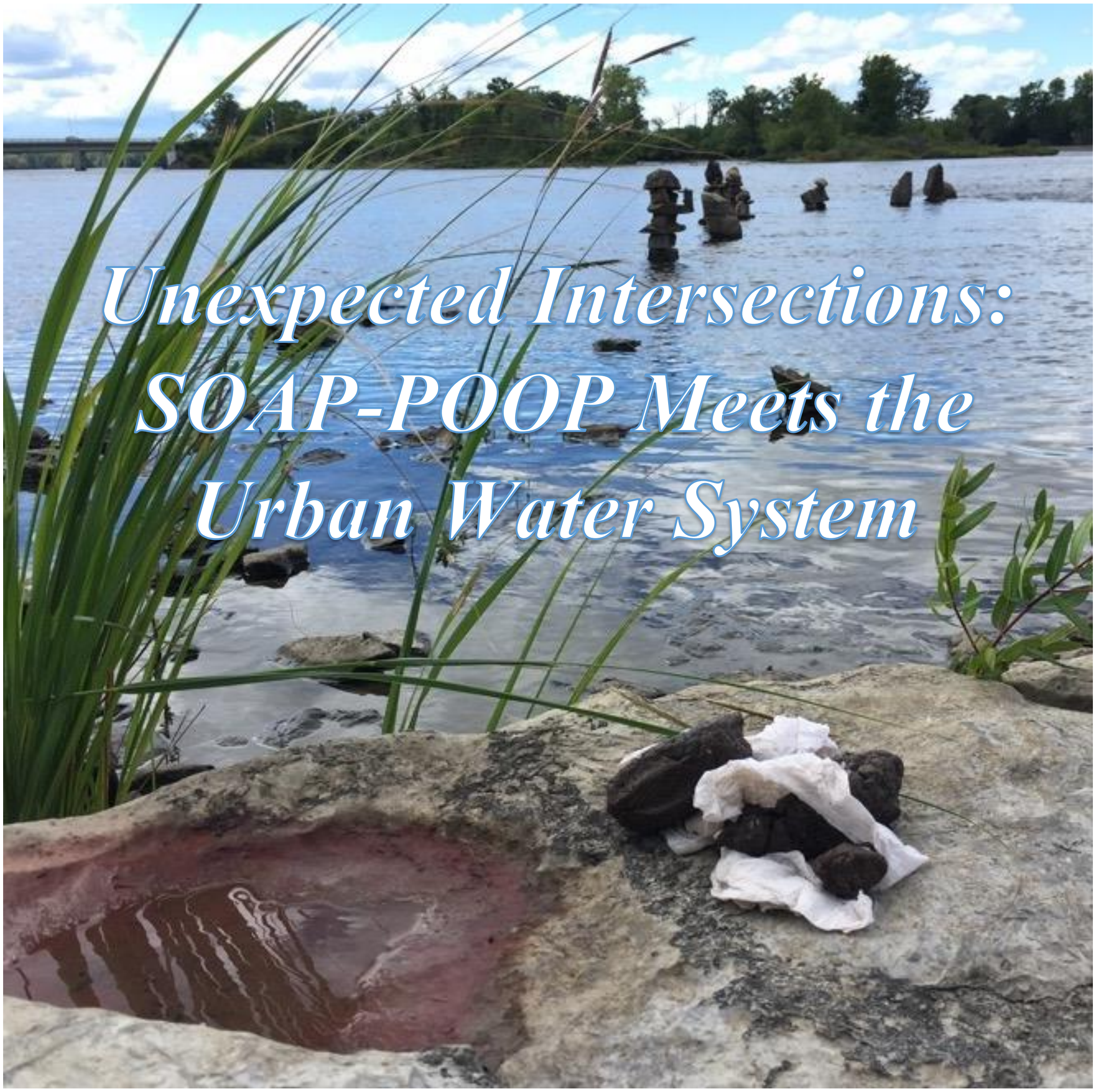

Unexpected Intersections: SOAP-POOP Meets the Urban Water System

A visual essay about soap, poop, the urban hydrologic system, COVID-19 and climate change, by Beth Shepherd

Part of *An Unexpected Intersection: Soap Meets Poop*,
a Culture Days Event organized by
The Unstuck Collective
September 26, 2020

Table of Contents

1.0 Unexpected Intersections: SOAP-POOP Meets the Urban Water System

1.1 Introduction

Living in Britannia by the Ottawa River, I often walk by the Britannia Water Filtration Plant where water from the Ottawa River enters the City of Ottawa's water supply. I remember going on a tour many years ago, learning how the water was purified and then pumped outward across the city. I think that the more-or-less invisible movement of water from the Ottawa River to our taps, then from our homes into some mysterious sewage system, and finally back to the river is miraculous.

At a meeting held this summer in my backyard beside Lac Deschênes, Maria Gomez Umana told a group of RIA artists about her initiative to reduce her plastic consumption by making some everyday consumer products that come in plastic, such as soap and toothpaste. She explored traditional ways of making soap but she was not overly pleased with the results since her initial cakes of soap looked rather turd-like. She then proceeded to add some natural ingredients such as coffee grounds, and indeed, the result did look like pooh. Her hopes to exhibit her scatological art were stymied by COVID-19 closures, but Maria nonetheless hoped to continue exploring the relationship between soap and poop in a collaborative setting. Group consensus at the meeting was that faeces art had run its course and there were no takers at the time. (See the note on scatological art in the next section.)

The subject of soap-poop slipped away into my subconscious where it remained…until my husband was trying to fix a toilet that was not flushing properly. Remembering Maria's pooh project, I envisioned taking some photographs of soap-poop along the Ottawa urban water system — Ironic, thought-provoking eco-art? Amusing toity humour? Whatever it turned out to be, it certainly could be an opportunity to collaborate. As well, soap-poop could easily fit within the scope of my current project on local urban ecology, COVID-19 and climate change.

After agreeing to proceed in a collaborative venture for Ottawa's Culture Days under the curatorial guidance of the Unstuck Collective's Petra Halkes, artists Maria Gomez Umana, Rene Price and myself began preparing for *An Unexpected Intersection: Soap Meets Poop*. Although the performative, installation-based event would be held outdoors and operate under COVID guidelines, Petra wanted to foster conversation with audiences in a comfortable living-room setting. It would also have to meet all the City's guidelines for COVID-safe events. I decided to contribute a "coffee table book" exploring the intersections of soap-poop and the Ottawa urban water systems with COVID-19 and climate change. In the end I produced three copies of the coffee table book — a plastic binder containing an earlier version of this essay and a catalogue of my images, with all pages encased in plastic page protectors. The idea was that after guests flipped through the coffee table book, I would wipe each page with a disinfectant and towel preparing it for the next user. The constant wiping of the pages was the "performance" part of my display.

I realized an irony that a project with its roots in an ideal to reduce consumer plastic had resulted in an exhibition that was full of plastic — from the table covering, binders, plastic page protectors, to a laminated poster and plastic sign holders — to make it COVID-19 friendly.

The scope of my project — "SOAP-POOP Meets the Urban Water System" — is local and human. I investigate how the urban water system intersects with the hydrological cycle, especially the movement of water from the Ottawa River to and from humans and back to the river further downstream.

My first step was to make some replica soap-poop, which I did using old soap, some wax and ends of old acrylic paint tubes — definitely not natural like Maria's homemade pooh but at least it smelled really nice. I formed my concoction in a number of shapes à la mode of some other contemporary scatological art discussed below but in miniature (see Plate 1).

On three separate trips — to the Britannia Water Filtration Plant, the Lemieux Island Water Filtration Plant and the Robert O. Pickard Environmental Centre, where wastewater is managed — I took a total of over a hundred photographs, most of which had my soap-poop entwined in the same piece of environmentally-friendly toilet paper. I edited these down to the collection of images in this catalogue.

Being interested in cartographic art, I used Google Earth to prepare some aerial views of the Ottawa River onto which I inset close-up aerial views of the three facilities.

I think the whole team is fascinated by infrastructure that supports the urban water systems. I decided to develop a simple maze puzzle to focus attention on the challenges of distributing fresh water to every home and then routing wastewater and sewage away for treatment.

Plate 1: Beth Shepherd, *SOAP-POOP: Scatological Sculptures*
Soap (oils, lye, fragrance), beeswax, acrylic paint

1.2 History of Scatological Art

Scatological art in the form of images, sculptures and performances of defecation and faeces was present in early modern art but took off after the 1960s. Perhaps the best known is Piero Manzoni's *Artist's Shit*, 1962 (Figure 1b, 90 tin cans with 30 grams of the artist's excrement). Manzoni was demonstrating that art was anything labelled as art by an artist, a premise advanced by Marcel Duchamp with his *Fountain*, 1917 (Figure 1a, a readymade porcelain urinal signed "R. Mutt"). Both are challenging the meaning and institutions of art, a theme common in Modernist art.

Figure 1a: Marcel Duchamp, *Fountain*, 1917 Figure 1b: Piero Manzoni's *Artist's Shit*, 1962

Postmodernism brought a new sense of materiality into visual art and has led to an increase in the use of faeces or the shit motif in art. Use of human excrement as a material or subject gives a sense of the perverse although meanings are as varied as abjection and disgust, sexual fetishism, toity or political humour, protest, counter-consumerism, etc.

Scatological art has always given rise to controversy. *Scatalogue 30 Years of Crap in Contemporary Art*, held in Ottawa at the Saw Gallery in 2003, faced typical outrage about the misuse of government funding in presenting such a show. (1)

Some more recent examples of scatological include Paul McCarthy's *Complex Shit*, 2008 (Figure 1c, large inflatable turds) or Geletin's large sculptures called VORM-FELLOWS-ATTITUDE," 2018 (Figure 1d). This art may be more about spectacle and a tongue-in-cheek exhibitions for "ALL WHO THINK THAT CONTEMPORARY ART IS SHIT" ((https://www.gelitin.net/projects/Vorm-Fellows-Attitude/).

	
Figure 1c: Paul McCarthy’s *Complex Shit*, 2008	Figure 1d: Geletin’s VORM-FELLOWS-ATTITUDE,” 2018

The rationale and meaning of excremental art is changing. According to the well-researched article by Jojada Verrips, of the University of Amsterdam, its use is expanding as a metaphor for the era of Neo-capitalism, which has brought about the horrific transformation of resources and consumer goods into waste that is despoiling the Earth. (1)

In the case of Soap-Poop, its meaning is in the eye of the beholder. We just hope it will catch audience attention and spark enriching dialogue.

1.3 Soap, Poop and Disease

Living in the midst of a pandemic, we have become obsessed with the invisible microbes that make us so sick. Soap-poop helps us visualize something invisible that needs to be managed to prevent disease. Handwashing with old-fashioned soap and water is *de rigueur*.

The Novel Coronavirus (Figure 2a, SARS-CoV-2) is the pathogen causing the current COVID-19 pandemic. According to public health officials, handwashing with soap and water is deemed to be one of the most effective methods of disease prevention, along with mask-wearing and physical distancing.

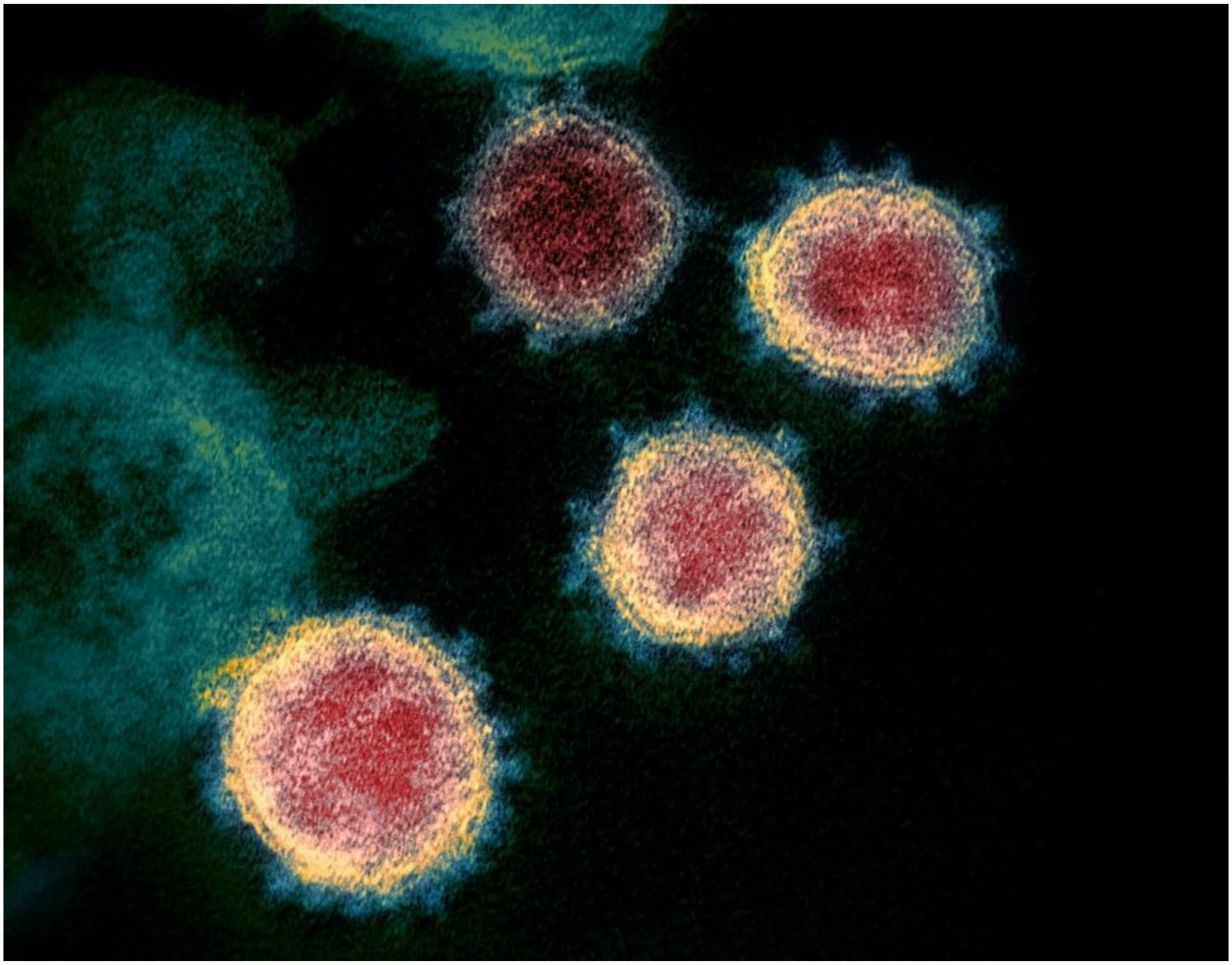

Figure 2a: Electron microscope image of SARS-CoV-2. National Institute of Health, March 6, 2020, https://scitechdaily.com/targets-for-vaccines-and-treatments-revealed-by-novel-coronavirus-structure/.

In the good-old-days (last year), poop would have epitomized the carrier of disease. *Escherichia coli* are a bacteria commonly found in the lower intestine of warm-blooded organisms which are expelled in great quantity into the environment in fecal matter (Figure 2b).


Figure 2b: *E. coli* using their flagella to swim, *Science News*, https://www.sciencenews.org/article/swimming-bacteria-remove-resistance-flow

Most strains *E. coli* are harmless — in fact, they contribute to a healthy gut microbiome — but some can cause serious illness. Recall the deaths in Walkerton, Ontario in the spring of 2000 when heavy rains caused E. *coli* from manure spread on nearby fields to enter an aquifer supplying the township's drinking water. (2)

In fact, unfit drinking water is still a major cause of disease in addition to COVID, in Canada and in many parts of the world, but that would be another conversation.

1.4 Soap, Poop and Climate Change

Water purification requires considerable energy. Methane gas produced in breaking down fecal matter is a very potent greenhouse gas. Although the focus of this project is human and local, many people still consume animal food products and intensive animal agriculture is a major factor in climate change. One large concentrated animal feeding operation, either a factory farm or a feedlot, can produce more fecal waste than a city of 1.5 million people, and although sewage treatment is required for human waste, there is no such requirement for animal waste. Animal food production also requires a tremendous amount of fresh water. (3)

Mishka Henner's image below was made by stitching together screenshots from Google Earth of a manure lagoon near Dalhart, Texas. The black dots in the rectilinear pens are cattle.

Figure 3: Mishka Henner, *Coronado Feeders*, *Dalhart*, *Texas* (detail), 2012
Archival pigment print, 102x122cm / 150x180cm
Mishkahenner.com/feedlots/

2.0 Ottawa's Urban Water System

Ottawa was built as a lumbering town and in early days the river was filled with logs and polluted by pulp and paper effluent. Much of the industry is gone but rural communities are responsible for the run-off of agricultural waste and urban areas are the source of pollutants in stormwater runoff and sewage overflows.

A river is a lotic (flowing) ecosystem that includes biotic and abiotic components that interact. The ecosystem is affected by many things but especially the inflows into the river, like run-off which can bring pollutants and sewage contamination. Extreme weather events, flooding, changing snowmelt patterns, deforestation, hard surfaces that come with urban development, and loss of wetlands are among factors that impact the river ecosystem. These effects can be offset by "green infrastructure," from the use of rain barrels to extensive catch-basins, which capture water and enables it to percolate into the ground. Phytotechnology also includes constructed wetlands, berms and tree barriers. (5) Keeping the Ottawa River watershed healthy is important for ensuring clean water now and well into the future.

Ottawa residents are fortunate to have an abundant fresh water source in the form of the Ottawa River and should strive to protect its health.

2.1 The Ottawa River Watershed

The Ottawa River has its source in Lac des Outaouais outside La Vérendrye Wildlife Refuge, 250 kilometers north of Ottawa. The stream grows larger as it flows through lakes and reservoirs on its way into Lake Temiskaming. It flows past the dam at Arnprior to Ottawa into Lac Deschenes and past the Britannia Water Filtration Plant. About ten kilometers down river is the Lemieux Island Water Filtration Plant. The river continues past the Chaudière Falls and the Parliament Buildings, where the Rideau River and then the Gatineau River, converge with the Ottawa. Further downstream is the Robert O. Pickard Environmental Centre where treated wastewater is returned to the Ottawa River. Past Hawkesbury the Ottawa River leaves Ontario on its way Montreal, where it joins the St. Lawrence River.

From source to mouth, the Ottawa River is 1,271 kilometers long. Many rivers and streams drain into the Ottawa along its way to the St Lawrence. The Ottawa watershed, or drainage basin, is 146,300 square kilometers, that is, twice the size of New Brunswick and larger than England. Climate change is affecting water flows throughout the watershed. Increased snowfall amounts and altered melting times in the northern watershed is affecting water levels and more frequent and extreme rainstorms throughout can result in more frequent flooding events. (4)

The Ottawa River is highly regulated with over fifty major dams and hydroelectric generating stations and thirteen principal reservoirs in the watershed. Despite the presence of regulatory personnel, the Ottawa Riverkeeper expresses concern that there is no single source of water quality data. (4) The map in Figure 4 shows the dams in the watershed — the dark blue outline shows the limits of the watershed; a red triangle shows the presence of a dam.

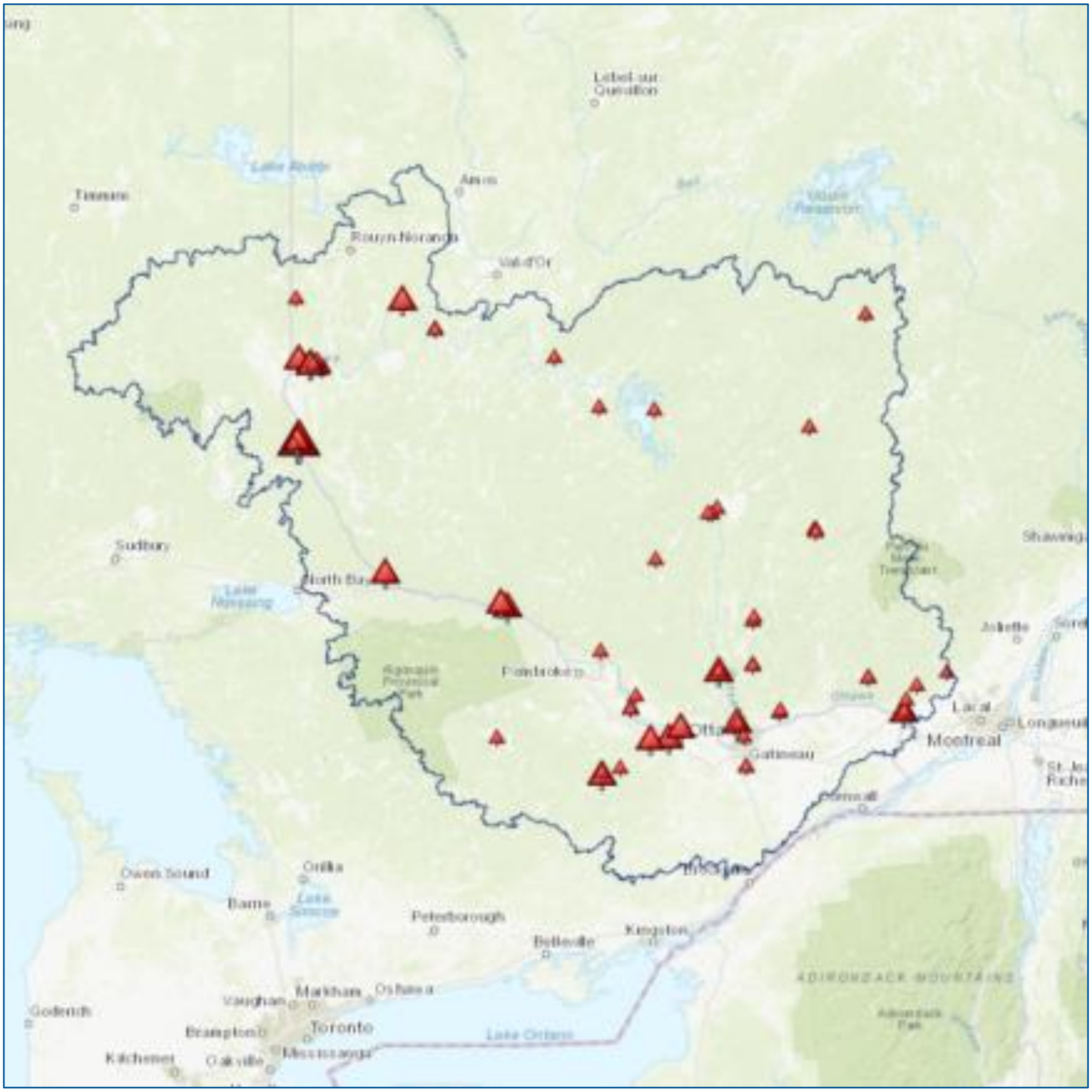

Figure 4: Dams in the Ottawa River Watershed, The Ottawa Riverkeeper Website, https://ork-so.maps.arcgis.com/apps/Embed/index.html?webmap=d356b80ad8b347efa83c95a50d9e7acb&extent=-75.9691,45.1545,-74.9549,45.5987&zoom=true&scale=true&disable_scroll=true&theme=light

2.2 The Hydrologic Cycle

The hydrologic cycle is the continuous circulation of water through various states to and from the Earth's hydrosphere, atmosphere, lithosphere, and biosphere, or more simply put, as illustrated in Figure 5, the evaporation of water from the Earth's surface, the transport of water vapour in the atmosphere from one place to another, and its eventual return to the surface in some form of precipitation. A combination of meteorologic, physiographic, biologic, human and technological factors affect the cycle in any region. (5)

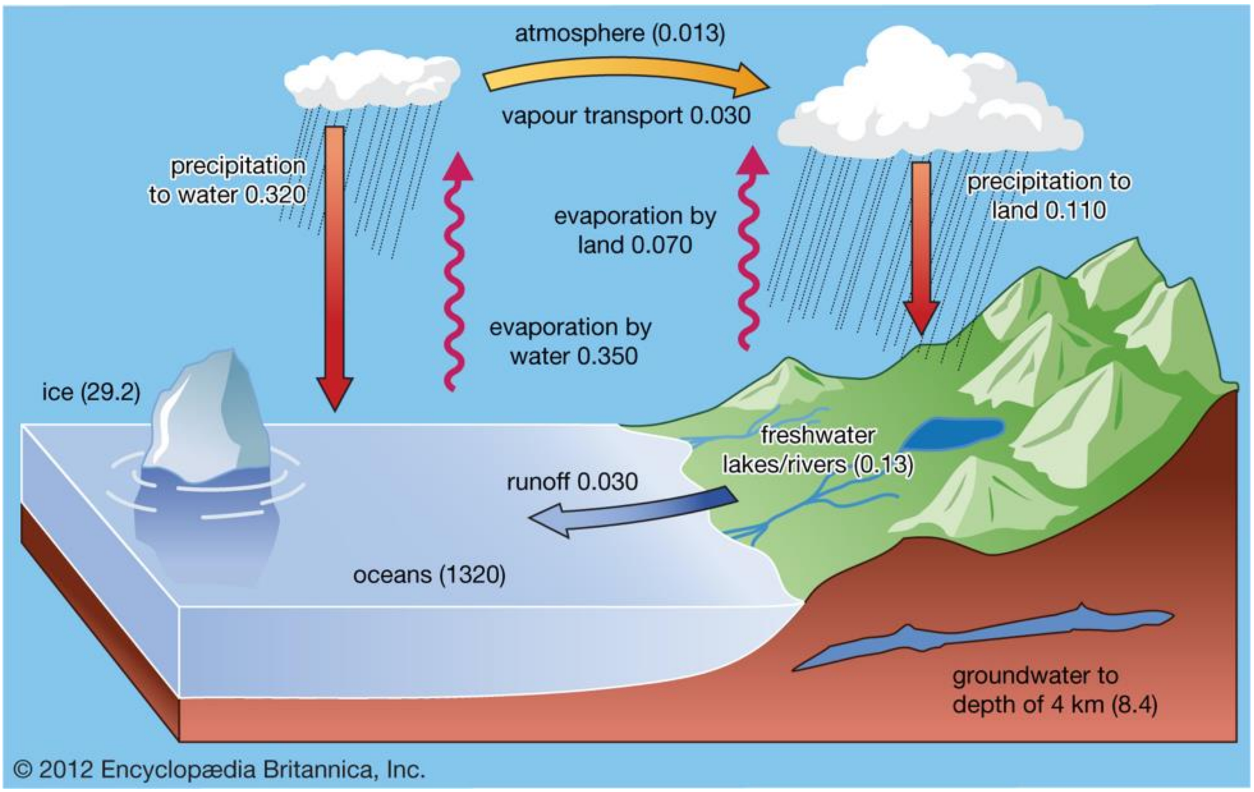

Figure 5: The Hydrologic Cycle, *Encyclopaedia Britannica*, 2012
https://media1.britannica.com/eb-media/73/1473-004-BA08FF0A.jpg

As the climate warms the hydrologic cycle speeds up as more water evaporates faster. This acceleration is a factor in changing climatic patterns where wet regions become wetter and dry regions become drier, as well as contributing to extreme weather events. (5)

Many countries and communities are already facing the devastating effects of flooding resulting from rising sea levels and extreme weather in the form of hurricanes and cyclones. Other regions are experiencing extended droughts and destructive wildfires. In northern regions, melting permafrost and diminished sea ice are changing the lives of humans, animals and plants as well as adding more greenhouse gases into the overheating environment.

All around the world we are all experiencing changing climatic patterns and more extreme weather events. These are increasingly causing loss of life and property, destruction of environments and habitats, food shortages, and a growing number of climate refugees.

Ottawa is fortunate in being well above sea level — the elevation of the river near Britannia is about 55 m above sea level, dropping to 40 m near the Robert O. Pickard Environmental Centre further east. (6) Nevertheless Ottawa, Gatineau and other urban centres in the regions have been experiencing floods in increasing frequency caused by changing snowfall and melt patterns in the upper watershed and more extreme weather in the form of heat and violent storms.

Ottawa is undertaking many stormwater management initiatives to protect the Ottawa River as well as constructing flood mitigation infrastructure to protect communities from an increased likelihood of flooding brought about by climate change. (For examples, refer to "Ottawa River Action Plan," City of Ottawa, https://ottawa.ca/en/living-ottawa/environment-conservation-and-climate/protecting-ottawas-waterways/ottawa-river-action-plan#projects-and-status-updates, and "Britannia Village Flood Control Project," Rideau Valley Conservation Authority, https://www.rvca.ca/britannia-village-flood-control-project.)

2.3 A Cartographic View of the Ottawa Urban Hydrologic System

In carrying out this project I was struck how all three sites of interest are not only located along the Ottawa River but also near the trans-Canada bike path. Walkers and bikers see attractive public information maps to help position them vis-à-vis the path, other routes, and nearby sites of interest. I thought about how important maps are in our everyday lives, helping us situate ourselves and move about in our environment.

While maps are useful to everybody by providing a grid for navigating and locating things and places — resources, property, navigation routes, government jurisdictions, strategic targets, etc. — they have been and remain extremely potent colonial and neo-colonial instruments of power and control. Borders, which are the manifestation of the lines on maps, are used to control the flow of climate refugees and to restrict the flow of people during the pandemic. Maps are also used for visualizing comparative place-based information, such as monitoring the hot spots of COVID-19.

I used Google Earth and Photoshop to create the composite map called the *Ottawa Urban Hydrologic System*. It locates the three facilities of interest along the Ottawa River (Plate 2).

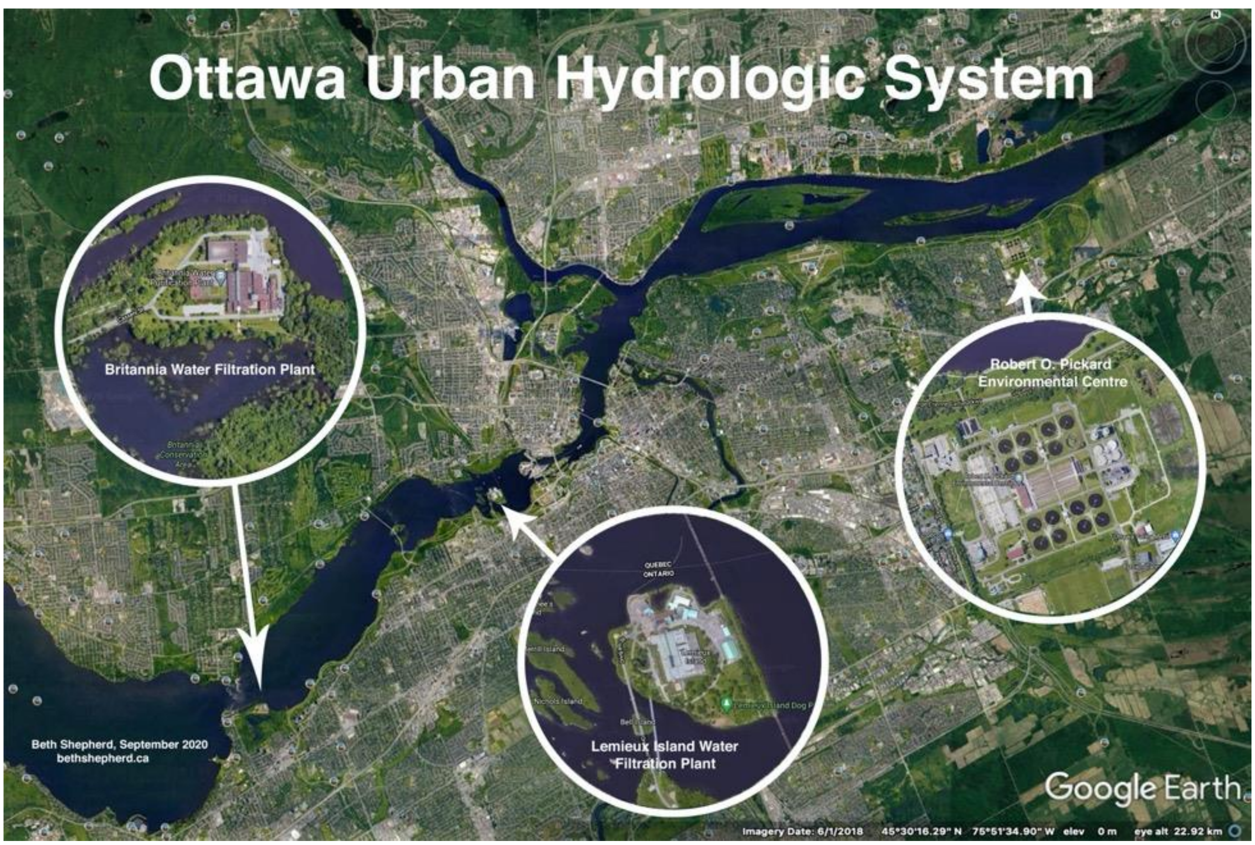

Plate 2: Beth Shepherd, *Ottawa Urban Hydrologic System*
Composite rendition of screenshots of Google Earth
24 X 36 inches, ink on paper encased in plastic

2.4 Stormwater

Storm sewers carry rainfall and other surface runoff directly to the nearest creek, stream or river, where it is discharged with limited or no treatment at outfalls (points of discharge). Ottawa's stormwater system includes:

- More than 2,700 kilometers of storm sewers
- More than 300 stormwater management facilities, including 133 wet ponds, 100 dry ponds, 12 stormwater pumping stations, underground storage, bioswales, and oil-grit separators, perforated pipes, etc.
- 1,200 kilometers of municipal drains in rural areas.

The variations in precipitation and extreme weather events have had their effects on the urban water systems especially through stormwater runoff flowing into the river. Runoff contributes chemical, biological and sediment pollution.

There are 13 locations in Ottawa where combined stormwater and sewer overflows (CSOs) may enter the river, including Ladouceur and Merton CSO outfalls. The three combined stormwater and sewer overflow sites that contribute the largest volumes are: Rideau Regulator Overflow, Booth Regulator Overflow, and Keefer Regulator Overflow. (7)

2.5 Safety of Water Used for Recreation

As well as a source of drinking water and egress for treated wastewater, the Ottawa River is a great recreational natural resource for all sorts of water sports including swimming, boating and various board sports. Although people swim in bodies of water throughout the region, Ottawa's public beaches are:

- Britannia Beach
- Westboro Beach
- Mooney's Bay Beach
- Petrie Island Beach.

Although Ottawa is fortunate to have relatively unpolluted sources of water in the Ottawa and Rideau Rivers, untreated water used for swimming and similar water sports can lead to infections. Naturally occurring bacteria, viruses and microscopic parasites are always present in surface water, but can become elevated from wildlife and birds, rainfall and stormwater runoff, human activity, and from time to time, sewer overflows. Excessive contamination can lead to skin, ear, eye, nose, throat, and gastrointestinal infections. The quality of water at Ottawa's beaches is monitored by testing for *E. coli* bacteria, an indicator of overall water safety. The City's public health services advises showers after swimming and handwashing with soap after playing in the sand. Beaches do not cause additional COVID-19 risks beyond the need for physical distancing and handwashing. (8)

Note: Ottawa's stormwater management system and water used for recreations are excluded from the current phase of the project.

3.0 Ottawa's Water Purification and Distribution System

Ottawa claims to have "some of the world's safest and highest quality drinking water." (9) It conducts 100,000 tests each year to make sure tap water remains that way. Ongoing research is carried out to improve water quality and processes at the Britannia facility.

The City of Ottawa distributes water to approximately 900,000 residential, commercial and industrial customers. (9) The delivery infrastructure consists of:

- More than 3,000 kilometres of water mains
- 32 pumping stations to maintain water pressure
- 14 reservoirs
- More than 23,000 hydrants
- More than 48,000 valves.

Note: Groundwater well systems in rural areas are outside the scope of the current project.

3.1 The Water Purification Process

The City of Ottawa operates two water purification plants with one at Britannia (opened in 1961), and the other on Lemieux Island (opened in 1932). Together they produce approximately 275 million litres of drinking water each day. (9)

Water coming from the Ottawa River goes through a multi-barrier process, "involving a series of physical and chemical treatment steps that remove undesirable substances such as colour, suspended particles, algae, bacteria, and viruses from the water in about eight hours." (9)

The water purification process is illustrated in Figure 6 from the City of Ottawa website.

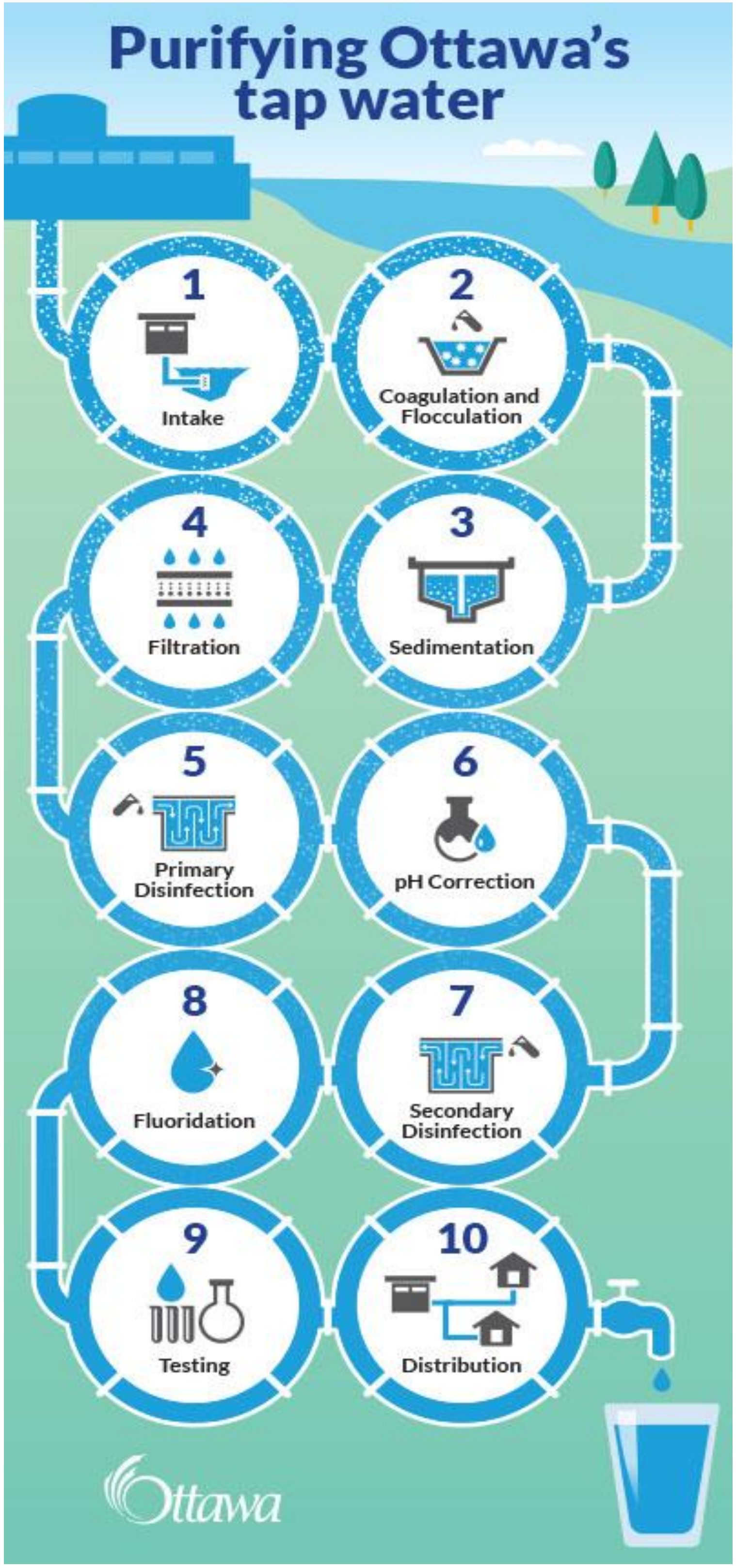

Figure 6: The Water Purification Process, City of Ottawa, https://ottawa.ca/en/living-ottawa/water/drinking-water/water-purification-quality-and-distribution

3.2 The Britannia Water Filtration Plant SOAP-POOP Album

The following plates 3-8 were taken at the Britannia Water Filtration plant on August 28, 2020.

Plate 3: Britannia 1

Plate 4: Britannia 2

Plate 5: Britannia 3

Plate 6: Britannia 4

Plate 7: Britannia 5

Plate 8: Britannia 6

3.3 The Lemieux Island Water Filtration Plant SOAP-POOP Album

The following plates 9 to 14 were taken at the Lemieux Island Filtration Plant on September 4, 2020.

Plate 9: Lemieux 1

Plate 10: Lemieux 2

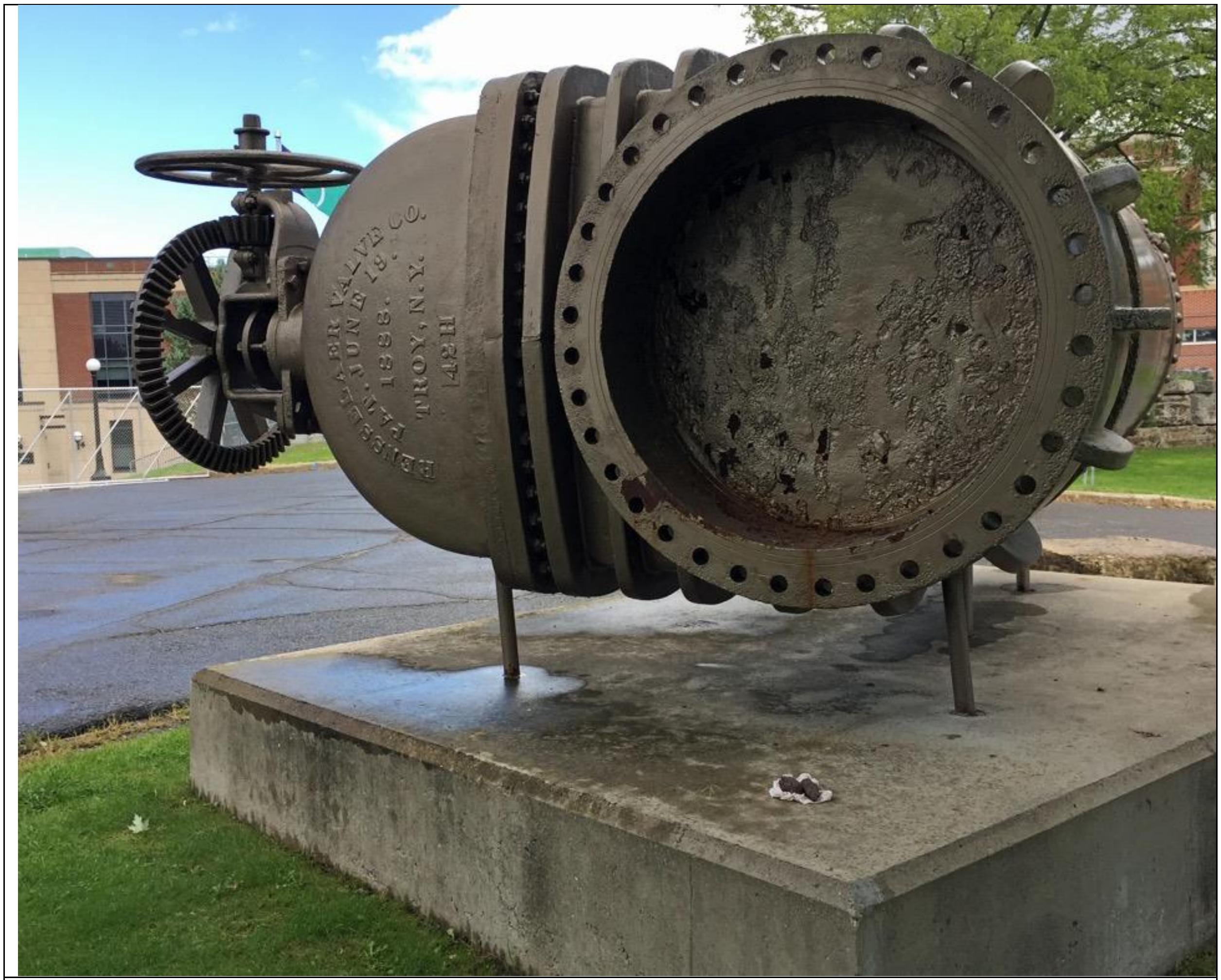

Plate 11: Lemieux 3


Plate 12: Lemieux 4

Plate 13: Lemieux 5

Plate 14: Lemieux 6

4.0 Ottawa's Wastewater Collection and Treatment System

Wastewater is water that has been used and discharged by homes, businesses and industrial sources. Although it is mostly water, it contains some other materials before arriving for treatment at the Robert O. Pickard Environmental Centre.

The Ottawa wastewater collection and treatment system comprises (10):

- 2,846 kilometers of sanitary sewers
- 108 kilometers of combined sewers
- 71 wastewater pumping stations
- More than 92,000 manholes
- Approximately 234,000 service connections
- Rural connections to the municipal trunk system.
- Individual septic systems
- Robert O. Pickard Environmental Centre for treatment.
    - Average Capacity ~ 500 millions of liters per day
    - Peak capacity ~1,400 millions of liters per day.

Figure 7: Aerial view of ROPEC, City of Ottawa, https://ottawa.ca/en/living-ottawa/water/wastewater-and-sewers/wastewater-collection-and-treatment

4.1 Wastewater Treatment Process

The following graphic in Figure 8 explains the water treatment process and indicates where this occurs within the ROPEC facilities. (10)

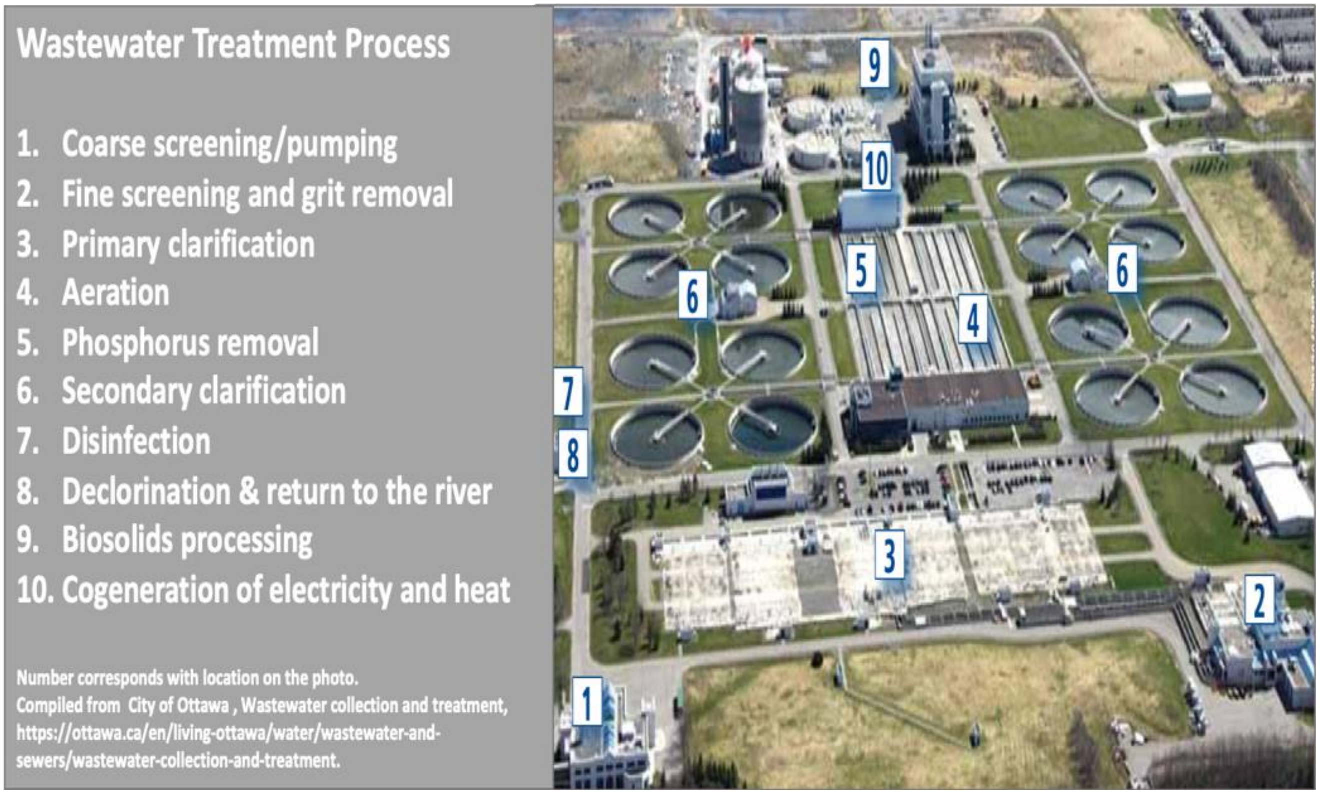

Figure 8: Wastewater Treatment Process at ROPEC

Once processed, sludge can be used for various purposes including fertilizer. Using it as fertilizer on food crops for human consumption has some risks due to heavy metals and other contaminants. Nevertheless, the Robert O. Pickard Environmental Centre produces 39 dry tonnes of biosolids each day, which are used as agricultural fertilizer. The plant also produces half of its energy requirements from gases like methane released in processing. (10)

4.2 SOAP vs. POOP — Greywater and Blackwater

Both greywater and blackwater are types of wastewater. Greywater is water that results from household activities like washing, cleaning and laundering clothes. Blackwater contains feces and urine and other bodily wastes so also contains harmful bacteria. It generally is produced through toilets and possibly kitchen sinks, which may have animal blood.

- Soap->greywater – can be used for irrigation with the right systems (see illustration below)

- Poop->blackwater – human blackwater is not suitable for agricultural purposes unless fully processed to kill pathogens.

Ottawa’s wastewater treatment system does not separate blackwater and greywater, and all treated as blackwater. We in Ottawa are fortunate to have an abundance of water. While many collect water in rain barrels for their gardens there is also the option of tapping into greywater to use in irrigation systems, as illustrated below.

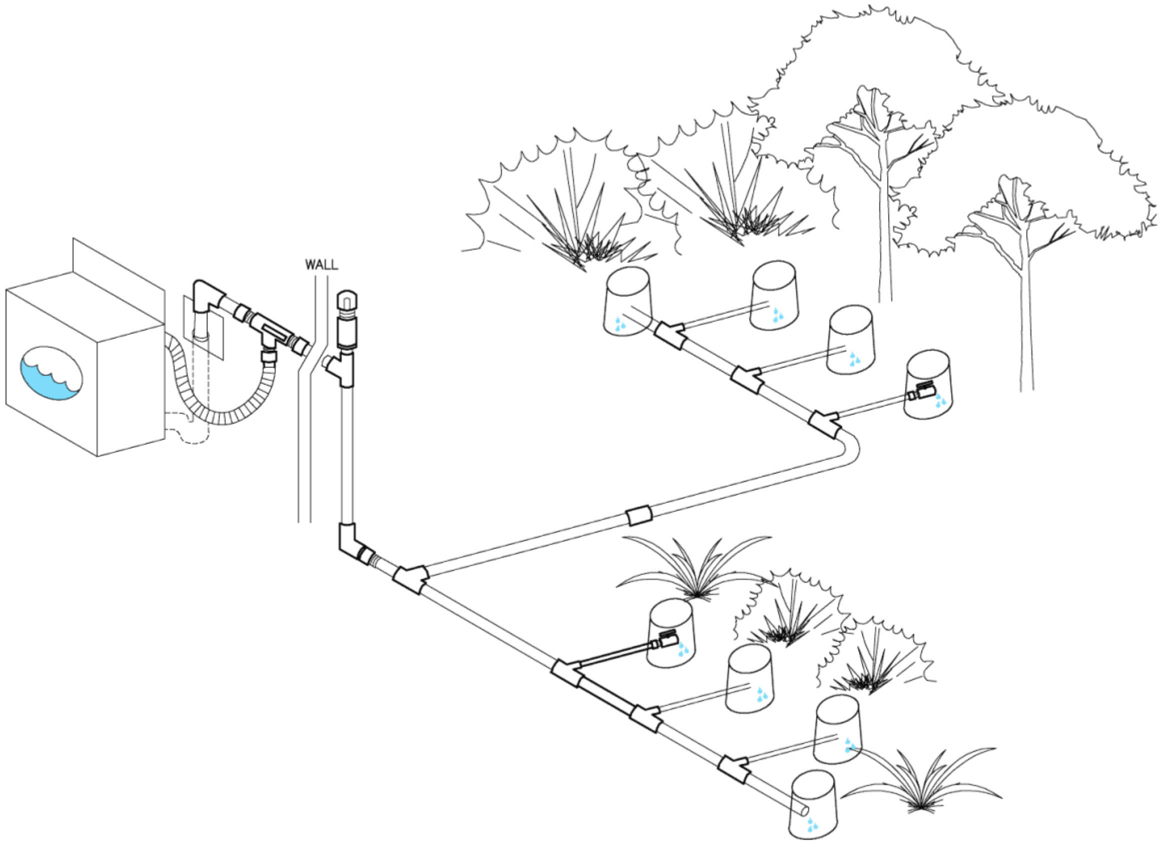

Figure 9: Laundry-to-landscape system
Image credit: CleanWater Components, https://greywateraction.org/greywater-reuse/

4.3 The Robert O. Pickard Environmental Centre SOAP-POOP Album

The following plates 15 to 20 were taken at or near the Robert O. Pickard Environmental Center on September 3, 2020.

Plate 15: ROPEC 1

Plate 16: ROPEC 2

Plate 17: ROPEC 3

Plate 18: ROPEC 4

Plate 18: ROPEC 5

Plate 20: ROPEC 6

4.4 COVID-19 Monitoring and the Increasing Threat of Fatbergs!

Living through a pandemic has taken its economic, medical and social tolls on many levels. Indeed, COVID-19 has set back advances on a number of environmental fronts as well. Although air travel has diminished, single-use personal protective equipment is on the increase. Many people are concerned about PPE litter (i.e., masks, gloves, wipes) in neighbourhoods and waterways. To stay on topic of our sewage system, this last section contains some articles that are quite eye-opening.

Elizabeth Payne's article talks about how the analysis of sewage is being used as an indicator for pending outbreaks in COVID-19 so public health officials can take early action. Detection in sewage can occur two days before outbreaks show up in testing and four days before hospitals see new patients.

Not only do we want to protect the Ottawa River but we need to be mindful of the health of our sewage system, especially what we throw into it. Diane Peters's article "Fatberg, dead ahead: Why experts want you to stop flushing things you shouldn't flush" describes the increasing incidence of infamous fatbergs which came to notoriety with the London fatberg. Danielle Kogan's article on "Canadian Scientists Find a Way to Turn 'Fatberg' Sewage Into Biofuel" describes how we can turn this waste into fuel.

Elizabeth Payne, "Scientists find COVID-19 answers in city's sewage," The Ottawa Citizen, September 1, 2020)

OTTAWA CITIZEN

TUESDAY, SEPTEMBER 1, 2020

Scientists find COVID-19 answers in city's sewage

ELIZABETH PAYNE

Sewage can act as an early warning system for COVID-19 spikes in a community or institution, Ottawa researchers have found.

And a more sensitive method of testing that sewage, developed by a team led by Dr. Alex MacKenzie, senior scientist at the CHEO Research Institute, could make the early warning system more effective.

Ottawa researchers say they would eventually like to see waste water surveillance expanded to pilot projects across the province that could test communities as well as schools and long-term care homes in real time.

Since the pandemic began, a team of Ottawa researchers has been looking in the sewers for answers about the spread of COVID-19. What they have found and developed could be game-changers in helping to control spread of the disease.

The data produced by analyzing waste water can predict COVID-19 outbreaks days before people begin showing symptoms and getting tested — something that could potentially help to reduce outbreaks in institutions and schools.

uOttawa engineering professor Robert Delatolla, MacKenzie, and a team of researchers have produced one paper — not yet peer reviewed or published — showing that their analysis of waste water in Ottawa and Gatineau is useful in tracking the number of COVID-19 cases in a community

SEWAGE FROM A5

Spike in COVID-19 cases showed up two days earlier in waste water

SEWAGE FROM A1

"In the absence of an effective vaccine to prevent COVID-19 it is important to be able to track community infections to inform public health interventions aimed at reducing the spread and therefore reduce pressures on health-care units, improve health outcomes and reduce economic uncertainty," the authors wrote, adding that waste-water surveillance has emerged as an effective tool to do so.

This summer, after that research paper had been submitted, they found out just how useful data gathered from waste water could be.

In mid-July, the daily COVID-19 case count suddenly spiked from single digits to new daily cases in the upper 20s in Ottawa.

When researchers looked at the data around that time, they found the spike showed up in waste [illegible] showing up in tests.

"We caught it two days before the daily numbers went up and four days before an associated increase in the hospitalizations," said Delatolla.

That is significant and suggests, if available in real time, waste-water surveillance could give public health officials more information to act sooner.

Research being led by the CHEO Research Institute's MacKenzie, could make that surveillance tool more accurate and potentially give public health officials an even earlier warning system by tracking proteins instead of RNA.

Wastewater surveillance has, so far, been done by measuring RNA in SARS-CoV-2, the virus that causes COVID-19. But that can be tricky, especially when case counts are low. RNA tends to be fragile and breaks down in the waste water, said MacKenzie.

He has developed a means of tracking SARS-CoV-2 by looking at proteins associated with the virus. He believes he is the first in the world to do so. The advantage, MacKenzie said, is that protein signals the presence of SARS-CoV-2 at a rate thousands of times higher than RNA does, which means the warning signal of an outbreak would be stronger and earlier and case levels could be more accurately measured even when they are low.

Wastewater surveillance is now being used around the world to track COVID-19 cases and is being studied across Canada.

Officials at the University of Arizona said last week they may have been able to prevent a large outbreak on campus after getting a positive sample in sewage from one of the university's dorms. After testing more than 300 people who live or work there, they found two asymptomatic students who were positive and isolated them. Waste-water testing is also being used in other parts of the world.

Delatolla said the sewage system is built so that waste water can be collected at individual sites, as officials at the University of Arizona did. It offers the possibility of narrowing the source of a spike early and taking action.

"Maybe now we can monitor the long-term care homes and make sure that we catch it early."

The scientists, who say they have had to scrape together funding to keep the research going, are scrambling to get their research published.

They have sent details of their work to the province's scientific table on COVID-19, which looks at the scientific and research response to the pandemic. They are hoping for funding to use the knowledge to help lessen the effect of the pandemic.

In a written statement, Ottawa Public Health called the work promising but still in early days when it comes to "reliably seeing an increasing signal from sewage

Robert Delatolla

before it is seen from human tes[t] surveillance.

"Ottawa Public Health is in reg[ular] contact with the uOttawa re[searchers] and is hopeful that on[e] or more facets of this work wil[l] contribute to COVID-19 surveil[lance] activity in the near future."

Meanwhile, MacKenzie, wh[o] usually does research on rare dis[eases] in children, said the pandem[ic] has opened a new world for hi[m] — underground — trying to wor[k] with researchers like Delatolla t[o] make a difference.

"It is like life during wartime: [it] is stressful and a tragedy but at th[e] same time the better part of hu[manity] comes out."

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Fatberg, dead ahead: Why experts want you to stop flushing things you shouldn’t flush

When you put a cleaning wipe or a baby wipe or a bathroom wipe down the toilet, it doesn’t just disappear — and, during COVID-19, that’s creating big smelly problems for sewers across Ontario

by Diane Peters

TV Ontario, Apr 16, 2020, https://www.tvo.org/article/fatberg-dead-ahead-why-experts-want-you-to-stop-flushing-things-you-shouldnt-flush.

Experts warn that many products that bill themselves as flushable are, in fact, not. (iStock/nito100)

On March 31, the City of Thunder Bay got a call from a resident in the north end of town: their basement was flooded with sewage. Crews geared up in personal protective equipment and headed over. When they checked out the sewer system, they found a nine-metre-long blockage made up mostly of wipes. Antibacterial cleaning wipes. Baby wipes. Bathroom wipes.

Across the province, as families hunker down at home due to the COVID-19 pandemic, municipalities are reporting sewer blockages of increased size and frequency. Hamilton, London, Ottawa, and Thunder Bay have reported more sewer problems. Barry Orr, sewer-outreach and control inspector with the City of London, recently checked in with worldwide wastewater colleagues. “Every single country is seeing way more blockages than they’ve ever seen,” he says. “Everybody is trying to get to the word out.”

Some wastewater workers call the larger blockages — massive clumps of wipes and other unflushable materials bound together by fats and greases — fatbergs. (A 42- tonne one recently found in Melbourne took a team nine hours to remove.) Both these and smaller masses can jam up a sewer system and cause damage to pumps and screens.

According to Orr, Canadian cities spend roughly $250 million annually dealing with solid waste in their sewers, and that cost could soon spike. Ontarians are flushing things they shouldn't be, like disinfectant wipes. "People are wiping down points of contact, like door handles and surfaces — everything — much more regularly," says Ian Morgan, Thunder Bay's chief chemist. "It looks likes it should be able to go down the drain; it feels like it should be able to go down the drain."

These wipes may slip away down your toilet, but they won't break down in the sewer system. Orr put one to the test using his washing machine. After a 33-minute cycle, complete with agitation, it came out, he says, "100 per cent fully intact."

Orr, who's working on a master's degree in environmental applied science and management at Ryerson University has also engaged in more traditional scientific research: he helped with a 2019 study looking into the flushability of wipes and other products. He conducted research at Ryerson's flushability lab — essentially, a toilet attached to a maze of pipes, plus the lab has agitation boxes filled with water. The study of 101 single-use products, 23 of which were labelled flushable, found that few fell apart in the system; none of the wipes did.

The worry that toilet paper could become scarce during the pandemic has likely compounded the problem. "If there's nothing handy, people reach for the next best thing, like baby wipes," says Morgan. These are also not made for flushing. And facial tissue may resemble toilet paper, but it doesn't disintegrate nearly as easily. Paper towel does not break down; feminine-hygiene products don't either. (And it's not just the most obvious culprits that contribute to fatbergs: Orr recently found a rubber dog toy in a sewer blockage.)

"Wipes are like making a snowman in your backyard," says Andrew Grice, director of Hamilton Water for the City of Hamilton. "They start clumping together and get bigger and bigger." The city has had two major blockages in the last few weeks.

He adds that busy home cooks have also been dumping more binding agents — cooking fats, greases, and oils — down the drain, where they act like glue and hold solid products, such as wipes, together. It's not easy for municipalities to manage what goes down residential drains, Grice says: "We have a much easier time enforcing this with companies than we do homes."

Then there's the fact that self-isolation has changed Ontarians' bathing schedules. In normal times, Morgan says, people take simultaneous early morning showers, flushing out the system and dislodging small clumps in the sewers before they turn into blockages: "We're not getting those big pushes between 7 and 8 a.m. every day."

To mimic the effect, the City of London has launched the Toilet Flush Challenge, which entails flushing all the toilets in a household at the same time to break up any small blockages.

Ontario cities, including Hamilton, London, and Thunder Bay, have launched public-education campaigns to remind people what, exactly, should go down drains — and what shouldn't. "Only flush toilet paper down the drain. Do not flush wipes, they plug the pipes!" says a poster from the City of Thunder Bay.

It's not just the health of the sewers that experts are worried about — worker safety is also top of mind. Two-person teams now travel in separate vehicles, Grice says, but when crews have to crowd in a sewer, it increases the risk of contracting COVID-19. "I'd prefer to not send our crews out," he says.

Morgan echoes those concerns. "When crews go out, we have to put them in less-than-ideal conditions in terms of social distancing," he says. "We don't know if this virus can be spread through fecal matter. We also might be exposing our crews to other things. I sincerely hope not."

A Fatburger, Business Insider.com
https://i.insider.com/5404956f69bedd571ae45583?width=1200

Canadian Scientists Find a Way to Turn 'Fatberg' Sewage Into Biofuel

BY **DANIELLE KOGAN** ON 8/23/18 AT 4:21 PM EDT **NEWSWEEK,** HTTPS://WWW.NEWSWEEK.COM/FATBERG-BIOFUEL-SEWAGE-CANADA-FAT-1088626

Last month, Canadian scientists announced a way to convert human waste, trash and greases congealing inside sewer pipes to biofuel last month. Now it might be the key to sustainably caring for sewage systems, especially in big cities.

Globs of fat, food scraps, napkins, condoms, human waste, and grease are just some of the ingredients typically found in a fatberg. That is the term for a nasty ever-growing blob that potentially clogs some sewer pipes and causes others to overflow. In recent years fatbergs were discovered in big cities like London or Baltimore.

They continue to grow as they come in contact with more detritus, according to a Smithsonian report. But, last month, Canadian scientists from the University of British Columbia (UBC) found a way to convert fatbergs into energy. Their findings were published in the journal *Water, Air & Soil Pollution*.

Though others had previously worked in the same area, the latest experiment has improved efficiency by finding a way to treat the fatbergs while they remain in sewers. The scientists heated their experimental fatbergs to between 194 and 212 degrees Fahrenheit before adding peroxide to force the organic matter to break up. Bacteria then turned the fatberg remnants into methane. The process is less costly than the alternative—excavating the sludge before converting it to fuel.

Methane from waste is already used by several other industries, including agriculture.

A Scottish biodiesel company was one of the first to suggest excavating and processing a 286,601-pound fatberg, known as the Whitechapel fatberg, found in London in September 2017, according to a report from *The Guardian.*

The Museum of London currently live-streams a small cut of the Whitechapel fatberg that hatched flies, sweated and changed color while on display. Since being taken off display, it grew an unusual and toxic yellow mold. Visitors weren't allowed to smell the two slices of fatberg due to the substance's volatility, and a Smithsonian report said the museum's two samples were always sealed within a three-box system and handled only by staffers wearing full-body protective suits. The exhibition of the fatbergs at the museum was an effort to make people think about their current way of life.

A congealed lump of fat, sanitary napkins, wet wipes, condoms, diapers and similar items found in sewer systems, is seen on display at the Museum of London. It is called a fatberg, and Canadian scientists have found a way to turn it into biofuel. DANIEL LEAL-OLIVAS/AFP/Getty Images

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