Water Offsets Ltd
www.wateroffsets.co.uk

THE SHELLEY ARMS,
BROADBRIDGE HEATH,
HORSHAM,
RH12 3JU.

Housing Association
Water Audit Report

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1.0 Introduction and Background

This Water Audit Report is submitted in support of a Proposed Development at the Shelley Arms, Broadbridge Heath, Horsham erection of four dwellings with associated parking, amenity space and landscaping and a new parking layout for the public house. The development site lies in an area that is supplied by Southern Water from the Sussex North Water Resource Zone, which is served by abstraction points located in the Arun Valley.

On 14 September 2021, Horsham District Council (HDC) received a Position Statement from Natural England. This position statement states that information collected by Natural England indicates water abstraction for drinking water supplies is having a negative impact on the wildlife sites in the Arun Valley. Therefore, they have advised that developments should not proceed unless they are able to demonstrate that they can be made water neutral.

It is the purpose of this Water Neutrality Audit report to set out the measures by which the Proposed Development at the Shelley Arms will be made water neutral. This will be achieved through a combination of water reduction and water recycling measures at the development site, as well as similar measures at existing Saxon Weald Housing Association homes.

As will be set out in Section 3, water use at the development site will be reduced by the use of water efficient fittings together with the installation of decentralised greywater recycling systems (H300 Hydraloop), which will ensure that the daily water demand per occupant will be 78.57 litres per person per day (l/p/d) with greywater recycling, which is much lower than the 85 l/p/d guideline that has been adopted by HDC. In accordance with guidance issued by HDC this has been calculated against the anticipated occupancy rate of the development based on local census data. The resulting yearly water demand associated within the development site has therefore been calculated as 249,492 litres per year.

In order for the Proposed Development to be water neutral, it is therefore necessary to secure 249,492 litres per year of water savings at the offsetting site. It is proposed to use stock of Housing Association homes, located in Horsham.

The reduction of water use at the Housing Association properties will therefore be transferred to the new development site consequently resulting in no additional water being abstracted from the Arun Valley abstraction points.

A portfolio of 12 Saxon Weald Housing Association Homes has been secured for the water offsetting works. The proposed water offsetting works will result in a 8.2% reduction in the current water use from the existing Housing Association homes. **Thus making the total available water offsetting volume for the stringent two (2) people occupancy of 269,984 litres/year. Which allows 249,492 litres/year to be made available to the development, leaving a sizable buffer of 20,492 litres/year.** Another benefit is derived from the reduction of carbon emissions amounting to 13 kgCO2.

The measures being implemented at the Housing Association properties will be secured by a Section 106 Agreement to which the developer Legal and General Affordable Homes, Water Offsets Ltd and the requisite Housing Associations will be signatories.

The remainder of this Report will detail the baseline and the water offsetting strategies that are proposed in order to demonstrate that the proposals at the new development site at Lower Broadbridge Farm will be water neutral.

2.0 Baseline Conditions

2.1 Development Site

The development site comprises existing agriculture fields and for the purpose of this Water Neutrality Report it has been assumed that the baseline water use is nil.

2.2 Housing Association Properties

Water Offsets Ltd is working in partnership with Cenergist to deliver water offsetting through a number of housing associations. Cenergist is a specialist water and energy services company that has been working with the United Kingdom's water companies to deliver ambitious water efficiency targets in both commercial and domestic properties. Through its proprietary water saving technologies it can deliver PCC savings of up to 22% in domestic properties and 30% in commercial properties. Cenergist annually works on over 30,000 homes and commercial buildings each year, achieving a CSAT rating across all programmes of work. Thus demonstrating a high level of quality and customer satisfaction.

For the water offsetting homes it is proposed to use the patented Control Flow HL2024, a pressure independent flow control valve. The Control Flow HL2024 range provides a catalogue of various flow control valves and devices to suit standard tap and pipe specifications. This means that the flow control valve can be fitted into kitchen taps, bath tapas, showers and on the inlet supply pipes. Control Flow HL2024 eliminates extreme variations caused by pressure fluctuations in the water supply system, providing a controlled and steady flow with nominal variation of less than 2%. Thus providing a robust appliance to achieve water efficiency targets and a great experience for the households.

Typical Cenergist performance results are as follows:

- *Custom satisfaction rates in excess of 99%,*
- *Reduction in water consumption of up to 75 litres per day or PCC of 23%,*
- *Total water and energy bill savings of up to £350 a year based on metered data,*
- *Legionella safe - Control Flow HL2024 does not increase the risk of legionella or require specialist legionella treatment.*

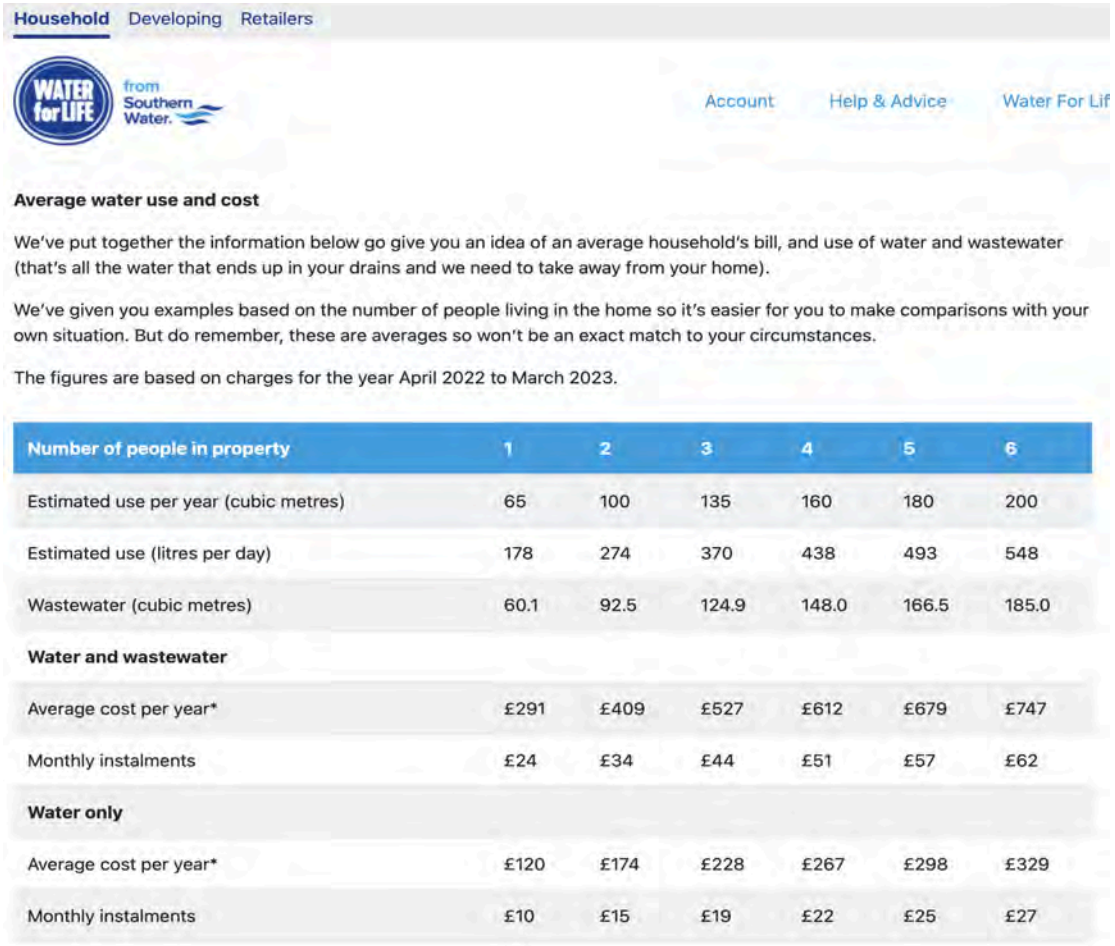
The product has been successfully used to deliver the water neutrality offsetting strategy by Crawley Homes, to support the development of 206 affordable homes at the Breezehurt Drive and Longley House developments. Legal and General has secured 1,100 Housing Association homes that will participate in the water offsetting works. The works will involve the installation of the Cenergist Control Flow HL2024 product including Hydraloop Concealed Unit for the properties undergoing complete refurbishment to toilets and bathrooms. Further details on the Cenergist product can be found in Appendix A.

2.3 Current Water Use

Southern Water has provided data of the average water use based on the properties found in their water supply zone, which covers the water neutrality zone. It is noted from the readings below that a 23% water saving equivalent to that achieved in the Crawley Homes equates to 31.51 litres/person/day.

- *Average Annual consumption - 100,000 litres/year*
- *Average daily consumption - 274 litres/day*
- *Daily consumption per person - 137 litres/day*
- *Baseline Water Saving - 31.51 litres/person/day*
- *Baseline Water Saving/Property - 63.02 litres/person/day*

Figure 2.1 Water Consumption Figures from Southern Water



Household Developing Retailers

WATER for LIFE from Southern Water.

Account Help & Advice Water For Lif

Average water use and cost

We've put together the information below go give you an idea of an average household's bill, and use of water and wastewater (that's all the water that ends up in your drains and we need to take away from your home).

We've given you examples based on the number of people living in the home so it's easier for you to make comparisons with your own situation. But do remember, these are averages so won't be an exact match to your circumstances.

The figures are based on charges for the year April 2022 to March 2023.

Number of people in property	1	2	3	4	5	6
Estimated use per year (cubic metres)	65	100	135	160	180	200
Estimated use (litres per day)	178	274	370	438	493	548
Wastewater (cubic metres)	60.1	92.5	124.9	148.0	166.5	185.0
Water and wastewater						
Average cost per year*	£291	£409	£527	£612	£679	£747
Monthly instalments	£24	£34	£44	£51	£57	£62
Water only						
Average cost per year*	£120	£174	£228	£267	£298	£329
Monthly instalments	£10	£15	£19	£22	£25	£27

The occupancy of the Crawley Homes pilot study found the occupancy to be 2.8, there adopting an occupancy figure of 2, which 40% less is considered to be a very robust approach and is thus adopted for this study. For completeness this study considers it prudent to also test the occupancy rate of 2.40.

2.4 Existing Water Fittings Specifications

The water efficiency works proposed at the Housing Associations homes are inline with the recommendations of the Waterwise Water Neutrality Hierarchy that has been adopted by both Natural England and Horsham District Council. In terms of residential water use, Horsham District Council have also adopted Part G Building Regulations, which sets the baseline for water consumption in both existing and new homes. This allows for the existing water use of the Housing Association properties to be assessed based on the applicable specifications, depending on the time that they would have been constructed.

The current Part G Building Regulations were adopted in 2010. These building regulations required the installation of water fittings to achieve a maximum water use of 125 l/p/d. The optional requirement of 110 l/p/d was voluntarily adopted by the more sustainable developments. In 2010 the Code for Sustainable Homes was introduced, Code Level 3, which was adopted for Social and had a requirement of a maximum 105 l/p/d.

The tables below highlight the acceptable maximum water fixtures, fittings and appliances specifications according to Part G Building Regulations 2010. These fixtures are specified in the following tables to demonstrate the applicable water use associated with the existing housing association homes.

Table 2.1 **Maximum fittings consumption**

Water fitting	Maximum consumption
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

Table 2.2 **Maximum fittings consumption optional requirement level**

Water fitting	Maximum consumption
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

a) Southern Water Current Water Use

The Part G Building Regulations calculator has been used to the average 137 l/p/d, which can be achieved using water efficient fittings.

Figure 2.2 - Southern Water Specification

WATER EFFICIENCY CALCULATOR - BATH SPECIFICATION - SOUTHERN WATER CONSUMPTION FIGURES

Installation Type	Unit of Measure	Capacity/Flow Rate	Use Factor	Fixed Use (l/p/d)	Litres/person/day
WC (single flush)	Flush volume (l)	0.00	4.42	0.00	**0.00**
WC (dual flush)	Full flush volume (l)	6.00	1.46	0.00	**8.76**
	Part flush volume (l)	4.00	2.96	0.00	**11.84**
WCs (multiple fittings)	Ave. effective flush volume (l)	0.00	4.42	0.00	**0.00**
Taps (excluding kitchen/utility room taps)	Flow Rate (l/min)	6.00	1.58	1.58	**11.06**
Bath (where shower also present)	Capacity to Overflow (l)	160.00	0.11	0.00	**17.60**
Shower (where bath also present)	Flow Rate (l/min)	12.00	4.37	0.00	**52.44**
Bath Only	Capacity to Overflow (l)	0.00	0.50	0.00	**0.00**
Shower Only	Flow Rate (l/min)	0.00	5.60	0.00	**0.00**
Kitchen/Utility Room Sink Taps	Flow Rate (l/min)	5.00	0.44	10.36	**12.56**
Washing Machine	Litres/kg Dry Load	9.00	2.10	0.00	**18.90**
Dishwasher	Litres/ Place Setting	1.00	3.60	0.00	**3.60**
Waste Disposal Unit	Litres/Use	0.00	3.08	0.00	**0.00**
Water Softner	Litres/pers/day	0.00	1.00	0.00	**0.00**
		Total Internal Calculated Use			**136.76**
		Contribution from Greywater			**30.05**
		Contribution from Greywater for External Use			**5.00**
		Normalisation Factor			**0.91**
		Total Internal Water Consumption			**92.56**
		External Water Use			**5.00**
		Effective Daily Water Demand l/p/d			**97.56**

GREYWATER YIELD - BATH SPECIFICATION - SOUTHERN WATER CONSUMPTION FIGURES

Installation Type	Unit of Measure	Capacity/Flow Rate	Use Factor	Fixed Use (l/p/d)	Litres/person/day
WC (single flush)	Flush volume (l)	0.00	4.42	0.00	**0.00**
WC (dual flush)	Full flush volume (l)	6.00	1.46	0.00	**8.76**
	Part flush volume (l)	3.00	2.96	0.00	**8.88**
WCs (multiple fittings)	Ave. effective flush volume (l)	0.00	4.42	0.00	**0.00**
Taps (excluding kitchen/utility room taps)	Flow Rate (l/min)	8.00	1.58	1.58	**14.22**
Bath (where shower also present)	Capacity to Overflow (l)	160.00	0.11	0.00	**17.60**
Shower (where bath also present)	Flow Rate (l/min)	12.00	4.37	0.00	**52.44**
Bath Only	Capacity to Overflow (l)	0.00	0.50	0.00	**0.00**
Shower Only	Flow Rate (l/min)	0.00	5.60	0.00	**0.00**
Kitchen/Utility Room Sink Taps	Flow Rate (l/min)	10.00	0.44	10.36	**14.76**
Washing Machine	Litres/kg Dry Load	8.00	2.10	0.00	**16.80**
Dishwasher	Litres/ Place Setting	1.00	3.60	0.00	**3.60**
Waste Disposal Unit	Litres/Use	0.00	3.08	0.00	**0.00**
Water Softner	Litres/pers/day	0.00	1.00	0.00	**0.00**
		Total Internal Calculated Use l/p/d			**137.06**
		Contribution towards Greywater			**84.26**
		% Greywater Contribution			**62.66%**

b) Current Building Regulations Specification

The current Part G Building Regulations were adopted in 2010, stipulating a maximum water use of 125 litres/person/day.

Figure 2.3 - Building Regulations Specification

WATER EFFICIENCY CALCULATOR - BATH SPECIFICATION - BUILDING REGULATIONS 2010 @ 125 litres/person/day

Installation Type	Unit of Measure	Capacity/Flow Rate	Use Factor	Fixed Use (l/p/d)	Litres/person/day
WC (single flush)	Flush volume (l)	0.00	4.42	0.00	0.00
WC (dual flush)	Full flush volume (l)	6.00	1.46	0.00	8.76
	Part flush volume (l)	4.00	2.96	0.00	11.84
WCs (multiple fittings)	Ave. effective flush volume (l)	0.00	4.42	0.00	0.00
Taps (excluding kitchen/utility room taps)	Flow Rate (l/min)	7.00	1.58	1.58	12.64
Bath (where shower also present)	Capacity to Overflow (l)	170.00	0.11	0.00	18.70
Shower (where bath also present)	Flow Rate (l/min)	9.00	4.37	0.00	39.33
Bath Only	Capacity to Overflow (l)	0.00	0.50	0.00	0.00
Shower Only	Flow Rate (l/min)	0.00	5.60	0.00	0.00
Kitchen/Utility Room Sink Taps	Flow Rate (l/min)	6.00	0.44	10.36	13.00
Washing Machine	Litres/kg Dry Load	8.00	2.10	0.00	16.80
Dishwasher	Litres/ Place Setting	1.00	3.60	0.00	3.60
Waste Disposal Unit	Litres/Use	0.00	3.08	0.00	0.00
Water Softner	Litres/pers/day	0.00	1.00	0.00	0.00
		Total Internal Calculated Use			124.67
		Contribution from Greywater			29.00
		Contribution from Greywater for External Use			5.00
		Normalisation Factor			0.91
		Total Internal Water Consumption			82.51
		External Water Use			5.00
		Effective Daily Water Demand l/p/d			87.51

GREYWATER YIELD - BATH SPECIFICATION - BUILDING REGULATIONS 2010 @ 125 litres/person/day

Installation Type	Unit of Measure	Capacity/Flow Rate	Use Factor	Fixed Use (l/p/d)	Litres/person/day
WC (single flush)	Flush volume (l)	0.00	4.42	0.00	0.00
WC (dual flush)	Full flush volume (l)	6.00	1.46	0.00	8.76
	Part flush volume (l)	4.00	2.96	0.00	11.84
WCs (multiple fittings)	Ave. effective flush volume (l)	0.00	4.42	0.00	0.00
Taps (excluding kitchen/utility room taps)	Flow Rate (l/min)	7.00	1.58	1.58	12.64
Bath (where shower also present)	Capacity to Overflow (l)	170.00	0.11	0.00	18.70
Shower (where bath also present)	Flow Rate (l/min)	9.00	4.37	0.00	39.33
Bath Only	Capacity to Overflow (l)	0.00	0.50	0.00	0.00
Shower Only	Flow Rate (l/min)	0.00	5.60	0.00	0.00
Kitchen/Utility Room Sink Taps	Flow Rate (l/min)	6.00	0.44	10.36	13.00
Washing Machine	Litres/kg Dry Load	8.00	2.10	0.00	16.80
Dishwasher	Litres/ Place Setting	1.00	3.60	0.00	3.60
Waste Disposal Unit	Litres/Use	0.00	3.08	0.00	0.00
Water Softner	Litres/pers/day	0.00	1.00	0.00	0.00
		Total Internal Calculated Use l/p/d			124.67
		Contribution towards Greywater			70.67
		% Greywater Contribution			76.41%

2.5 Housing Demographics

The existing homes water specifications are split according to the following table 2.2.

This forms the baseline upon which the requisite water offsetting works will be undertaken.

- *As a precautionary measure, it is considered that the current water use can be reduced from the average Southern Water Use for 2 people per dwelling of 100,000 litres/year.*
- *The water consumption associated with the other specification can be calculated as follows:*
- *Multiple the specification (125 l/p/d) by the number of occupants (2). To give a daily water consumption of 25) l/p/d which is then multiplied by 365 to give the annual water use.*
    - *125 x 2 = 250 l/p/d*
    - *250 x 365 (Specification x people x days in a year)*
    - ***91,250 litres/year***

Table 2.1 - Existing Homes Water Use Specifications

Water Use Specification	***Annual Water Use***	***No. of Homes***
a) Southern Water Specification (137 l/p/d)	*100,000 litres/year*	*900*
b) Building Regulations Specification (125 l/p/d)	*91,250 litres/year*	*200*
		1,100

2.6 Occupancy Rate

The Crawley Homes pilot study occupancy rate was found to be 2.8 per dwelling (Appendix A). The applicable water use associated with the existing stock has been taken as 2 people per household. This is very conservative, and yields a water consumption figure of 100,000 litres a year according to the Southern Water average water use figures that can be found in Section 2.3. It is therefore considered prudent to test the upper limit of the applicable occupancy for the Housing Association homes by using a figure in the middle of the 2.8 Crawley Homes occupancy rate and the conservative occupancy rate of 2.0; this figure being 2.40 people per dwelling.

3.0 Water Demand Of Proposed Development

The proposed development encompasses the construction of four residential homes. Horsham District Council requires that water use at the Development Site is restricted to 85 litres per person per day (l/p/ld). In order to achieve this, the following measures will be implemented at the Proposed Development:

Water efficient fittings including:

- *Dual flush toilets*
- *Aerated taps*
- *Aerated shower heads*
- *Highly efficient water saving appliances (Washing Machine & Dishwasher)*

A decentralised Hydraloop H300 greywater recycling system which will be used for flushing toilets. In accordance with established practice this specification has been used to complete the Building Regulations Part G Calculator (Table 3.1), which confirms that with these measures in place water use at the Proposed Development will be 78.57 lp/pd.

TABLE 3.1 - BUILDING REGULATIONS PART G CALCULATOR

WATER EFFICIENCY CALCULATOR - BATH SPECIFICATION

Installation Type	Unit of Measure	Capacity/Flow Rate	Use Factor	Fixed Use (l/p/d)	Litres/person/day
WC (single flush)	Flush volume (l)	0.00	4.42	0.00	**0.00**
WC (dual flush)	Full flush volume (l)	4.00	1.46	0.00	**5.84**
	Part flush volume (l)	2.60	2.96	0.00	**7.70**
WCs (multiple fittings)	Ave. effective flush volume (l)	0.00	4.42	0.00	**0.00**
Taps (excluding kitchen/utility room taps)	Flow Rate (l/min)	5.00	1.58	1.58	**9.48**
Bath (where shower also present)	Capacity to Overflow (l)	156.00	0.11	0.00	**17.16**
Shower (where bath also present)	Flow Rate (l/min)	7.80	4.37	0.00	**34.09**
Bath Only	Capacity to Overflow (l)	0.00	0.50	0.00	**0.00**
Shower Only	Flow Rate (l/min)	0.00	5.60	0.00	**0.00**
Kitchen/Utility Room Sink Taps	Flow Rate (l/min)	5.00	0.44	10.36	**12.56**
Washing Machine	Litres/kg Dry Load	9.00	2.10	0.00	**18.90**
Dishwasher	Litres/ Place Setting	1.00	3.60	0.00	**3.60**
Waste Disposal Unit	Litres/Use	0.00	3.08	0.00	**0.00**
Water Softner	Litres/pers/day	0.00	1.00	0.00	**0.00**
		Total Internal Calculated Use			**109.32**
		Contribution from Greywater			**22.99**
		Contribution from Rainwater			
					86.34
		Normalisation Factor			**0.91**
		Total Internal Water Consumption			**78.57**
		External Water Use			**5.00**
		From Recycled Greywater			**5.00**
		Effective Daily Water Demand l/p/d			**78.57**

In order to establish the water demand of the Proposed Development, anticipated water use per person must be calculated against the anticipated occupancy rate. The applicable occupancy rate is based on the local census data in accordance with the guidance from Horsham District Council. The actual water demand is therefore summarised in Table 3.2 below as follows:

Table 3.2: Water Demand of New Development

Type of Accommodation	*No. of Beds*	*Total Cumulative Number of Residents*	*Daily Water Demand Per Resident*	*Daily Potable Water Demand (l/d)*
Plot 1	***3***	2.47	78.57	194.06
Plot 2	***2***	1.88	78.57	147.71
Plot 3	***2***	1.88	78.57	147.71
Plot 4	***3***	2.47	78.57	194.06
Total Daily Water Consumption (litres)		**8.7**		**683.54**
Total Annual Water Consumption (litres)				**249,492.1**

(Note: Occupancy Rates & Daily Water Demand based on 2011 Census data adopted by HDC) https://www.horsham.gov.uk/planning/water-neutrality-in-horsham-district/water-neutrality-and-planning-applications)

The development site will deliver four new homes and accommodate around 8.7 residents who will use 683.54 litres of water a day and 78.57 litres per person per day with greywater recycling. This will result in a maximum water annual water demand of 249,492 litres per year.

This additional water demand within the Sussex North Water Resource Zone will need to be offset through the implementation of the water offsetting works at existing Housing Association properties, which lies within the same water supply zone. This will deliver a water neutral development at the proposed development site.

4.0 Proposed Flow Control System

4.1 Control Flow HL2024

The Control Flow HL2024 is an independent flow controller that can be set at varying flow rates, the lowest being 5 litres per minute, and the highest being 23.4 litres per minute. For domestic properties it is recommended to install 10, 12.8 or 15.6 litres per minute within each individual water offsetting home.

Traditional rubber flow controllers do not offer pressure independence such that they result in a flow rate variance of up to 10%, which is excessive when trying to deliver a consistent and robust water efficiency programme. Secondly the rubber flow controllers have a very short life span, owing to deteriorating rubber parts which ultimately lead to the destruction and ineffectiveness of the control flow unit.

Control Flow HL2024 is designed using high grade materials, offering a high level of durability and superior flow regulation that other products do not. As such, the Control Flow technology will offer lifetime savings of 10 years or more.

Figure 4.1 - Pressure Analysis HL2024 vs Rubber Unit



4.2 Control Flow MeterSave

The Control Flow MeterSave is a water saving device that can be installed in the meter chamber of each existing home as a retrofit measure or as part of new installation for a new development. We typically install this unit for Water Companies

This unit is typically installed for Water Companies that want to control water consumption and maximise water savings to achieve the AMP delivery targets.

Control Flow MeterSave can be used in a wide range of water company programmes as a supply only product too, water efficiency programmes, metering/smart metering and developer services projects.

Figure 4.2 - Control Flow MeterSave



Why Control Flow HL2024 is better than other products:

- *The only flow controller to be approved as pressure independent by KIWA the water testing Institute.*
- *National measured savings of 75 litres per property on average.*
- *Proven PCC saving of 23%.*
- *Can easily be installed as a retrofit, not just part of a newbuild programme.*
- *Highly engineered and designed product with a lifetime of 10 years or more.*
- *Pressure independence and reduction relieves demand on the water network.*

4.3 Control Flow HL2024 - 3P InLine

The Control Flow HL2024 3P Inline is optimally suitable to control flows into specified areas of any water system. This ensures flow system stabilisation, optimal user comfort and water savings. This product is installed inline, on the main supply leading into the property therefore negating the risk of the customer removing it and lasting a minimum 10 years, a much longer period than traditional water saving products.

It can deliver flow rates from 5 to 23.4 litres/minute. With typical residential installation being between 7.8 to 15.6 litres/minute. Prior to installation the existing flow rate and occupancy rate are checked and recorded.

Figure 4.3 - Control HL2024 - 3P Inline



4.4 Summary of Flow Control Systems

Across the several hundred thousand homes that have benefitted from the installation of the three Cenergist flow control valves, the average savings that have been achieved are around 70 litres of water per property, per day. The average PCC reduction is currently 23% on average. Besides the reduction in water consumption there is also a correlation with the gas consumption which has been found to result in a reduction in gas bills by £195.50 per annum. Further details are provided in the following section.

5.0 Crawley Homes Exemplar Water Offsetting Scheme

The Cenergist Control Flow HL2024 was installed in a pilot study of 100 properties to demonstrate and quantify water use reduction that could then be applied to the remaining stock. This initiative was carried out initially to support the two new water neutral developments at the Breezehurst Drive and Longley House sites in Crawley. Both schemes would result in the delivery of 205 affordable homes in Crawley District.

The results of the preliminary study would then be applied to the existing 8,000+ Crawley Homes stock to facilitate the development of future homes. In order to prove the proposed water savings within the identified properties, the project was delivered over a monitored period of time to allow for the pre-installation consumption meter readings to be taken, a meter reading on the day of installation which was over a period of four weeks, and a final meter another four weeks post the installation.

The schedule details of these works was as follows:

Pre-Installation Week One:

- *Relevant property addresses were provided by Crawley Homes.*
- *Each householder received a letter from Cenergist outlining the project.*
- *A Cenergist household Liaison Officer visited the properties to schedule an installation appointment.*
- *First water metre readings were obtained.*

Installation Week Four:

- *Installation of Control Flow HL2024 on 100 Crawley Homes properties.*
- *A second meter reading was taken on the day of installation.*

Post Installation - Week Eight:

- *The third meter reading was conducted.*

5.1 Summary of Water Saving Results

Cenergist installed the HL2024 Control Flow products into 100 existing Crawley Homes properties. As outlined above they obtained pre and post installation consumption data for all the 100 installations. Following analysis of the pilot study the results indicated a successful water reduction across all the 100 homes.

The key outcomes are as follows:

Table 5.1 - Flow Control Performance Results

Control Flow HL2024 Performance Results	
No. of Properties	*100*
Average PCC Reduction (L)	*30.53*
Average Occupancy	*2.8*
Average Daily Savings (L)	*73.07*
% Decrease in Water Consumption	*23%*

5.2 Benchmarking the Crawley Homes

Cenergist has been installing the Control Flow HL2024 into homes in the United Kingdom since early 2020. It has worked with many water companies on their water efficiency programmes and as such have a significant amount of data that they have gathered which can be benchmarked against the water savings achieved on the Crawley Homes pilot study. These readings are spread over a two year period, therefore accounting for seasonal variations during this time.

Table 6.2 - National Performance of Control low HL2024

Control Flow HL2024 National Performance Results	
Average Pre Consumption (L)	*396.34*
Average Post Consumption (L)	*326.93*
Average Pre PCC (L)	*199.85*
Average Post PCC (L)	*166.52*
Average Post Reduction (L)	*31.64*
Average Occupancy	***2.32***
Average Daily Saving (L)	***69.40***

Water Industry Validation of Cenergist Project

The extract below is from the Cenergist marketing literature.

"We have worked with them since early 2020 by installing products into 3000 homes, and through meter read analysis, pre and post product installation, we have seen steady average measured savings of 69 litres per day across that time period to the present day. We're really pleased about the consistent savings even across the different seasons,"

- Steve Johnston of Affinity Water

5.3 Summary of Gas Saving Results

The pilot study by Cenergist was conducted between 6 June and 8 August 2022. Undertaking the study in the summer ensured that the water energy use associated with the houses was based on gas consumption for heating up hot water only. It is however expected that the gas savings will be higher during the winter months, when additional energy is used for heating the homes.

The gas meter reading was taken at the appointment booking stage (4 weeks pre install), at the point of installation and a last reading 4 weeks post installation. This data was analysed and produced the following savings.

Table 5.3 - Gas Savings Results

Gas Performance Results	
No. of Properties	*95*
Average Daily Saving (Kwh)	*7.65*
% Decrease in Consumption	*49.33%*
Financial Saving Per Annum	*£195.50*

It must be noted that the above financial savings was based on the current £ per Kwh in the United Kingdom of £0.07p. However in October 2022 across the United Kingdom the energy prices rose. Therefore the Financial Saving Per Annum would increase from that stated above.

6.0 Water Offsetting Strategy

Both the proposed development site and the Housing Association homes fall within the Sussex North Water Resource Supply Zone. A recent directive from Natural England states that all new residential and commercial accommodations, with high-water uses, in this area will need to meet the new Habitat Regulations Assessment (HRA) requirement to demonstrate water neutrality. This measure has been stipulated to protect ecological flows and reduce the demand for increased water abstraction from the wells at Hardham. In order to protect the integrity of the Arun Valley which has the following protected designations; Sites of Special Scientific Interest (SSSI), Special Protected Area (SPA), Special Area of Conservation (SAC) and Ramsar.

What is a Water Neutral Development?

A Water Neutral development will not add to the overall existing water demand of an area or catchment and will have zero impact on existing water abstraction requirements or water mains supply.

As demonstrated in Section 3, water neutrality at the development site is demonstrated by implementing water efficiency measures, whilst this section of the resort will address the water offsetting works that will be undertaken at the Housing Association Homes.

6.1 Water Offsetting Strategy 1

Flow Control Valves

The primary water offsetting intervention that is proposed is the installation of the Control Flow HL2024. After reviewing an array of measures this is considered to be the most viable and deliverable water efficiency measure. This method is a tried and tested method for retrofitting existing properties to achieve robust water efficiency performance. Cenergist has installed this valve in over 30,000 homes achieving an average 75.00 litres/house/day; 23% per household.

The proposed installation will commence from the middle of October 2023. Below an analysis is made of the likely savings that would be achieved after the installation works. The national water saving is on average 75 litres/house/day, whilst the savings achieved for the Crawley Homes is 73 litres/house/day. For the

water offsetting works a robust approach has been to target an occupancy rate of 2.0 people per dwelling. In addition it is considered prudent to test the more realistic occupancy rate of 2.40 people per dwelling. For this analysis the water savings have been considered to be similar to those that were achieved in Crawley, as the housing stock is of a similar age given that most of the Social Homes were built some after the second world war under the Homes for Heroes programme.

Robust Occupancy - Water Saving for the Southern Water Specification

- *9no. x Existing homes*
- *Install Control Flow HL2024*
- *Water use specification - 137 l/p/d*
- *Occupancy Rate - 2.0*
- *23% Saving per person - 23% x 137 litres/day = 31.51 l/p/d*
- *Savings per home - 2 x 31.51 = 63.02 l/p/d*
- *Number of days per year 365 days*

  = 9 x 63.02 x 365

  = 207,021 litres/year (Annual Water Saving)

Robust Occupancy - Optional Building Regulations Specification

- *3no. x Existing homes*
- *Install Control Flow HL2024*
- *Water use specification - 125 l/p/d*
- *Occupancy Rate - 2.0*
- *23% Saving per person - 23% x 125 litres/day = 28.75 l/p/d*
- *Savings per home - 2 x 28.75 = 57.50 l/p/d*
- *Number of days per year 365 days*

  = 3 x 57.50 x 365

  = 62,963 litres/year (Annual Water Saving)

Total Existing Water Use for Robust Occupancy (2.0)

- *Southern Water 137 l/p/d (9) - 207,021 litres/year*
- *Building Regs 125 l/p/d (3) - 62,963 litres/year*

  = 269,984 litres/year

Normal Occupancy - Water Saving for the Southern Water Specification

- *9no. x Existing homes*
- *Install Control Flow HL2024*
- *Water use specification - 137 l/p/d*
- *Occupancy Rate - 2.40*
- *23% Saving per person - 23% x 137 litres/day = 31.51 l/p/d*
- *Savings per home - 2.40 x 31.51 = 75.62 l/p/d*
- *Number of days per year 365 days*

  = 9 x 75.62 x 365

  = 248,412 litres/year (Annual Water Saving)

Normal Occupancy - Optional Building Regulations Specification

- *3no. x Existing homes*
- *Install Control Flow HL2024*
- *Water use specification - 125 l/p/d*
- *Occupancy Rate - 2.40*
- *23% Saving per person - 23% x 125 litres/day = 28.75 l/p/d*
- *Savings per home - 2.40 x 28.75 = 69.00 l/p/d*
- *Number of days per year 365 days*

  = 3 x 69.00 x 365

  = 75,555 litres/year (Annual Water Saving)

Total Existing Water Use for Normal Occupancy (2.40)

- *Southern Water 137 l/p/d (9) - 248,412 litres/year*
- *Building Regs 125 l/p/d (3) - 75,555 litres/year*

  = 323,967 litres/year

6.2 Anticipated Actual Occupancy Rate

It is considered that it is more likely that the actual occupancy rate will sit between the two extremes; the robust occupancy rate of 2.0 and the normal occupancy rate of 2.4. Therefore a more realistic occupancy rate of 2.2 would result in an annual water consumption figure which can be calculated as follows:

a) Total Existing Water Use Normal Occupancy (2.0) - 269,984 litres/year
b) Total Existing Water Use Robust Occupancy (2.4) - 323,967 litres/year

c) Total Existing Water Use Robust Occupancy (2.2)

- (269,984 + 323,967)/2 litres/year

*- **296,976 litres/year***

6.3 Operational Buffer Allowance

It is proposed to allow for an operational buffer in the implementation of the water offsetting works. This approach goes a step further than the Crawley Homes approach, which mitigates the exact volume of the new developments. As can be seen in all scenarios considered the water offsetting works result in a water savings exceeding the demand at the development site of **249,492.1** litres/year. Table 6.2 highlights the buffer provided by each of the occupancy rates. As can be seen from Table 6.2 below the minimum buffer size is 8.2% for the normal occupancy rate of 2.0 people per dwelling, whilst the maximum anticipated occupancy of 2.4 people per dwelling yields a buffer of 29.8%. Thus demonstrating that the proposed installation of the Control Flow HL2024, will deliver a robust water offsetting solution for the development site.

Table 6.2 - Control Flow HL2024 Operational Buffer

Annual Water Saved (litres/year)	*Buffer Size (litres/year)*	*Occupancy Rate*	*(%) Buffer*
269,984	***20,492***	***2.0***	***8.2%***
296,976	***47,484***	***2.2***	***19.03%***
323,967	***74,475***	***2.4***	***29.8%***

7.0 Summary of Water Offsetting Strategy

In terms of water neutrality the additional water demand will be experienced in the North Sussex Water Resources Zone at the point of first occupation of the development site. Requiring water neutrality to be delivered prior to first occupation would be unrealistic and unjustified. This is because there will be no adverse impact of the proposed development site. This would be unnecessarily prejudicial and only serve to stop a viable and sustainable development that could be delivered if a realistic testing timescale and delivery of the water offsetting works is agreed.

Table 7.1 - Control Flow HL2024 Operational Buffer

Annual Water Saved (litres/year)	*Buffer Size (litres/year)*	*Occupancy Rate*	*(%) Buffer*
269,984	***20,492***	***2.0***	***8.2%***
296,976	***47,484***	***2.2***	***19.03%***
323,967	***74,475***	***2.4***	***29.8%***

Robustness of Water Offsetting Strategy

Table 7.1 above clearly demonstrates that a very robust water offsetting scheme is proposed. It must be noted that considering an extremely stringent occupancy of only 2 people yields a buffer of 8.2%.This report clearly demonstrates that it is viable to deliver a viable water offsetting scheme that will facilitate the development of a water neutral development at Land North of Horsham.

- **Strategy** - Installation of 12 no. Control Flow HL2024 units to regulate existing flows, and achieve a 8.2% water efficiency.

The proposed water offsetting works will result in a 8.2% reduction in the current water use from the existing Housing Association homes. **Thus making the total available water offsetting volume for the stringent two (2) people occupancy of 269,984 litres/year. Which allows 249,492 litres/year to be made available to the development, leaving a sizable buffer of 20,492 litres/year.** Another benefit is derived from the reduction of carbon emissions amounting to 13 kgCO2.

8.0 Compliance and Monitoring

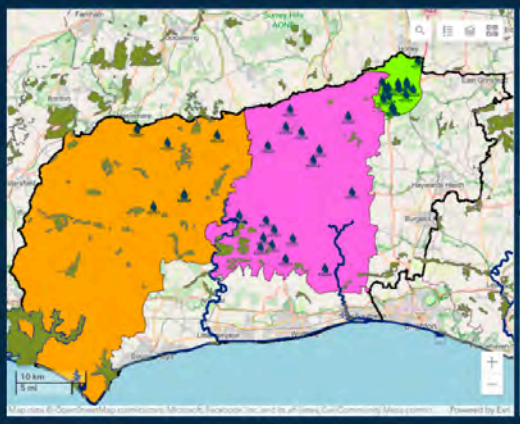
The Development Site together with the water offsetting homes where the Concealed Hydraloop Unit will be installed will benefit from smart water metres with telemetry connections to the Water Bank GIS monitoring database. This will provide an accurate and dynamic picture of water consumption of both the Development Site and the homes benefitting from the Concealed Hydraloop Unit. For the homes with the The GIS will make it possible to reach and monitor water neutrality targets, sustainability goals, protect the environment and save money.

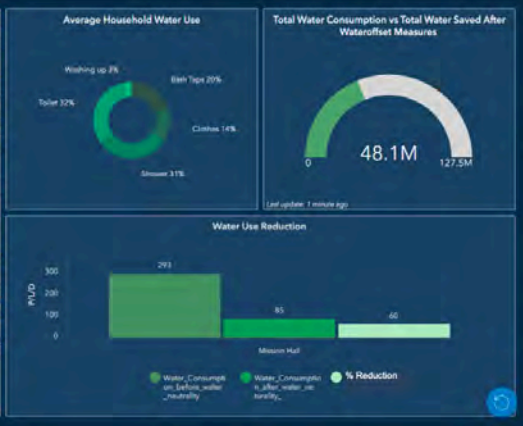
There is a requirement for the Development Site and Water Offsetting site to demonstrate how it will meet the requirement for perpetual monitoring of both development and water offsetting sites post development. It is proposed to use the Water Offsets Ltd - Waterbank GIS system which addresses this issue by providing an online portal where developers and Councils can easily monitor the performance of each site.

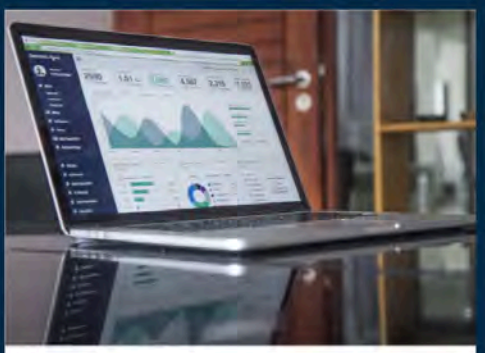
- ➔ *The GIS system will be linked to telemetry smart metres that are linked to the database.*
- ➔ *The GIS system provides water use data on a daily, monthly, quarterly and annual basis.*
- ➔ *The GIS system facilitates the linking of development sites with water offsetting sites so that there is no double counting of water offsetting credits.*
- ➔ *The details of the Water Neutrality strategy applicable to each site is displayed on the system and is mapped against its performance data.*
- ➔ *The details of the Water Offsetting site are also provided on the user dashboard and this is mapped against its targeted performance.*
- ➔ *The GIS is monitored on a 24/7 basis allowing for early warning of leaks or abnormalities.*
- ➔ *Quick alerts are sent by text and email to the relevant people.*
- ➔ *The GIS system allows for smart metres to be installed at critical locations to monitor consumption at both development and water offsetting sites.*

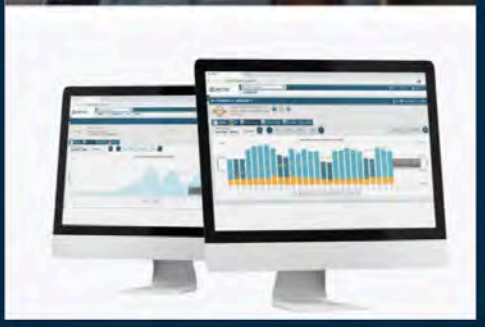
The measures being implemented at the Site (including monitoring) will be secured by a Section 106 Agreement which has been negotiated between Legal and General Affordable Homes, Horsham District Council and developers.

AquaCiTY - Innovative Water Technology









Design using our AquaCiTY proprietary software has saved over 48 million litres of water a year in the Water Neutrality Zone.

APPENDIX A

CENERGIST FLOW CONTROL VALVES

Cenergist

UK | INDIA | SPAIN | NETHERLANDS

Your Water Efficiency Partner



Control Flow HL2024

Crawley Borough Council

Our Company

Cenergist is a specialist water and energy services specialist and are pleased to continue to support our UK Water Company Partners in achieving their ambitious water efficiency goals.

Part of the Eneraqua Technologies plc group, we currently work with 7 UK water companies, helping them meet their water efficiency goals in both domestic and commercial buildings. Through our own patented water saving technologies, we can deliver PCC savings of up to 22% in domestic properties and 30% in commercial premises.

On average we improve some 30,000 homes and buildings each year with a current CSAT rating of 99% across all of our programmes of work. The high levels of customer satisfaction are due to the quality ethos embedded within the company – our employees treat each home as if it were their own. Householders and commercial building managers recognise this commitment to quality and the respect shown to their property.

Control Flow HL2024 are our family of patent protected products that provide unmatched performance in terms of pressure-independent flow control. With the ability to be installed at various points within the property, Control Flow HL2024 eliminates flow variations caused by pressure fluctuations in the supply system. By providing a controlled and steady flow with variations of less than 2%, Control Flow HL2024 provides a great experience for householders with:

- Customer satisfaction rates in excess of 99%
- Reduction in water consumption of up to 75 litres per day or PCC of 23%
- Total water and energy bill savings of up to £350 a year based on metered data
- Legionella safe – Control Flow HL2024 does not increase the risk of legionella or require any specialist legionella treatment

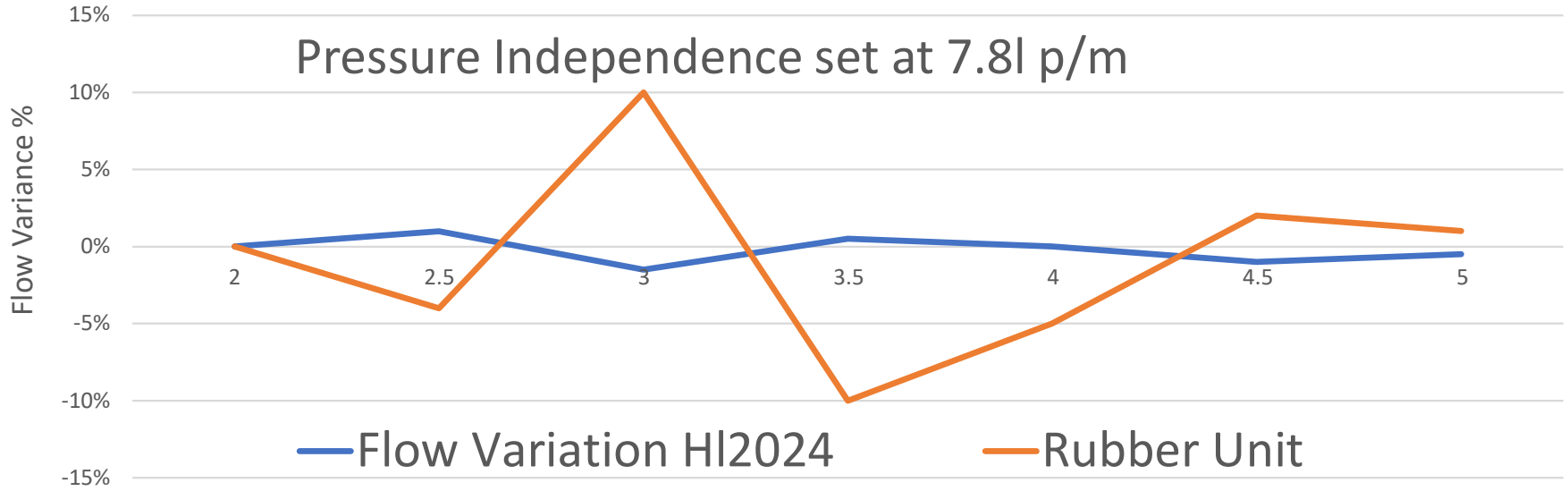
The benefits of the product are being recognised across the sector. In addition, Control Flow HL2024 is also being adopted by local authorities seeking to achieve water neutrality for new build developments.

Control Flow HL2024

Control Flow HL2024 is a pressure independent flow controller that can be set at varying flow rates, the lowest being 5 litres per minute, and the highest being 23.4 litres per minute. For higher, measured water savings, we would recommend installing the Control Flow inline at either 10, 12.8 or 15.6 litres per minute within each home, either at the cold- water inlet or within the meter chamber (if they have a meter), depending on occupancy. The homeowner will notice no difference to their water usage, and as such, we have a 99% customer satisfaction rating across all our projects.

Traditional flow controllers often claim pressure independence. However, this is often incorrect and used to paper over the cracks of poor response times; up to 10% variance in flow rate and a short life span. A common issue with flow controllers that utilise rubber parts is the degrading and ultimately destruction of the unit over a short period. In addition, they are often easily removed by the homeowner, negating any long- term water savings.

Control Flow HL2024 is designed using high grade materials, offering a high level of durability and superior flow regulation that other products do not. As such, the Control Flow technology will offer lifetime savings of 10 years or more.



Control Flow Meter Save

Control Flow MeterSave is a water saving device that can be installed in the meter chamber of each home as a retrofit measure or as part of a new install/repair programme. This is an ideal way to control water consumption within the home and maximise water savings to achieve AMP delivery targets.

Control Flow MeterSave can be included in a wide range of water company programmes as a supply only product too, such as existing water efficiency projects, metering/smart metering programmes and developer services projects.



Why Control Flow HL2024 is better than other products:

- Only flow controller to be approved as pressure independent by KIWA the water testing institute
- Measured saving of 75 litres per property on average
- Proven PCC saving of 23%
- Can easily be installed as retrofit, not just part of newbuild programme.
- Highly engineered and designed product with a lifetime of 10 years or more.
- Pressure independence and reduction relieves demand on network.

Control Flow HL2024- 3P Inline



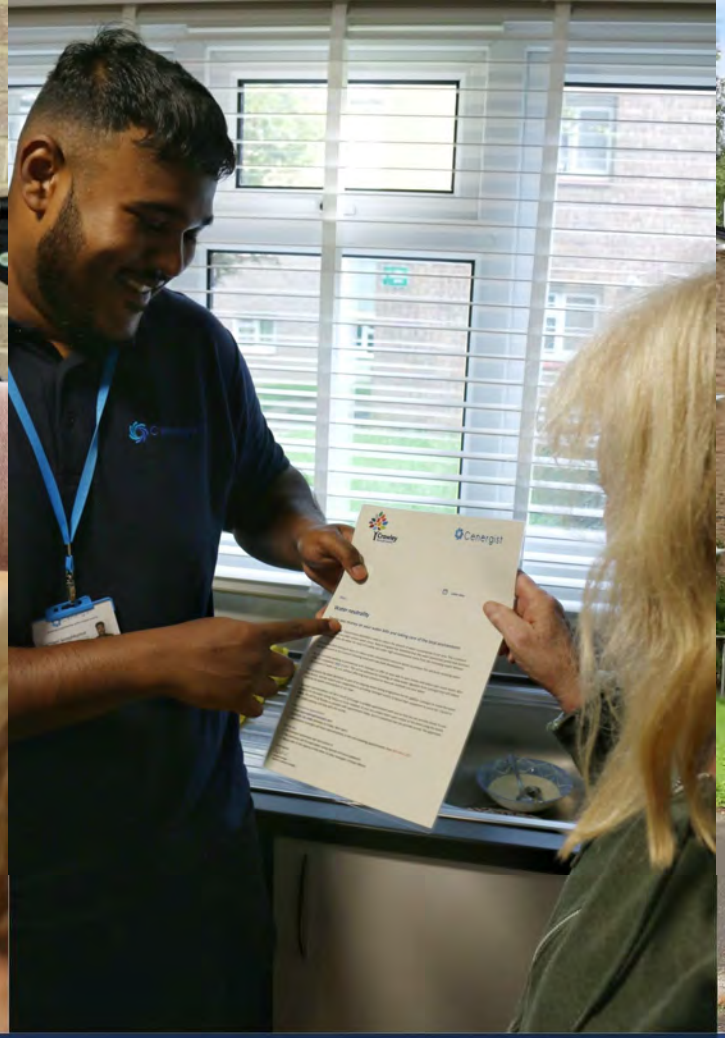
Fitted into the piping, the Control Flow 3P Inline is optimally suitable to control flows into specified areas of any water system. As such it ensures system stabilisation, optimal user comfort and water savings. The product is installed inline, negating the risk of the customer removing it and last 10 years- much longer than the traditional water saving products.

It can be set at a flow rate from 5-23.4 litres per minute. Before installing, we will always check flow rates and occupancy levels.

Across all of our projects so far, average measured savings are sat at 70 litres of water per property, per day. The PCC reduction is currently 23% on average.

The average household gas consumption reduction is measured at £195.50 per annum.







Crawley Borough Council

Pilot – Final Report

How we carried out the study with Crawley Council



Fairlawn House, Three Bridges

The main requirement of this project was to show the water consumption reduction through the installation of Control Flow HL2024 into Crawley Council properties. This will then support the method of installing the product into wider existing housing stock to allow the development of new build properties to take place without drawing down more precious resource from the existing water network.

To prove the water savings within the identified properties, we delivered the project over a set timeframe to allow for pre- installation consumption meter readings to be taken, a meter reading on the day of install four weeks later, and a final meter reading another four weeks post install.

The customer journey was as follows:

Pre- Installation- Week One:

- Properties were provided by Crawley Council.
- Each householder received a letter from Cenergist outlining the project.
- A Cenergist householder Liaison Officer visited the properties to schedule an installation appointment.
- First water meter readings were obtained.

Installation- Week Four:

- Installations of Control Flow HL2024 complete.
- Second water meter readings were obtained on the day of installation.

Post Installation- Week Eight:

- Third water meter readings were obtained.

Water Saving Results



Cenergist have installed Control Flow products into 100 Crawley Council householdered properties. We obtained pre and post installation consumption data for all installations.

Following our analysis, the pilot has shown a successful water consumption reduction across the 100 homes.

The key outcomes are as follows:

Control Flow HL2024	
No. of properties	100
Average PCC Reduction (L)	30.53
Average Occupancy	2.8
Average Daily Saving (L)	73.07
% Decrease in Consumption	23%

Gas Saving Results



The project was delivered 6th of June – 5th of August. It is assumed that gas usage is from hot water use only. Gas savings are expected to be higher during months where householders will be using their heating as well as hot water.

As part of our savings analysis we gathered gas meter readings at the appointment booking stage (4 weeks pre install), at the point of install and 4 weeks post installation. We used this data to produce the below savings.

The key outcomes are as follows:

Gas	
No. of properties	**95**
Average Daily Saving (Kwh)	7.65
% Decrease in Consumption	49.33%
Financial Saving Per Annum	£195.50

The above financial savings are based on the current £ per Kwh in the UK of £0.07p.

In October 2022 across the UK we will see the current £ per Kwh increase.
With this in mind the Financial Saving Per Annum is also likely to increase.

Long Term Water Industry Savings

Cenergist have installed Control Flow products into water company properties since early 2020. The savings below show the measured savings across each project since that time. The readings are spread across a two year timeframe, proving ongoing measured savings across time, and seasonal variance.

Control Flow HL2024	
Average Pre Consumption (L)	396.34
Average Post Consumption (L)	326.93
Average Pre PCC (L)	199.85
Average Post PCC (L)	166.52
Average PCC Reduction (L)	31.64
Average Occupancy	**2.32**
Average Daily Saving (L)	**69.40**

Long Term Water Industry Savings Validation



"Working with Cenergist has been a real pleasure to date. The whole team are very knowledgeable about their products and fully commit to driving change and reducing water consumption. They have been extremely helpful, flexible and proactive to our approaches, allowing us to make the easy decision of looking at future options within our Demand Management Portfolio to include Cenergist as a supplier to help with our tough demand reduction targets."

"We have worked with them since early 2020 by installing products into 3000 homes, and through meter read analysis, pre and post product installation, we have seen steady average measured savings of 69 litres per day across that time period to the present day. We're really pleased about the consistent savings even across the different seasons,"

- Steve Johnston of Affinity Water

Customer Satisfaction

Across our installs, following the completion of the pilot, we received feedback from every customer who received an install. Our customer satisfaction feedback shows an average rating of **4.88**. We revisit each customer around 2-4 weeks post install to retrieve feedback. We ask about; impact on usage and the customers main feedback has been they don't notice any difference following the installation of Control Flow HL2024.



Householder Quotes

85 The Birches, RH10 1RU

"Great service, hoping this will save me money" 5/5

2 Fairlawn House, RH10 1EL

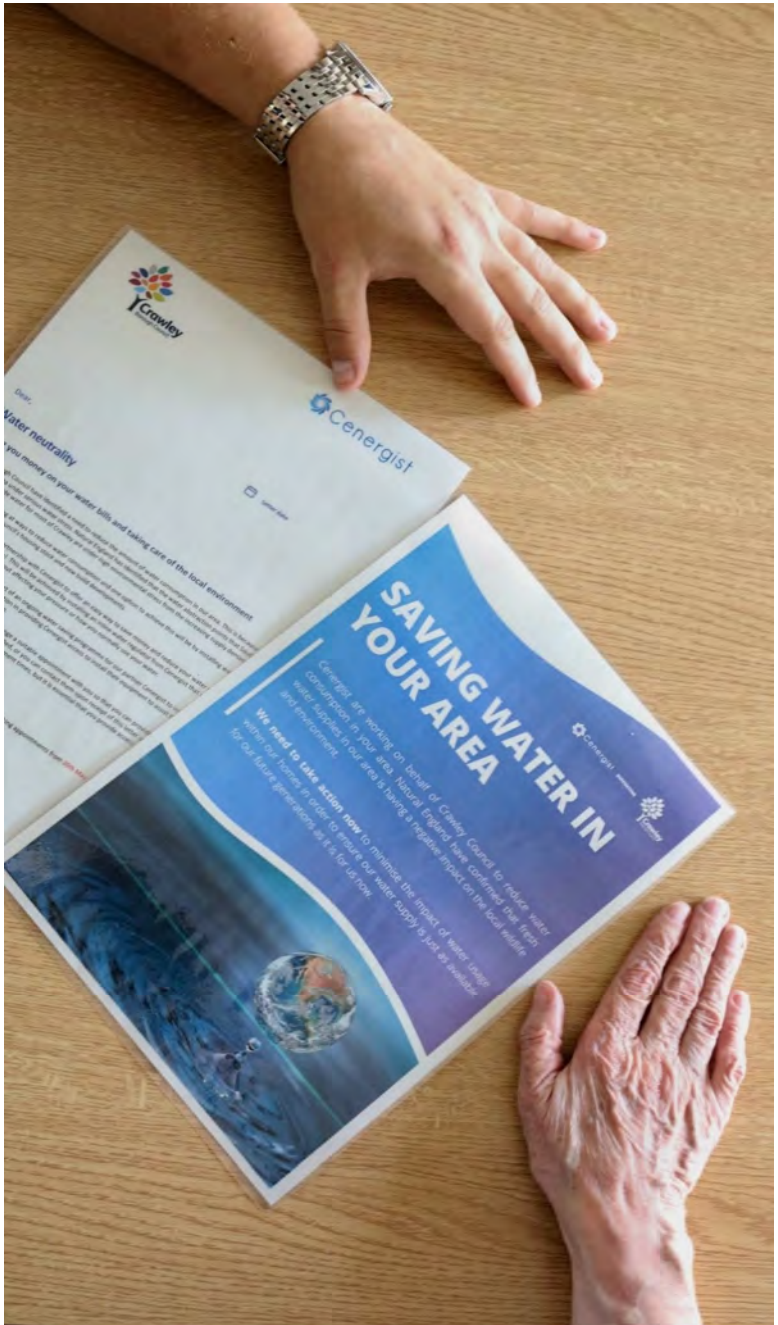
"No issues with install, really happy with Marc and the team very friendly" 5/5

87 The Birches, RH10 1RU

"Excellent. thank you for the service". 5/5

Customer Satisfaction Rating 1-5	Satisfaction Score %
4.88	99%

Conclusion



- The average daily saving show 73.07 litres per property per day
- Average PCC reduction of 30.53 litres
- Annual gas saving for householders is £195.50.
- Long term savings from wider water industry work sat at 69 litres
- 99% CSAT Score



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APPENDIX B
CONCEALED HYDRALOOP UNITS

FACT SHEET | Have your building Recycle Ready

With Hydraloop, you can recycle up to 95% of shower and bath water, as well as condensation water from air conditioning and optionally 50% of washing machine water. This enables you to reuse up to 85% of the total in-house water.
In order to install a Hydraloop system, make sure to be well prepared for plug-and-play installation. In this document, you'll find guidelines and plumbing information to make any building Recycle Ready and future proof for sustainable water supply.

INPUT & OUTPUT

Input sources	Grey water from showers, baths, air conditioning and optionally washing machines. **At any time**: avoid grey water from hand basins, dishwashers, floor drain and kitchen sink.
Output options	Toilets, garden, pool, washing machine, optional faucets for cleaning purposes. **At any time**: label grey water faucets with a 'non potable water' sign.

POSITIONING

Hydraloop vs input sources	If input sources are located on a higher floor than the Hydraloop system, you can make use of gravity for the input water. In other circumstances you'll need a lift pump. For Hydraloop Qualified lift pumps, see page 3.
Washing machine	If you want to use the washing machine recycle option for your laundry, we advise to install the Hydraloop system near the washing machine. You can only connect one machine.

CONDITIONS

Room specifications	Minimum height of the ceiling: 210 cm, 6.10" – Room temperature between 14-35° C | 57-95° F. **At any time**: avoid direct sunlight on the Hydraloop system.
Access to back up water	Tap water or rainwater
Electricity	100-230 Volt
Online access	Stable internet with working Wi-Fi connection
Washing machine water input	Only possible with Hydraloop washing machine add-on (sanitary lift pump included)

PIPING

Isolation	Isolate all pipes.
Input connection	Tie all incoming drains into a single pipe (75/50/40 mm | 3"/2"/1 ½") into the inlet (40 mm | 1 ½") on top of the Hydraloop system. Use riser pipes out of the system and branch them out to the output options.
Ventilation	Don't forget proper ventilation of the inlet pipe (75/50/40 mm | 3"/2"/1 ½") to support grey water flowing into the Hydraloop system without airlocks. Also provide sewer venting to ensure proper functioning of the Hydraloop system.
Bypass	Install appropriate bypass connections for maintenance
Grey water Identification	Label everything. Use color coding or large warning labels to designate that the pipes are running grey water.

INPUT CONNECTIONS

Grey water into Hydraloop	40 mm | 1 ½" connections
Backup water	½" male thread, minimum water flow of 20 liters | 5.3 gallons p/m, 29 psi / 2.2 bar. If pressure is higher (max. 55 psi / 4 bar), install expansion vessel and 50Mu mash filter.

OUTPUT CONNECTIONS

Wastewater to sewer	40 mm | 1 ½" connection to sewer – Sewer connection (75 to 50 mm| 3" to 2") with rubber manchet underneath or behind the Hydraloop system into floor or wall.
Recycled water to toilet	½" male thread – Prepare plumbing underneath or behind Hydraloop system. Connect with flexible hose.
Recycled water to washing machine	½" male thread – Prepare plumbing underneath or behind Hydraloop system. Connect with flexible hose.
Recycled water to garden/pool	½" male thread – Prepare plumbing underneath or behind Hydraloop system. Connect with flexible hose.

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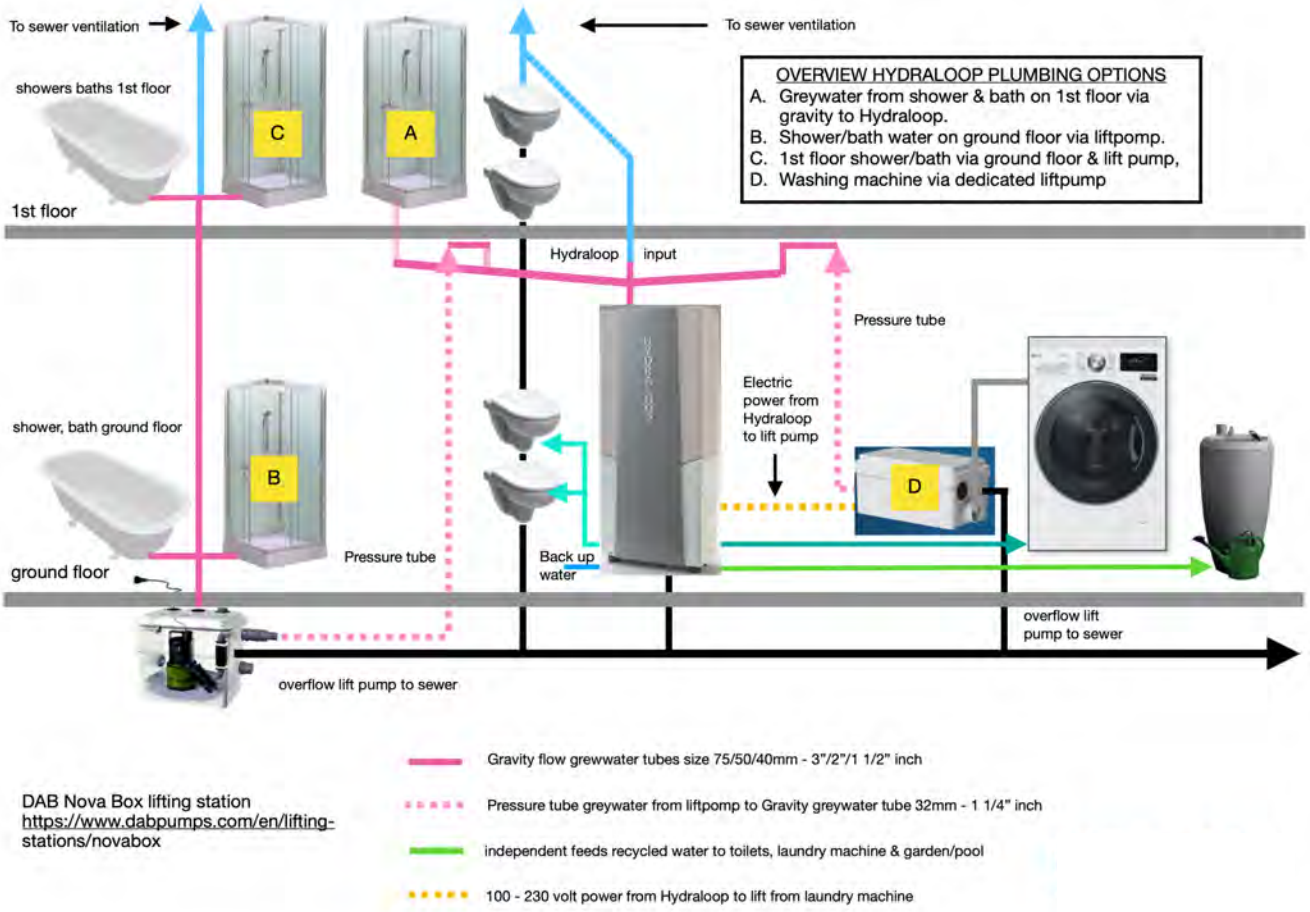
SCHEMATIC OVERVIEW



WATER SUPPLY UNTIL INSTALLATION OF HYDRALOOP

OPERATION BEFORE INSTALLATION OF A WATER RECYCLING SYSTEM	When your building is Recycle Ready, you can install a (temporary) bridge connection from the input pipes to the sewer. This enables you to use showers and baths as usual, until a water recycling system like Hydraloop is installed.



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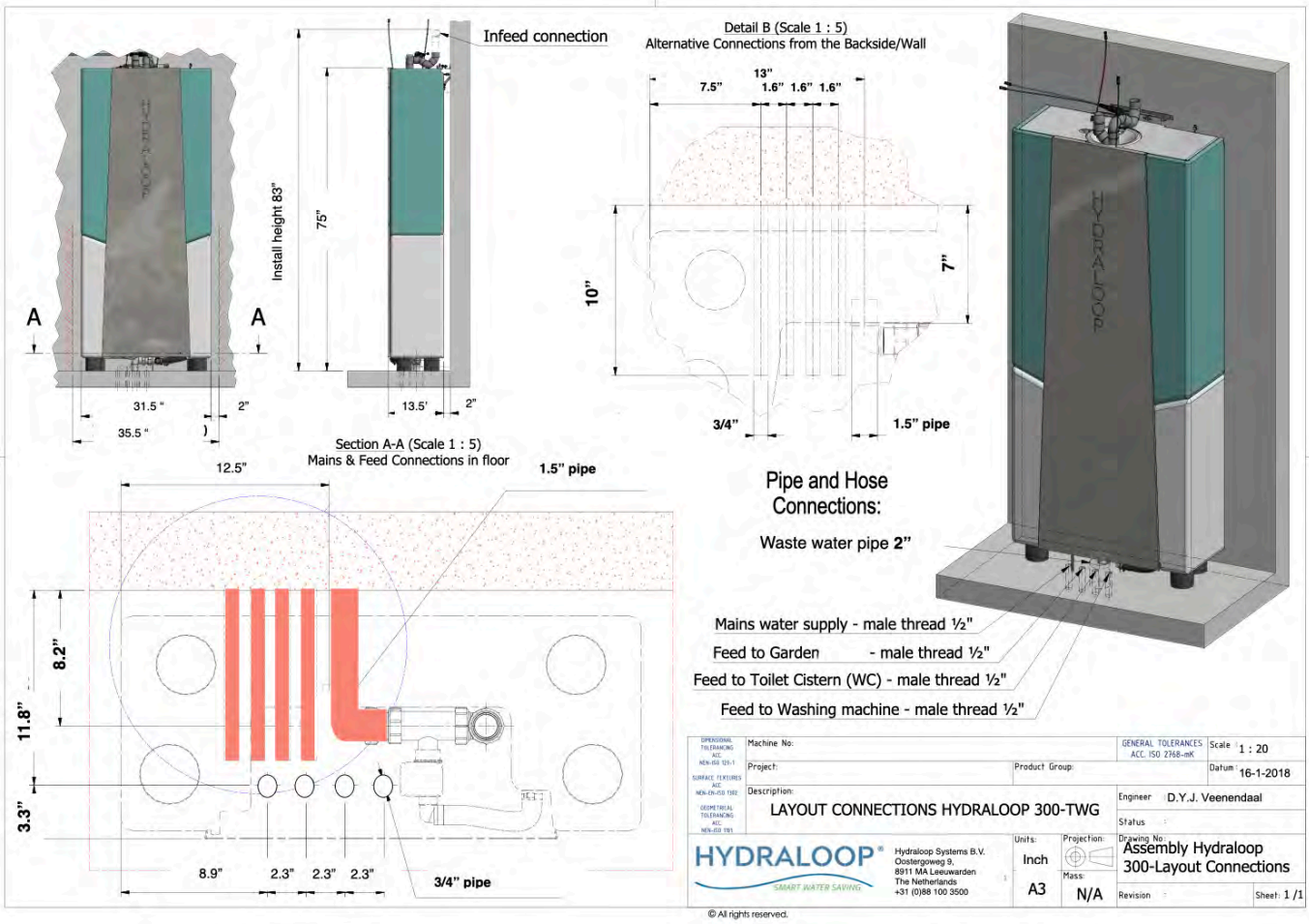
DIMENSIONS



HYDRALOOP 300 SPECIFICATIONS

CAPACITY	300 liters | 80 gallons
FAMILY HOME	Up to 5 persons
TREATMENT CAPACITY	530 liters | 140 gallons per day
DIMENSIONS	80 cm wide, 34 cm deep, 187 cm high | 31 ½" wide, 13'4" deep, 74" high
VOLTAGE	100/230 Volt, 24 Volt internal
POWER CONSUMPTION	20 watts during treatment. On average: 200 kWh/year per system
AVERAGE RECYCLED WATER QUALITY	non-potable water CBOD5 (mg/L) < 10 TSS (mg/L) <10 Turbidity (NTU < 5) E. coli (MPN/100ml.) < 14 PH (SU) 6.0 – 9.0
NOISE LEVEL	± 44 dB

HYDRALOOP QUALIFIED LIFT PUMPS

DAB NOVABOX 30/300	This lift pump is for installation in the crawl space underneath the floor 60.7 cm wide, 30.9 cm deep, 36 cm high | 23.9" wide, 12.2" deep, 14.1" high
DAB GENIX VT030	This lift pump is placed on or partly in the floor. 45.6 cm wide, 17.8 deep, 34.6 cm high | 18" wide, 7" deep, 13.6" high
CONNECTION PIPES	Make sure the pressure tube from the lift pump is 32 mm | 1.26" to avoid excessive flow of water entering the Hydraloop system.

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'RECYCLE READY' GUIDE

A Hydraloop water recycling system collects, treats and redistributes lightly contaminated greywater. Before the installation of a Hydraloop unit, make sure that the plumbing in your building is well prepared. In this 'Recycle Ready' Guide, you will find all necessary information to get any building 'Recycle Ready'.

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LEGEND

- Greywater to Hydraloop
- Backup water to Hydraloop
- Treated greywater to toilet
- Treated greywater to washing machine
- Treated greywater to garden or pool
- Greywater waste to sewer
- Ventilation

OWNER GUIDELINES

Work with professionals
The preparation of your plumbing must be completed by a professional plumber.

Submit your Pre-Installation Checklist
Before the installation of your Hydraloop unit, it is important to ensure the building is 'Recycle Ready'. If the preparations are not carried out correctly and complete, additional work and costs may be needed.

Please complete the Pre-Installation Checklist with your plumber, sign it, and forward to your installer at least one week before the installation date.

Check your local regulations
Before moving forward with your Hydraloop installation, please check your local guidelines for recycled water re-use.

PLUMBING GUIDELINES

Input Connections
Only collect lightly contaminated greywater. Do not connect water sources that contain grease, food scraps or waste. **No wash basin, kitchen sink, dishwasher or floor drain.**
Do not connect a washing machine without owner having purchased the Washing Machine Water Recycle Option **(WMR)**.

Output connections
In addition to the general information in this document, please work with the technical drawings on pages 7-9.

Non-potable Water Identification
All outputs from the Hydraloop system must be identified with the word 'Non-Potable water' or by a Non-Potable water sign.

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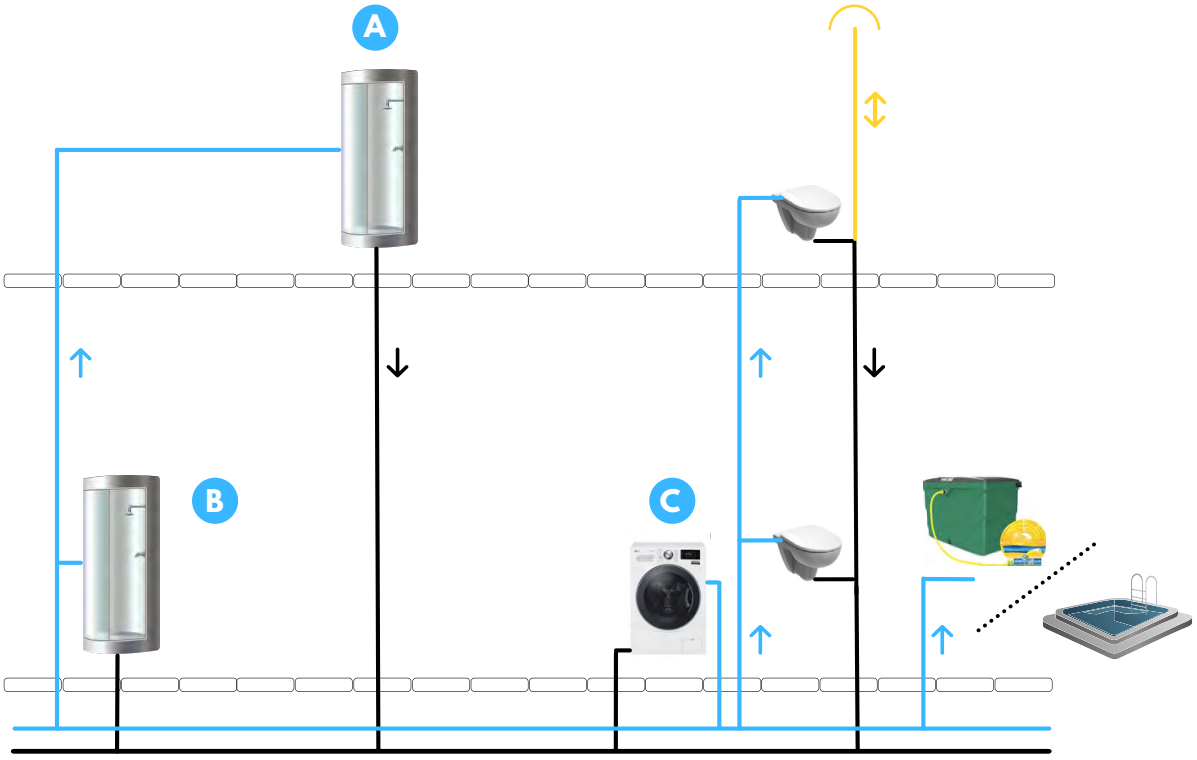
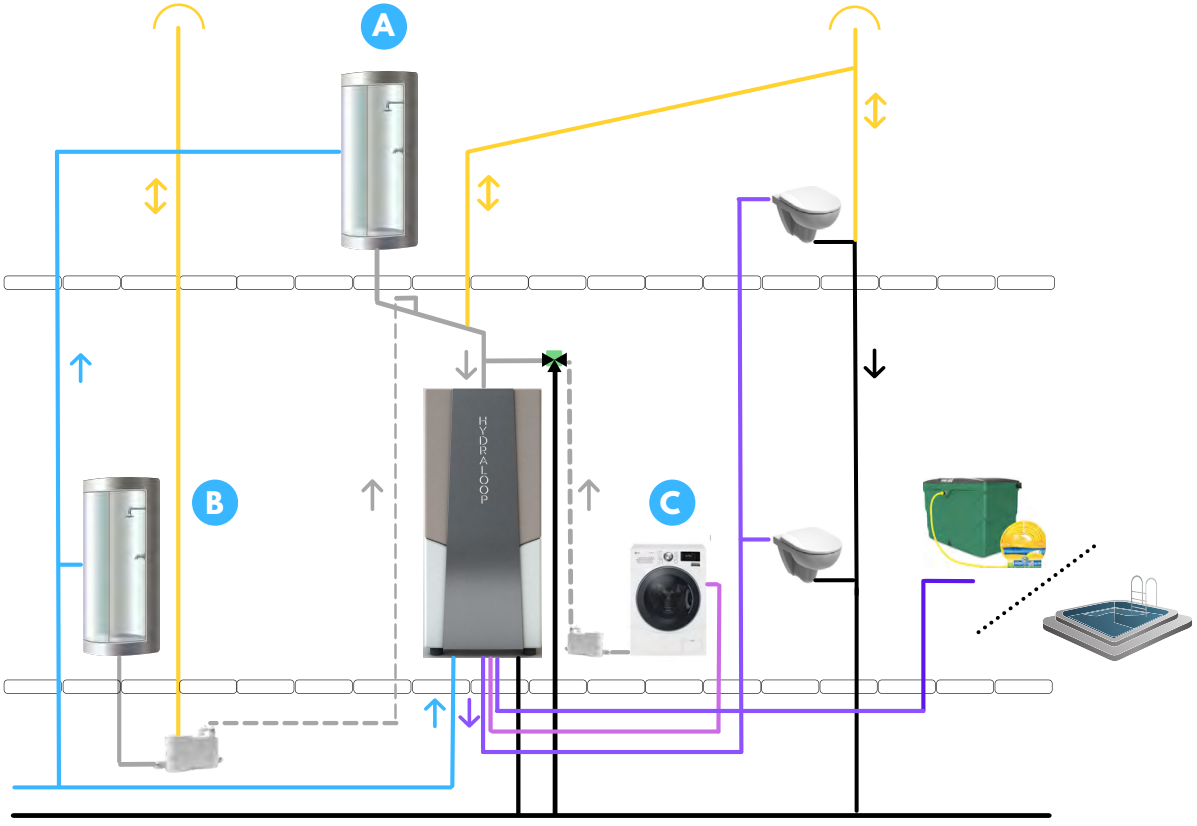
CONVENTIONAL PLUMBING DIAGRAM



'RECYCLE READY' PLUMBING DIAGRAM WITH PLUMBING OPTIONS



A **Hydraloop installation on lower floor – input by gravity**
Greywater from the shower, bath or other sources is gravity fed into Hydraloop

B **Hydraloop installation on same floor – input via lift pump**
Greywater from the shower, bath or other sources enters Hydraloop through lift pump

C **Optional: Hydraloop Washing Machine Water Recyle Option (WMR)**
50% of washing machine greywater enters the Hydraloop unit through Hydraloop-controlled **WMR**-valve

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CONNECTION OVERVIEW

Greywater inlet to Hydraloop for water from

- shower
- bath

H300
H600

- tumble dryer
- air conditioning
- heat pump

H600*

- washing machine (only with **WMR** option)

H300
H600

See page 4

*In the current setup, the H300 system cannot collect condensation water. This option will become available in 2023. If you want to know more, please contact Hydraloop or your Hydraloop Partner.

Power/network connections
- power supply
- wifi internet connection

See page 5

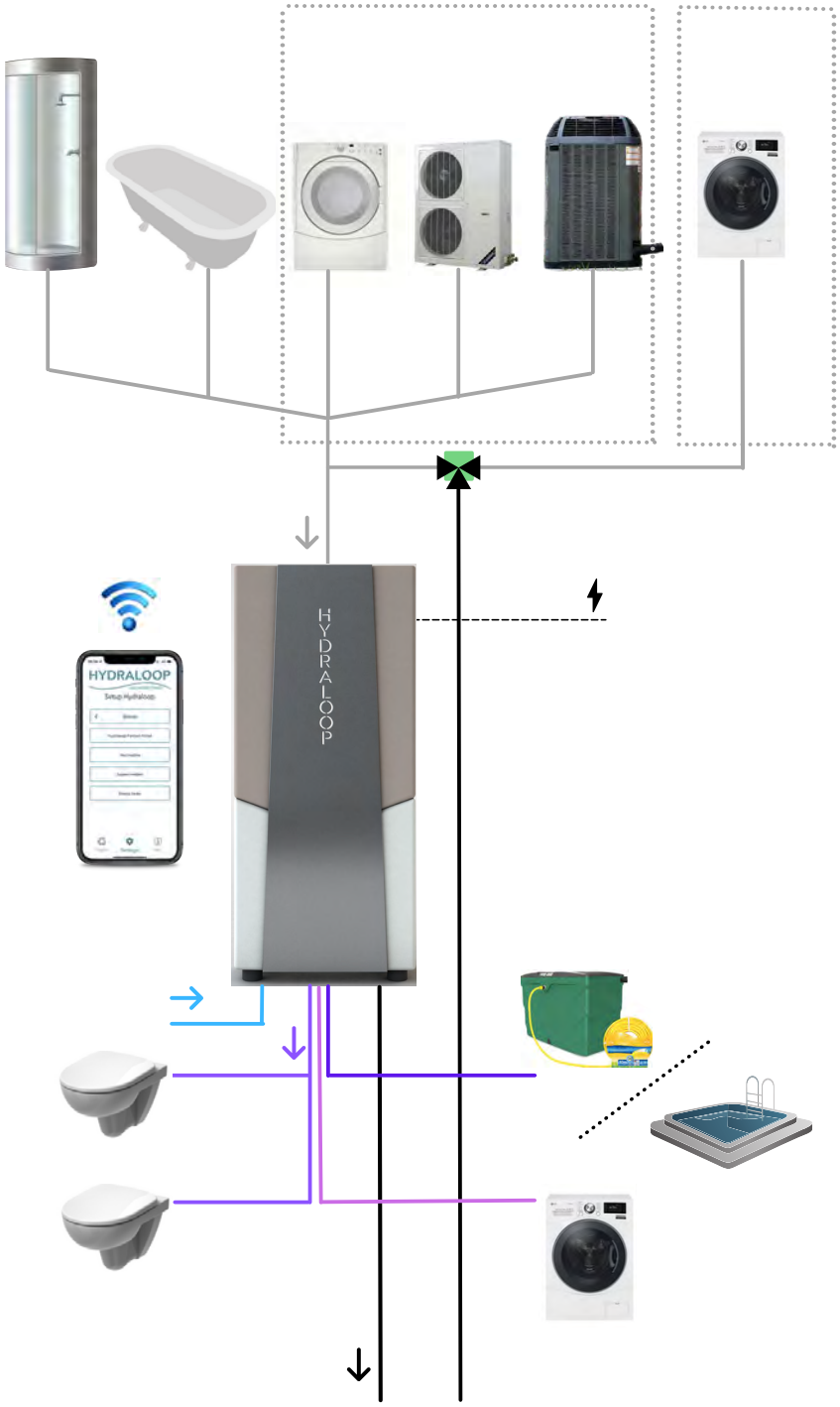
Treated greywater output dedicated lines for

- toilet flushing
- washing machine
- garden irrigation or swimming pool

Backup water inlet
- tap water or filtered rainwater

Wastewater outlet
- connection to sewer

See page 6



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GREYWATER INPUT CONNECTIONS



1 — **Gravity flow greywater line**
for input sources to H300 & H600
Do not connect water sources that contain grease, food scraps or waste. **No wash basin, kitchen sink, dishwasher or floor drain.**

2 — **Gravity flow greywater line**
for input sources to H600

3 — **Optional: Gravity flow greywater line for Washing Machine Water Recycle Option (WMR)**
Connecting greywater output from a washing machine to the Hydraloop is only possible if you specifically choose the **WMR**.
You can connect only one washing machine to the Hydraloop unit.

4 — **Greywater inlet**

5 — **Ventilation**
Placed along the greywater line to ensure proper ventilation and to help prevent air locks.
Ensure that greywater input and sewage output both have proper two-way ventilation. For more information, see schematic overview 'Recycle Ready' Plumbing Diagram on page 2.

The ventilation for the greywater input should be positioned above all greywater lines and end outside the building. You can also combine it with the sewage ventilation.

CONNECTION DETAILS

Greywater into Hydraloop
40mm | 1½"connections

Use separate greywater lines
Make sure that all greywater sources enter the Hydraloop unit from above. Ensure that all greywater connections are separated from black water.

Bring all greywater sources into one dedicated line
Connect all incoming greywater pipes into one single line going into the inlet (40 mm | 1½") on top of the Hydraloop system.

Input by gravity or lift pump
If your greywater input sources are located on a higher floor than the Hydraloop system, you can use gravity for the input greywater. In other circumstances, you'll need a lift pump. For lift pump requirements, see page 5.

See page 5

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SYSTEM CONNECTIONS, POSITIONING, LIFT PUMP REQUIREMENTS



SYSTEM CONNECTIONS

INTERNET

1 **Internet connection**
Stable internet connection with working Wifi in the room.

! Make sure to have a working Wifi connection with a bandwith of 2.4 GHz or 5 GHz prior to installation. It's not possible to connect an internet cable.

POWER

2 **Electricity (Hydraloop system)**
100-120V (60Hz) or 200-240V, depending on region.

We advise to position the power outlet in the room close to the top or the side of the system.

POSITIONING

Room specifications
Greywater inlet and optional **WMR** should be positioned at least 210 cm, 6.10” above the ground.

The room temperature should be between 14-35° C | 57-95° F. Extreme high or low temperatures should be avoided.

At any time: avoid direct sunlight on the Hydraloop unit.

We recommend placing the Hydraloop unit in a laundry room, mechanical room, or garage.

Allow at least 60 cm or 24" of space in front of the Hydraloop unit for maintenance access.

LIFT PUMP REQUIREMENTS

Please feel free to install a lift pump that is locally available and matches the following criteria:

Flow
Maximum flow of appr. 100 liters per minute (LPM) | 27 USGPM.

! **Ventilation**
Please ensure proper two-way ventilation by installing a ventilation stack that leads outside or by creating a relief line/overflow to the sewage.

Examples of suitable lift pumps
DAB NovaBox 30/300 (230 Volt countries)
Saniflo Sanivite (110 Volt countries)
Liberty 405 Pump (110 Volt countries, CSA certified)

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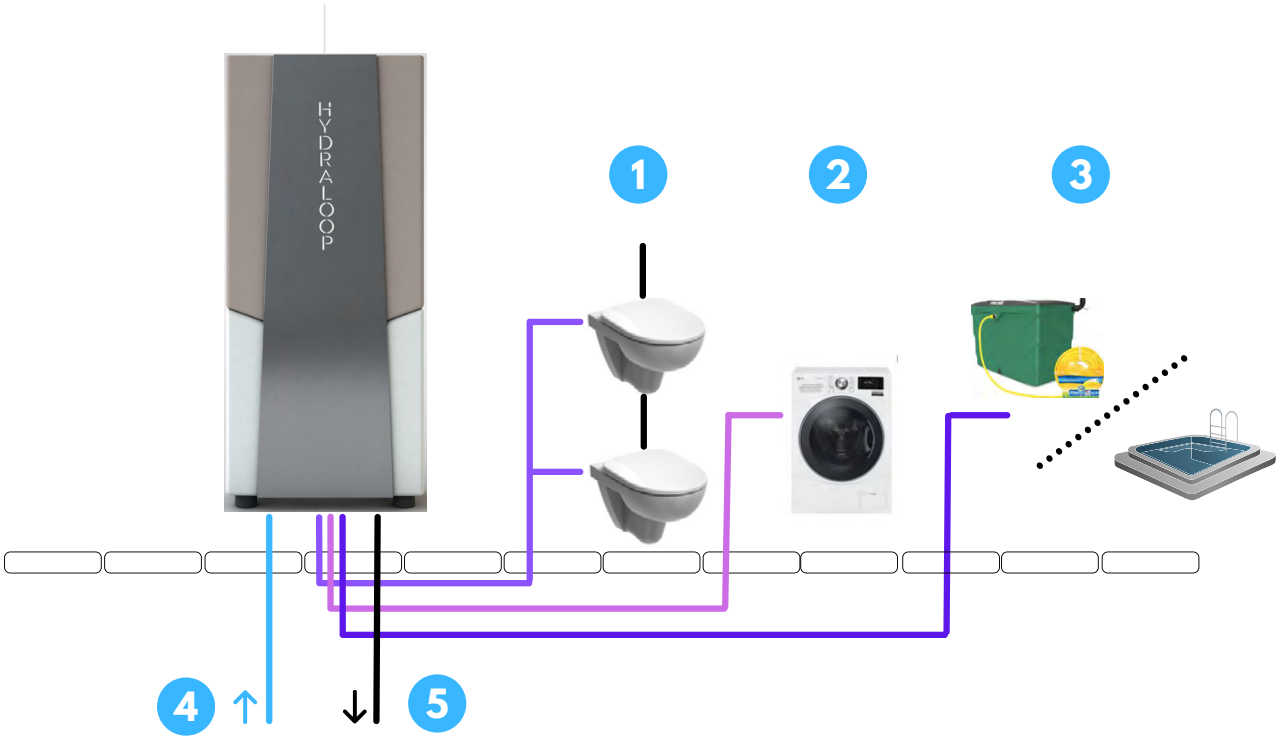
HYDRALOOP OUTPUT CONNECTIONS: TREATED GREYWATER OUTPUT, BACKUP WATER INPUT, WASTEWATER OUTPUT



TREATED GREYWATER

1. **Toilet feed water**
   Treated Hydraloop-water to toilets (pressure-controlled)
2. **Washing machine feed water**
   Treated Hydraloop-water to a washing machine (pressure-controlled)
3. **Garden/pool output**
   Treated Hydraloop-water to garden or pool (Hydraloop-controlled, unpressurized open connection to an external storage or swimming pool) Note: Treated greywater cannot be connected directly to a garden hose or sprinkler system.

BACKUP WATER

4. **Backup water inlet**
   Connection to tap water or filtered rainwater supply

WASTEWATER

5. **Wastewater output**
   Wastewater from Hydraloop to sewer (gravity). Output operates on a timer for wastewater release every 7 days.

CONNECTIONS

Treated greywater
All output connections are ½“ male thread (MNPT). Prepare the plumbing in the wall behind the future location of the Hydraloop unit. Connect with flexible hose.
For details, see 'Technical Drawings for your Plumber', page 8-9.

Backup water
½“ male thread (MNPT), minimum water flow of 20 LPM | 5.3 USGPM, 1½-3 bar | 21-43 psi. If the pressure is higher, install a pressure regulator. If a rainwater pump is used, also install an expansion vessel and a 50-micron mesh filter.

Wastewater
40mm | 1½” connection to sewer
Sewer connection (minimum 50 mm | 2“) with rubber sleeve underneath or behind the Hydraloop unit into the floor or wall.

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HYDRALOOP®

SMART WATER SAVING

NSF

Certified to NSF/ANSI Standard 350

The NSF/ANSI 350 standard verifies that all design and performance requirements of the standard have been met, and confirms through testing that effluent reuse water meets the stringent quality criteria. The NSF/ANSI 350 standard also sets water quality requirements for the reduction of chemical and microbiological contaminants for non-potable water use.

During the 26-week NSF/ANSI 350 testing period, the Hydraloop product was dosed daily with a greywater mix that contained raw wastewater, secondary effluent, body wash, shampoo, conditioner, soap, toothpaste, deodorant, bath cleaner, lactic acid, liquid handsoap, laundry detergent & softener, Na_2SO_4, $NaHCO_3$, Na_3PO_4 and test dust. The incoming greywater and the treated recycled water was lab tested for 26 weeks, typically 3 days a week.

Influent values of the incoming greywater used for the 26 week test

Parameters	Required range
TSS (mg/L)	50 - 160 mg/L
BOD5	130 - 210 mg/L
Temperature	25 - 35 Celcius
PH (SU)	6.0 - 8.5
Turbidety	30 - 100 NTU
Total phosphorous-P	1.0 - 3.0 mg/L
Total Kjeldahl -N	3.0 5.0 mg/L
COD	250 - 400 mg/L
Total coliforms	$10^3 - 10^7$ cfu/100 mL
E.coli	$10^2 - 10^6$ cfu/100 mL

Effluent values NSF-350 requirements and Hydraloop treated water test results

NSF/ANSI 350 requirements		HYDRALOOP average results	
CBDO5 (mg/L)	< 10	CBDO5 (mg/L)	6
TSS (mg/L)	< 10	TSS (mg/L)	3.3
Turbidity (NTU)	< 5	Turbidity (NTU)	2.3
E. coli (MPN/100mL)	< 14	E. coli (MPN/100mL)	< 1
PH (SU)	6.0 - 9.0	PH (SU)	6.0 - 9.0

HYDRALOOP CONCEALED UNITS






HYDRALOOP




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