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ENVIRONMENT

Wilson Bowden Developments Ltd
Plot J2
Kingsway Business Park, Rochdale
Sustainable Drainage Statement

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BWB

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Plot J2
Kingsway Business Park, Rochdale
Sustainable Drainage Statement

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July 2022

DOCUMENT ISSUE RECORD

Document Number:	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS
BWB Reference:	220810-SDS

Revision	Date of Issue	Status	Author:	Checked:	Approved:
P01	15.07.22	S2	Rowan Jobling BEng (Hons)	Matthew Bailey BSc (Hons)	David Gray BEng (Hons)
P02	20.07.22	S2	Louis Ream BEng (Hons)	Rowan Jobling BEng (Hons)	Rowan Jobling BEng (Hons)
P03	21.07.22	S2	Louis Ream BEng (Hons)	Rowan Jobling BEng (Hons)	Rowan Jobling BEng (Hons)

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(ii) The date on which the final report is delivered

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1. INTRODUCTION

1.1 A Sustainable Drainage Statement (SDS) sets out the principles of drainage design for a development and summarises the reasoning behind the chosen design. This includes consideration of national and local guidance, justification of specific flow rates, volumes of attenuated storage, as well as the appropriate level of treatment to be provided to surface water runoff.

1.2 This SDS has been produced by BWB Consulting on behalf of Wilson Bowden Developments Ltd in respect of a planning application for the proposed development of Plot J2, Kingsway Business Park, Rochdale (approximate grid reference: SD913114).

1.3 This SDS is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals. A Flood Risk Assessment (FRA) has been produced for the site (reference: KPJ-BWB-ZZ-XX-RP-YE-0001_FRA) and this SDS accompanies this overarching document.

1.4 It should be noted that outline planning permission existing for development of Plot J2 (application reference 14/00542/OUT) and the approved parameters allow for development across the site in accordance with the approved parameters plan. The only reason that a full application is being submitted is because the height of the buildings have been increased compared to the approved parameters.

1.5 A proposed site development plan is included as **Appendix 1.**

1.6 The location of the site and application boundary is illustrated within **Figure 1.1**, with contextual information provided within **Table 1.1**.

Table 1.1: Site Details

Site Name	Plot J2
Location	Kingsway Business Park, Rochdale
NGR (approx.)	SD913114
Application Site Area (ha)	5.43 (approximately)
Proposed Impermeable Area (ha)	3.504
Development Type	Commercial
Lead Local Flood Authority	Rochdale Borough Council
Local Planning Authority	Rochdale Borough Council
Environment Agency Area	Greater Manchester, Merseyside and Cheshire (GMC)
Sewerage Undertaker	United Utilities

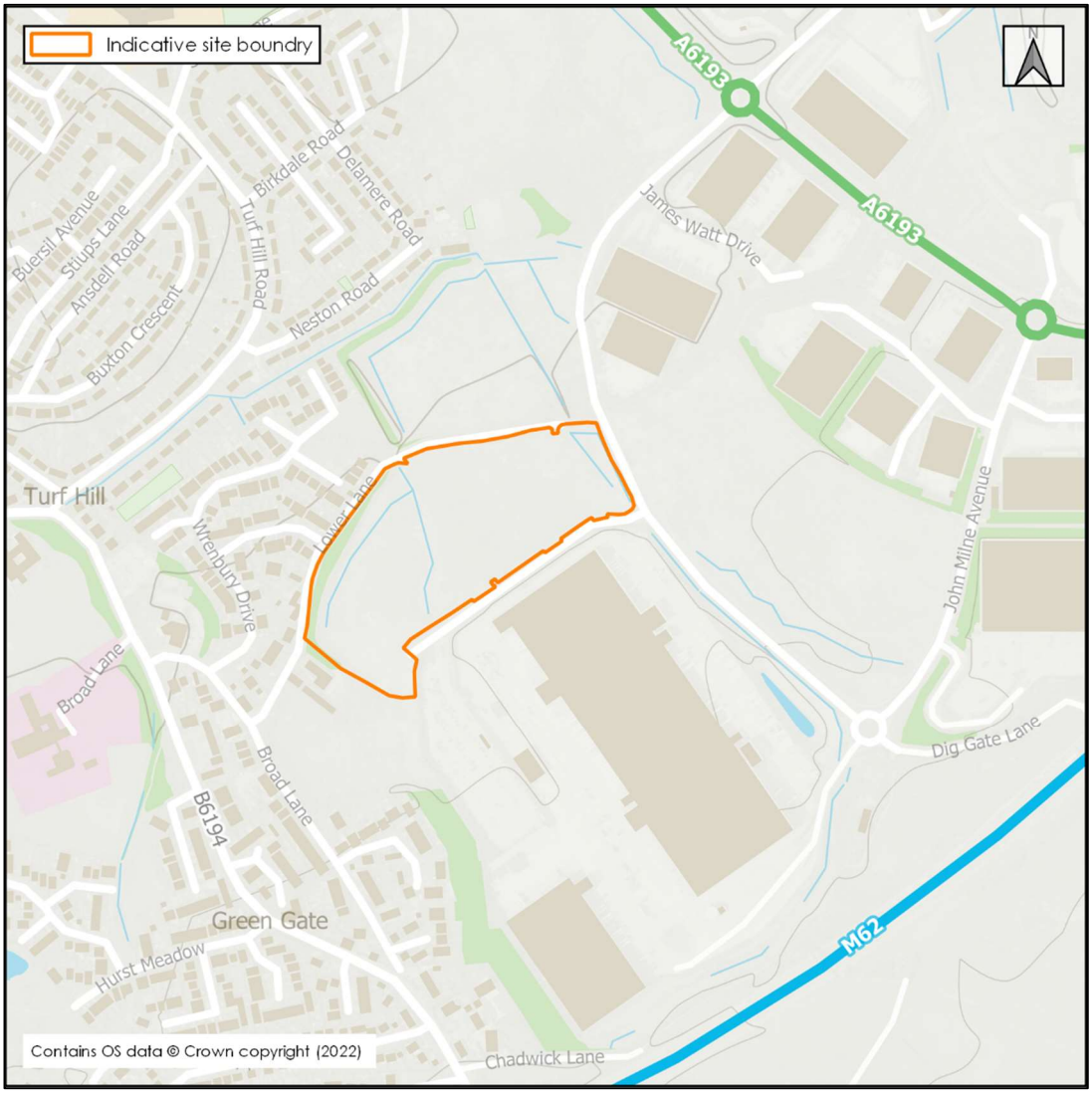

Figure 1.1: Site Location

Sustainable Drainage Guidance

1.7 Sustainable Drainage Systems (SuDS) aim to mimic a more natural runoff regime, treating and discharging water close to where it falls. They should be designed with the four pillars of SuDS in mind: water quality, water quantity, amenity and biodiversity.

1.8 The Non-Statutory Technical Standards for Sustainable Drainage Systems[1] as published by DEFRA have been utilised to inform the strategy.

[1] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

2. EXISTING CONDITIONS

2.1 The site is part of the wider Kingsway Business Park development, located approximately 2.4km south of Rochdale. The site is bound by Lower Lane to the north, John Milne Avenue to the east, James Kearns Avenue to the south and an existing tree line to the west. The majority of the wider business park sits to the east with the existing Asda distribution centre to the south.

2.2 A topographical survey has been undertaken and is included as **Appendix 2**. The existing site comprises greenfield land with levels generally falling from south to north. Levels range from approximately 158m Above Ordnance Datum (AOD) in the south west corner to 153m AOD along the northern boundary.

2.3 There are two large depressions within the site, one towards the eastern boundary and the second bisecting the centre of the site. At the base of the eastern feature, levels generally sit between 4m and 1.5m below the surrounding levels. The central feature generally sits between 2.8m and 1m below the surrounding levels.

2.4 There is an existing ditch approximately 8m beyond the eastern site boundary which flows in a northerly direction before discharging via a box culvert located along the north eastern corner of the site. The ditch is culverted (600mm) under James Kearne Avenue and is understood to intercept overland flows from the M62 south of the development. Further details of the wider catchment and hydrology can be found within the FRA (reference: JKP-BWB-ZZ-XX-RP-YE-0001_FRA).

2.5 The site is considered to drain via a natural regime of infiltration and runoff. During extreme rainfall events where infiltration potential is exceeded, runoff is expected to flow overland towards the two depressions in the topography. Flows exceeding the capacity of these topographical features would leave the site to the north, either via overland routes or the ditch's culverted outfall.

2.6 Much of the site wide drainage infrastructure for the business park has already been constructed, which acts to service future plots, as developments are brought forward. There are surface water and foul water sewers within John Milne Avenue and James Kearns Avenue which have been adopted by United Utilities (UU). Within John Milne Avenue the 300mm diameter foul sewer is shown to discharge in a northerly direction towards an existing pumping station. The 1500/1600mm diameter surface water sewer is shown to discharge in an easterly direction towards the existing attenuation ponds which are located approximately 800m east of the application boundary.

2.7 For reference, as built records of the wider drainage infrastructure and UU sewer record plans are included as **Appendix 3.**

2.8 BWB have previously undertaken three site wide drainage assessments across the business park which demonstrate the installed drainage networks and downstream attenuation has been designed and installed to accommodate the 100-year storm event for all future developments at the site. The technical note produced covering drainage catchment 1A/1B that Plot J2 is located within has previously been accepted by Rochdale Borough Council and UU, a summary note is included within **Appendix 4**.

2.9 A Phase 2 Geo-Environment Assessment was undertaken by BWB Consulting in February 2018 (reference: KBP-BWB-ZJ-XX-RP-YE-0002_PH2). Findings from the investigation are summarised below:

- Ground conditions were recorded to comprise topsoil or made ground to a maximum depth of 1.1m and 1.4m Below Ground Level (BGL) respectively overlying Hummocky Glacial Deposits to a proven depth of 10m BGL. The underlying Glacial Till was recorded to a maximum depth of 15.5m BGL although the base was unproven.
- Head Deposits, as mapped by the British Geological Survey (BGS), were encountered on site as Alluvium within the two site depressions between 0.25m and 3.7m BGL. Groundwater was monitored between 0.82m and 4.45m BGL.

Existing Runoff Rates

2.10 An assessment of the existing surface water runoff rates from the site have been undertaken and are summarised within **Table 2.1**. Calculations are included as **Appendix 5**.

2.11 The runoff rates have been estimated using the IH124 method, with appropriate prorated adjustments for a site of less than 50ha, as recommended in Interim Code of Practice for Sustainable Drainage[2]. This was undertaken within Micro Drainage, which makes the necessary adjustments for small sites automatically.

Table 2.1: Existing Runoff Rate (3.5ha)

Return Period (Yrs.)	Runoff Rate (l/s)
1	2.1
Mean Annual Flow Rate (QBAR)	2.5
30	4.2
100	5.1

Existing Runoff Volume

2.12 An assessment of the existing surface water runoff rates from for the proposed post development impermeable area (3.5ha) has been made for a 1 in 100-year, 6 hour storm.

2.13 As the existing site is permeable, the runoff volume has been calculated using the Source Control module within Micro Drainage to be **351m³**, results are included within **Appendix 6**.

[2] The National SUDS Working Group (2004), Interim Code of Practice for Sustainable Drainage

3. SURFACE WATER DRAINAGE STRATEGY

3.1 Proposals will see the erection of two employment buildings (Classes E(g)(iii), B2 and B8) with ancillary office space, new access, car parking, servicing, boundary treatments, hard and soft landscaping and other associated works. A proposed site drawing is included as **Appendix 1**.

3.2 The proposed development forms part of the wider Kingsway Business Park development which was granted outline planning permission in 2014 under reference 14/00542/OUT. This SDS has been progressed based on the criteria set out in the FRA (Ref:MCT/2014/FRA) for the wider site which will be referenced, as appropriate, within this report. Subsequent works by BWB have confirmed that the principles set out in the original FRA have been followed in terms of the as-built infrastructure. A summary note of the findings is included as **Appendix 4**.

3.3 For the purposes of this assessment, a measured impermeable area of 3.504ha has been used to assess the attenuation requirements for the site.

Drainage Hierarchy

3.4 The Planning Policy Guidance[3] and the SuDS Manual[4] identify that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

i. into the ground (infiltration);
ii. to a surface water body;
iii. to a surface water sewer, highway drain, or another drainage system;
iv. to a combined sewer.

3.5 The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible. Ground water levels were encountered at shallow depths during the monitoring period, as such the use of infiltration drainage techniques has been discounted.

3.6 As outlined previously, there is a network of existing sewers that have been designed and installed to service future plots of Kingsway Business Park.

3.7 It is therefore proposed to discharge flows from the development into the existing sewer within James Kearns Avenue to the south. The drainage discharges east towards an existing attenuation pond with flows ultimately discharging to Stanney Brook. While the immediate discharge point doesn't follow the above hierarchical approach, the wider drainage strategy discharges flows to a watercourse and as such the approach is considered to satisfy this criterion.

[3] Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/.
[4] The SuDS Manual (C753). CIRIA 2015.

Peak Flow Control

3.8 In order to comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems S2-S3[5], runoff from greenfield developments should not exceed the equivalent greenfield rates for the equivalent return period events.

3.9 As previously stated, the wider infrastructure has been designed and installed to accommodate the 1 in 100-year storm event, with flows being restricted at the downstream attenuation features. The proposed catchment for Plot J2, amongst others, is served by 'Basin 1A' and 'Basin 1B'. The restricted outflows from the attenuation features are controlled in such a way that the 1 in 10, 30, 50 and 100-year rainfall events do not exceed that of the predeveloped discharge rates.

3.10 It is therefore proposed to restrict flows leaving the development to the equivalent 1 in 100-year rate for the associated impermeable area. Rainfall events above this will be restricted to this rate up to and including the 100-year plus climate change event.

3.11 Using Micro Drainage, an average rainfall intensity for the 1 in 100-year, 15-minute event has been calculated to be 81.5mm/hr using FSR rainfall data. The resulting rainfall profile is provided as **Appendix 7**.

3.12 The contributing runoff rates from the 3.5 ha of drained impermeable surfaces within the site have been estimated using the Rational method, as described within

3.13 **Figure** 3.1.

Q = 2.78 x Ap x i

Where:
Q = runoff rate (l/s)
Ap = impermeable area (ha)
i = rainfall intensity (mm/hr)

Q = 2.78 x 3.5 x 81.5 = 792l/s

Figure 3.1: Rational Method

3.14 The maximum discharge rate has been set at the equivalent 1 in 100-year event in line with the wider drainage strategy, however, following completion of the detailed hydraulic modelling of the proposed drainage system, the proposed discharge rates, during the critical storm, for various return periods are outlined within **Table 3.1**.

Table 3.1: Proposed Discharge Rates (combined)

Return Period (Yr.)	Proposed Discharge Rate (l/s)
1	320.4
30 + 40%	684.6
100 + 45%	792.0

[5] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

3.15 Considering the downstream infrastructure restricts flows to the equivalent pre-developed runoff rates and proposals do not increase flows above what was designed for and consented, the site is considered to fulfil the necessary peak runoff control criteria.

Attenuated Storage

3.16 As the development proposals require a restricted runoff rate, it will be necessary to provide attenuated storage to balance the excess volume in a safe manner within the site.

3.17 The surface water storage should be located within the site in a position where it can receive runoff from the development and also in a position where it is hydraulically isolated from any fluvial floodplain or external surface water floodplain / overland flow route that may be present in the site. Environment Agency (EA) mapping shows two overland flow routes crossing the site, however, it is understood that these flow paths have been diverted through a ditch that sits immediately west of John Milne Avenue outside of the application boundary. Further details of this are presented in BWB FRA for the site (report reference KPJ-BWB-ZZ-XX-RP-YE-0001_FRA).

3.18 Sufficient storage for events up to the 1 in 100-year storm with an allowance for climate change should be provided.

3.19 While the proposed discharge rate has been based on the overall post development impermeable area, proposals for the site dictate that the two units will have to discharge separately to avoid any ongoing maintenance issues associated with a shared outfall.

3.20 It is proposed to discharge Unit J1 and J2 at maximum flow rates of 452 l/s and 340 l/s, respectively. The drainage from Unit J1 will discharge via two separate connections (at 151.5 l/s and 300.5 l/s). Due to the existing site topography and levels of the existing drainage it will be necessary to pump flows from Unit J2.

3.21 A simulation has been run using Micro Drainage 'Network' Module to identify the necessary storage provision for each unit. Using a flow control to restrict flows to the equivalent 100-year rate for the contributing areas, the volume of attenuated storage required for the development has been calculated for storm events up to the 100 year + 45% climate change event. The supporting Micro Drainage calculations (undertaken using Flood Studies Report rainfall data) are included as **Appendix 8**.

3.22 At this design stage, it is expected that a minimum of 100m^3 of attenuated storage will be provided within the attenuation tank for Unit J1, with the remaining volume being provided by the upstream pipes and manholes.

3.23 The necessary storage required for Unit J2 will be provided within the pipes and manholes proposed for that network.

Runoff Volume Control

3.24 The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6[6] states that where reasonably practical the runoff volume from a development for the 1 in 100-year 6 hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previously developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume. Where it is not reasonably practicable to constrain the volume of runoff from a development at or below the existing volume, then the runoff must be discharged in a manner that does not adversely affect flood risk.

3.25 An estimate of the post-development runoff volume from the 1 in 100-year 6 hour storm has been calculated using a rainfall depth of 69.12mm (derived from the Flood Estimation Handbook (FEH) Website) across the impermeable areas (3.5ha) of the site.

3.26 The rainfall data is provided as **Figure 3.2** with the existing and post-development runoff volumes are compared within **Table 3.2**.

Table 3.2: Runoff Volume Comparison

Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3)
351	2,419	+2,068

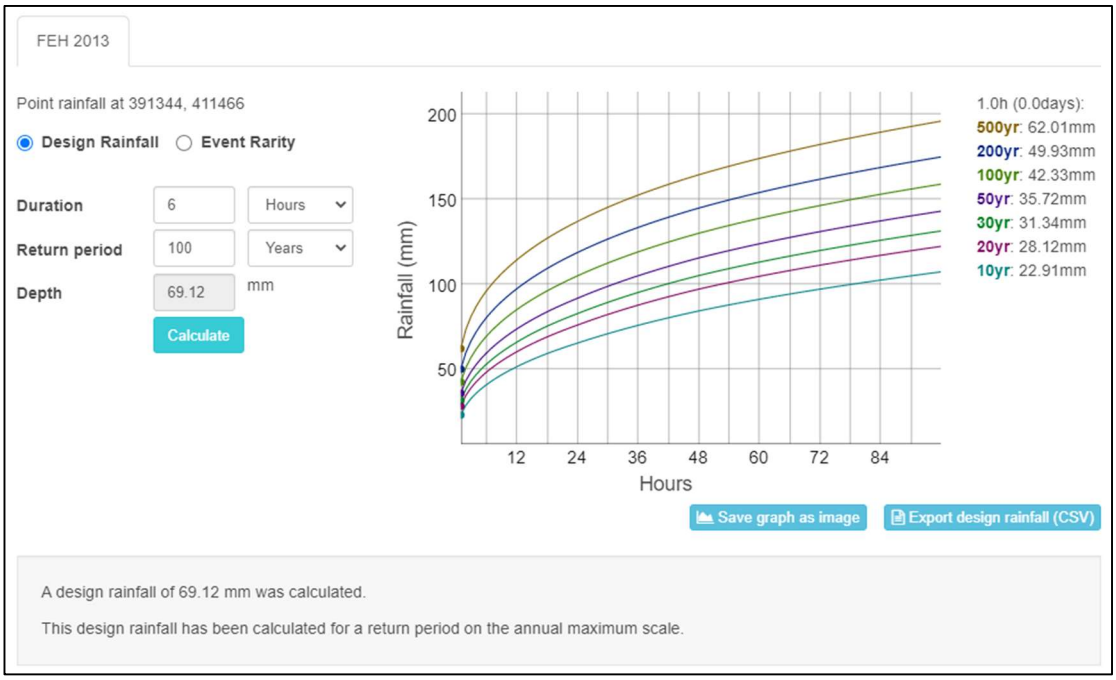

Figure 3.2: FEH Website – 1 in 100-Year, 6 Hour Rainfall Depth Rational Method

[6] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

3.27 The 1 in 100-year 6 hour storm runoff volume from the site has been shown to increase as a result of the proposed development. However, as the runoff volume from the development will be discharged into a site wide drainage network which ultimately discharges flows at a rate equivalent pre-developed runoff rates, the volume control criteria will be met.

Long Term Storage

3.28 As the development complies with the volume control criterion, provision for long term storage is not required.

Sustainable Drainage Systems

3.29 A drainage layout for the development is shown on BWB Dwg No: KPJ-BWB-DGG-XX-DR-D-0500. The drawing is included as **Appendix 9**.

3.30 The nature of the site is such that SuDS techniques are limited, it is proposed that a series of measures are incorporated within the proposed layout to provide an element of treatment to surface water runoff, these include:

- Silt traps
- Sump outfall units/gullies
- Filter Drain
- Full Retention Separators
- Attenuation storage tanks or pipes

3.31 The proposed carpark and service yard will have gullies and filter drains with sumps to allow the collection of silt, and all external runoff will pass through a petrol interceptor before discharging from the site. Using the simple index approach outlined within the SuDS manual the various separators proposed for the scheme will be sufficient to treat flows leaving the high pollution risk areas of the site (services yards & car parking). Further treatment is provided by the downstream attenuation ponds before flows are discharged into the wider catchment.

Residual Risk and Designing for Exceedance

3.32 The proposed system has been designed to accommodate all flows during the 1 in 30-year event, during the 1-100-year event some minor surface flooding is identified in the detailed hydraulic modelling.

3.33 Exceedance flows will generally be contained within the low-lying docking ports of the service yards.

4. MAINTENANCE

4.1 The maintenance responsibility of the drainage and SuDS features should be undertaken by the site operator or a suitable appointed management company.

4.2 Requirements for ongoing maintenance of the drainage network should form part of the Operation and Maintenance manual for the site and should be undertaken by the site management. Any specialist or proprietary products that are specified at detailed design should have a manufacturer specific maintenance regime which should be included within the document.

4.3 It is envisaged that a site specific Operation and Maintenance Plan will be developed once the proprietary products have been specified, however, a typical Schedule and key points for consideration are included within a plan included as **Appendix 10**, some examples are also provided below.

i. All drainage features should be located in open areas which are readily accessible.
ii. Gullies should be inspected and de-silted at least once a year, where necessary.
iii. Pipes, manholes and silt traps should be inspected and de-silted at least once a year, where necessary.
iv. The below ground tank should be regularly inspected and jetted, as appropriate, to remove silt and debris.
v. Flow controls should be inspected every 6 months, litter/debris and silt build up should be removed as necessary.

4.4 It is understood that the site wide drainage network has been adopted by UU through a Section 104 agreement and 'Basin 1A' and ' Basin 1B' have been adopted by Rochdale Borough Council. Therefore, arrangements for the maintenance of the site wide drainage infrastructure are already in place.

5. FOUL WATER DRAINAGE

5.1 It is proposed to connect foul flows from the development to the existing 225mm diameter foul sewer within James Kearns Avenue to the south. Each Unit will connect separately with Unit J1 discharging via gravity and Unit J2 requiring a pumping station. Connections will be made via the existing spurs that we constructed when the main spine drainage was installed.

5.2 As built records of the wider drainage infrastructure and UU sewer record plans are included as **Appendix 3.**

5.3 An indicative foul water drainage layout for the development is shown on BWB Dwg No: KPJ-BWB-DGG-XX-DR-D-0500 which is included as **Appendix 9.**

6. SUMMARY

6.1 This statement and supporting appendices demonstrate that the drainage design for the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

6.2 This SDS is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

6.3 This statement and supporting appendices demonstrate that the drainage design for the development is appropriate for the surrounding infrastructure.

6.4 Attenuation with the Kingsway Business Park has been designed such that up to the 1 in 100 year event can be accommodated with the existing ponds. It is proposed that the 45% allowance for climate change will be managed and stored entirely within the plot boundary with any surface water flooding will be directed away from access routes.

6.5 On Plot attenuation is proposed in order to account for climate change, with SuDS techniques being implemented where practical in order to provide treatment to surface water flows.

6.6 The proposed development of Plot J2 will utilise existing attenuation Basins 1A and 1B.

6.7 The completed North West SuDS Proforma is provided as **Appendix 11**.

APPENDICES

APPENDIX 1: Site Plans

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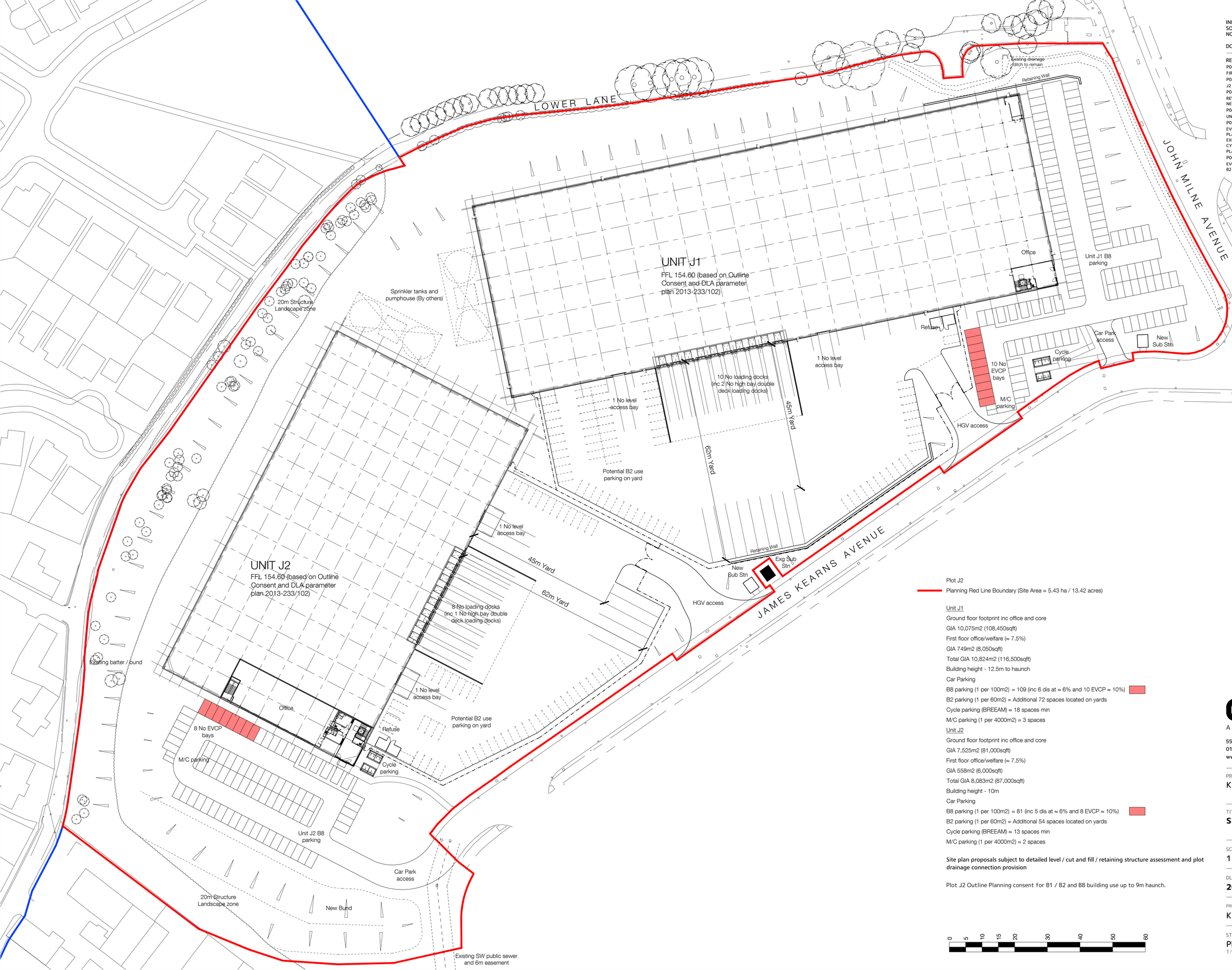
REVISIONS

P01	30/05/22	PSL	BLG
FIRST ISSUE			
P02	06/06/22	PSL	BLG
J2 BUILDING AND CAR PARK REVISED			
P03	13/06/22	PSL	BLG
REVISED TO LATEST BUILDING ARRANGEMENT NEW SUB STATIONS ADDED			
P04	28/06/22	PSL	BLG
UNIT J1 YARD ENTRANCE REVISED TO FACILITATE PROPOSED LEVELS			
P05	07/07/22	PSL	BLG
EVCP REVISED TO 20% PROVISION PLANNING APPLICATION BOUNDARY ADDED. EXISTING PUBLIC SEWER INDICATED TO SOUTH OF PLOT J CYCLE PARKING PROVISION REVISED TO BREEAM REQUIREMENTS PLANNING ISSUE			
P06	18/07/22	PSL	BLG
EVCP REVISED TO 10% PROVISION B2 PARKING INDICATED ON YARDS			



Plot J2

Planning Red Line Boundary (Site Area = 5.43 ha / 13.42 acres)

Unit J1

Ground floor footprint inc office and core

GIA 10,075m2 (108,450sqft)

First floor office/welfare (≈ 7.5%)

GIA 749m2 (8,050sqft)

Total GIA 10,824m2 (116,500sqft)

Building height - 12.5m to haunch

Car Parking

B8 parking (1 per 100m2) = 109 (inc 6 dis at ≈ 6% and 10 EVCP ≈ 10%)

B2 parking (1 per 60m2) = Additional 72 spaces located on yards

Cycle parking (BREEAM) ≈ 18 spaces min

M/C parking (1 per 4000m2) = 3 spaces

Unit J2

Ground floor footprint inc office and core

GIA 7,525m2 (81,000sqft)

First floor office/welfare (≈ 7.5%)

GIA 558m2 (6,000sqft)

Total GIA 8,083m2 (87,000sqft)

Building height - 10m

Car Parking

B8 parking (1 per 100m2) = 81 (inc 5 dis at ≈ 6% and 8 EVCP ≈ 10%)

B2 parking (1 per 60m2) = Additional 54 spaces located on yards

Cycle parking (BREEAM) ≈ 13 spaces min

M/C parking (1 per 4000m2) = 2 spaces

Site plan proposals subject to detailed level / cut and fill / retaining structure assessment and plot drainage connection provision

Plot J2 Outline Planning consent for B1 / B2 and B8 building use up to 9m haunch.

0 5 10 15 20 30 40 50 60

N W E S

Wilson Bowden Developments

dla ARCHITECTURE

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PROJECT
KINGSWAY PLOT J2

TITLE
SITE PLAN

SCALE		DATE
1:500	@A1	30/05/22

DLA REF	DRAWN	REVIEWED
2022-052	PSL	BLG

PROJECT	ORIGIN'R	ZONE	LEVEL	TYPE	ROLE	NUMBER
KPJ	DLA	JS	XX	DR	A	**90066**

STATUS
PLANNING

REVISION
P06

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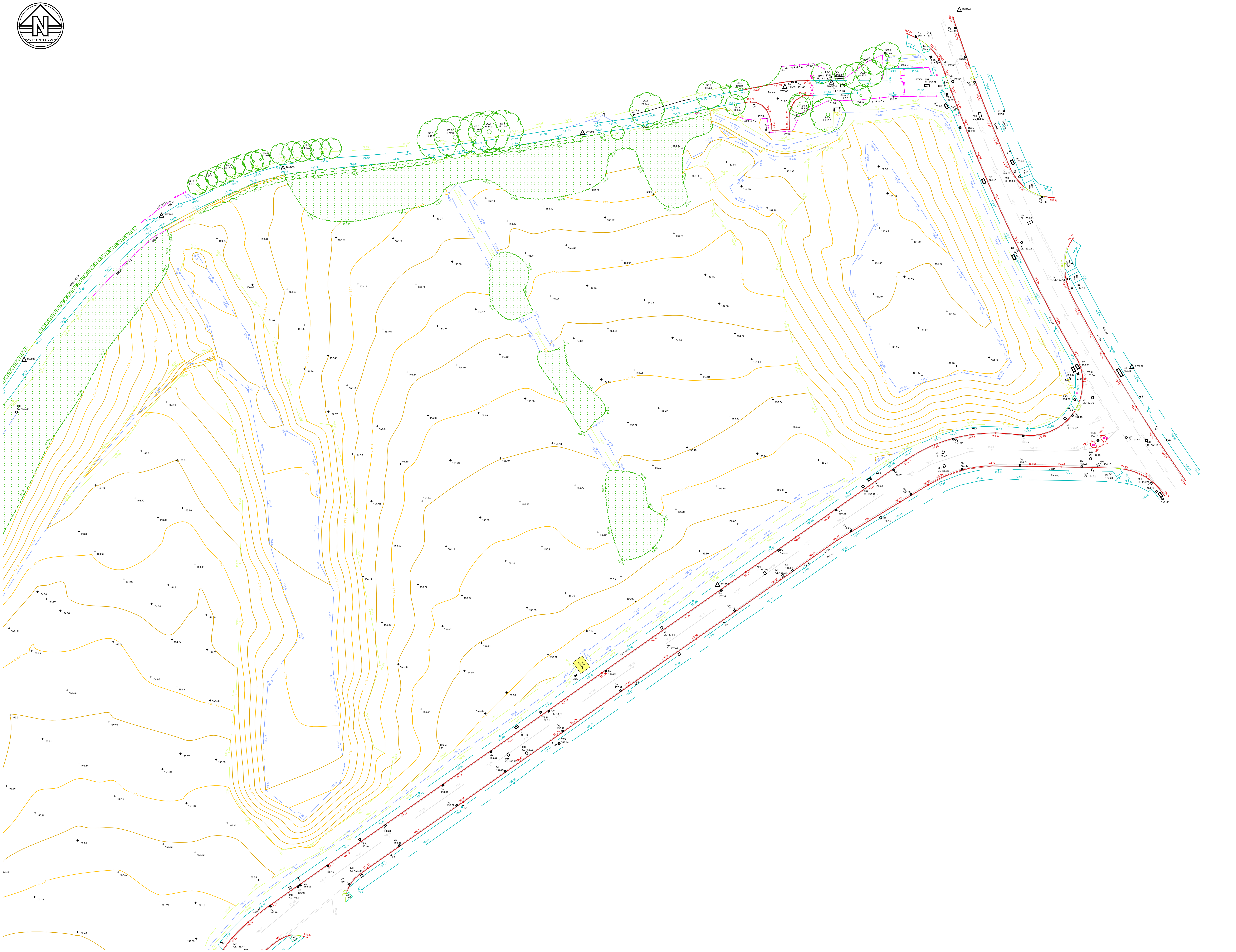
APPENDIX 2: Topographical Survey



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- Inspection Chamber
- 0.25 Flow direction and pipe diameter
- 1 Station and Name
- BH 1 Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- 50.00 Spot Level
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole		
		Gas	Gas	THL	Threshold Level
DK	Drop Kerb	GV	Gas Valve	TL	Traffic Light
DP	Down Pipe	GY	Gully	TP	Telegraph Post
Elec	Electric	Ht	Height	TS	Traffic Signal
EP	Electricity Post	IC	Inspection Chamber	UTS	Unable to Survey
ER	Earth Rod	IFL	Internal Floor Level	WL	Water Level
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WM	Water Meter
FL	Floodlight			WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P1	24.01.18	First Issue	SDS	DS

Issues & Revisions

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Client

Wilson Bowden Developments Ltd

Project Title

Plot J Kingsway Business Park, Rochdale

Drawing Title

Existing Site Plan Sheet 1 of 2

Drawn:	S. D Shreeves	Reviewed:	D. Smith
BWB Ref:	MCS 2374	Date: 24.01.18	Scale@A1: 1:500

Drawing Status

INFORMATION

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
KBP-BWB-00-01-DR-G-0001	S2	P1

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Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- Inspection Chamber
- Flow direction and pipe diameter (0.25)
- Station and Name (1)
- Monitoring Borehole (BH 1)
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- Spot Level (50.00)
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
		Gas	Gas	TL	Traffic Light
DK	Drop Kerb	GV	Gas Valve	TP	Telegraph Post
DP	Down Pipe	GY	Gully	TS	Traffic Signal
Elec	Electric	Ht	Height	UTS	Unable to Survey
EP	Electricity Post	IC	Inspection Chamber	WL	Water Level
ER	Earth Rod	IFL	Internal Floor Level	WM	Water Meter
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WO	Wash Out
FL	Floodlight				

Issues & Revisions

Rev	Date	Details of issue / revision	Drw	Rev
P1	24.01.18	First Issue	SDS	DS

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Client

Wilson Bowden Developments Ltd

Project Title

Plot J Kingsway Business Park, Rochdale

Drawing Title

Existing Site Plan Sheet 2 of 2

Drawn:	S. D Shreeves		Reviewed:	D. Smith	
BWB Ref:	MCS 2374	Date:	24.01.18	Scale@A1:	1:500

Drawing Status

INFORMATION

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
KBP-BWB-00-02-DR-G-0001	**S2**	**P1**

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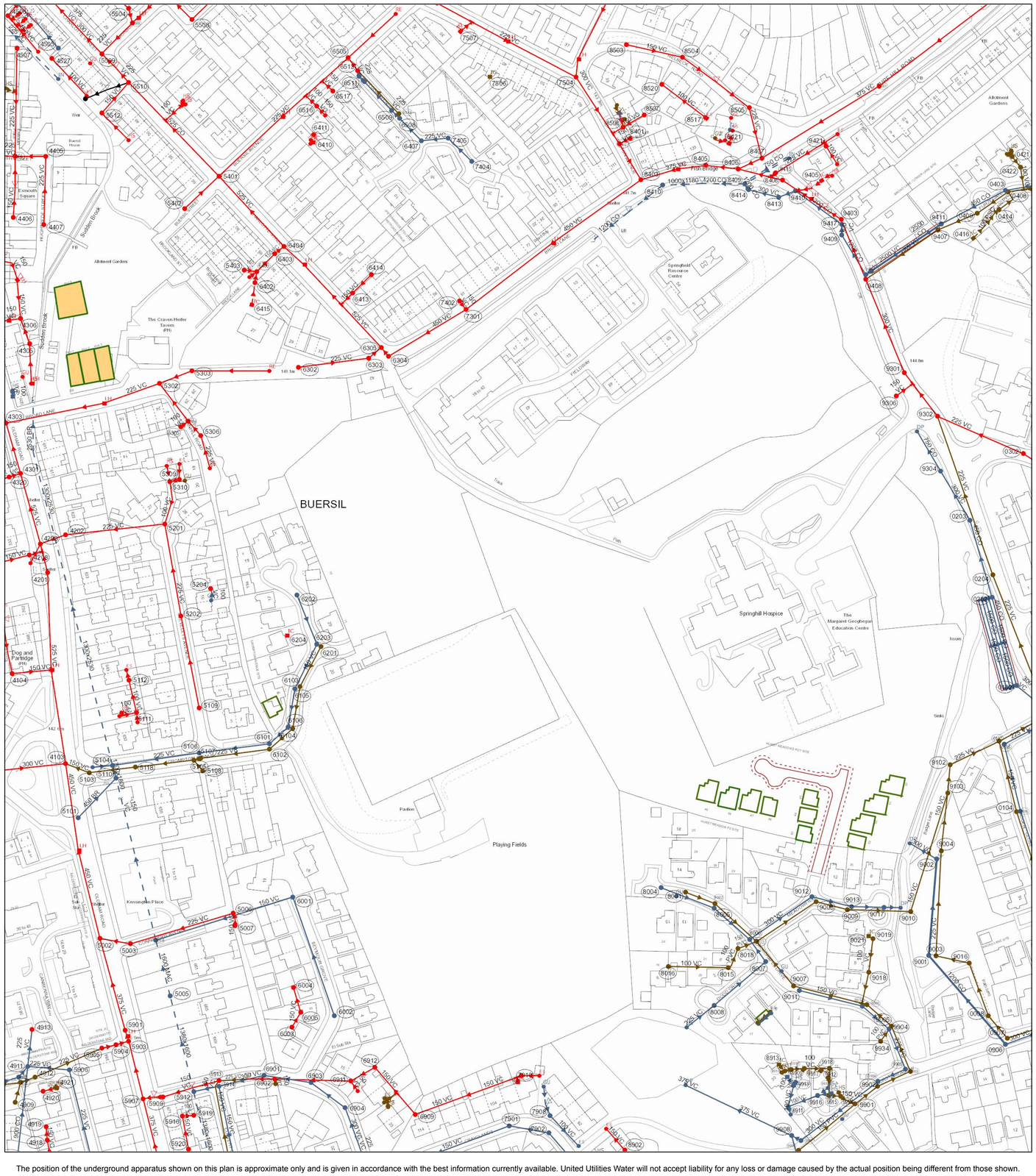
C:\Surveys\Surveys\Plot J Kingsway\KBP-BWB-00-ZZ-M2-G-001-Existing_Site_2D_Model.dwg

APPENDIX 3: As-built Drainage Drawings & United Utilities Sewer Records



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7904		CO		0			VC	62.54578	
5906	148.88	SW	146.57	225			VC	23.08679	
5913	148.56	CO	145.71	225			VC	15.52417	1 in 30
7405		SW	0	225			VC	14.83008	
7405		SW	0	225			VC	14.83008	
0906	158.8	SW	154.1	1200			CO	65.10599	1 in 203
0906	158.8	SW	154.1	1200			CO	65.10599	1 in 203
9304		SW	0	750			CO	25.63293	
9304		SW	0	750			CO	25.63293	
4306	139.81	CO	137.78	150			VC	13.15383	1 in 25
4907	150.41	SW	146.85	225			VC	7.81025	
9406		SW	140.93	1200			CO	25.80402	1 in 235
6509		SW	0	1200			CO	21.94175	
6509		SW	0	1200			CO	21.94175	
6001	146.83	SW	145.97	150			VC	79.69943	
6003		CO		150			VC	9.440902	
6511		SW	0	225			VC	3.354311	
6511		SW	0	225			VC	3.354311	
8402		CO	0	300			VC	23.32381	
8402		CO	0	300			VC	23.32381	
6406		CO	0	150			VC	14.14214	
9908	157.04	SW	154.63	375			VC	65.005	1 in 96
4909	150.49	FO	146.34	150			VC	11.40175	1 in 16
5914	148.56	SW	146.77	300			VC	14.31782	1 in 48
5904	147.52	CO	143.84	225			VC	7.28011	
5304		CO	0	225			VC	26.40076	
9906	157.21	SW	154.57	300			VC	53.77579	1 in 283
5912	148.53	SW	143.41	1398			MAC	54.57106	
7902	154.36	SW	152.94	150			VC	22.36068	1 in 56
9417		SW	140.8	1200			CO	31.54424	1 in 210
9417		SW	140.8	1200			CO	31.54424	1 in 210
5004		SW		150			VC	92.64988	
5510	140.52	CO	136.81	225			VC	10.63015	1 in 39
5510	140.52	CO	136.81	225			VC	10.63015	1 in 39
6407		SW	0	225			VC	17.36767	
6407		SW	0	225			VC	17.36767	
6413		CO		150			VC	9.079124	
6203	148.62	SW	146.38	225			VC	27.53776	1 in 29
0302	149.55	CO	146.72	225			VC	51.94846	1 in 18
0302	149.55	CO	146.72	225			VC	51.94846	1 in 18
8505	144.26	CO	140.7	225			VC	28.86174	1 in 66
8505	144.26	CO	140.7	225			VC	28.86174	1 in 66
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
5305	142.67	CO	140.38	100			VC	5	
8517		CO		100			VC	30.31561	
8517		CO		100			VC	30.31561	
9102	153.3	FO	151.75	225			VC	30.10442	1 in 188
9102	153.3	FO	151.75	225			VC	30.10442	1 in 188
5006	146.3	CO	143.8	225			VC	59.48109	1 in 47
6603	145.46	CO	142.31	225			VC	89.15154	1 in 27
5306	142.95	CO	140.21	225			VC	10.63015	
5319		CO		100			VC	24.22394	
5107	144.62	FO	141.94	225			VC	4.123106	
9902	157.22	FO	154.8	150			VC	19.96499	1 in 49
8004	155.32	SW	154.06	225			VC	31.67438	1 in 138
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
9914		FO		150			VC	4.993862	
9409		SW	140.82	300			VC	5.90783	1 in 295
9409		SW	140.82	300			VC	5.90783	1 in 295
6911		CO		150			VC	42.09335	
4912	149.94	FO	144.61	225			VC	40.31129	1 in 106
0008	159.14	FO	155.94	225			VC	31.14424	1 in 84
0008	159.14	FO	155.94	225			VC	31.14424	1 in 84
8911		SW		100			VC	4.626881	
6105	147.45	SW	145.43	225			VC	21.56608	1 in 18
5003	145.58	CO	141.85	225			VC	17.26268	1 in 25
5007		SW	0	300			VC	29.55138	
9014	156.94	SW	155.03	225			VC	19.4938	1 in 130
0202		SW	0	450			CO	44.36969	
0202		SW	0	450			CO	44.36969	
5505	141.61	CO	138.37	225			VC	24.76093	
5005		SW		1600			MAC	32.01562	
0004		FO	0	150			VC	53.71965	
5303	141.44	CO	138.43	225			VC	19.31321	1 in 129
0006		SW	0	225			VC	53.24144	
8413		SW	140.57	300			VC	17.25203	1 in 246
8413		SW	140.57	300			VC	17.25203	1 in 246
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
6902	149.81	CO	147.88	150			VC	15	1 in 13
7901		SW	152.53	150			VC	82.28001	1 in 64
4404	139.3	CO	136.75	225			VC	20.02498	1 in 167
4404	139.3	CO	136.75	225			VC	20.02498	1 in 167
0402		SW	143.16	450			CO	23.65433	1 in 394
0402		SW	143.16	450			CO	23.65433	1 in 394
6508		SW	0	300			VC	6.229615	
6508		SW	0	300			VC	6.229615	
6304	142.1	CO	138.07	525			VC	6.423124	
8001	155.59	FO	153.63	150			VC	17.37098	1 in 134
9008	156.78	FO	153.04	150			VC	17.8895	1 in 138
7402		CO		150			VC	6.025026	
9917		FO		100			VC	13.90552	
5309		CO		100			VC	5.249513	
6414		CO		150			VC	14.58395	
7301	141.99	CO	138.43	450			VC	50.24938	1 in 173
8005	155.82	SW	153.83	225			VC	26.14604	1 in 145
0501	144.25	CO	141.35	375			VC	82.80096	1 in 45
0501	144.25	CO	141.35	375			VC	82.80096	1 in 45
4406	139.56	CO	139.03	150			VC	17.02939	1 in 30
4406	139.56	CO	139.03	150			VC	17.02939	1 in 30
8504	145.01	CO	142.13	150			VC	23.60085	1 in 62
8504	145.01	CO	142.13	150			VC	23.60085	1 in 62
9016	158.19	FO	155.57	225			VC	18.83193	1 in 55
9016	158.19	FO	155.57	225			VC	18.83193	1 in 55
9403	143.17	CO	140.33	300			VC	10.37707	1 in 43
9403	143.17	CO	140.33	300			VC	10.37707	1 in 43
7504	143.57	CO	140.33	300			VC	44.10215	
7504	143.57	CO	140.33	300			VC	44.10215	
4303	140.46	CO	136.9	540			BR	55.54278	
4405	139.31	CO	136.93	225			VC	17	1 in 131
4405	139.31	CO	136.93	225			VC	17	1 in 131
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
8409	142.21	SW	140.27	1200			CO	23.56172	1 in 337
8409	142.21	SW	140.27	1200			CO	23.56172	1 in 337
8007	156.28	SW	153.8	225			VC	15.30872	1 in 102
9007	156.55	FO	153.75	150			VC	32.06864	1 in 64
9018		FO		100			VC	17.69356	
9012	156.76	SW	153.35	300			VC	22.57987	1 in 151
9019		FO		100			VC	18.61551	
6305		CO	0	525			VC	77.83431	
5920		CO		150			VC	18.80374	
9901	157	FO	154.9	150			VC	15.82329	1 in 158
8604	148.9	CO	146.11	300			VC	80.71104	1 in 18
6102	145.24	FO	142.82	225			VC	38.32754	1 in 44
5512		CO	0	150			VC	22.67157
5512		CO	0	150			VC	22.67157
9410		SW	140.65	1200			CO	9.901921	1 in 124
9410		SW	140.65	1200			CO	9.901921	1 in 124
9013	156.65	SW	153.2	300			VC	9.312605
4911	150.46	SW	0	225			CO	20.56932
0102		SW	0	450			CO	50.92858
0102		SW	0	450			CO	50.92858
4505	139.12	SW	136.23	660			BR	17.02939	1 in 122
4505	139.12	SW	136.23	660			BR	17.02939	1 in 122
0407		FO	142.82	300			VC	23.24899	1 in 155
0407		FO	142.82	300			VC	23.24899	1 in 155
5108	144.69	FO	143.11	150			VC	7.81025
6005		CO		150			VC	14.31617
6903	151.5	SW	149.76	300			VC	26.30589	1 in 16
5302	141.72	CO	138.25	225			VC	88.00275	1 in 110
5509	139.95	CO	136.31	300			VC	21.93171	1 in 40
5509	139.95	CO	136.31	300			VC	21.93171	1 in 40
5101	143.81	SW	140.36	450			BR	30.41381
6302	141.28	CO	139.03	225			VC	39.31921	1 in 80
0107		SW	0	225			VC	32.23659
0107		SW	0	225			VC	32.23659
0421		FO		100			VC	7.49179
0421		FO		100			VC	7.49179
0421		FO		100			VC	7.49179
0421		FO		100			VC	7.49179
9916		SW		100			VC	17.50452
8006	156.1	SW	153.65	300			VC	41.95615	1 in 140
6106	146	SW	144.24	225			VC	13.97316	1 in 18
5007	146.34	CO	144.24	150			VC	4	1 in 22
6101	145.25	SW	143.45	225			VC	39.31921	1 in 44
8503	145.32	CO	142.74	150			VC	31.7805	1 in 53
8503	145.32	CO	142.74	150			VC	31.7805	1 in 53
9009	156.69	FO	152.91	150			VC	35.07051	1 in 125
7404		SW	0	225			VC	18.36441
7404		SW	0	225			VC	18.36441
0003	160.15	FO	157.51	225			VC	29.93069	1 in 36
8003	156.11	FO	153.25	150			VC	39.77404	1 in 189
9918		FO		100			VC	15.00834
6512		FO	0	225			VC	33.16039
6512		FO	0	225			VC	33.16039
8405	142.08	CO	139.48	375			VC	37.00513	1 in 119
8405	142.08	CO	139.48	375			VC	37.00513	1 in 119
9915		FO		150			VC	5.487864
5504	140.36	CO	137.79	150			VC	8.246211
5504	140.36	CO	137.79	150			VC	8.246211
5202	144.29	CO	142.15	225			VC	51.78803	1 in 100
6103	147.46	FO	145.26	150			VC	23.67225	1 in 35
6904	152.96	SW	150.41	300			VC	23.69085	1 in 38
6402	141.67	CO	139.73	150			VC	6.082355
9301	145.35	CO	141.7	300			VC	55.96341
6901	149.44	SW	148.06	300			VC	25.70992	1 in 20
9011	156.55	SW	155.27	225			VC	35.96541	1 in 150
6510		SW	0	300			VC	4.151205
6510		SW	0	300			VC	4.151205
5903	147.13	CO	0	375			VC	6.324555
0104		FO	0	150			VC	40.16231
0104		FO	0	150			VC	40.16231
0101		SW	0	300			VC	27.8612
8401	142.31	CO	140.85	150			VC	6.708204
8401	142.31	CO	140.85	150			VC	6.708204
5111		SW	0	225			VC	18.34774
6202	148.65	SW	146.62	225			VC	29.42893	1 in 123
4506	138.36	CO	137.2	150			VC	15.6205
4506	138.36	CO	137.2	150			VC	15.6205
6303	141.97	CO	138.52	225			VC	9.219544

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0105		FO	0	225			VC	30.80777
0105		FO	0	225			VC	30.80777
0907	158.88	FO	156.68	225			VC	16.23012	1 in 22
0907	158.88	FO	156.68	225			VC	16.23012	1 in 22
4305	140.16	CO	138.41	150			VC	14.86607	1 in 28
8403	141.84	CO	139.12	450			VC	120.8216	1 in 178
8403	141.84	CO	139.12	450			VC	120.8216	1 in 178
5112		CO		100			VC	5.962448
6909		CO		150			VC	34.38065
4407	139.45	CO	137.43	225			VC	38.01316	1 in 88
4407	139.45	CO	137.43	225			VC	38.01316	1 in 88
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9421		CO		100			VC	2.137812
9421		CO		100			VC	2.137812
6002	150.35	SW	149.5	150			VC	69.89278	1 in 20
6018		FO		150			VC	10.99478
5907	148.31	CO	144.3	375			VC	32.98484
7908		SW		150			VC	23.19343
9501	143.36	CO	140.51	375			VC	76.32169	1 in 144
9501	143.36	CO	140.51	375			VC	76.32169	1 in 144
8902		CO		150			VC	15.76082
4908	150.4	FO	144.9	225			VC	8.544003	1 in 32
4202	141.23	CO	138.26	225			O	14.86607
9411		SW	140.96	450			CO	2.324237
9411		SW	140.96	450			CO	2.324237
9411		SW	140.96	450			CO	2.324237
9411		SW	140.96	450			CO	2.324237
5109	144.48	CO	142.78	225			VC	51.97115	1 in 85
4918		CO		150			VC	7.503705
9909	156.86	FO	155.18	150			PVC	40.55102	1 in 145
5403	141.84	CO	140.63	150			VC	7.071068
8414		SW	140.5	1200			CO	3.87781	1 in 129
8414		SW	140.5	1200			CO	3.87781	1 in 129
9904	157.17	SW	154.88	225			VC	24.10503	1 in 185
5201	143.87	CO	141.6	225			VC	55.32631	1 in 33
5905	148.2	CO	144.21	225			VC	8.246211	1 in 24
5110		SW		1700			BR	7.28011	
5909	148.32	CO	144.77	150			VC	5	1 in 63
5916		CO		100			VC	6.315803
5901	146.96	CO	142.49	375			VC	52.88667	1 in 32
8002	155.81	FO	153.5	150			VC	31.30356	1 in 125
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
8008	155.85	SW	154	225			VC	37.4892	1 in 187
9905	157.49	SW	154.75	225			VC	16.73408	1 in 93
9907	156.79	SW	154.38	375			VC	5.780062	1 in 5
6403	143.06	CO	139.18	150			VC	6.403124
9016		FO		150			VC	33.35115
6912		CO		150			VC	15.44867
0301		CO	0	225			VC	34.40696
6104	146.05	FO	144.59	150			VC	17.24208	1 in 10
5508		CO	0	225			VC	24.04163
5508		CO	0	225			VC	24.04163
5506	142.25	CO	138.98	225			VC	21.2132	1 in 40
5506	142.25	CO	138.98	225			VC	21.2132	1 in 40
6201	148.64	FO	147.09	150			VC	25.15165	1 in 14
8410	141.83	SW	139.9	1000			CO	24.20744	1 in 303
8410	141.83	SW	139.9	1000			CO	24.20744	1 in 303
9006	156.95	FO	154.02	150			VC	41.99197	1 in 156
0106		SW	0	225			VC	38.23397
0106		SW	0	225			VC	38.23397
0204		FO	0	225			VC	93.2085
0204		FO	0	225			VC	93.2085
9408		CO	0	300			VC	35.96058
0203		SW	0	300			VC	31.81309
0203		SW	0	300			VC	31.81309
9103	154.45	FO	152.1	225			VC	15.74119	1 in 45
9103	154.45	FO	152.1	225			VC	15.74119	1 in 45
0103		FO	0	225			VC	83.67099
8015		FO		100			PVC	12.13865
5106	144.57	SW	142.54	225			VC	48.50773	1 in 38
8507		CO		150			VC	20.40897
8507		CO		150			VC	20.40897
9002	155.74	SW		0			UN	0.3746718
9002	155.74	SW		0			UN	0.3746718
4921		CO		100			PVC	7.806711
8407	142.31	CO	139.93	375			VC	14.31782	1 in 143
8407	142.31	CO	139.93	375			VC	14.31782	1 in 143
9001	157.08	SW	153.78	1200			CO	53.7048	1 in 448
9001	157.08	SW	153.78	1200			CO	53.7048	1 in 448
8406	142.14	CO	139.6	375			VC	18.11077	1 in 181
8406	142.14	CO	139.6	375			VC	18.11077	1 in 181
9934		FO		100			PVC	10.48805
4103	143.8	CO	141.07	525			VC	106.6488	1 in 34
5503	139.71	CO	138.53	150			VC	23.34524	1 in 35
5118		FO	0	225			VC	25.79996
5402	141.67	CO	139.11	225			VC	26.1725
5402	141.67	CO	139.11	225			VC	26.1725
6517		CO		150			VC	8.513562
6517		CO		150			VC	8.513562
4301		CO	0	225			VC	29.12044
5105		FO	0	225			VC	32.62093
8415		CO		225			VC	3.670241
8415		CO		225			VC	3.670241
8408	142.37	CO	139.77	375			VC	25.18439	1 in 148
8408	142.37	CO	139.77	375			VC	25.18439	1 in 148
5104	143.48	SW	139.76	1300			BR	179.477
5401	142.17	CO	138.18	525			CO	72.13876	1 in 57
5401	142.17	CO	138.18	525			CO	72.13876	1 in 57
9306		CO		150			VC	11.50932
6513		CO	0	225			VC	8.776383
6513		CO	0	225			VC	8.776383
9004	156.47	FO	152.84	225			VC	32.34111	1 in 44
9004	156.47	FO	152.84	225			VC	32.34111	1 in 44
9302	146.88	CO	143.85	225			VC	30.42042	1 in 21
9302	146.88	CO	143.85	225			VC	30.42042	1 in 21
9003		FO	0	225			VC	58.31483
9003		FO	0	225			VC	58.31483
9903	157.54	FO	154.39	150			VC	27.17603	1 in 109
9903	157.54	FO	154.39	150			VC	27.17603	1 in 109
6404		CO	0	525			VC	53.07542
6404		CO	0	525			VC	53.07542
5002	145.38	CO	140.83	450			VC	98.95573
4201	141.43	CO	137.86	525			VC	16.49242
9005	157.14	FO	154.14	150			VC	18.05422	1 in 150

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined | blue - surface water
brown - foul | purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

- FO Foul
- SW Surface Water
- CO Combined
- OV Overflow

SEWER SHAPE

- CI Circular
- TR Trapezoidal
- EG Egg
- AR Arch
- OV Oval
- BA Barrel
- FT Flat Top
- HO HorseShoe
- RE Rectangular
- UN Unspecified
- SQ Square

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bolted
- CSU Concrete Segment Unbolted
- CC Concrete Box Culverted
- PSC Plastic / Steel Composite
- GRC Glass Reinforecd Plastic
- DI Ductile Iron
- PVC Polyvinyl Chloride
- CI Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Coursed
- MAR Masonry, Random
- U Unspecified

Address or Site Reference:

Plot J2 Kingsway Business Park,

OS sheet Number: SD9011SE
Scale: 1:1250 **Date:** 08/03/2021
Nodes: 335
Sheet: 1 of 6

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

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.

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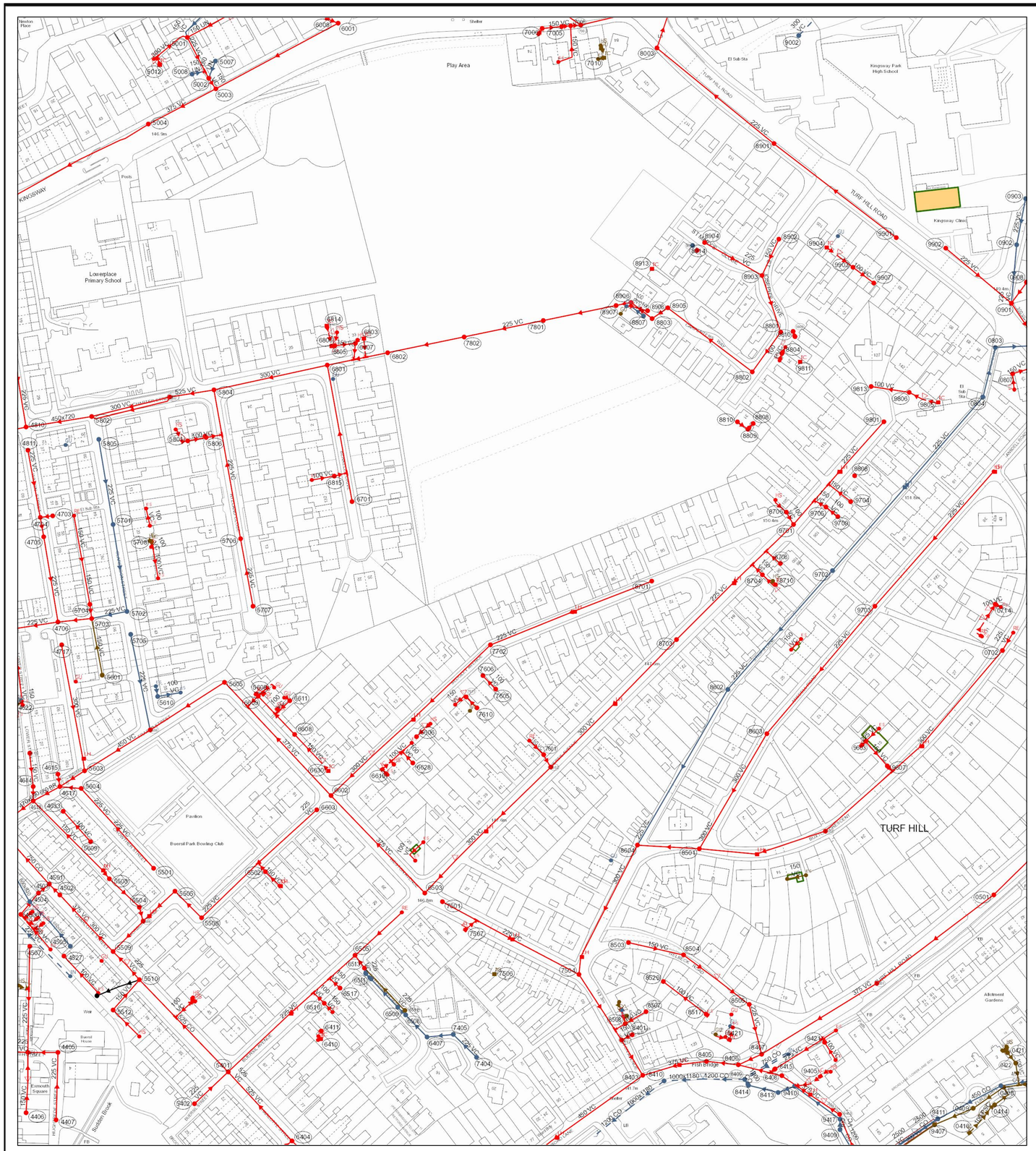

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
5003		CO	0	375			VC	42.94182	
7602	148.02	CO	144.92	300			VC	75.66527	1 in 81
7405		SW	0	225			VC	14.83008	
7405		SW	0	225			VC	14.83008	
9406		SW	140.93	1200			CO	25.80402	1 in 235
6509		SW	0	1200			CO	21.94175	
6509		SW	0	1200			CO	21.94175	
7008		CO	0	150			VC	5.764816	
6511		SW	0	225			VC	3.354311	
6511		SW	0	225			VC	3.354311	
8402		CO	0	300			VC	23.32381	
8402		CO	0	300			VC	23.32381	
8602	150.25	SW	148.16	225			VC	101.7104	1 in 1271
0807		CO	0	150			VC	10.5209	
0807		CO	0	150			VC	10.5209	
8801	148.12	CO	143.84	225			VC	27.47803	1 in 98
9607		CO	0	150			VC	4.148784	
9705		CO	0	150			VC	7.595233	1 in 33
6602	145.82	CO	142.62	375			VC	87.72685	1 in 33
9701	150.42	CO	147.39	225			VC	92.6364	1 in 80
8902	148.27	CO	146.8	150			VC	22.6324	1 in 8
9417		SW	140.8	1200			CO	31.54424	1 in 210
9417		SW	140.8	1200			CO	31.54424	1 in 210
5510	140.52	CO	136.81	225			VC	10.63015	1 in 39
5510	140.52	CO	136.81	225			VC	10.63015	1 in 39
9703	152.82	CO	149.56	225			VC	94.36631	1 in 41
6609		CO	0	150			VC	8.449613	
6407		SW	0	225			VC	17.36767	
6407		SW	0	225			VC	17.36767	
8505	144.26	CO	140.7	225			VC	28.86174	1 in 66
8505	144.26	CO	140.7	225			VC	28.86174	1 in 66
0414		FO	0	100			PVC	14.58894	
0414		FO	0	100			PVC	14.58894	
0414		FO	0	100			PVC	14.58894	
0414		FO	0	100			PVC	14.58894	
0908		CO	0	150			VC	14.49864	
0908		CO	0	150			VC	14.49864	
8517		CO	0	100			VC	30.31561	
8517		CO	0	100			VC	30.31561	
8603	149.52	CO	147.22	300			VC	75.26276	1 in 118
5007		SW	0	150			UN	10.41356	
6603	145.46	CO	142.31	225			VC	89.15154	1 in 27
6503	146.78	CO	143.59	375			VC	76.38062	1 in 81
9806		CO	0	100			VC	21.74045	
9806		CO	0	100			VC	21.74045	
8803	145.22	CO	142.76	225			VC	15.02805	1 in 63
8703	149.37	CO	146.21	300			VC	101.1212	1 in 79
4810	140.95	CO	136.69	470			BR	21.37756	
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0409		SW	140.92	300			VC	5.90783	1 in 295
0409		SW	140.82	300			VC	5.90783	1 in 295
9801	151.39	CO	148.8	225			VC	77.23551	1 in 58
7611		CO	0	100			VC	1.042587	
6611		CO	0	100			VC	11.12245	
0902	148.8	SW	145.28	225			VC	33.13608	
0902	148.8	SW	145.28	225			VC	33.13608	
8901	149.12	CO	147.13	225			VC	85.27602	1 in 86
5609		CO	0	100			VC	22.96621	
5505	141.61	CO	138.37	225			VC	24.76093	
0804	150.8	SW	148.48	225			VC	28.86174	1 in 43
0804	150.8	SW	148.48	225			VC	28.86174	1 in 43
5803	141.64	CO	138.14	300			VC	45.35416	1 in 73
7605		CO	0	100			VC	10.53285	
6502	143.93	CO	142.82	150			VC	6.403124	1 in 3
8413		SW	140.57	300			VC	17.25203	1 in 246
8413		SW	140.57	300			VC	17.25203	1 in 246
0422		FO	0	100			VC	12.55899	
0422		FO	0	100			VC	12.55899	
0422		FO	0	100			VC	12.55899	
0422		FO	0	100			VC	12.55899	
5004	146.77	CO	143.63	375			VC	101.2279	1 in 32
8903	148.37	CO	144.02	225			VC	33.70771	1 in 187
4404	139.3	CO	136.75	225			VC	20.02498	1 in 167
4404	139.3	CO	136.75	225			VC	20.02498	1 in 167
0402		SW	143.16	450			CO	23.65433	1 in 394
0402		SW	143.16	450			CO	23.65433	1 in 394
6508		SW	0	300			VC	6.229615	
6508		SW	0	300			VC	6.229615	
6802	143.59	CO	141.22	225			VC	34.79724	1 in 39
8706		CO	0	100			VC	8.005173	
4503	138.68	CO	0	150			VC	7.81025	
5001	150.36	CO	148.34	225			VC	25.94224	1 in 22
8906	145.14	CO	142.52	225			VC	8.648321	
7610		CO	0	100			VC	8.793706	
0501	144.25	CO	141.35	375			VC	82.80096	1 in 45
0501	144.25	CO	141.35	375			VC	82.80096	1 in 45
4406	139.56	CO	139.03	150			VC	17.02939	1 in 30
4406	139.56	CO	139.03	150			VC	17.02939	1 in 30
8504	145.01	CO	142.13	150			VC	23.60085	1 in 62
8504	145.01	CO	142.13	150			VC	23.60085	1 in 62
9403	143.17	CO	140.33	300			VC	10.37707	1 in 43
9403	143.17	CO	140.33	300			VC	10.37707	1 in 43
7504	143.57	CO	140.33	300			VC	44.10215	
7504	143.57	CO	140.33	300			VC	44.10215	
4405	139.31	CO	136.93	225			VC	17	1 in 131
4405	139.31	CO	136.93	225			VC	17	1 in 131
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
4717	139.15	CO	136.75	300			VC	72.18635	1 in 71
8409	142.21	SW	140.27	1200			CO	23.56172	1 in 337
8409	142.21	SW	140.27	1200			CO	23.56172	1 in 337
7601	148.15	CO	146.93	150			VC	8.062258	1 in 5
8003	148.03	CO	146.11	225			VC	22.13594	1 in 89
5702	140.89	SW	137.59	225			VC	20.39608	
6807		CO	0	150			VC	9.191045	
6305		CO	0	525			VC	77.83431	
8604	148.9	CO	146.11	300			VC	80.71104	1 in 18
5512		CO	0	150			VC	22.67157	
5512		CO	0	150			VC	22.67157	
8807		SW		100			PVC	9.053079	
9410		SW	140.65	1200			CO	9.901921	1 in 124
9410		SW	140.65	1200			CO	9.901921	1 in 124
4505	139.12	SW	136.23	660			BR	17.02939	1 in 122
4505	139.12	SW	136.23	660			BR	17.02939	1 in 122
0407		FO	142.82	300			VC	23.24899	1 in 155
0407		FO	142.82	300			VC	23.24899	1 in 155
8908		CO		100			PVC	9.774421	
0702	151.68	CO	149.89	300			VC	143.1863	1 in 118
0702	151.68	CO	149.89	300			VC	143.1863	1 in 118
6608		CO		150			VC	29.88698	
5705	140.64	SW	138.8	225			VC	55.10898	1 in 70
5803	141.64	CO	138.14	525			VC	46.99864	1 in 214
0903	148.43	SW	145.92	225			VC	26.4764	1 in 42
0903	148.43	SW	145.92	225			VC	26.4764	1 in 42
5509	139.95	CO	136.31	300			VC	21.93171	1 in 40
5509	139.95	CO	136.31	300			VC	21.93171	1 in 40
5802	141.87	CO	137.52	450			BR	37.48333	1 in 45
0421		FO		100			VC	7.49179	
0421		FO		100			VC	7.49179	
0421		FO		100			VC	7.49179	
0421		FO		100			VC	7.49179	
0907		CO		150			VC	12.23486	
5604	138.7	CO	136.91	225			VC	12.04159	
9810		CO		100			PVC	3.152436	
9901	150.27	CO	148.29	225			VC	87.00574	1 in 76
8503	145.32	CO	142.74	150			VC	31.7805	1 in 53
8503	145.32	CO	142.74	150			VC	31.7805	1 in 53
4705	140.11	CO	137.46	225			VC	48.6621	1 in 63
7404		SW	0	225			VC	18.36441	
7404		SW	0	225			VC	18.36441	
5002	148.07	CO	146.94	150			VC	7.211102	
6512		FO	0	225			VC	33.16039	
6512		FO	0	225			VC	33.16039	
8405	142.08	CO	139.48	375			VC	37.00513	1 in 119
8405	142.08	CO	139.48	375			VC	37.00513	1 in 119
5504	140.36	CO	137.79	150			VC	8.246211	
5504	140.36	CO	137.79	150			VC	8.246211	
4615	138.54	CO	136.8	150			VC	7.071068	
4703	140.41	CO	138.79	150			VC	7.071068	
8704		CO		150			VC	8.029721	
4502	139.02	CO	135.36	375			VC	8.485281	
6510		SW	0	300			VC	4.151205	
6510		SW	0	300			VC	4.151205	
8401	142.31	CO	140.85	150			VC	6.708204	
8401	142.31	CO	140.85	150			VC	6.708204	
4506	138.36	CO	137.2	150			VC	15.6205	
4506	138.36	CO	137.2	150			VC	15.6205	
8701	149.88	CO	146.65	225			VC	97.86507	1 in 91
9704		CO		150			VC	16.00533	
8403	141.84	CO	139.12	450			VC	120.8216	1 in 178
8403	141.84	CO	139.12	450			VC	120.8216	1 in 178
7002	147.5	CO	146.23	225			VC	64.7611	1 in 130
9709		CO		100			VC	8.562573	
5610		SW		100			VC	13.13935	
4407	139.45	CO	137.43	225			VC	38.01316	1 in 88
4407	139.45	CO	137.43	225			VC	38.01316	1 in 88
8904	145.97	CO	144.42	225			VC	37.30077	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9421		CO		100			VC	2.137812	
9421		CO		100			VC	2.137812	
4501		CO	0	750			CO	37.53665	
0803	149.73	SW	147.78	225			VC	22.02271	1 in 37
0803	149.73	SW	147.78	225			VC	22.02271	1 in 37
5805	141.85	SW	140.28	225			VC	48.6621	1 in 61
4613	138.29	CO	135.93	150			VC	19.10497	1 in 382
5605	142.5	CO	139.12	450			VC	49.92995	1 in 40
4706	139.36	CO	136.66	225			VC	26.30589	1 in 45
9501	143.36	CO	140.51	375			VC	76.32169	1 in 144
9501	143.36	CO	140.51	375			VC	76.32169	1 in 144
6628		CO		100			VC	8.871205	
5701	141.51	SW	139.47	225			VC	49.64877	1 in 68
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
7602	143.93	CO	142.1	225			VC	43.84097	1 in 50
9002	148.61	SW	146.91	300			VC	52.34501	1 in 0.35830658
9603		CO		150			VC	18.59209	
9702	151.52	SW	150.12	225			VC	89.27486	1 in 46
8501	151.21	CO	146.57	300			VC	35.05709	1 in 88
4811	140.83	CO	138.17	225			VC	38.63936	
4704		CO	0	225			VC	11.18034	
9902	150.33	CO	145.81	225			VC	48.27007	
7006		CO		150			VC	11.02506	
8414		SW	140.5	1200			CO	3.87781	1 in 129
8414		SW	140.5	1200			CO	3.87781	1 in 129
8905	145.43	CO	142.89	225			VC	10.63766	1 in 82
1001		SW	0	225			VC	80.9506	
5704	140.29	CO	139.45	150			VC	8.062258	
7005		CO		150			VC	4.983509	
5603	138.79	CO	135.59	460			BR	16.64332	
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
5501	140.92	CO	138.5	225			VC	60.87693	1 in 39
9602	151.77	CO	148.66	300			VC	73.24992	1 in 163
7702	149.27	CO	145.47	225			VC	91.97245	1 in 46
8708		CO		100			VC	10.67031	
6403	143.06	CO	139.18	150			VC	6.403124	
6001	148.89	CO	145.8	375			VC	78.29432	
5508		CO	0	225			VC	24.04163	
5508		CO	0	225			VC	24.04163	
4504	138.45	SW	136.09	600			BR	42.54409	
0601	145.07	CO	142.21	375			VC	78.49203	1 in 92
8802	148.71	CO	143.56	225			VC	59.84796	1 in 89
5506	142.25	CO	138.98	225			VC	21.2132	1 in 40
5506	142.25	CO	138.98	225			VC	21.2132	1 in 40
8410	141.83	SW	139.9	1000			CO	24.20744	1 in 303
8410	141.83	SW	139.9	1000			CO	24.20744	1 in 303
8804		CO		100			PVC	4.126227	
7801	144.24	CO	0	225			VC	45.69331	
5008		SW		150			UN	7.478387	
9408		CO	0	300			VC	35.96058	
8907		CO	0	225			VC	41.91701	
5601	139.49	FO	138.94	150			VC	32.50764	
5703		CO	0	225			VC	19.10497	
0901	149.75	CO	0	300			VC	28.84441	
0901	149.75	CO	0	300			VC	28.84441	
5606	140.37	CO	136.87	450			VC	43.56604	1 in 39
8809		CO		100			PVC	4.434119	
8507		CO		150			VC	20.40897	
8507		CO		150			VC	20.40897	
5706	141.67	CO	139.77	225			VC	85.32877	1 in 948
5804	141.28	CO	139.42	525			VC	25.31798	1 in 21
6801	141.77	CO	140.33	300			VC	65.51336	1 in 67
5707	142	CO	140.17	225			VC	38.63936	1 in 99
5801		CO		100			VC	10.70374	
5806		CO		100			VC	8.987749	
9903		CO		100			VC	14.85812	
6815		CO		100			VC	7.302792	
6701	143.15	CO	141.78	225			VC	78.26311	1 in 55
7501	146.44	CO	143.41	225			VC	87.23629	1 in 29
4614	137.97	CO	135.79	150			VC	8	
4618		CO	0	470			BR	15	
4617		CO	0	660			BR	17	
5503	139.71	CO	138.53	150			VC	23.34524	1 in 35
6404		CO	0	525			VC	53.07542	
6404		CO	0	525			VC	53.07542	
6505	145.6	CO	142.25	225			VC	97.28532	1 in 35
6505	145.6	CO	142.25	225			VC	97.28532	1 in 35
6516		CO		100			VC	8.513562	
6516		CO		100			VC	8.513562	
5402	141.67	CO	139.11	225			VC	26.1725	
5402	141.67	CO	139.11	225			VC	26.1725	
6513		CO	0	225			VC	8.776383	
6513		CO	0	225			VC	8.776383	
5401	142.17	CO	138.18	525			CO	72.13876	1 in 57
5401	142.17	CO	138.18	525			CO	72.13876	1 in 57
6517		CO		150			VC	8.14004	
6517		CO		150			VC	8.14004	
8406	142.14	CO	139.6	375			VC	18.11077	1 in 181
8406	142.14	CO	139.6	375			VC	18.11077	1 in 181
8408	142.37	CO	139.77	375			VC	25.18439	1 in 148
8408	142.37	CO	139.77	375			VC	25.18439	1 in 148
8415		CO		225			VC	3.670241	
8415		CO		225			VC	3.670241	
8407	142.31	CO	139.93	375			VC	14.31782	1 in 143
8407	142.31	CO	139.93	375			VC	14.31782	1 in 143
0714		CO		100			VC	3.548553	
0714		CO		100			VC	3.548553	
4507	138.21	CO	137.35	225			VC	60.00833	1 in 107
4507	138.21	CO	137.35	225			VC	60.00833	1 in 107

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined | blue - surface water
brown - foul | purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

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
- TR Trapezoidal
- AR Arch
- BA Barrel
- HO HorseShoe
- UN Unspecified

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bolted
- CSU Concrete Segment Unbolted
- CC Concrete Box Culverted
- PSC Plastic / Steel Composite
- GRC Glass Reinforced Plastic
- DI Ductile Iron
- PVC Polyvinyl Chloride
- CI Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Coursed
- MAR Masonry, Random
- U Unspecified

Address or Site Reference:

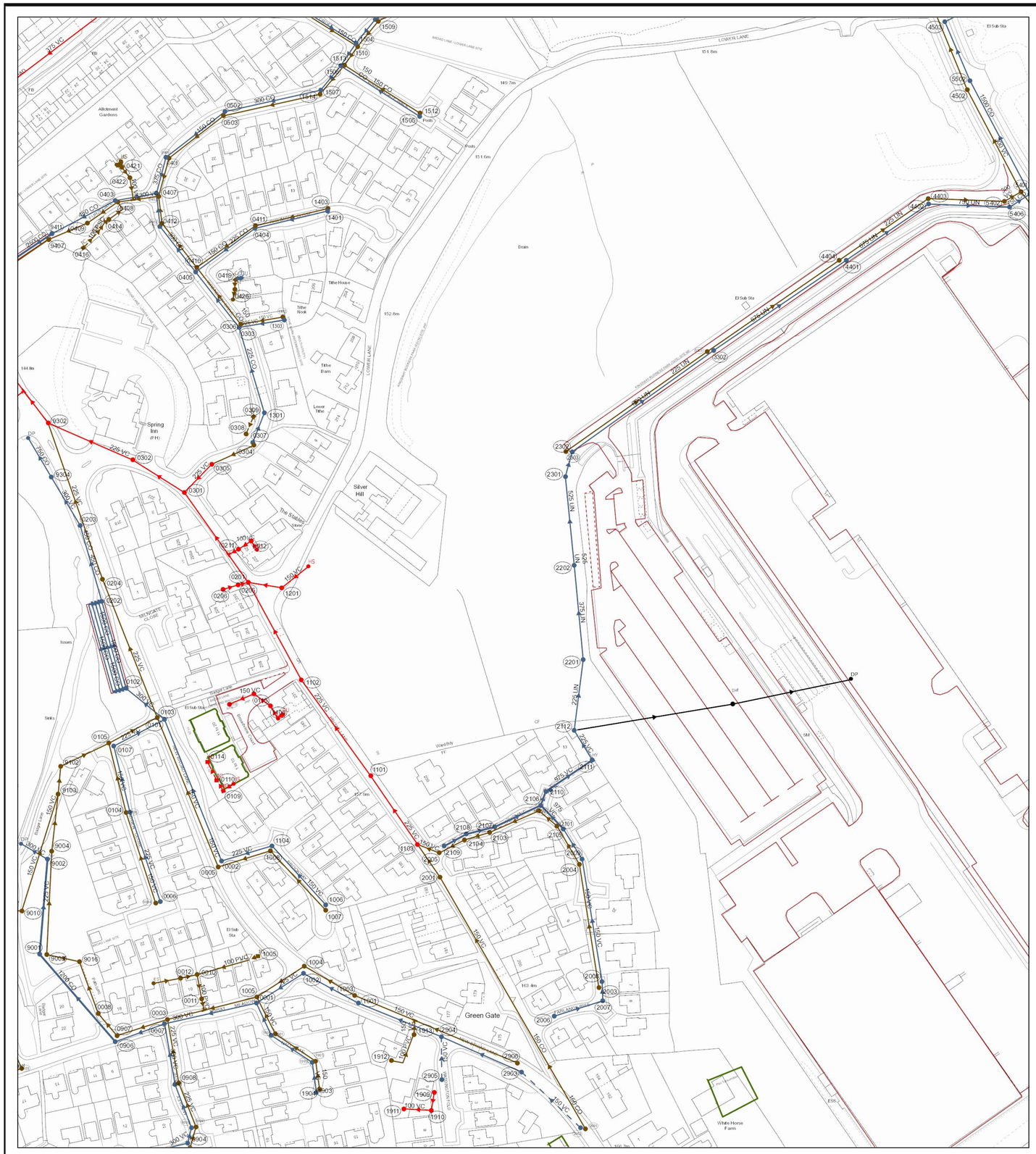
Plot J2 Kingsway Business Park,

OS sheet Number: SD9011NE
Scale: 1:1250 **Date:** 08/03/2021
Nodes: 281
Sheet: 2 of 6

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



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.

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
2108	159.96	SW	157.37	975			VC	16.66111	1 in 333
0902		SW	0	300			VC	34.83112	
0411		FO	146.98	150			CO	40.58736	1 in 116
0411		FO	146.98	150			CO	40.58736	1 in 116
1513		FO	144.32	150			CO	21.407	1 in 143
1513		FO	144.32	150			CO	21.407	1 in 143
1904		FO	0	150			VC	16.033	
0906	158.8	SW	154.1	1200			CO	65.10599	1 in 203
0906	158.8	SW	154.1	1200			CO	65.10599	1 in 203
9304		SW	0	750			CO	25.63293	
9304		SW	0	750			CO	25.63293	
1403		FO	148.98	150			CO	41.84739	1 in 21
1403		FO	148.98	150			CO	41.84739	1 in 21
0307		SW	152.75	225			CO	17.88566	1 in 31
0205		CO		150			VC	5.731936	
9009	156.69	FO	152.91	150			VC	35.07051	1 in 125
1511		FO	144.72	150			CO	32.79285	1 in 102
2101	160.3	FO	158.36	150			VC	13.28811	1 in 166
0003	160.15	FO	157.51	225			VC	29.93069	1 in 36
1103	159.71	CO	157.79	225			VC	46.79236	1 in 22
2905		SW		150			VC	24.26135	
0306		FO	150.39	150			CO	40.42958	1 in 11
2112	159.33	SW	157	225			UN	40.09351	1 in 40.4984958
0413		FO	144.6	150			CO	15.32946	1 in 9
0413		FO	144.6	150			CO	15.32946	1 in 9
1504		SW	144.75	300			CO	15.48764	1 in 258
1504		SW	144.75	300			CO	15.48764	1 in 258
1006		SW	0	150			VC	45.0378	
0005		FO	0	150			VC	90.99242	
1506		SW	144.69	300			CO	17.76127	1 in 254
1506		SW	144.69	300			CO	17.76127	1 in 254
5403		FO		300			VC	47.72846	
5403		FO		300			VC	47.72846	
1901		SW	0	225			VC	20.0131	
0909		FO	0	225			VC	26.60524	
4404	157.43	FO	152.61	225			UN	61.17443	1 in 169.928983
1002	161.29	SW	159.63	225			VC	31.34664	1 in 47
1003		FO	0	150			VC	32.80714	
2102	159.74	FO	158.28	150			VC	30.44789	1 in 145
1902		SW	0	150			VC	27.6842	
1104		SW	0	225			VC	29.68007	
0405		SW	147.01	300			CO	32.53698	1 in 17
0104		FO	0	150			VC	40.16231	
0104		FO	0	150			VC	40.16231	
0302	149.55	CO	146.72	225			VC	51.94846	1 in 18
0302	149.55	CO	146.72	225			VC	51.94846	1 in 18
0101		SW	0	300			VC	27.8612	
1505		SW	149.26	150			CO	52.75459	1 in 12
1505		SW	149.26	150			CO	52.75459	1 in 12
2303	156.37	FO	153.15	225			UN	97.56294	
1401		SW	149.33	225			CO	42.1358	1 in 21
1401		SW	149.33	225			CO	42.1358	1 in 21
2302	156.15	SW	154.1	600			UN	98.02001	1 in 408.416715
1509		FO	144.63	150			CO	18.38768	1 in 80
1509		FO	144.63	150			CO	18.38768	1 in 80
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
1903		SW	0	150			VC	16.99894	
2902		SW		150			VC	45.70297	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
2103	159.91	FO	158.07	150			VC	14.63457	1 in 183
9102	153.3	FO	151.75	225			VC	30.10442	1 in 188
9102	153.3	FO	151.75	225			VC	30.10442	1 in 188
0105		FO	0	225			VC	30.80777	
0105		FO	0	225			VC	30.80777	
0211		CO		100			VC	6.453387	
0502		SW	144.05	300			CO	41.94147	1 in 64
0502		SW	144.05	300			CO	41.94147	1 in 64
0907	158.88	FO	156.68	225			VC	16.23012	1 in 22
0907	158.88	FO	156.68	225			VC	16.23012	1 in 22
0908		FO	0	225			VC	36.32224	
2202	157.2	SW	155.11	525			UN	50.39003	1 in 69.0274378
2904		SW	0	225			VC	50.4094	
1303		SW	0	225			VC	25.78763	
0001	161.09	SW	158.42	300			VC	52.97608	
2105	160.49	SW	157.31	975			VC	18.44304	1 in 231
2106	159.65	SW	157.23	975			VC	8.288747	1 in 104
2003	164.81	FO	162.19	150			VC	70.23505	1 in 25
0503		FO	143.68	150			CO	38.95657	1 in 55
0503		FO	143.68	150			CO	38.95657	1 in 55
9902	157.22	FO	154.8	150			VC	19.96499	1 in 49
1505	161.09	FO	158.42	225			CO	51.80927	1 in 56.9332665
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
2005	160.17	FO	157.89	150			VC	13.1596	1 in 132
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
1106		CO		150			VC	11.43069	
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
0008	159.14	FO	155.94	225			VC	31.14424	1 in 84
0008	159.14	FO	155.94	225			VC	31.14424	1 in 84
0010		FO		150			PVC	13.81187	
1512		FO	148.83	150			CO	50.30449	1 in 11
1512		FO	148.83	150			CO	50.30449	1 in 11
0904		SW	0	300			VC	8.919135	
1508	148.04	FO	144.84	150			CO	31.98073	1 in 152
2006		FO	0	150			VC	99.26279	
0406		FO	142.97	150			CO	22.26924	1 in 148
0406		FO	142.97	150			CO	22.26924	1 in 148
1912		FO		100			PVC	23.82155	
0007		SW	0	300			VC	29.55138	
0202		SW	0	450			CO	44.36969	
0202		SW	0	450			CO	44.36969	
1510		FO	144.4	150			CO	12.81469	1 in 160
1510		FO	144.4	150			CO	12.81469	1 in 160
0102		SW	0	1500			CO	1.817491	
0102		SW	0	1500			CO	1.817491	
2903		SW	0	150			VC	49.39531	
0426		FO		100			PVC	5.848613	
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
0002		SW	0	225			VC	85.90768	
1301		SW	152.17	225			CO	50.23037	1 in 36
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
1507		SW	144.62	300			CO	55.27397	1 in 97
1507		SW	144.62	300			CO	55.27397	1 in 97
3302	157.57	SW	153.78	675			UN	90.28354	1 in 410.379716
0004		FO	0	150			VC	53.71965	
0006		SW	0	225			VC	53.24144	
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
2006	164.58	FO	163.2	150			VC	28.68437	1 in 84
1501		SW	145.19	225			CO	31.63678	1 in 167
1502		SW	145	225			CO	17.06475	1 in 100
1502		SW	145	225			CO	17.06475	1 in 100
0212		CO		100			VC	8.490474	
2110	159.42	SW	157.15	975			VC	31.59378	1 in 527
4401	157.33	SW	153.56	675			UN	56.10492	1 in 143.858771
0402		SW	143.16	450			CO	23.65433	1 in 394
0402		SW	143.16	450			CO	23.65433	1 in 394
0012		FO		100			PVC	9.562346	
2109	160.05	SW	157.48	975			VC	14.15419	1 in 129
2301	157.7	SW	154.38	525			UN	14.47448	1 in 72.3724227
2001	160.66	FO	158.66	225			VC	22.27283	1 in 26
1906		FO	0	150			VC	23.28693	
2901		FO	0	150			CO	81.9878	
0305		CO	151.34	225			VC	22.08146	1 in 15
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
0903		SW	0	300			VC	25.94431	
1004	161.29	FO	158.83	225			VC	31.95062	1 in 78
0501	144.25	CO	141.35	375			VC	82.80096	1 in 45
0501	144.25	CO	141.35	375			VC	82.80096	1 in 45
0304		FO	152.35	225			VC	26.15127	1 in 26
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
9016	158.19	FO	155.57	225			VC	18.83193	1 in 55
9016	158.19	FO	155.57	225			VC	18.83193	1 in 55
1905		FO	0	150			VC	27.39552	
0412		SW	145.1	300			CO	18.79074	1 in 10
0412		SW	145.1	300			CO	18.79074	1 in 10
1001		SW	0	225			VC	35.16157	
1102	155.85	CO	153.83	225			VC	62.64982	
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
1008		FO	0	150			VC	30.75521	
0201	153.99	CO	151.1	225			VC	62.07852	
0404		SW	147.33	225			CO	41.43991	1 in 166
0404		SW	147.33	225			CO	41.43991	1 in 166
0301		CO	0	225			VC	34.40696	
2008	164.76	SW	162.75	150			VC	69.78693	1 in 18
2107	159.84	SW	157.32	975			VC	28.53831	1 in 317
2104	159.95	FO	157.99	150			VC	15.96531	1 in 160
1910		CO		100			VC	15.54323	
1201	154.26	CO	152.63	150			VC	19.23538	
2004	161.69	FO	159.39	150			VC	25.09775	1 in 24
3301	157.53	FO	153.15	225			UN	90.18238	1 in 167.004402
1909		CO		100			VC	10.215	
2201	157.95	SW	155.86	375			UN	53.35257	1 in 88.9209580
0410		FO	146.63	150			CO	31.65265	1 in 16
0102		SW	0	450			CO	50.92858	
0102		SW	0	450			CO	50.92858	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
		FO		300			VC	49.39208	
		FO		300			VC	49.39208	
		FO		300			VC	49.39208	
		FO		300			VC	49.39208	
		FO	0	150			VC	45.83709	
		SW	145.08	225			CO	32.04808	1 in 128
		CO	155.68	225			VC	66.61081	1 in 36
		FO	142.82	300			VC	23.24899	1 in 155
		FO	142.82	300			VC	23.24899	1 in 155
				100			PVC	6.636372	
		SW	150.78	225			CO	39.63329	1 in 11
		SW	0	225			VC	38.23397	
		SW	0	225			VC	38.23397	
		FO	0	225			VC	93.2085	
		FO	0	225			VC	93.2085	
		SW	150.3	1500			CO	72.11285	1 in 189.770674
		SW	150.3	1500			CO	72.11285	1 in 189.770674
		SW	0	300			VC	31.81309	
		SW	0	300			VC	31.81309	
		FO	152.1	225			VC	15.74119	1 in 45
		FO	152.1	225			VC	15.74119	1 in 45
		SW	151.32	750			UN	45.79684	1 in 89.7977218
		SW	151.32	750			UN	45.79684	1 in 89.7977218
		SW	151.32	750			UN	45.79684	1 in 89.7977218
		SW	151.32	750			UN	45.79684	1 in 89.7977218
		CO		150			VC	15.01265	
		CO		150			VC	20.09185	1 in 14
		FO	0	150			VC	24.14102	
		FO	0	225			VC	83.67099	
		FO	144.17	150			CO	55.57507	1 in 113
		FO	144.17	150			CO	55.57507	1 in 113
		CO	150.81	750			CO	13.52622	
		SW	150.81	750			CO	13.52622	
		SW	150.81	750			CO	13.52622	
		SW	150.81	750			CO	13.52622	
		SW	162.86	150			VC	10.86747	1 in 99
		SW	0	225			VC	32.23659	
		SW	0	225			VC	32.23659	
				300			VC	0.2805609	
		SW	143.32	375			CO	21.03662	1 in 234
		SW	143.32	375			CO	21.03662	1 in 234
		FO		100			VC	7.49179	
		FO		100			VC	7.49179	
		FO		100			VC	7.49179	
		FO		100			VC	7.49179	
				150			VC	8.866211	
		FO	152.63	150			VC	68.90351	1 in 157
		FO	152.63	150			VC	68.90351	1 in 157
		FO	152.84	225			VC	32.34111	1 in 44
		FO	152.84	225			VC	32.34111	1 in 44
		SW	153.78	1200			CO	53.7048	1 in 448
		SW	153.78	1200			CO	53.7048	1 in 448
		SW		0			UN	0.3746718	
		SW		0			UN	0.3746718	
		FO	0	225			VC	58.31483	
		FO	0	225			VC	58.31483	
		FO	154.39	150			VC	27.17603	1 in 109
		FO	154.39	150			VC	27.17603	1 in 109
		CO		150			VC	11.50032	
		FO	143.85	225			VC	30.42042	1 in 21
		CO	143.85	225			VC	30.42042	1 in 21

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined | blue - surface water
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- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

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
- TR Trapezoidal
- AR Arch
- BA Barrel
- HO HorseShoe
- UN Unspecified

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bolted
- CSU Concrete Segment Unbolted
- CC Concrete Box Culverted
- PSC Plastic / Steel Composite
- GRC Glass Reinforecd Plastic
- DI Ductile Iron
- PVC Polyvinyl Chloride
- CI Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Coursed
- MAR Masonry, Random
- U Unspecified

Address or Site Reference:

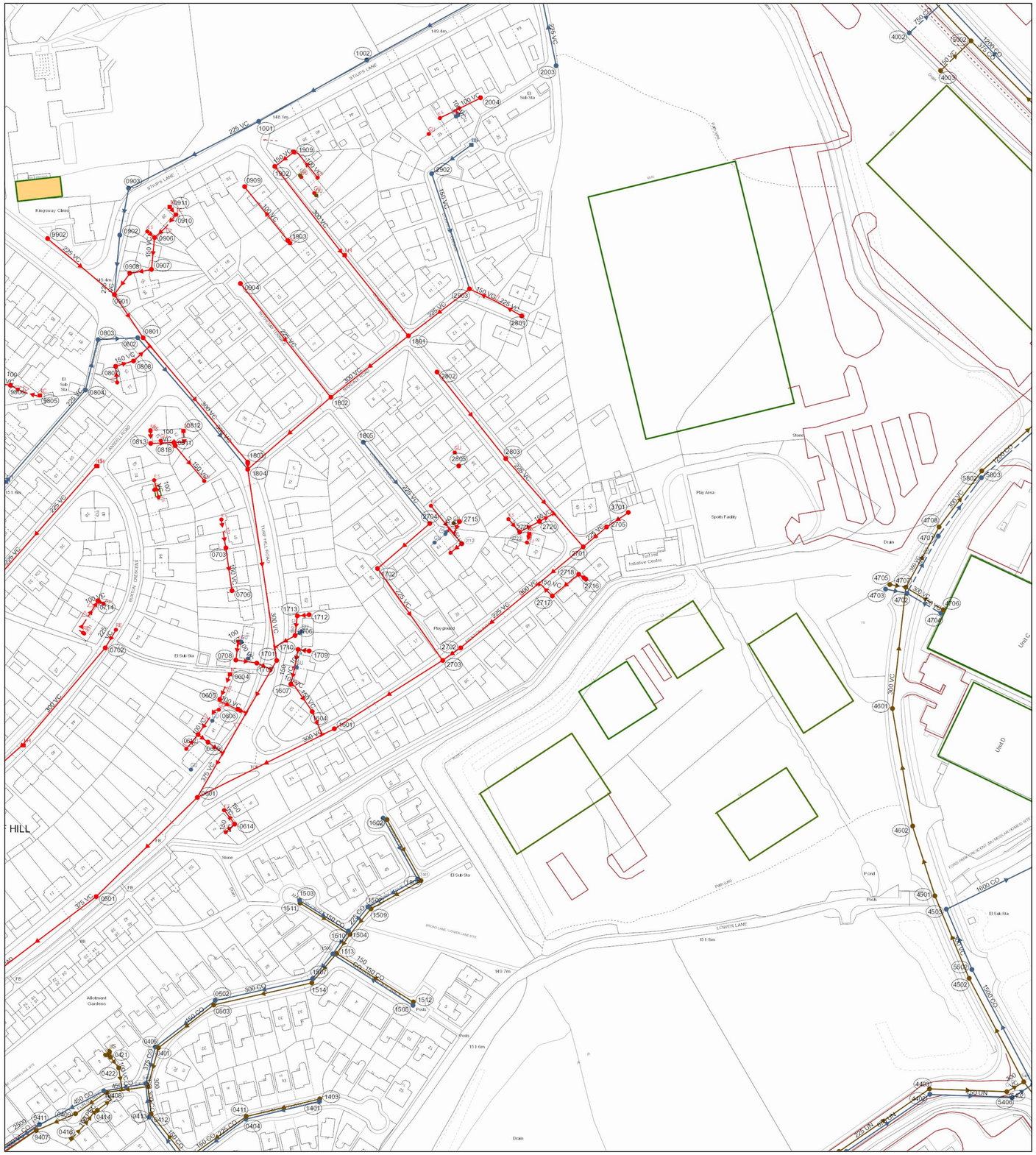
Plot J2 Kingsway Business Park,

OS sheet Number: SD9111SW
Scale: 1:1250 **Date:** 08/03/2021
Nodes: 262
Sheet: 3 of 6

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



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.

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0802	149.46	SW	145.06	225			VC	47.50789	1 in 99
0907		CO		150			VC	12.23486	
0411		FO	146.98	150			CO	40.58736	1 in 116
0411		FO	146.98	150			CO	40.58736	1 in 116
1513		FO	144.32	150			CO	21.407	1 in 143
1513		FO	144.32	150			CO	21.407	1 in 143
2903	150.05	CO	147.67	225			VC	42.80187	1 in 91
2701	146.54	CO	144.29	300			VC	44.04543	1 in 96
2717		CO		150			VC	10.59563	
1403		FO	148.98	150			CO	41.84739	1 in 21
1403		FO	148.98	150			CO	41.84739	1 in 21
1002	149.04	SW	147.39	225			VC	68.96376	
4704		SW		150			VC	21.90867	
4704		SW		150			VC	21.90867	
1511		FO	144.72	150			CO	32.79296	1 in 102
0813		CO		100			VC	12.8736	
4703		SW		1200			CO	12.04511	
1802	147.92	CO	144.92	300			VC	60.959	1 in 94
3701	147.15	CO	144.78	225			VC	14.4222	1 in 160
4706		FO		300			VC	24.15	
4706		FO		300			VC	24.15	
0807		CO		150			VC	10.5209	
0807		CO		150			VC	10.5209	
2003	149.86	SW	148.84	225			VC	43.93177	1 in 732
2802	149.09	CO	147.17	225			VC	61.22091	1 in 41
0413		FO	144.6	150			CO	15.32946	1 in 9
0413		FO	144.6	150			CO	15.32946	1 in 9
1504		SW	144.75	300			CO	15.48764	1 in 258
1504		SW	144.75	300			CO	15.48764	1 in 258
2712		CO		150			VC	7.944425	
4601		FO		300			VC	67.56996	
1506		SW	144.69	300			CO	17.76127	1 in 254
1506		SW	144.69	300			CO	17.76127	1 in 254
4705		FO		300			VC	8.985123	
5403		FO		300			VC	47.72846	
5403		FO		300			VC	47.72846	
0606		CO		100			VC	5.139068	
4404	157.43	FO	152.61	225			UN	61.17443	1 in 169.928983
0811		CO		150			VC	1.983958	
0708		CO		100			VC	11.72697	
0703		CO		100			VC	23.93983	
1712		CO		150			VC	6.545672	
5803		FO		300			VC	69.05277	
5803		FO		300			VC	69.05277	
0405		SW	147.01	300			CO	32.53698	1 in 17
1505		SW	149.26	150			CO	52.75459	1 in 12
1505		SW	149.26	150			CO	52.75459	1 in 12
0801	149.51	CO	145.03	300			VC	90.13878	1 in 693
1401		SW	149.33	225			CO	42.1358	1 in 21
1401		SW	149.33	225			CO	42.1358	1 in 21
1509		FO	144.63	150			CO	18.38768	1 in 80
1509		FO	144.63	150			CO	18.38768	1 in 80
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
0414		FO		100			PVC	14.58894	
0908		CO		150			VC	14.49864	
0908		CO		150			VC	14.49864	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
0502		SW	144.05	300			CO	41.94147	1 in 64
0502		SW	144.05	300			CO	41.94147	1 in 64
2702	146.64	CO	143.52	300			VC	12.20656	1 in 94
1705		CO		100			VC	8.781507	
2705	147.15	CO	144.48	225			VC	17.02039	1 in 95
1701	145.9	CO	143.06	300			VC	43.909	1 in 90
0503		FO	143.68	150			CO	38.95657	1 in 55
0503		FO	143.68	150			CO	38.95657	1 in 55
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9407		FO	142.37	300			VC	48.5247	1 in 93
9806		CO		100			VC	21.74045	
9806		CO		100			VC	21.74045	
1709		CO		100			VC	6.324672	
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0408		FO	142.67	300			VC	20.84793	1 in 149
0803	149.73	SW	147.78	225			VC	22.02271	1 in 37
0803	149.73	SW	147.78	225			VC	22.02271	1 in 37
4702		SW		1200			CO	36.10751	
4702		SW		1200			CO	36.10751	
2718		CO		150			VC	18.87213	
2902	151.6	SW	148.7	150			VC	67.35725	1 in 67
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4602		FO		300			VC	66.30259	
4602		FO		300			VC	66.30259	
0902	148.8	SW	145.28	225			VC	33.13608	
0902	148.8	SW	145.28	225			VC	33.13608	
1512		FO	148.83	150			CO	50.30449	1 in 11
1512		FO	148.83	150			CO	50.30449	1 in 11
1508	148.04	FO	144.84	150			CO	31.98073	1 in 152
0406		FO	142.97	150			CO	22.26924	1 in 148
0406		FO	142.97	150			CO	22.26924	1 in 148
1510		FO	144.4	150			CO	12.81469	1 in 160
1510		FO	144.4	150			CO	12.81469	1 in 160
1903		CO		100			VC	38.28889	
0609		CO		100			VC	10.31411	
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
0804	150.8	SW	148.48	225			VC	28.86174	1 in 43
0804	150.8	SW	148.48	225			VC	28.86174	1 in 43
1801	149.21	CO	145.65	300			VC	54.81788	1 in 77
1803	148.65	CO	144.19	300			VC	4	1 in 67
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
0605		CO		100			VC	11.90042	
1507		SW	144.62	300			CO	55.27397	1 in 97
1507		SW	144.62	300			CO	55.27397	1 in 97
1603		FO	145.1	150			CO	38.80575	1 in 149
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
0422		FO		100			VC	12.55899	
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
9411		SW	140.96	450			CO	2.324237	
1501		SW	145.19	225			CO	31.63678	1 in 167
0808		CO		150			VC	12.30246	
1502		SW	145	225			CO	17.06475	1 in 100
1502		SW	145	225			CO	17.06475	1 in 100
5802		SW		1200			CO	97.08168	
5802		SW		1200			CO	97.08168	
4401	157.33	SW	153.56	675			UN	56.10492	1 in 143.858771
4003		FO		150			VC	23.64423	
4003		FO		150			VC	23.64423	
0402		SW	143.16	450			CO	23.65433	1 in 394
0402		SW	143.16	450			CO	23.65433	1 in 394
2716		CO		150			VC	4.70551	
4707		FO		300			VC	38.29532	
9902	150.33	CO	145.81	225			VC	48.27007	
9902	150.33	CO	145.81	225			VC	48.27007	
0614		CO		150			VC	9.746106	
1001		SW	0	225			VC	80.9506	
4501		FO		300			VC	40.60453	
4501		FO		300			VC	40.60453	
5001		SW		1200			CO	79.97758	
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
0612		CO		100			VC	6.909049	
0501	144.25	CO	141.35	375			VC	82.80096	1 in 45
0501	144.25	CO	141.35	375			VC	82.80096	1 in 45
9702	151.52	SW	150.15	225			VC	129.7271	1 in 78
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0412		SW	145.1	300			CO	18.79074	1 in 10
0412		SW	145.1	300			CO	18.79074	1 in 10
5902		FO		375			CO	90.05116	
2715		CO		100			VC	7.501842	
4708		FO		300			VC	39.10264	
4708		FO		300			VC	39.10264	
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
4701		SW		1200			CO	40.18564	
4701		SW		1200			CO	40.18564	
1902	148.35	CO	146.85	300			VC	119.6362	1 in 101
0404		SW	147.33	225			CO	41.43991	1 in 166
0404		SW	147.33	225			CO	41.43991	1 in 166
5002		FO		375			CO	89.97364	
5002		FO		375			CO	89.97364	
1702	147.27	CO	144.81	225			VC	62.42596	1 in 53
0904	147.32	CO	145.74	225			VC	80.43009	1 in 130
0601	145.07	CO	142.21	375			VC	78.49203	1 in 92
1602		SW	145.42	225			CO	38.77482	1 in 169
0410		FO	146.63	150			CO	31.85265	1 in 16
1804	148.57	CO	144.11	300			VC	107.2007	1 in 104
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
1503		SW	145.08	225			CO	32.04808	1 in 128
0407		FO	142.82	300			VC	23.24899	1 in 155
0407		FO	142.82	300			VC	23.24899	1 in 155
0702	151.68	CO	149.89	300			VC	143.1863	1 in 118
0702	151.68	CO	149.89	300			VC	143.1863	1 in 118
5405	153.8	SW	150.3	1500			CO	72.11285	1 in 189.770674
5405	153.8	SW	150.3	1500			CO	72.11285	1 in 189.770674
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
0818		CO		150			VC	25.27634	
1708		CO		150			VC	13.09597	
1713		CO		150			VC	10.88608	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0903	148.43	SW	145.92	225			VC	26.4764	1 in 42
0903	148.43	SW	145.92	225			VC	26.4764	1 in 42
1805	147.83	SW	145.75	225			VC	58.25805	1 in 100
1514		FO	144.17	150			CO	55.57507	1 in 113
1514		FO	144.17	150			CO	55.57507	1 in 113
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
2704	147.55	CO	145.14	225			VC	38.28838	1 in 120
0401		SW	143.32	375			CO	21.03662	1 in 234
0401		SW	143.32	375			CO	21.03662	1 in 234
0421		FO		100			VC	7.49179	
0421		FO		100			VC	7.49179	
0421		FO		100			VC	7.49179	
0421		FO		100			VC	7.49179	
0901	149.75	CO	0	300			VC	28.84441	
0901	149.75	CO	0	300			VC	28.84441	
2801	149.66	CO	148.19	225			VC	16.12452	1 in 67
1710		CO		100			VC	10.07064	
0906		CO		150			VC	17.7427	
1607		CO		100			VC	2.514988	
1601	146	CO	143.06	300			VC	84.97163	1 in 106
1604		CO		150			VC	13.96629	
2703	146.54	CO	143.37	300			VC	71.02113	1 in 237
2803	148.75	CO	145.66	225			VC	65.19202	1 in 56
2720		CO		150			VC	9.220907	
2722		CO		150			VC	12.45645	
0714		CO		100			VC	3.548553	
0714		CO		100			VC	3.548553	
4002		SW		750			CO	26.26324	
4002		SW		750			CO	26.26324	

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined | blue - surface water
brown - foul | purple - overflow

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- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
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- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

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
- TR Trapezoidal
- AR Arch
- BA Barrel
- HO HorseShoe
- UN Unspecified

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bolted
- CSU Concrete Segment Unbolted
- CC Concrete Box Culverted
- PSC Plastic / Steel Composite
- GRC Glass Reinforecd Plastic
- DI Ductile Iron
- PVC Polyvinyl Chloride
- CI Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Coursed
- MAR Masonry, Random
- U Unspecified

Address or Site Reference:

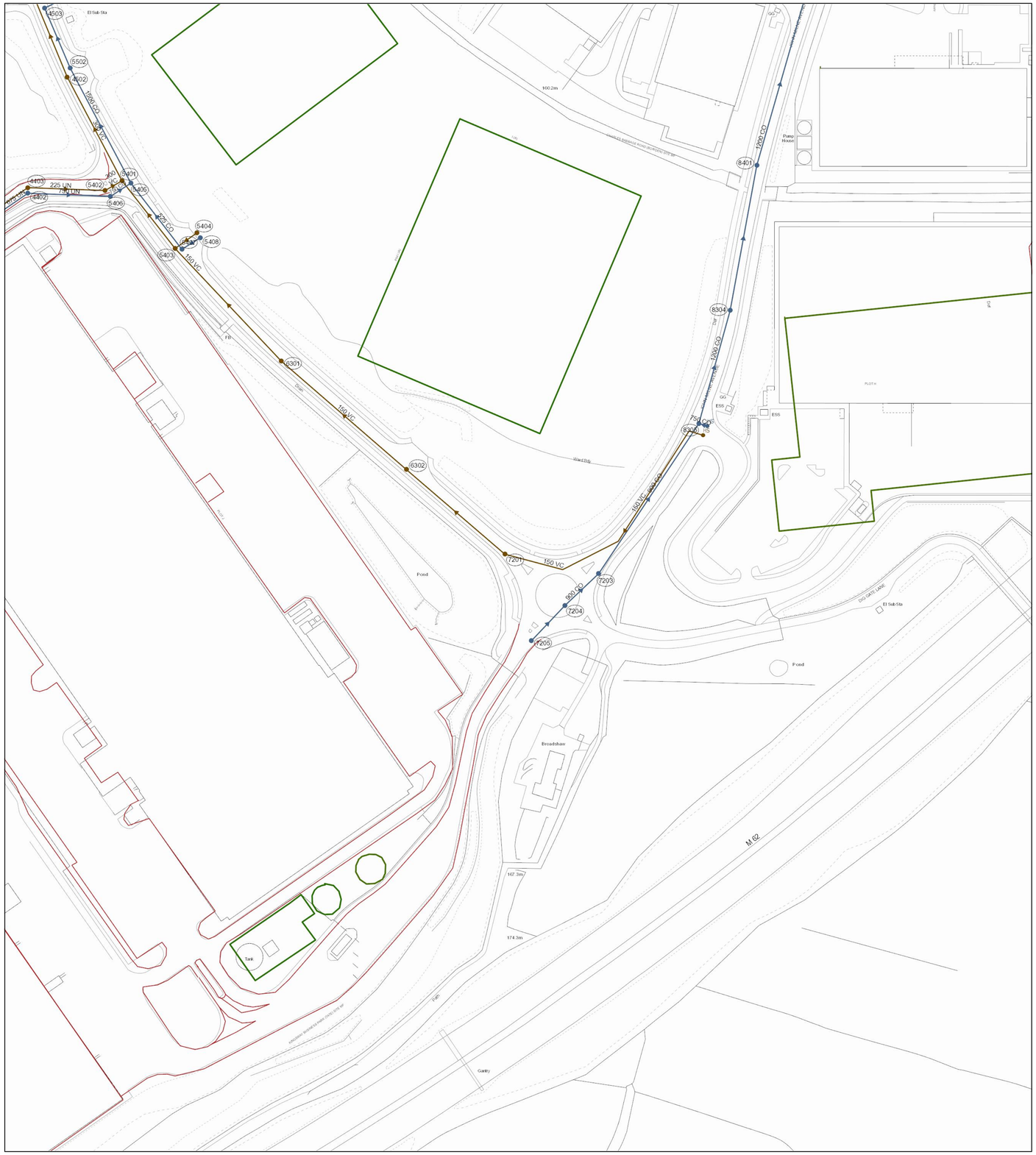
Plot J2 Kingsway Business Park,

OS sheet Number: SD9111NW
Scale: 1:1250 **Date:** 08/03/2021
Nodes: 233
Sheet: 4 of 6

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
6302		FO		150			VC	91.76202	
7201		FO		150			VC	72.03468	
5404		FO		150			VC	14.80197	
5404		FO		150			VC	14.80197	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
6301		FO		150			VC	85.86894	
8401		SW	159.68	1200			CO	94.13641	1 in 471
8401		SW	159.68	1200			CO	94.13641	1 in 471
8304		SW	159.87	1200			CO	81.92936	1 in 431
4401	157.33	SW	153.56	675			UN	56.10492	1 in 143.858771
7205		SW	160.69	900			CO	26.8662	1 in 244
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
5405	153.8	SW	150.3	1500			CO	72.11285	1 in 189.770674
5405	153.8	SW	150.3	1500			CO	72.11285	1 in 189.770674
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
7203		SW	160.53	900			CO	100.1353	1 in 455
5403		FO		300			VC	47.72846	
5403		FO		300			VC	47.72846	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
8305		SW	160.01	1200			CO	65.10339	1 in 465
5408		SW		525			CO	12.07634	
5408		SW		525			CO	12.07634	
4404	157.43	FO	152.61	225			UN	61.17443	1 in 169.928983
7204		SW	160.58	900			CO	25.80311	1 in 516
5407		SW		525			CO	46.30649	
5407		SW		525			CO	46.30649	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined, blue - surface water, brown - foul, purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforced Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

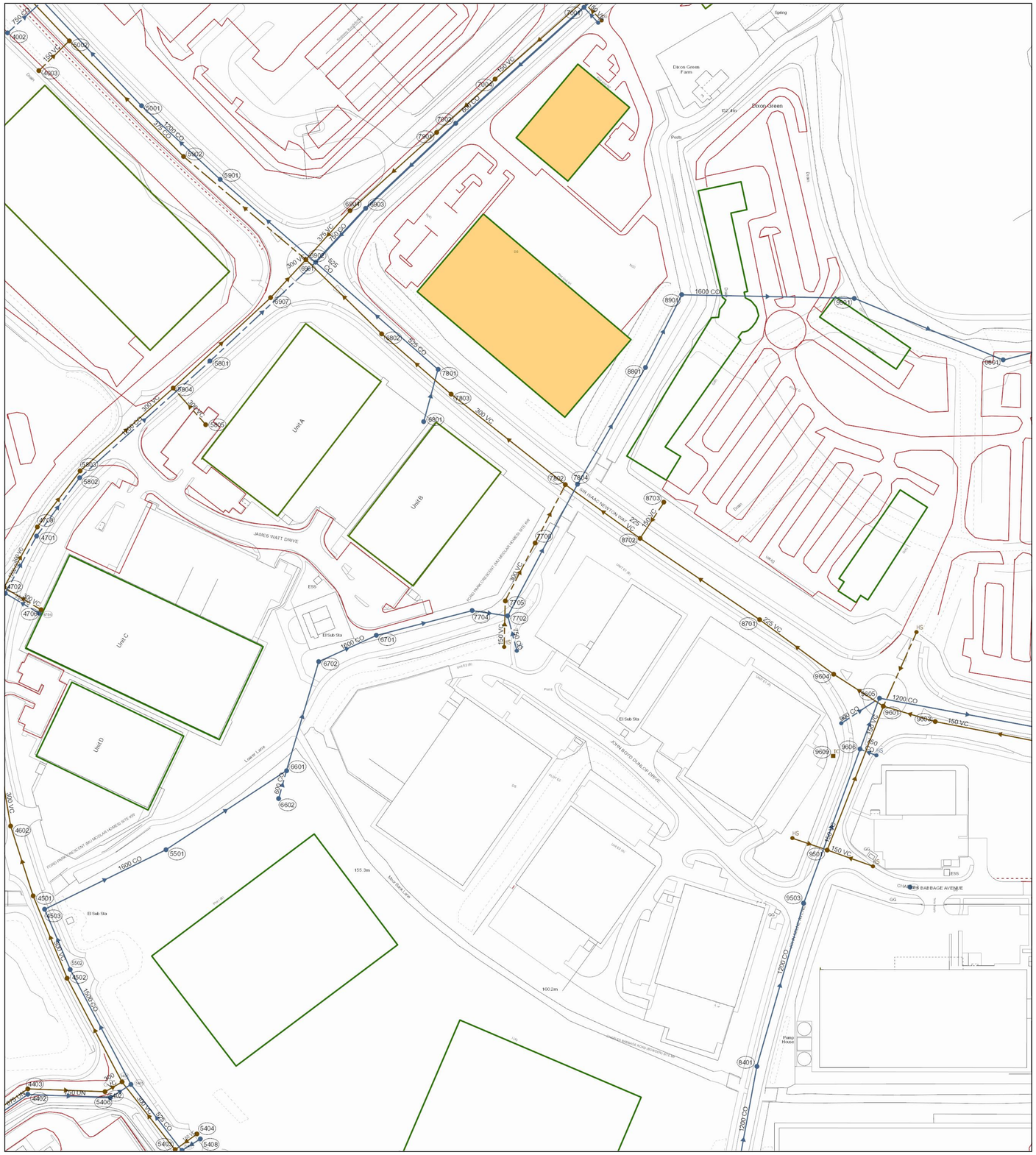
Plot J2 Kingsway Business Park,

OS sheet Number: SD9111SE
Scale: 1:1250 **Date:** 08/03/2021
Nodes: 54
Sheet: 5 of 6

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



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.

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7802		FO		300			VC	80.91534	
5501	154.05	SW	149.37	1600			CO	80.02651	1 in 229
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
4503	152.68	SW	149.68	1600			CO	74.8426	1 in 241
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
5402		FO	149.81	300			VC	10.80613	
8702		FO		225			VC	50.99903	
6702	151.43	SW	148.79	1600			CO	34.9901	1 in 233
7706		FO		300			VC	36.37383	
8901		SW	147.86	1600			CO	95.67445	1 in 504
5802		SW		1200			CO	97.08168	
5802		SW		1200			CO	97.08168	
6301		FO		150			VC	85.86894	
9605		SW	158.14	1200			CO	100.132	1 in 455
7804		SW	148.11	1600			CO	74.93015	1 in 441
9601		FO		225			VC	32.91376	
4704		SW		150			VC	21.90867	
4704		SW		150			VC	21.90867	
4401	157.33	SW	153.56	675			UN	56.10492	1 in 143.858771
4003		FO		150			VC	23.64423	
4003		FO		150			VC	23.64423	
4707		FO		300			VC	38.29532	
9501		FO		150			VC	85.64851	
4703		SW		1200			CO	12.04511	
6801		SW		525			CO	30.13011	
4706		FO		300			VC	24.15	
4706		FO		300			VC	24.15	
4501		FO		300			VC	40.60453	
4501		FO		300			VC	40.60453	
0801		SW	147.49	1600			CO	99.91635	1 in 476
5001		SW		1200			CO	79.97758	
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5502	153.05	SW	149.92	1500			CO	36.23714	1 in 259
5403		FO		300			VC	47.72846	
5403		FO		300			VC	47.72846	
5408		SW		525			CO	12.07634	
5408		SW		525			CO	12.07634	
4404	157.43	FO	152.61	225			UN	61.17443	1 in 169.928983
5805		FO		300			VC	27.09012	
7801		SW		525			CO	90.19792	
5902		FO		375			CO	90.05116	
5803		FO		300			VC	69.09277	
5803		FO		300			VC	69.09277	
4708		FO		300			VC	39.10264	
4708		FO		300			VC	39.10264	
4701		SW		1200			CO	40.18564	
4701		SW		1200			CO	40.18564	
9604		FO		225			VC	50.87432	
5404		FO		150			VC	14.80197	
5404		FO		150			VC	14.80197	
5002		FO		375			CO	89.97364	
5002		FO		375			CO	89.97364	
8703		FO		150			VC	23.93386	
9901		SW	147.67	1600			CO	89.38575	1 in 497
9503		SW	159.48	1200			CO	91.06557	1 in 68
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
5401		FO		300			VC	65.11729	
8801		SW	147.94	1600			CO	45.10106	1 in 564
6901		SW		1200			CO	70.12234	
8401		SW	159.68	1200			CO	94.13641	1 in 471
8401		SW	159.68	1200			CO	94.13641	1 in 471
8304		SW	159.87	1200			CO	81.92936	1 in 431
5901		SW		1200			CO	59.69337	
7705		FO		300			VC	36.19702	
5804		FO		300			VC	73.65378	
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
4502		FO		300			VC	49.39208	
6701	151.95	SW	148.64	1600			CO	55.01589	1 in 324
5801		SW		1200			CO	80.18147	
9606		SW	158.14	1200			CO	30.26674	1 in 504
8701		FO		225			VC	80.19164	
4702		SW		1200			CO	36.10751	
4702		SW		1200			CO	36.10751	
7702		SW	148.39	1600			CO	82.7011	1 in 295
5405	153.8	SW	150.3	1500			CO	72.11285	1 in 189.770674
5405	153.8	SW	150.3	1500			CO	72.11285	1 in 189.770674
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
4403	155.39	FO	152.25	225			UN	42.90464	1 in 23.9690754
6602		SW		600			CO	16.0316	
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
4402	155.41	SW	151.32	750			UN	45.79684	1 in 89.7977218
6601	154.11	SW	149.02	1600			CO	63.08245	1 in 274
4602		FO		300			VC	66.30259	
4602		FO		300			VC	66.30259	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
9603		FO		150			VC	29.97069	
5407		SW		525			CO	46.30649	
5407		SW		525			CO	46.30649	
7704		SW	148.47	1600			CO	19.9153	1 in 249
6904	149.21	FO	144.87	375			VC	36.5608	1 in 15
6802		FO		300			VC	58.772	
7004	150.27	FO	145.58	150			CO	43.93587	1 in 152
4002		SW		750			CO	26.26324	
4002		SW		750			CO	26.26324	
6907		FO		300			VC	28.86096	
7001	150.92	SW	147.45	600			CO	95.89897	1 in 87
6902	142.5	FO		375			CO	88.91026	
7901	149.83	FO	145.29	150			VC	64.62776	1 in 154
7803		FO		300			VC	50.98702	
6903	149.26	SW	144.34	750			CO	40.90734	
7002	148.83	SW	146.35	600			CO	68.60515	1 in 34

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined, blue - surface water, brown - foul, purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

- FO Foul
- SW Surface Water
- CO Combined
- OV Overflow

SEWER SHAPE

- CI Circular
- TR Trapezoidal
- EG Egg
- AR Arch
- OV Oval
- BA Barrel
- FT Flat Top
- HO HorseShoe
- RE Rectangular
- UN Unspecified
- SQ Square

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bolted
- CSU Concrete Segment Unbolted
- CC Concrete Box Culverted
- PSC Plastic / Steel Composite
- GRC Glass Reinforecd Plastic
- DI Ductile Iron
- PVC Polyvinyl Chloride
- CI Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Coursed
- MAR Masonry, Random
- U Unspecified

Address or Site Reference:

Plot J2 Kingsway Business Park,

OS sheet Number: SD9111NE

Scale: 1:1250 **Date:** 08/03/2021

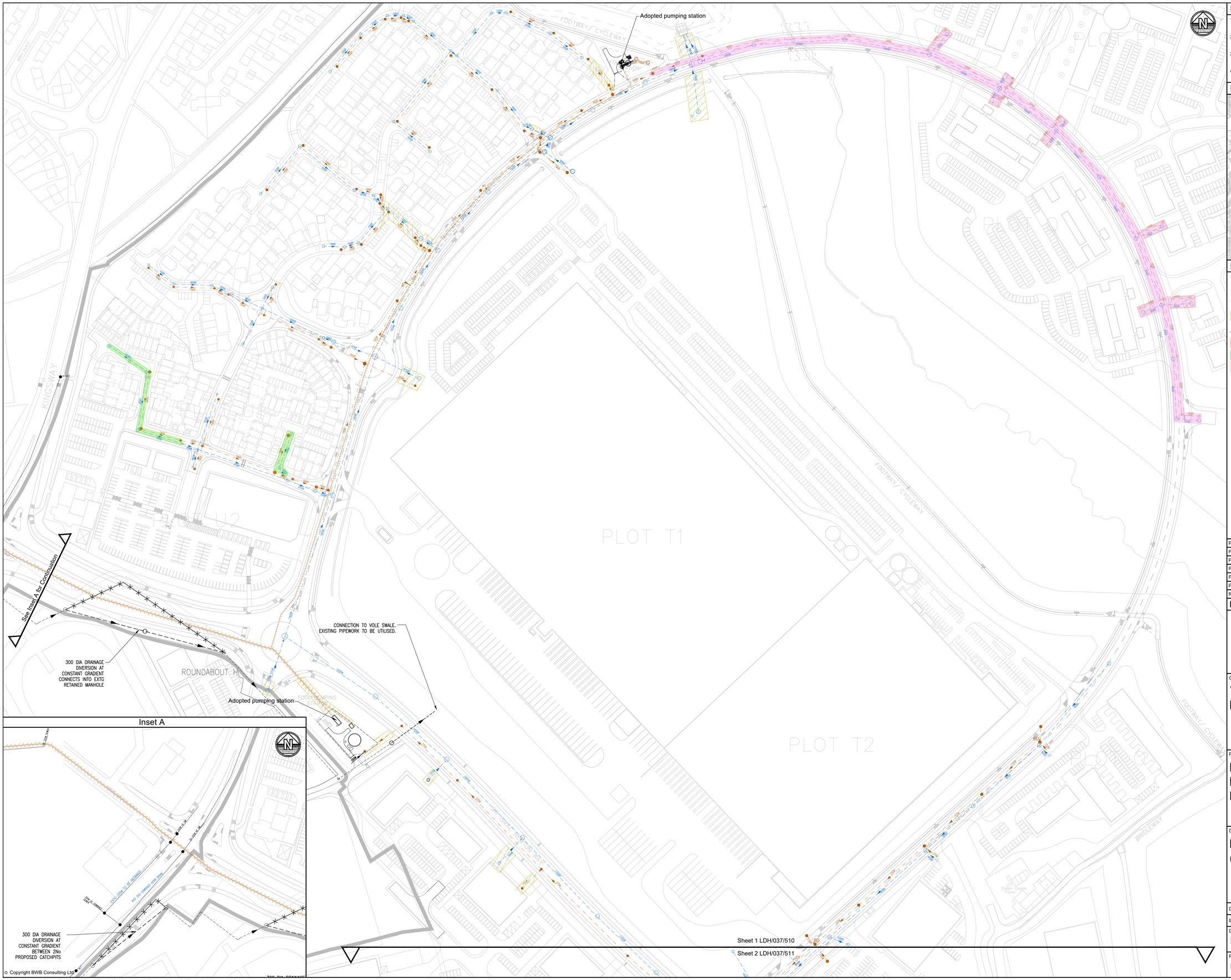
Nodes: 118

Sheet: 6 of 6

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



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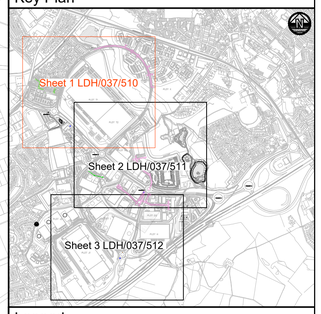
M:\Data\MCS\Kingsway Business Park Rochdale\General Site Wide\S104 Sewer Adoption Drawings\LDH-037-510 Sitewide Drainage Adoptions Plan.dwg

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.

Key Plan



Legend

- ADOPTED SURFACE WATER SEWER
- ADOPTED FOUL WATER SEWER
- ADOPTED FOUL RISING MAIN
- S104 EASEMENT IN ACCORDANCE WITH SEWERS FOR ADOPTION TABLE 2.1
- ABANDONED SURFACE WATER SEWER
- DRAINAGE MAINTAINED BY ASDA
- DRAINAGE MAINTAINED BY BARRATT
- DRAINAGE MAINTAINED BY WBD

The information shown within this drawing is based upon the following drawings:
I-WYG S104 Design Agreement 1 FW
I-WYG S104 Design Agreement 2 FW
I-WYG S104 Design Agreement 1 SW
I-WYG S104 Design Agreement 2 SW
I-WYG S104 Design Agreement 3 SW
WYG Drawing A032196-21-C-D/100-H Plot E Drainage Layout

LDH/058/011D/001 Adoptable Drainage Layout General Arrangement
LDH/058/012D/002 Proposed foul and surface water sewers longitudinal sections sheet 2
LDH/048/365 Section 104 Drainage layout (LDH048)

TAR-BWB-HDG-XX-DR-D-0500 Proposed Drainage Layout (MCS2292)
KBF-BWB-HDG-S104-DR-C-0500 Proposed Drainage Layout (MCS2381)
KBD-BWB-HDG-XX-DR-D-0551 SW & FW Drainage Layout (MCS2328)
KPK-BWB-ZZ-XX-DR-D-500 Drainage Layout (MCS2129)
KBP-BWB-HDG-ZN-DR-D-0500 Proposed SW & FW Drainage Layout(MCS2379)

C10303/270 Access road S104 sewer adoption agreement plan (Hydrock)
20095_03_001 Engineering layout (Mewies Engineering Consultants LTD)
H7276/S104 Section 104 Plan (David Wilson Homes)

I-Kingsway Masterplan
DLA Drawing 2010-095/1826 (26/04/18)

Rev	Date	Details of issue / revision	Drw	Rev
P6	08.07.20	Drainage maintained by Barratt extents updated	MC	AL
P5	06.08.19	Updated following UU comments	GDJ	AL
P4	01.08.19	Drainage adoptions updated	MC	AL
P3	26.07.19	Drainage adoptions updated	JM	KJ
P2	17.05.19	Drainage updated as per comments	MC	KJ
P1	23.01.19	Draft Issue	MC	KJ

Issues & Revisions

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Nottingham | 0115 924 1100
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Client
WILSON BOWDEN DEVELOPMENTS

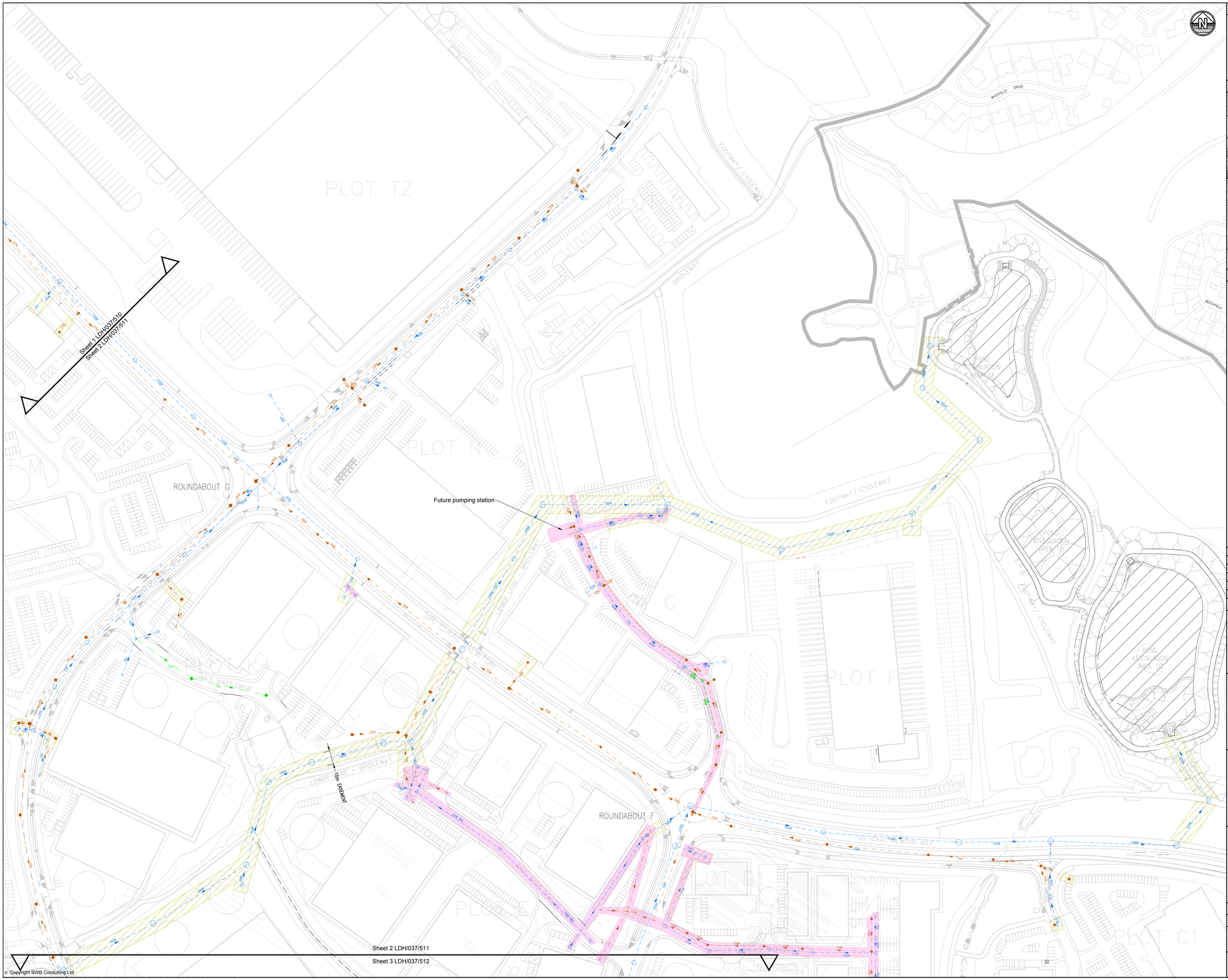
Project Title
KINGSWAY BUSINESS PARK ROCHDALE

Drawing Title
Drainage Adoptions Plan (Sheet 1 of 3)

Drawn:	M Carlisle	Reviewed:	K James
BWB Ref:	LDH037	Date: 23.01.19	Scale@A1: 1:1250

Drawing Status
DRAFT

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
LDH/037/510	S0	P6



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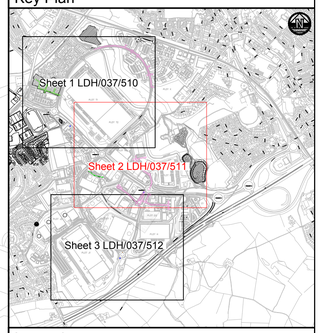
Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.

Key Plan



Legend

- ADOPTED SURFACE WATER SEWER
- ADOPTED FOUL WATER SEWER
- ADOPTED FOUL RISING MAIN
- ADOPTED HIGHWAY SURFACE WATER SEWER
- S104 EASEMENT IN ACCORDANCE WITH SEWERS FOR ADOPTION TABLE 2.1
- DRAINAGE MAINTAINED BY ASDA
- DRAINAGE MAINTAINED BY BARRATT
- DRAINAGE MAINTAINED BY WBD

The information shown within this drawing is based upon the following drawings:
I-WYG S104 Design Agreement 1 FW
I-WYG S104 Design Agreement 2 FW
I-WYG S104 Design Agreement 1 SW
I-WYG S104 Design Agreement 2 SW
I-WYG S104 Design Agreement 3 SW

WYG Drawing A032196-21-C-D/100-H Plot E Drainage Layout

LDH/058/011D/001 Adoptable Drainage Layout General Arrangement
LDH/058/012D/002 Proposed foul and surface water sewers longitudinal sections sheet 2
LDH/048/365 Section 104 Drainage layout (LDH048)

TAR-BWB-HDG-XX-DR-D-0500 Proposed Drainage Layout (MCS2292)
KBF-BWB-HDG-S104-DR-C-0500 Proposed Drainage Layout (MCS2381)
KBD-BWB-HDG-XX-DR-D-0551 SW & FW Drainage Layout (MCS2328)
KPK-BWB-ZZ-XX-DR-D-500 Drainage Layout (MCS2129)
KBP-BWB-HDG-ZN-DR-D-0500 Proposed SW & FW Drainage Layout(MCS2379)

C10303/270 Access road S104 sewer adoption agreement plan (Hydrock)
20095_03_001 Engineering layout (Mewies Engineering Consultants LTD)
H7276/S104 Section 104 Plan (David Wilson Homes)

I-Kingsway Masterplan
DLA Drawing 2010-095/1826 (26/04/18)

Rev	Date	Details of issue / revision	Drw	Rev
P5	06.08.19	Updated following UU comments	GDJ	AL
P4	01.08.19	Drainage adoptions updated	MC	AL
P3	26.07.19	Drainage adoptions updated	JM	KJ
P2	17.05.19	Drainage updated as per comments	MC	KJ
P1	23.01.19	Draft Issue	MC	KJ

Issues & Revisions

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■ Nottingham | 0115 924 1100
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Client
WILSON BOWDEN DEVELOPMENTS

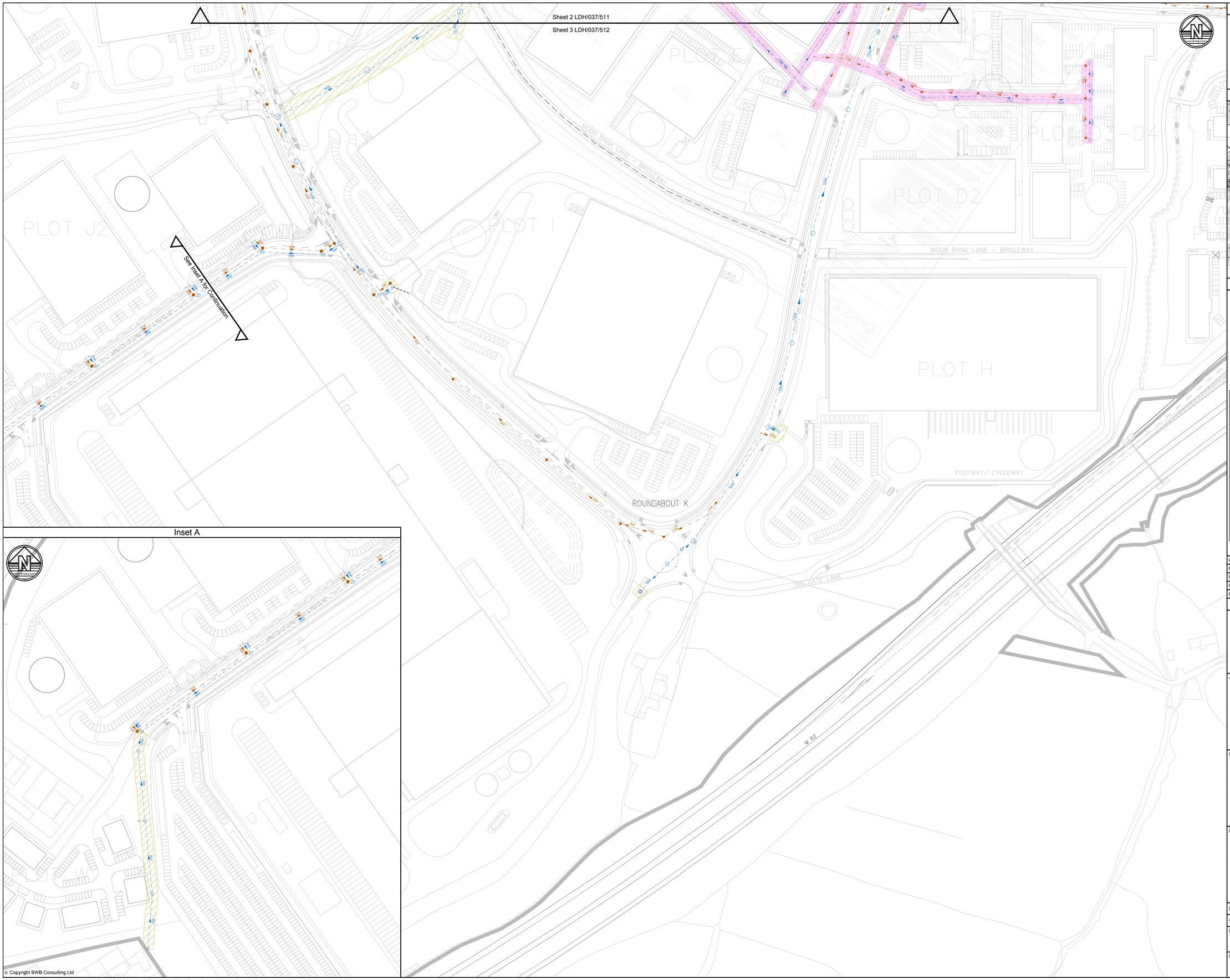
Project Title
KINGSWAY BUSINESS PARK ROCHDALE

Drawing Title
Drainage Adoptions Plan (Sheet 2 of 3)

Drawn:	M Carlisle		Reviewed:	K James	
BWB Ref:	LDH037	Date:	23.01.19	Scale@A1:	1:1250

Drawing Status
DRAFT

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
LDH/037/511	**S0**	**P5**



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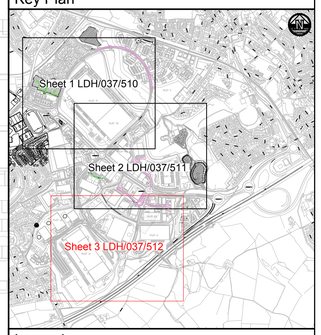
M:\Data\MCS\Kingsway Business Park Rochdale\General Site Wide\S104 Sewer Adoption Drawings\LDH-037-510 Sitewide Drainage Adoptions Plan.dwg

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.

Key Plan



Legend

- ADOPTED SURFACE WATER SEWER
- ADOPTED FOUL WATER SEWER
- ADOPTED FOUL RISING MAIN
- S104 EASEMENT IN ACCORDANCE WITH SEWERS FOR ADOPTION TABLE 2.1
- DRAINAGE MAINTAINED BY ASDA
- DRAINAGE MAINTAINED BY BARRATT
- DRAINAGE MAINTAINED BY WBD

The information shown within this drawing is based upon the following drawings:
I-WYG S104 Design Agreement 1 FW
I-WYG S104 Design Agreement 2 FW
I-WYG S104 Design Agreement 1 SW
I-WYG S104 Design Agreement 2 SW
I-WYG S104 Design Agreement 3 SW
WYG Drawing A032196-21-C-D/100-H Plot E Drainage Layout

LDH/058/011D/001 Adoptable Drainage Layout General Arrangement
LDH/058/012D/002 Proposed foul and surface water sewers longitudinal sections sheet 2
LDH/048/365 Section 104 Drainage layout (LDH048)
TAR-BWB-HDG-XX-DR-D-0500 Proposed Drainage Layout (MCS2292)
KBF-BWB-HDG-S104-DR-C-0500 Proposed Drainage Layout (MCS2381)
KBD-BWB-HDG-XX-DR-D-0551 SW & FW Drainage Layout (MCS2328)
KPK-BWB-ZZ-XX-DR-D-500 Drainage Layout (MCS2129)
KBP-BWB-HDG-ZN-DR-D-0500 Proposed SW & FW Drainage Layout(MCS2379)

C10303/270 Access road S104 sewer adoption agreement plan (Hydrock)
20095_03_001 Engineering layout (Mewies Engineering Consultants LTD)
H7276/S104 Section 104 Plan (David Wilson Homes)

I-Kingsway Masterplan
DLA Drawing 2010-095/1826 (26/04/18)

Rev	Date	Details of issue / revision	Drw	Rev
P4	06.08.19	Updated following UU comments	GDJ	AL
P3	26.07.19	Drainage adoptions updated	JM	KJ
P2	17.05.19	Drainage updated as per comments	MC	KJ
P1	23.01.19	Draft Issue	MC	KJ

Issues & Revisions

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Client

WILSON BOWDEN DEVELOPMENTS

Project Title

KINGSWAY BUSINESS PARK ROCHDALE

Drawing Title

Drainage Adoptions Plan (Sheet 3 of 3)

Drawn:	M Carlisle		Reviewed:	K James	
BWB Ref:	LDH037	Date:	23.01.19	Scale@A1:	1:1250

Drawing Status

DRAFT

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
LDH/037/512	**S0**	**P4**

APPENDIX 4: Site Wide Assessment Summary Note

TECHNICAL NOTE
Kingsway Business Park
Surface Water Sewer Modelling

Project	**Kingsway Business Park**		
Document Number	KBP-BWB-ZZ-XX-RP-CD-0004	**BWB Ref**	NTW2889
Author	David Gray	**Status**	S2
Checked	Matthew Bailey	**Revision**	P1
Approved	Rowan Jobling	**Date**	15.07.2022

Summary of Surface Water Sewer Modelling

1.1. This Technical Note provides a summary of the detailed hydraulic modelling exercises undertaken to date on the surface water sewers that serve the Kingsway Business Park.

1.2. The drainage strategy across the business park is split into three distinct catchments (as shown on **Figure 1.1** below).

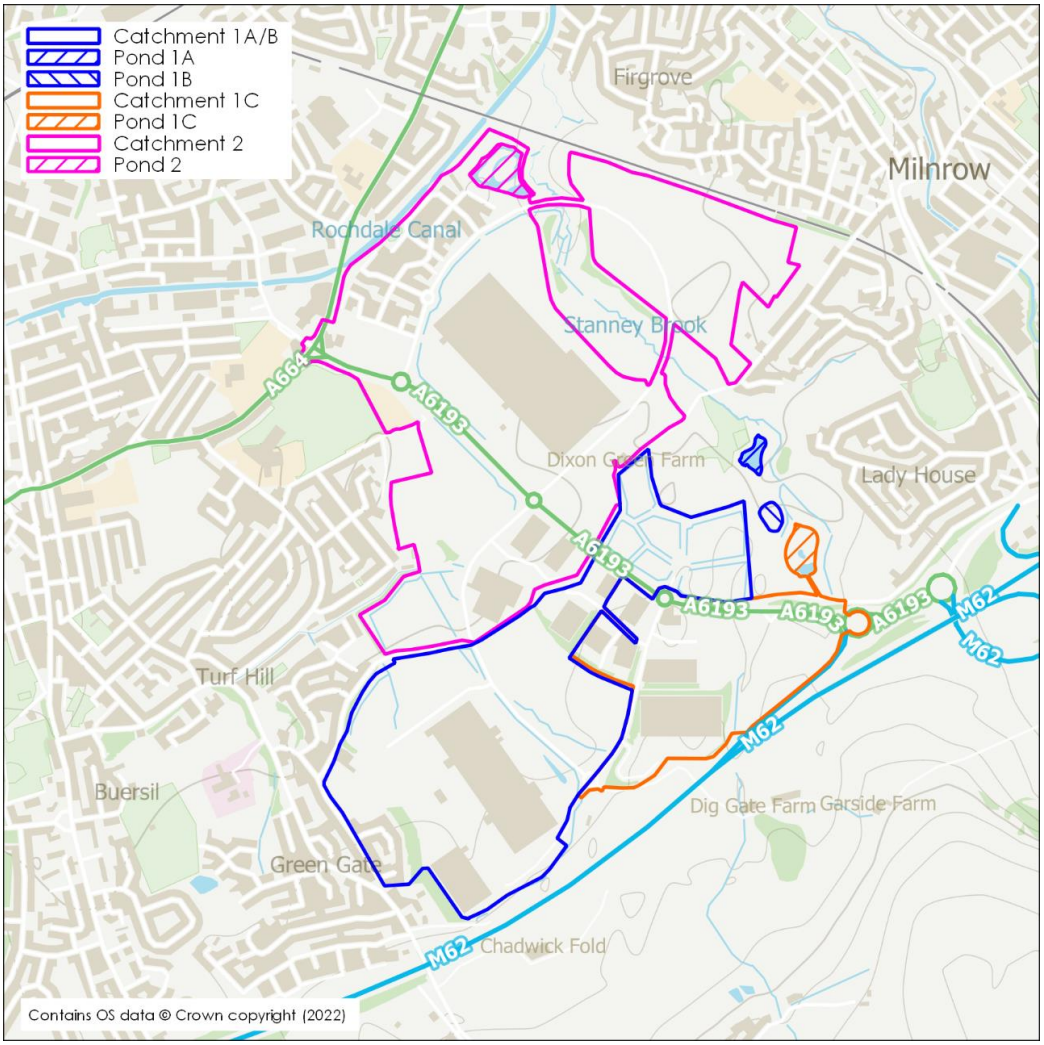

Figure 1.1: Business Park overall indicative catchments and attenuation ponds

1.3. Each drainage catchment is served by separate piped systems discharging to separate attenuation features. The existing drainage was constructed in 1999 and the hydraulic modelling exercises have shown that the surface water sewers have been designed to accommodate the 1 in 100-year storm event with no allowance for climate change for all plots across the business park.

1.4. Detailed hydraulic modelling and drawings for each drainage catchment are covered by individual reports, as listed below:

- Catchment 1A/1B – Report reference KBP-BWB-ZZ_XX-RP-CD-0001
- Catchment 1C – Report reference KBP-BWB-ZZ_XX-RP-CD-0002
- Catchment 2 – Report reference KBP-BWB-ZZ_XX-RP-CD-0003

1.5. **Table 1.1** (below) lists which Drainage catchment each development plot discharges to:

Table1.1: Drainage Catchment Split per Plot

Drainage Catchment	Development Plots
1A/B	E (West), F, G, I, J1, J2, W
1C	C1, D1, D2, D3, D4, E(East), H
2	K, L, M, N, O, P1, P2, P3, Q, R, S, T1, T2, U1, U2, V, X

Design Parameters and Assumptions

1.6. The design parameters and assumptions used for each catchment vary depending on the level of information that was available at the time of the modelling work. Catchment specific information is stated in each report and key parameters are listed below:

- Impermeable areas generally taken as 90% for industrial areas and 65% for residential areas
- Impermeable areas for roads taken as 100%
- Where plots have been constructed, a more detailed estimate of impermeable area has been used based on the detailed drainage design
- Network model simulation criteria set to default settings in MicroDrainage 2019.1.
- Simulations have been run for the network model using the 'Seasonal Return Period Wizard' for all storm durations for the 1 in 100-year event on 2.5 second increments with Dynamic Time Step turned off, Dynamic Viscous Dampening and Inertia turned on.

- Simulations have been run using both Flood Studies Report (FSR) and Flood Estimation Handbook (FEH) rainfall methodologies.
- The detention basin volumes have been checked by recreating them in AutoCAD Civils 3D Software before being input into the MicroDrainage Network Model.
- Note that the original drainage system was designed using FSR rainfall (as stated within 'Attenuation Ponds Health & Safety File'), however FEH simulations have been ran as a sensitivity test for the recreated network model.

Summary of findings from Catchment 1A/1B

1.7. The report and modelling results were reviewed and accepted by United Utilities and Rochdale Borough Council (correspondence contained within **Appendix A**)

1.8. A summary of the findings from the as-built drainage study is below:

- The pipe network operates well for all modelled storm events up to and including the 1 in 100-year with minimal surcharging.
- The maximum water level in the pond was higher than the original Section 104 design and is predicted to overtop the weir wall once all plots within the catchment have been developed.
- The peak flow rate from Pond 1A/1B is shown to be lower than the consented flows to the Stanney Brook.
- Several options were investigated to remedy the overtopping of the weir wall. The option suggested in the drainage study report was to raise the weir wall by 200mm which solved the overtopping issue.
- In subsequent conversations and meetings with Rochdale Borough Council's drainage engineer, Stephen McCann, it was agreed that the existing orifice plate flow control would be replaced with a larger diameter orifice plate. This option lowers the anticipated maximum water level within the pond to below the weir level while maintaining peak flows below the consented flows.
- During a site visit, it was observed that the flow control could be liable to becoming blocked with vegetation and litter. To lower the risk of future blockages, it has also been agreed to install a debris screen over the flow control.

Summary of findings from Catchment 1C

1.9. The report was issued to United Utilities and Rochdale Borough Council

1.10. A summary of the findings from the as-built drainage study is below:

- The pipe network operates well for all modelled storm events up to and including the 1 in 100-year with minimal surcharging.
- The maximum modelled water level within Pond 1C is below the original design level and peak flows are shown to be below the consented flow rate.
- The drainage forming catchment 1C is considered to be operating efficiently, safely and in line with the original design.

Summary of findings from Catchment 2

1.11. The report and modelling results have been reviewed and accepted by Rochdale Borough Council (correspondence contained within **Appendix A**)

1.12. Untitled Utilities have reviewed the report and commented on some minor flooding located within Sir Isaac Newton Way. This was discussed with United Utilities who were happy with the explanation and had no further concerns (correspondence contained within **Appendix A**).

1.13. A summary of the findings from the as-built drainage study is below:

- The pipe network operates well for all modelled storm events up to and including the 1 in 100-year with one area of minimal flooding within Sir Isaac Newton Way.
- The flooding was in the short duration, high intensity rainfall event and would be expected to pond within the road corridor for a short time before draining back into the sewer network once the peak storm has passed.
- The flooding in the sewer network is unrelated to water levels in Pond 2.
- The maximum modelled water level within Pond 2 is below the original design level and peak flows are shown to be below the consented flow rate.
- The drainage forming catchment 2 is considered to be operating efficiently, safely and in line with the original design.

Appendix A

Correspondence with United Utilities and Rochdale Borough Council

David Gray

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 19 August 2021 20:36
To: David Gray; Rowan Jobling; Iqbal Rassool; Wastewater Developer Services
Cc: Matthew Bailey; Stephen McCann; Ward, David; John Copestake; Brennan, Adam; Walker, Jillian
Subject: GENQ 4200041062 Kingsway Business Park, Rochdale OL16 4JN

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Good evening all and thank you for taking my call earlier David,

Firstly I would like to thank bwb for pulling together the modelling report, it has certainly helped clarify matters. Following a conversation between myself and Stephen McCann at the Lead Local Flood Authority we are now in a position to accept the proposed modelling report essentially as a drainage masterplan for the Business Park moving forward. However, we would request that this is subject to the provision of the mdx. Microdrainage model files being provided to Stephen at the Council for review against the modelling report to ensure its accuracy.

Once reviewed and the Lead Local Flood Authority are happy with the model outputs we will both be providing comments on the individual plots/below planning applications in turn:

DC/21/2987 – 21/00881/REM
DC/21/3213 – 21/01039/DOC
DC/21/3492 – 21/01041/DOC

As a point of note, we understand that there are a number of concerns the Lead Local Flood Authority have about Plot J2 which should be addressed but this sits outside United Utilities remit to comment.

I am on annual leave from tomorrow until Tuesday 24th August and for further information in my absence, I would suggest that Stephen McCann or David Gray would be best pace to answer any queries but I hope that this brings everyone together onto the same page.

Kind regards,

United Utilities
Water for the North West

Robert Brenton
Developer Engineer
Developer Services & Metering
Customer Services
M: 07880299827
unitedutilities.com

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David Gray

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 16 November 2021 17:07
To: David Gray; john.ruckledge@environment-agency.gov.uk; Darren Clark; Tracy Hibbert; Gerard Proudman; Michael Cummings
Subject: Kingsway park pond 1A - minor change of orifice plate on outlet to Stanney Brook.

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

To All

The matter of the capacity and flow discharge from the Kingsway Park Drainage Ponds to Stanney brook was raised when BWB submitted Drainage Details for Planning Applications for the latest Kingsway Plots G, I and J2. When BWB ran the drainage model with the new plots being developed it was realised that the pond would just overtop in a 1 in 100 year storm including climate change allowance of 40%. Although this is a rare event, it was deemed necessary to avoid the overtopping. David Gray looked at options and came up with a simple but effective proposal:-

- to change the low level orifice plate in the outlet weir wall (to Stanney Brook) from 200 to 226mm dia.

This does not require major works and will fulfil the original agreed discharge flow rate to Stanney Brook. It will also and keep water levels under the crest of the weir wall, and maintain a minimum of 300mm freeboard within the pond.

Therefore, I am suggesting that David Gray now organises the replacement of the orifice plate. In terms of installation, BWB will need to arrange to do this when water levels are low and obtain access through the gates. I have advised David that he can contact Michael Cummings to arrange access?

There is an email trail below.
Any comments / queries – please address them to David and myself.
I can forward the diagram of the location of the orifice plate – upon request.

regards
Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing

ROCHDALE BOROUGH COUNCIL

01706 924606
07552 570262
stephen.mccann@rochdale.gov.uk

Rochdale Borough Council
Floor 2, Number One Riverside
Smith Street, Rochdale, OL16 1XU

From: David Gray <David.Gray@bwbconsulting.com>
Sent: 07 November 2021 16:30
To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Cc: Iqbal Rassool <Iqbal.Rassool@bwbconsulting.com>; Peter Davies <Peter.Davies@bwbconsulting.com>; Darren Clark <Darren.Clark@gleeds.com>; Davies, Nick <nick.davies@wilsonbowden.co.uk>; Ellis, Dave <dave.ellis@wilsonbowden.co.uk>; Henson, Henry <henry.henson@wilsonbowden.co.uk>
Subject: RE: Kingsway - Question to EA re. Weir Wall to Stanney Brook

Hi Steve,

Following our discussion last week on the weir wall at Kingsway after reviewing John's email below, I have remodelled the outflow orifice so that the proposed flows are closer to the consented flows of 304 l/sec. The modified orifice is 226mm diameter (upsized from 200mm) with the higher orifice remaining as 250mm. This seems like an eminently sensible resolution.

This does lower water levels within the basin to just below the existing weir wall as shown in the extracts from Microdrainage below. The existing weir is set at 148.25m, the modelled water level is shown to be 148.231m and the flow is 303.4 l/sec.

From previous conversations, you suggested that you would be happy with the original situation, however John's email suggests that the outflow from the pond needs to stay within the consented discharge, which we understand to be 304 l/sec. In this situation, who makes the final decision on the acceptable flow rates? At the Outlet from Pond 1A, Stanney Brook is classed as Ordinary Watercourse so falls under the remit of the LLFA so I would think that myself as LLFA Officer can approve this modification to the orifice plate. Stanney Brook changes to 'Main River' after crossing Buckley Hill lane.

The revised hydraulic modelling shows that altering the orifice does lower the estimated water levels to just below the existing weir wall while keeping within the 304 l/sec flow rate, would this proposal be acceptable to RBC?.

I understand that RBC are responsible for maintenance of the pond, are you able to confirm if this extends to the outfall structure as well? If not, are you able to confirm who is responsible for the outfall structure? I understand that Environment received monies from the Developer and now maintain the pond and structures. The managers are Tracy Hibbert and Gerard Proudman who have been cc'd to this email.

I am happy to run through the revised modelling and discuss with yourself this week and agree the best way forward.

Kind Regards

David Gray
Principal Engineer | BWB Consulting Limited

5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
M 07437 015 337 **T** 0115 924 1100

David Gray

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 22 April 2022 15:52
To: David Gray
Subject: FW: Drainage Consultation Ref: 22/00373/FUL Plot M Kingsway
Attachments: Drainage Consultation 22-00373 FUL.docx

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Hi David,

For your ref. see appended and below.
Thanks v much for sending all the extra info this morning. The complexity of the mdx models is beyond my familiarity with using MicroDrainage but your explanations filled in the gaps so I have been able to be confident in 'approving' the proposals.

regards

Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing

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07552 570262
stephen.mccann@rochdale.gov.uk

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Smith Street, Rochdale, OL16 1XU

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From: Stephen McCann
Sent: 22 April 2022 15:50
To: Michael Doyle <Michael.Doyle@Rochdale.Gov.UK>; 'Mohammed.Aljafarawi@uuplc.co.uk' <Mohammed.Aljafarawi@uuplc.co.uk>
Subject: Drainage Consultation Ref: 22/00373/FUL Plot M Kingsway

Hello Michael (Principal Planning Officer) and Mohammed (UU Engineer),

Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

I have written my consultation, appended.
The two MicroDrainage Models, which Mohammed asked me to look at are pretty complex. I've talked to David Gray of BWB a couple of times about this and he's shown me the models in online Teams Screenshare and he has provided details to satisfy me that the system is well designed.

Mohammed, feel free to ring me to discuss OR you can ask David Gray. There are quite large flows coming off Plot M into the adopted Michael Faraday Ave sewer, but this was originally planned as such.
regards

Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing

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David Gray

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 11 February 2022 09:49
To: David Gray; 'Stephen McCann'
Cc: Wastewater Developer Services; Francis Comyn; 'Darren.Clark@gleeds.com'
Subject: MicroDrainage- pde 4200045304 Plot M Kingsway Business Park Rochdale OL16 4UG
Attachments: Existing SW Network Model - P1.MDX

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Good Morning David,

Thanks for the prompt response. I am happy with your explanation, I don't have any further concerns.
I would like to receive a modelling results confirmation to proceed.

Stephen,
Could you run the model as you did for catchment 1A as a sense check? Then provide confirmation of this results please.

Kind regards,

Mohammed Aljafarawi
Developer Engineer
Developer Services & Metering
Customer Services
Email: Mohammed.Aljafarawi@uuplc.co.uk
M: 07950474499
unitedutilities.com

From: David Gray
Sent: 10 February 2022 14:38
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>; 'Stephen McCann' < >
Cc: Francis Comyn < >; Darren Clark < >; Davies, Nick <nick.davies@wilsonbowden.co.uk>
Subject: RE: Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

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Mohammed, Steve,

Please find attached the MDX for Network 2 (Plot M catchment) file as mentioned in the email below.

Mohammed, the flooding occurs in the sewers located quite some way from Pond 2 and is not affected by the water level within Pond 2 or the flow rate from Pond 2.

As shown in the extract below, the flooding occurs at MH S317 in the short duration (30 min) / high intensity rainfall event and is due to the flow rate exceeding the capacity of the pipe for a short duration. Based on

the volume shown in the hydraulic model, any flooding would be entirely contained within Sir Isaac Newton Water and drain back down into the system once the peak storm has passed. This is standard practice for designing drainage systems.

In reality, surface water drainage features (gullies, slot drains, kerb drains) are not designed generally designed a much lower storm event, typically the 5 year storm. So although the model shows flooding in the 100 year storm, the water would not have drained into the sewers in the first instance. The surface water would pond on the road surface as the capacities of the road gullies would have been exceeded before the capacity of the sewers.

1.006	S306	30 minute 100 year Winte	148.876	147.154	2.494	0.000	1.34		
1.007	S315	30 minute 100 year Winte	148.210	146.712	2.427	0.000	1.44		
1.008	S316	30 minute 100 year Winte	147.154	146.248	2.262	0.000	1.26		
9.000	SPM	30 minute 100 year Winte	148.105	145.997	1.960	0.000	0.84		
1.009	S317	30 minute 100 year Winte	145.764	145.776	2.192	13.308	1.01		
10.000	SPV	30 minute 100 year Winte	148.108	145.509	1.383	0.000	0.03		
1.010	S318	30 minute 100 year Winte	145.562	145.508	2.310	0.000	1.03		

If it would be beneficial, I would be happy to attend a Teams meeting to discuss this in more detail and answer any other queries you may have.

Kind Regards

David Gray
Principal Engineer | BWB Consulting Limited

5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
M 07437 015 337 **T** 0115 924 1100

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 10 February 2022 13:46
To: 'Stephen McCann' <Stephen.McCann@Rochdale.Gov.UK>; David Gray <David.Gray@bwbconsulting.com>
Cc: Francis Comyn <Francis.Comyn@Rochdale.Gov.UK>
Subject: RE: Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Good afternoon Stephen,
Thanks for your email, I had this morning a conversation with my colleague Robert, I understand that previously both of you deals with Catchment 1A/B (blue in the below picture).

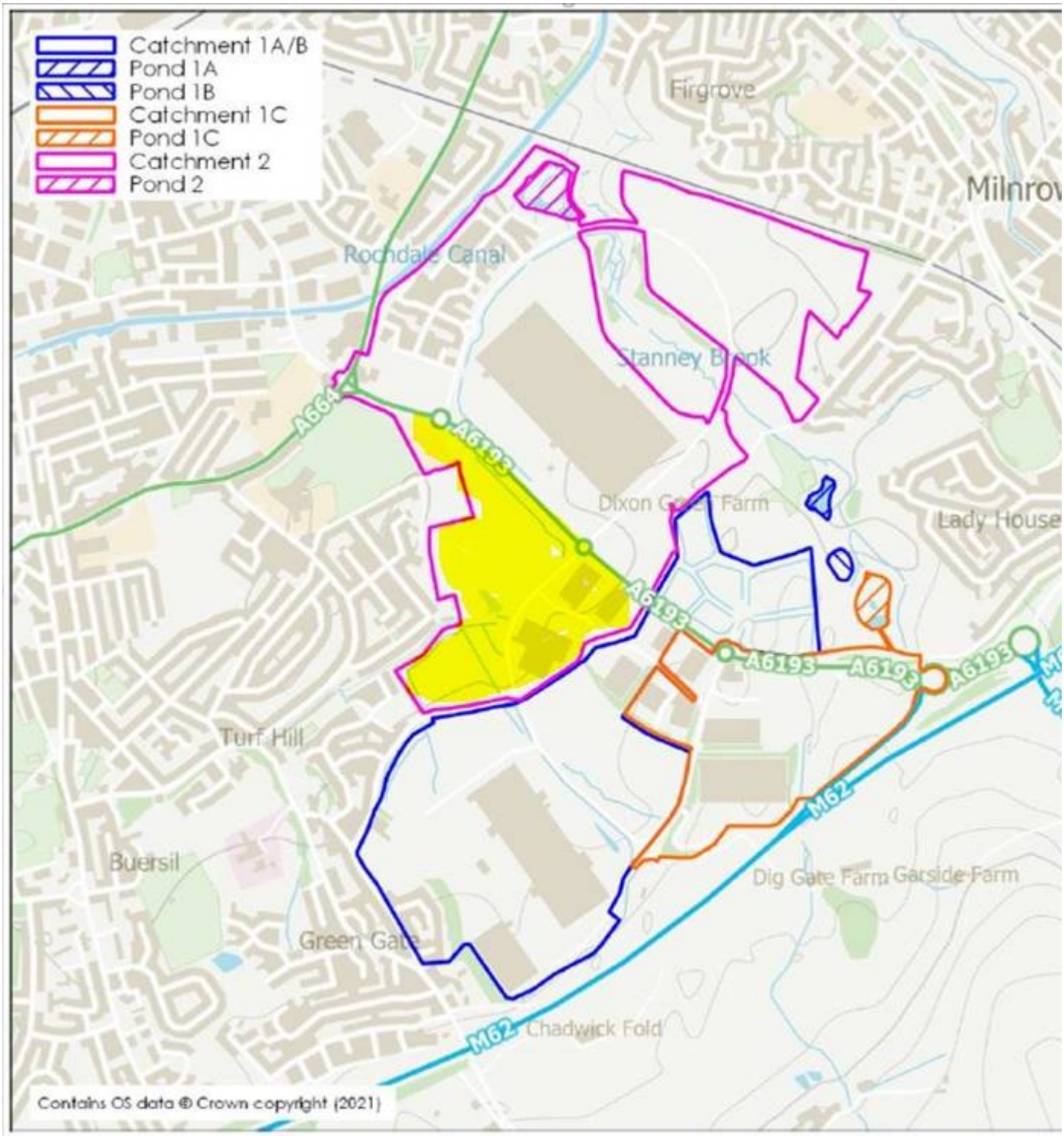

Figure 1.1: Business Park overall indicative catchments and attenuation ponds.

Currently, we are dealing with catchment 2 (pink colour), the developer contact our team regarding plot M (highlighted in yellow).

The provided modelling of catchment 2 has been done in line with previous model of catchment 1A. Previously 1A showed issues at the pond but the sewer network was fine.
Where catchment 2 model shows the pond is fine but the sewer network has a small amount of flooding (13m^3) within Sir Isaac Newton Way.

Also, the developer stated in the document no: KBP-BWB-ZZ-XX-RP-CD-0003, that the 'Pond 2' discharges surface water at a lower rate (444.5l/s) that of the original design intent (555l/s).

Could the developer provide the mdx. file to Stephen to run the model as you did for catchment 1A as a sense check.

Stephen, could you then provide confirmation of this results please.

Finally, whilst we have no problems with the proposal in principle...as there is a small amount of flooding on the sewer network, we request that this is investigated as there may be some remedial work to be done at the pond again as it does not appear to be passing forward the flow to the watercourse as it was originally designed to.

Kind regards,

Mohammed Aljafarawi
Developer Engineer
Developer Services & Metering
Customer Services
Email: Mohammed.Aljafarawi@uuplc.co.uk
M: 07950474499
unitedutilities.com

From: Stephen McCann [mailto:Stephen.McCann@Rochdale.Gov.UK]
Sent: 09 February 2022 15:30
To: Aljafarawi, Mohammed <Mohammed.Aljafarawi@uuplc.co.uk>
Cc: Francis Comyn <Francis.Comyn@Rochdale.Gov.UK>; 'David Gray' <David.Gray@bwbconsulting.com>
Subject: RE: Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

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Hello Mohammed,

With reference to your email below, the LLFA part of the Council, myself and Francis Comyn, are aware of the upgrade proposals to the Kingsway park pond 1A, as proposed by BWB - on behalf of the Kingsway Business park developers (Wilson Bowden, Homes England, & Rochdale Development Agency?).
I have recently done a site walkover with David Gray of BWB to discuss the options. As LLFA we agree that the upgrades, which should include a better trash screen on one of the ponds and an increased orifice plate are appropriate.

The previous UU consultee, Robert Brenton (UU) was involved in looking at the Kingsway Drainage Masterplan; he may be able to update you as he has recently dealt with several recent Kingsway Business park plot planning applications.

regards
Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing

ROCHDALE BOROUGH COUNCIL

01706 924606

07552 570262
stephen.mccann@rochdale.gov.uk

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 09 February 2022 13:00
To: 'David Gray' <David.Gray@bwbconsulting.com>
Cc: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

Good afternoon,

Thanks for providing the report.

After reviewing the site it would appear that the drainage infrastructure was installed around the year 2000 with agreement from the Rochdale council who acted as our agent at the time.

It would appear that the previously agreed drainage strategy was to freely drain the development areas through the large-diameter adopted sewers to the pond.
The pond appears to have been designed to act as storage to contain storm events up to the 1 in 100 years storm event, and the outfall to the pond was constructed to control flows into the watercourse.

Unfortunately, legislation has changed since the surface water strategy was agreed upon and the system was installed. We must therefore speak to the LLFA to ensure that the previously agreed strategy is still acceptable.

The LLFA will have to decide whether they are happy with the current arrangement where the drainage system, attenuation pond and outfall/flow control (350mm + 200mm ORIFICE plates) has already been constructed and is operational. **OR** whether they would like to restrict and attenuate flow on site in line with the latest legislation/guidance.

- Please contact the LLFA to agree on a way forward and let me know what their position is.
- If the LLFA are willing to accept the previously agreed strategy, could you please highlight the contributing area from the proposed development and the associated pipe length in the submitted Micro Drainage calculations so that the discharge rate from the proposed parcel can be confirmed?

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

Kind regards,

United Utilities
Water for the North West

Mohammed Aljafarawi
Developer Engineer
Developer Services & Metering
Customer Services
Email: Mohammed.Aljafarawi@uuplc.co.uk
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APPENDIX 5: Greenfield Runoff Rate Calculation

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.150
Area (ha)	3.500	Urban	0.000
SAAR (mm)	1120	Region Number	Region 10

Results	**l/s**
QBAR Rural	2.5
QBAR Urban	2.5
Q2 years	2.3
Q1 year	2.1
Q30 years	4.2
Q100 years	5.1

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APPENDIX 6: Greenfield Runoff Volume Calculation

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.000
Ratio R	0.273
Areal Reduction Factor	1.00
Area (ha)	3.500
SAAR (mm)	1137
CWI	123.672
Urban	0.000
SPR	10.000

Results

Percentage Runoff (%)	14.47
Greenfield Runoff Volume (m^3)	351.470

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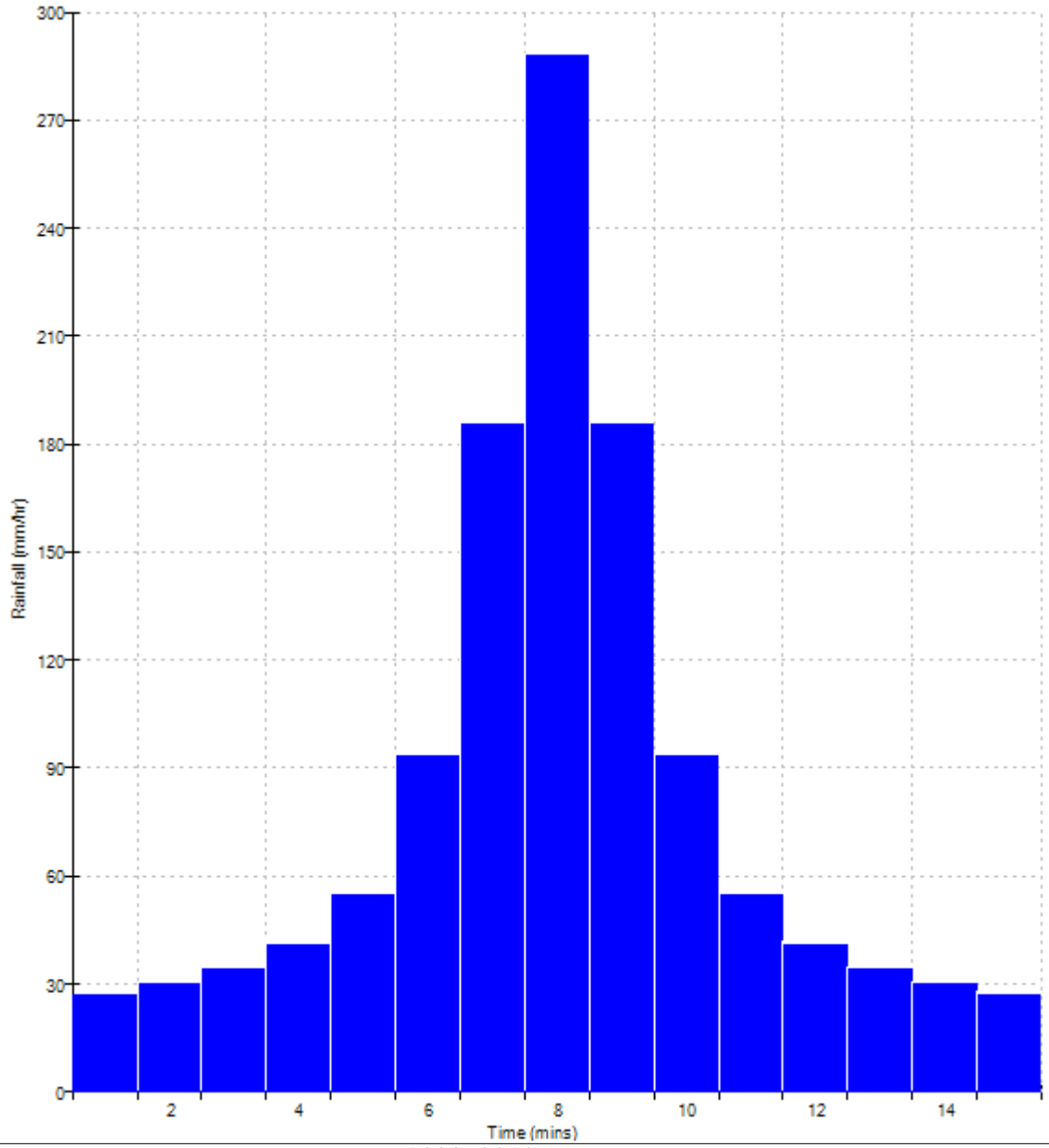
APPENDIX 7: 100-Year Rainfall Profile

Rainfall profile

Storm duration (mins) 15

FSR Data	
Region	England and Wales
M5-60 (mm)	19.000
Ratio R	0.272
Peak Intensity (mm/hr)	288.020
Ave. Intensity (mm/hr)	81.500
Return Period (years)	100.0



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APPENDIX 8: MicroDrainage Network Calculations

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	22.302	0.112	199.1	0.026	5.00	0.0	0.600	o	375	Pipe/Conduit	
S1.001	33.986	0.170	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.002	43.028	0.215	200.1	0.457	0.00	0.0	0.600	o	375	Pipe/Conduit	
S2.000	17.844	0.239	74.7	0.121	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	17.501	0.058	300.0	0.092	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.004	5.657	0.019	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.005	16.208	0.054	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	8.763	0.029	302.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.007	12.436	0.829	15.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.000	10.928	0.055	198.7	0.070	5.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	35.773	0.179	200.0	0.026	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.002	10.888	0.544	20.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.000	15.618	0.078	200.2	0.129	5.00	0.0	0.600	o	300	Pipe/Conduit	
S4.001	9.811	0.056	175.2	0.061	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.003	3.735	0.019	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.004	4.292	0.021	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.29	153.049	0.026	0.0	0.0	0.0	1.28	141.4	3.6
S1.001	50.00	5.73	152.937	0.026	0.0	0.0	0.0	1.28	141.1	3.6
S1.002	50.00	6.30	152.767	0.484	0.0	0.0	0.0	1.28	141.1	65.5
S2.000	50.00	5.20	152.941	0.121	0.0	0.0	0.0	1.52	60.2	16.4
S1.003	50.00	6.58	152.552	0.696	0.0	0.0	0.0	1.04	115.0	94.3
S1.004	50.00	6.67	152.494	0.696	0.0	0.0	0.0	1.04	115.0	94.3
S1.005	50.00	6.93	152.475	0.696	0.0	0.0	0.0	1.04	115.0	94.3
S1.006	50.00	7.05	152.346	0.696	0.0	0.0	0.0	1.16	185.2	94.3
S1.007	50.00	7.09	152.242	0.696	0.0	0.0	0.0	5.80	1256.4	94.3
S3.000	50.00	5.16	153.164	0.070	0.0	0.0	0.0	1.11	78.6	9.5
S3.001	50.00	5.70	153.109	0.097	0.0	0.0	0.0	1.11	78.3	13.1
S3.002	50.00	5.75	152.930	0.097	0.0	0.0	0.0	3.53	249.5	13.1
S4.000	50.00	5.24	152.520	0.129	0.0	0.0	0.0	1.11	78.3	17.5
S4.001	50.00	5.37	152.442	0.189	0.0	0.0	0.0	1.18	83.7	25.7
S3.003	50.00	5.81	152.386	0.286	0.0	0.0	0.0	1.11	78.3	38.7
S3.004	50.00	5.87	152.367	0.286	0.0	0.0	0.0	1.11	78.3	38.7

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S3.005	10.981	0.055	199.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S5.000	28.789	0.288	100.0	0.356	5.00	0.0	0.600	o	450	Pipe/Conduit	
S5.001	31.070	0.621	50.0	0.440	0.00	0.0	0.600	o	450	Pipe/Conduit	
S5.002	15.707	0.079	200.0	0.260	0.00	0.0	0.600	o	450	Pipe/Conduit	
S6.000	11.236	0.056	200.0	0.000	5.00	0.0	0.600	o	450	Pipe/Conduit	
S3.006	7.709	0.385	20.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.007	9.966	0.498	20.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S3.005	50.00	6.04	152.346	0.286	0.0	0.0	0.0	1.11	78.4	38.7
S5.000	50.00	5.24	153.017	0.356	0.0	0.0	0.0	2.03	323.4	48.3
S5.001	50.00	5.42	152.729	0.796	0.0	0.0	0.0	2.88	458.1	107.8
S5.002	50.00	5.60	152.108	1.057	0.0	0.0	0.0	1.43	228.1	143.1
S6.000	50.00	5.13	152.108	0.000	0.0	0.0	0.0	1.43	228.1	0.0
S3.006	50.00	6.06	152.029	1.343	0.0	0.0	0.0	5.02	1087.1	181.8
S3.007	50.00	6.10	151.644	1.343	0.0	0.0	0.0	5.46	1543.8	181.8

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.026	0.026	0.026
1.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.457	0.457	0.457
2.000	User	-	100	0.121	0.121	0.121
1.003	User	-	100	0.092	0.092	0.092
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
3.000	User	-	100	0.070	0.070	0.070
3.001	User	-	100	0.026	0.026	0.026
3.002	-	-	100	0.000	0.000	0.000
4.000	User	-	100	0.129	0.129	0.129
4.001	User	-	100	0.061	0.061	0.061
3.003	-	-	100	0.000	0.000	0.000
3.004	-	-	100	0.000	0.000	0.000
3.005	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.318	0.318	0.318
	User	-	100	0.038	0.038	0.356
5.001	User	-	100	0.440	0.440	0.440
5.002	User	-	100	0.260	0.260	0.260
6.000	-	-	100	0.000	0.000	0.000
3.006	-	-	100	0.000	0.000	0.000
3.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				2.039	2.039	2.039

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.251		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S8, DS/PN: S1.007, Volume (m³): 4.8

Unit Reference	MD-SHE-0459-1515-1800-1515
Design Head (m)	1.800
Design Flow (l/s)	151.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	459
Invert Level (m)	152.242
Minimum Outlet Pipe Diameter (mm)	500
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	151.5
Flush-Flo™	0.725	151.4
Kick-Flo®	1.359	132.1
Mean Flow over Head Range	-	124.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	12.0	1.200	142.1	3.000	194.3	7.000	294.4
0.200	43.6	1.400	134.0	3.500	209.6	7.500	304.5
0.300	87.1	1.600	143.0	4.000	223.7	8.000	314.3
0.400	131.3	1.800	151.5	4.500	237.0	8.500	323.8
0.500	147.5	2.000	159.4	5.000	249.6	9.000	333.1
0.600	150.3	2.200	167.0	5.500	261.5	9.500	342.0
0.800	151.1	2.400	174.3	6.000	272.9		
1.000	148.1	2.600	181.2	6.500	283.8		

Hydro-Brake® Optimum Manhole: S17, DS/PN: S3.007, Volume (m³): 7.4

Unit Reference	MD-CHE-0546-3005-3500-3005
Design Head (m)	3.500
Design Flow (l/s)	300.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	546
Invert Level (m)	151.644
Minimum Outlet Pipe Diameter (mm)	Site Specific Design (Contact Hydro International)
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

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Hydro-Brake® Optimum Manhole: S17, DS/PN: S3.007, Volume (m³): 7.4

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	3.500	300.1
Flush-Flo™	1.002	296.9
Kick-Flo®	1.335	190.0
Mean Flow over Head Range	-	221.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.8	1.200	214.8	3.000	278.2	7.000	422.1
0.200	39.9	1.400	191.2	3.500	300.1	7.500	436.7
0.300	81.9	1.600	204.2	4.000	320.5	8.000	450.7
0.400	129.7	1.800	216.4	4.500	339.6	8.500	464.4
0.500	173.6	2.000	227.9	5.000	357.7	9.000	477.7
0.600	208.3	2.200	238.8	5.500	374.8	9.500	490.5
0.800	264.5	2.400	249.3	6.000	391.2		
1.000	296.9	2.600	259.3	6.500	407.0		

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Storage Structures for Storm

Tank or Pond Manhole: S21, DS/PN: S6.000

Invert Level (m) 152.108

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	100.0	1.000	100.0	1.001	0.0

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.257
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	1	+0%	30/15 Summer			
S1.001	S2	15 Winter	1	+0%	30/15 Summer	30/15 Winter		
S1.002	S3	15 Winter	1	+0%	30/15 Summer	30/15 Winter		
S2.000	S4	15 Winter	1	+0%	30/15 Summer			
S1.003	S4	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S1.004	S5	15 Winter	1	+0%	30/15 Summer			
S1.005	S6	15 Winter	1	+0%	30/15 Summer			
S1.006	S7	15 Winter	1	+0%	30/15 Summer			
S1.007	S8	15 Winter	1	+0%	30/15 Summer			
S3.000	S10	15 Winter	1	+0%	100/15 Summer			
S3.001	S11	15 Winter	1	+0%	100/15 Summer			
S3.002	S12	15 Winter	1	+0%	100/15 Summer			
S4.000	S13	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
S4.001	S14	15 Winter	1	+0%	30/15 Summer			
S3.003	S13	15 Winter	1	+0%	30/15 Summer			
S3.004	S14	15 Winter	1	+0%	30/15 Summer			
S3.005	S15	15 Winter	1	+0%	30/15 Summer			
S5.000	S16	15 Winter	1	+0%	30/15 Summer			
S5.001	S17	15 Winter	1	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	153.089	-0.335	0.000	0.02			3.0	OK	
S1.001	S2	152.978	-0.334	0.000	0.02			2.9	OK	8
S1.002	S3	152.922	-0.220	0.000	0.35			45.2	OK	9
S2.000	S4	153.019	-0.147	0.000	0.26			13.8	OK	
S1.003	S4	152.803	-0.124	0.000	0.67			63.7	OK	4
S1.004	S5	152.760	-0.109	0.000	0.84			63.3	OK	
S1.005	S6	152.702	-0.148	0.000	0.68			63.4	OK	
S1.006	S7	152.574	-0.222	0.000	0.51			62.9	OK	
S1.007	S8	152.490	-0.277	0.000	0.09			63.2	OK	
S3.000	S10	153.236	-0.228	0.000	0.13			8.0	OK	
S3.001	S11	153.185	-0.224	0.000	0.14			10.4	OK	
S3.002	S12	152.976	-0.254	0.000	0.06			10.4	OK	
S4.000	S13	152.619	-0.201	0.000	0.22			14.3	OK	1
S4.001	S14	152.576	-0.166	0.000	0.32			19.9	OK	
S3.003	S13	152.556	-0.130	0.000	0.61			29.9	OK	
S3.004	S14	152.537	-0.130	0.000	0.61			30.2	OK	
S3.005	S15	152.495	-0.151	0.000	0.49			30.2	OK	
S5.000	S16	153.132	-0.335	0.000	0.14			40.0	OK	
S5.001	S17	152.869	-0.310	0.000	0.21			82.5	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S5.002	S18	15 Winter	1	+0%	30/15 Summer				152.372
S6.000	S21	30 Winter	1	+0%	30/15 Summer				152.123
S3.006	S16	15 Winter	1	+0%	30/15 Summer				152.217
S3.007	S17	15 Winter	1	+0%	30/15 Summer				152.051

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S5.002	S18	-0.186	0.000	0.64			108.2	OK	
S6.000	S21	-0.435	0.000	0.01			0.9	OK	
S3.006	S16	-0.337	0.000	0.28			131.7	OK	
S3.007	S17	-0.193	0.000	0.19			132.1	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.257
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	2	+0%	30/15 Summer			
S1.001	S2	15 Winter	2	+0%	30/15 Summer	30/15 Winter		
S1.002	S3	15 Winter	2	+0%	30/15 Summer	30/15 Winter		
S2.000	S4	15 Winter	2	+0%	30/15 Summer			
S1.003	S4	15 Winter	2	+0%	30/15 Summer	100/15 Summer		
S1.004	S5	15 Winter	2	+0%	30/15 Summer			
S1.005	S6	15 Winter	2	+0%	30/15 Summer			
S1.006	S7	15 Winter	2	+0%	30/15 Summer			
S1.007	S8	15 Winter	2	+0%	30/15 Summer			
S3.000	S10	15 Winter	2	+0%	100/15 Summer			
S3.001	S11	15 Winter	2	+0%	100/15 Summer			
S3.002	S12	15 Winter	2	+0%	100/15 Summer			
S4.000	S13	15 Winter	2	+0%	30/15 Summer	100/15 Winter		
S4.001	S14	15 Winter	2	+0%	30/15 Summer			
S3.003	S13	15 Winter	2	+0%	30/15 Summer			
S3.004	S14	15 Winter	2	+0%	30/15 Summer			
S3.005	S15	15 Winter	2	+0%	30/15 Summer			
S5.000	S16	15 Winter	2	+0%	30/15 Summer			
S5.001	S17	15 Winter	2	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	153.093	-0.331	0.000	0.03			3.8	OK	
S1.001	S2	152.987	-0.325	0.000	0.03			3.8	OK	8
S1.002	S3	152.947	-0.195	0.000	0.46			58.7	OK	9
S2.000	S4	153.031	-0.135	0.000	0.33			17.8	OK	
S1.003	S4	152.880	-0.047	0.000	0.82			77.2	OK	4
S1.004	S5	152.837	-0.032	0.000	1.00			75.0	OK	
S1.005	S6	152.730	-0.119	0.000	0.80			75.0	OK	
S1.006	S7	152.598	-0.197	0.000	0.60			75.0	OK	
S1.007	S8	152.515	-0.252	0.000	0.11			75.0	OK	
S3.000	S10	153.247	-0.217	0.000	0.17			10.3	OK	
S3.001	S11	153.198	-0.211	0.000	0.19			13.5	OK	
S3.002	S12	152.983	-0.247	0.000	0.07			13.4	OK	
S4.000	S13	152.640	-0.180	0.000	0.28			18.4	OK	1
S4.001	S14	152.606	-0.136	0.000	0.42			25.5	OK	
S3.003	S13	152.589	-0.097	0.000	0.78			38.6	OK	
S3.004	S14	152.569	-0.098	0.000	0.78			38.9	OK	
S3.005	S15	152.520	-0.126	0.000	0.63			38.9	OK	
S5.000	S16	153.150	-0.317	0.000	0.19			51.8	OK	
S5.001	S17	152.889	-0.290	0.000	0.27			106.8	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S5.002	S18	15 Winter	2	+0%	30/15 Summer				152.423
S6.000	S21	30 Winter	2	+0%	30/15 Summer				152.134
S3.006	S16	15 Winter	2	+0%	30/15 Summer				152.245
S3.007	S17	15 Winter	2	+0%	30/15 Summer				152.136

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S5.002	S18	-0.135	0.000	0.83			140.0	OK	
S6.000	S21	-0.424	0.000	0.01			1.7	OK	
S3.006	S16	-0.309	0.000	0.35			168.3	OK	
S3.007	S17	-0.108	0.000	0.24			169.4	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.257
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	30	+40%	30/15 Summer			
S1.001	S2	15 Winter	30	+40%	30/15 Summer	30/15 Winter		
S1.002	S3	15 Winter	30	+40%	30/15 Summer	30/15 Winter		
S2.000	S4	15 Winter	30	+40%	30/15 Summer			
S1.003	S4	15 Winter	30	+40%	30/15 Summer	100/15 Summer		
S1.004	S5	15 Winter	30	+40%	30/15 Summer			
S1.005	S6	15 Winter	30	+40%	30/15 Summer			
S1.006	S7	15 Winter	30	+40%	30/15 Summer			
S1.007	S8	15 Winter	30	+40%	30/15 Summer			
S3.000	S10	15 Winter	30	+40%	100/15 Summer			
S3.001	S11	15 Winter	30	+40%	100/15 Summer			
S3.002	S12	15 Winter	30	+40%	100/15 Summer			
S4.000	S13	15 Winter	30	+40%	30/15 Summer	100/15 Winter		
S4.001	S14	15 Winter	30	+40%	30/15 Summer			
S3.003	S13	15 Winter	30	+40%	30/15 Summer			
S3.004	S14	30 Winter	30	+40%	30/15 Summer			
S3.005	S15	30 Winter	30	+40%	30/15 Summer			
S5.000	S16	15 Winter	30	+40%	30/15 Summer			
S5.001	S17	15 Winter	30	+40%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	153.844	0.420	0.000	0.07			8.3	SURCHARGED
S1.001	S2	153.840	0.528	1.301	0.28			35.1	FLOOD
S1.002	S3	153.850	0.708	5.236	0.96			124.0	FLOOD
S2.000	S4	153.922	0.756	0.000	0.68			36.6	SURCHARGED
S1.003	S4	153.809	0.882	0.000	1.91			180.5	FLOOD RISK
S1.004	S5	153.708	0.839	0.000	2.33			174.3	SURCHARGED
S1.005	S6	153.596	0.746	0.000	1.80			167.6	SURCHARGED
S1.006	S7	153.474	0.678	0.000	1.27			158.1	SURCHARGED
S1.007	S8	153.436	0.670	0.000	0.21			149.9	SURCHARGED
S3.000	S10	153.305	-0.159	0.000	0.44			27.3	OK
S3.001	S11	153.266	-0.143	0.000	0.52			37.4	OK
S3.002	S12	153.172	-0.058	0.000	0.18			32.6	OK
S4.000	S13	153.246	0.426	0.000	0.67			44.5	SURCHARGED
S4.001	S14	153.202	0.460	0.000	1.05			64.3	SURCHARGED
S3.003	S13	153.156	0.470	0.000	1.88			92.5	SURCHARGED
S3.004	S14	153.140	0.473	0.000	1.68			83.5	SURCHARGED
S3.005	S15	153.123	0.477	0.000	1.34			82.5	SURCHARGED
S5.000	S16	153.573	0.106	0.000	0.48			132.3	SURCHARGED
S5.001	S17	153.509	0.330	0.000	0.71			280.7	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	8
S1.002	S3	9
S2.000	S4	
S1.003	S4	4
S1.004	S5	
S1.005	S6	
S1.006	S7	
S1.007	S8	
S3.000	S10	
S3.001	S11	
S3.002	S12	
S4.000	S13	1
S4.001	S14	
S3.003	S13	
S3.004	S14	
S3.005	S15	
S5.000	S16	
S5.001	S17	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S5.002	S18	15 Winter	30	+40%	30/15 Summer				153.218
S6.000	S21	30 Winter	30	+40%	30/15 Summer				152.828
S3.006	S16	30 Winter	30	+40%	30/15 Summer				153.037
S3.007	S17	30 Winter	30	+40%	30/15 Summer				153.089

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S5.002	S18	0.660	0.000	2.22			375.6	SURCHARGED	
S6.000	S21	0.270	0.000	0.89			145.7	SURCHARGED	
S3.006	S16	0.483	0.000	0.49			231.4	SURCHARGED	
S3.007	S17	0.845	0.000	0.32			229.0	SURCHARGED	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.257
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	30 Winter	100	+45%	30/15 Summer			
S1.001	S2	30 Winter	100	+45%	30/15 Summer	30/15 Winter		
S1.002	S3	30 Winter	100	+45%	30/15 Summer	30/15 Winter		
S2.000	S4	15 Winter	100	+45%	30/15 Summer			
S1.003	S4	15 Winter	100	+45%	30/15 Summer	100/15 Summer		
S1.004	S5	15 Summer	100	+45%	30/15 Summer			
S1.005	S6	15 Summer	100	+45%	30/15 Summer			
S1.006	S7	15 Summer	100	+45%	30/15 Summer			
S1.007	S8	15 Summer	100	+45%	30/15 Summer			
S3.000	S10	30 Winter	100	+45%	100/15 Summer			
S3.001	S11	30 Winter	100	+45%	100/15 Summer			
S3.002	S12	30 Winter	100	+45%	100/15 Summer			
S4.000	S13	30 Winter	100	+45%	30/15 Summer	100/15 Winter		
S4.001	S14	30 Winter	100	+45%	30/15 Summer			
S3.003	S13	30 Winter	100	+45%	30/15 Summer			
S3.004	S14	30 Winter	100	+45%	30/15 Summer			
S3.005	S15	30 Winter	100	+45%	30/15 Summer			
S5.000	S16	15 Winter	100	+45%	30/15 Summer			
S5.001	S17	15 Winter	100	+45%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	153.855	0.431	0.000	0.10			11.6	SURCHARGED
S1.001	S2	153.853	0.541	14.072	0.82			103.8	FLOOD
S1.002	S3	153.877	0.735	32.490	1.02			131.0	FLOOD
S2.000	S4	154.146	0.980	0.000	1.09			58.6	FLOOD RISK
S1.003	S4	153.848	0.921	2.831	2.01			189.5	FLOOD
S1.004	S5	153.781	0.913	0.000	2.57			192.3	SURCHARGED
S1.005	S6	153.746	0.897	0.000	1.92			179.3	SURCHARGED
S1.006	S7	153.669	0.874	0.000	1.33			165.4	SURCHARGED
S1.007	S8	153.641	0.874	0.000	0.21			150.0	SURCHARGED
S3.000	S10	154.034	0.570	0.000	0.50			30.5	SURCHARGED
S3.001	S11	154.019	0.610	0.000	0.56			40.6	SURCHARGED
S3.002	S12	153.995	0.765	0.000	0.19			35.6	FLOOD RISK
S4.000	S13	153.904	1.084	10.597	1.00			66.3	FLOOD
S4.001	S14	153.963	1.221	0.000	1.16			71.5	FLOOD RISK
S3.003	S13	153.989	1.303	0.000	1.82			89.7	SURCHARGED
S3.004	S14	153.986	1.319	0.000	1.77			87.8	SURCHARGED
S3.005	S15	153.981	1.335	0.000	1.41			86.6	SURCHARGED
S5.000	S16	154.417	0.950	0.000	0.60			164.9	FLOOD RISK
S5.001	S17	154.324	1.145	0.000	0.89			352.2	FLOOD RISK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	8
S1.002	S3	9
S2.000	S4	
S1.003	S4	4
S1.004	S5	
S1.005	S6	
S1.006	S7	
S1.007	S8	
S3.000	S10	
S3.001	S11	
S3.002	S12	
S4.000	S13	1
S4.001	S14	
S3.003	S13	
S3.004	S14	
S3.005	S15	
S5.000	S16	
S5.001	S17	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S5.002	S18	30 Winter	100	+45%	30/15 Summer				154.155
S6.000	S21	30 Winter	100	+45%	30/15 Summer				153.968
S3.006	S16	30 Winter	100	+45%	30/15 Summer				153.968
S3.007	S17	30 Winter	100	+45%	30/15 Summer				153.914

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S5.002	S18	1.597	0.000	2.42			410.0	SURCHARGED	
S6.000	S21	1.410	0.000	0.98			160.0	SURCHARGED	
S3.006	S16	1.414	0.000	0.51			242.8	SURCHARGED	
S3.007	S17	1.670	0.000	0.34			242.5	SURCHARGED	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.257	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	3.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.600
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.50
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	1000

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	31.654	0.106	298.6	0.257	5.00	0.0	0.600	o	450	Pipe/Conduit	
1.001	37.263	0.124	300.0	0.361	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	45.470	0.227	200.3	0.022	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	14.058	0.070	200.0	0.163	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	3.432	0.017	200.0	0.006	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.003	5.950	0.030	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.004	4.296	0.218	19.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	29.688	0.099	300.0	0.196	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.003	25.842	0.086	300.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.004	35.070	0.117	300.0	0.117	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.005	9.283	0.031	300.0	0.203	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.45	152.922	0.257	0.0	0.0	0.0	1.17	186.3	34.8
1.001	50.00	5.98	152.816	0.618	0.0	0.0	0.0	1.17	185.8	83.7
2.000	50.00	5.68	152.788	0.022	0.0	0.0	0.0	1.11	78.3	2.9
2.001	50.00	5.90	152.561	0.184	0.0	0.0	0.0	1.11	78.3	25.0
2.002	50.00	5.95	152.491	0.190	0.0	0.0	0.0	1.11	78.3	25.7
2.003	50.00	6.04	152.474	0.190	0.0	0.0	0.0	1.11	78.3	25.7
2.004	50.00	6.06	152.444	0.190	0.0	0.0	0.0	3.56	251.5	25.7
1.002	50.00	6.44	152.001	1.004	0.0	0.0	0.0	1.29	278.8	136.0
1.003	50.00	6.78	151.902	1.004	0.0	0.0	0.0	1.29	278.8	136.0
1.004	50.00	7.19	151.741	1.121	0.0	0.0	0.0	1.40	396.0	151.9
1.005	50.00	7.30	151.624	1.324	0.0	0.0	0.0	1.40	396.0	179.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	21.404	0.214	100.0	0.005	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	15.158	0.152	100.0	0.135	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	18.520	0.062	300.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.007	6.762	0.023	300.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.008	7.021	0.023	300.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.009	12.490	0.042	300.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	50.00	5.23	152.954	0.005	0.0	0.0	0.0	1.57	111.1	0.7
3.001	50.00	5.39	152.740	0.140	0.0	0.0	0.0	1.57	111.1	19.0
1.006	50.00	7.52	151.593	1.465	0.0	0.0	0.0	1.40	396.0	198.3
1.007	50.00	7.60	151.531	1.465	0.0	0.0	0.0	1.40	396.0	198.3
1.008	50.00	7.69	151.509	1.465	0.0	0.0	0.0	1.40	396.0	198.3
1.009	50.00	7.84	150.656	1.465	0.0	0.0	0.0	1.40	396.0	198.3

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.257	0.257	0.257
1.001	User	-	100	0.361	0.361	0.361
2.000	User	-	100	0.022	0.022	0.022
2.001	User	-	100	0.163	0.163	0.163
2.002	User	-	100	0.006	0.006	0.006
2.003	-	-	100	0.000	0.000	0.000
2.004	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.196	0.196	0.196
1.003	-	-	100	0.000	0.000	0.000
1.004	User	-	100	0.117	0.117	0.117
1.005	User	-	100	0.203	0.203	0.203
3.000	User	-	100	0.005	0.005	0.005
3.001	User	-	100	0.135	0.135	0.135
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
1.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.465	1.465	1.465

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.257		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 10, DS/PN: 1.009, Volume (m³): 9.7

Unit Reference	MD-CHE-0579-3400-3500-3400
Design Head (m)	3.500
Design Flow (l/s)	340.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	579
Invert Level (m)	150.656
Minimum Outlet Pipe Diameter (mm)	Site Specific Design (Contact Hydro International)
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	3.500	339.8
Flush-Flo™	1.048	339.8
Kick-Flo®	1.394	219.7
Mean Flow over Head Range	-	251.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	11.1	1.200	282.8	3.000	315.0	7.000	477.9
0.200	41.4	1.400	219.8	3.500	339.8	7.500	494.4
0.300	85.7	1.600	231.2	4.000	362.9	8.000	510.4
0.400	137.3	1.800	245.0	4.500	384.5	8.500	525.8
0.500	187.6	2.000	258.0	5.000	405.0	9.000	540.8
0.600	227.8	2.200	270.4	5.500	424.4	9.500	555.4
0.800	292.1	2.400	282.2	6.000	443.0		
1.000	336.9	2.600	293.6	6.500	460.8		

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 0
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.250
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	1	+0%	30/15 Summer			
1.001	2	15 Winter	1	+0%	30/15 Summer			
2.000	3	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
2.001	4	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
2.002	5	15 Winter	1	+0%	30/15 Summer			
2.003	6	15 Winter	1	+0%	30/15 Summer			
2.004	7	15 Winter	1	+0%	30/15 Summer			
1.002	3	15 Winter	1	+0%	30/15 Summer			
1.003	4	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
1.004	5	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
1.005	6	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
3.000	12	15 Winter	1	+0%	30/15 Winter			
3.001	13	15 Winter	1	+0%	30/15 Winter	100/15 Winter		
1.006	7	15 Winter	1	+0%	30/15 Summer			
1.007	8	15 Winter	1	+0%	30/15 Summer			
1.008	9	15 Winter	1	+0%	30/15 Summer			
1.009	10	15 Winter	1	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	153.067	-0.305	0.000	0.18			28.3	OK	
1.001	2	153.007	-0.259	0.000	0.38			61.7	OK	
2.000	3	152.824	-0.264	0.000	0.03			2.4	OK	4
2.001	4	152.668	-0.193	0.000	0.27			17.9	OK	4
2.002	5	152.616	-0.175	0.000	0.37			18.3	OK	
2.003	6	152.594	-0.180	0.000	0.34			18.2	OK	
2.004	7	152.523	-0.221	0.000	0.16			18.3	OK	
1.002	3	152.239	-0.287	0.000	0.42			97.4	OK	
1.003	4	152.140	-0.286	0.000	0.42			96.0	OK	5
1.004	5	151.999	-0.341	0.000	0.31			102.9	OK	3
1.005	6	151.924	-0.299	0.000	0.47			115.2	OK	
3.000	12	152.963	-0.291	0.000	0.01			0.6	OK	
3.001	13	152.816	-0.224	0.000	0.14			13.4	OK	2
1.006	7	151.897	-0.296	0.000	0.43			124.8	OK	
1.007	8	151.855	-0.276	0.000	0.57			123.9	OK	
1.008	9	151.831	-0.278	0.000	0.56			124.3	OK	
1.009	10	151.051	-0.205	0.000	0.47			124.6	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 0
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.250
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	2	+0%	30/15 Summer			
1.001	2	15 Winter	2	+0%	30/15 Summer			
2.000	3	15 Winter	2	+0%	30/15 Summer	100/15 Winter		
2.001	4	15 Winter	2	+0%	30/15 Summer	100/15 Winter		
2.002	5	15 Winter	2	+0%	30/15 Summer			
2.003	6	15 Winter	2	+0%	30/15 Summer			
2.004	7	15 Winter	2	+0%	30/15 Summer			
1.002	3	15 Winter	2	+0%	30/15 Summer			
1.003	4	15 Winter	2	+0%	30/15 Summer	100/15 Summer		
1.004	5	15 Winter	2	+0%	30/15 Summer	100/15 Winter		
1.005	6	15 Winter	2	+0%	30/15 Summer	100/15 Winter		
3.000	12	15 Winter	2	+0%	30/15 Winter			
3.001	13	15 Winter	2	+0%	30/15 Winter	100/15 Winter		
1.006	7	15 Winter	2	+0%	30/15 Summer			
1.007	8	15 Winter	2	+0%	30/15 Summer			
1.008	9	15 Winter	2	+0%	30/15 Summer			
1.009	10	15 Winter	2	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	153.093	-0.279	0.000	0.23			36.6	OK	
1.001	2	153.038	-0.228	0.000	0.49			79.9	OK	
2.000	3	152.828	-0.260	0.000	0.04			3.1	OK	4
2.001	4	152.685	-0.176	0.000	0.36			23.1	OK	4
2.002	5	152.636	-0.155	0.000	0.47			23.7	OK	
2.003	6	152.612	-0.161	0.000	0.43			23.6	OK	
2.004	7	152.535	-0.208	0.000	0.20			23.7	OK	
1.002	3	152.279	-0.247	0.000	0.54			125.9	OK	
1.003	4	152.180	-0.247	0.000	0.55			124.2	OK	5
1.004	5	152.048	-0.292	0.000	0.40			132.8	OK	3
1.005	6	151.980	-0.244	0.000	0.61			148.4	OK	
3.000	12	152.966	-0.288	0.000	0.01			0.8	OK	
3.001	13	152.828	-0.212	0.000	0.19			17.4	OK	2
1.006	7	151.954	-0.239	0.000	0.55			160.7	OK	
1.007	8	151.914	-0.217	0.000	0.73			159.5	OK	
1.008	9	151.889	-0.220	0.000	0.72			160.1	OK	
1.009	10	151.124	-0.132	0.000	0.60			160.4	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 0
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.250
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	30	+40%	30/15 Summer			
1.001	2	15 Winter	30	+40%	30/15 Summer			
2.000	3	15 Winter	30	+40%	30/15 Summer	100/15 Winter		
2.001	4	15 Winter	30	+40%	30/15 Summer	100/15 Winter		
2.002	5	15 Winter	30	+40%	30/15 Summer			
2.003	6	15 Winter	30	+40%	30/15 Summer			
2.004	7	15 Winter	30	+40%	30/15 Summer			
1.002	3	15 Winter	30	+40%	30/15 Summer			
1.003	4	15 Winter	30	+40%	30/15 Summer	100/15 Summer		
1.004	5	15 Winter	30	+40%	30/15 Summer	100/15 Winter		
1.005	6	15 Winter	30	+40%	30/15 Summer	100/15 Winter		
3.000	12	15 Winter	30	+40%	30/15 Winter			
3.001	13	15 Winter	30	+40%	30/15 Winter	100/15 Winter		
1.006	7	15 Winter	30	+40%	30/15 Summer			
1.007	8	15 Winter	30	+40%	30/15 Summer			
1.008	9	15 Winter	30	+40%	30/15 Summer			
1.009	10	15 Winter	30	+40%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	153.600	0.228	0.000	0.61			97.9	SURCHARGED
1.001	2	153.568	0.302	0.000	1.43			234.3	SURCHARGED
2.000	3	153.569	0.481	0.000	0.09			6.8	SURCHARGED
2.001	4	153.560	0.699	0.000	0.89			57.9	SURCHARGED
2.002	5	153.528	0.737	0.000	1.17			58.4	SURCHARGED
2.003	6	153.517	0.744	0.000	1.03			56.0	SURCHARGED
2.004	7	153.503	0.760	0.000	0.50			58.2	SURCHARGED
1.002	3	153.493	0.967	0.000	1.31			304.2	SURCHARGED
1.003	4	153.423	0.996	0.000	1.24			283.2	SURCHARGED
1.004	5	153.352	1.011	0.000	0.92			306.0	SURCHARGED
1.005	6	153.291	1.067	0.000	1.46			356.3	SURCHARGED
3.000	12	153.286	0.032	0.000	0.03			3.2	SURCHARGED
3.001	13	153.281	0.242	0.000	0.62			58.0	SURCHARGED
1.006	7	153.249	1.057	0.000	1.33			390.7	SURCHARGED
1.007	8	153.183	1.052	0.000	1.70			373.0	SURCHARGED
1.008	9	153.142	1.034	0.000	1.60			355.2	SURCHARGED
1.009	10	153.102	1.846	0.000	1.15			305.7	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	1	
1.001	2	
2.000	3	4
2.001	4	4
2.002	5	
2.003	6	
2.004	7	
1.002	3	
1.003	4	5
1.004	5	3
1.005	6	
3.000	12	
3.001	13	2
1.006	7	
1.007	8	
1.008	9	
1.009	10	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 0
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.250
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	100	+45%	30/15 Summer			
1.001	2	15 Winter	100	+45%	30/15 Summer			
2.000	3	30 Winter	100	+45%	30/15 Summer	100/15 Winter		
2.001	4	30 Winter	100	+45%	30/15 Summer	100/15 Winter		
2.002	5	15 Winter	100	+45%	30/15 Summer			
2.003	6	15 Winter	100	+45%	30/15 Summer			
2.004	7	15 Winter	100	+45%	30/15 Summer			
1.002	3	15 Winter	100	+45%	30/15 Summer			
1.003	4	30 Winter	100	+45%	30/15 Summer	100/15 Summer		
1.004	5	15 Winter	100	+45%	30/15 Summer	100/15 Winter		
1.005	6	30 Winter	100	+45%	30/15 Summer	100/15 Winter		
3.000	12	30 Winter	100	+45%	30/15 Winter			
3.001	13	15 Winter	100	+45%	30/15 Winter	100/15 Winter		
1.006	7	30 Winter	100	+45%	30/15 Summer			
1.007	8	30 Winter	100	+45%	30/15 Summer			
1.008	9	15 Winter	100	+45%	30/15 Summer			
1.009	10	15 Winter	100	+45%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	154.541	1.169	0.000	0.67			108.4	FLOOD RISK
1.001	2	154.494	1.228	0.000	1.70			278.2	FLOOD RISK
2.000	3	154.290	1.202	2.353	0.37			27.3	FLOOD
2.001	4	154.292	1.431	4.422	0.86			56.1	FLOOD
2.002	5	154.281	1.490	0.000	1.23			61.4	FLOOD RISK
2.003	6	154.274	1.500	0.000	1.02			55.5	FLOOD RISK
2.004	7	154.257	1.513	0.000	0.50			58.5	FLOOD RISK
1.002	3	154.248	1.722	0.000	1.38			321.7	SURCHARGED
1.003	4	154.078	1.651	28.705	1.28			290.7	FLOOD
1.004	5	154.052	1.711	2.726	0.96			316.6	FLOOD
1.005	6	154.034	1.810	0.018	1.42			345.6	FLOOD
3.000	12	154.056	0.802	0.000	0.07			7.0	SURCHARGED
3.001	13	154.050	1.010	0.325	0.78			72.7	FLOOD
1.006	7	154.006	1.814	0.000	1.30			381.7	FLOOD RISK
1.007	8	153.931	1.799	0.000	1.66			363.9	SURCHARGED
1.008	9	153.870	1.762	0.000	1.64			363.4	SURCHARGED
1.009	10	153.826	2.570	0.000	1.24			328.6	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	1	
1.001	2	
2.000	3	4
2.001	4	4
2.002	5	
2.003	6	
2.004	7	
1.002	3	
1.003	4	5
1.004	5	3
1.005	6	
3.000	12	
3.001	13	2
1.006	7	
1.007	8	
1.008	9	
1.009	10	

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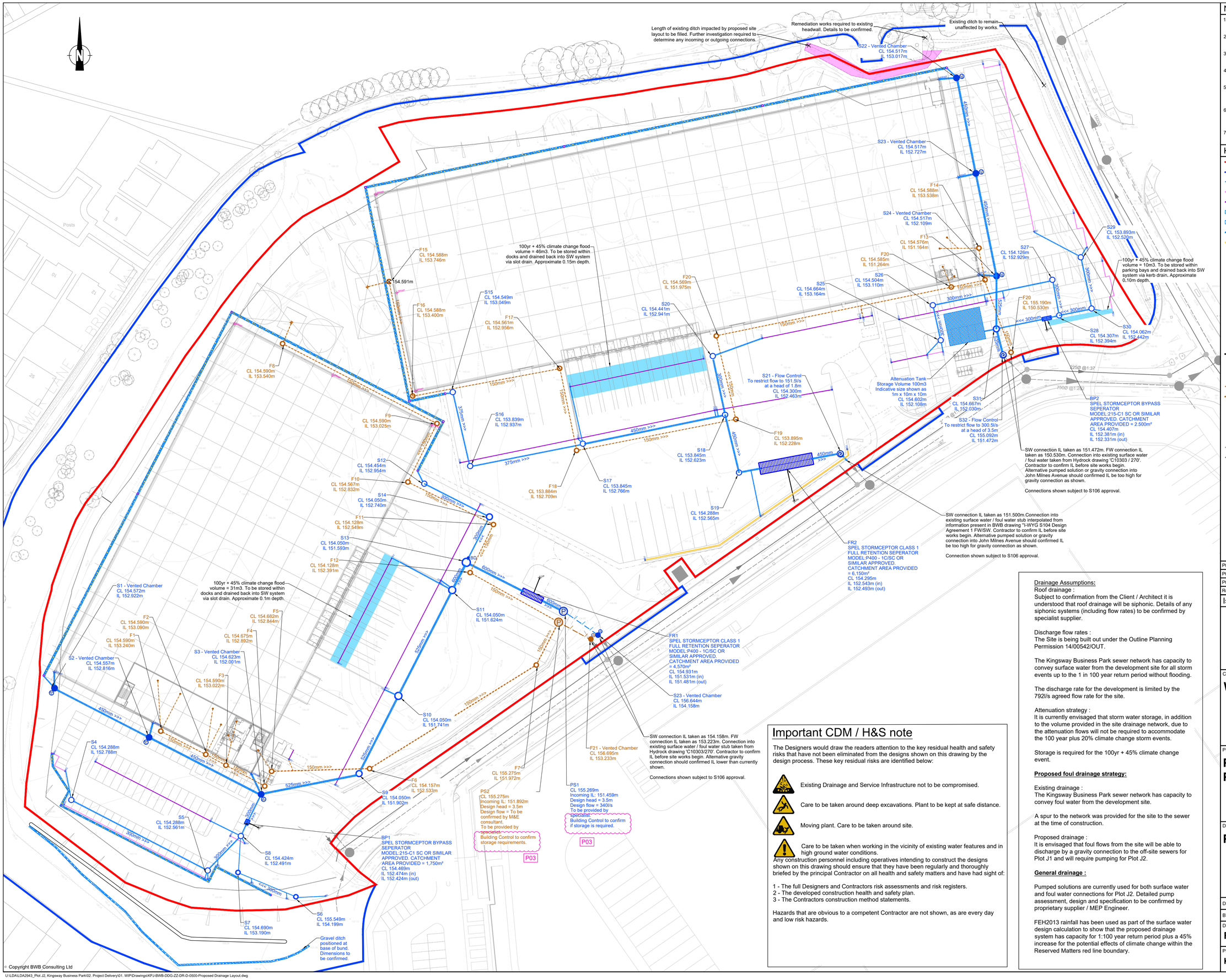
APPENDIX 9: Drainage Drawings



U:\LDA\LDA2943_Plot J2, Kingsway Business Park\02. Project Delivery\01. WIP\Drawings\KPJ-BWB-DDG-ZZ-DR-D-0500-Proposed Drainage Layout.dwg

Important CDM / H&S note

The Designers would draw the readers attention to the key residual health and safety risks that have not been eliminated from the designs shown on this drawing by the design process. These key residual risks are identified below:

Existing Drainage and Service Infrastructure not to be compromised.

Care to be taken around deep excavations. Plant to be kept at safe distance.

Moving plant. Care to be taken around site.

Care to be taken when working in the vicinity of existing water features and in high ground water conditions.

Any construction personnel including operatives intending to construct the designs shown on this drawing should ensure that they have been regularly and thoroughly briefed by the principal Contractor on all health and safety matters and have had sight of:

1 - The full Designers and Contractors risk assessments and risk registers.
2 - The developed construction health and safety plan.
3 - The Contractors construction method statements.

Hazards that are obvious to a competent Contractor are not shown, as are every day and low risk hazards.

Drainage Assumptions:

Roof drainage :
Subject to confirmation from the Client / Architect it is understood that roof drainage will be siphonic. Details of any siphonic systems (including flow rates) to be confirmed by specialist supplier.

Discharge flow rates :
The Site is being built out under the Outline Planning Permission 14/00542/OUT.

The Kingsway Business Park sewer network has capacity to convey surface water from the development site for all storm events up to the 1 in 100 year return period without flooding.

The discharge rate for the development is limited by the 792l/s agreed flow rate for the site.

Attenuation strategy :
It is currently envisaged that storm water storage, in addition to the volume provided in the site drainage network, due to the attenuation flows will not be required to accommodate the 100 year plus 20% climate change storm events.

Storage is required for the 100yr + 45% climate change event.

Proposed foul drainage strategy:

Existing drainage :
The Kingsway Business Park sewer network has capacity to convey foul water from the development site.

A spur to the network was provided for the site to the sewer at the time of construction.

Proposed drainage :
It is envisaged that foul flows from the site will be able to discharge by a gravity connection to the off-site sewers for Plot J1 and will require pumping for Plot J2.

General drainage :

Pumped solutions are currently used for both surface water and foul water connections for Plot J2. Detailed pump assessment, design and specification to be confirmed by proprietary supplier / MEP Engineer.

FEH2013 rainfall has been used as part of the surface water design calculation to show that the proposed drainage system has capacity for 1:100 year return period plus a 45% increase for the potential effects of climate change within the Reserved Matters red line boundary.

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. For site plan refer to DLA Architecture drawing "2022-052_KPJ-DLA-JS-XX- DR-A-90066_RevP05_SITE PLAN" recieved 14/07/22.
6. For topographical survey refer to BWB drawings "KBP-BWB-00-ZZ-M3-G-001-Existing_Site_3D_Model" & dated 07/06/22.
7. For drainage notes refer to BWB drawing 'KPJ-BWB-XX-XX-DR-D-0001_Civil Engineering Notes'.

Key Plan

- Site Boundary
- Application Boundary
- Proposed Surface Water Drainage
- Kerb Drain
- Slot Drain - QMax
- Filter Drain
- Gravel Ditch
- Surface Water Rising Main
- Back of Wall Drainage
- BD Surface Water Back Drop
- G Gully
- SRWP Siphonic Rain Water Pipe
- SU Channel Drain Sump
- Surface Water Vented Access Chamber
- Surface Water Flow Control Chamber
- Surface Water Catchpit
- Surface Water Pumping Station
- Full Retention Interceptor
- Bypass Interceptor
- VP Petrol Interceptor Vent Pipe
- Cellular Attenuation Tank
- Indicative Area of Surface Water Flood containment
- Proposed Foul Sewer Drainage
- Foul Sewer Rising Main
- BD Foul Back Drop
- Foul Pop Up
- Sprinkler Tank Drain Down
- Foul Pumping Station
- Surface Water Drainage
- Proposed Foul Sewer Drainage

PROPOSALS ARE SUBJECT TO APPROVAL

PROPOSALS ARE SUBJECT TO CHANGE DURING DETAILED DESIGN AND PROJECT TEAM REVIEW

SITE LEVELS SHOWN INDICATIVELY - SUBJECT TO CONTRACTORS METHOD OF WORKS. COULD BE RAISED OR LOWERED BY +/- 0.5m

Rev	Date	Details of issue / revision	Drw	Rev
P03	21.07.22	Pumping storage requirement notes updated	JT	JR
P02	19.07.22	Bund drainage added	JT	JR
P01	15.07.22	For Planning	JT	JR

Issues & Revisions

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Client
Wilson Bowden

Project Title
Plot J2 Kingsway Business Park

Drawing Title
Proposed Drainage Layout

Drawn:	J Taylor	Reviewed:	J Roberts
BWB Ref:	LDA2943	Date: July 22	Scale@A1: 1:500

Drawing Status
For Planning

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
KPJ-BWB-DGG-XX-DR-D-0500	S2	P03

APPENDIX 10: SuDS O&M Manual

1.0 Introduction

1.1. The proposed drainage system for Kingsway Business Park Plot J2 adopts a series of drainage features to collect and convey storm water discharge. It is important that the site owner maintains the drainage to ensure that the drainage system elements operate effectively for their lifetime.

1.2. This site drainage strategy will be incorporated within the Operation and Maintenance (O&M) manual for the site and be accessible to those who undertake maintenance. This document should be read in conjunction with the drainage system drawings.

2.0 Overview of Maintenance

2.1. All drainage systems, whether piped systems or SuDS systems require regular maintenance. The maintenance of the drainage system at Kingsway Business Park Plot J2 should be included alongside other regular maintenance tasks. The table below gives an overview of typical maintenance tasks and the frequency with which they need to be undertaken.

Activity	Indicative Frequency	Typical Tasks
Routine / regular maintenance	Monthly to annually (for normal care of SuDS)	Litter picking Inspections
Occasional maintenance	Annually (dependent on the design)	Sediment removal Vegetation management
Remedial maintenance	As required (tasks to repair problems due to damage or vandalism)	Inlet/outlet repair Erosion repairs Reinstatement works Reinstatement following pollution Removal of silt build up
Unplanned incidents	As required as reactive measures for unforeseen accidents/spillages	

2.2. The below table lists the drainage features present on the Kingsway Business Park Plot J2 site and provides a description of their function and design criteria.

Component	Function
Channel Drains	Channel drains are located at low points on the hardstanding external to collect surface water run-off and connect into the underground drainage system. A silt trap is located at the outfall of the channel drain to collect silt and debris prior to entering the underground surface water drainage system.
Gullies	Gullies are located at low points on the hardstanding external to collect surface water run-off and connect into the underground drainage system. A silt trap is located the base of the gully to collect silt and debris prior to entering the underground surface water drainage system.
Filter Drains	A stone filled trench with a perforated pipe at the bottom which collects, cleans and stores runoff before conveying the water to the downstream drainage system.
Geocellular Attenuation Tank	A modular cellular below-ground voided structure wrapped in an impermeable membrane, to prevent water seeping into the surrounding ground, which attenuates surface water flow prior to discharge from the site.
Vortex Control	A self-activating device that regulates the flow of water through the device depending on the height of the water above the opening (hydraulic head) by creating a swirling vortex flow which restrict discharge rates from the site.

2.3. The required maintenance for each of the drainage components that make up the drainage system is scheduled below.

3.0 Maintenance Guidance

3.1. The following maintenance guidance for the drainage system at Kingsway Business Park Plot J2 is based on CIRIA C753 – The SuDS Manual. These O&M requirements are to be continually monitored by the body responsible for the operation and maintenance of below ground drainage and SuDS features and modified as necessary to suit requirements of the site once operational.

3.2. All inspections should comply with all relevant Health and Safety legislation (Health and Safety at Work Regulations, 1999) including the development of risk assessments for working close to or in water.

3.3. Sediment testing may be required before sediment excavation to determine its classification and appropriate disposal methods. In the majority of cases, it will be acceptable to distribute the sediment on site if there is an appropriate safe and acceptable location to do so.

4.0 Channel Drains

4.1. Maintenance requirements for channel drains are given in the below Table.

Maintenance Activity	Action Required	Frequency
Regular Maintenance	Litter and debris removal	Monthly
	Check channel grating is secure and undamaged	Monthly
	Strim vegetation 1m min. Surround to channel drains and keep areas free from silt and debris	Monthly (during growing season)
	Undertake inspection of channel drains after leaf fall in autumn	As required
Occasional maintenance	Repair physical damage if necessary	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required
Monitoring	Inspect structures for evidence of poor operation.	Monthly/after large storms
	Inspect silt accumulation rates and establish appropriate removal, frequencies.	Half yearly
Incident remediation	Flush up and downstream drainage system, remove contaminated water with tanker	After spillage event

5.0 Gullies

5.1. Maintenance requirements for gullies are given in the below Table.

Maintenance Activity	Action Required	Frequency
Regular Maintenance	Litter and debris removal	Monthly
	Strim vegetation 1m min. Surround to gullies and keep areas free from silt and debris	Monthly (during growing season)
	Undertake inspection of gullies after leaf fall in autumn	As required
Occasional maintenance	Repair physical damage if necessary	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required
Monitoring	Inspect structures for evidence of poor operation.	Monthly/after large storms
	Inspect silt accumulation rates and establish appropriate removal, frequencies.	Half yearly
Incident remediation	Flush up and downstream drainage system, remove contaminated water with tanker	After spillage event

6.0 Filter Drains

6.1. Maintenance requirements for filter drains are given in the below Table.

Maintenance Activity	Action Required	Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Remove weeds on trench surface	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
	Removal and washing of exposed stones on the trench surface	Bi-annually or when silts is evident on surface
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required
Remedial maintenance	Clear perforated pipework blockages.	As Required
	Rehabilitate infiltration and filtration surfaces.	As Required
	Replace	As Required
	Replace geotextiles and clean and replace filter media, if clogging occurs.	As Required
Monitoring	Inspect pre-treatment systems, inlets, trench surfaces and perforated pipework for silt accumulation. Establish appropriate silt removal frequencies	Half Yearly
Incident remediation	Remove surface geotextile and replace, and wash or replace overlying filter medium	After spillage event
	Flush up and downstream drainage system, remove contaminated water with tanker	After spillage event

7.0 Geocellular Attenuation Tanks

7.1. Maintenance requirements for the geocellular attenuation tanks are given in the below Table.

Maintenance Activity	Action Required	Frequency
Regular Maintenance	Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage	Annually, after major storm event, or as required
	Remove debris from the catchment surface (where it may cause risks to performance)	Annually, after major storm event, or as required
	Remove sediment from pre-treatment structures and/or internal forebays	As required
Remedial maintenance	Repair physical damage if necessary	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Monthly/after large storms
	Survey inside of tank for sediment build-up and remove if necessary.	Half yearly
Incident remediation	Flush up and downstream drainage system, remove contaminated water with tanker	After spillage event
	Flush up and downstream drainage system, remove contaminated water with tanker	After spillage event

8.0 Control Chambers

8.1. Maintenance requirements for control chambers (vortex control and orifice) are given in the below Table.

Maintenance Activity	Action Required	Frequency
Regular Maintenance	Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage	Annually, after major storm event, or as required
	Remove control manhole cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt	Annually, after major storm event, or as required
	Undertake inspection of control chamber after leaf fall in autumn	As required
Occasional maintenance	Repair physical damage if necessary	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required
Monitoring	Inspect structures for evidence of poor operation.	Monthly/after large storms
	Inspect silt accumulation rates and establish appropriate removal, frequencies.	Half yearly
	Check flow control device is functioning and that the emergency drain down mechanism is working.	Half yearly
Incident remediation	Flush up and downstream drainage system, remove contaminated water with tanker	After spillage event
	Flush up and downstream drainage system, remove contaminated water with tanker	After spillage event

9.0 Flood Routes

9.1. Flood routes (exceedance routes) allow water volumes that exceed the capacity of the drainage system to pass through or round the site without causing damage to property. These routes must be clear of obstructions at all times.

9.2. Maintenance requirements for flood routes are given in the below table.

Maintenance Activity	Action Required	Frequency
Regular maintenance	Make visual inspection. Check route is not blocked by new fences, walls, soil or other rubbish. Remove as necessary	Monthly/after large storms

10.0 Proprietary Devices

10.1. Maintenance and inspection of proprietary devices, such as oil separators & pumping stations, should follow the advice provided by the manufacturer or supplier and should be included on the maintenance schedule for the site.

10.2. All proprietary devices should be checked during the first year of operation to make sure they are appropriate for the operation

11.0 Spillage - Emergency Action

11.1. Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore small spillages of oil or other known organic substances should be removed where possible using soak mats as recommended by the Environment Agency with residual spillage allowed to bio-remediate in the drainage system.

11.2. In the event of a serious spillage, either by volume or of unknown or toxic compounds, the spillage should be isolated with soil, turf or fabric and the penstocks located in the manholes up and downstream of the ponds should be closed. If the spillage occurs upstream of the ponds outlet pipes from manhole chamber(s) downstream of the spillage should be blocked with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or close woven fabric.)

11.3. During a major spillage the Environment Agency should be contacted immediately

APPENDIX 11: North West SuDS Proforma

NORTH WEST SuDS PRO-FORMA TEMPLATE

Document Change Log		
Version	**Date Agreed**	**Changes made**
Version 1	April 2020	Initial version issued
Version 2	July 2020	• Page 1 – 'Guidance to support you' section – word 'approved' changed to 'appropriate' • Section 5 – Box 4 'Evidence Required' - word 'approved' changed to 'appropriate' • Section 5 – Box 9 'Summarise how storage will be provided for 1 in 100 year (plus climate change) event on site' - word 'approved' changed to 'appropriate'
Version 3	August 2020	• Front sheet and Document Change Log added • Page 1 – Para 1 Footnote – words 'of 0.5 hectares' removed
Version 4	July 2021	• Front page amended and branding removed. • Section 1 - Previously Developed/ Brownfield Site – words *'then one of the approaches outlined in Section 24.5 of The SuDS Manual (C753) should be adopted'* removed. • Section 7b – Hierarchy Level 2 – Note wording amended from '*Where third party land is cited as a barrier, you should provide visibility of discussions held to date with the riparian landowner of the waterbody*' to '*Where discharge of any element in the hierarchy is discounted, an applicant should provide justification. If the reasoning for discounting a discharge of surface water to watercourse relates to issues associated with third party land or the securing of any other required consent, it may be necessary for the applicant to provide evidence to the local planning authority to support their proposed approach'*
Version 5	May 2022	• Pro-forma guidance updated to take account of the new climate change allowances published on 10 May 2022. There is no change to the pro-forma itself.

Website: **The Flood Hub**

This website is an online resource which has been funded by the North West Regional Flood and Coastal Committee as a one stop shop for flood advice and information across the North West.

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[PLEASE ADD LOCAL AUTHORITY LOGO TO THIS PAGE]

[*LOCAL AUTHORITY*]
SuDS PRO-FORMA

This Pro-forma is endorsed by the North West Regional Flood and Coastal Committee, including representatives from Lead Local Flood Authorities, Highway Authorities, United Utilities and the Environment Agency

[Amend as appropriate]

Version 5: May 2022

NORTH WEST SuDS PRO-FORMA

This pro-forma is a requirement for any planning application for major development[1].

It supports applicants in summarising and confirming how surface water from a development will be managed sustainably under current and future conditions.

Your sustainable drainage system should be designed in accordance with **CIRIA The SuDS Manual C753** and any necessary adoption standards.

HOW TO COMPLETE

Blue Box	Instruction/ Question
Orange Box	Evidence Required
White Box	To be completed by Developer / Consultant

1. Complete ALL white boxes
2. Submit this pro-forma to the Local Planning Authority, along with:
- Sustainable Drainage Strategy
- Site Specific Flood Risk Assessment (if required)
- Minimum supporting evidence, as indicated in orange boxes of this pro-forma.

GUIDANCE TO SUPPORT YOU

The pro-forma should be completed in conjunction with 'Completing your SuDS Pro Forma Guide.'

The pro-forma can be completed using freely available tools such as **Tools for Sustainable Drainage Systems** or appropriate industry standard surface water management design software.

[1] *as defined in Section 2 of **Statutory Instrument 2015 No. 595** or on sites in Critical Drainage Areas.*

SECTION 1. APPLICATION & DEVELOPMENT DETAILS

Planning Application Reference *(if available)*	
State type of planning application *i.e. Pre-application, Outline, Full, Hybrid, Reserved Matters** **Information only required if drainage is to be considered as part of reserved matters application*	Full
Developer(s) Name:	Wilson Bowden Developments Ltd
Consultant(s) Name:	BWB Consulting
Development Address *(including postcode)*	Kingsway Business Park, Rochdale, OL16 4NR
Development Grid Reference *(Eastings/Northings)*	391300, 411400
Total Development Site Area (Ha)	5.43ha (approx)
Drained Area (Ha)* of Development	3.504ha
Please indicate the flood zone that your development is in. Tick all that apply. *Based on the Environment Agency Flood Map for Planning and the relevant Local Authority Strategic Flood Risk Assessment (to identify Flood Zones 3a/3b).*	Flood Zone 1 ☒ Flood Zone 2 ☐ Flood Zone 3a ☐ Flood Zone 3b ☐
What is the surface water risk of the site? Tick all that apply. *Based on the Environment Agency Surface Water Flood Map.*	High ☒ Medium ☒ Low ☒
Have you submitted a Site Specific Flood Risk Assessment (FRA)? *See separate guidance notes for clarification on when a FRA is required*	Yes ☒ No ☐
Have you submitted a Sustainable Drainage Strategy?	Yes ☒ No ☐
Does your drainage proposal provide multi-functional benefits via SuDS?	Yes ☒ No ☐
Expected Lifetime of Development *(years)* *Refer to Planning Practice Guidance "Flood Risk and Coastal Change" Paragraph 026*	60

Development Type:		**State Proposed Number of Units**
Greenfield Site • *Site is wholly undeveloped, and a new drainage system will be installed*	☒	2
Previously Developed/ Brownfield Site • *Site is already developed, and the entirety of the existing surface water drainage system will be used to serve the new development (evidence must be provided to prove existing surface water drainage system is reusable);* ***OR*** • *Where records of the previously developed system are not available so that the hydraulic characteristics of the system cannot be determined or where the drainage system is not in reasonable working order i.e. broken, blocked or no longer operational for other reasons.*	☐	

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 1.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS KPJ-BWB-ZZ-XX-RP-YE-0001_FRA

SECTION 2: IMPERMEABLE AREA AND EXISTING DRAINAGE

	Existing (E)	Proposed (P)	Change (P – E)
State Impermeable Area (Ha)	0	3.504	3.504
Evidence Required: Plans showing development layout of site with existing and proposed impermeable areas.			☒

Are there existing sewers, watercourses, water bodies, highway drains, soakaways or filter drains on the site?	Yes ☐ No ☒ Don't Know ☐
Evidence Required: Plan(s) showing existing layout to include all: • Watercourses, open and culverted • Water bodies – ponds, swales etc. • Sewers, including manholes • Highway drains, include manholes, gullies etc. • Infiltration features - soakaways, filter drains etc.	There is watercourse beyond the eastern boundary and an extensive network of UU sewers serving the existing business park

Drainage Design *Outline planning applications should be able to demonstrate that a suitable drainage system is achievable.* *All other type of planning application should provide full details or reference to previous planning application where drainage details have been submitted or approved.*	
Select which design approach you are taking to manage water quantity *(refer to Section 3.3 SuDS Manual)* **Approach 1 – Volume control / Long Term Storage (Technical Standards S2/3, S4/5)** • *The attenuated runoff volume for the 1 in 100 year 6 hour event (plus climate change allowance) is limited to the greenfield runoff volume for the 1 in 100 year 6 hour event, with any additional runoff volume utilising long term storage and either infiltrated or released at 2 l/s/ha* • *The discharge rate for the critical duration 1 in 1 year event is restricted to the 1 in 1 year greenfield runoff rate* • *The discharge rate for the critical duration 1 in 100 year event (plus climate change allowance) is restricted to the 1 in 100 year greenfield runoff rate* **Approach 2 – Qbar (Technical Standards S6)** • *Justification has been provided that the provision of volume control/long term storage is not appropriate and an attenuation only approach is proposed. All events up to the critical duration 1 in 100 year event (plus climate change allowance) are limited to Qbar (1 in 2 year greenfield rate) or 2 l/s/ha, whichever is greater.*	☐ ☒
Evidence Required: Plans showing: • Existing flow routes and flood risks • Modified flow routes • Contributing and impermeable areas • Current (if any) and proposed 'source control' and 'management train' locations of sustainable drainage components (C753 Chapter 7) • Details of drainage ownership • Details of exceedance routes (Technical Standards S9) • Topographic survey • Locations and number of existing and proposed discharge points	☒

Note consideration should be given to manage surface water from both impermeable and permeable surfaces (including gardens and verges) likely to enter the drainage system.	

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 2.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

SECTION 3: PEAK RUNOFF RATES – TECHNICAL STANDARDS S2, S3 AND S6 (UNLESS S1 APPLIES)

Rainfall Event	Existing Rate (l/s)	Greenfield Rate (l/s)	Proposed Rate (l/s) *Previously developed sites - In line with S3 should be equivalent to Greenfield runoff rates – discuss with LLFA if this is not achievable pre-application*
Qbar *(Approach 2)*	Proposed flow rates have been set to discharge at the 1 in 100yr event in line within the wider strategy.	2.5	-
1 in 1 Year Event *(Approach 1)*	Downstream controls restrict the entire development to the equivalent greenfield rates on a catchment basis.	2.1	320.4
1 in 30 Year Event		4.2	(+40% cc) 684.6
1 in 100 Year Event* *(Approach 1)*		5.1	(+45% cc) 792.0
** Total discharge at the 1 in 100 year rate should be restricted to the greenfield runoff volume for the 1 in 100 Year 6 hour event with additional volumes (long-term storage volume) released at a rate no greater than 2 l/s/ha where infiltration is not possible. The climate change allowance should only be applied to the proposed rate and not the existing or greenfield rate.*			

Evidence Required: Methodology used to calculate peak runoff rate clearly stated and justified. Impermeable areas plan, supported by topographical survey confirming positive drainage. Hydraulic calculations and details of software used.	☒ ☒ ☒

State the hydraulic method used in your calculations *(Refer to Table 24.1 of The SuDS Manual)*	IH124

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 3.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

SECTION 4: DISCHARGE VOLUME – TECHNICAL STANDARDS S4, S5 AND S6 (UNLESS S1 APPLIES)

Rainfall Event	Existing Volume (m^3)	Greenfield Volume (m^3)	Proposed Volume (m^3)
1 in 100 Year 6 Hour Event *(Approach 1)*		351	2,419
Does the below statement apply to your development proposal? Long term storage is not achievable on this site and, in accordance with S6 of the Non Statutory Technical Standards for SuDS, the surface water discharge rates for events up to and including the 1 in 100 year critical event are limited to Qbar (Approach 2)			Yes ☒ No ☐
Evidence Required: Approach to managing the quantity of surface water leaving the site clearly stated and justified			☒
Methodology used to calculate discharge volume clearly stated and justified.			☒
Hydraulic calculations and details of software used.			☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 4.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

SECTION 5: STORAGE – TECHNICAL STANDARDS S7 AND S8

State climate change allowance used (%)	45
State housing density (houses per ha)	N/A
State urban creep allowance used (%)	N/A
Evidence Required: State / used in appropriate industry standard surface water management design software.	☒

State storage volume required (m^3) *(excluding non-void spaces)* *Must include an allowance for climate change and urban creep*	100m3 plus oversized pipes and manholes to provide additional storage
Have you incorporated interception into your design? *(Refer to Chapter 24 of The SuDS Manual C753)* *Where possible, infiltration or other techniques are to be used to try and achieve zero discharge to receiving waters for rainfall depths up to 5mm.*	Yes ☐ No ☒
Evidence Required: Drainage plans showing location of attenuation and all flow control devices and supporting calculations.	☒

Summarise how storage will be provided for 1 in 30 year event on site. *Storage must be designed to ensure that at no flooding occurs onsite in a 1 in 30 year event except in designed areas* ***and*** *no flooding occurs offsite in a 1 in 100 year (plus climate change allowance) event.*	Sufficient storage is provided within the pipes and manholes provided as part of the network
Summarise how storage will be provided for 1 in 100 year (plus climate change) event on site. *Where storage above the 1 in 30 year rainfall event is provided in designated areas designed to accommodate excess surface water volumes, plans showing storage locations and surface water depths and supported by calculations used in appropriate industry standard surface water management design software. It is important to run a range of duration events to ensure the worst case condition is found for each drainage element on the site*	Sufficient storage is provided within the pipes and manholes provided as part of the network. Unit J1 also incorporates a below ground attenuation tank of 100m3
Evidence Required: Plans showing size and location of storage and supporting calculations. Where there is controlled flooding, extents and depths must be indicated.	☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 5.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

SECTION 6: WATER QUALITY PROTECTION

Contaminated surface water run-off can have negative impacts on the quality of receiving water bodies. The potential level of contamination will influence final the design of an appropriate treatment train as part of your sustainable drainage system.

Is the proposal site known to be or potentially contaminated?	Yes ☐ No ☒
• *If the site is contaminated, it should be demonstrated that the sustainable drainage system will not increase the risk of pollution to controlled waters though the mobilisation of contaminants and/or creation of new pollution pathways.*	

Confirm the *Pollution Hazard Level* of the proposed development - Tick ALL that apply *Refer to Pollution Hazard Indices for different Land Use Classifications in Table 26.2 of The SuDS Manual C753 for further guidance.*		
Pollution Hazard Level *Tick ALL that apply*		**Surface water run-off from the proposed development will drain from:**
VERY LOW	☐	• Residential roofs
LOW	☒	• Other roofs (typically commercial/industrial roofs) • Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, home-zones and general access roads) • Non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day
MEDIUM	☒	• Commercial yard and delivery areas • Non-residential car parking with frequent change (e.g. hospitals, retail) • All roads except low traffic roads and trunk roads/motorways[2]
HIGH	☐	• Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites) • Sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured • Industrial sites • Trunk roads and motorways[1]

If the development's Pollution Hazard Level is 'Very Low' or 'Low', has the sustainable drainage design been risk assessed and appropriate mitigation measures included?	Yes ☒ No ☐
• *If the proposed development has a very low or low polluting potential, you should design your sustainable drainage system to include an appropriate treatment train in accordance with The SuDS Manual (C753).*	

If the development's Pollution Hazard Level is 'Medium' or 'High', is the application supported by a detailed water quality risk assessment?	Yes ☒ No ☐
• *If the proposed development has a high polluting potential, a detailed risk assessment will be required to identify an appropriate SuDS treatment train and ensure compliance with Paragraph 170 of the National Planning Policy Framework.* • *If the proposed development has a medium polluting potential, a detailed risk assessment may be required depending on the nature, scale and location of the development.*	

Has pre-application advice on water quality been obtained from the Environment Agency?	Yes ☐ No ☒
If YES, provide details:	

[2] Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 6.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

SECTION 7: DETAILS OF YOUR SUSTAINABLE DRAINAGE SYSTEM

a) Function of your Sustainable Drainage System

Do your proposals store rainwater for later use (as a resource)?	Yes ☐ No ☒
Evidence Required: Please provide a brief sentence in the adjacent white box to describe how this function has been achieved.	

Do your proposals promote source control to manage rainfall close to where it falls? (e.g. promoting natural losses through soakage, infiltration and evapotranspiration)	Yes ☒ No ☐
Evidence Required: Please provide a brief sentence in the adjacent white box to describe how this function has been achieved.	On-plot attenuation is provided before water discharges to the downstream network which provides further attenuation at the existing ponds

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7a.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

b) Hierarchy of Drainage Options – Planning Practice Guidance

The proposed method of discharge are set out within order of priority. Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

Proposed method of surface water discharge	**Is this proposed?**
Hierarchy Level 1: Into the ground (via infiltration)	Yes ☐ No ☒

If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☐	**A.** Completed Infiltration Checklist from The SuDS Manual (C753) Appendix B *An editable version of this form is available on SusDrain website.*	☒	A. Site investigation to demonstrate that the ground is not free draining. Test results to be provided in accordance with: • The methodology within BRE 365 (2016), ***OR*** • Falling head permeability tests BS EN ISO 22282-2: 2012
☐	**B.** British Geological Survey (BGS) Infiltration SuDS Map	☒	B. NOTE: where an applicant is unable to access a site to undertake testing, e.g. where unable to access a site for an outline application, they can submit a *SuDS GeoReport or similar.*
☐	**C.** Infiltration testing to BRE 365 (2016) or falling head permeability tests to BS EN ISO 2228-2: 2012 ***(optional for outline)***	☒	C. Evidence to confirm that infiltration to ground would result in a risk of deterioration to ground water quality.
☐	'Plan B' sustainable drainage plan and statement of approach with an alternative discharge method, in case infiltration proposals are proven not feasible upon	☒	D. Geotechnical advice from a competent person* which determines that infiltration of water to ground would pose an unacceptable risk of geohazards to the site and/or local area.

	further site specific ground investigation e.g. to consider seasonal variations to groundwater.		**Note: Competent person may include a Chartered Engineer, Chartered Geologists, Registered Ground Engineering Professionals (RoGEP).*

Proposed method of surface water discharge		**Is this proposed?**	
Hierarchy Level 2: To a surface water body *(select type)* ***NOTE:*** *Consent from LLFA or Permit from Environment Agency may be required – refer to guidance*		Yes ☐ No ☒ N/A ☐ ☐ Main river ☐ Canal ☐ Ordinary watercourse ☐ Other water body	
If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☐	Surface water body / watercourse survey and report	☒ ☒	Plan showing nearby watercourses and waterbodies **AND** Statement providing justification in your Sustainable Drainage Strategy ***Note:*** *Where discharge of any element in the hierarchy is discounted, an applicant should provide justification. If the reasoning for discounting a discharge of surface water to watercourse relates to issues associated with third party land or the securing of any other required consent, it may be necessary for the applicant to provide evidence to the local planning authority to support their proposed approach.*

Proposed method of surface water discharge		**Is this proposed?**	
Hierarchy Level 3: To a surface water sewer or highway drain *(select type)*		Yes ☒ No ☐ N/A ☐ ☒ Surface water sewer ☐ Highway drain	
If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☒	Written correspondence from Water and Sewerage Company/ Highway Authority regarding proposed connection.	☐ ☐	Plan showing nearby sewers and highway drains **AND** Statement providing justification in your Sustainable Drainage Strategy

Proposed method of surface water discharge		**Is this proposed?**
Hierarchy Level 4: To combined sewer		Yes ☐ No ☐ N/A ☒
If YES - Evidence Required		**If NO – Evidence Required**
☐	Written correspondence from Water and Sewerage Company	N/A

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7b.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

c) Proposed SuDS Component Types

	Tick ALL that apply				
Within property boundary	☐ Rainwater harvesting	☐ Green/ blue roofs	☐ Pervious pavements *[**Type:** A ☐ B ☐ C ☐]*	☐ Soakaway	☐ Bio retention systems

	Tick ALL that apply				
Within development site boundary *(not property)*	☐ Infiltration system *[**Type:** ☐ Surface level ☐ Below ground]*		☐ Filter strips	☒ Filter drains	☐ Swales
	☐ Bio retention system	☐ Detention basins	☐ Ponds and wetlands	☒ Attenuation tanks/ Oversized pipes	☒ Other (state below)
	If 'Other' please state: Due to the nature of the development a number of seperators are proposed to treat flows leaving the higher risk areas.				

Off site *(not within the boundary of the proposed development)*	***Please state:*** Further treatment, flow & volume control is provided by the downstream attenuation ponds prior to discharge into the wider catchment

I confirm that the above selected components have been designed in accordance with The SuDS Manual (C753).	I confirm ☒
I confirm that the management of flows resulting from rainfall in excess of a 1 in 100 year plus climate change rainfall event, and their exceedance route(s), has been fully considered in order to minimise the risks to people, property (new and existing) and infrastructure.	I confirm ☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7c.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

SECTION 8: OPERATION AND MAINTENANCE – TECHNICAL STANDARD S12 AND NATIONAL PLANNING POLICY FRAMEWORK

The applicant is responsible to ensure that ALL components selected in Section 7 can be maintained for the design life of the development. This information is required so the Local Planning Authority can ensure the maintenance and management of the sustainable drainage system. The Local Planning Authority will discuss how this will be secured (e.g. via planning condition or planning obligation).

	Information Provided?
Management Plan	Yes ☒ No ☐
Evidence Required: **Plan/ drawing provided to show the position of the different SuDS components with:** • Key included to identify any of the adopting bodies that you will be offering your sustainable drainage components for adoption *(relates to maintenance and management arrangements below).* • Plan/ drawing to identify any areas where certain activities are prohibited, detailing reasons why. **Action plan for accidental pollutant spillages.**	Refer to drainage drawing ☐ ☐

	Information Provided?
Maintenance Schedule	Yes ☒ No ☐
Evidence Required: A copy of the maintenance schedule including: 1. **Proactive and preventative maintenance** Detailing regular, occasional and remedial maintenance activities including recommendations for inspection and monitoring. This should include recommended frequencies, advice on plant/ machinery required and an explanation of the objectives for the maintenance proposed and potential implications of not meeting them. 2. **Reactive and corrective maintenance** (e.g. product repair and replacement). Including advice on excavations, or similar works, in locations that could affect the SuDS components/ adjacent structures.	☐

	Information Provided?
Maintenance and Management Arrangements	Yes ☒ No ☐
Evidence Required: Evidence of formal agreement with the party responsible for undertaking maintenance. Please select any of the adopting bodies that you will be offering your sustainable drainage components for adoption. Tick all that apply. ☐ **Water and Sewerage Company** *Section 104 agreement (Water Industry Act 1991)* ☐ **Highway Authority** *Section 278/38 agreement (Highways Act 1980)* ☐ **Local Authority Public Open Space** *[Refer to Local Authority Policy]* Please select the arrangement(s) for all non-adopted sustainable drainage components. Tick all that apply. ☒ **Management Company** ☒ **Property Owner** *(for SuDS components within property boundary only)* ☐ **Other** (please state)	☐ Formal arrangements to be finalised prior to occupation

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 8.	KPJ-BWB-ZZ-XX-RP-CD-0001_SDS

DECLARATION AND SUBMISSION

This pro-forma has been completed using evidence from information which has been submitted with the planning application.

The information submitted in the Sustainable Drainage Strategy and site-specific Flood Risk Assessment (FRA), where submitted, is proportionate to the site conditions, flood risks and magnitude of development and I agree that this information can be used as evidence to this sustainable drainage approach.

Submitter Details			
Completed by	Rowan Jobling	**Email Address**	rowan.jobling@bwbconsulting.com
		Telephone Number(s)	
Signed off by		**Accreditation(s) and/or Qualification(s) of Signatory**	BEng (Hons)
Date *(dd/mm/yyyy)*	14/08/22	**Company**	BWB Consulting

Client Details			
Name		**Company**	Wilson Bowden Developments Ltd

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