

PHOSPHORUS CALCULATION FOR PROPOSED REDEVELOPMENT AT ORCOP.

Date: 13/03/2023

Project Reference: NN-2023

Planning permission is being sought for the construction of one dwelling at Orcop Hill. An initial assessment has been undertaken to gauge the potential increase in phosphorous export to the catchment associated with the new development. The site is not currently in a nutrient neutral catchment; however, calculations have been undertaken using the closest catchment, in this instance the River Lugg SSSI nutrient budget calculator issued by Natural England.

Site characteristics:

The site is located 2.19km north of the village of Orcop and is centrally located in Orcop Hill. The application area extends to approximately 0.1ha. The site can be accessed from Lyston Lane and the site was formerly the garden of the adjacent Homelands.

Topography:

The site has a gentle slope eastward decreasing from 202m Above Ordnance Datum (AOD) in the west of the site to 200m AOD in the east.

Bedrock Geology:

The bedrock geology is site is Brownstones Formation: this comprises sandstone. sedimentary bedrock formed during the Devonian period. Superficial deposits are absent at site.

Soils:

Based on the Cranfield University Soilscales webtool, the soils at the site are classified as 'Soilscales 6' which means they comprise freely draining and slightly acid loamy soils.

Hydrology and rainfall :

The annual rainfall was sourced from the National River Flow Archive at 700.1 – 750 mm/yr. (<https://www.nrfa.ceh.uk/data/search>). The site is located in the catchment of the River Wye SAC catchment. The nearest watercourse to site is located approximately 325m southwest of the site. It flows southwards for approximately 600m to its confluence with the Garren Brook.

Phosphorous Budget:

Calculations below have been undertaken in accordance with the River Lugg and Wye SAC nutrient calculator. This is attached in full, and results are summarised below.

The site is not in a sewered area therefore wastewater will be discharged via a package treatment plant to ground. Site investigations have been undertaken and an infiltration rate of Vp 20 was confirmed. Based on the recent advice¹ the biological GRAF One2Clean or similar is recommended, rather than one that requires chemical dosing; calculations have been undertaken based on this system. An occupancy rate of 2.4 and a water usage of 120 litres/person/day is assumed.

The calculated total phosphorus within wastewater from the proposed development is 0.14 kgTP/yr.

The proposed site extends to 0.1ha and land use has been classified as Open Urban as its large residential garden / greenspace, the associated TP export of load 0.08 kg/year. The post-development land use as urban residential development has an associated export of 0.15 kg/year. However, recent guidance issued by CIRIA² indicated that if all surface water runoff is discharged to ground then it can be considered that 100% is mitigated. Drainage proposals include an attenuation and infiltration basin for all surface water runoff. Therefore, the post-development phosphorus export is 0.00 kgTP/yr.

As part of the agreed nutrient calculator methodology, a 20% precautionary buffer is added to the total site budget.

This results in a total mitigation requirement of **0.08 kgTP/yr.**

¹ Advice Note – Considering Package Treatment Plants and Septic Tanks as part of nutrients mitigation in Somerset. Natural England and Environment Agency Sept 2022.

Mitigation:

A mitigation strategy has been developed by Environmental Consultancy Halpin Robbins and agreed with Natural England whereby orchards planted downgradient of a drainage field act to remove any additional phosphorus exported to the environment. The proposed mitigation for this site is to plant an orchard of apple trees as they have a high phosphorous uptake. A minimum of two apple trees is required, however it is proposed to plant three. This is considered precautionary.

Below is a table detailing the specific savings per tree type, research provided by Halpin Robbins:

Type	Av. Phosphorous absorption in fruits (kg/tree/yr)
Braeburn (apple)	0.0487
Cherries	0.0018
Pears	0.0013
Plums and Damsons	0.0397
Medlar	0.0060
Quince	0.0024
Hazelnuts	0.0078
Walnuts	0.1580

Conclusion:

This proposed development is not located within a designated nutrient neutral area, however a phosphorus budget to demonstrate neutrality has been requested.

The proposed development has a small over increase in phosphorus export of 0.08 kgTP/yr. It is proposed to mitigate this through an established mitigation method of planting an orchard downgradient of the drainage field discharge. The uptake from the orchard will remove more than the required budget exceeding the requirement to demonstrate neutrality. It can therefore be concluded that the site will have no adverse effect on the Garren Brook or the River Wye SAC / SSSI and is therefore compliant with the Neighbourhood Development Plan.

Stage 1

User Inputs

Date of first occupancy:		
Average occupancy rate:	2.40	
Water usage (litres/person/day):	10	The average occupancy rate (people per dwelling/unit) should not be edited unless there is sufficient evidence.
Development Proposal (dwellings/units):		
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	2.4	people
Wastewater by development	240	litres/day
Annual wastewater TP load	0.14	kg TP/yr

Stage 2

User Inputs

Catchment:	Wye OC
Soil drainage type:	Freely draining
Annual average rainfall (mm):	700.1 - 750
Within Nitrate Vulnerable Zone (NVZ):	No

Existing land use type(s)	Area (ha)	Annual phosphorus nutrient export (kg TP)
Open urban land	10	0.08
Total:		0.1

Stage 4

Calculated Outputs

The total annual phosphorus load to mitigate is:

0.08 kg TP/year

0.08 kg TP/year