



Drainage Strategy

18-24 Seel Street Liverpool

> 30th August 2017 4/6462

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Definition of Version Code:

- D. Applied during initial drafting of the report before it has been reviewed.
- C Applied after the report has been reviewed but before it has been approved by the Project Manager.
- B. Applied after the Project Manager has approved the report ready for issue to the client.
- A Applied to reports after external/internal review.

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Appendix A – United Utilities Sewer Records.

Appendix B – Surface Water Runoff Estimates for Existing and Proposed Developments.

Appendix C – Drainage Strategy Plan.



1.0 INTRODUCTION

1.1 General

- 1.1.1 This document outlines the initial drainage design philosophy in relation to the proposed residential accommodation development at Seel Street, Liverpool.
- 1.1.2 The site is located in central Liverpool between Gradwell Street and Seel Street, these streets run parallel along the South West and North East boundaries of the site respectively. David Lewis Street connects the two along the North West boundary of the site. The South East boundary is shared with The Wolstenholme Square development.
- 1.1.3 The development covers an area of approximately 0.232 hectares.
- 1.1.4 The site is currently the PSS HQ comprising of two storey office space, with car parking space at the west side of the site.
- 1.1.5 The proposal includes the demolition of the community centre and concrete hardstandings and the construction of a new 11 storey residential accommodation building with courtyard area at ground level and a rooftop terrace covering the entire roof.
- 1.1.6 Existing Service plans have been provided by United Utilities. (Appendix A).

1.2 Background Information

- 1.2.1 General guidance for Liverpool City Council's drainage requirements for surface water runoff on brownfield sites indicates if a site has been previously developed, it should be demonstrated that the drainage system is still operation for it to be classed as brownfield.
- 1.2.2 Information should be obtained on the system (pipe diameters, levels, gradients, lengths, hydraulic controls, etc).
- 1.2.3 A drainage model should be developed utilising these details in order to evaluate peak flow rates at the outfalls from the existing site for the design return period events.
- 1.2.4 The maximum allowed flow from the site should be derived using the 1:2 year critical rainfall event with a 30% 'betterment' applied to offer improvement.
- 1.2.5 The limiting discharge figure for the proposed development should be used in the design of the drainage system for the minimum requirement that flows for up to the 1:30yr critical rainfall event, are retained within the system and that for the 1:100yr+30% climate change allowance critical rainfall event there will be no flooding to any buildings and any excess volumes of water will be retained on site.
- 1.2.6 Existing site drainage constraints will also be taken into account when agreeing any discharge limits and the proposed flow should not exceed existing flows. For example; if the existing site outfall was a 150mm dia pipe, irrespective of



the area being drained, it would have a maximum flow capacity which may be lower than any proposed flows calculated using the above criteria, assuming a free discharge. Therefore discharge to the existing drainage system from the development would be effectively increased from the existing situation which is contrary to Environment Agency and National Planning Policy Framework guidance for flood risk and surface water management.



2.0 SITE CHARACTERISTICS

2.1 Location

2.1.1 The development is located as detailed as below.

OS X (Eastings)	334822
OS Y (Northings)	389993
Nearest Post Code	L1 4BE
Lat (WGS84)	(53.402716)
Long (WGS84)	(-2.9818022)
National Grid Reference	SJ348899

- 2.1.2 The total planning application development area is approximately 2320 m².
- 2.1.3 A review of United Utility record drawings indicates there are two combined foul and surface water runs; the first runs north west along Seel Street against the east boundary of the site, and the second runs parallel on the west site boundary along Gradwell Street. Connections into each can be made via existing manholes located adjacent to the site. The service record can be found in Appendix A
- 2.1.4 There are no known watercourses on or in the immediate vicinity of the development.

2.2 Development Proposals

1.1.7 The proposal includes the demolition of the community centre and concrete hardstandings and the construction of a new 11 storey residential accommodation building with a paved courtyard area at ground level and a rooftop terrace covering the entire roof.



3.0 DRAINAGE STRATEGY

3.1 Surface Water Drainage

- 3.1.1 The development provides the opportunity for drainage improvements on site which will help to decrease the risk of the surface water flooding. It is proposed to develop surface water drainage designs to ensure that all water is stored on site for rainfall events up to 1 in 100 years with a 30% allowance for climate change.
- 3.1.2 The proposed development has an approximate impermeable area of 2320m². Based upon a 15 minute storm duration, the existing and proposed discharge rates for a number of storm events are as follows (Calculations based upon Wallingford procedure – Appendix B):

Storm Event	Existing Development (l/s)	Proposed Development (l/s)
1 in 2 year	25	25
1 in 30 year	47	47
1 in 100 year	60	60
1 in 100 year + 30% climate change	80	80

- 3.1.3 In accordance with Liverpool City Council surface water drainage requirements, the existing site is considered to be 'Brownfield'. A 30% 'betterment' of the existing surface water runoff will be considered for the proposed development. This reduces the maximum allowable discharge to 17.5 l/s.
- 3.1.4 To achieve the 30% betterment, a flow control will be installed prior to any surface water leaving the development with surface water attenuated in storage tanks below the internal courtyard area.
- 3.1.5 Initial calculations based upon a 1 in 30 year storm event indicate that 40m³ storage volume would be required. For a 1 in 100 year storm event with an allowance of 30% for climate change, the required storage volume would increase to 80m³. Refer to Drainage Strategy Plan Appendix C.
- 3.1.6 The surface water drainage system will remain separate from the foul water drainage system whilst on the development and will be discharged into a newly formed connection into the combined system in Gradwell Street.
- 3.1.7 During the detailed design phase, all storm durations up to and including 6 hour storm events will be modelled to determine the final storage requirements for the development.
- 3.1.8 All proposed restricted flow rates and connection points will be subject to United Utilities agreement and approval.



3.2 Foul Water Drainage

- 3.2.1 The foul water drainage system will be collected in a separate system to the surface water. This will be collected via pipes and inspection chambers and will be positioned between the development boundary and the outer elevations of the building.
- 3.2.2 Two runs of foul water drainage system are proposed on the development; the first will be collect from the east side of the building and discharge into the existing manhole along Seel Street. The second will collect from the west side of the structure and discharge into the existing manhole in Gradwell Street.
- 3.2.3 All proposed below ground foul water drainage will comply with Building Regulations Part H:2010, BS EN 12056-2:2000 and BS EN 752:2008.
- 3.2.4 The proposed foul water flow rates for the development have been conservatively estimated using BS EN 752:2008.

SUMMARY	Discharge Unit	Totals	Total DU
Shower	0.6	269	161.4
Washbasin	0.6	280	168
WCs (4I - 9I cistern)	2.5	280	700
Kitchen Sink	1.3	209	271.7
Dishwasher	0.8	168	134.4
Floor drains (50mm - 100mm)	2	15	30
Washing Machine (Commercial)	1.5	0	0
Washing Machine (House)	0.8	66	52.8
			1518.3
Peak Flow Discharge	19.5	l/s	

- 3.2.5 The proposed foul water system will be designed for peak flow rates.
- 3.2.6 United Utilities approval for the flow rate entering the public sewer will be required to proceed with detailed design.



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APPENDIX A

United Utilities Sewer Records





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APPENDIX B

Surface Water Runoff Estimates for Existing

Ted ds calculation version 2.0.00

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Liverpool, L3 95Y.	Cales by TG	Calcs date 31/08/2017	Checked by MD	Checked date	Approved by BH	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure	
Design rainfall intensity	
Location of catchment area	Liverpool
Storm duration	D = 15 min
Return period	Period = 2 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.400
5-year return period rain fall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rain fall intensity due to global warming	p _{ctmate} = 0 %
Factor Z1 (Wallingford procedure)	Z1 = 0.63
Rain fall for 15min storm with 5 year return period	M5_15min, = Z1 × M5_60min = 12.0 mm
Factor Z2 (Wallingford procedure)	Z2 = 0.79
Rain fall for 15min storm with 2 year return period	M2_15min = Z2 × M5_15min, = 9.6 mm
Design rain fall intensity	I _{max} = M2_15min / D = 38.2 mm/hr
Maximum surface water runoff	
Catchment area	A _{catch} = 2320 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max} = 24.6 \text{ I/s}$

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APPENDIX C

Drainage Strategy Plan

