

Primary

Primary treatment – French wetland

Site 4



SITE OVERVIEW

Population : 941
Type : French VF
Application : crude sewage
Year built : 2015

DESIGN PARAMETERS

Treatment area : 1,882 m²
Hydraulic loading rate : 0.52 m/d
Target consent : 30/50/15 mg/L
 BOD/TSS/NH₄-N



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PERFORMANCE METRICS

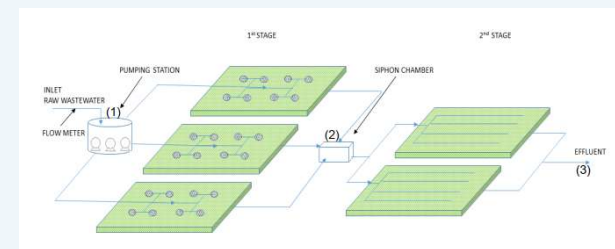
95%ile (passive): 9.6 mg NH₄-N/L
 95%ile (FBA): 5.3 mg NH₄-N/L

Parameter	Inlet to wetland (mg/L)		Outlet (mg/L)		% Removal
	Mean	St Dev	Mean	St Dev	
BOD	46	18	5	1.7	88
COD	169	59	39	11.3	75
TSS	56	21	6	3	88
NH ₄ -N	28	7	5.8	3.8	78

KEY FINDINGS

The system has been able to cope with hydraulic loads higher than basis of design with the addition of aeration into half the footprint of the second stage.

System configuration



Secondary

Integrated Constructed Wetland (ICW)

Yorkshire Water – Site 1



SITE OVERVIEW

Population : 160
Type : Surface flow (ICW)
Application : Septic tank effluent
Year built : 2022

DESIGN PARAMETERS

Treatment area : 2,917 m²
Hydraulic loading rate : 0.03 m/d
Nominal retention time: 10 days
Target consent : 4 mg/L TP



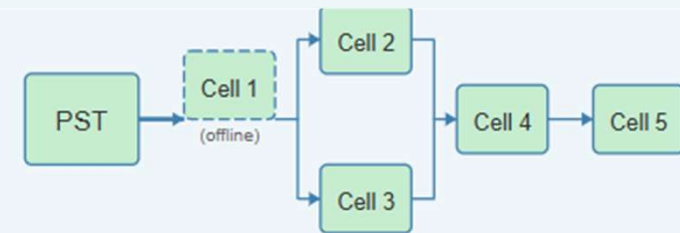
PERFORMANCE METRICS

Parameter	Inlet to wetland (mg/L)			Outlet (mg/L)			% Removal
	95%ile	Min	Max	95%ile	Min	Max	
BOD	312	50	376	15	2	39	95
COD	731	193	769	111	33	118	85
NH₄-N	78.6	21	84	41.3	7	43	47
Status	Meets UWWTR requirements for sites >2,000						

KEY FINDINGS

First UK secondary ICW demonstrating excellent performance with 95% BOD removal despite high organic loading

System configuration



Secondary

Aerated horizontal flow

Severn Trent – Site 5

SITE OVERVIEW

Population : 58
Type : Aerated HF
Application : Septic tank effluent
Year built : 2011 (retrofit year)

DESIGN PARAMETERS

Treatment area : 200 m²
Hydraulic loading rate : n/a
Target consent : Descriptive



PERFORMANCE METRICS

Parameter	Inlet to wetland (mg/L)			Outlet (mg/L)			% Removal
	Median	Min	Max	Median	Min	Max	
BOD	79	40	98	5	2	21	94
TSS	57	10	150	20	4	90	65
NH₄-N	29.4	1.0	59.6	0.8	0.1	2.6	97

KEY FINDINGS

The aerated wetland improved water quality from the passive HF bed, as well as reduced any visual and odour issues.

System configuration



Secondary

Vertical flow

Thames Water – Site 8



SITE OVERVIEW

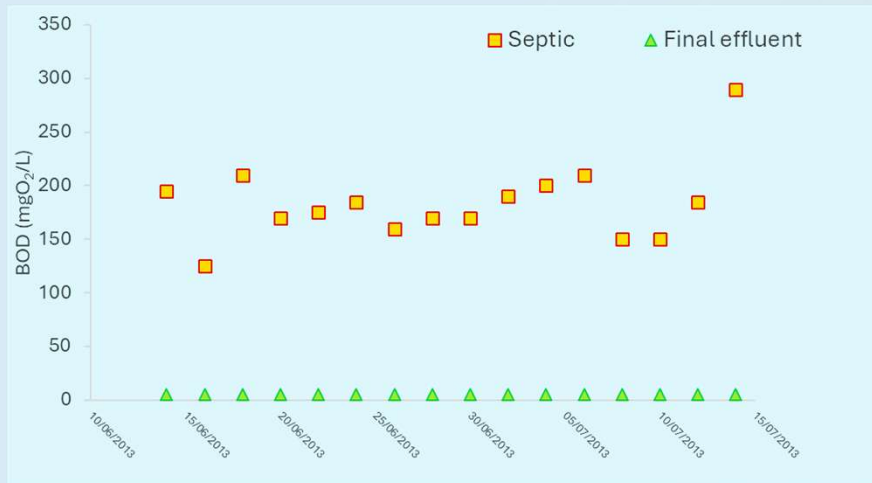
Population : 166
Type : Vertical flow
Application : Septic tank
Year built : 2013

DESIGN PARAMETERS

Treatment area : 684 m²
Hydraulic loading rate : m/d
Target consent : n/a



PERFORMANCE METRICS – Commissioning results



KEY FINDINGS

Analysis of records from the EA database for this site between 2015 and 2024 showed mean and 95%ile effluent BOD values of 6 mg/L and 24 mg/L, respectively, based on 17 samples.

System configuration



Secondary and tertiary

Conventional horizontal flow

Severn Trent – Site 9



SITE OVERVIEW

Population : 7,642
Type : Horizontal flow
Application : secondary and tertiary
Year built : 1997

DESIGN PARAMETERS

Treatment area : 4,968 m²
Hydraulic loading rate : 0.49 m/d
Target consent : 20/45/15/1
 BOD/TSS/NH₄/TP

UWWTR monitored site (pe>2,000). Datasets available from 1997, showing consistent compliance for all parameters.

PERFORMANCE METRICS

Parameter	Inlet (mg/L)		Outlet (mg/L)	
	95%	Mean	95%ile	Mean
COD	na	na	60	41
BOD	2.6	9	6	3
NH ₄ -N	na	na	5.7	2.3

n=36

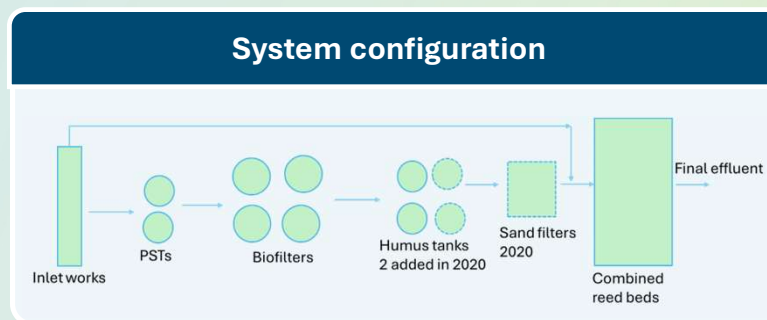
n=108



KEY FINDINGS

Combined secondary and tertiary reed bed system initially installed for capturing residual solids. Currently also trapping solids from Fe-dosed effluent upstream and achieving <6mg/L BOD in the outlet.

System configuration



Sewer overflow

Conventional horizontal flow

Wessex Water – Site B1



SITE OVERVIEW

Max flow : 60 L/s
Type : Horizontal flow
Application : pumping station overflow
Year built : 2011

DESIGN PARAMETERS

Treatment area : 2,695 m²
Hydraulic loading rate : 1.92 m/d
Target consent : n/a



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Low concentrations ≠ low treatment
 Average ammonia removal rate: ~7g/m²/d (*exceeds expectations*)

PERFORMANCE METRICS

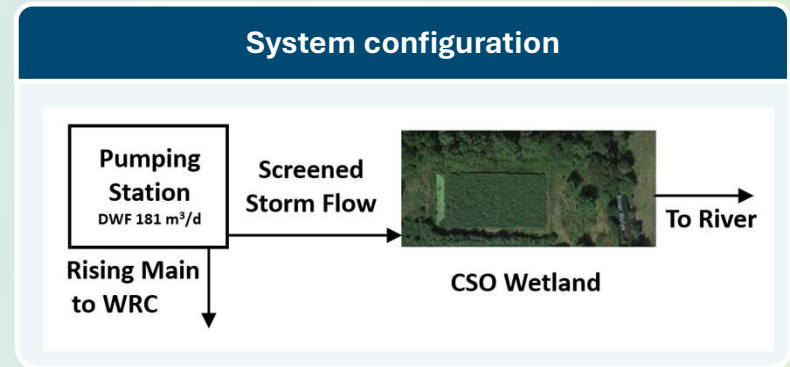
Parameter	Inlet (mg/L)		Outlet (mg/L)	
	95%	Mean	95%ile	Mean
BOD	8	5	4	3
TSS	12	7	15	7
NH ₄ -N	23.2	7.1	3.1	1.7

n=26

KEY FINDINGS

Single HF bed that receives flows from the sewage pumping station at times of high groundwater table – typically, October to May. Has an Operating Techniques Agreement for 2024 – 2027.

System configuration



**Sewer
overflow**

Aerated vertical flow

Southern Water – Site A2



SITE OVERVIEW

Max flow : 36 L/s
Type : Aerated vertical flow
Application : high flows at works
Year built : 2023

DESIGN PARAMETERS

Treatment area : 520 m²
Hydraulic loading rate : 0.17 to 6 m/d
Target consent : 20/40/20
 BOD/TSS/NH₄



PERFORMANCE METRICS

Parameter	Inlet to wetland (mg/L)		Outlet (mg/L)		% Removal
	Median	Average	Median	Average	
BOD	12.1	13.4	3	4.2	68-75
TSS	16.4	21.8	3.9	5.5	75
NH₄-N	2.7	2.9	1.7	2.4	17-37

KEY FINDINGS

The aerated wetland treated 134 events in 2024. Whilst infiltration results in compliant effluent without treatment, the wetland captures half of the pollution load that would otherwise be released to the environment.

System configuration

