

Nutrient Neutrality Statement and Calculations

Introduction

Nutrient pollution is a major environmental issue for many important sites for nature in England. In marine habitats increased levels of nutrients (especially nitrogen and phosphorus) can speed up the growth of certain plants, disrupting natural processes and impacting wildlife. This process is known as eutrophication.

Special Areas of Conservation (SAC), Special Protections Areas (SPA), and Ramsar sites are some of the most important areas for wildlife in the UK. They are internationally important for their habitats and wildlife and are protected under the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations). These sites are known as Habitats sites. The applications site is within the fluvial catchment of the Solent SAC, SPA and Ramsar sites.

Following a legal case in the Court of Justice of the EU in 2018, known as the Dutch Nitrogen Case, in June 2019 Natural England issued an advice note to the Solent planning authorities advising that planning permission should not be granted unless the impact from a particular development can be appropriately assessed to determine whether the development is compliant with the Habitats Regulations. To assess compliance, a competent authority (in this instance Eastleigh Borough Council) will undertake a Habitats Regulations Assessment (HRA) which is made up of several distinct stages and must be undertaken in accordance with the relevant legislation.

This document is presented to support the HRA and necessary appropriate assessment (AA) by providing details of the potential nutrient loading, proposed mitigation and relevant calculations.

Generic Methodology

This nutrient strategy has been informed by all relevant Natural England guidance, chiefly 'Nutrient Neutrality Generic Methodology' (November 2022) and the 'Nutrient Neutrality Budget Calculator' (2022).

The generic methodology to calculate a nutrient budget comprises the following stages:

- Calculate the increase in nutrient loading to a Habitats site that will result from additional wastewater
- Calculate the nutrient loading from the current use of the land
- Calculate the nutrient loading from the proposed use of the land
- Calculating the net change in nutrient loading to a Habitats site, including an appropriate buffer

The following table provides a detailed review of the steps entailed with in of the above stages, as describe in the Natural England guidance.

Step	Description	Calculation	Output
Stage 1: Increase in nutrient loading to a Habitats site			
1: Calculate increase in population resulting from the development	Calculates the additional population that will result from the proposed development	Number of new dwellings x residents per dwelling	Total additional population
2: Calculate the increase in wastewater production due to the development	Additional population would result in additional water usage and therefore additional production of wastewater, with associated nutrient load	Additional population x daily per person water usage (litres/person/day) x year (365.25 days to account for leap years)	Total daily water use (litres/year)
3: Determine the concentration of nutrients in wastewater and calculate additional wastewater nutrient load	Combine the annual rates of additional wastewater by the development, with the concentration of nutrients after wastewater treatment, to get the additional nutrient load that will discharge to the Habitats site	Annual water use (litres/year) x wastewater nutrient concentration (mg/l)	Nutrient load (kg/year)
Stage 2: Nutrient loading from existing land use			
1: Obtain nutrient export values from current land use	The current land use on a development site will have an associated level of nutrient export that will currently impact the Habitats site. This step provides details on how to obtain nutrient export coefficients to calculate the level of nutrient export from a development site pre-development	Various calculations depending on the land uses	Nutrient export coefficient (kg/ha/year)
2: Calculate the annual nutrient export from the current land uses on the development site	The nutrient export coefficients obtained in Step 1 of Stage 2 are used along with areas of land under each land use to calculate the total export of nutrients from the site before the pre-development	Nutrient export coefficient (kg/ha/year) x area of land (ha)	Nutrient load (kg/year)
Stage 3: Nutrient loading from the proposed land use			

1: Calculate the annual export from future land use	This step accounts for the nutrient export from land use on the development site after the development has been built. It uses nutrient export coefficient for land uses that were determined in Stage 2	Nutrient export coefficient (kg/ha/year) x area of land (ha)	Nutrient load (kg/year)
Stage 4: Calculating the nutrient budget and buffer			
1: Calculating the nutrient budget	The outputs from Stages 1-3 are combined to calculate the nutrient budget for the development	Stage 1 nutrient load – Stage 2 nutrient load + Stage 3 nutrient load	Nutrient load (kg/year) <i>This is the nutrient budget</i>
2: Add the buffer to the nutrient budget	The nutrient budget calculated in Step 1 of Stage 4 is increased by 20% to account for any residual uncertainties in the methods used to derive the various inputs to the calculation of the nutrient budget	Nutrient budget (kg/year) x 1.2	Nutrient load (kg/year) <i>This is the final output of the methodology</i>

Specific inputs for proposed development

The generic methodology is applied to this specific development proposal. The table below details the inputs that are used for each step of the generic methodology, and the justification for selecting that input.

Step	Input	Justification	Output
Stage 1: Increase in nutrient loading to a Habitats site			
1: Calculate increase in population resulting from the development	1 x new dwelling 2.4 residents per dwelling	As existing there is 1 dwelling at the application site. This will be demolished as part of the application and 2 x new dwellings will be constructed. This is a net change of 1 additional dwelling. The Office of National Statistics (ONS) provide an average value for the number of residents per dwelling. Use of this figure is consistent	Total additional population : 2.4

		with Natural England's guidance	
2: Calculate the increase in wastewater production due to the development	Additional population: 2.4 Daily per person water usage: 110 litres + 10 litres Year in days : 365.25	The additional population figure from Stage 1 Step 1: 2.4 Building Regulations provide a water efficiency standard for maximum water consumption per person that needs to be achieved for a new dwelling of 125 l/p/d. The Building Regulations note that new residential developments may conform to a higher efficiency standard of 110 l/p/d. The figure of 110 l/p/d is used in accordance with the Partnership for Urban South Hampshire (PUSH) Integrated Water Management Strategy and Policy DM10 of the Eastleigh Local Plan. Allowance to account for changes to less water efficient throughout the lifetime of the development: 10 l/p/d Days in a year accounting for leap years: 365.25	105,192 litres/year
3: Determine the concentration of nutrients in wastewater and calculate additional wastewater nutrient load	Annual water use: 105,192 litres/year Wastewater nutrient concentration Nitrates: 7.9 (mg/l) Phosphates: 1.6 (mg/l)	The annual water use is calculated Stage 1 Step 2 above. A sewage package treatment plant is proposed. The specifications of the specific unit are provided in Appendix A of this document. This provides the input value for	0.62 kg TN/year 0.17 kg TP/year

		wastewater nutrient concentration.	
Stage 2 & 3: Nutrient loading from existing / proposed land use			
The nutrient budget calculation in Stage 4 subtracts the nutrient loading from Stage 2 and adds the nutrient loading from Stage 3. As the site is in an existing residential use, and a residential use of the overall same land area is proposed (albeit comprised of two smaller residential plots); there would be no net change in nutrient loading between the existing and proposed land use. For this reason justification of the calculation inputs are not provided here. For completeness the inputs of stages 2 & 3 can be viewed in the Natural England Nutrient Neutrality Budget Calculator which is displayed below.			
Stage 4: Calculating the nutrient budget and buffer			
1: Calculating the nutrient budget	Increase in nutrient loading to Habitat Site: 0.62 kg TN/year 0.17 kg TP/year	See table above.	0.62 kg TN/year 0.17 kg TP/year <i>This is the nutrient budget</i>
2: Add the buffer to the nutrient budget	Nutrient budget: 0.62 kg TN/year 0.17 kg TP/year Buffer: +20%	The generic nutrient budget methodology requires an a buffer of 20% to account for any residual uncertainties in the methods used to derive the various inputs to the calculation of the nutrient budget	0.74 kg TN/year 0.2 kg TP/year <i>This is the final output of the methodology</i>

Natural England Nutrient Neutrality Budget Calculator

Natural England have provided a nutrient neutrality calculator as a tool for assessing the nutrient loading to the designated Solent Habitats site. The calculator has been applied to the proposed development and is displayed below.

Development site details	
Date (dd/mm/yyyy):	09/01/2024
Site Name:	St Martins Close
Planning Application number:	PP-12706102
Site Address:	St Martins Close, Bishopstoke, SO50 6BH

Stage 1

User Inputs

Date of first occupancy:	01/01/2023	
Average occupancy rate:	2.40	
Water usage (litres/person/day):	120	
Development Proposal (dwellings/units):	1	
Include deductible acceptable loading?	No	
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
Wastewater treatment works N permit (mg TN/litre):	Please enter value in cell to the right:	7.9

Stage 1 Calculated Loading

Additional population	2.4	people
Wastewater by development	288	litres/day
Annual wastewater TP load	0.17	kg TP/yr
Annual wastewater TN load	0.62	kg TN/yr

Stage 2

User Inputs

Catchment:	Itchen
Soil drainage type:	Freely draining
Annual average rainfall (mm):	700.1 - 750
Within Nitrate Vulnerable Zone (NVZ):	Yes

Existing land use type(s)	Area (ha)	Annual phosphorus nutrient export (kg TP)	Annual nitrogen nutrient export (kg TN)
Residential urban land	0.28	0.41	3.78
Total:	0.28	0.41	3.78

Stage 3

User Inputs

New land use type(s)	Area (ha)	Annual phosphorus nutrient export (kg TP)	Annual nitrogen nutrient export (kg TN)
Residential urban land	0.28	0.41	3.78
Total:		0.41	3.78

Stage 4

Calculated Outputs

The total annual phosphorus load to mitigate is:

0.2 kg TP/year

The total annual nitrogen load to mitigate is:

0.74 kg TN/year

Conclusion

The nutrient budget has been calculated in accordance with Natural England's Nutrient Neutrality Generic Methodology. It is concluded that the total annual nutrient loading from the proposed development would be:

Phosphorus: 0.2 kg TP/year

Nitrogen: 0.74 kg TN/year

The preferred approach to mitigate the identified nutrient loading is by purchasing the relevant credits from Eastleigh Borough Council as part of EBC's Nutrient Offset Scheme. EBC's Phosphate and Nitrate Scheme Expression of Interest forms have been submitted to nutrientoffset@eastleigh.gov.uk in support of this application.

Appendix A

Proposed Package Treatment Plant details:



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 %	7.9 mg/l	
	P _{tot}	80.2 %	1.6 mg/l	
Electrical consumption	0.63	kWh/d		

*at a test influent of ≥ 300 mg/l BOD₅ (mean)

**determined for temperatures $\geq 12^{\circ}\text{C}$ in the bioreactor

Performance tested by:

PIA – Prüfinstitut für Abwassertechnik GmbH

(PIA GmbH)

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52074 Aachen, Germany

This document replaces neither the declaration of performance nor the CE marking.



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Elmar Lancé

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