Appendix E – Summary of flood risk in Hinckley and Bosworth borough

The tables below summarise the areas where there are notable flood risks within Hinckley and Bosworth borough. For this summary the study area has been delineated into three sub-areas, as shown in Figure 1-1. Further information on these sub-areas can be found in Section 4.11 of the Main Report.

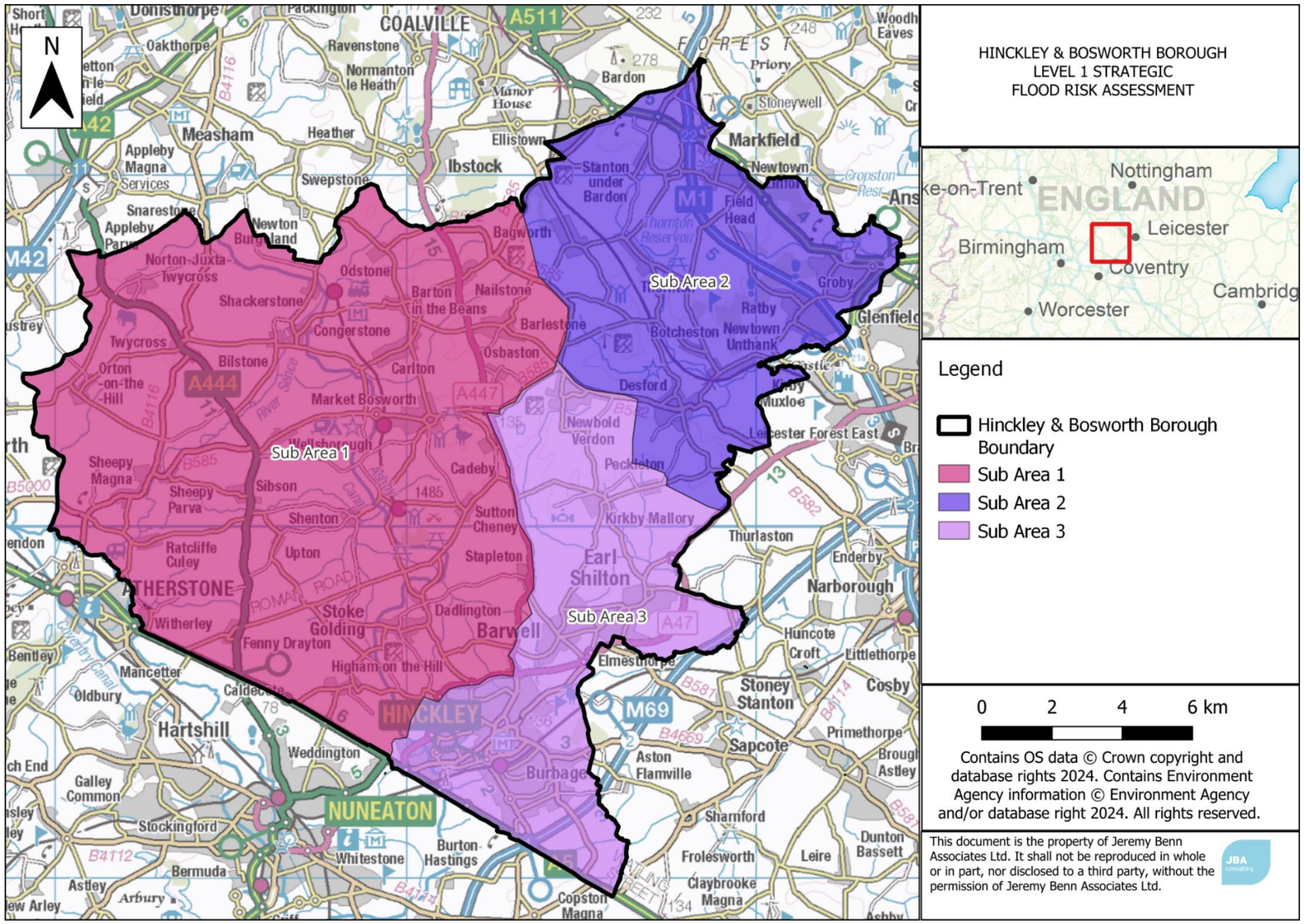

Figure 1-1: Sub-areas used to summarise the flood risk to the study area.

Sub-area 1: Market Bosworth, Barlestone, and Sheepy Magna

Table 1: Characteristics of sub-area 1 including location details and a description of the flood risk from all sources.

Characteristic	Description
Location	This sub-area is located in the west and centre of the borough. This is the largest sub-area and contains the key rural centres of Market Bosworth, Stoke Golding, and Barlestone, and the rural villages of Congerstone, Higham-on-the-Hill, Sheepy Magna, Twycross, and Witherley.
Fluvial flood risk	The main source of fluvial flood risk within the sub-area is from the River Sence which originates outside the north border of the borough flowing in a south-westerly direction through the centre of the sub-area. The floodplain of the River Sence mostly affects rural areas, but the watercourse does flow through the settlements of Shackerstone, Congerstone, Sheepy Magna, and Sheepy Parva. There are a small number of properties shown to be at risk in Flood Zone 2 along the eastern side of Shackerstone, and in Flood Zones 2 and 3a along Mill Lane and Main Road through Sheepy Magna. The River Sence also presents a fluvial flood risk to key transport infrastructure including the Burton Road (A444), Ashby Road (A447), and Sheepy Road (B4116). The Battlefield Line Railway (Heritage Steam Railway) is also shown to be at risk. There is also quite extensive fluvial risk from Shenton Brook, which originates in the southeast of the sub-area and flows in a westerly direction through the sub-area to its confluence with the River Sence near the southwest border of the sub-area, north of Ratcliffe Culey. Where Shenton Brook flows through Shenton there are a small number of properties located in Flood Zone 3a along Main Street. The flood extent in Flood Zone 2 is considerably wider with further properties and infrastructure shown to be at risk, particularly south of Sibson Lane and along Main Street. At the southwest border of the sub-area the River Sence joins the River Anker which flows in a north-westerly direction along the western border of the sub-area. In this area, the floodplain is wide but shown to affect predominantly rural areas within the sub-area. Flood Zone 2 extents are slightly wider and extend further north into the sub-area, near Atherstone Road, than the extents of Flood Zone 3a. There are several unnamed tributaries of the River Sence and Shenton Brook which present a fluvial flood risk across the sub-area, however, the risk from these watercourses is shown to affect predominantly rural locations. Additionally, there is quite extensive flood risk from Witherley Brook, which originates in the southwest corner of the sub-area and flows in a westerly direction in the south of the sub-area to join the River Anker. Where Witherley Brook flows through Witherley, in the east of Atherstone, several residential properties are shown to be at fluvial risk, particularly along Mythe Lane/Chapel Lane and Riverside/Bridge Lane. In this area, Flood Zones 2 and 3a show similar extents, but the Flood Zone 2 extent is wider than Flood Zone 3a around Chapel Lane and Atterton Lane. Mapping showing these flood extents can be seen in Appendix A.
Existing defences	The EA AIMS dataset shows an existing formal flood defence, an embankment, along the left bank of Witherley Brook, extending approximately 75 metres northwest along Mythe Lane, protecting residential properties and a Seven Trent Water sewerage infrastructure asset. This embankment was built with a design standard of protection of 1% AEP. Additionally, the EA AIMS dataset shows a series of natural high ground along mainly the left bank of Witherley Brook, and one area of engineered high ground along the left bank of Witherley Brook, where the brook originates. The EA AIMS dataset is shown in the mapping in Appendix A.

Characteristic	Description
Surface water flood risk	There is extensive surface water risk across the sub-area with surface water flow paths following the topography of the land, with two significant flow paths flowing in a south westerly direction. These flow paths flow through the centre of the sub-area through the urban areas of Congerstone, Sheepy Magna, Shenton, Ratcliffe Culey, and Market Bosworth, channelled along the low-lying routes of the River Sence and Shenton Brook. There is a smaller flow path near the west border of the sub-area, flowing in a southerly direction through the west border of the site, potentially impacting Orton on the Hill, channelled along the path of an unnamed watercourse. These flow paths are similar to those shown on the fluvial mapping. There is a large number of smaller flow paths which join the main larger, defined flow paths alongside small, isolated, areas of surface water ponding, which may suggest localised flood risk. There is a risk of surface water flooding to several settlements in the sub-area including: • Surface water flood maps for Market Bosworth show significant surface water ponding within the centre, along several roads including Station Road, Sutton Lane, and Weston Drive. Mapping shows Battlefield Line Railway to be at risk of surface water ponding. Surface water flow paths are also present in the north and west of Market Bosworth, the mapping shows both residential and business properties, particularly north of Wellsborough Road, south of Station Road, northeast and west of Main Street to be at risk. • Barlestone has two main flow paths which flow south through Barlestone and could affect properties in the north, west and east. Properties along several roads including north and south of Newbold Road, west of Meadow Road, and north and south of Barton Road are shown to be affected. • Sheepy Magna has one significant flow path which flows south between Sheepy Magna and Sheepy Parva, showing properties to be at risk in the northeast of Sheepy Magna. There is a large area of surface water pooling north of Meadow Close, and west of Twycross Close. Additionally, there are small areas of surface water ponding in the south of Sheepy Magna. Users should refer to Appendix A mapping for more detail on which areas have the greatest risk of flooding from surface water.
Susceptibility to groundwater flood risk	The ASGWF map shows large parts of the sub-area have less than a 50% susceptibility to groundwater flooding. The main areas of greater than a 50% susceptibility to groundwater flooding follow the path of the River Sence through the centre of the sub-area and the path of the River Anker along the southwest border. There are also additional areas with susceptibility to groundwater flooding of greater than 50% in the northeast near Osbaston. There are also several areas where there is a susceptibility to groundwater flooding of greater than 75%, along the west border near Orton on the Hill, in the northeast near Barlestone, and further south near Higham on the Hill. The JBA groundwater emergence map mirrors this with most of the sub-area designated as ‘No risk’ meaning the area is deemed as having no risk of groundwater emergence due to the nature of the local geological deposits. The main areas shown to have groundwater emergence levels within 0.5m of the ground surface are along the paths of the River Sence and Shenton Brook. There are a few other areas where the groundwater levels are within 0.5m of the ground surface, mainly in the northern areas of the sub-area near Osbaston, along the east border, and in the southern end of the sub-area near Fenny Drayton and Higham on the Hill.

Characteristic	Description
	The ROFSW suggests than surface water emerging from the areas detailed above is likely to flow in a predominantly south-westerly direction channelled along the routes of the River Sence and Sence Brook, and their unnamed tributaries. The AStGWF data set and JBA groundwater emergence map are shown in Appendix A mapping.
Reservoir inundation risk	Mapping shows the sub-area is at risk from several reservoirs located both within and outside the sub area. Bosworth Marina, and Bosworth Water Trust Amenity Lake are located in the centre of the sub-area, west of Market Bosworth. Glebe Farm (ID222) is located within the centre of the sub-area, northeast of Sibson. All three reservoir flood extents flow in a south westerly direction channelled downstream along the path of Shenton Brook, the River Sence, and the River Anker. In the 'Wet Day' event, the extents are wider in places, notably north of Ratcliffe Culey, and the 'Wet Day' extent of the Bosworth Water Trust Amenity Lake reservoir extends further southeast upstream along Shenton Brook through Shenton. Additionally, there are four further reservoirs, located outside the sub-area which present a risk within the sub-area: Merevale Park Estate, Seeswood Pool, Oldbury No.1, and Oldbury No.2. The flood extents from all four reservoirs flow south along the southwest border of the sub-area, channelled along the path of the River Anker. The settlement of Witherley is shown to be at reservoir flood risk in the 'Wet Day' event where the extents are considerably wider. The 'Dry Day' and 'Wet Day' reservoir extents are shown in Appendix A mapping.
Historic, recorded flood events	The Environment Agency Historic Flood Map and Recorded Flood Outline datasets show a record of historic flooding within this sub-area from the River Trent in December 1992. The historic flood extent is located along the southwest border of the sub-area along the path of the River Sence. The historic flood map and recorded flood outline extents are shown in Appendix A mapping.

Sub-area 2: Groby, Ratby, and Desford

Table 2: Characteristics of sub-area 2 including location details and a description of the flood risk from all sources.

Characteristic	Description
Location	This sub-area is located in the northeast of the borough. It contains the key rural centres of Groby, Ratby, Markfield, and Desford, and the rural villages of Bagworth, Stanton under Bardon, and Thornton.
Fluvial flood risk	The most significant source of fluvial flood risk within the sub-area is from Rothley Brook which originates in the centre of the sub-area and flows in a south-easterly direction through the centre of the sub-area to the east border and then flows along the eastern border. Where Rothley Brook flows through the centre and east of the sub-area, there are a number of properties shown to be at risk, particularly along the residential streets north of Desford Lane and Station Road in Ratby. In this area, Flood Zones 2 and 3a are shown to have similar extents, but Flood Zone 2 extends further into the south of Ratby and into Newton Unthank from the south along Station Road, Desford. There is a small area in the northeast corner of the sub-area, which is at fluvial flood risk from Slate Brook, which originates within the northeast corner of the sub-area and flows east to the Groby Pool reservoir. There is an unnamed watercourse which originates within the sub-area, near the northeast border, which flows east and joins Rothley Brook outside the sub-area. No settlements are shown to be at a fluvial flood risk, but Markfield Road (A50) and a couple of business north of the A50 are shown to be affected in both Flood Zones 2 and 3a, which show similar extents in this area.

Characteristic	Description
	Mapping showing these flood extents can be seen in Appendix A.
Existing defences	The EA AIMS dataset shows no existing formal flood defences within the sub-area. However, the EA AIMS dataset shows natural high ground along both banks of Rothley Brook. The EA AIMS dataset is shown in the mapping in Appendix A.
Surface water flood risk	There is extensive surface water risk across this sub-area. Surface water flow paths follow the topography of the land, with two significant flow paths flowing in a south-easterly direction through the centre of the study area, channelled along the route of Rothley Brook. There are also several smaller flow paths which join the main larger, defined flow path. From the above flow paths, there is a risk of surface water flooding to several settlements in the sub-area including: • Botcheston has a smaller surface water flow path which flows south to join a larger flow path south of Botcheston. The smaller surface water flow path presents a risk to the east side of Botcheston, particularly to properties between Markfield Lane and Main Street and between Main Street and Botcheston Road. There are small areas of surface water ponding along and south of Main Street. • The southern area of Ratby is affected by a large surface water flow path flowing east. There is a smaller flow path that flows south and joins the larger flow path to the south. Mapping shows properties along the west side of Ratby, between Desford Road and Station Road to be at risk. There is significant surface water pooling which is shown to affect properties between Markfield Road and Main Street and between Station Road and the M1. • Groby has two smaller surface water flow paths one which flows east and the other which flows south, both joining a larger flow path outside the east border of the sub-area. The flow path flowing east will affect the north and northeast corner of Groby, potentially impacting properties along serval roads including south of Markfield Road (A50), west of Ratby Road, and between Ratby Road and the Leicester Western Bypass (A46). The flow path flowing south affects the west, southwest, and south of Groby with properties along serval roads including Woodbank Road, between Oakmeadow Way and Sacheverell Way, and the industrial area east of Groby Road shown to be at risk. There are smaller areas of surface water pooling in the centre of Groby, along Chestnut Walk and Beaumont Green. • Markfield has significant surface water pooling in the centre. Properties between London Road and Leicester Road are shown to be at risk. There are also several areas of localised surface water ponding across the sub area. Users should refer to Appendix A mapping for more detail on which areas have the greatest risk of flooding from surface water.
Susceptibility to groundwater flood risk	The AStGWF map shows that most of the sub-area is less than 50% susceptible to groundwater flooding. Small parts along the middle of the eastern border of the sub-area are shown to have a susceptibility to groundwater flooding of greater than 50%. There is also an area on the northern border, near West Lane (B585), with a susceptibility to groundwater flooding of greater than 50%. There is an area on the southwest border of the sub-area, located south of Desford, where there is a susceptibility to groundwater flooding of greater than 75%. The JBA groundwater emergence map partially mirrors this, with the middle of the eastern border of the sub-area being particularly susceptible to groundwater emergence, with emergence levels within 0.025m of the ground surface. There are a few additional areas where the groundwater emergence levels are within 0.025m of the ground surface, mainly in the western and northern areas of the sub-area, located near Merry Lees and Bagworth, which differ from the ASGWF dataset.

Characteristic	Description
	The RoFSW suggests than any surface water emerging from the areas detailed above is likely to flow northeast channelled along the route of Rothley Brook. The AStGWF dataset and JBA groundwater emergence map are shown in Appendix A mapping.
Reservoir inundation risk	Mapping shows the sub-area to be affected by both the Thornton and Groby Pool reservoirs in both the 'Dry Day and 'Wet Day' scenarios. The Thornton reservoir is located in the centre of the sub-area and the flood extent follows the path of Rothley Brook flowing east, and along the east border of the sub-area. The Knighton Junction Swannington and Leicester Junction train line, the settlement of Newtown Unthank, and Desford Mill (to the northeast of the settlement of Desford), are inundated by the flood extent. The flood extent from Thornton reservoir in the 'Wet Day' scenario is larger than in the 'Dry Day' scenario and extends further north into the southern area of Ratby, near Taverner Drive and Station Road. The Groby Pool reservoir is located within the sub-area near the northeast border. The Old Hall Farm Fishery and Groby Quarry are inundated by the flood extent. The flood extent from Groby Pool reservoir in the 'Wet Day' scenario is larger than in the 'Dry Day' scenario and extends further south into the northeast corner of Groby, near Anstey Lane. The 'Dry Day' and 'Wet Day' reservoir extents are shown in Appendix A mapping.
Historic, recorded flood events	The Environment Agency Historic Flood Map has no records of flooding within this sub-area. The Environment Agency Recorded Flood Outline dataset has a record of historic flooding along Rothley Brook in 1977. The historic flood map and recorded flood outline extents are shown in Appendix A mapping.

Sub-area 3: Hinckley, Earl Shilton, and Burbage

Table 3: Characteristics of sub-area 3 including location details and a description of the flood risk from all sources.

Characteristic	Description
Location	This sub-area is located in the south and southeast of the borough. This sub-area contains the four urban areas of Hinckley, Earl Shilton, Burbage, and Barwell, and the key rural centre of Newbold Verdon.
Fluvial flood risk	The fluvial flood risk across the sub-area is shown to be minimal. The Ashby-de-la-Zouch canal flows south through the southwest of the sub-area through Hinckley, and out of the southern border of the sub-area. There is an unnamed watercourse which originates in the north of the sub-area, just south of Newbold Verdon, and flows in a south-easterly direction through the east border of the sub-area. There is also an unnamed watercourse located in the southeast of the sub-area and which flows in a north-easterly direction, along the east border of the sub-area, merging with the unnamed watercourse in the north of the sub-area. Mapping shows the Flood Zone 2 and 3a extents of the two unnamed watercourses detailed above are predominately rural and do not affect any settlements in the sub-area. There is fluvial flood risk shown in two areas in the southwest corner of the sub-area, which follow the route of three watercourses: Sketchley Brook, Harrow Brook, and Battling Brook. The western and centre areas of Hinckley and the north of Burbage are shown to be at fluvial flood risk in both Flood Zones 2 and 3a, with a number of residential and industrial buildings shown to be at flood risk. The flood extent of Flood Zone 3a will potentially impact properties north of Olive Close, west of Hammonds Way, and north of Brookside. The flood extent of Flood Zone 2 is considerably larger than the Flood Zone 3a extent for Sketchley Brook, due to the

Characteristic	Description
	relatively flat topography. The flood extent of Flood Zone 2 extends further south affecting Hinckley Sewage Works, properties north of Hammonds Way, south of Olive Close, and north of Tilton Road. Mapping showing these flood extents can be seen in Appendix A.
Existing defences	The EA AIMS dataset shows an existing formal flood defence, an embankment, across both banks of Battling Brook, located north of Trinity Marina, protecting residential properties and Longdale Road Allotments. This embankment was built with a design standard of protection of 1% AEP. Additionally, the EA AIMS dataset shows natural high ground along both banks of Battling and Harrow Brook. The EA AIMS dataset is shown in the mapping in Appendix A.
Surface water flood risk	There is more extensive surface water flood risk across this sub-area than other sub-areas. Surface water flow paths follow the topography of the land, with three significant flow paths, one in the north, one along the east border, and one in the southwest corner. Both the north and east border flow paths flow in an easterly direction, channelled along the route of two unnamed watercourses. There are several settlements affected by surface water flood risk in the 1% AEP and 0.1% AEP events from the two flow paths including Newbold Verdon, Peckleton, Kirby Mallory, Earl Shilton, and Barwell. The surface water flow path in the southwest corner of the site flows in a south westerly direction, channelled along the routes of Sketchley Brook, Harrow Brook, and Battling Brook. The flow paths flow through the settlements of Hinckley and Burbage, showing significant surface water flood risk to both residential and industrial properties. There are large areas of surface water pooling to the west of Burbage and Hinckley, particularly between Walting Street (A5) and Coventry Road, between Coventry Road and Normandy Way (A7), and the industrial area east of Normandy Way. Additionally, there is a large area of surface water pooling in the north and centre of Burbage, between Brookside and Grange Drive. Furthermore, the northeast and north of Hinckley has larger areas that will be affected by three smaller surface water flow paths, which flow north and join a larger flow path channelled through Shenton Brook, particularly affecting properties between Wykin Road, Hollycroft, and Normandy Way, and between Leicester Road (B4668) and Normandy Way. There is also significant surface water pooling and ponding around Trinity Marina, Hinckley Sewage Works, near Mill Street Industrial Estate, and Mallory Park Racing Circuit. Users should refer to Appendix A mapping for more detail on which areas have the greatest risk of flooding from surface water.
Susceptibility to groundwater flood risk	The AStGWF map shows that most of the sub-area is less than 50% susceptible to ground water flooding. The AStGWF map shows the southeast corner and small areas along the east border near the M69 of the sub-area have a susceptibility to groundwater flooding of greater than 50%. There is also an area in the northern area, near Newbold Verdon, with a susceptibility to groundwater flooding of greater than 50%. There is an area on the northeast border of the sub-area, located southwest of Desford, where there is a susceptibility to groundwater flooding of greater than 75%. The JBA groundwater emergence map partially emulates this, showing that the southeast corner and the area along the centre of the eastern border of the sub-area has groundwater emergence levels between 0.025m and 0.5m below the surface, with some areas with groundwater levels within 0.025m of the ground surface. The northern area of the sub-area is shown to be particularly susceptible to groundwater emergence, with large areas having groundwater emergence levels between 0.025m and 0.5m below the surface, with some larger areas with groundwater levels within 0.025m of the ground surface, particularly around Kirkby Mallory, Newbold Verdon, and Hall Farm Solar Farm.

Characteristic	Description
	The RoFSW suggests than any groundwater emerging from the northern areas of groundwater emergence is likely to flow in an easterly direction and groundwater emerging from the southern areas is likely to flow in a south westerly direction, channelled along the lower topography of the unnamed watercourses Sketchley Brook, Harrow Brook, and Battling Brook, and the Ashby-de-la-Zouch Canal. The AStGWF data set and JBA groundwater emergence map are shown in Appendix A mapping.
Reservoir inundation risk	Mapping shows the sub-area to be affected by the Mallory Park Large Lake reservoir in both the ‘Dry Day’ and ‘Wet Day’ scenarios. The Mallory Park Large Lake reservoir is located within the north of the sub-area and the flood extent follows the path of an unnamed watercourse flowing in a southeasterly direction, through the east border of the sub-area. The ‘Wet Day’ scenario extent is larger and extends further west into the sub-area. Mapping indicates that the flood extents in both scenarios will not affect any settlements within the sub-area. The ’Dry Day’ and ‘Wet Day’ reservoir extents are shown in Appendix A mapping.
Historic, recorded flood events	The Environment Agency Historic Flood Map and Recorded Flood Outline datasets have no records of flooding within this sub-area.