

Land Adjacent To Sycamore House, Wrexham Road – A534, Holt

Nutrient Neutrality Assessment and Mitigation Strategy

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Report produced by Greenshank Environmental Limited on behalf of the Pridding Farming Partnership

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Version history

Version number	Produced by	Role	Date
V1	Dr Gabriel Connor-Streich	Prinicpal Environmental Scientist	05/06/2024
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1 Introduction

A recent Natural Resources Wales (NRW) compliance assessment highlighted that 50% of the assessed waterbodies in the River Dee and Bala Lake Special Area of Conservation (SAC) catchment (hereafter the Dee SAC catchment) are failing their phosphorus (P) targets (Hatton-Ellis and Jones, 2021). This assessment combined with a 2018 European Court of Justice ruling, referred to as the 'Dutch N Case', resulted in a new requirement for residential developments to mitigate the additional P pollution caused by new housing. This requirement was termed 'nutrient neutrality' and is reflected in Policy NE6 of the recently adopted Wrexham Local Development Plan (LDP)[1]. New planning applications within the Dee SAC catchment must now show that proposed developments are nutrient neutral in order to obtain planning permission.

Greenshank Environmental (Greenshank) were instructed by the Pridding Farming Partnership to prepare a Nutrient Neutrality Assessment and Mitigation Strategy (NNAMS) for a proposed development in the village of Holt, Wrexham. Section 2 of this report provides an overview of the development proposal. The NNAMS used a P budget to detail the potential impact from the development due to additional P loading to the Dee SAC (Section 3). The mitigation strategy for the development is detailed in Section 4, with a summary of the NNAMS in Section 5.

2 Development proposal

The development is proposed for Land Adjacent To Sycamore House, Wrexham Road – A534, Holt. Table 1 lists key site details. This site has been identified as a strategic allocation in the Wrexham LDP[1]. The proposed development land is currently under agricultural land use. The development proposal includes residential dwellings with associated parking, gardens, public open space and access roads. The existing land use, post-development land use and number of proposed dwellings were used to inform the P budget for the development.

Table 1: Key information about the proposed development site.

	Site details
No. dwellings	39
Grid reference	E: 340589, N: 353375
Area	1.72 ha
Net developable area	1.24 ha

3 Phosphorus budget

Nutrient budget calculations require data to be input in three stages that describe the nutrient output from treated wastewater from a new development, the current nutrient export from land use on the development site and the nutrient export from land use on the site post-development. A final stage calculates the nutrient budget, including the use of a precautionary buffer to account for uncertainties in input data. The inputs to each stage of

[1] Wrexham County Borough Local Development Plan 2013-2028: Adopted 20 December 2023.

the nutrient budget calculations and the results from each stage are shown below, along with a justification for the use of each input value. It should be noted that in lieu of a nutrient budget calculator for the Wrexham Local Planning Authority (LPA) area or for the wider Dee SAC, data on agricultural land use to inform Stage 2 of the P budget and data on P export post-development for Stage 3 of the P budget were taken from the West Wales Nutrient Budget Calculator[2].

3.1 Stage 1: Additional phosphorus export due to wastewater

Table 2 provides a breakdown of the inputs and calculations required to calculate Stage 1 of the nutrient budget, including descriptions of the values chosen for each input that show where the Precautionary Principle has been applied. The drainage strategy for the proposed development[3] has confirmed that a foul water connection can be made to the public sewer and that foul water from the development will be treated at Holt wastewater treatment works (WwTW) prior to discharge to the Dee SAC.

Table 2: Stage 1 nutrient budget inputs and calculations.

Input	Calculation	Value	Description
Number of dwellings	NA	39	No. of proposed dwellings as detailed in Table 1.
Occupancy per dwelling	NA	2.3	The average occupancy rate for houses in Wrexham as cited from Census data in the Wrexham LDP[1].
Water usage	NA	120 l/person/day	Standard water usage required for compliance with Building Regulations, Part G + 10 l/person/day to account for increases over time if residents change fixtures and fittings.
Treated effluent concentration	NA	5 mg TP/l	It has been confirmed that Holt WwTW will have a P permit of 5 mg TP/l[4].
Additional population	2.3 persons x 39	89.7 persons	The total additional population due to the development.
Additional wastewater	120 l/person/day x 89.7 persons	10,764 l/day	The total additional wastewater generation due to the development.
Additional TP load	**(10,764 l/day x 5 mg TP/l) / 10^6 x 365.25 days**	**19.66 kg TP/year**	**Combining the additional wastewater generation with the P concentration in treated effluent from Holt WwTW results in the**

[2] Available from: https://www.carmarthenshire.gov.wales/home/council-services/planning/new-phosphates-targets/west-wales-calculator/, accessed on: 05/06/2024.
[3] Land adjacent to Sycamore House, Wrexham Road, Holt: Flood Consequences Assessment & Drainage Strategy. Jan 2022. Waterco.
[4] See outcomes from the NRW Review of Permits, available from: https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/our-role-in-planning-and-development/phosphorus-limits-on-environmental-permits-for-waste-water-treatment-work-discharges/?lang=en, accessed on: 05/06/2024

Input	Calculation	Value	Description
			total additional P output from wastewater due to the proposed development.

3.2 Stage 2: Existing phosphorus export due to land use

Table 3 provides a breakdown of the inputs required to calculate the nutrient export from current land use on the development site.

Table 3: Stage 2 nutrient budget inputs and calculations.

Input	Calculation	Value	Description
Soil drainage type	NA	Freely draining	The drainage characteristics soils at the development site, based on the Soilscapes soil map[5]
Average annual rainfall	NA	679 mm/year	Rainfall for the development site determined from the UK Centre for Ecology and Hydrology Gridded Estimated Areal Rainfall dataset (Tanguy et al., 2021).
Land use	NA	Mixed	The landowner has confirmed that the site is under mixed arable and livestock land use.
Site area	NA	1.72 ha	The area within the redline boundary for the development.
P export coefficient	NA	0.11 kg TP/ha/year	The per ha P export coefficient for the Ceredigion LPA was selected as the most precautionary input for the Mixed farm type in the West Wales Nutrient Budget Calculator.
P export from current land use	**1.74 ha x 0.11 kg TP/ha/year**	**0.19 kg TP/year**	**The P export from existing land use on the proposed development site.**

3.3 Stage 3: Future phosphorus export due to land use

Table 4 provides a breakdown of the inputs required to calculate the nutrient export from future land use on the development site.

[5] Soil drainage type determined using the Soilscapes soil map, available from: https://www.landis.org.uk/soilscapes/, accessed on: 05/06/2024.

Table 4: Stage 3 nutrient budget inputs and calculations.

Input	Calculation	Value	Description
Residential land use area	NA	1.24 ha	The area of residential land use on the site post-development.
Public open space area	NA	0.5 ha	The area of public open space on the development site post-development.
Residential P export coefficient	NA	1.45 kg TP/ha/year	The per ha P export associated with residential land use, taken from the West Wales Nutrient Budget Calculator.
Public open space P export coefficient	NA	0.02 kg TP/ha/year	The per ha P export associated with public open space using the Greenspace P export coefficient taken from the West Wales Nutrient Budget Calculator.
P export from land use	**1.24 ha x 1.45 kg TP/ha/year + 0.5 ha x 0.02 kg TP/ha/year**	**1.81 kg TP/year**	**The P export from future land use on the proposed development site.**

3.4 Stage 4: Net change in phosphorus export due to the development

Table 5 provides a breakdown of the inputs required to calculate the final nutrient budget for the development.

Table 5: Stage 4 nutrient budget inputs and calculations.

Input	Calculation	Value	Description
Stage 1 nutrient export	NA	19.66 kg TP/year	The output from Stage 1 of the nutrient budget calculations – nutrients from treated wastewater.
Stage 2 nutrient export	NA	0.19 kg TP/year	The output from Stage 2 of the nutrient budget calculations – nutrients from current land use.
Stage 3 nutrient export	NA	1.81 kg TP/year	The output from Stage 2 of the nutrient budget calculations – nutrients from future land use.
Precautionary buffer	NA	20%	The required uplift in the nutrient budget to account for uncertainties in inputs.
Final nutrient budget	**(19.66 kg TP/year – 0.19 kg TP/year + 1.81 kg TP/year) x 1.2**	**25.53 kg TP/year**	**The final nutrient budget is the difference between nutrient sources from current land use and nutrient sources from new wastewater generation and future land use,**

Input	Calculation	Value	Description
			uplifted by the 20% precautionary buffer.

4 Mitigation strategy

4.1 Interaction between the Wrexham Local Development Plan, Dee Catchment Phosphorus Reduction Strategy and the Review of Permits

The Wrexham LDP[1] states that new development should seek to connect to mains sewers where possible. As detailed above, the drainage strategy for the proposed development specifies a connection to the mains sewer draining to Holt WwTW and Dwr Cymru Welsh Water (DCWW) have confirmed that Holt WwTW has capacity to except foul water flows from the proposed development[3]. The LDP references the Dee Catchment Phosphorus Reduction Strategy (DCPRS; DTA Ecology, 2021) that has identified a set of 'Category 1' P mitigation measures that are to be delivered by Wrexham Council. These measures include enhancements to WwTWs.

Natural Resources Wales (NRW) are in the process of completing a Review of Permits[6] that is assessing whether existing P permits at WwTWs are aligned to the P targets in SAC rivers that are required to restore failing SACs to 'favourable' conservation status. Where NRW have confirmed a new permit for a WwTWs, the P concentration required by the permit is deemed sufficient to not result in adverse effects on a SAC due to additional P inputs.

NRW issued a revised 5 mg TP/l permit for Holt WwTW on 06/02/2024[4]. Following issuance of the new permit, DCWW have since confirmed that the programme of works to enable compliance with this new permit will become effective from 28/01/2028. From this date, new developments connecting to Holt WwTW will benefit from Category 1 measures to mitigate the impact of new development on the Dee SAC. Thus, assuming dwellings at the proposed development are not occupied before 28/01/2028, the development will be nutrient neutral.

It should be recognised that the potential impact due to increases in P loading to the Dee SAC will begin from the point of occupation of the proposed development. As such, a Grampian condition prohibiting occupation of dwellings at the proposed development until after 28/01/2028 should provide security that the development will not result in Adverse Effects on the Dee SAC. DCWW have also confirmed (see Appendix 1) that such a planning condition would, due to provisions in Section 106 of the Water Industry Act 1991, mean that DCWW would not approve a sewer connection from the proposed development until all planning conditions related to foul water drainage have been approved. This should provide confidence that dwellings within the proposed development cannot be occupied until a Grampian condition related to P input to the Dee SAC has been discharged, as DCWW will not have approved a sewer connection from the site thus meaning dwellings would not have functioning foul drainage systems and would not be habitable.

[6] See: https://naturalresources.wales/about-us/news-and-blogs/news/review-of-wastewater-permits-to-reduce-phosphorus-and-support-the-delivery-of-affordable-housing/?lang=en, accessed on: 05/06/2024

4.2 Sustainable drainage systems (SuDS)

The surface water drainage strategy for the development[3] proposes a SuDS attenuation pond to ensure surface water runoff is controlled at greenfield runoff rates. The attenuation pond will result in a reduction in P export from surface runoff due to natural processes of P retention. Recent guidance suggests that ponds can achieve a minimum 38% reduction in P (Bradley et al., 2022). Residential land use on the site is estimated to result in 1.80 kg TP/year of P export in surface runoff. Thus, the use of SuDS on the site will result in at least 0.68 kg TP/year reduction in P export from the site, providing added certainty that the proposed development will not have adverse effects on the Dee SAC due to P inputs.

5 Summary

This report details an NNAMS for the development of 39 dwellings on Land Adjacent To Sycamore House, Wrexham Road – A534, Holt. The development will connect to the Holt WwTW. A nutrient budget for the development shows that the development has a positive P budget that will increase P inputs to Dee SAC. However, following the outcome from the NRW Review of Permits, the Holt WwTW has been issued with a 5 mg TP/l permit that will be effective from 28/01/2028. New permits issued through the Review of Permit are aligned to SAC river P targets. Thus, although the proposed development will increase P inputs to the Dee SAC, the Review of Permits has determined that a 5 mg TP/l permit at Holt WwTW will mean that new development will not have an adverse effect on the Dee SAC due to P. It is suggested that a pre-occupation Grampian condition would provide sufficient certainty that the dwellings will not be occupied until after the effective date for the Holt WwTW permit. This in turn should provide certainty that proposed development will not result in adverse effects on the Dee SAC due to increased P inputs. The development is also incorporating a SuDS pond as part of its drainage strategy, which will lower the P export from surface runoff at the site. This will help to provide additional certainty that the development will be nutrient neutral.

6 References

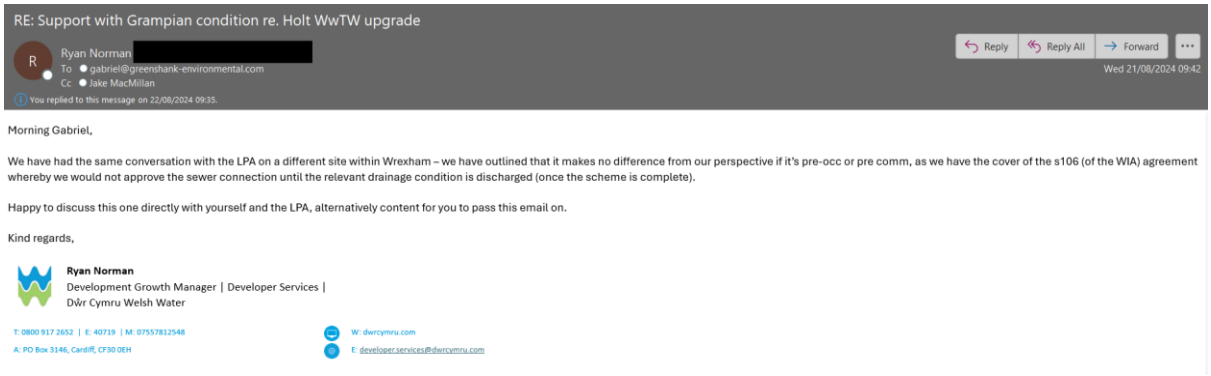
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Tanguy, M., Dixon, H., Prosdocimi, I., Morris, D.G., Keller, V.D.J., 2021. Gridded estimates of daily and monthly areal rainfall for the United Kingdom (1890-2019) [CEH-GEAR]. NERC EDS Environmental Information Data Centre. (Dataset).

Appendix 1



RE: Support with Grampian condition re. Holt WwTW upgrade

Ryan Norman [redacted]
To gabriel@greenshank-environmental.com
Cc Jake MacMillan

Reply | Reply All | Forward

Wed 21/08/2024 09:42

You replied to this message on 22/08/2024 09:35.

Morning Gabriel,

We have had the same conversation with the LPA on a different site within Wrexham – we have outlined that it makes no difference from our perspective if it's pre-occ or pre comm, as we have the cover of the s106 (of the WIA) agreement whereby we would not approve the sewer connection until the relevant drainage condition is discharged (once the scheme is complete).

Happy to discuss this one directly with yourself and the LPA, alternatively content for you to pass this email on.

Kind regards,

Ryan Norman
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