Appendix F

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F Potential development area flood risk summary

F.1 Introduction

The following sections include summaries for the 24 key settlements in Cotswold District. Note that Cirencester and Siddington, Kemble and Kemble Additional and Bourton-on-the-Water and Lower Slaughter have been grouped together due to their proximity. These should be read in conjunction with the detailed settlement maps provided alongside this report.

The information given is based on national and detailed mapping provided by the Environment Agency, and local evidence provided by the Councils.

The following points should be noted when interpreting the maps:

- Flood Zone 3a and Flood Zone 2 are based on the national Flood Map for Planning provided by the Environment Agency.
- Flood Zone 3b is based on the modelled 30-year defended flood extent where there is detailed model information.
- The Risk of Flooding from Surface Water (RoFSW) map is shown on a 1:10,000 map background, as stipulated by the guidance notes provided by the Environment Agency.
- This SFRA uses groundwater data in the form of JBA's 5m groundwater map, which provides a general broadscale assessment of the groundwater flood hazard. The good practice guide to producing SFRAs, developed by the EA and published December 2021, recommends the use of this dataset in SFRAs.

F.1.1 Andoversford

Potential Development in Andoversford		
Total number of potential development sites within Andoversford: 15	**Proposed uses:** Residential	**Flood risk vulnerability:** Housing - More Vulnerable.
Potential development sites in Andoversford	To view potential development sites, refer to the Index Map, and select Andoversford There are 15 potential development sites identified in the SHELAA	
Summary of flood risk to Andoversford		
Main River	There are no designated Main Rivers identified within the settlement.	
Ordinary Watercourse	River Coln and unnamed tributary.	
Historic Flooding	July 2007 - 24 properties were flooded in the village of Andoversford due to a combination of river, groundwater and surface water flooding 1979 - Anecdotal evidence from a resident suggests that flooding occurred	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 8	**FZ3:** 8
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows of the River Coln and unnamed tributary. Urban drainage - sewers, drains and gullies Surcharged culverts Roads and paths Surface water runoff - e.g. Manor Farm Field	Domestic houses and commercial properties Manor Farm Field Livestock Market Andoversford Primary School Car park of the Royal Oak public house Roads such as: - Hunters Way - Station Road - Gloucester Road - A40
Flood Warning	Andoversford is within an Environment Agency flood alert area.	
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling.	

F.1.1 Andoversford

Flood Defences	No known flood defences. Several structures and culverts along the River Coln may have an effect on flows and levels, such as the culvert beneath Station Road, which has been identified as having a relatively small capacity.

Fluvial flood risk:

The Andoversford detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Andoversford detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

There is no local evidence of notable surface water flooding problems at Andoversford, although some surface water runoff from fields to the west contributed to flooding in 2007. The RoFSW follows the River Coln and its tributary continuing south parallel to the A40.

Groundwater flood risk:

The Andoversford detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the west of the settlement is at low risk of groundwater flooding, whereas towards the east there is an increased risk. No historical record of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

No incidents on the sewer flooding register. No local evidence of foul sewer flooding.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the Coln and its tributaries.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Andoversford - Suitability of SuDS

Bedrock geology		Birdlip Limestone Formation and Whitby Mudstone Formation
Superficial deposits		Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control

F.1.1 Andoversford		
Infiltration		Mapping suggests permeability at this site, a site investigation should be carried out to assess potential for drainage by infiltration
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Andoversford - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA or Level 2 SFRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SuDS techniques.

Surface water runoff rates should be attenuated to greenfield runoff rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce runoff rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary. The CDC Water Cycle Study should also be consulted

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Four sites are 100% within Flood Zone 1 however are > 1 hectare in size, therefore should progress to FRA stage.

One site is within Flood Zone 3a, therefore this site should be subject to a Level 2 SFRA.

Seven sites are within Flood Zone 3b therefore should either be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

F.1.2 Bledington

Potential Development in Bledington		
Total number of potential development sites within Bledington: 2	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable.
Potential development sites in Bledington	To view potential development sites, refer to the Index Map, and select Bledington There are two potential development sites identified in the SHELAA	
Summary of flood risk to Bledington		
Main River	River Evenlode and tributaries Westcote Brook	
Ordinary Watercourse	Unnamed tributary to the River Evenlode	
Historic Flooding	Autumn 1993 - channel capacity exceeded along the River Evenlode at Kingham. April 1998 - channel capacity exceeded along the River Evenlode. July 2007 - significant fluvial flooding at Bledington and Churchill due to the channel capacity being exceeded as a result of heavy rainfall. November 2019 and October 2020 - fluvial flooding due to channel capacity being exceeded along the River Evenlode. December 2020 - steady rainfall which saturated the ground and a significant rainfall event occurring on the 23rd quickly overwhelmed the watercourses. It was noted that there were 307 properties affected internally. January 2021 - fluvial flooding from the unnamed tributary to the River Evenlode.	

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 0	**FZ3:** 0
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows of the River Evenlode and unnamed tributary. Roads and paths	Domestic houses and commercial properties Roads such as: - Chapel Street - Stow Road - Main Street - The Green

F.1.2 Bledington		
		- Church Street
Flood Warning		Bledington is within an Environment Agency flood alert area.
Available survey/detailed modelling		Flood Zones are based on broad-scale JFLOW modelling.
Flood Defences		High ground along the banks of the River Evenlode and tributaries. Flood embankment just north of Chapel Street with a condition rating of 2.
Fluvial flood risk: The Bledington detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view: Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.		
Surface Water flood risk: The Bledington detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas. The RoFSW map highlights a number of significant surface water flow routes through the settlement, which mainly follow the main river and ordinary watercourse channels. There are some smaller areas of ponding across the settlement.		
Groundwater flood risk: The Bledington detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the settlement is generally at low risk of groundwater flooding.		
Reservoir flood risk: N/A		
Sewer flood risk: No incidents on the sewer flooding register. No local evidence of foul sewer flooding.		
Effects of climate change: Climate change is likely to increase the frequency and severity of flooding from the River Evenlode and its tributaries, and Westcote Brook. Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.		
Andoversford - Suitability of SuDS		
Bedrock geology		Charmouth Mudstone Formation
Superficial deposits		Sand and Gravel; and Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**

F.1.2 Bledington

Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Bledington - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

Two sites are 100% within Flood Zone 1 however are > 1 hectare in size, therefore should progress to FRA stage.

F.1.2 Bledington

Potential Development in Blockley		
Total number of potential development sites within Blockley: 30	**Proposed use:** Residential	**Flood risk vulnerability** Housing – more vulnerable
Potential development sites in Andoversford	To view potential development sites, refer to the Index Map, and select Blockley There are 30 potential development sites identified in the SHELAA	

Summary of flood risk to Blockley		
Main River	There are no designated 'Main Rivers' identified within the settlement.	
Ordinary Watercourse	Blockley Brook.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 9	**FZ3:** 8
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Surface water runoff Channel exceedance of Blockley Brook and its floodplains Roads and paths	Domestic houses and commercial properties Isolated ponding at the Recreation Grounds Roads such as: - Station Road - Northcot Lane - Chapel Lane - School Lane - Lower Street - Days Lane - High Street - Brook Lane

Flood Warning	Blockley is within an Environment Agency flood alert area.
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling.
Flood Defences	There are several sluices which act as flow controls through village.
Fluvial flood risk:	

F.1.2 Bledington

The Blockley detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Blockley detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

There is no local evidence of notable surface water flooding problems at Blockley, although a highway drain blockage led to flooding of properties in Mill Close in April/May 2013. The RoFSW describes flow paths that follow the line of the Blockley Brook and its tributaries.

Groundwater flood risk:

The Blockley detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the settlement as being at little to no risk of groundwater flooding. There area adjacent to Blockley Brook is at high risk of groundwater flooding. No historical record of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

No incidents on the sewer flooding register. No local evidence of foul sewer flooding.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the Blockley Brook, although the flood extent is not likely to increase significantly due to the confined topography.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Blockley - Suitability of SuDS

Bedrock geology		Charmouth Mudstone Formation
Superficial deposits		Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this settlement
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.

F.1.2 Bledington		
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Blockley - Implications for development

Any site that falls within Flood Zone 2 or 3 will require an FRA in order to demonstrate how a potential development will mitigate against flood risk from all sources.

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

Eight sites are within Flood Zone 3b therefore should either be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

Six sites are at high or medium risk of surface water flooding, therefore should be subject to a Level 2 SFRA.

One site is within Flood Zone 2, therefore this site should progress to FRA stage.

Three sites are at low risk of surface water flooding, therefore should progress to FRA stage.

Five sites are 100% within Flood Zone 1 however are > 1 hectare in size, therefore should progress to FRA stage.

F.1.4 Bourton-on-the-Water and Lower Slaughter

Potential Development in Bourton-on-the-Water and Lower Slaughter		
Total number of potential development sites within Bourton-on-the-Water and Lower Slaughter: 51	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Bourton-on-the-Water and Lower Slaughter	To view potential development sites, refer to the Index Map, and select Bourton-on-the-Water or Lower Slaughter There are 51 potential development sites identified in the SHELAA	

Summary of flood risk to Bourton-on-the-Water and Lower Slaughter	
Main River	River Dickler Slaughter Brook River Windrush River Eye
Ordinary Watercourse	River Eye (ordinary watercourse) Unnamed drains
Historic Flooding	July 2007 - Estimated 95-100 properties flooded. Flooding was from extensive flooding from the River Windrush, rapid surface water runoff and overloaded sewers November 2012 - One property on Rissington Road flooded from an overloaded sewer due to excess water running off the fields December 2020 - fluvial flooding recorded by CDC. January 2021 - flooding to properties.

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 12	**FZ3:** 12
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows Urban drainage - sewers, drains and gullies Roads and paths Surface water runoff - e.g. Clapton Fields	Domestic houses and commercial properties The Cotswold School Nethercote Landsdowne Birdland Conigers

F.1.4 Bourton-on-the-Water and Lower Slaughter

		Roads such as: - Hunters Way - Station Road - Gloucester Road - A40
Flood Warning	Bourton-on-the-Water and Lower Slaughter are within an Environment Agency flood warning and alert area.	
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling and detailed 1D-2D ISIS-TUFLOW modelled flood extents along the River Windrush at Bourton-on-the-Water (2014).	
Flood Defences	Flood wall along the River Windrush at Bourton-on-the-Water with a condition rating of 2 and a standard of protection of 75 years. Three flood embankments along the River Windrush at Bourton-on-the-Water with a condition rating of between 1 and 2 and a standard of protection of 75 years.	

Fluvial flood risk:

The Bourton-on-the-Water and Lower Slaughter detailed SFRA maps show the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Bourton-on-the-Water and Lower Slaughter detailed SFRA maps show the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

Local evidence suggests that properties opposite Birdland are at risk from surface water runoff from fields. The RoFSW follows the line of the existing floodplain of the local watercourses. There is some isolated ponding including a large area in the playing fields at Cotswold School, Roman Way, Pockhill Lane and the industrial parks along Bourton Link. Flow routes along roads are evident at Victoria Street and Moore Road.

Groundwater flood risk:

The Bourton-on-the-Water and Lower Slaughter detailed SFRA maps show the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the settlement area is at little to no risk of groundwater flooding, however there is an area through the centre of the settlement that is at high risk of groundwater flooding.

Reservoir flood risk:

F.1.4 Bourton-on-the-Water and Lower Slaughter

N/A

Sewer flood risk:

There is one historic incident that has been detailed by Thames Water to have occurred within Bourton-on-the-Water.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the River Windrush and other watercourses.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this effect.

Bourton-on-the-Water and Lower Slaughter - Suitability of SuDS

Bedrock geology		Charmouth Mudstone Formation
Superficial deposits		Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable.
Infiltration		Mapping suggests low permeability at this settlement.
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Bourton-on-the-Water and Lower Slaughter - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

F.1.4 Bourton-on-the-Water and Lower Slaughter

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Seven sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

13 sites are at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

Two sites are within Flood Zone 3, therefore should be subject to a Level 2 SFRA.

One site is at climate change risk, therefore site should be subject to a Level 2 SFRA.

Four sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

One site is within Flood Zone 2, therefore site should progress to the FRA stage.

Five sites are 100% within Flood Zone 1 however are > 1 hectare in size, therefore should progress to FRA stage.

F.1.5 Chipping Campden

Potential Development in Chipping Campden		
Total number of potential development sites within Chipping Campden: 69	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Chipping Campden	To view potential development sites, refer to the Index Map, and select Chipping Campden There are 69 potential development sites identified in the SHELAA	
Summary of flood risk to Chipping Campden		
Main River	There are no designated Main Rivers identified within the settlement.	
Ordinary Watercourse	Knees Brook The Cam Unnamed Drains	
Historic Flooding	1947 - Serious floods occurred across the region In the 50s and 60s - Park Road has periodically suffered from lesser floods July 1968 – Flooding occurred in Chipping Campden from the River Cam June and July 1982- Flash flooding was reported, over 140 properties were affected 1993 – Minor flooding on Park Road July 2007 – Estimated 115 – 120 properties flooded. Sources were the River Cam, rapid surface water runoff and overloaded sewers/ drains November 2012 - One garden at Catbrook was flooded. The road B4035 from Chipping Campden to Shipston on Stour was closed off Cider Mill Lane due to flooding February 2018 - flooding to properties recorded by the LLFA. Local evidence suggests that a lack of maintenance of watercourses and drains in the area has contributed to flooding in the past, and that blockage of culverts has increased flood risk in past events.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 17	**FZ3:** 15

F.1.5 Chipping Campden

Source	Pathway	Receptor
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows. Urban drainage - sewers, drains and gullies Roads and paths	Domestic houses and commercial properties Chipping Campden School Westingham Mill Littleworth Roads such as: - Blind Lane - Park Road - Westend Terrace - Lower High Street - Sheep Street - Calf's Lane - Leysbourne - Aston Road - Rissington Road - Roman Way

Flood Warning	Chipping Campden is within and Environment Agency flood alert area.
Available survey/detailed modelling	Flood Zones based on broadscale JFLOW models.
Flood Defences	There are several structures which influence flow and levels, including the Blind Lane/Dyer's Lane culverts and the Guild Twin culvert. CDC and GCC have a maintenance regime for preventing and clearing critical structures from blockages.

Fluvial flood risk:

The Chipping Campden detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Chipping Campden detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

F.1.5 Chipping Campden

Surface water has formed a major component of previous severe flood events (e.g. 2007), particularly ponding on Park Road, High Street and Calf's Lane, overland flow to Sheep Street from Conduit Hill and backing up of the surface water system during high levels in the River Cam. The RoFSW follows the route of the existing drains and local watercourses within Chipping Campden. Roads such as Dyers Lane, Aston Road and Leysbourne are indicated as pathways along with some isolated ponding.

Groundwater flood risk:

The Chipping Campden detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the settlement is at little to no risk of groundwater flooding. Towards the east there is a patch of high risk of groundwater flooding, along Pudlicott Lane. No historical record of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

There have been a number of instances of sewer flooding recorded by Severn Trent Water within the settlement.

Effects of climate change:

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this effect.

Chipping Campden - Suitability of SuDS

Bedrock geology		Dyrham Formation
Superficial deposits		Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this settlement
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Chipping Campden - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

F.1.5 Chipping Campden

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, or where sewer flooding is a problem, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

11 sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

19 sites are at high or medium risk of surface water flooding, therefore should be subject to a Level 2 SFRA.

One site is within Flood Zone 2, therefore should progress to the FRA stage.

13 sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

Four sites are 100% within Flood Zone 1, however are > 1ha in area, therefore should progress to the FRA stage.

F.1.6 Cirencester and Siddington

Potential Development in Cirencester and Siddington		
Total number of potential development sites within Cirencester and Siddington: 169	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Cirencester and Siddington	To view potential development sites, refer to the Index Map, and select Cirencester or Siddington There are 169 potential development sites identified in the SHELAA	

Summary of flood risk to Cirencester and Siddington	
Main River	Churn Daglingworth Stream Gumstool Brook Abbey Ground Lake Channel
Ordinary Watercourse	Barton Mill Channel
Historic Flooding	December 1929 – Nine streets flooded after prolonged wet autumn. March 1947 – Parts of Cirencester flooded in snowmelt flood that affected the whole Thames catchment. 1990 - River Churn – several residential properties affected at Watermoor December 2000/Jan 2001- properties, roads and gardens affected in Cirencester and Siddington Jan 2003 – One property flooded in the Watermoor area July 2007 - Estimated 15-20 properties flooded in Chesterton area and 40-45 in Watermoor and other areas plus 1-5 in Siddington. Flooding was from the River Churn and rapid surface water runoff November/December 2012 - Around 45-50 properties flooded due to high levels in River Churn causing urban drainage network to back up. Winter 2013/14 - Similar flooding problems with high levels in River Churn causing urban drainage network to back up. February 2018 - internal flooding to properties recorded by the LLFA.

F.1.6 Cirencester and Siddington

	December 2020 - fluvial flooding to properties from the River Churn.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 31	**FZ3:** 22
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial (predominantly driven by groundwater inputs, typically long duration events) Blockages in urban drainage Reservoir (The Lake)	Channel exceedance and floodplain flows of the River Churn and tributaries. Urban drainage - sewers, drains and gullies Surface water runoff - e.g. fields on north side of Swindon Road	Domestic houses and commercial properties (for e.g. Tesco) Mill Place Powell's school Abbey Grounds City Bank recreation ground Kingsmead In Cirencester, roads such as: - Barton Lane - Spitalgate Lane - Trafalgar Road - Hereward Road - Hakeburn Road - Beeches Road - London Road - Countess Lillias Road - Siddington Road - Rose Way - Cherry Tree Drive - Cricklade Road - Swindon Road In Siddington, roads such as: - South Cerney Road - The Common - Park Way
Flood Warning	Cirencester and Siddington are within an Environment Agency flood warning and alert area.	
Available survey/detailed modelling	Cirencester and Siddington are within the area covered by the River Churn ISIS-	

F.1.6 Cirencester and Siddington	
	TUFLOW model (Environment Agency, last updated 2011)
Flood Defences	There are a number of control structures on the River Churn through Cirencester (Gloucester Road sluices, Barton Mill sluice, Gumstool Brook sluice and New Mill sluices). The Environment Agency have made improvements to formalise their operation for flood risk management. The Environment Agency has developed the Churn Flood Risk Management Strategy (CFRMS). This is a plan for managing flood risk from main rivers in the Churn river catchment. The CFRMS covers a 100-year period to 2108 and sets out a sustainable way of managing flood risk along the River Churn, allowing for the predicted impacts of climate change. Culverts are present at Abbey Grounds/Park Street, at the end of Barton Lane, Hereward Road, Spitalgate Lane and The Plough. Gloucester Road. River Churn benefits from bank protection along its course through Cirencester, specifically at the Abbey Grounds to Corinium Gate; London Road Cirencester, at Mitsubishi Motors, Watermoor; The Willows, City Bank Lane; and at Riverside Walk off Thomas Street.
Fluvial flood risk: The Cirencester and Siddington detailed SFRA maps show the fluvial flood risk in the settlement. Turn the flood zone layer on to view: Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.	
Surface Water flood risk: The Cirencester and Siddington detailed SFRA maps show the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas. Surface water runoff from the highways and urban area contributes to the exceedance of capacity in the surface water sewers, particularly in the Spitalgate area. The RoFSW shows isolated areas of ponding and road flooding across Cirencester, and a distinct flow path through residential areas in the north east.	

F.1.6 Cirencester and Siddington

Groundwater flood risk:

The Cirencester and Siddington detailed SFRA maps show the groundwater flood risk in the settlement. The River Churn's catchment is highly permeable, and its flows are predominantly driven by high groundwater levels. This was demonstrated in the November/December 2012 event, when river levels were maintained at a high level for a long period of time. The Environment Agency's log of groundwater related incidents has several entries in the Cirencester area where flooding of cellars and flooding from under floors has been reported. The JBA Groundwater map suggests a varied risk (low to high risk) of groundwater flood emergence, with the highest risk indicated within Siddington.

Reservoir flood risk:

The Environment Agency's Risk of Flooding from Reservoirs dataset suggests there is a risk of reservoir flooding from The Mansion Lake at Cirencester Park. If this failed, flooding would affect the area around the A419 junction, and flow across town roughly between Sheep Street/Trinity Road and Watermoor Road before joining the River Churn floodplain.

Sewer flood risk:

A significant pathway of flooding in November 2012 was surcharging of the surface water sewer network due to high river levels in the River Churn. This affected the Spitalgate/Trafalgar Road area. Some properties were also affected by foul sewer flooding. There have been a number of incidents recorded by Thames Water across Cirencester and Siddington.

Effects of climate change:

Climate change is likely to increase the frequency and severity of fluvial flooding from the River Churn.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this effect.

Cirencester and Siddington - Suitability of SuDS

Bedrock geology		Forest Marble Formation
Superficial deposits		Gravel; and Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this settlement.
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

F.1.6 Cirencester and Siddington

Cirencester and Siddington - Implications for development
Sites greater than 1ha in Flood Zone 1 require a full FRA. No development within 8m of a designated Main River/Flood Defence. CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones. The effect of blockage of culverts should be considered as part of an FRA where appropriate. Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy. A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques. The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites. Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site. An FRA should include a full investigation of groundwater flood risk. For major developments, groundwater monitoring should be carried out for a suitable period. For major developments, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary. Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.
Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)
All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses. 23 sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary. 47 sites are at high or medium risk of surface water flooding, therefore should be subject to a Level 2 SFRA. Two sites are within Flood Zone 3, therefore should be subject to a Level 2 SFRA. Four sites are at risk from climate change, therefore should be subject to a Level 2 SFRA. One site is within Flood Zone 2, therefore should progress to the FRA stage. 29 sites are at low risk of surface water flooding, therefore should progress to the FRA stage. Nine sites are 100% within Flood Zone 1, however are >1ha in area, therefore should progresss to the FRA stage.

F.1.7 Down Ampney

Potential Development in Down Ampney		
Total number of potential development sites within Andoversford: 17	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Down Ampney	To view potential development sites, refer to the Index Map, and select Down Ampney There are 17 potential development sites identified in the SHELAA	

Summary of flood risk to Down Ampney		
Main River	Ampney Brook	
Ordinary Watercourse	Unnamed drains Poulton Brook	
Historic Flooding	July 2007 – Estimated 5 – 10 properties flooded. Flooding may have been as a result of the Ampney Brook or the Poulton Brook; rapid surface water runoff and failure of the sewage pumping station.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 2	**FZ3:** 1
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface WAter	Channel exceedance and floodplain flows of the River Churn and tributaries (Poulton Brook). Urban drainage - sewers, drains and gullies Surface water runoff	Domestic houses and commercial properties Fields to west of the village Roads such as: - Down Ampney Road
Flood Warning	Down Ampney is within an Environment Agency flood alert and flood warning area.	
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling.	
Flood Defences	No known flood defences or assets affecting flows or levels.	

Fluvial flood risk:

The Down Ampney detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

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Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Down Ampney detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

The RoFSW indicates a low risk of surface water flooding in Down Ampney.

Groundwater flood risk:

The Down Ampney detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that there is a high risk of groundwater flooding across the settlement, probably due to its proximity to the River Thames alluvial gravels. No historical record of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

No incidents on the sewer flooding register. No local evidence of foul sewer flooding.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the Ampney Brook, although the flood extent is not likely to increase significantly.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this effect.

Down Ampney - Suitability of SuDS

Bedrock geology		Oxford Clay Formation
Superficial deposits		Sand and gravel; and Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this settlement.
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.

F.1.7 Down Ampney

Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Down Ampney - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

One site is within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

One site is at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

Four sites are at low surface water flood risk, therefore should progress to the FRA stage.

Two sites are 100% within Flood Zone 1, however >1ha in area, therefore should progress to the FRA stage.

F.1.8 Evenlode

Potential Development in Evenlode		
Total number of potential development sites within Evenlode: 0	**Proposed use:** N/A	**Flood risk vulnerability** N/A
Potential development sites in Evenlode	There are no potential development sites identified in the SHELAA	

Summary of flood risk to Evenlode	
Main River	River Evenlode
Ordinary Watercourse	Unnamed tributary to the River Evenlode
Historic Flooding	Autumn 1993 - exceedance of channel capacity of the River Evenlode caused fluvial flooding. December 2020 - fluvial flooding from the unnamed tributary to the River Evenlode.

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 0	**FZ3:** 0
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows of the River Evenlode and unnamed tributary Surface water Roads and paths	Domestic houses and commercial properties Railway line Roads such as: - Chapel Street - Church Lane

Flood Warning	Evenlode is within an Environment Agency flood alert area.
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling.
Flood Defences	No known flood defences.

Fluvial flood risk:

The Evenlode detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

F.1.8 Evenlode

The Evenlode detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

The RoFSW map indicates significant potential for surface water flooding at Evenlode. The surface water flow paths follow the main river and ordinary watercourses, however also flow along the railway line and Church Lane.

Groundwater flood risk:

The Evenlode detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the west and centre of the settlement is at high risk of groundwater flooding, whereas the east is at low risk.

Reservoir flood risk:

N/A

Sewer flood risk:

No incidents on the sewer flooding register. No local evidence of foul sewer flooding.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the Evenlode and its tributaries.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Evenlode - Suitability of SuDS

Bedrock geology		Charmouth Mudstone Formation
Superficial deposits		Sand and Gravel; and Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Evenlode - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

F.1.8 Evenlode

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

There are currently no proposed development sites within Evenlode.

F.1.9 Fairford

Potential Development in Fairford		
Total number of potential development sites within Fairford: 50	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Fairford	To view potential development sites, refer to the Index Map, and select Fairford There are 50 potential development sites identified in the SHELAA	
Summary of flood risk to Andoversford		
Main River	River Coln River Thames	
Ordinary Watercourse	Court Brook Unnamed drains	
Historic Flooding	December 2000 - eight properties were flooded at the eastern end of Milton Street, 5 properties were flooded in Whitehart Court and gardens were flooded at Courtbrook July 2007 - Estimated 60+ properties flooded. Flooding was as a result of flooding from the River Coln, rapid surface water runoff (RAF Fairford) and overloaded sewers. In addition there were concerns that the RAF air base had pumped a lot of water off the base.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 8	**FZ3:** 7
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows. Urban drainage - sewers, drains and gullies Roads and paths Surface water runoff	Domestic houses and commercial properties Fairford Church of England Primary School Roads such as: - Milton Street - Coronation Street - Bridge Street - Lakeside - Mill Lane - Park Street - London Street

F.1.9 Fairford		
		- Lower Croft Road - Aldsworth Close - White Heart Court - A417 - Back Lane - Moor Lane - East End - Courtbrook - Waterloo Meadows
Flood Warning	Fairford is within an Environment Agency flood warning and flood alert area.	
Available survey/detailed modelling	Flood Zone 3b, 3a and 2 are based on a detailed 1D-2D ISIS-TUFLOW model of the Upper Thames (covering the Thames Main River Limit to St John's) which was completed in 2014. Flood Zone 2 also incorporates historical flood outlines where these are more extensive than the modelled outlines.	
Flood Defences	There are a series of measures on the River Windrush to prevent water flooding property on Milton St, Back Lane, Court Brook; this involves the containment of high flows. There is Property Level Protection for nine properties at Court Brook. There is a bund upstream of Milton Street. The Environment Agency completed a scheme in Milton Street, the estimated Standard of Protection (SoP) is 1 in 100-year. Flood Action Plans have been prepared There are five control structures near Fairford Mill in order to manage local sluices. There are varying regimes within summer and winter.	
Fluvial flood risk: The Fairford detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view: Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year		

F.1.9 Fairford

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Fairford detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

Records of flooding from 2007 suggest that surface water flooding was a sigificant problem, particularly at RAF Fairford. The RoFSW does not particularly reflect this historical evidence, showing low risk in most of Fairford. Overland flow routes indicate pathways which follow existing drains and certain roads including Coronation Street and Milton Street, and roads at East End.

Groundwater flood risk:

The Fairford detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the settlement has a high risk of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

There are known problems with foul sewer flooding. Residents reported repeated incidents of sewer flooding (2000, 2003 and 2007). Thames Water identified Fairford as an area where properties experienced internal sewer flooding in the 2007 event.

Effects of climate change:

Climate change is likely to increase the frequency and severity of fluvial flooding from the River Coln.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this effect.

Fairford - Suitability of SuDS

Bedrock geology		Kellaways Clay Member
Superficial deposits		Sand and Gravel; and Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this settlement
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.

F.1.9 Fairford		
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Fairford - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Four sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

Three sites are within Flood Zone 3, therefore should be subject to a Level 2 SFRA.

11 sites are at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

One site is within Flood Zone 2, therefore should progress to the FRA stage.

12 sites are at low surface water flood risk, therefore should progress to the FRA stage.

Seven sites are 100% within Flood Zone 1, however are >1ha in area, therefore should progress to the FRA stage.

F.1.10 Kemble and Kemble Additional

Potential Development in Kemble		
Total number of potential development sites within Kemble: 15	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Kemble	To view potential development sites, refer to the Index Map, and select Kemble There are 15 potential development sites identified in the SHELAA	

Summary of flood risk to Kemble		
Main River	River Thames	
Ordinary Watercourse	Unnamed drains	
Historic Flooding	December 2012 - Minor flooding affected one property.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 1	**FZ3:** 1
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Blockages in urban drainage Surface Water	Channel exceedance and floodplain flows of the Upper Thames and Unnamed drains. Urban drainage - sewers, drains and gullies Roads and paths Surface water runoff from fields	Domestic houses and commercial properties Isolated ponding at Glebe Lane Roads such as: - Windmill Road - A429 - Parker's Bridge - Glebe Lane
Flood Warning	Kemble is within an Environment Agency flood warning and flood alert area.	
Available survey/detailed modelling	Flood Zone 3b, 3a and 2 for the River Thames are based on a detailed 1D-2D ISIS-TUFLOW model of the Upper Thames (covering the Thames Main River Limit to St John's) which was completed in 2014. Flood Zone 2 also incorporates historical flood outlines where these are more extensive than the modelled outlines. Flood Zones for unnamed drains are based on broad-scale JFLOW modelling.	
Flood Defences	Flood defence located at Parkers Bridge on the Upper Thames.	

F.1.10 Kemble and Kemble Additional

	High ground defences located along the banks of the River Thames.

Fluvial flood risk:

The Kemble detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Kemble detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

There is no local evidence of notable surface water flooding problems at Kemble. The RoFSW indicates a low risk of surface water flooding, with small areas of ponding.

Groundwater flood risk:

The Kemble detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the settlement is at fairly high risk of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

Thames Water have records of historic sewer flooding within this settlement.

Effects of climate change:

Climate change is likely to increase the frequency and severity of fluvial flooding from the River Thames and unnamed drains.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this effect.

Kemble - Suitability of SuDS

Bedrock geology		Forest Marble Formation
Superficial deposits		Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this settlement

F.1.10 Kemble and Kemble Additional		
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Kemble - Implications for development

Any site that falls within Flood Zone 2 or 3 will require an FRA in order to demonstrate how a potential development will mitigate against flood risk from all sources.

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

One site is within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

Five sites are at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

Four sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

F.1.10 Kemble and Kemble Additional

One site is 100% within Flood Zone 1, however >1ha in area, therefore should progress to the FRA stage.

F.1.11 Lechlade

Potential Development in Lechlade		
Total number of potential development sites within Lechlade: 29	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Lechlade	To view potential development sites, refer to the Index Map, and select Lechlade There are 29 potential development sites identified in the SHELAA	

Summary of flood risk to Lechlade	
Main River	River Thames River Leach
Ordinary Watercourse	Downington Ditch Little Lemhill Drain
Historic Flooding	1908 & 1935 - Rain and melted snow caused floods 1998 to 2013 - Flooding on the A417 and adjacent land has occurred five times between 1998 and present; properties and gardens have been affected. July 2007 - Estimated 130-140 properties flooded (over one-third of the reports of property flooding in Lechlade relate to garden sheds). Flooding was caused by a combination of fluvial and surface water flooding. November 2012 - St Johns Priory Park was flooded; no property was reported as being affected. Reports describe that the sewage system was struggling to cope with the heavy rainfall and excess surface water. Lechlade Road (near Garden Centre) was flooded. Winter 2013/14 - further problems with sewer system.

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 11	**FZ3:** 9
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance, floodplain flows and blocked culverts.	Domestic houses and commercial properties Riverside Marina Little London

F.1.11 Lechlade		
	Urban drainage - sewers, drains and gullies Roads and paths (particularly the A417) Surface water runoff - from Warren's Cross and surrounding fields.	Roads such as: - Thames Street - Warren Cross
Flood Warning	Lechlade is within an Environment Agency flood alert and flood warning area.	
Available survey/detailed modelling	Flood Zone 3b, 3a and 2 for the River Thames (and including the Little Lemhill Drain and Downington Ditch) are based on a detailed 1D-2D ISIS-TUFLOW model of the Upper Thames (covering the Thames Main River Limit to St John's) which was completed in 2014. Flood Zone 2 also incorporates historical flood outlines where these are more extensive than the modelled outlines.	
Flood Defences	River Leach benefits from bank protection around Lechlade Mill and around St John's Lock. Gate settings are adjusted at St John's Lock on the River Thames in order to manage flood levels upstream and downstream. Culverts are located at "The Weather House" Downington; Downington Grange, Downington; Opposite Green Farm, Downington; Priory Mill, Lechlade; Orchard house to Tollgate House; and at Horseshoe Lake.	
Fluvial flood risk: The Lechlade detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view: Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.		
Surface Water flood risk: The Lechlade detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.		

F.1.11 Lechlade

The RoFSW highlights the known surface water flow route down the A417 into Lechlade from the west. Other small areas of ponding are shown.

Groundwater flood risk:

The Lechlade detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the site is at the highest risk of groundwater flooding. No historical record of groundwater flooding within the settlement area.

Reservoir flood risk:

N/A

Sewer flood risk:

Thames Water has noted one sewer flood event to have occurred within Lechlade.

Effects of climate change:

Climate change is likely to increase the frequency and severity of fluvial flooding from the River Thames, Lemhill Drain and Downington Ditch.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents but warmer drier summers may counteract this effect.

Lechlade - Suitability of SuDS

Bedrock geology		Oxford Clay Formation
Superficial deposits		Sand and Gravel
SuDS Type	**Potential Suitability**	Comments
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Lechlade - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

F.1.11 Lechlade

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Seven sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

Two sites are within Flood Zone 3, therefore should be subject to a Level 2 SFRA.

Two sites are at high or medium risk of surface water flooding, therefore should be subject to a Level 2 SFRA.

Two sites are within Flood Zone 2, therefore should progress to the FRA stage.

Seven sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

Two sites are 100% within Flood Zone 1, however >1ha in area, therefore should progress to the FRA stage.

F.1.12 Mickleton

Potential Development in Mickleton		
Total number of potential development sites within Mickleton: 27	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Mickleton	To view potential development sites, refer to the Index Map, and select Mickleton There are 27 potential development sites identified in the SHELAA	
Summary of flood risk to Mickleton		
Main River	There are no designated Main Rivers identified within the settlement.	
Ordinary Watercourse	Noleham Brook Nortom Brook	
Historic Flooding	July 2007 - Estimated 5 to 10 properties flooded. Flooding was due to rapid surface water runoff and overloaded sewers February 2018 - flooding to properties recorded by LLFA. December 2020 - fluvial flooding recorded by CDC.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 3	**FZ3:** 3
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial (ordinary watercourses) Surface Water Blockages in urban drainage	Channel exceedance and floodplain flows of the Norton Brook. Urban drainage - sewers, drains and gullies Roads and paths Surface water runoff from fields	Domestic houses and commercial properties Sewers Roads such as: - Mill Lane - High Street
Flood Warning	Mickleton is within an Environment Agency flood alert area.	
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling.	
Flood Defences	No known flood defences or assets affecting flows or levels.	

Fluvial flood risk:

The Mickleton detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

F.1.12 Mickleton

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Mickleton detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

Local evidence suggests that surface water flooding problems have been experienced originating in the Meon Road area and flowing through the Meadow View area. The RoFSW indicates that surface water flooding is the main risk in Mickleton. Flow pathways follow the ordinary watercourses and a number of roads in the village, including Meon Road, Chapel Lane, Cotswold Edge, Pound Lane, Arbour Close

Groundwater flood risk:

The Mickleton detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the settlement is at very low risk of groundwater flooding. There is no historical record of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

There have been two historic sewer flood events recorded by Severn Trent.

Effects of climate change:

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect is even less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this affect.

Mickleton - Suitability of SuDS

Bedrock geology	Birdlip Limestone Formation and Whitby Mudstone Formation
Superficial deposits	Clay, Silt, Sand and Gravel

SuDS Type	Potential Suitability	Comments
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site
Detention		This option may be feasible provided site

F.1.12 Mickleton		
		slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Mickleton - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, or where sewer flooding is a problem, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Four sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design or the site boundary can be redrawn to remove the functional floodplain from the boundary.

15 sites are at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

F.1.12 Mickleton

Four sites are at low surface water flood risk, therefore should progress to the FRA stage.

F.1.13 Moreton-in-Marsh

Potential Development in Moreton-in-Marsh		
Total number of potential development sites within Moreton-in-Marsh: 123	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Moreton-in-Marsh	To view potential development sites, refer to the Index Map, and select Moreton-in-Marsh There are 123 potential development sites identified in the SHELAA	

Summary of flood risk to Moreton-in-Marsh	
Main River	River Evenlode
Ordinary Watercourse	Stow Brook Unnamed drains
Historic Flooding	July 2007 - Estimated 240-250 properties were flooded. Flooding was as a result of River Evenlode, rapid surface water runoff and overloaded sewers November 2012 - Three houses on The Green, Moreton-in-Marsh were flooded following heavy rain. Three properties on Croft Holm were recorded as being affected by overloaded sewers and surface water runoff. Moreton Station flooded. December 2020 - fluvial flooding recorded by CDC. January 2021 - flood to properties recorded by the LLFA.

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 42	**FZ3:** 8
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Blockages in urban drainage Blockages/constriction of culverts Surface Water	Channel exceedance and floodplain flows of the River Evenloade and Stow Brook. Urban drainage - sewers, drains and gullies Railway line Surface water runoff from fields Roads and paths	Domestic houses and commercial properties Queen Victoria Garden Caravan Park Old Town St David's Primary School Roads such as: - Bourton Road - High Street - East Street - Hospital Road - Fosseway Avenue

F.1.13 Moreton-in-Marsh		
		- Croft Holm - Primrose Court - Stow Road - Swans Close
Flood Warning	Moreton-in-Marsh is within an Environment Agency flood warning and flood alert area.	
Available survey/detailed modelling	Flood Zone 3 is based on broad-scale JFLOW modelling, Flood Zone 2 is mainly based on historical flood outlines. Flood Zone 3 is artificially cut off in the middle of the town and there is some uncertainty on the 100-year extent upstream of this and a precautionary approach should be taken.	
Flood Defences	There are several significant structures/culverts which may influence water levels and flow, including those at Queen Street, High Street, the A429, Budgens and the railway. Since the 2007 event, measures have been undertaken by CDC to improve conveyance of water in Moreton in Marsh: - Improved the maintenance schedules of watercourses; gullies and drains; and trash screens - Installed a river level monitoring device at Primrose Court to provide early indications of flood risk during high flows - Completed bank raising works on the Flood Relief Ditch in the verge of the A44 road, to prevent water spilling. Future plans include to lay a duplicate pipe below the A44 road, to prevent water spilling onto the road surface during storms - A flood relief channel runs south of Fosseway Avenue, flowing in a west to easterly direction, underneath the railway line and joining with the River Evenlode. CDC have extended it to the north to catch water that previously would have entered the River Evenlode and gone into the Queen Street culvert.	
Fluvial flood risk: The Moreton-in-Marsh detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:		

F.1.13 Moreton-in-Marsh

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Moreton-in-Marsh detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

Local evidence suggests that there is a major surface water flow component to flooding in Moreton-in-Marsh, with overland flow coming from farmland to the west and entering the town via the roads. There is also a flow route along the railway into the station, which cannot enter the river as it is culverted at that point. The RoFSW reflects local knowledge, showing flow paths from higher ground into Bourton Road, High Street, East Street, Croft Holm, Stow Road and Fosseway Avenue and St David's Primary School. The railway embankment will act as a barrier to flow.

Groundwater flood risk:

The Moreton-in-Marsh detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the site is at high risk of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

CDC report that Croft Holm and Primrose Court suffer from ongoing sewer flooding which backs up from the pumping station when the river is high. Thames Water have reported one historic flood event within this settlement.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the River Evenlode and tributaries. Flood extent is likely to increase along out of bank flow paths such as High Street.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this effect.

Moreton-in-Marsh - Suitability of SuDS

Bedrock geology		Charmouth Mudstone Formation
Superficial deposits		Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site

F.1.13 Moreton-in-Marsh		
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Moreton-in-Marsh - Implications for development

Flood Zone 2 covers a larger extent of the river than Flood Zone 3 and is based on recent flood events. CDC should consider treating Flood Zone 2 as Flood Zone 3a for planning purposes. Any site that falls within Flood Zone 2 or 3 will require an FRA in order to demonstrate how a potential development will mitigate against flood risk from all sources.

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

AN FRA should include a full investigation of groundwater flood risk. For major developments, groundwater monitoring should be carried out for a suitable period.

If the development is in an area of risk of flooding from reservoirs, developers should liaise with Emergency Planners.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

F.1.13 Moreton-in-Marsh

Nine sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design or the site boundary can be redrawn to remove the functional floodplain from the boundary.

29 sites are at high or medium risk of surface water flooding, therefore should be subject to a Level 2 SFRA.

20 sites are within Flood Zone 2, therefore should progress to the FRA stage.

21 are at low surface water flood risk, therefore should progress to the FRA stage.

Four sites are 100% within Flood Zone 1, however >1ha in area, therefore should progress to the FRA stage.

F.1.14 Naunton

Potential Development in Naunton		
Total number of potential development sites within Andoversford: 4	**Proposed use:** Residential	**Flood risk vulnerability** Housing – More Vulnerable
Potential development sites in Naunton	There are four potential development sites identified in the SHELAA	

Summary of flood risk to Naunton	
Main River	There are no designated Main Rivers identified within the settlement.
Ordinary Watercourse	River Windrush (ordinary watercourse).
Historic Flooding	1930s, 1947 and 1963 - severity and extent unknown. July 2007 - Estimated 20 -25 properties were flooded. Flooding was as a result of the Windrush, rapid surface water runoff and overloaded sewers. November 2012 - Properties were affected by sewer flooding. December 2012 - There were problems with the pumping station and blockage issues were recorded; a property was affected. February 2018 - fluvial flooding to properties recorded by the LLFA.

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 0	**FZ3:** 0
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows. Roads and paths	Domestic houses and commercial properties Guiting Power Roads such as: - Main Street - Hill Close - Lower Main Street - Dale Street

Flood Warning	Naunton is within an Environment Agency flood alert area.
Available survey/detailed modelling	Flood Zones are based on broadscale JFLOW models.

F.1.14 Naunton	
Flood Defences	CDC funded a Property Level Protection scheme in 2012. There are several bridges and culverts which may influence flow and levels.

Fluvial flood risk:

The Naunton detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Naunton detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

The Naunton Flood Study report notes that surface water has contributed to flooding in past events. The RoFSW indicates possible flow routes down the roads to the north and into the River Windrush.

Groundwater flood risk:

The Naunton detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the site is at low risk of groundwater flooding. The areas alongside the River Windrush are at high risk of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

There have been known problems with foul sewer flooding. CDC records describe problems with a pumping station and blockage issues. There are 6 incidents recorded on the Thames Water sewer flooding register in the postcode sector (GL54 3) which includes Naunton.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the River Windrush, although the flood extent is not likely to increase significantly due to the topography.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Naunton - Suitability of SuDS		
Bedrock geology		Limestone
Superficial deposits		Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control

F.1.14 Naunton		
Infiltration		Mapping suggests permeability at this site, a site investigation should be carried out to assess potential for drainage by infiltration
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Naunton - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

One site is at low risk of surface water flooding, therefore should progress to the FRA stage.

One site is 100% within Flood Zone 1, however >1ha in area, therefore should progress to the FRA stage.

F.1.15 Northleach

Potential Development in Northleach		
Total number of potential development sites within Northleach: 26	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Northleach	To view potential development sites, refer to the Index Map, and select Northleach There are 26 potential development sites identified in the SHELAA	
Summary of flood risk to Northleach		
Main River	There are no designated Main Rivers identified within the settlement.	
Ordinary Watercourse	River Leach (ordinary watercourse) Unnamed drain	
Historic Flooding	July 2007 - Estimated 15 -20 properties were flooded. Flooding was as a result of local watercourses and rapid surface water runoff.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 7	**FZ3:** 7
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Blockages in urban drainage Surface Water	Channel exceedance and floodplain flows Exceedance of culvert capacity via manholes Roads and paths	Domestic houses and commercial properties Mill End Roads such as: - West End - High Street - East End
Flood Warning	Northleach is within an Environment Agency flood alert area.	
Available survey/detailed modelling	The Flood Zone is based on broad-scale JFLOW modelling.	
Flood Defences	No known flood defences. There is a major culvert on the River Leach, roughly following the course of West End road. The CCTV survey showed that the culvert is substantially blocked under the old prison, causing flood water to be stored upstream.	
Fluvial flood risk: The Northleach detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:		

F.1.15 Northleach

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Northleach detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

There is no local evidence of notable surface water flooding problems at Northleach. The RoFSW indicates a potential overland route through the village from the north and following the course of the tributary at Mill End.

Groundwater flood risk:

The Northleach detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the settlement is at low risk of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

There are 6 incidents recorded on the Thames Water sewer flooding register in the postcode sector (GL54 3) which includes Northleach. No local evidence of foul sewer flooding.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the River Leach and tributaries, although the flood extent is not likely to increase significantly.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Northleach - Suitability of SuDS

Bedrock geology		Limestone
Superficial deposits		Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control
Infiltration		Mapping suggests permeability at this site, a site investigation should be carried out to assess potential for drainage by infiltration
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.

F.1.15 Northleach		
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Northleach - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

Modelling of the long culvert on the River Leach and the effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Four sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design or the site boundary can be redrawn to remove the functional floodplain from the boundary.

One site is within Flood Zone 3, therefore should be subject to a Level 2 SFRA.

Two sites are at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

One site is within Flood Zone 2, therefore should progress to the FRA stage.

Two sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

F.1.15 Northleach

Six sites are 100% within Flood Zone 1, however is >1ha in area, therefore should progress to the FRA stage.

F.1.16 South Cerney		
Potential Development in South Cerney		
Total number of potential development sites within South Cerney: 37	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in South Cerney	To view potential development sites, refer to the Index Map, and select South Cerney There are 37 potential development sites identified in the SHELAA	
Summary of flood risk to South Cerney		
Main River	River Churn Cerneywick Brook	
Ordinary Watercourse	Unnamed drains	
Historic Flooding	1990 - River Churn affected several residential properties at Watermoor, South Cerney and Cerney Wick 2000/2001 - River Churn flooded properties, roads and gardens in Cirencester, South Cerney and Siddington July 2007 - Estimated 1 to 5 properties flooded. Flooding was as a result of River Churn, rapid surface water runoff and overloaded sewers December 2012 - Estimated 30 - 35 properties flooded. Flooding was as a result of the River Churn, fallen trees in the channel of the River Churn, overloaded sewers and surface water runoff Winter 2013/14 - Similar problems with overloaded sewers experienced to 2012. February 2018 - flooding to properties as a results of overloaded sewerage systems recorded by the LLFA. December 2019 - fluvial flooding to properties recorded by the LLFA. December 2020 - fluvial flooding recorded by CDC.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 17	**FZ3:** 17
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows Urban drainage - sewers, drains and gullies	Domestic houses and commercial properties Upper Up Roads such as:

F.1.16 South Cerney		
	Roads and paths Surface water runoff from fields	- School Lane - Bow Wow - Boxbrush Road - Lakeside - Robert Franklin Way - Broadway Lane - Robert Franklin Way
Flood Warning	South Cerney is within an Environment Agency flood warning and flood alert area.	
Available survey/detailed modelling	Flood Zone 3b, 3a and 2 are based on a detailed 1D-2D ISIS-TUFLOW model of the Upper Thames (covering the Thames Main River Limit to St John's) including the lower Churn and Cerneywick Brook which was completed in 2014. Flood Zone 2 also incorporates historical flood outlines where these are more extensive than the modelled outlines.	
Flood Defences	The Lower Churn benefits from bank protection along its course through South Cerney specifically along School Lane and Bow Wow. Culverts are present at Lower Mill, Upper Mill and School Lane. Raised defences are located at the rear of The Close; Tallot House Drive; U/S of Clarks Hay Bridge; and at Upper Mill. After the flooding in 2012, residents enlarged the pipes through the disused railway embankment. These have been assessed by the EA as providing a small reduction in flood levels and extents in the Boxbush area of South Cerney without increased risk to properties downstream.	
Fluvial flood risk: The South Cerney detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view: Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.		
Surface Water flood risk:		

F.1.16 South Cerney

The South Cerney detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

Surface water runoff was identified as a factor contributing to several past flooding events. Roads running from west to east such as High Street, Station Road and Bow Wow are identified as flow routes in the fluvial hydraulic modelling and the RoFSW, with small areas of ponding in the town. A large area at risk of ponding is also shown to the north east.

Groundwater flood risk:

The South Cerney detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that a large proportion of the site is at high risk of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

There are known problems with sewer flooding. Thames Water identified South Cerney as an area where properties experienced internal sewer flooding in the 2007 event. CDC have recorded issues with sewer flooding in South Cerney in December 2012. Since then, reports describe the Cirencester and South Cerney sewer system had been surveyed and cleared out at points where there were blockages and build-ups of debris (Wilts & Gloucestershire Standard July 2013). Sewerage flooding was also recorded in February 2018.

Effects of climate change:

Climate change is likely to increase the frequency and severity of fluvial flooding from the River Thames, Lower Churn and Cerneywick Brook.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

In relation to groundwater, the effect of climate change is less certain. Milder wetter winters may increase the frequency of groundwater flooding incidents, but warmer drier summers may counteract this effect.

South Cerney - Suitability of SuDS

Bedrock geology		Kellaways Clay Member
Superficial deposits		Sand and Gravel; and Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.

F.1.16 South Cerney		
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

South Cerney - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

15 sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

Two sites are within Flood Zone 3, therefore should be subject to a Level 2 SFRA.

Seven sites are at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

Six sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

F.1.17 Stow-on-the-Wold		
Potential Development in Stow-on-the-Wold		
Total number of potential development sites within Stow-on-the-Wold: 59	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Stow-on-the-Wold	To view potential development site, refer to the Index Map, and select Stow-on-the-Wold There are 59 potential development sites identified in the SHELAA	
Summary of flood risk to Stow-on-the-Wold		
Main River	There are no designated Main Rivers identified within the settlement.	
Ordinary Watercourse	Unnamed drain	
Historic Flooding	There is no historical flooding identified within this settlement.	
No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 0	**FZ3:** 0
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial (ordinary watercourse) Surface Water	Channel exceedance and floodplain flows from the ordinary watercourse Roads and paths Surface water runoff from fields	Isolated ponding on roads
Flood Warning	No Environment Agency flood warning service in this area	
Available survey/detailed modelling	No Flood Zones in this area	
Flood Defences	No known flood defences or assets	
Fluvial flood risk: The Stow-on-the-Wold detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view: Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.		
Surface Water flood risk:		

F.1.17 Stow-on-the-Wold

The Stow-on-the-Wold detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

There is no local evidence of notable surface water flooding problems at Stow-on-the-Wold. The RoFSW shows potential flow paths along Park Street and to the south of Oddington Road.

Groundwater flood risk:

The Stow-on-the-Wold detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the settlement is at low risk of groundwater flooding. No records of historic groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

Thames Water have recorded an incident of historic sewer flooding. No local evidence of foul sewer flooding.

Effects of climate change:

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Stow-on-the-Wold - Suitability of SuDS

Bedrock geology		Chipping Norton Limestone Formation
Superficial deposits		None
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control
Infiltration		Mapping suggests permeability at this site, a site investigation should be carried out to assess potential for drainage by infiltration
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Stow-on-the-Wold - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

F.1.17 Stow-on-the-Wold

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Seven sites are at high or medium risk of surface water flooding, therefore should be subject to a Level 2 SFRA.

Eight sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

Six sites are 100% within Flood Zone 1, however are >1ha in area, therefore should progress to the FRA stage.

F.1.18 Tetbury

Potential Development in Tetbury		
Total number of potential development sites within Tetbury: 68	**Proposed use:** Residential	**Flood risk vulnerability** More Vulnerable
Potential development sites in Tetbury	To view potential development sites, refer to the Index Map, and select Tetbury There are 68 potential development sites identified in the SHELAA	

Summary of flood risk to Tetbury	
Main River	There are no designated Main Rivers identified within the settlement.
Ordinary Watercourse	River Avon (Tetbury branch) Unnamed tributary
Historic Flooding	June 2012 - flooding to properties recorded by the LLFA. April 2018 - flooding to properties recorded by the LLFA. December 2018 - flooding to properties recorded by the LLFA.

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 4	**FZ3:** 3
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial (ordinary watercourse) Surface Water	Channel exceedance and floodplain flows from the ordinary watercourses. Roads and paths	Domestic houses and commercial properties Police Station The Chipping Roads such as: - Charlton Road - New Church Street - Long Street - London Road - Baybrook Close - Fox Hill - Church Street

Flood Warning	Tetbury is within an Environment Agency flood alert area.
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling.

F.1.18 Tetbury

Flood Defences	No known flood defences or assets.

Fluvial flood risk:

The Tetbury detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Tetbury detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

The RoFSW indicates potential flow routes that follow the line of existing ordinary watercourses in the area. A flow route is also identified alongside London Road and from St Mary's Primary School south west towards The Splash.

Groundwater flood risk:

The Tetbury detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the majority of the settlement is at low risk of groundwater flooding, however this increases as you move closer towards the ordinary watercourses.

Reservoir flood risk:

N/A

Sewer flood risk:

No incidents on the sewer flooding register. No local evidence of foul sewer flooding.

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the River Avon (Tetbury branch) and tributaries, although the flood extent is not likely to increase significantly.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Tetbury - Suitability of SuDS

Bedrock geology		Forest Marble Formation
Superficial deposits		Clay, Silt, Sand and Gravel
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.

F.1.18 Tetbury		
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Tetbury - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Four sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

12 sites are at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

16 sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

Seven sites are 100% within Flood Zone 1, however >1ha in area, therefore should progress to the FRA stage.

F.1.19 Upper Rissington

Potential Development in Upper Rissington		
Total number of potential development sites within Upper Rissington: 5	**Proposed use:** Residential	**Flood risk vulnerability** Housing – More Vulnerable
Potential development sites in Upper Rissington	There are five potential development sites identified in the SHELAA	
Summary of flood risk to Upper Rissington		
Main River	There are no designated Main Rivers identified within the settlement.	
Ordinary Watercourse	The are no ordinary watercourses within this settlement.	
Historic Flooding	There are no reports of historical flooding identified for this settlement.	

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 0	**FZ3:** 0
Source	**Pathway**	**Receptor**
Heavy rainfall Surface Water	Channel exceedance and floodplain flows Roads and paths	Ansel's Hill Coppice Bunting's Hill Copse Far Hill House Roads such as: - Bleriot Grebe Square

Flood Warning	There are no Environment Agency flood warning or flood alert areas within this settlement.
Available survey/detailed modelling	No Flood Zones within this settlement.
Flood Defences	No known flood defences or assets.

Fluvial flood risk:

The Upper Rissington detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view:

Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year

Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.

Surface Water flood risk:

The Upper Rissington detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas.

F.1.19 Upper Rissington

There is no local evidence of notable surface water flooding problems at Upper Rissington. The RoFSW reflects this, showing only small patches of surface water flooding and a flow path which follows a tributary of the unnamed watercourses.

Groundwater flood risk:

The Upper Rissington detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the settlement is at low risk of groundwater flooding.

Reservoir flood risk:

N/A

Sewer flood risk:

No incidents recorded on the sewer flooding register. No local evidence of foul sewer flooding.

Effects of climate change:

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Upper Rissington - Suitability of SuDS

Bedrock geology		Chipping Norton Limestone Formation and Salperton Limestone Formation
Superficial deposits		None
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control
Infiltration		Mapping suggests permeability at this site, a site investigation should be carried out to assess potential for drainage by infiltration
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature may be suitable, provided the slopes in the site are <0.4.

Upper Rissington - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable'

F.1.19 Upper Rissington
development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy. A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques. The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites. Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site. For major developments, and upstream of areas identified as experiencing sewer flooding problems, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary. Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.
Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required) All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses. One site is at high or medium risk of surface water flooding, therefore should be subject to a Level 2 SFRA. Three sites are 100% within Flood Zone 1, however >1ha in area, therefore should progress to the FRA stage.

F.1.20 Weston-sub-Edge

Potential Development in Weston-sub-Edge		
Total number of potential development sites within Weston-sub-Edge: 5	**Proposed use:** Residential	**Flood risk vulnerability** Housing – More Vulnerable
Potential development sites in Weston-sub-Edge	There are five potential development sites identified in the SHELAA	

Summary of flood risk to Weston-sub-Edge	
Main River	There are no designated Main Rivers identified within the settlement.
Ordinary Watercourse	Coombe Brook
Historic Flooding	June 1952, June 1968, July 1982, June 1986, Jan 1993, April 1998, April 2001, September 2001, April 2005 and July 2007 - Flooded 10 times in the 60 years. July 2007 - Estimated 15 to 20 properties flooded. Flooding was as a result of a combination of the River Coombe and rapid surface water runoff

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 0	**FZ3:** 0
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial Surface Water	Channel exceedance and floodplain flows from the ordinary watercourses. Exceedance of culvert capacity Roads and paths	Domestic houses and commercial properties Manor Farm Cidermill Orchard Roads such as: - Parson's Lane - Church Street - Friday Street

Flood Warning	Weston-sub-Edge is within an Environment Agency flood alert area.
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling. A 1D HEC-RAS model was completed as part of the Weston Subedge Stage 2 Flood Study (Hyder, January 2012), commissioned by CDC after the 2007 floods to examine possible flood alleviation options.
Flood Defences	No known flood defences. Various culverts through the village may affect flood risk.

F.1.20 Weston-sub-Edge		
		(e.g. Friday Street, Manor Farm and Parson Street culverts)
Fluvial flood risk: The Weston-sub-Edge detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view: Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.		
Surface Water flood risk: The Weston-sub-Edge detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas. The Weston-sub-Edge Flood Study suggests that surface water and exceedance of urban drainage has contributed to previous flooding problems in the village. The RoFSW indicate flow routes from south to north with flow converging on the village along the B4632 and the parallel road to the east, eventually joining Coombe Brook.		
Groundwater flood risk: The Weston-sub-Edge detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the settlement is at low risk of groundwater flooding.		
Reservoir flood risk: N/A		
Sewer flood risk: No incidents on the sewer flooding register. No local evidence of foul sewer flooding.		
Effects of climate change: Climate change is likely to increase the frequency and severity of flooding from the Coombe Brook and tributaries, although the flood extent is not likely to increase significantly. Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.		
Weston-sub-Edge - Suitability of SuDS		
Bedrock geology		Blue Lias Formation and Charmouth Mudstone
Superficial deposits		None
SuDS Type	**Potential Suitability**	Comments
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site

F.1.20 Weston-sub-Edge		
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Weston-sub-Edge - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Two sites are within Flood Zone 3b therefore should be considered for withdrawal unless functional floodplain can be included in site design, or the site boundary can be redrawn to remove the functional floodplain from the boundary.

One site is at high or medium risk of surface water flooding, therefore should be subject to a Level 2 SFRA.

Two sites are at low risk of surface water flooding, therefore should progress to the FRA stage.

F.1.21 Willersey

Potential Development in Willersey		
Total number of potential development sites within Willersey: 18	**Proposed use:** Residential	**Flood risk vulnerability** Housing - More Vulnerable
Potential development sites in Willersey	To view potential development sites, refer to the Index Map, and select Willersey There are 18 potential development sites identified in the SHELAA	

Summary of flood risk to Willersey	
Main River	There are no designated Main Rivers identified within the settlement.
Ordinary Watercourse	Badsey Brook, East Stream and unnamed watercourses
Historic Flooding	January 1992 - One property and a number of roads were inundated Summer 2000 - Blockages at a number of culverts were reported to exacerbate flooding problems during the flood, particularly at Timms Green July 2007 - Estimated 45 to 50 properties were flooded. Flooding was as a result of local watercourses and surface water runoff November 2012, flooding under the railway bridge Badsey Lane was reported There have been reports of regular flooding in the Frampton Drive/Collin Lane area of Willersey. In 2010 an obstruction was removed from a culvert, which seems to have alleviated this issue

No of sites in the Flood Map for Planning (Rivers and Sea)	**FZ2:** 0	**FZ3:** 0
Source	**Pathway**	**Receptor**
Heavy rainfall Fluvial (ordinary watercourses) Blockage of culverts or trash screens on watercourses Surface Water	Channel exceedance and floodplain flows of the ordinary watercourses Roads and paths	Domestic houses and commercial properties Roads such as: - Frampton Drive/Collin Lane - Fields Lane - Broadway Road - Collin Close/ Lane - Recreation Ground - Railway

F.1.21 Willersey		
		- Badsey Lane - Willow Road - Timms Green
Flood Warning	No Environment Agency flood warning or alerts in this area.	
Available survey/detailed modelling	Flood Zones are based on broad-scale JFLOW modelling.	
Flood Defences	No known flood defences. Several culverts have the potential to block (e.g. Timms Green), increasing water levels. In 2009, residents cleared 500 metres of ditch running from the village's recreation ground to a culvert under the disused Cheltenham-to-Stratford railway line. (REF Willersey Stream Team works to prevent flooding) A new drainage culvert was installed in 2010.	
Fluvial flood risk: The Willersey detailed SFRA map shows the fluvial flood risk in the settlement. Turn the flood zone layer on to view: Flood Zone 3b - land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%) in any given year Flood Zone 3a - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any given year Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year.		
Surface Water flood risk: The Willersey detailed SFRA map shows the surface water flood risk in the settlement. Turn the Risk of Flooding from Surface Water (RoFSW) layer on to view the 1 in 30 (high), 1 in 100 (medium) and 1 in 1000 (low) year risk areas. The area under the railway bridge is reported to flood from surface water regularly to depths of approximately 1m. It is also reported that since the railway was abandoned the drains under the road have not been maintained. The RoFSW highlights the channels and floodplains of existing ordinary watercourses. Flow paths along Main Street, Badsey Lane and Campden Lane are also evident.		
Groundwater flood risk: The Willersey detailed SFRA map shows the groundwater flood risk in the settlement. The JBA Groundwater dataset suggests that the settlement is at low risk of groundwater flooding.		
Reservoir flood risk: N/A		
Sewer flood risk: No incidents on the sewer flooding register. No local evidence of foul sewer flooding.		

F.1.21 Willersey

Effects of climate change:

Climate change is likely to increase the frequency and severity of flooding from the Badsey Brook and its tributaries, although the flood extent is not likely to increase significantly.

Climate change is predicted to result in more frequent occurrences of extreme/ heavy rainfall events, increasing the likelihood of incidents of surface water flooding.

Willersey - Suitability of SuDS

Bedrock geology		Blue Lias Formation and Charmouth Mudstone
Superficial deposits		None
SuDS Type	**Potential Suitability**	**Comments**
Source Control		All forms of source control excluding pervious pavements would be suitable
Infiltration		Mapping suggests low permeability at this site
Detention		This option may be feasible provided site slopes are < 5%. Liner is required for permanent wet features in pervious soils.
Filtration		This feature is probably feasible. If the site has contaminated land issues; a line will be required.
Conveyance		Mapping indicates that this feature is probably not suitable, due to the slopes in the settlement (Slope <0.4)

Willersey - Implications for development

Sites greater than 1ha in Flood Zone 1 require a full FRA.

No development within 8m of a designated Main River/Flood Defence.

CDC should consider requesting an FRA where a site is close to an ordinary watercourse that is not included in the Flood Zones.

The effect of blockage of culverts should be considered as part of an FRA where appropriate.

Any site affected by the RoFSW, or with a history of surface water flooding, should undertake an FRA including a comprehensive investigation into surface water flood risk. 'More vulnerable' development should be located in the areas of least flood risk through sequential design of the site. Mitigation of any surface water risk should be detailed in a drainage strategy.

A drainage strategy should be submitted at an early stage to show how the impact of the development will be reduced through site design and SUDS techniques.

The strategy should demonstrate that surface water run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.

Developers should consider the surface water catchment when looking at solutions for mitigation measures for surface water runoff from potential development. This may require developers to consider solutions outside of their site.

For major developments, the relevant water company should be consulted at an early stage to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

F.1.21 Willersey

Development should account for cumulative impacts to neighbouring authorities. Consult the Cumulative Impact Assessment in Section 6.5.3 of the Level 1 SFRA report.

Comments on constraints to proposed sites (e.g. development not permitted/Exception Test required)

All sites have been assessed with regard to key flood indicators, such as the Environment Agency Flood Zones, RoFSW, local evidence and proximity to watercourses.

Ten sites are at high or medium surface water flood risk, therefore should be subject to a Level 2 SFRA.

Five sites are at low surface water flood risk, therefore should progress to the FRA stage.

One site is 100% within Flood Zone 1, however >1ha in area, therefore should progress to the FRA stage.