

## Nutrient Neutrality Calculation

**32 High Street, Emsworth PO10 7AW**

**Planning Ref: APP/24/00119**

**For**

**Helyer Davies Architects**

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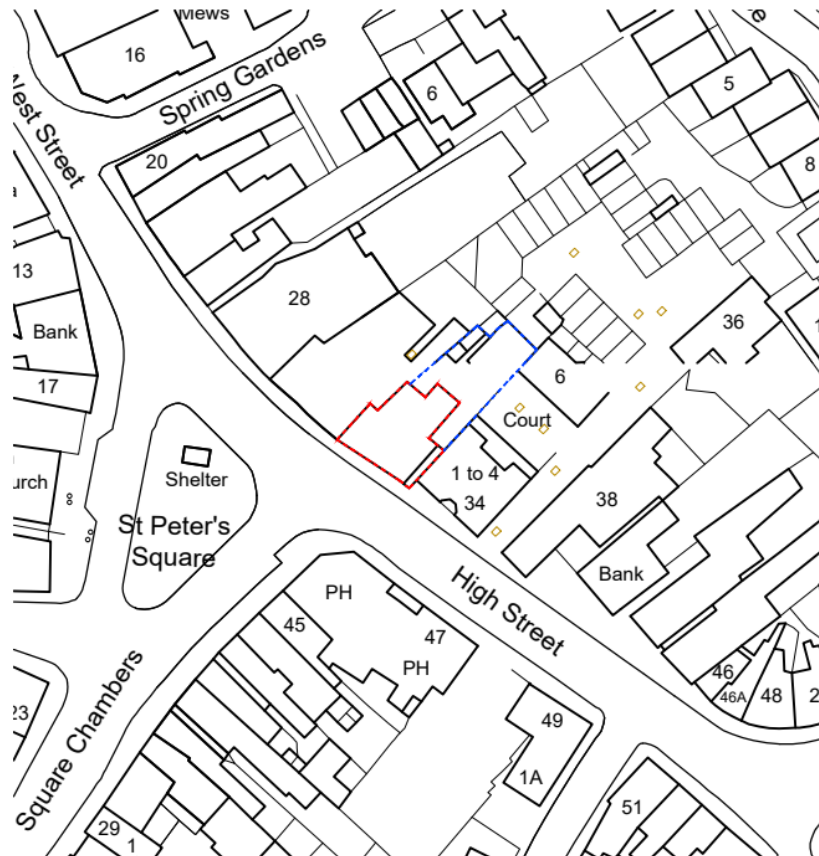
## 1 Introduction

- 1.1.1 CGS Civils Ltd has been appointed by Helyer Davies Architects to undertake a Nutrient Neutrality report for a proposed development at 32 High Street in Emsworth, West Sussex.
- 1.1.2 The purpose of this report is to provide an overview on the potential nutrient 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 nutrient load calculations
  - Calculations of the nutrient levels currently achieved from the current land use
  - Potential nutrient 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 '*Nutrient Neutrality Generic Methodology*' which provides details on how developments can achieve nutrient neutrality. The document utilizes a 4-stage approach, which will calculate the overall Nutrient Load Budget for a proposed development.

## 2 Site Information

- 2.1.1 The existing site of a mixed-use building that is currently utilised by an estate agent 'Office A' on the ground floor and part of the first floor. A second office 'Office B' is located on the first floor and within the loft room and a 1-bedroom dwelling located on the first floor with a holiday let bungalow to the rear courtyard.
- 2.1.2 The proposed development will consist of the conversion of the existing 'Office B' and 1-bedroom dwelling as well as the first-floor section of 'Office A' to form a single, 3-bedroom dwelling. The existing bungalow to the rear is to be retained

**Fig 1. Site Location Plan:**



### 3 The Importance of Nutrient Neutrality

- 3.1.1 The proposed development is located in Emsworth, West Sussex which is situated within the Solent region. Over recent years, new development within this area has been under scrutiny with regards to additional nutrients and nitrates being discharged into the Solent. The document '*Nutrient Neutrality Generic Methodology*' provides details on the importance of the Solent region along with how developments can achieve nutrient neutrality.
- 3.1.2 The aforementioned document identifies the Solent as being a wildlife area with significant importance within the United Kingdom. High levels of nutrient input from agriculture and/or wastewater sources are shown to be common within the water environment and as a result of this, new developments within the Solent region have raised uncertainty into the potential increase in nutrients, and how these can be analysed to determine the impact resulting from agricultural land being adapted to developed areas.
- 3.1.3 Discussions are ongoing with Local Planning Authorities; however, Natural England has indicated that to address the issue from new developments, any proposed development should demonstrate that 'nutrient neutrality' can be achieved, meaning that developers should demonstrate that the new development does not add any additional nutrient loading from the change in land use. However, if this cannot be achieved then discussions with Natural England/the Local Council would need to be undertaken to determine what techniques could be employed to mitigate the loadings. This could be either through site level activities such as woodland planting or the purchasing of bespoke credits.

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

- Calculating additional population
- Wastewater volume
- Receiving wastewater treatment works (WwTW) Environmental TN permit limit
- Deduct acceptable TN loading
- TN discharged after WwTW treatment
- Convert from mg/TN to kg/TN per year

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

- Calculate the Total Existing Land use
- Confirmation and Calculation of Nutrient Loss from land type

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

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

#### 3.5 Stage 4: Nutrient Load Budget:

- Calculate net change in Nutrient from Land Use Changes
- Determine the Nutrient 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 The first step is to determine the population within the site. Havant Borough Council have an occupancy calculator which determines the change in average occupancy from the proposed development. As the proposal is for the conversion of an office block and 1-bedroom to form a 3-bedroom dwelling, the change in occupancy will be 2.

Fig 2. Occupancy Calculator:

| Occupancy calculator                                        |                                                |                       |                        |
|-------------------------------------------------------------|------------------------------------------------|-----------------------|------------------------|
| Date                                                        | 27.03.24                                       |                       |                        |
| Site name                                                   | 32 High Street, Emsworth                       |                       |                        |
| Site address                                                | 32 High Street, Emsworth, West Sussex PO10 7AW |                       |                        |
|                                                             | Gross new homes proposed                       | Gross losses proposed | Net new homes proposed |
| 1 bed                                                       |                                                | -1                    | 1                      |
| 2 bed                                                       |                                                |                       | 0                      |
| 3 bed                                                       | 1                                              |                       | 1                      |
| 4 bed                                                       |                                                |                       | 0                      |
| 5+ bed                                                      |                                                |                       | 0                      |
| Total                                                       | 1                                              | -1                    | 2                      |
| Average occupancy to include in Solent Nutrient Calculator: |                                                |                       | 2.00                   |

- 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 will be **120 litres per person per day (l/p/d)**. This falls in line with Building Regulations Part G + 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**.

$$2 \times 120 \text{ l/p/d}$$

$$= 240 \text{ l/day}$$

- $2 \text{ (Increase in occupancy from Havant Occupancy Calculator)} \times 120 \text{ (110 l/p/d from Building Regs Part G + 10 l/p/d to cater for the change to less water efficient fittings)}$

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

$$240 \times 365.25$$

$$= 87,660 \text{ l/year}$$

- 4.1.4 As the site falls within the Solent Region, a deductible acceptable loading value of 2mg TN/l is subtracted from the permit limit. Due to the location of the site, the proposed development will discharge to the Budds Farm Wastewater Treatment Works which has a permit limit of 9.70 mg TN/l.

$$9.70\text{mg TN/l} - 2\text{ mg TN/l}$$

$$= \mathbf{7.70\text{ mg TN/l}}$$

- 4.1.5 The next step is to reduce this adjusted limit to 90% in order to account for a worst-case scenario where the WwTW operates at 90% of the permitted limit. Therefore, the adjusted value is to be multiplied by 0.9.

$$7.70\text{ mg TN/l} \times 0.90$$

$$= \mathbf{6.93\text{ mg TN/l}}$$

- 4.1.6 The reduced permit limit can now be multiplied by the annual wastewater produced by the site and then converted into kg/year:

$$87,660\text{ l/year} \times 6.93\text{ mg TN/l}$$

$$= \mathbf{607,483.8\text{ mg TN/year}}$$

$$607,483.8 / 1,000,000$$

$$= \mathbf{0.61\text{ kg TN/year}}$$

## 5 Stage 2: Calculating Nutrient Load from Current Land Use

- 5.1.1 The catchment area, soil type and annual average rainfall must then be identified:

- The site falls within the Western Streams Catchment Area
- The soil is noted to be Naturally Wet
- The annual average rainfall is 850.1 – 900mm
- The site falls within the Nitrate Vulnerable Zone (NVZ)

- 5.1.2 The current land usage will not be changed.

## 6 Stage 3: Calculating Nutrient Load from Future Land Use

- 6.1.1 The current land usage will not be changed.

## 7 Stage 4: Calculating Nutrient Load budget

- 7.1.1 The final stage of the Nutrient Neutrality Calcs will be to combined the last 3 stages together. This will result in the overall nutrient budget for the site and if measures need to be taken to make the site nutrient neutral

$$\text{Nitrogen Load from Wastewater} = \mathbf{0.61 \text{ Kg/TN/Yr}}$$

- Stage 1

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

$$0 - 0 = 0 \text{ Kg/TN/Yr}$$

- Stage 3 – Stage 2

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

$$0.61 + 0 = \mathbf{0.61 \text{ Kg/TN/Yr}}$$

- 0.61 (7.1.1) + 0.0 (7.1.2)

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

$$0.61 + 20\% = \mathbf{0.73 \text{ Kg/TN/Yr}}$$

## 8 Achieving Nutrient Neutrality

8.1.1 The above calculations confirm that the site is **NOT** nutrient neutral, and that mitigation is required. In most cases, on site mitigation will not be enough and additional off-site offsetting measures will also be required. Off-site measures may include:

- The purchase of nutrient offset 'credits'
- Bespoke mitigation projects prepared by the developer

8.1.2 Due to the size of the site, on-site mitigation is not possible. However, the nitrogen load can be offset through the planting of a woodland area elsewhere within the region. A woodland area is defined by Forest Research (Great Britain's principal organisation for forestry and tree related research) as the land which stands under trees with a canopy cover of at least 20% or having the potential to achieve this.

8.1.3 The amount of woodland required is subject to the land that is to be converted into woodland. At least 1 Ha of land will need to be converted into woodland in order to offset the **0.73 Kg/TN/Yr** produced by the site.

### 8.2 Nutrient Offset Credits

8.2.1 The developer may be able to purchase nutrient offset 'credits'; from an appropriate body (such as New Forest Council or the Hampshire and Isle of Wight Wildlife Trust).

8.2.2 The Hampshire of Wight Wildlife Trust have a Nutrient Reduction Programme in place as a means of reducing the nitrogen inputs in the Solent. This is due to nitrogen causing harm to the coastal environment. The trust aims to acquire land that is suitable to facilitate a reduction in nitrogen entering the Solent across several catchment areas in order to provide options for offset for all local authority areas. The programme itself will not only reach nutrient neutrality but it also aims to lead a reduction in nitrates across the Solent.

8.2.3 In order to take part in this programme, the developer must complete an Expression of Interest form which can be found on the Hampshire and Isle of Wight Wildlife Trust website. The Trust has established a series of tests that they required developments to comply with before they will sell nitrate credits to them. The credits are currently at an estimated value of £2500 - £3000 per kg excluding VAT.

More information can be found here: <https://www.hiwwt.org.uk/Nutrient-Reduction-Expression-Interest-Form>

### 8.3 Bespoke Mitigation Projects

8.3.1 Bespoke mitigation projects may also be carried out by the Developer in which the following on-site and offsite options can be considered:

- Conversion of agricultural land for community and wildlife benefits which would see permanent land use change by converting agricultural land to alternative uses for local communities or wildlife
- Acquire, or support others in acquiring, agricultural land elsewhere within an appropriate river catchment area and permanently change the land use to woodland, heathland, saltmarsh, wetland, or conservation grassland.

8.3.2 It is worth noting that small scale developments such as this site are encouraged to consider opportunities for providing local small-scale options e.g., the creation of local ponds, wetlands, local nature reserves, community orchards, or copses.

8.3.3 Another example is to repurpose a strip of agricultural land immediately adjacent to a public footpath into a greenway. This could be marked by hedges or woodland planting.

- Woodland planting on agricultural land is a means of securing permanent land use change without necessitating land purchase. It can be evidenced easily by aerial photography and site visits. The level of woodland planning required to achieve nutrient neutrality is 20% canopy cover at maturity. This equates to 100 trees per hectare – the nitrogen leaching rate from woodland planting is likely to equate to 5kg/ha/yr. In terms of the above site, this would require approx. 2.4Ha of woodland planting to achieve nutrient neutrality.
- Wetlands receiving nitrogen-rich water can remove a proportion of this nitrogen through processes such as denitrification and sedimentation. Wetlands can be designed as part of a Sustainable urban drainage system (SuDS), taking surface water runoff.

8.3.4 Alternatively, discharges from WwTWs can be routed through wetlands; or the flow, or part of the flow, of existing streams or rivers can be diverted through wetlands.

8.3.5 Before Bespoke mitigation projects are undertaken, the developer should contact the local council about these projects or use Natural England's Developer Advice service in order to determine which mitigation project would be the most beneficial for the site.

## 8.4 Conclusion

8.4.1 The calculations above confirm that the proposals **DO NOT** demonstrate nutrient neutrality and therefore offsetting will be required. Due to the size of the site, options are available and therefore the most straightforward route to nutrient neutrality would be to either purchase Nutrient Offset credits or undertake a bespoke mitigation project, such as the creation of woodland on site.