

1 Addendum

1.1 Introduction

The East Cambridgeshire District Council (ECDC) Water Cycle Study demonstrated that increased discharge of effluent due to growth at Littleport and Burwell Water Recycling Centres (WRC) may cause deterioration in local river quality. During consultation on the Proposed Local Plan, the Environment Agency (EA) raised concerns regarding the proposed growth in the district.

Following the comments from the EA, ECDC have reviewed and updated the quantum of development at Littleport within the plan period, which has resulted in a reduction in the number of dwellings of 600. Proposed development at Burwell will now only include sites that have allocated planning permission. Therefore, in order to address the concerns raised by the EA and to better understand the impact of future growth at Littleport and Burwell, an updated water quality assessment has been undertaken at the works.

In line with the original assessment the load standstill assessment and River Quality Planning (RQP) methodology will be used for Littleport WRC and Burwell WRC respectively.

1.2 Methodology

1.2.1 Growth Scenarios

For each development site, the receiving WRC and the increased Dry Weather Flow (DWF) to the WRC was calculated by using the number of housing units proposed, an occupancy rate of 2.3 persons per dwelling, and a consumption of 133 l/p/d (Anglian Water calculation) in line with the assessment in the existing WCS.

The wastewater demand for employment sites was calculated based on a discharge rate of 100l/employee per day.

Table 1-1: Growth during plan period by WRC

Water Recycling Centre	Forecast additional housing units	Forecast additional employees	Observed current 90%ile DWF (MI/d)	Forecast future total DWF (MI/d)
Burwell	566	1155	0.897	1.171
Littleport	2604	5425	0.716	1.988

Table 1-2: Estimated jobs growth at Burwell and Littleport

Policy Ref.	Estimated area of undeveloped employment land (ha)	Estimated floorspace (area x 0.35)	Estimated B1 jobs (0.001ha/job)	Estimated B2 jobs (0.0036ha/job)	Estimated B8 jobs (0.007sqm/job)
BUR.M1	0.5	0.175	175	49	25
BUR.E1	2.8	0.98	980	272	140
Total	3.3	1.155	1,155	321	165
LIT.E1	1	0.35	350	97	50
LIT.E2	13	4.55	4,550	1,264	650
LIT.M2	1.5	0.525	525	146	75
Total	15.5	5.425	5,425	1,507	775

Table 1-2 shows the potential future employment estimates which were provided for three employment scenarios, B1, B2 and B8. The number of potential employee numbers varies significantly across the different employment classes.

Net commitment housing units were used for both Burwell and Littleport. The estimated 'B1' jobs growth, which includes 0.001ha/job was used for employment numbers. The impact of including a further 600 units to be delivered at LIT.M2, either beyond or within the plan period was considered at Littleport.

1.2.2 Technically achievable limit (TAL)

To complete the assessment, future effluent flows were calculated to represent the updated future growth at proposed development sites within Littleport and Burwell. The assessment considered the impact of the updated Technically Achievable Limit (TAL) standard for phosphate which was introduced in unpublished EA Guidance in July 2017 and which has replaced the Best Available Technology (BAT) used in the original assessment. All other determinand limits have remained the same.

The EA advised the following technically achievable limits:

- BOD (95%ile) = 5mg/l
- Ammonia (95%ile) = 1mg/l
- Phosphate (AA) = 0.25mg/l

1.2.3 RQP Assessment

The Environment Agency's RQP tool was used to assess how the volumetric flows impacted upon the water quality at Burwell WRC and identify whether this causes a deterioration in the receiving watercourse.

Full methodology of EA guidance regarding deterioration limits and conditions are summarised in section 6.2.1 in the main report.

1.2.4 Load standstill Assessment

The load standstill assessment is a mass balance assessment of water quality. The current, consented and future loads for each determinand are calculated using the observed, consented and future flows multiplied by the permit level for each determinand. The future load is then compared with the consented load to check if it is likely to exceed its permit. The assessment gives a 'worst-case' scenario of each determinand.

The load after treatment at TAL is then calculated to each of the future loads. The TAL limit for phosphate has been updated within the assessment.

1.3 Results

1.3.1 RQP Analysis - Burwell

Tables showing the data used in the RQP assessment and the detailed results can be found in Annex B of this report. The original assessment and maps showing the location and water quality sampling points at Burwell can be found in section 1.4 of Appendix B, within the main report.

Table 1-3: Outcome of RQP assessment for Burwell WRC

Watercourse (WwTW)	Could the development cause a greater than 10% deterioration in WQ?	Could the development cause a deterioration in WFD class of any element?	Could the development prevent the water body from reaching GES?
Key	No infrastructure upgrade required to achieve		No infrastructure upgrade required to achieve
	Infrastructure upgrade likely to be required, but achievable with treatment at TAL		Infrastructure upgrade likely to be required, but achievable with treatment at TAL, or not achievable due to current technology limits.
	Cannot be achieved with treatment at TAL. Environmental capacity could be a constraint on growth.		Cannot be achieved with treatment at TAL. Environmental capacity could be a constraint on growth.
Burwell	Predicted deterioration is >10% for Ammonia. Proposed development could be accommodated with a tighter permit and upgrade to WwTW. This is achievable with treatment at TAL.	No class deterioration is predicted.	Good Ecological Status cannot be achieved for P due to current technology limits. The proposed growth should not prevent the waterbody achieving good status for P in the future. Ensure proposed growth doesn't cause significant deterioration.

The RQP assessment for Burwell WRC predicted no WFD class deterioration for all determinands, with BOD remaining 'High', ammonia remaining 'Good' and phosphate remained 'Moderate'.

The results do show a deterioration of greater than 10%, but without changing WFD class for ammonia, where the growth resulted in a deterioration of 13%, however this can be addressed through treatment at TAL. GES is achievable for both ammonia and BOD, however due to current technological limitations, this is not achievable for phosphate. The proposed growth should not prevent the watercourse from meeting good status in the future, if mid-class good status was achieved upstream. See Annex B, Table 4 within the RQP analysis of Burwell WRC, where future effluent quality must be treated at TAL (0.025mg/l) to achieve good status with a target concentration of 0.100 mg/l.

1.3.2 Load standstill Analysis

Figure 1-1 in Annex A shows the results of the load standstill assessment for Littleport. All residential growth within the local plan period can be accommodated at the works. Note this does not include the potential of a further 600 units either beyond or within the plan period at LIT.M2. Employment growth can only be accommodated with the B8 employment scenario of 0.007sqm/job. Other employment scenarios such as B1 (0.001ha/job) or B2 (0.0036ha/job) or the promotion of a further 600 units at LIT.M2, cause deterioration of BOD after treatment at TAL. These scenarios can only be accommodated with the inclusion of mitigation measures for which Anglian Water will be responsible for. One such measure could be waste transfer to the Ely (Old) WRC. A further RQP assessment will be undertaken to assess whether the additional DWF from Littleport can be

accommodated at Ely (Old) WRC and will not cause a deterioration of water quality in the watercourse.

1.3.3 RQP Analysis - Ely (Old)

Methodology

Before undertaking an RQP assessment for Ely WRC (Old), a further headroom assessment is needed to calculate whether there is suitable capacity at the works to accommodate additional flow. Table 1-4 below shows the new headroom calculation.

Table 1-4: Headroom assessment for Ely WRC (Old)

Permitted Maximum DWF (MI/d)	Observed DWF (90%ile)	Additional DWF (From Littleport and Ely)	Total (MI/d)	DWF Headroom % of permitted
4.350	2.934	0.937	3.871	11%

There is suitable capacity within Ely WRC (Old) treatment works and would not require an increase in permitted DWF in order to accommodate the additional flow. Below in Table 1-5 shows the results from the RQP assessment for Ely WRC (Old).

Table 1-5: Outcome of RQP assessment for Ely WRC (Old).

Watercourse (WwTW)	Could the development cause a greater than 10% deterioration in WQ?	Could the development cause a deterioration in WFD class of any element?	Could the development prevent the water body from reaching GES?
Key	No infrastructure upgrade required to achieve		No infrastructure upgrade required to achieve
	Infrastructure upgrade likely to be required, but achievable with treatment at TAL		Infrastructure upgrade likely to be required, but achievable with treatment at TAL, or not achievable due to current technology limits.
	Cannot be achieved with treatment at TAL. Environmental capacity could be a constraint on growth.		Cannot be achieved with treatment at TAL. Environmental capacity could be a constraint on growth.
Ely (Old)	No deterioration greater than 10% predicted.	No class deterioration is predicted.	Good Ecological Status cannot be achieved for P due to current technology limits. The proposed growth should not prevent the waterbody achieving good status for P in the future. Ensure proposed growth doesn't cause significant deterioration.

There was no WFD class deterioration for either determinand or deterioration greater than 10%. GES is not achievable for phosphate due to current technological limitations. The proposed growth should not prevent the waterbody from meeting good status in the future if a mid-class good status

was achieved upstream, good status could be achieved. The additional DWF from Littleport did not significantly worsen results, where phosphate could not meet good status in the original assessment.

1.4 Conclusions

Burwell

- The RQP analysis for Burwell WRC predicted deterioration in ammonia was greater than 10% but this can be addressed through treatment at TAL. There was no class deterioration in either determinand, but GES or GEP can only be met for ammonia and BOD.
- Proposed growth should not prevent the waterbody from meeting GES or GEP in the future for phosphate if mid-good class upstream is achieved.

Littleport

- The load standstill assessment for Littleport showed all residential properties (excluding the further 600 homes planned at LIT.M2) can be accommodated.
- Employment growth can only be accommodated with the B8 employment scenario, all other employment scenarios can only be accommodated through mitigation measures such as waste transfer to Ely WRC (Old).
- Headroom capacity at Ely WRC (Old) will not be exceeded with additional flow from Littleport as well as planned growth from Ely.
- The RQP analysis showed there to be no WFD class deterioration or deterioration greater than 10% in any determinand. GES can be met for both ammonia and BOD but not for phosphate.
- Planned growth will not prevent the waterbody from meeting GES or GEP in the future for phosphate if mid-good class upstream is achieved. The additional flow from Littleport did not significantly worsen results or analysis found within the main report for Ely WRC (Old).

It will be vital to liaise closely with Anglian Water regarding the timing of development in the area and in the future, if or when alternative treatment options may become available.

A Annex A - Load standstill Assessment for Littleport WRC

B Annex B - RQP Assessment

Figure 1-1: Load standstill Assessment for Littleport WRC with estimated jobs growth scenarios.

Planned Growth Scenario	Current Permit Level				Current Flow	Future Growth	Future Flow	Current pollutant load			Consented pollutant load			Future pollutant load			Is future pollutant load within permitted value after future growth?			Pollutant load with treatment at TAL			"No deterioration" achieved after treatment at TAL?		
	Permitted Maximum DWF (MI/d)	BOD 95%ile (mg/l)	NH ₄ 95%ile (mg/l)	P Annual Mean (Mg/l)	Observed 90%ile DWF (MI/d)	Additional DWF (MI/d)	Total DWF (MI/d)	BOD Load (mg/d)	NH ₄ Load (mg/d)	P Load (mg/d)	BOD Load (mg/d)	NH ₄ Load (mg/d)	P Load (mg/d)	BOD Load (mg/d)	NH ₄ Load (mg/d)	P Load (mg/d)	BOD	NH ₄	P	BOD Load (mg/d)	NH ₄ Load (mg/d)	P Load (mg/d)	BOD	NH ₄	P
Residential	2.067	10	3	2	0.716	0.01	0.73	7.160	2.148	1.432	20.670	6.201	4.134	7.280	2.184	1.456	Y	Y	Y	3.640	0.728	0.364	OK	OK	OK
Residential & 600 units (LIT.M2)	2.067	10	3	2	0.716	0.76	1.47	7.160	2.148	1.432	20.670	6.201	4.134	14.730	4.419	2.946	Y	Y	Y	7.365	1.473	0.737	NOT ACHIEVABLE	OK	OK
Residential & B8 Employment	2.067	10	3	2	0.716	0.66	1.37	7.160	2.148	1.432	20.670	6.201	4.134	13.720	4.116	2.744	Y	Y	Y	6.860	1.372	0.686	OK	OK	OK
Residential & B8 Employment & 600 units	2.067	10	3	2	0.716	0.83	1.55	7.160	2.148	1.432	20.670	6.201	4.134	15.460	4.638	3.092	Y	Y	Y	7.730	1.546	0.773	NOT ACHIEVABLE	OK	OK
Residential & B1 Employment & 600 units (LIT.M2)	2.067	10	3	2	0.716	1.27	1.99	7.160	2.148	1.432	20.670	6.201	4.134	19.880	5.964	3.976	Y	Y	Y	9.940	1.988	0.497	NOT ACHIEVABLE	OK	OK

WCS Assessment Datasheet	East Cambridgeshire
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STW	Burwell
Catchment	Cam
STW Point Code	
Assessment Date	
Receiving Water	Burwell Lode (River Cam)
WFD Waterbody ID	GB105033042720 - Burwell Lode
Upstream Sample Point	None
Downstream Sample Point	34M12 - Burwell Lode Factory Br. Burwell

Permit Reference Number AW1NF1065

Forecast Growth up to 2033 (Housing units)	
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Impact of climate change assessment
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STW Permit limits

Determinand	Unit	Limit	Statistic	Limit 2	Statistic
Permitted DWF	m3/day	1214	80%ile		
Post-Growth DWF	m3/day				
Max Daily	m3/day		Max Value		
BOD	mg/l	12	95 %ile	50	Max Value
Ammonia	mg/l	8	95 %ile	30	Max Value
Phosphate	mg/l	1	Annual Mean		

Comments/Assumptions
From EA supplied data sheet
From EA supplied data sheet
From EA supplied data sheet

Upstream River data

Determinand	Unit	Mean	SD	90 %ile	95 %ile
Flow	Ml/d	9.90	2.39		
BOD	mg/l	1.15	0.69		
Ammonia	mg/l	0.09	0.05		
Phosphate	mg/l	0.075	0.075		

Comments/Assumptions
Assumed mid-Good status upstream

STW discharge data

Determinand	Unit	Mean	SD	Shift Parameter	Samples
Flow	Ml/d	1.129	0.288		
Additional Flow due to Growth	Ml/d	0.274			
Post-Growth flow	Ml/d	1.403	0.358		
BOD	mg/l	2.550	1.080		
Ammonia	mg/l	1.060	1.730		
Phosphate	mg/l	0.48	0.22		

Comments/Assumptions
Data supplied from EA - 2015 Measured DWF for East Cams WwTWs spreadsheet
From WwTW headroom assessment
From WwTW headroom assessment

Downstream River data

Determinand	Unit	Mean	SD	90 %ile	95 %ile
BOD	mg/l				
Ammonia	mg/l				
Phosphate	mg/l				

Comments/Assumptions

Salmonid Fishery (Y/N)	No
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WFD Cycle 2

Determinand	Cycle 2 (2016)	Statistic	Unit	Standard	D/S sampling point +10%	No deterioration limit

Comments/Assumptions

BOD	High	90 %ile	mg/l	4	No data	4
Ammonia	Good	90 %ile	mg/l	0.6	No data	0.6
Phosphate	Moderate	Annual Average	mg/l	0.231	No data	0.231

1. Baseline performance

Determinand	Results worksheet	Baseline conc.	Is Cycle 2 WFD met?	Class used for no deterioration	No deterioration limit
BOD	RQP1	2.14	Yes	High	
Ammonia	RQP3	0.45	Yes	Good	
Phosphate	RQP5	0.13	Yes	Moderate	

Comments/Assumptions

2. No-deterioration test vs baseline

Determinand	Results worksheet	Baseline conc.	Results worksheet	Future conc.	Percentage Deterioration	Class Deterioration?
BOD	RQP1	2.14	RQP2	2.17	1%	No
Ammonia	RQP3	0.45	RQP4	0.51	13%	No
Phosphate	RQP5	0.13	RQP6	0.14	8%	No

Comments/Assumptions

3. Required discharge quality to avoid deterioration

Determinand	Statistic	Unit	Assumed TAL of treatment	Results worksheet	Effluent quality required to prevent deterioration	Is no deterioration achievable with treatment at TAL?
BOD	95%ile	mg/l	4	RQP7	N/A	No change to permit is required to prevent deterioration
Ammonia	95%ile	mg/l	0.6	RQP8	3.68	Yes
Phosphate	Annual Average	mg/l	0.25	RQP9	N/A	No change to permit is required to prevent deterioration

Comments/Assumptions

4. Could the development alone prevent the receiving water from reaching Good Ecological Status or Potential?

Determinand	Target Status	Target conc.	Effluent quality required to achieve target			
			Results worksheet	Present day	Results worksheet	Future
BOD	High	Acheiving target	RQP10	N/A	RQP14	N/A
Ammonia	Good	Acheiving target	RQP11	N/A	RQP15	N/A
Phosphate	Good	0.1	RQP12	0.27	RQP16	0.25

Comments/Assumptions
Assumed mid-upstream mid-Good status quality 0.075 mg/l

WCS Assessment Datasheet	East Cambridgeshire
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STW	Ely (Old) WRC
Catchment	Ouse
STW Point Code	
Assessment Date	
Receiving Water	Ely Ouse
WFD Waterbody ID	GB205033000070 - Ely Ouse (South Level)
Upstream Sample Point	36M01 - Ely Ouse Ely High Rd. Br
Downstream Sample Point	36M03 - Ely Ouse Cuckoo Rd. Br. Ely

Permit Reference Number AW1NF/1176
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Forecast Growth up to 2033 (Housing units)	
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Impact of climate change assessment
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STW Permit limits

Determinand	Unit	Limit	Statistic	Limit 2	Statistic
Permitted DWF	m3/day	4350	80%ile		
Post-Growth DWF	m3/day				
Max Daily	m3/day		Max Value		
BOD	mg/l	25	95 %ile		Max Value
Ammonia	mg/l	15	95 %ile		Max Value
Phosphate	mg/l	2	Annual Mean		

Comments/Assumptions
From EA supplied data sheet
From EA supplied data sheet
From EA supplied data sheet

Upstream River data

Determinand	Unit	Mean	SD	90 %ile	95 %ile
Flow	Ml/d	466.992	109.469		
BOD	mg/l	1.94	1.13		
Ammonia	mg/l	0.19	0.19		
Phosphate	mg/l	0.078	0.078		

Comments/Assumptions

STW discharge data

Determinand	Unit	Mean	SD	Shift Parameter	Samples
Flow	Ml/d	3.57	0.64		
Additional Flow due to Growth	Ml/d	0.94			
Post-Growth flow	Ml/d	4.51	0.81		
BOD	mg/l	7.66	3.60		
Ammonia	mg/l	3.41	1.77		
Phosphate	mg/l	0.96	0.55		

Comments/Assumptions
Data supplied from EA - 2015 Measured DWF for East Cambs WWTWs spreadsheet
Additional Growth without Littleport flow
From WwTW headroom assessment

Downstream River data

Determinand	Unit	Mean	SD	90 %ile	95 %ile
BOD	mg/l				
Ammonia	mg/l				
Phosphate	mg/l				

Comments/Assumptions

Salmonid Fishery (Y/N)	No
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WFD Cycle 2

Determinand	Cycle 2 (2016)	Statistic	Unit	Standard	D/S sampling point +10%	No deterioration limit

Comments/Assumptions

BOD	Good	90 %ile	mg/l	5	No data	5
Ammonia	Good	90 %ile	mg/l	0.6	No data	0.6
Phosphate	Moderate	Annual Average	mg/l	0.229	No data	0.229

1. Baseline performance

Determinand	Results worksheet	Baseline conc.	Is Cycle 2 WFD met?	Class used for no deterioration	No deterioration limit
BOD	RQP1	3.37	Yes	High	
Ammonia	RQP3	0.43	Yes	Good	
Phosphate	RQP5	0.09	No	Good	

Comments/Assumptions
Assumed mid-Good quality for Monte Carlo Calcs: mean and sd 0.078mg/l

2. No-deterioration test vs baseline

Determinand	Results worksheet	Baseline conc.	Results worksheet	Future conc.	Percentage Deterioration	Class Deterioration?
BOD	RQP1	3.37	RQP2	3.38	0%	No
Ammonia	RQP3	0.43	RQP4	0.44	2%	No
Phosphate	RQP5	0.09	RQP6	0.09	0%	No

Comments/Assumptions

3. Required discharge quality to avoid deterioration

Determinand	Statistic	Unit	Assumed TAL of treatment	Results worksheet	Effluent quality required to prevent deterioration	Is no deterioration achievable with treatment at TAL?
BOD	90 %ile	mg/l	5	RQP7	N/A	No change to permit is required to prevent deterioration
Ammonia	90 %ile	mg/l	0.6	RQP8	N/A	No change to permit is required to prevent deterioration
Phosphate	Annual Average	mg/l	0.25	RQP9	N/A	No change to permit is required to prevent deterioration

Comments/Assumptions

4. Could the development alone prevent the receiving water from reaching Good Ecological Status or Potential?

Determinand	Target Status	Target conc.	Effluent quality required to achieve target			
			Results worksheet	Present day	Results worksheet	Future
BOD	Good	Acheiving target	RQP10	N/A	RQP14	N/A
Ammonia	Good	Acheiving target	RQP11	N/A	RQP15	N/A
Phosphate	Good	0.099	RQP12	1.77	RQP16	1.40

Comments/Assumptions
Assumed mid-Good quality upstream (mean and SD of 0.078 mg/l)