

# Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>IRN001</b>			
	<b>Address</b>	Power Station Site, Ironbridge (Power Station)			
	<b>Area</b>	146 hectares			
	<b>Current land use</b>	Mixed			
	<b>Proposed land use</b>	Residential and Employment			
<b>Sources of flood risk</b>	<b>Location of site within catchment</b>	The site lies on the right bank of the River Severn in its middle reaches at Ironbridge. The northern area of the site is at relatively low elevation, extending onto the floodplain of the Severn whilst the southern area of the site slopes upwards to higher ground.			
	<b>Existing drainage features</b>	The River Severn runs from west to southeast along the northern boundary of the site. The Hunger Dale, an ordinary watercourse, enters the site in the middle of the southern boundary. It flows through the site from south to north for approximately 102m before entering a culvert. The culvert re-emerges at the northern site boundary to drain directly into the River Severn. There are two standing waterbodies present on the site. One is situated in the central area of the site close to the northern boundary and the other is situated in the southeast area of the site, close to the former site of the power station cooling towers.			
	<b>Fluvial</b>	<b>Proportion of site at risk</b>			
		<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>
		10%	17%	20%	80%
		<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>			
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%)					

# Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>IRN001</b>		
	<b>Address</b>	Power Station Site, Ironbridge (Power Station)		
	<b>Area</b>	146 hectares		
	<b>Current land use</b>	Mixed		
	<b>Proposed land use</b>	Residential and Employment		
		<p><b>Available data:</b> The Environment Agency's Flood Zone mapping and River Severn 1D hydraulic model (Buildwas to Bewdley model) has been used in this assessment. <i>At the time of the assessment, the River Severn was being re-modelled in a phasing of reaches, with Abermule to Shrewsbury completed first. Future Flood Risk Assessments should contact the EA to obtain latest model results following completion of the Severn modelling study.</i></p> <p><b>Flood characteristics:</b> Fluvial flood risk on this site is associated with the River Severn flowing along the northern boundary of the site. The extent of the Flood Zones is largely controlled by the topographic characteristics of the site with Flood Zones 2 and 3 extending southwards into the site onto the areas of lowest topography. Flood Zone 3b is mostly confined to the area immediately alongside the River Severn but this extends away from the channel in the northwest of the site. In this northwest area of the site the railway embankment constrains the extent of the Flood Zones. Fluvial flood risk remains in the part of the site that is north of the railway line. Due to the small catchment size (&lt;3km<sup>2</sup>) the Hunger Dale has not been included in the Environment Agency's Flood Zone mapping. Therefore, any fluvial flood risk from this watercourse in the south of the site has not been considered. The Environment Agency's Risk of Flooding from Rivers and Sea mapping partially covers this site. Along the northern boundary of the site, close to the River Severn, areas of the site are at high risk of flooding with an annual probability that flooding will occur of greater than 3.3%. An area of medium risk (probability of flooding 1%-3.3%) encroaches further south onto the site, with small areas of low risk (probability of 0.1%-1%) in the centre of the northern boundary and in the southeast of the site.</p>		
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		4%	6%	12%
		Max depths (m)		
		>0.9	>0.9	>0.9
		Max velocity (m/s)		
		>0.25	>0.25	>0.25
		<p><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></p>		

# Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



Site details	Site Code	IRN001
	Address	Power Station Site, Ironbridge (Power Station)
	Area	146 hectares
	Current land use	Mixed
	Proposed land use	Residential and Employment
		<p><b>Description of surface water flow paths:</b>            Surface water flooding is present across the site in the 30-year, 100-year and 1,000-year events.            In the south of the site an area of ponding occurs where the Hunger Dale enters the culvert with estimated maximum depths &gt;0.9m in all events. Surface water ponding is also evident in all events in the eastern area of the site, close to the waterbody at the former cooling towers. A surface water flow route running from the high ground to the south of the site enters the site directly into this waterbody. Other isolated areas of ponding at lower elevations in the northern area of the site are largely channelled along existing road or pathways, around existing structures or in topographic depressions.            There are two clear surface water flow paths that cross the site, primarily in the 1,000-year events. One path flows northward from the southern boundary of the site (situated to the west of Hunger Dale). It flows from higher elevations to lower elevations where it is impeded by the railway embankment and spreads laterally to the west and east. In the middle of this flow route, an area of ponding occurs in all events as water is impounded by another topographical feature. The second flow path is at the western end of the site flowing northwest from high to low elevation. At the western boundary of the site the flow path diverts to flow south west before leaving the site as it is bounded by the slightly elevated Much Wenlock Road.</p>
	Reservoir	There is a risk of flooding from reservoirs along the northern site boundary, primarily confined to the area within or directly surrounding the channel. The area of risk from reservoir flooding extends further into the site at the eastern edge of the site, to the north of the railway track. This area is at risk of flooding from the Ironbridge Cooling Tower Ponds reservoir which is located within the site boundary.
	Flood history	<p>The Environment Agency historic flood map shows that the area surrounding the Severn along the northern boundary of the site is associated with historic flooding events. The extent of the historic flood map is largely similar to Flood Zone 2 in this location.            In February 2020, the River Severn reached a peak of 6.8m at Buildwas gauging station which is located close to the north-western corner of the site. The highest recorded level at this gauging station was 7.04m in November 2000. The February 2020 flooding caused flood defences in Ironbridge (downstream of the site) to buckle and water seepage, though pumps managed flood risk on the land-side side of the defences.</p>

# Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	IRN001		
	<b>Address</b>	Power Station Site, Ironbridge (Power Station)		
	<b>Area</b>	146 hectares		
	<b>Current land use</b>	Mixed		
	<b>Proposed land use</b>	Residential and Employment		
<b>Flood risk management infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		-	-	-
	<b>Residual risk</b>	This site is not protected by any formal flood defences. The Ironbridge defences are located further downstream in the town/ wharf. If the entrance to the Hunger Dale culvert in the southern area of the site becomes blocked water is likely to back up, causing increased surface water ponding in an area already to susceptible to this risk. The culvert entrance is in a topographic depression where it is unlikely water will escape from but the depth of water at this location will likely increase if the culvert is blocked. The Coalbrookdale Brook joins at a confluence with the River Severn 400m downstream of the eastern site boundary.		
<b>Emergency planning</b>	<b>Flood warning</b>	The site is partially covered by the Environment Agency Flood Alert and Flood Warning Service. These areas are approximately reflective of the areas of the site close to the river along the northern boundary that fall within Flood Zones 2 and 3. These areas of the site fall within the River Severn at Ironbridge and Jackfield Flood Warning area (031FWFSE250) and the River Severn in Shropshire Flood Alert area (031WAF103).		
	<b>Access and egress</b>	Access and egress to the site can be gained only from Much Wenlock Road along the western boundary in all fluvial flooding events. The bridge crossing the Severn at the northwest corner of the site is high enough that water levels are unlikely to overtop this bridge when the river is in flood. The bridge that leads directly onto the site from Buildwas Road on the site's northern boundary may be inaccessible during fluvial flood events as the parts of the roadway leading to this bridge lie within Flood Zones 2, 3a and 3b. Surface water flooding follows flow routes along some stretches of Much Wenlock Road along the site's western boundary as well as along Buildwas bank on the northern bank of the River Severn. These flow routes are most prominent in the 1,000-year flood events where maximum levels are estimated to be <0.3m. Isolated ponding occurs along these access routes in the 30-year and 100-year events but maximum depths do not exceed 0.3m and therefore it is likely that access to the site from this route will still be possible. Access to the site via the bridge across the Severn on Buildwas Road along the northern boundary is possible in all surface water flooding events. The depths, velocities, hazards, durations and speeds of onset of surface water and fluvial flooding along access/ egress routes should be investigated further in a site-specific assessment, to confirm whether access for emergency vehicles could still be obtained.		

# Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>IRN001</b>	
	<b>Address</b>	Power Station Site, Ironbridge (Power Station)	
	<b>Area</b>	146 hectares	
	<b>Current land use</b>	Mixed	
	<b>Proposed land use</b>	Residential and Employment	
<b>Climate Change</b>	<b>Implications for the site</b>	<ul style="list-style-type: none"> <li>Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding.</li> <li>Detailed fluvial modelling showing the implications of climate change has been carried out at this site. Results show that the fluvial flood risk due to climate change extends across an area largely similar to Flood Zone 2, closely following the river along the northern boundary and confined by topographical features on the floodplain. In some areas, flood risk encroaches slightly further south into the site in comparison to Flood Zone 2. Climate change results from the new Severn model being constructed at the time of this study should be referred to for future site-specific studies.</li> <li>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.</li> <li>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.</li> <li>Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.</li> </ul>	
<b>Cumulative Impact of development within the catchment</b>	<b>Level of risk</b>	<b>Catchment</b>	<b>Level of risk</b>
		Farley Brook / River Severn	High / Low
	<b>Level of risk</b>		The site lies predominantly within the wider River Severn catchment, which is less sensitive to the cumulative impact of development as it is a large river system. The western end of the site spreads into the lower reaches of the Farley Brook sub-catchment. This sub-catchment has been identified as one that is more sensitive to the cumulative impacts of development within the catchment with proposed development covering 1.7% of the catchment area and evidence of properties at risk of surface water flooding in the 100-year event.
<b>Recommendations</b>		It is estimated that 1667m <sup>3</sup> of long-term storage is required at this site to ensure that greenfield runoff rates draining into the Farley Brook catchment are maintained at current levels. This is in addition to storage to capture the 100-year plus climate change event. Refer to Section 9 of the main SFRA report for more detailed information regarding cumulative impact assessment and policy recommendations at this site.	

# Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>IRN001</b>
	<b>Address</b>	Power Station Site, Ironbridge (Power Station)
	<b>Area</b>	146 hectares
	<b>Current land use</b>	Mixed
	<b>Proposed land use</b>	Residential and Employment
<b>Requirements for drainage control and impact mitigation</b>	<b>Broad scale assessment of possible SuDS</b>	<ul style="list-style-type: none"> <li>• Geology at the site consists of: <ul style="list-style-type: none"> <li>○ Bedrock – Coalbrookdale Formation - Mudstone.</li> <li>○ Superficial – Glaciofluvial Deposits and Alluvium Deposits (north and south).</li> </ul> </li> <li>• The site is not located within any Environment Agency designated Source Protection Zone.</li> <li>• Most source control techniques are likely to be suitable. Mapping suggests that slopes may be unsuitable for selective source control techniques.</li> <li>• 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 &lt;1m. Additionally, proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints given that the site is located with a Source Protection Zone.</li> <li>• Detention features are unlikely to be feasible as mapping suggests mean site slopes are &gt; 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.</li> <li>• Filtration systems are unlikely to be feasible as mapping suggests mean site slopes are &gt; 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 &gt;1m, additionally a liner maybe required to prevent the egress of groundwater.</li> <li>• All forms of conveyance are likely to be suitable. Where the slopes are &gt;5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater.</li> <li>• The central area of the site to the north of the railway line is identified as a historic landfill site (Ironbridge A).</li> <li>• Developers should refer to Shropshire Council's '<a href="#">Surface Water Management: Interim Guidance for Developers</a>' and '<a href="#">SuDS requirements for new developments</a>' webpage as well as the Level 1 SFRA, for information on suitable types of SuDS, the management train and opportunities and constraints in site master-planning.</li> </ul>

**Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables**



<b>Site details</b>	<b>Site Code</b>	<b>IRN001</b>
	<b>Address</b>	Power Station Site, Ironbridge (Power Station)
	<b>Area</b>	146 hectares
	<b>Current land use</b>	Mixed
	<b>Proposed land use</b>	Residential and Employment
<b>NPPF and planning implications</b>	<b>Exception Test requirements</b>	<p>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.</p> <p>The Exception test will need to be applied if:</p> <ul style="list-style-type: none"> <li>• More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2.</li> <li>• Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b.</li> <li>• More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.</li> </ul>

	<p><b>Requirements and guidance for site-specific Flood Risk Assessment</b></p>	<p><b>Flood Risk Assessment:</b></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• At the time of the assessment, the River Severn was being remodelled in a phasing of reaches, with Abermule to Shrewsbury completed first. Future Flood Risk Assessments should contact the EA to obtain latest model results following completion of the Severn modelling study, to confirm latest flood risk and climate change extents.</li> <li>• Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Shropshire Council’s Local Plan policies, and the LLFA’s <a href="#">‘Surface Water Management: Interim Guidance for Developers’</a> and <a href="#">‘SuDS requirements for new developments’ webpage</a>.</li> <li>• Consultation with the Local Authority, Lead Local Flood Authority and the Environment Agency should be undertaken at an early stage.</li> <li>• 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.</li> <li>• Development in FZ3b should be avoided unless appropriate use can be demonstrated in line with NPPF.</li> <li>• Development in FZ3 may require floodplain compensation and this should be confirmed with the EA at FRA stage.</li> </ul> <p><b>Guidance for site design and making development safe:</b></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• On site attenuation schemes would need to be tested against the River Severn to ensure flows are not exacerbated downstream within the catchment.</li> <li>• 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.</li> </ul>
--	---	--



# Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



Site details	Site Code	IRN001
	Address	Power Station Site, Ironbridge (Power Station)
	Area	146 hectares
	Current land use	Mixed
	Proposed land use	Residential and Employment
		<ul style="list-style-type: none"> <li>• 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.</li> <li>• Developers should refer to Shropshire Council's <a href="#">'Surface Water Management: Interim Guidance for Developers'</a> and <a href="#">'SuDS requirements for new developments'</a> webpage, and the Level 1 SFRA for information on SuDS.</li> <li>• New development must seek opportunities to reduce overall level of flood risk at the site, for example by: <ul style="list-style-type: none"> <li>○ Reducing volume and rate of runoff</li> <li>○ Relocating development to zones with lower flood risk</li> <li>○ Creating space for flooding.</li> </ul> </li> <li>• 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.</li> </ul>
Key messages		<p>The flood risk element of the Exception Test is likely to be passed if:</p> <ul style="list-style-type: none"> <li>• Development is limited to the 84% of the site outside of the Environment Agency's Flood Zone 3 and is preferentially located within Flood Zone 1, which covers 81% of the site. Development should be steered to the area of the site to the south of the railway line where fluvial flood risk is minimal and should avoid the area of high surface water risk associated with the Hunger Dale in the south of the site.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</li> <li>• 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.</li> <li>• Refer to Section 9 of the main SFRA report for information regarding policy to minimise risk due to the cumulative impacts of development at this site and within the Farley Brook catchment.</li> </ul> <p>Refer to the 'detailed guidance for developers' section for further information on the measures that are appropriate for this site.</p>

## Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>IRN001</b>
	<b>Address</b>	Power Station Site, Ironbridge (Power Station)
	<b>Area</b>	146 hectares
	<b>Current land use</b>	Mixed
	<b>Proposed land use</b>	Residential and Employment
<b>Mapping Information</b>		
<p>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 mapping. More details regarding data used for this assessment can be found below.</p>		
<b>Flood Zones</b>	<p>Flood Zones 2, 3a and 3b have been taken from the Environment Agency's Flood Map for Planning, and Flood Zone 3b from the River Severn Buildwas to Bewdley 1D hydraulic model.</p> <p>At the time of the assessment, the River Severn was being re-modelled in a phasing of reaches, with Abermule to Shrewsbury completed first. Future Flood Risk Assessments should contact the EA to obtain latest model results following completion of the Severn modelling study, to confirm latest flood risk and climate change extents.</p>	
<b>Climate change</b>	<p>Climate change was based on the River Severn Buildwas to Bewdley 1D hydraulic model.</p> <p>At the time of the assessment, the River Severn was being re-modelled in a phasing of reaches, with Abermule to Shrewsbury completed first. Future Flood Risk Assessments should contact the EA to obtain latest model results following completion of the Severn modelling study, to confirm latest flood risk and climate change extents.</p>	
<b>Fluvial depth, velocity and hazard mapping</b>	<p>The 1D River Severn hydraulic model does not provide outputs of depth, velocity and hazard, therefore, the Risk of Flooding from Surface Water Mapping has been used to consider the smaller Hunger Dale watercourse at this site. New River Severn results should be consulted for future studies following completion of the Severn modelling study in 2020.</p>	
<b>Surface Water</b>	<p>The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.</p>	
<b>Surface water depth, velocity and hazard mapping</b>	<p>The surface water depth, velocity and hazard mapping for the 1 in 30-year (high risk), 1 in 100-year (medium risk) and 1 in 1,000-year (low risk) events is taken from the Environment Agency's Risk of Flooding from Surface Water mapping.</p>	