

## TECHNICAL NOTE

JBA Project Code	2018s0161
Contract	South West Hertfordshire Level 1 SFRA
Client	Three Rivers District Council
Day, Date and Time	<b>12 May 2020</b>
Author	Fiona Hartland
Reviewer / Sign-off	<b>Paul Eccleston</b>
Subject	South West Hertfordshire Level 1 SFRA - <b>River Ver Addendum</b>

### 1 Context of the Addendum

A joint Level 1 SFRA for South West Hertfordshire was published in March 2019 to inform Local Plan making and flood risk management in Dacorum Borough, St Albans City and District, Three Rivers District and Watford Borough.

Since then, detailed hydraulic modelling on the River Ver has been released, which impacts the assessment of flood risk within two of the four South West Hertfordshire authorities - Dacorum Borough and St Albans City and District.

This document, which forms an addendum to the South West Hertfordshire Level 1 SFRA, seeks to provide a comparison between the latest River Ver flood outlines and the Flood Zones used in the Level 1 SFRA, which were based on the modelling outputs available at the time.

It also identifies which of the sites screened as part of the Level 1 SFRA may see a change in flood risk, as a result of the Flood Zones being updated with the River Ver modelling outputs.

### 2 River Ver Model

The Environment Agency hydraulic model of the River Ver (JBA Consulting, 2019) covers the entire course of the river, from its source upstream of Markyate, to confluence with the River Colne<sup>1</sup>.

The model was built using Flood Modeller-TUFLOW / ESTRY-TUFLOW software, and is a fully linked 1D-2D model. This allows flow through the channel and structures (such as bridges or culverts) to be represented in detail within the 1D model, while also representing flows out of the river channel and within the floodplain within the 2D domain.

Defended and undefended scenarios were modelled, to assess the impact of the Flood Storage Area (FSA) at Markyate on flood risk to downstream communities. Blockages were also assessed on culverted sections of the River Ver in Markyate, Sopwell and Holywell Hill Road in St. Albans.

A further aim of the modelling study was to understand the impact of groundwater abstractions at Bow Bridge, Holywell and Mud Lane pumping stations on flood risk within the River Ver catchment.

#### 2.1 Outcomes of modelling

The modelling study report<sup>1</sup> identified that in most urban areas of the River Ver catchment, such as in Redbourn and St. Albans, flow is contained within the river channel in smaller flood events (such as the 1 in 20 / 5% AEP event). In rural areas, the floodplain is more extensive, with flooding predicted from the 1 in 2 (50% AEP) event.

A comparison of defended and undefended scenarios identified that the Flood Storage Area upstream of Markyate provides defence to properties in Markyate (on Roman Way, Hicks Road, Ver Brook Avenue and Long Meadow) as well as reducing the risk of flooding in Redbourn.

Blockages to culverted sections of the River Ver in Markyate, Sopwell and Holywell Hill Road in St. Albans were seen to cause a notable increase in flood risk at these locations.

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<sup>1</sup> JBA Consulting (2019) River Ver Modelling Study: Draft Report. Available on request from the Environment Agency (Product 5).

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It should be noted that assessing the interaction between the River Ver and the urban drainage network (e.g. sewers, highway drainage) was beyond the scope of the modelling study. Further analysis into the impact of this mechanism on flood risk was recommended as a further study.

### 3 Comparison of Flood Zones

A comparison of the undefended 1 in 100 (1% AEP) and 1 in 1,000 (0.1% AEP) events identified that modelled flood extents on the River Ver were generally smaller than the existing Flood Zones.

This was particularly the case in the urban areas of Markyate, Redbourn and St. Albans, where the River Ver passes into long culverts, which were not represented within the original Flood Zones. A comparison of the original and revised flood extents is shown in the Appendix A maps.

In the upper catchment, north of Markyate, the River Ver results showed little out-of-bank flooding. This is likely to be due to a more detailed representation of the channel in the River Ver model, as well as the differences in flows applied to the model.

Downstream of Redbourn, the River Ver results for the 1 in 1,000 (0.1% AEP) event were similar in extent to Flood Zone 2, although the 1 in 100 (1% AEP) extent remained smaller than Flood Zone 3.

However, in some locations, an increase in Flood Zone extent was seen in the River Ver flood outlines. This often occurred where the watercourse and water bodies on the floodplain, such as lakes, were represented in more detail than in the original Flood Zones. However, in other cases, the difference in flood extent appeared to relate to a more detailed representation of structures, such as bridges or culverts, in the River Ver model.

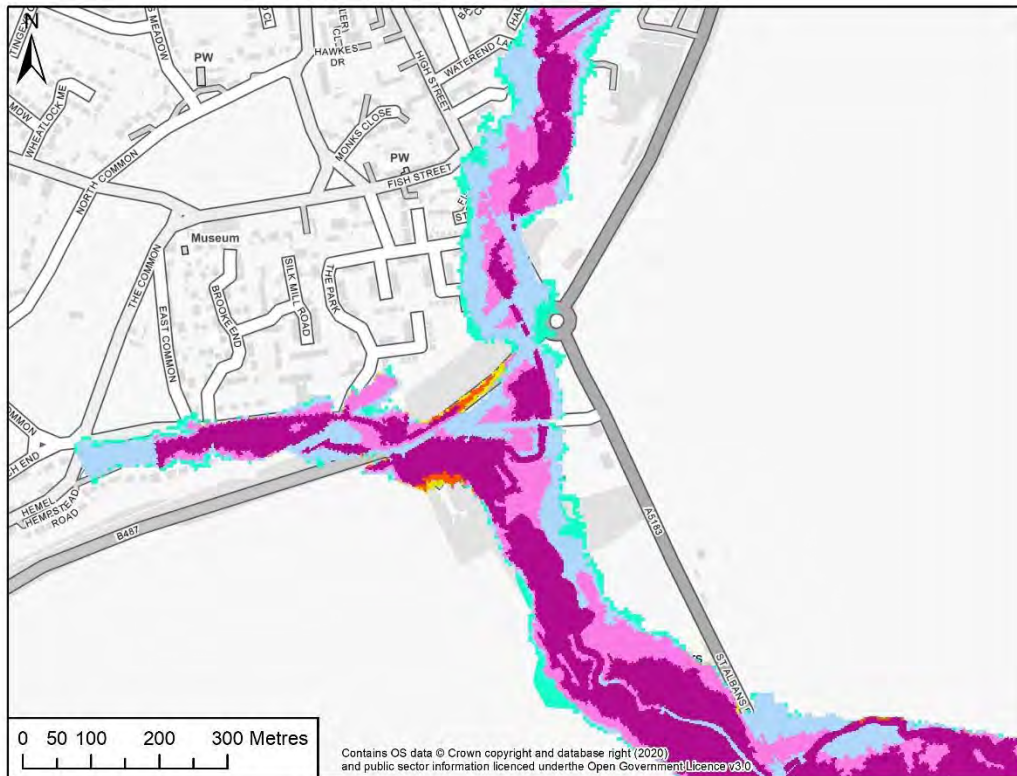
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Locations which saw an increase in flood risk were as follows:

- B487 in Redbourn (Figure 3-1) - additional flooding to the road appeared to relate to a more detailed representation of the bridge over the River Ver, or the B487 road itself, within the updated model.

Figure 3-1: Increase in flood extent (shown in orange and yellow) at B487 in Redbourn



**South West Hertfordshire Level 1 Strategic Flood Risk Assessment - River Ver Addendum**

Area of larger extent in New Flood Zone 3	River Ver Revised Flood Zone 3 (1 in 100/1% AEP)	Flood Zone 3 (existing)
Area of larger extent in New Flood Zone 2	River Ver Revised Flood Zone 2 (1 in 1000/0.1% AEP)	Flood Zone 2 (existing)



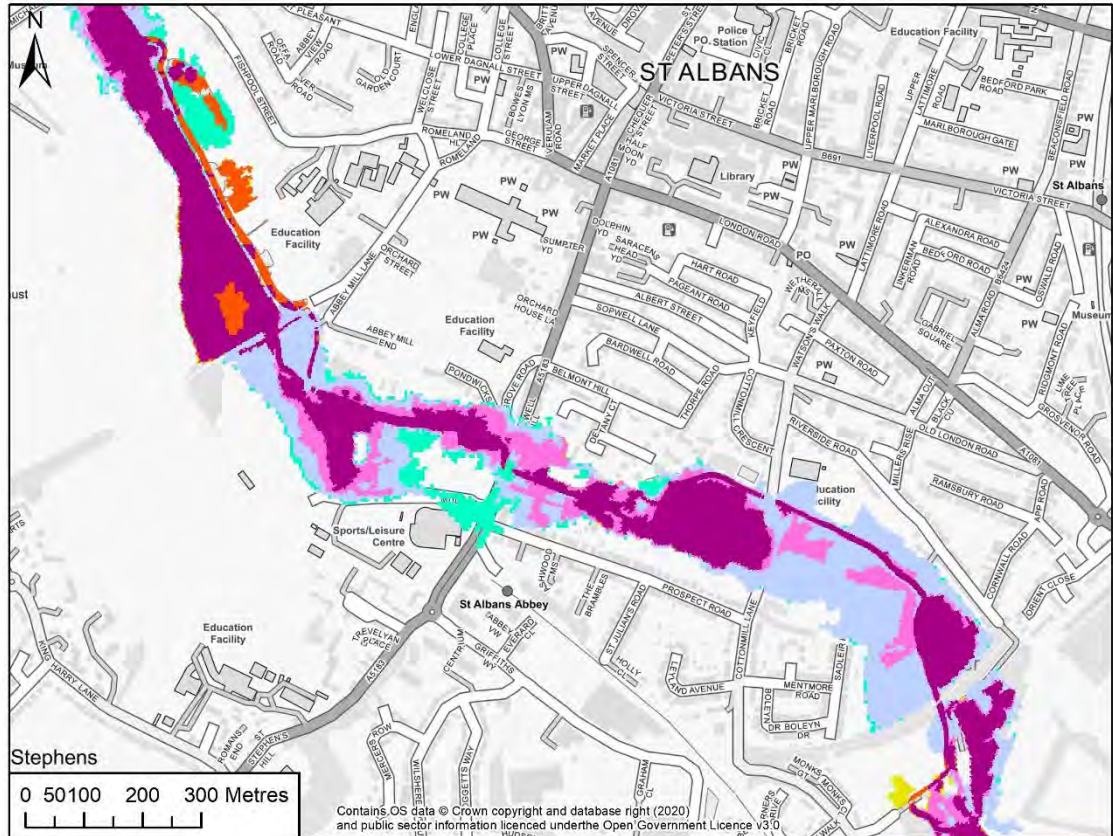
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- Abbey Mill Lane, south west St. Albans (Figure 3-2) - model represented the mill stream channel and the lake within the floodplain in greater detail.

Figure 3-2: Increase in flood extent (shown in orange and yellow) at Abbey Mill Lane, St. Albans



**South West Hertfordshire Level 1 Strategic Flood Risk Assessment - River Ver Addendum**

	Area of larger extent in New Flood Zone 3		River Ver Revised Flood Zone 3 (1 in 100/1% AEP)		Flood Zone 3 (existing)
	Area of larger extent in New Flood Zone 2		River Ver Revised Flood Zone 2 (1 in 1000/0.1% AEP)		Flood Zone 2 (existing)

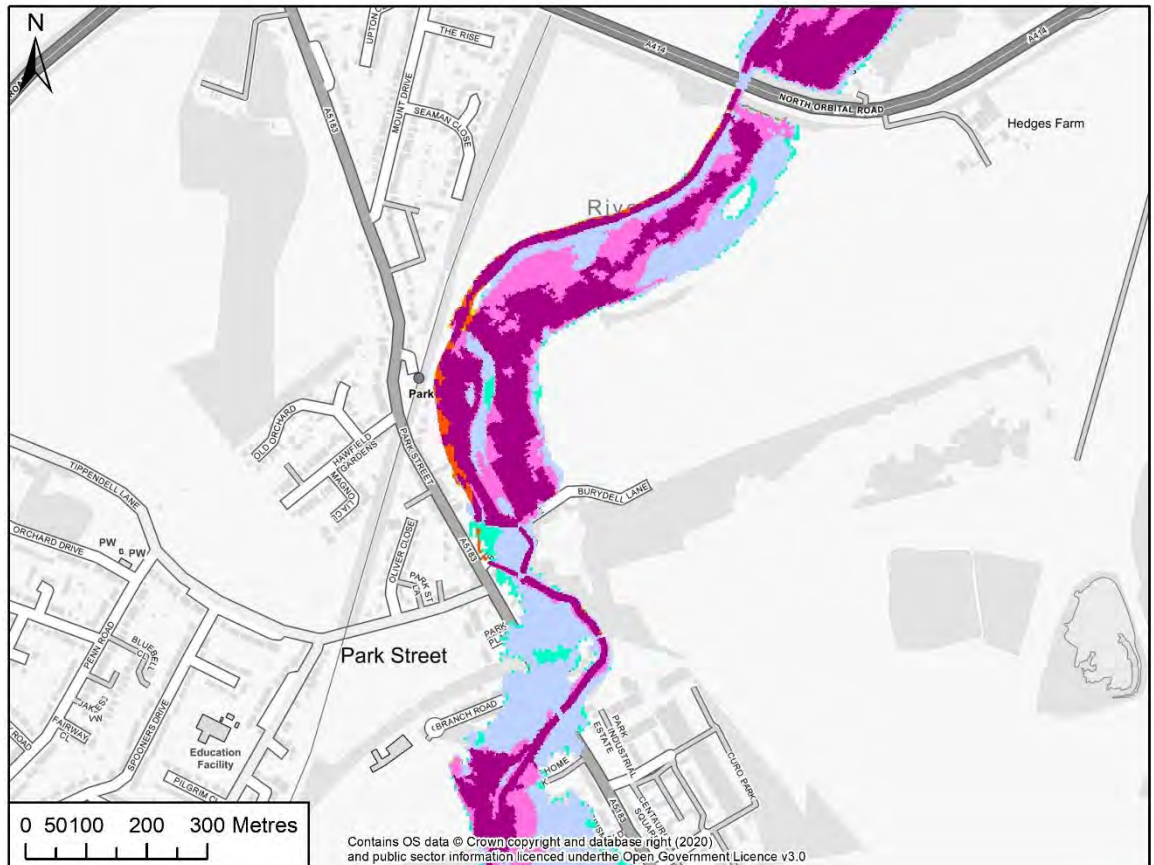
**JBA consulting**

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- Park Street train station (Figure 3-3) - model picked out the watercourse channel in greater detail than the original Flood Zone model.

Figure 3-3: Increase in flood extent (shown in orange and yellow) at Park Street Station, St. Albans



**South West Hertfordshire Level 1 Strategic Flood Risk Assessment - River Ver Addendum**

	Area of larger extent in New Flood Zone 3		River Ver Revised Flood Zone 3 (1 in 100/1% AEP)		Flood Zone 3 (existing)
	Area of larger extent in New Flood Zone 2		River Ver Revised Flood Zone 2 (1 in 1000/0.1% AEP)		Flood Zone 2 (existing)



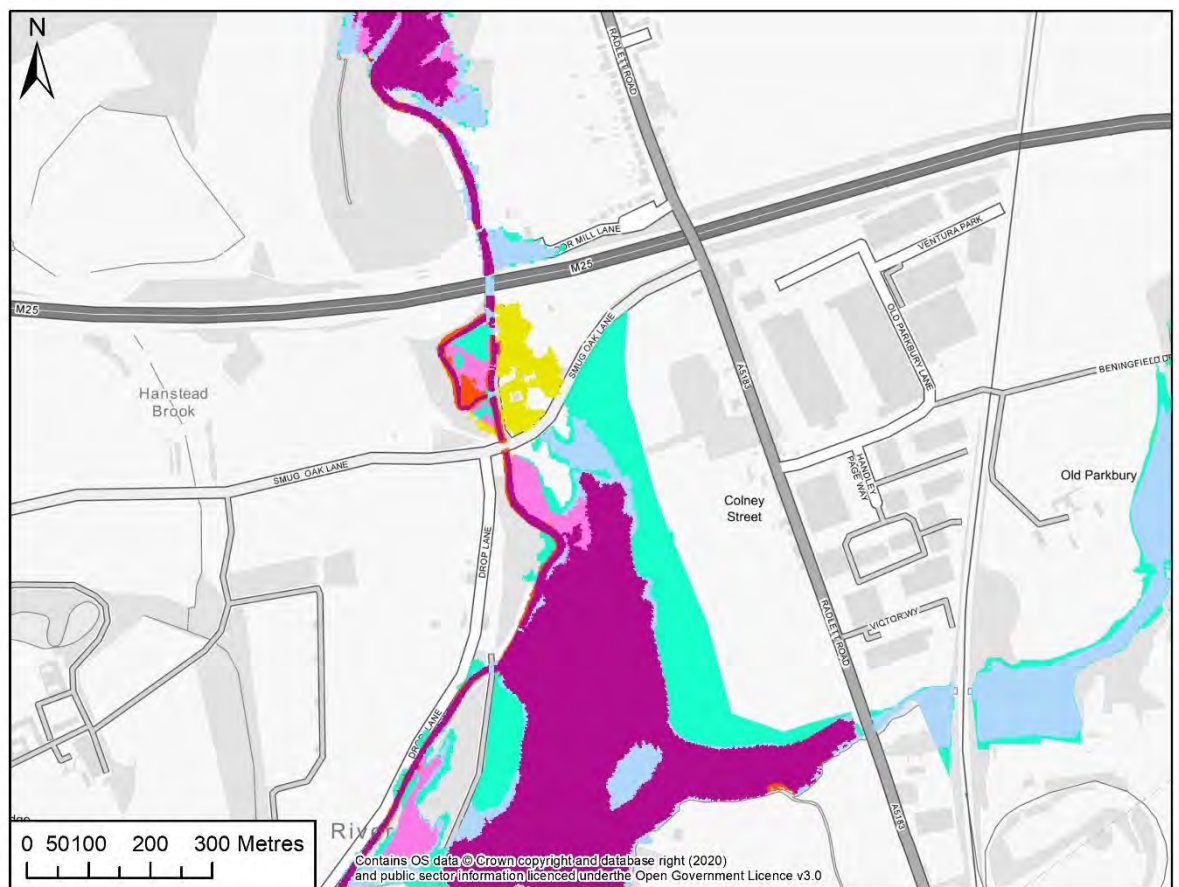


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- Smug Oak Lane, south of Frogmore (Figure 3-4) - the model appeared to represent the restriction in flow caused by the culvert or bridge below Smug Oak Lane in greater detail. It may also reflect the low-lying topography of the floodplain being better represented in the River Ver model, by more accurate LIDAR data.

Figure 3-4: Increase in flood extent (shown in orange and yellow) at Smug Oak Lane, south of Frogmore, St. Albans



**South West Hertfordshire Level 1 Strategic Flood Risk Assessment - River Ver Addendum**



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### 3.1 Reasons for overall difference

The main reason for the difference in flood extents, as explained in the River Ver Modelling Report (JBA, 2018) is that the original Flood Zones were based on broadscale mapping techniques. These modelling techniques do not take into account the presence of structures on the watercourse, such as bridges and culverts, and are unlikely to accurately represent flows within the watercourse itself.

There is also the difference in the river inflows estimated for the River Ver model and the original Flood Zones. The River Ver inflows were based on a detailed hydrological study, using the latest gauge record data, and are therefore likely to be more accurate.

## 4 Implication for sites

The new Flood Zone extents from the River Ver model have resulted in some change in flood risk to the sites within Dacorum Borough and St. Albans City and District, which were screened as part of the Level 1 SFRA.

Of the screened sites, one site in Dacorum Borough and 26 sites in St. Albans City and District have seen a change in Flood Zone extent, as a result of the River Ver model update. These sites are summarised in Table 4-1.

Table 4-1: Sites screened in Level 1 SFRA covered by the updated River Ver model

District / Borough	Site Reference	Site Name	Location	Change in Flood Zone extent
Dacorum	H/19	Hicks Road/High Street, Markyate	Markyate	Reduction
St. Albans	SHLAA-GB-PS-537	Land to the rear of 4A Frogmore, Park Street	Park Street, St. Albans	Reduction
	SHLAA-GB-PS-542	Moor Mill North, Park Street	Park Street, St. Albans	Reduction
	SHLAA-GB-BW-547	Moor Mill South, Bricket Wood	St. Albans	Increase
	SHLAA-GB-BW-547	Moor Mill South, Bricket Wood (Smug Oak Lane)	St. Albans	Increase (small)
	SHLAA-GB-R-551	North east of Redbourn, West of A5184	Redbourn	Reduction
	SHLAA-GB-PS-568	Land adjacent to No 2 Radlett Road, Frogmore	Frogmore, St. Albans	Reduction
	137	Fish Street Farm (part of 18)	Redbourn	Reduction
	199	Builders yard, Chequer Lane	Redbourn	Reduction
313	Hall & Co. Builder's Yard	Frogmore, St. Albans	Reduction	

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District / Borough	Site Reference	Site Name	Location	Change in Flood Zone extent
	306	New Barnes Mill, Sopwell	Sopwell	Reduction
	48	Colney Street Farm	Colney Street, St. Albans	Reduction
	189	S Burydell Lane & E River Ver	Park Street, St. Albans	Reduction
	190	S Minster Court	Frogmore, St. Albans	Reduction
	191	W of Frogmore	Park Street, St. Albans	Reduction
	192	Red Lion	Park Street, St. Albans	Reduction
	45	S Frogmore Home Park	Frogmore, St. Albans	Reduction
	314	88 Park Street, Park Street	Park Street, St. Albans	Reduction
	242	Corville Mill Burydell Lane	Park Street, St. Albans	Reduction (but change in location on site)
	455	Land north west of Woodlands Farm	North west of St. Albans	Reduction
	95	North east of Redbourn, West of A5184	Redbourn	Reduction
	18	East of Redbourn and West of A8183	Redbourn	Reduction
	431	South of Burydell Lane, east of the River Ver	Park Street, St. Albans	Reduction
	122	South of Burydell Lane, west of River Ver, Park Street	Park Street, St. Albans	Reduction
	428	Redbourn Golf Club, Kinsbourne Green Lane	North of Redbourn	Reduction
	425	Land to the south of Harpenden Lane, Redbourn	Redbourn	Reduction
	79	Land rear of 57 Fishpool Street	St. Albans	Increase



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### 5 Conclusions and Recommendations

A comparison of the existing Flood Zones and updated River Ver modelling has resulted in the following conclusions:

- The more detailed River Ver modelling has largely resulted in a reduction in the extent of the Flood Zones, particularly in the urban areas of Markyate, Redbourn and St. Albans.
- However, there are a few localised areas which have seen an increase in flood risk, where the River Ver flood extent is slightly greater in extent than the existing Flood Zones. This is the case in south Redbourn, as well as the Abbey Mill, Park Street and Frogmore areas of St. Albans.
- Of the sites screened in the South West Hertfordshire Level 1 SFRA, one site in Dacorum Borough and 26 sites in St. Albans City and District have seen a change in flood risk, as a result of the updated River Ver modelling. These are summarised in Table 4-1.
- The South West Hertfordshire Level 1 SFRA was completed prior to the release of the River Ver modelling. Therefore, the assessment and mapping of flood risk within the SFRA was based on the existing Flood Zones. As these Flood Zones are generally greater extent in extent than the River Ver, this will have led to an overestimation of flood risk at the majority of potential allocation sites in the floodplain of the River Ver.
- It is recommended that any subsequent Level 2 SFRA or Flood Risk Assessments in Dacorum Borough or St. Albans City and District use the latest Flood Zones, based on the River Ver modelling outputs.

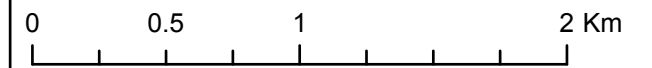
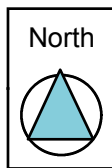
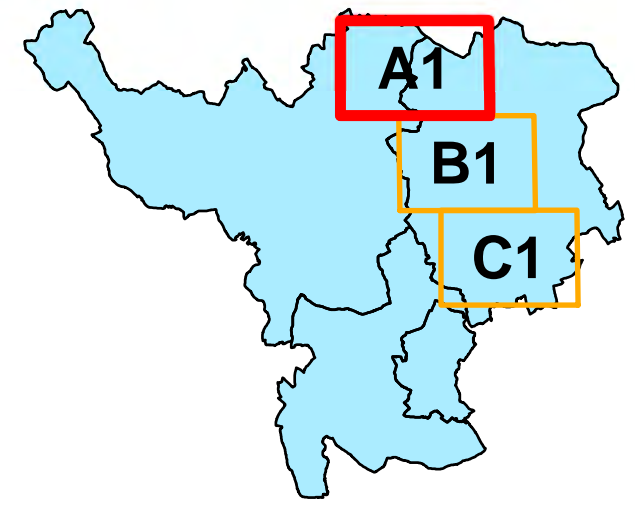
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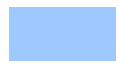
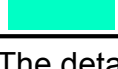
### A Appendix A: Map of Flood Zones and River Ver Modelling Outputs





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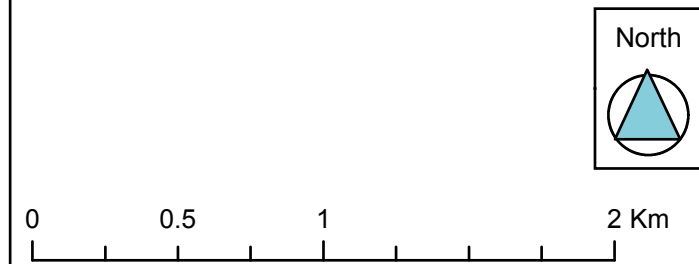
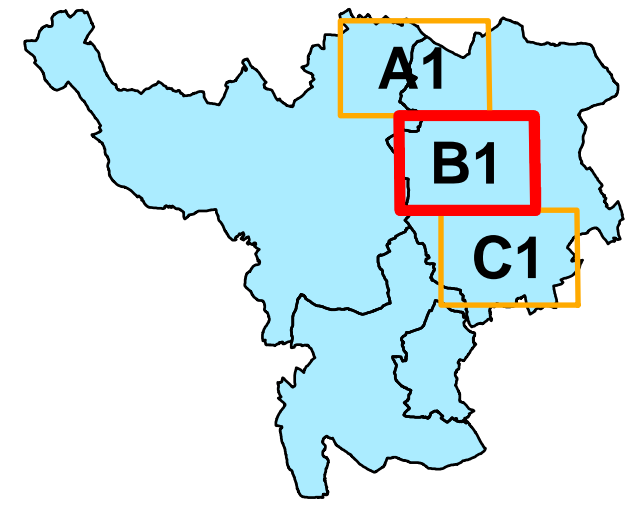
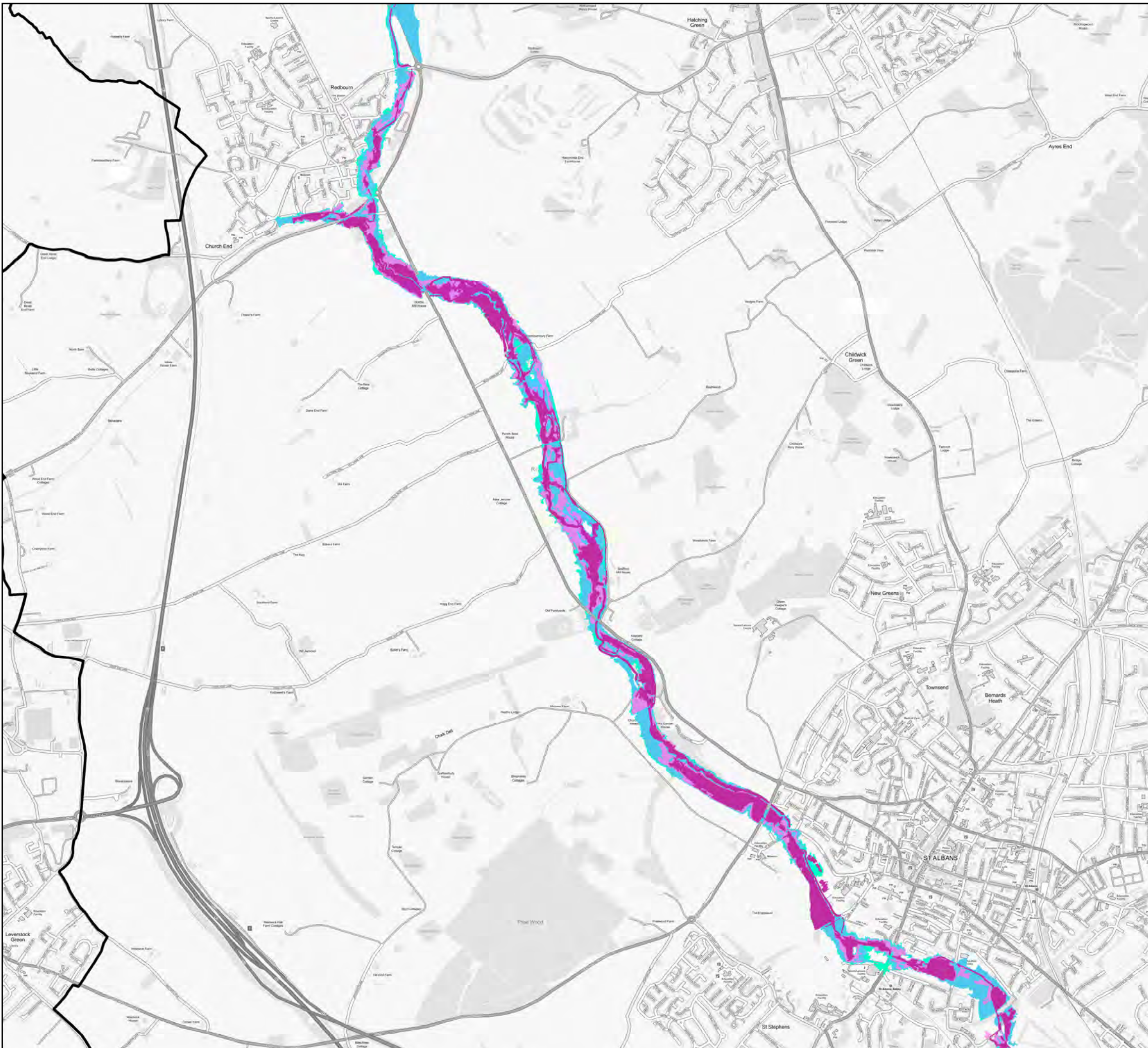
### Legend

-  Local Planning Authority Boundaries
-  River Ver Revised Flood Zone 3 (1 in 100/1% AEP)
-  River Ver Revised Flood Zone 2 (1 in 1000/0.1% AEP)
-  Flood Zone 3 (existing)
-  Flood Zone 2 (existing)

The detailed mapping contained in the following appendices uses an index grid to divide the South West Hertfordshire study area.






### Level 1 Strategic Flood Risk Assessment River Ver Addendum Appendix A - Ver Revised Flood Zones





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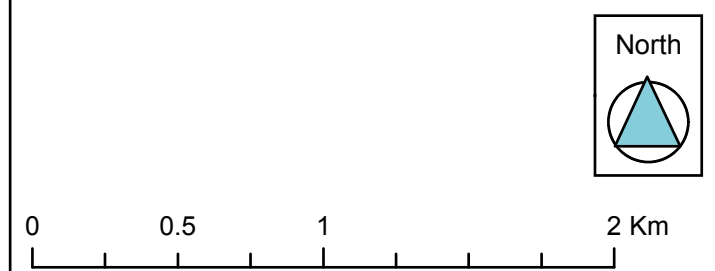
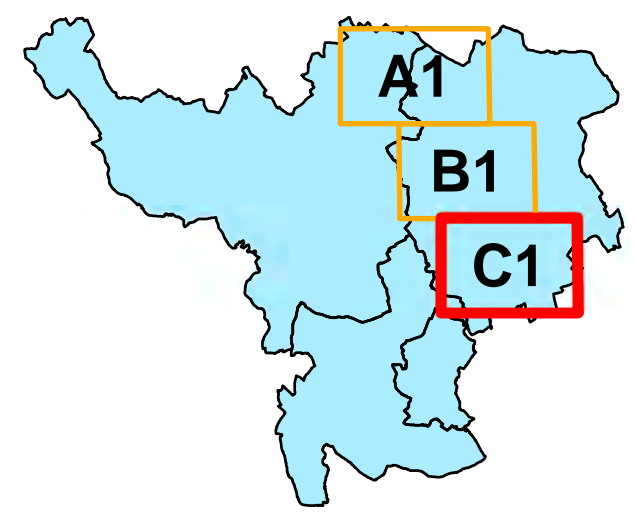
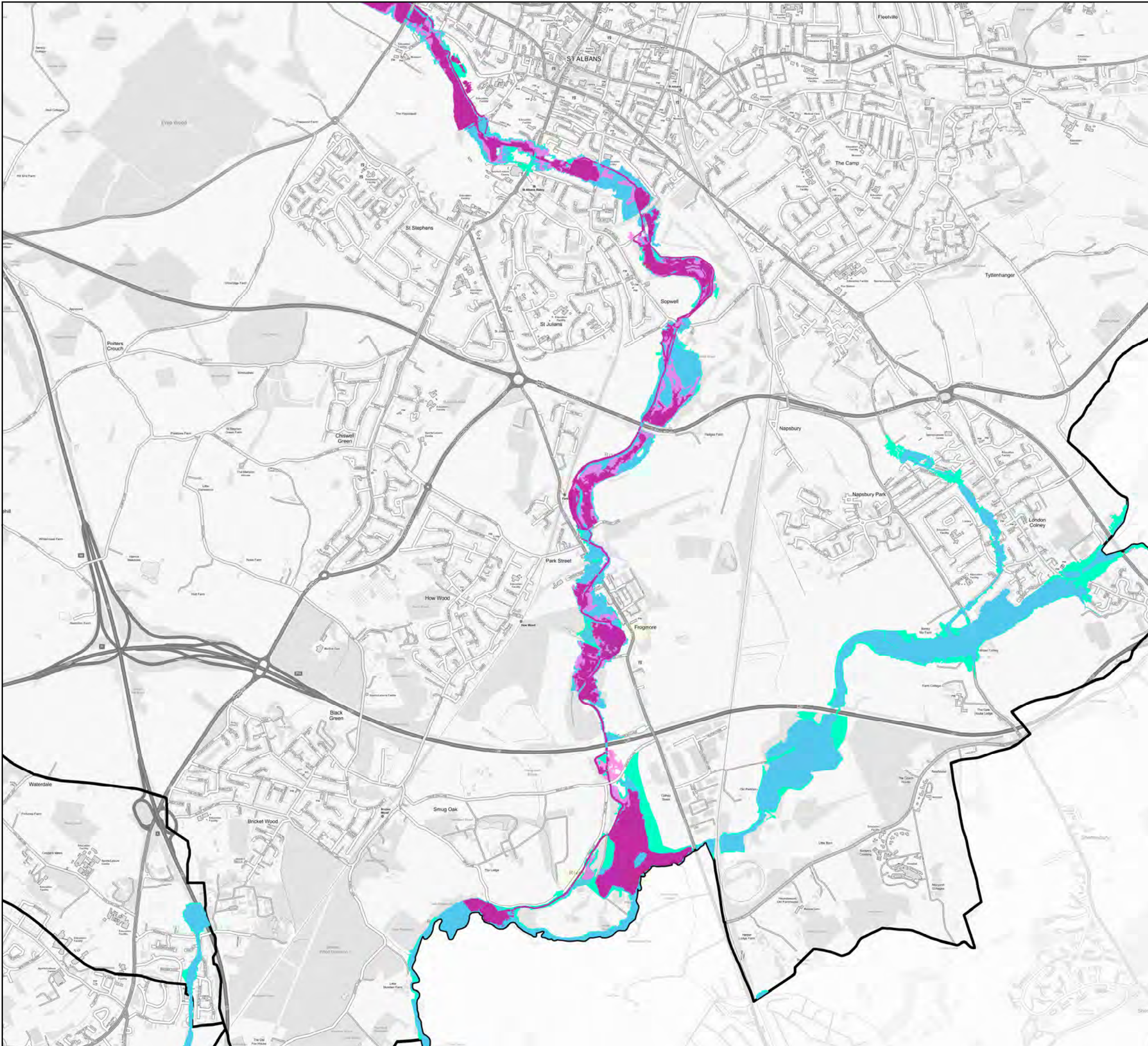
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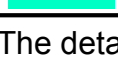






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