.930	75.420	72.900	375	1.50			213
5.000	32.076	0.200	420	74.380	75.840	74.180	300	-			160
5.001	26.741	0.270	460	74.180	75.850	73.910	150	1.50			99
6.000	3.415	0.140	1675	74.050	75.710	73.910	225	1.50			24
5.003	45.448	0.630	-	73.910	75.740	73.280	225	1.50			72
7.000	25.877	0.310	1602	73.590	75.750	73.280	300	1.50			83
5.004	23.852	0.380	80	73.280	75.630	72.900	400	1.50			63
8.000	14.698	0.360	842	73.260	75.000	72.900	225	1.50			41
1.007	31.244	0.130	-	72.900	75.260	72.770	450	1.50			240
1.008	19.445	0.080	-	72.770	75.240	72.690	450	1.50			243
Outfall					74.080						

M5-60	18.000	mm
R	0.360	
Total Catchment Area:	11656	m2



Notes.

1 All dimensions are in millimetres unless noted otherwise.

2 All levels are in metres unless noted otherwise.

3 This drawing is to be read in conjunction with all relevant Architects and Service Engineers drawings.

Proposed Drainage Catchment Plan
Scale 1:250

0 5m 10m 15m 20m 25m
Scale 1:250

Rev	Drawn	Date	Description

Drawing Status
INFORMATION

Contract
ONE CENTRAL PARK
MANCHESTER CITY COUNCIL

Drawing Title
PROPOSED DRAINAGE SURFACE WATER CATCHMENT AREA PLAN

integra consulting
Civil & Structural Engineers
Suite 3
14-32 Hewitt Street
MANCHESTER
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Tel : 0161 237 3400
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Scales	1:250 @ A0	Date	07/17
Drawn	JS	Checked	RH
Contract No	3010	Drawing No	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	Add Flow / Climate Change (%)	0
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.360	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.576	4-8	0.590	8-12	0.000

Total Area Contributing (ha) = 1.166

Total Pipe Volume (m³) = 34.545

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	11.810	0.740	16.0	0.003	5.00	0.0	0.600	o	100
1.001	34.743	0.350	99.3	0.000	0.00	0.0	0.600	o	150
1.002	49.859	0.250	199.4	0.134	0.00	0.0	0.600	o	300
2.000	38.283	0.380	100.7	0.042	5.00	0.0	0.600	o	150
2.001	23.490	0.230	102.1	0.019	0.00	0.0	0.600	o	150

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.10	74.640	0.003	0.0	0.0	0.0	1.94	15.3	0.4
1.001	50.00	5.68	73.900	0.003	0.0	0.0	0.0	1.01	17.8	0.4
1.002	50.00	6.42	73.550	0.137	0.0	0.0	0.0	1.11	78.4	18.6
2.000	50.00	5.64	73.910	0.042	0.0	0.0	0.0	1.00	17.7	5.7
2.001	50.00	6.03	73.530	0.061	0.0	0.0	0.0	0.99	17.6	8.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.003	28.952	0.150	193.0	0.000	0.00	0.0	0.600	o	300
3.000	29.843	0.350	85.3	0.098	5.00	0.0	0.600	o	150
3.001	27.411	0.300	91.4	0.292	0.00	0.0	0.600	o	225
1.004	38.169	0.160	238.6	0.000	0.00	0.0	0.600	o	375
4.000	52.573	0.980	53.6	0.070	5.00	0.0	0.600	o	150
1.005	14.067	0.060	234.5	0.000	0.00	0.0	0.600	o	375
1.006	6.381	0.030	212.7	0.000	0.00	0.0	0.600	o	375
5.000	32.076	0.200	160.4	0.042	5.00	0.0	0.600	o	300
5.001	26.741	0.270	99.0	0.046	0.00	0.0	0.600	o	150
6.000	3.415	0.140	24.4	0.168	5.00	0.0	0.600	o	225
5.002	45.448	0.630	72.1	0.000	0.00	0.0	0.600	o	225
7.000	25.877	0.310	83.5	0.160	5.00	0.0	0.600	o	300
5.003	23.852	0.380	62.8	0.008	0.00	0.0	0.600	o	400

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	6.85	73.300	0.198	0.0	0.0	0.0	1.13	79.7	26.8
3.000	50.00	5.46	73.800	0.098	0.0	0.0	0.0	1.09	19.2	13.3
3.001	50.00	5.79	73.450	0.390	0.0	0.0	0.0	1.37	54.4	52.8
1.004	50.00	7.40	73.150	0.588	0.0	0.0	0.0	1.17	129.1	79.6
4.000	50.00	5.64	73.970	0.070	0.0	0.0	0.0	1.38	24.3	9.5
1.005	50.00	7.60	72.990	0.658	0.0	0.0	0.0	1.18	130.2	89.1
1.006	50.00	7.68	72.930	0.658	0.0	0.0	0.0	1.24	136.8	89.1
5.000	50.00	5.43	74.380	0.042	0.0	0.0	0.0	1.24	87.6	5.7
5.001	50.00	5.87	74.180	0.088	0.0	0.0	0.0	1.01	17.8	11.9
6.000	50.00	5.02	74.050	0.168	0.0	0.0	0.0	2.66	105.8	22.7
5.002	50.00	6.36	73.910	0.256	0.0	0.0	0.0	1.54	61.3	34.7
7.000	50.00	5.25	73.590	0.160	0.0	0.0	0.0	1.72	121.7	21.7
5.003	50.00	6.53	73.280	0.424	0.0	0.0	0.0	2.39	299.8	57.4

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
8.000	14.693	0.360	40.8	0.084	5.00	0.0	0.600	o	225
1.007	31.244	0.130	240.3	0.000	0.00	0.0	0.600	o	450
1.008	19.445	0.080	243.1	0.000	0.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
8.000	50.00	5.12	73.260	0.084	0.0	0.0	0.0	2.05	81.7	11.4
1.007	50.00	8.08	72.900	1.166	0.0	0.0	0.0	1.31	207.9	157.9
1.008	50.00	8.33	72.770	1.166	0.0	0.0	0.0	1.30	206.7	157.9

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	75.090	0.450	Open Manhole	150	1.000	74.640	100				
2	75.900	2.000	Open Manhole	1500	1.001	73.900	150	1.000	73.900	100	
3	75.870	2.320	Open Manhole	1500	1.002	73.550	300	1.001	73.550	150	
4	75.350	1.440	Open Manhole	1500	2.000	73.910	150				
5	75.430	1.900	Open Manhole	1500	2.001	73.530	150	2.000	73.530	150	
6	75.570	2.270	Open Manhole	1500	1.003	73.300	300	1.002	73.300	300	
								2.001	73.300	150	
7	75.150	1.350	Open Manhole	1200	3.000	73.800	150				
8	75.320	1.870	Open Manhole	1500	3.001	73.450	225	3.000	73.450	150	
9	75.480	2.330	Open Manhole	1500	1.004	73.150	375	1.003	73.150	300	
								3.001	73.150	225	
10	75.320	1.350	Open Manhole	1500	4.000	73.970	150				
11	75.280	2.290	Open Manhole	1500	1.005	72.990	375	1.004	72.990	375	
								4.000	72.990	150	
12	75.420	2.490	Open Manhole	1500	1.006	72.930	375	1.005	72.930	375	
14	75.840	1.460	Open Manhole	1500	5.000	74.380	300				
15	75.850	1.670	Open Manhole	1500	5.001	74.180	150	5.000	74.180	300	
16	75.710	1.660	Open Manhole	1500	6.000	74.050	225				
17	75.740	1.830	Open Manhole	1500	5.002	73.910	225	5.001	73.910	150	
								6.000	73.910	225	
18	75.750	2.160	Open Manhole	1500	7.000	73.590	300				
19	75.630	2.350	Open Manhole	1500	5.003	73.280	400	5.002	73.280	225	
								7.000	73.280	300	
20	75.000	1.740	Open Manhole	1500	8.000	73.260	225				
21	75.260	2.360	Open Manhole	1500	1.007	72.900	450	1.006	72.900	375	
								5.003	72.900	400	
								8.000	72.900	225	
22	75.240	2.470	Open Manhole	1500	1.008	72.770	450	1.007	72.770	450	
	74.080	1.390	Open Manhole	0		OUTFALL		1.008	72.690	450	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	100	1	75.090	74.640	0.350	Open Manhole	150
1.001	o	150	2	75.900	73.900	1.850	Open Manhole	1500
1.002	o	300	3	75.870	73.550	2.020	Open Manhole	1500
2.000	o	150	4	75.350	73.910	1.290	Open Manhole	1500
2.001	o	150	5	75.430	73.530	1.750	Open Manhole	1500
1.003	o	300	6	75.570	73.300	1.970	Open Manhole	1500
3.000	o	150	7	75.150	73.800	1.200	Open Manhole	1200
3.001	o	225	8	75.320	73.450	1.645	Open Manhole	1500
1.004	o	375	9	75.480	73.150	1.955	Open Manhole	1500
4.000	o	150	10	75.320	73.970	1.200	Open Manhole	1500
1.005	o	375	11	75.280	72.990	1.915	Open Manhole	1500
1.006	o	375	12	75.420	72.930	2.115	Open Manhole	1500
5.000	o	300	14	75.840	74.380	1.160	Open Manhole	1500
5.001	o	150	15	75.850	74.180	1.520	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	11.810	16.0	2	75.900	73.900	1.900	Open Manhole	1500
1.001	34.743	99.3	3	75.870	73.550	2.170	Open Manhole	1500
1.002	49.859	199.4	6	75.570	73.300	1.970	Open Manhole	1500
2.000	38.283	100.7	5	75.430	73.530	1.750	Open Manhole	1500
2.001	23.490	102.1	6	75.570	73.300	2.120	Open Manhole	1500
1.003	28.952	193.0	9	75.480	73.150	2.030	Open Manhole	1500
3.000	29.843	85.3	8	75.320	73.450	1.720	Open Manhole	1500
3.001	27.411	91.4	9	75.480	73.150	2.105	Open Manhole	1500
1.004	38.169	238.6	11	75.280	72.990	1.915	Open Manhole	1500
4.000	52.573	53.6	11	75.280	72.990	2.140	Open Manhole	1500
1.005	14.067	234.5	12	75.420	72.930	2.115	Open Manhole	1500
1.006	6.381	212.7	21	75.260	72.900	1.985	Open Manhole	1500
5.000	32.076	160.4	15	75.850	74.180	1.370	Open Manhole	1500
5.001	26.741	99.0	17	75.740	73.910	1.680	Open Manhole	1500

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.000	o	225	16	75.710	74.050	1.435	Open Manhole	1500
5.002	o	225	17	75.740	73.910	1.605	Open Manhole	1500
7.000	o	300	18	75.750	73.590	1.860	Open Manhole	1500
5.003	o	400	19	75.630	73.280	1.950	Open Manhole	1500
8.000	o	225	20	75.000	73.260	1.515	Open Manhole	1500
1.007	o	450	21	75.260	72.900	1.910	Open Manhole	1500
1.008	o	450	22	75.240	72.770	2.020	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.000	3.415	24.4	17	75.740	73.910	1.605	Open Manhole	1500
5.002	45.448	72.1	19	75.630	73.280	2.125	Open Manhole	1500
7.000	25.877	83.5	19	75.630	73.280	2.050	Open Manhole	1500
5.003	23.852	62.8	21	75.260	72.900	1.960	Open Manhole	1500
8.000	14.693	40.8	21	75.260	72.900	2.135	Open Manhole	1500
1.007	31.244	240.3	22	75.240	72.770	2.020	Open Manhole	1500
1.008	19.445	243.1		74.080	72.690	0.940	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.003	0.003	0.003
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.134	0.134	0.134
2.000	-	-	100	0.042	0.042	0.042
2.001	-	-	100	0.019	0.019	0.019
1.003	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.098	0.098	0.098
3.001	-	-	100	0.292	0.292	0.292
1.004	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.070	0.070	0.070
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.042	0.042	0.042
5.001	-	-	100	0.046	0.046	0.046
6.000	-	-	100	0.168	0.168	0.168
5.002	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.160	0.160	0.160
5.003	-	-	100	0.008	0.008	0.008
8.000	-	-	100	0.084	0.084	0.084
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.166	1.166	1.166

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		74.080	72.690	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 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)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Region	England and Wales
Return Period (years)	30	M5-60 (mm)	18.000

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Synthetic Rainfall Details

Ratio R	0.360	Cv (Winter)	0.840
Profile Type	Summer	Storm Duration (mins)	30
Cv (Summer)	0.750		

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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 OFF
DVD Status ON
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
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.
1.000	15 Winter	30	0%					
1.001	15 Winter	30	0%					
1.002	15 Winter	30	0%	30/15 Summer				
2.000	15 Winter	30	0%	30/15 Winter				
2.001	15 Winter	30	0%	30/15 Summer				
1.003	15 Winter	30	0%	30/15 Summer				
3.000	15 Winter	30	0%	30/15 Summer				
3.001	15 Winter	30	0%	30/15 Summer				
1.004	15 Winter	30	0%	30/15 Summer				
4.000	15 Winter	30	0%	30/15 Winter				
1.005	15 Winter	30	0%	30/15 Summer				
1.006	15 Winter	30	0%	30/15 Summer				
5.000	15 Winter	30	0%					
5.001	15 Winter	30	0%	30/15 Summer				
6.000	15 Winter	30	0%	30/15 Summer				
5.002	15 Winter	30	0%	30/15 Summer				
7.000	15 Winter	30	0%					
5.003	15 Winter	30	0%					
8.000	15 Winter	30	0%	30/15 Summer				
1.007	15 Winter	30	0%	30/15 Summer				
1.008	15 Winter	30	0%	30/15 Summer				

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
1.000	1	74.656	-0.084	0.000	0.06	0.0	0.9	OK
1.001	2	73.969	-0.081	0.000	0.06	0.0	1.1	OK
1.002	3	73.983	0.133	0.000	0.55	0.0	40.9	SURCHARGED
2.000	4	74.081	0.021	0.000	0.70	0.0	11.9	SURCHARGED
2.001	5	74.017	0.337	0.000	0.80	0.0	13.4	SURCHARGED
1.003	6	73.937	0.337	0.000	0.51	0.0	36.7	SURCHARGED
3.000	7	75.036	1.086	0.000	1.20	0.0	22.1	FLOOD RISK
3.001	8	74.628	0.953	0.000	1.67	0.0	84.3	SURCHARGED
1.004	9	73.842	0.317	0.000	0.94	0.0	109.3	SURCHARGED
4.000	10	74.159	0.039	0.000	0.79	0.0	18.7	SURCHARGED
1.005	11	73.700	0.335	0.000	1.22	0.0	125.6	SURCHARGED
1.006	12	73.597	0.292	0.000	1.40	0.0	125.3	SURCHARGED

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

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
5.000	14	74.500	-0.180	0.000	0.15	0.0	11.7	OK
5.001	15	74.488	0.158	0.000	1.13	0.0	19.3	SURCHARGED
6.000	16	74.316	0.041	0.000	0.86	0.0	45.6	SURCHARGED
5.002	17	74.196	0.061	0.000	1.03	0.0	60.3	SURCHARGED
7.000	18	73.729	-0.161	0.000	0.43	0.0	46.7	OK
5.003	19	73.587	-0.093	0.000	0.42	0.0	106.1	OK
8.000	20	73.530	0.045	0.000	0.32	0.0	22.6	SURCHARGED
1.007	21	73.496	0.146	0.000	1.28	0.0	230.0	SURCHARGED
1.008	22	73.284	0.064	0.000	1.37	0.0	228.3	SURCHARGED

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	Add Flow / Climate Change (%)	0
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.360	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.576	4-8	0.590	8-12	0.000

Total Area Contributing (ha) = 1.166

Total Pipe Volume (m³) = 34.545

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	11.810	0.740	16.0	0.003	5.00	0.0	0.600	o	100
1.001	34.743	0.350	99.3	0.000	0.00	0.0	0.600	o	150
1.002	49.859	0.250	199.4	0.134	0.00	0.0	0.600	o	300
2.000	38.283	0.380	100.7	0.042	5.00	0.0	0.600	o	150
2.001	23.490	0.230	102.1	0.019	0.00	0.0	0.600	o	150

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.10	74.640	0.003	0.0	0.0	0.0	1.94	15.3	0.4
1.001	50.00	5.68	73.900	0.003	0.0	0.0	0.0	1.01	17.8	0.4
1.002	50.00	6.42	73.550	0.137	0.0	0.0	0.0	1.11	78.4	18.6
2.000	50.00	5.64	73.910	0.042	0.0	0.0	0.0	1.00	17.7	5.7
2.001	50.00	6.03	73.530	0.061	0.0	0.0	0.0	0.99	17.6	8.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.003	28.952	0.150	193.0	0.000	0.00	0.0	0.600	o	300
3.000	29.843	0.350	85.3	0.098	5.00	0.0	0.600	o	150
3.001	27.411	0.300	91.4	0.292	0.00	0.0	0.600	o	225
1.004	38.169	0.160	238.6	0.000	0.00	0.0	0.600	o	375
4.000	52.573	0.980	53.6	0.070	5.00	0.0	0.600	o	150
1.005	14.067	0.060	234.5	0.000	0.00	0.0	0.600	o	375
1.006	6.381	0.030	212.7	0.000	0.00	0.0	0.600	o	375
5.000	32.076	0.200	160.4	0.042	5.00	0.0	0.600	o	300
5.001	26.741	0.270	99.0	0.046	0.00	0.0	0.600	o	150
6.000	3.415	0.140	24.4	0.168	5.00	0.0	0.600	o	225
5.002	45.448	0.630	72.1	0.000	0.00	0.0	0.600	o	225
7.000	25.877	0.310	83.5	0.160	5.00	0.0	0.600	o	300
5.003	23.852	0.380	62.8	0.008	0.00	0.0	0.600	o	400

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	6.85	73.300	0.198	0.0	0.0	0.0	1.13	79.7	26.8
3.000	50.00	5.46	73.800	0.098	0.0	0.0	0.0	1.09	19.2	13.3
3.001	50.00	5.79	73.450	0.390	0.0	0.0	0.0	1.37	54.4	52.8
1.004	50.00	7.40	73.150	0.588	0.0	0.0	0.0	1.17	129.1	79.6
4.000	50.00	5.64	73.970	0.070	0.0	0.0	0.0	1.38	24.3	9.5
1.005	50.00	7.60	72.990	0.658	0.0	0.0	0.0	1.18	130.2	89.1
1.006	50.00	7.68	72.930	0.658	0.0	0.0	0.0	1.24	136.8	89.1
5.000	50.00	5.43	74.380	0.042	0.0	0.0	0.0	1.24	87.6	5.7
5.001	50.00	5.87	74.180	0.088	0.0	0.0	0.0	1.01	17.8	11.9
6.000	50.00	5.02	74.050	0.168	0.0	0.0	0.0	2.66	105.8	22.7
5.002	50.00	6.36	73.910	0.256	0.0	0.0	0.0	1.54	61.3	34.7
7.000	50.00	5.25	73.590	0.160	0.0	0.0	0.0	1.72	121.7	21.7
5.003	50.00	6.53	73.280	0.424	0.0	0.0	0.0	2.39	299.8	57.4

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
8.000	14.693	0.360	40.8	0.084	5.00	0.0	0.600	o	225
1.007	31.244	0.130	240.3	0.000	0.00	0.0	0.600	o	450
1.008	19.445	0.080	243.1	0.000	0.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
8.000	50.00	5.12	73.260	0.084	0.0	0.0	0.0	2.05	81.7	11.4
1.007	50.00	8.08	72.900	1.166	0.0	0.0	0.0	1.31	207.9	157.9
1.008	50.00	8.33	72.770	1.166	0.0	0.0	0.0	1.30	206.7	157.9

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	75.090	0.450	Open Manhole	150	1.000	74.640	100				
2	75.900	2.000	Open Manhole	1500	1.001	73.900	150	1.000	73.900	100	
3	75.870	2.320	Open Manhole	1500	1.002	73.550	300	1.001	73.550	150	
4	75.350	1.440	Open Manhole	1500	2.000	73.910	150				
5	75.430	1.900	Open Manhole	1500	2.001	73.530	150	2.000	73.530	150	
6	75.570	2.270	Open Manhole	1500	1.003	73.300	300	1.002	73.300	300	
								2.001	73.300	150	
7	75.150	1.350	Open Manhole	1200	3.000	73.800	150				
8	75.320	1.870	Open Manhole	1500	3.001	73.450	225	3.000	73.450	150	
9	75.480	2.330	Open Manhole	1500	1.004	73.150	375	1.003	73.150	300	
								3.001	73.150	225	
10	75.320	1.350	Open Manhole	1500	4.000	73.970	150				
11	75.280	2.290	Open Manhole	1500	1.005	72.990	375	1.004	72.990	375	
								4.000	72.990	150	
12	75.420	2.490	Open Manhole	1500	1.006	72.930	375	1.005	72.930	375	
14	75.840	1.460	Open Manhole	1500	5.000	74.380	300				
15	75.850	1.670	Open Manhole	1500	5.001	74.180	150	5.000	74.180	300	
16	75.710	1.660	Open Manhole	1500	6.000	74.050	225				
17	75.740	1.830	Open Manhole	1500	5.002	73.910	225	5.001	73.910	150	
								6.000	73.910	225	
18	75.750	2.160	Open Manhole	1500	7.000	73.590	300				
19	75.630	2.350	Open Manhole	1500	5.003	73.280	400	5.002	73.280	225	
								7.000	73.280	300	
20	75.000	1.740	Open Manhole	1500	8.000	73.260	225				
21	75.260	2.360	Open Manhole	1500	1.007	72.900	450	1.006	72.900	375	
								5.003	72.900	400	
								8.000	72.900	225	
22	75.240	2.470	Open Manhole	1500	1.008	72.770	450	1.007	72.770	450	
	74.080	1.390	Open Manhole	0		OUTFALL		1.008	72.690	450	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	100	1	75.090	74.640	0.350	Open Manhole	150
1.001	o	150	2	75.900	73.900	1.850	Open Manhole	1500
1.002	o	300	3	75.870	73.550	2.020	Open Manhole	1500
2.000	o	150	4	75.350	73.910	1.290	Open Manhole	1500
2.001	o	150	5	75.430	73.530	1.750	Open Manhole	1500
1.003	o	300	6	75.570	73.300	1.970	Open Manhole	1500
3.000	o	150	7	75.150	73.800	1.200	Open Manhole	1200
3.001	o	225	8	75.320	73.450	1.645	Open Manhole	1500
1.004	o	375	9	75.480	73.150	1.955	Open Manhole	1500
4.000	o	150	10	75.320	73.970	1.200	Open Manhole	1500
1.005	o	375	11	75.280	72.990	1.915	Open Manhole	1500
1.006	o	375	12	75.420	72.930	2.115	Open Manhole	1500
5.000	o	300	14	75.840	74.380	1.160	Open Manhole	1500
5.001	o	150	15	75.850	74.180	1.520	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	11.810	16.0	2	75.900	73.900	1.900	Open Manhole	1500
1.001	34.743	99.3	3	75.870	73.550	2.170	Open Manhole	1500
1.002	49.859	199.4	6	75.570	73.300	1.970	Open Manhole	1500
2.000	38.283	100.7	5	75.430	73.530	1.750	Open Manhole	1500
2.001	23.490	102.1	6	75.570	73.300	2.120	Open Manhole	1500
1.003	28.952	193.0	9	75.480	73.150	2.030	Open Manhole	1500
3.000	29.843	85.3	8	75.320	73.450	1.720	Open Manhole	1500
3.001	27.411	91.4	9	75.480	73.150	2.105	Open Manhole	1500
1.004	38.169	238.6	11	75.280	72.990	1.915	Open Manhole	1500
4.000	52.573	53.6	11	75.280	72.990	2.140	Open Manhole	1500
1.005	14.067	234.5	12	75.420	72.930	2.115	Open Manhole	1500
1.006	6.381	212.7	21	75.260	72.900	1.985	Open Manhole	1500
5.000	32.076	160.4	15	75.850	74.180	1.370	Open Manhole	1500
5.001	26.741	99.0	17	75.740	73.910	1.680	Open Manhole	1500

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.000	o	225	16	75.710	74.050	1.435	Open Manhole	1500
5.002	o	225	17	75.740	73.910	1.605	Open Manhole	1500
7.000	o	300	18	75.750	73.590	1.860	Open Manhole	1500
5.003	o	400	19	75.630	73.280	1.950	Open Manhole	1500
8.000	o	225	20	75.000	73.260	1.515	Open Manhole	1500
1.007	o	450	21	75.260	72.900	1.910	Open Manhole	1500
1.008	o	450	22	75.240	72.770	2.020	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.000	3.415	24.4	17	75.740	73.910	1.605	Open Manhole	1500
5.002	45.448	72.1	19	75.630	73.280	2.125	Open Manhole	1500
7.000	25.877	83.5	19	75.630	73.280	2.050	Open Manhole	1500
5.003	23.852	62.8	21	75.260	72.900	1.960	Open Manhole	1500
8.000	14.693	40.8	21	75.260	72.900	2.135	Open Manhole	1500
1.007	31.244	240.3	22	75.240	72.770	2.020	Open Manhole	1500
1.008	19.445	243.1		74.080	72.690	0.940	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.003	0.003	0.003
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.134	0.134	0.134
2.000	-	-	100	0.042	0.042	0.042
2.001	-	-	100	0.019	0.019	0.019
1.003	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.098	0.098	0.098
3.001	-	-	100	0.292	0.292	0.292
1.004	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.070	0.070	0.070
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.042	0.042	0.042
5.001	-	-	100	0.046	0.046	0.046
6.000	-	-	100	0.168	0.168	0.168
5.002	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.160	0.160	0.160
5.003	-	-	100	0.008	0.008	0.008
8.000	-	-	100	0.084	0.084	0.084
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.166	1.166	1.166

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		74.080	72.690	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 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)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Region	England and Wales
Return Period (years)	30	M5-60 (mm)	18.000

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Synthetic Rainfall Details

Ratio R	0.360	Cv (Winter)	0.840
Profile Type	Summer	Storm Duration (mins)	30
Cv (Summer)	0.750		

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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 OFF
DVD Status ON
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
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.
1.000	15 Winter	100	+30%					
1.001	15 Winter	100	+30%	100/15 Summer				
1.002	15 Winter	100	+30%	100/15 Summer				
2.000	15 Winter	100	+30%	100/15 Summer				
2.001	15 Winter	100	+30%	100/15 Summer				
1.003	15 Winter	100	+30%	100/15 Summer				
3.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			6
3.001	15 Winter	100	+30%	100/15 Summer	100/15 Summer			4
1.004	15 Winter	100	+30%	100/15 Summer				
4.000	15 Winter	100	+30%	100/15 Summer				
1.005	15 Winter	100	+30%	100/15 Summer				
1.006	15 Winter	100	+30%	100/15 Summer				
5.000	15 Winter	100	+30%	100/15 Summer				
5.001	15 Winter	100	+30%	100/15 Summer				
6.000	15 Winter	100	+30%	100/15 Summer				
5.002	15 Winter	100	+30%	100/15 Summer				
7.000	15 Winter	100	+30%	100/15 Summer				
5.003	15 Winter	100	+30%	100/15 Summer				
8.000	15 Winter	100	+30%	100/15 Summer				
1.007	15 Winter	100	+30%	100/15 Summer				
1.008	15 Winter	100	+30%	100/15 Summer				

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
1.000	1	74.661	-0.079	0.000	0.10	0.0	1.5	OK
1.001	2	74.638	0.588	0.000	0.33	0.0	5.6	SURCHARGED
1.002	3	74.629	0.779	0.000	0.68	0.0	50.4	SURCHARGED
2.000	4	74.885	0.825	0.000	0.81	0.0	13.9	SURCHARGED
2.001	5	74.716	1.036	0.000	1.02	0.0	17.0	SURCHARGED
1.003	6	74.532	0.932	0.000	0.74	0.0	53.6	SURCHARGED
3.000	7	75.166	1.216	16.395	2.03	0.0	37.5	FLOOD
3.001	8	75.324	1.649	4.479	2.08	0.0	105.2	FLOOD
1.004	9	74.435	0.910	0.000	1.22	0.0	142.4	SURCHARGED
4.000	10	75.070	0.950	0.000	0.93	0.0	22.0	FLOOD RISK
1.005	11	74.206	0.841	0.000	1.58	0.0	162.9	SURCHARGED
1.006	12	74.035	0.730	0.000	1.83	0.0	164.4	SURCHARGED

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

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
5.000	14	75.509	0.829	0.000	0.17	0.0	13.6	SURCHARGED
5.001	15	75.494	1.164	0.000	1.40	0.0	23.8	SURCHARGED
6.000	16	75.296	1.021	0.000	1.18	0.0	62.4	SURCHARGED
5.002	17	75.115	0.980	0.000	1.29	0.0	75.5	SURCHARGED
7.000	18	74.197	0.307	0.000	0.65	0.0	71.4	SURCHARGED
5.003	19	74.058	0.378	0.000	0.52	0.0	133.4	SURCHARGED
8.000	20	73.937	0.452	0.000	0.47	0.0	34.0	SURCHARGED
1.007	21	73.864	0.514	0.000	1.79	0.0	321.4	SURCHARGED
1.008	22	73.440	0.220	0.000	1.93	0.0	320.6	SURCHARGED

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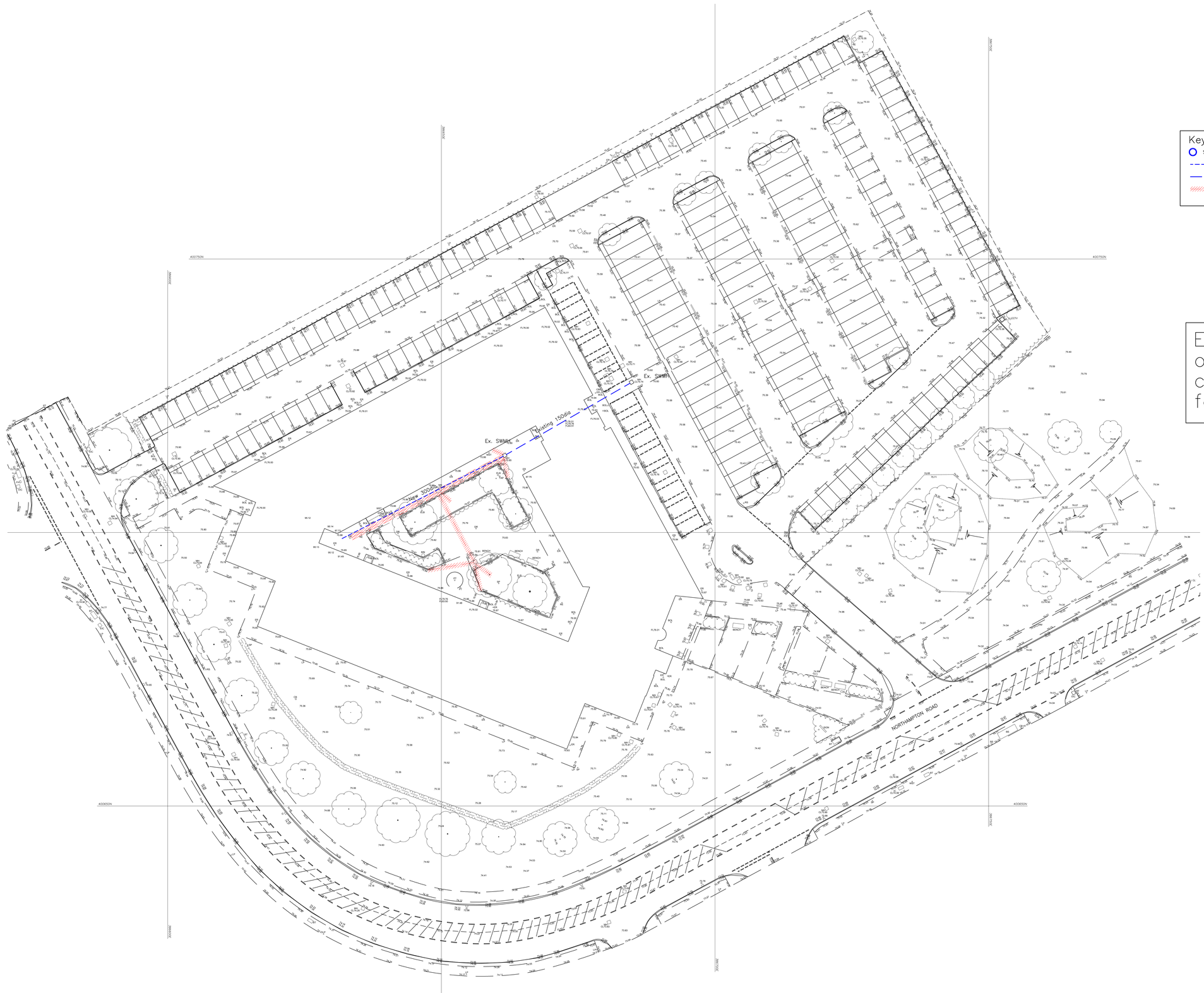
APPENDIX 9
PROPOSED DRAINAGE LAYOUT



Notes.

1 All dimensions are in millimetres unless noted otherwise.

2 All levels are in metres unless noted otherwise.

3 This drawing is to be read in conjunction with all relevant Architects and Service Engineers drawings.

Key

- SWMH – New Surface Water Manhole
- New Surface Water Drain
- Existing Surface Water Drain
- Existing Sewer to be grubbed / blocked up

Existing Drainage outside of the courtyard not shown for clarity

Proposed Drainage Catchment Plan
Scale 1:250

Scale 1:250

Rev	Drawn	Date	Description
P2	JS	07/17	Revised Scheme
P1	JS	07/17	Issued for Information

Drawing Status: INFORMATION

Contract: ONE CENTRAL PARK MANCHESTER CITY COUNCIL

Drawing Title: PROPOSED DRAINAGE SURFACE WATER

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Civil & Structural Engineers
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Scales	1:250 @ A0	Date	07/17
Drawn	JS	Checked	RH
Contract No	3010	Drawing No	3.01
			P2