H+H Drainage

Tremayne, Mortimer's Cross, Herefordshire HR6 9TG
Phone: 0845 2008421. Mobile: 07837 628764

Phosphate Mitigation

The Proposed New Dwelling at Streetfield Farm, Thornbury, Herefordshire HR7 4NH (in lieu of the Class Q building (Barn B) from 192624).

Planning Application 223779

15th April 2023

Prepared by Alex Taysum-Hunter

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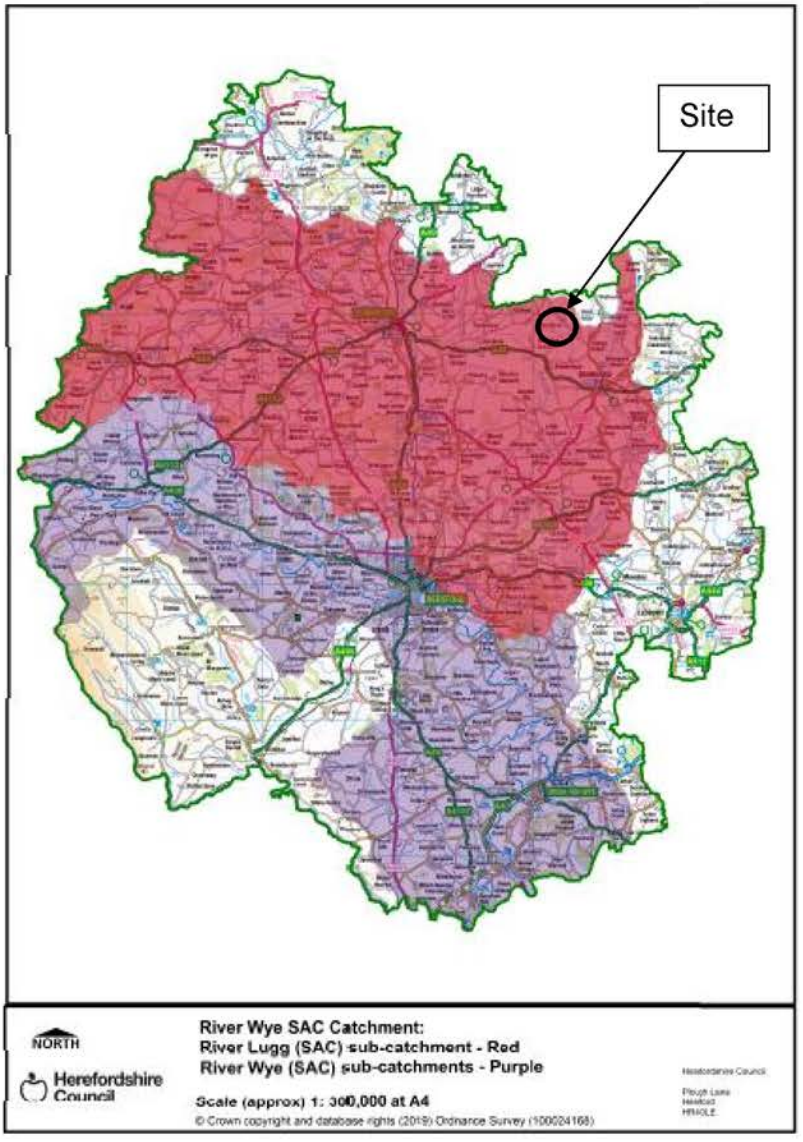
SUMMARY OF REPORT

The proposed development is located within the River Lugg Catchment (The Red Zone), which is designated as a Special Area of Conservation (SAC).

As such, the proposed development must show either a zero-phosphate discharge or must mitigate any phosphate discharge in line with guidance for Natural England and Herefordshire Council.



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Site Location and conditions

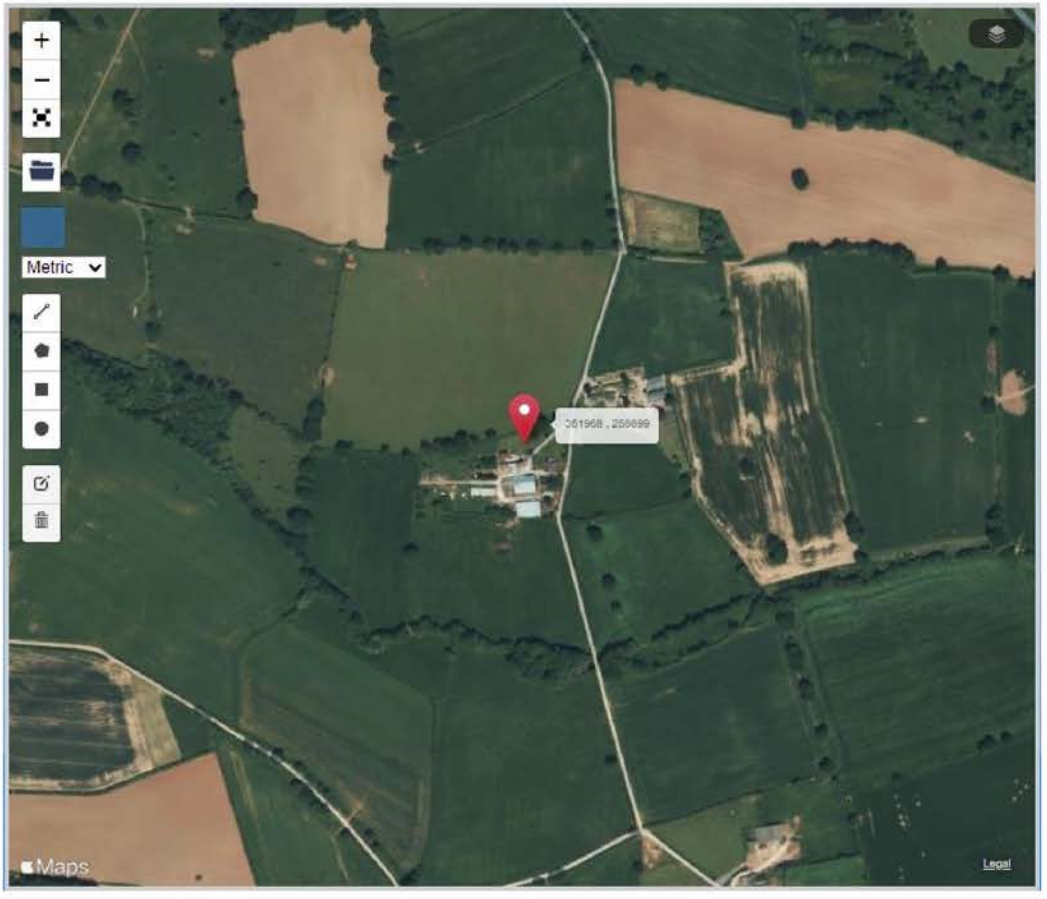
Streetfield Farm, Streetfield, Thornbury, Herefordshire HR7 4NH

SO 61968 58699

X (Easting): 361968
Y(Northing): 258699

Latitude: 52.225173
Longitude: -2.5581968

What3words: softly.thighs.pothole



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As can be seen from the following report, ground testing was completed at this location in May 2021. As can be seen from the percolation test results, the local soils were found to be impermeable and will not support a drainage field.

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16th May 2021

For the Attention of [redacted]

[redacted]

Dear Sir,

Ref: The BS.6297 Percolation Tests at Streetfield Farm, Thornbury, Herefordshire.

Many thanks for your instruction to complete the necessary percolation tests at Streetfield Farm. The tests were completed on the 12th May 2021.

The test area lies within the Lugg Catchment and is subject to the current Herefordshire Council Position Statement (Development in the River Lugg Catchment Area). As such, there are a number of parameters that must be met when completing percolation tests for a proposed off-mains foul drainage system:

Small discharges to ground i.e. less than 2m3/day1 that are within the surface or groundwater catchment of a designated site will present a low risk that the phosphorus will have a significant effect on the designated site where certain conditions are met:

a) *The drainage field is more than 50m from the designated site boundary (or sensitive interest feature)* ***and****;*

b) *The drainage field is more than 40m from any surface water feature e.g. ditch, drain, watercourse,* ***and****;*

c) *The drainage field is in an area with a slope no greater than 15%,* ***and****;*

d) *The drainage field is in an area where the high water table groundwater depth is at least 2m below the surface at all times* ***and****;*

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e) *The drainage field will not be subject to significant flooding, e.g. it is not in flood zone 2 or 3 and;*

f) *There are no other known factors which would expedite the transport of phosphorus for example fissured geology, insufficient soil below the drainage pipes, known sewer flooding, conditions in the soil/geology that would cause remobilisation phosphorus, presence of mineshafts, etc* ***and****;*

g) *To ensure that there is no significant in combination effect, the discharge to ground should be at least 200m from any other discharge to ground.*

Noting the above-mentioned 'rules', the percolation test holes were excavated in the locations shown on the following plan.

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As can be seen from the previous plan, there is a spring to the North West corner of the test area. The red radius denotes the area 40m away from the spring in accordance with the Position Statement.

There is a small watercourse (hydraulic pathway) along the North boundary of the test area. We have assumed that this could be piped in order to satisfy the Position Statement.

The large pond in the centre of the test area we have assumed that this would be filled in order to satisfy the General Binding Rules.

The drainage field serving the farm would be within 200m of the test area. In order to conform to the Position Statement, this drainage field would need to be re-located or the foul drainage system would need to be incorporated into the communal foul drainage system.

We are not sure as to the exact location of the drainage field that serves the neighbouring farm. However, it is likely that the drainage field is within 200m of the test area. If so, this would not conform to the Position Statement.

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Test Hole 1

Test Hole 2

Excavated spoil

Test Hole 3

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Test Hole 4

Test Hole 5

Test Hole 6

Excavated clay spoil

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In addition to the percolation test holes, two Groundwater Level Assessment Trial Holes (GWLA) were also excavated. The first trial hole was abandoned at a depth of 1,1m due to rock. The second trial hole was excavated to a depth of 2.2m and then left for 30-mins. We can confirm that there was no evidence of ground water at this depth.

GWLA 1 (1.1m deep)

Excavated rock

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GWLA 2 (2.2m deep)

Excavated clay spoil

As can be seen from the previous pictures, the topsoil was found to be primarily clay and the subsoil was found to be heavy red clay.

The following table show the results of the six percolation test holes.

Tests were completed at various depths in order to assess porosity at different depths. As can be seen from the percolation test results, the local topsoil and subsoil was found to have little or no porosity. These soils were found to be primarily clay.

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Site Name: Streetfield Farm

Date: 11th May 2021

Weather conditions: Showers

Hole reference	Hole Depth	Water Drop	Time (secs)	Av. Drop
A				
Test 1	500mm			DID NOT
Test 2	500mm			DRAIN
Test 3	500mm			
			Hole Average:	

Hole reference	Hole Depth	Water Drop	Time (secs)	Av. Drop
B				
Test 1	800mm			DID NOT
Test 2	800mm			DRAIN
Test 3	800mm			
			Hole Average:	

Hole reference	Hole Depth	Water Drop	Time (secs)	Av. Drop
C				
Test 1	200mm			DID NOT
Test 2	200mm			DRAIN
Test 3	200mm			
			Hole Average:	

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Hole reference	Hole Depth	Water Drop	Time (secs)	Av. Drop
D				
Test 1	600mm			DID NOT
Test 2	600mm			DRAIN
Test 3	600mm			
			Hole Average:	

Hole reference	Hole Depth	Water Drop	Time (secs)	Av. Drop
E				
Test 1	150mm			DID NOT
Test 2	150mm			DRAIN
Test 3	150mm			
			Hole Average:	

Hole reference	Hole Depth	Water Drop	Time (secs)	Av. Drop
F				
Test 1	1000mm			DID NOT
Test 2	1000mm			DRAIN
Test 3	1000mm			
			Hole Average:	

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In addition to the testing, it was noted that the surface water was puddling on the surface of the grass. In places, this water was noted to be trickling over land and through the grass.

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In conclusion, we must report that the evidence demonstrates that the installation of a drainage field or drainage mound would not be possible in this test area.

This percolation test has been completed in accordance with Building Regulations H3, BS.6297-1983, and The Environment Agency PPG4.

We hope that the above information is more than sufficient for your needs. If you have any further questions regarding this site or any other drainage system, please do not hesitate to contact the undersigned at your convenience.

Yours Faithfully,

Alex Taysum-Hunter.
British Water Accredited

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There is no local Public Foul Sewer and the previous report demonstrates that the local soils will not support a drainage field.

Using the following flow diagram of the Drainage Hierarchy, the site can be assessed: Following the flow diagram, we can see that the correct off-mains foul drainage solution is the installation of a **packaged sewage treatment plant** with a surface water discharge to the local watercourse.

This discharge of secondary treated effluent would be made under the Environment Agency General Binding Rules.

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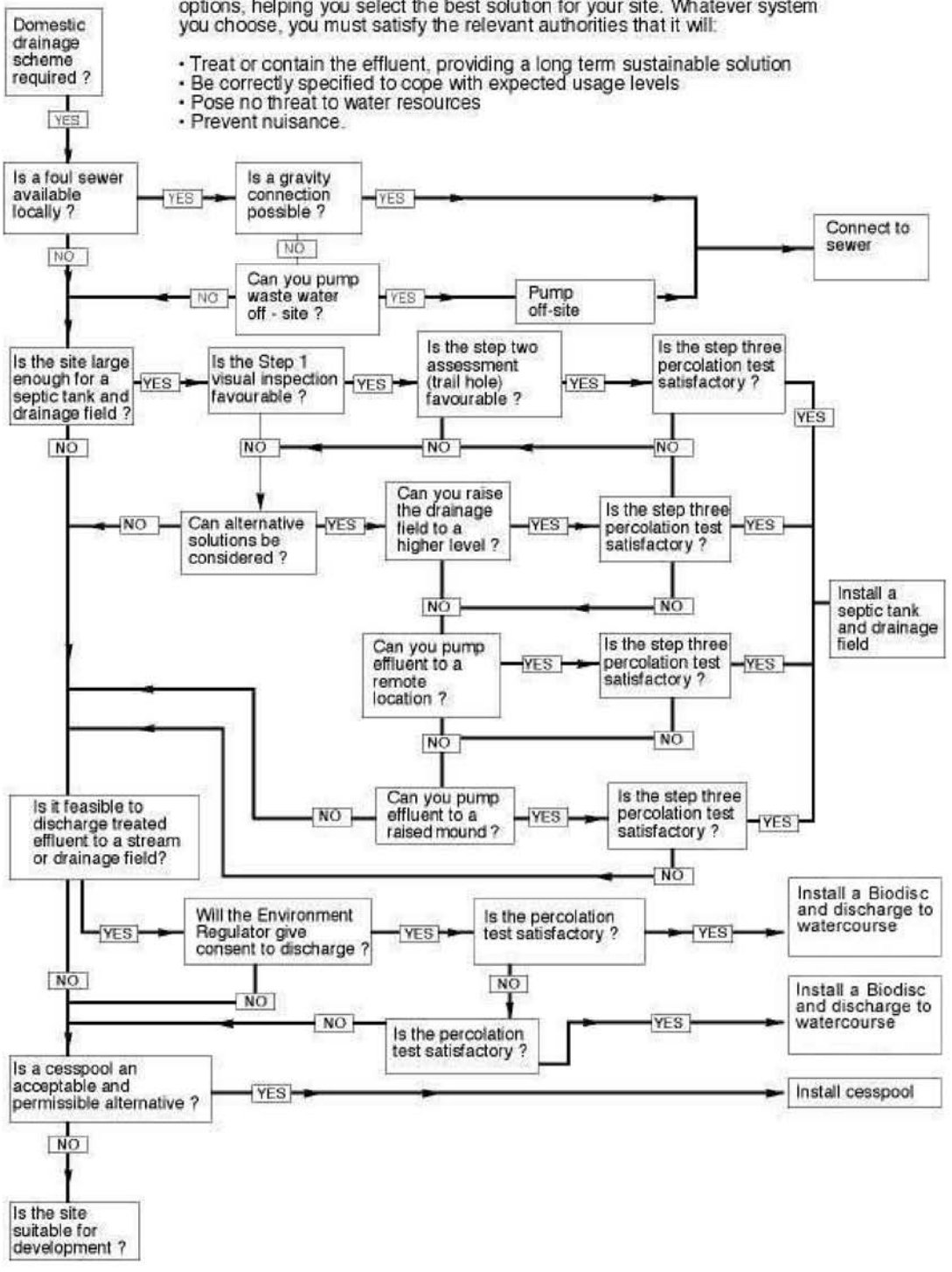
Site assessment and system selection

The flow chart below gives an overview of the principal off-mains drainage options, helping you select the best solution for your site. Whatever system you choose, you must satisfy the relevant authorities that it will:

- Treat or contain the effluent, providing a long term sustainable solution
- Be correctly specified to cope with expected usage levels
- Pose no threat to water resources
- Prevent nuisance.



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In order to comply with the River Lugg Catchment Position Statement and with guidance from Natural England, an effluent discharge to the local permanent watercourse must show phosphate mitigation or a reduction in Phosphate discharge.

There is currently Planning Permission in place to convert the barn to a dwelling at Streetfield Farm; Planning Reference 192624.

As demonstrated by the previous report, this Class Q conversion will require the installation of a packaged sewage treatment plant with a discharge of secondary treated effluent to the local permanent watercourse.

As there is no reference to the River Lugg Catchment Position Statement, or to the necessary foul drainage system in the Class Q permission; the Class Q dwelling off-mains foul drainage system would need to comply with Building Regulations Part H2 and with the Environment Agency General Binding Rules.

With the above information in mind, the following Nutrient Neutrality Budget Calculator demonstrates the total phosphate discharge from the Class Q dwelling:

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Development site details

Date (dd/mm/yyyy):	30/03/2023
Site Name:	Class Q inc. std PSTP
Planning Application number:	192624
Site Address:	Streetfield, Thornbury, Bromyard

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Stage 1

User Inputs

Date of first occupancy:	01/07/2024
Average occupancy rate:	2.30
Water usage (litres/person/day):	120
Development Proposal (dwellings/units):	1
Wastewater treatment works:	Package Treatment Plant default
Wastewater treatment works P permit (mg TP/litre):	9.7

Stage 1 Calculated Loading

Stage 1 Nutrient Loading

Additional population	2.3	people
Wastewater by development	276	litres/day
Annual wastewater TP load	**0.98**	**kg TP/yr**

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Stage 2

User Inputs

Catchment:	Arrow, Lugg and Frome
Soil drainage type:	Impeded drainage
Annual average rainfall (mm):	675.1 - 700
Within Nitrate Vulnerable Zone (NVZ):	Yes

Existing land use type(s)	**Area** (ha)	**Annual phosphorus nutrient export** (kg TP)
Mixed	0.24	0.14
Total:	**0.24**	**0.14**

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Stage 3

User Inputs

New land use type(s)	Area (ha)	Annual phosphorus nutrient export (kg TP)
Residential urban land	0.24	0.33
Total:	**0.24**	**0.33**

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Stage 4

Calculated Outputs

Annual Nutrient Budget

The total annual phosphorus load to mitigate is:	**1.4 kg TP/year**

As can be seen, the Class Q barn conversion (192624) would be served by a 'default' packaged treatment plant, and the phosphate discharge would be **1.4kg TP/year.**

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The following Nutrient Neutrality Budget Calculator demonstrates the total phosphate discharge from the proposed dwelling (223779):

Development site details

Date (dd/mm/yyyy):	30/03/2023
Site Name:	Streetfield proposed dwelling inc. non-chemical P-reducing PSTP
Planning Application number:	223779
Site Address:	Streetfield, Thornbury, Bromyard

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Stage 1

User Inputs

Date of first occupancy:	01/07/2024	
Average occupancy rate:	2.30	
Water usage (litres/person/day):	120	
Development Proposal (dwellings/units):	1	
Wastewater treatment works:	Package Treatment Plant user defined	
Wastewater treatment works P permit (mg TP/litre):	Please enter value in cell to the right:	1.6

Stage 1 Calculated Loading

Additional population	2.3	people
Wastewater by development	276	litres/day
Annual wastewater TP load	**0.16**	**kg TP/yr**

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Stage 2

User Inputs

Catchment:	Arrow, Lugg and Frome
Soil drainage type:	Impeded drainage
Annual average rainfall (mm):	675.1 - 700
Within Nitrate Vulnerable Zone (NVZ):	Yes

Existing land use type(s)	Area (ha)	Annual phosphorus nutrient export (kg TP)
Mixed	0.53	0.31
Total:	0.53	0.31

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Stage 3

User Inputs

New land use type(s)	Area (ha)	Annual phosphorus nutrient export (kg TP)
Residential urban land	0.53	0.73
Total:	0.53	0.73

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Stage 4

Calculated Outputs

The total annual phosphorus load to mitigate is:	0.69 kg TP/year

As can be seen, the proposed new dwelling (223779) will be served by a non-chemical dosing packaged treatment plant.

The proposed packaged sewage treatment plant is a "One2clean" SBR packaged sewage treatment plant as manufactured by Graf Ltd. As can be seen below, the One2clean packaged sewage treatment plant conforms to BSEN.12655-3 and is certified to reduce phosphate levels to 1.6mg/L without the use of chemical dosing.

PIA
Prüfinstitut für Abwassertechnik GmbH

PERFORMANCE RESULTS

Otto Graf GmbH
Carl-Zeiss-Str. 2 - 6, 79331 Teningen, Germany

EN 12566-3
Small wastewater treatment systems for up to 50 PT

Small wastewater treatment system one2clean
SBR plant in one two-zone polypropylene tank

Test report PIA2014-216B14.01.e

Nominal organic daily load*	0.27 kg/d		
Nominal hydraulic daily load	0.75 m³/d		
Material	polypropylene		
Treatment efficiency (nominal sequences)		Efficiency	Effluent
	COD	94.2 %	43 mg/l
	BOD_5	98.0 %	7 mg/l
	SS	96.3 %	14 mg/l
	NH_4-N**	98.3 %	0.5 mg/l
	N_{tot}**	87.0 %	7.0 mg/l
	P_{tot}	80.2 %	1.6 mg/l
Electrical consumption	0.83 kWh/d		

*at a test influent of ≥ 300 mg/l BOD_5 (mean)
**determined for temperatures ≥ 12°C in the bioreactor

Performance tested by

PIA – Prüfinstitut für Abwassertechnik GmbH
(PIA GmbH)
Hergenrather Weg 30
52074 Aachen, Germany

DAkkS

[redacted]

November 2014

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As noted, the One2clean packaged sewage treatment plant does not use chemical dosing. The system is an SBR unit (sequential batch separator) and uses aeration to encourage natural aerobic treatment of the effluent.

As demonstrated by the previous Nutrient Neutrality Budget Calculator, the phosphate discharge would be **0.69kg TP/year.**

Conclusion.

The previous information demonstrates that the installation of a new non-chemical dosing packaged sewage treatment plant to serve the proposed new dwelling will result in a reduction of phosphate.

The permitted Class Q barn conversion would discharge 1.4kg TP/year and the proposed dwelling will discharge only 0.69kg TP/year.

Therefore, in accordance with the Herefordshire Council River Lugg Catchment Position Statement and with Natural England guidance, the phosphate discharge from the proposed new dwelling can be mitigated within the site.

The discharge of secondary treated effluent via a Graff One2clean packaged sewage treatment plant will result in a reduction of 0.71kg TP/year.

By offsetting the proposed New Dwelling against the Permitted Class Q Barn Conversion, 0.71kg TP/year can be removed from the River Lugg Catchment.