Water Neutrality Statement

Proposed Development at 2 Forge Way, Billingshurst RH14 9LL

Applicant: David Frost

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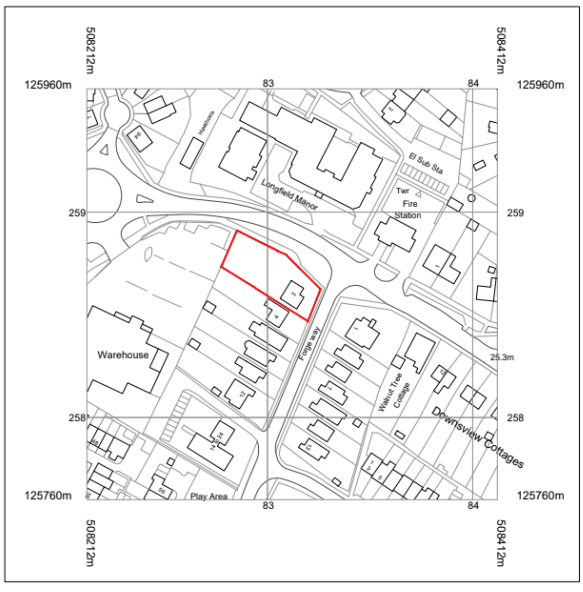
Introduction

Under Application reference DC/21/2706 Planning Permission is sought for the construction of a four-bedroom chalet style dwelling in existing garden land at No 2, Forge Way, Billingshurst. The existing dwelling standing on the site is a four-bedroom detached two-storey house.

The purpose of this report is to 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.

The proposed development is located at OS Grid Reference TQ 08212 25923 and has the post code RH14 9LL.

Fig 1 Site Location



Waterwise is an independent, not-for-profit non-governmental organisation (NGO) focussed on reducing water consumption in the UK. This report utilises the Waterwise definition of Water Neutrality:

'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.'

In January 2021 Waterwise published '*A review of Water Neutrality in the UK.'* This defines the three steps which should be undertaken in order to achieve water neutrality:

- 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

This report will address the following in separate sections:

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

Water Neutrality Demand Reduction

Per Capita Consumption (PCC) is the usual measure of water use and is the volume of water that is used by one person in one day, usually expressed 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 homes with a water meter, consume on average 131 l/p/d.

Part G of the Building Regulations requires that new build housing should achieve a minimum of 125 l/p/d.

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

Estimated Water Usage from The Proposed Development

The proposed scheme will consist of dividing the existing garden land to create a separate development plot. On this plot it is proposed to construct a four-bedroom chalet style dwelling. The existing four-bedroom, two storey house is unchanged by this proposal.

In order to follow the definition of Water Neutrality the increase in population must first be calculated. In accordance with the average occupancy levels set out by Horsham DC, the population for the existing property is 2.86. Following the same occupancy levels, the population for the proposed four-bedroom dwelling will be 2.86, which is a total population of 5.72. Therefore, there is an increase in population of 2.86.

Table 2 Average occupancy levels

Number of bedrooms	Average occupancy level
1	1.32
2	1.89
3	2.47
4	2.86
5	3.09

As the proposed property will be a new dwelling Policy 37 of the Horsham District Planning Framework applies, establishing a requirement for the optional building regulations standard of 110 l/p/d.

Taking the increase in population as above produces the following water demand:

2.86 x 110 l/p/d

= 314.6 l/d.

2.86 *(Increase in population due to the proposed works) x 110 l/p/d (*Horsham District Planning Framework requirement for the optional building regulations standard of 110 l/p/d).

Demand Reduction Measures

This section addresses the measures that can be undertaken to reduce water consumption in the new dwelling. The aspiration is to meet the '*Ambitious'* demand scenario of 62 l/p/d within Table 1 above.

The initial step in achieving water neutrality will be to ensure that water is used by the proposed development as efficiently as possible; through careful design and choice of fittings it is possible to reduce the water demand of the building. 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 is being used, and how this affects their water bill. This can help consumers to reduce water usage, identify leaks, and meet water saving targets, with the bonus of reduced bills.

Building Regulations Part G requires that when the new fittings approach is used, the water consumption of the fittings must not exceed a total of 125 l/p/d. The relevant values are listed in Table 3 below:

Table 3 Maximum Fittings Consumption from Building Regulations Part G

Water Fitting	Maximum Rating
WC	6.4/ litres dual flush or 4.5 litres single flush
Shower	10 l/min
Bath	185 litres
Basin Taps	6 l/min
Sink Taps	8 l/min
Dishwasher	1.25 l/place setting
Washing Machine	8.17 l/kilogram

Should the proposed development be required to comply with the Optional requirement 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 requires that the water consumption must not exceed 110 l/p/day. The maximum fittings consumption for the Optional requirement can be found in Table 4 below:

Table 4 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

In order to improve on the above requirements, the proposed new dwelling 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 5 below:

Table 5 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

By installing the water efficient devices listed above, it is possible to reduce the water demand on site from **314.6 l/day** down to **254.66 l/day**

2.86 x 89.04 l/p/d

= **254.66 l/day**

2.86 *(Increase in population due to the proposed works) x 89.04 (Appendix A – Water Calculator for Proposed fittings)*

Water Re-use Measures

Once the water demand has been reduced as far as is practicable 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 this is the used water from baths, showers and hand basins)
- Wastewater recycling

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 below ground rainwater harvesting tank as well as having sufficient capacity for a 35-day drought period. Collectable rainwater exceeds demand by a factor of approximately 3:1. See Appendix C.

By installing the water efficient devices listed above as well as a rainwater harvesting system the total demand will be reduced to:

2.86 x 66.22

= 189.38 l/day

2.86 (Increase in population due to the proposed works) x 66.22 (Appendix B – Water calculator for proposed fittings with RWH)

Offsetting Remaining Water Demand

The remaining water requirements for new homes or developments which cannot be satisfied with non-potable sources must be offset. Offsetting is usually established by entering into arrangements with third parties to deliver schemes that save water within the local region. Such schemes typically involve retrofitting installations to existing buildings with water efficient devices or water reuse systems.

In this instance however, the existing property on site is owned by the applicant. No 2 Forge Way is a four-bedroom dwelling which, in accordance with the occupancy levels set out by Horsham DC, has a population of 2.86 as mentioned above. Data protection legislation prevents the water bills for the property being available as the property is rented; the water usage has therefore been calculated using the Building Regulations Part G Water Calculator.

The total water usage for the existing property is **409.23 l/day,** see Appendix D.

2.86 x 143.09 l/p/d

= 409.23 l/day

2.86 (Population of existing 4-bedroom dwelling) x 143.09 l/p/d (water usage value of existing dwelling as demonstrated using Building Regulations Part G Water Calculator)

This existing dwelling demand can be reduced by the installation of retrofitted water efficiency devices as set out in Appendix A. This will deliver a reduction in demand from **409.23 l/day** to **254.68 l/d.**

2.86 x 89.05

= 254.68 l/d.

2.86 population of the existing dwelling x 89.05 l/p/d. (Appendix A – Water Calculator for proposed fittings)

The existing dwelling demand can be further reduced by the installation of rainwater harvesting at No 2 Forge Way. The existing roof area is sufficient to provide the required water to the property via a below ground rainwater harvesting tank as well as having sufficient capacity for a 35-day drought period. Collectable rainwater exceeds demand by a factor of approximately 2:1. See Appendix E.

Rainwater harvesting reduces demand to 66.22 l/p/d and reduces the total water usage to 189.38 l/d.

2.86 x 66.22

= 189.38 l/d.

2.86 population of the existing dwelling x 66.22 l/p/d. (Appendix B – Water Calculator for proposed fittings with RWH)

The incremental increase in water demand on the site created by the proposed development is **189.38 l/d**, whereas the offsetting reduction in demand from retrofitting water efficiency installations and rainwater harvesting at No 2 Forge Way is **219.86 l/d**.

409.23 – 189.38

= 219.85 l/d

409.23 l/d = 2.86 (Population of existing 4-bedroom dwelling) x 143.09 l/p/d (water usage value of existing dwelling calculated using Building Regulations Water Calculator; Appendix D); 189.38 = 2.86 (population of the existing 4-bedroom dwelling) x 66.22 l/p/d (Appendix B – Water Calculator for proposed fittings with RWH)

It is clear from the above that the addition of the proposed development on the site will make the site water neutral.

Conclusion

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

To summarise:

- The proposed development will use on average **189.38 l/day**

- The existing single dwelling has a current usage of **409.23 l/day**

- After installation of water efficient devices and a rainwater harvesting system water usage at the existing dwelling can be reduced by **219.85 l\d** to a total of **189.38 l/d.**

- The combined water usage for the site following the proposed scheme is **189.38 l/d + 189.38 l/d = 378.36 l/d,** this is less than the existing usage on the site of **409.23 l/d,** making the proposed scheme water neutral.

Appendix A:

Table 6 – Water Calculator from Building Regulations Part G – Information input from proposed site with water efficient devices from Table 4.

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

Appendix B:

Table 7 – Water Calculator from Building Regulations Part G – Information input from proposed site with water efficient devices from Table 4 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)			25.086
		Normalisation factor			0.91
		External water use			5
		Total water consumption (36(1)) (l/p/d)			66.217

Appendix C:

Table 8 - Rainwater Harvesting at Proposed Dwelling

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:				150	Total area of collectable roof space:	150	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						**76800**	**L**

USE OF RAINWATER IN THE BUILDING

	people:	*bedrooms:*	
Number of people or bedrooms in the building -	2.86	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*)	0	0.00	L
Amount of water you require every day		69.2	L
Amount of water you require every year	**DEMAND**	**25258**	**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	2422.00	L
The lesser of YIELD (blue) or DEMAND (green) per annum	25258	L
Therefore, volume of rainwater storage required	**2422**	**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 D:

Table 9 – Water Calculator from Building Regulations Part G – Information input from existing dwelling on site.

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.	6	1.46	0	8.76
	Part Flush vol.	4.5	2.96	0	13.32
WC (Multiple Fittings)	Average effective flush volume (l)	0	4.42	0	0
Taps (excl. Kitchen)	Flow rate (l/min)	11	1.58	1.58	18.96
Bath (shower also present)	Capacity to overflow (l)	150	0.11	0	16.50
Shower (bath also present)	Flow rate (l/min)	13.00	4.37	0	56.81
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)	12.50	0.44	10.36	15.86
Washing Machine	Litres/kg dry load	8.17	2.1	0	17.157
Dishwasher	litres/place setting	1.25	3.6	0	4.5
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)			151.75
		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)			143.09

Appendix E:

Table 10 - Rainwater Harvesting at No 2 Forge Way

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:				101.!	Total area of collectable roof space:	101 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						**51712 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*)	0	0.00	L
Amount of water you require every day		69.2	L
Amount of water you require every year	**DEMAND**	**25258**	**L**

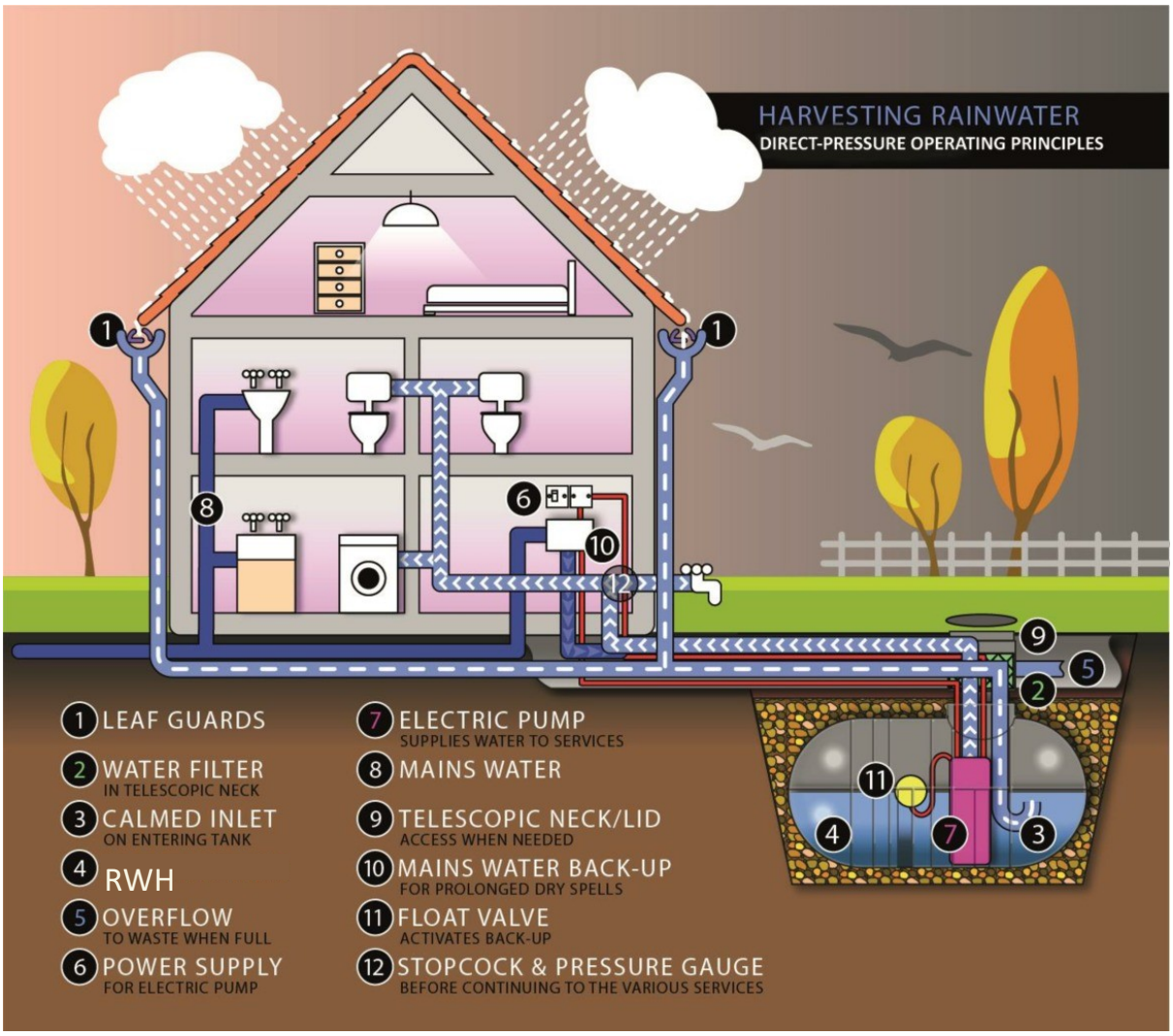
FINAL FIGURES

How many days drought protection do you need? Typically 21 (18 minimum)	35	
Capacity of water storage in litres required for drought protection	2422.00	L
The lesser of YIELD (blue) or DEMAND (green) per annum	25258	L
Therefore, volume of rainwater storage required	**2422**	**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

Typical Rainwater Harvesting Tank System:



Example Rainwater Harvesting Tank

SDS 3,400 Litre Rainwater Harvesting Tank

