



# Southern Staffordshire Outline Water Cycle Study

## Addendum

Stafford Borough, Lichfield District, Tamworth  
Borough, South Staffordshire District and Cannock  
Chase District Councils  
April 2011  
Final Report  
9V5955



**HASKONING UK LTD.  
COASTAL & RIVERS**

5th Floor, Radcliffe House  
Blenheim Court  
Solihull B91 2AA  
United Kingdom  
+44 (0)121 709 6520 Telephone  
Fax  
info@solihull.royalhaskoning.com E-mail  
www.royalhaskoning.com Internet

Document title Southern Staffordshire Outline Water Cycle  
Study  
Addendum  
Document short title Southern Staffordshire WCS  
Status Final Report  
Date April 2011  
Project name Stafford, Lichfield, Tamworth, South  
Staffordshire and Cannock WCS and SWMP  
Project number 9V5955  
Client Stafford Borough, Lichfield District, Tamworth  
Borough, South Staffordshire District and  
Cannock Chase District Councils  
Reference 9V5955/R00014/303671/Soli

Drafted by R Ranger  
Checked by M Stringer  
Date/initials check 15/4/11 ..... *M. Stringer*  
Approved by M Stringer  
Date/initials approval 15/4/11 ..... *M. Stringer*



## EXECUTIVE SUMMARY

### Addendum Objectives

An outline Water Cycle Study (WCS) was completed for five Local Authority areas (Stafford Borough, Lichfield District, Tamworth Borough, Cannock Chase District and South Staffordshire District) in southern Staffordshire in July 2010. The surface water flooding analysis included within the report was based solely upon the information available at that time, namely the Phase 1 SWMP. Since its publication, the following three new sources of surface water flood risk information have become available:

1. Settlement specific Phase 2 SWMPs;
2. National Flood Map for Surface Water (FMfSW); and
3. Staffordshire County Preliminary Flood Risk Assessment (PFRA).

As a result of these new sources of data it was considered necessary to update the surface water flood risk assessment within the WCS. The details and results of that update are contained within this report.

### Addendum Overview

Section 1 provides an overview of the changes this Addendum makes to the WCS report. Section 2 introduces the new datasets used for the assessment of site and settlement specific surface water flood risk. Sections 3 - 7 outline the new flood risk summaries (replacing Sections 5.6, 6.6, 7.6, 8.6 and 9.6 of the WCS) and update the conclusions for each Local Authority included with regards to flood risk. Section 10 summarises any new conclusions with regards to Flood Risk as a result of this updated assessment. Figures 5.6, 6.6, 7.6, 8.6 and 9.6 and Appendix H from the original WCS have been updated and are included in Appendix A and Appendix B, respectively.

### Conclusions and Key Recommendations

The key conclusions and recommendations resulting from this Addendum are as follows:

1. Individual Flood Risk Assessments (FRAs) will be required for a number of development sites in all five Local Authority areas and these should be undertaken where identified as necessary within this WCS, the Level 1 SFRA or the Phase 1 and 2 SWMPs;
2. Appropriate consideration must be given to the guidance provided in PPS25, and the Sequential and Exception Tests followed, for any development identified as being either wholly or partially located in Flood Zones 2 or 3. Appropriate consideration must also be given to surface water. Further information and policies regarding flood risk are provided in the Level 1 SFRAs and guidance on the appropriate protocol for assessing flood risk sought from Planning Policy Statement 25;
3. Improved surface water management is required over much of the study area, with significant risk of surface water flooding identified for a high number of

development sites (see Tables 3.2, 4.2, 5.2, 6.2 and 7.2 for reference to individual development sites)

4. Where development sites are identified as being located within the 30year surface water flood zone outline, the cause and impact of this flood risk should be identified further on a site specific basis by the developer, if progressed. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these sites;
5. Development within all the settlements identified as 'red', with regards to overall flood risk, in Tables 3.2, 4.2, 5.2, 6.2 and 7.2 should be reviewed as part of a site specific FRA with reference to the Phase 1 and Phase 2 SWMPs, Staffordshire County Councils historic flood risk database and the Level 1 SFRA by the developer. In addition, reference should be made to the Environment Agency's 'Risk of Flooding from Reservoirs' map.
6. When reviewing the results of flood risk this WCS should be reviewed alongside the SFRA and Phase 1 and Phase 2 SWMPs and updated with any further stages of these studies and the suggested recommendations and policies in these documents should be followed;
7. The settlement specific flood risk classifications must be viewed with consideration of the general scale on which they were derived - individual sites will require reconsideration on a site specific basis;
8. The utilisation of SUDS to reduce runoff below Greenfield rate must be included with all forthcoming development applications; and
9. Further guidance regarding the assessment of surface water flood risk for new developments using the FMfSW and Phase 2 SWMP models will be forthcoming and, once available, should be sought from Staffordshire County Council.

## CONTENTS

	Page
1 INTRODUCTION	5
1.1 General Overview	5
1.2 WCS Amendments	5
1.3 Addendum Outline	6
2 STRATEGIC ASSESSMENTS	7
2.1 Phase 2 SWMPs	7
2.2 Flood Map for Surface Water	7
2.3 Staffordshire County PFRA	7
2.4 Phase 1 SWMP	8
2.5 Fluvial Flood Risk	8
3 STAFFORD BOROUGH DEVELOPMENT SPECIFIC RESULTS	9
3.1 Flood Risk	9
3.1.1 Fluvial Flood Risk	9
3.1.2 Surface Water Flooding	10
3.1.3 Groundwater	10
3.1.4 Canals	10
3.1.5 Reservoirs	10
3.1.6 Summary	11
3.2 Recommendations	17
4 LICHFIELD DISTRICT DEVELOPMENT SITE SPECIFIC RESULTS	19
4.1 Flood Risk	19
4.1.1 Fluvial Flood Risk	19
4.1.2 Surface Water Flooding	20
4.1.3 Groundwater	20
4.1.4 Canals	20
4.1.5 Reservoirs	20
4.1.6 Summary	21
4.2 Recommendations	25
5 TAMWORTH BOROUGH DEVELOPMENT SPECIFIC RESULTS	27
5.1 Flood Risk	27
5.1.1 Fluvial Flood Risk	27
5.1.2 Surface Water Flooding	28
5.1.3 Groundwater	28
5.1.4 Canals	28
5.1.5 Reservoirs	28
5.1.6 Summary	29
5.2 Recommendations	32
6 SOUTH STAFFORDSHIRE DISTRICT DEVELOPMENT SPECIFIC RESULTS	33
6.1 Flood Risk	33

6.1.1	Fluvial Flood Risk	33
6.1.2	Surface Water Flooding	34
6.1.3	Groundwater	34
6.1.4	Canals	34
6.1.5	Reservoirs	34
6.1.6	Summary	35
6.2	Recommendations	39
7	CANNOCK CHASE DEVELOPMENT SPECIFIC RESULTS	41
7.1	Flood Risk	41
7.1.1	Fluvial Flood Risk	41
7.1.2	Surface Water Flooding	42
7.1.3	Groundwater	42
7.1.4	Canals	43
7.1.5	Reservoirs	43
7.1.6	Summary	44
7.2	Recommendations	47
8	CONCLUSIONS	49
8.1	Recommendations	49

## APPENDICES

Appendix A - Figures

Appendix B - Constraints Matrix



## GLOSSARY

<b>Environment Agency</b>	Executive Non-departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs and an Assembly Sponsored Public Body responsible to the National Assembly for Wales.
<b>Flood</b>	The temporary covering by water of land not normally covered with water.
<b>Flood probability</b>	The estimated likelihood of a flood of a given magnitude occurring or being exceeded in any specified time period.
<b>Flood Map for Surface Water</b>	Second edition national surface water flood mapping produced by the Environment Agency.
<b>Flood risk</b>	An expression of the combination of the flood probability and the magnitude of the potential consequences of the flood event.
<b>Lead Local Flood Authority</b>	Unitary Authorities or County Councils which issue Local Flood Risk Management Strategies for surface water run-off, groundwater and non-main rivers and have powers to carry out works for the management of surface water run-off and groundwater.
<b>Local Authority</b>	Administrative authorities (Districts and Boroughs) that operate in a two tier local government system under the County Councils.
<b>Local Flood Risk</b>	Flood risk from sources other than main river, the sea and reservoirs, principally meaning surface runoff, groundwater and ordinary watercourses.
<b>Main River</b>	A watercourse shown as such on a Main River Map, and for which the Environment Agency has responsibilities and powers.
<b>Ordinary Watercourses</b>	All watercourses that are no designated Main River and which are the responsibility of Local Authorities or where they exist, Internal Drainage Boards.
<b>Preliminary assessment report</b>	A high level summary of significant flood risk, based on available and readily derivable information, describing both the probability and harmful consequences of past and future flooding.
<b>Risk</b>	Measures the significance of a potential event in terms of likelihood and impact.
<b>Runoff</b>	Water flow over the ground surface to the drainage system.
<b>Surface runoff</b>	Rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving) and has not entered a watercourse, drainage system or public sewer.



## **ABBREVIATIONS**

<b>AStSWF</b>	Areas Susceptible to Surface Water Flooding
<b>FMfSW</b>	Flood Map for Surface Water
<b>FRA</b>	Flood Risk Assessment
<b>GIS</b>	Geographical Information Systems
<b>LLFA</b>	Lead Local Flood Authority
<b>PFRA</b>	Preliminary Flood Risk Assessment
<b>SFRA</b>	Strategic Flood Risk Assessment
<b>SWMP</b>	Surface Water Management Plan
<b>WCS</b>	Water Cycle Study



# 1 INTRODUCTION

## 1.1 General Overview

In November 2009 Royal Haskoning was appointed by Stafford Borough, Lichfield District, Tamworth Borough, South Staffordshire District and Cannock Chase District Councils (hereafter “the Councils”) to produce a Phase 1 and Phase 2 Surface Water Management Plan (SWMP) and a Phase 1 and Phase 2: Scoping and Outline Stage Water Cycle Study (WCS). The Phase 1 SWMP and WCS were finalised in July 2010 and the draft Phase 2 SWMP reports submitted in March 2011.

Due to the timing of publication of the WCS, the surface water flooding analysis included within the report was based solely upon the information available at that time. With regards to surface water flooding analysis was solely related to the Phase 1 SWMP. However, following publication of the WCS, the following three new sources of surface water flood risk information have become available:

1. Settlement specific Phase 2 SWMPs;
2. National Flood Map for Surface Water (FMfSW); and
3. Staffordshire County Preliminary Flood Risk Assessment (PFRA).

As a result of these new sources of data it was considered necessary to update the surface water flood risk assessment within the WCS.

## 1.2 WCS Amendments

Due to the size of the WCS document, it was considered more appropriate to update the flood risk section within an addendum rather than re-issuing the entire WCS document. As such, this Addendum should be referenced when referring to any of the flood risk sections within the original WCS (namely Sections 2.4, 3.4, 5.6, 5.9, 6.6, 6.9, 7.6, 7.9, 8.6, 8.9, 9.6, 9.9 and 10). Please note this Addendum supplements, rather than replaces most of these sections. However, the following summary tables, figures, boxes and appendices contained within the WCS have been superseded by this Addendum and their replacements included, in full, within this document:

**Table 1.1 - WCS Tables, Boxes, Figures and Appendices Replaced by this Addendum**

Tables	Boxes	Figures	Appendices
Table 5.14	Box 5.4	Figure 5.6	Appendix H (Tables H.1 - H.5)
Table 6.14	Box 6.4	Figure 6.6	
Table 7.14	Box 7.4	Figure 7.6	
Table 8.14	Box 8.4	Figure 8.6	
Table 9.14	Box 9.4	Figure 9.6	

### 1.3 Addendum Outline

Section 2 of this Addendum introduces the new datasets used for the assessment of site and settlement specific surface water flood risk. Sections 3 - 7 outline the new flood risk summaries (replacing Sections 5.6, 6.6, 7.6, 8.6 and 9.6 of the WCS) and update the conclusions for each Local Authority included with regards to flood risk. Section 10 summarises any new conclusions with regards to Flood Risk as a result of this updated assessment. The updated Figures and Appendix are included in **Appendix A** and **Appendix B**, respectively.

## 2 STRATEGIC ASSESSMENTS

### 2.1 Phase 2 SWMPs

The Phase 2 SWMPs have consisted of the construction of integrated surface water models for the settlements of Stafford town, Penkridge village, Cannock town, Tamworth town and Lichfield city. Each model covers the area contained within the watershed<sup>1</sup> of the settlements and accounts for overland flows, fluvial flows affected by surface water and the underground drainage network (i.e. sewers). The critical storm duration rainfall event has been overlaid onto the models producing outputs of flood extent, depth and velocity for a variety of annual probabilities of flooding. Further detailed information regarding the modelling can be found within the Phase 2 SWMP reports<sup>2</sup>.

For the purposes of this WCS Addendum assessment, only the model outlines for the 3.33% (1 in 30 chance of occurring in any given year) and 0.5% (1 in 200 chance of occurring in any given year) rainfall probability events with water depths of greater than 0.1m have been assessed.

### 2.2 Flood Map for Surface Water

The Phase 1 SWMP introduced three main sources of future flood risk information, one of which was the Environment Agency's 'Surface Water Flood Map'. The flood map utilised within that study was the national 'Areas Susceptible to Surface Water Flooding' (AStSWF), the Environment Agency's first edition mapping.

Following completion of the Phase 1 SWMP and the WCS, the Environment Agency released their second edition national mapping, Flood Map for Surface Water (FMfSW). Although still produced on a national scale, the FMfSW is more detailed than the AStSWF, containing more storm events, a representation of the influence of buildings and a representation of the influence of infiltration and the sewer system (simulated through a reduction in rainfall over urban areas). As such, the FMfSW further defines the potential surface water flow routes than those illustrated within the AStSWF maps. It has been produced for the 3.33% (1 in 30 chance of occurring in any given year) and 0.5% (1 in 200 chance of occurring in any given year) rainfall probability events and at two depth bands for each - greater than 0.1m and greater than 0.3m (deep). For the purposes of this WCS Addendum assessment, only the model outlines for the areas flooding with depths of greater than 0.1m have been assessed.

### 2.3 Staffordshire County PFRA

During the course of this project Staffordshire County Council has been assigned Lead Local Flood Authority (LLFA) status for Staffordshire and, as part of their new responsibilities, they have completed a Preliminary Flood Risk Assessment (PFRA) report for the County<sup>3</sup>. A requirement of this PFRA was the determination of 'Locally

---

<sup>1</sup> The area within which surface water will drain towards the settlement in question.

<sup>2</sup> Available from the relevant Local Authority

<sup>3</sup> The PFRA for Staffordshire has been completed by Royal Haskoning and the draft report submitted in March 2011<sup>3</sup>. It is due for submission to the Environment Agency in June 2011: *Staffordshire Preliminary Flood Risk Assessment, Draft Report, Royal Haskoning, March 2011*

Agreed Surface Water' information for the county, with regards to future flood risk. As the FMfSW was considered to more suitably represent the risk of surface water flooding within Staffordshire than the AStSWF it has been designated as a major element of the County's 'Locally Agreed Surface Water Information'<sup>4</sup>. However, where the more detailed Phase 2 SWMP model outlines are available (over the watersheds of Penkridge, Tamworth, Lichfield, Cannock and Stafford), they replace the FMfSW.

As a result of this assessment, it is the Locally Agreed Surface Water Information (FMfSW and Phase 2 SWMP model outlines) that is utilised within this WCS Addendum to assess the surface water flood risk to potential development sites and settlements.

## **2.4 Phase 1 SWMP**

Please note that, as a result publication of the FMfSW and the PFRA, the Phase 1 SWMP (to which the WCS refers) has also been updated in the form of an Addendum<sup>5</sup>. The settlement specific summary sheets at the back of the Phase 1 SWMP (to which the WCS makes a direct reference) were not updated as part of that Addendum. As such, the references within the WCS to the Phase 1 SWMP (with regards to surface water flood risk) should be discounted and the results contained within this report utilised instead.

## **2.5 Fluvial Flood Risk**

Please note, the assessment of fluvial flood risk within the WCS has not been updated and the conclusions from the Strategic Flood Risk Assessments (SFRAs) and Environment Agency's Fluvial Flood Zone maps have been drawn directly from the WCS into this Addendum.

---

<sup>4</sup> See Section 5.3 of the Staffordshire Preliminary Flood Risk Assessment, Draft Report, Royal Haskoning, March 2011.

<sup>5</sup> Southern Staffordshire Surface Water Management Plan Phase 1 Addendum, Final Report, Royal Haskoning, April 2011



### 3 STAFFORD BOROUGH DEVELOPMENT SPECIFIC RESULTS

#### 3.1 Flood Risk

**This Section replaces Section 5.6 of the original WCS**

This sections draws upon the results of the Level 1 SFRA and the FMfSW for Stafford Borough, in addition to the Phase 2 SWMP for Stafford town. As it is not the purpose of the WCS to repeat the findings of other Evidence Base studies, all the details of drainage networks and causes of flooding are not repeated here. Instead a summary is provided to explain the analysis undertaken in order to give each of the potential development sites/areas a classification with regards to flood risk. Following this, **Table 3.2** presents the different flood risk factors affecting each of the potential development sites/areas and therefore the overall classification of flood risk that is taken forward to the Constraints Matrix (**Appendix B**).

##### 3.1.1 Fluvial Flood Risk<sup>6</sup>

Stafford Borough is almost entirely located within the catchment of the River Trent, as shown in **Figure 3.1**<sup>7</sup> (**Appendix A**). The main watercourses located within the Borough boundaries are the River Trent, River Sow and River Penk and their tributaries. The River Sow mostly drains from within the Borough boundaries, whereas the Rivers Trent and Penk drain from neighbouring authority areas. The River Trent enters the Borough from the north from Stoke on Trent. It then drains through the town of Stone and to the east of Stafford town before exiting the Borough to the southeast, bordering Cannock Chase District and the town of Rugeley, before flowing through Lichfield District. The River Penk has its headwaters located within the Wolverhampton conurbation and drains through South Staffordshire District before joining the River Sow in Stafford town. As such all these watercourses pose a significant fluvial flood risk to the Borough, including the main urban areas. This risk is affected not only by activities within the Borough but also activities upstream in the neighbouring Local Authority areas. Conversely activities within the Borough also impact on the flood risk of Local Authority areas downstream.

The fluvial flood risk to the potential development sites has been determined from the Flood Zone outlines presented within the Stafford Borough SFRA to determine which of the potential development sites/areas are located within Flood Zones 2, 3 and 3b, as referenced in PPS25 and summarised **Table 3.2**. Depending upon the Flood Zone in which the potential development site is located, increasing restrictions will be placed upon the type of development allowed and the tests and assessments that must be complied with before development should go ahead. More information regarding these tests and restrictions is given in Section 3.4 of the original WCS document.

<sup>6</sup> Please note this section has not been altered from the original WCS document.

<sup>7</sup> Please note this figure replaces Figure 5.6 contained within the original WCS.

### 3.1.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Locally Agreed Surface Water Information relevant to Stafford Borough. This has accounted for the risk of future flooding from surface water, using the modelled extents within the FMfSW and Phase 2 SWMP. The historic flooding points have been used as part of the verification process carried out within the PFRA and Phase 2 SWMP, identifying a good correlation. As the record of historic flooding does not identify whether past issues have now been resolved, it was not considered appropriate to directly reference the historic flooding points within this assessment of surface water flood risk. However, it is recommended that Stafford Borough Council refer to the 'live' GIS layer of historic flooding<sup>8</sup> (held by Staffordshire County Council) as part of their assessment of future planning applications.

### 3.1.3 Groundwater<sup>9</sup>

The Stafford Borough SFRA states that there are no known occurrences of groundwater flooding within the District. As such it has not been incorporated within this analysis of flood risk.

### 3.1.4 Canals<sup>10</sup>

The SFRA states that there two historical occurrences of breaching within Stafford Borough - one at Church Eaton in 1957 and one in High Offley in 1991. Due to the single reference of each of these flood events and their historic occurrence it has not been considered necessary to include these events within the analysis of flood risk to the potential development sites. However, as reiterated in the SFRA it is important that any development proposed adjacent to a canal be investigated on an individual basis regarding flooding issues and should be considered as part of any FRA.

The Lichfield Canal is currently being restored and a pipe laid in the bed of the canal provides surface water drainage for most of the southern portion of Lichfield, including the new southern bypass. When restored the canal will replace this pipe and future flows from development must not exceed the capacity of the system.

### 3.1.5 Reservoirs

The Environment Agency have recently published maps showing the maximum extent of flooding from large reservoirs should the reservoirs fail and release the water they hold. However, flood risk from reservoirs is very low due to the high standards of inspection and maintenance required by legislation. As such an assessment of flood risk from reservoirs and impounded waterbodies has not been included within this WCS.

As stated in the SFRA there are five waterbodies within Stafford Borough that are identified as being governed by the Reservoirs Act 1975 (i.e. they have an impounded volume in excess of 25,000m<sup>3</sup>)<sup>11</sup>. These are shown on **Figure 3.1** and consist of:

<sup>8</sup> Initially produced as part of the Staffordshire County PFRA, March 2011

<sup>9</sup> Please note this section has not been altered from the original WCS document.

<sup>10</sup> Please note this section has not been altered from the original WCS document.

- Black Lake, Knowle Wall Farm (private)
- Bromley Mill Pool (private)
- Gap Pool (private)
- Tixall Park Pool (private)
- Trentham Gardens Lake (private)

A breach of any of these waterbodies may pose a flood risk to any existing or proposed potential development site located downstream, although, as mentioned above the risk is very low.

Although not assessed within this report, it is still recommended that the Council review these maps to raise their awareness of the potential flood extents, especially in relation to future development sites. In line with PPS25 a consideration of the risk of reservoir flooding should be included within any site specific Flood Risk Assessments (FRAs).

### 3.1.6 Summary

The flood risk to the proposed development sites/areas is summarised in **Table 3.2** below.

Sites within Flood Zone 3 (or Flood Zone 3a with climate change) are considered 'red' with regards to fluvial flood risk, sites in Flood Zone 2 are 'amber' and outside of these zones are 'green'. With regards to surface water flood risk, sites within the 30yr flood zone are considered 'red', sites within the 200yr flood zone are considered 'amber' and those outside the zones are 'green'. Within the watersheds of the five settlements assessed within the Phase 2 SWMP, the SWMP model outlines are used and outside of these watersheds the FMfSW outlines are used. For the settlements, an assessment has been undertaken based upon the extent of the FMfSW over the current potential development sites in that area, providing a broad summary. Site specific analysis should be undertaken for specific development sites and to assess areas outside the proposed development boundaries.

Where sites are identified as being at risk of flooding, additional analysis will be required as part of site specific Flood Risk Assessments (FRAs) to enable development to progress. Where surface water has been identified as a potential problem to the site, additional site specific analysis or mitigation may be required and further guidance relating to Sustainable Drainage Systems (SUDS) is provided within Section 5.7 of the WCS.

---

<sup>11</sup> NB following the enactment of the new Floods and Water Management Bill on 8<sup>th</sup> April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m<sup>3</sup>. As such there may now be additional water bodies within Stafford Borough classified as reservoirs and this should be addressed in the first review of this WCS.

The 'overall' classification has been determined using the standard matrix shown in **Table 3.1**. To emphasise the importance of not locating development within fluvial Flood Zone 3, all sites located within this zone are classified as having an overall flood risk of 'red', regardless of their surface water classification.

**Table 3.1 - Traffic Light Colour Code Matrix**

		Fluvial Flood Risk Classification		
		Blank	Amber	Red
Surface Water Flood Risk Classification	Blank	G	A	R
	Amber	A	A	R
	Red	A	R	R

**Table 3.2 - Flood Risk to Potential Development Sites in Stafford Borough**

Potential Development Site	FZ 2	FZ3	FZ3b	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
	(1000 year)	(100 year)	(Functional Floodplain)				
EC-1						30yr	A
EC - 2						30yr	A
EC - 3							G
EC - 4						30yr	A
EC - 5						200yr	A
GH - 1						30yr	A
GH - 2						30yr	A
GH - 3						30yr	A
GN - 1						200yr	A
GN - 2						30yr	A
GN - 3							G
GN - 4						200yr	A
GN - 5	Y	Y		Y	Y	30yr	R
GN - 6							G
GN - 7						30yr	A
GN - 8	Y	Y		Y	Y	30yr	R
GN - 9							G
HI - 1						30yr	A
HI - 2							G
HI - 3						200yr	A
HI - 4							G
HI - 5						30yr	A
HI - 6						30yr	A
HN - 1							G
HN - 2						200yr	A

Potential Development Site	FZ 2	FZ3	FZ3b	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
	(1000 year)	(100 year)	(Functional Floodplain)				
HN - 3						200yr	A
HN - 4							G
HN - 5						200yr	A
HN - 6						30yr	A
LH - 1							G
LH - 2							G
SF - 1						30yr*	A
SF - 10						30yr*	A
SF - 11						30yr*	A
SF - 12	Y	Y		Y	Y	30yr*	R
SF - 2						30yr*	A
SF - 3						30yr*	A
SF - 4						30yr*	A
SF - 5	Y	Y	Y	Y	Y	30yr*	R
SF - 6						30yr*	A
SF - 7						200yr*	A
SF - 8	Y	Y	Y	Y	Y	30yr*	R
SF - 9	Y	Y		Y	Y	30yr*	R
SN - 1						30yr	A
SN - 2						30yr	A
SN - 3						30yr	A
SN - 4	Y	Y		Y	Y	30yr	R
SN - 5						30yr	A
TT - 1 and TT-2						30yr	A
WO - 1						30yr	A
WO - 2						30yr	A
WO - 3						30yr	A
WO - 4							G
WO - 5						200yr	A
WO - 6						30yr	A
WO - 7							G
WT - 1	Y	Y		Y	Y	30yr*	R
YN - 1							G
HA - a						30yr	A
HA - b							G
HA - c						30yr	A
HI - a						30yr	A
HI - b						30yr	A
LA - a						30yr	A
LA - b							G
RH - a						30yr	A

Potential Development Site	FZ 2	FZ3	FZ3b	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
	(1000 year)	(100 year)	(Functional Floodplain)				
RH - b							G
SF - a						30yr*	A
SF - b	Y	Y		Y	Y	30yr*	R
SF - c						30yr*	A
SF - d	Y	Y	Y	Y	Y	30yr*	R
SF - e	Y	Y	Y	Y	Y	30yr*	R
SF - f	Y	Y		Y	Y	30yr*	R
SF - g	Y	Y	Y	Y	Y	30yr*	R
SF - h						30yr*	A
SF - i						30yr*	A
SN - a	Y	Y		Y	Y	30yr	R
SN - b						30yr	A
Stafford (in and around)	Y	Y	Y	Y	Y	30yr	R
Adbaston							G
Barlaston	Y	Y		Y	Y	200yr	R
Bradley						200yr	A
Bridgeford Area	Y	Y	Y	Y	Y	200yr	R
Church Eaton						30yr	A
Cotes Heath and Swynnerton	Marginal						A
Croxtan							G
Eccleshall and Copmere End	Y	Y	Y	Y	Y	30yr	R
Gnosall	Y	Y		Y	Y	30yr	R
Haughton						200yr	A
Haywood	Y			Y		30yr	R
Hilderstone	Marginal					200yr	A
Hixon and Stowe						30yr	A
Leadendale, Blythe Bridge and Fulford						200yr	A
Milwich						200yr	A
Norbury and Sutton	Marginal					200yr	A
Northwood	Y	Y	Y	Y	Y		R
North of Rugeley						200yr	A

Potential Development Site	FZ 2	FZ3	FZ3b	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
	(1000 year)	(100 year)	(Functional Floodplain)				
<b>Ranton</b>	Y	Y	Y	Y	Y		R
<b>Salt and Weston</b>	Y	Y	Y	Y	Y	200yr	R
<b>Slindon and Sturbridge</b>						200yr	A
<b>Stone (in and around)</b>	Y	Y		Y	Y	30yr	R
<b>Walton and Norton Bridge</b>	Y	Y	Y	Y	Y	200yr	R
<b>Woodseaves</b>						200yr	A
<b>Yarnfield</b>	Y	Y		Y	Y	200yr	R

NOTES:

\*Included within the Phase 2 SWMP Model

### BOX 3.1

#### **Stafford Borough Flood Risk: At a Glance...**

- Fluvial flood risk is a constraint to development in many areas of the Borough, although most significantly within the town of Stafford.
- A number of potential development sites (GN-5, GN-8, SF-12, SF-5, SF-8, SF-9, SN-4, WT-1, SF-b, SF-d, SF-e, SF-f, SF-g and SN-a) are located within the fluvial Flood Zones and will therefore require further analysis and/or mitigation to enable development to progress in accordance with PPS25.
- In relation to the existing potential development site locations, the following six settlements have been identified as being located within the 30yr surface water flood risk zones and a further 15 have been identified as being located in the 200yr surface water flood risk zone:
  - Stafford;
  - Stone;
  - Church Eaton;
  - Eccleshall and Copmere End
  - Gnosall;
  - Haywood; and
  - Hixon and Stowe
- Any proposed development within these settlements should be reviewed on a site specific basis with regards to surface water flood risk.
- Due to the combination of fluvial and surface water flood risk, 14 settlements and 17 of the potential development sites analysed within Stafford Borough have been classified as 'red' in terms of overall flood risk (see Table 3.2 above). Development within these areas should be reviewed with reference to both the Level 1 SFRAs and the SWMP. All development must follow the guidance provided within PPS25 and incorporate appropriate SUDS policies. For all of these locations further assessment in the form of site specific FRAs, by the developer will be required referring to the guidance provided within PPS25 and should incorporate appropriate SUDS policies.
- Due to the strategic nature of this assessment it is recommended that additional review should be undertaken by the Council and/or developers for individual sites using the latest flood risk information available at the time.



## 3.2 Recommendations

The recommendations below refer only to flood risk. Section 5.9 of the WCS should be referred to with reference to all other elements of the water cycle.

### Flood Risk

- Individual FRAs are required for a number of sites on the basis of fluvial flood risk (GN-5, GN-8, SF-12, SF-5, SF-8, SF-9, SN-4, WT-1, SF-b, SF-d, SF-e, SF-f, SF-g and SN-a). These should be procured by the developer.
- A high number of development sites have been identified as located within the 30year surface water flood zone outline (see Table 3.2 above). The cause and impact of this flood risk should be identified further on a site specific basis by the developer, if progressed. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these sites;
- Surface water flooding has been identified as a potential issue for current proposed planning locations in the following settlements in particular: Stafford; Stone; Church Eaton; Eccleshall and Copmere End; Gnosall; Haywood; and Hixon and Stowe. This should be considered by the Council when considering preferred options and by the developer at development progression within any of these locations. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these settlements.
- Development within all the settlements locations identified as 'red' or 'amber' in **Table 3.2** should be reviewed as part of a site specific FRA, accounting for both fluvial and surface water flood risk, with reference to the Phase 1 and Phase 2 SWMPs, Staffordshire County Councils historic flood risk database and the Level 1 SFRA by the developer. In addition, reference should be made to the Environment Agency's 'Risk of Flooding from Reservoirs' map.
- The Phase 2 SWMP for Stafford town should be referred to for additional detail regarding surface water flood risk in that settlement.



## 4 LICHFIELD DISTRICT DEVELOPMENT SITE SPECIFIC RESULTS

### 4.1 Flood Risk

This Section replaces Section 6.6 of the original WCS

This sections draws upon the results of the Level 1 SFRA and the FMfSW for Lichfield District, in addition to the Phase 2 SWMP for Lichfield City. As it is not the purpose of this WCS to repeat the findings of other Evidence Base studies, all the details of drainage networks and causes of flooding are not repeated here. Instead a summary is provided to explain the analysis undertaken in order to give each of the potential development sites/areas a classification with regards to flood risk. Following this, **Table 4.2** presents the different flood risk factors affecting each of the potential development sites/areas and therefore the overall classification of flood risk that is taken forward to the Constraints Matrix (**Appendix B**).

#### 4.1.1 Fluvial Flood Risk<sup>12</sup>

Lichfield District is located within the catchment of the River Trent, which flows from the northwest to southeast close to the border with East Staffordshire District, as shown in **Figure 4.1**<sup>13</sup> (**Appendix A**). Other main watercourses within the District include the River Blithe, the River Tame, the Mare Brook, the Curborough Brook and the Bourne Brook. All of these are mature rivers, carrying water from upstream settlements, such as Stoke on Trent, Stone and Tamworth. As such they are fairly substantial watercourses associated with wide flood zones, affecting settlements such as Alrewas, East Rugeley, Hamstall Ridware and Elford, as recorded in the historical records from flood events such as August 1987, December 1992, Autumn 2000 and June/July 2007.

A number of flood defences are located along these major watercourses, but, as specified in the SFRA, the residual flood risk is still high in a number of locations, such as Fradley. Although not reflected in the SFRA Flood Zones and therefore within this WCS, the risk of the breaching or overtopping of defences should be reviewed when considering any development close to these watercourses.

Although the two main settlements of Lichfield and Burntwood are not located on any of these Main Rivers, they are affected by, and contribute, a number of their tributaries. As such flood risk should be a key consideration for all development within the District and therefore development within these areas has an impact downstream, both within the District and beyond. Conversely the flood risk is affected not only by activities within the District but also activities upstream in the neighbouring Local Authority areas.

The fluvial flood risk to the potential development sites has been determined from the Flood Zone outlines presented within the Lichfield District Level 1 SFRA to determine which of the potential development sites/areas are located within Flood Zones 2, 3 and 3b, as referenced in PPS25 and summarised in **Table 4.2**. Depending upon the Flood Zone in which the potential development site is located, increasing restrictions will be

<sup>12</sup> Please note this section has not been altered from the original WCS document.

<sup>13</sup> Please note this figure replaces Figure 6.6 contained within the original WCS.

placed upon the type of development allowed and the tests and assessments that must be complied with before development should go ahead. More information regarding these tests and restrictions is given in Section 3.4 of the WCS. Due to the size of the watercourses, a large area of the District is located within the Flood Zones and, as such flood risk is a key element to be considered at all stages of the planning process.

#### 4.1.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Locally Agreed Surface Water Information relevant to Lichfield District. This has accounted for the risk of future flooding from surface water, using the modelled extents within the FMfSW and Phase 2 SWMP. The historic flooding points have been used part of the verification process carried out within the PFRA and Phase 2 SWMP, identifying a good correlation. As the record of historic flooding does not identify whether past issues have now been resolved, it was not considered appropriate to directly reference the historic flooding points within this assessment of surface water flood risk. However, it is recommended that the Council refer to the GIS layer of historic flooding<sup>14</sup> (held by Staffordshire County Council) as part of their assessment of future planning applications.

#### 4.1.3 Groundwater<sup>15</sup>

Although underlain by extensive fluvial sand and gravel deposits, which hold groundwater resources and have significant hydraulic interaction with the river systems, there are no known problems with groundwater flooding within the District. As such it has not been incorporated within this analysis of flood risk.

#### 4.1.4 Canals<sup>16</sup>

The SFRA states that there are no recorded incidences of flooding from either the Trent and Mersey Canal or the Coventry Canal. However, as reiterated in the SFRA it is important that any development proposed adjacent to a canal be investigated on an individual basis regarding flooding issues and should be considered as part of a FRA.

#### 4.1.5 Reservoirs

The Environment Agency have recently published maps showing the maximum extent of flooding from large reservoirs should the reservoirs fail and release the water they hold. However, flood risk from reservoirs is very low due to the high standards of inspection and maintenance required by legislation. As such an assessment of flood risk from reservoirs and impounded waterbodies has not been included within this WCS.

As stated in the SFRA there are eight waterbodies within Lichfield District that are identified as being governed by the Reservoirs Act 1975 (i.e. they have an impounded

---

<sup>14</sup> Initially produced as part of the Staffordshire County PFRA, March 2011

<sup>15</sup> Please note this section has not been altered from the original WCS document.

<sup>16</sup> Please note this section has not been altered from the original WCS document.

volume in excess of 25,000m<sup>3</sup>)<sup>17</sup>. These are shown on **Figure 4.1 (Appendix A)** and consist of:

- Canwell Estate Reservoir (private)
- Chasewater (Lichfield District Council)
- Little Aston Pool (private)
- Minster Pool (Lichfield District Council)
- Rugeley Amenity Lake (private)
- Rugeley Ash Lagoon (Lichfield District Council)
- Stowe Pool (Lichfield District Council)
- Swinfen Lake (private)

In addition, the Blithfield Reservoir is located just upstream of Lichfield District, within East Staffordshire District. The discharge from this reservoir is carried into the Lichfield District by the River Blithe.

A breach of any of these waterbodies may pose a flood risk to any existing or proposed potential development site located downstream, although, as mentioned above the risk is very low.

Although not assessed within this report, it is still recommended that the Council review these maps to raise their awareness of the potential flood extents, especially in relation to future development sites. In line with PPS25 a consideration of the risk of reservoir flooding should be included within any site specific Flood Risk Assessments (FRAs).

#### 4.1.6 Summary

The flood risk to the proposed development sites/areas is summarised in **Table 4.2** below.

Sites within Flood Zone 3 are considered 'red' with regards to fluvial flood risk, sites in Flood Zone 2 are 'amber' and outside of these zones are 'green'. With regards to surface water flood risk, sites within the 30yr flood zone are considered 'red', sites within the 200yr flood zone are considered 'amber' and those outside the zones are 'green'. Within the watersheds of the five settlements assessed within the Phase 2 SWMP, the SWMP model outlines are used and outside of these watersheds the FMfSW outlines are used. For the settlements, an assessment has been undertaken based upon the extent of the FMfSW over the current potential development sites in that area, providing a broad summary. Site specific analysis should be undertaken for specific development sites and to assess areas outside the proposed development boundaries.

Where sites are identified as being at risk of flooding, additional analysis will be required as part of site specific Flood Risk Assessments (FRAs) to enable development to progress. Where surface water has been identified as a potential problem to the site, additional site specific analysis or mitigation may be required and further guidance

---

<sup>17</sup> NB following the enactment of the new Floods and Water Management Bill on 8<sup>th</sup> April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m<sup>3</sup>. As such there may now be additional water bodies within Lichfield District classified as reservoirs and this should be addressed in a review of the WCS, if considered beneficial by the Council.

relating to Sustainable Drainage Systems (SUDS) is provided within Section 6.7 of the WCS.

The 'overall' classification has been determined using the standard matrix shown in **Table 4.1**. To emphasise the importance of not locating development within fluvial Flood Zone 3, all sites located within this zone are classified as having an overall flood risk of 'red', regardless of their surface water classification.

**Table 4.1 - Traffic Light Colour Code Matrix**

		Fluvial Flood Risk Classification		
		Blank	Amber	Red
Surface Water Flood Risk Classification	Blank	G	A	R
	Amber	A	A	R
	Red	A	R	R

**Table 4.2 - Flood Risk to Potential Development Sites in Lichfield District**

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
1							G
109						30yr*	A
126							G
127							G
128						30yr*	A
125						30yr*	A
408						200yr*	A
426						200yr	A
157						200yr	A
173						30yr	A
406						30yr	A
102	Y	Y		Y	Y	30yr	R
69	Y	Y		Y	Y	30yr	R
70	Y	Y		Y	Y	30yr	R
117						30yr	A
118						30yr	A
115							G
96						200yr	A
97	Not in Flood Zone but next to watercourse					200yr	A
94						30yr	A
95						30yr	A
140						30yr	A
495						30yr	A

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
38	Y	Y		Y	Y	30yr	R
104						30yr	A
43						30yr	A
108						30yr	A
Alrewas	Y	Y		Y	Y	200yr	R
Anker Valley						30yr	A
Armitage and the Longdons	Y	Y		Y	Y	30yr	R
Blithbury							G
Brownhills	Marginal					30yr	R
Burntwood (in and around)	Y	Y		Y	Y	30yr	R
Carroway Head						200yr	A
Clifton Campville						200yr	A
Colton						200yr	A
Edingale and Harlaston	Y	Y		Y	Y	30yr	R
Elford	Y	Y	Y	Y	Y	200yr	R
Fradley	No but canals cross through/between potential development sites					30yr	A
Hamstall Ridware	Y	Y	Y	Y	Y	30yr	R
Hill Ridware	Marginal					200yr	R
Kings Bromley	Y	Y	Y	Y	Y	200yr	R
Lichfield (in and around)	Marginal					30yr	R
Little Aston and North Streetly	Marginal					200yr	A
Mile Oak and Fazeley	Partially					200yr	A
Muckley Corner, Summerhill and Springhill						200yr	A
Shenstone	Y	Y		Y	Y	30yr	R
Shenstone Woodend	Marginal					200yr	A
Stonnall						200yr	A
Weeford							G
Whittington	No but next to canal						G
Whittington Heath						30yr	A

NOTES:

\*Included within the Phase 2 SWMP Model

#### BOX 4.1

##### *Lichfield District Flood Risk: At a Glance*

- Fluvial flood risk is a constraint to development in many areas of the District, although most significantly within and around the towns of Burntwood, Alrewas and Fradley.
- A number of potential development sites (102, 69, 70 and 38) are located within the Flood Zones and will therefore require further analysis and/or mitigation to enable development to progress in accordance with PPS25.
- Due to the strategic nature of this assessment it is recommended that additional review should be undertaken by the Council and/or developers for individual sites using the latest flood risk information available at the time.
- In relation to the existing potential development site locations, the following seven settlements have been identified as being located in the 30yr surface water flood zone and a further 12 have been identified as being located in the 200yr surface water flood risk zone:
  - Anker Valley
  - Armitage and Longdons;
  - Brownhills;
  - Burntwood;
  - Edingale and Harlaston;
  - Fradley;
  - Hamstall Ridware;
  - Lichfield City;
  - Shenstone; and
  - Whittington Health
- Any proposed development within these settlements should be reviewed on a site specific basis with regards to surface water flood risk.
- The potential for utilising the Lichfield canal for the conveyance of surface water is an option that can be discussed with British Waterways and the Lichfield and Hatherton Canal Trust. This point was raised within the Phase 2 SWMP.
- Due to the combination of fluvial and surface water flood risk, 14 settlements and 4 of the potential development sites analysed within Lichfield District have been classified as 'red' in terms of overall flood risk (see Table 3.2 above). Development within these areas should be reviewed with reference to both the Level 1 SFRAs and the SWMP. All development must follow the guidance provided within PPS25 and incorporate appropriate SUDS policies. For all of these locations further assessment in the form of site specific FRAs, by the developer will be required referring to the guidance provided within PPS25 and should incorporate appropriate SUDS policies.
- Due to the strategic nature of this assessment it is recommended that additional review should be undertaken by the Council and/or developers for individual sites using the latest flood risk information available at the time.



## 4.2 Recommendations

The recommendations below refer only to flood risk. Section 6.9 of the WCS should be referred to with reference to all other elements of the water cycle.

### Flood Risk

- Individual FRAs are required for a number of sites on the basis of fluvial flood risk (102, 69, 70 and 38). These should be procured by the developer
- A high number of development sites have been identified as located within the 30year surface water flood zone outline (see Table 3.2 above). The cause and impact of this flood risk should be identified further on a site specific basis by the developer, if progressed. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these sites;
- Surface water a flooding has been identified as a potential issue either within the Phase 1 SWMP (for the settlement as a whole) or within Table 3.2 above (for the proposed development sites), namely: Armitage and Longdons; Burntwood; Edingale and Harlaston; Fradley; Hamstall Ridware; Lichfield City; and Shenstone. This should be considered by the Council when considering preferred options and by the developer at development progression within any of these locations. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these settlements.
- Development within all the settlements identified as 'red' or 'amber' in **Table 4.2** should be reviewed as part of a site specific FRA with reference to both the Phase 1 and Phase 2 SWMPs, Staffordshire County Councils historic flood risk database and the Level 1 SFRA by the developer. In addition, reference should be made to the Environment Agency's 'Risk of Flooding from Reservoirs' map.
- The Phase 2 SWMP for Lichfield City should be referred to for additional detail regarding surface water flood risk in that settlement.



## 5 TAMWORTH BOROUGH DEVELOPMENT SPECIFIC RESULTS

### 5.1 Flood Risk

**This Section replaces Section 7.6 of the original WCS**

This sections draws upon the results of the Level 1 SFRA and the FMfSW for Tamworth Borough, in addition to the Phase 2 SWMP for Tamworth town. As it is not the purpose of this WCS to repeat the findings of other Evidence Base studies, all the details of drainage networks and causes of flooding are not repeated here. Instead a summary is provided to explain the analysis undertaken in order to give each of the potential development sites/areas a classification with regards to flood risk. Following this, **Table 5.2** presents the different flood risk factors affecting each of the potential development sites/areas and therefore the overall classification of flood risk that is taken forward to the Constraints Matrix (**Appendix B**).

#### 5.1.1 Fluvial Flood Risk<sup>18</sup>

Tamworth town, and therefore the Borough, is centred on the confluence of the River Tame and the River Anker. In addition, the Bourne Brook confluence with the River Tame is located slightly upstream on the Borough border. As the area of the Borough is so small, the risk of flooding from these watercourses is highly dependent upon activities beyond its boundaries, both within Lichfield District and in Warwickshire and the Birmingham conurbation.

A significant history of flooding has been recorded on both the River Tame and the River Anker within the Level 1 SFRA, including June 1955, December 1992 and Summer 2007. This risk is indicated in the width of the natural floodplains through the Borough and reiterated within the Flood Zone maps, as shown in **Figure 5.1**<sup>19</sup> (**Appendix A**).

Within the RFRA Tamworth has been classified as having a High probability of fluvial flood risk and a High consequence of fluvial flooding. The Borough is also identified as having a Medium probability of residual flooding from the overtopping/breaching of flood defences, with a High predicted consequence. As such it is a very important issue for consideration within the District and one that should be addressed throughout the planning process. Although not reflected in the SFRA Flood Zones and therefore within this WCS, the risk of the breaching or overtopping of defences should be reviewed when considering any development close to these watercourses.

The fluvial flood risk to the potential development sites has been determined from the Flood Zone outlines presented within the Tamworth Borough SFRA to determine which of the potential development sites/areas are located within Flood Zones 2, 3 and 3b, as referenced in PPS25 and summarised in **Table 5.2**. Depending upon the Flood Zone in which the potential development site is located, increasing restrictions will be placed upon the type of development allowed and the tests and assessments that must be

<sup>18</sup> Please note this section has not been altered from the original WCS document.

<sup>19</sup> Please note this figure replaces Figure 7.6 contained within the original WCS.

complied with before development should go ahead. More information regarding these tests and restrictions is given in Section 3.4 of the WCS.

#### 5.1.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Locally Agreed Surface Water Information relevant to Tamworth Borough. This has accounted for the risk of future flooding from surface water, using the modelled extents within the FMfSW and Phase 2 SWMP. The historic flooding points have been used part of the verification process carried out within the PFRA and Phase 2 SWMP, identifying a good correlation. As the record of historic flooding does not identify whether past issues have now been resolved, it was not considered appropriate to directly reference the historic flooding points within this assessment of surface water flood risk. However, it is recommended that the Council refer to the GIS layer of historic flooding<sup>20</sup> (held by Staffordshire County Council) as part of their assessment of future planning applications.

The RFRA has identified Tamworth Borough as being at Medium probability and Medium consequence risk of flooding from the surface water flooding.

#### 5.1.3 Groundwater<sup>21</sup>

Although underlain by extensive fluvial sand and gravel deposits, which hold groundwater resources and have significant hydraulic interaction with the river systems, there are no known problems with groundwater flooding within the Borough. As such it has not been incorporated within this analysis of flood risk.

The RFRA has identified Tamworth Borough as being at Low probability and Low consequence risk of flooding from the groundwater.

#### 5.1.4 Canals<sup>22</sup>

Two canals flow through Tamworth Borough - the Coventry Canal which cuts across the town centre, and the Birmingham and Fazeley canal, which has a junction with the Coventry Canal on the western Borough border. There are no records of flooding within the SFRA for either of these canals. However, as reiterated in the SFRA it is important that any development proposed adjacent to a canal be investigated on an individual basis regarding flooding issues and should be considered as part of any FRA.

The RFRA has identified Tamworth Borough as being at Low probability and Low consequence risk of flooding from the canal network.

#### 5.1.5 Reservoirs

No waterbodies have been identified in Tamworth Borough as being governed by the Reservoirs Act 1975 (i.e. they have an impounded volume in excess of 25,000m<sup>3</sup>)<sup>23</sup>.

---

<sup>20</sup> Initially produced as part of the Staffordshire County PFRA, March 2011

<sup>21</sup> Please note this section has not been altered from the original WCS document.

<sup>22</sup> Please note this section has not been altered from the original WCS document.

However, the Environment Agency have recently published maps showing the maximum extent of flooding from large reservoirs should the reservoirs fail and release the water they hold, indicating that the town may be at risk of flooding from reservoirs located outside the Borough boundaries. The flood risk from reservoirs is very low due to the high standards of inspection and maintenance required by legislation. As such an assessment of flood risk from reservoirs and impounded waterbodies has not been included within this WCS. Despite the low risk, it is still recommended that the Council review these maps to raise their awareness of the potential flood extents, especially in relation to future development sites. In line with PPS25 a consideration of the risk of reservoir flooding should be included within any site specific Flood Risk Assessments (FRAs).

#### 5.1.6 Summary

The flood risk to the proposed development sites/areas is summarised in **Table 5.2** below.

Sites within Flood Zone 3 are considered 'red' with regards to fluvial flood risk, sites in Flood Zone 2 are 'amber' and outside of these zones are 'green'. With regards to surface water flood risk, sites within the 30yr flood zone are considered 'red', sites within the 200yr flood zone are considered 'amber' and those outside the zones are 'green'. Within the watersheds of the five settlements assessed within the Phase 2 SWMP, the SWMP model outlines are used and outside of these watersheds the FMfSW outlines are used. For the settlements, an assessment has been undertaken based upon the extent of the FMfSW over the current potential development sites in that area, providing a broad summary. Site specific analysis should be undertaken for specific development sites and to assess areas outside the proposed development boundaries.

Where sites are identified as being at risk of flooding, additional analysis will be required as part of site specific Flood Risk Assessments (FRAs) to enable development to progress. Where surface water has been identified as a potential problem to the site, additional site specific analysis or mitigation may be required and further guidance relating to Sustainable Drainage Systems (SUDS) is provided within Section 7.7 of the WCS.

The 'overall' classification has been determined using the standard matrix shown in **Table 5.1**. To emphasise the importance of not locating development within fluvial Flood Zone 3, all sites located within this zone are classified as having an overall flood risk of 'red', regardless of their surface water classification.

---

<sup>23</sup> NB following the enactment of the new Floods and Water Management Bill on 8<sup>th</sup> April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m<sup>3</sup>. As such there may now be water bodies within Tamworth Borough classified as reservoirs and this should be addressed in a review of the WCS, if considered beneficial by the Council

Table 5.1 - Traffic Light Colour Code Matrix

		Fluvial Flood Risk Classification		
		Blank	Amber	Red
Surface Water Flood Risk Classification	Blank	G	A	R
	Amber	A	A	R
	Red	A	R	R

Table 5.2 - Flood Risk to Potential Development Sites in Tamworth Borough

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
<b>Housing</b>							
1	Y	Y	Y	Y	Y	30yr*	R
2							G
3							G
4							G
5						30yr*	A
6							G
7							G
8							G
9							G
10							G
12						30yr*	A
13	Y	Y		Y	Y	30yr*	R
14	Y	Y		Y	Y		R
15	Y	Y		Y	Y	30yr*	R
20						30yr*	A
16						30yr*	A
17							G
25						30yr*	A
<b>Employment</b>							
18	Y	Y		Y	Y	30yr*	R
7	Y	Y		Y	Y	30yr*	R
10	Y	Y		Y	Y		R
3	Y	Y		Y	Y	30yr*	R
2	Y	Y		Y	Y		R
1	Y	Y		Y	Y	30yr*	R
6	Y	Y		Y	Y	30yr*	R
4							G
5	Y	Y		Y	Y	30yr*	R

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
8							G
9							G
11							G
12						30yr*	A
13							G
14							G
15							G
16	Y	Y		Y	Y		R
17	Y	Y		Y	Y	30yr*	R
19							G
20							G
21							G
22							G

#### BOX 5.1

#### **Tamworth Borough Flood Risk: At a Glance**

- Fluvial flood risk is a constraint to development in many areas of the Borough.
- A number of potential development sites (housing sites 1, 13, 14 and 15 and employment sites 18, 7, 10, 3, 2, 1, 6, 5, 16 and 17) are located within the Flood Zones and will therefore require further analysis and/or mitigation to enable development to progress in accordance with PPS25.
- Surface water flooding has been identified as a unique major constraint to only a few of the potential development sites: housing sites 5, 12, 16 and 25 and employment site 12. For many other locations the risk of surface water flooding will be combined with, and exacerbate, fluvial flooding. As such the results of the Phase 2 SWMP should be considered when planning any development within the town and the risk of surface water flooding included within any FRA.
- Due to the combination of fluvial and surface water flood risk, 14 of the potential development sites analysed within Tamworth Borough have been classified as 'red' in terms of overall flood risk (see Table 3.2 above). Development within these areas should be reviewed with reference to both the Level 1 SFRA and the SWMP. All development must follow the guidance provided within PPS25 and incorporate appropriate SUDS policies. For all of these locations further assessment in the form of site specific FRAs, by the developer will be required referring to the guidance provided within PPS25 and should incorporate appropriate SUDS policies.
- The RFRA identifies Tamworth Borough as being at a High overall probability and High consequence of flooding.
- Due to the strategic nature of this assessment it is recommended that additional review should be undertaken by the Council and/or developers for individual sites using the latest flood risk information available at the time

## 5.2 Recommendations

The recommendations below refer only to flood risk. Section 7.9 of the WCS should be referred to with reference to all other elements of the water cycle.

### Flood Risk

- Individual FRAs are required for a number of sites (housing sites 1, 13, 14 and 15 and employment sites 18, 7, 10, 3, 2, 1, 6, 5, 16 and 17). These should be procured by the developer.
- A high number of development sites have been identified as located within the 30year surface water flood zone outline (see Table 3.2 above). The cause and impact of this flood risk should be identified further on a site specific basis by the developer, if progressed. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these sites;
- Surface water flooding is a potential issue to a number of development sites and in many locations this is combined with the high risk of fluvial flooding. This should be considered by the Council when considering preferred options and by the developer at development progression. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place within the town, possibly supplemented by a location-specific Phase 3 SWMP if required;
- Development of the sites identified as 'red' in Table 3.2 should be reviewed as part of a site specific FRA with reference to the Phase 1 and Phase 2 SWMPs, Staffordshire County Councils historic flood risk database and the Level 1 SFRA by the developer. In addition, reference should be made to the Environment Agency's 'Risk of Flooding from Reservoirs' map.



## 6 SOUTH STAFFORDSHIRE DISTRICT DEVELOPMENT SPECIFIC RESULTS

### 6.1 Flood Risk

**This Section replaces Section 8.6 of the original WCS**

This sections draws upon the results of the Level 1 SFRA and the FMfSW for South Staffordshire District, in addition Phase 2 SWMP for Penkridge village. As it is not the purpose of this WCS to repeat the findings of other Evidence Base studies, all the details of drainage networks and causes of flooding are not repeated here. Instead a summary is provided to explain the analysis undertaken in order to give each of the potential development sites/areas a classification with regards to flood risk. Following this, **Table 6.2** presents the different flood risk factors affecting each of the potential development sites/areas and therefore the overall classification of flood risk that is taken forward to the Constraints Matrix (**Appendix B**).

#### 6.1.1 Fluvial Flood Risk

South Staffordshire District is split between the catchments of the River Trent and the River Severn, as shown in **Figure 6.1**<sup>24</sup> (**Appendix A**). The north of the District is drained by the River Penk and its tributaries, whereas the south is drained by the River Wom and Smestow Brook into the River Stour. The River Penk flows north through Penkridge before joining the River Sow in Stafford. The headwaters of the catchment lie in Cannock Chase District and the edge of the Birmingham conurbation around Wolverhampton. The catchment of the River Stour and Smestow Brook also has its headwaters located in the edges of the Birmingham conurbation around Wolverhampton and flows south through Wombourne and Kinver before continuing through Wyre Forest District and the town of Kidderminster. As such all these watercourses pose a fluvial flood risk to the District, including the main settlements. This risk is affected not only by activities within the District but also activities upstream in the neighbouring Local Authority areas. Conversely activities within the District also impact on the flood risk of Local Authority areas downstream. The Sow and Penk Internal Drainage Board (IDB) is responsible for some of the watercourses within the District, as outlined in the SFRA. Their objectives are to discourage inappropriate development in areas at risk from flooding and, as such, will take an active role in the assessment of planning applications.

As illustrated in **Figure 6.1**, the Flood Zones identified for the watercourses within South Staffordshire District affect most of the larger settlements. The most notable recent events identified within the SFRA are 1958, Autumn 2000, October 2004 and Summer 2007, which, in most cases, identify an impact on the settlement of Penkridge.

The fluvial flood risk to the potential development sites has been determined from the Flood Zone outlines presented within the South Staffordshire District SFRA to determine which of the potential development sites/areas are located within Flood Zones 2, 3 and 3b, as referenced in PPS25 and summarised in **Table 6.2**. Depending upon the Flood Zone in which the potential development site is located, increasing restrictions will be placed upon the type of development allowed and the tests and assessments that must

---

<sup>24</sup> Please note this figure replaces Figure 8.6 contained within the original WCS.

be complied with before development should go ahead. More information regarding these tests and restrictions is given in Section 3.4 of the WCS.

#### 6.1.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Locally Agreed Surface Water Information relevant to South Staffordshire District. This has accounted for the risk of future flooding from surface water, using the modelled extents within the FMfSW and Phase 2 SWMP. The historic flooding points have been used part of the verification process carried out within the PFRA and Phase 2 SWMP, identifying a good correlation. As the record of historic flooding does not identify whether past issues have now been resolved, it was not considered appropriate to directly reference the historic flooding points within this assessment of surface water flood risk. However, it is recommended that the Council refer to the 'live' GIS layer of historic flooding<sup>25</sup> GIS layer of historic flooding (held by Staffordshire County Council) as part of their assessment of future planning applications.

#### 6.1.3 Groundwater<sup>26</sup>

The South Staffordshire District SFRA states that there are no known occurrences of groundwater flooding within the District. As such it has not been incorporated within this analysis of flood risk.

#### 6.1.4 Canals<sup>27</sup>

There are three canals located within South Staffordshire District - the Shropshire Union Canal, the Staffordshire and Worcestershire Canal and the Stourbridge Canal. There are no recorded breaches of these canals identified within the SFRA within the District boundaries. However, there are known interactions with the Staffordshire and Worcestershire canal and the Smestow Brook within the District and with the River Stour further downstream in Wyre Forest District. This has previously resulted in flooding of the village of Cookley and town of Kidderminster. As such it is important that any new development within South Staffordshire District does not allow surface water runoff to enter the canal system and therefore exacerbate the problem. As reiterated in the SFRA it is important that any development proposed adjacent to a canal be investigated on an individual basis regarding flooding issues and should be considered as part of any FRA.

#### 6.1.5 Reservoirs

The Environment Agency have recently published maps showing the maximum extent of flooding from large reservoirs should the reservoirs fail and release the water they hold. However, flood risk from reservoirs is very low due to the high standards of inspection and maintenance required by legislation. As such an assessment of flood risk from reservoirs and impounded waterbodies has not been included within this WCS.

---

<sup>25</sup> Initially produced as part of the Staffordshire County PFRA, March 2011

<sup>26</sup> Please note this section has not been altered from the original WCS document.

<sup>27</sup> Please note this section has not been altered from the original WCS document.

As stated in the SFRA there are three waterbodies within South Staffordshire District that are identified as being governed by the Reservoirs Act 1975 (i.e. they have an impounded volume in excess of 25,000m<sup>3</sup>)<sup>28</sup>. These are shown on **Figure 6.1** and are located at:

- Blevide
- Calf Heath
- Gailey

A breach of any of these waterbodies may pose a flood risk to any existing or proposed potential development site located downstream, although, as mentioned above the risk is very low.

Although not assessed within this report, it is still recommended that the Council review these maps to raise their awareness of the potential flood extents, especially in relation to future development sites. In line with PPS25 a consideration of the risk of reservoir flooding should be included within any site specific Flood Risk Assessments (FRAs).

#### 6.1.6 Summary

The flood risk to the proposed development sites/areas is summarised in **Table 6.2** below.

Sites within Flood Zone 3 are considered 'red' with regards to fluvial flood risk, sites in Flood Zone 2 are 'amber' and outside of these zones are 'green'. With regards to surface water flood risk, sites within the 30yr flood zone are considered 'red', sites within the 200yr flood zone are considered 'amber' and those outside the zones are 'green'. Within the watersheds of the five settlements assessed within the Phase 2 SWMP, the SWMP model outlines are used and outside of these watersheds the FMfSW outlines are used. For the settlements, a general assessment has been undertaken based upon the extent of the FMfSW over the settlement in question, providing a broad summary. As such, with regards to surface water flooding, classifications are given on the extent of surface water flooding rather than rainfall event. Site specific analysis should be undertaken for specific development sites and to assess areas outside the proposed development boundaries.

Where sites are identified as being at risk of flooding, additional analysis will be required as part of site specific Flood Risk Assessments (FRAs) to enable development to progress. Where surface water has been identified as a potential problem to the site, additional site specific analysis or mitigation may be required and further guidance relating to Sustainable Drainage Systems (SUDS) is provided within Section 8.7 of the WCS.

The 'overall' classification has been determined using the standard matrix shown in **Table 6.1**. To emphasise the importance of not locating development within fluvial

---

<sup>28</sup> NB following the enactment of the new Floods and Water Management Bill on 8<sup>th</sup> April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m<sup>3</sup>. As such there may now be additional water bodies within South Staffordshire District classified as reservoirs and this should be addressed in the first review of this WCS.

Flood Zone 3, all sites located within this zone are classified as having an overall flood risk of 'red', regardless of their surface water classification.

Table 6.1 - Traffic Light Colour Code Matrix

		Fluvial Flood Risk Classification		
		Blank	Amber	Red
Surface Water Flood Risk Classification	Blank	G	A	R
	Amber	A	A	R
	Red	A	R	R

Table 6.2 - Flood Risk to Potential Development Sites in South Staffordshire District

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
5						30yr	A
112	Y			Y		30yr*	R
165							G
151	Y	Y		Y	Y	30yr	R
147							G
204						30yr	A
40	Y	Y		Y	Y	200yr	R
41						30yr	A
395	Y	Y	Y	Y	Y	30yr	R
394	Y	Y	Y	Y	Y	30yr	R
51							G
208						30yr	A
164						30yr	A
398							G
6:0001:001						30yr	A
6:0002:002						30yr	A
6:0002:001	Y	Y		Y	Y	30yr	R
6:0025:001						200yr	A
6:0004:001	Y	Y		Y	Y	30yr	R
6:0006:001							G
6:0024:002							G
6:0007:001						30yr	A
6:0007:003						200yr	A
6:0007:006						30yr	A
6:0007:007							G
6:0008:001						30yr	A
6:0009:001						30yr	A

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
6:0013:001	Y	Y		Y	Y	30yr	R
6:0013:015						200yr*	A
6:0026:001	Y	Y		Y	Y		R
6:0014:001	Y	Y		Y	Y	30yr	R
6:0015:010	Y			Y			A
6:0015:001							G
6:0015:008							G
6:0016:001							G
6:0016:006							G
6:0013:016						30yr*	A
6:0013:002	Y	Y		Y	Y	30yr	R
6:0006:002						30yr	A
(44055)	Y	Y		Y	Y	30yr*	R
(44056)							G
Brewood	Partially					Moderate	A
Codsall	Marginal					Extensive	R
Coven and Four Ashes	Partially					Extensive	R
Essington						Moderate	A
Featherstone, Brinsford and Coven Heath	Partially					Extensive	R
Great Wyreley and Cheslyn Heath	Partially					Extensive	R
Kinver	Y	Y	Y	Y	Y	Moderate	R
Pattingham						Moderate	A
Penkridge	Y	Y	Y	Y	Y	Extensive	R
Perton	Partially					Extensive	R
South of Stafford	Y	Y	Y	Y	Y	Moderate	R
Weston under Lizard						Moderate	A
Wheaton Aston	Partially					Moderate	A
Wombourne	Y	Y	Y	Y	Y	Extensive	R

NOTES:

\*Included within the Phase 2 SWMP Model

**BOX 6.1**

**South Staffordshire Flood Risk: At a Glance...**

- Fluvial flood risk is a constraint to development in many areas of the District, including Penkridge, Kinver and Wombourne.
- A number of potential development sites (112, 151, 40, 395, 394, 6:0002:001, 6:0004:001, 6:0013:001, 6:0026:001, 6:0014:001, 6:0015:010, 6:0013:002 and 44055) are located within the Flood Zones and will therefore require further analysis and/or mitigation to enable development to progress in accordance with PPS25.
- The following seven settlements have been identified as having extensive surface water flood risk from the FMfSW and a further seven have been identified as having moderate surface water flood risk:
  - Codsall;
  - Coven and Four Ashes
  - Featherstone, Brinsford and Coven Heath
  - Great Wyreley and Cheslyn Heath;
  - Penkridge;
  - Perton; and
  - Wombourne.
- The potential for utilising the Hatherton canal for the conveyance of surface water is an option that can be discussed with British Waterways and the Lichfield and Hatherton Canal Trust.
- Due to the combination of fluvial and surface water flood risk, 9 settlements and 12 of the potential development sites analysed within Stafford Borough have been classified as 'red' in terms of overall flood risk (see Table 6.2 above). Development within these areas should be reviewed with reference to both the Level 1 SFRAs and the SWMP. All development must follow the guidance provided within PPS25 and incorporate appropriate SUDS policies. For all of these locations further assessment in the form of site specific FRAs, by the developer will be required referring to the guidance provided within PPS25 and should incorporate appropriate SUDS policies.
- Future potential development sites will require additional flood risk assessment against all the information introduced within the WCS and this Addendum.
- Due to the strategic nature of this assessment it is recommended that additional review be undertaken by the Council for individual sites using the latest flood risk information available at the time.

## 6.2 Recommendations

The recommendations below refer only to flood risk. Section 8.9 of the WCS should be referred to with reference to all other elements of the water cycle.

### Flood Risk

- Individual FRAs are required for a number of sites on the basis of fluvial flood risk (112, 151, 40, 395, 394, 6:0002:001, 6:0004:001, 6:0013:001, 6:0026:001, 6:0014:001, 6:0015:010, 6:0013:002 and 44055) and should be carried out by the developer.
- A high number of development sites have been identified as located within the 30year surface water flood zone outline (see Table 3.2 above). The cause and impact of this flood risk should be identified further on a site specific basis by the developer, if progressed. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these sites;
- Surface water flooding has been identified as a potential issue in the following settlements in particular: Codsall; Coven and Four Ashes; Featherstone, Brinsford and Coven Heath; Great Wyreley and Cheslyn Heath; Penkridge; Perton; and Wombourne. This should be considered by the Council when considering preferred options and by the developer at development progression within any of these locations. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these settlements.
- Development within all the settlements identified as 'red' in **Table 6.2** should be reviewed as part of a site specific FRA with reference to the Phase 1 and Phase 2 SWMPs, Staffordshire County Councils historic flood risk database and the Level 1 SFRA by the developer. In addition, reference should be made to the Environment Agency's 'Risk of Flooding from Reservoirs' map.
- The Phase 2 SWMP for Penkridge should be referred to for additional detail regarding surface water flood risk in that settlement.





## 7 CANNOCK CHASE DEVELOPMENT SPECIFIC RESULTS

### 7.1 Flood Risk

**This Section replaces Section 9.6 of the original WCS**

This sections draws upon the results of the Level 1 SFRA and the FMfSW for Cannock Chase District, in addition to the Phase 2 SWMP for Cannock town. As it is not the purpose of this WCS to repeat the findings of other Evidence Base studies, all the details of drainage networks and causes of flooding are not repeated here. Instead a summary is provided to explain the analysis undertaken in order to give each of the potential development sites/areas a classification with regards to flood risk. Following this, **Table 7.2** presents the different flood risk factors affecting each of the potential development sites/areas and therefore the overall classification of flood risk that is taken forward to the Constraints Matrix (**Appendix B**).

#### 7.1.1 Fluvial Flood Risk<sup>29</sup>

Cannock Chase District has relatively few watercourses compared to the other Districts and Boroughs assessed within this WCS. The town of Cannock and surrounding area is drained by the Ridings Brook and the Wash Brook, which subsequently feed into the Saredon Brook and the River Penk catchment, as shown in **Figure 7.1**<sup>30</sup> (**Appendix A**). The town of Rugeley is drained by the Rising Brook which flows into the River Trent, forming the northeastern boundary of the District. As such all these watercourses pose a fluvial flood risk to the District, including the main urban areas. As the District is located in the headwaters of the catchment, activities within the District will impact on the flood risk of Local Authority areas downstream. Conversely, the activities further upstream on the River Trent, for example within Stafford Borough and Stoke on Trent city, may impact on the flooding regime within the town of Rugeley.

Although few in number these watercourses have been affected by flooding over the recent years, including July 1999, November 2000 and June/July 2007, resulting in flooding of both Cannock and Rugeley. Since these events Cannock has been protected by a Flood Alleviation Scheme (FAS), protecting a number of properties against the 1 in 100 year event (1% chance of occurring). Although offering some protection this FAS still results in a residual flood risk to the area. Although not reflected in the SFRA Flood Zones and therefore within this WCS, the risk of the breaching or overtopping of defences should be reviewed when considering any development close to these watercourses.

The Rising Brook in Rugeley has been more recently assessed as part of a Level 2 SFRA. The conclusions of this study indicates that the Brook suffers from a lack of culvert capacity during storm events. As such it is vital that all developments within the town incorporate suitable SUDS techniques to ensure no additional surface water enters the Brook and, where possible, the surface runoff is actually decreased to reduce the problem.

<sup>29</sup> Please note this section has not been altered from the original WCS document.

<sup>30</sup> Please note this figure replaces Figure 9.6 contained within the original WCS.

Within the RFRA Cannock Chase District has been classified as having a Medium probability of fluvial flood risk and a High consequence of fluvial flooding. It is also identified as having a Medium probability of residual flooding from the overtopping/breaching of flood defences, with a High predicted consequence. As such it is a very important issue for consideration within the District and one that should be addressed throughout the planning process.

The fluvial flood risk to the potential development sites has been determined from the Flood Zone outlines presented within the Cannock Chase District SFRA to determine which of the potential development sites/areas are located within Flood Zones 2, 3 and 3b, as referenced in PPS25 and summarised in **Table 7.2**. Depending upon the Flood Zone in which the potential development site is located, increasing restrictions will be placed upon the type of development allowed and the tests and assessments that must be complied with before development should go ahead. More information regarding these tests and restrictions is given in Section 3.4 of the original WCS.

#### 7.1.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Locally Agreed Surface Water Information relevant to Stafford Borough. This has accounted for the risk of future flooding from surface water, using the modelled extents within the FMfSW and Phase 2 SWMP. The historic flooding points have been used part of the verification process carried out within the PFRA and Phase 2 SWMP, identifying a good correlation. As the record of historic flooding does not identify whether past issues have now been resolved, it was not considered appropriate to directly reference the historic flooding points within this assessment of surface water flood risk. However, it is recommended that the Council refer to the GIS layer of historic flooding (held by Staffordshire County Council) as part of their assessment of future planning applications.

The RFRA has identified Cannock Chase District as being at Low probability and Medium consequence risk of flooding from surface water.

#### 7.1.3 Groundwater<sup>31</sup>

The Level 1 SFRA states that the northern half of the District overlies Triassic sandstones forming a major aquifer, whereas the southern half of the District overlies Carboniferous Coal measures, forming a minor aquifer. There are some locations in the northern part of the District where the groundwater in the sandstone is suspected to leak into the underlying Coal measures. The southern half of the District has been significantly mined and, as such, water has been historically pumped out of the mines. Recently the Environment Agency has reported that there has been a small increase in flow in the Gains Brook and Wash Brook as a result. The SFRA therefore recommends that any development planned in proximity to these Brooks should consider this risk.

As there are no extensive reports of groundwater flooding within the District, an assessment has not been incorporated within this analysis of flood risk.

---

<sup>31</sup> Please note this section has not been altered from the original WCS document.

The RFRA has identified Cannock Chase District as being at Low probability and Low consequence risk of flooding from the groundwater.

#### 7.1.4 Canals<sup>32</sup>

Two canals are located within Cannock Chase - the Trent and Mersey Canal to the north-east and the Cannock Extension canal to the south. Although no particular flood events have been reported, the SFRA notes the potential interaction between the canals and their neighbouring watercourses. As such development proposals located next to these waterbodies should consider the potential flood risk. These will also need to consider the potential interaction between the Hatherton Canal (currently being restored) and the neighbouring watercourses (although the Hatherton Canal remained in water following closure, draining the Southern Fringes of Cannock and acting as a feeder for the Staffordshire and Worcestershire canal at Hatherton junction).

The RFRA has identified Cannock Chase District as being at Low probability and Medium consequence risk of flooding from the canals.

#### 7.1.5 Reservoirs

The Environment Agency have recently published maps showing the maximum extent of flooding from large reservoirs should the reservoirs fail and release the water they hold. However, flood risk from reservoirs is very low due to the high standards of inspection and maintenance required by legislation. As such an assessment of flood risk from reservoirs and impounded waterbodies has not been included within this WCS.

As stated in the SFRA there is one waterbody within Cannock Chase District that is identified as being governed by the Reservoirs Act 1975 (i.e. having an impounded volume in excess of 25,000m<sup>3</sup>), namely Mill Green Balancing pond<sup>33</sup>. This was constructed to attenuate storm flows relieve downstream flooding in Cannock.

A breach of any of this waterbody may pose a flood risk to any existing or proposed potential development site located downstream, although, as mentioned above the risk is very low.

Although not assessed within this report, it is still recommended that the Council review these maps to raise their awareness of the potential flood extents, especially in relation to future development sites. In line with PPS25 a consideration of the risk of reservoir flooding should be included within any site specific Flood Risk Assessments (FRAs).

---

<sup>32</sup> Please note this section has not been altered from the original WCS document.

<sup>33</sup> NB following the enactment of the new Floods and Water Management Bill on 8<sup>th</sup> April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m<sup>3</sup>. As such there may now be additional water bodies within Cannock Chase District classified as reservoirs and this should be addressed in the first review of this WCS.

### 7.1.6 Summary

The flood risk to the proposed development sites/areas is summarised in **Table 7.2** below.

Sites within Flood Zone 3 are considered 'red' with regards to fluvial flood risk, sites in Flood Zone 2 are 'amber' and outside of these zones are 'green'. With regards to surface water flood risk, sites within the 30yr flood zone are considered 'red', sites within the 200yr flood zone are considered 'amber' and those outside the zones are 'green'. Within the watersheds of the five settlements assessed within the Phase 2 SWMP, the SWMP model outlines are used and outside of these watersheds the FMfSW outlines are used. For the settlements, a general assessment has been undertaken based upon the extent of the FMfSW over the settlement in question, providing a broad summary. As such, with regards to surface water flooding, classifications are given on the extent of surface water flooding rather than rainfall event. Site specific analysis should be undertaken for specific development sites and to assess areas outside the proposed development boundaries.

Where sites are identified as being at risk of flooding, additional analysis will be required as part of site specific Flood Risk Assessments (FRAs) to enable development to progress. Where surface water has been identified as a potential problem to the site, additional site specific analysis or mitigation may be required and further guidance relating to Sustainable Drainage Systems (SUDS) is provided within Section 9.7 of the WCS.

The 'overall' classification has been determined using the standard matrix shown in **Table 7.1**. To emphasise the importance of not locating development within fluvial Flood Zone 3, all sites located within this zone are classified as having an overall flood risk of 'red', regardless of their surface water classification.

**Table 7.1 - Traffic Light Colour Code Matrix**

		Fluvial Flood Risk Classification		
		Blank	Amber	Red
Surface Water Flood Risk Classification	Blank	G	A	R
	Amber	A	A	R
	Red	A	R	R

Table 7.2 - Flood Risk to Potential Development Sites in Cannock Chase District

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
SITE A						30yr*	A
SITE A						30yr*	A
SITE B						30yr*	A
Former Power Station						30yr	A
C104						30yr	A
SITE E						200yr*	A
C37						30yr*	A
SITE G (large)						30yr*	A
SITE G (small)						30yr*	A
SITE C		Y			Y	30yr*	R
SITE F						30yr*	A
ELA 61							G
ELA 80						200yr*	A
ELA 081						30yr	A
ELA 056		Y			Y	30yr^	R
ELA 055						30yr^	A
ELA 021							G
ELA 036						30yr	A
ELA 079						30yr	A
Site 8	Y	Y		Y	Y	30yr	R
SITE C EXPANSION						30yr*	A
SITE A						30yr*	A
ELA024						200yr	A
ELA059						30yr*	A
ELA029	Y			Y		30yr	R
ELA067	Y	Y		Y	Y	30yr	R
ELA032		Y			Y	30yr*	R
ELA082						30yr*	A
ELA027		Y			Y		R
Cannock (in and around)	Partially					Extensive	R
Norton Canes						Moderate	A
Prospect Village and Cannock Wood						Moderate	A
Rugeley (in and around)	Y	Y	Y	Y	Y	Extensive	R

## BOX 7.1

### **Cannock Chase District Flood Risk: At a Glance**

- A number of potential development sites are located within the fluvial Flood Zones (Site C, ELA 056, Site 8, ELA029, ELA067, ELA032 and ELA027) and will therefore require further analysis and/or mitigation to enable development to progress in accordance with PPS25.
- Fluvial flooding is a significant constraint to development within the town of Rugeley and should be reviewed for all developments sites in the town.
- Within the Phase 1 SWMP, surface water flooding has been identified as being prominent with Cannock, Norton Canes and Rugeley. The Phase 2 SWMP has refined the flood extents within Cannock and Norton Canes, but fairly large areas of both settlements (Cannock in particular) are still identified at risk of surface water flooding, even during the higher probability flood events;
- The potential for utilising the Hatherton canal for the conveyance of surface water is an option that can be discussed with British Waterways and the Lichfield and Hatherton Canal Trust and has been recommended within the Phase 2 SWMP.
- Overall Cannock and Rugeley have been identified as being the settlements most at risk from flooding. Seven individual potential development sites have been classified as 'red' in terms of flood risk (Site C, ELA 056, Site 8, ELA029, ELA067, ELA032 and ELA027). Development within these areas should be reviewed with reference to both the Level 1 SFRAs and the SWMP. All development must follow the guidance provided within PPS25 and incorporate appropriate SUDS policies. For all of these locations further assessment in the form of site specific FRAs, by the developer will be required referring to the guidance provided within PPS25 and should incorporate appropriate SUDS policies.
- The RFRA identifies Cannock Chase District as being at a Low overall probability and High overall consequence of flooding.
- Site specific FRAs are recommended for all potential development sites to provide a more accurate assessment of both fluvial and surface water flood risk on a site specific basis.
- Due to the strategic nature of this assessment it is recommended that additional review be undertaken by the Council for individual sites using the latest flood risk information available at the time.

## 7.2 Recommendations

The recommendations below refer only to flood risk. Section 9.9 of the WCS should be referred to with reference to all other elements of the water cycle.

### Flood Risk

- Individual FRAs are required for a number of sites on the basis of fluvial flood risk (Site C, ELA 056, Site 8, ELA029, ELA067, ELA032 and ELA027) and should be carried out by the developer.
- Improved surface water management is required over much of the District, especially within the settlements of Cannock and Rugeley. This should be considered by the Council when considering preferred options and by the developer at development progression. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in either of these settlements.
- A high number of development sites have been identified as located within the 30year surface water flood zone outline (see Table 7.2 above). The cause and impact of this flood risk should be identified further on a site specific basis by the developer, if progressed. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these sites;
- Development within all the settlements identified as 'red' in Table 7.2 should be reviewed as part of a site specific FRA with reference to the Phase 1 and Phase 2 SWMPs, Staffordshire County Councils historic flood risk database and the Level 1 SFRA by the developer. In addition, reference should be made to the Environment Agency's 'Risk of Flooding from Reservoirs' map.
- The Phase 2 SWMP for Cannock town should be referred to for additional detail regarding surface water flood risk within Cannock and Norton Canes





## 8 CONCLUSIONS

Please note, the recommendations below relate only to flood risk. The original WCS should be referred to for conclusions and recommendations regarding all other elements of the water cycle.

### 8.1 Recommendations

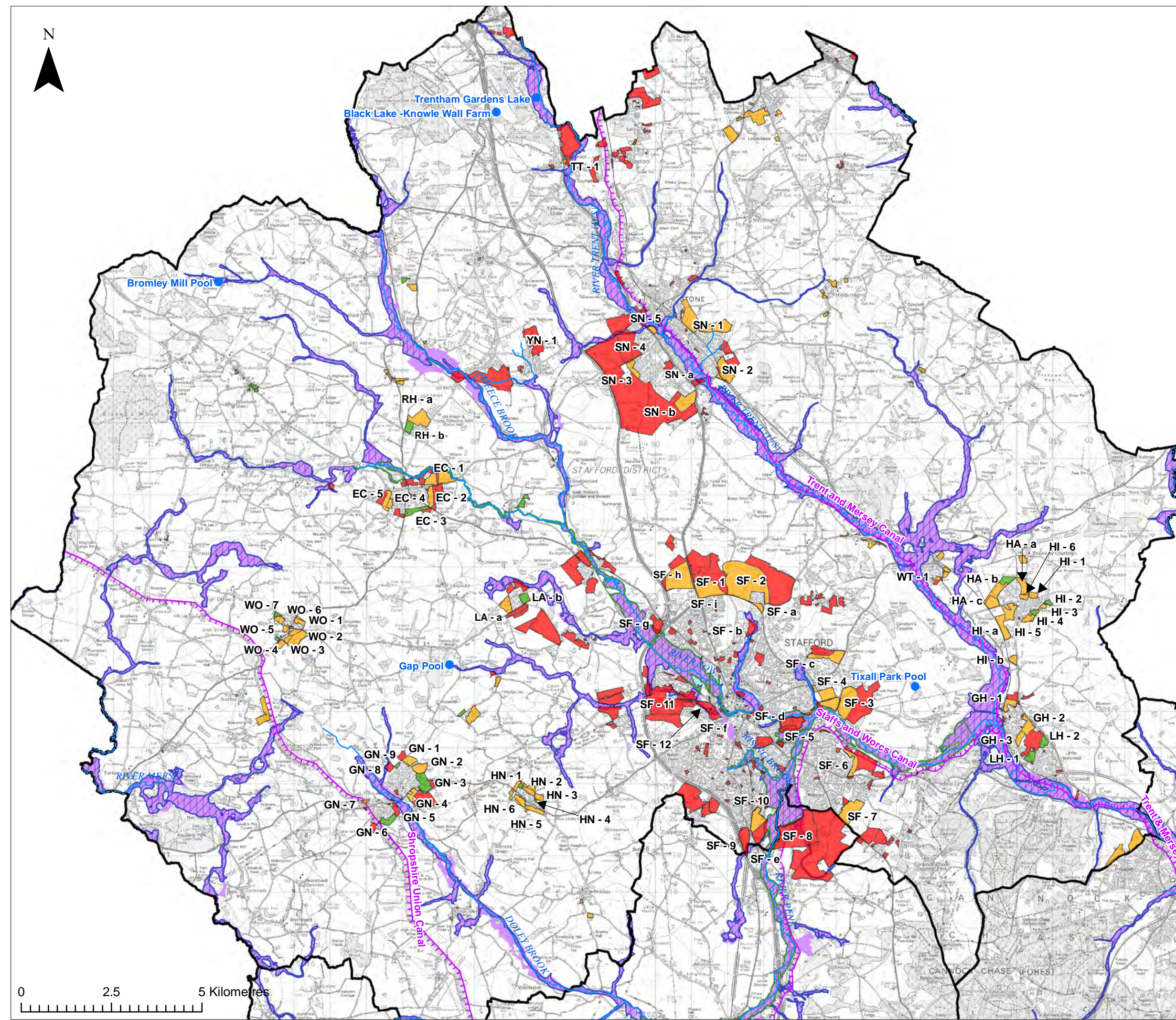
1. Individual Flood Risk Assessments (FRAs) will be required for a number of sites in all five Local Authority areas and these should be undertaken where identified as necessary within this WCS, the Level 1 SFRA or the Phase 1 and 2 SWMPs;
2. Appropriate consideration must be given to the guidance provided in PPS25, and the Sequential and Exception Tests followed, for any development identified as being either wholly or partially located in Flood Zones 2 or 3. Appropriate consideration must also be given to surface water. Further information and policies regarding flood risk are provided in the Level 1 SFRA and guidance on the appropriate protocol for assessing flood risk sought from Planning Policy Statement 25;
3. Improved surface water management is required over much of the study area, with significant risk of surface water flooding identified for a high number of development sites (see Tables 3.2, 4.2, 5.2, 6.2 and 7.2 for reference to individual development sites)
4. Where development sites are identified as being located within the 30year surface water flood zone outline, the cause and impact of this flood risk should be identified further on a site specific basis by the developer, if progressed. The Phase 1 and Phase 2 SWMPs should be consulted before development takes place in any of these sites;
5. Development within all the settlements identified as 'red', with regards to surface water flooding, in Tables 3.2, 4.2, 5.2, 6.2 and 7.2 should be reviewed as part of a site specific FRA with reference to the Phase 1 and Phase 2 SWMPs, Staffordshire County Councils historic flood risk database and the Level 1 SFRA by the developer. In addition, reference should be made to the Environment Agency's 'Risk of Flooding from Reservoirs' map.
6. When reviewing the results of flood risk this WCS should be reviewed alongside the SFRA and Phase 1 and Phase 2 SWMPs and updated with any further stages of these studies and the suggested recommendations and policies in these documents should be followed;
7. The settlement specific flood risk classifications must be viewed with consideration of the general scale on which they were derived - individual sites will require reconsideration on a site specific basis;
8. The utilisation of SUDS to reduce runoff below Greenfield rate must be included with all forthcoming development applications; and
9. Further guidance regarding the assessment of surface water flood risk for new developments using the FMfSW and Phase 2 SWMP models will be forthcoming and, once available, should be sought from Staffordshire County Council.





## Appendix A Figures





Key:

- Reservoirs
- Canal
- Main Rivers

**Potential Development Sites**

Flood Risk

- Little or no infrastructure
- Minor infrastructure upgrade required
- Major infrastructure upgrade required

**Flood Zones**

- Flood Zone 3b with Climate Change
- Flood Zone 3a with Climate Change
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

Title:  
Stafford Borough Flood Risk Classifications

Project:  
Southern Staffordshire Water Cycle Study Addendum

Clients:  
Stafford Borough, Lichfield District, South Staffordshire District, Tamworth Borough, and Cannock Chase District Councils

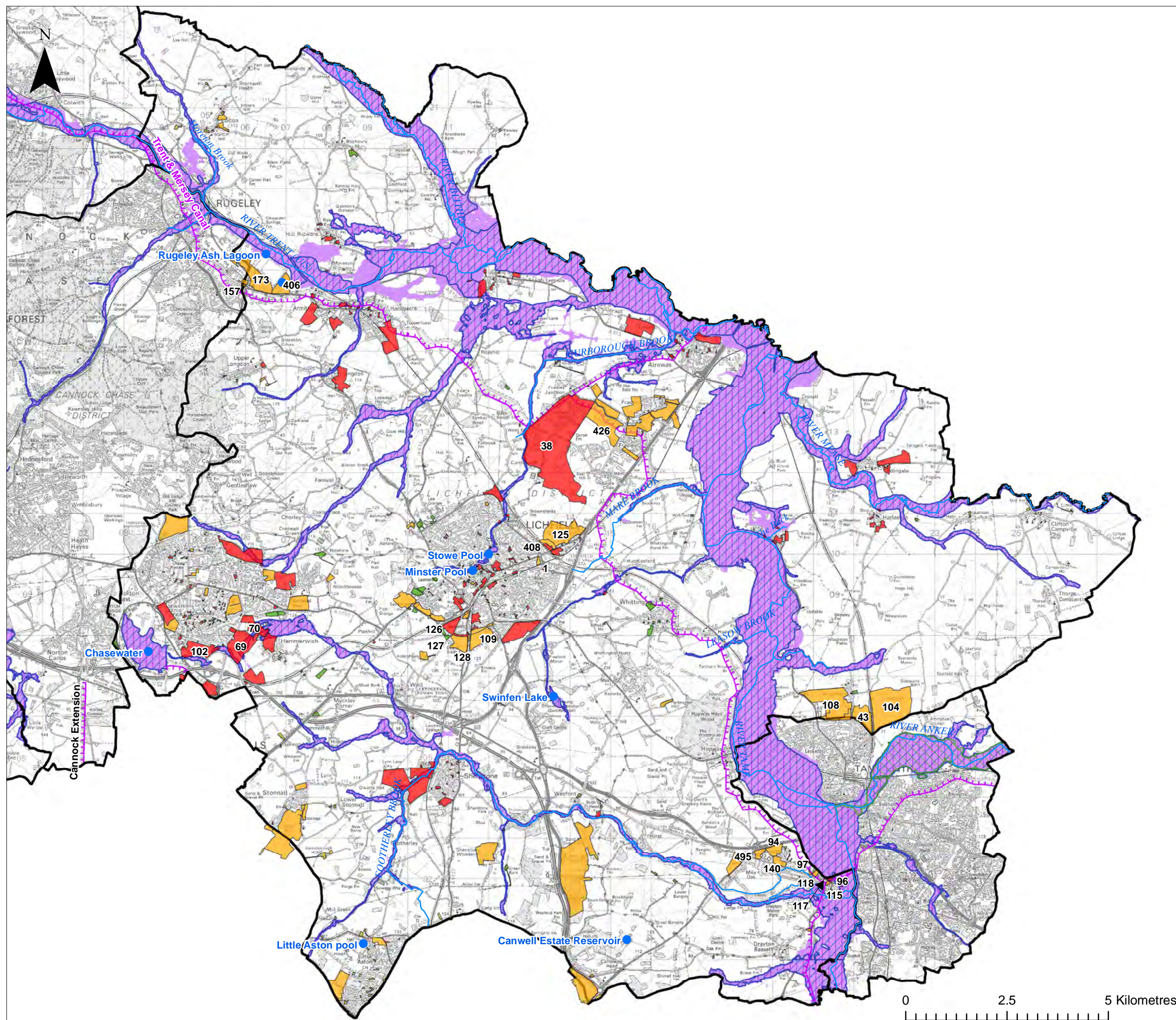
Date:  
April 2011

Scale:  
1:100,000 @ A3

Figure:  
3.1







Key:

- Reservoirs
- Canal
- Main Rivers

**Potential Development Sites**

Flood Risk

- Little or no infrastructure
- Minor infrastructure upgrade required
- Major infrastructure upgrade required

**Flood Zones**

- Flood Zone 3b with Climate Change
- Flood Zone 3a with Climate Change
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

Title:  
Lichfield District Flood Risk Classifications

Project:  
Southern Staffordshire Water Cycle Study Addendum

Clients:  
Stafford Borough, Lichfield District, South Staffordshire District, Tamworth Borough, and Cannock Chase District Councils

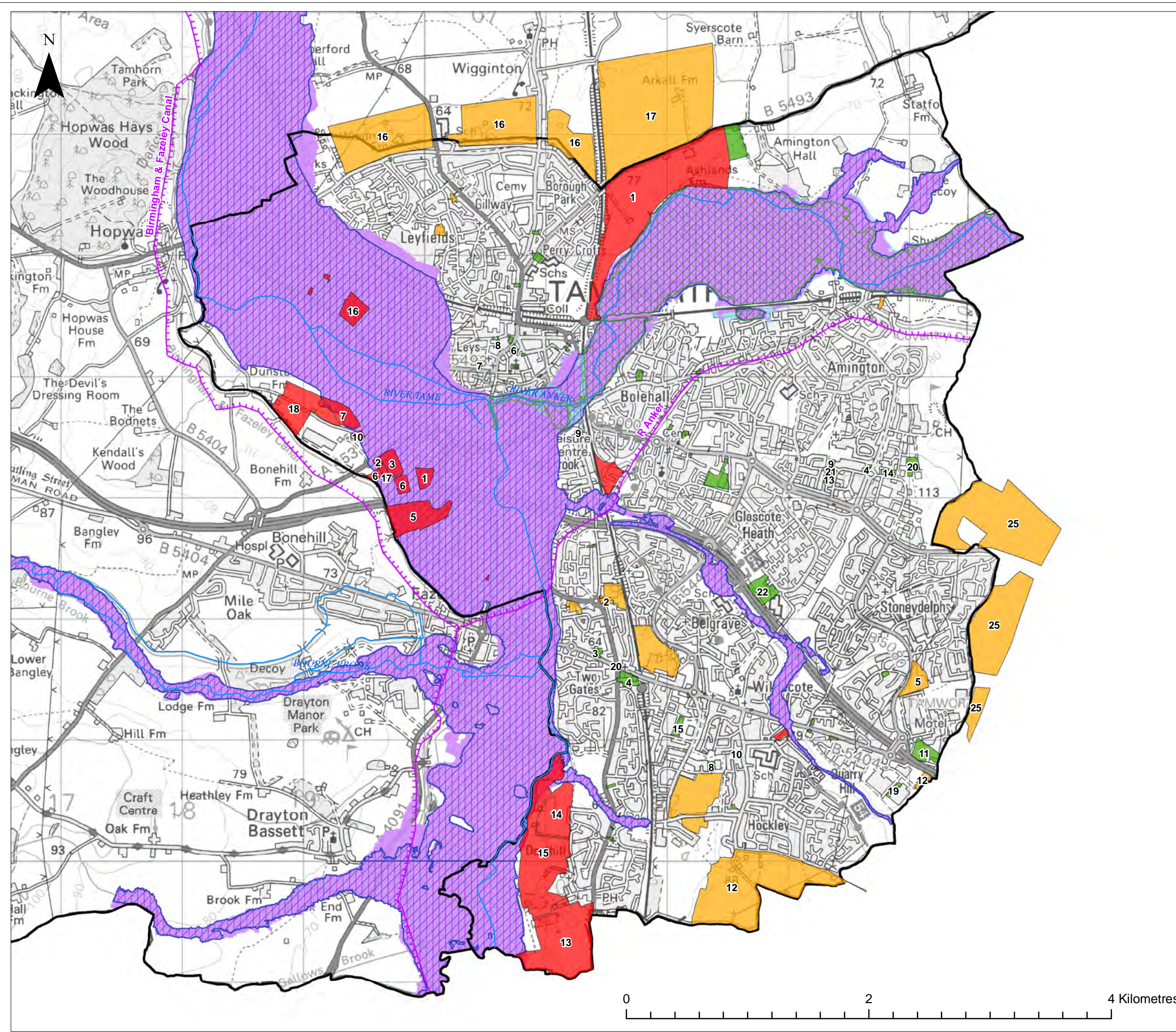
Date: April 2011	Scale: 1:90,000 @ A3
---------------------	-------------------------

Figure:  
4.1









Key:

- Reservoirs
- Canal
- Main Rivers

**Potential Development Sites**  
Flood Risk

- Little or no infrastructure required
- Minor infrastructure upgrade required
- Major infrastructure upgrade required

**Flood Zones**

- ▨ Flood Zone 3b with Climate Change
- Flood Zone 3a with Climate Change
- ▨ Flood Zone 3b
- ▨ Flood Zone 3a
- Flood Zone 2

Title:  
Tamworth Borough Flood Risk Classifications

Project:  
Southern Staffordshire Water Cycle Study Addendum

Clients:  
Stafford Borough, Lichfield District, South Staffordshire District, Tamworth Borough, and Cannock Chase District Councils

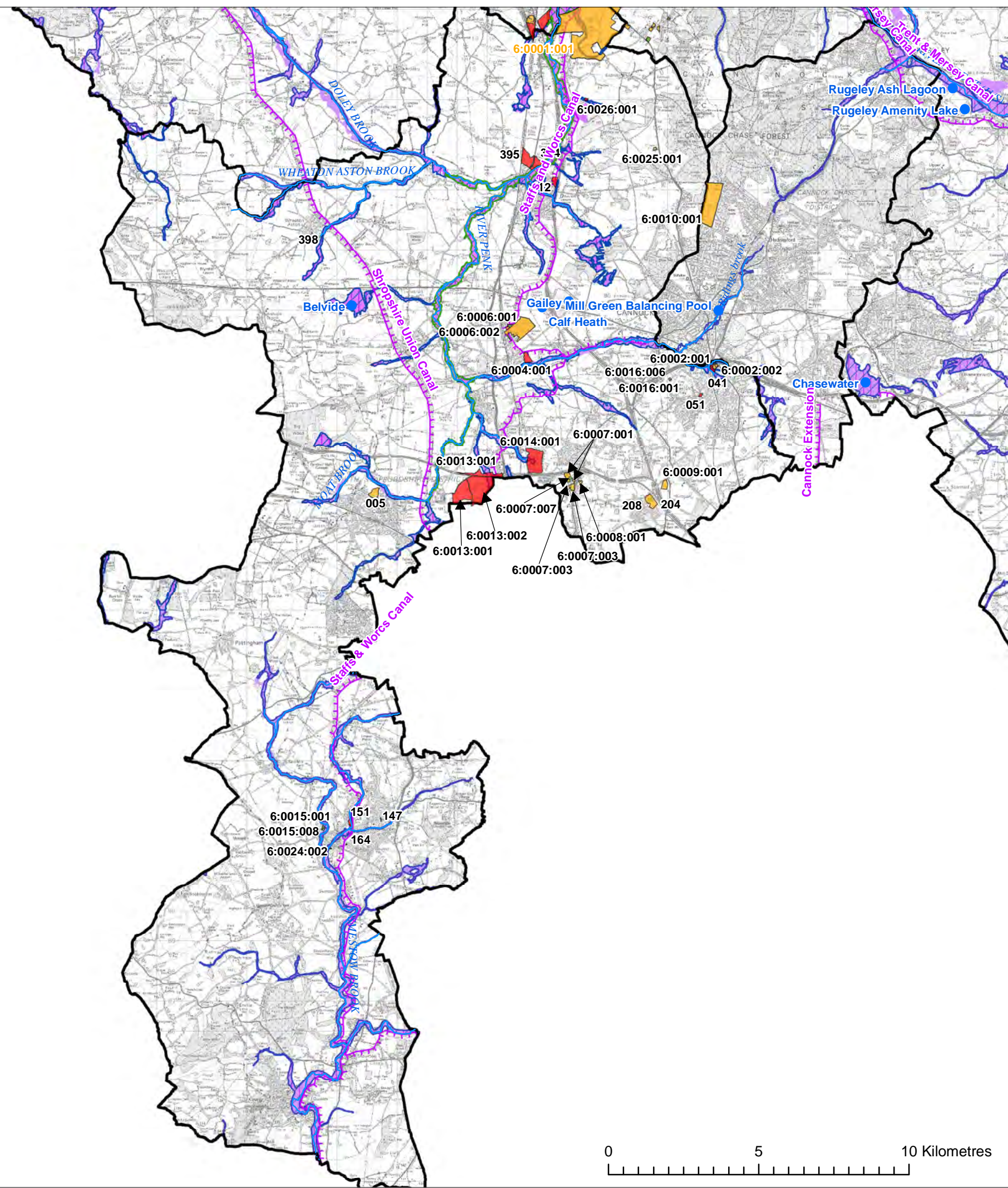
Date: April 2011	Scale: 1:30,000 @ A3
---------------------	-------------------------

Figure:  
5.1

**ROYAL HASKONING**

I:\9\5955\Technical\_Data\T3\_GIS Data\Figures\WCS\_Figures





**Key:**

- Reservoirs
- Canal
- Main Rivers

**Potential Development Sites**

Flood Risk

- Little or no infrastructure required
- Minor infrastructure upgrade required
- Major infrastructure upgrade required

**Flood Zones**

- Flood Zone 3b with Climate Change
- Flood Zone 3a with Climate Change
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

Title:  
South Staffordshire District  
Flood Risk Classifications

Project:  
Southern Staffordshire  
Water Cycle Study Addendum

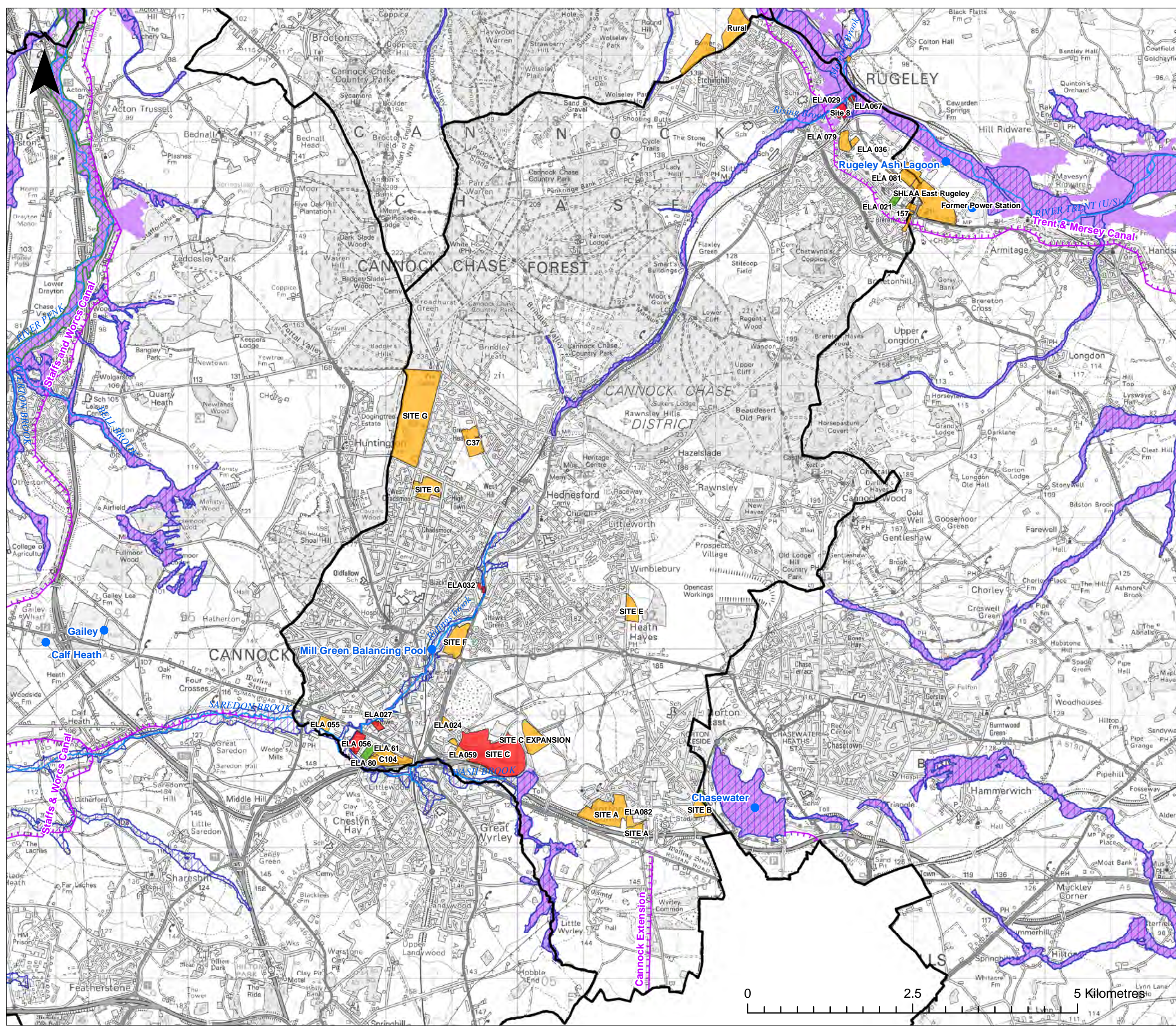
Clients:  
Stafford Borough, Lichfield District,  
South Staffordshire District,  
Tamworth Borough, and  
Cannock Chase District Councils

Date: April 2011	Scale: 1:140,000 @ A3
---------------------	--------------------------

Figure:  
6.1







**Key:**

- Reservoirs
- Canal
- Main Rivers

**Development Sites**

**Flood Risk**

- Little or no infrastructure
- Minor infrastructure upgrade required
- Major infrastructure upgrade required

**Flood Zones**

- Flood Zone 3b with Climate Change
- Flood Zone 3a with Climate Change
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

**Title:**  
Cannock Chase District Flood Risk Classifications

**Project:**  
Southern Staffordshire Water Cycle Study Addendum

**Clients:**  
Stafford Borough, Lichfield District, South Staffordshire District, Tamworth Borough, and Cannock Chase District Councils

<b>Date:</b> April 2011	<b>Scale:</b> 1:55,000 @ A3
----------------------------	--------------------------------

**Figure:**  
7.1





## **Appendix B**

### **Constraints Matrix**





**TABLE H.1 - Stafford Borough Constraints Matrix**

Development Site	Location	Use	Dwellings	WWTW	Water Resources	Water Supply	Wastewater Treatment	Wastewater Collection	Water Quality	Flood Risk	SUDS
<b>Housing</b>											
EC - 1	Eccleshall	Residential	240	ECCLESHALL AND STURBRIDGE	G	G	A	G	R	A	G
EC - 2	Eccleshall	Residential	240	ECCLESHALL AND STURBRIDGE	G	G	A	G	R	A	G
EC - 3	Eccleshall	Residential	240	ECCLESHALL AND STURBRIDGE	G	G	A	G	R	A	G
EC - 4	Eccleshall	Residential	90	ECCLESHALL AND STURBRIDGE	G	G	A	G	R	A	G
EC - 5	Eccleshall	Residential	225	ECCLESHALL AND STURBRIDGE	G	G	A	G	R	A	G
GH - 1	Haywood	Residential	210	HIXON	G	G	A	G	A	A	G
GH - 2	Haywood	Residential	300	HIXON	G	G	A	G	A	A	G
GH - 3	Haywood	Residential	180	HIXON	G	G	A	G	A	A	G
GN - 1	Gnosall	Residential	225	WOOD EATON	G	G	A	A	A	A	G
GN - 2	Gnosall	Residential	270	WOOD EATON	G	G	A	A	A	A	G
GN - 3	Gnosall	Residential	411	WOOD EATON	G	G	A	A	A	A	G
GN - 4	Gnosall	Residential	165	WOOD EATON	G	G	A	A	A	A	A
GN - 5	Gnosall	Residential	120	WOOD EATON	G	G	A	A	A	R	A
GN - 6	Gnosall	Residential	210	WOOD EATON	G	G	A	A	A	A	A
GN - 7	Gnosall	Residential	48	WOOD EATON	G	G	A	A	A	A	A
GN - 8	Gnosall	Residential	120	WOOD EATON	G	G	A	A	A	R	A
GN - 9	Gnosall	Residential	36	WOOD EATON	G	G	A	A	A	A	A
HI - 1	Hixon and Stowe	Residential	120	HIXON	G	G	A	G	A	A	G
HI - 2	Hixon and Stowe	Residential	60	HIXON	G	G	A	G	A	A	G
HI - 3	Hixon and Stowe	Residential	60	HIXON	G	G	A	G	A	A	G
HI - 4	Hixon and Stowe	Residential	60	HIXON	G	G	A	G	A	A	G
HI - 5	Hixon and Stowe	Residential	150	HIXON	G	G	A	G	A	A	G
HI - 6	Hixon and Stowe	Residential	90	HIXON	G	G	A	G	A	A	G
HN - 1	Haughton	Residential	30	HAUGHTON	G	G	A	A	G	A	A
HN - 2	Haughton	Residential	120	HAUGHTON	G	G	A	A	G	A	A
HN - 3	Haughton	Residential	120	HAUGHTON	G	G	A	A	G	A	A
HN - 4	Haughton	Residential	15	HAUGHTON	G	G	A	A	G	A	A
HN - 5	Haughton	Residential	180	HAUGHTON	G	G	A	A	G	A	A
HN - 6	Haughton	Residential	150	HAUGHTON	G	G	A	A	G	A	A
LH - 1	Haywood	Residential	210	HIXON	G	G	A	G	A	A	A
LH - 2	Haywood	Residential	150	HIXON	G	G	A	G	A	A	A
SF - 1	Stafford	Residential	800	BRANCOTE	G	G	A	A	R	A	G
SF - 10	Stafford	Residential	400	BRANCOTE	G	G	A	G	R	A	G
SF - 11	Stafford	Residential	1800	BRANCOTE	G	G	A	A	R	A	G
SF - 12	Stafford	Residential	300	BRANCOTE	G	G	A	G	R	R	G
SF - 2	Stafford	Residential	3000	BRANCOTE	G	G	A	R	R	A	G
SF - 3	Stafford	Residential	700	BRANCOTE	G	G	A	A	R	A	A
SF - 4	Stafford	Residential	800	BRANCOTE	G	G	A	A	R	A	A
SF - 5	Stafford	Residential	350	BRANCOTE	G	G	A	G	R	R	A
SF - 6	Stafford	Residential	300	BRANCOTE	G	G	A	G	R	A	A
SF - 7	Stafford	Residential	300	BRANCOTE	G	G	A	G	R	A	A
SF - 8	Stafford	Residential	2000	BRANCOTE	G	G	A	A	R	R	A
SF - 9	Stafford	Residential	300	PENKRIDGE	G	G	A	G	R	R	G
SN - 1	Stone	Residential	1400	PIREHILL	G	G	A	A	R	A	G
SN - 2	Stone	Residential	600	PIREHILL	G	G	A	A	R	A	G
SN - 3	Stone	Residential	600	PIREHILL	G	G	A	G	R	A	G
SN - 4	Stone	Residential	1000	PIREHILL	G	G	A	A	R	R	G
SN - 5	Stone	Residential	90	PIREHILL	G	G	A	G	R	A	G
TT - 1 and TT-2	Tittensor	Residential	45	STRONGFORD STOKE	G	G	A	G	R	A	A
WO - 1	Woodseaves	Residential	108	WOODSEAVES	G	G	A	A	A	A	G
WO - 2	Woodseaves	Residential	120	WOODSEAVES	G	G	A	A	A	A	G
WO - 3	Woodseaves	Residential	72	WOODSEAVES	G	G	A	A	A	A	A
WO - 4	Woodseaves	Residential	33	WOODSEAVES	G	G	A	A	A	A	A
WO - 5	Woodseaves	Residential	66	WOODSEAVES	G	G	A	A	A	A	A
WO - 6	Woodseaves	Residential	120	WOODSEAVES	G	G	A	A	A	A	G
WO - 7	Woodseaves	Residential	54	WOODSEAVES	G	G	A	A	A	G	G
WT - 1	Weston	Residential	111	WESTON	G	G	A	G	R	R	G
YN - 1	Yarnfield	Residential	250	ECCLESHALL AND STURBRIDGE	G	G	A	A	R	G	G
<b>Employment</b>											
HA - a	Hixon and Stowe	Employment		HIXON	G	G	A	G	A	A	G
HA - b	Hixon and Stowe	Employment		HIXON	G	G	A	G	A	G	G
HA - c	Hixon and Stowe	Employment		HIXON	G	G	A	G	A	A	G
HI - a	Hixon and Stowe	Employment		HIXON	G	G	A	G	A	A	G
HI - b	Hixon and Stowe	Employment		HIXON	G	G	A	G	A	A	G
LA - a	Ladfordfields	Employment		LADFORDFIELDS	G	G	Further Assessment Required	G	G	A	G
LA - b	Ladfordfields	Employment		LADFORDFIELDS	G	G	Further Assessment Required	G	G	A	G
RH - a	Slindon and Sturbridge	Employment		ECCLESHALL AND STURBRIDGE	G	G	A	Private	R	A	G
RH - b	Slindon and Sturbridge	Employment		ECCLESHALL AND STURBRIDGE	G	G	A	Private	R	G	G
SF - a	Stafford	Employment		BRANCOTE	G	G	A	G	R	A	G
SF - b	Stafford	Employment		BRANCOTE	G	G	A	G	R	R	G
SF - c	Stafford	Employment		BRANCOTE	G	G	A	G	R	A	A
SF - d	Stafford	Employment		BRANCOTE	G	G	A	G	R	R	G
SF - e	Stafford	Employment		BRANCOTE	G	G	A	G	R	R	G
SF - f	Stafford	Employment		BRANCOTE	G	G	A	G	R	R	G
SF - g	Stafford	Employment		GREAT BRIDGEFORD	G	G	Further Assessment Required	G	R	R	G
SF - h	Stafford	Employment		BRANCOTE	G	G	A	A	R	A	G
SF - i	Stafford	Employment		BRANCOTE	G	G	A	G	R	A	G
SN - a	Stone	Employment		PIREHILL	G	G	A	G	R	R	G
SN - b	Stone	Employment		PIREHILL	G	G	A	G	R	A	G
<b>Settlements</b>											
Stafford (in and around)	General			BRANCOTE, DERRINGTON and PENKRIDGE	G	G	A	G/A	R	R	R
Adbaston	General			ADBASTON	G	G	Further Assessment Required	G	G	G	A
Barlaston	General			STRONGFORD STOKE	G	G	A	G	R	R	G
Bradley	General			BRADLEY	G	G	Further Assessment Required	G	A	A	G
Bridgeford Area	General			GREAT BRIDGEFORD	G	G	Further Assessment Required	G	R	R	G
Church Eaton	General			WOOD EATON	G	G	A	G	A	A	G
Cotes Heath and Swynnerton	General			ECCLESHALL AND STURBRIDGE	G	G	A	G	R	A	A

Croxton	General	NONE	G	G	Further Assessment Required	G Ⓞ	Further Assessment Required	G	A
Eccleshall and Copmere End	General	ECCLESHALL AND STURBRIDGE	G	G	A	G Ⓞ	R	R	G
Gnosall	General	WOOD EATON	G	G	A	A Ⓞ	A	R	A
Haughton	General	HAUGHTON	G	G	A	A Ⓞ	G	A	R
Haywood	General	HIXON	G	G	A	G Ⓞ	A	R	A
Hilderstone	General	PIREHILL	G	G	A	G Ⓞ	R	A	A
Hixon and Stowe	General	HIXON	G	G	A	G Ⓞ	A	A	G
Leadendale, Blythe Bridge and Fulford	General	CHECKLEY	G	G	A	G Ⓞ	A	A	A
Milwich	General	MILWICH	G	G	Further Assessment Required	G Ⓞ	A	A	G
Norbury and Sutton	General	NORBURY	G	G	Further Assessment Required	A Ⓞ	Further Assessment Required	A	A
Northwood	General	STRONGFORD STOKE	G	G	A	G Ⓞ	R	R	G
North of Rugeley	General	RUGELEY	G	G	G	G Ⓞ	R	A	A
Ranton	General	LADFORDFIELDS	G	G	Further Assessment Required	G Ⓞ	G	R	G
Salt and Weston	General	WESTON	G	G	A	G Ⓞ	R	R	G
Slindon and Sturbridge	General	ECCLESHALL AND STURBRIDGE AND COPMERE	G	G	A	Further Assessment Required	R	A	G
Stone (in and around)	General	PIREHILL	G	G	A	A Ⓞ	R	R	G
Walton and Norton Bridge	General	NORTON BRIDGE	G	G	Further Assessment Required	G Ⓞ	R	R	G
Woodseaves	General	WOODSEAVES	G	G	A	A Ⓞ	A	A	A
Yarnfield	General	ECCLESHALL AND STURBRIDGE	G	G	A	A Ⓞ	R	R	A

Key:	Ⓞ	Requires Further Hydraulic Analysis by STWL
	R	Major Infrastructure Upgrade Required - Delay to Development Expected
	A	Minor Infrastructure Upgrade Required - Some Delay to Development Expected
	G	No Infrastructure Upgrade Required - No Delay to Development Expected

**TABLE H.2 - Lichfield District Constraints Matrix**

Development Site	Location	Use	WWTW	Water Resources	Water Supply	Wastewater Treatment	Wastewater Collection	Water Quality	Flood Risk	SUDS
1	East of Lichfield	Key Residential	LICHFIELD CURBOROUGH	G	A	R	G ⚡	R	G	A
109	South of Lichfield	Key Residential	LICHFIELD CURBOROUGH	G	A	R	G ⚡	R	A	A
126	South of Lichfield	Key Residential	LICHFIELD CURBOROUGH	G	A	R	G ⚡	R	G	A
127	South of Lichfield	Key Residential	LICHFIELD CURBOROUGH	G	A	R	G	R	G	A
128	South of Lichfield	Key Residential	LICHFIELD CURBOROUGH	G	A	R	G ⚡	R	A	A
125	East of Lichfield	Key Residential	LICHFIELD CURBOROUGH	G	A	R	A	R	A	R
408	East of Lichfield	Key Residential	LICHFIELD CURBOROUGH	G	A	R	G	R	A	R
426	Fradley	Key Residential	LICHFIELD CURBOROUGH	G	A	R	G	R	A	G
157	Armitage and The Longdons	Key Residential	RUGELEY	G	G	G	G ⚡	R	A	A
173	Armitage and The Longdons	Key Residential	RUGELEY	G	G	G	G ⚡	R	A	A
406	Armitage and The Longdons	Key Residential	RUGELEY	G	G	G	G ⚡	R	A	A
102	South of Burntwood	Key Residential	BURNTWOOD	G	R	A	G ⚡	A	R	A
69	South of Burntwood	Key Residential	BURNTWOOD	G	R	A	G ⚡	A	R	A
70	South of Burntwood	Key Residential	BURNTWOOD	G	R	A	G	A	R	A
117	Fazeley	Key Residential	TAMWORTH COTON LANE	G	A	A	G	R	A	G
118	Fazeley	Key Residential	TAMWORTH COTON LANE	G	A	A	G ⚡	R	A	G
115	Fazeley	Key Residential	TAMWORTH COTON LANE	G	A	A	G ⚡	R	G	G
96	Fazeley	Key Residential	TAMWORTH COTON LANE	G	A	A	G	R	A	G
97	Fazeley	Key Residential	TAMWORTH COTON LANE	G	A	A	G	R	A	G
94	Fazeley	Additional Alternative	TAMWORTH COTON LANE	G	A	A	G	R	A	G
95	Fazeley	Additional Alternative	TAMWORTH COTON LANE	G	A	A	G ⚡	R	A	G
140	Fazeley	Additional Alternative	TAMWORTH COTON LANE	G	A	A	A	R	A	G
495	Fazeley	Additional Alternative	TAMWORTH COTON LANE	G	A	A	G ⚡	R	A	G
38	Curborough New Settlement	Additional Alternative	LICHFIELD CURBOROUGH	G	R	R	A	R	R	G
104	Anker Valley	Additional Alternative	TAMWORTH COTON LANE	G	R	A	A	R	A	G
43	Anker Valley	Additional Alternative	TAMWORTH COTON LANE	G	R	A	G ⚡	R	A	G
108	Anker Valley	Additional Alternative	TAMWORTH COTON LANE	G	R	A	A	R	A	G
<b>Settlements</b>										
Alrewas		General	ALREWAS	G	A	R	G ⚡	R	R	G
Anker Valley		General	TAMWORTH COTON LANE	G	G ⚡	A	A	R	A	G
Armitage and the Longdons		General	ARMITAGE	G	G ⚡	G	A ⚡	R	R	A
Bliithbury		General	NONE	G	G ⚡	Further Assessment Required	Further Assessment Required	Further Assessment Required	G	G
Brownhills		General	WALSALL WOOD	G	R	A	G ⚡	A	R	A
Burntwood (in and around)		General	BURNTWOOD	G	R	A	G/A ⚡	A	R	R
Carroway Head		General	BASSETS POLE	G	G ⚡	A	G	G	A	A
Clifton Campville		General	CLIFTON CAMPVILLE	G	G ⚡	A	G	R	A	G
Colton		General	COLTON	G	G ⚡	G	G/G ⚡	A	A	G
Edingale and Harlaston		General	EDINGALE	G	G ⚡	R	G/A ⚡	R	R	G
Elford		General	ELFORD	G	G ⚡	A	G ⚡	R	R	G
Fradley		General	ALREWAS AND LICHFIELD CURBOROUGH	G	A	R	G ⚡	R	A	G
Hampstall Ridware		General	HAMPSTALL RIDWARE	G	G ⚡	G	G	A	R	G
Hill Ridware		General	ARMITAGE	G	G ⚡	G	G	R	R	A
Kings Bromley		General	LICHFIELD CURBOROUGH	G	G ⚡	R	G	R	R	G
Lichfield (in and around)		General	LICHFIELD CURBOROUGH	G	A ⚡	R	G/A ⚡	R	R	R
Little Aston and North Streetly		General	LITTLE ASTON	G	G ⚡	A	A	R	A	A
Mile Oak / Fazeley		General	TAMWORTH COTON LANE	G	A ⚡	A	G ⚡	R	A	G
Muckley Corner, Summerhill and Springhill		General	BURNTWOOD	G	G ⚡	A	Further Assessment Required	A	A	R
Other Rural		General	MIXED, SOME NOT SEWERED	G	G ⚡	Further Assessment Required	Further Assessment Required	Further Assessment Required	Further Assessment Required	Further Assessment Required
Shenstone		General	SHENSTONE	G	G ⚡	G	Further Assessment Required	R	R	R
Shenstone Woodend		General	NONE	G	G ⚡	Further Assessment Required	Further Assessment Required	Further Assessment Required	A	R
Stonnall		General	SHENSTONE AND GOSCOTE	G	G ⚡	G and A	A	R	A	A
Weeford		General	NONE	G	G ⚡	Further Assessment Required	Further Assessment Required	Further Assessment Required	G	A
Whittington		General	TAMWORTH COTON LANE	G	G ⚡	A	G ⚡	R	G	A
Whittington Heath		General	TAMWORTH COTON LANE	G	G ⚡	A	G ⚡	R	A	A

Key:	⚡	Requires Further Hydraulic Analysis by STWL
	R	Major Infrastructure Upgrade Required - Delay to Development Expected
	A	Minor Infrastructure Upgrade Required - Some Delay to Development Expected
	G	No Infrastructure Upgrade Required - No Delay to Development Expected



**TABLE H.5 - Cannock Chase District Constraints Matrix**

Development Site	Location	Use	WWTW	Water Resources	Water Supply	Wastewater Treatment	Wastewater Collection	Water Quality	Flood Risk	SUDS
<b>Residential Sites</b>										
SITE A (Large)	Norton Canes	Residential	GOSCOTE	G	A	A	A	G*	A	G
SITE A (Small)	Norton Canes	Residential	GOSCOTE	G	A	A	G⊗	G*	A	G
SITE B	Norton Canes	Residential	GOSCOTE	G	A	A	G⊗	G*	A	G
Former Power Station	Rugeley	Residential	RUGELEY	G	G⊗	G	G⊗	R	A	A
C104	Cannock (South)	Residential	CANNOCK	G	G	A	G⊗	A	A	G
SITE E	Cannock (Heath Hayes)	Residential	GOSCOTE	G	A	A	G⊗	G*	A	G
C37	Cannock (North)	Residential	CANNOCK	G	A	A	A	A	A	A
SITE G (small site)	Cannock (North)	Residential	CANNOCK	G	G	A	A	A	A	A
SITE G (large site)	Cannock (North)	Residential	CANNOCK	G	A	A	A	A	A	A
<b>Employment Sites</b>										
SITE C	Cannock (South)	Employment	CANNOCK	G	A⊗	A	G⊗	A	R	G
SITE F	Cannock	Employment	CANNOCK	G	G⊗	A	G⊗	A	A	G
ELA 61	Cannock	Employment	CANNOCK	G	G⊗	A	G⊗	A	G	G
ELA 80	Cannock (South)	Employment	CANNOCK	G	G	A	G⊗	A	A	G
ELA 081	Rugeley	Employment	RUGELEY	G	G⊗	G	G⊗	R	A	A
ELA 056	Cannock (South)	Employment	CANNOCK	G	G⊗	A	G⊗	A	R	G
ELA 055	Cannock (South)	Employment	CANNOCK	G	G⊗	A	G⊗	A	A	G
ELA 021	Rugeley	Employment	RUGELEY	G	G⊗	G	G⊗	R	G	A
ELA 036	Rugeley	Employment	RUGELEY	G	G⊗	G	G⊗	R	A	A
ELA 079	Rugeley	Employment	RUGELEY	G	G⊗	G	G⊗	R	A	A
Site 8	Rugeley	Employment	RUGELEY	G	G⊗	G	A	R	R	A
SITE C EXPANSION	Cannock (South)	Employment	CANNOCK	G	A⊗	A	G⊗	A	A	G
SITE A	Norton Canes	Employment	GOSCOTE	G	A	A	A	G*	A	G
ELA024	Cannock (South)	Employment	CANNOCK	G	G⊗	A	G⊗	A	A	G
ELA059	Cannock (South)	Employment	CANNOCK	G	G⊗	A	G⊗	A	A	G
ELA029	Rugeley	Employment	RUGELEY	G	G⊗	A	G	R	R	A
ELA067	Rugeley	Employment	RUGELEY	G	G	A	G	R	R	A
ELA032	Cannock	Employment	CANNOCK	G	G⊗	A	A	A	R	G
ELA082	Norton Canes	Employment	GOSCOTE	G	A	A	G⊗	G*	A	G
ELA027	Cannock (South)	Employment	CANNOCK	G	G⊗	A	G⊗	A	R	G
<b>Settlements</b>										
Cannock (in and around)		General	CANNOCK	G	G / A⊗	A	G⊗	A	R	A
Norton Canes		General	GOSCOTE	G	A	A	G/A	G*	A	G
Prospect Village and Cannock Wood		General	BURNTWOOD	G	Further Assessment Required	A	Further Assessment Required	A	A	A
Rugeley (in and around)		General	RUGELEY	G	G	G	A/G⊗	R	R	R
Other		General	MIXED	G	Further Assessment Required	Further Assessment Required	Further Assessment Required	Further Assessment Required	Further Assessment Required	Further Assessment Required

<b>Key:</b>	⊗	Requires Further Hydraulic Analysis by STWL
	R	Major Infrastructure Upgrade Required - Delay to Development Expected
	A	Minor Infrastructure Upgrade Required - Some Delay to Development Expected
	G	No Infrastructure Upgrade Required - No Delay to Development Expected



TABLE H.4 - South Staffordshire District Constraints Matrix

Development Site	Location	Use	Water Provider	WWTW	Water Resources	Water Supply	Wastewater Treatment	Wastewater Collection	Water Quality	Flood Risk	SUDS
<b>Housing</b>											
5	Codsall	Residential	STW	CODSALL	A	G	A	A	A	A	A
112	Penkridge	Residential	SSW	PENKRIDGE	G	G	A	G	R	R	A
165		Residential	STW	WOMBOURNE	A	G	R	G	R	G	A
151	Wombourne	Residential	STW	WOMBOURNE	A	G	R	A	R	R	A
147	Wombourne	Residential	STW	WOMBOURNE	A	G	R	G	R	G	A
204	Essington	Residential	STW	HILTON PARK	A	G	Further Assessment Required	G	A	A	G
40	Great Wyrley and Cheslyn Heath	Residential	SSW	GOSCOTE	G	G	A	G	G*	R	G
41	Great Wyrley and Cheslyn Heath	Residential	SSW	GOSCOTE	G	G	A	G	G*	A	G
395	North Penkridge	Residential	SSW	PENKRIDGE	G	A	A	G	R	R	G
394	North Penkridge	Residential	SSW	PENKRIDGE	G	A	A	G	R	R	G
51	Great Wyrley and Cheslyn Heath	Residential	SSW	GOSCOTE	G	G	A	G	G*	G	G
208	Essington	Residential	STW	HILTON PARK	A	G	Further Assessment Required	G	A	A	G
164	Wombourne	Residential	STW	WOMBOURNE	A	G	R	G	R	A	A
398	Wheaton Aston	Residential	STW	WHEATON ASTON	A	G	Further Assessment Required	Further Assessment Required	A	G	G
<b>Employment</b>											
6:0001:001	South of Stafford	Employment	STW	PENKRIDGE	G	G	A	A	R	A	G
6:0002:002	Great Wyrley and Cheslyn Heath	Employment	SSW	GOSCOTE	G	G	A	G	G*	A	G
6:0002:001	Great Wyrley and Cheslyn Heath	Employment	SSW	GOSCOTE	G	G	A	G	G*	R	G
6:0025:001	Northwest of Cannock	Employment	SSW	PENKRIDGE	G	G	A	G	R	A	A
6:0004:001	Coven and Four Ashes	Employment	SSW	COVEN HEATH	G	G	A	G	A	R	A
6:0006:001	Coven and Four Ashes	Employment	SSW	COVEN HEATH	G	G	A	G	A	G	A
6:0024:002	Wombourne	Employment	STW	WOMBOURNE	A	G	R	G	R	G	A
6:0007:001	Featherstone	Employment	STW	COVEN HEATH	A	G	A	G	A	A	A
6:0007:003	Featherstone	Employment	STW	COVEN HEATH	A	G	A	G	A	A	A
6:0007:006	Featherstone	Employment	STW	COVEN HEATH	A	G	A	G	A	A	A
6:0007:007	Featherstone	Employment	STW	COVEN HEATH	A	G	A	G	A	G	A
6:0008:001	Featherstone	Employment	STW	COVEN HEATH	A	G	A	G	A	A	A
6:0009:001	Essington	Employment	STW	GOSCOTE	A	G	A	G	G*	A	G
6:0013:001	East of Pendeford	Employment	STW	BARNHURST, COVEN HEATH, PENKRIDGE	A	G	A	G	A	R	A
6:0013:015	Northwest of Cannock	Employment	SSW	PENKRIDGE	G	G	A	G	R	A	A
6:0026:001	South of Stafford	Employment	STW	NONE	G		Further Assessment Required	G	R	R	G
6:0014:001	Featherstone	Employment	STW	COVEN HEATH	A	G	A	G	A	R	A
6:0015:010	Wombourne	Employment	STW	WOMBOURNE	A	G	R	G	R	A	A
6:0015:001	Wombourne	Employment	STW	WOMBOURNE	A	G	R	G	R	G	A
6:0015:008	Wombourne	Employment	STW	WOMBOURNE	A	G	R	G	R	G	A
6:0016:001	Great Wyrley and Cheslyn Heath	Employment	SSW	GOSCOTE	G	G	A	G	G*	G	A
6:0016:006	Great Wyrley and Cheslyn Heath	Employment	SSW	GOSCOTE	G	G	A	G	G*	G	A
6:0013:016	Northwest of Cannock	Employment	SSW	PENKRIDGE	G	G	A	G	R	A	A
6:0013:002	East of Pendeford	Employment	STW	BARNHURST, COVEN HEATH, PENKRIDGE	A	G	A	G	A	R	A
6:0006:002	Coven and Four Ashes	Employment	SSW	COVEN HEATH	G	G	A	G	A	A	A
(44055)	Coven and Four Ashes	Employment	SSW	COVEN HEATH	G	G	A	G	A	R	A
(44056)	Coven and Four Ashes	Employment	SSW	COVEN HEATH	G	G	A	G	A	G	A
<b>Settlements</b>											
Brewwood		General	STW	COVEN HEATH	A	G	A	G	A	A	A
Codsall		General	STW	CODSALL	A	G	A	A	A	R	A
Coven and Four Ashes		General	SSW/STW	COVEN HEATH	G/A	G / G	A	G	A	R	R
Essington		General	STW	MINWORTH, HILTON PARK AND GOSCOTE	A	G	R	G	A	A	A
Featherstone, Brinsford and Coven Heath		General	STW	COVEN HEATH	A	G	A	G	A	R	R
Great Wyrley and Cheslyn Heath		General	SSW	GOSCOTE	G	G	A	G	G*	R	G
Kinver		General	SSW	KINVER	G	G	Further Assessment Required	G	A	R	R
Pattingham		General	STW	PATTINGHAM	A	G	Further Assessment Required	G	R	A	A
Penkridge		General		PENKRIDGE	G	A	A	G	R	R	A
Perton		General	STW	TRESCOTT	A	G	A	G	R	R	A
South of Stafford		General	STW	BRANCOTE AND PENKRIDGE	G	G	A	A	R	R	A
Weston		General	STW	BLYMILL	G	G	Further Assessment Required	G	R	A	A
Wheaton aston		General	STW	WHEATON ASTON	A	G	Further Assessment Required	G	A	A	G
Wombourne		General	STW	WOMBOURNE	A	G	R	A/G	R	R	R

Key:	⊕	Requires Further Hydraulic Analysis by STWL
	R	Major Infrastructure Upgrade Required - Delay to Development Expected
	A	Minor Infrastructure Upgrade Required - Some Delay to Development Expected
	G	No Infrastructure Upgrade Required - No Delay to Development Expected





**TABLE H.3 - Tamworth Borough Constraints Matrix**

Development Site	Location	Use	WWTW	Water Resources	Water Supply	Wastewater Treatment	Wastewater Collection	Water Quality	Flood Risk	SUDS
<b>Residential</b>										
1		Residential	TAMWORTH COTON LANE	G	R	A	A	R	R	G
2	South Tamworth	Residential	TAMWORTH COTON LANE	G	G	A	G	R	G	G
3	South Tamworth (Two Gates)	Residential	TAMWORTH COTON LANE	G	G	A	G	R	G	G
4	South Tamworth (Two Gates)	Residential	TAMWORTH COTON LANE	G	G	A	G	R	G	G
5	Southeast Tamworth	Residential	TAMWORTH COTON LANE	G	A	A	G	R	A	G
6	Central Tamworth (The Leys)	Residential	TAMWORTH COTON LANE	G	G	A	G	R	G	G
7	Central Tamworth (The Leys)	Residential	TAMWORTH COTON LANE	G	G	A	G	R	G	G
8	Central Tamworth (The Leys)	Residential	TAMWORTH COTON LANE	G	G	A	G ☼	R	G	G
9	Central Tamworth	Residential	TAMWORTH COTON LANE	G	G	A	G	R	G	G
10	South Tamworth	Residential	TAMWORTH COTON LANE	G	G	A	G	R	G	G
12	South Tamworth	Residential	TAMWORTH COTON LANE	G	R	A	A	R	A	G
13	South Tamworth	Residential	TAMWORTH COTON LANE	G	R	A	A	R	R	G
14	South Tamworth	Residential	TAMWORTH COTON LANE	G	R	A	A	R	R	G
15	South Tamworth	Residential	TAMWORTH COTON LANE	G	R	A	A	R	R	G
20	South Tamworth (Two Gates)	Residential	TAMWORTH COTON LANE	G	G	A	G ☼	R	G	G
<b>Additional Alternative</b>										
16	Anker Valley	Additional	TAMWORTH COTON LANE	G	R	A	A	R	A	G
17	Anker Valley	Additional	TAMWORTH COTON LANE	G	R	A	A	R	G	G
25	Anker Valley	Additional	TAMWORTH COTON LANE	G	A	A	A	R	A	G
<b>Employment</b>										
18	West Tamworth	Employment	TAMWORTH COTON LANE	G	A ☼	A	A	R	R	G
7	West Tamworth	Employment	TAMWORTH COTON LANE	G	A ☼	A	A	R	R	G
10	West Tamworth (Bitterscote)	Employment	TAMWORTH COTON LANE	G	A ☼	A	A	R	R	G
3	West Tamworth (Bitterscote)	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	R	G
2	South Tamworth	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	R	G
1	West Tamworth (Bitterscote)	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	R	G
6	West Tamworth (Bitterscote)	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	R	G
4	East Tamworth	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G
5	West Tamworth (Bitterscote)	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	R	G
8	South Tamworth	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G
9	East Tamworth	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G
11	Southeast Tamworth	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	G	G
12	Southeast Tamworth	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	A	G
13	East Tamworth	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G
14	East Tamworth	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G
15	South Tamworth	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G
16	North Tamworth (The Alders)	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	R	G
17	West Tamworth (Bitterscote)	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	R	G
19	Southeast Tamworth	Employment	TAMWORTH COTON LANE	G	A ☼	A	G ☼	R	G	G
20	East Tamworth	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G
21	East Tamworth	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G
22	East Tamworth (Glascote Heath)	Employment	TAMWORTH COTON LANE	G	G ☼	A	G ☼	R	G	G

Key:	☼	Requires Further Hydraulic Analysis by STWL
	R	Major Infrastructure Upgrade Required - Delay to Development Expected
	A	Minor Infrastructure Upgrade Required - Some Delay to Development Expected
	G	No Infrastructure Upgrade Required - No Delay to Development Expected