



Nutrient Neutrality Calculation and Report

Application No PN/22/93015 for change of use from Commercial to Residential use class C3.

25 Shaftesbury Avenue, SO53 3BR

1. Introduction

1.1. This report details the nutrient loading calculated for PN/22/93015 for change of use from Commercial to Residential use class C3 at 25 Shaftesbury Avenue, SO53 3BR. The change of use is from a commercial day care nursery to a single residential unit. The nutrient calculation has been performed using the Itchen Nutrient Budget Calculator v 2.1.

1.2. The report has been prepared by Dr Simon Coles, PhD, MRSC, CChem who is an Environmental Chemist. His PhD specialised in the detection and monitoring of Nitrogen species in freshwater and was sponsored by the Natural Environment Research Council.

2. Executive Summary

2.1. For 25 Shaftesbury Avenue, SO53 3BR, the change of use from commercial day care nursery to single unit residential project has net nutrient reductions and contributes favourably to the reduction of nitrogen and phosphorus entering the River Itchen SAC and therefore no mitigation is required.

- a. The **nutrient net reductions** for the change in use from commercial day care nursery to single unit residential are substantial at

Total Phosphorus (TP)	- 0.3kg TP/year
Total Nitrogen (TN)	- 8.35kg TN/year

- b. The change of use results in a **significant reduction of the volume of wastewater from 1050 litres/day to 288 litres/day** using the Industry Standard Water usage taken from Table of Loadings for Sewage Treatment Systems - <https://www.britishwater.co.uk/page/Publications#wastewater%20treatment%20plant%20publications>.

3. Methodology

3.1. The nutrient calculation has been performed using the Itchen Nutrient Budget Calculator v2.1. As the Prior Approval has been granted for change of use from commercial day care nursery to single unit C3 residential, the calculations show the historical nutrient loading ('before') against the loading resulting from its new use ('after') as a residential unit.

4. Commercial Day Care Nursery Calculations ('before' scenario)

4.1 The site previously operated as Making Miracles Day Nursery with a capacity of 30 children plus 6 supervising nursery staff. In the last Ofsted report, 15 children were on the role. Therefore, the actual occupancy of 15+6 has been used and not the licensed operating capacity of 30+6. Water usage is based on Industry standard rates for non residential schools without canteen at 50 litres/person/day. **At 15 children + 6 staff water usage is 21 x 50 litres = 1,050 litres**

4.2 It must be noted that the licensed operating capacity of 30+6 would significantly increase the nutrient loading for the 'before' scenario. In addition, the fact that nursery age children require a lot more toilet breaks, nappy changes, hand washing, snack breaks, etc, which all require a higher use of water than is reflected in the 50 litres/person/day for primary and secondary school age children as shown below in the British Water flows and loads table.



Table of Loadings for Sewage Treatment Systems

Per person / activity / day (unless otherwise specified)	FLOW (Litres)	BOD (Grams)	Ammonia as N
DOMESTIC DWELLINGS (Grams)			
Standard residential	150	60	8
Mobile home type caravans with full services	150	60	8
INDUSTRIAL			
Office / Factory without canteen	50	25	5
Office / Factory with canteen	100	38	5
Open industrial site, e.g. construction, quarry, without canteen	60	25	5
*Full-time Day Staff	90	38	5
*Part-time Staff (4 hr shift)	45	25	3
SCHOOLS			
Non-residential with canteen cooking on site	90	38	5
Non-residential without a canteen	50	25	5

4.3 Stage 1 of the Itchen SAC Budget Calculator v2.1 (Day care 'before' scenario).

Stage 1

User Inputs

Date of first occupancy:	
Average occupancy rate:	21.00
Water usage (litres/person/day):	50
Development Proposal (dwellings/units):	1
Include deductible acceptable loading?	Yes
Wastewater treatment works:	Chickenhall Eastleigh WwTW
Wastewater treatment works P permit (mg TP/litre):	1
Wastewater treatment works N permit (mg TN/litre):	25

Post 2025 WwTW P permit:

0.6

 mg TP/litre

A nutrient permit is changing for the selected WwTW as of 01/01/2025. Therefore, two nutrient budgets will be calculated for the loading before and after the 2025 WwTW permit upgrade.

Stage 1 Calculated Loading

Post-2025 Stage 1 Nutrient Loading

Additional population	21	people
Wastewater by development	1050	litres/day
Annual wastewater TP load	0.21	kg TP/yr
Annual wastewater TN load	9.59	kg TN/yr

Pre-2025 Stage 1 Nutrient Loading

Annual wastewater TP load:	0.35	kg TP/yr
Annual wastewater TN load:	9.59	kg TN/yr

Figure 1: Screenshot from Itchen SAC Budget Calculator v2.1 - Stage 1 for Day Care Nursery ('before scenario') 25 Shaftesbury Ave, SO53 3BR.¹

Pre-2025 Stage Nutrient Loading

Annual wastewater TP load = 0.35kg TP/Yr

Annual wastewater TN load = 9.59kg TN/Yr

¹ Water usage taken from Table of Loadings for Sewage Treatment Systems - <https://www.britishwater.co.uk/page/Publications#wastewater%20treatment%20plant%20publications> as guided by Somerset Ecology Services (SES) response to 23/02474/FUL| (para 3.1 to this report)

4.4 **Stages 2 and 3 of the Itchen SAC Budget Calculator v2.1 (Day care ‘before’ scenario).** As the site size, location, soil type, usage remain unchanged, calculations for stages 2 & 3 also remain the same and do not affect the end calculations and therefore for simplicity have been omitted.

4.5 **Stage 4 of the Itchen SAC Budget Calculator v2.1 (Day care ‘before’ scenario).** Stage 4 calculations add a 20% increase buffer to the stage 1 results.

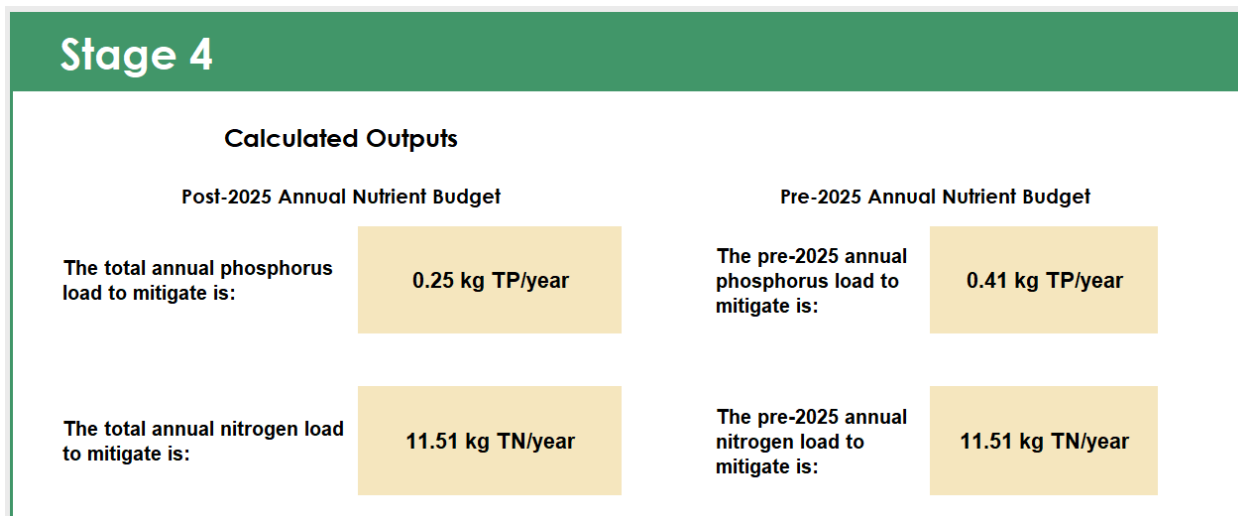


Figure 2: Screenshot from Itchen SAC Budget Calculator v2.1 - Stage 4 for Day Care Nursery (‘before scenario’) 25 Shaftesbury Ave, SO53 3BR.

Pre-2025 Stage Nutrient Loading

Annual wastewater TP load = 0.41kg TP/Yr

Annual wastewater TN load = 11.51kg TN/Yr

5. C3 residential single unit ('after scenario').

Stage 1

User Inputs

Date of first occupancy:	
Average occupancy rate:	2.40
Water usage (litres/person/day):	120
Development Proposal (dwellings/units):	1
Include deductible acceptable loading?	Yes
Wastewater treatment works:	Chickenhall Eastleigh WwTW
Wastewater treatment works P permit (mg TP/litre):	1
Wastewater treatment works N permit (mg TN/litre):	25

Stage 1 Calculated Loading

Post-2025 Stage 1 Nutrient Loading		
Additional population	2.4	people
Wastewater by development	288	litres/day
Annual wastewater TP load	0.06	kg TP/yr
Annual wastewater TN load	2.63	kg TN/yr

A nutrient permit is changing for the selected WwTW as of 01/01/2025. Therefore, two nutrient budgets will be calculated for the loading before and after the 2025 WwTW permit upgrade.

Post 2025 WwTW P permit:	0.6	mg TP/litre
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Pre-2025 Stage 1 Nutrient Loading		
Annual wastewater TP load:	0.09	kg TP/yr
Annual wastewater TN load:	2.63	kg TN/yr

Figure 3: Screenshot from Itchen SAC Budget Calculator v2.1 - Stage 1 for C3 Residential single unit ('after scenario') 25 Shaftesbury Ave, SO53 3BR.

Pre-2025 Stage Nutrient Loading

Annual wastewater TP load = 0.09kg TP/Yr

Annual wastewater TN load = 2.63kg TN/Yr

5.1. Stages 2 and 3 of the Itchen SAC Budget Calculator v2.1 (C3 Residential single unit 'after' scenario). As the site size, location, soil type, usage remain unchanged, calculations for stages 2 & 3 also remain the same and do not affect the end calculations and therefore for simplicity have been omitted.

5.2. Stage 4 of the Itchen SAC Budget Calculator v2.1 (C3 Residential single unit ‘after’ scenario). Stage 4 calculations add a 20% increase buffer to the stage 1 results.

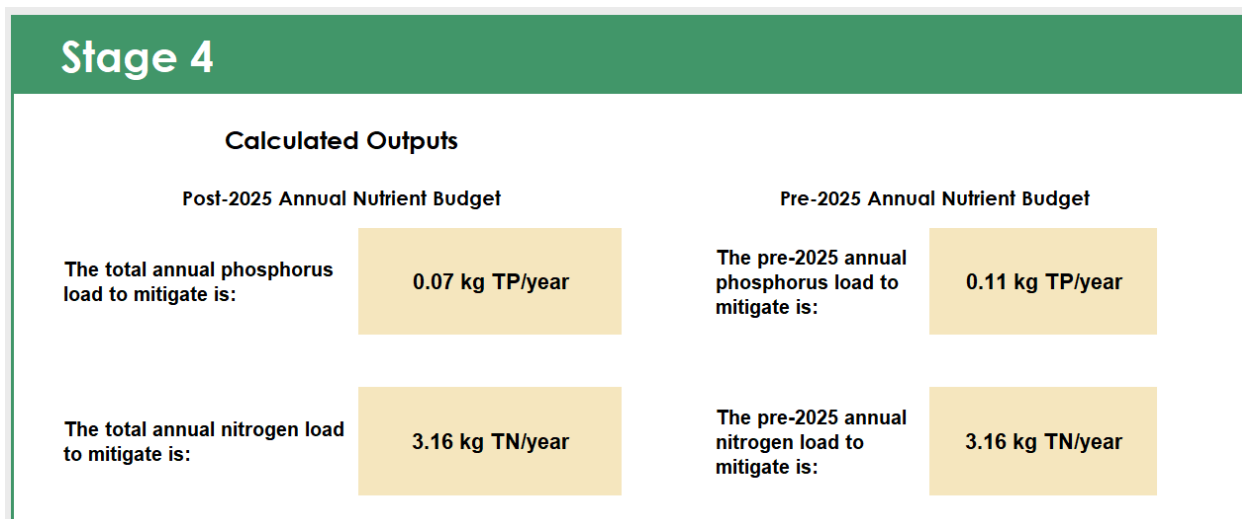


Figure 4: Screenshot from Itchen SAC Budget Calculator v2.1 - Stage 4 for C3 Residential single unit (‘after scenario’) 25 Shaftesbury Ave, SO53 3BR.

Pre-2025 Stage Nutrient Loading

Annual wastewater TP load = 0.11kg TP/Yr

Annual wastewater TN load = 3.16kg TN/Yr

6. Results

6.1. The table below shows the nutrient loading for 'before' and 'after' change of use with net reductions at 0.3 kg/yr and 8.35 kg/yr respectively.

	Phosphorus load (kg/yr)	Nitrogen load (kg/yr)
Day Care Nursery 15 + 6 persons ('before')	0.41	11.51
Day Care Nursery 30 + 6 persons	0.71	19.72
C3 residential single unit ('after')	0.11 (-0.3)	3.16 (-8.35)

Table 1: Reduction in nutrient loading resulting from change of use from Day Care nursery ('before') to C3 Residential single unit ('after') scenarios.

7. Conclusion

7.1. The application for change of use from day care nursery to single unit residential for 25 shaftesbury ave, SO52 3BR results in a net reduction of nutrient loading.

7.2. As such, nutrient neutrality requirements have been met and indeed positively contribute to the net reduction of nutrients entering the River Itchen catchment.