

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0028			
	Address	Top Croft, Cleeve Road, Middle Littleton			
	Area	0.71 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located to the north-east of Evesham, on the eastern slope of Cleeve Hill. It is located in the Gate Inn Brook catchment, a tributary to the Badsey Brook. The site is bordered to the north by residential properties of Top Croft Row off Cleeve Road and the south by the Titheway Cul-De-Sac. The eastern border is formed by a field boundary, and the western by the B4084 Cleeve Road.			
	Existing drainage features	There are no modelled drainage features in the Environment Agency's Detailed River Network through this site, though the Gate Inn Brook flows to the east of the site.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data.			
		Flood characteristics: Modelled fluvial Flood Zone mapping data from the Environment Agency shows there to be no risk from fluvial flooding at this site. Risk of Flooding from Rivers and Sea data is also not modelled at the site. The site is at risk from surface water flooding.			
	Surface Water	Proportion of site at risk (RoFfSW)			
		30-year	100-year	1,000-year	
		5%	11%	29%	
Max depths (m)					
0.3-0.9m		0.3-0.9m	>0.9m		
Max velocity (m/s)					
<0.25		>0.25	>0.25		
The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)					

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	Proposed land use	Residential		
		Description of surface water flow paths: Risk of Flooding from Surface Water data modelled at this site show flow paths that extend significantly through the site and along roadways and gullies surrounding the site. The primary and most significant flow path bisects the site west to east, following the slope of the hill. This flow path is topographically controlled by a narrow gully that cuts through the site. There are a number of these gullies along the eastern side of Cleeve Hill, each draining a section of the bank into the Gate Inn Brook ~500m to the east. The gully that bisects the site is active in all 30, 100 and 1,000-year surface water flood risk events, which are sourced from higher altitude on Cleeve Hill to the west and cross the Cleeve Road into the site. The entrance to the site from the B4084 on Cleeve Road also acts as a funnel, directing flows that accumulate on the road into the gully and through the site. This is more prevalent within the 100 and 1,000-year extents, although 30-year flow paths present within the gully do not cross into it from the road to the west. A smaller flow path is modelled to cut across the north-eastern corner in the 1,000-year extent also, though this is far less significant. Other accumulations and flow paths around the site are focussed along local roadways, including the Titheway and Tithe Court, School Lane, and in various locations along Cleeve Road north and south of the site. A site-specific Flood Risk Assessment should be undertaken to evaluate risk that these flow paths pose.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be within the reaches of the data modelled in the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There are no residual risks modelled at this site.		
	Flood warning	The site is not covered by modelled data in the Environment Agency's Flood Warning Service.		

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	Current land use	Greenfield
	Proposed land use	Residential
Emergency planning	Access and egress	Access and egress are possible at the entrance to the site from the entrance on the western border on Cleeve Road. A site-specific Flood Risk Assessment should be undertaken to evaluate surface water risk posed to access for vehicles and pedestrians at this location, and through the centre of the site, as modelled data shows significant flow paths in all 30, 100 and 1,000-year extents. The access location is localised though particularly impacted as the modelled data shows it to be entirely inundated during 1,000-year events, and heavily within 100-year events, with the site boundary at the road being the same width as the surface water flooding. Alternative access may be possible through Top Croft Row along the northern boundary, though the central surface water flow path would still need to be traversed to gain access to the southern half of the site.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling or Flood Zone data at the site. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This is extensive through the centre of the site along a gully flow path, with additional ponding accumulations along roadways surrounding the site. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

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Site details	Site Code	CFS0028
	Address	Top Croft, Cleeve Road, Middle Littleton
	Area	0.71 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. - Superficial – Head - Clay, silt, Sand and Gravel - 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 measures are 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 maybe required to prevent the egress of groundwater. - Filtration measures are 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk of groundwater flooding due to local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. The site is 'More vulnerable' but is not located in a Flood Zone, therefore this site should pass the Exception Test. However, there are some key considerations with regard to access and the bisecting surface water flow path.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of surface water flow routes, preserving these spaces as green infrastructure. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. • 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.
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	Address	Top Croft, Cleeve Road, Middle Littleton
	Area	0.71 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - The site is designated as 'Less Vulnerable' and is not affected by fluvial flood risk, therefore the Exception Test can be passed. - Development should however be steered away from the surface water flow path through the centre of the site, and consideration is needed regarding how the site is accessed, both from the nearby roads and from one side of the site to the other where the flow route bisects. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. The site is not affected by fluvial flood risk.	
Climate change	Climate change was based on Flood Zone 2 and 1,000-year Risk of Flooding from Surface Water extent to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are considered for surface water as part of a site-specific Flood Risk Assessment.	
Fluvial depth, velocity and hazard mapping	There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses.	
Surface Water	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
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.	

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP48/6			
	Address	Canal Basin (Netherwich)			
	Area	1.10 hectares			
	Current land use	Greenfield			
	Proposed land use	Mixed Use			
Sources of flood risk	Location of site within catchment	This site is located in the Netherwich region of Droitwich Spa around the Droitwich Canal and bordered on the west and south-west by the Kidderminster Road and the south-east by the B4090. The Fire Station is located on the opposite site of the B4090. The site is bisected in the west by the canal, which runs along the majority of the northern boundary, and cuts the site into two sections, the smaller of the two located to the north of the canal. For reference, this site has been screened twice; once as an individual entity, and the Proportional percentages represent this screening, but also as two individual sites (sections A and B), for a more accurate representation of flood risk across the site as a whole. Section A is the Primary site to the south of the canal (area = 0.95km²), and Section B is the smaller site to the north (area = 0.15km²).			
	Existing drainage features	Modelled drainage features in the Environment Agency's Detailed River Network show the Droitwich Canal and River Salwarpe as the primary features associated with this site. The canal basin at Netherwich is located along the northern bank of the canal at this site and borders the bisected section of the site along its eastern boundary.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		1%	8%	12%	88%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			

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	Address	Canal Basin (Netherwich)		
	Area	1.10 hectares		
	Current land use	Greenfield		
	Proposed land use	Mixed Use		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment, along with the Flood Zones derived in the 2018 Level 1 SFRA (which uses latest modelling data not always included in the EA's Flood Map for Planning). This site is covered by the River Salwarpe 1D hydraulic modelling.		
		Flood characteristics: Flood Zone mapping shows the site to be partially within Flood Zones 2 and 3, though the majority of the risk is within individual 'Site B'. Flood risk to the main section of the site (Site A) is minimal and located along the border with the canal only. This is primarily located along the eastern half of the canal boundary at the foot of the topographic incline off the B4090 and does not encroach further into the site than the foot of the slope. Flood risk to Section B is shown to be a combination of fluvial flooding and overtopping from the canal basin along the eastern border. There are links and interactions between this and the Droitwich Canal to the north of the northern Site B parcel. Section B has a proportional area coverage within Fluvial Flood Zones 2 and 3a of 63% and 44% respectively. Both Flood Zones are located in the central portion as a significant flow path which extends across the site north to south. The same extents also encroach along the north-east and eastern boundaries, connecting to modelled risk extents sourced from the canal and basin. Topographic inclines within Section B in the south-east and West are the only areas not impacted by either flood risk extent. The modelled flood risk connects to the River Salwarpe via a flow path in Flood Zone 2 along the northern boundary, though the modelled Flood Zone 3a data shows only a connection to the canal basin, not directly to the river within the parameter of the site. Risk of Flooding from Rivers and Sea data is the same extent at Fluvial Flood Zone 2.		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		2%	5%	27%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)		

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	Address	Canal Basin (Netherwich)		
	Area	1.10 hectares		
	Current land use	Greenfield		
	Proposed land use	Mixed Use		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this show flow paths similar to those shown in the Flood Zone mapping. As with the Fluvial Flood Risk, surface water has a greater impact upon section B than section A. Risk within this site is mostly associated with the lowest flood risk extent, the 1,000 year dataset, though ingressions of the 100 and 30-year extents are evident within the site in Section A. Surface water extents within section A are located primarily within the western half of the site. There are two main channels within slight topographic depressions that bisect the site north to south, connecting flow paths associated with the canal to accumulations on the Hampton Road to the south. The connecting flow path is only shown within the 1,000-year extent; however, smaller accumulations within this area are also within the 30 and 100-year food extents. Section B is at greater risk than section A, in a similar manner to the fluvial model extents. The 1,000-year surface water risk extent covers 68% of the area of section B, which is distributed in a similar form to Fluvial Flood Zones 2 and 3a, defined by topographic depressions and inclines. This is part of a significant accumulation that is modelled on the land between the canal/basin and the River Salwarpe to the North, which encompasses the majority of that area. Other accumulations and flow paths around the site are focussed along local roadways, including 100 and 1,000-year extent flow paths along Hampton Road and the B4090 to the south of the site, as well as patchy accumulations around the Fire Station. A large 30-year ponding area is also shown along the Hampton Road on the south-west corner; this does not extend into the site though the 100 and 1,000-year extents do so, as mentioned above.		
	Reservoir	The available online maps shows that the site is at indirect risk of reservoir flooding. Both the River Salwarpe and the Droitwich Canal are shown to be within the Maximum extent of flooding, which could encroach into both Sections A and B of this site.		
	Flood history	This site is not shown to be within the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		

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Site details	Site Code	SWDP48/6
	Address	Canal Basin (Netherwich)
	Area	1.10 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
	Residual risk	Residual risks at this site are primarily associated with the Droitwich Canal which is in both Fluvial Flood Zones 3b and the Risk of Flooding from Surface Water 30-year extent, as discussed above. Residual risk from the canal is that of potential overtopping during severe rainfall events, if the canal is perched about site levels. This would impact both sections of the site. However, the site levels look to be higher than the canal, though this is worth checking in a site-specific FRA. The River Salwarpe also flows through a culvert (passing under the road and railway to the west) which poses the risk of flooding from impoundment behind the culvert in a blockage scenario.
Emergency planning	Flood warning	The site is covered by the Environment Agency's Flood Warning Service, via a Flood Alert Area 'River Salwarpe, Elmbridge and Hadley Brooks and their tributaries'. The site is not covered by a Flood Warning Area.
	Access and egress	Access and egress are possible at both sections A and B of this site. Section A is accessible via Saltway to the south, noting there is significant risk on this road to the east, but to the south flood risk is much lower. Hampton Road is inundated in all surface water events but to the west Kidderminster Road could be considered more appropriate, noting some crossings of surface water in all events. This appears to be the only option for Section B of the site. Alternative routes to Section B should be investigated as this is at greater risk of flooding from surface water, as are the routes to and from the access point.

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	Address	Canal Basin (Netherwich)
	Area	1.10 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is detailed fluvial modelling available at the site of the River Salwarpe, which shows extents of the 2080s climate change scenarios (100-year +25%, 35% and 70%) encroaching across the northern boundary of section A in its entirety, though most significantly in the west of the site, where the 1,000-year RoFSW extent is modelled to connect flow paths from the canal and Hampton Road. Section B is entirely covered by the climate change extents. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is extensive through the centre of the site along a gully flow path, with additional ponding accumulations along roadways surrounding the site. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

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	Address	Canal Basin (Netherwich)
	Area	1.10 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Droitwich Halite Member - Halite. - Superficial – Head - Clay, silt, Sand and Gravel - 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 to prevent the egress of groundwater. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the site is at negligible risk of groundwater flooding due to the nature of local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified at 'More Vulnerable' and Employment development is classified as 'Less Vulnerable'. Mixed use developments should consider the highest vulnerability classification. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. The smaller parcel of the site is at higher flood risk with limited development potential. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Residual risk needs to be considered at FRA stage, from the numerous impoundments surrounding the site. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate.
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	Address	Canal Basin (Netherwich)
	Area	1.10 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
		- Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. - 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 88% of the site located within Flood Zone 1, therefore the southern portion of the site. - Mixed use developments should consider the highest level of vulnerability. Residential development will therefore need to be steered away from Flood Zone 3 and areas at highest risk near the Salwarpe and canal. - There are limitations for development to be placed in the small parcel (section B) of the site, because this is largely covered by the Flood Zones and is completely inundated by the climate change extents. - Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. - Access considerations are needed with Hampton Road being largely inundated and limited options for the smaller parcel onto Kidderminster Road. Refer to the detailed ‘guidance for developers’ section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency’s Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		

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	Address	Canal Basin (Netherwich)
	Area	1.10 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
Flood Zones		Flood Zones 2 and 3 originate from the River Salwarpe hydraulic model, represented in the Flood Zones derived as part of the Level 1 SFRA.
Climate change		Climate change was based on the River Salwarpe modelling from the Level 1 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch.
Fluvial depth, velocity and hazard mapping		There is no depth, hazard and velocity data available currently as the River Salwarpe model is 1D-only. The Risk of Flooding from Surface Water mapping has therefore been used as an indication.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0483a & b (Strategic Development Site)				
	Address	Land at Hadzor, Droitwich Spa, Hadzor				
	Area	78.139 hectares				
	Current land use	Greenfield				
	Proposed land use	Residential				
Sources of flood risk	Location of site within catchment	This strategic development site is located to the south-east of Droitwich Spa, in the village of Hadzor. The site is split into two sections for the purpose of this assessment (A and B) and is bisected by the Worcester and Birmingham Canal, North to South. Site A is the larger of the two sections, at 55.82ha and is located nearer Hadzor, forming the western half of the site. Site B is smaller at 22.33ha, situated to the east of the canal.				
	Existing drainage features	Modelled drainage features in the Environment Agency's Detailed River Network show the Worcester and Birmingham Canal as the primary feature associated with this site. Small drains and channels associated with the Body Brook along the northern boundary, and the Gitton Brook and Swan Pool (tributaries of the Body Brook) near the western border form the remaining fluvial features. These flow into the River Salwarpe just downstream of the M5.				
	Fluvial	Proportion of site at risk				
		Site Part	FZ3b	FZ3a	FZ2	FZ1
		Whole	<1%	<1%	<1%	99%
		A	<1%	<1%	<1%	99%
		B	0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)				
		None				
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)				
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data and the River Salwarpe 1D model.				
		Flood characteristics: Flood Zone mapping data from the Environment Agency shows the site to be at minimal risk from fluvial flooding. The northern corner of Site A is the only location where Fluvial Flood Zones 2 and 3 cross into the site boundary from the Hanbury Road, B4090, and this is very marginal only. This flooding is sourced from the Body Brook and Gitton Brook which join just north of the site as pass under the M5 motorway. The resulting impoundment from the culvert causes the flood risk nearest the site, which extends along the watercourses near the northern corner of Site A. There are no other ordinary watercourses visible on OS mapping. Risk of Flooding from Rivers and Sea data is similar extent as Fluvial Flood Zone 3a.				

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0483a & b (Strategic Development Site)		
	Address	Land at Hadzor, Droitwich Spa, Hadzor		
	Area	78.139 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
	Surface Water	Proportion of site at risk (RoFfSW)		
		Site Part	30-year	100-year
		Whole	<1%	1%
		A	<1%	1%
		B	1%	2%
		Max depths (m)		
			0.3-0.9m	>0.9m
		Max velocity (m/s)		
			<0.25	>0.25
		The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0483a & b (Strategic Development Site)		
	Address	Land at Hadzor, Droitwich Spa, Hadzor		
	Area	78.139 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site shows flow paths at this site are concentrated to areas of topographical depressions and connect to fluvial features bordering or neighbouring the site. Site A is impacted more than Site B by surface water flood risk; however, those risks are mostly within the 1,000-year extents only. These are concentrated primarily along the farm track which passes through Site A in the north-east leading to the Hanbury Road. These flows are sourced from higher terrain within the site nearer Hadzor village and flow northward where they join the drain which connects to the Body Brook. Nearer the drainage channel on the northern border of the site, there is a small accumulation modelled in the 30 and patches within the 100-year risk extent. These are also confined to the central flow path draining northwards. There are other minor accumulations modelled in the 1,000-year extent within Site A which are likely to pond within small hollows and depressions scattered across the site, with one in the South-Easter corner flowing into the Dean Brook, south of the site. There is only one area of surface water flooding within Site B. This is located in the far east of the site near Huntingdrop Farm and again topographically constrained. The eastern boundary of the site follows a slope leading towards a shallow valley feature which the surface water flow path here is modelled to follow before accumulating within the south-eastern corner where it exits the site. Beyond this, the flow path is impounded by railway embankments which run north – south near the site's eastern boundary. As this is a strategic site, risk overall appears low, but a Level 2 assessment has been undertaken to highlight where risk is more concentrated, given the site may be split and developed in different areas of the site in future. For example, if the two areas at highest surface water risk were portioned off and developed, then the risk in these locations would be higher as it is concentrated in a smaller land parcel.		
	Reservoir	The available online maps shows that there is no risk of flooding from Reservoirs at this site.		
	Flood history	This site is not shown to be within the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0483a & b (Strategic Development Site)
	Address	Land at Hadzor, Droitwich Spa, Hadzor
	Area	78.139 hectares
	Current land use	Greenfield
	Proposed land use	Residential
	Residual risk	Residual risks at this site are primarily associated with the Worcestershire and Birmingham Canal, although this is not shown to pose flood risk it still poses a low risk of overtopping into both Site A and B if it is perched above adjacent site levels. At Site A, impounding of floodwaters is shown near the north-west corner where the Body Brook and Gitton Brook converge and pass through a culvert under the M5 motorway. If this were to block, it could force more water back upstream towards the north-western corner of the site. At Site B there is a modelled impoundment along the Western edge of the Railway embankment which impact the South-Easters corner of the site. There is also a small culvert which passes under Hadzor Lane near the northern corner of Site A which should be considered. Overall, residual risk is deemed low when considering the site as a whole, but site-specific FRAs will investigate any risks further to confirm.
Emergency planning	Flood warning	The site is not covered directly by the EA's Flood Warning Service, however the River Salwarpe and Body Brook to the north, and Dean Brook to the south are included in a Flood Alert Area.
	Access and egress	Access and egress are possible to both Site A and B at numerous locations. Hadzor Lane is largely free of flood risk, except around the M5 area in the north-western corner of the site, where all surface water flood events inundate the road. Hanbury Road to the north is also shown to be affected by all surface water flood events but is clearer to the east. Areas at highest flood risk around the M5 should be avoided, and also developers should consider the near vicinity of the site, where there is also significant fluvial and surface water risk, for example south around Hay Lane and further east at Salt Way.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0483a & b (Strategic Development Site)
	Address	Land at Hadzor, Droitwich Spa, Hadzor
	Area	78.139 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is some detailed fluvial modelling available for the site, which shows extents of the 2080s scenarios (100-year +25%, 35% and 70% events) associated with the Body Brook encroaching marginally on the north-western boundary of Site A. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Branscombe Mudstone Formation - Mudstone - Superficial – None recorded - Most source control techniques are likely to be suitable. Mapping suggests that slopes may be unsuitable for selective source control techniques. - 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. - Detention options are 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 options are 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. - 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. - The site is not designated by the Environment Agency as previously being a landfill site. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the entire site to be at negligible risk of groundwater flooding due to the nature of local geological deposits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0483a & b (Strategic Development Site)
	Address	Land at Hadzor, Droitwich Spa, Hadzor
	Area	78.139 hectares
	Current land use	Greenfield
	Proposed land use	Residential
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site, so the Exception Test should be passed. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. • 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.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0483a & b (Strategic Development Site)
	Address	Land at Hadzor, Droitwich Spa, Hadzor
	Area	78.139 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 99% of the site located within Flood Zone 1, therefore the whole site just avoiding the very north-western tip where the Flood Zones pass near to the site. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. - Access needs to be considered away from the site where fluvial and surface water risk is high, for example near the M5 and further south/ east where roads to/ from the site lead. - As this is a strategic site, consideration is needed regarding surface water risk; this is shown to be low, but if the site is parcelled up in future, then the risk could be higher if concentrated into a smaller area. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area and the River Salwarpe 1D model.	
Climate change	Climate change was based on detailed model outputs available from 2D generalised modelling and the River Salwarpe 1D modelling. The 1,000-year surface water extent was also used to infer climate change impacts.	
Fluvial depth, velocity and hazard mapping	There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses.	
Surface Water	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
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.	

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP59/19			
	Address	Land adjacent to Station Road			
	Area	9.51 hectares			
	Current land use	Greenfield			
	Proposed land use	Mixed Use			
Sources of flood risk	Location of site within catchment	This site is located along Station Road in Broadway, to the south-east of Evesham. It lies within the Badsey Brook catchment, downstream of the confluence of the Badsey and Broadway brooks but in the upper reaches of this catchment. The site accompanies another in Broadway that sit at the foot of the Cotswold escarpment. The site is comprised primarily of one agricultural field and one sports field with a car park in the south-eastern corner, and is flanked by roads to the north-east and south-west, residential properties to the south, and a small patch of woodland with a lake to the West and a caravan park to the North.			
	Existing drainage features	Modelled drainage features in the Environment Agency's Detailed River Network show the primary drainage feature to be the Badsey Brook, which flows along the opposite side of the Childswickham Road on the south-western site boundary. The Broadway Brook enters the Badsey Brook ~530m upstream of the site.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	48%	52%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		<i>The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)</i>			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data.			
		Flood characteristics: Flood Zone mapping data from the Environment Agency shows a significant proportion of the site within Flood Zone 2 (almost half of the site). The site's shallow topographical incline in the east allows the lower gradient land in the west and south-west, nearer to the Brook to flood. Also, there is a railway embankment immediately north-west of the site which causes an impoundment of floodwater against it, hence the spread of Flood Zone 2 extent into the site. Flood zone 3 is constrained to the river channel along the southern side of Childswickham Road and mapping suggests it does not encroach into the site proximity. It does however overtop onto highways and residential areas to the south of the site, and into adjacent land to the West. A site-specific assessment may require a detailed hydraulic model to confirm flood risk, and this may refine Flood Zone 2 at the site.			
	Proportion of site at risk (RoFfSW)				

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP59/19		
	Address	Land adjacent to Station Road		
	Area	9.51 hectares		
	Current land use	Greenfield		
	Proposed land use	Mixed Use		
Surface Water		30-year	100-year	1,000-year
		0%	<1%	16%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site shows there are only minor ingressions into the site from surface water as topographic features allow for accumulations elsewhere. Primarily, surface water ponding is in the area to the north-east of the site in all extents, in the topographic low point adjacent to the railway line where fluvial risk also spreads. The 30 and 100-year datasets show accumulations to be patchy here, and only the 1,000-year extent encroaches into the eastern corner and along the northern border of the site from this ponding. Flow paths elsewhere within the site are in the 1,000-year extent only and are associated with small accumulations along highways that surround the site. Other flow paths around the site follow a similar route to Flood Zone 2 to the south of the site where the road crosses the brook. Here, flow paths in all 30, 100 and 1,000-year extents are shown to accumulate along highways and localised topographic depressions.		
	Reservoir	The available online maps shows that the site is not at risk of flooding from Reservoirs.		
	Flood history	This site is shown to be within the Environment Agency's Historic Flood Map to the same area within the site as fluvial Flood Zone 2, which covers 48% of the site in the west.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
	This site is not protected by any formal flood defences.			
	Residual risk	Residual risks at this site are associated with two structures near the site; one is just upstream of the site near the south-western corner, where the watercourse goes under Cheltenham Road, and the second is the railway structure and embankment which causes impounding, just to the north-west of the site. If these were to block, they could force water further out of bank upstream, or increase depths of flooding if in areas already ponding. A site-specific FRA should investigate potential impacts to the site from blockages of local structures.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP59/19
	Address	Land adjacent to Station Road
	Area	9.51 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
Emergency planning	Flood warning	The site is covered by the Environment Agency's Flood Warning Service, with a Flood Alert Area clipping the site – this is 'River Isbourne, Badsey Brook, Honeybourne Brook, Bretforton Brook, Littleton Brook and their tributaries'.
	Access and egress	Access and egress are possible at this site from Station Road along the eastern boundary, which is largely free of fluvial and surface water flood risk to the north, but caution if accessing from the south as the road becomes a surface water conduit in all flood events up to the B4632 Cheltenham Road. Cheltenham Road is not suitable due to flood risk in all surface water events and Flood Zone 2 risk across a large proportion in the vicinity of the site. Childswickham Road is also shown to be heavily impacted by fluvial and surface water flood risk, though for the latter this is mainly the 1,000-year extent. A detailed modelling assessment at FRA stage may confirm flood depths and hazard, which will help determine vehicle and emergency access to the site.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available at the site, and therefore Flood Zone 2 has been used as a conservative indication of flood risk from climate change. This extends across the western half of the site encompassing the lower incline ground. A detailed modelling study should test the 2080s climate change allowances, which may refine risk in the north-western corner of the site. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is present primarily within the Western corner of the site in the area of lower ground. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	• Geology at the site consists of: ◦ Bedrock – Charmouth Mudstone Formation - Mudstone. ◦ Superficial – Head - Clay, silt, Sand and Gravel • In areas where AStGWF is =50% <75%, 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 and risk of contaminated lands from designated landfill within the site boundary. These measures will not be applicable where AStGWF is >25% <50%. • Infiltration may be suitable. Mapping suggests a medium risk of groundwater flooding and underlying soils may be permeable. However, areas of the site have been designated as containing historic landfill therefore, 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. These measures will not be applicable where AStGWF is >25% <50%. • In areas where AStGWF is =50% <75%, detention may be feasible provided site slopes are < 5% at the location of the detention feature. If the site has contamination or groundwater issues; a liner will be required. These measures will not be applicable where AStGWF is >25% <50%. • In areas where AStGWF is =50% <75%, filtration features are probably suitable provided site slopes are <5% and the depth to the water table is >1m. If the site has contamination or groundwater issues; a liner will be required. These measures will not be applicable where AStGWF is >25% <50%. • In areas where AStGWF is =50% <75%, 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 or groundwater issues; a liner will be required. These measures will not be applicable where AStGWF is >25% <50%. • This site has areas within its boundary 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 EA) at an early stage to understand possible constraints. • The site is not located within any Environment Agency designated Source Protection Zone. • JBA's Groundwater Mapping dataset shows that the majority of the site up towards the eastern boundary has groundwater levels at or very near (within 0.025m of) the ground surface, suggesting groundwater may emerge at significant rates and has the capacity to flow overland and/or pond in any topographic low spots. The eastern boundary is designated as no risk.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable' and Employment development is classified as 'Less Vulnerable'. For mixed use developments, the highest level of vulnerability should be considered. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled drains along the southern/ western boundaries, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP59/19
	Address	Land adjacent to Station Road
	Area	9.51 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
		- 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 52% of the site located within Flood Zone 1, therefore the south-eastern portion of the site, avoiding where possible the northern half of the site which is covered by Flood Zones 2. - Where mixed use developments have mixed vulnerability classifications, the highest risk should be considered, i.e. residential 'more vulnerable'. - Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - A more detailed model may be required at FRA stage to confirm the Flood Zone extents, climate change and the impacts of structure blockages. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. - Access should be avoided where possible in areas at highest risk, for example Childswickham Road and Cheltenham Road. Station Road appears at lowest risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP59/19
	Address	Land adjacent to Station Road
	Area	9.51 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
Climate change		Climate change was based on Flood Zone 2 to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1124sc			
	Address	Land at Millend Racing Stables, Netherton Lane, Elmley Castle			
	Area	1.48 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is on the eastern fringe of Elmley Castle village, south-west of Evesham and near the northern foot of Bredon Hill. The site is almost rectangular in shape, apart from where the north-western boundary follows fluvial meanders. The driveway into Millend Racing Stables forms the remainder of the western boundary, with a field boundary forming the eastern border. The northern boundary is delineated by the Netherton Road, and the south by an un-named brook.			
	Existing drainage features	The Environment Agency's Detailed River Network two small un-named brooks are associated with this site, both flowing south to north near the western boundary and along the southern border of the site. These are just two of a plethora of small brooks that flow down the sides of Bredon Hill. Many of these flow into the River Avon in or around Evesham, such as the brook the two at this site adjoin to form along the north-western boundary. Near the south-west corner of the site, there is a large online pond which the western-most brook flows through. A smaller offline pond lies to the south of the larger pond.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. This site is not covered by the EA's Flood Zones as the catchment area is smaller than 3km ² .			
		Flood characteristics: There is no available Fluvial Flood Zone mapping data modelled for this site due to the size of the catchment. However, this does not mean there will be no flood risk associated and a site-specific Flood Risk Assessment should therefore be undertaken to assess any risk to the site. This may require a detailed hydraulic model to confirm the risk from the two drains which converge at the site's north-western boundary at Netherton Lane. In the absence of fluvial flood risk datasets, the Risk of Flooding from Surface Water can be used as an indication of flood risk for small drains.			
Surface Water	Proportion of site at risk (RoFfSW)				
	30-year	100-year	1,000-year		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1124sc		
	Address	Land at Millend Racing Stables, Netherton Lane, Elmley Castle		
	Area	1.48 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		4%	5%	85%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site indicates a significant area coverage of the 1,000-year extent. The 30 and 100-year extents are present through a central topographic channel that bisects the site, though the drainage network does not pick up a watercourse here. This channel that flows through the site is an accumulation along a section of the horse racing track in the neighbouring field which cuts into the site. All three modelled datasets have flow paths that follow this oval shaped track with accumulations along almost all of the track apart from the southern-most straight. The 1,000-year extent however covers a significantly greater area along a similar trajectory. This flow path encroaches across the majority of the southern half of the site, apart from a topographic feature in the south-east of the site. The flow path has a wider distribution also, expanding far across the eastern and southern boundaries into the central part of the racing track. It also crosses extensively over the Netherton Road to the north-east and the minor road to the south.		
		Reservoir The site is not shown to be at risk of reservoir flooding from the available online maps.		
		Flood history This site is not shown to be within the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	Residual risk at this site is associated with three culverts near the site. The primary culvert is at the north-western corner of the site where the un-named brook flows beneath the Netherton Road, posing an impoundment risk in high flows. The two other culverts pass beneath the minor road to the south (one on each arm of the brook) and pose a risk of impounded water flushing through into the site. The two online ponds pose a risk of overtopping into the brook along the eastern side of the site also. A site-specific Flood Risk Assessment should be carried out to evaluate these risks further.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1124sc
	Address	Land at Millend Racing Stables, Netherton Lane, Elmley Castle
	Area	1.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Emergency planning	Flood warning	The site is not covered by modelled data in the Environment Agency's Flood Warning Service.
	Access and egress	Access and egress are possible at the entrance to the stables via the Netherton Road and along the driveway which flanks the eastern boundary. A site-specific assessment should be undertaken to evaluate the accessibility to the site area to vehicles and pedestrians during high rainfall events, and to the surrounding roads which are modelled within the 1,000-year surface water flood risk dataset at various locations where the flood extents are shown to cross the roads. Risk is mostly in the 1,000-year event.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling or Flood Zone 2 available at the site, and therefore the 1,000-year surface water flood extent has been used as a proxy of flood risk from climate change. This shows that a significant proportion of the site could be at risk with climate change, notably the southern half of the site. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model, to confirm the impact in the site. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is evident within the site in the southern half of the site, fed primarily from surface water flowing off Bredon Hill to the south. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1124sc
	Address	Land at Millend Racing Stables, Netherton Lane, Elmley Castle
	Area	1.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Charmouth Mudstone Formation - Mudstone. - Superficial – Head - Clay, silt, Sand and Gravel. - 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 options should be feasible as slopes are < 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater. - Filtration features are 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. - The site is not designated by the Environment Agency as previously being a landfill site. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the site is at negligible risk of groundwater flooding due to the nature of the local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site, which may need to be confirmed via a detailed site assessment and hydraulic modelling 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. - More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • All sources of flooding, particularly the risk of fluvial, surface water Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled drains, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1124sc
	Address	Land at Millend Racing Stables, Netherton Lane, Elmley Castle
	Area	1.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		- Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. - 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to Flood Zone 1 and outside of the surface water flood extent where possible. A detailed model may need to confirm fluvial flood risk at the site-specific stage, and development should be steered away from areas at risk in the site from the drains. - Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. - Access is possible but risk across nearby roads in the near vicinity should be considered, as the 1,000-year surface water extents are fairly expansive and cross roads several times in the locality. Refer to the detailed ‘guidance for developers’ section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency’s Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency’s Flood Map for Planning; this is based on 2D generalised modelling but in this area there are no Flood Zones represented due to the small catchment size. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1124sc
	Address	Land at Millend Racing Stables, Netherton Lane, Elmley Castle
	Area	1.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate change		Climate change was based on the 1,000-year surface water flood extent in the absence of detailed model data and Flood Zone 2 proxy. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1144			
	Address	Land off Mayfield Road			
	Area	0.77 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located on the eastern fringe of Malvern, between the conurbations of Malvern Link to the north and Pound Bank to the south. Mayfield Road forms the north and eastern site boundary, and Elgar Avenue forms the western border, and the residential properties of Martin Close delineates the southern boundary.			
	Existing drainage features	Mapping from the Environment Agency's Detailed River Network shows that the site is bisected by an un-named tributary of the Whiteacre Brook. This flows through the site west to east, turning south at the eastern border flowing to the south-eastern corner where it is joined by another small tributary. From here the brook flows east towards the Whiteacre Brook and subsequently into the River Severn near Clevelode.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data:			
		The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. The small drains are not shown in the EA's Flood Zones because the catchment sizes are smaller than 3km ² . This does not mean there would be no fluvial risk to the site.			
	Flood characteristics:				
	Flood Zone data from the Environment Agency shows there to be no risk from flooding at this site; however, this is due to the upstream catchment being <3km ² and a site-specific Flood Risk Assessment should be undertaken to evaluate any potential risk. There are also several culverted sections in the area where the drain re-appears at the site's western boundary and then goes into culvert under Mayfield Road again before continuing east.				
	Surface Water	Proportion of site at risk (RoFfSW)			
30-year		100-year	1,000-year		
2%		12%	57%		
Max depths (m)					
0.3-0.9m		0.3-0.9m	>0.9m		
Max velocity (m/s)					

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1144		
	Address	Land off Mayfield Road		
	Area	0.77 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site show significant flow paths that extend through the site and along roadways surrounding the site. Surface water flow paths within the 30-year extent are constrained by the channel bisecting the site and flowing along the south-eastern boundary. There is also a ponding accumulation modelled in this extent along Elgar Avenue on the western border. This does not encroach into the site, though the same accumulation shown in the 100-year extent does cross into the site in small sections. Similarly, the 100-year modelled flow path within the site is largely constrained to the channel, however there is a ponding accumulation modelled near the southern boundary that lies within a topographic depression. There are other small 100-year extent flow paths modelled along Mayfield Road and in-and-around Elgar Avenue residential properties and roads to the west of the site. Surface water flow paths of the 1,000-year extent are far more significant and encompass the majority of the southern and central sections of the site. This is shown as being one large flow path sourced from higher ground to the west of the site and flowing through the residential estate around Elgar Avenue where it enters across the western boundary and exits onto Mayfield Road in the east, subsequently following the brook. Another small flow path joins this from Mayfield Road to the north.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be within the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1144
	Address	Land off Mayfield Road
	Area	0.77 hectares
	Current land use	Greenfield
	Proposed land use	Residential
	Residual risk	There are two culverts associated with this site where the brook enters the site (beneath Elgar Avenue) in the centre of the western border and exits the site (beneath Mayfield Road) in the south-eastern corner. Although only minor, both these culverts pose a risk of blockage and therefore increased risk to the site. The upstream culvert where the brook on the western boundary poses a risk of water backing up and forming an overland flow path through into the site, whereas the downstream culvert in the south-western corner poses a risk of flooding from impounded water within the site. A site-specific risk assessment should investigate these risks further.
Emergency planning	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.
	Access and egress	Access and egress are possible along Elgar Avenue into the west of the site. Vehicle access at this site is more difficult, as there is no visible access point for vehicles. Also, although mapping shows Mayfield Road and Elgar Avenue to be connected, this link—road near the north-east corner of the site is currently blocked and thus access to the site area from the road would be via a detour through the residential estate along Elgar Avenue from the south, off Madresfield Road. Elgar Avenue is shown to be at risk within all three surface water extents at the western boundary, as is the surrounding highway network, and therefore alternative routes to and from the site should be investigated further. Most routes and nearby roads are shown to be at risk in the 1,000-year event, so access is possible but developers should consider this wider network to ascertain where access and egress would be safest, given many of the surrounding roads do act as surface water flow path conduits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1144
	Address	Land off Mayfield Road
	Area	0.77 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling or Flood Zone 2 extent available at this site. The 1,000-year surface water extent can act as an indication, showing a large proportion of the site could be at risk in the future. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model, to confirm the impact in the site. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is extensive through the southern and central sections of the site, as well as along the surrounding road network, particularly within the 1000-year modelled data extent. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1144
	Address	Land off Mayfield Road
	Area	0.77 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation - Mudstone. - Superficial – Head - Clay, silt, Sand and Gravel - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the site to be at negligible risk of groundwater flooding due to the nature of local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site, which may need to be confirmed in a detailed site assessment and hydraulic model. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled drains, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1144
	Address	Land off Mayfield Road
	Area	0.77 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Development is limited to Flood Zone 1, therefore the northern and southern portions of the site, based on where the watercourse is located. A detailed hydraulic model may be required to confirm fluvial flood risk through the site, as well as potential residual risk given the culverts near and in the site. • The site is bisected by 1,000-year surface water risk (as well as the small drain)_so consideration is needed with regards to access from one side of the site to the other, depending on where access points will be. • Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1144
	Address	Land off Mayfield Road
	Area	0.77 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area. There is no Flood Zone representation at the site due to the catchment size being less than 3km ² . It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.
Climate change		Climate change was based on the 1,000-year surface water flood extent in the absence of detailed modelling and a fluvial Flood Zone 2 as a proxy. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1180			
	Address	Land west of Plough Road, Tibberton			
	Area	2.48 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located in the eastern fringes of Worcester, on the eastern side of the M5 motorway near junction 6, to the south-west of Tibberton village. The site lies to the west of Plough Road, with a small access track leading from the road between residential properties. The site's field boundary and a public footpath form the eastern border, with the northern border also a field boundary, and the residential properties along Hawthorn Rise forming the northern border. A large un-named hill lies to the north and west of the site, with the northern corner rising up the hillside.			
	Existing drainage features	There are no drainage features modelled at this site in the Environment Agency's Detailed River Network.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. There is no fluvial risk of flooding to this site.			
		Flood characteristics: There is no fluvial flood risk to the site. The site is at risk from surface water and hence a Level 2 assessment has been undertaken on this basis.			
		Surface Water	Proportion of site at risk (RoFfSW)		
			30-year	100-year	1,000-year
	2%		7%	19%	
Max depths (m)					
0.3-0.9m	0.3-0.9m		>0.9m		
Max velocity (m/s)					
<0.25	>0.25		>0.25		
The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)					

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1180		
	Address	Land west of Plough Road, Tibberton		
	Area	2.48 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site is mostly associated with a large flow path flowing west to east through the southern portion of the site and onto Plough Road. This is a significant flow path, sourced from the slopes of the neighbouring hill to the west, in 100 and 1,000-year extents, crossing into the site and bisecting it from the south-west and exiting along the south-east through residential properties on Plough Road. This then joins the un-named Bow Brook tributary near the railway embankment south of Tibberton. There is also a series of smaller accumulations modelled in the 30-year extent data through the same flow path though they are not connected. These are also restricted to the western side of the site, though are present in more significant accumulations south-east of the site near and along Plough Road. The other flow path impacting the site is modelled within the 1,000-year data extent only and follows the footpath along the western boundary of the site, flowing north to south. There are also smaller ponding accumulations along Plough Road near the site modelled in the 1,000-year extent data, and also in the 30 and 100-year data further south along the road.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be within the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There are no residual risks at this site..		
Emergency planning	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.		
	Access and egress	Access and egress are possible at the entrance along Plough Road, into the south-east of the site. A site-specific Flood Risk Assessment of this access point should be undertaken as the access route is shown to be compromised by all surface water extents, and alternative access routes should be investigated. Access and egress routes through the south and centre of the site are also compromised so thought is needed regarding access from the northern portion of the site shown to be bisected by surface water risk in the 100 and 1,000-year events.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1180
	Address	Land west of Plough Road, Tibberton
	Area	2.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no fluvial flood risk to the site and no watercourse nearby which could impact the site with climate change. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is evident within the site in the southern half of the site, fed from surface water flowing off the hill to the north and west. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1180
	Address	Land west of Plough Road, Tibberton
	Area	2.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Branscombe Mudstone Formation - Mudstone. Branscombe Mudstone Formation - Siltstone, Dolomitic. - Superficial – None recorded - Most source control techniques are likely to be suitable. Mapping suggests that slopes may be unsuitable for selective source control techniques. - Infiltration is 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. - Detention options are 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 maybe required to prevent the egress of groundwater. - Filtration options are 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. - 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. - The site is not designated by the Environment Agency as previously being a landfill site. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the site is at negligible risk of groundwater flooding due to the local geological deposits. The most northern tip is just clipped by a small area where groundwater levels are between 0.025m and 0.5m below ground surface, meaning a possibility of groundwater emerging at the surface locally.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. The site is not at fluvial flood risk, but consideration is needed for the site being bisected by 100-year and 1,000-year surface water flood risk.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. • 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.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1180
	Address	Land west of Plough Road, Tibberton
	Area	2.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - This site is not at fluvial flood risk and should therefore pass the Exception Test; however, consideration is still needed with regards to the surface water flow path bisecting the site, in terms of steering development away from this area and considering access and egress across the area of risk. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling. The site is not at fluvial flood risk.	
Climate change	Climate change was based on the 1,000-year surface water flood extent as the site is not at fluvial flood risk.	
Fluvial depth, velocity and hazard mapping	There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage	
Surface Water	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
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.	

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1181			
	Address	Land to the west of Ivy Lane, Bretforton			
	Area	1.48 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located to the east of the Vale of Evesham, in the north-west of Bretforton village on the periphery of Grange Road and Ivy Lane.			
	Existing drainage features	Modelled drainage features in the Environment Agency's Detailed River Network are not directly within this site but flow further to the north and west of the site. The primary drainage feature is an un-named tributary that flows east to west to the north of the site. A small field drain flows south to north and enters the brook to the north of the site. This un-named brook is a tributary of the Gate Inn Brook, which flows into the Broadway Brook and subsequently the River Avon south of Offenham.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	100%	0%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. There are no detailed hydraulic models along this watercourse.			
		Flood characteristics: The EA's Flood Map for Planning Flood Zones show this site is entirely within fluvial Flood Zone 2, which extends southwards from the un-named brook to the north, across the floodplain and through a significant portion of the residential estates of Grange Road, Ivy Lane, Holly Close, Gras Close and Station Road. Fluvial Flood Zone 3 however does not encroach into the site and remains restrained to the floodplain adjacent to the northern channel. The Flood Zone data is based on 2D generalised modelling which is shown to spread quite extensively in the surrounding area away from the channel and interacts and connects with the floodplain extents of other parallel drains to the north and south of the site. This spread seems quite extensive considering the sizes of the channels and catchments. It may be that a detailed hydraulic model which accounts for channel and structure survey, would reduce this flood extent somewhat, or would confirm whether Flood Zone 2 does indeed cover the entire site. Risk of Flooding from Rivers and Sea data is not present at the site specifically, though the brook to the north is High risk.			
		Proportion of site at risk (RoFfSW)			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1181		
	Address	Land to the west of Ivy Lane, Bretforton		
	Area	1.48 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
	Surface Water	30-year	100-year	1,000-year
		0%	0%	3%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site is shown in the centre of the site as a small ponding accumulation within the 1,000-year data extent, near the end of the track leading to Ivy Lane that enters the site in the north eastern corner. Overall, the site is at negligible risk of surface water flooding. The risk is mostly confined to the vicinity of the watercourses and other fields away from the site.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be entirely within the Environment Agency's Historic Flood Map and covers an area similar to Fluvial Flood Zone 2. This encompasses the whole site and extends to the south of Station Road, covering a significant proportion of Bretforton.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
	This site is not protected by any formal flood defences.			
	Residual risk	There are no residual risks modelled at this site.		
Emergency planning	Flood warning	The site is not directly covered by the Environment Agency's Flood Warning Areas or Alerts; however, a Flood Alert Area commences at the channel near the site, extending downstream to Bretforton. The site itself does not receive a service though.		
	Access and egress	Access and egress are possible at the entrance to the site on the north-east corner off Ivy Lane. Although this is not directly impacted by surface water flood risk, Ivy Lane and Station Road that lead to the site have flow paths modelled along them within 100 and 1,000-year extents. However, the main New Street/ Weston Road access road is largely clear of flood risk to the east. To the west, access should be avoided (or investigated in more detail to ascertain the depths and hazard) as the fluvial Flood Zones and the surface water extents cross local roads where watercourses converge.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1181
	Address	Land to the west of Ivy Lane, Bretforton
	Area	1.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available at the site, and therefore Flood Zone 2 has been used as a conservative indication of flood risk from climate change. This encompasses the entire site and extends to the south of Station Road. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model, to confirm the impact in the site, as it may be that the extents falls somewhere between the Flood Zone 3 and 2 extents, making more of the site viable. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is evident within the centre of the site, in numerous flow paths and ponding accumulations along roadways surrounding the site, and as a significant flow path along the brook to the north. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1181
	Address	Land to the west of Ivy Lane, Bretforton
	Area	1.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. - Superficial – Head - Clay, silt, Sand and Gravel. - All forms of source control are likely to be suitable, though a site-specific risk assessment may need to evaluate options along the access track. - 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 almost all suitable for all forms of detention, though the far eastern corner should be assessed as mapping shows this corner to be at greater risk of flooding from groundwater. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows negligible risk from groundwater flooding due to the nature of local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. The entire site is shown to be located in Flood Zone 2 so considerations are still needed regarding where to safely place more vulnerable development, and a detailed modelling study may help to refine risk by modelling flood depths, hazard to inform this. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled drains, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. • New development must seek opportunities to reduce overall level of flood risk at the site, for example by:
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1181
	Address	Land to the west of Ivy Lane, Bretforton
	Area	1.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		○ Reducing volume and rate of runoff ○ Relocating development to zones with lower flood risk ○ Creating space for flooding. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Overall, this site is sequentially less preferable as it is shown to be 100% located in Flood Zone 2. • The site is residential and the entire site is located in Flood Zone 2, so consideration is needed regarding where to place development safely in the site, which will need to be confirmed by a detailed hydraulic model to obtain depth, velocity and hazard data in the site, as well as confirm climate change extents which may be smaller than Flood Zone 2 and make parts of the site more viable. • Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. • Access needs to be considered given the site is in Flood Zone 2; however, once on the New Street/ Weston Road, access is preferable to the east, away from converging watercourses to the west where the risk is highest. Detailed modelling will help confirm the flood depths and hazard around access areas. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1181
	Address	Land to the west of Ivy Lane, Bretforton
	Area	1.48 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate change		Climate change was based on Flood Zone 2 to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a			
	Address	Chequers Lane/Henwick Road			
	Area	5.26 hectares			
	Current land use	University/Employment			
	Proposed land use	University			
Sources of flood risk	Location of site within catchment	This site is located in Worcester City centre along the right-hand bank of the River Severn between Hylton Road (A443) and Henwick Road (B2046), and the railway line. This site comprises two areas; the primary site encompasses a number of education and business buildings and grounds. This section is bordered along its eastern boundary partly by the Hylton Road (north-east and south-east), with its central section inset from the road and bordered by business properties. The western boundary is formed of Hardwick Close (north-west half) and residential properties off Henwick Road in the south-western half. The northern boundary is delineated by the access road off Hylton Road, and the southern boundary by the railway embankment. The secondary site is a small diamond shaped area to the north of the primary site, along Hylton Road, currently occupied by a car sales business.			
	Existing drainage features	The Environment Agency's Detailed River Network shows the primary drainage feature associated with this site is the River Severn near the eastern boundary.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		<1%	44%	98%	2%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		<i>The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)</i>			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a		
	Address	Chequers Lane/Henwick Road		
	Area	5.26 hectares		
	Current land use	University/Employment		
	Proposed land use	University		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment, along with the Flood Zones derived in the 2018 L1 SFRA (which uses latest modelling data not included in the EA's Flood Map for Planning). This site's Flood Zones originate from the River Severn 1D hydraulic model. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available data from the EA for detailed site-specific studies.		
		Flood characteristics: Flood Zone data shows this site to be almost entirely within Fluvial Flood Zone 2, apart from a very small area of the south-western corner, nearest Henwick Road. Flood Zone 2 extends further west than the majority of the western border, crossing Hardwick Close and into the residential properties' land off Henwick Road. Flood Zone 3b is restricted to the river channel behind the Hylton Road flood defences as this is the defended 20-year flood extent; however, Flood Zone 3a encroaches into the site along significant portions of the eastern boundary as this is the undefended 100-year flood extent, particularly in the south-east where it extends to the rear of the basketball club. It also traverses the southern boundary here between the site border and the railway embankment. In reality, the flood defences may prevent the defended 100-year from reaching the site, but there is residual risk to consider. Flood Zone 3a also encroaches in the centre of the eastern boundary along the access road off Hylton Road and flows around the central building into the car park at its rear. This Flood Zone also encroaches into the site in the north-east section that borders Hylton Road, as well as entirely encompassing the small secondary site to the north. The railway embankment forms an impoundment along the southern site boundary, along with the raised levels at Henwick Road, meaning the site is located in a low topographic triangle bound by higher ground impoundments and the River Severn. Risk of Flooding from Rivers and Sea data does not encroach into this site apart from two very small edges of the north-eastern boundaries along Hylton Road of both parts of the site, which are modelled as High risk due to the proximity to the River Severn.		
		Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		1%	7%	19%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
	Surface Water			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a		
	Address	Chequers Lane/Henwick Road		
	Area	5.26 hectares		
	Current land use	University/Employment		
	Proposed land use	University		
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i> Description of surface water flow paths: Risk of Flooding from Surface Water data shows a number of flow paths in and around the site in all 30, 100 and 1,000-year extents, though overall the risk to the site is low. The largest flow path is in the south of the site in the 1,000-year extent predominantly, along Chequers Lane from the Hylton Road, extending along a narrower path to the southern boundary and connecting to another flow path on the Henwick Road. There is also a slightly smaller path in the 100-year extent, with two much smaller ponding accumulations in the 30-year extent. This overall flow path is associated with the basketball arena in the south-east of the site and encompasses a significant proportion of this building. The site is then scattered with smaller accumulations of ponding, most of which are only modelled within the 1,000-year extent and are associated with lower-lying areas of ground mostly used as car parks or on access roads from Hylton Road. One more significant accumulation is along the central access road which bisects the northern half of the primary site north-south. The ponding here is modelled in all 30, 100 and 1,000-year extents, with a similar accumulation close by to the south-east, modelled in the 100 and 1,000-year extents only. Other flow paths are associated with roads surrounding the site, most notably along the length of Hylton Road (in all flow path extents); along Hardwick Close on the north-western boundary and Henwick Road near the south-west corner (100 and 1,000-year extents).		
		Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps; however, the River Severn near the eastern boundary is at high risk and should be considered in a site-specific risk assessment.	
		Flood history	Modelled data shows the site to be almost entirely within the Environment Agency's Historic Flood Map to the same extent as Fluvial Flood Zone 2.	
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		Levee	3	3
		This site is protected by formal flood defences 'Hylton Road Embankment' near the eastern boundary, between the site and the River Severn. The embankment extent along the river's right-hand bank along the length of the site on the opposite side of Hylton Road. Mapping shows the defences align with the south-eastern boundary of the site.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a
	Address	Chequers Lane/Henwick Road
	Area	5.26 hectares
	Current land use	University/Employment
	Proposed land use	University
	Residual risk	The site is at residual risk of flooding from potential flood defence overtopping or breach at Hylton Road, which could cause rapid inundation in an area which is then topographically constrained by the railway embankment and higher ground to the west. Extents would be like the Flood Zones as these are undefended, but the danger is from the sudden inundation and depths/hazard. The potential impacts of this should be considered in a FRA and should use the latest River Severn model from the EA which will better represent the floodplain and depths, velocities and hazard.
Emergency planning	Flood warning	The site is mostly covered by the Environment Agency's Flood Warning Service. The site is covered by the 'River Severn in Worcestershire' Flood Alert Area and the 'River Severn at Hylton Road, Worcester' Flood Warning Area. The site may need an Emergency Plan given its location adjacent to the flood defences.
	Access and egress	Access and egress are possible at this site to pedestrians and vehicles via roadways through and around the site, primarily via Hylton Road and Chequers Lane, but also via an access point in the south-western corner on Henwick Road. Henwick Road is at lowest flood risk in fluvial and surface water events. Hylton Road is protected by flood defences, but consideration is needed regarding the use of this road in more severe events or where there is the potential for overtopping. Where possible, access should be steered away from the River Severn, to the west where all risk is lower. A site-specific risk assessment should investigate vehicle access, and alternative access routes towards the site during severe weather, as parts of these roads, particularly Hylton Road and the central roads through the site are within surface water and fluvial flood risk extents.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a
	Address	Chequers Lane/Henwick Road
	Area	5.26 hectares
	Current land use	University/Employment
	Proposed land use	University
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is detailed fluvial modelling available at the site from the River Severn 1D model, which shows all three modelled climate change extents ('00-year +25%, 35% and 70%) encroaching almost exactly the same distances through the site east to west from the river. Most of the site is encompassed within these extents apart from the south-western corner and area south of Hardwick Close. As part of a site-specific Flood Risk Assessment, the latest River Severn model should be obtained as this will have more updated climate change modelling results. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a
	Address	Chequers Lane/Henwick Road
	Area	5.26 hectares
	Current land use	University/Employment
	Proposed land use	University
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation - Mudstone. - Superficial – Alluvium: Clay, Silt, Sand and Gravel. - Boundary of the Worcester Member (Sand and gravel) to the west - 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 options 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. - Filtration features are 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. Infiltration may be more viable in the southern section of the site due to the lower Groundwater flood risk although this is still possible. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the majority of the site to be at negligible groundwater flood risk, with only a small portion to the south at risk of flooding to subsurface assets, with groundwater between 0.5m and 5m below the surface.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a
	Address	Chequers Lane/Henwick Road
	Area	5.26 hectares
	Current land use	University/Employment
	Proposed land use	University
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. University buildings fall under Education, which are considered 'More Vulnerable'. 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. The site is protected by flood defences but the residual risk needs considering alongside the vulnerability of the development and its users.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Developers should confirm with the EA latest model results to use to assess the site at the Flood Risk Assessment stage, as a River Severn updated modelling study was ongoing at the time of the SFRA, and results were not available. • The potential for defence breach or overtopping should be considered in a site-specific assessment given the site's location immediately adjacent to the Hylton Road defences, particularly as there are some topographic constraints which would cause flood water impoundment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's 'Surface Water Management Plan' and 'SuDS design and evaluation guide' webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a
	Address	Chequers Lane/Henwick Road
	Area	5.26 hectares
	Current land use	University/Employment
	Proposed land use	University
		due to post-development runoff. Assessment for runoff should include allowance for climate change effects. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. Development needs to be steered away from Flood Zone 3 areas in the site. The site is protected by the Hylton Road flood defence but up to its standard of protection, so there is still risk in severe flood events or in the event of a failure. • The site may need an Emergency Plan given its educational use and location immediately adjacent to the Hylton Road flood defences. • Residual risk from potential overtopping or breach needs to be considered in a site-specific assessment. • The latest River Severn model should be obtained to interrogate depths, velocities and hazard at the site to ascertain safe access, effects of climate change and residual scenarios. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP43/29a
	Address	Chequers Lane/Henwick Road
	Area	5.26 hectares
	Current land use	University/Employment
	Proposed land use	University
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones	Flood Zones 2 and 3 originate from the River Severn 1D hydraulic model. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies.	
Climate change	Climate change was based on the River Severn modelling from the Level 1 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies.	
Fluvial depth, velocity and hazard mapping	There is no depth, hazard and velocity data available currently as the River Severn model is 1D-only. The Risk of Flooding from Surface Water mapping has therefore been used as an indication. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies, as this is a 1D-2D model.	
Surface Water	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
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.	

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP44/3			
	Address	Trinity House/Cornmarket			
	Area	2.1 hectares			
	Current land use	Town/Urban			
	Proposed land use	Commercial/ Retail			
Sources of flood risk	Location of site within catchment	This site is located in Worcester City centre and includes areas of the A38 dual carriageway between the Lowesmoor junction and St Martin's Gate roundabout, Silver Street and the junction of New Street and Reindeer Court known as the Cornmarket. It also includes the square of Trinity Street, The Trinity and Queen Street, as well as a large portion of the retail park along St Martin's Gate and the sports courtyard between the A38 and St Martin's Gate multi-story car park. The site is in the River Severn catchment, though is not at fluvial risk.			
	Existing drainage features	Mapping is not available for this site in the Environment Agency's Detailed River Network.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Flood Zones are derived from the Level 1 2018 SFRA which uses the River Severn modelling and the Flood Map for Planning to inform Flood Zones. The site is not covered by any Flood Zones.			
		Flood characteristics: Flood Zone mapping data shows there to be no risk from flooding at this site. Risk of Flooding from Rivers and Sea data is also not modelled at the site. The site has some surface water risk and potential access considerations, hence the Level 2 assessment.			
	Surface Water	Proportion of site at risk (RoFfSW)			
		30-year	100-year	1,000-year	
		0%	2%	12%	
Max depths (m)					
0.3-0.9m		0.3-0.9m	>0.9m		
Max velocity (m/s)					
<0.25	>0.25	>0.25			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP44/3		
	Address	Trinity House/Cornmarket		
	Area	2.1 hectares		
	Current land use	Town/Urban		
	Proposed land use	Commercial/ Retail		
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i> Description of surface water flow paths: Risk of Flooding from Surface Water data on this site shows only minor ingress of flow paths through the site, the majority of which are only modelled in the 1,000-year data extent. These are primarily located along the north-bound carriageway of the A38 through the centre of the site, and a small adjoining flow path from the Cornmarket in the site's western arm. The other significant flow path is along St Martin's Gate in the east of the site along both carriageways, which also join onto a much greater flow path in the southern arm on the sports ground next to the car park. This is a portion of a large flow path which encompasses the roads of Spring Gardens, St Paul's Street and the A38, and the car park and low land surrounding Spring Gardens Surgery to the south-east of the site. This is a continuous flow path in the 1,000-year extent, but also as significant ponding accumulations in the 100-year dataset, which encroaches into the southern arm of the site. Other flow paths modelled around the site are notable along Sansome Street near the northern boundary and Silver Street along the north-eastern border. These are ponding accumulations which slightly encroach into the site in the 1,000-year extent only (Sansome Street) and 100 and 1,000-year extents on Silver Street. This ponding is relatively small, however that on Sansome Street is far more significant, impacting the majority of the crossroad area of Sansome Street and Lowesmoor, as well as Sansome Street up to Sansome Walk. This accumulation is modelled heavily in all surface water extents.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be within the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There are no modelled residual risks associated with this site.		
	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP44/3
	Address	Trinity House/Cornmarket
	Area	2.1 hectares
	Current land use	Town/Urban
	Proposed land use	Commercial/ Retail
Emergency planning	Access and egress	Access and egress are easily possible at this site to pedestrians and vehicles via roadways through and around the site (A38, St Martin's Gate, Lowesmoor, New Street, Silver Street and Queen Street), as well as footpaths along these roads and through the Cornmarket. The consideration for access with this site, is largely concerned with the surrounding area to the north and south, which has a network of patchy surface water flood risk and areas of ponding. A site-specific risk assessment should investigate vehicle access, and alternative access routes towards the site during severe weather, as parts of these roads, particularly the A38 and St Martin's Gate, are within all three surface water flood risk extents.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - The site is not at fluvial flood risk and therefore the 1,000-year surface water flood extent has been used to infer climate change impacts. The main risk is in the southern portion of the site around St Martins Gate. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is modelled through the centre of the site along the A38 and St Martin's Gate in the east. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP44/3
	Address	Trinity House/Cornmarket
	Area	2.1 hectares
	Current land use	Town/Urban
	Proposed land use	Commercial/ Retail
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation - Mudstone. - Superficial – Alluvium: Clay, Silt, Sand and Gravel to the east. - Worcester Member: Sand and Gravel to the west - 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 to prevent the egress of groundwater. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the eastern half of the site to be at no groundwater risk. The western half is designated as levels between 0.5m and 5m below the ground surface, with the risk of flooding to sub-surface assets but with unlikely manifestation of groundwater at the surface.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Commercial development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. The site is not at fluvial flood risk and so will pass the Exception Test.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. • 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.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	SWDP44/3
	Address	Trinity House/Cornmarket
	Area	2.1 hectares
	Current land use	Town/Urban
	Proposed land use	Commercial/ Retail
		Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - The site is not at fluvial flood risk and therefore passes the Exception Test. - Consideration should still be given to certain portions of the site at higher surface water flood risk, for example around St Martins Gate, and access in the surrounding streets where risk is higher. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling. The site is not at fluvial flood risk.	
Climate change	Climate change was based on the 1,000-year surface water flood extent as there is no fluvial flood risk.	
Fluvial depth, velocity and hazard mapping	There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses.	
Surface Water	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
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.	

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0680			
	Address	Land off Sawmills Walk/Briar Close, Evesham			
	Area	0.88 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	This site is located in the west of Evesham, adjacent to Briar Close Business Park. The site slopes steeply east to west into the valley of the River Avon. The railway lies to the north of the site, and the Sports & Leisure Centre to the south-west. A public footpath runs along the southern boundary joining Sawmills Walk and Briar Close with the Sports & Leisure Centre.			
	Existing drainage features	Drainage features at this site include a series of small field drains which connect south-west of the site and flow directly into the River Avon. The primary drain runs along the western border after flowing west to east and turning south when it reaches the north-western corner of the site. This flows along the entire western boundary before joining the drainage system flowing into the Avon. There are three drainage channels that join and flow into the Avon. The second one flows from the south, and the third from the east running parallel to the southern boundary of the site along the side of the public footpath. The Environment Agency's Detailed River Network shows this to start ~halfway up the steep slope. This is likely not modelled as the catchment is <3km².			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		2%	5%	26%	74%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		<i>The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)</i>			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment along with River Avon modelled data, used to derive Flood Zones in the 2018 Level 1 SFRA.			
		Flood characteristics: Fluvial risk at this site is primarily associated with the River Avon flowing to the west of the site; all Flood Zones are very similar in extent as the Avon floodplain is flat and wide. Flood Zone 2 however extends further into the west of the site, spanning the western section and confined to the topographically lower quarter of the site. The land then rises away from the floodplain to the east. The railway line forms a topographic impoundment on the Avon immediately north of the site. Risk of Flooding from Rivers and Sea data however covers a similar reach to Flood Zone 3, and the High risk classification modelled data just crosses into the site in the north-western corner and then follows the western boundary north to south.			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0680		
	Address	Land off Sawmills Walk/Briar Close, Evesham		
	Area	0.88 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		0%	0%	<1%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Risk of Flooding from Surface Water mapping at this site shows almost no impact within the site from surface water flooding. However, the surrounding area, including the River Avon's floodplain, the railway embankment to the north, the business park to the north and east, and the drainage channel to the south, are all shown to be within the 1,000-year extent. Surface water flood risk extents of 30 and 100-years are not impacting the site in any capacity. The 1,000-year extent encroaches into the northern corner as a significant flow path flows west from atop the railway embankment down onto the floodplain. These flow paths are shown as being low risk for depth and velocity. The flow path extends along sections of the business park to the north-east. Ponding here is modelled within 100-year extents, and in the 30-year extent further along the railway embankment crossing Briar Close. A small 1,000-year extent flow path is also present flowing from Sawmills Walk. This follows the local topography where a small channel leads into the southern drain (likely the unmodelled reach in the Detailed River Network data). This has the potential to impact the south-eastern corner and southern boundary though is not modelled to encroach into the site. More minor ponding in the 100 and 1,000-year extent is modelled on the lanes to the south of the site adjoining Briar Close, including Albert Road, Rudge Road and Coxlea Close. These flows may connect to a small flow path that joins the southern drain from the south.		
	Reservoir	The site is shown to be at risk of reservoir flooding from the available online maps. The River Avon to the west of this site acts as the conduit for this flood risk. The encroaching extents into the site are shown to be Below <0.3m depth in a similar reach to Fluvial Flood Zone 2, and Between 0.3 and 2m along the western boundary with velocity throughout Below 0.5m/s. The Maximum Extent of Flooding from Reservoirs reach (Over 2m depth and Over 2m/s velocity) encroaches into the northern corner only, though is also shown near the southern boundary along the drain.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0680		
	Address	Land off Sawmills Walk/Briar Close, Evesham		
	Area	0.88 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
	Flood history	This site is shown to be within the reaches of the data modelled in the Environment Agency's Historic Flood Map. The data shows the extent to be the same as Fluvial Flood Zone 2, along the western section of the site at the foot of the slope.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	The only residual risk to this site would be from blockage to the Avon structure under the railway line, where its embankment forms an impoundment, and backing up of water could impact the site. It is unlikely due to the width of the floodplain and size of the channel through the structure, that significant impacts would be felt at the site, given it is located on its outer extremities of the flood extents, but this should be covered off in a FRA.		
Emergency planning	Flood warning	The site is partially covered by the Environment Agency's Flood Warning Service in its western section, aligned with the Flood Zones. The Flood Alert is for the River Avon in Worcestershire and the Flood Warning Area is the River Avon at Evesham.		
	Access and egress	Access and egress is possible from a small road leading off Briar Close. Surface water risk is fairly low in this area, mostly with 1,000-year flood risk. Other access at this site can be made via gateway in the south-east corner along the footpath/track leading to the Sports & Leisure Centre. This track is accessible via a turning off Sawmills Walk, opposite Evesham Mechanical Services. This footpath/track is in the 1,000-year Risk of Flooding from Surface Water extent and a site-specific risk assessment should be undertaken to investigate accessibility for vehicles and pedestrians to the site.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0680
	Address	Land off Sawmills Walk/Briar Close, Evesham
	Area	0.88 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling showing the potential implications of climate change is available at this site from the River Avon 1D hydraulic model, which was run for the 3 2080s epoch allowances (100-year +25%, 35% and 70%).. The three modelled datasets all encroach into the site along the western boundary, though not as far as Fluvial Flood Zone 2. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This would likely impact the site in a similar manner to the 1,000-year extent and encompass a significant area of the site, encroaching into shallower topographic features. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0680
	Address	Land off Sawmills Walk/Briar Close, Evesham
	Area	0.88 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. - Superficial – Wasperton Sand And Gravel Member - Sand And Gravel. - 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, likely in the western side on the floodplain, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration. - Detention options are 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 maybe required to prevent the egress of groundwater. - Filtration options are 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site has groundwater levels between 0.5-5m below the surface, where there is a risk of flooding to subsurface assets, but manifestation at the surface is unlikely. Immediately west of the boundary in the Avon floodplain, there is negligible risk from groundwater flooding due to the nature of local geological deposits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0680
	Address	Land off Sawmills Walk/Briar Close, Evesham
	Area	0.88 hectares
	Current land use	Greenfield
	Proposed land use	Employment
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site, away from the very western boundary. As Flood Zone 3 only encroaches into the site by a negligible percentage, it should pass the Exception Test if development is sited away from here. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0680
	Address	Land off Sawmills Walk/Briar Close, Evesham
	Area	0.88 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		- 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 74% of the site located within Flood Zone 1, therefore the eastern portion of the site, avoiding where possible the western boundaries where there is fluvial risk. - Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - Consideration is given to the potential for further impoundment at the railway embankment. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 originate from the River Avon model, represented in the Flood Zones derived as part of the Level 1 SFRA.
Climate change		Climate change was based on the River Avon modelling from the Level 1 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch.
Fluvial depth, velocity and hazard mapping		There is no depth, hazard and velocity data available currently as the Bow Brook model is 1D-only. The Risk of Flooding from Surface Water mapping has therefore been used as an indication.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0680
	Address	Land off Sawmills Walk/Briar Close, Evesham
	Area	0.88 hectares
	Current land use	Greenfield
	Proposed land use	Employment
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0691sc			
	Address	Land off Wyre Road, Pershore			
	Area	4.05 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located in the north-east of Pershore, on the right-hand bank floodplain of the Piddle Brook, ~1km north of the Brook's confluence with the River Avon. Wyre Road runs near the northern boundary with the Piddle Brook valley along the southern section of the site.			
	Existing drainage features	Drainage features at this site are shown in the Environment Agency's Detailed River Network along the eastern boundary and from the southern border. A small, un-named tributary flows south along the eastern boundary and joins the Piddle Brook. A small field drain also flows into the Piddle Brook from the southern boundary. The Piddle Brook flows east to west near the southern boundary of the site. Two ponds are located near the northern corner of the site; one in the parcel of land between the northern boundary and the Wyre Road roundabout; and the other to the east of the roundabout near Atlas Way.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		6%	10%	20%	80%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0691sc		
	Address	Land off Wyre Road, Pershore		
	Area	4.05 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment, along with the Flood Zones derived in the 2018 L1 SFRA (which uses latest modelling data not included in the EA's Flood Map for Planning). This site is captured in the River Avon hydraulic modelling, in the confluence floodplain between the River Avon and the Piddle Brook..		
		Flood characteristics: Fluvial risk at this site is associated with the Piddle Brook to the south of the site through the section which lies within the floodplain along the foot of the slope. The Piddle Brook also interacts with the River Avon here, as the Avon floodplain and flood extent is wide and incorporates the downstream extent of the Piddle Brook in the vicinity of the site. The site is located just where the floodplain of the Piddle Brook opens out to meet the Avon floodplain. With the Avon floodplain being so wide, there is often little difference between return period flood extents. Fluvial Flood Zone 3 (both 3a and 3b) infringes into the site along the southern boundary. Flood Zone 2 also encroaches along this same section although slightly further into the site. It also extends halfway along the eastern boundary following a topographic depression through which the unnamed tributary flows. Overall, risk is confined along the southern and eastern boundary as the land steeply rises away from the floodplain in the southern third of the site. Risk of Flooding from Rivers and Sea data from the Environment Agency models risk to be High and Medium, encroaching into the site a similar extent to Fluvial Flood Risk Zone 2.		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		<1%	<1%	<1%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0691sc		
	Address	Land off Wyre Road, Pershore		
	Area	4.05 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Description of surface water flow paths: Risk of Flooding from Surface Water modelling at this site shows almost no impact within the site from surface water flooding. However, the surrounding area, including the Piddle Brook's floodplain to the south, and the residential estates and highways to the north are all shown to be within all 30, 100 and 1,000-year extents. Very minor encroachments of the 1,000-year extent into the site are present along the southern border and in a small stretch in the north-eastern corner in the depression where the un-named tributary flows along the site boundary. The main surface water risk is adjacent to the site's southern boundary, in the Piddle Brook/ River Avon floodplain, where topography is lower and surface water naturally accumulates adjacent to the watercourses. There are flow paths along the upstream reach of the un-named tributary and the areas surrounding this watercourse, particularly to the east of Ascot Road, and north of Atlas Way. These accumulations are evident in and 30, 100 and 1000-year extents and all flow south towards the Wyre Road roundabout, and collects either on the road itself, or in the pond between the roundabout and the site.		
	Reservoir	The site is shown to be partially at risk of reservoir flooding from the available online maps. Risk of flooding from Reservoirs on the Piddle Brook to the south of this site is modelled to encroach over the southern boundary of the site. Encroachment is of a similar reach to Fluvial Flood Zone 2.		
	Flood history	This site is shown to be within the reaches of the data modelled in the Environment Agency's Historic Flood Map. The data shows the extent to be the same as Fluvial Flood Zone 2, along the southern section of the site at the foot of the slope.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
	Residual risk	This site is not protected by any formal flood defences. Residual risk at this site is associated primarily with the un-named tributary along the eastern border, which passes through a culvert under the Wyre Road near the roundabout to the north of the site. Although any impoundment here would firstly impact the land upstream of the culvert, secondary impacts could affect the site by overland flows across Wyre Road, down the eastern site boundary.		
Emergency planning	Flood warning	The site is partially covered by the Environment Agency's Flood Warning Service along the southern and south-eastern boundaries. The Flood Alert covering the site is 'River Avon in Worcestershire' – River Avon from Salford Priors to Tewkesbury. The site is not covered by a Flood Warning Area as no current properties are shown to be at risk.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0691sc
	Address	Land off Wyre Road, Pershore
	Area	4.05 hectares
	Current land use	Greenfield
	Proposed land use	Residential
	Access and egress	Access and egress at this site is via Wyre Road along the northern boundary. Parts of the road are in the 1,000-year Risk of Flooding from Surface Water and a site-specific Flood Risk Assessment will identify accessibility for vehicles and pedestrians to the site. Access to the south should be avoided as this is the floodplain.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling showing the potential implications of climate change is available at this site. The three modelled datasets for climate change (100-year +25%, 35% and 70% extents) all encroach into the site along the southern and south-eastern boundary. The 25% and 35% extents encroach to a similar reach to Fluvial Flood Zone 3; however, the 70% extent crosses slightly further than Flood Zone 2, but generally follows the Flood Zone 2 and Historic Flood Map extents. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This would likely impact the site in a similar manner to the 1,000-year extent and encompass a significant area of the site, encroaching into shallower topographic features. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0691sc
	Address	Land off Wyre Road, Pershore
	Area	4.05 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Charmouth Mudstone Formation - Mudstone. - Superficial – Wasperton Sand And Gravel Member - Sand And Gravel. - 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 options are 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 maybe required to prevent the egress of groundwater. - Filtration options are 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is split in half between two designations; the northern half of the site has groundwater levels between 0.5m and 5m below the ground surface, with a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely. Then in the southern half of the site along the river floodplain, there is no risk of groundwater flooding; risk is negligible due to the nature of the local geological deposits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0691sc
	Address	Land off Wyre Road, Pershore
	Area	4.05 hectares
	Current land use	Greenfield
	Proposed land use	Residential
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern boundary, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0691sc
	Address	Land off Wyre Road, Pershore
	Area	4.05 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		- 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 80% of the site located within Flood Zone 1, therefore the northern portion of the site, avoiding where possible the southern and eastern boundaries where there is fluvial risk. - Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site.
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Level 1 2018 SFRA, which used the Environment Agency's Flood Map for Planning and updated this where detailed models were available, as the model data was not always represented in the Flood Map for Planning. This site is located in the floodplain of the River Avon hydraulic model. A new model is also being built for the Piddle Brook in 2021; developers should seek the latest model available for a site-specific Flood Risk Assessment to confirm flood risk.
Climate change		Climate change was based on the River Avon's hydraulic model, where the 100-year event was upscaled by the 2080s scenarios (+25%, +35% and +70% for the Severn basin).

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0691sc
	Address	Land off Wyre Road, Pershore
	Area	4.05 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Fluvial depth, velocity and hazard mapping		There is no depth, hazard and velocity data available currently as the River Avon model is 1D-only; therefore, the Risk of Flooding from Surface Water mapping has been used as an indication. This should be explored further at site-specific stage.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0866			
	Address	Land adjacent to & west of the Galton Arms, Himbleton			
	Area	1.11 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	The village of Himbleton is located in the rural expanse to the north-east of Worcester along the right-hand bank of the Bow Brook. The site is located along Harrow Lane near the village centre. The site slopes from west to east towards the valley, with the lowest point being the north-eastern corner, along Harrow Lane.			
	Existing drainage features	There are no direct drainage features directly associated with this site shown in the Environment Agency's Detailed River Network. The nearest drainage feature is the Bow Brook which flows through the valley to the east of the site.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		<1%	<1%	<1%	99%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data:			
		The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. There are no detailed models of the Bow Brook available in this location.			
		Flood characteristics:			
		Fluvial risk at this site is associated with the Bow Brook to the east of the site, which funnels along Harrow Lane towards the site, though there is minimal fluvial flood risk related to this site.			
	Flood Zone 3 slightly infringes on the north-eastern corner along Harrow Lane. Flood Zone 2 also impacts this corner though extends further west along the lane towards the centre of the northern boundary. Encroachment into the site from both Flood Zones is minimal.				
Risk of Flooding from Rivers and Sea data from the Environment Agency models risk to be High and Medium. High risk is associated with areas similar to Fluvial Flood Risk Zone 2 in the eastern corner. Medium risk however encompasses the eastern corner, as well as extending along the northern boundary on Harrow Lane.					
Surface Water	Proportion of site at risk (RoFfSW)				
	30-year	100-year	1,000-year		
	<1%	<1%	2%		
	Max depths (m)				
	0.3-0.9m	0.3-0.9m	>0.9m		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0866		
	Address	Land adjacent to & west of the Galton Arms, Himbleton		
	Area	1.11 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Risk of Flooding from Surface Water at this site is largely associated with Harrow Lane along the northern boundary which carries a conduit of surface water overland flows leading to the Bow Brook flowing east in all 30, 100 and 1,000-year surface water extents. This flow path is sourced from surface run off flowing off the surrounding hillsides and channelling down Harrow Lane. This flow path does not encroach into the site due to the field boundary, except for in small, isolated pockets. There are two areas of narrow ponding that are modelled to accumulate at this site. One is a 100 and 1,000-year extent accumulation along the western boundary, which only slightly encroaches into the site; and the other is within a narrow depression through the centre of the site running west to east. Mapping indicates this to be only active during the 1,000-year event. These are negligible areas of risk. Significant surface water flooding is shown along the Bow Brook floodplain with extents similar to the Flood Zones.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is shown to be partially within the reaches of the Environment Agency's Historic Flood Map. The data shows the extent to cross the eastern corner and borders the north-eastern boundary along Harrow Lane.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	The only potential residual risk would be if the culvert of the Bow Brook blocked under Harrow Road, this could push more flood water up Harrow Lane towards the site, but as this is the outer edge of the flood extent, risk to the site is deemed low.		
Emergency planning	Flood warning	The site is partially covered by the Environment Agency's Flood Warning Service along the eastern and north-eastern boundaries. The site is covered by the Bow and Piddle Brook Flood Alert Area but is not covered by a Flood Warning Area.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0866
	Address	Land adjacent to & west of the Galton Arms, Himbleton
	Area	1.11 hectares
	Current land use	Greenfield
	Proposed land use	Residential
	Access and egress	Access and egress at this site are easiest via a gateway into the site from Harrow Lane in the eastern corner. Harrow Lane is the access road for the site, but a Level 2 assessment was flagged due to consideration of surface water risk down Harrow Lane. The Bow Brook floodplain is shown to cross the Lane to the east of the site, so access should be sought away from the site to the west. Developers need to consider this Lane being a surface water flow route and investigate further the depths, velocities and hazard in a site-specific Flood Risk Assessment should therefore be undertaken to investigate accessibility for vehicles and pedestrians to the site.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available at the site, and therefore Flood Zone 2 has been used as a conservative indication of flood risk from climate change. This extends along the northern boundary of the site. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances may need to be considered in a detailed hydraulic model. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This would likely impact the site in a similar manner to the 1000-year extent and encompass a significant area of the site, encroaching into shallower topographic features. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0866
	Address	Land adjacent to & west of the Galton Arms, Himbleton
	Area	1.11 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Wilmcote Limestone Member - Mudstone And Limestone, Interbedded. - Superficial – None recorded - 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 to prevent the egress of groundwater. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping shows the majority of the site at no risk due to local geological deposits. The far north-eastern boundary, which is considered as the Bow Brook floodplain, has groundwater levels at or very near 0.025m of the ground surface. Within this zone, there is a risk of groundwater flooding to both surface and subsurface assets.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site, away from the north-eastern corner. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths from the Bow Brook using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0866
	Address	Land adjacent to & west of the Galton Arms, Himbleton
	Area	1.11 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		- 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is steered away from the north-eastern corner where there is a minor encroachment of Flood Zones. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. - Access and egress need to be considered, given Harrow Lane acts as a surface water flow route conduit from west to east, and east of the site, the Bow Brook Flood Zones expand over the Lane. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available of the Bow Brook.
Climate change		Climate change was based on Flood Zone 2 and 1,000-year Risk of Flooding from Surface Water extent to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are considered for surface water as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0866
	Address	Land adjacent to & west of the Galton Arms, Himbleton
	Area	1.11 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0891			
	Address	Land south of Vale Park, Evesham			
	Area	4.74 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	This triangular shaped site is located to the south of Evesham and the Vale of Evesham along the right-hand bank of the Battleton Brook. It lies to the west of Longdon Hill and on the southern fringe of Vale Business Park.			
	Existing drainage features	The Environment Agency's Detailed River Network shows data shows the Battleton Brook flowing along the western boundary. An un-named field drain joins the brook at the northern corner of the site from the west, and another smaller drain joins the corner on the eastern boundary here from the east also.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data:			
		The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data.			
		Flood characteristics:			
	The site is not covered by the EA's Flood Zones in this location, as the catchment is less than 3km2. However, it is likely that there will be some risk associated with the Battleton Brook along the site's western boundary, and also at the northern tip where three small drains converge. This should be investigated in a site-specific Flood Risk Assessment and may need a hydraulic model to confirm risk along the site boundary.				
	In the absence of fluvial data, the surface water mapping datasets can be used as an indication of flood risk from small watercourses.				
Surface Water	Proportion of site at risk (RoFfSW)				
	30-year	100-year	1,000-year		
	2%	3%	15%		
	Max depths (m)				
	0.3-0.9m	0.3-0.9m	>0.9m		
	Max velocity (m/s)				
	<0.25	>0.25	>0.25		
	The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)				

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0891		
	Address	Land south of Vale Park, Evesham		
	Area	4.74 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site shows numerous flow paths in and around the site. More significantly is the influence of the Battleton Brook and the drainage channels that converge at the northern corner of the site. Topography associated with Longdon Hill directs a large proportion of the flow into and around the western drain. One particular flow path crosses the Battleton Brook from the south-west to enter the drain. These flow paths are shown to be active within 30 and 100-year events with much wider spread and interaction between the drains in the 1,000-year event. The smaller drainage channel to the east of the site also contributes small flow paths in the 30 and 100-year extents in and around the channel, and the 1,000-year extent is comparable to the western channel with a significantly wider area coverage. The Battleton Brook itself is shown to act only as a small conduit of surface water flows, with most of the flow paths flowing parallel along another unnamed drainage channel where topography is lower, and from the east. Individually, these flow path extents do not pose a significant surface water flood risk to the site, particularly in 30 and 10-year extents as they only impact the fringes of the northern corner. However, collectively they present a greater risk, again to the northern corner. North of the site along the Battleton Brook, surface water flood risk is shown to be greater in the 30 and 100-year extents, as well as a comparably wide coverage of the 1,000-year extent across the floodplain to the west of the Brook. All three extents are also modelled to severely impact the roads of the Business Park to the north. Access therefore needs to be considered due to limited road access points to the site and surrounding flood risk.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be within the reaches of the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There does not appear to be any significant residual risks posed to the site, other than a culvert at the Business Park on the Battleton Brook, which is blocked could force water upstream towards the northern tip of the site.		
	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0891
	Address	Land south of Vale Park, Evesham
	Area	4.74 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Emergency planning	Access and egress	Access and egress at this site are easiest via Enterprise Way; the southernmost road on Vale Business Park, north of the site. This does not directly connect to the site, though access is possible along field to the north of the site, along the western riverbank of the Battleton Brook. A site-specific risk assessment should be undertaken to assess possible access for pedestrians and vehicles to, and through, this site due to the significant extents of surface water risk surrounding the site, including access roads through the business park.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available at the site, nor is there a Flood Zone 2 extent to use as a proxy, therefore the 1,000-year surface water extents have been used to assess possible risk from climate change. This is shown to affect the site's western boundary along the channel and pond in the northern tip where topography is lower due to three drains converging. A detailed model may be required at FRA stage to assess the fluvial risk from climate change to the site. - Climate change should be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0891
	Address	Land south of Vale Park, Evesham
	Area	4.74 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. - Superficial – None recorded - 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, though a site-specific risk assessment should evaluate this in the eastern corner. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the site to be at no risk of groundwater flooding, due to the nature of the local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site, which needs to be confirmed in a site-specific assessment in the absence of any fluvial flood risk data, but steering away from the watercourse and areas of highest risk. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the Battleton Brook along the western and northern boundaries, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0891
	Address	Land south of Vale Park, Evesham
	Area	4.74 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Development is steered away from the channel to the west and northern tip of the site where surface water risk accumulates. • Whilst the site is currently not shown to be at fluvial risk, this is because the catchment size is too small to be captured in the EA's Flood Zones, and therefore risk will need to be confirmed in a Flood Risk Assessment. It is likely there will be some fluvial risk shown to the site, along the western boundary and northern tip, as indicated by the surface water mapping dataset. • Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. • Access and egress need to be considered as at present, there are no roads leading directly to the site, and those in the business park to the north are affected by surface water flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0891
	Address	Land south of Vale Park, Evesham
	Area	4.74 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available, and there is no Flood Zone data shown either, due to the small catchment size. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.
Climate change		Climate change was based on the 1,000-year surface water extent as a proxy, in the absence of fluvial model data and a Flood Zone 2 extent as a proxy. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925			
	Address	Two Shires Park, Weston Road, Honeybourne			
	Area	31.27 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	This large site is located east of Evesham near the headwater tributaries of the Broadway Brook, one of numerous tributaries draining the northern corner of Broadway Hill and Snowhill in the Cotswolds. The site primarily includes Two Shires Park industrial estate, but also parts of Tower Farm House along the north-western boundary, Tower Farm to the south-east, and West Acre on the B4035 (Weston Road) to the south-west. The Honeybourne Road runs along the eastern boundary and a disused railway embankment defines the south-eastern border.			
	Existing drainage features	The Environment Agency's Detailed River Network shows data shows that there are no river networks within the site; however, a small field drain is present to the north-west of the site, linking to a small pond on the adjacent side of the B4035. The nearest watercourse to this site is the Honeybourne Brook which flows through neighbouring land to the north-east of the site.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		2%	2%	9%	91%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)					

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925		
	Address	Two Shires Park, Weston Road, Honeybourne		
	Area	31.27 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. There are no detailed hydraulic models along this watercourse.		
		Flood characteristics: The available fluvial Flood Zone mapping data for this site shows the east and north-eastern section of the site, nearest the Honeybourne Road is impacted by Flood Zones 2 and 3. The floodplain to the east of the site and on the opposite side of the Honeybourne Road holds the majority of floodplain capacity, though topographic depressions in the ground topography dataset allow this to spill across the road at a number of locations, two of which enter the site along its eastern boundary. Flood Zone 3 just encroaches into the site's eastern boundary and Flood Zone 2 extends further through the north-eastern portion of the site. The Flood Zone data is based on 2D generalised modelling which is shown to spread quite extensively in the surrounding area away from the channel and interacts and connects with the floodplain extents of other parallel drains to the north-east of the site. This spread seems quite extensive considering the sizes of the channels and catchments. It may be that a detailed hydraulic model which accounts for channel and structure survey, would reduce this flood extent somewhat, or would confirm whether flood extents do indeed reach the site over Honeybourne Road or where there is a low spot in the ground topography dataset. Risk of Flooding from Rivers and Sea data shows that a similar area to Flood Zone 2 as being at Low or Medium risk, however the eastern corner near the railway embankment is High Risk.		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		2%	6%	20%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925		
	Address	Two Shires Park, Weston Road, Honeybourne		
	Area	31.27 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site shows flow paths in all 30, 100 and 1,000-year extents through the north-eastern portion of the site. The overall topography of the site slopes south-north, which directs surface water flow paths along the eastern side into the northern section before exiting and flowing towards the Honeybourne Brook, which turns to flow in a westerly direction north of the site. Extents of the 30-year and 100-year surface water risk are localised around the access lane into the estate near the entrance off the Honeybourne Road, and much of it is impounded here to the south of the lane as is the Fluvial Flood Zone 3; however, there is a small flow path that crosses the lane. Extents of the 1,000-year surface water flow paths are exponentially larger and encompass a significant proportion of the eastern and north-eastern section of the site. Instead of being a number of small individual flow paths or areas of ponding, the 1,000-year flow path is closer to one singular flow path that passes through the site from south to north, intertwining between buildings, along roads and through localised topographic depressions. As with the fluvial mapped risk, there are lots of parallel flow paths which cross and interact between the watercourses and areas of lower topography.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be within the reaches of the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There are no residual risks noted to the site as part of this assessment.		
	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925
	Address	Two Shires Park, Weston Road, Honeybourne
	Area	31.27 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Emergency planning	Access and egress	Access to the site is from either the Honeybourne Road along the north-eastern boundary, or the B4035 from the south-western boundary. Flood risk is most notable in the north-eastern section of the site along Honeybourne Lane, particularly to the north where it then turns into Weston Road. This road is affected significantly by both fluvial and surface water flood risk. Access south and then across the B4035 is much more suitable and is mostly at low risk. Developers should consider the access risk not only immediately at the site, but the near vicinity where watercourses and surface water risk crosses nearby roads at various locations, for example towards Mickleton, and then in the opposite direction where Flood Zones spread wider near Bretforton. A site-specific FRA should investigate safe access and egress in more detail, assessing the depths, velocities and hazard in the vicinity of the site as well as just at the site entrances.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925
	Address	Two Shires Park, Weston Road, Honeybourne
	Area	31.27 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available at the site, and therefore Flood Zone 2 has been used as a conservative indication of flood risk from climate change. This encroaches into eastern and north-eastern sections of the site. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model, to confirm the impact in the site. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This extends along the eastern section from large flow paths that pass through the site south to north. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925
	Address	Two Shires Park, Weston Road, Honeybourne
	Area	31.27 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. - Superficial – Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. - 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 options 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. Risk of groundwater egress is mapped to be <25% in the southern quarter of the site. - Filtration features are 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. Risk from groundwater egress is mapped as <25% in the southern quarter of the site. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows there is no risk from groundwater flooding due to the nature of the local geological deposits

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925
	Address	Two Shires Park, Weston Road, Honeybourne
	Area	31.27 hectares
	Current land use	Greenfield
	Proposed land use	Employment
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled watercourse, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925
	Address	Two Shires Park, Weston Road, Honeybourne
	Area	31.27 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		- Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. - 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 91% of the site located within Flood Zone 1 and the 80% outside of the surface water dataset, therefore steering away from the north-eastern portion of the site. - A more detailed model may be required at FRA stage to confirm risk to the site and its access. - Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. - Access considerations are needed in the wider vicinity of the site, as there is significant fluvial and surface water risk along Honeybourne Road and where numerous watercourses cross the B4035 and show risk across it. Refer to the detailed ‘guidance for developers’ section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency’s Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency’s Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0925
	Address	Two Shires Park, Weston Road, Honeybourne
	Area	31.27 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate change		Climate change was based on Flood Zone 2 to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0933 & CFS1076			
	Address	Land at Navigation Road, Diglis, Worcester			
	Area	14.27 hectares			
	Current land use	Greenfield			
	Proposed land use	Mixed Use			
Sources of flood risk	Location of site within catchment	This large site is located near the centre of Worcester, ~1.5km downstream along the left-hand bank of the River Severn. Diglis is a well-known location in Worcester for the large navigation locks and significant weir between the right-hand bank and Diglis Island, which was built to maintain and control the locks along the left-hand bank. The footpath that runs along the riverbank here forms the sites western boundary, with Navigation Road forming the north-eastern border (this turns west into the site, bisecting it east to west), and Cherry Orchard the south-eastern and southern boundaries. The northern boundary of the site is comprised of existing property borders. A short distance downstream of the site, the River Teme joins the Severn from the west.			
	Existing drainage features	The Environment Agency's Detailed River Network shows the primary drainage feature associated with this site is the River Seven which flows north to south along the site's western boundary. A docking port connected to the river lies near the north-eastern boundary of the site, and the 2 large navigation locks on the river itself are located in the centre of the western boundary.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		6%	9%	98%	2%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		<i>The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)</i>			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0933 & CFS1076		
	Address	Land at Navigation Road, Diglis, Worcester		
	Area	14.27 hectares		
	Current land use	Greenfield		
	Proposed land use	Mixed Use		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment, along with the Flood Zones derived in the 2018 L1 SFRA (which uses latest modelling data not included in the EA's Flood Map for Planning). This site's Flood Zones originate from the River Severn 1D hydraulic model. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available data from the EA for detailed site-specific studies.		
		Flood characteristics: The available Fluvial Flood Zone mapping data modelled for this site is from the River Severn, and this indicates flood risk at this site is extensive due to its proximity to the River Severn. Fluvial Flood Zone 3a and 3b are shown to impact the western boundary only, with minor topographic features dictating encroachment into the site. Flood Zone 3b encroaches into the site mostly on the meander near the south-western corner, whilst Flood Zone 3a extends further north along the western boundary and onto Diglis Dock Road. Flood Zone 2 however extends across the entirety of the site and engulfs the area over the eastern boundary until it is restrained by a topographic incline near Diglis Lane on the outskirts of the industrial estate to the east. The only sections not impacted by Flood Zone 2 are two small areas near the junction of Trow Way with the internal part of Navigation Road, through the centre of the industrial estate. Risk of Flooding from Rivers and Sea data shows an area covering the western half of the site is within the High-risk category, whilst the remainder is classified as Medium risk.		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		<1%	1%	5%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0933 & CFS1076		
	Address	Land at Navigation Road, Diglis, Worcester		
	Area	14.27 hectares		
	Current land use	Greenfield		
	Proposed land use	Mixed Use		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site shows small, scattered flow paths in all 30, 100 and 1,000-year extents across the site, though the overall proportion is very small, and risk is considered very low Most risk is present in the 1,000-year event, following the alignment of the River Severn and small pockets of ponding in the site and following nearby drains and roads. Similar accumulations are modelled to be present in the land surrounding the site, mostly constrained along roads and small topographic depressions. There are generally small in volume but are numerous, however notable pockets of ponding are modelled along Basin Road, Crossley Road and further along Diglis Dock Road.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps; however, the River Severn is shown to be at risk.		
	Flood history	This site is shown to be almost entirely within the reaches of the Environment Agency's Historic Flood Map, apart from a small section near the centre of the site similar to the area modelled to be unaffected by Fluvial Flood Zone 2, and a small area in the north-eastern corner near the boat dock. The Historic Flood Map data extends across a similar area as Fluvial Flood Zone 2 and reaches Diglis Lane to the east of the site.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
	This site is not protected by any formal flood defences.			
	Residual risk	Residual risk appears to be low as there are no structures visible on mapping which could impact the site if blockages were to occur and the site is located downstream of Worcester defences. There are the Navigation locks and weir at Diglis, as well as the boat dock near the north-western corner. There are two large navigation locks at Diglis which are located in the river's eastern channel, between Diglis Island and the left-hand bank, where the site's western border lies. The boat dock is located just upstream of these locks also. There is a risk of impounding behind the lock gates should they fail to open during high flows. Diglis weir, located in the western channel between Diglis Island and the river's left-hand bank, also poses an impounding risk and could deflect flows across to the eastern side if the river, impacting the locks. There is also an inherent risk from the weir due to the current construction of a large fish pass and public viewing gallery along the right-hand bank of the weir. A site-specific assessment should confirm any residual risks to the site.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0933 & CFS1076
	Address	Land at Navigation Road, Diglis, Worcester
	Area	14.27 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
Emergency planning	Flood warning	The site is entirely covered by the Environment Agency's Flood Warning Service. The Flood Alert Area of 'River Severn in Worcestershire' completely covers the site, and the western half of the site is also covered by the 'River Severn in South Worcester' Flood Warning Area.
	Access and egress	Access and egress at this site are easiest along roads into and through the industrial estate, namely Navigation Road and Diglis Dock Road, to the A38/Bath Road. A site-specific Flood Risk Assessment should be undertaken to evaluate accessibility to pedestrians and vehicles at both of these access points, as these roads are within the 100 and 1,000-year surface flood risk data, as well as being significantly covered by Flood Zone 2. Access routes around the wider perimeter of the site, including Diglis Lane should also be assessed due to their proximity to the Flood Zones and surface water extents.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling is available at the site from the River Severn 1D model, which shows all 2080s modelled scenarios encroach into the site. The 100-year +25% and 35% extents encroach across the western boundary, similar to Flood Zone 3 but extending a little further into the centre of the site. The 100-year +70% extent is similar to Flood Zone 2, largely covering the site except for a small portion in the southern portion. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This extends along the eastern section from large flow paths that pass through the site south to north. - The current day 1000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0933 & CFS1076
	Address	Land at Navigation Road, Diglis, Worcester
	Area	14.27 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation – Mudstone - Superficial – Alluvium - Clay, silt, Sand and Gravel. - 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 in the western half of the site. - 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 measures are 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 maybe required to prevent the egress of groundwater. - Filtration features are probably suitable provided site slopes are <5% and the depth to the water table is >1m. A liner should be used 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 should be used to prevent the egress of groundwater. - This site has areas within its boundary 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 EA) at an early stage to understand possible constraints. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping dataset shows the site to be at negligible risk from groundwater flooding due to the nature of local geological deposits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0933 & CFS1076
	Address	Land at Navigation Road, Diglis, Worcester
	Area	14.27 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable' and Employment development is classified as 'Less Vulnerable'. In mixed use developments, the highest vulnerability level should be considered ('More Vulnerable'). Residential development should be steered away from Flood Zone 3, and least vulnerable development placed where Flood Zone 2 extends. The site is largely covered by Flood Zone 2, so careful thought is needed at this site regarding where it is safe to place different types of development and how safe access and egress will be achieved. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Developers should confirm with the EA latest model results to use to assess the site at the Flood Risk Assessment stage, as a River Severn updated modelling study was ongoing at the time of the SFRA, and results were not available. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF (for example if the small drain was modelled. The Severn's FZ3b does not affect the site). • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0933 & CFS1076
	Address	Land at Navigation Road, Diglis, Worcester
	Area	14.27 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
		elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Overall, the site is less preferable sequentially, due to the site being covered by Flood Zone 2 and 9% Flood Zone 3. Once latest River Severn model results are available, this will show depth, velocity and hazard data which will help inform a detailed assessment on the areas in the site at higher/ lower risk. • The site is largely covered by Flood Zone 2, so careful thought is needed at this site regarding where it is safe to place different types of development and how safe access and egress will be achieved. The A38 is largely free of flood risk but getting from the site to this road would require access through Flood Zone 2 extents. • Residential development is placed outside of Flood Zone 3, and areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed ‘guidance for developers’ section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency’s Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0933 & CFS1076
	Address	Land at Navigation Road, Diglis, Worcester
	Area	14.27 hectares
	Current land use	Greenfield
	Proposed land use	Mixed Use
Flood Zones		Flood Zones 2 and 3 originate from the River Severn 1D hydraulic model. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies.
Climate change		Climate change was based on the River Severn modelling from the Level 1 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies.
Fluvial depth, velocity and hazard mapping		There is no depth, hazard and velocity data available currently as the River Severn model is 1D-only. The Risk of Flooding from Surface Water mapping has therefore been used as an indication. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies, as this is a 1D-2D model.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc			
	Address	Land at Mitton, East of Bredon Road, Tewkesbury			
	Area	74.01 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This large site is located north-east of Tewkesbury, on the southern side of Hardwick Bank along the Carrant Brook, a tributary of the River Avon. Hardwick Bank slopes west to east along the length of the site, with the Brooks flood plain along the western side of the site. Hardwick Bank Road forms the northern border, and the village of Mitton lies along the southern boundary. The B4080 (Tewkesbury Road) forms sections of the western boundary, which cuts around privately owned land and Barn House Farm buildings.			
	Existing drainage features	The Environment Agency's Detailed River Network shows the primary drainage features at this site is the Carrant Brook, which flows along the eastern boundary on the brook's right-hand bank. There is also a small unnamed field drain within the site that connects to the brook, and three others along the opposing left-hand bank that enter the brook along or near the site boundary. The M5 motorway passes the site at the eastern corner.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		21%	23%	27%	73%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)					

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc		
	Address	Land at Mitton, East of Bredon Road, Tewkesbury		
	Area	74.01 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Available data: The site lies on the Carrant Brook; Flood Zone data was derived in the Level 1 2018 SFRA, which uses model data from the Tewkesbury Confluence 1D-2D ISIS-TUFLOW model (part of the Tewkesbury Tributaries EA flood mapping study). The Carrant Brook 1D-2D model stops just at the M5 upstream of the site. Shortly downstream of the site, the Carrant Brook joins the River Avon. Flood characteristics: The available Fluvial Flood Zone mapping data modelled for this site shows all flood risk at this site is associated with the Carrant Brook, which impacts the eastern side of the site within the floodplain at the foot of Hardwick Bank. Half of the site lies on higher ground and half the site lies in the Carrant floodplain. Fluvial Flood Zones 2 and 3 (3a and 3b) all impact this floodplain throughout the site. Due to the low topography of the floodplain, there is little difference in the extents of the Flood Zones. Flood Zone 2 however does encroach onto the M5 motorway near the eastern corner, whereas Flood Zone 3 is impounded here. The site is at most risk in the southern portion, where the lower topography floodplain expands, and the site boundary follows the river channel. The 100-year flood depths are very high in the southern portion of the site, where water ponds adjacent to the watercourse in an area of low topography. Depths reach up to 2.42m in the floodplain which is significant. The highest floodplain velocity for the 100-year event is 1.65m/s which again is quite high. It is highest near to the channel in the north-eastern corner of the site. The resulting hazard is largely 'Danger for All' in the area of deep ponding and near the channel. In the narrower floodplain to the north-east, the hazard is 'Danger for Most'. Risk of Flooding from Rivers and Sea data shows that a similar area to Flood Zone 2 is modelled as being at Medium risk, however the majority of the floodplain is High Risk.		
		Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		6%	9%	13%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
	Surface Water			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc		
	Address	Land at Mitton, East of Bredon Road, Tewkesbury		
	Area	74.01 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site shows flow paths in all 30, 100 and 1,000-year extents, the majority of which is in the proximity of the Carrant Brook floodplain. In the southern-most corner of the site, the brook flows away from the foot of Hardwick Bank and then loops round to flow near the southern point of the hill. There is surface water risk in all events in the southern corner, adjacent to the channel where topography is low and surface water accumulates and ponds. Depths will be highest in this area of ponding near the channel. There are patches of 100-year risk elsewhere along the floodplain and the 1,000-year surface water extent then resembles a Flood Zone extent, completely covering the boundary along the Carrant Brook. The rest of the site is at negligible risk of surface water, as it is situated on high ground. It should be noted that the 1,000-year surface water extent spreads widely along the floodplain and across various access points which may be used to access the site.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is shown to be partially within the reaches of the Environment Agency's Historic Flood Map. The boundary for this reach through the site is the same extent as Fluvial Flood Zone 2, along the eastern and south-eastern boundaries at the foot of Hardwick Bank into the floodplain.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There are no residual risks at this site as such, though there is potential for interaction and impacts from the Avon to be felt upstream on the Carrant Brook and also the M5 motorway embankment acts as an impoundment upstream of the site; it is unlikely that a large structure like this would block, but this should be checked at site-specific assessment stage.		
Emergency planning	Flood warning	The site is partially covered by the Environment Agency's Flood Warning Service. The site is covered along the eastern boundary by the 'Rivers in North Gloucestershire' Flood Alert Area, called 'Rivers in Tewkesbury, Cheltenham and Gloucester'. The site is also partially covered in the southern portion by a Flood Warning Area called 'River Severn at Tewkesbury'.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc
	Address	Land at Mitton, East of Bredon Road, Tewkesbury
	Area	74.01 hectares
	Current land use	Greenfield
	Proposed land use	Residential
	Access and egress	Access and egress at this site are easiest at this site via the Tewkesbury Road along sections of the western boundary, atop Hardwick Bank. This road is largely free from flood risk. There are two field-tracks that lead into the central section of the site. One track leads along the north-western boundary where the site first borders the B4080 Tewkesbury Road; and the second is accessible via a track bypassing Barn House, further south along the B4080. The rest of the site is then accessible via field-boundary tracks, though a site-specific Flood Risk Assessment should be carried out to evaluate the accessibility of the site to pedestrians and vehicles, particularly the area within the floodplain, as this falls within all 3 fluvial Flood Zones, and the majority is within the 1,000-year surface water extent. This risk surrounds many of the potential access roads to the south, west, and east and depths, velocities and hazard are very high.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc
	Address	Land at Mitton, East of Bredon Road, Tewkesbury
	Area	74.01 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling of climate change is available at the site which shows all three 2080s scenarios (100-year +25%, 35% and 70%). The climate change extents are all very similar due to the width of the floodplain, and these resemble the Flood Zones, apart from a small reach in the north-eastern corner near the M5 motorway, which encroaches slightly further into the site. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This extends along the eastern section from large flow paths that pass through the site south to north. - The current day 1000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc
	Address	Land at Mitton, East of Bredon Road, Tewkesbury
	Area	74.01 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Charmouth Mudstone Formation - Mudstone. - Superficial – Cropthorne Sand And Gravel Member - Sand And Gravel. - 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 high risk of groundwater flooding in the central and southern parts of 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 options are 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 maybe required to prevent the egress of groundwater. - Filtration options are 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater Mapping datasets show the site to be at negligible groundwater flooding risk, due to the nature of the local geological deposits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc
	Address	Land at Mitton, East of Bredon Road, Tewkesbury
	Area	74.01 hectares
	Current land use	Greenfield
	Proposed land use	Residential
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc
	Address	Land at Mitton, East of Bredon Road, Tewkesbury
	Area	74.01 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		- 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 73% of the site located within Flood Zone 1, therefore the western portion of the site, avoiding where possible the eastern/ southern boundaries where there is fluvial and surface water risk. In these southern areas, the depths, velocities and hazard in the 100-year event are very high. - Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. - Access should be avoided to the south where the Avon and Carrant Brook floodplain is at significant fluvial and surface water risk, which covers many local roads. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the 2018 Level 1 SFRA, which uses the Environment Agency's Flood Map for Planning and detailed model data. The site is covered by the Tewkesbury Confluence 1D-2D hydraulic model, which forms part of the Tewkesbury Tributaries EA flood mapping study. The Carrant Brook model stops just upstream of the site at the M5.
Climate change		Climate change was based Tewkesbury Confluence 1D-2D hydraulic model, which forms part of the Tewkesbury Tributaries EA flood mapping study. The 100-year event was uplifted for the 2080s scenario for the Severn basin.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS1044 & CFS1044bsc
	Address	Land at Mitton, East of Bredon Road, Tewkesbury
	Area	74.01 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Fluvial depth, velocity and hazard mapping		The Tewkesbury Confluence model is 1D-2D and therefore depth, velocity and hazard data are available. The 100-year is displayed in the mapping.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367			
	Address	Land off Lingfield Road, Evesham			
	Area	8.07 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located along the right-hand bank of the River Isbourne in Evesham, ~100m upstream of its confluence with the River Avon. The large site spans all the accessible floodplain between the River Isbourne on the site's western boundary (~437m), and the perimeter of the residential area of Fairfield along its eastern border, including Lingfield Road Andrews Drive and Coldicott Gardens. The northern boundary is delineated by the Pershore Road (A4084) and the southern border by a field boundary neighbouring the residential area of Snaffle Way. The site is divided into two sections by a field boundary in the north-east, with a smaller field site in that north-eastern section, and the main site, a larger field area representing the remainder of the site. A public footpath lined with trees runs along this field boundary connecting the A4084 with Lingfield Road and Eastwick Drive to the east of the site.			
		The primary drainage feature at this site is the River Isbourne which runs along the site's western boundary. There is a small field drain identifiable in the north-eastern section of the site which flows from Eastwick Drive for a small distance before entering a culvert, presumably out-falling into the Isbourne/ Avon confluence. The site also slopes entirely from east to west, with a steep decline bisecting the site north to south defining the river valley of the Isbourne.			
	Existing drainage features	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		23%	28%	37%	63%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
	Fluvial	<i>The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)</i>			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367		
	Address	Land off Lingfield Road, Evesham		
	Area	8.07 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment, alongside the Flood Zones derived in the 2018 L1 SFRA (which uses latest modelling data not included in the EA's Flood Map for Planning). This site's Flood Zones originate from the River Isbourne and River Avon modelling.		
		Flood characteristics: Fluvial risk at this site is associated with primarily with the River Isbourne along its western boundary, but also from the River Avon near the northern edge as the confluence of the Isbourne into the Avon lies ~100m north of the site, so there will be some interaction between the two immediately north of the site. Flood Zone 3a and 3b are entirely constrained by the sloping topography of the site, thus within the river valley. This Flood Zone extends along the full length of the western boundary and the northern border, encompassing the north-western corner. Flood Zone 2 is also constrained by the same topographical features though its reach extends further into the site encroaching along the north-east and southern borders.		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		1%	9%	20%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367
	Address	Land off Lingfield Road, Evesham
	Area	8.07 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		Description of surface water flow paths: Surface water flood risk at this site is defined largely by the River Isbourne and its valley sides; however, there are other small pockets along footpaths and in neighbouring residential areas. The mapping also covers the same reaches as the Flood Zones; along the northern boundary of the site, the entire western border and the south-west corner close to the River Isbourne. Areas of the site along the river channel and corresponding with Flood Zones 3a and 3b are at high risk of flooding with an annual probability that flooding will occur of greater than the 30-year. The 30-year surface flood risk extent within the site is entirely restricted to the river channel and only crosses the western border in small pockets at low topographic features near meanders. There is one small area on Lingfield Road to the east of the site where surface water ponding occurs on the road corner. This ponding extends further along the road in 100-year extents but only becomes a conduit into the eastern corner of the site at the 1,000-year extent. Here the majority of the roads around Lingfield Road are affected, and flow into the site along the footpath that divides the north-eastern section of the site connecting Lingfield Road to the B4084 along the site's northern boundary. Extents of 100 and 1,000-year events are again primarily defined by the River Isbourne topography and its valley. An area of medium risk (probability of flooding 100-year) encroaches further into the west of the site corresponding with Flood Zone 2 reaches. The 100-year extent encroaches into the site in the north-western corner where surface water is impounded by the B4084 road, and long the south-western boundary with the river where topographical depressions allow water to collect. These extents are impact in larger stretches in the same areas in the 1,000-year event, spanning the majority of the site's western boundary and increased impoundment behind the B4084. However, this impoundment stretches along the northern border until topographical features allow it to flow across the road and into the River Avon north of the site. This impounding is also connected to by the surface water flowing along the footpath from Lingfield Road. Other notable surface flood risk features pertain to the 1,000-year extents only. This extent borders the site in small pockets at the northern corner; along the north-eastern boundary flowing from Coldicott Gardens; and near the south-eastern corner flowing from Hamilton Road. There is also a narrow conduit flowing down Mill Road into the River Isbourne near the site's north-western boundary.
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367		
	Address	Land off Lingfield Road, Evesham		
	Area	8.07 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
	Flood history	Environment Agency records indicate 37% of the site is within the Historic Flood Map area. This corresponds with the reaches of Flood Zone 2 and the medium risk of flooding from rivers and sea. This covers the western side of the site stretching from the north-east following the western boundary along the River Isbourne's right-hand bank, and the south-west site corner.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	Consideration should be taken to the small fishing lake to the south of the site during severe flood events. There could be a blockage risk at the structure under the B4084, which bounds the site to the north. This could push more flood water into the site's north-western corner or increase flood depths. This should be investigated in a site-specific assessment.		
Emergency planning	Flood warning	The site is covered by the Environment Agency's Flood Warning Service. The Flood Alert warning level (River Avon in Worcestershire) extends along the entire River Isbourne through this site and includes an extent along the western and northern boundaries similar to Flood Zone 3, constrained to the river valley. The Flood Warning Area 'River Avon at Evesham' covers the site from halfway along the Isbourne to the Avon,		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367
	Address	Land off Lingfield Road, Evesham
	Area	8.07 hectares
	Current land use	Greenfield
	Proposed land use	Residential
	Access and egress	Access and egress at this site is possible at the northern and southern extremities, with routes available into both the north-eastern section of the site and the main western site from the Pershore Road, B4084, along the site's northern boundary. There are two access routes to the north-eastern section via an open field track at the northern corner, and the footpath which divides the site halfway along the northern boundary. This access point also provides a route to the larger western section of the site via field tracks. This footpath route falls partially within the 100-year, and almost entirely within the 1,000-year surface water flood risk extents, however. Tracks along the western field once access has been made are within areas categorised as Medium risk for velocity and depth with regards to flood risk. A site-specific Flood Risk Assessment to ground truth these risks for pedestrian and vehicle access is recommended. The track in the northern corner does not fall within any surface flood risk extents. There is an access and egress route to the south-eastern corner of the main western field site via Hamilton Road which also does not fall within any surface water flood risk extent; however, roads adjoining and leading to Hamilton Road are impacted by the 1,000-year extents. Access to both sections of the site may be possible via the dividing footpath connecting Eastwick Drive to the B4084 via Eastwick Drive to the east of the site, though this is narrow and a site specific risk assessment will be needed to evaluate the potential of this route.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367
	Address	Land off Lingfield Road, Evesham
	Area	8.07 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling showing the potential implications of climate change is available at this site. The 100-year plus 25% and 35% fluvial flood risk due to climate change extends across an area similar to Flood Zone 3, following the River Isbourne along the western and northern reaches and confined by the river valley. In some areas, the 100-year plus 70% climate change flood risk encroaches slightly further into the site, comparable to Flood Zone 2 and within the Historic Flood Map extents. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367
	Address	Land off Lingfield Road, Evesham
	Area	8.07 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. - Superficial – Head - Clay, silt, Sand and Gravel. - 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 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 methods are unlikely to be feasible as mapping suggests mean site slopes are > 5%, notably through the centre of the site north-south. Feasibility of such options should be assessed as part of a site-specific assessment. If this feature is feasible a liner maybe required to prevent the egress of groundwater. - Filtration methods are unlikely to be feasible as mapping suggests mean site slopes are > 5%, notably through the centre of the site north-south. 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk of groundwater flooding, due to local geological deposits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367
	Address	Land off Lingfield Road, Evesham
	Area	8.07 hectares
	Current land use	Greenfield
	Proposed land use	Residential
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. 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. • More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. • A blockage assessment may be required in a Flood Risk Assessment at the B4084, accounting for climate change, to confirm finished floor levels and any residual risks. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the unnamed watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367
	Address	Land off Lingfield Road, Evesham
	Area	8.07 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Development is limited to the 63% of the site located within Flood Zone 1, therefore the eastern portion of the site, avoiding where possible the western half of the site where there is high fluvial and surface water risk. • Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Development should be avoided in Flood Zone 3b along the site's western side. • Space for green infrastructure should be considered in the areas of highest flood risk. • Risk is highest in the north-western portion of the site, where the Isbourne meets the Avon – in flood events there will be interaction between these two rivers, and there is residual risk from the B4084. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 originate from the River Isbourne and Avon hydraulic models, represented in the Flood Zones derived as part of the Level 1 SFRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0367
	Address	Land off Lingfield Road, Evesham
	Area	8.07 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate change		Climate change was based on the River Isbourne/ Avon modelling from the Level 1 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch.
Fluvial depth, velocity and hazard mapping		There is no depth, hazard and velocity data available currently as the River Avon model is 1D-only. The Risk of Flooding from Surface Water mapping has therefore been used as an indication.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0371			
	Address	Land off Inn Lane, Roselands, Hartlebury			
	Area	0.31 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	Hartlebury is located south-east of Stourport, and this site is within the main residential village to the west of the A449 dual carriageway, on land that forms the current boundary between residential properties to the north, east and south, and agricultural farmland to the west and south-west. The site is a rectangular field with a driveway (a public footpath leading to 'Quarry Bank', a main road ~300m to the west) extending from the north-eastern corner linking the site with Inn Lane.			
	Existing drainage features	There are no watercourses running through or around the site. The access track in the north-east is intercepted by surface water run-off along its entire length by a flow path which begins in east of the neighbouring site (CFS0420). Surrounding residential properties and anthropogenic features (roads etc) located near the eastern boundary and running along the southern border may act as drainage features to and from the site. An unnamed brook mapped to start along Inn Lane to the north-west of the site is where surface water converges towards, though this is not in any Flood Zones as the catchment is <3km ² . This site is assessed purely due to surface water risk on the access road.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. Flood characteristics: This site is entirely out of the EA's Flood Zones 2 and 3 and thus there is no fluvial flood risk at this site. The site's access road is at risk from surface water flooding.			
	Surface Water	Proportion of site at risk (RoFfSW)			
		30-year	100-year	1,000-year	
		0%	2%	5%	
Max depths (m)					
0.3-0.9m		0.3-0.9m	>0.9m		
Max velocity (m/s)					
<0.25		>0.25	>0.25		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0371		
	Address	Land off Inn Lane, Roselands, Hartlebury		
	Area	0.31 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i> Description of surface water flow paths: Surface water is the primary source of flood risk at this site, with the driveway in the north-eastern corner acting as a conduit for a small surface water flow path originating from the neighbouring site (CFS0420) which is at the top of a hill and the flow path affecting this site runs from the eastern side of that site. It then cuts through the residential cul-de-sac (Groves Way) which forms the eastern border of this site and enters in the north-east corner, flowing north along the access track onto Inn Lane. Here it turns west following the topography and the road. This flow path is shown in small patches in the 100-year extent, and as a continuous channel in the 1,000-year extent. There is no modelled flood risk in the 30-year extent. The site is sloping down towards the north-east corner which may contribute small surface water flow paths during <30 year events and thus are not modelled in the available data An unnamed brook mapped to start along Inn Lane to the north-west of the site is where surface water flow path converges towards, down Inn Lane.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	There are no records of historic flooding at the site from the Environment Agency.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There are no residual risks at this site.		
	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0371
	Address	Land off Inn Lane, Roselands, Hartlebury
	Area	0.31 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Emergency planning	Access and egress	Access and egress at this site are best made via the driveway leading to/from Inn Lane in the north-east of the site, although this does entirely lie within the 1,000-year and partially within the 100-year surface flood risk extents, hence why this site has been assessed. This driveway is also narrow at both its entrance from the lane (confined by two large, curved brick walls on either side) and the open gateway into the field where it meets the driveway. An alternative route may be useable via the Groves Way cul-de-sac along the eastern boundary. This is partially within the 100-year and 1,000-year surface water flood extents; however, this only cuts across the road away from the potential access point. Access via the southern arm of Groves Way cul-de-sac is also possible, leading to the south-eastern corner of the site. Both of these routes are classified as having low and medium risks only for depth and velocity regarding surface water, with neither site recording high risk, which corresponds with the surface water flood risk modelling. A third access route option would be via the footpath leading from the south-west corner of the site to Quarry Bank road, ~300m away. The footpath does not fall within any surface water flood risk extent; however, Quarry Bank is recorded within all 30, 100 and 1,000-year extents.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available or fluvial flood risk. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 1,000-year event is considered as part of surface water drainage strategies, or surface water modelling. This impacts the primary access route in the north-eastern corner and the residential area to the east of the site. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0371
	Address	Land off Inn Lane, Roselands, Hartlebury
	Area	0.31 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Helsby Sandstone Formation - Sandstone. - Superficial – None recorded - 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 options are 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 maybe required to prevent the egress of groundwater. - Filtration options are 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site has groundwater levels between 0.025 and 0.5m below the surface, where there is a risk to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. The site is 'More vulnerable' but is not located in a Flood Zone, therefore this site should pass the Exception Test. However, there are some key considerations with regards to access at the site.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. • 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.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0371
	Address	Land off Inn Lane, Roselands, Hartlebury
	Area	0.31 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - The site is designated as 'More Vulnerable' but is not affected by fluvial flood risk, therefore the Exception Test can be passed. - Development should however consider the access and egress off Inn Lane which is affected by surface water flooding and hence this site has been assessed in more detail. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. The site is not affected by fluvial flood risk.	
Climate change	Climate change was based on Flood Zone 2 and 1,000-year Risk of Flooding from Surface Water extent to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are considered for surface water as part of a site-specific Flood Risk Assessment.	
Fluvial depth, velocity and hazard mapping	There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses.	
Surface Water	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
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.	

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS400sc			
	Address	Eatons Farm, Church Lane, Tibberton			
	Area	9.55 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	This site is located to the east of Worcester, bordering the A4538 along its western boundary, a trunk road joining the M5 motorway junction north-west of the site, and the B4636 along the site's southern boundary. The site is made up of two fields; one in the south and the other in the north with the field boundary running bisecting the site east to west.			
	Existing drainage features	The primary drainage feature associated with this site is the un-named field drain which flows north to south along the site's eastern boundary. This flows south and joins numerous other field drains before flowing into an un-named brook. This subsequently flows into the Bow Brook south-east of the village of Crowle. The northern and southern sections of the site traverse two steep hills, with the valley passing east to west through the centre of the site. West of the site on the opposite side of the A4104 lies another un-named drained which flows west into the Barbourne Brook.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		<i>The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)</i>			
		Available data:			
		The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data.			
	Flood characteristics:				
	Fluvial risk is not shown to impact this site, though a site-specific Flood Risk Assessment should be undertaken to distinguish any risk from the drainage network running along the eastern boundary. It is likely that this risk will be localised to the drains/ eastern boundary as the topography steepens in the middle of the site.				
	Surface Water	Proportion of site at risk (RoFfSW)			
30-year		100-year	1,000-year		
2%		4%	9%		
Max depths (m)					
0.3-0.9m		0.3-0.9m	>0.9m		
Max velocity (m/s)					
<0.25		>0.25	>0.25		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS400sc		
	Address	Eatons Farm, Church Lane, Tibberton		
	Area	9.55 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i> Description of surface water flow paths: Risk of Flooding from Surface Water mapping indicates the majority of risk is associated with impoundment along the western boundary which borders the Pershore Road (A4538). Ponding in the north-western corner contributes a large proportion of this impoundment, which is present in all 30, 100 and 1,000-year extents. The 1,000-year extent along the western boundary breaches the border and encroaches onto the A4104, crossing it entirely from the north-western corner. Similarly, the 100 and 1,000-year extents cross the B4636 at the junction with the roundabout on the A4104 from the south-west corner. There are small areas of ponding along this southern road boundary during 1,000-year events also leading to the south-east corner where flows join the un-names drain.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	There are no records of historic flooding at the site from the Environment Agency.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	The field drain along the eastern boundary flows through a small culvert halfway along the site border and at the road along the southern boundary which may cause a residual risk in the event of a blockage. A site-specific risk assessment would evaluate any potential risk.		
	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS400sc
	Address	Eatons Farm, Church Lane, Tibberton
	Area	9.55 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Emergency planning	Access and egress	Access and egress at this site is possible in numerous locations around this site. The main roads along the site's western and southern boundaries are the only formal roads, each of them with some surface water risk in all surface water events, either where small drains flow underneath, or where there are topographic depressions on either side of the road. There are two gateways leading into the middle of the site from the A4104 along the western boundary, one into each field that comprise this site. Access to the south of the site is possible via a gateway in the south-eastern corner leading to the B4363. Other potential routes into the site via neighbouring fields are located along the eastern boundary across the culverted field drain, and through another gateway along the northern boundary. The eastern gateway is accessed via the same gate in the south-eastern corner. The gateway along the northern boundary is accessible via a gateway leading to the A4104 north-west of the site to the north of the roundabout.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling showing the potential implications of climate change is not available at this site. Risk from the eastern boundary drains may need to be considered at Flood Risk Assessment stage. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS400sc
	Address	Eatons Farm, Church Lane, Tibberton
	Area	9.55 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Branscombe Mudstone Formation - Mudstone. - Arden Sandstone Formation - Siltstone and Sandstone. - Sidmouth Mudstone Formation - Mudstone. - Superficial – Alluvium - Clay, silt, Sand and Gravel. - Most source control techniques are likely to be suitable. Mapping suggests that slopes may be unsuitable for selective source control techniques. - Infiltration is 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. - Detention options are unlikely to be feasible in certain parts of the site 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 maybe required to prevent the egress of groundwater. - Filtration options are unlikely to be feasible in certain parts of the site 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. - All forms of conveyance are likely to be suitable. Where the northern and southern slopes are >5% features should follow contours or utilise check dams to slow flows. - The site is not designated by the Environment Agency as previously being a landfill site. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk of groundwater flooding due to local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. The site is 'Less vulnerable' and is not located in a Flood Zone, therefore this site should pass the Exception Test. However, there are some key considerations with regard to the risk from the drain to the east.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled drains along the eastern boundary, using channel topographic survey. A blockage run may also be needed where this drain enters a culvert under the main road bounding the site. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS400sc
	Address	Eatons Farm, Church Lane, Tibberton
	Area	9.55 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		• Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Development is steered away from the surface water ponding in the north-western corner of the site, and away from the drainage channel bounding the east of the site. • If this drain is modelled at detailed assessment stage and it shows Flood Zones along the eastern boundary, then areas in Flood Zone 2 along the boundaries should be used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. • Consider access and egress along the main roads where the 30-year surface water extent impacts. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS400sc
	Address	Eatons Farm, Church Lane, Tibberton
	Area	9.55 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. The fluvial risk from the eastern drain may need to be confirmed in a hydraulic model at site-specific stage.
Climate change		Climate change was based on Flood Zone 2 and 1,000-year Risk of Flooding from Surface Water extent to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are considered for surface water as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0407sc			
	Address	Land south of Madresfield Road, Malvern			
	Area	9.95 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located on the eastern fringes of Great Malvern, on the boundary of the residential area of Pound Bank. Chance Lane forms the eastern boundary, with Hall Green (Road) and Baldenhall cul-de-sac along the southern boundary, and Windrush Crescent along the western border.			
	Existing drainage features	The Environment Agency's Detailed River Network shows the headwaters of an un-named tributary of the Whiteacres Brook flows along the entire northern boundary. This is formed from two smaller brooks which have their confluence along the northern boundary. One flows from the west across the north-eastern boundary and is joined by another flowing from the north, which drains a large area of Greater Malvern.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data:			
		The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data.			
		Flood characteristics:			
		There is no available Fluvial Flood Zone mapping data modelled for this site due to the catchment area of the drains being <3km ² , though the Flood Zones are present just shortly downstream of Chance Lane, east of the site. A site-specific Flood Risk Assessment should therefore be undertaken to assess any risk to the site from the drains flowing along the northern boundary			
	Risk of Flooding from Rivers and Sea data is also not present at this site. The Risk of Flooding from Surface Water dataset therefore offers a good indication of risk in the absence of modelled data.				
	Surface Water	Proportion of site at risk (RoFfSW)			
30-year		100-year	1,000-year		
3%		5%	9%		
Max depths (m)					
0.3-0.9m		0.3-0.9m	>0.9m		
Max velocity (m/s)					
<0.25		>0.25	>0.25		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0407sc		
	Address	Land south of Madresfield Road, Malvern		
	Area	9.95 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i> Description of surface water flow paths: Risk of Flooding from Surface Water data mapped for this site is mostly associated with the un-named brook along the northern boundary downstream of the confluence point. Extents of all 30, 100 and 1,000-year surface water data are present along this reach, with the 30 and 100-year extents generally restrained by the immediate floodplain except for near the confluence where the 100-year extent encroached slightly further into the site. The 1,000-year data extends further into the site along the northern boundary, though is still topographically controlled. Due to the location of the site, the majority of surface water flood risk flows west to east. Several overland flow paths from the south, north and west converge at the confluence of the two drains on the northern boundary. Outwards of the site, significant flow paths are shown to flow from the hillside residential estates to the east of the site and follow the topographical features which lead to the confluence of the two small brooks along the northern boundary. These are shown in all surface water extents and are sourced from a significant area across Pound Bank, Sherrard's Green, and Barnard's Green further to the west. The majority of these flows are directed by roads and topographic depressions towards to headwaters of the un-named tributary. A site-specific risk assessment should evaluate the overall risk from these extended flow paths, as well as 1,000-year extents along Hall Green and Chance Lane to the south-east and east, and Teme Avenue on the south-western corner boundary.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be within the reaches of the data modelled in the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	Residual risk at this site is associated solely with the culvert under Chance Lane in the north-eastern corner where the un-named brook passes beneath the road. This poses an impoundment and blockage risk in high flows and should be assessed in a site-specific Flood Risk Assessment.		
	Flood warning	The site is not covered by modelled data in the Environment Agency's Flood Warning Service.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0407sc
	Address	Land south of Madresfield Road, Malvern
	Area	9.95 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Emergency planning	Access and egress	Access and egress are possible via an open gateway in the north-eastern corner along Chance Lane. This, and the surrounding road network is modelled within the 1,000-year surface water extent, however. There is more localised risk around the culvert under Chance Lane in all surface water events, though overall risk is low in the surrounding roads. Alternative access and egress routes may be possible via Teme Avenue on the south-western corner though this would involve crossing a public footpath and carrying out some scrub clearance. Teme Avenue is also within the 1,000-year surface water risk extent, as are the roads approaching this location, and thus a site-specific risk assessment should incorporate this area also.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available at the site, and therefore Flood Zone 2 has been used as a conservative indication of flood risk from climate change. Flood Zone 2 does not commence until downstream of Chance Lane due to the catchment area upstream being too small for Flood Zone representation. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model, to confirm the impact in the site. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is evident within the site along the northern boundary along the brook and on land and roads surrounding this area, particularly to the west. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0407sc
	Address	Land south of Madresfield Road, Malvern
	Area	9.95 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation – Mudstone - Superficial – None recorded - 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 to prevent the egress of groundwater. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk of groundwater flooding in the eastern half of the site, due to local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. Whilst the site is not covered by the EA's Flood Zones, there is fluvial risk associated with the drains along the northern boundary, which should be confirmed in a Flood Risk Assessment. 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. - More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled drains along the northern boundaries, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the unnamed watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0407sc
	Address	Land south of Madresfield Road, Malvern
	Area	9.95 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Development is limited to Flood Zone 1, steered away from the northern boundary where flood extents from the channel is likely to encroach into the site along the northern boundary. This should be confirmed by a detailed hydraulic model at Flood Risk Assessment stage. • Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0407sc
	Address	Land south of Madresfield Road, Malvern
	Area	9.95 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate change		Climate change was based on Flood Zone 2 to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0498			
	Address	Former Pipe Supports site, Salwarpe Road, Droitwich Spa			
	Area	1.54 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	This site is located in the west of Droitwich Spa, between the conurbations of Westacre and Netherwich. The site is bordered along the northern boundary by the River Salwarpe; the eastern boundary by the mainline railway embankment; the southern boundary by the Droitwich Canal; and the western boundary by the Salwarpe Road. Droitwich Spa railway station lies to the south, and the A38/A442 roundabout junction to the north-west. It is topographically confined between these features.			
	Existing drainage features	The primary drainage feature associated with this site is the River Salwarpe which flows ~118m east to west along the northern boundary. It enters and exits the site through culverts passing under the railway embankment to the east and the Salwarpe Road to the west. Parallel to this is the Droitwich Canal along the site's southern boundary, which interacts with the Salwarpe upstream of the site.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		3%	19%	62%	38%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0498		
	Address	Former Pipe Supports site, Salwarpe Road, Droitwich Spa		
	Area	1.54 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment, along with the Flood Zones derived in the 2018 Level 1 SFRA (which uses latest modelling data not always included in the EA's Flood Map for Planning). This site is covered by the River Salwarpe 1D hydraulic modelling.		
		Flood characteristics: Fluvial risk at this site is associated with the River Salwarpe flowing along the northern boundary, though there are links and interactions between this and the Droitwich Canal along the southern boundary, which Flood Zone 2 joins. Flood Zone 3b is confined to the river channel and canal areas nearest the border; however, Flood Zone 3a extends across a large proportion of the north-eastern quarter and eastern side of the site. This appears to be a result of a slight gradient sloping towards the north-eastern corner. Flood Zone 2 extends significantly further and encompasses the majority of the site area, which is confined topographically between road, rail and watercourses, with minor topographic features relieving some small areas along the western side and east-central areas of flood risk. This Flood Zone 2 extent is similar in coverage to Risk of Flooding from Rivers and Sea data, which indicates that the area falls within the High Risk category across the site.		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		1%	3%	12%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0498		
	Address	Former Pipe Supports site, Salwarpe Road, Droitwich Spa		
	Area	1.54 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Description of surface water flow paths: Risk of Flooding from Surface Water mapping at this site shows a variety of flow paths in and around the site, but overall risk is fairly low. Within the site, there are four topographic depressions which allow ponding to build up. All four are modelled to accumulate water within the 1,000-year extent data, however only one in the central-western area accumulates in all three 30, 100 and 1,000-year extents. This is also the largest accumulating pond in area, with the south-eastern portion of the depression seemingly the deepest, as this is where accumulation occurs in all three events; 100 and 1,000-year extents spread out from this location. The other three 1,000-year event accumulations are along the eastern side of the site, one in the south-east near the canal embankment and two in the north-eastern quarter. Surface water flood risk is also present in 100 and 1,000-year extents along the length of the River Salwarpe, encroaching slightly into the northern boundary; and the length of the canal along the southern boundary, though this poses less of an encroachment risk.		
	Reservoir	The site is shown to be at risk of reservoir flooding from the available online maps. The River Salwarpe and the canal through this site, and Droitwich Spa as a whole, are shown to be with the Maximum Extent of Flooding from Reservoirs reach. Both flood speed and flood depth are shown as the maximum for this site; >2m depth and >2m/s speed respectively.		
	Flood history	This site is not shown to be within the reaches of the data modelled in the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
	This site is not protected by any formal flood defences.			
	Residual risk	There are three sources of residual risk at this site; the canal along the southern boundary, and the two culverts on the south-western and north-western corners through which the River Salwarpe flows under the Salwarpe Road (north-west). Residual risk from the canal is that of potential overtopping during severe rainfall events, if the canal is perched about site levels. This would impact the south of the site, and depending on the volume that spills over in relation to the topography of the site, has the potential to impact most of the area. Associated risk with from the two culverts is that of impounding and blockage. The culverts under the Salwarpe Road in the north-western and south-western corners of the site have the potential to block and back water up into the site		
Emergency planning	Flood warning	The site is partially covered by the Environment Agency's Flood Warning Service in its north and north-western section. There is a Flood Alert level which covers the north-western corner, ~1/3 of the site area. This Flood Alert is the River Salwarpe, Elmbridge and Hadley Brooks and their tributaries.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0498
	Address	Former Pipe Supports site, Salwarpe Road, Droitwich Spa
	Area	1.54 hectares
	Current land use	Greenfield
	Proposed land use	Employment
	Access and egress	Access and egress at this site can be made via the existing vehicle entrance along Salwarpe Road and Kidderminster Road, near the south-western and north-western corners. The open gateway enters the site via a ramp leading down into the south-west corner. This access point does not lie within any surface water flood risk extent, although conduits are present on surrounding roads and access routes. There is surface water risk in all events at various points along the Salwarpe and Kidderminster Roads, where the river crosses beneath structures. A site-specific assessment would identify the best route to take when approaching/leaving the site. Consideration should also be made to the residual risk from any impounding from the river and canal culverts, as well as how safe access and egress would be gained in a climate change event.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0498
	Address	Former Pipe Supports site, Salwarpe Road, Droitwich Spa
	Area	1.54 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling showing the potential implications of climate change is available at this site from the Level 1 SFRA modelling. The three modelled datasets for climate change (100-year plus 25%, 35% and 70% extents) all entirely inundate the site, as well as the land adjacent to Salwarpe Road to the west. The only small area not affected by modelled climate change data the ramp down into the from the access/egress location along Salwarpe Road in the south-western corner. This will present difficulties for the site's developable area, mitigation and finished floor levels if the whole site is inundated in a climate change scenario. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This would likely impact the site in a similar manner to the 1,000-year extent. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0498
	Address	Former Pipe Supports site, Salwarpe Road, Droitwich Spa
	Area	1.54 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation – Mudstone - Superficial – Alluvium - Clay, silt, Sand and Gravel. - 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 to prevent the egress of groundwater. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk of groundwater flooding, due to local geological deposits
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. In this site, these locations are limited. The highest risk is in the north-east of the site where Flood Zone 3 ponds. 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. There are significant considerations needed at the site though in relation to the impacts of fluvial climate change, which completely inundate the site, and residual risk from being topographically confined on all sides.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Residual risk needs to be considered and modelled at FRA stage, from the numerous impoundments and structures surrounding the site. • The impact of fluvial climate change covers the site, so safe access, mitigation etc need to be investigated and confirmed in a site-specific assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes, preserving these spaces as green infrastructure. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the unnamed watercourse 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. Locations for this will
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0498
	Address	Former Pipe Supports site, Salwarpe Road, Droitwich Spa
	Area	1.54 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		be difficult given the extent of flood risk on site, particularly in the climate change scenario. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Development is steered away from Flood Zone 3 in the north-west of the site. • Although the site is 'Less Vulnerable', there are significant considerations needed here due to the spread of fluvial flood risk across the site and residual risk of blockages from the Salwarpe Road structures. • Flood Zone 2 covers a large proportion of the site and the impacts of fluvial climate change completely inundate the site. This poses difficulties for mitigation, safe access/ egress and finished floor levels. • Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0498
	Address	Former Pipe Supports site, Salwarpe Road, Droitwich Spa
	Area	1.54 hectares
	Current land use	Greenfield
	Proposed land use	Employment
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 originate from the River Salwarpe hydraulic model, represented in the Flood Zones derived as part of the Level 1 SFRA.
Climate change		Climate change was based on the River Salwarpe modelling from the Level 1 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch.
Fluvial depth, velocity and hazard mapping		There is no depth, hazard and velocity data available currently as the River Salwarpe model is 1D-only. The Risk of Flooding from Surface Water mapping has therefore been used as an indication.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0560			
	Address	Land Adjacent to Defford Motors, Main Street, Defford.			
	Area	0.36 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located to the south-east of Defford, a village south-west of Pershore. It runs parallel along the main street between the road (A4104) along its north-western boundary, and the valley of the Bow Brook along its south-eastern boundary. The confluence of the Bow Brook with the River Avon is located ~0.5km south of the site.			
	Existing drainage features	The primary drainage feature associated with this site is the Bow Brook which runs to the south of the site, flowing in a south-westerly direction.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	3%	97%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data:			
		The Environment Agency's Flood Zone mapping has been used in this assessment, along with model outputs from the Bow Brook and River Avon modelling.			
		Flood characteristics:			
		Fluvial risk is of minimal impact to this site, though it does border the site's southern boundary. All the Flood Zone extents are very similar, suggesting the floodplain is flat and wide in this location, with the higher ground commencing at the site.			
	Flood Zone 3b from the Bow Brook does not encroach into the site, nor does Flood Zone 3a. Flood Zone 2 does marginally encroach this boundary where topographical features in the southern half of the site allow flows to enter.				
	The site is encroached by High and Low levels of modelled Risk of Flooding from Rivers and Sea data along the south-eastern boundary, similar to Fluvial Flood Zone 2, though the High risk is shown to reach slightly further into the site, though this may be a result of the resolution of the data available.				
Surface Water	Proportion of site at risk (RoFfSW)				
	30-year	100-year	1,000-year		
	0%	<1%	5%		
	Max depths (m)				
	0.3-0.9m	0.3-0.9m	>0.9m		
	Max velocity (m/s)				

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0560		
	Address	Land Adjacent to Defford Motors, Main Street, Defford.		
	Area	0.36 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Risk of Flooding from Surface Water mapping at this site shows negligible risk within the site, with 100 and 1,000-year extents overall restricted to the surrounding main roads and are topographically defined by the large hill upon which Defford is located. These two extents both have flow paths along the A4104 flowing downhill north-east to south-west, passing the north-western boundary. The 100-year extent does not encroach into the site except for running along the boundary where the access gate to the site off the road. The 1,000-year extent however does flow into the site via the gateway and bisects the site north to south, flowing downhill towards the Bow Brook and following the contours of the hill in the northern section of the site. This flow path does not exit the site however, so consideration towards ponding should be taken through this central section. Overall, it is low risk. Surface water risk extents are also prevalent within the Bow Brook itself, where surface water follows topography to the lowest points, hence the river channel, although none come close enough to the south-eastern boundary to be considered a surface water risk; fluvial flood risk is the inherent issue along this border.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
Flood risk management infrastructure	Flood history	The Environment Agency's Historic Flood Maps show there are records of historic flooding at the site along the south-eastern boundary with the same extent as Fluvial Flood Zone 2, which encroaches into the east of site.		
	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
Emergency planning	This site is not protected by any formal flood defences.			
	Residual risk	There are no residual risks identified at this site.		
	Flood warning	The site is partially covered by the Environment Agency's Flood Warning Service along its south-eastern boundary similar to Fluvial Flood Zone 2 and the Historic Flood Map extent. The Flood Alert is Bow and Piddle Brook.		
	Access and egress			
		Access and egress at this site are most easily made via the A4104 on the site's north-western boundary. This is however within the 100 and 1,000-year surface water flood risk extents, and consideration should be made to accessibility for pedestrians and vehicles through this route by means of the site-specific Flood Risk Assessment.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0560
	Address	Land Adjacent to Defford Motors, Main Street, Defford.
	Area	0.36 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling showing the potential implications of climate change is available at this site from the Bow Brook and River Avon modelling. The three modelled datasets for climate change all encroach into this site from the south-east, increasing in extent with time. The 100-year plus 25% extent enters the south-eastern section of the site only, though runs along the eastern border further north, along the base of the hill. The +35% extent follows a similar trend, though slightly further into the site, and crossing the northern section of the boundary in isolated locations. The +70% extent however reaches into the middle of the southern half of the site and also encroaches along the entire eastern boundary at the foot of the hill. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0560
	Address	Land Adjacent to Defford Motors, Main Street, Defford.
	Area	0.36 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirement s for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Charmouth Mudstone Formation - Mudstone. - Superficial – RTDU-SAGR - Most source control techniques are likely to be suitable. Mapping suggests that slopes may be unsuitable for selective source control techniques. - 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. - Detention options are 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 maybe required to prevent the egress of groundwater. - Filtration options are 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. - 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. - The site is not designated by the Environment Agency as previously being a landfill site. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the south-western half of the site is at negligible risk of groundwater flooding, due to local geological deposits. The north-western half of the site has groundwater levels between 0.5-5m below the surface, and there is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. 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. - More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0560
	Address	Land Adjacent to Defford Motors, Main Street, Defford.
	Area	0.36 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		- 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 97% of the site located within Flood Zone 1, therefore the northern portion of the site, avoiding where possible the southern boundary where Flood Zone 2 and climate change extents encroach into the site. - Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Consider access from Main Street where surface water flood risk is localised around the site in the 100-year and 1,000-year events. - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 originate from the Bow Brook and River Avon models, represented in the Flood Zones derived as part of the Level 1 SFRA.
Climate change		Climate change was based on the Bow Brook/ Avon modelling from the Level 1 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch.
Fluvial depth, velocity and hazard mapping		There is no depth, hazard and velocity data available currently as the Bow Brook model is 1D-only. The Risk of Flooding from Surface Water mapping has therefore been used as an indication.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0560
	Address	Land Adjacent to Defford Motors, Main Street, Defford.
	Area	0.36 hectares
	Current land use	Greenfield
	Proposed land use	Residential
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0587			
	Address	Land at Blackpole Road, Worcester			
	Area	13.57 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	This site is located in the northern fringes of Worcester at Blackpole on the banks of the Barbourne Brook. The site lies adjacent to Blackpole Industrial Estate which lies on the opposite side of the A4536 (Blackpole Road) which forms the western boundary. The A449 dual carriageway runs to the north, and the Worcester and Birmingham Canal forms the southern boundary. The A449 junction with Blackpole and slip-road to the west-bound lane, forms the north-western corner boundary.			
	Existing drainage features	The Environment Agency's Detailed River Network shows drainage features at this site are associated with the Barbourne Brook along the northern boundary for the majority of the site and the parallel channel split from the canal in the south-eastern corner to where it joins back with the main channel in the north-western corner of the site. The Worcester and Birmingham Canal forms the southern border of the site and crosses the Barbourne Brook and the tributary in the south-western corner as they flow into the site. A smaller un-named drain flows into the Barbourne Brook from the north, passing under the A449 and entering the brook on the right-hand bank, opposite the site. There is also a secondary drain which runs parallel to the A449 along the east-bound carriageway side which is not modelled to flow into the site. Other minor drains which flow from the south out of part of Blackpole Industrial Estate enter the Barbourne Brook slightly downstream of the site.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		28%	31%	32%	68%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0587		
	Address	Land at Blackpole Road, Worcester		
	Area	13.57 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment, alongside the latest Barbourne Brook 1D-2D hydraulic modelling received for this Level 2 SFRA.		
		Flood characteristics: The modelled Flood Zone data for this site indicates flood risk through this site is restricted by the river valley of the Barbourne Brook, which bisects the site east to west. Fluvial Flood Zones 2 and 3 are all present within the same confined topographic extents through this site, between the two channels. Flood Zone 3b is only shown to be out of bank along a small reach at the western side of the site, within the two channels. Flood Zone 3a is a slightly larger extent but again is confined to the floodplain between these two channels. Flood Zone 2 covers the majority of the land between these two channels, accounting for approximately a third of the site. The canal to the south forms various impoundment points for the watercourse upstream of the site. Near the western boundary with the Blackpole Road and around the confluence of the split Barbourne channel, there is some ponding of Flood Zones 3b, 3a and 2, before continuing downstream of the road in-bank. Risk of Flooding from Rivers and Sea data shows that a similar area to Flood Zone 3 is modelled as being at High risk, and a small portion similar to Flood Zone 2 is modelled as Medium risk. The 100-year modelled flood depths are low, at 0-0.7m where out of bank. The 100-year velocities are also low, between 0-0.25m/s with tiny, isolated pockets of 0.25-0.5m/s. The resulting hazard is very low in the central floodplain, with areas nearer the channel (aligning with the Flood Zone 3b extent) as 'Danger for Some'.		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		2%	3%	13%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0587		
	Address	Land at Blackpole Road, Worcester		
	Area	13.57 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Description of surface water flow paths: Risk of Flooding from Surface Water data for this site shows small flow paths in all 30, 100 and 1,000-year extents, although only minor paths. Surface water risks are largely of the 1,000-year extents only, with minimal impact from 30 and 100-year extents which are mostly associated with Barbourne Brook floodplain itself. Extents show risks are restricted to a similar area as the fluvial risk, between the Barbourne Brook main and split channel, with the central depression between the two channels holding majority of the flow paths. A large ponding accumulation is present in the 1,000-year extent, of which a small proportion encroaches into the site. A significantly smaller pond in also modelled along the boundary here in the 30-year extent. The larger accumulation here may be connected to flow paths that cover a significant area of roadways in the industrial estate to the south of the canal via a culvert. The ponding in the 1,000-year extent is shown to flow to the Blackpole Road along the western boundary. This could possibly connect with the Barbourne Brook as it passes under the road, although a site-specific risk assessment would clarify this, and any potential risk to the western edge of the site.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	This site is not shown to be within the reaches of the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0587
	Address	Land at Blackpole Road, Worcester
	Area	13.57 hectares
	Current land use	Greenfield
	Proposed land use	Employment
	Residual risk	There are a number of residual risks at this site and thus a site-specific risk assessment is recommended to investigate these potential risks further. The two culverts that are present in all datasets are at the entrance and exit points to the site by the Barbourne Brook. The brook enters the eastern border of the site through a culvert that passes beneath the canal and exits through one passing under the A4536 on the western border. The canal culvert has the potential for impounding to impact the south-eastern corner of the site if flows accumulate upstream of the site. The A4536 culvert poses an impoundment risk to the western-most fringes of the site and could add volume to the modelled surface water ponding in the south-west corner. Finally, the canal which forms the southern boundary along the length of the site poses a risk of overtopping into the south of the site. Given the topography of the site, any overspill may flow into the primary un-named drain that bisects the site and create a surface water flood risk, which could also in turn add to impounding volumes at the A4536 culvert. Site-specific Flood Risk Assessments should investigate the impacts of blockages to these culverts on the climate change scenario and confirm risk to the site and help inform finished floor levels in-site.
Emergency planning	Flood warning	The site is partially covered by modelled data in the Environment Agency's Flood Warning Service. The site is covered by the 'Barbourne Brook in Worcester' Flood Alert, up to the Blackpole Road. Downstream of the Blackpole Road, there is a Flood Warning Area called 'Blackpole and Perdiswell on the Barbourne Brook', which will receive flood warnings.
	Access and egress	Access and egress at this site are possible at this site via a gateway along the A4536, accessible from the southbound carriageway only, between the slip-road exit from the A449 and the bridge over the Barbourne Brook. This leads into the northern portion of the site only. Similarly, access to the southern portion of the site (south of the field drain) is possible through a different gateway along a hardcore track. In terms of road access, there is minimal risk on the A449 in the vicinity of the site and to the east, whereas to the west, there is 30-year surface water ponding. Blackpole Road has clear reaches and flooded reaches, so consideration is needed for access further from the site. The site is also bisected by the Barbourne Brook, so consideration needs to be given to both northern and southern parts of the site where the watercourse crosses. A site-specific Flood Risk Assessment should be undertaken to evaluate accessibility to pedestrians and vehicles at both of these access points, as the main road and southern gateway are within the 1,000-year surface flood risk modelled data.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0587
	Address	Land at Blackpole Road, Worcester
	Area	13.57 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling is available at the site from the Barbourne Brook modelling of the 100-year +25%, +35% and 70% climate change scenarios. These all cover an area similar to Fluvial Flood zone 2, between the Barbourne Brook split channels along the width of the site. Flood extents resemble Flood Zone 2. - Climate change should also be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This extends along the eastern section from large flow paths that pass through the site south to north. - The current day 1000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation – Mudstone - Superficial – Sidmouth Mudstone Formation – Mudstone - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's groundwater mapping suggests the site is at negligible risk of groundwater flooding, due to the nature of local geological deposits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0587
	Address	Land at Blackpole Road, Worcester
	Area	13.57 hectares
	Current land use	Greenfield
	Proposed land use	Employment
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. Development should not be placed between the Barbourne Brook split channels where the Flood Zones are present. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Blockage residual risk will need to be investigated and modelled in a FRA to confirm impacts and help inform finished flood levels. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's 'Surface Water Management Plan' and 'SuDS design and evaluation guide' webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. Consideration is needed where the site is bisected to ensure access to both parts of the site. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0587
	Address	Land at Blackpole Road, Worcester
	Area	13.57 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		- Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. - 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is limited to the 68% of the site located within Flood Zone 1, therefore the southern half of the site and a small proportion of the north-western corner of the site. - Development should be avoided between the split channel of the Barbourne Brook, where the Flood Zones are extensive and contained. - Safe access and egress need to be considered as the site is bisected significantly. There are roads near to these separated areas, but this split needs to be accounted for. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed ‘guidance for developers’ section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency’s Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 originate from the latest Barbourne Brook 1D-2D hydraulic model, obtained as part of this Level 2 SFRA.
Climate change		Climate change was based on the latest Barbourne Brook 1D-2D hydraulic model, obtained as part of this Level 2 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0587
	Address	Land at Blackpole Road, Worcester
	Area	13.57 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Fluvial depth, velocity and hazard mapping		There is fluvial depth, velocity and hazard data available for the Barbourne Brook model as it is a 1D-2D model. The 100-year outputs are shown in the interactive mapping.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652			
	Address	Land adjacent to Blackmore Park, Great Malvern			
	Area	24.1 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	Great Malvern, located to the east of the Malvern Hills, forms the headwater tributaries of the Pool Brook. This is joined by the Mere Brook near Hanley Castle and subsequently flows into the River Severn near Upton-Upon-Severn. This site is to the south-east of Great Malvern near the settlement of Poolbrook and is flanked on the south-west, south and south-east by dense woodland, with a small field-drain along its southern boundary. The topography here is low-lying with a slight gradient sloping to the south-east. The minor road along its northern edge forms the dividing boundary between this site and site CFS0117 Park Farm. Site CSF0141b is located further along this minor road, identified as ‘Some Risk’.			
	Existing drainage features	There are no watercourses running directly through the site. An unnamed field drain flows along the southern boundary, with another to the south of the woodlands. There is a small (~3km²) settling pool to the south-east of the site. A central gully has formed in the site field leading to this point, through which one of 2 footpaths passes. This leads through a conduit and into the woodland to the south. The second footpath, and potential overland conduit, runs east-west across the site, crossing the unnamed watercourse drain on the western boundary.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		<1%	<1%	1%	99%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
High					
<i>The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)</i>					

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652		
	Address	Land adjacent to Blackmore Park, Great Malvern		
	Area	24.1 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data.		
		Flood characteristics: The majority of this site does not lie within the EA's Flood Zones 2 or 3, apart from a small section to the south of the site. The fluvial flood risk to this part of the site is where a small gulley leads into the drain and is liable to flooding from the topography. The EA's Flood Zones commence just downstream of where the drain along the south-western boundary meets the watercourse flowing parallel with the southern boundary; this is because upstream of here, the catchment size is smaller than what is represented in the national Flood Zones. Both Flood Zones 2 and 3 are restricted by the local topography and current land-use conduits. There will be some fluvial flood risk associated with the drain along the south-western boundary, which is not present in the EA's Flood Zones due to the catchment being <3km ² . The risk posed by this watercourse should be investigated in a site-specific assessment, though it is anticipated not to pose a significant risk into the site given the adjoining topography.		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		<1%	1%	8%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652		
	Address	Land adjacent to Blackmore Park, Great Malvern		
	Area	24.1 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		Description of surface water flow paths: As with the fluvial flood risk, the surface water flow paths for the 30-year and 100-year floods are localised to the south of the site through the pathway conduit as described above. However, the 1,000-year surface water flood risk is not restricted to the south of the site, but extends throughout the length of the site, again located primarily around the footpath topographic conduits. These flow paths run north to south and collect at the southern gully where they flow into the drain. There is a small flow path to the west of the site which joins the drain along the western boundary. These flow paths are also contributed to from the minor road to the north of the site which is in-turn fed by channels in the adjacent northern site CSF0117. Overspill from the unnamed watercourse to the west of the site contributed a small portion of the surface water risk to the western boundary in the 1,000-year risk. There is also a small contribution to the 100-year risk along this boundary also, where the topography dips slightly. The surface water extents are fairly wide along the watercourse floodplains.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	There are no records of historic flooding at the site from the Environment Agency.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
	This site is not protected by any formal flood defences.			
	Residual risk	The culvert at the B4208 could block, and cause more water to flow over the road, east towards the site following sloping topography. The potential for this should be considered in a site-specific assessment, though it is anticipated the site is located far enough away to not receive any significant additional risk.		
	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652
	Address	Land adjacent to Blackmore Park, Great Malvern
	Area	24.1 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Emergency planning	Access and egress	The minor road along the northern boundary can be used to gain access and egress to the site, though this is within the 30-year, 100-year and 1,000-year surface water flooding extents, although minimal within 30-year and 100-year events. There is a central gate which leads into the field border in which the surface water flood water ponds and thus a site-specific assessment of depths, velocities, hazards, durations and speeds of onset of surface water flooding at this access/ egress location should be investigated further to confirm whether access for emergency vehicles could still be obtained. Alternative access and egress may be obtained from two locations along the main Blackmore Park Road (B4208) to the west of the site at Brook Cottage or a gateway further south along the road. The Council may need to confirm accessibility with landowners as both these access/ egress locations are through private property. Site-specific assessments should again take place at these locations as they both fall within the 30-year, 100-year and 1,000-year surface water flood extents. There are two public footpaths that cross the site, one north-south, and the other east-west. These routes are all within the 1,000-year surface water flood extent; however, are not affected by 30-year or 100-year events due to the site's topography.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652
	Address	Land adjacent to Blackmore Park, Great Malvern
	Area	24.1 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available at the site, and therefore Flood Zone 2 has been used as a conservative indication of flood risk from climate change. This extends along the southern boundary of the site. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model, to confirm the impact in the site, from the unmodelled watercourse along the south-western boundary also. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water extent provides an indication of the likely increase in extent of the more frequent events along the south-western boundary drain. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652
	Address	Land adjacent to Blackmore Park, Great Malvern
	Area	24.1 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation – Siltstone, Dolomitic, Mudstone; Malverns Complex – Granite-Rock, Microdiorite. - Superficial – Alluvium Deposits (Clay, silt, Sand and Gravel). - 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 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 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 features 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. - Filtration features are 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. 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. 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk from groundwater flooding due to the nature of local geological deposits.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652
	Address	Land adjacent to Blackmore Park, Great Malvern
	Area	24.1 hectares
	Current land use	Greenfield
	Proposed land use	Employment
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. Consideration still needs to be given to the watercourses not represented by the EA's Flood Zones as there will still be fluvial risk here, which needs to be confirmed in a FRA. 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.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled drains along the southern/ western boundaries, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes, preserving these spaces as green infrastructure. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the unnamed watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652
	Address	Land adjacent to Blackmore Park, Great Malvern
	Area	24.1 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		- Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. - 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - The site is designated as ‘Less Vulnerable’ and is not shown to be affected overly by fluvial flood risk so it should pass the Exception Test; however, there is a watercourse flowing parallel with the site’s western boundary which needs investigating in more detail using a hydraulic model, to confirm the Flood Zones extents. This may show some risk which will then need to be considered and development steered away from. - Development should be steered away from the surface water flow paths and the channel. Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed ‘guidance for developers’ section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency’s Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency’s Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk, as the site is not represented in the Flood Zones, but there is fluvial risk from the western drain.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0652
	Address	Land adjacent to Blackmore Park, Great Malvern
	Area	24.1 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate change		Climate change was based on Flood Zone 2 and 1,000-year Risk of Flooding from Surface Water extent to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0117			
	Address	Park Farm, Blackmore Park Road, Malvern			
	Area	14.05 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	This site is located to the south of Great Malvern, near the area of Pool Brook, and on land adjacent to (and directly north of) site CFS0652 (<i>Land adjacent to Blackmore Park, Great Malvern</i>). Blackmore Park Road (B4208) forms the western boundary, skirting around Malvern Lodge in the south-western corner, and two cottages in the north-western corner. Two un-named roads form the northern and southern boundaries, with the southern boundary skirting around Malvern Meadows in the centre of the border. The western boundary is delineated by a field boundary.			
	Existing drainage features	The Environment Agency's Detailed River Network shows the primary drainage feature associated with this site is an un-named tributary of the Pool Brook, which enters the site as two tributaries that join along the Blackmore Park Road and enter the site as one channel from the western boundary. It initially flows south-east, before turning sharply north-east to the northern border, which is then follows to the eastern boundary and exits the site in the north-eastern corner.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. Flood characteristics: There is no available Fluvial Flood Zone mapping data modelled for this site, due to the upstream catchment being <3km ² and thus a site-specific Flood Risk Assessment should be undertaken to assess any risk from the Pool Brook tributary flowing through the site. This should also consider risk from New Pool pond, located on higher ground just upstream of Blackmore Park Road. Risk of Flooding from Rivers and Sea data is also not modelled at this site. The Risk of Flooding from Surface Water dataset can therefore be used as an indication of risk.			
	Surface Water	Proportion of site at risk (RoFfSW)			
30-year		100-year	1,000-year		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0117		
	Address	Park Farm, Blackmore Park Road, Malvern		
	Area	14.05 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		<1%	1%	7%
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
	Reservoir	Description of surface water flow paths: Risk of Flooding from Surface Water data modelled for this site shows small, scattered flow paths in all 30, 100 and 1,000-year extents across the site and are influenced primarily by the tributary and overall topography. Extents of 30 and 100-year modelled data is mostly restricted to the tributary flowing into and through the site, though there is a small flow path shown in the 100-year extent along the southern border surrounding Malvern Meadows (likely associated with a driveway), and a smaller one still along the southern border west of Malvern Meadows (likely a field ditch). The 1,000-year extent is the most prominent at this site, though with a significant proportion still associated with the tributary. However, much of the flow path modelled in this extent diverts away from the channel along the section flowing towards the southern boundary. From here it flows southwards overland via two primary paths (one dictated by a field boundary and possibly an un-modelled field drain) and re-collects on the southern road and at Malvern Meadows. This extent then continues to follow the topography and flows west and south, into and around the neighbouring site (CFS0652). Other flow paths around the site are primarily along the northern boundary road, and with the tributary upstream of Blackmore Park Road, where the tributary exits a small pond.		
		The site is not shown to be at risk of reservoir flooding from the available online maps. There is however a large pool called 'New Pool' just upstream of the site to the west. Site specific studies should investigate this further, for example its size, influence, outfall operations etc.		
		This site is not shown to be within the reaches of the data modelled in the Environment Agency's Historic Flood Map.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0117
	Address	Park Farm, Blackmore Park Road, Malvern
	Area	14.05 hectares
	Current land use	Greenfield
	Proposed land use	Employment
	Residual risk	Residual risk associated to this site is from the small culverts along the western boundary where the two un-named tributaries flow under the Blackmore Park Road. An impoundment risk is present here in high flows, as is a secondary risk of overspill from the New Pool upstream. As this is situated on higher ground, there is a residual risk to the site located shortly downstream on lower ground. A site-specific Flood Risk Assessment should be undertaken to evaluate these risks further.
Emergency planning	Flood warning	The site is not covered by modelled data in the Environment Agency's Flood Warning Service.
	Access and egress	Access and egress are possible at this site via the roads along the northern, western and southern boundaries. Access may also be possible from the Blackmore Park Road near Malvern Lodge to the south of the tributary culvert through a double set of gates. Access routes through the site are possible, though the crossing point over the tributary should be assessed in a site-specific assessment, as should the access and egress points, as they fall within the 100 and 1,000-year surface water flood risk extents.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0117
	Address	Park Farm, Blackmore Park Road, Malvern
	Area	14.05 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available at the site, and therefore Flood Zone 2 has been used as a conservative indication of flood risk from climate change. However, there are no marked Flood Zone 2 areas at this site either due to the catchment size being smaller than those represented on the EA's Flood Zone mapping. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model, to confirm the impact in the site. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This extends along the central and southern sections from flow paths that pass through the site flowing southwards. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0117
	Address	Park Farm, Blackmore Park Road, Malvern
	Area	14.05 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation - Mudstone - Superficial – Head - Clay, silt, Sand and Gravel - 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 likely to be suitable. - 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 measures 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. - Filtration measures are 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. - The site is not designated by the Environment Agency as previously being a landfill site. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk from groundwater flooding due to the nature of local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site. Given the site is employment 'less vulnerable' and not shown to be located in a Flood Zone, this site should pass the Exception Test. However, there is no Flood Zone because the catchment is not modelled, and therefore risk from the watercourse should still be assessed and confirmed at site-specific FRA stage, and development steered away from this area. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the unmodelled drains, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes, preserving these spaces as green infrastructure. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the unnamed watercourse 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0117
	Address	Park Farm, Blackmore Park Road, Malvern
	Area	14.05 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • The site is designated as 'Less Vulnerable' and is not shown to be affected by fluvial flood risk so it should pass the Exception Test; however, there is a watercourse flowing through the site and along the boundary which needs investigating in more detail using a hydraulic model, to confirm the Flood Zones extents. This may show some risk which will then need to be considered. • Development should be steered away from the surface water flow paths and the channel. If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. • Residual risk from the New Pool should be investigated and potential impacts considered regarding flood risk and safety in the site, should this overtop. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0117
	Address	Park Farm, Blackmore Park Road, Malvern
	Area	14.05 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk, as the site is not represented in the Flood Zones, but there is fluvial risk.
Climate change		Climate change was based on Flood Zone 2 and 1,000-year Risk of Flooding from Surface Water extent to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0120			
	Address	Land south of Playing Field at Martley			
	Area	3.94 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This roughly diamond-shaped site lies on the western outskirts of the village of Martley, ~10km north-west of Worcester City, near the River Teme. The B4197 forms the western boundary, with Jury Lane residential estate along the eastern border (Hastings Close). The southern border runs along a field boundary, and the northern border is formed by a sports field. Hollins Lane passes the site at the eastern corner.			
	Existing drainage features	There are no watercourses in the vicinity of the site. The nearest modelled watercourse begins ~0.4km east of the site. This watercourse is an unnamed tributary which flows into the Laughern Brook and subsequently into the River Teme just south of Worcester, before entering the Severn downstream of Diglis.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data.			
		Flood characteristics: There is no available Fluvial Flood Zone mapping data modelled for this site as the site is not shown to be at fluvial flood risk. Risk of Flooding from Rivers and Sea data is also not modelled at this site.			
		Surface Water	Proportion of site at risk (RoFfSW)		
	30-year		100-year	1,000-year	
	1%		1%	3%	
Max depths (m)					
0.3-0.9m	0.3-0.9m		>0.9m		
Max velocity (m/s)					
<0.25	>0.25		>0.25		
The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)					

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0120
	Address	Land south of Playing Field at Martley
	Area	3.94 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		Description of surface water flow paths: Risk of Flooding from Surface Water data modelled for this site shows a single surface water ponding accumulation within the site in the northern corner, near cul-de-sacs off-of Jury Lane (Hastings Close). This is retained within a topographic depression and is modelled in all 30, 100 and 1,000-year surface water risk extents, increasing in volume with each larger extent. There is photographic evidence from the Council from 2020 showing flooding around Hastings Close, which seems to tie in with predicted flooding. This ponding encroaches into land between the site and Jury Lane, adjacent to the end of Hastings Close, in the 1,000-year extent, and is also modelled in smaller pockets here in the 100-year flow data. Other flow paths around the site are primarily along the surrounding roads, including Jury Lane, Hollins Lane, and the B4197. These flow paths are present in the 1,000-year data extents only, although a small flow path is evident within the 30 and 100-year extent in the field to the west of the B4197. To the north of the site, considerably more significant flow paths are present across the residential estate around Mortlake Drive, St Peter's Drive, the northern section of Jury Lane and the north-eastern portion of the sports field. These flow paths are shown within all 30, 100 and 1,000-year data sets extensively. See 'Flood History' section for more details.
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0120		
	Address	Land south of Playing Field at Martley		
	Area	3.94 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
	Flood history	This site is not shown to be within the reaches of the data modelled in the Environment Agency's Historic Flood Map. The Council did however provide photographs of 2020 flooding at the site, relating to a playing field subjected to flooding, in addition to some flooding on St Peters Drive and Hastings Close and in gardens/ driveways. These show large amounts of standing water. St Peters Drive is located topographically downstream of the site, whereas Hastings Close forms the boundary with the east of the site. There is some surface water ponding shown here in the surface water mapping which ties in with photographs, and also St Peters Drive (in addition to much of the surrounding housing estate) is shown to be inundated in all surface water events, though more extensively in the 100-year and 1,000-year events. However, it is not known whether this 2020 flooding is due to already saturated ground following previous rainfall events, therefore with nowhere for the water to infiltrate to, or a surcharged sewer, groundwater or potentially an old watercourse drain in the vicinity which could have blocked and caused an overland flow path etc. The site on the whole is shown to be at low risk from surface water and fluvial flooding. Groundwater mapping has been analysed in addition, to ascertain any risk. A detailed assessment is therefore recommended to determine the flooding mechanism, frequency or direction of flow, investigate local knowledge and so on.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
	This site is not protected by any formal flood defences.			
	Residual risk	There are no residual risks associated with this site.		
Emergency planning	Flood warning	The site is not covered by modelled data in the Environment Agency's Flood Warning Service.		
	Access and egress	Access and egress are difficult at this site in the 1,000-year surface water event, as there is no clear open access route into the site. However secondary routes may be possible via an overgrown spacing between treeline on the eastern corner on Hollins Lane. Excepting through the centre of Martley where risk is higher, surface water risk on nearby roads are generally low in the 30-year and 100-year events. Access routes may also be available through the sports field to the north and to the south-west corner of the site through a private driveway, opposite the Edgar Trading Estate.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0120
	Address	Land south of Playing Field at Martley
	Area	3.94 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling or Flood Zone data at the site. Climate change should therefore be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. This is evident within the site in the north-eastern corner and on land and roads surrounding this area. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA, to ensure there is no third party risk to the housing estate located next to and topographically lower than the site.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0120
	Address	Land south of Playing Field at Martley
	Area	3.94 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation – Siltstone, Dolomitic, Mudstone; Malverns Complex – Granite-Rock, Microdiorite. - Superficial – Alluvium Deposits (Clay, silt, Sand and Gravel). - 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 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 to prevent the egress of groundwater. - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is split into 2 halves; the western half groundwater levels are between 0.5-5m below surface with a risk to subsurface assets but unlikely to manifest on the surface. The eastern half (which also covers the housing estate) is between 0.025-0.5m below surface suggesting there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally. This supports the large areas of standing flooding seen in 2020 to the east, if for example the ground is already saturated/ groundwater flooding is likely.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0120
	Address	Land south of Playing Field at Martley
	Area	3.94 hectares
	Current land use	Greenfield
	Proposed land use	Residential
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. Given the site is not shown to be near any watercourses of fluvial risk, it should pass the Exception Test. However, there are some site considerations regarding surface water and groundwater flooding. 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. • More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Whilst flood risk at the site looks low, a detailed assessment may be required either at the site (to ensure no third party risk elsewhere) or in Martley itself to investigate the historic flooding seen and evidenced in photographs. As discussed, there is surface water risk shown in these locations and the groundwater mapping suggests higher susceptibility in the vicinity of the housing estate. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes, preserving these spaces as green infrastructure. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS.
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0120
	Address	Land south of Playing Field at Martley
	Area	3.94 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		- 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. - Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: - Development is steered away from Hastings Close/ the surface water ponding area to the north-east. This is because there is evidence of flooding occurring here. - The development is residential and 'More Vulnerable'; however, there is no fluvial risk to the site, therefore it should pass the Exception Test. - Consideration does need to be given to recent 2020 flooding and the reasons/ mechanisms for that, to ensure the site is not only safe itself, but does not cause adverse impacts immediately downstream to the housing estate. - If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). - Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. The site is not affected by fluvial flood risk.	
Climate change	Climate change was based on Flood Zone 2 and 1,000-year Risk of Flooding from Surface Water extent to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are modelled for surface water in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.	

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0120
	Address	Land south of Playing Field at Martley
	Area	3.94 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0143			
	Address	Parcel B – Land adjacent Broadway Road, Wickhamford			
	Area	1.76 hectares			
	Current land use	Greenfield			
	Proposed land use	Employment			
Sources of flood risk	Location of site within catchment	The site named ‘Parcel B – Land adjacent Broadway Road, Wickhamford’ is located to the south-east of Evesham, and the south of the Vale of Evesham. Parcel B is the smaller of two sites and borders the larger portion of land (site CFS0142 Parcel A) along its eastern boundary. To the east of this site is Broadway Road, and further to the west is the A46 bypass road around Evesham. A small field drain is located to the north-west of the site which flows into the Bengeworth Brook, and subsequently into the River Avon in Evesham.			
	Existing drainage features	The field drain in the northern corner runs along the site boundary for ~41m before turning along the neighbouring field boundary and flowing into the Bengeworth Brook. There is a ponded area north of the site near the confluence of the drain with the brook on the drains’ western side. The foot of a steeply inclined hill south-east of the site and bordering the neighbouring site (CFS0142) along its southern boundary has the potential to contribute overland flow paths in high rainfall events. Downstream of the site in the northwest, the Bengeworth Brook flows through a culvert under the A46.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	0%	0%	100%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		None			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data: The Environment Agency’s Flood Zone mapping has been used in this assessment. This is based on 2D generalised modelling data. Flood characteristics: This site does not lie within Flood Zones 2 or 3 and is entirely within Flood Zone 1. Flood risk at this site is associated with surface water; however, consideration should still be taken to the potential flood risk from the unnamed drain that begins in the northern corner of the site, though this is anticipated to be a low risk as it flows away from the site. A site-specific Flood Risk Assessment is recommended to quantify any potential risk. Fluvial flood risk has not been modelled here as the upstream catchment is <3km².			
	Surface Water	Proportion of site at risk (RoFfSW)			
		30-year	100-year	1,000-year	
		7%	14%	48%	
		Max depths (m)			

South Worcestershire Councils Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0143		
	Address	Parcel B – Land adjacent Broadway Road, Wickhamford		
	Area	1.76 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Surface water flooding poses the primary source of flood risk at this site. There are two prevalent flow paths through the site, one of which is active during 30 and 100-year surface water risk extents along the western side of the site, and the other within the 1,000-year extent flowing into the site from the south-east, sourced from run-off from a steep hill south-east of the site. Surface water at this site is predominantly topographically isolated as ponding in 30 and 100-year extents, with the shallow sloping gradient towards the north-western corner directing the majority of surface water to the western borders, where the field drain begins. The 30-year extent is restricted within the site boundary in this area apart from where it exits to the north. However, there are small pockets along the eastern boundary and in the south-west corner respectively which are within the 100-year extent. There is a potential tertiary surface flood risk potential which impacts the site predominantly within the 1,000-year extent flowing from the south. This flow path runs directly through the centre of the site joining the primary flow path along the western end. This extent also enters the site from the south-west corner and joining the central flow in the north-west quarter of the site, creating a large flood-risk surface area. Surface water flood risk at this site and its surrounding environment is delineated by strict topographic boundaries on all sides, with the site located in the centre. To the south-east is a large steep hill; to the south west is a smaller incline. These contribute a significant amount of surface water to the site, particularly in 1,000-year events. To the east and west lie two major roads, both of which have culverts passing under them which contain the Bengeworth Brook. Surface water in all flood extents builds up behind these culverts and increases the surface water flood risk to the north of site and surrounding area, joining with the flow path from the site. To the north is a road junction roundabout, where the two roads converge, contributing further surface water to the surrounding area. The low sloping gradient allows water to disperse over a wide area through and around this site which may impact any development around this site also.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	There are no records of historic flooding at the site from the Environment Agency.		

South Worcestershire Councils Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0143		
	Address	Parcel B – Land adjacent Broadway Road, Wickhamford		
	Area	1.76 hectares		
	Current land use	Greenfield		
	Proposed land use	Employment		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	Downstream of the site, after the unnamed field drain has joined the Bengeworth Brook, the channel flows through a culvert under the A46, which causes impounding of surface water upstream and along the road verge; however, this is a significant distance away from the site and likely has little impact on the site.		
Emergency planning	Flood warning	The site is not covered by the Environment Agency's Flood Warning Service.		
	Access and egress	Access and egress to the site is most easily made via the A46 to the west of the site but can also be made via the Broadway Road (A44) to the east, though this is a longer route. There are currently no formal road routes shown directly leading to the site. Along the A46 there is an open farm track which leads to the north-eastern corner of the site and follows all site boundaries apart from the northern border. The route from the Broadway Road (A44) is also via a field track which leads into and around the northern corner of site CFS0142 before following that site's western border and joining site CFS0143 at its eastern corner, where it connects with the same track described above. The access route from the A46 is free from any impact of any 30, 100 or 1,000-year surface flood risk extents between the main road and the northern corner of the site. Consideration of depth and velocity should be made to accessibility of vehicles and pedestrians if using this route as the corner it leads to is the most severely impacted within the site which is recorded as high risk for both parameters. The main roads are mostly affected in the 1,000-year surface water event, with points in the 30-year where watercourses pass underneath.		

South Worcestershire Councils Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0143
	Address	Parcel B – Land adjacent Broadway Road, Wickhamford
	Area	1.76 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - There is no detailed fluvial modelling available or Flood Zone 2 representation at this site., therefore the Risk of Flooding from Surface Water 1,000-year extent has been used as a conservative indication of flood risk from climate change. Consideration should still be made however to the potential fluvial risk in northern corner from the unnamed field drain which begins here. This is not mapped as the upstream catchment is <3km² but it is located in the most severely impacted area of the site. - Climate change should therefore be considered for surface water events; at the site-specific stage, the 1,000-year event is considered as part of surface water drainage strategies, or surface water modelling. These extend throughout the north-western corner and the western section of the site. There is also a possibility of this extent crossing the eastern border where a small pocket impacted by 100-year events, and the main flow route for 1,000-year events are focussed. This would require a detailed FRA to assess the site layout and design. - The 100-year extent also impacts the Bengeworth Brook north of the site where the field drain enters the brook, and also at the culvert under the A46. - Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0143
	Address	Parcel B – Land adjacent Broadway Road, Wickhamford
	Area	1.76 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. - Superficial – None recorded - 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk from groundwater flooding due to the nature of local geological deposits.
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Employment development is classified as 'Less Vulnerable'. It is recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site and steered away from the western side where surface water affects all flood events. Given the site is employment 'less vulnerable' and not shown to be located in a Flood Zone, this site should pass the Exception Test. However, there is no Flood Zone because the small drain to the north of the site commences in this location and hence is a small catchment. Risk from the watercourse should still be assessed and confirmed at site-specific FRA stage, and development steered away from this area where surface water risk is highest, as a large proportion of the site is at surface water risk. More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • All sources of flooding, particularly the risk of surface water and groundwater flooding, should be considered as part of a site-specific flood risk assessment. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • A more detailed assessment may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents of the small drain or surface water. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes, preserving these spaces as green infrastructure. • Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’, and the Level 1 SFRA for information on SuDS. • New development must seek opportunities to reduce overall level of flood risk at the site, for example by: ◦ Reducing volume and rate of runoff
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South Worcestershire Councils Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0143
	Address	Parcel B – Land adjacent Broadway Road, Wickhamford
	Area	1.76 hectares
	Current land use	Greenfield
	Proposed land use	Employment
		○ Relocating development to zones with lower flood risk ○ Creating space for flooding. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • The site is designated as 'Less Vulnerable' and is not shown to be affected by fluvial flood risk so it should pass the Exception Test; however, there is a watercourse starting from the site's northern boundary, flowing away from the site, which needs to be considered. • Development should be steered away from the western portion of the site at highest flood risk from surface water, which is also a flow path. As a large proportion of the site is covered by the 1,000-year surface water flood extent, consideration is needed regarding impacts of climate change on site, as this extent acts as a proxy for the climate change extent. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. • Access to the site needs to be considered as at present, there are no obvious formal road access points from the 2 A-roads. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning; this is based on 2D generalised modelling in this area as there is no detailed hydraulic model available. It is recommended that flood risk from the small drain at the northern boundary is considered.
Climate change		Climate change was based on Flood Zone 2 and 1,000-year Risk of Flooding from Surface Water extent to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.

South Worcestershire Councils Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0143
	Address	Parcel B – Land adjacent Broadway Road, Wickhamford
	Area	1.76 hectares
	Current land use	Greenfield
	Proposed land use	Employment
Fluvial depth, velocity and hazard mapping		There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at site-specific stage.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0252			
	Address	Land off Northwick Road, Bevere			
	Area	1.15 hectares			
	Current land use	Greenfield			
	Proposed land use	Residential			
Sources of flood risk	Location of site within catchment	This site is located along the left-hand bank of the River Severn between Bevere and Northwick conurbations, north of the City of Worcester. The site is a parcel of land which currently lies between the residential estates and the floodplain. The site is also divided by a local authority boundary which runs along the south-eastern corner and eastern boundary.			
	Existing drainage features	A small field drain flows through the south-eastern corner of the site, which passes through a small pond. This un-named drain flows out of the site along its southern boundary and follows neighbouring field boundaries north then west before joining the River Severn slightly upstream of the site.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
		0%	1%	17%	83%
		Highest zone of risk (Risk of Flooding from Rivers and Sea)			
		High			
		The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%)			
		Available data:			
		The Environment Agency's Flood Zone mapping has been used in this assessment, along with the Flood Zones derived in the 2018 L1 SFRA (which uses latest modelling data not included in the EA's Flood Map for Planning). This site's Flood Zones originate from the River Severn 1D hydraulic model. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies.			
	Flood characteristics:				
	Fluvial risk at this site is associated with the River Severn's floodplain and encroachment into the western and southern borders of the site, at the outer extremities of the Severn flood extents. This is controlled by the topography of the site; however, the un-named field drain in the south of the site provides a conduit for flood water to reach the southern section of the site. Flood Zone 3a extends into the south of the site where the drain crosses the boundary and only impacts a small area. It also extends close to the western boundary of the site near the south-western and north-western corners though it does not cross into the site. Flood Zone 2 is an extension of Flood Zone 3a in its location, however, it does encroach into the site along the entire western and southern boundaries.				
Surface Water	Proportion of site at risk (RoFfSW)				
	30-year	100-year	1,000-year		
	0%	1%	7%		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0252		
	Address	Land off Northwick Road, Bevere		
	Area	1.15 hectares		
	Current land use	Greenfield		
	Proposed land use	Residential		
		Max depths (m)		
		0.3-0.9m	0.3-0.9m	>0.9m
		Max velocity (m/s)		
		<0.25	>0.25	>0.25
		<i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</i>		
		Description of surface water flow paths: Surface water flood risk at this site is focussed around the south-west section and the western boundary, There is no modelled impact from 30-year at this site, and the 100-year extent is only apparent around the ponding in the south-eastern section of the site and along the un-named field drain downstream of this pond, which follows the drain west into the floodplain. The majority of the 1,000-year extent is also located to be in this section of the site, although the extent reaches further into the site, defined by topographic features around the pond and drain valley. This 1,000-year extent however is connected to a significant flow path of surface water to the south-east of the site along Northwick Road and the surrounding residential estate. These flows combine at the site's south-eastern corner where the field drain begins. A flow path here also flows along the eastern boundary of the site.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	Environment Agency records indicate none of the site is within the Historic Flood Map area. However modelling results indicate the south-western corner crosses the Historic Flood Map threshold in a very small area, the same as the low risk extent shown in Risk of Flooding from Rivers and Sea, from the River Severn outer flood extents.		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There are no residual risks at this site.		
Emergency planning	Flood warning	The site is covered by the Environment Agency's Flood Warning Service. The Flood Alert warning level for 'River Severn in Worcestershire' extends along a similar reach as the Fluvial Flood Zone 2, along the western and southern boundaries, though encroaches slightly further into west of the site. The Flood Warning level does not extend to this site. There is no Flood Warning Area in this location.		

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0252
	Address	Land off Northwick Road, Bevere
	Area	1.15 hectares
	Current land use	Greenfield
	Proposed land use	Residential
	Access and egress	Access and egress at this site are easily made via Northwick Road along the eastern boundary of the site. This is impacted by the 100-year and 1,000-year surface water extents along Northwick Road just south of the site as a result of the overland flow path from the surrounding residential estate.
Climate Change	Implications for the site	- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. - Detailed fluvial modelling showing the potential implications of climate change is available at this site. The 100-year plus 25% and 35% risk due to climate change extends across an area similar to Flood Zone 3; however, both extents do encroach into the western fringes of the site. The 100-year plus 70% climate change model results shows flooding encroaches slightly further into the site, comparable to Flood Zone 2. - Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. - The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent surface water events. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0252
	Address	Land off Northwick Road, Bevere
	Area	1.15 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS	- Geology at the site consists of: - Bedrock – Sidmouth Mudstone Formation – Mudstone - Superficial – Power House Terrace Deposits (River Severn) - Sand And Gravel. - 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. Infiltration likely to be suitable. - Mapping suggests that there is a high risk of groundwater flooding at this location apart from the eastern edge, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration. - Detention measures are 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 maybe required to prevent the egress of groundwater. - Filtration measures are 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. - The site is not located within any Environment Agency designated Source Protection Zone. - JBA's Groundwater mapping suggests the site is at negligible risk of groundwater flooding in the eastern half of the site, due to local geological deposits. The western half of the site has groundwater levels between 0.5-5m below the ground surface and there is a risk of flooding to subsurface assets, but surface manifestation is unlikely.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0252
	Address	Land off Northwick Road, Bevere
	Area	1.15 hectares
	Current land use	Greenfield
	Proposed land use	Residential
NPPF and planning implications	Exception Test requirements	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. 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. • More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.

	Requirements and guidance for site-specific Flood Risk Assessment	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. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk of fluvial, surface water and groundwater flooding, should be considered as part of a site-specific Flood Risk Assessment. • Developers should confirm with the EA latest model results to use to assess the site at the Flood Risk Assessment stage, as a River Severn updated modelling study was ongoing at the time of the SFRA, and results were not available. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Worcestershire County Council's Local Plan policies, and the LLFA's ‘Surface Water Management Plan’ and ‘SuDS design and evaluation guide’ webpage. • The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes along the southern and south-western boundaries, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b along the boundaries should be avoided unless appropriate use can be demonstrated in line with NPPF (for example if the small drain was modelled. The Severn's FZ3b does not affect the site). • Development in FZ3 along the boundaries may require floodplain compensation and this should be confirmed with the EA at FRA stage. Guidance for site design and making development safe: • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested 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. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk
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South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



Site details	Site Code	CFS0252
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	Area	1.15 hectares
	Current land use	Greenfield
	Proposed land use	Residential
		elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. • Developers should refer to Worcestershire County Council's 'Surface Water Management Plan' and 'SuDS design and evaluation guide', and the Level 1 SFRA for information on SuDS. • 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. • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.
Key messages		The flood risk element of the Exception Test is likely to be passed if: • Development is limited to the 83% of the site located within Flood Zone 1, therefore the northern portion of the site, avoiding where possible the southern and western boundaries where there is fluvial and surface water risk. . • Areas in Flood Zone 2 along the boundaries are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Space for green infrastructure should be considered in the areas of highest flood risk. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site
Mapping Information		
The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.		
Flood Zones		Flood Zones 2 and 3 originate from the River Severn 1D hydraulic model. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies.

South Worcestershire Councils Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables



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	Address	Land off Northwick Road, Bevere
	Area	1.15 hectares
	Current land use	Greenfield
	Proposed land use	Residential
Climate change		Climate change was based on the River Severn modelling from the Level 1 SFRA, whereby the 100-year was upscaled by 35% and 70% to reflect the 2080s epoch. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies.
Fluvial depth, velocity and hazard mapping		There is no depth, hazard and velocity data available currently as the River Severn model is 1D-only. The Risk of Flooding from Surface Water mapping has therefore been used as an indication. It should be noted that at the time of this study, an updated River Severn modelling study was being undertaken, so developers should request the latest available date from the EA for detailed site-specific studies, as this is a 1D-2D model.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
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.