DRAINAGE STRATEGY REPORT

FORMER FRIENDS SCHOOL FIELDS, MOUNT PLEASANT ROAD, SAFFRON WALDEN, ESSEX
ON BEHALF OF CHASE NEW HOMES LIMITED
JUNE 2024
IDL/1162/DS/001

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[redacted]

DRAINAGE STRATEGY REPORT

IDL/1162/DS/001

REPORT ISSUE

Revision	Date	Notes
P01	19/06/2024	Preliminary Issue
P02	19/09/2024	Drainage strategy report revised

PREPARED BY

Brijesh Mistry
Infrastructure Engineer June 2024

REVIEWED BY

Phil Tomes
Director June 2024

DISCLAIMER

CONTENTS

1 INTRODUCTION

1.1 Chase New Homes Limited has appointed Infrastructure Design Ltd (IDL) to prepare this Drainage Strategy Summary Report to support their planning application for their proposed residential development site.

1.2 This report has been prepared in accordance with both national and local planning policy and takes guidance from CIRIA 753, The SuDS Manual and The Building Regulations, Approved Document Part H.

1.3 The site is situated off Mount Pleasant Road, Saffron Walden, in the Uttlesford District. The National Grid Reference for the site is TL 54136 37688.

***Figure 1** – Site Location Plan*

Reference Documents:-

- Card Geotechnics Limited Soakaway Test results.
- Anglian Water Utilities Report
- Proposed site layout Plan from Coles Architects.
- Datum Surveys Services Ltd Topographical Survey (Sheets 1 and 2)
- Amazi Flood Risk Assessment report dated 24th June 2024.

- The site is an open playing field classified as greenfield open space, covering approximately 6.96 ha. The levels range from approximately 92.59m AOD at the site's eastern boundary to 85m AOD at the northwestern boundary lowest point near Mount Pleasant Road. On the west of the playing field is a former school site, which is currently under development to provide 96 residential units.

- The proposed development of the playing field site will comprise 91 new dwellings (houses and apartments), a new sports facility (comprising marked out football and cricket pitches and a new clubhouse), access roads, shared and private drives, POS and communal landscaping.

  The proposed main access to the development site will be from the former Walden School Access Road to the west and will remain private (constructed to standards acceptable to Essex Highways).

- There are no foul or surface water sewers located within the playing field site, however, adopted foul water sewers do exist to the north in Mount Pleasant Road, and to the southwest in The Avenue.

  The former school site (located west of the playing field site) discharged to a number of soakaways, and infiltration techniques are being implemented as part of the redevelopment of this site.

  Furthermore, the former school site discharges foul water drainage to both the adopted in Mount Pleasant Road and, in part, to a foul sewer in Avenue Road to the south.

  Refer to Appendix B for the Anglian Water sewer record map and the Datum topographical survey plans.

- BGS data shows the site is underlain with Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated), which suggests potential for soakaway drainage.

- Card Geotechnics Limited carried out soakage testing in April 2024, fully in accordance with BRE Digest 365.

- The test results indicated infiltration rates between 7.4 x 10-5 m/s and 4.5 x 10-6 m/s.

- No groundwater was observed during the infiltration testing and is expected to exist at considerable depth within the chalk strata.

***Figure 2**–Summary of Soakaway test results*

Trial Pit No:	Infiltration rate	Infiltration m/s	m/hr	Lowest results
SA01-1	8.2X10-5	8.20E-05	0.2952	
SA01-2	7.4X10-5	7.40E-05	0.2664	0.252
SA01-3	7.0X10-5	7.00E-05	0.252	
SA02-1	3.6X10-5	3.60E-05	0.1296	
SA02-2	7.0X10-5	3.10E-05	0.1116	
SA02-3	7.0X10-9	1.80E-05	0.0648	0.0648
SA03-1	7.6X10-6	7.60E-06	0.02736	
SA03-2	4.5X10-6	4.50E-06	0.0162	0.0162
SA03-3	5.7X10-6	5.70E-06	0.02052	

SA04-1	1.9X10-5	1.90E-05	0.0684	
SA04-2	6.5X10-6	6.50E-06	0.0234	0.0234
SA04-3	1.9X10-5	1.90E-05	0.0684	
SA05-1	4.3X10-5	4.30E-05	0.1548	
SA05-2	2.9X10-5	2.90E-05	0.1044	0.1044
SA05-3	1.3X10-4	1.30E-04	0.468	

- The north part of the site is within groundwater source protection zone 3 (SPZ3), and the south part of the site is located within groundwater source protection zone 2 (SPZ2).
- The site is located within flood zone 1 and is not considered to be at risk of surface water or groundwater flooding. Refer to the Amazi Flood Risk Assessment report dated 24th June 2024.

2 FOUL WATER DRAINAGE

- The proposed residential development's north and central parts of the development will discharge foul drainage via gravity to the existing Anglian Water foul sewer manhole located on Mount Pleasant Road manhole reference 2701. The southern part of the development will discharge via gravity to the Anglian Water foul sewer manhole located in The Avenue manhole reference 9504 via a newly formed lateral provided within the former school site and terminating at the western boundary of the playing fields site. Foul water drainage from the new clubhouse will discharge via a private package pump station to join the western outfall.
- Prior to commencing any onsite drainage works, the exact location and levels of the existing sewer manhole will be recorded, and consent pursuant to Section 106 of The Water Industry Act will be obtained from Anglian Water.

2.3 The drainage strategy layout is included in Appendix C.

3 SURFACE WATER DRAINAGE & SUDS

3.1 The total site area extends to approximately 6.96 hectares.

3.2 The total proposed impermeable area for the site is 17220 m2(1.722) with a roof of 0.734 Ha and a porous pavement area of 0.988 Ha. The impermeable area layout is included in Appendix C.

3.3 A hierarchal approach has been taken to selecting SuDS for the surface water drainage system outfalls. In order of priority, the methods of surface water discharge considered are:

i) via infiltration techniques

ii) to the nearest watercourse

iii) and to the nearest sewer.

3.4 As noted in sections 1.8-1.12, and with reference to Appendix A1, infiltration techniques are feasible options for discharging the proposed surface water runoff from the site.

3.5 Given the underlying chalk strata, the cellular soakaway systems are positioned at least 10m from the foundations of any existing or proposed structures.

3.6 Surface water from plot driveways, parking areas and access roads will discharge via porous paving into the ground (System A-full infiltration).

3.7 Any excess surface water runoff from the sports pitches generated during periods of heavy or prolonged rainfall, will be diverted via a land drain located alongside the western boundary of the sports pitches and discharging into the cellular soakaway.

3.8 To summarise, the following SuDs devices will be applied to the scheme;

Permeable paving - To access roads, car parking aisles and parking bays.

Cellular Soakaway (Crate Storage) - To accommodate the runoff from all storm events, including the peak 1 in 100 years, plus climate change storm events.

- The permeable paving system incorporating a geotextile-lined subbase will be used to form the new parking areas, communal parking/access roads, and drives. This will serve to improve water quality prior to discharge to the ground. A minimum permeable stone layer of 350mm is required where the sub-base is laid level.
- In all instances, there will be an absolute minimum of 1m of freeboard between the base of any infiltration device and the seasonally high groundwater level. (Note: Historically, groundwater levels in the chalk strata locally have been circa 45m+ BGL.)
- Given the low risk of pollution that surface water runoff from residential roofs and trafficked areas (via permeable paving) poses to the underlying geology, the groundwater resource within the SPZ's (2 & 3) will remain protected from harm.
- Appendix D provides the *Flow* software results summary for the 1 in 1, 1 in 30 (3.3%) (plus a 35% allowance for 'upper end' climate change) and 1 in 100 (1%) years (plus a 40% allowance for 'upper end' climate change) return period events for the cellular soakaway system.

4 ENCLOSURES

4.1 Appendix A1 includes the SuDS Hierarchy and Appendix A2 includes Simple Index Tools.

4.2 Appendix B includes a copy of the Topographical Site Survey and Infiltration test results.

4.3 Appendix C includes a copy of the Drainage Strategy Layouts.

4.4 Appendix D includes the Surface Water / SuDS calculations and simulation results.

4.5 Appendix E Management & Maintenance Regime.

APPENDIX A1 – SUDS HIERARCHY

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit	Included in the scheme?	Comments
	Living roofs	√	√	√	√	The clubhouse roof has a proposal of green roof. This will promote biodiversity and help retain and purify surface water runoff in the system.
	Basins and ponds	√	√	√		Given the site layout, topography, and requirement for sports facilities, this type of above-ground feature is not practicable for use on this development.
	Filter strips and swales	√	√	√	√	Filter strips will deal with excess runoff from the sports fields, however swales are not suited on this scheme.
	Infiltration devices	√	√	√	√	Cellular Soakaway systems are proposed for the scheme.
	Permeable surfaces and infiltration blanket	√	√		√	Permeable paving is proposed to be used extensively across the site. This will assist in pollution reduction
Least Sustainable	Tanked systems-Over size Pipes	√	√			Not required.

APPENDIX A2– SIMPLE INDEX TOOLS

SIMPLE INDEX APPROACH TOOL

[illegible]

1. The steps set out in the tool should be applied for each inflow or 'runoff area' (ie each impermeable surface area separately discharging to a SuDS component).

2. The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.

3. Relevant design examples are included in the SuDS Manual Appendix C.

4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.

5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.

DROP DOWN LIST — RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP

USER ENTRY — USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

[illegible]

- use the land use type with the highest Pollution Hazard Index
- apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.

[illegible]

Select land use type from the drop down list (or 'Other' if none applicable)

If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row

Runoff Area Land Use Description	Hazard Level	Suspended Solids	Metals	Hydrocarbons
Non residential parking with infrequent change (e.g. schools, offices, < 300 traffic movements a day)	Low	0.5	0.4	0.4
Landuse Pollution Hazard Index	Low	0.5	0.4	0.4

DESIGN CONDITIONS: 1, 2

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

[illegible]

[illegible]

[illegible]

Select SuDS Component 1 (i.e. the upstream SuDS component) from the drop down list

Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list

Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list

If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined indices' and enter component descriptions and agreed user defined indices in these rows

SuDS Component Description	Suspended Solids	Metals	Hydrocarbons
None			
None			
None			
Aggregated Surface Water Pollution Mitigation Index	0	0	0

DESIGN CONDITIONS: 1, 2, 3

Note: [illegible]

Is the runoff now discharged to an infiltration component?

Yes ? [Go to Step 2B]
No ? [Go to Step 2C]

STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

[illegible]

[illegible]

Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

[illegible]

Select type of groundwater protection from the drop down list

If the proposed groundwater protection is bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary product' or 'User defined indices' and enter a description of the protection and agreed user defined indices in this row

Groundwater protection description	Suspended Solids	Metals	Hydrocarbons
Pervious pavement underlain by 300 mm minimum depth of soils with good contamination attenuation potential	0.7	0.6	0.7
Groundwater Protection Pollution Mitigation Index	0.7	0.6	0.7

DESIGN CONDITIONS: 1, 2, 3

1. All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate fixed area, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events.

2. The pervious pavement must include a suitable filtration layer provides treatment and must include a geotextile at the base separating the foundation from the subgrade. The underlying soils must provide good contaminant attenuation potential (eg as recommended in Scottish ... or ... Wilson (2010), or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater.

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

	Suspended Solids	Metals	Hydrocarbons
Combined Pollution Mitigation Indices for the Runoff Area	0.7	0.6	0.7

Note: [illegible]

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

[illegible]

Suspended Solids	Metals	Hydrocarbons
Sufficient	Sufficient	Sufficient

DESIGN CONDITIONS: 1

Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

SIMPLE INDEX APPROACH TOOL

[illegible]

1. The steps set out in the tool should be applied for each inflow or 'runoff area' (ie each impermeable surface area separately discharging to a SuDS component).

2. The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.

3. Relevant design examples are included in the SuDS Manual Appendix C.

4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.

5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.

	DROP DOWN LIST	RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP
	USER ENTRY	USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

[illegible]

Select land use type from the drop down list (or 'Other' if none applicable)

If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row

Runoff Area Land Use Description	Hazard Level	Suspended Solids	Metals	Hydrocarbons
Residential roofing	Very low	0.2	0.2	0.05
Land use Pollution Hazard Index	Very low	0.2	0.2	0.05

DESIGN CONSTRAINTS: 1 | 2

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

[illegible]

SuDS Component Description	Suspended Solids	Metals	Hydrocarbons
Select SuDS Component 1: None			
Select SuDS Component 2: None			
Select SuDS Component 3: None			
Aggregated Surface Water Pollution Mitigation Index	0	0	0

DESIGN CONSTRAINTS: 1 | 2 | 3

Note: [illegible]

Is the runoff now discharged to an infiltration component?

Yes ? [illegible]
No ? [illegible]

STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

[illegible]

Select type of groundwater protection from the drop down list

	Suspended Solids	Metals	Hydrocarbons
[illegible]	[illegible]	[illegible]	[illegible]
Groundwater Protection Pollution Mitigation Index	0.4	0.3	0.3

DESIGN CONSTRAINTS: 1 | 2 | 3

[illegible]

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

	Suspended Solids	Metals	Hydrocarbons
Combined Pollution Mitigation Indices for the Runoff Area	0.4	0.3	0.3

Note: [illegible]

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

[illegible]

Suspended Solids	Metals	Hydrocarbons
Sufficient	Sufficient	Sufficient

DESIGN CONSTRAINTS: 1

[illegible]

APPENDIX B – TOPOGRAPHICAL SITE SURVEY AND INFILTRATION TEST RESULTS

N

Client	Project	Job No
Chase New Homes	Friends School, Playing Fields	CG/39877

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Title

Exploratory Hole Location Plan – Soakage Pits

Figure 1

Drafted by:	JMW
Checked by:	DRAFT
Approved by:	DRAFT

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA01
TEST NUMBER:	1

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A PHENNA GROUP COMPANY

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	0.92
40	0.7	1.01
85	1.4	1.10
125	2.1	1.16
170	2.8	1.24
215	3.6	1.30
255	4.3	1.35
300	5.0	1.41
340	5.7	1.45
385	6.4	1.50
430	7.2	1.54
470	7.8	1.58
515	8.6	1.62
560	9.3	1.66
600	10.0	1.69
645	10.8	1.72
685	11.4	1.75
730	12.2	1.79
775	12.9	1.82
815	13.6	1.84
860	14.3	1.87
900	15.0	1.90
945	15.8	1.93
990	16.5	1.96
1030	17.2	1.98
1075	17.9	2.00
1120	18.7	2.03
1160	19.3	2.05
1205	20.1	2.08
1245	20.8	2.10
1290	21.5	2.12
1335	22.3	2.14
1375	22.9	2.16
1420	23.7	2.18
1460	24.3	2.20
1505	25.1	2.22
1550	25.8	2.24
1590	26.5	2.25
1635	27.3	2.27
1680	28.0	2.29
1720	28.7	2.30
1765	29.4	2.32
1805	30.1	2.33
1850	30.8	2.35
1895	31.6	2.36
1935	32.3	2.37
1980	33.0	2.39
2025	33.8	2.40

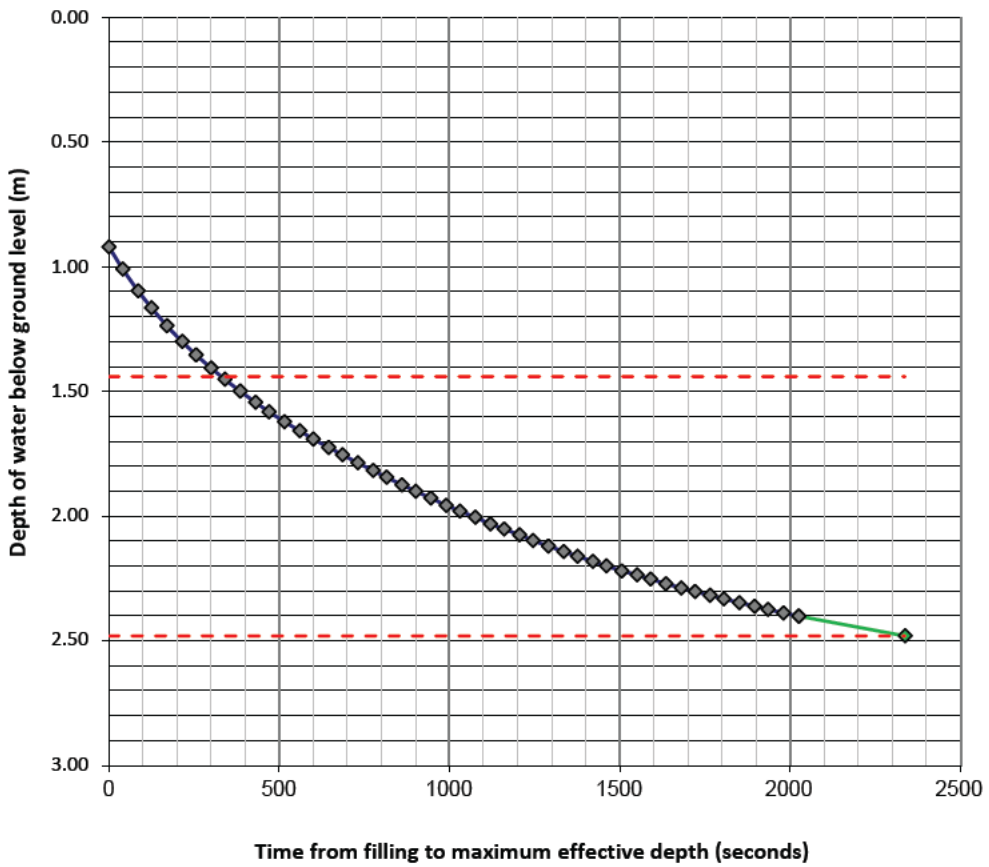
Geology of test section	**PIT LENGTH (L):**	2.40 m
Structureless Chalk	**PIT WIDTH (W):**	0.64 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**	Extrapolated
Maximum potential volume of water (V)	(m^3)	3.19
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED	(m^3)	1.60
Maximum head of water lost during test (ED) = ED - Water depth @ time 0	(m)	2.08
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	9.68
Level of water in pit at 75% effective depth (P_{25})	(m)	1.44
Level of water in pit at 25% effective depth (P_{75})	(m)	2.48
Time at 75% effective depth (T_{75})	(s)	331
Time at 25% effective depth (T_{25})	(s)	2337
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	2006
INDICATIVE SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**8.2E-05**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).
Final data point(s) extrapolated from trend of results.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman
After BRE Digest 365, Soakaway Design, 2016			Page 1 of 1



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.
Green data point(s) extrapolated from test results

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA01
TEST NUMBER:	2

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SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	0.79
80	1.3	0.91
165	2.8	1.02
245	4.1	1.11
330	5.5	1.20
410	6.8	1.27
495	8.3	1.34
580	9.7	1.41
660	11.0	1.46
745	12.4	1.52
825	13.8	1.57
910	15.2	1.62
995	16.6	1.66
1075	17.9	1.70
1160	19.3	1.74
1240	20.7	1.78
1325	22.1	1.82
1410	23.5	1.86
1490	24.8	1.89
1575	26.3	1.93
1655	27.6	1.96
1740	29.0	2.00
1825	30.4	2.03
1905	31.8	2.06
1990	33.2	2.09
2070	34.5	2.12
2155	35.9	2.14
2240	37.3	2.17
2320	38.7	2.19
2405	40.1	2.22
2485	41.4	2.24
2570	42.8	2.27
2655	44.3	2.29
2735	45.6	2.31
2820	47.0	2.34
2900	48.3	2.36
2985	49.8	2.38
3070	51.2	2.40
3150	52.5	2.42
3235	53.9	2.44
3315	55.3	2.46
3400	56.7	2.48
3485	58.1	2.50
3565	59.4	2.52
3650	60.8	2.54
3730	62.2	2.55
3815	63.6	2.57
3895	64.9	2.59

Geology of test section	**PIT LENGTH (L):**	2.40 m
Structureless Chalk	**PIT WIDTH (W):**	0.64 m
	PIT DEPTH (D):	3.00 m

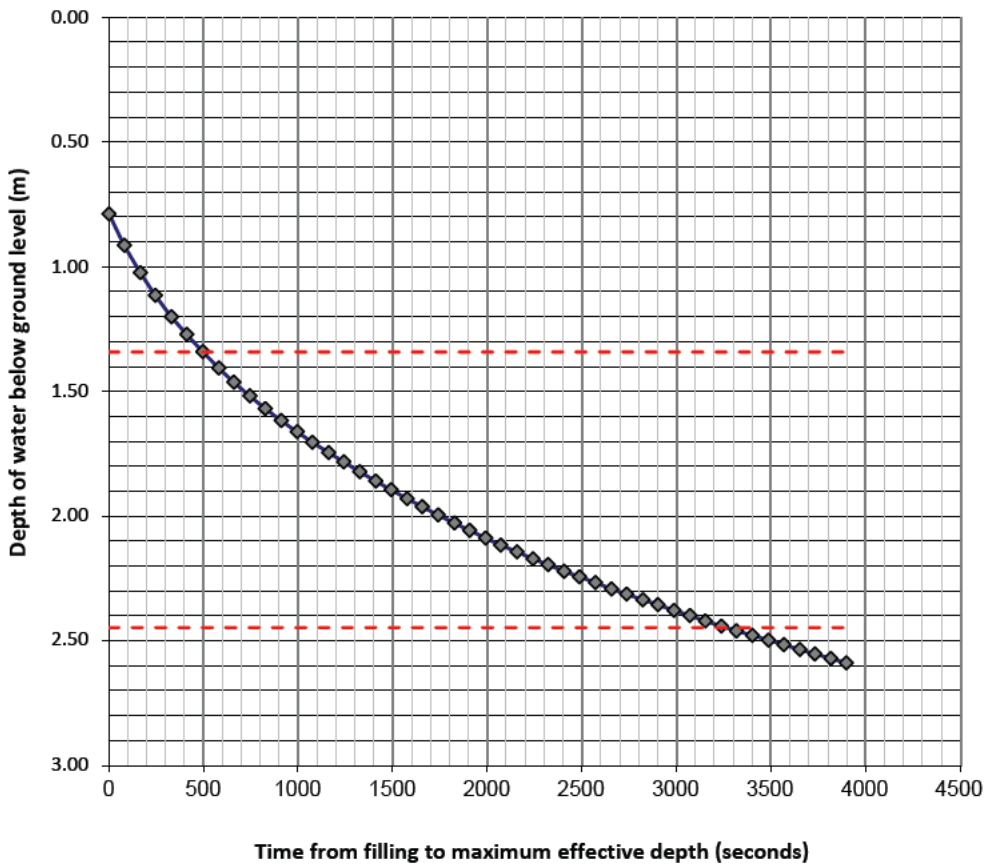
INPUT PARAMETERS:	**P_{25} achieved?**	Yes
Maximum potential volume of water (V)	(m^3)	3.40
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ D	(m^3)	1.70
Maximum depth of water (MDW) = D - Water depth @ time 0	(m)	2.21
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	8.26
Level of water in pit at 75% effective depth (P_{25})	(m)	1.34
Level of water in pit at 25% effective depth (P_{75})	(m)	2.45
Time at 75% effective depth (T_{75})	(s)	495
Time at 25% effective depth (T_{25})	(s)	3261
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	2766
SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**7.4E-05**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).

Compiled by:	Adam Cadman	Checked by:	Adam Cadman

After BRE Digest 365, Soakaway Design, 2016 —



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA01
TEST NUMBER:	3

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SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	0.35
105	1.8	0.54
215	3.6	0.70
325	5.4	0.84
430	7.2	0.95
540	9.0	1.06
650	10.8	1.15
755	12.6	1.23
865	14.4	1.31
975	16.3	1.38
1085	18.1	1.45
1190	19.8	1.50
1300	21.7	1.56
1410	23.5	1.62
1515	25.3	1.67
1625	27.1	1.72
1735	28.9	1.76
1840	30.7	1.81
1950	32.5	1.85
2060	34.3	1.89
2170	36.2	1.93
2275	37.9	1.97
2385	39.8	2.01
2495	41.6	2.04
2600	43.3	2.08
2710	45.2	2.12
2820	47.0	2.15
2925	48.8	2.18
3035	50.6	2.21
3145	52.4	2.24
3255	54.3	2.27
3360	56.0	2.30
3470	57.8	2.32
3580	59.7	2.35
3685	61.4	2.38
3795	63.3	2.41
3905	65.1	2.43
4010	66.8	2.46
4120	68.7	2.49
4230	70.5	2.52
4340	72.3	2.55
4445	74.1	2.58
4555	75.9	2.62
4665	77.8	2.66
4770	79.5	2.69
4880	81.3	2.74
4990	83.2	2.80
5100	85.0	2.84

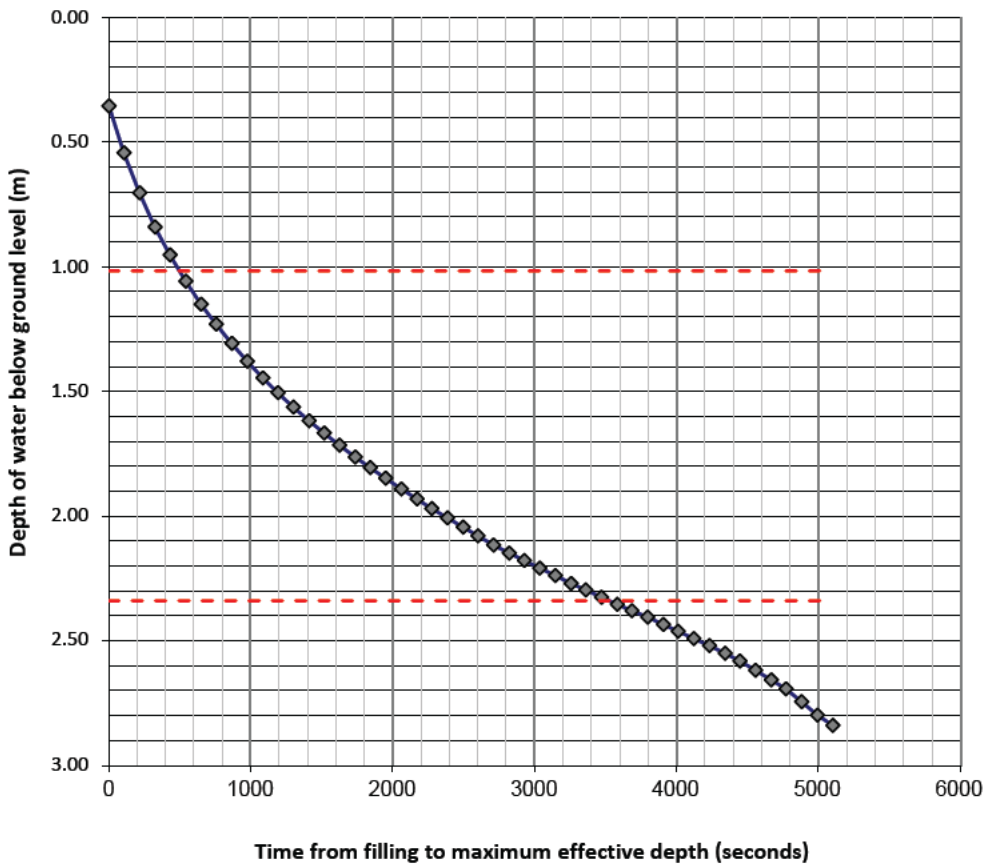
Geology of test section	**PIT LENGTH (L):**	2.40 m
Structureless Chalk	**PIT WIDTH (W):**	0.64 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**	Yes
Maximum potential volume of water (V)	(m^3)	4.06
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ D	(m^3)	2.03
Maximum depth of water (MDW) = D - Water depth @ time 0	(m)	2.65
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	9.58
Level of water in pit at 75% effective depth (P_{25})	(m)	1.02
Level of water in pit at 25% effective depth (P_{75})	(m)	2.34
Time at 75% effective depth (T_{75})	(s)	497
Time at 25% effective depth (T_{25})	(s)	3524
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	3027
SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**7.0E-05**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).

Compiled by:	Adam Cadman	Checked by:	Adam Cadman



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA02
TEST NUMBER:	1

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GEOTECHNICAL & GEOENVIRONMENTAL CONSULTANCY
A PHENNA GROUP COMPANY

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	1.99
105	1.8	2.05
210	3.5	2.08
315	5.3	2.11
420	7.0	2.14
525	8.8	2.16
635	10.6	2.19
740	12.3	2.21
845	14.1	2.23
950	15.8	2.25
1055	17.6	2.26
1160	19.3	2.28
1270	21.2	2.29
1375	22.9	2.31
1480	24.7	2.32
1585	26.4	2.33
1690	28.2	2.34
1795	29.9	2.35
1905	31.8	2.37
2010	33.5	2.38
2115	35.3	2.39
2220	37.0	2.40
2325	38.8	2.41
2430	40.5	2.42
2540	42.3	2.43
2645	44.1	2.44
2750	45.8	2.45
2855	47.6	2.45
2960	49.3	2.46
3065	51.1	2.47
3175	52.9	2.48
3280	54.7	2.48
3385	56.4	2.49
3490	58.2	2.50
3595	59.9	2.50
3700	61.7	2.51
3810	63.5	2.52
3915	65.3	2.52
4020	67.0	2.53
4125	68.8	2.54
4230	70.5	2.54
4335	72.3	2.55
4445	74.1	2.56
4550	75.8	2.56
4655	77.6	2.56
4760	79.3	2.57
4865	81.1	2.57
4975	82.9	2.58

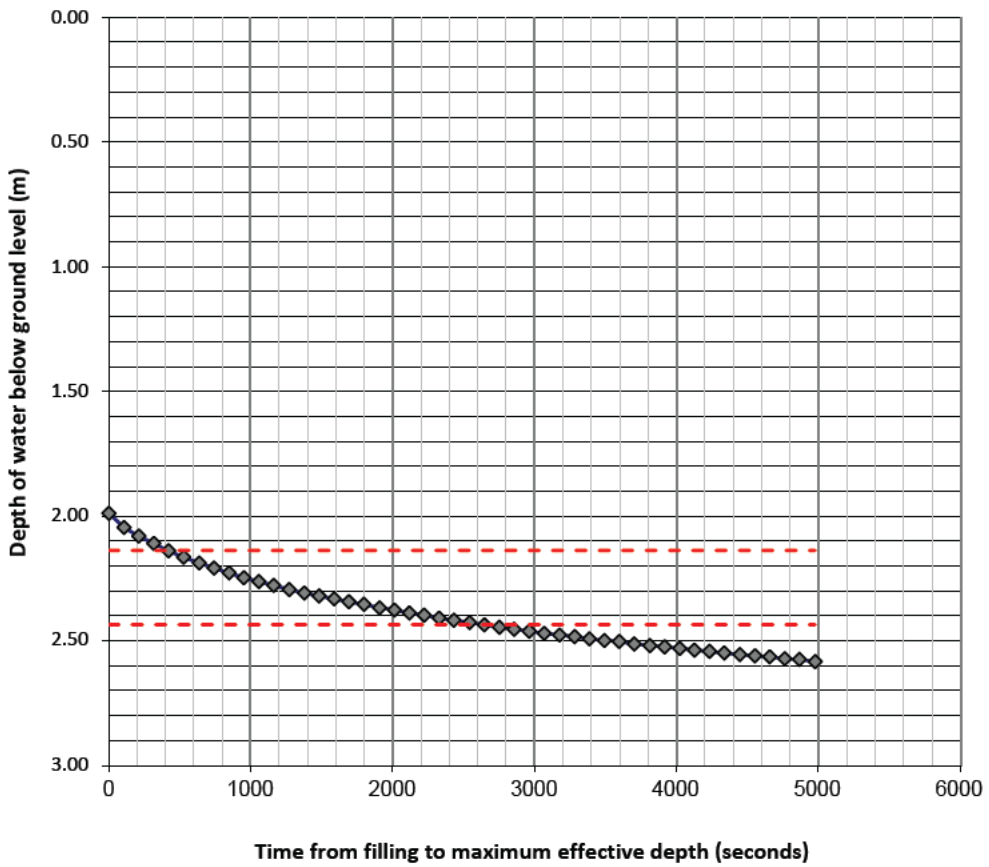
Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**	No
Maximum potential volume of water (V)	(m^3)	0.83
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED	(m^3)	0.42
Maximum head of water lost during test (ED) = ED - Water depth @ time 0	(m)	0.60
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	5.26
Level of water in pit at 75% effective depth (P_{25})	(m)	2.14
Level of water in pit at 25% effective depth (P_{75})	(m)	2.43
Time at 75% effective depth (T_{75})	(s)	414
Time at 25% effective depth (T_{25})	(s)	2633
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	2218
INDICATIVE SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**3.6E-05**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).
Pit did not drain to 25% effective depth of initial head of water during the duration of the test. Calculations are based on an Effective Depth (ED) for the actual total drop in water level over test period, and are therefore 'indicative' only.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA02
TEST NUMBER:	2

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GEOTECHNICAL & GEOENVIRONMENTAL CONSULTANCY
A PHENNA GROUP COMPANY

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	1.98
165	2.8	2.04
335	5.6	2.09
500	8.3	2.13
670	11.2	2.16
835	13.9	2.19
1005	16.7	2.22
1170	19.5	2.24
1340	22.3	2.27
1505	25.1	2.29
1675	27.9	2.31
1840	30.7	2.33
2010	33.5	2.35
2175	36.3	2.36
2345	39.1	2.38
2510	41.8	2.39
2680	44.7	2.41
2850	47.5	2.42
3015	50.3	2.43
3185	53.1	2.44
3350	55.8	2.45
3520	58.7	2.46
3685	61.4	2.47
3855	64.3	2.48
4020	67.0	2.49
4190	69.8	2.50
4355	72.6	2.51
4525	75.4	2.52
4690	78.2	2.53
4860	81.0	2.53
5025	83.8	2.54
5195	86.6	2.55
5365	89.4	2.55
5530	92.2	2.56
5700	95.0	2.57
5865	97.8	2.57
6035	100.6	2.58
6200	103.3	2.58
6370	106.2	2.59
6535	108.9	2.60
6705	111.8	2.60
6870	114.5	2.61

Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

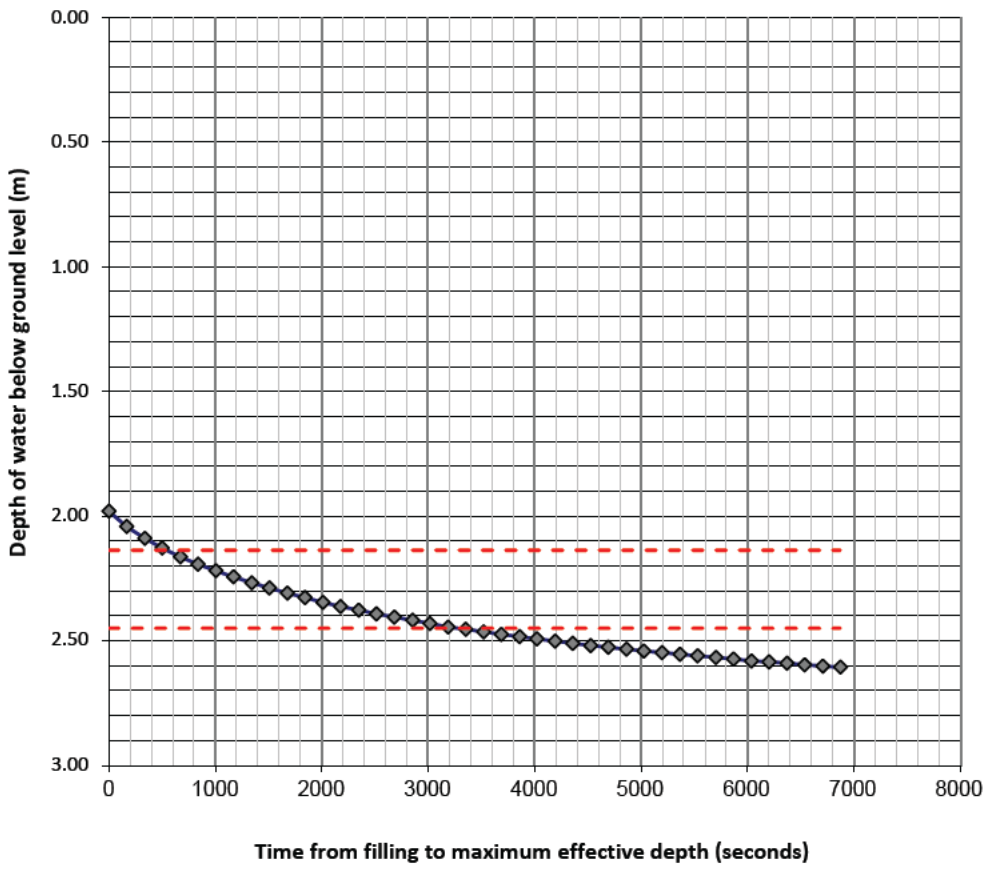
INPUT PARAMETERS:	**P_{25} achieved?**	No

Maximum potential volume of water (V)	(m^3)	0.88
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED	(m^3)	0.44
Maximum head of water lost during test (ED) = ED - Water depth @ time 0	(m)	0.63
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	5.22
Level of water in pit at 75% effective depth (P_{25})	(m)	2.14
Level of water in pit at 25% effective depth (P_{75})	(m)	2.45
Time at 75% effective depth (T_{75})	(s)	540
Time at 25% effective depth (T_{25})	(s)	3276
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	2736
INDICATIVE SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**3.1E-05**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).
Pit did not drain to 25% effective depth of initial head of water during the duration of the test. Calculations are based on an Effective Depth (ED) for the actual total drop in water level over test period, and are therefore 'indicative' only.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA02
TEST NUMBER:	3

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A PHENNA GROUP COMPANY

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	1.98
10	0.2	1.98
15	0.3	1.98
20	0.3	1.98
30	0.5	1.99
60	1.0	1.99
120	2.0	2.00
180	3.0	2.01
240	4.0	2.02
300	5.0	2.03
540	9.0	2.08
600	10.0	2.09
960	16.0	2.22
2700	45.0	2.31
4620	77.0	2.47
5880	98.0	2.55
6840	114.0	2.60
8280	138.0	2.67
10260	171.0	2.73
10860	181.0	2.76

Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**	Yes
Maximum potential volume of water (V)	(m^3)	1.43
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ D	(m^3)	0.71
Maximum depth of water (MDW) = D - Water depth @ time 0	(m)	1.02
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	4.15
Level of water in pit at 75% effective depth (P_{25})	(m)	2.24
Level of water in pit at 25% effective depth (P_{75})	(m)	2.75
Time at 75% effective depth (T_{75})	(s)	1250
Time at 25% effective depth (T_{25})	(s)	10560
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	9310
SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**1.8E-05**

Test remarks

Test measurements taken with data loggers.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman
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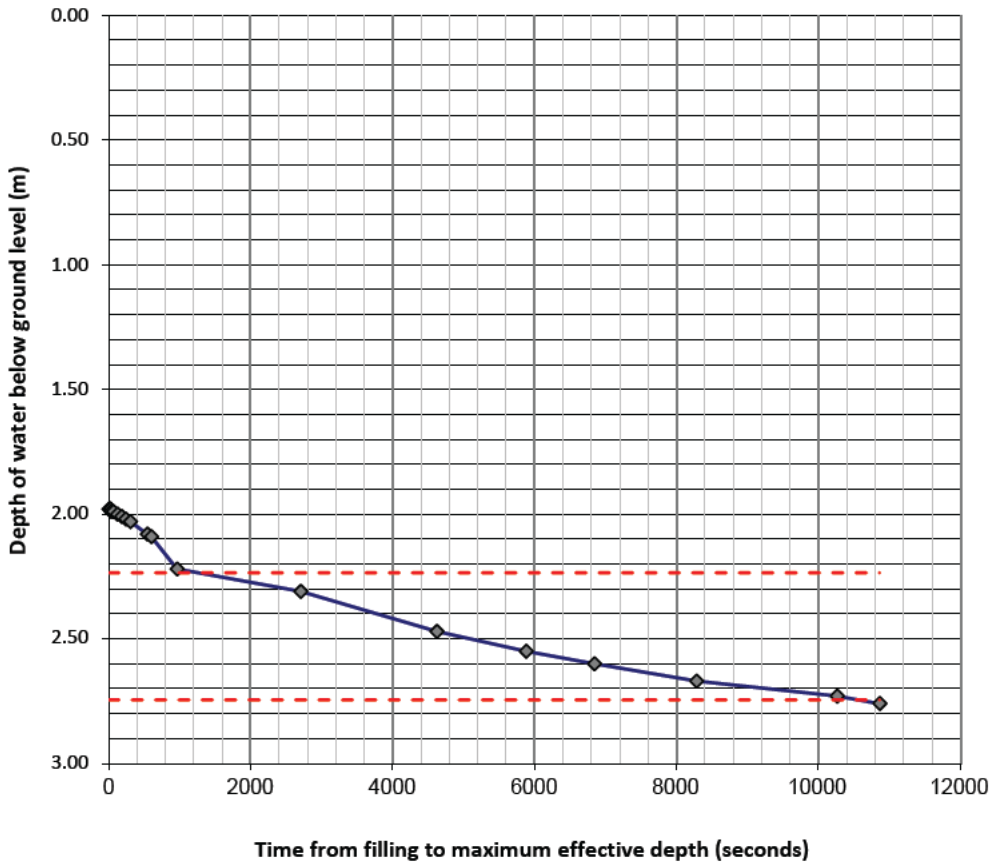

Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA03
TEST NUMBER:	1

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A PHENNA GROUP COMPANY

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	2.30
200	3.3	2.32
400	6.7	2.33
600	10.0	2.34
810	13.5	2.35
1010	16.8	2.36
1210	20.2	2.37
1410	23.5	2.38
1620	27.0	2.38
1820	30.3	2.39
2020	33.7	2.40
2230	37.2	2.40
2430	40.5	2.41
2630	43.8	2.41
2830	47.2	2.42
3040	50.7	2.43
3240	54.0	2.43
3440	57.3	2.43
3640	60.7	2.44
3850	64.2	2.44
4050	67.5	2.45
4250	70.8	2.45
4460	74.3	2.46
4660	77.7	2.46
4860	81.0	2.46
5060	84.3	2.46
5270	87.8	2.47
5470	91.2	2.47
5670	94.5	2.48
5880	98.0	2.48
6080	101.3	2.48
6280	104.7	2.49
6480	108.0	2.49
6690	111.5	2.49
6890	114.8	2.49
7090	118.2	2.49
7290	121.5	2.50
7500	125.0	2.50
7700	128.3	2.50
7900	131.7	2.51
8110	135.2	2.51
8310	138.5	2.51
8510	141.8	2.51
8710	145.2	2.52
8920	148.7	2.52
9120	152.0	2.52
9320	155.3	2.53
9530	158.8	2.53

Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.65 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**	No
Maximum potential volume of water (V)	(m^3)	0.30
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED	(m^3)	0.15
Maximum head of water lost during test (ED) = ED - Water depth @ time 0	(m)	0.23
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	4.41
Level of water in pit at 75% effective depth (P_{25})	(m)	2.36
Level of water in pit at 25% effective depth (P_{75})	(m)	2.47
Time at 75% effective depth (T_{75})	(s)	919
Time at 25% effective depth (T_{25})	(s)	5407
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	4489
INDICATIVE SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**7.6E-06**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).
Pit did not drain to 25% effective depth of initial head of water during the duration of the test. Calculations are based on an Effective Depth (ED) for the actual total drop in water level over test period, and are therefore 'indicative' only.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman

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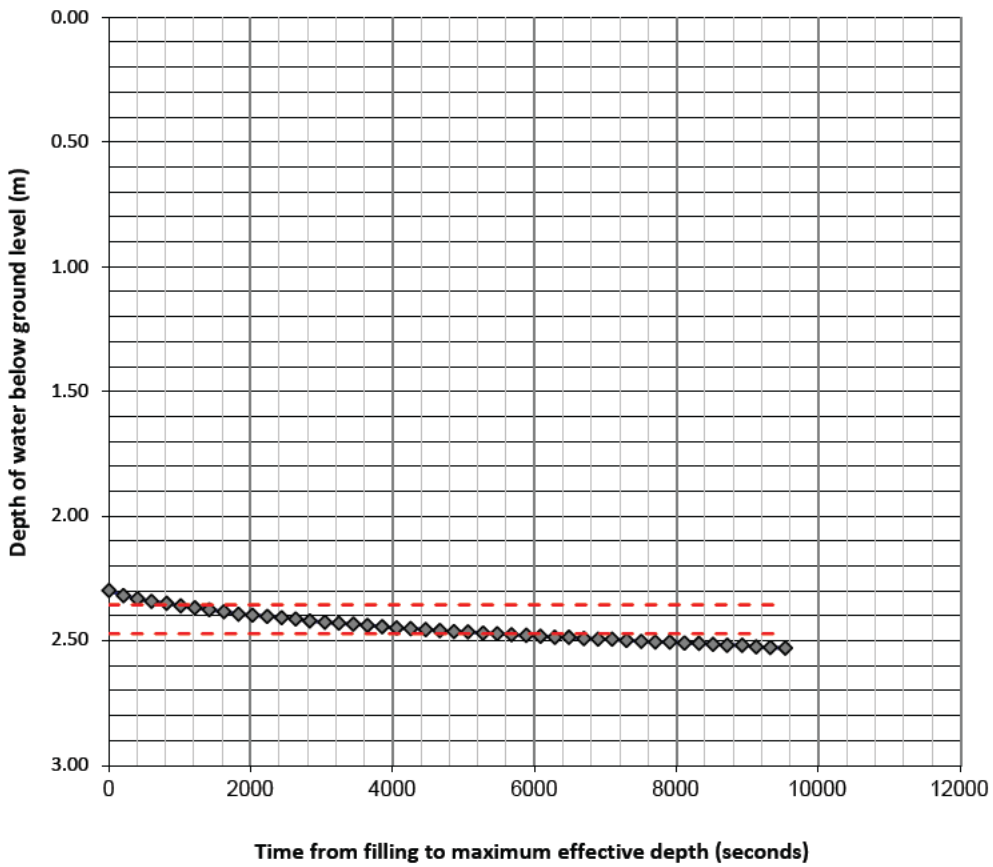

Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA03
TEST NUMBER:	2

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A PHENNA GROUP COMPANY

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	2.30
450	7.5	2.32
900	15.0	2.33
1350	22.5	2.34
1810	30.2	2.35
2260	37.7	2.36
2710	45.2	2.37
3160	52.7	2.38
3620	60.3	2.39
4070	67.8	2.40
4520	75.3	2.40
4980	83.0	2.41
5430	90.5	2.42
5880	98.0	2.42
6330	105.5	2.43
6790	113.2	2.44
7240	120.7	2.44
7690	128.2	2.45
8140	135.7	2.45
8600	143.3	2.46
9050	150.8	2.46
9500	158.3	2.47
9960	166.0	2.47
10410	173.5	2.48
10860	181.0	2.48
11310	188.5	2.49
11770	196.2	2.49
12220	203.7	2.50
12670	211.2	2.50
13130	218.8	2.51
13580	226.3	2.51

Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.65 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**		No
Maximum potential volume of water (V)		(m^3)	0.28
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED		(m^3)	0.14
Maximum head of water lost during test (ED) = ED - Water depth @ time 0		(m)	0.21
Surface area of pit up to 50% effective depth (AP_{50})		(m^2)	4.46
Level of water in pit at 75% effective depth (P_{25})		(m)	2.35
Level of water in pit at 25% effective depth (P_{75})		(m)	2.46
Time at 75% effective depth (T_{75})		(s)	1699
Time at 25% effective depth (T_{25})		(s)	8573
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})		(s)	6873
INDICATIVE SOIL INFILTRATION RATE (f) =	$PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**4.5E-06**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).
Pit did not drain to 25% effective depth of initial head of water during the duration of the test. Calculations are based on an Effective Depth (ED) for the actual total drop in water level over test period, and are therefore 'indicative' only.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman
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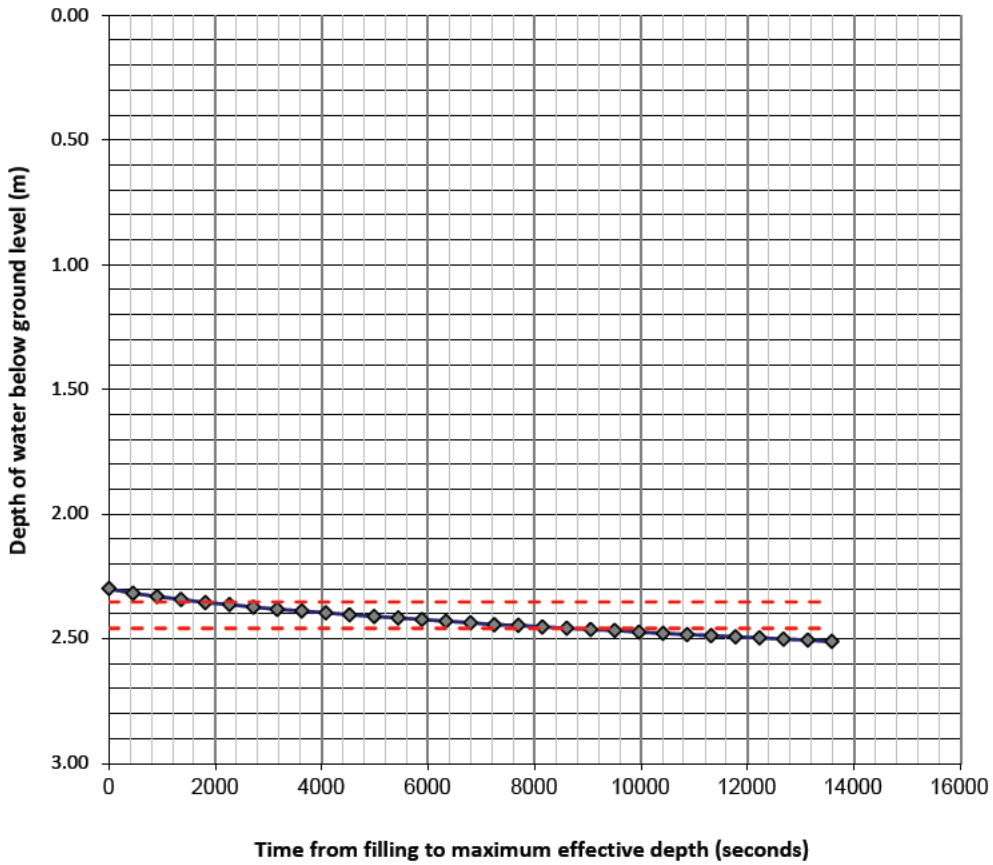

Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA03
TEST NUMBER:	3

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A PHENNA GROUP COMPANY

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	1.74
5	0.1	1.75
10	0.2	1.75
15	0.3	1.76
30	0.5	1.76
60	1.0	1.76
120	2.0	1.76
150	2.5	1.77
180	3.0	1.77
240	4.0	1.78
300	5.0	1.78
600	10.0	1.82
1500	25.0	1.89
3000	50.0	1.96
4440	74.0	2.00
5400	90.0	2.03
6840	114.0	2.06
8760	146.0	2.11
10500	175.0	2.15
12540	209.0	2.18
15060	251.0	2.23
16920	282.0	2.25
18600	310.0	2.28
19800	330.0	2.30

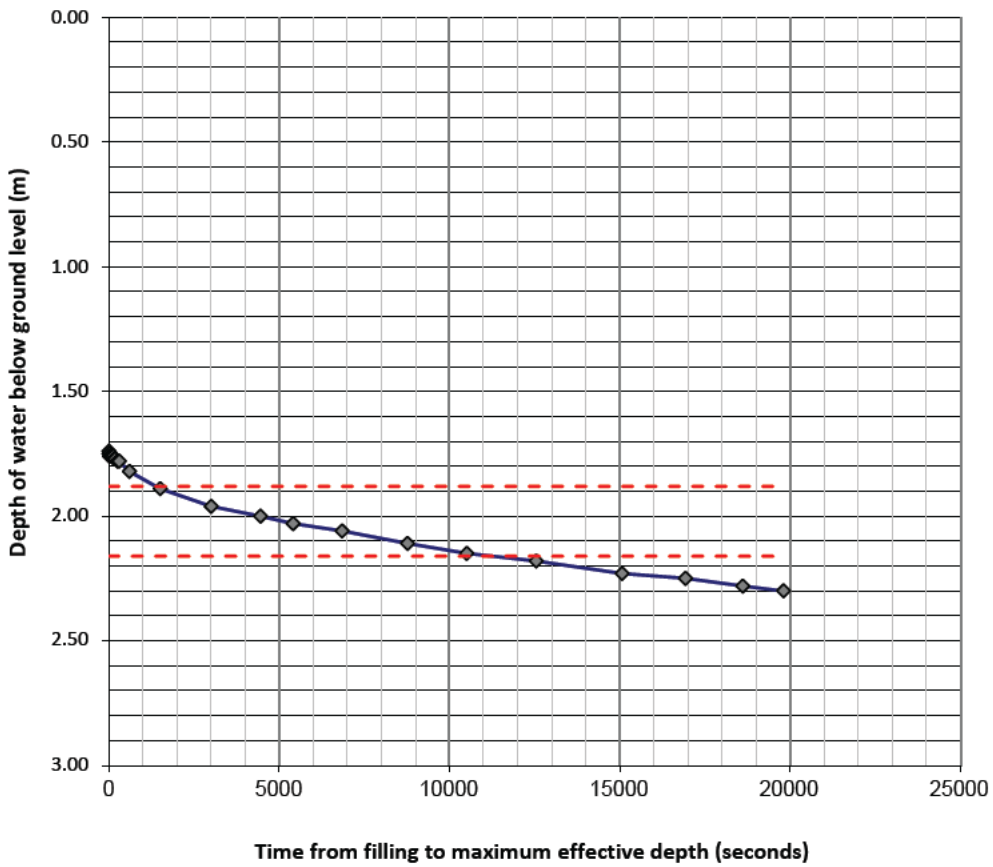
Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.65 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**		No
Maximum potential volume of water (V)		(m^3)	0.73
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED		(m^3)	0.36
Maximum head of water lost during test (ED) = ED - Water depth @ time 0		(m)	0.56
Surface area of pit up to 50% effective depth (AP_{50})		(m^2)	6.49
Level of water in pit at 75% effective depth (P_{25})		(m)	1.88
Level of water in pit at 25% effective depth (P_{75})		(m)	2.16
Time at 75% effective depth (T_{75})		(s)	1372
Time at 25% effective depth (T_{25})		(s)	11180
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})		(s)	9809
INDICATIVE SOIL INFILTRATION RATE (f) =	$PV_{75\text{-}25}/(AP_{50} \times T_{75}\text{-}T_{25})$	(m/s)	**5.7E-06**

Test remarks

Test measurements taken with dip meter and timer.
Pit did not drain to 25% effective depth of initial head of water during the duration of the test. Calculations are based on an Effective Depth (ED) for the actual total drop in water level over test period, and are therefore 'indicative' only.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA04
TEST NUMBER:	1

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SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	2.12
190	3.2	2.18
390	6.5	2.21
590	9.8	2.24
790	13.2	2.27
990	16.5	2.29
1190	19.8	2.31
1390	23.2	2.33
1590	26.5	2.34
1790	29.8	2.36
1990	33.2	2.38
2190	36.5	2.39
2380	39.7	2.40
2580	43.0	2.41
2780	46.3	2.43
2980	49.7	2.44
3180	53.0	2.45
3380	56.3	2.46
3580	59.7	2.47
3780	63.0	2.48
3980	66.3	2.49
4180	69.7	2.50
4380	73.0	2.51
4580	76.3	2.52
4770	79.5	2.52
4970	82.8	2.53
5170	86.2	2.54
5370	89.5	2.55
5570	92.8	2.56
5770	96.2	2.56
5970	99.5	2.57
6170	102.8	2.58
6370	106.2	2.58
6570	109.5	2.59
6770	112.8	2.60
6970	116.2	2.60
7160	119.3	2.61
7360	122.7	2.61
7560	126.0	2.62
7760	129.3	2.62
7960	132.7	2.63
8160	136.0	2.64
8360	139.3	2.64
8560	142.7	2.65
8760	146.0	2.66
8960	149.3	2.66
9160	152.7	2.66
9360	156.0	2.67

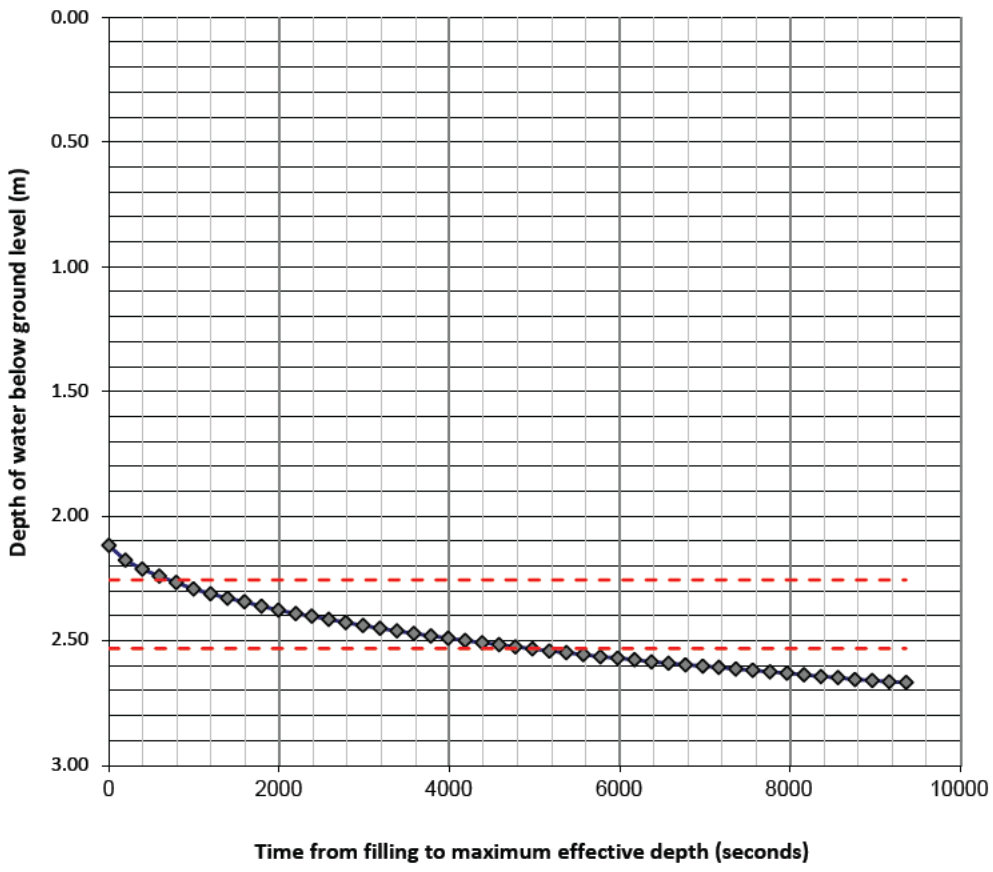
Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**	No
Maximum potential volume of water (V)	(m^3)	0.77
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED	(m^3)	0.38
Maximum head of water lost during test (ED) = ED - Water depth @ time 0	(m)	0.55
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	4.68
Level of water in pit at 75% effective depth (P_{25})	(m)	2.26
Level of water in pit at 25% effective depth (P_{75})	(m)	2.53
Time at 75% effective depth (T_{75})	(s)	703
Time at 25% effective depth (T_{25})	(s)	4924
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	4220
INDICATIVE SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**1.9E-05**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).
Pit did not drain to 25% effective depth of initial head of water during the duration of the test. Calculations are based on an Effective Depth (ED) for the actual total drop in water level over test period, and are therefore 'indicative' only.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA04
TEST NUMBER:	2

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A PHENNA GROUP COMPANY

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	2.16
450	7.5	2.23
900	15.0	2.27
1350	22.5	2.31
1810	30.2	2.35
2260	37.7	2.38
2710	45.2	2.41
3160	52.7	2.43
3620	60.3	2.46
4070	67.8	2.47
4520	75.3	2.49
4980	83.0	2.51
5430	90.5	2.53
5880	98.0	2.54
6330	105.5	2.56
6790	113.2	2.57
7240	120.7	2.58
7690	128.2	2.59
8140	135.7	2.60
8600	143.3	2.61
9050	150.8	2.62
9500	158.3	2.63
9960	166.0	2.64
10410	173.5	2.65
10860	181.0	2.65
11310	188.5	2.66
11770	196.2	2.67
12220	203.7	2.68
12670	211.2	2.68
13130	218.8	2.69
13580	226.3	2.70

Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**		Extrapolated
Maximum potential volume of water (V)		(m^3)	1.17
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED		(m^3)	0.59
Maximum head of water lost during test (ED) = ED - Water depth @ time 0		(m)	0.84
Surface area of pit up to 50% effective depth (AP_{50})		(m^2)	4.48
Level of water in pit at 75% effective depth (P_{25})		(m)	2.37
Level of water in pit at 25% effective depth (P_{75})		(m)	2.79
Time at 75% effective depth (T_{75})		(s)	2130
Time at 25% effective depth (T_{25})		(s)	22329
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})		(s)	20200
INDICATIVE SOIL INFILTRATION RATE (f) =	$PV_{75\text{-}25}/(AP_{50} \times T_{75}\text{-}T_{25})$	(m/s)	**6.5E-06**

Test remarks

Test measurements taken with data loggers. Data has been processed to reduce the number of individual data points (as provided to the left and plotted below).
Final data point(s) extrapolated from trend of results.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman
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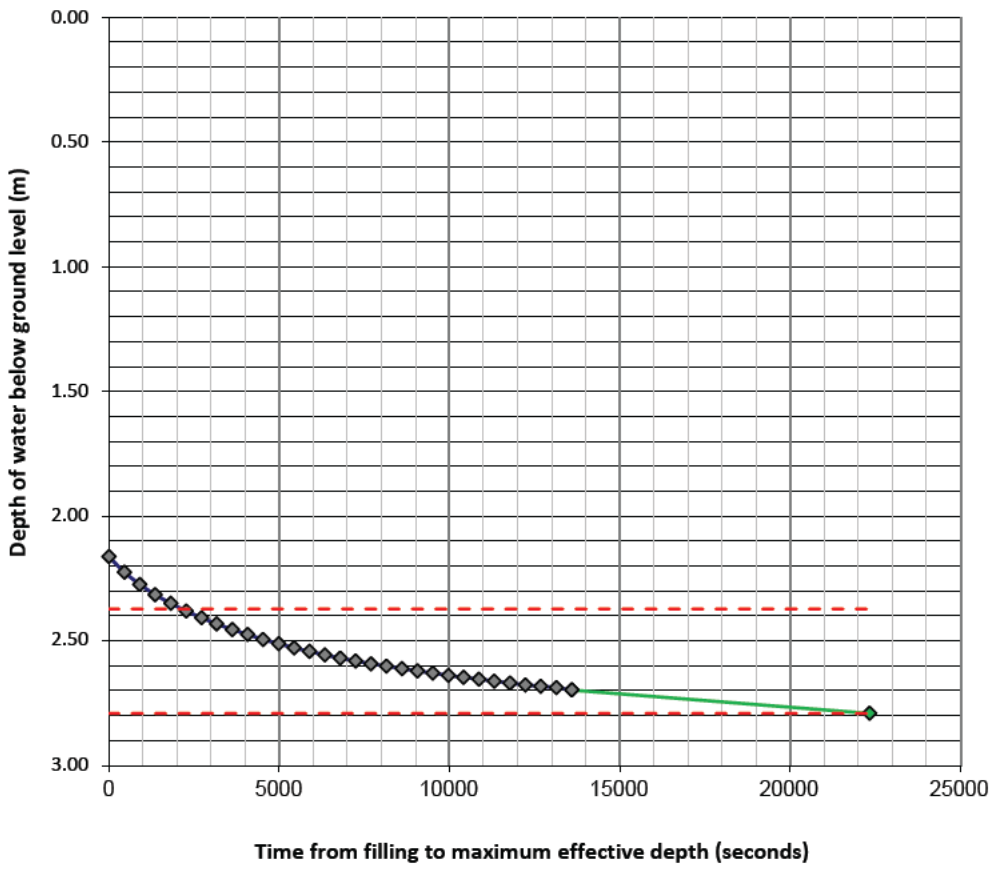

Notes on plot: top red line is P_{25}; bottom red line is P_{75}.
Green data point(s) extrapolated from test results

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA04
TEST NUMBER:	3

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SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	1.72
5	0.1	1.73
10	0.2	1.75
30	0.5	1.76
60	1.0	1.78
90	1.5	1.79
120	2.0	1.79
150	2.5	1.80
180	3.0	1.81
210	3.5	1.81
240	4.0	1.82
300	5.0	1.83
600	10.0	1.84
840	14.0	1.93
1440	24.0	2.07
4260	71.0	2.24
5700	95.0	2.31
7440	124.0	2.39
9180	153.0	2.45
10140	169.0	2.48

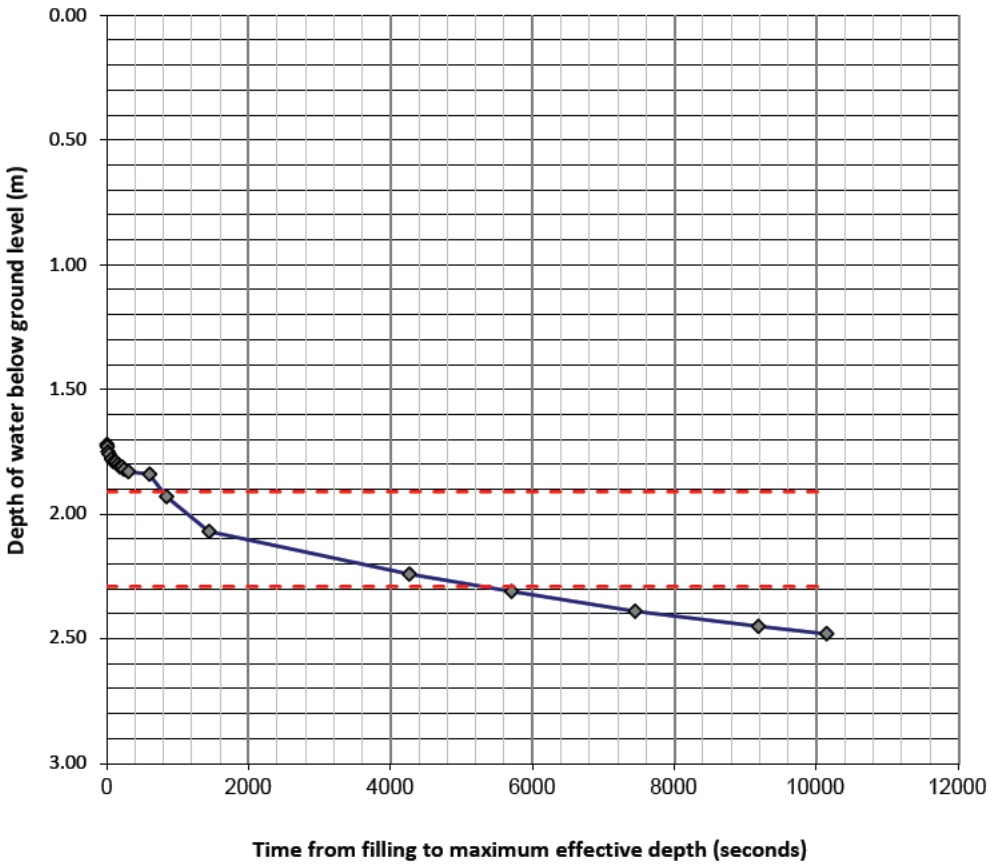
Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**	No
Maximum potential volume of water (V)	(m^3)	1.06
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED	(m^3)	0.53
Maximum head of water lost during test (ED) = ED - Water depth @ time 0	(m)	0.76
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	6.26
Level of water in pit at 75% effective depth (P_{25})	(m)	1.91
Level of water in pit at 25% effective depth (P_{75})	(m)	2.29
Time at 75% effective depth (T_{75})	(s)	787
Time at 25% effective depth (T_{25})	(s)	5289
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	4502
INDICATIVE SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**1.9E-05**

Test remarks

Test measurements taken with dip meter and timer.
Pit did not drain to 25% effective depth of initial head of water during the duration of the test. Calculations are based on an Effective Depth (ED) for the actual total drop in water level over test period, and are therefore 'indicative' only.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA05
TEST NUMBER:	1

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SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	2.00
30	0.5	2.10
60	1.0	2.13
90	1.5	2.15
120	2.0	2.17
150	2.5	2.18
180	3.0	2.19
210	3.5	2.20
240	4.0	2.22
270	4.5	2.23
300	5.0	2.24
360	6.0	2.27
420	7.0	2.28
480	8.0	2.30
540	9.0	2.32
600	10.0	2.33
900	15.0	2.40
1200	20.0	2.46
1500	25.0	2.51
1800	30.0	2.56
2700	45.0	2.66
3600	60.0	2.74

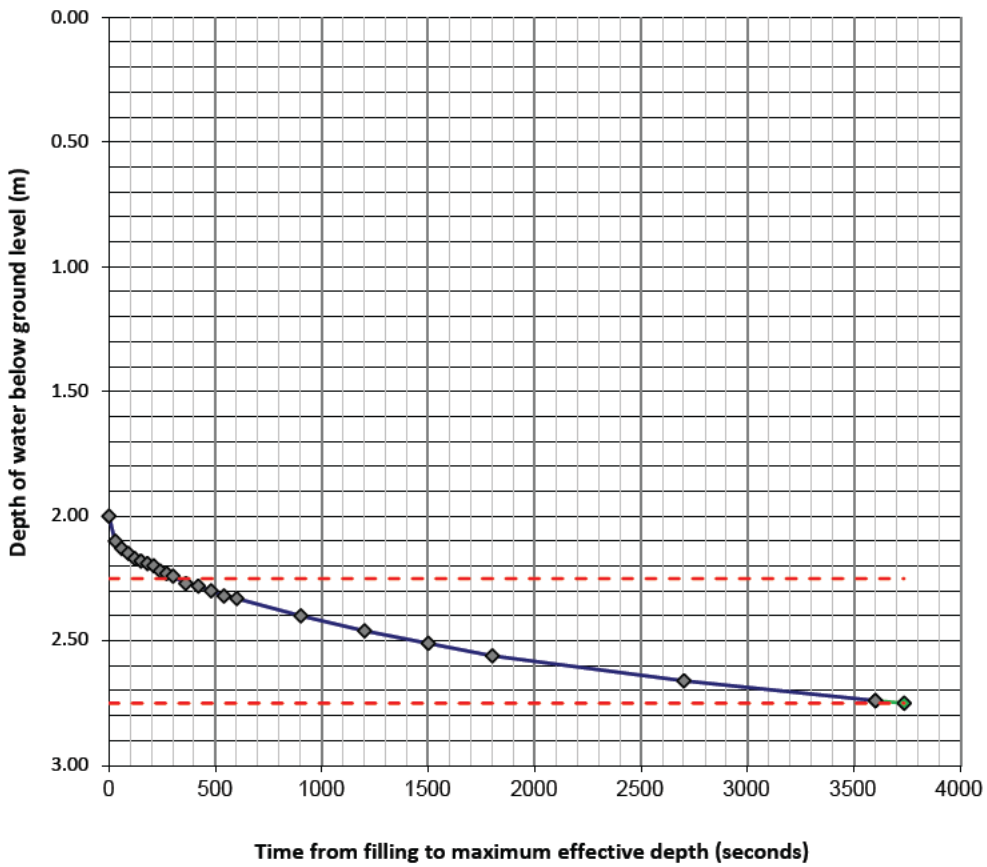
Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**		Extrapolated
Maximum potential volume of water (V)		(m^3)	1.40
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED		(m^3)	0.70
Maximum head of water lost during test (ED) = ED - Water depth @ time 0		(m)	1.00
Surface area of pit up to 50% effective depth (AP_{50})		(m^2)	4.80
Level of water in pit at 75% effective depth (P_{25})		(m)	2.25
Level of water in pit at 25% effective depth (P_{75})		(m)	2.75
Time at 75% effective depth (T_{75})		(s)	320
Time at 25% effective depth (T_{25})		(s)	3735
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})		(s)	3415
INDICATIVE SOIL INFILTRATION RATE (f) =	$PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**4.3E-05**

Test remarks

Test measurements taken with dip meter and timer.
Final data point(s) extrapolated from trend of results.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman
After BRE Digest 365, Soakaway Design, 2016			Page 1 of 1



Notes on plot: top red line is P_{25}; bottom red line is P_{75}.
Green data point(s) extrapolated from test results

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA05
TEST NUMBER:	2

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SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	2.02
30	0.5	2.03
60	1.0	2.06
90	1.5	2.08
120	2.0	2.08
150	2.5	2.08
180	3.0	2.10
210	3.5	2.11
240	4.0	2.12
270	4.5	2.14
300	5.0	2.16
360	6.0	2.19
420	7.0	2.21
480	8.0	2.23
540	9.0	2.25
600	10.0	2.27
900	15.0	2.31
1200	20.0	2.35
1500	25.0	2.39
1800	30.0	2.43
2700	45.0	2.54
3600	60.0	2.63
4800	80.0	2.72

Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**		Extrapolated
Maximum potential volume of water (V)		(m^3)	1.37
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ ED		(m^3)	0.69
Maximum head of water lost during test (ED) = ED - Water depth @ time 0		(m)	0.98
Surface area of pit up to 50% effective depth (AP_{50})		(m^2)	4.80
Level of water in pit at 75% effective depth (P_{25})		(m)	2.27
Level of water in pit at 25% effective depth (P_{75})		(m)	2.76
Time at 75% effective depth (T_{75})		(s)	585
Time at 25% effective depth (T_{25})		(s)	5543
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})		(s)	4958
INDICATIVE SOIL INFILTRATION RATE (f) =	$PV_{75\text{-}25}/(AP_{50} \times T_{75}\text{-}T_{25})$	(m/s)	**2.9E-05**

Test remarks

Test measurements taken with dip meter and timer.
Final data point(s) extrapolated from trend of results.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman
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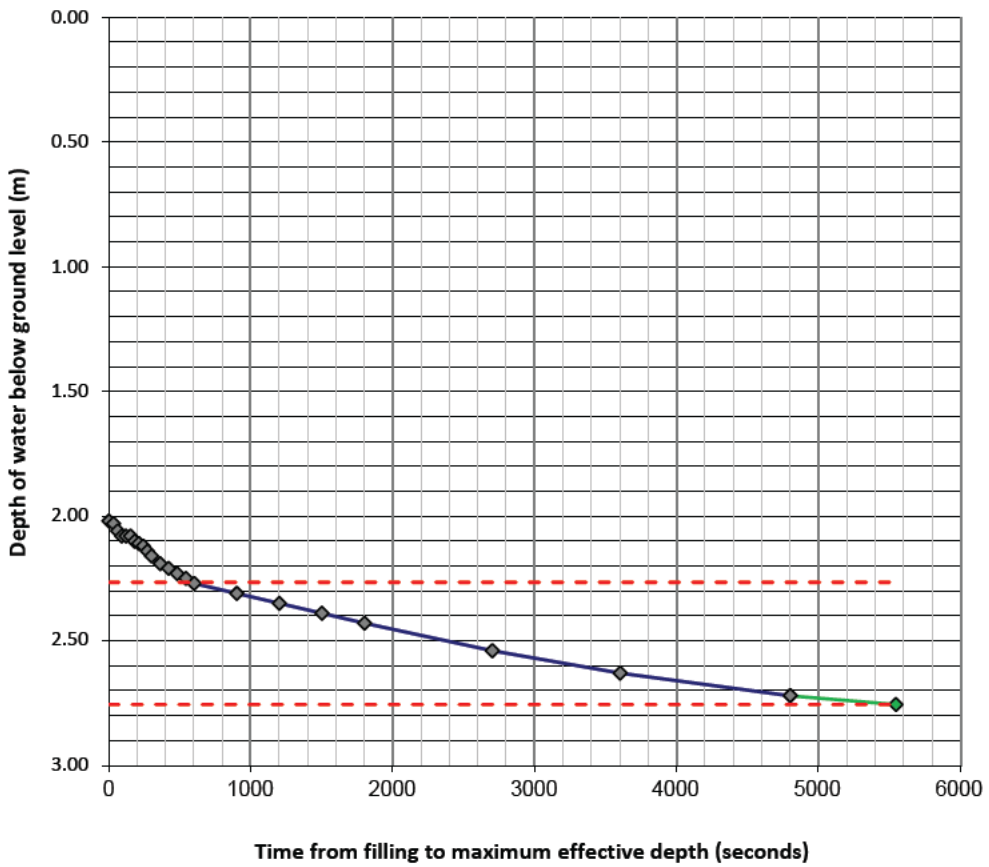

Notes on plot: top red line is P_{25}; bottom red line is P_{75}.
Green data point(s) extrapolated from test results

DATE:	April 2024
PROJECT No:	CG/39877
PROJECT NAME:	Friends School Playing Field
CLIENT:	Chase New Homes
TRIAL PIT ID:	SA05
TEST NUMBER:	3

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SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY

Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.0	1.88
30	0.5	1.89
60	1.0	1.90
90	1.5	1.91
120	2.0	1.91
150	2.5	1.92
180	3.0	1.93
210	3.5	1.95
240	4.0	1.96
270	4.5	1.98
300	5.0	1.99
360	6.0	2.00
420	7.0	2.01
480	8.0	2.02
540	9.0	2.03
600	10.0	2.13
900	15.0	2.35
1200	20.0	2.47
1500	25.0	2.55
1800	30.0	2.69
2700	45.0	2.80

Geology of test section	**PIT LENGTH (L):**	2.00 m
Structureless Chalk	**PIT WIDTH (W):**	0.70 m
	PIT DEPTH (D):	3.00 m

INPUT PARAMETERS:	**P_{25} achieved?**	Yes
Maximum potential volume of water (V)	(m^3)	1.57
Pit volume between 75% & 25% depths (PV25/75) = L x W x ½ D	(m^3)	0.78
Maximum depth of water (MDW) = D - Water depth @ time 0	(m)	1.12
Surface area of pit up to 50% effective depth (AP_{50})	(m^2)	4.42
Level of water in pit at 75% effective depth (P_{25})	(m)	2.16
Level of water in pit at 25% effective depth (P_{75})	(m)	2.72
Time at 75% effective depth (T_{75})	(s)	641
Time at 25% effective depth (T_{25})	(s)	2045
Time for outflow for 75% and 25% effective depth (T_{75}-T_{25})	(s)	1405
SOIL INFILTRATION RATE (f) = $PV_{75-25}/(AP_{50} \times T_{75}-T_{25})$	(m/s)	**1.3E-04**

Test remarks

Test measurements taken with dip meter and timer.

Compiled by:	Adam Cadman	Checked by:	Adam Cadman

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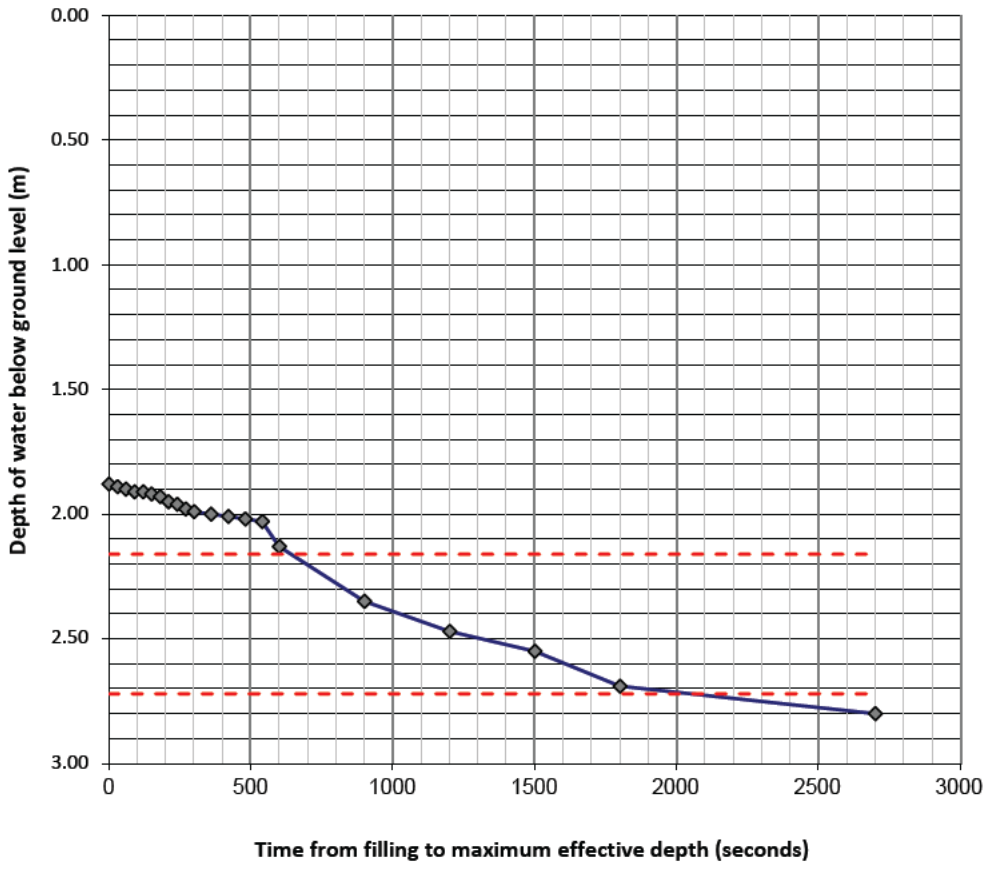

Notes on plot: top red line is P_{25}; bottom red line is P_{75}.

ABBREVIATIONS

ABH	Arch Beam Height	KO	Kerb Outlet
B	Brick	LTS	Low Timber Strip
BAL	Balcony	LP	Lamp Post
BB	Belisha Beacon	MH	Manhole
BD	Bollard	MKR	Marker
BH	Borehole or Beam Height	MSF	Metal Security Fence
BL	Bed Level	OV	Over Flow Pipe
BP	Brick Pier	OHC	Overhead Cables
BRW	Brick Retaining Wall	P	Post
BS	Bus Stop	PALF	Palisade Fence
BT	British Telecom	PF	Picket Fence
BW	Brick Wall	PIT	Inlet/ IPS
BWF	Barbed Wire Fence	PL	Pavement Light
CP	Catch Pit	PM	Parking Meter
CAB	Cabinet	PBF	Post & Rail Fence
CBF	Close Boarded Fence	PWH	Parapet Wall Height
CBW	Concrete Block Wall	R	Render
CF	Corrugated Iron Fence	RAD	Radiator
CL	Cover Level	RC	Roading Eye
CLF	Chain Link Fence	RH	Ridge Height
COL	Column	RS	Road Sign
CPF	Concrete Panel Fence	RWP	Rain Water Pipe
CPS	Concrete Paving Slabs	S	Stone
CRW	Concrete Retaining Wall	SV	Stop VALVE
CSU	Ceiling Slopes Up	SL	Soffit Level or Skylight
CTV	Cable Television	SP	Soil Pipe
CW	Concrete Wall	SR	SIRWICS
CZY	Crazy Paving	SPV	Stone Paving Slabs
D	Door	SRW	Stone Retaining Wall
DHL	Door Head Level	SA	Soakaway
DBH	Door Beam Height	SWS	Surface Water Sewer
EC	Electricity Cover	TJ	Top of Joist
EH	Eave Height	T	TILE
EP	Electricity Pole	TL	Traffic Light
FB	Flower Bed	UJ	Underside of Roof Joist
FC	Fence Ceiling	UR	Underside of Ridge Board
F/E	Fire Escape	UWP	Underside of Wall Plate
FBH	Flat Roof Height	V	Vent
FL	Floor Level	VP	Vent Pipe
FWS	Foul Water Sewer	WS	Wooden Sleeper
GY	Gully	WL	Water Level
GV	Gas Valve	WM	Water Meter
IC	Inspection Cover	WNF	Wire Mesh Fence
IL	Invert Level	WPF	Wooden Panel Fence
IRF	Iron Railing Fence	WCL	Window CIL Level
IWF	Interwoven Fence	WHL	Window Head Level
		WRW	Wooden Retaining Wall

Top of Banks / Bottom
Fences
Change in Surface
Edge of Vegetation
OS Data

2.28 Floor to Ceiling Height
Gate
Survey Station
+10.60 Floor Level
Tree

STATION CO-ORDINATE TABLE

Ref.	East	North	Elevation
1	553874.851	237658.095	86.899
2	553868.405	237758.741	83.313
3	553885.193	237770.784	83.614
4	553939.115	237764.825	85.280
5	553941.805	237730.871	87.080
6	553876.229	237596.902	84.826
7	553904.242	237565.281	86.498
8	553935.842	237540.870	87.208
9	553975.683	237542.075	88.253

NOTES

1. ALL LEVELS SHOWN ARE RELATED TO ORDNANCE SURVEY GPS DATUM.
2. TREE TYPES SHOWN ON THIS DRAWING CANNOT BE GUARANTEED AND IF CRITICAL SHOULD BE VERIFIED BY A TREE SPECIALIST. TREE SPREADS ARE AVERAGES UNLESS OTHERWISE INDICATED. TREE HEIGHTS ARE APPROXIMATE.
3. ALTHOUGH CARE HAS BEEN TAKEN, DUE TO ACCESS LIMITATIONS ALL HIGH LEVEL DETAIL HAS BEEN SURVEYED REMOTELY AND NOT CHECKED BY PHYSICAL MEASUREMENTS.
4. ALL CRITICAL MEASUREMENTS MUST BE CHECKED / VERIFIED.
5. ALL CO-ORDINATES AND LEVELS SHOWN RELATE TO AN ORDNANCE SURVEY DERIVED GRID.

C.	DRAINAGE SURVEY AMENDED.	021018
B.	SERVICES SURVEY ADDED.	170918
A.	SURVEY ENHANCED FOLLOWING MEASURED BUILDING SURVEY.	040918

REVISIONS DATE

A MEMBER OF THE SURVEY ASSOCIATION

INDICATIVE ONLY

SCALE: 1:500 @ A0
DATE: MAY 2018
DRAWN: JL / GR
JOB No:

TITLE: TOPOGRAPHICAL SURVEY SHEET 1 OF 2

JOB: FRIENDS SCHOOL, SAFFRON WALDEN.

CLIENT: CHASE NEW HOMES

DWG. No: DAT / 9.0C

DATUM SURVEY SERVICES LTD
BRICKFIELD HOUSE
HIGH ROAD
THORNWOOD
EPPING
ESSEX CM16 6TH
TEL: 07977 112286
OR 07977 111935

TREE SCHEDULE

NO.	GIRTH (DIA)	SPREAD	HEIGHT	TYPE
1	0.30TB	10.00	6.00	?
2	0.50	9.00	9.00	?
3	0.80	16.00	10.00	?
4	0.80	10.00	12.00	?
5	0.30	3.00	10.00	?
6	0.40	5.00	15.00	FIR
7	0.60	8.00	10.00	?
8	0.60	10.00	10.00	?
9	0.50	10.00	10.00	?
10	0.60	10.00	16.00	PINE
11	0.60	8.00	11.00	?
12	0.60TB	10.00	7.00	PINE
13	1.00MB	12.00	7.00	PINE
14	0.30	11.00	9.00	S/BIRCH
15	0.30	11.00	11.00	S/BIRCH
16	0.80TB	14.00	7.00	PINE
17	0.20	4.00	5.00	CHERRY
18	0.40	14.00	6.00	CHERRY
19	0.50	0.00	0.00	STUMP
20	0.50	0.00	0.00	STUMP
21	0.50	0.00	0.00	STUMP
22	0.50	0.00	0.00	STUMP
23	0.60	0.00	0.00	STUMP
24	0.40	0.00	0.00	STUMP
25	0.60	0.00	0.00	STUMP
26	0.30	10.00	6.00	?
27	0.90	20.00	13.00	?
28	0.30	12.00	9.00	?
29	0.50	13.00	11.00	?
30	1.00	14.00	15.00	?
31	0.80	10.00	15.00	?
32	0.30	12.00	5.00	CHERRY
33	0.30	7.00	5.00	?
34	0.60	15.00	7.00	WILLOW
35	0.30	12.00	7.00	?
36	0.20	7.00	6.00	?
37	0.70	9.00	10.00	?
38	0.80	13.00	10.00	?
39	0.70	10.00	10.00	?
40	0.70	10.00	10.00	?
41	0.70	10.00	10.00	?
42	0.60	12.00	11.00	?
43	0.70	12.00	12.00	?
44	0.70	9.00	11.00	?
45	0.70	12.00	12.00	?
46	0.70	12.00	12.00	?
47	0.30	6.00	5.00	?
48	0.30	6.00	5.00	?
49	0.30	6.00	5.00	?
50	0.20	6.00	5.00	?
51	0.40	0.00	0.00	STUMP
52	0.40	13.00	7.00	?
53	0.40	13.00	7.00	?
54	0.40	12.00	7.00	?
55	0.70	10.00	12.00	?
56	0.70	9.00	12.00	?
57	0.80	10.00	12.00	?
58	0.80	10.00	12.00	?
59	0.60	10.00	12.00	?
60	0.70	11.00	12.00	?
61	0.80	11.00	12.00	?
62	0.90	12.00	13.00	?
63	0.70	12.00	13.00	?
64	0.70	8.00	10.00	?
65	0.30	8.00	7.00	?
66	0.40	10.00	7.00	?
67	0.20	5.00	5.00	?
68	0.30	6.00	5.00	FIR
69	0.20	9.00	6.00	SYCAMORE
70	0.30	10.00	5.00	CHERRY
71	0.30	10.00	6.00	?
72	0.40	14.00	7.00	CHERRY
73	0.60	15.00	12.00	?
74	0.60	18.00	11.00	?
75	0.20	0.00	0.00	STUMP
76	0.20	7.00	6.00	?
77	0.50TB	7.00	6.00	?
78	0.70	6.00	7.00	?
79	0.40	10.00	7.00	CHERRY
80	0.50	0.00	0.00	STUMP
81	0.20	8.00	7.00	?
82	0.70	8.00	9.00	FIR
83	0.30	6.00	8.00	HAWTHORN
84	0.70	13.00	14.00	?
85	0.40	0.00	0.00	STUMP
86	0.20	5.00	6.00	?
87	0.50	18.00	15.00	PINE
88	0.60	15.00	13.00	PINE
89	0.20	8.00	7.00	?
90	0.40TB	7.00	3.00	?
91	0.70	18.00	15.00	PINE
92	0.20	5.00	7.00	?
93	0.60MB	10.00	6.00	?
94	0.40	10.00	14.00	PINE
95	0.50	12.00	13.00	?
96	0.40	10.00	14.00	?
97	0.50	11.00	15.00	?
98	0.50	9.00	15.00	?
99	0.60	12.00	14.00	?
100	0.70	7.00	15.00	?
101	0.20	4.00	7.00	S/BIRCH
102	0.80MB	13.00	7.00	FIR
103	0.70.	0.00	0.00	STUMP
104	1.00MB	10.00	8.00	FIR
105	0.80	14.00	14.00	?
106	1.10	18.00	16.00	?
107	0.70	20.00	18.00	?
108	0.30	9.00	12.00	?
109	0.70	15.00	11.00	?
110	0.50	13.00	13.00	?
111	0.30	7.00	14.00	?
112	0.30	6.00	7.00	?
113	0.80	19.00	18.00	?
114	0.40	7.00	14.00	?
115	0.60	14.00	17.00	?
116	0.30	8.00	14.00	?
117	0.50	14.00	15.00	?
118	0.50	12.00	8.00	CHERRY
119	0.60	16.00	17.00	?
120	0.30	9.00	7.00	?
121	0.50	12.00	16.00	?
122	0.70	14.00	13.00	?
123	0.70	16.00	15.00	?
124	0.70	12.00	14.00	?
125	0.80MB	6.00	9.00	FIR
126	0.25	10.00	10.00	?
127	0.40	8.00	7.00	?
128	0.60	12.00	14.00	?
129	0.60	12.00	14.00	?
130	0.60	10.00	14.00	?
131	0.60	10.00	14.00	?
132	0.60	10.00	14.00	?
133	0.60	10.00	14.00	?
134	0.60	10.00	14.00	?
135	0.60	10.00	14.00	?
136	0.60	10.00	14.00	?
137	0.40	10.00	12.00	?
138	0.30	10.00	10.00	?
139	0.60	12.00	14.00	?
140	0.60	14.00	18.00	?
141	0.60	10.00	12.00	?
142	0.60	10.00	12.00	?
143	0.70	12.00	16.00	?
144	0.40	11.00	9.00	?
145	0.70	12.00	16.00	?
146	0.70	12.00	13.00	?
147	0.80MB	13.00	7.00	?
148	0.20	8.00	6.00	?
149	1.30MB	10.00	7.00	FIR
150	0.60	18.00	16.00	?
151	0.90	17.00	17.00	?
152	0.30	11.00	6.00	?
153	1.40TB	14.00	12.00	?
154	2.20MB	12.00	11.00	?
155	1.40	10.00	13.00	?
156	0.90	14.00	19.00	?
157	0.90	14.00	16.00	?
158	0.80	13.00	14.00	?
159	0.60	14.00	19.00	?
160	0.90	10.00	14.00	?
161	0.40	8.00	7.00	?
162	0.60	10.00	12.00	?
163	0.30	3.00	5.00	?
164	0.90	13.00	10.00	?
165	0.40	4.00	4.00	?
166	0.40	9.00	7.00	?
167	0.60	13.00	10.00	?
168	0.30	10.00	8.00	?
169	0.40	14.00	10.00	?
170	0.20	4.00	8.00	?
171	0.90	20.00	15.00	?
172	0.20	10.00	10.00	?
173	1.00	20.00	14.00	?
174	1.20	3.00	15.00	?
175	0.60	11.00	17.00	?
176	0.80	10.00	15.00	?

TREE SCHEDULE

NO.	GIRTH (DIA)	SPREAD	HEIGHT	TYPE
177	0.60	11.00	9.00	?
178	0.70	12.00	15.00	?
179	0.70	11.00	14..00	?
180	0.30TB	4.00	7.00	?
181	0.60MB	8.00	14.00	?
182	0.30	5.00	14.00	?
183	0.50	10.00	15.00	?
184	0.30	7.00	14.00	?
185	0.40	12.00	13.00	?
186	0.50	10.00	14.00	?
187	0.40	8.00	9.00	?
188	0.30	10.00	15.00	?
189	0.60	12.00	15.00	?
190	0.70	14.00	15.00	?
191	0.50	4.00	3.00	FALLEN
192	0.20	5.00	7.00	?
193	0.20	5.00	7.00	?
194	0.40	5.00	7.00	?
195	0.50	10.00	9.00	?
196	0.50	8.00	9.00	?
197	0.40	10.00	9.00	?
198	0.40	11.00	5.00	?
199	0.80	20.00	16.00	?
200	0.40	14.00	9.00	?
201	0.30	7.00	9.00	?
202	0.60TB	13.00	9.00	?
203	0.40MB	12.00	7.00	?
204	0.30	7.00	7.00	?
205	0.30	13.00	10.00	?
206	0.30	13.00	14.00	?
207	0.40	15.00	9.00	?
208	0.40MB	15.00	5.00	?
209	0.60	10.00	14.00	?
210	0.40	10.00	14.00	?
211	0.30	8.00	12.00	?
212	0.90TB	20.00	12.00	?
213	0.30	7.00	10.00	?
214	0.50	22.00	12.00	?
215	0.50	22.00	12.00	?
216	0.50	22.00	12.00	?
217	0.30	13.00	7.00	?
218	0.30TB	13.00	8.00	?
219	0.20	6.00	6.00	?
220	0.40	8.00	9.00	?
221	0.30	13.00	8.00	?
222	0.20TB	8.00	7.00	?
223	0.30	12.00	8.00	?
224	0.20	6.00	7.00	?
225	0.30	12.00	10.00	?
226	0.20	8.00	9.00	S/BIRCH
227	0.20	8.00	9.00	?
228	0.20	10.00	10.00	?
229	0.30TB	8.00	10.00	?
230	0.20	9.00	11.00	?
231	0.30	18.00	11.00	?
232	0.30	18.00	10.00	?
233	0.20	7.00	10.00	?
234	0.40TB	14.00	10.00	?
235	0.20	10.00	10.00	?
236	0.20	10.00	12.00	?
237	0.30	15.00	13.00	?
238	0.20	13.00	13.00	?
239	0.30	12.00	14.00	?
240	0.30	13.00	14.00	?
241	0.20	8.00	14.00	S/BIRCH
242	0.30	13.00	12.00	?
243	0.20	8.00	10.00	?
244	0.30	12.00	11.00	?
245	0.20	10.00	10.00	?
246	0.30	9.00	8.00	?
247	0.20	8.00	11.00	?
248	0.20	8.00	11.00	?
249	0.30	15.00	10.00	?
250	0.20	15.00	10.00	?
251	0.30	15.00	10.00	?
252	0.30TB	10.00	11.00	?
253	0.20	10.00	10.00	?
254	0.20	10.00	11.00	?
255	0.40TB	11.00	9.00	?
256	0.20	8.00	14.00	?
257	0.20	8.00	12.00	?
258	0.20	6.00	13.00	?
259	0.40TB	10.00	11.00	?
260	0.20	8.00	10.00	?
261	0.50TB	12.00	11.00	?
262	0.20	10.00	10.00	?
263	0.20	8.00	11.00	?
264	0.20	8.00	9.00	?
265	0.50	10.00	9.00	?
266	0.20	8.00	12.00	?
267	0.30	10.00	12.00	?
268	0.20	8.00	6.00	?
269	0.30	10.00	12.00	?
270	0.30	10.00	12.00	?
271	0.30	12.00	13.00	?
272	0.60	13.00	11.00	?
273	0.50	12.00	6.00	?
274	0.60	12.00	16.00	?
275	0.30MB	6.00	5.00	?
276	0.30	6.00	4.00	?
277	0.60TB	10.00	8.00	?
278	0.40	5.00	8.00	?
279	0.50	8.00	11.00	S/BIRCH
280	0.40	15.00	11.00	?
281	0.50	12.00	11.00	?
282	0.80TB	16.00	11.00	S/BIRCH
283	0.50	16.00	12.00	S/BIRCH
284	0.60	16.00	18.00	?
285	0.60	16.00	18.00	?
286	0.60	16.00	18.00	?
287	0.60	16.00	18.00	?
288	0.60TB	9.00	6.00	?
289	0.30	5.00	3.00	?
290	0.20	6.00	4.00	?
291	0.50	20.00	18.00	?
292	0.30	10.00	11.00	?
293	0.70MB	8.00	8.00	?
294	0.50TB	14.00	8.00	?
295	0.30	12.00	7.00	?
296	0.40	12.00	7.00	?
297	0.20	9.00	7.00	?
298	1.00MB	12.00	7.00	?
299	0.60TB	13.00	8.00	?
300	POINT NOT USED			
301	0.30	8.00	8.00	?
302	0.20	14.00	10.00	?
303	0.30	10.00	10.00	?
304	0.30	8.00	10.00	?
305	0.40	10.00	10.00	?
306	0.40MB	14.00	8.00	?
307	1.10MB	10.00	8.00	?
308	0.40	18.00	17.00	?
309	0.30	2.00	2.00	?
310	0.50	22.00	15.00	?
311	0.60	11.00	9.00	?
312	0.40	14.00	5.00	?
313	0.70	16.00	16.00	?
314	0.70	14.00	15.00	?
315	0.60	12.00	6.00	?
316	0.70	12.00	8.00	?
317	0.50	4.00	10.00	?
318	0.30	8.00	16.00	?
319	0.50	10.00	17.00	?
320	0.20	5.00	7.00	?
321	0.30	9.00	11.00	S/BIRCH
322	0.20	12.00	7.00	?
323	0.40TB	9.00	12.00	?
324	0.20	6.00	8.00	?
325	0.50TB	13.00	15.00	S/BIRCH
326	0.40	9.00	10.00	?
327	0.20	5.00	12.00	?
328	0.30	7.00	13.00	S/BIRCH
329	0.20	4.00	10.00	S/BIRCH
330	0.20	5.00	13.00	S/BIRCH
331	0.30TB	5.00	11.00	?
332	0.30	6.00	11.00	?
333	0.40	8.00	11.00	?
334	0.30	9.00	6.00	?
335	0.30	9.00	6.00	?
336	0.40	10.00	12.00	?
337	0.20	15.00	7.00	?
338	0.20MB	15.00	7.00	?
339	0.20	8.00	11.00	?
340	0.40MB	14.00	7.00	?
341	0.50MB	6.00	4.00	?
342	0.60MB	12.00	10.00	?
343	0.70MB	12.00	5.00	?
344	0.50	10.00	6.00	?
345	0.30TB	10.00	5.00	?
346	0.50MB	10.00	4.00	?
347	0.20MB	8.00	6.00	?
348	0.30	5.00	7.00	?
349	0.30	4.00	4.00	FALLEN
350	0.30	8.00	5.00	FALLEN
351	0.30	8.00	10.00	S/BIRCH
352	0.30	5.00	10.00	S/BIRCH

TREE SCHEDULE

NO.	GIRTH (DIA)	SPREAD	HEIGHT	TYPE
353	0.20	8.00	9.00	S/BIRCH
354	0.30MB	8.00	5.00	?
355	0.30TB	5.00	6.00	?
356	0.30	6.00	6.00	HAWTHORN
357	0.40	12.00	9.00	?
358	0.40	0.00	1.00	STUMP
359	0.40MB	8.00	14.00	?
360	0.40	0.00	0.00	STUMP
361	0.20	0.00	0.00	STUMP
362	0.50	10.00	11.00	?
363	0.70	12.00	12.00	?
364	0.30	0.00	1.00	STUMP
365	0.40	4.00	3.00	?
366	0.20	6.00	10.00	?
367	0.50MB	8.00	6.00	HAWTHORN
368	0.30	8.00	9.00	?
369	0.50	12.00	14.00	?
370	0.30	8.00	16.00	S/BIRCH
371	0.20	8.00	7.00	?
372	0.20	8.00	10.00	?
373	0.20	6.00	11.00	?
374	0.20	6.00	10.00	?
375	0.20	8.00	13.00	?
376	0.70MB	10.00	13.00	?
377	0.30	9.00	14.00	S/BIRCH
378	0.20	8.00	13.00	?
379	0.20	8.00	16.00	S/BIRCH
380	0.20	12.00	10.00	?
381	0.30	9.00	14.00	S/BIRCH
382	0.20	8.00	7.00	?
383	0.30	7.00	16.00	S/BIRCH
384	0.20	6.00	12.00	?
385	0.20	8.00	10.00	?
386	0.50TB	9.00	13.00	?
387	0.20	6.00	15.00	S/BIRCH
388	0.20	4.00	10.00	?
389	0.50TB	12.00	13.00	?
390	0.20TB	5.00	11.00	?
391	0.20	6.00	10.00	?
392	0.20	8.00	11.00	?
393	0.20	10.00	10.00	?
394	0.90MB	10.00	8.00	?
395	0.60	12.00	10.00	?
396	0.20	8.00	10.00	?
397	0.20	8.00	10.00	?
398	0.70MB	14.00	12.00	?
399	0.40TB	5.00	12.00	?
400	0.50TB	10.00	10.00	?
401	0.40	20.00	10.00	?
402	0.50	8.00	15.00	?
403	0.50TB	10.00	15.00	?
404	0.30	12.00	10.00	?
405	0.40	10.00	15.00	S/BIRCH
406	0.30TB	6.00	7.00	?
407	0.30	12.00	14.00	?
408	0.50	14.00	17.00	?
409	0.50TB	10.00	11.00	?
410	0.30	10.00	11.00	?
411	0.70	14.00	18.00	?
412	0.20	10.00	14.00	?
413	0.40TB	12.00	9.00	?
414	0.40	12.00	15.00	?
415	0.50	8.00	9.00	?
416	0.70	8.00	8.00	?
417	0.30	5.00	4.00	?
418	0.20	5.00	7.00	?
419	0.40	8.00	18.00	?
420	0.20	10.00	13.00	?
421	0.30	13.00	13.00	?
422	0.70	13.00	16.00	?
423	0.60	14.00	17.00	?
424	0.50	20.00	16.00	?
425	0.70TB	11.00	8.00	?
426	0.50	6.00	7.00	?
427	0.50	6.00	18.00	?
428	0.40	13.00	14.00	?
429	0.40	7.00	15.00	?
430	0.50TB	9.00	16.00	?
431	0.50	14.00	19.00	?
432	0.60	12.00	18.00	?
433	0.50	10.00	16.00	?
434	0.60	8.00	6.00	?
435	0.60TB	6.00	7.00	?
436	0.30	8.00	10.00	?
437	0.70MB	6.00	7.00	?
438	0.50	20.00	18.00	?
439	0.30	10.00	16.00	?
440	6.00	12.00	14.00	?
441	0.40	10.00	16.00	?
442	0.60	8.00	14.00	?
443	0.60	8.00	16.00	?
444	0.20	8.00	10.00	?
445	0.60	8.00	15.00	?
446	0.70TB	10.00	20.00	?
447	0.50	9.00	18.00	?
448	0.50	8.00	18.00	?
449	0.80	10.00	18.00	?
450	0.50	15.00	16.00	?
451	0.90MB	15.00	17.00	?
452	0.50	12.00	10.00	?
453	0.70	13.00	16.00	?
454	0.80	9.00	12.00	?
455	0.80	19.00	20.00	?
456	1.00	12.00	16.00	?
457	0.60	13.00	20.00	?
458	0.40	13.00	18.00	?
459	0.30	6.00	14.00	PINE
460	0.30	6.00	5.00	?
461	0.70	10.00	14.00	?
462	0.70	10.00	10.00	SYCAMORE
463	0.30	6.00	5.00	CHERRY
464	0.20	5.00	6.00	?

ABBREVIATIONS

ABH	Arch Beam Height	KO	Kerb Outlet
B	Brick	LTS	Low Timber Strip
BAL	Balcony	LP	Lamp Post
BB	Belisha Beacon	MH	Manhole
BD	Bollard	MKR	Marker
BH	Borehole or Beam Height	MSF	Metal Security Fer
BL	Bed Level	OV	Over Flow Pipe
BP	Brick Pier	OHC	Overhead Cables
BRW	Brick Retaining Wall	P	Post
BS	Bus Stop	PALF	Palisade Fence
BT	British Telecom	PF	Picket Fence
BW	Brick Wall	PIT	Trial Pit
BWF	Barbed Wire Fence	PL	Pavement Light
CP	Catch Pit	PM	Parking Meter
CAB	Cabinet	PRF	Post & Rail Fence
CBF	Close Boarded Fence	PWH	Parapet Wall Heigh
CBW	Concrete Block Wall	R	Render
CIF	Corrugated Iron Fence	RAD	Radiator
CL	Cover Level	RE	Rodding Eye
CLF	Chain Link Fence	RH	Ridge Height
COL	Column	RS	Road Sign
CPF	Concrete Panel Fence	RWP	Rain Water Pipe
CPS	Concrete Paving Slabs	S	Stone
CRW	Concrete Retaining Wall	SV	Stop VALVE
CSU	Ceiling Slopes Up	SL	Soffit Level or Sky
CTV	Cable Television	SP	Soil Pipe
CW	Concrete Wall	SR	Service Riser
CZY	Crazy Paving	SPV	Stone Paving Slab
D	Door	SRW	Stone Retaining W
DHL	Door Head Level	SA	Soakaway
DBH	Door Beam Height	SWS	Surface Water Sev
EC	Electricity Cover	TJ	Top of Joist
EH	Eave Height	T	TILE
EP	Electricity Pole	TL	Traffic Light
FB	Flower Bed	UJ	Underside of Roof
FC	False Ceiling	UR	Underside of Ridg
F/E	Fire Escape	UWP	Underside of Wall
FRH	Flat Roof Height	V	Vent
FL	Floor Level	VP	Vent Pipe
FWS	Foul Water Sewer	WS	Wooden Sleeper
GY	Gully	WL	Water Level
GV	Gas Valve	WM	Water Meter
IC	Inspection Cover	WMF	Wire Mesh Fence
IL	Invert Level	WPF	Wooden Panel Fen
IRF	Iron Railing Fence	WCL	Window Cill Level
IWF	Interwoven Fence	WHL	Window Head Leve
		WRW	Wooden Retaining

Top
Banks
Bottom
Fences
Change in Surface
Edge of Vegetation
OS Data
3.28 Floor to Ceiling H
Gate
Survey S
+10.60 Floor Le
Tree

STATION CO-ORDINATE TABLE

Ref.	East	North	Elevation
1	553874.851	237658.095	86.899
2	553868.405	237758.741	83.313
3	553885.193	237770.784	83.614
4	553939.115	237764.895	85.280
5	553941.805	237730.871	87.080
6	553876.229	237566.902	84.826
7	553904.242	237565.281	86.498
8	553935.842	237540.870	87.208
9	553975.683	237542.075	88.253

NOTES

1. ALL LEVELS SHOWN ARE RELATED TO ORDNANCE SURVEY GPS DATUM.
2. TREE TYPES SHOWN ON THIS DRAWING CANNOT BE GUARANTEED AND IF CRITICAL SHOULD BE VERIFIED BY A TREE SPECIALIST. TREE SPREADS ARE AVERAGES UNLESS OTHERWISE INDICATED. TREE HEIGHTS ARE APPROXIMATE.
3. ALTHOUGH CARE HAS BEEN TAKEN, DUE TO ACCESS LIMITATIONS ALL HIGH LEVEL DETAIL HAS BEEN SURVEYED REMOTELY AND NOT CHECKED BY PHYSICAL MEASUREMENTS.
4. ALL CRITICAL MEASUREMENTS MUST BE CHECKED / VERIFIED.
5. ALL CO-ORDINATES AND LEVELS SHOWN RELATE TO AN ORDNANCE SURVEY DERIVED GRID.

C. DRAINAGE SURVEY AMENDED. 021
B. SERVICES SURVEY ADDED. 170
A. SURVEY ENHANCED FOLLOWING MEASURED BUILDING SURVEY. 040

REVISIONS D

A MEMBER OF THE SURVEY ASSOCIATION

IND CATIVE ONLY

SCALE: 1:500 @ A0
DATE: MAY 2018
DRAWN: JL / GR
JOB No:

TITLE: TOPOGRAPHICAL SURVEY SHEET 2 OF 2

JOB: FRIENDS SCHOOL, SAFFRON WALI

CLIENT: CHASE NEW HOMES

DWG. No: DAT / 9.0C

DAT 'M SURVEY SERVICES LTD
BRICKFIELD HOUSE
HIGH ROAD
THORNWOOD
EPPING
ESSEX CM16 6TH
TEL: 07977 112286
OR 07977 111935

APPENDIX C – PROPOSED DRAINAGE STRATEGY LAYOUTS & DRAINAGE AREA PLANS

CONTRACT DOCUMENT

Notes

Refers to Keen Consultant's tree protection plan for the location of TPO and existing tree removal.

Sub Stn
STC
Existing Parking Spaces (remarked)
Existing Access Road (regulated to new levels)
Existing Access Road
Existing Parking Spaces (remarked)
Plot 38
Plot 39
Plot 40
Plot 41
Plot 42
Plot 43
Plot 44
FFL 89.000
FFL 88.850
FFL 89.950
FFL 90.600
FFL 90.450
FFL 90.750
FFL 90.350
FFL 90.550
FFL 90.700
FFL 90.850
FFL 91.050
FFL 90.900
FFL 91.250
FFL 91.525
FFL 91.300
FFL 91.375
FFL 91.500
FFL 91.600
FFL 91.750
FFL 91.900
FFL 92.000
FFL 91.850
FFL 92.100
FFL 92.125
FFL 92.500
FFL 92.400
FFL 92.275
FFL 92.650
FFL 92.325
FFL 92.700
FFL 91.200
FFL 91.575
FFL 91.950
FFL 89.750
89.500
450 max GB
450 max RW
300 max RW
750 max RW
900 max RW
1000 max RW
1200 max RW
100 threshold
150 threshold
Level access to rear
1:15
1:40
+ 90.90
90.16
+ 90.85
91.60
92.30

Key

+ 90.00	Proposed finished levels
+ (90.00)	Interpolated existing spot levels
FFL 90.700	Proposed finished floor level
+ 90.34	Existing (pre-demolition) levels
	Denotes Retaining Walls
	Exceedance flow route
90.700	Primary Contours
90.725	Secondary Contours
	Tree to be removed (Refers to Keen Consultant's tree protection plan for the location of TPO and existing tree removal)

Rev	Description	Date
1	Preliminary Issue	20 06.24

Status: Preliminary Issue

Scale : 1:250@A0
Date : Jan 2024 | Checked: BM | Approved: PT
Drawn : IDL

Title :

Levels Layout Sheet 1 of 2

Project :
Playing Fields Site, Saffron Walden

Drg. No:	Rev:	File Ref:	
IDL/1229/05/101	1	Plot Ref:	1229-05-101 pdf

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+ 90.90
90.16 +
1:40
+ 90.85
+ 90.90
+ 91.60
92.30 +
+ 89.40
90.80 +
1:40
1:40
1:40
90.72 +
90.72 +
2No level pitches
90.72 +
90.72 +
+ 90.73
92.13 +
+ 89.31
90.71 +
+ 89.02
+ 90.65
90.42 +
92.05 +
89.30 +
88.80 +
+ 90.18
+ 88.25
+ 89.27
Max 1 in 5 batter
+ 87.50
+ 89.14
Max 1 in 4 batter
+ 88.83
+ 87.18
FFL 89.750
FFL 91.200
FFL 91.575
FFL 91.575
FFL 91.950
FFL 91.950
FFL 91.950
FFL 91.950
FFL 92.325
FFL 92.325
FFL 92.700
FFL 92.650
89.500
900 max RW
1000 max RW
68
67
66
65
69
36
35
34
33
32
31
240
326

Key

+ 90.00	Proposed finished levels
+ (90.00)	Interpolated existing spot levels
FFL 90.700	Proposed finished floor level
90.34 +	Existing (pre-demolition) levels
	Denotes Retaining Walls
	Exceedance flow route
90.700	Primary Contours
90.725	Secondary Contours
	Tree to be removed (Refers to Keen Consultant's tree protection plan for the location of TPO and existing tree removal)

CONTRACT DOCUMENT

Notes

Rev	Description	Date
1	Preliminary Issue	20.06.24

Status:
Preliminary Issue

Scale: 1:250@A0
Date: Jan 2024
Drawn: IDL
Checked: RM
Approved: PT

Title:
Levels Layout
Sheet 2 of 2

Project:
Playing Fields Site, Saffron Walden

Drg. No: IDL/1229/05/102
Rev: 1
File Ref: 1229-05.dwg
Plot Ref: 1229-05-102.pdf

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CONTRACT DOCUMENT

Notes

FFL 90.550
FFL 92.275
FFL 92.650
FFL 91.575
FFL 91.575
FFL 91.950
FFL 91.950
FFL 91.200
FFL 91.950
FFL 91.950
FFL 92.325
FFL 92.325
FFL 92.700
89.500
Plots 29-39 & 66-70
SA-03
SDS Geolight or similar approved and subject to detailed structural design.
170 5m2 x 0.75 crate depth
CL (max) 90 60
Top of Crates 88.75
Base 88 00
FWPS
FFL 89.750
New FW package pump station. As Xylem 1500 series or similar and approved.
CL 89.60
I. (lowest in) 88.05
Base 86 80
SA-04
SDS Geolight or similar approved and subject to detailed structural design.
60m2 x 0.75 crate depth
CL (max) 89.20
Top of Crates 87.15
Base 86.40
SA-05
SDS Geolight or similar approved and subject to detailed structural design.
50 6m2 x 0.75 crate depth
CL (max) 88.83
Top of Crates 86 63
Base 85.88
150Ø perforated pipe in shingle-filled trench as land drain
150Ø perforated pipe in shingle-filled trench as land drain
150Ø perforated pipe in shingle-filled trench as land drain
11
240
326

Drainage Key

- Foul Water Drainage
- Surface Water Drainage
- Foul rising Main
- Private foul water package pump station
- Foul PCC manhole
- Polypropylene universal inspection chambers 1200 deep max, 450 dia, 100 inlet / outlet connections (6 no. max) or 150 inlet/outlet connections (4 no max) as detailed on private drainage construction details.
- Denotes 500/600 dia pipic, 3000mm deep max with 4 no. max inlets / outlets up to 150mm dia, as detailed on private drainage construction details. Where >1200mm deep, use reduced size access cover. Wavin Range 500/600 or similar.
- Denotes 500/600 dia pipic silt trap with 300mm nominal sump, as messrs Polypipe Basic Silt Trap or similar.
- Rodding eye same dia. as downstream drain
- Private access roads in Permeable Block Paving (System A full infiltration) Infiltration into ground
- Parking spaces and drives in Permeable Block Paving (System A full infiltration) infiltration into ground
- Cellular soakaway system (SDS Geolight or similar approved)

Rev.	Description	Date
1	Preliminary Issue	20.06.24

Status:

Preliminary Issue

Scale :	1:250@A0		
Date :	June 2024	Checked :	Approved :
Drawn :	IDL	BM	PT

Title :

Drainage Layout Sheet 2 of 2

Project :

Playing Fields Site, Saffron Walden

Drg. No :	Rev.	File Ref.	1229-07.dwg
IDL/1229/07/104	1	Plot Ref.	1229-07-104.pdf

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CONTRACT DOCUMENT

Notes

Plots 1-28 & 40-49

SA-01
SDS Geolight or similar approved and subject to detailed structural design.
117m2 x 1.5m crate depth
CL (min) 89.32
Top of Crates 87.15
Base 85.65

Sub Stn
STC
Existing Parking Spaces (remarked)
Existing Access Road (regulated to new levels)
Existing Parking Spaces (remarked)
Plot 38
Plot 39
Plot 40
Plot 41
Plot 42
Plot 43
Plot 44

FFL 89.000
FFL 88.850
FFL 89.950
FFL 90.350
FFL 90.600
FFL 90.750
FFL 90.450
FFL 90.550
FFL 90.700
FFL 90.850
FFL 91.050
FFL 91.250
FFL 91.525
FFL 90.900
FFL 91.300
FFL 91.375
FFL 91.600
FFL 91.500
FFL 91.850
FFL 92.000
FFL 92.125
FFL 91.900
FFL 92.100
FFL 92.275
FFL 92.400
FFL 92.500
FFL 92.650
FFL 91.575
FFL 91.950
FFL 91.200
FFL 92.325
FFL 92.700
FFL 89.750

Plots 50-65 & 71-92

SA-02
SDS Geolight or similar approved and subject to detailed structural design.
111m2 x 0.75m crate depth
CL (min) 90 85
Top of Crates 89 60
Base 89 85

Plots 29-39 & 66-70

SA-03
SDS Geolight or similar approved and subject to detailed structural design.
170.5m2 x 0.75 crate depth
CL (min) 90.60
Top of Crates 88.75
Base 88.00

FWPS
New FW package pump station.
As Xylem 1500 series or similar and approved.
CL 89 60
IL (lowest in) 88 05
Base 86.80

Drainage Key

- Foul Water Drainage
- Surface Water Drainage
- RM — Foul rising Main
- FWPS — Private foul water package pump station
- Foul PCC manhole
- Polypropylene universal inspection chambers 1200 deep max, 450 dia, 100 inlet / outlet connections (6 no. max) or 150 inlet/outlet connections (4 no max) as detailed on private drainage construction details.
- R500 / R600 — Denotes 500/600 dia ppic, 3000mm deep max with 4 no. max inlets / outlets up to 150mm dia, as detailed on private drainage construction details. Where >1200mm deep, use reduced size access cover. Wavin Range 500/600 or similar.
- st — Denotes 500/600 dia ppic silt trap with 300mm nominal sump, as messrs Polypipe Basic Silt Trap or similar.
- re — Rodding eye same dia. as downstream drain
- Private access roads in Permeable Block Paving (System A full infiltration) Infiltration into ground
- Parking spaces and drives in Permeable Block Paving (System A full infiltration) infiltration into ground
- st — Cellular soakaway system (SDS Geolight or similar approved)

Rev	Description	Date
1	Preliminary Issue	20 06.24

Status: Preliminary Issue

Scale : 1:250@A0
Date : Jan 2024 | Checked: RM | Approved: PT
Drawn : IDL

Title : Drainage Layout Sheet 1 of 2

Project : Playing Fields Site, Saffron Walden

Drg. No: IDL/1229/07/101 | Rev: 1 | File Ref: 1229-07.dwg | Plot Ref: 1229-07-101 pdf

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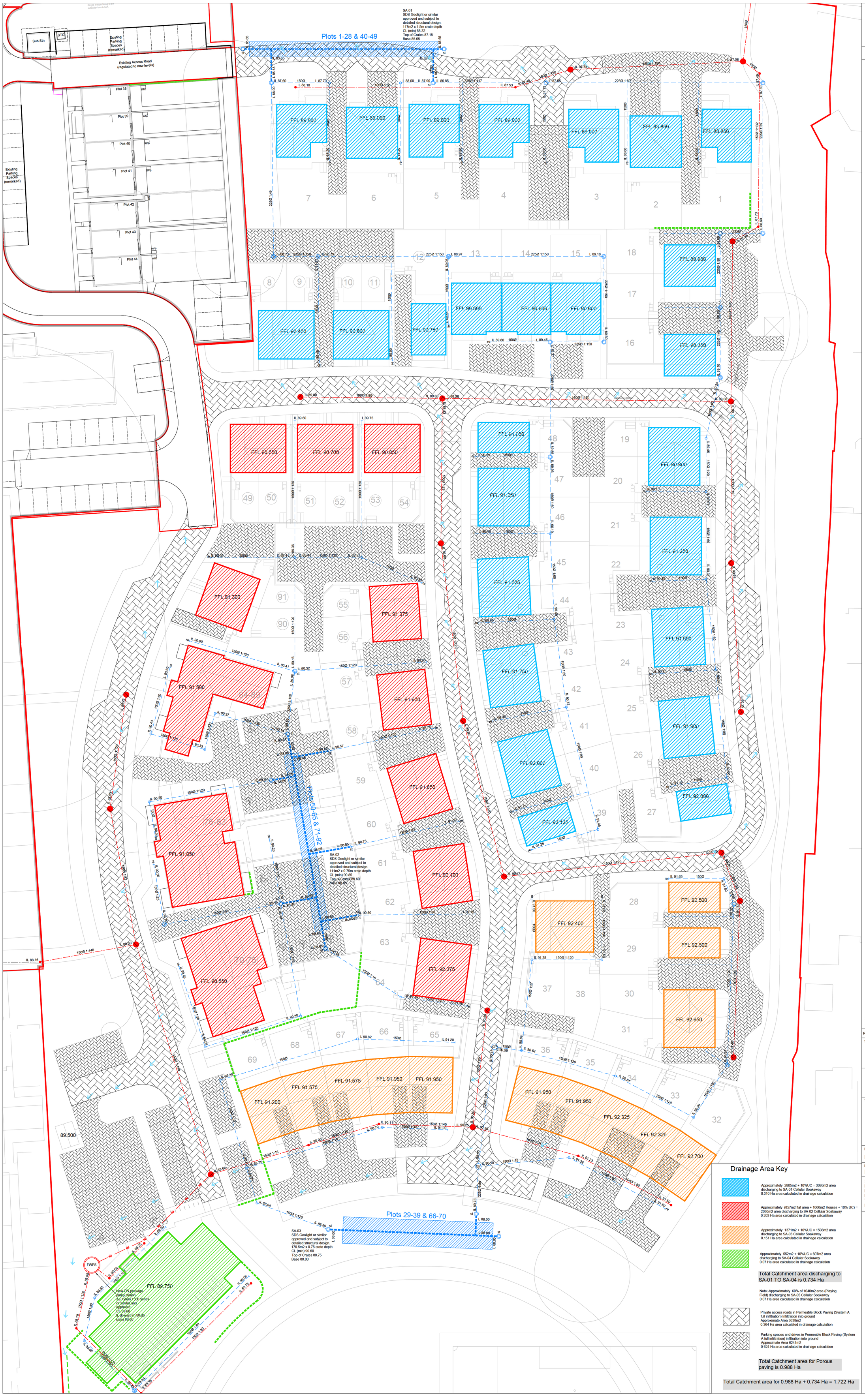
Notes



Rev	Description	Date
2	Impermeable Area revised	19 09 24
1	Preliminary Issue	20 06 24

Status:

Preliminary Issue

Scale :	1:250@A0		
Date :	Jun 2024	Checked:	Approved:
Drawn :	IDL	BM	PT

Title :

Drainage Area Layout

Project :

Playing Fields Site, Saffron Walden

Drg. No:	Rev:	File Ref:	1229-07-DAP.dwg
IDL/1229/07/105	2	Plot Ref:	1229-07-105.pdf

Drainage Area Key

Approximately 2805m2 + 10%UC = 3086m2 area discharging to SA-01 Cellular Soakaway
0.310 Ha area calculated in drainage calculation

Approximately (857m2 flat area + 1066m2 Houses + 10% UC) = 2030m2 area discharging to SA-02 Cellular Soakaway
0 203 Ha area calculated in drainage calculation

Approximately 1371m2 + 10%UC = 1508m2 area discharging to SA-03 Cellular Soakaway
0.151 Ha area calculated in drainage calculation

Approximately 552m2 + 10%UC = 607m2 area discharging to SA-04 Cellular Soakaway
0 07 Ha area calculated in drainage calculation

Total Catchment area discharging to SA-01 TO SA-04 is 0.734 Ha

Note:-Approximately 60% of 1040m2 area (Playing Field) discharging to SA-05 Cellular Soakaway
0 07 Ha area calculated in drainage calculation

Private access roads in Permeable Block Paving (System A full infiltration) Infiltration into ground
Approximate Area 3638m2
0.364 Ha area calculated in drainage calculation

Parking spaces and drives in Permeable Block Paving (System A full infiltration) infiltration into ground
Approximate Area 6241m2
0 624 Ha area calculated in drainage calculation

Total Catchment area for Porous paving is 0.988 Ha

Total Catchment area for 0.988 Ha + 0.734 Ha = 1.722 Ha

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APPENDIX D – SURFACE WATER DRAINAGE CALCULATION

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	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)	Easting (m)	Northing (m)	Depth (m)
SA1	0.310	88.350	554102.536	237747.849	2.700

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)		100 year (l/s)	5.8
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	0.950	Drain Down Time (mins)	10080	1 year (l/s)	1.5		
Winter CV	0.950	Additional Storage (m³/ha)	0.0	30 year (l/s)	4.3		

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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
30	0	0	0	100	40	0	0
30	35	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.53	Betterment (%)	0
Greenfield Method	IH124	Region	6	QBar	1.8
Positively Drained Area (ha)	0.353	Growth Factor 1 year	0.85	Q 1 year (l/s)	1.5
SAAR (mm)	590	Growth Factor 30 year	2.40	Q 30 year (l/s)	4.3
Soil Index	5	Growth Factor 100 year	3.19	Q 100 year (l/s)	5.8

Node SA1 Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	85.650	Design Flow (l/s)	0.1
Replaces Downstream Link	✓	Design Depth (m)	2.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	2.500	0.000

Node SA1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.25200	Porosity	0.95	Width (m)	3.000	Depth (m)	1.500
Side Inf Coefficient (m/hr)	0.25200	Invert Level (m)	85.650	Length (m)	39.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	200	Slope (1:X)	1000.0		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	100.123	28.331	2 year 1440 minute summer	5.100	1.367
2 year 15 minute winter	70.261	28.331	2 year 1440 minute winter	3.428	1.367
2 year 30 minute summer	62.784	17.766	2 year 2160 minute summer	3.557	0.983
2 year 30 minute winter	44.059	17.766	2 year 2160 minute winter	2.451	0.983
2 year 60 minute summer	40.921	10.814	2 year 2880 minute summer	2.924	0.784
2 year 60 minute winter	27.187	10.814	2 year 2880 minute winter	1.965	0.784
2 year 120 minute summer	30.840	8.150	2 year 4320 minute summer	2.229	0.583
2 year 120 minute winter	20.489	8.150	2 year 4320 minute winter	1.468	0.583
2 year 180 minute summer	25.361	6.526	2 year 5760 minute summer	1.877	0.480
2 year 180 minute winter	16.485	6.526	2 year 5760 minute winter	1.215	0.480
2 year 240 minute summer	20.644	5.456	2 year 7200 minute summer	1.641	0.419
2 year 240 minute winter	13.715	5.456	2 year 7200 minute winter	1.059	0.419
2 year 360 minute summer	16.001	4.118	2 year 8640 minute summer	1.479	0.377
2 year 360 minute winter	10.401	4.118	2 year 8640 minute winter	0.955	0.377
2 year 480 minute summer	12.559	3.319	2 year 10080 minute summer	1.363	0.348
2 year 480 minute winter	8.344	3.319	2 year 10080 minute winter	0.880	0.348
2 year 600 minute summer	10.200	2.790	30 year 15 minute summer	283.716	80.282
2 year 600 minute winter	6.969	2.790	30 year 15 minute winter	199.099	80.282
2 year 720 minute summer	9.002	2.413	30 year 30 minute summer	181.802	51.444
2 year 720 minute winter	6.050	2.413	30 year 30 minute winter	127.580	51.444
2 year 960 minute summer	7.247	1.908	30 year 60 minute summer	118.283	31.259
2 year 960 minute winter	4.800	1.908	30 year 60 minute winter	78.585	31.259

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 120 minute summer	75.603	19.980	30 year 7200 minute winter	1.831	0.724
30 year 120 minute winter	50.229	19.980	30 year 8640 minute summer	2.507	0.640
30 year 180 minute summer	58.236	14.986	30 year 8640 minute winter	1.618	0.640
30 year 180 minute winter	37.855	14.986	30 year 10080 minute summer	2.271	0.579
30 year 240 minute summer	45.711	12.080	30 year 10080 minute winter	1.466	0.579
30 year 240 minute winter	30.370	12.080	30 year +35% CC 15 minute summer	383.017	108.381
30 year 360 minute summer	34.072	8.768	30 year +35% CC 15 minute winter	268.784	108.381
30 year 360 minute winter	22.147	8.768	30 year +35% CC 30 minute summer	245.432	69.449
30 year 480 minute summer	26.166	6.915	30 year +35% CC 30 minute winter	172.233	69.449
30 year 480 minute winter	17.384	6.915	30 year +35% CC 60 minute summer	159.682	42.199
30 year 600 minute summer	20.941	5.728	30 year +35% CC 60 minute winter	106.089	42.199
30 year 600 minute winter	14.308	5.728	30 year +35% CC 120 minute summer	102.064	26.973
30 year 720 minute summer	18.282	4.900	30 year +35% CC 120 minute winter	67.809	26.973
30 year 720 minute winter	12.287	4.900	30 year +35% CC 180 minute summer	78.618	20.231
30 year 960 minute summer	14.496	3.817	30 year +35% CC 180 minute winter	51.104	20.231
30 year 960 minute winter	9.602	3.817	30 year +35% CC 240 minute summer	61.710	16.308
30 year 1440 minute summer	9.972	2.673	30 year +35% CC 240 minute winter	40.999	16.308
30 year 1440 minute winter	6.702	2.673	30 year +35% CC 360 minute summer	45.997	11.836
30 year 2160 minute summer	6.797	1.878	30 year +35% CC 360 minute winter	29.899	11.836
30 year 2160 minute winter	4.683	1.878	30 year +35% CC 480 minute summer	35.324	9.335
30 year 2880 minute summer	5.490	1.471	30 year +35% CC 480 minute winter	23.468	9.335
30 year 2880 minute winter	3.689	1.471	30 year +35% CC 600 minute summer	28.270	7.733
30 year 4320 minute summer	4.050	1.059	30 year +35% CC 600 minute winter	19.316	7.733
30 year 4320 minute winter	2.667	1.059	30 year +35% CC 720 minute summer	24.681	6.615
30 year 5760 minute summer	3.318	0.849	30 year +35% CC 720 minute winter	16.587	6.615
30 year 5760 minute winter	2.148	0.849	30 year +35% CC 960 minute summer	19.569	5.153
30 year 7200 minute summer	2.837	0.724	30 year +35% CC 960 minute winter	12.963	5.153

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 1440 minute summer	13.462	3.608	100 year 240 minute winter	37.538	14.932
30 year +35% CC 1440 minute winter	9.047	3.608	100 year 360 minute summer	42.000	10.808
30 year +35% CC 2160 minute summer	9.176	2.536	100 year 360 minute winter	27.301	10.808
30 year +35% CC 2160 minute winter	6.322	2.536	100 year 480 minute summer	32.234	8.519
30 year +35% CC 2880 minute summer	7.411	1.986	100 year 480 minute winter	21.416	8.519
30 year +35% CC 2880 minute winter	4.981	1.986	100 year 600 minute summer	25.786	7.053
30 year +35% CC 4320 minute summer	5.468	1.430	100 year 600 minute winter	17.619	7.053
30 year +35% CC 4320 minute winter	3.601	1.430	100 year 720 minute summer	22.503	6.031
30 year +35% CC 5760 minute summer	4.479	1.147	100 year 720 minute winter	15.123	6.031
30 year +35% CC 5760 minute winter	2.899	1.147	100 year 960 minute summer	17.821	4.693
30 year +35% CC 7200 minute summer	3.830	0.977	100 year 960 minute winter	11.805	4.693
30 year +35% CC 7200 minute winter	2.472	0.977	100 year 1440 minute summer	12.225	3.276
30 year +35% CC 8640 minute summer	3.384	0.863	100 year 1440 minute winter	8.216	3.276
30 year +35% CC 8640 minute winter	2.184	0.863	100 year 2160 minute summer	8.279	2.288
30 year +35% CC 10080 minute summer	3.065	0.782	100 year 2160 minute winter	5.704	2.288
30 year +35% CC 10080 minute winter	1.978	0.782	100 year 2880 minute summer	6.644	1.781
100 year 15 minute summer	359.906	101.841	100 year 2880 minute winter	4.465	1.781
100 year 15 minute winter	252.566	101.841	100 year 4320 minute summer	4.845	1.267
100 year 30 minute summer	231.671	65.555	100 year 4320 minute winter	3.190	1.267
100 year 30 minute winter	162.576	65.555	100 year 5760 minute summer	3.928	1.006
100 year 60 minute summer	151.892	40.141	100 year 5760 minute winter	2.542	1.006
100 year 60 minute winter	100.913	40.141	100 year 7200 minute summer	3.329	0.849
100 year 120 minute summer	94.622	25.006	100 year 7200 minute winter	2.149	0.849
100 year 120 minute winter	62.865	25.006	100 year 8640 minute summer	2.919	0.745
100 year 180 minute summer	72.259	18.595	100 year 8640 minute winter	1.884	0.745
100 year 180 minute winter	46.970	18.595	100 year 10080 minute summer	2.626	0.670
100 year 240 minute summer	56.501	14.932	100 year 10080 minute winter	1.695	0.670

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 15 minute summer	503.868	142.577	100 year +40% CC 720 minute winter	21.172	8.443
100 year +40% CC 15 minute winter	353.592	142.577	100 year +40% CC 960 minute summer	24.949	6.570
100 year +40% CC 30 minute summer	324.339	91.777	100 year +40% CC 960 minute winter	16.527	6.570
100 year +40% CC 30 minute winter	227.607	91.777	100 year +40% CC 1440 minute summer	17.114	4.587
100 year +40% CC 60 minute summer	212.648	56.197	100 year +40% CC 1440 minute winter	11.502	4.587
100 year +40% CC 60 minute winter	141.279	56.197	100 year +40% CC 2160 minute summer	11.590	3.203
100 year +40% CC 120 minute summer	132.471	35.008	100 year +40% CC 2160 minute winter	7.986	3.203
100 year +40% CC 120 minute winter	88.011	35.008	100 year +40% CC 2880 minute summer	9.301	2.493
100 year +40% CC 180 minute summer	101.162	26.032	100 year +40% CC 2880 minute winter	6.251	2.493
100 year +40% CC 180 minute winter	65.758	26.032	100 year +40% CC 4320 minute summer	6.782	1.773
100 year +40% CC 240 minute summer	79.101	20.904	100 year +40% CC 4320 minute winter	4.467	1.773
100 year +40% CC 240 minute winter	52.553	20.904	100 year +40% CC 5760 minute summer	5.499	1.408
100 year +40% CC 360 minute summer	58.801	15.131	100 year +40% CC 5760 minute winter	3.559	1.408
100 year +40% CC 360 minute winter	38.222	15.131	100 year +40% CC 7200 minute summer	4.661	1.189
100 year +40% CC 480 minute summer	45.128	11.926	100 year +40% CC 7200 minute winter	3.008	1.189
100 year +40% CC 480 minute winter	29.982	11.926	100 year +40% CC 8640 minute summer	4.087	1.043
100 year +40% CC 600 minute summer	36.101	9.874	100 year +40% CC 8640 minute winter	2.638	1.043
100 year +40% CC 600 minute winter	24.666	9.874	100 year +40% CC 10080 minute summer	3.676	0.938
100 year +40% CC 720 minute summer	31.504	8.443	100 year +40% CC 10080 minute winter	2.372	0.938

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	SA1	124	85.903	0.253	19.3	25.9908	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute summer	SA1	Depth/Flow	0.0	0.0
180 minute summer	SA1	Infiltration	4.8	

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	SA1	116	86.414	0.764	40.7	82.7712	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
120 minute winter	SA1	Depth/Flow	0.0	0.0
120 minute winter	SA1	Infiltration	6.3	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 98.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	SA1	152	86.755	1.105	41.2	120.6473	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	SA1	Depth/Flow	0.0	0.0
180 minute winter	SA1	Infiltration	7.3	

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	SA1	116	86.653	1.003	51.0	109.2954	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
120 minute winter	SA1	Depth/Flow	0.0	0.0
120 minute winter	SA1	Infiltration	7.0	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	SA1	172	87.301	1.651	53.1	164.6151	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	SA1	Depth/Flow	0.0	0.0
180 minute winter	SA1	Infiltration	8.4	

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	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)	Easting (m)	Northing (m)	Depth (m)
SA2	0.118	90.850	554102.536	237747.849	2.500

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)		100 year (l/s)	5.8
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	0.950	Drain Down Time (mins)	10080	1 year (l/s)	1.5		
Winter CV	0.950	Additional Storage (m³/ha)	0.0	30 year (l/s)	4.3		

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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
30	0	0	0	100	40	0	0
30	35	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.53	Betterment (%)	0
Greenfield Method	IH124	Region	6	QBar	1.8
Positively Drained Area (ha)	0.353	Growth Factor 1 year	0.85	Q 1 year (l/s)	1.5
SAAR (mm)	590	Growth Factor 30 year	2.40	Q 30 year (l/s)	4.3
Soil Index	5	Growth Factor 100 year	3.19	Q 100 year (l/s)	5.8

Node SA2 Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	88.350	Design Flow (l/s)	0.1
Replaces Downstream Link	✓	Design Depth (m)	2.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	2.500	0.000

Node SA2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.06480	Porosity	0.95	Width (m)	3.000	Depth (m)	1.500
Side Inf Coefficient (m/hr)	0.06480	Invert Level (m)	88.350	Length (m)	37.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	468	Slope (1:X)	1000.0		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	100.123	28.331	2 year 1440 minute summer	5.100	1.367
2 year 15 minute winter	70.261	28.331	2 year 1440 minute winter	3.428	1.367
2 year 30 minute summer	62.784	17.766	2 year 2160 minute summer	3.557	0.983
2 year 30 minute winter	44.059	17.766	2 year 2160 minute winter	2.451	0.983
2 year 60 minute summer	40.921	10.814	2 year 2880 minute summer	2.924	0.784
2 year 60 minute winter	27.187	10.814	2 year 2880 minute winter	1.965	0.784
2 year 120 minute summer	30.840	8.150	2 year 4320 minute summer	2.229	0.583
2 year 120 minute winter	20.489	8.150	2 year 4320 minute winter	1.468	0.583
2 year 180 minute summer	25.361	6.526	2 year 5760 minute summer	1.877	0.480
2 year 180 minute winter	16.485	6.526	2 year 5760 minute winter	1.215	0.480
2 year 240 minute summer	20.644	5.456	2 year 7200 minute summer	1.641	0.419
2 year 240 minute winter	13.715	5.456	2 year 7200 minute winter	1.059	0.419
2 year 360 minute summer	16.001	4.118	2 year 8640 minute summer	1.479	0.377
2 year 360 minute winter	10.401	4.118	2 year 8640 minute winter	0.955	0.377
2 year 480 minute summer	12.559	3.319	2 year 10080 minute summer	1.363	0.348
2 year 480 minute winter	8.344	3.319	2 year 10080 minute winter	0.880	0.348
2 year 600 minute summer	10.200	2.790	30 year 15 minute summer	283.716	80.282
2 year 600 minute winter	6.969	2.790	30 year 15 minute winter	199.099	80.282
2 year 720 minute summer	9.002	2.413	30 year 30 minute summer	181.802	51.444
2 year 720 minute winter	6.050	2.413	30 year 30 minute winter	127.580	51.444
2 year 960 minute summer	7.247	1.908	30 year 60 minute summer	118.283	31.259
2 year 960 minute winter	4.800	1.908	30 year 60 minute winter	78.585	31.259

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 120 minute summer	75.603	19.980	30 year 7200 minute winter	1.831	0.724
30 year 120 minute winter	50.229	19.980	30 year 8640 minute summer	2.507	0.640
30 year 180 minute summer	58.236	14.986	30 year 8640 minute winter	1.618	0.640
30 year 180 minute winter	37.855	14.986	30 year 10080 minute summer	2.271	0.579
30 year 240 minute summer	45.711	12.080	30 year 10080 minute winter	1.466	0.579
30 year 240 minute winter	30.370	12.080	30 year +35% CC 15 minute summer	383.017	108.381
30 year 360 minute summer	34.072	8.768	30 year +35% CC 15 minute winter	268.784	108.381
30 year 360 minute winter	22.147	8.768	30 year +35% CC 30 minute summer	245.432	69.449
30 year 480 minute summer	26.166	6.915	30 year +35% CC 30 minute winter	172.233	69.449
30 year 480 minute winter	17.384	6.915	30 year +35% CC 60 minute summer	159.682	42.199
30 year 600 minute summer	20.941	5.728	30 year +35% CC 60 minute winter	106.089	42.199
30 year 600 minute winter	14.308	5.728	30 year +35% CC 120 minute summer	102.064	26.973
30 year 720 minute summer	18.282	4.900	30 year +35% CC 120 minute winter	67.809	26.973
30 year 720 minute winter	12.287	4.900	30 year +35% CC 180 minute summer	78.618	20.231
30 year 960 minute summer	14.496	3.817	30 year +35% CC 180 minute winter	51.104	20.231
30 year 960 minute winter	9.602	3.817	30 year +35% CC 240 minute summer	61.710	16.308
30 year 1440 minute summer	9.972	2.673	30 year +35% CC 240 minute winter	40.999	16.308
30 year 1440 minute winter	6.702	2.673	30 year +35% CC 360 minute summer	45.997	11.836
30 year 2160 minute summer	6.797	1.878	30 year +35% CC 360 minute winter	29.899	11.836
30 year 2160 minute winter	4.683	1.878	30 year +35% CC 480 minute summer	35.324	9.335
30 year 2880 minute summer	5.490	1.471	30 year +35% CC 480 minute winter	23.468	9.335
30 year 2880 minute winter	3.689	1.471	30 year +35% CC 600 minute summer	28.270	7.733
30 year 4320 minute summer	4.050	1.059	30 year +35% CC 600 minute winter	19.316	7.733
30 year 4320 minute winter	2.667	1.059	30 year +35% CC 720 minute summer	24.681	6.615
30 year 5760 minute summer	3.318	0.849	30 year +35% CC 720 minute winter	16.587	6.615
30 year 5760 minute winter	2.148	0.849	30 year +35% CC 960 minute summer	19.569	5.153
30 year 7200 minute summer	2.837	0.724	30 year +35% CC 960 minute winter	12.963	5.153

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 1440 minute summer	13.462	3.608	100 year 240 minute winter	37.538	14.932
30 year +35% CC 1440 minute winter	9.047	3.608	100 year 360 minute summer	42.000	10.808
30 year +35% CC 2160 minute summer	9.176	2.536	100 year 360 minute winter	27.301	10.808
30 year +35% CC 2160 minute winter	6.322	2.536	100 year 480 minute summer	32.234	8.519
30 year +35% CC 2880 minute summer	7.411	1.986	100 year 480 minute winter	21.416	8.519
30 year +35% CC 2880 minute winter	4.981	1.986	100 year 600 minute summer	25.786	7.053
30 year +35% CC 4320 minute summer	5.468	1.430	100 year 600 minute winter	17.619	7.053
30 year +35% CC 4320 minute winter	3.601	1.430	100 year 720 minute summer	22.503	6.031
30 year +35% CC 5760 minute summer	4.479	1.147	100 year 720 minute winter	15.123	6.031
30 year +35% CC 5760 minute winter	2.899	1.147	100 year 960 minute summer	17.821	4.693
30 year +35% CC 7200 minute summer	3.830	0.977	100 year 960 minute winter	11.805	4.693
30 year +35% CC 7200 minute winter	2.472	0.977	100 year 1440 minute summer	12.225	3.276
30 year +35% CC 8640 minute summer	3.384	0.863	100 year 1440 minute winter	8.216	3.276
30 year +35% CC 8640 minute winter	2.184	0.863	100 year 2160 minute summer	8.279	2.288
30 year +35% CC 10080 minute summer	3.065	0.782	100 year 2160 minute winter	5.704	2.288
30 year +35% CC 10080 minute winter	1.978	0.782	100 year 2880 minute summer	6.644	1.781
100 year 15 minute summer	359.906	101.841	100 year 2880 minute winter	4.465	1.781
100 year 15 minute winter	252.566	101.841	100 year 4320 minute summer	4.845	1.267
100 year 30 minute summer	231.671	65.555	100 year 4320 minute winter	3.190	1.267
100 year 30 minute winter	162.576	65.555	100 year 5760 minute summer	3.928	1.006
100 year 60 minute summer	151.892	40.141	100 year 5760 minute winter	2.542	1.006
100 year 60 minute winter	100.913	40.141	100 year 7200 minute summer	3.329	0.849
100 year 120 minute summer	94.622	25.006	100 year 7200 minute winter	2.149	0.849
100 year 120 minute winter	62.865	25.006	100 year 8640 minute summer	2.919	0.745
100 year 180 minute summer	72.259	18.595	100 year 8640 minute winter	1.884	0.745
100 year 180 minute winter	46.970	18.595	100 year 10080 minute summer	2.626	0.670
100 year 240 minute summer	56.501	14.932	100 year 10080 minute winter	1.695	0.670

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 15 minute summer	503.868	142.577	100 year +40% CC 720 minute winter	21.172	8.443
100 year +40% CC 15 minute winter	353.592	142.577	100 year +40% CC 960 minute summer	24.949	6.570
100 year +40% CC 30 minute summer	324.339	91.777	100 year +40% CC 960 minute winter	16.527	6.570
100 year +40% CC 30 minute winter	227.607	91.777	100 year +40% CC 1440 minute summer	17.114	4.587
100 year +40% CC 60 minute summer	212.648	56.197	100 year +40% CC 1440 minute winter	11.502	4.587
100 year +40% CC 60 minute winter	141.279	56.197	100 year +40% CC 2160 minute summer	11.590	3.203
100 year +40% CC 120 minute summer	132.471	35.008	100 year +40% CC 2160 minute winter	7.986	3.203
100 year +40% CC 120 minute winter	88.011	35.008	100 year +40% CC 2880 minute summer	9.301	2.493
100 year +40% CC 180 minute summer	101.162	26.032	100 year +40% CC 2880 minute winter	6.251	2.493
100 year +40% CC 180 minute winter	65.758	26.032	100 year +40% CC 4320 minute summer	6.782	1.773
100 year +40% CC 240 minute summer	79.101	20.904	100 year +40% CC 4320 minute winter	4.467	1.773
100 year +40% CC 240 minute winter	52.553	20.904	100 year +40% CC 5760 minute summer	5.499	1.408
100 year +40% CC 360 minute summer	58.801	15.131	100 year +40% CC 5760 minute winter	3.559	1.408
100 year +40% CC 360 minute winter	38.222	15.131	100 year +40% CC 7200 minute summer	4.661	1.189
100 year +40% CC 480 minute summer	45.128	11.926	100 year +40% CC 7200 minute winter	3.008	1.189
100 year +40% CC 480 minute winter	29.982	11.926	100 year +40% CC 8640 minute summer	4.087	1.043
100 year +40% CC 600 minute summer	36.101	9.874	100 year +40% CC 8640 minute winter	2.638	1.043
100 year +40% CC 600 minute winter	24.666	9.874	100 year +40% CC 10080 minute summer	3.676	0.938
100 year +40% CC 720 minute summer	31.504	8.443	100 year +40% CC 10080 minute winter	2.372	0.938

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	SA2	172	88.499	0.149	6.4	13.8139	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute summer	SA2	Depth/Flow	0.0	0.0
240 minute summer	SA2	Infiltration	1.1	

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	SA2	232	88.744	0.394	9.5	39.5821	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	SA2	Depth/Flow	0.0	0.0
240 minute winter	SA2	Infiltration	1.3	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 98.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	SA2	236	88.911	0.561	12.8	57.1639	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	SA2	Depth/Flow	0.0	0.0
240 minute winter	SA2	Infiltration	1.4	

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	SA2	236	88.855	0.505	11.7	51.3436	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	SA2	Depth/Flow	0.0	0.0
240 minute winter	SA2	Infiltration	1.3	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	SA2	236	89.095	0.745	16.4	76.5646	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	SA2	Depth/Flow	0.0	0.0
240 minute winter	SA2	Infiltration	1.5	

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	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)	Easting (m)	Northing (m)	Depth (m)
SA3	0.151	90.850	554102.536	237747.849	2.850

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)		100 year (l/s)	5.8
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	0.950	Drain Down Time (mins)	10080	1 year (l/s)	1.5		
Winter CV	0.950	Additional Storage (m³/ha)	0.0	30 year (l/s)	4.3		

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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
30	0	0	0	100	40	0	0
30	35	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.53	Betterment (%)	0
Greenfield Method	IH124	Region	6	QBar	1.8
Positively Drained Area (ha)	0.353	Growth Factor 1 year	0.85	Q 1 year (l/s)	1.5
SAAR (mm)	590	Growth Factor 30 year	2.40	Q 30 year (l/s)	4.3
Soil Index	5	Growth Factor 100 year	3.19	Q 100 year (l/s)	5.8

Node SA3 Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	88.000	Design Flow (l/s)	0.1
Replaces Downstream Link	✓	Design Depth (m)	2.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	2.500	0.000

Node SA3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.02340	Porosity	0.95	Width (m)	5.500	Depth (m)	1.500
Side Inf Coefficient (m/hr)	0.02340	Invert Level (m)	88.000	Length (m)	31.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1470	Slope (1:X)	1000.0		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	100.123	28.331	2 year 1440 minute summer	5.100	1.367
2 year 15 minute winter	70.261	28.331	2 year 1440 minute winter	3.428	1.367
2 year 30 minute summer	62.784	17.766	2 year 2160 minute summer	3.557	0.983
2 year 30 minute winter	44.059	17.766	2 year 2160 minute winter	2.451	0.983
2 year 60 minute summer	40.921	10.814	2 year 2880 minute summer	2.924	0.784
2 year 60 minute winter	27.187	10.814	2 year 2880 minute winter	1.965	0.784
2 year 120 minute summer	30.840	8.150	2 year 4320 minute summer	2.229	0.583
2 year 120 minute winter	20.489	8.150	2 year 4320 minute winter	1.468	0.583
2 year 180 minute summer	25.361	6.526	2 year 5760 minute summer	1.877	0.480
2 year 180 minute winter	16.485	6.526	2 year 5760 minute winter	1.215	0.480
2 year 240 minute summer	20.644	5.456	2 year 7200 minute summer	1.641	0.419
2 year 240 minute winter	13.715	5.456	2 year 7200 minute winter	1.059	0.419
2 year 360 minute summer	16.001	4.118	2 year 8640 minute summer	1.479	0.377
2 year 360 minute winter	10.401	4.118	2 year 8640 minute winter	0.955	0.377
2 year 480 minute summer	12.559	3.319	2 year 10080 minute summer	1.363	0.348
2 year 480 minute winter	8.344	3.319	2 year 10080 minute winter	0.880	0.348
2 year 600 minute summer	10.200	2.790	30 year 15 minute summer	283.716	80.282
2 year 600 minute winter	6.969	2.790	30 year 15 minute winter	199.099	80.282
2 year 720 minute summer	9.002	2.413	30 year 30 minute summer	181.802	51.444
2 year 720 minute winter	6.050	2.413	30 year 30 minute winter	127.580	51.444
2 year 960 minute summer	7.247	1.908	30 year 60 minute summer	118.283	31.259
2 year 960 minute winter	4.800	1.908	30 year 60 minute winter	78.585	31.259

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 120 minute summer	75.603	19.980	30 year 7200 minute winter	1.831	0.724
30 year 120 minute winter	50.229	19.980	30 year 8640 minute summer	2.507	0.640
30 year 180 minute summer	58.236	14.986	30 year 8640 minute winter	1.618	0.640
30 year 180 minute winter	37.855	14.986	30 year 10080 minute summer	2.271	0.579
30 year 240 minute summer	45.711	12.080	30 year 10080 minute winter	1.466	0.579
30 year 240 minute winter	30.370	12.080	30 year +35% CC 15 minute summer	383.017	108.381
30 year 360 minute summer	34.072	8.768	30 year +35% CC 15 minute winter	268.784	108.381
30 year 360 minute winter	22.147	8.768	30 year +35% CC 30 minute summer	245.432	69.449
30 year 480 minute summer	26.166	6.915	30 year +35% CC 30 minute winter	172.233	69.449
30 year 480 minute winter	17.384	6.915	30 year +35% CC 60 minute summer	159.682	42.199
30 year 600 minute summer	20.941	5.728	30 year +35% CC 60 minute winter	106.089	42.199
30 year 600 minute winter	14.308	5.728	30 year +35% CC 120 minute summer	102.064	26.973
30 year 720 minute summer	18.282	4.900	30 year +35% CC 120 minute winter	67.809	26.973
30 year 720 minute winter	12.287	4.900	30 year +35% CC 180 minute summer	78.618	20.231
30 year 960 minute summer	14.496	3.817	30 year +35% CC 180 minute winter	51.104	20.231
30 year 960 minute winter	9.602	3.817	30 year +35% CC 240 minute summer	61.710	16.308
30 year 1440 minute summer	9.972	2.673	30 year +35% CC 240 minute winter	40.999	16.308
30 year 1440 minute winter	6.702	2.673	30 year +35% CC 360 minute summer	45.997	11.836
30 year 2160 minute summer	6.797	1.878	30 year +35% CC 360 minute winter	29.899	11.836
30 year 2160 minute winter	4.683	1.878	30 year +35% CC 480 minute summer	35.324	9.335
30 year 2880 minute summer	5.490	1.471	30 year +35% CC 480 minute winter	23.468	9.335
30 year 2880 minute winter	3.689	1.471	30 year +35% CC 600 minute summer	28.270	7.733
30 year 4320 minute summer	4.050	1.059	30 year +35% CC 600 minute winter	19.316	7.733
30 year 4320 minute winter	2.667	1.059	30 year +35% CC 720 minute summer	24.681	6.615
30 year 5760 minute summer	3.318	0.849	30 year +35% CC 720 minute winter	16.587	6.615
30 year 5760 minute winter	2.148	0.849	30 year +35% CC 960 minute summer	19.569	5.153
30 year 7200 minute summer	2.837	0.724	30 year +35% CC 960 minute winter	12.963	5.153

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 1440 minute summer	13.462	3.608	100 year 240 minute winter	37.538	14.932
30 year +35% CC 1440 minute winter	9.047	3.608	100 year 360 minute summer	42.000	10.808
30 year +35% CC 2160 minute summer	9.176	2.536	100 year 360 minute winter	27.301	10.808
30 year +35% CC 2160 minute winter	6.322	2.536	100 year 480 minute summer	32.234	8.519
30 year +35% CC 2880 minute summer	7.411	1.986	100 year 480 minute winter	21.416	8.519
30 year +35% CC 2880 minute winter	4.981	1.986	100 year 600 minute summer	25.786	7.053
30 year +35% CC 4320 minute summer	5.468	1.430	100 year 600 minute winter	17.619	7.053
30 year +35% CC 4320 minute winter	3.601	1.430	100 year 720 minute summer	22.503	6.031
30 year +35% CC 5760 minute summer	4.479	1.147	100 year 720 minute winter	15.123	6.031
30 year +35% CC 5760 minute winter	2.899	1.147	100 year 960 minute summer	17.821	4.693
30 year +35% CC 7200 minute summer	3.830	0.977	100 year 960 minute winter	11.805	4.693
30 year +35% CC 7200 minute winter	2.472	0.977	100 year 1440 minute summer	12.225	3.276
30 year +35% CC 8640 minute summer	3.384	0.863	100 year 1440 minute winter	8.216	3.276
30 year +35% CC 8640 minute winter	2.184	0.863	100 year 2160 minute summer	8.279	2.288
30 year +35% CC 10080 minute summer	3.065	0.782	100 year 2160 minute winter	5.704	2.288
30 year +35% CC 10080 minute winter	1.978	0.782	100 year 2880 minute summer	6.644	1.781
100 year 15 minute summer	359.906	101.841	100 year 2880 minute winter	4.465	1.781
100 year 15 minute winter	252.566	101.841	100 year 4320 minute summer	4.845	1.267
100 year 30 minute summer	231.671	65.555	100 year 4320 minute winter	3.190	1.267
100 year 30 minute winter	162.576	65.555	100 year 5760 minute summer	3.928	1.006
100 year 60 minute summer	151.892	40.141	100 year 5760 minute winter	2.542	1.006
100 year 60 minute winter	100.913	40.141	100 year 7200 minute summer	3.329	0.849
100 year 120 minute summer	94.622	25.006	100 year 7200 minute winter	2.149	0.849
100 year 120 minute winter	62.865	25.006	100 year 8640 minute summer	2.919	0.745
100 year 180 minute summer	72.259	18.595	100 year 8640 minute winter	1.884	0.745
100 year 180 minute winter	46.970	18.595	100 year 10080 minute summer	2.626	0.670
100 year 240 minute summer	56.501	14.932	100 year 10080 minute winter	1.695	0.670

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 15 minute summer	503.868	142.577	100 year +40% CC 720 minute winter	21.172	8.443
100 year +40% CC 15 minute winter	353.592	142.577	100 year +40% CC 960 minute summer	24.949	6.570
100 year +40% CC 30 minute summer	324.339	91.777	100 year +40% CC 960 minute winter	16.527	6.570
100 year +40% CC 30 minute winter	227.607	91.777	100 year +40% CC 1440 minute summer	17.114	4.587
100 year +40% CC 60 minute summer	212.648	56.197	100 year +40% CC 1440 minute winter	11.502	4.587
100 year +40% CC 60 minute winter	141.279	56.197	100 year +40% CC 2160 minute summer	11.590	3.203
100 year +40% CC 120 minute summer	132.471	35.008	100 year +40% CC 2160 minute winter	7.986	3.203
100 year +40% CC 120 minute winter	88.011	35.008	100 year +40% CC 2880 minute summer	9.301	2.493
100 year +40% CC 180 minute summer	101.162	26.032	100 year +40% CC 2880 minute winter	6.251	2.493
100 year +40% CC 180 minute winter	65.758	26.032	100 year +40% CC 4320 minute summer	6.782	1.773
100 year +40% CC 240 minute summer	79.101	20.904	100 year +40% CC 4320 minute winter	4.467	1.773
100 year +40% CC 240 minute winter	52.553	20.904	100 year +40% CC 5760 minute summer	5.499	1.408
100 year +40% CC 360 minute summer	58.801	15.131	100 year +40% CC 5760 minute winter	3.559	1.408
100 year +40% CC 360 minute winter	38.222	15.131	100 year +40% CC 7200 minute summer	4.661	1.189
100 year +40% CC 480 minute summer	45.128	11.926	100 year +40% CC 7200 minute winter	3.008	1.189
100 year +40% CC 480 minute winter	29.982	11.926	100 year +40% CC 8640 minute summer	4.087	1.043
100 year +40% CC 600 minute summer	36.101	9.874	100 year +40% CC 8640 minute winter	2.638	1.043
100 year +40% CC 600 minute winter	24.666	9.874	100 year +40% CC 10080 minute summer	3.676	0.938
100 year +40% CC 720 minute summer	31.504	8.443	100 year +40% CC 10080 minute winter	2.372	0.938

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	SA3	344	88.172	0.172	4.1	25.4249	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
360 minute winter	SA3	Depth/Flow	0.0	0.0
360 minute winter	SA3	Infiltration	0.6	

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	SA3	352	88.410	0.410	8.8	63.8523	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
360 minute winter	SA3	Depth/Flow	0.0	0.0
360 minute winter	SA3	Infiltration	0.6	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 98.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	SA3	472	88.577	0.577	9.4	90.9443	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
480 minute winter	SA3	Depth/Flow	0.0	0.0
480 minute winter	SA3	Infiltration	0.7	

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	SA3	472	88.519	0.519	8.5	81.6022	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
480 minute winter	SA3	Depth/Flow	0.0	0.0
480 minute winter	SA3	Infiltration	0.7	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	SA3	600	88.756	0.756	9.8	119.8658	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
600 minute winter	SA3	Depth/Flow	0.0	0.0
600 minute winter	SA3	Infiltration	0.7	

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	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)	Easting (m)	Northing (m)	Depth (m)
SA4	0.070	90.850	554102.536	237747.849	2.850

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)		100 year (l/s)	5.8
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	0.950	Drain Down Time (mins)	10080	1 year (l/s)	1.5		
Winter CV	0.950	Additional Storage (m³/ha)	0.0	30 year (l/s)	4.3		

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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
30	0	0	0	100	40	0	0
30	35	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.53	Betterment (%)	0
Greenfield Method	IH124	Region	6	QBar	1.8
Positively Drained Area (ha)	0.353	Growth Factor 1 year	0.85	Q 1 year (l/s)	1.5
SAAR (mm)	590	Growth Factor 30 year	2.40	Q 30 year (l/s)	4.3
Soil Index	5	Growth Factor 100 year	3.19	Q 100 year (l/s)	5.8

Node SA4 Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	88.000	Design Flow (l/s)	0.1
Replaces Downstream Link	✓	Design Depth (m)	2.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	2.500	0.000

Node SA4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.10440	Porosity	0.95	Width (m)	4.000	Depth (m)	1.500
Side Inf Coefficient (m/hr)	0.10440	Invert Level (m)	88.000	Length (m)	15.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	304	Slope (1:X)	1000.0		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	100.123	28.331	2 year 1440 minute summer	5.100	1.367
2 year 15 minute winter	70.261	28.331	2 year 1440 minute winter	3.428	1.367
2 year 30 minute summer	62.784	17.766	2 year 2160 minute summer	3.557	0.983
2 year 30 minute winter	44.059	17.766	2 year 2160 minute winter	2.451	0.983
2 year 60 minute summer	40.921	10.814	2 year 2880 minute summer	2.924	0.784
2 year 60 minute winter	27.187	10.814	2 year 2880 minute winter	1.965	0.784
2 year 120 minute summer	30.840	8.150	2 year 4320 minute summer	2.229	0.583
2 year 120 minute winter	20.489	8.150	2 year 4320 minute winter	1.468	0.583
2 year 180 minute summer	25.361	6.526	2 year 5760 minute summer	1.877	0.480
2 year 180 minute winter	16.485	6.526	2 year 5760 minute winter	1.215	0.480
2 year 240 minute summer	20.644	5.456	2 year 7200 minute summer	1.641	0.419
2 year 240 minute winter	13.715	5.456	2 year 7200 minute winter	1.059	0.419
2 year 360 minute summer	16.001	4.118	2 year 8640 minute summer	1.479	0.377
2 year 360 minute winter	10.401	4.118	2 year 8640 minute winter	0.955	0.377
2 year 480 minute summer	12.559	3.319	2 year 10080 minute summer	1.363	0.348
2 year 480 minute winter	8.344	3.319	2 year 10080 minute winter	0.880	0.348
2 year 600 minute summer	10.200	2.790	30 year 15 minute summer	283.716	80.282
2 year 600 minute winter	6.969	2.790	30 year 15 minute winter	199.099	80.282
2 year 720 minute summer	9.002	2.413	30 year 30 minute summer	181.802	51.444
2 year 720 minute winter	6.050	2.413	30 year 30 minute winter	127.580	51.444
2 year 960 minute summer	7.247	1.908	30 year 60 minute summer	118.283	31.259
2 year 960 minute winter	4.800	1.908	30 year 60 minute winter	78.585	31.259

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 120 minute summer	75.603	19.980	30 year 7200 minute winter	1.831	0.724
30 year 120 minute winter	50.229	19.980	30 year 8640 minute summer	2.507	0.640
30 year 180 minute summer	58.236	14.986	30 year 8640 minute winter	1.618	0.640
30 year 180 minute winter	37.855	14.986	30 year 10080 minute summer	2.271	0.579
30 year 240 minute summer	45.711	12.080	30 year 10080 minute winter	1.466	0.579
30 year 240 minute winter	30.370	12.080	30 year +35% CC 15 minute summer	383.017	108.381
30 year 360 minute summer	34.072	8.768	30 year +35% CC 15 minute winter	268.784	108.381
30 year 360 minute winter	22.147	8.768	30 year +35% CC 30 minute summer	245.432	69.449
30 year 480 minute summer	26.166	6.915	30 year +35% CC 30 minute winter	172.233	69.449
30 year 480 minute winter	17.384	6.915	30 year +35% CC 60 minute summer	159.682	42.199
30 year 600 minute summer	20.941	5.728	30 year +35% CC 60 minute winter	106.089	42.199
30 year 600 minute winter	14.308	5.728	30 year +35% CC 120 minute summer	102.064	26.973
30 year 720 minute summer	18.282	4.900	30 year +35% CC 120 minute winter	67.809	26.973
30 year 720 minute winter	12.287	4.900	30 year +35% CC 180 minute summer	78.618	20.231
30 year 960 minute summer	14.496	3.817	30 year +35% CC 180 minute winter	51.104	20.231
30 year 960 minute winter	9.602	3.817	30 year +35% CC 240 minute summer	61.710	16.308
30 year 1440 minute summer	9.972	2.673	30 year +35% CC 240 minute winter	40.999	16.308
30 year 1440 minute winter	6.702	2.673	30 year +35% CC 360 minute summer	45.997	11.836
30 year 2160 minute summer	6.797	1.878	30 year +35% CC 360 minute winter	29.899	11.836
30 year 2160 minute winter	4.683	1.878	30 year +35% CC 480 minute summer	35.324	9.335
30 year 2880 minute summer	5.490	1.471	30 year +35% CC 480 minute winter	23.468	9.335
30 year 2880 minute winter	3.689	1.471	30 year +35% CC 600 minute summer	28.270	7.733
30 year 4320 minute summer	4.050	1.059	30 year +35% CC 600 minute winter	19.316	7.733
30 year 4320 minute winter	2.667	1.059	30 year +35% CC 720 minute summer	24.681	6.615
30 year 5760 minute summer	3.318	0.849	30 year +35% CC 720 minute winter	16.587	6.615
30 year 5760 minute winter	2.148	0.849	30 year +35% CC 960 minute summer	19.569	5.153
30 year 7200 minute summer	2.837	0.724	30 year +35% CC 960 minute winter	12.963	5.153

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 1440 minute summer	13.462	3.608	100 year 240 minute winter	37.538	14.932
30 year +35% CC 1440 minute winter	9.047	3.608	100 year 360 minute summer	42.000	10.808
30 year +35% CC 2160 minute summer	9.176	2.536	100 year 360 minute winter	27.301	10.808
30 year +35% CC 2160 minute winter	6.322	2.536	100 year 480 minute summer	32.234	8.519
30 year +35% CC 2880 minute summer	7.411	1.986	100 year 480 minute winter	21.416	8.519
30 year +35% CC 2880 minute winter	4.981	1.986	100 year 600 minute summer	25.786	7.053
30 year +35% CC 4320 minute summer	5.468	1.430	100 year 600 minute winter	17.619	7.053
30 year +35% CC 4320 minute winter	3.601	1.430	100 year 720 minute summer	22.503	6.031
30 year +35% CC 5760 minute summer	4.479	1.147	100 year 720 minute winter	15.123	6.031
30 year +35% CC 5760 minute winter	2.899	1.147	100 year 960 minute summer	17.821	4.693
30 year +35% CC 7200 minute summer	3.830	0.977	100 year 960 minute winter	11.805	4.693
30 year +35% CC 7200 minute winter	2.472	0.977	100 year 1440 minute summer	12.225	3.276
30 year +35% CC 8640 minute summer	3.384	0.863	100 year 1440 minute winter	8.216	3.276
30 year +35% CC 8640 minute winter	2.184	0.863	100 year 2160 minute summer	8.279	2.288
30 year +35% CC 10080 minute summer	3.065	0.782	100 year 2160 minute winter	5.704	2.288
30 year +35% CC 10080 minute winter	1.978	0.782	100 year 2880 minute summer	6.644	1.781
100 year 15 minute summer	359.906	101.841	100 year 2880 minute winter	4.465	1.781
100 year 15 minute winter	252.566	101.841	100 year 4320 minute summer	4.845	1.267
100 year 30 minute summer	231.671	65.555	100 year 4320 minute winter	3.190	1.267
100 year 30 minute winter	162.576	65.555	100 year 5760 minute summer	3.928	1.006
100 year 60 minute summer	151.892	40.141	100 year 5760 minute winter	2.542	1.006
100 year 60 minute winter	100.913	40.141	100 year 7200 minute summer	3.329	0.849
100 year 120 minute summer	94.622	25.006	100 year 7200 minute winter	2.149	0.849
100 year 120 minute winter	62.865	25.006	100 year 8640 minute summer	2.919	0.745
100 year 180 minute summer	72.259	18.595	100 year 8640 minute winter	1.884	0.745
100 year 180 minute winter	46.970	18.595	100 year 10080 minute summer	2.626	0.670
100 year 240 minute summer	56.501	14.932	100 year 10080 minute winter	1.695	0.670

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 15 minute summer	503.868	142.577	100 year +40% CC 720 minute winter	21.172	8.443
100 year +40% CC 15 minute winter	353.592	142.577	100 year +40% CC 960 minute summer	24.949	6.570
100 year +40% CC 30 minute summer	324.339	91.777	100 year +40% CC 960 minute winter	16.527	6.570
100 year +40% CC 30 minute winter	227.607	91.777	100 year +40% CC 1440 minute summer	17.114	4.587
100 year +40% CC 60 minute summer	212.648	56.197	100 year +40% CC 1440 minute winter	11.502	4.587
100 year +40% CC 60 minute winter	141.279	56.197	100 year +40% CC 2160 minute summer	11.590	3.203
100 year +40% CC 120 minute summer	132.471	35.008	100 year +40% CC 2160 minute winter	7.986	3.203
100 year +40% CC 120 minute winter	88.011	35.008	100 year +40% CC 2880 minute summer	9.301	2.493
100 year +40% CC 180 minute summer	101.162	26.032	100 year +40% CC 2880 minute winter	6.251	2.493
100 year +40% CC 180 minute winter	65.758	26.032	100 year +40% CC 4320 minute summer	6.782	1.773
100 year +40% CC 240 minute summer	79.101	20.904	100 year +40% CC 4320 minute winter	4.467	1.773
100 year +40% CC 240 minute winter	52.553	20.904	100 year +40% CC 5760 minute summer	5.499	1.408
100 year +40% CC 360 minute summer	58.801	15.131	100 year +40% CC 5760 minute winter	3.559	1.408
100 year +40% CC 360 minute winter	38.222	15.131	100 year +40% CC 7200 minute summer	4.661	1.189
100 year +40% CC 480 minute summer	45.128	11.926	100 year +40% CC 7200 minute winter	3.008	1.189
100 year +40% CC 480 minute winter	29.982	11.926	100 year +40% CC 8640 minute summer	4.087	1.043
100 year +40% CC 600 minute summer	36.101	9.874	100 year +40% CC 8640 minute winter	2.638	1.043
100 year +40% CC 600 minute winter	24.666	9.874	100 year +40% CC 10080 minute summer	3.676	0.938
100 year +40% CC 720 minute summer	31.504	8.443	100 year +40% CC 10080 minute winter	2.372	0.938

Results for 2 year Critical Storm Duration. Lowest mass balance: 97.26%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	SA4	128	88.132	0.132	4.4	7.1038	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute summer	SA4	Depth/Flow	0.0	0.0
180 minute summer	SA4	Infiltration	0.9	

Results for 30 year Critical Storm Duration. Lowest mass balance: 97.26%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	SA4	172	88.376	0.376	6.9	20.9769	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	SA4	Depth/Flow	0.0	0.0
180 minute winter	SA4	Infiltration	1.1	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 97.26%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	SA4	176	88.544	0.544	9.3	30.6083	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	SA4	Depth/Flow	0.0	0.0
180 minute winter	SA4	Infiltration	1.2	

Results for 100 year Critical Storm Duration. Lowest mass balance: 97.26%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	SA4	176	88.491	0.491	8.6	27.5334	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	SA4	Depth/Flow	0.0	0.0
180 minute winter	SA4	Infiltration	1.1	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 97.26%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	SA4	232	88.736	0.736	9.7	41.5277	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	SA4	Depth/Flow	0.0	0.0
240 minute winter	SA4	Infiltration	1.3	

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	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)	Easting (m)	Northing (m)	Depth (m)
PP	0.988	84.000	554102.536	237747.849	0.350

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)		100 year (l/s)	5.8
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	0.950	Drain Down Time (mins)	10080	1 year (l/s)	1.5		
Winter CV	0.950	Additional Storage (m³/ha)	0.0	30 year (l/s)	4.3		

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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
30	0	0	0	100	40	0	0
30	35	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.53	Betterment (%)	0
Greenfield Method	IH124	Region	6	QBar	1.8
Positively Drained Area (ha)	0.353	Growth Factor 1 year	0.85	Q 1 year (l/s)	1.5
SAAR (mm)	590	Growth Factor 30 year	2.40	Q 30 year (l/s)	4.3
Soil Index	5	Growth Factor 100 year	3.19	Q 100 year (l/s)	5.8

Node PP Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	83.650	Design Flow (l/s)	0.1
Replaces Downstream Link	✓	Design Depth (m)	2.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	2.500	0.000

Node PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Porosity	0.33	Width (m)	98.800	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.03600	Invert Level (m)	83.650	Length (m)	100.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	92	Slope (1:X)	1000.0		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	100.123	28.331	2 year 1440 minute summer	5.100	1.367
2 year 15 minute winter	70.261	28.331	2 year 1440 minute winter	3.428	1.367
2 year 30 minute summer	62.784	17.766	2 year 2160 minute summer	3.557	0.983
2 year 30 minute winter	44.059	17.766	2 year 2160 minute winter	2.451	0.983
2 year 60 minute summer	40.921	10.814	2 year 2880 minute summer	2.924	0.784
2 year 60 minute winter	27.187	10.814	2 year 2880 minute winter	1.965	0.784
2 year 120 minute summer	30.840	8.150	2 year 4320 minute summer	2.229	0.583
2 year 120 minute winter	20.489	8.150	2 year 4320 minute winter	1.468	0.583
2 year 180 minute summer	25.361	6.526	2 year 5760 minute summer	1.877	0.480
2 year 180 minute winter	16.485	6.526	2 year 5760 minute winter	1.215	0.480
2 year 240 minute summer	20.644	5.456	2 year 7200 minute summer	1.641	0.419
2 year 240 minute winter	13.715	5.456	2 year 7200 minute winter	1.059	0.419
2 year 360 minute summer	16.001	4.118	2 year 8640 minute summer	1.479	0.377
2 year 360 minute winter	10.401	4.118	2 year 8640 minute winter	0.955	0.377
2 year 480 minute summer	12.559	3.319	2 year 10080 minute summer	1.363	0.348
2 year 480 minute winter	8.344	3.319	2 year 10080 minute winter	0.880	0.348
2 year 600 minute summer	10.200	2.790	30 year 15 minute summer	283.716	80.282
2 year 600 minute winter	6.969	2.790	30 year 15 minute winter	199.099	80.282
2 year 720 minute summer	9.002	2.413	30 year 30 minute summer	181.802	51.444
2 year 720 minute winter	6.050	2.413	30 year 30 minute winter	127.580	51.444
2 year 960 minute summer	7.247	1.908	30 year 60 minute summer	118.283	31.259
2 year 960 minute winter	4.800	1.908	30 year 60 minute winter	78.585	31.259

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 120 minute summer	75.603	19.980	30 year 7200 minute winter	1.831	0.724
30 year 120 minute winter	50.229	19.980	30 year 8640 minute summer	2.507	0.640
30 year 180 minute summer	58.236	14.986	30 year 8640 minute winter	1.618	0.640
30 year 180 minute winter	37.855	14.986	30 year 10080 minute summer	2.271	0.579
30 year 240 minute summer	45.711	12.080	30 year 10080 minute winter	1.466	0.579
30 year 240 minute winter	30.370	12.080	30 year +35% CC 15 minute summer	383.017	108.381
30 year 360 minute summer	34.072	8.768	30 year +35% CC 15 minute winter	268.784	108.381
30 year 360 minute winter	22.147	8.768	30 year +35% CC 30 minute summer	245.432	69.449
30 year 480 minute summer	26.166	6.915	30 year +35% CC 30 minute winter	172.233	69.449
30 year 480 minute winter	17.384	6.915	30 year +35% CC 60 minute summer	159.682	42.199
30 year 600 minute summer	20.941	5.728	30 year +35% CC 60 minute winter	106.089	42.199
30 year 600 minute winter	14.308	5.728	30 year +35% CC 120 minute summer	102.064	26.973
30 year 720 minute summer	18.282	4.900	30 year +35% CC 120 minute winter	67.809	26.973
30 year 720 minute winter	12.287	4.900	30 year +35% CC 180 minute summer	78.618	20.231
30 year 960 minute summer	14.496	3.817	30 year +35% CC 180 minute winter	51.104	20.231
30 year 960 minute winter	9.602	3.817	30 year +35% CC 240 minute summer	61.710	16.308
30 year 1440 minute summer	9.972	2.673	30 year +35% CC 240 minute winter	40.999	16.308
30 year 1440 minute winter	6.702	2.673	30 year +35% CC 360 minute summer	45.997	11.836
30 year 2160 minute summer	6.797	1.878	30 year +35% CC 360 minute winter	29.899	11.836
30 year 2160 minute winter	4.683	1.878	30 year +35% CC 480 minute summer	35.324	9.335
30 year 2880 minute summer	5.490	1.471	30 year +35% CC 480 minute winter	23.468	9.335
30 year 2880 minute winter	3.689	1.471	30 year +35% CC 600 minute summer	28.270	7.733
30 year 4320 minute summer	4.050	1.059	30 year +35% CC 600 minute winter	19.316	7.733
30 year 4320 minute winter	2.667	1.059	30 year +35% CC 720 minute summer	24.681	6.615
30 year 5760 minute summer	3.318	0.849	30 year +35% CC 720 minute winter	16.587	6.615
30 year 5760 minute winter	2.148	0.849	30 year +35% CC 960 minute summer	19.569	5.153
30 year 7200 minute summer	2.837	0.724	30 year +35% CC 960 minute winter	12.963	5.153

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 1440 minute summer	13.462	3.608	100 year 240 minute winter	37.538	14.932
30 year +35% CC 1440 minute winter	9.047	3.608	100 year 360 minute summer	42.000	10.808
30 year +35% CC 2160 minute summer	9.176	2.536	100 year 360 minute winter	27.301	10.808
30 year +35% CC 2160 minute winter	6.322	2.536	100 year 480 minute summer	32.234	8.519
30 year +35% CC 2880 minute summer	7.411	1.986	100 year 480 minute winter	21.416	8.519
30 year +35% CC 2880 minute winter	4.981	1.986	100 year 600 minute summer	25.786	7.053
30 year +35% CC 4320 minute summer	5.468	1.430	100 year 600 minute winter	17.619	7.053
30 year +35% CC 4320 minute winter	3.601	1.430	100 year 720 minute summer	22.503	6.031
30 year +35% CC 5760 minute summer	4.479	1.147	100 year 720 minute winter	15.123	6.031
30 year +35% CC 5760 minute winter	2.899	1.147	100 year 960 minute summer	17.821	4.693
30 year +35% CC 7200 minute summer	3.830	0.977	100 year 960 minute winter	11.805	4.693
30 year +35% CC 7200 minute winter	2.472	0.977	100 year 1440 minute summer	12.225	3.276
30 year +35% CC 8640 minute summer	3.384	0.863	100 year 1440 minute winter	8.216	3.276
30 year +35% CC 8640 minute winter	2.184	0.863	100 year 2160 minute summer	8.279	2.288
30 year +35% CC 10080 minute summer	3.065	0.782	100 year 2160 minute winter	5.704	2.288
30 year +35% CC 10080 minute winter	1.978	0.782	100 year 2880 minute summer	6.644	1.781
100 year 15 minute summer	359.906	101.841	100 year 2880 minute winter	4.465	1.781
100 year 15 minute winter	252.566	101.841	100 year 4320 minute summer	4.845	1.267
100 year 30 minute summer	231.671	65.555	100 year 4320 minute winter	3.190	1.267
100 year 30 minute winter	162.576	65.555	100 year 5760 minute summer	3.928	1.006
100 year 60 minute summer	151.892	40.141	100 year 5760 minute winter	2.542	1.006
100 year 60 minute winter	100.913	40.141	100 year 7200 minute summer	3.329	0.849
100 year 120 minute summer	94.622	25.006	100 year 7200 minute winter	2.149	0.849
100 year 120 minute winter	62.865	25.006	100 year 8640 minute summer	2.919	0.745
100 year 180 minute summer	72.259	18.595	100 year 8640 minute winter	1.884	0.745
100 year 180 minute winter	46.970	18.595	100 year 10080 minute summer	2.626	0.670
100 year 240 minute summer	56.501	14.932	100 year 10080 minute winter	1.695	0.670

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 15 minute summer	503.868	142.577	100 year +40% CC 720 minute winter	21.172	8.443
100 year +40% CC 15 minute winter	353.592	142.577	100 year +40% CC 960 minute summer	24.949	6.570
100 year +40% CC 30 minute summer	324.339	91.777	100 year +40% CC 960 minute winter	16.527	6.570
100 year +40% CC 30 minute winter	227.607	91.777	100 year +40% CC 1440 minute summer	17.114	4.587
100 year +40% CC 60 minute summer	212.648	56.197	100 year +40% CC 1440 minute winter	11.502	4.587
100 year +40% CC 60 minute winter	141.279	56.197	100 year +40% CC 2160 minute summer	11.590	3.203
100 year +40% CC 120 minute summer	132.471	35.008	100 year +40% CC 2160 minute winter	7.986	3.203
100 year +40% CC 120 minute winter	88.011	35.008	100 year +40% CC 2880 minute summer	9.301	2.493
100 year +40% CC 180 minute summer	101.162	26.032	100 year +40% CC 2880 minute winter	6.251	2.493
100 year +40% CC 180 minute winter	65.758	26.032	100 year +40% CC 4320 minute summer	6.782	1.773
100 year +40% CC 240 minute summer	79.101	20.904	100 year +40% CC 4320 minute winter	4.467	1.773
100 year +40% CC 240 minute winter	52.553	20.904	100 year +40% CC 5760 minute summer	5.499	1.408
100 year +40% CC 360 minute summer	58.801	15.131	100 year +40% CC 5760 minute winter	3.559	1.408
100 year +40% CC 360 minute winter	38.222	15.131	100 year +40% CC 7200 minute summer	4.661	1.189
100 year +40% CC 480 minute summer	45.128	11.926	100 year +40% CC 7200 minute winter	3.008	1.189
100 year +40% CC 480 minute winter	29.982	11.926	100 year +40% CC 8640 minute summer	4.087	1.043
100 year +40% CC 600 minute summer	36.101	9.874	100 year +40% CC 8640 minute winter	2.638	1.043
100 year +40% CC 600 minute winter	24.666	9.874	100 year +40% CC 10080 minute summer	3.676	0.938
100 year +40% CC 720 minute summer	31.504	8.443	100 year +40% CC 10080 minute winter	2.372	0.938

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	PP	76	83.711	0.061	76.9	61.2735	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
120 minute summer	PP	Depth/Flow	0.0	0.0
120 minute summer	PP	Infiltration	30.3	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	PP	82	83.759	0.109	188.3	192.8586	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
120 minute summer	PP	Depth/Flow	0.0	0.0
120 minute summer	PP	Infiltration	49.5	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	PP	86	83.789	0.139	254.3	289.1855	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
120 minute summer	PP	Depth/Flow	0.0	0.0
120 minute summer	PP	Infiltration	49.6	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	PP	84	83.780	0.130	235.7	261.1829	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
120 minute summer	PP	Depth/Flow	0.0	0.0
120 minute summer	PP	Infiltration	49.6	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	PP	92	83.825	0.175	330.1	408.9187	0.0000	OK

Link Event (Velocity)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
120 minute summer	PP	Depth/Flow	0.0	0.0
120 minute summer	PP	Infiltration	49.6	

APPENDIX E – MANAGEMENT & MAINTENANCE REGIME

The Management Company

The responsibility for maintenance of all elements of the development remain with Chase New Homes until handed over to the Management Company.

Handover of external works to the Management Company coincides with completion of the final residential unit.

The Management Company employs a specialist Managing Agent to manage the development which includes all aspects of maintenance.

The Management Company BI registered No. ***'tbc'*** *was incorporated in* ***'tbc'*** *and its directors are currently made up of Chase New Homes representatives plus an appointment from the Managing Agent.*

The Managing Agents are ***'tbc'*** *who have over '****tbc****' years' experience in the industry.*

At handover the Management Company and Managing Agent receive as built information together with operating and maintenance manuals which detail all maintenance protocols.

Approximately 1 year following completion of the final unit the residents will be invited to elect members to become directors of the Management Company, the Chase New Homes appointed directors at that time resign from the Management Company to be replaced by the elected representatives of the residents.

To ensure continuity and a full understanding of the development and the operation and maintenance of its various components the representative of the Managing Agent remains as a director of the Management Company and the appointment of the Managing Agents is fixed for a minimum period of two years following the date of resignation of the last Chase New Homes director.

After that two year period the Management Company have the right to re-tender the Managing Agent services but it is very rare that a change is made as our original appointments provide an excellent service.

Within the first two years from the final unit completion on the development the residents have two ways in which they can report any defects and problems which would include flooding and that is either to our Aftersales department or to the Managing Agents, the residents are issued with telephone numbers for both which include out of hours emergency response.

After two years our Aftersales contacts are normally replaced by members of the Management Company. The residents therefore have the ability to contact them or the Managing Agents which then remains through the life of the development.

Onsite Surface Water Drainage System (generally)

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the surface water drainage system;

Every 6 months: Remove silt build up from ***all*** catchpits and road gullies.

Annually: elect approx. 20% of the development's surface water inspection chambers (situated in accessible non-private areas) and inspect for blockages / silt build up. Remove silt and debris. Rotate on a 5 yearly cycle to cover all such chambers over this period.

Every 2-5 years (depending on outcome of aforementioned inspections)

Commission a CCTV survey and report on condition of the surface water piped drainage system upstream of the soakaways to check for structural integrity and hydraulic fluidity. Carry out promptly any remedial work as advised by CCTV company.

Permeable Paving

External parking areas and access roads are to be constructed in permeable block paving in order to;

a) Delay the surface water runoff from these areas, and
b) Enhance the quality of the rainwater prior to discharge into the ground.

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the pervious pavement;

Quarterly

i) Inspect the pervious pavement for signs of ponding and ensure there is no migration of soils from adjacent landscaped areas or other deleterious material that may prematurely clog up the jointing stone situated in the gaps between the blocks. Ideally this type of inspection should be undertaken immediately following a heavy rainfall event.

ii) Commission vacuum sweeping and brushing of the pervious pavement to ensure joints are kept free of silt. Minimum 3 sweeping per year, thus;

a) End of Winter (April) – to collect winter debris
b) Mid-Summer (July/August) – to collect dust, flower and grass-type deposits.
c) After Autumn leaf fall (November)

The company commissioned to carry out this work should ensure that their vacuum equipment is adjusted accordingly to avoid the removal of jointing material.

Any lost material should be replaced promptly to avoid the blocks from being dislodged.

Last Resort Remedial Action

i) Should a portion of the pervious pavement become substantially impervious due to excessive siltation, the following procedure should be followed;

a) Lift block paving and laying course
b) Break out underlying bitmac base layer and replace with similar compacted depth of course aggregate subbase material to BS EN 13242:2002 Type 4/20, wrapped in geotextile as Terram 1000 or similar.
c) Renew laying course, replace blocks and renew jointing material

NB. Material removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and as such may need to be disposed of as 'controlled waste'. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

Renew laying course, replace blocks and renew jointing material.NB. Material removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and as such may need to be disposed of as 'controlled waste'. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

Cellular Soakaway Storage

The principle means of surface water attenuation/disposal from the development is by way of cellular soakaways storage.

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the surface water drainage system;

Inspections to identify any areas not operating correctly, pollution, blocked inlets or outlets, standing water etc.

Collect and remove from site all extraneous rubbish that is detrimental to the operation or detracts from the appearance of the site, including paper, bottles, cans and similar debris.