



BODDINGTONS BREWERY, MANCHESTER

SITEWIDE DRAINAGE STRATEGY

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1. INTRODUCTION

1.1 Purpose of this Report

This Drainage strategy report has been prepared to support planning application 118831/FO/2018 – *“Erection of two buildings (a part 17, part 12 storey building and a part 26, part 23 storey building) to form 556 residential units (Use Class C3a) together with the creation of 3490 sqm of commercial floor space (Use Classes A1, A2, A3, B1 and D1) with associated landscaping, access and other associated works.”*

This report includes the information required in respect to Condition 6 of planning application 118831/FO/2018:

“Notwithstanding the water resources section of the ES stamped as received by the City Council, as Local Planning Authority on the 19 January 2018, (a) Prior to the commencement of a phase of development, a scheme for the drainage of surface water from the new development shall be submitted for approval in writing by the City Council as the Local Planning Authority. For the avoidance of doubt this shall include:

- *Runoff volume in the 1 in 100 year, 6 hours rainfall shall be constrained to a value as close as is reasonable practicable to the greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment;*

Due to the nature of the development it is not feasible to constrain the run-off volume to the greenfield run-off volume and instead the discharge from site will be limited to Q_{bar} . Microdrainage calculations of each of the 3 proposed surface water networks indicates the total run-off volume to be 568m³ for the 1 in 100 year 6 hour rainfall event (Refer to Appendix K for calculations) and this is less than the existing run-off volume of 599m³ (Refer to Section 3.1.2 for details)

- *Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event with allowance for 40% climate change in any part of a building;*

The drainage networks have been designed to accommodate the 1 in 100 year +40% climate change rainfall event with no flooding, refer to Appendix L for Microdrainage run-off calculations.

- *Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. The flood water should be routed away from the buildings and towards the less vulnerable areas i.e. open spaces, car parks and roads. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site.*

Refer to Appendix M for Overland Flood Flow Routes. External Levels have been designed to fall away from buildings and towards highways and landscaping areas.

- *Hydraulic calculation of the proposed drainage system;*

Refer to Appendix L for Proposed Surface Water Microdrainage Calculations for the 1, 2, 30 and 100 Year + 40% CC rainfall events.

- *Construction details of flow control and SuDS elements”*

Refer to Appendix N for Flow Control details, bio-retention detail and typical attenuation tank detail - supplier to produce site specific details for each tank which are to be included within the development O&M Manual.

The report should be read in conjunction with the Flood Risk Assessment & Drainage Strategy submitted as part of the original planning application.

- Flood Risk Assessment & Drainage Strategy – LO10517/R005.0 – December 2017 – Wardell Armstong

2. THE SITE

2.1 Site Location

The site situated on the Northern outskirts of Manchester city centre, approx. 200m northwest of Manchester Victoria railway station and opposite the MEN Arena. Site address is Dutton Street, Cheetham Hill, Greater Manchester, M3 1LE and is centred at National Grid Reference 383870E, 399260N. The site forms part of the former Boddingtons Brewery site.



Figure 2.1: Site Location

2.2 Site Description

The site boundaries are formed by highways on 2 sides: Dutton Street to the East and New Bridge Street to the south. The western side of the site abuts The Manchester City College - City Campus. Julia Street is located approximately 80m to south of the site.

Currently the site is occupied by a residential building and concrete hardstanding used as a private car park. The building is 2 storey structure that is scheduled to be demolished as part of the enabling works for the scheme.

The elevation of the site increases from approximately 29m AOD in the north-east corner to approximately 40m AOD in the south-west side.

Refer to Appendix A for the topographical survey.

2.3 Existing Site Drainage

A review of the topographical and utilities survey suggests that there are existing below ground drainage systems on site that drain the surface level car park that has been created since the demolition of the brewery buildings. There are areas of vegetation that slope to form the level differences across the site and other areas of overgrown vegetation that are underlay by redundant concrete slabs. As such it is appropriate to consider the site as 100% impermeable.

Refer to Appendix B for the Utility Survey.

Refer to Appendix C for United Utilities Sewer Maps.

2.4 Geology

Instructive site investigations have been undertaken by Brownfield Solutions Ltd (BSL). The following reports have been reviewed:

- Phase II Geo-Environmental Assessment Report – JEM/C5313/12029
- Piling Risk Assessment – JEM-C5313/12036
- Addendum Ground Gas Risk Assessment – AJS/C5313/12125

Within the BSL reports the site has been split into 3 areas which are indicated by the figure below.



Figure 2.2: Site Investigation Areas

2.4.1 Made Ground

Made ground is present across all areas of the site. This is comprised of asphalt concrete, gravelly sand and sandy gravelly clay. The depth of made ground varies between 0.45m to 4.60m.

2.4.2 Superficial Deposits

The composition and depth of superficial soils is shown to vary substantially with respect to the different areas of site.

Area A has natural superficial deposits comprising interbedded granular and cohesive stratum to depths between 0.50m and 22.00m. Area B natural superficial deposits comprising slightly gravelly slightly sandy clay to depths between 0.95m and 5.38m. Area C has natural superficial deposits comprising sand and gravel to depths between 3.00m and 11.50m

2.4.3 Solid Geology

The underlying bedrock is indicated to be part of the Chester Formation which typically comprises sandstone. Bedrock level varies substantially across the site. The bedrock slopes down by 10m from the North to the South of the site. The change in bedrock level is further intensified by the

drop in topographic level across the site. No faults are shown on or within an influencing distance of the site.

2.5 Hydrogeology & Hydrology

The following sections are based on the following reports:

- Phase 1 Desktop Study – Contaminated Land Assessment – LO10517/R006.01 – December 2017 – Wardell Armstrong
- Phase II Geo-Environmental Assessment Report – JEM/C5313/12029 – Brownfield Solutions Ltd

2.5.1 Hydrogeology

The superficial deposits underlying the site are classified as a Secondary Undifferentiated Aquifer. Secondary undifferentiated aquifers typically have variable characteristics and may be identified as Secondary A or B aquifers (minor or non-aquifers).

The underlying solid strata is classified as a Principal Aquifer. Principal aquifers are highly permeable formations usually with a known or probable presence of significant fracturing. They are usually highly productive, strategic reserves able to support large abstractions, public water supply and river base flow.

There is an active groundwater abstraction license onsite, operated by Interbrew UK Ltd for drinking, cooking, sanitary and washing purposes as well as brewery processes. Although the closure and demolition of the brewery suggests that groundwater abstraction no longer occurs although the license is still active. There are also a number of additional ground water abstraction licenses within 2km of the site.

The site does not lie within a source protection zone.

The site is considered to have a high leaching potential (HU) due to the site's urban location.

During the recent BSL site investigation, groundwater levels have ranged between 0.30m and 20.0m below ground level.

2.5.2 Hydrology

The nearest graded watercourse is the River Irk which is approximately 171m east of the site.

2.6 Proposed Development

Erection of two buildings (a part 17, part 12 storey building and a part 26, part 23 storey building) to form 556 residential units (Use Class C3a) together with the creation of 3490 sqm of commercial floor space (Use Classes A1, A2, A3, B1 and D1) with associated landscaping, access and other associated works.

Refer to Appendix D for proposed development plans.

3. EXISTING & PROPOSED SURFACE WATER DISCHARGE RATES

3.1 Pre-Development Surface Water Run-Off Rates

A review of the topographical survey and aerial images indicated that the existing site area is circa 1.2 ha and consists of approximately 76% (0.91ha) hard standing and 24% (0.29ha) vegetation. The areas of vegetation are either steep slopes between the level differences across the site or overgrown vegetation situated above redundant concrete slabs. As such it is appropriate to consider the existing site as 100% impermeable.

The existing site run-off rates and volume have been calculated as brownfield and greenfield to provide a comparison that will inform the proposed design.

3.1.1 Existing Brownfield Run-Off Rates

The brownfield run off rates have been calculated using the Modified Rational Method using the rainfall profile provided in Appendix E.

Modified Rational Method: $Q = 2.78Ci_{(peak)}A$

$$C = C_v C_R$$

$$C = 0.84 \times 1.3$$

Return Period	$i_{(peak)}$ (mm/hr)	Area (ha)	Peak Runoff (l/s)
1 in 1 Year	13.427	1.20	48.9
1 in 2 Year	16.383	1.20	59.7
1 in 30 Year	29.886	1.20	108.9
1 in 100 Year	38.870	1.20	141.6

Table 3.1: Brownfield Run-Off Rates

3.1.2 Existing Brownfield Run-Off Volume

The existing brownfield run off volume expected for a site of this size for a 100-year 6-hour storm has been calculated using the modified rational method.

$$\text{Runoff Volume} = 10C \times i_{(average)} \times A \times \text{storm duration}$$

$$\text{Runoff Volume} = 10 \times 0.84 \times 9.916 \times 1.2 \times 6$$

$$\text{Runoff Volume} = 599.720m^3$$

3.1.3 Existing Greenfield Run-Off Rates

The greenfield run-off for the site has been calculated using the MicroDrainage ICP SUDS method. This method utilises the IH124 method and linearly interpolates for sites less 50 hectares. Due to the urban environment that the site is situated in and given that a large proportion of site is urbanised (76% hard standing) it is considered appropriate to apply an urban factor to Q_{bar} . A bar has a return period of approximately 2.3 years. Refer to Appendix F for Microdrainage Greenfield Run-Off Rates.

Return Period	Q (l/s)
1 in 1 Year	15.2
1 in 2 Year	17.8
1 in 30 Year	25.3
1 in 100 Year	27.5
Q _{bar} (Rural)	7.1
Q _{bar} (Urban)	17.5

Table 3.2: Greenfield Run-Off Rates

3.1.4 Existing Greenfield Run-Off Volume

The existing greenfield run off volume expected for a site of this size for a 100-year 6-hour storm has been calculated using the Greenfield Volume calculator within Microdrainage assuming an urbanised catchment ratio of 0.75. The Greenfield Runoff Volume is calculated to be **385.567m³**. Refer to Appendix G for Microdrainage Drainage Greenfield Run-Off Volume calculation.

3.2 Proposed Surface Water Discharge Rates

As per the Strategic Flood Risk Assessment (SFRA), the drainage strategy submitted as part of the original planning submission proposed that discharge rates where to be reduced by at least 50% compared to the existing brownfield rates with an aim to reduce to greenfield run-off rates wherever possible.

A predevelopment enquiry has been submitted to United Utilities (UU) and as per the North West SuDS Pro-Forma they have agreed for the discharge from the development to be restricted to **Q_{bar} (Urban), 17.5 l/s**, to control the flow and volume of runoff from the site into the public sewer. Refer to Appendix H for the predevelopment enquiry correspondence.

4. SURFACE WATER DISCHARGE & SUDS ASSESSMENT

4.1 Surface Water Discharge Assessment

In accordance with the National Planning Practice Guidance (PPG), the following hierarchy of surface water drainage options has been considered:

- Discharge into the ground (infiltration);
- Discharge to a surface water body;
- Discharge to a surface water sewer, highway drain, or another drainage system;
- Discharge to a combined sewer.

4.1.1 Discharge to Ground (Infiltration)

The Phase II completed by BSL indicates the site is underlain by made ground to depths of up to 4.60m bgl which would pose risks to the mobilisation of contaminations should infiltration be utilised. Groundwater was also encountered at shallow depths which would limit infiltration rates and conflict with soakaway detailing. The intrusive investigations also identified multiple concrete slabs circa 2m below ground associated with previous uses of the site. For the reasons set out above infiltration has been discounted.

4.1.2 Connection to a Watercourse

Opportunities to discharge to a watercourse have also been considered. The closest watercourse is the River Irk which lies 171m east of the site. All routes to the River would require passing through third party land or constructing new surface water drainage in the already extremely congested City centre highways. The Phase II works completed by BSL attempted to identify a possible historic culvert via trenching, but no such feature was located. This also correlates with the investigation works undertaken on the adjacent site. As such this option is discounted.

4.1.3 Connection to a Sewer

The UU sewer asset maps show a small section of surface drainage adjacent to the site however identifies this as 'private drainage'. It is understood that this is redundant as it has not been encountered during the site enabling works or in topographical / utility surveys. As such there are no surface water sewers in close proximity to the site however there are several combined sewers in the highways surrounding the site. It is therefore proposed that surface water should be discharged into the combined sewer network, and this has been agreed in principle via a predevelopment enquiry with UU. Connection to the public sewer will be subject to a S106 application with UU. Each connection would require a separate S106 application.

4.2 Sustainable Drainage Systems (SuDS) Assessment

The table below provides a summary of typical SuDS outlined within CIRIA guide C753 'The SuDS Manual'. It provides an assessment of the various above and below ground SuDS that can provide water quality treatment and management of flows to reduce runoff rates and volumes and whether they can be suitably incorporated into this development. The purpose of this assessment is to set out the options that can be considered within the final drainage network and do not mean that all suitable features need to be incorporated into the final design.

SuDS Technique	Description	Suitability for development site	
Rainwater Harvesting	Collection of rainwater run-off for use	Large impermeable area and limited usage deems this unsuitable. Running and maintenance costs would not be acceptable to the client	✗
Green Roof	Vegetated roof area that reduces runoff and increases time of concentration.	Not efficient due to stepped roofs. Also, additional structure and costs due to increased loading.	✗
Blue Roof	Roof area designed to store and reduce peak runoff rates during intense storms.	Not efficient due to stepped roofs. Also, additional structure and costs due to increased loading.	✗
Infiltration systems	Systems that collect and storage runoff allowing it to infiltrate into the ground.	The large depths of made ground and shallow groundwater mean infiltration is not viable.	✗
Proprietary treatment systems	Underground structures designed to provide treatment to runoff	The site has a low pollution hazard rating so does not require a proprietary treatment system	✗
Filter Strips	Grass strips that promote sedimentation and filtration as runoff is conveyed over the surface	Urban nature of the development means there are no large grass strips	✗
Filter Drains	Granular filled Linear drains / soakaway with either granular fill and perforated pipe, or dense vegetation that treat runoff from adjacent impermeable areas	Not suitable due to known ground conditions	✗
Swales	Shallow landscape channels that treat and convey runoff.	Urban nature of the development means this is not a viable option.	✗
Bioretention systems	Shallow landscape depressions that allow runoff to pond temporarily on the surface, before filtering through vegetation and underling soils. Can either infiltrate or convey via perforated pipes.	Suitable as lined system with perforated pipes	✓
Trees	Tress within soil filled pits or permeable paving that can collect, store and treat run off	Maybe suitable subject to detailing.	?
Pervious Paving	Granular build-up beneath permeable paving systems that can be used to either store runoff (lined system) and increase time of concentration or allow percolation into the ground.	Not suitable due to known ground conditions	✗
Attenuation Storage tanks/ large diameter pipes	Large underground voided spaces used to storage runoff before infiltration or controlled discharge	Suitable to store and convey surface water run off	✓
Ponds and wetlands	Permanent pools of water used to treat run-off and provide attenuation above normal water level	Urban nature of the development means this is not a viable option.	✗
Detention Basins	Dry basins that are designed to temporarily store runoff providing water quality treatment. Can either be positively drained or infiltrate or both.	Urban nature of the development means this is not a viable option.	✗

✗ Not suitable

? Potentially suitable subject to further investigation

✓ Suitable

Table 4.1: SuDS Techniques & Suitability for Development Site

4.3 Water Quality Assessment

To assess the water quality consideration will be given to the guidance with the National Standard for Sustainable Urban Drainage (NSSUD) and CIRIA Guide C753. The pollution hazard levels for difference land uses are presented in table 4.2 and are based on the definitions in the NSSUD and C753.

Pollution Hazard Level	Land Use
Very Low	Residential roofs
Low	Individual property driveways, non-residential roofs, residential car parks, low traffic roads, non-residential car parking with infrequent change (e.g. Schools, offices)
Medium	Commercial yards and delivery areas, non-residential car parking with frequent change (e.g. hospital, retail), minor roads
High	Site with heavy pollution (e.g. Haulage yards, lorry parks, waste sites, sites with chemical and fuels are delivered, handled, stored etc.)

Table 4.2: Pollution Hazard Levels

The runoff from the site will be from the building roofs and external hard landscaped areas which will be predominately pedestrian areas with infrequent emergency, refuse and delivery vehicles. As such the pollution hazard level is considered to be low with the primary consideration given to the removal of gross solids and sediment.

Given surface water runoff from the development is to discharge into the combined sewers no treatment is required. However the use of silt traps and SuDS will provide inherent treatment.

4.4 SuDS Maintenance and Management Plan

The SuDS and below ground drainage networks are to be maintained by the property owners or a maintenance company employment on their behalf. They will be required to maintain the SuDS in line with the recommendations set out within the 'The SuDS Manual C753' and the suppliers' requirements.

The following operation and maintenance requirements for the SuDS that may be incorporated into the development are to be adopted by the Building Management Company. These requirements are general and have been extracted from 'The SuDS Manual C753'.

- Table 18.3 – Operation and maintenance requirements for bioretention systems
- Table 19.3 – Operation and maintenance requirements for Trees
- Table 21.3 – Operation and maintenance requirement for Attenuation storage tanks

The contractor delivering the development is to produce a verification report of the installed SuDS which should include any product specification requirements, and this should form part of the Operation & Maintenance Manual for the development.

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular Maintenance	Remove litter, surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosions protection if required	As required
	Repair minor accumulation of silt by raking away surface mulch scarifying surface of medium and replacing mulch.	As required
Remedial Actions	Remove and replace filter medium and vegetation above	As required but likely to be >20 years

Table 4.1 - Operation and Maintenance requirements for Bio-Retention Systems (Table 18.3 'The SuDS Manual C753)

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional Maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Table 4.2 - Operation and Maintenance requirements for Trees (Table 19.3 'The SuDS Manual C753)

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial Actions	Repair/ rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect/ check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tanks for sediment build-up and remove if necessary	Every 5 years or as required

Table 4.3 - Operation and Maintenance requirements for Attenuation Storage Tanks (Table 21.3 'The SuDS Manual C753)

5. DRAINAGE STRATEGY

5.1 Surface Water System

Due to the levels differences across the development it is proposed that there will be 3 separate surface water networks that are to collect run off from the building roofs and external hard landscaping. Each system will connect to the combined sewers within the surrounding highways via new connections and will be restricted to the greenfield run off rates identified in Section 3.0. One area of the development is land locked and as such drainage needs to be installed within 3rd party line in order to reach the public sewer. The route and associated easements have been discussed and agreed with the landowner, refer to Appendix P for correspondence. The surface water discharge rates from the site will be restricted by a vortex flow control within the final surface water manhole before discharging to the public sewer. Each connection to the combined sewer will require a S106 application with UU.

Surface water attenuation will be provided by oversized pipes and manholes, below ground geocellular tanks and bio-retention systems.

As detailed within Section 4.0 no surface water treatment is required prior to discharging into the public combined sewer however the adoption of silt traps, catchpit manholes and SuDS will provide inherent treatment.

The surface water drainage networks are to be designed and constructed in accordance with Building Regulations Part H, BS EN 752 and the Sewerage Sector Guidance (SSG). In addition the following requirements will also be adopted in accordance with the Non-Statutory Technical Standards for Sustainable Drainage, National Planning Policy Framework and Planning Practice Guidance:

- Foul and surface water are to be drained via separate systems.
- The below ground drainage system will be designed to ensure flooding does not occur on site for the 1 in 30 year events and no internal flooding for the 1 in 100 year events.
- The surface water system is to be designed to accommodate the 1, 2, 30 and 100 year events with a 40% climate change allowance for the 100 year event.
- The system will be designed for a maximum storm duration of 6 hours.

Refer to Appendix J for the Below Ground Drainage drawings.

Refer to Appendix K & L for supporting surface water microdrainage calculations.

Refer to Appendix M for Overland Flow Routes

Refer to Appendix N for Flow Control and SuDS Details

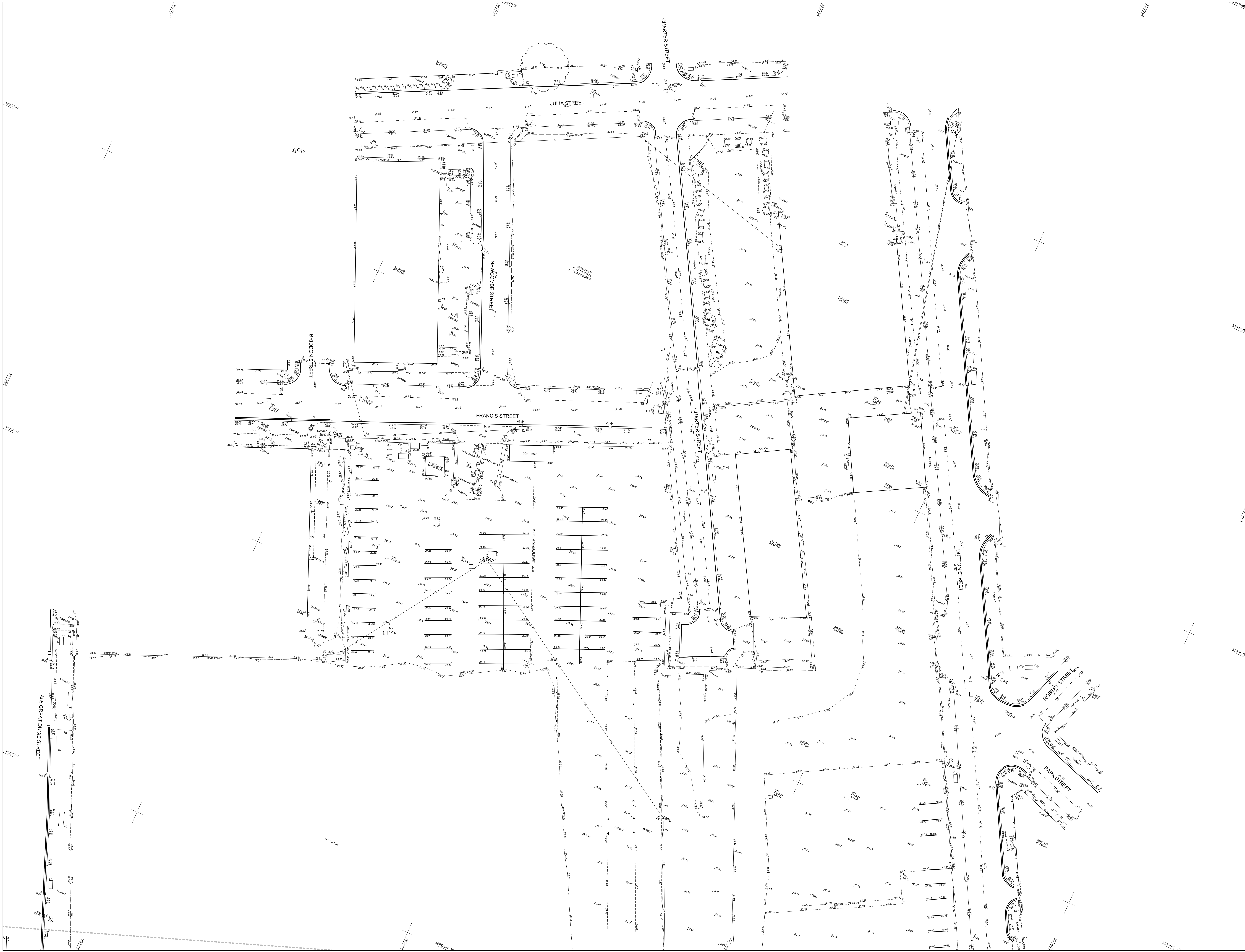
5.2 Foul Water System

Similarly to the surface water design the site is to have 3 separate foul water networks that collect the foul water associated with the residential apartments and retail spaces. Each network will have a separate connection to the combined sewers that surround the development and require separate S106 applications with UU.

It has been confirmed by UU via a pre-development enquiry that connects to the combined sewers at unrestricted rates are acceptable.

The foul networks are to be designed and constructed in accordance with Building Regulations Part H, BS EN 752 and the Sewerage Sector Guidance (SSG).

APPENDIX A TOPOGRAPHICAL SURVEY



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Note:
The survey is plotted on a plane local Grid. Orientation to National Grid.
All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Area Surveyed March 2023 as requested and added to Survey Operations Drawing 22K242 Shown within bold dashed line.

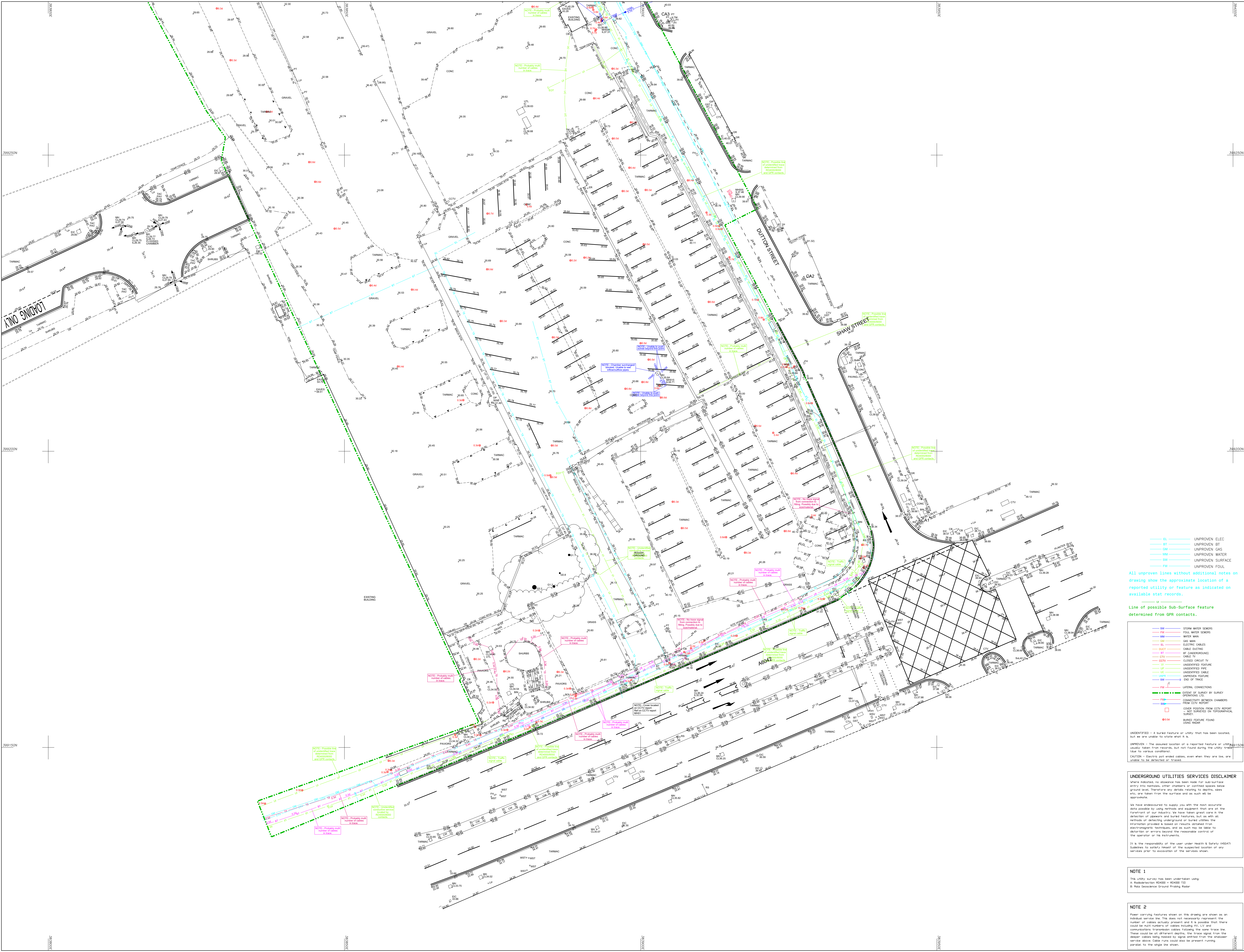
Revision - Date - Description
A - 24/05/23 - Invert levels added to survey.

SURVEY STATIONS			
Station	UTM X	UTM Y	Height
CA1	383947.50	599187.50	48.00
CA2	383947.50	599187.50	48.00
CA3	383944.61	599272.47	40.00
CA4	383973.40	599330.34	39.79
CA5	383929.14	599412.21	37.51
CA6	383775.40	599399.32	37.34
CA7	383728.75	599352.81	38.80
CA8	383753.73	599351.58	38.90
CA9	383756.45	599352.28	39.25
CA10	383830.84	599284.81	30.31
CA11	383756.45	599352.28	39.25
CA12	383830.84	599284.81	30.31
CA13	383830.84	599284.81	30.31
CA14	383830.84	599284.81	30.31
CA15	383830.84	599284.81	30.31
CA16	383830.84	599284.81	30.31
CA17	383830.84	599284.81	30.31
CA18	383830.84	599284.81	30.31
CA19	383830.84	599284.81	30.31
CA20	383830.84	599284.81	30.31
CA21	383830.84	599284.81	30.31
CA22	383830.84	599284.81	30.31
CA23	383830.84	599284.81	30.31
CA24	383830.84	599284.81	30.31
CA25	383830.84	599284.81	30.31
CA26	383830.84	599284.81	30.31
CA27	383830.84	599284.81	30.31
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CA36	383830.84	599284.81	30.31
CA37	383830.84	599284.81	30.31
CA38	383830.84	599284.81	30.31
CA39	383830.84	599284.81	30.31
CA40	383830.84	599284.81	30.31
CA41	383830.84	599284.81	30.31
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CA96	383830.84	599284.81	30.31
CA97	383830.84	599284.81	30.31
CA98	383830.84	599284.81	30.31
CA99	383830.84	599284.81	30.31
CA100	383830.84	599284.81	30.31

STANDARD REFERENCE & ABBREVIATIONS

AB	Altered Route	BL	Blind Level
AD	Asp Drain	BR	Brick
AE	Asp Drain	BS	Brick
AF	Asp Drain	BT	Brick
AG	Asp Drain	BU	Brick
AH	Asp Drain	CV	Close Valve
AI	Asp Drain	CP	Close Valve
AJ	Asp Drain	CR	Close Valve
AK	Asp Drain	CS	Close Valve
AL	Asp Drain	CT	Close Valve
AM	Asp Drain	CU	Close Valve
AN	Asp Drain	CV	Close Valve
AO	Asp Drain	CP	Close Valve
AP	Asp Drain	CR	Close Valve
AQ	Asp Drain	CS	Close Valve
AR	Asp Drain	CT	Close Valve
AS	Asp Drain	CU	Close Valve
AT	Asp Drain	CV	Close Valve
AV	Asp Drain	CP	Close Valve
AW	Asp Drain	CR	Close Valve
AX	Asp Drain	CS	Close Valve
AY	Asp Drain	CT	Close Valve
AZ	Asp Drain	CU	Close Valve
BA	Asp Drain	CV	Close Valve
BB	Asp Drain	CP	Close Valve
BC	Asp Drain	CR	Close Valve
BD	Asp Drain	CS	Close Valve
BE	Asp Drain	CT	Close Valve
BF	Asp Drain	CU	Close Valve
BG	Asp Drain	CV	Close Valve
BH	Asp Drain	CP	Close Valve
BI	Asp Drain	CR	Close Valve
BJ	Asp Drain	CS	Close Valve
BK	Asp Drain	CT	Close Valve
BL	Asp Drain	CU	Close Valve
BM	Asp Drain	CV	Close Valve
BN	Asp Drain	CP	Close Valve
BO	Asp Drain	CR	Close Valve
BP	Asp Drain	CS	Close Valve
BQ	Asp Drain	CT	Close Valve
BR	Asp Drain	CU	Close Valve
BS	Asp Drain	CV	Close Valve
BT	Asp Drain	CP	Close Valve
BU	Asp Drain	CR	Close Valve
BV	Asp Drain	CS	Close Valve
BW	Asp Drain	CT	Close Valve
BX	Asp Drain	CU	Close Valve
BY	Asp Drain	CV	Close Valve
BZ	Asp Drain	CP	Close Valve
CA	Asp Drain	CR	Close Valve
CB	Asp Drain	CS	Close Valve
CC	Asp Drain	CT	Close Valve
CD	Asp Drain	CU	Close Valve
CE	Asp Drain	CV	Close Valve
CF	Asp Drain	CP	Close Valve
CG	Asp Drain	CR	Close Valve
CH	Asp Drain	CS	Close Valve
CI	Asp Drain	CT	Close Valve
CJ	Asp Drain	CU	Close Valve
CK	Asp Drain	CV	Close Valve
CL	Asp Drain	CP	Close Valve
CM	Asp Drain	CR	Close Valve
CN	Asp Drain	CS	Close Valve
CO	Asp Drain	CT	Close Valve
CP	Asp Drain	CU	Close Valve
CQ	Asp Drain	CV	Close Valve
CR	Asp Drain	CP	Close Valve
CS	Asp Drain	CR	Close Valve
CT	Asp Drain	CS	Close Valve
CU	Asp Drain	CT	Close Valve
CV	Asp Drain	CU	Close Valve
CW	Asp Drain	CV	Close Valve
CX	Asp Drain	CW	Close Valve
CY	Asp Drain	CX	Close Valve
CZ	Asp Drain	CY	Close Valve
DA	Asp Drain	CZ	Close Valve
DB	Asp Drain	DA	Close Valve
DC	Asp Drain	DB	Close Valve
DD	Asp Drain	DC	Close Valve
DE	Asp Drain	DD	Close Valve
DF	Asp Drain	DE	Close Valve
DG	Asp Drain	DF	Close Valve
DH	Asp Drain	DG	Close Valve
DI	Asp Drain	DH	Close Valve
DJ	Asp Drain	DI	Close Valve
DK	Asp Drain	DJ	Close Valve
DL	Asp Drain	DK	Close Valve
DM	Asp Drain	DL	Close Valve
DN	Asp Drain	DM	Close Valve
DO	Asp Drain	DN	Close Valve
DP	Asp Drain	DO	Close Valve
DQ	Asp Drain	DP	Close Valve
DR	Asp Drain	DQ	Close Valve
DS	Asp Drain	DR	Close Valve
DT	Asp Drain	DS	Close Valve
DU	Asp Drain	DT	Close Valve
DV	Asp Drain	DU	Close Valve
DW	Asp Drain	DV	Close Valve
DX	Asp Drain	DW	Close Valve
DY	Asp Drain	DX	Close Valve
DZ	Asp Drain	DY	Close Valve
EA	Asp Drain	DZ	Close Valve
EB	Asp Drain	EA	Close Valve
EC	Asp Drain	EB	Close Valve
ED	Asp Drain	EC	Close Valve
EE	Asp Drain	ED	Close Valve
EF	Asp Drain	EE	Close Valve
EG	Asp Drain	EF	Close Valve
EH	Asp Drain	EG	Close Valve
EI	Asp Drain	EH	Close Valve
EJ	Asp Drain	EI	Close Valve
EK	Asp Drain	EJ	Close Valve
EL	Asp Drain	EK	Close Valve
EM	Asp Drain	EL	Close Valve
EN	Asp Drain	EM	Close Valve
EO	Asp Drain	EN	Close Valve
EP	Asp Drain	EO	Close Valve
EQ	Asp Drain	EP	Close Valve
ER	Asp Drain	EQ	Close Valve
ES	Asp Drain	ER	Close Valve
ET	Asp Drain	ES	Close Valve
EU	Asp Drain	ET	Close Valve
EV	Asp Drain	EU	Close Valve
EW	Asp Drain	EV	Close Valve
EX	Asp Drain	EW	Close Valve
EY	Asp Drain	EX	Close Valve
EZ	Asp Drain	EY	Close Valve
FA	Asp Drain	EZ	Close Valve
FB	Asp Drain	FA	Close Valve
FC	Asp Drain	FB	Close Valve
FD	Asp Drain	FC	Close Valve
FE	Asp Drain	FD	Close Valve
FF	Asp Drain	FE	Close Valve
FG	Asp Drain	FF	Close Valve
FH	Asp Drain	FG	Close Valve
FI	Asp Drain	FH	Close Valve
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FM	Asp Drain	FL	Close Valve
FN	Asp Drain	FM	Close Valve
FO	Asp Drain	FN	Close Valve
FP	Asp Drain	FO	Close Valve
FQ	Asp Drain	FP	Close Valve
FR	Asp Drain	FQ	Close Valve
FS	Asp Drain	FR	Close Valve
FT	Asp Drain	FS	Close Valve
FU	Asp Drain	FT	Close Valve
FV	Asp Drain	FU	Close Valve
FW	Asp Drain	FV	Close Valve
FX	Asp Drain	FW	Close Valve
FY	Asp Drain	FX	Close Valve
FZ	Asp Drain	FY	Close Valve
GA	Asp Drain	FZ	Close Valve
GB	Asp Drain	GA	Close Valve
GC	Asp Drain	GB	Close Valve
GD	Asp Drain	GC	Close Valve
GE	Asp Drain	GD	Close Valve
GF	Asp Drain	GE	Close Valve
GG	Asp Drain	GF	Close Valve
GH	Asp Drain	GG	Close Valve
GI	Asp Drain	GH	Close Valve
GJ	Asp Drain	GI	Close Valve
GK	Asp Drain	GJ	Close Valve
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GM	Asp Drain	GL	Close Valve
GN	Asp Drain	GM	Close Valve
GO	Asp Drain	GN	Close Valve
GP	Asp Drain	GO	Close Valve
GQ	Asp Drain	GP	Close Valve
GR	Asp Drain	GQ	Close Valve
GS	Asp Drain	GR	Close Valve
GT	Asp Drain	GS	Close Valve
GU	Asp Drain	GT	Close Valve
GV	Asp Drain	GU	Close Valve
GW	Asp Drain	GV	Close Valve
GX	Asp Drain	GW	Close Valve
GY	Asp Drain	GX	Close Valve
GZ	Asp Drain	GY	Close Valve
HA	Asp Drain	GZ	Close Valve
HB	Asp Drain	HA	Close Valve
HC	Asp Drain	HB	Close Valve
HD	Asp Drain	HC	Close Valve
HE	Asp Drain	HD	Close Valve
HF	Asp Drain	HE	Close Valve
HG	Asp Drain	HF	Close Valve
HH	Asp Drain	HG	Close Valve
HI	Asp Drain	HH	Close Valve
HJ	Asp Drain	HI	Close Valve
HK	Asp Drain	HJ	Close Valve
HL	Asp Drain	HK	Close Valve
HM	Asp Drain	HL	Close Valve
HN	Asp Drain	HM	Close Valve
HO	Asp Drain	HN	Close Valve
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HQ	Asp Drain	HP	Close Valve
HR	Asp Drain	HQ	Close Valve
HS	Asp Drain	HR	Close Valve
HT	Asp Drain	HS	Close Valve
HU	Asp Drain	HT	Close Valve
HV	Asp Drain	HU	Close Valve
HW	Asp Drain	HV	Close Valve
HX	Asp Drain	HW	Close Valve
HY	Asp Drain	HX	Close Valve
HZ	Asp Drain	HY	Close Valve
IA	Asp Drain	HZ	Close Valve
IB	Asp Drain	IA	Close Valve
IC	Asp Drain	IB	Close Valve
ID	Asp Drain	IC	Close Valve
IE	Asp Drain	ID	Close Valve
IF	Asp Drain	IE	Close Valve
IG	Asp Drain	IF	Close Valve
IH	Asp Drain	IG	Close Valve
II	Asp Drain	IH	Close Valve
IJ	Asp Drain	II	Close Valve
IK	Asp Drain	IJ	Close Valve
IL	Asp Drain	IK	Close Valve
IM	Asp Drain	IL	Close Valve
IN	Asp Drain	IM	Close Valve
IO	Asp Drain	IN	Close Valve
IP	Asp Drain	IO	Close Valve
IQ	Asp Drain	IP	Close Valve
IR	Asp Drain	IQ	Close Valve
IS	Asp Drain	IR	Close Valve
IT	Asp Drain	IS	Close Valve
IU	Asp Drain	IT	Close Valve
IV	Asp Drain		

APPENDIX B UTILITY SURVEY



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Note:
The survey is plotted on a plane local Grid. Orientation to National Grid.
All levels relate to Ordnance Datum, achieved using the OS National GPS Network.
Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.
Drainage information must be verified with local authority records before use
Revision - Date - Description
A - 24/05/23 - Additional information added from CCTV report.

SURVEY STATIONS			
Name	Easting	Northing	Height
CA1	383977.55	399229.12	38.00
CA2	383977.55	399229.12	40.00
CA3	383977.55	399229.12	40.00
CA4	383977.55	399229.12	40.00
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CA96	383977.55	399229.12	40.00
CA97	383977.55	399229.12	40.00
CA98	383977.55	399229.12	40.00
CA99	383977.55	399229.12	40.00
CA100	383977.55	399229.12	40.00

UNPROVEN ELEC
UNPROVEN BT
UNPROVEN GAS
UNPROVEN WATER
UNPROVEN SURFACE
UNPROVEN FOL

UNPROVEN - A buried feature or utility that has been located, but we are unable to state what it is.
UNPROVEN - The assumed location of a reported feature or utility trace usually taken from records, but not found during the utility trace (due to various conditions).
CAUTION - Electric joint boxes, even when they are live, are unlikely to be detected or traced.

UNDERGROUND UTILITIES SERVICES DISCLAIMER
Where indicated, no allowance has been made for sub-surface entry into manholes, other chambers or confined spaces below ground levels. Therefore any details relating to depths, sizes etc. are taken from the surface and as such will be approximate.
We have endeavored to supply you with the most accurate data possible by using methods and equipment that are at the forefront of our industry. We have taken great care in the detection of services and buried features, but we will not guarantee the accuracy of the data. The data is for information only and should not be used for construction purposes. The data is for information only and should not be used for construction purposes. The data is for information only and should not be used for construction purposes.
It is the responsibility of the user under Health & Safety (HS47) Substances to satisfy himself of the suspected location of any services prior to excavation of the services shown.

NOTE 1
This utility survey has been undertaken using:
A. Radiodetection (RADAR) - R10000 100
B. Non Invasive Ground Penetrating Radar

NOTE 2
Power carrying features shown on this drawing are shown on an individual service line. This does not necessarily represent the number of cables actually present and it is possible that there could be multiple numbers of cables including HV, LV and communications. Transposition of cables following the same route may. These could be at different depths, the trace signal from the deeper cables being masked by signals from the shallower service above. Cable runs could also be present running parallel to the single line shown.

STANDARD REFERENCE & ABBREVIATIONS

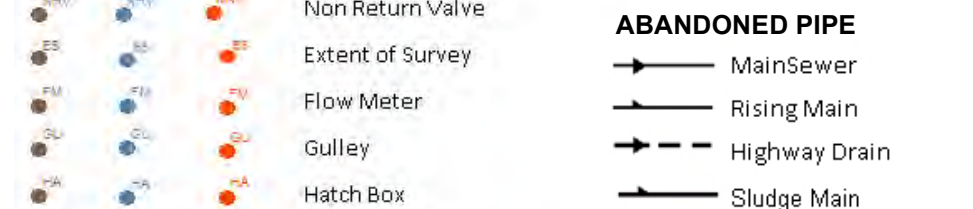
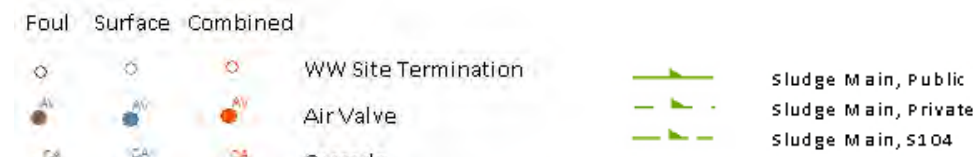
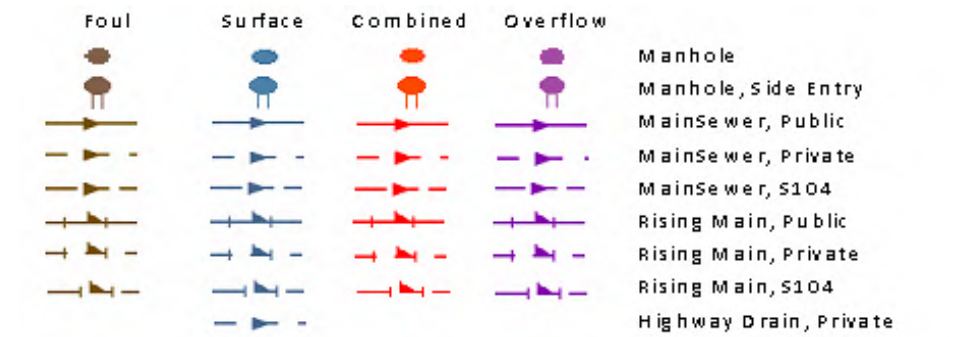
AW.....Asphalt Route	B.....Bed Level	BT.....British Telecom Box	CA.....Concrete	CH.....Chamber	CL.....Cable	CM.....Concrete Manhole	CO.....Concrete	CP.....Concrete	CS.....Concrete	CTV.....Cable Television	CU.....Cable	CV.....Concrete	CW.....Concrete	DA.....Drainage	DB.....Drainage	DC.....Drainage	DE.....Drainage	DF.....Drainage	DG.....Drainage	DH.....Drainage	DI.....Drainage	DJ.....Drainage	DK.....Drainage	DL.....Drainage	DM.....Drainage	DN.....Drainage	DO.....Drainage	DP.....Drainage	DQ.....Drainage	DR.....Drainage	DS.....Drainage	DT.....Drainage	DU.....Drainage	DV.....Drainage	DW.....Drainage	DX.....Drainage	DY.....Drainage	DZ.....Drainage	EA.....Electric	EB.....Electric	EC.....Electric	ED.....Electric	EE.....Electric	EF.....Electric	EG.....Electric	EH.....Electric	EI.....Electric	EJ.....Electric	EK.....Electric	EL.....Electric	EM.....Electric	EN.....Electric	EO.....Electric	EP.....Electric	EQ.....Electric	ER.....Electric	ES.....Electric	ET.....Electric	EU.....Electric	EV.....Electric	EW.....Electric	EX.....Electric	EY.....Electric	EZ.....Electric	FA.....Fence	FB.....Fence	FC.....Fence	FD.....Fence	FE.....Fence	FF.....Fence	FG.....Fence	FH.....Fence	FI.....Fence	FJ.....Fence	FK.....Fence	FL.....Fence	FM.....Fence	FN.....Fence	FO.....Fence	FP.....Fence	FQ.....Fence	FR.....Fence	FS.....Fence	FT.....Fence	FU.....Fence	FV.....Fence	FW.....Fence	FX.....Fence	FY.....Fence	FZ.....Fence	GA.....Grass	GB.....Grass	GC.....Grass	GD.....Grass	GE.....Grass	GF.....Grass	GG.....Grass	GH.....Grass	GI.....Grass	GJ.....Grass	GK.....Grass	GL.....Grass	GM.....Grass	GN.....Grass	GO.....Grass	GP.....Grass	GQ.....Grass	GR.....Grass	GS.....Grass	GT.....Grass	GU.....Grass	GV.....Grass	GW.....Grass	GX.....Grass	GY.....Grass	GZ.....Grass	HA.....Hedge	HB.....Hedge	HC.....Hedge	HD.....Hedge	HE.....Hedge	HF.....Hedge	HG.....Hedge	HH.....Hedge	HI.....Hedge	HJ.....Hedge	HK.....Hedge	HL.....Hedge	HM.....Hedge	HN.....Hedge	HO.....Hedge	HP.....Hedge	HQ.....Hedge	HR.....Hedge	HS.....Hedge	HT.....Hedge	HU.....Hedge	HV.....Hedge	HW.....Hedge	HX.....Hedge	HY.....Hedge	HZ.....Hedge	IA.....Iron	IB.....Iron	IC.....Iron	ID.....Iron	IE.....Iron	IF.....Iron	IG.....Iron	IH.....Iron	II.....Iron	IJ.....Iron	IK.....Iron	IL.....Iron	IM.....Iron	IN.....Iron	IO.....Iron	IP.....Iron	IQ.....Iron	IR.....Iron	IS.....Iron	IT.....Iron	IU.....Iron	IV.....Iron	IW.....Iron	IX.....Iron	IY.....Iron	IZ.....Iron	JA.....Junction	JB.....Junction	JC.....Junction	JD.....Junction	JE.....Junction	JF.....Junction	JG.....Junction	JH.....Junction	JI.....Junction	IJ.....Junction	JK.....Junction	KL.....Junction	KM.....Junction	KN.....Junction	KO.....Junction	KP.....Junction	KQ.....Junction	KR.....Junction	KS.....Junction	KT.....Junction	KU.....Junction	KV.....Junction	KW.....Junction	KX.....Junction	KY.....Junction	KZ.....Junction	LA.....Lamp	LB.....Lamp	LC.....Lamp	LD.....Lamp	LE.....Lamp	LF.....Lamp	LG.....Lamp	LH.....Lamp	LI.....Lamp	LJ.....Lamp	LK.....Lamp	LL.....Lamp	LM.....Lamp	LN.....Lamp	LO.....Lamp	LP.....Lamp	LQ.....Lamp	LR.....Lamp	LS.....Lamp	LT.....Lamp	LU.....Lamp	LV.....Lamp	LW.....Lamp	LX.....Lamp	LY.....Lamp	LZ.....Lamp	MA.....Manhole	MB.....Manhole	MC.....Manhole	MD.....Manhole	ME.....Manhole	MF.....Manhole	MG.....Manhole	MH.....Manhole	MI.....Manhole	MI.....Manhole	MJ.....Manhole	MK.....Manhole	ML.....Manhole	MM.....Manhole	MN.....Manhole	MO.....Manhole	MP.....Manhole	MP.....Manhole	MQ.....Manhole	MR.....Manhole	MS.....Manhole	MT.....Manhole	MU.....Manhole	MV.....Manhole	MW.....Manhole	MX.....Manhole	MY.....Manhole	MZ.....Manhole	NA.....Narrow	NB.....Narrow	NC.....Narrow	ND.....Narrow	NE.....Narrow	NE.....Narrow	NF.....Narrow	NG.....Narrow	NH.....Narrow	NI.....Narrow	NI.....Narrow	NJ.....Narrow	NK.....Narrow	NL.....Narrow	NM.....Narrow	NO.....Narrow	NP.....Narrow	NP.....Narrow	NQ.....Narrow	NR.....Narrow	NS.....Narrow	NT.....Narrow	NU.....Narrow	NV.....Narrow	NW.....Narrow	NX.....Narrow	NY.....Narrow	NZ.....Narrow	OA.....Ordnance	OB.....Ordnance	OC.....Ordnance	OD.....Ordnance	OE.....Ordnance	OF.....Ordnance	OF.....Ordnance	OG.....Ordnance	OH.....Ordnance	OI.....Ordnance	OJ.....Ordnance	OK.....Ordnance	OL.....Ordnance	OM.....Ordnance	ON.....Ordnance	OO.....Ordnance	OP.....Ordnance	OP.....Ordnance	OQ.....Ordnance	OR.....Ordnance	OS.....Ordnance	OT.....Ordnance	OU.....Ordnance	OV.....Ordnance	OW.....Ordnance	OX.....Ordnance	OY.....Ordnance	OZ.....Ordnance	PA.....Paved	PB.....Paved	PC.....Paved	PD.....Paved	PE.....Paved	PF.....Paved	PG.....Paved	PH.....Paved	PI.....Paved	PI.....Paved	PJ.....Paved	PK.....Paved	PL.....Paved	PM.....Paved	PN.....Paved	PO.....Paved	PP.....Paved	PP.....Paved	PQ.....Paved	PR.....Paved	PS.....Paved	PT.....Paved	PU.....Paved	PV.....Paved	PW.....Paved	PX.....Paved	PY.....Paved	PZ.....Paved	QA.....Quarry	QB.....Quarry	QC.....Quarry	QD.....Quarry	QE.....Quarry	QE.....Quarry	QF.....Quarry	QG.....Quarry	QH.....Quarry	QI.....Quarry	QJ.....Quarry	QK.....Quarry	QL.....Quarry	QM.....Quarry	QN.....Quarry	QO.....Quarry	QP.....Quarry	QP.....Quarry	QQ.....Quarry	QR.....Quarry	QS.....Quarry	QT.....Quarry	QU.....Quarry	QV.....Quarry	QW.....Quarry	QX.....Quarry	QY.....Quarry	QZ.....Quarry	RA.....Road	RB.....Road	RC.....Road	RD.....Road	RE.....Road	RE.....Road	RF.....Road	RG.....Road	RH.....Road	RI.....Road	RI.....Road	RJ.....Road	RK.....Road	RL.....Road	RM.....Road	RO.....Road	RP.....Road	RP.....Road	RQ.....Road	RR.....Road	RS.....Road	RT.....Road	RU.....Road	RV.....Road	RW.....Road	RX.....Road	RY.....Road	RZ.....Road	SA.....Sewer	SB.....Sewer	SC.....Sewer	SD.....Sewer	SE.....Sewer	SE.....Sewer	SF.....Sewer	SG.....Sewer	SH.....Sewer	SI.....Sewer	SI.....Sewer	SJ.....Sewer	SK.....Sewer	SL.....Sewer	SM.....Sewer	SN.....Sewer	SO.....Sewer	SP.....Sewer	SP.....Sewer	SQ.....Sewer	SR.....Sewer	SS.....Sewer	ST.....Sewer	ST.....Sewer	SU.....Sewer	SV.....Sewer	SW.....Sewer	SX.....Sewer	SY.....Sewer	SZ.....Sewer	TA.....Tarmac	TB.....Tarmac	TC.....Tarmac	TD.....Tarmac	TE.....Tarmac	TE.....Tarmac	TF.....Tarmac	TG.....Tarmac	TH.....Tarmac	TI.....Tarmac	TI.....Tarmac	TJ.....Tarmac	TK.....Tarmac	TL.....Tarmac	TM.....Tarmac	TO.....Tarmac	TP.....Tarmac	TP.....Tarmac	TQ.....Tarmac	TR.....Tarmac	TS.....Tarmac	TT.....Tarmac	TU.....Tarmac	TV.....Tarmac	TW.....Tarmac	TX.....Tarmac	TY.....Tarmac	TZ.....Tarmac	UA.....Utility	UB.....Utility	UC.....Utility	UD.....Utility	UE.....Utility	UE.....Utility	UF.....Utility	UG.....Utility	UH.....Utility	UI.....Utility	UI.....Utility	UJ.....Utility	UK.....Utility	UL.....Utility	UM.....Utility	UN.....Utility	UN.....Utility	UO.....Utility	UP.....Utility	UP.....Utility	UQ.....Utility	UR.....Utility	US.....Utility	UT.....Utility	UV.....Utility	UV.....Utility	UW.....Utility	UX.....Utility	UY.....Utility	UZ.....Utility	VA.....Valve	VB.....Valve	VC.....Valve	VD.....Valve	VE.....Valve	VE.....Valve	VF.....Valve	VG.....Valve	VH.....Valve	VI.....Valve	VI.....Valve	VJ.....Valve	VK.....Valve	VL.....Valve	VM.....Valve	VO.....Valve	VP.....Valve	VP.....Valve	VQ.....Valve	VR.....Valve	VS.....Valve	VT.....Valve	VU.....Valve	VV.....Valve	VW.....Valve	VX.....Valve	VY.....Valve	VZ.....Valve	WA.....Water	WB.....Water	WC.....Water	WD.....Water	WE.....Water	WE.....Water	WF.....Water	WG.....Water	WH.....Water	WI.....Water	WI.....Water	WJ.....Water	WK.....Water	WL.....Water	WM.....Water	WN.....Water	WO.....Water	WP.....Water	WP.....Water	WQ.....Water	WR.....Water	WS.....Water	WT.....Water	WU.....Water	WV.....Water	WW.....Water	WX.....Water	WY.....Water	WZ.....Water	XA.....X-ray	XB.....X-ray	XC.....X-ray	XD.....X-ray	XE.....X-ray	XE.....X-ray	XF.....X-ray	XG.....X-ray	XH.....X-ray	XI.....X-ray	XI.....X-ray	XJ.....X-ray	XK.....X-ray	XL.....X-ray	XM.....X-ray	XN.....X-ray	XO.....X-ray	XP.....X-ray	XP.....X-ray	XQ.....X-ray	XR.....X-ray	XS.....X-ray	XT.....X-ray	XU.....X-ray	XV.....X-ray	XW.....X-ray	XX.....X-ray	XY.....X-ray	XZ.....X-ray	YA.....Yard	YB.....Yard	YC.....Yard	YD.....Yard	YE.....Yard	YE.....Yard	YF.....Yard	YG.....Yard	YH.....Yard	YI.....Yard	YI.....Yard	YJ.....Yard	YK.....Yard	YL.....Yard	YM.....Yard	YN.....Yard	YO.....Yard	YP.....Yard	YP.....Yard	YQ.....Yard	YR.....Yard	YS.....Yard	YT.....Yard	YU.....Yard	YV.....Yard	YW.....Yard	YX.....Yard	YY.....Yard	YZ.....Yard	ZA.....Zebra	ZB.....Zebra	ZC.....Zebra	ZD.....Zebra	ZE.....Zebra	ZE.....Zebra	ZF.....Zebra	ZG.....Zebra	ZH.....Zebra	ZI.....Zebra	ZI.....Zebra	ZJ.....Zebra	ZK.....Zebra	ZL.....Zebra	ZM.....Zebra	ZN.....Zebra	ZO.....Zebra	ZP.....Zebra	ZP.....Zebra	ZQ.....Zebra	ZR.....Zebra	ZS.....Zebra	ZT.....Zebra	ZU.....Zebra	ZV.....Zebra	ZW.....Zebra	ZX.....Zebra	ZY.....Zebra	ZZ.....Zebra
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APPENDIX C

UNITED UTILITES SEWER MAP



WASTE WATER SYMBOLOGY



Refno	Cover	Func	Invert	Size	xSize	yShape	Mail	Length	Grad	Refno	Cover	Func	Invert	Size	xSize	yShape	Mail	Length	Grad
5200	31.59	CO								5200	31.59	CO							
5202	26.87	CO		23.34	525		CI	VC 55.23	789	5301	CO			150		CI	VC 5.86		
5301	CO									5302	27.62	CO		23.8	525		CI	VC 97.06	211
5303	27.79	CO		23.87	450		CI	VC 2.24		5304	27.71	CO		26.64	150		CI	VC 5	
5305	27.33	CO		23.67	450		CI	VC 29.15		5401	27.66	CO		25.98	150		CI	VC 6	
5402	27.23	CO								5403	27.26	CO							
5404	CO									6002	30.34	CO							
6003	29.99	CO								6004	28.5	CO							
6302	27.23	SW		23.66	640	880	HO	BR 95.58		6305	28.31	CO		23.57	700		CI	BR 9.43	
6402	27.69	CO		23.73	900		CI	BR 55.12	745	6403	CO								
6407	CO									7102	29.2	CO							
7102	29.47	CO		23.17	300		CI	BR 15.23	1523	7103	29.15	CO		23.28	1000		CI	BR 27.73	924
7104	29.11	CO		23.37	600	600	SQ	BR 86.2		7201	28.68	CO		23.34	1000		CI	BR 1	
7202	CO									7301	29.86	CO		25.86	640	920	HO	BR 32.2	
7302	32.46	CO		26.82	960	940	HO	BR 44.28	46	7402	32.75	CO		23.37	610	870	HO	BR 12.53	8
7403	32.75	CO		23.37	650	920	HO	BR 32.2	66	8302	38.71	CO							
8303	40.11	CO		36.29	300		CI	VC 20.88		8304	38.58	CO		35.2	375		CI	VC 55.15	42
8901	28.17	CO		33.91	300		CI	VC 1.41	71	9101	36.07	CO							
9401	42.71	CO		39.38	300		CI	VC 137.88		9402	41.75	CO		38.81	300		CI	VC 118.6	47
9504	CO									9505	SW		0	600	900	EG	BR 15.65		
9506	CO									9507	SW		0	300		CI	VC 13.42		
9508	CO									9509	CO		0	304	406	UN	VC 29.07		
9509	CO									9510	CO		0	525		CI	VC 56.82		
9510	CO									9511	CO		0	525		CI	VC 8.25		
9512	CO									9513	CO		0	304	406	UN	BR 6.32		
9514	CO									9516	SW								
9525	SW									9606	CO		0	525		CI	CO 5		
9607	CO									9608	CO			0	650	900	EG	BR 6.71	
9609	CO			23.68	700		CI	BR 52.48	750	9610	CO			3362	650	840	HO	BR 38.85	
9611	CO			0	300		CI	BR 136.19		9612	CO			750					
9613	CO			0	750		SQ	BR 30.02		9614	CO			300	500	UN	BR 83.24		
9615	CO			0	300	500	UN	BR 83.24		9616	CO								
9617	CO			0	381	508	UN	VC 105.35		9618	CO			0	939		CI	CO 60.35	
9619	CO			0	939		CI	CO 60.35		9620	CO			0	939		CI	CO 63.45	
9621	CO			0	650	1000	EG	BR 7.33		9622	CO			23.16	700	800	UN	BR 15.27	1527
9623	CO			23.22	300		CI	BR 27.73	924	9624	CO			33.22	300		CI	BR 27.73	
9625	CO			0	600	400	SQ	BR 51.52		9626	CO			0	600	400	SQ	BR 51.52	
9627	CO			0	304	406	UN	VC 45.91		9628	CO			0	304	406	UN	VC 45.91	
9629	CO			0	304	406	UN	VC 40.31		9630	CO			0	304	406	UN	VC 40.31	
9631	CO			0	750		CI	CO 30		9632	CO			0	304	406	UN	VC 47.54	
9633	CO			0	304	406	UN	VC 52.39		9634	CO			26.88	610	630	HO	BR 66.7	66
9635	CO			0	304	406	UN	VC 107.63		9636	CO			0	550	950	EG	BR 9.49	
9637	CO			26.88	610	630	HO	BR 66.7		9638	CO			27.69	650	650	SQ	BR 32.2	14
9639	CO			0	304	406	UN	VC 10.77		9640	CO			0	304	406	UN	VC 10.77	
9641	CO			0	304	406	UN	VC 22.85		9642	CO			0	304	406	UN	VC 42.06	
9643	CO			0	304	406	UN	VC 56.61		9644	CO			0	375		CI	VC 19.7	
9645	CO			0	375		CI	VC 4.47		9646	CO			0	375		CI	VC 9.49	
9647	CO			0	375		CI	VC 9.49		9648	CO			0	300		CI	VC 6.32	
9649	CO			0	300		CI	VC 11.66		9650	CO			0	300		CI	VC 7.28	
9651	CO			0	300		CI	VC 6.32		9652	CO			0	300		CI	VC 60.41	
9653	CO			0	100		CI	VC 29.73		9654	CO			0	300		CI	VC 60.08	
9655	CO			0	304	406	UN	VC 45.1		9656	CO			0	100		CI	VC 29.73	
9657	CO			0	300		CI	VC 20.25		9658	CO			0	300		CI	VC 17.72	
9659	CO			0	300		CI	VC 17.72		9660	CO								
9661	CO									9662	CO								
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9761	CO									9762	CO								
9763	CO									9764	CO								
9765	CO									9766	CO								
9767	CO																		

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular
EG	Egg
OV	Oval
FT	Flat Top
RE	Rectangular
SQ	Square

SEWER MATERIAL

AC	Asbestos Ceme
BR	Brick
PE	Polyethylene
RP	Reinforced Plas
CO	Concrete
CSB	Concrete Segme
CSU	Concrete Segme
CC	Concrete Box Cr
PSC	Plastic/Steel Co
GRC	Glass Reinforce
GRP	Glass Reinforce

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown. Crown copyright and database rights [2016] Ordnance Survey 100022432.

OS Sheet No: SJ8399SE

Scale: 1:1250 Date: 04/08/2017

142 Nodes

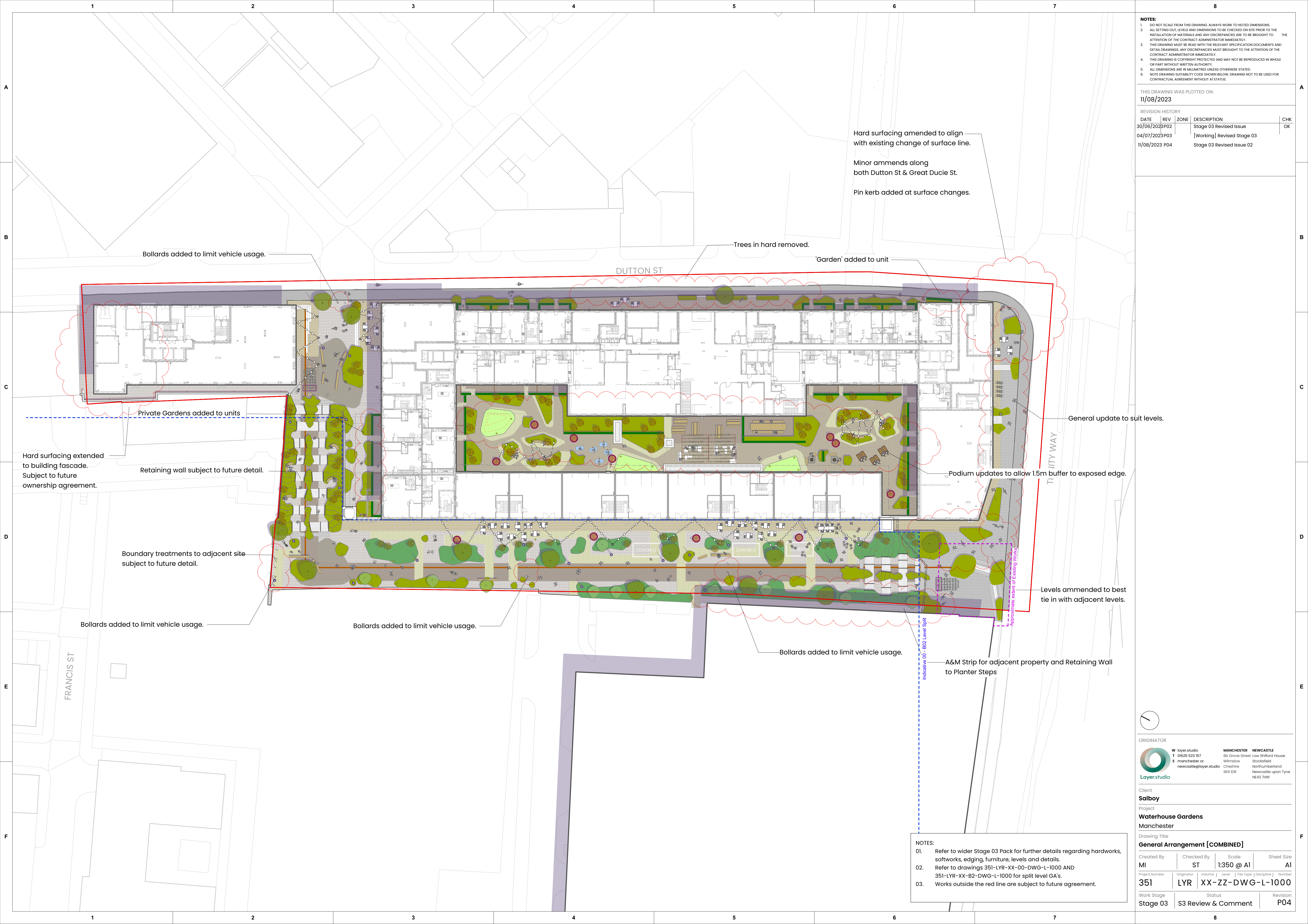
Sheet 1 of 1



SEWER RECORDS

APPENDIX D

PROPOSED DEVELOPMENT PLANS



NOTES:

- DO NOT SCALE FROM THIS DRAWING. ALWAYS WORK TO NOTED DIMENSIONS.
- ALL SETTING OUT, LEVELS AND DIMENSIONS TO BE CHECKED ON SITE PRIOR TO THE INSTALLATION OF MATERIALS AND ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR IMMEDIATELY.
- THIS DRAWING MUST BE READ WITH THE RELEVANT SPECIFICATION DOCUMENTS AND DETAIL DRAWINGS. ANY DISCREPANCIES MUST BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR IMMEDIATELY.
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- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
- NOTE DRAWING SUITABILITY CODE SHOWN BELOW. DRAWING NOT TO BE USED FOR CONTRACTUAL AGREEMENT WITHOUT A1 STATUS.

THIS DRAWING WAS PLOTTED ON:
11/08/2023

DATE	REV	ZONE	DESCRIPTION	CHK
30/06/2023	P02		Stage 03 Revised Issue	OK
04/07/2023	P03		[Working] Revised Stage 03	
11/08/2023	P04		Stage 03 Revised Issue 02	



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MANCHESTER NEWCASTLE
50a Grove Street Low Shilford House
Wilmslow Stocksfield
Cheshire Northumberland
SK9 1DR Newcastle upon Tyne
NE45 7HW

Client
Salboy

Project
Waterhouse Gardens
Manchester

Drawing Title
General Arrangement [COMBINED]

Created By	Checked By	Scale	Sheet Size
MI	ST	1:350 @ A1	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
351	LYR	XX-ZZ-DWG-L-1000				

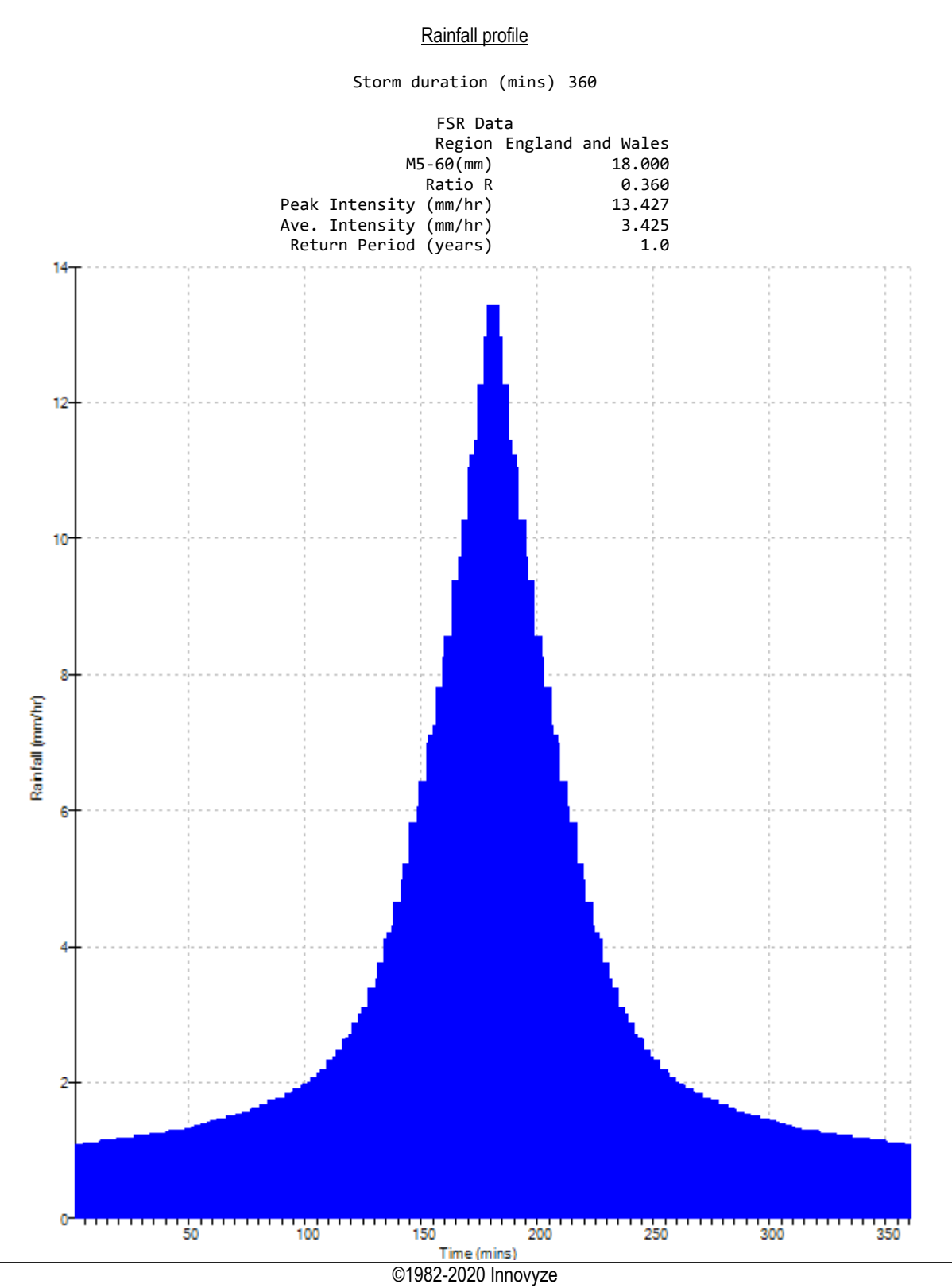
Work Stage	Status	Revision
Stage 03	S3 Review & Comment	P04

NOTES:

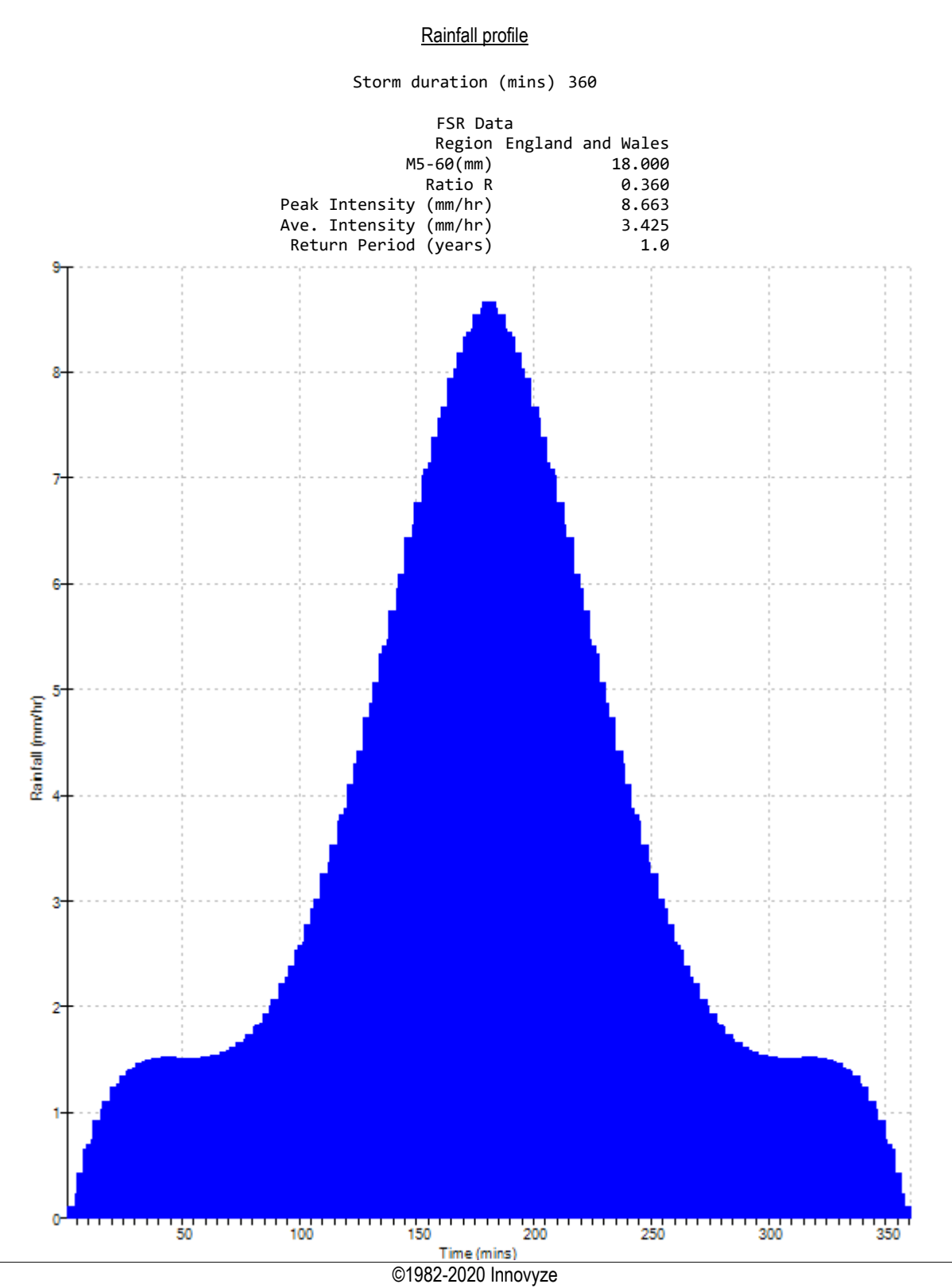
- Refer to wider Stage 03 Pack for further details regarding hardworks, softworks, edging, furniture, levels and details.
- Refer to drawings 351-LYR-XX-00-DWG-L-1000 AND 351-LYR-XX-B2-DWG-L-1000 for split level GA's.
- Works outside the red line are subject to future agreement.

APPENDIX E RAINFALL PROFILES

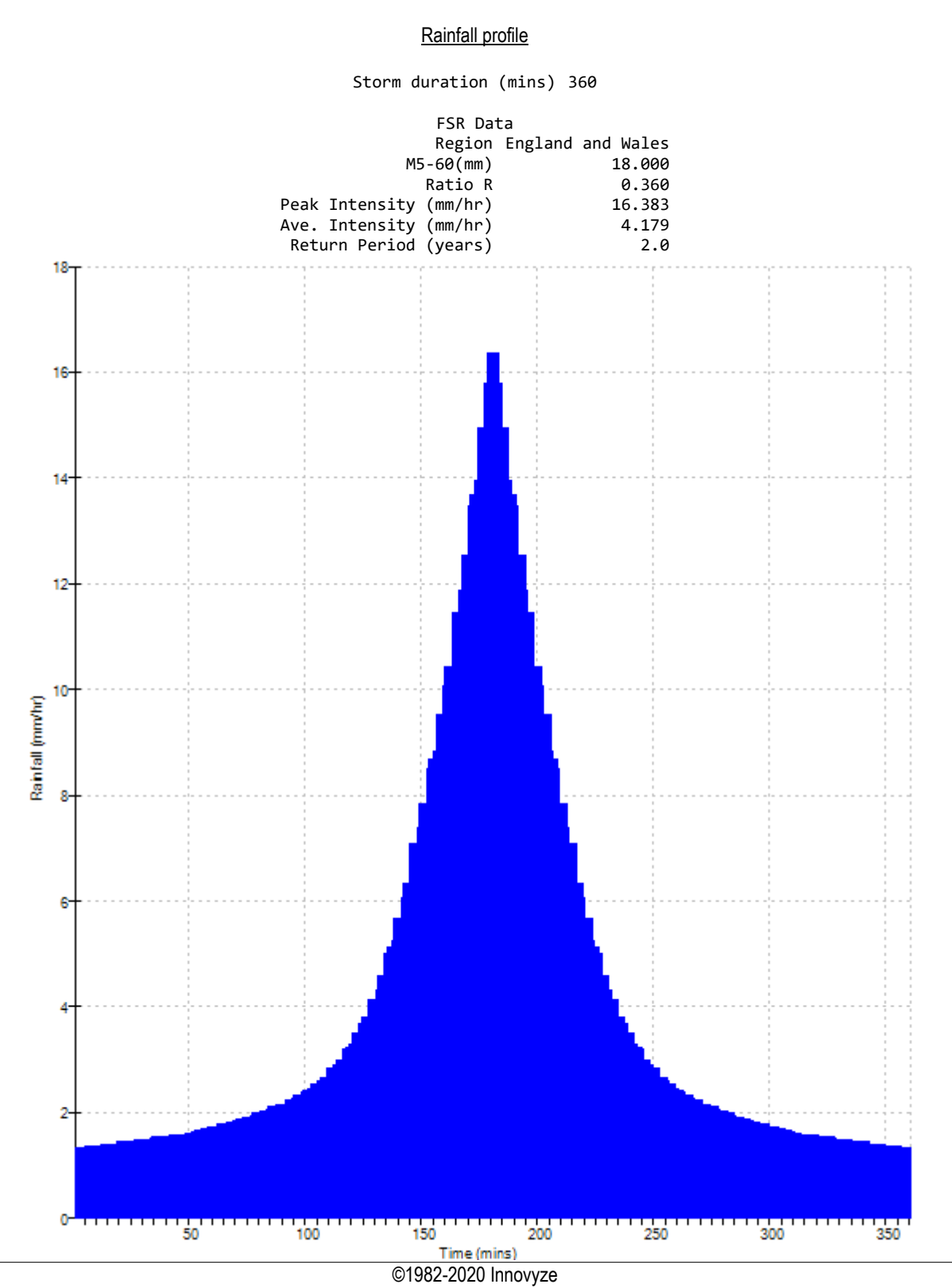
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Date 23/08/2023 10:37 File	Designed by JB Checked by PC	
Innovyze	Network 2020.1.3	



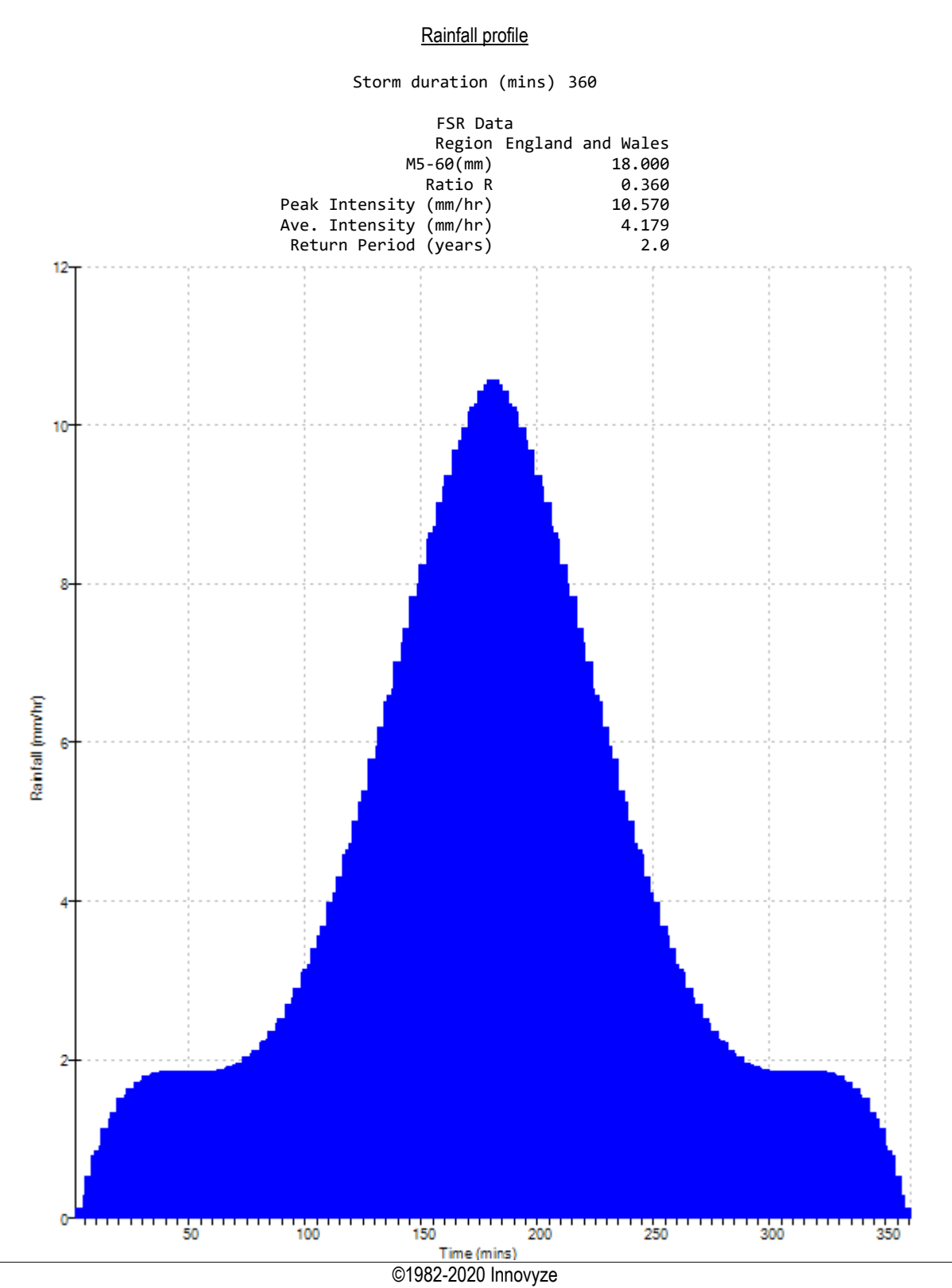
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Date 23/08/2023 10:38 File	Designed by JB Checked by PC	
Innovyze	Network 2020.1.3	



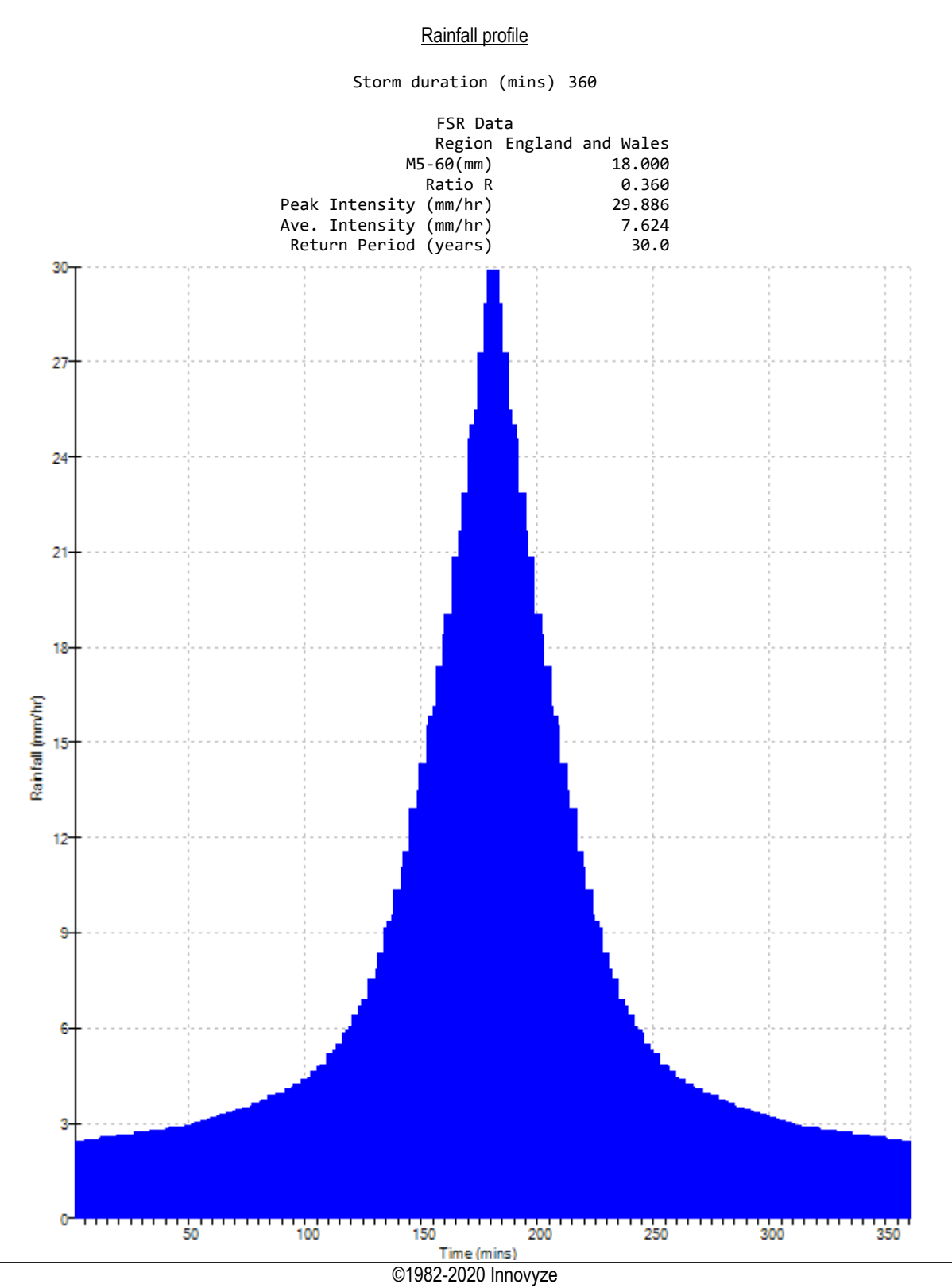
Renaissance Assoc.		Page 1
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Date 23/08/2023 10:35 File	Designed by JB Checked by PC	
Innovyze	Network 2020.1.3	



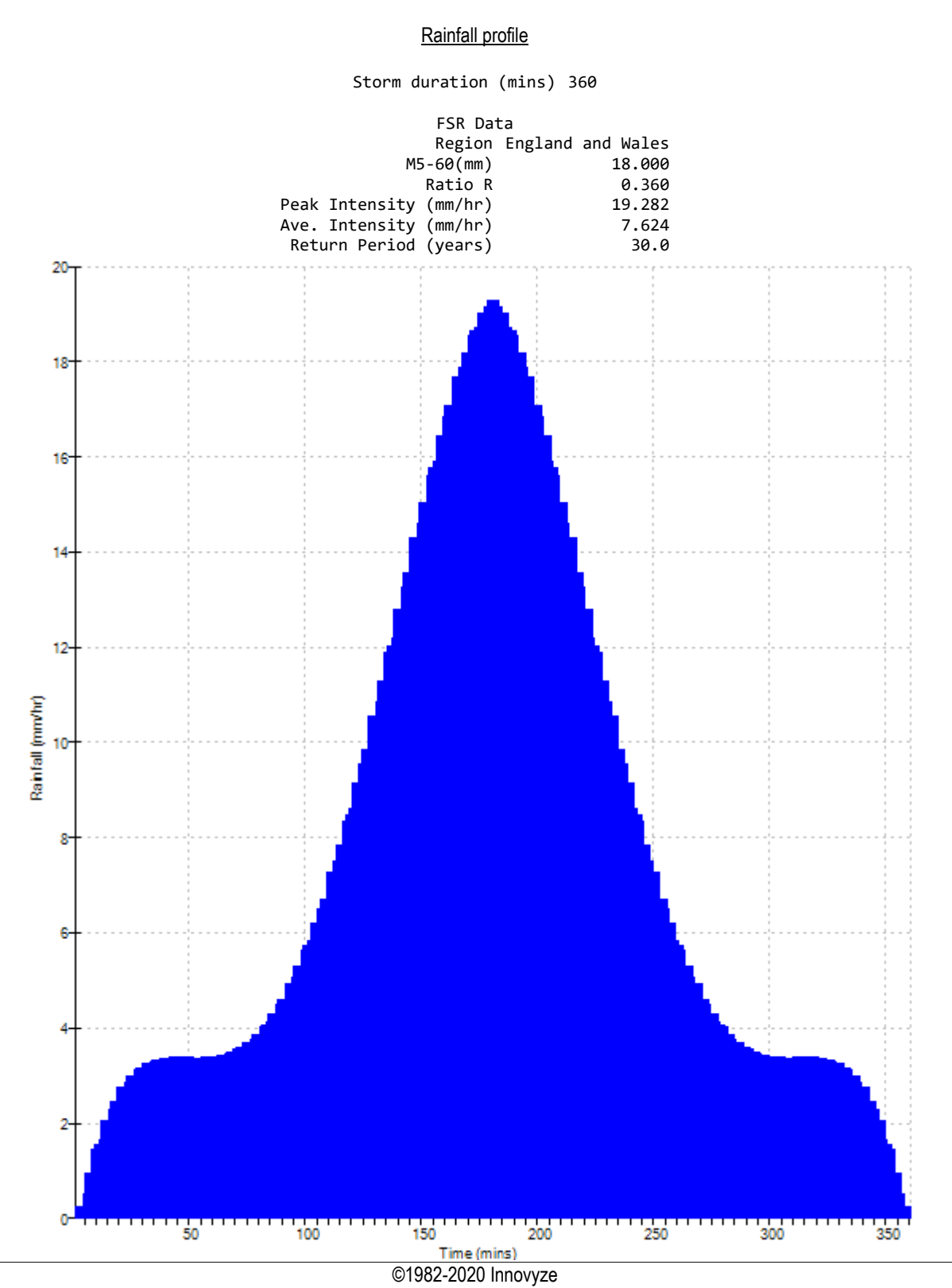
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Date 23/08/2023 10:36 File	Designed by JB Checked by PC	
Innovyze	Network 2020.1.3	



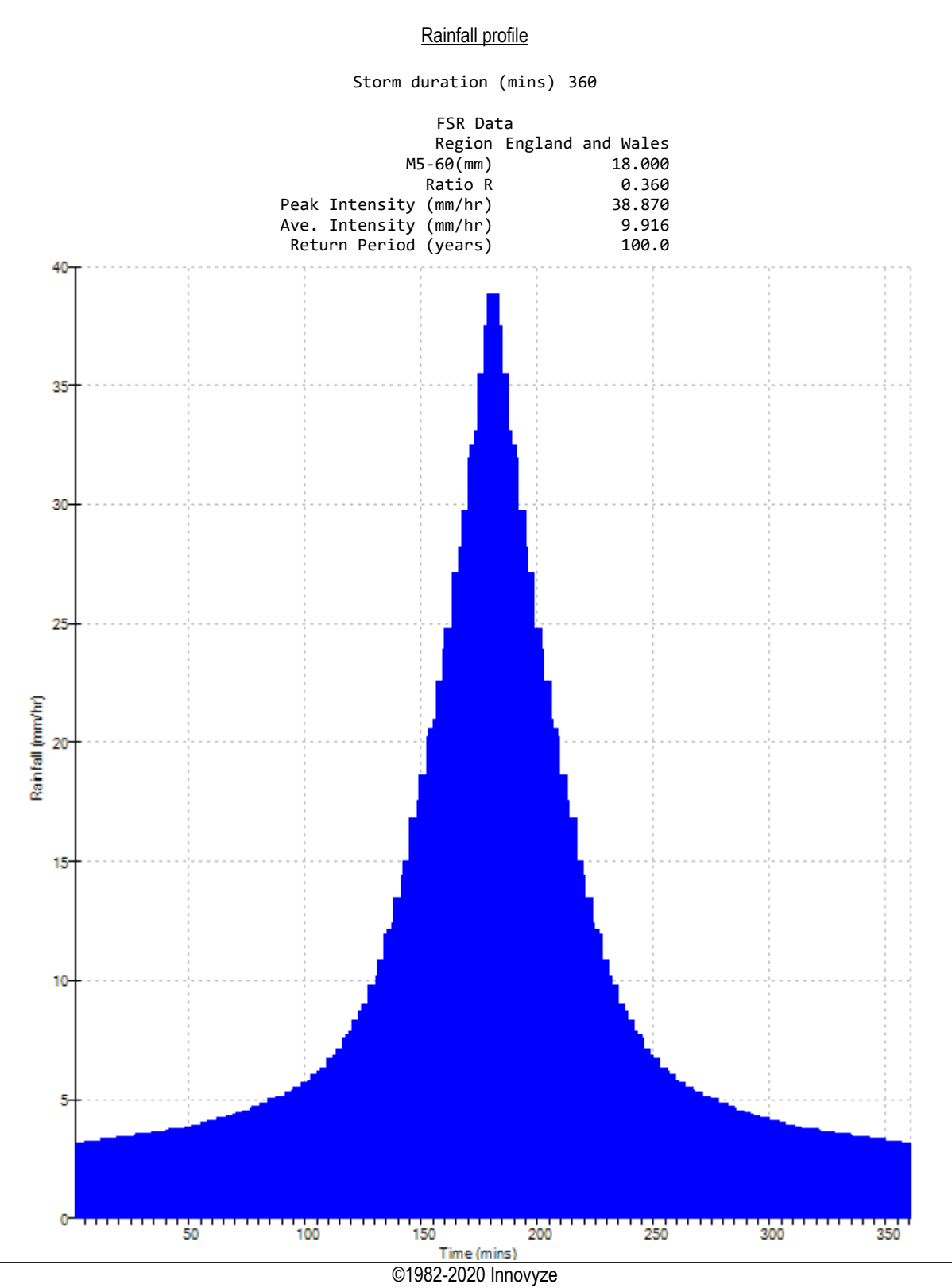
Renaissance Assoc.		Page 1
Carvers Warehouse 77 Dale Street Manchester M1 2HG	Boddingtons Brewery Manchester 1:30YR 6HR SUMMER	
Date 23/08/2023 10:33 File	Designed by JB Checked by PC	
Innovyze	Network 2020.1.3	



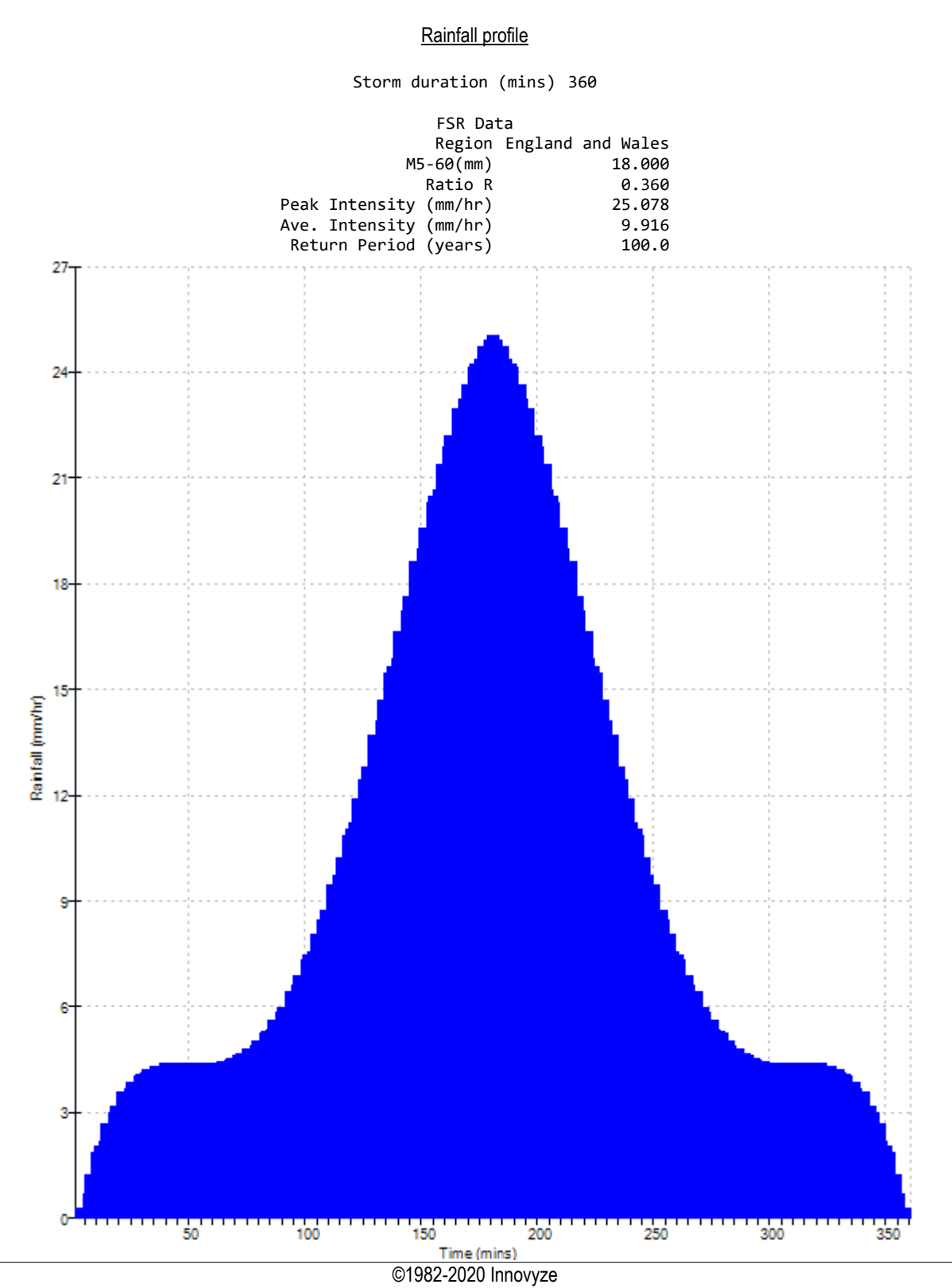
Renaissance Assoc.		Page 1
Carvers Warehouse 77 Dale Street Manchester M1 2HG	Boddingtons Brewery Manchester 1:30HR 6HR WINTER	
Date 23/08/2023 10:34 File	Designed by JB Checked by PC	
Innovyze	Network 2020.1.3	



Renaissance Assoc.		Page 1
Carvers Warehouse 77 Dale Street Manchester M1 2HG	Boddingtons Brewery Manchester 1:100YR 6HR SUMMER	
	Designed by JB Checked by PC	
Date 23/08/2023 10:30 File		
Innovyze	Network 2020.1.3	



Renaissance Assoc.		Page 0
Carvers Warehouse 77 Dale Street Manchester M1 2HG	Boddingtons Brewery Manchester 1:100 6HR WINTER	
Date 23/08/2023 10:32 File	Designed by JB Checked by PC	
Innovyze	Network 2020.1.3	



APPENDIX F

MICRODRAINAGE GREENFIELD RUN-OFF RATES

Renaissance Assoc.		Page 1
Carvers Warehouse 77 Dale Street Manchester M1 2HG	Boddingtons Brewery Greenfield Run-Off	
Date 17/04/2023 14:20 File	Designed by JB Checked by PC	
Innovyze	Source Control 2020.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	SAAR (mm)	899	Urban	0.750
Area (ha)	1.200	Soil	0.450	Region Number	Region 10

Results l/s

QBAR Rural	7.1
QBAR Urban	17.5
Q2 years 17.8	
Q1 year 15.2	
Q30 years 25.3	
Q100 years 27.5	

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APPENDIX G

MICRODRAINAGE GREENFIELD RUN-OFF VOLUME

Renaissance Assoc.		Page 1																										
Carvers Warehouse 77 Dale Street Manchester M1 2HG	BRWRY Greenfield Run-Off Volume																											
Date 12/09/2023 18:42 File	Designed by JB Checked by PC																											
Innovyze	Source Control 2020.1.3																											
<u>Greenfield Runoff Volume</u> FSR Data <table> <tr> <td>Return Period (years)</td> <td>100</td> </tr> <tr> <td>Storm Duration (mins)</td> <td>360</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> </tr> <tr> <td>M5-60 (mm)</td> <td>18.000</td> </tr> <tr> <td>Ratio R</td> <td>0.360</td> </tr> <tr> <td>Areal Reduction Factor</td> <td>1.00</td> </tr> <tr> <td>Area (ha)</td> <td>1.200</td> </tr> <tr> <td>SAAR (mm)</td> <td>899</td> </tr> <tr> <td>CWI</td> <td>120.055</td> </tr> <tr> <td>Urban</td> <td>0.750</td> </tr> <tr> <td>SPR</td> <td>47.000</td> </tr> </table> Results <table> <tr> <td>Percentage Runoff (%)</td> <td>54.01</td> </tr> <tr> <td>Greenfield Runoff Volume (m³)</td> <td>385.567</td> </tr> </table>			Return Period (years)	100	Storm Duration (mins)	360	Region	England and Wales	M5-60 (mm)	18.000	Ratio R	0.360	Areal Reduction Factor	1.00	Area (ha)	1.200	SAAR (mm)	899	CWI	120.055	Urban	0.750	SPR	47.000	Percentage Runoff (%)	54.01	Greenfield Runoff Volume (m³)	385.567
Return Period (years)	100																											
Storm Duration (mins)	360																											
Region	England and Wales																											
M5-60 (mm)	18.000																											
Ratio R	0.360																											
Areal Reduction Factor	1.00																											
Area (ha)	1.200																											
SAAR (mm)	899																											
CWI	120.055																											
Urban	0.750																											
SPR	47.000																											
Percentage Runoff (%)	54.01																											
Greenfield Runoff Volume (m³)	385.567																											
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APPENDIX H
UNITED UTILITIES PRE-DEVELOPMENT ENQUIRY
CORRESPONDENCE

JoeBullough

From: seweradoptions@uuplc.co.uk
Sent: 02 June 2023 13:48
To: JoeBullough
Cc: Patrick Clayton
Subject: RE: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

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Good afternoon Joe,

Apologies, it appears we were given different response dates. Due to the bank holiday the system unfortunately edited certain dates causing some delays. Please do accept my apologies for this.

I am happy with the proposed 17.5 l/s, thank you for sending over further information.

Please note this is subject to section 106 approval.

I have linked below the application form.

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

If I can be of any further assistance please do get in touch.

Kind regards



Ashleigh Bellerby
Assistant Developer Engineer
Developer Services & Metering
Customer Services
T: 07826891650
unitedutilities.com

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Visit: unitedutilities.com/wow

----- Original Message -----

From: JoeBullough [joebullough@renaissance-ltd.com]

Sent: 31/05/2023 10:14

To: seweradoptions@uuplc.co.uk

Cc: patrickclayton@renaissance-ltd.com

Subject: RE: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

Good Morning,

Please can an update be provided on the below given that we have now passed advised response date (30th May)?

Kind Regards,

Joe Bullough | Engineer

MEng

Carvers Warehouse, 77 Dale Street

Manchester, M1 2HG

e: joebullough@renaissance-ltd.com

t: 0161 393 6509

dd: 0161 552 1912

w: www.renaissance-ltd.com

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From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: Saturday, May 20, 2023 9:08 PM

To: JoeBullough <JoeBullough@renaissance-ltd.com>

Cc: Patrick Clayton <patrickclayton@renaissance-ltd.com>

Subject: RE: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

Hello Joe,

I have asked the engineer Ashleigh Bellerby to review your file again.

Please note the response will be due before 30th May

Regards

Samantha
0345 026 8989 - Option 4

----- Original Message -----

From: JoeBullough [joebullough@renaissance-ltd.com]

Sent: 18/05/2023 15:22

To: seweradoptions@uuplc.co.uk

Cc: patrickclayton@renaissance-ltd.com

Subject: RE: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

Ashleigh,

We can confirm that your understanding is incorrect and the modified rational method has **not** been used.

The modified rational method would result in far greater run off rate – 126.5/s assuming a rainfall intensity of 50mm/hr and an impermeable area of 0.91 ha and is normally used to approximate the existing site run off.

As explained in our previous email we have used the ICP SuDs Method within Microdrainage.

As you will be aware the IH124 method is to be used for catchments <50 ha and therefore the ICP SuDs Method follows the IH124 method using a catchment area of 50ha and the resulting run off is linearly interpolated for the actual area.

We have set out below the hand calculations that prove that the Microdrainage Calculations follow the IH 124 method.

Section 24.3.2 of The SuDs Manual indicates the IH124 Equation for Q Bar (rural) to be as follows:

$$Q_{BAR(rural)} = 0.00108 \text{ AREA}^{0.89} \times \text{SAAR}^{1.17} \times \text{SOIL}^{2.17}$$

where:

- $Q_{BAR(rural)}$ = mean annual flood (a return period in the region of 2.3 years)
- $AREA$ = area of the catchment in km²
- $SAAR$ = Standard Average Annual Rainfall for the period 1941–1970 in mm
- $SOIL$ = soil index, which is a value found from the FSR soil maps or the WRAP 1 the Wallingford procedure, and represents an estimate of the proportion from the catchment surface*

Where the site is less than 50 ha, the formula should be applied for 50 ha and the result fa based on the ratio of the actual site area and the applied area (50 ha).

- * If a reliable surface soils class map of the site is available, then IH126 **Table 2.12** (Boor al, 1995), can be used to allocate a HOST category to the site soils. IH126 **Table 4.16** c be used to obtain a corresponding value for SPR (note this is stated as a percentage, n a proportion so will need to be divided by 100). The extra detail provided by HOST is ge likely to provide an improved estimate of SPR than using the coarse categorisation of tl SOIL categories, although it should be recognised that SPRHOST was not originally de use in the IH124 equation, and Appendix 5 of Kellagher (2013) should be referenced for guidance on this issue.

HOST/SOIL CLASS	SPR Value % (HOST) ³	SPR Value SOIL *
1	0.02 ²	0.15 (0.10)
2	0.02 ²	0.30 (0.30)
3	0.12	0.40 (0.37)
4	0.02 ²	0.45 (0.47)
5	0.12	0.50 (0.53)
6	0.34	
7	0.21	
8	0.30	
9	0.25	
10	0.35	
11	0.02 ²	
12	0.60 ²	
13	0.02 ²	
14	0.40	
15	0.48	
16	0.22	
17	0.29	
18	0.47	
19	0.45	
20	0.47	
21	0.47	
22	0.600 ²	
23	0.600 ²	
24	0.40	
25	0.50	
26	0.59 ²	
27	0.60 ²	
28	-	
29	0.60 ²	

* Values of SPR for SOIL have been used for deriving Figure A10.1. These SPR values are based on the SOIL coefficients used in the Wallingford Procedure runoff model. The value in brackets is the SPR value for SOIL from the Flood Studies Report. The Wallingford Procedure analysis was carried out by the Institute of Hydrology and resulted in modified SPR values to obtain the best correlation for the percentage runoff equation for urban drainage.

Note 1: There is no relationship between the HOST index class and the index for SOIL.

Note 2: Where SPRHOST values are less than 0.1 then 0.1 shall be used. Where SPRHOST values are greater than 0.53 then 0.53 shall be used.

Note 3: SPRHOST values are from the predominant soils rather than FEH based values

Figure A12.1 SPR Values for SOIL and HOST

Using the following parameters

Area = 50 ha = 0.5km²

SAAR = 899mm

SOIL = Soil Type 4 = 0.45

Q_{BAR}(RURAL) = 294.4 l/s (for 50ha)

Linearly interpolating for the actual site area gives the following:

$Q_{BAR}(RURAL) = 294.4 \times (1.2/50) = 7.1 \text{ l/s}$ – note this is the same as the MicroDrainage calculation previously supplied – attached again for ease of reference.

Due to the urban environment the site is situated in and given a large proportion of the site (0.91/1.2ha i.e. 76%) is urbanised it is appropriate to apply an urban factor to the $Q_{BAR}(\text{rural})$ run off rate as set out below.

QBAR urban, Adjustment for urbanisation - From IH report 124 equations 7.2 to 7.4. CIRIA Book

The ratio of $Q_{BAR_{urban}}$ to $Q_{BAR_{rural}} = (1+URBAN)^{2NC} (1+URBAN ((21/CIND)-0.3))$

where

$$CIND = 102.4 \times SOIL + 0.28 \times (CWI - 125)$$

$$NC = 0.92 - 0.00024 \times SAAR \quad (\text{for } 500 \leq SAAR \leq 1100\text{mm})$$

$$NC = 0.74 - 0.000082 \times SAAR \quad (\text{for } 1100 \leq SAAR \leq 3000\text{mm})$$

- CWI Catchment wetness index is a function of the Average annual rainfall and is described in FSR figure I. 6.62
- CIND The catchment index
- NC Rainfall continentality factor which is a function of SAAR
- URBAN The fraction of the catchment area coloured orange on a 1:50000 Ordinance Map, or the fraction of the catchment to be urbanised.

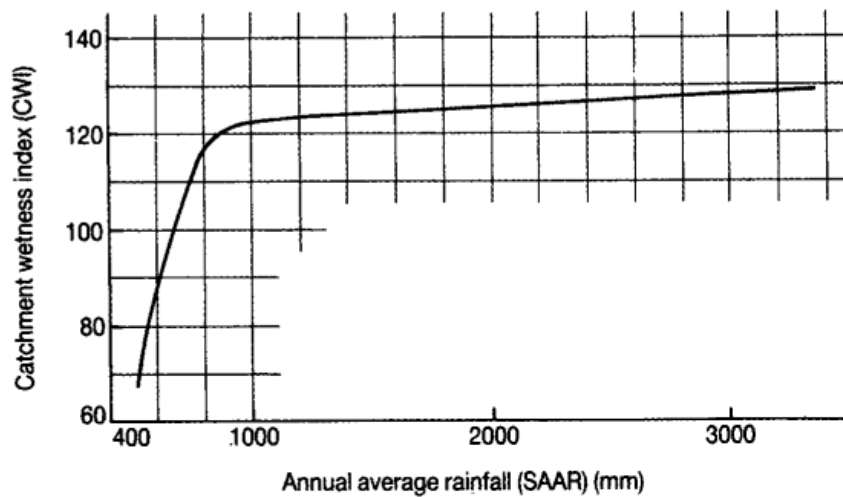


Figure 3.6 Plot of catchment wetness index, CWI, against mean annual rainfall, SAAR (based on FSR Figure I.6.62)

Using the above equations and site characteristics gives the following:

CWI = 122 (based on SAAR = 899mm)

NC= 0.70424

CIND = 45.24

URBAN = 0.75

$QBAR_{URBAN} : QBAR_{RURAL} = 2.470$

$QBAR_{URBAN} = QBAR_{RURAL} \times 2.470$

$QBAR_{URBAN} = 17.5 \text{ l/s}$ – note this is the same as the MicroDrainage calculation previously supplied – attached again for ease of reference.

To put this into perspective the approximate run off currently discharging from the site into the public sewer based upon the modified rational method is 126.5 l/s - assuming a rainfall intensity of 50mm/hr and an impermeable area of 0.91 ha.

Therefore a proposed run-off rate of 17.5 l/s provides a 86% reduction on the existing discharge rate.

We would also like to note that the above method has been applied and approved as part of other developments in the area – for example Salford Zone Youth UU Reference Number : 02466246.

As such we would be grateful if you could review the above and attached and confirm that the proposed total discharge rate of 17.5 l/s is indeed acceptable.

Kind Regards,

Joe Bullough | Engineer

MEng

Carvers Warehouse, 77 Dale Street

Manchester, M1 2HG

e: joebullough@renaissance-ltd.com

t: 0161 393 6509

dd: 0161 552 1912

w: www.renaissance-ltd.com

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From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: Tuesday, May 2, 2023 3:16 PM

To: JoeBullough <JoeBullough@renaissance-ltd.com>

Subject: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

Good afternoon Joe,

Thank you for your email.

I imputed the new site area (ha) into HR Wallingford IH124 and the below information was received. Please note United Utilities do not accept the modified rational method which, as far as I am aware has been used on the Microdrainage submitted. Please clarify if I am incorrect.

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: ashleigh bellerby
Site name: BRWRY DUTTON STREET
Site location: M3 1RR

Site Details
Latitude: 53.49003° N
Longitude: 2.24454° W
Reference: 3723894960
Date: May 02 2023 15:11

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 1.20

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics Default Edited

SOIL type: 4 5

HOST class: N/A N/A

SPR/SPRHOST: 0.47 0.53

Default Edited

Hydrological characteristics

SAAR (mm): 899 899

Hydrological region: 10 10

Growth curve factor 1 year: 0.87 0.87

Growth curve factor 30 years: 1.7 1.7

Growth curve factor 100 years: 2.08 2.08

Growth curve factor 200 years: 2.37 2.37

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates Default Edited

Q_{BAR} (l/s): 7.76 10.08

1 in 1 year (l/s): 6.75 8.77

1 in 30 years (l/s): 13.2 17.13

1 in 100 year (l/s): 16.15 20.96

1 in 200 years (l/s): 18.4 23.88

In line with the Q_{bar} calculation edited to soil type 5 United Utilities would accept a surface water discharge rate of 10.08 l/s, however this is to be determined by the LLFA.

If I can be of any further assistance please do get in touch.

Kind regards



Ashleigh Bellerby
Assistant Developer Engineer
Developer Services & Metering
Customer Services
T: 07826891650
unitedutilities.com

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----- Original Message -----

From: JoeBullough [joebullough@renaissance-ltd.com]

Sent: 17/04/2023 14:42

To: seweradoptions@uuplc.co.uk

Subject: RE: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Hi Ashleigh,

Thanks for getting back to me.

I note you have specified the area as 0.93ha which relates to the hard paved areas only. From my understanding the site area should be taken as the whole site area. I have attached an updated existing drained areas plan which provides a breakdown of the areas and shows the whole site area to be **1.20 ha**.

Our Qbar rates have been calculated within Microdrainage using the ICP SuDS method. The ICP SuDS method simply uses the IH124 method with an area of 50 ha and then linearly interpolates the results for the specified site area.

Update results of the Qbar calcs are attached which show Qbar (urban) to be **17.5 l/s**.

The following parameter have been used with the calculations:

1. SAAR(mm) = 899
2. Soil = 0.450 (Soil Type 4)
3. Area (ha) = 1.20
4. Region Number = 10
5. Urban Proportion = 0.75 - given a large proportion of the site (0.91/1.2ha i.e. 76%) is urbanised and also given the urban setting which the development is set in it is appropriate to apply to the maximum urban proportion of 0.75

We would be grateful if you could review the above and attached and confirm that the proposed total discharge rate of 17.5 l/s is acceptable.

Kind Regards,

Joe Bullough | Engineer

MEng

Carvers Warehouse, 77 Dale Street

Manchester, M1 2HG

e: joebullough@renaissance-ltd.com

t: 0161 393 6509

dd: 0161 552 1912

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From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: Wednesday, April 12, 2023 1:26 PM

To: JoeBullough <JoeBullough@renaissance-ltd.com>

Subject: RE: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

Good afternoon Joe,

Thank you for your email.

The discharge rate was from HR Wallingford IH124 Method using 0.93 as the total site area in ha unedited soil type (type 4), we would not object to soil type 5 being used which would be a discharge rate of 7.81 l/s.

Prior to consideration of your proposed 16.9 l/s please could you advise on your Qbar rates.

I would not object to the proposed points of discharge for surface water, subject to a section 106.

If I can be of any further assistance please do get in touch.

Kind regards



Ashleigh Bellerby
Assistant Developer Engineer
Developer Services & Metering
Customer Services
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----- Original Message -----

From: JoeBullough [joebullough@renaissance-ltd.com]

Sent: 29/03/2023 10:34

To: seweradoptions@uuplc.co.uk

Subject: RE: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

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Ashleigh,

Thank you for your response.

I note you have requested that a pass forward rate be limited to 6.7 l/s. Please could you provide the clarification of how this rate was derived?

Based on our calculations Qbar for the development gives a rate of 16.9 l/s. And it is our understanding that limiting the discharge to Qbar is deemed accepted in accordance with the North West SuDS Proforma.

I also note from your response that you would consider a surface water connection to the 600 dia sewer within Great Ducie Street. As the site does not lie adjacent to Great Ducie Street this would require third party agreements with the adjacent land owner to install the outlet pipe beneath their land. This would also limit the future development of this land which the owner

The topographical survey indicates the presence of existing drainage that heads towards Dutton Street.

On this basis and due to the nature of the development and large level difference across the proposed site (refer to BRW-REN-ZZ-FN-DR-C-00050 and BRW-REN-XX-XX-SK-C-00011) we have proposed 3 separate connections to the United Utilities Network. Please can you confirm that these are acceptable in principle?

Kind Regards,

Joe Bullough | Engineer

MEng

Carvers Warehouse, 77 Dale Street

Manchester, M1 2HG

e: joebullough@renaissance-ltd.com

t: 0161 393 6509

dd: 0161 552 1912

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From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: Friday, March 24, 2023 2:43 PM

To: Selvana Ahmad <SelvanaAhmad@renaissance-ltd.com>

Subject: Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

Good afternoon Selvana,

Pre Development Enquiry for: BRWRY DUTTON STREET Manchester M3 1RR UU Reference Number : 03758802

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

United Utilities would not object to your foul proposals to the public combined sewer at an unrestricted rate.

In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Thank you for providing evidence that infiltration is not possible onsite.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

United Utilities will consider a connection the proposed connection to the 600mm diameter public combined sewer within Great Ducie Street located West of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 6.7l/s.

Please note the given discharge rate is based on the full site area as the specifics of the area being developed are not yet clear. If there are significant areas of the site that will not be developed, the discharge rate should be reduced accordingly.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address:

DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Many thanks and kind regards,



Water for the North West

Ashleigh Bellerby

Assistant Developer Engineer
Developer Services & Metering
Customer Services

T: 07826891650

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----- Original Message -----

From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]

Sent: 15/03/2023 09:56

To: selvanaahmad@renaissance-ltd.com

Subject: BRWRY DUTTON STREET Manchester M3 1RR

PRE DEVELOPMENT APPLICATION AT: BRWRY DUTTON STREET Manchester M3 1RR – UU Ref 03758802

Please accept this email as receipt of your application received on 14.03.2023 for the above development. This has now been logged on our system and the job reference is 03758802 we would ask that you quote this reference in all future correspondence.

I have reviewed your application (and attachments) and can confirm this is suitable to be passed to Ashleigh Bellerby for technical assessment. You will receive their response within 8 working days.

Kind regards



Lucie Gaskell

Customer Advisor Advanced
Developer Services & Metering
Customer Services

Direct Tel: 01925 233050

Tel: 0345 072 6067

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APPENDIX J

BELOW GROUND DRAINAGE DRAWINGS