From: SM-Defra-Plan Cons Area Team (Sussex and Kent) (NE) <PlanConsAreaTeamSussexandKent@defra.gov.uk>
Sent: 22 March 2024 11:09
To: Halima.Chowdhury
Subject: FW: 2024-04-10 470597 - Reviewed HRA & AA & Water Neutrality - In respect of Prior Approval consent DC/21/1998 Clayfield Farm, Valewood Lane, Barns Green, Horsham (Horsham) HRA/23/0023
Attachments: Ecology (HRA Appropriate Assessment)- draft'.docx; Water neutrality strategy.pdf; Annex A to standard letters - April 2023 (PDF).PDF

Follow Up Flag: Follow up
Flag Status: Flagged

Thank you for consulting with Natural England regarding the following consultation(s).

The proposed development(s) falls within the Sussex North water supply zone; As set out in Natural England's Advice Note regarding Water Neutrality within the Sussex North Water Supply Zone, the existing water supply in the Sussex North water supply zone cannot be ruled out as contributing to the declines in wildlife within internationally protected sites in the Arun Valley SPA, SAC and Ramsar site. Achieving water neutrality is recognised as a suitable method to rule out potential adverse effects on the integrity of these sites arising from development.

Considering the supporting information provided by the applicant(s) and your authority's habitats regulation assessment (HRA) our advice is as follows.

Our ref	LPA ref	Planning Consultation and Location	Natural England's advice
470597	HRA/23/0023	**Planning Consultation**: Reviewed HRA & AA & Water Neutrality Strategy - Regulation 77 of the Conservation of Habitats and Species Regulations in respect of Prior Approval consent DC/21/1998. **Location**: Clayfield Farm, Valewood Lane, Barns Green, Horsham RH13 0QJ	We concur with the conclusion of your authority's HRA appropriate assessment insofar that adverse effects on the integrity of the Arun Valley Designated sites can be ruled out, as such: We have no objections subject to the: delivery, management and maintenance of measures identified in the water neutrality statement to achieve water neutrality.

Further general advice on the protected species and other natural environment issues is provided in the attached Annex A.

If you have any queries relating to this advice please let us know.

From: Halima.Chowdhury <Halima.Chowdhury@horsham.gov.uk>
Sent: Wednesday, March 20, 2024 6:08 PM
To: SM-NE-Consultations (NE) <consultations@naturalengland.org.uk>
Subject: HRA/23/0023, Clayfield Farm, Valewood Lane, Barns Green, Horsham,

You don't often get email from halima.chowdhury@horsham.gov.uk. Learn why this is important

Dear colleagues

HRA/23/0023,
Clayfield Farm, Valewood Lane, Barns Green, Horsham,
Regulation 77 of the Conservation of Habitats and Species Regulations in respect of Prior Approval consent DC/21/1998.

Please find attached updated HRA Appropriate Assessment and the Water Neutrality Strategy in relation to the consultation for the above planning application.

Kind regards

Halima Chowdhury
Planning Officer

Telephone: 01403 215059
Email: Halima.Chowdhury@horsham.gov.uk

Horsham District Council

Horsham District Council, Parkside, Chart Way, Horsham, West Sussex RH12 1RL
Telephone: 01403 215100 (calls may be recorded) www.horsham.gov.uk Chief Executive: Jane Eaton

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Horsham District Council
Habitats Regulations Assessment (HRA) Screening Matrix and Appropriate Assessment

PLEASE NOTE: This screening relates only for potential impacts from water resources on the Arun Valley SAC/ SPA/Ramsar sites and does not consider impacts on any other designated habitat sites. A separate HRA screening will be required for development affecting other SPAs, SACs, or Ramsar sites.

It is the responsibility of the Competent Authority (in this case Horsham District Council) to prepare a HRA report and it is the responsibility of the applicant to provide information to support this process.

This HRA Appropriate Assessment template is for use where a planning application will result in additional demand for mains water being created in the Sussex North Water Supply Zone that is predicted to adversely impact the Arun Valley SAC/ SPA/Ramsar sites.

The purpose of this HRA screening record is to assess the need for appropriate assessment in relation to the project detailed below.

The Conservation of Habitats and Species Regulations 2017 (as amended) requires that a Habitats Regulations Assessment screening is carried out in relation to any plan or project which is likely to have a significant effect on Habitats (European) sites, either alone or in combination with other plans or projects. Habitats sites are Special Protection Areas and Special Areas of Conservation. Ramsar sites should also be given the same level of protection, as stated within the National Planning Policy Framework.

In line with the Court judgement (CJEU *People Over Wind v Coillte Teoranta* C-323/17), mitigation measures cannot be taken into account when carrying out a screening assessment to decide whether a development is likely to result in significant effects on a Habitats site.

Where an Appropriate Assessment is carried out a project may only be authorised after having ascertained that it will not adversely affect the integrity of the site(s) concerned.

Table 1: HRA Screening matrix for water neutrality

Stage 1 HRA screening	
Brief description of the development project	Application: HRA/23/0023 Planning Application: Regulation 77 of the Conservation of Habitats and Species Regulations in respect of Prior Approval consent DC/21/1998 Location: Clayfield Farm, Valewood Lane, Barns Green, Horsham, West Sussex, RH13 0QJ Type of application: HRA.
Details of the development project If yes to C, then the applicant should have provided evidence and justification - no further HRA work is required	**Proximity to Arun Valley SAC / SPA / Ramsar**: Is the application site: A) Within the Sussex North Water Supply Zone (WSZ) **YES** B) Arun Valley SAC / SPA / Ramsar potentially impacted by the planning application: **YES there is credible evidence of a real risk that the proposal will, without measures to minimise water use and water offsetting, result in an increase in water demand.**

	C) Is the planning application directly connected with or necessary to the management of the Arun Valley SAC/SPA/Ramsar site? ~~YES~~/NO
Brief description of the Habitats sites within scope of this assessment	Arun Valley SAC, SPA and Ramsar site supports rare and diverse plant, invertebrate and bird assemblages as qualifying features. It consists of low-lying grazing marsh, largely on alluvial soils, but with an area of peat derived from a relict raised bog. Variation in soils and water supply lead to a wide range of ecological conditions and hence a rich flora and fauna. Further details are provided in Appendix 1.
Key vulnerabilities / factors affecting site integrity	For applications where increased demand for water resources is the only pathway for impacts, Natural England's substantive advice (Position Statement Interim Approach, September 2021) is that such applications - without mitigation - will result in a likely significant effect on the Arun Valley SAC/SPA/Ramsar site either alone or in combination with other developments in the Sussex North WSZ. As it cannot be concluded that the existing abstraction within Sussex North Water Supply Zone is not having an impact on the Arun Valley sites, developments within this zone must not add to this impact. Therefore, such applications, even where mitigation is proposed, must progress to Appropriate Assessment (AA). Natural England's Position Statement (September 2021) is that the Sussex North Water Supply Zone includes supplies from a groundwater abstraction which cannot, with certainty, conclude no adverse effect on the integrity of; • Arun Valley Special Area Conservation (SAC) • Arun Valley Special Protection Area (SPA) • Arun Valley Ramsar Site
HRA Screening Assessment Criteria	
The individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Arun Valley SAC, SPA and Ramsar site	Based on the threat from water demand identified by Natural England's Position Statement, the development proposals need assessment for hydrological changes to the Arun Valley SAC/ SPA/ Ramsar site. For applications, does the evidence show any likely significant effect on Arun Valley SAC/SPA/Ramsar site, without mitigation measures (either alone or in-combination with other plans or projects)? **YES** Test 1 the significance test below has been completed as the evidence shows a likely significant effect on Arun Valley SAC/SPA/Ramsar site, without mitigation measures (in-combination with other plans or projects).

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Test 1 the significance test: – Can a judgement be made as to whether there could be any potential significant impacts of the development on the integrity of the Arun Valley SPA/ SAC/Ramsar.	Following the CJEU ruling People over Wind, it is no longer legal to take into account any avoidance and mitigation measures as part of the application at this stage of HRA. For applications where increased demand for water resources is the only mechanism of impact, Natural England's advice is that such applications - **without mitigation** - will have a likely significant effect on the Arun Valley SAC/SPA/Ramsar site in combination with other developments in the Sussex North WSZ. **YES** Therefore, such applications, even where mitigation measures (minimise water use and water offsetting) are proposed, will progress directly to Stage 2 Appropriate Assessment to consider, with mitigation, the impacts of the development on mains water usage on the above designated sites, either alone or in combination with other plans and projects. **Explanation: All development likely to increase the demand for mains water usage, is predicted to result an identifiable impact on the Arun Valley SAC/SPA/Ramsar sites.** After mitigation has been embedded into the project design, Test 2 – the integrity test then needs to be applied.
Stage 2 Appropriate Assessment	
The above Stage 1 HRA screening has determined that a Likely Significant Effect is predicted at Arun Valley SAC/SPA/Ramsar site as a result of impacts on water quantity. This pathway has been screened in, and the potential for adverse effects on site integrity, either alone or in-combination will be assessed. Therefore, this section of the report to inform HRA Stage 2 only discusses the potential for impacts on water quantity as a result of the proposed development.	
Potential for Adverse Effects On the Integrity (AEOI) of a Habitats site from the development alone or in combination.	Supplementary advice on conserving and restoring site features for Arun Valley SAC/SPA sets a number of targets for the site under the supporting the Conservation Objectives in order that the integrity of the sites is maintained or restored as appropriate, and ensure that the sites contribute to achieving the Favourable Conservation Status of the Qualifying Features. The targets cover hydrology and flow, water quantity, area depth and water quality. The hydrology of the river Arun is the major factor affecting these targets and this is turn is affected by the abstraction at Hardham for the supply of drinking water. Continued or increased levels of groundwater abstraction at Hardham reduces water quantity in the Arun Valley sites and adversely affects water levels and flow within the sites (in combination with other plans and projects in the Sussex North WRZ). Without an alternative sustainable water supply or mitigation measures, the hydrology of the sites will be unable to maintain the types and extents of habitats requited to maintain the Qualifying Features.

Details of Water usage for the development	The application seeks planning permission for Regulation 77 of the Conservation of Habitats and Species Regulations in respect of Prior Approval consent DC/21/1998. The submitted strategy indicates an existing baseline water demand of 0 l/d as existing barn was utilised for storage of equipment and machinery necessary for agricultural usages and as such, there is no existing usage within the barn itself. The proposed development would comprise a water demand on 629.2 l/d. Through the use rainwater harvesting / onsite efficiencies, the proposed water demand would be reduced to 0 l/d. The strategy therefore demonstrates that the proposed use would use less water than the existing use. Subject to the attachment of the below listed condition, Officers are satisfied that the proposed development would be water neutral: ***Pre-commencement (slab level) Condition**: No development above ground floor slab level shall commence until full details of the water efficiency measures and rainwater harvesting system required by the approved water neutrality strategy (CGS Civils Consulting Civil Engineers dated 30th November 2023) have been submitted to and approved in writing by the Local Planning Authority.* *Reason: To ensure the development is water neutral to avoid an adverse impact on the Arun Valley SACSPA and Ramsar sites in accordance with Policy 31 of the Horsham District Planning Framework (2015), Paragraphs 179 and 180 of the National Planning Policy Framework (2021), its duties under the Conservation of Habitats and Species Regulations 2017 (as amended), and s40 of the NERC Act 2006 (Priority habitats & species).* ***Pre-Occupation Condition**: No dwelling hereby permitted shall be first occupied until evidence has been submitted to and been approved in writing by the Local Planning Authority that the approved water neutrality strategy for that dwelling has been implemented in full. The evidence shall include the specification of fittings and appliances used, evidence of their installation, and completion of the as built Part G water calculator or equivalent. The installed measures shall be retained as such thereafter.* *Reason: To ensure the development is water neutral to avoid an adverse impact on the Arun Valley SACSPA and Ramsar sites in accordance with Policy 31 of the Horsham District Planning Framework (2015), Paragraphs 179 and 180 of the National Planning Policy Framework (2021), its duties under the Conservation of Habitats and Species Regulations 2017 (as amended), and s40 of the NERC Act 2006 (Priority habitats & species).*

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Proposed mitigation for the project to secure the mitigation as a condition of any consent e.g. alternative sustainable water supply, minimising water use in new development. Water offsetting for residual demand in existing buildings in the Sussex North WRZ. See Position Statement issued by Natural England (September 2021)	**Summary of mitigation package** The following measures to minimise water use have been embedded within the development (see Waterwise Water Neutrality Practical Guidance January 2021) to be secured as part of any planning consent: • Water efficiency measures • Rainwater harvesting These measures have been embedded within the development to be secured as part of any planning consent and are considered sufficient to avoid adverse effects on the integrity of the interest features of the Arun Valley SPA, SAC & Ramsar site from the development either alone or in combination with other plans and projects.
Test 2 – the integrity test	**Conclusion:** Having considered the proposed avoidance and mitigation measures above to be provided in-perpetuity through: • The on-site water efficiency measures, • The provision of an alternative sustainable water supply, rainwater harvesting. Horsham District Council concludes that, with mitigation, the project will not have an Adverse Effect on the Integrity of the Arun Valley SAC/ SPA /Ramsar site, either alone or in combination with other plan and projects. This development would therefore not be in conflict with the conservation objectives for the Arun Valley SPA, SAC and Ramsar site which include 'maintaining or restoring the population of Qualifying Features'. See Appendix 1. As the mitigation has been considered after HRA screening, this HRA Appropriate Assessment is in line with the People over Wind CJEU Court ruling and, being beyond reasonable scientific doubt concerning the effects of the work envisaged on the site concerned, is also in line with the Holohan and Others v An Bord Pleanála court ruling. Having prepared this Appropriate Assessment of the implications of the project for the Arun Valley sites in view of their conservation objectives, subject to consultation with Natural England and fully considered any representation received where necessary, the authority can now agree the project under regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended).

Approving Planner: Halima Chowdhury **Date:** 20.03.2024

DISCLAIMER: This information has been produced by Place Services's Ecology Team on behalf of Horsham District Council, at their request.

Appendix 1 – details of Arun Valley SAC/SPA/Ramsar site

Qualifying Features for SPA/SAC	**Arun Valley SPA** A037 Bewick's swan, *Cygnus columbianus bewickii* (non-breeding). During the time of site notification, the SPA supported 115 individuals representing at least 1.6% of the wintering population in Great Britain (5 year peak mean 1992/93 - 1996/97). During the non-breeding season, the SPA regularly supports an assemblage of waterfowl with the area regularly supporting 27,241 individual waterfowl (5 year peak mean for 1992/93 to 1996/97) including: Shoveler *Anas clypeata*, Teal *Anas crecca*, Wigeon *Anas penelope*, Bewick's Swan *Cygnus columbianus bewickii.* **Arun Valley SAC** 4056 Little Whirlpool Ramshorn snail *Anisus vorticulus* *Anisus vorticulus* occurs across a range of sites in southern and eastern England. The Arun valley is one of the three main population centres for this species in the UK. This proposed site includes two of its core sites in the wash lands of the Arun floodplain (Pulborough Brooks and Amberley Wild Brooks SSSIs).
Qualifying Features for Ramsar	**Arun Valley Ramsar** **Ramsar criterion 2** The site holds seven wetland invertebrate species listed in the British Red Data Book as threatened. One of these, *Pseudamnicola confusa*, is considered to be endangered. The site also supports four nationally rare and four nationally scarce plant species **Ramsar criterion 3** In addition to the Red Data Book invertebrate and plant species, the ditches intersecting the site have a particularly diverse and rich flora. All five British duckweed (*Lemna* species), all five water-cress (*Rorippa* species), and all three British water milfoils (*Myriophyllum* species), all but one of the seven British water dropworts (*Oenanthe* species), and two-thirds of the British pondweeds (*Potamogeton* species) can be found on site. **Ramsar criterion 5** Assemblages of international importance: Species with peak counts in winter: 13774 waterfowl (5 year peak mean 1998/99-2002/2003)
Conservation Status of the relevant Qualifying Features	**Arun Valley SAC, SPA and Ramsar** In line with the national trend, the number of Bewick's swans wintering in the Arun Valley has declined since the time of designation and is now typically fewer than 50 birds. This may reflect an overall decline in the population of the species and/or be due to the effects of a milder climate in which more are able to winter in continental Europe (The Birds of Sussex, 2014). The waterfowl assemblage numbers fluctuate depending upon conditions in the valley but over the past five years have averaged 40,311, an increase from the five year mean of 27,241 at the time of designation. The Arun Valley is one of the remaining strongholds for the Little Whirlpool Ramshorn Snail.

Conservation Objectives (Only Relevant for SPA/SAC)	**Arun Valley SAC & SPA** Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features, and, • The distribution of the qualifying features within the site.

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Consulting Civil Engineers

Water Neutrality Report

Clayfield Farm, Valewood Lane, Barns Green, West Sussex RH13 0QJ

For

Mr John Forster

Rev – **P4**

Reference **C2201**

Date **30th November 2023**

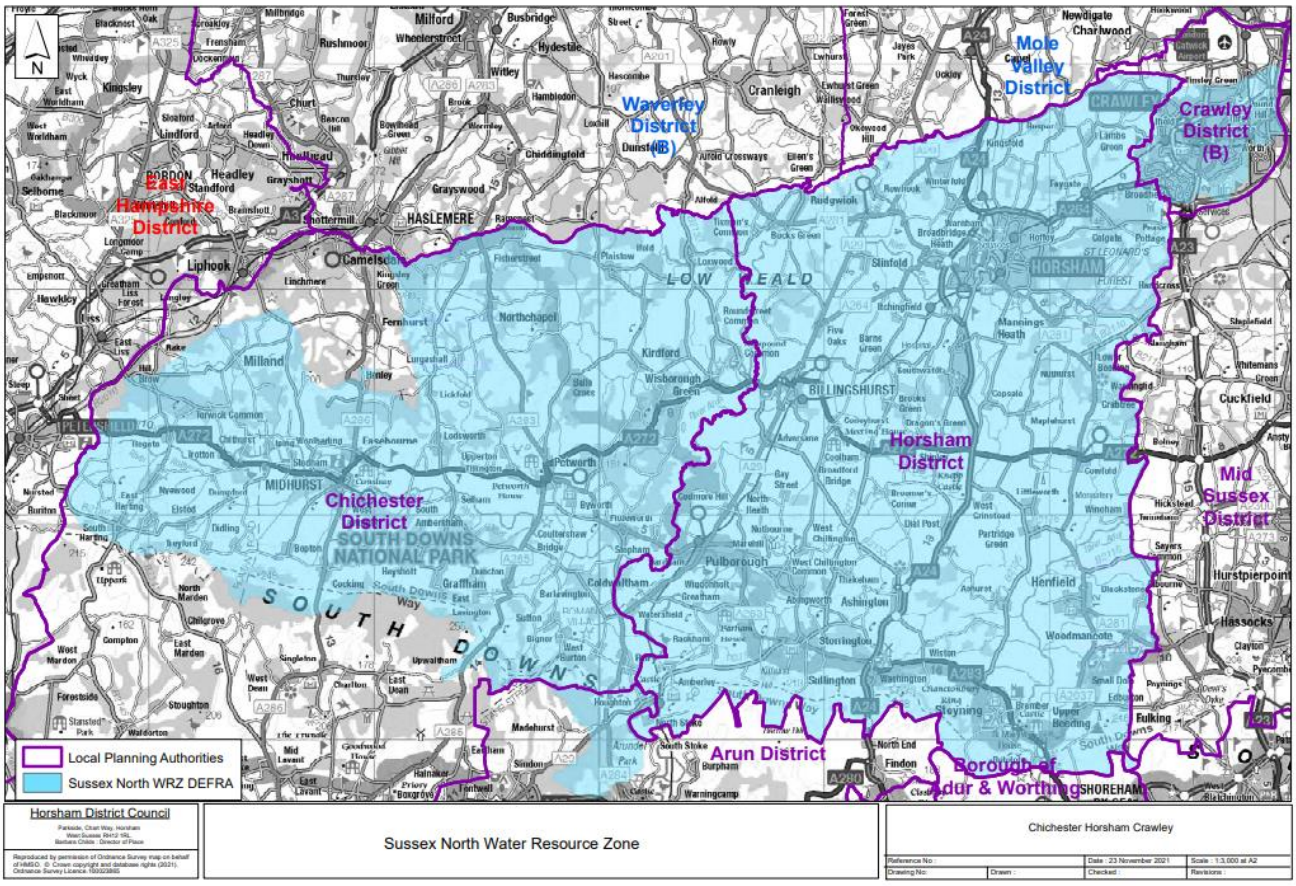
Revision	Date of Issue	Comments	Prepared By	Checked By
P	02.06.2022	Initial Issue	LH	CS
P1	18.11.2022	Revised	LH	CS
P2	15.08.2023	Revised	LH	CS
P3	17.10.2023	Revised	LH	CS
P4	30.11.2023	Revised	LH	CS

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

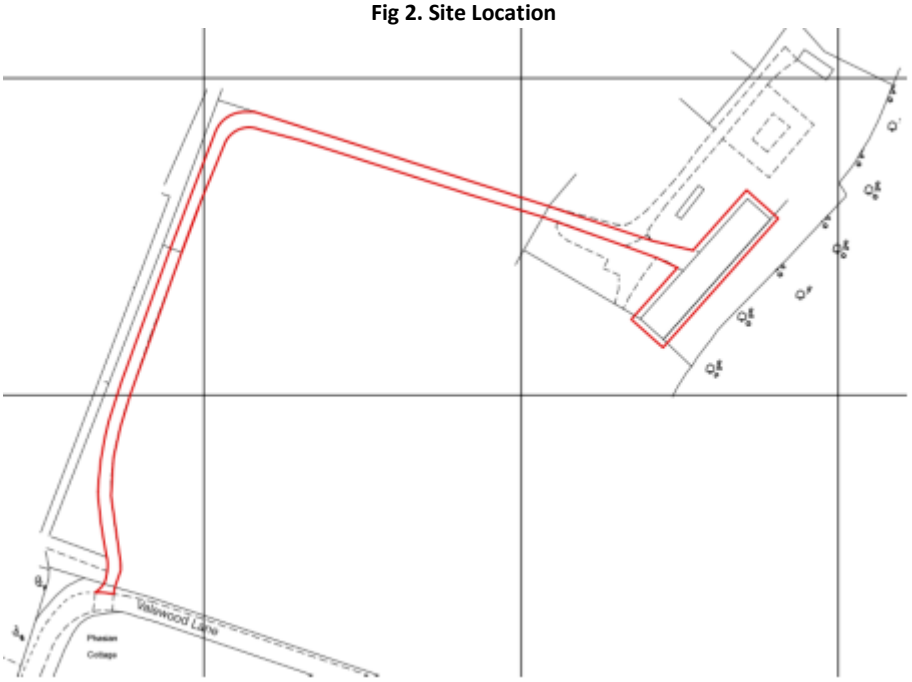
1.1.1 CGS Civils Ltd has been appointed by John Forster to undertake a Water Neutrality Report for a proposed development at Clayfield Farm in Barns Green, West Sussex. Planning permission is sought for the conversion of an existing agricultural barn to form 2 No. 4-bedroom dwellings. The site falls 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 11855 26542 and has the post code RH13 0QJ

Fig 2. Site Location



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.

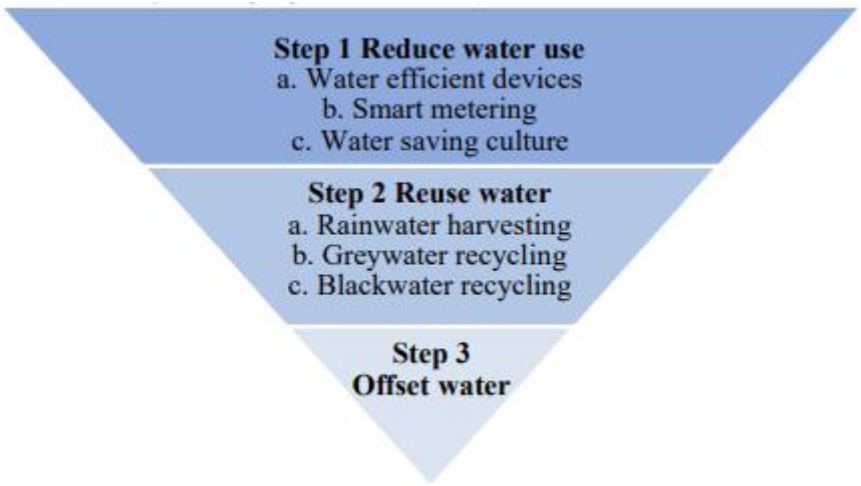
- Reduce water demand in the new development through improvement in efficiency.
- Re-use water, wherever possible.
- Offset the remaining water demand from the new development if required.

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 barn was utilised for storage of equipment and machinery necessary for agricultural usages and as such, there is no existing usage within the barn itself. The proposed scheme consists of the conversion of an existing agricultural barn to form 2 No. 4-bedroom dwellings.

2.1.2 As proven within this report, the use of low water usage fittings and rainwater harvesting can demonstrate water neutrality on site.

Table 2 Water Usage Comparison

Existing Water usage	**0 l/day**
Proposed Scheme water usage	0 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 a new 2 No. 4-bedroom dwellings. In accordance with the average occupancy levels set out by Horsham DC, the population for each property will be 2.86.

Table 3 Average occupancy levels

Number of bedrooms	Average occupancy level
1	1.32
2	1.89
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), therefore:

5.72 x 110 l/p/d
= 629.2 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
  - Water efficient white goods
- 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	6.4/4 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 changed 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 **629.2 l/day** down to **509.31 l/day**

5.72 x 89.04 l/p/d

= **509.31 l/day**

- *5.72 (average occupancy level for 2 No. 4-bedroom dwellings) x 89.04 (Appendix A – Water Calculator for Proposed fittings)*

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

5.1.1 Once the water demand has been reduced via the installation of water efficient products, water reuse should be considered. The term 'water reused' refers to the capture, treatment (if it is required) and the use of alternative water supplies for non-potable purposes. It includes:

- Rainwater and surface water harvesting
- Greywater recycling (typically the used water from baths, showers and hand basins)
- Wastewater recycling.

5.1.2 The installation of water reusing technology has the potential to save significant amounts of water; for example, 24% of water in the home is used for flushing the toilet and only 4% externally in the garden meaning a water reuse system could save at least a quarter of the demand if it was installed for these purposes. Depending on the quality and the system installed, it could also be possible to re-use water for a washing machine which accounts for 12% of total water usage.

Table 8 Practical Summary of Step 2

Step 2: Reuse Water			
Rainwater Harvesting	Small scale water butt	Rainwater Harvesting system for individual homes and buildings	Large scale surface water harvesting
Greywater Recycling		Small systems for individual homes	Largest scale systems for commercial and mixed-use sites

5.1.3 In this instance however, rainwater harvesting is proposed to enable total self-sufficiency within the building to provide water to all fittings including drinking water. The installation of water reusing technologies will further reduce the water demand on site, depending on the harvesting tank installed. The proposed roof area is sufficient to provide the required water to the property via a rainwater harvesting tank as well as has sufficient capacity for a 50-day drought period. **See Appendix C**.

5.1.4 By installing the water efficient devices listed above as well as the rainwater and greywater harvesting technologies listed above, the total demand will be reduced to:

5.72 x 0

= 0 l/day

- *5.72 (average occupancy level for 2 No. 4-bedroom dwellings) x 0 (Appendix B – Water calculator for proposed fittings with RWH)*

Table 9 Part G rainwater collection calculator (Per dwelling)

Rainwater Collection Calculation	
Collection Area (m²)	235
Yield Coefficient	0.8
Depth of rainfall (mm/year)	820
Daily rainwater collection (litres)	422.3
Number of occupants	2.86
Daily Rainwater per person (litres)	147.66

5.1.5 A calculation is to be made to ensure that the rainwater harvested is greater than the rainwater demand within the dwelling. 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.

5.1.6 Using the rainfall catchment data provided by the National River Flow Archives, the closest station point to the site is 41018 – Kird at Tanyards:



5.1.7 The latest data available for this station is SAAR 1961-1990, which shows that the depth of rainfall in the area is 820mm.

$$Y_R = A \times e \times h \times n \times 0.05$$

Where:

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

$$\underline{\mathbf{7322.6}} = 235 \times 0.8 \times 820 \times 0.95 \times 0.05$$

5.1.8 In order to ensure there is sufficient roof area, 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. (This will take into account full water usage within the property to ensure it can be entirely self-reliant).

$$D_N = P_d \times n \times 365 \times 0.05$$

Where:

D_N = the annual non-potable water demand (l)
P_d = The daily requirement per person (l)
n = number of persons

$$5115.11 = 98 \times 2.86 \times 365 \times 0.05$$

5.1.9 To ensure there is sufficient area to allow a 50-day drought storage, an extra 50 days is to be included:

$$\underline{\mathbf{5815.81}} = 98 \times 2.86 \times 415 \times 0.05$$

5.1.10 It should be noted that a mains water connection should still be made for use within an emergency. This emergency usage will not affect the water usage of the dwelling and will therefore not be included as part of the demand of the property. The water main will be connected to the rainwater harvesting tank through the use of an AB Cat 5 Break Tank that is fitted with a non-return valve. The tank will allow mains water to top of the rainwater harvesting tank if the water level falls below a certain point. The water level will be monitored using a ball valve. Further information can be supplied upon request by Silverline UK Ltd.

5.1.11 From the above water calculations, we have:

- Proposed water usage rate of 110 litres/person/day based on 'HDPF'
- Which can then be reduced to:
- Proposed water usage rate of 66.2 litres/person/day with water efficient devices and rainwater harvesting

5.1.12 In order to provide a cumulative consumption comparison between the existing and the proposed water usage, the occupancy rates would be for 'as existing' and 'as proposed':

- Proposed water demand from HDPF – 110 l/p/d at an overall occupancy rate 5.72 people = **629.2 l/day.**
- Proposed Water Demand with water efficient devices listed in **Table 4** and Rainwater harvesting recycling – 0 l/p/d at an overall occupancy rate of 5.72 people = **0 l/day**

5.1.13 The client is willing to install a 7,500l rainwater harvesting tank in order to achieve total self-sufficiency within the property. The harvesting tank is to be fitted with the following equipment in order to get the rainwater to a level safe for human consumption.

- Aerator
- Lowara 0.55 kW variable speed booster set
- PREFILT103/4 10" prefilter housing
- CRT10SW-05 5 micro sediment filter
- UV-CS165 ultraviolet steriliser
- WH1MH Whole house water filter
- 10" x 54" pH correction unit
- The reverse osmosis unit – This is fitted as a precaution only to treat just the drinking water point and not the entire house.

5.1.14 The likely contaminants associated with rainwater harvesting systems and how to treat them are:

- Dust – Sediment Filter
- Bacteria, including Clostridium Prefringers – High dose of UV treatment
- Nitrates – Heavy Metal reduction filter
- Organics – Carbon Filter

5.1.15 It is suggested that the supply is tested once the equipment is initially fitted to ensure effective operation then test the water every 6 months to ensure continued performance. The water treatment equipment will need to be maintained as per the manufacturers guidelines which are all laid out clearly in the equipment quote from Silverline Ltd. They will also send the end user reminders when the equipment needs servicing. The water is to be tested every 6 months, and results kept, there should be a record kept of all maintenance undertaken on the equipment as per the manufacturer's guidelines.

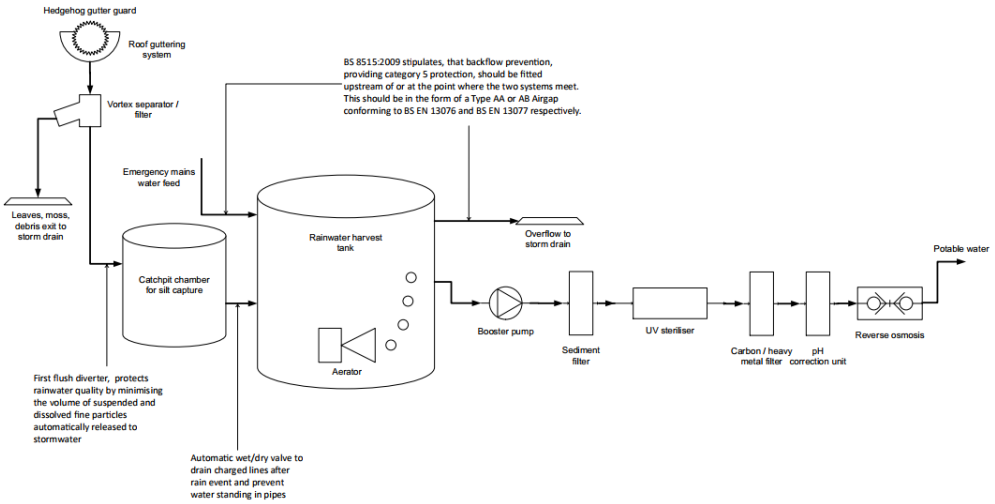
5.1.16 It has been confirmed by Silverline UK Ltd that the only maintenance of the system that is required is to replace filters are certain intervals. It is recommended that the:

- Aerator
- Lowara 0.55 kW variable speed booster set
- PREFILT103/4 10" prefilter housing
- CRT10SW-05 5 micro sediment filter is to be replaced every 6 months, or more frequently if it reduced water flow is experienced.
- UV-CS165 ultraviolet steriliser will need the lamps replacing every 12 months. It is also recommended that the quartz sleeve is removed and cleaned every 12 months to ensure light can get to the water.
- WH1MH Whole house water filter will require having the filter media replaced every 12 months.
- 10" x 54" pH correction unit will be required having the media topped up every year.
- The reverse osmosis unit will require the prefilters replacing every 6 months and the post filter every 12 months. In addition to this, the membrane will need replacing when the water production slows, however, this is dependent on the water used but it is generally every 3-6 years.

5.1.17 Due to the proposed rainwater harvesting tank and filtration system, there is no need to install a water main to the property, however, one should be installed in case of emergancy – as such this means the proposed site will not require a Water Neutrality report (based on Natural England's definition below) and will also be water neutral.

"The water neutrality approach applies to all development that uses water from the Sussex North water supply zone and specifically the Pulborough abstractions it is not restricted to new residential dwellings and may include other forms of development that use the public water supply. Whether an application is included would depend on what water supply is chosen. **Only development that uses public water supply from Sussex North water supply zone is included in the Statement. Many of the types of development that use water that the County Council permit do not use public water supply and would therefore not be covered by the Statement.** It is for the local planning authorities including the County Council to identify which types of development they believe may be captured."

Fig. 3 Schematic view of treatment system



5.1.18 Despite the proposed rainwater harvesting tank being below ground, extra precautions can be undertaken by ensuring that the rainwater harvesting tank is to be black in order to stop sunlight reaching the stored water, keeping the temperatures lower and allowing for higher oxygen concentration whilst also preventing algae and bacteria growth. The filters in place are implemented post storage.

5.1.19 The system will be considered as a private water supply and therefore it will be governed by the Private Water Supply Regulations 2016, which is regulated by the local council's Environmental Health officer or Pollution Control Officer. Following completion of the system, a treated water sample will be taken and tested by an independent UKAS accredited lab. The sample will be collected by a suitably qualified person with Drinking Water Inspectorate (DWI) certification for sampling water supplies. The system will be inspected every 6 months and maintenance procedures will be carried out to ensure that the water is treated property.

5.1.20 Inspection and sampling for E.Coli, TVC and Coliforms will be carried out twice yearly. The UV Steriliser will have lamps replaced every year, the filter media in the water filter will be replaced every 2 years and the media within the pH correction unit will be replaced every year.

Table 10 Schedule of Example Fittings

Water Fitting	Water Usage	Example Fitting:
WC	4/2.6 litres dual flush	E8967 Sandringham 21
Shower	7 l/min	Hansgrohe Hand Shower Croma S110
Bath	145 litres	Carron Shallow Single Bath
Basin Taps	2.5 l/min	Grohe Eurosmart Cosmopolitan
Sink Taps	5 l/min	Carron Phoenix Pura Plus
Dishwasher	0.73 l/place setting	Bosch SMS6EDI02G
Washing Machine	5.5 l/kilogram	Fisher & Paykel WM1490F1

Please note that the above fittings are examples only. Ensure that your chosen fittings meet the required water usage. All basin and Kitchen taps can be fitted with flow restrictors instead of a reduced flow tap in order to achieve necessary reduced water usage.

6 Step 3 – Offsetting remaining water demand

6.1.1 There is no need to offset the water usage from the proposed site due to the above.

7 Conclusion

7.1.1 The overall water demand can be reduced by utilising methods listed in the sections above to reduce and re-used water for the proposed development. This results in the site being water neutral.

7.1.2 The client is willing to install a 7,500l rainwater harvesting tank with a filter system per dwelling which will make the rainwater harvested from the roofs suitable for all household use including drinking.

7.1.3 To summarise:

- The proposed development will use on average **629.2 l/day**.
- This water demand can be reduced to **509.31 l/day** through the installation of water reducing appliances
- Re-using the water through rainwater harvesting tanks can further reduce the water demand down to **0 l/day**
- The overall water demand will be reduced, and the site will become water neutral.

8 Appendices

8.1 Appendix A:

Table 11 – Water Calculator from Building Regulations Part G – Information input from proposed site with water efficient devices from Table 6.

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	7.696
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	30.6
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)	5	0.44	10.36	12.56
Washing Machine	Litres/kg dry load	5.5	2.1	0	11.55
Dishwasher	litres/place setting	0.73	3.6	0	2.62
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)			92.358
		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)			89.045

8.2 Appendix B:

Table 12 – Water Calculator from Building Regulations Part G – Information input from proposed site with water efficient devices from Table 6 with Rainwater Harvesting.

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	7.696
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	30.6
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)	5	0.44	10.36	12.56
Washing Machine	Litres/kg dry load	5.5	2.1	0	11.55
Dishwasher	litres/place setting	0.73	3.6	0	2.62
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)			92.358
		Contribution from greywater (l/p/d)			0
		Contribution from rainwater (l/p/d)			98
		Normalisation factor			0.91
		External water use			5
		Total water consumption (36(1)) (l/p/d)			0

8.3 Appendix C:

Rainwater harvesting tank size calculator per plot:

COLLECTABLE ROOF AREA (M²)

Main Building	Width:		Length:	Rain Collection Area:	0	m²
Extension one	Width:		Length:	Rain Collection Area:	0	m²
Extension Two	Width:		Length:	Rain Collection Area:	0	m²
Extension Three	Width:		Length:	Rain Collection Area:	0	m²
Or the total roof area, if you already know it:		235		Total area of collectable roof space:	235	m²
Select Your Region		England SE & Central S		Average rainfall per year in your region:	64	L
Collectable rainwater per annum in litres - discounted by 20% to account for water loss					**120320**	**L**

USE OF RAINWATER IN THE BUILDING

	people:	*bedrooms:*	
Number of people or bedrooms in the building -	1	0	
☐ Number of clothes washing cycles per day (*50 litres each*)	0.00 Cycles	0.00	L
☐ Number of toilet flushes per day (*4.42 flushes per person, average 5 litres each*)	0.00 Flushes	0.00	L
Outdoor use in litres, per person per day (*recommended 5 litres per person per day*)	190	190.00	L
Amount of water you require every day		190	L
Amount of water you require every year	**DEMAND**	**69350**	**L**

FINAL FIGURES

How many days drought protection do you need? Typically 21 (18 minimum)	40	
Capacity of water storage in litres required for drought protection	7600.00	L
The lesser of YIELD (blue) or DEMAND (green) per annum	69350	L
Therefore, volume of rainwater storage required	**7600**	**L**

CONCLUSION

Is there sufficient roof water available:		YES
Recommended tank size from our shallow dig range:	F-Line Range:	7500 LITRE F-LINE TANK

Annex A – Additional advice

Natural England offers the following additional advice:

Landscape
Paragraph 174 of the National Planning Policy Framework (NPPF) highlights the need to protect and enhance valued landscapes through the planning system. This application may present opportunities to protect and enhance locally valued landscapes, including any local landscape designations. You may want to consider whether any local landscape features or characteristics (such as ponds, woodland, or dry-stone walls) could be incorporated into the development to respond to and enhance local landscape character and distinctiveness, in line with any local landscape character assessments. Where the impacts of development are likely to be significant, a Landscape & Visual Impact Assessment should be provided with the proposal to inform decision making. We refer you to the Landscape Institute Guidelines for Landscape and Visual Impact Assessment for further guidance.

Best and most versatile agricultural land and soils
Local planning authorities are responsible for ensuring that they have sufficient detailed agricultural land classification (ALC) information to apply NPPF policies (Paragraphs 174 and 175). This is the case regardless of whether the proposed development is sufficiently large to consult Natural England. Further information is contained in GOV.UK guidance Agricultural Land Classification information is available on the Magic website on the Data.Gov.uk website. If you consider the proposal has significant implications for further loss of 'best and most versatile' agricultural land, we would be pleased to discuss the matter further.

Guidance on soil protection is available in the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, and we recommend its use in the design and construction of development, including any planning conditions. For mineral working and landfilling separate guidance on soil protection for site restoration and aftercare is available on Gov.uk website. Detailed guidance on soil handling for mineral sites is contained in the Institute of Quarrying *Good Practice Guide for Handling Soils in Mineral Workings*.

Should the development proceed, we advise that the developer uses an appropriately experienced soil specialist to advise on, and supervise soil handling, including identifying when soils are dry enough to be handled and how to make the best use of soils on site.

Protected Species
Natural England has produced standing advice[1] to help planning authorities understand the impact of particular developments on protected species. We advise you to refer to this advice. Natural England will only provide bespoke advice on protected species where they form part of a Site of Special Scientific Interest or in exceptional circumstances.

Local sites and priority habitats and species
You should consider the impacts of the proposed development on any local wildlife or geodiversity sites, in line with paragraphs 175 and179 of the NPPF and any relevant development plan policy. There may also be opportunities to enhance local sites and improve their connectivity. Natural England does not hold locally specific information on local sites and recommends further information is obtained from appropriate bodies such as the local records centre, wildlife trust, geoconservation groups or recording societies.

Priority habitats and Species are of particular importance for nature conservation and are included in the England Biodiversity List published under section 41 of the Natural Environment and Rural Communities Act 2006. Most priority habitats will be mapped either as Sites of Special Scientific Interest, on the Magic website or as Local Wildlife Sites. List of priority habitats and species can be found on Gov.uk.
Natural England does not routinely hold species data, such data should be collected when impacts on priority habitats or species are considered likely. Consideration should also be given to the potential environmental value of brownfield sites, often found in urban areas and former industrial land, further information including links to the open mosaic habitats inventory can be found here.

[1] https://www.gov.uk/protected-species-and-sites-how-to-review-planning-proposals

Annex A – Additional advice

Ancient woodland, ancient and veteran trees
You should consider any impacts on ancient woodland and ancient and veteran trees in line with paragraph 180 of the NPPF. Natural England maintains the Ancient Woodland Inventory which can help identify ancient woodland. Natural England and the Forestry Commission have produced standing advice for planning authorities in relation to ancient woodland and ancient and veteran trees. It should be taken into account by planning authorities when determining relevant planning applications. Natural England will only provide bespoke advice on ancient woodland, ancient and veteran trees where they form part of a Site of Special Scientific Interest or in exceptional circumstances.

Environmental gains
Development should provide net gains for biodiversity in line with the NPPF paragraphs 174(d), 179 and 180. Development also provides opportunities to secure wider environmental gains, as outlined in the NPPF (paragraphs 8, 73, 104, 120,174, 175 and 180). We advise you to follow the mitigation hierarchy as set out in paragraph 180 of the NPPF and firstly consider what existing environmental features on and around the site can be retained or enhanced or what new features could be incorporated into the development proposal. Where onsite measures are not possible, you should consider off site measures. Opportunities for enhancement might include:

- Restoring a neglected hedgerow.
- Creating a new pond as an attractive feature on the site.
- Planting trees characteristic to the local area to make a positive contribution to the local landscape.
- Using native plants in landscaping schemes for better nectar and seed sources for bees and birds.
- Incorporating swift boxes or bat boxes into the design of new buildings.
- Designing lighting to encourage wildlife.
- Adding a green roof to new buildings.

Natural England's Biodiversity Metric 4.0 may be used to calculate biodiversity losses and gains for terrestrial and intertidal habitats and can be used to inform any development project. For small development sites the Small Sites Metric may be used. This is a simplified version of Biodiversity Metric 4.0 and is designed for use where certain criteria are met.

Natural England's Environmental Benefits from Nature tool may be used to identify opportunities to enhance wider benefits from nature and to avoid and minimise any negative impacts. It is designed to work alongside Biodiversity Metric 4.0 and is available as a beta test version.

Green Infrastructure
Natural England's Green Infrastructure Framework provides evidence-based advice and tools on how to design, deliver and manage green infrastructure (GI) . GI should create and maintain green liveable places that enable people to experience and connect with nature, and that offer everyone, wherever they live, access to good quality parks, greenspaces, recreational, walking and cycling routes that are inclusive, safe, welcoming, well-managed and accessible for all. GI provision should enhance ecological networks, support ecosystems services and connect as a living network at local, regional and national scales.

Development should be designed to meet the 15 Green Infrastructure Principles. The Green Infrastructure Standards can be used to inform the quality, quantity and type of green infrastructure to be provided. Major development should have a GI plan including a long-term delivery and management plan. Relevant aspects of local authority green infrastructure strategies should be delivered where appropriate.

GI mapping resources are available here and here. These can be used to help assess deficiencies in greenspace provision and identify priority locations for new GI provision.

Access and Recreation
Natural England encourages any proposal to incorporate measures to help improve people's access to the natural environment. Measures such as reinstating existing footpaths together with the creation of new footpaths and bridleways should be considered. Links to urban fringe areas should also be explored to strengthen access networks, reduce fragmentation, and promote wider green infrastructure.

Annex A – Additional advice

Rights of Way, Access land, Coastal access and National Trails
Paragraphs 100 and 174 of the NPPF highlight the important of public rights of way and access. Development should consider potential impacts on access land, common land, rights of way and coastal access routes in the vicinity of the development. Consideration should also be given to the potential impacts on the any nearby National Trails. The National Trails website www.nationaltrail.co.uk provides information including contact details for the National Trail Officer. Appropriate mitigation measures should be incorporated for any adverse impacts.

Biodiversity duty
Your authority has a duty to have regard to conserving biodiversity as part of your decision making. Conserving biodiversity can also include restoration or enhancement to a population or habitat. Further information is available here.