Hydraloop 204 (HCAA)

Andre Boerema
andre.boerema@sydneywater.com.au

March 2023

Sydney WATER

What is Hydraloop?

Hydraloop is a start-up based in Leeuwarden, The Netherlands

Hydraloop is also the range of products they produce.

They launched their Hydraloop product at CES 2020 where it won awards for sustainability and as a start-up.

NSW Health formally classified it as a Greywater Processing Unit in May 2021.

Sydney WATER

What can a Hydraloop do?

Hydraloop is very selective in what it attempts to do:

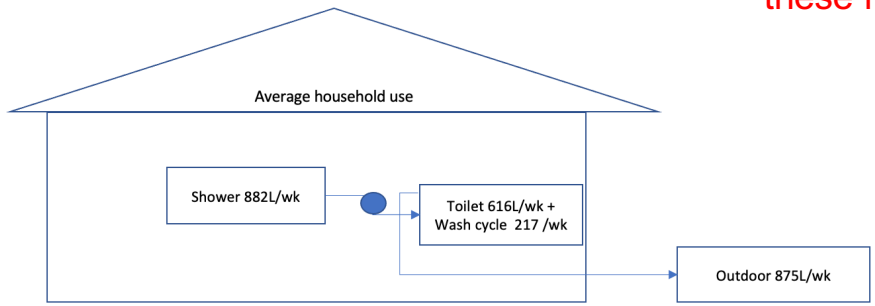
- It only accepts waste shower & bath water and washing machine *rinse* water
- It can theoretically supply treated water to:
  - toilets
  - *washing machine (wash cycle only)*
  - irrigation

In this scenario Hydraloop should be able to reduce ave. household demand between 31% and 48%

Or ~1ML / year for every 16 units installed

	Scenario	2			
	End use	Average household demand (L/wk)	Hydraloop Inflow	Hydraloop Outflow	
25%	Shower	882	Y	N	
6%	Washing machine wash	217	N	Y	
	Washing machine rinse	217	Y	N	
17%	Toilets	616	N	Y	
17%	Taps	616	N	N	
1%	Dishwasher	35	N	N	
2%	Leaks	76	N	N	
25%	Outdoor	875	N	Y	
	Processing water		N	N	
94%	Total	3534	1099	1708	L/wk
	Water Balance		**31%**	of demand can met by supply	

I'll come back to these figures later



On average. potential reduction in potable demand (depending on sequencing) ~31 %- 48%

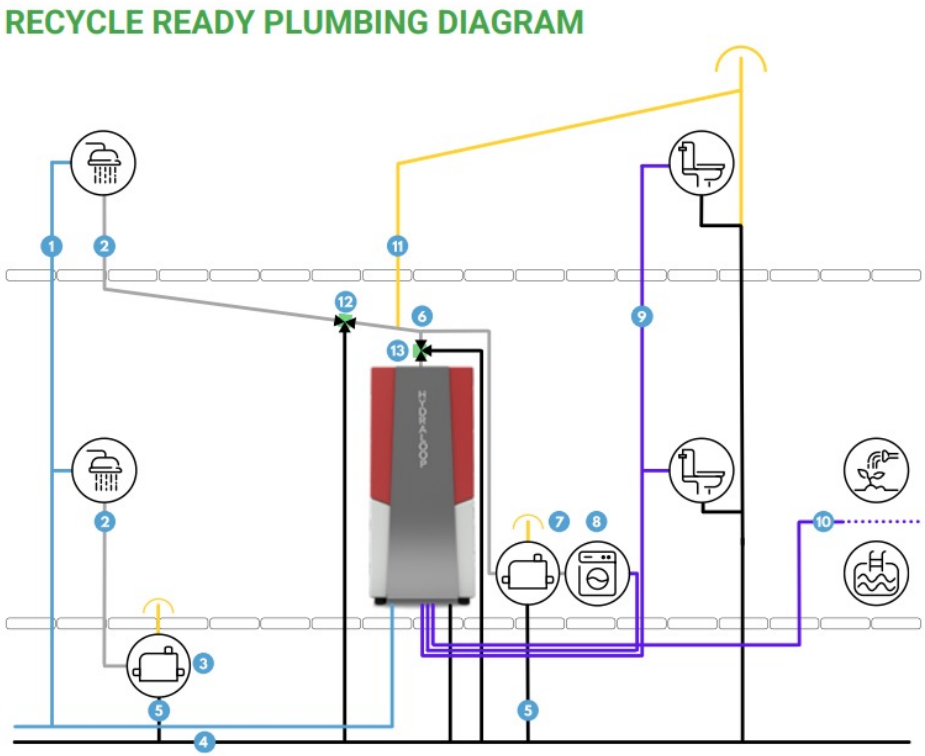
Note: Data from Sydney Water's End Use Study

The plumbing changes required by Hydraloop

Hydraloop only has the capability to treat wastewater from showers, baths, condensation and washing machine rinse water.

The plumbing configuration is not typical.

The inlet for flows into Hydraloop are ~2.2m above ground, pumped inflows may be common.



Sydney WATER

The quantity of savings come down to sequencing

The H300 has a total capacity of 300 Litres:

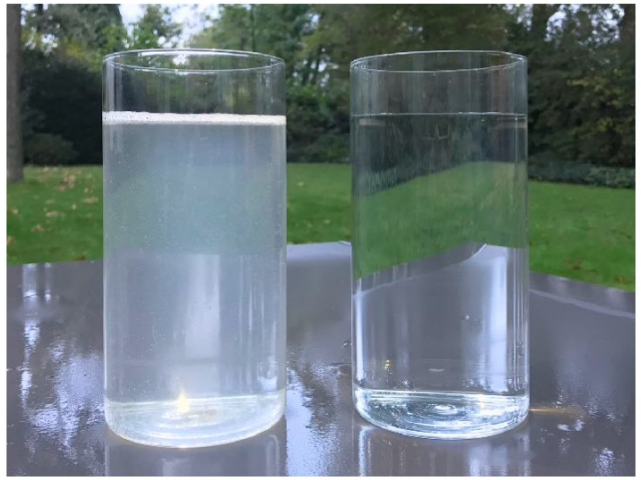
- 180 Litres in the treatment train with 1099L ave. weekly supply
- 120 litres available for discharge with 1708L ave. weekly (toilet, ½ wash & outdoor) demand

Over supply of treated wastewater on any day is potentially wasted.

So, daily sequencing of showering, washing and toilet usage will determine capacity utilisation.

It's not yet clear how the treated water can be safely stored externally to the Hydraloop? This could dramatically improve treatment capacity

Treated water meets stringent international quality standards for reuse as non potable water



BEFORE TREATMENT

AFTER TREATMENT

Sydney WATER

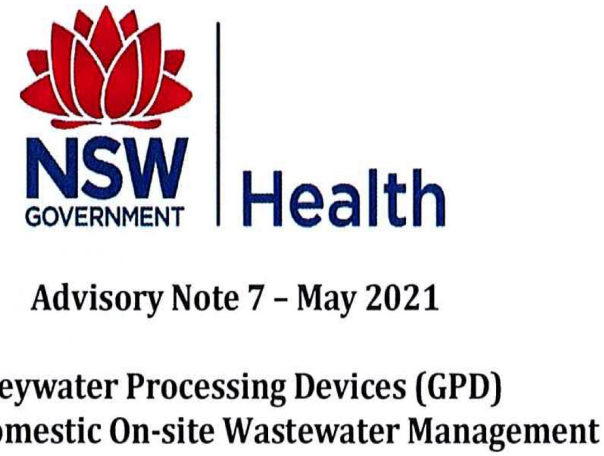
Hydraloop – the regulations - NSW Health

NSW Health created a new classification category for Hydraloop.

Greywater Processing Devices don't produce biosolids.

This distinction allows them to be regulated by Local Government (via s68 approval), rather than NSW Health.

https://www.health.nsw.gov.au/environment/domesticwastewater/Documents/adnote7.pdf



Sydney WATER

Hydraloop –Section 68 of the local government Act 1993

There's at least two aspects of S68 that result in Local Governments having a regulatory mandate for onsite greywater processing.

What types of activities generally require a section 68 approval?

The following types of activities generally require approval under section 68:

Temporary structures & places of public entertainment

- Install a manufactured home, moveable dwelling or associated structures.

Water supply, sewerage & stormwater work

- Carry out water supply work.
- Draw water from a Council water supply or a standpipe (including selling of the water).
- Install, alter, disconnect or remove a meter connected to a service pipe.
- Carry out sewerage work.
- Carry out stormwater drainage work.
- Connect a private drain or sewer with a Council controlled public drain or sewer.

Management of waste

- Transport waste over or under a public place.
- Put waste in a public place.
- Put a waste storage container in a public place.
- Dispose of waste into a Council sewer.
- Install, construct or alter a waste treatment device, or a human waste storage facility (such as a 'septic tank'), or, a drain connected to such a facility or device.
- Operate an on site sewage system (OSMS).

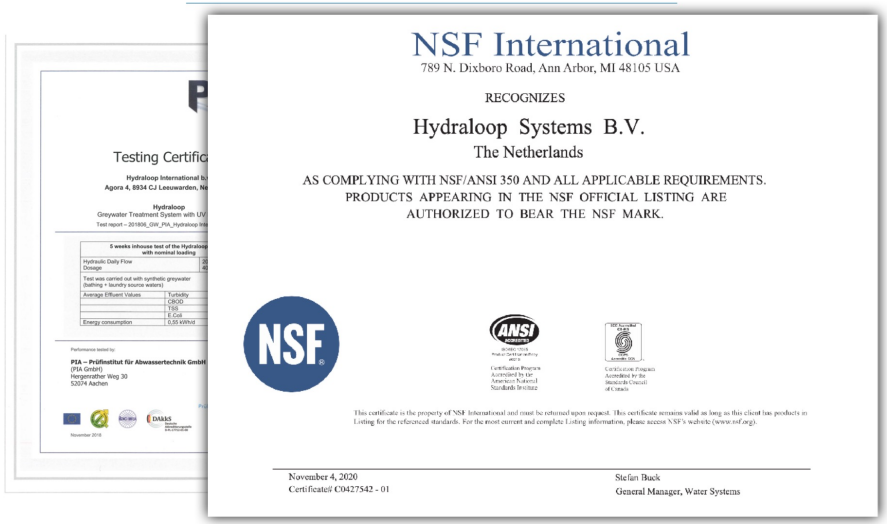
Sydney WATER

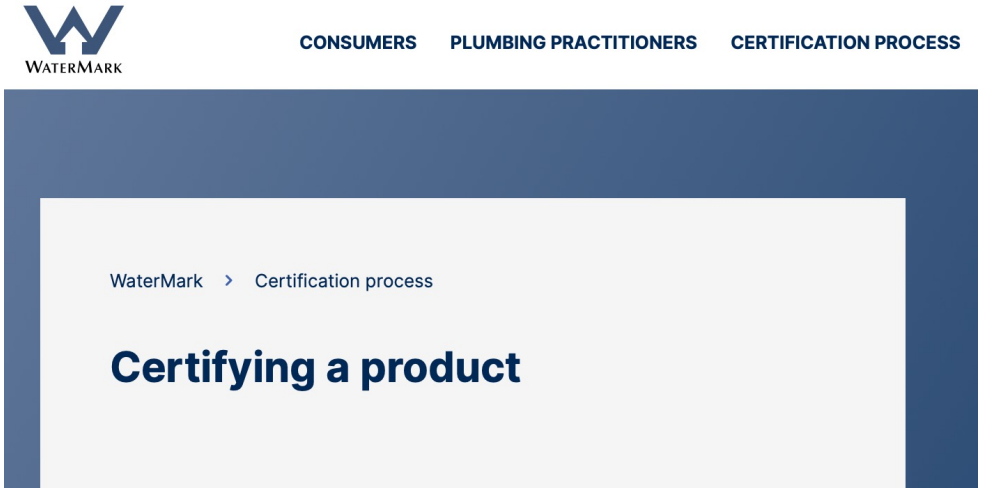
Hydraloop – the regulations – WaterMark + Aus. Construction and Building Code - ABCB

WaterMark certification is a prerequisite for plumbing products in Australia.

Aspects considered include backflow prevention, durability of materials (containment of wastewater), odour management and effluent water quality, failure modes and alarm systems.

Hydraloop has passed similar regulations in the US and EU, but there's no suitable category for testing under WaterMark yet, so an alternative approach is needed.





Thankfully, NSW Fair Trading provides a 'performance solutions' pathway for new technologies – hence the recent gazettal.

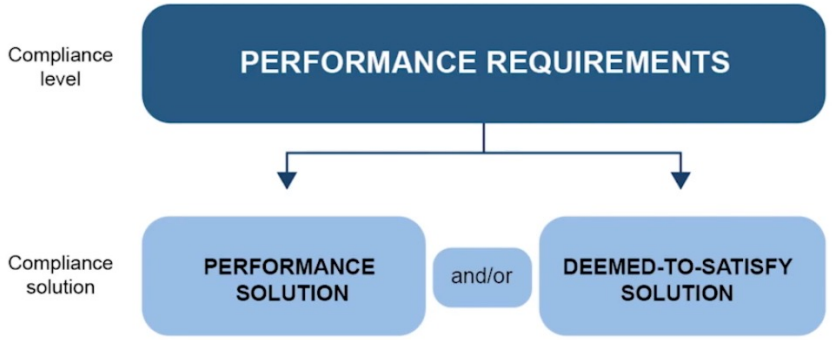
Performance Solutions – a way forward!

In a consumer market, Performance Solutions act like a short-term proxy for standards certification.

In Hydraloop's case, we can begin a trial with a gazetted performance solution but by the end of the trial Australian Consumer Law and local insurance requirements will require certified products unless Sydney Water is willing to accept some ongoing liability.

A WaterMark Technical Specification (WTS) presents a logical pathway to local certification in the longer term.

ABCB



(a) compliance with all relevant Performance Requirements; or
(b) the solution is at least equivalent to the Deemed-to-Satisfy (DTS) Provisions.

Sydney WATER

Our last regulatory hurdle was was cleared 4 November !

Government Gazette

of the State of

New South Wales

Number 519–Other
Friday, 4 November 2022

Plumbing and Drainage Act 2011

Order under section 20

I, Stephen Sharp , Manager Plumbing, Building Construction and Compliance , Better Regulation Division, Department of Customer Service as delegate under the Plumbing and Drainage Act 2011 (the Act):

(1) pursuant to sections 20(1) of the *Plumbing and Drainage Act 2011* by this Order, authorise the fittings described in Schedule 1 to be, on and from the date on which this Order is published in the *New South Wales Government Gazette*, authorised fittings to be used for plumbing and drainage work for the purposes of Section 8 of the *Plumbing and Drainage Act Act 2011*.

Signed this 3rd day of November 2022

Stephen Sharp
MANAGER PLUMBING
BUILDING CONSTRUCTION AND COMPLIANCE
BETTER REGULATION DIVISION
DEPARTMENT OF CUSTOMER SERIVCE

Attachments

- Schedule 1

16/3/23

Schedule 1

Authorised fittings to be used for plumbing and drainage

1. HYDRALOOP
A fitting that -

(a) is defined by NSW Health as a Greywater Processing Device (GPD)
(b) is manufactured in the Netherlands by Hydraloop BV; and
(c) recieves wastewater from a shower, bath and/or washing machine, and uses physical separtion, biological treatment, and disinfection with UV light to produce greywater suitable for household re-use;

Can be used for Plumbing and Drainage work under the following factors-

(a) only installed as part of a trial initiated by Sydney Water Corporation on the effects of water re-use and conservation, until the fitting meets the evidence of suitability outlined in Part A5 of the Plumbing Code of Australia; and
(b) the Sydney Water Corporation shall advise the plumbing regulator the address or addresses where the fitting is installed; and
(c) any pressurised greywater pipe work connected on the outlet of the fitting shall have a recycled water rough in type inspection arranged in accordance with s.13(1) of the Plumbing and Drainage Act 2011; and
(d) on the initial commissioning of the fitting a recycled water final inspection shall be arranged in accordance with s.13(1) of the Plumbing and Drainage Act 2011; and
(e) the fitting is installed in compliance with any requirements under Local Government Act 1993; and
(f) the fitting manufacturers installation instructions are adhered to including future servicing requirements: and
(g) any faults identified associated with the fitting that pose an imminent threat to public health are to be advised to the plumbing regulator in accordance with s. 11(2) of the Plumbing and Drainage Act 2011; and
(h) at the completion of the trial period determined by Sydney Water Corporation, should the fitting not meet the evidence of suitability outlined in Part A5 of the Plumbing Code of Australia, the fitting shall be disconnected and removed from use.

Hydraloop – the local utility regulations + AS3500

AS3500 says “where backflow prevention devices are provided as an integral part of a fixture and are appropriate for the cross-connection hazard generated by that fixture, no additional backflow prevention is required upstream of the point of connection to the water supply system.”

Current SW policy however requires dual testable backflow prevention (RPZD) devices to be installed at the meter.

This is because greywater treatment is classified at a medium Hazzard activity and uniquely in Sydney, that requires dual testable backflow prevention at ±$300 / year.

How might AS3500's backflow requirements be interpreted in your local area??

Sydney WATER

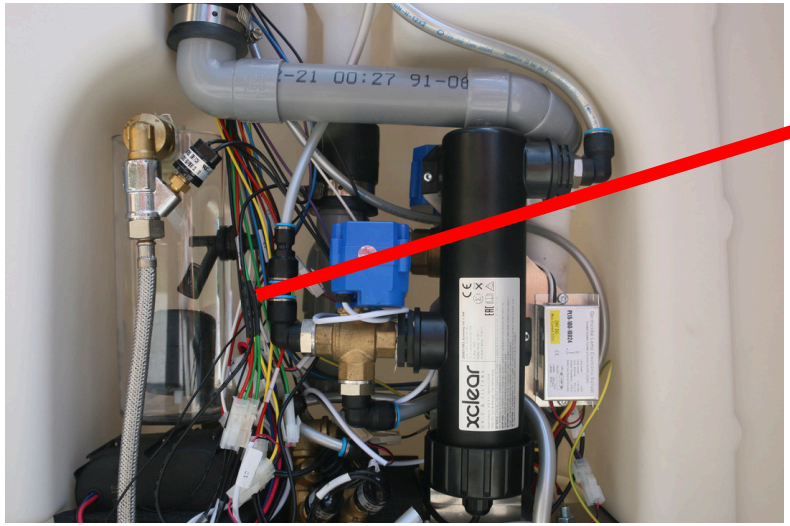
Hydraloop – the regulations: AS 2845.2

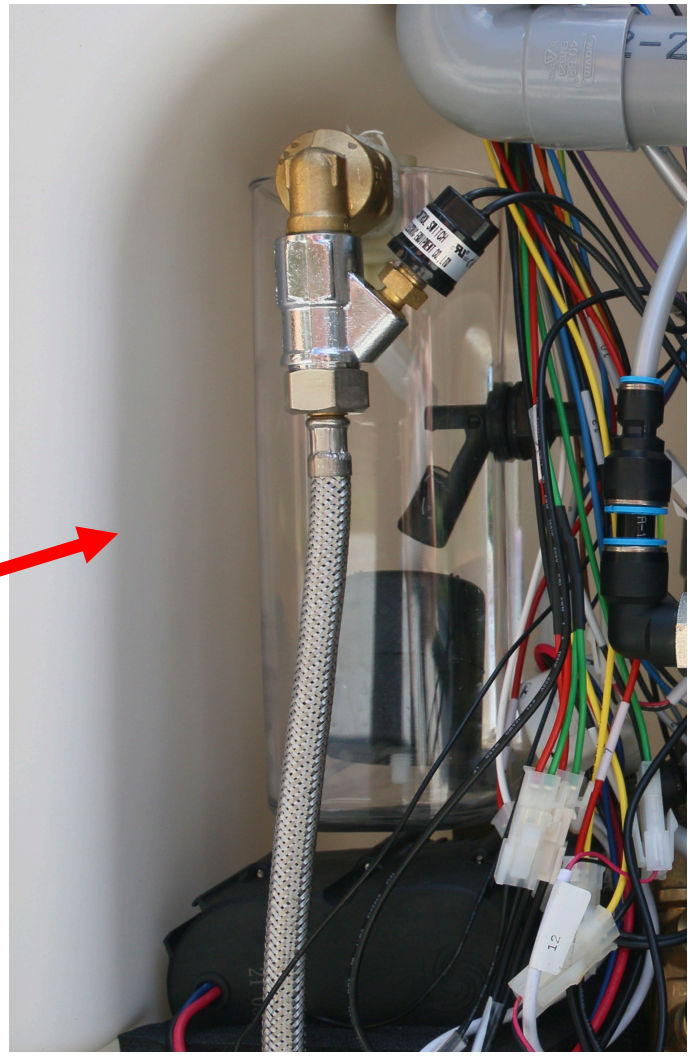
The Hydraloop system includes an integrated Air Gap backflow device that is compliant with the European equivalent to AS 2845.2; Backflow prevention devices Part 2: Registered air gaps.

The problem is the EU standard requires an airgap of 20mm

The Australian standard requires 40mm

The US standard requires 38.1mm





Sydney WATER

What's next?

Hydraloop have produced a draft ATS in July and with the support of a CAB, will submit it to the ABCB board.

Sydney Water and a number of stakeholders selected with support from Standards Australia will collaborate on the drafting process.

Trial installations are progressing.

But wait, there's always more hurdles to cross!

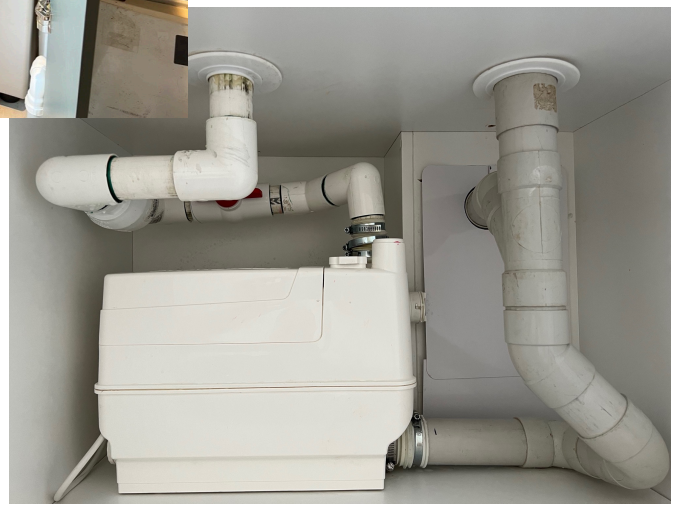
Plumbing requirements are atypical.

Shower waste is typically combined almost immediately below a bathroom floor.

Hydraloop requires only the shower wastewater.

This can make efficient retrofit opportunities a challenge.

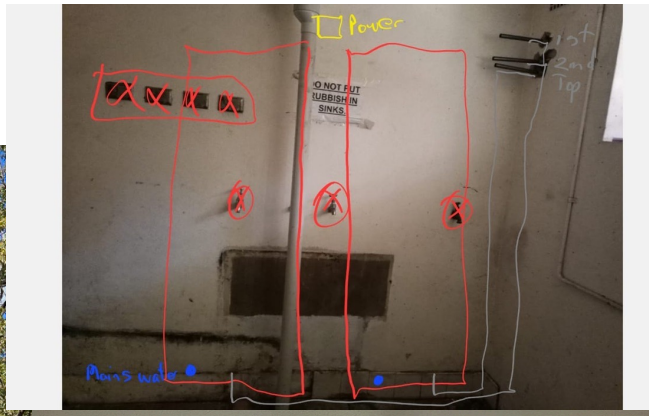
Council approvals are becoming our weakest link…



Installation experiences so far…

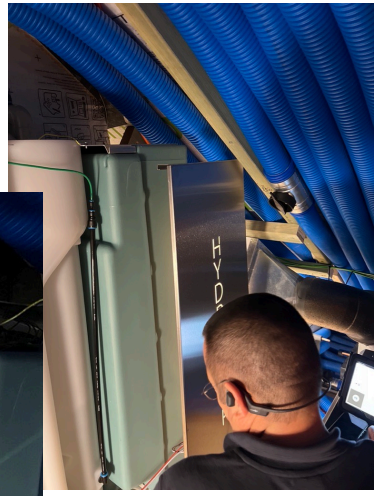
A social housing project in Glebe – 4 Hydraloops in two paired installations

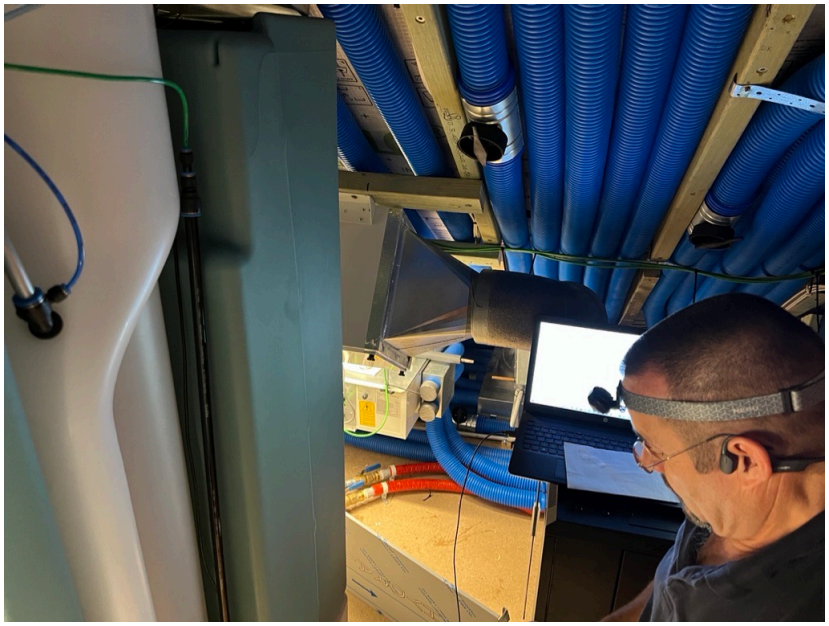
Servicing 15 studio apartments



Installation experiences so far...

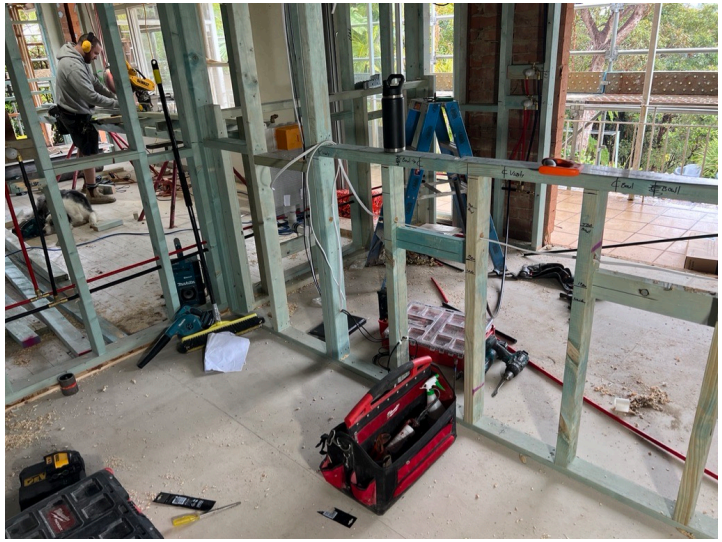
Queens Park





Installation experiences so far...

Major renovation - Willoughby



Operation and Maintenance

The treatment process:

6- steps:

1. Sedimentation
2. Floatation
3. Dissolved air floatation
4. Foam Fractionation
5. Aerobic bioreactor treatment
6. Stored water UV disinfection

Maintenance

- The unit is connected to the home wifi, so failures are sent as alerts to Hydraloop, the customer (via an app) and the installer.
- The unit uses its backup water supply and presurised air to self-clean and flush critical flow paths.
- In hard water areas citric acid is needed annually to flush the system.
- In Sydney only 2-yearly maintenance check is required.
- There are no filter nor chemical replacement needs.

Sydney WATER

Operation and Maintenance – Energy use

Thanks to the water quality test certificate we can see the unit used 0.55kWh/d over the 5-week test period.

5 weeks in house test of the Hydraloop system with nominal loading		
Hydraulic Daily Flow Dosage		200 L/d 40 L/dosage
Test was carried out with synthetic greywater (bathing + laundry source waters)		
Average Effluent Values	Turbidity	3 NTU
	CBOD	9 mg/L
	TSS	2 mg/L
	E.Coli	< 1 cfu/100mL
Energy consumption	0,55 kWh/d	

Extrapolated over a year this equates to 200kWh or around 11% of average NSW household energy use

Test conditions possibly mean more intensive usage than normal