Project No. & Name:	10939 – St Vincent's	Prepared by:	Checked by:	Rev:	Date:
Document Ref:	LCNP-WML-00-XX-RP-D-053	Daniel Baker	Loughlin O'Gorman	P02	May 2024

Background

1. The below Drainage Strategy Report has been created by WML to support and inform detailed Planning Conditions for the St Vincent's development, located within the existing Loreto College grounds.

2. The proposed scheme involves the demolition of an existing single storey building and the construction of another which will provide administration, meeting space, eatery and a covered seating area.

Surface Water Drainage Strategy

3. Reference should be made to the Flood Risk Assessment – WML Consulting, April 2023, Phase 1: Desk Top Study Report – WML Consulting, February 2023 and Phase 2: Ground Investigation Report – WML Consulting, April 2023.

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 752 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:** A review of the Phase 2: Ground Investigation Report by WML Consulting has confirmed that ground conditions on the site comprise made ground underlain by glacial deposits to a depth of circa 11mbgl and weathered sandstone of the Chester Pebble Bed Formation to a maximum depth of 12mbgl. These ground conditions are considered suitable for some infiltration techniques; however, it is noted that special consideration should be given to areas of deeper made ground and proximity with the existing brick surface water culvert immediately to the south.

8. **Surface water discharge via watercourse:** A review of the Ordnance Survey mapping around the site has confirmed the presence of Corn Brook Culvert which passes directly to the south of the development building and is understood to follow the line of the original watercourse.

9. A survey of the existing culvert undertaken by Survey Operations, March 2024, confirmed the route of the 3.7m x 1.45m Corn Brook Culvert as it passes through the site at a depth of approximately 2.5mbgl. A copy of the survey drawing can be found appended to this report.

10. **Surface water discharge via public sewer:** A review of the United Utilities (UU) public sewer records indicate that there are existing combined water sewers located within the adjacent Chichester Rd (south) and Moss Lane (west).

11. As-built drainage records for the previous development and a CCTV survey undertaken by Blocked Drains Northwest, April 2024 has confirmed that the existing building is served by a private combined drainage system which connects into the wider college drainage network before ultimately discharging to the UU public combined sewer located within Moss Lane.

Surface Water Drainage Proposals

12. Reference should be made to WML drawing LCNP-WML-00-FN-DR-D-5201.

13. In consideration of the above drainage hierarchy, the surface water proposals outlined within this report are based upon disposal of all surface water from the proposed development via a combination of both infiltration and a connection to the existing Corn Brook Culvert.

14. As noted within section 7, the findings of the Phase 2 Ground Investigation Report suggested that infiltration might be a viable solution for this development, however careful consideration should be given to presence of varying depths of made ground and the proximity to the existing surface water culvert.

15. It is understood that Corn Brook Culvert is of brick construction and therefore concentrated infiltration techniques such as cellular soakaways in the vicinity of the existing culvert could result in a weakening/wash out of the existing mortar or softening of the adjacent ground which could ultimately lead to structural failure.

16. It is therefore proposed to incorporate infiltration for new areas of hardstanding only i.e., footpaths where a permeable construction can be utilised to disperse of captured surface water runoff over a larger area and mitigate any risk associated with the structure of the existing culvert.

17. The permeable paving construction will include a stone sub-base layer which will act as storage for the captured surface water runoff prior to its percolation into the sub-strata.

18. In the absence of site-specific percolation test results, a nominal infiltration rate of 1x10-6 m/s has been utilised to determine the depth of sub-base required to store and disperse captured surface water runoff for all storm durations up to and including the critical 100-year event plus a 45% climate change allowance.

19. The intention is to dispose of surface water runoff from the remainder of the site (new building roof) via a new piped connection to the existing culvert.

20. The site is currently developed and comprises an existing structure along with a mixture of hardstanding (to be retained) interspersed with areas of soft landscaping. The site is classified as a 'Brownfield' site; thus, any new development requires a minimum 50% reduction in surface water runoff rate leaving the development site as outlined within the SFRA.

21. An existing site runoff calculation has been undertaken using a rainfall intensity of 50mm/hr and has resulted in a flow rate of circa 4.8 l/s, which after the 50% reduction would leave an allowable discharge rate of 2.4 l/s.

22. It is understood that LLFA policy is that any new development should aim to discharge surface water runoff at Greenfield runoff rates therefore a further assessment has been undertaken using MicroDrainage software which concluded the following flow rates;

Return Period	Flow (l/s)
1 in 1 year	0.4
1 in 30 year	0.7
1 in 100 year	0.8

23. A copy of the MicroDrainage calculations can be found appended to this report.

24. It should be noted that the above greenfield flow rates exclude the areas of proposed infiltration described in the above sections.

25. Due to the limitations of restricting forward flows to less than 1 l/s, the proposals for the new development intend to discharge all remaining surface water runoff from the site to 1 l/s for all critical storm durations up to and including the critical 100-year event plus a 45% climate change allowance.

26. It is proposed to collect roof water via a traditional roof drainage system and discharge via a new below ground drainage network located around the building footprint.

27. A below ground cellular attenuation tank has been incorporated within the drainage network to provide storage for all captured surface water runoff (excluding infiltration areas) where it can be then released via a flow chamber at a controlled/restricted flow rate to suit the allowable Greenfield flow rates noted above.

28. Given the limited area of retained hardstanding is considered that the water quality being discharged to Corn Brook Culvert is acceptable, however the drainage proposals do include pollution/treatment controls and are discussed later in this report.

Residual Flood Risk Mitigation

29. As identified with the Flood Risk Assessment (FRA) – WML Consulting, April 2023, there is a low residual risk of flooding from all sources with the exception of flooding from Corn Brook Culvert which is considered as having a medium residual flood risk.

30. The FRA includes a series of modelled flood scenarios provided by the Environment Agency which offer a theoretical flood water level at 4 node points across/adjacent to the development site.

31. The most notable flood water levels are shown at node 2 located on the junction of Chichester Rd (south) and Moss Ln (west) which recorded the following levels;

    - 33.010m AOD during a simulated 0.1% probability (1:1000-year event) + 30% climate change allowance.

    - 32.630m AOD during a simulated 1% probability (1:100-year event) + 75% climate change allowance.

32. The FRA noted that the higher figure of 33.010 was the result of an extreme event with an annual exceedance probability (AEP) of 0.1%.

33. Given that there are no historic records of flooding in the vicinity of the proposed development it is considered that the following flood risk mitigation measures will be based upon the more probable flood water level of 32.630 which has an AEP of 1% i.e., a 10x greater chance of occurring in a given year.

34. In accordance with the recommendations outlined within the FRA, the new building's finished floor level (FFL) should be set to provide a sufficient freeboard above the theoretical flood water level noted above.

35. In addition, external ground levels should be designed as such to direct any overland flow routes resulting from extreme rainfall away from the new building.

36. Given the above it is considered that the mitigation of residual risk identified within the FRA has been satisfied and is acceptable with regards to flood risk.

Waste Water Drainage Strategy

37. As noted in sections 10 & 11, it is understood that there is an existing private drainage system currently serving the existing building which ultimately discharges to the UU public sewer network.

38. It is therefore proposed to collect waste water from the proposed development via traditional soil stacks & SVPs prior and discharge via the existing site drainage system to the public sewerage network located to the east, subject to UU approval.

SUDs Review

39. In accordance with current policies and guidelines, SUDS techniques have been considered for the development site's drainage proposals. The suitability of various SUDs techniques has been reviewed and are discussed below.

40. Storing water for later use could be a viable option for this site. Blue/green roof systems were considered as part of the design for the building however as the retail building is a lightweight long span building, the implications of including a green or blue roof system would add significant embodied carbon to the supporting structure & building foundations.

41. Given the above, the incorporation of blue/green roof systems within the drainage proposals for this site was considered not to be a sustainable solution, however the addition of a rainwater harvesting tank could allow captured rainwater to be reused for onsite operations such as cistern flushes etc. and should be discussed with the client during detailed design.

42. Above ground SUDs features such as storage basins and swales were deliberated during the drainage design for this site, however due to the limited area of soft landscaping available across the development to implement such features especially given the proximity to existing structures such as Corn Brook Culvert, they have been considered to be not a practical solution for this project.

43. Permeable paving construction has been incorporated within the drainage proposals for new external hardstanding areas across the site (footpaths), which will provide both an element of storage and treatment of captured surface water runoff.

44. The quality of surface water runoff prior to discharge from the site should also be considered when reviewing potential SUDS options for the development works and this is reviewed in further detail below.

Water Treatment

45. As discussed within the above strategies, due to the limited potential for vehicle movements across the site it is considered that the water quality being discharged to Corn Brook Culvert is acceptable, however the drainage proposals include pollution/treatment controls to promote improvements in water quality leaving the site.

46. From table 26.2 of the SUDS manual, the proposed roof area is deemed to have a "low" pollution hazard level. i.e. TSS = 0.3, Metals = 0.2, Hydrocarbons = 0.05.

47. Unfortunately, due to the site limitations it has not been possible to incorporate traditional SUDs treatment features (as discussed in the above SUDs review) and therefore it has been necessary to incorporate alternative proprietary systems to ensure water quality is achieved.

48. Gully traps, sump units and catch pits have been incorporated within the drainage proposals to remove contaminants/pollutants from all surface water runoff prior to disposal from the site.

49. In addition to the above a vortex separator has also been integrated into the drainage network prior the final connection with the Corn Brook Culvert to remove any remaining sediments etc. that have not already been captured by the above.

50. Finally, the permeable paving sub-base incorporates a stone filtration layer which will provide mitigation indices of TSS = 0.4, Metals = 0.4, Hydrocarbons = 0.4. Though these figures are halved in line with the guidance provided in the SUDS manual.

Maintenance Plan

51. It is understood that the new drainage network will be privately owned and maintained by the client or an appointed maintenance company on their behalf and will not be offered up for adoption by United Utilities.

52. The proposed drainage system 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.

53. The proposed drainage design will consists of traditional manholes, pipes and channels.

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

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

56. It is recommended that the biannual inspections take place in spring and autumn where there is additional risk of blockage from debris associated with fallen leaves etc.

57. Attenuation has been provided in the form of a below ground storage crate system. A recommended maintenance schedule, checklist and a preferred cleaning procedure should be included from the supplier in the O&M Manual however it is anticipated that this should include twice yearly checking that the upstream manholes are free from debris and ensure that no sediment is being passed into the storage crates.

58. Flow restriction has been achieved through the incorporation of a hydrobrake flow control. A recommended maintenance schedule, checklist and a preferred cleaning procedure should be included from the supplier in the O&M Manual however it is anticipated that this should include twice yearly checking that the upstream manholes are free from debris.

59. Lastly, permeable paving construction has been incorporated within the drainage proposals for this site. It is proposed to check and clean the permeable surfaces regularly to ensure that surface water runoff is not prevented from draining into the sub-base layer, especially during the autumn period where a build-up leaves could occur and result in a loss of performance.

Proposed Drainage GA
LCNP-WML-00-FN-DR-D-5201

LEGEND

- EXISTING ADOPTED SURFACE WATER SEWER
- EXISTING ADOPTED COMBINED WATER SEWER
- EXISTING PRIVATE SURFACE WATER DRAIN
- EXISTING PRIVATE FOUL WATER DRAIN
- EXISTING PRIVATE COMBINED WATER DRAIN
- EXISTING PRIVATE DRAINAGE TO BE REMOVED
- EXISTING SURFACE WATER CULVERT
- EXISTING SURFACE WATER CULVERT - 7m EASEMENT
- PROPOSED PRIVATE SURFACE WATER SEWER
- PROPOSED PRIVATE WASTE WATER SEWER
- PROPOSED ATTENUATION TANK
- PROPOSED PERMEABLE SURFACING
- DENOTES RETAINING WALL
- SITE BOUNDARY

DRAINAGE NOTES

REFERENCE SHOULD BE MADE TO THE DRAINAGE STRATEGY DOCUMENT REF; LCNP-WML-00-XX-RP-D-053.

THE EXISTING DRAINAGE SHOWN ON THIS DRAWING IS BASED UPON THE UNITED UTILITIES (UU) SEWER RECORDS, CCTV SURVEY UNDERTAKEN BY BLOCKED DRAINS NORTHWEST (APRIL 2024) AND AS-BUILT DRAINAGE RECORDS.

THE LOCATION OF THE EXISTING SURFACE WATER CULVERT IS SHOWN INDICATIVE ONLY AND IS BASED UPON SURVEY INFORMATION UNDERTAKEN BY MALCOLM HUGHES CHARTERED SURVEYORS- APRIL 2023.

ALL DRAINAGE LEVELS SHOWN ARE FOR INFORMATION PURPOSES ONLY AND ARE BASED UPON THE EXISTING TOPOGRAPHICAL SURVEY. PROPOSED FINISHED LEVELS ARE TO BE PROVIDED BY 10 ARCHITECTS PRIOR TO DETAILED DESIGN.

THE ARCHITECT IS RESPONSIBLE FOR CONFIRMING ALL MANHOLE COVER LEVELS PRIOR TO CONSTRUCTION.

THE PROPOSED DRAINAGE DESIGN / INFORMATION SHOWN ON THIS DRAWING IS FOR INFORMATION PURPOSES ONLY AND IS SUBJECT TO DETAILED DESIGN.

RAIN WATER PIPES AND SLAB PENETRATIONS ARE SHOWN INDICATIVE ONLY. ARCHITECT/MEP ENGINEER IS TO CONFIRM FINAL SETTING OUT INFORMATION PRIOR TO CONSTRUCTION.

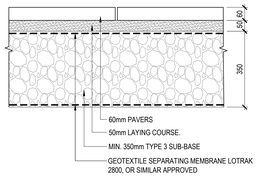
(BD) DENOTES EXTERNAL BACKDROP

(CP) DENOTES 'CATCH PIT' WITH 500mm DEEP SUMP BELOW OUTGOING INVERT LEVEL.

(FC) DENOTES FLOW CONTROL CHAMBER

(PVD) DENOTES PERMAVOID DIFFUSER UNITS

(VC) DENOTES 'VENTED COVER'



ALL WORKS TO BE IN ACCORDANCE WITH BS7533-3 GENERALLY.

PAVER: THICKNESS 60mm.
MATERIAL: AS SPECIFIED BY ARCHITECT

LAYING COURSE: THICKNESS 50mm.
MATERIAL: IN ACCORDANCE WITH Q24/455A

ROADBASE: NON REQUIRED.
MATERIAL: N/A

GRANULAR SUB-BASE AS SECTION Q20 OF WML SPECIFICATION THICKNESS 350 mm (SHW803 TYPE 3 GSB - MINIMUM 30% VOID RATIO).

JOINTING: NARROW JOINTS TO ARCHITECTS DETAIL
MATERIAL: IN ACCORDANCE WITH Q24/510A
LAYING PATTERN: AS SPECIFIED BY ARCHITECT.

ASSUMED CBR: 5% (SUBJECT TO CONFIRMATION OF CBR TESTS BY SITE INVESTIGATION SPECIALIST AFTER SITE STRIP)

ADDITIONAL FILLING REQUIRED TO RAISE SURFACE LEVEL FOLLOWING SITE STRIP TO BE IN ACCORDANCE WITH D20. (SH803 TYPE 3 GSB).

ALL MATERIAL WITHIN 450MM OF SURFACE LEVEL TO BE NON-FROST SUSCEPTIBLE. IF ENCOUNTERED NOTIFY WML. REPLACEMENT FILL TO BE GRADE 6F2 OR 6F5 UNLESS AGREED OTHERWISE.

TYPICAL DETAIL PERMEABLE BRICK / BLOCK PAVING TO FOOTPATHS

[SCALE 1:10]

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 LIAISON 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 FOR INFORMATION PURPOSES ONLY.

THE LAYOUT OF DRAINAGE ON THIS DRAWING IS FOR INFORMATION PURPOSES ONLY.

U.N.O SURFACE WATER DRAINAGE PIPES OVER Ø100mm TO BE TWIN WALLED STRUCTURED PLASTIC APPROVED BY THE ENGINEER.

U.N.O FOUL WATER DRAINAGE PIPES TO BE SUPERSLEVE VITRIFIED CLAY PIPES 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 100mm DIAMETER AT MINIMUM FALLS OF 1:80 UNLESS NOTED OTHERWISE.

ALL FOUL WATER CONNECTIONS TO BE 100mm DIAMETER AT MINIMUM FALLS OF 1:40 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 [38t] - 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.

SUBJECT TO APPROVAL FROM LOCAL PLANNING AUTHORITY

PRELIMINARY

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

Rev.	Amendment	Date	By	Chkd
P02	PLANNING ISSUE.	16.05.24	DB	LoG
P01	PRELIMINARY ISSUE.	16.05.24	DB	LoG

Project
St VINCENT'S,
LORETO COLLEGE

ARCH/CLIENT
CaddickConstruction.

Title
PROPOSED DRAINAGE GA

WML Job No.	Drawn	Checked	Date	Scale
10939	DB	LoG	MAY 2024	1:100 @ A0

WML CONSULTING
Civil, Structural & Geotechnical Engineers
No.8 Oak Green
Earl Road
Stanley Green Business Park
Cheadle Hulme
Cheshire SK8 6QL
Tel: 0161 482 9600
Fax: 0161 486 9210
e-mail info@wmlconsulting.com
www.wmlconsulting.com

Drawing No.

Project	Originator	Volume	Level	Type	Role	Number	Rev
LCNP	WML	00	FN	DR	D	5201	P02

Surface Water Drainage Calculations
10939-WML-00-XX-CA-C-0002

WML CONSULTING
Civil, Structural and Geotechnical Engineers

Surface Water Drainage Calculations

For a site referred to as

St Vincent's

Undertaken on behalf of

Loreto College

WML Job No: 10939

Document No: 10939-WML-ZZ-XX-CA-C-0002

Date: May 2024

Project No. & Name:	10939 – St Vincent's	Status:	Prepared by:	Rev:	Date:
Document Ref:	10939-WML-ZZ-XX-CA-C-0002	Preliminary	Daniel Baker	P01	May 2024

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. LCNP-WML-00-FN-DR-D-5201 – Proposed Drainage GA
    b. LCNP-WML-00-XX-RP-D-053 – Drainage Strategy Document

Summary of Results

1. The following summary demonstrates that the outgoing flow rates for the new development works are less than or equal to the 1 l/s allowable flow rate described within the drainage strategy document.

Greenfield Runoff Rate* (l/s)	Proposed Site Runoff Rate – Manhole S9 (l/s)
Q1: 0.4 Q30: 0.7 Q100: 0.8	1: 0.8 30: 0.9 100+45%: 0.9

Existing Greenfield Runoff Rates

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	0.035	Urban	0.750
SAAR (mm)	860	Region Number	Region 10

Results	**l/s**
QBAR Rural	0.2
QBAR Urban	0.5
Q1 year	0.4
Q1 year	0.4
Q30 years	0.7
Q100 years	0.8

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Proposed Surface Water Network Calculation

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)	1	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	12.502	0.250	50.0	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	18.500	0.250	74.0	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	4.500	0.050	90.0	0.014	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	7.500	0.050	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	7.500	0.050	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.004	4.000	0.100	40.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	7.592	0.200	38.0	0.000	0.00	0.0	0.600	o	150	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	46.24	5.15	31.450	0.010	0.0	0.0	0.0	1.43	25.2	1.3
S2.000	45.80	5.26	31.450	0.010	0.0	0.0	0.0	1.17	20.7	1.2
S1.001	45.53	5.33	31.200	0.034	0.0	0.0	0.0	1.06	18.7	4.2
S1.002	44.98	5.49	31.150	0.034	0.0	0.0	0.0	0.82	14.5	4.2
S1.003	44.44	5.64	31.100	0.034	0.0	0.0	0.0	0.82	14.5	4.2
S1.004	44.29	5.68	31.050	0.034	0.0	0.0	0.0	1.60	28.2	4.2
S1.005	44.03	5.76	30.950	0.034	0.0	0.0	0.0	1.64	29.0	4.2

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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	32.350	0.900	Open Manhole	450	S1.000	31.450	150				
S2	32.350	0.900	Open Manhole	450	S2.000	31.450	150				
S3	32.350	1.150	Open Manhole	450	S1.001	31.200	150	S1.000	31.200	150	
								S2.000	31.200	150	
S4	32.300	1.150	Open Manhole	450	S1.002	31.150	150	S1.001	31.150	150	
S-TANK	32.300	1.200	Junction		S1.003	31.100	150	S1.002	31.100	150	
S5	32.300	1.250	Open Manhole	1350	S1.004	31.050	150	S1.003	31.050	150	
S6	32.300	1.350	Open Manhole	1050	S1.005	30.950	150	S1.004	30.950	150	
S	32.300	1.550	Open Manhole	0		OUTFALL		S1.005	30.750	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	383275.093	396053.346	383275.093	396053.346	Required	
S2	383292.974	396039.973	383292.974	396039.973	Required	
S3	383286.903	396057.448	383286.903	396057.448	Required	
S4	383291.154	396058.925	383291.154	396058.925	Required	
S-TANK	383293.615	396051.840			No Entry	
S5	383296.077	396044.756	383296.077	396044.756	Required	
S6	383298.080	396041.294	383298.080	396041.294	Required	
S	383301.884	396034.723			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	150	S1	32.350	31.450	0.750	Open Manhole	450
S2.000	o	150	S2	32.350	31.450	0.750	Open Manhole	450
S1.001	o	150	S3	32.350	31.200	1.000	Open Manhole	450
S1.002	o	150	S4	32.300	31.150	1.000	Open Manhole	450
S1.003	o	150	S-TANK	32.300	31.100	1.050	Junction	
S1.004	o	150	S5	32.300	31.050	1.100	Open Manhole	1350
S1.005	o	150	S6	32.300	30.950	1.200	Open Manhole	1050

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	12.502	50.0	S3	32.350	31.200	1.000	Open Manhole	450
S2.000	18.500	74.0	S3	32.350	31.200	1.000	Open Manhole	450
S1.001	4.500	90.0	S4	32.300	31.150	1.000	Open Manhole	450
S1.002	7.500	150.0	S-TANK	32.300	31.100	1.050	Junction	
S1.003	7.500	150.0	S5	32.300	31.050	1.100	Open Manhole	1350
S1.004	4.000	40.0	S6	32.300	30.950	1.200	Open Manhole	1050
S1.005	7.592	38.0	S	32.300	30.750	1.400	Open Manhole	0

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)
S1.005	S	32.300	30.750	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	1
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

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Simulation Criteria for Storm

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	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: S5, DS/PN: S1.004, Volume (m³): 1.9

Unit Reference	MD-SHE-0049-1000-0800-1000
Design Head (m)	0.800
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	49
Invert Level (m)	31.050
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	1.0
Flush-Flo™	0.215	0.9
Kick-Flo®	0.437	0.8
Mean Flow over Head Range	-	0.8

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	0.8	1.200	1.2	3.000	1.8	7.000	2.7
0.200	0.9	1.400	1.3	3.500	1.9	7.500	2.8
0.300	0.9	1.600	1.4	4.000	2.1	8.000	2.9
0.400	0.8	1.800	1.4	4.500	2.2	8.500	2.9
0.500	0.8	2.000	1.5	5.000	2.3	9.000	3.0
0.600	0.9	2.200	1.6	5.500	2.4	9.500	3.1
0.800	1.0	2.400	1.6	6.000	2.5		
1.000	1.1	2.600	1.7	6.500	2.6		

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Storage Structures for Storm

Cellular Storage Manhole: S-TANK, DS/PN: S1.003

Invert Level (m) 31.100 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.0	30.0	2.600	0.0	41.0
0.200	30.0	34.4	2.800	0.0	41.0
0.400	30.0	38.8	3.000	0.0	41.0
0.600	0.0	41.0	3.200	0.0	41.0
0.800	0.0	41.0	3.400	0.0	41.0
1.000	0.0	41.0	3.600	0.0	41.0
1.200	0.0	41.0	3.800	0.0	41.0
1.400	0.0	41.0	4.000	0.0	41.0
1.600	0.0	41.0	4.200	0.0	41.0
1.800	0.0	41.0	4.400	0.0	41.0
2.000	0.0	41.0	4.600	0.0	41.0
2.200	0.0	41.0	4.800	0.0	41.0
2.400	0.0	41.0	5.000	0.0	41.0

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 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 OFF
DVD Status ON
Inertia Status ON

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, 45

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%					31.473
S2.000	S2	15 Winter	1	+0%					31.474
S1.001	S3	15 Winter	1	+0%	100/15 Summer				31.254
S1.002	S4	15 Winter	1	+0%	100/15 Summer				31.208
S1.003	S-TANK	60 Winter	1	+0%	30/30 Winter				31.153
S1.004	S5	60 Winter	1	+0%	30/15 Summer				31.151
S1.005	S6	60 Winter	1	+0%					30.968

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	-0.127	0.000	0.05			1.2	OK	
S2.000	S2	-0.126	0.000	0.06			1.2	OK	
S1.001	S3	-0.096	0.000	0.27			3.8	OK	
S1.002	S4	-0.092	0.000	0.31			3.9	OK	
S1.003	S-TANK	-0.097	0.000	0.07		29	1.0	OK*	

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

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
S1.004	S5	-0.049	0.000	0.04			0.8	OK	
S1.005	S6	-0.132	0.000	0.03			0.8	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 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 OFF
DVD Status ON
Inertia Status ON

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, 45

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	30	+0%					31.486
S2.000	S2	15 Winter	30	+0%					31.489
S1.001	S3	15 Winter	30	+0%	100/15 Summer				31.297
S1.002	S4	60 Winter	30	+0%	100/15 Summer				31.270
S1.003	S-TANK	60 Winter	30	+0%	30/30 Winter				31.267
S1.004	S5	60 Winter	30	+0%	30/15 Summer				31.265
S1.005	S6	30 Winter	30	+0%					30.969

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	-0.114	0.000	0.13			3.0	OK	
S2.000	S2	-0.111	0.000	0.15			2.9	OK	
S1.001	S3	-0.053	0.000	0.73			10.3	OK	
S1.002	S4	-0.030	0.000	0.43			5.4	OK	
S1.003	S-TANK	0.017	0.000	0.08		56	1.2	SURCHARGED*	

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

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
S1.004	S5	0.065	0.000	0.05			0.9	SURCHARGED	
S1.005	S6	-0.131	0.000	0.04			0.9	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 1
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 OFF
DVD Status ON
Inertia Status ON

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, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

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	120 Winter	100	+45%					31.511
S2.000	S2	120 Winter	100	+45%					31.511
S1.001	S3	120 Winter	100	+45%	100/15 Summer				31.510
S1.002	S4	120 Winter	100	+45%	100/15 Summer				31.509
S1.003	S-TANK	120 Winter	100	+45%	30/30 Winter				31.506
S1.004	S5	120 Winter	100	+45%	30/15 Summer				31.504
S1.005	S6	30 Summer	100	+45%					30.969

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	-0.089	0.000	0.09			2.0	OK	
S2.000	S2	-0.089	0.000	0.10			1.9	OK	

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

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
S1.001	S3	0.160	0.000	0.44			6.1	SURCHARGED	
S1.002	S4	0.209	0.000	0.48			6.0	SURCHARGED	
S1.003	S-TANK	0.256	0.000	0.09			1.2	SURCHARGED*	
S1.004	S5	0.304	0.000	0.05			0.9	SURCHARGED	
S1.005	S6	-0.131	0.000	0.04			0.9	OK	

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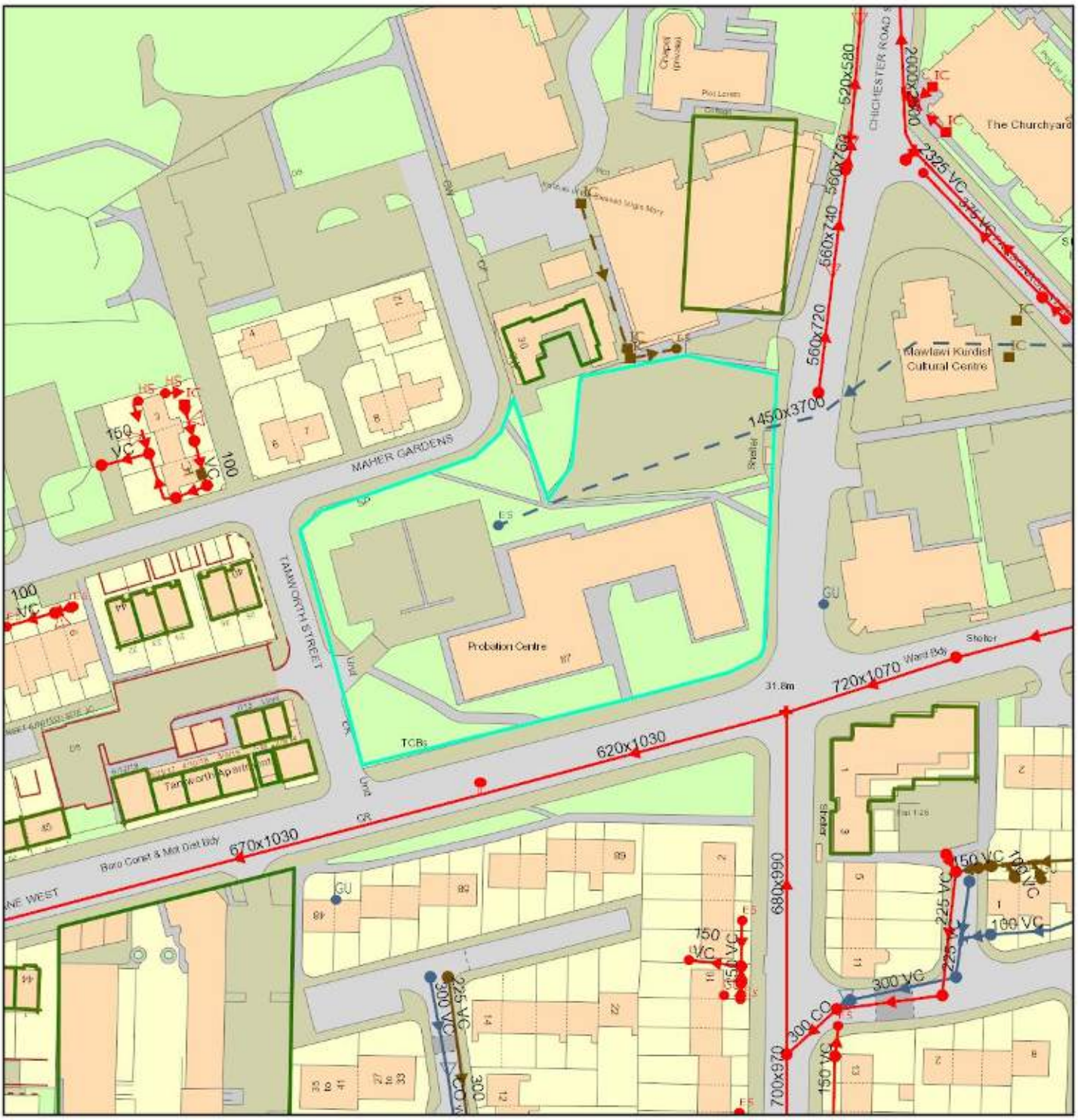
United Utilities Sewer Records

SEWER RECORD Former Moss Side Probation Offices 87 Moss Lane West Moss Side Manchester M15 5PE



The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

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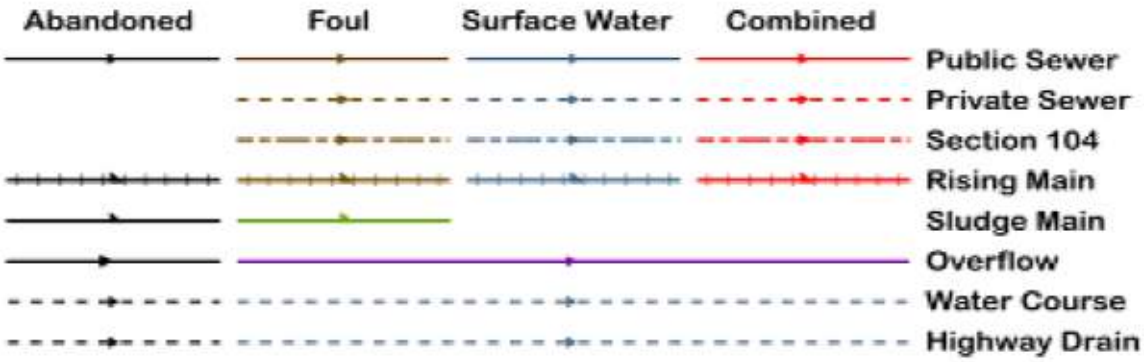
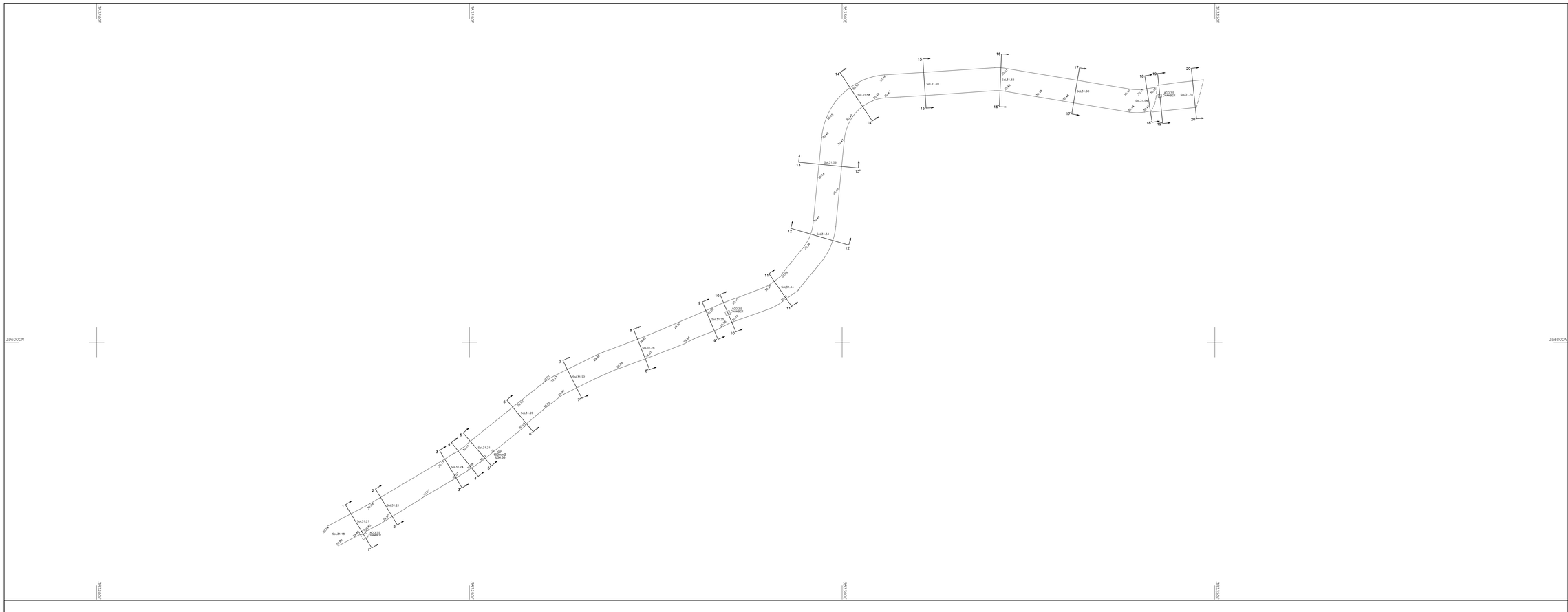
Wastewater Symbology

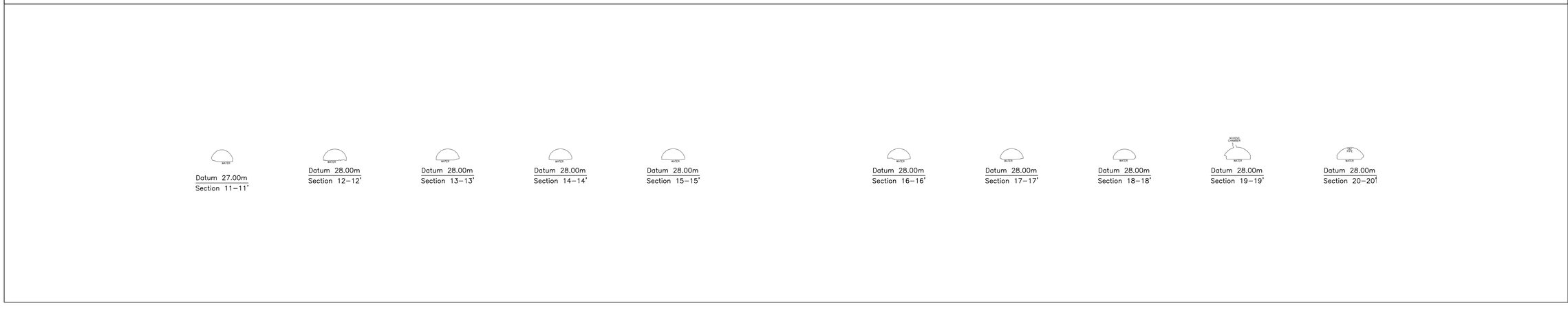


All point assets follow the standard colour convention:	red – combined	brown - foul
	blue – surface water	purple - overflow

- 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
- CP Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

Corn Brook Culvert Survey Drawings





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

Water present in culvert at time of survey.
Bed levels have been shown where visible.

STANDARD REFERENCE & ABBREVIATIONS

(AR).....Assumed Route
AB.....Air Brick
AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Bellshe Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom OC
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.....Cellar 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
EIO.....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.....Railing
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
IO.....Inspection Cover
IL.....Invert Level
IP.....Inlet Pipe
KO.....Kerb Outlet
LB.....Letter Box
LP.....Lamp Post
MG.....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
PF.....Petrol Pump
PI.....Post or Pillar
RE.....Rodding Eye
RS.....Road Sign
RTW.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Sump Level
SoL.....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
TFR.....Taken From Records
TJB.....Anchor Point (Bents/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TW.....Ticket Machine
TWC.....Terrace
TP.....Telecommunications Pole
TPIT.....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (WM,SC 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
WST.....Water Stop Tap (Domestic)
WSV.....Water Stop Valve (Mains)

Survey Operations

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

Client	CADDICK CONSTRUCTION LIMITED
Drawing Title	Confined Space Survey of Land at: Loreto College Culvert Manchester
Scale(s) 1:200	Surveyor DC
Date MAR 24	Drawn CJM
Job Number 24A156	Checked SO
Sheet Size & Drg Number & Revision	A0 24A156/001