Appendix 6

Severn Trent Water headroom assessment 2012

River Mease Catchment

Headroom assessment for sewage treatment works - 2012

1) Introduction

In accordance with the River Mease SAC Water Quality (Phosphate) Management Plan, Severn Trent Water has undertaken to provide regular updates on headroom availability at our sewage treatment facilities to inform planning decisions. This document sets out the sewage treatment headroom position as at March 2012 and replaces the document issued in December 2011. This information will be updated on an annual basis – the next scheduled update is March 2013.

2) Severn Trent Water's Statutory Duties

Severn Trent Water has a general duty under section 94 (clauses 1a and 1b) of the Water Industry Act 1991:

(a) to provide, improve and extend such a system of public sewers (whether inside its area or elsewhere) and so to cleanse and maintain those sewers and any lateral drains which belong to or vest in the undertaker as to ensure that that area is and continues to be effectually drained; and

(b) to make provision for the emptying of those sewers and such further provision (whether inside its area or elsewhere) as is necessary from time to time for effectually dealing, by means of sewage disposal works or otherwise, with the contents of those sewers.

In effect, this places an absolute obligation upon Severn Trent Water to provide such additional capacity as may be required to treat additional flows and loads arising from new domestic development. The complete Section 94 is included as appendix 1.

As a business, Severn Trent are specifically funded to discharge this legal obligation through our charging mechanism, as overseen by OFWAT through the five yearly Periodic Review process. Because Severn Trent is directly funded provide additional sewage treatment capacity to cater for new domestic development, the Company is unable to accept individual developer contributions towards increasing the capacity of a specific sewage works.

Severn Trent Water is also under a legal duty to comply with its sewage treatment works discharge consents, issued by the Environment Agency under the Water Resources Act 1991 (as amended by the Environment Act 1995). Should we be in a position of being unable to comply with a consent to discharge as a consequence of growth within the sewerage catchment, we are obliged to remedy the situation using our own resources.

3) Quantification of Headroom

As stated in Section 2 above, all of our sewage treatment facilities in the River Mease Catchment operate under effluent discharge consents, as issued by the Environment Agency. These consents specify both a volumetric limit (termed 'Dry Weather Flow') and limits on specific pollutants. [With the exception of Chilcote STW, which has a volumetric limit but operates under descriptive consent conditions.]

Quantification of 'Dry Weather Flow' is subject to specific definitions which are laid down by the Environment Agency in our discharge consents. An example of these conditions is attached as *appendix 2*. The difference between the measured DWF and the consented DWF is termed headroom.

There are a number of factors (in addition to new developments) that can affect the quantification of headroom such as:-

- Natural year on year variations in measured DWF
- Assessment of headroom against 80%ile or 90%ile measured flow
- Any changes in water consumption (domestic or trade)
- Closure of trade effluent dischargers (or increase in water reuse)
- Assumptions around water consumption in new build houses

It is for these reasons that the measured DWF and headroom figures quoted by Severn Trent Water in Section 5 below are central estimates based upon long term averages, not definitive numbers.

4. Dry Weather Flow Consent Conditions

The table below sets out the existing DWF consent conditions for the river Mease sewage treatment works. This incorporates some changes agreed in principle with the Environment Agency but not yet implemented.

Works	Current DWF m3/d	Agreed revision m3/d
Packington	4729	4656
Measham	1464	1390
Snarestone	420	
Edingale	113	
Clifton Campville	121	
Donisthorpe	725	
Overseal	455	
Netherseal	176	
Norton Juxta	60	
Smisby	50	
Chilcote STW	17	

5. Headroom

The table below sets out Severn Trent's central estimate of the number of new dwellings that can be accommodated at each of the river Mease sewage treatment works, before the consented DWF will be exceeded.

Works	Measured DWF (long term average)	Volumetric Headroom	Equivalent number of new dwellings
Packington	4320	336	1218
Meesham	1069	321	1163
Snarestone	406	14	51
Edingale	110*	3	11
Clifton Campville	93	28	101
Donisthorpe	670	55	199
Overseal	380	75	272
Netherseal	95	81	293
Norton Juxta	53	7	25
Smisby	34	16	58
Chilcote	n/a	n/a	<5[#]

* As previously reported, an error was identified with the flow recording device at Edingale in 2011. Whilst this error has now been corrected, the headroom assessment at Edingale STW has been made based upon a limited set of data.

Due to the very low DWF, Chilcote STW is not required to have permanent flow measurement installed. The headroom assessment provided of not more than 5 houses is an estimate as it is not possible to precisely quantify available headroom.

For reference purposes, the table below highlights the variance from the data included in the 2011 Headroom Assessment.

Works	Measured DWF variance % change (long term average)	Headroom increase from 2011 (m3/d)	Change in equivalent number of properties
Packington	-2.3	99	192*
Meesham	+1.6	-18	-65
Snarestone	-2.9	6	22
Edingale	n/a	n/a	-
Clifton Campville	-3.2	4	14
Donisthorpe	-1	6	22
Overseal	-2.1	7	26
Netherseal	-1.4	1	3
Norton Juxta	-2.9	2	7
Smisby	-4.9	2	7
Chilcote	n/a	n/a	-

*Net figure as an allowance previously made for water usage efficiency measures (metering) has been removed from 2012 headroom assessment.

Precautionary Principle

Technical compliance with our DWF consents is on the basis of 90%ile measured flow data. The headroom assessments in the table above have been based upon 80%ile flows. This has been done to give some protection against the measured DWF increasing in future years due to natural variation in rainfall.

6. Options Available to Severn Trent Water to increase headroom

As laid out in section 1 above, Severn Trent Water are legally obliged to make available such capacity as may be required to cater for new development. It is also clear in the legislation that we are not obliged to simply consider 'end of pipe' treatment solutions.

Severn Trent Water will work constructively with the relevant Planning Authorities, the EA and Natural England to ensure that all new developments within the River Mease catchment are delivered in such a way as to avoid any negative impacts on the SAC. In order to do this, we have set out below a number of options that are available to enable this to happen.

In the event that any of the works in the river Mease reaches a point whereby incoming flows exceed the consented volumetric consent, there are a number of options available to Severn Trent to restore compliance.

a) **Seek an increase in the relevant volumetric consent limit from the EA.**

In the context of the river Mease, Severn Trent would, as a minimum, expect the Environment Agency to apply 'constant load' principles such that any increase in a consented DWF is offset by a reduction in the polluting load parameters.

In the context of Phosphorus limits, there is a limit to which existing technology can be pushed whilst still delivering a compliant effluent. This is difficult to precisely quantify at the moment, because Phosphate stripping processes are not yet installed at all of the river Mease works, we are therefore unable to make informed comment on the extent to which we could comply with tighter Phosphorus limits. However, based upon experience elsewhere, marginal consent tightening (a few percentage points) is unlikely to prove insurmountable. However, this will need to be assessed on a case by case basis and our understanding of how far this option could be taken will improve over time (as our experience of operating the new phosphate stripping assets increases).

We acknowledge that the EA reserve the right to go beyond 'constant load'. In the event that a proposed consent tightening goes beyond what we believe we can actually deliver, we would necessarily have to explore other options.

b) **Local, within catchment, transfers**

Should the pattern of future development not match the availability of headroom at our works, we could explore the possibility of local sewerage catchment transfers between works within the Mease catchment to match supply and demand. As an example, Donisthorpe, Overseal and Netherseal STWs are all relatively close together and it may be feasible to transfer flows between these catchments.

c) **Catchment wide consent renegotiations**

Subject to agreement with the Environment Agency (and backed by Simcat river quality modelling), it may be possible to review sewage works discharge consents on a whole catchment basis to address a specific issue of a works exceeding its DWF. This could take one of two forms:-

i) A reduction in consented DWF at one or more sites (where headroom is available) to compensate for an increase in DWF at another.

ii) A tightening of the phosphate consent limits at one or more sites to offset an increase in phosphate discharge at another due to DWF exceedence.

d) **Transfer flows out of the River Mease Catchment entirely**

This could either be a transfer of crude sewage out of catchment to another sewage works (eg Ashby de la Zouche to Stanton STW) or a transfer of fully treated final effluent out of the river Mease and discharged directly to the river Trent.

Whilst this is technically a viable option for delivering the SAC conservation target, this would not be a preferred option for Severn Trent as it would have a significant carbon emissions implication. Also, significant transfer of final effluent out of the Mease catchment may also have undesirable implications for the river itself.

e) **Infiltration reduction**

It may be possible to offset the increase in flows due to development by implementing a programme of infiltration reduction within the sewer system as a whole. As with the 'out of catchment' option this is unlikely to be a preferred option with Severn Trent as it can be disruptive to our customers and expensive (and has a mixed track record of success).

Appendix 1

Section 94 of the 1991 Water Industry Act

94 General duty to provide sewerage system.

(1) It shall be the duty of every sewerage undertaker—

(a) to provide, improve and extend such a system of public sewers (whether inside its area or elsewhere) and so to cleanse and maintain those sewers and any lateral drains which belong to or vest in the undertaker as to ensure that that area is and continues to be effectually drained; and

(b) to make provision for the emptying of those sewers and such further provision (whether inside its area or elsewhere) as is necessary from time to time for effectually dealing, by means of sewage disposal works or otherwise, with the contents of those sewers.

(2) It shall be the duty of a sewerage undertaker in performing its duty under subsection (1) above to have regard—

(a) to its existing and likely future obligations to allow for the discharge of trade effluent into its public sewers; and

(b) to the need to provide for the disposal of trade effluent which is so discharged.

(3) The duty of a sewerage undertaker under subsection (1) above shall be enforceable under section 18 above—

(a) by the Secretary of State; or

(b) with the consent of or in accordance with a general authorisation given by the Secretary of State, by the Director.

(4) The obligations imposed on a sewerage undertaker by the following Chapters of this Part, and the remedies available in respect of contraventions of those obligations, shall be in addition to any duty imposed or remedy available by virtue of any provision of this section or section 95 below and shall not be in any way qualified by any such provision.

(5) In this section “trade effluent” has the same meaning as in Chapter III of this Part.

Appendix 2

Sewage works volumetric consent conditions

CONSENT NO.	T/23/35619/R

WATER RESOURCES ACT 1991

SECTION 88 - SCHEDULE 10

(AS AMENDED BY THE ENVIRONMENT ACT 1995)

NOTICE OF MODIFICATION OF CONSENT TO DISCHARGE

TO: Severn Trent Water Company Limited ("the Consent Holder")
2297 Coventry Road
Birmingham
B26 3PU

Following a review of the conditions of its consent, the **ENVIRONMENT AGENCY** ("the Agency") in pursuance of its powers under the Water Resources Act 1991 **HEREBY MODIFIES ITS CONSENT** to the making of a discharge **OF SEWAGE EFFLUENT**, as follows:

Treated Sewage Effluent

with respect to Modification of Consent No. T/23/35619/R served on the 14th day of October 2008.

FROM: Snarestone Sewage Treatment Works

AT: Appleby Road, Snarestone, Leicestershire

TO: The River Mease

FROM NOW ON the consent is modified as follows:

Substitution of condition 4 and 5, in Schedule T/23/35619/R 01 by the following new condition:

VOLUME

4 (a) The Dry Weather Flow of the discharge shall not exceed 420 cubic metres per day. The consented Dry Weather Flow limit is set at the Consent Holder's planned annual 80%-exceeded flow.

(b) In determining compliance with this consent, the measured Dry Weather Flow is that total daily volume that is exceeded by 90% of the recorded measured total daily volume values in any period of 12 months.

(c) The numeric value of the measured Dry Weather Flow shall not exceed the numeric value of the consented Dry Weather Flow limit.

(d) If the measured Dry Weather Flow exceeds the consented Dry Weather Flow limit then the Consent Holder shall as soon as is practicable investigate the reasons for the exceedance. The Consent Holder shall report the reasons for the exceedance to the Environment Agency and the steps that it proposes to take to restore compliance. An exceedance of the Dry Weather Flow limit shall not be recorded as a failure if the Consent Holder takes appropriate steps to restore compliance.

(e) If the measured Dry Weather Flow exceeds the consented Dry Weather limit because of unusual rainfall during the 12-month period, then it will not be recorded as a failure of the Dry Weather Flow limit. For the purposes of this condition, unusual rainfall shall mean rainfall that causes significantly higher sewage flows during the three-month period that normally records the lowest flows.

(f) For unusual rainfall to be considered, the Consent Holder shall notify the Agency and provide supporting evidence as part of the normal specified data returns.

Appendix 3

Detailed Example of Headroom Calculation

The example below relates specifically to Packington STW at Ashby de la Zouche, but a number of the principles are applicable to other works within the river Mease Catchment.

Current Consent

The current Packington DWF consent is set at 4729 m3/d. This is in the process of being reduced to 4656 m3/d as part of a wider agreement with the EA concerning river Mease discharges. The calculations below are made on the basis of the lower figure.

Variability in measured Dry Weather Flows

The table below illustrates the natural variability in measured dry weather flows.

Year	2005	2006	2007	2008	2009	2010	2011
DWF m3/d (80%ile)	4575	4505	4367	5111	4456	4190	3828

In quantifying headroom, there are no defined rules set down to determine how many years of flow data should be used. Older data is clearly not going to be representative of any recent changes and developments. However, using a smaller, more recent subset of information runs the risk of being unduly optimistic as the period since 2009 has been unusually dry, with 2011 being exceptionally dry.

The table below illustrates how variable the headroom calculation can be depending upon how the historic flow data is treated.

	Average 80%ile flow (m3)	Headroom against consent (m3)
Straight 7 year average	4433	223
6 year average excluding 2008*	4320	336
Last 2 year average	4009	647

*2008 was an unusually wet year

Variability in Water Consumption in new properties

To translate the measured DWF headroom in cubic metres into a headroom in terms of number of new properties that can be accommodated, assumptions around occupancy rate and per capita water usage need to be made.

Office of National Statistics data gives an average occupancy rate of 2.35 people per property for the Ashby de la Zouche area.

Standard domestic per capita water consumption for the area is 135 l/h/d. This gives a total per property of 317 litres per day. However, should the sustainable housing per capita usage of 100 litres per day be imposed on new developments as a planning condition, total usage per property drops to 235 l/d.

Summary of assumptions and headroom calculations.

The table below illustrates how the quantification of headroom can be affected by the two variables outlined above.

	Worst Case	Central estimate	Best Case
Assumption 1	Use lowest volumetric headroom figure of 233 m3	Use mid-range volumetric headroom figure of 336 m3	Use best case volumetric headroom figure of 647 m3/d
Assumption 2	No application of sustainable homes standard (use standard 135 l/h/d)	Use average of normal and sustainable homes water usage (@276 l/prop/d)	Full application of sustainable homes water consumption (100 l/h/d)
Headroom (properties)	735	1218	2753

Precautionary Principle

Whilst technical compliance with our DWF consent is on the basis of 90%ile measured flow data, the headroom assessment above has been based upon 80%ile flows. This has been done to give some protection against the measured DWF increasing in future years due to natural variation in rainfall. As alluded to earlier in this document (and reflected in the measured flow data), 2009 - 2011 have been dry years. The 2011 90%ile flow for Packington STW is 3,753m3/d, some 903m3/d below the adjusted DWF consent.

Factors not included in this assessment

Trade effluent changes

Long term future of the trade effluent discharge from Arla Dairy. Severn Trent are aware that Arla have applied for planning permission to develop a major new facility near Aylesbury. This could have implications for the 700m3/d discharge coming to Packington from the existing factory in Ashby de la Zouche. Loss of this trade effluent discharge would make significant headroom available at Packington. However, it would be premature to incorporate this into any headroom calculations.

In addition, the calculations above do not take account of the recent closure of the Standard Soap factory in Ashby de la Zouch that was announced in late 2011. This factory formerly discharged around 20m3/d to the sewerage system.

Changes in water consumption at existing properties (demand management)

Severn Trent, in common with other water companies, practices demand management. As part of some ongoing work in this area, the company is looking at installing water meters on existing properties whenever they change ownership. Initially this will be taking place in 4 post code areas, one of which is in Ashby de la Zouche. In total, the company expects to install 10000 meters across the 4 areas. The predicted impact of installing a meter is to reduce domestic consumption by around 10%. Assuming that 25% of the meters are installed in Ashby and that the 10% reduction is achieved (against a current per property average usage of 317 l/d) then this could potentially deliver up to a 79m3/d reduction in DWF to Packington STW.

As this trial has now started, allowance for this has now been removed from headroom calculations, as the demand reduction benefits will now start to be represented in the measured DWF data. This will avoid any potential double counting of headroom.