Plot H4, Indurent
Heywood Distribution Park,
OL10 2TR

Flood Risk Assessment & Drainage Strategy

for

Ref: 30042-BGL-XX-XX-RP-D-00001

Version 6
June 2025

DOCUMENT CONTROL SHEET

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5	27.05.2025	Updated to suit latest masterplan
6	16.06.2025	Amended to suit Planning Prospects comments

Burrows Graham Limited has prepared this report in accordance with the instructions of the above-named Client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

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1.0 – EXECUTIVE SUMMARY

This updated Flood Risk Assessment and Drainage Strategy has been developed in due cognisance of all relevant available policy information.

This report relates to Plot H4 of Heywood Distribution Park in Heywood, Rochdale. It has been prepared to discharge the requirements of conditions 8 and 9 of the outline planning permission reference 24/00805/OUT and reflects the proposed reserved matters scheme which comprises an employment unit with parking and service yard, open storage area, access, landscaping and associated infrastructure.

For clarity, this report is intended to support the approval of detail applications for the following conditions:

Condition 8 - *Prior to the commencement of development within any phase, details of a sustainable surface water drainage scheme and a foul water drainage scheme for that phase, in accordance with the principles set out in the submitted Flood Risk Assessment & Drainage Strategy reference 30042-BGL-XX-XX-RP-D-00001 Version 4 shall be submitted to and approved in writing by the Local Planning Authority. The drainage schemes must include:*

(i) An investigation of the hierarchy of drainage options in the National Planning Practice Guidance (or any subsequent amendment thereof).
(ii) A restricted rate of discharge of surface water agreed with the Local Planning Authority (if it is agreed that infiltration is discounted by the investigations);
(iii) Levels of the proposed drainage systems including proposed ground and finished floor levels in AOD;
(iv) Mitigation measures to manage the risk of sewer surcharge where applicable; and
(v) Foul and surface water which drain on separate systems. The approved schemes shall also be in accordance with the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards.
Prior to occupation of any phase the proposed development, the drainage schemes shall be completed in accordance with the approved details for that phase and retained thereafter for the lifetime of the development.

Condition 9 - *Prior to occupation of any phase of the development, a sustainable drainage management and maintenance plan for that phase shall be submitted to the Local Planning Authority and approved in writing.*
(i)The sustainable drainage management and maintenance plan shall include as a minimum:
Arrangements for adoption by an appropriate public body or statutory undertaker, or, management and maintenance by a management company; and
(ii) Arrangements for inspection and ongoing maintenance of all elements of the sustainable drainage system to secure the operation of the surface water drainage scheme throughout its lifetime.
The sustainable drainage system provided as part of each phase of the development shall subsequently be maintained and managed in accordance with the approved plan for that phase for the lifetime of the development.

Requirements summary

Planning Conditions **Ref.** 24/00805/OUT	**Summary**
Condition 8	(i) The drainage hierarchy has been considered. Infiltration is not suitable due to the ground conditions therefore the next appropriate means of discharge is into a watercourse via the existing sitewide surface water network which conveys flows towards Brightley Brook . Refer to section 5.1 (Disposal of surface water) for further details

	(ii) The surface water discharge has been restricted to a rate of 131.2 l/s. Refer to section 5.6 (Discharge rates) for further details. (iii) Level information is presented on drainage layout drawing ref. 30042-BGL-XX-XX-DR-C-00250. Refer to appendix D (Drainage layout) for further details. (iv) Hydraulic calculations, included in appendix E, show that the proposed drainage has been designed with no exceedance for storms up to and including 1:100-year events. For the unlikely event that exceedance emerges, due to blockage, damage etc. exceedance will be held and contained in the low-lying areas of the site such as the loading docks. Refer to section 7.2 (Drainage and exceedance flow routes) for further details. (v) Foul and surface water drainage has been designed on separate systems and in accordance with all relevant standards.
Condition 9	Reference should be made to the Drainage Inspection and Maintenance Schedule in Appendix F, which includes required actions and typical frequencies for all drainage infrastructure serving the development. The drainage will be managed and maintained by an appointed Management Company.

- The United Utilities Public Sewer Records, which have been included in Appendix C of this report, show there to be no public sewers within the site.
- Reference should be made to the following JPG reports.

Geoenvironmental Desk Study Report 5986-JPG-XX-XX-RP-G-060-S2-P03 dated January 2022

Geoenvironmental Ground Investigation 5986-JPG-XX-XX-RP-G-0605-S2-P03 dated January 2022

- The EA flood maps for planning show the site to be located wholly within flood zone 1.
- The EA Map of long-term flood risk from surface water indicates that the site is at a very low risk from surface water flooding.
- Based on the limited information available, it is considered that the risk of groundwater flooding to the development is low.
- As described in section 2.4 of this report, the majority of the site is underlain by Glacial Till, which is generally unfavourable to infiltration. Therefore, it is considered that soakaway drainage will not be a suitable means of disposing surface water runoff from the developed site.
  In line with the latest guidance, a 45% climate change allowance has been made on the 100-year storm event.
- The maximum runoff rate from the developed site will not exceed 131.2 l/s for all storms up to and including the 1 in 100-year storm plus 45% allowance for climate which is combination of greenfield runoff for the area previously greenfield and a 50% reduction in brownfield runoff for the area currently impermeable.
- It is anticipated that the average foul flow from the development will be 0.9 l/s.
- This Flood Risk Assessment and Drainage Strategy has concluded that the development is appropriate and can be occupied safely subject to implementation of the flood risk mitigation described in this report being carried out.

2.0 - PROJECT BACKGROUND

2.1 - Appointment

Burrows Graham Limited have been commissioned by Client Indurent (referred to the as 'the applicant' hereafter) to undertake an updated flood risk assessment and drainage strategy to discharge the requirements of conditions 8 and 9 of the outline planning permission reference 24/00805/OUT. It reflects the proposed reserved matters scheme for an employment unit with parking and service yard, open storage area, access, landscaping and associated infrastructure on Plot H4 at Heywood Business Park, Moss Hall, Road, Heywood, OL10 2TR.

2.2 - Aim of study

This FRA and Drainage Strategy has been developed in due cognisance of all relevant available policy information. It is anticipated that this report will satisfy the requirements of the National Planning Policy Framework (NPPF) and all relevant flood risk planning policies.

2.3 - Relevant policy and strategy documents

The following documents were reviewed as part of this Flood Risk Assessment:

- Defra Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)
- Environment Agency Climate Change Guidance (February 2016)
- Flood and Water Management Act (April 2010)
- National Planning Policy Framework (Updated December 2023) and Planning Practice Guidance (March 2014)
- Sustainable Drainage Systems Written Statement HCWS161 (December 2014)
- Bury, Rochdale, and Oldham Strategic Flood Risk Assessment (SFRA) Level 2 (October 2020)
- Rochdale Borough Strategy for Flood Risk Management 2014-2024 (March 2014)
- Rochdale Metropolitan Borough Council Preliminary Flood Risk Assessment (PFRA) (May 2011)

2.4 - Proposed development

- Outline planning was granted for the development of land with Use Classes E(g)(iii) (industrial processes), B2 (general industrial), B8 (storage and distribution, data centre), and removal of existing structures, hard standing, and associated works in May 2025 under reference 24/00805/OUT. Pursuant to that permission, an application has been made for the approval of Reserved Matters for an employment unit with parking and service yard, open storage area, access, landscaping and associated infrastructure. This report provides information required by conditions 8 and 9 of the permission and reflects the proposed reserved maters scheme.
- The development can be classified as 'less vulnerable' in accordance with guidance set out on the 'gov.uk' website, namely 'Table 2: Flood vulnerability classification'.

Reference should be made to the 'Site Plan' included in Appendix A, an extract of which is shown below.

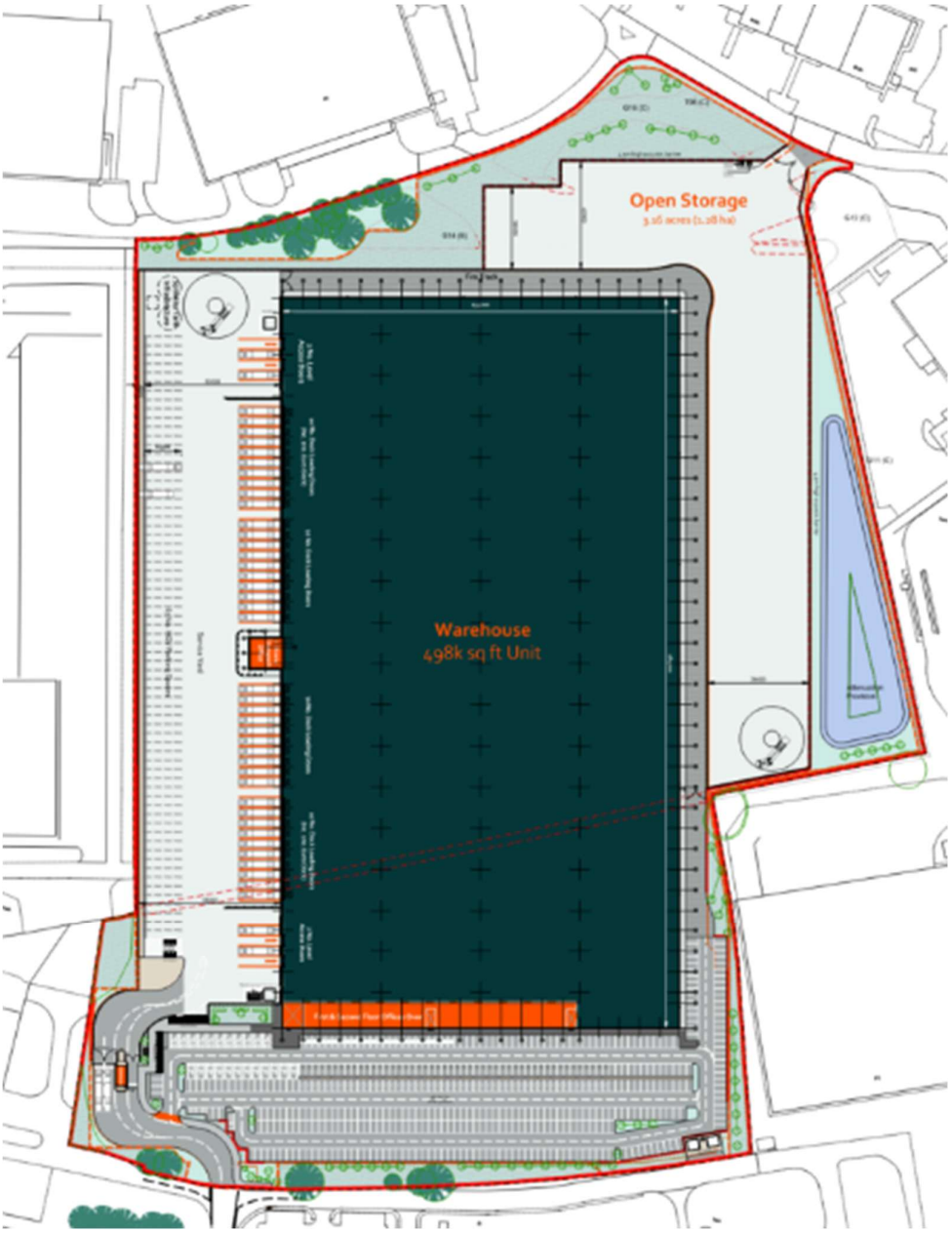


Figure 1 –Site Plan

3.0 - SITE DETAILS

3.1 - Site description

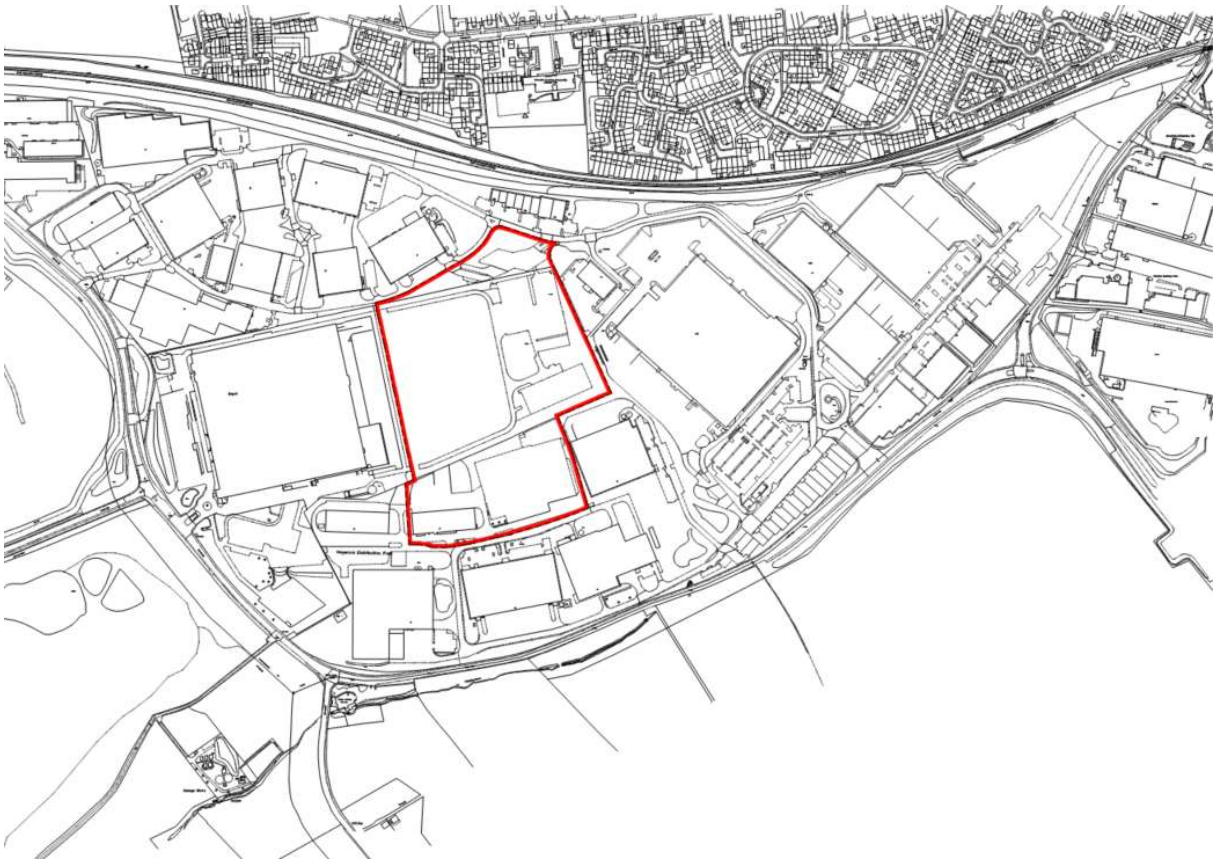


Figure 2 – Site Location Plan

Table 1 - Site characteristics

Site address	Plot H4, Indurent Heywood Distribution Park, Pilsworth Road, Heywood, OL10 2TR
Grid reference	383720, 409367
Area (hectares)	The site boundary has been measured to be 10.69 hectares.
Usage	Up to 47,400 sq m of E(g)(iii), B2 and B8 floor space
Surroundings	Heywood Distribution Park delineates all the boundaries of the site
Topography	Site levels generally fall from the Northwest to the Southeast. They vary between circa 124m at the Northwest to around circa 115m to the Southeast. A copy of the topographical survey has been included in Appendix B of this report.

3.2 - Existing drainage

The United Utilities Public Sewer Records, which have been included in Appendix C of this report, show there to be no public sewers within the site.

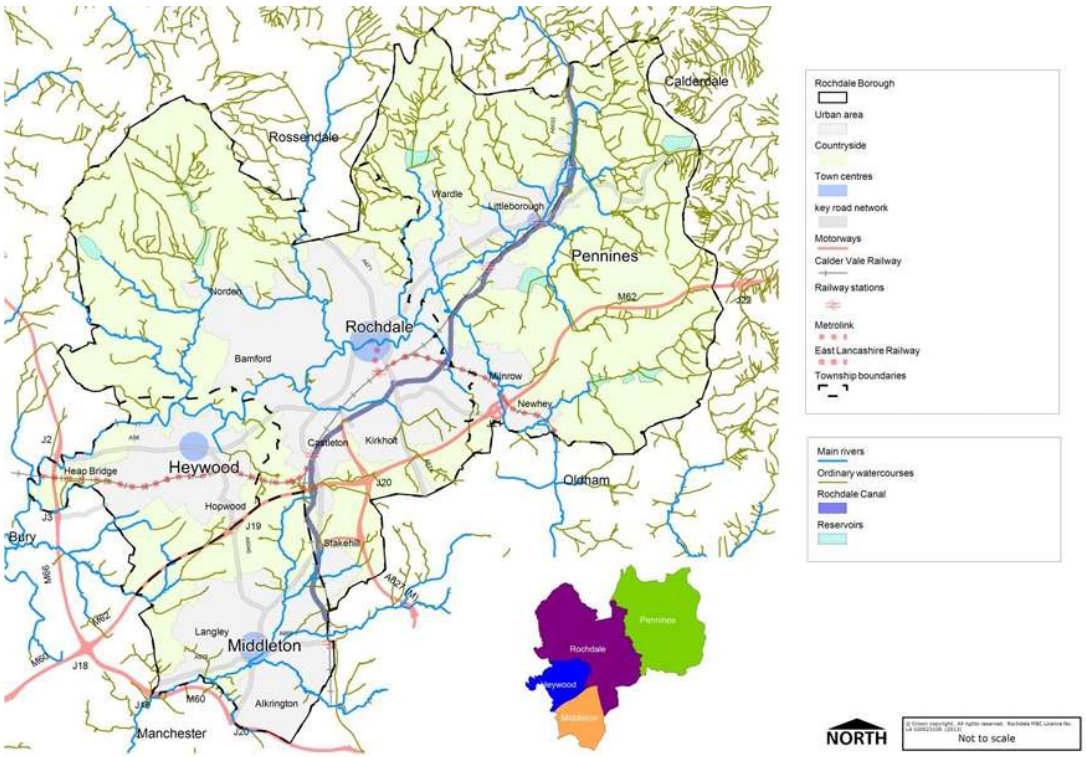


Figure 3 –Rochdale Watercourses Plan

The site is a mix of scrubland and existing landscaping (5.244Ha) and hardstanding (5.446Ha), the hardstanding area currently discharges via a network of sewers through the industrial estate which ultimately discharges via an 825dia pipe under Pilsworth Road to Blighty Brook which is shown on the Rochdale Watercourse Plan on figure 3.

3.3 - Existing watercourses

The nearest watercourse and main river is Blighty Brook which runs to the south of Pilsworth Road.

3.4 - Geology and hydrogeology

Reference should be made to the following JPG reports.

- Geoenvironmental Desk Study Report 5986-JPG-XX-XX-RP-G-060-S2-P03 dated January 2022
- Geoenvironmental Ground Investigation 5986-JPG-XX-XX-RP-G-0605-S2-P03 dated January 2022

- The key findings are Made Ground: Variable across the site with thickness between 0.20m and greater than 2.88m

- Glacial Till: Slightly sandy, slightly gravelly clay base between 2.40m bgl and 12.50m bgl. Generally firm, becoming stiff and very stiff with depth, however, some softer material within the upper 3m within central part of the site.
- Bedrock: Extremely weak to very weak mudstone and sandstone.
- In the Southeast of the site, at 0.55m to 0.90m thick coal seam at depths 1.90m bgl and 2.00m bgl

4.0 – FLOOD RISK STATEMENT

4.1 - Fluvial flood risk

The National Planning Policy Framework (NPPF) categorises flood risk as follows:

- Zone 1 (low probability) – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%);
- Zone 2 (medium probability) – Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year; and
- Zone 3a (high probability) - Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b The Functional Floodplain - This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the EA. (Not separately distinguished from Zone 3a on the Flood Map).

The EA flood maps for planning show that most of the site to be located within flood zone 1.

Figure 4 – EA Flood Map for Planning

Based on the above, the site considered to be at low risk of flooding from rivers or sea.

4.2 - Surface water flooding

The EA descriptions for the High, Medium and Low risk scenarios for surface water flooding are as follows:

- High risk means that each year this area has a chance of flooding of greater than 3.3%.
- Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%.
- Low risk means that each year this area has a chance of flooding of between 0.1% and 1%.
- Very Low risk means that each year this area has a chance of flooding of less than 0.1%.

The EA Map of long-term flood risk from surface water indicates that the site is generally at a very low risk from surface water flooding with some areas that show low to medium risk of surface water flooding. These areas are due to the low-lying existing topography and will be mitigated against through the proposed developments levels and drainage designs.

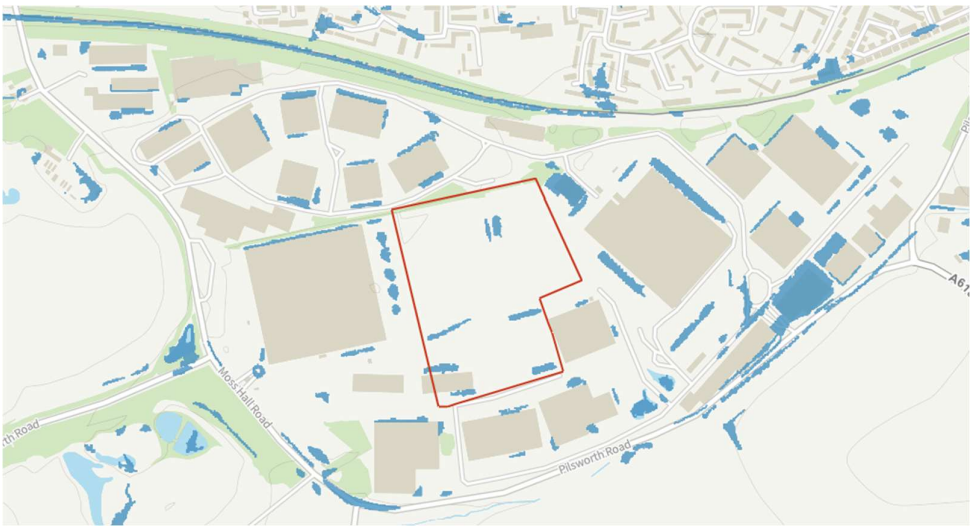


Figure 5 – EA Flood Map for Surface Water

4.3 - Groundwater flood risk

Groundwater flooding occurs when the water table, the level of water below the ground, rises above the ground surface or into cellars and basements. Groundwater flooding is most likely to occur in low lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks.

Based on the ground conditions outlined in Section 3.4, the risk of flooding from groundwater cannot be ruled out.

Based on the limited information available, it is considered that the risk of groundwater flooding to the development is low.

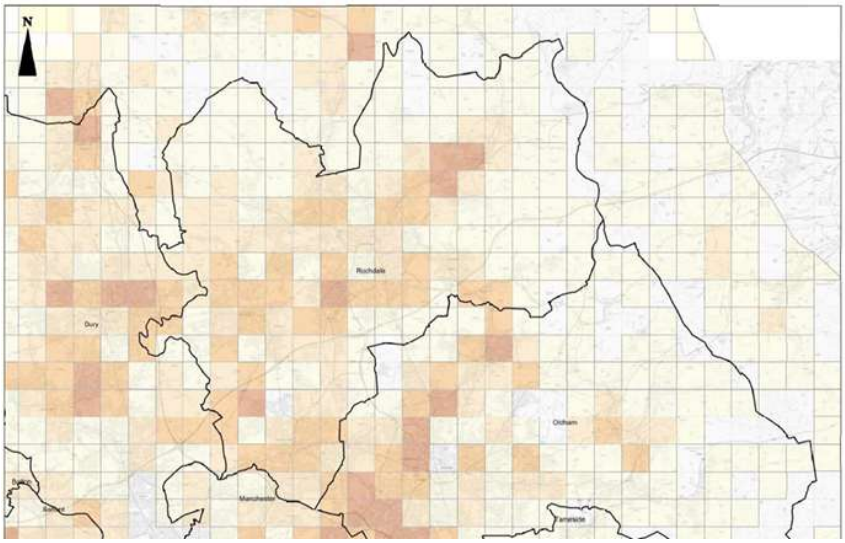


Figure 7 – Rochdale SFRA 5.14 – Risk of Flooding from Groundwater Extract

4.4 - Sewer flooding

There are no existing public sewers within the vicinity of the site. Therefore, the site is at low of risk of flooding from sewers.

4.5 - Tidal flooding

The site is remote from tidal influences and is therefore not at risk of tidal or coastal flooding.

4.6 - Reservoir flooding

Based on the EA Flood Risk from Reservoirs Map, the site is not at risk of flooding from reservoirs.

5.0– SURFACE WATER DRAINAGE STRATEGY

5.1 – Disposal of surface water

The method for removal of surface water from the site has been selected in accordance with the hierarchy outlined in Building Regulations Part H as summarised below:

- Infiltration to the ground
- Discharge to a watercourse
- Connection to a surface water sewer
- Connection to a combined sewer

As described in section 3.4 of this report, the majority of the site is underlain by Glacial Till, which is generally unfavourable to infiltration and given the site conditions provided in the Geo-Environmental Report it has been determined that infiltration is not feasible, primarily due to the deposits of clay and made ground. Therefore, it is considered that soakaway drainage will not be a suitable means of disposing surface water runoff from the developed site.

Following the drainage hierarchy, it is proposed to discharge surface water runoff from the site into a watercourse. Surface water flows from the site will be routed to an existing manhole within the Heywood Park development, reference should be made the drainage survey and drainage layout which has been included in appendix C and D respectively of this report. The existing sitewide surface water network conveys flows towards a watercourse to the south of the site, Brightley Brook, this approach replicates the existing scenario.

5.2 – Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) will be utilised in line with The SuDS Manual (C753) guidance and aim to minimise the impact a development has on the runoff quantity and quality and maximise amenity and biodiversity opportunities.

The management train approach is a fundamental principle of SuDS, it aims to primarily reduce pollution, flow rates and volume of runoff from the site. The main objective is to treat the runoff as close to the source as possible and it is imperative that at least two of the following should be included within the drainage strategy.

- **Prevention** – The use of good site design and rainwater re-use measures to prevent runoff.
- **Source Control** – Controlling the runoff as close to source as possible by using; green roofs, porous pavements and soakaways.
- **Site Control** – Use of water management techniques within local area, i.e. detention basins and geo-cellular storage.
- **Regional Control** – Management of water from a number of sites in a specific location, i.e. balancing ponds and wetlands.
-

The drainage strategy for this development will incorporate prevention by using rainwater harvesting systems where possible and site control in the form of flow control and associated attenuation ponds, attenuation tanks and permeable paving.

5.3 – General strategy

Refer to Burrows Graham Drainage Layout drawing (ref: 30042-BGL-XX-XX-DR-C-00250), which has been included in Appendix D of this report for general strategy for the surface water drainage system.

5.4 – Total site area and impermeable areas

The total drained impermeable area of the proposed development has been measured to be 9.1 hectares.

5.5 – Climate Change

In line with the latest guidance, a 45% allowance has been made.

5.6 – Discharge rates

The site is considered to be a brownfield development. A 50% betterment has been applied to existing rates.

The hydrological characteristics for the site have been taken from uksuds.com and summarised in Table 2 below.

Table 2 – Hydrological characteristics for the site

SAAR (mm)	1052
Hydrological region	10
Soil type	4
SPR	0.47

Using the IH124 method (Institute of Hydrology, 1994) and the above hydrological characteristics, the greenfield runoff rate has been applied to the area of the site which was previously greenfield (5.6Ha).

Table 3 – Greenfield runoff rates

QBAR	43.5 l/s
Q(1)	37.9 l/s
Q(30)	74.0 l/s
Q(100)	90.6 l/s

QBAR = 43.5 l/s
50% reduction = 21.75

The remaining area (3.5 Ha) of the plot, which is existing hardstanding, is calculated based on brownfield runoff rates using the Modified Rational Method (MRM) as below.

MRM = 2.78 x 25 x 3.5 x 0.9 = 218.92 l/s
50% reduction = 109.46 l/s

As such, the maximum runoff rate from the developed site will not exceed 131.2 l/s for all storms up to and including the 1 in 100-year storm plus 45% allowance for climate.

5.7 – Attenuation storage

In order to achieve the restriction in peak rate of surface water runoff from the developed site as described above, on site surface water attenuation storage will be required in order to temporarily store the residual volume of surface water for rainfall events resulting in a peak runoff rate greater than the allowable rate stated in section 5.6.

Attenuation will be provided in the form of detention ponds and underground attenuation tanks.

The attenuation storage will be designed to ensure that there is no surface water flooding on site for rainfall events up to and including the 1 in 30-year storm event. The attenuation storage will be designed to ensure that surface water runoff for storm events up to and including the 100-year storm plus a 45% allowance will not cause a risk of flooding to properties or increase the flood risk outside of the site.

A hydraulic modelling exercise of the proposed drainage system has been undertaken to ensure sufficient attenuation capacity is provided. The hydraulic calculations for this exercise can be found in Appendix E of this report.

5.8 – Water quality

Water quality has been considered and the following measures have been included within the surface water drainage proposals:

- Runoff from roofs is considered to be clean and can be discharged directly into the surface water network.
- All runoff from the car parking bays has a low risk and will pass through permeable paving.
- Runoff from service yard areas will pass through a Class 1 full retention separator. Service yard on the eastern proportion of the site will pass through the attenuation pond
- Silt will be prevented from entering the system by the use of channels with silt traps and catch pits where required.
-

5.9 – Maintenance

Reference should be made to the Drainage Inspection and Maintenance Schedule in Appendix F, which includes required actions and typical frequencies for all drainage infrastructure serving the development.

The drainage will be managed and maintained by an appointed Management Company.

6.0 – Foul water drainage strategy

It is currently proposed to discharge the foul flows generated from the development to the existing adopted foul/combined pumping station to the west of the site.

Any new connections (including the re-use of existing connections) to the public sewerage system will require Section 106 agreement for an indirect connection.

Based on an anticipated gross internal floor space of circa 47,400 square metres, it is calculated that the average foul flow from the development will be 0.9 l/s with the peak flow at 5.38 l/s

6DWF = 6PG + I + 3E

Where:
6DWF = foul drainage design flow (l/d)
P = population= 165 persons per hectare
G = water consumption = 90 l/person/day
I = dry weather infiltration = 10%
E = trade effluent = 0 l/s/ha

7.0 - MITIGATION / MANAGEMENT OF FLOOD RISK

7.1 – Access and egress

The proposed development will utilise the existing road infrastructure within Heywood Distribution Park with an access to the open storage area to the northeast of the site and access to the unit in the southwest. All internal site roads within the Heywood Distribution Park are accessed from the main entrance connecting to Pilsworth Road.

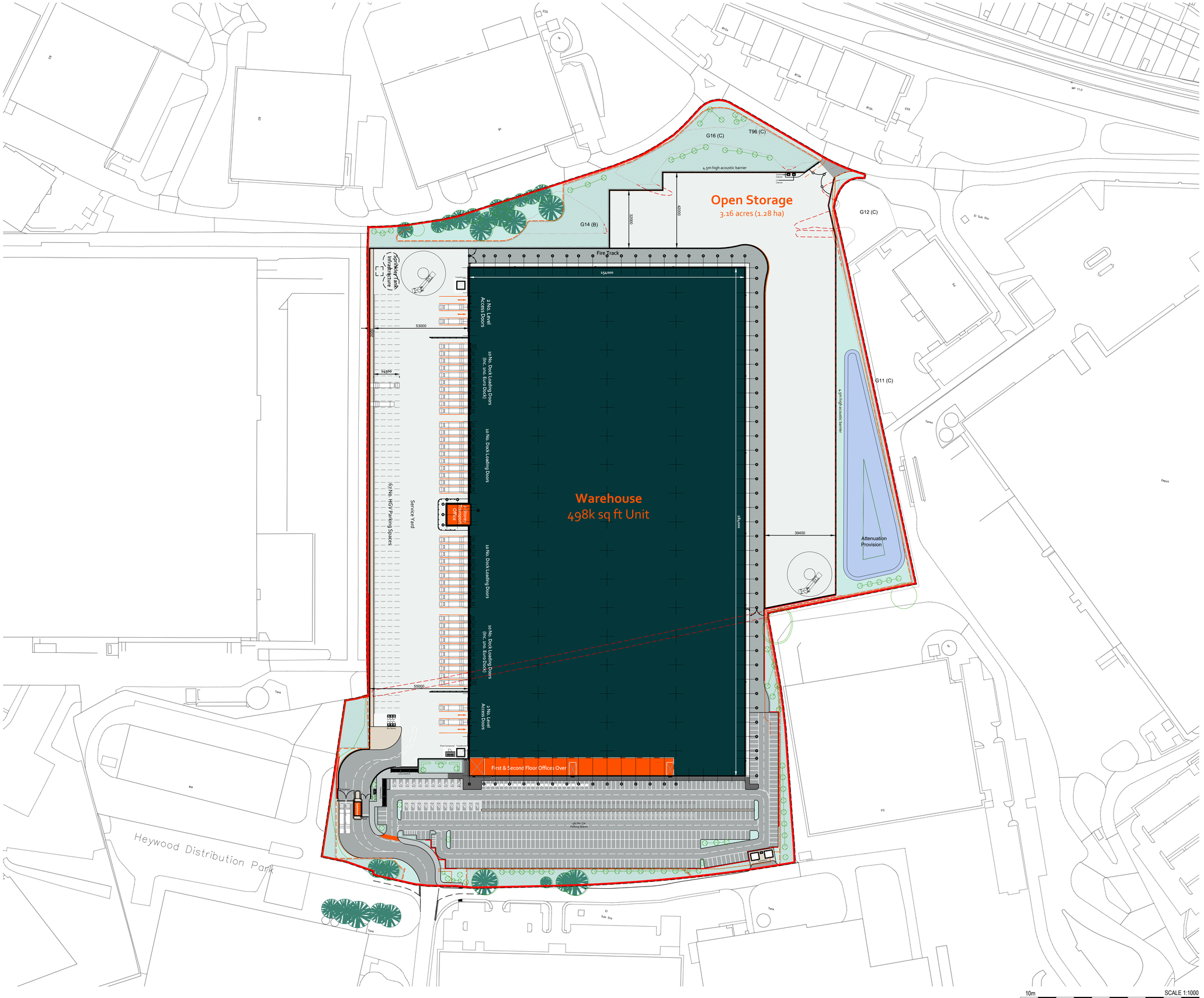
Pilsworth Road and the proposed site access roads are located within flood zone 1. Therefore, a safe means of access / egress is available to the site at all times.

7.2 - Drainage & exceedance flow routes

The proposed surface water drainage system will be designed in accordance with the drainage strategy set out in Section 4 of this report. This will ensure that there is no increase in flood risk to the site or elsewhere in the local catchment for all storm events up to and including the 100-year storm plus 45% climate change.

It should be noted that if storm events in excess of the 100-year storm plus 45% climate change or blockages occur, this will result in flood water arising from the site drainage system. If the site drainage system were to flood, it is considered that any surface water arising from the site drainage system would be contained within the area of dock levellers which are below ground level.

APPENDIX A – SITE PLAN



- Dimensions are in millimeters, unless stated otherwise.
- Scaling of this drawing is not recommended.
- It is the recipients responsibility to print this document to the correct scale.
- All relevant drawings and specifications should be read in conjunction with this drawing.

N

SCHEDULE OF ACCOMMODATION

Warehouse Area	-	469,110 ft²	- 43,582 m²
Ground Floor Core	-	902 ft²	- 84m²
Escape Stair Core -1	-	311 ft²	- 29 m²
Escape Stair Core -2	-	311 ft²	- 29 m²
1st & 2nd Floor Offices	-	23,532 ft²	- 2,186 m²
Transport Office	-	3,274 ft²	- 304 m²
Gatehouse	-	262 ft²	- 24 m²
Total Area	**-**	**497,702 ft²**	**- 46,238 m²**
Amenity Deck	-	11,995 ft²	- 1,114 m²
Total inc. Amenity Deck	**-**	**509,697 ft²**	**- 47,352 m²**
Loading Docks	-	38	
Euro Docks	-	2	
Level Access	-	4	
HGV Parking	-	67	
Car Parking	-	465 - including: 23 No. Accessible (5% min.) 48 No. Active EV (10% min.) 48 No. Passive EV (10% min.) 24 No. Car Share (5% min.) 12 PTW + 136 Cycle Spaces	
Lease Area	-	19.32 Acres / 7.82 Hectares	
Site Area	-	26.40 Acres / 10.69 Hectares	

rev	amendments	by	ckd	date
P06	Pedestrian crossing and routes indicated. Cycle provision confirmed. FPCR planting plan included.	JWY	RS	22.05.25
P05	Gas kiosk relocated. Additional cabinets added to open storage entrance.	RS	TDA	16.05.25
P04	Site plan updated to show amended site access kerb , location of s/s and bin store.	RS	TDA	12.05.25
P03	Updated to suit levels, M&E & Landscaping comments	RS	TDA	07.05.25
P02	Site plan updated to include s/s and transformers	RS	TDA	28.04.25
P01	Initial Issue	TJ	TDA	04.03.25

Plot H4, Heywood Distribution Park, Heywood

Site Plan

PLANNING

THIS DRAWING IS TO BE USED FOR THE STATED PURPOSE ONLY AND SHOULD NOT BE USED FOR ANY OTHER

/NDURENT

UMC ARCHITECTS®

RIBA PoW Stage:	3 - Spatial Coordination
Document Suitability:	S1
Drawn / Checked:	TJ / TDA
Date:	04.03.2025
Scale:	1:1000 A1
UMC Project Number:	25007

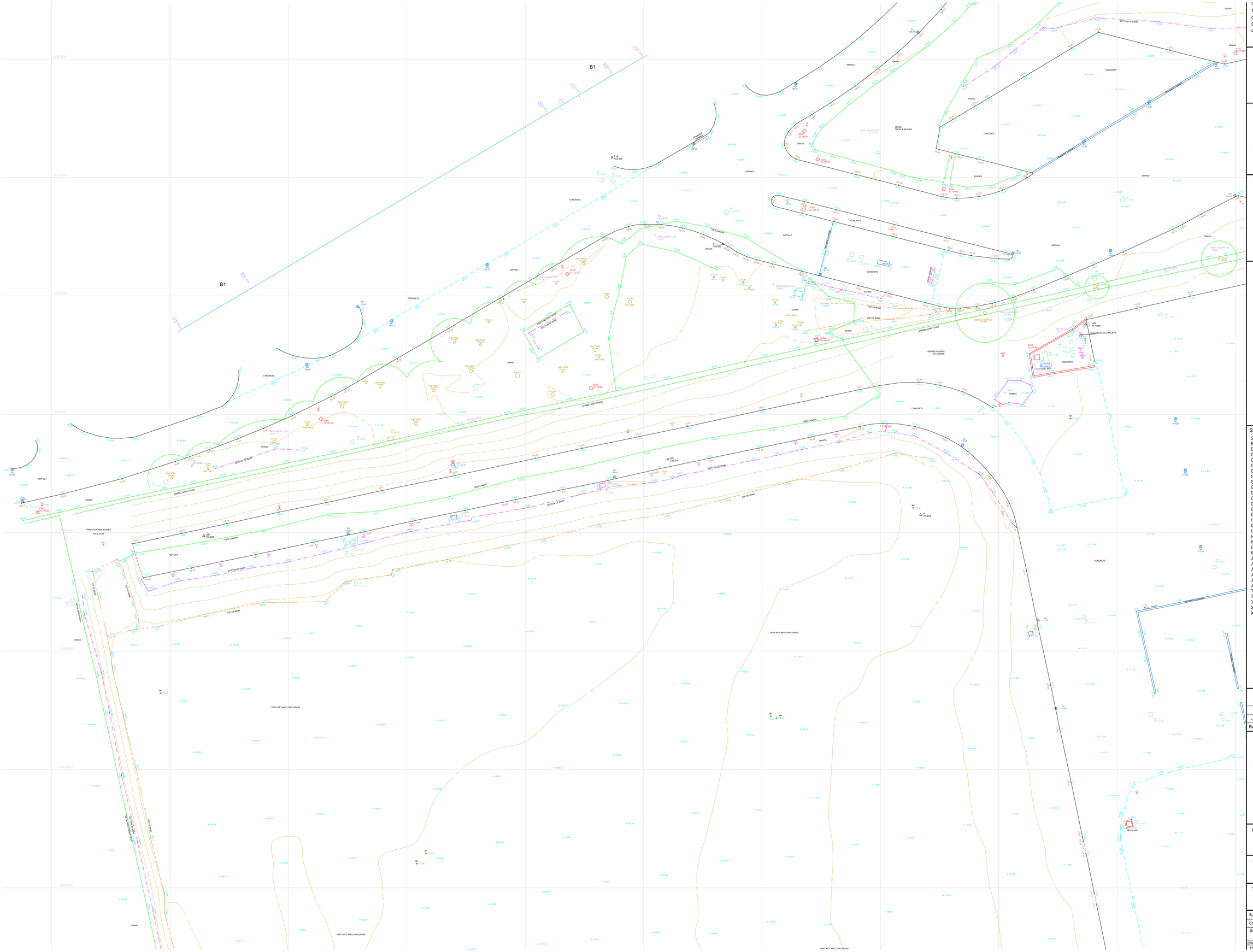
Indurent Drawing Reference:

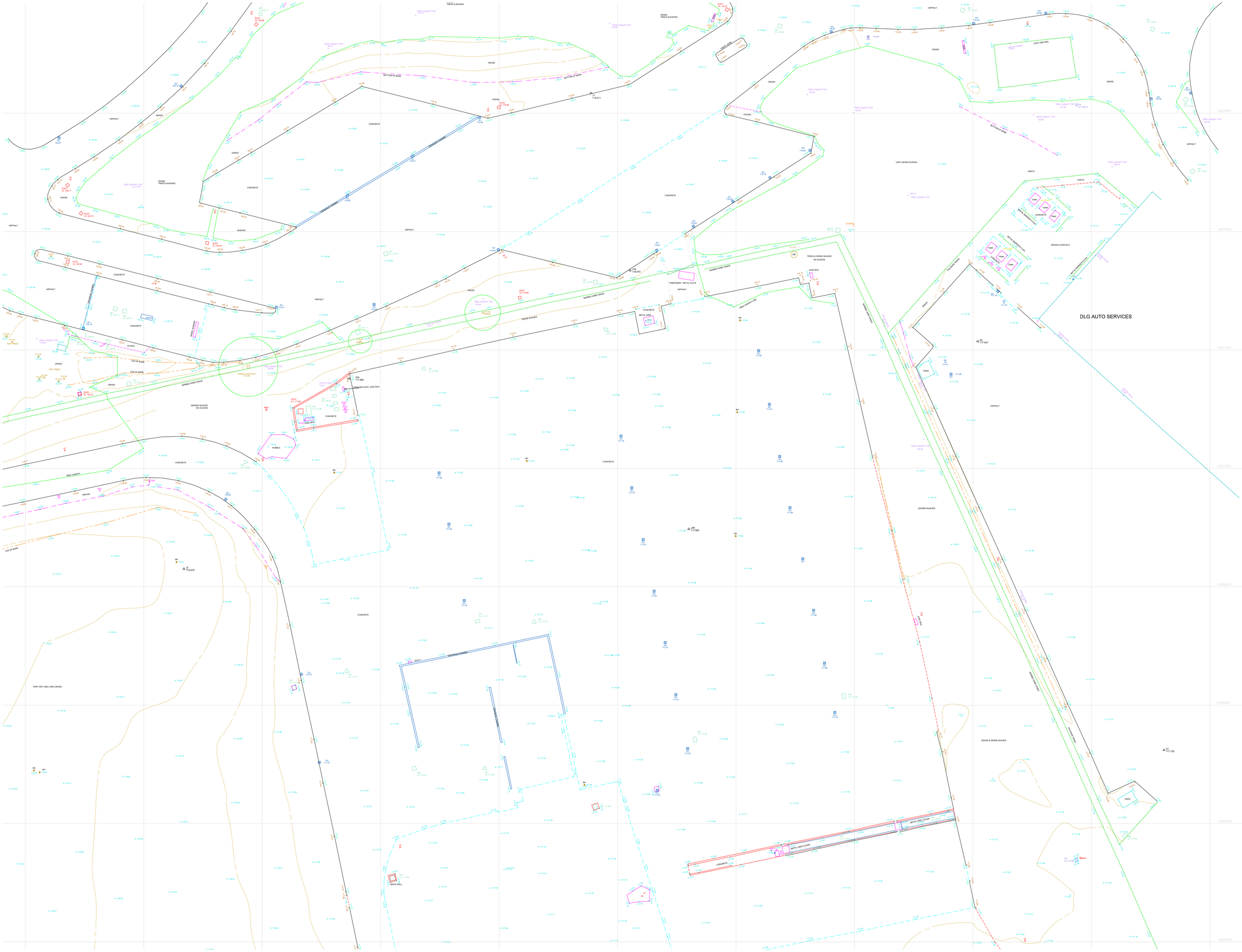
- UMC - 24 - 00 - DR - A - 0601

Document Reference:	Drawing no:	Revision:
25007 - UMC - 0100 - SI - DR - A	0601	P06

APPENDIX B – TOPOGRAPHICAL SURVEY

B12 WAREHOUSES
DLG AUTO SERVICES
ASPHALT
CONCRETE
GRASS
DENSE TREES & BUSHES
BUSHES
DENSE BUSHES NO ACCESS
VERY DENSE BUSHES
TREES & DENSE BUSHES NO ACCESS
GRAVEL
PAVING
RUBBLE
EARTH
GRASS & GRAVELS
METAL GRID
TEMPORARY METAL PLATE
SHED
POST AND RAIL
BARBED WIRE FENCE
METAL RAILING & GATE
TOP OF BANK
BOTTOM OF BANK
TREE CANOPY TOP
TREE CANOPY
TOP OF FENCE
DRAIN
ELEC
GAS
BT
CATV
SW
FW
BUS
JUNC BOX
MH
BH
SIGN
LAMP
TANK
CANOPY
ROOF
SOIL
ROAD
DRIVE
CAR PARK
ACCESS
SLOPE
STEPS
KERB
FENCE
WALL
HEDGE
TREE
BUSH
GATE
POLE
WIRE
CABLE
PIPE
MAIN
SEWER
DRAIN
WATER
GAS
ELEC
TELE
CATV
FW
SW
FOUL


B1
T1A
122.508
J1
120.655
J2A
117.992
J2B
117.882
J2F
120.270
J2G
119.879
J2
119.879
BENCH MARK
120.80
BENCH MARK
120.72
BENCH MARK
120.77
BENCH MARK
120.82
BENCH MARK
120.78
BENCH MARK
120.80


DLG AUTO SERVICES
TREES & BUSHES
DENSE TREES & BUSHES
GRASS
ASPHALT
CONCRETE
BUSHES
PAVING
GRAVEL
EARTH
GRASS & GRAVELS
VERY DENSE BUSHES
TREE CANOPY TOP
BOTTOM OF BANK
TOP OF BANK
ORANGE CABLE
BURIED GAS PIPE
BURIED WATER PIPE
BURIED ELEC
BURIED ELEC JUNC BOX
BURIED TELE
BURIED TELE JUNC BOX
BURIED FIBRE OPTIC
BURIED LOOP
BURIED LOOP JUNC BOX
BURIED LINE FENCE
RAILWAY FENCE
METAL GRID COVER
TEMPORARY METAL PLATE
TANK
SHED
POST AND RAIL
BRICK WALL
RUBBLE
VERY WET AND LONG GRASS
DENSED BUSHES NO ACCESS
TREES & DENSE BUSHES NO ACCESS
GRASS & DENSE BUSHES
ASH TREES
HORSE CHESTNUT
OHL
OHL 110.90
OHL 117.07
OHL 117.41
OHL 117.52
OHL 117.57
OHL 117.60
OHL 117.62
OHL 117.63
OHL 117.64
OHL 117.65
OHL 117.66
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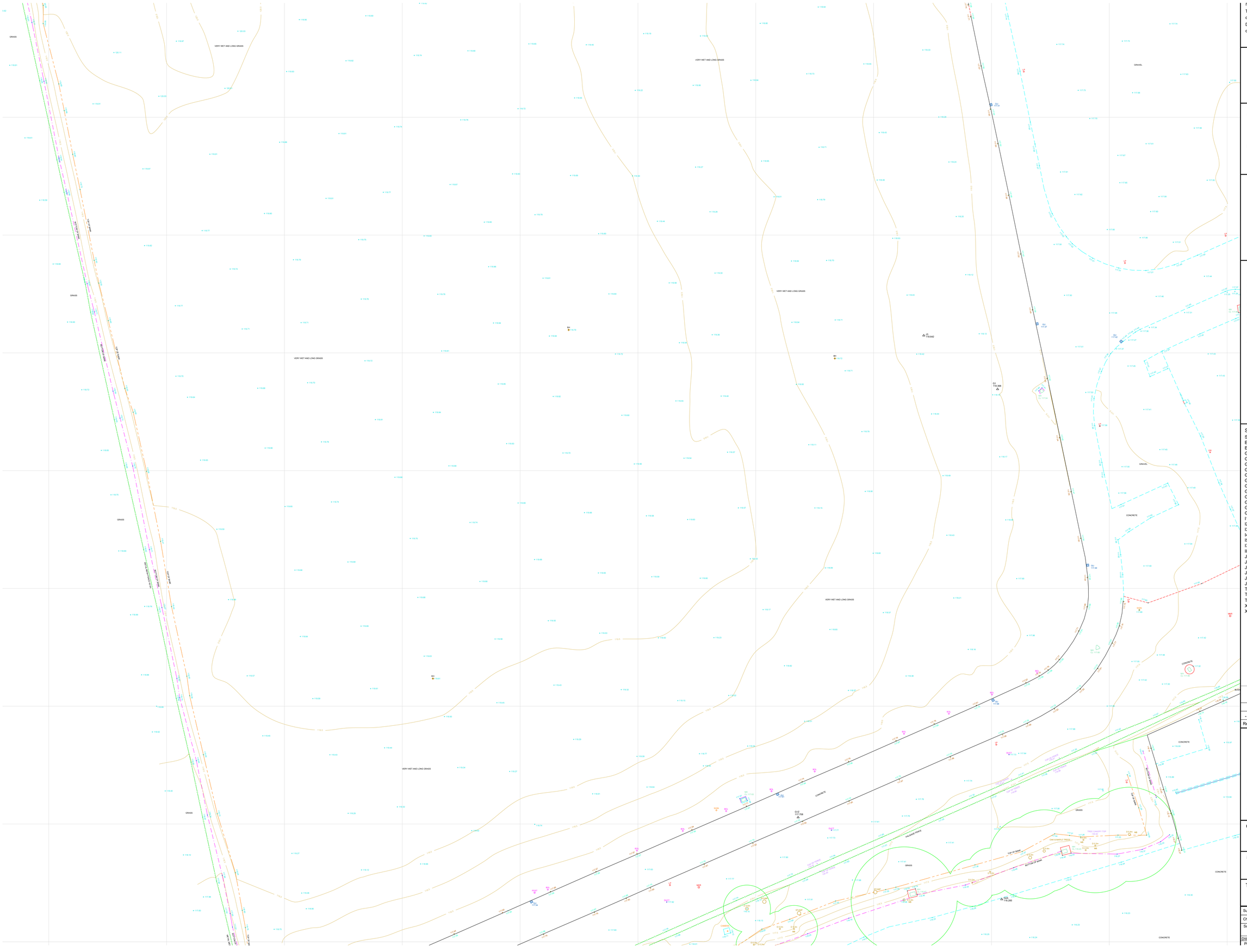
OHL



Notes

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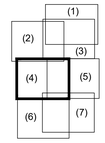

KEY

AIR VALVE	AV	KERB OUTLET	KO
BENCH MARK	BM	LAMP POST	LP
BIN	BIN	MANHOLE (CIRCULAR)	MH
BOLLARD	BOL	MANHOLE (RECTANGULAR)	MH
BORE HOLE	BH	MANHOLE (TRIANGULAR)	MH
BRITISH TELECOM COVER	BT	MARKER POST	MP
BUS STOP	BUS	GULLY	G
CABLE TV COVER	CATV	RODDING EYE	RE
CABLE TV SUPPLY	CA	SIGN POST	SIG
COLUMN	COL	TELECOM COVER	TC
DROPPED KERB	DK	TELEGRAPH POLE	TP
EARTHING POINT	ER	THRESHOLD LEVEL	TH
ELECTRICITY COVER	ELEC	TRAFFIC LIGHT	TL
ELECTRICITY POLE	EP	TRIAL PIT	TP
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GAS	WATER METER	WM
GATE		WATER STOP COCK	WSC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	WSV
INSPECTION COVER (RECTANGULAR)	IC		
COVER LEVEL	CL	CHAMBER BASE LEVEL	Ch
INVERT LEVEL	IL	WATER SURFACE LEVEL	WL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE	UT
GIRTH OF TREE TRUNK	G	DIAMETER OF TREE TRUNK	D
HEIGHT TO TOP OF TREE CANOPY	H	MULTI BOLE TREE	MB

Station Listing

Station	Easting	Northing	Level
E1	383932.269	409652.407	117.730
E2	383900.820	409721.459	117.407
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I1	383663.179	409423.997	117.726
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I4	383703.149	409350.782	115.100
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I7	383889.760	409496.505	116.050
I8	383867.085	409510.560	116.201
J1	383835.531	409763.385	119.311
J2	383766.785	409683.028	119.679
J3	383788.508	409562.954	118.642
J1B	383842.111	409733.436	118.670
J2A	383794.679	409715.168	117.992
J2B	383852.033	409689.753	117.882
T1	383733.376	409728.775	120.655
T2	383794.355	409797.264	119.924
T1A	383714.663	409743.380	122.508
X1	383893.545	409464.755	116.213
X2	383879.480	409418.068	117.888

Rev	Date	Drawn	Description
-	--/--/----	--	--

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Client
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Site
M400,
HEYWOOD DISTRIBUTION PARK

Title
TOPOGRAPHICAL SURVEY

Surveyed	JS / TW	Drawn	JS / TW
Check	DA	Date	13/10/2021
Scale 1:200	Job No P21-01208	Sheet Size A0	Rev 0

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role

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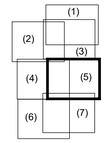

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AIR VALVE	AV	KERB OUTLET	KO
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BORE HOLE	BH	MANHOLE (TRIANGULAR)	MH
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BUS STOP	BUS	OULLY	OU
CABLE TV COVER	CATV	RODDING EYE	RE
CABLE TV SUPPLY	CA	SIGN POST	SIG
COLUMN	COL	TELECOM COVER	TC
DROPPED KERB	DK	TELEGRAPH POLE	TP
EARTHING POINT	EP	THRESHOLD LEVEL	TH
ELECTRICITY COVER	ELEC	TRAFFIC LIGHT	TL
ELECTRICITY POLE	EP	TRIAL PIT	TP
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GAS	WATER METER	WM
GATE		WATER STOP COCK	WSC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	WSV
INSPECTION COVER (RECTANGULAR)	IC		
COVER LEVEL	CL	CHAMBER BASE LEVEL	CH
INVERT LEVEL	IL	WATER SURFACE LEVEL	WL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE	UT
GIRTH OF TREE TRUNK	G	DIAMETER OF TREE TRUNK	D
HEIGHT TO TOP OF TREE CANOPY	H	MULTI BOLE TREE	MB

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Rev	Date	Drawn	Description
-	--/--/----	---	--

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Title
TOPOGRAPHICAL SURVEY

Surveyed	JS / TW	Drawn	JS / TW
Check	DA	Date	13/10/2021
Scale 1:200	Job No P21-01208	Sheet Size A0	Rev 0

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role

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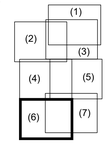

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CABLE TV SUPPLY	CS	SIGN POST	SIGN
COLUMN	COL	TELECOM COVER	TC
DROPPED KERB	DK	TELEGRAPH POLE	TP
EARTHING POINT	ER	THRESHOLD LEVEL	TH
ELECTRICITY COVER	ELEC	TRAFFIC LIGHT	TL
ELECTRICITY POLE	EP	TRIAL PIT	PIT
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GAS	WATER METER	WM
GATE		WATER STOP COCK	WC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	WV
INSPECTION COVER (RECTANGULAR)	IC		

COVER LEVEL	CL	CHAMBER BASE LEVEL	Ch.L
INVERT LEVEL	IL	WATER SURFACE LEVEL	WL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE	UTM
GIRTH OF TREE TRUNK	G	DIAMETER OF TREE TRUNK	D
HEIGHT TO TOP OF TREE CANOPY	H	MULTI BOLE TREE	MB

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G1A	383862.380	409575.275	117.419
G1C	383880.576	409536.526	118.768
G1Z	383767.185	409481.128	117.708
G2A	383801.740	409467.221	116.285
G2D	383768.964	409417.119	116.214
G2E	383723.879	409407.709	116.122
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Rev	Date	Drawn	Description	Check
02	25/10/2021	SJR	ADDITIONAL MANHOLES & NUMBERS	DBS

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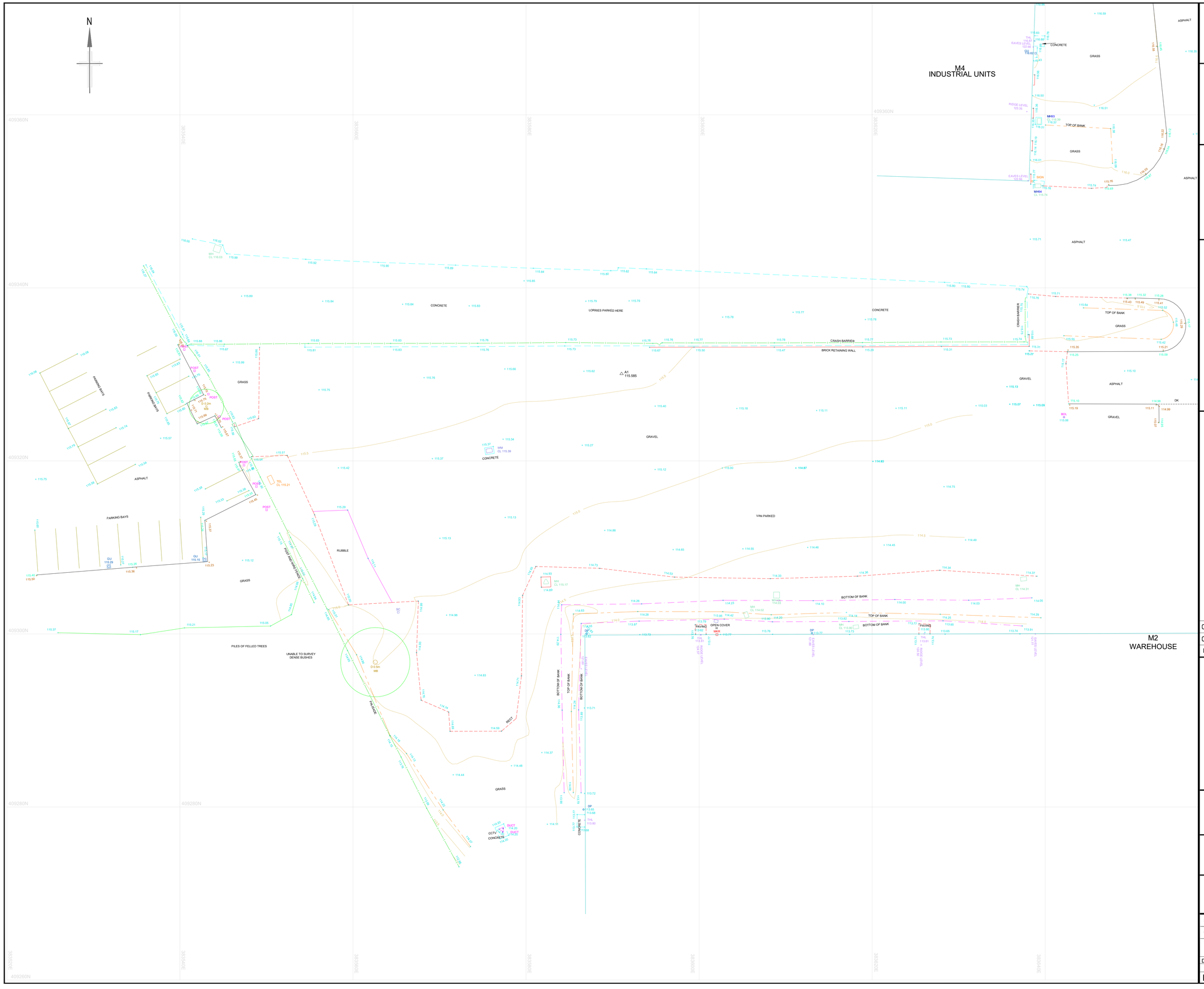
Title
TOPOGRAPHICAL SURVEY

Surveyed	JS / TW	Drawn	JS / TW
Check	DA	Date	13/10/2021
Scale 1:200	Job No P21-01208	Sheet Size A0	Rev 02

DWG Ref.

Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P21-01208	MET	EXT	XX	TOP	M2	G	006



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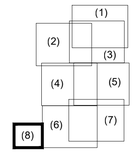

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A1	383591.039	409330.068	115.585

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GATE		WATER STOP COCK	SC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	SV
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Rev	Date	Drawn	Description	Check
03	09/05/22	JS	AREA TO SW ADDED	DA
02	25/10/21	SJR	ADDITIONAL MANHOLES & NUMBERS	DBS

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Site
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Title
TOPOGRAPHICAL SURVEY

Surveyed	JS	Drawn	JS
Check	DA	Date	09/05/2022
Scale 1:200	Job No P21-01208	Sheet Size A1	Rev 03

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P21-01208	MET	EXT	XX	TOP	M2	G	008

APPENDIX C – PUBLIC SEWER RECORDS & EXISTING DRAINAGE INFORMATION

Castle Keep Surveys Drawing Ledgend

Topographical Linetypes:

- Road
- Drop Kerb
- Steps
- Building Line
- Barrier
- Channel
- Concrete
- Chain Fence
- Metal Fence
- Post & Wire Fence
- Wooden Fence
- Top of Bank
- Bottom of Bank
- Tree Canopy Line
- Verge Line
- Wall
- Footpath

Underground Utility Linetypes:

- E — Electric
- GAS — Gas
- W — Water
- CATV — Cable TV
- CCTV — Closed Circuit TV
- BT — British Telecom
- EMPTY — Empty Ducting
- UNK — Unknown Metallic Utility
- GPR — GPR Anomaly Possible Utility
- COM — Communications
- Foul Water Drainage Route
- Surface Water Drainage Route
- Combined Service Drainage Route
- Unknown Drainage Route
- Field Drain
- Ace Drain
- E-TFR — Electric - Taken from Records
- E AR — Assumed Electric
- O/H E — Electric Overhead
- O/H BT — BT Overhead
- MSR — Multi Service Route
- MULTI SERVICE TRENCH — Multi Service Trench
- W-TFR — Water - Taken from Records
- W AR — Assumed Water Route
- GAS AR — Assumed Gas Route
- GAS-TFR — Gas - Taken from Records
- Survey Extents

Symbols:

- TP — Telegraph Pole
- LP — Lamp Post
- EP — Electric Post
- TL — Traffic Light
- FL — Floodlight
- CTV — Cable TV IC
- SC — Stop Cock
- GV — Gas Valve
- BOL — Bollard
- 2.345 — Spot Level
- Post — Post
- GUL — Gully
- ER — Earth Rod
- GR — Gas Riser
- RWP — Rain Water Pipe
- RS — Road Sign
- SVP — Soil Vent Pipe
- CK31 E=436076.617 N=546728.511 Level=25.558 — Station Control Details
- RE — Rodding Eye
- LOR — Loss of Reflection
- Gate
- Manhole
- Inspection Chamber
- Cable TV Cover
- BT Cover
- Road Gully
- Stop Valve
- Water Meter
- Air Valve
- Wash Out
- Fire Hydrant
- Gas Valve
- Cabinet
- Electric Link Pin
- Circular Manhole
- Triangular Manhole
- Tree
- EOS — End of Supply

MH1 CL 100.000 IL 98.000
IG CL 100.000
CATV CL 100.000
BT CL 100.000
RG CL 100.000
SV CL 100.000
WM CL 100.000
AV CL 100.000
WO CL 100.000
FH CL 100.000
GV CL 100.000
Cabinet 100.000
LB CL 100.000
MH2 CL 100.000 IL 97.500
MH3 CL 100.000 IL 97.500

Approximate National Grid North

CASTLE KEEP SURVEYS

Job Title:
Heywood Distribution Park
Heywood
QL10 2TT

Client Name:
BLACK CAT BUILDING CONSULTANCY

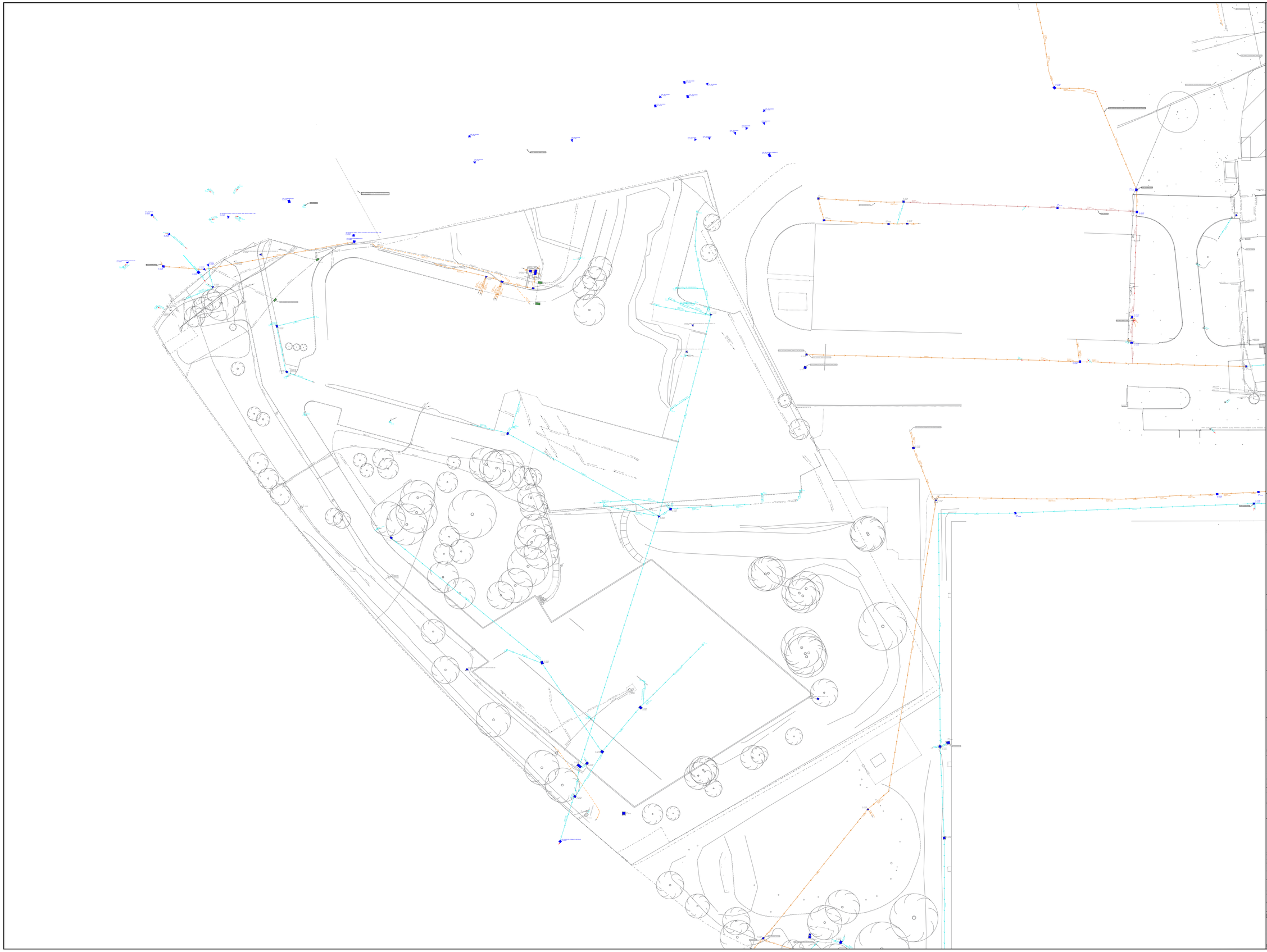
Drawing Title:
Drainage Survey

Scale	Surveyor
NTS @ A1	PK, LH
Date	Approved
18/05/2022	MD

Castle Keep Surveys Ltd
The Keep
The Village
Castle Eden
County Durham
TS27 4SL
T: 01429 836098
E: info@castlekeepsurveys.co.uk

Revision	Amendments	By	Checked
Rev A	- Additional Survey Information	PW	MD

Project Number	Drawing No	Revision
CKS - 1061	OV	A



Castle Keep Surveys Drawing Legend

Topographical Linetypes:

- Road
- Drop Kerb
- Steps
- Building Line
- Barrier
- Channel
- Concrete
- Chain Fence
- Metal Fence
- Post & Wire Fence
- Wooden Fence
- Top of Bank
- Bottom of Bank
- Tree Canopy Line
- Verge Line
- Wall
- Footpath

Underground Utility Linetypes:

- E — Electric
- GAS — Gas
- W — Water
- CATV — Cable TV
- CCTV — Closed Circuit TV
- BT — British Telecom
- EMPTY — Empty Ducting
- UNK — Unknown Metallic Utility
- GPR — GPR Anomaly Possible Utility
- COM — Communications
- Foul Water Drainage Route
- Surface Water Drainage Route
- Combined Service Drainage Route
- Unknown Drainage Route
- Field Drain — Field Drain
- Acc Drain — Acc Drain
- E-TFR — Electric - Taken from Records
- E AR — Assumed Electric
- O/H E — Electric Overhead
- O/H BT — BT Overhead
- MSR — Multi Service Route
- MULTI SERVICE TRENCH — Multi Service Trench
- W-TFR — Water - Taken from Records
- W AR — Assumed Water Route
- GAS AR — Assumed Gas Route
- GAS-TFR — Gas - Taken from Records
- Survey Extents

Symbols:

- TP — Telegraph Pole
- LP — Lamp Post
- EP — Electric Post
- TL — Traffic Light
- FL — Floodlight
- CTV — Cable TV IC
- SC — Stop Cock
- GV — Gas Valve
- BOL — Bollard
- 2.345 — Spot Level
- Post — Post
- GUL — Gully
- ER — Earth Rod
- GR — Gas Riser
- RWP — Rain Water Pipe
- RS — Road Sign
- SVP — Soil Vent Pipe
- CK31 E=436676.617 N=540728.511 Level=25.558 — Station Control Details
- RE — Reading Bar
- LOR — Loss of Reflection
- Gate
- MH1 CL 100.000 IL 98.000 — Manhole
- IC CL 100.000 — Inspection Chamber
- CATV CL 100.000 — Cable TV Cover
- BT CL 100.000 — BT Cover
- RG 100.000 — Road Gully
- SV CL 100.000 — Stop Valve
- WM CL 100.000 — Water Meter
- AV CL 100.000 — Air Valve
- WO CL 100.000 — Wash Out
- FH CL 100.000 — Fire Hydrant
- GV CL 100.000 — Gas Valve
- Cabinet 100.000 — Cabinet
- LB CL 100.000 — Electric Link Box
- MH2 CL 100.000 IL 97.500 — Circular Manhole
- MH3 CL 100.000 IL 97.500 — Triangular Manhole
- Tree
- EOS — End of Signal

Approximate National Grid North

CASTLE KEEP SURVEYS

Job Title: Heywood Distribution Park, Heywood, QL10 2TT

Client Name: BLACK CAT BUILDING CONSULTANCY

Drawing Title: Drainage Survey

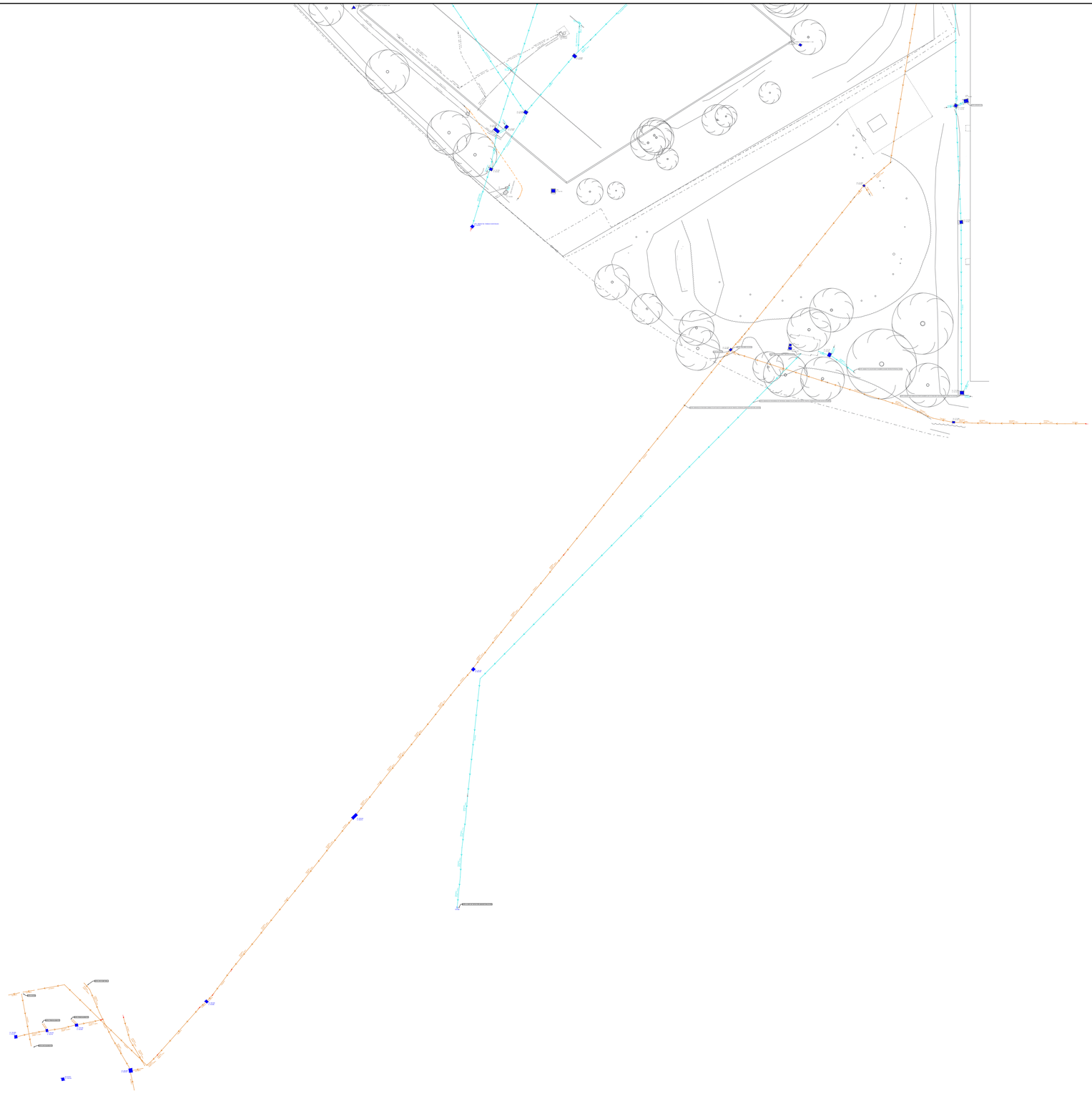
Scale	Surveyor
1:500 @ A1	PK, LH
Date	**Approved**
18/05/2022	MD

Castle Keep Surveys Ltd
The Keep
The Village
Castle Eden
County Durham
TS27 4SL
T: 01429 836038
E: info@castlekeepsurveys.co.uk

Revision	Amendments	By	Checked
Rev A	- Additional Survey Information	PW	MD

Project Number: CKS - 1061

Drawing No / Revision: 001 A



Castle Keep Surveys Drawing Ledgend

Topographical Linetypes:

- Road
- Drop Kerb
- Steps
- Building Line
- Barrier
- Channel
- Concrete
- Chain Fence
- Metal Fence
- Pond & Wire Fence
- Wooden Fence
- Top of Bank
- Bottom of Bank
- Tree Canopy Line
- Verge Line
- Wall
- Footpath

Underground Utility Linetypes:

- E — Electric
- GAS — Gas
- W — Water
- CATV — Cable TV
- CCTV — Closed Circuit TV
- BT — British Telecom
- EMPTY — Empty Ducting
- UNK — Unknown Metallic Utility
- GPR — GPR Anomaly Possible Utility
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- Foul Water Drainage Route
- Surface Water Drainage Route
- Combined Service Drainage Route
- Unknown Drainage Route
- Field Drain
- Ace Drain
- E-TFR — Electric - Taken from Records
- E AR — Assumed Electric
- O/H E — Electric Overhead
- O/H BT — BT Overhead
- MSR — Multi Service Route
- MULTI SERVICE TRENCH — Multi Service Trench
- W-TFR — Water - Taken from Records
- W AR — Assumed Water Route
- GAS AR — Assumed Gas Route
- GAS-TFR — Gas - Taken from Records
- Survey Extents

Symbols:

- TP — Telegraph Pole
- LP — Lamp Post
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- TL — Traffic Light
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- SC — Stop Cock
- GV — Gas Valve
- BOL — Bollard
- 2.345 — Spot Level
- Post — Post
- GUL — Gully
- ER — Earth Rod
- GR — Gas Riser
- RWP — Rain Water Pipe
- RS — Road Sign
- SVP — Soil Vent Pipe
- CK31 E=436076.617 N=546728.511 Level=25.558 — Station Control Details
- RE — Rodding Eye
- LOR — Line of Reflection
- Gate
- Manhole
- Inspection Chamber
- Cable TV Cover
- BT Cover
- Road Gully
- Stop Valve
- Water Meter
- Air Valve
- Wash Out
- Fire Hydrant
- Gas Valve
- Cabinet
- Electric Link Pin
- Circular Manhole
- Triangular Manhole
- Tree
- End of Topo

MH1 CL 100.000 IL 98.000
IC CL 100.000
CATV CL 100.000
BT CL 100.000
RG CL 100.000
SV CL 100.000
WM CL 100.000
AV CL 100.000
WO CL 100.000
FH CL 100.000
GV CL 100.000
Cabinet 100.000
LB CL 100.000
MH2 CL 100.000 IL 97.500
MH3 CL 100.000 IL 97.500
EOS

Approximate National Grid North

CASTLE KEEP SURVEYS

Job Title: Heywood Distribution Park, Heywood, QL10 2TT

Client Name: BLACK CAT BUILDING CONSULTANCY

Drawing Title: Drainage Survey

Scale	Surveyor
1:500 @ A1	PK, LH
Date	Approved
18/05/2022	MD

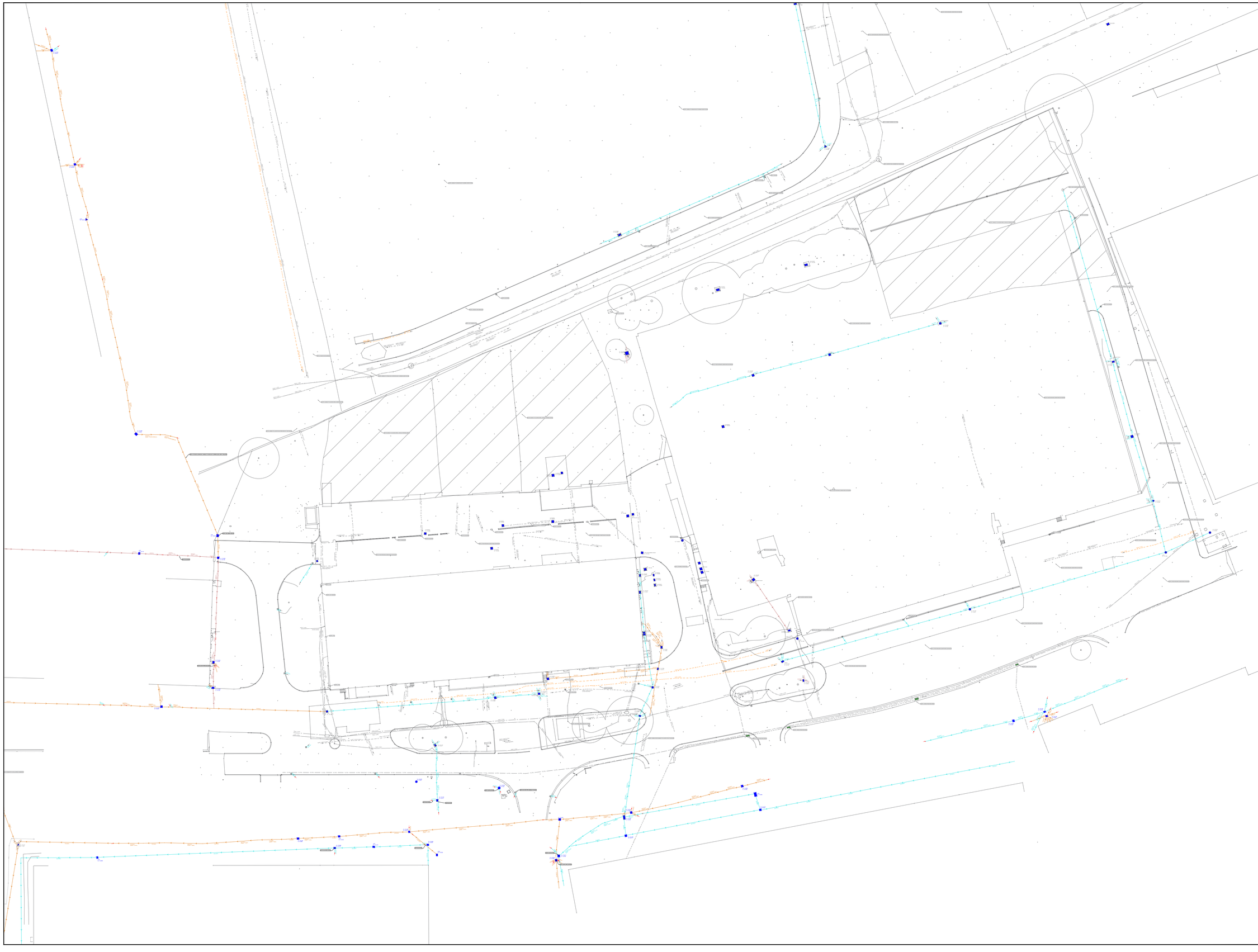
Castle Keep Surveys Ltd
The Keep
The Village
Castle Eden
County Durham
TS27 4SL
T- 01429 896098
E- info@castlekeepsurveys.co.uk

Revision	Amendments	By	Checked
Rev A	- Additional Survey Information	PW	MD

Project Number: CKS - 1061

Drawing No: 002

Revision: A



Castle Keep Surveys Drawing Legend

Topographical Linetypes:

- Road
- Drop Kerb
- Steps
- Building Line
- Barrier
- Channel
- Concrete
- Chain Fence
- Metal Fence
- Post & Wire Fence
- Wooden Fence
- Top of Bank
- Bottom of Bank
- Tree Canopy Line
- Verge Line
- Wall
- Footpath

Underground Utility Linetypes:

- E — Electric
- GAS — Gas
- W — Water
- CATV — Cable TV
- CCTV — Closed Circuit TV
- BT — British Telecom
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- UNK — Unknown Metallic Utility
- GPR — GPR Anomaly Possible Utility
- COM — Communications
- Foul Water Drainage Route
- Surface Water Drainage Route
- Combined Service Drainage Route
- Unknown Drainage Route
- Field Drain — Field Drain
- Acc Drain — Acc Drain
- E-TFR — Electric - Taken from Records
- E AR — Assumed Electric
- O/H E — Electric Overhead
- O/H BT — BT Overhead
- MSR — Multi Service Route
- MULTI SERVICE TRENCH — Multi Service Trench
- W-TFR — Water - Taken from Records
- W AR — Assumed Water Route
- GAS AR — Assumed Gas Route
- GAS-TFR — Gas - Taken from Records
- Survey Extents

Symbols:

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- FL — Floodlight
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- GV — Gas Valve
- BOL — Bollard
- 2.345 — Spot Level
- Post — Post
- GUL — Gully
- ER — Earth Rod
- GR — Gas Riser
- RWP — Rain Water Pipe
- RS — Road Sign
- SVP — Soil Vent Pipe
- CKS1 E=436076.617 N=546728.511 Level=25.558 — Station Control Details
- RE — Rodding Eye
- LOR — Lane of Reflection
- Gate
- Manhole — MH1 CL 100.000 IL 98.000
- Inspection Chamber — IC CL 100.000
- Cable TV Cover — CATV CL 100.000
- BT Cover — BT CL 100.000
- Road Gully — RG 100.000
- Stop Valve — SV CL 100.000
- Water Meter — WM CL 100.000
- Air Valve — AV CL 100.000
- Wash Out — WO CL 100.000
- Fire Hydrant — FH CL 100.000
- Gas Valve — GV CL 100.000
- Cabinet — Cabinet 100.000
- Electric Link Pin — LB CL 100.000
- Circular Manhole — MH2 CL 100.000 IL 97.500
- Triangular Manhole — MH3 CL 100.000 IL 97.500
- Tree
- EOS — End of Survey

Approximate National Grid North

CASTLE KEEP SURVEYS

Job Title: Heywood Distribution Park, Heywood, QL10 2TT

Client Name: BLACK CAT BUILDING CONSULTANCY

Drawing Title: Drainage Survey

Scale	Surveyor
1:500 @ A1	PK, LH
Date	Approved
18/05/2022	MD

Castle Keep Surveys Ltd
The Keep
The Village
Castle Eden
County Durham
TS27 4SL
T: 0429 886098
E: info@castlekeepsurveys.co.uk

Revision	Amendments	By	Checked
Rev A	- Additional Survey Information	PW	MD

Project Number: CKS - 1061

Drawing No: 003

Revision: A

Castle Keep Surveys Drawing Legend

Topographical Linetypes:

- Road
- Drop Kerb
- Steps
- Building Line
- Barrier
- Channel
- Concrete
- Chain Fence
- Metal Fence
- Post & Wire Fence
- Wooden Fence
- Top of Bank
- Bottom of Bank
- Tree Canopy Line
- Verge Line
- Wall
- Footpath

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- CATV — Cable TV
- CCTV — Closed Circuit TV
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- UNK — Unknown Metallic Utility
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- COM — Communications
- Foul Water Drainage Route
- Surface Water Drainage Route
- Combined Service Drainage Route
- Unknown Drainage Route
- Field Drain
- Ayo Drain
- E-TFR — Electric - Taken from Records
- E AR — Assumed Electric
- O/H E — Electric Overhead
- O/H BT — BT Overhead
- MSR — Multi Service Route
- MULTI SERVICE TRENCH — Multi Service Trench
- W-TFR — Water - Taken from Records
- W AR — Assumed Water Route
- GAS-AR — Assumed Gas Route
- GAS-TFR — Gas - Taken from Records
- Survey Extents

Symbols:

- TP — Telegraph Pole
- LP — Lamp Post
- EP — Electric Post
- TL — Traffic Light
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- CTV — Cable TV IC
- SC — Stop Cock
- GV — Gas Valve
- BOL — Bollard
- 2.345 — Spot Level
- Post — Post
- GUL — Gully
- ER — Earth Rod
- GR — Gas Riser
- RWP — Rain Water Pipe
- RS — Road Sign
- SVP — Soil Vent Pipe
- CKS1 E=436076.617 N=546728.511 Level=25.558 — Station Control Details
- RE — Rodding Eye
- LOR — Loss of Reflection
- Gate
- MH1 CL 100.000 IL 98.000 — Manhole
- IC CL 100.000 — Inspection Chamber
- CATV CL 100.000 — Cable TV Cover
- BT CL 100.000 — BT Cover
- RG 100.000 — Road Gully
- SV CL 100.000 — Stop Valve
- WM CL 100.000 — Water Meter
- AV CL 100.000 — Air Valve
- WO CL 100.000 — Wash Out
- FH CL 100.000 — Fire Hydrant
- GV2 CL 100.000 — Gas Valve
- Cabinet 100.000 — Cabinet
- LB CL 100.000 — Electric Link Pin
- MH2 CL 100.000 IL 97.500 — Circular Manhole
- MH3 CL 100.000 IL 97.500 — Triangular Manhole
- Tree
- EOS — End of Signal

Approximate National Grid North

CASTLE KEEP SURVEYS

Job Title:

Heywood Distribution Park
Heywood
QL10 2TT

Client Name:

BLACK CAT BUILDING CONSULTANCY

Drawing Title:

Drainage Survey

Scale	Surveyor
1:500 @ A1	PK, LH
Date	**Approved**
18/05/2022	MD

Castle Keep Surveys Ltd
The Keep
The Village
Castle Eden
County Durham
TS27 4SL
T: 01429 836038
E: info@castlekeepsurveys.co.uk

Revision	Amendments	By	Checked
Rev A	- Additional Survey Information	PW	MD

Project Number	Drawing No	Revision
CKS - 1061	004	A

Castle Keep Surveys Drawing Legend

Topographical Linetypes:

Road
Drop Kerb
Drop Kerb
Steps
Building Line
Barrier
Channel
Concrete
Chain Fence
Metal Fence
Post & Wire Fence
Wooden Fence
Top of Bank
Bottom of Bank
Tree Canopy Line
Verge Line
Wall
Footpath

Underground Utility Linetypes:

E — Electric
GAS — Gas
W — Water
CATV — Cable TV
CCTV — Closed Circuit TV
BT — British Telecom
EMPTY — Empty Ducting
UNK — Unknown Metallic Utility
GPR — GPR Anomaly Possible Utility
COM — Communications
Foul Water Drainage Route
Surface Water Drainage Route
Combined Service Drainage Route
Unknown Drainage Route
Field Drain
Ace Drain
E-TFR — Electric - Taken from Records
E AR — Assumed Electric
O/H E — Electric Overhead
O/H BT — BT Overhead
MSR — Multi Service Route
MULTI SERVICE TRENCH — Multi Service Trench
W-TFR — Water - Taken from Records
W AR — Assumed Water Route
GAS AR — Assumed Gas Route
GAS-TFR — Gas - Taken from Records
Survey Extents

Symbols:

TP — Telegraph Pole
LP — Lamp Post
EP — Electric Post
TL — Traffic Light
FL — Floodlight
CTV — Cable TV IC
SC — Stop Cock
GV — Gas Valve
BOL — Bollard
2.345 — Spot Level
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ER — Earth Rod
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CKS1 E=436076.617 N=546728.511 Level=25.558 — Station Control Details
RE — Rodding Eye
LOR — Line of Reflection
Gate
Manhole — MH1 CL 100.000 IL 98.000
Inspection Chamber — IC CL 100.000
Cable TV Cover — CATV CL 100.000
BT Cover — BT CL 100.000
Road Gully — RG CL 100.000
Stop Valve — SV CL 100.000
Water Meter — WM CL 100.000
Air Valve — AV CL 100.000
Wash Out — WO CL 100.000
Fire Hydrant — FH CL 100.000
Gas Valve — GV CL 100.000
Cabinet — Cabinet 100.000
Electric Link Pin — LB CL 100.000
Circular Manhole — MH2 CL 100.000 IL 97.500
Triangular Manhole — MH3 CL 100.000 IL 97.500
Tree
EOS — End of Survey

Approximate National Grid North

CASTLE KEEP SURVEYS

Job Title
Heywood Distribution Park
Heywood
QL10 2TT

Client Name
BLACK CAT BUILDING CONSULTANCY

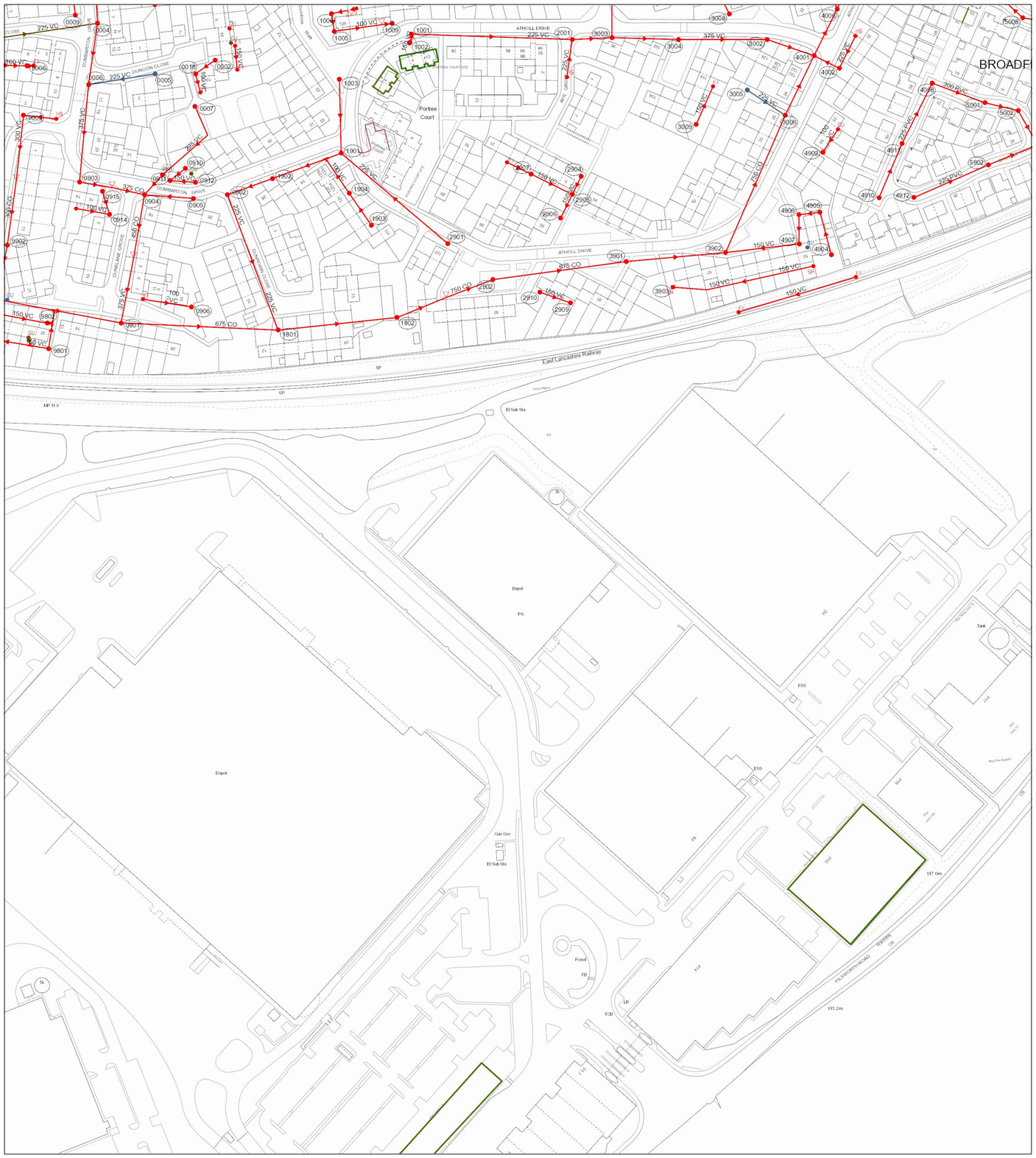
Drawing Title
Drainage Survey

Scale	Surveyor
1:500 @ A1	PK, LH
Date	Approved
18/05/2022	MD

Castle Keep Surveys Ltd
The Keep
The Village
Castle Eden
County Durham
TS27 4SL
T: 01429 896038
E: info@castlekeepsurveys.co.uk

Rev	Amendments	By	Checked
A	- Additional Survey Information	PW	MD

Project Number: CKS - 1061
Drawing No/Revision: 005 A



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4905		CO		150			VC	11.81597	
1904		CO		100			VC	23.02567	
9005	122.5	CO	118.25	300			VC	36.22154	1 in 86
9005	122.5	CO	118.25	300			VC	36.22154	1 in 86
3902	117.17	CO	113.89	750			CO	82.85529	
1001	130.63	CO	126.61	225			VC	89.05054	1 in 32
2907		CO		150			VC	25.52507	
0903	120.93	CO	117.99	375			VC	18.24829	1 in 73
0903	120.93	CO	117.99	375			VC	18.24829	1 in 73
1005		CO		100			VC	26.74235	
1901	129.48	CO	125.36	225			VC	40.49691	1 in 55
9009		CO		100			VC	24.87674	
9009		CO		100			VC	24.87674	
4906		CO		150			VC	16.19331	
1902	125.94	CO	122.27	225			VC	26.57066	1 in 25
2905		CO		150			VC	14.73866	
9903	119.47	SW	117.6	225			VC	30.26549	1 in 151
0004	123.34	CO	120.55	375			VC	34.36568	1 in 382
0004	123.34	CO	120.55	375			VC	34.36568	1 in 382
2902	126.11	CO	115.05	675			CO	74.67262	
2904		CO		150			VC	11.09488	
3003	124.06	CO	118.86	375			VC	37.01351	1 in 308
3002	119.66	CO	116.78	375			VC	27.51363	1 in 9
0915		CO		100			VC	13.41098	
0915		CO		100			VC	13.41098	
0912		CO		150			VC	14.15073	
3005	119.09	SW	116.62	225			VC	25.23886	1 in 194
0901		CO	0	225			VC	14.86607	
9801		CO		150			VC	21.436	
9801		CO		150			VC	21.436	
9004	124.41	CO	121.9	225			FO	80.895	1 in 124
0904	120.81	CO	117.56	450			CO	35.51056	1 in 40
1802	124.02	CO	115.42	675			CO	29.15476	1 in 117
4907		CO		150			VC	41.01618	
4001	118.88	CO	113.46	750			CO	26.83226	1 in 0.70396301
1002	130.45	CO	127.99	150			VC	3.162278	1 in 45
0902	123.09	CO	121.18	225			VC	80.05623	1 in 67
3901		CO	0	750			CO	55.22681	
2910		CO		150			VC	17.81119	
2901	128.02	CO	125.83	225			VC	77.33692	1 in 168
4001	118.88	CO	113.46	750			CO	48.08978	1 in 0.70396301
3004	121.95	CO	118.24	375			VC	49	1 in 117
0005	124.3	SW	121.33	225			VC	37.48333	1 in 69
9902	119.21	CO	116.79	300			CO	15.29706	1 in 109
9902	119.21	CO	116.79	300			CO	15.29706	1 in 109
0006	122.34	CO	118.65	375			VC	54.23099	1 in 83
0006	122.34	CO	118.65	375			VC	54.23099	1 in 83
2001	125.44	CO	122.87	225			VC	22.02271	1 in 29
3009		CO		150			VC	23.047	
0801	118.63	CO	115.6	675			CO	87.0919	1 in 212
0801	118.63	CO	115.6	675			CO	87.0919	1 in 212
9904	118.23	CO	116.12	675			CO	70.21396	1 in 140
9006		CO		100			VC	3.689362	
9006		CO		100			VC	3.689362	
2910		CO		150			VC	10.90181	
1801	121.49	CO	115.18	675			CO	66.37017	
1003		CO	0	225			VC	41.01219	
0905		CO	0	225			VC	27.07397	
4002	118.82	CO	115.64	225			VC	15.65248	1 in 15
3006	118.02	CO	113.52	750			CO	36.67424	1 in 917
1006		CO		100			VC	9.926938	
9801		CO		150			VC	47.28313	
9801		CO		150			VC	47.28313	
4904		CO		150			VC	24.2971	
1903		CO		100			VC	21.68016	
5001	118.67	CO	115.3	300			PVC	18.95647	1 in 211
5001	118.67	CO	115.3	300			PVC	18.95647	1 in 211
5001	118.67	CO	115.3	300			PVC	18.95647	1 in 211
5902	118.95	CO	115.36	225			PVC	29.59815	1 in 99
5902	118.95	CO	115.36	225			PVC	29.59815	1 in 99
5902	118.95	CO	115.36	225			PVC	29.59815	1 in 99
0002		CO		100			VC	13.26577	
4910	117.55	CO	116	225			PVC	32.53153	1 in 148
4912	117.85	CO	115.81	225			PVC	44.9441	1 in 100
4912	117.85	CO	115.81	225			PVC	44.9441	1 in 100
4912	117.85	CO	115.81	225			PVC	44.9441	1 in 100
0018		CO		100			VC	10.62286	
5007	118.77	CO	114.38	375			CO	22.10508	1 in 246
5007	118.77	CO	114.38	375			CO	22.10508	1 in 246
0007	124.57	CO	123.46	225			VC	50.7659	
5002	118.64	CO	115.13	375			CO	21.95498	1 in 100
5002	118.64	CO	115.13	375			CO	21.95498	1 in 100
5002	118.64	CO	115.13	375			CO	21.95498	1 in 100
4911	118.35	CO	115.78	225			PVC	37.43524	1 in 150
4008	118.73	CO	115.4	300			PVC	31.09115	1 in 311
4008	118.73	CO	115.4	300			PVC	31.09115	1 in 311
4008	118.73	CO	115.4	300			PVC	31.09115	1 in 311
5008	118.92	CO	114.29	375			CO	12.33427	1 in 247
5008	118.92	CO	114.29	375			CO	12.33427	1 in 247
5008	118.92	CO	114.29	375			CO	12.33427	1 in 247

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:

Heywood Business Park Heywood Business Park, Heywood,
.

OS sheet Number: SD8409NW
Scale: 1:1250 **Date:** 09/09/2020
Nodes: 535
Sheet: 1 of 8

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SEWER RECORDS

United Utilities — helping life flow smoothly

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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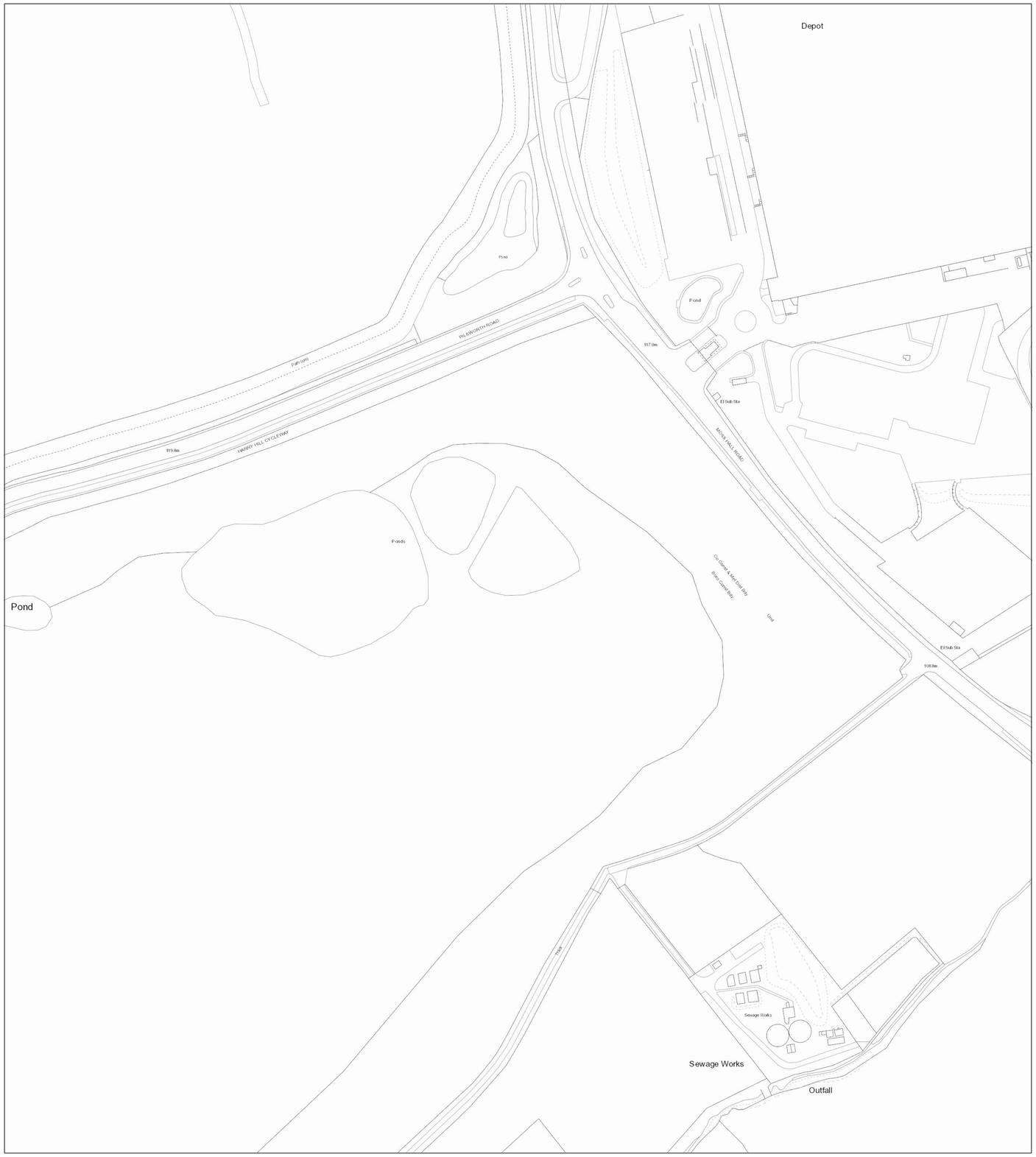
Bullough Moor Recreation Ground
BROADFIELD
Woodland Community Primary School
Broadfield Distribution Centre
Broadfield Distribution Centre
Broadfield Distribution Centre
East Lancashire Railway
East Lancashire Railway
Bowling Green
Pavilion
Pavilion
Play Area
Pond
Tank
Works
Works
Shelter
RECENT STREET
ARGYLE CRESCENT
SHORT STREET
ALEXANDRA ROAD
MELLOR CLOSE
BALCARR CLOSE
UNITY CLOSE
NORTH LIGHT VIEW
Footpath
Path
Path
Path



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

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
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- Valve
- Air Valve
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- Gully
- Cascade
- Flow Meter
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- Orifice Plate
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- 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:

Heywood Business Park Heywood Business Park, Heywood,
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OS sheet Number: SD8309SW
Scale: 1:1250 **Date:** 09/09/2020
Nodes: 535
Sheet: 3 of 8

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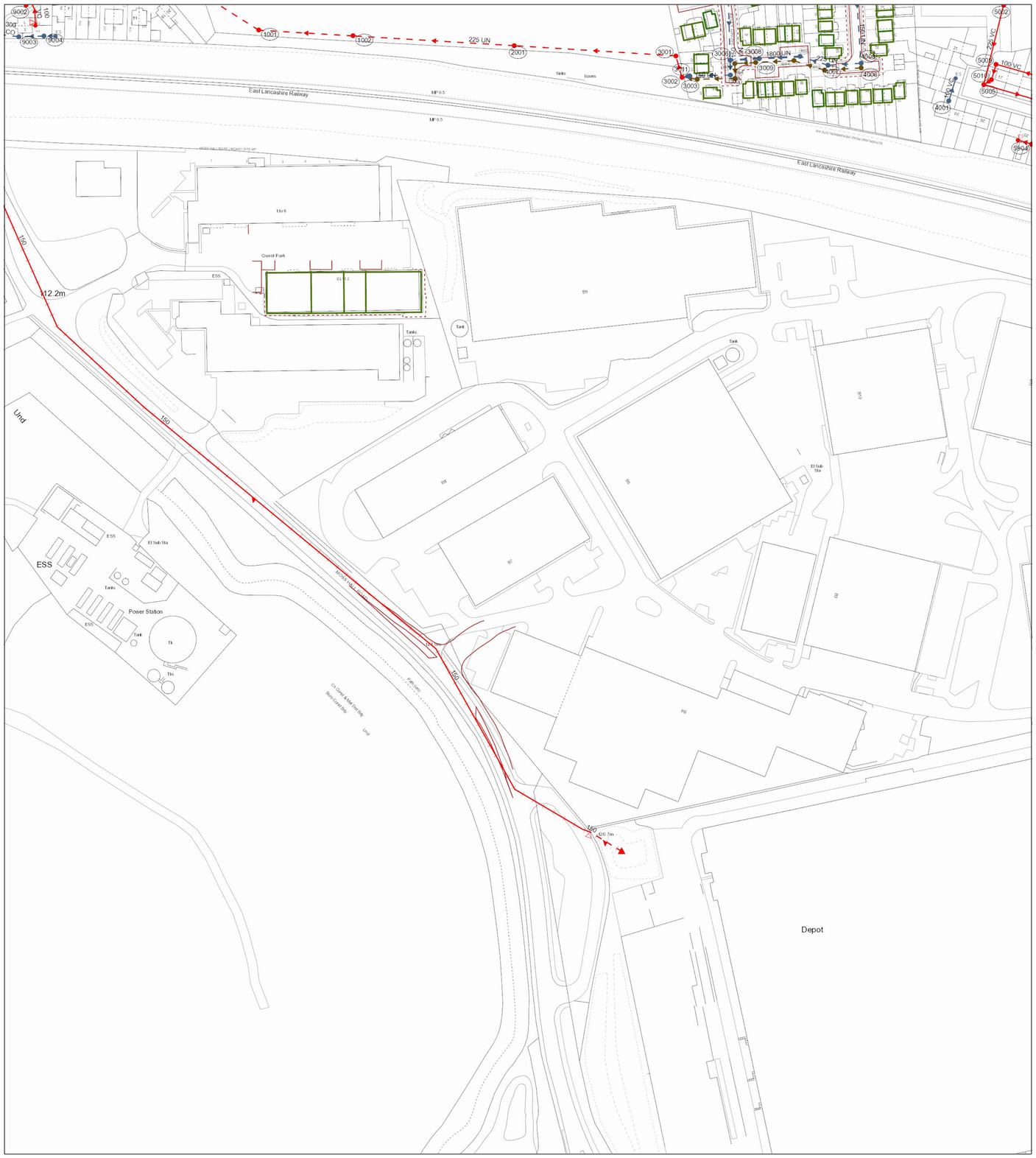
SEWER RECORDS

United Utilities
helping life flow smoothly



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
5009		CO		100			VC	8.969061	
5009		CO		100			VC	8.969061	
5002		CO	0	225			VC	45.35416	
5002		CO	0	225			VC	45.35416	
5904		CO		150			VC	7.888433	
5904		CO		150			VC	7.888433	
9003		SW		300			CO	22.39972	
5010		CO		100			VC	5.079654	
5010		CO		100			VC	5.079654	
4001		SW		100			VC	13.02645	
4001		SW		100			VC	13.02645	
9002	111.68	CO	110.66	150			VC	18.93498	1 in 79
5005	121.5	CO	119.65	225			VC	39.56008	1 in 172
5005	121.5	CO	119.65	225			VC	39.56008	1 in 172
5008		CO		100			VC	36.10003	
9004		SW		300			CO	13.90691	
2001	119.94	CO	115.64	225			UN	89.59208	1 in 166
4005	121.35	FO	119.9	150			UN	17.76026	1 in 40
3006	119.86	SW		0			UN	0.3975756	
3001	121.45	CO	116.19	225			UN	89.66122	1 in 163
3003	119.4	FO	117.5	150			UN	8.526172	1 in 39
3009	120.26	FO	118.93	150			UN	11.71183	1 in 25
3004	119.39	FO	118.03	150			UN	21.06626	1 in 40
4003	121.13	SW	116.52	1800			UN	22.79133	1 in 670
1002	118.57	CO	115.1	225			UN	52.32527	1 in 164
4008	121.9	SW	120.48	225			UN	18.38963	1 in 97
3008	120.42	SW	116.48	1800			UN	16.00616	1 in 400
3007	119.48	SW	116.43	225			UN	22.63467	1 in 162
4004	120.9	FO	119.46	150			UN	21.02954	1 in 40
4006	121.79	FO	120.42	150			UN	20.4621	1 in 39
4007	121.64	SW	120.29	225			UN	16.11843	1 in 10
3011	119.5	SW	116.29	225			UN	4.408012	1 in 147
3002	119.3	CO	116.26	225			UN	12.41516	1 in 177
3005	119.82	FO	118.46	150			UN	8.206367	1 in 19
1001	117.72	CO	114.78	225			UN	65.74036	1 in 126

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:

Heywood Business Park Heywood Business Park, Heywood,
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OS sheet Number: SD8309NW

Scale: 1:1250 **Date:** 09/09/2020

Nodes: 535

Sheet: 4 of 8

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SEWER RECORDS

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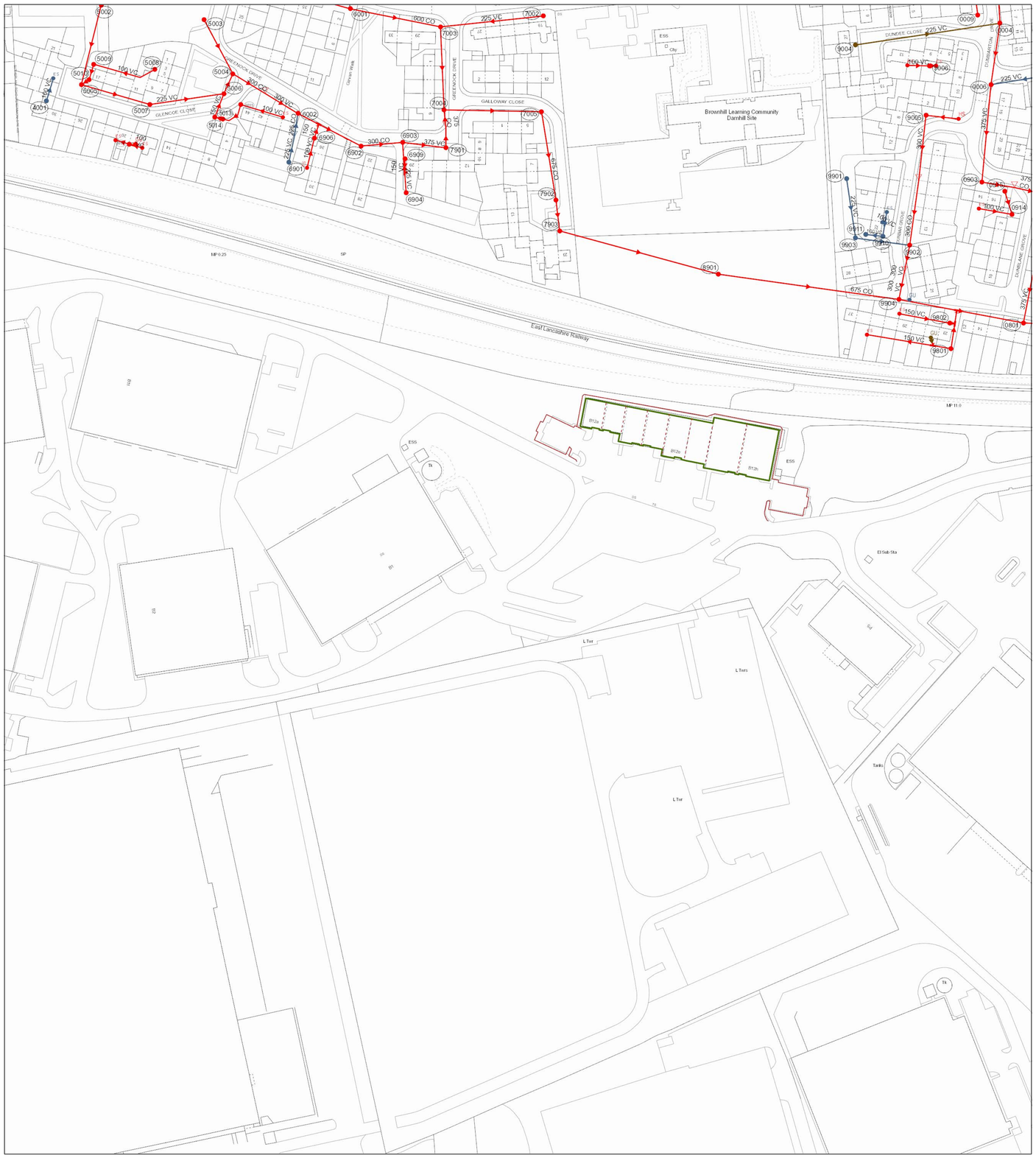

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
6906		CO		150			VC	8.000224	
6902	123.45	CO	118.73	300			CO	23.08679	
5007	122.11	CO	119.38	225			VC	41.4367	1 in 244
5010		CO		100			VC	5.079654	
5010		CO		100			CO	5.079654	
9005	122.5	CO	118.25	300			VC	36.22154	1 in 86
9005	122.5	CO	118.25	300			VC	36.22154	1 in 86
5015		CO		100			VC	15.30401	
7902		CO	0	675			CO	17.11724	
5006	122.65	CO	119.19	225			VC	12.08305	1 in 242
0903	120.93	CO	117.99	375			VC	18.24829	1 in 73
0903	120.93	CO	117.99	375			VC	18.24829	1 in 73
7004	124.52	CO	118.19	675			CO	54.00926	1 in 142
0009		CO		100			VC	24.87674	
0009		CO		100			VC	24.87674	
6903		CO	0	375			VC	24.18677	
9903	119.47	SW	117.6	225			VC	30.28549	1 in 151
0004	123.34	CO	120.55	375			VC	34.36568	1 in 382
0004	123.34	CO	120.55	375			VC	34.36568	1 in 382
5014		CO		100			VC	4.513749	
7002		CO	0	225			VC	57.31492	
0915		CO		100			VC	13.41098	
0915		CO		100			VC	13.41098	
5009		CO		100			VC	8.969061	
5009		CO		100			VC	8.969061	
9801		CO		150			VC	21.436	
9801		CO		150			VC	21.436	
9004	124.41	FO	121.9	225			VC	80.895	1 in 124
5904		CO		150			VC	7.888433	
5904		CO		150			VC	7.888433	
6001		CO	0	600			CO	50.9902	
7003	124.97	CO	120.13	600			CO	46.04346	1 in 177
6904	124.33	CO	122.08	225			VC	28.07134	
5003	123.62	CO	120.37	225			VC	34	1 in 179
6901	123.38	SW	121.61	225			VC	14.31782	1 in 65
9901	120.25	SW	117.94	225			VC	33.37664	1 in 115
0005	124.3	SW	121.33	225			VC	37.48333	1 in 69
5004	123.17	CO	119.13	300			CO	21.09502	1 in 141
7005	125.48	CO	117.71	675			CO	49.64877	
9902	119.21	CO	116.79	300			CO	15.29706	1 in 109
9902	119.21	CO	116.79	300			CO	15.29706	1 in 109
0006	122.34	CO	118.65	375			VC	54.23099	1 in 83
0006	122.34	CO	118.65	375			VC	54.23099	1 in 83
5002		CO	0	225			VC	45.35416	
5002		CO	0	225			VC	45.35416	
9910		SW		100			VC	9.507527	
0801	118.63	CO	115.6	675			CO	87.0919	1 in 212
0801	118.63	CO	115.6	675			CO	87.0919	1 in 212
9904	118.23	CO	116.12	675			CO	70.21396	1 in 140
9006		CO		100			VC	3.689362	
9006		CO		100			VC	3.689362	
6909		CO		150			VC	7.507593	
4001		SW		100			VC	13.02645	
4001		SW		100			VC	13.02645	
6002	122.78	CO	118.95	300			CO	39.35734	1 in 187
5005	121.5	CO	119.65	225			VC	39.56008	1 in 172
5005	121.5	CO	119.65	225			VC	39.56008	1 in 172
8901		CO	0	675			CO	100.9752	
9801		CO		150			VC	47.28313	
9801		CO		150			VC	47.28313	
5008		CO		100			VC	36.10003	
5013		CO		150			VC	13.95202	
7901	124.17	CO	118.42	375			VC	11	1 in 69
7903	122.98	CO	117.38	675			CO	91.21404	

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
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- 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
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PE	Polyethylene
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CO	Concrete
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ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

Heywood Business Park Heywood Business Park, Heywood,
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OS sheet Number: SD8309NE
Scale: 1:1250 **Date:** 09/09/2020
Nodes: 535
Sheet: 5 of 8

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SEWER RECORDS

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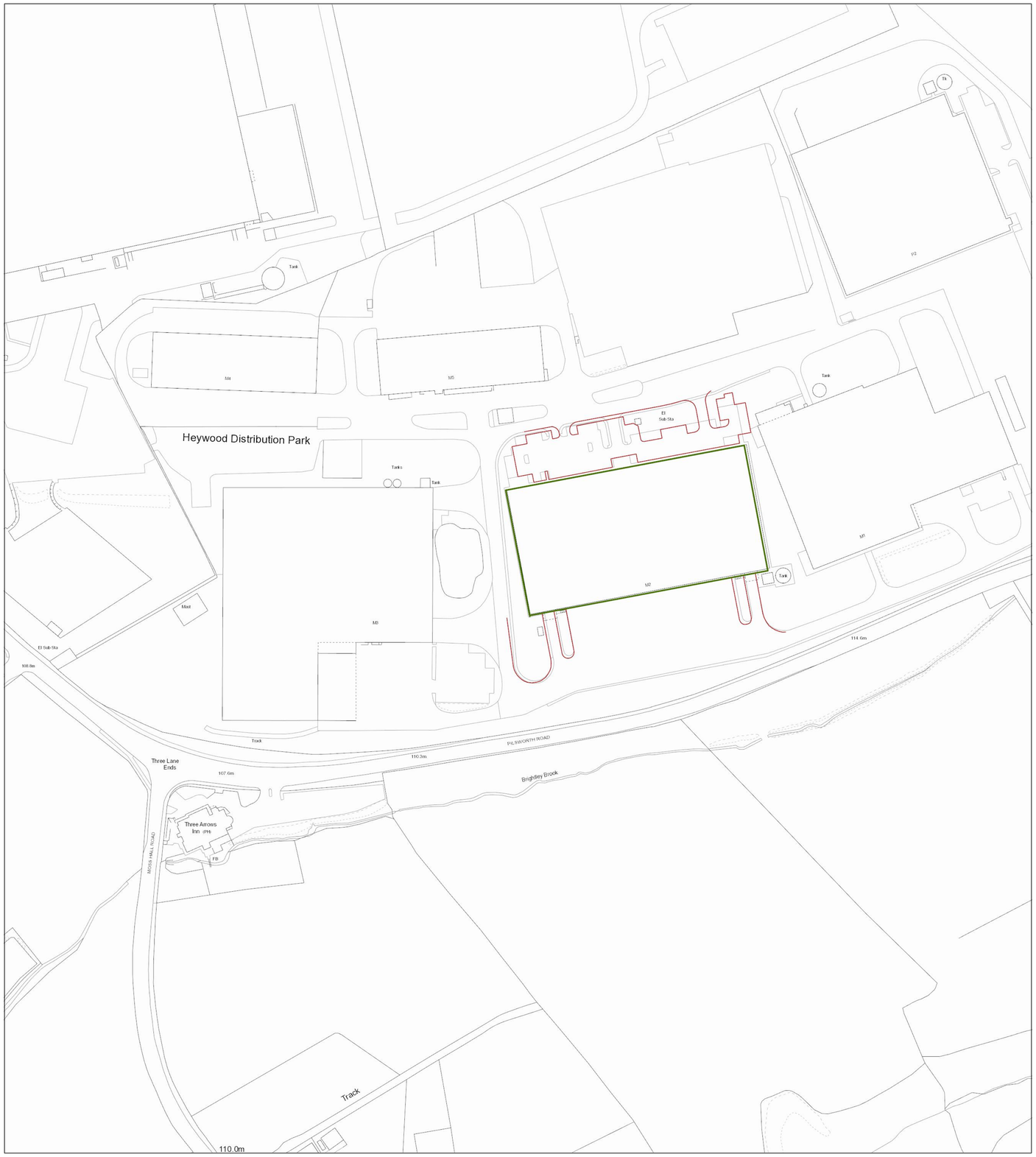

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

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

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- Head of System
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- Sewer Overflow
- Ww Treatment Works
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- 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
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RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
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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:

Heywood Business Park Heywood Business Park, Heywood,
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OS sheet Number: SD8309SE

Scale: 1:1250 **Date:** 09/09/2020

Nodes: 535

Sheet: 6 of 8

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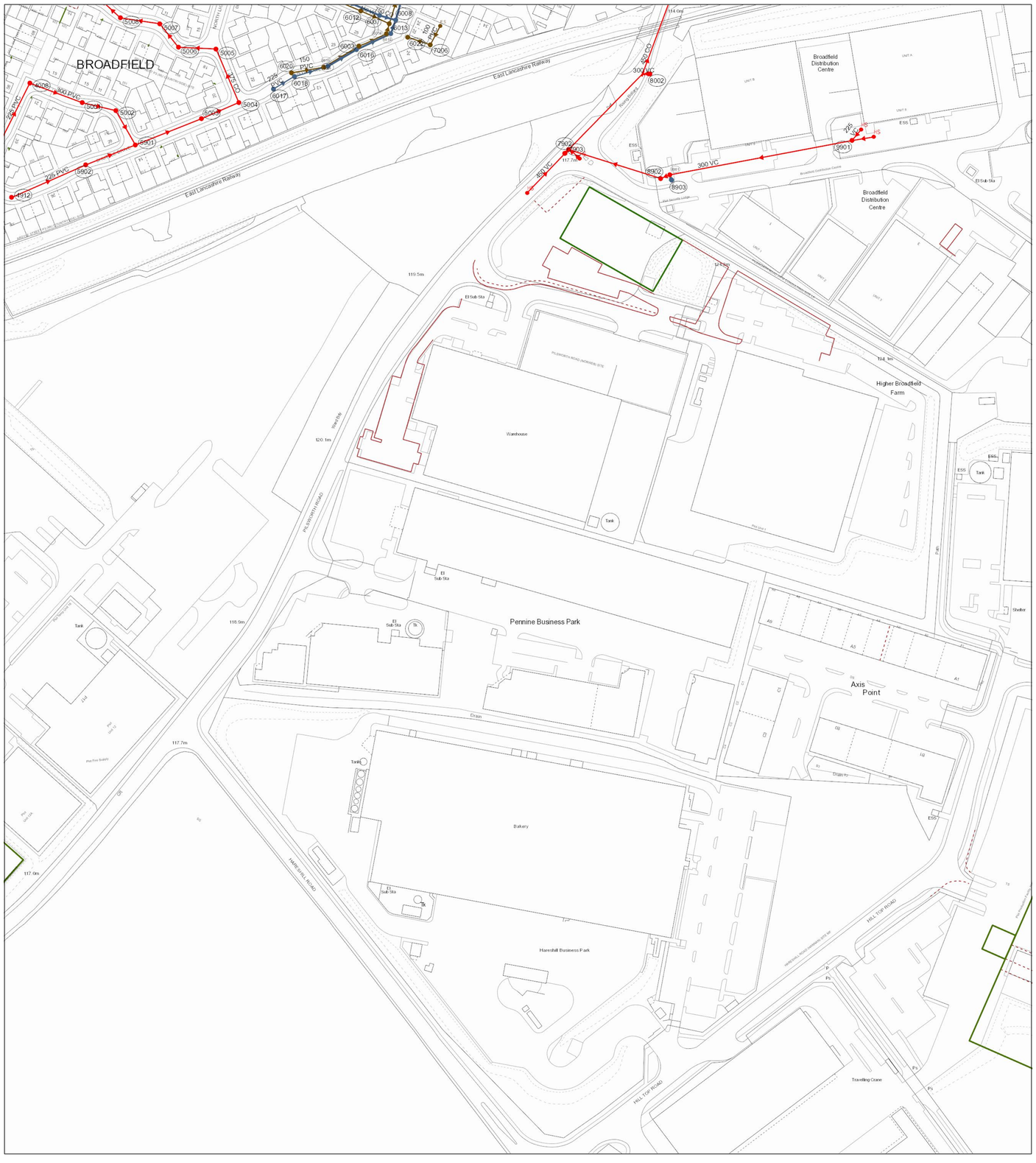
SEWER RECORDS

United Utilities
helping life flow smoothly

Pond
FB
LB
TCB
P/d
115.2m
PELSWORTH ROAD
TERRACE
OH
Tk
P/2
P/3a
PSC
S/d
S/d
S/d



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
6008	117.18	SW	113.8	750			CO	21.44651	1 in 113
6008	117.18	SW	113.8	750			CO	21.44651	1 in 113
6006	117.58	SW	113.98	750			CO	30.98208	1 in 221
8002	115.3	CO	113.7	300			VC	4	
8002	115.3	CO	113.7	300			VC	4	
6021	118.19	FO	115.37	150			PVC	22.657	1 in 151
6021	118.19	FO	115.37	150			PVC	22.657	1 in 151
6013	117.22	FO	114.99	150			PVC	22.25885	1 in 49
6013	117.22	FO	114.99	150			PVC	22.25885	1 in 49
8902	119.81	CO	116.49	300			VC	53.45091	1 in 22
8902	119.81	CO	116.49	300			VC	53.45091	1 in 22
6011	117.6	FO	115.52	150			VC	23.62983	1 in 88
8903	119.86	SW	118.55	150			VC	3.162278	
8903	119.86	SW	118.55	150			VC	3.162278	
6010	117.24	SW	113.75	750			CO	7.987405	1 in 160
6010	117.24	SW	113.75	750			CO	7.987405	1 in 160
7006		FO		100			PVC	13.23771	
7006		FO		100			PVC	13.23771	
6020	118.38	FO	115.58	150			PVC	18.24988	1 in 87
6020	118.38	FO	115.58	150			PVC	18.24988	1 in 87
6012	117.35	FO	115.25	150			VC	17.29594	1 in 86
6012	117.35	FO	115.25	150			VC	17.29594	1 in 86
6019	118.15	SW	113.85	750			CO	18.28965	1 in 366
6019	118.15	SW	113.85	750			CO	18.28965	1 in 366
6014	117.31	FO	115.09	150			PVC	5.733935	1 in 57
6014	117.31	FO	115.09	150			PVC	5.733935	1 in 57
7902	117.71	CO	113.78	450			CO	133.3667	1 in 702
7902	117.71	CO	113.78	450			CO	133.3667	1 in 702
6007	117.35	SW	113.85	750			CO	9.324365	1 in 72
6007	117.35	SW	113.85	750			CO	9.324365	1 in 72
6003	117.63	FO	115.22	150			PVC	16.7628	1 in 129
6003	117.63	FO	115.22	150			PVC	16.7628	1 in 129
6016	117.66	SW	113.8	750			CO	20.9893	1 in 420
6016	117.66	SW	113.8	750			CO	20.9893	1 in 420
9901	121.21	CO	118.81	300			VC	102.7716	1 in 48
9901	121.21	CO	118.81	300			VC	102.7716	1 in 48
6018	118.4	SW	116.12	225			VC	19.46568	1 in 162
6018	118.4	SW	116.12	225			VC	19.46568	1 in 162
6017	118.21	SW	115.21	225			PVC	13.47917	1 in 15
6017	118.21	SW	115.21	225			PVC	13.47917	1 in 15
8901	120.02	CO	116.66	300			VC	5.385165	1 in 54
8901	120.02	CO	116.66	300			VC	5.385165	1 in 54
5001	118.67	CO	115.3	300			PVC	18.95647	1 in 211
5001	118.67	CO	115.3	300			PVC	18.95647	1 in 211
5001	118.67	CO	115.3	300			PVC	18.95647	1 in 211
5005	118.38	CO	114.55	375			CO	20.92412	1 in 209
5005	118.38	CO	114.55	375			CO	20.92412	1 in 209
5902	118.95	CO	115.36	225			PVC	29.59815	1 in 99
5902	118.95	CO	115.36	225			PVC	29.59815	1 in 99
5902	118.95	CO	115.36	225			PVC	29.59815	1 in 99
5003	117.91	CO	114.76	375			CO	22.6778	1 in 252
5003	117.91	CO	114.76	375			CO	22.6778	1 in 252
4912	117.85	CO	115.81	225			PVC	44.9441	1 in 100
4912	117.85	CO	115.81	225			PVC	44.9441	1 in 100
4912	117.85	CO	115.81	225			PVC	44.9441	1 in 100
5007	118.77	CO	114.38	375			CO	22.10508	1 in 246
5007	118.77	CO	114.38	375			CO	22.10508	1 in 246
5002	118.64	CO	115.13	375			CO	21.95498	1 in 100
5002	118.64	CO	115.13	375			CO	21.95498	1 in 100
5002	118.64	CO	115.13	375			CO	21.95498	1 in 100
4911	118.35	CO	115.78	225			PVC	37.43524	1 in 150
4008	118.73	CO	115.4	300			PVC	31.09115	1 in 311
4008	118.73	CO	115.4	300			PVC	31.09115	1 in 311
4008	118.73	CO	115.4	300			PVC	31.09115	1 in 311
5004	118.01	CO	114.67	375			CO	32.21874	1 in 268
5004	118.01	CO	114.67	375			CO	32.21874	1 in 268
5008	118.92	CO	114.29	375			CO	12.33427	1 in 247
5008	118.92	CO	114.29	375			CO	12.33427	1 in 247
5008	118.92	CO	114.29	375			CO	12.33427	1 in 247
5901	118.47	CO	114.91	375			CO	39.24917	1 in 262
5901	118.47	CO	114.91	375			CO	39.24917	1 in 262
5006	118.59	CO	114.45	375			CO	16.57514	1 in 237
5006	118.59	CO	114.45	375			CO	16.57514	1 in 237

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

LEGEND

Abandoned | Foul | Surface Water | Combined

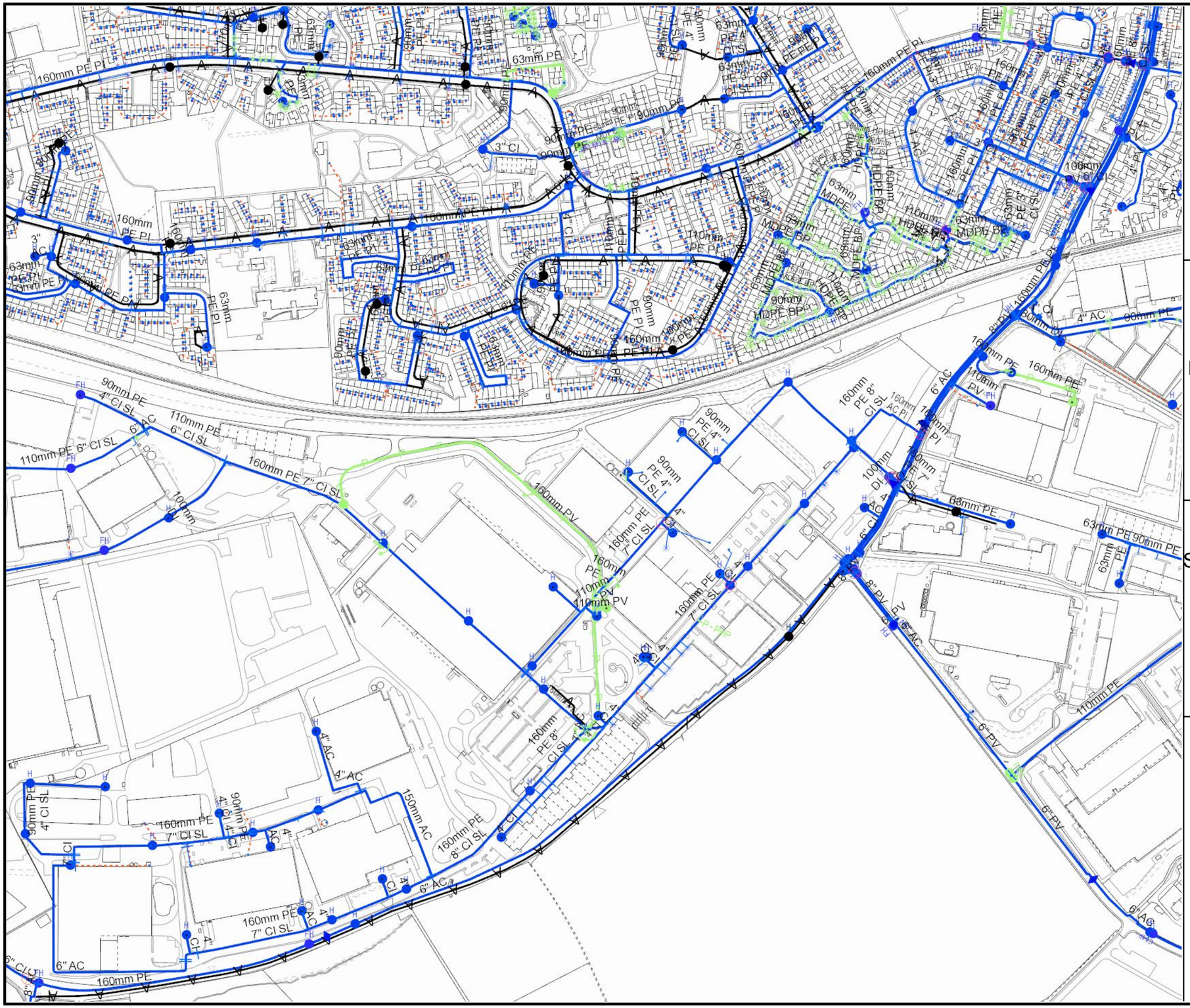
- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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



WATER MAIN RECORDS

Address or Site Reference

Heywood Business Park Heywood Business Park,
Heywood,
.

SD8409NW

Scale: 1:5000

Date: 09/09/2020

Printed by: Property Searches

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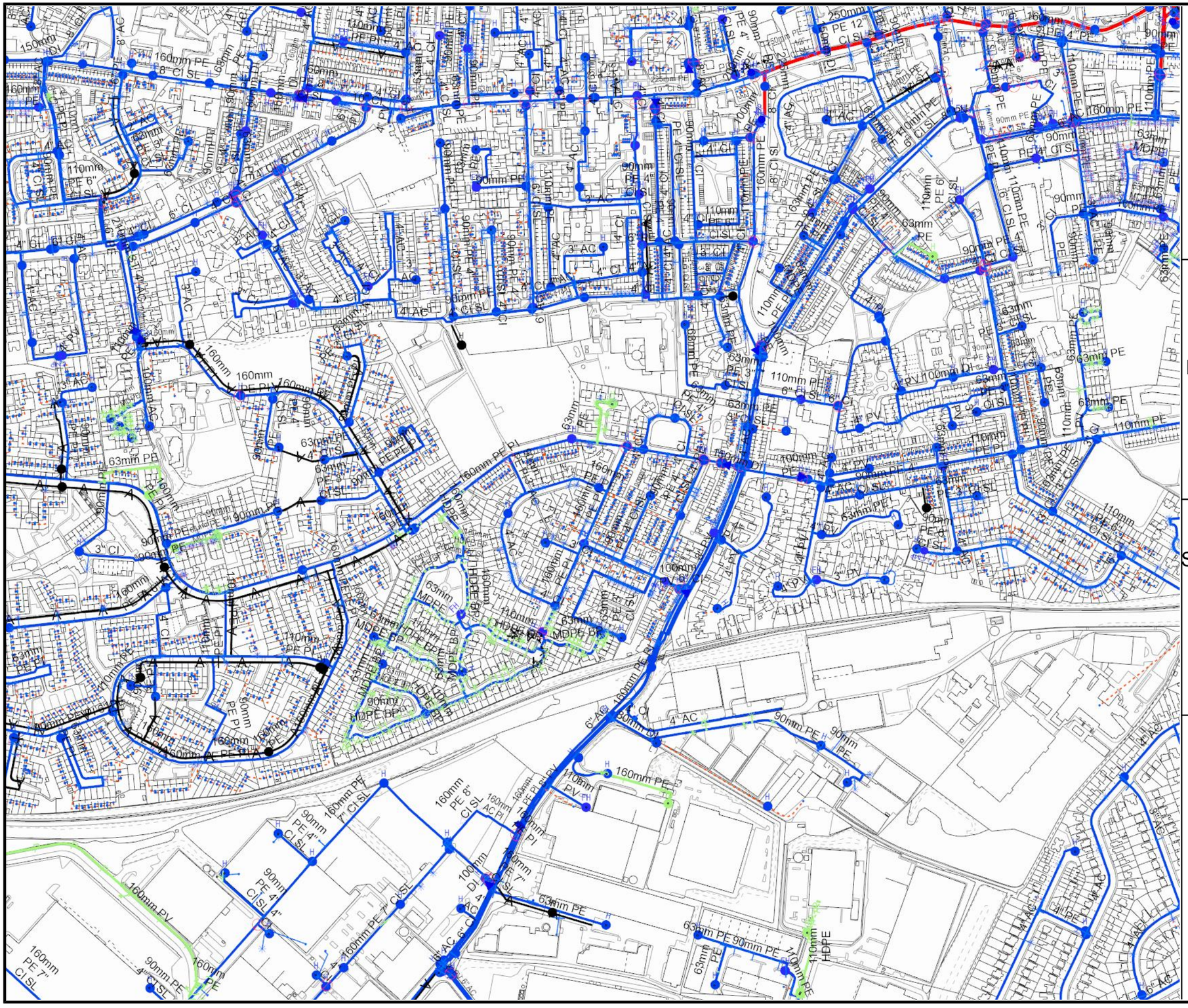

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WATER MAIN RECORDS

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SD8410SE

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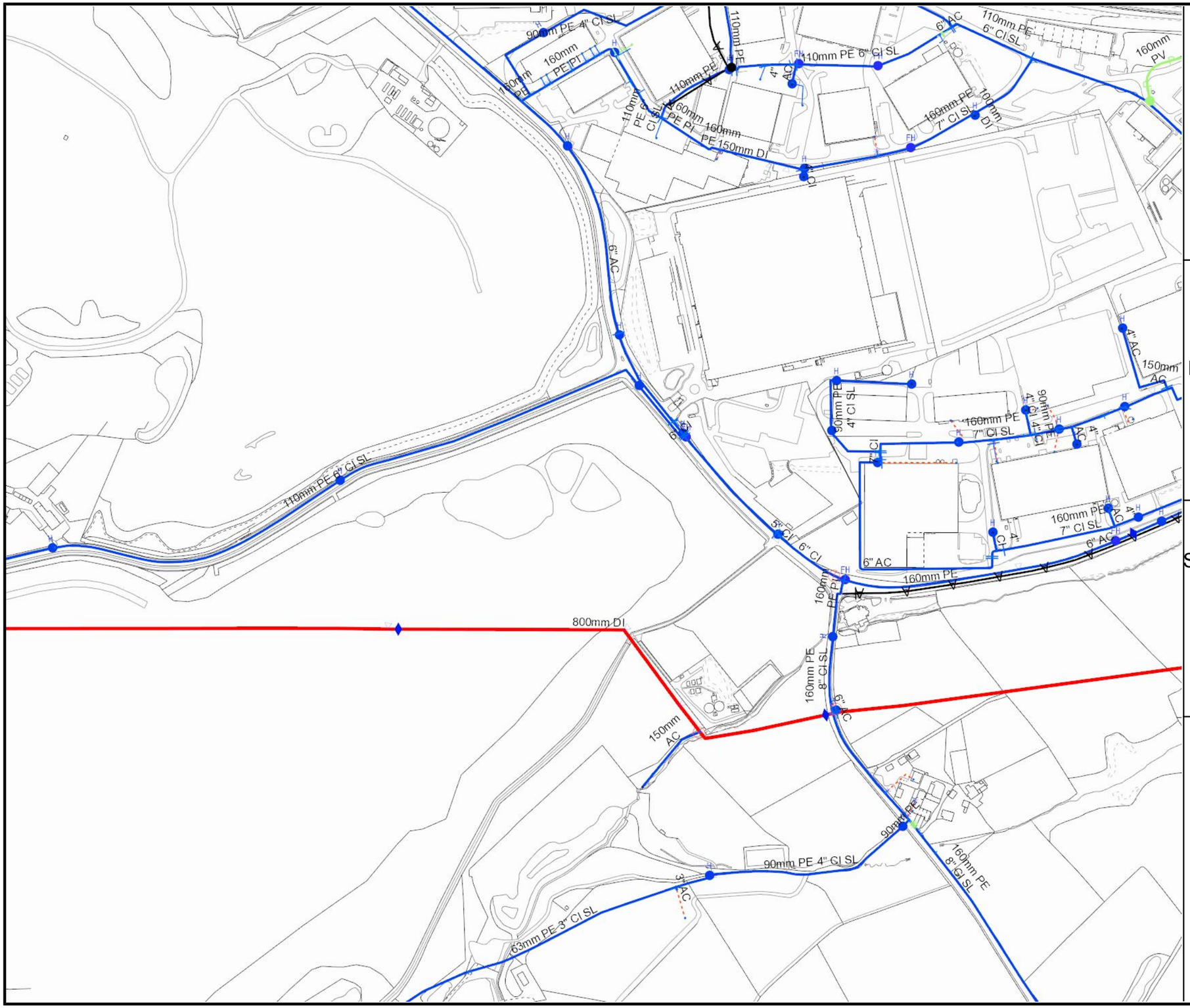

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SD8309SW

Scale: 1:5000

Date: 09/09/2020

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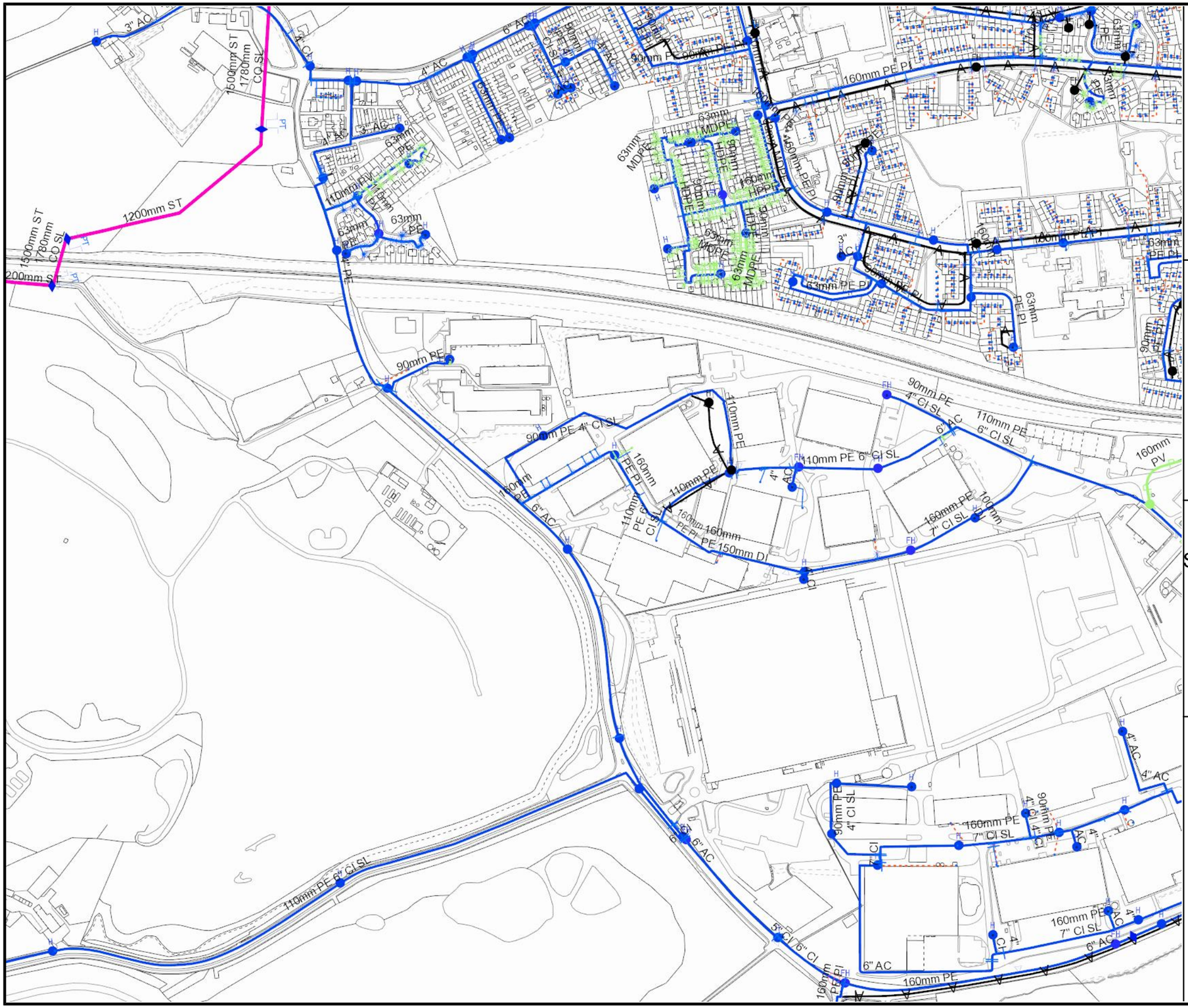

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Address or Site Reference

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SD8309NW

Scale: 1:5000

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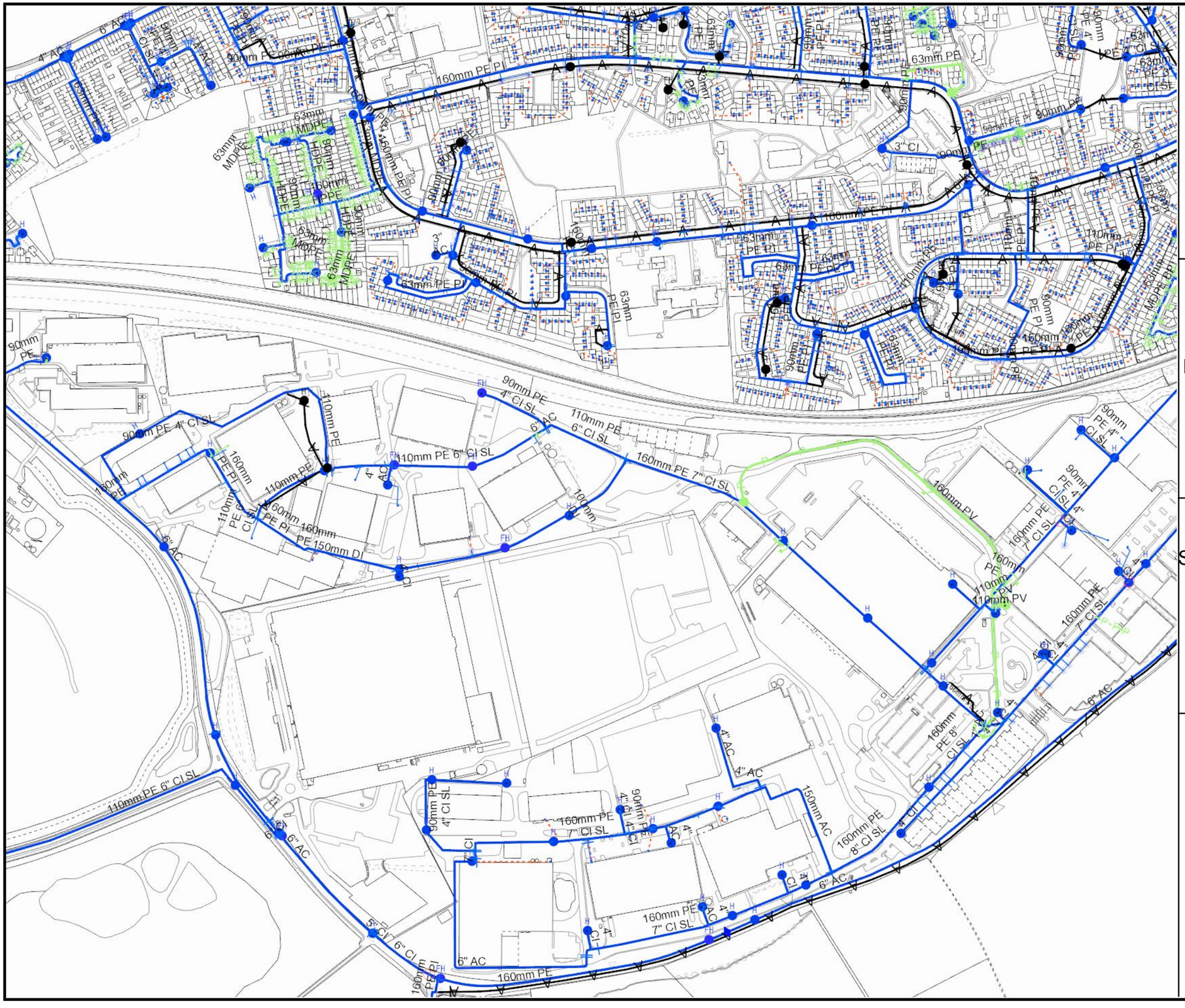
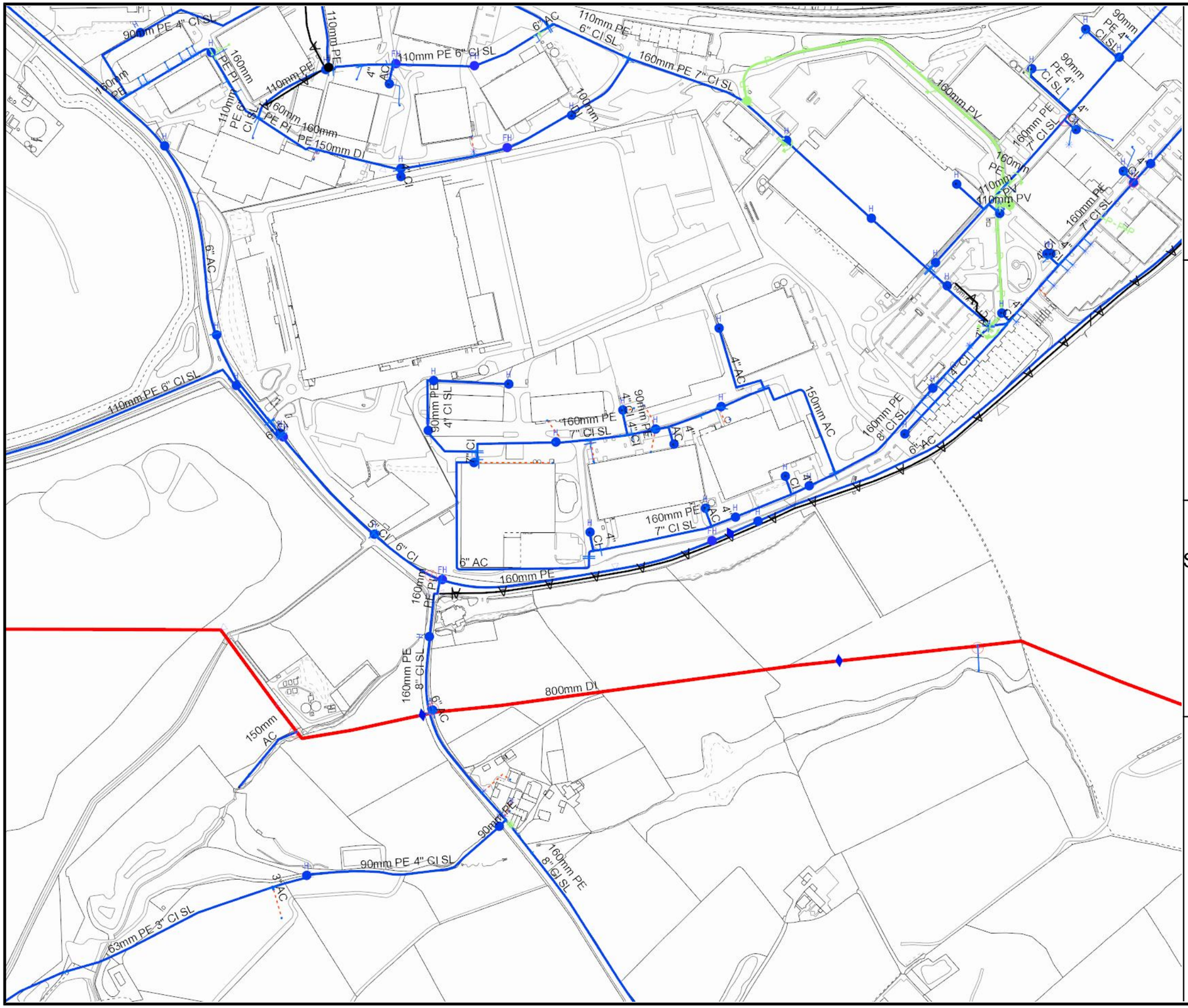

6" AC
4" AC
90mm PE
63mm PE
160mm PE PI
63mm MDPE
160mm HDPE
3" CI
110mm PE 6" CI SL
90mm PE 4" CI SL
110mm PE 6" CI SL
160mm PE 7" CI SL
110mm PE
160mm PE
150mm DI
4" AC
6" AC
5" CI
6" CI
160mm PE PI
63mm PE PI
90mm PE PI
110mm PE PI
63mm PE
90mm PE
110mm PE
160mm PE
4" CI SL
6" CI SL
7" CI SL
8" CI SL
150mm AC
160mm PV
110mm PV
63mm PE PI
90mm PE PI
110mm PE PI
160mm PE PI



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SD8309SE

Scale: 1:5000

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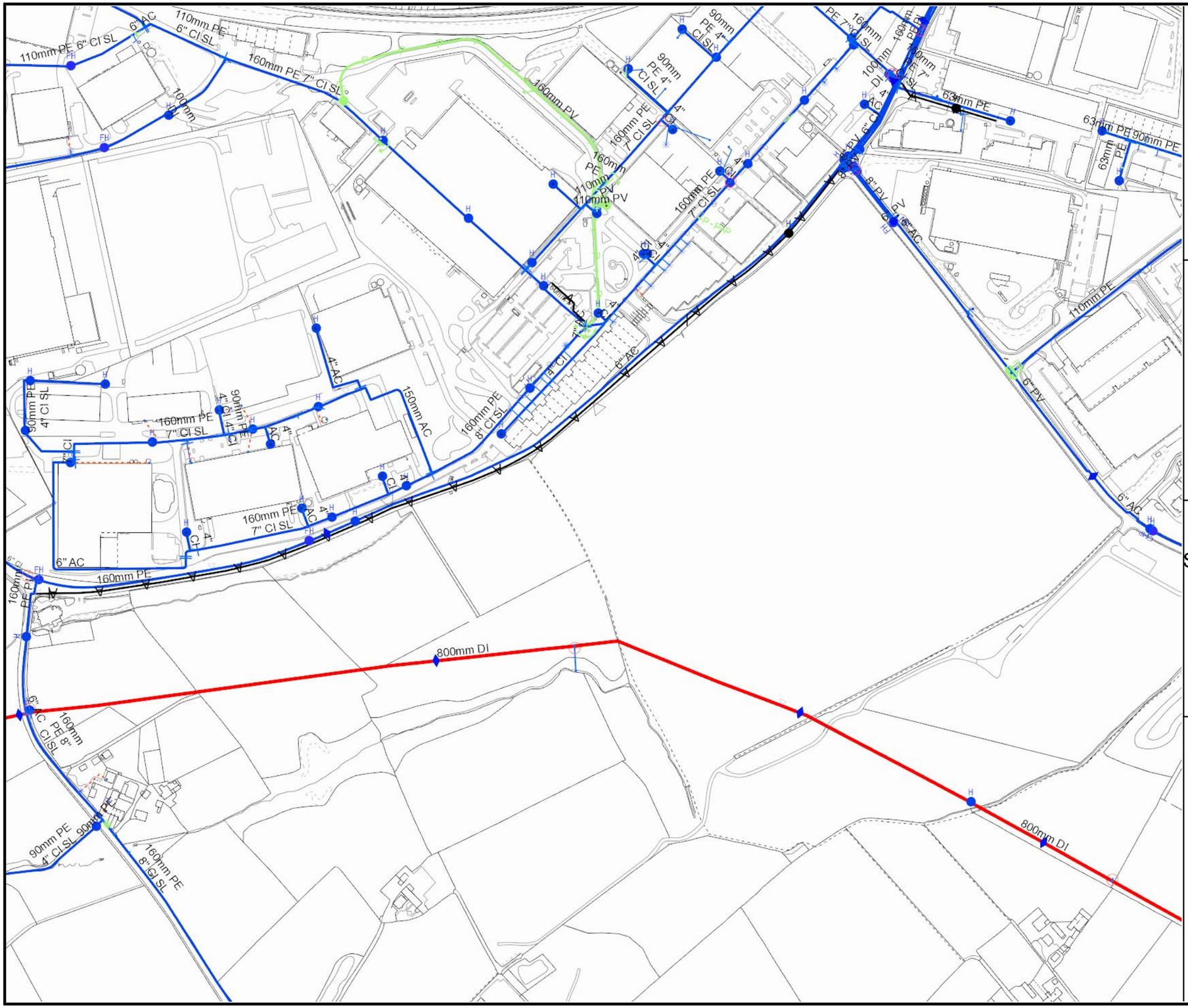

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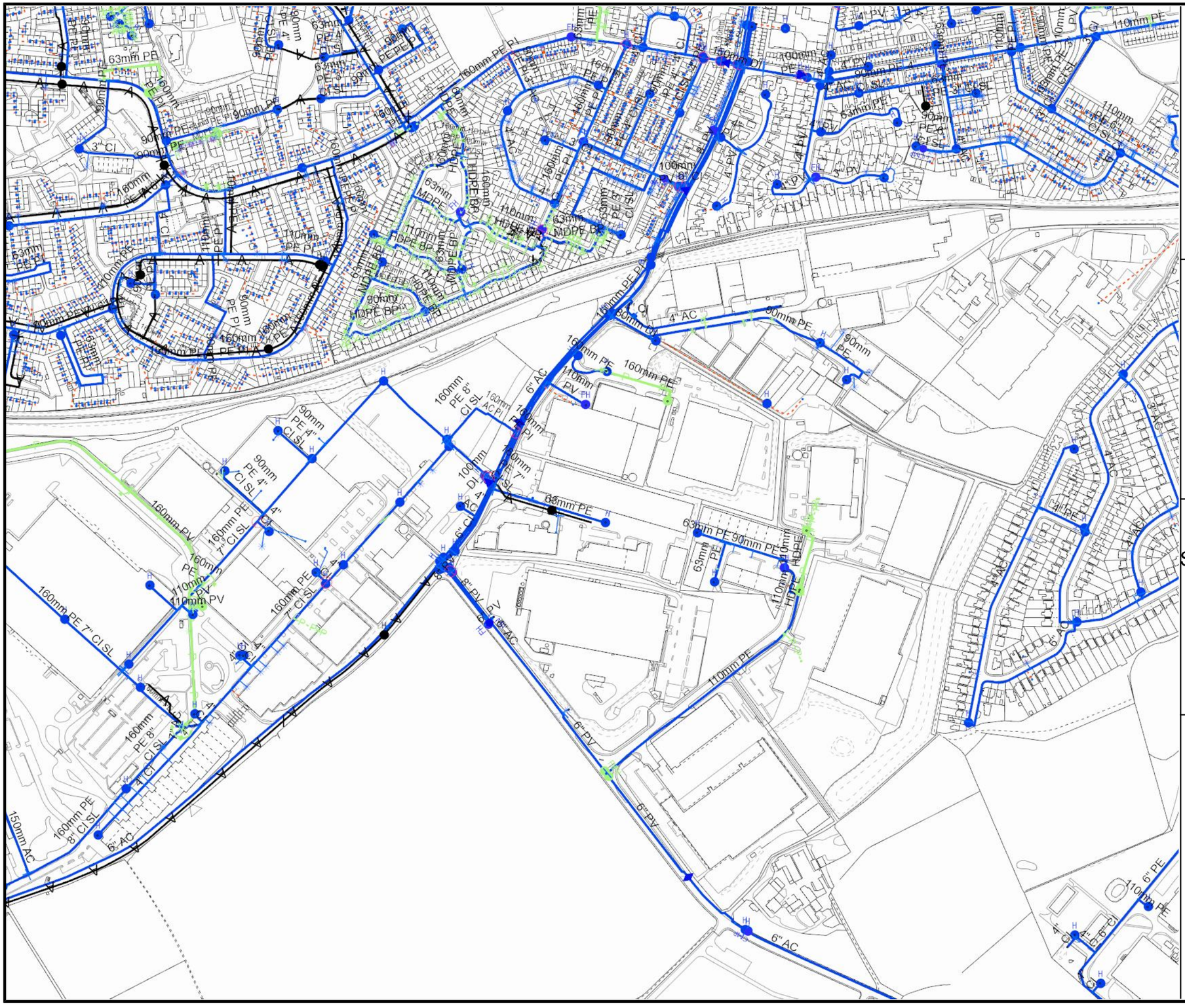

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WATER MAIN RECORDS

Address or Site Reference

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SD8409NE

Scale: 1:5000

Date: 09/09/2020

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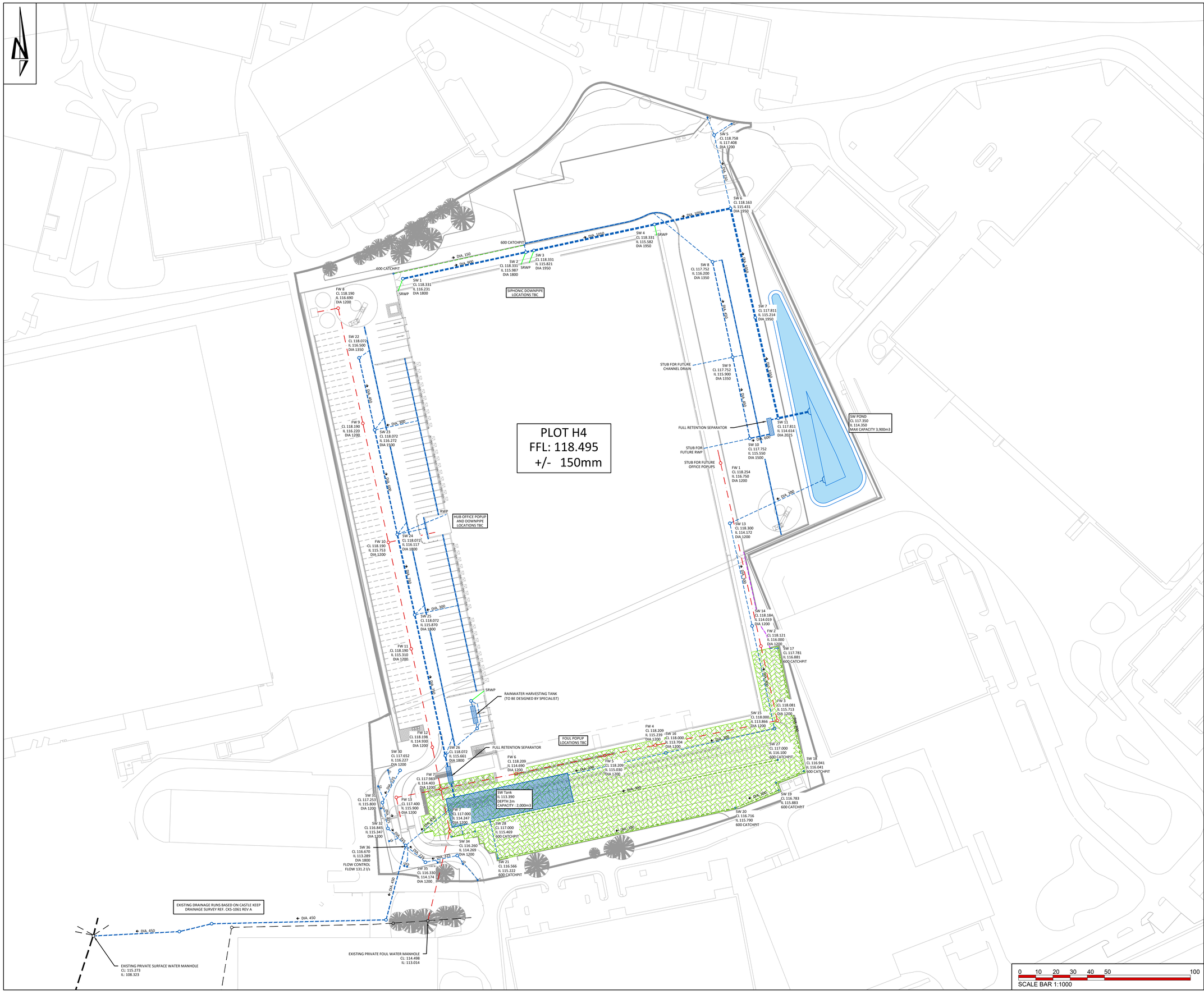
APPENDIX D – DRAINAGE LAYOUT



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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION

MAINTENANCE

DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

GENERAL NOTES:

1. This drawing shall be read in conjunction with all the relevant architects, engineers' and service engineers drawings & specifications.
2. All units in millimeters U.O.N. on the drawing.
3. Do Not Scale off the drawing.

KEY:

- Surface Water Drainage
- Attenuation pond
- Underground Attenuation Tank
- Permeable Paving (Lined)
- Kerb Drain
- Channel Drain
- Perforated Drain / Filter Drain
- Foul Water Drainage (150mm Dia, Min. Gradient 1:150)
- Existing Drainage

REV	DATE	BY	DESCRIPTION	CHKD
P02	27.05.2025	BP	Update to latest layout	JW
P01	01.05.2025	BP	Preliminary Issue	JW

Burrows Graham

North Office:
5 Ambassador Place, Stockport Road, Altrincham WA15 8DB
Tel: +44 (0)161 804 8046

South Office:
Buckland House, Dower Mews, High Street, Berkhamsted HP4 2BL
Tel: +44 (0)161 804 8046

CLIENT

INDURENT

PROJECT

HEYWOOD

DRAWING TITLE

PLOT H4
DRAWING LAYOUT

BGL PROJECT NUMBER	DRAWING STATUS	OFFICE	
30042	PRELIMINARY	NORTH	
SCALE @ A1	DATE	DRAWN BY	CHECKED BY
1:1000	01.05.2025	BP	JW

DRAWING No	REV
30042-BGL-XX-XX-DR-C-00250	P02

APPENDIX E – HYDRAULIC CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	1.155	5.00	118.331	1800	383682.639	409683.576	2.100
2	1.157	5.00	118.331	1800	383754.154	409699.014	2.344
3	1.058	5.00	118.331	1950	383758.883	409700.035	2.510
4	1.856	5.00	118.331	1950	383828.974	409715.163	2.749
5	0.018	5.00	118.758	1200	383863.703	409767.150	1.350
6			118.163	1950	383873.204	409724.517	2.732
7			117.811	1950	383887.616	409660.983	2.597
8		5.00	117.752	1350	383862.747	409693.348	1.552
9	0.481	5.00	117.752	1350	383874.432	409637.971	1.852
10	0.345	5.00	117.752	1500	383884.382	409590.699	2.202
11			117.811	2025	383900.946	409602.465	3.197
Pond			117.350		383929.190	409585.110	3.000
13			118.300	1200	383872.811	409541.347	4.128
14	0.074	5.00	118.184	1200	383885.792	409481.642	4.165
15	0.086	5.00	118.000	1200	383898.774	409421.936	4.134
16	0.284	5.00	118.000	1200	383835.611	409407.795	4.296
17		5.00	117.781		383903.153	409456.695	0.900
18			116.941	1200	383916.444	409394.317	0.900
19	0.057	5.00	116.783	1200	383912.324	409387.448	0.900
20	0.159	5.00	116.716		383888.328	409378.998	0.926
21	0.198	5.00	116.566		383735.629	409345.953	1.344
22	0.271	5.00	118.072	1350	383657.138	409637.565	1.572
23	0.217	5.00	118.072	1500	383666.238	409595.598	1.800
24	0.220	5.00	118.072	1800	383679.403	409534.881	1.955
25	0.215	5.00	118.072	1800	383689.539	409488.133	2.202
26	0.222	5.00	118.072	1800	383707.295	409406.243	2.411
27		5.00	117.000		383900.689	409403.754	0.900
28	0.395	5.00	117.000		383731.058	409367.252	1.531
Tank			117.800		383712.524	409382.126	4.410
30	0.043	5.00	117.652	1200	383680.426	409397.549	1.425
31	0.045	5.00	117.253	1200	383670.174	409378.796	1.453
32	0.017	5.00	116.845	1200	383673.353	409363.769	1.498
34	0.045	5.00	116.260	1200	383713.708	409348.000	1.991
35			116.330	1200	383695.153	409344.090	2.156
36	0.040	5.00	116.670	1350	383683.676	409353.856	3.381
37_out			115.150	1350	383672.943	409344.859	1.931
38	0.207	5.00	117.220	1200	383691.286	409601.006	0.820
39	0.207	5.00	117.220	1200	383714.484	409493.542	0.820

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	73.162	0.600	116.231	115.987	0.244	300.0	900	5.68	50.0
1.001	2	3	4.838	0.600	115.987	115.971	0.016	300.0	900	5.72	50.0
1.002	3	4	71.705	0.600	115.821	115.582	0.239	300.0	1050	6.32	50.0
1.003	4	6	45.208	0.600	115.582	115.431	0.151	300.0	1050	6.70	50.0
2.000	5	6	43.679	0.600	117.408	116.181	1.227	35.6	150	5.43	50.0
1.004	6	7	65.148	0.600	115.431	115.214	0.217	300.0	1050	7.25	50.0
1.005	7	11	60.017	0.600	115.214	114.614	0.600	100.0	1050	7.54	50.0
3.000	8	9	56.596	0.600	116.200	115.900	0.300	188.7	450	5.64	50.0
3.001	9	10	48.308	0.600	115.900	115.700	0.200	241.5	450	6.26	50.0
3.002	10	11	20.318	0.600	115.550	115.464	0.086	236.3	600	6.47	50.0
1.006	11	Pond	33.150	0.600	114.614	114.350	0.264	125.6	1050	7.72	50.0
1.007	Pond	13	71.371	0.600	114.350	114.172	0.178	400.0	300	9.25	50.0
1.008	13	14	61.100	0.600	114.172	114.019	0.153	400.0	300	10.55	50.0
1.009	14	15	61.101	0.600	114.019	113.866	0.153	400.0	300	11.86	50.0
1.010	15	16	64.727	0.600	113.866	113.704	0.162	400.0	300	13.24	50.0
1.011	16	Tank	125.735	0.600	113.704	113.390	0.314	400.0	300	15.93	50.0
4.000	17	18	63.778	0.600	116.881	116.041	0.840	75.9	300	5.59	50.0
4.001	18	19	8.010	0.600	116.041	115.883	0.158	50.7	300	5.65	50.0
4.002	19	20	25.440	0.600	115.883	115.790	0.093	275.0	300	6.10	50.0
4.003	20	21	156.255	0.600	115.790	115.222	0.568	275.0	300	8.86	50.0
4.004	21	Tank	42.922	0.600	115.222	113.390	1.832	23.4	300	9.08	50.0
5.000	22	23	42.942	0.600	116.500	116.422	0.078	550.5	450	5.83	50.0
6.000	38	23	25.625	0.600	116.400	116.272	0.128	200.0	300	5.39	50.0
5.001	23	24	62.128	0.600	116.272	116.117	0.155	400.0	600	6.69	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.803	1147.3	156.5	1.200	1.444	1.155	0.0	222	1.282
1.001	1.803	1147.3	313.3	1.444	1.460	2.312	0.0	319	1.548
1.002	1.984	1718.0	456.6	1.460	1.699	3.369	0.0	367	1.692
1.003	1.984	1718.0	708.1	1.699	1.682	5.225	0.0	469	1.894
2.000	1.692	29.9	2.4	1.200	1.832	0.018	0.0	29	1.024
1.004	1.984	1718.0	710.5	1.682	1.547	5.243	0.0	470	1.895
1.005	3.446	2983.8	710.5	1.547	2.147	5.243	0.0	346	2.857
3.000	1.476	234.8	0.0	1.102	1.402	0.000	0.0	0	0.000
3.001	1.303	207.3	65.2	1.402	1.602	0.481	0.0	173	1.159
3.002	1.580	446.6	111.9	1.602	1.747	0.826	0.0	204	1.324
1.006	3.074	2661.5	822.5	2.147	1.950	6.069	0.0	399	2.727
1.007	0.780	55.1	822.5	2.700	3.828	6.069	0.0	300	0.790
1.008	0.780	55.1	822.5	3.828	3.865	6.069	0.0	300	0.790
1.009	0.780	55.1	832.5	3.865	3.834	6.143	0.0	300	0.790
1.010	0.780	55.1	844.1	3.834	3.996	6.229	0.0	300	0.790
1.011	0.780	55.1	882.6	3.996	4.110	6.513	0.0	300	0.790
4.000	1.806	127.7	0.0	0.600	0.600	0.000	0.0	0	0.000
4.001	2.213	156.4	0.0	0.600	0.600	0.000	0.0	0	0.000
4.002	0.943	66.7	7.7	0.600	0.626	0.057	0.0	68	0.633
4.003	0.943	66.7	29.2	0.626	1.044	0.216	0.0	139	0.914
4.004	3.261	230.5	56.0	1.044	4.110	0.413	0.0	100	2.709
5.000	0.859	136.7	36.7	1.122	1.200	0.271	0.0	159	0.732
6.000	1.108	78.3	28.0	0.520	1.500	0.207	0.0	124	1.019
5.001	1.211	342.4	94.1	1.200	1.355	0.695	0.0	214	1.040

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
5.002	24	25	47.834	0.600	116.117	115.870	0.247	193.7	750	7.09	50.0
7.000	39	25	25.525	0.600	116.400	116.020	0.380	67.2	300	5.22	50.0
5.003	25	26	83.793	0.600	115.870	115.661	0.209	400.0	750	8.09	50.0
5.004	26	Tank	24.677	0.600	115.661	115.661	0.000	0.0	750	8.50	50.0
8.000	27	28	173.514	0.600	116.100	115.469	0.631	275.0	300	8.07	50.0
8.001	28	Tank	23.764	0.600	115.469	113.390	2.079	11.4	300	8.15	50.0
1.012	Tank	36	40.391	0.600	113.390	113.289	0.101	400.0	450	16.59	50.0
9.000	30	31	21.372	0.600	116.227	115.800	0.427	50.1	225	5.19	50.0
9.001	31	32	15.360	0.600	115.800	115.347	0.453	33.9	225	5.31	50.0
9.002	32	36	14.312	0.600	115.347	114.962	0.385	37.2	225	5.42	50.0
10.000	34	35	18.962	0.600	114.269	114.174	0.095	200.0	225	5.34	50.0
10.001	35	36	15.070	0.600	114.174	114.099	0.075	200.0	225	5.62	50.0
1.013	36	37_out	14.005	0.600	113.289	113.219	0.070	200.0	450	16.76	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
5.002	2.007	886.7	124.0	1.205	1.452	0.915	0.0	187	1.435
7.000	1.921	135.8	28.0	0.520	1.752	0.207	0.0	92	1.520
5.003	1.393	615.3	181.0	1.452	1.661	1.336	0.0	277	1.218
5.004	1.000	441.8	211.1	1.661	1.389	1.558	0.0	0	∞
8.000	0.943	66.7	0.0	0.600	1.231	0.000	0.0	0	0.000
8.001	4.675	330.4	53.5	1.231	4.110	0.395	0.0	81	3.469
1.012	1.010	160.7	1203.3	3.960	2.931	8.879	0.0	450	1.023
9.000	1.853	73.7	5.8	1.200	1.228	0.043	0.0	43	1.116
9.001	2.254	89.6	11.8	1.228	1.273	0.087	0.0	55	1.574
9.002	2.152	85.6	14.1	1.273	1.483	0.104	0.0	61	1.594
10.000	0.921	36.6	6.1	1.766	1.931	0.045	0.0	62	0.686
10.001	0.921	36.6	6.1	1.931	2.346	0.045	0.0	62	0.686
1.013	1.434	228.0	1228.9	2.931	1.481	9.068	0.0	450	1.452

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	73.162	300.0	900	Circular	118.331	116.231	1.200	118.331	115.987	1.444
1.001	4.838	300.0	900	Circular	118.331	115.987	1.444	118.331	115.971	1.460
1.002	71.705	300.0	1050	Circular	118.331	115.821	1.460	118.331	115.582	1.699
1.003	45.208	300.0	1050	Circular	118.331	115.582	1.699	118.163	115.431	1.682
2.000	43.679	35.6	150	Circular	118.758	117.408	1.200	118.163	116.181	1.832
1.004	65.148	300.0	1050	Circular	118.163	115.431	1.682	117.811	115.214	1.547

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1800	Manhole	Adoptable	2	1800	Manhole	Adoptable
1.001	2	1800	Manhole	Adoptable	3	1950	Manhole	Adoptable
1.002	3	1950	Manhole	Adoptable	4	1950	Manhole	Adoptable
1.003	4	1950	Manhole	Adoptable	6	1950	Manhole	Adoptable
2.000	5	1200	Manhole	Adoptable	6	1950	Manhole	Adoptable
1.004	6	1950	Manhole	Adoptable	7	1950	Manhole	Adoptable

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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.005	60.017	100.0	1050	Circular	117.811	115.214	1.547	117.811	114.614	2.147
3.000	56.596	188.7	450	Circular	117.752	116.200	1.102	117.752	115.900	1.402
3.001	48.308	241.5	450	Circular	117.752	115.900	1.402	117.752	115.700	1.602
3.002	20.318	236.3	600	Circular	117.752	115.550	1.602	117.811	115.464	1.747
1.006	33.150	125.6	1050	Circular	117.811	114.614	2.147	117.350	114.350	1.950
1.007	71.371	400.0	300	Circular	117.350	114.350	2.700	118.300	114.172	3.828
1.008	61.100	400.0	300	Circular	118.300	114.172	3.828	118.184	114.019	3.865
1.009	61.101	400.0	300	Circular	118.184	114.019	3.865	118.000	113.866	3.834
1.010	64.727	400.0	300	Circular	118.000	113.866	3.834	118.000	113.704	3.996
1.011	125.735	400.0	300	Circular	118.000	113.704	3.996	117.800	113.390	4.110
4.000	63.778	75.9	300	Circular	117.781	116.881	0.600	116.941	116.041	0.600
4.001	8.010	50.7	300	Circular	116.941	116.041	0.600	116.783	115.883	0.600
4.002	25.440	275.0	300	Circular	116.783	115.883	0.600	116.716	115.790	0.626
4.003	156.255	275.0	300	Circular	116.716	115.790	0.626	116.566	115.222	1.044
4.004	42.922	23.4	300	Circular	116.566	115.222	1.044	117.800	113.390	4.110
5.000	42.942	550.5	450	Circular	118.072	116.500	1.122	118.072	116.422	1.200
6.000	25.625	200.0	300	Circular	117.220	116.400	0.520	118.072	116.272	1.500
5.001	62.128	400.0	600	Circular	118.072	116.272	1.200	118.072	116.117	1.355
5.002	47.834	193.7	750	Circular	118.072	116.117	1.205	118.072	115.870	1.452
7.000	25.525	67.2	300	Circular	117.220	116.400	0.520	118.072	116.020	1.752
5.003	83.793	400.0	750	Circular	118.072	115.870	1.452	118.072	115.661	1.661
5.004	24.677	0.0	750	Circular	118.072	115.661	1.661	117.800	115.661	1.389
8.000	173.514	275.0	300	Circular	117.000	116.100	0.600	117.000	115.469	1.231
8.001	23.764	11.4	300	Circular	117.000	115.469	1.231	117.800	113.390	4.110
1.012	40.391	400.0	450	Circular	117.800	113.390	3.960	116.670	113.289	2.931

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.005	7	1950	Manhole	Adoptable	11	2025	Manhole	Adoptable
3.000	8	1350	Manhole	Adoptable	9	1350	Manhole	Adoptable
3.001	9	1350	Manhole	Adoptable	10	1500	Manhole	Adoptable
3.002	10	1500	Manhole	Adoptable	11	2025	Manhole	Adoptable
1.006	11	2025	Manhole	Adoptable	Pond		Junction	
1.007	Pond		Junction		13	1200	Manhole	Adoptable
1.008	13	1200	Manhole	Adoptable	14	1200	Manhole	Adoptable
1.009	14	1200	Manhole	Adoptable	15	1200	Manhole	Adoptable
1.010	15	1200	Manhole	Adoptable	16	1200	Manhole	Adoptable
1.011	16	1200	Manhole	Adoptable	Tank		Junction	
4.000	17		Junction		18	1200	Manhole	Adoptable
4.001	18	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
4.002	19	1200	Manhole	Adoptable	20		Junction	
4.003	20		Junction		21		Junction	
4.004	21		Junction		Tank		Junction	
5.000	22	1350	Manhole	Adoptable	23	1500	Manhole	Adoptable
6.000	38	1200	Manhole	Adoptable	23	1500	Manhole	Adoptable
5.001	23	1500	Manhole	Adoptable	24	1800	Manhole	Adoptable
5.002	24	1800	Manhole	Adoptable	25	1800	Manhole	Adoptable
7.000	39	1200	Manhole	Adoptable	25	1800	Manhole	Adoptable
5.003	25	1800	Manhole	Adoptable	26	1800	Manhole	Adoptable
5.004	26	1800	Manhole	Adoptable	Tank		Junction	
8.000	27		Junction		28		Junction	
8.001	28		Junction		Tank		Junction	
1.012	Tank		Junction		36	1350	Manhole	Adoptable

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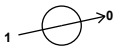
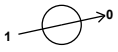
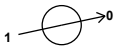
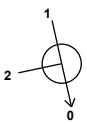
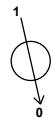
Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
9.000	21.372	50.1	225	Circular	117.652	116.227	1.200	117.253	115.800	1.228
9.001	15.360	33.9	225	Circular	117.253	115.800	1.228	116.845	115.347	1.273
9.002	14.312	37.2	225	Circular	116.845	115.347	1.273	116.670	114.962	1.483
10.000	18.962	200.0	225	Circular	116.260	114.269	1.766	116.330	114.174	1.931
10.001	15.070	200.0	225	Circular	116.330	114.174	1.931	116.670	114.099	2.346
1.013	14.005	200.0	450	Circular	116.670	113.289	2.931	115.150	113.219	1.481

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
9.000	30	1200	Manhole	Adoptable	31	1200	Manhole	Adoptable
9.001	31	1200	Manhole	Adoptable	32	1200	Manhole	Adoptable
9.002	32	1200	Manhole	Adoptable	36	1350	Manhole	Adoptable
10.000	34	1200	Manhole	Adoptable	35	1200	Manhole	Adoptable
10.001	35	1200	Manhole	Adoptable	36	1350	Manhole	Adoptable
1.013	36	1350	Manhole	Adoptable	37_out	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	383682.639	409683.576	118.331	2.100	1800				
						0	1.000	116.231	900
2	383754.154	409699.014	118.331	2.344	1800		1.000	115.987	900
									
						0	1.001	115.987	900
3	383758.883	409700.035	118.331	2.510	1950	1	1.001	115.971	900
									
						0	1.002	115.821	1050
4	383828.974	409715.163	118.331	2.749	1950	1	1.002	115.582	1050
									
						0	1.003	115.582	1050
5	383863.703	409767.150	118.758	1.350	1200				
						0	2.000	117.408	150
6	383873.204	409724.517	118.163	2.732	1950		1	2.000	116.181	150
							2	1.003	115.431	1050
							0	1.004	115.431	1050
7	383887.616	409660.983	117.811	2.597	1950		1	1.004	115.214	1050
							0	1.005	115.214	1050

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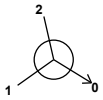
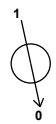
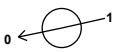
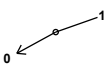
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	383862.747	409693.348	117.752	1.552	1350		0 3.000	116.200	450
9	383874.432	409637.971	117.752	1.852	1350		1 3.000	115.900	450
							0 3.001	115.900	450
10	383884.382	409590.699	117.752	2.202	1500		1 3.001	115.700	450
							0 3.002	115.550	600
11	383900.946	409602.465	117.811	3.197	2025		1 3.002	115.464	600
							2 1.005	114.614	1050
							0 1.006	114.614	1050
Pond	383929.190	409585.110	117.350	3.000			1 1.006	114.350	1050
							0 1.007	114.350	300
13	383872.811	409541.347	118.300	4.128	1200		1 1.007	114.172	300
							0 1.008	114.172	300
14	383885.792	409481.642	118.184	4.165	1200		1 1.008	114.019	300
							0 1.009	114.019	300
15	383898.774	409421.936	118.000	4.134	1200		1 1.009	113.866	300
							0 1.010	113.866	300
16	383835.611	409407.795	118.000	4.296	1200		1 1.010	113.704	300
							0 1.011	113.704	300
17	383903.153	409456.695	117.781	0.900			0 4.000	116.881	300
18	383916.444	409394.317	116.941	0.900	1200		1 4.000	116.041	300
							0 4.001	116.041	300
19	383912.324	409387.448	116.783	0.900	1200		1 4.001	115.883	300
							0 4.002	115.883	300
20	383888.328	409378.998	116.716	0.926			1 4.002	115.790	300
							0 4.003	115.790	300

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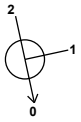
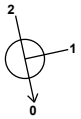
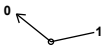
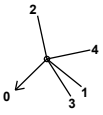
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
21	383735.629	409345.953	116.566	1.344		1	4.003	115.222	300
						0	4.004	115.222	300
22	383657.138	409637.565	118.072	1.572	1350	0	5.000	116.500	450
23	383666.238	409595.598	118.072	1.800	1500	 1	6.000	116.272	300
						2	5.000	116.422	450
						0	5.001	116.272	600
24	383679.403	409534.881	118.072	1.955	1800	1	5.001	116.117	600
						0	5.002	116.117	750
25	383689.539	409488.133	118.072	2.202	1800	 1	7.000	116.020	300
						2	5.002	115.870	750
						0	5.003	115.870	750
26	383707.295	409406.243	118.072	2.411	1800	1	5.003	115.661	750
						0	5.004	115.661	750
27	383900.689	409403.754	117.000	0.900		0	8.000	116.100	300
28	383731.058	409367.252	117.000	1.531		 1	8.000	115.469	300
						0	8.001	115.469	300
Tank	383712.524	409382.126	117.800	4.410		 1	8.001	113.390	300
						2	5.004	115.661	750
						3	4.004	113.390	300
						4	1.011	113.390	300
						0	1.012	113.390	450
30	383680.426	409397.549	117.652	1.425	1200	0	9.000	116.227	225
31	383670.174	409378.796	117.253	1.453	1200	1	9.000	115.800	225
						0	9.001	115.800	225
32	383673.353	409363.769	116.845	1.498	1200	1	9.001	115.347	225
						0	9.002	115.347	225
34	383713.708	409348.000	116.260	1.991	1200	0	10.000	114.269	225

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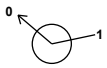
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
35	383695.153	409344.090	116.330	2.156	1200	 1	10.000	114.174	225
						0	10.001	114.174	225
36	383683.676	409353.856	116.670	3.381	1350	1	10.001	114.099	225
						2	9.002	114.962	225
						3	1.012	113.289	450
						0	1.013	113.289	450
37_out	383672.943	409344.859	115.150	1.931	1350	1	1.013	113.219	450
38	383691.286	409601.006	117.220	0.820	1200	0	6.000	116.400	300
39	383714.484	409493.542	117.220	0.820	1200	0	7.000	116.400	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node 36 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.013	Sump Available	✓
Replaces Downstream Link	✓	Product Number	CTL-SHE-0434-1312-1600-1312
Invert Level (m)	113.289	Min Outlet Diameter (m)	0.450
Design Depth (m)	1.600	Min Node Diameter (mm)	0
Design Flow (l/s)	131.2		

Node Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	114.350
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	355.0	0.0	3.000	2275.0	0.0

Node Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	113.390
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	244

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1000.0	0.0	2.000	1000.0	0.0	2.001	0.0	0.0

Node 21 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	115.222	Slope (1:X)	30.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.250
Safety Factor	2.0	Width (m)	80.000	Inf Depth (m)	
Porosity	0.30	Length (m)	21.000		

Node 20 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	115.790	Slope (1:X)	30.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.250
Safety Factor	2.0	Width (m)	75.000	Inf Depth (m)	
Porosity	0.30	Length (m)	21.000		

Node 17 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	116.881	Slope (1:X)	30.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.250
Safety Factor	2.0	Width (m)	40.000	Inf Depth (m)	
Porosity	0.30	Length (m)	18.000		

Node 27 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	116.100	Slope (1:X)	30.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.250
Safety Factor	2.0	Width (m)	90.000	Inf Depth (m)	
Porosity	0.30	Length (m)	26.000		

Node 28 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	115.469	Slope (1:X)	30.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.250
Safety Factor	2.0	Width (m)	110.000	Inf Depth (m)	
Porosity	0.30	Length (m)	26.000		

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	116.438	0.207	148.0	2.8081	0.0000	OK
15 minute winter	2	11	116.330	0.343	290.4	4.2578	0.0000	OK
15 minute winter	3	11	116.192	0.371	412.9	4.2302	0.0000	OK
15 minute winter	4	11	116.063	0.481	640.8	7.9305	0.0000	OK
15 minute winter	5	11	117.436	0.028	2.3	0.0390	0.0000	OK
15 minute winter	6	11	115.880	0.449	640.2	1.3392	0.0000	OK
15 minute winter	7	12	115.562	0.348	639.1	1.0404	0.0000	OK
15 minute summer	8	1	116.200	0.000	0.0	0.0000	0.0000	OK
15 minute winter	9	11	116.068	0.168	61.7	1.1143	0.0000	OK
15 minute winter	10	11	115.756	0.206	100.5	1.0108	0.0000	OK
240 minute winter	11	184	115.210	0.596	194.9	1.9200	0.0000	OK
180 minute winter	Pond	140	115.196	0.846	225.9	529.6241	0.0000	SURCHARGED
180 minute winter	13	136	114.939	0.767	66.0	0.8675	0.0000	SURCHARGED
180 minute winter	14	132	114.713	0.694	66.1	1.0313	0.0000	SURCHARGED
180 minute winter	15	124	114.486	0.620	66.2	0.9586	0.0000	SURCHARGED
60 minute summer	16	36	114.246	0.542	83.6	1.3302	0.0000	SURCHARGED
15 minute summer	17	1	116.881	0.000	0.0	0.0000	0.0000	OK
15 minute summer	18	1	116.041	0.000	0.0	0.0000	0.0000	OK
15 minute winter	19	10	115.948	0.065	7.2	0.1542	0.0000	OK
15 minute winter	20	12	115.908	0.118	27.3	2.0860	0.0000	OK
15 minute winter	21	11	115.317	0.095	43.5	1.4506	0.0000	OK
15 minute winter	22	11	116.654	0.154	34.7	0.7515	0.0000	OK
15 minute winter	23	11	116.480	0.208	85.2	0.8671	0.0000	OK
15 minute winter	24	11	116.295	0.178	112.8	0.8539	0.0000	OK
15 minute winter	25	12	116.129	0.259	163.5	1.1632	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	142.4	0.878	0.124	12.1436	
15 minute winter	2	1.001	3	285.3	1.415	0.249	0.9761	
15 minute winter	3	1.002	4	417.0	1.271	0.243	23.5711	
15 minute winter	4	1.003	6	638.0	1.732	0.371	16.6573	
15 minute winter	5	2.000	6	2.2	0.992	0.075	0.0981	
15 minute winter	6	1.004	7	639.1	2.147	0.372	19.4317	
15 minute winter	7	1.005	11	646.6	2.431	0.217	15.9728	
15 minute summer	8	3.000	9	0.0	0.000	0.000	1.4760	
15 minute winter	9	3.001	10	58.9	1.124	0.284	2.5337	
15 minute winter	10	3.002	11	101.0	1.248	0.226	1.6459	
15 minute winter	11	1.006	Pond	737.9	3.837	0.277	10.7737	
15 minute summer	Pond	1.007	13	69.7	1.053	1.265	5.0259	
60 minute winter	13	1.008	14	66.3	0.941	1.202	4.3026	
60 minute winter	14	1.009	15	66.3	0.941	1.203	4.3027	
60 minute winter	15	1.010	16	66.5	0.944	1.206	4.5580	
60 minute winter	16	1.011	Tank	78.0	1.418	1.414	8.5750	
15 minute summer	17	4.000	18	0.0	0.000	0.000	0.0001	
15 minute summer	18	4.001	19	0.0	0.000	0.000	0.0434	
15 minute winter	19	4.002	20	6.9	0.442	0.104	0.4565	
15 minute winter	20	4.003	21	21.0	0.980	0.315	3.4701	
15 minute winter	21	4.004	Tank	44.5	3.471	0.193	0.9969	
15 minute winter	22	5.000	23	33.5	0.802	0.245	1.7953	
15 minute winter	23	5.001	24	86.3	1.105	0.252	4.8555	
15 minute winter	24	5.002	25	111.8	1.055	0.126	5.1088	
15 minute winter	25	5.003	26	160.6	1.009	0.261	13.3562	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	26	12	115.988	0.327	182.8	1.4339	0.0000	OK
15 minute summer	27	1	116.100	0.000	0.0	0.0000	0.0000	OK
15 minute winter	28	10	115.558	0.089	50.6	1.5862	0.0000	OK
240 minute winter	Tank	164	113.715	0.325	144.6	325.0455	0.0000	OK
15 minute winter	30	10	116.268	0.041	5.5	0.0714	0.0000	OK
15 minute winter	31	10	115.854	0.054	11.1	0.0938	0.0000	OK
15 minute winter	32	10	115.409	0.062	13.1	0.0835	0.0000	OK
15 minute winter	34	10	114.331	0.062	5.8	0.0978	0.0000	OK
15 minute winter	35	11	114.236	0.062	5.7	0.0698	0.0000	OK
240 minute winter	36	160	113.669	0.380	114.5	0.6327	0.0000	OK
15 minute summer	37_out	1	113.219	0.000	53.9	0.0000	0.0000	OK
15 minute winter	38	10	116.517	0.117	26.5	0.7218	0.0000	OK
15 minute winter	39	10	116.492	0.092	26.5	0.5678	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	26	5.004	Tank	179.3	1.140	0.406	3.9033	
15 minute summer	27	8.000	28	0.0	0.000	0.000	1.4775	
15 minute winter	28	8.001	Tank	51.5	5.096	0.156	0.5511	
240 minute winter	Tank	1.012	36	111.4	0.843	0.693	5.3569	
15 minute winter	30	9.000	31	5.4	0.893	0.074	0.1305	
15 minute winter	31	9.001	32	11.0	1.370	0.123	0.1235	
15 minute winter	32	9.002	36	13.0	1.518	0.151	0.1222	
15 minute winter	34	10.000	35	5.7	0.657	0.156	0.1651	
15 minute winter	35	10.001	36	5.7	0.660	0.155	0.1295	
240 minute winter	36	Hydro-Brake®	37_out	114.5				1580.7
15 minute winter	38	6.000	23	25.7	0.671	0.329	0.9888	
15 minute winter	39	7.000	25	25.8	1.441	0.190	0.5122	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	116.640	0.409	362.3	5.5364	0.0000	OK
15 minute winter	2	11	116.617	0.630	692.9	7.8262	0.0000	OK
15 minute winter	3	11	116.536	0.715	981.2	8.1584	0.0000	OK
15 minute winter	4	11	116.442	0.860	1520.3	14.1808	0.0000	OK
15 minute winter	5	10	117.452	0.044	5.7	0.0615	0.0000	OK
15 minute winter	6	11	116.190	0.759	1523.5	2.2669	0.0000	OK
240 minute winter	7	224	116.036	0.822	368.4	2.4544	0.0000	OK
15 minute summer	8	1	116.200	0.000	0.0	0.0000	0.0000	OK
15 minute winter	9	11	116.191	0.291	151.0	1.9303	0.0000	OK
240 minute winter	10	224	116.036	0.486	58.3	2.3792	0.0000	OK
240 minute winter	11	224	116.036	1.422	426.2	4.5797	0.0000	SURCHARGED
240 minute winter	Pond	224	116.036	1.686	433.8	1507.5930	0.0000	SURCHARGED
240 minute winter	13	188	115.704	1.532	76.2	1.7327	0.0000	SURCHARGED
240 minute winter	14	172	115.421	1.401	76.2	2.0826	0.0000	SURCHARGED
60 minute winter	15	39	115.164	1.298	74.0	2.0084	0.0000	SURCHARGED
60 minute winter	16	37	114.933	1.229	109.8	3.0138	0.0000	SURCHARGED
15 minute summer	17	1	116.881	0.000	0.0	0.0000	0.0000	OK
15 minute summer	18	1	116.041	0.000	0.0	0.0000	0.0000	OK
15 minute winter	19	12	115.995	0.112	17.7	0.2665	0.0000	OK
15 minute winter	20	12	115.990	0.200	67.3	5.5471	0.0000	OK
15 minute winter	21	11	115.367	0.145	106.9	3.1330	0.0000	OK
15 minute winter	22	10	116.751	0.251	85.1	1.2230	0.0000	OK
15 minute winter	23	11	116.622	0.350	208.6	1.4623	0.0000	OK
15 minute winter	24	11	116.421	0.304	276.4	1.4585	0.0000	OK
15 minute winter	25	11	116.334	0.464	398.2	2.0838	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	330.0	1.010	0.288	27.5993	
15 minute winter	2	1.001	3	661.6	1.600	0.577	2.1608	
15 minute winter	3	1.002	4	972.2	1.426	0.566	49.5645	
15 minute winter	4	1.003	6	1518.0	2.126	0.884	32.2083	
15 minute winter	5	2.000	6	5.5	1.284	0.182	0.1861	
15 minute winter	6	1.004	7	1517.7	2.576	0.883	38.2577	
15 minute winter	7	1.005	11	1515.7	2.849	0.508	32.9621	
15 minute summer	8	3.000	9	0.0	0.000	0.000	2.9666	
15 minute winter	9	3.001	10	145.8	1.409	0.703	4.9963	
15 minute winter	10	3.002	11	249.3	1.568	0.558	3.2309	
15 minute winter	11	1.006	Pond	1714.7	4.268	0.644	26.4137	
480 minute winter	Pond	1.007	13	77.4	1.099	1.404	5.0259	
480 minute winter	13	1.008	14	77.4	1.100	1.405	4.3026	
480 minute winter	14	1.009	15	77.5	1.101	1.406	4.3027	
480 minute winter	15	1.010	16	77.6	1.102	1.408	4.5580	
30 minute winter	16	1.011	Tank	115.5	1.643	2.095	8.8542	
15 minute summer	17	4.000	18	0.0	0.000	0.000	0.0001	
15 minute summer	18	4.001	19	0.0	0.000	0.000	0.0846	
15 minute winter	19	4.002	20	17.3	0.553	0.259	0.9397	
15 minute winter	20	4.003	21	51.2	1.268	0.768	6.4494	
15 minute winter	21	4.004	Tank	107.8	3.884	0.468	1.9996	
15 minute winter	22	5.000	23	82.3	1.040	0.602	3.3987	
15 minute winter	23	5.001	24	211.3	1.346	0.617	9.7501	
15 minute winter	24	5.002	25	273.0	1.204	0.308	10.8383	
15 minute winter	25	5.003	26	388.6	1.279	0.632	25.4521	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	26	12	116.177	0.516	449.5	2.2621	0.0000	OK
15 minute summer	27	1	116.100	0.000	0.0	0.0000	0.0000	OK
15 minute winter	28	10	115.602	0.133	123.8	3.2282	0.0000	OK
240 minute winter	Tank	184	114.106	0.716	252.2	715.5691	0.0000	SURCHARGED
15 minute winter	30	10	116.291	0.064	13.4	0.1114	0.0000	OK
15 minute winter	31	10	115.888	0.087	27.3	0.1528	0.0000	OK
15 minute winter	32	10	115.450	0.103	32.2	0.1387	0.0000	OK
15 minute winter	34	10	114.370	0.101	14.2	0.1605	0.0000	OK
15 minute winter	35	11	114.275	0.101	14.0	0.1140	0.0000	OK
240 minute winter	36	180	114.034	0.745	131.4	1.2412	0.0000	SURCHARGED
15 minute summer	37_out	1	113.219	0.000	107.8	0.0000	0.0000	OK
15 minute winter	38	11	116.725	0.325	64.8	2.0022	0.0000	SURCHARGED
15 minute winter	39	10	116.545	0.145	64.8	0.8949	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	26	5.004	Tank	449.2	1.571	1.017	7.0422	
15 minute summer	27	8.000	28	0.0	0.000	0.000	2.5998	
15 minute winter	28	8.001	Tank	126.0	5.715	0.381	0.9831	
120 minute winter	Tank	1.012	36	131.1	0.862	0.816	6.3997	
15 minute winter	30	9.000	31	13.3	1.128	0.180	0.2523	
15 minute winter	31	9.001	32	27.0	1.695	0.301	0.2447	
15 minute winter	32	9.002	36	31.8	1.907	0.372	0.2390	
15 minute winter	34	10.000	35	14.0	0.815	0.382	0.3254	
15 minute winter	35	10.001	36	13.9	0.837	0.380	0.2502	
360 minute winter	36	Hydro-Brake®	37_out	131.2				3379.7
15 minute winter	38	6.000	23	62.3	0.884	0.795	1.8045	
15 minute winter	39	7.000	25	65.3	1.530	0.481	1.3118	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	118.292	2.061	679.2	27.9055	0.0000	FLOOD RISK
15 minute winter	2	11	118.210	2.223	1247.2	27.5991	0.0000	FLOOD RISK
15 minute winter	3	11	118.102	2.281	1797.2	26.0312	0.0000	FLOOD RISK
15 minute winter	4	11	117.794	2.212	2786.5	36.4691	0.0000	SURCHARGED
15 minute winter	5	10	117.469	0.061	10.6	0.0856	0.0000	OK
15 minute winter	6	12	117.237	1.806	2695.1	5.3925	0.0000	SURCHARGED
360 minute winter	7	344	117.149	1.935	455.5	5.7786	0.0000	SURCHARGED
360 minute winter	8	344	117.149	0.949	4.4	1.3578	0.0000	SURCHARGED
360 minute winter	9	344	117.149	1.249	47.9	8.2790	0.0000	SURCHARGED
360 minute winter	10	344	117.149	1.599	75.2	7.8288	0.0000	SURCHARGED
360 minute winter	11	344	117.148	2.534	604.5	8.1615	0.0000	SURCHARGED
360 minute winter	Pond	344	117.148	2.798	517.7	3498.9880	0.0000	FLOOD RISK
360 minute winter	13	336	116.778	2.606	80.2	2.9478	0.0000	SURCHARGED
360 minute winter	14	328	116.448	2.429	80.3	3.6099	0.0000	SURCHARGED
360 minute winter	15	256	116.112	2.245	80.3	3.4737	0.0000	SURCHARGED
30 minute summer	16	19	116.062	2.358	171.2	5.7831	0.0000	SURCHARGED
15 minute summer	17	1	116.881	0.000	0.0	0.0000	0.0000	OK
15 minute winter	18	13	116.123	0.082	4.7	0.0923	0.0000	OK
15 minute winter	19	13	116.122	0.239	33.3	0.5699	0.0000	OK
15 minute winter	20	13	116.116	0.326	120.8	13.9620	0.0000	SURCHARGED
15 minute winter	21	11	115.420	0.198	184.8	5.6169	0.0000	OK
15 minute winter	22	12	117.020	0.520	159.4	2.5373	0.0000	SURCHARGED
15 minute winter	23	12	116.926	0.654	388.3	2.7324	0.0000	SURCHARGED
15 minute winter	24	12	116.741	0.624	500.8	2.9922	0.0000	OK
15 minute winter	25	11	116.672	0.802	680.4	3.6051	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	611.6	1.004	0.533	46.3682	
15 minute winter	2	1.001	3	1211.5	1.912	1.056	3.0662	
15 minute winter	3	1.002	4	1758.6	2.039	1.024	61.8554	
15 minute winter	4	1.003	6	2685.0	3.113	1.563	38.9981	
15 minute winter	5	2.000	6	10.5	1.295	0.350	0.5321	
15 minute winter	6	1.004	7	2677.2	3.104	1.558	56.1991	
15 minute winter	7	1.005	11	2663.7	3.088	0.893	51.7729	
15 minute winter	8	3.000	9	-24.3	-0.275	-0.104	7.1230	
15 minute winter	9	3.001	10	257.7	1.635	1.243	7.3247	
15 minute winter	10	3.002	11	448.1	1.826	1.003	5.0407	
15 minute winter	11	1.006	Pond	3083.7	4.593	1.159	28.5964	
1440 minute winter	Pond	1.007	13	83.7	1.189	1.519	5.0259	
1440 minute winter	13	1.008	14	83.8	1.190	1.520	4.3026	
1440 minute winter	14	1.009	15	83.9	1.191	1.522	4.3027	
1440 minute winter	15	1.010	16	84.0	1.194	1.525	4.5580	
15 minute winter	16	1.011	Tank	146.4	2.080	2.655	8.8542	
15 minute summer	17	4.000	18	0.0	0.000	0.000	0.3074	
15 minute winter	18	4.001	19	-4.7	-0.161	-0.030	0.3028	
15 minute summer	19	4.002	20	27.3	0.636	0.409	1.5858	
15 minute winter	20	4.003	21	73.9	1.440	1.108	9.3406	
15 minute winter	21	4.004	Tank	180.6	4.106	0.783	2.5407	
15 minute winter	22	5.000	23	150.5	1.057	1.102	6.8039	
15 minute winter	23	5.001	24	371.2	1.431	1.084	17.5000	
15 minute winter	24	5.002	25	461.8	1.240	0.521	19.8848	
15 minute winter	25	5.003	26	674.7	1.533	1.096	36.6880	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	26	11	116.385	0.724	783.2	3.1775	0.0000	OK
15 minute summer	27	1	116.100	0.000	0.0	0.0000	0.0000	OK
15 minute winter	28	10	115.651	0.182	232.2	5.6954	0.0000	OK
240 minute winter	Tank	232	114.983	1.593	417.2	1593.3960	0.0000	SURCHARGED
15 minute winter	30	10	116.317	0.090	25.2	0.1560	0.0000	OK
15 minute winter	31	10	115.930	0.130	51.3	0.2265	0.0000	OK
15 minute winter	32	10	115.503	0.156	60.4	0.2111	0.0000	OK
240 minute winter	34	232	114.910	0.641	6.0	1.0174	0.0000	SURCHARGED
240 minute winter	35	232	114.910	0.736	6.0	0.8325	0.0000	SURCHARGED
240 minute winter	36	232	114.910	1.621	132.0	2.7023	0.0000	SURCHARGED
15 minute summer	37_out	1	113.219	0.000	130.9	0.0000	0.0000	OK
15 minute winter	38	11	117.215	0.815	121.5	5.0277	0.0000	FLOOD RISK
15 minute winter	39	11	116.979	0.579	121.5	3.5690	0.0000	FLOOD RISK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	26	5.004	Tank	783.1	1.968	1.773	9.6344	
15 minute summer	27	8.000	28	0.0	0.000	0.000	3.8594	
15 minute winter	28	8.001	Tank	229.9	6.082	0.696	1.3189	
960 minute summer	Tank	1.012	36	131.1	0.858	0.816	6.3997	
15 minute winter	30	9.000	31	25.0	1.297	0.339	0.4118	
15 minute winter	31	9.001	32	50.8	1.908	0.566	0.4079	
15 minute winter	32	9.002	36	59.8	2.184	0.699	0.3922	
15 minute winter	34	10.000	35	26.3	0.930	0.718	0.5360	
15 minute winter	35	10.001	36	26.1	0.986	0.712	0.3982	
240 minute winter	36	Hydro-Brake®	37_out	132.0				3168.2
15 minute winter	38	6.000	23	110.1	1.564	1.406	1.8045	
15 minute winter	39	7.000	25	107.4	1.560	0.791	1.7975	

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APPENDIX F – DRAINAGE INSPECTION & MAINTENANCE SCHEDULE

Maintenance Schedule	Required Action	Typical Frequency
Below Ground Drainage Pipes, Manholes, Outfall headwalls, ditches, trash screens etc		
Regular Maintenance	Lift covers and inspect manholes for evidence of debris and silt deposits and evidence of blockages (standing water). Carry out CCTV survey if required. Inspect ditches, trash screens, headwalls etc. and clear debris and silt deposits to avoid restriction to flow.	Quarterly or following significant rainfall events.
Remedial Actions	High pressure jetting and/or remove minor blockages and silt build up	As required – 20% loss of pipe cross-section
	Replace broken access covers, remove major blockages, repair structurally defective pipework	As required
Flow control chamber		
Regular Maintenance	Lift covers and inspect chamber fore evidence of debris and silt deposits and evidence of blockages. Test bypass door operating correctly.	Quarterly or following significant rainfall events.
Remedial Actions	High pressure jetting and or remove minor blockages and silt build up	As required
	Replace broken access covers, remove major blockages, repair/replace defective flow control devices	As required
Linear channel drains and gullies		
Regular Maintenance	Lift access covers and inspect for silt/debris accumulation	Quarterly or following significant rainfall events.
Remedial Actions	Replace broken access covers, gratings	Annually
	High pressure jetting and/or remove minor blockages and silt build up	As required
Rainwater pipes		
Regular Maintenance	Inspect rainwater goods for evidence of leaking pipework	Monthly (or as required)
Occasional Maintenance	Remove rodding eyes and carry out high pressure jetting to remove any debris	Quarterly
Remedial Actions	Replace cracked / leaking pipework	As required
Ponds		
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)

Maintenance Schedule	Required Action	Typical Frequency
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at the start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, e.g. penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1 to 5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required

Maintenance Schedule	Required Action	Typical Frequency
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows	As required
Attenuation Tank (Maintenance activities recommended by the manufacturer should be added to this schedule where not included)		
Regular maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation.	Six monthly
	Change the filter media	As recommended by manufacturer
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor performance	Six monthly
	Inspect sediment accumulation rates and filter media and establish appropriate replacement frequencies.	Monthly during first half of the year, then every six months