Consulting Civil Engineers

Water Neutrality Report

Cattlestone Farm, Harbolets Road, West Chiltington

For

Philips Surveyors LLP

Rev – **P4**

Reference **C2770**

Date **13th June 2024**

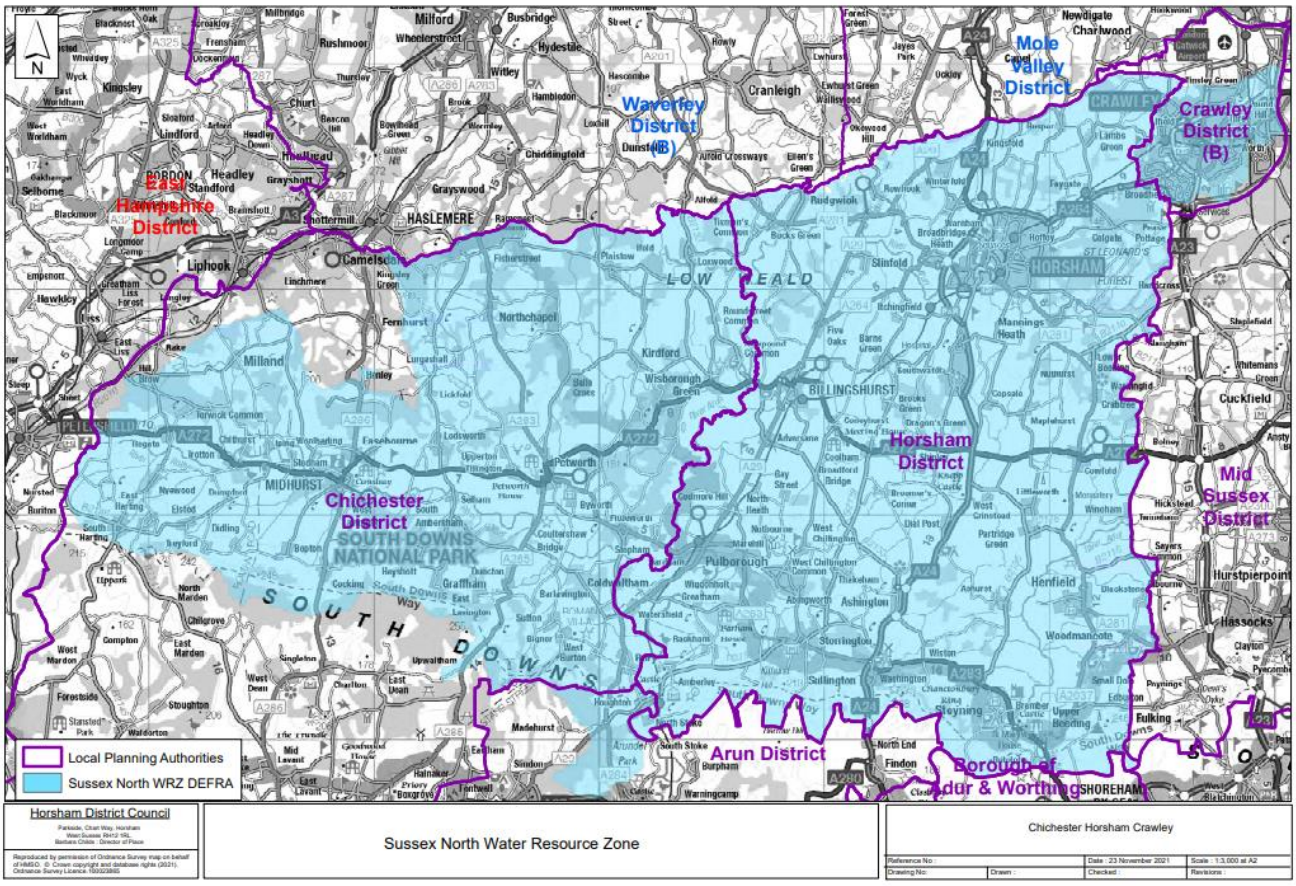
Revision	Date of Issue	Comments	Prepared By	Checked By
P-	23rd August 2023	Initial Issue	LT	CS
P1	**19th April 2024**	**Updated to address planning comments**	**LT**	**CS**
P2	25th April 2024	Revised to suit comments	LH	CS
P3	3rd June 2024	Revised Location plan	LH	CS
P4	13th June 2024	Revised Location Plan	LH	CS

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 Philips Surveyors LLP to undertake a Water Neutrality Report for a proposed development at Cattlestone Farm, Harbolets Road, Pulborough. Planning permission is sought for the demolition of the existing fire damaged building and the construction of a new 3-bedroom dwelling. 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



1.1.2 The proposed development is located at OS Grid Reference TQ 10067 19973 and has the post code RH20 2LG.

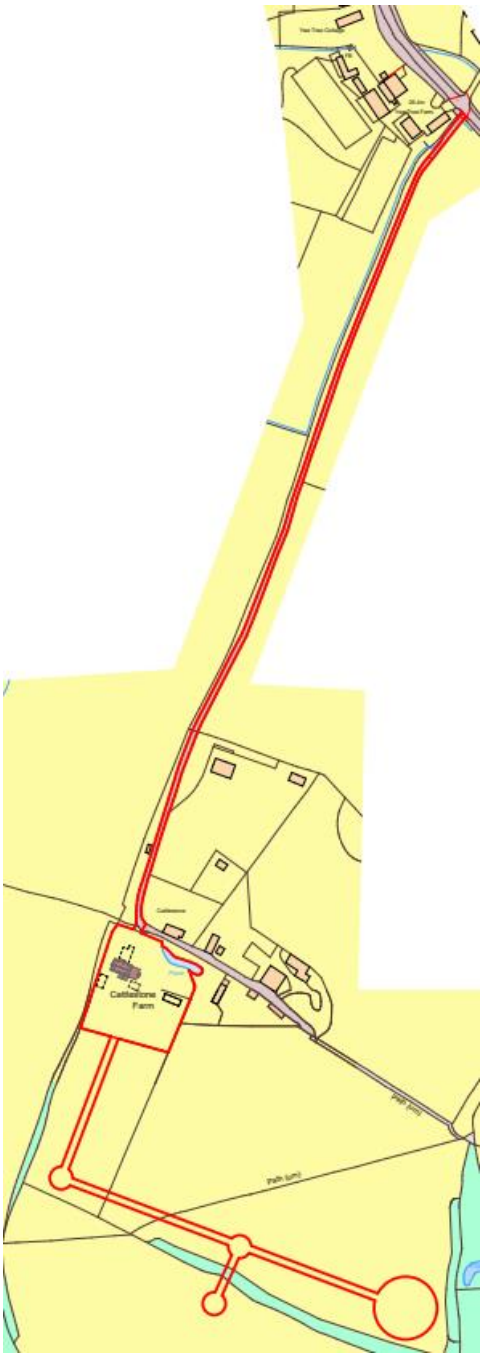


Fig 2. Site Location Plan

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.

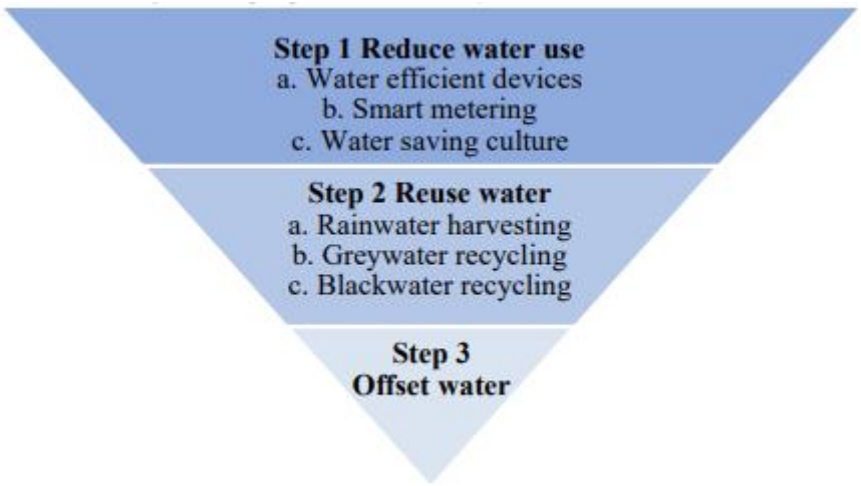
- Reduce water demand in the new development through improvement in efficiency.
- Re-use water, wherever possible.
- Offset the remaining water demand from the new development if required.

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 3. 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 of Cattlestone Farm currently provides pasture for 7 highland cows and approximately 200 ewes, which require a total of **1040 litres of water per day.** The livestock are currently provided with water through mains fed troughs in the fields. It is proposed that these are to be replaced with a pond in each field, fed by springs and ditches with a natural water supply. The smallest pond will be approximately 6m across and 1m deep, the second pond will be slightly larger and the third will be around 50m long, 10m wide and 2m deep. There is sufficient rainfall and total pond area to provide a sufficient amount of drinking water for all 200 ewes and 7 cattle on site. (4.1.4 – 4.1.9). This results in the water demand of **1040 l/day** being offset.

2.1.2 There is also a proposal for siting 2 shepherds huts on land at Cattlestone Farm. The water demand for these huts have been provided in a separate report, refer to the previously approved water neutrality statement for the past project at this site (Horsham District Council planning reference DC/22/1915) for more information. This report shows that the water demand from the shepherds' huts will be **185.86 l/day**. It is proposed within the report that this water demand will be offset with the introduction of the ponds mentioned above, resulting in a reduction of **854.14 l/day** (1040 l/day from the ponds – 185.86 l/day from the shepherds' hut) over the existing site which can be used to offset the proposed site.

2.1.3 The proposed site will consist of a new 3-bedroom dwelling which will replace the existing fire damaged building. As outlined in the report, the water demand from this building will be **271.70 l/day.**

2.1.4 This results in a total reduction in water demand of **582.4 l/day** over the existing site, making the site water neutral.

Table 2 Water Usage Comparison

Existing Water usage	**1040 l/day**
Proposed Scheme water usage	271.70 l/day
Proposed Shepard's hut water usages	185.86 l/day
Total water demand offset by replacement of mains fed troughs to naturally suppled ponds/springs	1040 l/day
Overall reduction of water usage within the region	- 582. l/day
Proposed Scheme water usage equal to or lower than existing site	Yes

3 Calculation of the existing water usage

3.1.1 To calculate the water usage of the existing site the average water usage of livestock was taken from a Defra report by King, J. Tiffin, D., Drakes, D. & Smith, K. 2006, "Water use in agriculture: establishing a baseline".

3.1.2 The report states that the overall drinking requirements for an ewe is 4.5 l/animal/day and a beef cow requires 20 l/animal/day.

Table 3 Drinking water requirements for cattle

Animal	Water volume (l/animal/day)	Total volume (l/animal/year)
Dairy cow - lactating	104.5	32,421
Dairy cow – dry period	20	1,095
Dairy cow - overall	91.8	33,516
Beef cow	20	7,300
Dairy and beef bull	20	7,300
Calves	5	1,825

Table 4 Drinking water requirements for sheep

Animal	Water volume (l/animal/day)	Total volume (l/animal/year)	Other – dipping (l/animal/year)
Ewe	4.5	1,643	4.5
Ram	3.3	1,204.5	4.5
Lamb	1.68	613.5	0.9

3.1.3 The existing site currently serves 200 ewes and 7 highland cows, providing water to them via mains fed troughs, therefore the total water demand produced from the existing site is estimated to be **140 l/day** for the cows and **900 l/day** for the ewes, resulting in a total of **1,040 l/day**.

4 Calculation of estimate water usage from the proposed development

4.1.1 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 the construction of a 3-bedroom dwelling. In accordance with the average occupancy levels set out by Horsham DC, the population for the property will be 2.47.

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

4.1.2 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), therefore:

2.47 x 110 l/p/d
= 271.70 l/day

4.1.3 There is also a proposal for siting 2 shepherds huts on land at Cattlestone Farm. The water demand for these huts have been provided in a separate report, refer to the previously approved water neutrality statement for the past project at this site (Horsham District Council planning reference DC/22/1915) for more information. This report shows that the water demand from the shepherds' huts will be **185.86 l/day**.

4.1.4 It is proposed within the report that this water demand will be offset by replacing the existing mains fed troughs with three ponds located in the fields, the smallest of which will be approximately 6m across and 1m deep, the second pond will be slightly larger and the third will be around 50m long, 10m wide and 2m deep.

4.1.5 The previously approved scheme under ref DC/22/1915 calculated that over the last 3 years within the Arun at Pallingham catchment, there has been an average rainfall of **924.7mm**.

4.1.6 A calculation is to be made to ensure that the rainwater harvested within the ponds is greater than the rainwater demand from the entire site. The following is a calculation for 5% of the annual rainwater yield and has been calculated using Rainfall data from the National River Flow Archive which provides annual rainfall data as recorded by the Met office and follows the intermediate approach as detailed within BS 8515:2009.

4.1.7 The collection area for the following calculation is based off the sizes provided for the proposed ponds as listed above. The smallest pond is 6x6x1m deep and the largest is 50x10x2m deep. As there is no definitive size given for the third pond within the previously approved water neutrality report - Horsham District Council planning reference DC/22/1915 – it is assumed it is the same size as the smallest pond for the following calculations. Therefore, the combined catchment area of all 3 ponds is **572m².** It is important to note that the local geological data of the site shows that the site is underlain by Wealden Clay formation which is comprised of mudstone which is known to have very low permeability and to naturally hold water.

$$Y_R = A_x \, h_x \, n_x \, 0.05$$

Where:

Y_R = the annual rainwater yield (l)
A = The collecting area (m^2)
h = depth of rainfall (mm)
n = hydraulic filter efficiency

$$\underline{\mathbf{25125.1}} = 572_x \, 924.7_x \, 0.95_x \, 0.05$$

4.1.8 In order to ensure there is sufficient area within the proposed ponds, another calculation from BS 8515:2009 must be carried out in order to calculate the annual demand within the property. The following is a calculation for 5% of the annual non-potable water demand. The calculation will use the water demand from the existing cattle and ewes on site which have been confirmed to have a water demand of **1040 l/day.**

$$D_N = P_{d\,x} \, 365_x \, 0.05$$

Where:
D_N = the annual non-potable water demand (l)
P_d = The daily requirement for the site (l)

$$\mathbf{18,980} = 1040_x \, 365_x \, 0.05$$

4.1.9 To ensure there is sufficient area to allow a 35-day drought storage, an extra 35 days is to be included:

$$\underline{\mathbf{20,800}} = 1040_x \, 400_x \, 0.05$$

4.1.10 This results in the water demand from the existing cattle and ewes (**1040 l/day** - 3.1.3) being offset from the existing site, with **854.14 l/day** (1040 l/day from the ponds – 185.86 l/day from the shepherds' hut) less water being used over the existing site which can then be used to offset the proposed 3-bedroom dwelling's water demand.

4.1.11 As the proposed 3-bedroom dwelling has a water demand of **271.70 l/day**, this property's water demand will also be offset by the installation of the ponds.

4.1.12 This results in a total reduction of **582.44 l/day** over the existing site, taking into account both the 3-bedroom dwelling and the two shepherds' huts, making the site water neutral, therefore there is no need for the further steps outlined within *'A Review of Water Neutrality in the UK'* carried out by Waterwise in January 2021.

5 Conclusion

5.1.1 The overall water demand can be reduced by utilising methods listed in the sections above to offset the water required as drinking water for the highland cows and ewes present at Cattlestone Farm. This results in the site not only being water neutral but will also provide a degree of betterment over the existing site's water demand.

5.1.2 To summarise:

- The existing site has a water demand of **1040 l/day**, this is from the mains fed troughs providing water to the 7 cows and 200 ewes present at the site.
- This water demand can be fully offset by replacing these troughs with ponds fed by ponds and ditches with a natural water supply. There is sufficient rainfall and total pond area to provide a sufficient amount of drinking water for all 200 ewes and 7 cattle on site. (4.1.4 – 4.1.9)
- There are two shepherds' huts proposed at the site, the details of which are included within a separate report. The water demand for these huts will be **185.86 l/day**, leaving a water demand of **854.14 l/day** (1040 l/day from the ponds – 185.86 l/day from the shepherds' hut) offset from the existing site which can be used to offset the proposed 3-bedroom dwelling.
- The proposed 3-bedrom dwelling will have a water demand of **271.70 l/day.**
- The overall water demand will be reduced by **582.44 l/day** over the existing site, taking into account both the proposed 3-bedroom dwelling and the two shepherds' huts, making the site water neutral whilst also providing betterment over the existing site's water demand.