Report No: 19/003.01
Revision: 00
Dated: 11th January 2019

Development of land at former Wombwell High School Barnsley

Flood Risk Assessment

Client:

Premier Construction Northern
51 Rimington Road
Wombwell
Barnsley
S73 8DQ

Prepared by:

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

REVISION HISTORY

Revision	Date	Details
00	11th January 2019	First issue

APENDICES

A: Location Plan

B: Topographical survey plan

C: Site Layout Plan

D: Fluvial flood map

E: Surface water flood map

F. Reservoirs flood map

G: REFH results

H: Report of infiltration tests – Eastwood and Partners

ABBREVIATIONS

AEP: Annual exceedance probability

AOD: Above Ordnance Datum

CCA: Climate change allowance

E: East

FEH: Flood Estimation Handbook

FRA: Flood risk assessment

NE: North east

PPG: Planning Practice Guidance

SE: South east

SFRA: Strategic Flood Risk Assessment

ReFH2: Revitalised Flood Hydrograph model, version 2

SITE	Land at former Wombwell High School, Lundhill Road, Wombwell, Barnsley, S73 0RA.
PURPOSE OF THIS REPORT	This site-specific flood risk assessment is required in connection with a planning application to Barnsley Metropolitan Borough Council for residential development of the site.
SITE LOCATION AND DESCRIPTION	See Location Plan in Appendix A.
National Grid Reference	440295E, 402435N approx
Gross Site Area	Approximately 6.76 ha
Ground surface	100% pervious surface.
Topography	Ground levels fall towards the northern apex of the site in the range 74.7m to 50.03m AOD. See topographical survey plan in Appendix B.
Geology	Superficial: None recorded. Bedrock: Oaks Rock - Sandstone.
Watercourses	None within the vicinity of the site. **The site is not within 20m of a Main River.**
Reservoirs and Canals	No reservoirs within the vicinity of the site. Elsecar Canal (disused) passes around the SE, E and NE sides of the site and is approximately 220m from the site at its nearest point.
Existing site drainage	There is no evidence of an existing drainage system on the topographical survey plan.
Existing sewers	It is not known whether there are any sewers crossing the site.
THE DEVELOPMENT	A development of 229 dwellings is proposed as shown on the Site Layout Plan in Appendix C. Access to the site will be off Lundhill Road, as shown on the site layout plan.

VULNERABILITY CLASSIFICATION	The development is classified as **'More Vulnerable'**, in accordance with Table 2 of the Planning Practice Guidance for Flood Risk and Coastal Change, paragraph 066.
FLOOD ZONE	Flood zone 1, (see Appendix D). Reference: Flood Map for Planning.
REQUIREMENT TO CONSULT THE ENVIRONMENT AGENCY	Not required when the development is in flood zone 1 and not within 20m of a main river or in a critical drainage area. Reference: Environment Agency Standing Advice.
THE SEQUENTIAL TEST	The Sequential Test is not required as the development is in Flood Zone 1.
REQUIREMENT FOR THE EXCEPTION TEST	Not required as the development is in Flood Zone 1. Reference: Planning Practice Guidance for Flood Risk and Coastal Change, paragraph 067.
HISTORY OF FLOODING	There is no available evidence of historic or potential flooding of the site.
FLUVIAL FLOODING	
Functional floodplain	The site is not in the functional floodplain.
Annual probability of fluvial flooding	Less than 0.1%.
Flood defences	None
Loss of floodplain storage	None
Obstruction to overland flow routes	None
Flood warning area	The site is not in a Flood Warning Area

SURFACE WATER FLOODING

Risk of surface water flooding	The Updated Surface Water Flood Map indicates a very low risk with no depths indicated. See Appendix E.
Critical Drainage Areas	The site is not in a critical drainage area.

GROUNDWATER FLOODING

Groundwater flooding occurs when the water table rises above the ground surface or enters basements. It is typically associated with highly permeable rock such as chalk and highly fissured limestone. These geological conditions are not present at the site and the risk of this type of flooding at the site is therefore assessed to be very low.

SEWER FLOODING

The site in its existing condition is not at risk from sewer flooding. Following development, sewer flooding could occur if the capacity of the sewers is exceeded, but the risk of such flooding is assessed to be low.

FLOODING FROM RESERVOIRS AND CANALS

The site is not in an area at risk of flooding from reservoirs or canals.

See Appendix F.

EFFECT OF THE DEVELOPMENT ON FLOOD RISK

Fluvial and tidal flood risk	No effect
Surface water flood risk	The effect of the development on surface water runoff rates and volumes has been assessed using FEH Point Data and the ReFH2 model. A summary of the results is provided in Appendix G. The results show that the development, which is assumed for the purposes of this FRA to convert 50% of the site to impervious area, will potentially increase runoff rates and volumes by an average of 53% and 30% respectively.
Groundwater flood risk	No effect

Sewer flooding risk

No effect

EFFECT OF CLIMATE CHANGE

Climate change must be considered over the expected lifetime of the development which, for residential development is defined to be 100 years in paragraph 026 of the Planning Practice Guidance. Climate change must therefore be considered up to 2118.

Current guidance on the application of climate change allowances was issued in February 2016 and updated on 3rd February 2017. The guidance provides the anticipated changes to peak river flow and rainfall intensity for different scenarios of carbon dioxide emissions over future epochs up to 2115.

The effects of climate change on peak river flow will not affect the flood zone designation throughout the lifetime of the development as the site is not at risk from fluvial flooding.

The current guidance requires the Central and Upper End allowances to be used when assessing the effects of increases to peak rainfall intensities. The allowances apply across the whole of England and in the period 2070 to 2115 are:

- Central allowance: 20%
- Upper end allowance: 40%

The effects of these climate change allowances are shown in the summary of the ReFH2 results in Appendix G and the detailed drainage design must take into account the range of climate change effects on surface water runoff.

FLOOD RISK MANAGEMENT

Fluvial flood risk

No recommendations

Surface water flood risk

The effect of the development on surface water flood risk can be mitigated by the application of sustainable drainage principles in the detailed drainage design of the drainage system.

Peak flow control	The underlying geology of the site suggests that infiltration drainage could be feasible. Infiltration tests were carried by Eastwood and Partners in December 2018 and their report is provided in Appendix H. The report concludes that infiltration drainage will be feasible in the areas of sand and gravel, but where reworked clay is present the infiltration rates were poor.
Attenuation storage	Attenuation storage will be required to accommodate the excess runoff volume from the critical duration event. The form and capacity of this storage will be determined in the detailed design of the drainage system for the development. As a preliminary estimate, the required storage capacity, should surface water be discharged to a sewer, is estimated to be: • 1% AEP with 20% CCA: 2,072m^3 • 1% AEP with 40% CCA: 2,527m^3 The actual storage capacity will need to be verified in the detailed drainage design. In the event that infiltration drainage is proposed, the storage capacity will depend on the infiltration rate determined in field tests.
Groundwater flood risk	No recommendations.
Sewer flooding risk	No recommendations.
Reservoir flood risk	No recommendations.

CONCLUSIONS

1. The development classification is **More Vulnerable.**

2. The site is in flood zone 1 where the annual probability of fluvial flooding is less than 0.1%.

3. There is no requirement for the Environment Agency to be consulted on this development.

4. There is no requirement for the Sequential Test or the Exception Test as the proposed development is in Flood Zone 1.

5. There is no evidence of historic flooding at the site.

6. The risk of surface water flooding is very low.

7. The risk of groundwater flooding is assessed to be low.

8. The risk of sewer flooding is assessed to be low.

9. The site is not in an area at risk of flooding from reservoirs or canals.

10. The development will increase peal surface water runoff rates by approximately 53% and peak surface water runoff volume by approximately 30%.

    The effect of the development can be mitigated by the application of sustainable drainage principles, limiting the runoff rate and providing attenuation storage for the excess runoff volume.

11. The geology underlying the site suggests that infiltration drainage could be feasible and infiltration tests have confirmed this in the areas where there is sand and gravel.

RECOMMENDATIONS

1. It is recommended that a detailed drainage design is prepared and submitted to Barnsley MDC and Yorkshire Water for approval, prior to construction.

USE OF REPORT

This report is prepared specifically for Premier Construction Northern for the purpose of the aforementioned planning application and the report may not be used for any other purpose and it may not be assigned to any third party without our written permission.

DISCLAIMER

This flood risk assessment is based on data available at the time of its preparation and JOC Consultants Ltd accepts no liability for the consequences of any changes to or re-assessment of this data in the future.

APPENDIX A

Location Plan

Former Wombwell High School Site, off Lundhill Road, Wombwell, S70 0RA

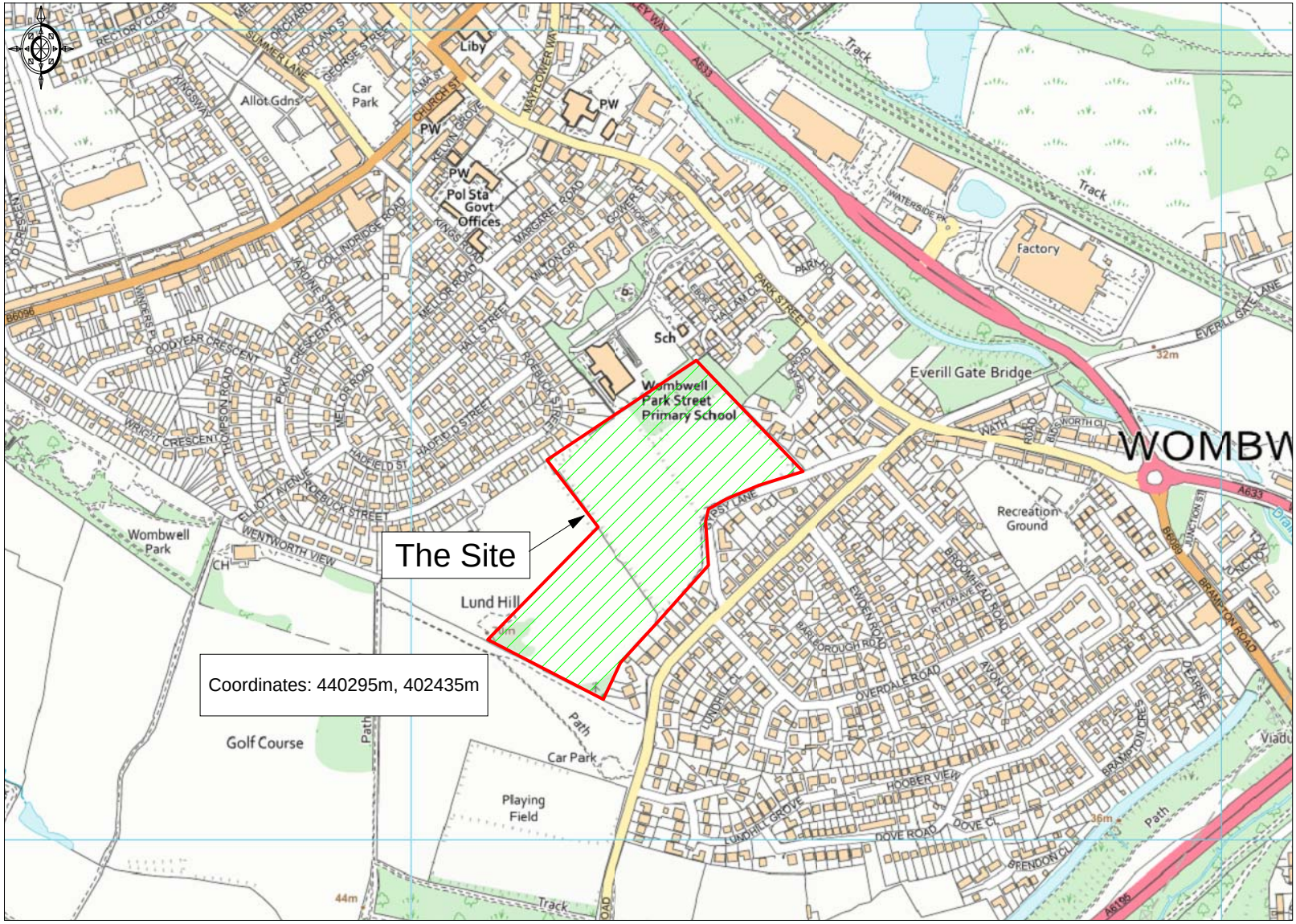
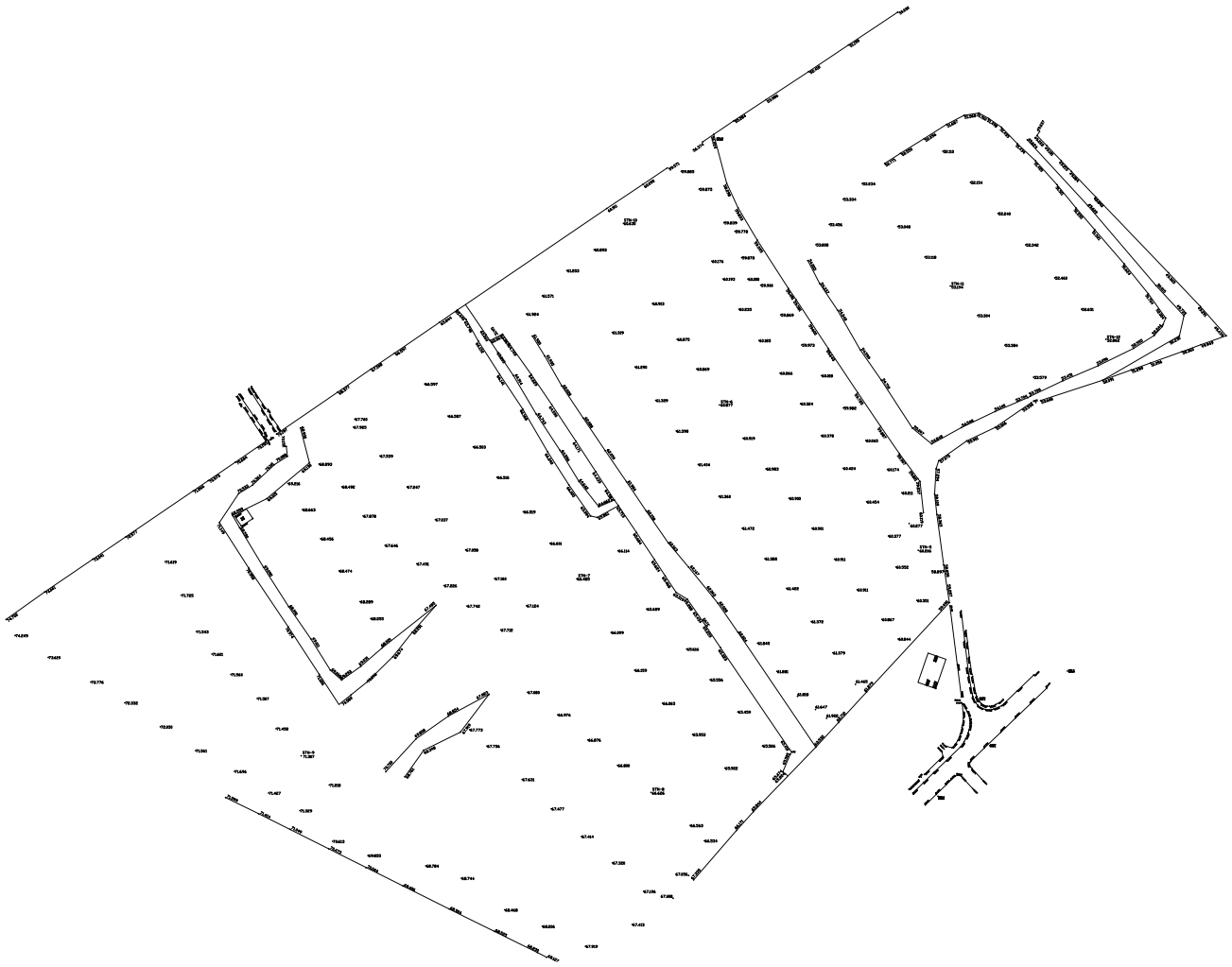


Figure 1: Location Plan

APPENDIX B

Topographical Survey Plan



F & S SURVEYING SERVICES LTD
21, Haw View
Yeadon
Leeds
West Yorkshire
LS19 7XF
Tel : 07714007707
Email : surveys.sutton@btinternet.com

CLIENT	PREMIER
SITE	Wombwell School
TITLE	Level and Boundary survey
DWG No	FS10001
DATE	06/09/2016
SCALE	1 : 1
SURVEYED BY	BEF / DS
DRAWN BY	BEF / DS
CHECKED BY	DS / BEF

NOTES –

1.The accuracy of this drawing is dependent on the original specification. Before use of this information the user should consult F & S Surveys Limited and satisfy themselves of the detail and accuracy before undertaking any works.

2.ALL reasonable care has been taken in the survey detail represented on this drawing but any discrepancies must be reported to F & S Surveys Limited immediately.

3.This survey provides position and description of features in relationship to control stations and in no way implies legal title or boundary ownership.

4.All levels surveyed using Topcon GPRS system, coordinates and levels to National Grid GPS

LEGEND :-

- Building
- Road Channel
- Road Centre Line
- Footpath
- Fence Line
- Wall Line
- Top of Bank
- Bottom of Bank
- Terrace Line
- Tree Canopy Line
- Hedge Line
- Overhead Lines
- Contour Major
- Contour Minor

- GY Gully
- MH Manhole Cover
- MH Manhole Triangular
- MH Manhole Circular
- STN Control Station
- GS Gas
- ST Stop Tap
- SV Stop Valve
- WM Water Meter
- CATV CATV Inspection Cover
- BT BT Inspection Cover

- LP Street Light
- TP Telephone Pole
- EP Electric Pole / Pylon
- BH Bore Hole
- POST Concrete Post
- FH Fire Hydrant
- FFL Floor Level
- IL Invert Level
- +59.521 Spot Height
- Road Sign
- TL Traffic Light
- Trees
- Bushes

APPENDIX C

Site Layout Plan

THE Premier Group OF COMPANIES

Gypsy Lane, Wombwell
ACCOMMODATION SCHEDULE

STEN ARCHITECTURE

Reference	Code	Floor Area (Sqft)	Beds	Storeys	Total	Total Sqft	% of Mix
Private							
Type L		624	2	1	2	1248	1.0
Bungalow PB		832	3	1	3	2496	1.5
Type F		839	3	2	31	26009	15.0
Type H		919	3	2	15	13785	7.3
Type S		978	3	2	28	27384	13.6
Type T		1055	3	2	10	10550	4.9
Type C		1000	3	2	4	4000	1.9
Type G		1100	3	2.5	20	22000	9.7
Type D		1215	4	2	28	34020	13.6
Type J		1200	4	2.5	38	45600	18.4
Type A		1296	4	2	14	18144	6.8
Type E		1420	4	2	13	18460	6.3
Sub-Total					206	**223696**	100.0
Affordable							
Type L		624	2	1	4	2496	17.4
Type B		685	2	2	19	13015	82.6
Sub-Total					23	**15511**	100.0
Grand Total					229	239207	

		hectares	acres
Approx gross area		7.72	19.08
Gross developable area		7.39	18.26
POS required (15%)		1.11	2.74
POS provided		1.12	2.77
nett developable area		5.92	14.63
coverage		39	**16352**

Notes:

All Dimensions are to be verified on site before any work commences. If any discrepancies, errors are emissions are noted, these are to be report to STEN architecture immediately.

If any other drawings are reference within this layout, please refer to the specific detailed drawing for design, materials and specific working practices.

PLANNING LAYOUT KEY:

Boundary treatments

- Brick wall
- Close boarded timber fence
- Property division
- Metal railings
- Post & rail
- 450 Knee rail

General

- Affordable plot
- Bin collection point (bin collection day only)
- Site boundary
- Herringbone Block paving
- Retained tree

N

Scaled @ 1:500

0 10m 20m 50m

REV:	DESCRIPTION:	BY:	DATE:

STEN ARCHITECTURE

Suite 4, Unit 1,
Benton Office Park,
Bennett Avenue,
Horbury,
Wakefield,
WF4 5RA
Tel: 01924 669424

Web: www.sten-architecture.co.uk
Twitter: @STEN_arch
Facebook: stenarchitectureltd
Linkedin: Sten Architecture

CLIENT: Premier group of companies
51 Rimington Road
Wombwell
Barnsley
S73 8DQ

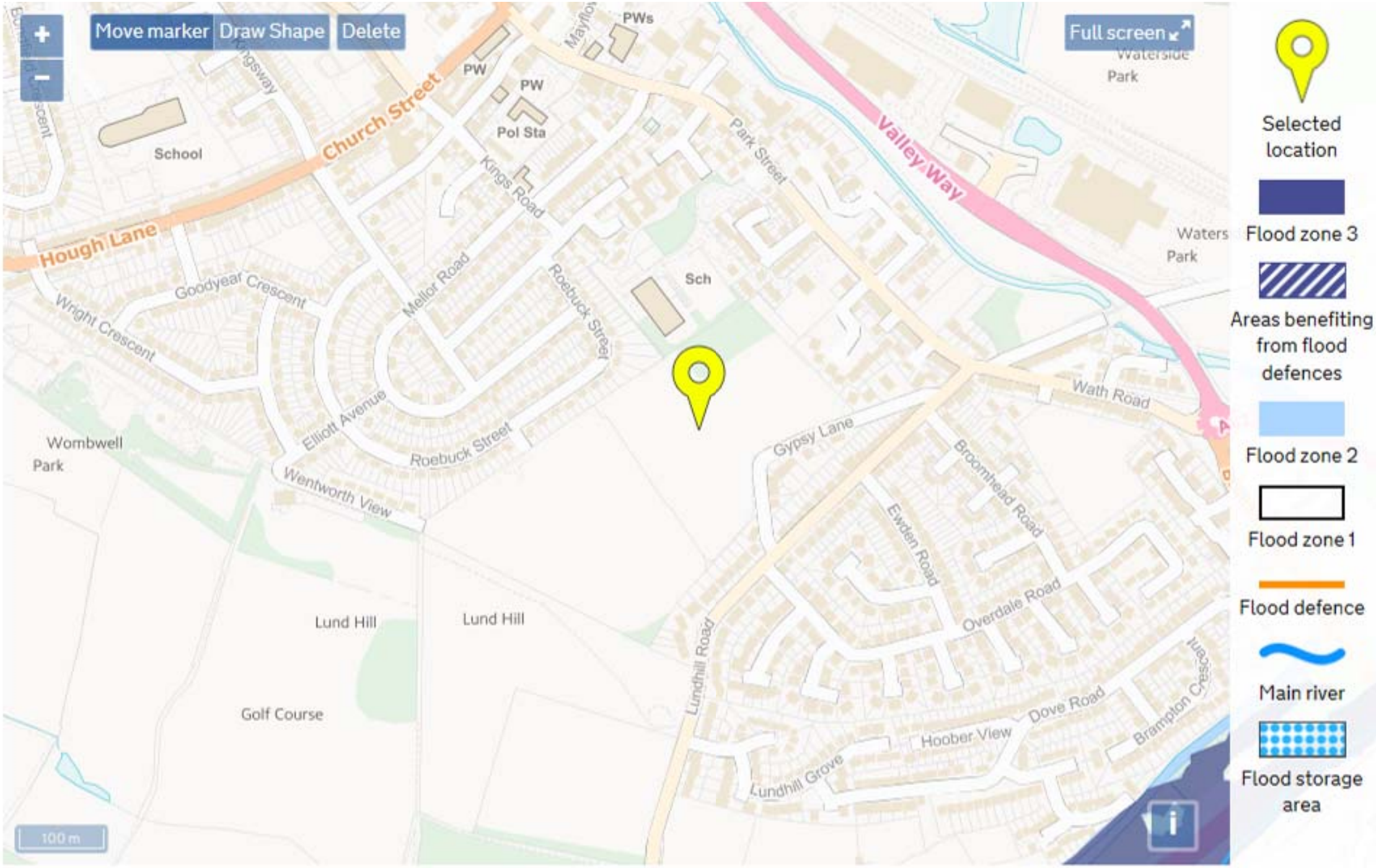
SITE: Wombwell

TITLE: Planning Layout

SCALE AT A0:	DATE:	DRAWN:	CHECKED:
1:500	13.12.18	TS	--
PROJECT NO:	**DRAWING NO:**		**REVISION:**
1876	1876.01		--

APPENDIX D

Fluvial flood map


Move marker
Draw Shape
Delete
Full screen
Church Street
Hough Lane
Valley Way
School
PW
PW
Pol Sta
PWs
Park Street
Kings Road
Mellor Road
Roebuck Street
Goodyear Crescent
Wright Crescent
Elliott Avenue
Roebuck Street
Wentworth View
Sch
Waterside Park
Waters Park
Wath Road
Gypsy Lane
Broomhead Road
Ewden Road
Overdale Road
Lundhill Road
Dove Road
Hoober View
Lundhill Grove
Brampton Crescent
Wombwell Park
Lund Hill
Lund Hill
Golf Course
100 m
Selected location
Flood zone 3
Areas benefiting from flood defences
Flood zone 2
Flood zone 1
Flood defence
Main river
Flood storage area

APPENDIX E

Surface water flood map

Flood risk from rivers or the sea

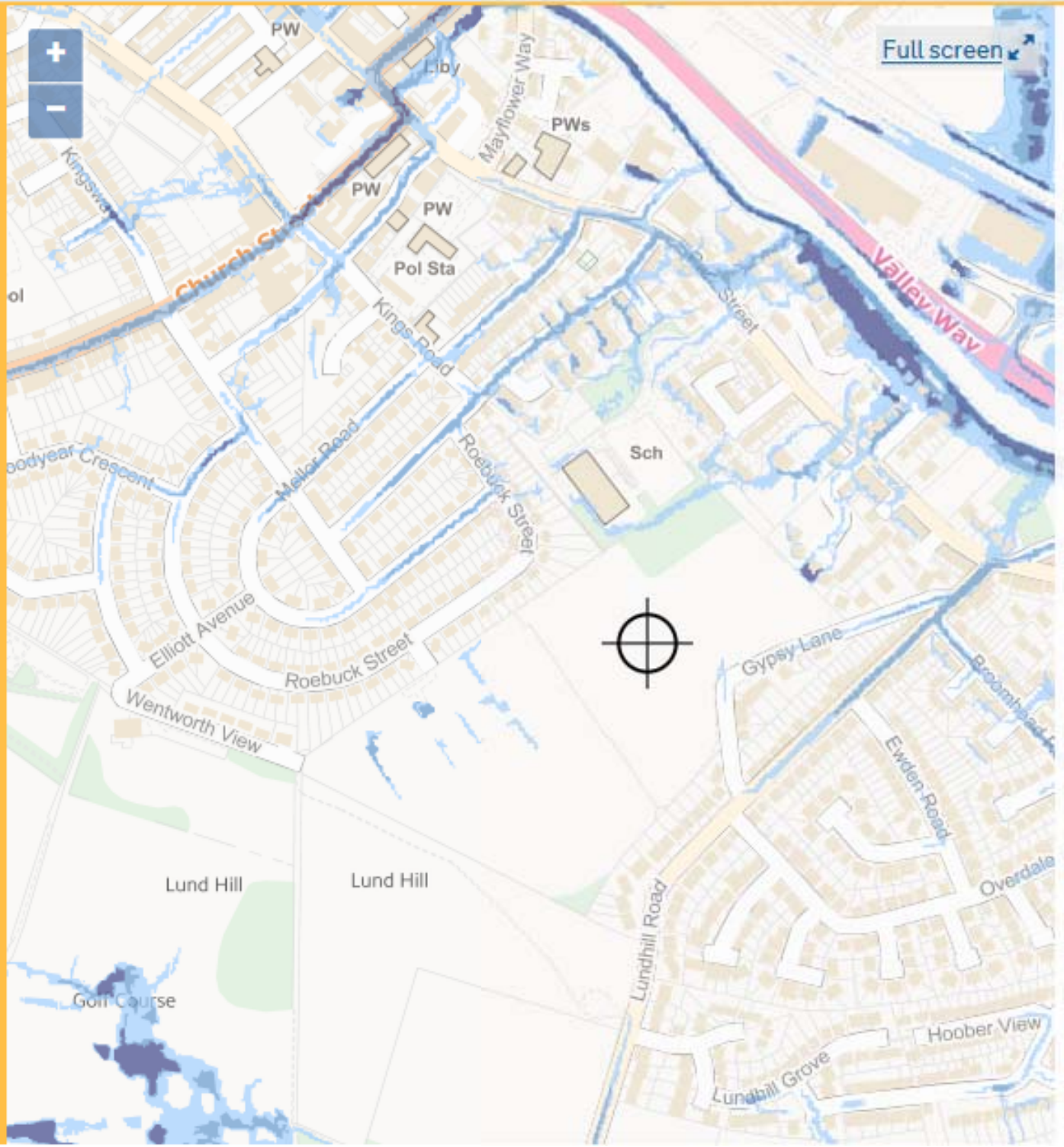
- ○ Extent of flooding
- ○ Depth and flow estimates at monitoring stations

Flood risk from surface water

- ◉ Extent of flooding
- ○ High risk: depth
- ○ High risk: velocity
- ○ Medium risk: depth
- ○ Medium risk: velocity
- ○ Low risk: depth
- ○ Low risk: velocity

Flood risk from reservoirs

- ○ Extent of flooding
- ○ Flood depth

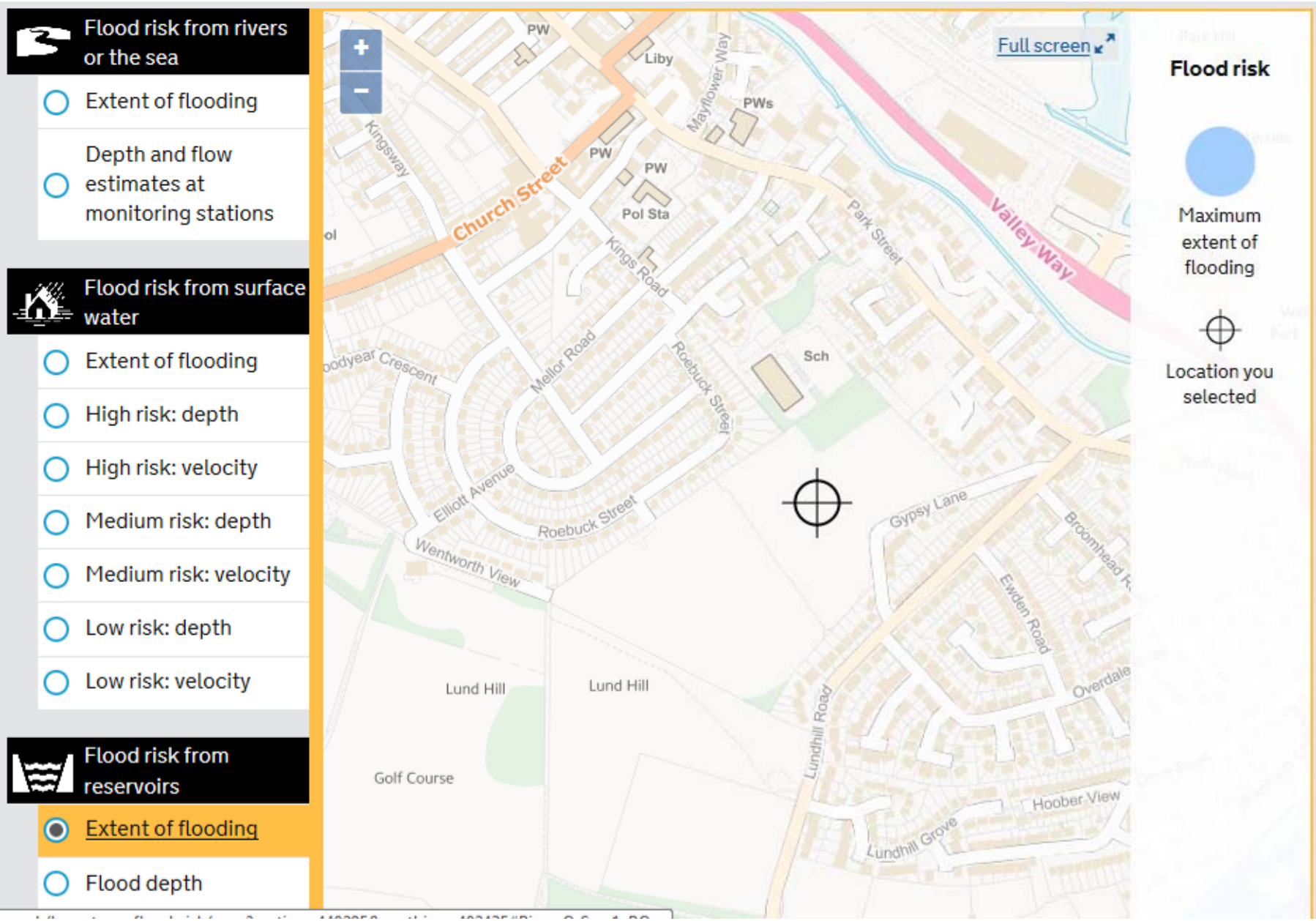


Flood risk

- High
- Medium
- Low
- Very low
- Location you selected

APPENDIX F

Reservoirs flood map


Flood risk from rivers or the sea
Extent of flooding
Depth and flow estimates at monitoring stations
Flood risk from surface water
Extent of flooding
High risk: depth
High risk: velocity
Medium risk: depth
Medium risk: velocity
Low risk: depth
Low risk: velocity
Flood risk from reservoirs
Extent of flooding
Flood depth
Full screen
Flood risk
Maximum extent of flooding
Location you selected
Church Street
Valley Way
Park Street
Kings Road
Mellor Road
Roebuck Street
Elliott Avenue
Wentworth View
Gypsy Lane
Ewden Road
Lundhill Road
Lundhill Grove
Hoober View
Overdale
Lund Hill
Golf Course
Sch
Pol Sta
PW
PWs
Liby
Mayflower Way
Kingsway

APPENDIX G

REFH2 Results

19/003: Wombwell High School Site

SUMMARY OF REFH RESULTS

Event AEP	Greenfield		Brownfield		Post development		% change	
	Peak Flow l/s	Volume m^3	Peak Flow l/s	Volume m^3	Peak Flow l/s	Volume m^3	Peak Flow	Volume
100%	33.11	431.56			51.55	574.53	56%	33%
50%	37.59	496.38			58.57	658.80	56%	33%
3.3%	86.05	1,197.46			131.28	1,542.09	53%	29%
1%	119.25	1,678.73			178.28	2,122.81	50%	26%
						Average:	53%	30%
1% - 20% CCA					214.06	2568.77		
1% - 40% CCA					250.59	3023.35		
Estimate of attenuation storage required:					20% CCA	2072.39		
					40% CCA	2526.97		

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:04:58 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: 1DB7-59BB

Site name: Wombwell High School Site - Greenfield
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Greenfield

Model run: 1 year

Summary of results

Rainfall - FEH 2013 (mm):	16.95	Total runoff (ML):	0.43	431.56 m^3
Total Rainfall (mm):	10.61	Total flow (ML):	0.75	
		Peak flow (m^3/s):	0.03	33.11 l/s
Peak Rainfall (mm):	3.59			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:05:33 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: 1DB7-59BB

Site name: Wombwell High School Site - Greenfield
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Greenfield

Model run: 2 year

Summary of results

Rainfall - FEH 2013 (mm):	19.40	Total runoff (ML):	0.50	496.38 m^3
Total Rainfall (mm):	12.15	Total flow (ML):	0.86	
		Peak flow (m^3/s):	0.04	37.59 l/s
Peak Rainfall (mm):	4.10			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:05:51 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: 1DB7-59BB

Site name: Wombwell High School Site - Greenfield
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Greenfield

Model run: 30 year

Summary of results

Rainfall - FEH 2013 (mm):	44.58	Total runoff (ML):	1.20	1197.46 m^3
Total Rainfall (mm):	27.91	Total flow (ML):	2.06	
		Peak flow (m^3/s):	0.09	86.05 l/s
Peak Rainfall (mm):	9.43			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:06:18 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: 1DB7-59BB

Site name: Wombwell High School Site - Greenfield
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Greenfield

Model run: 100 year

Summary of results

Rainfall - FEH 2013 (mm):	60.65	Total runoff (ML):	1.68	1678.73 m^3
Total Rainfall (mm):	37.97	Total flow (ML):	2.90	
		Peak flow (m^3/s):	0.12	119.25 l/s
Peak Rainfall (mm):	12.83			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:08:03 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: AFED-CF4C

Site name: Wombwell High School Site
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Post development

Model run: 1 year

Summary of results

Rainfall - FEH 2013 (mm):	16.95	Total runoff (ML):	0.57	574.53 m^3
Total Rainfall (mm):	10.61	Total flow (ML):	0.73	
		Peak flow (m^3/s):	0.05	51.55 l/s
Peak Rainfall (mm):	3.59			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0.03 [0]	Yes
Urbext 2000	0.32 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:08:46 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: AFED-CF4C

Site name: Wombwell High School Site
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Post development

Model run: 2 year

Summary of results

Rainfall - FEH 2013 (mm):	19.40	Total runoff (ML):	0.66	658.80 m^3
Total Rainfall (mm):	12.15	Total flow (ML):	0.84	
		Peak flow (m^3/s):	0.06	58.57 l/s
Peak Rainfall (mm):	4.10			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0.03 [0]	Yes
Urbext 2000	0.32 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:09:05 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: AFED-CF4C

Site name: Wombwell High School Site
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Post development

Model run: 30 year

Summary of results

Rainfall - FEH 2013 (mm):	44.58	Total runoff (ML):	1.54	1542.09 m^3
Total Rainfall (mm):	27.91	Total flow (ML):	1.97	
		Peak flow (m^3/s):	0.13	131.28 l/s
Peak Rainfall (mm):	9.43			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0.03 [0]	Yes
Urbext 2000	0.32 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:09:31 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: AFED-CF4C

Site name: Wombwell High School Site
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Post development

Model run: 100 year

Summary of results

Rainfall - FEH 2013 (mm):	60.65	Total runoff (ML):	2.12	2122.81 m^3
Total Rainfall (mm):	37.97	Total flow (ML):	2.73	
		Peak flow (m^3/s):	0.18	178.28 l/s
Peak Rainfall (mm):	12.83			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0.03 [0]	Yes
Urbext 2000	0.32 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:24:45 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: 1167-CB3B

Site name: Wombwell High School Site
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Post development: 1% AEP & 20% CCA

Model run: 200 year

Summary of results

Rainfall - FEH 2013 (mm):	72.75	Total runoff (ML):	2.57	2568.77 m^3
Total Rainfall (mm):	45.55	Total flow (ML):	3.31	
		Peak flow (m^3/s):	0.21	214.06 l/s
Peak Rainfall (mm):	15.39			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0.03 [0]	Yes
Urbext 2000	0.32 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

UK Design Flood Estimation

Generated on Friday, January 11, 2019 11:25:12 AM by John
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: 1167-CB3B

Site name: Wombwell High School Site
Easting: 440289
Northing: 402467
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.07
Using plot scale calculations: Yes
Site description: Post development: 1% AEP & 40% CCA

Model run: 367 year

Summary of results

Rainfall - FEH 2013 (mm):	84.88	Total runoff (ML):	3.02	3023.35 m^3
Total Rainfall (mm):	53.14	Total flow (ML):	3.92	
		Peak flow (m^3/s):	0.25	250.59 l/s
Peak Rainfall (mm):	17.95			

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.42	No
Cmax (mm)	260.56	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.17 [1.24]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	30.46 [26.16]	Yes
BR	0.72	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km²)	0.03 [0]	Yes
Urbext 2000	0.32 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km²)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

APPENDIX H

Report of infiltration tests

Eastwood and Partners report dated 27th December 2018

Eastwood & Partners
CONSULTING ENGINEERS

Eastwood & Partners, St Andrew's House, 23 Kingfield Road, Sheffield, S11 9AS
Tel: 0114 255 4554 Fax: 0114 255 4330 mail@eastwoodandpartners.com www.eastwoodandpartners.com

Mr M Platts
Premier Group
51 Rimington Road
Wombwell
Barnsley
S73 8DQ

PR/AJK/SAE/43497-001

27 December 2018

Dear Martyn,

Wombwell High School

We are writing to report the findings of the infiltration testing undertaken on the above site on 17 and 18 December 2018.

The site comprises a former school, now demolished, and associated playing fields. The site is split into three terraces, with the upper terrace and former school present in the west of the site, and the lowest terrace present in the east of the site. A difference in level of approximately 5 m bgl is present between each terrace.

Site Works

Nine soakaway pits were excavated across the site, to depths of between 1.2 m and 2.3 m below ground level (bgl).

Water was then pumped in to each pit to a depth of at least 500 mm, and the change in water level was monitored at regular intervals over at least a three hour period, or until the water had drained from each pit, whichever came first. Between one and three infiltration tests were undertaken in each pit.

Two trial pits were additionally excavated to 2.4 m and 3.4 m bgl, in order to assess the depth of fill in the east of the uppermost terrace.

The locations of the soakaway and trial pits are shown on the Exploratory Hole Location Plan, drawing number 43497/001/A, which is appended to this report.

Ground Conditions

Historically, a cut and fill earthworks exercise has occurred on the site in order to create three flat terraces for the former school playing fields. Generally the surrounding land slopes from the west down to the east.

Topsoil comprising clayey sand, and occasionally sandy clay, was encountered in the excavations across the site to depths of between 0.3 m and 0.5 m bgl. This was underlain by clayey sand and gravel in SA3, SA6 and SA7, encountered to the base of the pit in SA3 and underlain by weak to medium strong sandstone at 1.1 m and 0.9 m bgl respectively in SA6 and SA7.

In the remainder of exploratory holes, made ground comprising sandy gravelly reworked clay, with occasional to frequent cobbles of sandstone with depth was encountered, with the depth of made ground increasing towards the east. This was underlain by natural sand and gravel from 0.6 m bgl in SA1 and SA4, and from 1.4 m bgl in SA7, and by weak to medium strong sandstone from depths of between 1.1 m and 2.25 m bgl in SA2, SA8, SA9, TP1 and TP2. Pits excavated in the west of each terrace generally recorded sandstone bedrock at shallower depth than those in the east of each terrace.

The trial pit and soakaway logs are appended to this report.

Infiltration Results

The results and calculation of Infiltration Results are appended to this report, and are summarised in the table below:

Soakaway	Test Material	BRE365 Soil Infiltration Rate (x10-6) m/s	Average Infiltration Rate
SA1 Test 1	Reworked clay over sand and gravel	34	31
SA1 Test 2		69	56
SA1 Test 3		47	57
SA2	Reworked clay over sandstone at base	0	0
SA3 Test 1	Sand and gravel	360	580
SA3 Test 2		240	360
SA3 Test 3		310	430
SA4 Test 1	Reworked clay over sand and gravel	21	34
SA4 Test 2		25	40
SA5 Test 1	Reworked clay over sand and gravel	45	66
SA5 Test 2		18	33
SA6 Test 1	Sand and gravel over sandstone	220	310
SA6 Test 2		120	180
SA6 Test 3		120	160

SA7 Test 1	Gravel over sandstone	33	39
SA7 Test 2		17	25
SA8	Reworked clay over sandstone	-	2.5
SA9 Test 1	Reworked clay over sandstone	98	98
SA9 Test 2		64	76
SA9 Test 3		61	79

Conclusion

Soakaways excavated within sand and gravel generally performed the best, with those soakaways whose pit walls generally comprised reworked clay performing the worst overall.

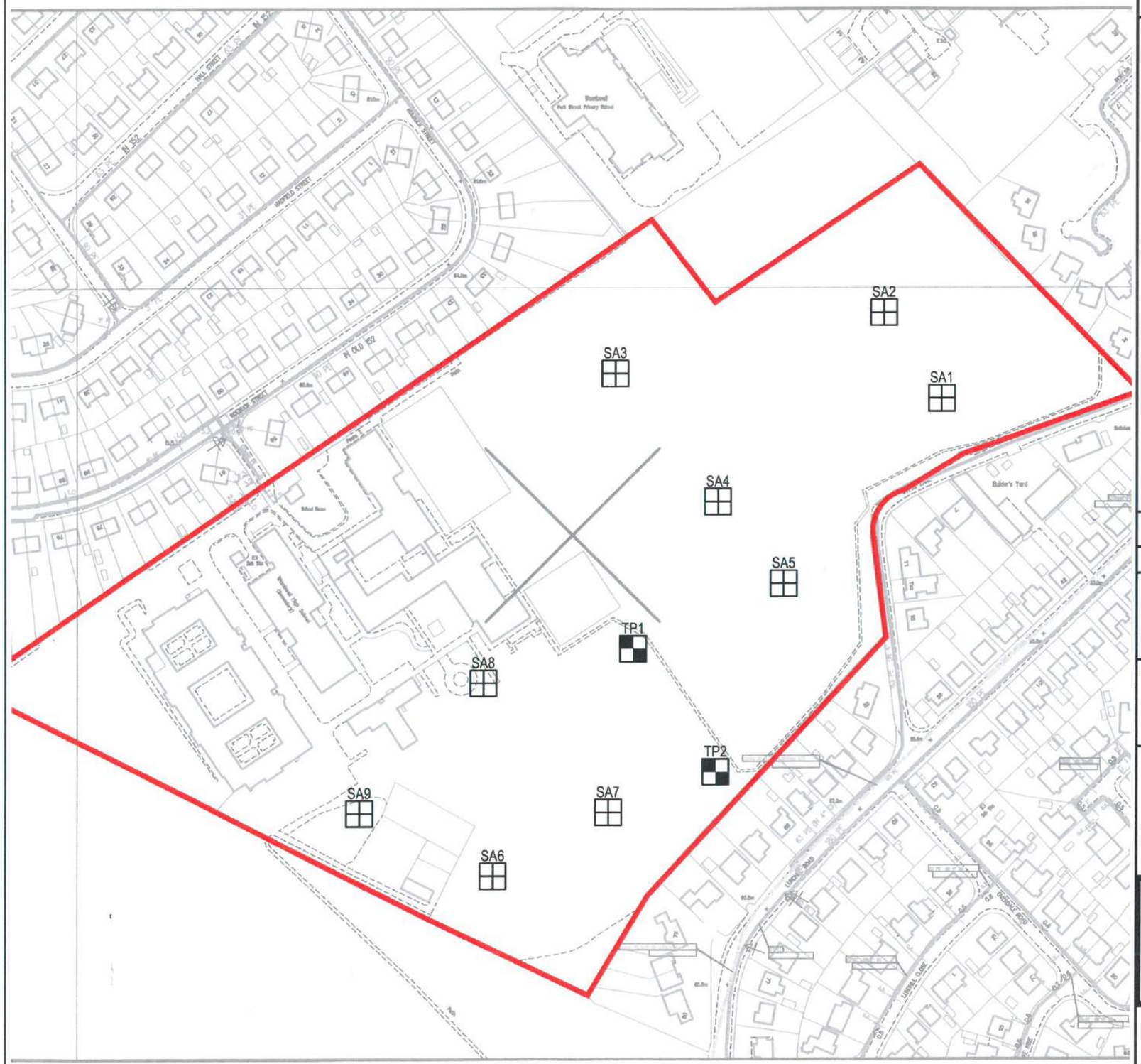
Therefore it is recommended soakaways be constructed within the sand and gravel generally found to the west of each terrace, and avoid the made ground, found to extend to significant depth towards the east of each terrace.

We trust that this meets with your approval, however if you have any comments or queries please do not hesitate to contact us.

Yours sincerely

Andrew Kerslake
Associate

Enc. Exploratory Hole Plan
Infiltration Results - SA1 to SA9
Trial Pit and Soakaway Logs



This plan shows those pipes owned by Cadent Gas Ltd in their role as a

INFORMATION WITHIN THIS DRAWING IS NOT NECESSARILY PRODUCED TO SCALE. ALWAYS USE FIGURED DIMENSIONS AND CO-ORDINATES - IF IN DOUBT, ASK.

KEY:

- Approximate location of trial pits excavated by Eastwood and Partners on 18.12.18.
- Approximate location of soakaway excavated by Eastwood and Partners between 17.12.18 and 18.12.18.
- Site Boundary

REV	DESCRIPTION	SIG	CHK	DATE
A	First Issue.			

PREMIER CONSTRUCTION NORTHERN LTD

WOMBWELL HIGH SCHOOL, GYPSY LANE, WOMBWELL

EXPLORATORY HOLE LOCATION PLAN

Eastwood & Partners CONSULTING ENGINEERS
E&P
St. Andrew's House
23 Kingfield Road
Sheffield
S11 9AS
Tel 0114 255 4554
Fax 0114 255 4330
mail@eastwoodandpartners.com
www.eastwoodandpartners.com

SCALE WHEN PLOTTED AT A3	DRAWING STATUS
1:2000	INFORMATION

DRAWN	CHECKED	DATE	DRAWING NUMBER	REV
TC	?	19.12.18	43497/001	A

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA1
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 2.50m / Depth: 1.60m / 0.60m	Scale 1:25
Client: Premier Construction Northern Ltd.			Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Grass over dark brown sandy CLAY.
			0.35			MADE GROUND: Light brown /orange brown sandy reworked CLAY.
			0.60			Brown Clayey SAND and GRAVEL with occasional to frequent cobbles. Gravel is fine to coarse angular to sub-angular of sandstone.
			1.60			Trialpit Complete at 1.600m

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA2
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 2.90m, 0.60m	Scale 1:25
Client: Premier Construction Northern Ltd.		Depth: 2.25m	Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Gras sover dark brown clayey SAND.
			0.40			MADE GROUND: Firm brown sandy reworked CLAY.
			1.20			MADE GROUND: Stiff to friable brown mottled grey sandy gravelly reworked CLAY with occasional cobbles. Gravel is medium to coarse angular to sub-angular of sandstone.
			1.80			MADE GROUND: Grey brown friable sandyreworked CLAY.
			2.20			Strong brown SANDSTONE.
			2.25			Trialpit Complete at 2.250m

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA3
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 2.90m, 0.60m	Scale 1:25
Client: Premier Construction Northern Ltd.		Depth: 1.60m	Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Grass over dark brown clayey SAND.
			0.40			Orange brown clayey SAND and GRAVEL. Gravel is medium to coarse angular to sub-angular of sandstone. Occasional becomng frequent cobbles with depth.
			1.60			Trialpit Complete at 1.600m

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA4
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 3.10m, 0.65m	Scale 1:25
Client: Premier Construction Northern Ltd.		Depth: 1.50m	Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Grass over dark brown clayey SAND.
			0.30			MADE GROUND: Brown very sandy reworked CLAY.
			0.60			Orange brown clayey SAND and GRAVEL. Gravel is fine to coarse subangular of sandstone. Occasional becoming frequent cobbles from 0.9 m bgl.
			1.50			Trialpit Complete at 1.500m

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA5
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 2.80m (0.65m) Depth: 1.80m	Scale 1:25
Client: Premier Construction Northern Ltd.			Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Grass over dark brown clayey SAND.
			0.30			MADE GROUND: Brown sandy gravelly reworked CLAY with occasional cobbles. Gravel is fine to coarse sub-angular of sandstone.
			1.40			Brown slightly clayey SAND and GRAVEL.Gravel is fine to coarse sub-angular of sandstone, with occasional cobbles.
			1.80			Trialpit Complete at 1.800m

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA6
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 3.00m, 0.70m	Scale 1:25
Client: Premier Construction Northern Ltd.		Depth: 1.30m	Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Grass over dark brown clayey SAND.
			0.30			Yellow/orange brown slightly clayey SAND and GRAVEL. Gravel is fine to coarse angular to subangular of sandstone. Frequent cobbles with depth.
			1.10			Weak to medium strong yellow brown SANDSTONE recovered as cobbles and gravel.
			1.30			Trialpit Complete at 1.300m

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA7
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 3.10m, 0.80m, Depth: 1.20m	Scale 1:25
Client: Premier Construction Northern Ltd.			Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Grass over dark brown clayey SAND.
			0.50			Orange brown slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular of sandstone, with frequent cobbles with depth.
			0.90			Medium strong SANDSTONE recoverd as sand gravel, with frequent cobbles.
			1.20			Trialpit Complete at 1.200m

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA8
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 3.20m, 0.70m	Scale 1:25
Client: Premier Construction Northern Ltd.		Depth: 1.30m	Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Grass over dark brown clayey SAND.
			0.40			MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is fine to medium sub-angular of sandstone.
			0.60			POSSIBLE MADE GROUND: Yellow/orange brown sandy very gravelly CLAY. Gravel is fine to medium sub-angular of sandstone.
			1.10			Extremely weak to weak grey brown SANDSTONE, recovered as tabular gravel.
			1.30			Trialpit Complete at 1.300m

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
SA9
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: 3.20m, 0.70m	Scale 1:25
Client: Premier Construction Northern Ltd.		Depth: 1.25m	Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Grass over dark brown clayey SAND.
			0.40			MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is fine to medium sub-angular of sandstone.
			0.60			POSSIBLE MADE GROUND: Yellowish brown sandy gravelly CLAY. Gravel is fine to coarse subangular of sandstone.
			1.10			Weak to medium strong yellow brown SANDSTONE, recovered as tabular gravel and cobbles.
			1.25			Trialpit Complete at 1.250m

1
2
3
4

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
TP1
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: m	Scale 1:25
Client: Premier Construction Northern Ltd.		Depth: 3.40m m	Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Dark Brown clayey SAND.
			0.40			MADE GROUND: Brown Sandy gravelly reworked CLAY with occasional cobbles. Gravel is fine to coarse sub-angular of SANDSTONE.
			1.00			MADE GROUND: Brown sclayey gravelly SAND. Gravel is fine to coarse sub-angular of SANDSTONE with occasional cobbles.
			1.30			MADE GROUND: Brown sandy gravelly reworked CLAY with occasional cobbles. Gravel is fine to coarse sub-angular of SANDSTONE.
			2.00			Extremely weak to weak grey brown SANDSTONE recovered as sand, gravel and occasional cobbles. Cobble content increases with depth.
			3.40			Trialpit Complete at 3.400m

1 2 3 4

Remarks:

Stability:

Eastwood&Partners
CONSULTING ENGINEERS

TrialPit No
TP2
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Wombwell High School	43497	Level:	19/12/2018
Location:		Dimensions: m	Scale 1:25
Client: Premier Construction Northern Ltd.		Depth: 2.40m m	Logged

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL: Dark brown clayey SAND.
			0.30			MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is fine to coarse sub-angular of SANDSTONE.
			0.80			MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is fine to coarse sub-angular of SANDSTONE.
			1.20			MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is sub-angular of SANDSTONE.
			2.10			Medium strong brown SANDSTONE recovered as sand, gravel and cobbles.
			2.40			Trialpit Complete at 2.400m

Remarks:

Stability:

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA1 - Test 1**

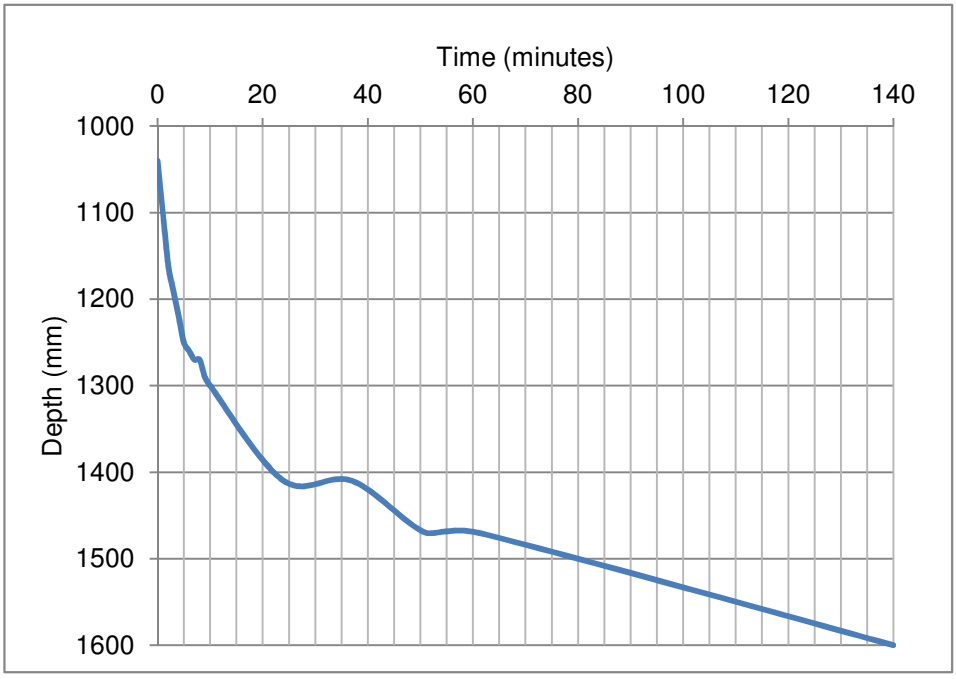
Test Pit Dimensions

Length = **2500** mm
Width = **600** mm
Depth = **1600** mm (Total depth)

Plan area = **1.5** m²

Approximate time to discharge water into the hole: **40** Seconds
Depth to water after completion of pumping: **1040** mm

Time (min)	Depth (mm)
0	**1040**
1	**1100**
2	**1160**
3	**1190**
4	**1220**
5	**1250**
6	**1260**
7	**1270**
8	**1270**
9	**1290**
10	**1300**
24	**1410**
37	**1410**
51	**1470**
61	**1470**
140	**1600**



Depth (m)	Description
0.00 - 0.35	TOPSOIL: Grass over dark brown sandy CLAY.
0.35 - 0.60	MADE GROUND: Light brown / orange brown sandy reworked CLAY.
0.60 - 1.60	Brown clayey SAND and GRAVEL with occasional to frequent cobbles. Gravel is fine to coarse angular to sub-angular of sandstone.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA1 - Test 1

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters
Depth to water = **1040** mm
Start time = **0** min

Final parameters
Depth to water = **600** mm
End time = **140** min

Average water depth: **280** mm
Change in water depth: **560** mm
Time interval: **140** min

Effective Storage Volume of Water in the Trial Pit = **0.75** m³
75% Effective Depth = **1225** mm from ground level
25% Effective Depth = **1475** mm from ground level
Time at 75% Effective Depth = **4** minutes
Time at 25% Effective Depth = **64** minutes

= **0.38** m³

= **3.05** m²

= **3600** sec

= **3.4E-05 m/sec**

Average Soakaway Rate = **1.0E-04** m³/sec
Average soakaway area = **3.24** m² (sides + base)

V_{p75-25} **Soil Infiltration Rate =** **3.4E-05 m/sec**
a_{p50} **verage Infiltration Rate =** **3.1E-05 m/sec**

t_{p75-25}

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA1 - Test 2**

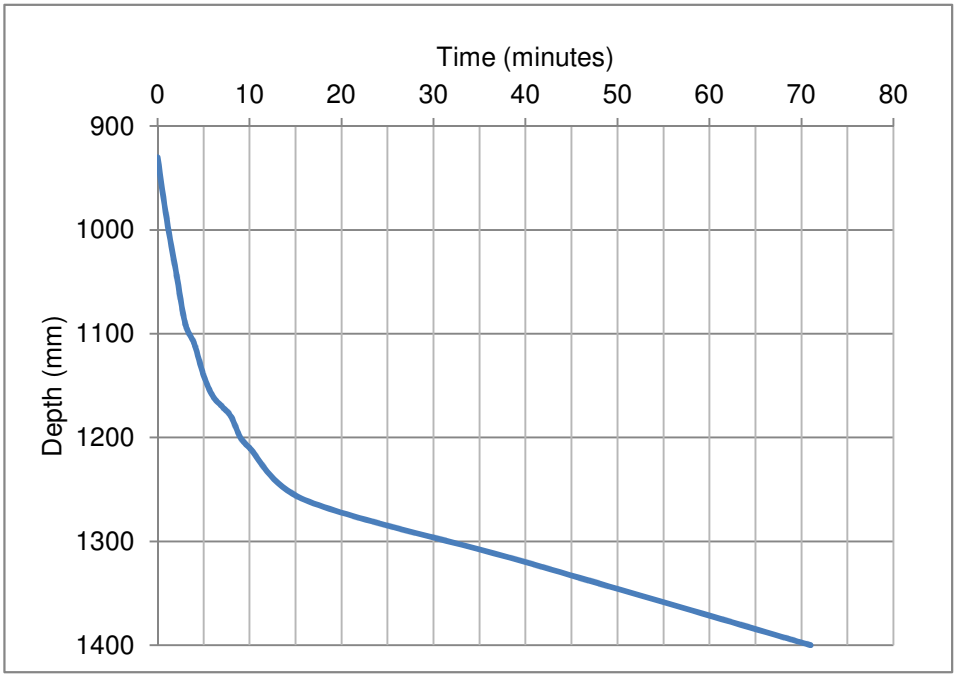
Test Pit Dimensions

Length = **2500** mm
Width = **600** mm
Depth = **1400** mm (Total depth)

Plan area = **1.5** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **930** mm

Time (min)	Depth (mm)
0	**930**
1	**990**
2	**1040**
3	**1090**
4	**1110**
5	**1140**
6	**1160**
7	**1170**
8	**1180**
9	**1200**
10	**1210**
16	**1260**
40	**1320**
71	**1400**



Depth (m)	Description
0.00 - 0.35	TOPSOIL: Grass over dark brown sandy CLAY.
0.35 - 0.60	MADE GROUND: Light brown / orange brown sandy reworked CLAY.
0.60 - 1.60	Brown clayey SAND and GRAVEL with occasional to frequent cobbles. Gravel is fine to coarse angular to sub-angular of sandstone.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA1 - Test 2

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters
Depth to water = **930** mm
Start time = **0** min

Final parameters
Depth to water = **400** mm
End time = **71** min

Average water depth: **235** mm

Change in water depth: **470** mm

Time interval: **71** min

Effective Storage Volume of Water in the Trial Pit = **0.615** m³
75% Effective Depth = **1093** mm from ground level
25% Effective Depth = **1298** mm from ground level
Time at 75% Effective Depth = **3** minutes
Time at 25% Effective Depth = **30** minutes

V_{p75-25} = **0.31** m³

a_{p50} = **2.77** m²

t_{p75-25} = **1620** sec

f = 6.9E-05 m/sec

Average Soakaway Rate = **1.7E-04** m³/sec
Average soakaway area = **2.96** m² (sides + base)

BR365 Soil Infiltration Rate = 6.9E-05 m/sec
Average Infiltration Rate = 5.6E-05 m/sec

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA1 - Test 3**

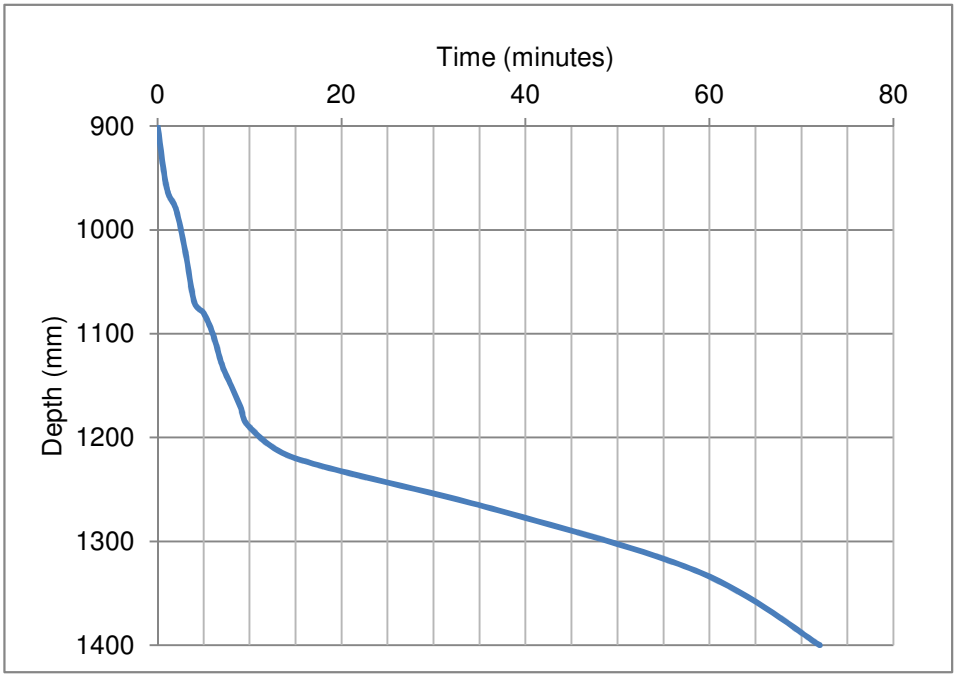
Test Pit Dimensions

Length = **2500** mm
Width = **600** mm
Depth = **1400** mm (Total depth)

Plan area = **1.5** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **900** mm

Time (min)	Depth (mm)
0	**900**
1	**960**
2	**980**
3	**1020**
4	**1070**
5	**1080**
6	**1100**
7	**1130**
8	**1150**
9	**1170**
10	**1190**
15	**1220**
37	**1270**
59	**1330**
72	**1400**



Depth (m)	Description
0.00 - 0.35	TOPSOIL: Grass over dark brown sandy CLAY.
0.35 - 0.60	MADE GROUND: Light brown / orange brown sandy reworked CLAY.
0.60 - 1.60	Brown clayey SAND and GRAVEL with occasional to frequent cobbles. Gravel is fine to coarse angular to sub-angular of sandstone.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA1 - Test 3

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters
Depth to water = **900** mm
Start time = **0** min

Final parameters
Depth to water = **400** mm
End time = **72** min

Average water depth: **250** mm

Change in water depth: **500** mm

Time interval: **72** min

Effective Storage Volume of Water in the Trial Pit = **0.66** m³
75% Effective Depth = **1070** mm from ground level
25% Effective Depth = **1290** mm from ground level
Time at 75% Effective Depth = **4** minutes
Time at 25% Effective Depth = **45** minutes

V_{p75-25} = **0.33** m³

a_{p50} = **2.86** m²

t_{p75-25} = **2460** sec

f = 4.7E-05 m/sec

Average Soakaway Rate = **1.7E-04** m³/sec
Average soakaway area = **3.05** m² (sides + base)

BR365 Soil Infiltration Rate = 4.7E-05 m/sec
Average Infiltration Rate = 5.7E-05 m/sec

EASTWOOD & PARTNERS **Sheet 1 of 2**
(Consulting Engineers) Ltd

PROJECT:	**Wombwell High School**	**Job No. 43497**	**Date 19.12.18**
SUBJECT:	**Infiltration Test Results and Calculation of Infiltration Rates**	**Prepared JA/SAE**	**Checked DN**

Test No. **SA2 - Test 1**

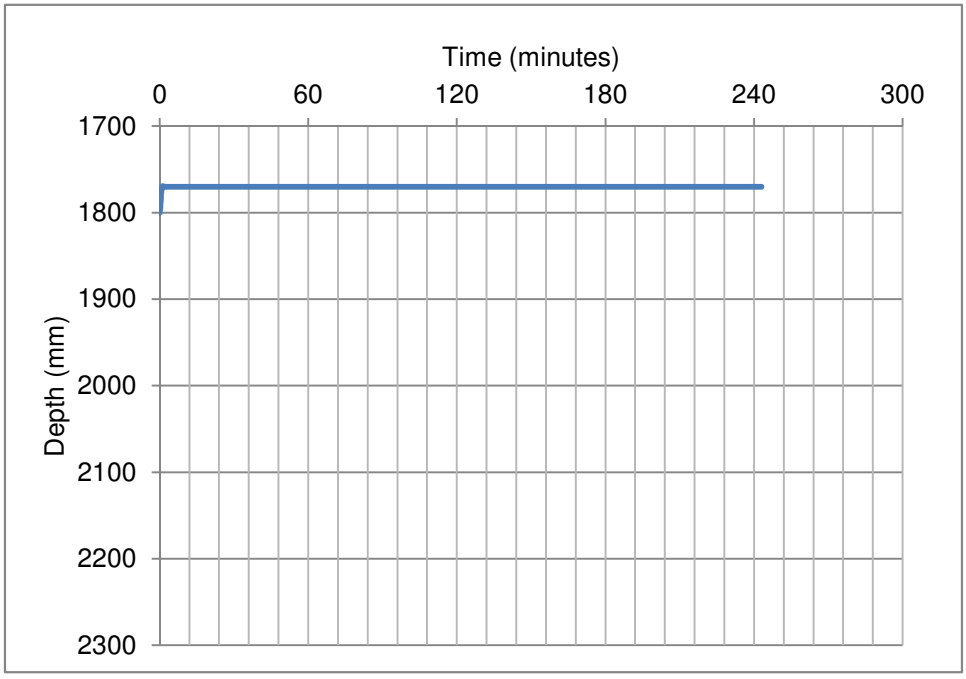
Test Pit Dimensions

Length = **2900** mm
Width = **600** mm
Depth = **2250** mm (Total depth)

Plan area = **1.74** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **1800** mm

Time (min)	Depth (mm)
0	**1800**
1	**1770**
2	**1770**
3	**1770**
4	**1770**
5	**1770**
6	**1770**
7	**1770**
8	**1770**
9	**1770**
10	**1770**
20	**1770**
39	**1770**
112	**1770**
203	**1770**
243	**1770**



Depth (m)	Description
0.00 - 0.40	TOPSOIL: Grass over dark brown clayey SAND.
0.40 - 1.20	MADE GROUND: Firm brown sandy reworked CLAY.
1.20 - 1.80	MADE GROUND: Stiff to friable brown mottled grey sandy gravelly reworked CLAY with occasional cobbles. Gravel is medium to coarse angular to sub-angular of sandstone.
1.8-2.2	MADE GROUND: Grey brown friable sandyreworked CLAY.
2.2 - 2.25	Strong brown SANDSTONE.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA2 - Test 1

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters
Depth to water = **1770** mm
Start time = **0** min

Final parameters
Depth to water = **770** mm
End time = **243** min

Average water depth: **480** mm

Change in water depth: **0** mm

Time interval: **243** min

Effective Storage Volume of Water in the Trial Pit = **0.8352** m³
75% Effective Depth = **1890** mm from ground level
25% Effective Depth = **2130** mm from ground level
Time at 75% Effective Depth = **N/A** minutes
Time at 25% Effective Depth = **N/A** minutes

V_{p75-25} = **0.42** m³

a_{p50} = **3.42** m²

t_{p75-25} = **0** sec

= **N/A m/sec**

Average Soakaway Rate = **0.0E+00** m³/sec
Average soakaway area = **5.10** m² (sides + base)

$\frac{V_{p75-25}}{a_{p50}}$ **BR365 Soil Infiltration Rate = 0.0E+00 m/sec**
Average Infiltration Rate = 0.0E+00 m/sec

t_{p75-25}

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA3 - Test 1**

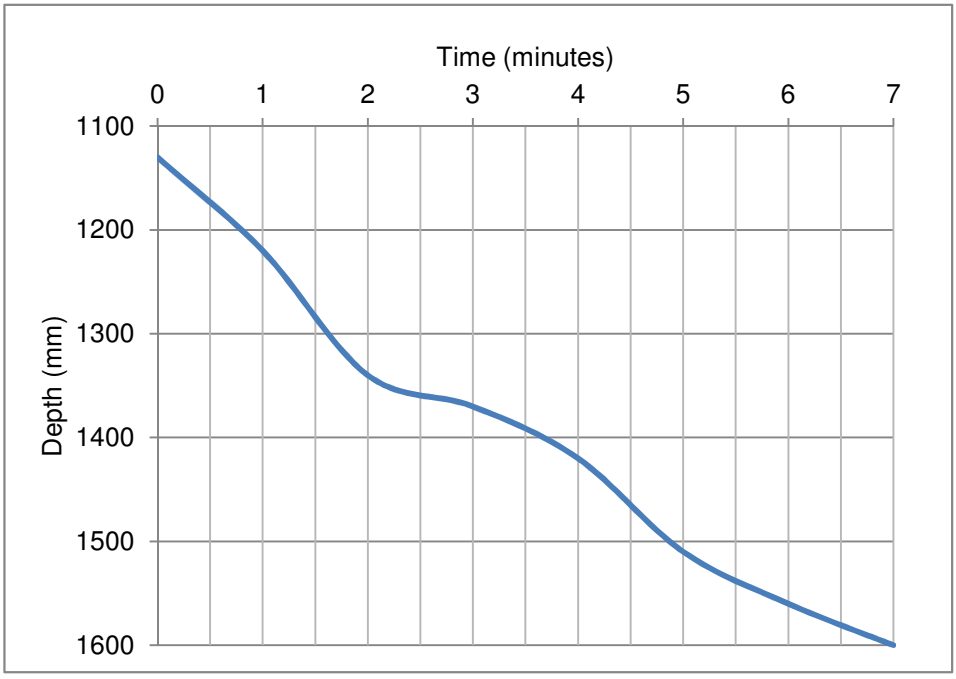
Test Pit Dimensions

Length = **2900** mm
Width = **600** mm
Depth = **1600** mm (Total depth)

Plan area = **1.74** m²

Approximate time to discharge water into the hole: **40** Seconds
Depth to water after completion of pumping: **1130** mm

Time (min)	Depth (mm)
0	**1130**
1	**1220**
2	**1340**
3	**1370**
4	**1420**
5	**1510**
6	**1560**
7	**1600**



Depth (m)	Description
0.00 - 0.40	TOPSOIL: Grass over dark brown clayey SAND.
0.40 - 1.6	Orange brown clayey SAND and GRAVEL. Gravel is medium to coarse angular to sub-angular of sandstone. Occasional becomng frequent cobbles with depth.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA3 - Test 1

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters
Depth to water = **1130** mm
Start time = **0** min

Final parameters
Depth to water = **600** mm
End time = **7** min

Average water depth: **235** mm

Change in water depth: **470** mm

Time interval: **7** min

Effective Storage Volume of Water in the Trial Pit = **0.6612** m³
75% Effective Depth = **1315** mm from ground level
25% Effective Depth = **1505** mm from ground level
Time at 75% Effective Depth = **2** minutes
Time at 25% Effective Depth = **5** minutes

= **0.33** m³

= **3.07** m²

= **300** sec

= **3.6E-04 m/sec**

Average Soakaway Rate = **1.9E-03** m³/sec
Average soakaway area = **3.39** m² (sides + base)

V_{p75-25} **BR365 Soil Infiltration Rate = 3.6E-04 m/sec**
a_{p50} **Average Infiltration Rate = 5.8E-04 m/sec**

t_{p75-25}

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA3 - Test 2**

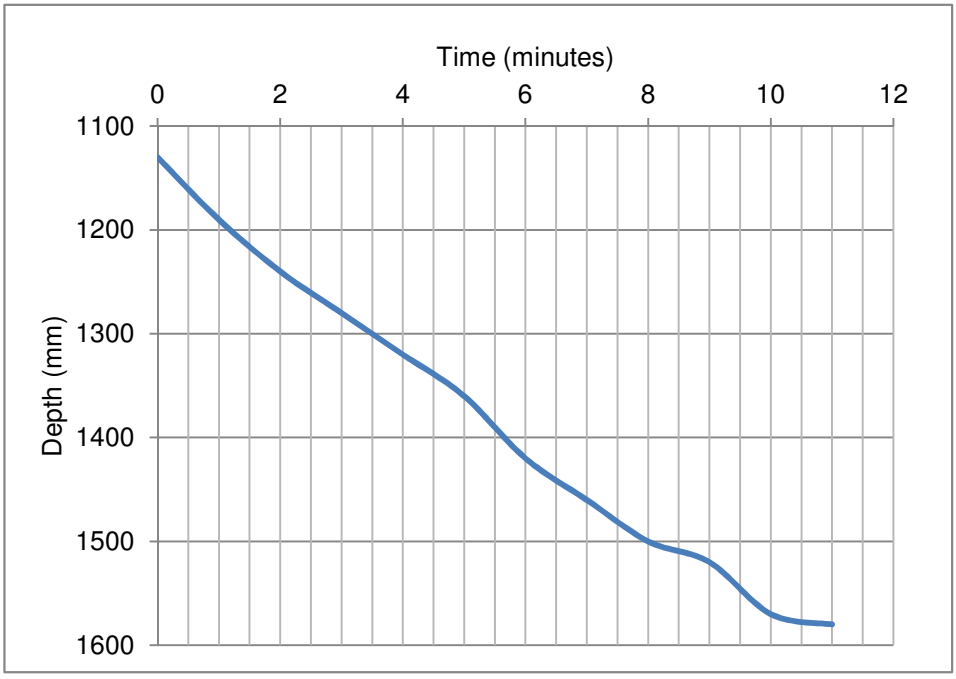
Test Pit Dimensions

Length = **2900** mm
Width = **600** mm
Depth = **1580** mm (Total depth)

Plan area = **1.74** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **1130** mm

Time (min)	Depth (mm)
0	**1130**
1	**1190**
2	**1240**
3	**1280**
4	**1320**
5	**1360**
6	**1420**
7	**1460**
8	**1500**
9	**1520**
10	**1570**
11	**1580**



Depth (m)	Description
0.00 - 0.40	TOPSOIL: Grass over dark brown clayey SAND.
0.40 - 1.6	Orange brown clayey SAND and GRAVEL. Gravel is medium to coarse angular to sub-angular of sandstone. Occasional becomng frequent cobbles with depth.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA3 - Test 2

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters
Depth to water = **1130** mm
Start time = **0** min

Final parameters
Depth to water = **580** mm
End time = **11** min

Average water depth: **225** mm

Change in water depth: **450** mm

Time interval: **11** min

Effective Storage Volume of Water in the Trial Pit = **0.6786** m³
75% Effective Depth = **1288** mm from ground level
25% Effective Depth = **1483** mm from ground level
Time at 75% Effective Depth = **3.5** minutes
Time at 25% Effective Depth = **7.5** minutes

V_{p75-25} = **0.34** m³

a_{p50} = **3.11** m²

t_{p75-25} = **450** sec

2.4E-04 m/sec

Average Soakaway Rate = **1.2E-03** m³/sec
Average soakaway area = **3.32** m² (sides + base)

$\frac{V_{p75-25}}{a_{p50}}$ **5 Soil Infiltration Rate =** **2.4E-04 m/sec**
verage Infiltration Rate = **3.6E-04 m/sec**

t_{p75-25}

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA3 - Test 3**

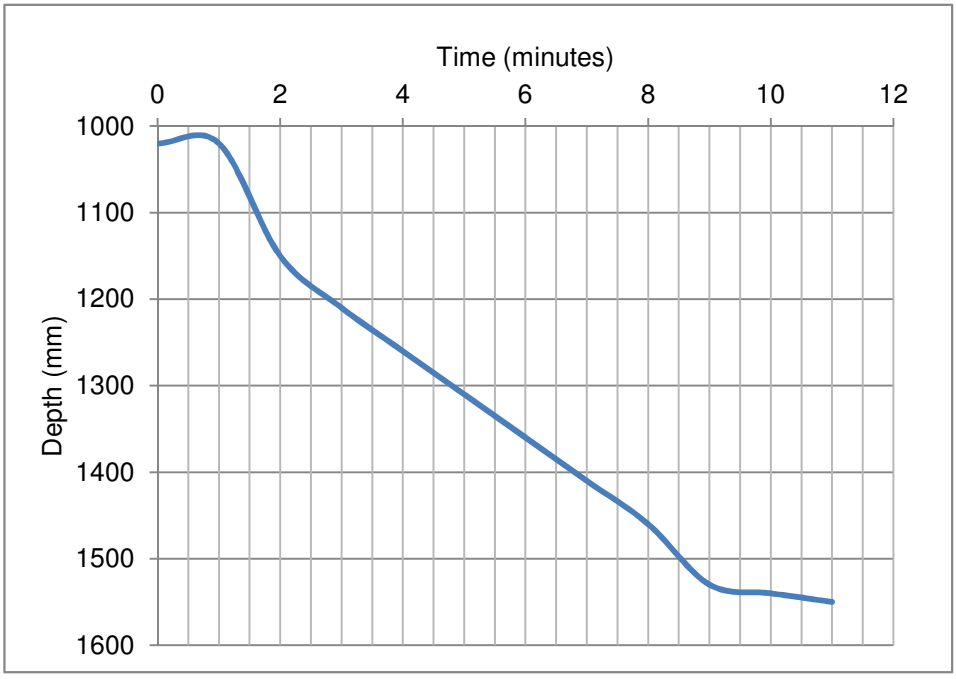
Test Pit Dimensions

Length = **2900** mm
Width = **600** mm
Depth = **1550** mm (Total depth)

Plan area = **1.74** m²

Approximate time to discharge water into the hole: **50** Seconds
Depth to water after completion of pumping: **1020** mm

Time (min)	Depth (mm)
0	**1020**
1	**1020**
2	**1150**
3	**1210**
4	**1260**
5	**1310**
6	**1360**
7	**1410**
8	**1460**
9	**1530**
10	**1540**
11	**1550**



Depth (m)	Description
0.00 - 0.40	TOPSOIL: Grass over dark brown clayey SAND.
0.40 - 1.6	Orange brown clayey SAND and GRAVEL. Gravel is medium to coarse angular to sub-angular of sandstone. Occasional becomng frequent cobbles with depth.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA3 - Test 3

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters

Depth to water = **1020** mm
Start time = **1** min

Final parameters

Depth to water = **550** mm
End time = **11** min

Average water depth: **265** mm

Change in water depth: **530** mm

Time interval: **10** min

Effective Storage Volume of Water in the Trial Pit = **0.9222** m³
75% Effective Depth = **1153** mm from ground level
25% Effective Depth = **1418** mm from ground level
Time at 75% Effective Depth = **2** minutes
Time at 25% Effective Depth = **7** minutes

= **0.46** m³

= **3.60** m²

= **420** sec

= **3.1E-04 m/sec**

Average Soakaway Rate = **1.5E-03** m³/sec
Average soakaway area = **3.60** m² (sides + base)

V_{p75-25} / a_{p50} **Soil Infiltration Rate =** **3.1E-04 m/sec**
Average Infiltration Rate = **4.3E-04 m/sec**

t_{p75-25}

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA4 - Test 1**

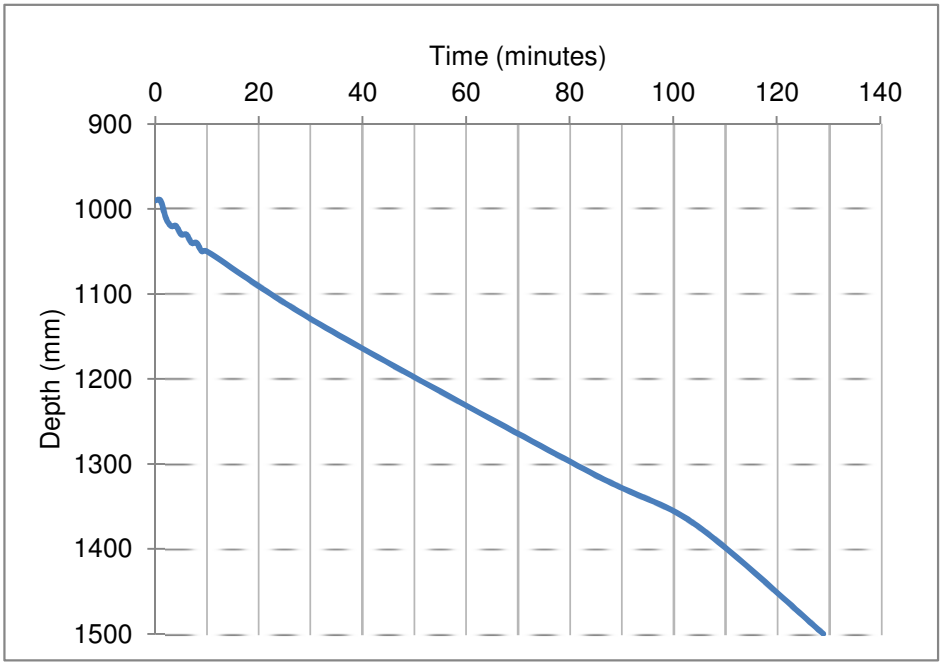
Test Pit Dimensions

Length = **3100** mm
Width = **650** mm
Depth = **1500** mm (Total depth)

Plan area = **2.015** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **990** mm

Time (min)	Depth (mm)
0	**990**
1	**990**
2	**1010**
3	**1020**
4	**1020**
5	**1030**
6	**1030**
7	**1040**
8	**1040**
9	**1050**
10	**1050**
33	**1140**
84	**1310**
104	**1370**
129	**1500**



Depth (m)	Description
0.00 - 0.30	TOPSOIL: Grass over dark brown clayey SAND.
0.30 - 0.60	MADE GROUND: Brown very sandy reworked CLAY.
0.60 - 1.5	Orange brown clayey SAND and GRAVEL. Gravel is fine to coarse subangular of sandstone. Occasional becoming frequent cobbles from 0.9 m bgl.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA4 - Test 1

Soil Infiltration Rate in Accordance with BR365

Where:

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters
Depth to water = **990** mm
Start time = **0** min

Final parameters
Depth to water = **500** mm
End time = **129** min

Average water depth: **255** mm

Change in water depth: **510** mm

Time interval: **129** min

Effective Storage Volume of Water in the Trial Pit = **1.02765** m³
75% Effective Depth = **1118** mm from ground level
25% Effective Depth = **1373** mm from ground level
Time at 75% Effective Depth = **27** minutes
Time at 25% Effective Depth = **105** minutes

V_{p75-25} = **0.51** m³

a_{p50} = **3.93** m²

t_{p75-25} = **6300** sec

f = 2.1E-05 m/sec

Average Soakaway Rate = **1.3E-04** m³/sec
Average soakaway area = **3.93** m² (sides + base)

V_{p75-25} / a_{p50} t_{p75-25} Soil Infiltration Rate = 2.1E-05 m/sec
Average Infiltration Rate = 3.4E-05 m/sec

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA4 - Test 2**

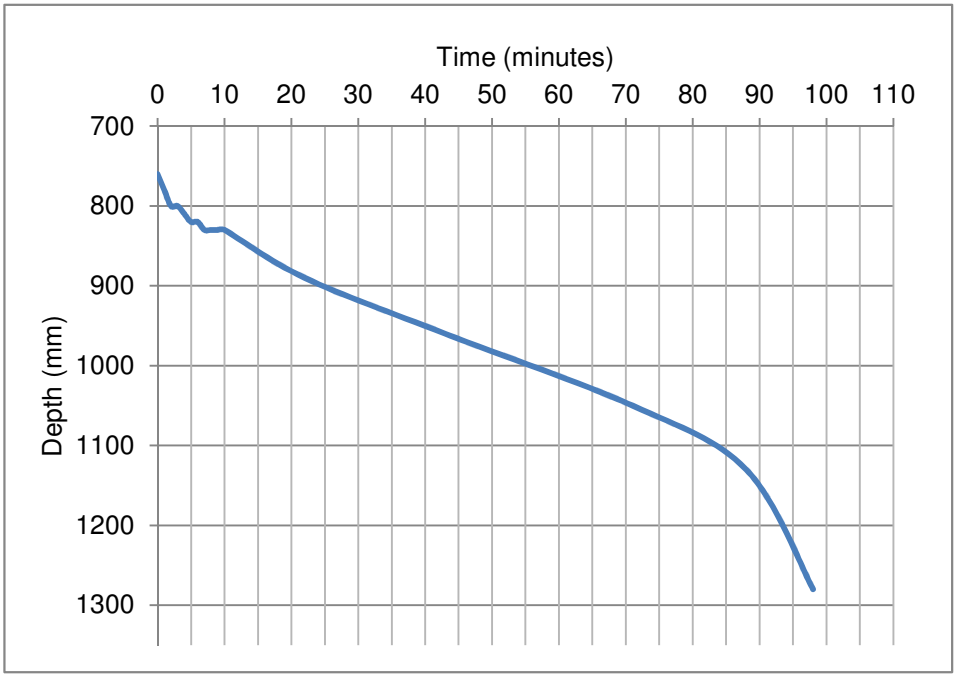
Test Pit Dimensions

Length = **3100** mm
Width = **650** mm
Depth = **1350** mm (Total depth)

Plan area = **2.015** m²

Approximate time to discharge water into the hole: **50** Seconds
Depth to water after completion of pumping: **760** mm

Time (min)	Depth (mm)
0	**760**
1	**780**
2	**800**
3	**800**
4	**810**
5	**820**
6	**820**
7	**830**
8	**830**
9	**830**
10	**830**
22	**890**
43	**960**
71	**1050**
88	**1130**
98	**1280**



Depth (m)	Description
0.00 - 0.30	TOPSOIL: Grass over dark brown clayey SAND.
0.30 - 0.60	MADE GROUND: Brown very sandy reworked CLAY.
0.60 - 1.5	Orange brown clayey SAND and GRAVEL. Gravel is fine to coarse subangular of sandstone. Occasional becoming frequent cobbles from 0.9 m bgl.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA4 - Test 2

Soil Infiltration Rate in Accordance with BR365

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **760** mm
Start time = **0** min

Final parameters

Depth to water = **280** mm
End time = **98** min

Average water depth: **330** mm

Change in water depth: **520** mm

Time interval: **98** min

Effective Storage Volume of Water in the Trial Pit = **1.14855** m³
75% Effective Depth = **923** mm from ground level
25% Effective Depth = **1208** mm from ground level
Time at 75% Effective Depth = **32** minutes
Time at 25% Effective Depth = **93** minutes

V_{p75-25} = **0.57** m³

a_{p50} = **4.15** m²

t_{p75-25} = **5580** sec

f = 2.5E-05 m/sec

Average Soakaway Rate = **1.8E-04** m³/sec
Average soakaway area = **4.49** m² (sides + base)

BR365 Soil Infiltration Rate = 2.5E-05 m/sec
Average Infiltration Rate = 4.0E-05 m/sec

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA5 - Test 1**

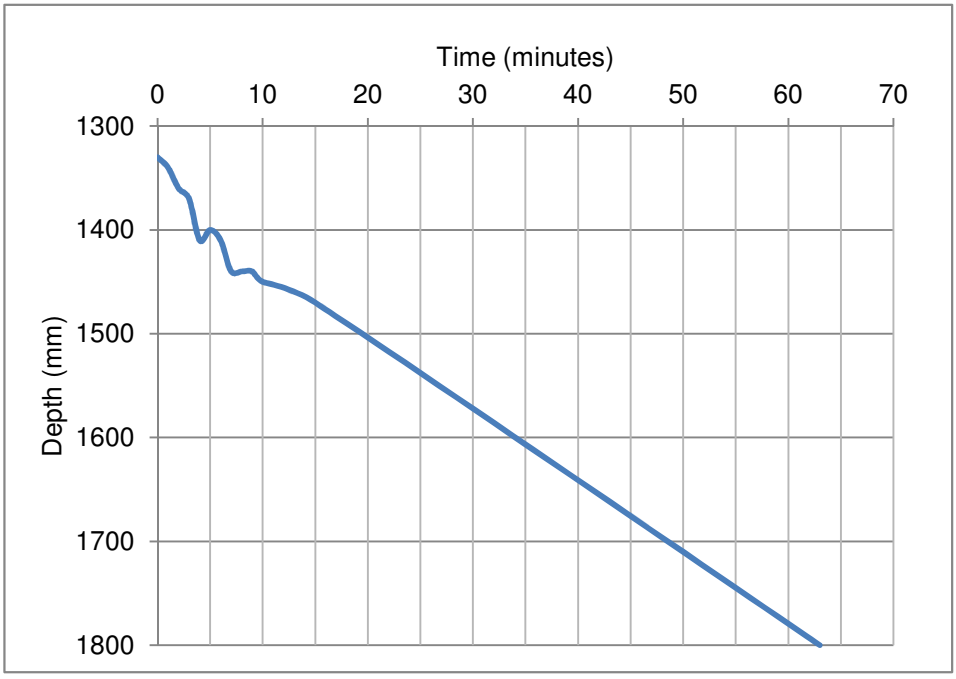
Test Pit Dimensions

Length = **2800** mm
Width = **650** mm
Depth = **1800** mm (Total depth)

Plan area = **1.82** m²

Approximate time to discharge water into the hole: **50** Seconds
Depth to water after completion of pumping: **1330** mm

Time (min)	Depth (mm)
0	**1330**
1	**1340**
2	**1360**
3	**1370**
4	**1410**
5	**1400**
6	**1410**
7	**1440**
8	**1440**
9	**1440**
10	**1450**
15	**1470**
63	**1800**



Depth (m)	Description
0.00 - 0.30	TOPSOIL: Grass over dark brown clayey SAND.
0.30 -1.40	MADE GROUND: Brown sandy gravelly reworked CLAY with occasional cobbles. Gravel is fine to coarse sub-angular of sandstone.
1.40 - 1.80	Brown slightly clayey SAND and GRAVEL.Gravel is fine to coarse sub-angular of sandstone, with occasional cobbles.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA5 - Test 1

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters
Depth to water = **1330** mm
Start time = **0** min

Final parameters
Depth to water = **800** mm
End time = **63** min

Average water depth: **235** mm

Change in water depth: **470** mm

Time interval: **63** min

Effective Storage Volume of Water in the Trial Pit = **0.8372** m³
75% Effective Depth = **1455** mm from ground level
25% Effective Depth = **1685** mm from ground level
Time at 75% Effective Depth = **11** minutes
Time at 25% Effective Depth = **46** minutes

= **0.42** m³

= **3.41** m²

= **2760** sec

= **4.5E-05 m/sec**

Average Soakaway Rate = **2.3E-04** m³/sec
Average soakaway area = **3.44** m² (sides + base)

V_{p75-25} / a_{p50} **5 Soil Infiltration Rate = 4.5E-05 m/sec**
verage Infiltration Rate = 6.6E-05 m/sec

t_{p75-25}

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA5 - Test 2**

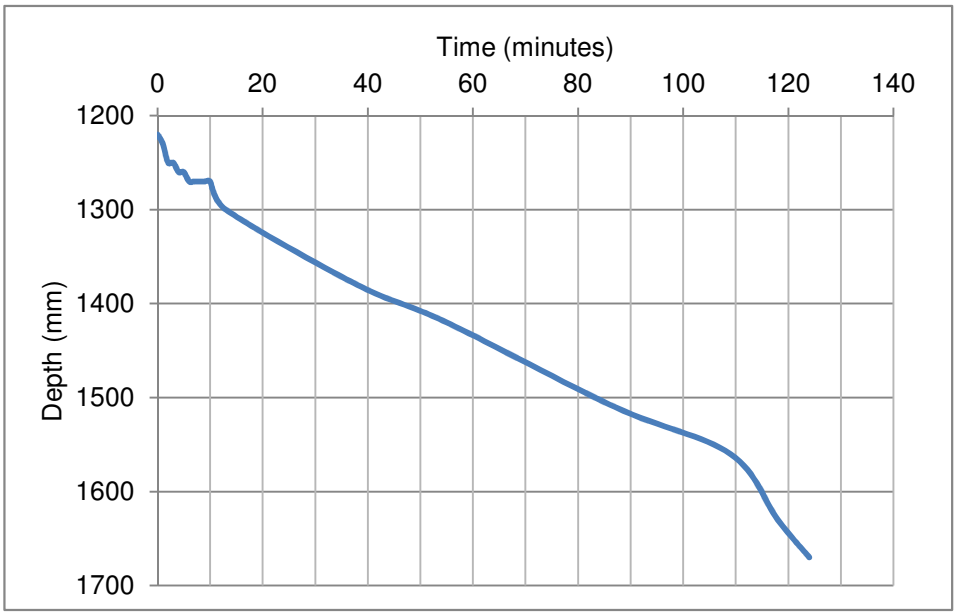
Test Pit Dimensions

Length = **2800** mm
Width = **650** mm
Depth = **1670** mm (Total depth)

Plan area = **1.82** m²

Approximate time to discharge water into the hole: **50** Seconds
Depth to water after completion of pumping: **1220** mm

Time (min)	Depth (mm)
0	**1220**
1	**1230**
2	**1250**
3	**1250**
4	**1260**
5	**1260**
6	**1270**
7	**1270**
8	**1270**
9	**1270**
10	**1270**
13	**1300**
38	**1380**
55	**1420**
87	**1510**
109	**1560**
118	**1630**
124	**1670**



Note: Repeated minor side collapse between 2 minutes and 10 minutes

Depth (m)	Description
0.00 - 0.30	TOPSOIL: Grass over dark brown clayey SAND.
0.30 -1.40	MADE GROUND: Brown sandy gravelly CLAY with occasional cobbles. Gravel is fine to coarse sub-angular of sandstone.
1.40 - 1.80	Brown slightly clayey SAND and GRAVEL.Gravel is fine to coarse sub-angular of sandstone, with occasional cobbles.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA5 - Test 2

Soil Infiltration Rate in Accordance with BR365

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **1270** mm
Start time = **10** min

Final parameters

Depth to water = **1670** mm
End time = **124** min

Average water depth: **200** mm

Change in water depth: **400** mm

Time interval: **114** min

Effective Storage Volume of Water in the Trial Pit = **0.8008** m³
75% Effective Depth = **1340** mm from ground level
25% Effective Depth = **1560** mm from ground level
Time at 75% Effective Depth = **26** minutes
Time at 25% Effective Depth = **109** minutes

V_{p75-25} = **0.40** m³

a_{p50} = **3.34** m²

t_{p75-25} = **6540** sec

f = **1.8E-05 m/sec**

Average Soakaway Rate = **1.1E-04** m³/sec
Average soakaway area = **3.20** m² (sides + base)

BR365 Soil Infiltration Rate = 1.8E-05 m/sec
Average Infiltration Rate = 3.3E-05 m/sec

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA6 - Test 1**

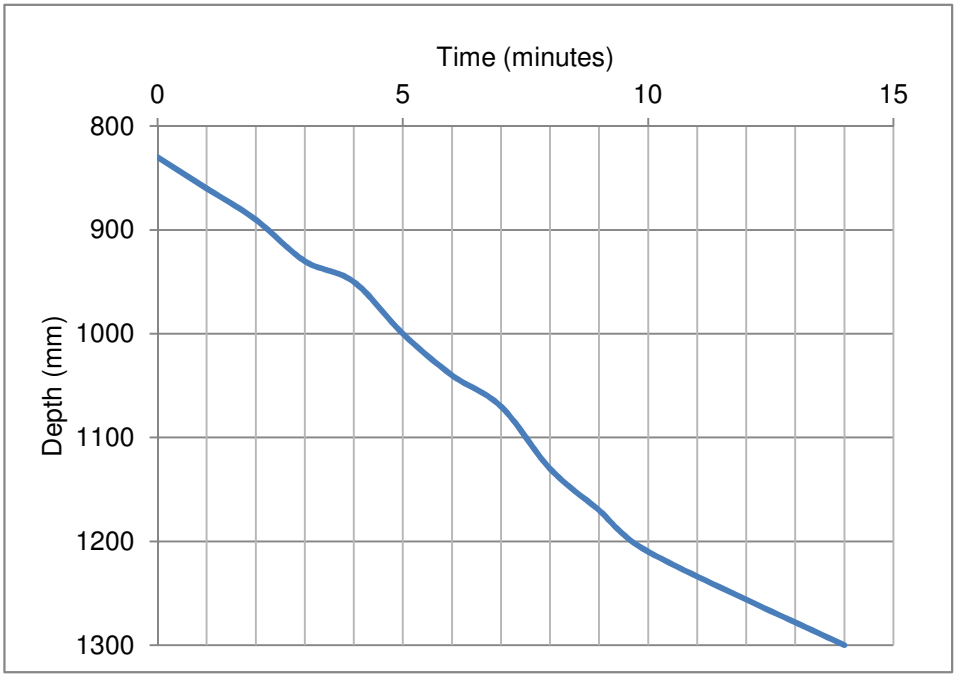
Test Pit Dimensions

Length = **3000** mm
Width = **700** mm
Depth = **1300** mm (Total depth)

Plan area = **2.1** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **830** mm

Time (min)	Depth (mm)
0	**830**
1	**860**
2	**890**
3	**930**
4	**950**
5	**1000**
6	**1040**
7	**1070**
8	**1130**
9	**1170**
10	**1210**
14	**1300**



Depth (m)	Description
0.00 - 0.30	TOPSOIL: Grass over dark brown clayey SAND.
0.30 - 1.10	Yellow/orange brown slightly clayey SAND and GRAVEL. Gravel is fine to coarse angular to subangular of sandstone. Frequent cobbles with depth.
1.10 - 1.30	Weak to medium strong yellow brown SANDSTONE recovered as cobbles and gravel.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA6 - Test 1

Soil Infiltration Rate in Accordance with BR365

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **830** mm
Start time = **0** min

Final parameters

Depth to water = **300** mm
End time = **14** min

Average water depth: **235** mm

Change in water depth: **470** mm

Time interval: **14** min

Effective Storage Volume of Water in the Trial Pit = **0.924** m³
75% Effective Depth = **970** mm from ground level
25% Effective Depth = **1190** mm from ground level
Time at 75% Effective Depth = **4.5** minutes
Time at 25% Effective Depth = **9.5** minutes

V_{p75-25} = **0.46** m³

a_{p50} = **3.73** m²

t_{p75-25} = **570** sec

$\frac{V_{p75-25}}{a_{p50}}$ = **2.2E-04 m/sec**

Average Soakaway Rate = **1.2E-03** m³/sec
Average soakaway area = **3.84** m² (sides + base)

BR365 Soil Infiltration Rate = 2.2E-04 m/sec
Average Infiltration Rate = 3.1E-04 m/sec

EASTWOOD & PARTNERS **Sheet 1 of 2**
(Consulting Engineers) Ltd

PROJECT:	**Wombwell High School**	**Job No. 43497**	**Date 19.12.18**
SUBJECT:	**Infiltration Test Results and Calculation of Infiltration Rates**	**Prepared JA/SAE**	**Checked DN**

Test No. **SA6 - Test 2**

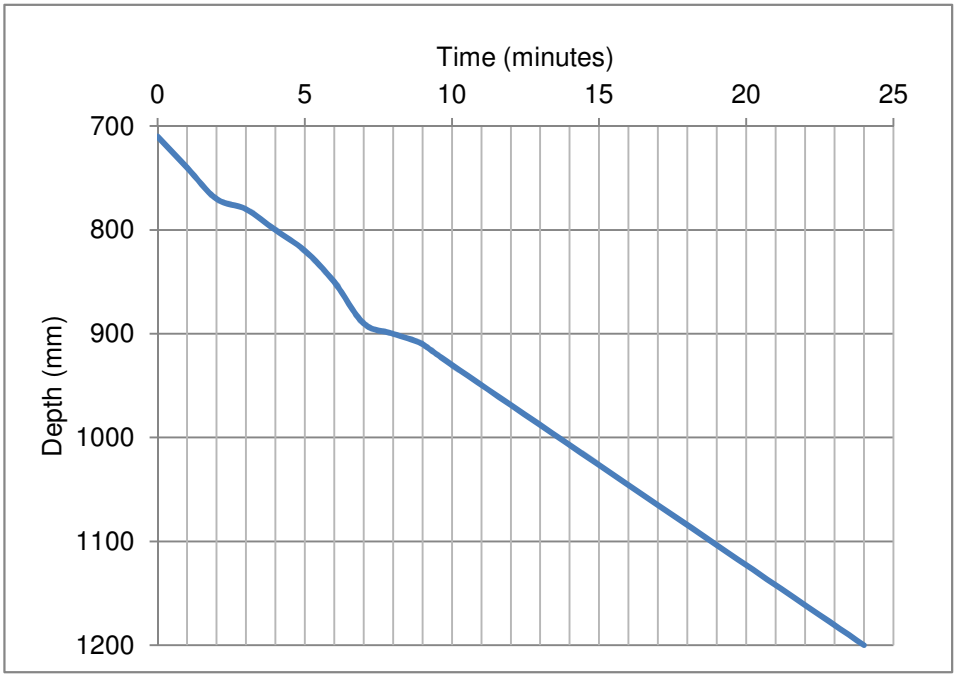
Test Pit Dimensions

Length = **3000** mm
Width = **700** mm
Depth = **1200** mm (Total depth)

Plan area = **2.1** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **710** mm

Time (min)	Depth (mm)
0	**710**
1	**740**
2	**770**
3	**780**
4	**800**
5	**820**
6	**850**
7	**890**
8	**900**
9	**910**
10	**930**
24	**1200**



Depth (m)	Description
0.00 - 0.30	TOPSOIL: Grass over dark brown clayey SAND.
0.30 - 1.10	Yellow/orange brown slightly clayey SAND and GRAVEL. Gravel is fine to coarse angular to subangular of sandstone. Frequent cobbles with depth.
1.10 - 1.30	Weak to medium strong yellow brown SANDSTONE recovered as cobbles and gravel.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA6 - Test 2

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters
Depth to water = **710** mm
Start time = **0** min

Final parameters
Depth to water = **200** mm
End time = **24** min

Average water depth: **245** mm

Change in water depth: **490** mm

Time interval: **24** min

Effective Storage Volume of Water in the Trial Pit = **0.966** m³
75% Effective Depth = **855** mm from ground level
25% Effective Depth = **1085** mm from ground level
Time at 75% Effective Depth = **6.5** minutes
Time at 25% Effective Depth = **18** minutes

V_{p75-25} = **0.48** m³

a_{p50} = **3.80** m²

t_{p75-25} = **1080** sec

f = 1.2E-04 m/sec

Average Soakaway Rate = **7.1E-04** m³/sec
Average soakaway area = **3.91** m² (sides + base)

BR365 Soil Infiltration Rate = 1.2E-04 m/sec
Average Infiltration Rate = 1.8E-04 m/sec

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA6 - Test 3**

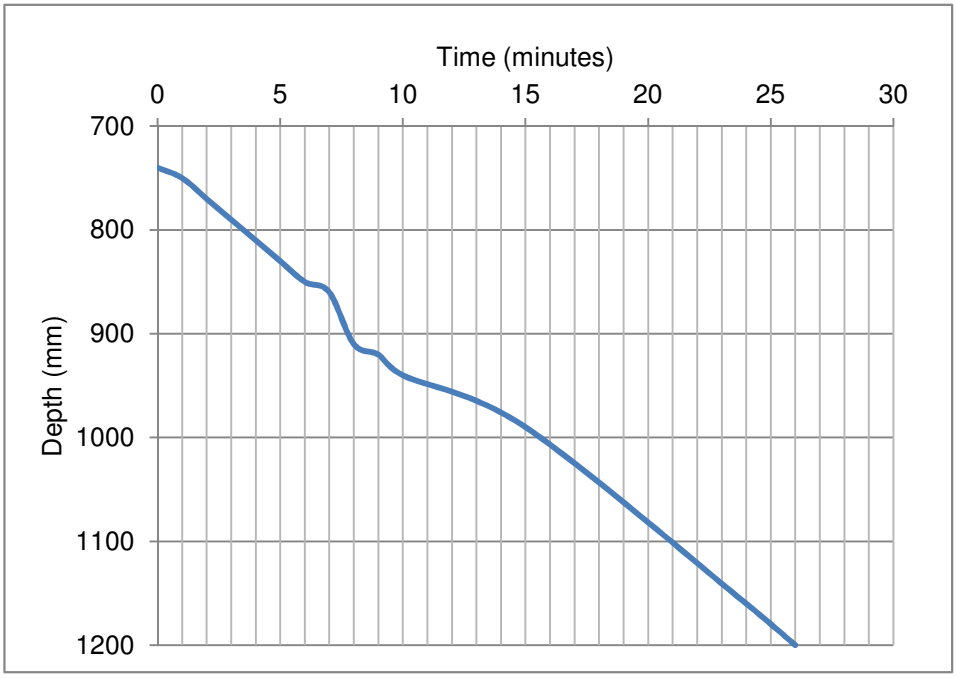
Test Pit Dimensions

Length = **3000** mm
Width = **700** mm
Depth = **1200** mm (Total depth)

Plan area = **2.1** m²

Approximate time to discharge water into the hole: **40** Seconds
Depth to water after completion of pumping: **740** mm

Time (min)	Depth (mm)
0	**740**
1	**750**
2	**770**
3	**790**
4	**810**
5	**830**
6	**850**
7	**860**
8	**910**
9	**920**
10	**940**
15	**990**
24	**1160**
26	**1200**



Depth (m)	Description
0.00 - 0.30	TOPSOIL: Grass over dark brown clayey SAND.
0.30 - 1.10	Yellow/orange brown slightly clayey SAND and GRAVEL. Gravel is fine to coarse angular to subangular of sandstone. Frequent cobbles with depth.
1.10 - 1.30	Weak to medium strong yellow brown SANDSTONE recovered as cobbles and gravel.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA6 - Test 3

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters
Depth to water = **740** mm
Start time = **0** min

Final parameters
Depth to water = **200** mm
End time = **26** min

Average water depth: **230** mm

Change in water depth: **460** mm

Time interval: **26** min

Effective Storage Volume of Water in the Trial Pit = **0.945** m³
75% Effective Depth = **863** mm from ground level
25% Effective Depth = **1088** mm from ground level
Time at 75% Effective Depth = **7** minutes
Time at 25% Effective Depth = **18** minutes

V_{p75-25} = **0.47** m³

a_{p50} = **3.77** m²

t_{p75-25} = **1080** sec

BR365 Soil Infiltration Rate = 1.2E-04 m/sec

= **1.2E-04 m/sec**

Average Soakaway Rate = **6.2E-04** m³/sec
Average soakaway area = **3.80** m² (sides + base)

Average Infiltration Rate = 1.6E-04 m/sec

EASTWOOD & PARTNERS **Sheet 1 of 2**
(Consulting Engineers) Ltd

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. **SA7 - Test 1**

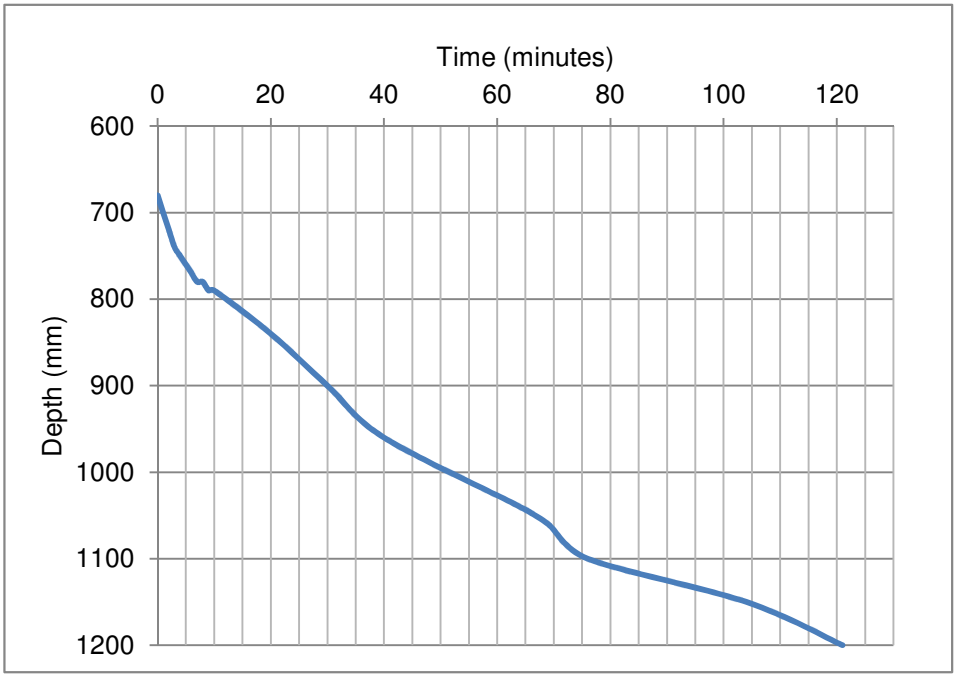
Test Pit Dimensions

Length = **3100** mm
Width = **800** mm
Depth = **1200** mm (Total depth)

Plan area = **2.48** m²

Approximate time to discharge water into the hole: **40** Seconds
Depth to water after completion of pumping: **680** mm

Time (min)	Depth (mm)
0	**680**
1	**700**
2	**720**
3	**740**
4	**750**
5	**760**
6	**770**
7	**780**
8	**780**
9	**790**
10	**790**
20	**840**
30	**900**
40	**960**
64	**1040**
69	**1060**
76	**1100**
104	**1150**
121	**1200**



Depth (m)	Description
0.00 - 0.50	TOPSOIL: Grass over dark brown clayey SAND.
0.50 - 0.90	Orange brown slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular of sandstone, with frequent cobbles with depth.
0.90 - 1.20	Medium strong SANDSTONE recoverd as sand gravel, with frequent cobbles.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared JA/SAE	Checked DN

Test No. SA7 - Test 1

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters

Depth to water = **680** mm
Start time = **0** min

Final parameters

Depth to water = **200** mm
End time = **121** min

Average water depth: **260** mm

Change in water depth: **520** mm

Time interval: **121** min

Effective Storage Volume of Water in the Trial Pit = **1.24** m³
75% Effective Depth = **825** mm from ground level
25% Effective Depth = **1075** mm from ground level
Time at 75% Effective Depth = **18** minutes
Time at 25% Effective Depth = **70** minutes

V_{p75-25} = **0.62** m³

a_{p50} = **4.43** m²

t_{p75-25} = **4200** sec

f = 3.3E-05 m/sec

Average Soakaway Rate = **1.8E-04** m³/sec
Average soakaway area = **4.51** m² (sides + base)

BR365 Soil Infiltration Rate = 3.3E-05 m/sec
Average Infiltration Rate = 3.9E-05 m/sec

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SAE	Checked DN

Test No. **SA7 - Test 2**

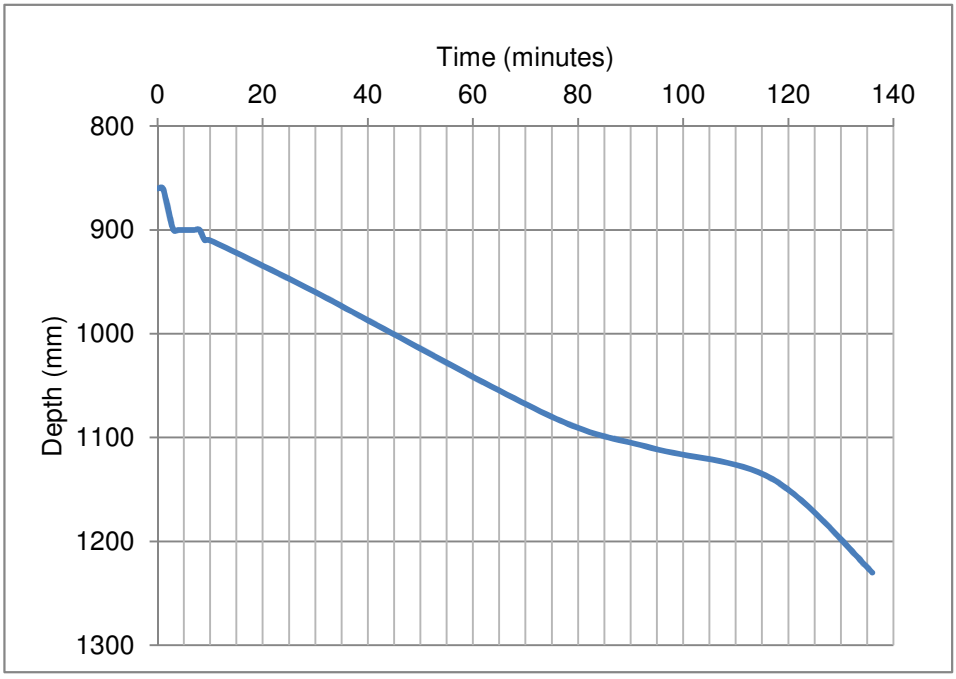
Test Pit Dimensions

Length = **3100** mm
Width = **800** mm
Depth = **1300** mm (Total depth)

Plan area = **2.48** m²

Approximate time to discharge water into the hole: **40** Seconds
Depth to water after completion of pumping: **860** mm

Time (min)	Depth (mm)
0	**860**
1	**860**
2	**880**
3	**900**
4	**900**
5	**900**
6	**900**
7	**900**
8	**900**
9	**910**
10	**910**
30	**960**
75	**1080**
94	**1110**
117	**1140**
136	**1230**



Depth (m)	Description
0.00 - 0.50	TOPSOIL: Grass over dark brown clayey SAND.
0.50 - 0.90	Orange brown slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular of sandstone, with frequent cobbles with depth.
0.90 - 1.20	Medium strong SANDSTONE recovered as sand gravel, with frequent cobbles.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SAE	Checked DN

Test No. SA7 - Test 2

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters

Depth to water = **910** mm
Start time = **10** min

Final parameters

Depth to water = **230** mm
End time = **136** min

Average water depth: **230** mm

Change in water depth: **320** mm

Time interval: **126** min

Effective Storage Volume of Water in the Trial Pit = **1.0912** m³
75% Effective Depth = **970** mm from ground level
25% Effective Depth = **1190** mm from ground level
Time at 75% Effective Depth = **34** minutes
Time at 25% Effective Depth = **128** minutes

V_{p75-25} = **0.55** m³

a_{p50} = **4.20** m²

t_{p75-25} = **7680** sec

f = **1.7E-05 m/sec**

Average Soakaway Rate = **1.0E-04** m³/sec
Average soakaway area = **4.27** m² (sides + base)

BR365 Soil Infiltration Rate = 1.7E-05 m/sec
Average Infiltration Rate = 2.5E-05 m/sec

EASTWOOD & PARTNERS **Sheet 1 of 2**
(Consulting Engineers) Ltd

PROJECT:	**Wombwell High School**	**Job No. 43497**	**Date 19.12.18**
SUBJECT:	**Infiltration Test Results and Calculation of Infiltration Rates**	**Prepared SAE**	**Checked DN**

Test No. **SA8 - Test 1**

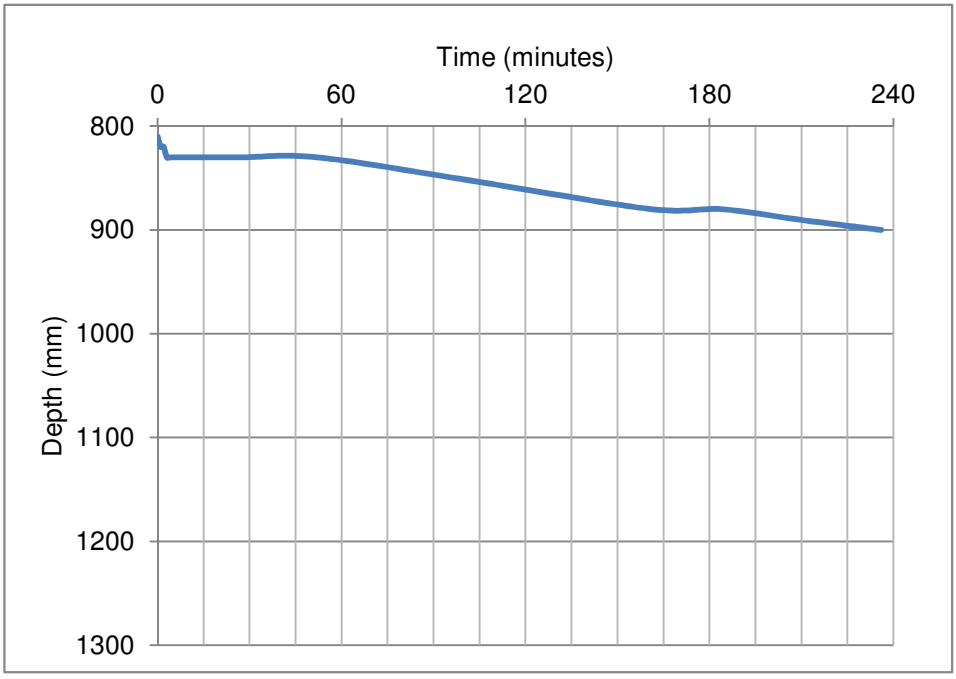
Test Pit Dimensions

Length = **3200** mm
Width = **700** mm
Depth = **1300** mm (Total depth)

Plan area = **2.24** m²

Approximate time to discharge water into the hole: **40** Seconds
Depth to water after completion of pumping: **810** mm

Time (min)	Depth (mm)
0	**810**
1	**820**
2	**820**
3	**830**
4	**830**
5	**830**
6	**830**
7	**830**
8	**830**
9	**830**
10	**830**
20	**830**
28	**830**
52	**830**
97	**850**
161	**880**
184	**880**
209	**890**
236	**900**



Depth (m)	Description
0.00 - 0.40	TOPSOIL: Grass over dark brown clayey SAND.
0.40 - 0.60	MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is fine to medium sub-angular of sandstone.
0.6 - 1.1	POSSIBLE MADE GROUND: Yellow/orange brown sandy very gravelly CLAY. Gravel is fine to medium sub-angular of sandstone.
1.1 - 1.3	Extremely weak to weak grey brown SANDSTONE, recovered as tabular gravel.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SAE	Checked DN

Test No. SA8 - Test 1

Soil Infiltration Rate in Accordance with BR365

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Initial parameters

Depth to water = **810** mm
Start time = **0** min

Final parameters

Depth to water = **900** mm
End time = **236** min

Average water depth: **445** mm

Change in water depth: **90** mm

Time interval: **236** min

Effective Storage Volume of Water in the Trial Pit = **1.0752** m³
75% Effective Depth = **940** mm from ground level
25% Effective Depth = **1180** mm from ground level
Time at 75% Effective Depth = **N/A** minutes
Time at 25% Effective Depth = **N/A** minutes

V_{p75-25} = **0.54** m³

a_{p50} = **4.11** m²

t_{p75-25} = **0** sec

BR365 Soil Infiltration Rate = **#DIV/0! m/sec**

Average Soakaway Rate = **1.4E-05** m³/sec
Average soakaway area = **5.71** m² (sides + base)

UTC Soil Infiltration Rate = **UTC m/sec**
Average Infiltration Rate = **2.5E-06 m/sec**

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SAE	Checked DN

Test No. **SA9 - Test 1**

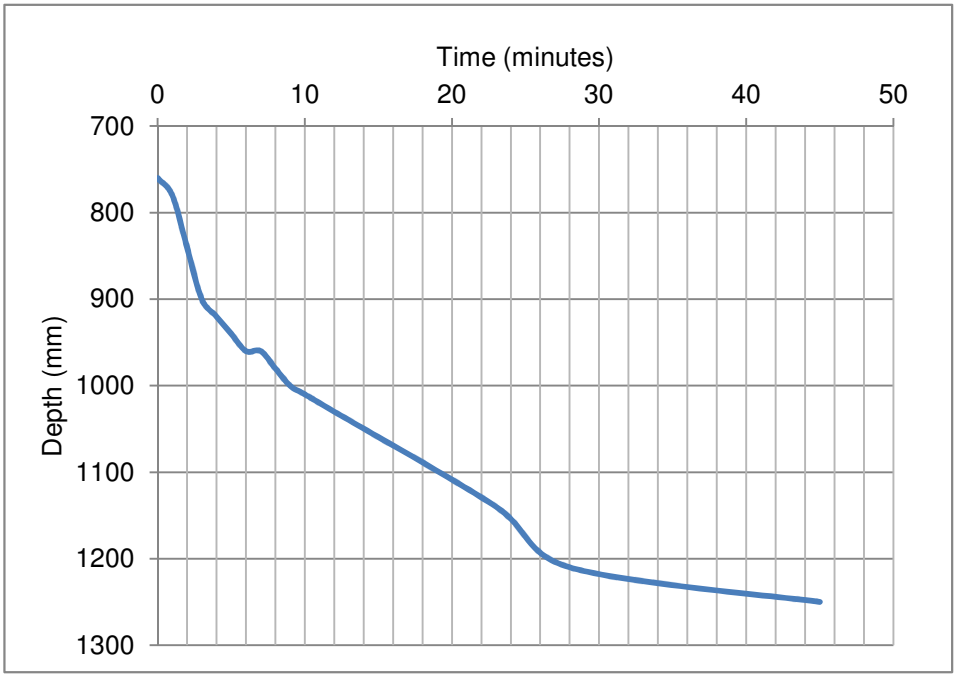
Test Pit Dimensions

Length = **3200** mm
Width = **700** mm
Depth = **1250** mm (Total depth)

Plan area = **2.24** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **760** mm

Time (min)	Depth (mm)
0	**760**
1	**780**
2	**840**
3	**900**
4	**920**
5	**940**
6	**960**
7	**960**
8	**980**
9	**1000**
10	**1010**
12	**1030**
23	**1140**
28	**1210**
45	**1250**



Depth (m)	Description
0.00 - 0.40	TOPSOIL: Grass over dark brown clayey SAND.
0.4 - 0.6	MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is fine to medium sub-angular of sandstone.
0.6 -1.1	POSSIBLE MADE GROUND: Yellowish brown sandy gravelly CLAY. Gravel is fine to coarse subangular of sandstone.
1.1 - 1.25	Weak to medium strongyellow brown SANDSTONE, recovered as tabular gravel and cobbles.

PROJECT:	**Wombwell High School**	**Job No. 43497**	**Date 19.12.18**
SUBJECT:	**Infiltration Test Results and Calculation of Infiltration Rates**	**Prepared SAE**	**Checked DN**

Test No. SA9 - Test 1

Soil Infiltration Rate in Accordance with BR365

Where:

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **760** mm
Start time = **0** min

Final parameters

Depth to water = **250** mm
End time = **45** min

Average water depth: **245** mm

Change in water depth: **490** mm

Time interval: **45** min

Effective Storage Volume of Water in the Trial Pit = **1.0528** m³
75% Effective Depth = **898** mm from ground level
25% Effective Depth = **1133** mm from ground level
Time at 75% Effective Depth = **3** minutes
Time at 25% Effective Depth = **22** minutes

V_{p75-25} = **0.53** m³

a_{p50} = **4.07** m²

t_{p75-25} = **1320** sec

f = 9.8E-05 m/sec

Average Soakaway Rate = **4.1E-04** m³/sec
Average soakaway area = **4.15** m² (sides + base)

BR365 Soil Infiltration Rate = 9.8E-05 m/sec
Average Infiltration Rate = 9.8E-05 m/sec

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SAE	Checked DN

Test No. **SA9 - Test 2**

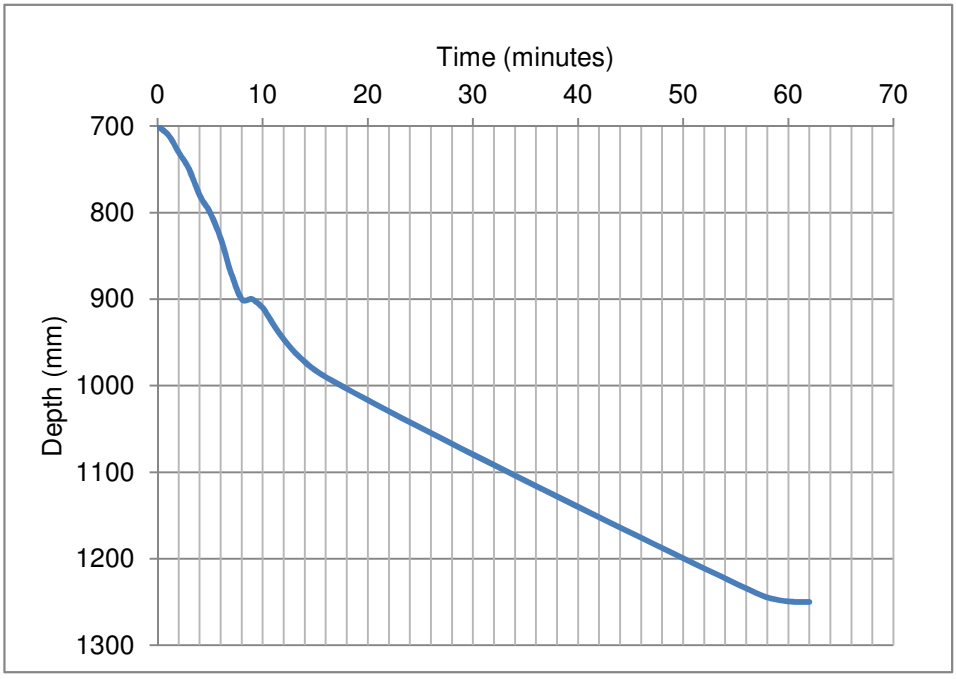
Test Pit Dimensions

Length = **3200** mm
Width = **700** mm
Depth = **1250** mm (Total depth)

Plan area = **2.24** m²

Approximate time to discharge water into the hole: **30** Seconds
Depth to water after completion of pumping: **700** mm

Time (min)	Depth (mm)
0	**700**
1	**710**
2	**730**
3	**750**
4	**780**
5	**800**
6	**830**
7	**870**
8	**900**
9	**900**
10	**910**
16	**990**
57	**1240**
62	**1250**



Depth (m)	Description
0.00 - 0.40	TOPSOIL: Grass over dark brown clayey SAND.
0.4 - 0.6	MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is fine to medium sub-angular of sandstone.
0.6 -1.1	POSSIBLE MADE GROUND: Yellowish brown sandy gravelly CLAY. Gravel is fine to coarse subangular of sandstone.
1.1 - 1.25	Weak to medium strongyellow brown SANDSTONE, recovered as tabular gravel and cobbles.

PROJECT:	**Wombwell High School**	**Job No. 43497**	**Date 19.12.18**
SUBJECT:	**Infiltration Test Results and Calculation of Infiltration Rates**	**Prepared SAE**	**Checked DN**

Test No. SA9 - Test 2

Soil Infiltration Rate in Accordance with BR365

Where:

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters
Depth to water = **700** mm
Start time = **0** min

Final parameters
Depth to water = **250** mm
End time = **62** min

Average water depth: **275** mm

Change in water depth: **550** mm

Time interval: **62** min

Effective Storage Volume of Water in the Trial Pit = **1.2096** m³
75% Effective Depth = **845** mm from ground level
25% Effective Depth = **1115** mm from ground level
Time at 75% Effective Depth = **6** minutes
Time at 25% Effective Depth = **36** minutes

V_{p75-25} = **0.60** m³

a_{p50} = **4.35** m²

t_{p75-25} = **2160** sec

f = 6.4E-05 m/sec

Average Soakaway Rate = **3.3E-04** m³/sec
Average soakaway area = **4.39** m² (sides + base)

BR365 Soil Infiltration Rate = 6.4E-05 m/sec
Average Infiltration Rate = 7.6E-05 m/sec

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SAE	Checked DN

Test No. **SA9 - Test 3**

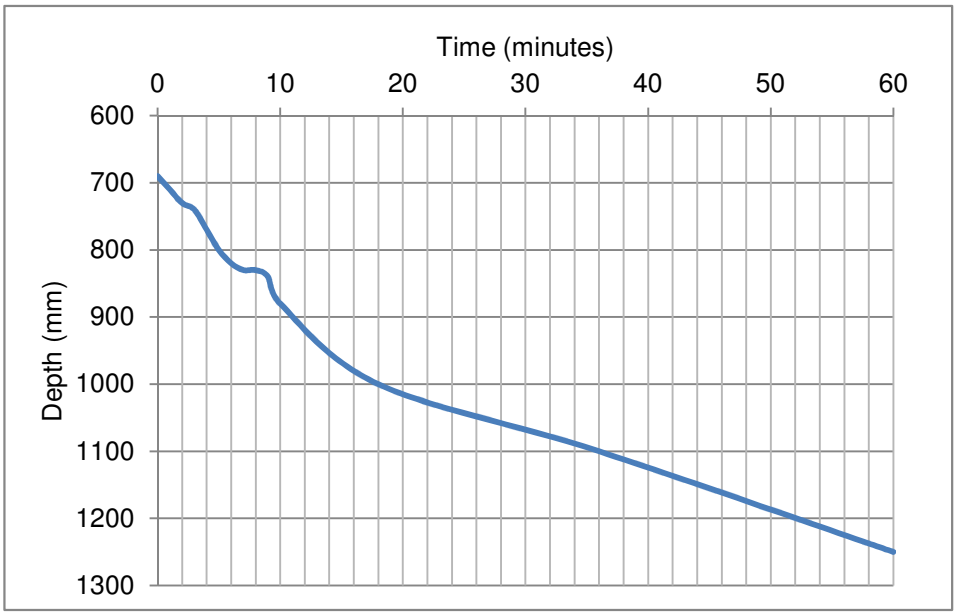
Test Pit Dimensions

Length = **3200** mm
Width = **700** mm
Depth = **1250** mm (Total depth)

Plan area = **2.24** m²

Approximate time to discharge water into the hole: **40** Seconds
Depth to water after completion of pumping: **690** mm

Time (min)	Depth (mm)
0	**690**
1	**710**
2	**730**
3	**740**
4	**770**
5	**800**
6	**820**
7	**830**
8	**830**
9	**840**
10	**880**
18	**1000**
36	**1100**
60	**1250**



Depth (m)	Description
0.00 - 0.40	TOPSOIL: Grass over dark brown clayey SAND.
0.4 - 0.6	MADE GROUND: Brown sandy gravelly reworked CLAY. Gravel is fine to medium sub-angular of sandstone.
0.6 -1.1	POSSIBLE MADE GROUND: Yellowish brown sandy gravelly CLAY. Gravel is fine to coarse subangular of sandstone.
1.1 - 1.25	Weak to medium strongyellow brown SANDSTONE, recovered as tabular gravel and cobbles.

PROJECT:	Wombwell High School	Job No. 43497	Date 19.12.18
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SAE	Checked DN

Test No. SA9 - Test 3

Soil Infiltration Rate in Accordance with BR365

$$f = \frac{V_{p75-25}}{a_{p50} x t_{p75-25}}$$

Where:

V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **690** mm
Start time = **0** min

Final parameters

Depth to water = **1250** mm
End time = **60** min

Average water depth: **280** mm

Change in water depth: **560** mm

Time interval: **60** min

Effective Storage Volume of Water in the Trial Pit = **1.2096** m³
75% Effective Depth = **845** mm from ground level
25% Effective Depth = **1115** mm from ground level
Time at 75% Effective Depth = **9** minutes
Time at 25% Effective Depth = **38** minutes

V_{p75-25} = **0.60** m³

a_{p50} = **4.35** m²

t_{p75-25} = **2280** sec

f = **6.1E-05 m/sec**

Average Soakaway Rate = **3.5E-04** m³/sec
Average soakaway area = **4.42** m² (sides + base)

BR365 Soil Infiltration Rate = 6.1E-05 m/sec
Average Infiltration Rate = 7.9E-05 m/sec

End of Report