Southern Staffordshire Outline Water Cycle Study

Final Report

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

July 2010
Final Report
9V5955

Cannock Chase Council
Lichfield district council
South Staffordshire Council
Staffordshire County Council
Stafford Borough Council
Tamworth Borough Council

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EXECUTIVE SUMMARY

Study Objectives

This report has followed the requirements of the Environment Agency's Water Cycle Study (WCS) guidance and the requirements of the Brief to produce an Outline WCS for the Local Authority areas of Stafford Borough, Lichfield District, Tamworth Borough, South Staffordshire District and Cannock Chase District. As such, it assesses the constraints and requirements that will arise from the scale of the proposed growth on the water infrastructure of southern Staffordshire.

The Councils are in the process of preparing their Local Development Frameworks (LDFs), as required by the Planning and Compulsory Purchase Act 2004. To assist with the identification of the potential development sites and settlements most suitable for development, this WCS, through consultation with the Councils, the Environment Agency, Severn Trent Water Limited (STWL) and South Staffordshire Water (SSW) has identified the potential constraints to development within the region. It considers the following issues, addressing the constraints that they may pose to future development and discusses the improvements necessary to achieve the required level of development:

- Water Resources;
- Water Supply;
- Wastewater Collection;
- Wastewater Treatment;
- Water Quality and Environmental Issues;
- Flood Risk; and
- Demand Management

In addition to assisting the Councils, the WCS process also provides a benefit to the water companies by providing them with a more detailed indication of the potential development within the area. This will reduce the number of assumptions that are necessary in making decisions in relation to future planning of resource and infrastructure requirements.

Outputs

This report places a main focus upon the potential development sites, scenarios and options provided by the Councils. In addition, to test sensitivity, it considers two trajectories of higher growth. The report also considers, in more general terms, each of the main settlements within each Borough or District to give a holistic overview of the study area. It assesses the flood risk, water resources, water supply, sewerage infrastructure, wastewater treatment, water quality and Sustainable Drainage System (SUDS) constraints for each proposed site, assigning a traffic-light colour code to indicate the ease of development in each case. The discussion common to all Local Authority areas is presented within the first four sections of this report, which are followed by five separate sections, each specific to an individual District or Borough. The report concludes with the presentation of a constraints table to assist the Councils in their comparison of the viability and potential cost and time implications of the development of various sites.

Conclusions and Key Recommendations

For a full list of all recommendations please see Section 5.9, 6.9, 7.9, 8.9 and 9.9 for Local Authority specific recommendations (Stafford Borough, Lichfield District, Tamworth Borough, South Staffordshire District and Cannock Chase District respectively) and Section 10 for general study area recommendations. The following summary recommendations highlight the key conclusions, relevant to all Local Authority areas:

Water Resources

- There are sufficient water resources to meet the predicted demands over the next 25 years, based upon the latest Regional Spatial Strategy (RSS Phase 2) figures. This is, however, dependent upon the implementation of a number of mitigation measures, which may place a time constraint upon the speed at which new development can be delivered. Most of the water resources within the study area are under pressure leading to tighter restrictions upon abstraction. Discussion with the water companies indicates that there is insufficient water resource to meet the demands of higher development scenarios. The water companies review their Water Resource Management Plans (WRMPs) every five years. Regular communication will enable them to factor higher growth targets into their next review and therefore propose a strategy to provide sufficient water.
- The Councils should inform STWL and SSW of any high water demand development sites as early in the development process as possible.

Water Supply

- STWL are confident that water can be supplied to wherever it is required within their supply area, although developer contributions should be secured prior to the agreement of planning permission. SSW have identified some areas which are currently suffering from occasional low pressure in the water supply system. Due to the close linkages between the supply systems of many of the larger settlements within the region it is important that development plans are discussed with the water companies as far in advance as possible to ensure the correct infrastructure can be delivered in advance of its requirement.
- The Councils should keep STWL and SSW informed of their latest development strategies as early in the development process as possible.
- Developers should approach the water companies as early as possible regarding new development sites and should be prepared to provide contributions for the necessary network upgrades.

Wastewater Collection

- STWL provide sewerage services for the entire study area. They have provided a site specific analysis of the wastewater infrastructure constraints for the potential development sites. No major “show stoppers” have been identified but some infrastructure upgrade and implementation will be required for most sites, which may delay the progression of the sites.

- Consultation must be held with STWL ahead of the progression of any potential development sites to ensure the appropriate wastewater infrastructure is in place with sufficient time. This is required from the Council at options development stage and by the developers at site progression. Discussion should be held as far in advance as possible to enable STWL to fund, source and implement the required infrastructure improvements by the time they are required. See Sections 5.9, 6.9, 7.9, 8.9 and 9.1 for reference to the sites/areas requiring infrastructure upgrade and/or additional hydraulic analysis for Stafford Borough, Lichfield District, Tamworth Borough, South Staffordshire District and Cannock Chase District respectively.
- Site specific requirements should be addressed by the developer at planning stage, if progressed. Developers should approach the water companies as early as possible regarding new development sites and should be prepared to provide contributions for the necessary network upgrades.

Wastewater Treatment

- STWL provide sewerage services for the entire study area. They have provided a site specific analysis of the wastewater treatment constraints for the potential development sites. No major "show stoppers" have been identified but some infrastructure upgrade and implementation will be required for most sites, which may delay the progression of the sites.
- The Wastewater Treatment Works (WwTWs) have been identified within the Study Area as either currently operating under pressure, or have been predicted to exceed their capacity due to the planned development:

  - Strongford
  - Haughton
  - Penkridge
  - Pirehill
  - Eccleshall
  - Sturbridge
  - Hixon
  - Wood Eaton
  - Woodseaves

  STWL have an obligation under the Water Industry Act 1991 to provide additional treatment capacity as and when required and have not identified any areas for which the provision of additional capacity would be particularly problematic. However, expanding the WwTWs and/or negotiating additional discharge consents may be a lengthy process. It is therefore important that the Councils factor this delay into their development schedules and that the Councils and/or developers consult with STWL as early in the development process as possible.

Water Quality and Environmental Issues

- A high number of environmentally important sites (including RAMSARs, SSSIs, SACs etc) are located either within or downstream of the study area and potential development sites Many of these are water dependent and are therefore sensitive to a decrease in water supply and/or are particular susceptible to an increase in pollutants. In addition, many of the watercourses within the study area have been identified as currently suffering from low water

quality, which, under the Water Framework Directive (WFD) must not deteriorate, with the aim to improve the quality. All development must therefore be implemented in a manner than does not negatively impact the environment through excess abstraction or the release of pollutants. This should be assessed by the developer at planning application stage.

- The Councils should consider policies to improve the water quality within the Borough as a whole, but most significantly on the:

Stafford
- River Sow;
- River Trent; and
- tributaries of the River Meese

Cannock Chase
- Burntwood Brook;
- Saredon Brook; and
- River Trent

South Staffordshire
- River Sow;
- River Stour;
- River Worfe;
- and Wom Brook

Lichfield
- Black Brook;
- Footherley Brook;
- River Tame;
- River Trent;
- Burntwood Brook;
- Ford Brook;
- Moreton Brook;
- River Blithe; and
- River Mease

Tamworth
- River Tame

- Water Quality issues affect, and may restrict development within a number of the WwTW catchments (see Sections 5.9, 6.9, 7.9, 8.9 and 9.1, Stafford Borough, Lichfield District, Tamworth Borough, South Staffordshire District and Cannock Chase District respectively, for details of the affected WwTWs. It is the responsibility of STWL to ensure the WwTWs do not exceed their consented discharge limits, but to accept further flows the treatment processes must be tightened or a new consent negotiated with the Environment Agency. There may therefore be a delay to development within the specified catchments and discussion should be held within STWL as soon as possible in the planning process, either by the Councils on a strategic level or by the developers for specific sites.

Flood Risk

- Fluvial and surface water are the key sources of flood risk within the study area. Discussion of fluvial flooding has been sourced from the existing Level 1 SFRAs, whereas discussion of surface water flooding has been taken from the Phase 1 Surface Water Management Plan (SWMP) undertaken in parallel to this study. All the Local Authority areas are, in some form, at risk either fluvial and/or surface water flooding. Details of the affected sites are provided in Sections 5 - 9.
- A number of the larger settlements have been identified as suffering from one or both of these types of flooding and further assessment has been recommended for the settlements of Stafford, Lichfield, Cannock, Tamworth and Penkridge in the form of a Phase 2 SWMP.

- A number of development sites have been identified as requiring site specific Flood Risk Assessments (FRAs), which should be undertaken by the developer. See Sections 5.9, 6.9, 7.9, 8.9 and 9.1, Stafford Borough, Lichfield District, Tamworth Borough, South Staffordshire District and Cannock Chase District respectively, for details of the affected WwTWs. All development should follow the guidance stated within PPS25.
- All developments classified as being at risk of fluvial and/or surface water flooding must be assessed by the developer with reference to the Level 1 SFRAs and Phase 1 SWMP.

Demand Management

- For all sites a high level of implementation of demand management techniques will be a necessity, including SUDS, water metering, rain water harvesting and grey water recycling to accommodate the increasing demands and effects of climate change.
- The Code for Sustainable Homes should also be followed, with the aim to comply with Level 3 and, where possible, Level 4.
- Water efficiency is key to ensuring the current resources are not exceeded and the environment is not negatively impacted from development.
- Any new development shall not allow any deterioration in water quality and shall improve the water quality where possible.
- Due to the adoption of the Floods and Water Management Act, STWL is no longer required to accept surface water runoff from new development sites. As such, developers must ensure all planning applications must include a suitable SUDS scheme, that is tailored to the local conditions and prevents pollutants reaching the water bodies. This will be submitted by the developer and review by the relevant SUDS approval board (SAB) within Staffordshire County Council.
- Removal of surface water from the sewers will reduce the operation of Combined Sewer Overflows (CSOs).
- Where possible the Councils should investigate the potential for retrofitting existing developments.
- Where possible the Councils should mitigate agricultural runoff into watercourses.

Constraints Matrix

The constraints matrix for all potential developments sites assessed within this study and key settlements is shown in **Appendix H**. Although some potential development sites will require some degree of investment to make them feasible, no major “show stoppers” have been identified and no sites have been classified as ‘red’ in all categories, relating to a high level cost and time estimation. A red colour code against an individual water cycle element indicates that the potential development site in question require a higher degree of investment, whereas those highlighted in green will require a lower level of investment. This matrix will not only guide the Councils and developers to the sites most suitable for development at the present time but will also assist in streamlining the sites and determining whether they require further analysis.

Data Sources

The data used within this WCS (and parallel Phase 1 SMWP) is documented within **Appendix B**. The results of the SWMP have been used to supplement the flood risk analysis within this report. Additional data has been obtained from the Councils, Staffordshire County Council, the Environment Agency, South Staffordshire Water and Severn Trent Water Limited. As a number of data sources, including the Regional Spatial Strategy, STWL's Water Resource Management Plan and the SWMP are currently in draft form, it is recommended that this WCS be reviewed in light of any new findings released in these documents.

Co-operation

This WCS was carried out for the Councils with the co-operation and support of Staffordshire County Council, the Environment Agency, Severn Trent Water Limited, and South Staffordshire Water.

GLOSSARY

Asset Management Plans	Asset Management Planning is the process by which the Office of Water Services (Ofwat) determined the programme of water infrastructure and environmental improvements that are to be funded over a five year period and the water bill price rises that have to be allowed to fund this.
Brownfield site	Any land or site that has been previously developed.
Catchment	The area contributing flow or *runoff* to a particular point on a watercourse.
Climate change	Long-term variations in global temperature and weather patterns both natural and as a result of human activity, primarily greenhouse gas emissions.
Critical Dry Year	The most severe dry year drought period anticipated with a management time frame (typically 25 years)
Culvert	Covered channel or pipe that forms a *watercourse* below ground level, or through a raised embankment.
Defra	UK Government department responsible for policy and regulations on the environment, food and rural affairs.
Development	The carrying out of building, engineering, mining or other operations in, on, over or under land or the making of any material change in the use of any buildings or other land.
Dry Weather Flow	Peak water demand flow expected during hot, dry weather conditions.
Enmained	Watercourse designated as a *Main River*
Environment Agency	Government Agency charged with the protection of the environment.
Exception Test	The final process of the PPS25 Sequential Test (TIERS 3 & 4). It is required for some developments (depending on their vulnerabilities as defined in Tables D.2 and D.3 of Planning Policy Statement (PPS) 25: Development and Flood Risk), when a development application is made for a site within Flood Zones 2 & 3 and no other site of lower flood risk is available.
Filter Capacity	Maximum volume of water that can be retained within a filter.

Flood defence	Flood defence infrastructure, such as flood walls and embankments, intended to protect an area against flooding, to a specified *standard of protection*.
Flood Hazard	The potential risk to life and potential damage to property resulting from flooding.
Flood probability	The estimated likelihood of a flood of a given magnitude occurring or being exceeded in any specified time period.
Flood risk	An expression of the combination of the *flood probability* and the magnitude of the potential consequences of the *flood event*.
Flood risk assessment	A study to assess the risk of a site or area flooding, and to assess the impact that any changes or development in the site or area will have on *flood risk*.
Flood Zones	Flood Zones are defined in Table D.1 of Planning Policy Statement (PPS) 25: Development and Flood Risk. They indicate land at risk by referring to the probability of flooding from river and sea, ignoring the presence of defences.
Floodplain	Area of land that borders a watercourse, an estuary or the sea, over which water flows in time of flood, or would flow but for the presence of flood defences where they exist.
Fluvial Water	Water contained or flowing within a river or stream.
Functional floodplain	Land where water has to flow or be stored in times of flood. It includes the land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes.
Greenfield	Previously undeveloped land.
Groundwater	Water in the ground, usually referring to water in the saturated zone below the *water table*.
Groundwater flooding	Flooding caused by *groundwater* escaping from the ground when the *water table* rises to or above ground level.

Growth Points	The New Growth Points initiative was designed to provide support to local communities who wish to pursue large scale and sustainable growth, including new housing, through partnership with the Government. 29 areas were named New Growth Points and will share £40m in 2007-8 for a first round of infrastructure projects and to support growth related studies, master planning and capacity-building.
Headroom	Buffer between supply and demand targets
Housing Land Availability Assessments	Independent assessments of land availability which considers the options for meeting the Regional Spatial Strategy housing targets.
LiDAR	Data set that provides a 3D image of the surface of the earth.
Local Development Documents	Documents that set out the spatial strategy for local planning authorities which comprise development plan documents.
Local Development Framework	Framework which forms part of the statutory development plan and supplementary planning documents which expand policies in a development plan document or provide additional detail.
Local Planning Authority	Body responsible for planning and controlling development, through the planning system.
Main River	A watercourse designated on a statutory map of Main rivers, maintained by the Environment Agency.
Mitigation measure	A generic term used in this guide to refer to an element of *development* design which may be used to manage some *risk* to the *development*, or to avoid an increase in *risk* elsewhere.
Ofwat	The Water Services Regulation Authority, which is the economic regulator of the water and sewerage industry in England and Wales.
Ordinary watercourse	A watercourse which is not a private drain and is not designated a *Main river*.
Regional Spatial Strategy	A document produced as part of the national planning system with the main purpose to provide a long term land use and transport planning framework for the Region. It guides the preparation of local authority development plans and local transport plans.

Return period	A term sometimes used to express *flood probability*. It refers to the estimated average time gap between floods of a given magnitude, but as such floods are likely to occur very irregularly, an expression of the *annual flood probability* is preferred.
River Basin Management Plan (RBMP)	Plans that set out the environmental objectives for all groundwater and surface waterbodies and Protected Areas within a River Basin District.
Runoff	Water flow over the ground surface to the drainage system.
Sequential Test	The Sequential Test refers to the application of this approach by Local Planning Authorities (LPAs) in determining land uses that are compatible with the level of flood risk at each allocated development site within a Local Authority area. Development should be directed to Flood Zone 1 wherever possible, and then sequentially to Flood Zones 2 and 3, and to the areas of least flood risk within Flood Zones 2 and 3, as identified by the Strategic Flood Risk Assessments (SFRA) (see Table D.1 and Table D.2 of PPS25).
Settlement of Significant Development	Towns identified for the focus of growth beyond the Major Urban Area. These are identified as being capable of balanced and sustainable growth, with development primarily aimed at meeting the economic and social needs of the area rather than attracting out-migration from the Major Urban Areas.
Standard of protection	The estimated probability of an event occurring which is more severe than those against which an area is protected by flood defences.
Strategic Centre	Urban areas identified within the Regional Spatial Strategy as key locations for development and/or regeneration to promote the region as a whole and support wider development aims.
Strategic Flood Risk Assessment (SFRA)	A study to examine flood risk issues on a sub-regional scale, typically for a river catchment or local authority area during the preparation of a development plan.
Source Protection Zone (SPZ)	Defined areas showing the risk of contamination to selected groundwater sources used for public drinking water supply, from any activities that might cause pollution in the area.
Surface Water	Water collected or flowing over the ground not contained within a watercourse. Usually results from heavy rainfall.

Sustainable Drainage Systems (SUDS)	A sequence of management practices and control structures, often referred to as SUDS, designed to drain surface water in a more sustainable manner. Typically, these techniques are used to attenuate rates of runoff from potential development sites.
Watercourse	Any natural or artificial channel that conveys surface water.
Water Cycle Strategy (WCS)	Provides a plan and programme of Water Services Infrastructure implementation. It is determined through an assessment of the environment and infrastructure capacity for: water supply; sewage disposal; flood risk management; and surface water drainage.
Watershed	Line depicting the area within which all surface water will drain into an area of interest, such as a town or village. For the assessment of surface water this boundary is defined from the topography.

ABBREVIATIONS

AMP	Asset Management Plan
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
CAMS	Catchment Abstraction Management Strategy
CDD	Cistern Displacement Devices
CDWF	Consented Dry Weather Flow
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
CSO	Combined Sewer Overflow
DAP	Drainage Action Plan
DCLG	Department of Communities and Local Government
DI	Distribution Input
DMA	District Meter Areas
DO	Deployable Output
DWF	Dry Weather Flow
DVA	Derwent Valley Aqueduct
dWMRSS	Draft West Midlands Regional Spatial Strategy
dWRMP	draft Water Resources Management Plan
ECSFDI	England Catchment Sensitive Farming Delivery Initiative#
FAS	Flood Alleviation Scheme
FRA	Flood Risk Assessment
FWRMP	Final Water Resource Management Plan
GIS	Geographical Information System
GQA	General Quality Assessment

GWV	Ground Water Vulnerability
GWMU	Ground Water Management Unit
HOF	Hands-Off Flow
IDB	Internal Drainage Board
LDF	Local Development Framework
LiDAR	Light Detecting and Ranging
LPA	Local Planning Authority
NLP	Nathanial Lichfield Partners
NVZ	Nitrate Vulnerable Zones
OS	Ordnance Survey
PPS25	Planning Policy Statement 25 – Development and Flood Risk
RBMP	River Basin Management Plan
RQO	River Quality Objective
RSA	Restoring Sustainable Abstraction
RSS	Regional Spatial Strategy
SAC	Special Areas of Conservation
SFRA	Strategic Flood Risk Assessment
SHLAA	Strategic Housing Land Availability Assessment
SPZ	Source Protection Zone
SSSI	Sites of Special Scientific Interest
SSW	South Staffordshire Water
STWL	Severn Trent Water Limited
SUDS	Sustainable Drainage Systems
SWS	Special Wildlife Site

UWWTD	Urban Wastewater Treatment Directive
WAFU	Water Available for Use
WCS	Water Cycle Strategy
WFD	Water Framework Directive
WMRA	West Midlands Regional Assembly
WMRSS	West Midlands Regional Spatial Strategy
WRMU	Water Resource Management Unit #
WRP	Water Resources Plan
WRZ	Water Resource Zone
WTW	Water Treatment Works
WwTW	Wastewater Treatment Works

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 Phase 1 and Phase 2: Scoping and Outline Stage Water Cycle Study (WCS). This report relates to the production of the Phase 1 and 2 WCS and has been written to the specification of the Environment Agency's Water Cycle Study guidance (version 4) and the requirements of the Brief.

1.2 Scope

As shown in **Table 1.1** the Councils are at different stages in the process of preparing their Local Development Framework (LDF) submissions, as required by the Planning and Compulsory Purchase Act 2004. To inform and support their submissions, the Councils are required to present a portfolio of studies, forming an Evidence Base, of which this WCS will form a part.

Table 1.1 - Local Authority Development Plan Status (January 2010)

Local Authority	Commencement	Publication*	Submission*	Adoption*
Stafford Borough[1]				
Core Strategy	October 2007	June 2011	November 2011	May 2012
Site Specific Documents	October 2009	December 2010	April 2011	December 2011
Lichfield District[2]				
Core Strategy	March 2007	October 2009	January 2010	August 2010
Site Specific Documents	July 2009	November 2010	February 2011	November 2011
Tamworth Borough[3]				
Core Strategy	2007	October 2010	February 2011	January 2012
Site Specific Documents	October 2008	July 2010	October 2010	May 2011
South Staffordshire District[4]				
Core Strategy		November 2010	March 2011	November 2011
Site Specific Documents	July 2009	November 2011	March 2012	November 2012
Cannock Chase District[5]				
Core Strategy	September 2004	December 2009	March 2010	May 2010
Site Specific Documents	September 2009	September 2011	December 2011	February 2012

NB Shaded cells represent completed items

**Progression of all the Core Strategies is delayed due to RSS Phase 2 Review delays and guidance that is awaited following the formation of a new Government. All figures are correct at the time of print.*

[1] Stafford Borough Council Local Development Scheme, November 2008

[2] Lichfield District Council, Local Development Scheme, July 2009

[3] Tamworth Borough Council, Local Development Scheme, September 2009

[4] South Staffordshire District Council, March 2007

[5] Cannock Chase District Council, April 2009. Please note, the Council is currently re-considering its timetable in light of delays primarily related to the potential impacts of development upon the Cannock Chase Special Area of Conservation. Further information on the most up to date timetable should be sought from the Council."

The Councils also need to be in a position to respond with technical studies to the partial review of the Regional Spatial Strategy (RSS Phase 2). The WCS is one such study, required in order to assess the constraints and requirements that will arise from the proposed growth on the water infrastructure of the study area. In addition, it will assist in determining which locations within the Local Authority areas are the most suitable to accommodate the required growth.

The study area for this project covers the administrative areas of Stafford Borough, Lichfield District, Tamworth Borough, South Staffordshire District and Cannock Chase District, totalling an area of just under 1,450km², as shown in **Figure 1.1**. Due to the cross boundary issues associated with the targeted growth (explained further in Section 3), it is important for this area to be studied as a whole and the locations identified for development selected carefully with due consideration of all the elements of the water cycle, both within and beyond the Local Authority boundaries. Alongside the other studies collated as part of the LDF Evidence Base, a sustainable approach to development planning and investment programming will be developed which is essential to the creation of sustainable communities and economic prosperity within the southern Staffordshire sub-region.

1.3 Objectives of the Water Cycle Study

The WCS considers the following issues, addressing the constraints that they may pose to future development and discusses the improvements necessary to achieve the required level of development throughout the planning period, until 2026:

- Flood Risk;
- Water Resources;
- Water Supply;
- Wastewater Collection:
- Wastewater Treatment;
- Water Quality and Environmental Issues; and
- Demand Management.

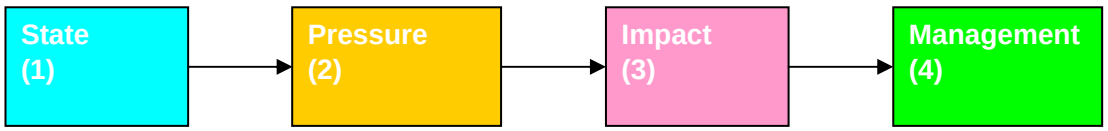
The WCS process also provides a benefit to the water companies by providing them with a more detailed indication of the possible development within the area. This will reduce the number of assumptions that are necessary in making decisions in relation to future planning of resource and infrastructure requirements.

This WCS has been produced for the five Local Authorities in consultation with all five Councils, Staffordhire County Council the Environment Agency, Severn Trent Water Limited (STWL), South Staffordshire Water (SSW) and British Waterways.

2 DATA COLLECTION AND METHODOLOGY

2.1 Overview

A sequential approach was adopted within the production of this WCS and followed the high level model shown:



1. Firstly, the current status of the water management infrastructure was assessed in order to gain an insight into the current demands placed upon it as well as existing management strategies.
2. Secondly, using information available at the time of writing, the likely trends of future growth, environmental targets and possible external threats (e.g. climate change) were established.
3. Thirdly, the impact of the identified pressures on the existing water infrastructure and other environmental assets was assessed.
4. Finally, high level sustainable management strategies were proposed in order to manage the identified problems.

2.2 Data Collection and Guidance on the use of this Study

Over the duration of the study much data has been requested, received and reviewed from the project consultees. A record of the data collected is presented as a data register in **Appendix B**.

The data included within the study was correct as of February 2010. Due to the nature of this data and study, some of this information will become superseded fairly rapidly. In addition, the Local Authorities, who are at different stages within their planning cycles, are continuing to progress their development strategies resulting in differing levels of information available to support the WCS and also have differing needs as a result. Any limitations of the data are discussed further in the relevant sections of the report.

This report, therefore, can only represent a snapshot in time and has to acknowledge that the supporting data and best practices are ever changing. The report will need to be periodically reviewed and updated to bring it in line with the latest data and best practices. As such, the Environment Agency guidance recommends reviewing this WCS every five years.

This report does not remove the need for planning authorities and developers to consult with the water companies, the Environment Agency and other statutory bodies to confirm the validity of information and any other impacts that development may have on the water cycle, particularly in details at a local level, which this study may not have identified.

2.3 Housing Growth and Employment Trajectories

The growth targets, as presented in the Draft Phase Two Revision of the West Midlands Regional Spatial Strategy (WMRSS) for the study area between 2006 and 2026 currently stand as follows:

Table 2.1 - Phase 2 RSS Targets for Growth (2006 - 2026)

	Residential (dwellings)	Indicative Annual Average (2006 - 2026)	Employment (ha)
Stafford Borough	10,100 *(7000 - Stafford*)	505 *(350)*	120
Lichfield District	8,000	400	99
Tamworth Borough	2,900	145	42
South Staffordshire District	3,500	175	24
Cannock Chase District	5,800	290	84

Stafford town has been identified within the Phase 2 RSS as a Settlement of Significant Development, hence its specific target for residential growth. The RSS also identifies a number of cross-boundary issues within the study area due to the space constraints within particular Local Authority boundaries or around existing urban areas. For a number of locations the growth targets above will require neighbouring authorities to work together in determining the most mutually beneficial locations for growth. Most notably issues arise between:

- Stafford Borough and South Staffordshire District in relation to the growth south of Stafford town;
- Cannock Chase District, Lichfield District and Stafford Borough in relation to the growth of Rugeley town; and
- Tamworth Borough and Lichfield District (also spreading beyond the study area boundary in to North Warwickshire District) with regards to the growth proposed for Tamworth.

In addition to the housing targets outlined above, it has been agreed with the Councils to consider two scenarios of higher development for the purposes of sensitivity testing. The first sensitivity test was carried out using a 10% increase in the draft WMRSS figures quoted above and the second using a 30% increase. As part of the Nathanial Lichfield Partners (NLP) 'Development Options' study[6], carried out for the Government Office for the West Midlands (GOWM), Stafford Borough has been identified as potentially being required to accommodate a higher quota of development, depending upon the Scenario adopted as part of the final WMRSS Phase 2 submission (due to be published early in 2010). Scenario 2 of the NLP study identifies a requirement for an additional 1,500 dwellings and Scenario 3 an additional 3,000 dwellings within Stafford Borough, which are roughly inline with the 10% and 30% increases stated above.

[6] Development Options for the West Midlands RSS in Response to the NHPAU Report, Government Office for the West Midlands, Nathanial Lichfield and Partners, October 2008

The three scenarios of growth being reviewed within this WCS are shown in **Table 2.2** below. Higher scenarios of employment have been included as increased development of any nature will impact upon all elements of the water cycle. However, commercial (e.g. offices or retail) developments generally have a less significant impact on the water cycle than residential, due to their lower water consumption requirements and wastewater production. There is no set measure or definition for 'large' commercial developments, although any development larger than infill office building will require consideration by the water companies.

Table 2.2 - Sensitivity Scenarios of Growth

		Stafford Borough	Lichfield District	Tamworth Borough	South Staffordshire District	Cannock Chase District
Scenario 1 (Phase 2 RSS)	Residential (dwellings)	10,100 *(7000 - Stafford)*	8,000	2,900	3,500	5,800
	Employment (ha)	120	99	42	24	84
Scenario 2 (+10%)	Residential (dwellings)	10,000-14,500 (Issues & Options) 11,600 (NLP*)	8,800	3,190	3,850	6,380
	Employment (ha)	70 -110 (Issues & Options)	108.9	46.2	26.4	92.4
Scenario 3 (+30%)	Residential (dwellings)	13,100 (NLP*)	10,400	3,770	4,550	7,540
	Employment (ha)	150	128.7	54.6	31.2	109.2

** NLP - Nathanial Lichfield and Partners*[7]

For the purposes of analysis within this study the Councils have provided GIS datasets of the proposed development locations and their potential development capacity and timescales. These locations have formed the basis for discussion with Severn Trent Water Limited (STWL) and South Staffordshire Water (SSW). As far as possible the key sites have been analysed individually, whereas the smaller, more scattered sites have been analysed in groups. This is discussed in more detail within Sections 5 - 9.

2.4 Flood Risk

All the Local Authority areas considered within this WCS have already carried out Level 1 Strategic Flood Risk Assessments (SFRA) at a District/Borough level. In addition, Cannock Chase District has carried out a Level 2 SFRA for the town of Rugeley, as shown in **Table 2.3**. The identification of Level 1 and Level 2 SFRAs relates to the requirements of PPS25[8] which suggests the use of a global coarse SFRA (Level 1)

[7] Development Options for the West Midlands RSS in Response to the NHPAU Report, Government Office for the West Midlands, Nathanial Lichfield and Partners, October 2008

[8] N.B. The PPS 25 Practice Guide was updated in December 2009 and referenced within this analysis. The main document of PPS 25 has been reviewed and updated since this report was drafted, although the changes are minor and do not impact upon the conclusions of this study. The updated documents can be viewed at the following

supported by a more detailed assessment (Level 2) in those areas where the Exception Test may be needed to assess new development proposals.

The assessment of flood risk within this report has been based upon these existing assessments, but supplemented with the findings of the Phase 1 SWMP, the Regional Flood Risk Appraisal, in addition to any other information made available by the Councils, County Council, Environment Agency and Water Companies.

A strategic summary of the flood risk issues within the Study Area as a whole is provide in **Box 3.7** in Section 3.4.

Table 2.3 - Local Authority Strategic Flood Risk Assessments (SFRAs) Current Status

Local Authority	Level 1 SFRA	Level 2 SFRA
Stafford Borough	Whole Borough, January 2008	
Lichfield District	Whole District, January 2008	
Tamworth Borough	Whole Borough, January 2008, updated in September 2008	
South Staffordshire District	Whole District, 2007, updated in October 2008	
Cannock Chase District	Whole District, April 2008	Rugeley Town, January 2009

2.5 Water Resources and Supply

Two water companies serve the southern Staffordshire study area - Severn Trent Water Limited (STWL) and South Staffordshire Water (SSW). The boundary between these two is shown in **Figure 2.1**. Roughly, STWL supplies water to the whole of Stafford Borough and parts of South Staffordshire District, whereas SSW supplies water to the whole of Lichfield District and Tamworth Borough, in addition to the remaining parts of South Staffordshire District (including the villages of Penkridge, Gailey and Kinver).

Due to the heightened security around water supply resources, this study has not been able to gain details about the location of water abstraction points, water treatment works, or water networks from the water companies. This means that making an independent accurate assessment on the impact of growth on the water infrastructure is particularly difficult.

Initial global assessments of water availability were made using the water companies' draft Water Resource Management Plans (dWMRP), Statement of Response and, where available, Final Water Resource Management Plans (FWRMP) and the Environment Agency's Catchment Abstraction Management Strategies (CAMS). Discussion has also taken place with the water companies to compare the trajectories used in their dWRMPs/FWRMPs with the WMRSS requirements and to identify any foreseeable site-specific limitations to the water supply resources and supply network.

website:
http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps25/

Strategic summaries of the water resources and supply issues within the Study Area as a whole are provided in **Boxes 3.1** and **3.2** in Section 3.1.

2.6 Wastewater Collection and Treatment

STWL are responsible for the removal and treatment of wastewater across the entire study area. Due to data security restrictions, very limited information was directly available for this study. STWL however, to support Local Authorities, provide a service for WCSs whereby they analyse the development sites and trajectories within their Strategies Team. Following this they provide their own assessment of the potential impact of the proposed development upon their wastewater collection and treatment infrastructure. It is these results which have been utilised within this WCS.

As this WCS extends only as far as an Outline stage, no modelling of the wastewater network has been undertaken. However, we recommend that the results of any modelling of the surface water network, undertaken as part of the Phase 2 SWMP, be incorporated within any update to this WCS. Where any potential limitations to the wastewater infrastructure are identified, recommendations to investigate further as part of any Detailed WCS analysis are included within the Local Authority specific sections of this report.

Strategic summaries of the wastewater collection and treatment issues within the Study Area as a whole are provided in **Boxes 3.4** and **3.5** in Section 3.2.

2.7 Water Quality and Environmental Issues

Environmental capacity is an important consideration when planning growth. It is also a central constraint in the principle of sustainable development. Although there are various definitions of environmental capacity, it is essentially an assessment of the amount of development the various elements of the environment can accommodate. This ‘capacity’ can be hard to define, since it involves a level of subjectivity. The level of change that can be accommodated often depends on the level of impact, or decline in quality or services, that is felt to be acceptable.

This WCS has been limited to considering those effects of development that relate to the water environment. Within this environment no decrease in quality is considered acceptable, as stated within the objectives of the Water Framework Directive (WFD). The effects upon the water environment have been assessed in terms of the quality of the water within the watercourses receiving effluent from WwTWs, but also with reference to environmentally designated sites both within and beyond the individual Local Authority boundaries.

A strategic summary of the water quality issues within the Study Area as a whole is provided in **Box 3.6** in Section 3.3.

2.8 Development Area Actions

Within the individual Districts and Boroughs a number of potential development areas have been identified and these have been discussed in more detail within the individual Local Authority sections. The discussions cover all the key areas (water resources and supply, wastewater collection and treatment, water quality and environmental issues and flood risk). The key issues for development now and in the future are also identified and possible solutions suggested.

The current situation is displayed as a “traffic light” system. The colours, green, amber and red have been set to provide a visual display of which development may be a problem if action is not taken. This can therefore be used as an indication of the level of investment required for each site to enable development to take place.

2.9 Data Limitations

As with all studies of this nature, the analysis relies heavily on data and information supplied by third parties. This is augmented by work carried out directly for the study. This WCS has pulled together much data from many parties to enable this report to be prepared. However there are some limitations with the process which should be noted, and some points for future projects relating to the data. Firstly, much of the data has come from the local planning authorities as part of their core strategy formulation and evidence base collected to date. As shown in **Table 1.1** all the Councils are at different stages of their core strategy formulation and therefore the level of detail and extent of information varies. In addition, the RSS has not yet been adopted and this has given rise to uncertainty in some Local Authority areas. As development is projected up to 15 years in the future some locations are as yet unknown in detail and only the concepts of development in generic areas was available.

Furthermore, much of this data is not static and is regularly being updated and revised as new information is collected or trends in development change. This study reflects a point in time and will need to be reconsidered at a later point. This study is based on data available at the start of 2010 and does not include changes to data such as revised development scenarios introduced since then. Future revisions of the study to accommodate any changes will be required on a regular basis.

3 STRATEGIC ASSESSMENTS

3.1 Water Supply and Resources

As stated in Section 2.5, the supply of potable water to the southern Staffordshire study area is split between South Staffordshire Water (SSW) and Severn Trent Water Limited (STWL). The assessment of water resources and water supply included in this WCS has therefore been primarily based on consultation with and data provided by SSW and STWL, together with any additional information provided by the Councils and the Environment Agency.

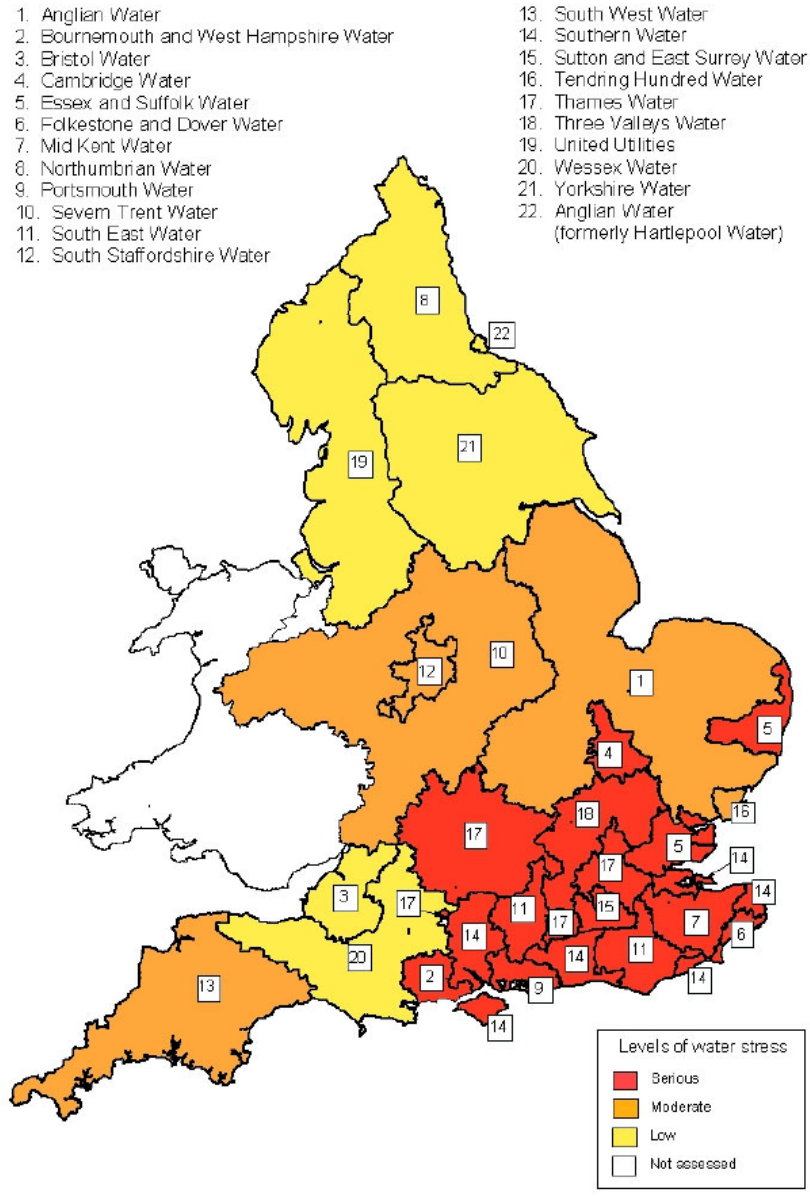
3.1.1 Water Resources

In 2007 the Environment Agency published a document entitled 'Identifying Areas of Water Stress', which is available on their website[9]. This document included a map of England, identifying areas of relative water stress, as shown in **Figure 3.1**. The whole of STWL and SSW's supply zones are shown as areas of 'Moderate' water stress, based upon the amount of water available per person both now and in the future[10]. As such, enhanced levels of water efficiency activity will be required to enable water supplies to be preserved.

Water companies have a duty to maintain the security of their supplies. In order to help achieve this, the Water Resource Management Plan Regulations (2007) require all water companies to publish a Water Resources Management Plan (WRMP). The draft versions of the most recent plans were published in 2008 and explain how each company expects to supply water to its customers over the 25 year period from 2010 to 2035. These set out forecasts of supply and demand over a twenty-five year horizon and address how they intend to provide sufficient water to meet the needs of the customer whilst protecting the environment. They also form part of the five yearly business plans each company must submit to Defra, the latest of which was submitted in August 2008. Following the submission of the draft WRMPs (dWRMPs), the water companies release 'Statements of Response' summarising their responses to the comments made on the dWRMP during the consultation period and the proposed changes they intend to make to the final versions. These were published during 2009. Following Defra's consideration of their Statement of Response, the Water Companies publish their Final Water Resource Management Plans (FWRMP). SSW published their FWRMP in August 2009. STWL published their Statement of Response in February 2009, but are still in the process of finalising their WRMP. As such this WCS utilises the results of SSW's FWRMP and STWL's Statement of Response, summarised in Section 3.1.2 below.

[9] http://publications.environment-agency.gov.uk/pdf/GEHO0107BLUT-e-e.pdf
[10] Using data from the 2004 water company Water Resource Management Plans

Figure 3.1 - Environment Agency Areas of Water Stress



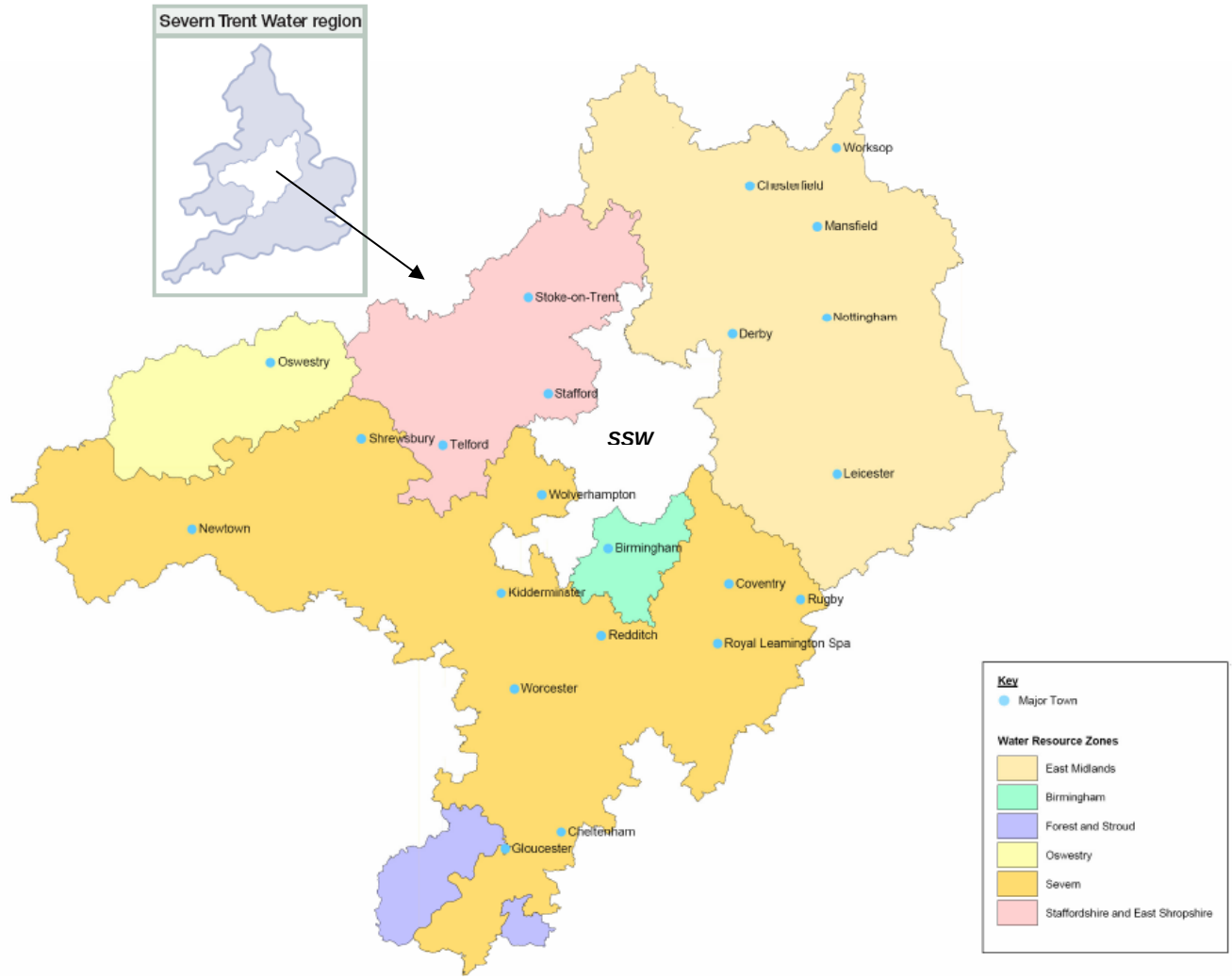
(Environment Agency, Identifying Areas of Water Stress, 2007: pp11)

Within their WRMPs the water companies refer to their Water Resource Zones (WRZs). A WRZ is the largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers experience the same risk of supply failure from a resource failure[11]. As shown in **Figure 3.2**, STWL's supply area is split into six WRZs, with SSW's supply area in the centre (shown in white). SSW is unusual in that its entire supply area is derived from just one Water Resource Zone.

[11] West Midlands Regional Spatial Strategy (RSS 11) – The Impact of Housing Growth on Public Water Supplies, Environment Agency, June 2007

Within the study area, supply is provided within STWL's 'Staffordshire and East Shropshire' and 'Severn' WRZs and SSW's WRZ.

Figure 3.2 - Water Resource Zones of STWL and SSW



(Adapted from STW publications – Focus on Water, 2007 and dWRMP SEA, Technical Summary, 2008)

Due to the size of these zones it is difficult to obtain detailed information at the Local Authority scale. However it does imply that, within these zones, the precise location of development is not important in terms of water resources.

However, following Environment Agency concerns regarding whether the Severn WRZ complies with the definition of a WRZ (e.g. that all customers within the zone share the same risk of supply failure), STWL are currently in the process of setting up a network of 40 to 50 'water accountability' zones which will provide leakage and water production management information at a sub WRZ level. The dWRMP stated that STWL planned to have these accountability zones set up and metered by March 2009. However, within the Statement of Response, STWL claim they intend to leave the WRZ definitions as they stand at present within the FWRMP, although they admit they do require a

review[12]. If, following revision, it is decided to divide the current WRZs further, a more detailed analysis of water resource availability at the District scale may be possible. *N.B. following publication of this report as a draft, the Environment Agency have confirmed that STWL have begun a review of their WRZs and that some subdivision of the existing zones will follow.*

The comments made within each water companies' FWRMP (SSW) or Statement of Response (STWL) regarding each of these WRZs are summarised below.

3.1.2 Severn Trent Water Limited

Water Sources

STWL is one of the largest water companies in England and supplies a population of over 8 million people with around 1,900 million litres of potable water. STWL serves an area of 21,000 square kilometers in the Midlands and central Wales, stretching from the Bristol Channel to the Humber and from mid-Wales to the East Midlands.

Over its entire supply area STWL obtains 40% of its water from river abstraction. The other 60% is split equally between groundwater and reservoirs. In total STWL operates 17 major surface water abstraction and raw water treatment works, around 180 groundwater abstraction sources and 15 reservoirs, most of which are naturally filled by gravity. The groundwater sources draw mainly from the Triassic Sandstone Aquifers in the English Midlands (which underlay much of this study area) but also smaller aquifers in Nottinghamshire and the Cotswolds. Triassic sandstone has large water storage capacity within the structure of the strata and it does not tend to react rapidly to periods of low rainfall. Therefore, it gives a relatively reliable and constant supply of water.

In addition to the indigenous supplies, STWL imports water from neighbouring water undertakers, principally SSW and Dwr Cymru (Welsh Water). The Welsh transfer is supplied via the Elan Aqueduct under gravity from Powys to Frankley, located to the East of Wyre Forest on the outskirts of Birmingham. This is stored in the Bartley Green Reservoir and in normal operation supplements Birmingham city's supply, although a small quantity is transferred from the Birmingham WRZ into the Severn WRZ. It constitutes approximately 14% of STWL's total water supply.

Current and Future Water Availability

Since the publication of their dWRMP, STWL have, following comments and concerns raised by stakeholders, re-assessed their supply demand balance analysis. Their latest assessments of the baseline scenario supply/demand balance, as published in their SoR, are discussed in the WRZ specific sections below. These compare the Distribution Input (DI), which indicates total demand, with the Water Available for Use (WAFU).

However, due to concerns that some abstraction of water could be contributing to environmental damage of rivers and wetlands, the Environment Agency have constructed a programme called 'Restoring Sustainable Abstraction' (RSA), which may result in abstraction reductions being identified. These will be included in the FWRMP, once confirmed by the Environment Agency.

[12] Statement of Response, Severn Trent Water, February 2009

The scenario post 2010 is dependent upon the investment STWL are able to make during AMP5 and AMP6. This has been highlighted in consultation with both the Environment Agency and STWL and within the CAMS studies.

Consultation with STWL has identified that although the SoR assessments accounted for development figures in line with the Draft Phase Two WMRSS and therefore Scenario 1, there is some flexibility with the water supply headroom figures, although this is unlikely to be sufficient to serve higher development scenarios, especially Scenario 3. However, without mitigation, this will be in deficit within the next five years. It is therefore essential that mitigation measures are implemented. As many of the measures outlined above are reliant upon support via the Ofwat Business Plan process, the promotion of water efficiency measures, such as rainwater harvesting, greywater recycling and the implementation of water meters are critical installations in new developments. STWL are currently promoting water resource efficient development with an aim for 'sustainable homes'. Guidance regarding rainwater harvesting has been provided by the Environment Agency and can be downloaded their website[13] . Although this technique is generally not very effective on an individual scale, the Environment Agency states that it has been proven to be effective on a larger scale.

To ensure that the efficient use of water is being promoted by water companies to their consumers, Ofwat requested in August 2007 that all water companies set voluntary water efficiency targets for 2008-9 and 2009-10. Following this voluntary trial Ofwat intends to propose more refined targets as part of their final determination of price limits in 2009 (PR09). In June 2008 Ofwat released a consultation paper which details their proposals for setting annual water efficiency targets for each water company for AMP5 (2010-11 to 2014-15). Within this paper Ofwat proposes that each company has a minimum equivalent base service target of saving 1litre of water per billed property per day through approved water efficiency activity. For STWL this relates to 3.3Ml/d. On top of this base target they request a sustainable economic level of water efficiency, which is to be proposed by the water companies, and that would form part of a sustainable economic approach to balancing supply and demand.

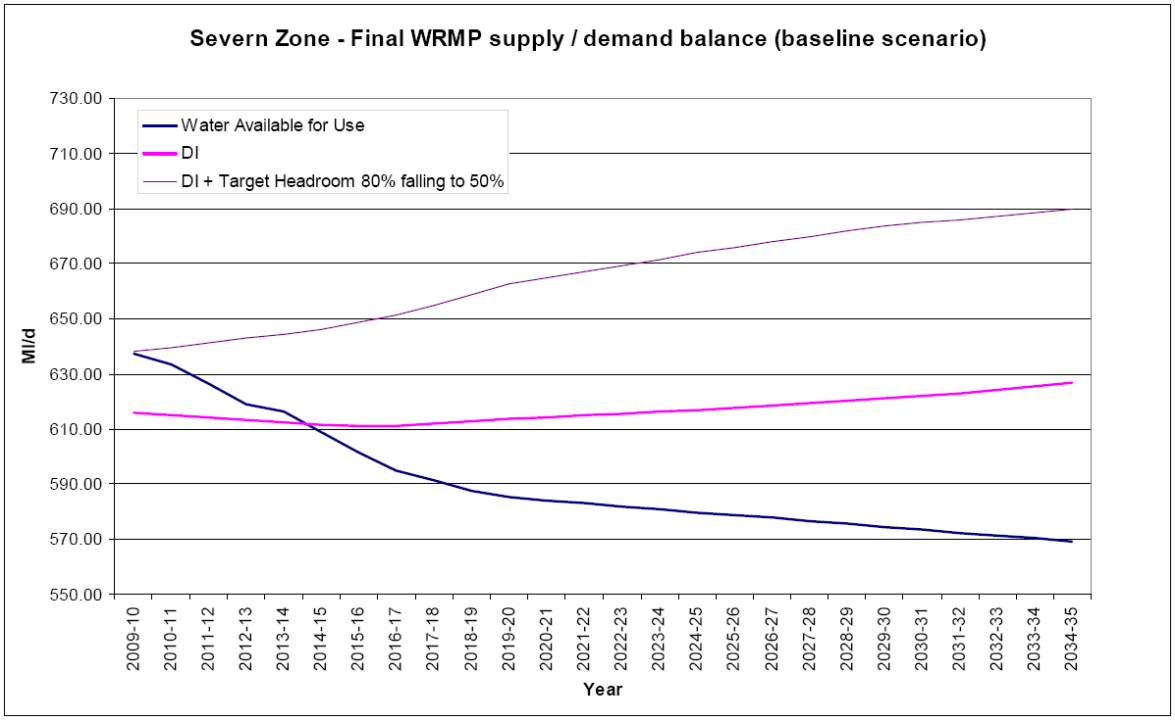
The following sections discuss the specific issues identified by STWL for the two WRZs which supply the Study Area.

Severn WRZ (STWL)

Figure 3.3 shows STWL's latest assessment of the baseline scenario supply/demand balance for the Severn WRZ, as shown in their SoR This compares the Distribution Input (DI), which indicates total demand, with the Water Available for Use (WAFU). Although the recalculation from their dWRMP has produced a lower demand forecast, it has also predicted a lower WAFU over much of the planning period, mainly due to inclusion of a more realistic representation of climate change. This new projection indicates that there is enough WAFU in the system to meet the DI until 2013-14, although beyond this date the supply/demand balance becomes increasingly negative, reaching a projected supply/demand shortfall of around 120Ml/d by 2035. However, the recalculated figures do indicate that the WAFU is lower than the DI plus target headroom throughout the planning period.

[13] http://publications.environment-agency.gov.uk/pdf/GEHO0108BNPN-E-E.pdf

Figure 3.3 - Adjusted Severn Zone Baseline Scenario Supply/Demand Balance (Statement of Response)



(Draft Water Resource Management Plan – Statement of Response, STWL, Feb 2009)

Within their dWRMP STWL refer to six 'sub regions' within their Severn WRZ. The region of the Study Area located within this WRZ is located on the boundary of three of these sub regions, namely: Worcestershire, Warwickshire, Gloucestershire and South Shropshire; Wolverhampton; and the Shrewsbury system.

The Worcestershire, Warwickshire, Gloucestershire and South Shropshire area has a predicted supply-demand balance deficit based on dry year demand and supply. This shortfall was identified in WRP04 and solutions were funded in this AMP period. The main scheme included a new river intake and water treatment works at Ombersley, which would have supplied an additional 30 million litres of water a day to support the Severn WRZ through the strategic water grid. The aim of this strategy was to achieve a supply/demand balance at the 80% confidence level by 2010. However, the Environment agency have confirmed that this mitigation strategy is no longer included in the plan as STWL have shown they can meet the demands within the timescale without needing to develop this resource.

The Wolverhampton area has been identified as having a water resource surplus and the Shrewsbury sub zone identified as having adequate resource available, even when the Growth Point projections are taken into consideration. Despite this some resilience options are being considered.

To overcome the shortfalls identified within the Severn WRZ, STWL outlined a number of measures ("interventions") in their Statement of Response, as shown in **Table 3.1** below and graphically in **Figure 3.4**.

Table 3.1 - Proposed Intervention Strategy to Maintain Supply/Demand Balance, Severn WRZ

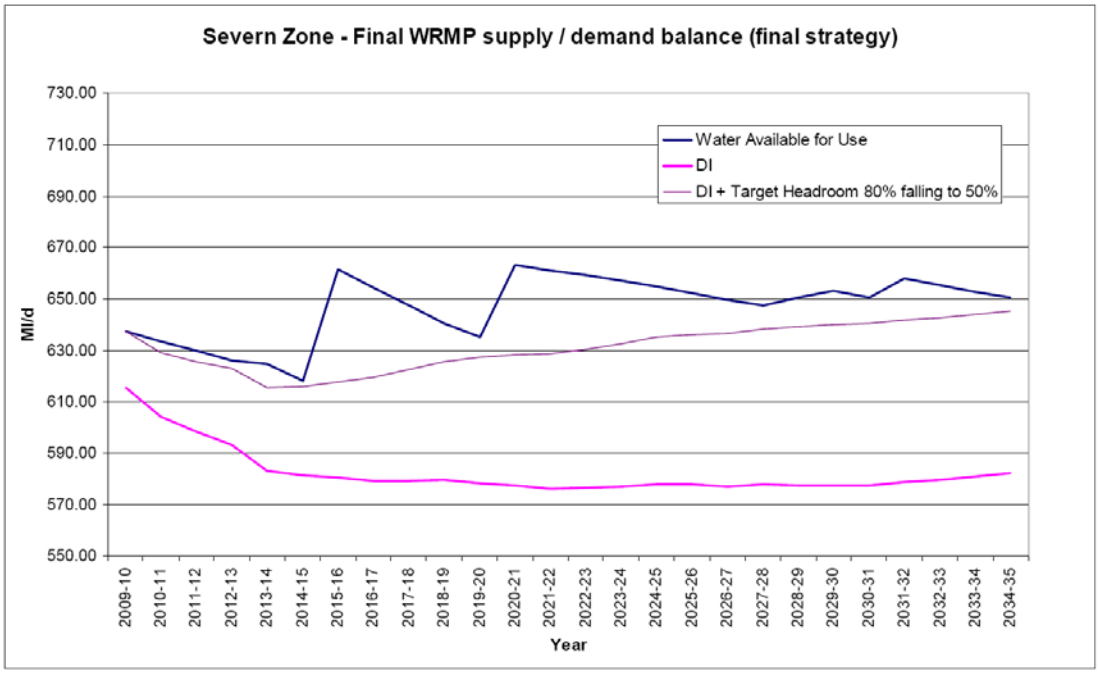
AMP Period	Proposed Intervention
AMP 5 2010 - 2015	• Additional household metering; • Household and non-household water efficiency programme; • Leakage control through a combination of active leakage control, mains replacement and pressure control; • Derwent Valley Aqueduct (DVA) duplication from Kings Corner to Hallgates.
AMP 6 2015 – 2020	• New Birmingham groundwater source; • Minworth aquifer storage and recovery; • Highters Heath aquifer storage and recovery; • Household and non-household water efficiency programme; • Leakage control through combination of active leakage control, mains replacement and pressure control.
AMP 7 2020 – 2025	• Household and non-household water efficiency programme; • Leakage control through combination of active leakage control, mains replacement and pressure control.
AMP 8 2025 – 2030	• Norton aquifer storage and recovery; • River Leam flow compensation change; • Household and non-household water efficiency programme; • Leakage control through combination of active leakage control, mains replacement and pressure control.
AMP 9 2030 - 2035	• Whitacre aquifer storage and recovery; • Household and non-household water efficiency programme; • Leakage control through combination of active leakage control, mains replacement and pressure control.

(Adapted from dWRMP, Statement of Response, STWL, Feb 2009)

The dramatic increases in the WAFU shown in **Figure 3.4** relates to the processes shown in **Table 3.1** above that result in significant water resource increase, such as the DVA duplication at the end of AMP5 and the introduction of a new Birmingham groundwater source in AMP6. If all the strategies listed in **Table 3.1** are implemented then this figure implies that the WAFU will remain above the DI plus target headroom throughout the planning period. However, the margin is such that if one or more cannot be implemented for any reason, the resulting WAFU may drop below the DI plus target headroom level.

The Ombersley treatment works appears to no longer be included within the proposed interventions to meet the supply/demand balance within the Severn WRZ.

Figure 3.4- Adjusted Severn Zone Baseline Scenario Final Strategy Supply/Demand Balance

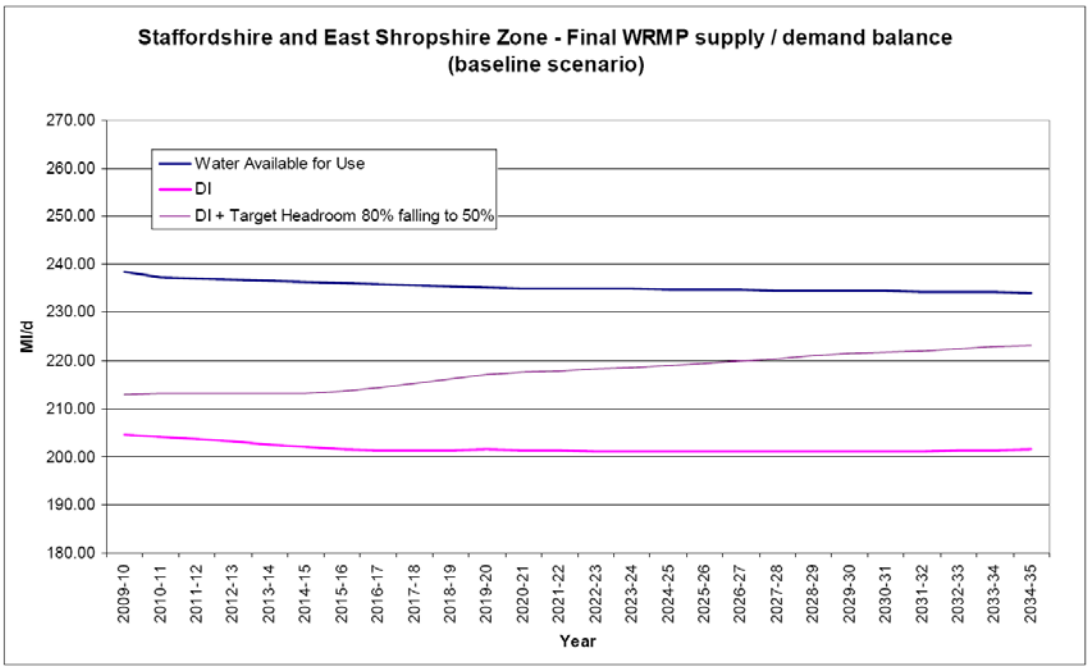


(Draft Water Resource Management Plan – Statement of Response, STWL, Feb 2009)

Staffordshire and East Shropshire WRZ (STWL)

Figure 3.5 shows STWL's latest assessment of the baseline scenario supply/demand balance for the Staffordshire and East Shropshire WRZ. This compares the Distribution Input (DI), which indicates total demand, with the Water Available for Use (WAFU). This projection indicates that there is actually enough WAFU in the system to meet the DI throughout the planning period, even under the baseline scenario.

Figure 3.5 - Adjusted Staffordshire and East Shropshire Zone Baseline Scenario Supply/Demand Balance (Statement of Response)



(Draft Water Resource Management Plan – Statement of Response, STWL, Feb 2009)

Within their dWRMP STWL refer to five 'sub regions' within their Staffordshire and East Shropshire WRZ. The majority of the study area supplied from this WRZ is located within the Stafford and Stone sub region. However the western edge of the study area is also likely to be supplied from the Telford sub region.

The Stafford and Stone region is identified within the dWRMP as having some surplus water at present, although it is under pressure from water quality issues and potential reduction in abstraction license quantities dependent upon the findings of the current RSA investigations. As a result of further investigation some of this water may be used to support the Leek and Stoke sub region to the north, although potential resilience measures also require consideration. For emergency purposes this sub region has links with SSW in the south.

The Telford area has been identified as currently having some surplus resource, although this is restricted by complex nitrate blending arrangements (see page 231 of STWL's dWRMP). The dWRMP identifies that there is sufficient resource to meet the growth requirements for this sub region, but further resilience measures will be required.

To overcome any shortfalls for the WRZ, STWL outlined a number of measures ("interventions") in their Statement of Response, as shown in **Table 3.2** below and graphically in **Figure 3.6** .

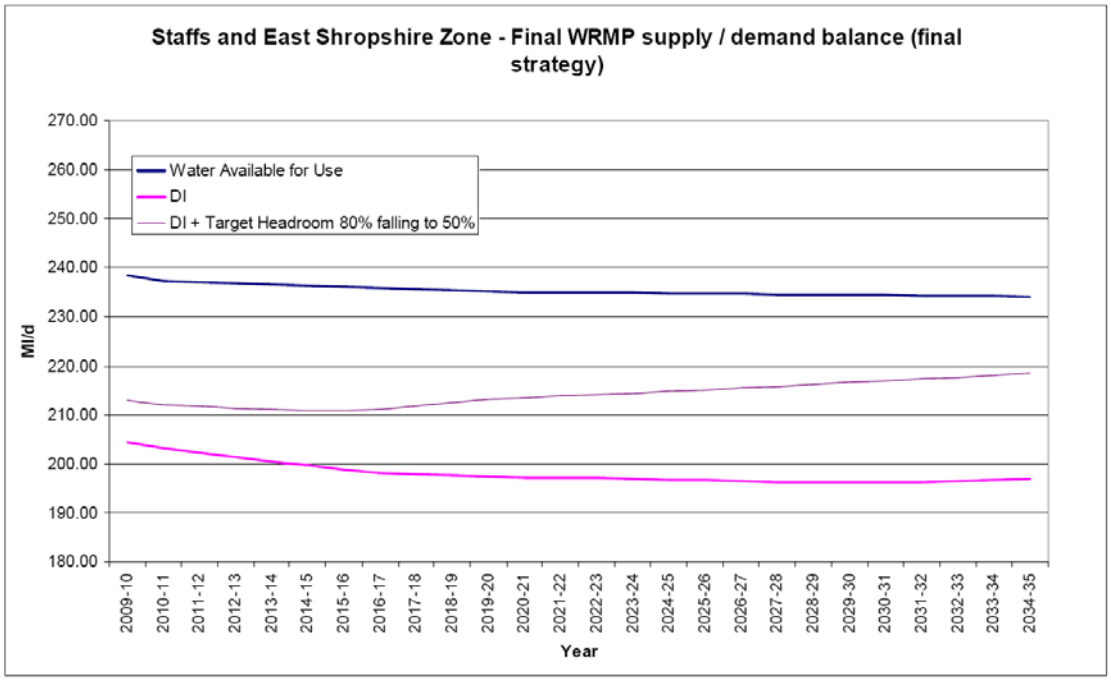
Table 3.2 - Proposed Intervention Strategy to Maintain Supply/Demand Balance, Staffordshire and East Shropshire WRZ

AMP Period	Proposed Intervention
AMP 5 2010 - 2015	• Household and non-household water efficiency programme; and • Leakage control through a combination of active leakage control, mains replacement and pressure control
AMP 6 2015 – 2020	• Household and non-household water efficiency programme; and • Leakage control through a combination of active leakage control, mains replacement and pressure control
AMP 7 2020 – 2025	• Household and non-household water efficiency programme; and • Leakage control through a combination of active leakage control, mains replacement and pressure control
AMP 8 2025 – 2030	• Household and non-household water efficiency programme; and • Leakage control through a combination of active leakage control, mains replacement and pressure control
AMP 9 2030 - 2035	• Household and non-household water efficiency programme; and • Leakage control through a combination of active leakage control, mains replacement and pressure control

(Adapted from dWRMP, Statement of Response, STWL, Feb 2009)

The WAFU stability shown in **Figure 3.6** relates to the processes shown in **Table 3.2** in addition to the recalculation of DO, as mentioned above.

Figure 3.6- Adjusted Staffordshire and East Shropshire Zone Baseline Scenario Final Strategy Supply/Demand Balance



(Draft Water Resource Management Plan – Statement of Response, STWL, Feb 2009)

Water Supply

STWL were unable to give comment regarding the capacity of the water supply network to supply the water resources to the individual development areas discussed within this WCS. Discussion confirmed that they do not provide assessment of water supply on a site or area specific basis for WCSs, referring only to their dWRMP and Statement of Response. They concluded that the *"network is ok"* and that if the dWRMP and Statement of Response conclude that water is available then they would supply it to wherever necessary, although they may require the appropriate developer contributions. Presumably more detailed assessment and an idea of the scale of developer contribution required will be available once individual sites are progressed.

BOX 3.1

STWL's Water Resources and Supply: At a Glance…..

Water Resources

Based on the latest RSS figures, STWL believe there is sufficient water supply to meet the predicted demands at a Water Resource Zone (WRZ) level. However, this is reliant upon the implementation of a number of mitigation measures, affecting all relevant WRZs, as listed in Tables 3.1 and 3.2, above. These measures are to be implemented by the water companies and are particularly critical for the Severn WRZ, increasing the water supply balance from negative to positive, affecting the central area of South Staffordshire District.

STWL recognise that the local delivery scale is potentially the largest problem as the WRMP does not assess the situation at an asset specific level. This will be reviewed within STWL's next Business Plan and is therefore reliant upon the provision of as much information regarding the size, location and profile of the proposed development from the Councils as far in advance as possible. It is therefore vital that Councils and developers consult with STWL as early as possible in the development process. The Councils should notify STWL as soon as preferred development options are decided. This will assist STWL in planning for the future water demand.

Water Supply

If water is available STWL will supply it, although developer contributions may be required. It is therefore vital that Councils and developers consult with STWL as early as possible in the development process. The Councils should notify STWL as soon as preferred development options are decided. This will assist STWL in planning and budgeting the phasing of network improvements across the planning period.

3.1.3 South Staffordshire Water

Water Sources

SSW supplies a population of nearly 1.25 million, over an area of almost 1,490km^2. SSW's area of supply stretches from the edge of Ashbourne in the North, to Halesowen in the South, and from Burton on Trent in the East to Kinver in the West, as shown in **Figure 2.1**.

Approximately 50% of the company's water supply in a critical dry year is abstracted from surface water sources: Blithfield Reservoir (which supplies Seedy Mill water treatment works), located on the River Blithe in East Staffordshire; and the River Severn, extracted at Hampton Loade[14]. The majority of the remaining water supply is abstracted from the Sherwood Sandstone aquifer from 27 groundwater sources. Triassic sandstone has large water storage capacity within the structure of the strata and it does not tend to react rapidly to periods of low rainfall. Therefore, it gives a relatively reliable and constant supply of water. In addition to these indigenous supplies, SSW also imports and exports water to and from STWL to enable maintenance of a consistent supply.

Current and Future Water Availability

The latest assessment of water resources, as published on SSW's website, is as follows:

> **Current water resources position at the end of September 2009**
>
> May, June and July were very wet months, which were followed by two very dry months in August and September. Flows on the River Severn are currently below average and River Regulation (releases from Clywedog Reservoir) was initiated by the Environment Agency at the end of September. There are no groundwater resources issues. Blithfield Reservoir storage level was at 67% at the end of September. This is not uncommon for this time of year, however it is at the threshold of the first reservoir trigger level (the drought monitoring curve). No further action is proposed at this stage. We will continue to review this position.
>
> **Reservoir levels**
>
> We use the level in Blithfield Reservoir as the main indicator of resource availability. Regular analyses of refill scenarios for Blithfield Reservoir are routinely undertaken during the refill season and the levels are monitored continuously. Blithfield reservoir was at 67% at the end of September, this is slightly below average for the time of year.
>
> **River Severn**
>
> The surface water reservoirs used to support flows in the River Severn were in a healthy position at the end of September (Clywedog 87% and Vyrnwy 90%) and therefore there are no concerns over availability of resources for river support.

[14] SSW FWRMP, 2009

Groundwater

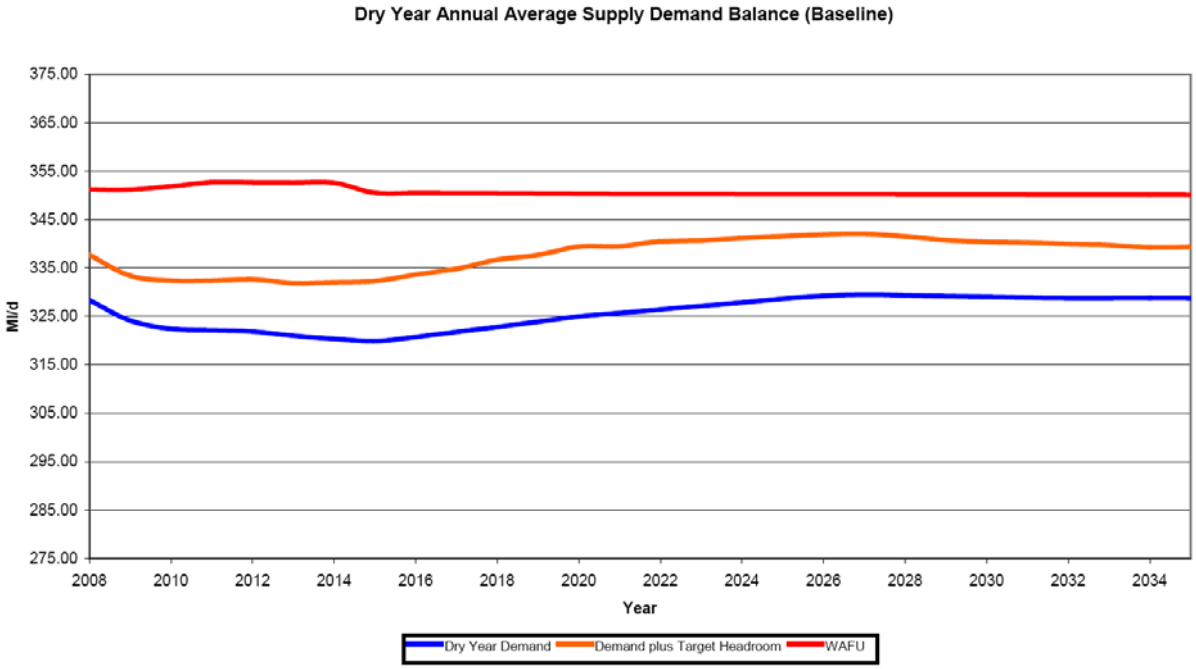
Groundwater levels in the Sherwood Sandstone aquifer do not tend to react rapidly to short periods of high or low rainfall. Current groundwater levels are within the normal range. In general the reliable yield of our groundwater sources is unaffected by groundwater levels, and therefore we do not use groundwater levels as a means of assessing the water resources situation.

Rainfall

The rainfall (recorded at our Seedy Mill treatment works) for September was significantly lower than the ten year average at 31%. This is the second very dry month in a row (rainfall in August was 59% of the 10 year average). However the previous three months were very wet May (110%), June (152%) and July (166%).

SSW's FWRMP states that there is a sufficient water resource to meet supply over the planning period, as shown in the baseline Supply Demands graph, **Figure 3.7**. This is based upon the RSS Phase 2 figures available in 2008 (equivalent to Scenario 1 being assessed in this WCS).

Figure 3.7 - SSW Baseline Supply Demand Balance (FWRMP)



N.B. As SSW only have one WRZ, this graph is valid for the whole of their supply area.

As the whole of SSW's supply area forms one WRZ, this status does not vary over the Study Area or between sub-regions. However, through discussion with SSW, it appears there is not much flexibility in these figures and, as such, additional measures would be required to meet the higher sensitivity scenarios being considered within this WCS, especially the 30% increase (Scenario 3). These measures have not been included within the FWRMP. The company expressed significant concern over the possibility of the development figures increasing from the latest RSS Phase 2. As such discussion

must be held with SSW to inform them of any predicted development above this RSS limit as soon as possible to determine whether and how the demand can be met. SSW stated that the speed of delivery of any additional sites cannot be guaranteed.

As sufficient water resources have been identified, no problems are foreseen and, as such, no new schemes are planned within the planning period. However, it must be considered that individual commercial customers who require large volumes of water get priority due to the revenue they produce. Although SSW have factored non residential water use into their FWRMP resourcing may become a problem if an individual commercial customer suddenly demands a large volume of water. Again it would be of assistance to SSW if the Councils inform them in advance of any potential development application being made.

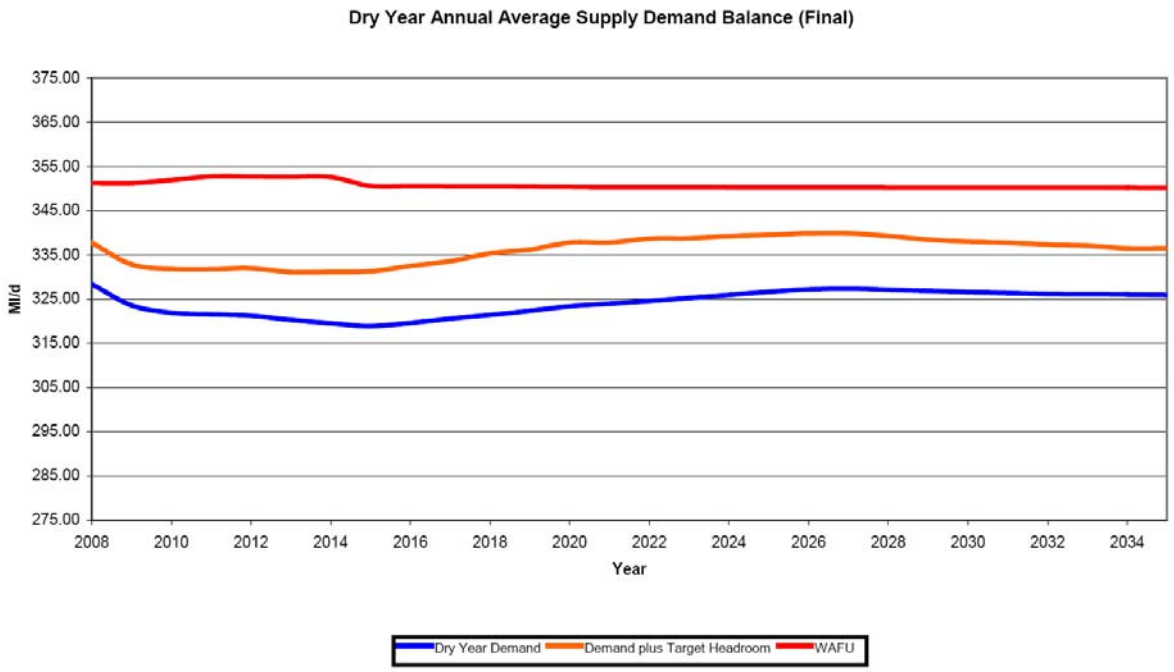
Three key mitigation measures are promoted within SSW's FWRMP and included within their predictions of water availability, namely:

- Metering;
- Leakage; and
- Water Efficiency

As such the implementation of the Code for Sustainable Homes in all new developments is critical to the delivery of the FWRMP. This is discussed further in Section 4.

The final Supply Demand graph, shown in **Figure 3.8** is based upon the inclusion of SSW's measures of metering upon change of occupier and meeting the leakage target's set by Ofwat.

Figure 3.8 - SSW Final Supply Demand Balance (FWRMP)



N.B. As SSW only have one WRZ, this graph is valid for the whole of their supply area.

Water Supply

Within their FWRMP SSW identify that localised distribution issues may be experienced in urban areas, due to high simultaneous demand, usually from domestic customers. As it is not a water resource issue the investment required to update the infrastructure is being factored into their Final Business Plan and is not considered in the FWRMP.

To assist in the assessment of the potential investment required to permit development, SSW have provided a high level analysis of the potential development sites within the Study Area for use in this WCS. The results of this assessment are only preliminary and represent a 'snapshot in time'. As individual sites are brought forward for development they would required a more detailed review, which may result in alteration of the conclusions (all applications should be made through SSW's website). The results of this preliminary analysis are included in the Local Authority specific Sections, 5 to 9.

BOX 3.2

SSW's Water Resources and Supply: At a Glance…..

Water Resources

Based on the latest RSS figures, SSW believe there is sufficient water supply to meet the predicted demands on water resources within Scenario 1 of the RSS. However, their final supply demand scenarios are reliant upon the implementation of metering, leakage and water efficiency measures, including the Code for Sustainable Homes (assumed Level 3). There is not sufficient flexibility to accommodate scenarios of increased development or large scale commercial development. It is therefore vital that the Councils and developers consult with SSW as early as possible in the development process. The Councils should notify SSW as soon as preferred development options are decided. This will assist SSW in planning for the future water demand.

Water Supply

Some urban areas are at risk of experiencing low flows at peak times. SSW have provided an individual site analysis of the potential development sites within the study area. As development sites are progressed, the Councils and developers should notify SSW as early as possible regarding the location and size of developments. The Councils should notify SSW as soon as preferred development options are decided. This will assist SSW in planning and budgeting the phasing of network improvements across the planning period, either wtihin their Business Plans or through developer contributions.

3.1.4 Environment Agency

The Environment Agency has released a number of Catchment Abstraction Management Strategies (CAMS) which have been produced in consultation with a range of key stakeholders and explain how they will manage the water resources. There are five CAMS studies relevant to the Study Area:

- **Staffordshire Trent Valley** (July 2007) which covers the catchments of the Rivers Trent, Sow, Penk and Blithe in Cannock District, Stafford Borough, South Staffordshire District and Lichfield District;
- **Tame, Anker and Mease** (March 2008) which covers the Rivers Trent, Mease, Tame, Anker and Bourne Brook in Lichfield District and Tamworth Borough;
- **The Trent Corridor** (December 2003) which focuses solely on the River Trent, affecting Stafford Borough, Lichfield District and Cannock Chase District;
- **Worcestershire Middle Severn** (December 2006) which covers the Smestow Brook and River Stour in South Staffordshire District; and
- **Shropshire Middle Severn** (September 2007) which receives runoff from the western edges of Stafford Borough (including the River Meese) and part of South Staffordshire District.

All these studies are available through the Environment Agency's website[15], which includes maps of their catchment boundaries. As indicated above it is the first four which are key to this study, with the Shropshire Middle Severn receiving runoff from the more rural areas of the western edge of the Study Area where no major developments are currently planned.

These studies outline where water is available for abstraction, where there is a need to reduce current rates of abstraction, outline their policy on time-limited licences and renewal of licences and provide an indication of the reliability of a potential abstraction licence. They highlight the status of the water resource management units (WRMU) and groundwater management units (GWMU) within each area, in addition to the water SSSIs, Special Areas of Conservation (SAC) and Special Protection Areas (SPA) which are affected by changes in water availability. The CAMS outline the current status of the WRMUs and GWMUs, the integrated status (taking consideration of both the GWMU and WRMU status) and the target status in 2010 and 2016, using the four tier system to categorise water resource availability as shown in **Table 3.3**.

Appendix C summarises the water availability for each of the watercourses located within the Study Area, in addition to the environmentally important sites which may be negatively affected if the targets set out in the CAMS are not reached.

[15] http://www.environment-agency.gov.uk/research/planning/33518.aspx

Table 3.3 - Environment Agency Water Resource Availability Status Categories

Indicative Resource Availability Status	Licence Availability
Water Available	Water is likely to be available at all flows including low flows. Restrictions may apply.
No Water Available	No water is available for further licensing at low flows. Water may be available at higher flows with appropriate restrictions.
Over-licensed	Current actual abstraction is such that no water is available at low flows. If existing licences were used to their full allocation they could cause unacceptable environmental damage at low flows. Water may be available at high flows, with appropriate restrictions.
Over-abstracted	Existing abstraction is causing unacceptable damage to the environment at low flows. Water may still be available at high flows, with appropriate restrictions.

(Adapted from the Worcestershire Middle Severn CAMS, EA, 2006: pp17)

Agricultural practices also have a high demand for water supply and can have a major impact on water resources, mainly to fulfil irrigation requirements, but also due to the potential impacts from the use of fertilisers and general land management. This supply is often gained from river or groundwater abstractions which therefore require a licence from the Environment Agency. As outlined in the CAMS this may become very restricted within the Study Area and increasingly pressurised due to development and climate change. Although it must be appreciated that the CAMS status is at low flows only, the sandstone aquifer beneath the Study Area has a high storage and lag time response to recharge, having the impact of 'smoothing out' the impact of groundwater abstraction on surface flow regimes over the entire hydrological year. As such, the assessment within the CAMS actually applies to any flow regime.

The conclusions of the five CAMS studies relevant to the Study Area are summarised below. Where a watercourse has been marked with a 'hands-off flow' (HOF), restrictions will be in place stating that abstraction must cease when the flow falls below a certain threshold, as identified within the CAMS.

Staffordshire Trent Valley

There are five WRMUs and eleven GWMUs within this CAMS:

- WRMU1 and WRMU2 - Upper and Lower Trent and the River Swarbourn
- WRMU 3 - Rivers Sow and Penk
- WRMU 4 - Scotch Brook
- WRMU 5 - River Blithe
- Forsbrook GWMU
- Spot GWMU
- Oulton GWMU
- Tittensor GWMU
- Hatton GWMU
- Bishops Wood GWMU
- Teddesley GWMU
- Rugeley GWMU
- Coven GWMU
- Hopton GWMU
- Hardiwick GWMU

Map 3 on page 15 of the Staffordshire Trent Valley CAMS[16] graphically illustrates the integrated management unit status of the main waterbodies within the catchment.

Table 3.4 summarises the current status of the key watercourse in addition to the impact of water availability on abstraction licences, and therefore agricultural practices.

Table 3.4 - Impact of Water Availability on Abstraction Licences in Staffordshire Trent Valley CAMS

Water Source	Status	New Licences	Existing Licences*
Upper River Trent	Water Available	Issued subject to HoF Time limit of 31 March 2015	No impact Time limited licences will be renewed
Lower Trent and Swarbourn	No Water Available	Issued subject to HoF Time limit of 31 March 2015	No impact Time limited licences will be renewed
River Sow	No Water Available (Overabstracted in top reach)	*Upstream of Doxey Marshes:* Issued subject to HoF. Water only available at very high flows (approx. 20% of year) Time limit of 31 March 2015 *Downstream of Doxey Marshes*: Issued subject to HoF Time limit of 31 March 2015	No impact
River Penk	No Water Available	Issued subject to HoF Subject to three tiered abstraction conditions Time limit of 31 March 2015	Three tiered abstraction condition during summer months changing to two tiered with HoF No change to winter licences

[16] http://www.environment-agency.gov.uk/research/planning/33522.aspx

Water Source	Status	New Licences	Existing Licences*
Scotch Brook	Over Abstracted	Closed to new licences	No impact No additional water granted Time limited licences may be renewed
River Blithe	Water available (Over abstracted in top reaches)	*Upstream of Blithfield Reservoir* Closed to new licences *Blithfield to Nethertown* Issued subject to HoF Time limit of 31 March 2015 *Downstream of Nethertown* Closed to new abstraction	No impact Presumption of renewal to time-limited licences
Tittensor, Hatton, Spot, Forsbrook GWMUs	Over Abstracted	No water available - closed to new licences	No additional water Time limited licences may be renewed
Rugeley and Teddesley GWMUs	Over Licensed	No water available - closed to new licences	No additional water Time limited licences may be renewed
Bishops Wood GWMU	No Water Available	Applications considered but limited water Time limit of 31 March 2015	No impact Time limited licences will be renewed
Oulton, Hardiwick and Hopton GWMU	Water Available	Applications accepted Time limit of 31 March 2015	No impact Time limited licences will be renewed
Coven GWMU	Water Available	Applications accepted Time limit of 31 March 2015	No impact Time limited licences will be renewed

* all will be subject to local considerations and other renewal criteria

Tame, Anker and Mease

There are three WRMUs and one GWMU within this CAMS that are located within the Study Area

- WRMU1 - Tame, Anker, Cole and Trent
- WRMU 3 - Bourne/Black Brook
- WRMU 4 - Mease
- Lichfield and Shenstone GWMU

Map 3 on page 16 of the Tame, Anker and Mease CAMS graphically illustrates the integrated management unit status of the main waterbodies within the catchment.

Table 3.5 summarises the current status of the key watercourse in addition to the impact of water availability on abstraction licences, and therefore agricultural practices.

Table 3.5 - Impact of Water Availability on Abstraction Licences in Tame, Anker and Mease CAMS

Water Source	Status	New Licences	Existing Licences*
River Tame River Anker River Trent	Water Available	Issued subject to HoF Time limit of 31 March 2014	No impact Presumption of renewal to time-limited licences
Bourne/Black Brook	Over Abstracted	No water available - closed to new licences	No further licensing Voluntary revocations and reductions required Encouragement of efficient water use Investigation for larger abstraction from Lichfield and Shenston GWMUs Presumption of renewal to time-limited licences
River Mease	No Water Available	Consider new winter applications Approval required from Natural England Closed for new summer abstractions Time limit relating to Habitats Directive	Impacts being investigated under Habitats Directive Currently no impact Time limited licences may be renewed
Lichfield and Shenstone GWMU	Over Abstracted	No water available for consumptive abstractions	Consideration under RSA Voluntary revocations and reductions encouraged Encouragement of efficient water use Presumption of renewal to time-limited licences

* all will be subject to local considerations and other renewal criteria

The Trent Corridor

This CAMS predates the Staffordshire Trent Valley CAMS discussed above. As the conclusions for the section of River Trent within the Study Area are identical in both studies, this CAMS will not be reviewed here. Reference is instead made to the Staffordshire Trent Valley section above.

Worcestershire Middle Severn

There is one WRMUs and one GWMU within this CAMS located within the Study Area

- WRMU 2 - Rivers Worfe, Stour and Salwarpe
- Triassic Sandstone Aquifer

Map 4 on page 16 of the Worcestershire Middle Severn CAMS graphically illustrates the integrated management unit status of the main waterbodies within the catchment.

Table 3.6 summarises the current status of the key watercourse in addition to the impact of water availability on abstraction licences, and therefore agricultural practices.

Table 3.6 - Impact of Water Availability on Abstraction Licences in Worcestershire Middle Severn CAMS

Water Source	Status	New Licences	Existing Licences*
River Stour Smestow Brook	Over Abstracted	All subject to HOF No low flow licences Encouragement of winter storage reservoirs and water efficient measures Restrictive daily pumping capacity	No increase in low flow quantity HOF Reductions on volumes Daily pumping capacity of 0.5Ml/d Reservoirs and efficiency measures
GWMU (Triassic Sandstone Aquifer)	Over Abstracted	No further water available	No additional water Renewal licences only approved through stringent testing Reduction to maximum usage of all licences due for renewal

* all will be subject to local considerations and other renewal criteria

Shropshire Middle Severn

There are two WRMUs and two GWMU within this CAMS located in proximity to the Study Area

- WRMU 2 - River Tern Catchment
- WRMU 3 - Coley Brook Catchment
- Aqualate GWMU
- Sambrook East GWMU

Table 3.7 summarises the current status of the key watercourse in addition to the impact of water availability on abstraction licences, and therefore agricultural practices.

Table 3.7 - Impact of Water Availability on Abstraction Licences on Shropshire Middle Severn CAMS

Water Source	Status	New Licences	Existing Licences*
River Tern and Sambrook East GWMU	Over Licensed	Encouragement of winter storage reservoirs and other water efficient measures All subject to HoF Short term licences available from groundwater No presumption of renewal	Same condition as new licences on increased part of licence Renewal licences required to pass 3 tests Consideration of retrieval of unused licences and encourage downward variation
Coley Brook and Aqualate GWMU	Over Abstracted	Aqualate GWMU Closed All subject to HoF Encouragement of winter storage reservoirs and other water efficient measures	Same condition as new licences Renewal licences required to pass 3 tests Consideration of retrieval of unused licences and encourage downward variation

* all will be subject to local considerations and other renewal criteria

BOX 3.3

CAMS: At a Glance…..

Very few of the WRMU and GWMUs have water available for use or sufficient resource to supply new or increased abstractions. A large area is classified as currently being over abstracted, including the Scotch Brook, Bourne/Black Brook, the River Stour, Smestow Brook, the Tittensor, Hatton, Spot and Forsbrook GWMU, Lichfield and Shenstone GWMU, Worcestershire Middle Severn GWMU and Coley Brook and Aqualate GWMU (mainly the southern and western watercourses and a large proportion of the aquifers).

For most of the Study Area, there will be increasing restrictions on the abstraction licences. The reduction in water abstraction from the Aquifers and Main Rivers will undoubtedly affect agricultural practices in the region. More water is currently available in the south east of the Study Area (Lichfield District and Tamworth Borough) from the Rivers Tame, Trent and Anker but even these are subject to a HoF.

These studies indicate that much of the Study Area and specific areas within all Districts/Boroughs are under pressure with regards to water availability. As much of the Study Area is situated over the head waters of catchments and the River Trent connects this area to many surrounding Local Authority areas, problems with water availability within this area extend far beyond the borders of the Local Authorities and can have negative impacts on sites much further downstream. It is therefore essential that appropriate measures are taken not to over abstract the sources of groundwater and surface water within the administrative areas considered here. The impacts of housing development upon these water sources will be considered and addressed by the water companies. However any development which proposes to utilise its own water abstraction, from either ground or surface water sources, will require approval by the Environment Agency. For such developments the Councils and developers must consider the information provided in the CAMS and consult with the Environment Agency. This may result in a delay and, where a watercourse is identified as having limited or no water available, possibly a refusal for an abstraction licence.

There are a high number of SSSIs, SACs, RAMSAR and BAP habitats which are dependent upon water availability and many of which are already highly stressed. Development within the region must therefore take account of the requirements of these sites and not further exacerbate the problems with increased water abstraction. The Environment Agency and water companies are already working together to help solve these problems. The large WRZs used by the water companies will assist in this as water does not need to be sourced locally. Some methods to help partially resolve these problems are discussed in Section 4, of this report, 'Demand Management', however further investigation of sites located in proximity or upstream of SSSIs may require further site-specific analysis before development by the developers. In addition to water availability, many of these sites are also sensitive to the quality of the water they receive in terms of chemical input, eutrophication, acidification, sediment inputs and urban debris. These water quality issues are discussed in Section 4 of this WCS.

As development and climate change predictions are set to increase the pressure on water availability, it is essential that measures, such as winter storage of water for agricultural use and the provision of storage lakes, are promoted by the Councils and adopted sooner rather than later.

3.1.5 Non Residential Water Use

Some non-residential water use has a much higher demand for water supply than typical housing or employment development, for example the food processing or brewing industries. If these are proposed for development within a region then it is vital to inform the water company as they will need to structure this into their forecasts within their asset management and business plans. Some allowance has already been made in the WRMPs but this is based on average trends so will require updating as information becomes available.

For WRZ such as Severn, where the supply-demand balance is already close to deficit, this could be a major concern. As the water supply has already been identified as being under pressure over much of the Study Area the introduction of a high water use industry may create significant problems for development within the area, especially in the short term before the improvements suggested by STWL are in operation.

Conversely, typical office based employment development has a much lower water supply requirement per land area than residential use and therefore will have less impact in areas such as Severn and Staffordshire and East Shropshire, with a negative supply-demand balance.

STWL and SSW have mentioned non-resident water demand within their dWRMP and Statement of Response / FWRMP. They have both noted that the recent economic downturn has had a significant effect on the quantity of water used by their commercial customers over the last year and they expect this trend to continue through 2009/10 with the effects felt throughout AMP5. STWL have also revised their water efficiency strategy to target certain types of commercial customers with significant savings within their water consumption predictions. To assist in achieving these targets the Environment Agency recommend that all Councils adopt policies promoting the implementation of water efficient non-residential development, for example they should achieved a BREEAM rating of Good or Very Good. Such BREEAM standards are set by the Building Research Establishment (BRE), upon which there is increasing pressure for commercial buildings to adhere. These can be viewed in detail on the BREEAM website[17].

3.1.6 Canal Network

One option for boosting water supply to a WRZ experiencing a supply demand deficit is to bulk import additional water from other areas which are experiencing a surplus. One of the methods for achieving this is to utilise the existing canal network as a transfer resource. This is briefly discussed by STWL as a water resource option in their dWRMP but is not included as a viable option within their plans for the study area in the near future. The source of the water pumped into this system may be a reservoir, river or groundwater, but the scheme would require the transfer of water of a suitable quality and to a suitable location, where a new treatment works would be required to process the water before it entered the supply network. However, this is a system that the Environment Agency is promoting and may become a more prominent consideration in

[17] http://www.breeam.org

N.B, Royal Haskoning's M&E Building Services Advice Group has the capability to offer BREEAM pre-assessments and full BREEAM assessments for buildings, involving both the pre-construction and post construction stages.

the future, although there are currently no active projects being considered within the West Midlands.

3.1.7 Conclusions

Consultation with STWL and SSW identifies that, as long as sufficient forewarning of development is given to enable mitigation to be put in place (such as the improvement to water supply listed in Section 3.1.2) and as long as the development targets do not increase greatly beyond those specified in the Phase 2 RSS (Scenario 1 of this WCS), then water resources are not envisaged to be a problem within the Study Area. SSW are confident that they have sufficient water to meet the demand of the proposed increase in population and STWL are confident that sufficient water is available within and between the WRZs to enable demand to be met. However, the timing of development is very important as the WRMPs are based on the pro rata growth rates stated in the RSS Phase 2, with some adjustment for the current economic downturn.

Should the pro rata growth increase, as a result of an accelerated rate of development or an increased development projection, the water supply may not be sufficient and additional measures to transfer water into the area from outside the WRZs will need to be budgeted for and installed to prevent shortfalls in the water supply. For the water companies to plan for such an occurrence and gain the appropriate funding, there would be an obvious delay in the availability of an increase in water supply. It is therefore essential that should the development projections differ from the current Phase Two WMRSS, the water companies are made aware of, and start planning for, the changes as soon as possible.

However, it must also be noted that the movement of water within a WRZ is reliant upon existing infrastructure, such as pump capacities and pipe size, which may act as a limiting factor. In addition, it must be borne in mind that water resources are a potential problem within much of the Study Area and will potentially become more problematic in the future due to development, increasing restrictions on abstractions, agricultural impact and non residential water use.

The capacity of the infrastructure used to pipe water to existing and new development, both residential and commercial, could potentially have a significant impact on the timing of development. For example, in order to serve a significant increase in population it may be necessary to undertake significant improvements to the existing infrastructure. This is especially true for large development in primarily rural areas which may not have sufficient, or even any, infrastructure present. Similarly, the type of employment land intended for development is also an important consideration as the water supply requirements for a brewery or food processing plant are much greater than for an office block, which again may result in a requirement for significant improvements to be made to the existing infrastructure. The lead in time necessary to make these improvements would of course impact on the delivery of the new development.

However, it is not feasible at this stage for the water companies to undertake a detailed analysis in order to determine more accurately the infrastructure requirements and associated capital costs, especially due to the long term phasing of developments and uncertainty at this time. If any changes or upgrades are required the water companies

will need to be informed in advance in order to obtain the appropriate funding and approve the application.

An extension to the water supply network will be required for the development of Greenfield sites and adjustments to the network for Brownfield sites, the exact locations, timing and size of development would need to be submitted to the water companies as soon as possible to allow them to factor any costs into their next AMP submissions to Ofwat. The calculations of cost and design for individual sites are generally not undertaken by the water companies until they are approached by a developer, who would be required to pay an infrastructure charge. In addition, if the higher development Scenarios were implemented instead of Scenario 1 then there is a higher probability that the capacity of the current infrastructure will be exceeded and upgrades to the system required.

Unfortunately, due to security restrictions, the water companies are not able to provide detailed information regarding the capacity of the existing network or schematics of the layout.

STWL are confident that as long as water is available they will supply it to wherever it is required, subject to the appropriate contributions from developers. They cannot, however, provide a guarantee of water supply as the financial constraints and practicalities of time scale must always be a consideration. SSW have provided a more locationally based analysis of the development sites, which will be referred to as appropriate within Sections 5 to 9.

3.2 Wastewater Collection and Treatment

3.2.1 Introduction

This section will address the capacity of the existing wastewater infrastructure to deal with the increase in flow as a result of the potential increase in population as a result of growth, both in terms of pipe network and in the capacity of the sewage treatment works.

STWL is responsible for wastewater collection and treatment over the entire Study Area. Due to the complexities of wastewater systems and the number of variables for consideration, such as ongoing operational improvements and factors beyond their control (such as rainfall), STWL do not provide raw data for consultant use within WCSs due to the potential for misinterpretation. Instead they provide comments on the capacity of their assets utilising their knowledge of specific issues regarding current asset performance and their ability to provide additional future capacity. As such, the analysis they have provided should be more accurate than any undertaken directly from the raw data.

To assist them with the accuracy of this analysis we have supplied shapefiles of proposed potential development across the entire Study Area, in addition to the trajectories for growth across the planning period (related to the individual potential development sites where possible), as agreed with the Councils at the start of this commission. As this is a Phase 2 Outline WCS, the objective of STWL's analysis is to identify any potential 'show stoppers' where the time required to provide additional

capacity may delay developments or where there are physical constraints which would make capacity improvements unreasonably expensive or impractical. As such their assessment has been based on desktop studies. If any sites are identified as requiring further analysis within a Phase 3 Detailed WCS, STWL have stated that they will consider undertaking hydraulic modelling, once the sites are confirmed.

This assessment therefore provides two-way benefits for both the Councils and STWL to ensure that development is located in the most sustainable and cost effective locations.

3.2.2 Wastewater Infrastructure

The main network of sewers between developed areas and WwTWs are considered 'public' sewers and are the responsibility of STWL. However, for houses built after 1 October 1937 all pipework serving more than one property will be a 'private' sewer until they join the public sewer, normally under the road. Maintenance of private sewers is the responsibility of all the house owners using it. It is the capacity and location of the main public sewers that will be discussed within this report.

There are two types of public sewer: foul and surface. The foul sewers remove dirty wastewater that cannot be discharged into the environment and carry it to sewage treatment works. Surface water sewers transmit runoff from housing (i.e. roofs, driveways etc.) and discharge it into ditches and rivers. Although new developments generally connect road gullies to housing estate mains, highway drainage is usually owned and operated by highways authorities, especially on main routes and water companies have no legal requirement to take highway drainage. However, there will also be locations within the study area where there is only one combined sewer, which is a much older system and transmits both foul and surface water. Although the proportion of 'dirty' water containing sewage is much less in these systems, the inclusion of foul water results in the need to treat all the discharge from these sewers at the WwTWs.

Wastewater is collected within 'catchments', under the power of gravity or artificially pumped. At the 'downstream' end of the catchments the wastewater is then either treated at a WwTW and the treated effluent released into a watercourse or it is pumped to another catchment which does contain a WwTW. Outside of the catchments, in the more rural areas of the Study Area, some of the wastewater is collected in septic tanks. Where potential development sites fall outside the current WwTW catchments it is assumed that they will be able to connect to the existing network, although, depending upon the topography, some parts of the sites may require pumps to connect to the gravity network. Further investigation regarding these sites will be required with STWL to establish whether they can be connected into the existing sewer network or whether new infrastructure will need to be installed.

Additional features of the sewerage network are Combined Sewer Overflows (CSOs). CSOs are located on the older combined sewer systems, mentioned above. As the combined sewers transmit both foul sewage and surface water they rapidly reach capacity and are at risk flooding during rainstorm events. Therefore at times of high flow CSOs operate at overflows to discharge some of the sewage out of the sewer system and into a nearby watercourse. However, this discharge contains surface water and foul effluent and thus poses health and ecological risks as well as aesthetic pollution.

One of the key aspects that could generally improve the network and the associated risks of flooding (and excessive flows into works) is the separation of surface water from sewage (i.e. combined systems) and the reduction in such systems is expected to help the long term flood risk and capacity issues in a number of locations. Increases in flow through these combined systems are unlikely to be acceptable due to the increase in pollutants that this would generate in the receiving watercourses.

STWL have provided analysis of the capacity of the sewerage infrastructure on a site-by-site basis (as far as feasibly possible) based upon the development and trajectory information provided by the Councils. As this is an Outline study this has been purely based on a desktop study, using information such as the results of their existing models and Drainage Action Plan (DAP) reports, and has not involved any hydraulic assessment. The results are referred to in detail within Sections 5 - 9.

3.2.3 STWL Generic WCS Response

STWL have provided a generic response letter that outlines their approach and highlights particular issues regarding their sewerage and sewage treatment assets of which they would like any users of this WCS to be aware. This is included in **Appendix D**. The key points noted in this are as follows:

Storm Water Drainage

The historic practice of discharging storm water in foul sewers is unsustainable and they are working to address this issue and do not expect future development to continue this practice. As such, where suitable surface water sewers or watercourses are not available to cater for new development they would only accept connection of surface water runoff discharging to the foul/combined sewer as a last resort. In addition they support the removal of surface water already connected to the foul or combined sewer. This is in line with the Government's Future Water Strategy[18] which sets out a vision for more effective management of surface water to deal with the dual pressures of climate change and housing development and supports our recommendations for the inclusion of SUDS practices in all new developments, as discussed in Section 4.3.

Sewer Flooding

STWL have endeavoured to provide comment on known flooding problems likely to affect or be affected by any proposed development. However, they reiterate that a negative comment does not mean development cannot proceed as they are undertaking feasibility assessments as part of their ongoing capital investment programme to address the most severe flooding problems over the next 2/3 years. As a result many flooding problems may be resolved by the time development takes place. If development is being proposed upstream of a known flooding problem they may consider the provision of additional spare capacity to 'future proof' the design.

Sewage Treatment Capacity

Under Section 94 of the Water Industry Act 1991, STWL have an obligation to provide treatment capacity for future domestic development and ensure that their assets do not

[18] http://www.defra.gov.uk/environment/quality/water/strategy/pdf/future-water.pdf

have an adverse effect on the environment. As there is a requirement to minimise their customers' bills and for efficiency reasons there will often be minimal headroom at a Wastewater Treatment Works (WwTW) but STWL will provide additional treatment capacity once developments are confirmed. By not providing additional capacity until there is certainty that development will take place, STWL aim to avoid potential inefficient investment (usually when development has outline planning status). As such the identification of minimal spare headroom at a WwTWs does not always indicate that there is not spare capacity for future development. Additional capacity may be sought by changing their operational regime or negotiation of new consent parameters with the Environment Agency. As soon as a WwTWs is identified as potentially not having capacity (a process in which this WCS will assist) STWL will initiate the process to look at potential long term solutions to how these problems can be overcome.

Development Confidence

Due to the inefficient investment potential, identified above, STWL will not commit to upgrading their assets and providing additional capacity until there is a reasonable level of development confidence. As such they require the Local Planning Authorities to provide guidance in as much detail as possible through the LDF liaison as to where development is likely to be located. Provided there is provision of 3-4 years notice they do not envisage problems in providing additional capacity but will only trigger investment once specific developer enquiries are received. In some cases this may delay the timing of the development.

Funding

Through the WCS process STWL aim to identify areas where future development proposal may have detrimental impacts on the sewerage or sewage infrastructure performance and may be unduly expensive or impractical to update or delay timing of the development.

In summary, STWL state the following:

> *"We have an obligation to provide sewage treatment capacity for future development and to ensure that the performance of the sewerage system is not unduly affected. We therefore welcome the opportunity to contribute to the Water Cycle Study process yet for most developments proposals we would not foresee any particular issues to provide additional capacity as and when required. If as part of our assessments we identify developments which could result in major 'show stoppers' (e.g. where provision of additional capacity could make it unduly expensive to cater for growth or where provision of additional capacity may affect phasing of growth) we would be happy to discuss these in further detail with the local planning authority."*
>
> ***STWL, December 2009***

BOX 3.4

Wastewater Collection: At a Glance…

- All the potential development sites assessed in **South Staffordshire District, Tamworth Borough and Cannock Chase District** were classified as having a **low or medium** potential impact on the sewerage infrastructure;
- Three of the potential development sites in **Lichfield District** were assessed as having a **high** potential impact on the sewerage infrastructure (site 360 in Little Aston, 370 in Stonnall and 545 in Shenstone) and some were indicated as having **no connection** to the current sewerage network (see Appendix G for site references);
- One of the potential development sites assessed in **Stafford Borough** was indicated to have a **medium/high** potential impact on the sewerage infrastructure (SF-2 in Stafford) and another two were highlighted as being connected to a **private** sewer (RH-a and RH-b)

Development of all these sites will therefore require further consultation with STWL as early in the development process as possible. Obtaining the appropriate funding and permissions and implementing the necessary improvements is likely to be a lengthy process and may delay development if not pursued in advance. Detailed requirements should be identified by the developer, although the process will be expediate if the Councils provide STWL with regular updates regarding their preferred development site locations and size..

3.2.4 Wastewater Treatment

All wastewater transmitted in the combined or foul sewer networks, either by gravity systems or pumps, is taken to a WwTW to be cleansed and subsequently released back into the river network. The number of WwTWs is decreasing due to a preference for the utilisation of fewer larger works, although the Environment Agency is now trying to reduce the trend in amalgamating smaller works as it is not always the most viable option environmentally.

The capacity of these systems is an important consideration when planning new development. This is judged in terms of the ability of the WwTW to receive more flow and the quality of the watercourse into which it discharges. For a WwTW to increase its capacity, it has the potential to require an increase in Consented Dry Weather Flow (CDWF). If the quality of the river in question is already marginal or poor, it may prove to be a barrier to the increase in CDWF due to the enhanced influence an increase in treated effluent will have upon the aquatic ecosystem. However, should consent be granted, the conditions will undoubtedly be stringent and require additional capital investment by STWL in order to meet the higher effluent standard, particularly with regards to the level of phosphates discharged[19]. The Urban Wastewater Treatment Directive (UWWTD) is designed to make sure all wastewater in the EU is treated to the

[19] West Midlands Regional Spatial Strategy (RSS 11) The Impact of Housing Growth on Water Quality and Waste Water Infrastructure, 2007

appropriate standard. An essential element of the Directive is that quality standards for effluent fall into categories depending on the size of the treatment works and the sensitivity of the receiving watercourse. As populations grow, some WwTW may exceed the UWWTD threshold that requires nutrient removal[15]. In locations where households cannot be connected to existing sewers, particularly of concern in the rural areas of the Study Area, this may result in additional septic tank discharges to waterbodies in which levels of phosphates and nitrates are already very high. Under the Water Resources Act a 'consent to discharge' must be obtained from the Environment Agency before any polluting material is legally discharged into a watercourse. The consents are based upon the quality and volume of the wastewater and the quality and capacity of the receiving watercourse. If a WwTW needs to expand due to new development with it may be necessary for a new consent for increased flow to be applied for. The Phase 2 RSS states that although the Environment Agency may grant this it is likely to set tighter limits on the pollutant concentrations to ensure overall loading is unaltered. When the initial RSS targets were released, the Environment Agency carried out a study to assess the impact of housing growth on water quality and wastewater infrastructure[15]. This assessed the main WwTWs within the West Midlands with regards to the risk posed to the flow and quality of the receiving watercourse.

There are a total of 84 WwTWs located within the Study Area and the locations of these within the Local Authority areas are shown in **Figure 3.11**, although only 31 of these will be affected by the proposed developments (highlighted in red).

The WwTWs assessed within the Environment Agency's risk assessment study and their associated risk classifications are shown in **Table 3.8** below. The Flow risk represents an estimation of WwTW Dry Weather Flow (DWF) as compared to the CDWF. The Quality Risk considers both the Biochemical Oxygen Demand (BOD), which measures the capacity of the wastewater to use up oxygen in the river, and Ammonia, which is both toxic and uses up oxygen in the river. This rough assessment thereby identifies WwTWs which are close to using up their consented flow limit. As this assessment was carried out in 2007 and it is likely the discharges and consented limits of the WwTWs have been adjusted since that date, this assessment is not a substitute for STWL's assessment which follows. However, it can be used as an indicator for the WwTWs not assessed by STWL.

Table 3.8 - Environment Agency WwTW Risk Assessment

WwTWs	Flow Risk	Quality Risk	Overall Risk	Affected by Proposed Development?
Brancote	L	M	M	✓
Burntwood	M	L	M	✓
Cannock	L	M	M	✓
Codsall	M	M	M	✓
Coven Heath	L	M	M	✓
Goscote	M	H	H	✓
Lichfield	H	L	H	✓
Little Aston	L	L	L	✓
Penkridge	H	L	H	✓
Pirehill	M	L	M	✓
Roundhill	M	H	H	✓
Rugeley	L	L	L	✓
Strongford	L	H	H	✓
Tamworth	M	L	M	✓
Trescott	M	L	M	
Walsall Wood	M	L	M	✓
Wombourne	M	L	M	✓

KEY

Flow Risk
Estimated flow is calculated as 0.180 x population equivalent in lieu of actual data from Water Companies and is assumed to be a representation of Dry Weather Flow (DWF).
H - Estimated flow is 100 per cent of Consented DWF, or greater
M - Estimated flow is greater than or equal to 75 and less than100 percent of Consented DWF
L - Estimated flow is less than 75 per cent of Consented DWF

Quality Risk
Combination of BOD Risk and Ammonia Risk

BOD risk
H - Consented BOD of 10 mg/l or less
M - Consented BOD of greater than 10 mg/l and less than or equal to15mg/l
L - Consented BOD of greater than 15 mg/l

Ammonia risk
H - Consented NH4 of 3 mg/l or less
M - Consented NH4 of greater than 3 mg/l and less than10mg/l
L - Consented NH4 of greater than or equal to10 mg/l

Overall Risk
Overall risk is identified by the highest of the three risks calculated above.

STWL have provided a spreadsheet analysing the potential impact of the proposed development upon their WwTWs and sewerage infrastructure. The results and comments included within this analysis are referred to within the Sections 5 to 9. However, a summary of the WwTW information, as provided by STWL is shown in **Table 3.9** below. Please note that additional information regarding STWL's analysis of all these WwTWs is provided in Sections 5 to 9 of this report.

Table 3.9 - WwTW Capacity

Name	Consent Reference	Consented DWF (m³/d)	Current/Observed DWF (m³/d)	Water Quality Headroom†	Spare Hydraulic Capacity (dwellings)	Receiving Watercourse
Alrewas	T/07/36151/R	894	1183	Limited	0*	Tributary of River Tame
Armitage	T/05/36081/R	1372	1298	Significant	1932	Shropshire Brook
Bassets Pole	T/16/36166/R	55	64	Significant	0*	Colletts Brook
Brancote	T/04/36032/R	26610	14890	Limited	14342	River Sow
Burntwood	T/17/35855/R	7400	6479	Limited	23984	Burntwood Brook
Cannock	T/03/36222/R	17600	13474	Limited	Theoretical design capacity issues*	Saredon Brook
Clifton Campville	T/23/35635/R	121	94	Significant	702	River Mease
Codsall	T/03/35861/R	2784	3362	Significant	0*	Bilbrook, Tributary of River Penk
Colton	T/05/35883/R	140	112	Significant	729	Tributary of Moreton Brook
Eccleshall & Sturbridge	T/02/35657/R	1650	1279	Limited	572	River Sow
Edingale	T/23/35594/R	113	371	Limited	0*	River Mease
Elford	T/22/35591/R	109	106	Significant	78	River Tame
Goscote	T/08/36220/R	24900	22090	Limited	73177	Rough Brook
Hamstall Ridware	T/06/35589/R	50	36	Significant	365	River Blithe
Haughton	T/02/35592/R	123	125	Significant	0*	Tributary of Butterbank Brook
Hixon	T/01/36221/R	1754	1205	Limited	1430	Pasturefields Brook
Lichfield	T/07/36033/R	6250	9156	Limited	0*	The Fullbrook
Little Aston	T/17/35743/R	7000	5219	Limited	46380	Footherley Bk
Penkridge	T/03/35658/R	2120	2975	Limited	0*	River Penk
Pirehill	T/01/35916/R	3200	3595	Limited	0*	River Trent
Rugeley	T/05/36077/R	6600	4719	Significant	48984	River Trent
Shenstone	T/17/35749/R	1050	1014	Significant	938	Black Brook
Strongford	T/01/36052/R	120000	94220	Minimal	4130	Yockerton Brook
Tamworth	T/22/36211/R	23840	16263	Limited	Filter Capacity Issues*	River Tame
Walsall Wood	T/08/36224/R	4784	3678	Limited	28802	Ford Brook
Weston under Lizard	T/01/35841/R	239	167	Limited	188	Tributary of River Trent
Wombourne	S/06/56197/R	3289	2620	Minimal	1740	Smestow Brook

Name	Consent Reference	Consented DWF (m^3/d)	Current/Observed DWF (m^3/d)	Water Quality Headroom†	Spare Hydraulic Capacity (dwellings)	Receiving Watercourse
Wood Eaton	T/03/35862/R	1036	879	Significant	415	Doley Brook
Woodseaves	S/04/55988/R	138	92	Significant	Further process assessments required*	Tributary of Lonco Brook

NOTES:

** Further information is provided within the Local Authority area specific sections of this report.*

† 'Headroom' refers to the buffer, or space, remaining in the treatment system to accommodate further flows.

This analysis indicates that some of the WwTWs are already operating under pressure and, as a result will require either an increase in CDWF or an improvement in their operating capacity to accommodate any potential new development in these areas. Following the consultation as part of this WCS these WwTWs may be identified within STWL's future programme of works for improvement. Further consultation between the Councils and STWL will therefore be required once the preferred development sites are defined, although additional discussion and information is provided in the Local Authority area specific sections of this report.

When consent limits are reviewed, the ammonia and phosphate levels in the receiving watercourses must be considered, as will the requirements of the WFD and the findings of the River Basin Management Plans (RBMP), published in 2009. These issues are discussed further in Sections 5-9.

When reviewing discharge consents the Environment Agency have two over-arching policies which they adhere to:

1. Growth - they will not allow any breach of a statutory standard due to growth and will minimise any deterioration due to growth;
2. No deterioration - they will minimise the deterioration to water quality.

Where they are not satisfied that control measures are in place to prevent deterioration of the watercourse in the current class (as stated in the RBMPs), they may object to proposals for growth.

BOX 3.5

Wastewater Treatment: At a Glance…

Strongford and Wombourne WwTWs have been identified as having minimal headroom with regards to water quality and Alrewas, Bassets Pole, Codsall, Edingale, Haughton, Lichfield, Penkridge and Pirehill have been identified as having minimal hydraulic capacity. However, whilst WwTWs may not have sufficient spare capacity to accept the levels of development being proposed in their catchment area this does not necessarily mean that development cannot take place. Under Section 94 of the Water Industry Act 1991 sewerage undertakers have an obligation to provide additional treatment capacity as and when required. Where necessary STWL will discuss any discharge consent implications with the Environment Agency. If there are specific issues which may prevent or delay the provision on additional capacity these have been highlighted within the assessment. It is therefore vital that Councils and developers consult with STWL as early as possible in the development process. The Councils should notify STWL as soon as preferred development options are developed. This is especially important for development proposed in the WwTW catchments listed above. This will assist STWL in their discussions with the Environment Agency regarding their consent limits and in planning and budgeting the phasing of treatment work improvements across the planning period.

3.3 Water Quality and Environmental Issues

3.3.1 Introduction

As mentioned above water quality is an important consideration when planning new development. Any deterioration in quality will result in a negative impact on the biodiversity of the watercourse itself, the destination of any abstracted water and environmental sites located downstream. There are many ways in which pollution can enter a watercourse but the two main sources relevant to this study are from unsustainable development or agricultural practices within the catchment. This can either enter the watercourse directly (most commonly from insufficiently treated sewage effluent) or in the form of diffuse pollution from contaminated surface runoff.

This WCS reviews the current quality of the watercourses within the Study Area that have the potential to be affected by the proposed development, the potential sources of pollution and provides recommendations to minimise this risk. In addition environmental assessments are undertaken to identify potential environmental receptors that might be affected by any changes that might be necessary to the water supply and treatment system. In these assessments we highlight any likely vulnerabilities and issues for future consideration.

The assessment is based primarily on the location of WwTWs which will be potentially impacted by the new developments, and the connectivity between these WwTWs and key sites designated for their conservation value. Such areas designated at a European[20] or International[21] level which have the potential to be affected are identified and described below. Where nationally-designated Sites of Special Scientific Interest (SSSIs) along the watercourses may be affected these are also mentioned.

The general approach to the assessment of water quality and environmental issues is introduced within this section, alongside the overarching principles of measuring and protecting water quality. All details and analysis will be carried out in Sections 5 to 9.

3.3.2 Directives

There are several European Union Directives that influence water quality and therefore sewage treatment levels, including the Urban Waste Water Treatment Directive (UWWTD)[22], Water Framework Directive (WFD) and Freshwater Fish Directive. Additional Directives relating to agricultural runoff are discussed in Section 3.3.7 below.

Water Framework Directive

The European Water Framework Directive (WFD) became part of UK law in December 2003. The aim of the Directive is to protect and enhance the quality of all the

[20] Special Protection Areas and Special Areas of Conservation are established under the EC Birds Directive and Habitats Directive respectively, and together form the Natura 2000 network

[21] Additionally, this review has taken account of sites designated as wetlands of international importance under the Ramsar Convention.

[22] *See the Defra web page* http://www.defra.gov.uk/environment/quality/water/waterquality/sewage/uwwtd/index.htm

waterbodies with an objective of achieving 'no deterioration'. As such all waterbodies must meet the class limits for the status class declared in the final RBMPs with the aim to achieve good ecological status. It is the responsibility of the Environment Agency as the 'competent authority' to ensure the Directive is carried out. This Directive affects any discharges to designated waters, including industry and sewage treatment plants, and the standards set within it are taken into account when the Environment Agency sets discharge consent limits. It is therefore advised that, without appropriate mitigation, no development takes place within the catchments of WwTWs that are currently exceeding their discharge consents. It is the responsibility of STWL to implement the appropriate mitigation and ensure that their WwTWs discharge within the consented limits.

Urban Waste Water Treatment Directive

The aim of this Directive is to ensure all the wastewater in the EU is treated to the appropriate standard. Quality standards for effluent fall into categories depending upon the size of the WwTWs and the sensitivity of the receiving water body. Where populations exceed the threshold of the Directive the watercourses are given special designations, such as 'Sensitive Areas (Eutrophic)', which require the WwTWs to adhere to tighter limits on the quality of the effluent being discharged. As the populations increase, so the limits tighten. As such development which requires the utilisation of works identified in the UWWTD may be restricted by the environmental constraints on the discharge.

Freshwater Fish Directive

The aim of the Freshwater Fish Directive is to protect and improve the quality of rivers and lakes to encourage healthy fish populations. Water quality standards are set for 'designated' areas which are significant bodies of water capable of supporting fish populations. In 2013 the waters currently designated as Fish Directive waters will become protected areas under the Water Framework Directive.

3.3.3 River Quality

The Environment Agency regularly assesses the quality of the watercourses in the UK. This is provided in the form of General Quality Assessment (GQA) grades. These are in the form of four quality indicators - Chemical, Biological, Nitrate and Phosphorous - which are assessed on a common six point scale, as shown in **Table 3.10**. Chemical quality is an indicator of organic pollution in general, Biological quality is an indicator of the overall 'health' of rivers and Nitrate and Phosphate levels indicate diffuse pollution, most notably from agricultural practices. Elevated levels of these nutrients are of concern because they can cause eutrophication, which harms the water environment. In addition, excess nitrate has to be removed before water can be supplied to consumers, increasing supply costs.

Table 3.10 - GQA Assessment Scale

Grade	Standard	Explanation
A	Very Good	The quality is similar to (or better than) that expected for an average, unpolluted river of this size, type and location.
B	Good	The quality shows minor differences from Grade 'a' and falls a little short of that expected for an unpolluted river of this size, type and location.
C	Fairly Good	The quality is worse than that expected for an unpolluted river of this size, type and location.
D	Fair	The quality shows considerable differences from that expected for an unpolluted river of this size, type and location
E	Poor	The quality is much worse than expected for an unpolluted river of this size.
F	Bad	The quality is so bad that, in terms of biology, there may be little or no life present in the river
U	No Result	Not monitored/measurement has not been recorded.

Using the results of these assessments the Environment Agency set targets for improvement. Until 2006 this was in the form of River Quality Objectives (RQO). These objectives were based on chemical quality and were agreed by the Government for 40,000km of river length in England and Wales when the water industry was privatised in 1989. The aim was to specify the water quality required within the rivers to ensure they can be relied upon for water supplies, recreation and conservation and focus upon ensuring the rivers support fish. These targets have now been brought in line with the objectives of the WFD and are provided within Appendix B of the RBMPs, published in 2009. To assess the quality of the watercourses within the Study Area both the GQA grades for Chemical and Biological Quality and the RBMP ecological status' have been reviewed within the Local Authority specific sections of this report.

3.3.4 Effect of Development upon Water Quality

In general there are three main ways in which new development might impact on the water environment:

1. Increased abstraction due to development can have a direct negative impact on the condition of surrounding surface watercourses or on the underlying groundwater resource. This has been addressed within Section 2.5;
2. Increased development can result in changes in water quality where they receive discharges from WwTWs.
3. Lastly the impacts can have a knock-on effect on the environmentally significant sites. This is of most relevant for sites which are highly dependent on water resources and quality, such as grazing meadows or marshes.

It is therefore important that these risks are assessed and mitigation delivered before development commences.

Watercourses receiving discharges from the WwTWs serving the proposed new development areas are identified on a site-by-site basis within Sections 5 to 9. The water quality assessment outlines their current condition, or that of the surrounding environment, and identifies particularly sensitive areas.

Under the Water Framework Directive there is a requirement for all inland waters to achieve 'good ecological status' or 'potential' by 2015. The Water Framework Directive status of each receiving watercourse (as stated within the RBMPs) has also been considered within this assessment.

If increases in consented discharges will be necessary in order to enable the required levels of development, it will be necessary for a consent variation application to be made. At that time consent limits would be reviewed and if necessary tightened.

At a development site level SUDS can be implemented as part of new developments with the resulting effect of improving water quality and reducing additional rate and volume of surface water run off. This is discussed further in Section 4.3.

3.3.5 Designated Sites

The designated sites which have the potential to be affected by the potential development, either as a result of increased demand for water or increased effluent, are identified within the Sections 5 - 9. Within these sections a brief overview of the important sites and the likely impact of development is provided.

3.3.6 Effect of WwTWs on Water Quality

Untreated sewage discharges can have a significant impact on the environment. The inappropriate collection and treatment of sewage, and disposal of the sewage sludge (generated as a by-product of sewage treatment), have detrimental effects on river quality, mainly due to overloading of phosphates and nitrates resulting in eutrophication. Defra has identified nitrate and eutrophic sensitive areas in the UK which are being adversely affected by sewage discharges. However, for the worst affected watercourses the WwTW have been identified as Eutrophic Tertiary Treatment Works which have to provide a final treatment stage to raise the effluent quality before its release into the stream.

Analysis is carried out within the Local Authority specific sections of this report to identify the WwTWs within the WCS study area that will potentially receive discharge from the proposed developments, the watercourse into which they discharge and the distance from the discharge point of the WwTW to the nearest designated site. It also briefly outlines the new developments which will be associated with each WwTW. Discharge from WwTWs are diluted within watercourses and the scale of potential impacts decreases with distance. Assumptions have been made about the likelihood of increased development of the identified scale, and consequent WwTW discharge, affecting the condition of a designated site. However, the impact of development on watercourse quality and the water body status will still be assessed.

3.3.7 Effect of Agricultural Practices on Water Quality

As mentioned previously in this section, agriculture is a major source of diffuse pollution. Diffuse pollution cannot be attributed to a precise point or incident, but is the cumulative effect of day to day activities over a large area, including agriculture, forestry, mining, construction and urban life. The main agricultural sources of diffuse pollution include silt

from soil erosion, nutrients from the application of fertiliser or spreading of manure and pesticides from the handling and application of the chemicals. In addition to this pollution entering surface water sources, it can be carried within infiltrating rain water and pollute groundwater sources. On their website, Defra states the following statistics[23]:

- around 60% of nitrate and 25% of phosphates in English waters originate from agricultural land;
- Agricultural practices contribute between 25-50% of pathogen loadings which affect England's bathing waters;
- Up to 75% of the sediment input into rivers can be attributed to agriculture, reducing water clarity and causing serious problems for fish, plants and insects; and
- Pesticides are contaminating drinking water sources, requiring expensive treatment at water works.

Defra considers that the improved control of the application of manures and fertilisers to land is essential to improve the diffuse water pollution from agriculture. Studies to achieve this are ongoing, but the three currently recommended methods are:

- Promoting the Codes of Good Agricultural Practice
- Encouraging Catchment Sensitive Farming
- Implementing the EC Nitrates Directive

Codes of Good Agricultural Practice

These codes, until recently, consisted of Water, Air and Soil codes, which were introduced in the early 1990s and outline practical steps for preventing environmental pollution from farming activities. However, these have recently been reviewed and now consolidated into one document entitled 'Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, land growers and land managers'. The consultation phase for this document ran from August 2007 until November 2007.

One of the aims of the code is to help farmers achieve the standards which will be required by the integrated approach to managing water quality and quantity across whole river catchments by 2015 as part of the Water Framework Directive. It does this by explaining the environmental impacts of farming practices and suggests methods of minimising these impacts with regards to management plans, use of farm buildings and structures, field work, specialised horticulture, wastes and water supplies to the farm. The full document can be found at on the Defra website[24].

[23] http://www.defra.gov.uk/Environment/water/quality/nitrate/intro.htm

[24] http://www.defra.gov.uk/foodfarm/landmanage/cogap/response.htm

Catchment Sensitive Farming

Catchment Sensitive Farming is land management that keeps diffuse emissions of pollutants to levels consistent with the ecological sensitivity and uses of rivers, groundwater and other aquatic habitats, both in the immediate catchment and further downstream. It includes managing appropriately the use of fertilisers, manures and pesticides; promoting good soil structure and rain infiltration to avoid run-off and erosion; protecting watercourses from faecal contamination, sedimentation and pesticides; reducing stocking density; managing stock on farms to avoid compaction and poaching of land; and separating clean and dirty water on farms.

At present the advice element of the programme is being delivered through the England Catchment Sensitive Farming Delivery Initiative (ECSFDI) across 50 Priority Catchments in England alongside some limited capital grants. The ECSFDI was rolled out across 40 catchments in England in 2006 with another 10 catchments added, along with 7 extensions in October 2008. These were jointly identified by Natural England and the Environment Agency from data gathered for the Water Framework Directive (WFD) and cover approximately 40% of the agricultural area of England. Some of the catchments included within this initiative at present cover the western edges of Stafford Borough and South Staffordshire District. Further information regarding this scheme can be found on the Defra website[25].

EC Nitrates Directive

This is an environmental measure designed to reduce water pollution by nitrate from agricultural sources to prevent such pollution from occurring in the future. The Directive requires Member States to:

- designate as Nitrate Vulnerable Zones (NVZs) all land draining to waters that are affected by nitrate pollution;
- establish a voluntary code of good agricultural practice to be followed by all farmers throughout the country (outlined above);
- establish an Action Programme of measures for the purposes of tackling nitrate loss from agriculture. The Action Programme should be applied either within NVZs or throughout the whole country; and
- review the extent of their NVZs and the effectiveness of their Action Programmes at least every four years and to make amendments if necessary.

66 Nitrate Vulnerable Zones (NVZs), 8% England, were designated in 1996 to protect drinking waters from nitrate pollution. A further 47% of England was designated as an NVZ in October 2002 to include all surface and groundwaters. On 1st January 2009 the NVZs were expanded again to cover 70% of England. Almost all of Study Area is now

[25] http://www.defra.gov.uk/foodfarm/landmanage/water/csf/index.htm

included within this zone. The boundary can be viewed in more detail on the Magic website[26]. Further information on this Directive can be found on the Defra website[27]. Within these areas farmers will have to comply with a number of rules to promote best practice in the use and storage of fertiliser and manure (building upon the Code for Agricultural Practice for the Protection of Water), for example by following restrictions on the time of year that fertiliser can be spread on land and through storing excess manure.

Improvements to the nitrate and phosphate levels from agricultural sources within the Study Area can therefore be made through:

- ⇨ promotion of the Codes of Good Agricultural Practice, especially now the updated version has been released;
- ⇨ Participation in the Catchment Sensitive Farming Initiative, if the study area is included within the Priority Catchments list either now or in the future; and
- ⇨ Recognition of their location within a NVZ and application of the updated EC Nitrates Directive Action Programme.

BOX 3.6

Water Quality: At a Glance…

Water quality is an important consideration to ensure development is implemented in a sustainable way with regards to the WFD, UWWTD, Freshwater Fish Directive, Codes of Agricultural Practice, Catchment Sensitive Farming and EC Nitrates Directive. It is affected by both direct and diffuse pollution and has impacts within both the local and wider area, including designated environmental sites. The watercourses receiving discharge from the potential development sites are reviewed in Sections 5 to 9 in terms of current and future water quality and the targets set under the WFD. Where they are identified as suffering from poor water quality, the water companies must either improve their treatment processes or negotiate higher consents with the Envioronment Agency. The water companies do not view water quality as a barrier to development, but the required improvements/negotations may result in a time delay.

3.4 Flood Risk

3.4.1 Introduction

PPS25 identifies flood risk as a material planning consideration, which should be addressed at all stages of the planning process. The issue of flood risk in respect to new development should be considered in terms of:

- Direct flood risk to the new development;
- Increased flood risk to other areas as a result of an increase in surface water runoff rate; and
- Increase in flood risk from development in the floodplain.

[26] http://www.magic.gov.uk/website/magic/viewer.htm?startTopic=magicall&box=-100000:0:800000:700000&chosenLayers=nvzIndex

[27] http://www.defra.gov.uk/environment/quality/water/waterquality/diffuse/nitrate/directive.htm

This WCS has reviewed all these elements of flood risk, drawing upon all available flood assessment information for the study area from the Councils, County Council, Environment Agency and Water Companies, including the following data sources:

- Environment Agency Flood Maps;
- Local Authority Strategic Flood Risk Assessments (SFRA);
- Regional Flood Risk Appraisal;
- Phase 1 Surface Water Management Plan (SWMP), carried out alongside this WCS; and
- Historical occurrences of flooding (utilised within the SWMP and SFRAs).

No hydraulic modelling was carried out for the purposes of this WCS.

3.4.2 Environment Agency Flood Maps

In accordance with PPS25, the location of new development should initially be based on the Flood Zones defined in the Environment Agency's Flood Map, which refer to the probability of sea and river flooding, ignoring the presence of any defences. **Figure 3.12** shows the location of the Flood Zones across the Study Area - these can be viewed in more detail on the Environment Agency's website[28]. **Table 3.11** below shows the Flood Risk Vulnerability and Flood Zone Compatibility (from PPS25), together with the requirement for application of the Exception Test.

Table 3.11 - Flood Risk Vulnerability and Flood Zone "Compatibility" (from PPS25)

Flood Zone	Definition	Flood Risk Vulnerability Classification				
		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	*Low Probability:* less than 1:1000 probability of river or sea flooding in any year (<0.1%)	✓	✓	✓	✓	✓
Zone 2	*Medium Probability:* 1%-0.1% probability of river flooding or 0.5%-0.1% probability of sea flooding in any year	✓	✓	Exception Test Required	✓	✓
Zone 3a	*High Probability:* >1% probability of river flooding or >0.5% probability of sea flooding in any year	Exception Test Required	✓	✘	Exception Test Required	✓
Zone 3b	*Functional Floodplain:* annual probability of flooding of 1:20 years (5%) or greater, where flood water flows or is stored	Exception Test Required	✓	✘	✘	✘

The Sequential and Exception Tests

The Sequential Test aims to steer all development to areas at the lowest probability of flooding. When land is allocated for development, the Sequential Test should be applied to demonstrate that all other sites reasonably available for development in areas at a lower probability of flooding have been considered first.

Following the application of the Sequential Test, there may be valid reasons for considering a development type which is not entirely compatible with the level of flood risk

[28] http://www.environment-agency.gov.uk/homeandleisure/floods/31650.aspx

of that site. The Exception Test provides a method of managing flood risk whilst allowing necessary development to occur. However, this does tend to be in exceptional circumstances.

PPS25 states "*The Exception Test is only appropriate for use when there are large areas in Flood Zones 2 and 3, where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is necessary for wider sustainable development reasons*."

The Exception Test shows:

- if a proposed development provides wider sustainability benefits that outweigh the increased flood risk;
- that the development does not subsequently increase flood risk;
- that, where possible, the development will reduce flood risk; and
- most importantly that the development will be safe.

The development should also be on previously developed land.

Employment use, including shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non residential institutions and assembly and leisure, are identified within PPS25 as being 'Less Vulnerable'. These are therefore permitted in Flood Zones 2 or 3a, following application of the Sequential Test. Residential use is generally classified as 'More Vulnerable', unless it consists of caravans, mobile homes or park homes intended for permanent use or includes basement dwellings, in which case it is classified as 'Highly Vulnerable'. Following application of the Sequential Test, application of the Exception Test is required for More Vulnerable use development in Flood Zone 3a and Highly Vulnerable development in Flood Zone 2.

The Flood Zone maps currently do not cover surface water flooding, groundwater flooding or flooding from sewers. In addition watercourses where the upstream catchment is less than 3km^2 have not been mapped.

The identification of these other types of flooding is considered within the individual SFRAs, mainly through consideration of recorded flooding, and comments are made on individual sites/areas within the Local Authority areas. Surface water flooding is also elaborated upon in more detail within the SWMP undertaken alongside this study. These have been picked up either in the following Council-specific summaries, or within the detailed development area descriptions.

3.4.3 SFRAs

All the Councils have undertaken a Level 1 SFRA to support their LDF submissions. These documents follow the requirements of "PPS25 - Development and Flood Risk" and are designed to assist in the planning process by providing information to enable the "Sequential" and "Exception" Tests to be applied to ensure that only appropriate development takes place within the floodplain, as mentioned above.

As shown in **Table 2.3** all the Level 1 SFRAs were either completed or updated in 2008. In addition Cannock Chase District Council commissioned a Level 2 SFRA for the town of Rugeley, completed in 2009. Level 2 SFRAs provide a strategic assessment of flood risk on a Local Authority area scale for all forms of flooding. They also assess the location of flood defences and therefore the "real" flood risk and associated impact upon development.

The SFRAs indicate that a large majority of the Study Area is at risk of fluvial flooding due to the vast number of Main Rivers located within the study boundary. In addition there is a widespread incidence of surface water flooding. This has been assessed in more detail within the SWMP undertaken alongside this WCS.

3.4.4 Regional Flood Risk Appraisal (RFRA)

The RFRA for the West Midlands was finalised and updated in February 2009. This latest publication has been written in accordance with PPS25 (2006), its Practice Guide companion (2008) and the Phase 2 RSS figures. It also takes into account the results of the latest SFRAs and Catchment Flood Management Plans (CFMPs). Within the Study Area this report has placed particular emphasis upon Stafford as a Growth Point and Site of Significant Development (SSD).

The majority of the Study Area falls within the catchment of the River Trent, although a small area of western Stafford Borough and south and western South Staffordshire District drain into the catchment of the River Severn.

The RFRA summarises the sources of flood risk within each of the Local Authority areas, provides a score for critical infrastructure vulnerability (i.e. the relative percentage of the Local Authority's critical infrastructure located within Flood Zones 2 and 3) and a summary of the Local Authorities deemed to either have low flood risk constraints with regards to development (includes Cannock Chase District) or areas of high growth and/or flood risk (Tamworth Borough). These findings will be reviewed in greater detail within Sections 9 and 7 respectively.

3.4.5 SWMP

A Phase 1 SWMP has been undertaken alongside this WCS. It covers the entire Study Area and reviews all historical occurrences of surface water flooding. In addition it provides a review of potential areas of surface water flooding, as based upon the Environment Agency's surface water flood map. The details of this assessment can be found within the Phase 1 report[29]. This review has highlighted that it is the urban areas in particular that are susceptible to surface water flooding and, as such, has recommended that modelling is undertaken for the urban areas of Stafford, Lichfield, Tamworth, Cannock and Penkridge as part of a Phase 2 SWMP assessment. This will be undertaken later this year once LiDAR data has been procured. As such this WCS should be updated in light of the findings of that study.

[29] Southern Staffordshire SWMP, Phase 1 draft, Royal Haskoning, 2010.

BOX 3.7

Flood Risk: At a Glance…

Most of the Study Area is at risk of some form of flood risk although it is fluvial and surface water which are the most prominent. As development should be located in accordance with the recommendations of PPS25 this is an important consideration for all Local Authority areas. Assessment has been made of the individual potential development sites but in many cases additional analysis will be required by developers in the form of site specific Flood Risk Assessments (FRA) once the sites come forward. The affected sites are identified within Sections 5 -9.

This assessment should be reviewed in light of the Phase 2 SWMP and any SFRAs undertaken at a later date.

4 DEMAND MANAGEMENT

4.1 General

National government policy for sustainable development includes efficient resource use and PPS11 and PPS12 emphasise the need for water efficiency as part of sustainable development. In addition the Department of Communities and Local Government (DCLG) requirements for the sustainable communities' plan include higher standards of water efficiency and 25% savings. Government has stated a greater need for higher regional standards of water efficiency in response to the regional water resources position and the Water Act 2003 requirements place a duty on undertakers to achieve further water conservation and on public authorities to take into account the desirability of conserving water supplied to premises[30].

Development will increase the water requirement within the Study Area, but through managed water usage, wastage can be reduced and the developments made more sustainable in the long term to meet the Government requirements outlined above.

4.2 Water Usage

The three main methods used to promote sustainable water usage are metering (to encourage conservative usage in the home) leakage control (to reduce loss through the pipelines) and sustainable housing (to increase the efficiency of water usage). All three of these methods have been referred to in detail within STWL's dWRMP and Statement of Response and SSW's FWRMP. These are discussed below.

4.2.1 Metering

As stated in the RSS report[24], in general water users who are not metered use more water on average than metered customers. Metering helps to give users a signal and incentive to manage their own demand for water and, on average, water savings are reported within a range of 5-15% compared to unmetered use. All new properties are metered and further savings can be expected as more existing customers are metered and, in the long run, through the introduction of smart meters and changes to tariffs. Such changes can be promoted by both water companies and Councils, but will have to be made alongside protection of vulnerable customers.

The following outlines the policies being promoted within the Water Companies' WRMPs:

STWL

By 2006-7 28% of households within STWL's region were metered, which was slightly ahead of the meter penetration they had projected in WRP04. Their dWRMP assumes that as a minimum, the current levels of uptake of free water meters will continue through the planning period and that the minimum level of meter penetration reached by

[30] West Midlands Regional Spatial Strategy (RSS 11) The Impact of Housing Growth on Public Water Supplies, 2007

2035 will be 66% of the total housing stock. Due to a high uptake of free meters in 2007/8 this prediction has been increase to 72%. STWL do not operate any policies that compulsorily meter existing households (and cannot as the Environment Agency classifies this area of the West Midlands as an areas of only 'Moderate Water Stress', rather than high). However, they are proposing to implement a policy of metering households on change of occupier in their Staffordshire and East Shropshire WRZs for the 2010 – 2015 period and, within their Statement of Response, propose to increase this trial area beyond this WRZ, although they have not yet ascertained where. This may be extended to include the Severn WRZ. They can also encourage existing customers to have a meter installed through improvement of education/information and use of more favourable pricing and reward structures.

SSW

SSW currently have a relatively low proportion of metered household customers (20% of billed properties). For a number of years SSW has had in place a range of policies relating to metering and they propose to continue with these policies through the planning period as follows:

- Sprinkler metering policy – domestic customers wishing to use unattended garden watering devices must be metered.
- Free meter policy – domestic and commercial customers can opt for a meter free of charge with a 12 month reversion period for domestic customers.
- New supply policy – all new household and non-household properties must be metered.

During AMP5 SSW intend to proactively increase the rate of growth in meter penetration through implementation of water meters upon change in occupier. This was introduced in June 2008 under the 2003 Water Act. At the time of installation SSW intend to provide free water saving cistern displacement devices. From 2010/11 they also intend to install intelligent meters in all new developments and replacements to facilitate development and implementation of new tariff structures and better inform the customers of their water usage.

4.2.2 Leakage Control

Water companies have to meet leakage targets set by Ofwat to ensure they are related to economic levels. The Environment Agency expectation is that companies will continue to strive for higher standards and use new technology to drive leakage down further in future, especially where water resources are scarce. Government states that it does not expect water companies to allow leakage to rise. As stated in the RSS report[29], it is the view of the water companies that higher capital investment will be needed to achieve significant further reductions in leakage. Given that about 25% of all water supply is lost to leakage across the UK, more effort at a strategic scale by the water companies, focusing on individual properties through education would be of benefit.

STWL

At present an estimated 27% of treated water within STWLs supply zone is currently unaccounted for and therefore classed as leakage. Within their dWRMP they state that:

> *"Our AMP4 strategy has been to drive leakage down by 17Ml/d through a combination of measures, including:*
>
> - *Improving our processes of proactive and reactive leakage control;*
> - *Implementing our Accountability Zones (AZs) programme to enable improved leakage reporting and targeting in trunk mains outside of DMAs;*
> - *Replacing around 300km of water mains per annum;*
> - *Installing continuous pressure monitoring at around 4000 critical pressure points within our network;*
> - *Offering a free or subsidised customer owned supply pipe repair and replacement service;*
> - *Working with contractors and academics to improve leak detecting technology "*

Their policy is to continue to achieve and maintain the economic level of leakage during AMP5 and over the longer term. Their assessment of the preferred long term strategy considers leakage reduction options alongside water resource investment options and demand management options, and seeks to achieve the *"overall least whole life cost mix of the different types of investment"*. The Statement of Response now also states that their leakage strategy due to be outlined in their FWRMP, is based around the principle of never allowing leakage to rise over the forecast period. As part of this they intend to locate the household water meters at the point where the customer supply pipe meets the STWL supply pipe, thus enabling rapid identification of leaks within the customer's pipes rather than their own.

SSW

At present SSW classify 73.24Ml/d as leakage. Their policy on free supply pipe repairs remains unchanged as follows:

- Private domestic customers only (Local Authorities, Housing Associations and other tenanted properties are excluded).
- External underground leaks only (internal leaks or leaks under a building or other permanent structure are excluded).
- First repairs only.

Their AMP5 strategy is to maintain the current levels of leakages and will be supported by:

- *Extended and enhanced coverage of network operational metering to improve assessment and location of trunk main leakage.*
- *Improvements to the current DMA structure to support maintenance of long term efficiency of leakage identification on distribution mains and services.*
- *Additional pressure management on a localised cost effective basis, to counter the effects of asset deterioration / natural rate of rise of leakage.*

- *Further development of the mains renewal targeting processes to maximise the leakage reduction benefits while targeting mains and service renewals to maintain infrastructure asset serviceability.*
- *Improvements to the leakage monitoring and activity targeting processes.*
- *Further developments to support more effective leakage detection staff, including focused training, introduction of apprentices, and development of improved performance incentive schemes for both direct and contract staff.*
- *Further investigation, and appropriate adoption, of new technology.*
- *Capital maintenance of the existing leakage management infrastructure to support effective future operational activities.*

4.2.3 Sustainable Housing

It was recommended within the West Midlands RSS[29] that a revision should be made to the RSS to include a policy on water efficiency. This would require that all new houses are to meet Level 3 of the Code of Sustainable Homes, requiring good water efficiency to be achieved, although the Environment Agency would like to see the Local Authorities strive for Level 4. In terms of water usage Level 3 requires that:

> The home will have to be designed to use no more than about 105 litres of water per person per day. This could be achieved by fitting a number of items such as:
>
> - 6/4 Dual Flush WC;
> - Flow Reducing/Aerating taps throughout;
> - 6-9 litres per minute shower (note that an average electric shower is about 6/7 litres per minute);
> - a smaller, shaped bath – still long enough to lie down in, but less water required to fill it to a level consistent with personal comfort;
> - 18ltr maximum volume dishwasher;
> - 60ltr maximum volume washing machine.
>
> Other minimum requirements are required for:
>
> - Surface water management – this may mean the provision of soakaways and areas of porous paving;

(Code for Sustainable Homes: A step-change in sustainable home building practice, 2006)

This code was published by DCLG in December 2006. Initially it was compulsory for all homes receiving government funding, and restricts water use to 105 litres per capita per day. Since April 2007 a developer of any new home can be assessed against this code. From May 1st 2008 this assessment became mandatory, although it is recommended that more stringent targets should be set (for example Level 4). The Council may benefit from a review of the Level 4 requirements against how the present housing stock compares (for example using Ofwat data). The code uses a points system to identify the most efficient homes, with higher points being awarded for the most efficient. Points are awarded for internal potable water consumption, (i.e. reduced toilet cistern sizes) external potable water consumption (i.e. water butts, grey water recycling and rainwater harvesting discussed below), surface water run off (specifically the use of SUDS) and

flood risk, which is generally based on development location. There are similar measures against which commercial development can be assessed, dependent upon its intended use. These are set by the Building Research Establishment (BRE) and are known as BREEAM standards (BRE Environmental Assessment Method), upon which there is increasing pressure for commercial buildings to adhere. These can be viewed in detail on the BREEAM website[31]

In November 2008 Ofwat set STWL a new water efficiency target for 2010 to 2015 of a reduction in customer consumption by an average of 1 litre/property/day over the next five years, equating to 3.27Ml/d annually or 16.35 Ml/d by 2015. They propose to do this through focus upon domestic water audits and limited household measures, including:

- Provision of Cistern Displacement Devices (CDD), such as the 'Save-a-Flush' device;
- Partner Activity with product manufactures and suppliers;
- Encouraging customers to carry out Self Audits of water use and wastage reduction opportunities;
- Demonstration of 'best in class' water use within new or refurbished STWL offices, including rainwater harvesting and greywater reuse (discussed in more detail below);
- Institutional and commercial audit and retrofit through the delivery of water efficient devices, audits and advice to institutional and commercial properties (such as schools);
- Household audit and retrofit in the Social Housing sector; and
- Product subsidies, education and product promotion to provide access to water efficient products.

SSW has stated a similar proposal within their FWRMP covering the following and wish to seek opportunities to work with Local Authorities and housing associations to identify opportunities for mutual benefit.

- Provision of cistern devices on request to customers.
- Promotion of water butts.
- Provision of household self-audit information.
- Provision of non-household self-audit information.
- Provision of water efficiency advice during Water Regulations inspections.
- Water saving tips and information on the Company website.
- Promotion and enforcement of sprinkler metering policy.
- Water efficiency information advertised in appropriate press.

All of these initiatives should be advertised to the local community and embraced within all new developments to provide both water availability and environmental benefits. More information and guidance regarding water efficiency techniques can be found in the following document: '*Water Efficient Solutions: The Practical Guide for Industry, Commerce and the Public Sector, 2008'*

[31] http://www.breeam.org.

Greywater Recycling

There are two types of greywater recycling systems. A water diversion system diverts greywater directly to the subsoil in the garden and a water recycling system with purification for the reuse of water in the home. The water for the water recycling system is collected from bath, shower and sink waste. The system then consists of a cleaning tank to remove any solids and then 'treat' the water, with the addition of disinfection tablets. This water is then collected in a tank ready for use, but provision must be made to discharge the water if it is stored for too long, as it may become hazardous. The water can then be reused for toilet flushing. More information and guidance regarding greywater recycling can be found in the Environment Agency's document 'Greywater: an Information Guide, 2008'. However, although this technique works well at the community scale, it is not always appropriate for individual properties or small scale developments.

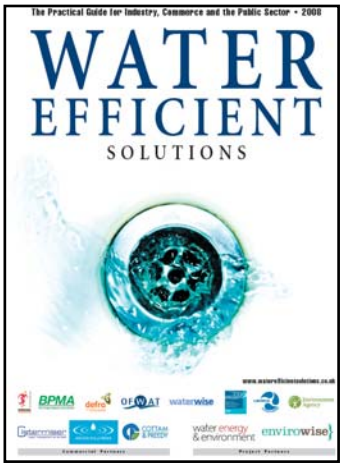
Rainwater Harvesting

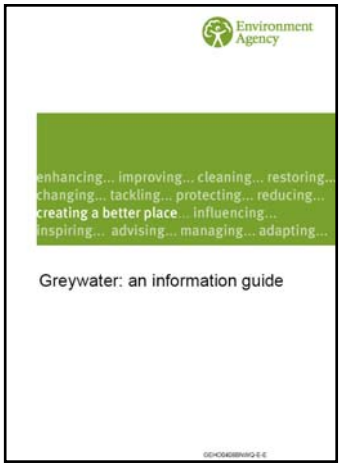
Rainwater harvesting is also a growing sector of water recycling. This is where rainwater from the roof area of the property is collected, and then reused to flush toilets, supply washing machines and outside tap use. Systems that combine the collection of rainwater and the reuse of greywater are also in use. However, it is now understood that this method works well at the community level but not at the individual property level due to cost and reliability issues. It is therefore most effective when implemented as part of a large-scale development.

STWL have specified that their main areas of activity during AMP4 were:

- Distribution of Save-a-flush cistern displacement devices to organisations and businesses who are installing them to customer and business premises;
- Discounted water butts and the opportunities for customers to purchase a discounted rain saver kit;
- Extension of their domestic product promotion to include additional product such as water efficient shower heads, shower timers and internal leak alarms since February 2008;
- Setting up of a partnership with Envirowise to target their top 250 water users with the aim to raise awareness of the importance of water efficiency and to give advice on the implementation of water efficiency measures;
- To undertake trials to investigate the use of retrofit water efficient devices in domestic properties and schools;
- Education programmes through education centres, provision of educational material and their 'Be Smart' initiative; and
- Development of options for their future water efficiency strategy developed through 2007, using their involvement with Waterwise and other industry trials.

More information regarding rainwater harvesting can be found in the Environment Agency's document 'Harvesting *Rainwater for Domestic Uses: An information guide, 2008'*.





4.3 Sustainable Drainage Systems

Within new developments, the incorporation of a suitably designed drainage system will be necessary in order to mitigate the risk of surface water and overland flooding as well as the risk posed by the overloading of local sewers and watercourses. It is therefore essential that Sustainable Drainage policies are included in the Councils' LDF documents. Such a system should ideally be based upon Sustainable Drainage principles aimed at simulating natural processes and mitigating the impact of polluted surface water runoff upon the environment. Within the design of these systems, appropriate consideration of safe exceedence flows must be made, for example, to account for the predicted impact of climate change and possible blockages. Moreover, full advantage should be made of the opportunities for environmental enhancement posed by the utilisation of these systems. Proposed SUDS schemes should also consider operation and maintenance issues. The system should be robust in design in order to prevent blockages, allow ease of maintenance and reduce long term maintenance costs. Moreover, a suitable maintenance scheme should be proposed although the operation of the system should not be overly reliant upon maintenance being carried out.

It is essential to consider source control within the surface water drainage proposals; techniques which aim to manage the surface water at or close to the receiving surface should be utilised as widely as possible. For example, paved surfaces (e.g. car parks and access roads) could be of permeable construction allowing water to be stored prior to discharge. Other areas could be drained using a network of grassed swales which would serve to improve the quality of the surface water and reduce the flow rate, whilst directing it to the attenuation area or discharge point. Furthermore, it is recommended that rainwater re-use schemes be utilised, such as, rainwater harvesting for domestic use, such as toilet flushing, as well as the encouragement of the use of water butts and rainwater storage tanks. Further source control techniques would include the installation of green roofs where practical. Incorporation of such measures would serve to greatly

reduce the volume of surface water requiring discharge, reduce water demand, and would also further satisfy the Code for Sustainable Homes.

However, it must be appreciated that any discussions regarding SUDS provision must be commenced early in the development process as it can take a long time decide upon the most appropriate type of SUDS to use on a particular site, how they should be adopted and who is responsible for their maintenance.

Additional information on the planning, design, construction and operation of SUDS can be found in the CIRIA publication C697, *The SUDS Manual,* and the associated site handbook C698, both of which can be downloaded from the CIRIA website[32].

The Adoption of SUDS

The maintenance of SUDS systems has been subject to a great deal of discussion over the last few years. Following Royal Assent of the Floods and Water Management Act on 8th April 2010, legislation is now in place to implement a standardised process for the adoption of SUDS. Developers are now responsible for the inclusion of SUDS within their designs to accommodate all surface water discharge from the finished site. The water companies are no longer obliged to accept any surface water drainage from new development. Responsibility for adoption and maintenance of the schemes rests with the local approving body (in this case, Staffordshire County Council). As such, it is vital that the Local Authorities work together with the County Council in reviewing and approving SUDS schemes proposed with all new developments. Appendix E has been updated to provide information regarding the new legislation.

There are already a number of good practice case examples where relevant organisations including local authorities, developers and water companies have developed acceptable adoption solutions for developments or development areas. Defra is currently working with its partners to develop an agreed national adoption system for SUDS. Some options for these are already being tested within the ongoing Defra Integrated Urban drainage pilots. The Floods and Water Management Act, which received Royal Asset on 8th April 2010, includes clearer policy and responsibilities for adoption of SUDS. In the meantime it is good practice for the relevant key stakeholders including developers, water companies, Local Councils and County Council (Highways) to develop agreed bespoke adoption agreements for development areas to enable whole life management of SUDS. The Construction Industry Research and Information Association (CIRIA) has already published guidance that enable maintenance and adoption agreements to be set-up[33].

Section 106 of the Town and Country Planning Act 1990 allows Planning Authorities to enter into legally binding agreements with the local unitary authority in order to offset the cost of the development. This may be in the form of a fee, say as a contribution to a new school, or it could be an agreement, such as a section of the development site is developed as an amenity area and handed to the Local Authority.

[32] http://www.ciria.org.uk/suds/publications.htm

[33] Interim Code of Practice for Sustainable Drainage Systems, July 2004 (http://www.ciria.org/suds/icop.htm)

The use of the Section 106 agreement has been considered as a method of collecting a financial contribution from developers in order to fund the future maintenance of SUDS schemes. An alternative method of collection could be through the Water Authorities Infrastructure Charge, which is paid in relation to all new properties.

However, before the collection of this money is considered, the following points would need determining:

- Who will 'adopt' the SUDS schemes?
- What will happen to developments that are not suitable for SUDS?
- How will the level of fees be set?
- If SUDS are not constructed on a suitable development should the developer be penalised?

These items will require further consideration as SUDS become more commonplace.

A summary guidance sheet outlining the SUDS and the different types of SUDS measures available is provided in **Appendix E**.

.

4.3.1 SUDS Selection

As stated within their Groundwater Protection Policy[34], the Environment Agency will support the use of sustainable drainage systems for new discharges to ground of surface run-off from roads, vehicle parking and public/amenity areas outside of Source Protection Zone 1 (Inner Zone), provided that an appropriate level of risk assessment demonstrates the groundwater conditions to be suitable. There should also be adequate protective measures for groundwater and arrangements for effective management and maintenance of the system.

To determine the applicability of the various SUDS techniques outlined above for a specific site, a number of characteristics for the site in question must first be assessed. This will enable the most appropriate SUDS to be installed. The CIRIA SUDS Manual[35], 2007, outlines five criteria which must be addressed when selecting the most suitable SUDS design for a development, consisting of:

- Land use characteristics;
- Site characteristics;
- Catchment characteristics;
- Quantity and quality performance requirements; and
- Amenity and environmental requirements.

The most important criteria from a planning perspective are the site characteristics and these are discussed in more detail below. However, as proven by the SUDS schemes implemented by Royal Haskoning in Cambourne, Cambridgeshire, located on clay, alternative SUDS schemes can be implemented on soils with low or bad permeability through detention/retention techniques, although these will be restricted where

[34] The Environment Agency's Groundwater Protection Policy is available on the Environment Agency's website: http://www.ciria.org/suds/icop.htm)

[35] The SUDS Manual, CIRIA C697, 2007

groundwater or source protection zones exist. More information can be found within the Environment Agency's Groundwater Policy and Protection (GP3) document.

Site Characteristics

The characteristics discussed are based upon the CIRIA SUDS Manual and include the following:

- Soil Type;
- Groundwater;
- Drainage Area;
- Topography;
- Hydraulic Head;
- Availability of Space; and
- Intended Usage (this is considered a separate criteria within the CIRIA SUDS Manual but has been included here as it also important from a planning perspective).

Soil Type

As detailed in the CIRIA Manual, the function of different SUDS is very dependent on the underlying soils and it is therefore important that the type of soil is established early in the planning process. The most significant feature of the soil type with regards to SUDS is the permeability and therefore the soil infiltration rate (loosely extending from 'sandy', highly permeable soil types in one extreme to 'clay' based, impermeable soil types in the other. Whereas permeable soils can enhance the operation of some practices, enabling collected water to drain away from the surface much more rapidly, other practices are adversely affected, for example those intended to be permanent wetlands or ponds.

In addition highly permeable soils may create a negative impact where the development site is located close to contaminated land or has the potential to produce surface runoff with a high pollutant load, which should not be allowed to connect to the groundwater flows. Where contaminated land is present, the drainage of surface or roof water could mobilise the contaminants and therefore pose a risk to 'Controlled Waters' receptors. Therefore, proposals for the drainage of surface or roof water into the ground will need to take into account the outcome of a site investigation and any subsequent risk assessments and remedial options appraisals required for the site. Conversely, the requirement for surface or roof water drainage into the ground will need to be accounted for by any risk assessment or remedial options appraisal.

Impermeable soils however will result in a very slow infiltration rate of surface water which is not compatible with SUDS techniques relying upon the passage of water through the soil profile, such as porous pavement or infiltration devices. SUDS in these areas would therefore need to utilise storage rather than infiltration.

Maps of soil type for the Study Area are available from the National Soil Resources Institute website[36]. By zooming into the required area, an OS map of the area of

[36] http://www.landis.org.uk/soilscapes/.

interest will be displayed underneath the coloured soil classifications. When selected with the 'identify' tool, the characteristics of the soil type in question will be displayed to the left of the screen, including the drainage and texture. Alternatively a 'Permeability Dataset' is available upon request from the British Geological Survey, details of which can be found on the BGS website[37].

The permeability of the subsoil beneath a proposed development site influences the range of applicable techniques; permeable soils lend themselves to the application of infiltration based SUDS whilst the application of a SUDS system to a site with a soil of low permeability will necessitate the presence of a watercourse in which to discharge attenuated flows. However, in the absence of a watercourse, an agreement could be possible with the surface water regulating authority to discharge attenuated flows into a nearby surface water drain. Within an assessment of the feasibility of SUDS for a development site, it is recommended that an infiltration test be conducted. **Table 4.1** provides a rough assessment of the applicability of various SUDS techniques dependent upon soil type.

Table 4.1 - Applicable SUDS Techniques Based Upon Soil Type

	Permeable	Impermeable
Filter Strips and Swales	✓	✓
Filter drains and Pervious Surfaces	✓	?
Infiltration Devices	✓	✘
Basins, Ponds and Wetlands	?	✓
Green Roofs	✓	✓
Underground Storage	✓	✓
Water Butts	✓	✓

✓ Feasible ✘ Not Feasible **?** Marginal – needs careful consideration

Some of the techniques not considered feasible due to the soil type may be mitigated against. For example, basins, ponds and wetlands may be lined to prevent rapid infiltration into highly permeable soils.

Groundwater

As many SUDS methods utilise the infiltration of surface water into the underlying soil, they interact with the groundwater systems. It is therefore important to consider whether a groundwater supply exists beneath the site (i.e. in the form of a major or minor aquifer), whether the supply is susceptible to pollutants due to the permeability of the overlying substrata, and also the depth of the groundwater table and its susceptibility to flooding.

As outlined in the CIRIA Manual, all infiltration devices require at least 1m of soil depth between the base of the device and the maximum expected groundwater level (the seasonal high). This ensures that the system continues to operate during periods of exceptionally wet weather and reduces the risk of groundwater flooding as a result of the

[37] http://www.bgs.ac.uk/discoverymetadata/13603036.html

SUDS. This is therefore of greatest concern where SUDS are installed on permeable ground, especially those techniques relying upon the passage of water through the soil profile, such as porous pavement or infiltration devices.

The locations of the major and minor aquifers and their susceptibility to diffuse pollutants are shown on the Groundwater Vulnerability maps, shown as an overview in **Figure 4.1** and in more detail within Sections 5 to 9. These maps also contain a measure of soil classification outlining the leaching potential of the strata. For sites located above areas of high Groundwater Vulnerability (highly vulnerable aquifers), increased pollutant attenuation measures will need to be employed and straight infiltration systems will not be applicable.

Depending upon the proposed catchment and estimated surface water runoff pollutant load, the application of SUDS, especially those based upon infiltration, must be done so with care within areas designated by the Environment Agency as Source Protection Zones (SPZ). These define the locations of groundwater sources, such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. **Figure 4.2** shows the SPZs beneath the study area. The SPZ locations beneath each of the Local Authority areas is shown in more detail within Sections 5 to 9.

The shape and size of the zones depends upon the condition of the ground, how the groundwater is removed and other environmental factors. The three zones are defined as below:

Zone 1 (Inner protection zone)

Any pollution that can travel to the borehole within 50 days from any point within the zone is classified as being inside zone 1. This applies at and below the water table. This zone also has a minimum 50 metre protection radius around the borehole. These criteria are designed to protect against the transmission of toxic chemicals and water-borne disease.

Zone 2 (Outer protection zone)

The outer zone covers pollution that takes up to 400 days to travel to the borehole, or 25% of the total catchment area – whichever area is the biggest. This travel time is the minimum amount of time that we think pollutants need to be diluted, reduced in strength or delayed by the time they reach the borehole.

Zone 3 (Total catchment)

The total catchment is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.

(Environment Agency website)

N.B. Although the location of these SPZs are valid as of January 2010, the Environment Agency periodically reviews and updates the maps. The location of these zones may therefore change in the future.

Figure 4.2 shows a large number of SPZs located beneath the study area. Depending upon the proposed catchment and estimated surface water runoff pollutant load, the application of SUDS, especially those based upon infiltration, must be done so with care within areas designated as Source Protection Zones (SPZ). SUDS schemes serving these catchments must fully integrate the management train concept and be lined in the upper stages (i.e. where the pollutant load is likely to be at its highest) in order to minimise the potential for pollutant laden surface water to infiltrate the ground. The management train concept describes a set of drainage techniques in series to reduce pollution, flow rates and volumes. However, in addition to consideration of the actual pollutant loading of the surface water to be attenuated, attention must also be given to the ground which the surface water soaks through (i.e. the contaminated status of the site). The Environment Agency will object to enhanced infiltration through contaminated land where not accompanied by an appropriate risk assessment, leachate test, and/or associated soil remedial plan to show it would not cause increased pollution of groundwater. Where regeneration is planned within the urban areas issues surrounding contaminated land will be very important to note and may require further site specific surveys.

Both SPZs and GWV have been addressed in more detail within the Local Authority specific sections of this report (Sections 5 to 9). An overview of the applicability of different SUDS techniques based upon these assessments is given in **Table 4.2**.

Table 4.2 - Applicable SUDS techniques based upon GWV and SPZs

	High Water Table (<1m)	High Vulnerability Catchments	Low Vulnerability Catchments	SPZ Catchments
Filter Strips and Swales	✖	?	✓	?
Filter drains and Pervious Surfaces	✖	✖	✓	✖
Infiltration Devices	✖	✖	✓	✖
Basins, Ponds and Wetlands	✓	?	✓	?
Green Roofs	✓	✓	✓	✓
Underground Storage	✓	?	✓	?
Water Butts	✓	✓	✓	✓

✓ Feasible ✖ Not Feasible **?** Marginal – needs careful consideration

Drainage Area

The area of a catchment draining to a particular SUDS scheme is an important consideration as large flows may overwhelm the ability of the SUDS system to treat the runoff. This is especially prominent where vegetation is used as a filter, for example in swales and filter strips. The CIRIA guidance recommends that areas larger than 2ha should not drain to a single SUDS component. However, large scale basins, ponds and wetlands can be utilised in larger sites (> 5ha), although the most effective mechanism will involve the use of other SUDS mechanisms upstream as part of a SUDS management train. This information should be made available by the developer.

The drainage area of a site in question can be calculated through comparison of the site plans with the topography of the area in order to determine the prominent drainage routes of surface water. This is summarised in **Table 4.3**.

Table 4.3 - Applicable SUDS techniques as single components, based upon Drainage Area

	Larger Catchment (>2ha)	Smaller Catchments (<2ha)
Filter Strips and Swales	✗	✓
Filter drains and Pervious Surfaces	?	✓
Infiltration Devices	✗	✓
Basins, Ponds and Wetlands	✓	✓
Green Roofs	✗	✓
Underground Storage	✓	✓
Water Butts	✓	✓

✓ Feasible ✗ Not Feasible **?** Marginal – needs careful consideration

Topography

The gradient of the slope in a potential development site is an important consideration for SUDS as many cannot operate, or will require modification to function, on steep slopes due to the limited infiltration time provided. For example filter strips and infiltration practices generally require infiltration times that are only achievable on gentler slopes to fulfil their function, however, swales, for example, can be adapted and located along the contours of a slope. It is also difficult to achieve sufficient volumes in ponds/basins located on steeper slopes and the infiltration of water may result in saturation of the slope further down creating slope instability or the re-emergence of stormwater.

In addition, many SUDS designs are limited by low site gradients as they require the surface runoff to reach the system with minimal infiltration en route. On completely flat ground it may prove difficult to encourage the surface water to reach the SUDS systems at all. This is discussed further in the following section regarding the hydraulic head and related to compatible SUDS techniques in **Table 4.4**.

Table 4.4 - Applicable SUDS techniques based upon Topography

	Steep Gradient (>5%)	Shallow Gradient (0-5%)
Filter Strips and Swales	?	✓
Filter drains and Pervious Surfaces	✗	✓
Infiltration Devices	✗	✓
Basins, Ponds and Wetlands	✗	✓
Green Roofs	✓	✓
Underground Storage	?	✓
Water Butts	✓	✓

✓ Feasible ✗ Not Feasible **?** Marginal – needs careful consideration

Hydraulic Head

As mentioned above, many SUDS schemes require a difference in elevation between the source and the outflow to enable the surface water to reach the required treatment location. The situation in which little, or no, head exists is summarised below. However, where the hydraulic head is low, it can be created artificially through excavation of the site or the installation of embankments, which may enable the use of the techniques identified as 'not feasible' below. Information regarding the hydraulic head should be indicated through a site survey or review of LiDAR data on a site specific basis. The applicable SUDS techniques for the various gradients are shown in **Table 4.5**:

Table 4.5 - Applicable SUDS techniques based upon Hydraulic Head

	0-1m	1-2m
Filter Strips and Swales	✗	?
Filter drains and Pervious Surfaces	✓	✓
Infiltration Devices	✓	✗
Basins, Ponds and Wetlands	✓	✓
Green Roofs	✓	✓
Underground Storage	✓	✓
Water Butts	✓	✓

✓ Feasible ✗ Not Feasible **?** Marginal – needs careful consideration

Availability of Space

As indicated in the descriptions of the various SUDS techniques, some require more land than others. Inevitably, the area required also increases with the size of the development. In many instances they can be incorporated into the design within open space and playing fields included as part of a development (e.g. as a pond), or areas located within the Flood Zones, which in many cases will not be granted permission for development anyway and can be designed to flood on rare occasions. The applicability of various SUDS techniques based upon the availability of space is summarised in **Table 4.6.**

Table 4.6 - Applicable SUDS techniques based upon the availability of space

	High Space Availability	Low Space Availability
Filter Strips and Swales	✓	✗
Filter drains and Pervious Surfaces	✓	✓
Infiltration Devices	✓	?
Basins, Ponds and Wetlands	✓	?
Green Roofs	✓	✓
Underground Storage	✓	✓
Water Butts	✓	✓

✓ Feasible ✗ Not Feasible **?** Marginal – needs careful consideration

Intended Usage

The intended usage of a site should always be considered alongside the site characteristics mentioned above when selecting SUDS features and should be obtained from the developer for all aspects considered in the site. For example, commercial or industrial uses, which are likely to experience increased pollutant loads, would require more robust SUDS features, such as lined ponds and treatment of the collected water, and application of the Treatment Train concept to ensure adequate pollutant removal. In many cases infiltration systems will not be appropriate without remedial measures and most techniques will require the use of liners. Residential uses, however, can commonly be expected to receive lower pollutant input and lower inflow volumes in comparison, thus allowing smaller and fewer SUDS features to be used. The eight different classifications (ranging from very low density development to contaminated land) are discussed in more detail within the CIRIA Manual. The main classifications are summarised below.

Table 4.7 - Applicable SUDS techniques based upon the intended use of the land

	Residential	Commercial	Brownfield	Contaminated Land
Filter Strips and Swales	✓	✓	✓	?
Filter drains and Pervious Surfaces	✓	✓	✓	?
Infiltration Devices	✓	✓	✓	?
Basins, Ponds and Wetlands	✓	✓	✓	?
Green Roofs	✓	✓	✓	✓
Underground Storage	✓	✓	✓	?
Water Butts	✓	✓	✓	✓

✓ Feasible ✖ Not Feasible **?** Marginal – needs careful consideration

4.4 Developer Contributions

4.4.1 Introduction

When a local planning authority considers a planning application it should be based on whether it is consistent with the development plan for the area. Where it is not consistent, it is normally refused; however, there are some cases where planning conditions or the use of Planning Obligations will make this acceptable.

A Planning Obligation is the means for a developer to make a contribution where a development causes an impact that needs to be addressed, so it can resolve these impacts in order to make a development acceptable.

There are three basic types of outcomes that can be achieved through using a Planning Obligation; Prescribing, Mitigating and Compensation. A Planning Obligation can prescribe the type of development to be achieved under a planning policy which would otherwise not be acceptable. An example of this is the provision of affordable housing within a housing development. Where a development creates a need for a certain facility, a planning obligation can mitigate for this by providing this facility such as the provision of a new road which is not provided for in the planning application. Planning Obligations can also compensate for the loss or damage that may be caused by a development. For example a public rights of way can be rerouted so that it is not lost.

Overall, a Planning Obligation will enable a contribution from a developer in some form. Without such a payment, the development would be considered unacceptable in planning terms. These are currently being consulted upon and more information can be obtained from the Communities and Local Government website[38].

4.4.2 National Policy Framework

Planning Policy Statement 1 (PPS1) (OPDM, 2005) identifies a number of areas within Paragraph 26 to address when preparing development plans, which relate to Planning Obligations. These are:

> *(iii) Not impose disproportionate costs, in terms of environmental and social impacts by unnecessarily constraining otherwise beneficial economic or social development.*
>
> *(iv) Have regard to the resources likely to be available for implementation and the costs likely to be incurred, and be realistic about what can be implemented over the period of the plan;*
>
> *(viii) Recognise that the impact of proposed development may adversely affect people who do not benefit directly. Local planning authorities can use planning conditions or obligations to ameliorate such impacts;*

Paragraph 16 also makes reference to ensuring that the “impact of development on the social fabric of communities” is taken account of.

[38] http://www.communities.gov.uk/documents/planningandbuilding/pdf/1518602.pdf

In terms of more specific guidance on this issue, Planning Policy Statement (PPS25) on Development and Flood risk (CLG, 2006) addresses a number of issues in relation to Developer Contributions and flood risk management in Annex G.

Where a development requires flood risk management measures, these are normally expected to be provided by the developer, but this will only be acceptable where they:

- conform with the appropriate flood-risk management policies
- meet the Sequential and Exception Tests and
- do not have a major adverse impact on flood flows or storage

The requirements of the Sequential and Exception Tests are outlined in PPS25. In areas where there is known to be a risk of flooding, the Sequential Test aims to determine the suitability of land for development, using risk-based approach. The overall test aims to locate new development to in areas of the lowest risk of flooding e.g. Zone 1. Where this is not possible, the developments "flood vulnerability" is assessed in terms of its suitability for the other higher flood zones (2-3b).

The Exception Test is applied after the Sequential test and where the Sequential test can't be met e.g. where new development can't be located in a low enough Flood Zone compatible with the vulnerability of the proposed use. The Test is a means of managing flood risk while still allowing needed or essential development required for wider sustainable communities to occur.

Although the funding of such works is normally the responsibility of the developer, where works have already been provided to protect existing development, this may provide opportunities for additional development, but it should not add to flood risk elsewhere.

Where flood risk management measurement works are required they are likely to require a Section 106 agreement (addressed below), which will cover both the works and their future maintenance.

4.4.3 Planning Obligations and Circular 5/05

The main method to make a financial contribution is by a planning obligation; a type of legal agreement which is permitted by Section 106 of the Town and Country Planning Act 1990 (as amended by section 12 (1) of the Planning and Compensation Act 1991).

The basis of a Planning Obligation is that it may or may not be subject to conditions, it may make a restriction or requirement for a given or indefinite period of time. Also it may ensure that money should be paid on the basis of a formula or specific amount, paid periodically by a given or indefinite period of time.

Circular 5/05 therefore supports the use of a formulae and standard charges as part of a framework for negotiating and securing planning obligations. It also supports the used of pooled these contributions:

> *"Where the combined impact of a number of developments creates the need for infrastructure, it may be reasonable for associated developers' contributions to be*

pooled, in order to allow the infrastructure to be secured in a fair and equitable way" (paragraph B21).

Tests for Planning Obligation

They should only be sought where they meet all of the following tests:

(i) relevant to planning;
(ii) necessary to make the proposed development acceptable in planning terms;
(iii) directly related to the proposed development;
(iv) fairly and reasonably related in scale and kind to the proposed development; and
(v) reasonable in all other respects.
(ODPM Circular 5/05 'Planning Obligations)

Types of Planning Obligation

There are two types of obligation that can be used, which depend on the depending on the difficulty of the issues involved, a "unilateral undertaking" and a bilateral "Section 106 Agreement".

A unilateral undertaking is the more simple form of planning obligation and is only entered into by one party. Generally, they tend to be used where the person entering into the undertaking is the landowner and where it only needs to cover straightforward financial contributions and where the local authority's costs are paid by the landowner. *The terms of the agreement are identified by the applicant.*

A Section 106 Agreement" or Planning Agreement is used in more complex and major developments. It involves a legal bilateral agreement between the planning authority and an applicant or developer and sometimes others who have an interest in the land e.g. another local authority.

Those entering such agreements should not be asked to solve existing problems, but they may be asked to make a contribution towards solving an existing problem if the proposed development would make things worse.

4.4.4 Community Infrastructure Levy

As part of the Planning Act 2008, which was granted Royal Assent on 26th November 2008, the Government has included provisions for a new Community Infrastructure Levy (CIL) to raise investment for vital infrastructure and is seen as an additional funding mechanism rather than replacing any other existing method. This, like its predecessors, is based on a standard approach or tariff based system.

Reference to CIL is also included within PPS12. This confirms that, subject to the Parliamentary timetable, the CIL powers are proposed to come into effect by spring 2009.

The purpose of the Community Infrastructure Levy (CIL) is to extend the number of developers that are required to contribute towards infrastructure costs as well as providing more certainty about these costs through a more standardised approach.

Background

Since 2003 the Government has been looking for a new method to gain some of the increased valve that is achieved when a site is given planning permission and developed for the local community through some form of development charge.

The 2004 Planning and Compensation Act made provisions for an "Optional Planning Charge", but this was never been implemented. This was shortly followed by the Planning-gain Supplement (PGS) which was proposed by the 2004 Barker review of housing supply. However, the 2007 Housing Green Paper outlined the need to consider whether the PGS or other mechanism would raise sufficient funds to provide the infrastructure needed for a development in an equitable way. This was followed by an announcement in the October 2007 Budget that PGS would be deferred and there would be legislation for a new mechanism.

Setting

The Planning Act enables local authorities to apply CIL on new developments within their area to enable the delivery of the necessary new infrastructure; it should not address existing problems in an area.

The CIL needs to relate to the local development plan and its vision and proposals for development (within the Local Development Framework - LDF) for the area and therefore only those that produce such plans can set this charge, except Minerals and Waste Authorities.

Planning Policy Statement 12 on Local Spatial Planning identifies that the development plan should be accompanied by a mechanism to identify what the local infrastructure requirements are to deliver the plan (Paragraphs 4.8-4.12). This infrastructure needs to be costed and after other means to fund this are accounted for, the remaining gap will form the basis of what needs to come from CIL and especially how much from each user class of development.

It is proposed that the means to charge CIL will come from a "charging schedule" which will be a new document within the LDF and therefore subject to public consultation and scrutiny. Although it will not form part of the development plan, it will be tested at a public inquiry and be binding by an independent person, but the local authority does not have to adopt it if there remained issues; this would be resolved through a new examination.

The schedule is proposed to be based on a standard charge based on a square metre of development or per dwelling. The Government is also proposing, at a national level, to have inflation indices and exemptions, as well as enabling varying geographic rates within an area.

Charging

It is proposed that the amount owed is to be determined when planning consent is given, but payment is due on commencement of the development (as defined in the 1990 Town and Country Planning Act). Payment would be made within a prescribed time, currently 28 days, but the options of instalments is being considered. Phased developments would be treated separately.

With regards to the enforcement of paying the charge, the charging authority will be able to add interest and surcharges to late payers, which will be determined nationally.

Spending

The CIL can only be spent on infrastructure and not for example services for an area. It can be used to fund both local and sub-regional development, which is of benefit to more than one local authority area. Where this is the case, the Regional Spatial Strategy (RSS) should have identified this need. This will enable local authorities to work together and bring together their CIL.

The issue of flood defences is one of a number of different infrastructure requirements identified by the Government as being appropriate for spending CIL on. The Planning Act indicates that regulations will outline a definition of infrastructure and lists some examples of what this could apply to and flood defences are included in this.

There are also other ways the funds could be used, such as for “forward funding” where another body such as a Development Agency pay for some infrastructure and are paid back from the Levy from the benefiting Local Authorities.

4.4.5 The relationship between the CIL and Planning Obligations

Overall the Government accepts that Planning Obligations are an effective means to address a number of planning-related issues and it will keep it in an amended form, rather than remove it completely, as had been previously proposed. This will enable those local authorities who chose not to operate a CIL in their area, to still use this method, albeit in an amended form.

In terms of amendments, one option being considered is whether community facilities such as medical centre, libraries and schools, as well as necessary transport improvements, should be provided through the CIL. Another is to reduce the range of planning obligations through reducing the criteria of Circular 5/05 or not allowing planning obligations to make use of standard charges.

The Killian Pretty review, published in November 2008, carried out a detailed review of the whole process concerning applying for planning permission, which includes how additional improvements can be made to planning obligations. Recommendations from this review are now in the process of being implemented.

4.4.6 The Local Planning Authority

There is a need to establish how the Local Authorities will, with their partners and other agencies, provide this guidance and co-ordination and what strategies and resources need to be in place to achieve the objectives of the RSS.

This section has outlined that the method to achieve this from the private sector is through the use of developer contributions. It has specifically outlined the main current mechanism to achieve this, S106 agreements, as well as an emerging mechanism that could also be used alongside this, the Community Infrastructure Levy.

BOX 4.1

Demand Management: At a Glance…

A number of demand management techniques are applicable within the Study Area, both for new developments and the retrofitting of existing developments. Both water companies promote the installation of water meters and grey water recycling and rainwater harvesting within new developments to reduce water consumption. They both also aim to reduce leakage within the planning period. It is recommended that new developments are built in line with the Code for Sustainable Homes Level 3 and, where possible, Level 4.

SUDS are a key tool in the management of surface water runoff and pollution and are now an essential consideration for the removal of surface water from all new developments. However, they must be chosen with care dependent with consideration of individual site characteristics. Funding is available from developers to implement a number of the demand management techniques discussed within this section, but will require agreement before the planning application is approved. It is therefore important that all these techniques are considered and pursued in advance by the developer and factored into the planning application.

5 STAFFORD BOROUGH DEVELOPMENT SPECIFIC RESULTS

5.1 Introduction

A general overview of all the elements of the WCS and the methodology used to assess them has been introduced in Sections 1 to 4 above. This section details the Local Authority specific analysis for Stafford Borough and the implication of these results for development within the Borough.

Figures

5.2 Growth and Development

5.2.1 Scenarios for Growth

Stafford town has been identified in the Phase 2 RSS as a Settlement of Significant Development (SSD) and, as such, the Borough has been given a relatively high target of growth as compared to the other Districts and Boroughs within the Study Area. Within the NLP Development Options study Stafford has been identified as potentially being required to accommodate a higher quota of development, although this depends upon the final Scenario adopted as part of the final WMRSS Phase 2 submission.

The scenarios of growth being considered within this WCS for Stafford Borough are as stated in Section 2.3 and reiterated in **Table 5.1** below:

Table 5.1 - Stafford RSS and Growth Scenarios

	Residential (dwellings)	Indicative Annual Average (2006 - 2026)	Employment (ha)
Scenario 1 (RSS)	10,100 *(7000 - Stafford)*	505 *(350)*	120
Scenario 2 (+10%)	10,000-14,500 (Issues & Options) 11,600 (NLP*)	500 - 725 (Issues & Options) 580 (NLP)	70 -110 (Issues & Options)
Scenario 3 (+30%)	13,100 (NLP*)	655	150

**NLP - Nathanial Lichfield and Partners*

N.B. Annualised figures have been assumed.

5.2.2 Potential Development Sites

Stafford Borough Council have provided, for use in this study, a number of shapefiles showing the location of potential development sites being considered for development. These consist of:

- Housing Sites;
- Employment Sites;
- Site Requests (2008-09); and
- Sites within the Residential Development Boundary (RDB) (2008-09).

As they are the key sites for future development, the housing sites and employment sites have been analysed on an individual site basis within this WCS. Due to the number of 'Request' and 'RDB' sites it was not possible to undertake an individual analysis of all of these. Instead, they have been grouped into areas, based upon existing settlements, as follows:

- Adbaston
- Barlaston
- Bradley
- Bridgeford Area
- Church Eaton
- Cotes Heath and Swynnerton
- Croxton
- Eccleshall
- Gnosall
- Haughton
- Haywood
- Hilderstone
- Hixon and Stowe
- Leadendale, Blythe Bridge and Fulford
- Milwich
- Norbury and Sutton
- Clayton/South Newcastle under Lyme;
- Rugeley;
- Ranton
- Salt and Weston
- Slindon and Sturbridge
- Stafford (in and around)
- Stone (in and around)
- Walton and Norton Bridge
- Woodseaves
- Yarnfield

An overview of the Borough and the locations of the individual potential development sites mentioned above are shown in **Figure 5.1**. The housing sites are shown in red and the employment in green. The 'RDB' and 'Request' sites have been outlined in black to indicate they will be included within the 'area' analysis rather than individually.

This not only provides the Council with a site-by-site review of the key sites, but also gives a spatial overview of the Borough as a whole which should assist in the analysis of any additional future sites not provided for use in this WCS. Reference is also made to the individual housing and employment sites throughout this analysis using the ID numbers provided by the Council. This should aid the Council in cross referencing this new information with their existing data. Development trajectories, provided by the Council, have formed the basis of discussion with the stakeholders. However, it must be noted that the sites shown may have been progressed/developed during the timescale of this project.

The rest of this section summarises the potential constraints to development for each of the potential development sites and areas for all elements of the water cycle. For ease of reference the potential development sites and areas have been given a traffic light colour coded classification indicating the infrastructure upgrade (and therefore the indicative investment) required to enable development to progress in each location. These results are summarised in the Constraints Matrix contained in **Table H.1** of **Appendix H.** The underlying philosophy to the colour scheme is shown below and the reasons for the classification in each case discussed in more detail in Sections 5.3 to 0.

Green	Little or no infrastructure upgrade required
Amber	Minor infrastructure upgrade required
Red	Major infrastructure upgrade required

5.3 Water Resources and Water Supply

Please see Section 3.1 for more background information

5.3.1 Water Resources

As shown in **Figure 2.1** and **Figure 5.2**, Stafford Borough is wholly located within STWL's water supply area and within their Staffordshire and East Shropshire WRZ. This includes the sites located across the Borough boundary in South Staffordshire District (South of Stafford town), one of which is the residential site SF-8. As such, water is supplied from a combination of surface and groundwater sources and is classified by the Environment Agency as being under 'moderate' water stress. According to STWL's Statement of Response, there is enough water available for use within this zone to meet the baseline scenario of development as stated in the Phase 2 RSS (Scenario 1 within this WCS), although this will require review once the Environment Agency's RSA sites have been confirmed. Although not essential, STWL still identify the need for resilience measures for this WRZ between AMP5 (2010 - 2015) and AMP9 (2030 - 2035), which have been identified to include:

- Household and non-household water efficiency; and

- Leakage control through a combination of active leakage control, mains replacement and pressure control.

Table 5.2 illustrates, a comparison of the Water Available for Use (WAFU) with the Distribution Input (DI), which is essentially total demand.

Table 5.2 - Predicted Supply/Demand Balance within Stafford Borough

Staffordshire and East Shropshire WRZ	**AMP5 2010-15**	**AMP6 2015-20**	**AMP7 2020-25**	**AMP8 2025-30**
Supply/demand (FINAL WRMP) Baseline Scenario				
Supply/demand (FINAL WRMP) Final Strategy				

Red - WAFU is less than DI

Amber - WAFU is less than DI plus target headroom, but greater than DI

Green - WAFU is greater than DI plus target headroom

Non Residential Water Use

The Council has not identified any plans for major commercial development with a high water requirement. Some allowance has been made in STWL's dWRMP for such use, but as headroom is limited such developments may not be feasible, especially within the short term. If such development is identified the Council need to inform STWL as soon as possible to enable adjustment of their water resource plans and discussion of the feasibility of the proposal.

Abstraction

Although unlikely to impact on residential development, the Environment Agency's policies regarding abstraction from the watercourses within the Borough may impact upon the viability of smaller commercial developments or agriculture.

The analysis undertaken within Section 3.1.4 and **Appendix C** indicates that the followings CAMS are relevant to Stafford Borough:

- Staffordshire Trent Valley; and
- Shropshire Middle Severn

The current status of the relevant waterbodies for Stafford Borough within these CAMS and the resulting impact upon abstraction licences is summarised in **Table 5.3** below and shown graphically in **Figure 5.2**.

Table 5.3 - Impact of Water Availability on Abstraction Licences within Stafford Borough

Water Source	Individual Status	Target Status 2016	New Licences*	Existing Licences
Upper River Trent	Water Available	No Water Available	Issued subject to HoF Time limit of 31 March 2015	No impact Time limited licences will be renewed
Lower Trent and Swarbourn	No Water Available	No Water Available	Issued subject to HoF Time limit of 31 March 2015	No impact Time limited licences will be renewed
River Sow	No Water Available (Over abstracted in top reach)	No Water Available (Over abstracted in top reach)	*Upstream of Doxey Marshes:* Issued subject to HoF. Water only available at very high flows (approx. 20% of year) Time limit of 31 March 2015 *Downstream of Doxey Marshes*: Issued subject to HoF Time limit of 31 March 2015	No impact
River Penk	No Water Available	No Water Available	Issued subject to HoF Subject to three tiered abstraction conditions Time limit of 31 March 2015	Three tiered abstraction condition during summer months changing to two tiered with HoF No change to winter licences
Scotch Brook	Over Abstracted	Over Licensed	Closed to new licences	No impact No additional water granted Time limited licences may be renewed
River Blithe	Water available (Over abstracted in top reaches)	No water available (Over abstracted in top reaches)	*Upstream of Blithfield Reservoir* Closed to new licences *Blithfield to Nethertown* Issued subject to HoF Time limit of 31 March 2015 *Downstream of Nethertown* Closed to new abstraction	No impact Presumption of renewal to time-limited licences
Tittensor, Hatton, Spot, Forsbrook	Over Abstracted	Over Licensed	No water available - closed to new licences	No additional water Time limited licences may be renewed

Water Source	Individual Status	Target Status 2016	New Licences*	Existing Licences
GWMUs				
Rugeley and Teddesley GWMUs	Over Licensed	Over Licensed	No water available - closed to new licences	No additional water Time limited licences may be renewed
Bishops Wood GWMU	No Water Available	No Water Available	Applications considered but limited water Time limit of 31 March 2015	No impact Time limited licences will be renewed
Oulton, Hardiwick and Hopton GWMU	Water Available	Water Available	Applications accepted Time limit of 31 March 2015	No impact Time limited licences will be renewed
River Tern and Sambrook East GWMU	Over Licensed	Over Licensed	Encouragement of winter storage reservoirs and other water efficient measures All subject to HoF Short term licences available from groundwater No presumption of renewal	Same condition as new licences on increased part of licence Renewal licences required to pass 3 tests Consideration of retrieval of unused licences and encourage downward variation
Coley Brook and Aqualate GWMU	Over Abstracted	Over Abstracted	Aqualate GWMU Closed All subject to HoF Encouragement of winter storage reservoirs and other water efficient measures	Same condition as new licences Renewal licences required to pass 3 tests Consideration of retrieval of unused licences and encourage downward variation

NOTES

* all will be subject to local considerations and other renewal criteria

HOF - Hands off Flow

This indicates that a number of the watercourses within Stafford Borough are under pressure with regards to water availability with two of the groundwater sources and Scotch Brook being classified as currently 'over abstracted'. Only two watercourses and one GWMU are identified as having water available for use at present and even two of these will have HoF limits set for new abstraction licences. This will undoubtedly affect agricultural practices in the region and, if tightened, may impact upon STWL's ability to extract the required volume of water resource. Where low flows are identified this may impact upon STWL's ability to gain adjusted discharge consent limits for the WwTWs that require expansion. This is an issue that will require further discussion with the Environment Agency and STWL once the development sites are confirmed. In addition,

as shown in **Appendix C**, a number of sites of Environmental importance are affected by the watercourses listed above. These are investigated further within Section 0.

5.3.2 Water Supply

STWL have not provided a spatial analysis of the capacity of their water supply network. Correspondence with them has confirmed that they are confident that, as long as water resources are available, they will supply any proposed developments, although they may require receipt of the appropriate developer contributions. This will require as much advance notice of final development locations as possible to ensure the appropriate network adjustments are planned and undertaken in sufficient time.

5.3.3 Summary

Due to the confidence of STWL to resource and supply sufficient water within Stafford Borough across the planning period, all the potential development sites and areas provided by Stafford Borough Council have been classified as 'green' for both water supply and resources within **Table H.1** of **Appendix H**. This is shown graphically in **Figure 5.2**. However, the headroom available within the Staffordshire and East Shropshire WRZ is limited and, as such, either of the higher scenarios of development may cause the demand to outstrip supply. This would result in a requirement for additional water resources to be sought and therefore new infrastructure to be installed and additional expenditure required.

BOX 5.1

Stafford Borough Water Resources and Supply: At a Glance…

- Sufficient supply for Scenario 1
- Insufficient resources to supply Scenarios 2 or 3. This would require additional consultation between Stafford Borough Council and STWL and the rerunning of their WRMP models.
- STWL are confident they can supply developments with connection to the water resources as long as water resources are available and developer contributions are received where necessary.
- Limited water availability from the surface and groundwater management units may impact current and future agricultural practices and small commercial developments, especially within the currently Over Abstracted Scotch Brook and Tittensor, Hatton, Spot and Forsbrook GWMU. Developers promoting any development requiring the abstraction of water should consider the information contained within the CAMS reports and apply to the Environment Agency for the necessary licence.
- None of the development sites within Stafford Borough have been identified by the STWL as being limited by water resources or supply:

⇨ All the potential development sites within Stafford Borough are classified as '**green'** with regards to water resources.

⇨ All the potential development sites within Stafford Borough are classified as '**green'** with regards to water supply.

- However, the Council needs to inform STWL as far in advance as possible of all potential development sites to enable the appropriate funding sources to be obtained and necessary network improvements to be planned and undertaken for the system as a whole.

5.4 Wastewater Treatment and Collection

Please see Section 3.2 for more background information

All wastewater collection and treatment within Stafford Borough is the responsibility of STWL.

5.4.1 Wastewater Treatment

Table 5.4 lists all the WwTWs that serve Stafford Borough and indicates which of these are affected by the proposed potential development sites/areas. This is also shown graphically on **Figure 5.3**, with the WwTWs affected by development highlighted in red.

Table 5.4 - WwTWs within Stafford Borough

WwTW	Affected by Proposed Development
ADBASTON (STW)	✓ Adbaston
ASHLEY (STW)	
BRADLEY (STW)	✓ Bradley
BRANCOTE (STW)	✓ Stafford town (central)
CHEBSEY - THE GREEN (STW)	
CHECKLEY (STW)	✓ Leadendale, Blythe Bridge and Fulford
COPMERE (STW)	✓ Eccleshall and Copmere End
CROXTON - THE HIGHFIELDS (STW)	
DERRINGTON (STW)	✓ Stafford town (west)
ECCLESHALL AND STURBRIDGE (STW)	✓ Cotes Heath and Swynnerton, Eccleshall and Copmere End, Slindon and Sturbridge, Yarnfield
ELLENHALL - GRANGE CLOSE (STW)	
FAIROAK - COPSY DALE (STW)	
FORTON (STW)	
FRADWELLS - THE DUTTONS (STW)	
GAYTON - CHERRY LANE (STW)	
GREAT BRIDGEFORD (STW)	✓ Bridgeford Area
HANCHURCH (STW)	
HAUGHTON (STW)	✓ Haughton
HIGH OFFLEY - TUNSTALL LANE (STW)	
HILCOTE - THE LEAS (STW)	
HILDERSTONE - SPOT LANE (STW)	
HIXON (STW)	✓ Haywood and Hixon and Stowe
KNIGHTLEY EAVES (STW)	
LADFORDFIELDS (STW)	✓ Ranton
MILWICH (STW)	✓ Milwich
MODDERSHALL - HILL ROAD (STW)	
NEWPORT (STW)	
NORBURY (STW)	✓ Norbury and Sutton
NORTON BRIDGE (STW)	✓ Walton and Norton Bridge
PENKRIDGE (STW)	✓ South Stafford
PIREHILL (STW)	✓ Hilderstone , Stone (in and around)
RANTON - BROOK LANE (STW)	

WwTW	Affected by Proposed Development
RUGELEY (STW)	✓ North of Cannock
SANDON (STW)	
SLINDON - BROWNS BRIDGE (STW)	
STAFFORDSHIRE-LEA HEATH (STW)	
STANDON - MILL LANE (STW)	
STOWE BY CHARTLEY - MILL COTTAGES (STW)	
STRONGFORD (STW)	✓ Barlaston, Northwood
SWYNNERTON - (STW)	
WALTON - (STW)	
WALTON ON THE HILL (STW)	
WESTON (STW)	✓ Salt and Weston
WETWOOD (STW)	
WOOD EATON (STW)	✓ Gnosall
WOODSEAVES (STW)	✓ Woodseaves

As discussed in Section 3.2.4, STWL were consulted regarding the capacity of the WwTWs affected by the proposed development. Unfortunately, it was not feasible at this stage for STWL to undertake analysis of all the potential development areas within the Borough and their analysis has instead focussed upon the key residential and employment sites. For all other WwTWs further discussion will be required with STWL if development is progressed within the relevant development areas, namely:

- Adbaston;
- Bradley
- Leadendale, Blythe Bridge and Fulford;
- Bridgeford Area;
- Ranton;
- Milwich;
- Norbury and Sutton; and
- Walton and Norton Bridge

Table 5.5 summarises the comments made by STWL with regards to the proposed development within Stafford Borough. The 'Constraints to Expansion' refers to the physical and quality restrictions. The physical constraints refer to the space required to physically expand the WwTW buildings, whereas the quality constraints refer to the ability of the works to process additional effluent and still meet to the quality targets for the discharge (in many cases the treatment of additional effluent will require an increase in discharge consent from the Environment Agency). STWL's full response can be found in **Appendix F**.

Table 5.5 - Stafford Borough WwTW Consent Data

Name	Consented DWF (m^3/d)	Current/Observed DWF (m^3/d)*	Headroom	Constraints to Expansion		Receiving Watercourse
				Physical	Quality	
Brancote	26610	14890	Limited	No issue	No issue	River Sow
Eccleshall & Sturbridge	1650	1279	Limited	No issue	No issue	River Sow
Haughton	123	125	Significant	No issue	No issue	Tributary of Butterbank Brook
Hixon	1754	1205	Limited	No issue	No issue	Pasturefields Brook
Penkridge	2120	2975	Limited	No issue	No issue	River Penk
Pirehill	3200	3595	Limited	No issue	No issue	River Trent
Rugeley	6600	4719	Significant	No issue	No issue	River Trent
Strongford	120000	94220	Minimal	No issue	No issue	Yockerton Brook
Weston	239	167	Limited	No issue	No issue	Tributary of River Trent
Wood Eaton	1036	879	Significant	No issue	No issue	Doley Brook
Woodseaves	138	92	Significant	No issue	No issue	Tributary of Lonco Brook

* red text highlights WwTWs where the Current/Observed DWF exceeds the CDWF - these issues are discussed further in **Table 5.6**.

This assessment indicates that a number of the WwTWs assessed by STWL are reaching, or exceeding, their consented discharge limits. However, from their assessment of the spare capacity at each of these work STWL has no concerns regarding their ability to increase the capacity to accommodate the proposed development, as outlined in **Table 5.5** above and **Table 5.6** below. However, this is reliant upon the Environment Agency granting the additional consents and the WwTWs retaining the required water quality targets (discussed further in Section 3.3).

Table 5.6 - Stafford Borough Impact of Development upon WwTWs

WwTW	Affected Potential development sites/Areas	STWL Spare Capacity (dwellings)	Proposed dwellings within WwTW Catchment (residential sites)	Impact of Development
Brancote	Stafford town	14342	10750	None
Eccleshall & Sturbridge	Cotes Heath and Swynnerton Eccleshall and Copmere End, Slindon and Sturbridge Yarnfield	572	1285	Severe capacity exceedence
Haughton	Haughton	0[1]	615	Capacity Exceedence
Hixon	Haywood Hixon and Stowe	1430	1590	Capacity Exceedence
Penkridge	Stafford (south)	0[2]	300	Capacity Exceedence
Pirehill	Hilderstone Stone	0[3]	3690	Severe capacity exceedence
Rugeley	North of Cannock	4900	Not specified	None but possible affect with tighter quality limits
Strongford	Barlaston Northwood	4130	45	None
Weston	Salt and Weston	188	111	None
Wood Eaton	Gnosall	415	1605	Severe capacity exceedence
Woodseaves	Woodseaves	Further process assessments required[4]	573	Potential capacity exceedence

NOTES

1 - There appears to be zero hydraulic capacity, although there is capacity from a quality performance perspective. STWL therefore do not envisage any issues dealing with the proposed growth.

2 - There appears to be zero hydraulic capacity. STWL do not envisage any problems with increasing the treatment capacity.

3 - There appears to be zero hydraulic capacity. However, as part of the National Environmental Programme there is an obligation to meet a new 2 mg/l 'P' standard by 30 September 2014 and as part of this project additional treatment capacity to accommodate new development needs will be provided.

4 - Further process assessments are required at this WwTW to confirm treatment capacity.

As they have focussed upon the WwTWs serving the key potential development sites, STWL have not provided analysis of all the WwTWs affected by the potential development areas, including:

- Adbaston;
- Bradley;
- Great Bridgeford;
- Checkley;
- Milwich;
- Norbury;
- Ladfordfields; and
- Norton Bridge.

One of these WwTWs, Checkley has been included within the Environment Agency's 2007 risk assessment[39], as shown in **Table 5.7**. This classification has been used in **Appendix H**.

Table 5.7 - Environment Agency 2007 Risk Assessment for Stafford Borough

WwTWs	Flow Risk	Quality Risk	Overall Risk	Development Area
Checkley	L	M	M	Leadondale, Blythe Bridge and Fulford

As the rest are all relatively small WwTWs they have also not been included within the Environment Agency's risk assessment. If development is to be progressed in the areas served by these WwTWs it is recommended further consultation is sought from STWL.

As a result of this assessment, the potential development sites/areas have been classified within **Appendix H** using the following criteria. Where no information is available for the WwTW no classification is given to indicate that further assessment will be required through consultation with STWL once the development sites are finalised.

Green	Sufficient headroom identified by STWL with no issues regarding further expansion *or* low overall risk identified by the Environment Agency
Amber	Sufficient headroom identified by STWL with issues regarding expansion *or* WwTWs identified as having limited or minimal headroom but with the potential to expand to accommodate growth / growth *and* headroom comparisons do not indicate a shortfall *or* medium overall risk identified by the Environment Agency
Red	Limited headroom with issues identified by STWL regarding expansion *or* Insufficient headroom *or* high overall risk identified by the Environment Agency.

[39] West Midlands Regional Spatial Strategy (RSS 11) The Impact of Housing Growth on Water Quality and Waste Water Infrastructure, 2007

5.4.2 Wastewater Collection

STWL has provided an assessment of the capacity of the wastewater infrastructure network to receive the additional flow from the proposed potential key residential and employment development sites. This full assessment is provided in **Table G.1** of **Appendix G**. This assessment has therefore been used to classify the proposed potential development sites in **Appendix H** using the criteria outlined below. This is shown graphically in **Figure 5.4**. The assessment of the development areas has taken place, where possible, based upon their proximity to the key sites. Where this has not been feasible the site classification has been left blank to indicate further consultation is required with STWL if development is pursued in that area.

Green	Low predicted impact on the sewerage infrastructure, in line with STWL's colour scheme (where this is subject to hydraulic modelling the site is marked with a '✪').
Amber	Medium or Low/Medium predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)
Red	Medium/High or High predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)

5.4.3 Summary

Overall, no major "show stoppers" have been identified by STWL with regards to wastewater collection and treatment within Stafford Borough. However, a number of restrictions regarding WwTW capacity and infrastructure extent/capacity have been identified. As a result further consultation with STWL is recommended on a site specific basis when and if the sites are progressed. Where a restriction has been identified with regards to the WwTW capacity, it is essential STWL are notified as early as possible regarding the number of dwellings and type of commercial development intended for the catchment as they may need to seek additional funding sources and further consultation with the Environment Agency with regards to the discharge consents.

BOX 5.2

Stafford Borough Wastewater Collection and Treatment: At a Glance…

Wastewater Collection

- Additional hydraulic analysis is required for a number of potential development sites with regards to the capacity of the network, including a number in Eccleshall, Hilderstone, Stafford, Stone and Walton (see Appendix H for exact sites). This will be carried out by STWL once the sites and capacities are confirmed, either by the Council or by a developer.
- Some sites require infrastructure improvements to increase capacity, either within the mains and/or in the pumping stations, including many in Gnosall, Haughton, Norbury and Sutton, Stafford, Stone, Woodseaves and Yarnfield (see Appendix H). Developer contributions may be sought to fund these improvements.
- SF-2 has been identified as requiring significant improvement to connect it to the wastewater infrastructure network. Any other sites located on the edge of the network will require similar infrastructure improvements.
- All sites will require individual review by STWL once they are progressed as part of the planning application process.
- It therefore may not be possible to develop a number of the sites in the short term.

Wastewater Treatment

- Although STWL do not foresee a problem in accommodating the proposed development, nearly all of WwTWs require some form of expansion or additional analysis to accommodate the additional flow (with the exception of Rugeley).
- Three WwTWs (Haughton, Penkridge and Pirehill) have been identified by STWL as having no hydraulic capacity. A review of the data provided indicates that Eccleshall and Sturbridge, Hixon, Wood Eaton and Woodseaves may also exceed their capacity if all the proposed development was progressed. At present STWL do not foresee a problem with improving these works but this will take time and investment and, as such, may cause a delay.
- Only one WwTW, Stongford, has been identified as having minimal water quality headroom at present.
- All development sites within the catchments of the WwTWs mentioned above require further assessment with STWL, either by developers on a site specific basis or by the Council to assist in the formulation of their preferred options.

5.5 Water Quality and Environmental Issues

Please see Section 3.3 for more background information

As outlined in Section 3.3, this assessment is primarily based upon the watercourses which are affected by the discharge from WwTWs impacted by the proposed development. As discussed above it is anticipated that 21 WwTWs will be responsible for dealing with the associated discharges.

Table 5.8 identifies the WwTWs within Stafford Borough that are affected by the proposed development, the watercourse into which they discharge and the distance from the discharge point of the WwTW to the nearest environmentally designated site (this has only been undertaken for the WwTWs affected by the key potential development sites). These watercourses will be reviewed in more detail within this section.

Table 5.8 - Watercourses and Designated Sites Affected by Development

STW	Receiving watercourse	Designated Site
Adbaston	Lonco Brook	Cop Mere SSSI - 4km (approx)
Bradley	Tributary of Church Eaton Brook	None on watercourse within 10km
Brancote	River Sow	Baswich Meadows SSSI – 200m upstream Cannock Chase SAC/SSSI - 2km downstream (500m to south) Rawbones Meadows SSSI -3.2km downstream
Checkley	River Blithe	None on watercourse within 10km
Copmere	River Sow	Midland Meres and Mosses Phase 2 RAMSAR (0km) Cope Mere SSSI (0km)
Derrington	Doxey Brook	Baswich Meadows SSSI - 4.8km (approx)
Eccleshall and Sturbridge	River Sow	7.9km downstream – Doxey and Tillington Marshes SSSI
Hixon	Pasturefields Brook	None on watercourse within 10km
Haughton	Butterbank Brook (to Presford Brook to Doxey Brook)	None on watercourse within 10km
Great Bridgeford	River Sow	Doxey and Tillington Marshes SSSI - 3.5km (approx)
Ladfordsfield	Tributary of Lonco Brook	None on watercourse within 10km
Millwich	Gayton Brook	None on watercourse within 10km
Norbury	Tributary of River Meese	Aqualate Mere - 4 km (approx) Doley Common SSSI - 3km (approx)
Penkridge	River Penk	Baswich Meadows SSSI – 8.4km (approx)
Pirehill	River Trent	Pasturefields Salt Marsh SAC - 10 km (approx)
Rugeley	River Trent	None on watercourse within 10km
Strongford Stoke	(Yockerton Brook) to River Trent	Trent Wood - 4km (approx)
Woodseaves	Doley Brook (becomes Church Eaton Brook)	Loynton Moss SSSI - 700m (approx)
Wood Eaton	River Trent	None on watercourse within 10km
Weston (in	River Sow	Pasturefields Salt Marsh SAC/SSSI - 2.4km

STW	Receiving watercourse	Designated Site
combination impact with Hixon*)		(approx) Doxey and Tillington Marshes - 3km (approx)

5.5.1 Water Quality

Table 5.9 and **Table 5.10** below identify the current biological and chemical water quality grades for the watercourses into which the identified Stafford Borough WwTWs discharge. Red shading indicates poor or bad water quality. Green shading indicates good or very good water quality. The full key is provided below **Table 5.10**.

Table 5.9 - Chemical GQA Grades for Watercourses within Stafford Borough

WwTW	Watercourse	Chemical Grades			
		1990	1995	2000	2006
Adbaston	Lonco Brook	B	C	B	B
Bradley	Tributary of Church Eaton Brook	C (Church Eaton Brook)	D (Church Eaton Brook)	C (Church Eaton Brook)	C (Church Eaton Brook)
Brancote	River Sow	D	C	C	C
Checkley	River Blithe	B	B	B	B
Copmere	River Sow	E	C	C	D
Derrington	Doxey Brook	C	C	B	B
Eccleshall & Sturbridge	River Sow	E	D	C	E
Hixon	Pasturefields Brook	C	E	E	D
Haughton	Butterbank Brook (to Presford Brook to Doxey Brook)	C (Doxey Brook)	C (Doxey Brook)	B (Doxey Brook)	B (Doxey Brook)
Great Bridgeford	River Sow	C	B	C	C
Ladfordsfield	Tributary of Lonco Brook	C	C	B	B
Milwich	Gayton Brook	C	B	C	A
Norbury	Tributary of River Mease	U (River Mease)	E (River Mease)	E (River Mease)	E (River Mease)
Norton Bridge	Meece Brook	D	C	A	B
Penkridge	River Penk	D	B	C	C
Pirehill	River Trent	E	C	C	C

WwTW	Watercourse	Chemical Grades			
		1990	1995	2000	2006
Rugeley	River Trent	C	C	B	C
Strongford Stoke	(Yockerton Brook) to River Trent	E	C	D	C
Woodseaves	Tributary of Lonco Brook	C (Lonco Brook downstream)	C (Lonco Brook downstream)	B (Lonco Brook downstream)	B (Lonco Brook downstream)
Wood Eaton	Doley Brook (becomes Church Eaton Brook)	C (Church Eaton Brook)	D (Church Eaton Brook)	C (Church Eaton Brook)	C (Church Eaton Brook)
Weston.	River Trent	E	C	C	C

Table 5.10 - Biological GQA Grades for Watercourses within Stafford Borough

STW	Watercourse	Biological Grades			
		1990	1995	2000	2006
Adbaston	Lonco Brook	U	B	A	A
Bradley	Tributary of Church Eaton Brook	C (Church Eaton Brook)	D (Church Eaton Brook)	C (Church Eaton Brook)	B (Church Eaton Brook)
Brancote	River Sow	C	C	C	B
Checkley	River Blithe	B	A	B	A
Copmere	River Sow	C	B	B	A
Derrington	Doxey Brook	C	C	C	B
Eccleshall & Sturbridge	River Sow	U	B	C	C
Hixon	Pasturefields Brook	C	E	C	D
Haughton	Drain which enters Butterbank Brook (Presford Brook - Doxey brook)	C (Doxey Brook)	C (Doxey Brook)	C (Doxey Brook)	B (Doxey Brook)
Great Bidgeford	River Sow	U	C	C	B
Ladfordsfield	Tributary of Lonco Brook	C	A	A	A
Milwich	Gayton Brook	U	A	B	B
Norbury	Tributary of River Mease	U (River Mease)	U (River Mease)	D (River Mease)	C (River Mease)
Norton Bridge	Meece Brook	U	B	B	A
Penkridge	River Penk	D	C	C	C
Pirehill	River Trent	U	C	C	C
Rugeley	River Trent	D	C	D	C
Strongford	(Yockerton	U	E	D	C

STW	Watercourse	Biological Grades			
		1990	1995	2000	2006
Stoke	Brook) to River Trent				
Woodseaves	Tributary of Lonco Brook	C (Lonco Brook downstream)	A (Lonco Brook downstream)	A (Lonco Brook downstream)	A (Lonco Brook downstream)
Wood Eaton	Doley Brook (becomes Church Eaton Brook)	C (Church Eaton Brook)	D (Church Eaton Brook)	C (Church Eaton Brook)	B (Church Eaton Brook)
Weston	River Trent	E	C	C	D

Water Quality Key

A	Very Good	The quality is similar to (or better than) that expected for an average, unpolluted river of this size, type and location.
B	Good	The quality shows minor differences from Grade 'a' and falls a little short of that expected for an unpolluted river of this size, type and location.
C	Fairly Good	The quality is worse than that expected for an unpolluted river of this size, type and location.
D	Fair	The quality shows considerable differences from that expected for an unpolluted river of this size, type and location.
E	Poor	The quality is much worse than expected for an unpolluted river of this size.
F	Bad	The quality is so bad that, in terms of biology, there may be little or no life present in the river.
U	No Result	Not monitored/measurement has not been recorded.

This indicates that the vast majority of the watercourses are likely to be affected by the proposed development have been improving their water quality over the past 20 years, with many achieving good or very good status in the 2006 review. For the majority of the WwTWs in Stafford Borough, the future developments are of a small enough nature to conclude that future increases in flow will not have a significant impact on the water quality of the receiving watercourse, although this will require review, especially for the WwTWs identified as requiring expansion in STWL's analysis above. However the WwTWs highlighted in red (for example Eccleshall and Sturbridge, Hixon and Norbury) may struggle to expand their capacity for the proposed development until their water quality issues are improved, as it is unlikely the Environment Agency will grant additional consent.

However, the Brancote WwTW area has a significant number of residential and employment related development planned and there is the potential that this increase could have an impact on the WwTW discharge flow and water quality in the River Trent. As this watercourse is also destined to receive additional flow from many of the other WwTWs upstream in both Stafford Borough and potentially from Stoke on Trent, the cumulative effect could be significant. As such, further investigation into the expected future flows will be required to properly assess the potential impact.

To further investigate the potential restrictions upon expansion for each of the WwTWs with regards to the WFD we have reviewed their Protected Area Descriptions published

in the RBMP, alongside the current ecological status of the watercourse. These are summarised in **Table 5.11** and shown graphically on **Figure 5.5**.

Table 5.11 - RBMP Summary for Stafford Borough

Watercourse	WwTW	Ecological Status	Freshwater Fish Directive	Nitrates Directive	Urban Wastewater Treatment Directive
Lonco Brook	Adbaston Ladfordsfield Woodseaves		Not Reviewed		
Butterbank Brook	Haughton		Not Reviewed		
Church Eaton Brook	Bradley (Wood Eaton)	Moderate	✓	✓	
Doley Brook	Wood Eaton		Not Reviewed		
Doxey Brook	Derrington	Moderate		✓	
Gayton Brook	Milwich	Moderate	✓	✓	
Pasturefields Brook	Hixon		Not Reviewed		
River Blithe	Checkley	Moderate	✓	✓	
River Penk	Penkridge	Moderate	✓	✓	
River Sow	Brancote Copmere Eccleshall and Sturbridge Great Bridgeford	Poor to Moderate	✓	✓	✓
River Trent	Pirehill Rugeley Weston Strongford	Poor Moderate upstream	✓	✓	✓
Yockerton Brook	Strongford		Not Reviewed		

For the WwTWs located on watercourses with poor or moderate ecological status or where a protected designation has been specified, the Environment Agency will place tighter discharge quality consents on the watercourses and, as a result, may not increase the discharge consents as requested by STWL without additional processing of the effluent or, in the worse cases, not at all. It is therefore recommended that the Council discusses the potential restrictions in further detail with both the Environment Agency and STWL before progressing development within these WwTW catchments.

5.5.2 Environmental Issues

Many aspects of development impact upon environmentally significant sites, including:

- Abstraction from the watercourses (reducing the water supply to the environmental site);
- Wastewater discharge (decreasing the quality of the water); and
- Pollution from surface runoff.

The first two of these aspects will be discussed in more detail below. The third will be discussed in more detail within Section 5.7.

Water Supply

As identified in **Appendix C**, the following environmentally significant sites are affected by the WRMUs or GWMUs located within Stafford Borough:

- Allscott Settling Ponds (SSSI)
- Aqualate Mere (SSSI)
- Attingham Park (SSSI)
- Baswich Meadows (SSSI)
- Belvide Reservoir (SSSI)
- Blithfield Reservoir (SSSI)
- Bracken Hurst (SSSI)
- Brown Moss (SAC & SSSI)
- Buddulphs Pool (SSSI)
- BurntWood (SSSI)
- Cannock Chase (SSSI and SAC)
- Cannock Extension Canal (SSSI, SAC)
- Chartley Moss (SSSI, SAC, RAMSAR)
- Clarepool Moss (SSSI)
- Cole Mere (SSSI)
- Cop Mere (SSSI, RAMSAR)
- Doxey and Tillington Marshes (SSSI)
- Fenn's, Whixhall, Bettisfield, Wern & Cadney Mosses (SAC & SSSI)
- Hodnet Heath (SSSI)
- Loynton Moss (SSSI)
- Maer Pool (SSSI)
- Midlands Meres and Mosses Phase 1 (Ramsar)
- Midlands Meres and Mosses Phase 2(Ramsar)
- Mottey Meadows (SSSI and SAC)
- Muxton Marsh (SSSI)
- Newport Canal
- Pasturefields Saltmarsh (SSSI and SAC)
- Prees Branch Canal (SSSI)
- Rawbones Meadow (SSSI)
- Ruswood Pastures (SSSI)
- Stafford Brook (SSSI)
- Stowe Pool and Walk Mill Clay Pitts (SSSI)
- Sweat Mere and Cross Mere (SSSI)
- Upper Blithe investigated under AMP scheme
- West Midlands Mosses (SAC)
- Wetley Moor (SSSI)

All these sites are dependent upon receiving a sufficient quantity of water in order to survive. In order to protect these sites, and the species living within them, it is essential that all abstraction within the Borough is undertaken within the Environment Agency consent limits stated within the CAMS reports and that the targets set for 2016/2019 are reached. This should not impact the key potential development sites but may cause potential problems for smaller commercial development or agriculture.

Wastewater

The key SSSI sites affected by the discharge from WwTWs are highlighted in **Table 5.8** above. An overview description of these designated sites is given below:

Cannock Chase Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI)
Cannock Chase is a large, diverse area of semi-natural vegetation. It comprises lowland heathland, valley mire/wet heath and dry oak-birch woodlands. There are also small areas of stream valley systems and natural and artificial pools and damp depressions. The plant communities present are rare and are some of the most floristically-rich and representative examples of their type in central England. The area is primarily designated as a SAC due to the presence of dry heaths and wet heaths with cross-leaved heather *Erica tetralix*.

The wetland community on the site contains several plants which are considered rare in the county and/or nationally uncommon. These include marsh fern *Thelypteris thelypteroides*, round-leaved sundew *Drosera rotundifolia*, and bog asphodel *Narthecium ossifragum*.

The diverse invertebrate fauna includes many species which are only found in certain areas of the country but are still considered to be of national occurrence. Moth species include notable heathland and mires species such as the small pearl-bordered fritillary *Boloria selene* and the grass wave *Perconia strigillaria*, as well as woodland species such as the angle-striped sallow *Enargia paleacea*, and alder kitten *Furcula bicuspis*. This is also the only place in the county where bog bush-cricket *Metrioptera brachyptera* occurs. The large size and mixed vegetation of Cannock Chase also supports a wide range of mammal and bird species including red squirrel *Sciurus vulgaris* and a nationally significant population of nightjar *Caprimulgus europaeus*.

Cannock Chase overlies coal measures which have been deep-mined. Mining fissures continue to appear across the site even though mining has ceased and this is thought to detrimentally affect site hydrology. The underlying Sherwood Sandstone is a major aquifer, with water abstracted for public and industrial uses; the effects of this on the wetland features of the Chase are not fully understood.

Pasturefields Saltmarsh SAC and SSSI
This is an inland location for species which are usually associated with grazed coastal saltmarshes. Pasturefields Saltmarsh is a modified remnant of the former saltmarshes of the Trent Valley, and one of only two known remaining brine spring marshes in the country. The saltmarsh contains a number of halophytic plants (those largely restricted to saline habitats). The most notable of these, sea plantain *Plantago maritima*, is known from only one other inland site in Britain.

The most saline conditions surround small 'pans' of standing water where there is a high cover of common saltmarsh-grass *Puccinellia maritima*, with lesser sea spurrey *Spergularia marina*, saltmarsh rush *Juncus gerardi* and sea arrowgrass *Triglochin maritima*. On soils of intermediate salinity creeping bent *Agrostis stolonifera* replaces *Puccinellia* as the most abundant species. Marsh foxtail *Alopecurus geniculatus* and sea milkwort *Glaux maritima* are also present.

The site also has local importance for breeding waders, snipe *Gallinago gallinago*, redshank *Tringa totanus* and lapwing *Vanellus vanellus*. The condition of the site is dependent upon traditional agricultural management with livestock grazing and more importantly, the brine source being maintained and, whilst the hydrogeology of the site is not fully understood, it could be likely to be vulnerable to any abstractions of water from the underground aquifer.

Baswich Meadows SSSI
Baswich Meadows SSSI is an agriculturally unimproved, low-lying permanent pasture in the valley of the River Sow. It occupies a level site on river alluvium and peat with soils that remain moist for most of the year and have not been subject to intensive drainage.

The most important feature on the site is the semi-natural grassland community and the area of greatest botanical interest consists of a diverse sward of grasses, sedges, rushes and herbs intermediate in character between a neutral grassland type and a wetter mire type. The most abundant plants include sharp-flowered rush *Juncus acutiflorus*, brown sedge *Carex disticha,* red fescue *Festuca rubra*, crested dog's-tail *Cynosurus cristatus*, meadow buttercup *Ranunculus acris* and great burnet *Sanguisorba officinalis*. Several rare or uncommon Staffordshire species are also present, such as water avens *Geum rivale*, marsh arrowgrass *Triglochin palustris* and tubular water-dropwort *Oenanthe fistulosa*.

The low intensity summer grazing and high water table that sustain the botanical interest of the site also provide conditions required by breeding waders. The site is part of one of the major river valley locations for breeding redshank in the Severn and Trent catchments and is of county importance for snipe. The drier, more modified parts of the site contribute to the habitat requirements of lapwing.

Rawbones Meadow SSSI
The site is a large, low-lying flood meadow in the valley of the river Sow. It is a long-established neutral grassland on permanently moist alluvium and is of special interest because of a transitional type of species-rich rushy pasture. This plant community is a mixture of wet grassland and swamp species. The vegetation over much of the site is rather uniform, and is adapted to the prevailing hydrological regime of winter/spring flooding and a near-surface, early summer water table. The largest area is dominated by soft rush *Juncus effuses* with creeping bent, reed sweet-grass *Glyceria maxima* and creeping buttercup *Ranunculus repens*. Associated species present are lesser spearwort *Ranunculus flammula*, marsh ragwort *Senecio aquaticus* and cuckooflower *Cardamine pratensis*. Other species include meadowsweet *Filipendula ulmaria*, ragged-robin *Lychnis flos-cuculi*, southern marsh-orchid *Dactylorhiza praetermissa* and probably the largest Staffordshire population of the county rarity tubular water-dropwort.

The area sustains a number of pairs of breeding snipe and also supports redshank and lapwing. In some years winter flooding attracts large numbers of wildfowl. On higher ground around the edges of the site, species-poor, semi-improved grassland occurs. These drier margins together with the unimproved grassland meet the habitat requirements of a wide range of animals. Mallard *Anas platyrhyncos*, skylark *Alauda arvensis*, yellow wagtail *Motacilla flava* and reed bunting *Emberiza schoeniclus* nest regularly on the site. Hare *Lepus capensis*, water vole *Arvicola terrestris* and damselflies commonly occur.

Loynton Moss SSSI

Loynton Moss is a largely-wooded basin mire on the site of a former mere occupying a glacial kettle hole. There is a range of successional woodland and scrub communities and mixed tall fen on nutrient-rich peat, a situation unique in Staffordshire. These wetland habitats are nationally rare and have been greatly reduced in extent by conflicting land uses; more than half of the original Moss was drained and cultivated in 1970.

Fen vegetation is dominated by common reed *Phragmites australis* with associated plants such as great reedmace *Typha latifolia*, branched bur-reed *Sparganium erectum*, marsh cinquefoil *Potentilla palustris* and the nationally uncommon cowbane *Cicuta virosa*. The fen is flanked by carr, consisting of grey willow *Salix cinerea* scrub on permanently saturated soil. Mature, mixed deciduous woodland is present on the canal embankment. Alder *Alnus glutinosa* and downy birch *Betula pubescens* are the most common trees while the shrub layer contains the largest stand in the county of alder buckthorn *Frangula alnus* as well as the locally scarce bog myrtle *Myrica gale*. Small populations of white sedge *Carex curta*, tufted sedge *C. elata* and elongated sedge *C. elongate* are also present on site. All three are very scarce in Staffordshire and the latter is nationally rare.

The site is important for insects associated with fen and carr. There is an outstanding assemblage of moths and butterflies, including uncommon species such as the dentated pug *Anticollix sparsata*, the small yellow wave *Hydrelia flammeolaria* and the round-winged muslin *Thumatha senex*.

Doxey and Tillington Marshes SSSI

This site is an extensive area of low-lying damp grassland, marsh, swamp and pools in the flood plain of' the River Sow. The site is of ornithological importance all year round and has special significance for the numbers of breeding snipe. There is also one of the largest areas of reed sweet-grass swamp in the county. The frequent flooding (less so in recent years) and raised water table through land subsidence, has served to maintain or create a variety of wetland habitats. Drier parts of the site are cattle grazed producing short, open pastures. The ill-drained ground is dominated by soft rush and hard rush *Juncus inflexus*. The many shallow ditches dividing the pastures contain additional species such as water-plantain *Alisma plantago-aquatica*, lesser water parsnip *Berula erecta*, celery-leaved buttercup *Ranunculus sceleratus* and brooklime *Veronica beccabunga.*

Doxey and Tillington Marshes are particularly important as a habitat for breeding and wintering birds. Regular breeding species include grebe species, tufted duck *Aythya*

fuligula, reed and sedge warbler *Acrocephalus scirpaceus* and *A. schoenobaenus,* redshank and lapwing. The site supports a diverse wintering bird community; 80 or more species are present in most winters. There are locally important concentrations of wintering snipe and lapwing. From late August to October roosts of swallows *Hirundo rustica* and martins *Hirundo* spp. can build up to several thousand birds.

Cop Mere SSSI

Cop Mere is a shallow lake lying in a hollow in Keuper Marl. The River Sow enters the mere at the western end and leaves at the eastern end. Cop Mere is also of importance for its range of swamp, fen and carr communities. The site also includes areas of dry and marshy unimproved pasture and a fringe of dry woodland. The open water supports a limited range of submerged water plants, including small pondweed *Potamogeton berchtoldii* and horned pondweed *Zannichellia palustris*, which are uncommon in Staffordshire.

To the west of the mere is an extensive area of alder *Alnus glutinosa* carr and willow *Salix* sp scrub and woodland. A significant feature of this habitat is the abundance of bird cherry *Prunus padus*. North of the mere is a series of fish ponds in a wooded valley. The southernmost of these is included in the site because the surrounding damp woodland contains two county rarities, herb Paris *Paris quadrifolia* and thin-spiked wood-sedge *Carex strigosa*.

The mere is of interest for its breeding birds, which include reed warbler *Acrocephalus scirpaceus*, sedge warbler *A. schoenobaenus*, great crested grebe *Podiceps cristatus*, little grebe *Tachybaptus ruficollis*, grey wagtail *Motacilla cinerea* and, in the woodland, sparrowhawk *Accipiter nisus* and green, great spotted and lesser spotted woodpeckers *Picus viridis, Dendrocopos major* and *D minor*.

The site is divided into four SSSI units, 2 of which are in favourable condition. The unit which corresponds to the lake is in an unfavourable, no change condition, due to water pollution from agricultural run off. Any changes in water quality in the River Sow could exacerbate this condition.

Doley Common SSSI

Doley Common is a low-lying, agriculturally-unimproved pasture in the flood plain of the Doley Brook. The major interest is a nationally rare and threatened acidic marshy grassland community, which is extremely scarce in Staffordshire.

Where the drainage is most impeded with surface water-logging there is a diverse mixture of grasses, rushes, sedges and herbs. Some of the more abundant species are brown bent *Agrostis canina*, purple moor-grass *Molinia caerulea* and marsh pennywort *Hydrocotyle vulgaris*. Important plants present are bogbean *Menyanthes trifoliata*, marsh arrow-grass *Triglochin palustris* and marsh violet *Viola palustris*. The violet is the food plants of the small pearl-bordered fritillary butterfly *Clossinia selene*, which is now very rare in the Staffordshire.

Mesotrophic grassland characterised by prominent tussocks of tufted hair-grass *Deschampsia cespitosa* is present where drainage conditions improve. Wetland herbs

are present at a low frequency, such as wild angelica *Angelica sylvestris*, greater bird's-foot-trefoil *Lotus uliginosus* and marsh horsetail *Equisetum palustre*.

The peripheral watercourse and flooded ditches provide habitats for a range of water plants and breeding amphibians. The site is locally important for its wintering and breeding birds. The occurrence of four breeding wader species in recent years is considered to be notable.

The SSSI is currently in an unfavourable, recovering condition. Water quality has not been identified as an issue on the site but there is the potential that significant decreases in water quality could impact the species composition on the site.

Midland Mere and Mosses Phase 2 Ramsar
The Ramsar site is comprised of 18 units spread over the Wrexham, Shropshire, Cheshire and the Staffordshire Plain. The majority of the units are in Cheshire and north Shropshire, with a small number of outlying sites in adjacent parts of Staffordshire and Wrexham. The Meres and Mosses form a geographically diverse series of lowland open water and peatland sites. The 18 component sites include open waterbodies (meres), the majority of which are nutrient-rich with associated fringing habitats, reed swamp, fen, carr and damp pasture. Peat accumulation has resulted in the nutrient-poor peat bogs (mosses) forming in some sites on the fringes of the meres or completely infilling basins. The wide range of resulting habitats supports nationally important flora and fauna.

The sites area designated as a Ramsar area due to the diverse range of habitats and by supporting a number of rare species of plants associated with wetlands, including the nationally scarce cowbane *Cicuta virosa* and, elongated sedge *Carex elongata*. Also present are the nationally scarce bryophytes *Dicranum affine* and *Sphagnum pulchrum*. The site also supports an assemblage of invertebrates including several rare species. There are 16 species of British Red Data Book insect listed for this site including the following endangered species: the moth *Glyphipteryx lathamella*, the caddisfly *Hagenella clathrata* and the sawfly *Trichiosoma vitellinae*.

Water pollution from discharges and agricultural run off has been identified as an issue for a number of the units, including the two sites in the Stafford area.

Wastewater Treatment Works

The following preliminary assessment has been undertaken for the three most influential WwTWs:

Brancote WwTW is situated upstream of three designated areas, one of which is a SAC. The WwTW discharges into an unnamed ditch which enters the River Trent. The closest site is Baswich Meadows SSSI, which is located 200m upstream of the area. Cannock Chase SAC and SSSI is located 2km downstream of the WwTW. However, this site is not located along the watercourse it is considered that altering the discharge of the Brancote WwTW will not have any impact on its condition or interest features. 3.2km downstream of the discharge point is Rawbones Meadow SSSI, which is currently in an unfavourable recovering condition. This is a wet grassland site which is tolerant to flooding but can be affected by agricultural chemicals.

A large number of dwellings are planned for the Brancote area and this can be expected to affect WwTW discharge flows. However, none of the designated sites are likely to be directly impacted by these developments due to their location and sensitivity.

Woodseaves WwTW is situated 700m upstream of Loynton Moss SSSI. The SSSI is currently in unfavourable recovering condition, although the unfavourable assessment was primarily due to changing and conflicting land uses. The site's management should " ensure that the local surface water that drains into the fen via ditches, or by seeping through permeable soils such as sand, is of appropriate quality" (Natural England, 2005). However there is a limited amount of residential development, and no employment-related development, proposed for the Woodseaves area. It is therefore considered that any environmental impacts will be minimal and will have not affect the interest features of the SSSI.

Pasturefields salt marsh SAC and SSSI are located 2.4km downstream of the discharge point of **Weston WwTW**. The site condition is currently unfavourable recovering, and is subject to the quality of the water it receives. Management should ensure the protection of appropriate water quality which is usually dependent on land-use in the wider catchment. A small number of dwellings are proposed for the Weston area and as such the developments proposed are unlikely to have a significant impact on the discharge and its quality.

5.5.3 Summary

There are a large number of environmentally significant sites located within Stafford Borough and all, in some form, are at risk of degradation due to development. It is therefore important that the Council undertakes the appropriate environmental surveys before they decide on the final sites they wish to bring forward for development. This assessment has briefly reviewed the potential impact increased water abstraction or wastewater treatment may have upon the most significant of these sites. It has concluded that measures will be required to minimise this impact and to follow the Environment Agency's guidelines and regulations.

A simple scoring system has been used to assign a colour code to each of the potential development sites to summarise the conclusions of the water quality and environmental analysis as follows:

Table 5.12 - Water Quality and Environmental Analysis Scoring System

RBMP Ecological Status	2006 GQA (if RBMP not available)*	Directives in RBMP	Environmental Sites downstream of WwTWs	Overall Classification
High = 0	A/B = 0	1 point per Directive	1 point if present	0 points = Green
Moderate = 1	C/D = 1			1-3 points = Amber
Poor = 2	E/F = 2			4-6 points = Red

* the worst score out of the Chemical or Biological is used

Green	Development not predicted to impact water quality and/or Environment Sites
Amber	Some predicted impact to impact water quality and/or Environment Sites from development. Mitigation may be required.
Red	Significant predicted impact to impact water quality and/or Environment Sites from development. Mitigation will be required.

The overall classifications are presented in the Constraints Matrix in **Appendix H**.

BOX 5.3

Stafford Borough Water Quality: At a Glance…

- The River Sow and River Meese (in relation to one of its tributaries within the Borough) have been identified as currently having low water quality from the 2006 assessment.
- The River Sow and The River Trent have been identified as having 'poor to moderate' ecological status in the RBMP and the Church Eaton Brook, Doxey Brook, Gayton Brook, River Blithe and River Penk as having 'moderate' ecological status.
- Potential developments within the catchments of these watercourse may be impacted by abstraction and wastewater treatment limitations and should be discussed with STWL and the EA, either by the Council at options appraisal or by the developers at planning application stage.
- WwTWs identified as requiring additional capacity and being located on, or upstream, of a watercourse identified as having a poor water quality at present or being vulnerable to the impact of new development may struggle to obtain the required increases in consent from the Environment Agency. Additional consultation will be required for sites in those catchments, most notably:
  - Eccleshall and Sturbridge
  - Weston
  - Brancote
  - Pirehill
  - Penkridge

  It is unlikely this will prevent development, but a delay whilst new consents are negotiated or STWL upgrades/improves its WwTWs.

5.6 Flood Risk

Please see Section 3.4 for more background information

A Level 1 SFRA has already been undertaken for Stafford Borough and a Phase 1 SWMP undertaken alongside this study, this WCS therefore utilises much of the data and conclusions from those reports. 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** 5.14 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.

5.6.1 Fluvial Flood Risk

Stafford Borough is almost entirely located within the catchment of the River Trent, as shown in **Figure 5.6**. 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 in **Table 3.11**. 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.

5.6.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Phase 1 SWMP being undertaken alongside this WCS. This has accounted for historic flooding occurrences and the potential for future surface water flooding (roughly inferred from the Environment Agency's surface water flood map). It has also accounted for the risk of flooding from the sewer network. More information regarding the analysis process can be obtained from the Phase 1 SWMP.

5.6.3 Groundwater

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.

5.6.4 Canals

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.

5.6.5 Reservoirs

Flood risk from reservoirs is moderately 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, although the Council may wish to review this if any additional information regarding particular waterbodies is obtained at a later date.

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 25,000m³)[40]. These are shown on **Figure 6.6** and consist of:

- 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; however the risk is moderately low due to the reasons outlined above. As such an assessment of flood risk from reservoirs and impounded waterbodies has not been included within this WCS, although the Council

[40] NB following the enactment of the new Floods and Water Management Bill on 8th April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m³. 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.

may wish to review this if any additional information regarding particular waterbodies is obtained at a later date.

5.6.6 Summary

The flood risk to the proposed development sites/areas is summarised in **Table 5.14** below. Where sites have been identified as being located within the Flood Zones, 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. These findings will be updated once the Phase 2 SWMP is completed and further guidance regarding appropriate mitigation measures is provided within Section 5.7.

The colour coding for 'surface water' has been taken from the parallel SWMP assessment. The 'overall' classification has been determined using the following methodology:

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'. The surface water classification is provided as shown and the two are combined using the standard matrix shown in **Table 5.13** to provide the 'overall' classification. However, there are two anomalies to this method:

1. When a site is located within Flood Zone 3 but only assigned a 'green' grade with regards to surface water flood risk, it is still shown as having a 'red' overall classification. This highlights the importance of development restraint within Flood Zone 3 as specified within PPS25. These sites are marked with an asterisk.
2. When a site is not located within Flood Zone 3 but is identified as being within the extent of Flood Zone 3a with climate change, it is treated within this analysis as if it is located within Flood Zone 3 to provide conservative conclusions.

Table 5.13 - Traffic Light Colour Code Matrix

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

Table 5.14 - Flood Risk to Potential Development Sites

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
EC-1						A	A
EC - 2						R	A
EC - 3						A	A
EC - 4						A	A
EC - 5						A	A
GH - 1						R	A
GH - 2						A	A
GH - 3						A	A
GN - 1						A	A
GN - 2						G	G
GN - 3						G	G
GN - 4						G	G
GN - 5	Y	Y		Y	Y	A	R
GN - 6						G	A
GN - 7						A	A
GN - 8	Y	Y		Y	Y	A	R
GN - 9						A	A
HI - 1						R	A
HI - 2						A	A
HI - 3						R	A
HI - 4						A	A
HI - 5						A	A
HI - 6						A	A
HN - 1						G	G
HN - 2						A	A
HN - 3						G	G
HN - 4						G	G
HN - 5						A	A
HN - 6						A	A
LH - 1						G	G
LH - 2						G	G
SF - 1						A	A
SF - 10						A	A
SF - 11						A	A
SF - 12	Y	Y		Y	Y	R	R
SF - 2						A	A
SF - 3						G	G
SF - 4						G	G

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
SF - 5	Y	Y	Y	Y	Y	A	R
SF - 6						A	A
SF - 7						G	G
SF - 8	Y	Y	Y	Y	Y	A	R
SF - 9	Y	Y		Y	Y	A	R
SN - 1						A	A
SN - 2						A	A
SN - 3						G	G
SN - 4	Y	Y		Y	Y	R	R
SN - 5						A	A
TT - 1 and TT-2						G	G
WO - 1						A	A
WO - 2						A	A
WO - 3						A	A
WO - 4						G	G
WO - 5						G	G
WO - 6						A	A
WO - 7						A	A
WT - 1	Y	Y		Y	Y	A	R
YN - 1						A	A
HA - a						A	A
HA - b						A	A
HA - c						R	R
HI - a						R	R
HI - b						R	R
LA - a						A	A
LA - b						A	A
RH - a						A	A
RH - b						A	A
SF - a						A	A
SF - b	Y	Y		Y	Y	A	R
SF - c						A	A
SF - d	Y	Y	Y	Y	Y	A	R
SF - e	Y	Y	Y	Y	Y	A	R
SF - f	Y	Y		Y	Y	R	R
SF - g	Y	Y	Y	Y	Y	A	R
SF - h						A	A
SF - i						A	A
SN - a	Y	Y		Y	Y	A	R
SN - b						A	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
Stafford (in and around)	Y	Y	Y	Y	Y	R	R
Adbaston	Y	Y	Y	Y	Y	A	R
Barlaston	Y	Y		Y	Y	A	R
Bradley						G	G
Bridgeford Area	Y	Y	Y	Y	Y	A	R
Church Eaton	Y	Y	Y	Y	Y	A	R
Cotes Heath and Swynnerton	Marginal					A	A
Croxton						G	G
Eccleshall and Copmere End	Y	Y	Y	Y	Y	R	R
Gnosall	Y	Y		Y	Y	A	R
Haughton						A	A
Haywood	Y			Y		A	R
Hilderstone	Marginal					G	A
Hixon and Stowe						A	A
Leadendale, Blythe Bridge and Fulford						A	A
Milwich	Y	Y	Y	Y	Y	A	R
Norbury and Sutton	Marginal					A	A
Northwood	Y	Y	Y	Y	Y	G	A*
North of Cannock						A	A
Ranton	Y	Y	Y	Y	Y	A	R
Salt and Weston	Y	Y	Y	Y	Y	R	R
Slindon and Sturbridge						A	A
Stone (in and around)	Y	Y		Y	Y	R	R
Walton and Norton Bridge	Y	Y	Y	Y	Y	R	R
Woodseaves						A	A
Yarnfield	Y	Y		Y	Y	R	R

BOX 5.4

Stafford Borough Flood Risk: At a Glance…

- 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 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.
- Fluvial flood risk is a constraint to development in many areas of the Borough, although most significantly within the town of Stafford.
- Six settlements have been identified within the SWMP as being at high risk of surface water flooding, namely:
  - Stafford;
  - Eccleshall and Copmere End;
  - Salt and Weston;
  - Stone;
  - Walton and Norton Bridge; and
  - Yarnfield**.**
- 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 5.14 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.

5.7 Demand Management

Please see Section 4 for more background information

General guidance regarding demand management that is applicable over the whole of Stafford Borough is presented in Section 4. Many of the factors and, in particular, the suitability of SUDS techniques are dependent upon site specific characteristics. In many cases these will have to be investigated in site specific analysis when the sites are brought forward for development. However, two aspects can be strategically assessed within this study which should provide the Council with an overview of the general restrictions, and therefore costs, associated within the implementation of SUDS over the Borough. The two aspects are Groundwater Vulnerability and the location of Source Protections Zones (SPZ).

Datasets for both these elements have been obtained from the Environment Agency and are shown on **Figure 5.7** and **Figure 5.8**. As explained in Section 4.3, the higher the groundwater vulnerability, the greater the restriction upon the type of SUDS that can be

implemented on the potential development site. Similarly the closer a site is to the centre of SPZ, the greater the restriction, as explained in more detail within Section 4. The effect of these upon the individual potential development sites is summarised in **Table 5.15**.

Table 5.15 - Restrictions upon the Use of SUDS within Stafford Borough

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
EC - 1	N/A	N/A	Minor	G
EC - 2	N/A	N/A	Minor	G
EC - 3	N/A	N/A	N/A	G
EC - 4	N/A	N/A	N/A	G
EC - 5	N/A	N/A	N/A	G
GH - 1	N/A	N/A	Minor	G
GH - 2	N/A	N/A	N/A	G
GH - 3	N/A	N/A	N/A	G
GN - 1	N/A	N/A	N/A	G
GN - 2	N/A	N/A	N/A	G
GN - 3	N/A	N/A	N/A	G
GN - 4	N/A	Y	Minor	A
GN - 5	N/A	Y	Major	A
GN - 6	N/A	Y	Major	A
GN - 7	N/A	Y	Major	A
GN - 8	N/A	Y	Major	A
GN - 9	N/A	Y	Major	A
HI - 1	N/A	N/A	N/A	G
HI - 2	N/A	N/A	N/A	G
HI - 3	N/A	N/A	N/A	G
HI - 4	N/A	N/A	N/A	G
HI - 5	N/A	N/A	N/A	G
HI - 6	N/A	N/A	N/A	G
HN - 1	N/A	Y	N/A	A
HN - 2	N/A	Y	N/A	A
HN - 3	N/A	N/A	N/A	G
HN - 4	N/A	N/A	N/A	G
HN - 5	N/A	Y	N/A	A
HN - 6	N/A	Y	N/A	A
LH - 1	N/A	N/A	Major	A
LH - 2	N/A	N/A	N/A	G
SF - 1	N/A	N/A	N/A	G
SF - 10	N/A	N/A	Minor	G
SF - 11	N/A	N/A	N/A	G
SF - 12	N/A	N/A	N/A	G

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
SF - 2	N/A	N/A	Minor	G
SF - 3	N/A	N/A	Major	A
SF - 4	N/A	N/A	Major	A
SF - 5	N/A	N/A	Major	A
SF - 6	N/A	N/A	Major	A
SF - 7	N/A	N/A	Major	A
SF - 8	N/A	N/A	Major	A
SF - 9	N/A	N/A	Minor	G
SN - 1	N/A	N/A	Minor	G
SN - 2	N/A	N/A	Minor	G
SN - 3	N/A	N/A	N/A	G
SN - 4	N/A	N/A	Minor	G
SN - 5	N/A	N/A	Minor	G
TT - 1 and TT-2	N/A	N/A	Major	A
WO - 1	N/A	N/A	Minor	G
WO - 2	N/A	N/A	Minor	G
WO - 3	N/A	Y	Minor	A
WO - 4	N/A	Y	Major	A
WO - 5	N/A	Y	Minor	A
WO - 6	N/A	N/A	Minor	G
WO - 7	N/A	N/A	N/A	G
WT - 1	N/A	N/A	Minor	G
YN - 1	N/A	N/A	Minor	G
HA - a	N/A	N/A	N/A	G
HA - b	N/A	N/A	N/A	G
HA - c	N/A	N/A	Minor	G
HI - a	N/A	N/A	Minor	G
HI - b	N/A	N/A	Minor	G
LA - a	N/A	N/A	Minor	G
LA - b	N/A	N/A	N/A	G
RH - a	N/A	N/A	N/A	G
RH - b	N/A	N/A	N/A	G
SF - a	N/A	N/A	Minor	G
SF - b	N/A	N/A	Minor	G
SF - c	N/A	N/A	Major	A
SF - d	N/A	N/A	Minor	G
SF - e	N/A	N/A	Minor	G
SF - f	N/A	N/A	Minor	G
SF - g	N/A	N/A	Minor	G
SF - h	N/A	N/A	N/A	G
SF - i	N/A	N/A	N/A	G

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
SN - a	N/A	N/A	Minor	G
SN - b	N/A	N/A	Minor	G
Stafford (in and around)	Y	N/A	Major and Minor	R
Adbaston	N/A	N/A	Major	A
Barlaston	N/A	N/A	Minor	G
Bradley	N/A	N/A	N/A	G
Bridgeford Area	N/A	N/A	Minor	G
Church Eaton	N/A	N/A	Minor	G
Cotes Heath and Swynnerton	N/A	Y	Major and Minor	A
Croxton	N/A	Y	Major	A
Eccleshall and Copmere End	N/A	N/A	Minor (marginal)	G
Gnosall	N/A	Y	Major and Minor	A
Haughton	Y	N/A	Minor (marginal)	R
Haywood	N/A	N/A	Major	A
Hilderstone	N/A	N/A	Major (marginal)	A
Hixon and Stowe	N/A	N/A	Minor (marginal)	G
Leadendale, Blythe Bridge and Fulford	N/A	Y	Major and Minor	A
Milwich	N/A	N/A	Minor (marginal)	G
Norbury and Sutton	N/A	Y	Major	A
Northwood	N/A	N/A	Minor	G
North of Cannock	N/A	Y	Major	A
Ranton	N/A	N/A	Minor (v marginal)	G
Salt and Weston	N/A	N/A	Minor	G
Slindon and Sturbridge	N/A	N/A	Minor (marginal)	G
Stone (in and around)	N/A	N/A	Minor	G
Walton and Norton Bridge	N/A	N/A	Minor (marginal)	G
Woodseaves	N/A	Y	Major and Minor (marginal)	A

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
Yarnfield	N/A	N/A	Major and Minor	A

NOTES

* Overall classification has been given using the following system:

Red - Located over an Inner SPZ

Amber - Located within the Total SPZ and any GWV class *or* just located within Major GWV area

Green - Not located within GWV area or over SPZ *or* just located within Minor GWV area.

5.7.1 Summary

Although some restrictions are highlighted for the use of SUDS within the Borough, very few of the potential development sites/areas have been classified as having a major constraint (i.e. marked in red). Even for these sites appropriate SUDS techniques are available, but they must take into account the vulnerability of the underlying substrata as outlined within this section and discussed further in Section 4.

BOX 5.5

Stafford Borough SUDS: At a Glance

- A number of development areas are affected by SPZs and/or GWV (see Table 5.15 above). Sites GN-5,6,7,8,and 9, LH-1. SF-3, 4, 5, 6, 7 and 8, TT-1 and TT-2, WO-4 and SF-c are located within a major GWV area. However, no development sites are located over the Inner Catchment of SPZs.
- As a result, some restrictions may be placed upon the appropriate SUDS for each site, although appropriate techniques are available. These must be investigated by the developer.
- Site specific investigation will be required for new development allocations within the settlements identified as being within a SPZ and/or GWV area. Stafford and Haughton are identified as potentially having the most severe restrictions upon the use of SUDS.

5.8 Constraints Matrix

The constraints matrix presented in **Appendix H** summarises all the conclusions from this section on a site by site basis. It identifies the site reference, purpose, proposed number of dwellings at the time of writing, the water supply company, wastewater treatment works and the colour coded classification for each of the areas of water resources, water supply, wastewater collection, wastewater treatment, water quality, flood risk and SUDS. The table utilises the colour codes introduced at the start of this section as follows:

Green	Little or no infrastructure upgrade required
Amber	Minor infrastructure upgrade required
Red	Major infrastructure upgrade required

No major “show stoppers” have been identified, although a number of sites have more than one element that requires investment to enable development to take place. For a number of the restrictions, the responsibility lies with the developer and/or water company to secure the appropriate funding. However, the Council should be aware that these issues may result in time delays for site development and should therefore consider them within their Core Strategy.

5.9 Recommendations

5.9.1 LDF Policies and Development Control Policies

Due to the close proximity and similar characteristics of all the Districts and Boroughs within the Study Area, there are a number of common recommended policies. These are outlined in Section 10.1 at the end of this report. The policy recommendations specific to this Borough are included here. It must be noted that all the recommendations and conclusions presented in this report are based upon the most recent data and information, as presented in this report, and may be superseded at a later date.

Water Supply

- STWL have not identified any development sites requiring major infrastructure upgrade. However, they should be kept informed of the latest development strategy by the Council and consulted regarding individual development sites by developers.

Water Resources

- No water resource issues have been identified by STWL. However, their final supply demand scenario is reliant upon the implementation of a number of mitigation measures/infrastructure improvements. The Council should inform STWL of any high water demand development sites as early in the development process as possible.

Wastewater Collection

- Consultation must be held with STWL ahead of the progression of any potential development sites to ensure the appropriate wastewater infrastructure is in place with sufficient time. This is required from the Council at options development stage and by the developers at site progression. Discussion should be held as far in advance as possible to enable STWL to fund, source and implement the required infrastructure improvements by the time they are required. This is particularly important for the areas around Gnosall, Haughton, Norbury and Sutton, Stafford, Stone, Woodseaves and Yarnfield, which have been identified as requiring infrastructural upgrade and Eccleshall, Hilderstone, Stafford, Stone and Walton, which require further hydraulic analysis.
- Site SF-2 requires further investigation with regards to the provision of wastewater infrastructure. As this is site specific it discussion should be held between the developer and STWL at a planning stage, if progressed.

Wastewater Treatment

- All development sites within the catchments of the Haughton, Penkridge, Pirehill, Eccleshall and Sturbridge, Hixon, Wood Eaton, Woodseaves and Strongford WwTWs require further discussion with STWL, either by developers on a site specific basis or by the Council to assist in the formulation of their preferred options.
- Strongford WwTW requires further investigation with regards to headroom availability. This will be undertaken by STWL if the Council or developers identify that further development will definitely be located within that catchment.

Water Quality and Environment

- The Council should consider policies to improve the water quality within the Borough as a whole, but most significantly on the River Sow, River Trent and tributaries of the River Meese.
- The water quality issues impact all potential developments within the catchments of the Brancote, Copmere, Eccleshall and Sturbridge, Great Bridgeford, Pirehill, Rugeley, Weston, Strongford and Norbury WwTWs. This will require consideration by both the developer and STWL during the planning application stage and discussion with the EA.
- Due the vast number of environmentally significant sites within the Borough policies must be emplaced to ensure that development does not have an adverse impact on any of these areas. This should be undertaken by the developer at planning application stage.

SUDS

- Due to the adoption of the Floods and Water Management Act, STWL is no longer required to accept surface water runoff from new development sites. As such, all planning applications must include a suitable SUDS scheme. This will be submitted by the developer and review by the relevant SUDS approval board (SAB) within Staffordshire County Council.

Flood Risk

- Individual FRAs are required for a number of 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). These should be procured by the developer.
- Surface water a flooding is a potential issue within a number of settlements, namely: Stafford; Eccleshall and Copmere End; Salt and Weston; Stone; Walton and Norton Bridge; and Yarnfield. This should be considered by the Council when considering preferred options and by the developer at development progression. The Phase 1 SWMP should be consulted before development takes place in any of these settlements.
- Development within all the settlements identified as ‘red’ in Table 5.14 should be reviewed as part of a site specific FRA with reference to both the Phase 1 SWMP and Level 1 SFRA by the developer.
- Stafford town would benefit from inclusion within a Phase 2 SWMP, procured by the Council.

6 LICHFIELD DISTRICT DEVELOPMENT SPECIFIC RESULTS

6.1 Introduction

A general overview of all the elements of the WCS and the methodology used to assess them has been introduced in Sections 1 to 4 above. This section details the Local Authority specific analysis for Lichfield District and the implication of these results for development within the District.

Figures

6.2 Growth and Development

6.2.1 Scenarios for Growth

The scenarios of growth being considered within this WCS for Lichfield District are as stated in Section 2.3 and reiterated in **Table 6.1** below:

Table 6.1 - Lichfield District RSS and Growth Scenarios

	Residential (dwellings)	Indicative Annual Average (2006 - 2026)	Employment (ha)
Scenario 1 (RSS Phase 2)	8000	400	99
Scenario 2 (+10%)	8800	440	108.9
Scenario 3 (+30%)	10400	520	128.7

N.B. Annualised figures have been assumed.

6.2.2 Potential Development Sites

Lichfield District Council have provided, for use in this study, a number of shapefiles showing the location of potential development sites being considered for development. These consist of:

- Key Residential;
- Additional Alternative
- Scattered Rural

No sites have been identified solely for employment development.

The ‘key residential’ and ‘additional alternative’ sites have been analysed on an individual site basis within this WCS. The rest of the sites have been grouped into areas, based upon existing settlements, as follows:

- Alrewas
- Anker Valley
- Armitage and the Longdons
- Blithbury
- Brownhills
- Burntwood (in and around)
- Carroway Head
- Clifton Campville
- Colton
- Edingale and Harlaston
- Elford
- Fradley
- Hampstall Ridware
- Hill Ridware
- Kings Bromley
- Lichfield (in and around)
- Little Aston and North Streetly
- Mile Oak / Fazeley
- Muckley Corner, Summerhill and Springhill
- Other Rural
- Shenstone
- Shenstone Woodend
- Stonnall
- Weeford
- Whittington
- Whittington Heath

The location of all these areas and the individual potential development sites mentioned above is shown in **Figure 6.1**. The housing sites are shown in red and the additional alternative in purple. The scattered sites have been outlined in brown to indicate they will be included within the ‘area’ analysis rather than individually.

This not only provides the Council with an analysis of all the sites, but also gives a spatial overview of the District as a whole which should assist in the analysis of any additional future sites not provided for use in this WCS. Reference is made to the individual sites throughout this analysis using the ID numbers provided by the Council. This should aid the Council in cross referencing this new information with their existing data. Development trajectories, provided by the Council, have formed the basis of discussion with the stakeholders. However, it must be noted that the sites shown may have been progressed/developed during the timescale of this project.

The rest of this section summarises the potential constraints to development for each of the potential development sites and areas for all elements of the water cycle. For ease of reference the potential development sites and areas have been given a traffic light colour coded classification indicating the infrastructure upgrade (and therefore the indicative investment) required to enable development to progress in each location. These results are summarised in the Constraints Matrix contained in **Table H.2** of **Appendix H.** The underlying philosophy to the colour scheme is shown below and the reasons for the classification in each case discussed in more detail in Sections 6.3 to 6.8.

Green	Little or no infrastructure upgrade required
Amber	Minor infrastructure upgrade required
Red	Major infrastructure upgrade required

6.3 Water Resources and Water Supply

Please see Section 3.1 for more background information

6.3.1 Water Resources

As shown in **Figure 2.1** and **Figure 6.2**, Lichfield District is wholly located within SSW's water supply area. As such, water is supplied from a combination of surface and groundwater sources and is classified by the Environment Agency as being under 'moderate' water stress. According to SSW's FWRMP, there is enough water available for use within this zone to meet the baseline scenario of development as stated in the Phase 2 RSS (Scenario 1 within this WCS). This prediction of a favourable supply/demand balance remains across the planning period, as illustrated in **Table 6.2**. However, this is reliant upon the implementation of metering, leakage and water efficiency measures and most importantly the Code for Sustainable Homes. This will therefore impact upon the design of new developments within the District.

There is insufficient resource within the supply area to meet the higher scenarios of development, especially Scenario 3.

Table 6.2 - Predicted Supply/Demand Balance within Lichfield District

	AMP5 2010-15	AMP6 2015-20	AMP7 2020-25	AMP8 2025-30
Baseline Scenario Supply/demand (FINAL WRMP)				
Final Strategy Supply/demand (FINAL WRMP)				

Red - WAFU is less than DI; Amber - WAFU is less than DI plus target headroom, but greater than DI
Green - WAFU is greater than DI plus target headroom

Non Residential Water Use

The Council has not identified any plans for major commercial development with a high water requirement. Discussion with SSW indicates that although some allowance has been made in their FWRMP for such use, headroom is limited and such developments may create an adverse impact on their supply/demand balance, especially within the short term. As commercial customers are economically beneficial to the water company they will usually be progressed, but this may be detrimental to the water resource situation for the rest of the planning period. Therefore, if such development is identified the Council need to inform SSW as soon as possible to enable adjustment of their water resource plans and discussion of the feasibility of the proposal.

Abstraction

Although unlikely to impact on residential development, the Environment Agency's policies regarding abstraction from the watercourses within the District may impact upon the viability of smaller commercial developments or agriculture.

The analysis undertaken within Section 3.1.4 and **Appendix C** indicates that the followings CAMS are relevant to Lichfield District:

- Staffordshire Trent Valley; and
- Tame, Anker and Mease;

The current status of the relevant waterbodies for the District within these CAMS and the resulting impact upon abstraction licences is summarised in **Table 6.3** below and shown graphically in **Figure 6.2**.

This indicates that a number of the waterbodies within Lichfield District are under pressure with regards to water availability with the Lichfield and Shenstone GWMU and Bourne/Black Brook being classified as currently 'over abstracted'. Three of the watercourses are identified as currently having 'water available' but these will have HoF limits set for new abstraction licences. This will undoubtedly affect agricultural practices in the region and, if tightened, may impact upon SSW's ability to extract the required volume of water resource. Where low flows are identified this may impact upon SSW's ability to gain adjusted discharge consent limits for the WwTWs that require expansion. This is an issue that will require further discussion with the Environment Agency and SSW once the potential development sites are confirmed. In addition, as shown in **Appendix C**, a number of sites of Environmental importance are affected by the watercourses listed above. These are investigated further within Section 6.5.

NOTES (for Table 6.3)

* all will be subject to local considerations and other renewal criteria

HOF - Hands off Flow

Table 6.3 - Impact of Water Availability on Abstraction Licences within Lichfield District

Water Source	Individual Status	Target Status 2016	New Licences*	Existing Licences
Lower Trent and Swarbourn	No Water Available	No Water Available	Issued subject to HoF Time limit of 31 March 2015	No impact Time limited licences will be renewed
River Blithe	Water available (Over abstracted in top reaches)	No water available (Over abstracted in top reaches)	*Upstream of Blithfield Reservoir* Closed to new licences *Blithfield to Nethertown* Issued subject to HoF Time limit of 31 March 2015 *Downstream of Nethertown* Closed to new abstraction	No impact Presumption of renewal to time-limited licences
Rugeley and Teddesley GWMUs	Over Licensed	Over Licensed	No water available - closed to new licences	No additional water Time limited licences may be renewed
River Tame River Trent	Water Available	Water Available	Issued subject to HoF Time limit of 31 March 2014	No impact Presumption of renewal to time-limited licences
Bourne/Black Brook	Over Abstracted	Over Licensed	No water available - closed to new licences	No further licensing Voluntary revocations and reductions required Encouragement of efficient water use Investigation for larger abstraction from Lichfield and Shenston GWMUs Presumption of renewal to time-limited licences
River Mease	No Water Available	No Water Available	Consider new winter applications Approval required from Natural England Closed for new summer abstractions Time limit relating to Habitats Directive	Impacts being investigated under Habitats Directive Currently no impact Time limited licences may be renewed
Lichfield and Shenstone GWMU	Over Abstracted	Over Licensed	No water available for consumptive abstractions	Consideration under RSA Voluntary revocations and reductions encouraged Encouragement of efficient water use Presumption of renewal to time-limited licences

6.3.2 Water Supply

To assist in the analysis of potential development sites SSW have provided a spatial analysis of the capacity of their water supply network to accommodate the predicted level of growth for the key residential sites. Their comments are shown in **Table 6.4** and supplemented with the results of a face to face discussion held with SSW in January 2010.

Table 6.4 - SSW Comments Regarding Water Supply in Lichfield District

ID Reference Number	Location	Capacity	Area	SSW Comment
426	Fradley Airfield	1000	39.9	Not envisaged that major off-site mains infrastructure upgrades/new mains will be required. A 250mm main will be required through the site.
125 and 408	North Streethay	850	42.6	Not envisaged that major off-site mains infrastructure upgrades/new mains will be required. A 160mm/200mm main will be required through the site.
157, 173 and 406	East of Rugeley	1130	49	Not envisaged that major off-site mains infrastructure upgrades/new mains will be required.
102	South Burntwood	250	23.8	There is a lack of Mains infrastructure in Burntwood to cope with development
69 and 70	South East Burntwood	500	50.8	There is a lack of Mains infrastructure in Burntwood to cope with development
To include 117, 118, 115, 96, 97	East of Tamworth (within Fazeley)	272	3.7	Only minor infrastructure upgrades envisaged (district meter and associated pipework to be upgraded to 110mm – approximately 40m length).
All Strategic in Lichfield, excluding South Lichfield and North Streethay	Lichfield Commitments	1575	78.1	Generally ok, although there are minor pumping issues that may require resolution. **Lichfield supply leads into Tamworth so the two are interlinked.**
1, 109, 128, 127 and 126	Lichfield (south)	1650	37.3	Not envisaged that major off-site mains infrastructure upgrades/new mains will be required. Sites 109, 128, 127 & 126, a 250mm main will be required through the site (from existing 250mm main Falkland Rd to existing 20" main Tamworth Rd, approximately 1,750m length and may include railway crossing).
All Strategic in Burntwood except 102, 69 and 70	Burntwood 'Capacity' - assume commitments?	225	19	Lack of Mains infrastructure to support development
38	Curborough New Settlement	5000	240	This may prove problematic due to the scale of development occurring downstream in Burton upon Trent

These comments have not provided any major “show stoppers” to development, although the Buntwood area and Curborough settlement have flagged up potential issues, which may require substantial investment to be resolved. The analysis has also indicated that some infrastructure upgrade will be required to the south of Lichfield, east of Tamworth and around Fradley. Due to the interlinkages between Lichfield and Tamworth and Curborough and Burton upon Trent, it is important that Lichfield District Council liaises with Tamworth Borough Council and East Staffordshire District Council when planning the most suitable locations for development.

SSW will require receipt of the appropriate developer contributions to undertake all the necessary upgrades. This will require as much advance notice of final development locations as possible to ensure the appropriate network adjustments are planned and undertaken in sufficient time.

6.3.3 Summary

SSW do not envisage water resources to be a problem with Lichfield District, although this will require review if a higher Scenario of growth or large commercial developments are incorporated. As such all the developments within the District have been classified as ‘green’ for water resources.

Although SSW are generally confident that water can be supplied to all areas of the District, some locations have been identified as potentially requiring more investment than others. The colour scheme for water supply has therefore been based upon the analysis carried out in **Table 6.4** above. For the general development areas, analysis has been based, as far as possible on the conclusions of **Table 6.4**, but where information is not available the sites have been classified as ‘green’, although marked with a ✪ to indicate further investigation may be required.

BOX 6.1

Lichfield District Water Resources and Supply: At a Glance

- Sufficient supply for Scenario 1
- Insufficient resources to supply Scenarios 2 or 3. This would require additional consultation between Lichfield District Council and SSW, the rerunning of their WRMP models and potentially the inclusion of additional water supply.
- SSW can supply water to all developments, but some may require additional investment. Major upgrades will be required for all sites in the town of Buntwood, including sites 102, 69 and 70, the Curborough new settlement (site 38) and the Anker Valley (sites 104, 43 and 108). Minor infrastructure upgrade will be required for Fradley Airfield (site 426), North Streethay (sites 125 and 408), Fazeley (sites 117, 118, 115, 96 and 97), and south Lichfield (sites 1, 109, 128, 127 and 126). This will require discussion with SSW ahead of development taking place and in most cases funding will be required from developer contributions.
- Limited water availability from the surface and groundwater management units, especially within the currently Over Abstracted Bourne/Black Brook and the Lichfield and Shenstone GWMU, may impact current and future agricultural practices and small commercial developments. Developers promoting any development requiring the abstraction of water should consider the information contained within the CAMS reports and apply to the Environment Agency for the necessary licence.
- None of the development sites within Lichfield District have been identified by the SSW as being limited by water resource, although some water supply issues will require resolution:

⇨ All the potential development sites within Lichfield District are classified as '**green'** with regards to water resources.

⇨ Seven of the potential development site within Lichfield District (102, 69, 70, 104, 43, 108 and 38) have been classified as '**red**'. Few problems are envisaged for Lichfield City but Burntwood and Brownhills will require significant upgrade of their supply mains. Additional analysis will be required for many of the smaller settlements, as shown in **Appendix H**.

- The Council needs to inform SSW as far in advance as possible of all potential development sites to enable the appropriate funding sources to be obtained and necessary network improvements to be planned and undertaken for the system as a whole.

6.4 Wastewater Treatment and Collection

Please see Section 3.2 for more background information

All wastewater collection and treatment within Lichfield District is the responsibility of STWL.

6.4.1 Wastewater Treatment

Table 6.5 lists all the WwTWs that serve Lichfield District and indicates which of these are affected by the proposed potential development sites/areas. This is also shown graphically on **Figure 6.3** with the WwTWs affected by development highlighted in red.

Table 6.5 - WwTWs within Lichfield District

WwTW	Affected by Proposed Development
ADMASTON (STW)	
ALREWAS (STW)	✓ Alrewas, Fradley
ARMITAGE (STW)	✓ Armitage and the Longdons, Hill Ridware, East of Rugeley
BASSETS POLE	✓ Carroway Head
BURNTWOOD (STW)	✓ Burntwood, Muckley Corner, Summerhill and Springhill
CLIFTON CAMPVILLE (STW)	✓ Clifton Campville
COLTON (STW)	✓ Colton
COMBERFORD (STW)	
EDINGALE (STW)	✓ Edingale and Harlaston
ELFORD (STW)	✓ Elford
ELMHURST (STW)	
GOSCOTE (STW)	✓ Stonnall (south of A452)
HAMSTALL RIDWARE (STW)	✓ Hamstall Ridware
HINTS (STW)	
LICHFIELD - CURBOROUGH (STW)	✓ Lichfield, Kings Bromley, Curborough
LITTLE ASTON (STW)	✓ Little Aston
LYSWAYS LANE (STW)	
RUGELEY (STW)	✓ East of Rugeley
SHENSTONE (STW)	✓ Shenstone, Stonnall
TAMWORTH - COTON LANE (STW)	✓ East of Tamworth (within Fazeley), Anker Valley, Mile Oak, Whittington, Whittington Heath
WALSALL WOOD (STW)	✓ Brownhills

As discussed in Section 3.2.4, STWL were consulted regarding the capacity of the WwTWs affected by the proposed development. Unfortunately, it was not feasible at this stage for STWL to undertake analysis of all the potential development areas within the Borough and their analysis has instead focussed upon the key residential and employment sites.

Table 6.6 summarises the comments made by STWL with regards to the potential proposed development within Lichfield District. The 'Constraints to Expansion' refers to

the physical and quality restrictions. The physical constraints refer to the space required to physically expand the WwTW buildings, whereas the quality constraints refer to the ability of the works to process additional effluent and still meet to the quality targets for the discharge (in many cases the treatment of additional effluent will require an increase in discharge consent from the Environment Agency). STWL's full response can be found in **Appendix F**.

Table 6.6 - Lichfield District WwTW Consent Data

Name	Consented DWF (m^3/d)	Current/Observed DWF (m^3/d)*	Headroom	Constraints to Expansion		Receiving Watercourse
				Physical	Quality	
Alrewas	894	1183	V. Limited	No issue	Limited	Tributary of River Tame
Armitage	1372	1298	Significant	No issue	No issue	Shropshire Brook
Bassets Pole	55	64	Significant	No issue	No issue	Colletts Brook
Burntwood	7400	6479	Limited	No issue	No issue	Burntwood Brook
Clifton Campville	121	94	Significant	Issues	No issue†	River Mease
Colton	140	112	Significant	No issue	No issue	Tributary of Moreton Brook
Edingale	1650	1279	Limited	Issues	No issue†	River Mease
Elford	113	371	Limited	No issue	No issue	River Tame
Goscote	24900	22090	Limited	No issue	No issue	Rough Brook
Hamstall Ridware	50	36	Significant	No issue	No issue	River Blithe
Lichfield	6250	9156	Limited	Marginal	No issue	The Fullbrook
Little Aston	7000	5219	Limited	No issue	No issue	Footherley Bk
Rugeley	6600	4719	Significant	No issue	No issue	River Trent
Shenstone	1050	1014	Significant	No issue	No issue	Black Brook
Tamworth	23840	16263	Limited	No issue	No issue	River Tame
Walsall Wood	4784	3678	Limited	No issue	No issue	Ford Brook

* red text highlights WwTWs where the Current/Observed DWF exceeds the CDWF - these issues are discussed further in **Table 6.7**

† Following publication of the draft report the Environment Agency have noted there may be potential restrictions in the provision of a new Consent to Discharge for these WwTWs. Discussion is required between STWL and the Environment Agency for development to progress in these catchments.

This assessment indicates that a number of the WwTWs assessed by STWL are reaching, or exceeding their consented discharge limits. For many of the WwTWs STWL has no concerns regarding their ability to increase the capacity to accommodate the proposed development, as outlined in **Table 6.6** above and **Table 6.7.** This is reliant upon the Environment Agency granting the additional consent and the WwTWs retaining the required water quality targets (discussed further in Section 6.4).

Table 6.7 - Lichfield District Impact of Development upon WwTWs

WwTW	Affected Potential Development Sites/Areas	STWL Spare Capacity (dwellings)	Proposed dwellings within WwTW Catchment (residential sites)	Impact of Development
Alrewas	Alrewas and Fradley	0[1]	Not specified	Severe capacity exceedence
Armitage	Armitage and the Longdons and Hill Ridware	1932	Not specified	None
Bassets Pole	Carroway Head	0[2]	Not specified	Potential for exceedence
Burntwood	Burntwood (in and around)	23984	975	None but requires early warning
Clifton Campville	Clifton Campville	702	Not specified	Possible quality exceedence[5]
Colton	Colton	729	Not specified	None
Edingale	Edingale	1932	Not specified	Possible quality exceedence[5]
Elford	Elford	78	Not specified	None
Goscote	Stonnall (south of A452)	73177	Not specified	None STWL states up to 28 dwellings ok
Hamstall Ridware	Hamstall Ridware	365	Not specified	None
Lichfield	Lichfield (in and around) and Fradley (and potentially Alrewas)	0[3]	5075 (plus another potential 5000)	Severe capacity exceedence
Little Aston	Little Aston and North Streetly	46380	Not specified	Possible quality exceedence
Rugeley	East of Rugeley	4900	1130	None but possible affect with tighter quality limits
Shenstone	Shenstone and Stonnall	938	Not specified	None
Tamworth	Anker Valley, Mile Oak, Whittington, Whittington Heath (north and west Tamworth)	Further process assessments required[4]	1712	Severe capacity exceedence
Walsall Wood	Brownhills	28802	Not specified	None but possible affect with tighter quality limits STWL states 240 dwellings ok

NOTES

1 - All flow is received from the pumping station located off Dark Lane, Alrewas which has no spare capacity. It is also located within the floodplain. There is the potential for this WwTWs to be closed and all flows rerouted to Lichfield. **Due to the levels of potential development being considered in Alrewas and Fradley Village early guidance from Lichfield District Council to STWL regarding overall development proposals is essential.**

2 - small works which will require additional consent from the Environment Agency to accept additional flows. STWL do not envisage any issues with dealing with future growth.

3 - No hydraulic capacity at present although major investment is planned to meet a higher DWF consent (as set under the National Environmental Programme) by 2012. **Due to the levels of potential development being considered early guidance from Lichfield District Council to STWL regarding overall development proposals is essential.**

4 - Significant hydraulic capacity available but STWL are concerned about the capacity of the filter process. However, STWL do not envisage any issues dealing with the future growth.

5 - Environment Agency have identified potential restrictions to growth within these catchments due to the potential for a new Consent to Discharge being granted for these WwTWs.

As a result of this assessment, the potential development sites/areas have been classified within **Appendix H** using the following criteria.

Green	Sufficient headroom identified by STWL with no issues regarding further expansion *or* low overall risk identified by the Environment Agency
Amber	Sufficient headroom identified by STWL with issues regarding expansion *or* WwTWs identified as having limited or minimal headroom but with the potential to expand to accommodate growth / growth *and* headroom comparisons do not indicate a shortfall *or* medium overall risk identified by the Environment Agency
Red	Limited headroom with issues identified by STWL regarding expansion *or* Insufficient headroom *or* high overall risk identified by the Environment Agency.

6.4.2 Wastewater Collection

STWL has provided an assessment of the capacity of the wastewater infrastructure network to receive the additional flow from the proposed key residential and employment potential development sites. This full assessment is provided in **Appendix G**. This assessment has therefore been used to classify the proposed potential development sites in **Appendix H** using the criteria outlined below. The assessment of the development areas has taken place, where possible, based upon their proximity to the key sites. Where this has not been feasible the site classification has been left blank to indicate further consultation is required with STWL if development is pursued in that area. The resulting colour codes for each of the potential development sites are shown in **Figure 6.4**.

Green	Low predicted impact on the sewerage infrastructure, in line with STWL's colour scheme (where this is subject to hydraulic modelling the site is marked with a '✪').
Amber	Medium or Low/Medium predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)
Red	Medium/High or High predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)

6.4.3 Summary

Overall, no major "show stoppers" have been identified by STWL with regards to wastewater collection and treatment within Lichfield District. However, a number of restrictions regarding WwTW capacity and infrastructure extent/capacity have been identified, especially with regards to the areas served by Lichfield and Alrewas WwTWs. As a result, further consultation with STWL is recommended on a site specific basis when and if the sites are progressed. Where a restriction has been identified with regards to the WwTW capacity, it is essential STWL are notified as early as possible regarding the number of dwellings and type of commercial development intended for the catchment as they may need to seek additional funding sources and further consultation with the Environment Agency with regards to the discharge consents.

BOX 6.2

Lichfield District Wastewater Collection and Treatment: At a Glance

Wastewater Collection

- Additional hydraulic analysis is required for a number of potential development sites with regards to the capacity of the network, including sites 1, 109, 126, 128, 157, 173, 406, 102, 69, 118, 115, 95, 495 and 43. This will be carried out by STWL once the sites and capacities are confirmed, either by the Council or by a developer.
- Some sites require infrastructure improvements to increase capacity, either within the mains and/or in the pumping stations namely sites 125, 140, 38, 104 and 108 (see **Appendix H**). Developer contributions may be sought to fund these improvements.
- Some areas within Little Aston and Shenstone have been identified by STWL as requiring significant improvement to the network in order to accommodate the additional flows.
- All sites will require individual review by STWL once they are progressed as part of the planning application process.
- It therefore may not be possible to develop a number of the sites in the short term.

Wastewater Treatment

- Although STWL do not foresee a problem in accommodating the proposed development, nearly all of WwTWs require some form of expansion or additional analysis to accommodate the additional flow, with the exceptions of Rugeley, Armitage, Colton, Hamstall Ridware and Shenstone. However, if the higher scenarios of growth are identified in these areas will require further consultation with STWL.
- Three WwTWs have been identified by STWL as having no hydraulic capacity (Alrewas, Bassets Pole and Lichfield). A review of the data provided indicates that another, Tamworth, may exceed its capacity if all the proposed development was progressed.
- Only one WwTW, Alrewas, was identified as having very limited water quality headroom at present.
- All development sites within the catchments of the WwTWs mentioned above require further assessment with STWL, either by developers on a site specific basis or by the Council to assist in the formulation of their preferred options. In particular STWL have requested they are notified by the Council with regards to any changes in the proposed development within the Alrewas and Lichfield WwTW catchments.
- Some physical and quality issues have been identified regarding the expansion of some of the WwTWs (Alrewas, Burntwood, Clifton Campville, Edingale and Lichfield), which will require additional review by STWL. The Council should notify STWL to any alteration or finalisation in the development projections within these catchments. Generally STWL do not foresee a problem with improving most of the WwTWs but it will take time and investment and, as such, may cause a delay to development.
- New Consent to Discharge may be refused for either Clifton Campville WwTW and/or Edingale WwTW, affecting the villages of Edingale, Clifton Campville and Harlaston.

6.5 Water Quality and Environmental Issues

Please see Section 3.3 for more background information

As outlined in Section 3.3, this assessment is primarily based upon the watercourses which are affected by the discharge from WwTWs impacted by the proposed development. As discussed above it is anticipated that 16 WwTWs will be responsible for dealing with the associated discharges.

Table 6.8 identifies the WwTWs within Lichfield District that are affected by the proposed development, the watercourse into which they discharge and the distance from the discharge point of the WwTW to the nearest environmentally designated site (this has only been undertaken for the WwTWs affected by the key potential development sites). These watercourses will be reviewed in more detail within this section.

Table 6.8 - Watercourses and Designated Sites Affected by Development

STW	Receiving watercourse	Designated Site
Alrewas	Trib R.Tame	None on watercourse within 10km
Armitage	Shropshire Brook	None on watercourse within 10km
Bassets Pole	Colletts Brook	None on watercourse within 10km
Burntwood	Burntwood Brook	None on watercourse within 10km
Clifton Campville	River Mease	**River Mease SAC and SSSI - 0km**
Colton	Trib Of Moreton Bk	None on watercourse within 10km
Edingale	River Mease	**River Mease SAC and SSSI - 0km**
Elford	River Tame	None on watercourse within 10km
Goscote	Rough Brook	None on watercourse within 10km
Hamstall Ridware	River Blithe	None on watercourse within 10km
Lichfield	**The Fullbrook**	**Big Lyntus Wood - 1 km**
Little Aston	Footherley Bk	None on watercourse within 10km
Rugeley	River Trent	None on watercourse within 10km
Shenstone	Black Brook	None on watercourse within 10km
Tamworth	River Tame	None on watercourse within 10km
Walsall Wood	Ford Brook	None on watercourse within 10km

6.5.1 Water Quality

Table 6.9 and **Table 6.10** below identify the current biological and chemical water quality grades for the watercourses into which the identified Lichfield District WwTWs discharge. Red shading indicates poor or bad water quality. Green shading indicates good or very good water quality. The full key is provided beneath **Table 6.10**.

Table 6.9 - Chemical GQA Grades for Watercourses within Lichfield District

WwTW	Watercourse	Chemical Grades			
		1990	1995	2000	2006
Alrewas	Trib R.Tame	E (River Tame)	E (River Tame)	C (River Tame)	C (River Tame)
Armitage	Shropshire Brook	C (River Trent)	C (River Trent)	B (River Trent)	C (River Trent)
Bassets Pole	Colletts Brook	U	B	B	B
Burntwood	Burntwood Brook	F	E	E	D
Clifton Campville	River Mease	C	B	B	B
Colton	Trib Of Moreton Bk	B (Moreton Brook)	C (Moreton Brook)	A (Moreton Brook)	B (Moreton Brook)
Edingale	River Mease	C	B	B	B
Elford	River Tame	E	E	C	C
Goscote	Rough Brook	U	C	C	B
Hamstall Ridware	River Blithe	B	C	B	B
Lichfield	The Fullbrook	C (River Trent)	C (River Trent)	B (River Trent)	B (River Trent)
Little Aston	Footherley Bk	E	D	C	C
Rugeley	River Trent	C	C	B	C
Shenstone	Black Brook	E	D	B	B
Tamworth	River Tame	E	D	D	C
Walsall Wood	Ford Brook	U	U	E	E

Table 6.10 - Biological GQA Grades for Watercourses within Lichfield District

WwTW	Watercourse	Biological Grades			
		1990	1995	2000	2006
Alrewas	Trib R.Tame	D (River Tame)	D (River Tame)	D (River Tame)	C (River Tame)
Armitage	Shropshire Brook	D (River Trent)	C (River Trent)	D (River Trent)	C (River Trent)
Bassets Pole	Colletts Brook	D	D	C	D
Burntwood	Burntwood Brook	U	E	D	E
Clifton Campville	River Mease	U	U	C	B
Colton	Trib Of Moreton Bk	U (Moreton Brook)	A (Moreton Brook)	B (Moreton Brook)	A (Moreton Brook)
Edingale	River Mease	U	U	C	B
Elford	River Tame	D	D	D	C
Goscote	Rough Brook	U	D	D	D
Hamstall Ridware	River Blithe	B	B	B	B
Lichfield	The Fullbrook	C (River Trent)	C (River Trent)	C (River Trent)	C (River Trent)
Little Aston	Footherley Bk	D	D	D	D
Rugeley	River Trent	C	C	B	C
Shenstone	Black Brook	U	D	D	D
Tamworth	River Tame	U	C	D	C
Walsall Wood	Ford Brook	E	E	E	E

Water Quality Key

A	Very Good	The quality is similar to (or better than) that expected for an average, unpolluted river of this size, type and location.
B	Good	The quality shows minor differences from Grade 'a' and falls a little short of that expected for an unpolluted river of this size, type and location.
C	Fairly Good	The quality is worse than that expected for an unpolluted river of this size, type and location.
D	Fair	The quality shows considerable differences from that expected for an unpolluted river of this size, type and location.
E	Poor	The quality is much worse than expected for an unpolluted river of this size.
F	Bad	The quality is so bad that, in terms of biology, there may be little or no life present in the river.
U	No Result	Not monitored/measurement has not been recorded.

This indicates that the vast majority of the watercourses are likely to be affected by the proposed development have been improving their water quality over the past 20 years, with many achieving good or very good status in the 2006 review. For the majority of the WwTWs in Lichfield District, the future developments are of a small enough nature to conclude that future increases in flow will not have a significant impact on the water quality of the receiving watercourse, although this will require review, especially for the WwTWs identified as requiring expansion in STWL's analysis above. However the WwTWs highlighted in red (for example Walsall Wood and Burntwood) may struggle to expand their capacity for the proposed development until their water quality issues are improved, as it is unlikely the Environment Agency will grant additional consent.

The Lichfield WwTW area has a significant area of development planned and there is the potential that this increase could have an impact on the WwTW discharge flow and water quality in the Fulbrook and the River Trent as a result. As the River Trent is also destined to receive additional flow from many of the other WwTWs upstream in both Lichfield District, Stafford Borough and beyond, the cumulative effect could be significant. As such further investigation into the expected future flows will be required to properly assess the potential impact.

To further investigate the potential restrictions upon expansion for each of the WwTWs with regards to the WFD we have reviewed their Protected Area Descriptions published in the RBMP, alongside the current ecological status of the watercourse. These are summarised in **Table 6.11** and shown graphically on **Figure 6.5**.

Table 6.11 - RBMP Summary for Lichfield District

Watercourse	WwTW	Ecological Status	Freshwater Fish Directive	Nitrates Directive	Urban Wastewater Treatment Directive
Black Brook	Shenstone	Poor	✓	✓	
Burntwood Brook	Burntwood	Moderate	✓	✓	
Collets Brook	Bassets Pole				
Footherley Brook	Little Aston	Poor	✓	✓	
Ford brook	Walsall Wood	Moderate	✓	✓	
Moreton Brook	Colton	Moderate		✓	
River Blithe	Hamstall Ridware	Moderate	✓	✓	
River Mease	Clifton Campville Edingale	Moderate	✓	✓	✓
			Plus Natura 2000		
River Tame	Alrewas Elford Tamworth (Armitage)	Poor	✓	✓	✓
River Trent	(Lichfield) Rugeley	Poor Moderate upstream	✓	✓	✓
Rough Brook	Goscote	Not Reviewed			
Shropshire Brook	Armitage	Not Reviewed			
The Fullbrook	Lichfield	Not Reviewed			

For the WwTWs located on watercourses with poor or moderate ecological status or where a protected designation has been specified, the Environment Agency will place tighter discharge quality consents on the watercourses and, as a result, may not increase the discharge consents as requested by STWL without additional processing of the effluent or, in the worse cases, not at all. It is therefore recommended that the Council discusses the potential restrictions in further detail with both the Environment Agency and STWL before progressing development within these WwTW catchments.

Following review of the draft WCS report, the Environment Agency have stressed that, as they discharge directly into the River Mease, the Clifton Campville and/or Edingale WwTWs may be refused a new Consent Discharge (N.B. this was not identified by STWL in Table 6.6). A requirement for increased discharge from either of these works therefore requires discussion between STWL and the Environment Agency, once the growth trajectories in those areas have been finalised.

6.5.2 Environmental Issues

Many aspects of development impact upon environmentally significant sites, including:

- Abstraction from the watercourses (reducing the water supply to the environmental site);
- Wastewater discharge (decreasing the quality of the water); and
- Pollution from surface runoff.

The first two of these aspects will be discussed in more detail below. The third will be discussed in more detail within Section 6.7.

Water Supply

As identified in **Appendix C**, the following environmentally significant sites are affected by the WRMUs or GWMUs located within Lichfield District:

- Alvecote Pools (SSSI)
- Ashby Canal (SAC)
- Bentley Park Wood (SSSI)
- Biddulph's Pool & No Man's Bank (SSSI)
- Birches Barn Meadows (SSSI)
- Blithfield Reservoir (SSSI)
- Bracken Hurst (SSSI)
- Cannock Chase (SSSI and SAC)
- Chartley Moss (SSSI, SAC, RAMSAR)
- Chasewater Heaths (SSSI)
- Clayhanger (SSSI)
- Edgbaston Pool (SSSI)
- Ensor's Pool (SSSI, SAC)
- Hoar Park Wood (SSSI)
- Jockey Fields (SSSI)
- Middleton Pool (SSSI)
- Newton Burgoland Marshes (SSSI)
- Pasturefields Saltmarsh (SSSI and SAC)
- River Mease (SSSI and SAC)
- Stafford Brook (SSSI)
- Stowe Pool and Walk Mill Clay Pitts (SSSI)
- Stubbers Green Bog (SSSI)
- Sutton Park (SSSI)
- Swan Pool & the Swag (SSSI)
- Upper Blithe investigated under AMP scheme
- Wetley Moor (SSSI)
- Whitacre Heath (SSSI)

All these sites are dependent upon receiving a sufficient quantity of water in order to survive. In order to protect these sites, and the species living within them, it is essential that all abstraction within the District is undertaken within the Environment Agency consent limits stated within the CAMS reports and that the targets set for 2016/2019 are reached. This should not impact the key potential development sites but may cause potential problems for smaller commercial development or agriculture.

Wastewater

The key SSSI sites affected by the discharge from WwTWs are highlighted in **Table 6.8** above. An overview description of these designated sites is given below:

Big Lyntus Woodland
Big Lyntus woodland is an area of ancient woodland near Fradley, which is protected as a woodland nature reserve. There is no evidence to suggest that this area floods from the small watercourse that runs along its southern boundary and therefore it is unlikely that any changes in water quality will impact this site. Also this drain is small and connects into Curborough brook and is unlikely to be impacted by changes in WwTW discharge.

As such, with the exception of water abstraction, it is not thought that development will have a significant impact upon the environmentally significant sites within the District with regards to water quality. However, the cumulative effect from development across the region may have impacts both within and beyond the District boundaries, especially where the watercourses have already been identified as suffering from marginal water quality at present.

River Mease SAC and SSSI
Sections of the River Mease and Gilwiskaw Brook are designated as a Special Area of Conservation (SAC) and notified as a Site of Special Scientific Interest (SSSI), due to the presence of spined loach, bullhead fish, white clawed crayfish and otters. The River Mease is one of the only waterbodies in the UK where the spined loach currently exists.

Water quality is a major concern for this designated site as it is currently unfavourable for a number of reasons, including phosphate levels. Natural England are concerned about the potential increase in phosphate levels that is likely to result from an higher level of sewage discharge into the watercourses due to development in the area. The higher phosphate levels would result in algae growth and consequently reduced oxygen levels. As such they have already objected to development applications upstream on the watercourse (Packington Nook).

As such, it is thought that development within the Edingale and Clifton Campville WwTW catchments (including the settlements of Edingale, Harlaston and Clifton Campville) may impact upon the condition of the SAC and SSSI. If a planning application does not demonstrate that further development will not have an adverse impact on the SSSI and SAC, it will receive resistance form Natural England and potentially be refused permission.

6.5.3 Summary

Although there are not vast numbers of environmentally significant sites located within Lichfield District, they are all, in some form, at risk of degradation due to development. Not all of these have been assessed here. It is therefore important that the Council undertakes the appropriate environmental surveys before they decide on the final sites they wish to bring forward for development. This assessment has briefly reviewed the potential impact increased water abstraction or wastewater treatment may have upon

the most significant of these sites. It has concluded that measures will be required to minimise this impact and to follow the Environment Agency's guidelines and regulations.

A simple scoring system has been used to assign a colour code to each of the potential development sites to summarise the conclusions of the water quality and environmental analysis as follows:

Table 6.12 - Water Quality and Environmental Analysis Scoring System

RBMP Ecological Status	2006 GQA (if RBMP not available)*	Directives in RBMP	Environmental Sites downstream of WwTWs	Overall Classification
High = 0	A/B = 0	1 point per Directive	1 point if present	0 points = Green
Moderate = 1	C/D = 1			1-3 points = Amber
Poor = 2	E/F = 2			4-6 points = Red

* the worst score out of the Chemical or Biological is used

Green	Development not predicted to impact water quality and/or Environment Sites
Amber	Some predicted impact to impact water quality and/or Environment Sites from development. Mitigation may be required.
Red	Significant predicted impact to impact water quality and/or Environment Sites from development. Mitigation will be required.

The overall classifications are presented in the Constraints Matrix in **Appendix H**.

BOX 6.3

Lichfield District Water Quality: At a Glance

Water Quality

- Within the District, the Ford Brook and the Burntwood Brook have been identified as currently having low water quality, based upon the 2006 assessment.
- The Black Brook, Footherley Brook, River Tame and River Trent have been identified as having 'poor' ecological status in the RBMP and the Burntwood Brook, Ford Brook, Moreton Brook, River Blithe and River Mease as having 'moderate' ecological status.
- Potential developments within the catchments of these watercourses may be impacted by abstraction and wastewater treatment limitations and should be discussed with STWL and the EA, either by the Council at options appraisal or by the developers at planning application stage.
- WwTWs identified as requiring additional capacity and being located on, or upstream, of a watercourse identified as having a poor water quality at present or being vulnerable to the impact of new development may struggle to obtain the required increases in consent from the Environment Agency. Additional consultation will be required for sites in those catchments, most notably:
    - Lichfield Curborough
    - Tamworth Coton Lane
    - Alrewas
    - Clifton Campville
    - Edingale
    - Elford
    - Little Aston
    - Shenstone

  It is unlikely this will prevent development, but a delay whilst new consents are negotiated or STWL upgrades/improves its WwTWs.

6.6 Flood Risk

Please see Section 3.4 for more background information

A Level 1 SFRA has already been undertaken for Lichfield District and a Phase 1 SWMP undertaken alongside this study, this WCS therefore utilises much of the data and conclusions from those reports. 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 6.14** 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.

6.6.1 Fluvial Flood Risk

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 6.6** (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 3.11**. 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. 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.

6.6.2 Surface Water Flooding

Surface water flooding is a significant consideration for Lichfield District, most notably for the city of Lichfield, which suffered badly during the June/July 2007 flood event. An assessment of surface water flood risk to the potential development sites has been obtained from the Phase 1 SWMP being undertaken alongside this WCS. This has accounted for historic flooding occurrences and the potential for future surface water flooding (roughly inferred from the Environment Agency's surface water flood map). It has also accounted for the risk of flooding from the sewer network. More information regarding the analysis process can be obtained from the Phase 1 SWMP.

6.6.3 Groundwater

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.

6.6.4 Canals

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.

6.6.5 Reservoirs

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 volume in excess of 25,000m³)[41]. These are shown on **Figure 6.6** (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.

[41] NB following the enactment of the new Floods and Water Management Bill on 8th April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m³. As such there may now be additional water bodies within Lichfield District classified as reservoirs and this should be addressed in the first review of this WCS.

A breach of any of these waterbodies may pose a flood risk to any existing or proposed potential development site located downstream. However flood risk from reservoirs is moderately 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, although the Council may wish to review this if any additional information regarding particular waterbodies is obtained at a later date.

6.6.6 Summary

The flood risk to the proposed potential development sites/areas is summarised in **Table 6.14** below. Where sites have been identified as being located within the Flood Zones, 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. These findings will be updated once the Phase 2 SWMP is completed and further guidance regarding appropriate mitigation measures is provided within Section 6.7.

The colour coding for 'surface water' has been taken from the parallel SWMP assessment. The 'overall' classification has been determined using the following methodology:

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'. The surface water classification is provided as shown and the two are combined using the standard matrix shown in **Table 6.13** to provide the 'overall' classification. However, there are two anomalies to this method:

1. When a site is located within Flood Zone 3 but only assigned a 'green' grade with regards to surface water flood risk, it is still shown as having a 'red' overall classification. This highlights the importance of development restraint within Flood Zone 3 as specified within PPS25. These sites are marked with an asterisk.
2. When a site is not located within Flood Zone 3 but is identified as being within the extent of Flood Zone 3a with climate change, it is treated within this analysis as if it is located within Flood Zone 3 to provide conservative conclusions.

Table 6.13 - Traffic Light Colour Code Matrix

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

Table 6.14 - Flood Risk to Potential Development Sites

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						A	A
109						A	A
126						A	A
127						A	A
128						A	A
125						A	A
408						A	A
426						R	A
157						A	A
173						A	A
406						A	A
102	Y	Y		Y	Y	R	R
69	Y	Y		Y	Y	A	R
70	Y	Y		Y	Y	A	R
117						A	A
118						G	G
115						A	A
96						R	A
97	Not in Flood Zone but next to watercourse					G	G
94						A	A
95						A	A
140						A	A
495						G	G
38	Y	Y		Y	Y	A	R
104						G	G
43						A	A
108						A	A
Alrewas	Y	Y		Y	Y	A	R
Anker Valley						G	G
Armitage and the Longdons	Y	Y		Y	Y	R	R
Blithbury						G	G
Brownhills	Marginal					A	A
Burntwood (in and around)	Y	Y		Y	Y	R	R
Carroway Head						G	G
Clifton Campville	Y	Y	Y	Y	Y	G	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
Colton						A	A
Edingale and Harlaston	Y	Y		Y	Y	A	R
Elford	Y	Y	Y	Y	Y	R	R
Fradley	No but canals cross through/between potential development sites					A	A
Hamstall Ridware	Y	Y	Y	Y	Y	A	R
Hill Ridware	Marginal					A	A
Kings Bromley	Y	Y	Y	Y	Y	A	R
Lichfield (in and around)	Marginal					R	R
Little Aston and North Streetly	Marginal					R	R
Mile Oak and Fazeley	Partially					R	R
Muckley Corner, Summerhill and Springhill						A	A
Shenstone	Y	Y		Y	Y	A	R
Shenstone Woodend	Marginal					G	A
Stonnall						A	A
Weeford						A	A
Whittington	No but next to canal					R	A
Whittington Heath						A	A

BOX 6.4

Lichfield District Flood Risk: At a Glance

- 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..
- 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.
- Seven settlements have been identified within the SWMP as being at high risk of surface water flooding, namely:
    - Lichfield;
    - Armitage and the Longdons;
    - Burntwood;
    - Elford;
    - Little Aston;
    - Mile Oak and Fazeley; and
    - Whittington
- 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.
- Due to the combination of fluvial and surface water flood risk, 11 settlements and 4 of the potential development sites analysed within Stafford Borough have been classified as 'red' in terms of overall flood risk. 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. 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.

6.7 Demand Management

Please see Section 4 for more background information

General guidance regarding demand management that is applicable over the whole of Lichfield District is presented in Section 4. Many of the factors and, in particular, the suitability of SUDS techniques are dependent upon site specific characteristics. In many cases these will have to be investigated in site specific analysis when the sites are brought forward for development. However, two aspects can be strategically assessed within this study which should provide the Council with an overview of the general restrictions, and therefore costs, associated within the implementation of SUDS over the District. The two aspects are Groundwater Vulnerability and the location of Source Protections Zones (SPZ).

Datasets for both these elements have been obtained from the Environment Agency and are shown on **Figure 6.7** and **Figure 6.8** As explained in Section 4.3, the higher the groundwater vulnerability, the greater the restriction upon the type of SUDS that can be implemented on the potential development site. Similarly the closer a site is to the centre of SPZ, the greater the restriction, as explained in more detail within Section 4. The affect of these upon the individual potential development sites is summarised in **Table 6.15**.

Table 6.15 - Restrictions upon the Use of SUDS within Lichfield District

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
1	N/A	Y	N/A	A
109	N/A	Y	Major	A
126	N/A	Y	Major	A
127	N/A	Y	Major	A
128	N/A	Y	Major	A
125	Y	N/A	Major	R
408	Y	N/A	Major	R
426	N/A	N/A	N/A	G
157	N/A	Y	Major	A
173	N/A	Y	Major	A
406	N/A	Y	Major	A
102	N/A	Y	Major	A
69	N/A	Y	Major	A
70	N/A	Y	Major	A
117	N/A	N/A	Minor	G
118	N/A	N/A	Minor	G
115	N/A	N/A	Minor	G
96	N/A	N/A	Minor	G
97	N/A	N/A	N/A	G
94	N/A	N/A	N/A	G

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
95	N/A	N/A	N/A	G
140	N/A	N/A	N/A	G
495	N/A	N/A	N/A	G
38	N/A	N/A	Major and Minor	G
104	N/A	N/A	N/A	G
43	N/A	N/A	N/A	G
108	N/A	N/A	N/A	G
Alrewas	N/A	N/A	Minor	G
Anker Valley	N/A	N/A		G
Armitage and the Longdons	N/A	Y	Major and Minor	A
Blithbury	N/A	N/A	N/A	G
Brownhills	N/A	Y	Major	A
Burntwood (in and around)	Y	Y	Major	R
Carroway Head	N/A	Y	Major and Minor (marginal)	A
Clifton Campville	N/A	N/A	Minor (marginal)	G
Colton	N/A	N/A	Minor	G
Edingale and Harlaston	N/A	N/A	Minor (partially)	G
Elford	N/A	N/A	Minor	G
Fradley	N/A	N/A	Minor	G
Hamstall Ridware	N/A	N/A	Minor (marginal)	G
Hill Ridware	N/A	N/A	Major and Minor	A
Kings Bromley	N/A	N/A	Minor	G
Lichfield (in and around)	Y	Y	Major	R
Little Aston and North Streetly	N/A	Y	Major	A
Mile Oak	N/A	N/A	Minor (partially)	G
Muckley Corner, Summerhill and Springhill	Close	Y	Major	R
Shenstone	Y	Y	Major	R
Shenstone Woodend	Y	Y	Major	R
Stonnall	N/A	Y	Major	A
Weeford	N/A	Close	Major	A
Whittington	N/A	Y	Major	A
Whittington Heath	N/A	Marginal	Major	A

NOTES

* Overall classification has been given using the following system:

Red - Located over an Inner SPZ

Amber - Located within the Total SPZ and any GWV class *or* just located within Major GWV area

Green - Not located within GWV area or over SPZ *or* just located within Minor GWV area

6.7.1 Summary

Although some restrictions are highlighted for the use of SUDS within the District, very few of the potential development sites have been classified as having a major constraint (i.e. marked in red), although a few of the settlements have been highlighted as requiring further assessment if future potential development sites are identified. Even for these sites appropriate SUDS techniques are available, but they must take into account the vulnerability of the underlying substrata as outlined within this section and discussed further in Section 4.

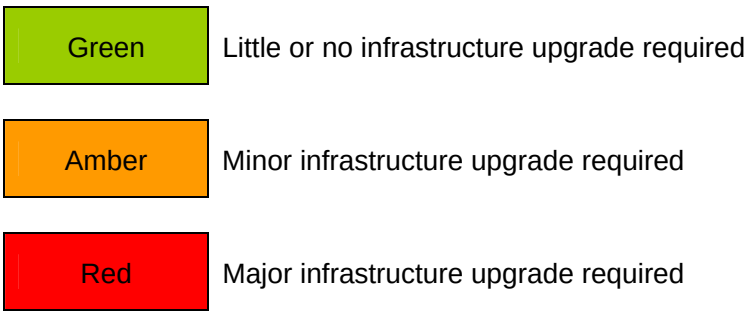
BOX 6.5

Lichfield District SUDS: At a Glance

- A number of development areas are affected by SPZs and/or GWV (see **Table 6.15** above). Sites 126, 109, 127, 128, 125, 408, 157, 173, 406, 102, 69, 70 and 38 are located within a major GWV area. Sites 125 and 408 are also located within the Inner Catchment of a SPZ.
- As a result, some restrictions may be placed upon the appropriate SUDS for each site, although appropriate techniques are available. These must be investigated by the developer.
- Site specific investigation will be required for new development allocations within the settlements identified as being within a SPZ and/or GWV area. Sites 125 and 408 and the settlements of Burntwood, Lichfield, Muckley Corner, Summerhill and Springhill, Shenstone and Shenstone Woodend are identified as potentially having the most severe restrictions upon the use of SUDS. For the settlements this will require review on a site specific basis.

6.8 Constraints Matrix

The constraints matrix presented in **Appendix H** summarises all the conclusions from this section on a site by site basis. It identifies the site reference, purpose, proposed number of dwellings at the time of writing, the water supply company, wastewater treatment works and the colour coded classification for each of the areas of water resources, water supply, wastewater collection, wastewater treatment, water quality, flood risk and SUDS. The table utilises the colour codes introduced at the start of this section as follows:



No major "show stoppers" have been identified, although a number of sites have more than one element that requires investment to enable development to take place. For a number of the restrictions, the responsibility lies with the developer and/or water company to secure the appropriate funding. However, the Council should be aware that these issues may result in time delays for site development and should therefore consider them within their Core Strategy.

6.9 Recommendations

6.9.1 LDF Policies and Development Control Policies

Due to the close proximity and similar characteristics of all the Districts and Boroughs within the Study Area, there are a number of common recommended policies. These are outlined in Section 10.1 at the end of this report. The policy recommendations specific to this District are included here. It must be noted that all the recommendations and conclusions presented in this report are based upon the most recent data and information, as presented in this report, and may be superseded at a later date.

Water Supply

- Consultation must be held with SSW ahead of the progression of any potential development sites requiring water supply infrastructure upgrade. This is required from the Council at options development stage and by the developers at site progression. Discussion should be held as far in advance as possible to enable SSW to fund, source and implement the required infrastructure improvements by the time they are required. This is particularly important for sites 102, 69, 70, 38, 117, 118, 115, 96, 97, 1, 109, 128, 127 and 126. Developer contributions will be required for progression of these sites.
- Water supply is connected to East Staffordshire District and Tamworth Borough downstream - SSW should be notified by the Council as far in advance as possible regarding the development plans for the District to ensure the appropriate plans are delivered.
- Consultation is required with SSW regarding the proposed Curborough settlement. It would be beneficial for this to be carried out by both the Council, at a strategic planning stage, and developers, if the site is progressed.
- The Council should inform SSW of any high water demand development sites as early in the development process as possible.

Water Resources

- No water resource issues have been identified by SSW. However, the Council should inform SSW of any high water demand development sites as early in the development process as possible.

Wastewater Infrastructure

- Consultation must be held with STWL ahead of the progression of any potential development sites to ensure the appropriate wastewater infrastructure is in place with sufficient time. This is required from the Council at options development stage and by the developers at site progression. Discussion should be held as far in advance as possible to enable STWL to fund, source and implement the required infrastructure improvements by the time they are required. This is particularly important for sites 125, 140, 38, 104 and 108 and within Little Aston and Shenstone which have been identified as requiring infrastructure improvements and sites 1, 109, 126, 128, 157, 173, 406, 102, 69, 118, 115, 95, 495 and 43 which require additional hydraulic analysis.
- Consultation is required with STWL regarding the proposed Curborough settlement. It would be beneficial for this to be carried out by both the Council, at a strategic planning stage, and developers, if the site is progressed.

Wastewater Treatment

- In the short term, development should not take place within Lichfield, Alrewas and Bassets Pole WwTW catchments until the wastewater treatment capacity issues are resolved. STWL also requests that they are provided with early warning from the Council if any development is to take place within the Burntwood catchment. In addition, early consultation will be required with STWL if any development is taken forward within the Clifton Campville or Edingale WwTW catchments. STWL do not foresee any problems regarding progression of these development sites in the long term, although the Environment Agency feel a new Consent to Discharge may be refused for Clifton Campville and/or Edingale WwTWs.

SUDS

- Due to the adoption of the Floods and Water Management Act, STWL is no longer required to accept surface water runoff from new development sites. As such, all planning applications must include a suitable SUDS scheme. This will be submitted by the developer and review by the relevant SUDS approval board (SAB) within Staffordshire County Council. As far as possible the Council should investigate the retrofitting of SUDS into existing developments.

Water Quality and Environment

- Policies are required to improve the water quality within most of the watercourses within the District, most notably the Black Brook, Footherley Brook, River Tame, River Trent, Burntwood Brook, Ford Brook, Moreton Brook, River Blithe and River Mease. This may impact on the proposed developments and will require consideration by both the developer and STWL during the planning application stage and discussion with the Environment Agency.
- Due the vast number of environmentally significant sites within the District policies must be emplaced to ensure that development does not have an

adverse impact on any of these areas. This should be undertaken by the developer at planning application stage.

Flood Risk

- Individual FRAs are required for a number of sites (102, 69, 70 and 38). These should be procured by the developer
- Further analysis regarding flood risk is required for a number of the identified settlements/development areas.
- Surface water a flooding is a potential issue within a number of settlements, namely: Lichfield; Armitage and the Longdons; Burntwood; Elford; Little Aston; Mile Oak and Fazeley; and Whittington. This should be considered by the Council when considering preferred options and by the developer at development progression. The Phase 1 SWMP should be consulted before development takes place in any of these settlements.
- Development within all the settlements identified as 'red' in Table 6.14 should be reviewed as part of a site specific FRA with reference to both the Phase 1 SWMP and Level 1 SFRA by the developer.
- Lichfield town would benefit form inclusion within a Phase 2 SWMP, procured by the Council.

7 TAMWORTH BOROUGH DEVELOPMENT SPECIFIC RESULTS

7.1 Introduction

A general overview of all the elements of the WCS and the methodology used to assess them has been introduced in Sections 1 to 4 above. This section details the Local Authority specific analysis for Tamworth Borough and the implication of these results for development within the Borough.

Figures

7.2 Growth and Development

7.2.1 Scenarios for Growth

The scenarios of growth being considered within this WCS for Tamworth Borough are as stated in Section 2.3 and reiterated in **Table 7.1** below:

Table 7.1 - Tamworth Borough RSS and Growth Scenarios

	Residential (dwellings)	Indicative Annual Average (2006 - 2026)	Employment (ha)
Scenario 1 (RSS Phase 2)	2900	145	42
Scenario 2 (+10%)	3190	159.5	46.2
Scenario 3 (+30%)	3770	188.5	54.6

N.B. Annualised figures have been assumed.

7.2.2 Potential Development Sites

Tamworth Borough Council have provided, for use in this study, a number of shapefiles showing the location of potential development sites being considered for development. These consist of:

- Residential Sites;
- Additional Potential Sites Outside Tamworth Borough;
- Employment Sites

All the key sites within these three groups have been analysed individually within this WCS. There are a large number of scattered sites within the 'residential site' shapefile.

As these have already gained planning permission and are all relatively small in size they have not been analysed individually within this WCS.

The location of all the individual potential development sites mentioned above is shown in **Figure 7.1**. The housing sites are shown in red, the additional alternative in purple and the employment sites in green. The scattered sites with planning permission have been outlined in brown (highlighted in the key as 'potential' development sites).

Due to the small size of the Borough and the large spread of potential development sites the analysis presented within this section should not only provide the Council with an analysis of the key sites individually, but also gives a spatial overview of the Borough as a whole which should assist in the analysis of any additional future sites not provided for use in this WCS.

Reference is made to the individual sites throughout this analysis using the ID numbers provided by the Council. This should aid the Council in cross referencing this new information with their existing data. Development trajectories, provided by the Council, have formed the basis of discussion with the stakeholders. However, it must be noted that the sites shown may have been progressed/developed during the timescale of this project.

The rest of this section summarises the potential constraints to development for each of the potential development sites and areas for all elements of the water cycle. For ease of reference the potential development sites and areas have been given a traffic light colour coded classification indicating the infrastructure upgrade (and therefore the indicative investment) required to enable development to progress in each location. These results are summarised in the Constraints Matrix contained in **Table H.3** of **Appendix G**. The underlying philosophy to the colour scheme is shown below and the reasons for the classification in each case discussed in more detail in Sections 5.3 to 0.

Green	Little or no infrastructure upgrade required
Amber	Minor infrastructure upgrade required
Red	Major infrastructure upgrade required

7.3 Water Resources and Water Supply

Please see Section 3.1 for more background information

7.3.1 Water Resources

As shown in **Figure 2.1** and **Figure 7.2**, Tamworth Borough is wholly located within SSW's water supply area. As such, water is supplied from a combination of surface and groundwater sources and is classified by the Environment Agency as being under 'moderate' water stress. According to SSW's FWRMP, there is enough water available for use within this zone to meet the baseline scenario of development as stated in the Phase 2 RSS (Scenario 1 within this WCS). This prediction of a favourable supply/demand balance remains across the planning period, as illustrated in **Table 7.2**. However, this is reliant upon the implementation of metering, leakage and water efficiency measures and most importantly the Code for Sustainable Homes. This will therefore impact upon the design of new developments within the Borough.

There is insufficient resource within the supply area to meet the higher scenarios of development, especially Scenario 3.

Table 7.2 - Predicted Supply/Demand Balance within Tamworth Borough

	AMP5 2010-15	AMP6 2015-20	AMP7 2020-25	AMP8 2025-30
Supply/demand (FINAL WRMP) Baseline Scenario				
Supply/demand (FINAL WRMP) Final Strategy				

Red - WAFU is less than DI

Amber - WAFU is less than DI plus target headroom, but greater than DI

Green - WAFU is greater than DI plus target headroom

Non Residential Water Use

The Council has not identified any plans for major commercial development with a high water requirement. Discussion with SSW indicates that although some allowance has been made in their FWRMP for such use, headroom is limited and such developments may create an adverse impact on their supply/demand balance, especially within the short term. As commercial customers are economically beneficial to the water company they will usually be progressed, but this may be detrimental to the water resource situation for the rest of the planning period. Therefore, if such development is identified the Council need to inform SSW as soon as possible to enable adjustment of their water resource plans and discussion of the feasibility of the proposal.

Abstraction

Although unlikely to impact on residential development, the Environment Agency's policies regarding abstraction from the watercourses within the District may impact upon the viability of smaller commercial developments or agriculture.

The analysis undertaken within Section 3.1.4 and **Appendix C** indicates that only the Tame, Anker and Mease CAMS is relevant to Tamworth Borough.

The current status of the relevant waterbodies for the Borough within this CAMS and the resulting impact upon abstraction licences is summarised in **Table 7.3** below and shown graphically in **Figure 7.2.**

Table 7.3 - Impact of Water Availability on Abstraction Licences within Tamworth Borough

Water Source	Individual Status	Target Status 2016	New Licences*	Existing Licences
River Tame River Anker	Water Available	Water Available	Issued subject to HoF Time limit of 31 March 2014	No impact Presumption of renewal to time-limited licences
Bourne/Black Brook	Over Abstracted	Over Licensed	No water available - closed to new licences	No further licensing Voluntary revocations and reductions required Encouragement of efficient water use Investigation for larger abstraction from Lichfield and Shenston GWMUs Presumption of renewal to time-limited licences
Lichfield and Shenstone GWMU	Over Abstracted	Over Licensed	No water available for consumptive abstractions	Consideration under RSA Voluntary revocations and reductions encouraged Encouragement of efficient water use Presumption of renewal to time-limited licences

NOTES

* all will be subject to local considerations and other renewal criteria

HOF - Hands off Flow

This indicates that a both the Bourne/Black Brook and the underlying GWMU are under pressure with regards to water availability, currently being classified as 'over abstracted'. However, both the Rivers Tame and Anker have been identified as having water available for use at present, although any applications for new abstraction licences will be subject to HoF limits. This will undoubtedly affect agricultural practices in the region and, if tightened, may impact upon SSW's ability to extract the required volume of water resource. Where low flows are identified this may impact upon STWL's ability to gain adjusted discharge consent limits for the WwTWs that require expansion. This is an

issue that will require further discussion with the Environment Agency and STWL once the potential development sites are confirmed. In addition, as shown in **Appendix C**, a number of sites of Environmental importance are affected by the watercourses listed above. These are investigated further within Section 7.5.

7.3.2 Water Supply

To assist in the analysis of potential development sites SSW have provided a spatial analysis of the capacity of their water supply network to accommodate the predicted level of growth for the key residential sites. Their comments are shown in **Table 7.4** and supplemented with the results of a face to face discussion held with SSW in January 2010. *N.B.SSW has undertaken this analysis as if all sites will be brought forward at a similar time. It is highly unlikely this will be the case.*

Table 7.4 - SSW Comments Regarding Water Supply in Tamworth Borough

ID Reference Number	Location	Capacity	Area	SSW Comment
1	Anker Valley	1000 (minimum)	36.9	It is envisaged that major off-site water mains infrastructure will be required. Requires approximately 1,100m of new 300mm main and 1,000m of new 180mm main to be laid off-site (in highway). Site 1 has been analysed in isolation to Site 17, it has been assumed that either Site 1 or Site 17 will be developed (not both sites).
2	Land south of St Peters Close Phase 2	20	0.5	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
3	Parkfield House	6	0.2	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
4	Land off Cottage Farm Road	49	1.2	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
5	Pennine Way	153	3.5	Analysed in conjunction with site 25 (assumed 500 properties within SSW area of supply). New booster pump sets may be required at Glascote booster station. Not envisaged that off-site mains infrastructure upgrades/new mains will be required
6	Arriva Bus Depot	52	0.4	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
7	Norris Brothers	15	0.2	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
8	NCC (UK) Ltd Phoenix Special Purpose Machines Hospital St	13	0.2	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
9	Land adjacent to The Lamb,	9	0.2	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.

ID Reference Number	Location	Capacity	Area	SSW Comment
	Tamworth Football Club.			
10	Off Town Wall	14	0.2	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
12	Land south of Hockley Road	1620	43	Sites 12, 13, 14 & 15. The analysis has assumed that all of these sites will be developed at the same time. Major off-site infrastructure will be required: Complete booster station refurbishment at Two Gates booster station (including suction/delivery pipework, pump sets, motors, control gear and associated electrical and mechanical upgrades). New 250mm main approx. 1,060m length. New 200mm main approx. 2,940m length. Rehabilitate existing 6" main with 160mm main approx. 770m length. New 160mm main approx. 440m length. New 250mm district meter and 280mm associated pipework approx 20m length. All of the above main laying will be in highway (excluding booster station).
13	Land west of A51	988	27.2	
14	Land off Wigford Road	389	9.7	
15	Land between River Tame & Wigford Road	1063	29	
20	Derelict Buildings off B5404	19	0.2	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
16 and 17	North of Tamworth (Land north of Perrycrofts and land north of Anker Valley)	Perrycrofts - 1229 ; Anker Valley - 1498	Perrycrofts - 167.3 ; Anker Valley - 78	Site 16 - It is envisaged that major off-site water mains infrastructure will be required. Requires approximately 2,500m of new 300mm diameter water main (in highway). It is also envisaged that Wiggington booster station will also need to be refurbished/upgraded (including suction/delivery pipework, pump sets, motors, control gear and associated electrical and mechanical upgrades). Site 17 - As per the infrastructure requirements for Site 1
25	West of M42	1367	71.1	Analysed in conjunction with site 5. It has been assumed that about 500 properties for this site may fall within SSW area of supply. New booster pump sets may be required at Glascote booster station. Not envisaged that off-site mains infrastructure upgrades/new mains will be required.

These comments have not provided any major "show stoppers" to development, although some areas, such as the Additional sites to the south of Tamworth and the Anker Valley sites to the north of Tamworth have been flagged as requiring significantly more investment to enable development than some of the other sites. From consultation with SSW the topography poses a potential problem for all the potential

development sites south of the A5, as additional pumping assets will be required to boost the network.

The analysis has also indicated that some infrastructure upgrade will be required to the other Additional development sties to the east of the town, close to the M42. One other issue flagged by SSW is the location of Tamworth 'downstream' from Lichfield town on the water supply network. Due to this link between Lichfield and Tamworth, it is important that the two authorities liaise with each other when planning the most suitable locations for development.

SSW will require receipt of the appropriate developer contributions to undertake all the necessary upgrades. This will require as much advance notice of final development locations as possible to ensure the appropriate network adjustments are planned and undertaken in sufficient time. All the individual sites within Tamworth will require individual review and infrastructure upgrade to enable development to take place.

7.3.3 Summary

SSW do not envisage water resources to be a problem with Tamworth Borough, although this will require review if a higher Scenario of growth or large commercial developments are incorporated. As such all the developments within the Borough have been classified as 'green' for water resources.

Although SSW are generally confident that water can be supplied to all areas of the Borough, some locations have been identified as potentially requiring more investment than others. The colour scheme for water supply has therefore been based upon the analysis carried out in **Table 7.4** above. For the development areas not individually assessed by SSW, analysis has been based, as far as possible on the conclusions of **Table 7.4**, but these sites have been marked with a ✪ to indicate further investigation may be required.

BOX 7.1

Tamworth Borough Water Resources and Supply: At a Glance

- Sufficient supply for Scenario 1.
- Insufficient resources to supply Scenarios 2 or 3. This would require additional consultation with SSW, the rerunning of their WRMP models and potentially the inclusion of additional water supply.
- SSW can supply water to all developments, but some may require additional investment. Major upgrades will be required for the Anker Valley (sites 1, 16 and 17) and the land to the south of Tamworth (sites 12, 13 14 and 15). Minor infrastructure upgrade will be required for sites 2 and 25. This will require discussion with SSW ahead of development taking place and in most cases funding will be required from developer contributions.
- Limited water availability from the surface and groundwater management units, especially within the currently Over Abstracted Bourne/Black Brook and the Lichfield and Shenstone GWMU, may impact current and future agricultural practices and small commercial developments. Developers promoting any development requiring the abstraction of water should consider the information contained within the CAMS reports and apply to the Environment Agency for the necessary licence.
- None of the development sites within Tamworth Borough have been individually identified by the SSW as being limited by water resource, although some water supply issues will require resolution:

⇨ All the potential development sites within Tamworth Borough are classified as '**green'** with regards to water resources.

⇨ Seven of the potential development sites/areas within Tamworth Borough (1, 12, 13, 14, 15, 16 and 17) have been classified as '**red**'. Additional analysis will be required for the small scattered sites.

- The Council needs to inform SSW as far in advance as possible of all potential development sites to enable the appropriate funding sources to be obtained and necessary network improvements to be planned and undertaken for the system as a whole.

7.4 Wastewater Treatment and Collection

Please see Section 3.2 for more background information

All wastewater collection and treatment within Tamworth Borough is the responsibility of STWL.

7.4.1 Wastewater Treatment

Tamworth Borough is unusual as, due to its size, all areas of the Borough are served by the same WwTW, Tamworth - Coton Lane, as shown in **Table 7.5** and **Figure 7.3**.

Table 7.5 - WwTWs within Tamworth Borough

WwTW	Affected by Proposed Development
TAMWORTH - COTON LANE (STW)	✓ All Sites

As discussed in Section 3.2.4, STWL were consulted regarding the capacity of the WwTWs affected by the proposed development. The 'Constraints to Expansion' refers to the physical and quality restrictions. The physical constraints refer to the space required to physically expand the WwTW buildings, whereas the quality constraints refer to the ability of the works to process additional effluent and still meet to the quality targets for the discharge (in many cases the treatment of additional effluent will require an increase in discharge consent from the Environment Agency). The summary of their conclusions regarding Tamworth WwTW are shown in **Table 7.6** and their full response can be found in **Appendix F**.

Table 7.6 - Tamworth Borough WwTW Consent Data

Name	Consented DWF (m^3/d)	Current/Observed DWF (m^3/d)*	Headroom	Constraints to Expansion		Receiving Watercourse
				Physical	Quality	
Tamworth	23840	16263	Limited	No issue	No issue	River Tame

This review indicates that limited headroom has been identified at this WwTW in light of the proposed development. However, STWL do consider there to be sufficient potential to expand these works to accommodate the growth, although this is reliant upon the Environment Agency granting the additional consents and the WwTW retaining the required water quality targets (discussed further in Section 7.5) and identified in **Table 7.7** to be a key issue:

Table 7.7 - Tamworth Borough Impact of Development upon WwTWs

WwTW	Affected Potential Development Sites/Areas	STWL Spare Capacity (dwellings)	Proposed dwellings within WwTW Catchment (residential sites)	Impact of Development
Tamworth Coton	Tamworth town and around	Further process assessments required[1]	Up to 6610 (with 4094 as alternative options)	Potential quality exceedence

NOTES

1 - Significant hydraulic capacity available but STWL are concerned about the capacity of the filter process. However, STWL do not envisage any issues dealing with the future growth.

However, STWL have stated that they do not envisage a problem accommodating the development within Tamworth Borough, even if the Anker Valley developments are progressed. It is recommended that STWL are kept up to date with any changes to the proposed development targets with as much advance notice as possible.

As a result of this assessment, the potential development sites/areas have been classified within **Appendix H** using the following criteria. Where no information is available for the WwTW no classification is given to indicate that further assessment will be required through consultation with STWL once the potential development sites are finalised.

Green	Sufficient headroom identified by STWL with no issues regarding further expansion *or* low overall risk identified by the Environment Agency
Amber	Sufficient headroom identified by STWL with issues regarding expansion *or* WwTWs identified as having limited or minimal headroom but with the potential to expand to accommodate growth / growth *and* headroom comparisons do not indicate a shortfall *or* medium overall risk identified by the Environment Agency
Red	Limited headroom with issues identified by STWL regarding expansion *or* Insufficient headroom *or* high overall risk identified by the Environment Agency.

7.4.2 Wastewater Collection

STWL has provided an assessment of the capacity of the wastewater infrastructure network to receive the additional flow from the proposed potential development sites. Unfortunately, it was not feasible at this stage for STWL to undertake analysis of all the potential development areas within the Borough and their analysis has instead focussed upon the key residential potential development sites. This full assessment is provided in **Appendix F**. and has been used to classify the proposed potential development sites in **Appendix H** using the criteria outlined below. This is shown graphically in **Figure 7.4**. The assessment of the sites not assessed by STWL has taken place, where possible,

based upon their proximity to the key sites. Where this has not been feasible the site classification has been left blank to indicate further consultation is required with STWL if development is pursued in that area.

Generally wastewater collection is not deemed to be a problem to development within the main area of the town. However, a number of issues have been identified for the sites on the outskirts of Tamworth, which will require new connections to be made to the network. Although these will impose additional time and infrastructural costs to the sites, STWL has not identified any major barriers to development in these areas.

Green	Low predicted impact on the sewerage infrastructure, in line with STWL's colour scheme (where this is subject to hydraulic modelling the site is marked with a '✪').
Amber	Medium or Low/Medium predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)
Red	Medium/High or High predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)

BOX 7.2

Tamworth Borough Wastewater Collection and Treatment: At a Glance

Wastewater Collection

- Additional hydraulic analysis is required for potential development sites 8 and 20 with regards to the capacity of the network. This will be carried out by STWL once the sites and capacities are confirmed, either by the Council or by a developer.
- Some sites (1, 12, 13, 14, 15. 16, 17 and 25) require infrastructure improvements to increase capacity, either within the mains and/or in the pumping stations(see **Appendix H**). Developer contributions may be sought to fund these improvements.
- No potential development sites have been identified as requiring significant improvement to connect it to the wastewater infrastructure network.
- All sites will require individual review by STWL once they are progressed as part of the planning application process.
- It therefore may not be possible to develop a number of the sites in the short term.

Wastewater Treatment

- Although STWL do not foresee a problem in accommodating the proposed development, Tamworth WwTW has limited headroom and, as such, will require quality improvements in order to accommodate the proposed development. The Council and/or developers should therefore advise STWL as far in advance as possible so the appropriate expansions to the works can be identified, approved, funded and implemented.

7.5 Water Quality and Environmental Issues

Please see Section 3.3 for more background information

As outlined in Section 3.3, this assessment is primarily based upon the watercourses which are affected by the discharge from WwTWs impacted by the proposed development. As discussed above it is anticipated that only one WwTWs, Tamworth - Coton Lane will be responsible for dealing with the associated discharges. This WwTW discharges into the River Tame and there are no environmentally designated sites within 10km downstream of this discharge point.

7.5.1 Water Quality

Table 7.8 below identifies the current biological and chemical water quality grades for the River Tame, into which the Tamworth WwTW discharges. Red shading indicates poor or bad water quality. Green shading indicates good or very good water quality. The full key is shown below.

Table 7.8 - Chemical and Biological GQA Grades for the River Tame

Testing Year	1990	1995	2000	2006
Chemical Grades	E	D	D	C
Biological Grades	U	C	D	C

Water Quality Key

A	Very Good	The quality is similar to (or better than) that expected for an average, unpolluted river of this size, type and location.
B	Good	The quality shows minor differences from Grade 'a' and falls a little short of that expected for an unpolluted river of this size, type and location.
C	Fairly Good	The quality is worse than that expected for an unpolluted river of this size, type and location.
D	Fair	The quality shows considerable differences from that expected for an unpolluted river of this size, type and location.
E	Poor	The quality is much worse than expected for an unpolluted river of this size.
F	Bad	The quality is so bad that, in terms of biology, there may be little or no life present in the river.
U	No Result	Not monitored/measurement has not been recorded.

This indicates that the River Tame does not currently classify as having a particularly good chemical or biological water quality, although its chemical water quality has been improving over the last 20 years. The RBMP for the River Tame has also been reviewed and highlights the river as having a poor ecological status overall, as shown in **Table 7.9** and illustrated graphically on **Figure 8.5**. This table also reviews the potential restrictions for the watercourse with regard to the WFD by reviewing their Protected Area Descriptions published in the RBMP.

Table 7.9 - RBMP Summary for the River Tame

Watercourse	WwTW	Ecological Status	Freshwater Fish Directive	Nitrates Directive	Urban Wastewater Treatment Directive
River Tame	Tamworth	Poor	✓	✓	✓

As a result of this poor classification and the number of directives applicable to the watercourse the Environment Agency is likely to place tighter discharge quality consents on the WwTW. As a result, they may not increase the discharge consents if requested by STWL without additional processing of the effluent or, in the worse cases scenario, not at all. As the WwTW is crucial to all the development within Tamworth it is likely that STWL will need to invest in improving quality of the effluent released from the WwTW in order to accommodate the increase in flows. It is therefore recommended that the Council discusses the potential restrictions in further detail with both the Environment Agency and STWL before progressing any development.

7.5.2 Environmental Issues

Many aspects of development impact upon environmentally significant sites, including:

- Abstraction from the watercourses (reducing the water supply to the environmental site);
- Wastewater discharge (decreasing the quality of the water); and
- Pollution from surface runoff.

The first two of these aspects will be discussed in more detail below. The third will be discussed in more detail within Section 7.7.

Water Supply

As identified in **Appendix C**, the following environmentally significant sites are affected by the WRMUs or GWMUs located within Tamworth Borough:

- Alvecote Pools (SSSI) (partly in Tamworth Borough and partly in North Warwickshire)
- Ashby Canal (SSSI)
- Bentley Park Wood (SSSI)
- Biddulph's Pool & No Man's Bank (SSSI)
- Birches Barn Meadows (SSSI)
- Chasewater Heaths (SSSI)
- Clayhanger (SSSI)
- Edgbaston Pool (SSSI)
- Ensor's Pool (SSSI, SAC)
- Hoar Park Wood (SSSI)
- Jockey Fields (SSSI)
- Middleton Pool (SSSI)
- Newton Burgoland Marshes (SSSI)
- Stubbers Green Bog (SSSI)
- Sutton Park (SSSI)
- Swan Pool & the Swag (SSSI)
- Whitacre Heath (SSSI)
- Hoar Park Wood (SSSI)

All these sites are dependent upon receiving a sufficient quantity of water in order to survive. In order to protect these sites, and the species living within them, it is essential that all abstraction within the Borough is undertaken within the Environment Agency consent limits stated within the CAMS reports and that the targets set for 2016/2019 are reached. This should not impact the key potential development sites but may cause potential problems for smaller commercial development or agriculture.

Wastewater

No key environmentally significant sites have been identified downstream of the Tamworth WwTW.

7.5.3 Summary

Very few environmentally significant sites are located within Tamworth Borough. However, a number are located in the surrounding areas that may be affected by the abstraction of water from within the Borough. It is therefore important that the Council undertakes the appropriate environmental surveys before they decide on the final sites they wish to bring forward for development. This assessment has briefly reviewed the potential impact increased water abstraction or wastewater treatment may have upon the most significant of these sites. It has concluded that although not significant in terms of environmentally designated sites, the water quality within the Borough requires improvement to meet the objectives of the WFD. Measures will therefore be required to minimise the impact of new development and to follow the Environment Agency's guidelines and regulations.

A simple scoring system has been used to assign a colour code to each of the potential development sites to summarise the conclusions of the water quality and environmental analysis as follows:

Table 7.10 - Water Quality and Environmental Analysis Scoring System

RBMP Ecological Status	2006 GQA (if RBMP not available)*	Directives in RBMP	Environmental Sites downstream of WwTWs	Overall Classification
High = 0	A/B = 0	1 point per Directive	1 point if present	0 points = Green
Moderate = 1	C/D = 1			1-3 points = Amber
Poor = 2	E/F = 2			4-6 points = Red

* the worst score out of the Chemical or Biological is used

This scoring system has been used across the sub regional study area. For Tamworth WwTW it results in a score of 5, which results in all the potential development sites within Tamworth Borough being classified as red with regards to water quality, as shown on **Figure 7.5** This implies that the watercourse into which all the effluent from the proposed development will be discharged is already under stress and significant improvements are likely to be required before it can receive additional discharge.

Green	Development not predicted to impact water quality and/or Environment Sites
Amber	Some predicted impact to impact water quality and/or Environment Sites from development. Mitigation may be required.
Red	Significant predicted impact to impact water quality and/or Environment Sites from development. Mitigation will be required.

The overall classifications are presented in the Constraints Matrix in **Appendix H**.

BOX 7.3

Tamworth Borough Water Quality: At a Glance

- The River Tame has been identified as having relatively low water quality and poor ecological status.
- This may impact the potential for development with regards to both abstraction and wastewater treatment.
- Tamworth WwTW may struggle to obtain the required increases in consent from the Environment Agency. Additional consultation will be required within the Steering Group to determine the best way for the Council and STWL to approach the impact of new development and still meet the objectives of the WFD.

7.6 Flood Risk

Please see Section 3.4 for more background information

A Level 1 SFRA has already been undertaken for Tamworth Borough (updated in September 2009) and a Phase 1 SWMP undertaken alongside this study. This WCS therefore utilises much of the data and conclusions from those reports. 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 7.12** 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.

7.6.1 Fluvial Flood Risk

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 7.6**.

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 form 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 3.11**. 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.

7.6.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Phase 1 SWMP being undertaken alongside this WCS. This has accounted for historic flooding occurrences and the potential for future surface water flooding (roughly inferred from the Environment Agency's surface water flood map). It has also accounted for the risk of flooding from the sewer network. More information regarding the analysis process can be obtained from the Phase 1 SWMP.

As a result of this risk of surface water flooding, a policy for the adoption should be included within all new development proposals. This is investigated further within Section 7.7.

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

7.6.3 Groundwater

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.

7.6.4 Canals

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.

7.6.5 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 25,000m³)[42]. In addition flood risk from reservoirs is moderately 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, although the Council may wish to review this if any additional information regarding particular waterbodies is obtained at a later date.

7.6.6 Summary

The flood risk to the proposed potential development sites/areas is summarised in **Table 7.12** below. Where sites have been identified as being located within the Flood Zones, 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. These findings will be updated once the Phase 2 SWMP is completed and further guidance regarding appropriate mitigation measures is provided within Section 5.7.

The colour coding for 'surface water' has been taken from the parallel SWMP assessment. The 'overall' classification has been determined using the following methodology:

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'. The surface water classification is provided as shown and the two are combined using the standard matrix shown in **Table 7.11** to provide the 'overall' classification. However, there are two anomalies to this method:

[42] NB following the enactment of the new Floods and Water Management Bill on 8th April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m³. As such there may now be water bodies within Tamworth Borough classified as reservoirs and this should be addressed in the first review of this WCS.

1. When a site is located within Flood Zone 3 but only assigned a 'green' grade with regards to surface water flood risk, it is still shown as having a 'red' overall classification. This highlights the importance of development restraint within Flood Zone 3 as specified within PPS25. These sites are marked with an asterisk; and
2. When a site is not located within Flood Zone 3 but is identified as being within the extent of Flood Zone 3a with climate change, it is treated within this analysis as if it is located within Flood Zone 3 to provide conservative conclusions.

Table 7.11 - Traffic Light Colour Code Matrix

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

Table 7.12 - Flood Risk to Potential Development Sites

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
Housing							
1	Y	Y	Y	Y	Y	A	R
2						G	G
3						G	G
4						G	G
5						G	G
6						G	G
7						G	G
8						G	G
9						G	G
10						G	G
12						A	A
13	Y	Y		Y	Y	A	R
14	Y	Y		Y	Y	G	A*
15	Y	Y		Y	Y	A	R
20						G	G
16						G	G
17						G	G
25						A	A
Employment							
21							
18	Y	Y		Y	Y	A	R
7	Y	Y		Y	Y	G	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
10	Y	Y		Y	Y	G	A*
3	Y	Y		Y	Y	A	R
2	Y	Y		Y	Y	G	A*
1	Y	Y		Y	Y	A	R
6	Y	Y		Y	Y	A	R
4						G	G
5	Y	Y		Y	Y	R	R
8						G	G
9						G	G
11						G	G
12						G	G
13						G	G
14						G	G
15						G	G
16	Y	Y		Y	Y	A	R
17	Y	Y		Y	Y	A	R
19						G	G
20						G	G
21						G	G
22						G	G

BOX 7.4

Tamworth Borough Flood Risk: At a Glance

- 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.
- 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.
- Fluvial flood risk is a constraint to development in many areas of the Borough.
- Surface water flooding has not been identified as a unique major constraint to development for any of the potential development sites, with the exception of employment site 5. However, in many cases it will be combined with, and therefore exacerbate, fluvial flooding. As such, investigation of the causes of surface water flooding within the town will benefit the drainage network as a whole, assisting in the alleviation of both fluvial flooding and wastewater drainage.
- A Phase 2 SWMP would be beneficial for the Borough and should be procured by the Council.
- The RFRA identifies Tamworth Borough as being at a High overall probability and High consequence of flooding.

7.7 Demand Management

Please see Section 4 for more background information

General guidance regarding demand management that is applicable over the whole of Stafford Borough is presented in Section 5.7. Many of the factors and, in particular, the suitability of SUDS techniques are dependent upon site specific characteristics. In many cases these will have to be investigated in site specific analysis when the sites are brought forward for development. However, two aspects can be strategically assessed within this study which should provide the Council with an overview of the general restrictions, and therefore costs, associated within the implementation of SUDS over the Borough. The two aspects are Groundwater Vulnerability and the location of Source Protections Zones (SPZ).

Datasets for both these elements have been obtained from the Environment Agency and are shown on **Figure 7.7** and **Figure 7.8**. As explained in Section 4.3, the higher the groundwater vulnerability, the greater the restriction upon the type of SUDS that can be implemented on the potential development site. Similarly the closer a site is to the centre of SPZ, the greater the restriction, as explained in more detail within Section 4. The affect of these upon the individual potential development sites is summarised in **Table 7.13**.

Table 7.13 - Restrictions upon the Use of SUDS within Tamworth Borough

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
Housing				
1	N/A	N/A	Minor	G
2	N/A	N/A	Minor	G
3	N/A	N/A	Minor	G
4	N/A	N/A	Minor	G
5	N/A	N/A	Minor	G
6	N/A	N/A	N/A	G
7	N/A	N/A	N/A	G
8	N/A	N/A	N/A	G
9	N/A	N/A	Minor	G
10	N/A	N/A	Minor	G
12	N/A	N/A	Minor	G
13	N/A	N/A	Minor	G
14	N/A	N/A	Minor	G
15	N/A	N/A	Minor	G
20	N/A	N/A	Minor	G
16	N/A	N/A	N/A	G
17	N/A	N/A	N/A	G
25	N/A	N/A	Minor	G
Employment				G

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
21	N/A	N/A	N/A	G
18	N/A	N/A	N/A	G
7	N/A	N/A	N/A	G
10	N/A	N/A	N/A	G
3	N/A	N/A	Minor	G
2	N/A	N/A	Minor	G
1	N/A	N/A	Minor	G
6	N/A	N/A	Minor	G
4	N/A	N/A	Minor	G
5	N/A	N/A	Minor	G
8	N/A	N/A	Minor	G
9	N/A	N/A	Minor	G
11	N/A	N/A	Minor	G
12	N/A	N/A	Minor	G
13	N/A	N/A	Minor	G
14	N/A	N/A	Minor	G
15	N/A	N/A	Minor	G
16	N/A	N/A	Minor	G
17	N/A	N/A	Minor	G
19	N/A	N/A	Minor	G
20	N/A	N/A	Minor	G
21	N/A	N/A	Minor	G
22	N/A	N/A	Minor	G

NOTES

* Overall classification has been given using the following system:

Red - Located over an Inner SPZ

Amber - Located within the Total SPZ and any GWV class *or* just located within Major GWV area

Green - Not located within GWV area or over SPZ *or* just located within Minor GWV area.

7.7.1 Summary

Although some restrictions are highlighted for the use of SUDS within the Borough, none of the potential development sites have been classified as having any constraint (i.e. marked in amber or red), although many are affected by minor groundwater vulnerability. A wide range of SUDS techniques should therefore be available for all potential development sites, although they must take into account the vulnerability of the underlying substrata as outlined within this section and discussed further in Section 4.

BOX 7.5

Tamworth Borough SUDS: At a Glance

- There are very few noted restrictions upon the use of SUDS techniques within the Borough as there are no SPZs and only minor GWV areas.
- A wide range of appropriate SUDS techniques are therefore available for the specified potential development sites.
- New sites should be analysed with reference to the information provided within this report.

7.8 Constraints Matrix

The constraints matrix presented in **Appendix H** summarises all the conclusions from this section on a site by site basis. It identifies the site reference, purpose, proposed number of dwellings at the time of writing, the water supply company, wastewater treatment works and the colour coded classification for each of the areas of water resources, water supply, wastewater collection, wastewater treatment, water quality, flood risk and SUDS. The table utilises the colour codes introduced at the start of this section as follows:

Green	Little or no infrastructure upgrade required
Amber	Minor infrastructure upgrade required
Red	Major infrastructure upgrade required

No major “show stoppers” have been identified, although a number of sites have more than one element that requires investment to enable development to take place. For a number of the restrictions, the responsibility lies with the developer and/or water company to secure the appropriate funding. However, the Council should be aware that these issues may result in time delays for site development and should therefore consider them within their Core Strategy.

7.9 Recommendations

7.9.1 LDF Policies and Development Control Policies

Due to the close proximity and similar characteristics of all the Districts and Boroughs within the Study Area, there are a number of common recommended policies. These are outlined in Section 10.1 at the end of this report. The policy recommendations specific to this Borough are included here. It must be noted that all the recommendations and conclusions presented in this report are based upon the most recent data and information, as presented in this report, and may be superseded at a later date.

Water Supply

- Significant investment may be required to provide water supply infrastructure to the Anker Valley potential development sites and south of the A5. Further consultation is required between the Council and SSW to determine the viability of progression such sites.

Water Resources

- No water resource issues have been identified by SSW. However, the Council should inform STWL of any high water demand development sites as early in the development process as possible.

Wastewater Infrastructure

- Consultation must be held with STWL ahead of the progression of any potential development sites to ensure the appropriate wastewater infrastructure is in place with sufficient time. This is required from the Council at options development stage and by the developers at site progression. Discussion should be held as far in advance as possible to enable STWL to fund, source and implement the required infrastructure improvements by the time they are required. This is particularly important for sites housing sites 1, 12, 13, 14, 15, 16, 17 and 25 and employment sites 18, 7 and 10, which have been identified as requiring infrastructure improvements. A number of development sites also require additional hydraulic analysis by STWL once they have been confirmed (please refer to **Appendix H**).

Wastewater Treatment

- All development sites are served by the Tamworth WwTW. As this has limited headroom, the Council should advise STWL as to their final development targets as soon as possible. Developers should also notifiy STWL as soon as they intend to take sites forward, especially the larger developments, to avoid delay if STWL are required to increase the capacity of the works.

Water Quality and Environment

- The quality of the River Tame requires improvement. All development must not negatively impact the watercourse and STWL will be required to improve the quality of discharge from the Tamworth WwTW before development can commence. This should be addressed by the Council on a strategic scale, but also by developers as sites are progressed.

- Although there are no environmentally significant sites within the Borough, all development must consider sites within the neighbouring Local Authority areas. This should be considered by the developers.

SUDS

- There are minimal limitations on the use of SUDS, however this will still require assessment on a site by site basis by developers.

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 Phase 2 SWMP is recommended for the Borough, procured by the Council.

8 SOUTH STAFFORDSHIRE DEVELOPMENT SPECIFIC RESULTS

8.1 Introduction

A general overview of all the elements of the WCS and the methodology used to assess them has been introduced in Sections 1 to 4 above. This section details the Local Authority specific analysis for South Staffordshire District and the implication of these results for development within the District.

Figures

8.2 Growth and Development

8.2.1 Scenarios for Growth

The scenarios of growth being considered within this WCS for South Staffordshire District are as stated in Section 2.3 and reiterated in **Table 8.1** below:

Table 8.1 - South Staffordshire District RSS and Growth Scenarios

	Residential (dwellings)	Indicative Annual Average (2006 - 2026)	Employment (ha)
Scenario 1 (RSS Phase 2)	3500	175	24
Scenario 2 (+10%)	3850	192.5	26.4
Scenario 3 (+30%)	4550	227.5	31.2

N.B. Annualised figures have been assumed.

8.2.2 Potential Development Sites

South Staffordshire District Council have provided, for use in this study, a number of shapefiles showing the location of potential development sites being considered for development. These consist of:

- Key Residential; and
- Key Employment

These key sites have been analysed on an individual site basis within this WCS. However, to provide the Council with an assessment of the rest of the District, analysis the main settlements has also been provided:

- Brewood
- Codsall
- Coven and Four Ashes
- Essington
- Featherstone, Brinsford and Coven Heath
- Great Wyreley and Cheslyn Heath
- Kinver
- Pattingham
- Penkridge
- Perton
- South of Stafford
- Weston under Lizard
- Wheaton Aston
- Wombourne

The location of all these areas and the individual potential development sites mentioned above is shown in **Figure 8.1**. The housing sites are shown in red and the employment sites in green.

This method not only provides the Council with an analysis of all the sites, but also gives a spatial overview of the District as a whole which should assist in the analysis of any additional future sites not provided for use in this WCS.

Reference is made to the individual sites throughout this analysis using the ID numbers provided by the Council. This should aid the Council in cross referencing this new information with their existing data. Development trajectories, provided by the Council, have formed the basis of discussion with the stakeholders. However, it must be noted that the sites shown may have been progressed/developed during the timescale of this project.

The rest of this section summarises the potential constraints to development for each of the potential development sites and areas for all elements of the water cycle. For ease of reference the potential development sites and areas have been given a traffic light colour coded classification indicating the infrastructure upgrade (and therefore the indicative investment) required to enable development to progress in each location. These results are summarised in the Constraints Matrix contained in **Table H.4** of **Appendix H.** The underlying philosophy to the colour scheme is shown below and the reasons for the classification in each case discussed in more detail in Sections 5.3 to 0.

Green	Little or no infrastructure upgrade required
Amber	Minor infrastructure upgrade required
Red	Major infrastructure upgrade required

8.3 Water Resources and Water Supply

Please see Section 3.1 for more background information

8.3.1 Water Resources

As shown in **Figure 2.1** and **Figure 8.2**, South Staffordshire District is located within both SSW and STWL's water supply areas and is served by a mixture of STWL's Staffordshire and East Shropshire and Severn WRZs. In general the north east and south of the District is served by SSW, including the settlements of Penkridge, Four Ashes, Great Wyreley, Cheslyn Heath and Kinver. The very northern tip and north western peninsula of the District is located within STWL's Staffordshire and East Shropshire WRZ, including the developments south of Stafford town and the village of Weston under Lizard. The main central area of the District is located within STWL's Severn WRZ. As such this section briefly discusses all three water supply areas.

SSW

Water is supplied from a combination of surface and groundwater sources and is classified by the Environment Agency as being under 'moderate' water stress. According to SSW's FWRMP, there is enough water available for use within this zone to meet the baseline scenario of development as stated in the Phase 2 RSS (Scenario 1 within this WCS). This prediction of a favourable supply/demand balance remains across the planning period, as illustrated in **Table 8.2**. However, this is reliant upon the implementation of metering, leakage and water efficiency measures and most importantly the Code for Sustainable Homes. This will therefore impact upon the design of new developments within the District.

There is insufficient resource within the supply area to meet the higher scenarios of development, especially Scenario 3. Mitigation measures may therefore need to be in place prior to development and maintaining discussions with SSW are critical.

Table 8.2 - Predicted Supply/Demand Balance within SSW's Supply Area

South Staffordshire Water	AMP5 2010-15	AMP6 2015-20	AMP7 2020-25	AMP8 2025-30
Supply/demand (FINAL WRMP) Baseline Scenario				
Supply/demand (FINAL WRMP) Final Strategy				

Red - WAFU is less than DI

Amber - WAFU is less than DI plus target headroom, but greater than DI

Green - WAFU is greater than DI plus target headroom

STWL - Severn WRZ

Water is supplied from a combination of surface and groundwater sources and is classified by the Environment Agency as being under 'moderate' water stress. According to STWL's Statement of Response, there is enough water available for use within this zone to meet the baseline scenario of development as stated in the Phase 2 RSS (Scenario 1 within this WCS), although this will require review once the Environment Agency's RSA sites have been confirmed. Although not essential, STWL still identify the need for resilience measures for this WRZ between AMP5 (2010 - 2015) and AMP9 (2030 - 2035), which have been identified to include:

- Additional household metering;
- Household and non-household water efficiency;
- Leakage control through a combination of active leakage control, mains replacement and pressure control.
- Derwent Valley Aqueduct DVA) duplication from Kings Corner to Hallgates
- New Birmingham groundwater source;
- Minworth aquifer storage and recovery;
- Highters Heath aquifer storage and recovery;
- Norton aquifer storage and recovery;
- River Leam flow compensation change; and
- Whitacre aquifer storage and recovery

The timescales for these interventions are identified in **Table 3.1** on Page 15.

Table 8.3 illustrates a comparison between the Water Available for Use (WAFU) and the Distribution Input (DI), which is essentially total demand. However, the margin in this WRZ is such that if one or more cannot be implemented for any reason, the resulting WAFU may drop below the DI plus target headroom level. Due to the size of the WRZ this may be due to developments far beyond South Staffordshire District's boundary.

Table 8.3 - Predicted Supply/Demand Balance within STWL's Severn WRZ

Severn WRZ	**AMP5 2010-15**	**AMP6 2015-20**	**AMP7 2020-25**	**AMP8 2025-30**
Baseline Scenario Supply/demand (FINAL WRMP)				
Final Strategy Supply/demand (FINAL WRMP)				

Red - WAFU is less than DI

Amber - WAFU is less than DI plus target headroom, but greater than DI

Green - WAFU is greater than DI plus target headroom

STWL - South Staffordshire WRZ

Water is supplied from a combination of surface and groundwater sources and is classified by the Environment Agency as being under 'moderate' water stress. According to STWL's Statement of Response, there is enough water available for use within this zone to meet the baseline scenario of development as stated in the Phase 2 RSS (Scenario 1 within this WCS), although this will require review once the Environment Agency's RSA sites have been confirmed. Although not essential, STWL still identify the need for resilience measures for this WRZ between AMP5 (2010 - 2015) and AMP9 (2030 - 2035), which have been identified to include:

- Household and non-household water efficiency; and
- Leakage control through a combination of active leakage control, mains replacement and pressure control.

This is a significant improvement upon the analysis carried out within their dWRMP, as **Table 8.4** illustrates, with a comparison of the Water Available for Use (WAFU) with the Distribution Input (DI), which is essentially total demand.

Table 8.4 - Predicted Supply/Demand Balance within STWL's Staffordshire and East Shropshire WRZ

Staffordshire and East Shropshire WRZ	AMP5 2010-15	AMP6 2015-20	AMP7 2020-25	AMP8 2025-30
Baseline Scenario Supply/demand (FINAL WRMP)				
Final Strategy Supply/demand (FINAL WRMP)				

Red - WAFU is less than DI
Amber - WAFU is less than DI plus target headroom, but greater than DI
Green - WAFU is greater than DI plus target headroom

Non Residential Water Use

The Council has not identified any plans for major commercial development with a high water requirement. Some allowance has been made in STWL's dWRMP for such use, but as headroom is limited such developments may not be feasible, especially within the short term. If such development is identified the Council need to inform STWL as soon as possible to enable adjustment of their water resource plans and discussion of the feasibility of the proposal.

Abstraction

Although unlikely to impact on residential development, the Environment Agency's policies regarding abstraction from the watercourses within the Borough may impact upon the viability of smaller commercial developments or agriculture.

The analysis undertaken within Section 3.1.4 and **Appendix C** indicates that the followings CAMS are relevant to South Staffordshire District:

- Staffordshire Trent Valley;
- Shropshire Middle Severn; and
- Worcestershire Middle Severn

The current status of the relevant waterbodies for South Staffordshire District within these CAMS and the resulting impact upon abstraction licences is summarised in **Table 8.5** below and shown graphically in **Figure 8.2.**

Table 8.5 - Impact of Water Availability on Abstraction Licences within South Staffordshire District

Water Source	Individual Status	Target Status 2016	New Licences	Existing Licences
River Penk	No Water Available	No Water Available	Issued subject to HoF Subject to three tiered abstraction conditions Time limit of 31 March 2015	Three tiered abstraction condition during summer months changing to two tiered with HoF No change to winter licences
Rugeley and Teddesley GWMUs	Over Licensed	Over Licensed	No water available - closed to new licences	No additional water Time limited licences may be renewed
Coven GWMU	Water Available	Water Available	Applications accepted Time limit of 31 March 2015	No impact Time limited licences will be renewed
River Stour Smestow Brook	Over Abstracted	Over Abstracted	All subject to HOF No low flow licences Encouragement of winter storage reservoirs and water efficient measures Restrictive daily pumping capacity	No increase in low flow quantity HOF Reductions on volumes Daily pumping capacity of 0.5Ml/d Reservoirs and efficiency measures
GWMU (Triassic Sandstone Aquifer)	Over Abstracted	Over Abstracted	No further water available	No additional water Renewal licences only approved through stringent testing Reduction to maximum usage of all licences due for renewal
River Tern and Sambrook East	Over Licensed	Over Licensed	Encouragement of winter storage reservoirs and other water efficient measures	Same condition as new licences on increased part of licence Renewal licences required

Water Source	Individual Status	Target Status 2016	New Licences	Existing Licences
GWMU			All subject to HoF Short term licences available from groundwater No presumption of renewal	to pass 3 tests Consideration of retrieval of unused licences and encourage downward variation
Coley Brook and Aqualate GWMU	Over Abstracted	Over Abstracted	Aqualate GWMU Closed All subject to HoF Encouragement of winter storage reservoirs and other water efficient measures	Same condition as new licences Renewal licences required to pass 3 tests Consideration of retrieval of unused licences and encourage downward variation

NOTES

* all will be subject to local considerations and other renewal criteria

HOF - Hands off Flow

This indicates that a number of the watercourses within South Staffordshire District are under pressure with regards to water availability with two of the groundwater sources and Smestow Brook being classified as currently 'over abstracted'. Only one GWMU and no watercourses are identified as having water available for use at present. This will undoubtedly affect agricultural practices in the region and, if tightened, may impact upon STWL and SSW's ability to extract the required volume of water resource. Where low flows are identified this may impact upon STWL's ability to gain adjusted discharge consent limits for any WwTWs that require expansion. This is an issue that will require further discussion with the Environment Agency and STWL once the potential development sites are confirmed. In addition, as shown in **Appendix C**, a number of sites of Environmental importance are affected by the watercourses listed above. These are investigated further within Section 8.7.

8.3.2 Water Supply

STWL

STWL have not provided a spatial analysis of the capacity of their water supply network. Correspondence with them has confirmed that they are confident that, as long as water resources are available, they will supply any proposed developments, although they may require receipt of the appropriate developer contributions. This will require as much advance notice of final development locations as possible to ensure the appropriate network adjustments are planned and undertaken in sufficient time.

SSW

To assist in the analysis of potential development sites SSW have provided a spatial analysis of the capacity of their water supply network to accommodate the predicted level of growth for the key residential sites. Their comments are shown in **Table 8.6** and

supplemented with the results of a face to face discussion held with SSW in January 2010.

Table 8.6 - SSW Comments Regarding Water Supply in South Staffordshire District

ID Reference Number	Location	Capacity	Area	SSW Comment
395	Land North of Penkridge Road, Penkridge	360	15.9	Sites 395 and 394 analysed together. It is envisaged that off-site water mains infrastructure will be required. Requires approximately 400m of new 250mm diameter water main (in highway from existing 250mm main to site).
394	Land off Stafford Road, Penkridge	186.3	6.9	
112	Land at Cherrybrook Drive, NE Penkridge	74.7	4.1	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
041	Land Off Walsall Road, Churchbridge, Great Wyreley	180	6.7	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
040	Land at New Horse Road, New Horse Road, Cheslyn Heath	43	0.9	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
051	Glenthorne House, High Street, Cheslyn Heath	9	0.2	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.

These comments have not provided any major “show stoppers” to development, although some sites around Penkridge have been flagged as requiring some investment to enable development to take place. During consultation SSW did not identify any major issues for this area of their supply network.

SSW will require receipt of the appropriate developer contributions to undertake the necessary upgrades. This will require as much advance notice of final development locations as possible to ensure the appropriate network adjustments are planned and undertaken in sufficient time. Any additional sites identified within this supply area will require individual review and infrastructure upgrade to enable development to take place.

8.3.3 Summary

STWL

As sufficient water resources have been identified within the Staffordshire and East Shropshire supply area, with minimal mitigation measures required, all the potential development sites and areas have been classified as 'green' for both water resources within **Table H.4** of **Appendix H**. Due to the investment required to ensure all the mitigation measures can be installed for the Severn Zone and the reliance upon these measures to ensure water is available for development, the potential development sites and areas within the Severn WRZ have been marked as 'amber' for water resources within **Table H.4** of **Appendix H**.

Due to the confidence of STWL to supply sufficient water within South Staffordshire District across the planning period, as long as water resources are available, all the potential development sites and areas located within their supply area have been highlighted in 'green' for water supply. This is shown graphically within **Figure 8.2**.

However, the headroom available within the Staffordshire and East Shropshire WRZ, and more noticeably within the Severn WRZ is limited and, as such, either of the higher scenarios of development may cause the demand to outstrip supply. This would result in a requirement for additional water resources to be sought and therefore new infrastructure to be installed and additional expenditure required.

SSW

SSW do not envisage water resources to be a problem with South Staffordshire District, although this will require review if a higher Scenario of growth or large commercial developments are incorporated. As such all the development areas and sites located within SSW's supply zone been classified as 'green' for water resources.

Although SSW are generally confident that water can be supplied to all areas of the District, the area around Penkridge has been identified as requiring some additional investment. The colour scheme for water supply has therefore been based upon the analysis carried out in **Table 8.6** above. For the development areas not individually assessed by SSW, analysis has been based, as far as possible on the conclusions of **Table 8.6**, but these sites have been marked with a ✪ to indicate further investigation may be required. The colour codes assigned are shown graphically in **Figure 8.2.**

BOX 8.1

South Staffordshire Water Resources and Supply: At a Glance

- Sufficient supply for Scenario 1, although the central area of the District, located within STWL's Severn WRZ, requires higher investment by STWL to ensure continuation of supply than other the areas.
- Insufficient resources to supply Scenarios 2 or 3. This would require additional consultation between South Staffordshire District Council, STWL and SSW and the rerunning of their WRMP models.
- STWL are confident they can supply developments with connection to the water resources as long as water resources are available and developer contributions are received where necessary.
- SSW are generally confident that water can be supplied to all the developments, although the area around Penkridge has been identified as requiring some investment, in the form of off-site water mains infrastructure. Developer contributions may need to be sought to fund the required improvements, especially for development sites 395 and 394..
- Limited water availability from the surface and groundwater management units (most notably the River Stour, Smestow Brook, the Triassic Sandstone Aquifer GWMU and Coley Brook and Aqualate GWMU) may impact current and future agricultural practices and small commercial developments. Developers promoting any development requiring the abstraction of water should consider the information contained within the CAMS reports and apply to the Environment Agency for the necessary licence.
- The Council needs to inform STWL and SSW as far in advance as possible to enable the appropriate funding sources to be obtained and necessary network improvements to be planned and undertaken for the system as a whole.

8.4 Wastewater Treatment and Collection

Please see Section 3.2 for more background information

All wastewater collection and treatment within South Staffordshire District is the responsibility of STWL.

8.4.1 Wastewater Treatment

Table 8.7 lists all the WwTWs that serve South Staffordshire District and indicates which of these are affected by the proposed potential development sites/areas. This is also shown graphically on Figure 8.3, with the WwTWs affected by development highlighted in red.

Table 8.7- WwTWs within South Staffordshire District

WwTW	Affected by Proposed Development
BARNHURST (STW)	✓ Huntington
BISHOPSWOOD (STW)	
BLYMILL (STW)	✓ Weston under Lizard
BOBBINGTON (STW)	
BRANCOTE (STW)	✓ South of Stafford
BURNHILL GREEN (STW)	
CANNOCK (STW)	✓ Great Wyreley and Cheslyn Heath
CODSALL (STW)	✓ Codsall
COVEN HEATH (STW)	✓ Huntington, Four Ashes, Hilton, Coven, Featherstone, Brinsford
CRATEFORD LANE (STW)	
DIMMINGSDALE (STW)	
ENVILLE (STW)	
FOUR CROSSES (STW)	
GAILEY (STW)	
GOSCOTE (STW)	✓ Great Wyreley and Cheslyn Heath, Churchbridge, Essington, Bridgetown
GOSPEL END (STW)	
HILTON PARK (STW)	✓ Essington
HIMLEY (STW)	
HIMLEY HALL (STW)	
KINVER (STW)	✓ Kinver
LOWER GORNAL (STW)	
LOWER PENN (STW)	
MINWORTH (STW)	✓ Essington
PATTINGHAM (STW)	✓ Pattingham
PENKRIDGE (STW)	✓ Huntington, South of Stafford, Penkridge, Acton Gate
ROUNDHILL (STW)	
TRESCOTT (STW)	✓ Perton
WHEATON ASTON (STW)	✓ Wheaton Aston
WILLENHALL (STW)	
WOMBOURNE (STW)	✓ Wombourne

As discussed in Section 3.2.4, STWL were consulted regarding the capacity of the WwTWs affected by the proposed development. Unfortunately, it was not feasible at this stage for STWL to undertake analysis of all the potential development areas within the District and their analysis has instead focussed upon the key residential and employment sites. For all other WwTWs further discussion will be required with STWL if development is progressed within the relevant development areas, namely:

- Barnhurst
- Blymill
- Coven Heath
- Hilton Park
- Kinver
- Minworth
- Pattingham
- Trescott
- Wheaton Aston

Table 8.8 summarises the comments made by STWL with regards to the proposed development within South Staffordshire District. The 'Constraints to Expansion' refers to the physical and quality restrictions. The physical constraints refer to the space required to physically expand the WwTW buildings, whereas the quality constraints refer to the ability of the works to process additional effluent and still meet to the quality targets for the discharge (in many cases the treatment of additional effluent will require an increase in discharge consent from the Environment Agency). STWL's full response can be found in **Appendix F**.

Table 8.8 - South Staffordshire District WwTW Consent Data

Name	Consented DWF (m^3/d)	Current/Observed DWF (m^3/d)*	Headroom	Constraints to Expansion		Receiving Watercourse
				Physical	Quality	
Brancote	26610	14890	Limited	No issue	No issue	River Sow
Cannock	17600	13474	Limited	No issue	No issue	Saredon Brook
Codsall	2784	3362	Significant	No issue	No issue	Bilbrook, Tributary of River Penk
Goscote	24900	22090	Limited	No issue	No issue	Rough Brook
Penkridge	2120	2975	Limited	No issue	No issue	River Penk
Wombourne	3289	2620	Minimal	No issue	Limited	Smestow Brook

* red text highlights WwTWs where the Current/Observed DWF exceeds the CDWF - these issues are discussed further in **Table 8.9**

This assessment indicates that a number of the WwTWs assessed by STWL are reaching, or exceeding, their consented discharge limits. However, from their assessment of the spare capacity at each of these work STWL has no concerns, with

the exception of Wombourne WwTW regarding their ability to increase the capacity to accommodate the proposed development, as outlined in **Table 8.8** above and **Table 8.9** below. It should be appreciated this is reliant upon the Environment Agency granting the additional consents and the WwTWs retaining the required water quality targets (discussed further in Section 8.5). As stated within **Table 8.9** the Wombourne WwTW has been identified as being at risk from severe quality exceedence issues and, as such STWL are currently considering closing this WwTW and transferring flows elsewhere. They do not see this as an issue to development, but they will require notice of any planned development within the catchment of that WwTW to ensure it is factored into their decision making.

Table 8.9 - South Staffordshire District Impact of Development upon WwTWs

WwTW	Affected Potential Development Sites/Areas	STWL Spare Capacity (dwellings)	Proposed dwellings within WwTW Catchment (residential sites)	Impact of Development
Brancote	South of Stafford	14342	Not specified	None
Cannock	Great Wyreley and Cheslyn Heath	Limited treatment capacity[1]	297	Potential for quality exceedence
Codsall	Codsall	0[2]	221	Capacity Exceedence
Goscote	Cheslyn Heath, Great Wyreley, Churchbridge, Essington, Bridgetown	73177	290	None
Penkridge	Huntington, South of Stafford, Penkridge, Acton Gate	0[3]	551	Severe capacity exceedence
Wombourne	Wombourne	1740[4]	82	Severe quality exceedence

NOTES

1 - Significant hydraulic capacity but potential restrictions on treatment capacity. However, STWL do not envisage any issues with dealing with future growth.

2 - There is zero hydraulic capacity at this WwTW. However, STWL do not envisage any issues with dealing with future growth.

3 - There is zero hydraulic capacity at this WwTW. However, STWL do not envisage any issues with dealing with future growth.

4 - There is hydraulic capacity available but zero capacity from a water quality perspective. STWL are currently assessing the options to close this WwTW and transfer all flows to Roundhill.

Some of the WwTWs not affected by the proposed development areas have not been analysed by STWL, but are included within the Environment Agency's 2007 risk assessment[43], as shown in **Table 8.10**. This provides a high level initial review of these works, although additional consultation will be required with STWL if development is progressed in these locations. The classification has been used in **Appendix H**.

[43] West Midlands Regional Spatial Strategy (RSS 11) The Impact of Housing Growth on Water Quality and Waste Water Infrastructure, 2007

Table 8.10 - Environment Agency 2007 Risk Assessment for South Staffordshire District

WwTWs	Flow Risk	Quality Risk	Overall Risk	Affected by Development?
Coven Heath	L	M	M	Kinver (not proposed)
Minworth	L	H	H	Essington (not proposed)
Trescott	M	L	M	Perton (not proposed)

As the rest are all relatively small WwTWs they have also not been included within the Environment Agency's risk assessment. If development is to be progressed in the areas served by these WwTWs it is recommended further consultation is sought from STWL.

As a result of this assessment, the potential development sites/areas have been classified within **Appendix H** and graphically in **Figure 8.3** using the following criteria. Where no information is available for the WwTW no classification is given to indicate that further assessment will be required through consultation with STWL once the potential development sites are finalised.

Green	Sufficient headroom identified by STWL with no issues regarding further expansion *or* low overall risk identified by the Environment Agency
Amber	Sufficient headroom identified by STWL with issues regarding expansion *or* WwTWs identified as having limited or minimal headroom but with the potential to expand to accommodate growth / growth *and* headroom comparisons do not indicate a shortfall *or* medium overall risk identified by the Environment Agency
Red	Limited headroom with issues identified by STWL regarding expansion *or* Insufficient headroom *or* high overall risk identified by the Environment Agency.

8.4.2 Wastewater Collection

STWL has provided an assessment of the capacity of the wastewater infrastructure network to receive the additional flow from the proposed key residential and employment potential development sites. This full assessment is provided in **Appendix G**. This assessment has therefore been used to classify the proposed potential development sites in **Appendix H** using the criteria outlined below. This is shown graphically in **Figure 8.4**. The assessment of the development areas has taken place, where possible, based upon their proximity to the key sites. Where this has not been feasible the site classification has been left blank to indicate further consultation is required with STWL if development is pursued in that area.

Green	Low predicted impact on the sewerage infrastructure, in line with STWL's colour scheme (where this is subject to hydraulic modelling the site is marked with a '✪').
Amber	Medium or Low/Medium predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)
Red	Medium/High or High predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)

BOX 8.2

South Staffordshire Wastewater Collection and Treatment: At a Glance

Wastewater Collection

- Additional hydraulic analysis is required for all potential development sites with regards to the capacity of the network, with the exception of sites 5, 165, 6:0001:001. This will be carried out by STWL once the sites and capacities are confirmed, either by the Council or by a developer.
- Some sites (5, 165, 6:0001:001) require infrastructure improvements to increase capacity, either within the mains and/or in the pumping stations (see **Appendix H**). Developer contributions may be sought to fund these improvements.
- All sites will require individual review by STWL once they are progressed as part of the planning application process.
- It therefore may not be possible to develop a number of the sites in the short term.

Wastewater Treatment

- Although STWL do not foresee a problem in accommodating the proposed development, nearly all of WwTWs require some form of expansion or additional analysis to accommodate the additional flow. Penkridge and Wombourne in particular require additional review. At present STWL do not foresee a problem with improving these works but this will take time and investment and, as such, may cause a delay.
- Codsall and Penkridge WwTWs have been identified as having no hydraulic capacity at present. A review of the data provided indicates that another, Cannock, may exceed its capacity if all the proposed development was progressed.
- Only Wombourne WwTW has been identified as having minimal water quality headroom at present. This is also identified as being a constraint to expansion of the WwTW.
- All development sites within the catchment of these WwTWs require further assessment with STWL, either by developers on a site specific basis or by the Council to assist in the formulation of their preferred options.

8.5 Water Quality and Environmental Issues

Please see Section 3.3 for more background information

As outlined in Section 3.3, this assessment is primarily based upon the watercourses which are affected by the discharge from WwTWs impacted by the proposed development. As discussed above it is anticipated that 15 WwTWs will be responsible for dealing with the associated discharges.

Table 8.11 identifies the WwTWs within South Staffordshire District that are affected by the proposed development, the watercourse into which they discharge and the distance from the discharge point of the WwTW to the nearest environmentally designated site (this has only been undertaken for the WwTWs affected by the key potential development sites). These watercourses will be reviewed in more detail within this section.

Table 8.11 - Watercourses and Designated Sites Affected by Development

STW	Receiving watercourse	Designated Site
Barnhurst	Wom Brook	None on watercourse within 10km
Blymill	**Tributary of the Back Brook**	**Mottey Meadows SSSI and SAC - 3km (approx)**
Brancote	River Sow	None on watercourse within 10km
Cannock	Saredon Brook	None on watercourse within 10km
Codsall	Bilbrook - Tributary of the River Penk	None on watercourse within 10km
Coven Heath	Featherstone Brook	None on watercourse within 10km
Goscote	Rough Brook	None on watercourse within 10km
Hilton Park	Latherford Brook	None on watercourse within 10km
Kinver	River Stour	None on watercourse within 10km
Minworth	River Tame	None on watercourse within 10km
Pattingham	Nun Brook	None on watercourse within 10km
Penkridge	River Penk	None on watercourse within 10km
Trescott	Smestow Brook	None on watercourse within 10km
Wheaton Aston	Longnor Brook	None on watercourse within 10km
Wombourne	**Smestow Brook**	**Checkhill Bogs SSSI - 5.5km (approx)**

8.5.1 Water Quality

Table 8.12 and **Table 8.13** below identify the current biological and chemical water quality grades for the watercourses into which the identified South Staffordshire District WwTWs discharge. Red shading indicates poor or bad water quality. Green shading indicates good or very good water quality. The full key is shown below **Table 8.13**.

Table 8.12 - Chemical GQA Grades for Watercourses within South Staffordshire District

WwTW	Watercourse	Chemical Grades			
		1990	1995	2000	2006
Barnhurst	Wom Brook	E (Downstream)	E (Downstream)	D (Downstream)	D (Downstream)
Blymill	Tributary of the Back Brook	U (River Meese)	E (River Meese)	E (River Meese)	E (River Meese)
Brancote	River Sow	D	C	C	C
Cannock	Saredon Brook	F	C	C	C
Codsall	Bilbrook - Tributary of the River Penk	D (River Penk)	C (River Penk)	B (River Penk)	C (River Penk)
Coven Heath	Featherstone Brook	D (River Penk)	C (River Penk)	B (River Penk)	C (River Penk)
Goscote	Rough Brook	U	C	C	B
Hilton Park	Latherford Brook	E	C	B	B
Kinver	River Stour	E	E	D	C
Minworth	River Tame	E	E	D	C
Pattingham	Nun Brook	B (River Worfe)	B (River Worfe)	B (River Worfe)	A (River Worfe)
Penkridge	River Penk	D	B	C	C
Trescott	Smestow Brook	E	D	D	D
Wheaton Aston	Longnor Brook	C (Church Eaton Brook)	D (Church Eaton Brook)	C (Church Eaton Brook)	C (Church Eaton Brook)
Wombourne	Smestow Brook	E (Wom Brook)	E (Wom Brook)	C (Wom Brook)	C (Wom Brook)

Table 8.13 - Biological GQA Grades for Watercourses within South Staffordshire District

WwTW	Watercourse	Biological Grades			
		1990	1995	2000	2006
Barnhurst	Wom Brook	E (Downstream)	E (Downstream)	E (Downstream)	E (Downstream)
Blymill	Tributary of the Back Brook	U (River Meese)	U (River Meese)	D (River Meese)	C (River Meese)
Brancote	River Sow	C	C	C	B
Cannock	Saredon Brook	F	D	D	D
Codsall	Bilbrook - Tributary of the River Penk	U (River Penk)	C (River Penk)	C (River Penk)	C (River Penk)
Coven Heath	Featherstone Brook	U (River Penk)	C (River Penk)	C (River Penk)	C (River Penk)
Goscote	Rough Brook	U	D	D	D
Hilton Park	Latherford Brook	D	D	D	C
Kinver	River Stour	U	D	D	D
Minworth	River Tame	U	E	E	D
Pattingham	Nun Brook	B (River Worfe)	C (River Worfe)	B (River Worfe)	A (River Worfe)
Penkridge	River Penk	D	C	C	C
Trescott	Smestow Brook	D	D	D	D
Wheaton Aston	Longnor Brook	C (Church Eaton Brook)	D (Church Eaton Brook)	C (Church Eaton Brook)	B (Church Eaton Brook)
Wombourne	Smestow Brook	U (Wom Brook)	D (Wom Brook)	C (Wom Brook)	D (Wom Brook)

Water Quality Key		
A	Very Good	The quality is similar to (or better than) that expected for an average, unpolluted river of this size, type and location.
B	Good	The quality shows minor differences from Grade 'a' and falls a little short of that expected for an unpolluted river of this size, type and location.
C	Fairly Good	The quality is worse than that expected for an unpolluted river of this size, type and location.
D	Fair	The quality shows considerable differences from that expected for an unpolluted river of this size, type and location.
E	Poor	The quality is much worse than expected for an unpolluted river of this size.
F	Bad	The quality is so bad that, in terms of biology, there may be little or no life present in the river.
U	No Result	Not monitored/measurement has not been recorded.

This assessment indicates that some of the watercourses are likely to be affected by the proposed development. They have been improving their water quality over the past 20 years, with a few of them achieving good or very good status in the 2006 review. For the majority of the WwTWs in South Staffordshire District, the future developments are of a small enough nature to conclude that future increases in flow will not have a significant impact on the water quality of the receiving watercourse, although this will require review, especially for the WwTWs identified as requiring expansion in STWL's analysis above. However the WwTWs highlighted in red (for example Barnhurst and Minworth) may struggle to expand their capacity for the proposed development until their water quality issues are improved, as it is unlikely the Environment Agency will grant additional consent.

From this review the Penkridge and Wombourne WwTWs are also concerning as the water quality is still average and both are expecting fairly significant development. The watercourses on which they are located (the River Penk and Smestow/Wom Brook respectively) will receive additional flow from other WwTWs further downstream, both within and beyond the District boundaries, which may impact their quality further.

To further investigate the potential restrictions upon expansion for each of the WwTWs with regards to the WFD we have reviewed their Protected Area Descriptions published in the RBMP, alongside the current ecological status of the watercourse. These are summarised in **Table 8.14** and shown graphically on **Figure 8.5**.

Table 8.14 - RBMP Summary for South Staffordshire District

Watercourse	WwTW	Ecological Status	Freshwater Fish Directive	Nitrates Directive	Urban Wastewater Treatment Directive
Back Brook	Blymill	Moderate		✓	
Bilbrook	Codsall	Not Reviewed			
Church Eaton Brook	(Wheaton Aston)	Moderate	✓	✓	
Featherstone Brook	Coven Heath	Not Reviewed			
Latherford Brook	Hilton Park	Not Reviewed			
Longnor Brook	Wheaton Aston	Not Reviewed			
Nun Brook	Pattingham	Not Reviewed			
River Penk	(Codsall) (Coven Heath) Penkridge	Moderate	✓	✓	
River Sow	Brancote	Poor to Moderate	✓	✓	✓
River Stour	Kinver	Poor	✓	✓	✓
River Tame	Minworth	Moderate	✓	✓	
Rough Brook	Goscote	Not Reviewed			
River Worfe	(Pattingham)	Poor	✓	✓	
Saredon Brook	Cannock	Moderate	✓	✓	
Smestow Brook	Trescott Wombourne	Moderate	✓	✓	✓
Wom Brook	Barnhurst	Poor	✓		

For the WwTWs located on watercourses with poor or moderate ecological status or where a protected designation has been specified, the Environment Agency will place tighter discharge quality consents on the watercourses and, as a result, may not increase the discharge consents as requested by STWL without additional processing of the effluent or, in the worse cases, not at all. It is therefore recommended that the Council discusses the potential restrictions in further detail with both the Environment Agency and STWL before progressing development within these WwTW catchments.

8.5.2 Environmental Issues

Many aspects of development impact upon environmentally significant sites, including:

- Abstraction from the watercourses (reducing the water supply to the environmental site);
- Wastewater discharge (decreasing the quality of the water); and
- Pollution from surface runoff.

The first two of these aspects will be discussed in more detail below. The third will be discussed in more detail within Section 8.7.

Water Supply

As identified in **Appendix C**, the following environmentally significant sites are affected by the WRMUs or GWMUs located within South Staffordshire District:

- Allscott Settling Ponds (SSSI)
- Aqualate Mere (SSSI)
- Attingham Park (SSSI)
- Baswich Meadows (SSSI)
- Belvide Reservoir (SSSI)
- Brown Moss (SAC & SSSI)
- Brownheath Moss (SSSI)
- Buddulphs Pool (SSSI)
- Burntood Pools AMP
- BurntWood (SSSI)
- Cannock Chase (SSSI and SAC)
- Cannock Extension Canal (SSSI, SAC)
- Checkhill Bogs (SSSI)
- Clarepool Moss (SSSI)
- Cole Mere (SSSI)
- Cop Mere (SSSI, RAMSAR)
- Doxey and Tillington Marshes (SSSI)
- Feckenham Forest (SSSI)
- Fenn's, Whixhall, Bettisfield, Wern & Cadney Mosses (SAC & SSSI)
- Fens Pool (SSSI)
- Hodnet Heath (SSSI)
- Hurcott and Podmore Pools (SSSI)
- Illey Pastures (SSSI)
- Loynton Moss (SSSI)
- Maer Pool (SSSI)
- Midlands Meres and Mosses Phase 1 (Ramsar)
- Midlands Meres and Mosses Phase 2(Ramsar)
- Mottey Meadows (SSSI and SAC)
- Muxton Marsh (SSSI)
- Newport Canal
- Oakley Pool (SSSI)
- Prees Branch Canal (SSSI)
- Puxton Marshes (SSSI)
- Rawbones Meadow (SSSI)
- River Stour Flood Plain (SSSI)
- Romsley Manor Farm (SSSI)
- Ruswood Pastures (SSSI)
- Shrawley Wood (SSSI)
- Stourvale Marsh (SSSI)
- Sweat Mere and Cross Mere (SSSI)
- The Wilderness and Vermin Valley (SSSI)
- Upton Warren Pools (SSSI)
- Upton Warren Pools (SSSI)
- West Midlands Mosses (SAC)
- Westwood Great Pool (SSSI)
- Wilden Marshes and Meadows (SSSI)

All these sites are dependent upon receiving a sufficient quantity of water in order to survive. In order to protect these sites, and the species living within them, it is essential that all abstraction within the District is undertaken within the Environment Agency consent limits stated within the CAMS reports and that the targets set for 2016/2019 are reached. This should not impact the key potential development sites but may cause potential problems for smaller commercial development or agriculture.

Wastewater

The key environmental sites affected by the discharge from WwTWs are highlighted in **Table 8.11** above. An overview description of these designated sites is given below:

Checkhill Bogs SSSI
The site consists of three areas of wet woodland along the course of the Spittle Brook, a tributary of the river Stour, to the north-west of Stourbridge. The site represents mature, secondary woodland of a type which is nationally much reduced and under threat, and restricted in Staffordshire. The undisturbed character of the site, the high humidity and quantity of decaying timber provides a favourable environment for mosses, liverworts, and fungi as well as invertebrates dependent on dead wood.

The entire site is currently in an unfavourable, no change condition. It has been identified that lack of weed control and water abstraction are responsible for this condition. Poor water quality can affect the species composition of ground flora and invertebrate species in wet woodlands and therefore changes in STW outfalls may negatively impact the condition of this site.

Mottey Meadows
Mottey Meadows is designated as a SSSI, SAC and a National Nature Reserve (NNR). The site is floristically-diverse mesotrophic grassland where traditional late hay cutting and aftermath grazing methods are used. The site is important because of its large size, variety of grassland community types and presence of rare species. Furthermore it contains an extensive example of an alluvial flood meadow. These flood meadows comprise the greater part of the site. The sward is typically rich in species, including mosses, and many grasses such as meadow foxtail *Alopecurus pratensis*, sweet vernal *Anthoxanthum odoratum*, and tall fescue *Festuca arundinacea*. Unusually, a few woodland plants also occur such as wood anemone *Anemone nemorosa* and goldilocks *Ranunculus auricomus*.

Where soils are permanently wet a crested dogs-tail *Cynosurus cristatus* and marsh marigold *Caltha palustris* community prevails. A wide range of wetland herbs occur including marsh ragwort *Senecio aquaticus*, ragged robin *Lychnis flos-cuculi*, and southern marsh-orchid *Dactylorhiza praetermissa*.

A further six types of semi-natural grassland are present on the site. These range from relic fen-meadow on peaty soils through swards dominated by tussocks of soft-rush *Juncus effusus* to those with abundant leguminous plants, such as bird's-foot trefoil *Lotus corniculatus*. Snake's head fritillary *Fritillaria meleagris* is also present on the site. The meadows are drained by a system of underground drains and surface ditches which channel water to the Mottymeadow Brook and its tributary. Most of the meadows are bordered by hedgerows. The site is of local importance for breeding waders such as snipe and curlew, and plant-feeding beetles are well represented.

8.5.3 Summary

There are a large number of environmentally significant sites located within and around South Staffordshire District and all, in some form, are at risk of degradation due to development. It is therefore important that the Council undertakes the appropriate environmental surveys before they decide on the final sites they wish to bring forward for development. This assessment has briefly reviewed the potential impact increased water abstraction or wastewater treatment may have upon the most significant of these sites. It has concluded that measures will be required to minimise this impact and to follow the Environment Agency's guidelines and regulations.

A simple scoring system has been used to assign a colour code to each of the potential development sites to summarise the conclusions of the water quality and environmental analysis as follows:

Table 8.15 - Water Quality and Environmental Analysis Scoring System

RBMP Ecological Status	2006 GQA (if RBMP not available)*	Directives in RBMP	Environmental Sites downstream of WwTWs	Overall Classification
High = 0	A/B = 0	1 point per Directive	1 point if present	0 points = Green
Moderate = 1	C/D = 1			1-3 points = Amber
Poor = 2	E/F = 2			4-6 points = Red

* the worst score out of the Chemical or Biological is used

Green	Development not predicted to impact water quality and/or Environment Sites
Amber	Some predicted impact to impact water quality and/or Environment Sites from development. Mitigation may be required.
Red	Significant predicted impact to impact water quality and/or Environment Sites from development. Mitigation will be required.

The overall classifications are presented in the Constraints Matrix in **Appendix H**.

BOX 8.3

South Staffordshire Water Quality: At a Glance

- Within the District, the Back Brook and Wom Brook have been identified as currently having low water quality, based upon the 2006 assessment.
- The River Sow, River Stour, River Worfe and Wom Brooke have been identified as having 'poor' ecological status in the RBMP and the Back Brook, Church Eaton Brook, River Penk, River Tame, Saredon Brook and Smestow Brook as having 'moderate' ecological status.
- Potential developments within the catchments of these watercourses may be impacted by abstraction and wastewater treatment limitations and should be discussed with STWL and the Environment Agency, either by the Council at options appraisal or by the developers at planning application stage.
- WwTWs identified as requiring additional capacity and being located on, or upstream, of a watercourse identified as having a poor water quality at present or being vulnerable to the impact of new development may struggle to obtain the required increases in consent from the Environment Agency. Additional consultation will be required for sites in those catchments, most notably:
    - Penkridge
    - Wombourne

  It is unlikely this will prevent development, but a delay whilst new consents are negotiated or STWL upgrades/improves its WwTWs.

8.6 Flood Risk

Please see Section 3.4 for more background information

A Level 1 SFRA has already been undertaken for South Staffordshire District and a Phase 1 SWMP undertaken alongside this study, this WCS therefore utilises much of the data and conclusions from those reports. 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 8.17** 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.

8.6.1 Fluvial Flood Risk

South Staffordshire District is split between the catchments of the River Trent and the River Severn, as shown in **Figure 8.6.** 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 8.6**, 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 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 in **Table 3.11**. 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.

8.6.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Phase 1 SWMP being undertaken alongside this WCS. This has accounted for historic flooding occurrences and the potential for future surface water flooding (roughly inferred from the Environment Agency's surface water flood map). It has also accounted for the risk of flooding from the sewer network. More information regarding the analysis process can be obtained from the Phase 1 SWMP.

As a result of this risk of surface water flooding, a policy for the adoption should be included within all new development proposals. This is investigated further within Section 8.7.

8.6.3 Groundwater

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.

8.6.4 Canals

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.

8.6.5 Reservoirs

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 25,000m³)[44]. These are shown on **Figure 8.6** and are located at:

- Blevide
- Calf Heath
- Gailey

[44] NB following the enactment of the new Floods and Water Management Bill on 8th April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m³. 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.

A breach of any of these waterbodies may pose a flood risk to any existing or proposed potential development site located downstream. However flood risk from reservoirs is moderately low due to the high standards of inspection and maintenance required by legislation. In addition there is no record of flooding from these waterbodies. As such an assessment of flood risk from reservoirs and impounded waterbodies has not been included within this WCS, although the Council may wish to review this if any additional information regarding particular waterbodies is obtained at a later date.

8.6.6 Summary

The flood risk to the proposed potential development sites/areas is summarised in **Table 8.17** below. Where sites have been identified as being located within the Flood Zones, 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. These findings will be updated once the Phase 2 SWMP is completed and further guidance regarding appropriate mitigation measures is provided within Section 8.7.

The colour coding for 'surface water' has been taken from the parallel SWMP assessment. The 'overall' classification has been determined using the following methodology:

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'. The surface water classification is provided as shown and the two are combined using the standard matrix shown in **Table 8.16** to provide the 'overall' classification. However, there are two anomalies to this method:

1. When a site is located within Flood Zone 3 but only assigned a 'green' grade with regards to surface water flood risk, it is still shown as having a 'red' overall classification. This highlights the importance of development restraint within Flood Zone 3 as specified within PPS25. These sites are marked with an asterisk.
2. When a site is not located within Flood Zone 3 but is identified as being within the extent of Flood Zone 3a with climate change, it is treated within this analysis as if it is located within Flood Zone 3 to provide conservative conclusions.

Table 8.16 - Traffic Light Colour Code Matrix

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

Table 8.17 - Flood Risk to Potential Development Sites

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						A	A
112	Y			Y		A	R
165						A	A
151	Y	Y		Y	Y	R	R
147						A	A
204						A	A
40	Y	Y		Y	Y	A	R
41						R	A
395	Y	Y	Y	Y	Y	A	R
394	Y	Y	Y	Y	Y	A	R
51						A	A
208						A	A
164						A	A
398						A	A
6:0001:001						A	A
6:0002:002						A	A
6:0002:001	Y	Y		Y	Y	R	R
6:0025:001						G	G
6:0004:001	Y	Y		Y	Y	R	R
6:0006:001						G	G
6:0024:002						G	G
6:0007:001						A	A
6:0007:003						A	A
6:0007:006						A	A
6:0007:007						A	A
6:0008:001						A	A
6:0009:001						A	A
6:0013:001	Y	Y		Y	Y	A	R
6:0013:015						A	A
6:0026:001	Y	Y		Y	Y	G	A*
6:0014:001	Y	Y		Y	Y	A	R
6:0015:010	Y			Y		G	A*
6:0015:001						G	G
6:0015:008						G	G
6:0016:001						G	G
6:0016:006						G	G
6:0013:016						A	A
6:0013:002	Y	Y		Y	Y	A	R
6:0006:002						G	G

Potential Development Site	FZ 2 (1000 year)	FZ3 (100 year)	FZ3b (Functional Floodplain)	FZ3a with Climate Change	FZ3b with Climate Change	Surface Water	Overall
(44055)	Y	Y		Y	Y	R	R
(44056)						A	A
Brewood	Partially					A	A
Codsall	Marginal					A	A
Coven and Four Ashes	Partially					A	A
Essington						A	A
Featherstone, Brinsford and Coven Heath	Partially					A	A
Great Wyreley and Cheslyn Heath	Partially					R	R
Kinver	Y	Y	Y	Y	Y	A	R
Pattingham						A	A
Penkridge	Y	Y	Y	Y	Y	R	R
Perton	Partially					R	R
South of Stafford	Y	Y	Y	Y	Y	A	R
Weston under Lizard						A	A
Wheaton Aston	Partially					A	A
Wombourne	Y	Y	Y	Y	Y	R	R

BOX 8.4

South Staffordshire Flood Risk: At a Glance…

- 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.
- 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.
- Fluvial flood risk is a constraint to development in many areas of the District, including Penkridge, Kinver and Wombourne.
- Five settlements have been identified within the SWMP as being at high risk of surface water flooding, namely:
    - Codsall;
    - 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, 6 settlements (Great Wyreley and Cheslyn Hay, Kinver, Penkridge, Perton, South of Stafford and Wombourne) and 11 of the potential development sites (112, 151, 40, 395, 394, 6;0002:001, 6:0004:001, 6:0013:001, 6:0014:001, 6:0013:002, 44055) analysed within South Staffordshire District have been classified as ‘red’ in terms of overall flood risk. 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. 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.
- A Phase 2 SWMP has been recommended for the settlement of Penkridge.
- Future potential development sites will require additional flood risk assessment.

8.7 Demand Management

Please see Section 4 for more background information

General guidance regarding demand management that is applicable over the whole of South Staffordshire District is presented in Section 4. Many of the factors and, in particular, the suitability of SUDS techniques are dependent upon site specific characteristics. In many cases these will have to be investigated in site specific analysis when the sites are brought forward for development. However, two aspects can be strategically assessed within this study which should provide the Council with an overview of the general restrictions, and therefore costs, associated within the implementation of SUDS over the Borough. The two aspects are Groundwater Vulnerability and the location of Source Protections Zones (SPZ).

Datasets for both these elements have been obtained from the Environment Agency and are shown on **Figure 8.7** and **Figure 8.8**. As explained in Section 4.3, the higher the groundwater vulnerability, the greater the restriction upon the type of SUDS that can be implemented on the potential development site. Similarly the closer a site is to the centre of SPZ, the greater the restriction, as explained in more detail within Section 4. The affect of these upon the individual potential development sites is summarised in **Table 8.18**.

Table 8.18- Restrictions upon the Use of SUDS within South Staffordshire District

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
5	N/A	y	Major	A
112	N/A	N/A	Major	A
165	N/A	N/A	Major	A
151	N/A	Y	Major	A
147	N/A	Y	Major	A
204	N/A	N/A	Minor	G
40	N/A	N/A	Minor	G
41	N/A	N/A	Minor	G
395	N/A	N/A	Minor	G
394	N/A	N/A	Minor	G
51	N/A	N/A	Minor	G
208	N/A	N/A	Minor	G
164	N/A	Y	Major	A
398	N/A	N/A	N/A	G
6:0001:001	N/A	N/A	Minor	G
6:0002:002	N/A	N/A	Minor	G
6:0002:001	N/A	N/A	Minor	G
6:0025:001	N/A	N/A	Major	A
6:0004:001	N/A	Y	Major	A
6:0006:001	N/A	Y	Major	A

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
6:0024:002	N/A	Y	Major	A
6:0007:001	N/A	N/A	Major	A
6:0007:003	N/A	N/A	Major	A
6:0007:006	N/A	N/A	Major	A
6:0007:007	N/A	N/A	Major	A
6:0008:001	N/A	N/A	Major	A
6:0009:001	N/A	N/A	Minor	G
6:0013:001	N/A	Y	Major	A
6:0013:015	N/A	N/A	Major	A
6:0026:001	N/A	N/A	N/A	G
6:0014:001	N/A	Y	Major	A
6:0015:010	N/A	Y	Major	A
6:0015:001	N/A	Y	Major	A
6:0015:008	N/A	Y	Major	A
6:0016:001	N/A	N/A	Minor	A
6:0016:006	N/A	N/A	Minor	A
6:0013:016	N/A	N/A	Major	A
6:0013:002	N/A	Y	Major	A
6:0006:002	N/A	Y	Major	A
(44055)	N/A	Y	Major	A
(44056)	N/A	Y	Major	A
Brewood	N/A	Marginal	Minor (marginal)	A
Codsall	N/A	Y	Major	A
Coven and Four Ashes	Close	Y	Major	R
Essington	N/A	N/A	Minor	A
Featherstone, Brinsford and Coven Heath	Close	Y	Major	R
Great Wyreley and Cheslyn Heath	N/A	N/A	Minor	G
Kinver	Y	Y	Major	R
Pattingham	N/A	Y	Major	A
Penkridge	N/A	Close	Major and Minor	A
Perton	N/A	Y	Major	A
South of Stafford	N/A	Marginal	Minor	A
Weston under Lizard	N/A	Y	Major	A
Wheaton Aston	N/A	N/A	Minor (marginal)	G
Wombourne	Y	Y	Major	R

NOTES

* Overall classification has been given using the following system:

Red - Located over an Inner SPZ

Amber - Located within the Total SPZ and any GWV class *or* just located within Major GWV area

Green - Not located within GWV area or over SPZ *or* just located within Minor GWV area.

8.7.1 Summary

Although some restrictions are highlighted for the use of SUDS within the District, none of the potential development sites have been classified as having a major constraint (i.e. marked in red), although four of the settlements have been highlighted as requiring further assessment if future potential development sites are identified. Even for these sites appropriate SUDS techniques are available, but they must take into account the vulnerability of the underlying substrata as outlined within this section and discussed further in Section 4.

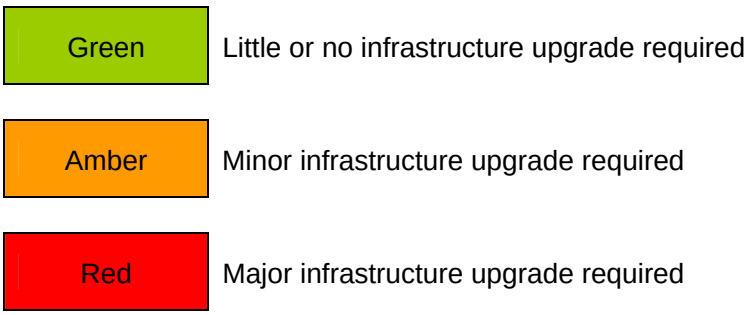
BOX 8.5

South Staffordshire District SUDS: At a Glance

- A number of development areas are affected by SPZs and/or GWV. Almost all the sites are located in a major GWV (see **Table 8.18** above) and, although none of the individual development sites are affected, the development areas of Coven and Four Ashes, Featherstone, Brinsford and Coven Heath, Kinver and Wombourne are located either close to, or above, inner SPZs.
- As a result, some restrictions may be placed upon the appropriate SUDS for each site, although appropriate techniques are available. These must be investigated by the developer.
- Site specific investigation will be required for new development allocations within the settlements identified as being within a SPZ and/or GWV area. None of the individual development sites have been identified as having major SUDS restrictions. However any new proposed development sites within the settlements listed above will require review on a site specific basis.

8.8 Constraints Matrix

The constraints matrix presented in **Appendix H** summarises all the conclusions from this section on a site by site basis. It identifies the site reference, purpose, proposed number of dwellings at the time of writing, the water supply company, wastewater treatment works and the colour coded classification for each of the areas of water resources, water supply, wastewater collection, wastewater treatment, water quality, flood risk and SUDS. The table utilises the colour codes introduced at the start of this section as follows:



No major "show stoppers" have been identified, although a number of sites have more than one element that requires investment to enable development to take place. For a number of the restrictions, the responsibility lies with the developer and/or water company to secure the appropriate funding. However, the Council should be aware that these issues may result in time delays for site development and should therefore consider them within their Core Strategy.

8.9 Recommendations

8.9.1 LDF Policies and Development Control Policies

Due to the close proximity and similar characteristics of all the Districts and Boroughs within the Study Area, there are a number of common recommended policies. These are outlined in Section 10.1 at the end of this report. The policy recommendations specific to this District are included here. It must be noted that all the recommendations and conclusions presented in this report are based upon the most recent data and information, as presented in this report, and may be superseded at a later date.

Water Supply

- Within the central and southern areas of the District water supply is highly dependent upon infrastructure implementation proposed by STWL. Progression of the strategies specified should be monitored by the Council.
- Penkridge requires some water supply infrastructure upgrade. Further discussion should be held with SSW before development progresses in that area.

Water Resources

- No water resource issues have been identified by STWL or SSW. However, STWL's final supply demand scenario is reliant upon the implementation of a number of mitigation measures/infrastructure improvements. The Council should inform STWL and SSW of any high water demand development sites as early in the development process as possible.

Wastewater Infrastructure

- Consultation must be held with STWL ahead of the progression of any potential development sites to ensure the appropriate wastewater infrastructure is in place with sufficient time. This is required from the Council at options development stage and by the developers at site progression. Discussion should be held as far in advance as possible to enable STWL to fund, source

and implement the required infrastructure improvements by the time they are required. This is particularly important for the sites 5, 151, 6:0001:001, which have been identified as requiring infrastructural upgrade.

Wastewater Treatment

- Codsall, Penkridge and Wombourne WwTWs have been highlighted as suffering from capacity restrictions. Further consultation should be sought with STWL for these areas before development is progressed, either by the Council to assist with their options assessment or by developers as the sites are progressed.

Water Quality and Environment

- Consideration must be given to the environmental sites both within and beyond the District borders, including Checkhill Bogs. This should be assessed on a site specific basis by developers.
- It is recommended the Council implements policies to improve the water quality within many of the watercourses within the District, but most notably the River Sow, River Stour, River Worfe and Wom Brook. This should be reviewed before development takes place in those catchments.
- Due the number of environmentally significant sites within the District policies must be emplaced to ensure that development does not have an adverse impact on any of these areas. This should be undertaken by the developer at planning application stage.

SUDS

- Due to the adoption of the Floods and Water Management Act, STWL is no longer required to accept surface water runoff from new development sites. As such, all planning applications must include a suitable SUDS scheme. This will be submitted by the developer and reviewed by the relevant SUDS approval board (SAB) within Staffordshire County Council. As far as possible the Council should investigate the retrofitting of SUDS into existing developments.

Flood Risk

- Individual FRAs are required for a number of 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) and should be carried out by the developer.
- Improved surface water management is required over much of the District, especially within the settlements of Codsall; Great Wyreley and Cheslyn Heath; Penkridge; Perton; and Wombourne..
- Further assessment within a Phase 2 SWMP for the settlement of Penkridge is recommended, procured by the Council.

9 CANNOCK CHASE DEVELOPMENT SPECIFIC RESULTS

9.1 Introduction

A general overview of all the elements of the WCS and the methodology used to assess them has been introduced in Sections 1 to 4 above. This section details the Local Authority specific analysis for Cannock Chase District and the implication of these results for development within the District.

Figures

9.2 Growth and Development

9.2.1 Scenarios for Growth

The scenarios of growth being considered within this WCS for Cannock Chase District are as stated in Section 2.3 and reiterated in **Table 9.1** below:

Table 9.1 - Cannock Chase District RSS and Growth Scenarios

	Residential (dwellings)	Indicative Annual Average (2006 - 2026)	Employment (ha)
Scenario 1 (RSS)	5800	290	84
Scenario 2 (+10% Phase 2)	6380	319	92.4
Scenario 3 (+30%)	7540	377	109.2

N.B. Annualised figures have been assumed.

9.2.2 Potential Development Sites

Cannock Chase District Council have provided, for use in this study, a number of shapefiles showing the location of potential development sites being considered for development. These consist of:

- Key Residential; and
- Key Employment

These key sites have been analysed on an individual site basis within this WCS. However, to provide the Council with an assessment of the rest of the District, analysis of the main settlements has also been provided:

- Cannock (in and around)
- Norton Canes
- Prospect Village and Cannock Wood
- Rugeley (in and around)

The location of all these areas and the individual potential development sites mentioned above is shown in **Figure 9.1.** The housing sites are shown in red and the employment sites in green.

This method not only provides the Council with an analysis of all the sites, but also gives a spatial overview of the District as a whole which should assist in the analysis of any additional future sites not provided for use in this WCS.

Reference is made to the individual sites throughout this analysis using the ID numbers provided by the Council. This should aid the Council in cross referencing this new information with their existing data. Development trajectories, provided by the Council, have formed the basis of discussion with the stakeholders. However, it must be noted that the sites shown may have been progressed/developed during the timescale of this project.

The rest of this section summarises the potential constraints to development for each of the potential development sites and areas for all elements of the water cycle. For ease of reference the potential development sites and areas have been given a traffic light colour coded classification indicating the infrastructure upgrade (and therefore the indicative investment) required to enable development to progress in each location. These results are summarised in the Constraints Matrix contained in **Table H.5** of **Appendix H.** The underlying philosophy to the colour scheme is shown below and the reasons for the classification in each case discussed in more detail in Sections 5.3 to 0.

Green	Little or no infrastructure upgrade required
Amber	Minor infrastructure upgrade required
Red	Major infrastructure upgrade required

9.3 Water Resources and Water Supply

Please see Section 3.1 for more background information

As shown in **Figure 2.1** and **Figure 9.2** Cannock Chase District is wholly located within SSW's water supply area. As such, water is supplied from a combination of surface and groundwater sources and is classified by the Environment Agency as being under 'moderate' water stress. According to SSW's FWRMP, there is enough water available for use within this zone to meet the baseline scenario of development as stated in the Phase 2 RSS (Scenario 1 within this WCS). This prediction of a favourable supply/demand balance remains across the planning period, as illustrated in **Table 9.2**. However, this is reliant upon the implementation of metering, leakage and water efficiency measures and most importantly the Code for Sustainable Homes. This will therefore impact upon the design of new developments within the District.

There is insufficient resource within the supply area to meet the higher scenarios of development, especially Scenario 3.

Table 9.2 - Predicted Supply/Demand Balance within Cannock Chase District

Staffordshire and East Shropshire WRZ	**AMP5 2010-15**	**AMP6 2015-20**	**AMP7 2020-25**	**AMP8 2025-30**
Supply/demand (FINAL WRMP) Baseline Scenario				
Supply/demand (FINAL WRMP) Final Strategy				

Red - WAFU is less than DI

Amber - WAFU is less than DI plus target headroom, but greater than DI

Green - WAFU is greater than DI plus target headroom

Non Residential Water Use

The Council has not identified any plans for major commercial development with a high water requirement. Discussion with SSW indicates that although some allowance has been made in their FWRMP for such use, headroom is limited and as such developments may create an adverse impact on their supply/demand balance, especially within the short term. As commercial customers are economically beneficial to the water company they will usually be progressed, but this may be detrimental to the water resource situation for the rest of the planning period. Therefore, if such development is identified the Council need to inform SSW as soon as possible to enable adjustment of their water resource plans and discussion of the feasibility of the proposal.

Abstraction

Although unlikely to impact on residential development, the Environment Agency's policies regarding abstraction from the watercourses within the District may impact upon the viability of smaller commercial developments or agriculture, but only if they require some extraction from the watercourse.

The analysis undertaken within Section 3.1.4 and **Appendix C** indicates that the followings CAMS are relevant to Cannock Chase District:

- Staffordshire Trent Valley; and
- Tame, Anker and Mease;

The current status of the relevant waterbodies for the District within these CAMS and the resulting impact upon abstraction licences is summarised in **Table 9.3** below and shown graphically in **Figure 9.2**.

Table 9.3 - Impact of Water Availability on Abstraction Licences within Cannock Chase District

Water Source	Individual Status	Target Status 2016	New Licences	Existing Licences
Lower Trent and Swarbourn	No Water Available	No Water Available	Issued subject to HoF Time limit of 31 March 2015	No impact Time limited licences will be renewed
River Penk	No Water Available	No Water Available	Issued subject to HoF Subject to three tiered abstraction conditions Time limit of 31 March 2015	Three tiered abstraction condition during summer months changing to two tiered with HoF No change to winter licences
Rugeley and Teddesley GWMUs	Over Licensed	Over Licensed	No water available - closed to new licences	No additional water Time limited licences may be renewed
Coven GWMU	Water Available	Water Available	Applications accepted Time limit of 31 March 2015	No impact Time limited licences will be renewed

Water Source	Individual Status	Target Status 2016	New Licences	Existing Licences
Bourne/Black Brook	Over Abstracted	Over Licensed	No water available - closed to new licences	No further licensing Voluntary revocations and reductions required Encouragement of efficient water use Investigation for larger abstraction from Lichfield and Shenston GWMUs Presumption of renewal to time-limited licences
Lichfield and Shenstone GWMU	Over Abstracted	Over Licensed	No water available for consumptive abstractions	Consideration under RSA Voluntary revocations and reductions encouraged Encouragement of efficient water use Presumption of renewal to time-limited licences

NOTES

* all will be subject to local considerations and other renewal criteria

HOF - Hands off Flow

This indicates that a number of the waterbodies within Cannock Chase District are under pressure with regards to water availability, with the Lichfield and Shenstone GWMU and Bourne/Black Brook being classified as currently 'over abstracted'. Only one waterbody is currently identified as having water available for use. This will undoubtedly affect agricultural practices in the region and, if tightened, may impact upon SSW's ability to extract the required volume of water resource. Where low flows are identified this may impact upon SSW's ability to gain adjusted discharge consent limits for the WwTWs that require expansion. This is an issue that will require further discussion with the Environment Agency and SSW once the potential development sites are confirmed. In addition, as shown in **Appendix C**, a number of sites of Environmental importance are affected by the watercourses listed above. These are investigated further within Section 6.5.

9.3.1 Water Supply

To assist in the analysis of potential development sites SSW have provided a spatial analysis of the capacity of their water supply network to accommodate the predicted level of growth for the key residential sites. Their comments are shown in **Table 9.4** and supplemented with the results of a face to face discussion held with SSW in January 2010.

Table 9.4 - SSW Comments Regarding Water Supply in Cannock Chase Council

ID Reference Number	Location	Capacity	Area	SSW Comment
SITE A (1)	Land north of A5/M6 Toll	88	2.1	All three sites analysed together. It is envisaged that new off-site water mains infrastructure/upgrades will be required. Requires approximately 330m of new 225mm water main to be laid (in highway) and rehabilitation of existing 6" water main with 160mm main (length approx. 370m).
SITE A (2)	Land north of A5/M6 Toll	520	25.71	
SITE B	Former Greyhound Stadium	168	5.4	
Former Power Station	Rugeley	1060	25	Not envisaged that off-site infrastructure upgrades/new will be required.
C104	Former Automotive Works, Bridgetown	267	12	Water mains infrastructure laid in 2009.
SITE E	Land east of Wimblebury Road	400	6.1	It is envisaged that off-site water mains infrastructure will be required. Requires approximately 500m of new 200mm diameter water main (in highway). It is also envisaged that Wimblebury booster station will also need to be refurbished/upgraded (including suction/delivery pipework, pump sets, motors, control gear and associated electrical and mechanical upgrades).
C37	Land at Green Heath Road	330	8	It is envisaged that off-site water mains infrastructure will be required. Requires approximately 1,500m of new 200mm diameter water main (in highway from existing mains and thro' site).
SITE G	Cannock Festival Stadium	350	4.85	Not envisaged that off-site mains infrastructure upgrades/new mains will be required.
SITE G	Land West of Pye Green Road	750	65.7	It is envisaged that off-site water mains infrastructure will be required. Requires approximately 1,200m of new 200mm diameter water main (in highway from existing mains and thro' site). May also require booster station refurbishment at Limepit Lane booster station (further analysis/investigations would be required to confirm this).

These comments have not provided any major "show stoppers" to development, although many of them do require some degree of infrastructural implementation or upgrade to enable development to proceed. Site G, in particular, has been identified by SSW as potentially being problematic with regards to the water supply network. They have, however, identified, during consultation, that any developments in Rugeley should not pose a problem with regards to the water supply network. However, a comment has been raised that if the power station was to come back on line at any point then water supply to the surrounding sites may be limited.

SSW will require receipt of the appropriate developer contributions to undertake all the necessary upgrades. This will require as much advance notice of final development

locations as possible to ensure the appropriate network adjustments are planned and undertaken in sufficient time.

9.3.2 Summary

SSW do not envisage water resources to be a problem with Cannock Chase District, although this will require review if a higher Scenario of growth or large commercial developments are incorporated. As such all the developments within the District have been classified as 'green' for water resources.

Although SSW are generally confident that water can be supplied to all areas of the District, some locations have been identified as potentially requiring more investment than others. The colour scheme for water supply has therefore been based upon the analysis carried out in **Table 9.4** above. For the general development areas, analysis has been based, as far as possible on the conclusions of **Table 9.4**, but where information is not available the sites have been classified as 'green', although marked with a ✪ to indicate further investigation may be required.

BOX 9.1

Cannock Chase District Water Resources and Supply: At a Glance…

- Sufficient supply for Scenario 1
- Insufficient resources to supply Scenarios 2 or 3. This would require additional consultation between Cannock Chase District Council and SSW, the rerunning of their WRMP models and potentially the inclusion of additional water supply.
- SSW can supply water to all developments, but some may require additional investment. No major upgrades have been identified, but sites A (1), A (2), B, E, C37 and G have been identified as requiring minor infrastructure upgrade. This will require discussion with SSW ahead of development taking place and in most cases funding will be required from developer contributions.
- Limited water availability from the surface and groundwater management units, especially within the currently Over Abstracted Bourne/Black Brook and the Lichfield and Shenstone GWMU, may impact current and future agricultural practices and small commercial developments. Developers promoting any development requiring the abstraction of water should consider the information contained within the CAMS reports and apply to the Environment Agency for the necessary licence. For agricultural purposes, there are efficient ways of managing this, such as storage of water through the winter months to provide summer irrigation.
- None of the development sites within Cannock Chase District have been identified by SSW as being limited by water resources or supply:

⇨ All the potential development sites within Cannock Chase District are classified as '**green**' with regards to water resources.

⇨ None of the potential development sites/areas within Cannock Chase District have been classified as '**red**'. Few problems are envisaged for Rugeley town but some of the sites surrounding Cannock town will require some upgrade to the water supply network.

- However, the Council needs to inform STWL as far in advance as possible of all potential development sites to enable the appropriate funding sources to be obtained and necessary network improvements to be planned and undertaken for the system as a whole

9.4 Wastewater Treatment and Collection

Please see Section 3.2 for more background information

All wastewater collection and treatment within Cannock Chase District is the responsibility of STWL.

9.4.1 Wastewater Treatment

Table 9.5 lists all the WwTWs that serve Cannock Chase District and indicates which of these are affected by the proposed potential development sites/areas. This is also shown graphically on **Figure 9.3**, with the WwTWs affected by development highlighted in red.

Table 9.5 - WwTWs within Cannock Chase District

WwTW	Affected by Proposed Development
BURNTWOOD	✓ Prospect Village and Cannock Wood
CANNOCK (STW)	✓ Cannock
GOSCOTE (STW)	✓ Cannock (East), Norton Canes
PENKRIDGE BANK (STW)	
RUGELEY (STW)	✓ Rugeley

As discussed in Section 3.2.4, STWL were consulted regarding the capacity of the WwTWs affected by the proposed development. Unfortunately, it was not feasible at this stage for STWL to undertake analysis of all the potential development areas within the District and their analysis has instead focussed upon the key residential and employment sites. For all other WwTWs further discussion will be required with STWL if development is progressed within the relevant development areas, namely Penkridge Bank WwTW (which serves a small area to the west of Rugeley).

Table 9.6 summarises the comments made by STWL with regards to the proposed development within Cannock Chase District. The 'Constraints to Expansion' refers to the physical and quality restrictions. The physical constraints refer to the space required to physically expand the WwTW buildings, whereas the quality constraints refer to the ability of the works to process additional effluent and still meet to the quality targets for the discharge (in many cases the treatment of additional effluent will require an increase in discharge consent from the Environment Agency). STWL's full response can be found in **Appendix F**.

Table 9.6 - Cannock Chase District WwTW Consent Data

Name	Consented DWF (m^3/d)	Current/Observed DWF (m^3/d)*	Headroom	Constraints to Expansion		Receiving Watercourse
				Physical	Quality	
Burntwood	7400	6479	Limited	No issue	No issue	Burntwood Brook
Cannock	17600	13474	Limited	No issue	No issue	Saredon Brook
Goscote	24900	22090	Limited	No issue	No issue	Rough Brook
Rugeley	6600	4719	Significant	No issue	No issue	River Trent

This assessment indicates that a number of the WwTWs assessed by STWL are reaching their consented discharge limits. However, from their assessment of the spare capacity at each of these work STWL has no concerns regarding their ability to increase the capacity to accommodate the proposed development, as outlined in **Table 9.6** above and **Table 9.7** below. However, this is reliant upon the Environment Agency granting the additional consents and the WwTWs retaining the required water quality targets (discussed further in Section 9.5).

Table 9.7 - Cannock Chase District Impact of Development upon WwTWs

WwTW	Affected Potential Development Sites/Areas	STWL Spare Capacity (dwellings)	Proposed dwellings within WwTW Catchment (residential sites)	Impact of Development
Burntwood	Prospect Village and Cannock Wood	23984	Not specified	None
Cannock	Cannock	Limited treatment capacity[1]	3150	Possible exceedence of treatment capacity
Goscote	Cannock (East), Norton Canes	73177	1276	None
Rugeley	Rugeley	4900	1900	None

NOTES

1 - Significant hydraulic capacity but potential restrictions on treatment capacity. However, STWL do not envisage any issues with dealing with future growth.

As a result of this assessment, the potential development sites/areas have been classified within **Appendix H** using the following criteria. Where no information is available for the WwTW no classification is given to indicate that further assessment will be required through consultation with STWL once the potential development sites are finalised.

Green	Sufficient headroom identified by STWL with no issues regarding further expansion *or* low overall risk identified by the Environment Agency
Amber	Sufficient headroom identified by STWL with issues regarding expansion *or* WwTWs identified as having limited or minimal headroom but with the potential to expand to accommodate growth / growth *and* headroom comparisons do not indicate a shortfall *or* medium overall risk identified by the Environment Agency
Red	Limited headroom with issues identified by STWL regarding expansion *or* Insufficient headroom *or* high overall risk identified by the Environment Agency.

9.4.2 Wastewater Collection

STWL has provided an assessment of the capacity of the wastewater infrastructure network to receive the additional flow from the proposed key residential and employment potential development sites. This full assessment is provided in **Appendix G**. This assessment has therefore been used to classify the proposed potential development sites in **Appendix H** using the criteria outlined below. This is shown graphically in **Figure 9.4**. The assessment of the development areas has taken place, where possible, based upon their proximity to the key sites. Where this has not been feasible the site classification has been left blank to indicate further consultation is required with STWL if development is pursued in that area.

Green	Low predicted impact on the sewerage infrastructure, in line with STWL's colour scheme (where this is subject to hydraulic modelling the site is marked with a '✪').
Amber	Medium or Low/Medium predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)
Red	Medium/High or High predicted impact on the sewerage infrastructure (in line with STWL's colour scheme)

BOX 9.2

Cannock Chase District Wastewater Collection and Treatment: At a Glance…

Wastewater Collection

- Additional hydraulic analysis is required for all the potential development sites with regards to the capacity of the network, with the exception of Site A (1), C37, G (large and small), Site 8, Site A (employment) and ELA032. This will be carried out by STWL once the sites and capacities are confirmed, either by the Council or by a developer.
- Some sites (Site A (1), C37, G (large and small), Site 8, Site A (employment) and ELA032) require moderate infrastructure improvements to increase capacity, either within the mains and/or in the pumping stations (see **Appendix H**). Developer contributions may be sought to fund these improvements.
- All sites will require individual review by STWL once they are progressed as part of the planning application process.
- It therefore may not be possible to develop a number of the sites in the short term.

Wastewater Treatment

- Although STWL do not foresee a problem in accommodating the proposed development nearly all of WwTWs require some form of expansion or additional analysis to accommodate the additional flow. At present STWL do not foresee a problem with improving these works but this will take time and investment and, as such, may cause a delay.
- None of the WwTWs have been identified as having no spare hydraulic capacity at present. However, a review of the data provided indicates that another, Cannock, may exceed its capacity if all the proposed development was progressed.
- Burntwood, Cannock and Goscote have been identified as having minimal water quality headroom at present, however STWL do not foresee any issue regarding the negotiation of a new consent with the Environment Agency.
- All development sites within the catchment of these WwTWs require further assessment with STWL, either by developers on a site specific basis or by the Council to assist in the formulation of their preferred options.

9.5 Water Quality and Environmental Issues

Please see Section 3.3 for more background information

As outlined in Section 3.3, this assessment is primarily based upon the watercourses which are affected by the discharge from WwTWs impacted by the proposed development. As discussed above it is anticipated that five WwTWs will be responsible for dealing with the associated discharges.

Table 9.8 identifies the WwTWs within Cannock Chase District that are affected by the proposed development, the watercourse into which they discharge and the distance from the discharge point of the WwTW to the nearest environmentally designated site (this has only been undertaken for the WwTWs affected by the key potential development sites). These watercourses will be reviewed in more detail within this section.

Table 9.8 - Watercourses and Designated Sites Affected by Development

STW	Receiving watercourse	Designated Site
Burntwood	Burntwood Brook	None on watercourse within 10km
Cannock	Saredon Brook	None on watercourse within 10km
Goscote	Rough Brook	None on watercourse within 10km
Penkridge Bank	**Stafford Brook**	**Cannock Chase SSSI and SAC (0km)** **Stafford Brook SSSI - 1.5km (approx)**
Rugeley	River Trent	None on watercourse within 10km

9.5.1 Water Quality

Table 9.9 and **Table 9.10** below identify the current biological and chemical water quality grades for the watercourses into which the identified Cannock Chase District WwTWs discharge. Red shading indicates poor or bad water quality. Green shading indicates good or very good water quality. The full key is shown below **Table 9.10**.

Table 9.9 - Chemical GQA Grades for Watercourses within Cannock Chase District

WwTW	Watercourse	Chemical Grades			
		1990	1995	2000	2006
Burntwood	Burntwood Brook	F	E	E	D
Cannock	Saredon Brook	F	C	C	C
Goscote	Rough Brook	U	C	C	B
Penkridge Bank	Stafford Brook	C (River Trent)	C (River Trent)	B (River Trent)	C (River Trent)
Rugeley	River Trent	C	C	B	C

Table 9.10 - Biological GQA Grades for Watercourses within Cannock Chase District

WwTW	Watercourse	Biological Grades			
		1990	1995	2000	2006
Burntwood	Burntwood Brook	U	E	D	E
Cannock	Saredon Brook	F	D	D	D
Goscote	Rough Brook	U	D	D	D
Penkridge Bank	Stafford Brook	D (River Trent)	C (River Trent)	D (River Trent)	C (River Trent)
Rugeley	River Trent	D	C	D	C

Water Quality Key		
A	Very Good	The quality is similar to (or better than) that expected for an average, unpolluted river of this size, type and location.
B	Good	The quality shows minor differences from Grade 'a' and falls a little short of that expected for an unpolluted river of this size, type and location.
C	Fairly Good	The quality is worse than that expected for an unpolluted river of this size, type and location.
D	Fair	The quality shows considerable differences from that expected for an unpolluted river of this size, type and location.
E	Poor	The quality is much worse than expected for an unpolluted river of this size.
F	Bad	The quality is so bad that, in terms of biology, there may be little or no life present in the river.
U	No Result	Not monitored/measurement has not been recorded.

This indicates that although most of the watercourses have been improving in term of chemical quality, most are still fairly low and, in terms of Biological water quality, all are fairly poor. Of particular concern is the Burntwood WwTW. For the larger potential development sites these quality scores may be significant in restricting the ability of the WwTWs to receive additional flow. As it is unlikely that the Environment Agency will grant additional consent they may be restricted in their ability expand their capacity for the proposed development until their water quality issues are improved.

To further investigate the potential restrictions upon expansion for each of the WwTWs with regards to the WFD we have reviewed their Protected Area Descriptions published in the RBMP, alongside the current ecological status of the watercourse. These are summarised in **Table 9.11** and shown graphically on **Figure 9.5**.

Table 9.11 - RBMP Summary for Cannock Chase District

Watercourse	WwTW	Ecological Status	Freshwater Fish Directive	Nitrates Directive	Urban Wastewater Treatment Directive
Burntwood Brook	Burntwood	Moderate	✓	✓	
Stafford Brook	Penkridge Bank	Not Reviewed (see River Trent below)			
River Trent	Rugeley (Penkridge Bank)	Poor Moderate upstream	✓	✓	✓
Rough Brook	Goscote	Not Reviewed			
Saredon Brook	Cannock	Moderate	✓	✓	

For the WwTWs located on watercourses with poor or moderate ecological status or where a protected designation has been specified, the Environment Agency will place tighter discharge quality consents on the watercourses and, as a result, may not increase the discharge consents as requested by STWL without additional processing of the effluent or, in the worse cases, not at all. It is therefore recommended that the Council discusses the potential restrictions in further detail with both the Environment Agency and STWL before progressing development within these WwTW catchments.

9.5.2 Environmental Issues

Many aspects of development impact upon environmentally significant sites, including:

- Abstraction from the watercourses (reducing the water supply to the environmental site);
- Wastewater discharge (decreasing the quality of the water); and
- Pollution from surface runoff.

The first two of these aspects will be discussed in more detail below. The third will be discussed in more detail within Section 9.6.

Water Supply

As identified in **Appendix C**, the following environmentally significant sites are affected by the WRMUs or GWMUs located within Cannock Chase District:

- Baswich Meadows (SSSI)
- Belvide Reservoir (SSSI)
- Biddulph's Pool & No Man's Bank (SSSI)
- Bracken Hurst (SSSI)
- Burntood Pools AMP
- Cannock Chase (SSSI and SAC)
- Cannock Extension Canal (SSSI, SAC)
- Chasewater Heaths (SSSI)
- Cop Mere (SSSI, RAMSAR)
- Doxey and Tillington Marshes (SSSI)
- Maer Pool (SSSI)
- Mottey Meadows (SSSI and SAC)
- Pasturefields Saltmarsh (SSSI and SAC)
- Rawbones Meadow (SSSI)
- Stafford Brook (SSSI)
- Stowe Pool and Walk Mill Clay Pitts (SSSI)
- Sutton Park (SSSI)
- Wetley Moor (SSSI)

All these sites are dependent upon receiving a sufficient quantity of water in order to survive. In order to protect these sites, and the species living within them, it is essential that all abstraction within the District is undertaken within the Environment Agency consent limits stated within the CAMS reports and that the targets set for 2016/2019 are reached. This should not impact the key potential development sites but may cause potential problems for smaller commercial development or agriculture.

Wastewater

The key environmental site affected by the discharge from WwTWs is Cannock Chase SAC/SSSI, as highlighted in **Table 9.8** above. An overview description of this site is given below:

Cannock Chase Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI)
Cannock Chase is a large, diverse area of semi-natural vegetation. It comprises lowland heathland, valley mire/wet heath and dry oak-birch woodlands. There are also small areas of stream valley systems and natural and artificial pools and damp depressions. The plant communities present are rare and are some of the most floristically-rich and representative examples of their type in central England. The area is primarily designated as a SAC due to the presence of dry heaths and wet heaths with cross-leaved heather *Erica tetralix*.

The wetland community on the site contains several plants which are considered rare in the county and/or nationally uncommon. These include marsh fern *Thelypteris thelypteroides*, round-leaved sundew *Drosera rotundifolia*, and bog asphodel *Narthecium ossifragum*.

The diverse invertebrate fauna includes many species which are only found in certain areas of the country but are still considered to be of national occurrence. Moth species include notable heathland and mires species such as the small pearl-bordered fritillary

Boloria selene and the grass wave *Perconia strigillaria*, as well as woodland species such as the angle-striped sallow *Enargia paleacea*, and alder kitten *Furcula bicuspis*. This is also the only place in the county where bog bush-cricket *Metrioptera brachyptera* occurs. The large size and mixed vegetation of Cannock Chase also supports a wide range of mammal and bird species including red squirrel *Sciurus vulgaris* and a nationally significant population of nightjar *Caprimulgus europaeus*.

Cannock Chase overlies coal measures which have been deep-mined. Mining fissures continue to appear across the site even though mining has ceased and this is thought to detrimentally affect site hydrology. The underlying Sherwood Sandstone is a major aquifer, with water abstracted for public and industrial uses; the effects of this on the wetland features of the Chase are not fully understood.

9.5.3 Summary

There are a large number of Environmentally significant sites located within and around Cannock Chase District and all, in some form, are at risk of degradation due to development. It is therefore important that the Council undertakes the appropriate environmental surveys, such as Appropriate Assessments and Sustainability Appraisals, before they decide on the final sites they wish to bring forward for development. This assessment has briefly reviewed the potential impact increased water abstraction or wastewater treatment may have upon the most significant of these sites. It has concluded that measures will be required to minimise this impact and to follow the Environment Agency's guidelines and regulations.

A simple scoring system has been used to assign a colour code to each of the potential development sites to summarise the conclusions of the water quality and environmental analysis as follows:

Table 9.12 - Water Quality and Environmental Analysis Scoring System

RBMP Ecological Status	2006 GQA (if RBMP not available)*	Directives in RBMP	Environmental Sites downstream of WwTWs	Overall Classification
High = 0	A/B = 0	1 point per Directive	1 point if present	0 points = Green
Moderate = 1	C/D = 1			1-3 points = Amber
Poor = 2	E/F = 2			4-6 points = Red

* the worst score out of the Chemical or Biological is used

Green	Development not predicted to impact water quality and/or Environment Sites
Amber	Some predicted impact to impact water quality and/or Environment Sites from development. Mitigation may be required.
Red	Significant predicted impact to impact water quality and/or Environment Sites from development. Mitigation will be required.

The overall classifications are presented in the Constraints Matrix in **Appendix H**.

BOX 9.3

Cannock Chase District Water Quality: At a Glance

- Within the District, the Burntwood Brook has been identified as currently having low water quality, based upon the 2006 assessment.
- The River Trent has been identified as having 'poor' ecological status in the RBMP and the Burntwood Brook and Saredon Brook as having 'moderate' ecological status.
- Potential developments within the catchments of these watercourses may be impacted by abstraction and wastewater treatment limitations and should be discussed with STWL and the Environment Agency, either by the Council at options appraisal or by the developers at planning application stage.
- WwTWs identified as requiring additional capacity and being located on, or upstream, of a watercourse identified as having a poor water quality at present or being vulnerable to the impact of new development may struggle to obtain the required increases in consent from the Environment Agency. This does not appear to be of particular concern to Cannock Chase District, unless the proposed development target increases significantly.

9.6 Flood Risk

Please see Section 3.4 for more background information

A Level 1 SFRA has already been undertaken for Cannock Chase District, a Level 2 SFRA has been undertaken for Rugeley town centre and a Phase 1 SWMP undertaken alongside this study. This WCS therefore utilises much of the data and conclusions from those reports. 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 9.14** 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.

9.6.1 Fluvial Flood Risk

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. 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.

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 3.11**. 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.

9.6.2 Surface Water Flooding

An assessment of surface water flood risk to the potential development sites has been obtained from the Phase 1 SWMP being undertaken alongside this WCS. This has accounted for historic flooding occurrences and the potential for future surface water flooding (roughly inferred from the Environment Agency's surface water flood map). It has also accounted for the risk of flooding from the sewer network. More information regarding the analysis process can be obtained from the Phase 1 SWMP.

As a result of this risk of surface water flooding, a policy for the adoption should be included within all new development proposals. This is investigated further within Section 7.7.

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

9.6.3 Groundwater

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 (as shown in **Figure 9.7**). 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.

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

9.6.4 Canals

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.

9.6.5 Reservoirs

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 25,000m³), namely Mill Green Balancing pond[45]. This was constructed to attenuate storm flows relieve downstream flooding in Cannock.

A breach of this waterbody may pose a flood risk to any existing or proposed potential development site located downstream. However flood risk from reservoirs is moderately 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, although the Council may wish to review this if any additional information regarding particular waterbodies is obtained at a later date.

[45] NB following the enactment of the new Floods and Water Management Bill on 8th April 2010, the Reservoirs Act has been extended to include impounded waters with a volume in excess of 10,000m³. 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.

9.6.6 Summary

The flood risk to the proposed potential development sites/areas is summarised in **Table 9.14** below. Where sites have been identified as being located within the Flood Zones, 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. These findings will be updated once the Phase 2 SWMP is completed and further guidance regarding appropriate mitigation measures is provided within Section 9.6.

The colour coding for 'surface water' has been taken from the parallel SWMP assessment. The 'overall' classification has been determined using the following methodology:

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'. The surface water classification is provided as shown and the two are combined using the standard matrix shown in **Table 9.13** to provide the 'overall' classification. However, there are two anomalies to this method:

1. When a site is located within Flood Zone 3 but only assigned a 'green' grade with regards to surface water flood risk, it is still shown as having a 'red' overall classification. This highlights the importance of development restraint within Flood Zone 3 as specified within PPS25. These sites are marked with an asterisk.
2. When a site is not located within Flood Zone 3 but is identified as being within the extent of Flood Zone 3a with climate change, it is treated within this analysis as if it is located within Flood Zone 3 to provide conservative conclusions.

Table 9.13 - Traffic Light Colour Code Matrix

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

Table 9.14 - Flood Risk to Potential Development Sites

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						G	G
SITE A						G	G
SITE B						A	A
Former Power Station						A	A
C104						A	A
SITE E						G	G
C37						A	A
SITE G (large)						G	G
SITE G (small)						A	A
SITE C		Y			Y	A	R
SITE F						G	G
ELA 61						A	A
ELA 80						A	A
ELA 081						A	A
ELA 056		Y			Y	A	R
ELA 055						A	A
ELA 021						A	A
ELA 036						G	G
ELA 079						G	G
Site 8	Y	Y		Y	Y	A	R
SITE C EXPANSION						G	G
SITE A						A	A
ELA024						A	A
ELA059						A	A
ELA029	Y			Y		A	R
ELA067	Y	Y		Y	Y	G	R
ELA032		Y			Y	G	A*
ELA082						G	G
ELA027		Y			Y	A	R
Cannock (in and around)	Partially					R	R
Norton Canes						R	A
Prospect Village and Cannock Wood						A	A
Rugeley (in and around)	Y	Y	Y	Y	Y	R	R

BOX 9.4

Cannock Chase District Flood Risk: At a Glance

- A number of potential development sites are located within the 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.
- 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.
- Fluvial flooding is a significant constraint to development within the town of Rugeley and should be reviewed for all developments sites in the town.
- Surface water flooding has been identified as being prominent with Cannock, Norton Canes and Rugeley. Cannock has been recommended within the Phase 1 SWMP for inclusion within a Phase 2 SWMP.
- 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.
- Overall Cannock and Rugeley have been identified as being the settlements most at risk from flooding. Six individual potential development sites have been classified as 'red' in terms of flood risk (Site C, ELA 056, Site 8, ELA029, ELA067 and ELA027).
- 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 flood risk within the District.

9.7 Demand Management

Please see Section 4 for more background information

General guidance regarding demand management that is applicable over the whole of Cannock Chase District is presented in Section 4. Many of the factors and, in particular, the suitability of SUDS techniques are dependent upon site specific characteristics. In many cases these will have to be investigated in site specific analysis when the sites are brought forward for development. However, two aspects can be strategically assessed within this study which should provide the Council with an overview of the general restrictions, and therefore costs, associated within the implementation of SUDS over the District. The two aspects are Groundwater Vulnerability and the location of Source Protections Zones (SPZ).

Datasets for both these elements have been obtained from the Environment Agency and are shown on **Figure 9.7** and **Figure 9.8**. As explained in Section 4.3, the higher the groundwater vulnerability, the greater the restriction upon the type of SUDS that can be implemented on the potential development site. Similarly the closer a site is to the

centre of SPZ, the greater the restriction, as explained in more detail within Section 4. The affect of these upon the individual potential development sites is summarised in **Table 9.15**.

Table 9.15 - Restrictions upon the Use of SUDS within Cannock Chase District

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
SITE A	N/A	N/A	Minor	G
SITE A	N/A	N/A	Minor	G
SITE B	N/A	N/A	Minor	G
Former Power Station	N/A	Y	Major	A
C104	N/A	N/A	Minor	G
SITE E	N/A	N/A	Minor	G
C37	N/A	N/A	Major and Minor	A
SITE G	N/A	N/A	Major	A
SITE G	N/A	N/A	Major	A
General	N/A	N/A	N/A	G
SITE C	N/A	N/A	Minor	G
SITE F	N/A	N/A	Minor	G
ELA 61	N/A	N/A	Minor	G
ELA 80	N/A	N/A	Minor	G
ELA 081	N/A	N/A	Major	A
ELA 056	N/A	N/A	Minor	G
ELA 055	N/A	N/A	Minor	G
ELA 021	N/A	N/A	Major	A
ELA 036	N/A	N/A	Major	A
ELA 079	N/A	N/A	Major	A
Site 8	N/A	N/A	Major	A
SITE C EXPANSION	N/A	N/A	Minor	G
SITE A	N/A	N/A	Minor	G
ELA024	N/A	N/A	Minor	G
ELA059	N/A	N/A	Minor	G
ELA029	N/A	N/A	Major	A
ELA067	N/A	N/A	Major	A
ELA032	N/A	N/A	Minor	G
ELA082	N/A	N/A	Minor	G
ELA027	N/A	N/A	Minor	G
Cannock (in and around)	N/A	Y (north)	Major and Minor	A
Norton Canes	N/A	N/A	Minor	G
Prospect Village and Cannock Wood	N/A	Marginal	Minor	A

Potential Development Site	Source Protection Zones		Ground Water Vulnerability	Overall
	Inner Catchment	Total Catchment		
Rugeley (in and around)	Y (northwest)	Y	Major	R

NOTES

* Overall classification has been given using the following system:

Red - Located over an Inner SPZ

Amber - Located within the Total SPZ and any GWV class *or* just located within Major GWV area

Green - Not located within GWV area or over SPZ *or* just located within Minor GWV area.

9.7.1 Summary

Very few restrictions are highlighted for the use of SUDS within the District, with only one settlement classified as having a major constraint (i.e. marked in red). Even for sites within this area appropriate SUDS techniques are available, but they must take into account the vulnerability of the underlying substrata as outlined within this section and discussed further in Section 4.

BOX 9.5

Cannock Chase District SUDS: At a Glance

- A number of potential development sites/settlements are affected by SPZs and/or GWV (see **Table 9.15** above). Sites C37, G, ELA 081, ELA 021, ELA036, ELA079, 8, ELA029, ELA067 and the Former Power Station are located within a major GWV area. No sites are located within an Inner SPZ, although parts of Rugeley are affected by one.
- Site specific investigation will be required for new development allocations within the settlements identified as being within a SPZ and/or GWV area, most notably those within Rugeley, which are likely to have the most severe restrictions upon the use of SUDS. This will require a site specific review to be carried out by the developers.

9.8 Constraints Matrix

The constraints matrix presented in **Appendix H** summarises all the conclusions from this section on a site by site basis. It identifies the site reference, purpose, proposed number of dwellings at the time of writing, the water supply company, wastewater treatment works and the colour coded classification for each of the areas of water resources, water supply, wastewater collection, wastewater treatment, water quality, flood risk and SUDS. The table utilises the colour codes introduced at the start of this section as follows:

Green	Little or no infrastructure upgrade required
Amber	Minor infrastructure upgrade required
Red	Major infrastructure upgrade required

No major "show stoppers" have been identified, although a number of sites have more than one element that requires investment to enable development to take place. For a number of the restrictions, the responsibility lies with the developer and/or water company to secure the appropriate funding. However, the Council should be aware that these issues may result in time delays for site development and should therefore consider them within their Core Strategy.

9.9 Recommendations

9.9.1 LDF Policies and Development Control Policies

Due to the close proximity and similar characteristics of all the Districts and Boroughs within the Study Area, there are a number of common recommended policies. These are outlined in Section 10.1 at the end of this report. The policy recommendations specific to this District are included here. It must be noted that all the recommendations and conclusions presented in this report are based upon the most recent data and information, as presented in this report, and may be superseded at a later date.

Water Supply

- The water supply infrastructure will require review on a site by site basis ahead of any development, especially for sites A (1), A (2), B, E, C37 and G , which have been identified as requiring an upgrade. Consultation should be held with SSW as soon as possible to ensure the appropriate infrastructure is in place with sufficient time. This is required from the Council at options development stage and by the developers at site progression.
- SSW have highlighted that if the power station in Rugeley was to come back on line there would be restrictions in the water supply to the surrounding sites. This should be accounted for in the development plans.

Water Resources

- Limited headroom in Cannock WwTW means any development, at any scale, planned to utilise these works should be reviewed with STWL, although they do not regard this as a barrier to development. Further consultation should be sought with STWL before development is progressed, either by the Council to assist with their options assessment or by developers as the sites are progressed

Wastewater Infrastructure

- Consultation must be held with STWL ahead of the progression of any potential development sites to ensure the appropriate wastewater infrastructure is in place with sufficient time, either by the Council on a strategic scale or by the developer on a site specific scale.

Wastewater Treatment

- Any development within the catchment of Penkridge Bank WwTW must account for the impact upon environmentally sensitive sites. This must be investigated on a site specific basis by the developer, through consultation with STWL and the Environment Agency.

Water Quality and Environment

- It is recommended the Council implements policies to improve the water quality within many of the watercourses within the District, but most notably the Burntwood Brook, Saredon Brook and the River Trent (which may impact upon the development proposed in Rugeley). This should be reviewed before development takes place in those catchments. Such policies may include improving the discharge from the WwTW or decreasing pollution.
- Due the number of environmentally significant sites within the Study Area, policies must be emplaced to ensure that development does not have an adverse impact on any of these areas. This should be undertaken by the developer at planning application stage.

SUDS

- Due to the adoption of the Floods and Water Management Act, STWL is no longer required to accept surface water runoff from new development sites. As such, all planning applications must include a suitable SUDS scheme. This will be submitted by the developer and reviewed by the relevant SUDS approval board (SAB) within Staffordshire County Council. As far as possible the Council should investigate the retrofitting of SUDS into existing developments.

Flood Risk

- Individual FRAs are required for a number of sites (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, Norton Canes and Rugeley.
- Further assessment within a Phase 2 SWMP for the settlement of Cannock, but also covering Norton Canes is recommended, procured by the Council.

10 CONCLUSIONS

This report has summarised the potential restrictions for the location of new development based upon the information available for the following seven areas:

- Water Resources
- Water Supply
- Wastewater Collection
- Wastewater Treatment
- Water Quality and Environment
- Flood Risk
- Demand Management

These have been classified using a traffic light colour coding system and presented in the form of a constraints matrix for each Local Authority in **Appendix H**. The aim of this matrix is to provide each Council with a quick comparative illustration of the potential development sites provided for analysis and also give an overview of the District/Borough as a whole. As the colour code indicates the level of infrastructure improvement or implementation to enable development at each location, it provides a high level cost and time comparison for delivery. Although detailed cost and time implications cannot be provided for such a large scale analysis (which requires detailed discussion with the relevant service providers on a site by site basis), generally the sites highlighted in yellow will require higher cost and time investment than those highlighted in green, and similarly for the red compared to the yellow. If required by the Council, targeted sites can be taken forward to a 'Phase 3: Detailed' WCS which will provide more accurate time and cost scales.

It is recommended that this study is reviewed once the final WRMPs (STWL) and WMRSS figures are published and if any other strategic studies are carried out (for example Level 2 SFRAs and the Phase 2 SWMP). In addition, a review should be carried out once the Water Framework Directive Programme of Measures has been published as they may require a reduction in abstraction, resulting in a higher demand for mains water. If possible, it is also recommended that additional models of the ordinary watercourses, sewer networks and water supply systems are carried out to increase the accuracy of the results, perhaps through commission of a Phase 3 Detailed WCS. This will allow finalisation of the constraints matrix and inclusion of accurate high level costings, which may create greater divides between the potential development sites than could be presented here. For many of the sites, however, this will still provide a 'broad-scale' analysis and viability of development may not be concluded upon within detailed site-specific FRAs and infrastructure upgrade analyses.

10.1 Recommendations

This WCS provides information regarding all elements of the Water Cycle to support appropriate land use allocations within each Local Authority area. The site allocations within the Local Development Framework should reflect the Council's strategic planning policies and should address all the issues and limitations regarding water supply, wastewater treatment and flood risk identified within this report.

Due to the number of similarities between the Local Authority areas, there are a number of common recommendations for the Councils' LDF and Development Control Policies. Rather than repeating these recommendations throughout the report they have been summarised here. Any specific recommendations for each Local Authority area have been addressed within the relevant Section above.

Suggested local policies for the LDF and Development Control policies relating to the finding of this WCS are as follows. However, it must be noted that all the recommendations and conclusions presented in this report are based upon the most recent data and information, as presented in this report, and may be superseded at a later date.

Strategic Approach

- Location and phasing of development should ensure that infrastructure is provided in the right place and at the right time;
- Consideration must be given to the actions of the Local Authorities both upstream and downstream of the District or Borough to ensure a strategic approach is adopted for a catchment, supply or treatment area as a whole;
- The location of potential development sites should be allocated according to the capacity of the wastewater network, water supply network and the guidance set out in PPS25, as identified in this WCS and the Level 1 SFRAs;
- It should be assured that the development of any new site does not detrimentally impact any existing development in terms of wastewater disposal, water supply or flood risk;
- Ample lead times must be provided for the new and updated infrastructure required by new development. As such, continued close two way communication with Severn Trent Water and South Staffordshire Water is necessary to ensure the delivery of infrastructure to facilitate the new development without causing environmental deterioration;
- As far as possible Brownfield land should be chosen for development above Greenfield land, where it is appropriate and practical in terms of water supply, wastewater treatment and flood risk; and
- Communication is key to the success of sustainable development and must be maintained between all members of the Steering group beyond completion of this WCS.

Water Resources and Supply

- Water efficiency measures should be installed within all new developments to reduce water usage (this will include the installation of water meters); and
- The water companies should be informed with as much notice as possible regarding the locations and scale of proposed development. This is particularly important with regards to proposals above the current RSS Phase 2 allocations and for any commercial developments.

Flood Risk

- When reviewing the results of flood risk this WCS should be reviewed alongside the SFRA and SWMP and updated with any further stages of these studies;
- The suggested recommendations and policies in the SFRA, with regards to flood risk, should be noted;

- 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. Further information and policies regarding flood risk are provided in the Level 1 SFRAs;
- FRAs should be undertaken where identified as necessary within this WCS or the Level 1 SFRA and Phase 1 SWMP; and
- Further assessment of surface water flooding within the key settlements of Cannock, Stafford, Tamworth, Penkridge and Lichfield as part of a Phase 2 SWMP.

Wastewater Collection and Treatment

- No new development should be connected to the surface water sewer network. SUDS and onsite surface water mitigation need implementing with the development through developer contributions as there is no capacity in the surface water sewer network;
- Where the sewerage network is identified as already operating at capacity, measures should be implemented to reduce the surface water discharge through the retrofitting of existing developments;
- On site attenuation must be applied to all sites currently draining to combined sewers or where there are plans to separate out to surface water drainage.
- Where Brownfield sites currently discharge to combined sewers and there is an aspiration to discharge surface water to the watercourse the runoff rates of new development must be less than the current Brownfield rate, regardless of the current capacity of the watercourse.
- Until upgrade or improvement works are carried out no development should take place in areas served by WwTWs or sewer networks that have been identified as currently operating at, or above, current capacity;
- In line with the objectives of the WFD, no development should take place within the catchments of WwTWs that are currently exceeding their discharge consents until the discharge issues are resolved; and
- As STWL and SSW are key in the provision of wastewater infrastructure the certainty of delivery times of any STWL and SSW schemes must be monitored to ensure that it is in parallel with development.

Water Quality and Environmental Issues

- The development of any new site should not have a negative impact on water quality, either directly through pollution of surface or ground water or indirectly through overloading of WwTWs;
- In line with the objectives of the WFD, development must not result in any waterbody failing to meet the class limits for the status class declared in the final River Severn and Humber RBMPs; and
- Further site specific analysis of the potential development site located in proximity or upstream of SSSIs may be required before development commences.

Demand Management

- Policies should be included that ensure all new homes are built to the appropriate water efficient standard and the Council should ensure the Water

Company keeps them updated on progress with their water efficiency measures and programmed schedule of works;

- More stringent targets for demand management than Level 3 of the Code for Sustainable Homes should be investigated and adopted wherever feasible. This means that promotion of water reuse is required in all new developments as far as possible;
- All new development should adopt appropriate SUDS, grey water recycling and/or rainwater harvesting methods as appropriate to deal with the surface water runoff produced on that site. Due to the nature of the study area every new development will require the inclusion of SUDS and some will require the collected surface water to be disposed of on site, using a non-infiltration method;
- There is the potential to utilise the canal network for the conveyance of surface water flows in areas where no viable SUDS options are identified. This will, however, require discussion and approval by British Waterways. Due to the requirement of the Floods and Water Management Act for stakeholders to work closely together to reduce surface water flood risk, subject to dealing with issues of water quality, flow rate and network improvement to accommodate additional flows, it would be expected that BW be more receptive to receiving discharge from new development adjacent to the canal network. In the case of the private restorations being undertaken by the Lichfield and Hatherton Canals Trust, they would be very willing to receive flows subject to similar license arrangements provided by British Waterways. This is particularly the case with the Lichfield Canal, which is being restored from Huddlesford junction upstream to Ogley junction. Until this canal is complete and receiving flow from Chase Water there will be temporary issues with water supply to overcome.
- All necessary measures should be adopted to reduce water supply demand and through efficiency measures, both in new developments and through retrofitting of old development;
- Formal submission to the appropriate water company will be required for any new development, outlining the water usage requirements for the site;
- Ensure the policies of the Core Strategy and associated LDF Documents are designed to achieve the recommended high level of implementation of demand management techniques in a manner which allows this to be achievable and enforceable.

<u>Further Assessment</u>

- The Environment Agency would expect an Infrastructure Delivery Plan to demonstrate the Councils' development strategy for the District/Borough;
- The investigation of some cost estimations would be useful for the Core Strategy and Site Allocations DPD. These costs would come from a Phase 3 WCS for specific areas;
- This WCS should be updated with any further assessments of any elements of the water cycle, such as Level 2 SFRAs and Phase 2 SWMPs.
- Recently, there has been a decline in house-building, with little sign of recovery. If the current trend continues, or, as a result of changes in Government policy, then the supply demand balances predicted by the water companies will also change. The next WRMPs are due for submission in 4 years time, with work commencing in 3 years. This WCS will therefore require review in 5 years to reflect the latest assessment.

Appendix A
Figures

Appendix B
Data Register

Appendix C
CAMS Summary

Appendix D
STWL Generic Response to WCSs

Appendix E
SUDS Guidance

Appendix F
STWL Site Specific Wastewater Treatment Analysis

Appendix G
STWL Site Specific Wastewater Infrasatructure Analysis

Appendix H
Constraints Matrix

Appendix I
Comments on Draft WCS Report and Responses