Project No. & Name:	9003 – Glendene, Wythenshawe	Prepared by:	Rev:	Date:
Document Ref:	9003-WML-ZZ-XX-RP-C-1001	Daniel Baker	T02	April 2022

DRAINAGE STRATEGY – Glendene, Wythenshawe

Background

1. The below Drainage Strategy Report has been created by WML to support and inform detailed Planning Conditions for Glendene, Wythenshawe.

2. The Report relates to the construction of a new residential development, comprising 56no low rise residential houses and associated parking / landscaping following the demolition of the former children's care home.

3. The Strategy is to be read in conjunction with the Phase 2 Ground Investigation Report, Ref: 9003-WML-00-XX-RP-G-0002, WML Consulting (October 2019), Flood Risk Assessment, Ref: 9003-WML-00-XX-RP-G-0003 and WML Consulting drainage drawings 9003-WML-ZZ-XX-DR-C-1001 to 1005.

Surface Water Drainage Strategy

4. The proposed drainage strategy for this site will incorporate the principles of, and where appropriate demonstrate compliance with the NPPF and the SUDS manual.

5. The proposed drainage system should be designed in accordance with BS EN 7524 and Building Regulations Part H (2010). Approved Document H indicates the following hierarchy for the disposal of surface water drainage from the new development sites, firstly discharge via infiltration, secondly discharge via watercourse and lastly discharge to sewer.

6. These options are discussed in further detail below.

7. **Surface water discharge via infiltration:** The preliminary site investigation has confirmed that the site is predominantly underlain by cohesive strata which are unlikely to be sufficiently permeable for the use of soakaways and other infiltration techniques.

8. **Surface water discharge via watercourse:** there are no existing watercourses near or within the site, hence discharge to watercourse is not feasible in this instance.

9. **Surface water discharge via public sewer**: as discharge via infiltration and via watercourse is not feasible, discharge of surface water via a connection to the public sewerage system will be required.

10. It is understood that there are existing combined public sewers located within the northern and eastern boundary of the site. United Utilities sewer records are appended to this report.

11. A CCTV drainage survey of the existing drainage system should be undertaken to determine the size, depth and condition of the existing public sewers prior to detailed design.

12. The existing site has been previously developed and is occupied by a former children's home along with associated ancillary buildings, car parking and soft landscaping. As the site comprises a mixture of surfaces it can be considered to be both Greenfield and Brownfield. Refer to Appendix 02 for further information.

13. The existing greenfield runoff rate has been calculated using MicroDrainage Software version 2020 and has resulted in the following flow rates:

Greenfield Runoff Rate (l/s)
Q1: 4.3 Q30: 8.3 Q100: 10.2

14. It is understood that the LLFA requests that all new developments are restricted to the Q1 year Greenfield runoff rate.

15. The existing Brownfield flow rate has been calculated based on a 50mm/Hr rainfall intensity which resulted in an existing flow rate of 72.9 l/s.

16. The SFRA requires that the existing brownfield flows leaving the site are reduced by 50% (min) which results in an allowable flow rate of 36.4 l/s.

17. Given the mixture of surfaces present on the existing site it is proposed to restrict all surface water runoff from the new development to a combined flow of 4.3 l/s (greenfield) + 36.4 l/s (brownfield) = 40.7 l/s.

18. The site drainage system will be designed to contain all surface water for all critical storm events up to and including the 100 year event plus a 40% climate change allowance.

19. For the purposes of design, this report and the associated drawings discharge surface water runoff from the site via one of 2No. different connection to the existing UU sewerage network.

20. Area 1 comprises the 13 houses in the south-west corner of the site and discharges via a new connection to the existing UU combined sewer located within Greenbrow Rd. Area 2 comprises the remaining 43 houses to which discharge via a new connection to the north within Wastdale Rd.

21. Therefore it is proposed to restrict surface water runoff from the new site to the following flow rates:

    - Area 1 = 10 l/s
    - Area 2 = 30 l/s

22. In order to achieve the above flow rates, the drainage design for each area will incorporate oversized pipework and flow controls to store surcharged water for all storms up to and including the critical 100 year event plus 40% climate change allowance.

23. It is understood that a portion of the new site drainage from each of the areas described above will be offered up for adoption by United Utilities to coincide with the new adoptable highways/access roads.

24. WML drawings 9003-WML-ZZ-XX-DR-C-1001 to 1005 highlight the extent of the proposed adoptable drainage, which includes the oversized pipework mentioned above. Consultation with United Utilities should be undertaken during detailed design to obtain their approval for the proposals and ascertain any additional requirements they may impose.

Foul Water Drainage Strategy

25. It is proposed to collect foul water traditional soil stacks and discharge to the new adoptable sewer network as highlighted on WML drawings 9003G-WML-ZZ-XX-DR-C-1001 to 1005.

SUDs Review

26. As the site consists residential buildings, storing water for later use could be a viable option. The use of hard standing areas and car parking are not considered a good enough quality to be considered for water reuse schemes, however water butts located on rain water pipes could be used for ground keeping/domestic purposes. This should be discussed with the client at detailed design stage.

27. Due to the small surface area (roof) available, the implementation of green roof systems and long term rainwater harvesting techniques are not considered suitable for this development.

28. Permeable paving has been considered for the storage of surface water for the development. However due to space required to store the volume of water resulting from large storm events and the minimal void space within the permeable sub base (30%), and given that a portion of the existing highways and drainage are to be adopted it is considered that permeable paving is not a suitable option for this temporary development.

29. Above ground storage basins were also deliberated for the storage of surface water runoff, however due to the limited communal green space across the site it is considered to be an unsuitable option for this site.

Maintenance Strategy

30. It is understood that a portion of the proposed site drainage is to be offered up for adoption by United Utilities as shown on WML Drawings 9003-WML-ZZ-XX-DR-C-1001 – 1005. The remaining drainage is understood to be the shared responsibility of the residents or an appointed person/company on their behalf.

31. The proposed drainage has been designed in accordance with the current standards and guidelines to achieve a minimum self-cleansing velocity, however excessive debris in the system could still result in loss of performance.

32. The proposed drainage design consists of traditional manholes, pipes, trapped gullies and drainage channels.

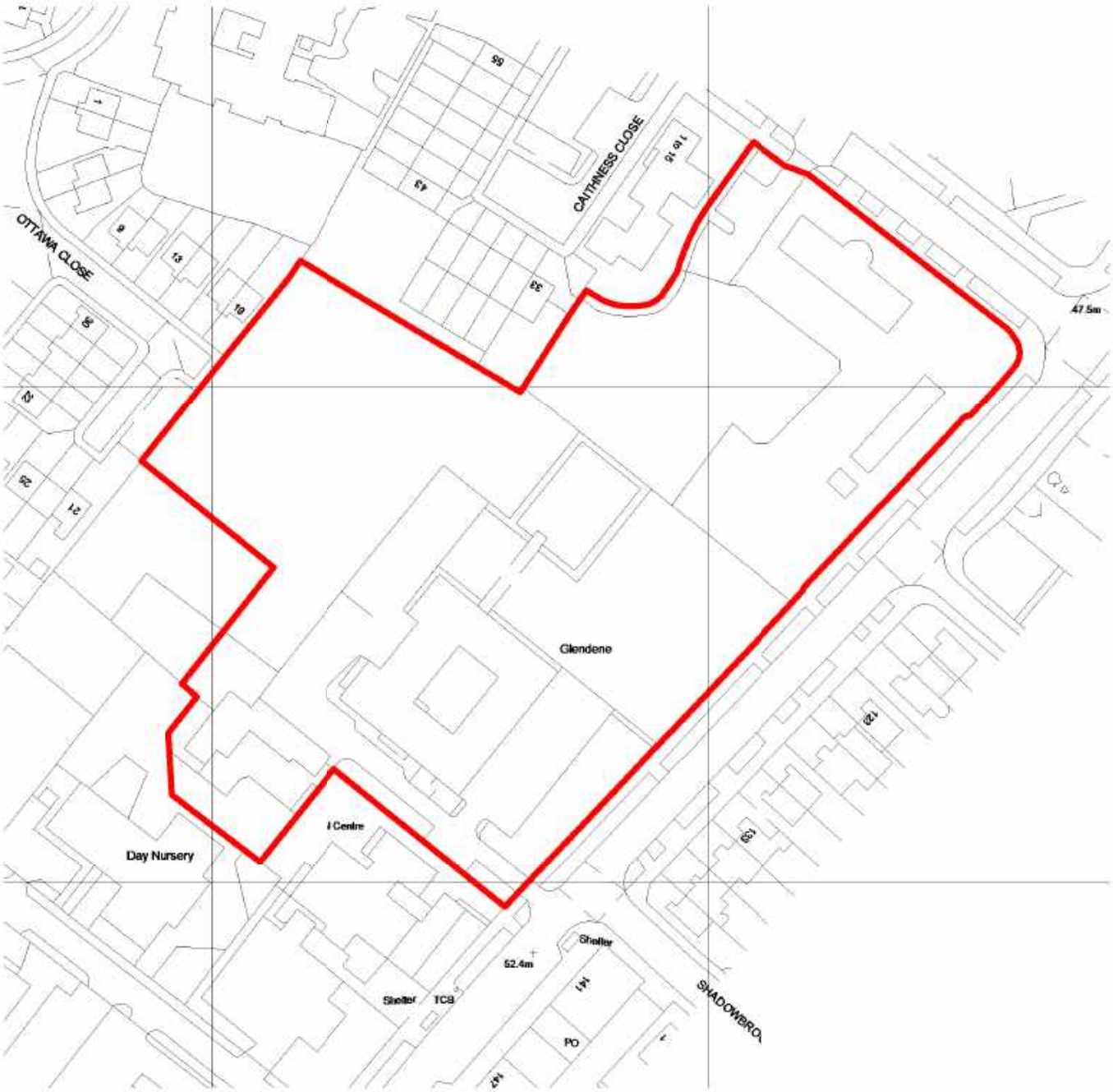
33. It is proposed to check the drainage system and lift manhole/inspection chamber covers to ensure that the pipework associated with each chamber is operating correctly twice yearly and ensure gullies/channels are free from debris.

34. Any problems encountered will be investigated by CCTV survey if required and any remedial works necessary carried out in a timely manner.

35. It has been necessary to incorporate 2No. Hydrobrake flow control devices as part of the proposed surface water design. It is recommended that the hydrobrake is inspected twice a year during the full site drainage as noted above. The manufacturer also provides a cleaning, maintenance and repair service for the hydrobrake that covers the following;

- Scheduled cleaning
- Emergency breakdown assistance
- On-site repairs
- Equipment strip-down
- Planned maintenance
- Planned spares replacements

36. Given that both Hydrobrake flow control units will be located within the adoptable drainage, it is considered that any maintenance requirement will be under the ownership and responsibility of United Utilities.



North

Site Edged Red

20 0 20 40 60 80 100

Rev	Date	Int	Description
2	03.05.18	LT	Red line boundary amended
1	02.05.18	LT	Red line boundary amended

btp ARCHITECTS

RIBA Chartered Practice

Client: WCHG

Project: Glendene

Job No: 3375

Scale @ A4: 1 : 1250

Description: Location Plan

Drawn By:	Checked By:	Date:	Status Code:	Drawing No:	Rev:
LT	VJS	02/05/18	S0	100	2

Purpose of Issue: Feasibility

File Identifier: CF-BTP-00-LP-DR-A-3333_100

DO NOT SCALE FROM THIS DRAWING
ALL DIMENSIONS MUST BE CHECKED ON SITE BY
CONTRACTOR PRIOR TO CONSTRUCTION

Elizabeth House, 486 Didsbury Road, Heaton Mersey, Stockport, SK4 3BS
t 0161 443 1221 e info@bernardtaylor.co.uk w
www.btparchitects.co.uk

WML CONSULTING
Civil, Structural and Geotechnical Engineers

Surface Water Drainage Calculations

For a site referred to as

Glendene, Wythenshawe

Undertaken on behalf of

Garden City Design & Build Ltd.

Job No: 9003

Document No: 9003-WML-00-XX-CA-C-0001

Date: April 2022

Project No. & Name:	9003 – Glendene, Wythenshawe	Status:	Prepared by:	Rev:	Date:
Document Ref:	9003-WML-00-XX-CA-C-0001	Preliminary	Daniel Baker	P01	April 2022

General Notes

1. The calculations within this document have been undertaken using MicroDrainage Software version 2020.

2. This document is to be read in conjunction with the following documents;

    a. 9003-WML-ZZ-XX-DR-C-1001 - 1005 – Proposed Drainage GAs
    b. 9003-WML-ZZ-XX-RP-C-1001 – Drainage Strategy Document

Summary of Results

3. The following summary demonstrates that the outgoing flow rates for the new development works are less than or equal to those of the pre-development site.

4. The existing site comprises a combination of Greenfield and Brownfield areas as shown within appendix 01 below.

5. Greenfield Areas have been calculated using MicoDrainage Software version 2020 whilst the existing Brownfield flow rate has been calculated using a 50mm/Hr rainfall intensity as noted within the drainage strategy.

Existing		
Greenfield Runoff Rate (l/s)	Brownfield Runoff Rate (l/s)	Proposed Site Runoff Rate - Total (l/s)
Q1: 4.3 Q30: 8.3 Q100: 10.2	72.9 36.4 - Allowable (50% reduction)	4.3 +36.4 = 40.7

Proposed				
Proposed Site Runoff Rate - South (l/s)	Proposed Site Runoff Rate - North (l/s)	Actual Site Runoff Rate - South (l/s)	Actual Site Runoff Rate - North (l/s)	Actual Site Runoff Rate - Total (l/s)
10.00	30.00	9.8	30.3	40.1

6. It is noted that during the 100 year event plus 40% climate change allowance there is a small volume of flooding, circa 0.26m³. This is considered negligible and will be contained within the site via the proposed gullies and associate pipework.

7. The following calculations are associated with the adoptable drainage only and don't take into account the extensive private drainage network which will provide an additional storage volume and further reduce the risk of flooding.

Existing Site Area Plan

LEGEND

EXISTING BROWNFIELD AREA: 5,249m²

EXISTING GREENFIELD AREA: 8,909m²

Greenfield Runoff Assessment

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.891	Urban	0.000
SAAR (mm)	849	Region Number	Region 10

Results	**l/s**
QBAR Rural	4.9
QBAR Urban	4.9
Q100 years	10.2
Q1 year	4.3
Q30 years	8.3
Q100 years	10.2

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Proposed Surface Water Network
(South)

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.360	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	26.500	0.085	311.8	0.041	5.00	0.0	0.600	o	600	Pipe/Conduit	
S2.000	7.000	0.030	233.3	0.056	5.00	0.0	0.600	o	600	Pipe/Conduit	
S1.001	42.000	0.140	300.0	0.034	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.002	3.315	0.035	94.7	0.061	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	3.156	0.088	35.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.32	48.760	0.041	0.0	0.0	0.0	1.37	388.4	5.6
S2.000	50.00	5.07	48.705	0.056	0.0	0.0	0.0	1.59	449.5	7.6
S1.001	50.00	5.82	48.675	0.131	0.0	0.0	0.0	1.40	396.0	17.7
S1.002	50.00	5.86	48.535	0.192	0.0	0.0	0.0	1.62	114.2	26.0
S1.003	50.00	5.88	48.500	0.192	0.0	0.0	0.0	2.63	186.2	26.0

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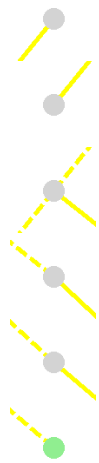
Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	50.710	1.950	Open Manhole	2400	S1.000	48.760	600				
S2	51.920	3.215	Open Manhole	2400	S2.000	48.705	600				
S3	51.830	3.155	Open Manhole	2400	S1.001	48.675	600	S1.000	48.675	600	
								S2.000	48.675	600	
S4	52.250	3.715	Open Manhole	2400	S1.002	48.535	300	S1.001	48.535	600	
S-C1	52.250	3.750	Open Manhole	1350	S1.003	48.500	300	S1.002	48.500	300	
S	52.390	3.978	Open Manhole	0		OUTFALL		S1.003	48.412	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	247.334	-61.660	247.334	-61.660	Required	
S2	226.275	-87.713	226.275	-87.713	Required	
S3	230.682	-82.275	230.682	-82.275	Required	
S4	263.600	-108.359	263.600	-108.359	Required	
S-C1	266.021	-110.624	266.021	-110.624	Required	
S	268.420	-112.675			No Entry	



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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	600	S1	50.710	48.760	1.350	Open Manhole	2400
S2.000	o	600	S2	51.920	48.705	2.615	Open Manhole	2400
S1.001	o	600	S3	51.830	48.675	2.555	Open Manhole	2400
S1.002	o	300	S4	52.250	48.535	3.415	Open Manhole	2400
S1.003	o	300	S-C1	52.250	48.500	3.450	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	26.500	311.8	S3	51.830	48.675	2.555	Open Manhole	2400
S2.000	7.000	233.3	S3	51.830	48.675	2.555	Open Manhole	2400
S1.001	42.000	300.0	S4	52.250	48.535	3.115	Open Manhole	2400
S1.002	3.315	94.7	S-C1	52.250	48.500	3.450	Open Manhole	1350
S1.003	3.156	35.9	S	52.390	48.412	3.678	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.041	0.041	0.041
2.000	-	-	100	0.056	0.056	0.056
1.001	-	-	100	0.034	0.034	0.034
1.002	-	-	100	0.061	0.061	0.061
1.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.192	0.192	0.192

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.003	S	52.390	48.412	0.000	0	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.360		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S4, DS/PN: S1.002, Volume (m³): 28.0

Unit Reference	MD-SHE-0131-1000-2000-1000
Design Head (m)	2.000
Design Flow (l/s)	10.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	131
Invert Level (m)	48.535
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	10.0
Flush-Flo™	0.569	9.8
Kick-Flo®	1.167	7.8
Mean Flow over Head Range	-	8.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.7	1.200	7.9	3.000	12.1	7.000	18.1
0.200	8.3	1.400	8.5	3.500	13.0	7.500	18.7
0.300	9.2	1.600	9.0	4.000	13.9	8.000	19.3
0.400	9.6	1.800	9.5	4.500	14.7	8.500	19.9
0.500	9.8	2.000	10.0	5.000	15.4	9.000	20.5
0.600	9.8	2.200	10.5	5.500	16.2	9.500	21.0
0.800	9.6	2.400	10.9	6.000	16.8		
1.000	9.0	2.600	11.3	6.500	17.5		

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.360
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	1	+0%	100/15 Summer				48.819
S2.000	S2	30 Winter	1	+0%	100/15 Summer				48.801
S1.001	S3	30 Winter	1	+0%	100/15 Summer				48.801
S1.002	S4	30 Winter	1	+0%	30/15 Summer				48.797
S1.003	S-C1	30 Winter	1	+0%					48.567

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.541	0.000	0.01			4.5	OK	
S2.000	S2	-0.504	0.000	0.02			4.9	OK	
S1.001	S3	-0.474	0.000	0.03			10.0	OK	
S1.002	S4	-0.038	0.000	0.14			8.5	OK	
S1.003	S-C1	-0.233	0.000	0.11			8.5	OK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.360
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	30 Winter	30	+0%	100/15 Summer				49.085
S2.000	S2	30 Winter	30	+0%	100/15 Summer				49.085
S1.001	S3	30 Winter	30	+0%	100/15 Summer				49.085
S1.002	S4	30 Winter	30	+0%	30/15 Summer				49.081
S1.003	S-C1	30 Winter	30	+0%					48.572

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.275	0.000	0.02			6.5	OK	
S2.000	S2	-0.220	0.000	0.04			10.0	OK	
S1.001	S3	-0.190	0.000	0.04			13.1	OK	
S1.002	S4	0.246	0.000	0.16			9.8	SURCHARGED	
S1.003	S-C1	-0.228	0.000	0.13			9.8	OK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.360
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	60 Winter	100	+40%	100/15 Summer				50.403
S2.000	S2	60 Winter	100	+40%	100/15 Summer				50.404
S1.001	S3	60 Winter	100	+40%	100/15 Summer				50.403
S1.002	S4	60 Winter	100	+40%	30/15 Summer				50.402
S1.003	S-C1	60 Winter	100	+40%					48.572

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	1.043	0.000	0.02			7.2	SURCHARGED	
S2.000	S2	1.099	0.000	0.05			11.5	SURCHARGED	
S1.001	S3	1.128	0.000	0.03			11.5	SURCHARGED	
S1.002	S4	1.567	0.000	0.16			9.8	SURCHARGED	
S1.003	S-C1	-0.228	0.000	0.13			9.8	OK	

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Proposed Surface Water Network
(North)

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.360	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S3.000	14.500	0.150	96.7	0.132	5.00	0.0	0.600	o	150	Pipe/Conduit	
S3.001	12.007	0.130	92.4	0.042	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.002	39.683	0.040	992.1	0.039	0.00	0.0	0.600	o	1200	Pipe/Conduit	
S3.003	21.927	0.020	1096.4	0.142	0.00	0.0	0.600	o	1200	Pipe/Conduit	
S4.000	52.000	1.850	28.1	0.050	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.001	28.000	0.140	200.0	0.070	0.00	0.0	0.600	o	750	Pipe/Conduit	
S3.004	12.000	0.010	1200.0	0.028	0.00	0.0	0.600	o	1200	Pipe/Conduit	
S3.005	2.940	0.100	29.4	0.048	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.006	3.842	0.040	96.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S3.000	50.00	5.24	48.770	0.132	0.0	0.0	0.0	1.02	18.1	17.9
S3.001	50.00	5.38	47.300	0.174	0.0	0.0	0.0	1.36	54.1	23.6
S3.002	50.00	5.94	45.670	0.213	0.0	0.0	0.0	1.18	1333.8	28.8
S3.003	50.00	6.27	45.630	0.355	0.0	0.0	0.0	1.12	1268.1	48.1
S4.000	50.00	5.35	48.850	0.050	0.0	0.0	0.0	2.48	98.5	6.8
S4.001	50.00	5.59	46.200	0.120	0.0	0.0	0.0	1.98	872.6	16.2
S3.004	50.00	6.46	45.610	0.503	0.0	0.0	0.0	1.07	1211.5	68.1
S3.005	50.00	6.47	45.600	0.551	0.0	0.0	0.0	2.91	205.7	74.6
S3.006	50.00	6.51	45.500	0.551	0.0	0.0	0.0	1.60	113.4	74.6

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S5	50.920	2.150	Open Manhole	1200	S3.000	48.770	150				
S6	50.200	2.900	Open Manhole	1200	S3.001	47.300	225	S3.000	48.620	150	1245
S7	50.000	4.330	Open Manhole	2700	S3.002	45.670	1200	S3.001	47.170	225	525
S8	48.850	3.220	Open Manhole	2700	S3.003	45.630	1200	S3.002	45.630	1200	
S9	50.850	2.000	Open Manhole	1200	S4.000	48.850	225				
S10	48.490	2.290	Open Manhole	2400	S4.001	46.200	750	S4.000	47.000	225	275
S11	47.910	2.300	Open Manhole	2700	S3.004	45.610	1200	S3.003	45.610	1200	
								S4.001	46.060	750	
S12	47.700	2.100	Open Manhole	2700	S3.005	45.600	300	S3.004	45.600	1200	
S-C3	47.700	2.200	Open Manhole	1500	S3.006	45.500	300	S3.005	45.500	300	
S	47.410	1.950	Open Manhole	0		OUTFALL		S3.006	45.460	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S5	254.597	-27.724	254.597	-27.724	Required	
S6	265.884	-36.826	265.884	-36.826	Required	
S7	277.858	-35.930	277.858	-35.930	Required	
S8	302.765	-5.038	302.765	-5.038	Required	
S9	306.167	-46.186	306.167	-46.186	Required	
S10	338.552	-5.501	338.552	-5.501	Required	
S11	316.645	11.937	316.645	11.937	Required	
S12	320.034	23.448	320.034	23.448	Required	
S-C3	318.954	26.182	318.954	26.182	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S	321.156	29.330			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S3.000	o	150	S5	50.920	48.770	2.000	Open Manhole	1200
S3.001	o	225	S6	50.200	47.300	2.675	Open Manhole	1200
S3.002	o	1200	S7	50.000	45.670	3.130	Open Manhole	2700
S3.003	o	1200	S8	48.850	45.630	2.020	Open Manhole	2700
S4.000	o	225	S9	50.850	48.850	1.775	Open Manhole	1200
S4.001	o	750	S10	48.490	46.200	1.540	Open Manhole	2400
S3.004	o	1200	S11	47.910	45.610	1.100	Open Manhole	2700
S3.005	o	300	S12	47.700	45.600	1.800	Open Manhole	2700
S3.006	o	300	S-C3	47.700	45.500	1.900	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S3.000	14.500	96.7	S6	50.200	48.620	1.430	Open Manhole	1200
S3.001	12.007	92.4	S7	50.000	47.170	2.605	Open Manhole	2700
S3.002	39.683	992.1	S8	48.850	45.630	2.020	Open Manhole	2700
S3.003	21.927	1096.4	S11	47.910	45.610	1.100	Open Manhole	2700
S4.000	52.000	28.1	S10	48.490	47.000	1.265	Open Manhole	2400
S4.001	28.000	200.0	S11	47.910	46.060	1.100	Open Manhole	2700
S3.004	12.000	1200.0	S12	47.700	45.600	0.900	Open Manhole	2700
S3.005	2.940	29.4	S-C3	47.700	45.500	1.900	Open Manhole	1500
S3.006	3.842	96.1	S	47.410	45.460	1.650	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
3.000	-	-	100	0.132	0.132	0.132
3.001	-	-	100	0.042	0.042	0.042
3.002	-	-	100	0.039	0.039	0.039
3.003	-	-	100	0.142	0.142	0.142
4.000	-	-	100	0.050	0.050	0.050
4.001	-	-	100	0.070	0.070	0.070
3.004	-	-	100	0.028	0.028	0.028
3.005	-	-	100	0.048	0.048	0.048
3.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.551	0.551	0.551

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S3.006	S	47.410	45.460	0.000	0	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.360		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S12, DS/PN: S3.005, Volume (m³): 22.5

Unit Reference	MD-SHE-0223-3000-2000-3000
Design Head (m)	2.000
Design Flow (l/s)	30.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	223
Invert Level (m)	45.600
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	2.000	30.0
Flush-Flo™	0.586	30.0
Kick-Flo®	1.268	24.1
Mean Flow over Head Range	-	26.0

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

Depth (m)	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**
0.100	7.5	1.200	25.7	3.000	36.4	7.000	54.9
0.200	22.0	1.400	25.3	3.500	39.2	7.500	56.7
0.300	27.8	1.600	26.9	4.000	41.8	8.000	58.5
0.400	29.2	1.800	28.5	4.500	44.3	8.500	60.3
0.500	29.8	2.000	30.0	5.000	46.6	9.000	62.0
0.600	30.0	2.200	31.4	5.500	48.8	9.500	63.6
0.800	29.5	2.400	32.7	6.000	50.9		
1.000	28.4	2.600	34.0	6.500	52.9		

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.360
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S3.000	S5	15 Winter	1	+0%	30/15 Summer			
S3.001	S6	15 Winter	1	+0%	100/15 Summer			
S3.002	S7	30 Winter	1	+0%	100/30 Summer			
S3.003	S8	30 Winter	1	+0%	100/30 Summer			
S4.000	S9	15 Winter	1	+0%				
S4.001	S10	15 Winter	1	+0%	100/30 Winter			
S3.004	S11	30 Winter	1	+0%	100/30 Summer			
S3.005	S12	30 Winter	1	+0%	1/15 Summer	100/60 Winter		
S3.006	S-C3	30 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S5	48.887	-0.033	0.000	0.95			15.8	OK
S3.001	S6	47.405	-0.120	0.000	0.43			20.0	OK
S3.002	S7	45.940	-0.930	0.000	0.02			17.7	OK

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.003	S8	45.939	-0.891	0.000	0.04			19.4	OK
S4.000	S9	48.887	-0.188	0.000	0.06			5.9	OK
S4.001	S10	46.276	-0.674	0.000	0.02			13.1	OK
S3.004	S11	45.935	-0.875	0.000	0.04			26.1	OK
S3.005	S12	45.933	0.033	0.000	0.35			27.3	SURCHARGED
S3.006	S-C3	45.640	-0.160	0.000	0.45			27.3	OK

PN	US/MH Name	Level Exceeded
S3.000	S5	
S3.001	S6	
S3.002	S7	
S3.003	S8	
S4.000	S9	
S4.001	S10	
S3.004	S11	
S3.005	S12	1
S3.006	S-C3	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.360
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S3.000	S5	15 Winter	30	+0%	30/15 Summer			
S3.001	S6	15 Winter	30	+0%	100/15 Summer			
S3.002	S7	30 Winter	30	+0%	100/30 Summer			
S3.003	S8	30 Winter	30	+0%	100/30 Summer			
S4.000	S9	15 Winter	30	+0%				
S4.001	S10	30 Winter	30	+0%	100/30 Winter			
S3.004	S11	30 Winter	30	+0%	100/30 Summer			
S3.005	S12	30 Winter	30	+0%	1/15 Summer	100/60 Winter		
S3.006	S-C3	30 Summer	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S5	49.479	0.559	0.000	2.15			35.8	SURCHARGED
S3.001	S6	47.525	0.000	0.000	1.00			46.5	OK
S3.002	S7	46.372	-0.498	0.000	0.05			42.1	OK

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.003	S8	46.367	-0.463	0.000	0.06			32.8	OK
S4.000	S9	48.909	-0.166	0.000	0.15			14.6	OK
S4.001	S10	46.365	-0.585	0.000	0.05			28.3	OK
S3.004	S11	46.364	-0.446	0.000	0.06			34.1	OK
S3.005	S12	46.362	0.462	0.000	0.38			29.9	SURCHARGED
S3.006	S-C3	45.648	-0.152	0.000	0.49			29.9	OK

PN	US/MH Name	Level Exceeded
S3.000	S5	
S3.001	S6	
S3.002	S7	
S3.003	S8	
S4.000	S9	
S4.001	S10	
S3.004	S11	
S3.005	S12	1
S3.006	S-C3	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.360
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S3.000	S5	15 Winter	100	+40%	30/15 Summer			
S3.001	S6	15 Winter	100	+40%	100/15 Summer			
S3.002	S7	60 Winter	100	+40%	100/30 Summer			
S3.003	S8	60 Winter	100	+40%	100/30 Summer			
S4.000	S9	15 Winter	100	+40%				
S4.001	S10	60 Winter	100	+40%	100/30 Winter			
S3.004	S11	60 Winter	100	+40%	100/30 Summer			
S3.005	S12	60 Winter	100	+40%	1/15 Summer	100/60 Winter		
S3.006	S-C3	60 Winter	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S5	50.767	1.847	0.000	3.62			60.2	FLOOD RISK
S3.001	S6	47.774	0.249	0.000	1.71			78.9	SURCHARGED
S3.002	S7	47.702	0.832	0.000	0.06			53.9	SURCHARGED

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.003	S8	47.702	0.872	0.000	0.08			44.2	SURCHARGED
S4.000	S9	48.932	-0.143	0.000	0.28			26.3	OK
S4.001	S10	47.702	0.752	0.000	0.05			29.8	SURCHARGED
S3.004	S11	47.701	0.891	0.000	0.06			34.7	FLOOD RISK
S3.005	S12	47.700	1.800	0.261	0.38			30.3	FLOOD
S3.006	S-C3	45.649	-0.151	0.000	0.49			30.3	OK

PN	US/MH Name	Level Exceeded
S3.000	S5	
S3.001	S6	
S3.002	S7	
S3.003	S8	
S4.000	S9	
S4.001	S10	
S3.004	S11	
S3.005	S12	1
S3.006	S-C3	

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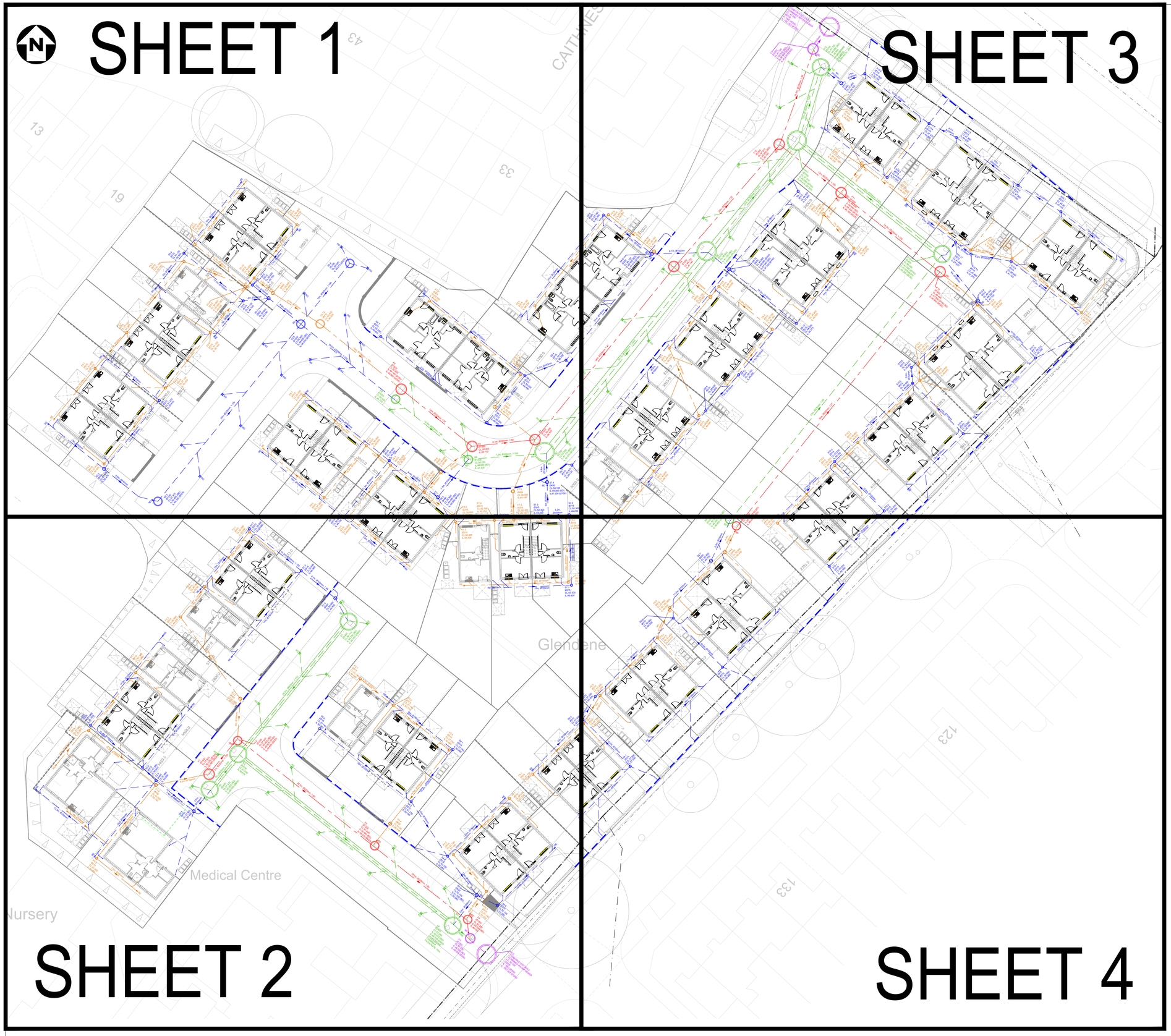

LEGEND

- PROPOSED PRIVATE SURFACE WATER SEWER
- PROPOSED PROPOSED FOUL WATER SEWER
- PROPOSED ADOPTED SURFACE WATER SEWER
- PROPOSED ADOPTED FOUL WATER SEWER
- PROPOSED ADOPTED COMBINED WATER SEWER
- EXISTING ADOPTED COMBINED WATER SEWER

SUBJECT TO APPROVAL FROM LOCAL PLANNING AUTHORITY AND UNITED UTILITIES

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Project
GLENDENE,
WYTHENSHAWE

CLIENT
BTP ARCHITECTS

Title
PROPOSED DRAINAGE LAYOUT
OVERVIEW

Drawn	Checked	Date	Scale
DB	LoG	SEPT 21	1:200 @ A0

WML CONSULTING
Chartered Civil and Structural Engineers
No.8 Oak Green
Earl Road
Stanley Green Business Park
Cheadle Hulme
Cheshire SK8 6QL
Tel 0161 482 0600
Fax 0161 486 9210
e-mail info@wmlconsulting.com
www.wmlconsulting.com

Project	Originator	Volume	Level	Type	Role	Number	Rev
9003	WML	ZZ	XX	DR	C	1001	T04

0 2 4 6 8 10 12 14
SCALE IN METRES 1:200

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Project
GLENDENE,
WYTHENSHAWE

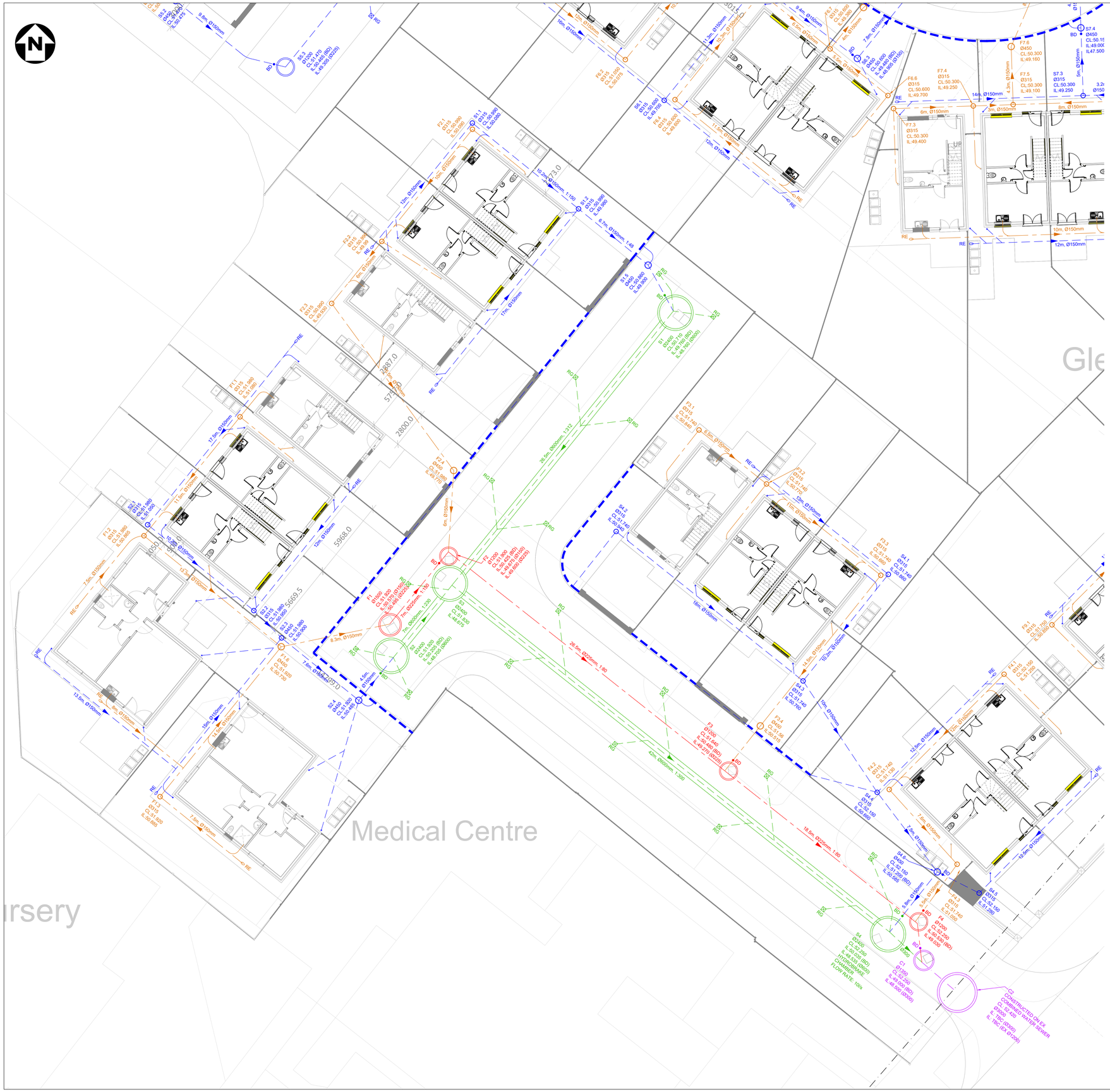
CLIENT
BTP ARCHITECTS

Title
PROPOSED DRAINAGE LAYOUT
SHEET 1

Drawn	Checked	Date	Scale
DB	LoG	SEPT 21	1:100 @ A0

WML CONSULTING
Chartered Civil and Structural Engineers
No.8 Oak Green
Earl Road
Cheadle Royal Business Park
Cheadle Hulme
Cheshire SK8 6QL
Tel 0161 482 0600
Fax 0161 488 9210
e-mail info@wmlconsulting.com
www.wmlconsulting.com

Project	Originator	Volume	Level	Type	Role	Number	Rev
9003	- WML -	ZZ -	XX -	DR -	C -	1002	T04



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WYTHENSHAWE

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BTP ARCHITECTS

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PROPOSED DRAINAGE LAYOUT
SHEET 2

Drawn	Checked	Date	Scale
DB	LoG	SEPT 21	1:100 @ A0

WML CONSULTING
Chartered Civil and Structural Engineers
No.8 Oak Green
Earl Road
Stanley Green Business Park
Cheadle Hulme
Cheshire SK8 6QL
Tel 0161 482 0600
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e-mail info@wmlconsulting.com
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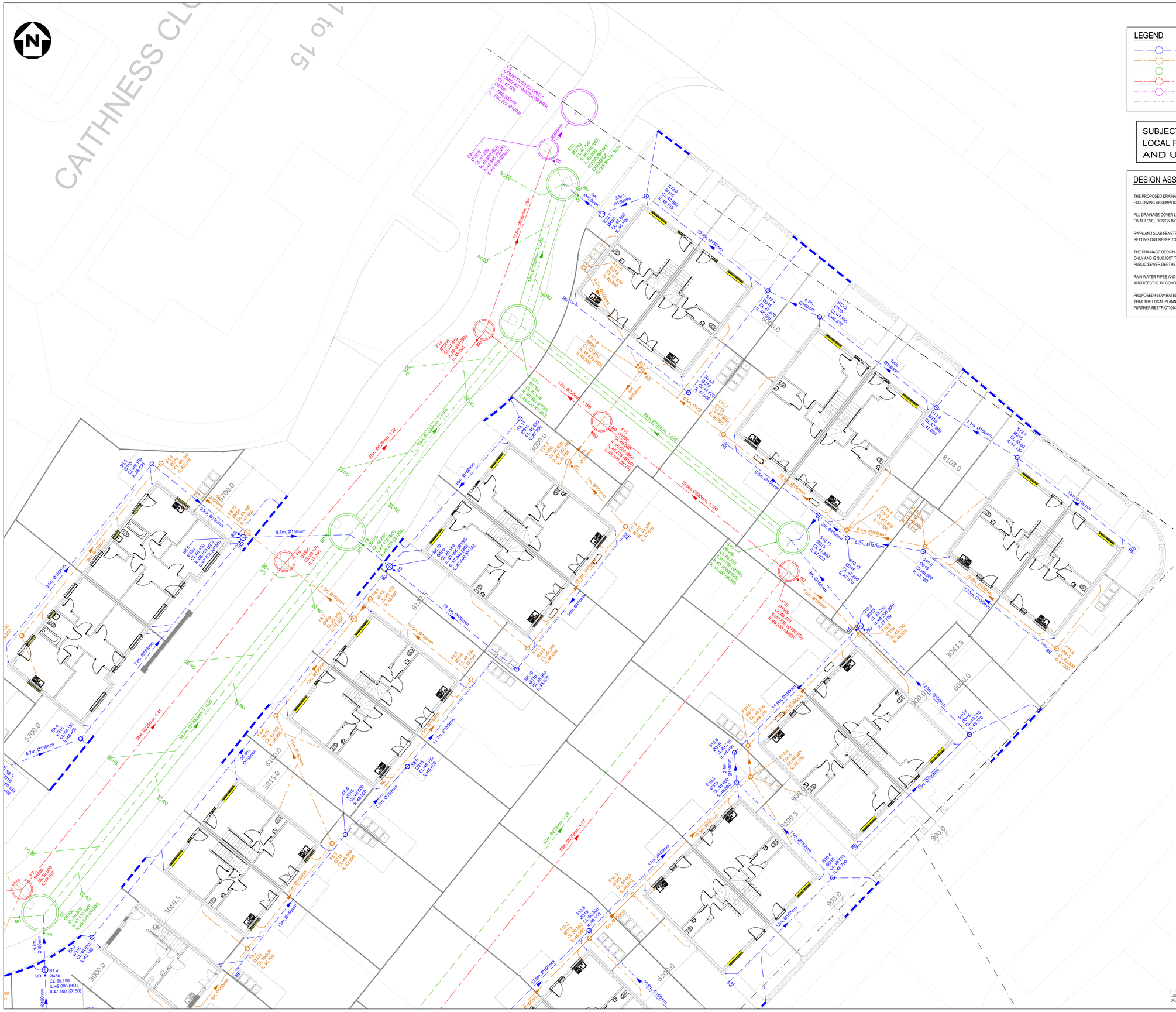
Project	Originator	Volume	Level	Type	Role	Number	Rev
9003	- WML -	ZZ -	XX -	DR -	C -	1003	T04

0 1 2 3 4 5 6 7
SCALE IN METRES 1:100



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COVER LEVELS ON THIS DRAWING ARE APPROXIMATE AND INDICATIVE ONLY ARCHITECT TO CONFIRM COVER LEVELS TO ALL MANHOLES AND GULLIES PRIOR TO CONSTRUCTION.

THE LAYOUT OF DRAINAGE ON THIS DRAWING IS INDICATIVE ONLY ARCHITECT TO CONFIRM EXACT LOCATION OF MANHOLES AND GULLIES.

U.N.O. ALL DRAINAGE GOODS & FITTINGS TO BE:-

UPTO 300Ø (AND INCLUDING) TO BE SUPERSLEVE VITRIFIED CLAY PIPES OR SIMILAR.

ABOVE 300Ø TO BE CONCRETE BY STANTON BONNA OR SIMILAR.

ALL COVERS AND RODDING ACCESS POINTS TO BE SEALED AND SCREWED TIGHT.

ALL INTERNAL MANHOLE COVERS TO BE DOUBLE SEALED, LOCKABLE AND RECESSED TO ACCEPT FLOOR FINISHES WHERE APPLICABLE.

SETTING OUT OF ALL INTERNAL GULLY/PLUMBING CONNECTIONS TO BE CO-ORDINATED BETWEEN THE SERVICE ENGINEERS AND THE ARCHITECT.

ALL INTERNAL GULLIES, PLUMBING CONNECTIONS, SOIL STACKS, SVPS AND ALL OTHER CONNECTIONS OF FOUL AND SURFACE WATER DRAINS TO BELOW GROUND TO BE FITTED WITH ACCESSIBLE RODDING POINTS ABOVE SLAB LEVEL.

ALL SURFACE WATER CONNECTIONS TO BE 150mm DIAMETER AT MINIMUM FALLS OF 1:80 UNLESS NOTED OTHERWISE.

ALL FOUL WATER CONNECTIONS TO BE 150mm DIAMETER AT MINIMUM FALLS OF 1:150 UNLESS NOTED OTHERWISE.

ALL CONNECTIONS TO BE MADE IN ACCORDANCE WITH STANDARD DETAIL DRAWINGS.

ALL PIPEWORK TO BE INSTALLED WITH SOFFITS LEVEL (E.G. AT CHANGES IN PIPE SIZE) U.N.O.

FOR DETAILS OF GREASE TRAP/MACERATOR REQUIREMENTS ASSOCIATED WITH KITCHENS REFER TO SERVICE ENGINEER.

ON COMPLETION OF DRAINAGE WORKS, THE NEW DRAINAGE SYSTEM IS TO BE THOROUGHLY CLEANED AND A CCTV SURVEY CARRIED OUT TO CONFIRM NO CONSTRUCTION DEBRIS OR BLOCKAGES REMAIN.

CONNECTIONS TO CARRIER DRAINS ARE TO BE 'Y' JUNCTIONS.

ALL PRIVATE DRAINAGE IS TO COMPLY WITH BS EN 752 AND BUILDING REGS. PART H.

PIPE GRADIENTS ARE INDICATIVE MINIMUMS.

SURFACE CHANNEL DRAINS TO BE ACO MULTIDRAIN OR SIMILAR.

MANHOLES:

ALL PROPOSED NEW MANHOLES TO BE PRECAST RING MANHOLES TYPE B UNLESS NOTED OTHERWISE. INTERNAL DIAMETERS OF MANHOLES TO BE 1050Ø mm WHERE DEPTH TO PIPE SOFFIT IS LESS THAN 1.5m, AND 1200mm Ø ELSEWHERE UNLESS NOTED OTHERWISE. IC - DENOTES POLYPROPYLENE INSPECTION CHAMBER BY 'HEPWORTH' OR SIMILAR APPROVED INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

MANHOLE COVERS:

CARRIAGEWAYS GENERAL - EN124 CLASS D400
CARRIAGEWAYS WITHIN 0.5m OF KERB - EN124 CLASS C250
SLOW MOVING HGV [3B] - EN 124 CLASS B125 SLOW MOVING GLV [10t] - EN 124 CLASS B125 SLOW MOVING PRIVATE CARS - EN124 CLASS B125.

INTERNAL - JONES OF OSWESTRY - SUPRASTEEL DOUBLE SEALED WITH NEOPRENE GASKET AND COVER GREASE OR SIMILAR APPROVED.

REFER TO ARCHITECTS DRAWINGS FOR DETAILS OF ANY MANHOLE COVERS WHICH REQUIRE INSET PANELS.

TENDER DRAWING

Rev.	Amendment	Date	By	Chkd
T04	REVISED TO SUIT UPDATED SITE LAYOUT.	06.04.22	DB	LoG
T03	REVISED TO SUIT COORDINATION WITH S104 ADOPTABLE DRAINAGE ARRANGEMENT.	23.03.22	DB	LoG
T02	REVISED TO SUIT UPDATED SITE LAYOUT & PLANNING COMMENTS.	21.03.22	DB	LoG
T01	TENDER ISSUE.	17.09.21	DB	LoG

Project
GLENDENE,
WYTHENSHAWE

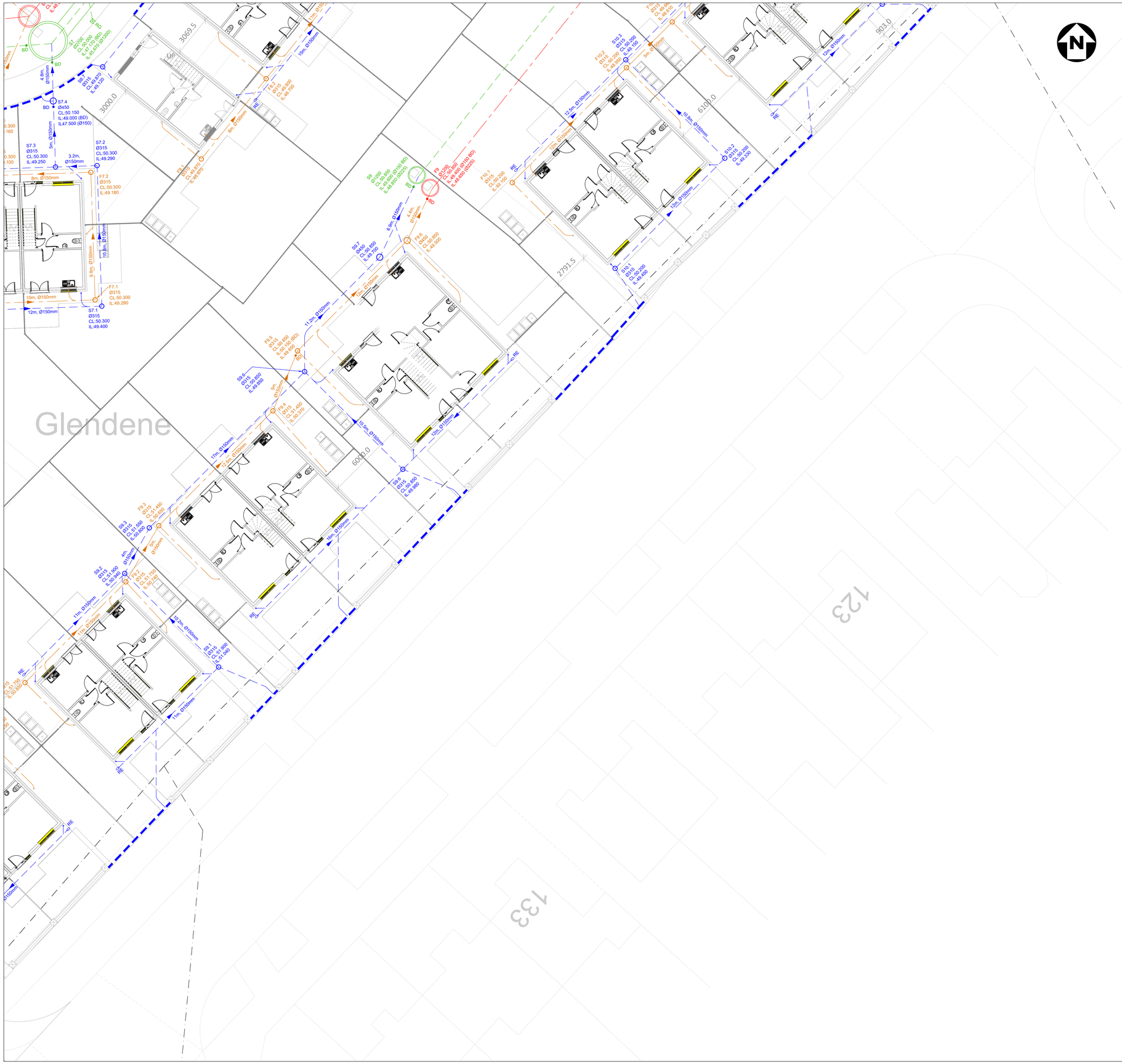
CLIENT
BTP ARCHITECTS

Title
PROPOSED DRAINAGE LAYOUT
SHEET 3

Drawn	Checked	Date	Scale
DB	LoG	SEPT 21	1:100 @ A0

WML CONSULTING
Chartered Civil and Structural Engineers
No.8 Oak Green
Earl Road
Stanley Green Business Park
Handforth
Cheshire SK9 6QL
Tel 0161 482 0600
Fax 0161 486 9210
e-mail info@wmlconsulting.com
www.wmlconsulting.com

Project	Originator	Volume	Level	Type	Role	Number	Rev
9003	WML	ZZ	XX	DR	C	1004	T04



LEGEND

- PROPOSED PRIVATE SURFACE WATER SEWER
- PROPOSED PROPOSED FOUL WATER SEWER
- PROPOSED ADOPTED SURFACE WATER SEWER
- PROPOSED ADOPTED FOUL WATER SEWER
- PROPOSED ADOPTED COMBINED WATER SEWER
- EXISTING ADOPTED COMBINED WATER SEWER

SUBJECT TO APPROVAL FROM LOCAL PLANNING AUTHORITY AND UNITED UTILITIES

DESIGN ASSUMPTIONS

THE PROPOSED DRAINAGE DESIGN ON THIS DRAWING IS BASED ON THE FOLLOWING ASSUMPTIONS;

ALL DRAINAGE COVER LEVELS SHOWN ARE INDICATIVE AND ARE SUBJECT TO FINAL LEVEL DESIGN BY THE ARCHITECT.

RWPs AND SLAB PENETRATIONS ARE SHOWN INDICATIVE ONLY. FOR FINAL SETTING OUT REFER TO ARCHITECT DRAWINGS.

THE DRAINAGE DESIGN / INFORMATION SHOWN ON THIS DRAWING IS INDICATIVE ONLY AND IS SUBJECT TO CONFIRMATION OF THE EXISTING UNITED UTILITIES PUBLIC SEWER DEPTHS.

RAIN WATER PIPES AND SLAB PENETRATIONS ARE SHOWN INDICATIVE ONLY. ARCHITECT IS TO CONFIRM FINAL POSITIONS PRIOR TO DETAILED DESIGN.

PROPOSED FLOW RATES ARE AS OUTLINED IN THE DRAINAGE STRATEGY ASSUME THAT THE LOCAL PLANNING AUTHORITY & UNITED UTILITIES DO NOT IMPOSE FURTHER RESTRICTIONS TO DISCHARGE RATES.

GENERAL NOTES

DO NOT SCALE FROM THIS DRAWING WORK TO FIGURED DIMENSIONS ONLY.

NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS ALLOWED WITHOUT PRIOR PERMISSION IN WRITING.

ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND THE SPECIFICATION.

THE CONTRACTOR SHALL INCORPORATE ALL THE REQUIREMENTS OF THE PRE-TENDER STAGE HEALTH AND SAFETY PLAN.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH WML DRAINAGE DETAIL DRAWINGS FOR DETAILS OF MATERIALS AND WORKMANSHIP REFER TO THE SPECIFICATION.

THE CONTRACTOR IS RESPONSIBLE FOR CHECKING INVERT LEVELS AND POSITIONS OF ALL EXISTING DRAINS, SEWERS, INSPECTION CHAMBERS AND MANHOLES SHOWN ON THIS DRAWING IMMEDIATELY ON SITE ESTABLISHMENT. ANY DISCREPANCIES MUST BE REPORTED TO WML CONSULTING IMMEDIATELY.

WHERE THE NEW SITE DRAINAGE CONNECTS IN TO EXISTING MANHOLES IN CARRIAGEWAYS AND/OR EXISTING ADOPTED SEWERS, THE CONTRACTOR IS RESPONSIBLE FOR ALL LIASON WITH THE RELEVANT STATUTORY UNDERTAKER AND LOCAL AUTHORITY WITH REGARD TO ROAD CLOSURES, TRAFFIC MANAGEMENT, PERMITS TO WORK, SUBMISSION OF CONTRACTORS METHOD STATEMENTS AND RISK ASSESSMENTS AND OTHER DOCUMENTATION AND CORRESPONDENCE ASSOCIATED WITH THE SITE STAGE (PART 2) ELEMENT OF THE WORKS.

ROCKER PIPES TO BE PROVIDED AT ALL CONCRETE CASED INTERFACES.

PROVIDE ADEQUATE PROTECTION TO MAINTAIN MINIMUM COVER TO DRAINS DURING THE CONSTRUCTION PERIOD.

COVER LEVELS ON THIS DRAWING ARE APPROXIMATE AND INDICATIVE ONLY ARCHITECT TO CONFIRM COVER LEVELS TO ALL MANHOLES AND GULLIES PRIOR TO CONSTRUCTION.

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ALL INTERNAL MANHOLE COVERS TO BE DOUBLE SEALED, LOCKABLE AND RECESSED TO ACCEPT FLOOR FINISHES WHERE APPLICABLE.

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SLOW MOVING HGV [38t] - EN 124 CLASS B125 SLOW MOVING
GLV [10t] - EN 124 CLASS B125 SLOW MOVING PRIVATE CARS - EN124 CLASS B125.

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REFER TO ARCHITECTS DRAWINGS FOR DETAILS OF ANY MANHOLE COVERS WHICH REQUIRE INSET PANELS.

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Rev.	Amendment	Date	By	Chkd
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T01	TENDER ISSUE.	17.09.21	DB	LoG

Project
GLENDENE,
WYTHENSHAWE

CLIENT
BTP ARCHITECTS

Title
PROPOSED DRAINAGE LAYOUT
SHEET 4

Drawn	Checked	Date	Scale
DB	LoG	SEPT 21	1:100 @ A0

WML CONSULTING
Chartered Civil and Structural Engineers
No.8 Oak Green
Earl Road
Stanley Green Business Park
Cheadle Hulme
Cheshire SK8 6QL
Tel 0161 482 0600
Fax 0161 482 9210
e-mail info@wmlconsulting.com
www.wmlconsulting.com

Project	Originator	Volume	Level	Type	Role	Number	Rev
9003	- WML -	ZZ -	XX -	DR -	C -	1005	T04

SCALE IN METRES 0 1 2 3 4 5 6 7 1:100

WML Consulting Ltd

No. 8
Oak Green, Earl Road, Stanley Green Business Park
Cheadle Hulme, Cheshire
SK8 6QL

FAO:

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

Your Ref: 9003G
Our Ref: UUPS-ORD-159769
Date: 31/03/2020

Dear Sirs

Location: Glendene

I acknowledge with thanks your request dated 31/03/2020 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

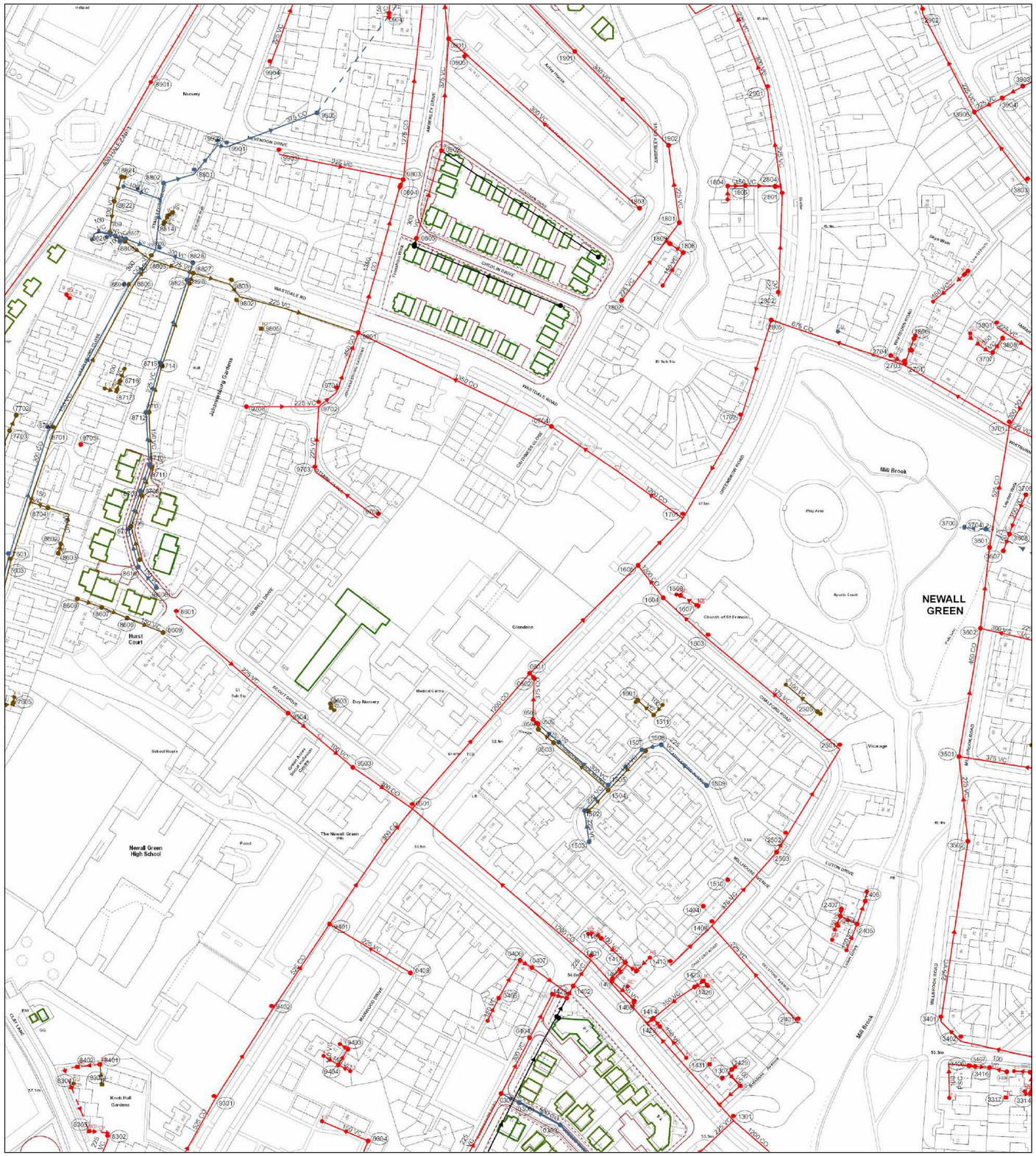
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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



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

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
8606		FO		150			VC	14.40904	
0803		CO	0	1275			CO	110.6526	1 in 40.3841639
3801	49.78	CO	47.93	225			VC	33.28663	1 in 98
8611	51.9	FO	50.06	150			VC	18.84315	1 in 38
1702	46.16	CO	43.35	675			CO	63.63175	1 in 578
8825	47.81	FO	45.46	150			VC	6.067524	1 in 13
8706	51.72	SW	50.09	225			VC	22.12795	1 in 43
8828	47.15	SW	45.66	300			VC	21.89158	1 in 219
8711	50.87	FO	48.88	150			VC	30.70935	1 in 49
0503	52.24	FO	48.09	150			VC	11.33484	1 in 567
2901	45.92	CO	41.54	300			VC	29.15476	1 in 121
9304		CO		150			VC	27.9417	
0504	52.14	FO	48.07	150			VC	3.151597	
2704		CO		150			VC	8.998477	
8714	49.45	SW	48.03	225			VC	48.34048	1 in 21
2805		CO	0	675			CO	57.56735	
3502		CO	0	225			CO	47.26521	
0505	52.09	CO	47.77	375			CO	3.67822	1 in 10
9702	48.61	CO	46.1	225			VC	12.80625	1 in 67
8827	47.31	FO	44.98	225			VC	21.28725	1 in 73
3903		CO	0	225			VC	13.258	
1413	54.66	CO	0	225			VC	31.82766	
0405		CO		150			VC	23.95266	
2405		CO		150			VC	19.0198	
1901	41.84	CO	0	300			VC	76.38062	
3904		CO	0	225			VC	17.32036	
2407		CO		150			VC	4.147971	
1509	51.36	SW	49.51	225			VC	33.89066	1 in 1695
1407		CO		150			VC	16.5834	
3601		CO	44.4	525			CO	67.89698	1 in 234
9902	45.81	SW	43.92	375			CO	5.09902	
1502	52.35	SW	49.39	225			VC	19.27257	1 in 42
1805		CO		150			VC	16.51042	
0406		CO		150			VC	7.672066	
9701	48.11	CO	45.89	225			VC	18.02776	1 in 120
3707		CO		150			VC	9.682163	
9803	47.2	FO	44.71	225			VC	8.778169	1 in 439
3407		CO		100			PSC	7.982378	
2902	49.61	CO	46.89	225			VC	54.74486	1 in 105
3602	47.8	CO	44.8	450			CO	45.27692	1 in 119
3905		CO	0	225			VC	61.62091	
1505	52.12	SW	48.93	300			CO	36.46046	1 in 228
3701	49.33	CO	44.09	675			CO	67.23094	1 in 232
1601		FO		100			VC	1.591524	
2701	47.51	CO	43.78	675			CO	78.1089	
8701	50.87	SW	48.59	300			CO	92.32322	1 in 44
9706		CO	0	225			VC	40	
2501	50.37	CO	47.25	375			VC	95.13148	1 in 170
3501	48.95	CO	46.18	450			CO	72.00694	1 in 185
1401	54.86	CO	49.02	1200			CO	129.8345	1 in 519
2801	45.7	CO	41.97	225			VC	59.5399	1 in 142
2802	45.32	CO	42.31	225			VC	55.03635	1 in 172
0601	51.97	CO	46.11	1200			CO	84.85281	
1503	52.63	SW	50.75	225			VC	17.30342	1 in 13
8602		FO		100			VC	29.56504	
7601	52.43	SW	50.53	300			CO	73.37575	1 in 38
2806		CO		100			VC	14.60949	
9903	45.24	CO	42.83	225			VC	70.40597	1 in 1.75883001
8710	50.86	SW	49.18	225			VC	29.20329	1 in 56
3406		CO		100			PSC	3.615523	
3408		CO		100			VC	9.82795	
8708	51.28	FO	49.28	150			VC	16.27259	1 in 41
8601	52.33	CO	50.43	225			VC	82.21922	1 in 161
1418		CO		100			VC	19.11771	
2804		CO		150			VC	3.12448	
1409	53.64	CO	50.71	375			VC	54.56189	1 in 103
8608	52.1	SW	50.76	150			VC	15.06891	1 in 49
9705	50.7	CO	48.98	225			VC	43.60046	1 in 68
2502	51.78	CO	47.64	375			VC	57.45433	1 in 155
8821		FO		100			VC	14.14246	
1507	51.72	SW	49.27	300			VC	27.18165	1 in 80
1801	43.02	CO	41.33	225			VC	43.41659	1 in 197
1511		FO		100			VC	12.2732	
8808		FO		150			VC	17.37575	
8806	48.53	FO	46.34	150			VC	17.48706	1 in 17
9301	57.29	CO	52.41	525			CO	59.36329	1 in 1979
8709	51.23	SW	49.57	225			VC	15.10844	1 in 39
2505		FO		100			VC	22.90295	
8712	50.15	FO	48.25	150			VC	26.96131	1 in 50
9503		CO	49.56	300			CO	40.22437	1 in 1006
1408		CO		150			VC	3.404488	
2401	54.18	CO	52.44	225			VC	72.24957	1 in 94
8826	47.75	SW	45.78	300			VC	9.988146	1 in 83
1605		CO	0	1200			CO	36.06938	
9703	50.07	CO	47.33	225			CO	36.05551	1 in 150
1506	51.72	FO	48.61	150			VC	30.11493	1 in 143
8805	47.66	FO	45.26	225			VC	24.87032	1 in 89
9402	56.33	CO	52.36	525			CO	57.68882	1 in 444
3803	51.35	CO	48.17	225			VC	49.27602	
9404		CO		150			VC	10.0969	
0501	53.9	CO	48.74	1200			CO	99.24717	
1603	49.9	CO	46.67	375			VC	33.97058	
9401	55.52	CO	52.22	525			CO	53.25411	
9604	53.62	CO	49.65	225			VC	23.43075	
1701	48.24	CO	43.21	1200			CO	44.40721	1 in 82
9801	47.29	CO	41.68	1350			CO	42.72002	
0904		CO		150			VC	31.11258	
1508	51.56	SW	49.49	300			VC	11.18575	1 in 51
8803	47.45	SW	45.56	300			CO	37.49954	1 in 49
9901	45.46	SW	0	375			CO	53.48832	
9403		CO		150			VC	5.238464	
8713	50.15	SW	48.66	225			VC	28.59993	1 in 45
1417		CO		100			VC	11.47192	
7603	52.49	FO	50.37	150			VC	76.84399	1 in 39
8704		FO		150			VC	10.17398	
8707	51.72	FO	49.57	150			VC	18.27362	1 in 63
9802	47.32	FO	44.56	225			VC	68.74677	1 in 94
1504	52.12	FO	48.4	150			VC	40.06825	1 in 129
8607		FO		150			VC	15.47942	
3401	52.92	CO	0	225			VC	101.1187	
0502	52.21	SW	48.77	375			CO	15.35727	1 in 15
8610	52	SW	50.45	225			VC	22.02133	1 in 61
0704	47.4	CO	42.11	1350			CO	118.9664	1 in 313
8702	50.87	FO	48.39	150			VC	92.0668	1 in 45
1604		CO	0	1200			CO	22.80351	
8820		FO		100			VC	9.812818	
3402	53.72	CO	50.7	225			VC	15.55635	
1902	42.45	CO	41.09	300			VC	73.53911	
0409		CO	0	225			VC	52.47857	
0804		CO	0	1275			CO	4.472136	1 in 1.42879737
1501	52.36	FO	48.61	150			VC	16.00198	1 in 76
3704	47.97	SW		225			VC	14.56998	
0902	44.2	CO	40.99	375			VC	62.1289	1 in 1.58694504
8605		FO		150			VC	21.39214	
9904	44.26	CO	41.2	225			VC	66.12866	
2503	51.98	CO	47.67	375			VC	9.433981	1 in 943
8715	49.49	FO	47.71	150			VC	48.15601	1 in 21
1804		CO		150			VC	9.753429	
2808		CO		100			VC	1.046221	
9905		SW		375			CO	154.4021	
8822		FO		100			VC	17.55938	
3313		CO		100			VC	8.858211	
8801	45.93	SW	44.39	375			CO	20.61553	1 in 46
0901	42.09	CO	39.92	375			VC	36.22154	
8302	58.13	CO	56.04	225			VC	86.53901	1 in 87
8804	48.5	SW	46.46	300			CO	24.93308	1 in 28
0602	51.71	CO	43.31	375			CO	3.606938	
2703		CO		100			VC	1.027408	
8802	46.43	SW	44.67	375			CO	17.72005	1 in 68
8807		SW		150			VC	17.84174	
2404		CO		150			VC	10.26936	
0506	52.09	CO	47.39	375			CO	22.90132	1 in 6
0407		CO		150			VC	25.27765	
1802	45.2	CO	42.41	225			VC	53.60037	1 in 69
8716		FO		100			VC	7.36653	
1402		CO	0	225			VC	17.37591	
1808		CO		150			VC	8.708892	
3708		CO		100			VC	14.33734	
1426		CO		150			VC	28.86863	
0305	55.84	CO	53.26	300			VC	34.62127	1 in 151
0303	56.17	SW	53.45	900			CO	26.0199	1 in 372
1305		CO		100			VC	15.68315	
1428	54.85	CO	52.82	300			VC	7.633457	
1803	43.1	CO	41.21	300			VC	141.6757	1 in 115
0403	54.5	CO	52.87	300			VC	8.351165	1 in 139
0306	55.9	SW		0			UN	0.2583497	
1429		CO		100			VC	12.77448	
1301	55.7	CO	49.22	1200			CO	119.0042	1 in 661
1423		CO		150			VC	5.628433	
1414		CO		150			VC	4.361307	
3608		CO		150			VC	10.01934	
0404	55.03	CO	53.03	300			VC	27.23461	1 in 170
1809		CO		150			VC	2.867604	

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

SEWER MATERIAL

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

Address or Site Reference:

Glendene,

Scale: 1:1250 **Date:** 31/03/2020

Sheet: 1 of 1

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SEWER RECORDS

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