Shropshire Outline Water Cycle Study

Executive Summary

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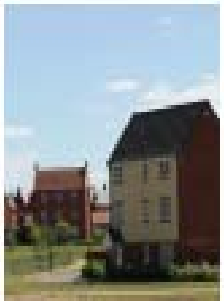


Sustaining & Improving the Quality of People's Lives

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Revision schedule

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1 Executive summary

The Panel Report following the Phase 2 examination of the Regional Spatial Strategy (RSS) for the West Midlands has increased the number of new homes proposed in Shropshire over the next 20 years, from 25,700 to 27,500. The RSS sets out a settlement strategy that identifies the sub regional role of Shrewsbury as a Settlement of Significant Development and Growth Point. Given this role, the RSS proposes that Shrewsbury should accommodate 6,500 dwellings up to 2026 and that development should be of a smaller scale in the market towns and focused on catering for local needs and local regeneration in the villages.

Building new homes is not simply a matter of constructing the buildings themselves. To operate effectively as a home, and as part of a wider community, each building is also dependant on a range of services, and the infrastructure necessary to provide these. A critical component of this infrastructure is associated with water; the provision of clean water for drinking and washing; the safe disposal of wastewater; and protection from flooding.

The addition of a small number of new homes may not represent a significant additional burden on existing water infrastructure. However when large numbers of houses are built, there is a risk that existing infrastructure will be overwhelmed, and both the environment and people's quality of life, will suffer.

There is a finite capacity within the environment, and it cannot simply provide more and more water to serve new development. Equally, there is a limit to the amount of wastewater that can be safely returned to our rivers and the sea without having a detrimental impact on the environment. Furthermore, we know that extreme rainfall can overwhelm drains and overtop flood defences. Climate change is bringing fresh challenges as patterns of rainfall are predicted to change, with more intense rainfall events. We must also make sure that water infrastructure contributes to the shift to a low carbon economy that is essential if greenhouse gas emissions are to be reduced. Planning for water has to take into account these natural constraints, and factors such as the timing and location imposed by the development itself.

Shropshire Council is currently preparing its Core Strategy, as part of the LDF process. LDF documents submitted to the Secretary of State must include an evidence base to support the proposed strategic approach. The water cycle strategy will be used to inform the Shropshire Council's LDF documents, sustainability appraisals, and appropriate assessments, which are subject to inspection by an independent inspector. Therefore, the water cycle strategy must provide the evidence base to ensure that development does not have a detrimental impact on the environment, and that water services infrastructure is provided in a timely manner.

1.1 Environmental Capacity

To ensure that growth does not have a detrimental impact on the environment, there are three components which a water cycle strategy considers:

- Water resources – is there sufficient water available to meet the additional demand?
- Water quality and wastewater treatment – is there sufficient capacity in the receiving watercourses to accommodate additional load from wastewater treatment works (WwTW)?
- Flood risk – is there sufficient land for development in low flood risk areas?

Environmental capacity is more likely to be a showstopper to development than infrastructure capacity, because there is finite capacity in the environment to accommodate new demand without causing unacceptable environmental damage.

1.1.1 Water resources

Shropshire has been classified by the Environment Agency as an area of moderate water stress. New development will place an increased demand on water resources, which could lead to environmental damage through unsustainable abstractions. In their draft Water Resource Management Plan 2009 (dWRMP), Severn Trent Water identified that there was a supply-demand deficit (i.e. demand was predicted to outstrip supply) across some parts of Shropshire; however, their final WRMP is not expected to show this deficit, due to greater demand management (through metering) and leakage control measures. Nevertheless, the analysis undertaken for the WCS indicates that adopting a business as usual model could result in an increase in demand in Shropshire of 17.5% by 2026, due to development. Therefore, the study has recommended progressive implementation of the Code for Sustainable Homes (CSH) from level 3 (105 litres per head per day [l/h/d]) to CSH level 6 (80 l/h/d), which is in line with Government policy.

It is critical that demand is managed in the existing housing stock, to ensure that the overall net increase in demand for water is minimised. Reducing demand in the existing housing stock is more difficult to achieve, but can be done through a range of measures including progressive metering, reducing demand through incentivisation (would require policy change from central Government). It is recommended that improved water efficiency begins in single-owned public buildings, which are more straightforward to target than private or multi-use buildings.

1.1.2 Water quality and wastewater treatment

Foul flow from new development results in an increased volume of foul effluent arriving at a Wastewater Treatment Works (WwTW). If the additional volume arriving at the WwTW causes flow from the works to exceed its current Dry Weather Flow (DWF) consent, as agreed with the Environment Agency, there is a risk that water quality in the receiving watercourse could deteriorate if no

mitigation is provided. Typically, the mitigation is to tighten the discharge consent of pollutants from a WwTW, to ensure that the overall load (load = flow * concentration) does not cause deterioration in water quality.

To meet the requirements of a new consent with tighter quality standards, Severn Trent Water (STW) may have to upgrade the existing works. Any improvements to the water services infrastructure needs to be programmed into a water company's capital programme, which runs in five year Asset Management Plan (AMP) cycles. This funding cycle and its associated constraints can have implications for the phasing of development, and it is important that water companies are involved in the planning process to ensure that infrastructure can be provided in time.

In Shropshire, 14 WwTWs will require new discharge consents to ensure no deterioration of water quality. For the majority of these works, the discharge consent can be tightened to ensure no deterioration of water quality, without treating effluent beyond the limits of conventional treatment. However, at some works there is a possibility that a discharge consent cannot be set to ensure no deterioration, without going beyond the limits of conventional treatment.

Albrighton – a phosphate consent of <1 mg/l would be required to ensure no deterioration of current class. This is beyond the limits of conventional treatment and in this instance the proposed level of development (MoD) may not be achievable within environmental capacity limits. The sustainable levels of growth would need to be confirmed through the Site Allocations and Management of Development DPD.

In the case of Mile Oak WwTW in Oswestry, the assessment has indicated that there is a potential for the ammonia consent to be tightened to 2 mg/l to ensure no deterioration of class and to maintain current load (it should be noted that maintenance of current load guarantees no deterioration in the quality of the final effluent, but is based on a worst-case scenario and goes beyond no deterioration of current WFD class). Although 3mg/l is classed as the limit of conventional treatment by Severn Trent Water Ltd and the Midlands Region of the Environment Agency, consents below 3 mg/l are in common usage elsewhere in England, and we do not consider that a consent tighter than 3 mg/l should be material constraint to development in Oswestry. Any further tightening of consents which would be required to ensure good ecological status would need to be subject to environmental benefit-cost, be promoted through the National Environment Programme and funded through the AMP process. In light of these findings we consider that growth at Oswestry, to the levels considered by this WCS, is not constrained by environmental capacity

At Ludlow, a similar situation is evident for phosphate. The phosphate consent does not need to be tightened to ensure no deterioration of current phosphate WFD class (good status). However, the load standstill suggests a phosphate

consent of < 1mg/l would be needed. In light of these findings we consider that growth at Ludlow, to the levels considered by this WCS, are not constrained by environmental capacity.

Growth should also not hinder the ability of a receiving watercourse to meet the requirements of the WFD; that is to achieve "good ecological status" in all water bodies. At the majority of WwTWs assessed, new discharge consents can be set to achieve good ecological status downstream of the discharge, without going beyond the limits of conventional treatment. However, the evidence indicates that at Mile Oak, Wem-Aston Road, Much Wenlock and Albrighton WwTWs, consents would need to be set beyond the limit of conventional treatment to achieve good ecological status. A further assessment has been carried out at these WwTWs to identify the indicative consents without any growth. At all WwTWs, the indicative consents would need to be set beyond the limits of conventional treatment with **and** without growth; therefore this should not be viewed as a barrier to growth.

1.1.3 Flood risk

Development should be safe from flooding, and should not increase flood risk elsewhere; this should include all sources of flood risk. The assessment of flood risk has considered fluvial flood risk, and flooding from all sources based on the level 1 Strategic Flood Risk Assessment (SFRA). In addition, new surface water mapping has been carried out to identify the vulnerability of different settlements to pluvial (or surface water) flooding.

At the sustainable urban extensions in Shrewsbury and Oswestry, flood risk should not pose a constraint to development. There are, however, some localised issues which need to be addressed through developer-led Flood Risk Assessments (FRAs). For example, at Shrewsbury South urban extension, additional runoff to the Money Brook could impact on flood risk in the Rea Brook. At the urban extensions, good management of surface water runoff in the design will ensure that flood risk is not increased elsewhere. Both Shrewsbury and Oswestry were identified as settlements which were highly vulnerable to pluvial flooding, and it is recommended that Surface Water Management Plans are progressed in these settlements to understand and mitigate the surface water flood risk.

Flood risk has been categorised as 'high' in a number of market towns, key centres and local centres:

- Minsterley / Pontesbury – some fluvial flood risk, but recent development has led to the overloading of drains
- Church Stretton – combination of pluvial and fluvial flooding, particularly in the winter months;
- Much Wenlock – significant flooding from both fluvial and pluvial sources and recent flooding has occurred during summer 2007 and November 2008, and;

- Albrighton – the settlement is affected by both pluvial and fluvial flooding.

In addition, the surface water mapping indicates that Whitchurch, Gobowen, Shifnal, Craven Arms, and Bucknell, are all highly vulnerable to pluvial flooding. Where flood risk is considered to be 'high', this does not preclude development but highlights where new need development will need to contribute to more sustainable water management. Further assessment will be required, either through FRAs, or more strategic studies such as SWMPs, to ensure that new development is safe from flooding and does not increase flood risk elsewhere.

1.2 Infrastructure capacity

When assessing infrastructure capacity, there are two principal components:

- Wastewater – is there sufficient wastewater infrastructure (at the WwTW and in the network) to accommodate the additional flows generated from new development?
- Surface water – what infrastructure is required to manage surface water?

1.2.1 Wastewater

New development will cause additional foul flows in the sewerage system, which can result in hydraulic (i.e. physical) capacity in both the sewerage network, and at the WwTW. The WCS has assessed the existing capacity at WwTW and wastewater networks which will be affected by growth. It has identified where there might be capacity constraints now and in the future, and where there are proposed schemes to resolve capacity constraints.

Development in Shrewsbury and Bayston Hill will drain to Monkmoor WwTW. Monkmoor WwTW has hydraulic capacity to accommodate all of the proposed growth in Shrewsbury and Bayston Hill. Therefore, there are no capacity constraints at the works to accommodating additional foul flows from new development. In Shrewsbury, there are no major wastewater network infrastructure constraints. However, the proposed urban extension to the west of Shrewsbury does drain through the Rad Brook trunk valley sewer, which currently has known sewer flooding problems. Options to resolve the flooding problems in the town centre are currently being appraised by STW as part of their capital investment programme. Subject to this scheme going ahead, there are not considered to be any constraints to this development.

In Oswestry, additional foul flows from development will drain to Mile-Oak WwTW. This WwTW has no existing capacity to accommodate additional flows. Severn Trent Water (STW) has identified that there is a capital investment project at this works, and they have indicated there are sufficient finances in AMP5 to provide infrastructure capacity to serve growth. However, in the short-term and prior to capacity improvements being provided, Shropshire Council should

continue to liaise with STW to identify whether development applications will cause further hydraulic capacity constraints. With regards to the wastewater network, STW have indicated that there are no major capacity constraints to development, and there is good hydraulic performance in the catchment. There are some sewer flooding problems on Victoria Avenue, which would need to be further assessed for any development upstream of this.

In the market towns, key centres and local centres, there are a number of WwTWs which do not have any current hydraulic capacity to accommodate additional foul flows from development. STW has indicated there are no physical constraints to providing additional infrastructure at these works to accommodate additional flows. Therefore, provision of infrastructure should not be considered as an absolute showstopper to development, but the phasing of development will need to be influenced by the timing of infrastructure provision. Ongoing partnership working will be needed between Shropshire Council and STW to ensure that infrastructure provision and phasing of development is aligned in the market towns, key centres and local centres through the Site Allocations and Management of Development DPD.

1.2.2 Surface water drainage

The effect of development is generally to reduce the permeability of a site. The consequence of this, if no measures are put in place, is to increase the volume of water and the peak flow rate from the developed site during and after rainfall event. Increases in the volume of water and the peak flow rate can cause flooding to occur both within a development site, and can increase flood risk downstream of the development.

The ethos of sustainable surface water drainage is to mimic, as far as possible, the surface water flows (volume and peak flow rate) from the site prior to development. This can be achieved through drainage infrastructure which can reduce the volume of water and peak flow rate from the development site; this drainage infrastructure has become commonly known as Sustainable Drainage Systems (SUDS). SUDS are used to reduce the peak flow rate and volume of water from a development site, and SUDS techniques can be used to improve the quality of surface water runoff and provide amenity and biodiversity benefits.

As part of the WCS mapping has been undertaken across Shropshire to identify the types of SUDS which are more likely to be broadly applicable in different locations in Shropshire. The mapping has identified locations, at a coarse scale, which will be suitable for infiltration of surface water runoff, attenuation of surface water runoff or combination (infiltration / attenuation). The mapping has shown that large parts of the northern and eastern edge of Shropshire have a higher potential to infiltrate surface water runoff from development sites. In south-east, central and north-west Shropshire soils are less permeable and the potential to infiltrate additional surface water runoff will depend on local conditions. South-west and parts of the north of Shropshire are underlain by solid

bedrock geology which has a low permeability; in these locations there is less potential to infiltrate runoff. In line with the Flood and Water Management Act, infiltration of runoff should be promoted in the first instance.

At the sustainable urban extensions in Shrewsbury and Oswestry, the WCS has assessed the potential storage volumes required at the sites to ensure surface water runoff rates and volume are no greater than current greenfield rates and volumes. The assessment is principally undertaken to identify, at a high level, the potential land take required to manage surface water. At the urban extensions s, the evidence indicates that no more than 4% of the development site would be taken up by storage to manage surface water runoff rate and volume. This is not considered to pose a constraint to development.

1.3 Conclusions for Shrewsbury and Oswestry

A summary of the key findings for Shrewsbury and Oswestry are illustrated in 1.3.1 and 1.3.2. The key findings for the market towns, key centres and local centres are provided in the main body of the report (Chapter 9).

1.3.1 Shrewsbury

The key findings and recommendations from the outline WCS which influence growth in Shrewsbury are highlighted below.

- STW has identified that there is sufficient hydraulic capacity at Monkmoor WwTW to accommodate the proposed level of growth.
- STW has not identified any wastewater network infrastructure capacity issues, and it is unlikely that development will cause any hydraulic capacity constraints within the sewerage network. There is currently good hydraulic performance within the sewerage system.
- A new discharge consent will be required at Monkmoor WwTW to ensure no deterioration of water quality downstream of the WwTW. The analysis has shown a new discharge consent can be set within the limits of conventional treatment to ensure no deterioration of current water quality. The analysis has also shown that growth should not hinder the ability to meet the WFD downstream of the works. The findings indicate there are no water quality constraints to accommodating growth at Monkmoor WwTW.
- The proposed urban extension areas in Shrewsbury are at low fluvial flood risk and fluvial flood risk is not considered to represent a constraint to development for the urban extensions. There is some predicted surface water flooding within the urban extensions, which will need to be considered during master planning of the sites. Proposed development within central Shrewsbury will be more constrained by fluvial flood risk, and each development proposal will need to be accompanied by a site-specific FRA to ensure that inappropriate development is avoided.
- The surface water mapping has identified Shrewsbury as an area of high surface water flood risk, and it is recommended that a SWMP is

developed to a) test options to mitigate existing surface water flood risk, and b) to strategically plan the drainage provision within the new developments.

- The assessment for the urban extension areas has indicated that the surface water drainage requirements to ensure runoff rates and volumes do not exceed greenfield runoff rates and volumes will not be a constraint to development. Approximately 2-4% of the available land will be required to attenuate runoff. Infiltration of surface water runoff may be applicable in certain parts of Shrewsbury, particularly in the urban extension to the west.

1.3.2 Oswestry

The key findings from the outline WCS which influence growth in Oswestry are highlighted below.

- There is currently no hydraulic capacity at Mile Oak WwTW. STW has identified that there are no physical constraints to providing additional infrastructure, but there is an immediate capacity issue to consider. STW has indicated there are sufficient finances in AMP5 to be able to provide additional capacity to accommodate growth and there is a capital scheme which has been promoted. Given the urban extension areas will not come forward until 2014, capacity should be available at the works before these sites are developed. In the short term, Shropshire Council should continue to liaise with STW to confirm development applications will not cause further hydraulic capacity constraints. The hydraulic capacity issue is not considered to be an absolute showstopper to development. In addition, there is a possibility of draining some of the new development in Oswestry to Drenewydd-Oswestry WwTW which does have hydraulic capacity to accept proposed levels of growth up to 2026.
- There is understood to be sufficient wastewater network capacity to accommodate the urban extension area to the east of Oswestry, which lies approximately 1.5km to the north of Mile Oak WwTW. Throughout Oswestry, no major wastewater constraints have been identified, but STW has noted existing flooding problems on Victoria Road, and any development to the west of this will need to be further assessed to confirm there is sufficient capacity in the network.
- Mile Oak WwTW currently exceeds its DWF consent set by the Environment Agency, and will require a new discharge consent to accommodate growth. Modelling work suggests there is potential for a new ammonia consent to ensure no deterioration of current WFD class; however, we consider that growth at Oswestry, to the levels considered by this WCS, is not constrained by environmental capacity.
- There is a very low level of fluvial flood risk in Oswestry, which is unlikely to present a constraint to development. Based on the surface water assessment, Oswestry has been classified as a high surface water

flood risk area, and a SWMP should be developed to consider the complex interactions between different sources of flooding.

- With regards to sustainable surface water drainage, the proposed urban extension area lies on highly permeable geology and surface water runoff should be infiltrated wherever possible. Based on a worst case assessment, approximately 4% of the proposed site will be needed to store surface water runoff to ensure post development rates and volumes do not exceed greenfield runoff rates and volumes. The remainder of growth in Oswestry will be suitable for both infiltration and attenuation approaches to managing surface water, depending on local characteristics of the site.