



Pickstock Homes



Outlining planning permission for 45 homes in Overton, North Wales

Phosphate Budget for the proposed development.

Pickstock Homes

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ADAS GENERAL NOTES

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CONTENTS

1	SUMMARY	1
2	METHODOLOGY.....	2
3	RESULTS	3
3.1	Introduction.....	3
3.2	Step One - calculate additional population	3
3.3	Step Two - confirm the water use	3
3.4	Step Three - confirm the WWTW and permit level.....	3
3.5	Step Four - calculate total phosphate.....	3
3.6	Step Five - calculate phosphate loss based on existing land use	3
3.7	Step Six - calculate phosphate loss based on proposed land use	4
3.8	Step Seven – overall phosphate budget.....	4
4	PHOSPHORUS MITIGATION MEASURES	6
4.1	Wastewater treatment works at Overton.	6
4.2	Adoption of a non mains sewage system	6
4.3	Risk assessment based on proposed P discharge via the Overton WWTW.	7
4.4	Conclusions	8

Tables

Table 3.3-1: Summary of the total P calculation	5
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1 SUMMARY

ADAS have been commissioned by Pickstock Homes to produce a phosphate (P) budget for an outline 45 unit residential housing development at Overton, North Wales.

Overall it can be shown that the development will not be phosphate neutral, with the increase in population being the primary cause of an increase of approximately 25 kg of P per annum.

It is noted that the discharge from the intended WTW at Overton and the downstream areas, are not currently failing with respect to phosphate levels, and that the increase in phosphate from the additional discharge would be at a level that could be regarded as *de minimus*.

However, if mitigation was required, there is potential to create a tertiary treatment between the WWTW discharge and the River Dee, in the form of a constructed wetland.

2 METHODOLOGY

This phosphate budget methodology is broadly based on a Natural England document entitled '*Methodology to calculate the nitrogen budget for development in the Solent and achieve nitrogen neutrality*' (Working Draft August 2018) and '*Advice on achieving nutrient neutrality for new development in the Solent region*'. (Version 2 June 2019 and subsequent versions).' This approach has been adapted for phosphates in new developments that affect the Somerset Levels and Moors Ramsar site. The calculations can now be performed in Phosphorous Budget Calculator v3.1

(https://ssccust1.spreadsheethosting.com/1/3d/08e177701b0026/Copy%20of%20P%20budget%20Calc_V3.1%20developer%20version/Copy%20of%20P%20budget%20Calc_V3.1%20developer%20version.htm)

The methodology incorporates a 7 step approach as follows:

- Step 1 – Calculate additional population;
- Step 2 – Confirm water use;
- Step 3 – Confirm Waste Water Treatment Works (WWTW) and permit level;
- Step 4 – Calculate total phosphate (TP) in kg per annum that would exit the WWTW after treatment;
- Step 5 - Calculate the P loss from existing land use;
- Step 6 – Calculate the P loss from the proposed land use;
- Step 7 – Calculate the overall P budget with an uncertainty.

Assumptions for each of the calculations are presented in the following Results section (Section 3).

3 RESULTS

3.1 Introduction

This section details the assessment based on steps 1-7 previously described.

3.2 Step One - calculate additional population

The additional population is calculated to be approximately **108 persons**, based on the following assumptions:

- The proposal has 45 units;
- The average occupancy is 2.4 persons/unit.

3.3 Step Two - confirm the water use

The water use is estimated at **11880 L/day** based on the following assumptions:

- The water use was estimated at 110 L/person/day;
- The above figure is based on a typical residential usage;

3.4 Step Three - confirm the WWTW and permit level

A level of **5 mg TP/L** is proposed as the permitted discharge level, based on the following assumptions:

- There is an available foul sewer connection for the proposed development (Overton WWTW);
- Since the WWTW has no discharge consent level, a default value of 5mg TP/L has been used.

3.5 Step Four - calculate total phosphate

An estimated **21.68 kg** of total P is calculated as the annual total P contribution from the proposed development.

3.6 Step Five - calculate phosphate loss based on existing land use

An estimated **2.15 kg** of total P is calculated as the annual total P loss based on existing land use, based on the following assumptions:

- The site (B1 only) is 5.37 ha
- The soil type is free draining (as shown by a preliminary search on MAGIC);
- The existing use is improved grassland, based on aerial photography in MAGIC

3.7 Step Six - calculate phosphate loss based on proposed land use

An estimated **2.82 kg** of total P of total P is calculated as the annual total P loss based on proposed land use, based on the following assumptions:

- The site (B1 only) is 5.37 ha and the soil type is impaired drainage (as above).
- The proposed use is 3 ha urban development and the remainder greenspace.

3.8 Step Seven – overall phosphate budget

An estimated **26.82 kg** of total P is calculated as the annual total P contribution from the proposed development.

- Based on the overall phosphate budget a 20% uncertainty is included.

A summary of the full results is shown in Table 3.1.

Table 3.3-1: Summary of the total P calculation

Steps	Item	Value	Units	Assumptions
	Proposed development	45	Units	
1	Additional Persons	108	Person	2.4 persons per unit
2	Water Use	11880	L/day	110L per person per day
3	Permit Level (Overton WWTW)	5	mg TP/L	Default discharge consent limit (assumed).
4	Total P discharge from WWTW derived from development	59400	mg TP/day	
4b	Total P discharge from WWTW derived from development	0.0594	kg TP/day	
4c	Annual Total P contribution from development	21.68	kg TP/year	365 days per year.
5	Annual Total P contribution from existing land use	2.15	kg TP/year	5.37 ha, under free draining soil and improved grassland land use
6	Annual Total P contribution from proposed land use	2.82	kg TP/year	5.37 ha, under impeded soil ha urban development land use with the remainder as greenspace,
7	Overall TP budget	26.82	kg TP/year	Annual P contribution of discharge plus proposed use minus existing use; Includes 20% Uncertainty

4 PHOSPHORUS MITIGATION MEASURES

Given the development site has an overall excess P budget, there is potential that planning permission will not be granted without the excess being addressed. In terms of reducing the overall impact of the development, it is possible to reduce the budget under certain scenarios. However, the major source of P output is clearly from the foul water that can only realistically be reduced by lowering the number of units built. Modifications of the land use can be made, for example the inclusion of green spaces into the exact design. However, these are only likely to produce small effects and not address the overall excess budget. There is sometimes no *de minimus* limit. It should be noted that the phosphate calculation presented here is based on guidance provided by a different local planning authority. We have seen no guidance with respect to the Dee SAC that would allow a similar calculation to be performed. For an exact calculation, a guidance from the LPA would be required. Therefore we can regard at present the figure presented to be within the “ball park” given the assumptions noted.

4.1 Wastewater treatment works at Overton.

Our overt assumption is that Overton WWTW does not have a phosphate discharge consent limit. However, this would need to be confirmed in discussion with the service provider (the assumption is that there is sufficient capacity but this would need to be clarified), it is possible that the Overton WWTW has plans to be upgraded under AMP7 framework. This would potentially negate the necessity for addressing the phosphate excess. However, we understand that this is not currently the case.

As we understand, there is potential to treat the discharge from the WWTW before it reaches the River Dee. This is an option that could be explored, with appropriate design. Assuming that the WWTW serves the current population of Overton at present, based on the assumptions used in the phosphate calculator, the treatment works with the additional population would be a source of 300 kg P/annum. An engineered solution that removed a relatively small percentage of phosphorus would therefore enable the project to become P neutral overall.

4.2 Adoption of a non mains sewage system

Given the presumable location of a sewage system in the locality of Overton, it is unlikely that a non-mains sewage system would be adopted.

“Generally, if the boundary of a single property is within 30 metres of a public sewer, it is considered feasible to connect. For larger developments, the number of properties is multiplied by 30 to calculate the distance at which it is still feasible to connect.

You have the right to connect to a public sewer. If a water company refuses to adopt your connection, you must appeal the decision with Ofwat before you can apply for a permit for a private sewage treatment system.

A lack of capacity in the sewer is not a valid reason for a water company to refuse a connection.”

Therefore, whilst an off grid solution is possible, these are generally not acceptable and only realistically pursued once a sewer connection has been denied.

4.3 Risk assessment based on proposed P discharge via the Overton WWTW.

As seen in the graphic below, the area of the Dee at Overton and the downstream areas are compliant to phosphorus levels (from Compliance Assessment of Welsh River SACs against Phosphorus Targets). It is only upstream areas that are non-compliant with respect to phosphate. Therefore, based on the most likely discharge point, the areas at greater risk will not be affected by the development.

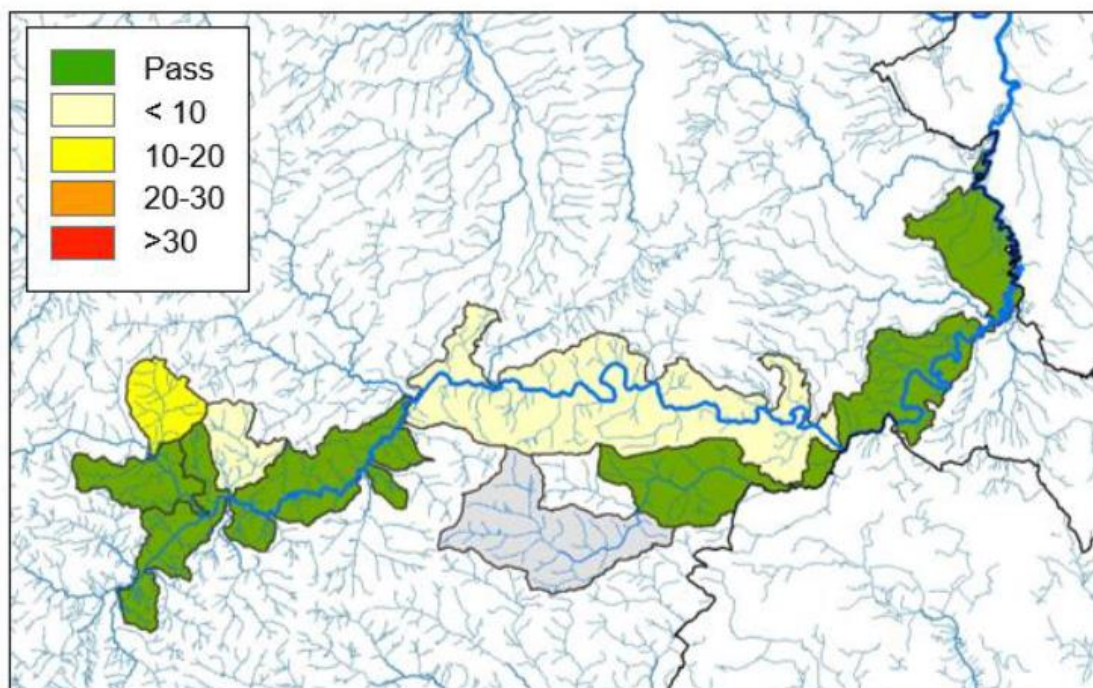


Figure 8. Phosphorus compliance map for the River Dee SAC. Water bodies shaded green pass their target. Other colours fail the target with different colours representing the magnitude of failures in $\mu\text{g l}^{-1}$, expressed as the larger of annual means and growing season means. Greyed out water bodies could not be assessed due to lack of data.

Flow data from a recording site just upstream from Overton at Manley Hall has a mean flow rate for the Dee at approximately $30\text{m}^3/\text{s}$ (<https://nrfa.ceh.ac.uk/data/station/info/67015>). On the basis that even if the river concentration of P was at $49\text{ }\mu\text{g/L}$ (approaching the limit of $50\text{ }\mu\text{g/L}$) the addition of an extra $26.82\text{ kg of P/annum}$ would only raise the mean concentration of the River Dee to rise to $49.03\text{ }\mu\text{g/L}$. The overall effect is therefore minimal and whilst the River Dee SAC remains at compliance downstream to P levels, the overall risk from this single development is negligible.

It is important to note that, whilst this individual development has a negligible effect, it will need to be considered within the wider context of any other development plans in the area. On this basis, it may be that the policy is to only accept developments that are fully phosphorus neutral if the receiving WWTW is subject to an HRA requirement.

4.4 Conclusions

Under the current model proposed the development is not phosphate neutral, although it would be recommended that the LPA issue specific guidance on determining phosphate neutrality.

There is an argument that the increase in phosphate would be negligible and since the sensitive area is not currently failing its phosphate levels it follows that the development would not need to be strictly phosphate neutral in this instance.

If, however, strict phosphate neutrality needed to be achieved, the tertiary treatment at the outfall of the WWTW would be seen as a viable option through an appropriately designed constructed wetland to remove sufficient phosphorus entering the sensitive site.