

Brewery Waste



**Not all that they
produce goes out in
bottles.**



Breweries - a growing industry

- 218 breweries in NZ (NZ Brewer's Association Jan 2019)
- 6 breweries in the Hutt Valley with another 2 plus a distillery coming this year
- Producing approx. 4 million liters of beer per annum
- Range in size from 100 thousand up to 3 million liters per annum

For every



produced

On average, the equivalent of



Of liquid waste are produced

Brewing Process Steps

- Prepare the mash – malted grain, hops and water
- Remove the grain and sparge to recover sugars
- Boil up the mash to produce the wort
- Cool and remove the trub (spent hops and protein)
- Add yeast and sometimes more hops and ferment the wort
- Remove the spent yeast, filter and package off the beer

Waste from Wort Production

- Spent grain and hops
Most goes to stock feed but one case of it being used to make crackers



- Cooling water

Most breweries use glycol chillers and heat exchangers but smaller ones often use reticulated water for cooling

- Cleaning and sanitising

CIP usually high pH – up to 11

Sanitising low pH – down to 1

Fermentation Waste

- Spent yeast and hops

Yeast and other solids settle in the bottom of the fermentation tank and are drained off often to the floor and then washed off down the drain. Some capture and reuse the yeast.

- Cleaning and sanitising

- Filter aids

Packaging Waste

- Wash water
 - Rinsing bottles before filling
 - Washing and sanitising kegs
 - Cleaning and sanitising filling machines and rooms
 - Waste beer

Pretreatment - Advice from an expert

- “The best option is almost always to have someone else treat your wastewater for you – especially if they’ll do it for free.”
- “They may give you rules and limits as well as charge fees.”
- “They can often treat your waste cheaper than you can.”
- “Play nice with regulatory authorities.”

<https://brewerywastewater.com/brewery-wastewater-101/>

Pretreatment requirements

- Need to keep coarse solids out of the drains
 - Settle out and remove spent grain and hops
- Need to control pH of the discharge
 - Keep between pH 5 and 10?
- Need to minimise suspended solids
 - Spent yeast the biggest contributor
- Need to reduce COD getting to the drain
 - Spent yeast and waste beer

Current pretreatment in our patch

All separate out spent grain and hops.

Systems then include

- Small balancing tank/sump
 - pH can be an issue
- Larger settling/balancing tank/s
 - End up with a solids layer for disposal
- Large settling and balancing tanks with pH control
 - Even larger volumes of solids to dispose of.

Pretreatment improvements on the way

- Larger balance tank for smaller breweries to remove pH spikes
- Side streaming of highly concentrated waste such as spent yeast and secondary hops
- Glycol cooling to reduce waste water volumes especially in summer.

Waste Characteristics

Brewery	SS mg/kg			COD mg/kg			pH		
	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.
A	1,360	3,600	280	29,400	75,000	2,500	4.7	4.9	4.4
B	720	1,700	170	14,800	33,600	2,400	7.4	10	5.7
C	300	800	5	1,500	4,000	140	8.1	11	4
D	3,500	5,000	640	18,000	32,500	2,700	5.3	6.5	4.4

Annual Trade Waste Charges

		Annual Charges				
Brewery	Annual Waste M³	Volume - \$0.52 / M³	SS – \$1.00 / kg	COD – \$0.34 / kg	Total	\$ / M³
A	400	\$207	\$543	\$4,045	\$4,796	\$12
B	1,000	\$518	\$719	\$5,091	\$6,328	\$6
C	1,400	\$725	\$419	\$722	\$1,867	\$1
D	19,000	\$9,842	\$66,367	\$117,648	\$193,857	\$10

Thank you

- Questions?