

## E Summary of Flood Risk in Wolverhampton

For the purpose of summarising flood risk across Wolverhampton, Figure E-1 details the five separate areas analysed in this appendix. Areas were determined by ward outlines from 2011 census data and grouped according to similar topography and watercourses/canals.

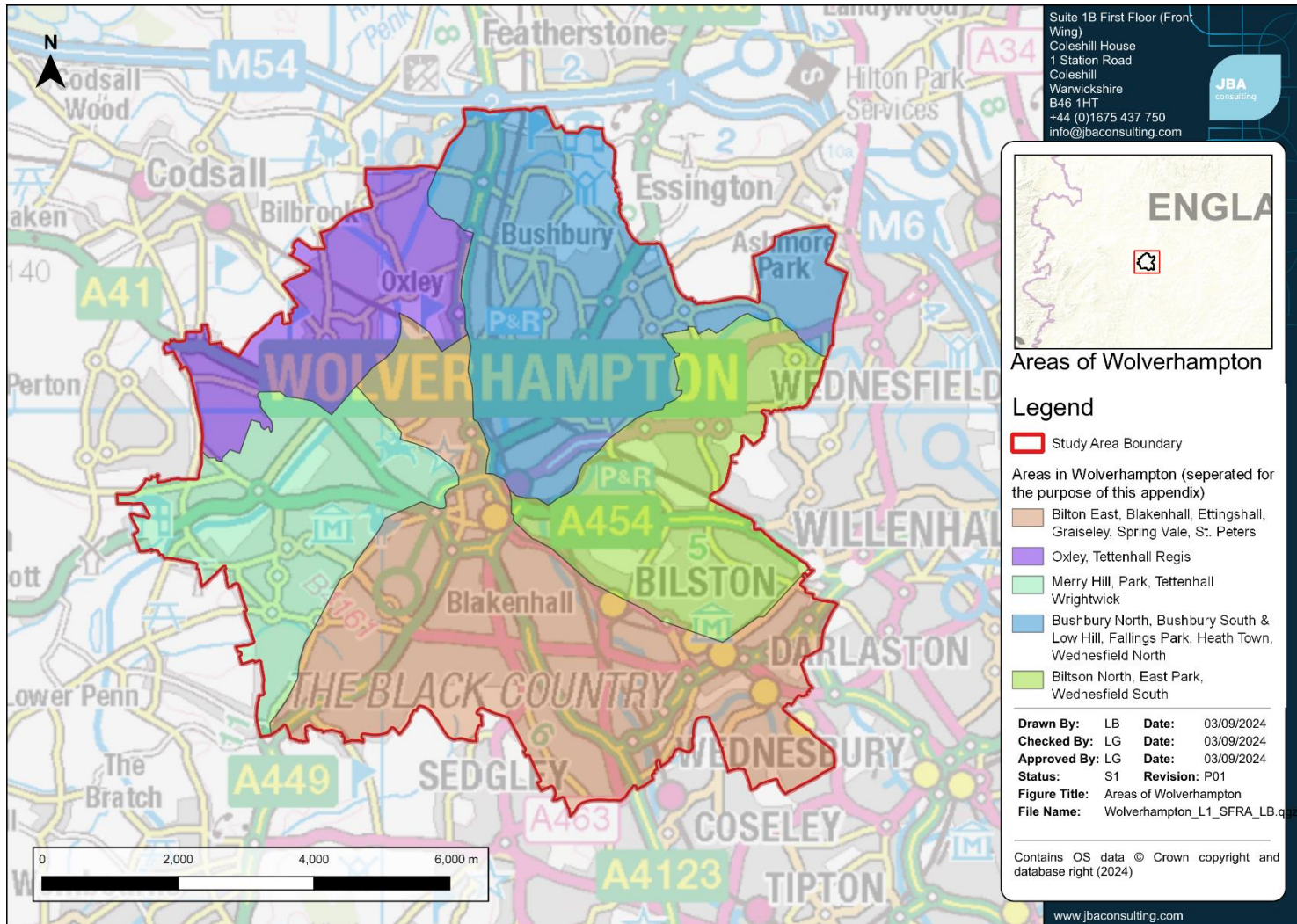


Figure E-1: Areas (grouped wards) of Wolverhampton

## E Summary of Flood Risk in Wolverhampton

Area: Bilton East, Blakenhall, Ettenshall, Graiseley, Penn, Spring Vale, St. Peters.

<p>Fluvial Flood Risk</p>	<p>The Environment Agency's Flood Map for Planning (FMfP) shows flood risk follows the flow route of the Bilston Brook along the Wolverhampton boundary.</p> <p>1.9% of the area is within Flood Zone 2 and 1.0% is within Flood Zone 3. The EA's FMfP ignores the presence of flood defences so it is unlikely to be representative of actual flood risk across the entire area. Settlements which are at the greatest fluvial flood risk include Bilston and Loxdale as the Flood Zones are present in these locations. However, these are a conservative estimate and may not be purely fluvial in nature, but related to surcharging of culverts/sewers and the overland flows.</p> <p>The area is heavily urbanised and as such has residual risk in the form of culverts which can become blocked and surcharge, forming overland flood flows. As only one of the culverts in this area has associated flood zones, it is likely that overland flow will follow the same flow paths as surface water. Using the 0.1% surface water event as an indicative flood risk outline, surcharging of the following culverts are likely to produce significant flood extents: Ettingshall Brook, Graiseley Brook, Merry Hill Brook, and the unmapped portion of the Bilston Brook are likely to have severe overland flow</p> <p>There is no hydraulic modelling within this area.</p>
<p>Surface Water Flood Risk</p>	<p>Surface water flood risk is extensive. Flooding in all AEP events is channelled by topography into the watercourses listed in the fluvial flood risk section to the east or follow the topography with majority of the roads within this area experience flow paths and/or ponding. The worst affected areas are around culverted watercourses such as the Smestow Brook to the north-west of this area and the Bilston/ Ettingshall Brooks to the south-east. The area is most affected in the 1% AEP plus 40% climate change allowance and 0.1% AEP events, with extents along most roads through all wards included in the area, however depths, velocities and flood hazard rating will vary.</p> <p>Users should refer to Appendix A mapping for more detail on which areas have the greatest risk of flooding from surface water.</p> <p>There is no Internal Drainage Board situated within this area.</p>
<p>Existing Defences</p>	<p>There is natural high ground along the Smestow Brook, on both banks. These defences have SOPs of the 4-year event.</p>
<p>Reservoir Inundation Risk</p>	<p>This area is impacted by extents from Sedgley Beacon Reservoir (South Staffordshire Water PLC) in the Dry Day scenario, and current mapping indicates that the site is not impacted by reservoir flooding in the Wet Day' scenario. However, this does not eliminate the possibility for extents, only that there are no extents mapped.</p>

## E Summary of Flood Risk in Wolverhampton

Area: Bilton East, Blakenhall, Ettenshall, Graiseley, Penn, Spring Vale, St. Peters.

<p>Historic, Recorded Flood Events</p>	<p>From the EA's Recorded Flood Outlines shapefile:</p> <ul style="list-style-type: none"> <li>• There are no recorded flood outlines in this area.</li> </ul> <p>From the EA's Historic Flood Map shapefile:</p> <ul style="list-style-type: none"> <li>• There are no recorded flood outlines in this area.</li> </ul> <p>From South Staffordshire Council (LLFA) Flooding Hotspots shapefile:</p> <ul style="list-style-type: none"> <li>• Number of incidents: 0</li> <li>• Cause of incidents: n/a</li> </ul> <p>See Appendix A for more detailed mapping.</p>
<p>JBA Groundwater Emergence Map</p>	<p>Groundwater levels vary greatly within the area. Groundwater levels are below 0.025m and between 0.025m to 0.5m from the grounds surface, predominantly in areas associated with the culverted Smestow Brook, Bilston Brook and Merryhill Brook.</p>

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Area: Oxley, Tettenhall Regis	
Fluvial Flood Risk	<p>The Environment Agency's Flood Map for Planning (FMfP) shows flood risk follows the flow route of the Smestow Brook and its tributaries, as well as a flow route along the Staffordshire and Worcestershire canal from the Waterhead Brook, into topographic low areas of the area flowing into the River Penk outside of the city boundaries. This is likely in conjunction with surcharging of the Pendeford Brook. The source of the River Penk is not likely to present a fluvial flood risk.</p> <p>4.4% of the area is within Flood Zone 2 and 3.0% is within Flood Zone 3. The EA's FMfP ignores the presence of flood defences so it is unlikely to be representative of actual flood risk across the entire area. Settlements which are at the greatest fluvial flood risk include Pendeford where extents cover the central area of the town and Stockwell End/Claregate where the Smestow Brook flows through these locations.</p> <p>The area is heavily urbanised and as such has residual risk in the form of culverts which can become blocked and surcharge, forming overland flood flows. As only one of the culverts in this area has associated flood zones, it is likely that overland flow will follow the same flow paths as surface water. Using the 0.1% surface water event as an indicative flood risk outline, surcharging of the following culverts are likely to produce significant flood extents: Oxley Brook (Flowing into the Pendeford Brook) and the Pendeford Brook.</p> <p>The 2012 Smestow Brook hydraulic model shows that for the most part remains in close proximity to the watercourse, however, there are extents the are present beyond the watercourse along Aldersley Road. This flood extent occurs in the 0.1% AEP event at the mid-eastern boundary of the area near Stockwell End and Claregate. .Mapping showing these flood extents can be seen in Appendix A.</p>
Surface Water Flood Risk	<p>Surface water flood risk is extensive. Flooding is channelled by topography into the watercourses listed in the fluvial flood risk section within the central part of the area, or follow the topography of the area with the majority of the roads experiencing flow paths and/or ponding. The worst affected areas follow the culverted Pendeford Brook in Pendeford, as well as the areas of Pendeford and Oxley with significant flow paths and ponding particularly in the 1% AEP + 40% climate change allowance and 0.1% AEP events. Within these events, extents along most roads through all wards included in this area, however flood depths, velocities, and hazard ratings will vary across the area. It is noted that potential fluvial flooding has been picked up in the surface water mapping across ordinary watercourses as well as the canals and Smestow Brook.</p> <p>Users should refer to Appendix A mapping for more detail on which areas have the greatest risk of flooding from surface water.</p> <p>There is no Internal Drainage Board situated within this area.</p>
Existing Defences	<p>There is natural high ground along the Smestow Brook, on both banks. These defences have SOPs for the 4-year event.</p>
Reservoir Inundation Risk	<p>This area is not impacted by reservoir flooding in both the 'Dry Day' and 'Wet Day' scenarios. However, while current mapping indicates that the site is not impacted by reservoir flooding in the 'Wet Day' scenario, this does not eliminate the possibility for extents, only that there are no extents mapped.</p>

## E Summary of Flood Risk in Wolverhampton

Area: Oxley, Tettenhall Regis	
Historic, Recorded Flood Events	<p>From the EA's Recorded Flood Outlines shapefile:</p> <ul style="list-style-type: none"> <li>• There are no recorded flood outlines in this area.</li> </ul> <p>From the EA's Historic Flood Map shapefile:</p> <ul style="list-style-type: none"> <li>• There are no recorded flood outlines in this area.</li> </ul> <p>From South Staffordshire Council (LLFA) Flooding Hotspots shapefile:</p> <ul style="list-style-type: none"> <li>• Number of incidents: 8</li> <li>• Cause of incidents: failure of external flood defences, surface water, 2 incidents do not state the cause of flooding.</li> </ul> <p>See Appendix A for more detailed mapping.</p>
JBA Groundwater Emergence Map	<p>The area has very varied groundwater levels. With levels below 0.025m associated with the Smestow Brook, the Staffordshire and Worcestershire Canal, and the Shropshire Union Canal, in addition to the Pendeford area. The remainder of the area predominantly has levels between 0.025m to 0.5m.</p>

## E Summary of Flood Risk in Wolverhampton

### Area: Merry Hill, Park, Tettenhall Wightwick

Fluvial Flood Risk	<p>The Environment Agency's Flood Map for Planning (FMfP) shows flood risk follows the flow route of the Smestow Brook flowing through the area.</p> <p>2.5% of the area is within Flood Zone 2 and 1.2% is within Flood Zone 3. The EA's FMfP ignores the presence of flood defences so it is unlikely to be representative of actual flood risk across the entire area. Settlements which are at the greatest fluvial flood risk include Wightwick and Castlecroft as the Smestow Brook borders these locations.</p> <p>The area is heavily urbanised and as such has 'residual risk in the form of culverts which can become blocked and surcharge, forming overland flood flows. As only one of the culverts in this area has associated flood zones, it is likely that overland flow will follow the same flow paths as surface water. Using the 0.1% surface water event as an indicative flood risk outline, surcharging of the following culverts are likely to produce significant extents: Finchfield Brook, and the Merry Hill Brook. Additionally, modelling for blockage scenarios for the Graisely Brook shows that the area where there are multiple culverts off of Compton Road (A454) surrounding Glen Court, Ave Road, Ross Close, and Wyvis Close (all within Compton), are severely affected in the event of a blockage in the 1% AEP and 0.1% AEP events.</p> <p>The 2012 Smestow Brook hydraulic model shows that flooding predominantly remains close to the watercourse. However, flood extents around Wightwick flood past the Birdgnorth Road (A454), the Staffordshire and Worcestershire Canal and greenfield land. This flooding occurs during the 3.3%, 1% and 0.1% AEP fluvial flood events.</p> <p>Mapping showing these flood extents can be seen in Appendix A.</p>
Surface Water Flood Risk	<p>Surface water flood risk is extensive. Flooding is channelled by topography into the watercourses listed in the fluvial flood risk section within the central part of the area, or follow the topography of the area with the majority of the roads experiencing flow paths and/or ponding. The worst affected areas follow the culverted Graisely Brook in Compton, the Finchfield Brook, and the Merryhill Brook (with an additional, significant connecting flow path), both of which are in Merry Hill. The area is most affected in the 1% AEP + 40% climate change allowance and 0.1% AEP events, within extents along most roads through all wards included in this area, however flood depths, velocities, and hazard ratings will vary across the area. It is noted that potential fluvial flooding has been picked up in the surface water mapping across ordinary watercourses as well as the canals and Smestow Brook.</p> <p>Users should refer to Appendix A mapping for more detail on which areas have the greatest risk of flooding from surface water.</p> <p>There are no internal drainage board areas within this area.</p>
Existing Defences	<p>There is natural high ground along the Smestow Brook, on both banks. These defences have SOPs for either the 4 year event or the 20-year event.</p>
Reservoir Inundation Risk	<p>This area is not impacted by reservoir flooding in both the 'Dry Day' and 'Wet Day' scenarios. However, while current mapping indicates that the site is not impacted by reservoir flooding in the 'Wet Day' scenario, this does not eliminate the possibility for extents, only that there are no extents mapped.</p>

## E Summary of Flood Risk in Wolverhampton

### Area: Merry Hill, Park, Tettenhall Wightwick

<p>Historic, Recorded Flood Events</p>	<p>From the EA's Recorded Flood Outlines shapefile:</p> <ul style="list-style-type: none"> <li>• There are no recorded flood outlines in this area.</li> </ul> <p>From the EA's Historic Flood Map shapefile:</p> <ul style="list-style-type: none"> <li>• There are no recorded flood outlines in this area.</li> </ul> <p>From South Staffordshire Council (LLFA) Flooding Hotspots shapefile:</p> <ul style="list-style-type: none"> <li>• Number of incidents: 13</li> <li>• Cause of incidents: culvert failure, sewer flooding, 8 incidents did not state the source of flooding (e.g. groundwater, surface water etc.)</li> </ul> <p>See Appendix A for more detailed mapping.</p>
<p>JBA Groundwater Emergence Map</p>	<p>The area has varied levels of groundwater. Groundwater levels below 0.025m predominantly are around the Smestow Brook and the Merryhill Brooks with the majority of the area encountering groundwater levels between 0.025m to 0.5m.</p>

## E Summary of Flood Risk in Wolverhampton

Area: Bushbury North, Bushbury South & Low Hill, Fallings Pak, Heath Town, Wednesfield North

<p>Fluvial and Flood Risk</p>	<p>The Environment Agency's Flood Map for Planning (FMfP) shows flood risk follows the flow route of the Waterhead Brook and the unnamed watercourse.</p> <p>2.1% of the area is within Flood Zone 2 and 1.6% is within Flood Zone 3. The EA's FMfP ignores the presence of flood defences so it is unlikely to be representative of actual flood risk across the entire area. Bushbury is the only settlement which is at fluvial flood risk include as the Waterhead brook flows through the town and the unnamed watercourse primarily flows through countryside.</p> <p>The area is heavily urbanised and as such has residual risk in the form of culverts which can become blocked and surcharge, forming overland flood flows. As only one of the culverts in this area has associated flood zones, it is likely that overland flow will follow the same flow paths as surface water. Using the 0.1% surface water event as an indicative flood risk outline, surcharging of the following culverts are likely to produce significant flood extents: Smestow Brook, unnamed ordinary watercourses, and the Waterhead Brook. Where culvert blockage modelling has been provided, the culverted Waterhead Brook in Bushbury significantly affects the residential area on the north bank of the brook in the 1% and 0.1% AEP events. Buildings and roads are affected, particularly those along Abbeyfield Road, Blackbrook Way and Ainsworth Road.</p> <p>There are no hydraulic models in this area.</p>
<p>Surface Water Flood Risk</p>	<p>Surface water flood risk is extensive. Flooding is either channelled by topography into the watercourses listed in the fluvial flood risk section, or follow the topography of the area with the majority of the roads experiencing flow paths and/or ponding. The worst affected areas are around the culverted watercourses in the area, particularly Waterhead Brook, Smestow Brook, and Waddens Brook. Additionally, there are significant extents that are not associated with culverts in Wednesfield, North Bushbury, Spring field, and Fallings Park. The area is most affected by the 1% AEP plus 40% climate change allowance and 0.1% AEP events, with extents along most roads throughout all wards included in the area, however depths, velocities and flood hazard ratings will vary.</p> <p>Users should refer to Appendix A mapping for more detail on which areas have the greatest risk of flooding from surface water.</p> <p>There is no Internal Drainage Board areas within this area.</p>
<p>Existing Defences</p>	<p>There are no defences present within this area.</p>
<p>Reservoir Inundation Risk</p>	<p>This area is not impacted by reservoir flooding in both the 'Dry Day' and 'Wet Day' scenarios. However, while current mapping indicates that the site is not impacted by reservoir flooding in the 'Wet Day' scenario, this does not eliminate the possibility for extents, only that there are no extents mapped.</p>



## E Summary of Flood Risk in Wolverhampton

Area: Bushbury North, Bushbury South & Low Hill, Fallings Pak, Heath Town, Wednesfield North	
Historic, Recorded Flood Events	<p>From the EA's Recorded Flood Outlines shapefile:</p> <ul style="list-style-type: none"> <li>• There are no recorded flood outlines in this area.</li> </ul> <p>From the EA's Historic Flood Map shapefile:</p> <ul style="list-style-type: none"> <li>• Flooding has occurred along the River Wensum from Lyng to 860m south of Guist.</li> </ul> <p>From South Staffordshire Council (LLFA) Flooding Hotspots shapefile:</p> <ul style="list-style-type: none"> <li>• Number of incidents: 44</li> <li>• Cause of incidents: only one incident cause was noted – sewer flooding – the remainder did not state the source of flooding (e.g. surface water, sewer, groundwater etc.)</li> </ul> <p>See Appendix A for more detailed mapping.</p>
JBA Groundwater Emergence Map	<p>The area is split into an area with groundwater levels below 0.025m and between 0.025m to 0.5m in Bushby and areas associated with the Waterhead Brook. The remainder of the area is at no risk.</p>

## E Summary of Flood Risk in Wolverhampton

Area: Bilston North, East Park, Wednesfield South	
Fluvial Flood Risk	<p>The Environment Agency's Flood Map for Planning (FMfP) shows flood zones are present and follow the flow routs of the 0.1% AEP surface water event, this could be attributed to surcharging of manholes of the River Tame culvert. It is noted that the flood zones from potential water surcharging is similar to that of the 0.1% AEP surface water event.</p> <p>2.9% of the area is within Flood Zone 2 and 1.5% is within Flood Zone 3. The EA's FMfP ignores the presence of flood defences so it is unlikely to be representative of actual flood risk across the entire area. Settlements which are at the greatest fluvial flood risk Stow Lawn as the Flood Zones are present in these locations. However, these are a conservative estimate and may not be fluvial in nature but related to surcharging of culverts/sewers or overland flows.</p> <p>The area is heavily urbanised and as such has residual risk in the form of culverts which can become blocked and surcharge, forming overland flood flows. As only one of the culverts in this area has associated flood zones, it is likely that overland flow will follow the same flow paths as surface water. Using the 0.1% surface water event as an indicative flood risk outline, surcharging of the following culverts is likely to produce significant flood extents: Bently Canal Culvert, River Tame, and the Waddens Brook,</p> <p>The 2017 Waddens Brook hydraulic model shows flood extents the culverted River Tame and culverted Waddens Brook produce flood extents in the 3.3%, 1%, 1%+20% CC, 1%+30% CC, 1%+50% CC, and 0.1% AEP events. Extents from the River Tame predominantly affect residential roads and buildings while the Waddens Brook extends onto the Waddens Brook Lane (B4484)</p> <p>Mapping showing these flood extents can be seen in Appendix A.</p>
Surface Water Flood Risk	<p>Surface water flood risk is extensive. Flooding is channelled by topography eastwards into the watercourses, the Brimingham Canal, and Wryley and Essington Canal, or follows the topography of the area along the roads, with the majority experiencing flow paths and/or ponding. The worst affected areas are around the culverted water courses, particularly the culverted River Tame to the south and Waddens Brook to the north, with Wednesfield, Monmore Green, and Bilston most affected. The area is most affected by the 1% AEP plus 40% climate change allowance and 0.1% AEP events, with extents along most roads through all wards included within this area, however depths, velocities, and flood hazard ratings will vary.</p> <p>Users should refer to Appendix A mapping for more detail on which areas have the greatest risk of flooding from surface water.</p> <p>There are no Internal Drainage Board areas within this area.</p>
Existing Defences	<p>There are no defences present within this area.</p>
Reservoir Inundation Risk	<p>This area is not impacted by reservoir flooding in both the 'Dry Day' and 'Wet Day' scenarios. However, while current mapping indicates that the site is not impacted by reservoir flooding in the 'Wet Day' scenario, this does not eliminate the possibility for extents, only that there are no extents mapped.</p>

## E Summary of Flood Risk in Wolverhampton

### Area: Bilston North, East Park, Wednesfield South

<p>Historic, Recorded Flood Events</p>	<p>From the EA's Recorded Flood Outlines shapefile:</p> <ul style="list-style-type: none"> <li>• There are no recorded flood outlines in this area.</li> </ul> <p>From the EA's Historic Flood Map shapefile:</p> <ul style="list-style-type: none"> <li>• Flooding has occurred along the River Wensum from Lyng to 860m south of Guist.</li> </ul> <p>From South Staffordshire Council (LLFA) Flooding Hotspots shapefile:</p> <ul style="list-style-type: none"> <li>• Number of incidents: 3</li> <li>• Cause of incidents: overflowing drains and sewerage overflow, the two remaining incidents do not specify flooding source.</li> </ul> <p>See Appendix A for more detailed mapping.</p>
<p>JBA Groundwater Emergence Map</p>	<p>The area is predominantly not at risk, however there are instances of groundwater levels below 0.025m and between 0.025m to 0.5m in Bilston. with groundwater levels within 0.5m of the surface remain near the flow routes of the River Wensum, Penny Spot Beck and Black Water.</p>