



DRAINAGE STRATEGY

PROPOSED IMPROVEMENT OF WREXHAM TENNIS CENTRE



**JULY 2023
Suitability S1
Revision P01**

Prepared on Behalf of:

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SUITABILITY	REV	DATE	DESCRIPTION	Org.	Chk'd	App'd
S2	P01	14.07.23	First Issue.			

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1.0 Introduction

1.1 Project Background

1.1.1 Bingham Rawlings Partnership Ltd have been appointed to provide a drainage strategy, for both surface water and foul, for the proposal to improve the existing facilities at Wrexham Tennis Centre, Wrexham , LL11 2BW (National Grid Reference: **SJ 32897 51474**), the site location plan is contained within **Appendix A**.

1.1.2 Bingham Rawlings Partnership Ltd reserve the right to undertake further investigation into the adequacy of the recommendations made within this report, if works on site have not commenced within twelve months of the issuing of this report.

1.2 Scope of Proposed Drainage Strategy

1.2.1 This report aims to provide a suitable drainage strategy for the discharge of surface water and foul effluent generated by the proposed development.

1.2.2 The purpose of the calculations enclosed within this report and accompanying details are to produce a drainage layout that complies with the relevant legislation of the Tan 15, CIRIA C753 '*The SuDS Manual*' and Approved Document H of the Building Regulations 2010.

1.3 Proposed Development

1.3.1 The proposal involves the construction of three roofed paddle tennis courts and a two additional outdoor tennis courts within the existing Wrexham tennis centre. The proposed site layout is illustrated within **Appendix B**.

1.6 Existing Nearby Drainage

1.6.1 The current hardstanding areas are all drained to an existing surface water drainage network which directs surface water to several chamber soakaways located across the site. the existing drainage arrangement is indicated within the drawing contained within **Appendix C**.

2.0 Design Criteria

2.1.1 The following design criteria will apply to the surface water run-off and foul discharge design for the site:

- Approved Document H, Building Regulations.
- BRE Digest 365;
- BS EN 752:2017;
- CIRIA C753 'The SuDS Manual' 2015;
- DEFRA / Environment Agency 'Preliminary Rainfall Runoff Management for Developments' Technical Report;
- Discharge Units from BS EN 12056: Part 2;
- Flood & Water Management Act 2010;
- Highways Act 1991;
- Institute of Hydrology Report (IHR) 124;
- Land Drainage Act 1991;
- Modified Rational Method;
- Sewers for Adoption 7th Edition;
- Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems
- Technical Advice Note (TAN) 15: Development and Flood Risk;
- Wallingford Procedure;
- Water Industries Act 1991.

3.0 Surface Water Drainage Design

3.1 Guiding Principles

3.1.1 The disposal of surface water has been designed in strict accordance with the provision of TAN 15, the Flood and Water Management Act 2010 and other best practice documents, such as CIRIA C753 'SuDS Manual' 2015.

3.2 Method of discharge

3.2.1 In accordance with the SuDS Manual 2015, surface water should be managed and discharged from a new development in line with the following hierarchy:

- Priority level 1: Re-use of water;
- Priority level 2: Infiltration into ground;
- Priority level 3: Discharge to a water body;
- Priority level 4: Discharge to a surface water run-off drain;
- Priority level 5: Discharge to a combined surface water run-off and foul drain.

3.2.2 Re-use of surface water cannot be considered as the soul method of surface water disposal, paragraph G1.1 The Statutory SuDS Guidance for Wales states "As much of the runoff as possible (subject to technical or cost constraints) should be discharged to each destination before a lower priority destination (level) is considered." Therefore, attempts must be made to reuse as much surface water as possible. Therefore it is proposed to implement above ground water Butts at the base of the rainwater pipes on the proposed roofed paddle tennis court for re-use by the grounds person maintaining the site.

3.2.3 Infiltration testing has been undertaken by '*Cadarn consulting Engineers Ltd*' this report is not included as part of this strategy due to the size, however this can be issued upon request.

3.2.4 The Porosity report confirms that testing was undertaken within a single trial hole located within the site. The trial hole was filled with water and left to empty, 3 times in accordance with BRE digest 365. The report concludes that the ground had good porosity characteristics.

3.2.5 Therefore, the use of infiltration systems such as soakaways for the disposal of surface water run-off generated from the proposed development is suitable, and infiltration structures should be designed using the worse test result of the three tests, that being $2.08 \times 10^{-4} \text{ m/s}$.

3.3 Climate Change

3.3.1 TAN 15 states that an allowance for climate change should be provided within the on-site attenuation, without specifying what allowance should be made. The NPPF, which is the English equivalent of TAN 15, does however provide guidance derived from DEFRA FCDPAG3 'Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts' October 2006 (see **Table 1**). This document considers the effects of climate change for different design criteria.

3.3.2 The proposed development will have a design life of 100 years; based on the NPPF's guidance, the development therefore requires an allowance of 30% for climate change to be applied to the peak rainfall intensity.

Table 1. Climate Change Requirements.

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak Rainfall Intensity	+5%	+10%	+20%	+30%
Peak River Flow	+10%	+20%		
Offshore Wind Speed	+5%		+10%	
Extreme Wave Height	+5%		+10%	

3.4 Design Philosophy

- 3.4.1 As infiltration is a viable means of surface water disposal, greenfield/brownfield run-off rate calculations are not required as the rate of discharge will be determined by the natural infiltration rate.
- 3.4.2 The tables below summarise the existing effective areas with their corresponding run-off coefficients, as per the Wallingford procedure, IHR 124 and the Modified Rational Method.
- 3.4.3 For the purpose of the design, the site will be treated as two separate design s and two separate systems. System 1 includes the drainage system accommodating the proposed roofed paddle tennis courts, and system 2 accommodates the proposed run-off from the two additional outdoor tennis courts.

3.5 Method of Storage

- 3.5.1 As part of the proposal there is an area of existing hardstanding surface adjacent to the roofed paddle tennis course which is to be replaced with a grassed planting area, therefore it is proposed to create a depression within this area for rainwater storage creating a planted detention basin which relies on infiltration and transpiration to the plants within this area, removing the need for a below ground drainage system. this system is to be designed to accommodate the 1 in 100-year return period rainfall event plus an allowance of 30% for climate change.
- 3.5.2 The proposed additional two tennis courts are to be impermeable as required by the tennis court design, therefore the proposal is to implement a linear channel drainage system around the perimeter of the tennis courts to intercept surface water run-off, this then conveys surface water to a proposed chamber soakaway. Refer to the proposed on-site drainage arrangement enclosed in **Appendix D**.

3.5.3 A hydraulic model has been compiled for both systems indicating the storage requirements and capacities of the proposed sites, a copy of this is contained within **Appendix E**.

APPENDICES

APPENDIX A

Site Location Plan

GRID REF: SJ 32802 51489
EASTING: 332826
NORTHING: 351458
AREA: 35,666.808 m² (3.56 Ha)



This drawing is to be read in conjunction with all relevant architects drawings and specifications.

Do not scale – use written dimensions only !

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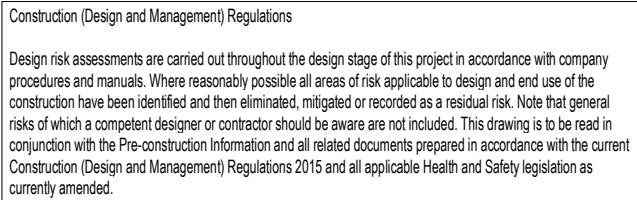
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Project: WREXHAM TENNIS CENTRE				
Detail: SITE LOCATION PLAN				
Project No.	Drawing No.	Scale	By	Rev.
4887	EW01	1:2500	B.T.	*

APPENDIX B

Proposed Site Layout



Ownership Boundary
Application Boundary

EXTERNAL WORKS OVERVIEW

1. 3 no. covered Padel courts replacing 2 no. existing tennis courts, built to a specification capable of hosting high level Padel competitions.
2. 2 no. outdoor tennis courts related to become all weather, with suitable drainage system installed. Courts resurfaced and resized to be suitable for higher grade competitions. New ball catch perimeter fencing installed around both courts.
3. All outdoor courts resurfaced and resized to be suitable for higher grade competitions. Existing ball catch perimeter fencing around all courts removed and replaced with new.
4. 2 no. new outdoor courts installed to replace those removed for padel tennis courts. Sized to be suitable for higher grade competitions. New ball catch perimeter fencing installed around both courts.
5. Existing floodlights to outdoor courts 1-2 removed and replaced with new LED floodlights to padel courts.
6. New LED floodlights installed to 6 no. outdoor tennis courts. Refer to external lighting plan for further details.
7. Complete overhaul of the indoor off-court areas with new:
 - a. Entrance canopy and refurbished entrance foyer
 - b. Canopy to bar lounge space
 - c. Tennis dedicated side entrance athium
8. Removal of existing hedge to north of outdoor courts 3-6, with new landscaped path here and bench seating to provide outdoor viewing area out onto tennis courts. Gravel path to be formed to provide access to this area.
9. Removal of existing hedge in front of new padel courts and 3 no. new replacement trees planted.
10. Existing railings adjusted and extended around new outdoor courts 1 & 2
11. New flagstone paved pedestrian access path formed to improve safety and wayfinding from car park to main entrance.
12. Existing M&E plant equipment removed and replaced with new, efficient, modern equivalent.
13. Existing flagstone paving extended towards padel courts to form larger external area for social seating and court viewing.
14. Area behind hedge to be grassland (mow restricted to two cuts per year in spring and autumn, allowing autumn cuttings to lie for two weeks before removal).
15. New display signage installed to fascias of flat roof to indicate main entrance. New large building signage also installed to front gable end of portal frame.
16. Existing invasive rhododendron to the south of the tennis centre building near the boundary wall to be removed, as recommended within the Preliminary Ecology Appraisal.
17. New secure and sheltered bike storage for an additional 4 no. cycles.
18. 2 no. new ev car charging points.
19. New solar pv car charging installed. Existing solar pv panels assessed and also replaced if required.
20. New condenser compound with 2.5m high grey powder coated aluminium screening

P01	Stage 3 Issue	29/06/2023
P00	Preliminary Issue	01/06/2023
REV	DESCRIPTION	DRAWN BY CHECKED BY APPROVED BY DATE
	RIBA PLAN OF WORK WORKSTAGE	LEVEL OF MODEL DEFINITION (LoD)

PURPOSE OF ISSUE - SUITABLE FOR ...	STATUS or SUITABILITY
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CLIENT
Wrexham Tennis Centre

PROJECT TITLE
Wrexham Tennis Centre

EN) DRAWING TITLE
Proposed Site Plan

PROJECT No 19802 SCALE @ A1 1 : 500

DRAWING No JB51192.2007 +A2.2016/ & BS EN ISO19650	1192: Project - Originator - Volume - Level - Type - Role - Number	REVISION
	19650: Project - Originator - Functional - Spatial - Form - Discipline - Number	
	Breakdown Breakdown	
	WTC-LAW-XX-XX-DR-A-069001	
		P01

DO NOT SCALE Any discrepancy or query concerning this drawing should be referred to the Architect

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P01 Stage 3 Issue	29/06/2023
P00 Preliminary Issue	01/06/2023
REV. DESCRIPTION DRAWN BY CHECKED BY APPROVED BY DATE	
RIBA PLAN OF WORK WORKSTAGE	LEVEL OF MODEL DEFINITION (Ld0)
PURPOSE OF ISSUE - SUITABLE FOR ...	STATUS or SUITABILITY

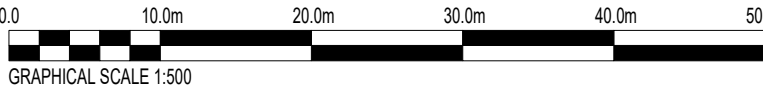


CARDIFF 029 2052 8140
LONDON 0207 138 3560
WREXHAM 01978 357 887
www.lawray.co.uk
CLIENT
Wrexham Tennis Centre

PROJECT TITLE
Wrexham Tennis Centre

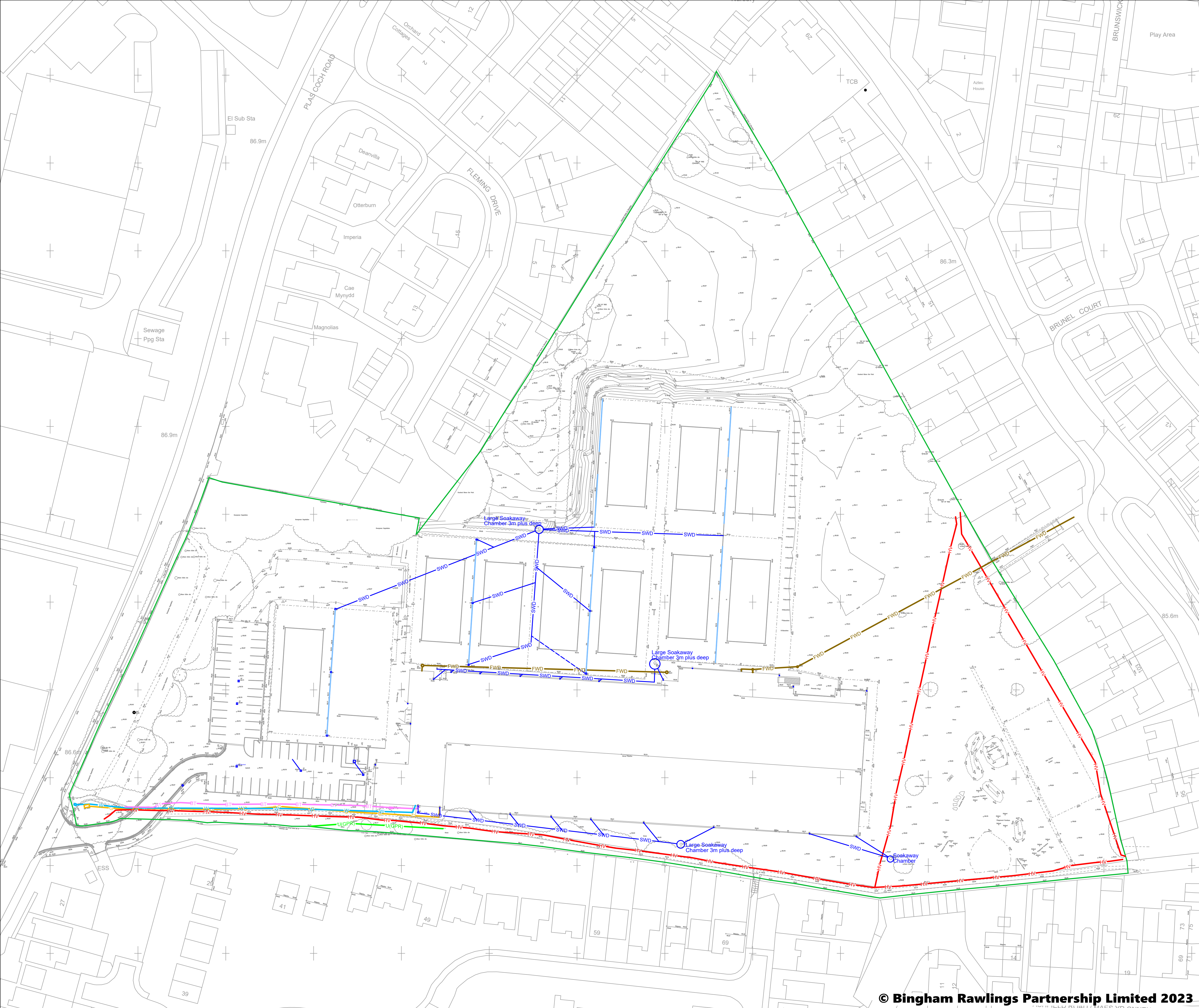
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Proposed Site 3D

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19802-001-100	100



APPENDIX C

Topographic Survey and Drainage Layout



NOTES

- DO NOT SCALE FROM THIS DRAWING.
- ALL LEVELS IN METERS UNLESS NOTED OTHERWISE ON DRAWING.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.
- PLEASE REFER TO ARCHITECT'S DRAWINGS FOR FINAL BUILDING LOCATION.

KEY

	TELECOMMUNICATIONS (BT)
	GAS
	HIGH VOLTAGE
	WATER
	FOUL WATER DRAINAGE
	SURFACE WATER DRAINAGE
	UNKNOWN UTILITY (GPR)

Revisions.

Revision	Made by	Date	Checked	Description

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b.r.p
Bingham
Rawlings
Partnership
Limited

Project	WREXHAM TENNIS CENTRE	
Drawing Title	EXISTING TOPOGRAPHIC SURVEY, DRAINAGE AND UTILITIES LAYOUT	
Architect	LAWRAY ARCHITECTS	
Client	WREXHAM TENNIS CENTRE	
Scale	1/500	Revision
Drawn	B.Thorne	
Date	13.07.23	
Checked	L.Rowlands	

4887 | EW04

APPENDIX D

Proposed Drainage Layout

1. CONTRACTOR TO ASCERTAIN EXACT POSITION/DEPTH OF ALL SERVICES, INCLUDING BUT NOT LIMITED TO:
 - SURFACE WATER & FOUL DRAINAGE
 - HIGHWAY DRAINAGE
 - WATER
 - ELECTRICITY
 - TELECOMMUNICATIONS
 - CCTV
 - GAS & ANY OTHER UTILITIES WHICH MAY BE PRESENT
2. ALL TEMPORARY WORKS ARE THE RESPONSIBILITY OF THE CONTRACTOR. ALL TEMPORARY WORKS TO BE DESIGNED & DETAILED BY THE CONTRACTOR. SHORING/PROPPING ARRANGEMENTS TO BE ADEQUATE TO SUPPORT ALL APPLIED LOADS AND CONSIDERATION GIVEN TO THE ADJACENT STRUCTURE IN THE TEMPORARY CONDITION.
3. PRIOR TO COMMENCEMENT OF THE WORKS, CONTRACTOR TO ESTABLISH THE EXISTING FOUNDATION LEVELS OF THE ADJACENT PROPERTIES TO ASCERTAIN WHETHER FURTHER RETAINING STRUCTURES ARE REQUIRED.
4. ALL WORKS CONTAINED WITHIN THE HIGHWAY ARE SUBJECT TO HIGHWAY APPROVAL.

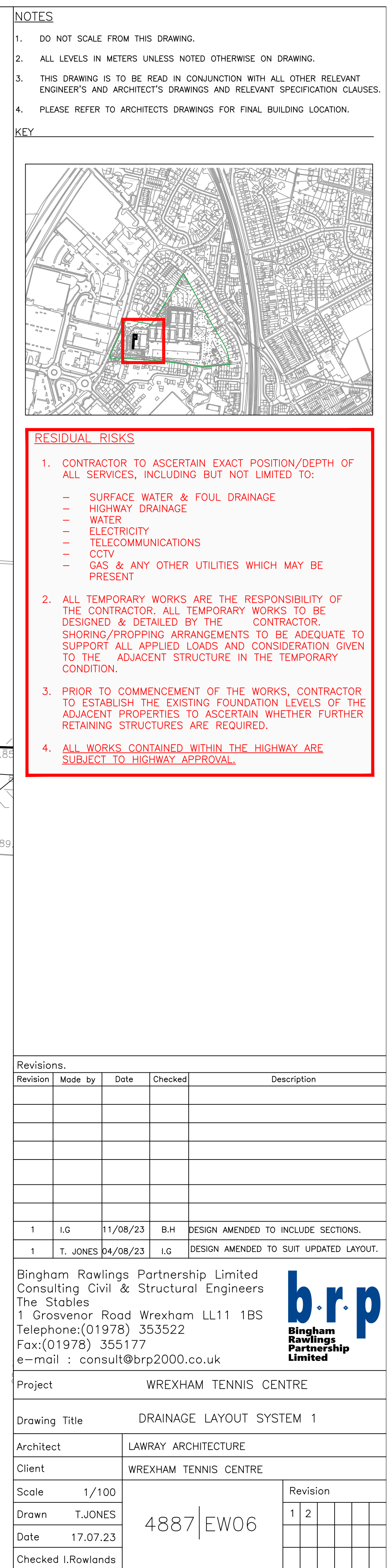


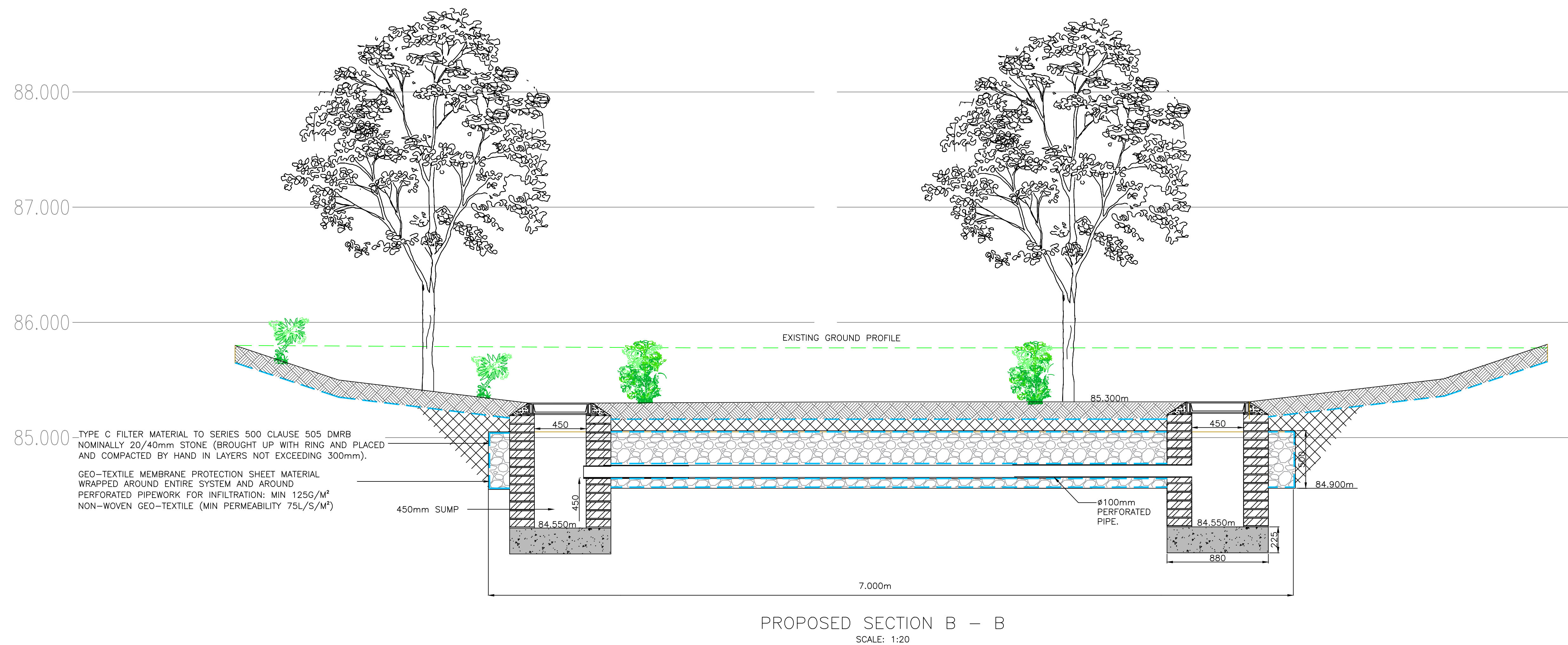
CONCRETE BED & HAUNCH MINIMUM
COMPRESSIVE STRENGTH 25 N/mm²

KEY

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Revisions.				
Revision	Made by	Date	Checked	Description
1	I.G	11/08/23	B.H	FIRST ISSUE

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Project	WREXHAM TENNIS CENTRE									
Drawing Title	SYSTEM 1 DRAINAGE DETAILS									
Architect	LAWRAY ARCHITECTURE									
Client	WREXHAM TENNIS CENTRE									
Scale	1/100	4887 EW07				Revision				
Drawn	I.G					1				
Date	11.08.23									
Checked	I.Rowlands									

APPENDIX E

Soakaway Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	30	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.330	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1			86.196		332905.160	351494.753	2.339
ACO1	0.017	5.00	86.000		332887.924	351492.664	0.650
ACO2	0.017	5.00	86.000		332921.482	351490.414	0.650
ACO5	0.046	5.00	86.000		332885.483	351455.965	0.650
J1			86.000		332896.367	351477.421	0.951
ACO3		5.00	86.000		332886.656	351473.756	0.650
ACO6	0.017	5.00	86.000		332919.127	351453.713	0.650
J2			86.000		332911.446	351476.284	0.948
ACO4	0.029	5.00	86.000		332920.319	351471.500	0.650
S1.1			86.196	2400	332905.500	351499.300	2.396

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
AC05-J1	AC05	J1	24.059	0.600	85.350	85.049	0.301	79.9	150	5.36	50.0
ACO3-J1	ACO3	J1	10.380	0.600	85.350	85.049	0.301	34.5	150	5.10	50.0
J1-S1	J1	S1	19.435	0.600	85.049	84.806	0.243	80.0	150	5.64	50.0
ACO6-J2	ACO6	J2	23.842	0.600	85.350	85.052	0.298	80.0	150	5.35	50.0
ACO4-J2	ACO4	J2	10.081	0.600	85.350	85.052	0.298	33.8	150	5.10	50.0
J2-S1	J2	S1	19.510	0.600	85.052	84.808	0.244	80.0	150	5.64	50.0
ACO1-S1	ACO1	S1	17.362	0.600	85.350	84.800	0.550	31.6	150	5.16	50.0
ACO2-S1	ACO2	S1	16.889	0.600	85.350	84.200	1.150	14.7	150	5.11	50.0
1.002	S1	S1.1	4.560	0.600	83.857	83.800	0.057	80.0	225	5.70	50.0

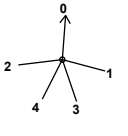
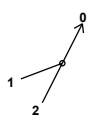
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
AC05-J1	1.125	19.9	8.1	0.500	0.801	0.046	0.0	67	1.067
ACO3-J1	1.720	30.4	0.0	0.500	0.801	0.000	0.0	0	0.000
J1-S1	1.125	19.9	8.1	0.801	1.240	0.046	0.0	67	1.067
ACO6-J2	1.125	19.9	3.0	0.500	0.798	0.017	0.0	40	0.815
ACO4-J2	1.736	30.7	5.1	0.500	0.798	0.029	0.0	41	1.291
J2-S1	1.125	19.9	8.1	0.798	1.238	0.046	0.0	67	1.067
ACO1-S1	1.798	31.8	3.0	0.500	1.246	0.017	0.0	31	1.127
ACO2-S1	2.642	46.7	3.0	0.500	1.846	0.017	0.0	25	1.481
1.002	1.463	58.2	22.2	2.114	2.171	0.126	0.0	96	1.367

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
AC05-J1	24.059	79.9	150	Circular	86.000	85.350	0.500	86.000	85.049	0.801
ACO3-J1	10.380	34.5	150	Circular	86.000	85.350	0.500	86.000	85.049	0.801
J1-S1	19.435	80.0	150	Circular	86.000	85.049	0.801	86.196	84.806	1.240
ACO6-J2	23.842	80.0	150	Circular	86.000	85.350	0.500	86.000	85.052	0.798
ACO4-J2	10.081	33.8	150	Circular	86.000	85.350	0.500	86.000	85.052	0.798
J2-S1	19.510	80.0	150	Circular	86.000	85.052	0.798	86.196	84.808	1.238
ACO1-S1	17.362	31.6	150	Circular	86.000	85.350	0.500	86.196	84.800	1.246
ACO2-S1	16.889	14.7	150	Circular	86.000	85.350	0.500	86.196	84.200	1.846
1.002	4.560	80.0	225	Circular	86.196	83.857	2.114	86.196	83.800	2.171

Link	US Node	Node Type	DS Node	Dia (mm)	Node Type	MH Type
AC05-J1	AC05	Junction	J1		Junction	
ACO3-J1	ACO3	Junction	J1		Junction	
J1-S1	J1	Junction	S1		Junction	
ACO6-J2	ACO6	Junction	J2		Junction	
ACO4-J2	ACO4	Junction	J2		Junction	
J2-S1	J2	Junction	S1		Junction	
ACO1-S1	ACO1	Junction	S1		Junction	
ACO2-S1	ACO2	Junction	S1		Junction	
1.002	S1	Junction	S1.1	2400	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	332905.160	351494.753	86.196	2.339			1 AC02-S1	84.200	150
						2	ACO1-S1	84.800	150
						3	J2-S1	84.808	150
						4	J1-S1	84.806	150
						0	1.002	83.857	225
ACO1	332887.924	351492.664	86.000	0.650			0 ACO1-S1	85.350	150
ACO2	332921.482	351490.414	86.000	0.650			0 AC02-S1	85.350	150
AC05	332885.483	351455.965	86.000	0.650			0 AC05-J1	85.350	150
J1	332896.367	351477.421	86.000	0.951			1 ACO3-J1	85.049	150
						2	AC05-J1	85.049	150
						0	J1-S1	85.049	150
ACO3	332886.656	351473.756	86.000	0.650			0 ACO3-J1	85.350	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
ACO6	332919.127	351453.713	86.000	0.650					
						0	ACO6-J2	85.350	150
J2	332911.446	351476.284	86.000	0.948					
						1	ACO4-J2	85.052	150
						2	ACO6-J2	85.052	150
						0	J2-S1	85.052	150
ACO4	332920.319	351471.500	86.000	0.650					
						0	ACO4-J2	85.350	150
S1.1	332905.500	351499.300	86.196	2.396	2400				
						1	1.002	83.800	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	18.000	Drain Down Time (mins)	240
Ratio-R	0.330	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

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

Node S1.1 Lined Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.74880	Invert Level (m)	83.800	Pit Length (m)	3.500
Side Inf Coefficient (m/hr)	0.74880	Time to half empty (mins)	75	Depth (m)	2.000
Safety Factor	2.0	Ring Diameter (m)	2.400	Inf Depth (m)	
Porosity	1.00	Pit Width (m)	3.500	Number Required	1

Results for 1 year +30% CC Critical Storm Duration. Lowest mass balance: 99.30%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	S1	92	84.375	0.518	6.8	0.0000	0.0000	SURCHARGED
15 minute winter	ACO1	10	85.379	0.029	2.6	0.0151	0.0000	OK
15 minute winter	ACO2	10	85.374	0.024	2.6	0.0126	0.0000	OK
15 minute winter	ACO5	10	85.412	0.062	7.1	0.0873	0.0000	OK
15 minute winter	J1	11	85.110	0.061	7.0	0.0000	0.0000	OK
15 minute summer	ACO3	1	85.350	0.000	0.0	0.0000	0.0000	OK
15 minute winter	ACO6	10	85.386	0.036	2.6	0.0190	0.0000	OK
15 minute winter	J2	11	85.113	0.061	7.0	0.0000	0.0000	OK
15 minute winter	ACO4	10	85.389	0.039	4.5	0.0345	0.0000	OK
120 minute winter	S1.1	92	84.375	0.575	9.6	9.6422	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
120 minute winter	S1	1.002	S1.1	9.6	0.808	0.165	0.1814
15 minute winter	ACO1	ACO1-S1	S1	2.6	1.084	0.081	0.0412
15 minute winter	ACO2	ACO2-S1	S1	2.6	1.421	0.055	0.0306
15 minute winter	ACO5	ACO5-J1	J1	7.0	1.044	0.353	0.1616
15 minute winter	J1	J1-S1	S1	6.9	1.032	0.349	0.1305
15 minute summer	ACO3	ACO3-J1	J1	0.0	0.000	0.000	0.0335
15 minute winter	ACO6	ACO6-J2	J2	2.6	0.523	0.129	0.1185
15 minute winter	J2	J2-S1	S1	6.9	1.031	0.347	0.1306
15 minute winter	ACO4	ACO4-J2	J2	4.5	0.887	0.145	0.0515
120 minute winter	S1.1	Infiltration		2.1			

Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 99.30%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	S1	96	85.358	1.501	16.4	0.0000	0.0000	SURCHARGED
15 minute winter	ACO1	10	85.395	0.045	6.4	0.0238	0.0000	OK
15 minute winter	ACO2	10	85.388	0.038	6.4	0.0196	0.0000	OK
15 minute winter	ACO5	10	85.457	0.107	17.3	0.1519	0.0000	OK
120 minute winter	J1	96	85.359	0.310	6.0	0.0000	0.0000	SURCHARGED
120 minute winter	ACO3	96	85.359	0.009	0.0	0.0000	0.0000	OK
15 minute winter	ACO6	10	85.408	0.058	6.4	0.0303	0.0000	OK
120 minute winter	J2	96	85.359	0.307	6.0	0.0000	0.0000	SURCHARGED
15 minute winter	ACO4	10	85.412	0.062	10.9	0.0550	0.0000	OK
120 minute winter	S1.1	96	85.358	1.558	15.2	26.1327	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
120 minute winter	S1	1.002	S1.1	15.2	0.969	0.261	0.1814
15 minute winter	ACO1	ACO1-S1	S1	6.3	1.405	0.199	0.0780
15 minute winter	ACO2	ACO2-S1	S1	6.4	1.806	0.136	0.1765
15 minute winter	ACO5	ACO5-J1	J1	17.1	1.283	0.858	0.3200
120 minute winter	J1	J1-S1	S1	6.0	0.992	0.302	0.3421
120 minute winter	ACO3	ACO3-J1	J1	0.0	0.004	0.001	0.0937
15 minute winter	ACO6	ACO6-J2	J2	6.3	0.646	0.318	0.2319
120 minute winter	J2	J2-S1	S1	6.0	0.992	0.302	0.3435
15 minute winter	ACO4	ACO4-J2	J2	10.9	1.098	0.354	0.1007
120 minute winter	S1.1	Infiltration		3.5			

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.30%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	S1	140	85.788	1.931	16.3	0.0000	0.0000	SURCHARGED
180 minute winter	ACO1	140	85.788	0.438	2.2	0.2292	0.0000	FLOOD RISK
180 minute winter	ACO2	140	85.788	0.438	2.2	0.2292	0.0000	FLOOD RISK
180 minute winter	ACO5	140	85.791	0.441	6.0	0.6246	0.0000	FLOOD RISK
180 minute winter	J1	140	85.790	0.741	6.0	0.0000	0.0000	FLOOD RISK
180 minute winter	ACO3	140	85.790	0.440	0.7	0.0000	0.0000	FLOOD RISK
180 minute winter	ACO6	140	85.790	0.440	2.2	0.2299	0.0000	FLOOD RISK
180 minute winter	J2	140	85.789	0.737	6.0	0.0000	0.0000	FLOOD RISK
180 minute winter	ACO4	140	85.790	0.440	3.8	0.3922	0.0000	FLOOD RISK
180 minute winter	S1.1	140	85.788	1.988	14.0	33.3423	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
180 minute winter	S1	1.002	S1.1	14.0	0.867	0.241	0.1814
180 minute winter	ACO1	ACO1-S1	S1	2.2	1.004	0.069	0.3057
180 minute winter	ACO2	ACO2-S1	S1	2.2	1.095	0.047	0.2973
180 minute winter	ACO5	ACO5-J1	J1	6.0	0.992	0.302	0.4236
180 minute winter	J1	J1-S1	S1	6.0	0.954	0.299	0.3421
180 minute winter	ACO3	ACO3-J1	J1	-0.7	-0.044	-0.022	0.1827
180 minute winter	ACO6	ACO6-J2	J2	2.2	0.496	0.111	0.4197
180 minute winter	J2	J2-S1	S1	6.0	0.958	0.300	0.3435
180 minute winter	ACO4	ACO4-J2	J2	3.8	0.831	0.124	0.1775
180 minute winter	S1.1	Infiltration		4.2			