



	Site Code		Site SA18 – Land off Eastgate Street					
Area			0.12 hectares					
Site details	Current	land use	Brownfield					
Proposed lar		ed land	Residential					
Existi featur		drainage		The site is located approximately 230m south of the culverted part of th River Twyver and 620m north of the Sud Brook.				verted part of the
				P	roportion of	site at ris	k	
			FZ3b		FZ3a	FZ2		FZ1
			0%		<1%	17%		83%
Sources of	Fluvial		Flood risk to the site originates from the River Twyver and the Sud Brook. The flood extents spread through the city in the area between the two watercourses, caused by overland flow paths from culverted reaches of watercourse. Flood Zone 3a encroaches slightly into the site at the north-western and southern edges of the site with Flood Zone 2 further extending into the site. Flood Zone 2 fully surrounds the site in the immediate vicinity.					
flood risk		Proportion of site at risk (RoFfSW)						
tiood risk			30-year		100-у	ear		1,000-year
								•
			0%		0%			2%
	Surface	Water	0% The site is not at events; however, the Eastgate Street. Slightly into the site northern edge of the site.	the ext The 1, e boun	f surface wate ents come clo 000-year surf dary from a flo	er flooding ise to the boace water flow path alon	undar lood ex lg East	30 and 100-year y of the site along xtent encroaches tgate Street at the
	Surface		The site is not at events; however, the Eastgate Street. Slightly into the site northern edge of the site of the s	the ext The 1, e boun he site	f surface water tents come clo 000-year surfa dary from a flo and a small a	er flooding i se to the bo ace water fl bw path alon rea of pondi	oundar lood ex lig East ng at t	30 and 100-year y of the site along xtent encroaches tgate Street at the
		oir	The site is not at events; however, the Eastgate Street. Slightly into the site northern edge of the site.	the ext The 1, e boun he site own to vered bords of	of surface water surface water some clood on the surface water surface and a small a surface water s	er flooding is se to the boace water flow path alon rea of ponding eservoir flooment Agencing at the si	oundary lood ex lig East ng at the ding.	30 and 100-year y of the site along xtent encroaches tgate Street at the he southern edge
	Reservo	oir	The site is not at events; however, the Eastgate Street. It is slightly into the site northern edge of the site. The site is not should be site in the site is not could be site. The site is not could be site in the site	the exite the site own to vered by Sever	f surface water standary from a floa and a small a be at risk of recoy the Environ historic floodin Trent Water Standa	er flooding is se to the boace water flow path alon rea of ponding eservoir flooment Agencing at the since rd of	oundary ood ex og East ng at the ding. cy's his	30 and 100-year y of the site along xtent encroaches tgate Street at the he southern edge
	Reservo	oir istory	The site is not at events; however, the satgate Street. Slightly into the site northern edge of the site. The site is not should be site in the site is not county. The site is not county Council or site.	the exite the site own to vered by Sever	f surface water tents come close to come clo	er flooding is se to the boace water flow path alon rea of ponding eservoir flooment Agencing at the since rd of	oundary ood ex og East ng at the ding. cy's his	30 and 100-year y of the site along xtent encroaches tgate Street at the he southern edge
Flood risk	Reservo	oir istory	The site is not at events; however, teastgate Street. Slightly into the site northern edge of the site. The site is not shour the site is not county. The site is not county Council or the site. Defence Typ	the ext The 1, e boun he site own to vered bords of Seven	of surface water tents come close to 2000-year surfactory from a float and a small at the beat risk of respectively the Environ historic flooding Trent Water Standa Protect	er flooding is set to the boace water flow path alon rea of ponding eservoir flooment Agencing at the significant control of tion	oundary lood exige East ing at the ding. ey's his te from	30 and 100-year y of the site along xtent encroaches tgate Street at the he southern edge
Flood risk management infrastructure	Reservo	oir istory es	The site is not at events; however, the satgate Street. Slightly into the site northern edge of the site. The site is not should be site in the site is not county. The site is not county Council or site.	the ext The 1, e boun he site own to vered bords of c Severe tected eing an ing on impact	f surface water tents come closed on the closed on	er flooding is se to the boace water flow path along rea of pondices ervoir flooment Agencing at the significant of the coverland flower, if these are sult. This	ding. cy's histe from	30 and 100-year y of the site along xtent encroaches tgate Street at the he southern edge storic flood map. In Gloucestershire Condition





	Site Code		Site SA18 – Land off Eastgate Street				
	Area		0.12 hectares				
Site details Current land use Proposed land use		and use	Brownfield				
		d land	Residential				
Emergency planning	Access a egress	ind	Access and egress to the site is only stretch of Eastgate Street. Part of thi and egress in the 30 and 100-year suyear fluvial event; however, it is not water and fluvial events. Depths and h specific assessment to confirm whet access where the site is completely enflood events.	is boundary urface water possible in azard should her emergei	is available events and i the 1,000-yed be confirmency vehicles	for access n the 100- ar surface ed in a site- could still	
	Climate c	_	River Basin District	Central	Higher Central	Upper End	
	'2080s'	Severn	25%	35%	70%		
Climate Change	Climate		Climate change information was unay Flood Zone 2 extents (1,000-year fluvi change impacts until latest modelling of this study are available. Fluvial, tid with depth, hazard and the frequency of climate change in the future.	al event) for results being al and surfac	an indication undertaken ee water exte	of climate at the time ents, along	





	Site Code	Site SA18 – Land off Eastgate Street		
	Area	0.12 hectares		
Site details Current land use		Brownfield		
	Proposed land use	Residential		
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	 Geology at the site consists of: Bedrock – Mudstone, siltstone, limestone and sandstone Superficial – Clay, silt and sand The site is not located within a Groundwater Source Protection Zone. Most source control techniques are likely to be suitable. Mapping suggests that permeable paving may have to use non-infiltrating systems given the possible risk from groundwater. Infiltration may be suitable. Mapping suggests a medium risk of groundwater flooding and underlying soils may be permeable. Further site investigation should be carried out to assess potential for drainage by infiltration. If infiltration is suitable it should be avoided in areas where the depth to the water table is <1m. Mapping suggests that the site slopes are suitable for all forms of detention. A liner maybe required due to the site potential groundwater flooding. All filtration techniques are likely to be suitable. A liner maybe required to prevent the egress of groundwater. All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater. The site is not designated by the Environment Agency as previously being a landfill site. 		
NPPF and planning implications	Exception Test requirements	 The Sequential Test will need to be passed before the Exception Test is applied. The Exception Test will need to be applied if: More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. Essential Infrastructure in Flood Zone 3b will require the Exception Test. Residential development is classified as 'More Vulnerable'. 		





	Site Code	Site SA18 – Land off Eastgate Street		
	Area	0.12 hectares		
Site details	Current land use	Brownfield		
	Proposed land use	Residential		
	Requirements and guidance for site-specific Flood Risk Assessment	 At the planning application stage, a site-specific Flood Risk Assessment will be required if any development is located within Flood Zones 2 or 3 or is greater than one hectare. Other sources of flooding should also be considered. Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. Resilience measures will be required if buildings are situated in the flood risk area through the centre of the site's boundary. Raising Finished Floor Levels above the design event may remove the need for resilience measures. New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects. Safe access and egress will need to be demonstrated. New development must seek opportunities to reduce overall level of flood risk at the site, for example by: Reducing volume and rate of runoff Relocating development to zones with lower flood risk Creating space for flooding. 		
		Mapping Information		
Flood Zones		Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning Flood Zones (which match the modelled 100-year and 1,000-year flood extents) and Flood Zone 3b has been derived from the 2006 River Twyver 2D TUFLOW hydraulic model.		
Climate change	•	Climate change modelling was unavailable for this site. Flood Zone 2 can be used as an indication of the flood risk due to climate change.		
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.		
Fluvial depth, v	velocity and hazard	Depth mapping for the 1 in 100-year event (Flood Zone 3a) has been taken from the 2006 River Twyver 2D TUFLOW hydraulic model. Hazard and velocity mapping outputs were unavailable.		
Surface water of hazard mappin	depth, velocity and g	The surface water depth, velocity and hazard mapping for the 1 in 100-year event (considered to be medium risk) is taken Environment Agency's Risk of Flooding from Surface Water.		





	Site Code	Site SA24 – Part	of West Quay, the D	ocks			
	Area	0.84 hectares					
Site details	Current land use	Brownfield					
Proposed land use		Parking					
	Existing drainage features		s canal to the east vern, separated by				
			Proportion of	site at risk			
		FZ3b	FZ3a	FZ2	FZ1		
		_*	1%	100%	0%		
Sources of	Fluvial	the River Severn is located within Severn. *Detailed modellir number of tidal-flu unavailable for th	The site is located very marginally in Flood Zone 3a via a flow path from the River Severn to the Gloucester and Sharpness Canal. The entire site is located within Flood Zone 2, with the risk originating from the River				
		Proportion of site at risk (RoFfSW)					
			roportion of site	at risk (Itol 151	**)		
flood risk		30-year	100-y	•	1,000-year		
		30-year 0%	100-y	ear	1,000-year		
	Surface Water	30-year 0% The site is not at events. The north the 1,000-year su and Sharpness Ca	100-y	ear er flooding in the edges of the site via flows paths from ponding encroact	1,000-year 10% e 30 and 100-year e are located within om the Gloucester h the site boundary		
	Surface Water Reservoir	30-year 0% The site is not at events. The north the 1,000-year su and Sharpness Ca along Llanthony Fevent.	100-y 0% risk of surface wate-eastern and eastern urface water extent, vanal. Small areas of Road and Severn Road e of the site is pa	ear er flooding in the nedges of the site via flows paths from ponding encroacle and in the 1,000-	1,000-year 10% e 30 and 100-year e are located within rom the Gloucester h the site boundary year surface water		
		30-year 0% The site is not at events. The north the 1,000-year su and Sharpness Ca along Llanthony Fevent. The eastern edg Saintbridge Balan 99% of the site is a There is an incid Canal approximat There are no reco	100-y 0% risk of surface wate-eastern and eastern urface water extent, vanal. Small areas of Road and Severn Road e of the site is pa	ear or flooding in the edges of the site via flows paths from July 20 ing at the site from July 20 ing at the site from the site from July 20 ing at the site from	1,000-year 10% e 30 and 100-year e are located within om the Gloucester h the site boundary year surface water flooding from the s historic flood map. ter and Sharpness 007.		
	Reservoir	30-year 0% The site is not at events. The north the 1,000-year su and Sharpness Ca along Llanthony Fevent. The eastern edg Saintbridge Balan 99% of the site is a There is an incid Canal approximat There are no reco	a risk of surface wate-eastern and eastern and eastern and surface water extent, wanal. Small areas of Road and Severn Road and Severn Road e of the site is particing Pond 1. Covered by the Envirolent of overtopping sely 80m north of the ords of historic flood or Severn Trent Water	ear er flooding in the edges of the site via flows paths from ponding encroach oad in the 1,000-rtially at risk of conment Agency's on the Gloucest site, from July 20 ing at the site from r.	1,000-year 10% e 30 and 100-year e are located within om the Gloucester h the site boundary year surface water flooding from the s historic flood map. ter and Sharpness 007.		
	Reservoir	30-year 0% The site is not at events. The north the 1,000-year su and Sharpness Ca along Llanthony Fevent. The eastern edg Saintbridge Balan 99% of the site is a There is an incid Canal approximat There are no reconstructed to the county Council or County Council or Canal State of County Council or Canal State of County Council or Canal State of	a risk of surface wate-eastern and eastern and eastern and surface water extent, wanal. Small areas of Road and Severn Road and Severn Road e of the site is particing Pond 1. Covered by the Envirolent of overtopping sely 80m north of the ords of historic flood or Severn Trent Wate	ear er flooding in the edges of the site via flows paths from ponding encroach oad in the 1,000-rtially at risk of conment Agency's on the Gloucest site, from July 20 ing at the site from r.	1,000-year 10% e 30 and 100-year e are located within om the Gloucester h the site boundary year surface water flooding from the shistoric flood map. ter and Sharpness 007. om Gloucestershire		
Flood risk management	Reservoir Flood history	30-year 0% The site is not at events. The north the 1,000-year su and Sharpness Ca along Llanthony Fevent. The eastern edg Saintbridge Balan 99% of the site is a There is an incid Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximation of	a risk of surface wate-eastern and eastern and eastern and surface water extent, vanal. Small areas of Road and Severn Trent Water Severn Trent Water Standar Protect	ear or flooding in the edges of the site via flows paths from ponding encroach oad in the 1,000-rtially at risk of conment Agency's on the Gloucest site, from July 20 ing at the site from the control of the control	1,000-year 10% e 30 and 100-year e are located within om the Gloucester h the site boundary year surface water flooding from the s historic flood map. ter and Sharpness 007. om Gloucestershire Condition		
flood risk	Reservoir Flood history Defences	30-year 0% The site is not at events. The north the 1,000-year su and Sharpness Ca along Llanthony Fevent. The eastern edg Saintbridge Balan 99% of the site is a There is an incid Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximation of	a risk of surface wate-eastern and eastern and eastern and surface water extent, wanal. Small areas of Road and Severn Road and Severn Road e of the site is particing Pond 1. Covered by the Envirolent of overtopping sely 80m north of the ords of historic flood or Severn Trent Water	ear or flooding in the edges of the site via flows paths from ponding encroach oad in the 1,000-rtially at risk of conment Agency's on the Gloucest site, from July 20 ing at the site from the control of the control	1,000-year 10% e 30 and 100-year e are located within om the Gloucester h the site boundary year surface water flooding from the s historic flood map. ter and Sharpness 007. om Gloucestershire Condition		
Flood risk management	Reservoir Flood history	30-year 0% The site is not at events. The north the 1,000-year su and Sharpness Ca along Llanthony Fevent. The eastern edg Saintbridge Balan 99% of the site is a There is an incid Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximat There are no reconstructed to the county Council of Canal approximation of	a risk of surface wate-eastern and eastern and eastern and surface water extent, vanal. Small areas of Road and Severn Trent Water Severn Trent Water Standar Protect	ear or flooding in the edges of the site via flows paths from ponding encroach oad in the 1,000-rially at risk of conment Agency's on the Gloucest site, from July 20 ing at the site from r. ord of control of control of the control of contro	1,000-year 10% e 30 and 100-year e are located within om the Gloucester h the site boundary year surface water flooding from the s historic flood map. ter and Sharpness 007. om Gloucestershire Condition		





	Site Code	Site SA24 – Part of West Quay, the Docks				
Site details	Area	0.84 hectares				
	Current land use	Brownfield				
	Proposed land use	Parking	Parking			
	Access and egress	Dry access and egress to the site is a Llanthony Road in all surface water et (FZ3). As the entire site is located in F and egress available in the 1,000-ye along Llanthony Road to the east.	vents and the Flood Zone 2	e 100-year flo there is no o	uvial event dry access	
	Climate change allowances for	River Basin District	Central	Higher Central	Upper End	
	'2080s'	Severn	25%	35%	70%	
Climate Change	Implications for the site	The 25% and 35% climate change extents do not increase significantly when compared with Flood Zone 3a, but there is a significant increase with the 70% climate change event, which extends to cover >50% of the site. As the site is affected by surface water flooding from the 1,000-year event, climate change may also increase the extent, depth and frequency of surface water flooding.				





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	Site Code	Site SA24 – Part of West Quay, the Docks				
	Area	0.84 hectares				
Site details	Current land use	Brownfield				
	Proposed land use	Parking				
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	 Geology at the site consists of: Bedrock – Mudstone, siltstone, limestone and sandstone Superficial – Clay, silt and sand The site is not located within a Groundwater Source Protection Zone. All forms of source control are likely to be suitable. Infiltration likely to be suitable. Mapping suggests a low risk of ground water flooding however, site investigations should be carried out to assess potential for drainage by infiltration. Mapping suggests that the site slopes are suitable for all forms of detention. All filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required. All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. If the site has contamination issues; a liner will be required. The site is not designated by the Environment Agency as previously being a landfill site. 				
NPPF and planning implications	Exception Test requirements	 The Sequential Test will need to be passed before the Exception Test is applied. The Exception Test will need to be applied if: More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. Essential Infrastructure in Flood Zone 3b will require the Exception Test. Parking is classified as 'Less Vulnerable'. 				





	Site Code	Site SA24 – Part of West Quay, the Docks		
	Area	0.84 hectares		
Site details	Current land use	Brownfield		
	Proposed land use	Parking		
	Requirements and guidance for site-specific Flood Risk Assessment	 At the planning application stage, a site-specific Flood Risk Assessment will be required if any development is located within Flood Zones 2 or 3 or is greater than one hectare. Other sources of flooding should also be considered. Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. Resilience measures will be required if buildings are situated in the flood risk area through the centre of the site's boundary. Raising Finished Floor Levels above the design event may remove the need for resilience measures. New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects. Safe access and egress will need to be demonstrated. New development must seek opportunities to reduce overall level of flood risk at the site, for example by: Reducing volume and rate of runoff Relocating development to zones with lower flood risk Creating space for flooding. 		
		Mapping Information		
Flood Zones		Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning Flood Zones. Detailed modelling to produce Flood Zone 3b was not available for this site due to the combined tidal-fluvial scenarios modelled. Flood Zone 3a can be used as an indication of Flood Zone 3b in the absence of modelled data.		
Climate change)	The climate change allowances for the '2080s' epoch were modelling using the 2007 River Severn Tidal 1D hydraulic model.		
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.		
Fluvial depth, v	velocity and hazard	Fluvial depth, velocity and hazard mapping for the 1 in 100-year event (Flood Zone 3a) was unavailable for this site.		
Surface water of hazard mappin	depth, velocity and g	The surface water depth, velocity and hazard mapping for the 1 in 100-year event (considered to be medium risk) is taken Environment Agency's Risk of Flooding from Surface Water.		





	Site Code		Site SA02 – Barnwood Manor					
	Area		1.95 hectares					
Site details	Current	land use	Brownfield					
	Propose use	ed land	Residential					
Existing drainag features		_	The Wotton Brook	flows	from east to v	vest through	n the c	centre of site.
				Pı	roportion of	site at ris	k	
			FZ3b		FZ3a	FZ2		FZ1
			0%*		9%	14%		86%
Sources of flood risk	Fluvial		Flood risk to the site is associated with the Wotton Brook that flows through the centre of the site. Flood Zone 3a is largely confined to the channel through the site, with Flood Zone 2 extending slightly further into the floodplain from the left bank (southern area of the site). *0% of the site is seen to be located within Flood Zone 3b as the modelled outline of the Wotton Brook does not include the channel. As the Wotton Brook flows through the centre of the site, this part of the site is located within Flood Zone 3b; however, the water remains in bank.					
			Proportion of site at risk (RoFfSW)					
inoca non			30-year		100-y			1,000-year
	Surface	Water	4% The surface wate the Wotton Brook the site in the 30-are a few isolated	chann year a areas flow p	risk affecting el and floodpland 100-year e of surface wa bath along Ba	the site ma ain with surf vent along t ter ponding rnwood Roa	ainly co	16% onverges towards ater only affecting atercourse. There
	Surface		4% The surface wate the Wotton Brook the site in the 30-are a few isolated year event, and a	chann year and areas flow pring the	risk affecting el and floodpland 100-year e of surface wa bath along Ba 1,000-year ev	the site ma ain with surf vent along t ter ponding rnwood Roa ent.	ainly co face wa the wa at the ad just	16% onverges towards ater only affecting atercourse. There is site in the 1,000-
		oir	4% The surface wate the Wotton Brook the site in the 30-are a few isolated year event, and a the site boundary The site is not show the	chann year ar areas flow p in the own to % of th , along ords of	risk affecting el and floodpland 100-year e of surface wa path along Ba 1,000-year ev be at risk of rehe site is cover the Wotton Ba historic floodi	the site magin with surfivent along ter ponding rowood Roaent. eservoir floodered by the rook. ng at the si	ainly co face wathe wathe wathe at the ad just oding.	16% onverges towards atter only affecting attercourse. There is site in the 1,000-trencroaching into
	Reservo	oir istory	4% The surface wate the Wotton Brook the site in the 30-are a few isolated year event, and a the site boundary The site is not show the	chann year ar areas flow p in the own to % of th , along ords of Sever	risk affecting el and floodpland 100-year e of surface wa path along Ba 1,000-year ev be at risk of rehe site is cover the Wotton Ba historic floodi	the site making with surfivent along to ter ponding modern. eservoir floodered by the rook. In gat the sice of the control o	ainly co face wathe wathe wathe at the ad just oding.	16% converges towards rater only affecting attercourse. There is site in the 1,000-trencroaching into
	Reservo	oir istory	The surface wate the Wotton Brook the site in the 30-are a few isolated year event, and a the site boundary The site is not should be a site in the site boundary. The site is not should be a site in the site i	chann year ar areas flow p in the own to % of th , along ords of Sever	risk affecting el and floodpland 100-year e of surface was bath along Ba 1,000-year ev be at risk of rethe site is covered the Wotton Bathistoric flooding Trent Water	the site making with surfivent along to ter ponding modern. eservoir floodered by the rook. In gat the sice of the control o	ainly co face wathe wathe wathe at the ad just oding.	16% onverges towards ater only affecting atercourse. There e site in the 1,000- t encroaching into comment Agency's m Gloucestershire
Flood risk	Reservo	oir istory	The surface wate the Wotton Brook the site in the 30-are a few isolated year event, and a the site boundary The site is not should be a site in the site boundary. The site is not should be a site in the site i	chann year ar areas flow p in the own to % of th , along ords of Sever	risk affecting el and floodpla nd 100-year e of surface wa bath along Ba 1,000-year ev be at risk of re he site is cove the Wotton B historic floodi rn Trent Water Standa Protect	the site marking went along the reponding rowood Roaent. eservoir floodered by the rook. Ing at the sign of tion	ainly co face withe war at the ad just oding.	16% onverges towards ater only affecting atercourse. There e site in the 1,000- t encroaching into comment Agency's m Gloucestershire
	Reservo	sistory	4% The surface wate the Wotton Brook the site in the 30-are a few isolated year event, and a the site boundary The site is not shown and the site is	chann year ar areas flow p in the own to % of th , along ords of Sever e North the site there is e water	risk affecting el and floodpland 100-year e of surface was path along Ba 1,000-year events be at risk of results in the site is covered to the site is covered by the Wotton Be historic flooding Trent Water Standa Protect I by any format Upton Lane we so on the easte is already an mapping externil	the site making with surfivent along to ter ponding mood Roalent. Deservoir floodered by the rook. The agent of the simple of	ainly coface withe war at the ad just oding. Environments from the from th	16% onverges towards ater only affecting atercourse. There e site in the 1,000- t encroaching into comment Agency's m Gloucestershire Condition - could increase the ect access on this here in the Flood



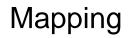


	Site Code	Site SA02 – Barnwood Manor				
	Area	1.95 hectares				
Site details	Current land use	Brownfield				
	Proposed land use	Residential				
Emergency planning	Access and egress	Dry access and egress is available surface water event and all fluvial exwould be cut off in the 100-year and much of the length of Barnwood Road and hazard of the surface water alon Road is however very low for the 100-Dry access and egress via Newstead surface water events. Dry access and egress is available all fluvial and surface water flood events passes under the road, dry access an and surface water flood events due to The depths of surface water flooding be investigated in a site-specific asset for emergency vehicles could still be of	rents; however, 1,000-year set is at surface gethe site bodyear event. If Road is averaged most of least the surface on general most of least the surface of general most of g	rer, access a urface water e water risk. bundary with ailable in all North Upton where the Wo not possible in bonding. s/ egress rou	and egress events as The depth Barnwood fluvial and Lane in all tton Brook n all fluvial tes should	
	Climate change allowances for	River Basin District	Central	Higher Central	Upper End	
	'2080s'	Severn	25%	35%	70%	
Climate Change	Implications for the site	Fluvial extents from climate change compared with FZ3a. Minor increase site where the Wotton Brook passes affected by surface water flooding f change may also increase the exterwater flooding.	es can be se the site bor rom the 1,0	en at the ed undary. As 00-year evel	ges of the the site is nt, climate	





	Site Code	Site SA02 – Barnwood Manor
	Area	1.95 hectares
Site details	Current land use	Brownfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	 Geology at the site consists of: Bedrock — Mudstone, siltstone, limestone and sandstone Superficial — Clay, silt and sand The site is not located within a Groundwater Source Protection Zone. Most source control techniques are likely to be suitable. Mapping suggests that permeable paving may have to use non-infiltrating systems given the possible risk from groundwater. Mapping also suggests that slopes may be unsuitable for selective source control techniques. Mapping suggests that there is a medium risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration. Detention is unlikely to be feasible as mapping suggests mean site slopes are > 5%. Feasibility of such options should be assessed as part of a site-specific assessment. If this feature is feasible, a liner may be required to prevent the egress of groundwater. Filtration is unlikely to be feasible as mapping suggests mean site slopes are > 5%. Feasibility of such options should be assessed as part of a site-specific assessment. If this feature is feasible, it should be located where the depth to the water table is >1m; additionally, a liner maybe required to prevent the egress of groundwater. All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater. The site is not designated by the Environment Agency as previously being a landfill site.
NPPF and planning implications	Exception Test requirements	 The Sequential Test will need to be passed before the Exception Test is applied. The Exception Test will need to be applied if: More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. Essential Infrastructure in Flood Zone 3b will require the Exception Test. Residential development is classified as 'More Vulnerable'.





	Site Code	Site SA02 – Barnwood Manor		
	Area	1.95 hectares		
Site details	Current land use	Brownfield		
	Proposed land use	Residential At the planning application stage, a site-specific Flood R		
	Requirements and guidance for site-specific Flood Risk Assessment	 At the planning application stage, a site-specific Flood Risk Assessment will be required if any development is located within Flood Zones 2 or 3 or is greater than one hectare. Other sources of flooding should also be considered. Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. Resilience measures will be required if buildings are situated in the flood risk area through the centre of the site's boundary. Raising Finished Floor Levels above the design event may remove the need for resilience measures. Onsite attenuation schemes would need to be tested against the Wotton Brook through the centre of the site to ensure flows are not exacerbated downstream within the catchment. New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects. Safe access and egress will need to be demonstrated. New development must seek opportunities to reduce overall level of flood risk at the site, for example by: Reducing volume and rate of runoff Relocating development to zones with lower flood risk Creating space for flooding. 		
		Mapping Information		
Flood Zones		Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning Flood Zones and Flood Zone 3b has been derived from the 2007 Wotton Brook 1D-2D ISIS-TUFLOW hydraulic model.		
Climate change)	The climate change allowances for the '2080s' epoch were modelled using the 2007 Wotton Brook 1D-2D ISIS-TUFLOW hydraulic model.		
Surface Water		The Environment Agency's Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.		
Fluvial depth, v mapping	relocity and hazard	Depth, velocity and hazard mapping for the 1 in 100-year event (Flood Zone 3a) have been taken from the 2007 Wotton Brook 1D-2D ISIS-TUFLOW hydraulic model.		
Surface water of hazard mapping	depth, velocity and g	The surface water depth, velocity and hazard mapping for the 1 in 100-year event (considered to be medium risk) is taken Environment Agency's Risk of Flooding from Surface Water.		





	Site Code	е	Site SA07 – Lyntor	n Fields – Land e	ast of Waterw	ells		
	Area		2.23 hectares					
Site details	Current I	and use	Greenfield					
	Proposed	d land	Employment					
	Existing features	drainage	The site is bounded by the Dimore Brook at the southern edge of the site.					
				Proportion	of site at ris	k		
			FZ3b	FZ3a	FZ2		FZ1	
			1%	1%*	1%*		99%*	
Sources of flood risk	Fluvial		*The site is not loo the catchment is < site from the Dir Environment Agen results from the 20 of the site is locate (equivalent to Floo	ated within the E 3km²; however, more Brook wh cy's Flood Map fo 109 1D-2D ESTR and within the 20-y d Zone 3a) and	nvironment Aghere is some ch has not r Planning. Use Y-TUFLOW Dear (Flood Zo,000-year ext	gency's Flood minor fluvial been includ sing the hydra imore Brook ne 3b), 100-y ent (equivale	d Zones as risk to the ed in the aulic model model, 1% year extent nt to Flood	
			Zone 2). The channel is therefore shown to stay in-bank along this reach. Proportion of site at risk (RoFfSW)					
			30-year	· ·		1,000-year		
	0()		<1%	1%		3%		
	Surface Water		The site is at risk of surface water flooding at the southern boundary of the site along the Dimore Brook. There is an isolated area of ponding in the 1,000-year surface water event at the north-western corner of the site.					
	Reservoi	ir	The site is not shown to be at risk of reservoir flooding.					
	Flood his	story	The site is covered by the Environment Agency's historic flood map. There are no records of historic flooding at the site from Gloucestershire County Council or Severn Trent Water.					
	Defenses		Defence Type		dard of ection	Condition		
Flood risk	Defences	5	•		-	-		
management			The site is not protected by any formal flood defences.					
infrastructure	<u> </u>		The Dimore Brook is partially culverted near the site; should blockages occur, this could increase flood risk to the site at the south-eastern boundary. The potential impact of this may need to be considered at a site-specific stage.					
			site-specific stage.	<u> </u>				
Fmergency	Flood wa	arning		<u> </u>		gency's Floo	d Warning	
Emergency planning	Flood wa		site-specific stage. The site is not co	overed by the E	nvironment A			
	Access a	and	site-specific stage. The site is not conservice. Dry access and eg	overed by the E gress to the site is events.	nvironment A			





	Site Code	Site SA07 – Lynton Fields – Land east of Waterwells
	Area	2.23 hectares
Site details	Current land use	Greenfield
	Proposed land use	Employment
	Implications for the site	Climate change was modelled using 2D generalised modelling techniques for the Dimore Brook due to omissions in the model data received, meaning that the detailed hydraulic model could not be rerun for climate change. The 2D generalised modelling shows an increase in flood extents due to climate change; however, 2D generalised modelling tends to be very conservative compared to a detailed model with channel and structure survey. Even with the conservative outputs, the site only has a marginal encroachment of risk from flooding in the climate change scenarios, therefore if sufficient easement was left between the watercourse and the site boundary, the fluvial flood risk could be removed.
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	 Geology at the site consists of: Bedrock – Mudstone, siltstone, limestone and sandstone Superficial – Sand and gravel The site is not located within a Groundwater Source Protection Zone. All forms of source control are likely to be suitable. Infiltration may be suitable. Mapping suggests a medium risk of groundwater flooding and underlying soils may be permeable. Further site investigation should be carried out to assess potential for drainage by infiltration. If infiltration is suitable, it should be avoided in areas where the depth to the water table is <1m. Mapping suggests that the site slopes are suitable for all forms of detention. A liner maybe required due to the site potential groundwater flooding. All filtration techniques are likely to be suitable. A liner maybe required to prevent the egress of groundwater. All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater. The site is not designated by the Environment Agency as previously being a landfill site.
NPPF and planning implications	Exception Test requirements	 The Sequential Test will need to be passed before the Exception Test is applied. The Exception Test will need to be applied if: More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. Essential Infrastructure in Flood Zone 3b will require the Exception Test. Commercial development is classified as 'Less Vulnerable'.





	Site Code	Site SA07 – Lynton Fields – Land east of Waterwells
	Area	2.23 hectares
Site details	Current land use	Greenfield
	Proposed land use	Employment
	Requirements and guidance for site- specific Flood Risk Assessment	
		Mapping Information
Flood Zones		Flood Zones 2, 3a and 3b have been taken from the 2009 Dimore Brook 1D-2D ESTRY-TUFLOW hydraulic model, as this watercourse is not represented in the EA's Flood Map for Planning.
Climate change	9	Climate change outlines were derived from 2D generalised modelling conducted for the purpose of this Level 2 SFRA.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
Fluvial depth, v	velocity and hazard	Depth, velocity and hazard mapping for the 1 in 100-year event (Flood Zone 3a) have been taken from the 2009 Dimore Brook 1D-2D ESTRY-TUFLOW hydraulic model.





	Site Cod	le	Site SA07 – Lynton Fields – Land east of Waterwells			
	Area Current land use		2.23 hectares			
Site details			Greenfield			
	Propose use	ed land	Employment			
Surface water of hazard mappin		ocity and	The surface water depth, velocity and haza (considered to be medium risk) is taken E from Surface Water.			





		1						
	Site Code	Site SA08 – King's	s Quarter					
	Area	4.45 hectares						
Site details	Current land use	Brownfield	Brownfield					
	Proposed land use	Mixed use						
	Existing drainage features	the entrance of th	runs culverted thro e culvert approximately 400m downstr	ately 650m u	ostream of th			
			Proportion o					
		FZ3b	FZ3a	FZ2		FZ1		
	Fluvial	0%	11%	29%		71%		
	Tiuviai	culverted through	site is associated the site. The flood on this culvert upstre	risk is cause	ed by an ove			
Sources of			roportion of site					
flood risk		30-year	100-	/ear	1,000-	year		
		1%	60		179	-		
	Surface Water	The site is affected by isolated areas of ponding in the 30-year and 100-year surface water flood events; however, flow paths are present in the 1,000-year event at the north-eastern and south-eastern areas of the site, predominantly along roads.						
	Reservoir	The site is not shown to be at risk of reservoir flooding.						
	Flood history	There are no records of historic flooding at the site from the Environment Agency's Historic Flood Map, Gloucestershire County Council or Severn Trent Water.						
	Defences	Defence Typ	efence Type Standard of Protection		Cond	ition		
	Defences	-	-		-			
Flood risk		This site is not protected by any formal flood defences.						
management infrastructure	Residual risk	The River Twyver runs culverted through the eastern edge of the site. Whilst the entrance and exit of the culvert are located at least 400m away from the site, the flood risk to the site is from an overland flow path resulting from the upstream culvert inlet, and so if this culvert was to block further, there could be some impact at the site. This should be investigated and confirmed at site-specific stage.						
	Flood warning	The site is not of Service.	overed by the En	rironment Ag	jency's Floo	d Warning		
Emergency planning	Access and egress	in all fluvial and	gress is available vi surface water ever m the site in a sou e.	nts. Access	and egress	look most		
Climate	Climate change	River Bas	sin District	Central	Higher Central	Upper End		
Change	allowances for					Liid		





	Site Code	Site SA08 – King's Quarter				
	Area	4.45 hectares				
Site details	Current land use	Brownfield				
	Proposed land use	Mixed use				
	Implications for the site	Climate change information was unavailable for this site. Please refer to Flood Zone 2 extents (1,000-year fluvial event) for an indication of climate change impacts until new modelling being undertaken at the time of this SFRA is available. Fluvial, tidal and surface water extents, along with depth, hazard and the frequency of flooding are likely to increase from climate change in the future.				
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	 Geology at the site consists of: Bedrock – Mudstone, siltstone, limestone and sandstone Superficial – Clay, silt and sand The site is not located within a Groundwater Source Protection Zone. Most source control techniques are likely to be suitable. Mapping suggests that permeable paving may have to use non-infiltrating systems given the possible risk from groundwater. Infiltration may be suitable. Mapping suggests a medium risk of groundwater flooding and underlying soils may be permeable. Further site investigation should be carried out to assess potential for drainage by infiltration. If infiltration is suitable, it should be avoided in areas where the depth to the water table is <1m. Mapping suggests that the site slopes are suitable for all forms of detention. A liner maybe required due to the site potential groundwater flooding. All filtration techniques are likely to be suitable. A liner maybe required to prevent the egress of groundwater. All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater. The site is not designated by the Environment Agency as previously being a landfill site. 				
NPPF and planning implications	Exception Test requirements	 The Sequential Test will need to be passed before the Exception Test is applied. The Exception Test will need to be applied if: More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. Essential Infrastructure in Flood Zone 3b will require the Exception Test. As the site is Mixed Use, the highest vulnerability classification should be taken, so if residential and commercial, the residential 'More Vulnerable' should be used. 				





	Site Code	Site SA08 – King's Quarter
	Area	4.45 hectares
Site details	Current land use	Brownfield
	Proposed land use	Mixed use
	Requirements ar guidance for site specific Flood Risk Assessmen	remove the need for resilience measures. New or re-development should adopt exemplar source control
		Mapping Information
Flood Zones		Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning Flood Zones (which match the modelled 100-year and 1,000-year extents) and Flood Zone 3b has been derived from the 2006 River Twyver 2D TUFLOW hydraulic model.
Climate change)	Climate change modelling was unavailable for this site. Flood Zone 2 can be used as an indication of the flood risk due to climate change.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
Fluvial depth, v	velocity and hazard	Depth mapping for the 1 in 100-year event (Flood Zone 3a) has been taken from the 2006 River Twyver 2D TUFLOW hydraulic model. Hazard and velocity mapping outputs were unavailable.
Surface water of hazard mappin	depth, velocity and g	The surface water depth, velocity and hazard mapping for the 1 in 100-year event (considered to be medium risk) is taken Environment Agency's Risk of Flooding from Surface Water.





	Site Code	Site SA09 – Form	er Qua	yside House	- Greater Bl	lackfria	ars
	Area	1.59 hectares					
Site details	Current land use	Brownfield					
	Proposed land use	Residential/ stude	ent acco	ommodation			
	Existing drainage features	The western edge A4301.	e of the	site is separ	ated from t	he Riv	er Severn by the
			Pro	oportion of	site at ris	k	
		FZ3b		FZ3a	FZ2		FZ1
		_*		63%	97%		3%
Sources of	Fluvial	the west of the sit most eastern corr *Detailed modellir tidal influence a combining river-d river event. There	Flood risk to the site originates from the River Severn which is located to the west of the site. Only 3% of the site is located in Flood Zone 1, at the most eastern corner of the site. *Detailed modelling is available for the River Severn; however, due to the tidal influence at Gloucester, a number of scenarios are available combining river-dominant with a low tide, and tidal-dominant with a low river event. Therefore, Flood Zone 3b was unavailable for this site. Flood Zone 3a can be used as an indication of Flood Zone 3b in the absence of				
flood risk		Proportion of site at risk (RoFfSW)					
		30-year	•	100-y			1,000-year
		3%		6%			15%
	Surface Water	There are isolated areas of surface water ponding at the site in the 30-year and 100-year events, along the site boundary with Quay Street and Barrack Square. In the 1,000-year event, these areas become flow paths down the roads towards the River Severn.					
		Barrack Square. I	n the 1,	,000-year eve	ent, these ar	reas be	
	Reservoir	Barrack Square. I	n the 1, wards t	,000-year eve the River Sev	ent, these ar ern.		
	Reservoir Flood history	Barrack Square. I down the roads to The site is not sho Approximately 26 historic flood may Severn. There are no reco	n the 1, wards to what to keep the common to keep t	,000-year eventhe River Seventhe River Seventhe at risk of reme site is covered the western historic floodin Trent Water	ent, these arern. eservoir floo ered by the n edge of the	ding. Environte site from	connent Agency's e, from the River
		Barrack Square. I down the roads to The site is not shown the short approximately 26 historic flood may Severn. There are no recommendations.	n the 1, wards to what to keep the common to keep t	,000-year ever the River Seventhe River Seventhe at risk of re- the site is coverage the western historic floodin Trent Water Standa	ent, these aren. eservoir floo ered by the n edge of the ng at the site. rd of	ding. Environte site from	onment Agency's e, from the River
Elead vials	Flood history	Barrack Square. I down the roads to The site is not sho Approximately 26 historic flood may Severn. There are no reco	n the 1, owards to the 1, owards to the 2, along profes of 1 or Severn	,000-year eventhe River Seventhe River Seventhe at risk of reme site is covered the western historic floodin Trent Water	ent, these arern. eservoir floo ered by the n edge of the ng at the site. rd of tion	ding. Environte site from	connent Agency's e, from the River on Gloucestershire
Flood risk management infrastructure		Barrack Square. I down the roads to The site is not shown that is not shown to the site is not shown to show the site is not show the site i	n the 1, owards to own to be % of the control of th	be at risk of respective site is covered to the site is covered to t	ent, these aren. eservoir floodered by the nedge of the n	ding. Environte from the site which from the fro	connent Agency's e, from the River on Gloucestershire Condition Good (2) also incorporate the site's western
management	Flood history	Barrack Square. I down the roads to The site is not sho Approximately 26 historic flood may Severn. There are no reco County Council of Defence Typ Demountable defences down to the flood defences, a	n the 1, owards to own to be % of the control of left	,000-year every the River Seven he site is covery the western historic flooding Trent Water Standa Protec Unknows Severn from the approximatel of flooding the site of the River Severn from the approximatel of flooding the River Severn from the severn frow from the severn from the severn from the severn from the sever	ent, these aren. eservoir floo ered by the n edge of the ng at the site. rd of tion wn the A4301, ately 20m to y 5m in leng o the site s	ding. Environte site from the which from the gth. should	connent Agency's e, from the River of Gloucestershire Condition Good (2) also incorporate the site's western I the defence be





	Site Code	Site SA09 – Former Quayside House – Greater Blackfriars						
	Area	1.59 hectares						
Site details	Current land use	Brownfield						
	Proposed land use	Residential/ student accommodation						
	Access and egress	Dry access and egress will be available from the site via Barrack Square towards the south-eastern corner of the site and the A4031 in all surface water events and via Barrack Square towards the south-eastern corner of the site in the 100-year fluvial event. There would be no access and egress available from the site in the 1,000-year fluvial event.						
	Climate change	River Basin District	Central	Higher Central	Upper End			
	'2080s'	Severn	25%	35%	70%			
Climate Change	Implications for the site	Fluvial extents from climate change compared with FZ3a. However, arous site, the 70% climate change extent with FZ2. As the site is affected by surface water climate change may also increase the surface water flooding.	und the south increases s er flooding fro	h-eastern co lightly when om the 100-y	rner of the compared vear event,			





	Site Code	Site SA09 – Former Quayside House – Greater Blackfriars				
	Area	1.59 hectares				
Site details	Current land use	Brownfield				
	Proposed land use	Residential/ student accommodation				
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	 Geology at the site consists of: Bedrock – Mudstone, siltstone, limestone and sandstone Superficial – Clay, silt and sand The site is not located within a Groundwater Source Protection Zone. All forms of source control are likely to be suitable. Infiltration likely to be suitable. Mapping suggests a low risk of ground water flooding; however, site investigations should be carried out to assess potential for drainage by infiltration. Mapping suggests that the site slopes are suitable for all forms of detention. All filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required. All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. If the site has contamination issues; a liner will be required. The site is not designated by the Environment Agency as previously being a landfill site. 				
NPPF and planning implications	Exception Test requirements	 The Sequential Test will need to be passed before the Exception Test is applied. The Exception Test will need to be applied if: More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. Essential Infrastructure in Flood Zone 3b will require the Exception Test. Residential development is classified as 'More Vulnerable. 				





	Site Code	Site SA09 – Former Quayside House – Greater Blackfriars		
	Area	1.59 hectares		
Site details	Current land use	Brownfield		
	Proposed land use	Residential/ student accommodation		
	Requirements and guidance for site-specific Flood Risk Assessment	 At the planning application stage, a site-specific Flood Risk Assessment will be required if any development is located within Flood Zones 2 or 3 or is greater than one hectare. Other sources of flooding should also be considered. Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. Resilience measures will be required if buildings are situated in the flood risk area through the centre of the site's boundary. Raising Finished Floor Levels above the design event may remove the need for resilience measures. New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects. Safe access and egress will need to be demonstrated. New development must seek opportunities to reduce overall level of flood risk at the site, for example by: Reducing volume and rate of runoff Relocating development to zones with lower flood risk Creating space for flooding. 		
		Mapping Information		
Flood Zones		Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning Flood Zones. Detailed modelling to produce Flood Zone 3b was not available for this site due to the different combinations of fluvial-tidal scenarios. Flood Zone 3a can be used as an indication of Flood Zone 3b in the absence of modelled data.		
Climate change)	The climate change allowances for the '2080s' epoch were modelling using the 2007 River Severn Tidal 1D hydraulic model.		
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.		
Fluvial depth, v	velocity and hazard	Fluvial depth, velocity and hazard mapping for the 1 in 100-year event (Flood Zone 3a) was unavailable for this site.		
Surface water of hazard mappin	depth, velocity and g	The surface water depth, velocity and hazard mapping for the 1 in 100-year event (considered to be medium risk) is taken Environment Agency's Risk of Flooding from Surface Water.		





	Site Code		Site SA13 – Land	at St C	Oswalds			
	Area		6.47 hectares					
Site details	Current land	d use	Mixed					
	Proposed la	ınd	Residential					
	Existing drainage features		The River Twyver western corner of from the site boun	the site	e and the Rive			Om from the north- proximately 160m
				Pr	roportion of	site at ris	k	
			FZ3b		FZ3a	FZ2		FZ1
			-*		5%	100%)	0%
Sources of flood risk	Fluvial		Flood risk to the site originates from the River Severn and the River Twyver. The River Twyver has existing modelling available, but only the mapped output for the more detailed 2D domain was provided, therefore there are no results in the vicinity of the site. However, the site is elevated on higher ground, with the site's western boundary bounding Flood Zone 3, with Flood Zone 2 completely covering the entire site. *Detailed modelling to produce Flood Zone 3b was unavailable for this site. Flood Zone 3a can be used as an indication of Flood Zone 3b in the absence of modelled data.					
nood nok			Proportion of site at risk (RoFfSW)					
			30-year		100-у			1,000-year
			The western edge of the site is bounded by an area of surface water ponding in the 30-year and 100-year events. A large proportion of the southern site edge is bounded by surface water in the 1,000-year event, though this is marginal, with other isolated areas of ponding within the site boundary in the 100 and 1,000-year surface water events.					
	Surface Wa	ter	The western edge ponding in the 30 southern site edge though this is man)-year e is bo ginal, v	and 100-year ounded by sur with other isola	events. A face water in ated areas o	large in the of pond	of surface water proportion of the 1,000-year event, ding within the site
	Surface Wa	ter	The western edge ponding in the 30 southern site edge though this is man)-year e is bo ginal, v 00 and	and 100-year bunded by sur with other isola 1,000-year s	events. A face water in ated areas our urface water	large in the of pond r even	of surface water proportion of the 1,000-year event, ding within the site
			The western edge ponding in the 30 southern site edge though this is many boundary in the 10. The site is not should be site in the site is entirely map. There are no reconstructed to the site in	object. Description: Descrip	and 100-year survith other isola 1,000-year sube at risk of received by the E	events. A face water in the fa	large in the of pond r even oding.	of surface water proportion of the 1,000-year event, ding within the site ts. cy's historic flood m Gloucestershire
	Reservoir		The western edge ponding in the 30 southern site edge though this is man boundary in the 10. The site is not should be site is entirely map. There are no recommendations and the site is entirely map.	object. Description: Descrip	and 100-year bunded by sur with other isola 1,000-year si be at risk of re ered by the E historic floodi rn Trent Water Standa	revents. A face water in ated areas of urface water esservoir floor environment at the sign of the sig	large in the of pond r even oding.	of surface water proportion of the 1,000-year event, ding within the site ts.
Flood risk	Reservoir		The western edge ponding in the 30 southern site edge though this is many boundary in the 10. The site is not should be site in the site is entirely map. There are no reconstructed to the site in	object. Description: Descrip	and 100-year bunded by sur with other isola 1,000-year so be at risk of re ered by the E historic floodi on Trent Water	revents. A face water in ated areas of urface water esservoir floor environment at the sign of the sig	large in the of pond r even oding.	of surface water proportion of the 1,000-year event, ding within the site ts. cy's historic flood m Gloucestershire
management	Reservoir Flood histor		The western edge ponding in the 30 southern site edge though this is man boundary in the 10. The site is not shown that the site is entirely map. There are no reconstructed to the site is entirely map. There are no reconstructed to the site is entirely map. There are no reconstructed to the site is entirely map. There are no reconstructed to the site is entirely map. There are no reconstructed to the site is entirely map.	o-year e is bo ginal, v oo and own to y cover ords of Sever	and 100-year bunded by sur with other isola 1,000-year si be at risk of re ered by the E historic floodi Trent Water Standa Protect -	revents. A face water in ated areas of urface water eservoir floor notionment at the simulation.	large in the of pond r even oding. Agen te fron	of surface water proportion of the 1,000-year event, ding within the site ts. cy's historic flood m Gloucestershire
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Site details	Site Code	Site SA13 – Land at St Oswalds				
	Area	6.47 hectares				
	Current land use	Mixed				
	Proposed land use	Residential				
	Access and egress	Dry access and egress will be available from the site at Longhorn Avenue and parts of Gavel Way in all surface water events and the 100-year fluvial event (FZ3). However, links away from the site to other roads needs to be considered due to Flood Zone 3 crossing the A417 in several locations, and the site bounding a rail embankment. There would be no dry access and egress available from the site in the 1,000-year fluvial event (FZ2).				
Climate Change	Climate change allowances for '2080s'	River Basin District	Central	Higher Central	Upper End	
		Severn	25%	35%	70%	
	Implications for the site	Fluvial extents from climate change increase when compared with FZ3a. The majority of the south and eastern site boundary are not located within Flood Zone 3, however climate change extents do cover these areas. As the site is affected by surface water flooding from the 100-year event, climate change may also increase the extent, depth and frequency of surface water flooding.				





	Site Code	Site SA13 – Land at St Oswalds	
	Area	6.47 hectares	
Site details	Current land use	Mixed	
	Proposed land use	Residential	
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	 Geology at the site consists of: Bedrock - Mudstone, siltstone, limestone and sandstone Superficial - Clay, silt and sand The site is not located within a Groundwater Source Protection Zone. Most source control techniques are likely to be suitable. Mapping suggests that permeable paving may have to use non-infiltrating systems given the possible risk from groundwater. Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration. Detention may be feasible provided site slopes are < 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater. Filtrations is probably suitable provided site slopes are <5% and the depth to the water table is >1m. A liner maybe required to prevent the egress of groundwater. All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater. This entire site has previously been designated by the Environment Agency as being a landfill site. A thorough ground investigation will be required as part of a detailed FRA to determine the extent of the contamination and the impact this may have on SuDS. As such, proposed SuDS should be discussed with the relevant stakeholders (LPA, LLFA and 	
NPPF and planning implications	Exception Test requirements	 EA) at an early stage to understand possible constraints. The Sequential Test will need to be passed before the Exception Test is applied. The Exception Test will need to be applied if: More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. Essential Infrastructure in Flood Zone 3b will require the Exception Test. Residential development is classified as 'More Vulnerable'. 	





Site details	Site Code	Site SA13 – Land at St Oswalds		
	Area	6.47 hectares		
	Current land use	Mixed		
	Proposed land use	Residential		
	Requirements and guidance for site- specific Flood Risk Assessment	 At the planning application stage, a site-specific Flood Risk Assessment will be required if any development is located within Flood Zones 2 or 3 or is greater than one hectare. Other sources of flooding should also be considered. Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. Resilience measures will be required if buildings are situated in the flood risk area through the centre of the site's boundary. Raising Finished Floor Levels above the design event may remove the need for resilience measures. New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects. Safe access and egress will need to be demonstrated. New development must seek opportunities to reduce overall level of flood risk at the site, for example by: Reducing volume and rate of runoff Relocating development to zones with lower flood risk Creating space for flooding. 		
Mapping Information				
Flood Zones		Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning Flood Zones. Detailed modelling is available for the River Severn, but due to the combination of tidal-fluvial scenarios, Flood Zone 3b was not available for this site. Flood Zone 3a can be used as an indication of Flood Zone 3b in the absence of modelled data.		
Climate change		The climate change allowances for the '2080s' epoch were modelling using the 2007 River Severn Tidal 1D hydraulic model.		
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.		
Fluvial depth, velocity and hazard mapping		Fluvial depth, velocity and hazard mapping for the 1 in 100-year event (Flood Zone 3a) was unavailable for this site.		
Surface water depth, velocity and hazard mapping		The surface water depth, velocity and hazard mapping for the 1 in 100-year event (considered to be medium risk) is taken Environment Agency's Risk of Flooding from Surface Water.		