

Flood Risk Assessment
Houghton Barton Self Build
July 2017

Report produced by:

Teignbridge District Council
Forde House
Brunel Road
Newton Abbot
Devon
TQ12 4XX

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Revision Schedule

Version	Prepared By	Approved By	Date
1.0	MCF		10/07/2017
1.1	MCF		7/08/2017

1.0 Introduction

This drainage statement has been prepared by Teignbridge District Council to support a planning application for a residential development.

The report has been prepared to consider the risk of flooding to the site and to detail mitigation measures, including proposed surface water management proposals

The report follows guidance and requirements of the Technical Guidance to the National Planning Policy Framework and National Planning Practice Guidance.

2.0 Existing Site Description and Development Proposals

2.1 Development proposals

The proposal is for a custom-build residential development comprising of 20 properties and associated infrastructure.

2.2 Site Location

The site is located to the west of Newton Abbot, Devon, between Perry Lane and Howton Road.

National Grid Reference for the site is SX 83243 72747.

Refer to **Appendix A** - Location Plan.

2.3 Existing Site Description

The proposed site is currently open farmland laid to grass, levels generally fall from south to north.

The nearest watercourse (which is piped under the field to the north of Perry Lane), lies some 100m to the north east of the site, being an unnamed tributary of the Blatchford Brook.

3.0 Sources of Potential Flooding

As a residential development this site is classified within Table 2: Flood Risk Vulnerability Classification as a 'More Vulnerable'.

Based on the Environment Agency's flood map, the proposed site lies within Flood Zone 1, land assessed as having a less than 1 in 1000 annual probability of flooding in any year (<0.1%).

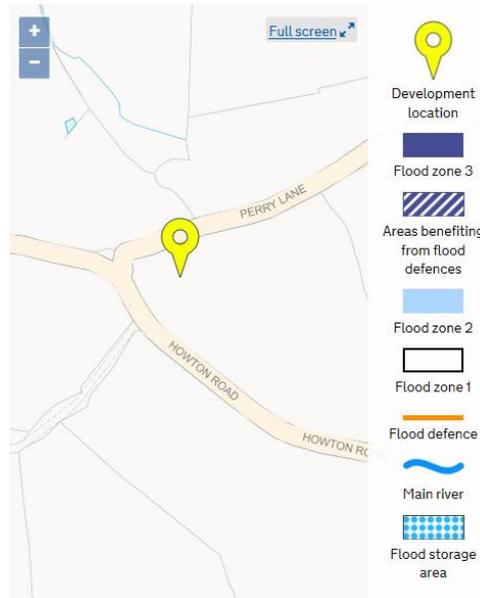


Figure 1: EA Flood Zone Map

The site, currently surrounded by open farmland, sits higher than surrounding land resulting in surface water runoff from surrounding land flowing away from the site.

4.0 Surface Water Runoff Assessment

In accordance with the National Planning Policy Framework and associated technical guidance Sustainable Drainage Systems (SuDs) should be used to manage surface water from new developments. SuDs should be designed to control surface water runoff as close to where it falls as possible and mimic natural drainage processes.

The hierarchy for surface water disposal from development in accordance with National Planning Practice Guidance in descending order of preference is:

- 1) Discharge to ground via a suitably designed soakaway/infiltration system.
- 2) Discharge to a watercourse.
- 3) Discharge to a surface water sewer.
- 4) Discharge to a combined sewer.

5.0 Existing Site Drainage and Pre-Development Runoff Rates

The proposed site is currently undeveloped and consists of open grassed farmland. Runoff from the site is generally in a north-easterly direction towards Perry Farm where flows are intercepted by a tributary leading to the Blatchford Brook.

Geotechnical investigations within the vicinity of the site generally discovered cohesive soils overlying extremely weak mudstone slate bedrock recovered as a clayey gravel. Infiltration tests have not been undertaken, however based on the geotechnical information the ground is likely to be relatively impermeable.

The pre-development Greenfield runoff for the site has been calculated using the IH124 method, based on an area of 0.93 ha as:

- $Q_{bar} = 4.22$ l/s
- 1 in 1 year = 3.29 l/s
- 1 in 30 year = 8.22 l/s
- 1 in 100 year = 10.25 l/s

5.1 Proposed Drainage

In developing the surface water drainage strategy for disposal of surface water runoff from the site the pre-existing ground conditions have been taken in to consideration to assess the suitability of SuDs measures.

Percolation tests have not been undertaken, however based on the findings from the geotechnical study the ground is unlikely to be suitable for infiltration, additionally due to the weak nature of the sub-soil, slope stability could be compromised if infiltration was utilised in this location.

Following the hierarchy of surface water disposal the next preferred means of disposal is to a watercourse, as previously identified there is a watercourse some 150m to the north-east of the site. It is therefore proposed to discharge to the surface water to the open section of this watercourse prior to it passing under Perry Lane. The proposed surface water drainage system will be designed to discharge at greenfield rates with an additional 40% allowance for climate change.

For outline purposes the impermeable area has been assumed as between 1600m² to 2600m², within the site public open green space will account for approximately 0.30ha. On this basis the proposed discharge rates for the site are:

- 1 in 1 year = 1.80 l/s
- 1 in 30 year = 4.40 l/s
- 1 in 100 year = 5.50 l/s

The estimated attenuation volume for the site is 306m³, it is proposed to provide this in permeable driveways, Swales and an attenuation pond in the north-east corner of

the site with discharge through a flow control device which mimics greenfield runoff characteristics.

Calculations can be found in appendix B, these figures represent a worst-case scenario. These calculations will be refined at detailed design stage at which point required attenuation volume is likely to reduce, these figures are used to demonstrate availability of storage.

5.2 Exceedance flow routes

In the event that the system fails at any point, exceedance flows will be directed along the internal road network towards the north east corner which is the lowest part of the site. Flows exceeding the proposed attenuation pond will flow through the adjacent field towards the unnamed tributary of the Blatchford Brook, being open land there is no risk to people or property.

5.3 Water Quality

Silt traps will be included within the drainage system, in addition treatment storage has been included within the attenuation design. Suitable planting will be included within the attenuation pond to further provide water quality benefits.

5.3 Future Maintenance

Access for maintenance of the SuDS features has been accounted for in the proposals. It is intended that the future maintenance of the surface water drainage system is undertaken by a maintenance contractor through agreement with a private management company.

6.0 Conclusion

- 1) The development site is located within Flood Zone 1 with a low probability of flooding from rivers or the sea (<0.1%) in any given year.
- 2) In accordance with the hierarchy of discharge solutions, consideration has been given to disposal of surface water to ground, however ground conditions are unsuitable and unstable.
- 3) Surface water will be attenuated, with an additional allowance of 40% for climate change, and discharged at a controlled rate to the nearest watercourse.
- 4) All surface water runoff will be discharged via trapped gullies/sumps and open SuDS features to remove silts prior to discharge from the system.
- 5) The drainage system will be passed over to a management company who will be responsible for the maintenance of the system. Details of this are to be provided at detailed stage.

Appendix B – Attenuation Calculations



Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Mark Fox
Site name:	Houghton Barton
Site location:	Newton Abbot

Site coordinates	
Latitude:	50.54272° N
Longitude:	3.64896° W

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", WS-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the drainage scheme.

Reference:	5990542
Date:	2017-08-08T16:25:10

Methodology	IH124
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Site characteristics	
Total site area (ha)	0.93
Significant public open space (ha)	0.43
Area positively drained (ha)	0.5
Pervious area contribution (%)	30
Impermeable area (ha)	0.26
Percentage of drained area that is impermeable (%)	52
Impervious area drained via infiltration (ha)	0
Return period for infiltration system design (year)	10
Impervious area drained to rainwater harvesting systems (ha)	0
Return period for rainwater harvesting system design (year)	10
Compliance factor for rainwater harvesting system design (%)	66
Net site area for storage volume design (ha)	0.5
Net impermeable area for storage volume design (ha)	0.29

* Where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective Impermeable area is less than 50 % of the 'area positively drained', the 'net site area' and the estimates of Qbar and other flow rates will have been reduced accordingly.

Design criteria

Volume control approach	Use long term storage	
	Default	Edited
Climate change allowance factor	1.4	1.4
Urban creep allowance factor	1.1	1.1
Interception rainfall depth (mm)	1	1
Minimum flow rate (l/s)	1	1
Qbar estimation method	Calculate from SPR and SAAR	
SPR estimation method	Calculate from SOIL type	
	Default	Edited
Qbar total site area (l/s)	7.09	--
SOIL type	4	3
HOST class	N/A	N/A
SPR	0.47	0.37

Hydrology		Default	Edited
SAAR (mm)		1034	1034
M5-60 Rainfall Depth (mm)		20	20
'r' Ratio M5-60/M5-2 day		0.3	0.3
Rainfall 100 yrs 6 hrs		70	
Rainfall 100 yrs 12 hrs		99.96	
FEH/FSR conversion factor		1.19	1.19
Hydrological region		8	
Growth curve factor: 1 year		0.78	0.78
Growth curve factor: 10 year		1.49	1.49
Growth curve factor: 30 year		1.95	1.95
Growth curve factor: 100 year		2.43	2.43

Site discharge rates	Default	Edited
Qbar total site area (l/s)	7.09	4.22
Qbar net site area (l/s)	3.81	2.27
1 in 1 year (l/s)	3	1.8
1 in 30 years (l/s)	7.4	4.4
1 in 100 years (l/s)	9.3	5.5

Estimated storage volumes	Default	Edited
Interception storage (m³)	2	2
Attenuation storage (m³)	246	287
Long term storage (m³)	0	16
Treatment storage (m³)	31	31
Total storage (excluding treatment) (m³)	248	306

This report was produced using the Storage estimation tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEA, Hydro solutions or any other organisation for use of this data in the design or operational characteristics of any drainage systems.