Land at Sir Robert's Farm
Goose Green Lane
Pulborough
West Sussex

Water Neutrality Statement

In connection with:
The demolition of an existing dwelling and erection of a replacement three-bed farmhouse-style dwelling with a detached garage; the demolition of a building (with existing full planning permission for change of use to a three-bedroom residential dwelling) and erection of a replacement barn-style three-bed residential dwelling with a detached garage; together with associated access and change of use of land from paddock to residential curtilage.

At:
Sir Robert's Farm
Goose Green Lane
Pulborough
West Sussex RH20 2LW

Version 1

1 Introduction and Executive Summary

This Water Neutrality Statement has been prepared in support of the planning application for:

> **The demolition of an existing dwelling and erection of a replacement three-bed farmhouse-style dwelling with a detached garage; the demolition of a building (with existing full planning permission for change of use to a three-bedroom residential dwelling) and erection of a replacement barn-style three-bed residential dwelling with a detached garage; together with associated access and change of use of land from paddock to residential curtilage.**

This report demonstrates how the proposed development will meet the requirements of Horsham District Council's Planning Policy, Natural England's Position Statement for Applications within the Sussex North Water Supply Zone[1].

Water neutrality is not defined in legislation, however Natural England draw the definition from the Gatwick Sub-regional Water Cycle Study (2020)[2]:

> *"For every new development,* ***total water use in the Sussex North Water Supply Zone*** *after the development must be* ***equal to or less*** *than the total water-use in the region before the new development."*

This report concludes that the proposed development **will have a net neutral water demand, compared to the baseline water consumption**.

2 The Proposed Development

Details of the proposed development can be found in the accompanying Design and Access Statement and associated drawings.

The proposed development is located at Sir Robert's Farm Goose Green Lane, Pulborough, West Sussex RH20 2LW (the "**Site**"). The site is located within the Sussex North Water Resource Supply Zone. This supply is sourced from abstraction points in the Arun Valley, which includes locations such as Amberley Wild Brooks Site of Special Scientific Interest (SSSI), Pulborough Brooks SSSI and Arun Valley Special Protection Area/Special Area of Conservation and Ramsar site.

The Site comprises:

1. **Sir Robert's Bungalow** - A Use Class C3 dwelling house. The accommodation comprises 4 bedrooms, 2 bathrooms, living room and kitchen. In this document, this building is referred to as the "**Bungalow**". The Bungalow has full planning permission for its demolition, change of land use from paddock to residential curtilage, and replacement with a four-bedroom two storey barn-style residential dwelling and detached garage (see DC/25/0040).

[1] September 2021 – Interim Approach

[2] Gatwick Sub-Region Water Cycle Study, Final Report (August 2020) JBA Consulting

2. **Sir Robert's Cottage** - A Use Class C3 dwelling house. The building comprises a pitched roof single storey bungalow. The accommodation comprises a combined living room/kitchen, one bedroom and one bathroom. In this document, this building is referred to as the "**Cottage**". This application includes the replacement of the Cottage with a three-bedroom two-storey farmhouse-style dwelling and designation of the associated residential curtilage.

3. **Sussex Barn** - The Sussex Barn has full extant planning permission under Ref. DC/23/1546 for conversion to a three bedroom residential dwelling. All conditions have been discharged and the development has commenced. In this Statement, this building is referred to as the "**Sussex Barn**".

4. **Workshop** - The Workshop has full extant planning permission under Ref. DC/23/1549 for change of use to a three bedroom residential dwelling house (Class C3) and associated minor alterations. This application includes the demolition and relocation of a replacement three-bedroom dwelling to the North of its existing site, to make way for the Cottage replacement and curtilage, and proposes its associated curtilage and access. In this document, this building is referred to as the "**Workshop**".

5. **Garages** - The Garages have full extant planning permission under Ref. DC/23/1550 for change of use to a one bedroom residential dwellinghouse (Class C3) and associated minor alterations- In this document, this building is referred to as the "**Garages**".

The proposed development subject of the application to which this report relates comprises:

1. the demolition of the one-bed Cottage, and erection of a replacement three-bed Sussex Farmhouse-style dwelling; and

2. demolition of the Workshop (with extant permission as a three-bed dwelling under DC/23/1549), and erection of a three-bed 'chickenshed' style dwelling.

3 Policy and Regulations

The proposed development is required to meet both local planning policy as well as the National Standards (Part G) requirements in relation to water specification and use on site.

3.1 Building Regulation Approved Document Part G[3]

The minimum Part G standard equates to 125l/p/d and enhanced standard 110l/p/d (both including 5l/p/d external water use) and apply to a dwelling formed by:

- new construction
- material change of use where the building is used as a dwelling where previously it was not; or

[3] Sanitation, hot water safety and water efficiency (2015) edition with amendments

- material change of use where the building contains a flat, where previously it did not.

3.2 Horsham District Planning Framework (Nov. 2015)

Policy 37 of the Horsham Planning framework (2015) sets out the water efficiency requirements for all new developments erected within the region. A target figure of 110 l/p/d must be achieved or bettered for all new developments.

3.3 Natural England Position Statement[4]

In September 2021, Natural England released substantive advice for all developments that fall within the Sussex North's water supply zone. To alleviate stresses imposed on the water network, all new developments must demonstrate the water consumption after the development is complete will be no greater than the consumption of the site as existing.

4 Approach to Water Neutrality

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.

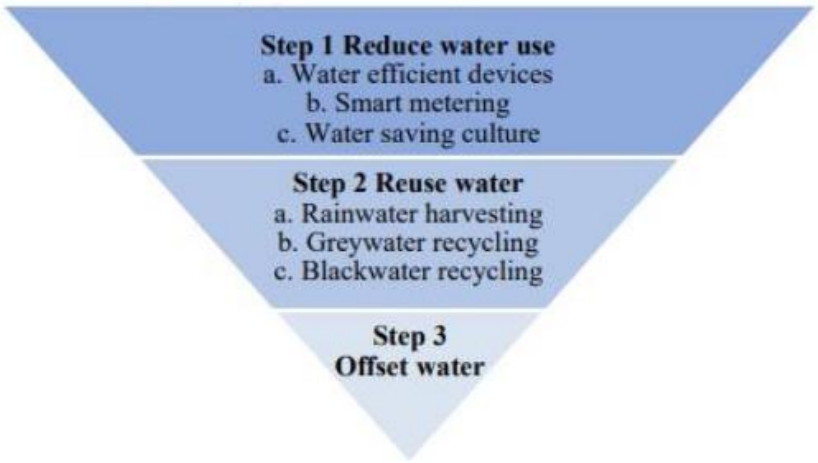
- Reduce water demand in the new development through improvement in efficiency.
- Re-use water, wherever possible.
- Offset the remaining water demand from the new development if required.

The report will be split into the following sections:

- A calculation of the Baseline Water Consumption of the Site
- A calculation of estimate water usage of the Site based on the 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 (if necessary).

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.

[4] Natural England's Position Statement for Applications within the Sussex North Water Supply Zone (September 2021 – Interim Approach)



5 Existing Water Usage – The Baseline Water Consumption

The Site does not have a water meter. Therefore, the Baseline Water Consumption of the Site is calculated based on the following:

5.1 Part G Calculator

Horsham District Counsel ("**HDC**") has advised the Applicant that the average PCC in Southern Water's Sussex North Water Resource Zone of 135l/p/d is no longer accepted in the calculation of the assumed baseline. HDC has advised that the baseline is to be calculated in accordance with the Part G calculator. The correspondence with HDC is in Appendix A.

To calculate the estimated water use of the existing dwellings, the WRC Part G Water Efficiency Calculator for new dwellings has therefore been used. This calculator has been developed in accordance with the Government's National Calculation Methodology for assessing water efficiency in new dwellings in support of: The Code for Sustainable Homes, April 2009 and subsequent versions, and the Building Regulations Approved Document Part G, 2009.

A report detailing the survey of the existing fixtures and fittings, and the calculated water consumption of each of the Bungalow and Cottage is contained in Appendix B.

Based on the Part G Water Consumption Calculation, the total water consumption of the existing Bungalow and Cottage are: **211 Litres/person/day** and **165 Litres/person/day** respectively.

5.2 Occupancy

When calculating water use and water offset, the building's occupancy must be taken into consideration as part of the overall calculation in order to produce a total litres per day water use figure.

Based on extrapolated 2011 census data for Horsham District, average occupancy data is as follows:

- One-bedroom dwellings: 1.32 occupants
- Two-bedroom dwellings: 1.88 occupants
- Three-bedroom dwellings: 2.47 occupants
- Four-bedroom dwellings: 2.86 occupants
- Five-bedroom dwellings: 3.09 occupants

Accordingly, the existing water consumption is calculated as follows:

Existing Dwelling	Bedrooms	Occupancy	(L/p/d)	Total (l/d)
Bungalow	4	2.86	211	603.46
Cottage	1	1.32	165	217.8
Total				**821.26**

In connection with other developments on the Site, the applicant has committed to implement water saving measures in the Bungalow and Cottage in order to offset the water consumption of three additional properties. Please refer to the Water Neutrality Statements submitted in connection with the Sussex Barn conversion (DC/23/1546), Workshop conversion (DC/23/1549) and Garages conversion (DC/23/1550).

In order to achieve water neutrality in respect of DC/23/1546, DC/23/1549 and DC/23/1550, a total water reduction of at least 394.4l/d was required. A total reduction of 464.3l/d was achieved by a commitment to reducing the Per Capita Consumption (PCC) to 85.4l/p/d in both the existing Bungalow and the Cottage.

The water consumption of:(i) the original Site (pre any water saving measures); and (ii) the current approved Site (i.e. the Site as permitted under various planning permissions) is set out in the following table:

Original Site (Pre-Planning/water reducing measures)					**Current Approved Site**				
Existing Dwelling	**Bedrooms**	**Occupancy**	**Original (L/p/d)**	**Total (l/d)**	**Bedrooms**	**Occupancy**	**Committed (L/p/d)**	**Total (l/d)**	**Notes**
Bungalow	4	2.86	211	603.46	4	2.86	85.4	244.24	See: DC/25/0040
Cottage	1	1.32	165	217.8	1	1.32	85.4	112.73	
Sussex Barn	0	0	0	0	3	2.47	63	155.61	Includes RWH. See DC/23/1546
Workshop	0	0	0	0	3	2.47	63	155.61	Includes RWH. See DC/23/1549
Garages	0	0	0	0	1	1.32	63	83.16	Includes RWH. See DC/23/1550
Total				**821.26**				**751.35**	

The water consumption of the original site is calculated as 821litres/day (the "**Baseline Water Consumption**").

As currently permitted, the Site demonstrates a net negative water consumption of: **- 69.9l/d**

The Applicant has reserved the right to use the surplus 69.9l/d in connection with other developments on the Site.

6 Water Use of Proposed Development

To calculate the water use of the proposed development, the WRC Part G Water Efficiency Calculator[5] for new dwellings has been used. This calculator has been developed in accordance with the Government's National Calculation Methodology for assessing water efficiency in new dwellings in support of: The Code for Sustainable Homes, April 2009 and subsequent versions, and the Building Regulations Approved Document Part G, 2009.

The proposed water related fitting specifications are detailed in Appendix C.

The following table sets out the water consumption of the Site as proposed under the application to which this report relates (without any further water reducing measures). For this stage of the assessment, both the Bungalow replacement and Workshop replacement are assumed to achieve 85.4 litres, per person, per day, based on the proposed fittings (see Appendix D).

Dwelling	Bedrooms	Occupancy	Committed (L/p/d)	Total (l/d)	Notes
Plot 1 (Bungalow replacement)	4	2.86	85.4	244.24	Permitted under DC/25/0040.
Plot 2 (Cottage replacement)	3	2.47	85.4	210.94	Subject of this application. One-bedroom Cottage, replaced with three-bed dwelling.
Sussex Barn	3	2.47	63	155.61	Includes RWH. See DC/23/1546
Plot 5 (Workshop replacement)	3	2.47	85.4	210.94	Subject of this application. Workshop replaced with three-bed dwelling.
Garages	1	1.32	63	83.16	Includes RWH. See DC/23/1550
Total				**904.89**	

The total water consumption of the Site based on the current development as proposed under the application to which this report relates is **904.89 l/d**. A reduction of **83.63 l/d** is therefore required for the Site to be water neutral.

7 Identifying Measures That Can be Used to Re-Use Water

The term “water re-use” refers to the capture, treatment (if required) and use of alternate supplies for non-potable purposes. It includes: rainwater and surface harvesting, greywater recycling and wastewater recycling.

It is proposed that rainwater harvesting is installed in both the Cottage replacement dwelling and Workshop replacement dwelling. The installation of water re-use technologies will

[5] https://wrcpartgcalculator.co.uk/

further reduce the water demand on site, depending on the harvesting tank installed. By installing a sufficiently sized rainwater harvesting tank, the water consumption associated with toilet flushing and washing machine use can be provided for from harvested rainwater.

By installing a sufficiently sized rainwater harvesting tank, and water treatment system, the water consumption associated with toilet flushing and washing machine use can be provided for from harvested rainwater.

The proposed roof area of the Cottage replacement building is sufficient to provide the required water to the dwelling via a-3000 litre below ground rainwater harvesting tank.

The proposed roof area of the Workshop replacement dwelling is sufficient to provide the required water to the dwelling via a 3000-litre below ground rainwater harvesting tank.

The tanks have capacity for a 35-day drought period. The rainwater harvesting tank size calculations are show in Appendix E and the proposed harvesting system is shown in Appendix F.

The calculations to show the available rainwater capture is greater than the rainwater demand within each dwelling is presented in Appendix G.

Based on the proposed fittings and rainwater harvesting systems proposed, the total water consumption per person, per day for each of the Cottage and Workshop replacement dwellings can be reduced to 63 litres, per person, per day (see Appendix H).

Dwelling	Bedrooms	Occupancy	Committed (L/p/d)	Total (l/d)	Notes
Plot 1 (Bungalow replacement)	4	2.86	85.4	244.24	Permitted under DC/25/0040.
Plot 2 (Cottage replacement)	3	2.47	63	210.94	Subject of this application. One-bedroom Cottage, replaced with three-bed dwelling. Including RWH.
Sussex Barn	3	2.47	63	155.61	Includes RWH. See DC/23/1546
Plot 5 (Workshop replacement)	3	2.47	63	210.94	Subject of this application. Workshop replaced with three-bed dwelling. Including RWH.
Garages	1	1.32	63	83.16	Includes RWH. See DC/23/1550
Total				**794.23**	

The total water consumption of the Site based on the proposed development, with rainwater harvesting installed in each of the Cottage and Workshop replacement dwellings, is **794.23 litres/day**. This demonstrates a net water reduction of 27.02 l/d compared to the Baseline Water Consumption.

The applicant has reserved the right to use the surplus 27.02l/d in connection with other developments on the site.

Appendix A - Correspondence with HDC regarding calculation of Baseline Water Consumption

RE: DC/23/0547 - Revised Water Neutrality Statement

1 message

Robert.Hermitage <Robert.Hermitage@horsham.gov.uk> Wed, Aug 9, 2023 at 4:50 PM
To: Michael isherwood <[redacted]>

Hi Michael

I have just reviewed this statement. I note that 135lpd has been applied to the existing dwelling as an assumed baseline. Unfortunately, we no longer accept this position, as this caused some issues with offsetting schemes where we requested Part G calculators to demonstrate their baseline. In order to make things consistent, fair and taking the precautionary approach, we know expect baselines to be demonstrated with a Part G calculator.

Please let me know if you wish to update the statement again.

Many thanks

Robert Hermitage

Principal Planning Officer

Appendix B - Water Consumption Survey

Land at Sir Robert's Farm
Goose Green Lane
Pulborough
West Sussex

Water Consumption Survey

At:
Sir Robert's Farm
Goose Green Lane
Pulborough
West Sussex RH20 2LW

Version 1

1 Introduction

The report has been prepared in support of a water neutrality statement in connection with the proposed development of Sir-Roberts Farm. The proposed development relies on the baseline water consumption of two residential properties on the site. The residential properties comprise:

- an existing four-bedroom bungalow; and
- an existing one-bedroom cottage.

This report presents a survey of the existing fixtures and fittings in each of the properties, and evidences their current water consumption rate. The report presents recordings of the flow rate of each fixture/fitting and photographs of each, and an explanation of the methodology used to calculate the flow rates etc. The results have then been input into a Part G water calculator to calculate the total water consumption per person per day for each property.

Based on the flow rates and capacities measured, as calculated in accordance with the Part G Calculator, the total water consumption of the existing dwellings are:

- Bungalow: 211 Litres/person/day
- Cottage: 165 Litres/person/day

2 Methodology

This section describes the methodology used for calculating the capacity/flow rate etc of the existing fixtures and fittings. Videos of each process were taken during the survey and are available on request.

2.1 Taps

To measure the flow rate of each tap the following methodology was followed:

1. Tap photographed and short description of the tap style taken.
2. Tap opened to full flow.
3. Stopwatch prepared at zero.
4. One litre container placed under the tap collecting the water, stopwatch simultaneously started.
5. Stopwatch stopped once water reached one litre mark.
6. Process repeated three time and average reading taken.
7. Litres per minute calculated by:

   (60 / average recorded time) x no. of litres collected = litres / minute

2.2 Bath

For the Part G calculator, the Bath capacity (litres) up to the overflow is required. As the baths in the two properties are old, and exact specifications cannot be obtained, the baths were measured (length, width and depth to overflow. Comparable models have been located on-line and the capacities have been estimated from there.

2.3 Shower

Methodology as per Tabs, but using larger container, timing the collection of 5 litres.

2.4 Toilet

To measure the flush capacity of each toilet (each being single flush), the following methodology was followed:

1. Toilet photographed and short description taken.
2. Cistern lid opened. Water level marked inside cistern.
3. Measuring container with 10-15liters of water added. This was weighed.
4. The toilet is flushed, holding the float valve up so that the cistern does not refill after flushing.
5. Once flush complete, the water from the container was emptied into the cistern until it reaches the marked original water level.
6. The water level in the container was then measured using the marked scale, and weight.
7. The new weight is deducted from the original weight, giving the weight of water emptied into the cistern. The weight of water is 1kg per litre.

3 Results

3.1 Bungalow

The bungalow is a four-bedroom residential property, currently occupied. It has one family bathroom and one en-suite.

The family bathroom comprises a toilet, bath and basin.

The en-suit comprise a toilet, shower and basin. The en-suit is in a state of disrepair and has been for some time. The shower and toilet are not operational and therefore have not been considered in the water consumption of the property (see section 3.1.3.2).

3.1.1 Toilets (WC)

Main Bathroom. Two-piece, single flush toilet.

Figure 1 - Main Bathroom Toilet

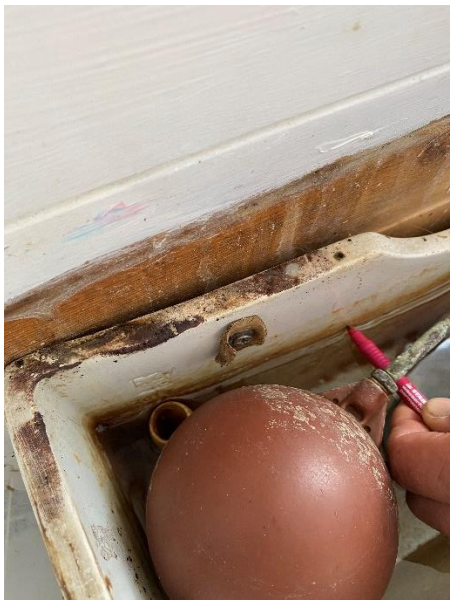


Figure 3 – Cistern water level marked

Figure 2 - Cistern water level measured

Figure 5 - Weight of water prior to refilling cistern

Figure 4 - Water level of water prior to refilling cistern

Figure 7 - Weight of water after cistern refill

Figure 6 - Water level after refill of cistern

Cistern flush volume = **13.7 Litres**

3.1.2 Bath

Rectangular bathtub measuring 1780mm long, 700mm wide. Depth to overflow 330mm

Figure 8 - Bathtub (no shower)

Based on a similar sized bath (link below), estimated volume of **207 Litres** up to overflow.

https://www.screwfix.com/p/ideal-standard-della-single-ended-bath-acrylic-2-tap-holes-1700mm/197jp

3.1.3 Basin Taps

3.1.3.1 Main Bathroom

Separate hot and cold basin taps. Old style taps.

Figure 9 - Main bathroom basin

Test no.	**Time taken to fill 1 Litre (seconds)**
1	3.58
2	3.67
3	3.73
Average:	**3.66**

The average time to fill one Litre of water from the cold tap was 3.66 seconds. This equates to a flow rate of **16.40 Litres/Minute**.

3.1.3.2 En-suite

3.1.3.2.1 Basin Taps

Separate hot and cold basin taps. Old style taps.

Figure 10 - En-suite basin

Test no.	Time taken to fill 1 Litre (seconds)
1	3.16
2	3.48
3	3.16
Average:	**3.27**

The average time to fill one Litre of water from the cold tap was 3.27 seconds. This equates to a flow rate of **18.34 Litres/Minute**.

3.1.3.2.2 Shower

The shower in the en-suite was inoperable and had been for some time. No measurement could be taken.

Figure 12 - Inoperable shower

Figure 11 - Temperature control dial missing from shower

3.1.3.2.3 Toilet

The toilet in the en-suite was inoperable and had been for some time. No measurement could be taken.

Figure 14 - Inoperable en-suite toilet

Figure 13 - Flush handle missing from toilet

3.1.4 Kitchen Tap

Single mixer tap.

Figure 15 - Kitchen tap

Test no.	Time taken to fill 1 Litre (seconds)
1	4.33
2	4.14
3	4.66
Average:	**4.37**

The average time to fill one Litre of water from the cold tap was 4.37 seconds. This equates to a flow rate of **13.73 Litres/Minute**.

3.1.5 Washing Machine

Figure 17 - Washing Machine

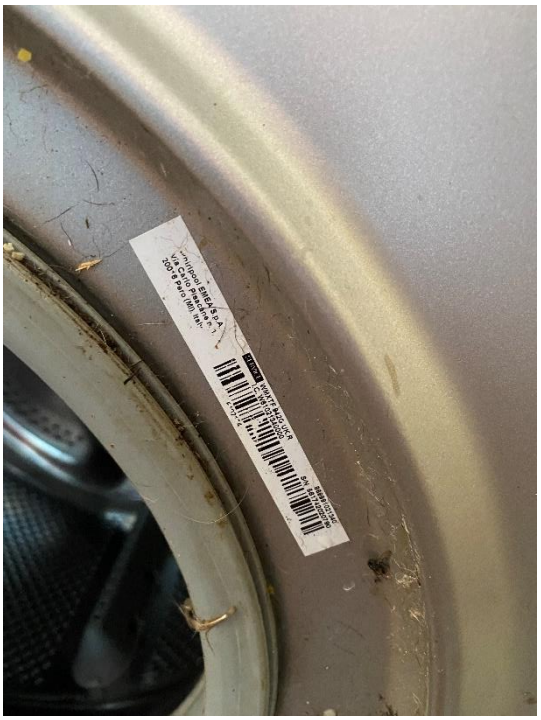


Figure 16 - Washing Machine Model Number

Based on the product data sheets (links below), the annual water consumption is 11690 Litres, based on 220 standard washing cycles at full and partial load. Average water consumption per wash is 53.1 Litres, equating to **5.9 Litres per kg dry load**.

https://www.hotpoint.co.uk/hotpoint-freestanding-front-loading-washing-machine-9kg-f102134/p

https://whirlpool-cdn.thron.com/static/TNOOIL_PRF102134en.pdf_5VEWMB.pdf?xseo=&response-content-disposition=inline%3Bfilename%3D%22doc.pdf%22

https://whirlpool-cdn.thron.com/static/SKQHYT_PFF102134en.pdf_X4NSEP.pdf?xseo=&response-content-disposition=inline%3Bfilename%3D%22Product-Fiche.pdf%22

3.1.6 Outdoor Tap

Single outdoor tap.

Figure 18 - Outdoor tap

No measurements were taken for the outdoor tap, as the Part G Calculator assumes 5 Litres per day per person

3.1.7 Part G Calculation

To calculate the water consumption of the proposed development, the WRC Part G Water Efficiency Calculator for new dwellings has been used. This calculator has been developed in accordance with the Government's National Calculation Methodology for assessing water efficiency in new dwellings in support of: The Code for Sustainable Homes, April 2009 and subsequent versions, and the Building Regulations Approved Document Part G, 2009.

Installation Type	Unit of Measure	Capacity/Flow rate (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day = [(1)x(2)] + (3) (4)
WC (single flush)	Flush Volume (litres)	13.70	4.42	0.00	60.55
WC (dual flush)	Full flush Volume (litres)		1.46	0.00	0
	Part flush Volume (litres)		2.96	0.00	0
WC (multiple fittings)	Average effective flushing Volume (litres)		4.42	0.00	0
Taps (excluding kitchen/utility room taps)	Flow rate (litres/min)	17.37	1.58	1.58	29.02
Bath (where shower also present)	Capacity to overflow(litres)		0.11	0.00	0
Shower (where bath also present)	Flow Rate(litres / minute)		4.37	0.00	0
Bath Only	Capacity to overflow(litres)	207.00	0.50	0.00	103.50
Shower Only	Flow Rate (litres/minute)		5.60	0.00	0
Kitchen/Utility room sink taps	Flow rate (litres/minute)	13.73	0.44	10.36	16.40
Washing Machine	(Litres/kg dry load)	5.90	2.1	0.00	12.39
Dishwasher	(Litres/place setting)	1.25	3.6	0.00	4.5
Waste disposal unit	(Litres/use)	☐ Present	3.08	0.00	0
Water Softener	(Litres/person/day)		1.00	0.00	0
	(5)	Total Calculated use (litres/person/day) =SUM(column 4)			226.36
	(6)	Contribution from greywater (litres/person/day)			0
	(7)	Contribution from rainwater (litres/person/day)			0
	(8)	Normalisation factor			0.91
	(9)	Total internal water consumption = [(5)-(6)-(7)]x(8) (litres/person/day)			205.99
	(10)	External water use			5.0
	(11)	Total water consumption (Building Regulation 17.K) =(9)+(10)(litres/person/day)			211.0

Click here to fill in details before printing:

Estimated water consumption of the Bungalow equals **211 Litres/Person/Day.**

3.2 Cottage

The cottage is a one-bedroom residential property, currently occupied. It has one bathroom.

The bathroom comprises a toilet, bath and basin.

3.2.1 Toilet (WC)

Two piece, single flush toilet.

Figure 19 - Toilet

Figure 20 - Water level market in cistern (red line)

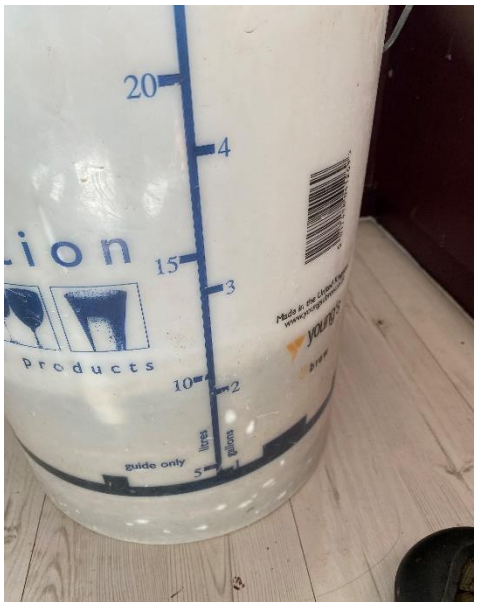


Figure 22 - Waterline at 10 litres prior to refilling cistern after flush.

Figure 21 - Water level after refilling cistern up to marked level (not registering on scale).

Figure 24 - Weight of water prior to refilling cistern

Figure 23 - Weight of water after refilling cistern

Cistern flush volume = **8.9 Litres**

3.2.2 Bath

Rectangular bathtub measuring 1480mm long, 780mm wide. Depth to overflow 310mm

Figure 25 – Bathtub (with shower)

Based on a similar sized bath (link below), estimated volume of **150 Litres** up to overflow.

https://www.victorianplumbing.co.uk/ideal-standard-i-life-1500-x-700mm-0th-single-ended-idealform-bath?categoryId=bddfea45-3f3b-4c92-8b2a-ea346b3e004d-2935:en-GB

3.2.3 Basin Tap

Separate hot and cold basin taps. Old style tap.

Figure 26 - Bathroom basin

Test no.	Time taken to fill 1 Litre (seconds)
1	3.81
2	3.69
3	3.71
Average:	**3.74**

The average time to fill one Litre of water from the cold tap was 3.74 seconds. This equates to a flow rate of **16.04 Litres/Minute**.

3.2.4 Shower

Mixer shower.

Figure 27 – Shower

It took 45.8 seconds for the shower to fill a container with 10 litres. This equates to a flow rate of **13.1 Litres/Minute**.

3.2.5 Kitchen Tap

Mixer tap.

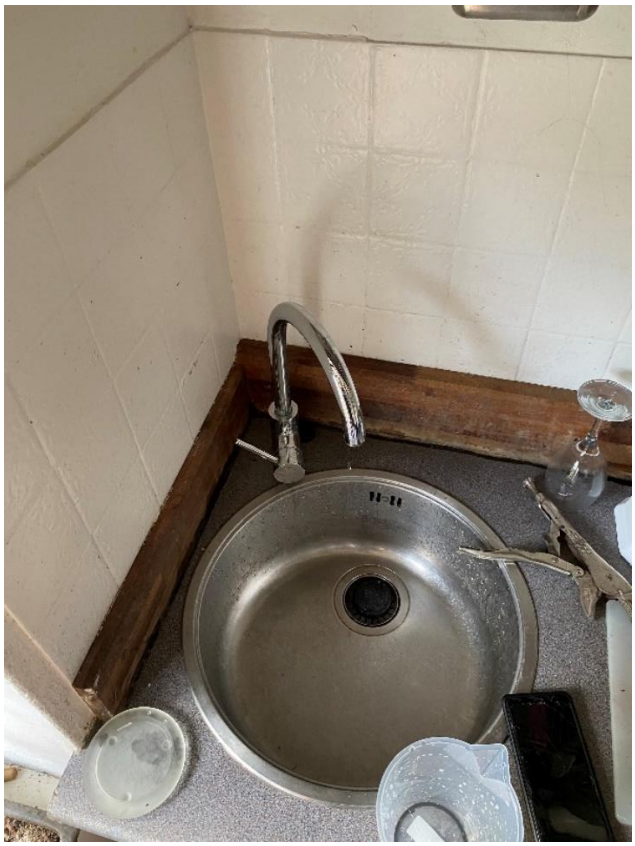


Figure 28 - Kitchen tap

Test no.	Time taken to fill 1 Litre (seconds)
1	5.16
2	5.93
3	5.58
Average:	**5.56**

The average time to fill one Litre of water from the cold tap was 5.56 seconds. This equates to a flow rate of **10.79 Litres/Minute**.

3.2.6 Washing Machine

Hoover 7kg washing machine

Figure 29 - Washing Machine

Specification can be found here: https://service.hoover.co.uk/advice-centre/washing-machines/ophs-712df/

Uses 44 Litres per cycle. Assuming a 7kg load, this equates to 6.29 Litres/kg

3.2.7 Outdoor Tap

Single outdoor tap.

No measurements were taken for the outdoor tap, as the Part G Calculator assumes 5 Litres per day per person.

3.2.8 Part G Calculation

To calculate the water consumption of the proposed development, the WRC Part G Water Efficiency Calculator for new dwellings has been used.[1] This calculator has been developed in accordance with the Government's National Calculation Methodology for assessing water efficiency in new dwellings in support of: The Code for Sustainable Homes, April 2009 and subsequent versions, and the Building Regulations Approved Document Part G, 2009.

Installation Type	Unit of Measure	Capacity/Flow rate (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day = [(1)x(2)] + (3) (4)
WC (single flush)	Flush Volume (litres)	9.80	4.42	0.00	43.32
WC (dual flush)	Full flush Volume (litres)		1.46	0.00	0
	Part flush Volume (litres)		2.96	0.00	0
WC (multiple fittings)	Average effective flushing Volume (litres)		4.42	0.00	0
Taps (excluding kitchen/utility room taps)	Flow rate (litres/min)	16.04	1.58	1.58	26.92
Bath (where shower also present)	Capacity to overflow(litres)	150.00	0.11	0.00	16.50
Shower (where bath also present)	Flow Rate(litres / minute)	13.10	4.37	0.00	57.25
Bath Only	Capacity to overflow(litres)		0.50	0.00	0
Shower Only	Flow Rate (litres/minute)		5.60	0.00	0
Kitchen/Utility room sink taps	Flow rate (litres/minute)	10.79	0.44	10.36	15.11
Washing Machine	(Litres/kg dry load)	6.29	2.1	0.00	13.21
Dishwasher	(Litres/place setting)	1.25	3.6	0.00	4.5
Waste disposal unit	(Litres/use)	☐ Present	3.08	0.00	0
Water Softener	(Litres/person/day)		1.00	0.00	0
	(5)	**Total Calculated use (litres/person/day) =SUM(column 4)**			176.81
	(6)	Contribution from greywater (litres/person/day)			0
	(7)	Contribution from rainwater (litres/person/day)			0
	(8)	Normalisation factor			0.91
	(9)	Total internal water consumption = [(5)-(6)-(7)]x(8) (litres/person/day)			160.90
	(10)	External water use			5.0
	(11)	**Total water consumption (Building Regulation 17.K) =(9)+(10)(litres/person/day)**			165.9

Click here to fill in details before printing:

Estimated water consumption of the Cottage equals **165 Litres/Person/Day.**

[1] https://wrcpartgcalculator.co.uk/

Appendix C - Proposed Water Fitting Specifications

Fitting	Measure	Capacity/flow rate	Product Details
WC (Dual Flush)	Flush Volume (litres)	Full Flush – 4l Part Flush – 3l	Ideal Standard Prosys 120mm Depth Mechanical Concealed Cistern
Kitchen and other taps (regulated by flow regulators)	Flow Rate (litres/min)	4l/m	Reliance RWC 4 Litres Per Minute Flow Regulator Valve with Isolating Valve & Strainer SERV970000
Shower	Flow Rate (litres/min)	6	Grohe Tempesta 100 Hand Shower
Bath	Capacity to overflow (litres)	181	Kent Premiercast Square Single Ended Bath
Washing Machine	Litres per kilogram of dry load	4.7	Fisher Paykel WM1490F1 9kg Freestanding Washing Machine 1400rpm
Dishwasher	Litres per place setting	0.43	Beko BDIN38641C | Integrated Dishwasher with SaveWater Technology

Appendix D - Water Consumption Calculation for Proposed development (litres/person/day) with water efficient fittings and appliances (without further water re-use measures)

Installation Type	Unit of Measure	Capacity/Flow rate (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day = ((1)x(2)) + (3) -4
WC (dual flush)	Full flush Volume (litres)	4	1.46	0	5.84
	Part flush Volume (litres)	3	2.96	0	8.88
Taps (excluding kitchen/utility room taps)	Flow rate (litres/min)	4	1.58	1.58	7.9
Bath (where shower also present)	Capacity to overflow(litres)	145	0.11	0	15.95
Shower (where bath also present)	Flow Rate(litres / minute)	6	4.37	0	26.22
Kitchen/Utility room sink taps	Flow rate (litres/minute)	4	0.44	10.36	12.12
Washing Machine	(Litres/kg dry load)	4.7	2.1	0	9.87
Dishwasher	(Litres/place setting)	0.43	3.6	0	1.55
	(5)	Total Calculated use (litres/person/day) =SUM(column 4)			88.33
	(6)	Contribution from greywater (litres/person/day)			0
	(7)	Contribution from rainwater (litres/person/day)			0
	(8)	Normalisation factor			0.91
	(9)	Total internal water consumption = [(5)-(6)-(7)]x(8) (litres/person/day)			80.38
	(10)	External water use			5
	(11)	Total water consumption (Building Regulation 17.K) =(9)+(10)(litres/person/day)			**85.4**

Appendix E – Minimum Tank Size Calculations

Cottage replacement building:

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:				203	Total area of collectable roof space:	203 m²
Select Your Region		England SE & Central			Average rainfall per year in your region:	64 L
Collectable rainwater per annum in litres - discounted by 20% to account for water loss						**103936 L**

USE OF RAINWATER IN THE BUILDING

Number of people or bedrooms in the building -	*people:* 2.47	*bedrooms:* 0	
☑ Number of clothes washing cycles per day (*50 litres each*)	0.50 Cycles	25.00	L
☑ Number of toilet flushes per day (*4.42 flushes per person, average 5 litres each*)	8.84 Flushes	44.20	L
Outdoor use in litres, per person per day (*recommended 5 litres per person per day*)	5	10.00	L
Amount of water you require every day		79.2	L
Amount of water you require every year	**DEMAND**	**28908**	**L**

FINAL FIGURES

How many days drought protection do you need? Typically 21 (18 minimum)	35	
Capacity of water storage in litres required for drought protection	2772.00	L
The lesser of YIELD (blue) or DEMAND (green) per annum	28908	L
Therefore, volume of rainwater storage required	**2772**	**L**

CONCLUSION

Is there sufficient roof water available:		YES
Recommended tank size from our shallow dig range:	F-Line Range:	3000 LITRE F-LINE TANK

Workshop replacement building:

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:				273	Total area of collectable roof space:	273 m²
Select Your Region		England SE & Central			Average rainfall per year in your region:	64 L
Collectable rainwater per annum in litres - discounted by 20% to account for water loss						**139776 L**

USE OF RAINWATER IN THE BUILDING

	people:	bedrooms:	
Number of people or bedrooms in the building -	2.47	0	
☑ Number of clothes washing cycles per day (*50 litres each*)	0.50 Cycles	25.00	L
☑ Number of toilet flushes per day (*4.42 flushes per person, average 5 litres each*)	8.84 Flushes	44.20	L
Outdoor use in litres, per person per day (*recommended 5 litres per person per day*)	5	10.00	L
Amount of water you require every day		79.2	L
Amount of water you require every year	**DEMAND**	**28908**	**L**

FINAL FIGURES

How many days drought protection do you need? Typically 21 (18 minimum)	35	
Capacity of water storage in litres required for drought protection	2772.00	L
The lesser of YIELD (blue) or DEMAND (green) per annum	28908	L
Therefore, volume of rainwater storage required	**2772**	**L**

CONCLUSION

Is there sufficient roof water available:		YES
Recommended tank size from our shallow dig range:	F-Line Range:	3000 LITRE F-LINE TANK

Appendix F – Proposed rainwater harvesting system

PRODUCT DESCRIPTION

F-LINE 3000 LITRE DIRECT FEED SYSTEM

£2,397.00 – £2,760.00

Ex VAT

F-line Flat Tank 3000 litre underground domestic rainwater harvesting system kit with mains water backup. The unique F-Line flat tank, supplied complete as a kit for use as a home and garden rainwater harvesting system. Collect, filter, store and pump for your valuable garden plants and to flush toilets. **Mainland UK delivery included**

Appendix G – Detailed calculation of rainwater availability against non-potable water demand.

Rainwater Collection

The water efficiency calculator for new dwellings methodology document available in Appendix A of The Building Regulations 2010 Part G allows calculation of rainwater collection volume according to two methodologies, both of which are based upon British Standard 16941-1:2018 (previously BS 8515:2009+A1:2013).

To calculate the storage requirements to meet non-potable demand the lesser of 5% of the annual yield (supply) or 5% of the annual non-potable demand should be calculated.

Annual yield is given as: $Yr = A \times e \times AAR \times h \times 0.05$

- Yr is 5% of Annual rainwater yield (litres)
- A is the collection area (m^2).
    - For the Cottage replacement this is: $203m^2$
    - For the Workshop replacement this is $273m^2$
- e is the yield coefficient (0.9 is used for tiled roof)
- AAR is the site specific annual average rainfall (mm). Based on the Met Office data from the North Heath climate station annual rainfall is 858.70.[6]
- h is the hydraulic filter efficiency (0.95 used as typical for rainwater filter efficiency).

Annual rainwater yield:

Cottage replacement $Yr = 203 \times 0.9 \times 858.70 \times 0.95 \times 0.05 = 7,452.44$ litres

Workshop replacement $Yr = 273 \times 0.9 \times 858.70 \times 0.95 \times 0.05 = 10,019.96$ litres

Rainwater Demand

For any appliance (WC or washing machine) where rainwater is to be used for supply to all of the appliances of that type within the property, the volume of water for rainwater demand can be taken directly from the relevant appliance consumption. This can be found in Section A26 of the water efficiency calculator for new dwellings methodology document and allows calculation of the water demand from only the appliances where rainwater is to be used.

Non-Potable water demand is given as: $Dn = Pd \times n \times 365 \times 0.05$

- Dn is 5% of annual non potable water demand (litres).
- Pd is the daily non potable requirement per person (litres). This is 24.59 litres based on WC and Washing Machine consumption per person per day (see Appendix C).
- n is the number of persons.

Non-Potable annual water demand:

[6] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcpdj5hby

Cottage replacement Dn = 24.59 x 2.47 x 365 x 0.05 = 1,108 litres

Workshop replacement Dn = 24.59 x 2.47 x 365 x 0.05 = 1,108 litres

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

Cottage replacement Dn = 24.59 x 2.47 x 400 x 0.05 = 1,215 litres

Workshop replacement Dn = 24.59 x 2.47 x 400 x 0.05 = 1,215 litres

The rainwater collection is greater than the non-potable water demand, indicating there is adequate supply of rainwater to service the non-potable water demand. A 3000-litre storage tank for each property is sufficient.

North Heath

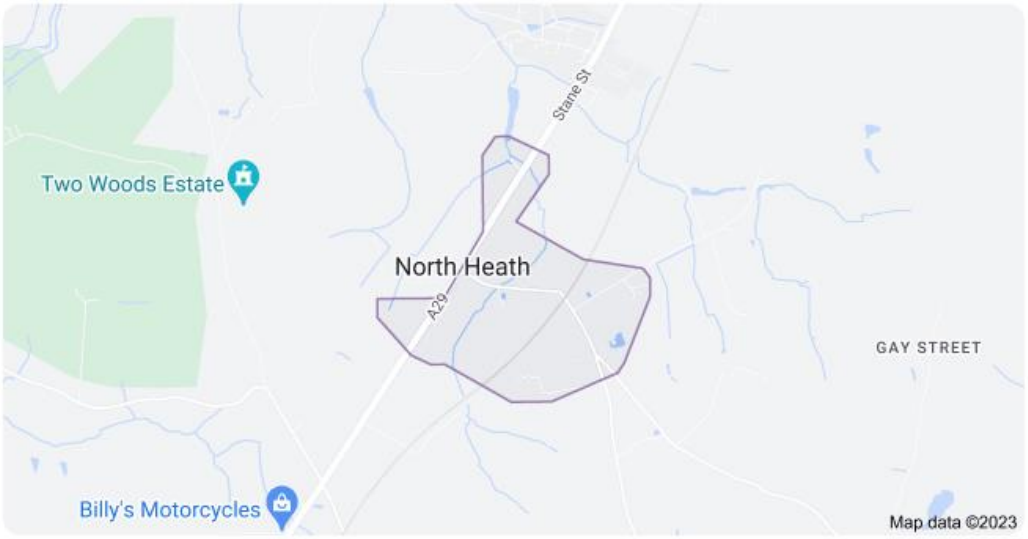
Location: 50.99321, -0.47659 **Altitude:** 21 m above mean sea level **Station type:** Observing Site

Average tables | Average graphs | Location comparison | Average maps

Climate period: 1991-2020

Station: North Heath

Month	Maximum temperature (°C)	Minimum temperature (°C)	Days of air frost (days)	Sunshine (hours)	Rainfall (mm)	Days of rainfall ≥1 mm (days)	Monthly mean wind speed at 10 m (knots)
January	8.55	2.52	–	55.25	92.33	–	–
February	9.02	2.24	–	83.04	63.49	–	–
March	11.74	3.44	–	117.86	52.58	–	–
April	14.83	4.64	–	170.19	52.57	–	–
May	17.61	6.99	–	205.07	46.86	–	–
June	20.65	9.68	–	199.60	55.92	–	–
July	23.31	11.77	–	215.93	63.28	–	–
August	22.99	11.58	–	196.60	63.61	–	–
September	19.93	9.46	–	148.17	63.38	–	–
October	15.89	7.06	–	109.26	103.33	–	–
November	11.89	4.40	–	66.22	103.13	–	–
December	9.20	2.62	–	54.06	98.22	–	–
Annual	15.50	6.39	–	1621.25	858.70	–	–



North Heath

Pulborough

Appendix H - Water Consumption Calculation for proposed development including provision for rainwater harvesting (litres/person/day)

Installation Type	Unit of Measure	Capacity/Flow rate (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day = ((1)x(2)) + (3) -4
WC (dual flush)	Full flush Volume (litres)	4	1.46	0	5.84
	Part flush Volume (litres)	3	2.96	0	8.88
Taps (excluding kitchen/utility room taps)	Flow rate (litres/min)	4	1.58	1.58	7.9
Bath (where shower also present)	Capacity to overflow(litres)	145	0.11	0	15.95
Shower (where bath also present)	Flow Rate(litres / minute)	6	4.37	0	26.22
Kitchen/Utility room sink taps	Flow rate (litres/minute)	4	0.44	10.36	12.12
Washing Machine	(Litres/kg dry load)	4.7	2.1	0	9.87
Dishwasher	(Litres/place setting)	0.43	3.6	0	1.55
	(5)	Total Calculated use (litres/person/day) =SUM(column 4)			88.33
	(6)	Contribution from greywater (litres/person/day)			0
	(7)	Contribution from rainwater (litres/person/day)			24.59
	(8)	Normalisation factor			0.91
	(10)	External water use			5
	(11)	Total water consumption (Building Regulation 17.K) =(9)+(10)(litres/person/day)			**63.00**