

Technical Note - Discharge of Surface Water Management Planning Conditions



The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA

Project	Reptune, Yapton
Project Number	23262

By Martin Kempshall CEng MICE

Date 5 June 2020

1 Introduction

- 1.1 This Technical Note has been produced in support of Discharging of Condition 4 of Planning Permission Y/22/19/PL comprising demolition of existing redundant garage building and erection of 1 No. dwelling and associated works at the Garage Premises, Main Road, Yapton, BN18 0EA.
- 1.2 This Technical Note is to be read in conjunction with all planning, architectural and other reports that accompany the Planning Application for the proposed development.
- 1.3 The proposed development will incorporate a sustainable drainage system which will discharge all surface water via infiltration to ground using permeable paving with subbase attenuation.

2 Condition 4

- 2.1 Condition 4 of Outline Planning Application Y/22/19/PL states:

Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design of any Infiltration drainage. No building / No part of the extended building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.



Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies W SP1, W DM1, W DM2 and W DM3 of the Arun Local Plan. This is required to be a precommencement condition because it is necessary to implement the surface water drainage system prior to commencing any building works.

3 Design Parameters for Discharge of Condition 4

3.1 Summary of Surface Water Management and Design

- 3.1.1 The following design criteria has been set to ensure compliance with the principles of the design will be based upon *Arun District Council Supplementary Requirements for Surface Water Drainage Proposals*.
- 3.1.2 Infiltration to ground is proposed in accordance with the Drainage Hierarchy of preference set out in approved Document H of the Building Regulations and CIRIA C753.
- 3.1.3 The system is designed to attenuate all storm water events up to and including the critical 1:100 year storm with a 20% allowance for Climate Change. The designing for exceedance event of 1:100 year plus 40% allowance for Climate Change has been accommodated within the attenuation system to ensure that all surface water is retained on site during this event.
- 3.1.4 Requirements of Table 26.2 of CIRIA SuDS Manual have been achieved to ensure water quality requirements are achieved throughout the site.
- 3.1.5 The design has been based upon tested infiltration rates at two trial pits completed by Land Science in February 2020 with an average rate for Trail Pit 1 (TP201) yielding an average rate of 5.63×10^{-3} m/s and an average rate of 1.97×10^{-5} m/s recorded for Trail Pit 2 (TP202).
- 3.1.6 For the purpose of our design calculations we have used the lesser rate of 1.97×10^{-5} m/s.
- 3.1.7 The existing neighbouring right way of way will be retained and drained as existing.

3.2 Detailed Surface Water Drainage Design

- 3.2.1 All surface water is to be collected and discharged via an infiltration blanket beneath a permeable paved surface.
- 3.2.2 The drainage has been designed to accommodate and discharge all surface water to ground for all the impermeable areas of the site via infiltration blanket. The infiltration blanket comprises permeable paving, which for surface water storage, requires a minimum 240mm depth of voided subbase beneath the permeable paving. The depth of the construction will be determined by the CBR value of the underlying ground

condition found onsite by the contractor and the formation level will be consistent across the site.

3.2.3 A copy of Drawing 101 showing the proposed drainage layout is located at the rear of this Technical Note.

3.2.4 A copy of the Microdrainage Calculations for the surface water network and attenuation system is located at the rear of this Technical Note.

3.3 General Site Ground Conditions

3.3.1 The Ashdown Site Investigation report of July 2019 identifies made ground generally comprising gravelly clay, which was encountered to depths of between 0.30m and 3.10m. The gravel fraction comprised variable quantities of flint, brick and concrete.

3.3.2 Beneath the made ground, the investigation encountered slightly sandy gravelly clay soils persisting to the full depths of the trial pits, and to depths of between 2.30m and 4.50m below ground level in the boreholes.

3.4 Winter Groundwater Monitoring

3.4.1 Land Science Limited undertook groundwater monitoring from 24 October 2019 to 18 February 2020 and identified a maximum groundwater level of approximately 1.50 metres below existing ground levels.

3.4.2 A full copy of Land Science Limited's Report is located at the rear of this Technical Note.

3.5 Surface Water Quality

3.5.1 The proposed development is for residential use. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for this type of development is low.

3.5.2 The surface water scheme will include mitigation to ensure that surface water is suitably treated, and any pollution risk adequately managed prior to discharge.

3.5.3 Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types. Those determined as of most relevance to the development proposals are as follows:

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car park, low-traffic roads	Low	0.5	0.4	0.4

Table 2: Pollution Hazard Indices

3.5.4 Where multiple drainage components are used in series the individual mitigation index of secondary and tertiary components is lowered by 50% due to reduced performance associated with primary treatment.

SuDS Type	Total suspended solids (TSS)	Metals	Hydrocarbons
Permeable pavement	0.7	0.6	0.7

Table 3: Pollution Mitigation Indices

3.5.5 The proposed use of permeable paving will meet the target treatment level required for runoff with very low to low risk of pollution hazard thus demonstrating that the surface water drainage system for the site can be designed to adequately mitigate against the risk of pollution.

4 Documents appended

- Drawing 101 E - Proposed Drainage Strategy Plan
- Drawing 501 C - Construction Details
- Microdrainage Calculations for Climate Change adjusted 1 in 100 year event
- Land Science Limited's Report Extracts

The Civil Engineering Practice					Page 1
11 Tungsten Building George Street Fishersgate BN41 1RA		Reptune, Yapton Storage Calculations Minimised			
Date 04/06/2020 File 1 in 100 Plus 40 Minimi...		Designed by SRD Checked by MEK			
Innovyze		Source Control 2020.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Half Drain Time : 66 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	5.970	0.210	1.4	6.4	Flood Risk
30 min Summer	6.024	0.264	1.4	8.1	Flood Risk
60 min Summer	6.057	0.297	1.4	9.1	Flood Risk
120 min Summer	6.062	0.302	1.4	9.2	Flood Risk
180 min Summer	6.048	0.288	1.4	8.8	Flood Risk
240 min Summer	6.028	0.268	1.4	8.2	Flood Risk
360 min Summer	5.989	0.229	1.4	7.0	Flood Risk
480 min Summer	5.952	0.192	1.4	5.9	Flood Risk
600 min Summer	5.919	0.159	1.4	4.9	Flood Risk
720 min Summer	5.889	0.129	1.4	4.0	O K
960 min Summer	5.845	0.085	1.4	2.6	O K
1440 min Summer	5.808	0.048	1.3	1.5	O K
2160 min Summer	5.796	0.036	1.0	1.1	O K
2880 min Summer	5.789	0.029	0.8	0.9	O K
4320 min Summer	5.781	0.021	0.6	0.6	O K
5760 min Summer	5.777	0.017	0.5	0.5	O K
7200 min Summer	5.774	0.014	0.4	0.4	O K
8640 min Summer	5.772	0.012	0.3	0.4	O K
10080 min Summer	5.771	0.011	0.3	0.3	O K
15 min Winter	5.998	0.238	1.4	7.3	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	124.343	0.0	17		
30 min Summer	83.917	0.0	31		
60 min Summer	54.074	0.0	56		
120 min Summer	33.635	0.0	88		
180 min Summer	25.091	0.0	122		
240 min Summer	20.228	0.0	156		
360 min Summer	14.907	0.0	224		
480 min Summer	11.995	0.0	288		
600 min Summer	10.125	0.0	350		
720 min Summer	8.810	0.0	406		
960 min Summer	7.068	0.0	520		
1440 min Summer	5.171	0.0	736		
2160 min Summer	3.774	0.0	1100		
2880 min Summer	3.015	0.0	1468		
4320 min Summer	2.192	0.0	2188		
5760 min Summer	1.746	0.0	2936		
7200 min Summer	1.464	0.0	3632		
8640 min Summer	1.268	0.0	4320		
10080 min Summer	1.124	0.0	5136		
15 min Winter	124.343	0.0	17		
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The Civil Engineering Practice					Page 2	
11 Tungsten Building George Street Fishersgate BN41 1RA			Reptune, Yapton Storage Calculations Minimised			
Date 04/06/2020 File 1 in 100 Plus 40 Minimi...			Designed by SRD Checked by MEK			
Innovyze			Source Control 2020.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
30 min Winter	6.063	0.303	1.4	9.3	Flood Risk	
60 min Winter	6.106	0.346	1.4	10.6	Flood Risk	
120 min Winter	6.108	0.348	1.4	10.7	Flood Risk	
180 min Winter	6.087	0.327	1.4	10.0	Flood Risk	
240 min Winter	6.056	0.296	1.4	9.0	Flood Risk	
360 min Winter	5.993	0.233	1.4	7.1	Flood Risk	
480 min Winter	5.936	0.176	1.4	5.4	Flood Risk	
600 min Winter	5.886	0.126	1.4	3.9	O K	
720 min Winter	5.846	0.086	1.4	2.6	O K	
960 min Winter	5.808	0.048	1.3	1.5	O K	
1440 min Winter	5.796	0.036	1.0	1.1	O K	
2160 min Winter	5.786	0.026	0.7	0.8	O K	
2880 min Winter	5.781	0.021	0.6	0.6	O K	
4320 min Winter	5.775	0.015	0.4	0.5	O K	
5760 min Winter	5.772	0.012	0.3	0.4	O K	
7200 min Winter	5.770	0.010	0.3	0.3	O K	
8640 min Winter	5.769	0.009	0.3	0.3	O K	
10080 min Winter	5.768	0.008	0.2	0.2	O K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
30 min Winter	83.917	0.0	31			
60 min Winter	54.074	0.0	58			
120 min Winter	33.635	0.0	93			
180 min Winter	25.091	0.0	134			
240 min Winter	20.228	0.0	170			
360 min Winter	14.907	0.0	240			
480 min Winter	11.995	0.0	304			
600 min Winter	10.125	0.0	364			
720 min Winter	8.810	0.0	416			
960 min Winter	7.068	0.0	500			
1440 min Winter	5.171	0.0	736			
2160 min Winter	3.774	0.0	1100			
2880 min Winter	3.015	0.0	1460			
4320 min Winter	2.192	0.0	2140			
5760 min Winter	1.746	0.0	2856			
7200 min Winter	1.464	0.0	3576			
8640 min Winter	1.268	0.0	4384			
10080 min Winter	1.124	0.0	5136			
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The Civil Engineering Practice		Page 4																
11 Tungsten Building George Street Fishersgate BN41 1RA	Reptune, Yapton Storage Calculations Minimised																	
Date 04/06/2020	Designed by SRD																	
File 1 in 100 Plus 40 Minimi...	Checked by MEK																	
Innovyze	Source Control 2020.1																	
<u>Model Details</u> Storage is Online Cover Level (m) 6.200 <u>Infiltration Blanket Structure</u> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.07200</td> <td>Diameter/Width (m)</td> <td>10.0</td> </tr> <tr> <td>Safety Factor</td> <td>1.5</td> <td>Length (m)</td> <td>10.2</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>0.350</td> </tr> <tr> <td>Invert Level (m)</td> <td>5.760</td> <td></td> <td></td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.07200	Diameter/Width (m)	10.0	Safety Factor	1.5	Length (m)	10.2	Porosity	0.30	Cap Volume Depth (m)	0.350	Invert Level (m)	5.760		
Infiltration Coefficient Base (m/hr)	0.07200	Diameter/Width (m)	10.0															
Safety Factor	1.5	Length (m)	10.2															
Porosity	0.30	Cap Volume Depth (m)	0.350															
Invert Level (m)	5.760																	
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Title: Site Location

Reference: LS 4653

Project: Former Reprune Garage, Yapton

Figure: 1

Client: Peter Mountford

Date: 21/02/2020

Prepared by: AC

Checked by: ET

Version: 01

Sheet: 1 of 1

Locations are indicative and not to scale

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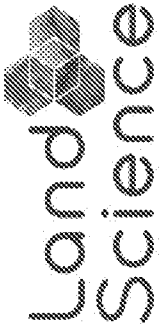


	Title: Exploratory Hole Location Plan	Reference: LS 4653	Prepared by: MM
	Project: Former Reptune Garage, Main Road, Yapton, West Sussex, BN18 0EA	Figure: 2	Checked by: AC
	Client: Peter Mountford	Date: 21/2020	Version: 01

TP201



Locations are indicative. Not to scale.

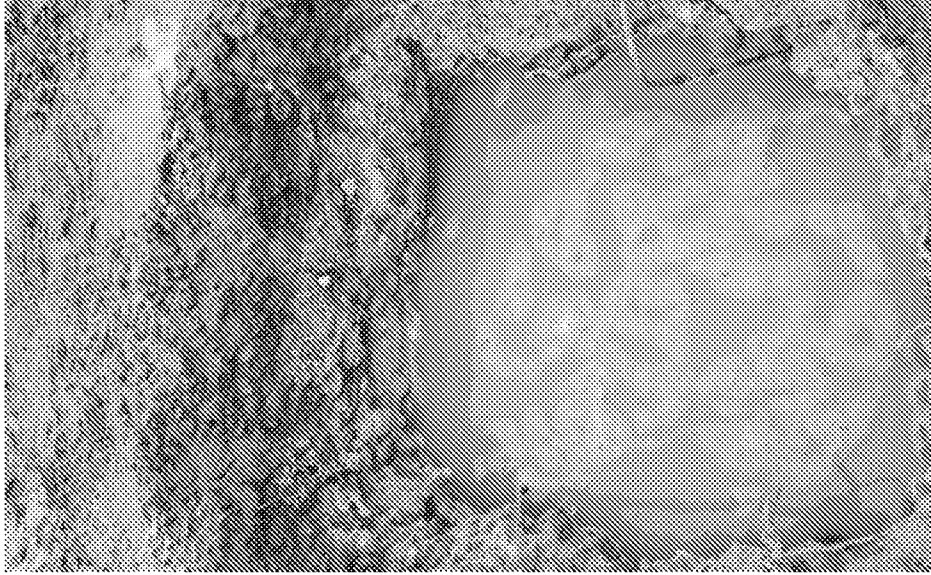
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	PROJECT:	Former Reptune Garage, Main Road, Yapton, West Sussex	FIGURE:	N/A	CHECKED:	ET
	CLIENT:	Mr Peter Mountford	DATE:	21/02/2020	VERSION	V1

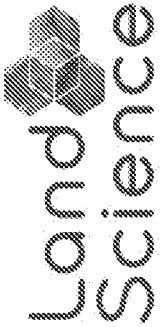
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UNIT 10, 19 ALBERT DRIVE BURGESS HILL, WEST SUSSEX, RH15 9TN

TP202

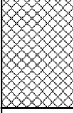


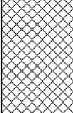
	TITLE: Site Photographs		REF: 15 4653	PREPARED: AC
	PROJECT: Former Reptune Garage, Main Road, Yapton, West Sussex		FIGURE: N/A	CHECKED: ET
	CLIENT: Mr Peter Mountford		DATE: 21/02/2020	VERSION: V1

UNIT 10, 19 ALBERT DRIVE BURGESS HILL, WEST SUSSEX, RH15 9TN

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				Brighton London Bristol		Site [REDACTED] mer Reptune Garage, Main Road, Yapton, West Sussex		Trial Pit Number TP201	
Machine : Hand Excavated Method : Trial Pit		Dimensions		Ground Level (mOD)		Client Mr Peter Mountford		Job Number LS4653	
		Location		Dates 18/02/2020		Engineer The Civil Engineering Practice		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
					(0.10) 0.10 (0.40) 0.50	Asphalt. (HARDSTANDING) Loose dark brown sandy slightly clayey GRAVEL of brick and concrete. (MADE GROUND)		 	
						Abandoned at 0.50m			
No image available						Remarks			
						Scale (approx) 1:25		Logged By SP	

				Brighton London Bristol 		Site Former Reptune Garage, Main Road, Yapton, West Sussex		Trial Pit Number TP202	
Machine : Hand Excavated Method : Trial Pit		Dimensions		Ground Level (mOD)		Client Mr Peter Mountford		Job Number LS4653	
		Location		Dates 18/02/2020		Engineer The Civil Engineering Practice		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
					(0.10) 0.10 (0.40) 0.50	Grass overlying dark brown sandy clay. (MADE GROUND) Pale brown/yellow silty clayey gravelly SAND. Gravels are brick and concrete with localised cobbles of concrete. (MADE GROUND) Complete at 0.50m	 		
No image available						Remarks			
						Scale (approx) 1:25		Logged By SP	

Site : Former Reptune Garage, Main Road, Yapton, West Sussex

Client : Peter Mountford

Engineer : The Civil Engineering Practice (CEP)

Job Number
LS4913

Sheet
1 / 2

Location	Date	Level	Location
TP201	18/02/2020		

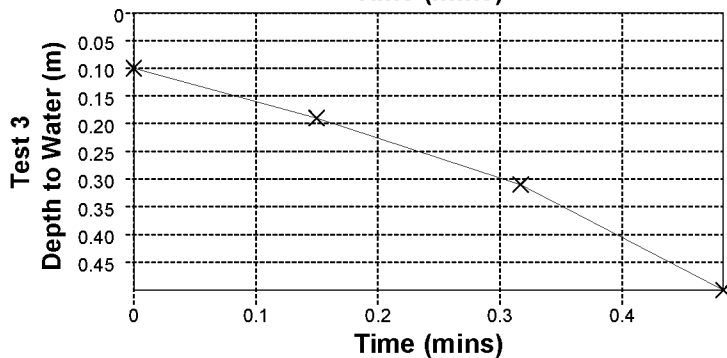
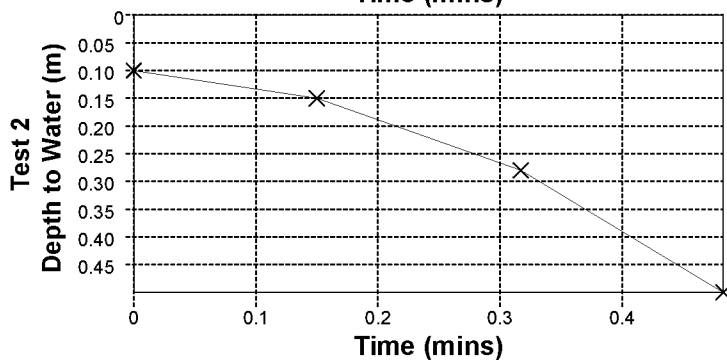
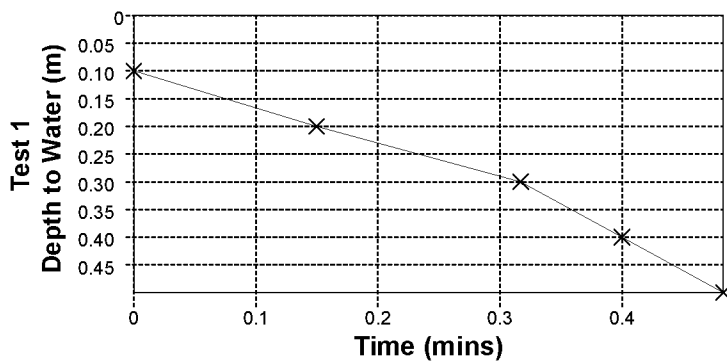
Pit Width (m)	0.50
Pit Depth (m)	0.50
Pit Length (m)	0.50

Soil type at test level	
Groundwater	
Drain discharge depth	0.1
Sidewall stability	
Stone filled or open pit	Open Pit

	1	2	3
Effective depth (m)	0.40	0.40	0.40
Volume outflowing between 75% & 25% (m3)	0.05	0.05	0.05
Mean surface area through which outflow occurs (m2)	0.65	0.65	0.65
Time for outflow between 75% & 25% (min)	0.25	0.20	0.24
SOIL INFILTRATION RATE (ms ⁻¹), f	5.13E-3	6.41E-3	5.34E-3

Remarks

Elapsed time (mins)	Depth to Water Test 1	Depth to Water Test 2	Depth to Water Test 3
0	0.10	0.10	0.10
0.15	0.20	0.15	0.19
0.317	0.30	0.28	0.31
0.4	0.40		
0.483	0.50	0.50	0.50



Site : Former Reptune Garage, Main Road, Yapton, West Sussex

Client : Peter Mountford

Engineer : The Civil Engineering Practice (CEP)

Job Number

LS4913

Sheet

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Location	Date	Level	Location
TP202	18/02/2020		

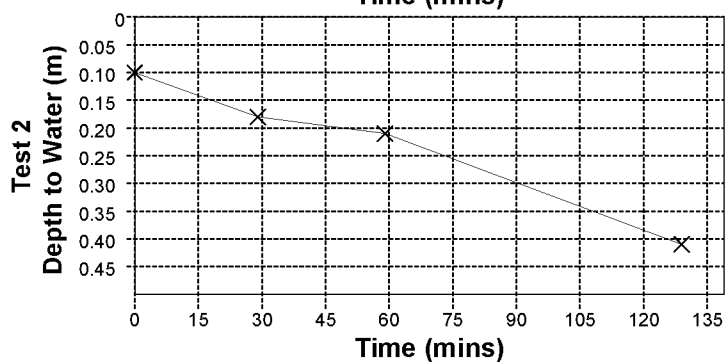
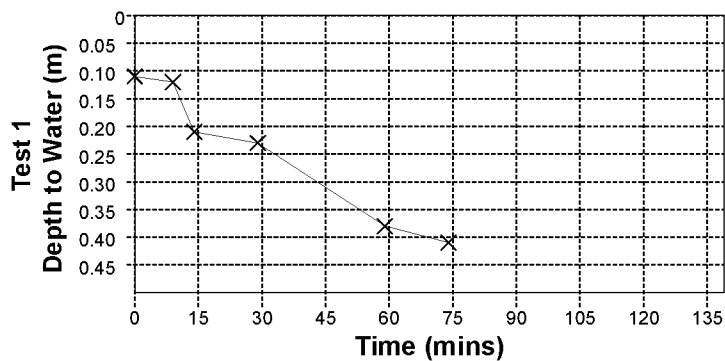
Pit Width (m)	0.50
Pit Depth (m)	0.50
Pit Length (m)	0.50

Soil type at test level	
Groundwater	
Drain discharge depth	0.1
Sidewall stability	
Stone filled or open pit	

	1	2
Effective depth (m)	0.39	0.40
Volume outflowing between 75% & 25% (m3)	0.05	0.05
Mean surface area through which outflow occurs (m2)	0.64	0.65
Time for outflow between 75% & 25% (min)	56.39	76.50
SOIL INFILTRATION RATE (ms ⁻¹), f	2.25E-5	1.68E-5

Remarks

Elapsed time (mins)	Depth to Water Test 1	Depth to Water Test 2
0	0.11	0.10
9	0.12	
14	0.21	
29	0.23	0.18
59	0.38	0.21
74	0.41	
129		0.41



Former Reptune Garage 24th October 2019 to 18th February 2020

