

12 Background SuDS information



SuDS control surface water runoff close to where it falls. SuDS are designed to replicate, as closely as possible, the natural drainage from the Site before development to ensure that the flood risk downstream does not increase as a result of the Site being developed, and that the Site will have satisfactory drainage under current and likely future climatic conditions. SuDS provide opportunities to reduce the causes and impacts of flooding; remove pollutants from urban runoff at source; and combine water management with green space with benefits for amenity, recreation and wildlife. Government planning policy and planning decisions now include a presumption in favour of SuDS being used for all development Sites, unless they can be shown to be inappropriate.

For general information on SuDS see our website: <http://geosmartinfo.co.uk/>

Infiltration SuDS

Government policy for England is to introduce sustainable drainage systems (SuDS) via conditions in planning approvals. Guidance indicates that capturing rainfall runoff on-Site and infiltrating it into the ground (infiltration SuDS) is the preferred method for managing surface water without increasing flood risk downstream.

The greatest benefit to general flood risk is if all runoff is infiltrated on-Site, however, this may not be feasible due to physical and economic constraints in which case infiltration may be considered as a part of an integrated drainage solution. The final design capacity for an infiltration SuDS system depends on the Site constraints and the requirements of the individual Planning Authority and the Lead Local Flood Authority.

The capacity of the ground to receive infiltration depends on the nature, thickness and permeability of the underlying material and the depth to the high groundwater table. The final proportion of the Site drained by infiltration will depend on topography, outfall levels and a suitable drainage gradient. It is important to note that, even if the whole Site cannot be drained by infiltration, the use of partial infiltration is encouraged, with the remainder of runoff discharged via other SuDS systems.

Types of infiltration SuDS

Infiltration components include infiltration trenches, soakaways, swales and infiltration basins without outlets, rain gardens and permeable pavements. These are used to capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, before returning it to the water table below.

An infiltration trench is usually filled with permeable granular material and is designed to promote infiltration of surface water to the ground. An infiltration basin is a dry basin or depression designed to promote infiltration of surface water runoff into the ground. Soakaways are the most common type of infiltration device in the UK where drainage is often connected to over-sized square or rectangular, rubble-filled voids sited beneath lawns.

According to the guidance in Building Research Establishment (BRE) Digest 365 (2016) a soakaway must be able to discharge 50% of the runoff generated during a 1 in 10 year storm event within 24 hours in readiness for subsequent storm flow. This is the basic threshold criteria for a soakaway design and the internal surface area of the proposed soakaway design options should be calculated on this basis by taking into account the soil infiltration rate for the Site.

Developers need to ensure their design takes account of the construction, operation and maintenance requirements of both surface and subsurface components, allowing for any machinery access required.

SuDS maintenance and adoption

Regular maintenance is essential to ensure effective operation of the soakaway(s) over the intended lifespan of the proposed development. A maintenance schedule for SuDS is required. Sewerage undertakers or Local Authorities may adopt SuDS and will require maintenance issues to be dealt with in accordance with their Management Plan. If the SuDS will not be adopted other provision is required with associated financial implications. Maintenance is a long-term obligation requiring the upkeep of all elements of the SuDS, including mechanical components (e.g. pumps), as well as inspections, regular maintenance and repair.

Additional background SuDS information can be found on our website: <http://geosmartinfo.co.uk/>

13 Further information



The following table includes a list of additional products by GeoSmart:

Additional GeoSmart Products			
	<p>Additional assessment:</p> <p>FloodSmart Report</p>		<p>The FloodSmart Report range provides clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at a Site. Our consultants assess available data to determine the level of risk based on professional judgement and years of experience.</p> <p>Please contact info@geosmartinfo.co.uk for further information.</p>
	<p>✓ Additional assessment:</p> <p>EnviroSmart Report</p>		<p>Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective.</p> <p>Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements.</p> <p>Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions.</p> <p>Please contact info@geosmartinfo.co.uk for further information.</p>

14 References and glossary



British Geological Survey (BGS). (2021). Geology of Britain Viewer. Based on British Geological Survey materials © NERC 2021. Accessed from: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> on 17/06/2021.

Building Research Establishment (BRE) (2016). Digest 365, Soakaway design.

CEH (2021) Online FEH web service Depth/duration/frequency modelling using the FEH 1999 and new 2013 models. Accessed from: <https://fehweb.ceh.ac.uk/> on 17/06/2021.

CIRIA (2015) The SuDS manual (C753).

Department for Environment, Food and Rural Affairs (2015). Non-statutory technical standards for SuDS (March 2015).

Environment Agency [EA] (2021). MagicMap. Accessed from: <http://magic.defra.gov.uk/MagicMap.aspx> on 17/06/2021.

GeoSmart (2021) GeoSmart GW5 Version 2.4.

HM Government (2010). The building regulations 2010 Part H drainage and waste disposal (2015 edition).

LASOO (2015) Practice Guidance, Local Authority SuDS Officer Organisation.

Ministry of Housing, Communities & Local Government. (2019). National Planning Policy Framework (NPPF).

Ministry of Housing, Communities & Local Government. (2014). National Planning Policy Guidance (NPPG).

NERC (2009) WINFAP-FEH CD-ROM version 3.0.

JBA Consulting (2016) Cotswold District Council Strategic Flood Risk Assessment. Accessed from: <https://www.cotswold.gov.uk/media/t5pbt5s/6204-strategic-flood-risk-assessment-level-2-may-2016.pdf> on 17/06/2021.

Glossary

General terms

Attenuation	Reduction of peak flow and increased duration of a flow event.
Combined sewer	A sewer designed to carry foul sewage and surface water in the same pipe.
Detention basin	A vegetated depression, normally is dry except after storm events, constructed to store water temporarily to attenuate flows. May allow infiltration of water to the ground.
Evapotranspiration	The process by which the Earth's surface or soil loses moisture by evaporation of water and by uptake and then transpiration from plants.
FEH	Flood Estimation Handbook, produced by Centre for Ecology and Hydrology, Wallingford (formerly the Institute of Hydrology).
Filter drain or trench	A linear drain consisting of a trench filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage, to store and conduct water, but may also be designed to permit infiltration.
First flush	The initial runoff from a site or catchment following the start of a rainfall event. As runoff travels over a catchment it will collect or dissolve pollutants, and the "first flush" portion of the flow may be the most contaminated as a result. This is especially the case for intense storms and in small or more uniform catchments. In larger or more complex catchments pollution.
Flood plain	Land adjacent to a watercourse that would be subject to repeated flooding under natural conditions (see Environment Agency's Policy and practice for the protection of flood plains for a fuller definition).
Greenfield runoff	This is the surface water runoff regime from a site before development, or the existing site conditions for brownfield redevelopment sites.
Impermeable surface	An artificial non-porous surface that generates a surface water runoff after rainfall.
Permeability	A measure of the ease with which a fluid can flow through a porous medium. It depends on the physical properties of the medium, for example grain size, porosity and pore shape.

Runoff	Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.
Sewerage undertaker	This is a collective term relating to the statutory undertaking of water companies that are responsible for sewerage and sewage disposal including surface water from roofs and yards of premises.
Soakaway	A subsurface structure into which surface water is conveyed to allow infiltration into the ground.
Treatment	Improving the quality of water by physical, chemical and/or biological means.

The terms included in this glossary have been taken from CIRIA (2015) guidance.

Data Sources

Aerial Photography	Contains Ordnance Survey data © Crown copyright and database right 2021 BlueSky copyright and database rights 2021
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2021 Ordnance Survey data © Crown copyright and database right 2021
Flood Risk (RoFRS/Pluvial/Surface Water Features/SPZ)	Environment Agency copyright and database rights 2021 Ordnance Survey data © Crown copyright and database right 2021
Flood Risk (Groundwater) and SuDS infiltration suitability (SD50)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2021) Contains British Geological Survey materials © NERC 2021 Ordnance Survey data © Crown copyright and database right 2021
Sewer Location	Contains Ordnance Survey data © Crown copyright and database right 2021 Contains STL Regulated Drainage and Water Search data 2021
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2021 Environment Agency copyright and database rights 2021

15 Appendices



Appendix A



Site plans (layout and topography)

Appendix B



Rainfall runoff calculations

Greenfield Site Run-Off Calculations using the loH124 method

Greenfield peak run-off rate (QBAR):

Parameters	Input	Units	Comments
Area	50	ha	mimimum 50ha
SAAR	841	mm	FEH CD ROM (NERC, 2009)
SPR	0.10	N/A	Soil run-off coefficient
Region	6	N/A	Region on Hydrological area map

QBAR

$$Q_{\text{BAR(rural)}} = 1.08 \text{AREA}^{0.89} \text{SAAR}^{1.17} \text{SPR}^{2.17}$$

Where:

$Q_{\text{BAR(rural)}}$	is the mean annual flood (a return period of 2.3 years) in l/s
AREA	is the area of the catchment in km ² (minimum of 0.5km ²)
SAAR	is the standard average rainfall for the period 1941 to 1970 in mm
SPR	is the soil run-off coefficient

$Q_{\text{BAR(rural)}}$ can be factored by the UK Flood Studies Report regional growth curves to produce peak flood flows for any return period.

$Q_{\text{BAR(rural)}}$	=	10.41	l/s for 50ha site
Divided by 50 to scale down	=	0.21	l/s/ha
Actual Area of the entire Site	=	0.78	ha

Return Periods (Growth curves obtained from DEFRA report)

Return Period	Growth Factor	Peak site run-off rate	
		l/s/ha	(l/s)
1	$Q_{\text{BAR(rural)}} \times 0.85$	0.18	0.138
2	$Q_{\text{BAR(rural)}} \times 0.88$	0.18	0.14
5	$Q_{\text{BAR(rural)}} \times 1.28$	0.27	0.21
10	$Q_{\text{BAR(rural)}} \times 1.62$	0.34	0.26
25	$Q_{\text{BAR(rural)}} \times 2.14$	0.45	0.35
30	$Q_{\text{BAR(rural)}} \times 2.24$	0.47	0.364
50	$Q_{\text{BAR(rural)}} \times 2.62$	0.55	0.43
100	$Q_{\text{BAR(rural)}} \times 3.19$	0.66	0.52
200	$Q_{\text{BAR(rural)}} \times 3.86$	0.80	0.63

Greenfield total run-off volume:

= actual area of the entire site x SPR x 6 hour rainfall depth

Return Period	6 hour rainfall (mm) from FEH CD-ROM	Area (ha)	SPR	Total run-off (m ³)
2.3 (QBAR)	26.79	0.78	0.10	20.9
1	25.3	0.78	0.10	19.7
10	41.27	0.78	0.10	32.2
30	53.47	0.78	0.10	41.7
100	69.72	0.78	0.10	54.4

Summary

Entire site area:	0.780 ha			
Climate Change Factor	40%			
	<i>Current</i>	<i>Proposed</i>		
Permeable Surface (ha)	0.556	0.500		
Impermeable Surface (ha)	0.225	0.280		
1 in 1 year				
Greenfield run-off volume total:	19.73 m ³			
RUN-OFF During a 1 in 1 year 6 hour event:	Greenfield Site	Current Development	Proposed Development	Proposed Development +CC
From permeable surfaces (using GF total run-off) (m ³)	19.73	14.05	12.65	17.71
From impermeable surfaces (m ³)		56.80	70.84	99.18
TOTAL run-off produced from Site (m ³)	19.73	70.85	83.49	116.89
Difference between greenfield site and proposed +cc development (m³):				97.15
				492%
Difference between current and proposed +cc development (m³):				46.03
				65%
Peak Greenfield run-off rate that must not be exceeded in the run-off from the proposed development (l/s):				0.14
1 in 10 year				
Greenfield run-off volume total:	32.19 m ³			
RUN-OFF During a 1 in 1 year 6 hour event:	Greenfield Site	Current Development	Proposed Development	Proposed Development +CC
From permeable surfaces (using GF total run-off) (m ³)	32.19	22.93	20.64	28.89
From impermeable surfaces (m ³)		89.28	111.36	155.90
TOTAL run-off produced from Site (m ³)	32.19	112.21	131.99	184.79
Difference between greenfield site and proposed +cc development (m³):				152.60
				474%
Difference between current and proposed +cc development (m³):				72.58
				65%
Peak Greenfield run-off rate that must not be exceeded in the run-off from the proposed development (l/s):				0.26
1 in 30 year				
Greenfield run-off volume total:	41.71 m ³			
RUN-OFF During a 1 in 30 year 6 hour event:	Greenfield Site	Current Development	Proposed Development	Proposed Development +CC
From permeable surfaces (using GF total run-off) (m ³)	41.71	29.70	26.74	37.43
From impermeable surfaces (m ³)		120.04	149.72	209.60
TOTAL run-off produced from Site (m ³)	41.71	149.74	176.45	247.03
Difference between greenfield site and proposed +cc development (m³):				205.32
				492%
Difference between current and proposed +cc development (m³):				97.29
				65%
Peak Greenfield run-off rate that must not be exceeded in the run-off from the proposed development (l/s):				0.36
1 in 100 year				
Greenfield run-off volume total:	54.38 m ³			
RUN-OFF During a 1 in 100 year 6 hour event:	Greenfield Site	Current Development	Proposed Development	Proposed Development +CC
From permeable surfaces (using GF total run-off) (m ³)	54.38	38.73	34.86	48.80
From impermeable surfaces (m ³)		156.52	195.22	273.30
TOTAL run-off produced from Site (m ³)	54.38	195.25	230.08	322.11
Difference between greenfield site and proposed +cc development (m³):				267.72
				492%
Difference between current and proposed +cc development (m³):				126.86
				65%
Peak Greenfield run-off rate that must not be exceeded in the run-off from the proposed development (l/s):				0.52

Appendix C



Regulated Drainage and Water Search

Regulated Drainage & Water Search



Search Details

Prepared for: GeoSmart

Matter: 74441.01

Client address: Suite 9-11 Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU

Property:

Northfield Farm, Withington Road, Andoversford, Cheltenham, GL54 4LL

Water Company:

Thames Water Utilities Ltd

Thames Water Plc, PO Box 286, Swindon, SN38 2RA

Date Returned:

22/06/2021

Property type:

Residential

This search was compiled by the Data Supplier above and provided by InfoTrack Ltd - t: 0207 186 8090, e: helpdesk@infotrack.co.uk. This search is subject to terms and conditions issued by InfoTrack which can be viewed at www.infotrack.co.uk or supplied on request. This search is also subject to terms and conditions issued by the Data Supplier, available on request. InfoTrack and the Data Supplier above are registered with the Property Codes Compliance Board (PCCB) as subscribers to the Search Code. The PCCB independently monitors how registered firms maintain compliance with the Code. Visit www.propertycodes.org.uk for more information.



InfoTrack Limited, Level 11, 91 Waterloo Road, London, SE1 8RT
T: 0207 186 8090 E: helpdesk@infotrack.co.uk



Summary for Conveyancers

This summary identifies matters revealed which you may wish to highlight to your client or investigate further. It is intended as a snapshot of the information contained in the search, should in no way be considered legal advice, and should be taken in context with the full search information and with your client's planned use and enjoyment of the property.



Maps

1.1	Where relevant, please include a copy of an extract from the public sewer map	Map Provided
1.2	Where relevant, please include a copy of an extract from the map of waterworks	Map Provided



Drainage

2.1	Does foul water from the property drain to the public sewer?	No
2.2	Does surface water from the property drain to the public sewer?	No
2.3	Is a surface water drainage charge payable?	Refer to Vendor
2.4	Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundaries of the property?	No
2.4.1	Does the public sewer map indicate any public sewage pumping station within the boundaries of the property?	No
2.5	Does the public sewer map indicate any public sewer within 30.48 metres (100 feet) of any buildings within the property?	No
2.5.1	Does the public sewer map indicate any public pumping station within 50 metres (164.04 feet) of any buildings within the property?	Insured
2.6	Are any sewers or lateral drains serving, or which are proposed to serve the property, the subject of an existing adoption agreement or an application for such an agreement?	No
2.7	Has any Sewerage Undertaker approved or been consulted about any plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain?	No
2.8	Is any building which is, or forms part of the property, at risk of internal flooding due to overloaded public sewers?	Insured
2.9	Please state the distance from the property to the nearest boundary of the nearest sewage treatment works	Insured



Water

3.1	Is the property connected to mains water supply?	Yes
3.2	Are there any water mains, resource mains or discharge pipes within the boundaries of the property?	No
3.3	Is any water main or service pipe serving, or which is proposed to serve the property, the subject of an existing adoption agreement or an application for such an agreement?	No
3.4	Is this property at risk of receiving low water pressure or flow?	Insured
3.5	What is the classification of the water supply for the property?	See report
3.6	Please include details of the location of any water meter serving the property	See report



Charging

4.1.1	Who is responsible for providing the sewerage services for the property?	Thames Water
4.1.2	Who is responsible for providing the water services for the property?	Thames Water
4.2	Who bills the property for sewerage services?	Thames Water
4.3	Who bills the property for water services?	Thames Water
4.4	What is the current basis for charging for sewerage and/or water services at the property?	See report
4.5	Will the basis for charging for sewerage and water services at the property change as a consequence of a change of occupation?	Insured



Question 1.1

Where relevant, please include a copy of an extract from the public sewer map

A copy of an extract from the public sewer map is included in which the location of the property is identified



Guidance Notes:

Pipes that are shown on the public sewer map as sewers, disposal mains or lateral drains are defined as those for which a Sewerage Undertaker holds statutory responsibility under the Water Industry Act 1991. A Sewerage Undertaker is not generally responsible for rivers, water courses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only. Sewers or lateral drains indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended that these details are checked with the developer, if any. Please note that following the private sewer transfer on 1 October 2011 there may be additional public assets other than those shown on the public sewer map.

Question 1.2

Where relevant, please include a copy of an extract from the map of waterworks

A copy of an extract from the map of waterworks is included in which the location of the property is identified



Guidance Notes:











Pipes that are shown on the map of waterworks as water mains, resource mains or discharge pipes are defined as those for which a Water Undertaker holds statutory responsibility under the Water Industry Act 1991. Water Undertakers are not responsible for private water mains or private service pipes connecting the property to the public water main and do not hold details of these. These may pass through land outside of the control of the seller, or may be shared with adjacent properties. The buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal. The extract of the map of waterworks shows water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.



Public Sewer & Water Map



© Crown copyright Land Registry. © Crown copyright and database rights 2011 Ordnance Survey 100042851

 Public Combined Sewer	 Public Foul Sewer
 Public Surface Water Sewer	 Abandoned Public Sewer
 Water Pipes	 Sewer Publicly Maintained under Section 24 Public Health Act 1936
 Section 104 Surface Water Sewer	 Section 104 Foul Sewer
 Decommissioned Water	 Public Sewage Pumping Station

This map is provided by InfoTrack Ltd and must be used in conjunction with the search results attached. Please note, the boundary may have been adjusted from the plan provided so that it reflects the National Polygon dataset provided by the Land Registry. This dataset covers all registered titles (freehold and leasehold) in England and Wales and shows the indicative shape and position of each boundary. The information shown on the map is based on data obtained from various sources but the position of any water company apparatus must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. This map should not be used for detailed design of any proposed works and users of this map are strongly advised to commission their own survey of the area before carrying out any works to establish the actual position of all apparatus.



Question 2.1

Does foul water from the property drain to the public sewer?

Records indicate that foul water from the property does not drain to a public sewer. There are no public foul water sewers within the vicinity of the property. We recommend that drainage connections are confirmed with the vendor.



Guidance Notes:

The above answer is inferred from the proximity of a public sewer as indicated on the enclosed map. If the inference is wrong, the attached Information Accuracy Indemnity covers an adverse entry.

For confirmation, please refer to billing information, form TA6 or the Property Details Questionnaire which confirms connection to mains drainage. Sewerage Undertakers are not responsible for private drains and private sewers that connect the property to the public sewerage system, and do not hold details of these. The property owner will normally have sole responsibility for private drains serving the property and may have shared responsibility with other users if the property is served by a private sewer which also serves other properties if not connected to the public sewerage system. These may pass through land outside of the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal. An extract from the public sewer map is enclosed. This will show known public sewers and lateral drains in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or private sewers connecting the property to the public sewerage system. If foul water does not drain to the public sewerage system the property may have private facilities in the form of a septic tank, cesspit or other type of treatment plant.