Burrows Graham

Marchmont Knowsley

Flood Risk Assessment and Drainage Strategy

for

NW IOS 3 Unit Trust

Ref: 40184-BGL-XX-XX-RP-D-00001

Version V1

Date 23/03/2026

DOCUMENT CONTROL SHEET

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Client: NW IOS 3 Unit Trust

Project: Marchmont Knowsley

Title: Flood Risk Assessment and Drainage Strategy

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Document Production Record

Issue Number:	**01**	**Name**	**Signature**
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Document Revision Record

Issue number	**Date**	**Revision Details**
P01	23/03/2026	Preliminary Issue
P02	26/03/2026	Amended to suit planners comments

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1.0 EXECUTIVE SUMMARY

The development proposal is for the construction of an open area storage facility & associated infrastructure on a 1.09 Ha greenfield site located at Faraday Rd, Liverpool, L33 7UT.

In accordance with the NPPF and local strategic flood risk assessment, this report has studied and assessed the flood risk to the site by all sources.

A review of the EA Flood Maps shows that the site is located predominantly/entirely within Flood Zone 1 (land defined as having less than a 1 in 1000 annual probability of flooding from of river or sea water) and is defined as 'less vulnerable' leading to the conclusion the development is considered 'appropriate' in accordance with NPPF guidelines.

Further to this, the site is considered to be at 'low risk' from all sources of flooding; fluvial, pluvial, tidal, sewer related, groundwater and artificial sources.

As the site is within Flood Zone 1, the sequential and exception tests are not required by the local authority.

The drainage strategy as outlined below is to restrict the proposed flow rate to ensure that the flood risk to the site and surrounding catchment is not increased by development.

The drainage hierarchy has been considered in the drainage strategy discussed in section 5, the surface water runoff will be collected from the impermeable areas and directed via the underground network to the outfall at a restricted rate of 2.5l/s to an existing UU Sewer.

Foul flows will be collected by an independent network and discharge to the nearest foul sewer located southwest of the site adjacent to the existing surface water sewer. A section 106 agreement will be applied for an agreed with United Utilities at detailed design stage.

2.0 - PROJECT BACKGROUND

2.1 - Appointment

Burrows Graham Limited have been commissioned by 'NW IOS 3 Unit Trust' (referred to the as 'the applicant' hereafter) to undertake a flood risk assessment and drainage strategy of suitable scope to support a planning application for a proposed open storage facility on Land at Faraday Rd, Liverpool, L33 7UT.

2.2 - Aim of study

This Flood risk assessment 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 February 2025) and Planning Practice Guidance (March 2014)
- Sustainable Drainage Systems Written Statement HCWS161 (December 2014)
- Knowsley Level 1 SFRA (2009)
- Knowsley Level 2 SFRA (2012)
- Knowsley Local Flood Risk Management Strategy (2017)

2.4 - Proposed development

- 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 Layout' included in Appendix A, an extract of which is shown below.

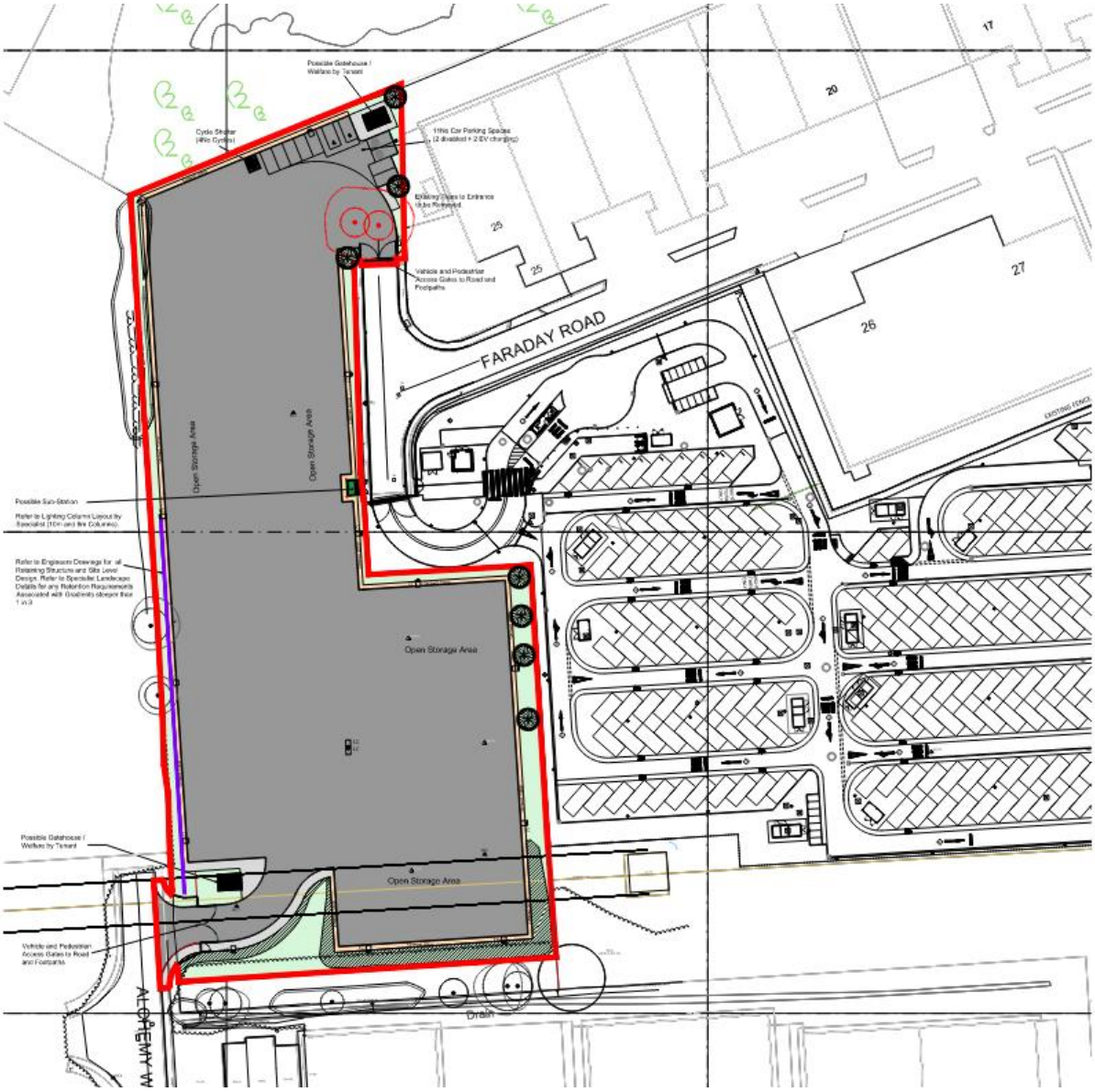


Figure 1 – Site Layout

3.0 - SITE DETAILS

3.1 - Site description

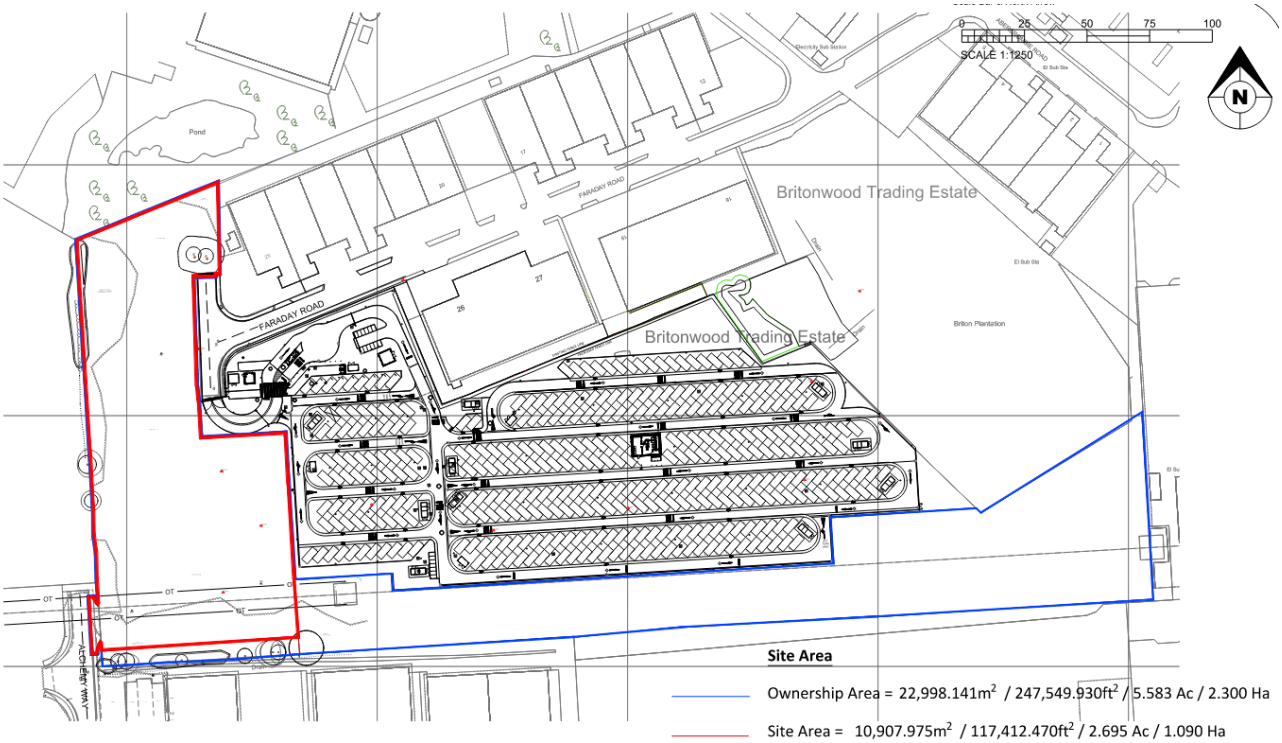


Figure 2 – Site Location Plan

Table 1 - Site characteristics

Site address	Faraday Rd, Liverpool, L33 7UT
Grid reference	342727.248, 397158.751
Area (hectares)	The site boundary has been measured to be 1.09 hectares.
Usage	Use Class B8, which will include storage and distribution
Surroundings	North – Kammac Knowsley Jupiter Distribution Centre delineates the northern boundary. South – Perfect Shutters Distribution Centre delineates the southern boundary. East – Amazon Van Park delineates the eastern boundary. West – Burhill DCR Logistics Distribution Centre delineates the western boundary
Topography	Site levels generally fall from north to south, with some higher points to the east. Due to this, levels are highest in the western area of the site at approximately 32.900m AOD. The lowest lying area of the site is to the southwestern area of the site at approximately 28.800m AOD. 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 900mm surface water public sewer within the site. The nearest manhole cover level is 28.840m AOD and the invert level at this manhole is 25.970m AOD. The public sewer records also show there to be 450mm foul water public sewer within the site. The nearest manhole cover level is 28.860m AOD and the invert level at this manhole is 25.450m AOD.

3.3 - Existing watercourses

The nearest existing watercourse, Knowsley Brook, is located 400m away from the site. There are no Main River's within the vicinity of the site.

3.4 - Geology and hydrogeology

The site is underlain by Devensian Till over Triassic Chester Formation sandstone. Superficial deposits are classed as a Secondary aquifer, while the sandstone bedrock forms a Principal Aquifer. Groundwater has been recorded at shallow depths of approximately 0.10–0.40 m below ground level and standing water has been observed on site. Due to the shallow groundwater and low permeability soils, the site is deemed to have low suitability for infiltration drainage.

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.

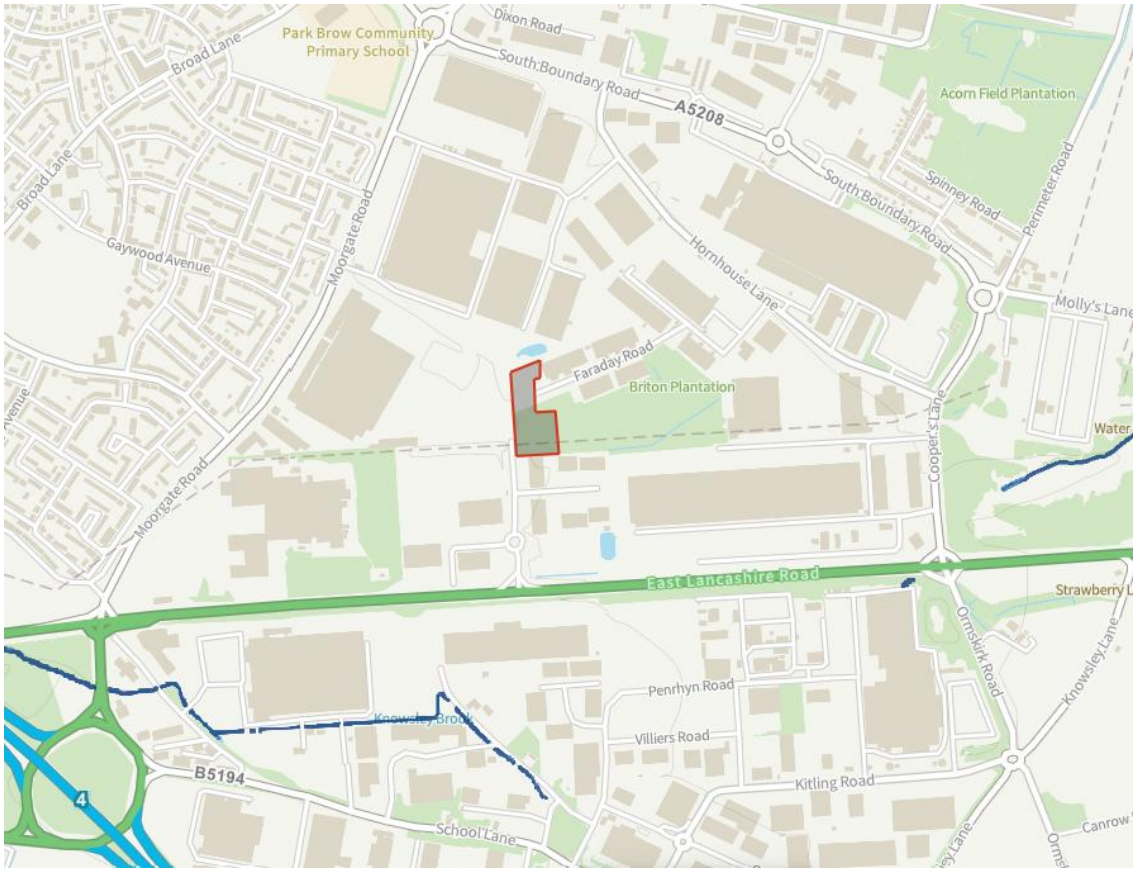


Figure 3 – EA Flood Map for Planning

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 at high risk from surface water in 3 locations. These maps are typically due to the existing topography and as such, the proposed development levels and drainage design will mitigate the risk of surface water flooding.

Figure 4 – EA Flood Map for Surface Water

4.3 - Groundwater flood risk

Based on Knowsley Metropolitan Borough Council Level 1 Strategic Flood Risk Assessment the Groundwater level is c.25AOD, the proposed levels are a minimum of 28.8m at the tie point and generally above 30m for the yard.

Figure 5 – Atkins map for Groundwater Flooding

4.4 - Sewer flooding

There are both surface & foul water sewers running through the site but are operated and maintained by United Utilities. Therefore, the risk of flooding is considered to be low

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

Infiltration on this site is not considered possible due to poor permeability outlined in SI reports. There is no watercourse within a proximity to the site, therefore the strategy is to discharge to the nearest available surface water sewer.

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 as such as many of the following aspects 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 several sites in a specific location, i.e. balancing ponds and wetlands.

The drainage strategy for this development will incorporate full retention separators and site control in the form of flow control and an associated attenuation tank. The use of Rainwater Harvesting Tanks is not relevant for a site of this nature.

5.3 – General strategy

For details of the outline drainage proposals for the site, reference should be made to drawing (ref: 40184-BGL-XX-XX-DR-C-00210), which has been included in Appendix E of this report.

5.4 – Total site area and impermeable areas

The total drained impermeable area of the proposed development has been measured to be 0.938 hectares.

5.5 – Climate Change

In line with the latest guidance, a 35% allowance has been made for the 30 year event and 40% allowance has been made for the 100 year event.

5.6 – Discharge rates

The site is considered to be a greenfield development.

The hydrological characteristics for the site have been taken from uksuds.com and summarised in Table 3 below.

Table 3 – Hydrological characteristics for the site

SAAR (mm)	863
Hydrological region	10
Soil type	2
SPR	0.3

Using the IH124 method (Institute of Hydrology, 1994) and the above hydrological characteristics, the greenfield runoff rates for a site based on a total site area of 1.09 hectares have been set out in Table 4.

Table 4 – Greenfield runoff rates

QBAR	2.5 l/s
Q(1)	2.2 l/s
Q(30)	4.3 l/s
Q(100)	5.3 l/s

The maximum runoff rate from the developed site will not exceed 2.5 l/s for all storms up to and including the 1 in 100 year storm plus 40% 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 over and above the flow rate noted above.

Attenuation will be provided in the form of 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 40% 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, and the results have been included in Appendix F 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:

- All drainage from the hard paved area of the site is considered to be high risk and will therefore pass through a Class 1 full retention separator prior to discharging to the outfall sewer.
- 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 G, 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 public foul sewer in Alchemy Way

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

Based on the Discharge Unit Method, it is anticipated that the peak foul flow from the development will be 1.22 l/s. This has been calculated using the following formula:

$$Q = k\sqrt{\sum DU}$$

Where:
Q = Flow rate (l/s)
k = Frequency factor
∑DU = Sum of Discharge Units

Q = k√∑DU

Where Q = Flow rate (l/s)
k = Frequency factor
∑DU = Sum of Discharge Units

Total Office size (sq m)	5000	
Number Staff	30	1 per 10 sq m
Levels	3	1 sink per floor
Males (60%)	18	

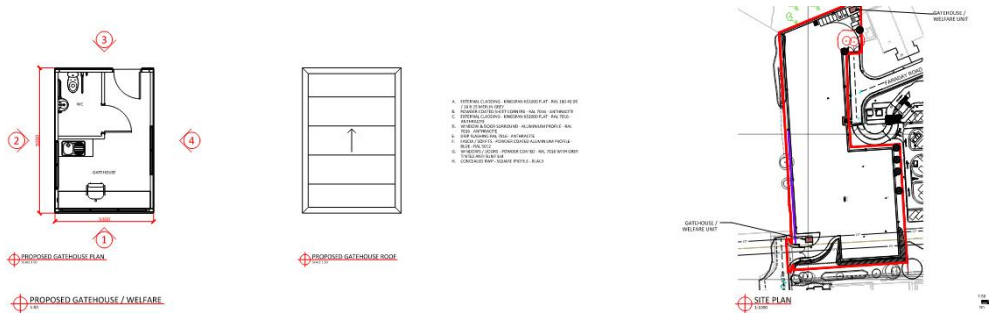
Table 3 **Minimum scale of provision of sanitary appliances for staff toilets in offices, shops, factories and other non-domestic premises used as place of work**

Sanitary appliances for female staff, and for male staff where urinals are not installed		
Number of persons at work	**Number of WCs**	**Number of washbasins**
1 to 5	1	1
6 to 15	2	2
16 to 30	3	3
31 to 45	4	4
46 to 60	5	5
61 to 75	6	6
76 to 90	7	7
91 to 100	8	8
Above 100	8, plus 1 WC and washbasin for every unit or fraction of a unit of 25 persons	

	No.	WHB	Shower	Urinal	Kitchen sink	D/W	Washing machine	WC	DU per Unit	Total DU
		2	0	0	2			2		
	1	0	0	0	6	0	0	0	0	6

TOTAL DISCHARGE UNITS 6

Total Sewer discharge from Building (l/s) 1.22
(0.5k factor for frequent use)



7.0 - MITIGATION / MANAGEMENT OF FLOOD RISK

7.1– Access and egress

Access to and egress from the site will be provided by a site access road that ties into Faraday Road and Alchemy Road.

Faraday Road and Alchemy Road 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

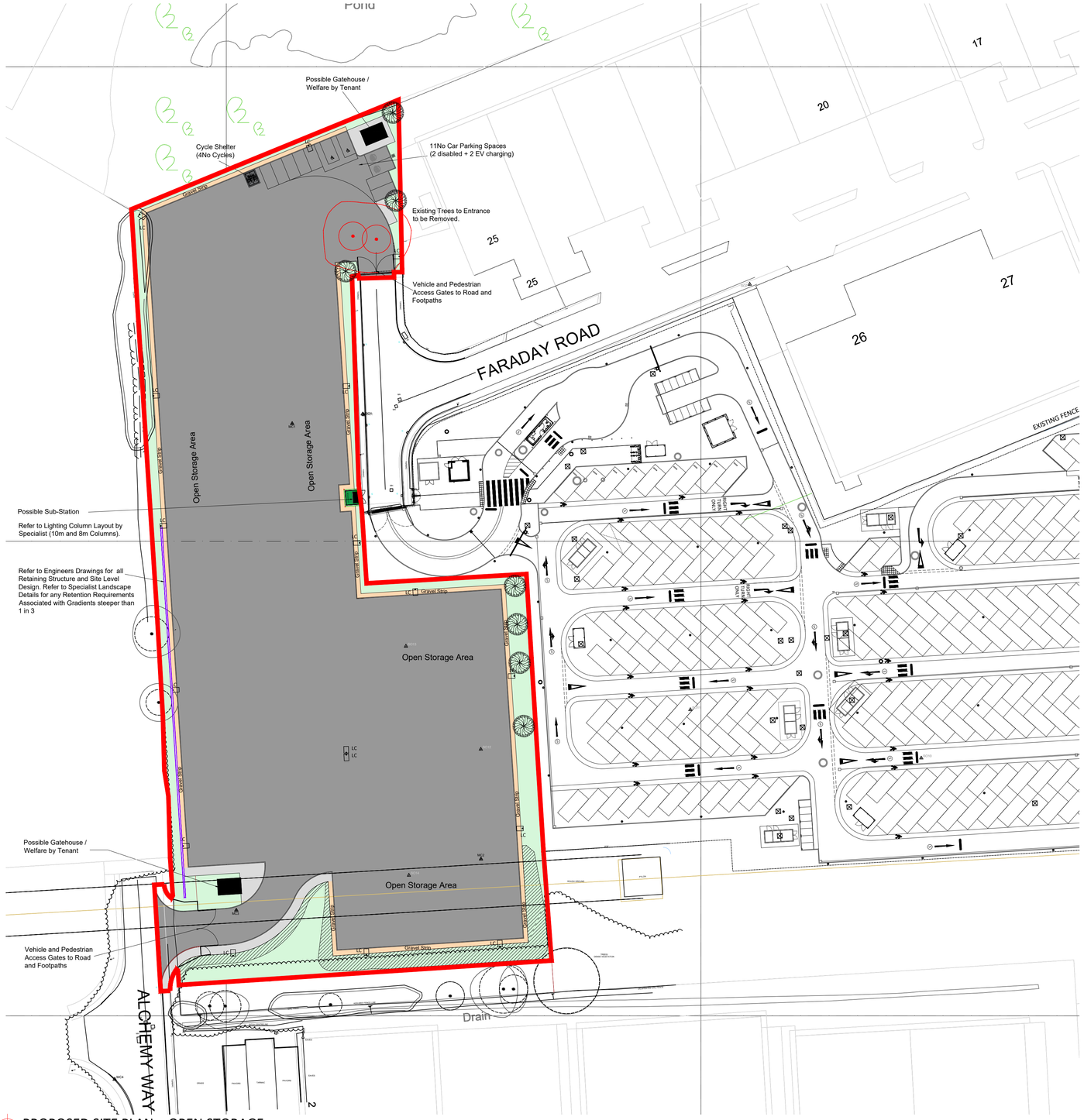
The proposed surface water drainage system will be designed in accordance with the drainage strategy set out in Section 5 of this report. This will ensure that there is no increase in flood risk to the site or elsewhere in the local catchment for all storm events up to and including the 100 year storm plus 40% climate change.

It should be noted that if storm events in excess of the 100 year storm plus 40% 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 or directed to the existing ditches that surround the site.

8.0 – CONCLUSION

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.

APPENDIX A – DEVELOPMENT MASTERPLAN



PROPOSED SITE PLAN - OPEN STORAGE
1:500

0 10 20 50 100

SCALE BAR 1:500

NORTH

Site Area

Site Area = 10,907.975m^2 / 117,412.470ft^2 / 2.695 Ac / 1.090 Ha

Site Finishes Legend

- Landscape Area - Refer to Specialist Drawings
- Gravel Margin
- Pedestrian Footpath
- Storage Hard Surface - Concrete
- Retaining Structure - Refer to Engineers Detials
- Hatch Area - Slope for levels for cut and fill areas by Engineer.

Scale this drawing for planning purposes only
ashton smith to be notified of discrepancies in figured dimensions
Contractors must check all dimensions from site
This drawing is copyright and is for use on this site only
This drawing is to be used solely for information as entitled
For other information refer to the latest revision of any cross referenced drawing

LOCATION PLAN:

NOTES:

REVISIONS

REV	DATE	DESCRIPTION	DRAWN BY	CHECK BY
P06	2026/03/26	Updated ownership boundary (blue) and renamed Plot to Site Area.	D.L.	R.B.
P05	2026/03/23	Updated to additional comments received.	D.L.	R.B.
P04	2026/03/18	Updated to comments received and Teams call 17/03/2026.	D.L.	R.B.
P03	2026/03/09	Updated to comments 04 & 05/03/2026 and various documents received	D.L.	R.B.
P02	2026/02/27	Updated to comments received 25/02/2026	D.L.	R.B.
P01	2026/02/18	Initial Issue	D.L.	RB

PROJECT TITLE
Marchmont Open Storage Facility, Knowsley

DRAWING TITLE
Proposed Site Plan
Open Storage

RIBA STAGE	STATUS		DRAWN BY	CHECKED BY
N/A	PLANNING		DL	RB
SHEET	SCALE	DATE	SUITABILITY	REVISION
A1	1 : 500	2026/02/18	S0	P06

DRAWING NO.
MAR2 - ASA - 00- EX.SI - D - A - 0003_ (S0 - P06)

CLIENT
MARCHMONT

AshtonSmith
Beyond Design

Ashton Smith, Belvedere House, 2 Victoria Avenue, Harrogate, North Yorkshire, HG1 1EL
Tel: 01423 522882 Fax: 01423 565104
www.ashtonsmith.co.uk

JOB NO. 24040

APPENDIX B – TOPOGRAPHICAL SURVEY

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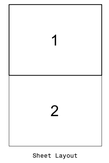
SURVEY STATIONS

Name	Easting	Northing	Height
SO1	342728.73	397226.82	31.80
MC1	342713.88	397224.80	31.68
MC2	342753.66	397133.05	31.98
MC3	342702.11	397122.26	31.97
MC4	342676.49	397086.64	28.81

STANDARD REFERENCE & ABBREVIATIONS

(AR).....Assumed Route
AB.....Air Brick
AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Belisha Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom IC
BRTW.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C/I.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBW.....Concrete Block Wall
CCTV.....Closed Circuit TV
CD.....Cable Duct
CEL.....Ceiler Light
CH/L.....Chain Link
CHY.....Chimney
CL.....Cover Level
CM.....Cable Marker
COL.....Column
CONC.....Concrete
CP.....Catch Pit
CRTW.....Concrete Retaining Wall
CTV.....Cable Television
CUL.....Culvert
CW.....Concrete Block Wall
DC.....Drainage Channel
DPC.....Damp Proof Course
DR.....Drain
DSW.....Dry Stone Wall
EEP.....Electricity Cable Pit
EIC.....Electricity Inspection Cover
EJ.....Expansion Joint
EJB.....Electricity Junction Box
EL SUB STN..Electricity Sub Station
EL.....Eaves Level
ELB.....Electricity Box
EP.....Electricity Pole
ER.....Earth Rod
ETL.....Electricity Transmission Line
FB.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FP.....Flagpole
G*.....Girth (of tree)
G.....Gulley
GAB.....Gabion
GIP.....Gas Inlet Pipe
GMKR.....Gas Marker
GOT.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HSE.....Housing
HT.....Height
HV.....High Voltage
I/R.....Iron Railing
II.....Inspection Cover
IL.....Invert Level
IP.....Inlet Pipe
KO.....Kerb Outlet
L@.....Letter Box
LP.....Lamp Post
ML.....Multi-Girth
MH.....Manhole
MKR.....Marker
MP.....Mooring Point
NP.....Street Name Plate
O/H.....Overhead
O/P.....Open Paling
OE.....Overhead Electric Wire
OF.....Outfall Pipe
OSBM.....Ordnance Survey Bench Mark
OT.....Overhead Telecom Wire
P/C.....Post & Chain
P/R.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PH.....Petrol Pump
PT.....Post or Pillar
RE.....Rodding Eye
RS.....Road Sign
RTW.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Susp Level
Soa.....Soffit Level
SP.....Sign Post
SPL.....Springing Level
SRTW.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
SW.....Stone Wall
TAC.....Textile Facing
TB.....Traffic Bollard
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TFR.....Taken From Records
TIE.....Anchor Point (Masts/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TM.....Ticket Machine
TMC.....Tarmac
TP.....Telecommunications Pole
TPIT.....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (BM,IC etc)
UTS.....Unable to Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/M.....Wire Mesh
WL.....Water Level
WM.....Water Meter
WO.....Wash Out
WP.....Waste Pipe
WOT.....Water Stop Tap (Domestic)
WSV.....Water Stop Valve (Mains)



Sheet Layout

SurveY OPERATIONS

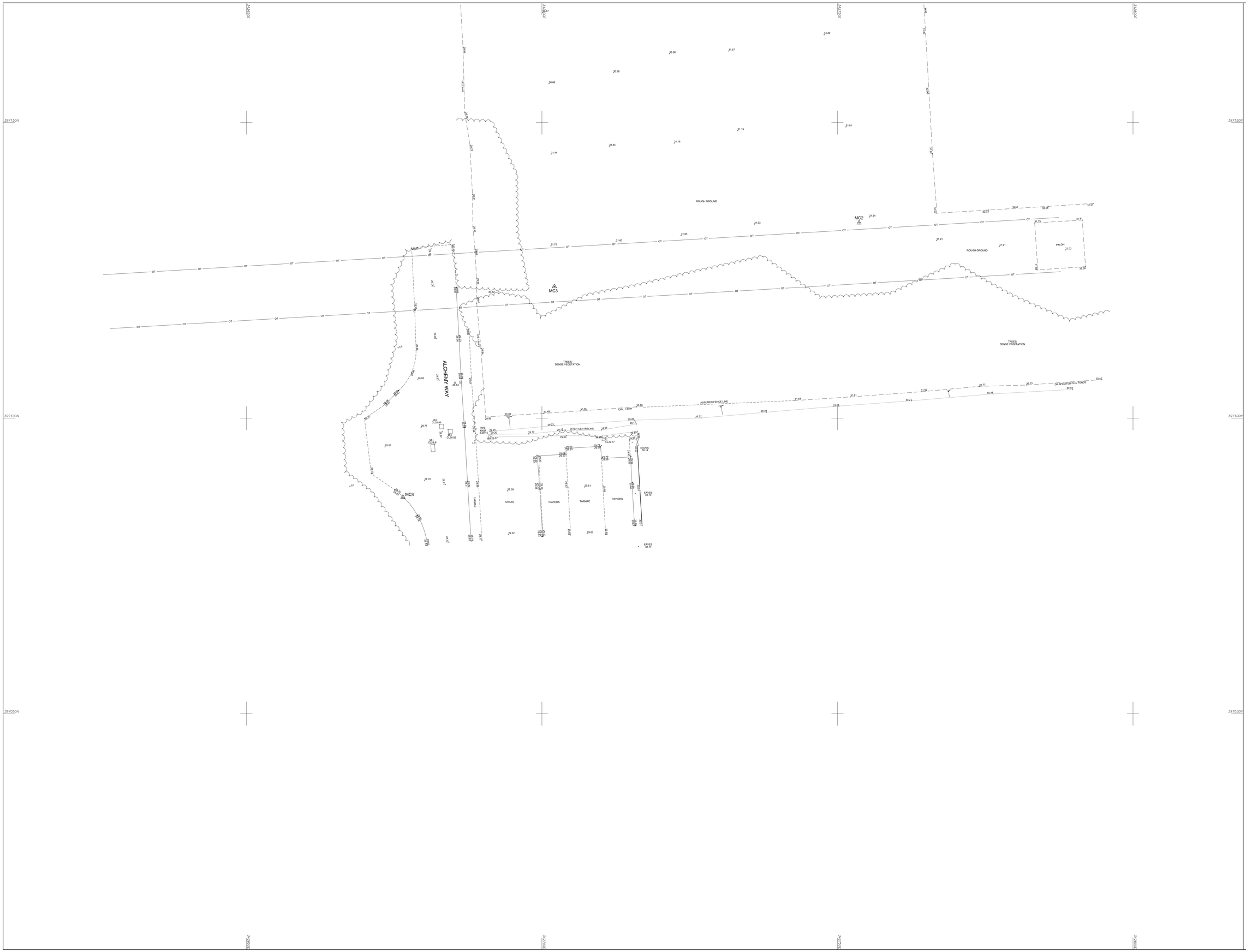
Smith Street, Skelmersdale, Lancs. WN8 8LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@survops.co.uk - www.survops.co.uk

Client
Helme & Partners Limited

Drawing Title
Topographical Survey of Land at:
Britonwood Unit 24 Faraday Road
Liverpool
Sheet 1 of 2

Scale(s)	1:200	Surveyor	MC
Date	FEB 26	Drawn	JR
Job Number	26A302	Checked	TP/MG

Sheet Size & Drg Number & Revision
A0 26A302/001



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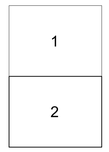
BT Box.....British Telecom Box
BT.....British Telecom IC
BRTW.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C/I.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBW.....Concrete Block Wall
CCTV.....Closed Circuit TV
CD.....Cable Duct
CEL.....Ceiler Light
CH/L.....Chain Link
CHY.....Chimney
CL.....Cover Level
CM.....Cable Marker
COL.....Column
CONC.....Concrete
CP.....Catch Pit
CRTW.....Concrete Retaining Wall
CTV.....Cable Television
CUL.....Culvert
CW.....Concrete Block Wall
DC.....Drainage Channel
DPC.....Damp Proof Course
DR.....Drain
DSW.....Dry Stone Wall
ECP.....Electricity Cable Pit
ECI.....Electricity Inspection Cover
EJ.....Expansion Joint
EJB.....Electricity Junction Box
EL SUB STN.....Electricity Sub Station
EL.....Eaves Level
ELB.....Electricity Box
EP.....Electricity Pole
ER.....Earth Rod
ETL.....Electricity Transmission Line
FB.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FP.....Flagpole
G*.*.....Girth (of tree)
G.....Gulley
GAB.....Gabion
GIP.....Gas Inlet Pipe
GMKR.....Gas Marker
GST.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HSE.....Housing
HT.....Height
HV.....High Voltage
I/R.....Iron Railing
II.....Inspection Cover
IL.....Invert Level
IP.....Inlet Pipe
KO.....Kerb Outlet
L@.....Letter Box
LP.....Lamp Post
ML.....Multi-Girth
MH.....Manhole
MKR.....Marker
MP.....Mooring Point
NP.....Street Name Plate
O/H.....Overhead
O/P.....Open Paling
OE.....Overhead Electric Wire
OP.....Outfall Pipe
OSBM.....Ordnance Survey Bench Mark
OT.....Overhead Telecom Wire
P/C.....Post & Chain
P/R.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PP.....Petrol Pump
PT.....Post or Pillar
RE.....Rodding Eye
RS.....Road Sign
RTW.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Susp Level
Soa.....Soffit Level
SP.....Sign Post
SPL.....Springing Level
SRTW.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
SW.....Stone Wall
TAC.....Tactile Paving
TB.....Traffic Bollard
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TCM.....Taken From Records
TIC.....Anchor Point (Masts/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TM.....Ticket Machine
TNC.....Turnap
TP.....Telecommunications Pole
TP(T.....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
U/L.....Unable to Lift (MH,IC etc)
U/S.....Unable to Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/M.....Wire Mesh
WL.....Water Level
WM.....Water Meter
WO.....Mash Out
WP.....Waste Pipe
WST.....Water Stop Tap (Domestic)
WSV.....Water Stop Valve (Mains)



Sheet Layout

Survey Operations

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Tel: 01695 725662 Fax: 01695 51816
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Client
Helme & Partners Limited

Drawing Title
Topographical Survey of Land at:
Britonwood Unit 24 Faraday Road
Liverpool
Sheet 2 of 2

Scale(s)	1:200	Surveyor	MC
Date	FEB 26	Drawn	JR
Job Number	26A302	Checked	TP/MG

Sheet Size & Drg Number & Revision
A0 26A302/002

APPENDIX C – PUBLIC SEWER RECORDS & EXISTING DRAINAGE INFORMATION

STANDARD REFERENCE & ABBREVIATIONS

(AR).....Assumed Route
AB.....Air Brick
AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Belisha Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom IC
BRTW.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C/I.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBW.....Concrete Block Wall
CCTV.....Closed Circuit TV
CD.....Cable Duct
CEL.....Ceiler Light
CH/L.....Chain Link
CHY.....Chimney
CL.....Cover Level
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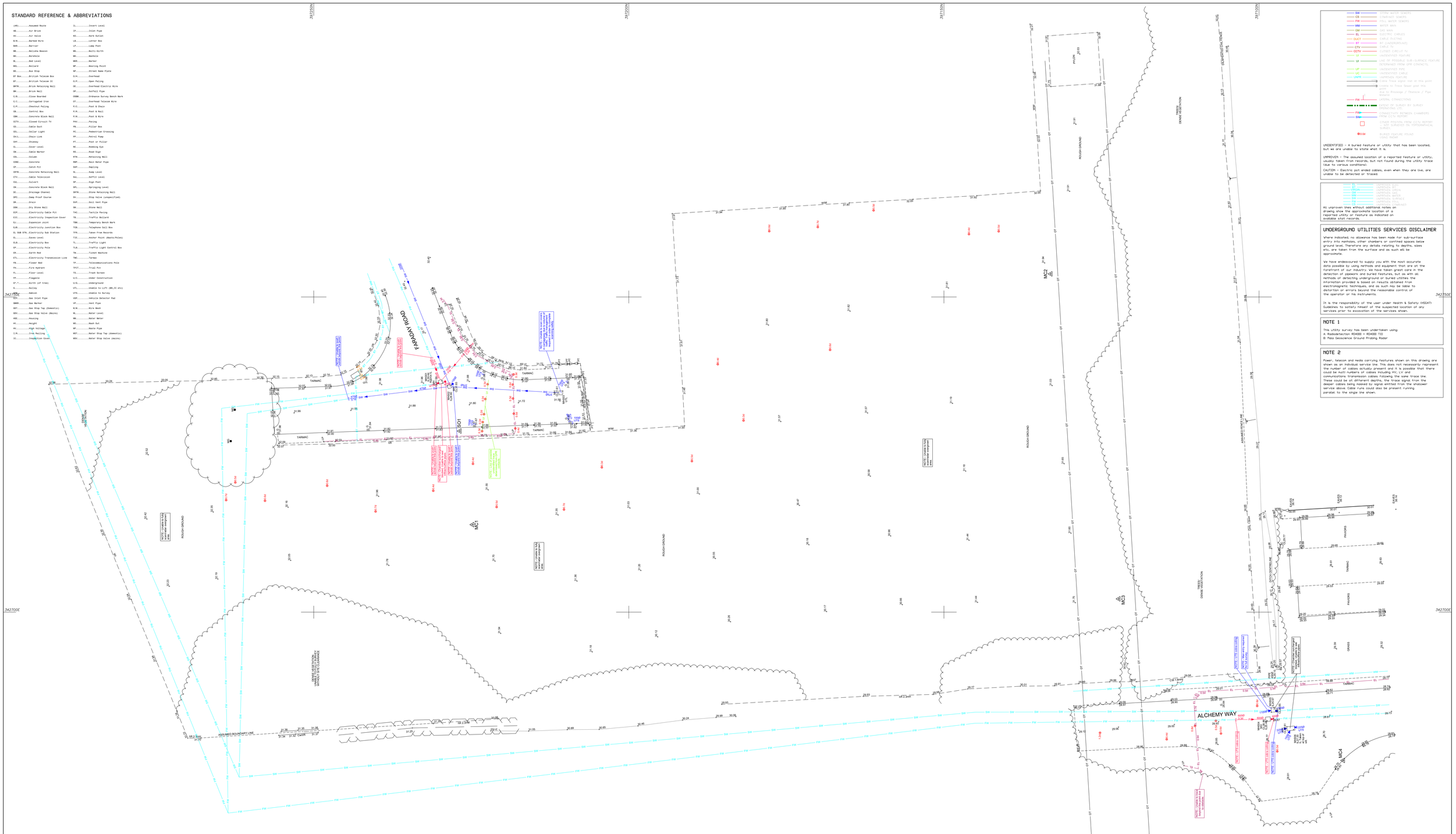
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TFR.....Taken From Records
TIP.....Anchor Point (Posts/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TM.....Tunnel Manhole
TMC.....Tarmac
TP.....Telecommunications Pole
TP(T).....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
U/L.....Unable to Lift (MH,IC etc)
U/S.....Unable to Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/W.....Wire Mesh
WL.....Water Level
WM.....Water Meter
WO.....Wash Out
WP.....Waste Pipe
WSP.....Water Stop Tap (domestic)
WSV.....Water Stop Valve (mains)



BW ..... BOOM WATER SEWERS
CS ..... COMBINED SEWERS
FW ..... FOUL WATER SEWERS
WM ..... WATER MAIN
GM ..... GAS MAIN
EL ..... ELECTRIC CABLES
DUCT ..... CABLE DUCTING
BT ..... BT UNDERGROUND
CTV ..... CABLE TV
CCTV ..... CLOSED CIRCUIT TV
U/I ..... UNDERWATER FEATURE
U/I ..... LINE OF POSSIBLE SUB-SURFACE FEATURE INTERPRET FROM GPR CONTACTS
UP ..... UNIDENTIFIED PIPE
UC ..... UNIDENTIFIED CABLE
UNFR ..... UNFROZEN FEATURE
Cross Trace signal here at this point
Cross to Trace Sewer past this point
Blockage / Obstacle / Pipe Bend
FW ..... LATERAL CONNECTIONS
EXTENT OF SURVEY BY SURVEY OPERATIONS LTD
FW ..... CONNECTIVITY BETWEEN CHAMBERS FROM CCTV REPORT
SW ..... OTHER POINTS FROM CCTV REPORT - NOT SURVEYED ON TOPOGRAPHICAL SURVEY
5.04 ..... BURIED FEATURE FOUND USING RADAR

UNIDENTIFIED - A buried feature or utility that has been located, but we are unable to state what it is.

UNPROVEN - The assumed location of a reported feature or utility, usually taken from records, but not found during the utility trace (due to various conditions).

CAUTION - Electric pat ended cables, even when they are live, are unable to be detected or traced.

BT ..... UNPROVEN BT
CTV ..... UNPROVEN CTV
GM ..... UNPROVEN GAS
FW ..... UNPROVEN SEWER
WM ..... UNPROVEN WATER
FW ..... UNPROVEN SURFACE
SW ..... UNPROVEN SURFACE
UP ..... UNPROVEN PIPE

All unproven lines without additional notes on drawing show the approximate location of a reported utility or feature as indicated on available plant records.

UNDERGROUND UTILITIES SERVICES DISCLAIMER

Where indicated, no allowance has been made for sub-surface entry into manholes, other chambers or confined spaces below ground level. Therefore any details relating to depths, sizes etc. are taken from the surface and as such will be approximate.

We have endeavoured to supply you with the most accurate data possible by using methods and equipment that are at the forefront of our industry. We have taken great care in the detection of pipework and buried features, but as with all methods of detecting underground or buried utilities the information provided is based on results obtained from electromagnetic techniques, and as such may be liable to distortion or errors beyond the reasonable control of the operator or his instruments.

It is the responsibility of the user under Health & Safety (HSG47) Guidelines to satisfy himself of the suspected location of any services prior to excavation of the services shown.

NOTE 1

This utility survey has been undertaken using:
A: Radiodetection RD4000 + RD4000 TD
B: Pulo Geoscience Ground Probing Radar

NOTE 2

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

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

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

Utility information added to Survey Operations topographical survey 26A302.

SURVEY STATIONS

Name	Easting	Northing	Height
SO1	342728.73	397226.82	31.80
MC1	342713.88	397224.80	31.68
MC2	342753.66	397133.05	31.98
MC3	342702.13	397122.26	31.97
MC4	342676.49	397086.64	28.81

Client
Helme & Partners Limited

Survey Operations

Drawing Title
Utility Survey of Land at:
Britonwood Unit 24 Faraday Road
Liverpool

Scale(s)	1:200	Surveyor	MCR
Date	Mar 26	Drawn	AC
Job Number	26A303	Checked	SO

Smith Street, Skelmersdale, Lancs. WN8 8LN
Tel: 01695 725662 Fax: 01695 51816
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Sheet Size & Drg Number & Revision
A0 26A303/001

Water for the North West

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Burrows Graham

5 Amassador Place
Stockport Road,
Altrincham, Trafford
WA14 2TY

FAO:

Your Ref: 40184-MM-Sewer Records
Our Ref: UUPS-ORD-713715
Date: 05/03/2026

Dear Sirs

Location: 21 FARADAY ROAD, KNOWSLEY INDUSTRIAL PARK, LIVERPOOL, L33 7UT

I acknowledge with thanks your request dated 02/03/2026 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Water for the North West

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

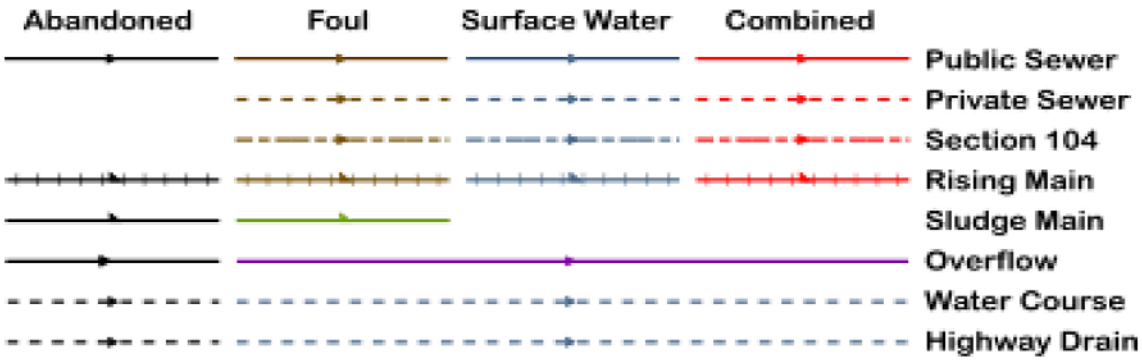
TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

United Utilities
Water for the North West

Wastewater Symbology



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

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic

United Utilities
Water for the North West

SEWER RECORDS

Address or Site Reference

21 FARADAY ROAD,
KNOWSLEY INDUSTRIAL PARK,
LIVERPOOL,
L33 7UT

Scale: 1:5000
Date: 05/03/2026

Printed by: Property Searches

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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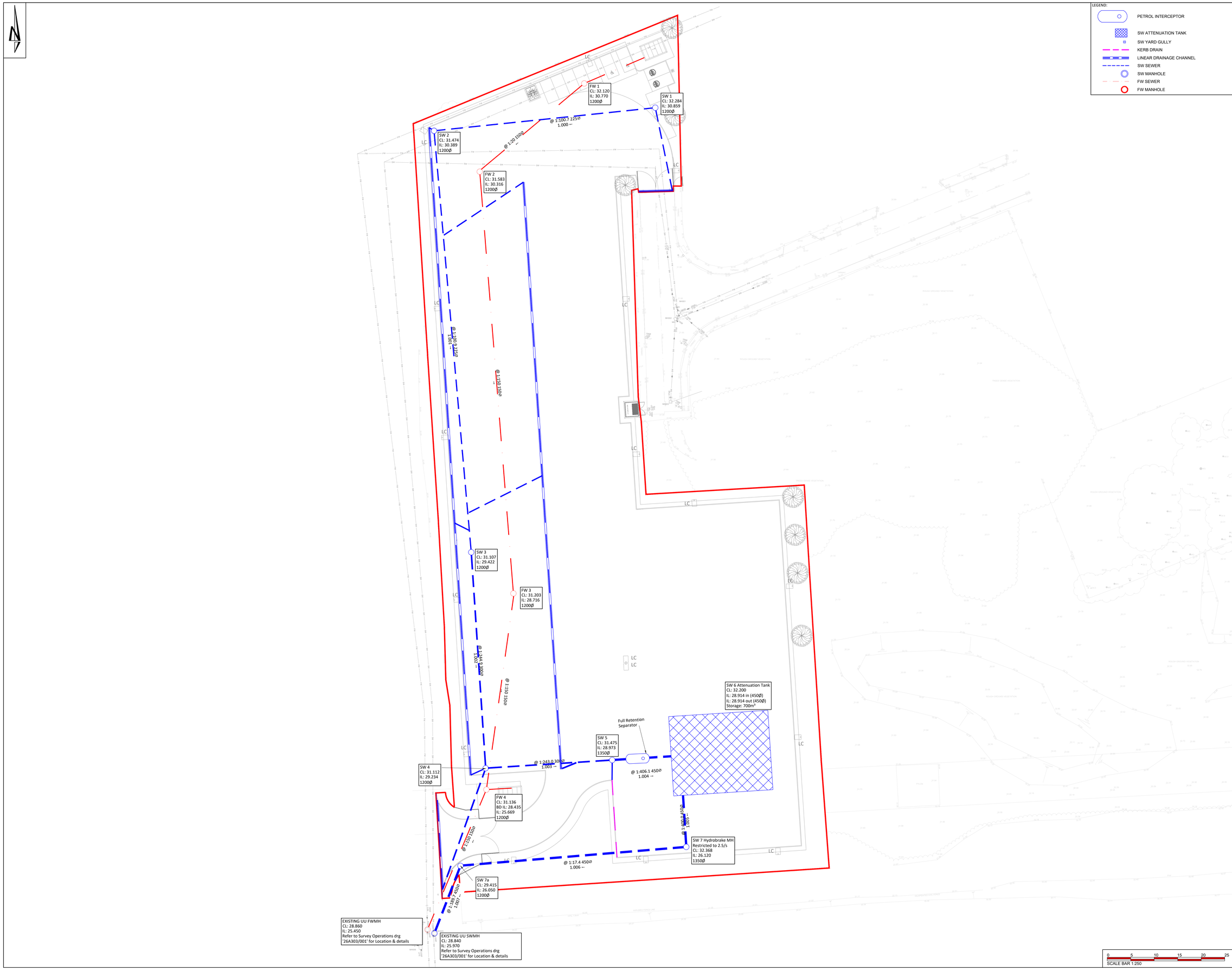
APPENDIX D – DRAINAGE STRATEGY



LEGEND:

- PETROL INTERCEPTOR
- SW ATTENUATION TANK
- SW YARD GULLY
- KERB DRAIN
- LINEAR DRAINAGE CHANNEL
- SW SEWER
- SW MANHOLE
- FW SEWER
- FW MANHOLE

THIS DRAWING IS THE COPYRIGHT OF BURROWS GRAHAM LIMITED.

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. Do not scale off the drawing.
3. All temporary works for formwork, excavations etc., to be the design responsibility of the Contractor.
4. The Contractor shall allow for the protection, temporary and permanent support and diversion works as necessary, to all existing services to the satisfaction of the asset owners.
5. The Contractor shall allow for dealing with surface water run-off into excavations and from groundwater by means of sumps, pumping and de-watering as appropriate, in order to keep the excavation as reasonably dry as possible during the construction of the works.
6. The Contractor is responsible for obtaining all required permits and licenses.
7. All private drainage within the site is to comply with the requirements of the relevant British/European Standard, (including BS EN 752, BS EN 1610, BS EN 295, BS EN 1917, BS5911, BSB000-0 & 14 and BS EN 124), and the Building Regulations Part H .
8. Any adoptable drainage is to be in accordance with the requirements of the adopting authority. If in doubt seek clarification.
9. All pipework within chambers are to be laid soffit to soffit (U.O.N). All chamber invert levels are for the outgoing pipe levels. Backdrop pipework shall be connected at soffit to soffit with the backdrop / rodding access level specified.
10. Catchpit invert levels are for the outgoing pipe, pipes to be soffits level, sump level specified separately. All Catchpits are to be built with a 300 sump (U.O.N).
11. Any gradients of drains indicated are indicative only and the Contractor shall install the drains to the specified levels shown for each chamber (U.O.N).
12. Cover levels of the access points are provisional and subject to adjustment on site to suit the finished ground levels.
13. Positions and sizes of above ground foul and surface water drainage connections ("pop-ups") are indicative only. Setting out and confirmation of the internal requirements is the responsibility of the Architect. Contractor to confirm requirement prior to construction.
14. Diameter of PCC manholes varies with pipe size, number of connections, depth etc. Minimum sizes are shown on the Burrows Graham Standard Details drawings. Sizes shown on drainage layout and/or manhole schedules take precedence over minimum sizes.
15. Flow control chambers should be built in accordance with the requirement of the manufacturer. Allowance should be made for a 600 sump and double covers and frames on the chambers.
16. Insitu concrete grades to be as stated on the drawings. Design chemical class for all precast concrete products shall be DC4 unless agreed otherwise.
17. All separators shall be in accordance with Building Regulations Part H3-A and with BS EN 858 and be kite-marked / CE- marked in accordingly. The oil alarm system is to be in accordance with Client's requirements. Separators to be installed in accordance with manufacturer's recommendations / requirements (venting, protection etc)
18. All below ground plastic/GRP tanks shall be installed in accordance with the manufacturers instructions / requirements. They shall be provided with sufficient concrete surround to counter floatation and shall have a wall thickness adequate to resist the highest ground water level which could be encountered at their location.
19. All existing drainage/structures to be abandoned shall be broken out and removed from site, the excavation shall be backfilled with a suitable granular material to the required level. Alternatively, deep drains may be cleaned and grouted with a 1:10 cementitious grout, with structures broken down to 1m below proposed finished ground level and infilled with a suitable granular material. Abandoned gullies are to be removed from site and abandoned tails are to be sealed with a 300 thick concrete plug at a depth of 1.0m below proposed finished ground level.
20. Where utility/land drainage trenches etc cross over drainage trenches, the Contractor shall construct an impermeable barrier to prevent groundwater infiltrating into the drainage trench.
21. Design assumes that no sewerage authority sewers or other drainage systems require modification, diversion or abandoning (U.O.N on the drawings)
22. Unless otherwise agreed, all outfalls to ponds and watercourses to be proprietary PCC units. Where applicable, headwall details are to be approved by the relevant authority (i.e. Internal Drainage Board / Lead Local Flood Authority / Environment Agency / Highway Authority)
23. All headwalls to have guardrail and headwalls with pipes greater than Ø375 to have a trash screen/grating fitted.
24. All manholes less than 1.5m deep are considered as none man entry and shall be maintained from ground level.
25. Upon completion of the works, the Contractor shall clean all drainage by jetting, removing all debris from site and the system is to be CCTV surveyed. No débris shall be permitted to enter the existing drainage system.
26. No deep rooting trees/vegetation should be planted within 5.0m of any drainage works.
27. The storage and installation of all proprietary drainage items used are to be strictly in accordance with the manufacturers instructions / requirements.
28. Any works within the public highway to be reinstated to highway authority requirements. All relevant permits/licences must be sought by the contractor prior to the works being undertaken.
29. Penstocks, where indicated, shall be electronically operated complete with power supply and connection (refer to service engineers drawings for cable and ducting etc.)
30. Statutory Undertakers information, where shown, is indicative only based on supplied records. The contractor shall verify the depth position and nature of the services as necessary in order to construct the works.
31. Drainage channels are to be ACO Qmax in service yards and ACO Multidrain in car parks, or similar approved. Channels are to be sized by the supplier and approved by the Engineer in writing prior to ordering. Drainage channels to be installed to manufacturers' requirements. Design of channels shall be based on a 1 in 30 year storm return period, 15 minute duration. Outlet units on channel drains to include silt traps.
32. All RWP, gully and channel connections shall be Ø150 U.O.N. Waste/soil stack connections shall be Ø100mm. U.O.N and shall have internal above ground rodding eyes or large access fittings in accordance with Building Regulations.
33. All WPC's, SRWP's and RWP's are shown indicatively. Locations shall be confirmed by others.
34. Siphonic break chambers (i.e. with SRWP entering) to be constructed with open grated manhole covers. ("Waterway 2000" or similar approved).
35. All sprinkler drain, gully locations and flow rates to be confirmed by the sprinkler Contractor. Potential local storage manholes for sprinkler discharge are to be confirmed following definition of system requirements. It is assumed that future sprinkler installation points will be located close to foul water drainage runs.
36. Below ground drainage connections to be provided to all canopy downpipes

36.1. Ø150mm with concrete bed and surround U.O.N.

37. All rising mains to be laid at minimum gradients of 1:500 rising and 1:300 falling. Air valves and washout valves may be required at high and low points respectively.

REV	DATE	BY	DESCRIPTION	CHKD
P04	26.03.26	MM	Updated to suit Architects layout	JW
P03	25.03.26	MM	Updated to suit comments	JW
P02	24.03.26	MM	Updated to suit Architects layout	JW
P01	09.03.26	MM	Issued for Information	JW

Burrows Graham

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Tel: +44 (0)161 804 8046

South Office:
Bourne House, Prince Edward Street, Berkhamsted, Herts HP4 3EZ
Tel: +44 (0)1442 508 402

CLIENT
MARCHMONT

PROJECT
MARCHMONT KNOWSLEY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT

BGL PROJECT NUMBER	DRAWING STATUS	OFFICE
40184	PRELIMINARY	NORTH

SCALE @ A0	DATE	DRAWN BY	CHECKED BY
1:250	27.02.26	MM	JW

DRAWING No: 40184-BGL-XX-XX-DR-C-00210

REV: P04

APPENDIX E – HYDRAULIC CALCULATIONS

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	6.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
1	0.114	6.00	32.284	1200	342731.527	397273.376	1.425	30.859
2			31.474	1200	342684.449	397268.470	1.085	30.389
3	0.288	6.00	31.107	1200	342692.365	397178.819	1.685	29.422
4			31.112	1200	342695.436	397132.885	1.878	29.234
5	0.448	6.00	31.475	1350	342722.357	397134.621	2.502	28.973
6			32.200	1350	342746.270	397136.162	3.286	28.914
7	0.073	6.00	32.368	1350	342738.121	397116.145	3.508	28.860
8			28.840	1350	342684.539	397097.761	2.870	25.970
7a			29.415	1350	342689.472	397112.109	3.365	26.050

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	47.333	0.600	30.859	30.389	0.470	100.7	225	6.61	50.0
1.001	2	3	90.000	0.600	30.389	29.497	0.892	100.9	225	7.76	50.0
1.002	3	4	46.037	0.600	29.422	29.234	0.188	244.9	300	8.53	50.0
1.003	4	5	26.977	0.600	29.234	29.123	0.111	243.0	300	8.97	50.0
1.004	5	6	23.963	0.600	28.973	28.914	0.059	406.1	450	9.37	50.0
1.005	6	7	21.612	0.600	28.914	28.860	0.054	400.0	450	9.73	50.0
1.006	7	7a	48.816	0.600	28.860	26.050	2.810	17.4	450	9.89	50.0
1.007	7a	8	15.172	0.600	26.050	25.970	0.080	189.7	450	10.07	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	1.303	51.8	15.5	1.200	0.860	0.114	0.0	84	1.139
1.001	1.301	51.7	15.5	0.860	1.385	0.114	0.0	84	1.138
1.002	1.000	70.7	54.6	1.385	1.578	0.403	0.0	198	1.100
1.003	1.004	71.0	54.6	1.578	2.052	0.403	0.0	198	1.103
1.004	1.002	159.4	115.3	2.052	2.836	0.851	0.0	284	1.088
1.005	1.010	160.7	115.3	2.836	3.058	0.851	0.0	283	1.094
1.006	4.895	778.5	125.1	3.058	2.915	0.923	0.0	121	3.631
1.007	1.473	234.2	125.1	2.915	2.420	0.923	0.0	234	1.496

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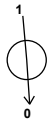
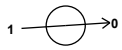
Pipeline Schedule

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)
1.000	47.333	100.7	225	Circular	32.284	30.859	1.200	31.474	30.389	0.860
1.001	90.000	100.9	225	Circular	31.474	30.389	0.860	31.107	29.497	1.385
1.002	46.037	244.9	300	Circular	31.107	29.422	1.385	31.112	29.234	1.578
1.003	26.977	243.0	300	Circular	31.112	29.234	1.578	31.475	29.123	2.052
1.004	23.963	406.1	450	Circular	31.475	28.973	2.052	32.200	28.914	2.836
1.005	21.612	400.0	450	Circular	32.200	28.914	2.836	32.368	28.860	3.058
1.006	48.816	17.4	450	Circular	32.368	28.860	3.058	29.415	26.050	2.915
1.007	15.172	189.7	450	Circular	29.415	26.050	2.915	28.840	25.970	2.420

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.003	4	1200	Manhole	Adoptable	5	1350	Manhole	Adoptable
1.004	5	1350	Manhole	Adoptable	6	1350	Manhole	Adoptable
1.005	6	1350	Manhole	Adoptable	7	1350	Manhole	Adoptable
1.006	7	1350	Manhole	Adoptable	7a	1350	Manhole	Adoptable
1.007	7a	1350	Manhole	Adoptable	8	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
1	342731.527	397273.376	32.284	1.425	1200		0	1.000	30.859	225
2	342684.449	397268.470	31.474	1.085	1200		1	1.000	30.389	225
							0	1.001	30.389	225
3	342692.365	397178.819	31.107	1.685	1200		1	1.001	29.497	225
							0	1.002	29.422	300
4	342695.436	397132.885	31.112	1.878	1200		1	1.002	29.234	300
							0	1.003	29.234	300
5	342722.357	397134.621	31.475	2.502	1350		1	1.003	29.123	300
							0	1.004	28.973	450
6	342746.270	397136.162	32.200	3.286	1350		1	1.004	28.914	450
							0	1.005	28.914	450
7	342738.121	397116.145	32.368	3.508	1350		1	1.005	28.860	450
							0	1.006	28.860	450

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
8	342684.539	397097.761	28.840	2.870	1350		1	1.007	25.970	450
7a	342689.472	397112.109	29.415	3.365	1350		1	1.006	26.050	450
							0	1.007	26.050	450

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	20.0		

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	35	0	0
100	40	0	0

Node 7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	28.860	Product Number	CTL-SHE-0054-2500-4000-2500
Design Depth (m)	4.000	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.5	Min Node Diameter (mm)	1200

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	28.914
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	350.0	0.0	2.000	350.0	0.0	2.001	0.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	30.928	0.069	10.1	0.1875	0.0000	OK
15 minute winter	2	12	30.455	0.066	10.2	0.0748	0.0000	OK
15 minute winter	3	12	29.572	0.150	35.1	0.6849	0.0000	OK
15 minute summer	4	10	29.410	0.176	31.1	0.1988	0.0000	OK
15 minute winter	5	9	29.368	0.395	74.9	1.9795	0.0000	OK
1440 minute winter	6	1380	29.350	0.436	6.0	145.5501	0.0000	OK
1440 minute winter	7	1380	29.350	0.490	1.3	0.9038	0.0000	SURCHARGED
120 minute summer	8	96	25.992	0.022	1.2	0.0000	0.0000	OK
120 minute summer	7a	98	26.073	0.023	1.2	0.0336	0.0000	OK

Link Event (Upstream Depth)	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	10.2	1.051	0.196	0.4673	
15 minute winter	2	1.001	3	9.9	0.965	0.191	0.9613	
15 minute winter	3	1.002	4	34.1	0.961	0.482	1.6631	
15 minute summer	4	1.003	5	35.5	1.013	0.501	1.3303	
15 minute winter	5	1.004	6	101.8	2.027	0.638	1.7794	
1440 minute winter	6	1.005	7	1.1	0.085	0.007	3.4091	
1440 minute winter	7	1.006	7a	1.2	0.561	0.002	0.1079	
120 minute summer	7a	1.007	8	1.2	0.397	0.005	0.0456	23.4

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Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.14%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	31.244	0.385	43.4	1.0532	0.0000	SURCHARGED
15 minute winter	2	13	31.025	0.636	42.1	0.7194	0.0000	SURCHARGED
15 minute winter	3	12	30.651	1.229	138.9	5.5960	0.0000	SURCHARGED
1440 minute winter	4	1410	30.368	1.134	7.2	1.2830	0.0000	SURCHARGED
1440 minute winter	5	1410	30.368	1.395	16.0	6.9953	0.0000	SURCHARGED
1440 minute winter	6	1410	30.368	1.454	15.8	485.6758	0.0000	SURCHARGED
1440 minute winter	7	1410	30.368	1.508	1.6	2.7830	0.0000	SURCHARGED
1440 minute winter	8	1410	25.995	0.025	1.6	0.0000	0.0000	OK
1440 minute winter	7a	1410	26.077	0.027	1.6	0.0385	0.0000	OK

Link Event (Upstream Depth)	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	42.1	1.442	0.812	1.8825	
15 minute winter	2	1.001	3	43.8	1.161	0.847	3.5794	
15 minute winter	3	1.002	4	126.8	1.801	1.794	3.2419	
1440 minute winter	4	1.003	5	7.2	0.552	0.101	1.8997	
1440 minute winter	5	1.004	6	15.8	0.623	0.099	3.7968	
1440 minute winter	6	1.005	7	1.6	0.069	0.010	3.4243	
1440 minute winter	7	1.006	7a	1.6	0.604	0.002	0.1322	
1440 minute winter	7a	1.007	8	1.6	0.434	0.007	0.0556	128.3

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.10%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	31.984	1.125	56.2	3.0751	0.0000	FLOOD RISK
15 minute winter	2	11	31.474	1.085	50.2	1.2271	2.7057	FLOOD
15 minute winter	3	11	31.107	1.685	172.4	7.6735	3.1487	FLOOD
1440 minute winter	4	1410	30.833	1.599	9.6	1.8085	0.0000	FLOOD RISK
1440 minute winter	5	1410	30.833	1.860	20.8	9.3240	0.0000	SURCHARGED
1440 minute winter	6	1410	30.833	1.919	20.9	640.7994	0.0000	SURCHARGED
1440 minute winter	7	1410	30.833	1.973	1.8	3.6401	0.0000	SURCHARGED
1440 minute winter	8	1410	25.997	0.027	1.8	0.0000	0.0000	OK
1440 minute winter	7a	1410	26.079	0.029	1.8	0.0409	0.0000	OK

Link Event (Upstream Depth)	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	50.2	1.466	0.970	1.8825	
15 minute winter	2	1.001	3	43.0	1.082	0.832	3.5794	
15 minute winter	3	1.002	4	142.9	2.029	2.021	3.2419	
1440 minute winter	4	1.003	5	9.5	0.544	0.134	1.8997	
1440 minute winter	5	1.004	6	20.5	0.654	0.129	3.7968	
1440 minute winter	6	1.005	7	1.8	0.069	0.011	3.4243	
1440 minute winter	7	1.006	7a	1.8	0.622	0.002	0.1440	
1440 minute winter	7a	1.007	8	1.8	0.450	0.008	0.0607	141.2

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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
Pumps (Maintenance activities recommended by the manufacturer should be added to this schedule where not included)		
Regular Maintenance	Ensure sumps and Floats are clean	Quarterly
	Assess the condition of the pipework for wear or damage	Quarterly
	Lift covers and inspect manholes for evidence of debris and silt deposits and evidence of blockages - quarterly	Quarterly
	Examine the condition of pump including impeller, seals, valves and pipework (as recommended by the manufacturer)	Quarterly
Remedial Actions	Consult pump specialist	As Required
	Service and replace and elements of the system	Six Monthly