

G S A

**GRAHAM SCHOFIELD
ASSOCIATES**

**CONSULTING CIVIL AND
STRUCTURAL ENGINEERS**

Suite 3 Balfour Court
Off Hough Lane
Leyland
PR25 2TF

Tel (01772) 459383
Website: grahamschofieldassociates.co.uk
Email: reception@gsa72.co.uk

DRAINAGE STRATEGY REPORT

FOR

**4No. INDUSTRIAL BUILDINGS COMPRISING
9 BUSINESS UNITS**

**AT SANDBROOK PARK, SANDBROOK WAY, ROCHDALE, OL11 1RY
FOR NORTHERN TRUST CO. LTD**



Project : 2023.110
Date : 18.01.24
Engineer : G Schofield C Eng, MI Struct E, MICE, MIEI
Issue No 1 : 18.01.24
Issue No 2 : 24.01.24

Directors: G.Schofield C Eng, MI Struct E, MICE, MIEI ❖ I.Schofield BSc (Hons) MSc, C Eng, MI Struct E
M.O'Sullivan MSc, I Eng, AMI Struct E. AMICE

Report Control

Report Title	Drainage Strategy Report			
Project Number	2023.110			
Revision	Issue	Date	Prepared	Approved
01	Issue 1	18.01.24	G Schofield	L Edwards
02	Issue 2	24.01.24	G Schofield	L Edwards

CONTENTS

1.0	Brief	3
1.1	Limitations	3
2.0	Existing Site Description and Location	3
2.1	Site Location	3
2.2	Notable Features	4
3.0	Development Proposals	4
4.0	Surface Water Management.....	4
5.0	Existing Site Drainage Arrangements & Flood Risk	4
5.1	Existing Site Drainage	4
5.2	Existing Flood Risk	5
6.0	Proposed Site Drainage Arrangements	6
6.1	Foul Water	7
6.2	Surface Water	7
6.3	Flood Risk.....	8
	Figure 1: Site Location Plan	3
	Figure 2: Environment Agency Flood Mapping for Planning	5
	Figure 3: Environment Agency Surface Water Flooding – High Risk: Depth Extract	6
	Figure 4: Environment Agency Surface Water Flooding –Low Risk: Depth Extract	6
	Appendix A: - Topographic Survey	
	Appendix B: - Development Proposals	
	Appendix C: - Results of percolation tests	
	Appendix D: - Soakaway Design	
	Appendix E:- Indicative Drainage Layout and Details.....	

1.0 BRIEF

Graham Scofield Associates Ltd have been appointed by Northern Trust Co. Ltd, to undertake a Drainage Strategy in support of a planning application to construct 4No Industrial Buildings comprising 9 Business units at Sandbrook Park, Sandbrook Way, Rochdale, OL11 1RY.

1.1 Limitations

The opinions expressed within this review are based upon sourced documentation available. Graham Schofield Associates Ltd have not undertaken any or quantitative assessments or special investigations.

The report is based upon current guidance and may therefore require revision to incorporate any future changes in guidance or legislation.

2.0 EXISTING SITE DESCRIPTION AND LOCATION

2.1 Site Location

A brown field site located at National Grid Reference 389543; (E), 412045 (N) and is currently vacant. The site is roughly rectangular in shape, of some 0.54 Ha in area at the location indicated below in Figure 1. It is the next and final phase of development on land owned by Northern Trust Co. Ltd.



Figure 1: Site Location Plan

The site is bounded to the north by the previous phase of the development. The south boundary adjoins the public access area of Sandbrook Park.

The eastern boundary is shared with an adopted public cycle and footpath fronting residential property and the west boundary fronts the main site road and provides the access points into this phase of the development.

2.1 Notable Features

At the time, this report has been written a topographical survey of the area had been undertaken and is to be found in Appendix 'A'

The site falls from an O.S. level of approximately 137.0m along the north boundary to approximately 131.5m along the south boundary over a distance of approximately 115.0m.

This equates to an average gradient of 1 in 21. Thus it is proposed to introduce a retaining wall part way down the site.

3.0 DEVELOPMENT PROPOSALS

To develop 4 no. Industrial Buildings comprising 9 Business units.

Proposed finished floor levels are pitched; thus; -

Block A	-	136.500
Block B	-	136.000
Block C	-	133.950
Block D	-	133.750

4.0 SURFACE WATER MANAGEMENT

This drainage strategy report aims to examine the current site and its context in terms of any existing drainage regimes. Based on this information and paying due regard to any Environmental / Topographical constraints associated with the site, examination of available options for the satisfactory disposal of foul and surface water flows will be investigated. From these investigations a preferred Surface Water Management Plan is to be developed for later detailed design development for compliance with the Building Regulations Part H.

The basis of this strategy will be to identify a robust and workable drainage solution that can be delivered for the site that is fully compliant with current Planning Policy, Building Regulations, and design guidance. The site is in Flood Zone 1, the site is less than 1 ha and does not appear to have critical drainage problems.

5.0 EXISTING SITE DRAINAGE ARRANGEMENTS & FLOOD RISK

5.1 Existing Site Drainage

From the United Utilities asset search information, it has been determined there are no separate public surface water sewers which run within or near to the site. However, to the southern boundary of the development site, as a whole, the watercourse known as 'Sudden Brook' runs in culvert throughout the entire length of the site.

It is worthy of note that when phase 1 of the site was developed in 2004 the method of disposal of the surface water was via a series of traditional stone filled soakaways which have performed satisfactorily over the years. The following phase was developed in 2021/2022 and a similar soakaway system was employed for the disposal of surface water.

The site wide development made allowance in the design of the foul drainage for the future development of the site. The foul drainage discharges to a trunk sewer located along the southern boundary of the development site.

5.2 Existing Flood Risk

The Environment Agency Flood Map for Planning has been reviewed to initially assess the level of flood risk for the area - see Figure 2 below. The flood map shows areas that are a risk of flooding in a 1% (1 in 100 year) fluvial or a 0.5% (1 in 200 year) tidal and a 0.1% (1 in 1000 year) Annual Exceedance Probability (AEP).

This information indicates that the site lies within an area defined as Flood Zone 1 "Low Probability" envelope, which is assessed as having a less than 0.1% annual probability of rivers or sea flooding in any year by reference to National Planning Policy Framework (NPPF). The flood risk mapping indicates that the site is not within an area identified as being at risk. The Flood Map does not provide information on the depth of flooding associated with flood zones.

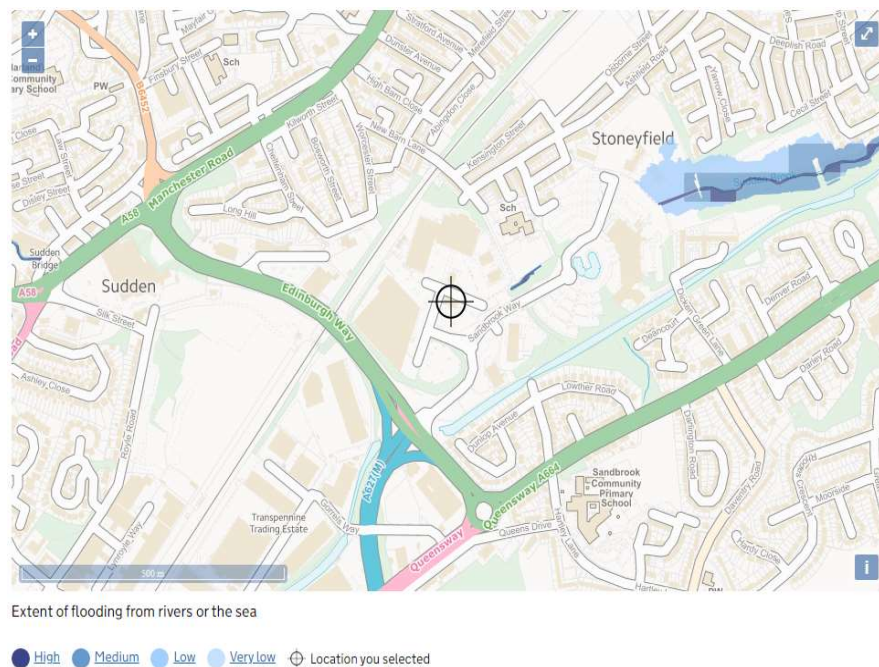


Figure 2: Environment Agency Flood Mapping for Planning

The Environment Agency also predicts the depth of flooding associated with each probability scenario. Figure 3 below indicates extent of depth associated with the High Probability risk. A high probability means that each year, the area has a chance of flooding greater than 1 in 30 (3.3%). In this scenario, the predicted water depth for the site is not at high risk of flooding.

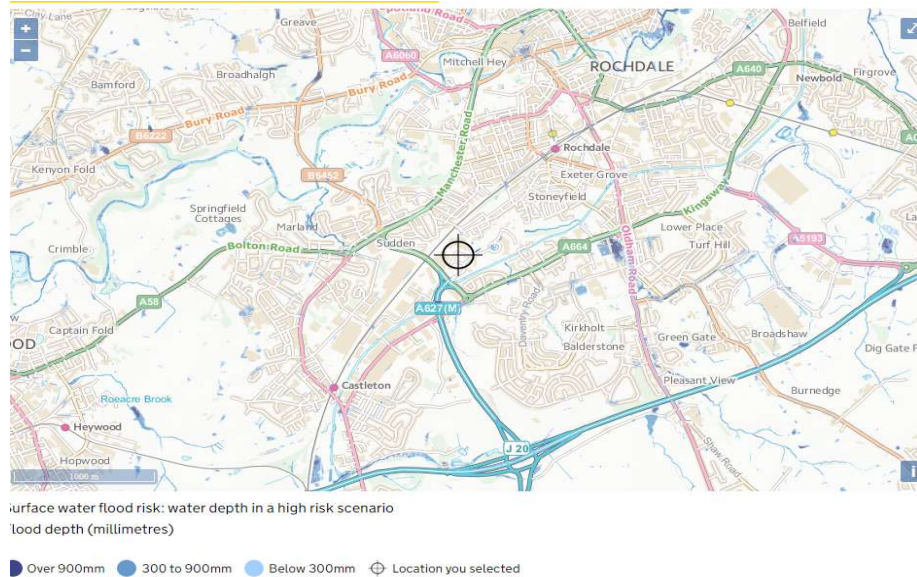


Figure 3: Environment Agency Surface Water Flooding – High Risk: Depth Extract

Surface Water Flooding has also been considered for the Low Probability event, Figure 4 below. In this respect, a Low Probability indicates flooding occurring because of rainfall will have an annual probability of occurring between 0.1% (1 in 1000 years) and 1% (1 in 100 years). The predicted water depth for the site is not at high risk of flooding.



Figure 4: Environment Agency Surface Water Flooding –Low Risk: Depth Extract

6.0 PROPOSED SITE DRAINAGE ARRANGEMENTS

The development represents the next phase of construction on a larger development site on which the first phase of the development was carried out in 2004, with a further phase being completed in 2022. The first phase of the development installed a foul water

drainage system with capacity to cater for the later phases of development. Surface water was disposed of via soakaways.

The current site area is 0.54 Ha of vacant land comprising grass and topsoil over made ground comprising gravel, brick, concrete, sand overlying coarse subrounded sand and gravel. The proposal includes four detached industrial properties. The development proposals for the site will result in an increase of the impermeable area of 0.48 Ha and therefore an increase in the peak surface water runoff rates and volume from the site. The development proposals and their associated drainage implications are reviewed below.

6.1 Foul Water

The existing foul water drainage system was designed for a fully developed site for commercial use throughout. As such the change of use to industrial will reduce the discharge rate.

It is therefore proposed to discharge the foul drainage directly into the existing privately owned (by the developer) system which eventually outfalls into the public trunk sewer.

6.2 Surface Water

Following the drainage hierarchy as presented in Paragraph 80 of the National Planning Policy Guidance the options for surface water management/discharge must be considered in the following order:

1. Infiltration (percolation) through the soil/sub strata
2. To a Surface Water Body (pond, ditch, stream, river)
3. To a Surface Water Sewer or a Highway Drain
4. Combined Water Sewer

The disposal of surface water from the previous phases of development was to soakaway. As such the site investigation for the adjacent previous phases included percolation tests in accordance with BRE Digest 365. The results of the tests showed the sub-strata is conducive to the use of soakaways as an effective mode of the disposal of water. This method is the preferred option for compliance with the National Planning Policy.

To “trigger” the design of the surface water drainage system the HR Wallingford Greenfield run off estimation was used to undertake the calculation using IH – 124 methodology which gave a Q bar of 4.76 litres/second. A copy of HR Wallingford Greenfield Runoff rate estimation tool report is provided in Appendix ‘D’.

It is proposed to provide a linear soakaway system incorporating attenuation. A model of the proposed surface water drainage was created and simulated storm events for 1 in 2 year, 1 in 30 year, 1 in 100 year + climate change allowance. The Climate Change Allowance was derived from “*Flood Risk assessments: climate changes allowances*” gov.uk website “*Table 2: peak rainfall intensity allowance in small catchments (less than 5km²) or urban drainage catchments (based on a 1961 to 1990 baseline)*” The structural design cases for wind loading use a design life of 50 years, this will be utilised for the drainage design life, this would put the development in the

“Total potential change anticipated for the ‘2080s’ (2070 to 2115)” The guidance states that *“Design your drainage system to make sure there is no increase in the rate of runoff discharged from the site for the upper end allowance.”* Hence 40% allowance is used. The results and a proposed drainage layout are shown in Appendix D; E and F.

6.3 Flood Risk

The development proposals are not currently located within areas identified by the Environment Agency as being at risk of flooding for planning purposes. Based on being able to satisfactorily manage the surface water flows from the site by means of attenuation and controlled discharge by infiltration it is considered that the development proposals do not affect upon the current flood risk areas or increase the risk of flooding.

7.0 SUMMARY

A review of the relevant guidance documents and various types of data collected at the site has enabled a full assessment of the flood risks to be quantified. The site is located within the Flood Zone 1 therefore all uses of land are appropriate in this zone.

This assessment has investigated the possibility of groundwater flooding and flooding from other sources at the site. It is considered that there will be low risk of groundwater flooding across the site and low risk of flooding from other sources.

It is proposed that a new foul drain from the development site be connected to the existing private site drainage.

The proposed method of managing the surface water runoff is by soakaway with attenuation.

Development of the site is not considered to represent an increased flood risk to the site or the wider area. The permeable area of the site will likely decrease, however, with effective storage measures to accommodate the 100yr + 40% climate change events it will be possible to manage efficiently the surface water runoff from the proposed development.

**APPENDIX 'A' –
Topographical Survey**



SURVEY ORIENTATED TO REAL TIME GPS

NOTES AND AMENDMENTS

ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN
DRAINAGE INFORMATION MUST BE CHECKED AND VERIFIED WITH LOCAL AUTHORITY RECORDS
PRIOR TO WORK COMMENCING
Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.
TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE THE AVERAGE SPREAD.
THE DRIP LINE LAYER DENOTES THE TREES EXTREMITY

REVISIONS

REV.	DESCRIPTION	SURVEY	DRAWN	DATE
A	UTILITIES ADDED	CH	JC	12.10.2018
B	UTILITIES ADDED	MG	FSH	25.03.2021
C	BT TRACED WHILST SETTING OUT	MG	FSH	12.07.2021
D	EXPOSED CABLES SURVEYED	JR	JC	30.07.2021
E	UPDATED AREA	MG	ES	13.12.2022

Topographical Survey Legend

Bin	Litter bin	TL	Tie line
BH	Bore Hole	TP	Telegraph pole
Bd	Billboard	TPS	Traffic paving slabs
BS	Bus stop	TS	Traffic signal light
BT	British telecom ic	TV	Television cover
CPS	Concrete paving slabs	VP	Vent pipe
DR	Drain	WM	Water meter
Elec	Electrical cut	WC	Wash out
EP	Elec. pole	UTL	Unable to lift
ER	Earth rod	Fence	Fence annotation
PH	Fire Hydrant	B/W	Barbed wire
FP	Flagpole	C/B	Closed boarded
FT	Floodlight	C/I	Corrugated iron
G	Gully	C/L	Chain link
GP	Gate post	C/P	Concrete panel
GV	Gas valve	H/R	Hand rail
IC	Inspection cover	I/R	Iron railings
JB	Junction box	O/B	Open boarded
KO	Kerb outlet	P/C	Post & chain
LB	Litter box	P/R	Post & rail
LP	Lamp post	P/W	Post & wire
Mur	Utility marker	P/W	Post & wire
MP	Mile post	W/M	Wire mesh
MP	Monitoring Well	AL	Arch level
NF	Name plate	BL	Bed level
P	Post	CL	Cover level
PM	Parking meter	EN	Entrance level
RE	Rodding eye	FL	Floor level
RS	Road sign	IL	Insert level
RWP	Rain water pipe	PL	Paved level
SP	Sign post	RH	Roadridge level
ST	Stop tap	SL	Soft level
SB	Service Box	Spr	Arch springing level
SV	Stop valve	Top	Top of pipe/culvert
TCS	Telephone call box	WH	Wall height
TH	Trail Hole	WL	Water level

BENCH MARK INFORMATION

All levels relate to OSBM Newlyn
Datum Generated by VRS GPS

SURVEY STATIONS

STN1	389537.7920	412024.7400	137.236
STN2	389557.4630	412000.4030	136.388
STN2A	389592.1540	411990.2970	134.910

JLP Surveying

JLP Surveying Consultants Ltd,
Suite 25 Rodney House,
King Street,
Wigan
WN1 1BT
Tel - 01942 243313
Fax - 01942 492230
Mobile - 07710 424988
EMAIL - peterhouston@jlpurveyors.com

PROJECT
Sandbrook Way
Rochdale

DRAWING TITLE

Topographical Land Survey

SCALE	SHEET SIZE	No. of SHEETS	DATE	REVISION
-------	------------	---------------	------	----------

1:200	A0	1	11.10.18	E
-------	----	---	----------	---

DRAWING NUMBER

S18-889

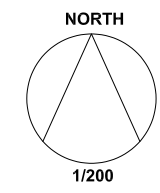
**APPENDIX 'B' –
Development Proposals**



BURRIED SERVICES

1	E=389571.177	N=412079.460
2	E=389571.246	N=412078.767
3	E=389552.101	N=412063.404
4	E=389552.048	N=412064.075
5	E=389528.602	N=412044.988
6	E=389528.582	N=412044.062
7	E=389528.742	N=412044.168
8	E=389528.784	N=412044.996
9	E=389535.194	N=412049.647
10	E=389545.616	N=412039.013
11	E=389545.682	N=412038.934
12	E=389563.170	N=412053.191
13	E=389563.132	N=412053.056
14	E=389584.048	N=412070.798
15	E=389584.674	N=412070.917

to be read in conjunction with existing stats information



CONCEPT

- the Hybrid units only require pedestrian and vehicular from the rear. this eases the problem of transition from footpath and roads to graded levels to service-yard areas.
- proposed ssl's relate to frontage levels,access roads and footpath levels
- levels easier to cut and fill within area designated car park
- design assumes incoming kerb races are not sacrosant and that we can bring new races in.
- 21600 Building line to building line between industrial units
- trying to avoid retaining wall costs where possible with levels and banking solutions

SCHEDULE OF ACCOMMODATION

Block A	
3 units each 1100 sq.ft.....total 3300 sq.ft.	
Block B	
4 units each 1650 sq.ft.....total 6600sq.ft	
Block C	
Reduced Single Hybrid unit 3991sq.fttotal 3208 sq.ft	
Block D	
Single Hybrid unit 4316sq.ft total 4316 sq.ft	
Grand total Blocks A,B,C and D =	17,424 sq.ft

15,000 sq.ft normally required per acre so for this site ideal would be 19,950 sq.ft
this layout achieves approx 17424 sq ft so 87% efficient

Approx area of site 5,408 sq.m
10,000 sq.m equals 1 Hectare
1 Hectare =2.47 Acre
so area approx 1.33 Acre
15,000 sq.ft required per acre required
so approx 19,950 sq.ft required on the site
Accommodation achieved 17,424 sq.ft

All site dimensions shall be verified by the contractor on site prior to work commencing

Do not scale from this drawing

Only work to written dimensions

This drawing is the property of Whittle Jones and copyright is reserved by them. The drawing is not to be copied or used without their prior written consent.

NOTES

READ THIS DRAWING IN CONJUNCTION WITH JLP TOPOGRAPHICAL SURVEY DRAWING NO.S22-768

schedule of accommodation BLOCK A				
unit	total sq.m	total sq.ft	cars	m2/car
1	103.6	1100	2	100
2	103.6	1100	2	100
3	103.6	1100	2	100
total	310.8	3300	6	51.5

schedule of accommodation BLOCK B				
unit	total sq.m	total sq.ft	cars	m2/car
1	153	1657	3	50
2	153	1657	3	50
3	153	1657	3	50
4	153	1657	3	50
total	612	6628	12	50

schedule of accommodation HYBRID BLOCK C				
unit	total sq.m	total sq.ft	cars	m2/car
1	370	3991	8	50

schedule of accommodation HYBRID BLOCK D				
unit	total sq.m	total sq.ft	cars	m2/car
1	370	3991	8	50

Grand total Blocks A,B,C and D=17,88

15,000 sq.ft normally required per acre so for this site ideal would be 19,950 sq.ft
this layout achieves approx 17,882 sq ft so 90%
total car parking spaces required on site =26 pl
so actual total required 28 spaces plus 1 dis.spc
32 car parking spaces total
60 spaces actually available on site so surplus ie.28 spaces could be for overspill share

MATERIAL KEY

- Air Entrained Concrete Finish to apron to Loading Doors
- 600 x 600mm Concrete Paving
- Flags, shading Indicates tactile paving
- Tactile paving and dropped kerb
- Gravel infill
- Grassed areas
- Gravel infill
- Electrical Vehicle Charging Point
- Bin Storage/Refuse approx 3600 x 1800
- Bicycle Shelter approx 3600 x 1800
- 200 X 50 pc edging strip
- Bollards to Loading Doors
- Assumed site boundary [to be checked against title deeds]

Rev. 1 Date 4.4.23 Drawn By DE

ISSUED BY INFORMATION

NT

NORTHERN TRUST

INVESTMENT / DEVELOPMENT / REGENERATION

NORTHERN TRUST
LYNCH HOUSE, 228-230 FIVE, CHURCHILL PARK, NEWCASTLE, NSW
Tel: 0129 228 555 Fax: 0129 228 556
Email: info@northerntrust.com.au

Client

Project

Sandbrook Park, Rochdale
Phase 2

Drawing

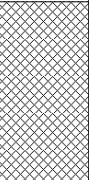
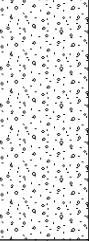
CONCEPT DRAWING 1
Phase 2 [overlaid] on current Topo Survey

Drawn By	DE	Date	4.4.23	Drawn By	DE	Rev.	
Checked By	DE	Date	4.4.23	Checked By	WJ	WJ-204-0016	
Scale	1/200	@A0					

**APPENDIX 'C' –
Results of Percolation Tests**

Trial Pit Log

Project Name: Sandbrook Business Park - Phase 3, Rochdale		Client: Northern Trust		Date: 28/01/2021	
Location: Sandbrook Business Park - Phase 3, Rochdale		Contractor:		Co-ords: E389495.00 N411976.00	
Project No. : 30257		Crew Name:		Equipment:	
Location Number SA1	Location Type TP	Level 136.70m AoD	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.60	136.70		MADE GROUND: Greyish brown fine to coarse subrounded to subangular sandy gravel of sandstone with occasional cobble of brick and boulder of concrete	
					0.90	136.10		MADE GROUND: Dark grey slightly clayey fine to coarse sand and gravel of sandstone, brick and concrete	
					1.70	135.80		Brown subrounded SAND and GRAVEL of sandstone	1
					2.70	135.00		Pale orange brown fine to medium SAND	2
								End of Borehole at 2.700m	3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Mechanically excavated by a JCB 3CX wheeled excavator with 600mm wide bucket.							
---	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Sandbrook Business Park - Phase 3, Rochdale		Client: Northern Trust		Date: 28/01/2021	
Location: Sandbrook Business Park - Phase 3, Rochdale		Contractor:		Co-ords: E389506.00 N412011.00	
Project No. : 30257		Crew Name:		Equipment:	
Location Number SA2a	Location Type TP	Level 137.70m AoD	Logged By	Scale 1:25	Page Number Sheet 1 of 1

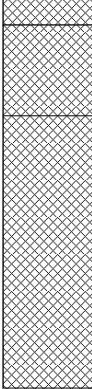
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10	137.70		MADE GROUND: Grey fine to coarse sandy gravel of sandstone	
								MADE GROUND: Greyish brown fine to coarse subrounded to subangular sandy gravel of sandstone with occasional cobble of brick and boulder of concrete	
					0.70	137.60		MADE GROUND: Dark grey slightly clayey fine to coarse sand and gravel of sandstone, brick and concrete	1
					1.20	136.50		MADE GROUND: Concrete slab	
					1.20	137.00		End of Borehole at 1.200m	
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Mechanically excavated by a JCB 3CX wheeled excavator with 600mm wide bucket.							
---	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Sandbrook Business Park - Phase 3, Rochdale		Client: Northern Trust		Date: 28/01/2021	
Location: Sandbrook Business Park - Phase 3, Rochdale		Contractor:		Co-ords: E389515.00 N412006.00	
Project No. : 30257		Crew Name:		Equipment:	
Location Number SA2b	Location Type TP	Level 137.35m AoD	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10	137.35		MADE GROUND: Grey fine to coarse sandy gravel of sandstone	1
					0.40	137.25		MADE GROUND: Greyish brown fine to coarse subrounded to subangular sandy gravel of sandstone with occasional cobble of brick and boulder of concrete	
								MADE GROUND: Dark grey slightly clayey fine to coarse sand and gravel of sandstone, brick and concrete	
					1.30	136.05		MADE GROUND: Concrete slab	2
					1.30	136.95		End of Borehole at 1.300m	
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Mechanically excavated by a JCB 3CX wheeled excavator with 600mm wide bucket.							
---	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Sandbrook Business Park - Phase 3, Rochdale		Client: Northern Trust		Date: 28/02/2021	
Location: Sandbrook Business Park - Phase 3, Rochdale		Contractor:		Co-ords: E389521.00 N412014.00	
Project No. : 30257		Crew Name:		Equipment:	
Location Number SA2c	Location Type TP	Level 137.20m AoD	Logged By	Scale 1:25	Page Number Sheet 1 of 1

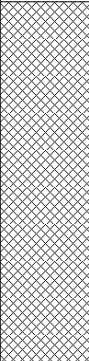
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10	137.20		MADE GROUND: Grey fine to coarse sandy gravel of sandstone	
					0.40	137.10		MADE GROUND: Greyish brown fine to coarse subrounded to subangular sandy gravel of sandstone with occasional cobble of brick and boulder of concrete	
					1.00	136.20		MADE GROUND: Dark grey slightly clayey fine to coarse sand and gravel of sandstone, brick and concrete	
					1.00	136.80		MADE GROUND: Concrete slab	1
								End of Borehole at 1.000m	
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Mechanically excavated by a JCB 3CX wheeled excavator with 600mm wide bucket.							
---	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Sandbrook Business Park - Phase 3, Rochdale		Client: Northern Trust		Date: 28/01/2021	
Location: Sandbrook Business Park - Phase 3, Rochdale		Contractor:		Co-ords: E389528.00 N412035.00	
Project No. : 30257		Crew Name:		Equipment:	
Location Number SA3	Location Type TP	Level 137.75m AoD	Logged By	Scale 1:25	Page Number Sheet 1 of 1

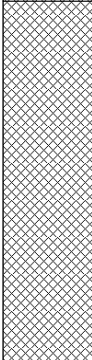
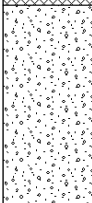
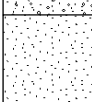
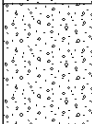
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					1.20	137.75		MADE GROUND: Grey fine to coarse subangular sandy gravel of sandstone	1
					2.20	136.55		Greyish brown fine to coarse subrounded SAND and GRAVEL of sandstone <i>Non-woven geotextile at base base of made ground</i>	2
								End of Borehole at 2.200m	3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Mechanically excavated by a JCB 3CX wheeled excavator with 600mm wide bucket.						
---	--	--	--	--	--	---

Trial Pit Log

Project Name: Sandbrook Business Park - Phase 3, Rochdale		Client: Northern Trust		Date: 28/01/2021	
Location: Sandbrook Business Park - Phase 3, Rochdale		Contractor:		Co-ords: E389551.00 N412030.00	
Project No. : 30257		Crew Name:		Equipment:	
Location Number SA4	Location Type TP	Level 137.20m AoD	Logged By	Scale 1:25	Page Number Sheet 1 of 1

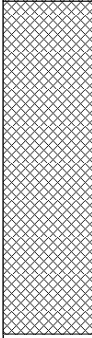
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	137.20		MADE GROUND: Grey fine to coarse subangular sandy gravel of sandstone	1
								MADE GROUND: Dark grey clayey fine to coarse sand with much fine to coarse subangular gravel and cobbles of concrete and brick, occasional boulder of concrete and piece of wood	
					1.40	137.00		Brown fine to coarse subrounded SAND and GRAVEL of sandstone	2
					2.10	135.80		Orange brown fine to medium SAND	
					2.40	135.10		Orange brown fine to coarse subrounded SAND and GRAVEL of sandstone	
					2.80	134.80		End of Borehole at 2.800m	3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Mechanically excavated by a JCB 3CX wheeled excavator with 600mm wide bucket.							
---	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Sandbrook Business Park - Phase 3, Rochdale		Client: Northern Trust		Date: 28/01/2021	
Location: Sandbrook Business Park - Phase 3, Rochdale		Contractor:		Co-ords: E389582.00 N412057.00	
Project No. : 30257		Crew Name:		Equipment:	
Location Number SA5	Location Type TP	Level 137.18m AoD	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	137.18		MADE GROUND: Grey fine to coarse subangular sandy gravel of sandstone	1
					1.30	136.99		MADE GROUND: Dark grey fine to coarse sand and gravel of sandstone and brick	
								End of Borehole at 2.300m	2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Mechanically excavated by a JCB 3CX wheeled excavator with 600mm wide bucket.							
---	--	--	--	--	--	--	---

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
 Job Name: Phase 3, Sandbrook Way
 Job No.: 30257



Trial Pit No.	SA1
Test No.	1

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.41	1410
	1	1.48	1480
	3	1.55	1550
	5	1.60	1603
	10	1.62	1620
	15	1.71	1710
	47	2.10	2100
	75	2.15	2150
	92	2.17	2170
	110	2.19	2190
	151	2.23	2230
	214	2.24	2240
	253	2.26	2260
	300	2.27	2270

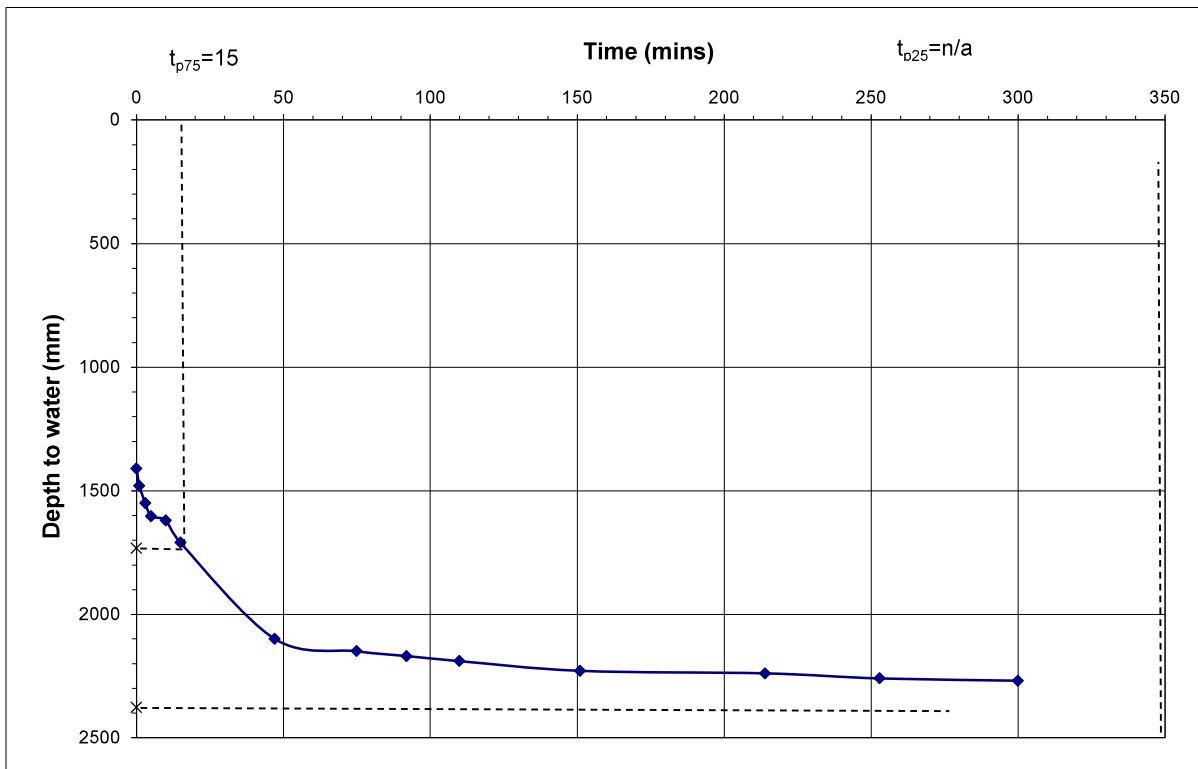
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.40	1400
Width	=	0.70	700
Depth	=	2.70	2700

Effective depth (empty)		mm	m
75%	=	2378.00	2.378
50%	=	2055.00	2.055
25%	=	1733.00	1.733

Depth at start of test (mm)	=	1410
Depth at end of test (mm)	=	1970

Base area of pit	=	0.98
a_{p50} - 50% internal surface area inc. base	=	3.689
V_{p75-25} - Volume 75 - 25%	=	0.6321

Read from the graph:		
t_{p75} (min)	=	15
t_{p25} (min)	=	



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

Client:	Northern Trust
Job Name:	Phase 3, Sandbrook Way
Job No.:	30257



Trial Pit No.	SA3
Test No.	1

[illegible]

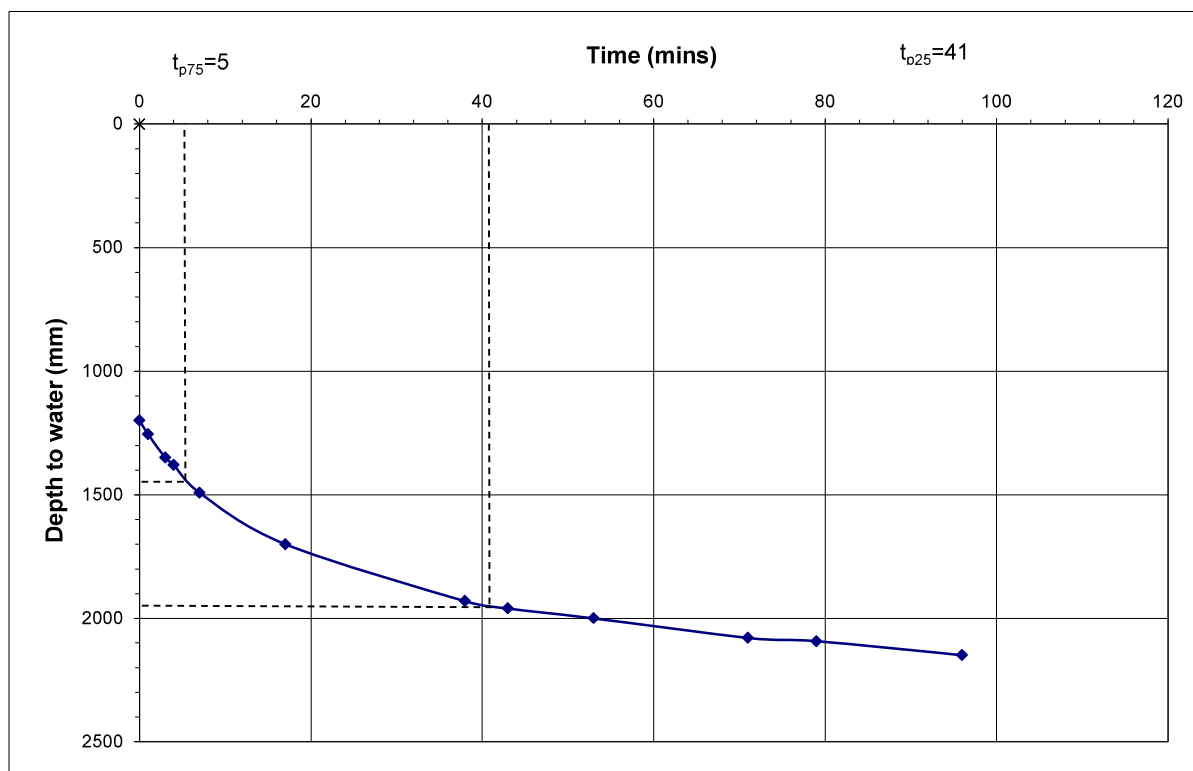
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.30	1300
Width	=	0.65	650
Depth	=	2.20	2200

Effective depth (empty)	mm	m
75% =	1.95	1950
50% =	1.70	1700
25% =	1.45	1450

Depth at start of test (mm)	=	1200
Depth at end of test (mm)	=	2150

Base area of pit	=	0.845
a_{p50} - 50% internal surface area inc. base	=	1950.845
V_{p75-25} - Volume 75 - 25%	=	422.5

Read from the graph:		
$t_{p\ 75}$ (min)	=	5
$t_{p\ 25}$ (min)	=	41



Soil infiltration rate, f , (m/s) =	1.00E-04	(normal test)
---------------------------------------	----------	---------------

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
 Job Name: Phase 3, Sandbrook Way
 Job No.: 30257



Trial Pit No.	SA3
Test No.	2

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.45	1450
	1	1.46	1462
	2	1.47	1474
	4	1.50	1496
	6	1.52	1520
	8	1.54	1540
	10	1.56	1560
	18	1.63	1630
	31	1.71	1710
	38	1.76	1764
	46	1.81	1808
	56	1.85	1850
	68	1.89	1894
	82	1.94	1940
	92	1.96	1958
	109	2.01	2008
	116	2.02	2022
	125	2.03	2032

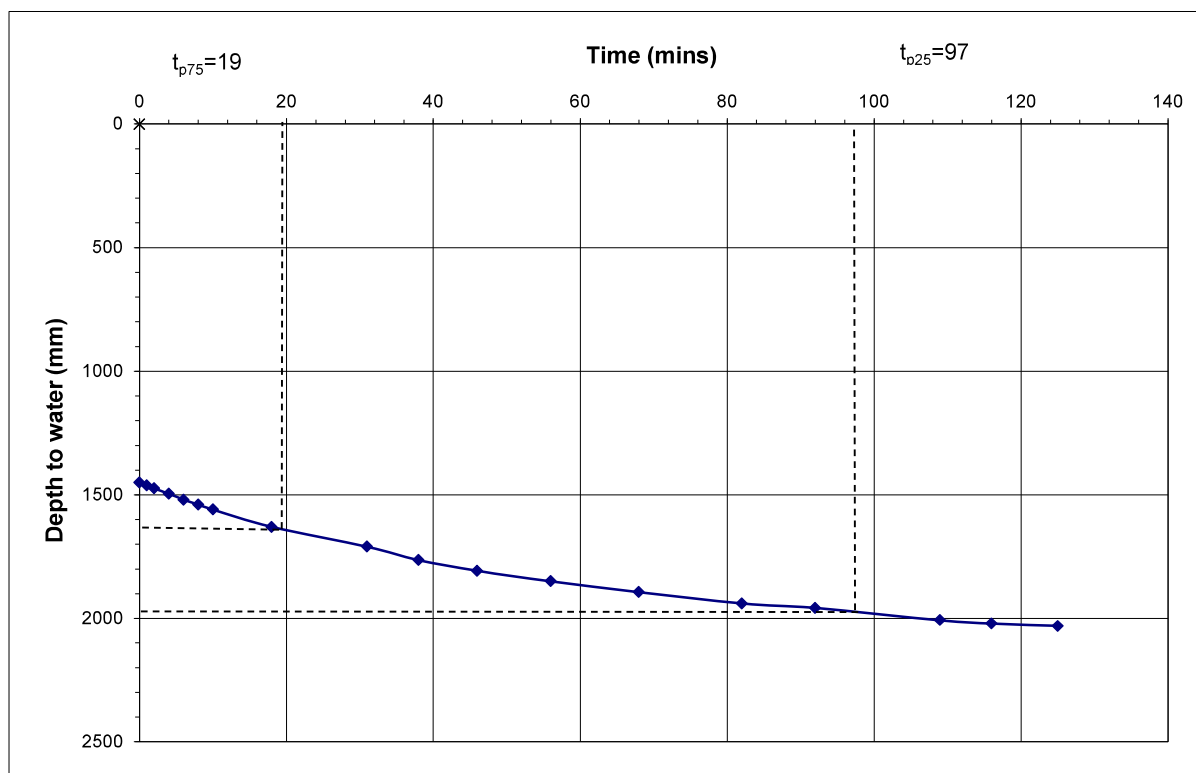
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.30	1300
Width	=	0.65	650
Depth	=	2.15	2150

Effective depth (empty)		mm	m
75%	=	1.98	1975
50%	=	1.80	1800
25%	=	1.63	1625

Depth at start of test (mm)	=	1450
Depth at end of test (mm)	=	2032

Base area of pit	=	0.845
a_{p50} - 50% internal surface area inc. base	=	1365.845
V_{p75-25} - Volume 75 - 25%	=	295.75

Read from the graph:		
t_{p75} (min)	=	19
t_{p25} (min)	=	97



Soil infiltration rate, f , (m/s) = 4.63E-05 (normal test)

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
 Job Name: Phase 3, Sandbrook Way
 Job No.: 30257



Trial Pit No.	SA4
Test No.	1

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.55	1550
	1	1.60	1597
	2	1.62	1622
	3	1.65	1650
	4	1.68	1680
	5	1.70	1702
	11	1.80	1800
	15	1.85	1848
	29	1.99	1990
	38	2.04	2044
	46	2.09	2090
	56	2.13	2130
	63	2.15	2150
	74	2.19	2190
	88	2.22	2220
	104	2.25	2250
	133	2.30	2304
	270	2.49	2490

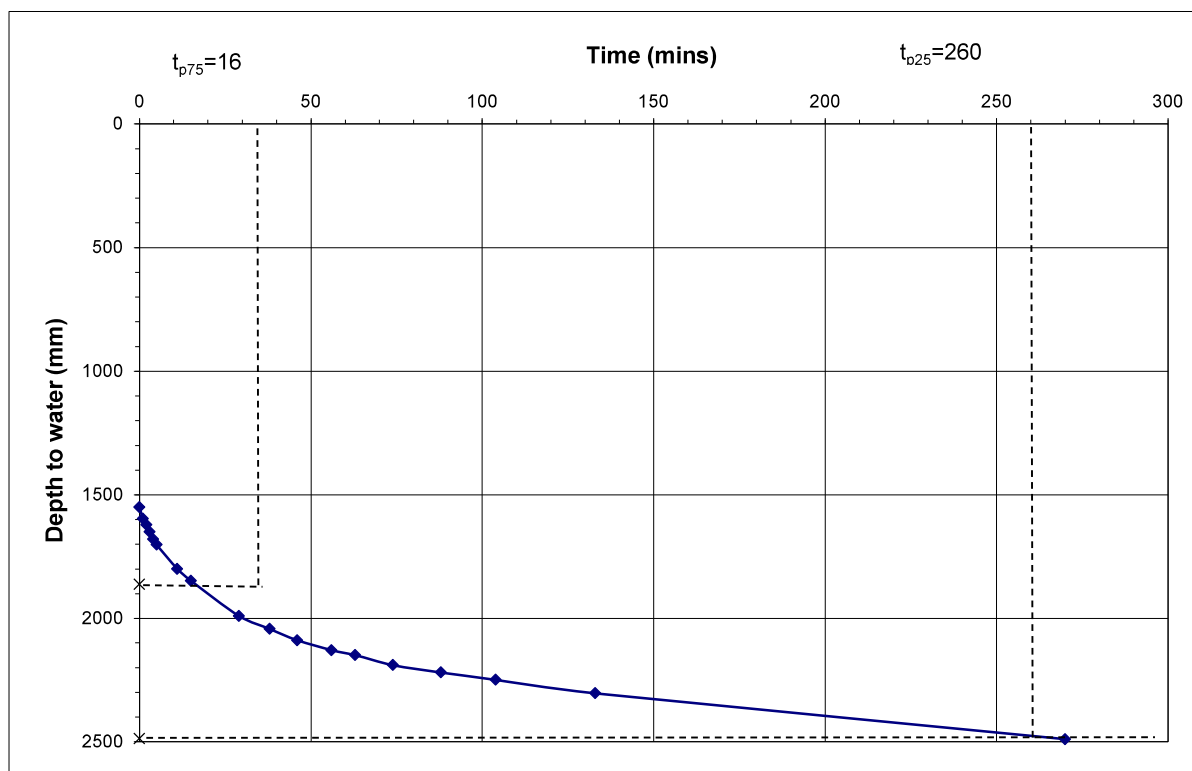
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.40	1400
Width	=	0.65	650
Depth	=	2.80	2800

Effective depth (empty)		mm	m
75%	=	2487.50	2.4875
50%	=	2175.00	2.175
25%	=	1862.50	1.8625

Depth at start of test (mm)	=	1550
Depth at end of test (mm)	=	2304

Base area of pit	=	0.91
a_{p50} - 50% internal surface area inc. base	=	3.4725
V_{p75-25} - Volume 75 - 25%	=	0.56875

Read from the graph:		
t_{p75} (min)	=	16
t_{p25} (min)	=	260



Soil infiltration rate, i , (m/s) = 1.12E-05 (normal test - extrapolated)

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
Job Name: Phase 3, Sandbrook Way
Job No.: 30257



Trial Pit No.	SA4
Test No.	1

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.55	1550
	1	1.60	1597
	2	1.62	1622
	3	1.65	1650
	4	1.68	1680
	5	1.70	1702
	11	1.80	1800
	15	1.85	1848
	29	1.99	1990
	38	2.04	2044
	46	2.09	2090
	56	2.13	2130
	63	2.15	2150
	74	2.19	2190
	88	2.22	2220
	104	2.25	2250
	133	2.30	2304

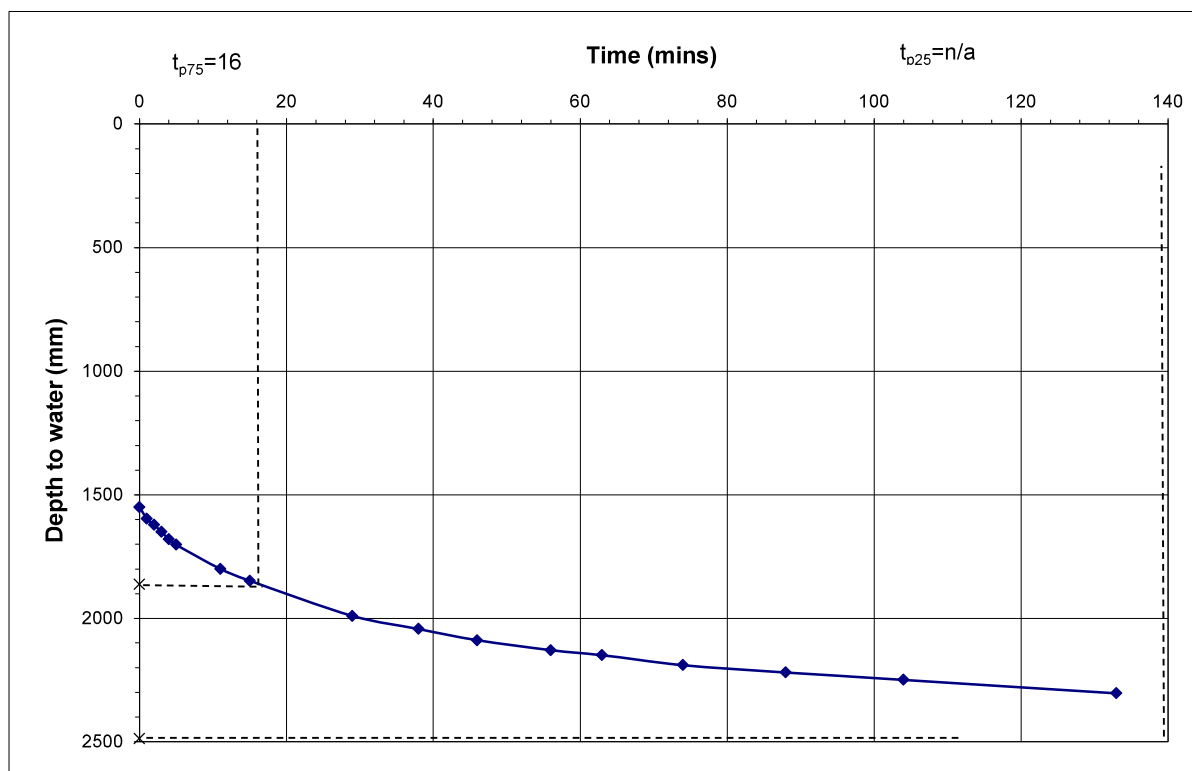
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.40	1400
Width	=	0.65	650
Depth	=	2.80	2800

Effective depth (empty)		mm	m
75%	=	2487.50	2.4875
50%	=	2175.00	2.175
25%	=	1862.50	1.8625

Depth at start of test (mm)	=	1550
Depth at end of test (mm)	=	2304

Base area of pit	=	0.91
a_{p50} - 50% internal surface area inc. base	=	3.4725
V_{p75-25} - Volume 75 - 25%	=	0.56875

Read from the graph:		
t_{p75} (min)	=	16
t_{p25} (min)	=	



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
Job Name: Phase 3, Sandbrook Way
Job No.: 30257



Trial Pit No.	SA4
Test No.	2

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.66	1660
	1	1.67	1670
	2	1.69	1685
	3	1.70	1700
	4	1.71	1710
	5	1.72	1720
	8	1.75	1750
	10	1.76	1762
	15	1.81	1810
	33	1.91	1910
	42	1.95	1950
	52	2.00	2000
	70	2.05	2050
	82	2.06	2060
	92	2.08	2084
	103	2.11	2108
	123	2.15	2150
	146	2.19	2194
	360	2.52	2520

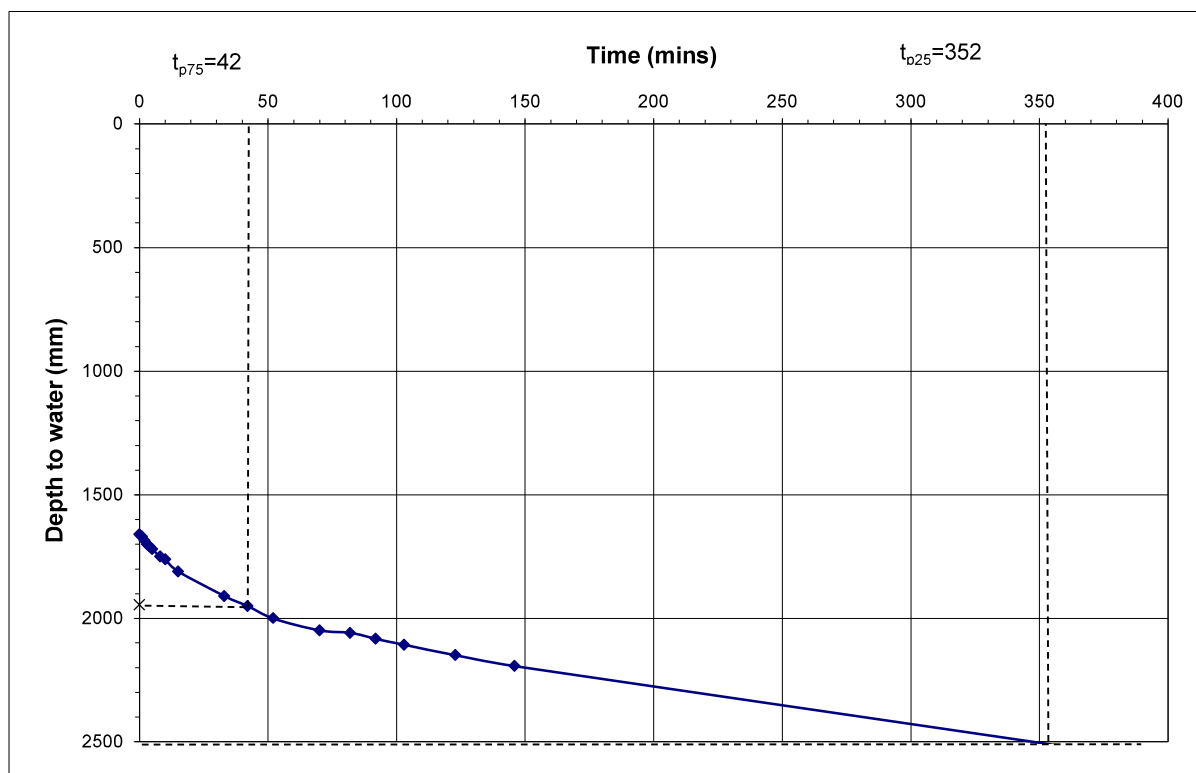
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.40	1400
Width	=	0.65	650
Depth	=	2.80	2800

Effective depth (empty)		mm	m
75%	=	2515.00	2.515
50%	=	2230.00	2.23
25%	=	1945.00	1.945

Depth at start of test (mm)	=	1660
Depth at end of test (mm)	=	2194

Base area of pit	=	0.91
a_{p50} - 50% internal surface area inc. base	=	3.247
V_{p75-25} - Volume 75 - 25%	=	0.5187

Read from the graph:		
t_{p75} (min)	=	42
t_{p25} (min)	=	352



Soil infiltration rate, i , (m/s) = 8.59E-06 (normal test - extrapolated)

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
 Job Name: Phase 3, Sandbrook Way
 Job No.: 30257



Trial Pit No.	SA4
Test No.	2

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.66	1660
	1	1.67	1670
	2	1.69	1685
	3	1.70	1700
	4	1.71	1710
	5	1.72	1720
	8	1.75	1750
	10	1.76	1762
	15	1.81	1810
	33	1.91	1910
	42	1.95	1950
	52	2.00	2000
	70	2.05	2050
	82	2.06	2060
	92	2.08	2084
	103	2.11	2108
	123	2.15	2150
	146	2.19	2194

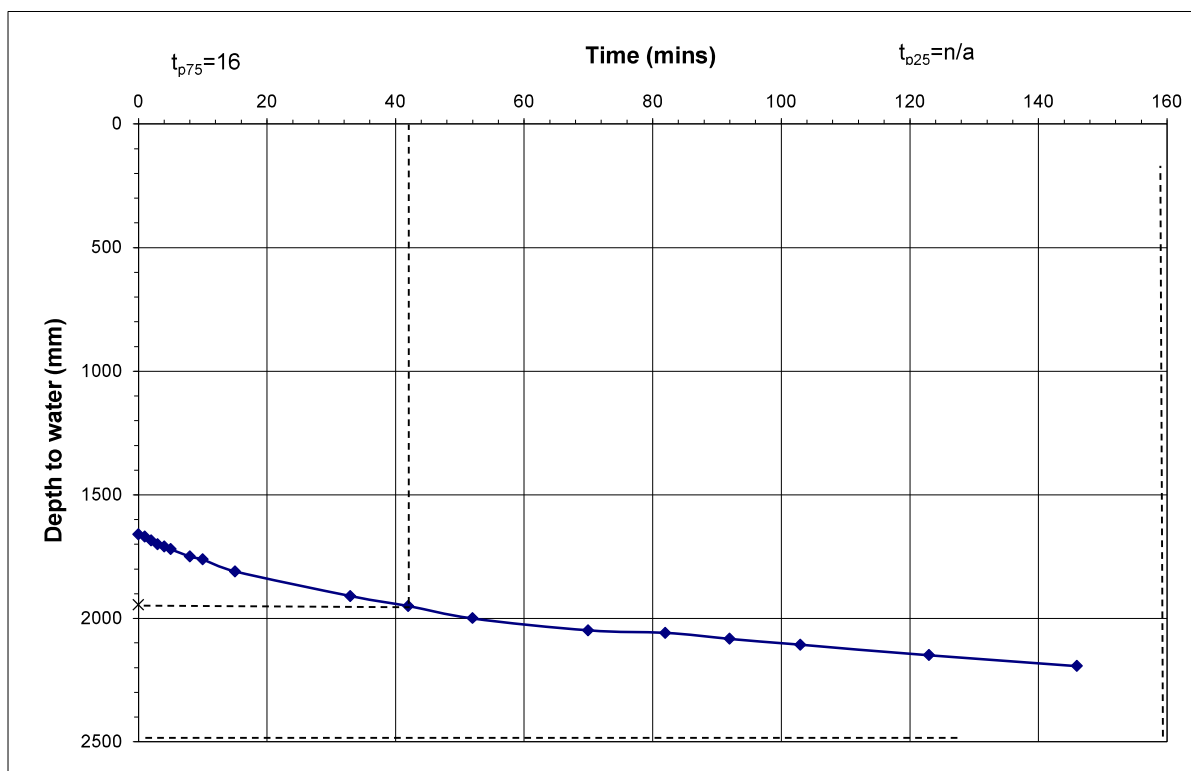
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.40	1400
Width	=	0.65	650
Depth	=	2.80	2800

Effective depth (empty)		mm	m
75%	=	2515.00	2.515
50%	=	2230.00	2.23
25%	=	1945.00	1.945

Depth at start of test (mm)	=	1660
Depth at end of test (mm)	=	2194

Base area of pit	=	0.91
a_{p50} - 50% internal surface area inc. base	=	3.247
V_{p75-25} - Volume 75 - 25%	=	0.5187

Read from the graph:		
t_{p75} (min)	=	42
t_{p25} (min)	=	



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
Job Name: Phase 3, Sandbrook Way
Job No.: 30257



Trial Pit No.	SA5
Test No.	1

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.45	1450
	1	1.48	1480
	2	1.51	1510
	3	1.53	1530
	4	1.54	1542
	5	1.55	1552
	11	1.60	1604
	20	1.66	1660
	28	1.72	1716
	38	1.73	1730
	46	1.75	1752
	64	1.83	1830
	86	1.90	1900
	160	2.10	2100

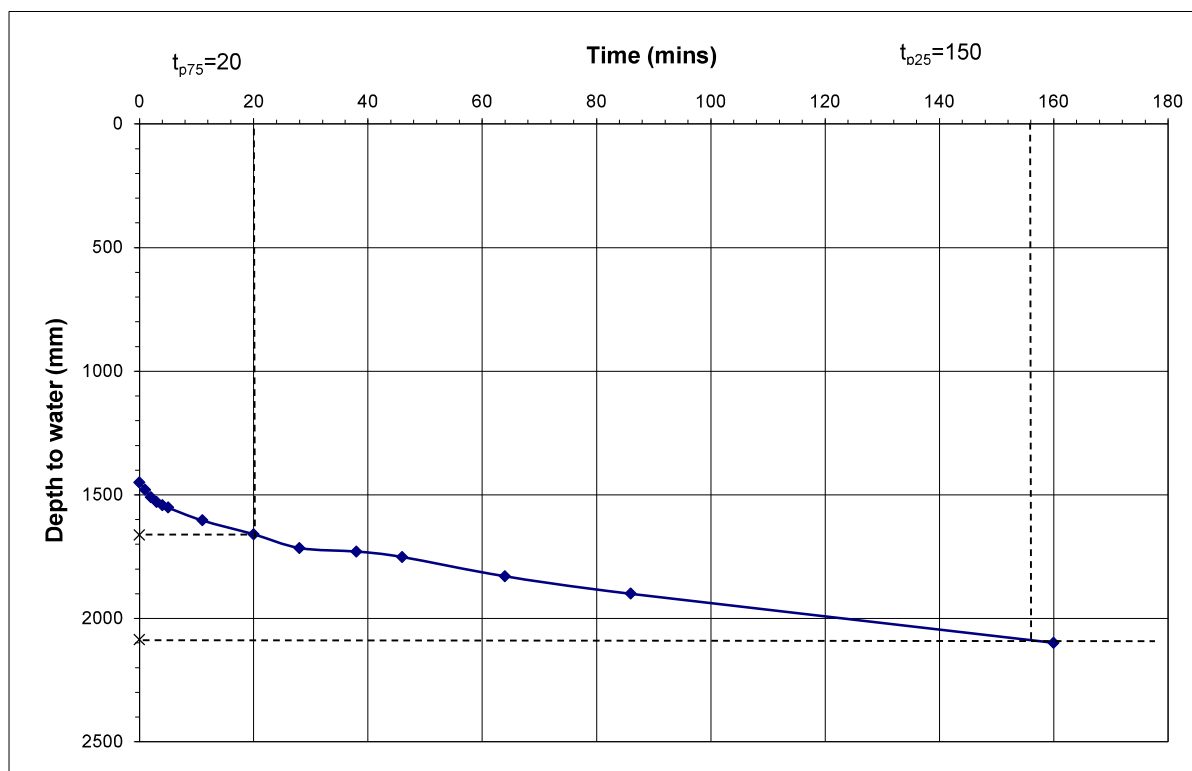
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.70	1700
Width	=	0.70	700
Depth	=	2.30	2300

Effective depth (empty)		mm	m
75%	=	2087.50	2.088
50%	=	1875.00	1.875
25%	=	1662.50	1.663

Depth at start of test (mm)	=	1450
Depth at end of test (mm)	=	1900

Base area of pit	=	1.19
a_{p50} - 50% internal surface area inc. base	=	3.23
V_{p75-25} - Volume 75 - 25%	=	0.50575

Read from the graph:		
t_{p75} (min)	=	20
t_{p25} (min)	=	150



Soil infiltration rate, i , (m/s) = 2.01E-05 (normal test - extrapolated)

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
 Job Name: Phase 3, Sandbrook Way
 Job No.: 30257



Trial Pit No.	SA5
Test No.	1

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.45	1450
	1	1.48	1480
	2	1.51	1510
	3	1.53	1530
	4	1.54	1542
	5	1.55	1552
	11	1.60	1604
	20	1.66	1660
	28	1.72	1716
	38	1.73	1730
	46	1.75	1752
	64	1.83	1830
	86	1.90	1900

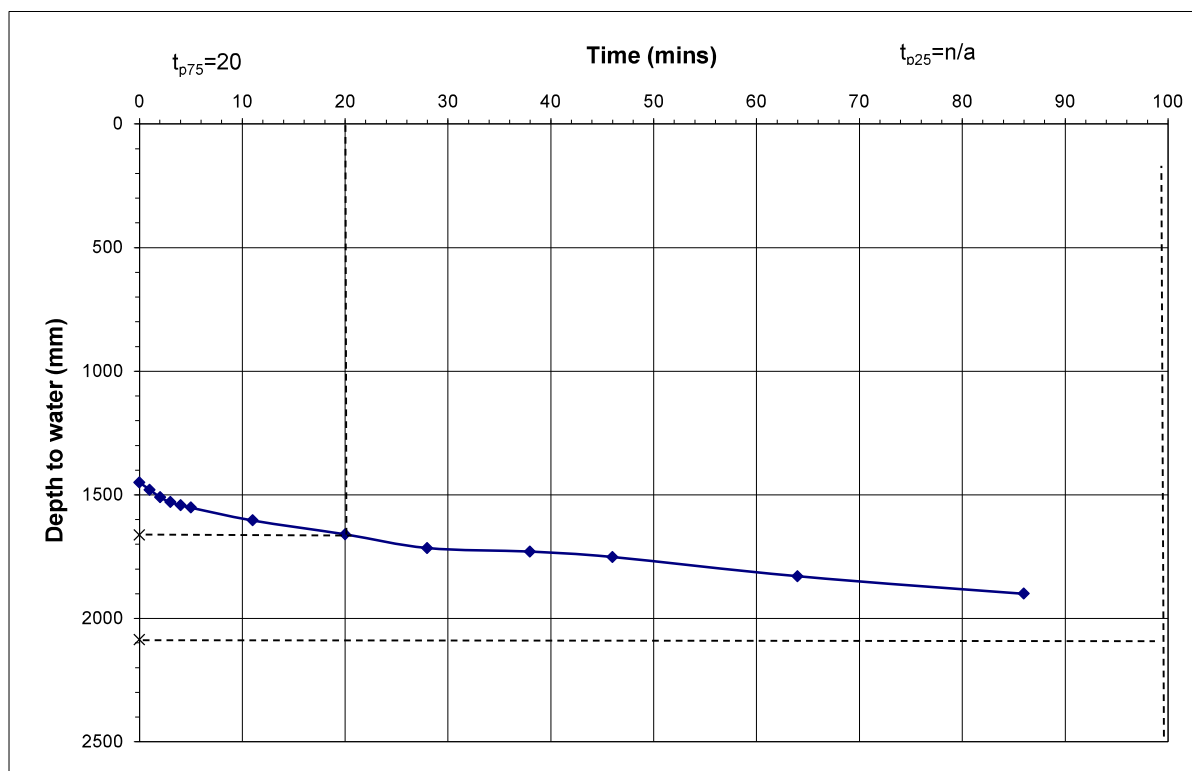
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	1.70	1700
Width	=	0.70	700
Depth	=	2.30	2300

Effective depth (empty)		mm	m
75%	=	2087.50	2.088
50%	=	1875.00	1.875
25%	=	1662.50	1.663

Depth at start of test (mm)	=	1450
Depth at end of test (mm)	=	1900

Base area of pit	=	1.19
a_{p50} - 50% internal surface area inc. base	=	3.23
V_{p75-25} - Volume 75 - 25%	=	0.50575

Read from the graph:		
t_{p75} (min)	=	20
t_{p25} (min)	=	



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
Job Name: Phase 3, Sandbrook Way
Job No.: 30257



Trial Pit No.	SA5
Test No.	2

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.37	1370
	1	1.38	1380
	2	1.39	1386
	3	1.39	1393
	4	1.40	1400
	6	1.41	1410
	8	1.42	1420
	10	1.43	1432
	26	1.44	1440
	50	1.54	1540
	63	1.57	1570
	77	1.60	1600
	100	1.63	1630
	110	1.65	1652
	123	1.68	1678
	140	1.70	1700
	155	1.72	1720
	200	1.70	1770

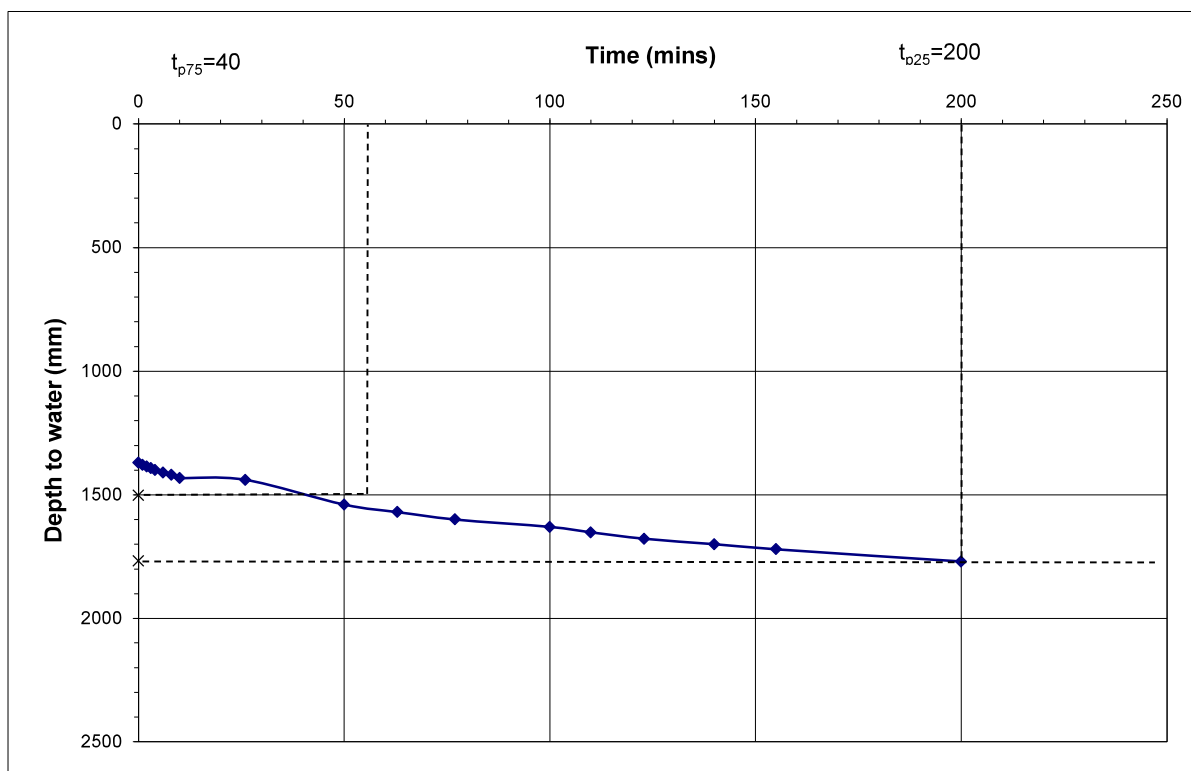
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	2.20	2200
Width	=	1.20	1200
Depth	=	1.90	1900

Effective depth (empty)		mm	m
75%	=	1767.50	1.7675
50%	=	1635.00	1.635
25%	=	1502.50	1.5025

Depth at start of test (mm)	=	1370
Depth at end of test (mm)	=	1900

Base area of pit	=	2.64
a_{p50} - 50% internal surface area inc. base	=	4.442
V_{p75-25} - Volume 75 - 25%	=	0.6996

Read from the graph:		
t_{p75} (min)	=	40
t_{p25} (min)	=	200



Soil infiltration rate, i , (m/s) = 1.64E-05 (normal test - extrapolated)

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 2007

Client: Northern Trust
 Job Name: Phase 3, Sandbrook Way
 Job No.: 30257



Trial Pit No.	SA5
Test No.	2

Time	Elpsed Time (min)	Depth to water form ground level	
		(m)	(mm)
	0	1.37	1370
	1	1.38	1380
	2	1.39	1386
	3	1.39	1393
	4	1.40	1400
	6	1.41	1410
	8	1.42	1420
	10	1.43	1432
	26	1.44	1440
	50	1.54	1540
	63	1.57	1570
	77	1.60	1600
	100	1.63	1630
	110	1.65	1652
	123	1.68	1678
	140	1.70	1700
	155	1.72	1720

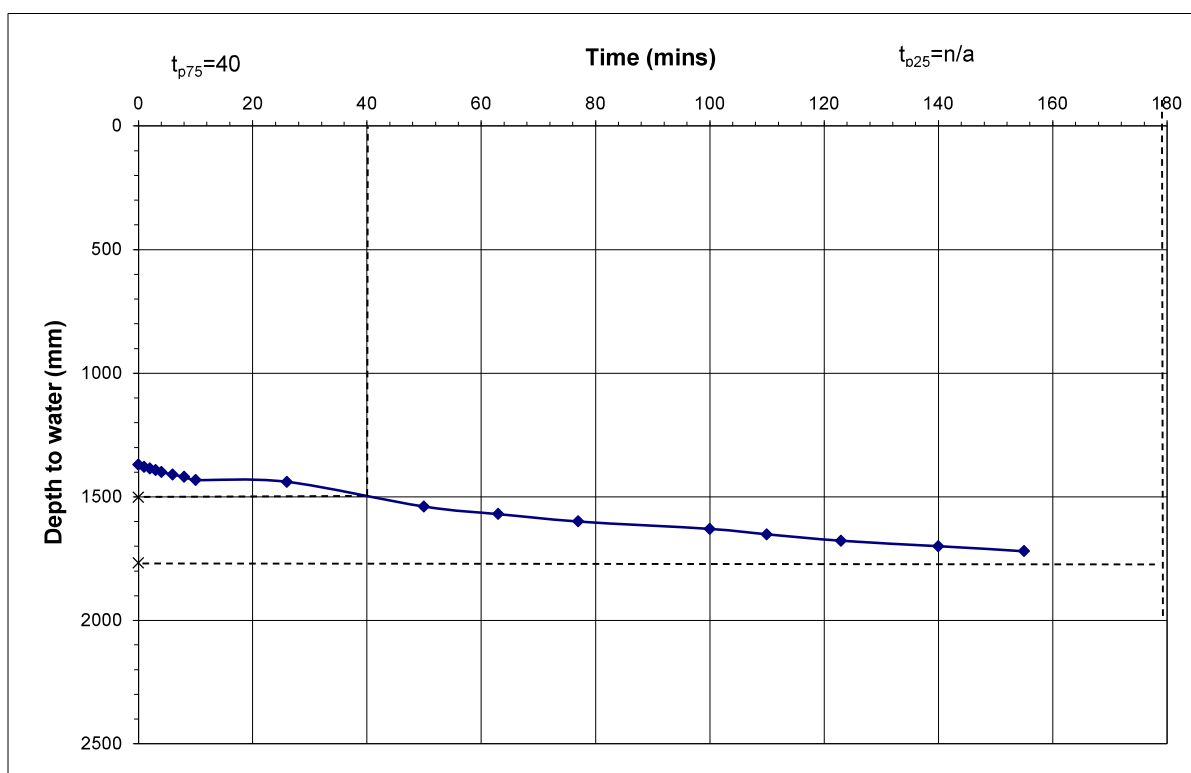
SOAKAWAY TRIAL PIT			
Dimensions		(m)	(mm)
Length	=	2.20	2200
Width	=	1.20	1200
Depth	=	1.90	1900

Effective depth (empty)		mm	m
75%	=	1767.50	1.7675
50%	=	1635.00	1.635
25%	=	1502.50	1.5025

Depth at start of test (mm)	=	1370
Depth at end of test (mm)	=	1900

Base area of pit	=	2.64
a_{p50} - 50% internal surface area inc. base	=	4.442
V_{p75-25} - Volume 75 - 25%	=	0.6996

Read from the graph:		
t_{p75} (min)	=	40
t_{p25} (min)	=	



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

11.4 Compaction Tests

11.4.1 The sample of the dark grey made ground was scheduled for laboratory compaction testing (using a 4.5kg rammer) and particle size distribution analysis to determine their suitability for re-engineering.

11.4.2 The results are summarised in the Tables below:

Sample location & depth	Material description	% passing 37.5mm sieve	% passing 20mm sieve
TP6 – 0.8m	MG: Dark Grey	95	83

Sample location & depth	G _s (Mg/m ³)	MDD (Mg/m ³)	OMC (%)	Allowable mc range for 95% MDD & <5% air voids	In-situ moisture content (%)
TP6 – 0.8m	2.59	1.91	11	14-15.7	20.1

11.4.3 It is apparent that the in-situ moisture content of the sample of dark grey made ground tested, is generally greater the allowable moisture content range to achieve 95% Maximum Dry Density (MDD) and <5% air voids.

11.4.4 The natural moisture content of a second sample of dark grey made ground submitted for laboratory analysis was recorded at between 15-16%, which is near to the maximum allowable moisture content range for 95% MDD and <5% air voids.

11.5 California Bearing Ratio (CBR)

11.5.1 CBR tests were commissioned on two remoulded samples (TP6 – 0.8m and TP11 – 2.1m) of dark grey made ground, at natural moisture contents.

11.5.2 CBR Tests on the two remoulded samples returned mean CBR values of 1.2% and 1.4%.

11.6 In-Situ Soakaway Tests

11.6.1 The in-situ soakaway tests were undertaken by ALM in general accordance with BRE Digest 365:2016. Further guidance/explanatory notes are presented in Appendix A.

11.6.2 The in-situ soakaway tests were undertaken on the 28th January 2021. Trial pits in which the soakaway tests were to be conducted, were excavated in the vicinity of 5No. locations (SA1-SA5) highlighted by the structural engineer. The exact locations were adjusted by the engineer to account for only 60m of delivery hose from the water tanker being available, and the tanker being located in a central location on the car park area. Locations of the soakaway pits are shown on Drawing No.30257-5 in Appendix B.

11.6.3 Soakaway tests were conducted in natural strata beneath the site. This created a degree of difficulty relating to the presence of deep made ground in some areas of the site requiring excavation through the made ground to significant depth in order to conduct the test. This also introduced additional instability and frequent small collapse of the test pits.

11.6.4 Soakaway pit SA2 was not performed due to an extensive buried concrete slab being encountered in 3No. trial pits excavated in the proposed location.

11.6.5 Water was rapidly pumped into each Soakaway Test Pit from a 16,000ltr water tanker, to a level below the base of made ground. Water levels were recorded at regular time intervals within the soakaway pits, by means of an electronic dip meter.

- 11.6.6 In order to calculate the corresponding soil infiltrating rate for each soakaway test, the time taken for water levels to reach 25% full is required to be recorded. Where the 25% full level was marginally not achieved, infiltration rates were extrapolated. Due to time constraints during the day, some of the pits were refilled prior to achieving 25% full, in order to allow a second test.
- 11.6.7 On completion of the first test, each test pit was again rapidly refilled with clean water with the water levels recorded at regular time intervals until water levels reached 25% full.
- 11.6.8 The results of the soakaway tests are included in Appendix G to this report and summarised in the table below.

Summary of In Situ Soakaway Tests

Test Pit	Test No.	Time Taken to Reach (minutes)		Soil Infiltration rate (m/sec)
		75% Full	25% Full	
SA1	1	15	n/a	n/a
SA3	1	5	41	1.00×10^{-4}
	2	19	97	4.63×10^{-5}
SA4*	1	16	260	1.12×10^{-5}
	2	42	352	8.59×10^{-6}
SA5*	1	20	150	2.01×10^{-5}
	2	40	200	1.64×10^{-5}

*Extrapolated

- 11.6.9 Significant variation in the soil infiltration rates between Soakaway Test Pits was observed. In Test Pit SA1, the time for water levels to reach 75% full took 15 minutes, however, infiltration slowed significantly when the water level reached 2.1m. This could be explained by a change in strata within the trial pit from sand and gravel strata to fine to medium sand.
- 11.6.10 Infiltration rates in the second tests in both SA3 and SA4 where an order of magnitude slower than the first tests.
- 11.6.11 The presence of fine to medium sand within the soakaway test pits appeared reduce soil infiltration rates, with the fastest infiltration rate being recorded in SA3 where no fine to medium sand strata was recorded.

12 GEOTECHNICAL ISSUES

12.1 Conceptual Site Model

- 12.1.1 The site is underlain by a veneer of granular made ground which is typically between 1m to 2m deep, but ranges from 0.6m thick in the north, to a maximum of 3.1m in the southwest.
- 12.1.2 A buried concrete slab was encountered between depths of 1.0m and 1.4m in a number of locations in the southern central parts of the site, which may present obstruction to future foundations and service connections. Buried obstructions should be removed where they conflict with proposed structures at the site.
- 12.1.3 The site is generally flat, therefore significant reprofiling of site levels is not anticipated.
- 12.1.4 A moderately steep embankment slope is present along the northwest edge of the site. The slope is approximately 3m high at its highest in the north, and retained at its base by a shallow (circa 600mm high) retaining wall. The integrity of the retaining wall should be confirmed prior to development.

12.2 Foundation Recommendations

General

- 12.2.1 The proposed commercial development will comprise 4No. commercial buildings housing 14No. business units, as shown on Northern Trust Drawing No.WJ131-0050_RevE in Appendix B. The buildings are anticipated to be of light weight steel frame construction.
- 12.2.2 Made ground is not considered a suitable foundation material and foundations should therefore be taken through these materials into underlying strata of adequate bearing capacity.
- 12.2.3 Standard Penetration Tests (SPT's) have reported N-values between 7 and 21 in natural granular strata, which suggest that natural strata will offer a safe bearing capacity of at least 70kN/m².
- 12.2.4 Sub-surface concrete in contact with the made and natural ground should be Design Sulphate Class DS-1, with the site allocated an ACEC Classification of AC-1.

Strip/Trench Fill Footings

- 12.2.5 It is considered that strip footings/trench fill are suitable foundation solution for proposed buildings
- 12.2.6 Where the ground is found to comprise varying and significant amounts of coarse granular (cobbly/bouldery) or varying soil types, reinforcement of footings is recommended as a precaution against differential settlement.
- 12.2.7 Reinforcement, as a precaution against differential settlement, is recommended only where foundation excavations encounter significant lateral and vertical variations in strata.

Vibro Foundations

- 12.2.8 As an alternative to strip/trench fill foundations, foundations seated on vibro improved ground may be considered a possible foundation solution for proposed buildings. However, the suitability of the made ground for vibro ground improvement should be confirmed by a vibro contractor.

12.2.9 The specialist contractor should also provide:

- a detailed schedule of work
- a programme
- an indication of what tests are to be carried out on completion of the work, and who will be responsible for these tests
- the layout and depth of stone columns, and the accuracy to be achieved
- the factor of safety incorporated into the design
- the criteria for non-acceptance of the vibrating poker work
- calculations and case histories to justify the ground improvement proposals
- the layout of the stone columns
- details of the equipment and process

12.2.10 The ground beneath proposed roads & services may also be improved by vibro.

12.3 Excavations

12.3.1 Based on the results of the investigation it is unlikely that major groundwater flows will be encountered in shallow excavations.

12.3.2 Excavations in made ground and natural ground will be unstable in the short term and if left open for any significant period of time, may require shoring.

12.4 Drainage

12.4.1 Soakaway drainage tests have determined infiltration rates between 1.00×10^{-4} and 8.59×10^{-6} in natural granular strata beneath the site. Therefore, consideration should be given to a soakaway drainage solution for surface water runoff from the proposed development.

12.4.2 The presence of fine to medium sand within the soakaway test pits appeared reduce soil infiltration rates. Therefore, effort should be made to locate any soakaway drainage solution within natural sand and gravel deposits rather than fine to medium sands.

12.5 Highways/Pavements

12.5.1 Where made ground is present, consideration should be given to the excavation of the full thickness (up to a maximum of 2m) of made ground with subsequent screening, selection and replacement (in accordance with Series 600) of suitable material in engineered layers in order to provide a uniform subgrade for proposed pavement areas. Replaced made ground could also be improved by vibro techniques, subject to suitability. Unsuitable materials include soft or wet materials, biodegradables including topsoil, wood, scrap metal, frozen material and oversize.

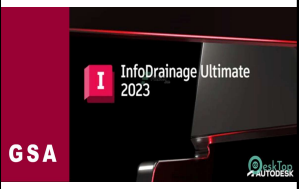
12.5.2 Any residual made ground materials in the base of the excavation (i.e. in areas where the thickness of made ground exceeds 2m) should be inspected and (where necessary) any soft spots removed and replaced with suitable engineered fill.

12.5.3 Where the granular made ground is re-engineered it is considered that a CBR value of 1% should be achievable.

12.5.4 Crushing of demolition\hardstand\foundation arisings will generate aggregate, which (subject to confirmatory testing) should be suitable for use as unbound pavement materials within the highways, although granular made ground present beneath the majority of the site, is considered likely to be suitable for re-engineering.

12.5.5 Tarmac materials could be re-used beneath road and pavement areas within the proposed development, subject to appropriate approval.

APPENDIX 'D' – Soakaway Design

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024 Designed by: L.Edwards Checked by: I.Schofield Approved By: G.Schofield	
Report Details: Type: Network Design Criteria Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF	

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

FSR

Type: FSR

Return Period (years)	100.0
Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.300

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Backdrop (m)	0.000
Max. Backdrop (m)	0.000
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☒
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☒
--------------	-------------------------------------

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Title: Rainfall Analysis Criteria	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	150
Perform No Discharge Analysis	☐

Rainfall		
FSR		Type: FSR
Region	England And Wales	
M5-60 (mm)	20.0	
Ratio R	0.300	
Summer	☒	
Winter	☒	

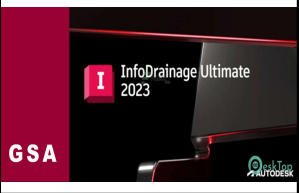
Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
2.0	0.000
30.0	0.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



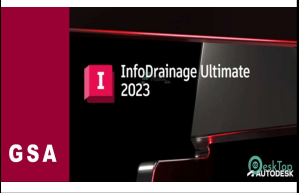
Soakaway 7
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	1.6	0.033	0.119	0.000	0.9	0.0	0.0	0.9
10	7.2	0.150	0.540	0.000	7.6	0.0	0.1	7.7
15	1.9	0.350	1.262	0.000	0.8	0.0	0.3	1.1
20	0.0	0.399	1.440	0.000	0.0	0.0	0.4	0.4
25	0.0	0.368	1.324	0.000	0.0	0.0	0.4	0.3
30	0.0	0.340	1.226	0.000	0.0	0.0	0.3	0.3

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



Infiltration Trench A
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Tables

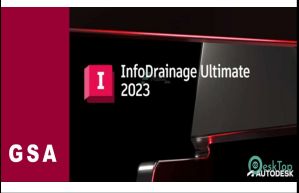
Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	IT1(L/s)	SA7(L/s)	SA8(L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	2.5	0.017	0.000	0.073	0.000	0.0	0.0	0.0
10	11.3	0.037	0.000	0.158	0.000	0.0	0.0	0.0
15	2.9	0.019	0.000	0.086	0.000	0.0	0.0	0.0
20	0.1	0.006	0.000	0.029	0.000	0.0	0.0	0.0
25	0.0	0.002	0.000	0.010	0.000	0.0	0.0	0.0
30	0.0	0.002	0.000	0.008	0.000	0.0	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



Time (mins)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.0
5	0.0	0.0
10	0.1	0.1
15	0.0	0.0
20	0.0	0.0
25	0.0	0.0
30	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



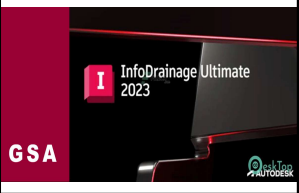
Soakaway 8
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	2.4	0.041	0.146	0.000	1.6	0.0	0.0	1.6
10	11.1	0.186	0.669	0.000	13.0	0.0	0.2	13.2
15	2.9	0.452	1.627	0.000	1.7	0.0	0.4	2.1
20	0.1	0.513	1.849	0.000	0.0	0.0	0.5	0.5
25	0.0	0.470	1.694	0.000	0.0	0.0	0.5	0.5
30	0.0	0.550	1.982	0.000	0.0	0.0	0.5	0.5

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



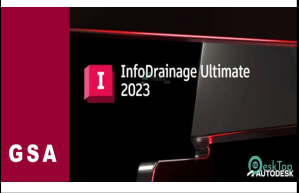
Soakaway 12
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SA12(L/s)	IT2(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	1.9	0.029	0.105	0.000	-0.7	1.4	0.0	0.7
10	12.2	0.128	0.461	0.000	-6.3	5.0	0.1	-1.2
15	1.6	0.202	0.728	0.000	0.0	5.6	0.2	5.8
20	12.7	0.167	0.600	0.000	-12.6	5.3	0.2	-7.1
25	8.0	0.092	0.331	0.000	-8.0	4.5	0.1	-3.5
30	3.2	0.043	0.156	0.000	-3.2	2.1	0.0	-1.1

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



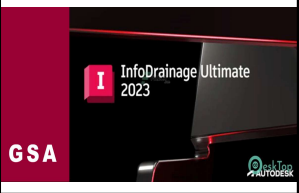
Soakaway 13
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0
5	2.5	0.091	0.327	0.000	-1.2	0.1	-1.2
10	11.7	0.645	2.321	0.000	-5.8	0.6	-5.2
15	3.3	1.215	4.373	0.000	-1.7	1.2	-0.6
20	0.2	1.241	4.470	0.000	-0.2	1.2	1.0
25	0.0	1.146	4.126	0.000	0.0	1.1	1.1
30	0.0	1.056	3.802	0.000	0.0	1.0	1.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



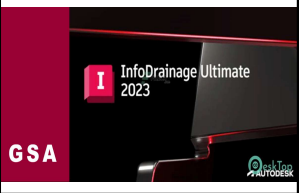
Soakaway 15
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0
5	0.0	0.000	0.000	0.000	0.0	0.0
10	0.0	0.000	0.000	0.000	0.0	0.0
15	0.0	0.000	0.000	0.000	0.0	0.0
20	0.0	0.000	0.000	0.000	0.0	0.0
25	0.0	0.000	0.000	0.000	0.0	0.0
30	0.0	0.000	0.000	0.000	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



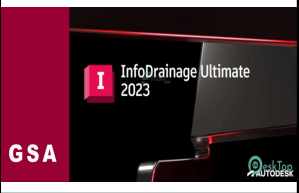
Infiltration Trench B
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Tables

Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	2.4	0.023	0.000	0.080	0.000	0.0	0.0	0.0
10	11.0	0.052	0.000	0.185	0.000	0.0	0.1	0.1
15	2.9	0.027	0.000	0.096	0.000	0.0	0.0	0.0
20	0.1	0.008	0.000	0.033	0.000	0.0	0.0	0.0
25	0.0	0.002	0.000	0.009	0.000	0.0	0.0	0.0
30	0.0	0.002	0.000	0.007	0.000	0.0	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



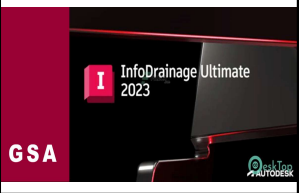
Infiltration Trench C
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Tables

Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	1.3	0.014	0.000	0.039	0.000	0.0	0.0	0.0
10	6.0	0.031	0.000	0.089	0.000	0.0	0.0	0.0
15	1.6	0.016	0.000	0.050	0.000	0.0	0.0	0.0
20	0.0	0.005	0.000	0.019	0.000	0.0	0.0	0.0
25	0.0	0.002	0.000	0.009	0.000	0.0	0.0	0.0
30	0.0	0.001	0.000	0.007	0.000	0.0	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



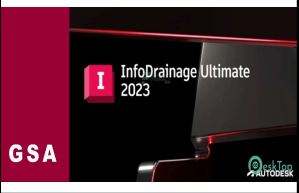
Soakaway 7
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	3.9	0.067	0.241	0.000	2.5	0.0	0.1	2.6
10	17.4	0.361	1.302	0.000	0.0	0.0	0.4	0.4
15	8.6	1.111	3.998	0.000	-4.5	0.0	1.1	-3.4
20	18.9	1.091	3.928	0.000	-8.7	0.0	1.1	-7.6
25	0.2	1.145	4.126	0.000	0.0	0.0	1.1	1.2
30	0.0	1.166	4.197	0.000	0.0	0.0	1.1	1.1

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



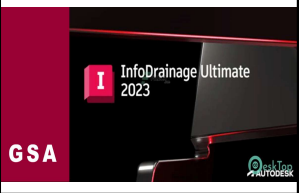
Infiltration Trench A
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Tables

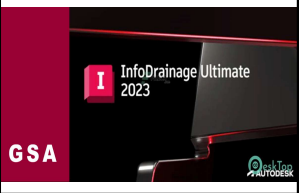
Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	IT1(L/s)	SA7(L/s)	SA8(L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	6.0	0.027	0.000	0.115	0.000	0.0	0.0	0.0
10	27.2	0.064	0.000	0.276	0.000	0.0	0.0	0.0
15	6.3	0.029	0.000	0.126	0.000	0.0	0.0	0.0
20	2.4	0.021	0.018	0.169	0.000	0.8	-0.5	0.0
25	0.0	0.003	0.007	0.043	0.000	0.1	0.0	0.0
30	0.0	0.002	0.003	0.024	0.000	0.0	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



Time (mins)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.0
5	0.0	0.0
10	0.1	0.1
15	0.0	0.0
20	0.1	0.3
25	0.0	0.1
30	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



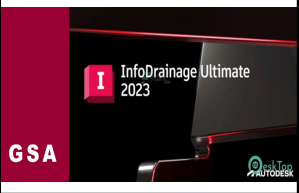
Soakaway 8
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	6.0	0.082	0.294	0.000	4.3	0.0	0.1	4.4
10	28.7	0.670	2.413	0.000	203.6	0.0	0.7	204.3
15	12.6	2.087	7.518	0.000	-6.4	0.0	2.1	-4.4
20	6.7	2.140	7.706	0.000	-2.8	0.0	2.1	-0.7
25	0.1	2.103	7.574	0.000	0.0	0.0	2.1	2.0
30	0.0	2.085	7.509	0.000	0.0	0.0	2.1	2.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



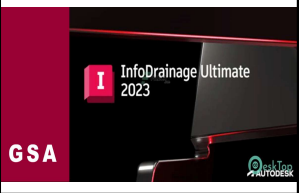
Soakaway 12
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SA12(L/s)	IT2(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	4.0	0.062	0.223	0.000	-0.9	2.9	0.1	2.1
10	14.5	0.359	1.293	0.000	0.8	6.5	0.4	7.7
15	3.3	0.558	2.010	0.000	0.0	8.7	0.5	9.3
20	7.6	0.438	1.577	0.000	-7.6	7.7	0.4	0.5
25	9.3	0.338	1.219	0.000	-9.3	6.8	0.3	-2.2
30	12.3	0.256	0.922	0.000	-12.3	6.1	0.3	-5.9

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



Soakaway 13
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0
5	6.2	0.235	0.847	0.000	-3.1	0.2	-2.9
10	28.4	1.582	5.695	0.000	-14.3	1.6	-12.7
15	4.0	2.360	8.496	0.000	1.3	2.3	3.6
20	1.1	2.316	8.339	0.000	-0.7	2.3	1.6
25	0.9	2.206	7.943	0.000	-0.9	2.2	1.3
30	0.0	2.086	7.511	0.000	0.0	2.1	2.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



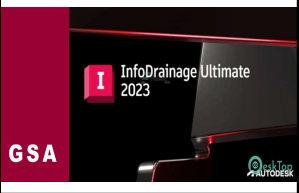
Soakaway 15
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0
5	0.0	0.000	0.000	0.000	0.0	0.0
10	0.0	0.000	0.000	0.000	0.0	0.0
15	0.0	0.000	0.000	0.000	0.0	0.0
20	0.0	0.000	0.000	0.000	0.0	0.0
25	0.0	0.000	0.000	0.000	0.0	0.0
30	0.0	0.000	0.000	0.000	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



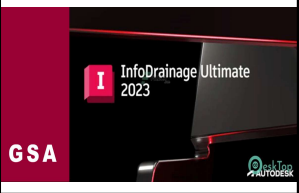
Infiltration Trench B
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Tables

Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	5.9	0.037	0.000	0.128	0.000	0.0	0.0	0.0
10	26.6	0.187	0.000	0.668	0.000	0.0	0.2	0.2
15	6.1	0.041	0.000	0.519	0.000	0.0	0.2	0.2
20	0.0	0.011	0.000	0.377	0.000	0.0	0.1	0.1
25	0.0	0.003	0.000	0.314	0.000	0.0	0.1	0.1
30	0.0	0.002	0.000	0.281	0.000	0.0	0.1	0.1

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



Infiltration Trench C
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Tables

Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	3.2	0.022	0.000	0.063	0.000	0.0	0.0	0.0
10	14.5	0.051	0.000	0.148	0.000	0.0	0.1	0.1
15	4.6	0.226	0.135	1.668	0.000	0.0	0.6	0.6
20	0.0	0.189	0.209	1.712	0.000	0.0	0.6	0.6
25	0.0	0.080	0.194	1.296	0.000	0.0	0.5	0.5
30	0.0	0.003	0.180	0.971	0.000	0.0	0.3	0.3

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



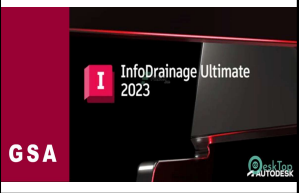
Soakaway 7
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	7.1	0.106	0.383	0.000	4.9	0.0	0.1	5.0
10	32.1	0.581	2.093	0.000	3.2	0.0	0.6	3.8
15	8.0	2.354	8.474	0.000	-0.6	0.0	2.3	1.7
20	5.7	2.403	8.650	0.000	-5.0	0.0	2.4	-2.6
25	1.7	2.357	8.487	0.000	0.0	0.0	2.3	2.3
30	17.3	2.343	8.438	0.000	-16.0	0.0	2.3	-13.7

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



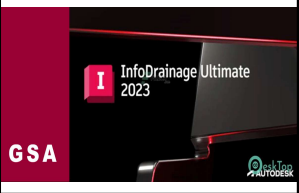
Infiltration Trench A
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Tables

Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	IT1(L/s)	SA7(L/s)	SA8(L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	11.0	0.037	0.000	0.158	0.000	0.0	0.0	0.0
10	50.2	0.309	0.000	1.631	0.000	0.0	0.0	0.0
15	19.3	0.303	0.167	5.993	0.000	12.1	5.6	0.0
20	1.1	0.227	0.278	5.349	0.000	0.6	0.0	0.0
25	0.7	0.158	0.259	4.637	0.000	0.0	0.0	0.0
30	0.5	0.154	0.245	4.320	0.000	9.7	9.3	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



Time (mins)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.0
5	0.1	0.1
10	0.6	0.6
15	2.1	19.7
20	1.9	2.5
25	1.6	1.6
30	1.5	20.5

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		





Soakaway 8
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Winter

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	0.1	0.002	0.006	0.000	0.0	0.0	0.0	0.0
10	0.1	0.006	0.020	0.000	-0.1	0.0	0.0	-0.1
15	0.3	0.013	0.044	0.000	-0.1	0.0	0.0	0.0
20	0.7	0.023	0.079	0.000	-0.3	0.0	0.0	-0.3
25	0.4	0.030	0.108	0.000	0.1	0.0	0.0	0.1
30	0.4	0.038	0.135	0.000	0.0	0.0	0.0	0.0
35	0.5	0.050	0.179	0.000	0.0	0.0	0.0	0.1
40	0.5	0.055	0.197	0.000	1.0	0.0	0.1	1.1
45	0.6	0.061	0.218	0.000	0.4	0.0	0.1	0.4
50	0.6	0.080	0.286	0.000	0.0	0.0	0.1	0.1
55	3.0	0.100	0.362	0.000	4.8	0.0	0.1	4.9
60	0.6	0.141	0.508	0.000	0.0	0.0	0.1	0.2
65	0.7	0.145	0.522	0.000	15.8	0.0	0.1	16.0
70	6.0	0.163	0.587	0.000	7.4	0.0	0.2	7.5
75	0.7	0.195	0.703	0.000	0.0	0.0	0.2	0.2
80	0.7	0.235	0.845	0.000	0.0	0.0	0.2	0.3
85	0.7	0.272	0.976	0.000	0.0	0.0	0.3	0.3
90	0.7	0.284	1.020	0.000	0.0	0.0	0.3	0.3
95	0.7	0.319	1.147	0.000	0.0	0.0	0.3	0.3
100	0.8	0.352	1.266	0.000	0.0	0.0	0.3	0.4
105	0.8	0.382	1.377	0.000	0.0	0.0	0.4	0.4
110	0.8	0.411	1.479	0.000	0.0	0.0	0.4	0.4
115	0.8	0.437	1.574	0.000	0.0	0.0	0.4	0.5
120	0.8	0.461	1.661	0.000	0.0	0.0	0.5	0.5
125	0.8	0.483	1.741	0.000	0.0	0.0	0.5	0.5
130	0.8	0.504	1.811	0.000	0.0	0.0	0.5	0.5
135	0.8	0.413	1.487	0.000	84.3	0.0	0.4	84.7
140	0.8	0.310	1.117	0.000	0.0	0.0	0.3	0.3
145	0.8	0.346	1.245	0.000	0.0	0.0	0.3	0.4
150	0.8	0.378	1.360	0.000	0.0	0.0	0.4	0.4
155	0.8	0.407	1.464	0.000	0.0	0.0	0.4	0.4
160	0.8	0.433	1.560	0.000	0.0	0.0	0.4	0.5
165	0.8	0.458	1.649	0.000	0.0	0.0	0.5	0.5
170	0.8	0.481	1.733	0.000	0.0	0.0	0.5	0.5
175	0.8	0.503	1.810	0.000	0.0	0.0	0.5	0.5
180	29.3	0.504	1.814	0.000	-28.5	0.0	0.5	-28.0
185	0.8	0.396	1.426	0.000	0.0	0.0	0.4	0.4
190	0.8	0.309	1.113	0.000	0.0	0.0	0.3	0.3
195	0.8	0.349	1.257	0.000	0.0	0.0	0.3	0.4
200	0.8	0.387	1.393	0.000	0.0	0.0	0.4	0.4
205	0.9	0.306	1.103	0.000	0.0	0.0	0.3	0.3
210	0.9	0.350	1.260	0.000	0.0	0.0	0.3	0.4
215	0.9	0.394	1.417	0.000	0.0	0.0	0.4	0.4
220	0.9	0.319	1.148	0.000	0.0	0.0	0.3	0.3
225	1.0	0.368	1.326	0.000	0.0	0.0	0.4	0.3
230	1.0	0.299	1.076	0.000	0.0	0.0	0.3	0.3
235	1.0	0.354	1.274	0.000	0.0	0.0	0.3	0.4
240	1.0	0.391	1.408	0.000	9.3	0.0	0.4	9.7

2023.110: Sandbrook Park Rochdale OL11 1RY		Date: 23/01/2024		
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Designed by: L.Edwards	Checked by: I.Schofield	
		Approved By: G.Schofield		
		Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
245	1.1	0.352	1.267	0.000	0.0	0.0	0.3	0.4
250	1.1	0.414	1.491	0.000	0.0	0.0	0.4	0.4
255	1.2	0.359	1.293	0.000	0.0	0.0	0.4	0.4
260	1.2	0.393	1.417	0.000	0.0	0.0	0.4	0.4
265	1.3	0.319	1.147	0.000	0.0	0.0	0.3	0.3
270	1.3	0.397	1.431	0.000	0.0	0.0	0.4	0.4
275	1.4	0.350	1.260	0.000	0.0	0.0	0.3	0.4
280	1.5	0.436	1.569	0.000	0.0	0.0	0.4	0.4
285	1.5	0.391	1.409	0.000	0.0	0.0	0.4	0.4
290	1.6	0.343	1.235	0.000	0.0	0.0	0.3	0.4
295	1.7	0.443	1.596	0.000	0.0	0.0	0.4	0.4
300	1.7	0.401	1.444	0.000	0.0	0.0	0.4	0.4
305	1.8	0.358	1.288	0.000	0.0	0.0	0.4	0.4
310	1.9	0.474	1.705	0.000	0.0	0.0	0.5	0.4
315	1.9	0.438	1.576	0.000	0.0	0.0	0.4	0.4
320	2.0	0.398	1.432	0.000	0.0	0.0	0.4	0.4
325	2.0	0.698	2.511	0.000	0.0	0.0	0.7	0.7
330	2.2	0.490	1.765	0.000	0.0	0.0	0.5	0.5
335	2.2	0.470	1.691	0.000	0.0	0.0	0.5	0.4
340	2.4	0.451	1.622	0.000	0.0	0.0	0.4	0.4
345	2.4	0.436	1.569	0.000	0.0	0.0	0.4	0.4
350	2.5	0.428	1.540	0.000	0.0	0.0	0.4	0.4
355	2.5	0.422	1.519	0.000	0.0	0.0	0.4	0.4
360	2.7	0.424	1.525	0.000	0.0	0.0	0.4	0.4
365	2.7	0.434	1.561	0.000	0.0	0.0	0.4	0.5
370	2.9	0.451	1.624	0.000	0.0	0.0	0.4	0.5
375	2.9	0.478	1.720	0.000	0.0	0.0	0.5	0.5
380	3.1	0.511	1.841	0.000	0.0	0.0	0.5	0.5
385	3.1	0.391	1.408	0.000	0.0	0.0	0.4	0.4
390	3.2	0.445	1.602	0.000	0.0	0.0	0.4	0.5
395	3.3	0.624	2.247	0.000	0.0	0.0	0.6	0.6
400	3.4	0.657	2.365	0.000	0.0	0.0	0.6	0.7
405	3.5	0.838	3.019	0.000	0.0	0.0	0.8	0.8
410	3.5	1.068	3.847	0.000	0.0	0.0	1.1	1.1
415	3.6	1.268	4.564	0.000	0.0	0.0	1.2	1.3
420	3.7	1.457	5.246	0.000	0.0	0.0	1.4	1.5
425	3.8	1.638	5.897	0.000	0.0	0.0	1.6	1.6
430	3.8	1.810	6.518	0.000	0.0	0.0	1.8	1.8
435	3.9	1.947	7.012	0.000	0.0	0.0	1.9	1.9
440	4.0	2.125	7.650	0.000	0.0	0.0	2.1	2.1
445	4.1	2.218	7.986	0.000	0.0	0.0	2.2	2.2
450	4.1	2.206	7.944	0.000	0.0	0.0	2.2	2.1
455	4.2	2.201	7.926	0.000	0.0	0.0	2.2	2.1
460	14.5	2.223	8.002	0.000	-10.3	0.0	2.2	-8.1
465	4.5	2.232	8.035	0.000	-0.3	0.0	2.2	1.9
470	111.1	2.233	8.039	0.000	-106.8	0.0	2.2	-104.6
475	24.7	2.227	8.018	0.000	94.2	0.0	2.2	96.4
480	4.3	2.351	8.467	0.000	0.0	0.0	2.3	2.3
485	4.3	2.328	8.383	0.000	0.0	0.0	2.3	2.3
490	4.3	2.363	8.510	0.000	0.0	0.0	2.3	2.4
495	4.3	2.375	8.552	0.000	5.5	0.0	2.3	7.9
500	4.3	2.373	8.544	0.000	23.6	0.0	2.3	26.0
505	4.2	2.377	8.555	0.000	0.0	0.0	2.3	2.3
510	6.7	2.397	8.631	0.000	-2.5	0.0	2.4	-0.1
515	4.1	2.405	8.659	0.000	0.0	0.0	2.4	2.4
520	4.0	2.412	8.684	0.000	0.4	0.0	2.4	2.8
525	4.0	2.411	8.682	0.000	0.0	0.0	2.4	2.3

2023.110: Sandbrook Park Rochdale OL11 1RY		Date: 23/01/2024		
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Designed by: L.Edwards	Checked by: I.Schofield	
		Approved By: G.Schofield		
		Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		 

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
530	18.7	2.431	8.753	0.000	-14.7	0.0	2.4	-12.3
535	12.7	2.391	8.609	0.000	-8.9	0.0	2.4	-6.5
540	3.8	2.429	8.746	0.000	2.0	0.0	2.4	4.4
545	14.8	2.431	8.753	0.000	-11.1	0.0	2.4	-8.7
550	3.6	2.456	8.843	0.000	0.0	0.0	2.4	2.4
555	3.5	2.456	8.843	0.000	0.0	0.0	2.4	2.4
560	3.5	2.464	8.868	0.000	0.0	0.0	2.4	2.4
565	4.4	2.464	8.871	0.000	2.1	0.0	2.4	4.5
570	4.4	2.476	8.916	0.000	0.0	0.0	2.4	2.4
575	3.5	2.474	8.904	0.000	0.0	0.0	2.4	2.4
580	3.1	2.474	8.907	0.000	0.0	0.0	2.4	2.5
585	11.2	2.475	8.908	0.000	9.9	0.0	2.4	12.3
590	16.8	2.490	8.965	0.000	-13.9	0.0	2.5	-11.4
595	2.9	2.479	8.925	0.000	0.8	0.0	2.4	3.2
600	2.7	2.498	8.997	0.000	0.0	0.0	2.5	2.5
605	2.9	2.471	8.897	0.000	0.0	0.0	2.4	2.5
610	2.6	2.482	8.937	0.000	0.0	0.0	2.4	2.5
615	2.9	2.457	8.845	0.000	0.4	0.0	2.4	2.8
620	4.2	2.440	8.783	0.000	0.0	0.0	2.4	2.4
625	49.0	2.450	8.817	0.000	-46.7	0.0	2.4	-44.2
630	2.2	2.428	8.745	0.000	0.0	0.0	2.4	2.4
635	2.2	2.457	8.845	0.000	0.0	0.0	2.4	2.4
640	2.8	2.416	8.698	0.000	0.0	0.0	2.4	2.3
645	2.0	2.406	8.661	0.000	0.0	0.0	2.4	2.3
650	16.4	2.422	8.719	0.000	-14.5	0.0	2.4	-12.1
655	29.9	2.418	8.705	0.000	-25.4	0.0	2.4	-23.0
660	2.0	2.386	8.592	0.000	0.0	0.0	2.3	2.3
665	1.7	2.390	8.605	0.000	0.0	0.0	2.4	2.3
670	31.4	2.378	8.560	0.000	-27.5	0.0	2.3	-25.1
675	5.2	2.388	8.599	0.000	7.2	0.0	2.4	9.6
680	1.5	2.352	8.472	0.000	0.0	0.0	2.3	2.3
685	1.5	2.467	8.884	0.000	0.0	0.0	2.4	2.4
690	12.5	2.333	8.403	0.000	21.5	0.0	2.3	23.8
695	1.3	2.365	8.515	0.000	0.6	0.0	2.3	2.9
700	1.3	2.340	8.424	0.000	6.6	0.0	2.3	8.9
705	1.2	2.375	8.551	0.000	0.0	0.0	2.3	2.4
710	7.1	2.181	7.853	0.000	0.0	0.0	2.1	2.1
715	17.8	2.259	8.153	0.030	-13.6	0.0	2.2	-11.4
720	1.1	2.246	8.086	0.000	75.4	0.0	2.2	77.6
725	3.9	2.257	8.124	0.000	0.0	0.0	2.2	2.2
730	2.6	2.225	8.010	0.000	0.0	0.0	2.2	2.2
735	1.0	2.249	8.098	0.000	0.0	0.0	2.2	2.2
740	1.0	2.239	8.061	0.000	0.0	0.0	2.2	2.2
745	5.6	1.999	7.196	0.000	0.0	0.0	2.0	2.0
750	1.8	1.691	6.089	0.000	0.0	0.0	1.7	1.7
755	11.0	1.127	4.059	0.000	30.9	0.0	1.1	32.0
760	10.9	1.015	3.654	0.000	-10.0	0.0	1.0	-9.0
765	108.3	0.979	3.525	0.000	-1.2	0.0	1.0	-0.3
770	114.0	1.223	4.402	0.000	-109.7	0.0	1.2	-108.5
775	253.9	1.690	6.085	0.000	-244.2	0.0	1.7	-242.5
780	0.8	1.370	4.933	0.000	23.6	0.0	1.3	25.0
785	0.8	1.238	4.456	0.000	0.0	0.0	1.2	1.2
790	0.8	1.202	4.330	0.000	0.0	0.0	1.2	1.2
795	74.8	1.225	4.409	0.000	265.4	0.0	1.2	266.6
800	0.8	1.385	4.987	0.000	0.0	0.0	1.4	1.4
805	0.8	1.129	4.065	0.000	0.0	0.0	1.1	1.1
810	0.8	1.103	3.972	0.000	0.0	0.0	1.1	1.1

2023.110: Sandbrook Park Rochdale OL11 1RY		Date: 23/01/2024			
		Designed by: L.Edwards	Checked by: I.Schofield		Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF			

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
815	0.8	1.080	3.887	0.000	0.0	0.0	1.1	1.0
820	0.8	1.058	3.811	0.000	0.0	0.0	1.0	1.0
825	0.8	1.037	3.738	0.000	0.0	0.0	1.0	1.0
830	0.8	1.019	3.671	0.000	0.0	0.0	1.0	1.0
835	0.8	1.002	3.609	0.000	0.0	0.0	1.0	1.0
840	0.8	0.986	3.552	0.000	0.0	0.0	1.0	0.9
845	0.8	0.971	3.499	0.000	0.0	0.0	1.0	0.9
850	0.8	0.958	3.450	0.000	0.0	0.0	0.9	0.9
855	0.8	0.945	3.406	0.000	0.0	0.0	0.9	0.9
860	0.8	0.934	3.364	0.000	0.0	0.0	0.9	0.9
865	0.8	0.923	3.327	0.000	0.0	0.0	0.9	0.9
870	0.8	0.913	3.290	0.000	0.0	0.0	0.9	0.9
875	0.8	0.903	3.254	0.000	0.0	0.0	0.9	0.9
880	0.8	0.893	3.218	0.000	0.0	0.0	0.9	0.9
885	0.7	0.883	3.182	0.000	0.0	0.0	0.9	0.8
890	0.7	0.873	3.146	0.000	0.0	0.0	0.9	0.8
895	0.7	0.863	3.108	0.000	0.0	0.0	0.8	0.8
900	0.7	0.852	3.068	0.000	0.0	0.0	0.8	0.8
905	0.7	0.839	3.024	0.000	0.0	0.0	0.8	0.8
910	0.6	0.826	2.976	0.000	0.0	0.0	0.8	0.8
915	0.6	0.811	2.923	0.000	0.0	0.0	0.8	0.8
920	0.6	0.795	2.865	0.000	0.0	0.0	0.8	0.8
925	0.5	0.751	2.705	0.000	0.0	0.0	0.7	0.8
930	0.5	0.305	1.097	0.000	0.0	0.0	0.3	0.3
935	0.4	0.313	1.127	0.000	0.0	0.0	0.3	0.3
940	0.4	0.320	1.152	0.000	0.0	0.0	0.3	0.3
945	0.3	0.321	1.158	0.000	0.0	0.0	0.3	0.3
950	0.2	0.317	1.142	0.000	0.0	0.0	0.3	0.3
955	0.1	0.306	1.105	0.000	0.0	0.0	0.3	0.3
960	0.1	0.290	1.045	0.000	0.0	0.0	0.3	0.3
965	0.0	0.272	0.981	0.000	0.0	0.0	0.3	0.2
970	0.0	0.252	0.912	0.000	0.0	0.0	0.2	0.2
975	0.0	0.235	0.848	0.000	0.0	0.0	0.2	0.2
980	0.0	0.218	0.789	0.000	0.0	0.0	0.2	0.2
985	0.0	0.203	0.735	0.000	0.0	0.0	0.2	0.2
990	0.0	0.190	0.685	0.000	0.0	0.0	0.2	0.2
995	0.0	0.177	0.639	0.000	0.0	0.0	0.2	0.1
1000	0.0	0.165	0.597	0.000	0.0	0.0	0.2	0.1
1005	0.0	0.154	0.558	0.000	0.0	0.0	0.2	0.1
1010	0.0	0.145	0.522	0.000	0.0	0.0	0.1	0.1
1015	0.0	0.135	0.489	0.000	0.0	0.0	0.1	0.1
1020	0.0	0.127	0.459	0.000	0.0	0.0	0.1	0.1
1025	0.0	0.119	0.431	0.000	0.0	0.0	0.1	0.1
1030	0.0	0.112	0.405	0.000	0.0	0.0	0.1	0.1
1035	0.0	0.103	0.373	0.000	0.0	0.0	0.1	0.1
1040	0.0	0.091	0.327	0.000	0.2	0.0	0.1	0.3
1045	0.0	0.082	0.297	0.000	0.2	0.0	0.1	0.3
1050	0.0	0.074	0.266	0.000	0.0	0.0	0.1	0.0
1055	0.0	0.065	0.236	0.000	0.0	0.0	0.1	0.0
1060	0.0	0.059	0.212	0.000	0.0	0.0	0.1	0.0
1065	0.0	0.053	0.192	0.000	0.0	0.0	0.1	0.0
1070	0.0	0.049	0.178	0.000	0.0	0.0	0.0	0.0
1075	0.0	0.049	0.178	0.000	0.0	0.0	0.0	0.0
1080	0.0	0.050	0.183	0.000	0.0	0.0	0.0	0.1
1085	0.0	0.050	0.183	0.000	0.0	0.0	0.1	0.1
1090	0.0	0.045	0.163	0.000	0.1	0.0	0.0	0.1
1095	0.0	0.041	0.148	0.000	0.0	0.0	0.0	0.1

2023.110: Sandbrook Park Rochdale OL11 1RY		Date: 23/01/2024		
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Designed by: L.Edwards	Checked by: I.Schofield	
		Approved By: G.Schofield		
		Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		 

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
1100	0.0	0.046	0.165	0.000	0.0	0.0	0.0	0.1
1105	0.0	0.050	0.180	0.000	0.0	0.0	0.0	0.1
1110	0.0	0.050	0.180	0.000	0.0	0.0	0.0	0.0
1115	0.0	0.046	0.166	0.000	0.0	0.0	0.0	0.0
1120	0.4	0.046	0.167	0.000	-0.4	0.0	0.0	-0.3
1125	0.0	0.048	0.172	0.000	0.0	0.0	0.0	0.0
1130	0.0	0.051	0.184	0.000	0.0	0.0	0.1	0.1
1135	0.0	0.047	0.169	0.000	0.1	0.0	0.0	0.1
1140	0.0	0.043	0.154	0.000	0.0	0.0	0.0	0.1
1145	0.0	0.042	0.152	0.000	0.0	0.0	0.0	0.1
1150	0.3	0.048	0.173	0.000	-0.3	0.0	0.0	-0.2
1155	0.0	0.052	0.189	0.000	0.0	0.0	0.1	0.1
1160	0.0	0.050	0.182	0.000	0.0	0.0	0.0	0.0
1165	0.0	0.052	0.187	0.000	0.0	0.0	0.1	0.1
1170	0.0	0.048	0.172	0.000	0.0	0.0	0.0	0.0
1175	0.3	0.051	0.183	0.000	-0.3	0.0	0.0	-0.3
1180	0.0	0.047	0.168	0.000	0.2	0.0	0.0	0.3
1185	0.0	0.046	0.165	0.000	0.0	0.0	0.0	0.1
1190	0.0	0.045	0.164	0.000	0.0	0.0	0.0	0.0
1195	0.4	0.048	0.173	0.000	-0.4	0.0	0.0	-0.3
1200	0.0	0.045	0.161	0.000	0.0	0.0	0.0	0.0
1205	0.0	0.045	0.164	0.000	0.0	0.0	0.0	0.1
1210	0.0	0.047	0.168	0.000	0.0	0.0	0.0	0.0
1215	0.0	0.043	0.155	0.000	0.1	0.0	0.0	0.1
1220	0.0	0.047	0.166	0.000	0.0	0.0	0.0	0.1
1225	0.0	0.047	0.169	0.000	0.0	0.0	0.0	0.0
1230	0.0	0.047	0.168	0.000	0.0	0.0	0.0	0.0
1235	0.0	0.045	0.165	0.000	0.0	0.0	0.0	0.1
1240	0.3	0.051	0.184	0.000	-0.3	0.0	0.1	-0.3
1245	0.0	0.048	0.175	0.000	0.0	0.0	0.0	0.0
1250	0.0	0.049	0.178	0.000	0.0	0.0	0.0	0.1
1255	0.0	0.046	0.167	0.000	0.0	0.0	0.0	0.0
1260	0.0	0.050	0.181	0.000	0.0	0.0	0.0	0.1
1265	0.0	0.047	0.169	0.000	0.0	0.0	0.0	0.0
1270	0.0	0.049	0.177	0.000	0.0	0.0	0.0	0.1
1275	0.0	0.049	0.178	0.000	0.1	0.0	0.0	0.1
1280	0.0	0.047	0.169	0.000	0.0	0.0	0.0	0.0
1285	0.0	0.049	0.176	0.000	0.0	0.0	0.0	0.1
1290	0.0	0.048	0.174	0.000	0.0	0.0	0.0	0.0
1295	0.0	0.048	0.173	0.000	0.0	0.0	0.0	0.0
1300	0.0	0.049	0.178	0.000	0.1	0.0	0.0	0.2
1305	0.0	0.046	0.165	0.000	0.1	0.0	0.0	0.1
1310	0.0	0.046	0.165	0.000	0.0	0.0	0.0	0.0
1315	0.0	0.046	0.165	0.000	0.0	0.0	0.0	0.0
1320	0.0	0.042	0.150	0.000	0.0	0.0	0.0	0.0
1325	0.0	0.047	0.170	0.000	0.0	0.0	0.0	0.1
1330	0.0	0.052	0.187	0.000	0.3	0.0	0.1	0.4
1335	0.0	0.048	0.172	0.000	0.0	0.0	0.0	0.0
1340	0.0	0.044	0.159	0.000	0.1	0.0	0.0	0.1
1345	0.2	0.042	0.148	0.000	-0.2	0.0	0.0	-0.2
1350	0.0	0.046	0.166	0.000	0.0	0.0	0.0	0.0
1355	0.2	0.049	0.171	0.000	-0.2	0.0	0.0	-0.2
1360	0.3	0.045	0.162	0.000	-0.3	0.0	0.0	-0.3
1365	0.0	0.050	0.180	0.000	0.0	0.0	0.0	0.1
1370	0.3	0.049	0.176	0.000	-0.3	0.0	0.0	-0.2
1375	0.3	0.053	0.190	0.000	-0.3	0.0	0.1	-0.3
1380	0.0	0.048	0.175	0.000	0.0	0.0	0.0	0.0

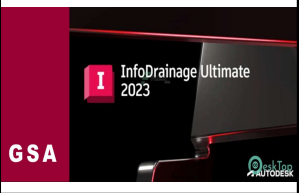
2023.110: Sandbrook Park Rochdale OL11 1RY		Date: 23/01/2024		
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Designed by: L.Edwards	Checked by: I.Schofield	
		Approved By: G.Schofield		
		Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		 

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
1385	0.0	0.044	0.160	0.000	0.0	0.0	0.0	0.0
1390	0.3	0.046	0.165	0.000	-0.3	0.0	0.0	-0.3
1395	0.3	0.053	0.191	0.000	-0.3	0.0	0.1	-0.3
1400	0.0	0.051	0.183	0.000	0.0	0.0	0.1	0.0
1405	0.0	0.049	0.177	0.000	0.0	0.0	0.0	0.0
1410	0.0	0.047	0.168	0.000	0.0	0.0	0.0	0.0
1415	0.0	0.044	0.157	0.000	0.0	0.0	0.0	0.0
1420	0.0	0.049	0.179	0.000	0.0	0.0	0.0	0.1
1425	0.0	0.046	0.168	0.000	0.0	0.0	0.0	0.0
1430	0.0	0.044	0.158	0.000	0.1	0.0	0.0	0.1
1435	0.2	0.042	0.148	0.000	-0.2	0.0	0.0	-0.2
1440	0.4	0.047	0.170	0.000	-0.4	0.0	0.0	-0.3
1445	0.0	0.047	0.169	0.000	0.1	0.0	0.0	0.1
1450	0.0	0.046	0.167	0.000	0.0	0.0	0.0	0.0
1455	0.0	0.047	0.171	0.000	0.0	0.0	0.0	0.1
1460	0.0	0.047	0.172	0.000	0.1	0.0	0.0	0.1
1465	0.0	0.046	0.166	0.000	0.0	0.0	0.0	0.1
1470	0.0	0.046	0.166	0.000	0.0	0.0	0.0	0.0
1475	0.0	0.046	0.165	0.000	0.0	0.0	0.0	0.0
1480	0.0	0.048	0.175	0.000	0.0	0.0	0.0	0.0
1485	0.0	0.048	0.172	0.000	0.2	0.0	0.0	0.2
1490	0.4	0.050	0.180	0.000	-0.4	0.0	0.0	-0.4
1495	0.0	0.050	0.178	0.000	0.0	0.0	0.0	0.1
1500	0.0	0.047	0.168	0.000	0.0	0.0	0.0	0.0
1505	0.0	0.047	0.171	0.000	0.0	0.0	0.0	0.1
1510	0.0	0.045	0.163	0.000	0.0	0.0	0.0	0.0
1515	0.0	0.041	0.149	0.000	0.0	0.0	0.0	0.0
1520	0.3	0.045	0.161	0.000	-0.3	0.0	0.0	-0.2
1525	0.2	0.050	0.176	0.000	-0.2	0.0	0.0	-0.1
1530	0.0	0.047	0.171	0.000	0.0	0.0	0.0	0.0
1535	0.0	0.043	0.155	0.000	0.0	0.0	0.0	0.0
1540	0.0	0.046	0.165	0.000	0.0	0.0	0.0	0.1
1545	0.0	0.047	0.169	0.000	0.0	0.0	0.0	0.0
1550	0.0	0.043	0.156	0.000	0.0	0.0	0.0	0.0
1555	0.0	0.049	0.178	0.000	0.0	0.0	0.0	0.1
1560	0.3	0.050	0.180	0.000	-0.3	0.0	0.0	-0.3
1565	0.0	0.045	0.163	0.000	0.0	0.0	0.0	0.0
1570	0.0	0.046	0.166	0.000	0.0	0.0	0.0	0.1
1575	0.0	0.046	0.166	0.000	0.0	0.0	0.0	0.0
1580	0.0	0.047	0.171	0.000	0.0	0.0	0.0	0.1
1585	0.0	0.046	0.167	0.000	0.0	0.0	0.0	0.0
1590	0.0	0.048	0.173	0.000	0.0	0.0	0.0	0.0
1595	0.0	0.047	0.171	0.000	0.0	0.0	0.0	0.0
1600	0.0	0.049	0.177	0.000	0.0	0.0	0.0	0.1
1605	0.0	0.044	0.157	0.000	0.0	0.0	0.0	0.0
1610	0.3	0.048	0.174	0.000	-0.3	0.0	0.0	-0.3
1615	0.3	0.047	0.168	0.000	-0.3	0.0	0.0	-0.3
1620	0.3	0.051	0.185	0.000	-0.3	0.0	0.1	-0.3
1625	0.0	0.047	0.168	0.000	0.0	0.0	0.0	0.0
1630	0.0	0.048	0.172	0.000	0.0	0.0	0.0	0.0
1635	0.0	0.049	0.176	0.000	0.0	0.0	0.0	0.1
1640	0.0	0.048	0.175	0.000	0.0	0.0	0.0	0.1
1645	0.3	0.048	0.173	0.000	-0.2	0.0	0.0	-0.2
1650	0.0	0.044	0.160	0.000	0.0	0.0	0.0	0.0
1655	0.0	0.045	0.161	0.000	0.0	0.0	0.0	0.1
1660	0.4	0.049	0.177	0.000	-0.4	0.0	0.0	-0.4
1665	0.0	0.045	0.164	0.000	0.0	0.0	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY		Date: 23/01/2024		
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Designed by: L.Edwards	Checked by: I.Schofield	
		Approved By: G.Schofield		
		Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SoakawaySA7 (L/s)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
1670	0.0	0.041	0.149	0.000	0.0	0.0	0.0	0.0
1675	0.0	0.043	0.156	0.000	0.0	0.0	0.0	0.1
1680	0.0	0.049	0.178	0.000	0.0	0.0	0.0	0.1
1685	0.0	0.053	0.191	0.000	0.0	0.0	0.1	0.1
1690	0.0	0.050	0.178	0.000	0.0	0.0	0.0	0.1
1695	0.0	0.044	0.159	0.000	0.0	0.0	0.0	0.0
1700	0.3	0.048	0.172	0.000	-0.3	0.0	0.0	-0.2
1705	0.0	0.048	0.174	0.000	0.0	0.0	0.0	0.0
1710	0.0	0.047	0.171	0.000	0.0	0.0	0.0	0.0
1715	0.0	0.052	0.190	0.000	0.0	0.0	0.1	0.1
1720	0.0	0.047	0.169	0.000	0.0	0.0	0.0	0.0
1725	0.0	0.046	0.166	0.000	0.0	0.0	0.0	0.1
1730	0.0	0.045	0.163	0.000	0.0	0.0	0.0	0.0
1735	0.0	0.046	0.166	0.000	0.1	0.0	0.0	0.1
1740	0.0	0.045	0.163	0.000	0.0	0.0	0.0	0.0
1745	0.2	0.043	0.152	0.000	-0.2	0.0	0.0	-0.2
1750	0.0	0.049	0.175	0.000	0.0	0.0	0.0	0.1
1755	0.0	0.044	0.158	0.000	0.0	0.0	0.0	0.0
1760	0.2	0.050	0.177	0.000	-0.2	0.0	0.0	-0.2
1765	0.0	0.050	0.181	0.000	0.0	0.0	0.0	0.1
1770	0.0	0.048	0.173	0.000	0.0	0.0	0.0	0.0
1775	0.4	0.048	0.172	0.000	-0.4	0.0	0.0	-0.3
1780	0.0	0.053	0.193	0.000	0.0	0.0	0.1	0.1
1785	0.0	0.050	0.179	0.000	0.0	0.0	0.0	0.0
1790	0.0	0.053	0.193	0.000	0.0	0.0	0.1	0.1
1795	0.0	0.053	0.191	0.000	0.0	0.0	0.1	0.0
1800	0.0	0.051	0.184	0.000	0.0	0.0	0.1	0.0
1805	0.0	0.049	0.177	0.000	0.0	0.0	0.0	0.0
1810	0.0	0.053	0.191	0.000	0.4	0.0	0.1	0.5
1815	0.3	0.049	0.174	0.000	-0.3	0.0	0.0	-0.3
1820	0.0	0.045	0.162	0.000	0.0	0.0	0.0	0.0
1825	0.0	0.041	0.149	0.000	0.0	0.0	0.0	0.0
1830	0.4	0.042	0.153	0.000	-0.4	0.0	0.0	-0.3
1835	0.0	0.045	0.166	0.000	0.1	0.0	0.0	0.2
1840	0.0	0.046	0.168	0.000	0.0	0.0	0.0	0.1
1845	0.0	0.043	0.157	0.000	0.0	0.0	0.0	0.0
1850	0.3	0.045	0.162	0.000	-0.3	0.0	0.0	-0.3
1855	0.0	0.046	0.164	0.000	0.0	0.0	0.0	0.0
1860	0.3	0.045	0.161	0.000	-0.3	0.0	0.0	-0.3
1865	0.0	0.050	0.180	0.000	0.0	0.0	0.0	0.1
1870	0.0	0.053	0.193	0.000	0.0	0.0	0.1	0.1
1875	0.0	0.049	0.176	0.000	0.0	0.0	0.0	0.0
1880	0.0	0.047	0.168	0.000	0.0	0.0	0.0	0.0
1885	0.0	0.048	0.174	0.000	0.0	0.0	0.0	0.0
1890	0.0	0.044	0.161	0.000	0.1	0.0	0.0	0.1
1895	0.0	0.045	0.163	0.000	0.0	0.0	0.0	0.1
1900	0.0	0.048	0.173	0.000	0.2	0.0	0.0	0.2
1905	0.0	0.044	0.158	0.000	0.0	0.0	0.0	0.0
1910	0.0	0.042	0.152	0.000	0.0	0.0	0.0	0.1
1915	0.0	0.046	0.167	0.000	0.0	0.0	0.0	0.0
1920	0.0	0.048	0.172	0.000	0.0	0.0	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



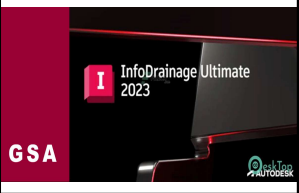
Soakaway 12
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	SA12(L/s)	IT2(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
5	5.8	0.107	0.384	0.000	0.0	4.8	0.1	4.9
10	26.3	0.447	1.608	0.000	0.0	7.7	0.4	8.2
15	6.0	1.403	5.050	0.000	0.0	16.0	1.4	17.4
20	9.6	1.031	3.711	0.000	-9.6	12.8	1.0	4.2
25	1.3	0.459	1.651	0.000	-1.3	7.9	0.5	7.0
30	0.0	0.361	1.299	0.000	0.0	7.0	0.4	7.3

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



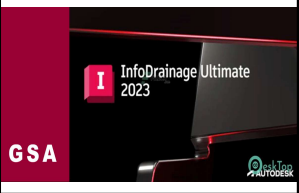
Soakaway 13
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0	0.0
5	11.4	0.435	1.568	0.000	-5.7	0.4	-5.2
10	26.0	2.481	8.934	0.000	3.8	2.4	6.3
15	7.4	2.607	9.388	0.000	9.9	2.6	12.5
20	1.2	2.328	8.384	0.000	-0.8	2.3	1.5
25	0.9	2.220	7.994	0.000	-0.9	2.2	1.3
30	0.1	2.108	7.591	0.000	-0.1	2.1	2.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



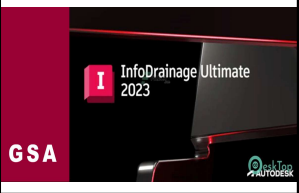
Soakaway 15
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Soakaway

Tables

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0	0.0
5	0.0	0.000	0.000	0.000	0.0	0.0
10	0.0	0.000	0.000	0.000	0.0	0.0
15	0.0	0.000	0.000	0.000	0.0	0.0
20	0.0	0.000	0.000	0.000	0.0	0.0
25	0.0	0.000	0.000	0.000	0.0	0.0
30	0.0	0.000	0.000	0.000	0.0	0.0

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



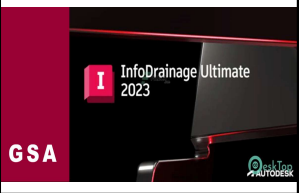
Infiltration Trench B
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Tables

Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	10.8	0.051	0.000	0.181	0.000	0.0	0.1	0.1
10	49.1	0.295	0.000	3.500	0.000	0.0	1.2	1.2
15	11.2	0.211	0.561	6.698	0.000	0.0	2.4	2.4
20	0.0	0.014	0.500	5.112	0.000	0.0	1.8	1.8
25	0.0	0.003	0.448	4.434	0.000	0.0	1.6	1.6
30	0.0	0.002	0.402	3.864	0.000	0.0	1.4	1.4

2023.110: Sandbrook Park Rochdale OL11 1RY	Date: 23/01/2024		
	Designed by: L.Edwards	Checked by: I.Schofield	Approved By: G.Schofield
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Graham Schofield Associates: Suite 3 Balfour Court off Hough Lane Leyland PR25 2TF		



Infiltration Trench C
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Tables

Time (mins)	Total Inflow (L/s)	US Depth(m)	DS Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Outlet(L/s)	Infiltration (L/s)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0	0.0	0.0
5	5.9	0.030	0.000	0.087	0.000	0.0	0.0	0.0
10	30.6	0.262	0.029	1.570	0.000	0.0	0.6	0.6
15	16.0	0.247	0.785	3.696	0.000	0.0	1.4	1.4
20	0.0	0.206	0.996	4.814	0.000	0.0	1.8	1.8
25	0.0	0.095	0.891	3.885	0.000	0.0	1.4	1.4
30	0.0	0.004	0.800	3.095	0.000	0.0	1.1	1.1

**APPENDIX 'E' –
Indicative Drainage Layout & Design**



FOUL WATER MANHOLE SCHEDULE						
REF:	COVER LEVEL (M)	INVERT LEVEL (M)	DEPTH (M)	MINIMUM SIZE & CONSTRUCTION	COVER SLAB & COVER	COMMENTS
F1	136.378	135.178	1.200	1200Ø PCC RINGS	D400	150 CONCRETE SURROUND
F2	136.378	135.069	1.309	1200Ø PCC RINGS	D400	150 CONCRETE SURROUND
F3	136.378	134.448	1.930	1200Ø PCC RINGS	D400	150 CONCRETE SURROUND
EXTG	136.042	133.422 BD1 134.228	2.620			EXISTING FOUL WATER MANHOLE DETAILS TO BE VERIFIED BY SITE CHECK
F4	135.878	135.278	0.600	PPIC	D400	150 CONCRETE SURROUND
F5	135.878	134.846	1.032	PPIC	D400	150 CONCRETE SURROUND
F6	135.878	134.724	1.154	PPIC	D400	150 CONCRETE SURROUND
F7	135.878	134.444	1.434		D400	150 CONCRETE SURROUND
F8	135.700	133.146 BD 134.344	2.554	1200Ø PCC RINGS	B125	150 CONCRETE SURROUND
F9	133.800	131.860 BD 132.600	1.940	1200Ø PCC RINGS	B125	150 CONCRETE SURROUND
F10	132.900	131.230	1.670	1200Ø PCC RINGS	B125	150 CONCRETE SURROUND
EXTG	132.298	129.988 BD3 131.100	2.310			EXISTING FOUL WATER MANHOLE DETAILS TO BE VERIFIED BY SITE CHECK

DRAINAGE NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATION & ALL RELEVANT ENGINEERS & SUBCONTRACTOR'S DRAWINGS.
- DO NOT SCALE OFF THIS DRAWING. USE ONLY FIGURED DIMENSIONS & IF IN DOUBT ASK. ALL DIMENSIONS ARE IN MILLIMETRES.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF ALL DIMENSIONS. & FOR CORRECT SETTING OUT ON SITE. SETTING OUT & WORKMANSHIP IS TO COMPLY WITH B.S.5606 : 1978.
- SUB-BASE IS TO BE GSB1 STONE TO SPECIFICATION FOR HIGHWAYS WORK CL. 803 OR APPROVED EQUIVALENT PLACED & COMPACTED IN LAYERS USING A VIBRATING ROLLER.
- SERVICES TO BE LOCATED PRIOR TO WORK COMMENCING ON THE ROAD CROSSING. CARE TO BE TAKEN TO HAND DIG TRIAL HOLES TO LOCATE SERVICES & ALL SERVICES TO BE MARKED CLEARLY.
- ALL MATERIALS SUPPLIED SHOULD HAVE THE RELEVANT TEST CERTIFICATES.
- ALL WORKS TO BE UNDERTAKING IN CROSS OVER AREAS TO BE UNDER THE SUPERVISION OF L.A. HIGHWAY ENGINEERS.
- ALL WORKS AND MATERIALS ETC. IN ACCORDANCE WITH DMRB VOLUME 7
- ALL WORK TO COMPLY WITH THE RELEVANT CLAUSES OF B.S. EN 752: 1998 BUILDING DRAINAGE AND THE SEWERS FOR ADOPTION CURRENT EDITION.
- ARRANGEMENT OF EXISTING DRAINAGE INDICATED HAS BEEN COMPILED FROM A LEVEL SURVEY UNDERTAKEN AT MANHOLE POSITIONS. REFER TO CCTV DRAINAGE SURVEY OF THE EXISTING DRAINAGE SYSTEM.
- PRIOR TO COMMENCEMENT OF THE WORKS THE CONTRACTOR SHALL CONFIRM THE LOCATION AND LEVEL OF THE PROPOSED DRAINAGE OUTFALLS AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
- ALL PIPES BUILT INTO THE MANHOLE INVERTS SHALL BE INSTALLED WITH SOFFITS LEVEL UNLESS SHOWN OTHERWISE.
- ALL MANHOLES AND CONNECTIONS PASSING THROUGH WALLS TO BE FITTED WITH ROCKER PIPES.
- COVER LEVELS SHOWN ARE APPROXIMATE AND SHALL BE ADJUSTED ON SITE BY THE CONTRACTOR TO SUIT THE FINAL LEVELS. THE CONTRACTOR SHALL PROVIDE WRITTEN CONFIRMATION OF THE FINISHED COVER AND INVERT LEVELS OF ALL MANHOLES.
- THE CONTRACTOR SHALL CONTROL ACCURATE LINE AND LEVEL OF PIPE LAYING BY USE OF AN OPTICAL LASER.
- THE CONTRACTOR SHALL PROTECT THE PIPELINE FROM TEMPORARY CONSTRUCTION LOADS WHICH MAY BE IN EXCESS OF THE SERVICE LOADS.

KEY: -

- INDICATES PROPOSED SURFACE WATER DRAINAGE
--- INDICATES PROPOSED FOUL WATER DRAINAGE

- PIPEWORK AND PIPE BEDDING SHALL COMPLY WITH THE DETAILS INDICATED ON THE DRAWINGS UNLESS OTHERWISE STATED:
- PIPEWORK WITH LESS THAN 600mm COVER FROM FINISHED LEVEL, IN AREAS OF VEHICULAR LOADING, SHALL BE PROTECTED WITH A 150mm C20 CONCRETE SURROUND. FLEXIBLE JOINTS SHALL BE MAINTAINED AT EACH PIPE JOINT BY THE USE OF COMPRESSIVE SHEET CUT TO FIT THE PIPE PROFILE.
- TRENCHES IN AREAS RECEIVING VEHICULAR LOADING SHALL BE BACKFILLED WITH GF2 GRANULAR FILL.
- TRENCHES WITHIN 1m OF LOAD BEARING WALLS SHOULD BE FILLED WITH CONCRETE AT LEAST TO THE LEVEL OF THE UNDERSIDE OF THE FOUNDATION. WHERE THE DISTANCE IS MORE THAN 1m FROM THE WALL, THE CONCRETE FILL SHOULD BE TO A LEVEL BELOW THE UNDERSIDE OF THE FOUNDATION EQUAL TO THE DISTANCE FROM THE WALL TO THE NEAR SIDE OF THE TRENCH LESS 150mm.
- SOFT SPOTS IN THE TRENCH FORMATION SHALL BE REMOVED AND REPLACED WITH GF2 IN LAYERS & COMPACTED IN LAYERS OF 150mm MAX.
- UNLESS NOTED OTHERWISE MANHOLE COVERS, CHANNEL GRATINGS AND ROAD GRATINGS SHALL BE DUCTILE IRON TO BSEN 124 BLACK COATED AS FOLLOWS: -
HIGHWAYS CLASS D400
CAR PARKS CLASS C250
LANDSCAPED AREAS CLASS B125 OR A15
- MANHOLE COVERS SHALL HAVE A BADGE TO INDICATE FOUL OR STORM WATER.
- THE CONTRACTOR SHALL REGULATE EXISTING COVERS AND FRAMES TO THE PROPOSED LEVELS INDICATED.
- TWO SETS OF MANHOLE LIFTING KEYS SHALL BE HANDED OVER TO THE CLIENT ON COMPLETION OF THE WORKS.
- LATERAL CONNECTIONS IN BETWEEN MANHOLE RUNS SHALL BE FORMED BY USING PURPOSE MADE JUNCTION FITTINGS. BEND FITTINGS SHALL BE PROVIDED WHERE APPROPRIATE TO DIRECT THE FLOW INTO MAIN RUNS.

REFERENCE DRAWINGS

RESIDUAL RISKS

SURFACE WATER MANHOLE SCHEDULE						
REF:	COVER LEVEL (M)	INVERT LEVEL (M)	DEPTH (M)	MINIMUM SIZE & CONSTRUCTION	COVER SLAB & COVER	COMMENTS
S1	136.480	135.458	1.022	PPIC	B125	150 CONCRETE SURROUND
S2	136.480	135.358	1.122	PPIC	B125	150 CONCRETE SURROUND
S3	136.480	135.350	1.130	PPIC	B125	150 CONCRETE SURROUND
S4	135.980	134.942	1.038	PPIC	B125	150 CONCRETE SURROUND
S5	135.980	134.770	1.222	PPIC	B125	150 CONCRETE SURROUND
S6	135.980	134.758	1.234	PPIC	B125	150 CONCRETE SURROUND
S7	135.964	131.864	4.100	1800Ø PCC RINGS	D400	SOAKAWAY (SEE DETAIL DRG OOG)
S8	135.964	131.864	4.100	1800Ø PCC RINGS	D400	SOAKAWAY (SEE DETAIL DRG OOG)
S9	133.850	132.990	0.860	PPIC	B125	150 CONCRETE SURROUND
S10	133.850	132.815	1.035	PPIC	B125	150 CONCRETE SURROUND
S11	133.730	133.085	0.645	PPIC	B125	150 CONCRETE SURROUND
S12	133.740	129.640	4.100	1800Ø PCC RINGS	D400	SOAKAWAY (SEE DETAIL DRG OOG)
S13	133.355	129.255	4.100	1800Ø PCC RINGS	D400	SOAKAWAY (SEE DETAIL DRG OOG)
S14	131.748	130.627	1.121	PPIC	B125	150 CONCRETE SURROUND
S15	132.324	128.224	4.100	1800Ø PCC RINGS	D400	SOAKAWAY (SEE DETAIL DRG OOG)

REV	DESCRIPTION	DRAWN	APPROVED	DATE
STATUS				
PLANNING				
client NORTHERN TRUST CO. LTD.				
project SANDBROOK PARK, ROCHDALE PHASE 2				
title INDICATIVE DRAINAGE LAYOUT				
drawn: SNG		checked: GS		drawing number
date: 15.01.24		date:		2023-110-C001
scale: 1:250		A1		

GRAHAM SCHOFIELD ASSOCIATES
Consulting Civil and Structural Engineers
Suite 3 Balfour Court,
Leyland
PR25 2TE
tel: (01772) 459383
email: reception@gsa72.co.uk

GSA

