



79 SILVER STREET, READING, RG1 2SU



SILVER STREET 79 LLP

DRAINAGE STRATEGY

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1 Introduction

Westlakes Consulting, as a division of Westlakes Engineering Ltd., has been commissioned by Silver Street 79 LLP to prepare a Drainage Strategy report for a development site at 79 Silver Street, Reading, RG1 2SU.

1.1 Site Description

The development site consists of a three-storey commercial development with a paved area to the front and a concrete access down the side of the property leading to a tarmac yard at the rear of the property, and a small garden which lies behind No 1 Mount Pleasant Terrace. With the exception of the garden area the site is made up of impermeable roof or impermeable paving. The total area of the site is 0.106ha of which 90% is impermeable

The site is accessed from Silver Street, which is adjacent to the western boundary of the site.

The site is located within a mix of commercial and residential property in an area lying south east of the centre of Reading.

The nearest surface water feature is the River Kennet which is located approximately 520m west of the site.

1.2 Proposed Future Use

Full Planning Permission for the demolition of the existing building on the site and erection of a part 3 and part 4 storey building to provide 56 student studio rooms was granted on 10th January 2018.

Post-development there will be a sunken garden giving access to studio units, and leisure facilities in the basement (-1 level) There is also a proposed area of soft landscaping at the back of the development. The proposed drainage strategy is discussed in detail within Section 3 of this report.

1.3 Site Levels

It is assumed that post-development external site surface levels will be similar to those pre-development, however the internal levels in the sunken garden will reflect basement levels.

1.4 Underlying Ground

Ground investigation (GI) was undertaken by Westlakes between 29th and 31st January 2018 and comprised drilling 3 cable percussive boreholes (BH1 to BH3) to 13m below ground level (bgl) and 2 window sampling boreholes (WS1 and WS2) to 3 and 4m bgl.

The site was found to be underlain by at least 1.3m of made ground, extending to a maximum encountered depth of 2.8m bgl. Topsoil was encountered beneath the garden area to 0.9m bgl. Superficial clay/sand/gravel of the Taplow Gravel Formation underlie the site over Lambeth Group clay over weathered chalk bedrock. Groundwater was not encountered during the GI.

2 Managing Surface Water

In accordance with the National Planning Policy Framework (NPPF) (Achieving sustainable development – Section 10, Meeting the challenge of climate change), the Environment Agency Report ref SC030219 – Rainfall runoff management for Developments, and the local Strategic Flood Risk Assessment (SFRA), consideration should be given to natural water flows at the site. The development should not adversely affect flow or increase flood risk elsewhere, including increasing run-off rates. The disposal of surface water should be dealt with in a sustainable way and climate change should also be accounted for. The site drainage strategy is discussed in Section 3.

2.1 Climate Change

There is evidence to suggest that the climate is changing with sea levels predicted to continue to rise along with more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall. The NPPF recommends that the effects of climate change be accounted for in FRA, with consideration of the EA flood maps and local authority SFRA.

Increased rainfall or higher intensity short-duration rainfall may increase as a result of climate change. Technical guidance published in March 2012 by the NPPF (Para 13 Table 5) recommends that for developments with a design life beyond 2085, a 30% increase in peak rainfall intensity should be accommodated. A 30% increase is therefore being allowed for within the new surface water drainage design to take account of climate change as discussed in Section 2. Climate change may also lead to variations in groundwater level which will also be considered during the drainage design.

2.2 Critical Drainage Area

Critical Drainage Areas have been delineated within the SFRA, using a combination of natural catchments, areas with historical sewer flooding and areas susceptible to surface water flooding greater than 0.3 m (as defined by the 1 in 200 chance of occurring in a year Flood Map for Surface Water (FMfSW) map). Specific drainage requirements are recommended in these areas to help reduce local flood risk.

The site is located within Character area 3 Reading south, close to the boundary with Reading Central. The site lies in an area which is identified as Flood Zone 1, having a less than a 1:1000 annual probability of flooding from watercourses or the sea. The SFRA states that special considerations will be given to the proposed Green Park Village development which lies in zone 2, 3A and 3B flood zones. The report describes development in areas close to Reading central as being “heavily constrained by the availability of brown field and the availability of green field sites”. Because of the limited potential for development, the site does not appear to be within a Critical Drainage area. The site is a brownfield site and the SFRA states:

- *Development should aim for a minimum reduction in surface water runoff rates of 30% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year (1% AEP) storm event, considering climate change.*
- *Development should be designed so that there is no flooding to the development in a 1 in 30 year (3.33% AEP) event and so that there is no property flooding in a 1 in 100 year (1% AEP) plus climate change event.*
- *Wherever possible, reductions in surface water should be achieved through the implementation of SUDS with source control considered firstly. There may be opportunities to deliver SUDS through integrated solutions for collections of strategic sites”.*

2.3 Sustainable Drainage Systems (SUDS)

SUDS are a desirable way to manage surface water disposal within new developments and SUDS methods for surface water drainage management are discussed further within the SUDS Manual. When designing



surface water drainage strategies priority should be given to disposal of surface water via infiltration drainage systems over first watercourses and then sewers.

The granular Taplow Gravel appears to have a low fines content and is expected to have a relatively good infiltration rate, however, the cohesive Lambeth Group clay is expected to have a relatively poor infiltration rate which could make a soakaway unfeasible for this site.

There would need to be sufficient space on site to allow safe soakaway construction e.g. BRE365 guidelines recommends that soakaways are positioned at least 5m from building foundations and site boundaries. Based on the proposed layout drawing WL_950_040_P1 in Appendix 1 it is apparent that there would be insufficient space on site to comply with this recommendation.

3 Drainage Strategy

Westlakes are undertaking the new site drainage design and have obtained details of Thames Water sewer assets in the area local to the site. The proposed strategy is set out below and is also shown on Drawing WL-950-045_P1 included as Appendix 1 along with supporting MicroDrainage calculations (Appendix 2).

3.1 Existing Site Drainage and Connections to the Public Sewer

The proposed development site consists of a single building which has two 150mm diameter into the existing sewers in Silver Street, one into the 300mm diameter combined sewer and one into the 300mm diameter surface water sewer.

3.2 Existing Flows from Site

The site is approximately 0.106 ha in area and is considered to be 90% impermeable in its pre-development state.

The combined existing brownfield flow has been estimated using Microdrainage modelling software and these calculations are included in Appendix 2. The calculations are based on a site impermeable area of 0.096 ha and a 2 pipe system was created for the existing site which produces brownfield flow rates at discharge of:

- 1 in 30 year – 25.6 l/s
- 1 in 100 year + 30% climate change – 37.6 l/s

3.3 Surface Water Drainage Strategy

The use of soakaways has been discounted for this site, as discussed in paragraph 2.3, due to existing ground conditions and the lack of space available to provide the recommended clearance prescribed in BRE365. There are no nearby watercourses to which surface waters could be discharged. It is therefore proposed that site surface water is discharged to the public sewer network.

It is noted in Section 2.2, that brownfield sites should aim for a minimum reduction in surface water runoff rates of 30%. In order to provide a conservative response, this figure has been applied to the existing impermeable site area (0.096ha) and in this scenario the total allowable discharge rates from site would be:

- 1 in 30 year – 17.9 l/s
- 1 in 100 year + Climate Change – 26.3 l/s

It is proposed that surface water from the site is allowed to discharge into the 300mm diameter surface water sewer in Silver Street at the reduced brownfield rates above, as shown on the drainage strategy drawing WL_950_040_P1.

The rate of discharge will need to be confirmed by the local drainage and Thames Water who will consider the capacity of the sewer and check their records for history of surcharging or flooding in the network.

To reduce the amount of surface run off the developer will investigate the use of porous paving and soft landscaping. If successful, this will reduce the run off area to 0.0648ha from the roofs and the bins store with the remaining site areas comprising permeable paved surfaces and landscaping thereby reducing the impermeable surfaces by circa 32.5% post-development. It is noted that the suitability of porous paving will be influenced by the permeability of the underlying ground and whether contamination is present, which will be considered as the design processes.

The site surface water drainage has been designed in accordance with current best practice to provide adequate capacity not to flood for a 1 in 30 year storm event and flood water generated from a 1 in 100 year plus climate change storm event (+30%) shall be constrained within the site boundary so not to cause off-site flooding. The risk of flooding elsewhere will not be increased as a result of the development proposals.

All redundant drains, sewers and manholes within the site will be removed or filled.



Discussions are taking place with Thames Water and the local drainage authority regarding the discharge of surface waters. Discharge restrictions and connection charges are still to be confirmed.

3.4 Foul Flows

It is proposed to connect foul flows via a new connection to the existing foul water network located within Silver Street, shown on the drainage strategy drawing WL_950_040_P1.

The foul discharge unit method has been used to define the peak flow 7.1 l/s (see Appendix 3).

3.5 Access and Egress

The site has pedestrian access from Silver Street which is located in EA Flood zone one 1 and is therefore at low risk of flooding from rivers and the sea. There may be localised areas of surface water flooding of gullies during heavy rainfall although this is not considered likely to represent a threat to accessibility for vehicles or pedestrians.

Safe access and egress should therefore be maintained.

3.6 Maintenance Plan

The foul and surface water systems will require regular maintenance to ensure effective operation. The appointed management company will take on the responsibility of operating and maintaining these systems. The table below details the anticipated frequency of maintenance for the proposed drainage network.

Element	Proposed Action	Frequency
Hydrobrake Chamber	Chamber to be checked to ensure there are no blockages or obstructions in the inlet or outlet pipes. Silt and other sediments to be removed where necessary.	6 months
Foul pumping chamber	Foul pumping chamber to be inspected to ensure there are no blockages or obstructions in the inlet pipework. Visual inspection of the base of the chamber to identify excessive sludge build up and, if necessary, arrange for specialist contractor to empty/desludge.	6 months
Submersible pumps in foul pumping chamber	Pumps to be inspected as recommended by manufacturer. Refer to manufacturers installation and operating instruction for list of points to be checked.	Annually
Foul water drainage system (whole)	Covers to be lifted to allow a visual inspection of the system to take place. Any blockages should be cleared.	Annually
SW drainage system (whole)	Covers to be lifted to allow a visual inspection of the system to take place. Any blockages should be cleared. Silt and other sediments to be removed where necessary.	Annually
Permeable paving	Paving to be brushed or vacuumed to reduce the build-up of silt and other sediments.	Annually

Table 1 Drainage Maintenance Schedule

4 Conclusions

The site is in EA Flood Zone 1 and is not known to flood historically. The following conclusions are drawn:

- The site is thought to be at low risk from all forms of flooding.
- The site is underlain Taplow Gravel superficial drift deposits which may be relatively permeable and could therefore support use of soakaways. However, there is insufficient space within the proposed development to allow safe soakaway construction and consequently use of soakaways is not recommended. There are no nearby watercourses. Permeable paving is planned to be included as part of the development proposals.
- It is proposed to discharge surface water into the surface water sewer in Silver Street at attenuated discharge rates of 17.9 l/s for a 1 in 30 year event and 26.3 l/s for a 1 in 100 year plus climate change event.
- The new site drainage will be designed with adequate capacity not to flood during a 1 in 30 year storm event and flood water generated from a 1 in 100 year plus climate change storm event (+30%) shall be constrained within the areas on site. The risk of off-site flooding will not increase as a result of the development and safe access and egress is to be maintained.
- Discharge restrictions and charges may apply for connections to the public drainage network.
- It is proposed to discharge foul flows to the combined sewer in Silver Street via a new connection, as shown on drawing WL_950_040_P1. The peak flow calculated using the discharge unit method is 7.1 l/s.



Appendix 1 Drawing WL_950_001_P1_Drainage Strategy

FOR TENDER

GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES, RELATIVE TO ORDNANCE DATUM SURVEY
3. ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY.
6. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THEIR SPECIFICATIONS.
7. DO NOT SCALE FROM THIS DRAWING, ONLY WRITTEN OR CALCULATED DIMENSIONS TO BE USED.
8. FOR GRID SET-OUT COORDINATES REFER TO ARCHITECTS DRAWINGS.

DRAINAGE NOTES

1. ALL NON ADOPTABLE DRAINS UP TO 150 DIA. TO BE POLYPIPE UPVC UNDERGROUND DRAIN MANUFACTURED IN ACCORDANCE WITH BS EN 1401-106 EQUAL APPROVED.
2. ALL ADOPTABLE DRAINS UP TO 300 DIA. TO BE POLYSEWER BLENDED DRAIN MANUFACTURED IN ACCORDANCE WITH THE WATER INDUSTRY SPECIFICATION WIS-45401.
3. DRAINS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. BACKFILL AND BEDDING TO AS PER TYPICAL DETAIL UNO.
4. ALL DRAINS TO BE Laid SOFTLY TO SOFTLY, AND THE EXACT POSITIONS OF ALL DRAINS MAY BE DETERMINED ON SITE PRIOR TO COMMENCEMENT OF WORK, ANY REVISIONS ARE TO BE SUBJECT TO THE APPROVAL OF THE LOCAL BUILDING INSPECTOR.
5. WORKS TO ANY ADOPTED SERVICES ARE TO BE IN ACCORDANCE WITH 'SEWERS FOR ADOPTION' 7th EDITION AND SHOULD BE APPROVED WITH THAMES WATER PRIOR TO COMMENCEMENT.

7. REFER TO ARCHITECT'S DRAWINGS FOR INTERNAL DRAINAGE POP UP POSTIONS.
8. ANY DRAINS PASSING THROUGH SUBSTRUCTURE WALLS TO HAVE A MINIMUM 50mm CLEAR SPACE. RC LINTEL SUPPORT ABOVE & EMENT FIBRE COLLARS EITHER SIDE TO PREVENT VERMIN ENTRY
9. ANY DRAINS CAST IN & PASSING THROUGH CONCRETE DRAINAGE BEAMS TO HAVE A FLEXIBLE JOINT NOT MORE THAN 150mm FROM THE FACE OF THE DRAINAGE BEAM. (FLEXIBLE JOINT TO BE 150mm FROM BEAMS) AND A MAXIMUM 600mm LONG ROCKER PIER EITHER SIDE
10. ALL LINES OF DRAINAGE INDICATED ARE PROVISIONAL ONLY. THE EXACT POSITIONS OF ALL DRAINS MAY BE ALTERED TO SUIT AND DETERMINED ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY REVISIONS ARE TO BE SUBJECT TO THE APPROVAL OF THE LOCAL BUILDING INSPECTOR.

11. WHERE DRAIN IS WITHIN 1M OF A BUILDING, THE TRENCH IS FILLED WITH CONCRETE UP TO THE UNDERSIDE OF THE FOUNDATIONS AND WHERE THE TRENCH IS FURTHER AWAY THAN 1M FROM THE BUILDING, THE TRENCH IS FILLED WITH CONCRETE TO A LEVEL BELOW THE LOWEST LEVEL FOR THE BUILDING EQUAL TO THE DISTANCE FROM THE BUILDING, LESS 150MM.

12. COVER LEVELS SHOWN ARE APPROXIMATE ONLY AND SHOULD BE ALTERED TO SUIT FINISHED SURFACE LEVELS. READ IN CONJUNCTION WITH THE MANHOLE SCHEDULE

LEGEND

- | | |
|---|--------------------------------|
|  | EXISTING FOUL WATER |
|  | EXISTING SURFACE WATER |
|  | EXISTING SEWER TO BE ABANDONED |
|  | PROPOSED PUMPED FOUL WATER |
|  | PROPOSED FOUL WATER |
|  | PROPOSED SURFACE WATER |

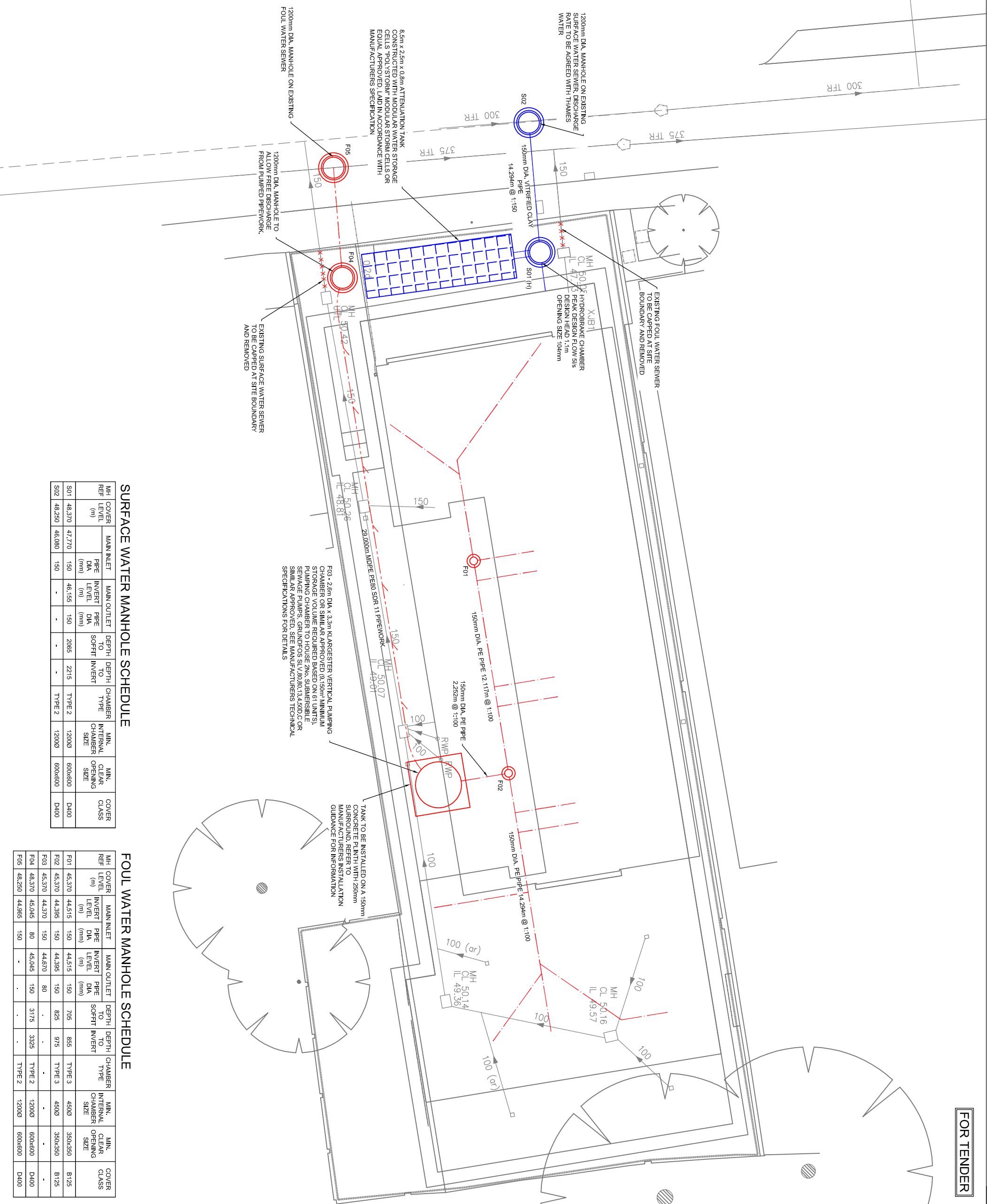
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Rev	Date	Revision Details	By	Chkd	App



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79 SILVER STREET, READING

Title		PROPOSED DRAINAGE LAYOUT	
Drawing No.		Revision	
WL_950_040		P1	
Scale	1:100 @ A1	Date	13.06.2016
Drawn	GM	Chk	GE
Unit 2, 1, 20 Date Street Manchester, M11 1EZ		Appd	GE
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Tel: 0161 236 820			



SURFACE WATER MANHOLE SCHEDULE

SLOT	MH COVER LEVEL (in)	MAIN INLET		MAIN OUTLET		DEPTH TO SOFT	DEPTH TO INVERT	CHAMBER TO TYPE	MIN. INTERNAL CHAMBER SIZE	MIN. CLEAR OPENING SIZE	COVER CLASS
		PPE DIA LEVEL (in)	INVERT DIA (mm)	PPE DIA (mm)	SOFT INVERT						
S01	48,270	47.770	150	46.155	150	2065	2215	TYPE 2	12000	600x600	D400
S02	48,250	46.080	150	-	-	-	-	TYPE 2	12000	600x600	D400

FOUL WATER MANHOLE SCHEDULE

	MANHOLE REF	COVER LEVEL (m)	MAN INLET INVERT LEVEL (m)	MAN OUTLET INVERT LEVEL (m)	DEPTH TO TOP OF SOFT	DEPTH TO INVERT	CHAMBER TYPE	MIN. INTERNAL CHAMBER SIZE	MIN. CLEAN. OPENING	COVER CLASS
F01		46.370	44.515	150	44.515	150	705	855	TYPE 3 4500 350x350	B125
F02		46.370	44.395	150	44.395	150	825	975	TYPE 3 4500 350x350	B125
F03		46.370	44.370	150	44.670	80	-	-	-	-
F04		46.370	45.045	80	45.045	150	3175	3325	TYPE 2 12000 600x600	D400
F05		48.250	44.965	50	-	-	-	-	TYPE 2 12000 600x600	D400



Appendix 2 Microdrainage Calculations – Existing Brown Field Run off

Westlakes Engineering Ltd		Page 1
20 Dale Street Manchester M1 1EZ		
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Micro Drainage		Network 2013.1.1

STORM SEWER DESIGN by the Modified Rational Method

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	20.000	0.400	50.0	0.096	5.00	0.0	0.600	o	150
1.001	20.000	0.333	60.1	0.000	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	5.23	20.000	0.096	0.0	0.0	0.0	1.43	25.2	13.0
1.001	49.15	5.49	19.600	0.096	0.0	0.0	0.0	1.30	23.0	13.0

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)
1.001	outfall	21.000	19.267	19.267	1200	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /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)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.700	Storm Duration (mins)	30
Ratio R	0.400		

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Micro Drainage		Network 2013.1.1

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 Coefficient	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	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.100	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
Return Period(s) (years)	1, 30
Climate Change (%)	0, 0

PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0%	30/15 Summer				
1.001	15 Winter	30	0%	30/15 Summer				

PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m³)	Flow / Cap. (l/s)	O'flow (l/s)	Flow (l/s)	
1.000	1	20.374	0.224	0.000	1.11	0.0	26.3	SURCHARGED
1.001	2	19.879	0.129	0.000	1.18	0.0	25.6	SURCHARGED

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STORM SEWER DESIGN by the Modified Rational Method

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	20.000	0.400	50.0	0.096	5.00	0.0	0.600	o	150
1.001	20.000	0.333	60.1	0.000	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	5.23	20.000	0.096	0.0	0.0	0.0	1.43	25.2	13.0
1.001	49.15	5.49	19.600	0.096	0.0	0.0	0.0	1.30	23.0	13.0

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)
1.001	outfall	21.000	19.267	19.267	1200	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /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)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.700	Storm Duration (mins)	30
Ratio R	0.400		

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Micro Drainage		Network 2013.1.1

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 Coefficient	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	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.100	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
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+30%	30/15 Summer				
1.001	15 Winter	100	+30%	30/15 Summer				

PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m³)	Flow / Cap.	O'flow (l/s)	Flow (l/s)	
1.000	1	21.458	1.308	0.000	1.62	0.0	38.5	SURCHARGED
1.001	2	20.424	0.674	0.000	1.74	0.0	37.6	SURCHARGED

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Appendix 3 Proposed Development Peak Foul Flow Rate Calculations

Foul Drainage Calculations For 79 Silver Street, Reading

Discharge Unit Method

USE??(Housing/Flats/Offices)

Student studios

61 units

Reception and management office

Appliance	Number	DU	Total
Appliances			
WC	64	1.2	76.8
Kitchen Sink	62	1.05	65.1
Wash Basin	64	0.3	19.2
Bath	0	1.05	0
Shower	61	0.45	27.45
Dishwasher	0	0.5	0
Washing machine	12	0.65	7.8
Foul Gully	2	1.3	2.6

Total DU 198.95

KDU (Frequency) 0.5

Total 7.1 l/s