**Water Cycle Study 2012 extracts.**

**1.4 WCS Update Scope**

This WCS update provides information at a level suitable to ensure that there are solutions to deliver growth for the preferred development allocations, including the policy required to deliver it.

The outcome is the development of a water cycle strategy for the district which informs site specific and other DPDs of the water environment and WSI issues. This will need to be considered in bringing growth forward at various sites, including guidance for developers in conforming to the requirements of the strategy.

The following sets out the key objectives of the WCS update for Stratford-on-Avon District Council:

• determine if solutions to wastewater treatment for each growth Local Service Village are required and how this might impact phasing of development within (and around) each village;

• determine whether any Habitats Directive designated ecological sites have the potential to be impacted by the wastewater treatment strategy via a screening process;

• determine whether additional water resources are required to support growth;

• determine upgrades required to water supply infrastructure relative to potential options for growth;

• consider whether growth can be delivered and achieve a ‘neutral water use’ condition. Provide a pathway to achievement of water neutrality;

• provide detail on SuDS constraints for the villages

• determine impact of infrastructure and mitigation provision on housing delivery phasing; and

• provide policy recommendations.

**1.6 Water Use – Key Assumption**

For all wastewater and water supply assessments, an assumption was made on the likely use per new household going forward in the plan period. It was agreed with STW that a starting assumption of 150l/h/d would be used to calculate wastewater generation and water use per person.

**2.1 Preferred Growth Strategy**

The purpose of the Water Cycle Study update is to assess the potential impact of a revised wider dispersal of proposed development upon Stratford-on-Avon District’s water environment and WSI, including flood risk, surface water drainage, water resources, wastewater infrastructure and water quality and ecological issues. Stratford-on-Avon District Council’s revised spatial approach of future expected development will focus more development in the 39 Local Service Villages and smaller villages within the District up to 2028. These figures form the basis for the WCS.

The focus of this study is on wastewater treatment infrastructure and the impact of wastewater treatment on water quality and ecology within the District and more widely. This is because a more dispersed spatial pattern of growth affects more Wastewater Treatment Works (WwTW) and because many of the WwTWs serving the District discharge into smaller watercourses with less dilution capacity near the headstreams of the rivers.

**3.1.3 W F D Compliance**

The WFD is the most significant piece of water legislation since the creation of the EU. The overall requirement of the directive is that all waterbodies in the UK must achieve “Good Status”. The definition of a waterbody’s ‘status’ is a complex assessment that combines standards for water quality with standards for water availability, hydromorphology (i.e. habitat and flow quality) with ecological requirements.

The two key aspects of the WFD relevant to the wastewater assessment in this WCS are the policy requirements that:

• development must not cause a deterioration in status of a waterbody 4; and

• development must not prevent future attainment of ‘good status’, hence it is not acceptable to allow an impact to occur just because other impacts are causing the status of a water body to already be less than good.

Where consented headroom at a WwTW would be exceeded by proposed levels of growth, a water quality modelling assessment has been undertaken to determine the quality conditions that would need to be applied to the new consent to ensure the two policy requirements of the WFD are met. The modelling process (assumptions and modelling tools) is described in detail in Appendix 2.

**3.1.6 R A G Assessment Over vi ew**

The results for each WwTW are presented in a Red/Amber/Green (RAG) Assessment for ease of planning reference. The RAG code refers broadly to the following categories and the process is set out in Figure 3-1.

• Green – water quality will not be adversely affected. Growth can be accepted with no changes to the WwTW infrastructure or consent required.

• Amber – in order to protect water quality changes to the discharge consent are required, and upgrades may be required to WwTW infrastructure which may have phasing implications;

• Red - in order to protect water quality changes to the discharge consent are required which are beyond the limits of what can be achieved with conventional treatment. An alternative solution needs to be sought.

**3.3.3 Ecological opportunities associated with Local Service Villages**

All developments at Local Service Villages would have potential for the enhancement of ecological value through new SuDS opportunities linked to the new development. These could provide habitat for Warwickshire BAP species and habitats such as fen, marsh and swamp, great crested newt or water vole. In addition, the following Local Service Villages are close to existing watercourses and may therefore present opportunities for more specific riverine habitat improvements associated with development, such as the creation of an improved river profile and improved backwaters/meanders:

• Earlswood;

• Great Alne;

• Welford-on-Avon;

• Clifford Chambers;

• Newbold-on-Stour;

• Halford;

• Tredington;

• Alveston;

• Gaydon;

• Wootton Wawen;

• Wilmcote;

• Snitterfield; and,

• Long Itchington.

**4.3 Demand for Water**

Likely increases in demand in the study area have been calculated using six different water demand projections based on different rates of water use for new homes that could be implemented through potential future policy.

The projections were derived as follows:

• Projection 1 – Baseline Assumption – New homes would use 150 l/h/d 34 , this reflects the planning consumption used by STW and TW to maintain security of supply;

• Projection 2 – Building Regulations – New homes would conform to (and not use more than Part G of the Building Regulations requirement (in force as of the 6 th April 2010) of 125 l/h/d (equivalent to the Code for Sustainable Homes (CfSH) Level 1/2 rating of 120 l/h/d plus 5 l/h/d for outdoor use);

• Projection 3 – Code for Sustainable Homes Levels 1 & 2 – New homes would achieve CfSH Level 1/2 rating of 120 l/h/d;

• Projection 4 – Code for Sustainable Homes Levels 3 & 4 – New homes would achieve CfSH Level 3/4 rating of 105 l/h/d;

• Projection 5 – Code for Sustainable Homes Levels 5 & 6 – New homes would achieve CfSH Level 5/6 rating of 80 l/h/d; and,

• Projection 6 – Very High Efficiency – New homes would include both greywater recycling and rainwater harvesting reducing water use to a minimum of 62 l/h/d.

**Appendix 2 Modelling assumptions and input data**

Several key assumptions have been used in the water quality and consent modelling as follows:

• the wastewater generation per new household is based on an assumed Occupancy Rate (OR) of 2.1 people per house and an average consumption of 150 l/h/d (as set out in Section 1.6). The 150l/h/d figure makes an allowance for commercial use and use in schools and hospitals etc considered to represent increases in non-domestic use across the study area;

• WwTW current flows were taken as the current consented dry weather flow (DWF). Future 2028 flows were calculated by adding the volume of additional wastewater generated by new dwellings (using an OR of 2.1, a consumption value of 150l/h/d and allowance for an increase in infiltration) to the current consented DWF value;

• WwTW current discharge quality was taken as the current consented limits for each water quality element. Where an element did not have a consented limit, Ammonia was modelled as 10 mg/l and Phosphate as 4mg/l based on common consented limits in other locations. Figures for the mean and standard deviation of each element were calculated based on these consent levels using RQP 2.5 (discussed further below).

• River flow data for the RQP modelling has been provided by the Environment Agency based on outputs from the Low Flow Enterprise (LFE) model – data was provided as mean flow and Q95 63 . The receiving watercourse that had the WFD status was used to determine the location to extract the river flow data as there was a lack of monitoring data.

• The WFD 'no deterioration' targets for each WwTW are the downstream status, for each water quality element. The published status from the RBMP was used for this as consistent river monitoring data was not available for all the sites in the study area. Details are provided below along with the full results and outputs from the water quality modelling in Tables A2.1 and A2.2.

• For the purposes of this study, the limits of conventionally applied treatment processes are considered to be:

• 5mg/l for BOD;

• 1mg/l for Ammoniacal-N; and

• 1mg/l for Phosphate.