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Shropshire Council
Erratum to Water Cycle Study

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Revision History

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S3-P01 11/02/2021	Draft Report	Joy Tetsill (Principal Planning Officer)
A1-C02 02/03/2021	Final Report	Joy Tetsill

Contract

This report describes an addendum to work commissioned by Shropshire Council in February 2021. Richard Pardoe of JBA Consulting carried out this work.

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Purpose

This document has been prepared as an erratum to the original Water Cycle Study for Shropshire Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by Shropshire Council for the purposes for which it was originally commissioned and prepared.

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A Introduction

A.1 Terms of reference

JBA Consulting recently completed a Water Cycle Study for Shropshire Council. During the course of the evidence base review it became apparent that there were a number of errors in the water quality section of the WCS report. This erratum has been prepared to correct those errors and present a clearer results table as an aid to understanding the results.

This erratum should be read alongside the main WCS report: Shropshire Water Cycle Study 2020

A.2 Summary of changes

Changes are required to following sections of the report:

- Executive summary
- Section 9 - Water quality chapter
- Section 14 – Summary and Conclusions

These changes are shown in Section B of this report. Where new text is proposed, the whole paragraph is replaced. For clarity, sections 9.6 to 9.8 have been replaced in their entirety.

B Changes to original WCS

Executive Summary

Water quality

The water quality modelling undertaken in this study uses a model calibrated with water quality data and assumptions from 2010-12, and updated with the latest effluent flows at WwTWs within the study area, and incorporating AMP6 and AMP7 improvements provided by the EA. It should therefore be used to identify areas at risk of deterioration, and should not be used to set permit limits or definitively rule out growth in particular catchments.

At five WwTWs in Shropshire (Clive, Ditton Priors, Market Drayton, Oswestry Mile Oak and Nescliffe-Wilcot) water quality modelling identified a risk that planned growth could cause a deterioration in water quality, and that it may not be possible to mitigate this with treatment at the technically achievable limit. At a further WwTW (Bishops Castle WwTW), there is a risk that growth may prevent good ecological status being achieved in the future.

At these works, further mitigation may need to be taken to accommodate growth and options include pumping wastewater to a different WwTW or changing the point of discharge to a less sensitive waterbody. Detailed optioneering is beyond the scope of this study and is best undertaken by Severn Trent Water who have a detailed knowledge of their assets, and the range of options and constraints at each.

9 Water Quality

9.6 Summary of Modelling Results

Table 9.1 below summarises the results of the water quality assessments that have been performed in the study area.

The first two tests conducted are:

- "Could the development cause a greater than 10% deterioration in WQ for one or more determinands?" and

- "Could the development cause a deterioration in WFD class of any element?"

Where either of those tests were failed, the WwTW has been given an "amber" assessment.

A further test then investigated whether improvements in treatment processes (simulated by every WwTW being set to treat at the technically achievable limit), could prevent this deterioration. If this test was failed – a "red" assessment was applied.

Where deterioration could be prevented, the assessment remains "amber" highlighting the likelihood that upgrades may be required at that WwTW or others upstream.

The final test investigates whether growth alone could prevent good ecological status being achieved in the future.

Only those WwTWs where an issue was identified (either a deterioration of greater than 10%, a deterioration in class, or a prevention of good ecological status being achieved in the future) are shown in Table 9.1. The remaining WwTWs where the modelling did not predict any water quality issues are listed in Table 9.3 and can be said to have environmental capacity to support growth. The exception to these is the WwTWs in the Clun catchment. The modelling shows a less than 10% deterioration, however the presence of the River Clun SAC at the downstream end of the catchment dictates that any deterioration in water quality is unacceptable. This is covered in more detail in section 12 of the WCS.

Some WwTWs discharged to a watercourse which is not assessed under the water framework directive and so are marked as "Unknown WFD Standards". Only the 10% deterioration test has been applied at these works.

Within the BOD/Ammonia SIMCAT model, some of the WwTWs had their effluent quality expressed as a load (kg) rather than a concentration (mg/l). This prevented the running of the final test of whether the development could prevent the waterbody from reaching good ecological status. These are recorded in Table 9.1 as "Unable to assess BOD/AMM".

Table 9.1 Water quality modelling results (WwTWs with identified issues only)

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?
ACKLETON/STABLEFORD (WRW)	3	0	Predicted deterioration is >10% for Ammonia and Phosphate	No	Yes	No
ALBRIGHTON (WRW)	4,181	220,000	Predicted deterioration is >10% for Ammonia, BOD and Phosphate	Development may cause BOD class to deteriorate from Moderate to Poor.	Yes	No
ALVELEY (WRW)	126	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
BASCHURCH	437	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
BISHOPS CASTLE (WRW)	136	10,400	Predicted deterioration is >10% for Ammonia	No	Yes	No – Amm / BOD Risk that phosphate target may not be met
BOBBINGTON (WRW)	1	0	Predicted deterioration is >10% for Phosphate	No	Yes	No

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?
BOMERE HEATH (WRW)	116	0	Predicted deterioration is >10% for Phosphate, BOD and Ammonia	No	Yes	No
BRIDGNORTH-SLADS (WRW)	1,695	192,800	Predicted deterioration is >10% for Phosphate	No	Yes	No
BURNHILL GREEN (WRW)	4	0	Predicted deterioration is >10% for Ammonia and Phosphate	Deterioration in class from Poor to Bad predicted for Phosphate	Yes	Unable to assess BOD/AMM No - P
CHILDS ERCALL	13	0	Predicted deterioration is >10% for BOD and Phosphate	No	Yes	No
CHILDS ERCALL-LEAFIELDS (WRW)	2	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
CHIRBURY (WRW)	46	0	Predicted deterioration is >10% for Phosphate	No	Yes	No

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?
CLAVERLEY (WRW)	12	0	Predicted deterioration is >10% for Ammonia	No	Yes	No
CLEOBURY MORTIMER (WRW)	204	6,000	Predicted deterioration is >10% for Ammonia	No	Yes	No
CLIVE (WRW)	43	0	Predicted deterioration is >10% for Ammonia and Phosphate	No	No (Ammonia deterioration remains >10%)	No
COALPORT (WRW)	7,782	273,514	Predicted deterioration is >10% for Phosphate	No	Yes	No
CORLEY	82	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
DITTON PRIORS (WRW)	67	0	Predicted deterioration is >10% for Ammonia and Phosphate	Unknown WFD Standards	No (Ammonia deterioration remains >10%)	Unknown WFD Standards

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m²)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?
DORRINGTON (WRW)	145	0	Predicted deterioration is >10% for Ammonia and Phosphate	Unknown WFD Standards	Yes	Unknown WFD Standards
DUDLESTON HEATH (STW)	100	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
ELLESMERE - WHARF MEADOW (WRW)	811	36,800	Predicted deterioration is >10% for Phosphate	Unknown WFD Standards	Yes	Unknown WFD Standards
GRAFTON (WRW)	1	0	Predicted deterioration is >10% for Phosphate	No	Yes	Unable to assess BOD/AMM No - P
HAMPTON LOADE	1	0	Predicted deterioration is >10% for Ammonia	No	Yes	Unknown WFD Standards
HIGHLEY (WRW)	201	4,000	Predicted deterioration is >10% for Ammonia	No	Yes	No

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?
HINSTOCK STW (STW)	157	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
HODNET (WRW)	110	0	Predicted deterioration is >10% for Ammonia	Ammonia and BOD may deteriorate in class from Good to Moderate	Yes	No
HOLLINWOOD	7	0	Predicted deterioration is >10% for Phosphate	No	Yes	Unable to assess BOD/AMM No - P
HORDLEY	2	0	Predicted deterioration is >10% for Phosphate	No	Yes	Unable to assess BOD/AMM No - P
KINNERLEY (WRW)	63	0	Predicted deterioration is >10% for Phosphate	Phosphate may deteriorate in class from Moderate to Poor	Yes	No
KNIGHTON (WRW)	253	0	Predicted deterioration is >10% for	No	Yes	No

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?
			Ammonia and Phosphate			
KNOCKIN (WRW)	55	0	Predicted deterioration is >10% for Phosphate	Phosphate may deteriorate in class from Moderate to Poor	Yes	No
LYDBURY NORTH (WRW)	19	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
MARKET DRAYTON (WRW)	1,006	48,000	Predicted deterioration is >10% for Ammonia and Phosphate	No	No (Ammonia deterioration remains >10%)	No
MORETON SAYE	22	0	Predicted deterioration is >10% for Phosphate	Unknown WFD Standards	Yes	Unknown WFD Standards
MUCH WENLOCK	190	4,400	Predicted deterioration is >10% for Phosphate	Phosphate may deteriorate in class from Poor to Bad	Yes	No
NESSCLIFFE - WILCOT (WRW)	155	0	Predicted deterioration is >10% for	No	No (Ammonia deterioration remains >10%)	No

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?
			Ammonia and Phosphate			
NORTON-IN-HALES (WRW)	63	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
OSWESTRY DRENEWYDD			No		N/A	Inconclusive - Risk that phosphate target may not be met No – P and BOD
OSWESTRY MILE OAK	1,822	148,000	Predicted deterioration is >10% for Ammonia	No	No (Ammonia deterioration remains >10%)	No
PEPLOW	6	0	Predicted deterioration is >10% for Phosphate	No	Yes	Unable to assess BOD/AMM No - P
PERTHY - WINDY RIDGE (WRW)	33	0	Predicted deterioration is >10% for Phosphate	No	Yes	Unable to assess BOD/AMM No - P
HIGHER HEATH-PREES (WRW)	339	0	Predicted deterioration is >10% for Phosphate	No	Yes	No

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?
PREES - GOLFHOUSE LANE (WRW)	103	0	Predicted deterioration is >10% for Phosphate	Unknown WFD Standards	Yes	Unknown WFD Standards
RUSHBURY	5	0	Predicted deterioration is >10% for Phosphate	No	Yes	Unable to assess BOD/AMM No - P
RUYTON TOWNS	116	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
SHIFNAL	1,914	160,600	Predicted deterioration is >10% for Phosphate	No	Yes	No
SHREWSBURY MONKMOOR	8,145	604,520	Predicted deterioration is >10% for Phosphate	No	Yes	No
WEST FELTON (WRW)	112	0	Predicted deterioration is >10% for Phosphate	No	Yes	No
WHIXALL	1	0	Predicted deterioration is	Unknown WFD Standards	Yes	Unknown WFD Standards

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?	Could the development alone prevent the water body from reaching Good class?	
			>10% for Phosphate				
WOLLERTON	3	0	Predicted deterioration is >10% for Phosphate	No	Yes	Unable to assess BOD/AMM	No - P
WOORE (WRW)	91	0	Predicted deterioration is >10% for Phosphate	Unknown WFD Standards	Yes	Unknown WFD Standards	
WORFIELD	1	0	Predicted deterioration is >10% for Phosphate	No	Yes	Unable to assess BOD/AMM	No - P

At many WwTW in the study area, development is predicted to cause a deterioration in water quality of 10% or greater in one or more determinands, or in WFD class (for example from Good to Moderate status). In the majority of cases this deterioration could be prevented by improvements in treatment technology (and a tightening of its environmental permit) at that WwTW or upstream. However, at five WwTW (shown in Table 9.2 below), treatment at the technically achievable limit could not prevent a deterioration. At these WwTW, environmental capacity could be a constraint and mitigation may need to be taken to accommodate growth. Mitigation options include pumping wastewater to a different WwTW or changing the point of discharge to a less sensitive waterbody.

Table 9.2 WwTW where treatment at TAL may not prevent deterioration

WwTW	Housing growth over plan period (dwellings)	Employment growth over plan period (m2)	Comments
Clive	43	0	Deterioration in Ammonia from 0.06 to 0.07 mg/l (16.7%) – cannot be reduced with treatment at TAL. However, WFD status remains high.
Ditton Priors	67	0	Deterioration in Ammonia from 0.07 to 0.11 mg/l (57.1%) – can only be reduced to 42.9% with treatment at TAL. However, WFD status remains high.
Market Drayton	1,006	48,000	Deterioration in Ammonia from 0.17 to 0.19 mg/l (11.8%) – which cannot be reduced with treatment at TAL. However, WFD status remains high.
Nesscliffe Wilcot	155	0	Deterioration in Ammonia from 0.06 to 0.08 mg/l (33.3%) – which cannot be reduced with treatment at TAL. However, WFD status remains high.
Oswestry Mile Oak	1,822	148,000	Deterioration in Ammonia from 0.10 to 0.11 mg/l (10.0%) – which cannot be reduced with treatment at TAL. However, WFD status remains high.

At Bishops Castle WwTW, whilst a large deterioration is not predicted due to growth, should improvements in water quality be made elsewhere in the catchment, there is a risk that the additional growth served by this WwTW could become the factor that prevents good ecological status being achieved in the watercourse downstream in the future.

At Oswestry Drenewydd WwTW the modelling was inconclusive. If improvements are made to upstream water quality, following delivery of growth, the resulting downstream water quality is likely to be close to the good ecological status target.

Table 9.3 WwTW with environmental capacity

Wastewater Treatment Works		
Acton Burnell	Five Fords (Assessed with RQP)	Pant Plas Cerig
Ashton Carbonell	Ford	Picklescott
Aston near Wem	Frankton	Pontesbury
Aston-on-Clun	High Hatton	Prees - Hill
Beckbury	Hilton Stratford Lane	Seifton
Bedlem	Homer	Shawbury
Bitterley-Orchard Lee	Hopton Wafers	Snailbeach
Blymhill	Ightfield	Snailbeach P/Pect Cottage
Bucknell*	Kidderminster Oldington	Stiperstones
Buildwas-Park View	Knowbury	Stoke Heath
Cardington	Lea Cross	Stoke St Milborough
Castle Pulve	Llynclys Bryn Melyn	Stoke on Tern
Caynham Pulverbatch	Longdon Common	Stottesdon
Cheswardine	Longville in the Dale	Tenbury Wells
Church Stretton	Loppington	Ticklerton
Clun*	Lower Common	Walcot
Condover	Ludlow	Welshampton
Coton-Park Villas	Lyneal	Wem – Soulton Villas
Craven Arms	Minsterley	Wem
Cressage	Montford Bridge	Whitchurch (Assessed with RQP)
Cross Houses	Morville	Woodseaves
Culmington-Corve View	Munslow	Worthen
Diddlebury-the Moors	Newcastle	Yockleton
Edstaston-Pepper Street	Onibury	
Ercall Heath		

*Water quality modelling did not identify an issue using the methodology described here, but the fact that the River Clun SAC is already in an unfavourable condition means that any deterioration at these WwTWs would be unacceptable – see section 12.

9.6.1 Priority substances

As well as the physico-chemical water quality elements (BOD, Ammonia, Phosphate etc.) addressed above, a watercourse can fail to achieve Good Ecological Status due to exceeding permissible concentrations of hazardous substances. Currently 33 substances are defined as hazardous or priority hazardous substances, with others under review. Such substances may pose risks both to humans (when contained in drinking water) and to aquatic life and animals feeding on aquatic life. These substances are managed by a range of different approaches, including EU and international bans on manufacturing and use, targeted bans, selection of safer alternatives and end-of-pipe treatment solutions. There is considerable concern within the UK water industry that regulation of these substances by setting permit values which require their removal at wastewater treatment works will place a huge cost burden upon the industry and its customers, and that this approach would be out of keeping with the "polluter pays" principle.

We also consider how the planning system might be used to manage priority substances:

- Industrial sources – whilst this report covers potential employment sites, it doesn't consider the type of industry and therefore likely sources of priority substances are unknown. It is recommended that developers should discuss potential uses which may be sources of priority substances from planned industrial facilities at an early stage with the EA and, where they are seeking a trade effluent consent, with the sewerage undertaker.
- Agricultural sources - There is limited scope for the planning system to change or regulate agricultural practices. UK water companies are involved in a range of "Catchment-based Approach" schemes aimed at reducing diffuse sources of pollutants, including agricultural pesticides.
- Surface water runoff sources - some priority substances e.g. heavy metals, are present in urban surface water runoff. It is recommended that future developments would manage these sources by using SuDS that provide water quality treatment, designed following the CIRIA SuDS Manual. This is covered in more detail in section 11.7.
- Domestic wastewater sources - some priority substances are found in domestic wastewater as a result of domestic cleaning chemicals, detergents, pharmaceuticals, pesticides or materials used within the home. Whilst an increase in the population due to housing growth could increase the total volumes of such substances being discharged to the environment, it would be more appropriate to manage these substances through regulation at source, rather than through restricting housing growth through the planning system.

No further analysis of priority substances will be undertaken as part of this study.

9.7 Conclusions

The water quality modelling undertaken in this study uses a model calibrated with water quality data and assumptions from 2010-12, and updated with the latest effluent flows at WwTWs within the study area, and incorporating AMP6 and AMP7 improvements provided by the EA. It should therefore be used to identify areas at risk of deterioration, and should not be used to set permit limits or definitively rule out growth in particular catchments.

At five WwTWs in Shropshire (Clive, Ditton Priors, Market Drayton, Oswestry Mile Oak and Nescliffe-Wilcot) water quality modelling identified a risk that planned growth could cause a deterioration in water quality, and that it may not be possible to mitigate this with treatment at the technically achievable limit. At these works, further mitigation may need to be taken to accommodate growth. Mitigation options include pumping wastewater to a different WwTW or changing the point of discharge to a less sensitive waterbody. Detailed optioneering is beyond the scope of this study and is best undertaken by Severn Trent Water who have a detailed knowledge of their assets, and the range of options and constraints at each.

At Bishops Castle WwTW, there is a risk that growth may prevent good ecological status being achieved in the future.

9.8 Recommendations

Table 9.4 Table of recommendations for water quality

Action	Responsibility	Timescale
Provide annual monitoring reports to STW and WW detailing projected housing growth in the Local Authority	SC	Ongoing
Take into account the full volume of growth (from SC and neighbouring authorities) within the catchment when considering WINEP schemes or upgrades at WwTW	STW, WW	Ongoing
Identify options to accommodate growth at the five WwTWs (Clive, Ditton Priors, Market Drayton, Oswestry Mile Oak and Nescliffe-Wilcot) at risk of deterioration that cannot be prevented.	STW	Aligned with projected growth plan

14 Summary and overall conclusions

14.1 Summary

The water cycle study has also assessed the impact of additional wastewater discharge on water quality in Shropshire. Downstream of many WwTWs that are expected to serve growth a deterioration in water quality is predicted, but in most cases, this could be prevented by improvements in treatment processes at those works. In five cases (Clive, Ditton Priors, Market Drayton, Nesscliffe Wilcot, and Oswestry Mile Oak), prevention of this deterioration may not be possible. and alternative solutions may be required in order to accommodate growth.

At Bishops Castle WwTW, whilst a large deterioration is not predicted due to growth, should improvements in water quality be made elsewhere in the catchment, there is a risk that the additional growth served by this WwTW could become the factor that prevents good ecological status being achieved in the watercourse downstream in the future.

Table 14.1 Summary of conclusions from the study (Water quality only)

Assessment	Conclusion
Water quality impact assessment	• At five WwTWs in Shropshire (Clive, Ditton Priors, Market Drayton, Oswestry Mile Oak and Nescliffe-Wilcot), water quality modelling identified a risk that planned growth could cause a deterioration in water quality, and that it may not be possible to mitigate this with treatment at the technically achievable limit. • At a further WwTW (Bishops Castle), there is a risk that growth may prevent good ecological status being achieved in the future. • At these works, further mitigation may need to be taken to accommodate growth and options include pumping wastewater to a different WwTW or changing the point of discharge to a less sensitive waterbody. Detailed optioneering is beyond the scope of this study and is best undertaken by Severn Trent Water who have a detailed knowledge of their assets, and the range of options and constraints at each.

14.2 Recommendations

Table 14.2 Summary of recommendations (water quality only)

Aspect	Action	Responsibility	Timescale
Water Quality	Take into account the full volume of growth (from SC and neighbouring authorities) within the catchment when considering WINEP schemes or upgrades at WwTW	STW, WW	Ongoing
	Identify options to accommodate growth at the five WwTWs (Clive, Ditton Priors, Market Drayton, Oswestry Mile Oak and Nescliffe-Wilcot) at risk of a deterioration.	STW	Aligned with projected growth plan

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