FLOOD RISK ASSESSMENTS & DRAINAGE STRATEGIES

Lince Lane, Kirtlington

Reference: 402 -Rev - V1

Sep-22

www.rida-reports.co.uk

Drainage Strategy

Rev 1 Produced by: ARD 079 721 44579 arge@rida-reports.co.uk

Oxford Innospace, Old Music Hall, 106-108 Cowley Road, Oxford, OX4 1JE

England and Wales number 10590566

Purpose of this report

1.1 The purpose of this statement is to accompany the technical drawings and details showing the proposed Surface Water drainage system as part of the planning application for this development.

Site Characteristics

2.1 The site background is clearly identified through answers to the questions in table 1 below.

Table 1: Site Characteristics . See appendix B for support documentation

TOPIC	QUESTION	ANSWER
Protected species or habitat	Is the site near to designated sites and priority habitats?	No
Flood Plain	Is the site located in the flood plain?	No
Soils and Geology	Soil permeability? - See appendix B for results	Yes
Space constraints	Space for SuDS components?	Yes
Topography	Sited on a flat site?	Yes
	Sited on a steep slope (5-15%)	No
	Sited on a very steep slope (>15%)	No
Groundwater	Is the site at groundwater flood risk?	No
Contaminated land	Are there contaminated soils on site?	No
Source Protection Zone	Is the site within a SPZ 3?	No
Runoff characteristics	Is the development in a high risk flooding area?	No

Existing and Proposed Site

2.2 The distribution of catchment areas for existing and proposed site is as per table 2 below. See appendix A for details

Table 2 : Existing and Proposed catchment areas in hectares

Description		**Existing Site**	**Proposed Site**
Impermeable Areas		0.000	0.122
Permeable Areas	Connected to Drainage	0.000	0.000
	Self Draining Areas	0.000	0.187
Areas Draining Away from drainage System		0.913	0.604
	Total Development Area	0.913	0.913

Area Distribution Per property and reference models

P1	P2	P3	P4	P5	P6	P7	P8
0.016	0.016	0.016	0.018	0.009	0.009	0.019	0.019

Model 1 refers to Properties P1, P2, P3, P4, P7, P8 and has an area of 0.019ha + 10%

Model 2 refers to Properties P5, P6 and has an area of : 0.009ha + 10%

Evaluation of Discharge Point

3.1 The SuDS design takes into account Building Regulations Section H3 and the National Planning Practice Guidance. The aim is to discharge surface water run-off as high up the drainage hierarchy, as reasonably practicable:

1. into the ground (infiltration);
2. to a surface water body;
3. to a surface water sewer, highway drain, or another drainage system;
4. to a combined sewer.

3.2 The discharge point has been evaluated following the NPPG and Building regulations. The findings are in table 3 below.

Table 3: Drainage Hierarchy evaluation

Superficial geology classification	The British Geological Society records show that the superficial deposits are Hanborough Gravel Member - Sand and Gravel.
Bedrock geology classification	The British Geological Society records of the site show that it is located within the Peterborough Member - Mudstone.
Landis Top Soil Infiltration	The SOILSCAPE's records of the site show that it is located within an area of freely draining soils.
Groundwater	The British Geological Survey's flood risk susceptibility maps show that the development has limited susceptibility to ground water flooding. The risk from groundwater flood to the site is considered very low.
Is infiltration feasible?	Soakaway tests were undertaken for the site. The lowest infiltration rate for this site is 0.000008m/s or 0.0288m/hr. This infiltration is possible at shallow depth only as the water table is 1.9m bgl
Is a discharge to a watercourse possible?	There is a watercourse in proximity to the site. Connection is possible. However infiltration is feasible at shallow depths.
Is a discharge to a surface water sewer possible?	There are no surface water sewers in the proximity to the site.
Is a discharge to a combined sewer possible?	There are no combined sewers in the proximity to the site.

Existing and Proposed Peak Run-off Calculations

4.1 The current site is a Greenfield. The peak runoff rate for the existing site was calculated as per table 4 and discharge rates as per table 5.

Table 4: Peak run-off rate calculation method for existing site

Method Used	Calculation Method
X	Report124 Flood Estimation for Small Catchments method has been used to estimate the site peak flow rates
	This is a brownfield site, runoff rates are calculated in accordance with best practice simulation modelling and using the modified rational method
	This is a brownfield site where the pre-development drainage isn't known. The runoff rates are calculated using the Greenfield model with soil type 5

4.2 The runoff flow produced by the development will be controlled as per table 5.

Table 5: Runoff discharge rate control

Control Used	Description of runoff discharge
X	Water will be discharged into the ground via a SuDS as described in table 6 below
	The peak discharge rate has been reduced to Greenfield Qbar flow
	The peak discharge rate has been taken as 0.7 l/s as it is not possible to reduce it to the Greenfield Qbar rate
	The peak discharge rate has been reduced to Brownfield pre-development 1 in 1 flow
	The peak discharge rate has been reduced by 60% from the existing Brownfield pre-development 1 in 2 flow rate

Run-off flows

4.3 The size of the SuDS has been calculated for all events up to the 1 in 100 including an allowance for climate change of 40%. As per tables above, it is proposed to infiltrate all the flows. See table 6 for values and appendix C for calculations.

Table 6: Peak discharge rates for SuDS

Return Period Event	Discharge Rate (l/s)			Infiltration Rate (m/hr)
	Existing Greenfield	Existing Brownfield	Proposed	
Qbar	0.10	N/A	N/A	0.0288
1 in 1	0.10	N/A	0.0	0.0288
1 in 2	0.10	N/A	0.0	0.0288
1 in 30	0.30	N/A	0.0	0.0288
1 in 30 + CC	N/A	N/A	0.0	0.0288
1 in 100	0.40	N/A	0.0	0.0288
1 in 100 + CC	N/A	N/A	0.0	0.0288

Proposed Sustainable Drainage System

5.1 The following sustainable drainage systems have been used for this site. The drainage design uses these drainage system through out the site. See table 7 for details.

Table 7: Proposed Drainage System

SuDS Proposed	Feasible	Proposed
Use of green roofs	No	No
Store rainwater for later use	No	No
Use infiltration techniques, for instance soakaways, permeable surfaces	Yes	Yes
Attenuate rainwater in ponds or open water features for gradual release	No	No
Attenuate rainwater by storing in tanks or sealed water features for gradual release	No	No
Discharge Point Proposed		
Discharge rainwater direct to a watercourse	Yes	No
Discharge rainwater to a surface water sewer/drain	No	No
Discharge rainwater to the combined sewer	No	No

5.2 The location and details of the SuDS can be seen drainage layouts in appendix D. Calculations are in appendix C.

5.3 The drainage calculations demonstrate:
- No flooding occurs for the 1 in 30 storm events.
- Any flooding for the 1 in 100 year + 40% climate change event can be safely contained on site

5.4 The proposed drainage strategy presents one possible solution to demonstrate that the development can be sustainably drained, to comply with the requirements of the NPPF. Other solutions may be feasible and may prove to be better suited to the site. These will become apparent during the detailed design stage. The strategy above should not therefore be interpreted as the definitive scheme solution.

Management of Exceedance Flows

5.5 The drainage network has been designed to attenuate surface runoff for all events up to and including the 1% AEP + CC(1 in 100 years). However consideration has been given to what may happen when the design capacity of the surface water drainage network is exceeded. Surface water will flow to the lowest points within the site located to the front of the property. The flood risk to the buildings would therefore remain low. See appendix D.

Maintenance and Management plan responsibility

6.1 The SuDS will be maintained by The Owner the property

Maintenance and Management plan for proposed SuDS

6.2 The maintenance and Management Plan Guidance from the SuDS Manual, CIRIA C753 (CIRIA, 2015) is to be followed for the effective maintenance of the proposed SuDS techniques outlined above. The maintenance for SuDS structures are as follow:

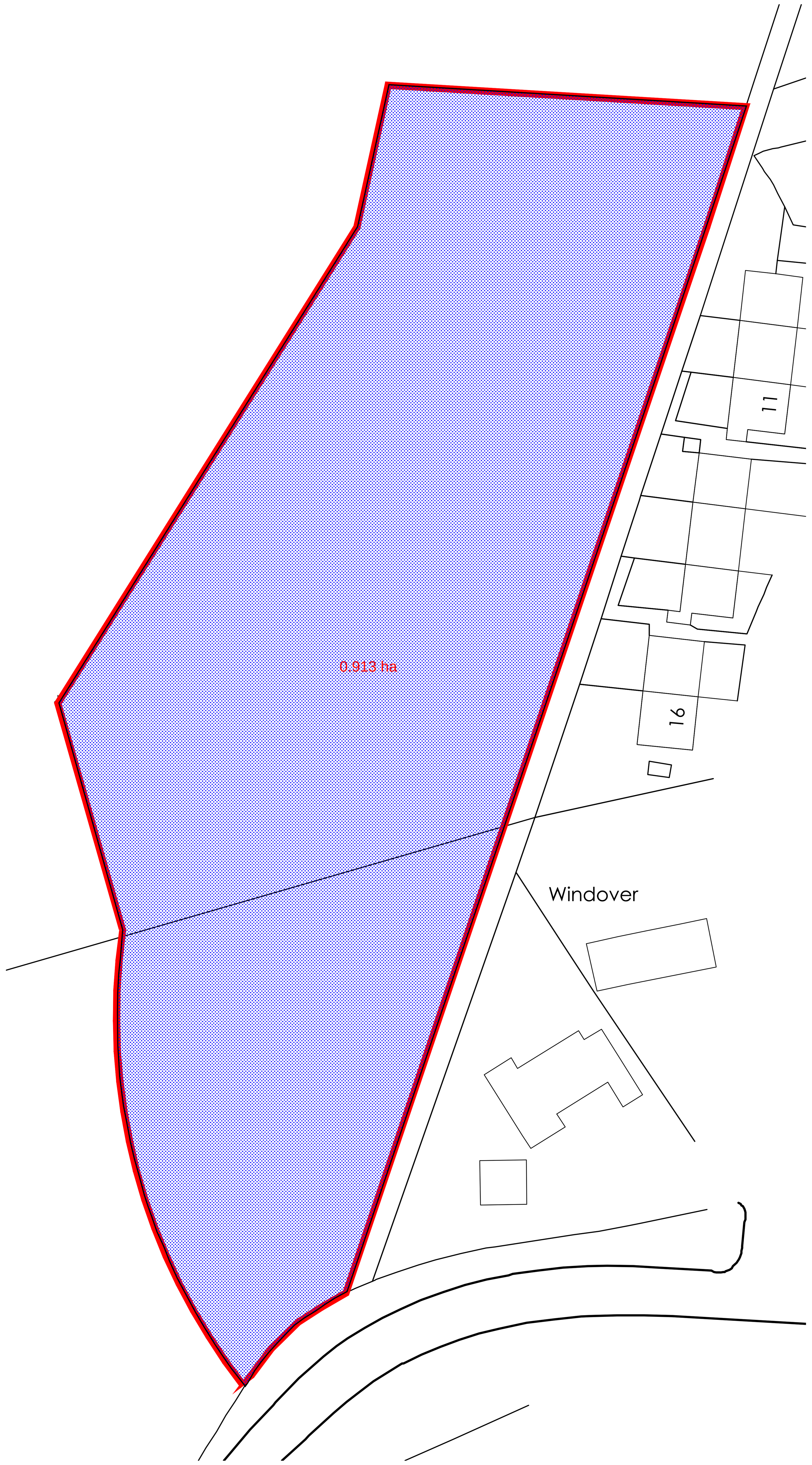
Operation and maintenance requirements for soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Appendix A



EXISTING SITE
1:500

PROPOSED SITE
1:500

Drawing Scale Bar

Drawing scale	Line length	Drawing scale	Line length
1:5	= 0.25 metres	1:200	= 10.0 metres
1:10	= 0.5 metres	1:250	= 12.5 metres
1:20	= 1.0 metres	1:500	= 25.0 metres
1:25	= 1.25 metres	1:1000	= 50.0 metres
1:50	= 2.5 metres	1:1250	= 62.5 metres
1:100	= 5.0 metres	1:2500	= 125 metres

Measure length of line above for checking of scale

GENERAL NOTES

KEY

PERMEABLE AREAS

IMPERMEABLE AREAS

STUDY AREA

Rev	Details	Date	By	Chk'd

Drawing Status:
PRELIMINARY

RIDA
FLOOD RISK ASSESSMENT & DRAINAGE STRATEGIES

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e: info@rida-reports.co.uk
t: 01608 510 121
www.rida-reports.co.uk

Client:

Project:
Lince Lane, Kirtlington

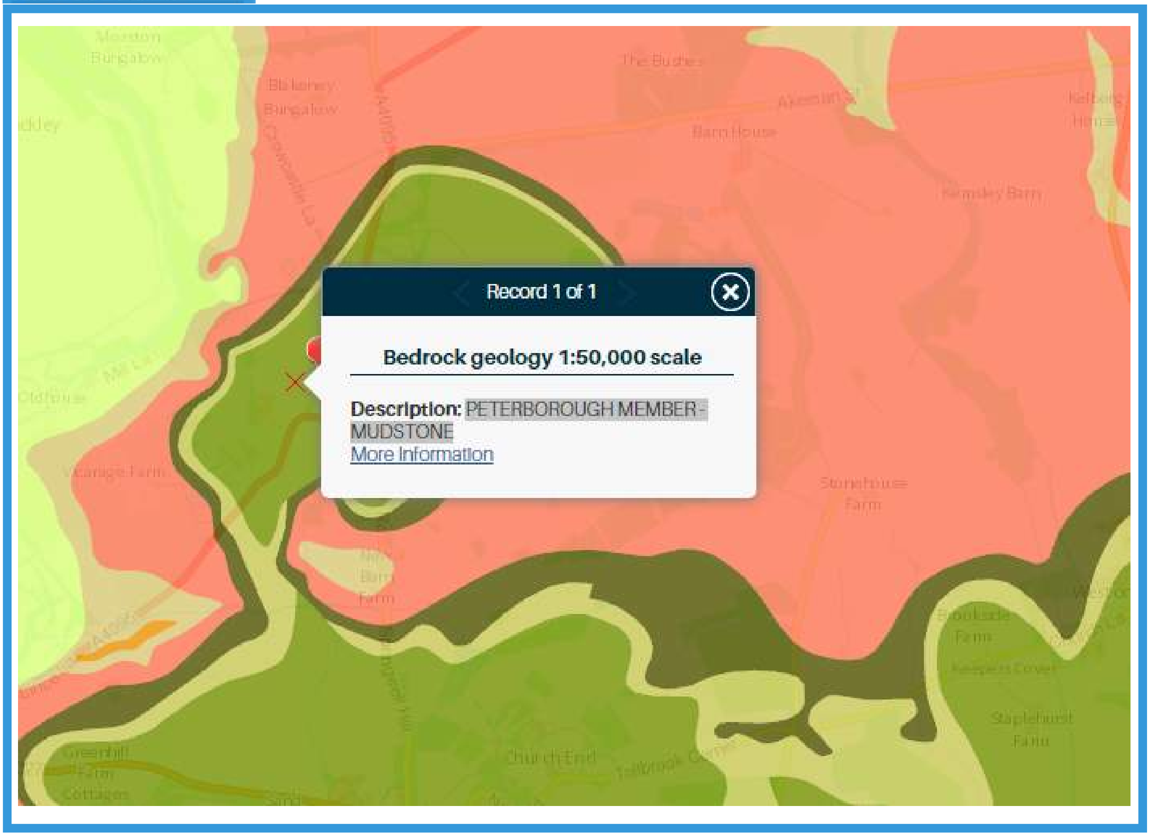
Drawing:
Existing and Proposed Areas
Permeable and Impermeable

Print Size:	Project No:	Drawing No:	Revision:
A1	0402	002	P1

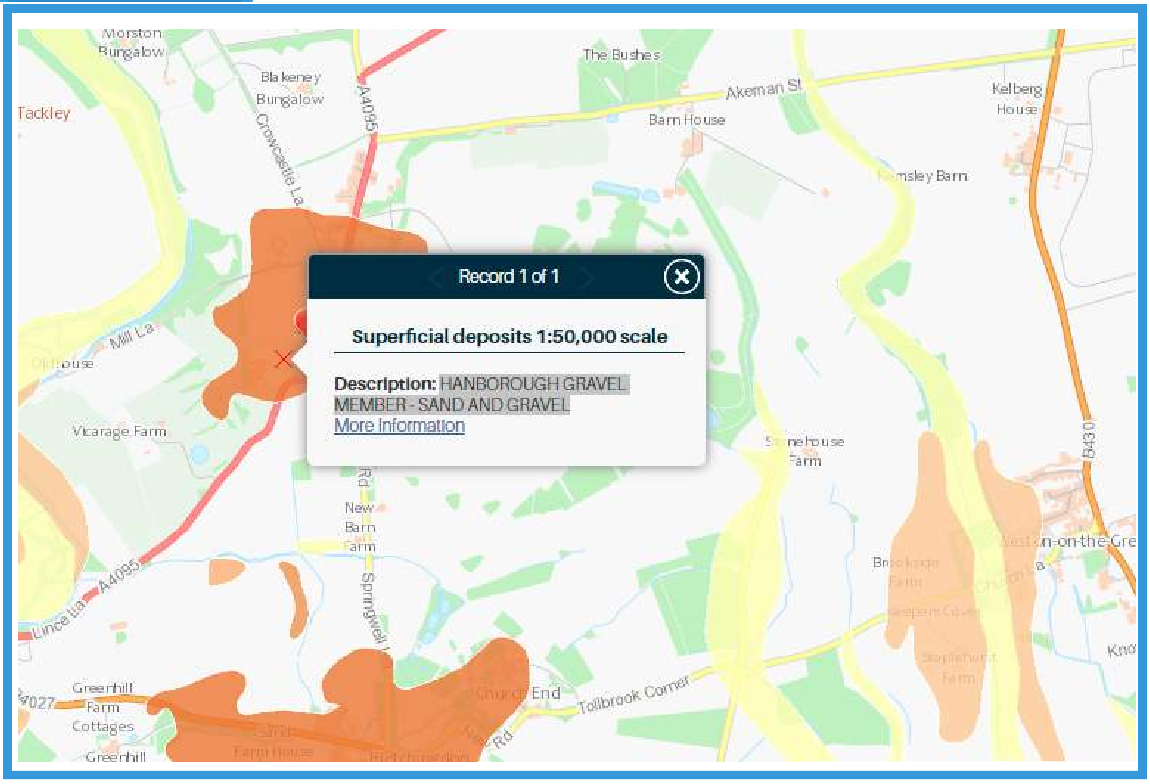
Appendix B

SITE GEOLOGY

GEOLOGY - BEDROCK - PETERBOROUGH MEMBER - MUDSTONE

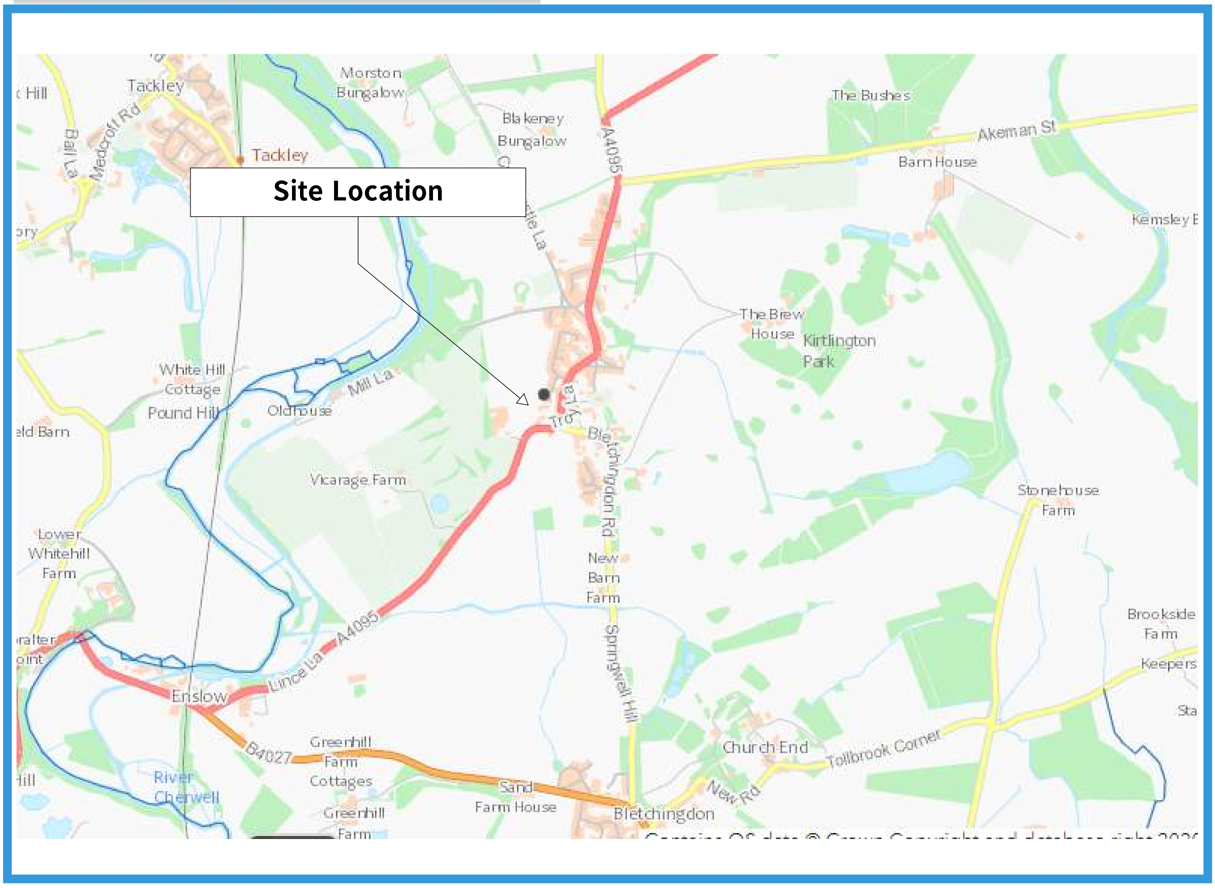


GEOLOGY - SUPERFICIAL DEPOSITS - HANBOROUGH GRAVEL MEMBER - SAND AND GRAVEL



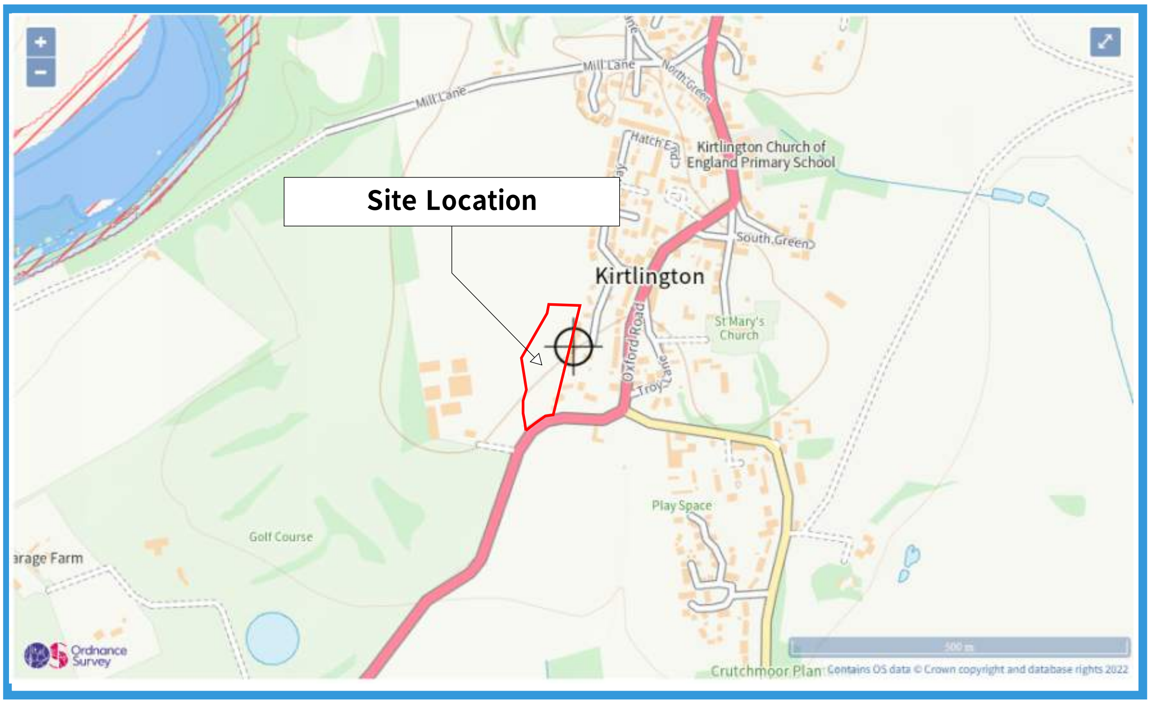
SITE HYDROGEOLOGY

Main River Map



Flood risk from reservoirs

Extent of flooding

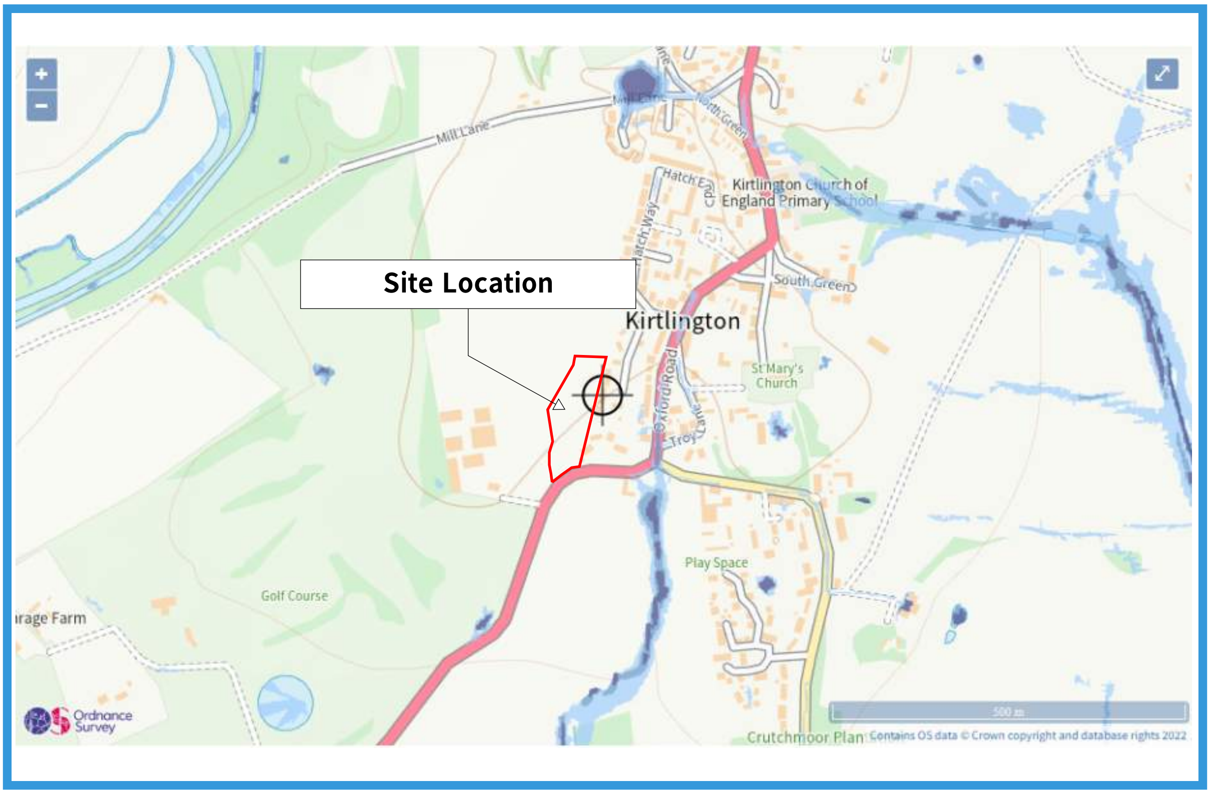


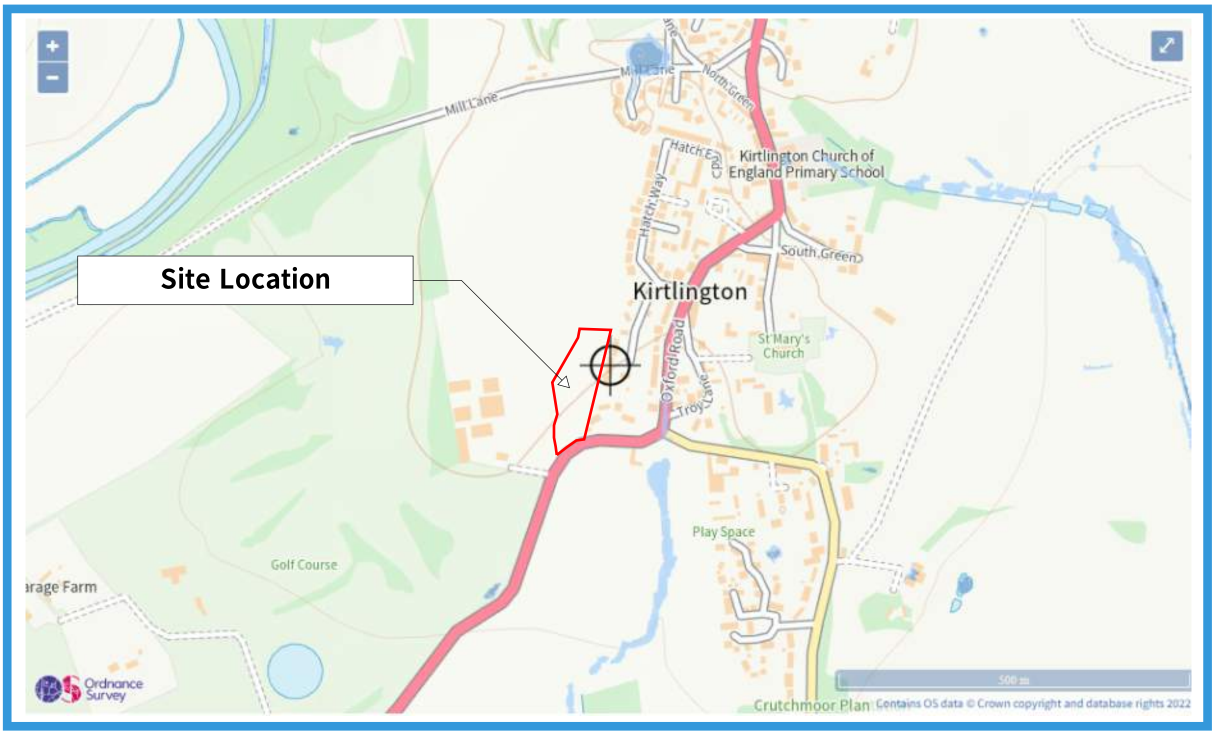
SITE FLOOD RISK

Flood risk from surface water

Extent of flooding

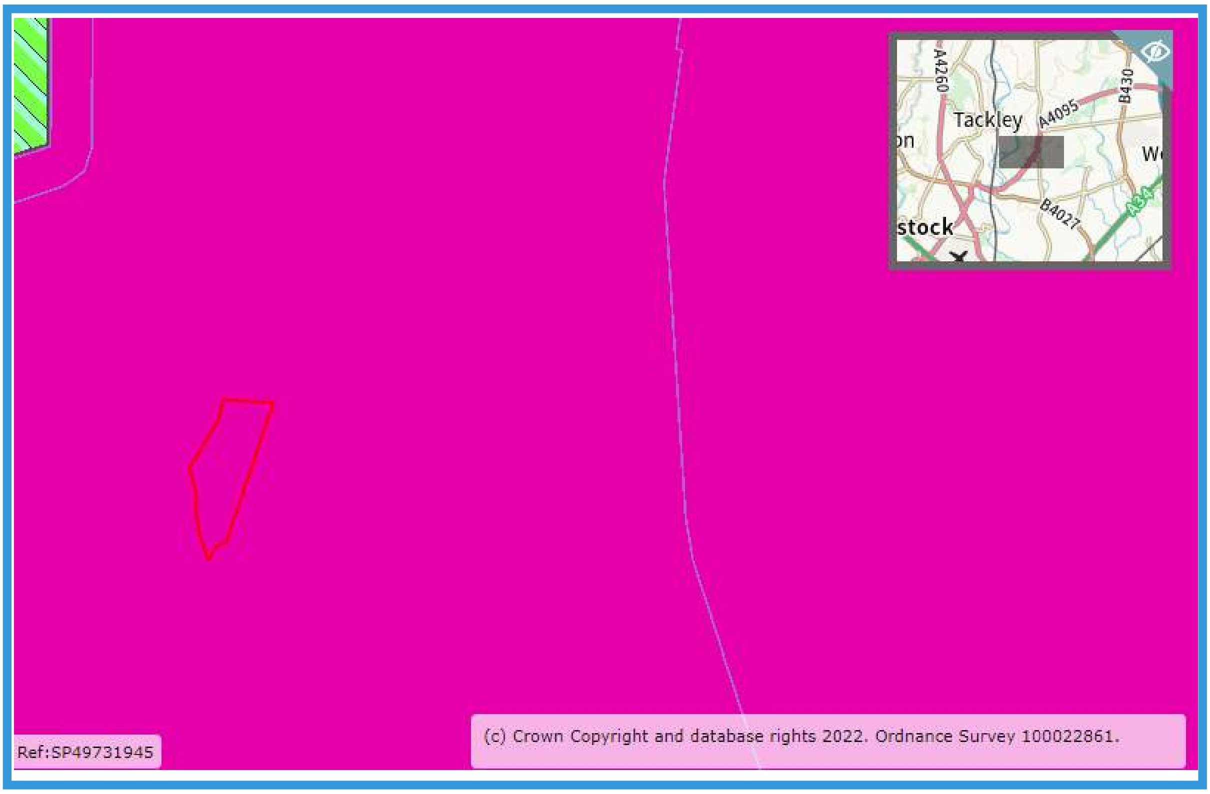
High risk means a chance of flooding greater than 3.3% (1:30)
Medium risk means a chance of flooding of btw 1% (1:100) and 3.3%
Low risk means a chance of flooding of btw 0.1% (1:1000) and 1%
Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding

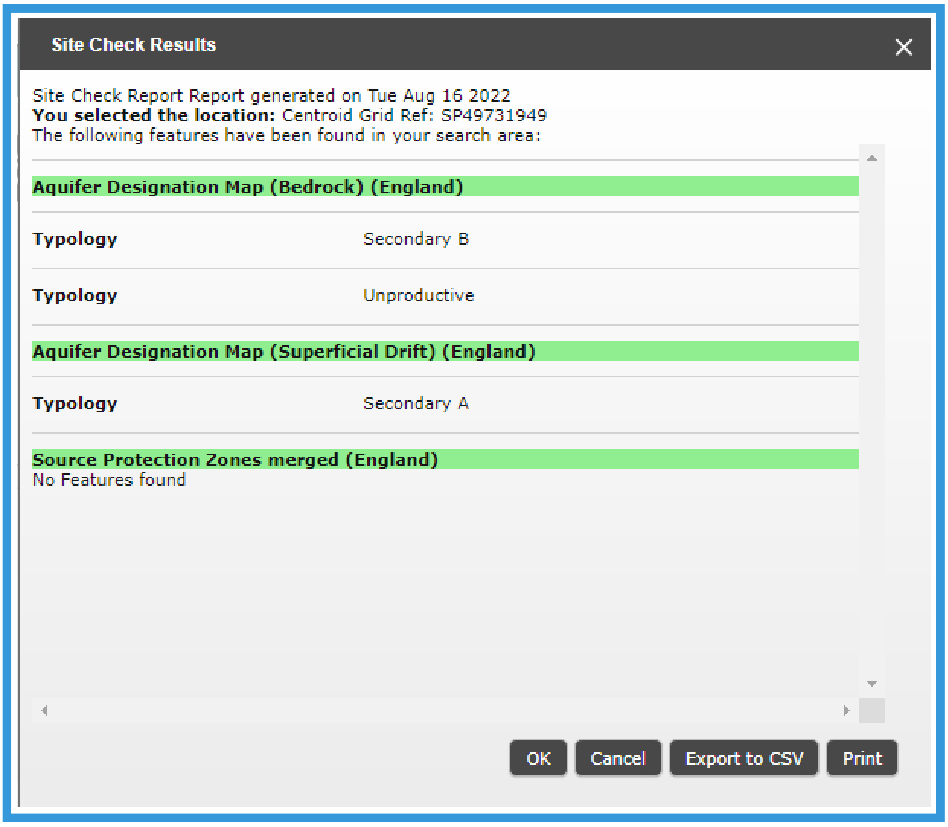




Over 900mm   300 to 900mm   Below 300mm

MAGIC RESULTS





Site Check Results

Site Check Report Report generated on Tue Aug 16 2022
You selected the location: Centroid Grid Ref: SP49731949
The following features have been found in your search area:

Aquifer Designation Map (Bedrock) (England)

Typology	Secondary B
Typology	Unproductive

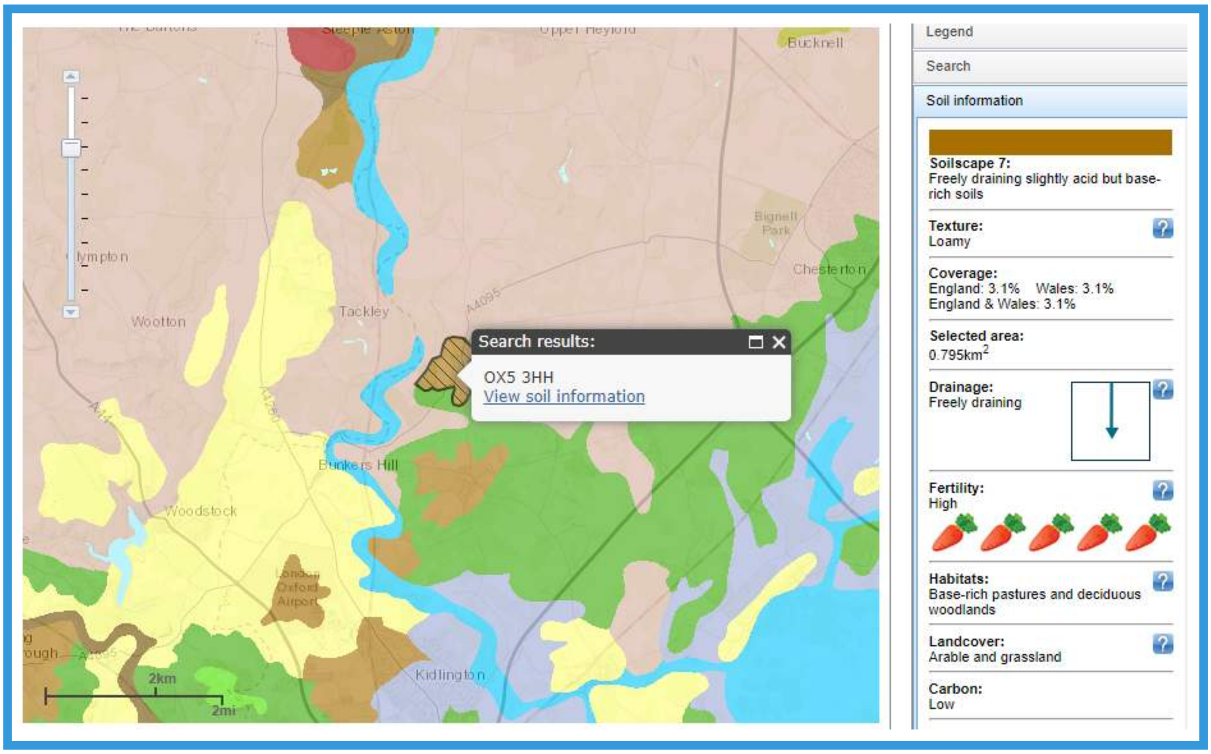
Aquifer Designation Map (Superficial Drift) (England)

Typology	Secondary A

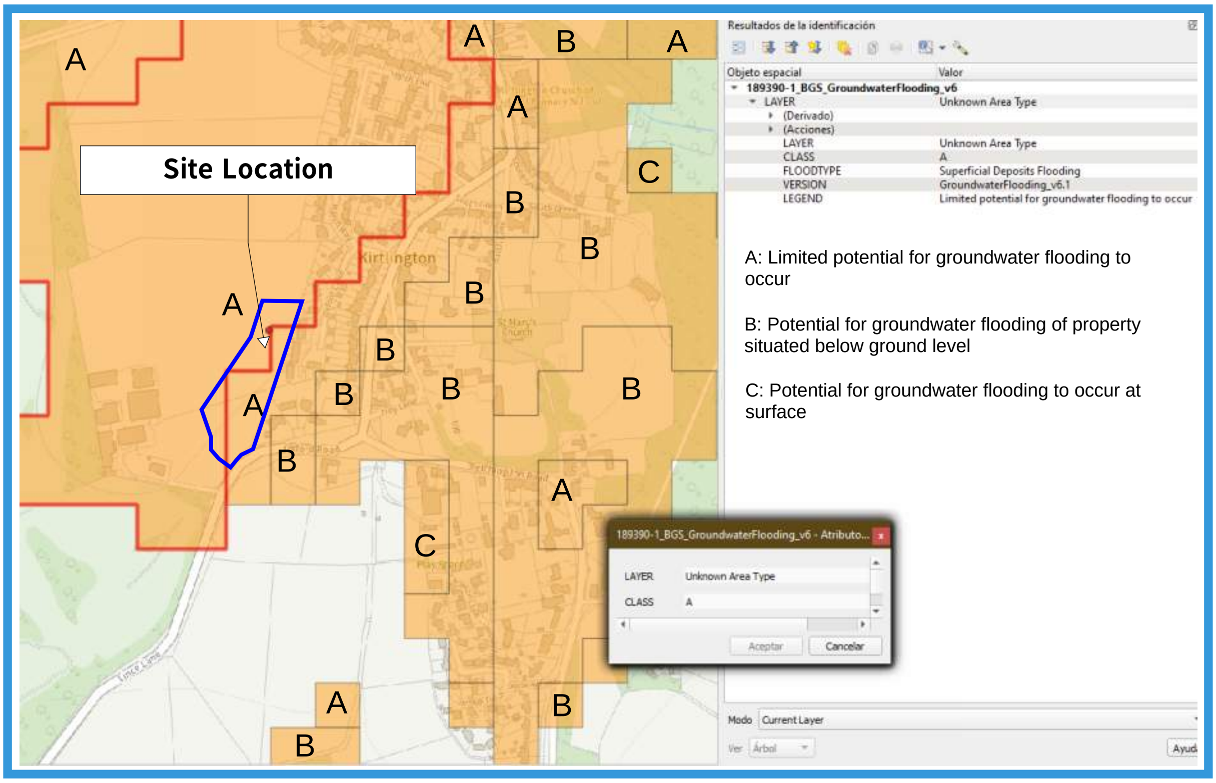
Source Protection Zones merged (England)
No Features found

OK | Cancel | Export to CSV | Print

SOILSCAPES MAP



GROUND WATER FLOOD RISK



Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
OX5 3HH	**449754/219485**	**16 Aug 2022 13:24**

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Environment Agency

Flood map for planning

Your reference
OX5 3HH

Location (easting/northing)
449754/219485

Scale
1:2500

Created
16 Aug 2022 13:24

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

Site Check Report Report generated on Tue Aug 16 2022
You selected the location: Centroid Grid Ref: SP49731943
The following features have been found in your search area:

SSSI Impact Risk Zones - to assess planning applications for likely impacts on SSSIs/SACs/SPAs & Ramsar sites (England)

1. DOES PLANNING PROPOSAL FALL INTO ONE OR MORE OF THE CATEGORIES BELOW?	2. IF YES, CHECK THE CORRESPONDING DESCRIPTION(S) BELOW. LPA SHOULD CONSULT NATURAL ENGLAND ON LIKELY RISKS FROM THE FOLLOWING:
All Planning Applications	
Infrastructure	Airports, helipads and other aviation proposals.
Wind & Solar Energy	
Minerals, Oil & Gas	Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction.
Rural Non Residential	
Residential	
Rural Residential	
Air Pollution	Livestock & poultry units with floorspace > 500m², slurry lagoons & digestate stores > 750m², manure stores > 3500t.
Combustion	General combustion processes >50MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.
Waste	
Composting	
Discharges	
Water Supply	
Notes 1	
Notes 2	
GUIDANCE - How to use the Impact Risk Zones	/Metadata_for_magic/SSSI IRZ User Guidance MAGIC.pdf

Nitrate Vulnerable Zones 2017 Designations (England)

Nitrate Vulnerable Zone ID	472
Nitrate Vulnerable Zone Name	Cherwell (Ray to Thames) and Woodeaton Brook NVZ
Type of Nitrate Vulnerable Zone	Surface Water
Status of NVZ since 2013 designations	Existing
Unique Reference number	S472

Aquifer Designation Map (Bedrock) (England)

Typology	Unproductive

Aquifer Designation Map (Superficial Drift) (England)

Typology	Secondary A

Soilscape (England)

Reference	7
Name	FREELY DRAINING SLIGHTLY ACID BUT BASE-RICH SOILS
Main Surface Texture Class	LOAMY
Natural Drainage Type	FREELY DRAINING
Natural Fertility	HIGH
Characteristic Semi-natural Habitats	BASE-RICH PASTURES AND DECIDUOUS WOODLANDS
Main Land Cover	ARABLE AND GRASSLAND
Hyperlink	/Metadata_for_magic/soilscape_summary.pdf

Areas of Outstanding Natural Beauty (England)
No Features found

Limestone Pavement Orders (England)
No Features found

Local Nature Reserves (England) - points
No Features found

Local Nature Reserves (England)
No Features found

Moorland Line (England)
No Features found

National Nature Reserves (England) - points
No Features found

National Nature Reserves (England)
No Features found

National Parks (England)
No Features found

Ramsar Sites (England) - points
No Features found

Ramsar Sites (England)
No Features found

Proposed Ramsar Sites (England) - points
No Features found

Proposed Ramsar Sites (England)
No Features found

Sites of Special Scientific Interest Units (England) - points
No Features found

Sites of Special Scientific Interest Units (England)
No Features found

Sites of Special Scientific Interest (England) - points
No Features found

Sites of Special Scientific Interest (England)
No Features found

Special Areas of Conservation (England) - points
No Features found

Special Areas of Conservation (England)
No Features found

Possible Special Areas of Conservation (England) - points
No Features found

Possible Special Areas of Conservation (England)
No Features found

Special Protection Areas (England) - points
No Features found

Special Protection Areas (England)
No Features found

Potential Special Protection Areas (England) - points
No Features found

Potential Special Protection Areas (England)
No Features found

Biosphere Reserves (England) - points
No Features found

Biosphere Reserves (England)
No Features found

Less Favoured Areas (England)
No Features found

Wild Bird General Licence Protected Sites Condition Zone (England)
No Features found

Source Protection Zones merged (England)
No Features found

The Brownfield Consultancy
Woodstock
Memorial Road
Fenny Compton.
CV47 2XU

Your Ref:

Our Ref: BC624 L.001 / JT

Dan Moore
Manorwood Homes
4 Wroslyn Road
Freeland
Oxfordshire
OX29 8HU

22nd July 2022

Dear Dan

LINCE LANE, KIRTLINGTON
Results of Infiltration Testing

The Brownfield Consultancy was commissioned by Manorwood Homes to undertake trial pit soakaway (infiltration) testing in accordance with BRE 365 at the above site. The fieldwork was undertaken on 18th July 2022. The site comprises of an irregular shaped field with its long axis north – south, located south of Kirtlington. A residential development is proposed for the plot comprising of seven dwellings with garages and driveways. A Location Plan and proposals are presented in Appendix A.

1. FIELDWORK

Soakaway tests were undertaken within four trial pits denoted SA1 – SA4 to depths of 1.00m to 1.50m. One further pit denoted TP1 was excavated to 1.90m to confirm ground conditions. The locations of the trial pits are denoted on the Exploratory Hole Location Plan in Appendix A.

The pits were excavated by a backhoe excavator, their dimensions carefully measured and then flooded using a mobile water bowser. The time taken for the water to drain was then measured.

2. GROUND CONDITIONS

Reference to the online BGS Mapping Index indicates that the site is underlain by superficial deposits of Hanborough Gravel Member (sand and gravel) overlying the Peterborough Member (Clay and Mudstone). The investigation confirmed the anticipated geology of Hanborough Gravel; the Peterborough Member was not reached.

A summary of the strata encountered during the investigation is described in the following sections but for full details reference should be made to the exploratory hole logs presented in Appendix B.

Topsoil
Topsoil ranging in depth from 0.20-0.30m was encountered in all pits and comprised dark brown SAND with varying quantities of gravel.

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Woodstock
Memorial Road
Fenny Compton.
CV47 2XU

Hanborough Gravel
The Hanborough Gravel was encountered to the base of each pit and comprised brown SAND with varying quantities of quartzite, limestone and ironstone gravel. In some pits it was described as 'locally clayey'.

Groundwater
A 'Very Slow' ingress of groundwater was encountered in TP1 at 1.90m. After 4 hours the level was recorded at 1.80m. Soils were described as 'damp' in TP1 at a depth of 1.20-1.30m.

3. INFILTRATION

3No. successful repeat tests were accomplished in all pits. The following soil infiltration rates (*f*) are calculated:-

SA1 $f = 3.8 \times 10^{-5}$ m/sec, 3.0×10^{-5} m/sec, 4.6×10^{-5} m/sec

SA2 $f = 1.3 \times 10^{-5}$ m/sec, 8.0×10^{-6} m/sec, 8.9×10^{-6} m/sec

SA3 $f = 1.2 \times 10^{-5}$ m/sec, 1.1×10^{-5} m/sec, 8.3×10^{-6} m/sec

SA4 $f = 2.6 \times 10^{-5}$ m/sec, 1.6×10^{-5} m/sec, 1.4×10^{-5} m/sec

The soakaway spreadsheets are presented in Appendix C.

4. RECOMMENDATIONS

It is clear from the results that infiltration in the Hanborough Gravel is a viable means of surface water disposal. Groundwater was encountered at 1.90m and this needs to be further investigated and monitored. The adoption of a 1m 'freeboard' is often necessary which, on the evidence so far, would suggest that all soakways need to be constructed at a maximum depth of 0.90m. We would recommend that at a future date, soakaway tests are conducted at depths of 0.30-0.90m also.

We trust the above is satisfactory for your purposes. Should you have any queries please do not hesitate to contact me.

Yours sincerely

Jim Twaddle **CGeol**
Director

Appendix A *Exploratory Hole Location Plan*
Appendix B *Exploratory Hole Logs*
Appendix C *Soakaway Test Calculations*

APPENDIX A

Exploratory Hole Location Plan

Site Location Plan

LINCE LANE, KIRKLINGTON

EXPLORATORY HOLE LOCATION PLAN

APPENDIX B

Exploratory Hole Logs

Brownfield Consultancy
The Cottage, Mill Lane
Fenny Compton, CV47 2YF
Phone: 07852881086

TRIAL PIT LOG

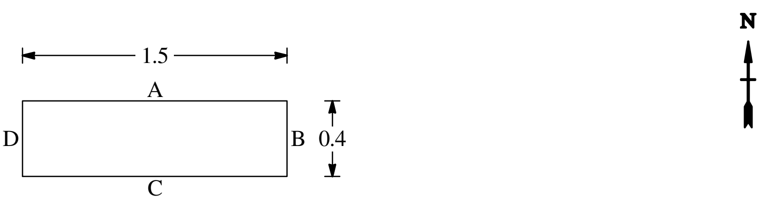
The Brownfield Consultancy

Project				TRIAL PIT No
Lince Lane, Kirtlington				SA1
Job No: BC624	Date: 18-07-22	Ground Level (m):	Co-Ordinates ():	
Contractor: The Brownfield Consultancy Ltd				Sheet: 1 of 1

STRATA / SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		Grass over dark brown slightly gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. (HANBOROUGH GRAVEL)			
0.20-0.85		Brown slightly gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. Sand is fine to coarse. (HANBOROUGH GRAVEL)			
0.85-1.30		Brown and yellow brown locally clayey SAND with occasional gravel of angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. Sand is fine to coarse.(HANBOROUGH GRAVEL) 1.20 - 1.30 Damp.			
1.30		Pit terminated at target depth. No obvious groundwater.			

Shoring/Support:
Stability: Stable.



GENERAL REMARKS

Soakaway test undertaken. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client: Manorwood Homes	Method/Plant Used: Backhoe excavator.	Logged By: JT

Brownfield Consultancy
The Cottage, Mill Lane
Fenny Compton, CV47 2YF
Phone: 07852881086

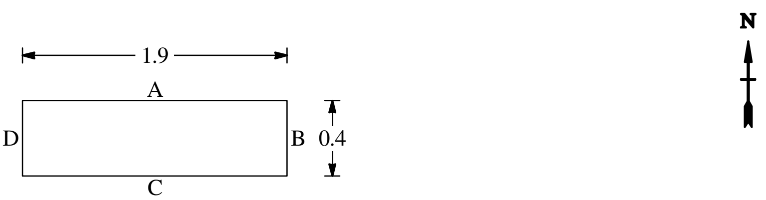
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Lince Lane, Kirtlington				SA2
Job No: BC624	Date: 18-07-22	Ground Level (m)	Co-Ordinates ()	
Contractor: The Brownfield Consultancy Ltd				Sheet: 1 of 1

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		Grass over dark brown slightly gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. (HANBOROUGH GRAVEL)			
0.20-1.05		Brown slightly gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. Sand is fine to coarse. (HANBOROUGH GRAVEL) 0.80 - 1.05 Locally clayey.			
1.05		Pit terminated at target depth. No obvious groundwater.			

Shoring/Support:
Stability: Stable.



GENERAL REMARKS

Soakaway test undertaken. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client: Manorwood Homes	Method/ Plant Used: Backhoe excavator.	Logged By: JT

Brownfield Consultancy
The Cottage, Mill Lane
Fenny Compton, CV47 2YF
Phone: 07852881086

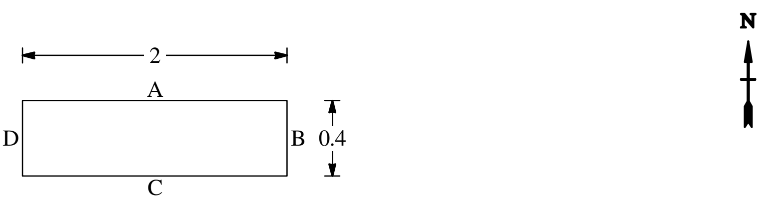
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Lince Lane, Kirtlington				SA3
Job No: BC624	Date: 18-07-22	Ground Level (m):	Co-Ordinates ():	
Contractor: The Brownfield Consultancy Ltd				Sheet: 1 of 1

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Grass over dark brown slightly gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite and limestone. (HANBOROUGH GRAVEL)			
0.30-1.00		Brown slightly gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. Sand is fine to coarse. (HANBOROUGH GRAVEL) 0.80 - 1.00 Locally clayey, gravelly.			

Shoring/Support:
Stability: Stable.



GENERAL REMARKS

Soakaway test undertaken.
Backfilled with arisings.

All dimensions in metres Scale 1:25	Client: Manorwood Homes	Method/Plant Used: Backhoe excavator.	Logged By: JT

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Fenny Compton, CV47 2YF
Phone: 07852881086

TRIAL PIT LOG

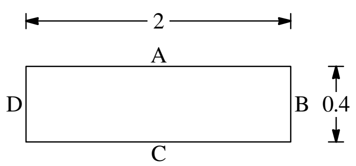
The Brownfield Consultancy

Project: Lince Lane, Kirtlington				TRIAL PIT No: **SA4**
Job No: BC624	Date: 18-07-22	Ground Level (m)	Co-Ordinates ()	
Contractor: The Brownfield Consultancy Ltd				Sheet: 1 of 1

STRATA / SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Grass over dark brown slightly gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite and limestone. (HANBOROUGH GRAVEL)			
0.30-1.10		Brown SAND with occasional gravel of angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. Sand is fine to coarse. (HANBOROUGH GRAVEL)			
1.10-1.50		Brown fine to coarse SAND.(HANBOROUGH GRAVEL)			
1.50		Pit terminated at target depth. No obvious groundwater.			

Shoring/Support:
Stability: Stable.



GENERAL REMARKS

Soakaway test undertaken. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client: Manorwood Homes	Method/Plant Used: Backhoe excavator.	Logged By: JT

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The Cottage, Mill Lane
Fenny Compton, CV47 2YF
Phone: 07852881086

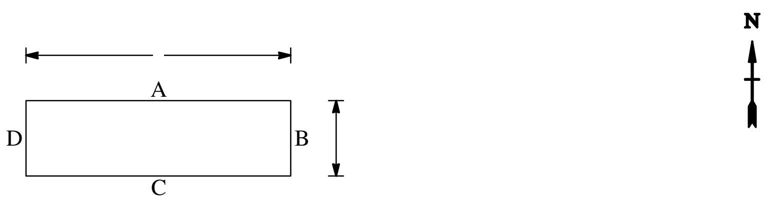
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Lince Lane, Kirtlington				TP1
Job No: BC624	Date: 18-07-22	Ground Level (m)	Co-Ordinates ()	
Contractor: The Brownfield Consultancy Ltd				Sheet: 1 of 1

STRATA				SAMPLES & TESTS		
Depth	No		DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30			Grass over dark brown gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. (HANBOROUGH GRAVEL)			
0.30-1.90			Brown slightly gravelly SAND. Gravel is angular to subrounded fine and medium occasionally coarse quartzite, limestone and rare ironstone. Sand is fine to coarse. (HANBOROUGH GRAVEL) 1.70 - 1.90 Gravelly.			
1.90			Pit terminated at target depth. Very slow groundwater ingress at 1.90m; level at 1.80m after 4 hours.			

Shoring/Support:
Stability: Stable.



GENERAL REMARKS

Backfilled with arisings.

All dimensions in metres Scale 1:25	Client: Manorwood Homes	Method/Plant Used: Backhoe excavator.	Logged By: JT

APPENDIX C

Soakaway Calculation Sheets

The Brownfield Consultancy	SOIL INFILTRATION TEST
Woodstock **Memorial Road** **Fenny Compton** **CV47 2XU** **Tel: 07852881086**	**Project:** Lince Lane, Kirtlington **Project No:** BC624

Test Location: SA1 | Test No: 1 | Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.300
1	0.400
5	0.650
13	0.860
31	1.030
46	1.060

Trial pit dimensions

depth (m)	1.30
length (m)	1.50
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate

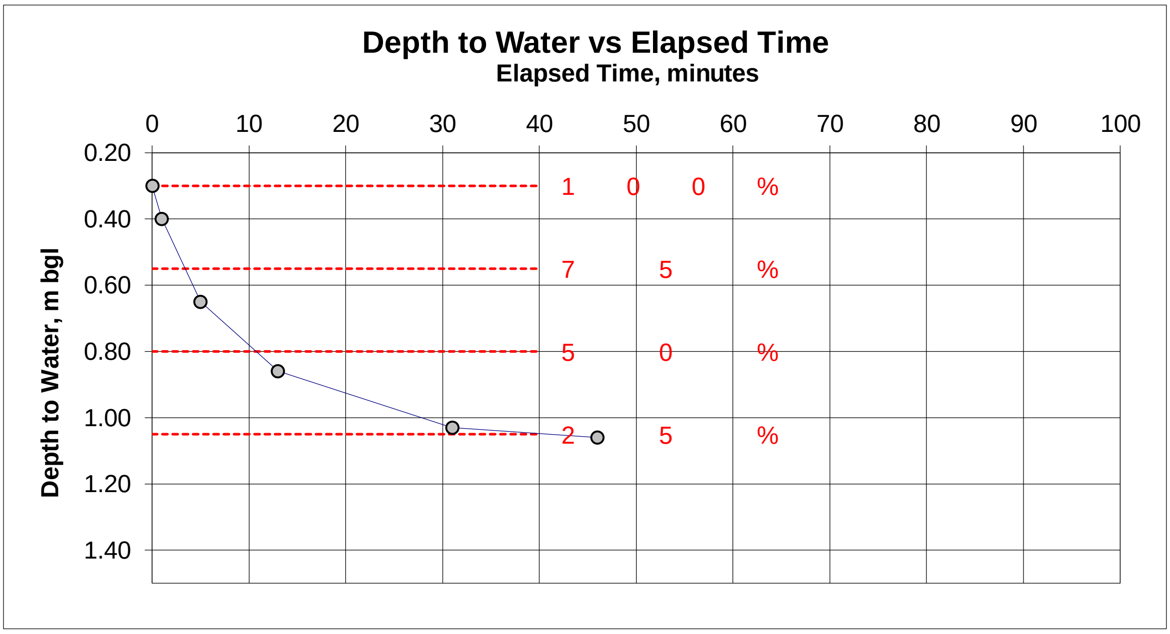
Vp = volume of water from 75% to 25% effective depth

αp = Internal surface area at 50% effective depth

tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins)	4
time at 25% effective depth (mins)	43
(from graph)	

Calculated Soil Infiltration Rate = 3.8E-05 m/sec



The Brownfield Consultancy

SOIL INFILTRATION TEST

Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA1   Test No: 2   Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.290
2	0.450
7	0.620
15	0.850
30	0.960
38	1.000
49	1.030
55	1.050
67	1.080

Trial pit dimensions

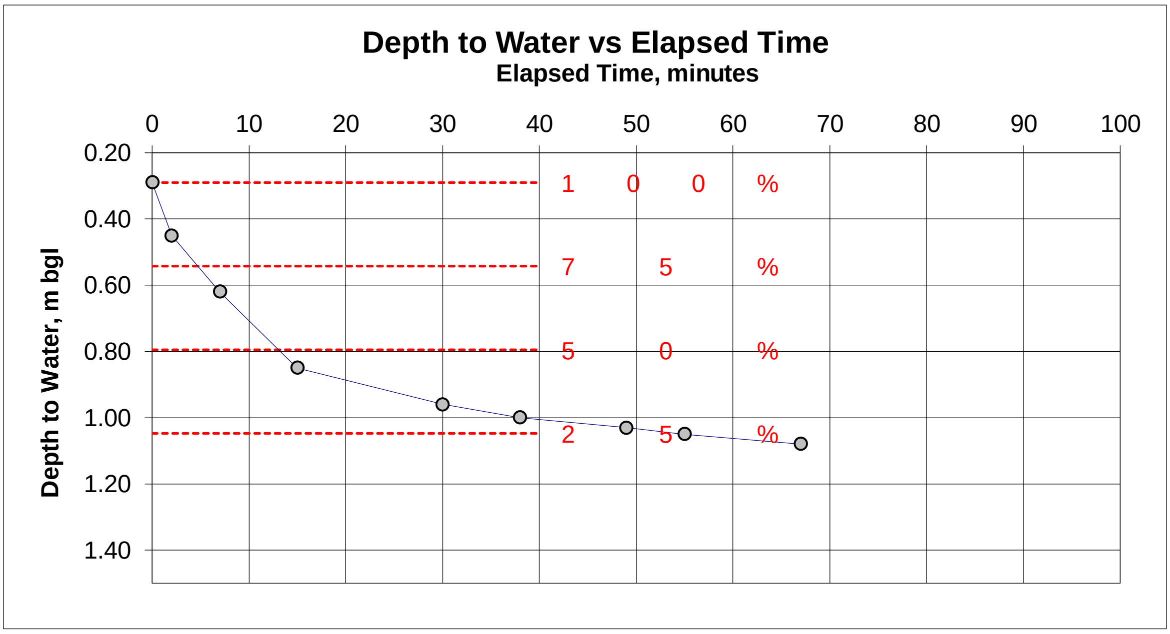
depth (m)	1.30
length (m)	1.50
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 5
time at 25% effective depth (mins) 55
(from graph)

Calculated Soil Infiltration Rate = 3.0E-05 m/sec



The Brownfield Consultancy

Woodstock
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Fenny Compton
CV47 2XU
Tel: 07852881086

SOIL INFILTRATION TEST

Project: Lince Lane, Kirtlington

Project No: BC624

Test Location: SA1 | Test No: 3 | Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.270
12	0.720
31	0.930
40	0.980
63	1.040

Trial pit dimensions

depth (m)	1.20
length (m)	1.50
width (m)	0.40

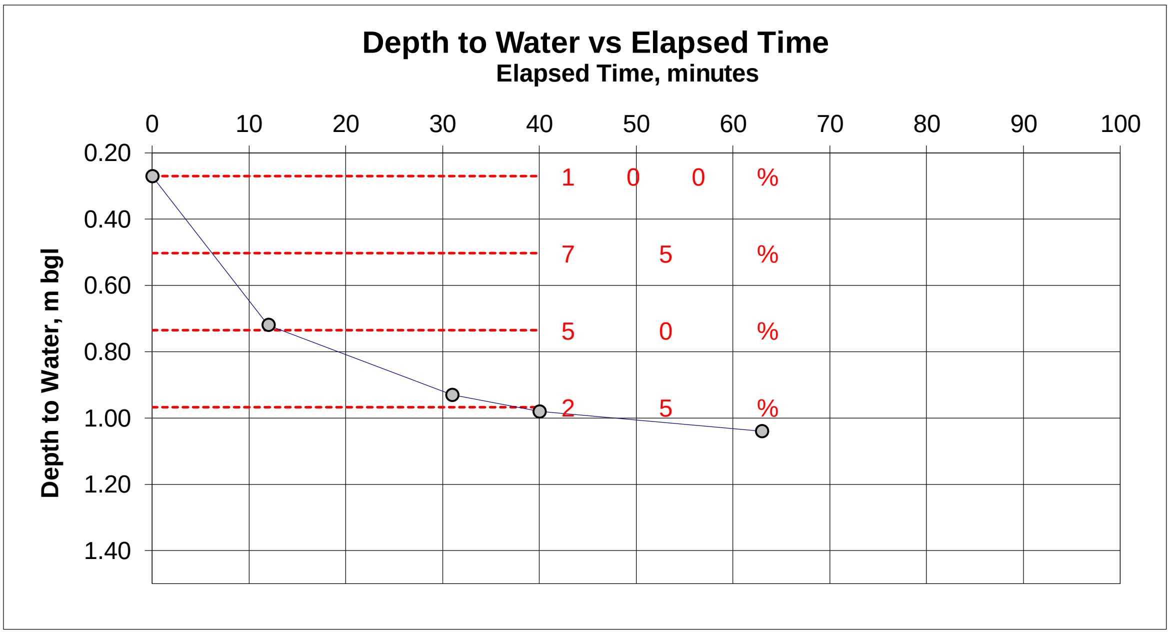
Collaspsed to 1.20m

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 6
time at 25% effective depth (mins) 40
(from graph)

Calculated Soil Infiltration Rate = 4.6E-05 m/sec



The Brownfield Consultancy

SOIL INFILTRATION TEST

Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA2 | Test No: 1 | Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.540
6	0.620
12	0.660
23	0.720
45	0.800
60	0.840
79	0.880
91	0.900
112	0.930
129	0.950

Trial pit dimensions

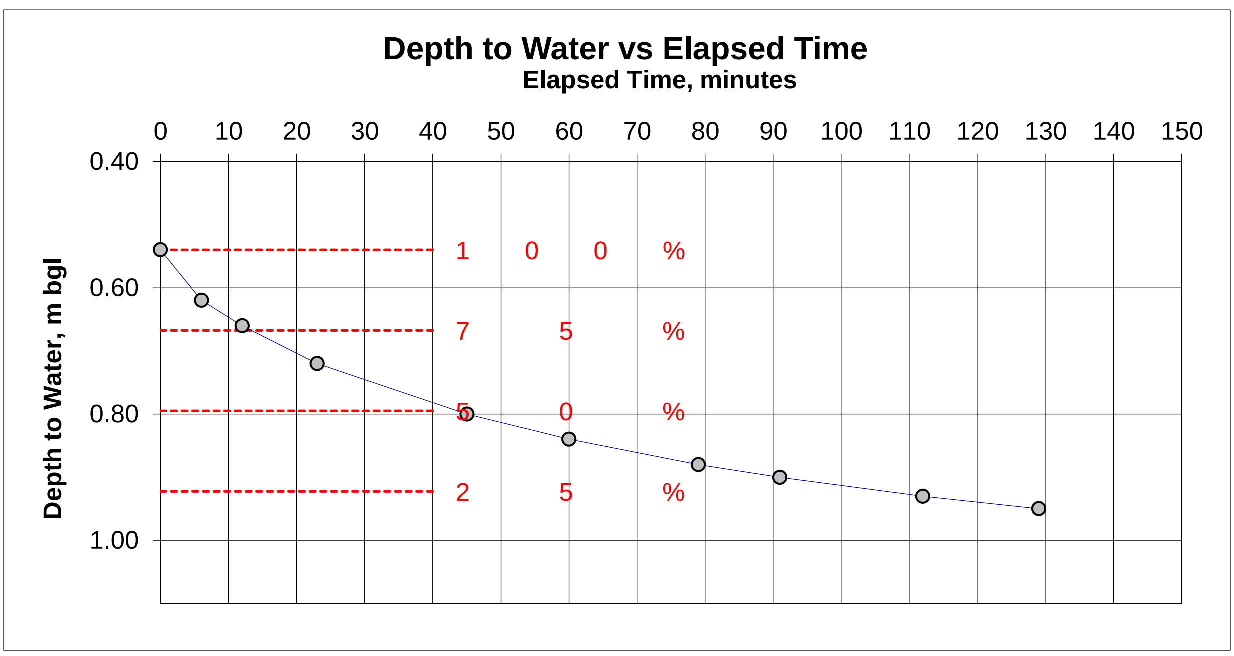
depth (m)	1.05
length (m)	1.90
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 13
time at 25% effective depth (mins) 120
(from graph)

Calculated Soil Infiltration Rate = 1.3E-05 m/sec



The Brownfield Consultancy

SOIL INFILTRATION TEST

Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA2 Test No: 2 Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.260
12	0.420
24	0.490
39	0.560
74	0.670
117	0.770
138	0.800
181	0.840
204	0.860

Trial pit dimensions

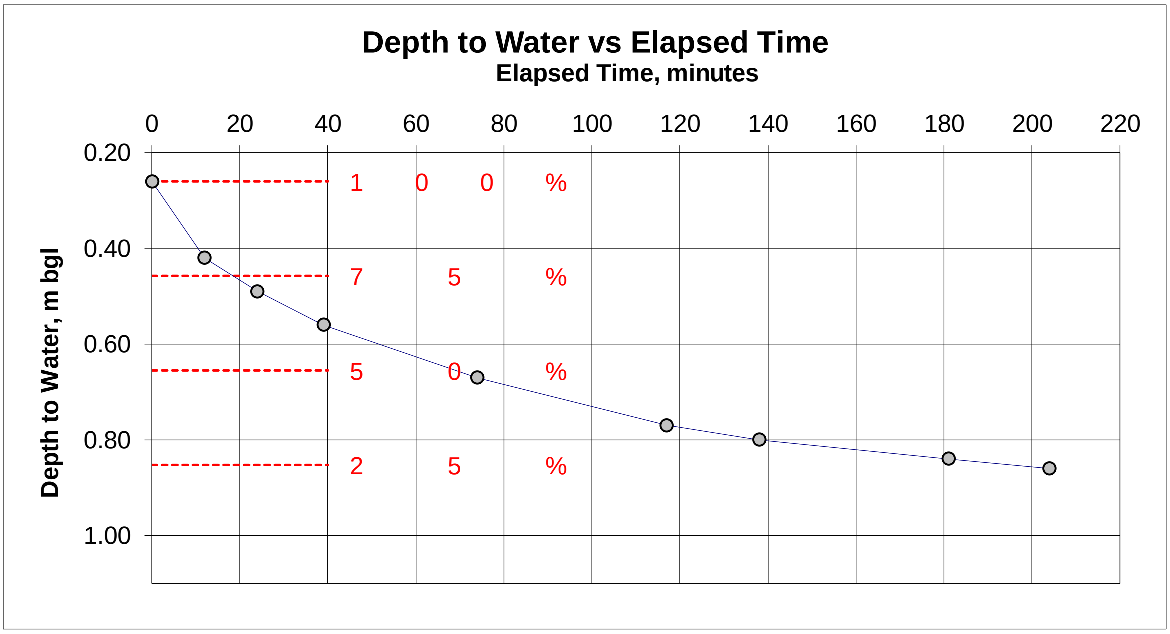
depth (m)	1.05
length (m)	1.90
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 18
time at 25% effective depth (mins) 200
(from graph)

Calculated Soil Infiltration Rate = 8.0E-06 m/sec



The Brownfield Consultancy

SOIL INFILTRATION TEST

Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA2 Test No: 3 Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.270
25	0.440
63	0.570
93	0.650
123	0.710
153	0.770
182	0.830
209	0.880

Trial pit dimensions

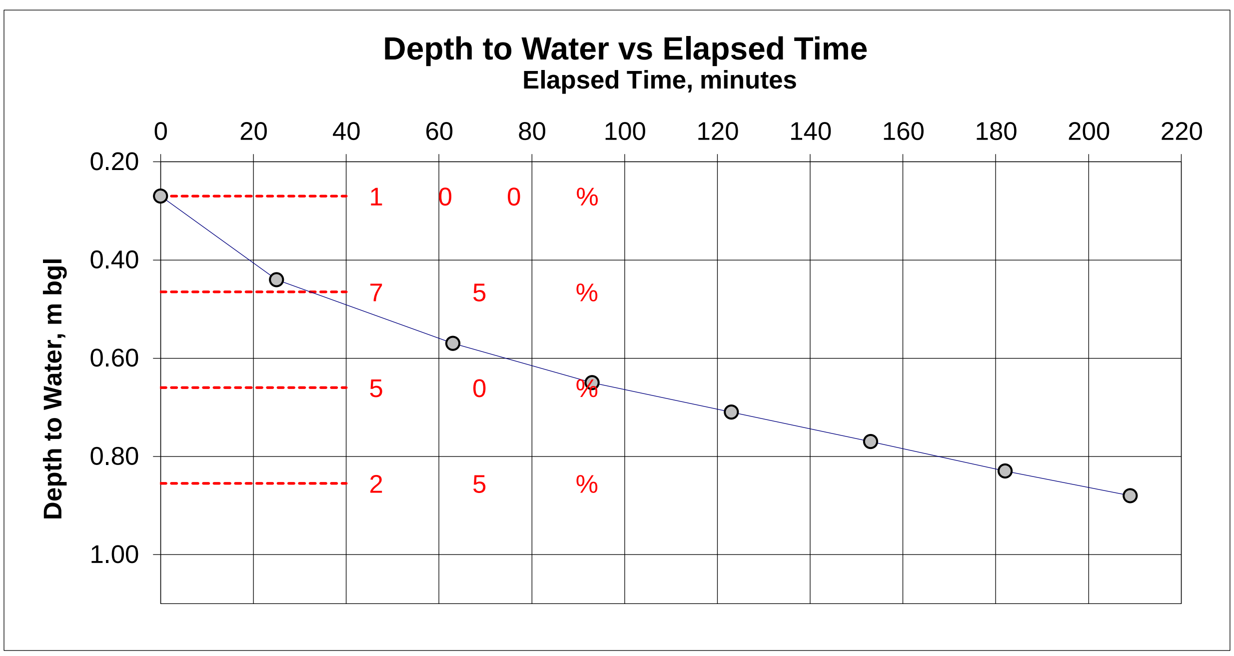
depth (m)	1.05
length (m)	1.90
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 34
time at 25% effective depth (mins) 200
(from graph)

Calculated Soil Infiltration Rate = 8.9E-06 m/sec



The Brownfield Consultancy
Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

SOIL INFILTRATION TEST

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA3 | Test No: 1 | Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.400
8	0.520
25	0.620
41	0.690
56	0.740
72	0.770
90	0.800
108	0.830
129	0.850
144	0.870

Trial pit dimensions

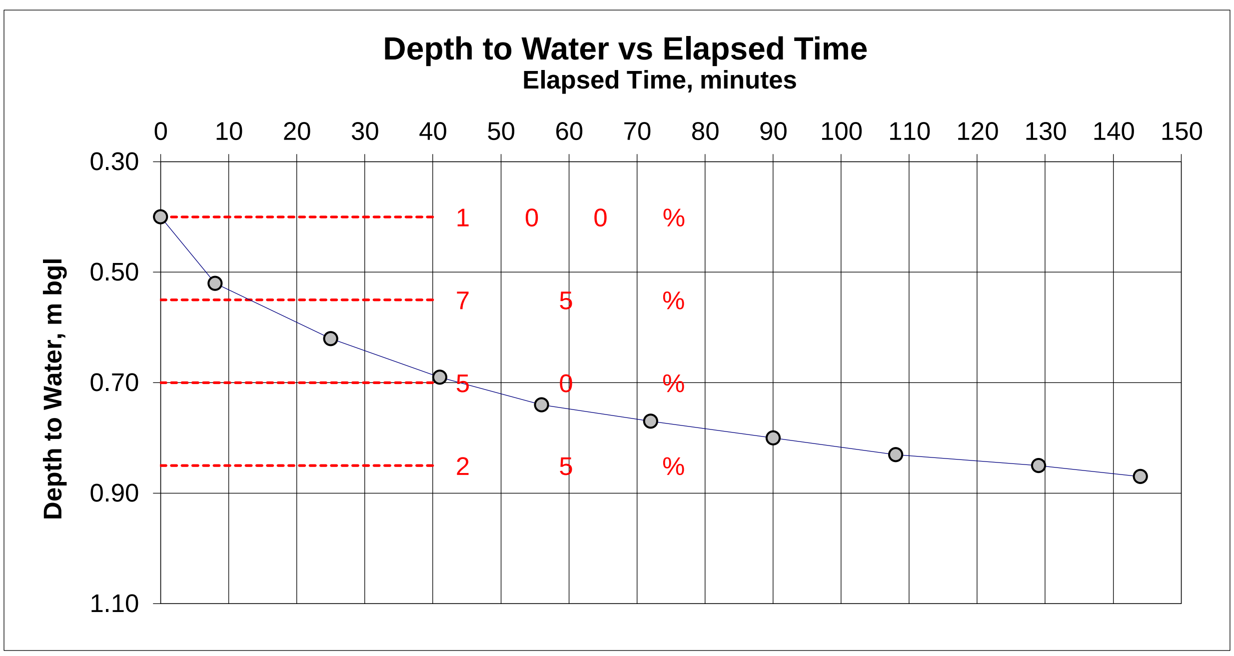
depth (m)	1.00
length (m)	2.00
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 13
time at 25% effective depth (mins) 130
(from graph)

Calculated Soil Infiltration Rate = 1.2E-05 m/sec



The Brownfield Consultancy	SOIL INFILTRATION TEST
Woodstock **Memorial Road** **Fenny Compton** **CV47 2XU** **Tel: 07852881086**	**Project:** Lince Lane, Kirtlington **Project No:** BC624

Test Location: SA3 Test No: 2 Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.200
1	0.260
8	0.360
20	0.420
29	0.470
70	0.600
113	0.700
127	0.740
141	0.770
164	0.810
179	0.840

Trial pit dimensions

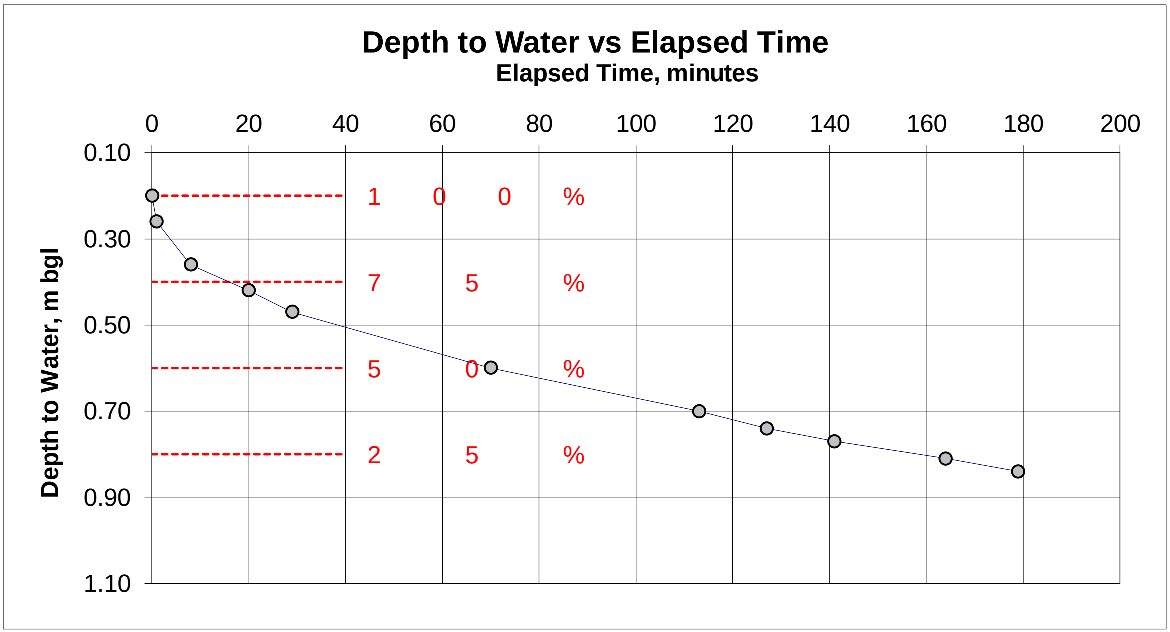
depth (m)	1.00
length (m)	2.00
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 18
time at 25% effective depth (mins) 160
(from graph)

Calculated Soil Infiltration Rate = 1.1E-05 m/sec



The Brownfield Consultancy

Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

SOIL INFILTRATION TEST

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA3 | Test No: 3 | Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.270
25	0.410
61	0.520
91	0.600
121	0.670
151	0.720
181	0.770
223	0.830

Trial pit dimensions

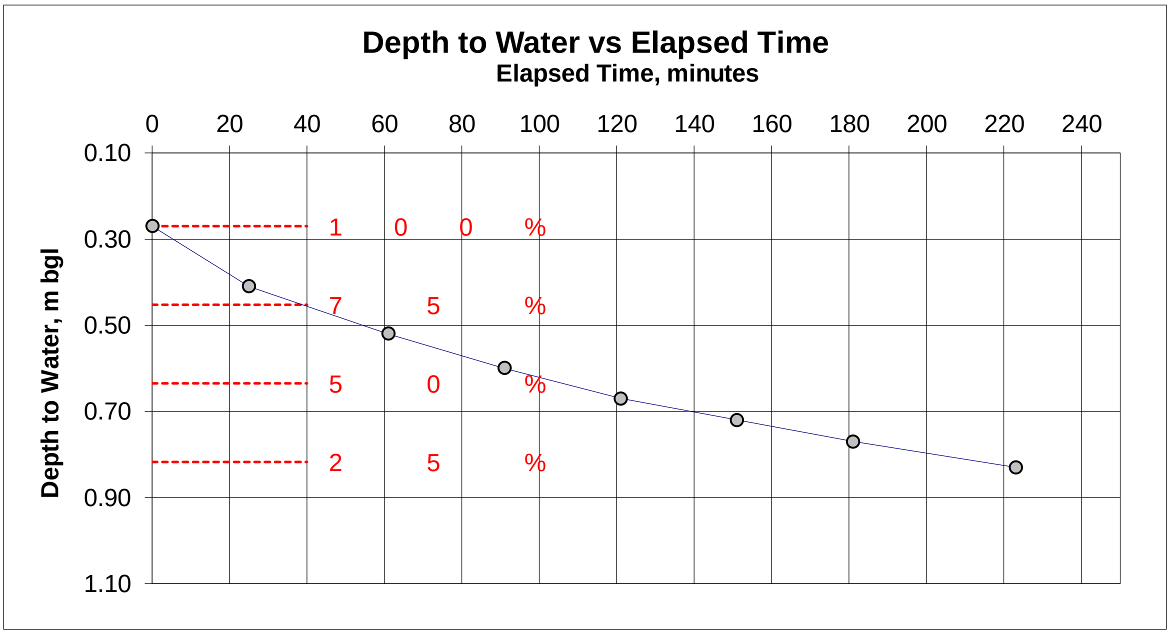
depth (m)	1.00
length (m)	2.00
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins)	40
time at 25% effective depth (mins)	215
(from graph)	

Calculated Soil Infiltration Rate = 8.3E-06 m/sec



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SOIL INFILTRATION TEST

Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA4 | Test No: 1 | Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.670
1	0.750
4	0.870
18	1.060
38	1.170
44	1.200
56	1.270
63	1.300
74	1.320

Trial pit dimensions

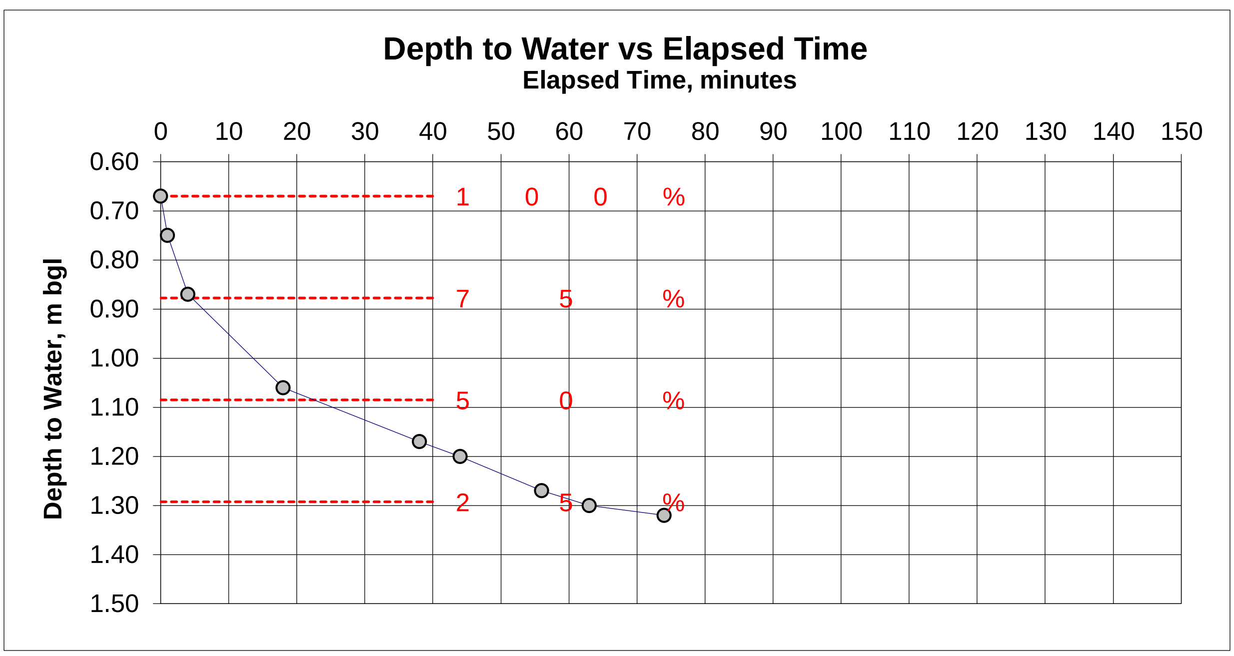
depth (m)	1.50
length (m)	2.00
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 4
time at 25% effective depth (mins) 63
(from graph)

Calculated Soil Infiltration Rate = 2.6E-05 m/sec



The Brownfield Consultancy

SOIL INFILTRATION TEST

Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA4 Test No: 2 Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.560
37	0.990
80	1.180
110	1.260
125	1.290

Trial pit dimensions

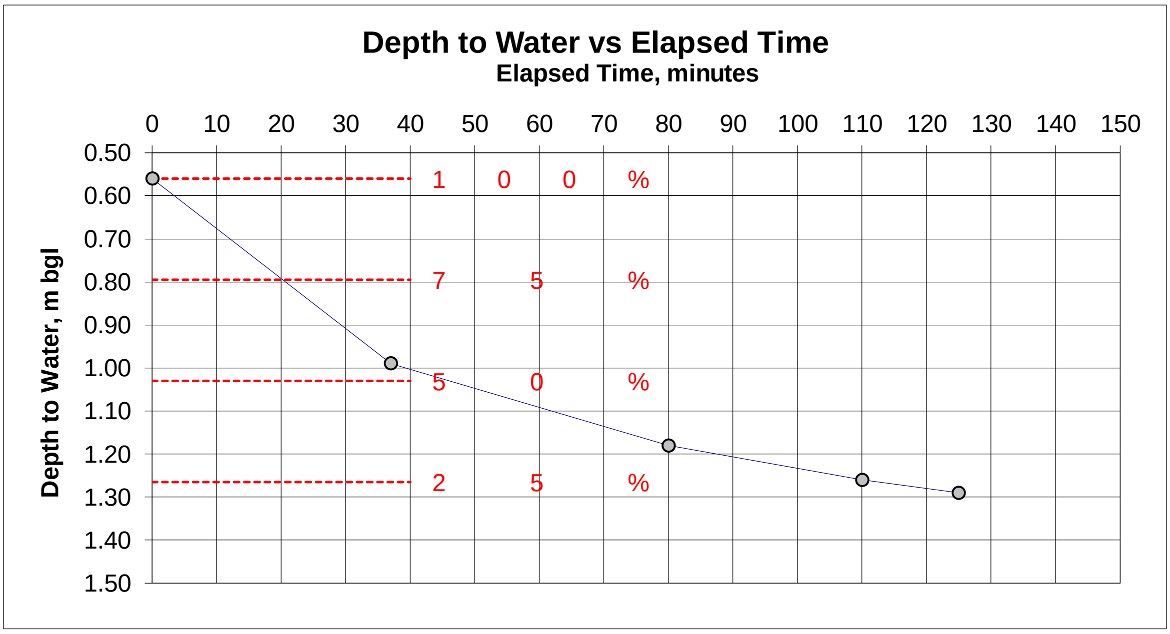
depth (m)	1.50
length (m)	2.00
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins)	20
time at 25% effective depth (mins) (from graph)	117

Calculated Soil Infiltration Rate = 1.6E-05 m/sec



The Brownfield Consultancy

SOIL INFILTRATION TEST

Woodstock
Memorial Road
Fenny Compton
CV47 2XU
Tel: 07852881086

Project:
Lince Lane, Kirtlington

Project No:
BC624

Test Location: SA4

Test No: 3

Date: 18.7.22

Water level during test

Time mins	Depth m bgl
0	0.400
23	0.850
64	1.030
93	1.140
123	1.220
143	1.270

Trial pit dimensions

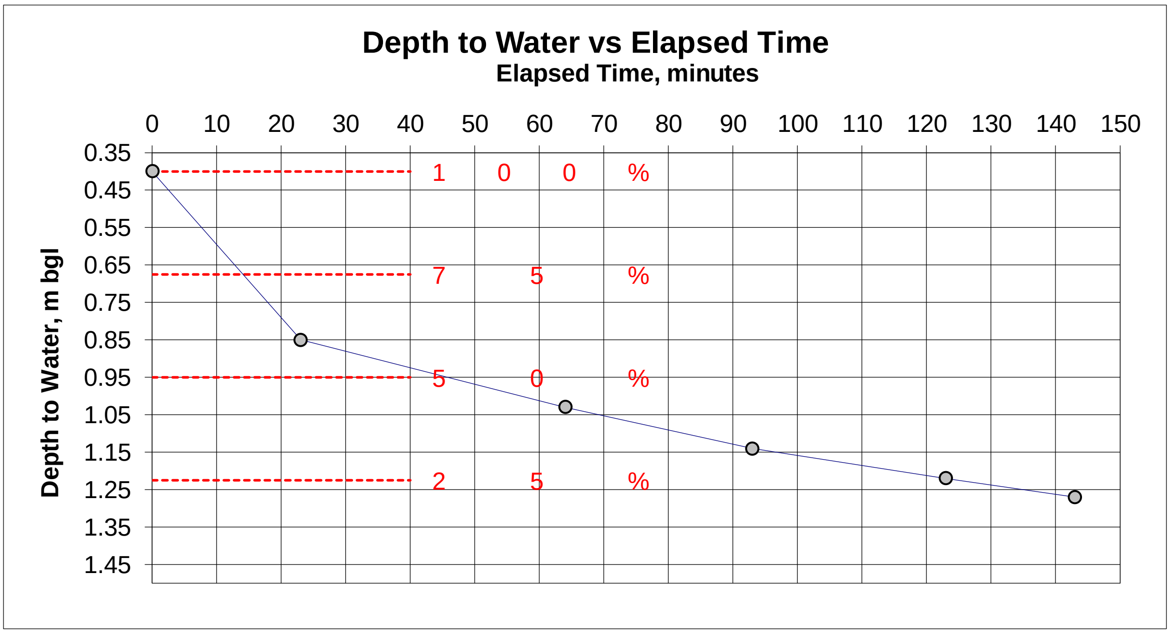
depth (m)	1.50
length (m)	2.00
width (m)	0.40

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 14
time at 25% effective depth (mins) 127
(from graph)

Calculated Soil Infiltration Rate = 1.4E-05 m/sec



Appendix C

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.1
Summer CV	0.750	2 year (l/s)	0.1
Winter CV	0.840	30 year (l/s)	0.3
Analysis Speed	Normal	100 year (l/s)	0.4
Skip Steady State	x	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
30	40	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.913	Betterment (%)	0
SAAR (mm)	639	QBar	0.1
Soil Index	1	Q 1 year (l/s)	0.1
SPR	0.10	Q 2 year (l/s)	0.1
Region	6	Q 30 year (l/s)	0.3
Growth Factor 1 year	0.85	Q 100 year (l/s)	0.4
Growth Factor 2 year	0.88		

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Inverts
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	6.00	Enforce best practice design rules	✓

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100	150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
House	0.021	6.00	101.000	450	-0.063	0.531	0.600
Soakaway			101.000		10.351	0.272	0.700
Dummy			101.000	450	19.921	0.430	0.800

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	House	Soakaway	10.000	0.600	100.400	100.300	0.100	100.0	100	6.22	50.0
1.001	Soakaway	Dummy	10.000	0.600	100.300	100.200	0.100	100.0	100	6.43	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.769	6.0	2.8	0.500	0.600	0.021	0.0	48	0.756
1.001	0.769	6.0	2.8	0.600	0.700	0.021	0.0	48	0.756

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m^3/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
30	40	0	0
100	0	0	0
100	40	0	0

Node Soakaway Online Pump Control

Flap Valve	x	Invert Level (m)	100.300	Switch on depth (m)	1.500
Downstream Link	1.001	Design Depth (m)	1.500	Switch off depth (m)	0.010
Replaces Downstream Link	✓	Design Flow (l/s)	0.1		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	1.500	0.000

Node Soakaway Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	100.300
Side Inf Coefficient (m/hr)	0.02880	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	55.0	0.0	0.400	55.0	0.0	0.401	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	2 year 15 minute summer	141.566	40.058
1 year 15 minute winter	76.857	30.991	2 year 15 minute winter	99.345	40.058
1 year 30 minute summer	71.439	20.215	2 year 30 minute summer	91.753	25.963
1 year 30 minute winter	50.133	20.215	2 year 30 minute winter	64.388	25.963
1 year 60 minute summer	48.435	12.800	2 year 60 minute summer	61.301	16.200
1 year 60 minute winter	32.179	12.800	2 year 60 minute winter	40.727	16.200
1 year 120 minute summer	30.053	7.942	2 year 120 minute summer	37.449	9.897
1 year 120 minute winter	19.966	7.942	2 year 120 minute winter	24.880	9.897
1 year 180 minute summer	23.233	5.979	2 year 180 minute summer	28.672	7.378
1 year 180 minute winter	15.102	5.979	2 year 180 minute winter	18.637	7.378
1 year 240 minute summer	18.475	4.882	2 year 240 minute summer	22.636	5.982
1 year 240 minute winter	12.274	4.882	2 year 240 minute winter	15.039	5.982
1 year 360 minute summer	14.169	3.646	2 year 360 minute summer	17.235	4.435
1 year 360 minute winter	9.210	3.646	2 year 360 minute winter	11.203	4.435
1 year 480 minute summer	11.185	2.956	2 year 480 minute summer	13.550	3.581
1 year 480 minute winter	7.431	2.956	2 year 480 minute winter	9.003	3.581
1 year 600 minute summer	9.182	2.511	2 year 600 minute summer	11.088	3.033
1 year 600 minute winter	6.274	2.511	2 year 600 minute winter	7.576	3.033
1 year 720 minute summer	8.203	2.199	2 year 720 minute summer	9.878	2.647
1 year 720 minute winter	5.513	2.199	2 year 720 minute winter	6.639	2.647
1 year 960 minute summer	6.768	1.782	2 year 960 minute summer	8.113	2.136
1 year 960 minute winter	4.483	1.782	2 year 960 minute winter	5.374	2.136
1 year 1440 minute summer	4.949	1.326	2 year 1440 minute summer	5.891	1.579
1 year 1440 minute winter	3.326	1.326	2 year 1440 minute winter	3.959	1.579

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 15 minute summer	268.706	76.035	100 year 15 minute summer	348.738	98.681
30 year 15 minute winter	188.566	76.035	100 year 15 minute winter	244.728	98.681
30 year 30 minute summer	174.929	49.499	100 year 30 minute summer	228.965	64.789
30 year 30 minute winter	122.757	49.499	100 year 30 minute winter	160.677	64.789
30 year 60 minute summer	116.589	30.811	100 year 60 minute summer	153.288	40.510
30 year 60 minute winter	77.459	30.811	100 year 60 minute winter	101.841	40.510
30 year 120 minute summer	70.438	18.615	100 year 120 minute summer	92.562	24.461
30 year 120 minute winter	46.797	18.615	100 year 120 minute winter	61.496	24.461
30 year 180 minute summer	53.298	13.715	100 year 180 minute summer	69.806	17.964
30 year 180 minute winter	34.645	13.715	100 year 180 minute winter	45.376	17.964
30 year 240 minute summer	41.604	10.995	100 year 240 minute summer	54.269	14.342
30 year 240 minute winter	27.641	10.995	100 year 240 minute winter	36.055	14.342
30 year 360 minute summer	31.221	8.034	100 year 360 minute summer	40.484	10.418
30 year 360 minute winter	20.295	8.034	100 year 360 minute winter	26.315	10.418
30 year 480 minute summer	24.324	6.428	100 year 480 minute summer	31.414	8.302
30 year 480 minute winter	16.160	6.428	100 year 480 minute winter	20.871	8.302
30 year 600 minute summer	19.756	5.404	100 year 600 minute summer	25.431	6.956
30 year 600 minute winter	13.498	5.404	100 year 600 minute winter	17.376	6.956
30 year 720 minute summer	17.490	4.687	100 year 720 minute summer	22.452	6.017
30 year 720 minute winter	11.754	4.687	100 year 720 minute winter	15.089	6.017
30 year 960 minute summer	14.215	3.743	100 year 960 minute summer	18.166	4.784
30 year 960 minute winter	9.416	3.743	100 year 960 minute winter	12.033	4.784
30 year 1440 minute summer	10.161	2.723	100 year 1440 minute summer	12.896	3.456
30 year 1440 minute winter	6.829	2.723	100 year 1440 minute winter	8.667	3.456
30 year +40% CC 15 minute summer	376.189	106.449	100 year +40% CC 15 minute summer	488.233	138.153
30 year +40% CC 15 minute winter	263.992	106.449	100 year +40% CC 15 minute winter	342.620	138.153
30 year +40% CC 30 minute summer	244.900	69.298	100 year +40% CC 30 minute summer	320.551	90.705
30 year +40% CC 30 minute winter	171.860	69.298	100 year +40% CC 30 minute winter	224.948	90.705
30 year +40% CC 60 minute summer	163.225	43.136	100 year +40% CC 60 minute summer	214.603	56.713
30 year +40% CC 60 minute winter	108.443	43.136	100 year +40% CC 60 minute winter	142.577	56.713
30 year +40% CC 120 minute summer	98.613	26.061	100 year +40% CC 120 minute summer	129.587	34.246
30 year +40% CC 120 minute winter	65.516	26.061	100 year +40% CC 120 minute winter	86.094	34.246
30 year +40% CC 180 minute summer	74.617	19.202	100 year +40% CC 180 minute summer	97.729	25.149
30 year +40% CC 180 minute winter	48.503	19.202	100 year +40% CC 180 minute winter	63.526	25.149
30 year +40% CC 240 minute summer	58.245	15.393	100 year +40% CC 240 minute summer	75.977	20.078
30 year +40% CC 240 minute winter	38.697	15.393	100 year +40% CC 240 minute winter	50.477	20.078
30 year +40% CC 360 minute summer	43.710	11.248	100 year +40% CC 360 minute summer	56.677	14.585
30 year +40% CC 360 minute winter	28.413	11.248	100 year +40% CC 360 minute winter	36.841	14.585
30 year +40% CC 480 minute summer	34.053	8.999	100 year +40% CC 480 minute summer	43.979	11.622
30 year +40% CC 480 minute winter	22.624	8.999	100 year +40% CC 480 minute winter	29.219	11.622
30 year +40% CC 600 minute summer	27.658	7.565	100 year +40% CC 600 minute summer	35.604	9.738
30 year +40% CC 600 minute winter	18.898	7.565	100 year +40% CC 600 minute winter	24.327	9.738
30 year +40% CC 720 minute summer	24.485	6.562	100 year +40% CC 720 minute summer	31.433	8.424
30 year +40% CC 720 minute winter	16.456	6.562	100 year +40% CC 720 minute winter	21.125	8.424
30 year +40% CC 960 minute summer	19.901	5.240	100 year +40% CC 960 minute summer	25.432	6.697
30 year +40% CC 960 minute winter	13.183	5.240	100 year +40% CC 960 minute winter	16.847	6.697
30 year +40% CC 1440 minute summer	14.225	3.812	100 year +40% CC 1440 minute summer	18.055	4.839
30 year +40% CC 1440 minute winter	9.560	3.812	100 year +40% CC 1440 minute winter	12.134	4.839

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	House	10	100.452	0.052	2.7	0.0446	0.0000	OK
600 minute winter	Soakaway	840	100.391	0.091	0.3	4.7341	0.0000	OK
15 minute summer	Dummy	1	100.200	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	House	1.000	Soakaway	2.7	1.302	0.450	0.0235	
600 minute winter	Soakaway	Pump	Dummy	0.0				0.0
600 minute winter	Soakaway	Infiltration		0.0				

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	House	10	100.460	0.060	3.5	0.0511	0.0000	OK
600 minute winter	Soakaway	630	100.413	0.113	0.4	5.8811	0.0000	SURCHARGED
15 minute summer	Dummy	1	100.200	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	House	1.000	Soakaway	3.5	1.359	0.583	0.0287	
600 minute winter	Soakaway	Pump	Dummy	0.0				0.0
600 minute winter	Soakaway	Infiltration		0.0				

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	House	1590	100.530	0.130	0.3	0.1120	0.0000	SURCHARGED
1440 minute winter	Soakaway	1680	100.530	0.230	0.3	12.0175	0.0000	SURCHARGED
15 minute summer	Dummy	1	100.200	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	House	1.000	Soakaway	0.3	0.506	0.050	0.0782	
1440 minute winter	Soakaway	Pump	Dummy	0.0				0.0
1440 minute winter	Soakaway	Infiltration		0.0				

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	House	11	100.644	0.244	9.3	0.2094	0.0000	SURCHARGED
1440 minute winter	Soakaway	1440	100.611	0.311	0.5	16.2564	0.0000	SURCHARGED
15 minute summer	Dummy	1	100.200	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	House	1.000	Soakaway	8.9	1.500	1.482	0.0696	
1440 minute winter	Soakaway	Pump	Dummy	0.0				0.0
1440 minute winter	Soakaway	Infiltration		0.0				

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
15 minute winter	House	11	100.605	0.205	8.6	0.1762	0.0000	SURCHARGED
1440 minute winter	Soakaway	1560	100.591	0.291	0.4	15.1967	0.0000	SURCHARGED
15 minute summer	Dummy	1	100.200	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m^3)	Discharge Vol (m^3)
15 minute winter	House	1.000	Soakaway	8.3	1.495	1.374	0.0659	
1440 minute winter	Soakaway	Pump	Dummy	0.0				0.0
1440 minute winter	Soakaway	Infiltration		0.0				

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	House	12	100.812	0.412	12.0	0.3535	0.0000	FLOOD RISK
1440 minute winter	Soakaway	1470	100.686	0.385	0.6	20.1421	0.0000	SURCHARGED
15 minute summer	Dummy	1	100.200	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	House	1.000	Soakaway	11.5	1.633	1.905	0.0782	
1440 minute winter	Soakaway	Pump	Dummy	0.0				0.0
1440 minute winter	Soakaway	Infiltration		0.0				

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Inverts
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	6.00	Enforce best practice design rules	✓

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100	150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
House	0.010	6.00	101.000	450	-0.063	0.531	0.500
Soakaway			101.000		10.351	0.272	0.600
Dummy			101.000	450	19.921	0.430	0.700

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	House	Soakaway	10.000	0.600	100.500	100.400	0.100	100.0	100	6.22	50.0
1.001	Soakaway	Dummy	10.000	0.600	100.400	100.300	0.100	100.0	100	6.43	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.769	6.0	1.4	0.400	0.500	0.010	0.0	32	0.621
1.001	0.769	6.0	1.4	0.500	0.600	0.010	0.0	32	0.621

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
30	40	0	0
100	0	0	0
100	40	0	0

Node Soakaway Online Pump Control

Flap Valve	x	Invert Level (m)	100.400	Switch on depth (m)	1.500
Downstream Link	1.001	Design Depth (m)	1.500	Switch off depth (m)	0.010
Replaces Downstream Link	✓	Design Flow (l/s)	0.1		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	1.500	0.000

Node Soakaway Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	100.400
Side Inf Coefficient (m/hr)	0.02880	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
0.000	30.0	0.0	0.400	30.0	0.0	0.401	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	2 year 15 minute summer	141.566	40.058
1 year 15 minute winter	76.857	30.991	2 year 15 minute winter	99.345	40.058
1 year 30 minute summer	71.439	20.215	2 year 30 minute summer	91.753	25.963
1 year 30 minute winter	50.133	20.215	2 year 30 minute winter	64.388	25.963
1 year 60 minute summer	48.435	12.800	2 year 60 minute summer	61.301	16.200
1 year 60 minute winter	32.179	12.800	2 year 60 minute winter	40.727	16.200
1 year 120 minute summer	30.053	7.942	2 year 120 minute summer	37.449	9.897
1 year 120 minute winter	19.966	7.942	2 year 120 minute winter	24.880	9.897
1 year 180 minute summer	23.233	5.979	2 year 180 minute summer	28.672	7.378
1 year 180 minute winter	15.102	5.979	2 year 180 minute winter	18.637	7.378
1 year 240 minute summer	18.475	4.882	2 year 240 minute summer	22.636	5.982
1 year 240 minute winter	12.274	4.882	2 year 240 minute winter	15.039	5.982
1 year 360 minute summer	14.169	3.646	2 year 360 minute summer	17.235	4.435
1 year 360 minute winter	9.210	3.646	2 year 360 minute winter	11.203	4.435
1 year 480 minute summer	11.185	2.956	2 year 480 minute summer	13.550	3.581
1 year 480 minute winter	7.431	2.956	2 year 480 minute winter	9.003	3.581
1 year 600 minute summer	9.182	2.511	2 year 600 minute summer	11.088	3.033
1 year 600 minute winter	6.274	2.511	2 year 600 minute winter	7.576	3.033
1 year 720 minute summer	8.203	2.199	2 year 720 minute summer	9.878	2.647
1 year 720 minute winter	5.513	2.199	2 year 720 minute winter	6.639	2.647
1 year 960 minute summer	6.768	1.782	2 year 960 minute summer	8.113	2.136
1 year 960 minute winter	4.483	1.782	2 year 960 minute winter	5.374	2.136
1 year 1440 minute summer	4.949	1.326	2 year 1440 minute summer	5.891	1.579
1 year 1440 minute winter	3.326	1.326	2 year 1440 minute winter	3.959	1.579

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 15 minute summer	268.706	76.035	100 year 15 minute summer	348.738	98.681
30 year 15 minute winter	188.566	76.035	100 year 15 minute winter	244.728	98.681
30 year 30 minute summer	174.929	49.499	100 year 30 minute summer	228.965	64.789
30 year 30 minute winter	122.757	49.499	100 year 30 minute winter	160.677	64.789
30 year 60 minute summer	116.589	30.811	100 year 60 minute summer	153.288	40.510
30 year 60 minute winter	77.459	30.811	100 year 60 minute winter	101.841	40.510
30 year 120 minute summer	70.438	18.615	100 year 120 minute summer	92.562	24.461
30 year 120 minute winter	46.797	18.615	100 year 120 minute winter	61.496	24.461
30 year 180 minute summer	53.298	13.715	100 year 180 minute summer	69.806	17.964
30 year 180 minute winter	34.645	13.715	100 year 180 minute winter	45.376	17.964
30 year 240 minute summer	41.604	10.995	100 year 240 minute summer	54.269	14.342
30 year 240 minute winter	27.641	10.995	100 year 240 minute winter	36.055	14.342
30 year 360 minute summer	31.221	8.034	100 year 360 minute summer	40.484	10.418
30 year 360 minute winter	20.295	8.034	100 year 360 minute winter	26.315	10.418
30 year 480 minute summer	24.324	6.428	100 year 480 minute summer	31.414	8.302
30 year 480 minute winter	16.160	6.428	100 year 480 minute winter	20.871	8.302
30 year 600 minute summer	19.756	5.404	100 year 600 minute summer	25.431	6.956
30 year 600 minute winter	13.498	5.404	100 year 600 minute winter	17.376	6.956
30 year 720 minute summer	17.490	4.687	100 year 720 minute summer	22.452	6.017
30 year 720 minute winter	11.754	4.687	100 year 720 minute winter	15.089	6.017
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30 year 960 minute winter	9.416	3.743	100 year 960 minute winter	12.033	4.784
30 year 1440 minute summer	10.161	2.723	100 year 1440 minute summer	12.896	3.456
30 year 1440 minute winter	6.829	2.723	100 year 1440 minute winter	8.667	3.456
30 year +40% CC 15 minute summer	376.189	106.449	100 year +40% CC 15 minute summer	488.233	138.153
30 year +40% CC 15 minute winter	263.992	106.449	100 year +40% CC 15 minute winter	342.620	138.153
30 year +40% CC 30 minute summer	244.900	69.298	100 year +40% CC 30 minute summer	320.551	90.705
30 year +40% CC 30 minute winter	171.860	69.298	100 year +40% CC 30 minute winter	224.948	90.705
30 year +40% CC 60 minute summer	163.225	43.136	100 year +40% CC 60 minute summer	214.603	56.713
30 year +40% CC 60 minute winter	108.443	43.136	100 year +40% CC 60 minute winter	142.577	56.713
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30 year +40% CC 120 minute winter	65.516	26.061	100 year +40% CC 120 minute winter	86.094	34.246
30 year +40% CC 180 minute summer	74.617	19.202	100 year +40% CC 180 minute summer	97.729	25.149
30 year +40% CC 180 minute winter	48.503	19.202	100 year +40% CC 180 minute winter	63.526	25.149
30 year +40% CC 240 minute summer	58.245	15.393	100 year +40% CC 240 minute summer	75.977	20.078
30 year +40% CC 240 minute winter	38.697	15.393	100 year +40% CC 240 minute winter	50.477	20.078
30 year +40% CC 360 minute summer	43.710	11.248	100 year +40% CC 360 minute summer	56.677	14.585
30 year +40% CC 360 minute winter	28.413	11.248	100 year +40% CC 360 minute winter	36.841	14.585
30 year +40% CC 480 minute summer	34.053	8.999	100 year +40% CC 480 minute summer	43.979	11.622
30 year +40% CC 480 minute winter	22.624	8.999	100 year +40% CC 480 minute winter	29.219	11.622
30 year +40% CC 600 minute summer	27.658	7.565	100 year +40% CC 600 minute summer	35.604	9.738
30 year +40% CC 600 minute winter	18.898	7.565	100 year +40% CC 600 minute winter	24.327	9.738
30 year +40% CC 720 minute summer	24.485	6.562	100 year +40% CC 720 minute summer	31.433	8.424
30 year +40% CC 720 minute winter	16.456	6.562	100 year +40% CC 720 minute winter	21.125	8.424
30 year +40% CC 960 minute summer	19.901	5.240	100 year +40% CC 960 minute summer	25.432	6.697
30 year +40% CC 960 minute winter	13.183	5.240	100 year +40% CC 960 minute winter	16.847	6.697
30 year +40% CC 1440 minute summer	14.225	3.812	100 year +40% CC 1440 minute summer	18.055	4.839
30 year +40% CC 1440 minute winter	9.560	3.812	100 year +40% CC 1440 minute winter	12.134	4.839

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	House	10	100.535	0.035	1.3	0.0197	0.0000	OK
1440 minute winter	Soakaway	1410	100.475	0.075	0.1	2.1310	0.0000	OK
15 minute summer	Dummy	1	100.300	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	House	1.000	Soakaway	1.3	1.036	0.217	0.0147	
1440 minute winter	Soakaway	Pump	Dummy	0.0				0.0
1440 minute winter	Soakaway	Infiltration		0.0				

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	House	10	100.540	0.040	1.7	0.0223	0.0000	OK
1440 minute winter	Soakaway	1440	100.487	0.087	0.1	2.4855	0.0000	OK
15 minute summer	Dummy	1	100.300	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	House	1.000	Soakaway	1.7	1.079	0.284	0.0181	
1440 minute winter	Soakaway	Pump	Dummy	0.0				0.0
1440 minute winter	Soakaway	Infiltration		0.0				

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	House	840	100.566	0.066	0.3	0.0368	0.0000	OK
600 minute winter	Soakaway	825	100.565	0.165	0.3	4.7138	0.0000	SURCHARGED
15 minute summer	Dummy	1	100.300	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	House	1.000	Soakaway	0.3	0.513	0.050	0.0664	
600 minute winter	Soakaway	Pump	Dummy	0.0				0.0
600 minute winter	Soakaway	Infiltration		0.0				

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	House	915	100.657	0.157	0.3	0.0877	0.0000	SURCHARGED
960 minute winter	Soakaway	1095	100.657	0.257	0.3	7.3110	0.0000	SURCHARGED
15 minute summer	Dummy	1	100.300	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	House	1.000	Soakaway	0.3	0.513	0.050	0.0782	
960 minute winter	Soakaway	Pump	Dummy	0.0				0.0
960 minute winter	Soakaway	Infiltration		0.0				

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	House	705	100.620	0.120	0.4	0.0672	0.0000	SURCHARGED
720 minute winter	Soakaway	885	100.620	0.220	0.4	6.2676	0.0000	SURCHARGED
15 minute summer	Dummy	1	100.300	0.000	0.0	0.0000	0.0000	OK

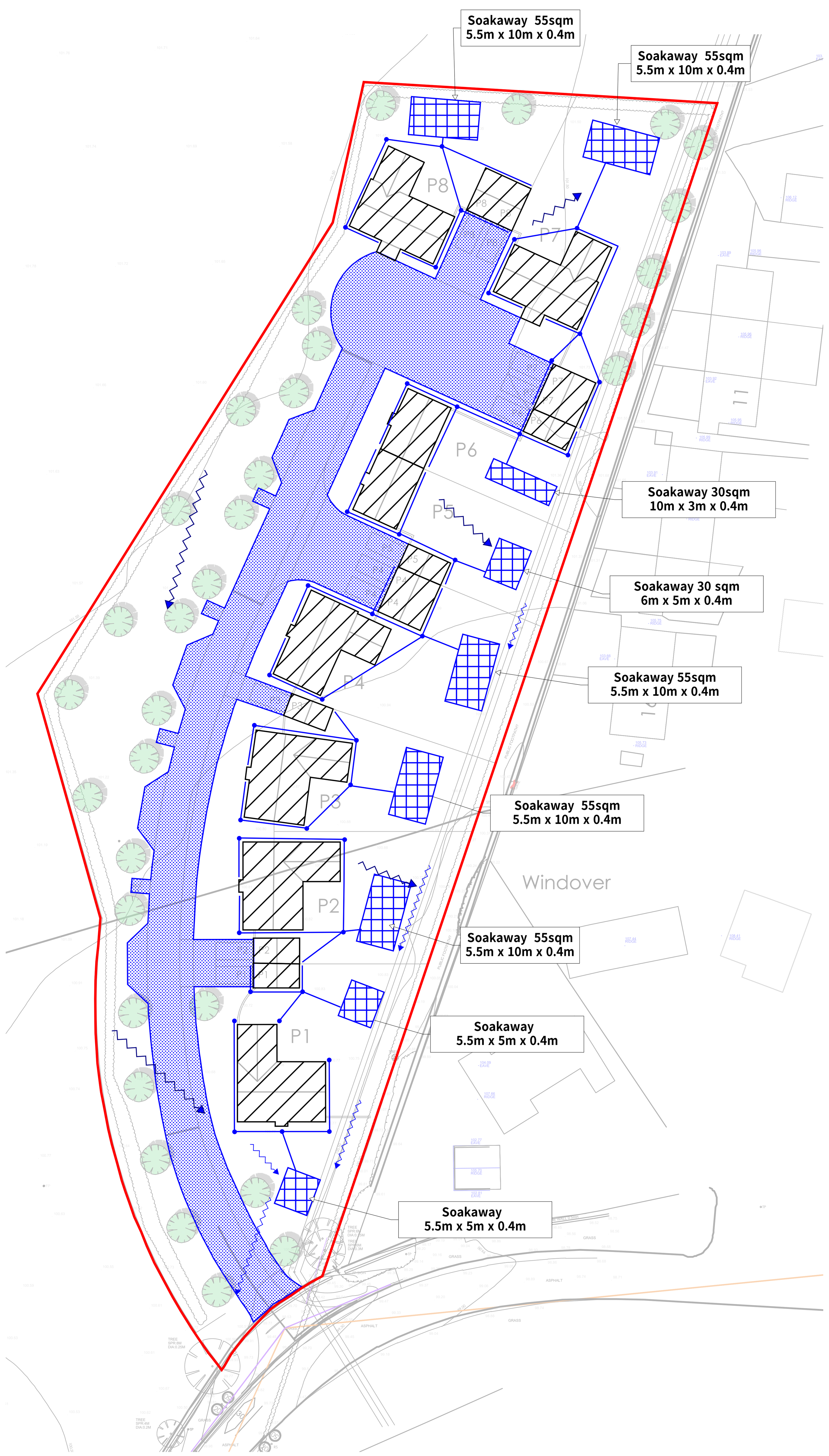
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	House	1.000	Soakaway	0.4	0.513	0.066	0.0782	
720 minute winter	Soakaway	Pump	Dummy	0.0				0.0
720 minute winter	Soakaway	Infiltration		0.0				

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	House	1530	100.755	0.254	0.3	0.1423	0.0000	FLOOD RISK
1440 minute winter	Soakaway	1350	100.754	0.354	0.3	10.0932	0.0000	FLOOD RISK
15 minute summer	Dummy	1	100.300	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	House	1.000	Soakaway	0.3	0.458	0.048	0.0782	
1440 minute winter	Soakaway	Pump	Dummy	0.0				0.0
1440 minute winter	Soakaway	Infiltration		0.0				

Appendix D



Scale 1:500

KEY

- Proposed Surface Water Sewer Pipe
- Exceedance Flows
- Permeable Paving
  80mm Block Paving
  50mm Grids
  450mm Type 3
- Silt Trap
- Soakaway

Drawing Scale Bar

Drawing scale	Line length	Drawing scale	Line length
1:5	= 0.25 metres	1:200	= 10.0 metres
1:10	= 0.5 metres	1:250	= 12.5 metres
1:20	= 1.0 metres	1:500	= 25.0 metres
1:25	= 1.25 metres	1:1000	= 50.0 metres
1:50	= 2.5 metres	1:1250	= 62.5 metres
1:100	= 5.0 metres	1:2500	= 125 metres

Measure length of line above for checking of scale

GENERAL NOTES

1. All dimensions are in millimetres and levels in m AOD unless stated otherwise.

2. Do not scale. If in any doubt, consult Engineer.

3. Read in conjunction with the architects and engineers schedule drawings.

4. Check inverts and sizes of existing pipes prior to the commencement of any work. Report any discrepancies to the engineer and await instructions.

5. The location of services is shown as indicative. This drawing should be read in conjunction with the utilities drawings. No warranty to their accuracy can be given. The contractor shall take all necessary measures to satisfy himself as to the location of the existing services and connection points. Excavation should be undertaken in compliance with HSG47.

6. Concrete structures design sulphate class and ACEC concrete class unknown.

7. Pipework to be 110mm Thermoplastics U-PVC (Polypipe or similar) installed at levels marked on this drawing. Pipe bedding should be class Z in pipes within 1.5m of the building or shallower than 700mm below ground level. For all other areas the pipe bedding should be class S.

8. Joints and fittings for gravity sewers shall comply with the relevant provisions of BS EN 1401-1, BS EN 1852 and BS EN 12666-1. Pipes shall have a limit of 6% deformation. Pipes shall be SN8 ring stiffness and stamped accordingly. Pipe sections shall not be longer than 3m.

9. Plastic chambers and rings, including demarcation chambers,shall comply with BS EN 3598-1 or BS EN 13598-2 as appropriate.

10. Inspection chamber covers and frames shall comply with the relevant provisions of BS EN 124 and should be double sealed.

11. All inspection chamber covers shall be the non-ventilating type and shall have closed keyways.

12. Testing of pipelines should be as follow:

Gravity Pipework: Air pipe testing. Pipework should withstand a pressure of 100mm water gauge and this should not fall by more than 25mm in a 5minute period. However where traps or gullies are connected they should withstand a pressure of 50mm water gauge and this should not fall by more than 12mm in a 5minute period. It is recommended that pipework installations are tested in sections rather than waiting to complete in one operation.

13. Manhole covers to be set square to the building. Covers of existing manholes to be adjusted to match final ground levels.

14. Granular Bedding for pipes shall be constructed by spreading and compacting granular bedding material over the full width of the pipe trench. After the pipes have been laid, additional granular material shall, if required, be placed and compacted equally on each side of the pipes and, where practicable, this shall be done in sequence with the removal of the trench supports.

Rev	Details	Date	By	Ch'd

Drawing Status:
PRELIMINARY

RIDA
FLOOD RISK ASSESSMENT & DRAINAGE STRATEGIES

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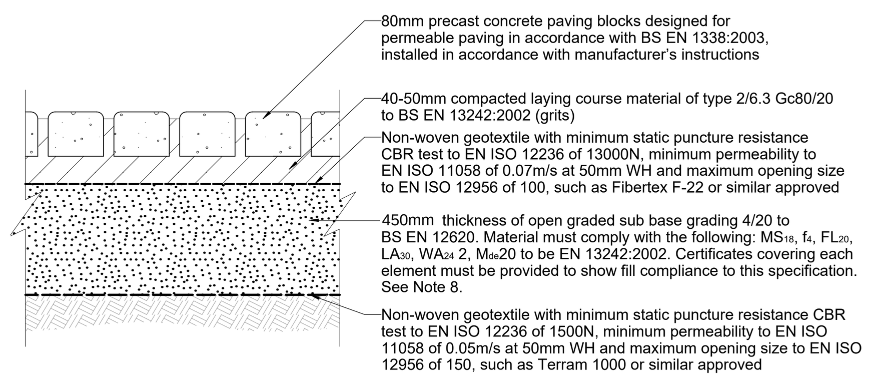
Client:

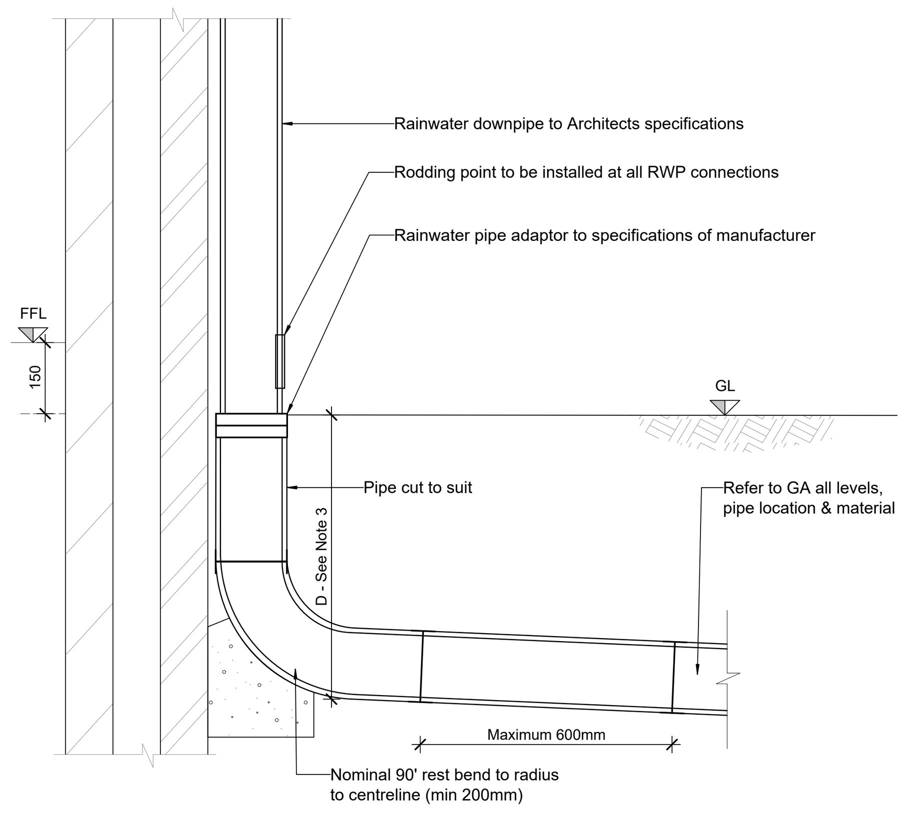
Project:
Lince Lane, Kirtlington

Drawing:
Proposed Drainage Strategy

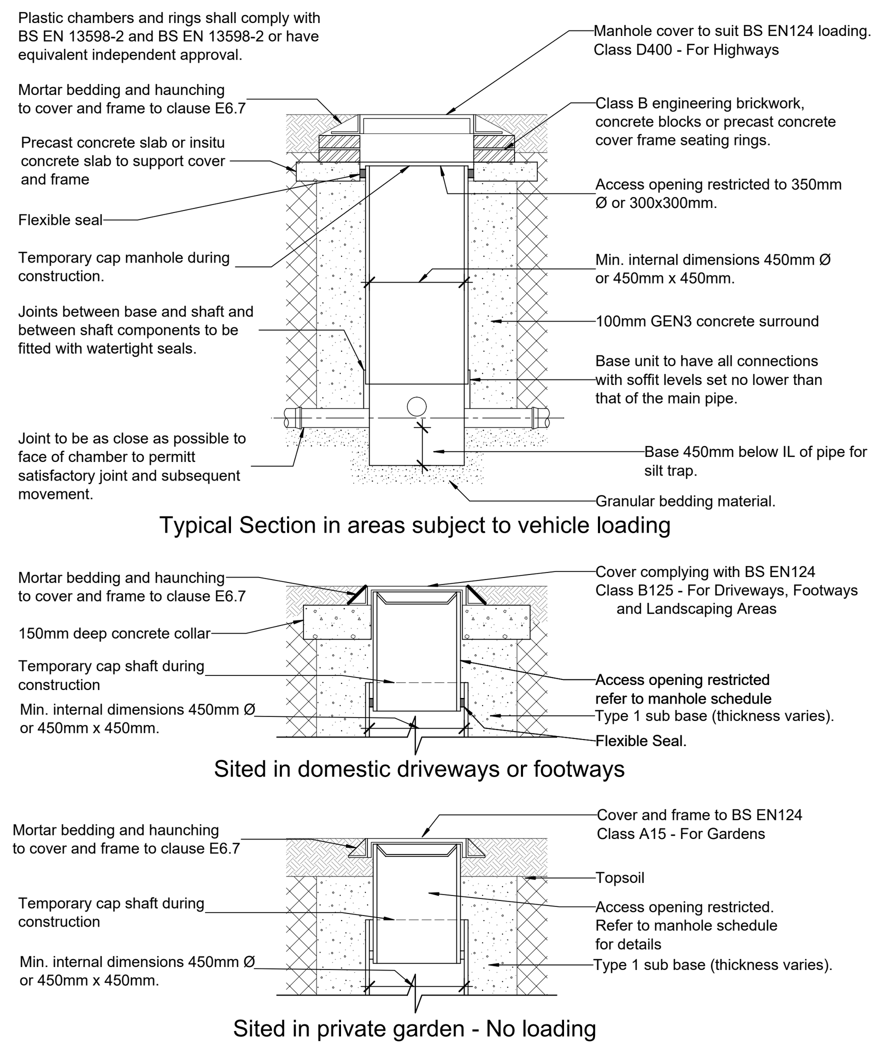
Print Size:	Project No:	Drawing No:	Revision:
A1	**0402**	003	P1



Permeable Paving

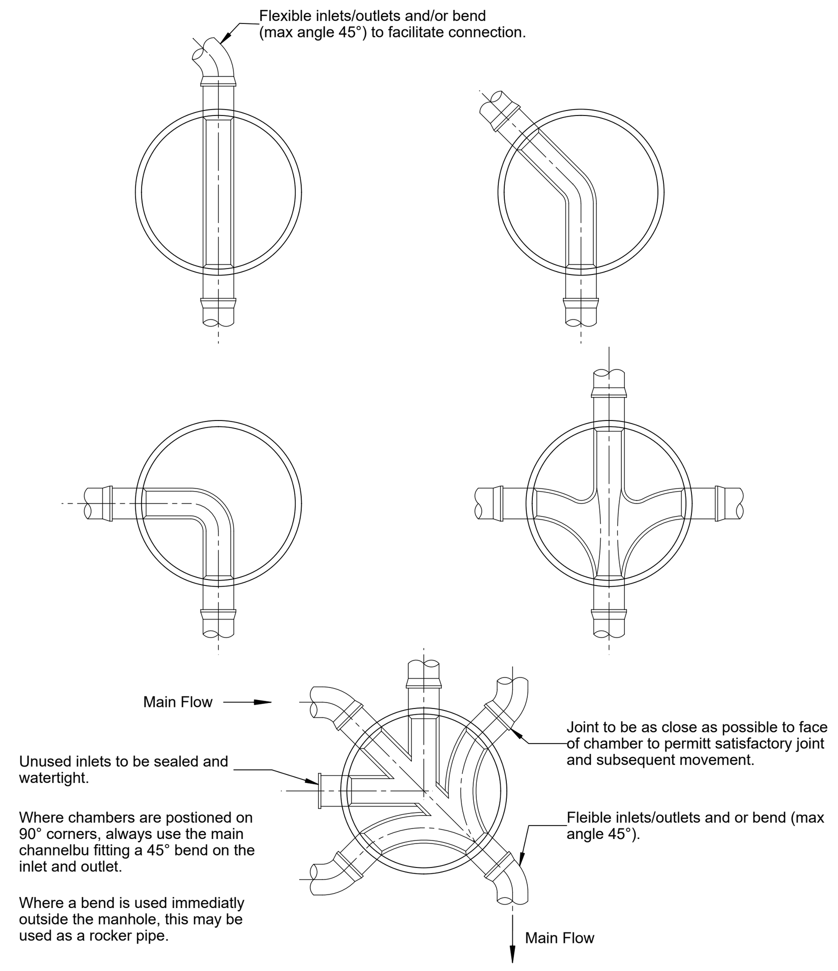


8251 - External Rainwater Pipe Connection Detail

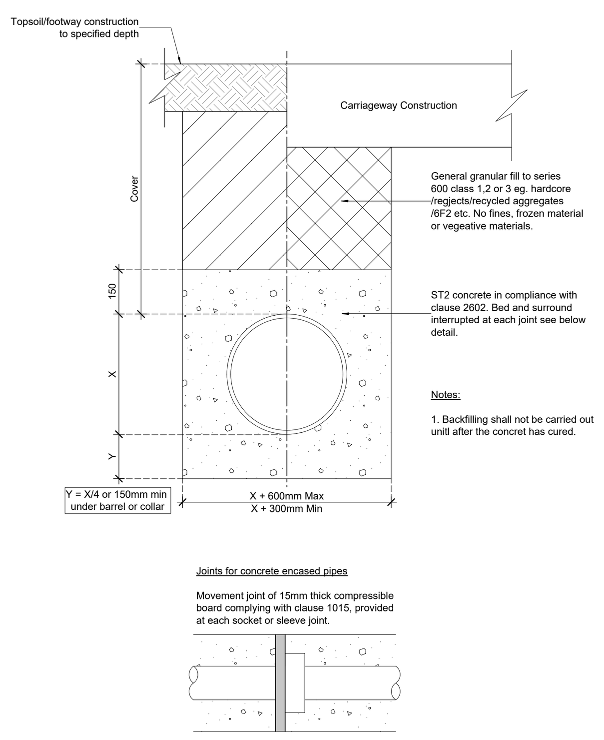


Notes:
1. Refer to drawing 8193 for base layouts.

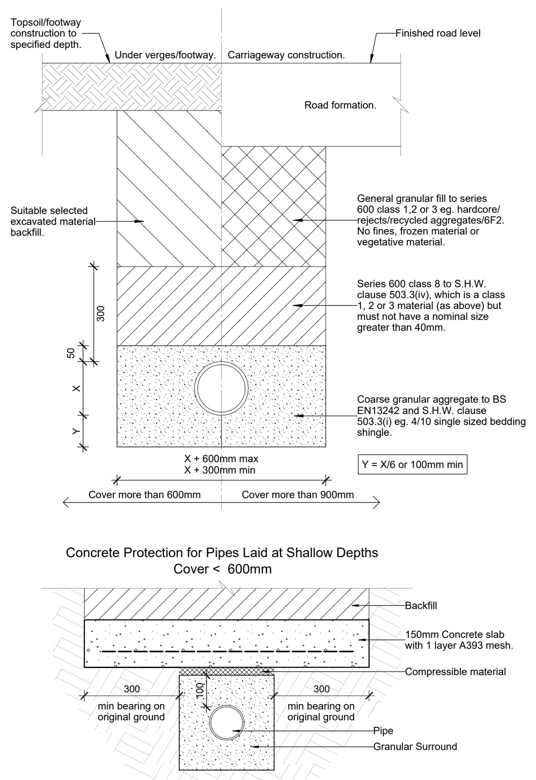
Silt Trap Plastic



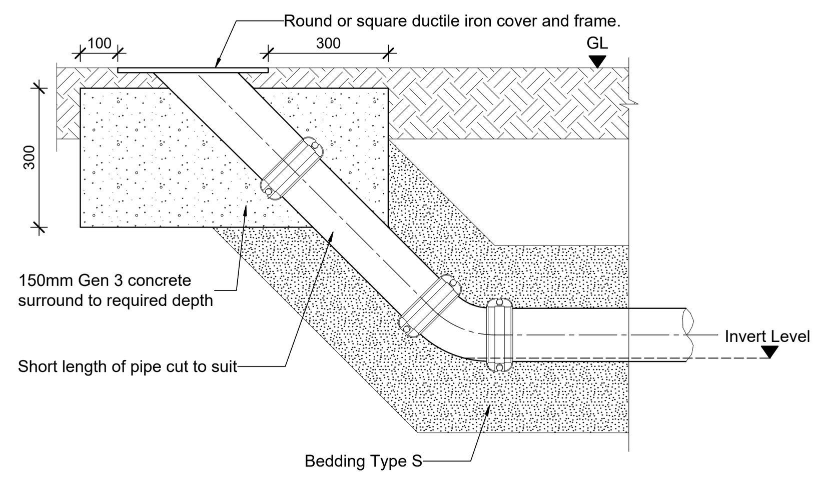
Chamber Type 3 Base Layouts



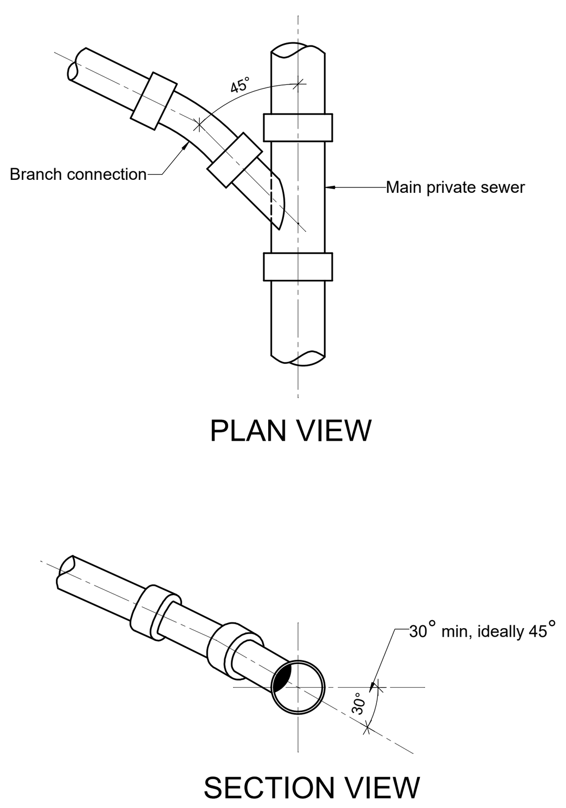
Pipe Bedding Detail Type Z



Pipe Bedding Detail Type S



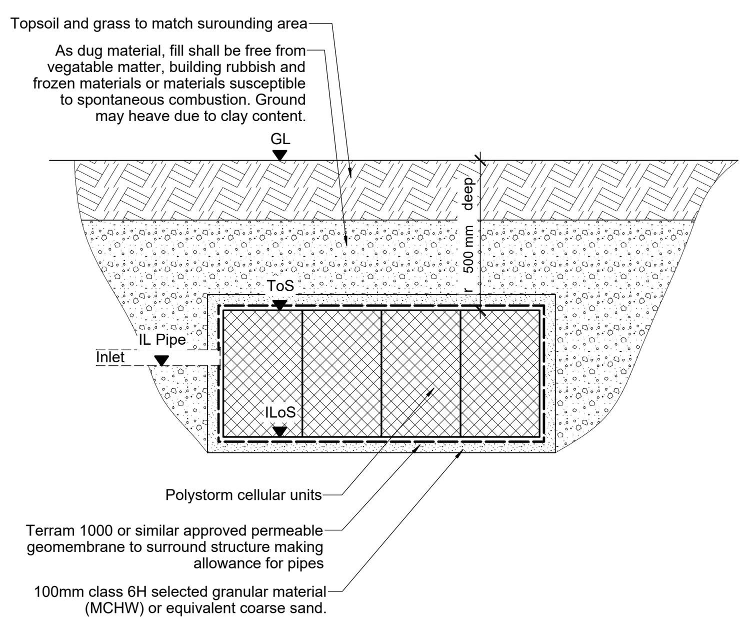
External Rodding Eye Detail



NOTES:

1. The vertical angle between the connecting pipe and the horizontal should be greater than 0° and not more than 60°.
2. Where the connection is being made to a sewer with a nominal internal diameter of 300 mm or less, connections should be made using 45° angle, or 90° angle, curved square junctions.
3. Connections made with junction fittings should be made by cutting the existing pipe, inserting the junction fitting and jointing with flexible repair couplings or slip couplers.

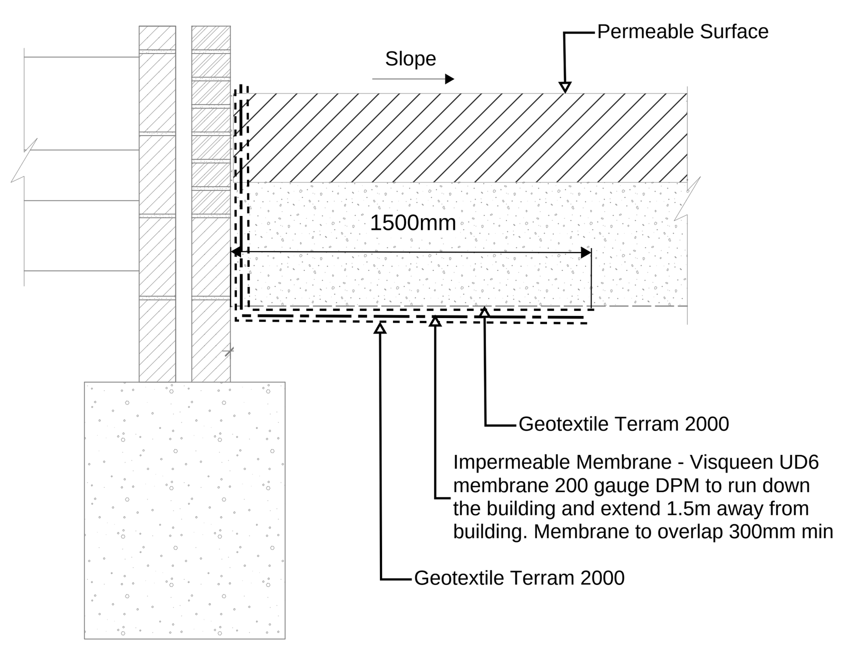
Lateral Connection to private sewer



NOTES:

1. Permeable modular storage cell with 95% minimum void ratio. Maximum load 20 tonnes/m².
2. Installation of units as per supplier recommendations.
3. Ground may heave due to clay content in the as dug material. Contractor to level ground where required.
4. The area of the infiltration unit and the minimum total storage volume should be as per approved by the local planning authority documents.

Cellular Infiltration System - Landscape Area



Permeable Surface Against Building

Drawing Scale Bar

Drawing scale	Line length	Drawing scale	Line length
1:5	= 0.25 metres	1:200	= 10.0 metres
1:10	= 0.5 metres	1:250	= 12.5 metres
1:20	= 1.0 metres	1:500	= 25.0 metres
1:25	= 1.25 metres	1:1000	= 50.0 metres
1:50	= 2.5 metres	1:1250	= 62.5 metres
1:100	= 5.0 metres	1:2500	= 125 metres

Measure length of line above for checking of scale

GENERAL NOTES

Rev	Details	Date	By	Chk'd

Drawing Status:
PRELIMINARY

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Client:

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Lince Lane, Kirtlington

Drawing:
Standard Details

Print Size:	Project No:	Drawing No:	Revision:
A1	**0402**	006	P1