

SOLSTICE PARK, SOLAR WAY, AMESBURY

Brunel Design Partnerships Ltd

Technical Note – Discharge of Planning Condition 5

253107-KTN-TN-01-A

16th July 2025



The Site
24 Chosen View Road
Cheltenham
GL51 9LT

DOCUMENT CONTROL

Document Status

Revision	Date	Document Author	Status
A	16.07.25	Kris Tovey	ISSUE01

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National Standards, regulations and Council policy do change which could affect the validity of this Report. The methodologies adopted and the sources of information used by K-Ten Consulting Ltd in providing its services are outlined within the report. Any information provided by third parties and referred to within the report and appendices has not been checked or verified by K-Ten Consulting Ltd, unless otherwise expressly stated within this Report.

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1.0 INTRODUCTION

- 1.1 K-Ten Consulting Ltd (K-Ten) provide professional Flood Risk, Infrastructure and Drainage services throughout the UK.
- 1.2 The project consists of the construction of single building to provide 6no. units comprising Eg(i), B2 and B8 Uses on existing Business Park
- 1.3 Planning has been submitted (Ref PL/2024/09773) and planning conditions recommended on 15th January 2025.
- 1.4 Condition 5 relates to surface water drainage and SuDS.
- 1.5 K-Ten have been commissioned by Brunel Design Partnership Ltd (applicant) to prepare technical design information to discharge planning condition 5.

2.0 PLANNING CONDITIONS PL/2024/09773/FUL

2.1 Condition 5 relates to surface water drainage and states:

Notwithstanding the submitted details, no development shall commence on site until details for the discharge of surface water from the site (including surface water from the access / driveway), together with permeability test results to BRE365, and being sized appropriately for the current requirement for 1 in 100 +40% storm events has been submitted to and approved in writing by the Local Planning Authority. The development shall not be first occupied until the surface water drainage scheme has been constructed in accordance with the approved details.

REASON: The application contained insufficient information to enable this matter to be considered prior to granting planning permission and the matter is required to be agreed with the Local Planning Authority before development commences in order that the development is undertaken in an acceptable manner, to ensure that the development can be adequately drained

3.0 EXISTING DRAINAGE

- 3.1 The site is served by Wessex Water public drainage assets with storm and foul drainage located to the north within Solar Way.
- 3.2 Refer to **Appendix A** for sewer records.
- 3.3 The proposed development area is located on land with a previous building which has been demolished.
- 3.4 The drainage was designed and constructed in 2004 under planning permission S/2004/0755
- 3.5 The external areas are hardstanding and currently used for parking.
- 3.6 The existing building and external areas were positively drained into a separate storm water drainage system with discharge to linear soakaways within the parking areas.
- 3.7 This system is still in place and operational, serving the surrounding catchment and external area of the demolished building.
- 3.8 A separate foul drainage system is also present on site with gravity discharge to public drainage system.
- 3.9 Refer to **Appendix B** for existing site drainage plan.

4.0 PROPOSED SURFACE WATER DRAINAGE STRATEGY

- 4.1 A surface water strategy is proposed to manage and reduce the flood risk and surface water run-off from the development, with consideration to SuDS.
- 4.2 The SuDS hierarchy dictates that surface water run off should be managed as high up the following list as practically possible:
 - a) into the ground (via infiltration) and re-use, or then;
 - b) to a surface water body, or then;
 - c) to a surface water sewer, highway drain or another drainage system, or then;
 - d) to a combined sewer.
- 4.3 Online soil maps indicate the site to be underlain with shallow lime-rich soils over chalk or limestone which suggests infiltration will be viable.
- 4.4 Infiltration testing has been completed on site in 2025 to the methodology within BRE365.
- 4.5 Test results have found rates in the region of 1.4×10^{-4} m/sec which supports discharge to ground as a method of surface water management.
- 4.6 Refer to **Appendix C** for Infiltration test results.
- 4.7 As the current site surface water drainage, designed and constructed in 2004, is fully operational and the site impermeable catchment will remain the same we propose to utilise existing drainage connections on site.
- 4.8 It is proposed to collect the proposed roof water via traditional drainage and discharge to existing surface water system on site and utilise the existing trench linear soakaways.
- 4.9 The current drainage was designed in 2004 and therefore did not include climate change allowances. In accordance with planning condition requirements the proposed drainage shall consider current design criteria and therefore an assessment of the soakaway capacity with climate change is required.
- 4.10 Using *Causeway Flow* hydraulic design software, a model has been simulated with the 2004 constructed software with current storm design requirements, based on infiltration rates observed in 2025, using the following rainfall descriptors:
 - Rainfall Catchment descriptor – FEH-22
 - CV (Summer and Winter) – 1.0
 - Void ratio – 30%
 - Factor of Safety x 2
 - Storm Durations (mins) – 15 to 10080
 - Storm events – up to and including 100 year plus 40% climate change

- 4.11 Existing trench soakaway SK06 is 27m long x 1.2m wide x 2.32m deep with 30% void ratio. The current impermeable catchment, including 50% new roof area will be 720m².
- 4.12 Existing trench soakaway SK07 is 38m long x 0.8m wide x 1.79m deep with 30% void ratio. The current impermeable catchment, including 50% new roof area will be 480m².
- 4.13 For the purpose of design assessment, the worst infiltration rate of 1.34×10^{-4} m/sec (0.482 m/hr) has been used.
- 4.14 The 100 year event plus a 40% allowance for climate change is retained within the existing soakaways with maximum water level:
- SK06 2.306m
 - SK07 1.413m
- 4.15 Refer to **Appendix D** for drainage calculations
- 4.16 Refer to **Appendix E** for the proposed drainage strategy layout.
- 4.17 All drainage will be constructed in accordance with Building Regulations part H.

5.0 MAINTENANCE AND MANAGEMENT

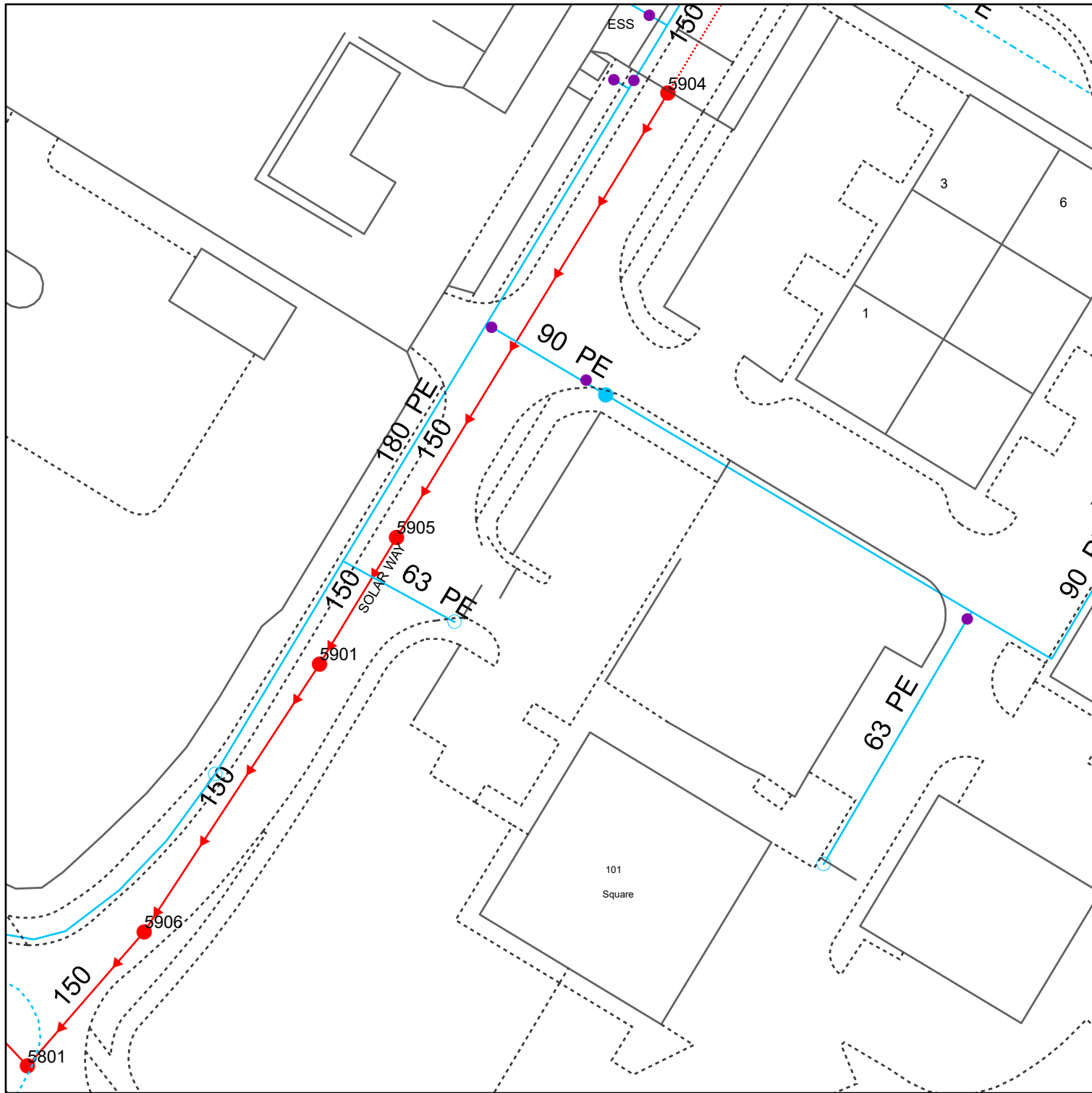
- 5.1 Maintenance of SuDS features is required in order to ensure that the surface water drainage system operates effectively, and the risk of flooding of the site and surrounding areas is reduced.
- 5.2 A maintenance schedule should be undertaken to ensure that the drainage system remains fully operational for the design lifetime. The below table summarises a maintenance plan for the drainage systems and components within the development.
- 5.3 The SuDS Manual (CIRIA C753) and specific product suppliers guidelines should also be referred to for further information on maintenance and frequency.
- 5.4 All on site drainage will be maintained and managed by a management company which will manage all new and existing systems on site

Drainage Component	Required Action	Typical Frequency
General pipework, manholes, chambers, silt traps and headwalls	Stabilise adjacent areas	As required
	Remove weeds and vegetation	As required
	Clear/Jet any poor performing structures	As required
	Inspect all drainage features for poor operation	3 monthly, 48 hours after large storms in first six months
	Monitor inspection chambers and silt traps. Inspect silt accumulation and determine silt clearance frequencies	Annually

APPENDIX A

WESSEX WATER SEWER RECORDS

Wessex Water Network Map



Reproduced from the Ordnance Survey map with the permission of the Controller of His Majesty's Stationery Office. © Crown copyright and database rights (2025) OS AC0000848304

WATER MAINS		SEWERS		STRATEGIC		PUBLIC		PRIVATE		SECTION 104		OTHER WESSEX PIPES		NON-WESSEX / UNKNOWN	
	Distribution		Foul								Rising Mains				Private Rising Mains
	Washout		Surface								Standby Rising Mains				Culverted Watercourse
	Raw Water		Combined								EDM				Highway Drain
	Abandoned		Abandoned								Overflow				Use Unknown
	Private										Syphon				Status Unknown
Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).															
Some styles of line and symbol are shown on the key in sample/typical colours.															
FITTINGS		STRUCTURES										OTHER STRUCTURES			
	Hydrant		Manhole - Foul		Pumping Station - Surface		Pumping Stn - Foul/Combined		Gully		Attenuation Tank		Tunnel		Interceptor
	Other		Manhole - Surface		Vent Column		Rodding Eye		Catchpit		Flushing Chamber		Soakaway		Non Return Valve
			Inlet		Outfall		Air Valve		Hatch Box		Washout				
			Lamphole		Bifurcation - Surface		Bifurcation - Combined		Combined Sewage Overflow						

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are not to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526633 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

Date: 16/07/2025
Centre: 417587E, 141954N
Scale: 1:625
(when printed at A4 size)



APPENDIX B
EXISTING SITE DRAINAGE PLAN

AS BUILT
See Note 9



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Notes:

- 1) Site layout reference to 'Site Block Plan' Rev B produced by Abbey Manor Developments Limited, dated 27th April 2004
- 2) All spurs are 150mm super strength VC pipes laid at 1:150
- 3) All adoptable highway works to be constructed in accordance with the Specification for Highway Works 1998 (SHW) as amended, published by HMSO, and Wiltshire County Council's Design Guide
- 4) Use of any Working Drawing does not absolve the Client from his responsibilities under Health and Safety: The Construction (Design and Management) Regulations 1994. The Planning Supervisor is required to contact PFA Consulting prior to permitting this drawing to be used in connection with any construction works.
- 5) Traffic signs and road markings shall comply with the Traffic Signs Regulations and General Directions 2002.
- 6) All road markings shall be laid out in accordance with the Traffic Signs Manual Chapter 5
- 7) All road markings shall be formed in thermoplastic material complying with BS 3262: Class A
- 8) All works within the limit of the highway shall be signed in accordance with the Department of Transport's Traffic Signs Manual (1991) Chapter 8 'Traffic Safety Measures and Signing for Roadworks and Temporary Situations'
- 9) All 'As Built' amendments are not carried out by PFA Consulting - they are added for inclusion in building 100-A's Health and Safety file. PFA Consulting have no record of the as built amendments. No further amendments for Units 1-15.

Q 2401/06 Issued as an 'As Built' drawing for Units 1-15. ADM
PFA Consulting Ltd. 2401/06

Rev	Date	Description	Initials
O	19/05/05	Manhole F11C repositioned, manhole F11B deleted and drainage to Road 11 added	DRB
N	23/08/05	Relocated foul drainage for building 100-B added	DW
M	25/07/05	Minor Storm drainage amendments	DW
L	18/07/05	Minor Foul drainage amendments	DW
K	10/07/05	Minor Storm drainage amendments	DW
J	09/06/05	Minor Storm and foul drainage amendments around Fineston	DW
I	31/05/05	Private foul sewer alterations to Unit 1 & 2 due to new non-disabled shower arrangements	DW
H	26/05/05	Additional surface water drainage information added and minor foul water drainage amendments	DW
G	01/05/05	Minor foul surface water drainage and soakaway amendments	CS

Client

Abbey Manor
Group Limited

Project

Zone A, Solstice Park

Drawing Title

Foul and Surface Water
Drainage Layout

Drawing No. A102/24 Rev Q

Date September 2004

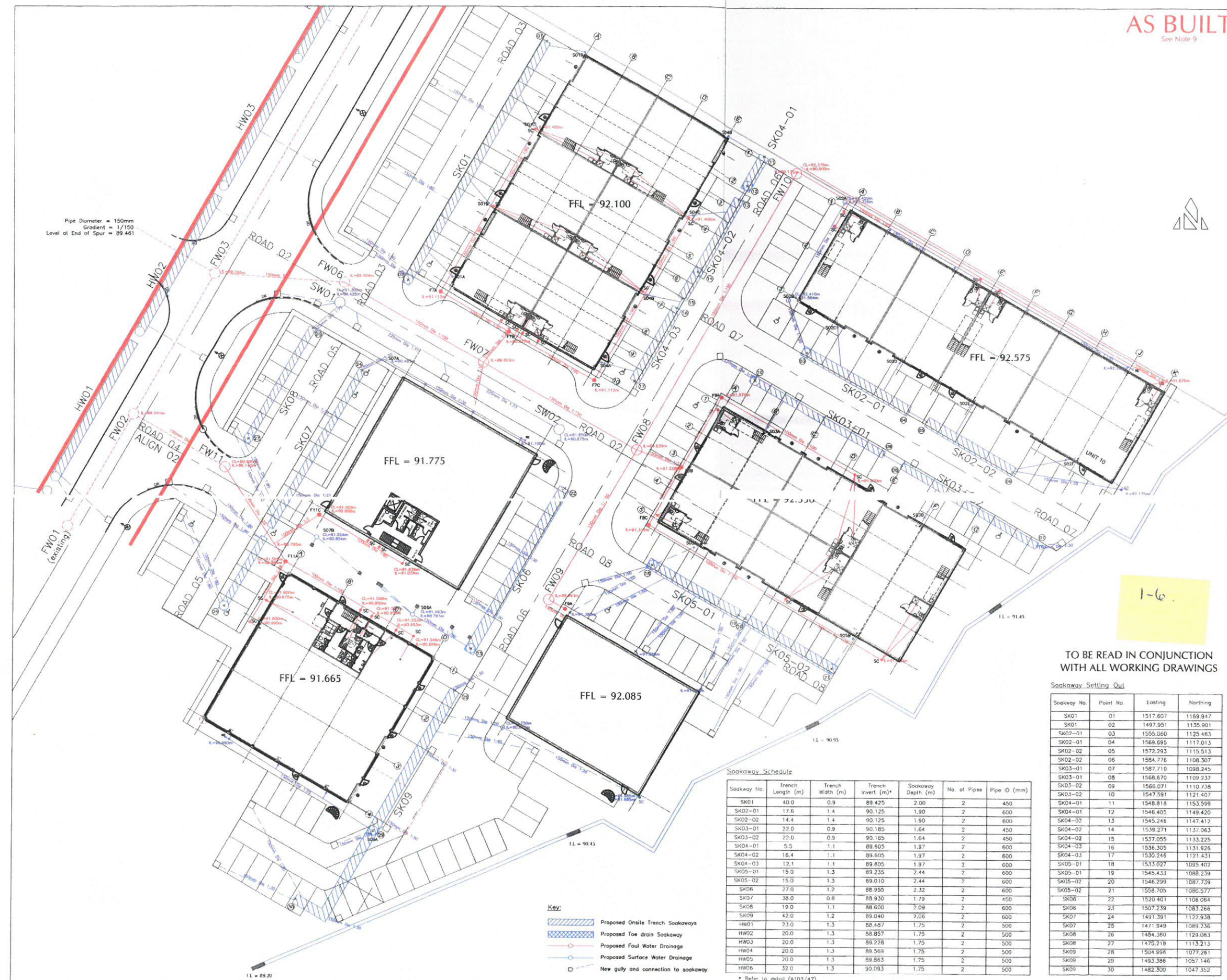
Scale 1:250 @ A1

Drawn By DW

Checked By GE

E-Mail geves@pfapl.com

File Ref. A102/PFA Drawings/A102_24q.hwg



TO BE READ IN CONJUNCTION
WITH ALL WORKING DRAWINGS

Soakaway Setting Out

Soakaway No.	Point No.	Easting	Northing
SK01	01	1517.607	1169.947
SK01	02	1497.951	1135.901
SK02-01	03	1555.060	1125.463
SK02-01	04	1569.695	1117.013
SK02-02	05	1572.293	1115.513
SK02-02	06	1584.776	1108.307
SK03-01	07	1587.710	1098.245
SK03-01	08	1568.670	1109.237
SK03-02	09	1566.071	1110.738
SK03-02	10	1547.591	1121.407
SK04-01	11	1548.818	1153.599
SK04-01	12	1546.405	1149.420
SK04-02	13	1545.246	1147.417
SK04-02	14	1539.271	1137.063
SK04-02	15	1537.055	1133.225
SK04-03	16	1536.305	1131.626
SK04-03	17	1530.246	1121.431
SK05-01	18	1533.027	1095.402
SK05-01	19	1545.433	1088.239
SK05-02	20	1546.299	1087.759
SK05-02	21	1558.705	1080.577
SK06	22	1520.401	1106.064
SK06	23	1507.239	1083.268
SK07	24	1491.391	1127.938
SK07	25	1471.949	1089.736
SK08	26	1484.380	1129.083
SK08	27	1475.218	1113.213
SK09	28	1504.998	1077.261
SK09	29	1493.386	1057.146
SK09	30	1482.300	1047.352

Soakaway Schedule

Soakaway No.	Trench Length (m)	Trench Width (m)	Trench Invert (m)*	Soakaway Depth (m)	No. of Pipes	Pipe ID (mm)
SK01	40.0	0.9	89.425	2.00	2	450
SK02-01	17.6	1.4	90.125	1.90	2	600
SK02-02	14.4	1.4	90.125	1.90	2	600
SK03-01	22.0	0.9	90.185	1.64	2	450
SK03-02	22.0	0.9	90.185	1.64	2	450
SK04-01	5.5	1.1	89.605	1.97	2	600
SK04-02	16.4	1.1	89.605	1.97	2	600
SK04-03	12.1	1.1	89.605	1.97	2	600
SK05-01	15.0	1.3	89.235	2.44	2	600
SK05-02	15.0	1.3	89.010	2.44	2	600
SK06	27.0	1.2	88.955	2.32	2	600
SK07	38.0	0.8	88.930	1.79	2	450
SK08	19.0	1.1	88.600	2.09	2	600
SK09	42.0	1.2	89.040	2.08	2	600
HW01	23.0	1.3	88.487	1.75	2	500
HW02	20.0	1.3	88.857	1.75	2	500
HW03	20.0	1.3	89.278	1.75	2	500
HW04	20.0	1.3	89.569	1.75	2	500
HW05	20.0	1.3	89.863	1.75	2	500
HW06	32.0	1.3	90.093	1.75	2	500

* Refer to detail (A102/47)

Key:

- Proposed Onsite Trench Soakaways
- Proposed Toe drain Soakaway
- Proposed Foul Water Drainage
- Proposed Surface Water Drainage
- New gully and connection to soakaway

APPENDIX C

INFILTRATION TEST RESULTS

Plot 102, Solstice Park, Amesbury

Test Location: TP1

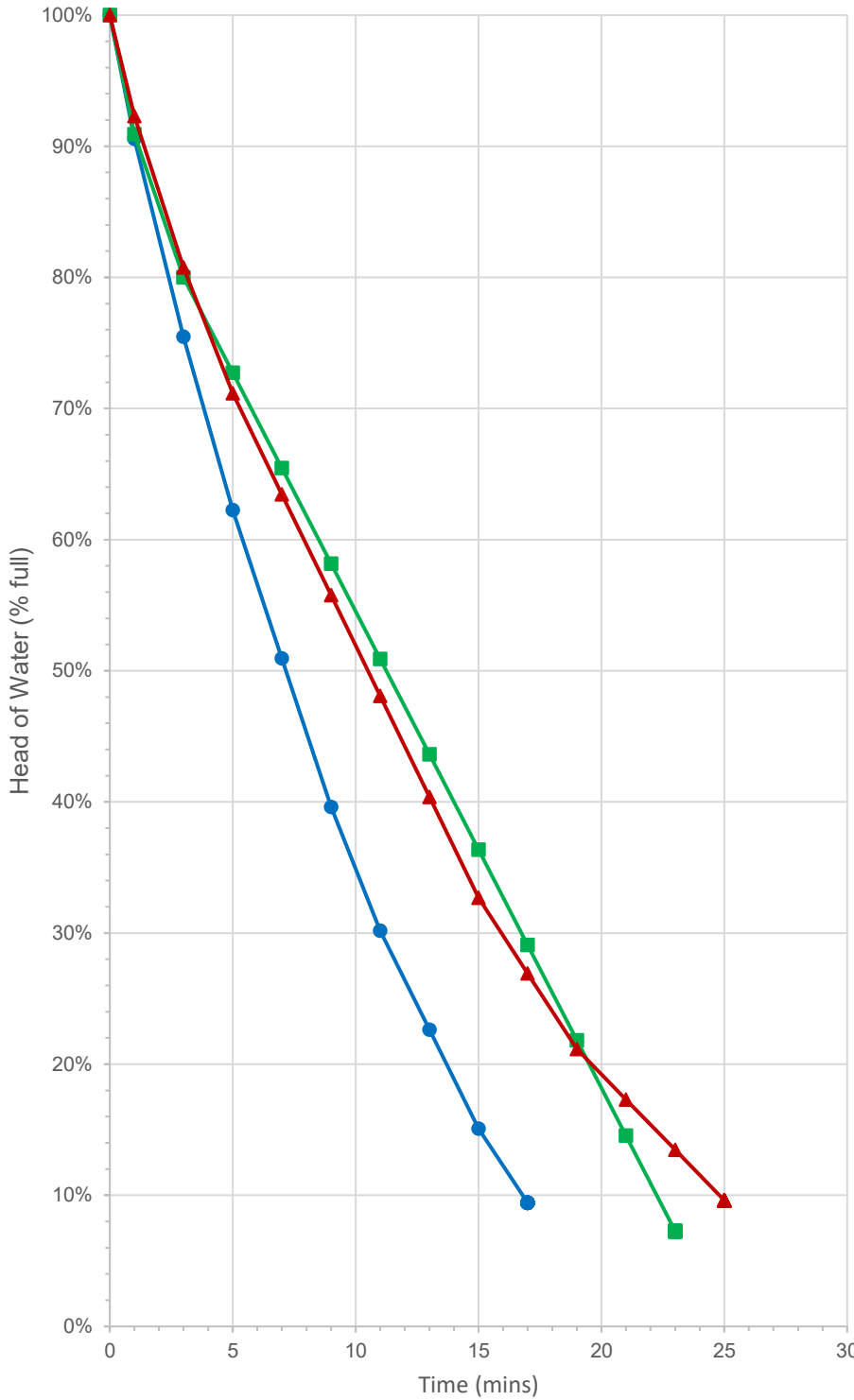
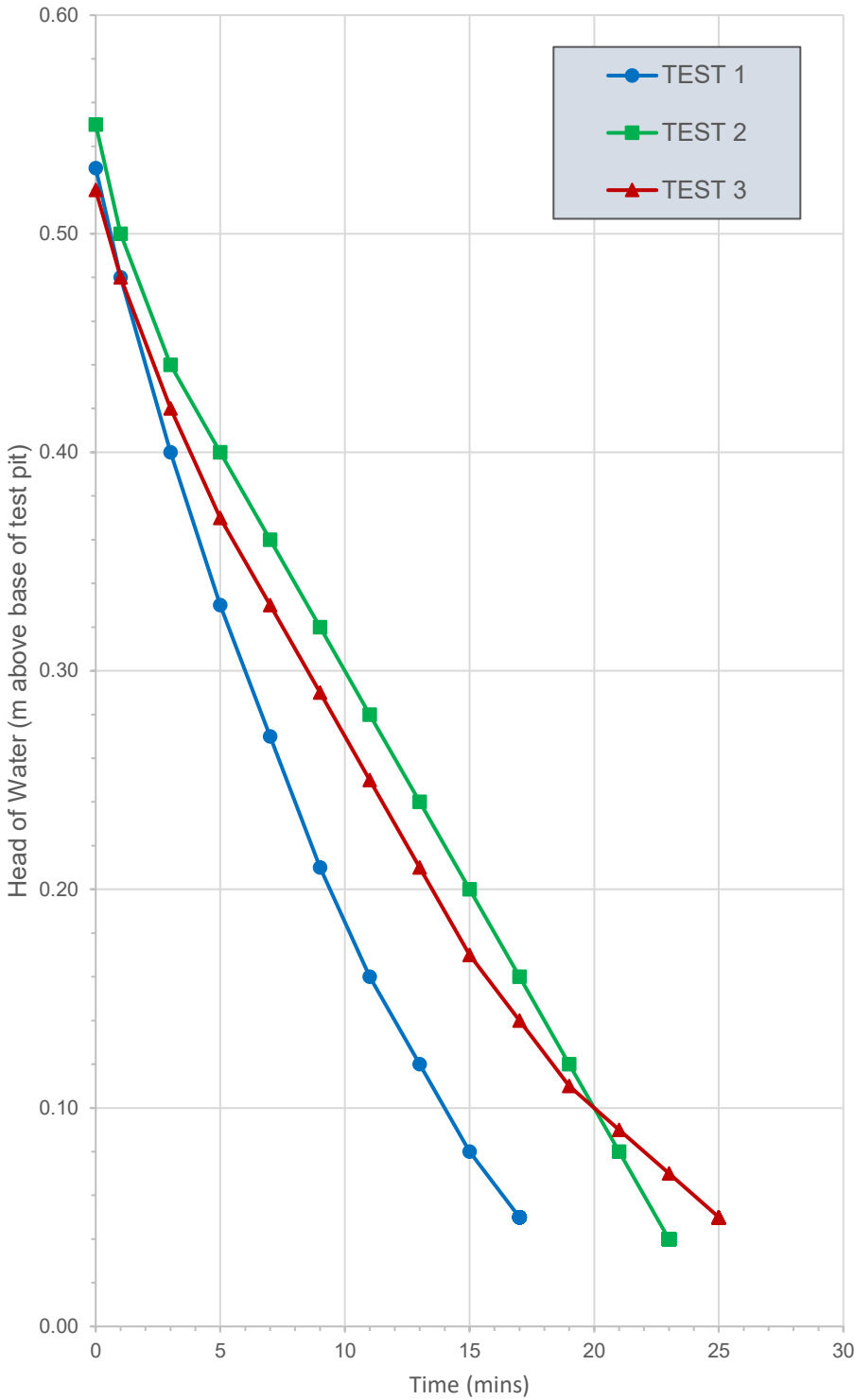
TEST PIT DIMENSIONS

Length	Width	Depth
2.10 m	0.45 m	2.10 m

Comments:
Testing undertaken within structureless chalk (Seaford Chalk Formation). Water supplied to pit via tractor-towed vacuum tanker. Three fills completed.

Observation No.	TEST 1		TEST 2		TEST 3	
	Time (min)	Head (m)	Time (min)	Head (m)	Time (min)	Head (m)
1	0.00	0.530	0.00	0.550	0.00	0.520
2	1.00	0.480	1.00	0.500	1.00	0.480
3	3.00	0.400	3.00	0.440	3.00	0.420
4	5.00	0.330	5.00	0.400	5.00	0.370
5	7.00	0.270	7.00	0.360	7.00	0.330
6	9.00	0.210	9.00	0.320	9.00	0.290
7	11.00	0.160	11.00	0.280	11.00	0.250
8	13.00	0.120	13.00	0.240	13.00	0.210
9	15.00	0.080	15.00	0.200	15.00	0.170
10	17.00	0.050	17.00	0.160	17.00	0.140
11	-	-	19.00	0.120	19.00	0.110
12	-	-	21.00	0.080	21.00	0.090
13	-	-	23.00	0.040	23.00	0.070
14	-	-	-	-	25.00	0.050
15	-	-	-	-	-	-
16	-	-	-	-	-	-
17	-	-	-	-	-	-
18	-	-	-	-	-	-
19	-	-	-	-	-	-
20	-	-	-	-	-	-
21	-	-	-	-	-	-
22	-	-	-	-	-	-
23	-	-	-	-	-	-
24	-	-	-	-	-	-
25	-	-	-	-	-	-
$V_{p75-25} \text{ (m}^3\text{)}$	0.250		0.260		0.246	
$a_{p50} \text{ (m}^2\text{)}$	2.297		2.348		2.271	
$t_{p75-25} \text{ (sec)}$	558		825		808	
$f \text{ (m/sec)}$	0.000195349 1.95E-04		0.000134185 1.34E-04		0.000133899 1.34E-04	

Soil infiltration rate, $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$



APPENDIX D

DRAINAGE CALCULATIONS

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	4.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	Cover Level (m)	Depth (m)
SK06	0.072	91.275	2.320
SK07	0.048	90.720	1.790

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
10	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node SK06 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.48200	Invert Level (m)	88.955	Depth (m)	2.320
Side Inf Coefficient (m/hr)	0.48200	Time to half empty (mins)	27	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	1.200	Number Required	1
Porosity	0.30	Pit Length (m)	27.000		

Node SK07 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.48200	Invert Level (m)	88.930	Depth (m)	1.790
Side Inf Coefficient (m/hr)	0.48200	Time to half empty (mins)	19	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	38.000	Number Required	1
Porosity	0.30	Pit Length (m)	0.800		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	104.220	29.491
2 year 15 minute winter	73.137	29.491
2 year 30 minute summer	67.853	19.200
2 year 30 minute winter	47.616	19.200
2 year 60 minute summer	45.683	12.073
2 year 60 minute winter	30.351	12.073
2 year 120 minute summer	31.277	8.266
2 year 120 minute winter	20.780	8.266
2 year 180 minute summer	25.140	6.469
2 year 180 minute winter	16.341	6.469
2 year 240 minute summer	20.339	5.375
2 year 240 minute winter	13.513	5.375
2 year 360 minute summer	15.793	4.064
2 year 360 minute winter	10.266	4.064
2 year 480 minute summer	12.512	3.306
2 year 480 minute winter	8.312	3.306
2 year 600 minute summer	10.265	2.808
2 year 600 minute winter	7.014	2.808
2 year 720 minute summer	9.150	2.452
2 year 720 minute winter	6.149	2.452
2 year 960 minute summer	7.497	1.974
2 year 960 minute winter	4.966	1.974
2 year 1440 minute summer	5.446	1.460
2 year 1440 minute winter	3.660	1.460
2 year 2160 minute summer	3.936	1.088
2 year 2160 minute winter	2.712	1.088
2 year 2880 minute summer	3.321	0.890
2 year 2880 minute winter	2.232	0.890
2 year 4320 minute summer	2.614	0.683
2 year 4320 minute winter	1.721	0.683
2 year 5760 minute summer	2.245	0.575
2 year 5760 minute winter	1.453	0.575
2 year 7200 minute summer	1.990	0.508
2 year 7200 minute winter	1.285	0.508
2 year 8640 minute summer	1.811	0.462
2 year 8640 minute winter	1.169	0.462
2 year 10080 minute summer	1.680	0.428
2 year 10080 minute winter	1.084	0.428
10 year 15 minute summer	210.848	59.663
10 year 15 minute winter	147.964	59.663
10 year 30 minute summer	137.633	38.945
10 year 30 minute winter	96.585	38.945
10 year 60 minute summer	92.708	24.500
10 year 60 minute winter	61.593	24.500
10 year 120 minute summer	56.918	15.042
10 year 120 minute winter	37.815	15.042
10 year 180 minute summer	43.489	11.191
10 year 180 minute winter	28.269	11.191
10 year 240 minute summer	34.161	9.028
10 year 240 minute winter	22.696	9.028
10 year 360 minute summer	25.710	6.616
10 year 360 minute winter	16.712	6.616

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 480 minute summer	19.959	5.275
10 year 480 minute winter	13.261	5.275
10 year 600 minute summer	16.138	4.414
10 year 600 minute winter	11.026	4.414
10 year 720 minute summer	14.221	3.811
10 year 720 minute winter	9.558	3.811
10 year 960 minute summer	11.463	3.019
10 year 960 minute winter	7.593	3.019
10 year 1440 minute summer	8.117	2.175
10 year 1440 minute winter	5.455	2.175
10 year 2160 minute summer	5.726	1.583
10 year 2160 minute winter	3.946	1.583
10 year 2880 minute summer	4.751	1.273
10 year 2880 minute winter	3.193	1.273
10 year 4320 minute summer	3.645	0.953
10 year 4320 minute winter	2.400	0.953
10 year 5760 minute summer	3.071	0.786
10 year 5760 minute winter	1.988	0.786
10 year 7200 minute summer	2.681	0.684
10 year 7200 minute winter	1.730	0.684
10 year 8640 minute summer	2.407	0.614
10 year 8640 minute winter	1.553	0.614
10 year 10080 minute summer	2.207	0.563
10 year 10080 minute winter	1.425	0.563
30 year 15 minute summer	275.999	78.098
30 year 15 minute winter	193.684	78.098
30 year 30 minute summer	182.661	51.687
30 year 30 minute winter	128.183	51.687
30 year 60 minute summer	123.928	32.751
30 year 60 minute winter	82.335	32.751
30 year 120 minute summer	73.498	19.423
30 year 120 minute winter	48.830	19.423
30 year 180 minute summer	55.313	14.234
30 year 180 minute winter	35.955	14.234
30 year 240 minute summer	43.039	11.374
30 year 240 minute winter	28.594	11.374
30 year 360 minute summer	31.985	8.231
30 year 360 minute winter	20.791	8.231
30 year 480 minute summer	24.658	6.516
30 year 480 minute winter	16.382	6.516
30 year 600 minute summer	19.842	5.427
30 year 600 minute winter	13.557	5.427
30 year 720 minute summer	17.423	4.670
30 year 720 minute winter	11.709	4.670
30 year 960 minute summer	13.965	3.677
30 year 960 minute winter	9.251	3.677
30 year 1440 minute summer	9.832	2.635
30 year 1440 minute winter	6.608	2.635
30 year 2160 minute summer	6.875	1.900
30 year 2160 minute winter	4.737	1.900
30 year 2880 minute summer	5.658	1.516
30 year 2880 minute winter	3.802	1.516

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 4320 minute summer	4.287	1.121
30 year 4320 minute winter	2.823	1.121
30 year 5760 minute summer	3.580	0.916
30 year 5760 minute winter	2.317	0.916
30 year 7200 minute summer	3.111	0.794
30 year 7200 minute winter	2.008	0.794
30 year 8640 minute summer	2.784	0.710
30 year 8640 minute winter	1.797	0.710
30 year 10080 minute summer	2.546	0.649
30 year 10080 minute winter	1.643	0.649
100 year 15 minute summer	350.198	99.094
100 year 15 minute winter	245.753	99.094
100 year 30 minute summer	233.842	66.169
100 year 30 minute winter	164.099	66.169
100 year 60 minute summer	159.567	42.169
100 year 60 minute winter	106.013	42.169
100 year 120 minute summer	92.512	24.448
100 year 120 minute winter	61.462	24.448
100 year 180 minute summer	68.867	17.722
100 year 180 minute winter	44.766	17.722
100 year 240 minute summer	53.251	14.073
100 year 240 minute winter	35.379	14.073
100 year 360 minute summer	39.326	10.120
100 year 360 minute winter	25.563	10.120
100 year 480 minute summer	30.200	7.981
100 year 480 minute winter	20.064	7.981
100 year 600 minute summer	24.240	6.630
100 year 600 minute winter	16.562	6.630
100 year 720 minute summer	21.247	5.694
100 year 720 minute winter	14.279	5.694
100 year 960 minute summer	17.000	4.477
100 year 960 minute winter	11.261	4.477
100 year 1440 minute summer	11.910	3.192
100 year 1440 minute winter	8.004	3.192
100 year 2160 minute summer	8.275	2.287
100 year 2160 minute winter	5.701	2.287
100 year 2880 minute summer	6.769	1.814
100 year 2880 minute winter	4.549	1.814
100 year 4320 minute summer	5.059	1.323
100 year 4320 minute winter	3.331	1.323
100 year 5760 minute summer	4.174	1.068
100 year 5760 minute winter	2.701	1.068
100 year 7200 minute summer	3.596	0.917
100 year 7200 minute winter	2.321	0.917
100 year 8640 minute summer	3.195	0.815
100 year 8640 minute winter	2.062	0.815
100 year 10080 minute summer	2.905	0.741
100 year 10080 minute winter	1.875	0.741
100 year +40% CC 15 minute summer	490.278	138.732
100 year +40% CC 15 minute winter	344.055	138.732
100 year +40% CC 30 minute summer	327.378	92.637
100 year +40% CC 30 minute winter	229.739	92.637

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 60 minute summer	223.394	59.036
100 year +40% CC 60 minute winter	148.418	59.036
100 year +40% CC 120 minute summer	129.516	34.227
100 year +40% CC 120 minute winter	86.047	34.227
100 year +40% CC 180 minute summer	96.414	24.811
100 year +40% CC 180 minute winter	62.672	24.811
100 year +40% CC 240 minute summer	74.552	19.702
100 year +40% CC 240 minute winter	49.530	19.702
100 year +40% CC 360 minute summer	55.057	14.168
100 year +40% CC 360 minute winter	35.788	14.168
100 year +40% CC 480 minute summer	42.280	11.173
100 year +40% CC 480 minute winter	28.090	11.173
100 year +40% CC 600 minute summer	33.935	9.282
100 year +40% CC 600 minute winter	23.187	9.282
100 year +40% CC 720 minute summer	29.746	7.972
100 year +40% CC 720 minute winter	19.991	7.972
100 year +40% CC 960 minute summer	23.800	6.267
100 year +40% CC 960 minute winter	15.766	6.267
100 year +40% CC 1440 minute summer	16.674	4.469
100 year +40% CC 1440 minute winter	11.206	4.469
100 year +40% CC 2160 minute summer	11.584	3.202
100 year +40% CC 2160 minute winter	7.982	3.202
100 year +40% CC 2880 minute summer	9.477	2.540
100 year +40% CC 2880 minute winter	6.369	2.540
100 year +40% CC 4320 minute summer	7.082	1.852
100 year +40% CC 4320 minute winter	4.664	1.852
100 year +40% CC 5760 minute summer	5.843	1.496
100 year +40% CC 5760 minute winter	3.782	1.496
100 year +40% CC 7200 minute summer	5.034	1.284
100 year +40% CC 7200 minute winter	3.249	1.284
100 year +40% CC 8640 minute summer	4.474	1.141
100 year +40% CC 8640 minute winter	2.887	1.141
100 year +40% CC 10080 minute summer	4.067	1.037
100 year +40% CC 10080 minute winter	2.625	1.037



Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
30 minute summer	SK06	22	89.288	0.333	11.8	3.4455	0.0000	OK
30 minute summer	SK07	21	89.127	0.197	7.9	1.9060	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
30 minute summer	SK06	Infiltration	3.4
30 minute summer	SK07	Infiltration	3.1



Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
30 minute summer	SK06	23	89.764	0.809	24.0	8.3685	0.0000	OK
30 minute summer	SK07	22	89.431	0.501	16.0	4.8394	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
30 minute summer	SK06	Infiltration	5.2
30 minute summer	SK07	Infiltration	4.6



Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
60 minute summer	SK06	41	90.103	1.148	23.1	11.8677	0.0000	OK
30 minute summer	SK07	22	89.638	0.708	21.2	6.8399	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
60 minute summer	SK06	Infiltration	6.5
30 minute summer	SK07	Infiltration	5.7



Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
60 minute summer	SK06	41	90.518	1.563	29.8	16.1587	0.0000	OK
30 minute summer	SK07	23	89.879	0.949	27.2	9.1653	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
60 minute summer	SK06	Infiltration	8.1
30 minute summer	SK07	Infiltration	7.0



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
60 minute summer	SK06	41	91.261	2.306	41.7	23.8488	0.0000	OK
60 minute summer	SK07	40	90.343	1.413	27.8	13.6411	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
60 minute summer	SK06	Infiltration	10.9
60 minute summer	SK07	Infiltration	9.4

APPENDIX E

DRAINAGE LAYOUT

