



Water Neutrality Assessment for Proposed Development at Rickman's Green Village, Rickman's Lane, Plaistow, RH14 0LE

November 2022

Project No. 3177.2

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Issue History

Rev	Date	Purpose/Status	Comments
A	30-11-2022	Information	Updated to suit comments

1. INTRODUCTION

- 1.1. WARD Associates Consulting Engineers Limited have been commissioned by DLBP Ltd, on behalf of Artemis Land and Agriculture Ltd (the landowner), to prepare a water neutrality report to support the planning application for the proposed development for the erection of 108 dwelling (Use Class C3), and associated access and street network, footpaths, open spaces, lant, landscaping and site infrastructure.
- 1.2. The site address is Rickman's Green Village, Rickman's Lane, Plaistow, RH14 0LE.
- 1.3. The report focuses on water neutrality and provides strategies to achieve this goal. It is based on the principles in "Water Neutrality Study Part C – JBA Consulting (November 2022)" and documents released by the Environment Agency.
- 1.4. The assessment will draw a comparison between estimated existing and proposed water demand to prove no increase in overall water abstraction from Hardham Treatment Works as a result of the proposed development
- 1.5. The development of the site to achieve Water Neutrality is feasible using a combination of solutions including:
 - Maximising Water Efficiency to reduce demand
 - Maximise Water Reuse through Hydroloops installed to each plot
 - Maximise grey water harvesting with separate installation to each plot
 - Utilise Borehole abstraction for water demand
 - Utilise Water credits from offsetting through theWaterBank
- 1.6. The final solution will dependent upon the capacity for the use of borehole abstraction which will need to be verified by surveys of below ground water features and subject to obtaining licences for abstraction from the Environment Agency.
- 1.7. No other third party may rely upon or reproduce the contents of this report without the written approval of WARD Associates (Consulting Engineers) Ltd. If any unauthorised third party comes into the possession of this report, they rely on it entirely at their own risk and WARD do not owe them any Duty of Care or Skill.

2. EXISTING SITE

- 2.1. Rickman's Green Village is located on part of Crouchlands Farm. The site includes agricultural fields, and incorporates the existing access point from Rickman's Lane. There is an area of woodland to the south of the phase 1 parcel
- 2.2. Rickman's Green Village's homes and potential school land will be situated on just 17% of Crouchlands Farm.
- 2.3. The wider landholding at Crouchlands Farm, lawfully operating as a livestock farm, comprises 194 hectares of fields in agricultural use, an assortment of agricultural buildings and associated hardstanding, and areas of woodland. The existing farm buildings (comprising the large cattle shed and workshop, existing barns and the portakabins currently accommodating Artemis's office and welfare facilities), Hardnips Barn to the west and the existing fields to the south and west of the existing farm buildings.
- 2.4. Artemis purchased Crouchlands Farm in 2019 to remediate and regenerate the Farm, and to address the effects of previous use of the Farm caused by the previous owner. Since purchasing the site, Artemis has spent more than £7.5 million on restoration work - this has included:
 - the removal of the remaining biogas plant;
 - the clearance of waste material stored at the Farm;
 - the restoration of lagoons 1 and 2;
 - improvements to the farm infrastructure including trackways, buildings and fencing;
 - the improvement of the existing Public Rights of Way, and the creation of new permissive paths; and
 - a commitment to the Countryside Stewardship Scheme, including significant planting of 2,500 m of hedgerows, and restoration of fencing around the entire farm landholding.
- 2.5.5. Alongside this restoration work, Artemis has also reintroduced livestock to the Farm including rare breed cattle, sheep and pigs. In March 2022, the Farm achieved the prestigious 'Red Tractor' status which assures that the produce supplied by the farm is of the highest standards.

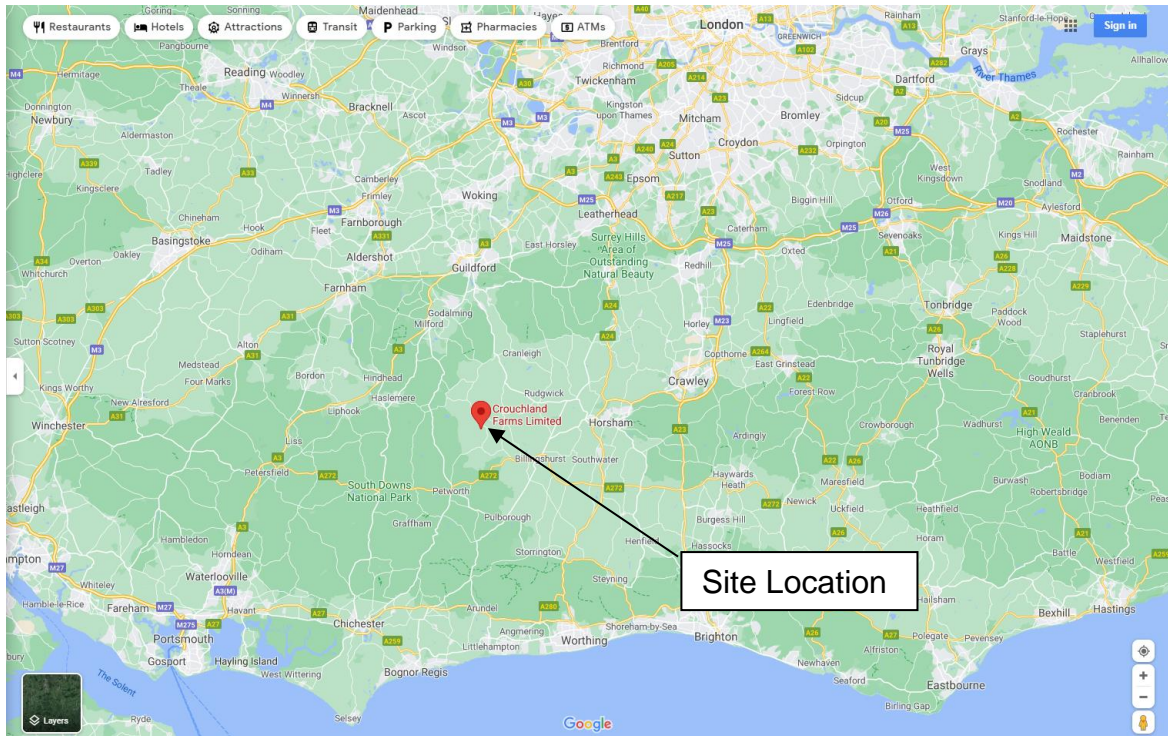


Figure 1 – Site Location plan

3. PROPOSED DEVELOPMENT

- 3.1. Rickman's Green Village will constitute a new village of a high-quality, well-planned, sustainable form of development. The development will provide up to 600 homes (including 30% affordable homes) to the east and west of Rickman's Lane, focused around a new village hub, including the opportunity for education provision
- 3.2. This report is provided in relation to the full planning application for Phase 1 which is for the erection of 108 dwellings (Use Class C3), and associated access and street network, footpaths, open spaces, plant, landscaping and site infrastructure.
- 3.3. Rickman's Green Village will be of the highest quality design that respects and enhances the existing character of the surrounding area. The proposal makes use of the existing agricultural field pattern to ensure the rural character of the site is maintained, as well as protecting existing woodland and hedgerows.



Figure 2 – Ste Plan indicating location of Phase 1

3.4. The proposed development for the site is shown in Figure 3.

06 Architectural Design Proposals
Housing Layout

108 homes in total, including 30% affordable

Key

- Type A1A2 (Barn)
2no. 1B2P & 2no. 2B4P apartments (private/affordable)
- Type B (Cottage)
2B4P terrace (private)
- Type C (Cottage)
2B4P terrace (affordable)
- Type D (Cottage)
3B4P terrace (affordable)
- Type E (Cottage)
3B4P terrace (private)
- Type F1/F2 (Barn)
3B5P semi-detached (private)
- Type G (Barn)
3B6P semi-detached (private)
- Type H (Farmhouse)
3B6P detached (private)
- Type I (Cottage)
4B6P terrace (affordable)
- Type J (Farmhouse)
4B7P semi-detached (private)
- Type K (Farmhouse)
4B8P detached (private)
- Type L (Farmhouse)
5B10P detached (private)
- Type M (Farmhouse)
5B10P detached (private)



Figure 3 – Proposed Development Plan

3.5. A schedule of accommodation is shown in Figure 4.

Development Schedule						
Project:	Rickman's Green Village Phase 1		Client:	Artemis Land & Agriculture		
Project No:	12-1455-01		Date:	29/09/2022		
House Type	Typology	Character Type	Occupancy	Unit No.	GIA (sqm)	Tenure
A1	Apartment	Barn	2x 1B2P 2x 2B4P	5	59 72	Private / affordable
A2	Apartment	Barn	2x 1B2P 2x 2B4P	3	59 72	Private / affordable
B	Terrace	Cottage	2B4P	17	92	Private
C	Terrace	Cottage	2B4P	4	88	Affordable
D	Terrace	Cottage	3B4P	5	103	Affordable
E	Terrace	Cottage	3B4P	8	108	Private
F1	Semi-detached	Barn	3B5P	9	122	Private
F2	Semi-detached	Barn	3B5P	9	122	Private
G	Semi-detached	Farmhouse	3B6P	2	131	Private
H	Detached	Farmhouse	3B6P	2	147	Private
I	Terrace	Cottage	4B6P	3	117	Affordable
J	Detached	Farmhouse	4B7P	3	152	Private
K	Detached	Farmhouse	4B8P	9	167	Private
L	Detached	Farmhouse	5B10P	3	212	Private
M	Detached	Farmhouse	5B10P	2	209	Private

Unit Schedule				
Occupancy	Tenure	Occupancy	GIA (sqm)	GIA (sqft)
1B2P	Affordable	10	590	6,351
	Private	6	354	3,810
2B4P	Affordable	14	1,008	10,850
	Private	24	1,996	21,485
3B4P	Affordable	5	515	5,543
	Private	8	864	9,300
3B5P	Private	18	2,196	23,638
3B6P	Private	4	556	5,985
4B6P	Affordable	3	351	3,778
4B7P	Private	2	304	3,272
4B8P	Private	8	1,336	14,381
5B10P	Private	6	1,054	11,345
TOTAL		108	11,124	119,739

TOTAL Affordable & Low Cost	32	30%
TOTAL Private	76	70%

Affordable & Low Cost Unit Schedule			
Occupancy	Occupancy	Unit %	Policy %*
1 Bed	10	31%	32.5%
2 Bed	14	44%	45%
3 Bed	5	16%	17.5%
4+ Bed	3	9%	5%

*As the proposals do not currently differentiate between affordable and low cost tenures, the policy percentage is taken as an average of the two figures.

Private Unit Schedule			
Occupancy	Occupancy	Unit %	Policy %*
1 Bed	6	8%	6%
2 Bed	24	32%	32%
3 Bed	30	39%	39%
4+ Bed	16	21%	23%

Figure 4 – Schedule of Accommodation

3.6. From the schedule of accommodation, it can be seen the proposed development is for 108 houses varying from 1 bed to 4+ beds.

3.7. The worst-case maximum total occupancy of the development site is shown in Figure 5.

Type	Number	Total / Persons
1 Bed – 2 Person	16	32
2 Bed – 4 Person	38	152
3 Bed – 4 Person	13	52
3 Bed – 5 Person	18	90
3 Bed – 6 Person	4	24
4 Bed – 6 Person	3	18
4 Bed – 7 Person	2	14
4 Bed – 8 Person	8	64
5 Bed – 10 Person	6	60
	TOTAL	506 People

Figure 5 – Schedule of Accommodation

3.8. The development site will be designed to achieve water neutrality based on the accommodation of 506 people across the 108 houses. It is noted that this is the theoretical worst case and in reality the occupancy and water consumption will likely be lower.

3.9. An outline planning application has been submitted for Rickman's Green Village Phase 2 (Outline planning application for the erection of up to 492 dwellings (Use Class C3), education provision including primary school (Use Class F1) and associated access, footpaths, open spaces, landscaping and site infrastructure. All matters reserved other than access). A condition is expected to be added to that permission to ensure water neutrality is achieved at reserved matters stage. The principals for achieving Water Neutrality for Phase 2 will be the same as those proposed within this report for Phase 1.

4. BACKGROUND AND RATIONAL FOR REPORT

4.1. Natural England is concerned that existing water abstraction in the Sussex North Water Resource Zone, which supplies part of the north of the district, is having an impact on protected sites in the Arun Valley. The increasing demand for water is thought to be harming internationally protected species, with the potential threat of extinction for some of these species. In response to this, Natural England has advised that new developments within this zone must not add to this impact.

4.2. Map Showing area of Chichester District within the Sussex North Water supply Zone which the Crouchlands Farm lies within.

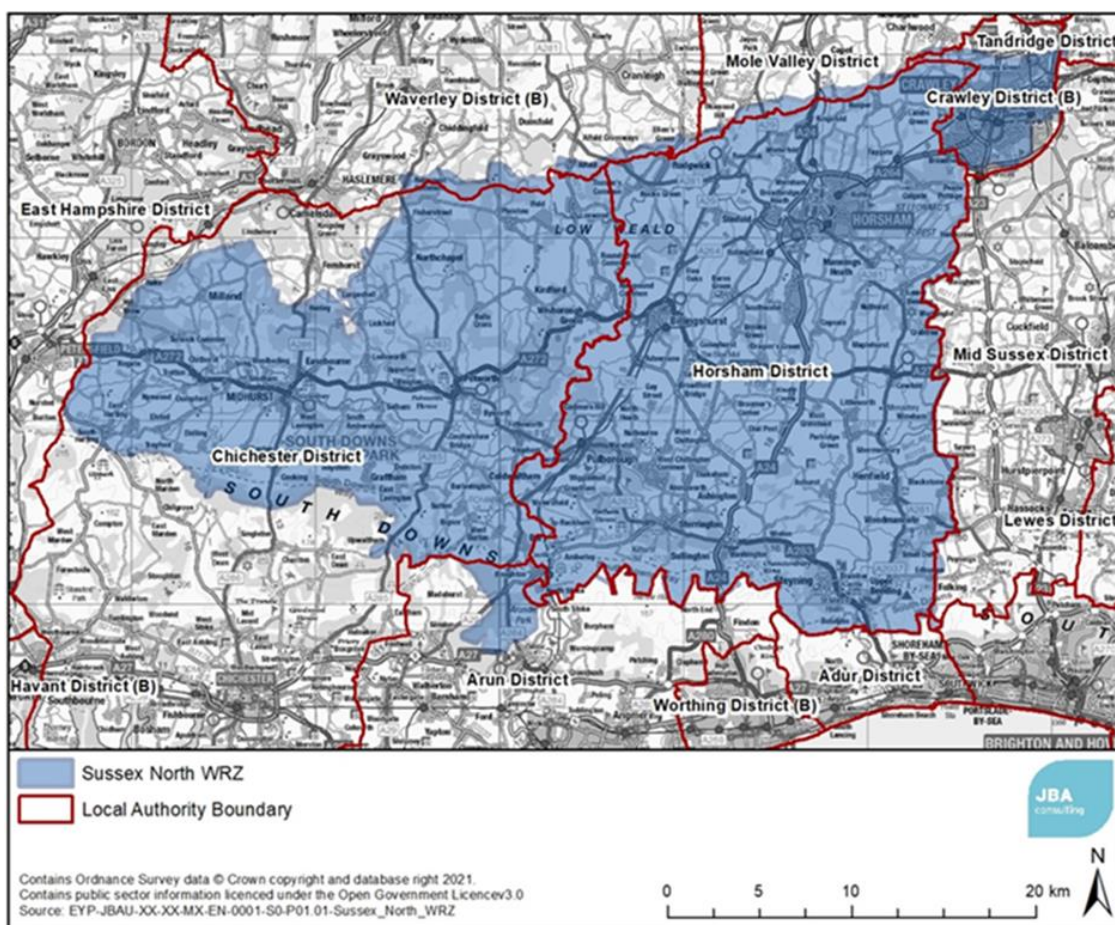


Figure 6 – Sussex North Water supply Zone

4.3. Abstraction is the permanent or temporary removal of water from a river, lake, reservoir, canal, estuary or groundwater. It changes the natural flow pattern and the amount of water in the environment. This can reduce the amount of habitat, prevent natural movement of species and concentrate pollution in the water environment. Abstracted water is used by everyone in their day to day lives for:

- drinking water; cleaning; irrigating crops; supporting industry; producing food; generating power; and, for use in households and many other goods and services.
- 4.4. Natural England has raised concern that further water extraction in the affected area may be having an adverse impact on protected sites in the Arun Valley. It has advised that any development must be 'water neutral' if it is to proceed. This means that new development should not increase the rate of water abstraction from the current water supply site above existing levels.
- 4.5. This report follows the guidance provided within the 'Natural England's Advice Note regarding Water Neutrality within the Sussex North Water Supply Zone: February 2022 V2'.
- 4.6. A previous application has been submitted for the Whole Farm Plan. The description of this development included:
The regeneration of Crouchlands Farm, comprising demolition of selected buildings, extension, refurbishment and remodelling of selected buildings and the erection of new buildings to provide up to a total of 17,169 m2 (including retained / refurbished existing buildings) comprising the existing farm hub (sui generis), a rural enterprise centre (Use Classes E, C1 and F1), a rural food and retail centre (Use Class E), an equestrian centre (Use Class F2) and a glamping site (sui generis); Refer to Appendix A for proposed site plans, drawings 463-PA-05 G.
- 4.7. A Water Neutrality Report was submitted as part of this application to demonstrate that this development could achieve water neutrality through reducing water demand by applying water efficient solutions to the development and providing the livestock demand through rainwater harvesting.
- 4.8. This report is for the Phase 1 development of 108 dwellings and is independent to the Whole Farm Plan.
- 4.9. This report follows the guidance provided within the JBA Consulting report 'Sussex North Water Neutrality Study: Part C – Mitigation Strategy – Final Report – November 2022'.
- 4.10. This report provides sufficient detail to satisfy the requirements as set out in the Chichester District Council - EIA Scoping Opinion letter dated – 02-09-2022.

5. METHODOLOGY

- 5.1. The water demand for the Rickman's Green Phase 1 is considered independently from any future development across the wider site.
- 5.2. A comparison of the existing water demand with the proposed water demand has been undertaken with measures proposed to achieve water neutrality.

6. EXISTING WATER DEMAND

- 6.1. The existing site is agricultural land currently used for livestock farming with a mix of Cows, Pigs and Sheep.
- 6.2. As noted above the Phase 1 development is linked to the Whole Farm Plan application which has previously been submitted in which any existing water use has been accounted for within that Water Neutrality assessment. The existing water use of the site is therefore considered as zero.

7. PROPOSED WATER DEMAND

- 7.1. Water neutrality can be achieved by a combination of reducing water use on the development, maximising rainwater harvesting, utilising water reuse on site. The remaining demand can be provided by borehole abstraction or offsetting.
- 7.2. Due to the size of the proposed development it is proposed to have a multi-layered water offsetting strategy in order to achieve water neutrality. It is considered that this will give the development the most robust water security, reduce water use, and facilitate the development whilst also protecting the environment.

STEP 1 - REDUCED WATER DEMAND

- 7.3. The first proposed approach is to reduce the water demand of the proposed development.
- 7.4. Per Capita Consumption (PCC) is used as a measure of water use and is the amount of water that is used by one person in one day. It is usually measured in litres per person per day (l/p/d) but can also be expressed in litres per head per day (l/h/d).
- 7.5. In terms of the new homes, the following figures are typically discussed:
- Building Regulations approved document currently state that new build homes should achieve a minimum of 125 l/p/d.
 - Building regulations approved document also states a lower target of 110 l/p/d is allowed if the local authority can establish a clear need based on available evidence.
 - Southern Water has committed in their Water Resource Management Plan to a water efficiency policy that aims to achieve a PCC of 100 l/p/d by 2040. Southern Water have therefore advised Councils that a target of 100 l/p/d should be adopted in policy for new build properties, and 80l/p/d for strategic developments where master planning and community level schemes can provide greater saving.
 - The JBA Consulting – Sussex North Water Neutrality Study: Part C – Mitigation Strategy – November 2022 report refers to the realistically Achievable rate of 85l/p/day which is recommended as the target for all new build housing.
- 7.6. The proposed water demand for each resident has been calculated using a standard water usage calculator as per figure 7.

Installation Tpe	Unit of Measurement	Capacity/Flow Rate	Use Factor	Fixed Use (Litres/Person/Day)	Litres/Person/Day = (1 x 2) + 3
WC (Multiple Fittings)	Flush Volume (Litres)	3.3	4.42	0	14.59
Wash Hand Basin	Flow Rate (Litres/Minute)	5	1.58	1.58	9.48
Bath	Capacity to Overflow (Litres)	150	0.11	0	16.50
Shower (Where Bath Present)	Flow Rate (Litres/Minute)	6.5	4.37	0	28.41
Kitchen Sink	Flow Rate (Litres/Minute)	6	0.44	10.36	13.00
Dishwasher	Litres/Place Setting	1.25	3.6	0	4.50
Washing Machine	Litres/Use	8.17	2.1	0	17.16
5	Total Calculated Use (Sum Detailed in Column 4)				103.63
6	Contribution From Greywater (Litres/Person/Day)				0.00
7	Contribution From Rainwater (Litres/Person/Day)				0.00
8	Normalization Factor				0.91
9	Total Water Consumption Without External Use				94.30
10	External Water Use				5.00
11	TOTAL WATER CONSUMPTION (l/p/d)				99.30

Figure 7 – Water usage calculation

7.7. Based on the above calculation the proposed water use per person is 99.3 l/day.

STEP 2 – GREYWATER HARVESTING

7.8. The above calculation does not account for the provision of grey water harvesting for garden use and toilet flushing. Individual greywater harvesting units will be provided to each plot suitability sized to provide sufficient capacity for garden use and toilet flushing. This will be sufficient to reduce the demand to the realistic achievable level of 85l/p/day which is the target.

7.9. Rainwater harvesting will be designed to ensure each plot has provision for a minimum capacity of 35 days-worth of water usage storage.

7.10. Using the realistic achievable demand of 85 l/p/day this equates to a water demand on the development site of 506 people x 85 l x 365 days = 15,986,650l per annum / 43,010 l per day.

7.11. Other water saving/reusing and offsetting opportunities therefore need to be considered to achieve water neutrality.

STEP 3 - BOREHOLE WATER ABSTRACTION

7.12. The first option is to consider the installation of a borehole for water abstraction to supply potable water to this development. The abstracted groundwater will be treated to WHO drinking water standards.

7.13. Subject to capacity of below ground water features the borehole could be designed to provide 100% capacity to the meet the demand of 43,010 l per day for the proposed development.

- 7.14. Borehole Licence application will be made to the Environment Agency (EA), in order to establish whether they may have any objections to the proposed borehole installation at the development site. Subject to comments from the EA a survey of water features will then be required.

STEP 4 - RAINWATER HARVESTING

- 7.15. As part of the application a drainage strategy has been developed for the management of surface water on the development. The proposed solution utilises a series of attenuation tanks, basins and swales for the management of surface water on the site. A copy of the drainage strategy layout is contained within Appendix A. The provision of these features will enable a significant amount of rainwater to be harvested.
- 7.16. The total impermeable area across the proposed development is 2.086ha and the annual average rainfall (SAAR) is 801mm.
- 7.17. The BS 16941-1 provide a methodology for calculating annual yield and non-potable water demand. It is proposed to use a 25% collection of rainwater harvesting.

$$Yr = A \times e \times SAAR \times n$$

Yr = 25% of annual rainwater yield (litres)

A - rainfall collection area (20,860m²)

SAAR - total annual rainfall (801mm)

e - surface yield coefficient (0.9)

n - hydraulic treatment efficiency (0.9)

$$Yr = 0.25 \times 20,860 \times 0.9 \times 801 \times 0.9 = 3,383,544 \text{ litres/year.}$$

- 7.18. The use of rainwater harvesting could provide circa 20% of the development water demand with the remaining provided via borehole abstraction. The rainwater will be treated to WHO drinking water standards.

STEP 5 - EXCESS GREYWATER RECYCLING

- 7.19. It is proposed that in addition to the greywater harvesting provided to each individual plot a greywater recycling system will also be implemented. The proposed Hydraloop system will recycle greywater on-site from the showers, bathrooms and taps and clean it to World Health Organisation drinking water

standards. The recycled water will be used for toilet flushing, laundry and aquifer recharge. Details of the proposed Hydraloop are contained within Appendix B.

7.20. The hydraloop provides a 6-step treatment process:

- Step 1 - Sedimentation: Sediment and grit removal.
- Step 2 - Flotation: Soap and hair skimmed off to foul sewer.
- Step 3 - Dissolved Air Floatation: For organic matter and suspended solids removal.
- Step 4 - Foam Fractionation: Detergent, soap, and shampoo removal.
- Step 5 - MBBR: Aerobic biological reactor treatment.
- Step 6 - UV-disinfection: UV disinfection of the water every 4 hours.

STEP 6 - WATER OFFSETTING- THEWATERBANK

7.21. Water Offsets Ltd www.wateroffsets.co.uk is a company providing environmental consultancy services as well as theWaterBank.

7.22. theWaterBank is a database that matches developers with existing property owners willing to offer their existing buildings for retrofits to achieve significant water reductions. More importantly these savings will need to be made within the same water resource zone inc which the development is proposed.

7.23. Offsetting is usually done by working in partnership with local organisations, housing associations, the council, businesses, churches and charities.

7.24. Typical Options for water offsetting schemes are as follows:

- All offset schemes will require a water efficiency audit and a detailed water efficiency retrofit design.
- The developer would then need to donate/pay a fee to a housing association to retrofit their homes or existing businesses.
- Offsetting by fixing leaks over and above planned work by water companies.
- Retrofitting school buildings or local hotels to improve water efficiency.
- Retrofitting water reuse schemes such as in public buildings or schools or private institutions like hotels in the area.
- Installing smart meters (above what was already planned by water companies) can also help encourage water saving behaviours and provide information on how much water is being used.

7.25. Subject the results of the borehole abstraction assessment and the requirement for further water reduction/offset the developer can elect to appoint theWaterBank to secure water offsetting credits. theWaterBank has secured local schools and local houses to participate in the provision of water offsetting credits by reducing consumption of water through the retrofitting of existing water fittings with more efficient water fittings and rainwater harvesting. theWaterBank will secure the water offsetting credits on its GIS database which will allocate a unique reference number associated to the development site and the schools providing the water credits. Once assigned to a site the water offsets credits cannot be transferred to another site and are secured via a S106 agreed with the Council.

SUMMARY OF PROPOSED WATER USE STRATEGY

- 7.26. The above demonstrates there are a range of strategies for achieving water neutrality on the development site. The first step is to reduce water use through water efficiency measures and then the next stage is to maximise water reuse through grey water harvesting and use of hydraloop to each plot.
- 7.27. The final water neutrality resolution will incorporate a combination of borehole installation, rainwater harvesting, greywater recycling and theWaterBank will be subject to the outcome of the borehole tests and ground water survey and consent of the requisite licence by the Environment Agency.
- 7.28. The site will benefit from swales, basins and attenuation storage as part of the development surface water drainage strategy. These will enhance the opportunity of achieving water neutrality through rainwater harvesting. The proposed installation of greywater recycling facilities throughout the development ensures that a very sustainable and holistic development is built at this location.

8. RECOMMENDATIONS & CONCLUSIONS

8.1. The development of the site to achieve Water Neutrality is feasible using a combination of solutions including:

- Maximising Water Efficiency to reduce demand
- Maximise Water Reuse through Hydroloops installed to each plot
- Maximise grey water harvesting with separate installation to each plot
- Utilise Borehole abstraction for water demand
- Utilise Water credits from offsetting through theWaterBank

8.2. The final solution will depend upon the capacity for the use of borehole abstraction which will need to be verified by surveys of below ground water features and subject to obtaining licences for abstraction from the Environment Agency.

8.3. The proposed water saving/reuse and offsetting strategies will be developed in tandem with the drainage strategy for the site to ensure an environmentally sustainable development.

APPENDIX A

PROPOSED DRAINAGE STRATEGY LAYOUT

NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SITE SURVEY, SURVEY PLANS AND ARCHITECTURAL DRAWINGS.
- THIS DRAWING SHOULD NOT BE SCALED. THERE SHALL BE NO DIMENSIONAL CHANGES IN REGARDS TO DIMENSIONS. ALL DIMENSIONS SHOULD BE CONFIRMED ON SITE.
- ANY DISCREPANCY ON THIS DRAWING SHOULD BE CLARIFIED IMMEDIATELY FOR THE CONTRACTOR.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL WORKS AND SAFETY OF THE WORKS.
- ASGAEA HAS PRODUCED THIS DRAWING BASED ON THE CLIENT'S INFORMATION. THE CONTRACTOR CANNOT ACCEPT RESPONSIBILITY FOR DISCREPANCIES RESULTING FROM NEW PLANS/ DRAWING IN LIGHT OF WEBER SITE INFORMATION AND SITE INVESTIGATIONS. UTILITIES SURVEYS AND IT IS THE RESPONSIBILITY OF THE PRINCIPLE CONTRACTOR TO MAKE THE DESIGNER AND CLIENT AWARE OF ANY DISCREPANCIES THAT MAY AFFECT THE DRAWING AND SPECIFICATION.

LEGEND

- PROPOSED SURFACE WATER DRAIN
- SURFACE WATER MANHOLE
- HYDROBRAKE MANHOLE
- GECELLULAR ATTENUATION TANK
- OPEN ATTENUATION FEATURE
- UGLY CABLE AND 3m BUFFER ZONE

CLIENT: ROYAL HASKONINGDHV

SITE: PHASE 1 - RICKMANS GREEN VILLAGE

DRAWING: SW DRAINAGE ARRANGMENT

DRAWING NUMBER: 552-D001_PH1

DATE: 29/09/2022

REV: A

DRAWN BY: A.J.B

DRAWING SCALE: NTS

PRELIMINARY DRAWING FOR PLANNING ONLY - NOT FOR CONSTRUCTION

aegea
Flood risk, water and environment



ALL LEVELS ARE TO METRES ABOVE ORDNANCE DATUM (AOD) UNLESS OTHERWISE SPECIFIED

DISCHARGE FROM SITE TO BE RESTRICTED TO PERMITTED FLOW RATES PRIOR TO DISCHARGE.

ATTENUATION STORAGE TO BE PROVIDED FOR UP TO 10% OF THE DESIGN FLOW RATE OF THE DESIGN STORM EVENT (PLUS 45% ALLOWANCE FOR CLIMATE CHANGE).

CITY AND DRAINAGE CONNECTIVITY SURVEY IS REQUIRED TO DETERMINE THE LEVEL AND CONDITION OF EXISTING DRAINAGE ENVIRONMENT INCLUDING OUTFALL LOCATIONS.

LONG TERM GROUNDWATER MONITORING IS RECOMMENDED TO DETERMINE THE MAXIMUM LIKELY GROUNDWATER LEVEL BELOW BASINS AND SWALES IF GROUNDWATER IS ENCOUNTERED AT A DEPTH OF 1M OR LESS BELOW THE BASE LEVEL OF THE SWALES. MONITORING SHOULD BE INSTALLED TO PREVENT GROUNDWATER INGRESS.

ANY NEW OUTFALL REQUIRES APPROVAL AND CONSENT TO DISCHARGE FROM LEAD LOCAL FLOOD AUTHORITY AND/OR LOCAL PLANNING AUTHORITY REQUIRED.

APPENDIX B

HYDRALOOP TECHNICAL DETAILS



Certified to
NSF/ANSI
Standard 350

FACT SHEET - Residential Water Recycling

With a Hydraloop system, you can recycle up to 95% of shower & bath water and optionally 50% of washing machine water – which enables you to reuse up to 85% of the total in-house domestic water. Due to its innovative and breakthrough technology, Hydraloop water is clean, clear, safe and certified and for toilet flushing, washing machine, garden irrigation and/or to top-up a swimming pool.

Hydraloop H300

H300	Input: Greywater from shower and bath Output: Two (2) valves for recycled water to the toilets and the washing machine Colour: Stone Front Plate: Stainless-steel front plate with white coloured logo and small status light
H300 Premium	Input: Greywater from shower and bath Output: Two (2) valves for recycled water to the toilets and the washing machine Choose from three colours: Dew, Chili and Stone Front Plate: Premium stainless-steel front plate with Hydraloop LED logo lights

Add-ons

Output Garden	One (1) extra valve for recycled water in the garden
Output Pool	One (1) extra valve for recycled water for the pool
Washing Machine Option	Option to recycle 50% of greywater from washing machine, including sanitary lift pump
Lift pumps *	DAB Novabox 30/300. This lift pump is submerged underneath the floor DAB Genix VT 030. This lift pump is on the floor

A lift pump is only necessary if the Hydraloop is positioned on the same floor or a storey higher as the shower/bathtub

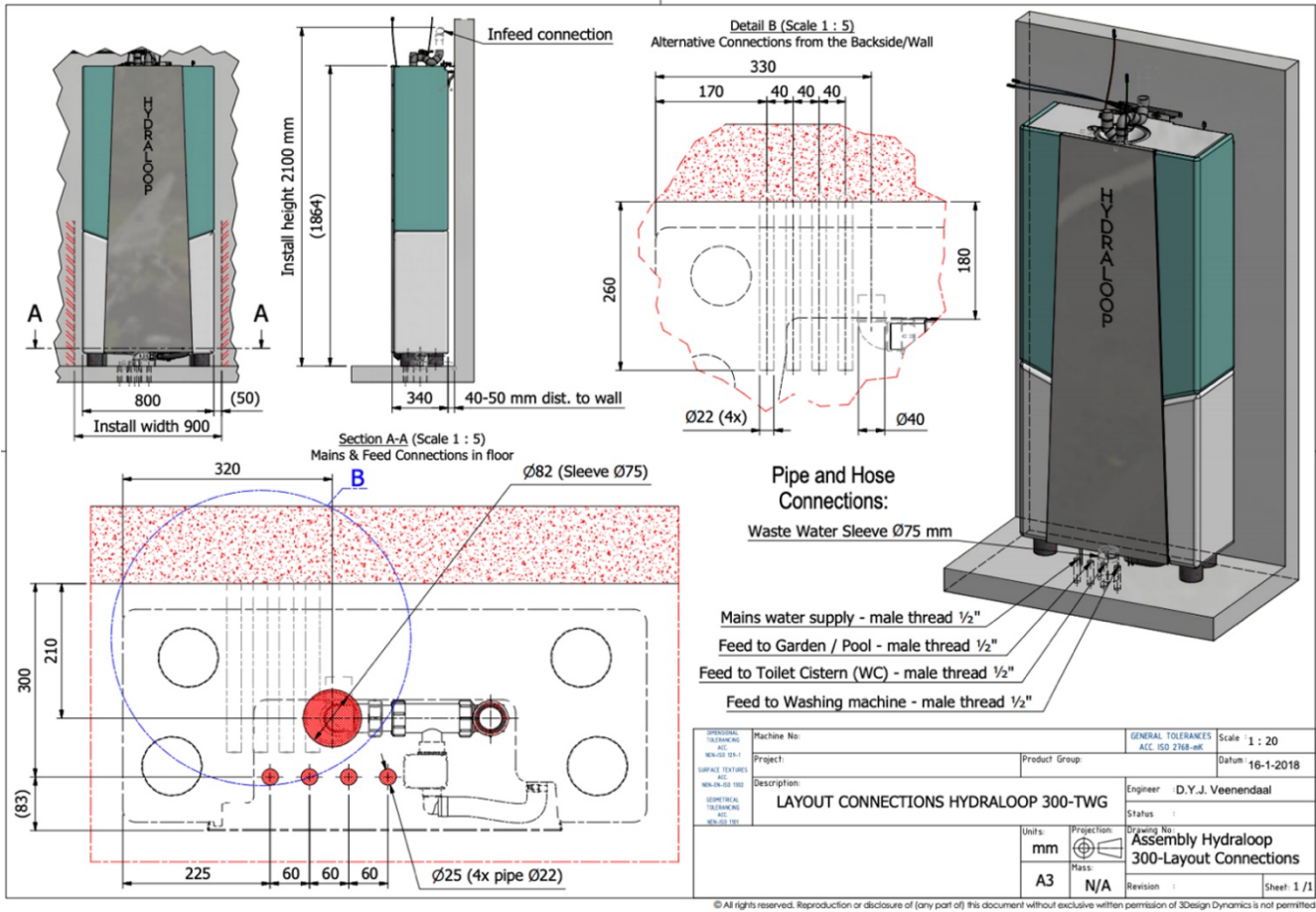
Hydraloop H300 Specifications

Volume	300 liters / 80 gallons
Cleaning capacity	530 liters / 140 gallons per day
Dimensions	80 cm wide, 34 cm deep, 187 cm high 31,5" wide, 13,4" deep, 74" high
Voltage	100/240 Volt, 24 Volt internal
Usage	20 watts during treatment. Average power consumption: 200kWh/year
WIFI	The Hydraloop unit needs to be connected with an internal WIFI-network
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.

LED Light Indications

White	Hydraloop provides recycled water.
Blue	Hydraloop provides mains water (until recycled water becomes available).
Purple	The washing machine mode is active.
Green	In self-cleaning mode.
Orange + two (2) short sound signals per minute	The UV disinfection lamp is not functioning properly.
Red + three (3) short sound signals/minute	The water distribution pump has switched itself off. Which might happen when water is leaking somewhere in-house.

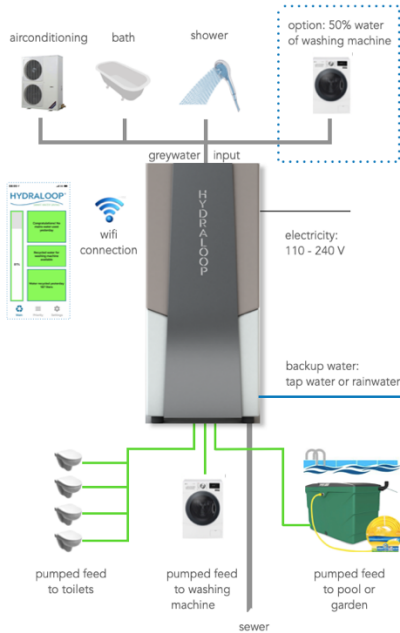
Sizes





Certified to NSF/ANSI Standard 350

Schematic overview



- Input from wastewater of bath & shower
- Output for toilet flushing, washing machine, garden irrigation and / or pool
- Wifi connected for Smartphone app, over the air updates and remote support
- 'Fit & Forget turnkey product
- No filters, membranes or chemicals
- Fully automatic, self-cleaning, low maintenance
- BREEAM and LEED certification points
- No compromise on hygiene and living comfort
- Contribute towards sustainable and off grid living



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 Hydraloo product was dosed daily with a greywater mix that contained raw wastewater, secondary effluent, body wash, shampoo, conditioner, soap, toothpaste, deodorant, bath cleaners, lactic acid, liquid handsoap, laundry detergent & softener, Na₂SO₄, NaHCO₃, Na₃PO₃ 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
Turbidity	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 Hydraloo 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

Safety certificate
K102335/01

Issued: 2020-01-21
Revision: 1 of 2
Page: 1 of 2

Water recycling system

STATEMENT BY KIWA
With this Safety certificate, issued in accordance with the Kiwa Regulations for Certification, Kiwa declares that legitimate confidence exists that the products supplied by

Hydraloo International B.V.

comply with the technical specifications as set down in this safety certificate and are marked with the Kiwa safety mark as specified in this safety certificate and, on delivery, relied upon to comply with Kiwa evaluation guidelines

BRL R1401101 "Aspects of technical water supply protection for appliances with a contamination risk" dated 2019-05-21,
wherein the requirements of

EN 1717: 2000 "Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow"

are applied for analyzing the risk of contamination by backflow and for selecting the appropriate backflow prevention unit(s).

Ronald Karel Kiwa
Ronald Karel
Kiwa

Publication of this certificate is allowed
Advice: consult www.kiwa.nl in order to ensure that this certificate is still valid

kiwa

CERTIFICATE

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