



Consulting Civil Engineers

## Nitrogen Neutrality Calculation

**Wildfowlers, Shore Road, Bosham, Chichester PO18 8QL**

**For**

**Mr & Mrs Bradley**

Rev **P**

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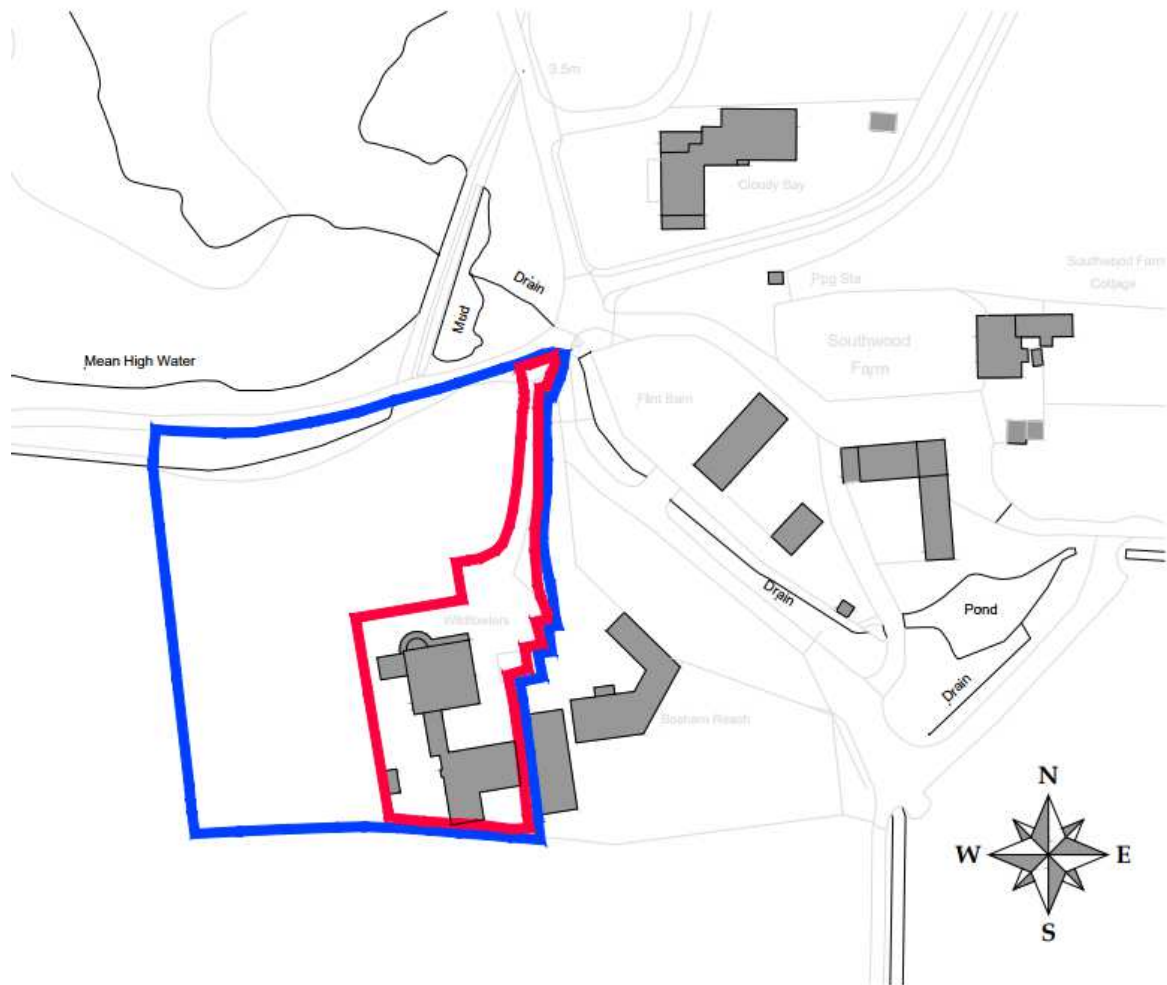
## 1 Introduction

- 1.1.1 CGS Civils Ltd have been appointed by Mr & Mrs Bradley to undertake a Nitrate Neutrality report for a proposed development at Wildfowlers, Shore Road, Bosham, Chichester PO18 8QL
- 1.1.2 The purpose of this report is to provide an overview on the potential nitrate changes on the site as a result of changing the existing land to accommodate the proposed development.
- 1.1.3 This report will provide:
- A review of the importance of achieving nutrient neutrality on sites within the Solent region
  - Existing Wastewater nitrogen load calculations
  - Calculations of the nitrate levels currently achieved from the current land use
  - Potential nitrate calculations caused by the changes in land use
  - An overall nutrient neutrality calculation for the new development
- 1.1.4 This report will carry out the calculations documented within '*Advice on Achieving Nutrient Neutrality for New Developments in the Solent Region – (November 2020)*' which provides details on how developments can achieve nutrient neutrality. The document utilizes a 4-stage approach, which will calculate the overall Nitrogen Load Budget for a proposed development.

## 2 Site Information

- 2.1.1 The existing site consists of a single domestic dwelling with a domestic garden area adjacent to the existing building. The site is bordered by other residential properties to the north west and west; farmland to the south and east and the Chichester Harbour lies to the north.
- 2.1.2 The proposed development will consist of the demolition of the existing dwelling and development of a new domestic dwelling.

### Site Location Plan:



LOCATION PLAN  
(SCALE 1:1250)

### 3 The Importance of Nutrient Neutrality

- 3.1.1 The proposed development is situated within the Solent region, in particular within Bosham which is located Chichester, West Sussex and over the recent years new development within this area has been under scrutiny with regards to the additional nutrient and nitrates added to the system. The document '*Advice on Achieving Nutrient Neutrality for New Developments in the Solent Region – (November 2020)*' which provides details on the importance of the Solent region along with how developments can achieve nutrient neutrality.
- 3.1.2 The document in question outlines that the Solent Region is one of the most important wildlife areas within the United Kingdom. High levels of nutrients and phosphorus input, from agriculture and/or wastewater sources, are shown to be common within the water environment. Due to this, new developments within the Solent region had raised uncertainty into the potential increase in nutrient and how to quantify this within the system once agricultural fields are altered to a built environment.
- 3.1.3 Work is ongoing with the Local Planning Authorities into this, however, Natural England has indicated that, to address the issue from new developments, any proposed development should show they can achieve 'nutrient neutrality', meaning that developers demonstrate that the new development does not add any additional nutrients from the change in land use. However, if this cannot be achieved, discussions with Natural England/Local Council would need to be undertaken to understand the 'Credits' needed either on the land or elsewhere (e.g., if land has permanently been taken out of intensive farming to open woodland/parkland).

#### 3.2 Stage 1: Calculating wastewater Total Nitrogen Load from the proposed development:

- Calculating additional population
- Wastewater volume
- Applying a deduction due to PTP efficiency
- Calculating the TN after PTP treatment
- Applying acceptable N Loading
- TN Discharged from site

#### 3.3 Stage 2: Calculating Nitrogen load from current land use:

- Calculate the Total Existing Agricultural Land
- Confirmation and Calculation of Nitrate Loss from Farm Type

#### 3.4 Stage 3: Calculating the adjusted Nitrogen Load to account for the future land uses:

- Calculation of Nitrogen Load from proposed future Land uses
- Combine the Nitrogen Load from the proposed future Land uses

#### 3.5 Stage 4: Nitrogen Load Budget:

- Calculate net change in Nitrogen from Land Use Changes
- Determine the Nitrogen Budget

- 3.5.1 The following sections within this report will follow these four stages of Natural England's Methodology to determine whether the proposed development will result in a positive or negative effect on Nutrient Neutrality.

## 4 Stage 1: Calculating Wastewater

4.1.1 First step is to determine the population within the site, the proposed development will consist of a single 5-bedroom domestic dwelling, which will have a population of 2.4 – this is in accordance with the national Occupancy Data derived from the 2011 census.

4.1.2 The next step is to calculate the increase in wastewater production as a result of the proposed development. This is calculated using an estimated water use per additional head of population. The average water use for new builds within the CDC area will be **120 litres per person per day (l/p/d)**. This falls in line with Policy 40 of Chichester District Council's Key Policies + an additional 10 l/p/d to account for changes to less water efficient fittings throughout the lifetime of the development. Therefore, the water usage from the proposed development will be **288 l/p/d**.

$$2.4 \times 120 \text{ l/p/d}$$

$$= \mathbf{288 \text{ l/day}}$$

- 2.4 (National occupancy level for a single new build) x 120 (110 l/p/d from Policy 40 of CDC's Key Policies + 10 l/p/d to cater for the change to less water efficient fittings)

4.1.3 It is then required to convert the water demand from l/day to l/year, therefore:

$$288 \times 365.25$$

$$= \mathbf{105,192 \text{ l/year}}$$

4.1.4 As the site falls within the Solent Region, a deductible acceptable loading value of 2mg TN/l is applied to the total value of the Klargester BE-X Package Treatment Plant, which has a nitrate value of 17.9mg TN/l within the effluent runoff. Therefore, the nitrogen load is 15.9mg TN/l and the total Annual load of nitrogen from site is:

15.9mg TN/l (Nitrate load in effluent runoff from PTP – 2 mg TN/l for deductible acceptable loading) x 105,192 l/year  
(4.1.3)

$$= \mathbf{1,672,552.8 \text{ mg/TN/Yr}}$$

$$1,672,552.8 / 1,000,000 = \mathbf{1.672 \text{ Kg/TN/Yr}}$$

## **5 Stage 2: Calculating Nitrogen Load from Current Land Use**

- 5.1.1 As the site usage is to remain the same – Urban Land – there is no requirement to calculate the change in land usage in accordance with Natural England guidance.

## **6 Stage 3: Calculating Nitrogen Load from Future Land Use**

- 6.1.1 As the site usage is to remain the same – Urban Land – there is no requirement to calculate the change in land usage in accordance with Natural England guidance.

## 7 Stage 4: Calculating Nitrogen Load budget

- 7.1.1 The final stage of the Nitrogen Neutrality Calcs will be to combine the last 3 stages together. This will result in the overall nitrogen budget for the site and if measures are needed to be taken to make the site nitrogen neutral

Nitrogen Load from Wastewater = **1.672 Kg/TN/Yr**

- Stage 1

- 7.1.2 The total net change in nitrogen load from land use change

= **0**

- Stage 3 – Stage 2

- 7.1.3 The final step will be to determine the site's nitrogen budget

1.672 = **1.672 Kg/TN/Yr**

- 1.672 (7.1.1) + 0 (7.1.2)

- 7.1.4 As the Nitrogen load budget is positive, a 20% precautionary buffer must be applied

1.672 + 20% = **2.0064 Kg/TN/Yr**



## 8 Achieving Nutrient Neutrality

8.1.1 Due to the proposed development consisting of the demolition of an existing domestic dwelling and construction of the proposed dwelling, there is no change in nitrates discharging from the site and by Natural England's own definition, the site is Nitrate Neutral.

8.1.2 The existing property at Wildfowlers has a population of 2.4 in line with the guidance from Natural England, and currently discharges all foul water runoff into a cesspit on site. Due to the existing population and nature of the existing discharge, it is clear that the proposed site is not only Nutrient Neutral, but that it also provides a degree of betterment of the existing discharge due to the installation of a new modern treatment plant.

### 8.2 Conclusion

8.2.1 The calculations above confirm that the proposals demonstrate nutrient neutrality and therefore offsetting will not be required.