Consulting Civil Engineers

Water Neutrality Report

Normans, East Street, Rusper, Horsham, West Sussex

For

Dean Smith

Rev – **P1**

Reference C**3153**

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Richard Cobden House, Lion Street, Chichester, West Sussex, PO19 1LW
Tel: 01243 933253 E: mail@cgscivils.co.uk **W:** www.cgscivils.co.uk

1 Introduction

1.1.1 CGS Civils Ltd has been appointed by Dean Smith to undertake a Water Neutrality Report for a proposed development at Normans, East Street, West Sussex. Planning permission is sought to convert the existing car port into 1-bedroom ancillary accommodation. The site falls within the Sussex North Water Supply Zone, in which Natural England have written to all authorities within the zone providing a position statement for applications which may place increased pressure on this zone. This explains that recent case law has established that abstraction from the Supply Zone may be having an impact on protected sites (Arun Valley Special Area of Conservations (SAC), Special Protection Area (SPA) and Ramsar site). As a result, developments within this zone must not add to this impact, as such, the purpose of this report is to therefore provide an overview on the potential water usage changes on the site as a result of the proposed development, and to confirm that the site is water neutral.

Fig 1. Sussex North Water Supply Zone Area

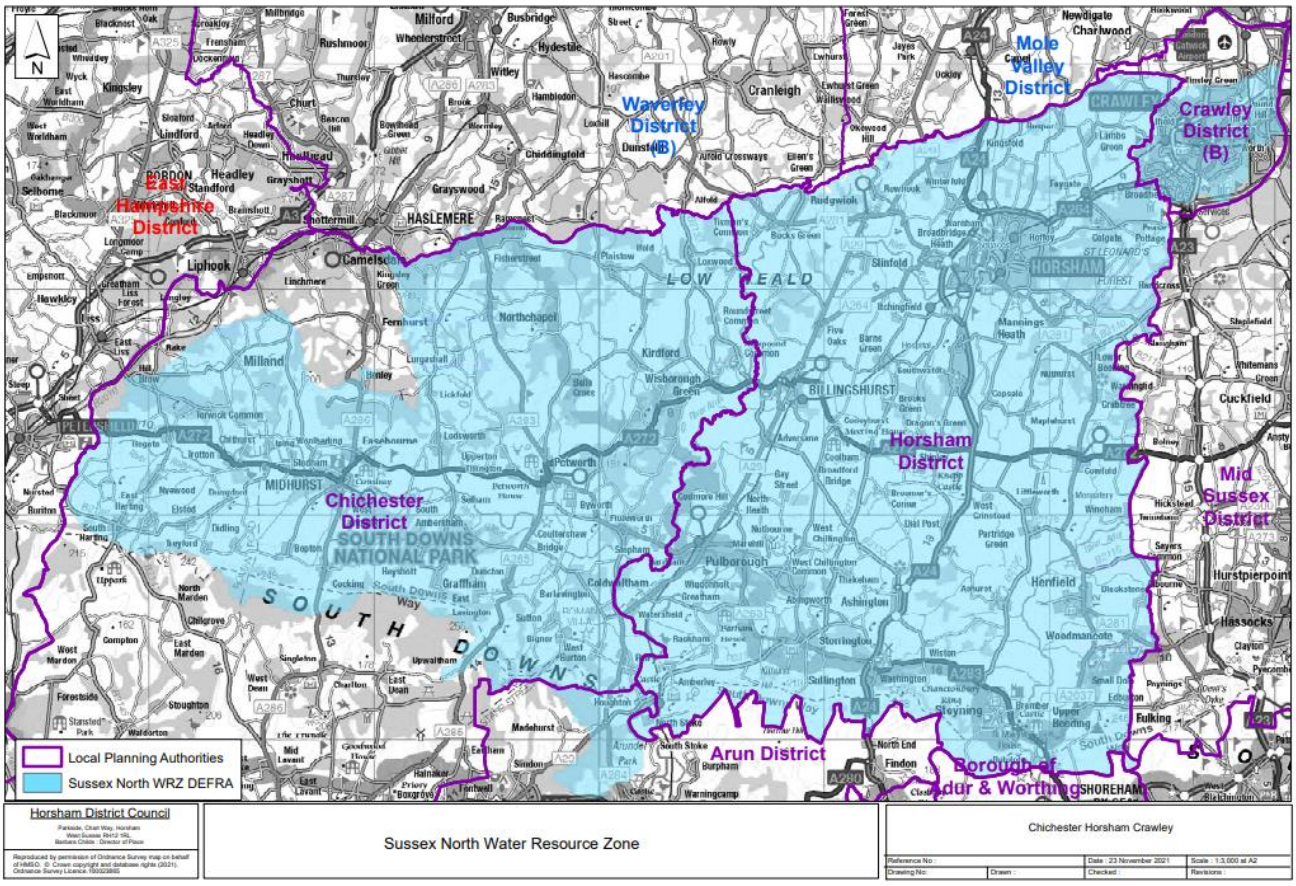
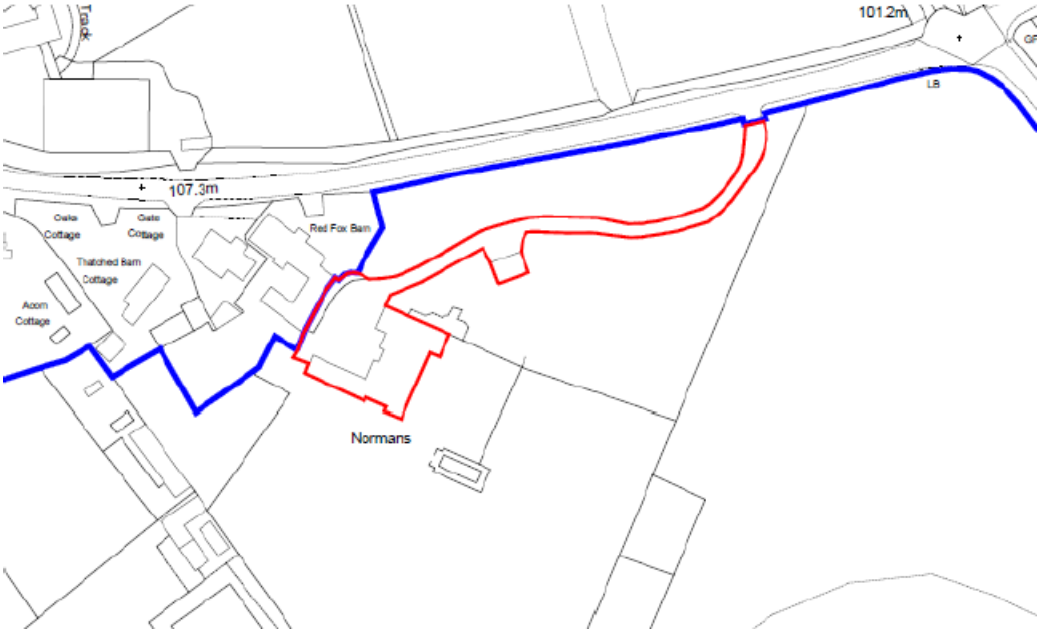


Fig 2. Site Location



1.1.2 The proposed development is located at OS Grid Reference TQ 21051 37186 and has the post code RH12 4RD.

1.1.3 Waterwise defined Water Neutrality as:

'For every new development, total water use in the region after the development must be equal to or less than the total water uses in the region before the new development.'

1.1.4 Achieving water neutrality involves using a three-step approach. First, the demand for water from the new development must be reduced as far as is practicable, followed by the re-use of water; then the remaining demand should be offset within the region. Following this three-step approach allows the volume that requires offsetting to be reduced which ultimately reduces the cost of the overall scheme. This is noted within the Waterwise neutrality definition, which defines the three steps which should be undertaken in order to achieve water neutrality in their recent review dated January 2021.

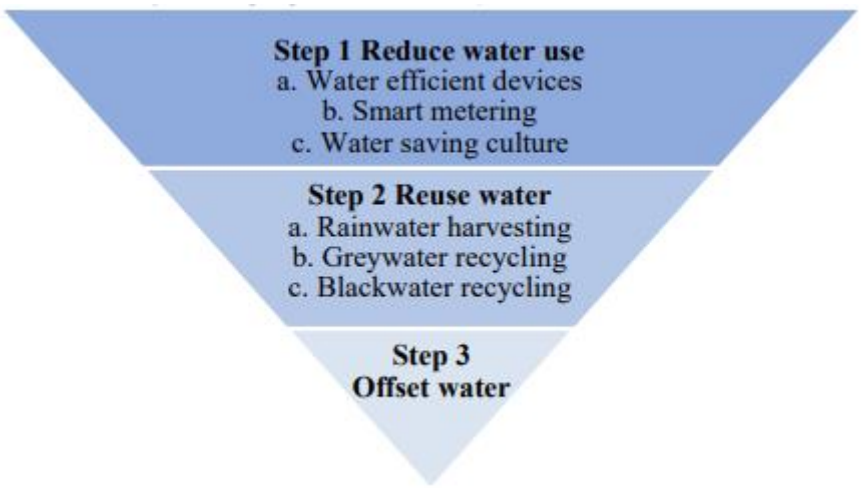
- Reduce water demand in the new development through improvement in efficiency.
- Re-use water, wherever possible.
- Offset the remaining water demand from the new development if required.

1.1.5 The report will be split into the following sections:

- A Review of Water Neutrality demand reduction
- A calculation of estimate water usage from proposed development
- Identification of measures that can be first used to reduce this demand
- Identification of measures that can be used to re-use water
- Establish solutions to offset that demand in order to achieve neutrality.

1.1.6 This report will follow the methods documented within *'A Review of Water Neutrality in the UK'* carried out by Waterwise in January 2021. The document provides details on how developments can achieve water neutrality by utilising the 3-stage approach.

Fig 2. 3-stage approach



1.1.7 Some increase in water demand within the region from planned development during the local plan period is inevitable. However, it can be minimised by making the site as water efficient as possible.

1.1.8 Per Capita Consumption (PCC) is used as a measure of water use and is the volume of water that is used by one person in one day. It is usually measured in litres per person per day (l/p/d). The average PCC within Southern Water's 'Sussex North Water Resource Zones (WRZ)' is 135 l/p/d. Homes without a water meter consume on average 160 l/p/d and for homes with a water meter, consume on average 131 l/p/d.

1.1.9 Part G of the Building regulations currently states that new build housing should achieve a minimum of 125 l/p/d. A tighter target of 110 l/p/d can be requested if the local authority can establish a clear need based on available evidence.

1.1.10 The table below indicates different demand scenarios including Southern Water's Target 100 Ambition to achieve 100 l/p/d, as well as further scenarios where water demand is cut more dramatically.

Table 1 PCC Demand Scenarios

Demand Scenario	Per Capita Consumption (l/p/d)
British Flows and Loads	150
Building Regulations Standard	125
Building Regulations Optional	110
Target 100	100
Realistic Achievable	85
Ambitious	62

1.1.11 The benefits of water neutrality are wide ranging, from financial and reputational to environment and social. For a new domestic building, they could include:

- **Saving Water** – Over 100,000 litres of water can be saved per year for each water neutral home built
- **Saving Carbon** – A significant CO2 saving can be achieved by reducing the demand for hot water for baths, showers, basins, dishwashers and washing machines
- **Saving Money** – Both water and energy bills will reduce
- **Reducing environmental impact** – Decreasing water abstracted from rivers and groundwater sources
- **Improved Resilience** – For the future by minimising the additional pressure on water resources
- **Enabling future housing growth** – In water scarce areas by reducing the impact of new homes and buildings
- **Reducing discharge to sewage** – by using less water, collecting rainwater and recycling greywater, less water is discharged to the drainage network
- **Short pay-back time** – After approximately 5 years the saving of water neutrality will outweigh the costs of doing so.

2 Executive Summary

2.1.1 The existing site currently comprises of a residential property and a detached car port located to the northeast of this property. As the carport alone is being converted into ancillary accommodation, only the water demand from the carport should be considered when determining water neutrality, therefore the water demand from the existing site is considered to be **0 l/day.** The proposed 1-bedroom ancillary accommodation will have a water demand of **98.71 l/day** prior to any mitigation techniques and a demand of **85.4 l/day** with water efficient fittings.

2.1.2 As proven within this report, the installation of water efficient fittings within the proposed dwelling will reduce the water usage to a level where the remaining water demand can be offset by installing water efficient toilets, showers and taps within the main house.

Table 2 Water Usage Comparison

Existing Water usage	**0 l/day**
Proposed Scheme water usage	85.4 l/day
Total water demand offset by other properties within the region	122.90 l/day
Proposed Scheme water usage equal to or lower than existing site	Yes

3 Calculation of estimate water usage from the proposed development

3.1.1 Before any necessary steps to achieve water neutrality can be determined, the total water demand for the proposed development must first be calculated. The proposed scheme will consist of converting the existing carport to form a 1-bedroom dwelling. In accordance with the average occupancy levels set out by Horsham DC, the population for the property will be 1.32.

Table 3 Average occupancy levels

Number of bedrooms	Average occupancy level
1	1.32
2	1.88
3	2.47
4	2.86
5	3.09

3.1.2 As the proposed property will be a new dwelling, Policy 37 of the Horsham District Planning Framework (HDPF) triggers the requirement for the optional building regulations standard of 110 litres per person per day (l/p/d). However, as there is no kitchen within the proposed annexe, the need for kitchen taps, washing machine and dishwasher have been removed, therefore the average water usage is **74.78 l/p/day (Appendix A)**:

1.32 x 74.78 l/p/d
= 98.71 l/day

3.1.3 The following sections within this report will cover measures that can be undertaken in order to reduce the water consumption of the proposed property and aim for the 'Ambitious' PCC of 62/l/p/d.

4 Step 1 – Identifying measures that can be used to reduce this demand

4.1.1 The first and most important step in achieving water neutrality will be to ensure that the water used by the proposed development is used as efficiently as possible; the smaller the water demand of the building due to the design and fittings, the less water is needed to be reused and offset. There are a number of ways of achieving a smaller water demand:

- Fitting homes with efficient products, such as:

  - Aerated Taps

  - Aerated Shower heads

  - Low Flush Toilets, or air flush toilets

  - Installing Smart Meters, this allows the consumer to see how much water they are using, and how this affects their water saving bill. This can help consumers to reduce water usage, identify leaks, and meet water saving targets, with the bonus of reduced bills.

- Designing home to encourage water saving behaviours, this can also help reduce water use and help ensure that other measures that are put in place are effective. Education and awareness are important components of achieving water neutrality.

4.1.2 Building Regulations Part G states that when the new fittings approach is used, the water consumption of the fittings must not exceed a total of 125 l/p/day/. The values are listed in the table 4 below:

Table 4 Maximum Fittings Consumption from Building Regulations Part G

Water Fitting	Maximum Rating
WC	6/4 litres dual flush or 4.5 litres single flush
Shower	10 l/min
Bath	185 litres
Basin Taps	6 l/min
Sink Taps	8 l/min
Dishwasher	1.25 l/place setting
Washing Machine	8.17 l/kilogram

4.1.3 Should the proposed development be required to comply with the optional water efficiency as part of the conditions for planning permission, the estimated consumption of water can be calculated via the Optional requirement level of fittings consumption. This is listed within Building Regulations Part G, which also states that the water consumption must not exceed 110 l/p/day, and the maximum fittings consumption for optional requirement can be found in Table 5 below:

Table 5 Maximum fittings consumption optional requirement level from Building Regulations Part G

Water Fitting	National Base Level
WC	4/2.6 litres dual flush
Shower	8 l/min
Bath	170 litres
Basin Taps	5 l/min
Sink Taps	6 l/min
Dishwasher	1.25 l/place setting
Washing Machine	8.17 l/kilogram

4.1.4 However, to improve on the above requirements, the proposed site can implement the following measures in order to focus on becoming a water efficient development. By installing the following features, the development can achieve a water demand of around 85 l/p/d, which aligns with a 'Realistic Achievable' PCC. See Table 6 below:

Table 6 Water efficient fittings consumption

Water Fitting	Consumption Level
WC	4/2.6 litres dual flush
Shower	7 l/min
Bath	145 litres
Basin Taps	2.5 l/min
Sink Taps	5 l/min
Dishwasher	0.67 l/place setting
Washing Machine	5.5 l/kilogram

Please note that by accepting this report, you accept the low flow rates of the proposed fittings required to achieve water neutrality. CGS Civils cannot be held responsible for any reduced comfort levels that may arise from the use of these fittings.

4.1.5 Water demand can also be reduced through fitting metres, which help to identify leaks and track water consumption as a way to support and encourage behavioural changes such as, not leaving the tap running when brushing teeth and using eco settings on the washing machine and dishwasher. It should be noted that behavioural changes have not been used within the calculations within this report as it is impossible to enforce.

Table 7 Practical Summary of Step 1

Step 1: Reduce Water				
Toilets	Cistern displacement devices (toilet hippos)	Retrofit flush devices to dual flush	Fix leaky toilets	
Taps	Tap inserts (aerators)	Low flow restrictors	Push taps	Infrared Taps
Showers/baths	Low flow shower heads (less than 8litres/min)	Shower timers	Reduced bath frequency & volume	
Outdoors	Hosepipe flow restrictors	Hosepipe siphons	Water butts	Mulches and composting to keep soil moist
Smart Metering	Leakage information	Encourage behavioural changes	Innovative tariffs	Savings estimates

4.1.6 By installing the water efficient devices listed above, it is possible to reduce the water demand on site from **98.71 l/day** down to **85.4 l/day.**

1.32 x 64.7 l/p/d

= **85.4 l/day**

- *1.32 (average occupancy level for a 1-bedroom dwelling) x 64.7 (Appendix B – Water Calculator for Proposed fittings)*

4.1.7 It is proposed that this remaining water demand is offset by retrofitting the main house with water efficient fittings. This will be addressed in Section 3 of this report.

5 Step 2 – Identify measures that can be used to re-use water

5.1.1 The remaining water demand will be offset by retrofitting the main house with water efficient fittings, this will be explained in the next section.

6 Step 3 – Offsetting remaining water demand

6.1.1 Finally, the remaining water demand must be offset. In this instance, the main house is also owned by the client and can be retrofitted with the water efficient fittings listed above in Section 1 of this report. The existing property is currently occupied by 5 people. An existing fittings survey has been carried out on this property (refer to C3153 Existing Fittings Survey) which found that the water demand for the main house is **124.44 l/p/day**, or a total of **622.20 l/day** for all five occupants.

6.1.2 As outlined within the Existing Fittings Survey, by installing water efficient toilets, showers and taps within the property it is possible to reduce the water demand of the main house down to **99.86 l/p/day** or **499.30 l/day** for all five occupants. This is a total reduction in water demand of **122.90 l/day**, as this exceeds the proposed 1-bedroom's remaining water demand, this results in the proposals becoming water neutral.

7 Conclusion

7.1.1 The overall water demand can be reduced by utilising methods listed in the sections above to reduce the water demand for the proposed development. This results in the water usage being reduced to a level that the remaining demand can be offset by retrofitting the main house with water efficient toilets, showers, and taps.

7.1.2 To summarise:

- The proposed development will use on average **98.71 l/day** prior to any mitigation techniques.
- This water demand can be reduced to **85.4 l/day** through the installation of water reducing appliances.
- The existing water demand for the main house can be reduced by utilising the above measures in the 'reduce' section of this report. The existing dwelling has a total population of 5 which has a total water demand of **622.20 l/day**. By following the above measures, this can be reduced down to **499.30 l/day.** This is a total reduction in water demand of **122.90 l/day.**
- The overall water demand will be reduced by **37.5 l/day** over the existing site, resulting in the site becoming water neutral.

8 Appendices

8.1 Appendix A:

Table 10 – Water Calculator from Building Regulations Part G – Information input from proposed site water fittings from Table 5

The Water Calculator for New Dwellings with Water efficient measures					
Installation Type	Unit of measure	Volume/ flow rate	Use factor	Fixed use	Litres/person/day
WC (Single Use)	Flush volume (l)	0	4.42	0	0
WC (Dual Flush)	Full Flush Vol.	4	1.46	0	5.84
	Part Flush vol.	2.6	2.96	0	7.70
WC (Multiple Fittings)	Average effective flush volume (l)	0	4.42	0	0
Taps (excl. Kitchen)	Flow rate (l/min)	5	1.58	1.58	9.48
Bath (shower also present)	Capacity to overflow (l)	170	0.11	0	18.7
Shower (bath also present)	Flow rate (l/min)	8	4.37	0	34.96
Bath only	Capacity to overflow (l)	0	0.5	0	0
Shower only	Flow rate (l/min)	0	5.6	0	0
Kitchen sink taps	Flow rate (l/min)	0	0.44	10.36	0
Washing Machine	Litres/kg dry load	0	2.1	0	0
Dishwasher	litres/place setting	0	3.6	0	0
Waste disposal unit	litres/use	0	3.08	0	0
Water softener	litres/person/day	0	1	0	0
		Total Calculated use (l/p/d)			76.68
		Contribution from greywater (l/p/d)			0
		Contribution from rainwater (l/p/d)			0
		Normalisation factor			0.91
		External water use			5
		Total water consumption (36(1)) (l/p/d)			74.78

8.2 Appendix B:

Table 11 – Water Calculator from Building Regulations Part G – Information input from proposed site water efficient fittings from Table 6 – excluding

The Water Calculator for New Dwellings with Water efficient measures					
Installation Type	Unit of measure	Volume/ flow rate	Use factor	Fixed use	Litres/person/day
WC (Single Use)	Flush volume (l)	0	4.42	0	0
WC (Dual Flush)	Full Flush Vol.	4	1.46	0	5.84
	Part Flush vol.	2.6	2.96	0	7.70
WC (Multiple Fittings)	Average effective flush volume (l)	0	4.42	0	0
Taps (excl. Kitchen)	Flow rate (l/min)	2.5	1.58	1.58	5.53
Bath (shower also present)	Capacity to overflow (l)	145	0.11	0	15.95
Shower (bath also present)	Flow rate (l/min)	7	4.37	0	30.60
Bath only	Capacity to overflow (l)	0	0.5	0	0
Shower only	Flow rate (l/min)		5.6	0	0
Kitchen sink taps	Flow rate (l/min)	0	0.44	10.36	0
Washing Machine	Litres/kg dry load	5.5	2.1	0	0
Dishwasher	litres/place setting	0	3.6	0	0
Waste disposal unit	litres/use	0	3.08	0	0
Water softener	litres/person/day	0	1	0	0
		Total Calculated use (l/p/d)			65.62
		Contribution from greywater (l/p/d)			0
		Contribution from rainwater (l/p/d)			0
		Normalisation factor			0.91
		External water use			5
		Total water consumption (36(1)) (l/p/d)			64.7