17079/CSB/JY

KINGSMERE, PARCELS C & D, BICESTER

SURFACE WATER DRAINAGE REPORT

PREPARED ON BEHALF OF PERSIMMON HOMES

1.0   Introduction

1.1   The purpose of this document is to describe the surface water drainage arrangements which are envisaged for land Parcels C & D on the Kingsmere Development Scheme.

1.2   The approved design code has been followed in relation to determining the approach to surface water disposal and the proposals also reflect the individual parcel requirements which have been laid down by the overall infrastructure providers in order to follow the drainage strategy for the Kingsmere Scheme as a whole.

2.0   Background and Constraints

2.1   The main principle associated with stormwater disposal on the Kingsmere Scheme is to ensure that as much water is directed to the ground as is possible with the release of any discharge into the infrastructure facilities being strictly controlled for all storms up to a 100 year plus climate change rainfall event.

2.2   The Design Code describes the expectation that for each parcel, the potential for infiltration will be fully investigated and this will be relied on as much as possible to limit the flows entering the strategic sewer and attenuation facilities.

2.3   The Design Code also describes a SuDS philosophy which is to be applied across the scheme with appropriate mechanisms for dealing with storm water run-off for each element of development hard surface.

2.4   It is considered that the proposals which are outlined in this document are fully compliant with the Design Code requirements.

3.0   Infiltration Potential

3.1   In accordance with the expectations of the Design Code and the guidance on the design of individual parcel drainage systems prepared by WSP, comprehensive infiltration testing has been undertaken to supplement the overall geotechnical information for the Kingsmere area as a whole.

3.2   The testing which has been carried out has been undertaken at depths which are suitable for both permeable paving and for soakaways. The results of the testing regime which has been carried out fully in compliance with BRE Digest 365 can be found in Appendix 1 of this document.

3.3   It is noted that the results obtained achieve remarkably similar values throughout the site with co-efficients of 1×10^{-5} m/s , generally being achieved at the near surface test locations and a slight improvement being achieved for the deeper tests which relate to the potential use of more conventional soakaway techniques.

3.4   It is considered reasonable to adopt the blanket value of 1×10^{-5} m/s as appropriate for the design criteria which will be utilised throughout the parcel areas.

4.0   Infrastructure Limitations

4.1   The strategic drainage facilities which have already been installed in the vicinity of these parcels anticipate restricted discharge being released at rates equivalent to Greenfield run-off for all storms up to the 100 year plus climate change rainfall event. The climate change allowance which is anticipated is a 30% increase in rainfall intensity in accordance with the guidance laid down in the National Planning Policy Framework.

4.2   In relation to Parcel C, the drainage strategy anticipates an allowable discharge of 15.5 l/s and this will discharge to a single outfall point on the land's southern boundary.

4.3   In relation to Parcel D, the discharge rate which has been determined is 23.1 l/s and this is to be divided between the four connection points which have been provided into the infrastructure system.

4.4   The expectation of the Design Code is that with the exception of Secondary Streets which will be constructed in tarmac, all other roads will benefit from porous paving which will have the beneficial effect of utilising the infiltration capabilities of the soil.

4.5   The Design Code anticipates that sub-base beneath the porous paving roads will cater for storms up to at least the 10 year return period with any excess flows for larger rainfall events being directed via highway drains or swales to the strategic sewer systems which feed the attenuation basin. In relation to this layout, it is not considered that there is sufficient space to create swales which will be effective and the highway drain option is therefore being pursued.

4.6   In relation to private paved areas, extended use of permeable paving is also anticipated and this will be designed to receive connections from roof water from at least the front of any adjacent dwellings. Any rear roof areas which cannot be discharged to the permeable paving sub-base will be directed towards plastic matrix soakaways which will be located within rear gardens, recognizing the normal offset requirements of 5 metres from any building which are laid down in the Building Regulations.

5.0   Design Proposals

5.1   The design proposals for the adoptable highway areas involve the use of permeable paving in accordance with the design code with only the estate road which separates the two parcel areas being finished in tarmac.

5.2   The principle drainage arrangements which are anticipated for these estate roads are indicated on the catchment plan which can be found in Appendix 2 of this document.

5.3   Appendix 3 contains Microdrainage calculations which incorporate the porous paving areas as well as appropriate controls which will be located upstream of the connection points into the infrastructure sewers. The good infiltration capabilities of the underlying soil indicate that a sub-base depth of 400mm is adequate to accommodate the 10 year return period storm but the modelling approach tests the performance of the system for the 100 year plus 30% climate change rainfall event to demonstrate that the discharge rates set in the overall drainage strategy for Kingsmere is not exceeded. The results of this modelling exercise are summarized in the table below.

Network	Peak Flow	Permissible discharge
Network 1 (Parcel C)	15.4 l/s	15.5 l/s
Network 2 (Parcel D)	4.8 l/s	-
Network 3 (Parcel D)	9.0 l/s	-
Network 4 (Parcel D)	5.0 l/s	-
Network 5 (Parcel D)	4.0 l/s	-
Parcel D Totals	22.8 l/s	23.1 Total

5.4   It can be concluded therefore that the expectations of the Design Code and indeed the overall drainage strategy has been complied with in relation to these proposals.

5.5   In relation to the private paved areas, it is proposed that the porous paved areas will be designed to reflect the prevailing infiltration rates and to accommodate all storms up to the 10 year rainfall event. Any soakaways will similarly be designed to the same robust standards in compliance with the expectation of the Design Code.

6.0   Conclusions

6.1   It is therefore concluded that the requirements of the Design Code and the drainage strategy can be fulfilled successfully with the proposals which are envisaged for this scheme and preparations are already in hand to submit appropriate details to the relevant adopting authorities on this basis.

APPENDIX 1

INFILTRATION TESTS

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ENGINEERING THE FUTURE

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N
W — E
S

SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
SW9
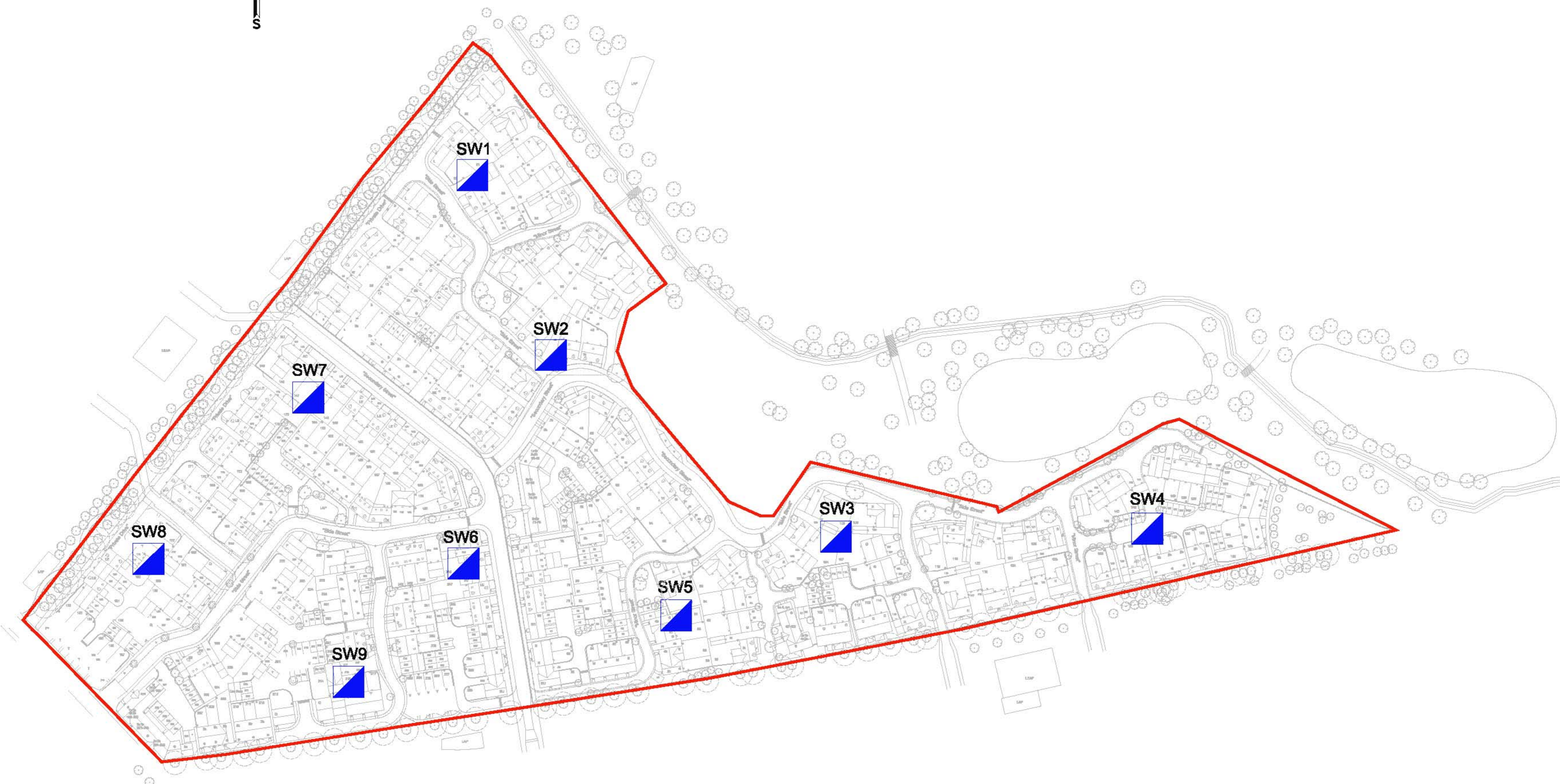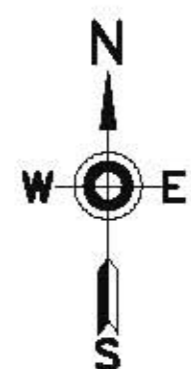
KEY

SW4
Soakaway location

Two soakaway pits were excavated at each location except at location SW1 where three were excavated due to unexpected stratum being encountered.

Rev.	Date	Description of Issue	Chkd
		Revisions	

Issue Purpose:
INFORMATION

Project
**PERSIMMON HOMES
KINGSMERE
BICESTER**

Drawing Title:
**SOAKAWAY TESTING
LOCATION PLAN**

Designer's Risk Assessment Reference:
13-0199 XDRA 001

Specification Reference:
N/A

Drawn By: AF   Checked By: JB

Scales: 1:500
        1:250   Date: MAY '14

Drawing No.   Rev.

13-0199 GEO 001 I1

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Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date	14/05/2014
	0.45	1.00	0.70		Soakaway No.	1a.1

SOAKAWAY TEST RESULTS
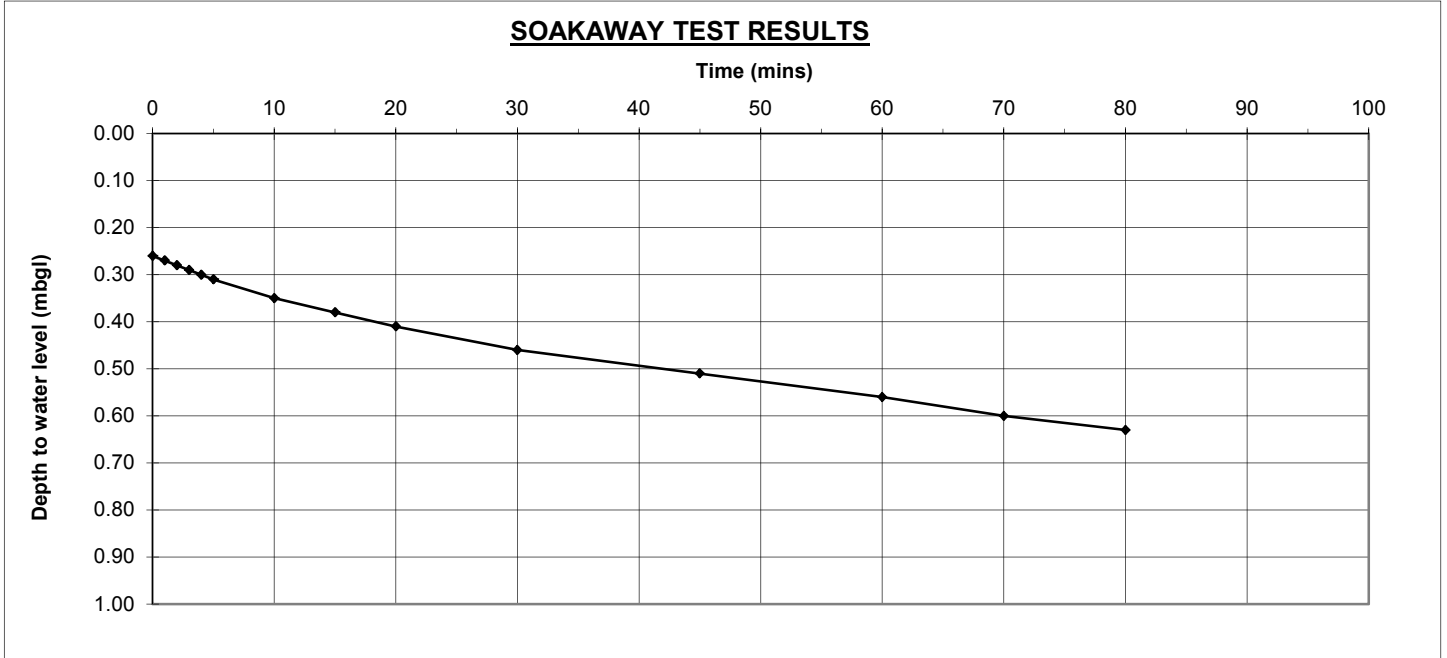
From above graph;

0.185 m	= Depth drop between 75% and 25% of maximum depth to final depth
43 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.08325 m³
ap50 =	2.0247 m²
tp75-25 =	43.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.59E-05**	m/s

	Permeability Guideline (m/s)		
Good	Poor		Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$		$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	1.00	0.70	**Test Date** 14/05/2014	
				Soakaway No. 1a.2	

SOAKAWAY TEST RESULTS

From above graph;

0.175 m	= Depth drop between 75% and 25% of maximum depth to final depth
52 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.07875 m³
ap50 =	2.1117 m²
tp75-25 =	52.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **1.20E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 14/05/2014
	0.45	1.00	0.70	**Soakaway No.** 1a.3

SOAKAWAY TEST RESULTS
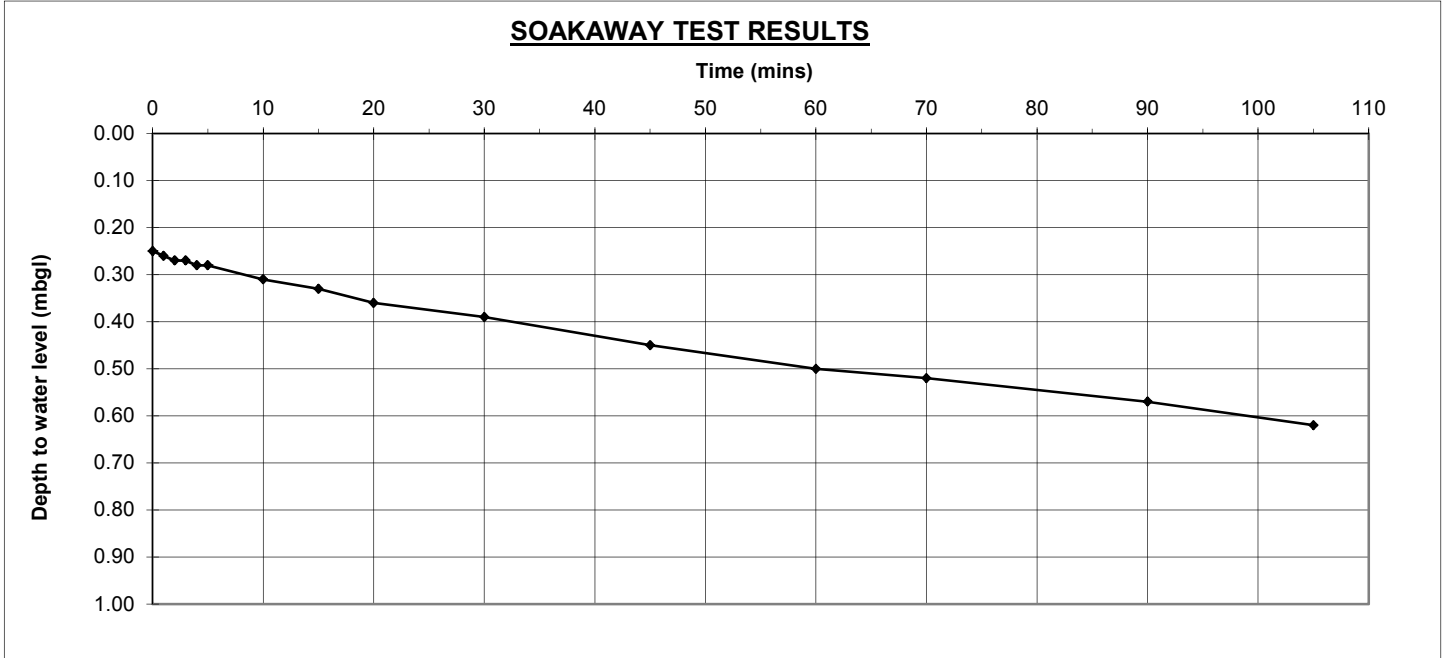
From above graph;

0.185 m	= Depth drop between 75% and 25% of maximum depth to final depth
62 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.08325 m³
ap50 = 2.0537 m²
tp75-25 = 62.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **1.09E-05** m/s		Permeability Guideline (m/s)		
		Good	Poor	Practically Impervious
		$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 16/05/2014
	0.45	2.00	1.40	**Soakaway No.** 1C.1

SOAKAWAY TEST RESULTS
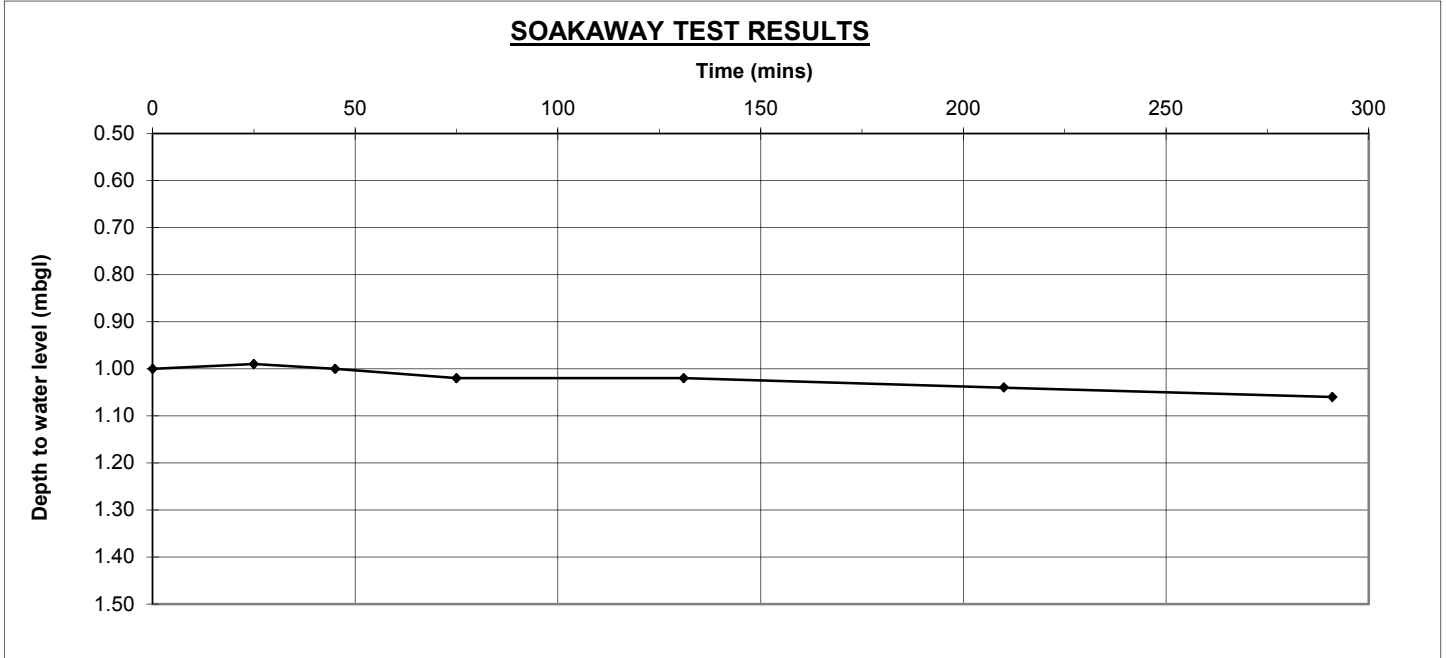
From above graph;

0.03 m	= Depth drop between 75% and 25% of maximum depth to final depth
162 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.027 m³
ap50 =	4.8837 m²
tp75-25 =	162.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

	Permeability Guideline (m/s)		
Soil Infiltration Rate (f) = **5.69E-07** m/s	Good	Poor	Practically Impervious
	10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 14/05/2014
	0.45	1.00	0.65	**Soakaway No.** 2a.1

SOAKAWAY TEST RESULTS
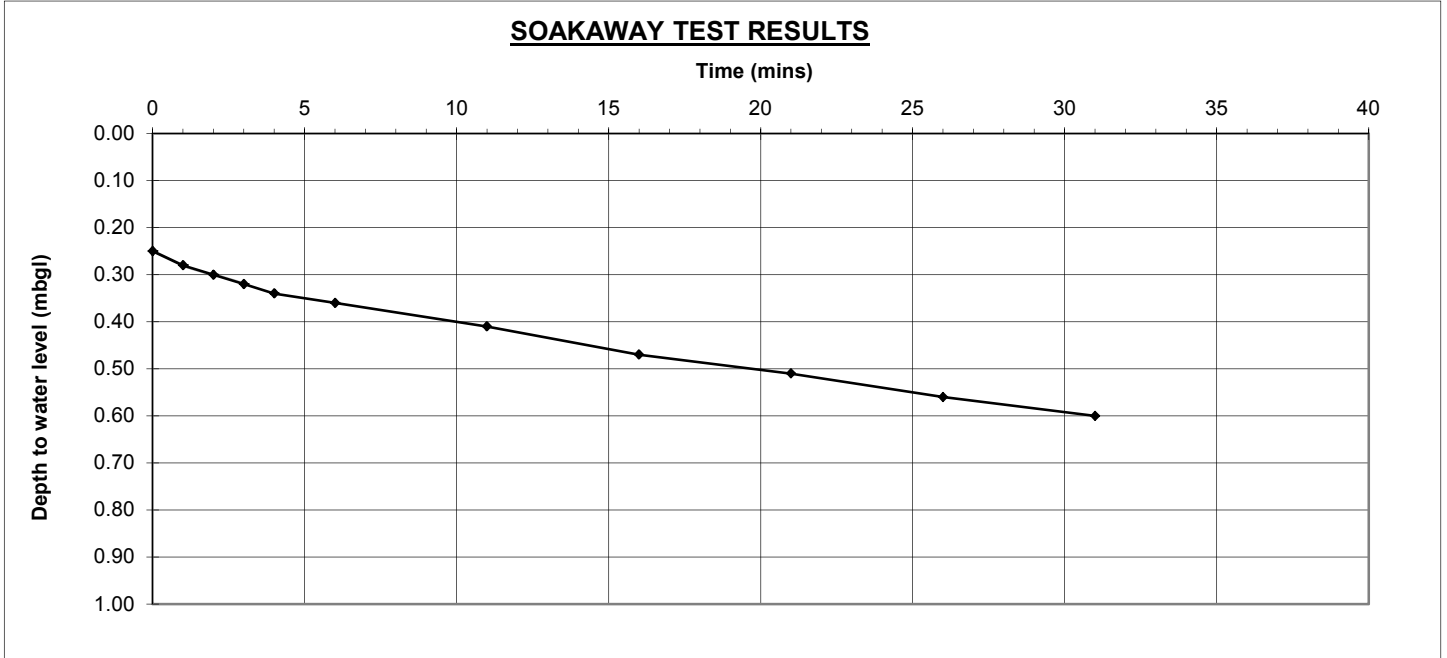
From above graph;

0.175 m	= Depth drop between 75% and 25% of maximum depth to final depth
17.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.07875 m³
ap50 =	1.9667 m²
tp75-25 =	17.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**3.81E-05**	m/s

|	Permeability Guideline (m/s)		
Good	Poor		Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}		10^{-8} - 10^{-10}

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Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	1.00	0.65		

Test Date 14/05/2014

Soakaway No. 2a.2

SOAKAWAY TEST RESULTS

From above graph;

0.17 m	= Depth drop between 75% and 25% of maximum depth to final depth
19.9 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.0765 m³
ap50 = 1.9377 m²
tp75-25 = 19.9 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **3.31E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base	Test Date 14/05/2014
	0.45	1.00	0.65	Soakaway No. 2a.3

SOAKAWAY TEST RESULTS

From above graph;

0.15 m	= Depth drop between 75% and 25% of maximum depth to final depth
17 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.0675 m³
ap50 =	1.9667 m²
tp75-25 =	17.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

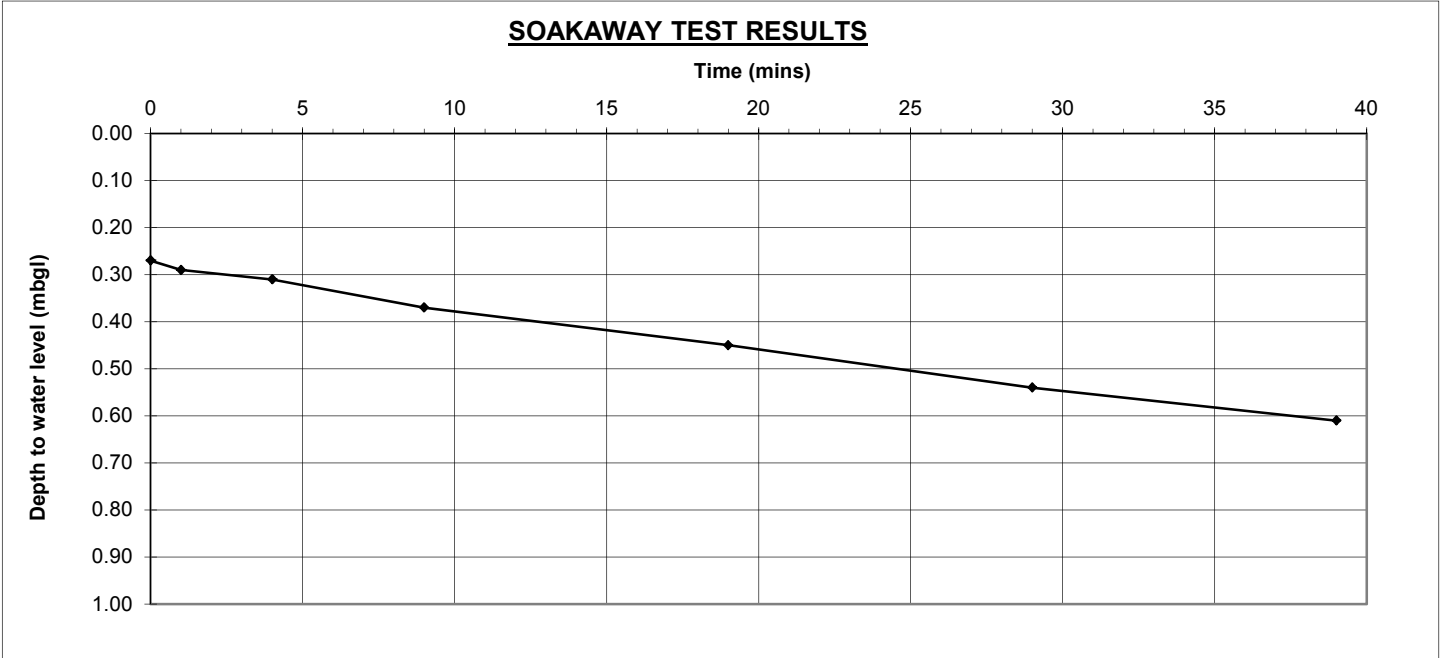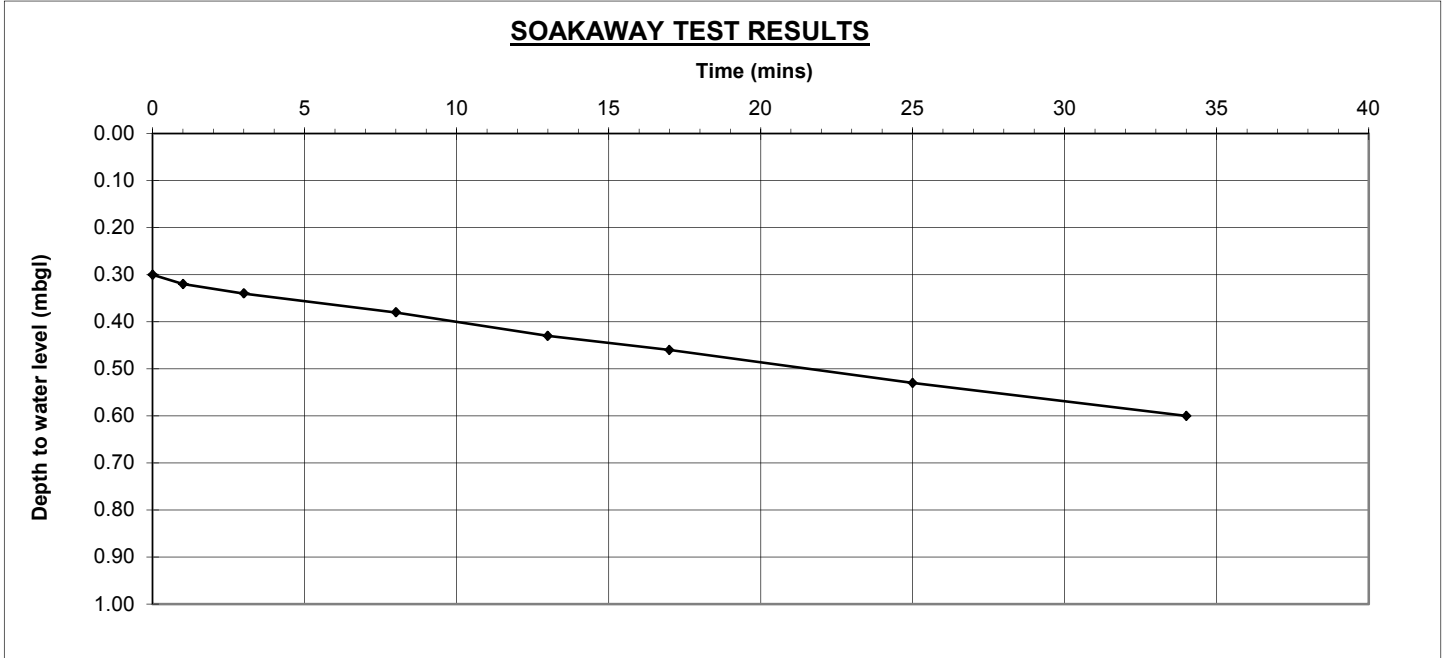| Soil Infiltration Rate (f) = **3.36E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**
	0.45	2.00	1.90

Test Date 14/05/2014

Soakaway No. 2b.1

SOAKAWAY TEST RESULTS

From above graph;

0.26 m	= Depth drop between 75% and 25% of maximum depth to final depth
41.3 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.234 m³
ap50 = 3.6587 m²
tp75-25 = 41.3 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**2.58E-05**	m/s

	Permeability Guideline (m/s)		
Good	Poor	Practically Impervious	
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$	

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base	
	0.45	2.00	1.90	

Test Date 14/05/2014

Soakaway No. 2b.2

SOAKAWAY TEST RESULTS

From above graph;

0.235 m	= Depth drop between 75% and 25% of maximum depth to final depth
54.8 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.2115 m³
ap50 =	3.7077 m²
tp75-25 =	54.8 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.73E-05**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**		
	0.45	2.00	1.90		

Test Date 14/05/2014
Soakaway No. 2b.3

SOAKAWAY TEST RESULTS

From above graph;

0.2 m	= Depth drop between 75% and 25% of maximum depth to final depth
27 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.18 m³
ap50 =	3.9527 m²
tp75-25 =	27.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**2.81E-05**	m/s

	Permeability Guideline (m/s)		
Good	Poor	Practically Impervious	
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$	

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.60	1.50	1.00	**Test Date** 14/05/2014	
				Soakaway No. 3a.1	

SOAKAWAY TEST RESULTS

From above graph;

0.09 m	= Depth drop between 75% and 25% of maximum depth to final depth
10 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.081 m³
ap50 =	3.6006 m²
tp75-25 =	10.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**3.75E-05**	m/s

		Permeability Guideline (m/s)	
Good	Poor	Practically Impervious	
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}	

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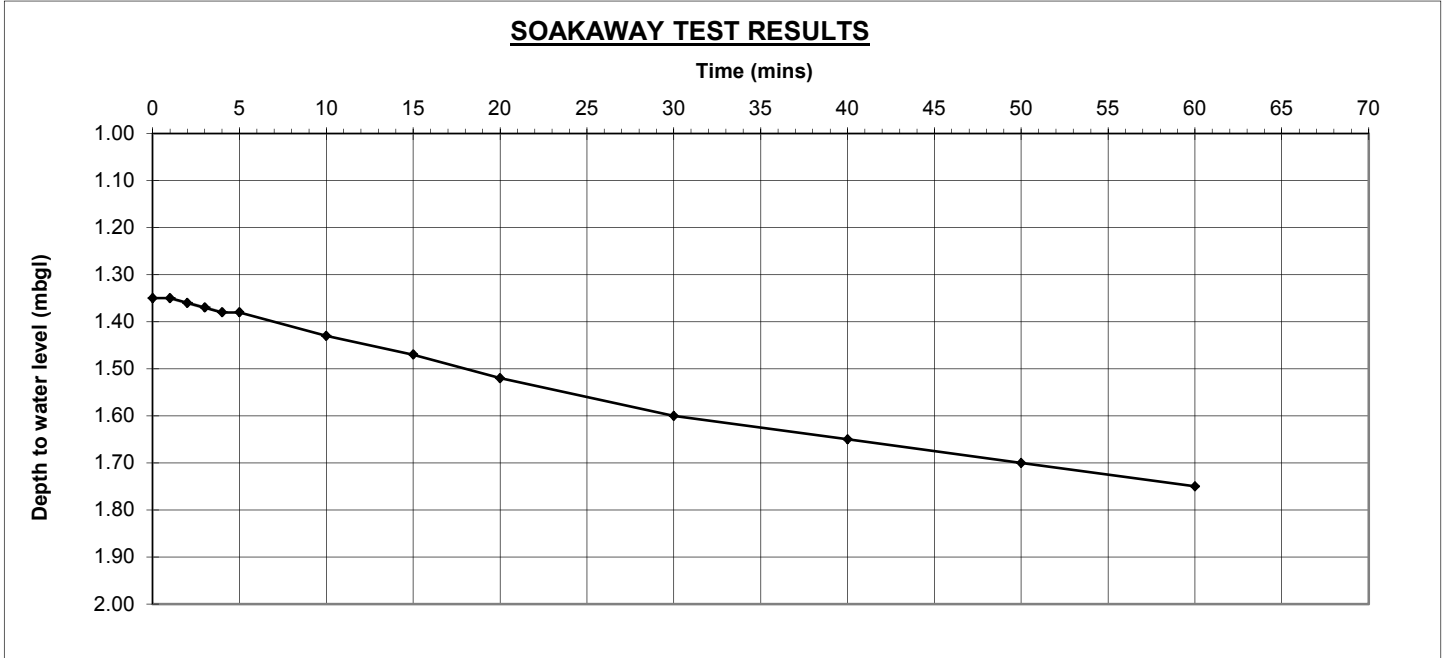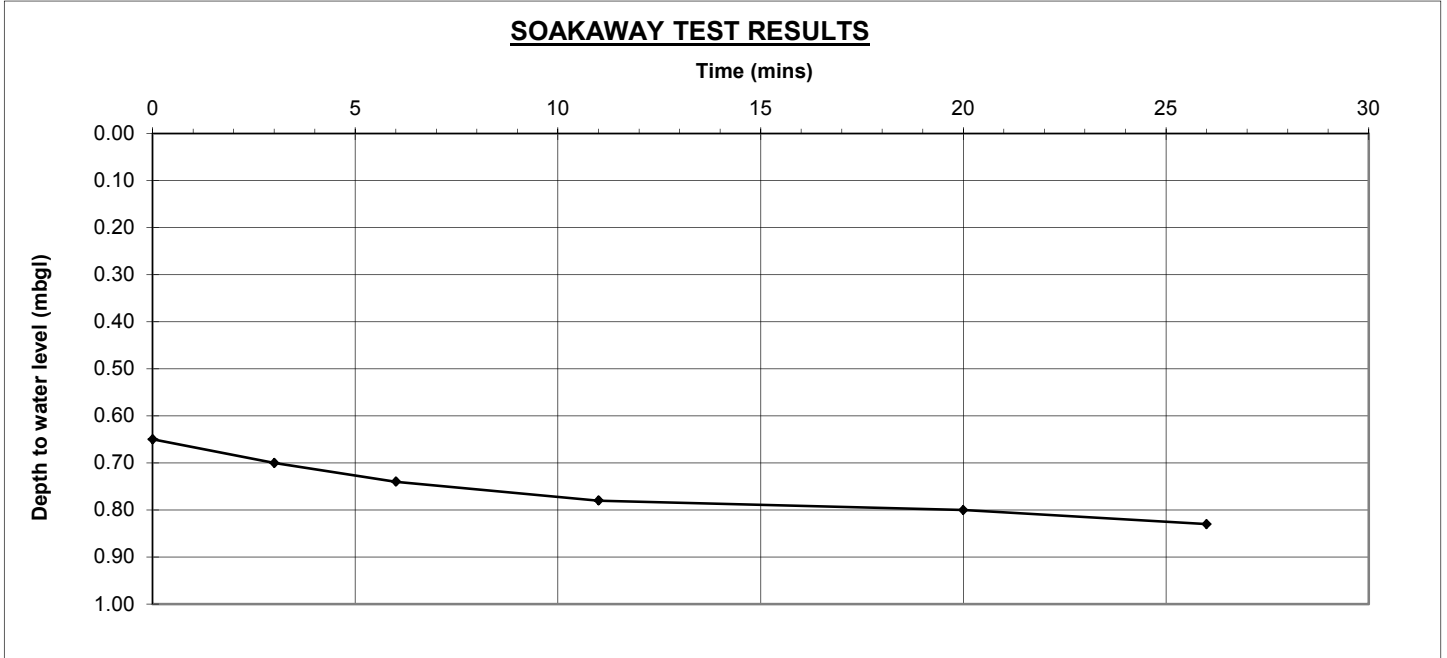## Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.60	1.50	1.00		

Test Date 14/05/2014

Soakaway No. 3a.2

SOAKAWAY TEST RESULTS

From above graph;

0.11 m	= Depth drop between 75% and 25% of maximum depth to final depth
19.75 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP_{75-25} = Volume outflowing between 75% and 25% of effective depth.

ap_{50} = Mean surface area through which the outflow occurs.

tp_{75-25} = Time for the outflow between 75% and 25% of the effective depth.

VP_{75-25} = 0.099 m³
ap_{50} = 3.6426 m²
tp_{75-25} = 19.8 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

		Permeability Guideline (m/s)		
Soil Infiltration Rate (f) = **2.29E-05** m/s		Good	Poor	Practically Impervious
		$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date 14/05/2014
	0.60	1.50	1.00		**Soakaway No.** 3a.3

SOAKAWAY TEST RESULTS

From above graph;

0.145 m	= Depth drop between 75% and 25% of maximum depth to final depth
29.75 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP_{75-25} = Volume outflowing between 75% and 25% of effective depth.

ap_{50} = Mean surface area through which the outflow occurs.

tp_{75-25} = Time for the outflow between 75% and 25% of the effective depth.

VP_{75-25} =	0.1305 m³
ap_{50} =	3.3486 m²
tp_{75-25} =	29.8 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **2.18E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date 15/05/2014
	0.45	3.00	2.30		**Soakaway No.** 3b.1

SOAKAWAY TEST RESULTS

From above graph;

0.07 m	= Depth drop between 75% and 25% of maximum depth to final depth
39 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP_{75-25} = Volume outflowing between 75% and 25% of effective depth.

ap_{50} = Mean surface area through which the outflow occurs.

tp_{75-25} = Time for the outflow between 75% and 25% of the effective depth.

VP_{75-25} = 0.0945 m³
ap_{50} = 7.9257 m²
tp_{75-25} = 39.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

		Permeability Guideline (m/s)		
Soil Infiltration Rate (f) = **5.10E-06** m/s		Good	Poor	Practically Impervious
		10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

ROLTON GROUP
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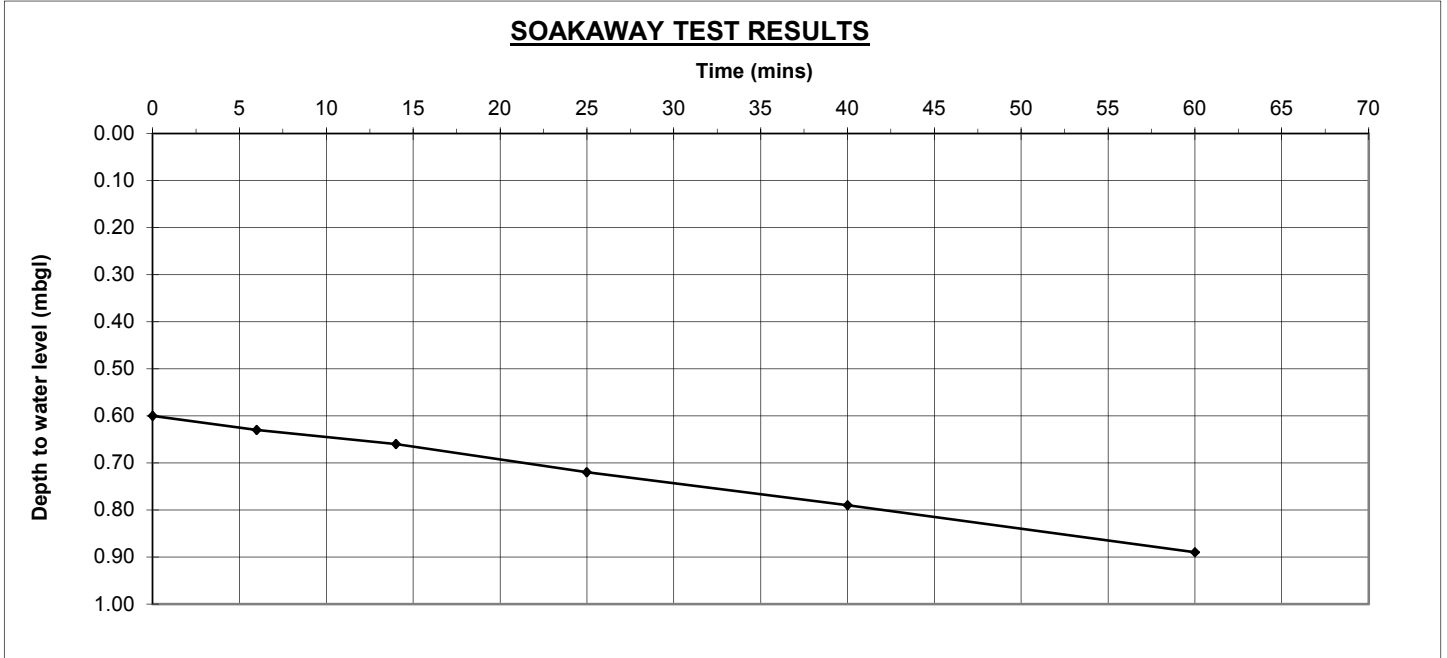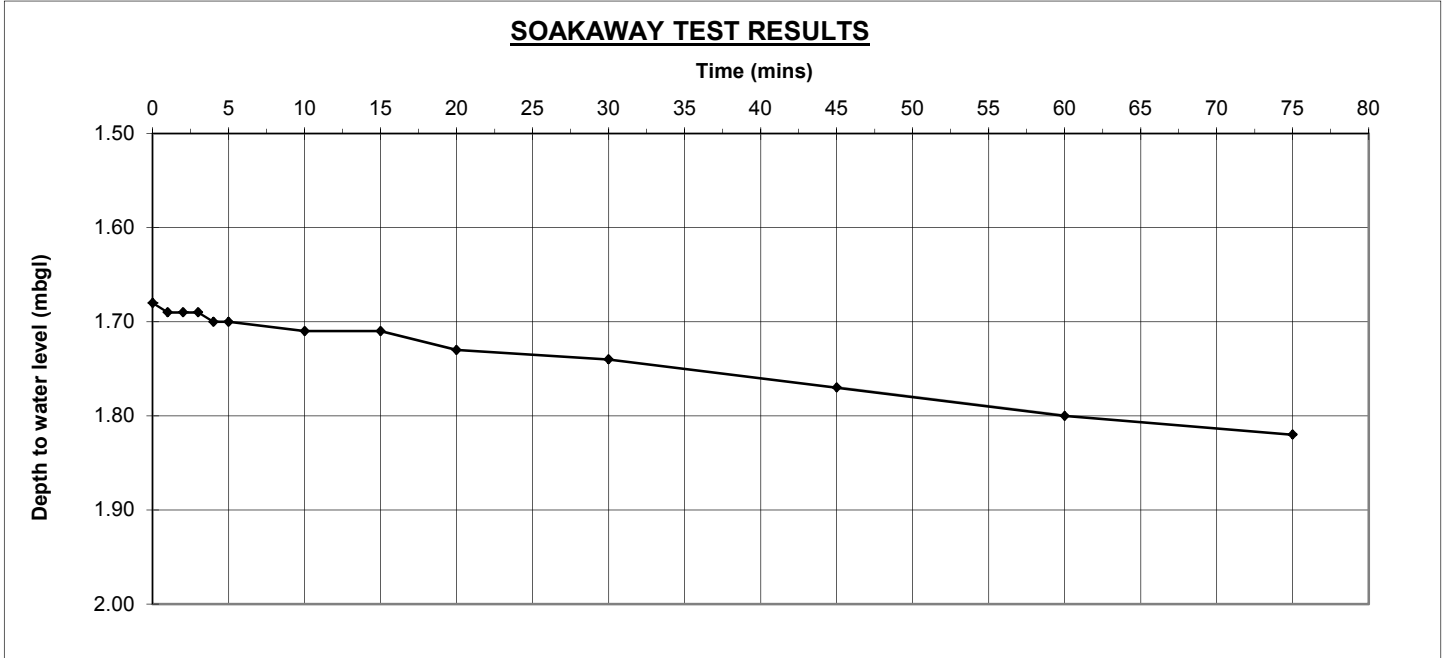## Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base			
	0.45	3.00	2.30			

Test Date 15/05/2014

Soakaway No. 3b.2

SOAKAWAY TEST RESULTS

From above graph;

0.03 m	= Depth drop between 75% and 25% of maximum depth to final depth
18.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.0405 m³
ap50 =	8.3397 m²
tp75-25 =	18.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**4.38E-06**	m/s

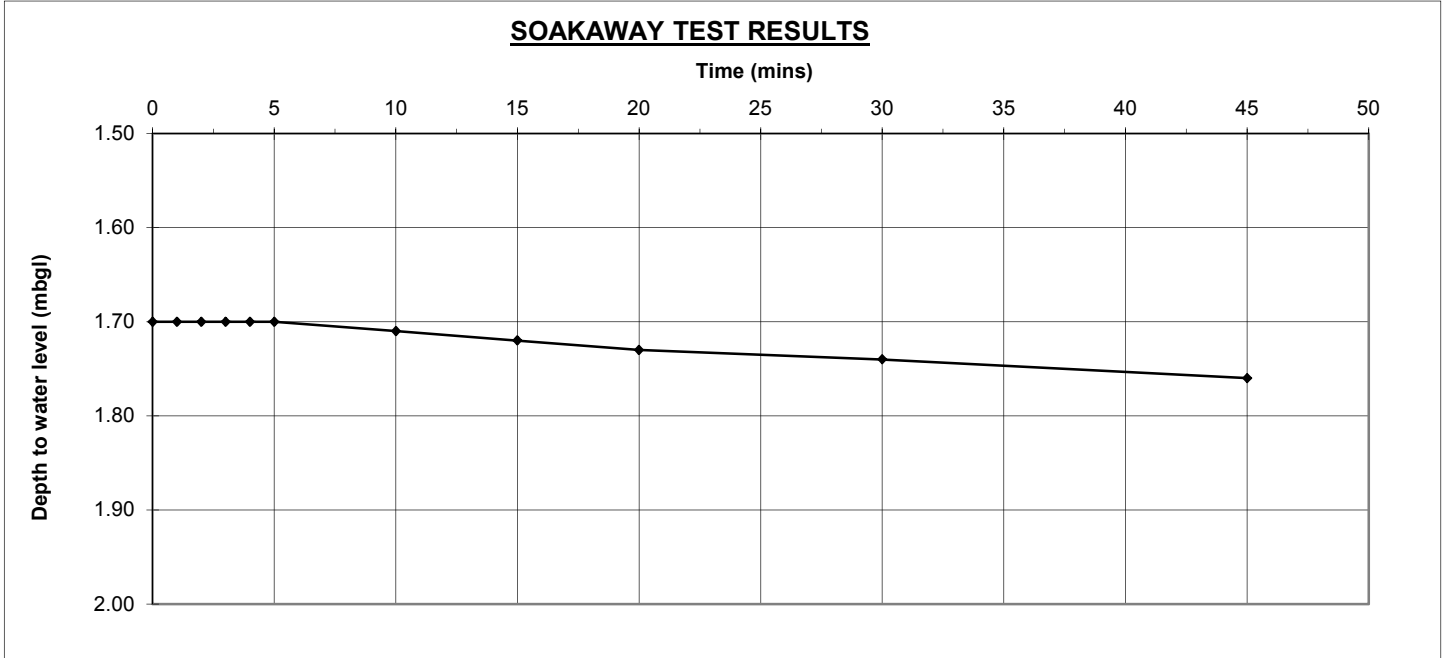| Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**		
	0.45	3.00	2.30	**Test Date**	16/05/2014
				Soakaway No.	3b.3

SOAKAWAY TEST RESULTS
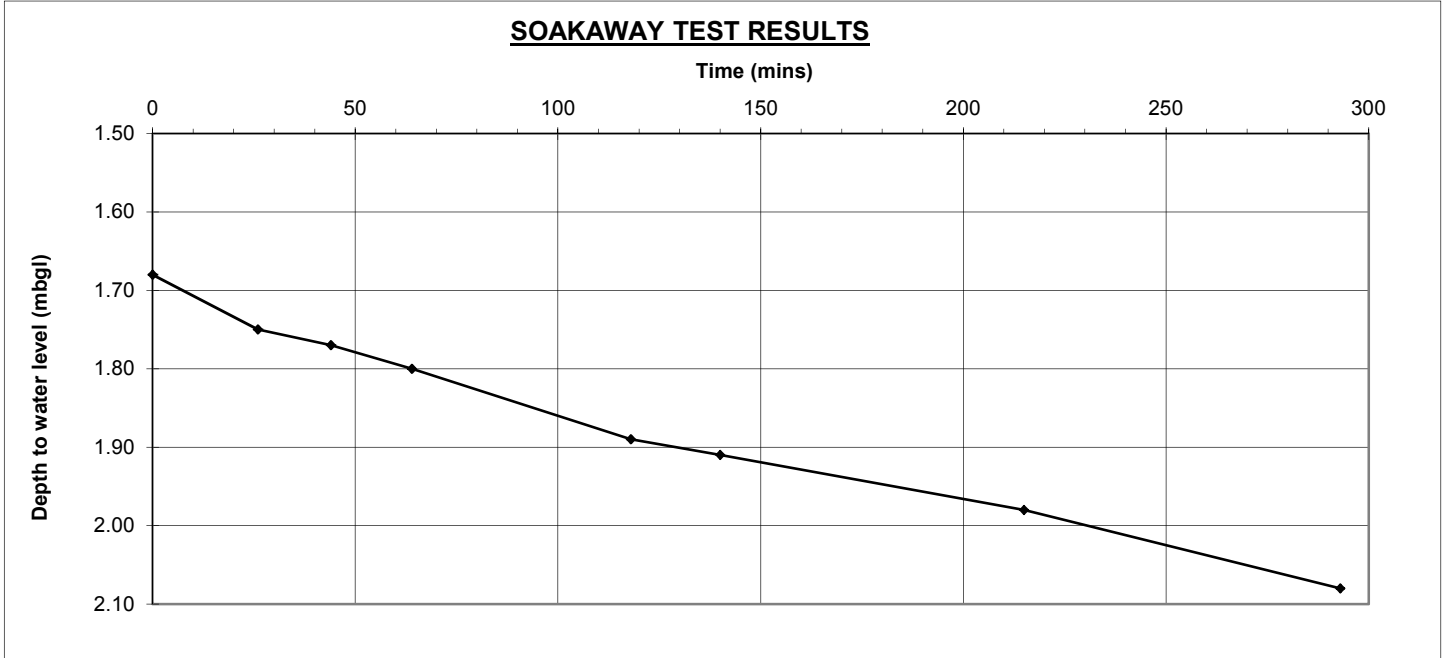
From above graph;

0.2 m	= Depth drop between 75% and 25% of maximum depth to final depth
157 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.27 m³
ap50 = 6.1317 m²
tp75-25 = 157.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **4.67E-06** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.60	1.50	1.00	**Test Date** 15/05/2014	
				Soakaway No. 4a.1	

SOAKAWAY TEST RESULTS

From above graph;

0.215 m	= Depth drop between 75% and 25% of maximum depth to final depth
39.9 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.1935 m³
ap50 = 4.3146 m²
tp75-25 = 39.9 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **1.87E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 15/05/2014
	0.60	1.50	1.00	**Soakaway No.** 4a.2

SOAKAWAY TEST RESULTS
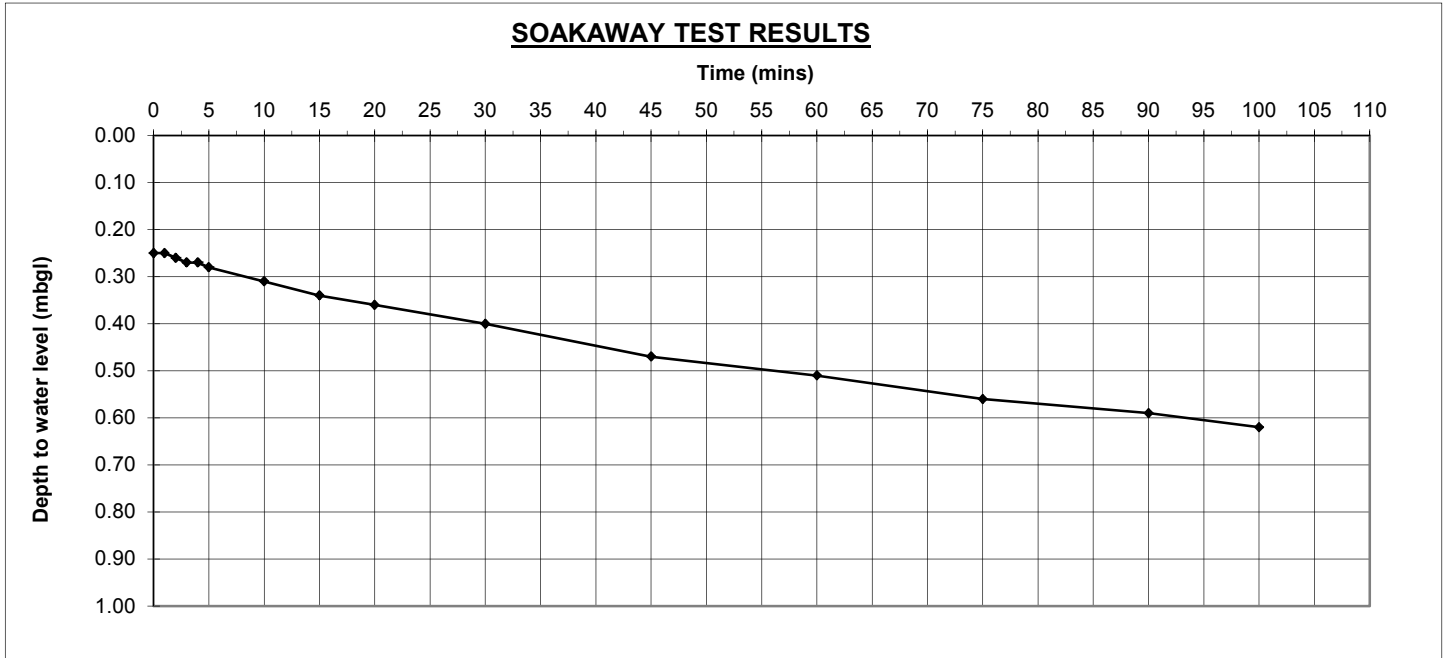
From above graph;

0.185 m	= Depth drop between 75% and 25% of maximum depth to final depth
48 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.1665 m³
ap50 =	4.4826 m²
tp75-25 =	48.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.29E-05**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 15/05/2014
	0.60	1.50	1.00	**Soakaway No.** 4a.3

SOAKAWAY TEST RESULTS

From above graph;

0.15 m	= Depth drop between 75% and 25% of maximum depth to final depth
40.25 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.135 m³
ap50 = 4.8186 m²
tp75-25 = 40.3 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

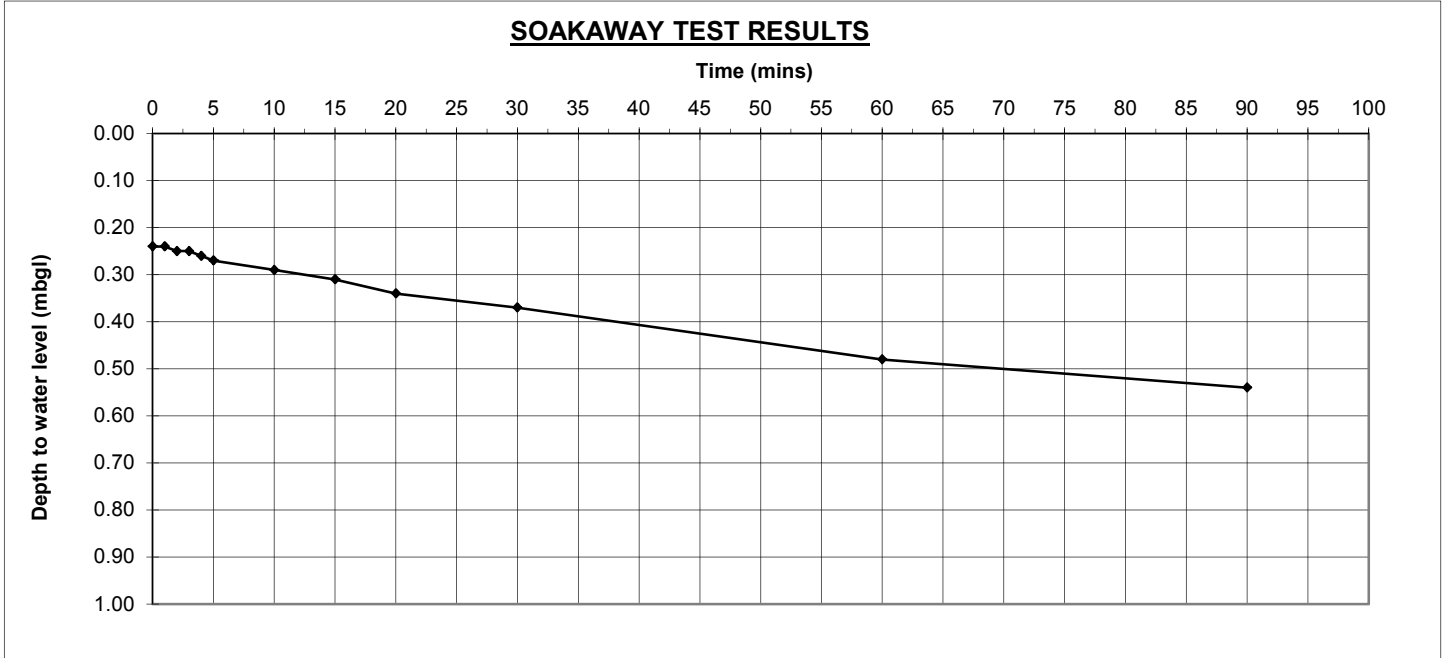| Soil Infiltration Rate (f) = **1.16E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

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Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 15/05/2014
	0.45	1.80	0.70	**Soakaway No.** 5a.1

SOAKAWAY TEST RESULTS
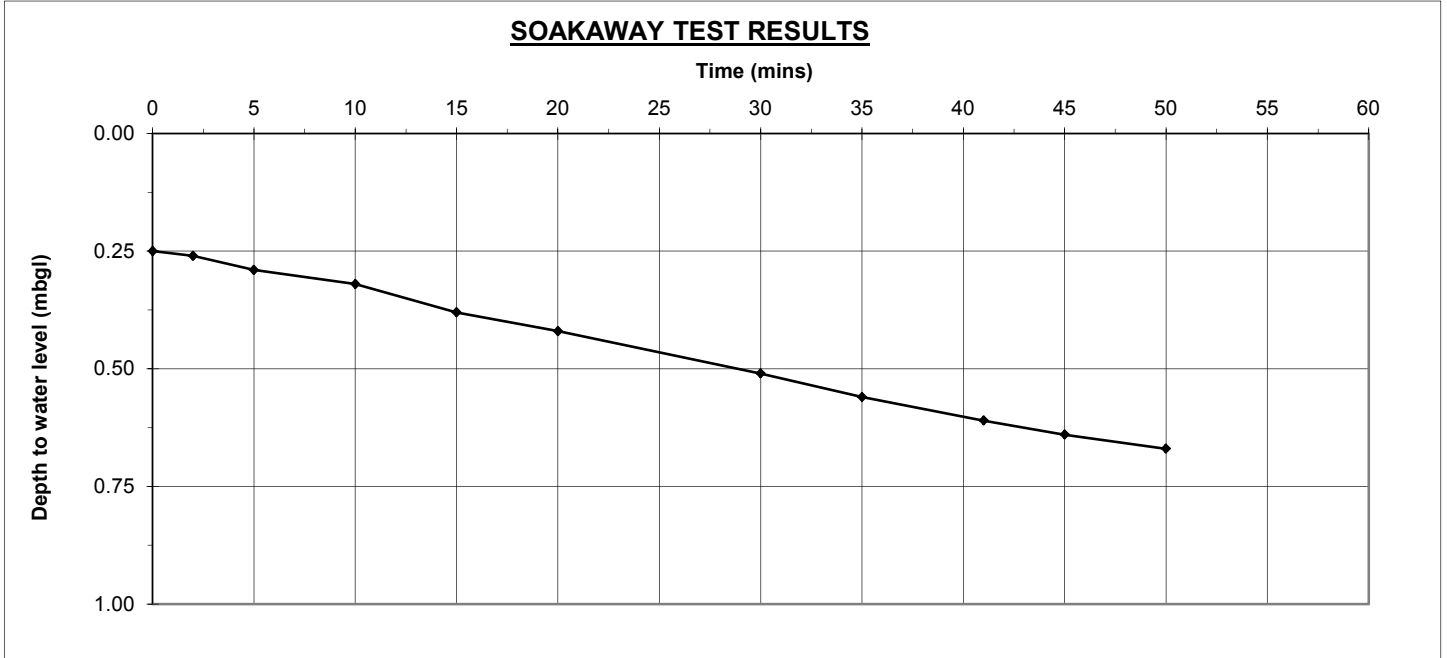
From above graph;

0.21 m	= Depth drop between 75% and 25% of maximum depth to final depth
23 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.1701 m³
ap50 = 3.0735 m²
tp75-25 = 23.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**4.01E-05**	m/s

| Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

ROLTON GROUP
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Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date	15/05/2014
	0.45	1.80	0.70		**Soakaway No.**	5a.2

SOAKAWAY TEST RESULTS

From above graph;

0.2 m	= Depth drop between 75% and 25% of maximum depth to final depth
26.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP_{75-25} = Volume outflowing between 75% and 25% of effective depth.

ap_{50} = Mean surface area through which the outflow occurs.

tp_{75-25} = Time for the outflow between 75% and 25% of the effective depth.

VP_{75-25} =	0.162 m³
ap_{50} =	3.1635 m²
tp_{75-25} =	26.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**3.22E-05**	m/s

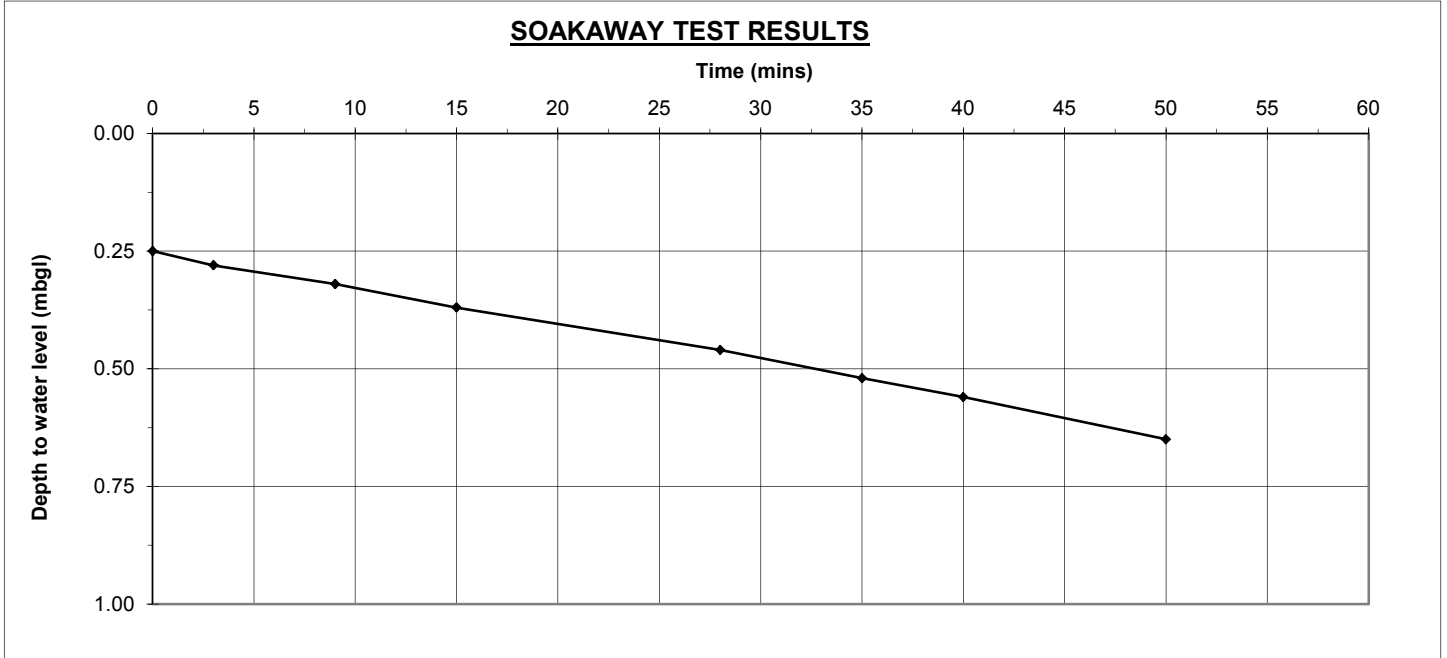| Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**		
	0.45	1.80	0.70		

Test Date 15/05/2014

Soakaway No. 5a.3

SOAKAWAY TEST RESULTS

From above graph;

0.205 m	= Depth drop between 75% and 25% of maximum depth to final depth
22.6 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.16605 m³
ap50 =	3.1635 m²
tp75-25 =	22.6 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **3.87E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 15/05/2014
	0.45	3.00	1.50	**Soakaway No.** 5b.1

SOAKAWAY TEST RESULTS

From above graph;

0.085 m	= Depth drop between 75% and 25% of maximum depth to final depth
14.8 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.11475 m³
ap50 = 5.8557 m²
tp75-25 = 14.8 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **2.21E-05** m/s		Permeability Guideline (m/s)		
		Good	Poor	Practically Impervious
		$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**		**Test Date** 15/05/2014
	0.45	3.00	1.50		**Soakaway No.** 5b.2

SOAKAWAY TEST RESULTS

From above graph;

0.135 m	= Depth drop between 75% and 25% of maximum depth to final depth
3.7 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.18225 m³
ap50 = 5.1657 m²
tp75-25 = 3.7 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.59E-04**	m/s	Permeability Guideline (m/s)		
			Good	Poor	Practically Impervious
			10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**		
	0.45	3.00	1.50	**Test Date** 15/05/2014	
				Soakaway No. 5b.3	

SOAKAWAY TEST RESULTS

From above graph;

0.15 m	= Depth drop between 75% and 25% of maximum depth to final depth
5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.2025 m³
ap50 =	4.9587 m²
tp75-25 =	5.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

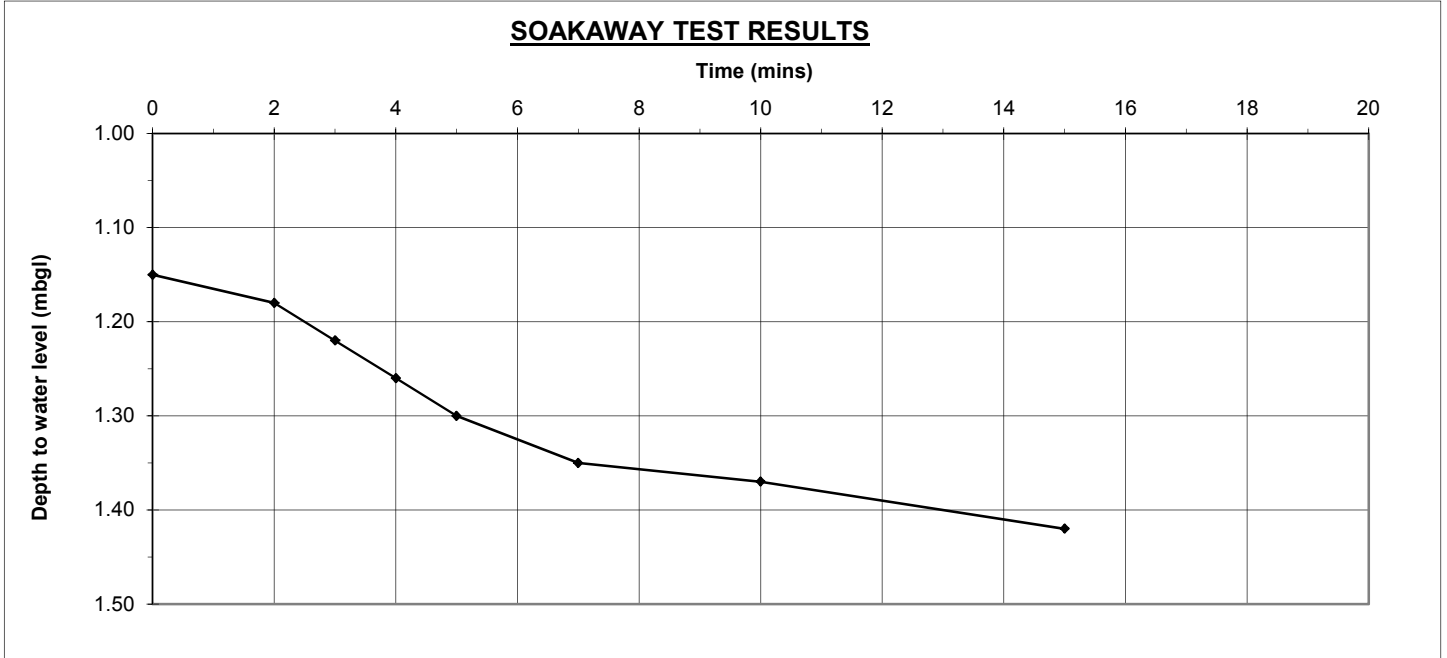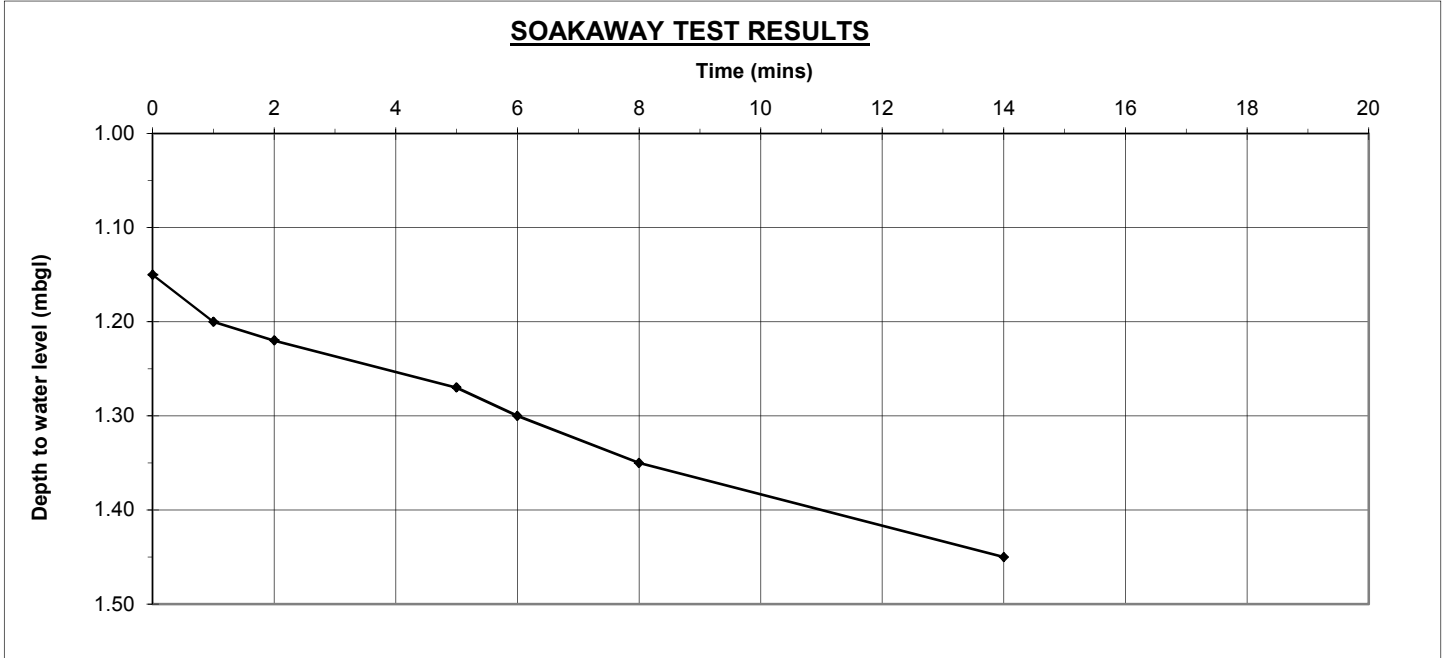| Soil Infiltration Rate (f) = **1.36E-04** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

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Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 15/05/2014
	0.45	1.00	1.00	**Soakaway No.** 6a.1

SOAKAWAY TEST RESULTS

From above graph;

0.09 m	= Depth drop between 75% and 25% of maximum depth to final depth
35 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.0405 m³
ap50 =	2.6337 m²
tp75-25 =	35.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

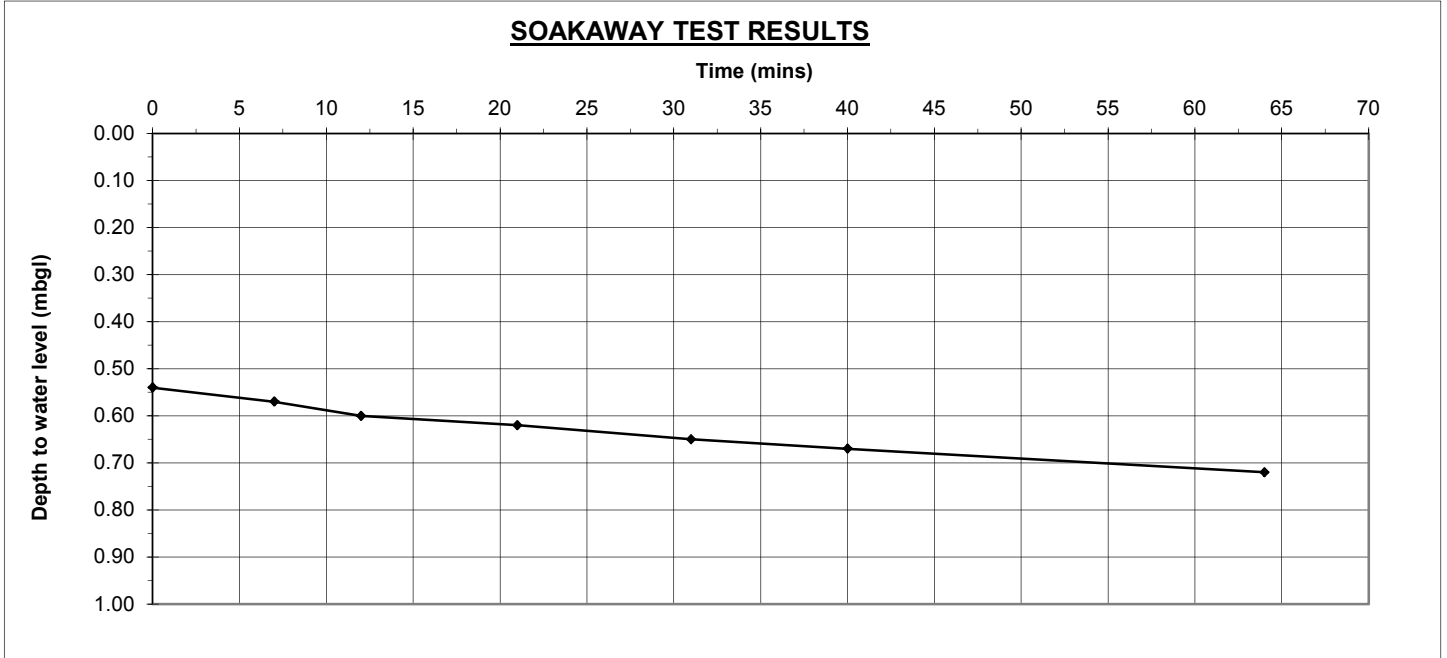| Soil Infiltration Rate (f) =	**7.32E-06**	m/s	Permeability Guideline (m/s)		
			Good	Poor	Practically Impervious
			10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	1.00	1.00		

Test Date 15/05/2014

Soakaway No. 6a.2

SOAKAWAY TEST RESULTS
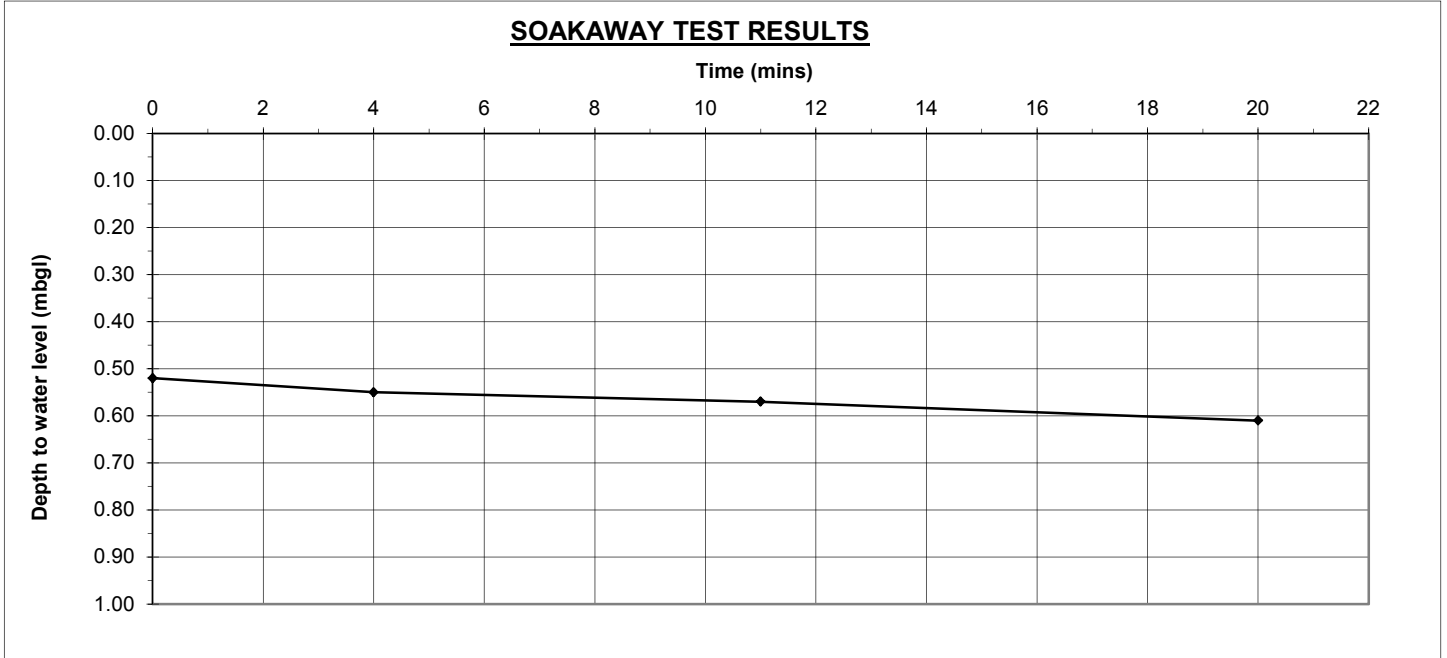
From above graph;

0.045 m	= Depth drop between 75% and 25% of maximum depth to final depth
11.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.02025 m³
ap50 = 2.9527 m²
tp75-25 = 11.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**9.94E-06**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**		
	0.45	1.00	1.00		

Test Date 16/05/2014
Soakaway No. 6a.3

SOAKAWAY TEST RESULTS

From above graph;

0.205 m	= Depth drop between 75% and 25% of maximum depth to final depth
103 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP_{75-25} = Volume outflowing between 75% and 25% of effective depth.
ap_{50} = Mean surface area through which the outflow occurs.
tp_{75-25} = Time for the outflow between 75% and 25% of the effective depth.

VP_{75-25} =	0.09225 m³
ap_{50} =	2.6047 m²
tp_{75-25} =	103.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**5.73E-06**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date	15/05/2014
	0.45	2.50	1.70		**Soakaway No.**	6b.1

SOAKAWAY TEST RESULTS

From above graph;

0.175 m	= Depth drop between 75% and 25% of maximum depth to final depth
35 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.
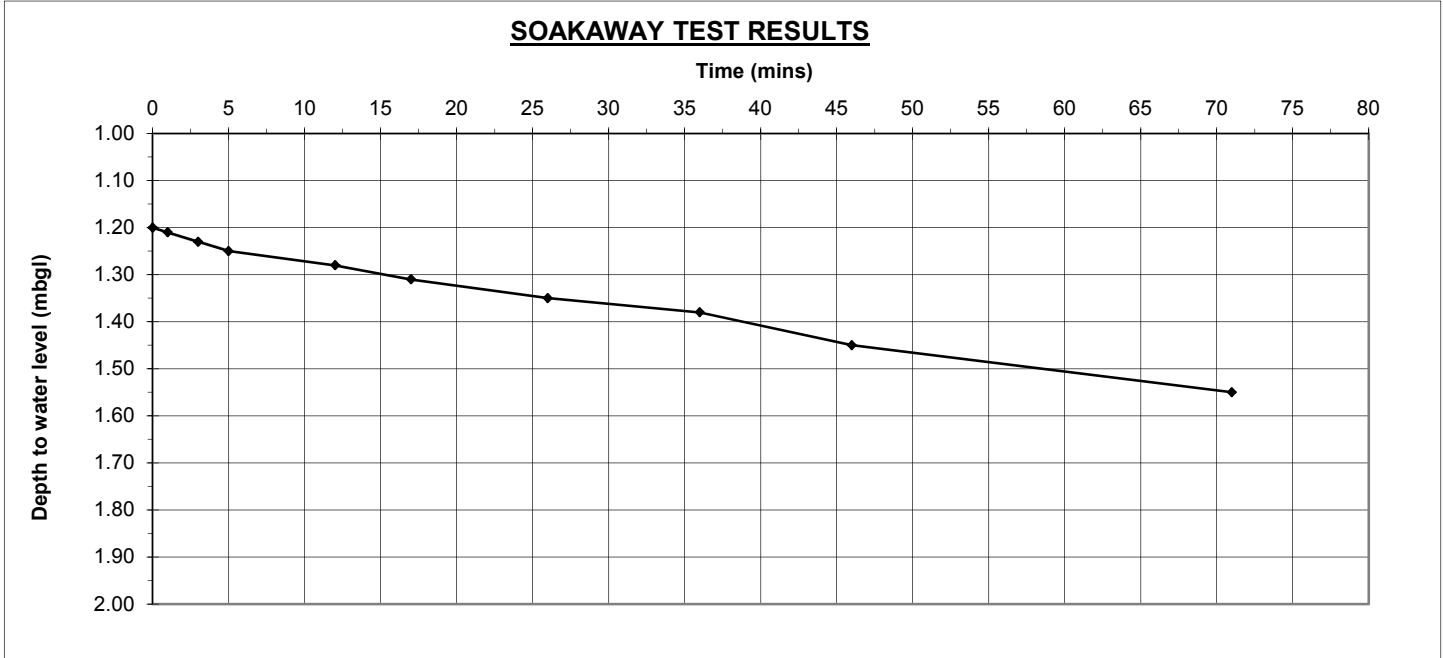
VP75-25 =	0.196875 m³
ap50 =	4.8007 m²
tp75-25 =	35.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.95E-05**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

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Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**		
	0.45	2.50	1.70		

Test Date 15/05/2014

Soakaway No. 6b.2

SOAKAWAY TEST RESULTS
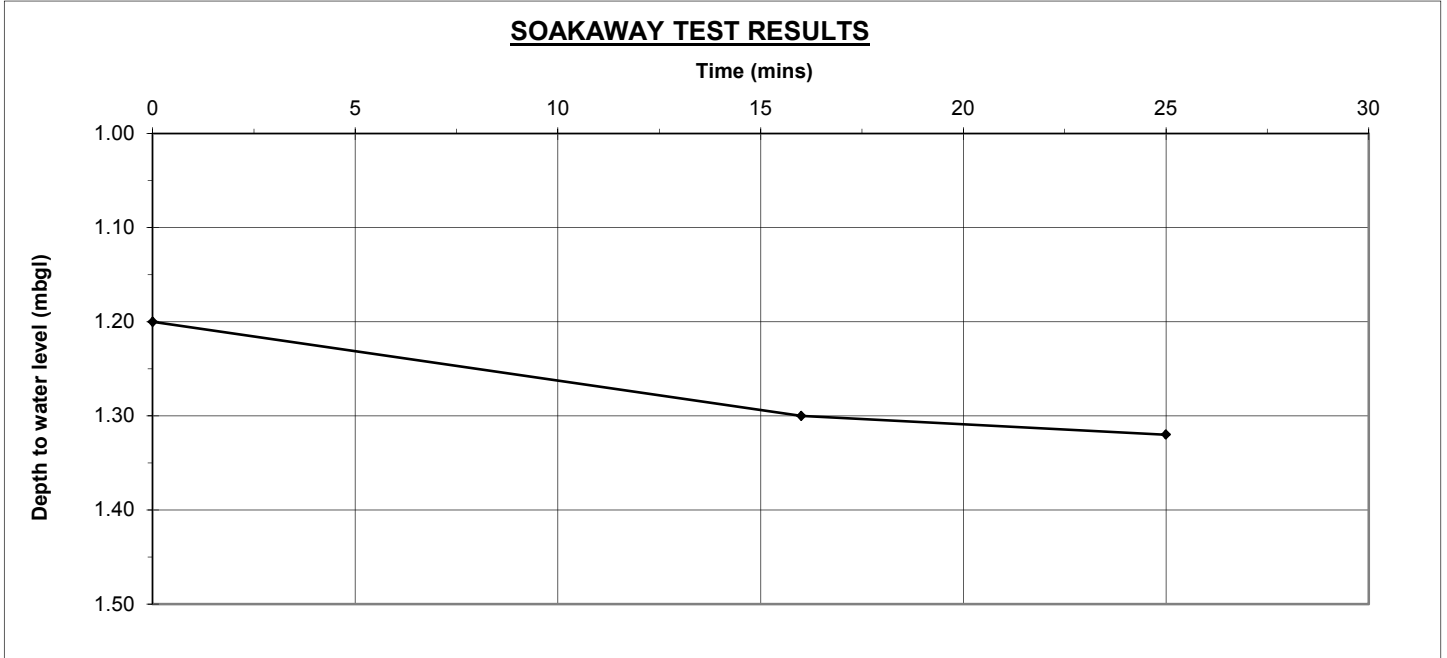
From above graph;

0.075 m	= Depth drop between 75% and 25% of maximum depth to final depth
14.25 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.084375 m³
ap50 =	5.9807 m²
tp75-25 =	14.3 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.65E-05**	m/s

	Permeability Guideline (m/s)		
Good	Poor	Practically Impervious	
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$	

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	2.50	1.70	**Test Date** 16/05/2014	
				Soakaway No. 6b.3	

SOAKAWAY TEST RESULTS
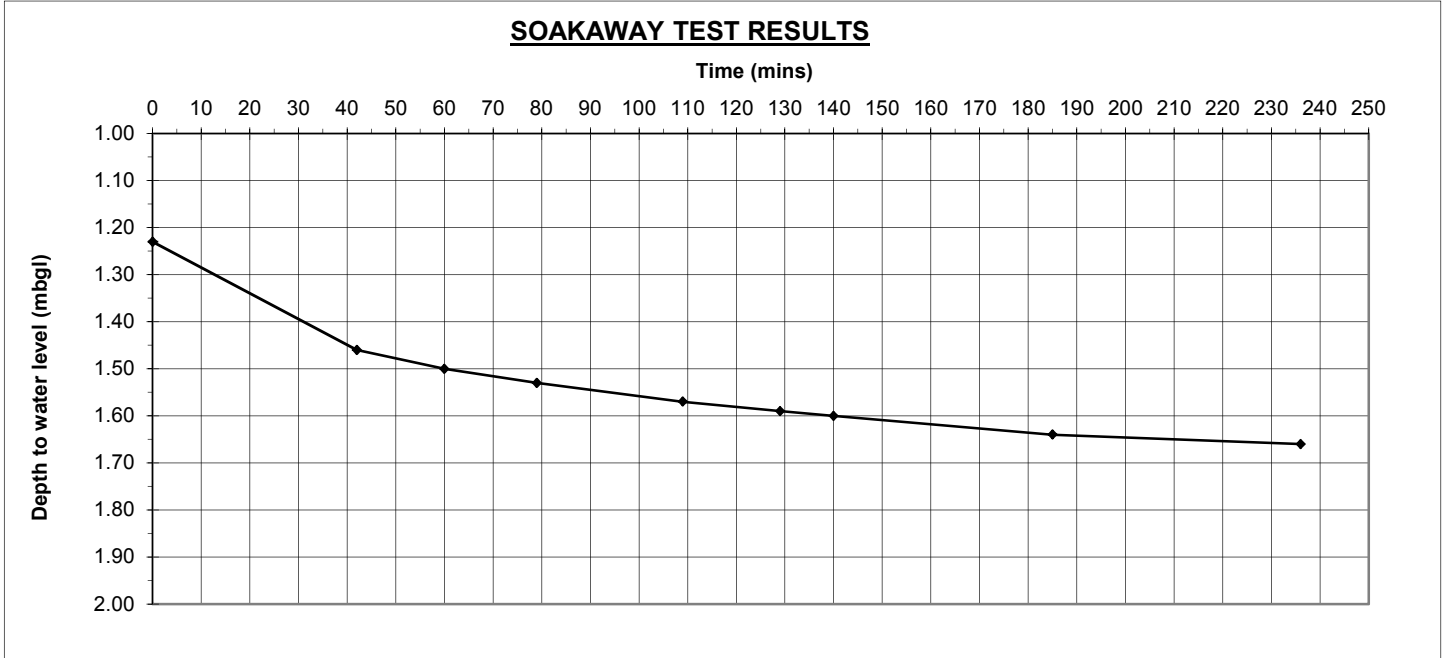
From above graph;

0.215 m	= Depth drop between 75% and 25% of maximum depth to final depth
76 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.241875 m³
ap50 =	4.1517 m²
tp75-25 =	76.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.28E-05**	m/s	Permeability Guideline (m/s)		
			Good	Poor	Practically Impervious
			$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

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Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date 16/05/2014
	0.45	2.00	0.80		**Soakaway No.** 7a.1

SOAKAWAY TEST RESULTS

From above graph;

0.14 m	= Depth drop between 75% and 25% of maximum depth to final depth
17 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.
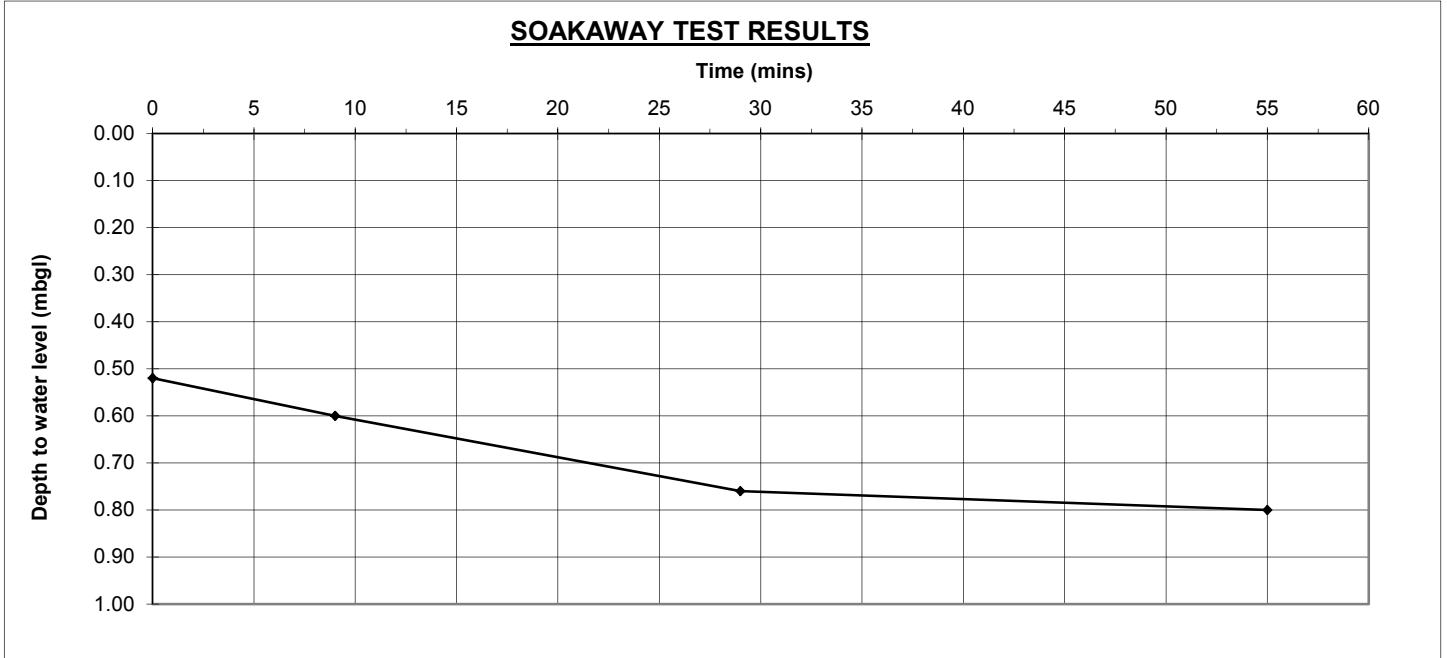
VP75-25 =	0.126 m³
ap50 =	3.2177 m²
tp75-25 =	17.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**3.84E-05**	m/s

	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**		
	0.45	2.00	0.80	**Test Date**	16/05/2014
				Soakaway No.	7a.2

SOAKAWAY TEST RESULTS
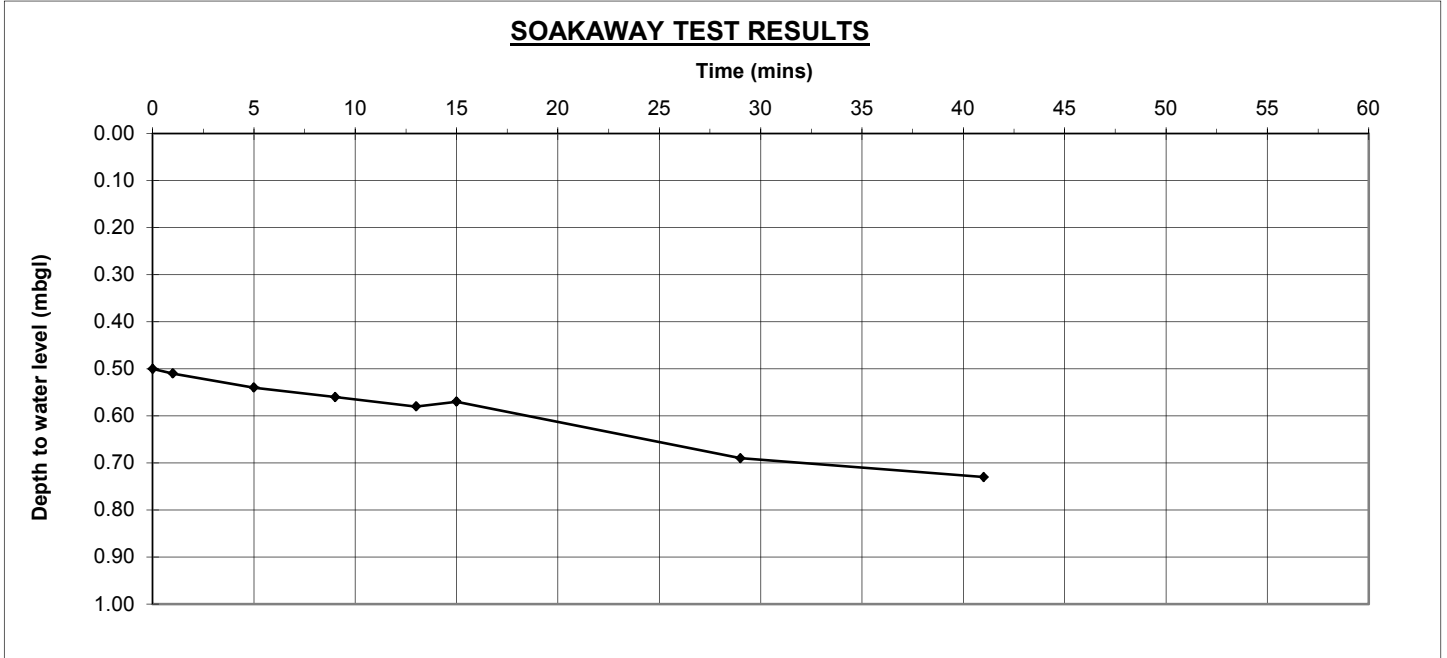
From above graph;

0.115 m	= Depth drop between 75% and 25% of maximum depth to final depth
19.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP_{75-25} = Volume outflowing between 75% and 25% of effective depth.
ap_{50} = Mean surface area through which the outflow occurs.
tp_{75-25} = Time for the outflow between 75% and 25% of the effective depth.

VP_{75-25} =	0.1035 m³
ap_{50} =	3.5607 m²
tp_{75-25} =	19.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**2.48E-05**	m/s

	Permeability Guideline (m/s)		
Good	Poor	Practically Impervious	
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$	

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	2.00	0.80		

Test Date 16/05/2014
Soakaway No. 7a.3

SOAKAWAY TEST RESULTS

From above graph;

0.13 m	= Depth drop between 75% and 25% of maximum depth to final depth
29 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.117 m³
ap50 =	3.5117 m²
tp75-25 =	29.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.91E-05**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date	16/05/2014
	0.45	2.00	1.60		Soakaway No.	7b.1

SOAKAWAY TEST RESULTS

From above graph;

0.14 m	= Depth drop between 75% and 25% of maximum depth to final depth
3.7 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.126 m³
ap50 = 3.5607 m²
tp75-25 = 3.7 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.59E-04**	m/s

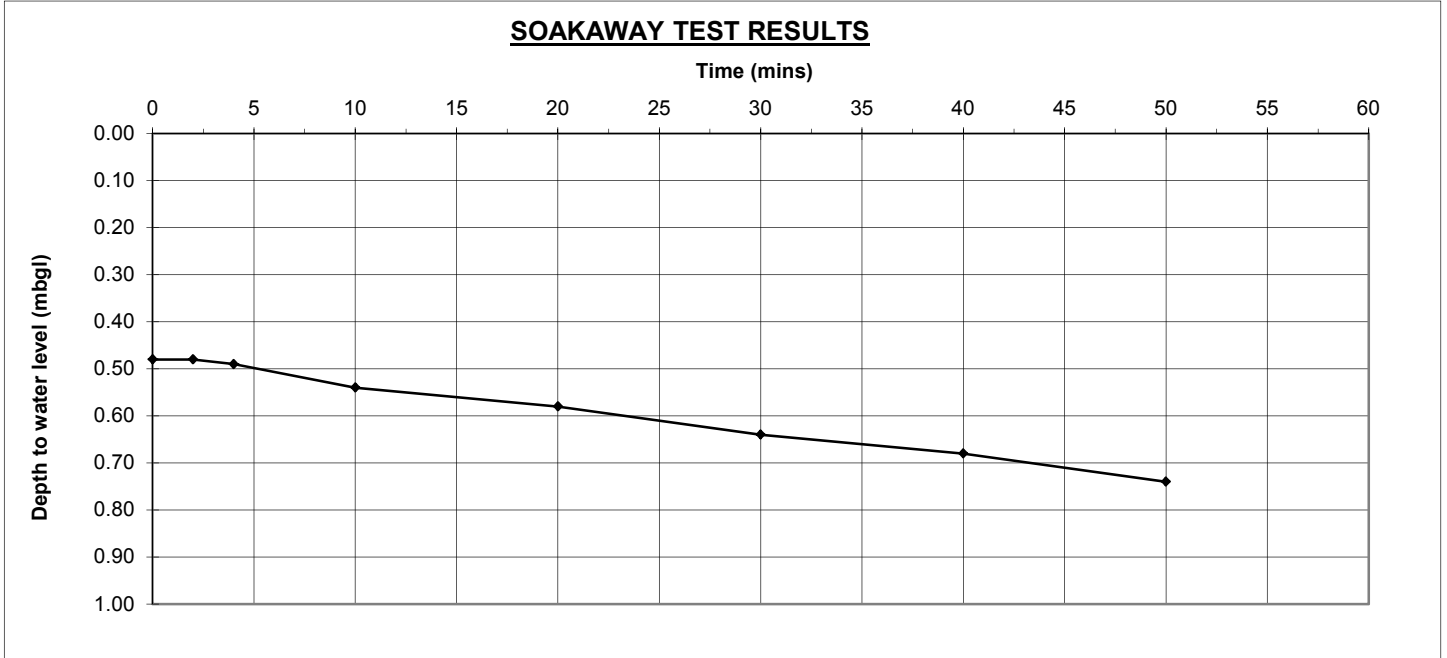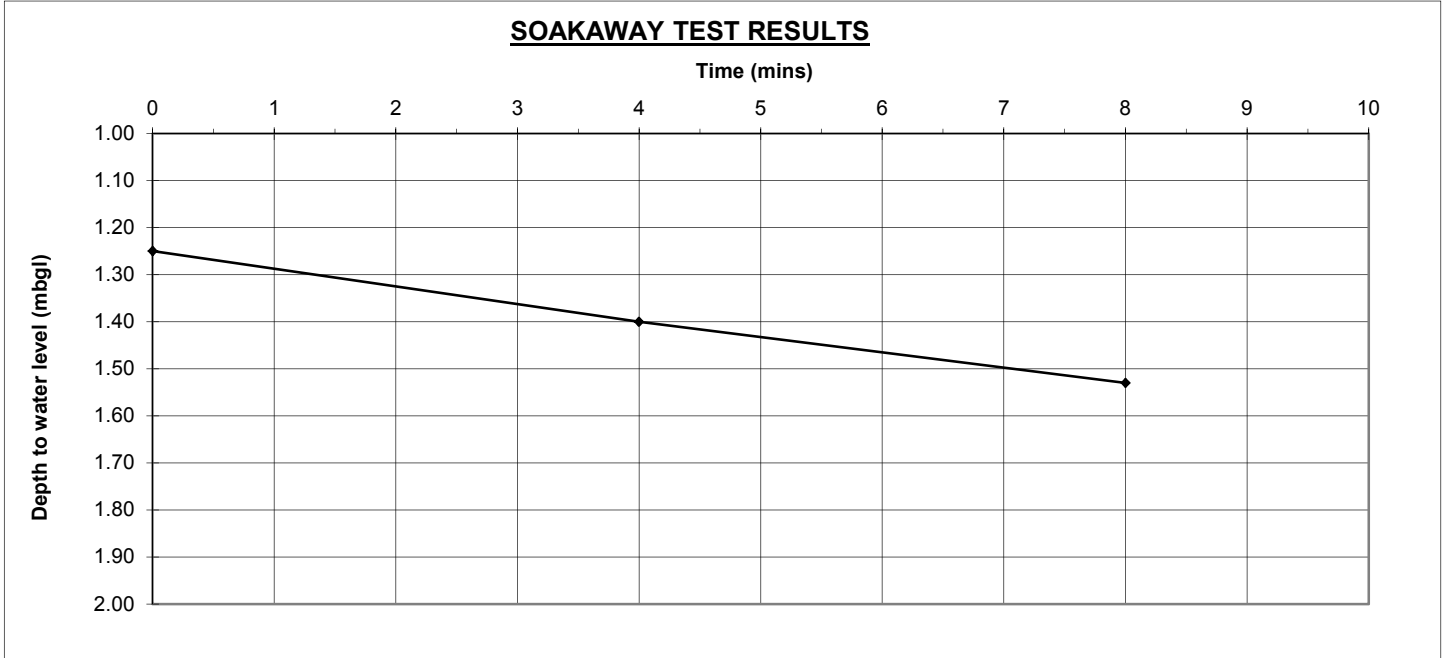| Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 16/05/2014
	0.45	2.00	1.60	**Soakaway No.** 7b.2

SOAKAWAY TEST RESULTS

From above graph;

0.125 m	= Depth drop between 75% and 25% of maximum depth to final depth
7.4 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.1125 m³
ap50 = 3.7077 m²
tp75-25 = 7.4 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **6.83E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date	16/05/2014
	0.45	2.00	1.60		Soakaway No.	7b.3

SOAKAWAY TEST RESULTS
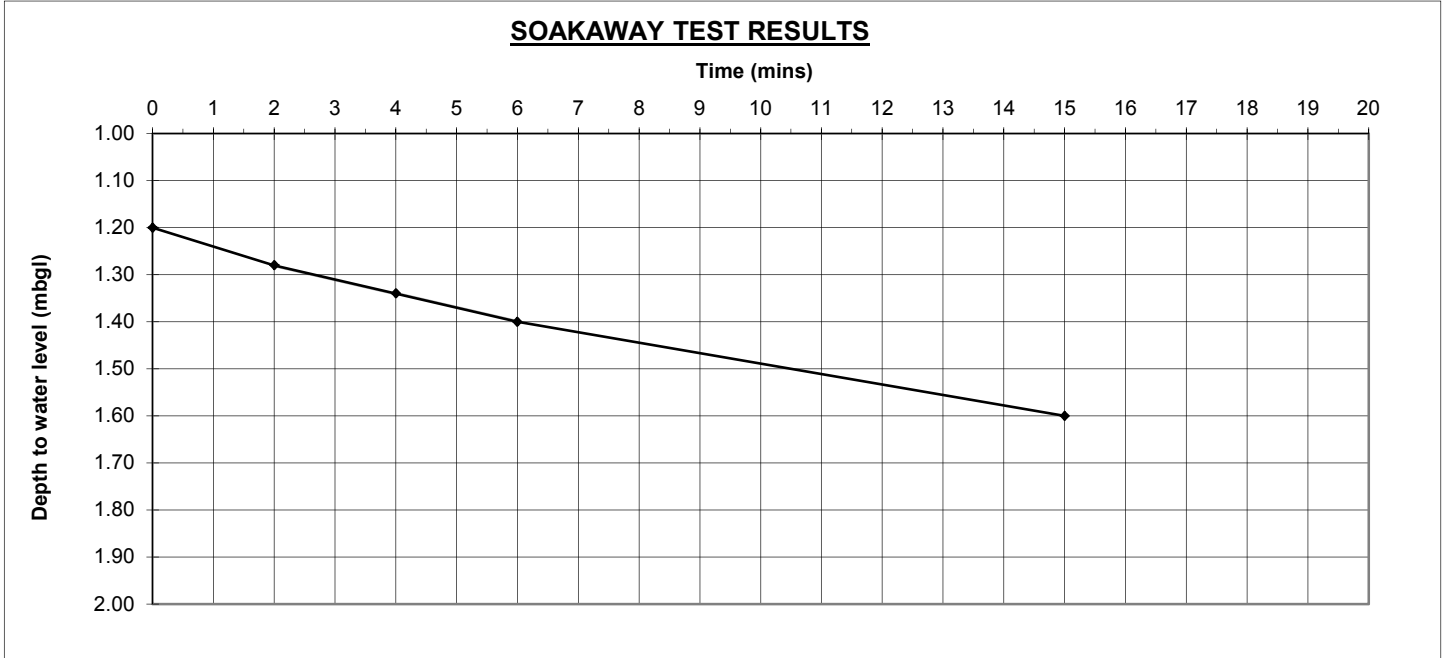
From above graph;

0.2 m	= Depth drop between 75% and 25% of maximum depth to final depth
7.9 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP_{75-25} = Volume outflowing between 75% and 25% of effective depth.
ap_{50} = Mean surface area through which the outflow occurs.
tp_{75-25} = Time for the outflow between 75% and 25% of the effective depth.

VP_{75-25} = 0.18 m³
ap_{50} = 3.2177 m²
tp_{75-25} = 7.9 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.18E-04**	m/s		Permeability Guideline (m/s)		
			Good	Poor	Practically Impervious	
			$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$	

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 16/05/2014
	0.45	1.00	0.80	**Soakaway No.** 8a.1

SOAKAWAY TEST RESULTS

From above graph;

0.13 m	= Depth drop between 75% and 25% of maximum depth to final depth
40 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.0585 m³
ap50 = 1.8217 m²
tp75-25 = 40.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

	Permeability Guideline (m/s)		
Soil Infiltration Rate (f) = 1.34E-05 m/s	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base	Test Date	16/05/2014
	0.45	1.00	0.80	Soakaway No.	8a.2

SOAKAWAY TEST RESULTS

From above graph;

0.125 m	= Depth drop between 75% and 25% of maximum depth to final depth
44.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.05625 m³
ap50 =	1.9667 m²
tp75-25 =	44.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**1.07E-05**	m/s

	Permeability Guideline (m/s)		
Good	Poor	Practically Impervious	
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$	

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 16/05/2014
	0.45	1.00	0.80	**Soakaway No.** 8a.3

SOAKAWAY TEST RESULTS

From above graph;

0.12 m	= Depth drop between 75% and 25% of maximum depth to final depth
54 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.054	m³
ap50 =	2.1407	m²
tp75-25 =	54.0	mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**7.79E-06**	m/s

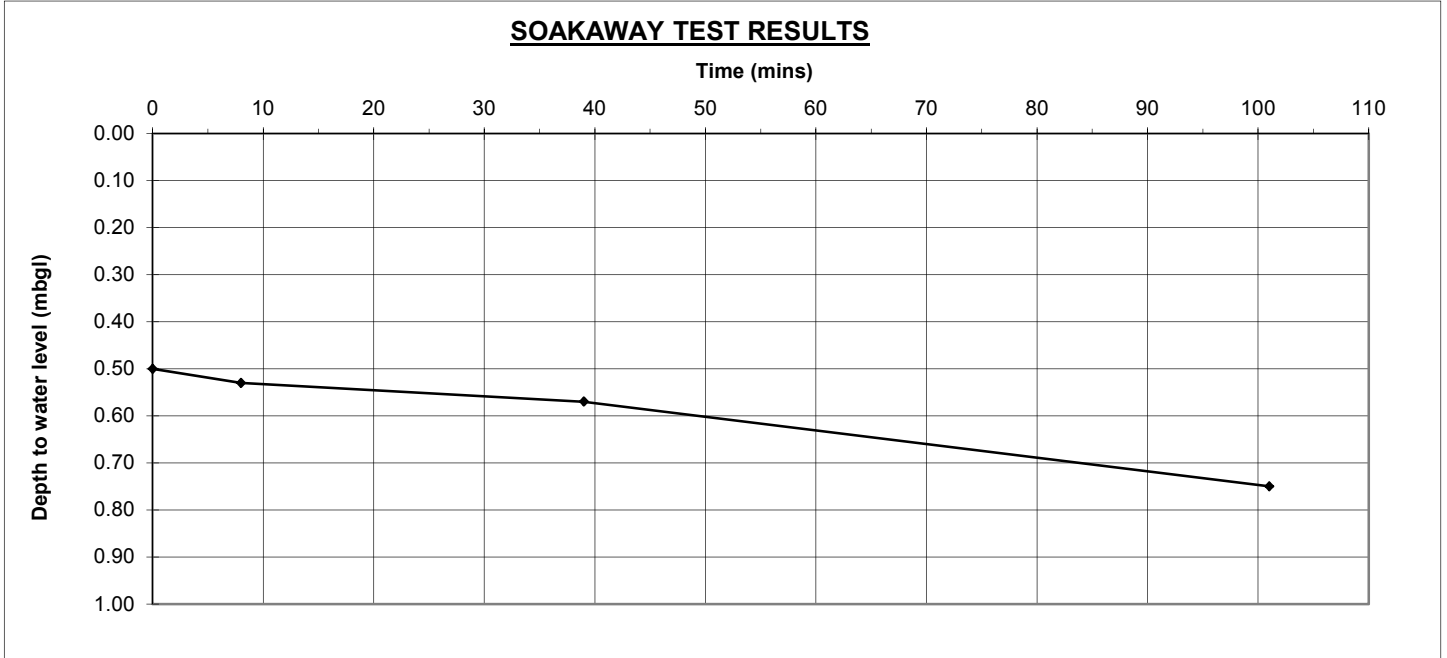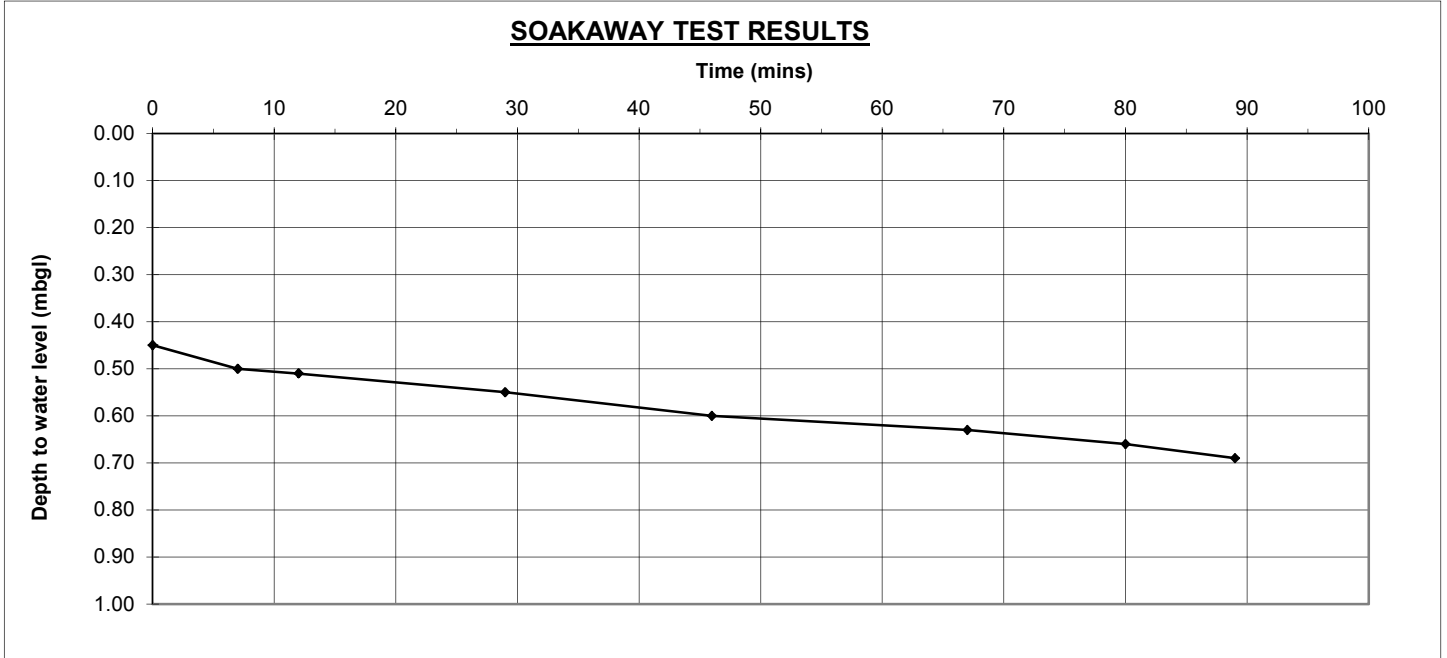| Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	2.00	1.80	**Test Date** 16/05/2014	
				Soakaway No. 8b.1	

SOAKAWAY TEST RESULTS

From above graph;

0.21 m	= Depth drop between 75% and 25% of maximum depth to final depth
37 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.189 m³
ap50 = 4.0997 m²
tp75-25 = 37.0 mins

General Geological Profile :

0   0

0   0

0   0

0   0

Notes :

Soil Infiltration Rate (f) =	**2.08E-05**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base	Test Date 16/05/2014
	0.45	2.00	1.80	Soakaway No. 8b.2

SOAKAWAY TEST RESULTS

From above graph;

0.125 m	= Depth drop between 75% and 25% of maximum depth to final depth
9.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where   using

$f = \dfrac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.1125 m³
ap50 = 4.8837 m²
tp75-25 = 9.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **4.04E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

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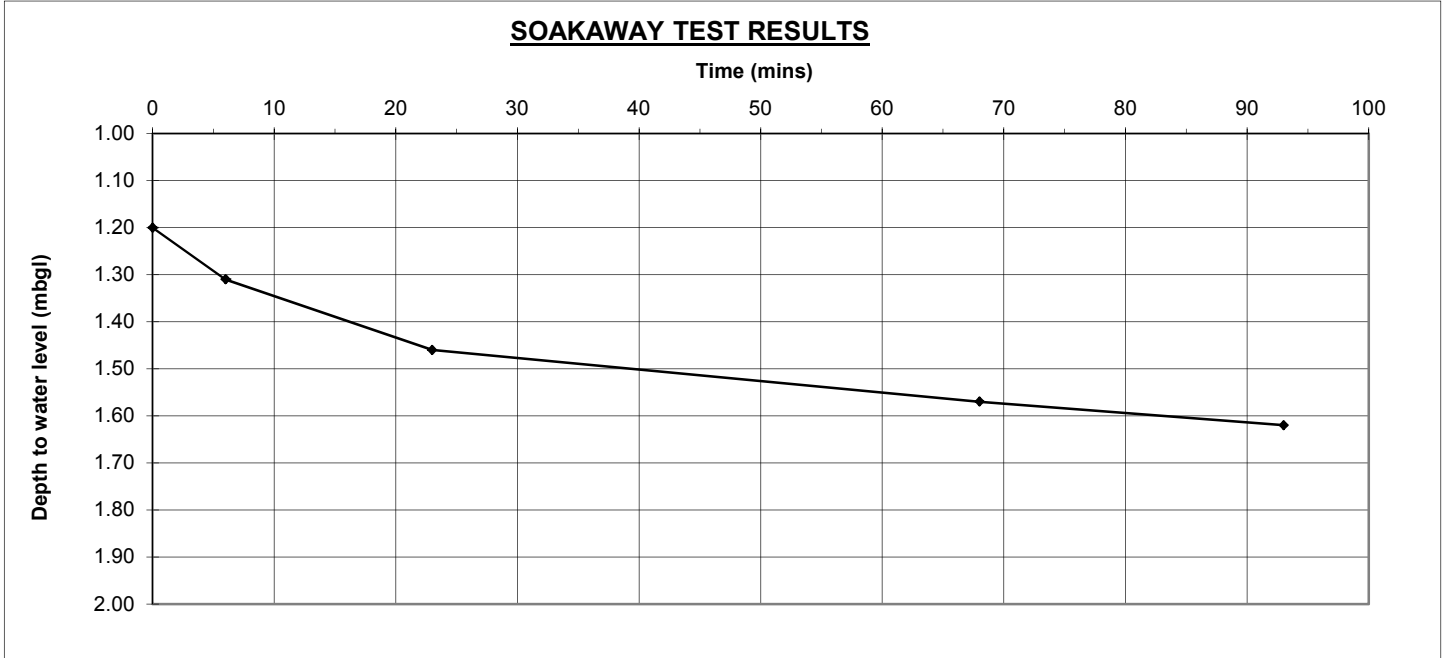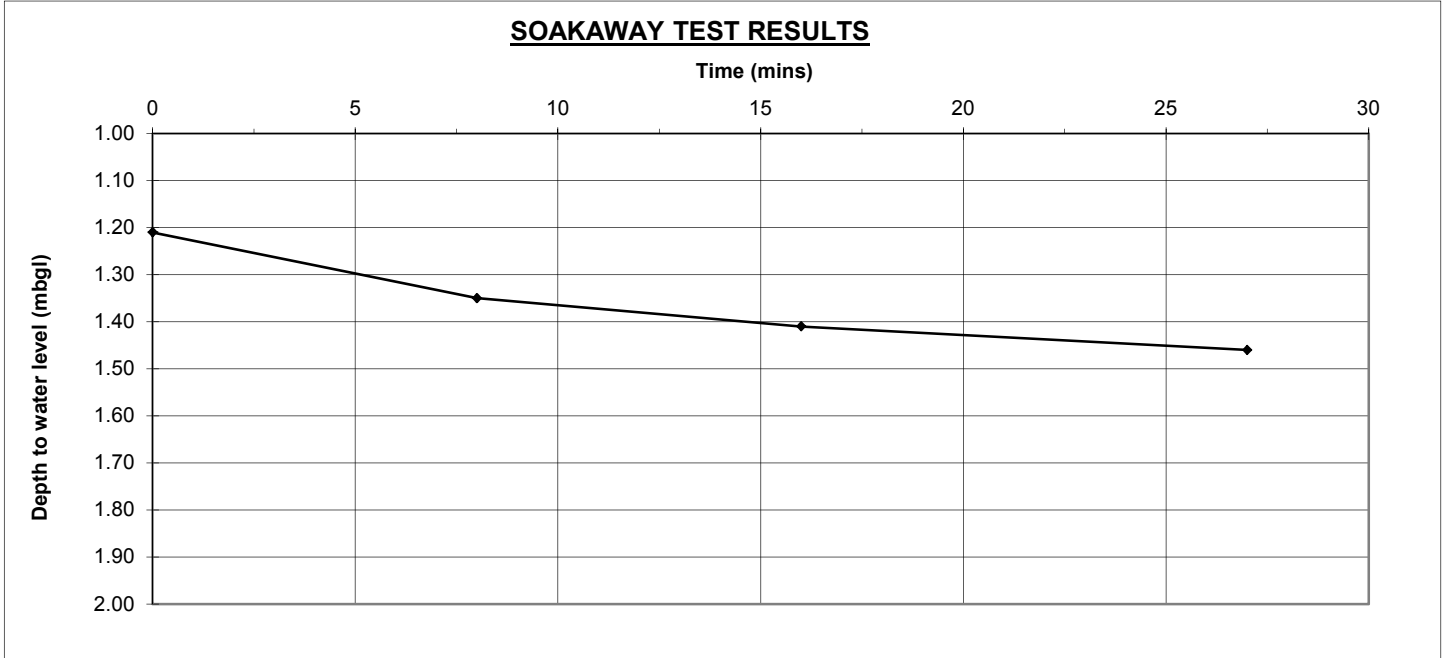
![ROLTON GROUP — ENGINEERING THE FUTURE]

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	2.00	1.80		

Test Date 16/05/2014

Soakaway No. 8b.3

SOAKAWAY TEST RESULTS

From above graph;

0.22 m	= Depth drop between 75% and 25% of maximum depth to final depth
37 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.198 m³
ap50 = 4.2467 m²
tp75-25 = 37.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**2.10E-05**	m/s

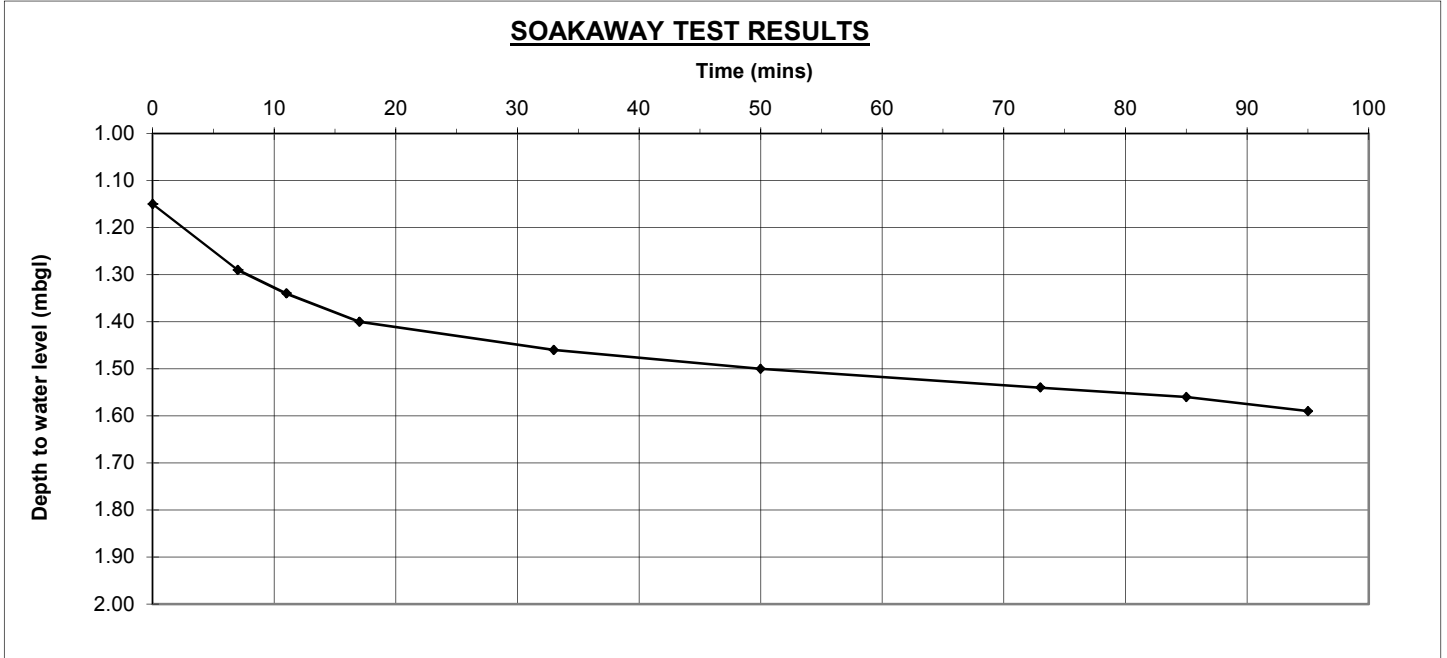| Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 16/05/2014
	0.45	2.00	0.80	**Soakaway No.** 9a.1

SOAKAWAY TEST RESULTS
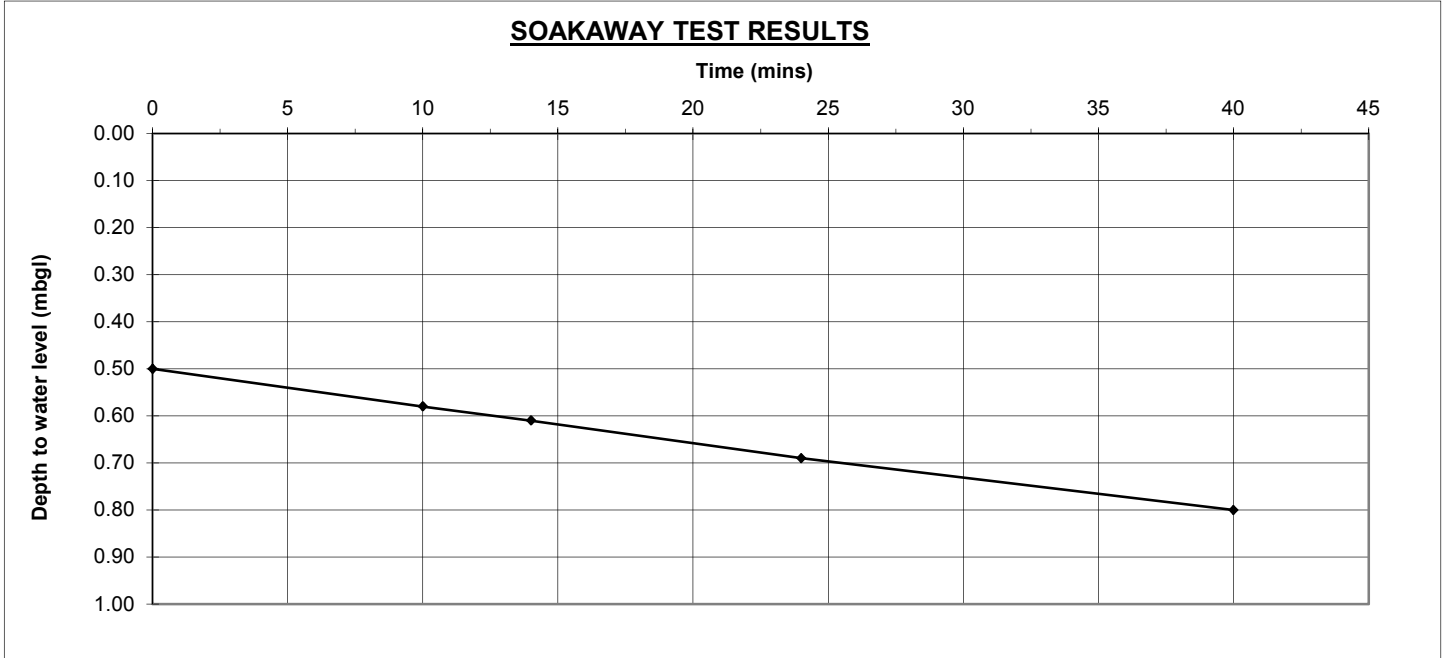
From above graph;

0.15 m	= Depth drop between 75% and 25% of maximum depth to final depth
20.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.135 m³
ap50 =	3.2177 m²
tp75-25 =	20.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**3.41E-05**	m/s

| Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base	
	0.45	2.00	0.80	

Test Date 16/05/2014

Soakaway No. 9a.2

SOAKAWAY TEST RESULTS
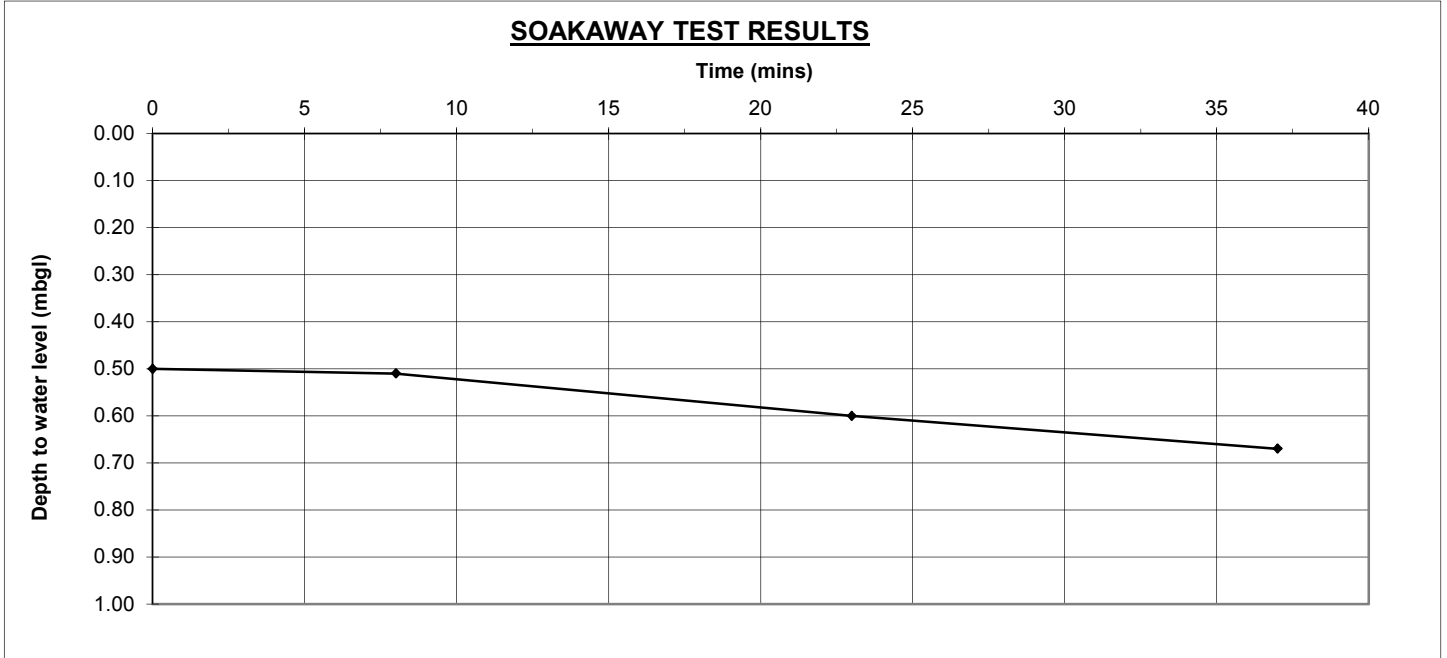
From above graph;

0.085 m	= Depth drop between 75% and 25% of maximum depth to final depth
15.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75-25}}{ap_{50} \times tp_{75-25}}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.0765 m³
ap50 =	3.8547 m²
tp75-25 =	15.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**2.13E-05**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

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Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	2.00	0.80	**Test Date** 16/05/2014	
				Soakaway No. 9a.3	

SOAKAWAY TEST RESULTS

From above graph;

0.15 m	= Depth drop between 75% and 25% of maximum depth to final depth
29 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.
ap50 = Mean surface area through which the outflow occurs.
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.135 m³
ap50 =	3.2177 m²
tp75-25 =	29.0 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**2.41E-05**	m/s	Good	Poor	Practically Impervious
			$10^{-3} - 10^{-5}$	$10^{-6} - 10^{-7}$	$10^{-8} - 10^{-10}$

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	**Width**	**Length**	**Depth to Base**	**Test Date** 16/05/2014
	0.45	3.00	2.00	**Soakaway No.** 9b.1

SOAKAWAY TEST RESULTS

From above graph;

0.125 m	= Depth drop between 75% and 25% of maximum depth to final depth
11.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP_{75\text{-}25}}{ap_{50} \times tp_{75\text{-}25}}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.
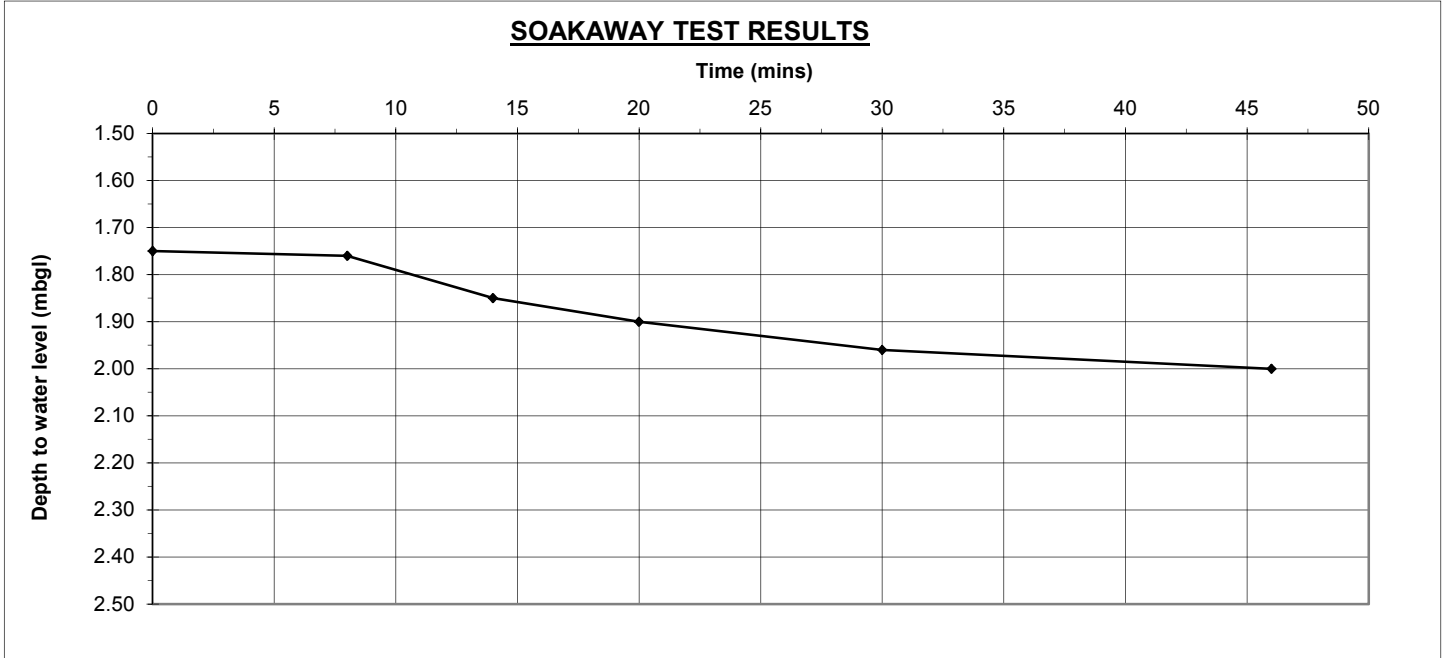
tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.16875 m³
ap50 = 4.6137 m²
tp75-25 = 11.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) = **5.30E-05** m/s	Permeability Guideline (m/s)		
	Good	Poor	Practically Impervious
	10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		
	0.45	3.00	2.00	**Test Date** 16/05/2014	
				Soakaway No. 9b.2	

SOAKAWAY TEST RESULTS

From above graph;

0.105 m	= Depth drop between 75% and 25% of maximum depth to final depth
12.5 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$f = \dfrac{VP_{75\text{-}25}}{ap_{50} \times tp_{75\text{-}25}}$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 =	0.14175 m³
ap50 =	5.2347 m²
tp75-25 =	12.5 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

Soil Infiltration Rate (f) =	**3.61E-05**	m/s

Permeability Guideline (m/s)		
Good	Poor	Practically Impervious
10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

Calculation of Infiltration Rate in Broad Accordance with BRE Digest 365.

ROLTON GROUP
ENGINEERING THE FUTURE

Contract Name : Kingsmere
Contract No : 13-0199

Trial Pit Dimensions (m)	Width	Length	Depth to Base		Test Date	16/05/2014
	0.45	3.00	2.00		**Soakaway No.**	9b.3

SOAKAWAY TEST RESULTS
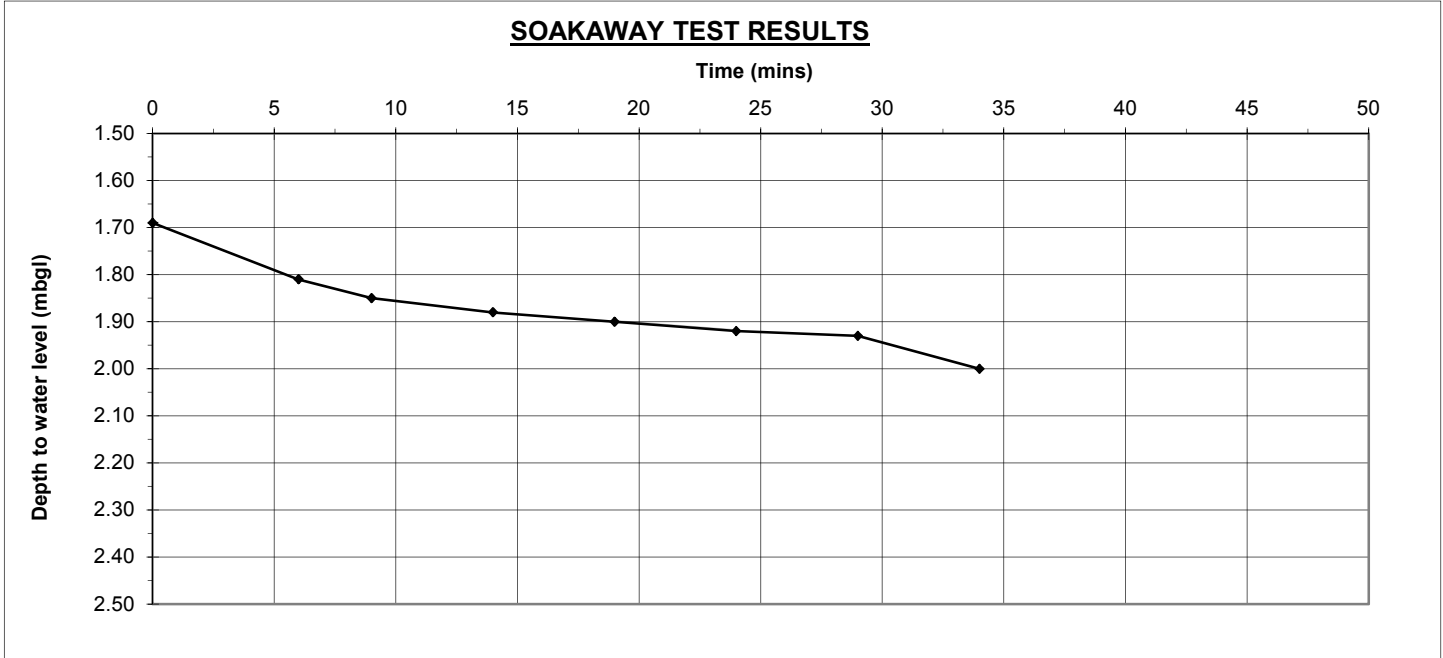
From above graph;

0.155 m	= Depth drop between 75% and 25% of maximum depth to final depth
24.25 mins	= Time for outflow between 75% and 25% of maximum depth to final depth

Calculation of Soil Infiltration Rate (f):

where

$$f = \frac{VP75\text{-}25}{ap50 \times tp75\text{-}25}$$

using

VP75-25 = Volume outflowing between 75% and 25% of effective depth.

ap50 = Mean surface area through which the outflow occurs.

tp75-25 = Time for the outflow between 75% and 25% of the effective depth.

VP75-25 = 0.20925 m³
ap50 = 4.6137 m²
tp75-25 = 24.3 mins

General Geological Profile :

0	0
0	0
0	0
0	0

Notes :

		Permeability Guideline (m/s)	
Soil Infiltration Rate (f) = **3.12E-05** m/s	Good	Poor	Practically Impervious
	10^{-3} - 10^{-5}	10^{-6} - 10^{-7}	10^{-8} - 10^{-10}

APPENDIX 2

DRAINAGE PLANS

1. Contractors must check all dimensions on site. Only figured dimensions are to be worked from. Discrepancies must be reported to the Architect or Engineer before proceeding. © This drawing is copyright

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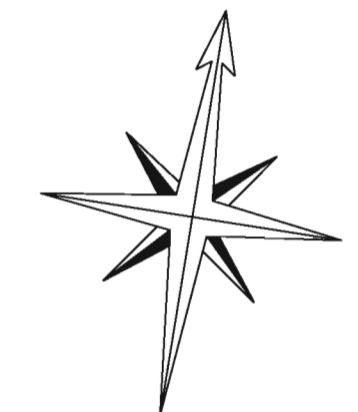
NETWORK	AREA (ha)
NETWORK 1	0.296
NETWORK 2	0.079
NETWORK 3	0.174
NETWORK 4	0.039
NETWORK 5	0.139

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Title KINGSMERE
BICESTER

Details DRAINAGE STRATEGY

Revision		Description				Drawn	Checked	Date
Preliminary	Information		Tender	Construction				
				As Built				

Scale: 1:500 @ A0   Date: JUNE 2014   Drawn: GLG   Chk: CSR

17079/2023

APPENDIX 3

MICRODRAINAGE CALCULATIONS

Woods Hardwick		Page 0
15-17 Goldington Road Bedford MK40 3NH		
Date 30/06/2014 12:31	Designed by c.brackley	
File Network 1 Revisi...	Checked by	
Micro Drainage	Network W.12.6	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 17079 BICESTER NET 1.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model – England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.400	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	2	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

Network Design Table for 17079 BICESTER NET 1.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	16.387	0.159	103.1	0.003	4.00	0.0	0.600	o	300
1.001	84.768	0.673	126.0	0.040	0.00	0.0	0.600	o	600
1.002	11.202	0.027	414.9	0.045	0.00	0.0	0.600	o	600
1.003	13.947	0.185	75.4	0.017	0.00	0.0	0.600	o	600
2.000	10.000	0.100	100.0	0.026	4.00	0.0	0.600	o	150
2.001	13.194	0.157	84.0	0.000	0.00	0.0	0.600	o	300
1.004	76.113	0.187	407.0	0.050	0.00	0.0	0.600	o	600
1.005	6.725	0.017	395.6	0.052	0.00	0.0	0.600	o	600

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	2.00	4.18	72.887	0.003	0.0	0.0	0.0	1.55	109.5	0.0
1.001	2.00	4.83	72.428	0.043	0.0	0.0	0.0	2.17	613.2	0.2
1.002	2.00	4.98	71.755	0.088	0.0	0.0	0.0	1.19	336.2	0.5
1.003	2.00	5.07	71.728	0.105	0.0	0.0	0.0	2.81	793.6	0.6
2.000	2.00	4.17	72.250	0.026	0.0	0.0	0.0	1.00	17.8	0.1
2.001	2.00	4.29	72.000	0.026	0.0	0.0	0.0	1.72	121.3	0.1
1.004	2.00	6.12	71.543	0.181	0.0	0.0	0.0	1.20	339.5	1.0
1.005	2.00	6.22	71.356	0.233	0.0	0.0	0.0	1.22	344.4	1.3

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Woods Hardwick		Page 1
15-17 Goldington Road Bedford MK40 3NH		**Micro Drainage®**
Date 30/06/2014 12:31 File Network 1 Revisi...	Designed by c.brackley Checked by	
Micro Drainage	Network W.12.6	

Network Design Table for 17079 BICESTER NET 1.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
3.000	10.000	0.100	100.0	0.037	4.00	0.0	0.600	o	150
3.001	12.470	0.062	201.1	0.000	0.00	0.0	0.600	o	300
3.002	9.320	0.039	239.0	0.000	0.00	0.0	0.600	o	300
3.003	5.902	0.024	245.9	0.000	0.00	0.0	0.600	o	300
4.000	10.000	0.100	100.0	0.026	4.00	0.0	0.600	o	150
4.001	52.629	0.263	200.1	0.000	0.00	0.0	0.600	o	300
3.004	44.413	0.185	240.1	0.000	0.00	0.0	0.600	o	300
3.005	4.042	0.351	11.5	0.000	0.00	0.0	0.600	o	300
1.006	6.226	0.060	103.8	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	2.00	4.17	72.250	0.037	0.0	0.0	0.0	1.00	17.8	0.2
3.001	2.00	4.35	72.000	0.037	0.0	0.0	0.0	1.10	78.1	0.2
3.002	2.00	4.51	71.938	0.037	0.0	0.0	0.0	1.01	71.6	0.2
3.003	2.00	4.61	71.899	0.037	0.0	0.0	0.0	1.00	70.6	0.2
4.000	2.00	4.17	72.388	0.026	0.0	0.0	0.0	1.00	17.8	0.1
4.001	2.00	4.96	72.138	0.026	0.0	0.0	0.0	1.11	78.3	0.1
3.004	2.00	5.69	71.875	0.063	0.0	0.0	0.0	1.01	71.4	0.3
3.005	2.00	5.70	71.690	0.063	0.0	0.0	0.0	4.66	329.3	0.3
1.006	2.00	6.30	71.339	0.296	0.0	0.0	0.0	1.28	51.0	1.6

Online Controls for 17079 BICESTER NET 1.SWS

Hydro–Brake® Manhole: 14, DS/PN: 1.006, Volume (m³): 5.3

Design Head (m) 1.500 Hydro–Brake® Type Md6 SW Only Invert Level (m) 71.339
Design Flow (l/s) 15.5   Diameter (mm)   148

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.9	1.200	13.8	3.000	21.6	7.000	33.1
0.200	10.9	1.400	14.8	3.500	23.4	7.500	34.2
0.300	12.7	1.600	15.8	4.000	25.0	8.000	35.3
0.400	12.5	1.800	16.8	4.500	26.5	8.500	36.4
0.500	12.0	2.000	17.7	5.000	27.9	9.000	37.5
0.600	11.7	2.200	18.5	5.500	29.3	9.500	38.5
0.800	11.9	2.400	19.4	6.000	30.6		
1.000	12.8	2.600	20.2	6.500	31.9		

Storage Structures for 17079 BICESTER NET 1.SWS

Porous Car Park Manhole: 6, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	53.0
Max Percolation (l/s)	73.6	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	72.800	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: 10, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	74.0
Max Percolation (l/s)	102.8	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	72.800	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: 14, DS/PN: 4.001

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	62.0
Max Percolation (l/s)	86.1	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	72.850	Cap Volume Depth (m)	0.400

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Micro Drainage	Network W.12.6	

Summary of Critical Results by Maximum Level (Rank 1) for 17079 BICESTER NET 1.SWS

Margin for Flood Risk Warning (mm)   300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status   ON
DVD Status   ON
Inertia Status   OFF

Profile(s)   Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)   1, 30, 100
Climate Change (%)   0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+30%					
1.001	60 Winter	100	+30%					
1.002	60 Winter	100	+30%	100/15 Winter				
1.003	60 Winter	100	+30%	100/15 Summer				
2.000	60 Winter	100	+30%	100/15 Winter				
2.001	60 Winter	100	+30%	100/15 Summer				
1.004	60 Winter	100	+30%	100/15 Summer				
1.005	60 Winter	100	+30%	30/15 Summer				
3.000	60 Winter	100	+30%	100/15 Summer				
3.001	60 Winter	100	+30%	100/15 Summer				
3.002	60 Winter	100	+30%	100/15 Summer				
3.003	60 Winter	100	+30%	100/15 Summer				
4.000	60 Winter	100	+30%	100/30 Summer				
4.001	60 Winter	100	+30%	100/15 Winter				
3.004	60 Winter	100	+30%	100/15 Summer				
3.005	60 Winter	100	+30%	30/15 Winter				
1.006	60 Winter	100	+30%	1/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	72.915	-0.272	0.000	0.02	0.0	1.8	OK
1.001	2	72.865	-0.163	0.000	0.02	0.0	13.0	OK
1.002	3	72.865	0.510	0.000	0.09	0.0	17.4	SURCHARGED
1.003	4	72.865	0.537	0.000	0.04	0.0	18.5	SURCHARGED
2.000	8	72.869	0.469	0.000	0.50	0.0	7.9	SURCHARGED
2.001	6	72.864	0.564	0.000	0.07	0.0	7.2	SURCHARGED
1.004	5	72.864	0.721	0.000	0.09	0.0	28.1	SURCHARGED
1.005	6	72.861	0.905	0.000	0.11	0.0	22.1	SURCHARGED
3.000	9	72.875	0.475	0.000	0.71	0.0	11.2	SURCHARGED
3.001	10	72.868	0.568	0.000	0.17	0.0	10.8	SURCHARGED
3.002	10	72.867	0.629	0.000	0.18	0.0	10.1	SURCHARGED
3.003	11	72.866	0.667	0.000	0.19	0.0	9.3	SURCHARGED

Summary of Critical Results by Maximum Level (Rank 1) for 17079 BICESTER NET 1.SWS

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
4.000	13	72.872	0.334	0.000	0.50	0.0	7.9	SURCHARGED
4.001	14	72.867	0.429	0.000	0.10	0.0	7.8	SURCHARGED
3.004	12	72.865	0.690	0.000	0.22	0.0	14.6	SURCHARGED
3.005	13	72.861	0.871	0.000	0.06	0.0	8.4	SURCHARGED
1.006	14	72.860	1.296	0.000	0.45	0.0	15.4	SURCHARGED

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 17079 BICESTER NET 2.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model – England and Wales

Return Period (years)	2		Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000		Minimum Backdrop Height (m)	0.200
Ratio R	0.400		Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	5		Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00		Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750		Min Slope for Optimisation (1:X)	500
PIMP (%)	100			

Designed with Level Soffits

Network Design Table for 17079 BICESTER NET 2.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	10.000	0.100	100.0	0.038	4.00	0.0	0.600	o	150
1.001	33.488	0.440	76.1	0.000	0.00	0.0	0.600	o	300
1.002	15.798	0.066	241.1	0.000	0.00	0.0	0.600	o	300
1.003	68.911	0.300	229.7	0.041	0.00	0.0	0.600	o	300
1.004	28.512	0.350	81.5	0.000	0.00	0.0	0.600	o	300
1.005	8.172	0.364	22.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	5.00	4.17	72.050	0.038	0.0	0.0	0.0	1.00	17.8	0.5
1.001	5.00	4.48	71.800	0.038	0.0	0.0	0.0	1.80	127.5	0.5
1.002	5.00	4.74	71.360	0.038	0.0	0.0	0.0	1.01	71.3	0.5
1.003	5.00	5.85	71.294	0.079	0.0	0.0	0.0	1.03	73.0	1.1
1.004	5.00	6.12	70.994	0.079	0.0	0.0	0.0	1.74	123.2	1.1
1.005	5.00	6.17	70.644	0.079	0.0	0.0	0.0	2.77	110.3	1.1

Online Controls for 17079 BICESTER NET 2.SWS

Hydro-Brake® Manhole: 29, DS/PN: 1.005, Volume (m³): 3.3

Design Head (m) 1.300 Hydro-Brake® Type Md6 SW Only Invert Level (m) 70.644
Design Flow (l/s)   5.0   Diameter (mm)   87

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5	1.200	4.7	3.000	7.5	7.000	11.4
0.200	3.4	1.400	5.1	3.500	8.1	7.500	11.8
0.300	3.2	1.600	5.5	4.000	8.6	8.000	12.2
0.400	3.1	1.800	5.8	4.500	9.2	8.500	12.6
0.500	3.2	2.000	6.1	5.000	9.7	9.000	13.0
0.600	3.4	2.200	6.4	5.500	10.1	9.500	13.3
0.800	3.9	2.400	6.7	6.000	10.6		
1.000	4.3	2.600	7.0	6.500	11.0		

Storage Structures for 17079 BICESTER NET 2.SWS

Porous Car Park Manhole: 25, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	76.0
Max Percolation (l/s)	105.6	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	72.650	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: 28, DS/PN: 1.004

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	82.0
Max Percolation (l/s)	113.9	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	71.800	Cap Volume Depth (m)	0.400

Summary of Critical Results by Maximum Level (Rank 1) for 17079 BICESTER NET 2.SWS

Margin for Flood Risk Warning (mm) 300.0   DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status   ON

Profile(s)   Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)   1, 30, 100
Climate Change (%)   0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+30%	100/15 Summer				
1.001	60 Winter	100	+30%	100/30 Winter				
1.002	60 Winter	100	+30%	100/15 Summer				
1.003	60 Winter	100	+30%	30/30 Winter				
1.004	60 Winter	100	+30%	30/15 Summer				
1.005	60 Summer	100	+30%		100/30 Winter			3

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	72.313	0.113	0.000	1.47	0.0	23.3	SURCHARGED
1.001	25	72.111	0.011	0.000	0.10	0.0	11.4	SURCHARGED
1.002	26	72.105	0.445	0.000	0.15	0.0	9.2	SURCHARGED
1.003	27	72.102	0.507	0.000	0.25	0.0	17.8	SURCHARGED
1.004	28	72.089	0.794	0.000	0.07	0.0	7.8	SURCHARGED
1.005	29	72.224	1.355	0.233	0.06	0.0	4.8	FLOOD

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 17079 BICESTER NET 3.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model – England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.000
Ratio R	0.400	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	5	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

Network Design Table for 17079 BICESTER NET 3.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	10.940	0.046	237.8	0.000	4.00	0.0	0.600	o	300
1.001	22.118	0.500	44.2	0.060	0.00	0.0	0.600	o	300
1.002	34.495	0.143	241.1	0.000	0.00	0.0	0.600	o	300
1.003	14.727	0.061	241.1	0.000	0.00	0.0	0.600	o	300
1.004	20.222	0.084	240.7	0.120	0.00	0.0	0.600	o	300
1.005	13.963	0.700	19.9	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	5.00	4.18	71.650	0.000	0.0	0.0	0.0	1.02	71.8	0.0
1.001	5.00	4.34	71.604	0.060	0.0	0.0	0.0	2.37	167.6	0.8
1.002	5.00	4.91	71.104	0.060	0.0	0.0	0.0	1.01	71.3	0.8
1.003	5.00	5.15	70.961	0.060	0.0	0.0	0.0	1.01	71.3	0.8
1.004	5.00	5.48	70.900	0.180	0.0	0.0	0.0	1.01	71.3	2.4
1.005	5.00	5.56	70.816	0.180	0.0	0.0	0.0	2.94	117.0	2.4

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Micro Drainage	Network W.12.6	

Online Controls for 17079 BICESTER NET 3.SWS

Hydro-Brake® Manhole: 55, DS/PN: 1.005, Volume (m³): 2.7

Design Head (m) 1.200 Hydro-Brake® Type Md6 SW Only Invert Level (m) 70.816
Design Flow (l/s) 8.0   Diameter (mm)   113

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.6	1.200	8.0	3.000	12.6	7.000	19.3
0.200	6.3	1.400	8.6	3.500	13.6	7.500	20.0
0.300	6.4	1.600	9.2	4.000	14.6	8.000	20.6
0.400	6.1	1.800	9.8	4.500	15.5	8.500	21.2
0.500	5.9	2.000	10.3	5.000	16.3	9.000	21.9
0.600	6.1	2.200	10.8	5.500	17.1	9.500	22.5
0.800	6.6	2.400	11.3	6.000	17.8		
1.000	7.3	2.600	11.7	6.500	18.6		

Storage Structures for 17079 BICESTER NET 3.SWS

Porous Car Park Manhole: 52, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	120.0
Max Percolation (l/s)	166.7	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	72.200	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: 55, DS/PN: 1.005

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	240.0
Max Percolation (l/s)	333.3	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	71.600	Cap Volume Depth (m)	0.400

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Micro Drainage	Network W.12.6	

Summary of Critical Results by Maximum Level (Rank 1) for 17079 BICESTER
NET 3.SWS

Margin for Flood Risk Warning (mm) 300.0   DVD Status   ON
Analysis Timestep Fine Inertia Status OFF
DTS Status   ON

Profile(s)   Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)   1, 30, 100
Climate Change (%)   0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	60 Winter	100	+30%	30/15 Winter				
1.001	60 Winter	100	+30%	30/15 Summer				
1.002	60 Winter	100	+30%	30/15 Summer				
1.003	60 Winter	100	+30%	1/15 Winter	100/960 Summer			
1.004	60 Winter	100	+30%					
1.005	60 Winter	100	+30%		100/60 Winter			1

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	50	72.383	0.433	0.000	0.00	0.0	0.1	SURCHARGED
1.001	51	72.383	0.479	0.000	0.11	0.0	16.3	SURCHARGED
1.002	52	72.374	0.970	0.000	0.24	0.0	15.5	SURCHARGED
1.003	53	72.369	1.108	0.000	0.25	0.0	14.8	FLOOD RISK
1.004	54	72.364	1.164	0.000	0.79	0.0	49.0	FLOOD RISK
1.005	55	72.342	1.301	0.089	0.09	0.0	9.0	FLOOD

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 17079 BICESTER NET 4.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model – England and Wales

Return Period (years) 2	Add Flow / Climate Change (%)	0
M5-60 (mm) 20.000	Minimum Backdrop Height (m)	0.000
Ratio R 0.400	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr) 5	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha) 0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff. 0.750	Min Slope for Optimisation (1:X)	500
PIMP (%) 100		

Designed with Level Soffits

Online Controls for 17079 BICESTER NET 4.SWS

Hydro-Brake® Manhole: 76, DS/PN: 1.001, Volume (m³): 4.3

Design Head (m) 1.200 Hydro-Brake® Type Md6 SW Only Invert Level (m) 69.834
Design Flow (l/s)   5.0   Diameter (mm)   89

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.6	1.200	5.0	3.000	7.8	7.000	12.0
0.200	3.6	1.400	5.3	3.500	8.5	7.500	12.4
0.300	3.4	1.600	5.7	4.000	9.0	8.000	12.8
0.400	3.3	1.800	6.1	4.500	9.6	8.500	13.2
0.500	3.4	2.000	6.4	5.000	10.1	9.000	13.6
0.600	3.6	2.200	6.7	5.500	10.6	9.500	13.9
0.800	4.1	2.400	7.0	6.000	11.1		
1.000	4.5	2.600	7.3	6.500	11.5		

Storage Structures for 17079 BICESTER NET 4.SWS

Porous Car Park Manhole: 76, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.03600	Width (m) 5.0
Membrane Percolation (mm/hr)	1000	Length (m) 160.0
Max Percolation (l/s)	222.2	Slope (1:X) 100.0
Safety Factor	2.0	Depression Storage (mm) 5
Porosity	0.30	Evaporation (mm/day) 3
Invert Level (m)	70.900	Cap Volume Depth (m) 0.400

Summary of Critical Results by Maximum Level (Rank 1) for 17079 BICESTER NET 4.SWS

Margin for Flood Risk Warning (mm) 300.0   DVD Status   ON
Analysis Timestep Fine Inertia Status OFF
DTS Status   ON

Profile(s)   Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)   1, 30, 100
Climate Change (%)   0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	30 Winter	100	+30%	30/15 Summer				
1.001	30 Winter	100	+30%	30/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	75	71.079	0.779	0.000	0.21	0.0	14.9	SURCHARGED
1.001	76	71.072	1.013	0.000	0.07	0.0	5.0	SURCHARGED

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 41 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Σ	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	72.970	0.170	4.2	3.9		8.1	21.6	O K
30 min Summer	72.992	0.192	4.8	3.9		8.7	27.5	O K
60 min Summer	73.001	0.201	5.0	3.9		9.0	30.3	O K
120 min Summer	72.999	0.199	5.0	3.9		8.9	29.6	O K
180 min Summer	72.989	0.189	4.7	3.9		8.6	26.7	O K
240 min Summer	72.977	0.177	4.4	3.9		8.3	23.6	O K
360 min Summer	72.956	0.156	3.9	3.8		7.8	18.4	O K
480 min Summer	72.938	0.138	3.5	3.8		7.3	14.3	O K
600 min Summer	72.922	0.122	3.0	3.8		6.8	11.1	O K
720 min Summer	72.907	0.107	2.7	3.7		6.4	8.6	O K
960 min Summer	72.883	0.083	2.1	3.7		5.8	5.1	O K
1440 min Summer	72.849	0.049	1.2	3.6		4.8	1.8	O K
2160 min Summer	72.812	0.012	0.1	3.5		3.6	0.1	O K
2880 min Summer	72.800	0.000	0.0	2.9		2.9	0.0	O K
4320 min Summer	72.800	0.000	0.0	2.0		2.0	0.0	O K
5760 min Summer	72.800	0.000	0.0	1.6		1.6	0.0	O K
7200 min Summer	72.800	0.000	0.0	1.3		1.3	0.0	O K
8640 min Summer	72.800	0.000	0.0	1.1		1.1	0.0	O K
10080 min Summer	72.800	0.000	0.0	1.0		1.0	0.0	O K
15 min Winter	72.984	0.184	4.6	3.9		8.5	25.5	O K
30 min Winter	73.007	0.207	5.2	3.9		9.1	32.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	128.285	17
30 min Summer	84.226	30
60 min Summer	52.662	46
120 min Summer	31.800	80
180 min Summer	23.353	114
240 min Summer	18.644	146
360 min Summer	13.543	210
480 min Summer	10.792	272
600 min Summer	9.043	332
720 min Summer	7.823	390
960 min Summer	6.219	510
1440 min Summer	4.493	736
2160 min Summer	3.241	1100
2880 min Summer	2.568	0
4320 min Summer	1.847	0
5760 min Summer	1.461	0
7200 min Summer	1.217	0
8640 min Summer	1.048	0
10080 min Summer	0.923	0
15 min Winter	128.285	17
30 min Winter	84.226	30

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
60 min Winter	73.016	0.216	5.4	4.0	9.4	34.9	O K
120 min Winter	73.010	0.210	5.3	4.0	9.2	33.1	O K
180 min Winter	72.996	0.196	4.9	3.9	8.8	28.7	O K
240 min Winter	72.979	0.179	4.5	3.9	8.4	24.2	O K
360 min Winter	72.950	0.150	3.7	3.8	7.6	16.8	O K
480 min Winter	72.924	0.124	3.1	3.8	6.9	11.5	O K
600 min Winter	72.901	0.101	2.5	3.7	6.3	7.7	O K
720 min Winter	72.882	0.082	2.0	3.7	5.7	5.0	O K
960 min Winter	72.851	0.051	1.3	3.6	4.9	2.0	O K
1440 min Winter	72.812	0.012	0.1	3.5	3.6	0.1	O K
2160 min Winter	72.800	0.000	0.0	2.6	2.6	0.0	O K
2880 min Winter	72.800	0.000	0.0	2.1	2.1	0.0	O K
4320 min Winter	72.800	0.000	0.0	1.5	1.5	0.0	O K
5760 min Winter	72.800	0.000	0.0	1.2	1.2	0.0	O K
7200 min Winter	72.800	0.000	0.0	0.9	0.9	0.0	O K
8640 min Winter	72.800	0.000	0.0	0.8	0.8	0.0	O K
10080 min Winter	72.800	0.000	0.0	0.7	0.7	0.0	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
60 min Winter	52.662	48
120 min Winter	31.800	86
180 min Winter	23.353	122
240 min Winter	18.644	156
360 min Winter	13.543	222
480 min Winter	10.792	282
600 min Winter	9.043	342
720 min Winter	7.823	398
960 min Winter	6.219	502
1440 min Winter	4.493	736
2160 min Winter	3.241	0
2880 min Winter	2.568	0
4320 min Winter	1.847	0
5760 min Winter	1.461	0
7200 min Winter	1.217	0
8640 min Winter	1.048	0
10080 min Winter	0.923	0

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Micro Drainage	Source Control W.12.6	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.139

Time   Area
(mins)   (ha)

0-4 0.139

Model Details

Storage is Online Cover Level (m) 73.500

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	278.0
Max Percolation (l/s)	386.1	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	72.800	Cap Volume Depth (m)	0.500

Hydro-Brake® Outflow Control

Design Head (m) 1.000 Hydro-Brake® Type Md6 SW Only Invert Level (m) 72.000
Design Flow (l/s) 4.0   Diameter (mm)   83

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.3	1.200	4.3	3.000	6.8	7.000	10.4
0.200	3.0	1.400	4.7	3.500	7.4	7.500	10.8
0.300	2.8	1.600	5.0	4.000	7.9	8.000	11.1
0.400	2.8	1.800	5.3	4.500	8.3	8.500	11.5
0.500	2.9	2.000	5.6	5.000	8.8	9.000	11.8
0.600	3.1	2.200	5.8	5.500	9.2	9.500	12.1
0.800	3.5	2.400	6.1	6.000	9.6		
1.000	3.9	2.600	6.3	6.500	10.0		