

Engineer/ Manage/ Deliver/

JANUARY 2021

**SURFACE WATER
DRAINAGE STRATEGY**

**HILLINGDON HOSPITAL
MODULAR
NORTH & SOUTH
BUILDINGS**

REVISION D – 28.01.2021

**PROJECT NO.
MCB/JC/44278**



Alan Wood & Partners



SURFACE WATER DRAINAGE STRATEGY

Proposed Modular Buildings – North and South – Hillingdon Hospital

This report has been prepared to satisfy Condition 8 of the Planning Conditions for the project as below.

Condition 8 states:

Notwithstanding the submitted plans, prior to commencement of external works, a scheme for the provision of sustainable water management shall be submitted to, and approved in writing by the Local Planning Authority. The scheme shall clearly demonstrate how it manages water and demonstrate ways of controlling the surface water on site, in accordance with Policy 5.15 of the London Plan and will:

- i. provide information about the design storm period and intensity, the method employed to delay and control the surface water discharged from the site and the measures taken to prevent pollution of the receiving groundwater and/or surface waters;*
- ii. include a timetable for its implementation; and*
- iii. provide a management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime.*

The scheme shall also demonstrate the use of methods to minimise the use of potable water through water collection, reuse and recycling and will:

- iv. provide details of water collection facilities to capture excess rainwater;*
- v. provide details of how rain and grey water will be recycled and reused in the development*

Thereafter the development shall proceed in accordance with the approved scheme.

REASON

- i) To ensure that surface water run off is controlled to ensure the development does not increase the risk of flooding in accordance with Policy EM6 Flood Risk Management in Hillingdon Local Plan: Part 1- Strategic Policies (Nov 2012) and Policy 5.12 Flood Risk Management of the London Plan (March 2016), Policies DMEI 9 and DMEI 10 of the Hillingdon Local Plan: Part Two - Development Management Policies (2020)*

ii) *To ensure that surface water run off is handled as close to its source as possible in compliance with Policy 5.13 Sustainable Drainage of the London Plan (March 2016), and*

iii) *To conserve water supplies in accordance with Policy 5.15 Water use and supplies of the London Plan (March 2016), the National Planning Policy Framework (March 2012), and the Planning Practice Guidance (March 2014).*

(i) BASIS OF DESIGN

The impermeable area of the site is 3924 m² as per the plan in Appendix A.

Surface water is attenuated by an underground attenuation tank that has been designed for a winter storm duration of 120 mins with an intensity of 34.246 mm/hr based on a 100 year return period plus 40% climate change.

See Microdrainage calculations in Appendix B.

The means of attenuating the flows is by a cellular tank of 192.66m³ capacity with a flow control device to restrict the outflow to 12.5 l/s as per the Glanville Report – Issue 3 March 2020.

The unrestricted flow from this area was approximately 54 l/s.

The outflow is pumped to an existing connection to the watercourse where it discharges.

See drainage layout in Appendix C.

The car park included in the catchment area is less than 800 m² so no petrol/oil interceptor is required.

The system includes a number of silt trap manholes to prevent silt and other detritus reaching the watercourse.

(ii) IMPLEMENT DATE

The system will be operational by the end of April 2021.

(iii) MAINTENANCE REGIME

Maintenance requirements will be as per the manufacturers instructions for the pump sets, usually a 12 month service interval.

The pump chamber and the silt trap manholes present will need inspecting monthly for the first 3 months and then annually thereafter.

The attenuation tank and flow control manhole will need inspecting monthly for the first 3 months then annually thereafter.

An internal attenuation tank survey is required every 5 years.

To support the discharge of the 'Sustainable Water Management' planning condition for the construction of the three storey temporary modular building (Modular South) at Hillingdon Hospital, Uxbridge, the following technical note has been prepared with specific reference to item v):- *provide details of how rain and grey water will be recycled and reused in the development to conserve water supplies in accordance with Policy 5.15 Water use and supplies of the London Plan (March 2016), the National Planning Policy Framework (March 2012), and the Planning Practice Guidance (March 2014).*

(iv) RAINWATER RECYCLING

Incorporation of a rainwater harvesting has not been incorporated as it is not deemed to be a viable opportunity to this particular project. The temporary nature of this building construction with a limited planning approval of 5 years means that the expense of rainwater harvesting will not be cost effective as the long-term savings will be much less than the initial cost and ongoing maintenance of the system and unlikely to be recouped during the agreed planning approval period. Due to the building being a 3 storey ward building consisting of 68 bed spaces and a total of 48 WCs, it is considered that water demand will far exceed any supply from rainwater harvesting, particularly during drier months. In accordance with HTM 07-04 systems would require a secondary automatic supply when rainfall is insufficient adding further costs to this temporary building. In addition to this there is insufficient space available within the building or within the immediate vicinity of building to accommodate the rainwater plant items without significant implications on planning and the building design. Any available external areas adjacent to the proposed building are largely taken up by existing Root Protection Areas and surface water attenuation leaving little to no room for the inclusion of buried rainwater tanks.

(v) GREY WATER RECYCLING

HTM 07-04 states "Grey water should not be used in healthcare premises". As such we have discounted this option in line with the Health Technical Memorandum.

APPENDIX A

Impermeable Area Plan

New Street
as per SOC appraisal
Option 2

864m²

748m²

143m²

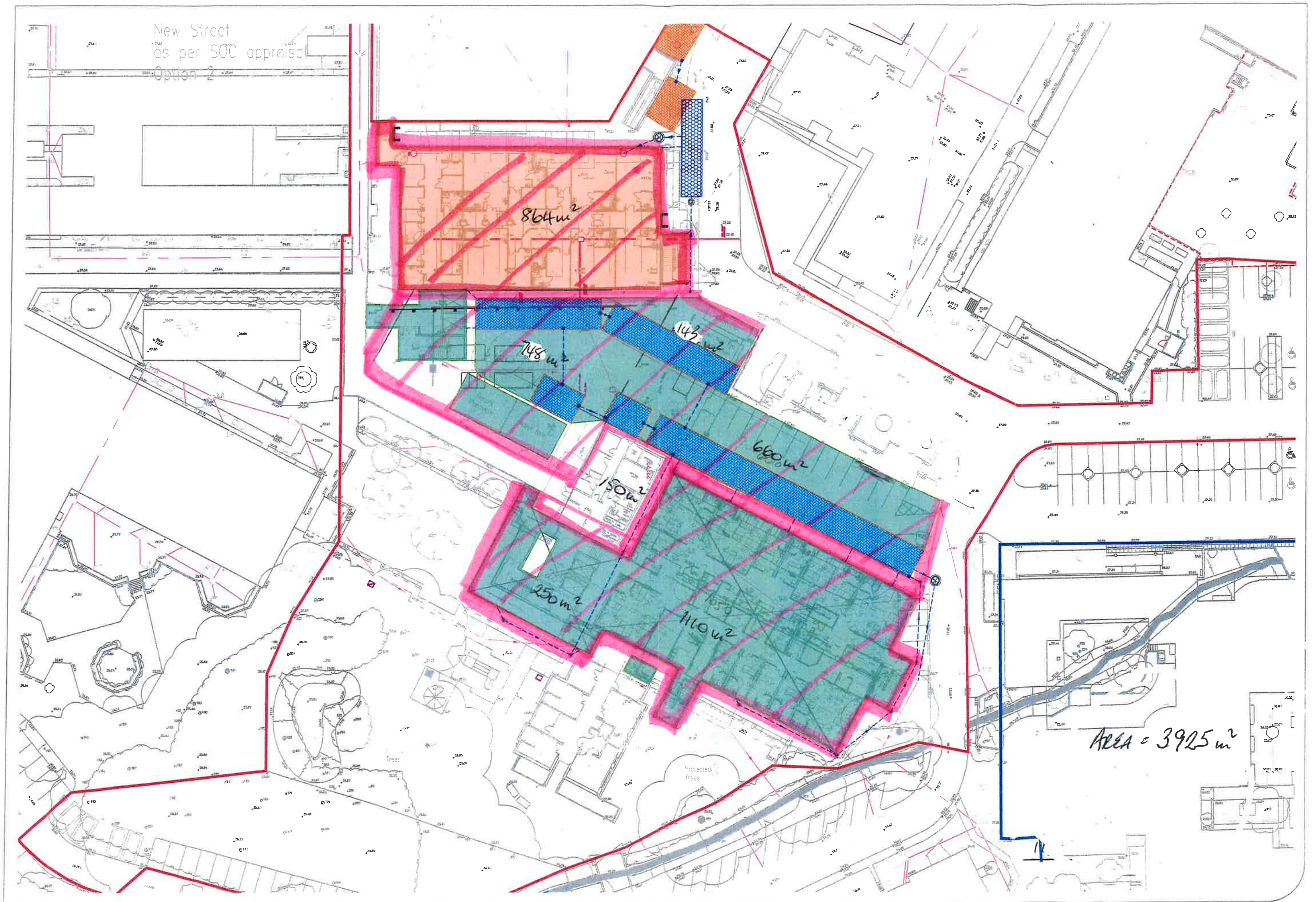
660m²

150m²

250m²

1110m²

AREA = 3925m²



APPENDIX B

Surface Water Micro-drainage Calculations

Micro Drainage

Designed by Bions

Checked by

Source Control 2020.1

Half Drain Time : 155 minutes.

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
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15 min	Summer	138.153	0.0	100.8	18
30 min	Summer	90.705	0.0	132.5	32
60 min	Summer	56.713	0.0	166.4	62
120 min	Summer	34.246	0.0	201.0	106
180 min	Summer	25.149	0.0	221.4	136
240 min	Summer	20.078	0.0	235.7	170
360 min	Summer	14.585	0.0	256.9	238
480 min	Summer	11.622	0.0	272.9	306
600 min	Summer	9.738	0.0	285.9	374
720 min	Summer	8.424	0.0	296.8	442
960 min	Summer	6.697	0.0	314.5	570
1440 min	Summer	4.839	0.0	340.8	824
2160 min	Summer	3.490	0.0	369.2	1192
2880 min	Summer	2.766	0.0	390.0	1556
4320 min	Summer	1.989	0.0	420.5	2288
5760 min	Summer	1.573	0.0	443.9	2992
7200 min	Summer	1.311	0.0	462.2	3680
8640 min	Summer	1.129	0.0	477.5	4408
10080 min	Summer	0.994	0.0	490.5	5144
15 min	Winter	138.153	0.0	112.9	18

Micro Drainage

Designed by Bions

Checked by

Source Control 2020.1

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
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30 min Winter	35.457	0.857	0.0	10.4	10.4	137.7	O K
60 min Winter	35.609	1.009	0.0	11.3	11.3	162.0	O K
120 min Winter	35.687	1.087	0.0	11.7	11.7	174.4	O K
180 min Winter	35.685	1.085	0.0	11.7	11.7	174.2	O K
240 min Winter	35.668	1.068	0.0	11.6	11.6	171.4	O K
360 min Winter	35.610	1.010	0.0	11.3	11.3	162.2	O K
480 min Winter	35.545	0.945	0.0	10.9	10.9	151.7	O K
600 min Winter	35.480	0.880	0.0	10.5	10.5	141.3	O K
720 min Winter	35.419	0.819	0.0	10.1	10.1	131.4	O K
960 min Winter	35.310	0.710	0.0	9.4	9.4	114.0	O K
1440 min Winter	35.145	0.545	0.0	8.1	8.1	87.5	O K
2160 min Winter	34.986	0.386	0.0	6.8	6.8	62.0	O K
2880 min Winter	34.889	0.289	0.0	5.7	5.7	46.4	O K
4320 min Winter	34.785	0.185	0.0	4.4	4.4	29.7	O K
5760 min Winter	34.734	0.134	0.0	3.6	3.6	21.5	O K
7200 min Winter	34.707	0.107	0.0	3.0	3.0	17.1	O K
8640 min Winter	34.696	0.096	0.0	2.6	2.6	15.3	O K
10080 min Winter	34.688	0.088	0.0	2.3	2.3	14.1	O K

	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
	30 min Winter	90.705	0.0	148.5	32
	60 min Winter	56.713	0.0	186.4	60
	120 min Winter	34.246	0.0	225.1	114
	180 min Winter	25.149	0.0	248.0	144
	240 min Winter	20.078	0.0	264.1	182
	360 min Winter	14.585	0.0	287.7	258
	480 min Winter	11.622	0.0	305.7	332
	600 min Winter	9.738	0.0	320.2	404
	720 min Winter	8.424	0.0	332.4	472
	960 min Winter	6.697	0.0	352.3	606
	1440 min Winter	4.839	0.0	381.8	866
	2160 min Winter	3.490	0.0	413.5	1232
	2880 min Winter	2.766	0.0	436.8	1588
	4320 min Winter	1.989	0.0	471.1	2292
	5760 min Winter	1.573	0.0	497.2	3000
	7200 min Winter	1.311	0.0	517.7	3672
	8640 min Winter	1.129	0.0	534.8	4400
	10080 min Winter	0.994	0.0	549.5	5136

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Source Control 2020.1

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Total Area (ha) 0.392

0 4 0.392

341 Beverley Road
Hull
HU5 1LD

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Source Control 2020.1



Model Details

Storage is Online Cover Level (m) 36.405

Cellular Storage Structure

Invert Level (m)	34.600	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

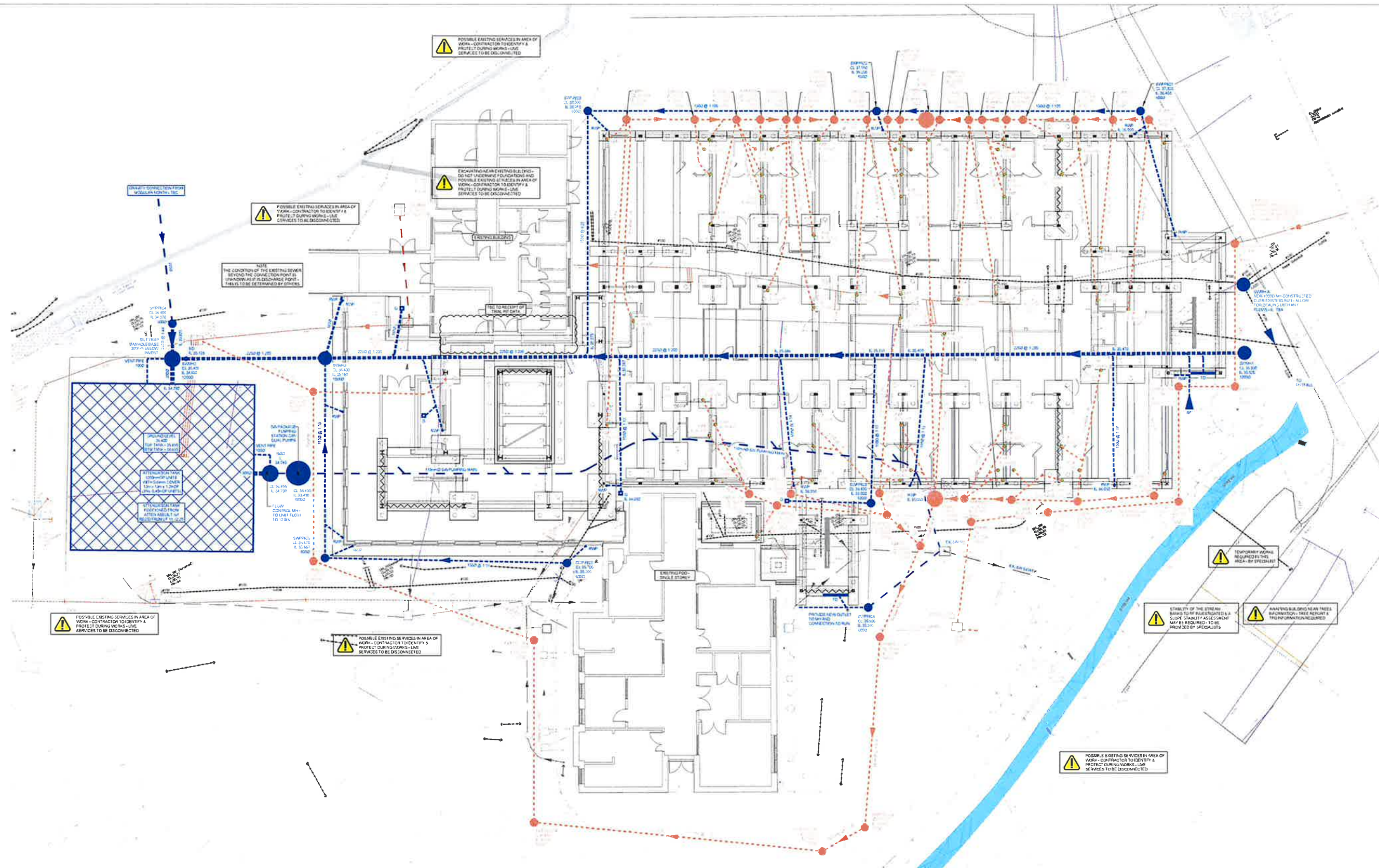
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	169.0	0.0	1.300	0.0	0.0
1.200	169.0	0.0			

Orifice Outflow Control

Diameter (m) 0.074 Discharge Coefficient 0.600 Invert Level (m) 34.600

APPENDIX C

Drainage Layout



- ## NOTES
- THESE NOTES ARE INTENDED TO AGREEMENT DRAWINGS AND THE OPERATIONS, WHERE CONFLICT OF REQUIREMENTS EXISTS, THE ORDER OF PRECEDENCE SHALL BE, AS SHOWN IN THE FOLLOWING HIERARCHY:
1. THE DRAWINGS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERING AND ARCHITECTURAL DOCUMENTS.
 2. DRAWINGS NOT TO SCALE AND ALL DIMENSIONS TO BE OBTAINED FROM THE CONTRACT AND ANY DISCREPANCY THERE REFERRED TO THE ENGINEER AND FURTHER ACTION TO BE TAKEN BY THE USER WHEN REQUIRED.
 3. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AS WELL AS THE BUILDING IS FULLY CERTIFIED THAT THE CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE RELEVANT AUTHORITIES BEFORE BUILDING AND ALL COMPONENTS ARE SAME EXACTLY AS SHOWN. THIS INCLUDES THE ACCORDANCE WITH THE RELEVANT STANDARDS AND CODES OF PRACTICE WHICH HAVE BEEN CONSULTED. NECESSARY DETAILED DRAWINGS OF THE PROPERTY OF THE CONTRACTOR ON COMPLETION OF THE DESIGN DRAWINGS AND THE PROGRESS AND ANY ALTERNATIVE PROPOSALS ARE SAFE IN THE TEMPORARY CONDITION.

01. Damage
02. Patients should be notified via Hospital Status Sheet or under 'Inpatient' column and to check up and provide updates regarding their condition.
03. Patients' emergency and public info to be available
04. Submitting Hospital Performance Report to be used in all cases (Indicate patient group and/or condition having an exceptionally high or low rate of mortality). Which cases under top 10 patients & non top 10 patients (more than 4000 cases) & 10000 (12.5 percent) to be submitted to be processed.
05. An exception is made with regard to cases on training (SPUs) that will be approved by the Employer and may require approval based on under building data at the contractor's request.
06. Where cases are listed (and 12.5% of cases is 1,000) (12.5 percent) and be submitted to be processed.
07. Where data are not correct, the latest records will be processed with a 10000 (12.5 percent) and be submitted to be processed.
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FOR CONCRETE NOTE REFERENCE TO DRAWING NO. 2100

ALL PLANTS UNDER NURSING SYSTEMS DIFFERENTIALS AND DIMENSIONS NEED TO BE CHEMICALLY RESISTANT REFER TO 34 FOR FURTHER INFORMATION
ALL WOODS AND FENCES MUST BE AT LEAST 10% LOWER LEVELS AND 10% FOR POP-UP PLANTING REFER TO 34 FOR FURTHER INFORMATION

19	INTERVIEW FARMING AMENDED AND ADDED PILL CLARE, WIMBORNAH ADOPTED	20.01.21	470	WBS	
20	LEVELS AMENDED 2250 PIRE RUN BWWH	21.01.21	470	WBS	
21	2 FISHING AMENDED AND ADDED WIMBORNAH ADOPTED	19.01.21	470	WBS	
22	13.1.21 BOWEN'S UPDATED TO LATEST SCHEME	31.12.20	470	WBS	
23	UPDATED TO LATEST SCHEME	19.12.20	470	WBS	
24	UPDATE MODULAR NORTH CONNECTION	11.12.20	510	WBS	
25	AMENDMENTS TO TOP COMMENTS	27.11.20	510	WBS	
26	AMENDED TO LATEST SCHEME	30.11.20	510	WBS	
27	CONSTRUCTION ISSUE	19.11.20	510	WBS	
28	1st FIRST ISSUE	21.10.20	470	WBS	
Rev	Summary	Date	By	Qty	Am

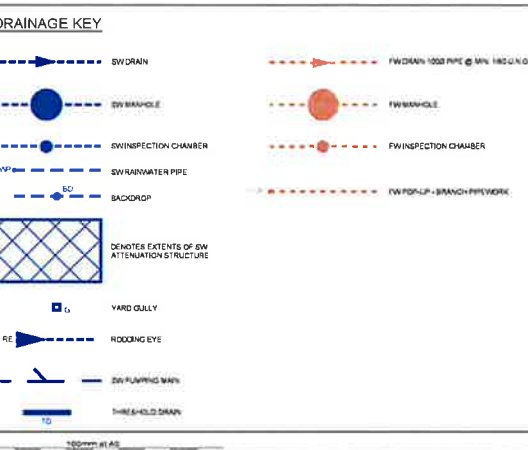


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HILLINGDON HOSPITAL, PIELD HEATH
ROAD, UXBRIDGE, UB8 3NN

WESTERN BUILDING SYSTEMS LTD

DRAINAGE LAYOUT						
Role:	S - STRUCTURAL ENGINEER					
Drawing Status:	CONSTRUCTION					
Job no	44278	Scale	As Noted	Rev	C9	
Project	Original	Volume	Level	Type	Rate	Number
HIHO - AWP - ZZ - XX - DR - S - 3000						



DRAINAGE LAYOUT
SCALE 1:100

FOR MANHOLE SCHEDULE REFER TO DRAWING HIHO-AWP-ZZ-XX-DR-S-3010
DRAWING TO BE READ IN CONJUNCTION WITH 3010, 3100, 3101, 3102, 3103, 3104

-  CONDITION AND CAPACITY OF DRAINAGE SYSTEM BEYOND CONNECTION POINT TO BE BY OTHERS
-  SINKS ARE NOTED AS BEING DISCONTINUED AND SHOULD CONTAIN ASBESTOS - REFER TO S1 REPORT
-  GROUND WATER NOTED AT SHALLOW DEPTHS - REFER TO S1 REPORT
-  SERVICE TUNNEL INDICATED IN S1-FIGURE 2 ANNOTATED SITE LAYOUT - EXACT POSITION AND DEPTH TO BE SURVEYED & ADVISED TO ENGINEER PRIOR TO WORK COMMENCING

[illegible]

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Geo-environmental Investigations
Historic Building Services

Highway Design
Land Remediation Advice
Land Surveying
Marine Works
Mining Investigations
Modular Design
Parametric Modelling
Party Wall Surveyors
Planning Applications
Project Managers
Renewable Energy
Risk Assessments & Remediation
Road & Drainage Design
Site Investigations
Site Supervision
Structural Engineering
Sulphate Attack Specialists
Temporary Works
Topographic & Measured Surveys
Traffic Assessments

Quality Assurance Accreditation

ISO 9001 Registered firm
Certificate no. GB.02/07

Environmental Accreditation

ISO 14001 Registered firm
Certificate no. GB.09/277b



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