Lincoln House & 123 Deansgate, Manchester

Drainage Design Report

July 2016







FAIRHURST

CONTROL SHEET

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				Checked	
				Approved	

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1 Introduction

1.1 Purpose

Fairhurst Consulting has been appointed by Worthington Mancap LLP to develop a detailed drainage design to service a proposed commercial development site off Deansgate, Manchester at Grid Ref: 383640, 398190 and shown in Appendix A Site Location Plan.

1.2 Proposed Development

The site comprises a multi storey office block with commercial premises on the ground floor and a basement car park.

1.3 Flood Risk Assessment & Drainage Design Strategy

A flood risk assessment for the development was produced by Fairhurst Consulting (Sordy, 2015), with the following detailed drainage design recommendations put forward:

"4.6.2 Design Method

The following design method should be adopted:

i. *Surface water will discharge to the adjacent 450mm combined sewer in Brazennose Street to the south of the site*
ii. *The drainage system should be designed not to flood during an event with a return period of 1 in 30 years in accordance with "Sewers for Adoption - 2012 Edition".*
iii. *There will be no increase in hardcover as part of the redevelopment of the site.*
iv. *Discharge calculations should be provided for both 1:30 and 1:100 year storm events.*
v. *Climate change should be accommodated by a 30% increase to design rainfall intensities.*
vi. *Although the site is covered by a layer of granular made ground overlaying Gravels the anticipated presence of basements in adjacent buildings and the basement structure within the proposed development make the use of soakaways infeasible.*
vii. *Foul water will discharge to the adjacent 450mm combined sewer in Brazennose Street to the south of the site "*

(Sordy, 2015)*p7-8*

2 Site Characterisation

2.1 Topography

The site has an area of 0.14ha in the urban commercial district of Deansgate Manchester.

2.2 Ground Conditions

The site is entirely comprised of developed urban area with the following soil profile:

- Superficial Deposits as Sand & Gravel
- Bedrock indicated as Sandstone (Chester Pebble Beds Formation)
- Made Ground (as sand, gravel, and bricks) to between 1.20m and 1.40m bgl
- Loose to Medium Dense Gravel to between 4.20m and 4.90m
- Bedrock as Sandstone proven to 15.00m bgl

(Sordy, 2015)

2.3 Flood Risk Summary

The flood risk report by (Sordy, 2015) concludes that the site is not at risk from flooding either from coastal, pluvial or surface water.

2.4 Hydrological

The hydrological parameters for the site development are as follows:

Parameter	Value
M5-60 (mm)	17
'r' Ration M5-60 / M5-2 day factor	0.4
SAAR (mm)	889
Soil Type	4
Soil value for IH124	0.47

3 Drainage Design

3.1 Concept Design

The flood risk assessment concluded that infiltration is not feasible for the site and that the drainage design concept for the site will be to discharge both surface and foul water to a combined sewer near the site of the development (Sordy, 2015).

3.2 Design Solution

The drainage network to service the development is shown in Appendix B Proposed Drainage Plan showing both surface and foul sewer networks discharging to a combined sewer that runs across the site.

3.3 Hydrologic & Hydraulic Simulation

The drainage network has been analysed using the MicroDrainage Simulation software package, and the results show that both surface and foul water network system do not flood for the return periods of 1 Year, 30 Year or 100 Year with an allowance of 30% for Climate Change for surface water and an allowance factor of 20% for foul water flows as shown in Appendix C Hydrologic & Hydraulic Assessment Results.

4 Conclusions

The drainage design solution for this development has adopted the drainage design findings concluded in the Flood Risk Assessment and Drainage Design Strategy for the development by (Sordy, 2015) as follows:

i. The discharge of surface water is to a combined sewer that crosses the development site from Mulberry Street and continues to the south of the site along Deansgate Street as shown in Appendix B Proposed Drainage Plan.
ii. The drainage system has been designed to achieve no flooding for the site for the return periods of 1 Year, 30 year and 100 Year in accordance to Sewers for Adoption – Seventh Edition August 2012.
iii. Pre development and post development hardstanding areas have remained the same at 0.13ha as sown in Appendix B Proposed Drainage Plan.
iv. The drainage design for surface water has allowed 30% increase in rainfall intensities for Climate Change in accordance with the latest CIRIA Guidance (B W Ballard, S Wilson, H Udale-Clarke, S illman, T Scott, R Ashley, R Kellagher, 2015) and results shown in Appendix C Hydrologic 7 Hydraulic Assessment Results.
v. Soakaways have not been adopted for this drainage design as they are not feasible as demonstrated in the Flood Risk Assessment and Drainage Design Strategy Report by (Sordy, 2015).

vi. Foul water discharge for the development is to a combined sewer that crosses the development site from Mulberry Street and continues to the south of the site along Deansgate Street as shown in Appendix B Proposed Drainage Plan.

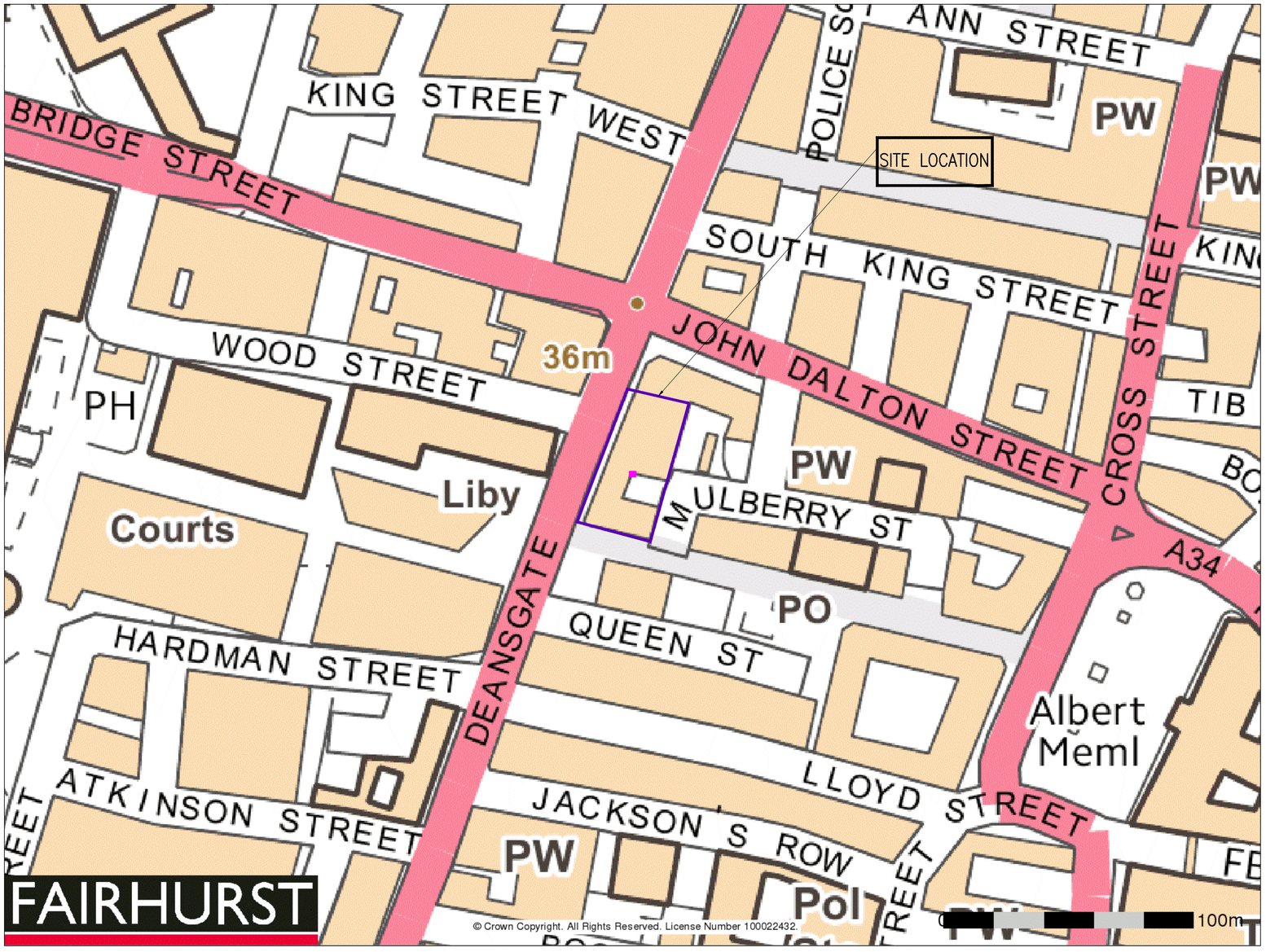
References:

B W Ballard, S Wilson, H Udale-Clarke, S illman, T Scott, R Ashley, R Kellagher, 2015. *The SuDS Manual (C753),* London: CIRIA.

HR Wallingford Ltd, 2015. *Winter rain acceptance potential map for the UK*. [Online]
Available at: http://www.uksuds.com/information/WRAP_map.pdf
[Accessed 29.06.2016].

Sordy, C., 2015. *Flood Risk Assessment,* Leeds: Fairhurst Consulting.

Appendix A SITE LOCATION PLAN



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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARD/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION.

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

Rev.	Date	Description	Drwn.	Chkd.	Appd.

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Tel: 0113 243 4671
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Client:

Project Title:
125 DEANSGATE
MANCHESTER

Drawing Title:
SITE LOCATION PLAN

Scale at A1:	Status:	
NTS	Preliminary	
Drawn:	Checked:	Approved:
JC	WN	FT
Date:	Date:	Date:
29/06/16	29/06/16	29/06/16

Drawing No.: 108348/2007

Revision: –

Appendix B PROPOSED DRAINAGE PLAN

Do not scale from this drawing.

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CONSTRUCTION

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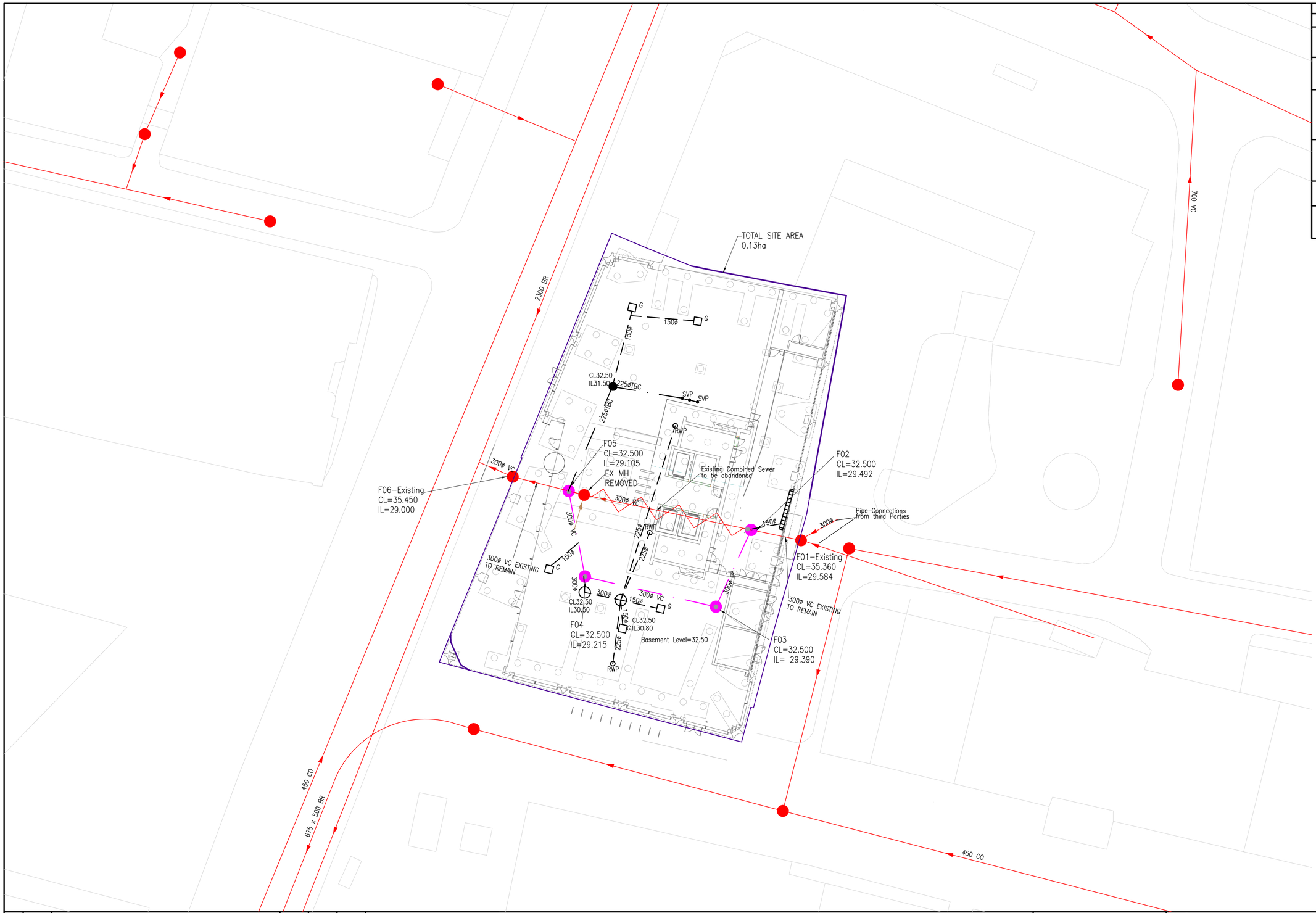

KEY:–

- PROPOSED FOUL SEWER
- PROPOSED SURFACE WATER SEWER
- EXISTING FOUL SEWER
- EXISTING SURFACE WATER SEWER
- EXISTING COMBINED SEWER
- EX. SEWER TO BE ABANDONED
- PROPOSED FOUL WATER SEWER DIVERSION
- PROPOSED SURFACE WATER SEWER DIVERSION
- PROPOSED CHANNEL DRAIN
- PROPOSED KERB DRAIN
- SU PROPOSED SILT UNIT
- G PROPOSED GULLY
- YG PROPOSED YARD GULLY
- RWP RAIN WATER PIPE
- RE PROPOSED RODDING EYE

NOTES

1). FOUNDATION PLAN INDICATIVE, SUBJECT TO CHANGE
2). ALL FOUL AND SURFACE WATER CONNECTION POINTS ARE INDICATIVE AND SUBJECT TO CHANGE.
3). FURTHER CONNECTIONS MAY BE REQUIRED SUBJECT TO LAYOUT.

Rev.	Date	Description	Drawn	Checked	Approved

Notes:

Client:

Project Title:
125 DEANSGATE
MANCHESTER

Drawing Title:
PROPOSED DRAINAGE

FAIRHURST
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Tel: 0113 243 4671 Fax: 0844 381 4412

Scale at A1:	Status:	
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03/06/16	02/06/16	02/06/16

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Revision: –

Appendix C HYDROLOGIC & HYDRAULIC ASSESSMENT RESULTS

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 (%)	30
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.400	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

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)	Auto Design
S1.000	5.574	0.092	60.7	0.000	5.00	0.0	0.600	o	300	
S1.001	8.893	0.102	87.2	0.000	0.00	0.0	0.600	o	300	
S1.002	14.132	0.175	80.8	0.000	0.00	0.0	0.600	o	300	
S2.000	3.875	0.140	27.7	0.140	5.00	0.0	0.600	o	225	
S2.001	1.675	0.042	40.0	0.000	0.00	0.0	0.600	o	225	
S1.003	9.150	0.101	90.6	0.000	0.00	0.0	0.600	o	300	
S1.004	6.074	0.105	57.8	0.000	0.00	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)
S1.000	50.00	5.05	29.584	0.000	0.0	0.0	0.0	2.02	142.9	0.0
S1.001	50.00	5.13	29.492	0.000	0.0	0.0	0.0	1.68	119.1	0.0
S1.002	50.00	5.27	29.390	0.000	0.0	0.0	0.0	1.75	123.8	0.0
S2.000	50.00	5.03	29.480	0.140	0.0	0.0	5.7	2.50	99.2	24.6
S2.001	50.00	5.04	29.342	0.140	0.0	0.0	5.7	2.07	82.5	24.6
S1.003	50.00	5.36	29.215	0.140	0.0	0.0	5.7	1.65	116.8	24.6
S1.004	50.00	5.41	29.105	0.140	0.0	0.0	5.7	2.07	146.4	24.6

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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	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.140	0.140	0.140
2.001	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.140	0.140	0.140

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)
S1.004	S6	35.450	29.000	29.000	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 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	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.000	Storm Duration (mins)	30
Ratio R	0.400		

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of 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	M5-60 (mm) 17.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.400	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	30, 30, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	360 Winter	1	+30%					29.584	-0.300	0.000
S1.001	S2	360 Winter	1	+30%					29.492	-0.300	0.000
S1.002	S3	360 Winter	1	+30%					29.390	-0.300	0.000
S2.000	S7	15 Winter	1	+30%	30/15 Summer				29.580	-0.125	0.000
S2.001	S8	15 Winter	1	+30%	30/15 Summer				29.485	-0.082	0.000
S1.003	S4	15 Winter	1	+30%					29.321	-0.194	0.000
S1.004	S5	15 Winter	1	+30%					29.209	-0.196	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.00		0.0	OK	
S1.001	S2	0.00		0.0	OK	
S1.002	S3	0.00		0.0	OK	
S2.000	S7	0.40		21.3	OK	
S2.001	S8	0.71		21.1	OK	
S1.003	S4	0.27		21.4	OK	
S1.004	S5	0.26		21.4	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of 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	M5-60 (mm) 17.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.400	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	30, 30, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	360 Winter	30	+30%					29.584	-0.300	0.000
S1.001	S2	360 Winter	30	+30%					29.492	-0.300	0.000
S1.002	S3	15 Winter	30	+30%					29.390	-0.300	0.000
S2.000	S7	15 Winter	30	+30%	30/15 Summer				29.793	0.087	0.000
S2.001	S8	15 Winter	30	+30%	30/15 Summer				29.652	0.086	0.000
S1.003	S4	15 Winter	30	+30%					29.392	-0.123	0.000
S1.004	S5	15 Winter	30	+30%					29.279	-0.126	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.00		0.0	OK	
S1.001	S2	0.00		0.0	OK	
S1.002	S3	0.00		0.0	OK	
S2.000	S7	0.97		51.2	SURCHARGED	
S2.001	S8	1.73		51.7	SURCHARGED	
S1.003	S4	0.65		51.9	OK	
S1.004	S5	0.64		51.6	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of 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	M5-60 (mm)	17.000
Region	England and Wales	Ratio R	0.400
Cv (Summer)	0.750		
Cv (Winter)	0.840		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	30, 30, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	360 Winter	100	+30%					29.584	-0.300	0.000
S1.001	S2	360 Winter	100	+30%					29.492	-0.300	0.000
S1.002	S3	15 Winter	100	+30%					29.407	-0.283	0.000
S2.000	S7	15 Winter	100	+30%	30/15 Summer				29.972	0.267	0.000
S2.001	S8	15 Winter	100	+30%	30/15 Summer				29.741	0.175	0.000
S1.003	S4	15 Winter	100	+30%					29.424	-0.091	0.000
S1.004	S5	15 Winter	100	+30%					29.312	-0.093	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.00		0.0	OK	
S1.001	S2	0.00		0.0	OK	
S1.002	S3	0.00		0.3	OK	
S2.000	S7	1.25		66.0	SURCHARGED	
S2.001	S8	2.22		66.5	SURCHARGED	
S1.003	S4	0.83		66.2	OK	
S1.004	S5	0.81		65.6	OK	

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FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	1.00	Add Flow / Climate Change (%)	20
Industrial Peak Flow Factor	3.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
F1.000	5.561	0.092	60.6	0.000	0	0.0	1.500	o	300	
F1.001	8.893	0.102	87.2	0.000	0	0.0	1.500	o	300	
F1.002	14.132	0.175	80.8	0.000	0	0.0	1.500	o	300	
F1.003	9.150	0.101	90.6	0.000	0	0.0	1.500	o	300	
F2.000	11.922	0.165	72.3	1.540	0	0.0	1.500	o	150	
F1.004	6.074	0.105	57.8	0.000	0	0.0	1.500	o	300	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	29.584	0.000	0.0	0	0.0	0	0.00	1.78	126.0	0.0
F1.001	29.492	0.000	0.0	0	0.0	0	0.00	1.49	105.0	0.0
F1.002	29.390	0.000	0.0	0	0.0	0	0.00	1.54	109.1	0.0
F1.003	29.215	0.000	0.0	0	0.0	0	0.00	1.46	103.0	0.0
F2.000	29.416	1.540	0.0	0	0.9	57	0.90	1.03	18.2	5.5
F1.004	29.105	1.540	0.0	0	0.9	42	0.91	1.83	129.1	5.5

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Area Summary for Foul - Main

Pipe Number	Gross Area (ha)	Pipe Total (ha)
1.000	0.000	0.000
1.001	0.000	0.000
1.002	0.000	0.000
1.003	0.000	0.000
2.000	1.540	1.540
1.004	0.000	0.000
	Total	Total
	1.540	1.540

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F1.004	F6	35.450	29.000	29.000	0	0

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Appendix D DESIGN RISK ASSESSMENT

Risk Assessment

Activity: Sewer Connection	**Reference:** 108348
Task Description: Design of surface and underground drainage services	
Assessor: WELLINGTON NDLOVU	**Date:** 29.06.2016

Assessment of Risk

Hazard	Likelihood	Severity	Risk
Trench collapse	Med	High	High
Falling into excavations	Med	Med	Med
Live flows	Med	Med	Med
Materials falling into excavation	Med	High	Med
Dust	Med	Low	Low
Flooding	Med	Med	Med
Noise	Med	Low	Med
Exposure to contamination and waste	Low	Med	Med
Contact with underground services	Low	High	Med
Fumes and toxic gases	Low	High	Med
Impact with vehicles	Low	Med	Low
Work in inclement weather	Low	Med	Low
	L | M | H	L | M | H	L | M | H
	L | M | H	L | M | H	L | M | H
	L | M | H	L | M | H	L | M | H
	L | M | H	L | M | H	L | M | H

Hazard	Likelihood	Severity	Risk
	L | M | H	L | M | H	L | M | H
	L | M | H	L | M | H	L | M | H
	L | M | H	L | M | H	L | M | H
	L | M | H	L | M | H	L | M | H

People at Risk

- [x] Workers
- [x] Adjacent Workers
- [ ] Site Wide Personnel
- [ ] Occupants
- [ ] Visitors
- [ ] Members of Public

Other:

Controls

Risk	Control Measures
Trench Collapse	Ground conditions should be established by survey and in engineers report. All trenches to be assessed by a competent person, sides to be battered to a safe angle or supported with timber or other suitable trench support following assessment. No person shall enter unsupported excavations of any depth. No materials to be stored close to excavation which could fall into or place additional loading on side of excavation. Excavation soil, plant and work materials must not be placed within 1.5m of an open excavation. Trenches to be inspected and signed off prior to entry each shift by a competent person. Weather monitored and entry prohibited to excavation during heavy rainfall or where risk of flooding identified.
Falling into/materials falling into excavation	Changes to ground conditions will trigger re-evaluation of trench support suitability. Edges of excavations to be protected by toe boards to prevent materials falling into excavation Safety barriers to be put in place where necessary to prevent risk of falling
Live flows	Prior to commencing work all sewers are to be located by tracing manhole covers and confirming sewer runs. Adequate ventilation to be provided for works in close proximity to sewers. Leave trench immediately should sewer be broken uncontrolled to avoid possibility of asphyxiation / flooding. When work on cutting the sewer is about to commence stopper off the sewer at the upstream manhole provided authorisation given and checks are made during the course of the work to ensure that flooding will not occur upstream of the works. After the connection has been made the stopper shall be loosened and the pressure allowed to reduce from behind the stopper. This will then enable it to be removed when it is considered safe to do so. No cutting of any type of public sewer shall be started if heavy rainfall is likely to occur before completion of the connection.
Contact with underground services	Where machinery used, operatives should be suitably trained and equipment maintained and tested as necessary. The area to be excavated will be surveyed with a cable avoidance tool (CAT) and the locations of services marked. Safe digging practices in accordance with HSE guidance to be used. All digging within 600mm of buried services will be by hand. Pipes to be supported in accordance with utility providers requirements as necessary. No use of pipes / cables as hand or foot holds.
Exposure to contamination	Contracts manager to determine prior to commencement on site. No smoking, eating or drinking in work area. Prior to finishing work for a break, remove all protective clothing in the dirty conditions room prior to washing and changing to ordinary work clothes. All cuts to be thoroughly washed and covered with a waterproof dressing.
Contact with waste	Appropriate PPE to be worn at all times when working with foul drainage. Good hygiene and washing prior to taking a break after a task associated with waste.

Risk	Control Measures
Work in confined spaces	Competent person to test atmosphere before entry and during work operations Eliminate the need for confined space working wherever possible. Employees to undertake adequate training. Rescue procedure to be planned and practised regularly. Permit to work for confined space entry. First aider to be available on site. Communication system to be in place. Safe means of access and egress required.
Traffic management	Vehicles to be kept well away from excavations. All vehicles on site to be accompanied by a banksman. Where vehicles are required to tip into excavations the edges should be protected using baulks of timber or stop blocks to prevent falling in or overloading.
Noise, fumes etc	No vehicles to be left running close to excavation where exhaust fumes could enter. Prior to entering excavations, gas detector to be lowered to establish a safe environment. Continued monitoring during the excavation works. Only trained operatives to enter confined space. Suitable PPE to be provided to protect against noise, dust and inclement weather
Other	PPE – HI-Viz, Safety Boots, and Hard Hats to be worn at all times on site. Safe means of access and egress to be provided. Ensure that all excavation are secured if left overnight to prevent injury to trespassers, particularly children, and any overnight security patrols. Excavations must be inspected by a competent person: at the start of each shift; after any incident that could have affected the excavation; after any fall of earth or materials. Good hygiene practice to be in place, wash hands before eating, drinking or smoking. Cover wounds with waterproof dressings.

Risk	Control Measures

Assessment of Remaining Risk

Very Low
safe to proceed work to control measures

Low
safe to proceed with caution

Medium
safe to proceed with further controls

High
proceed under further controls and supervised

Very High
unsafe DO NOT proceed - further action needed

Further Action Required

Action Required	Action Timeframe	Date Completed	Completed By
Ensure adequate supervision is provided and that control measures remain valid for the duration of the works.	Ongoing		
Safe systems of work are provided and issued to all staff and training provided in their use.	1 Week Refresh at Inductions		
Staff to be trained in the importance and use of correct Personal Protective Equipment and wearing of the correct PPE made a condition of employment.	1 Week Refresh at Inductions		
Permit to work system used for excavations and confined space entry.	Ongoing		

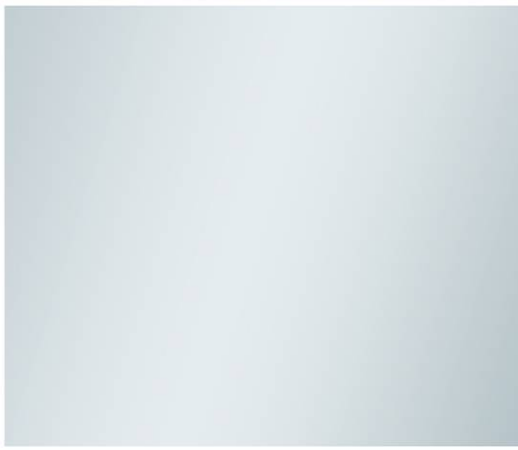
Acknowledgement

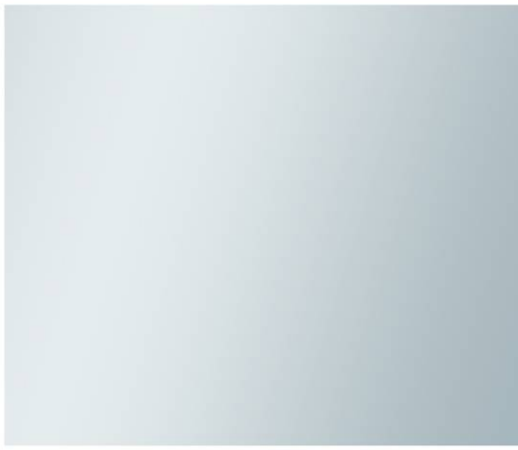
By signing this form you confirm that you have read and understood the risk assessments outlined and associated safe methods of work, are competent to undertake the work, and that you agree to comply with the safe working procedures in place to minimise the hazards present for the activities undertaken.

Name	Signature	Date
WELLINGTON NDLOVU		29.06.2016









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