

Surface Water Drainage Design Statement

Eldon Grove, Liverpool

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|---------------------|--------------------------------------------------------------------------------------|
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Background

- 1 This note has been prepared by Weetwood Services Ltd ('Weetwood') for Stonebase Construction Ltd ('the Client').
- 2 The document relates to the proposed redevelopment of an approximately 0.74 hectare (ha) brownfield site at Eldon Grove, Liverpool at Ordnance Survey National Grid Reference SJ 346 916, as illustrated in **Figure 1**.
- 3 The existing site comprises of three former tenement blocks within the northern portion of the site, and a disused playground within the southern portion. The development proposals entail the construction of up to 136 residential apartments, including the refurbishment of Eldon Grove, with associated access and areas of landscaping.
- 4 Liverpool City Council's (LCC) Surface Water Management Guidance¹ document states that a drainage design statement is required for sites between 0.5 – 1.0 ha and located within Flood Zone 1.
- 5 The statement should indicate how the site currently drains, provide calculations showing the existing surface water runoff rates, and propose the allowable peak runoff rate from the proposed development. For previously developed sites the peak allowable flow rate from the site should be derived based upon the runoff from the existing site for the 1 in 2 annual probability rainfall event with a 30% reduction applied to offer improvement.

Surface Water Drainage at the Existing Site

- 6 The site comprises of predominantly impermeable surfaces. Google Street View indicates that the former tenement blocks (approximately 0.14 ha) are positively drained by a surface water drainage system (indicated by roof gutters and rainwater down pipes on the dwellings).
- 7 There is no available information indicating how the remainder of the impermeable surfaces drain. For the purposes of this report, it is thus assumed that the remainder of the site is not positively drained.

¹ Ref: Liverpool City Council Greenfield/Brownfield Sites Surface Water Management Guidance, Draft Outline Document, Updated October 2015.

- 8 Public sewer records have been obtained from United Utilities (**Appendix A**). This shows an extensive network of combined sewers within the immediate vicinity of the site, which are currently utilised for the disposal of surface water.
- 9 Records indicate a 900 x 550 mm public combined sewer crossing the centre alignment of the site (south of the former tenement blocks), and a 225 mm diameter surface water sewer (section 104) located between the former tenement blocks and Bond Street.
- 10 Based on the above, it is reasonable to assume that the on-site drainage system discharges to either the combined sewer or the surface water sewer.

Surface Water Runoff Rates – Existing Site

- 11 The peak discharge rates of surface water runoff from the former tenement blocks have been calculated based on the Modified Rational Method² (MRM).
- 12 As it is assumed that the remainder of the site is not positively drained (para. 7), these areas have not been included within the drainage calculations.
- 13 The following parameters have been obtained from the maps in Volume 3 of the Wallingford Procedure:

| | |
|-------------------------------------------------|--------|
| M5-60 minute rainfall depth: | 19 mm |
| Ratio of M5-60 to M5-2 day rainfall: | 0.40 |
| Average Annual Rainfall: | 820 mm |
| Winter Rain Acceptance Potential/ Soil Type: | 0.45 |
| The Urban Catchment Wetness Index (UCWI) value: | 88.2 |

- 14 A time of concentration of 15 minutes has been used.
- 15 A rainfall estimation calculation has been carried out to convert the M5-60 minute rainfall to the 15 minute duration rainfall for the 1 in 1 and 1 in 100 annual probability rainfall events. The calculated rainfall intensities for these events are 29.5 and 93.3 mm/hr respectively.
- 16 The flow rate as given by the MRM is:

$$Q = 2.78 \times C_v \times C_r \times \text{rainfall intensity} \times \text{impermeable area}$$

where:

C_v is the volumetric runoff coefficient = $P_r/PIMP = 0.80$

where P_r is Percentage Runoff and PIMP is Percentage Impermeable Area

C_r is the routing coefficient = 1.3

Impermeable Area = 0.14 ha

- 17 The peak discharges of surface water runoff from the former tenement blocks are shown in **Table 1**.

Table 1: Peak Runoff Rate from the Former Tenement Blocks

| Annual probability of rainfall event | Peak discharge for 0.14 ha impermeable area (l/s) |
|--------------------------------------|---------------------------------------------------|
| 1 in 1 | 12.0 |
| 1 in 2 | 15.5 |

² The Wallingford Procedure, Volume 4, 1981

| | |
|----------|------|
| 1 in 30 | 29.4 |
| 1 in 100 | 37.9 |

Surface Water Runoff Rates – Redeveloped Site

- 18 In accordance with the National Planning Policy Framework (NPPF) Planning Practice Guidance³, surface water runoff should be disposed of according to the following hierarchy:
1. Into the ground (infiltration)
 2. To a surface water body
 3. To a surface water sewer, highway drain, or another drainage system
 4. To a combined sewer
- 19 According to British Geological Survey (BGS) mapping the site is underlain by soils with impeded drainage and therefore not suitable for infiltration. There are no waterbodies within the vicinity of the site. Given this, it is proposed to direct all runoff from the redeveloped site to the public sewer system as per the existing arrangement.
- 20 In accordance with the requirements of LCC (para. 5), it is proposed that surface water runoff generated by a 1 in 100 annual probability rainfall event including a 30% allowance for climate change would be limited to the existing 1 in 2 annual probability rainfall event including a 30% reduction. This results in a peak discharge of 10.8 l/s.
- 21 The above discharge rate would need to be agreed with United Utilities at the detailed drainage design stage.

Summary

- 22 This statement has indicated that the former tenement blocks (Eldon Grove) are positively drained by an on-site surface water drainage system. Based on sewer records, it is reasonable to assume that the on-site drainage system discharges to the sewer network.
- 23 The peak discharge rates of surface water runoff from Eldon Grove have been calculated based on the Modified Rational Method.
- 24 In accordance with LCC, it is proposed to restrict the peak allowable discharge rate to the existing 1 in 2 annual probability rainfall event with a 30% reduction applied to offer improvement. The resulting peak discharge is therefore 10.8 l/s.

³ Paragraph 080, Reference ID: 7-080-20150323

Figures

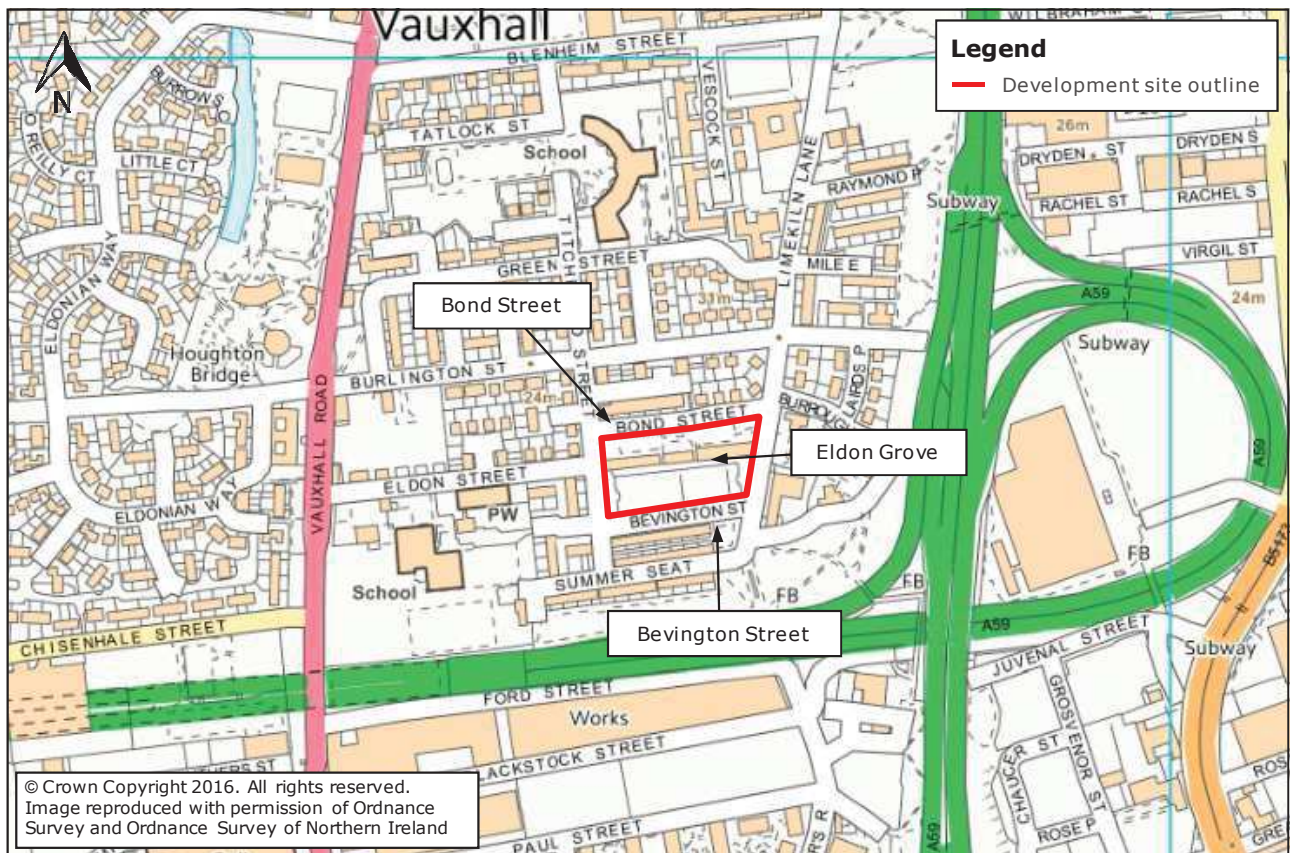
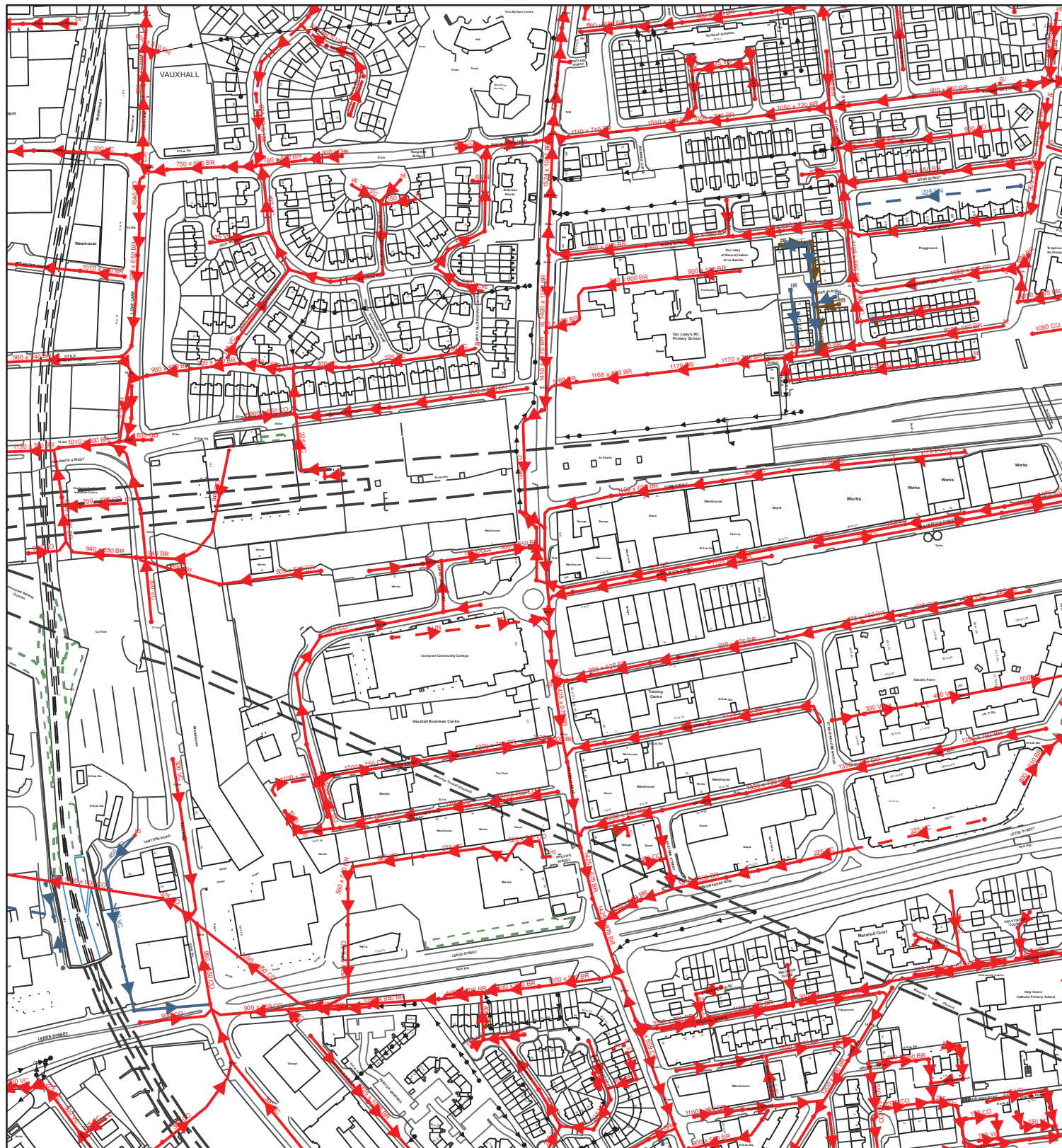


Figure 1: Site Location

Appendix A

United Utilities Sewer Map



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Date: 23/03/2015

Extract From Map of Public Sewers

X334298 Y391404



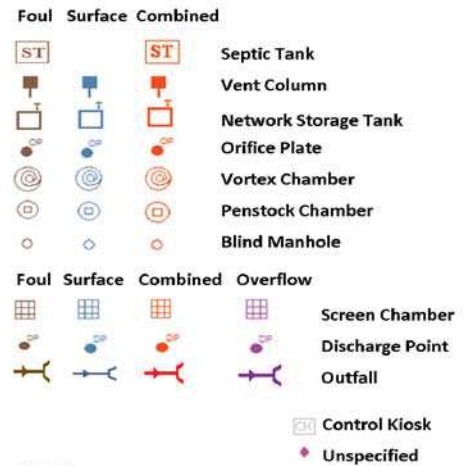
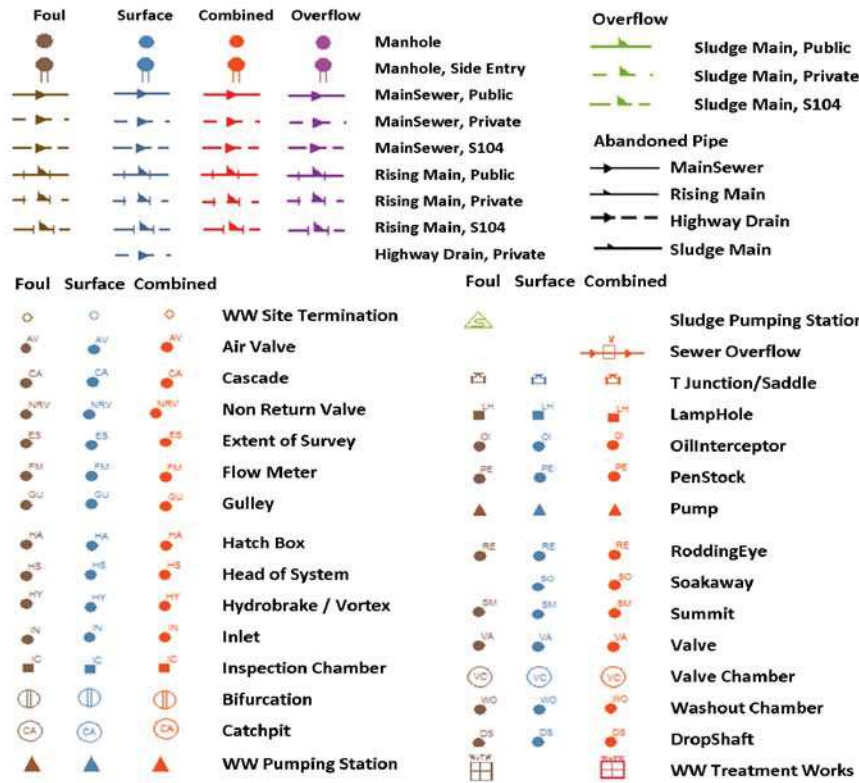
Legend

| | |
|--|---------------|
| | Water Course |
| | Overflow Pipe |
| | Sludge Main |
| | Highway Drain |
| | Combined |
| | Surface Water |
| | Foul |
| | Abandoned |
| | Public Sewer |
| | Private Sewer |
| | Section 104 |
| | Rising Main |

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown

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WASTE WATER SYMBOLOGY



| Legend | | | |
|---------------------------|-----------------------|----------------|--|
| MANHOLE FUNCTION | | SEWER SHAPE | |
| FO Foul | CI Circular | TR Trapezoidal | |
| SW Surface Water | EC Egg | AR Arch | |
| CO Combined | OV Oval | BA Barrel | |
| OV Overflow | FT Flat Top | HO HorseShoe | |
| | RE Rectangular | UN Unspecified | |
| | SQ Square | | |
| SEWER MATERIAL | | | |
| AC Asbestos Cement | DI Ductile Iron | | |
| BR Brick | VC Vitrified Clay | | |
| CO Concrete | PP Polypropylene | | |
| CSB Concrete Segment | PF Pitched Fibre | | |
| CSU Concrete Segment | MA Masonry, Coursed | | |
| CC Concrete Box Culverted | MA Masonry, Random | | |
| PSC Plastic / Steel | RP Reinforced Plastic | | |
| GR Glass Reinforced | CI Cast Iron | | |
| GRP Glass Reinforced | SI Spun Iron | | |
| PVC Polyvinyl Chloride | ST Steel | | |
| PE Polyethylene | U Unspecified | | |

CLEAN WATER SYMBOLOGY

PIPE WORK



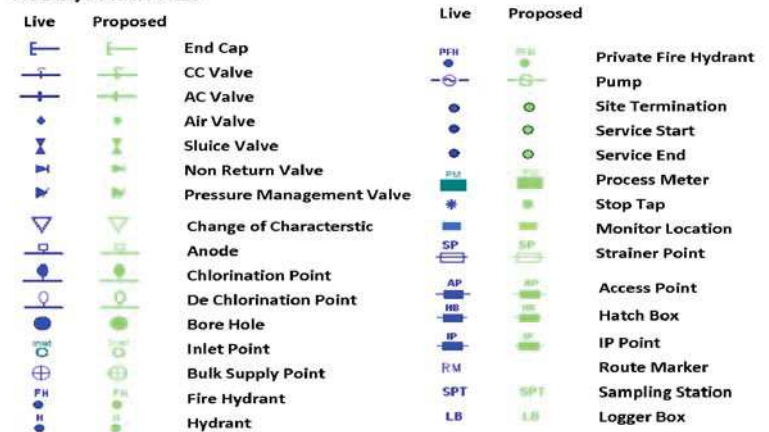
ABANDONED PIPE



PROPERTY TYPES



NODES/FURNITURES



| Legend | |
|--------------------|-------------------------|
| MATERIAL TYPES | LINING TYPES |
| AC ASBESTOS CEMENT | CL CEMENT LINING |
| CI CAST IRON | TB TAR OR BITUMEN |
| CU COPPER | ERL EPOXY RESIN |
| CO CONCRETE | |
| DI DUCTILE IRON | INSERTION TYPES |
| GI GALVANISED IRON | DD DIE DRAWN |
| GR GREY IRON | DR DIRECTIONAL DRILLING |
| OT OTHERS | MO MOLING |
| PB LEAD | PI PIPELINE |
| PV UPVC | SL SLIP LINED |
| SI SPUN IRON | |
| ST STEEL | |
| UN UNKNOWN | |
| PE POLYETHYLENE | |



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