

Tracking Viruses in Wastewater for Public Health: How Sewage Helps Us Catch Outbreaks Early

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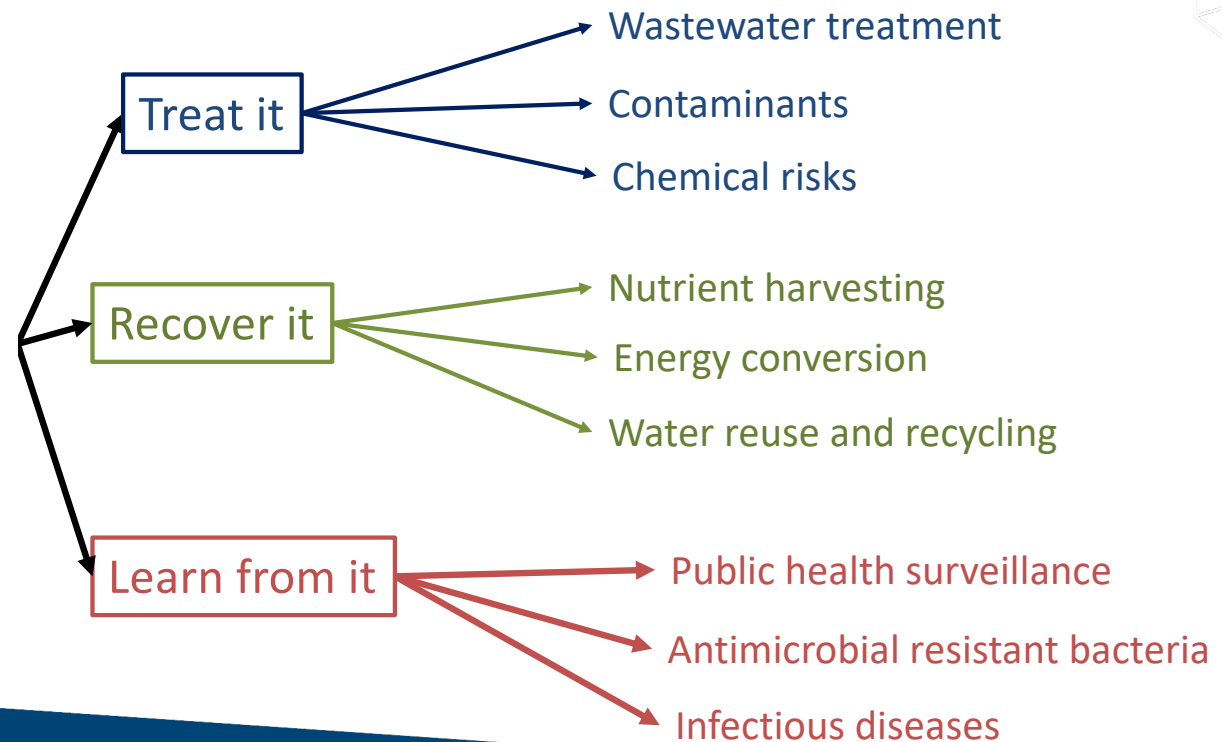
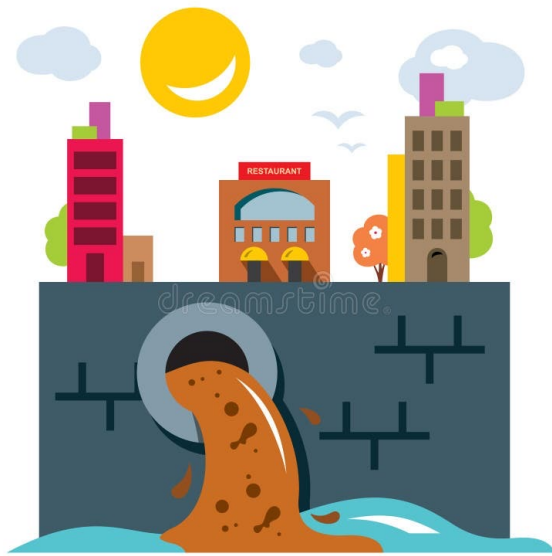
Popping the Science Bubble

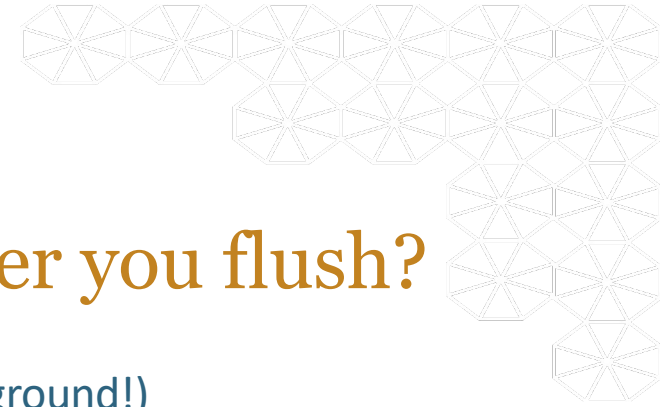
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Wastewater is not waste!



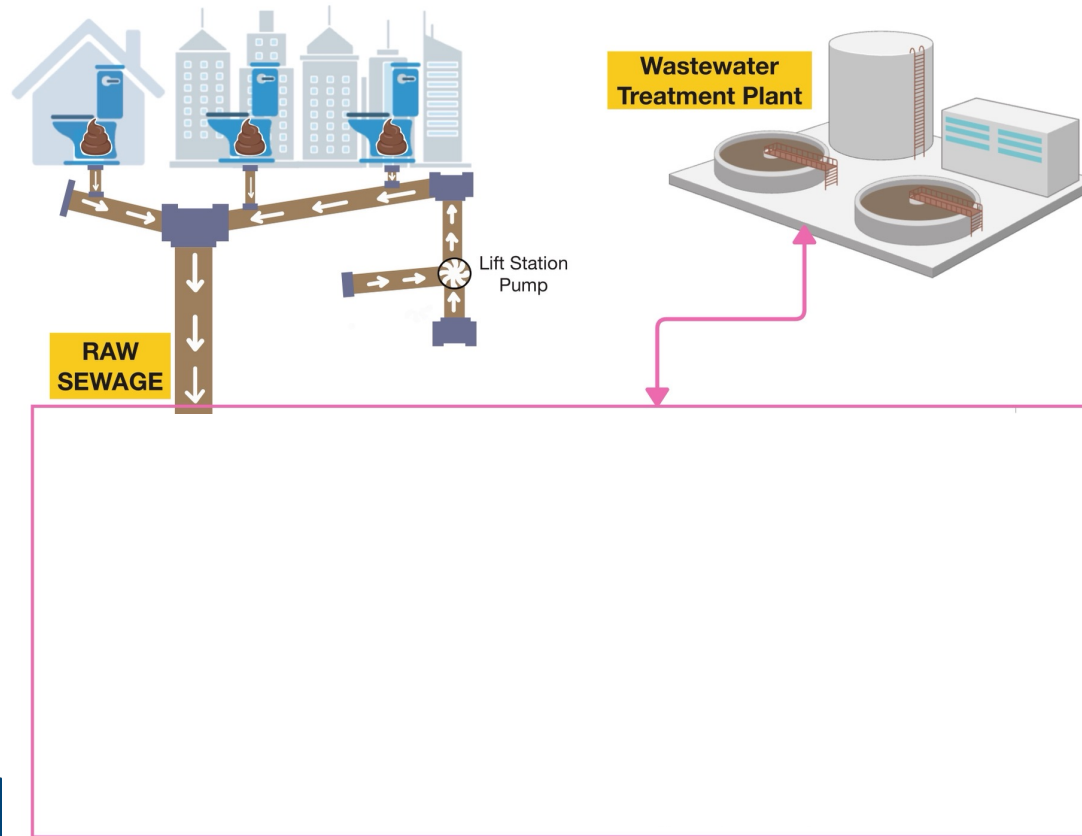


The sewer system - What happens after you flush?

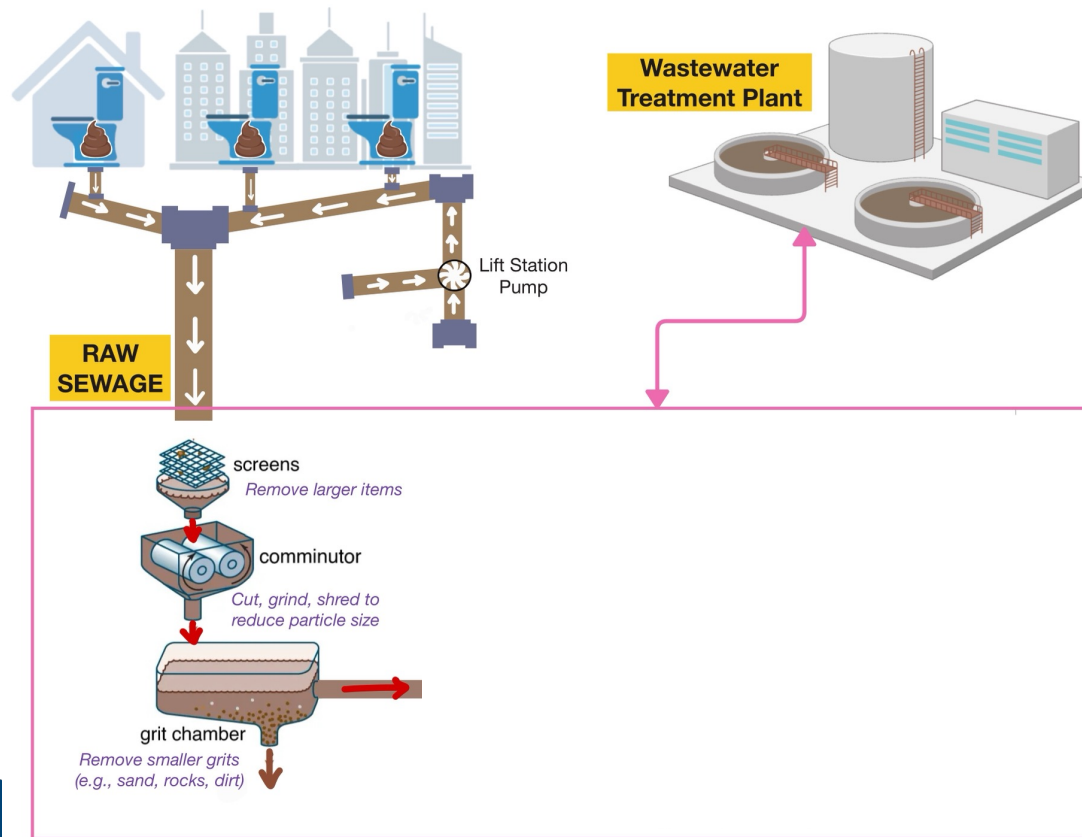
(The wastewater doesn't disappear into a mysterious world underground!)



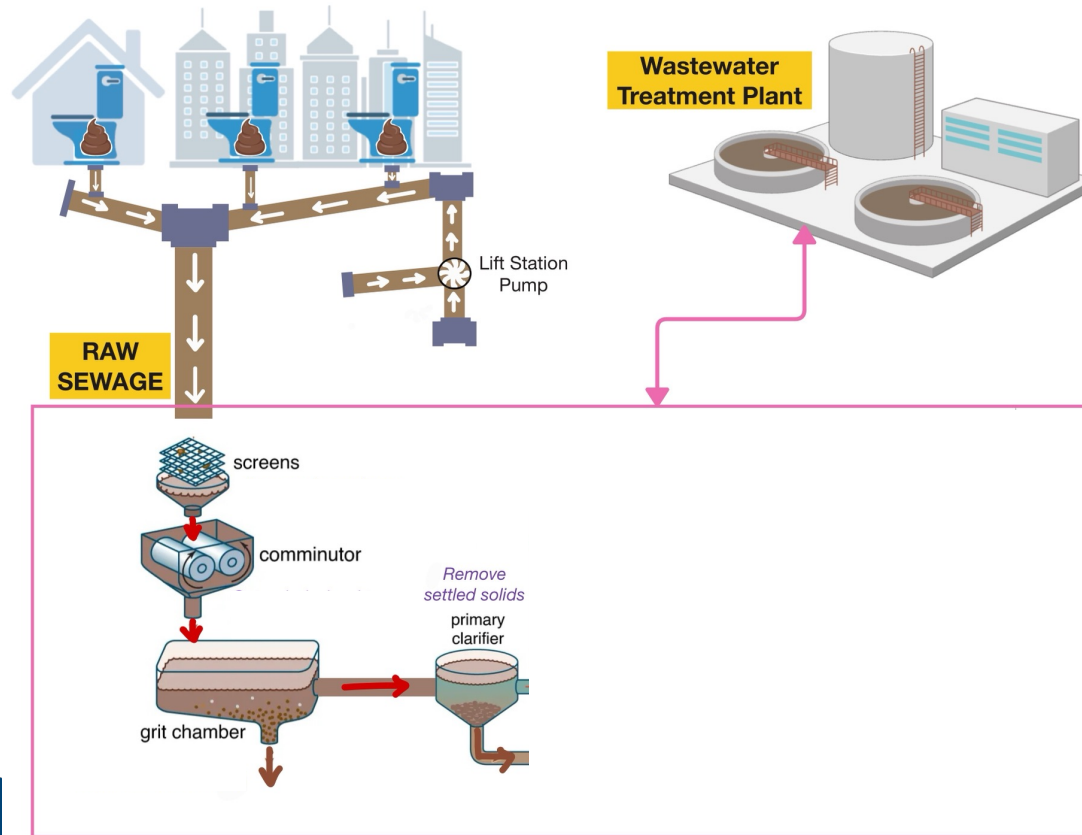
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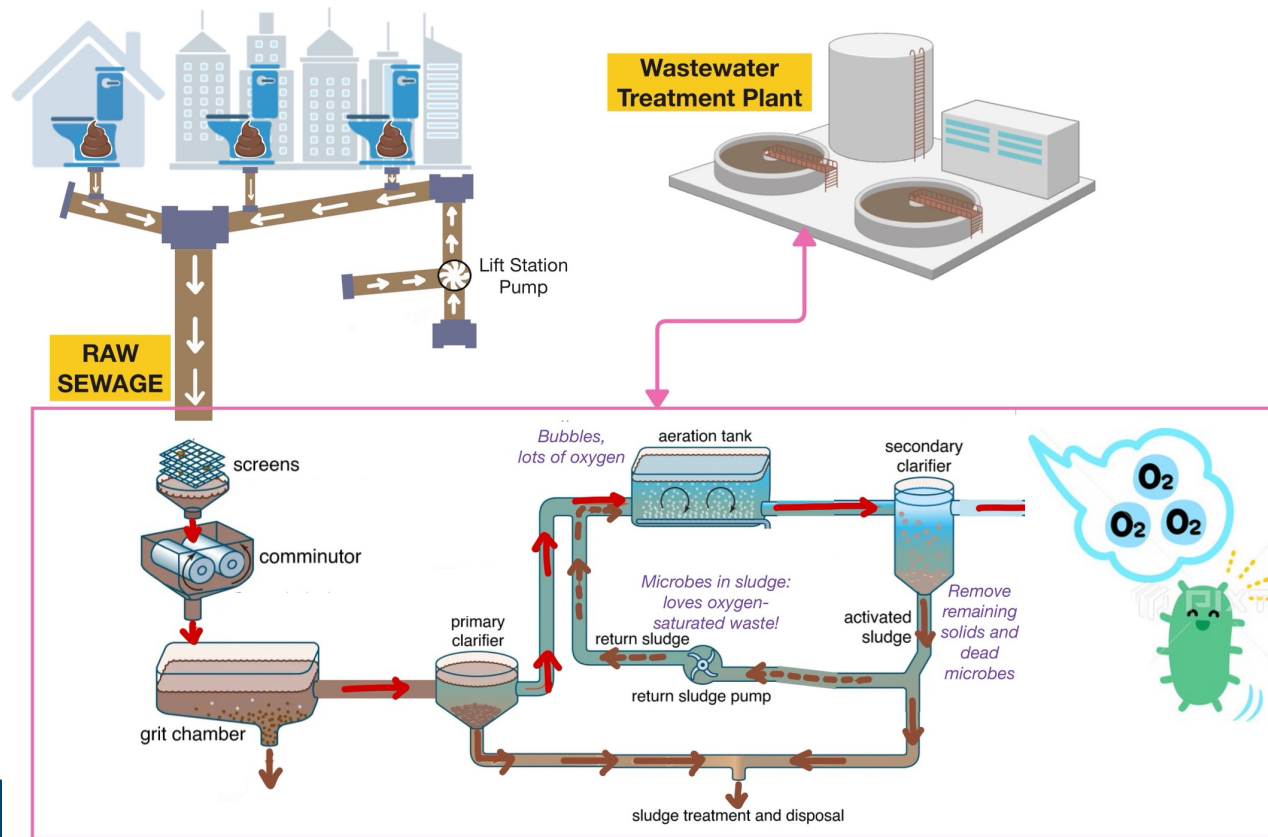
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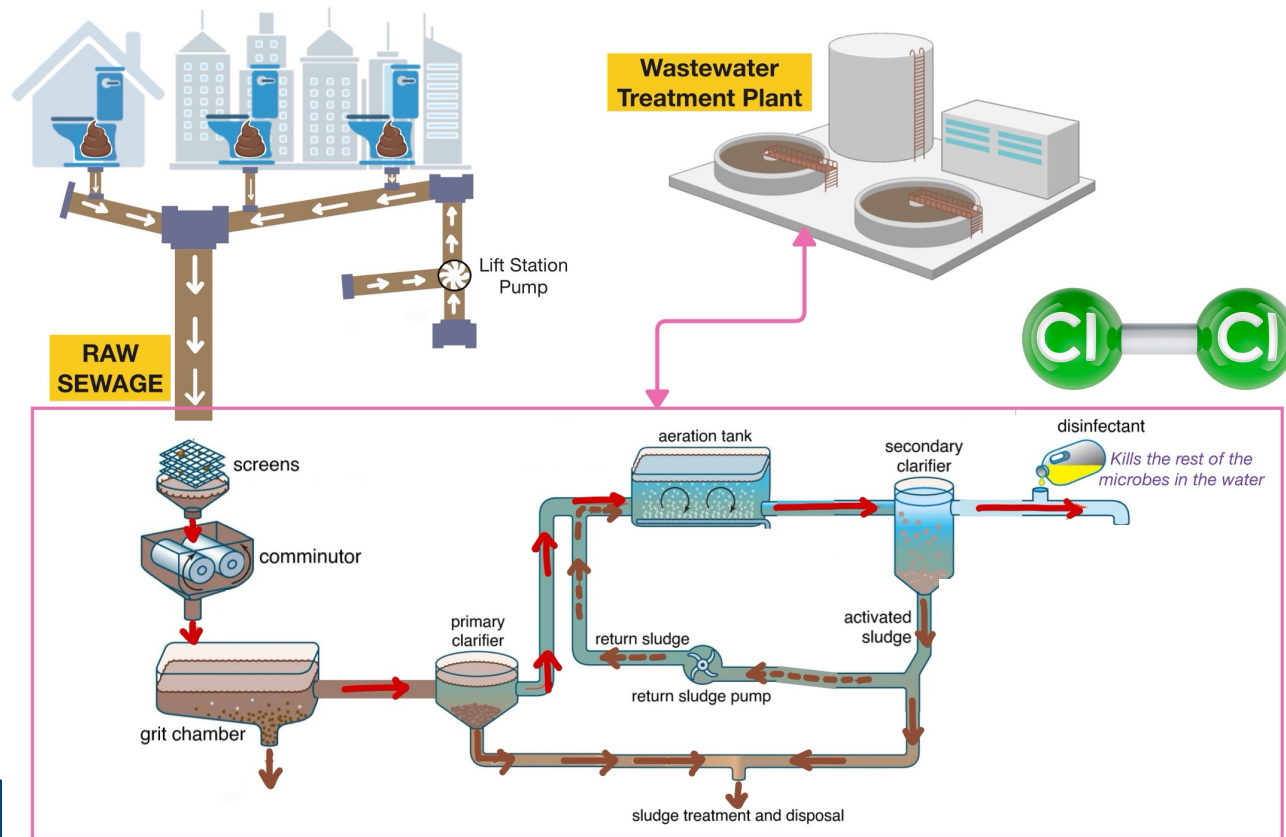
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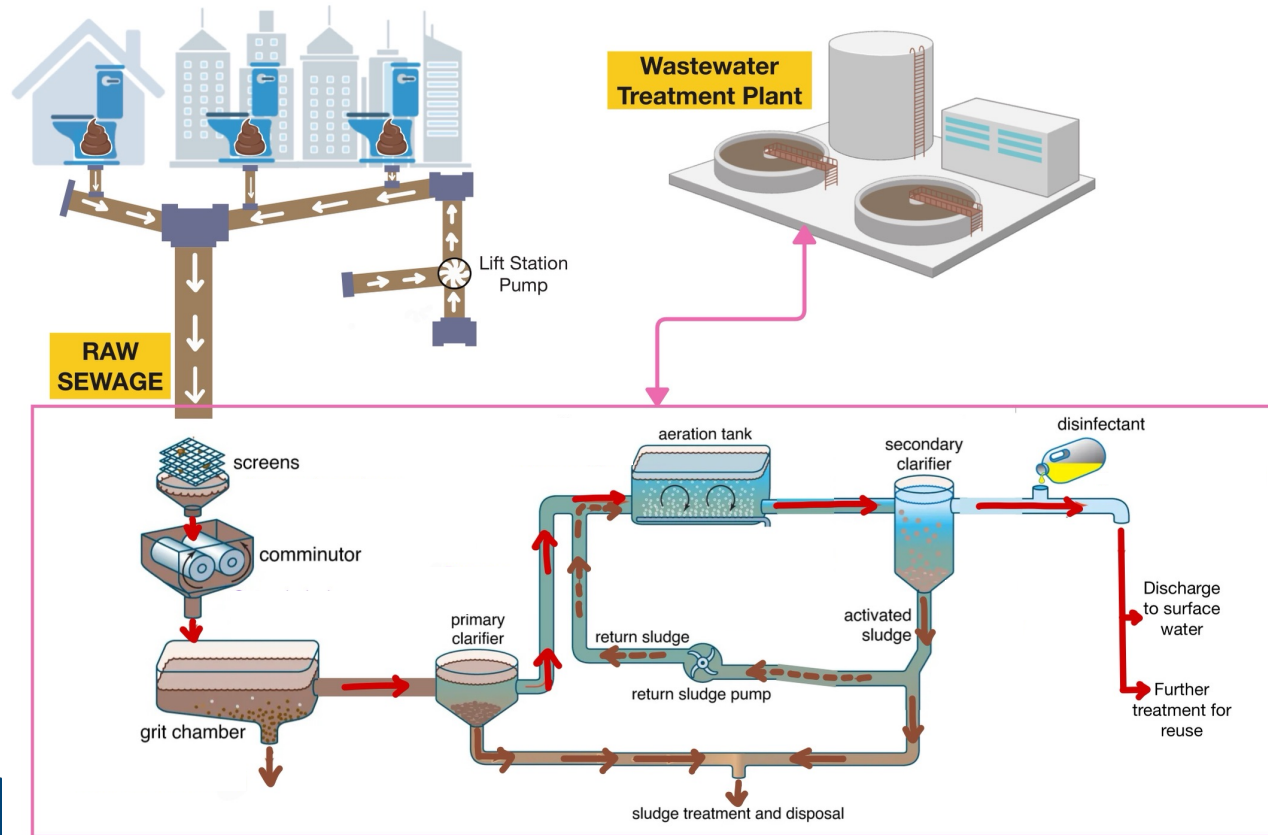
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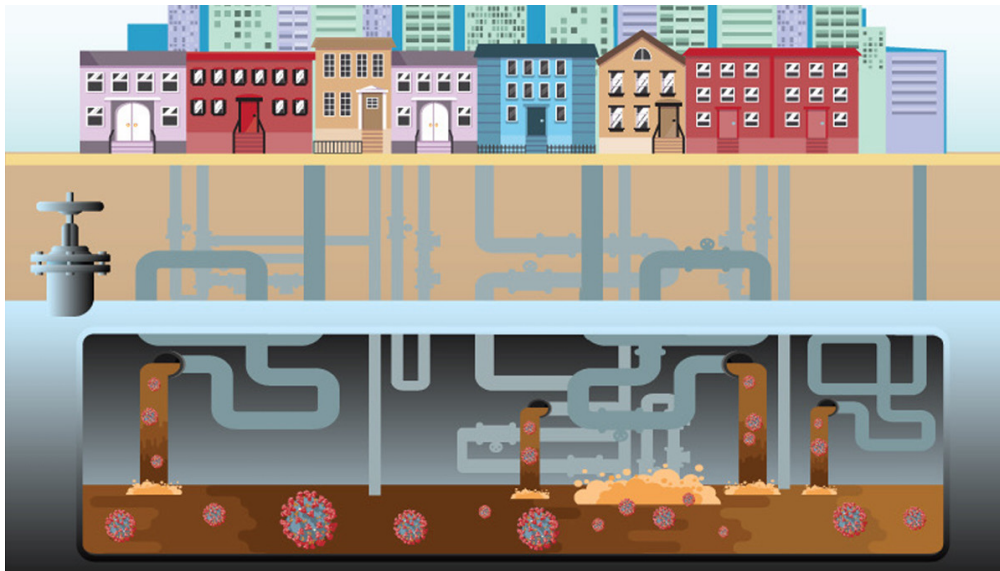


The sewer system - What happens after you flush?





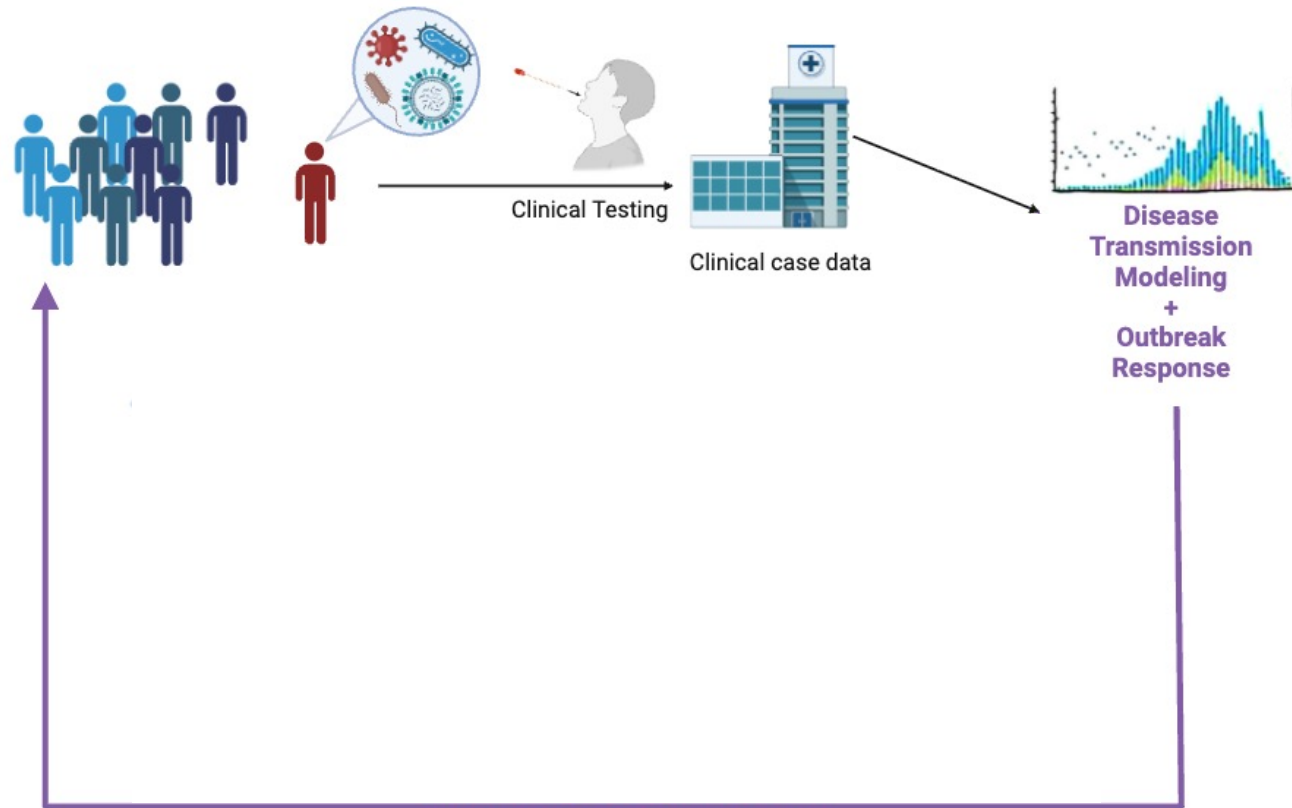
Wastewater monitoring = Testing sewage to track infectious diseases



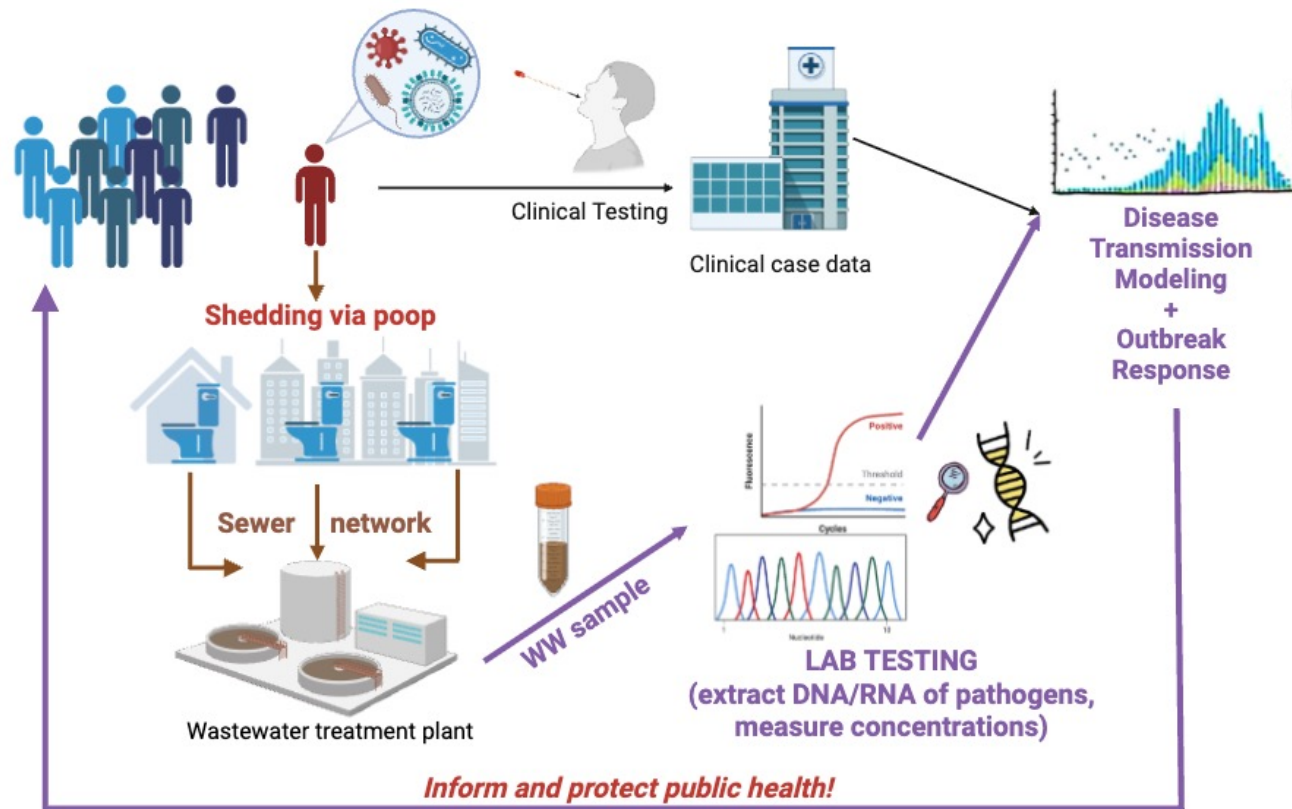
- Have you heard of testing sewage to track diseases?
- What diseases have you heard of?
- Have you ever used wastewater monitoring results for your daily life activities?



Wastewater monitoring – Overview

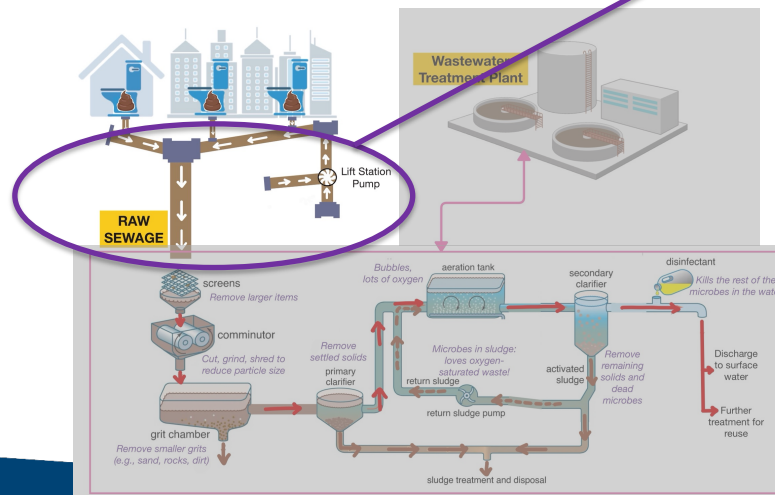


Wastewater monitoring – Overview

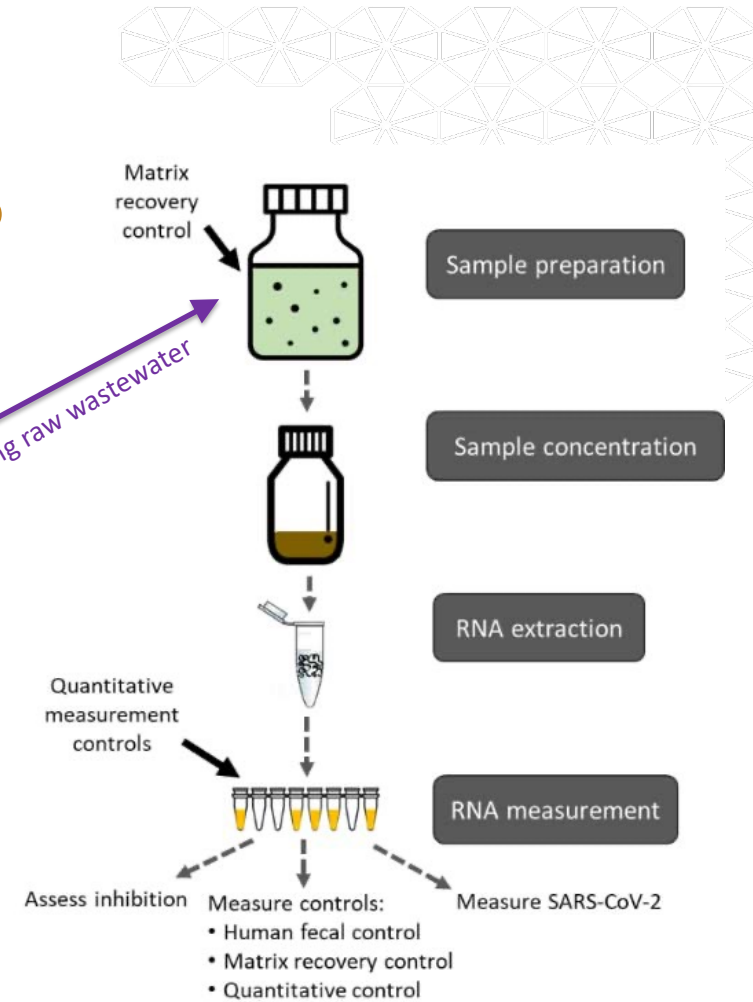


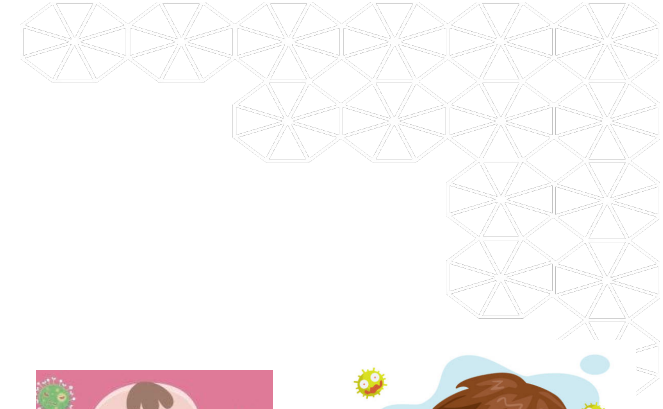
Wastewater monitoring – What happens during lab testing?

- Different steps within each stage
- Many methods for each step
- Lab testing technology is advancing everyday!



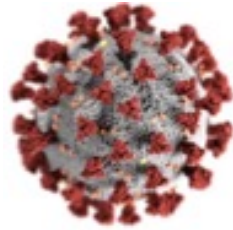
Sampling raw wastewater





Various targets to be monitored

- Pathogens
- Drugs
- Antimicrobial resistance genes



Coronavirus
(e.g., SARS-CoV-2)



Influenza A

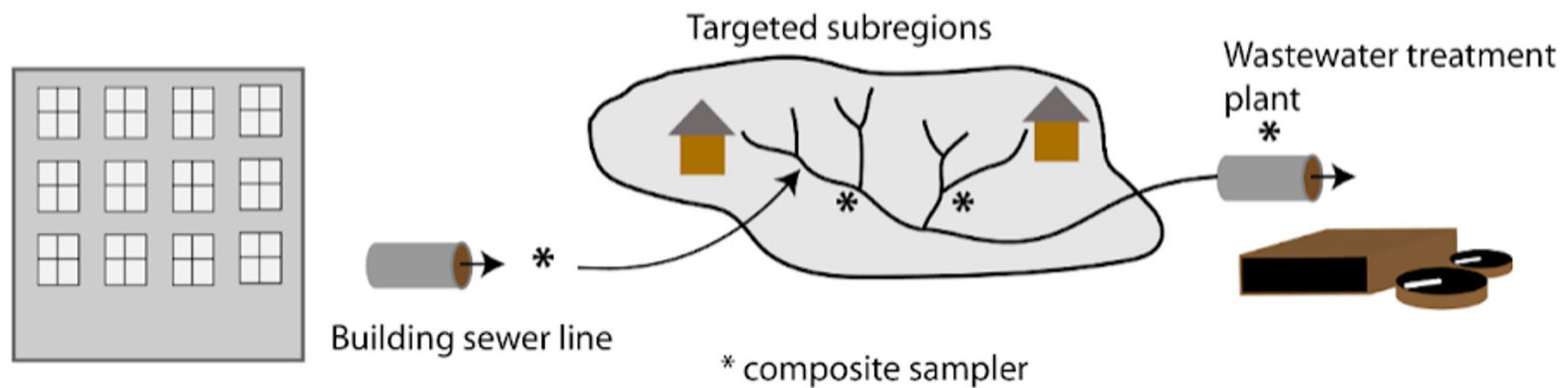


Respiratory
Syncytial Virus
(RSV)



Measles

Various sampling locations

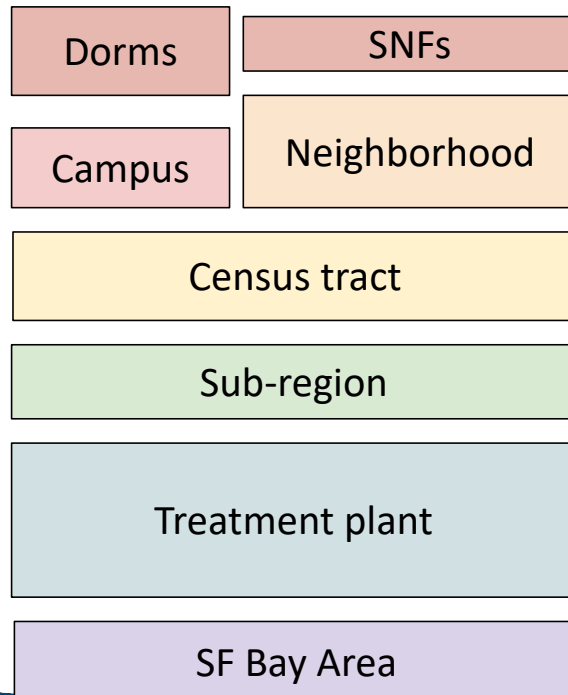


Various sampling locations = Different applications

Population

Sampling Scale

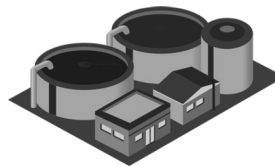
Public Health Application



Building



Sewershed



Treatment
Plant Influent

Rapid response: test, trace, isolate;
reward and reinforce

Compare trends across neighborhoods
Allocate resources (testing, contact tracing,
vaccination outreach)
Engage community

Inform mass communications
Relax/increase restrictions
Confirm low prevalence
Integrated regional decision making



Wastewater monitoring – Advantages & Use Cases

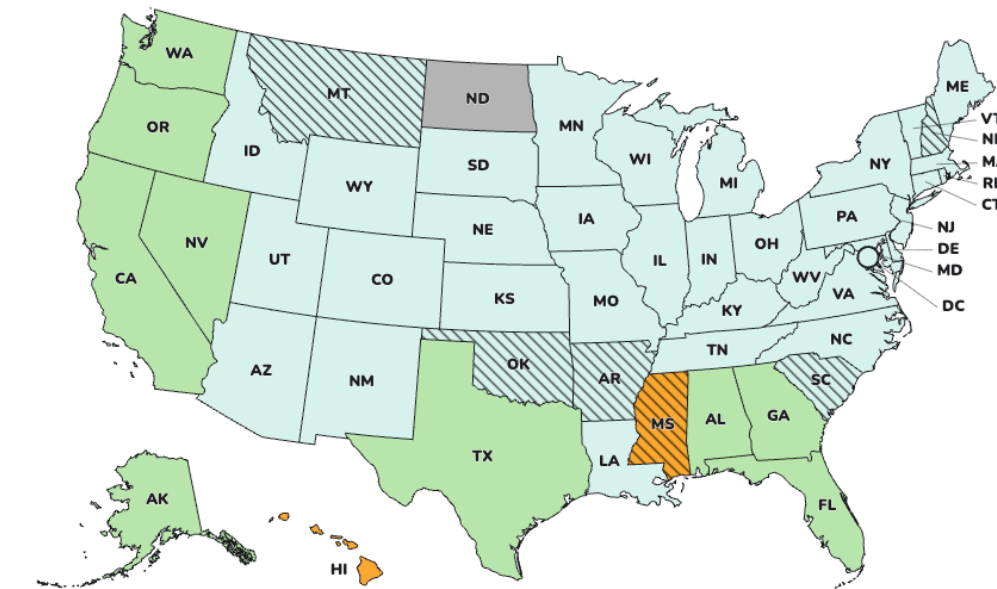
- Pooled sample for the whole community → Assess infection rate
- Less biased than individual clinical case data (not everyone gets tested)
- Can provide an earlier signal
 - Allocate resources (e.g., at hospitals)
 - Encourage preventive actions (e.g., vaccination, masks, social distancing)
- Can be implemented for many US communities (80% served by sewer systems)

CDC's National Wastewater Monitoring Program

COVID-19 Wastewater Viral Activity Levels



⊘ Limited Coverage



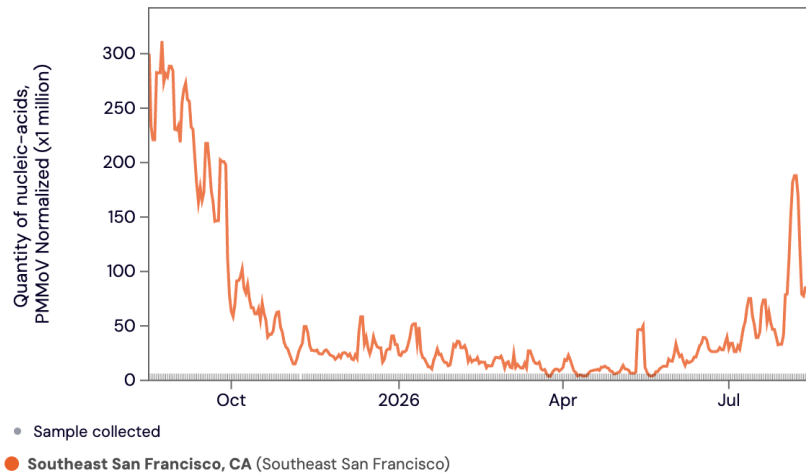
U.S. territories



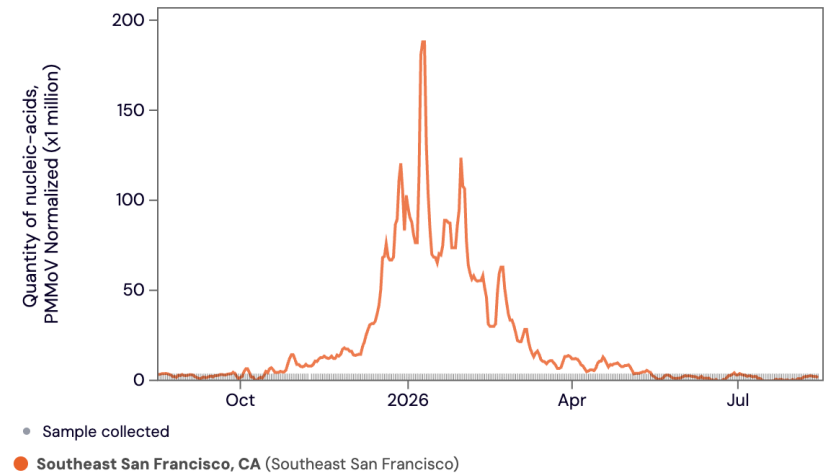
Source: <https://www.cdc.gov/wastewater/>

Surveillance over time – Example

SARS-CoV-2, Southeast San Francisco, CA



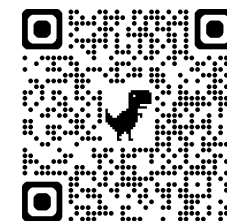
Influenza A, Southeast San Francisco, CA



Source: WastewaterSCAN (<https://www.wastewaterscan.org/>)

Scientist(s) Highlight: Cal-SuWers Team

- Cal-SuWers = California Surveillance of Wastewaters
- Under California Department of Public Health (CDPH)
- Statewide monitoring of 9 viruses across respiratory, enteric, and other groups



Cal-SuWers
Dashboard

Cal-SuWers Epi Team



Alexander Yu, MD, MPH
Team Lead &
Infectious Diseases Branch Chief



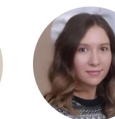
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Guinevere Ellison-Giles, MPH
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Sophia Koch, PhD
Epidemiologist /
Data Scientist



Mariah Ottstot, MPH
Epidemiologist



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Research Scientist II



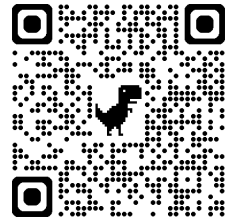
Yvonne McMahon
Health Program Specialist

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Scientist(s) Highlight: Cal-SuWers Team



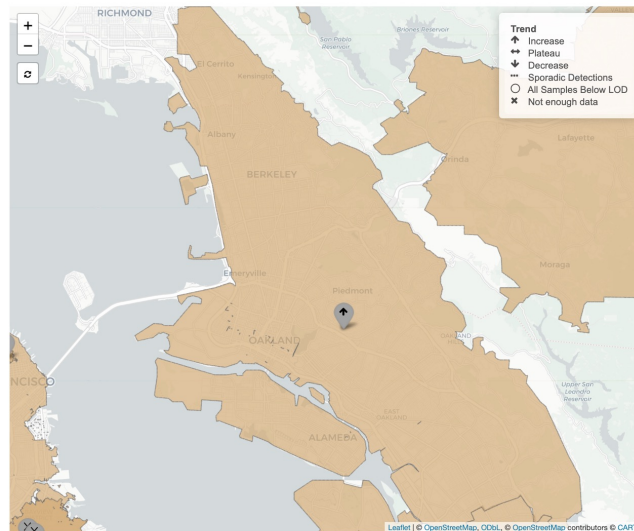
Cal-SuWers
Dashboard

Trends of SARS-CoV-2 for Sewersheds in California (Last Update: 08/16/2026)

[Click to show or hide the description](#)

To view the trend of each sewershed and wastewater concentration, use the dropdown on the left sidebar or click the sewershed on the map. The current wastewater trends are determined by comparing this data to the levels 21 days prior. Wastewater surveillance is one metric to consider alongside other metrics and does not represent severity of disease. For more information on clinical indicators for respiratory viruses, see the [Respiratory Virus Dashboard](#).

Note: Sewershed-level metrics are currently under development and will be available on the dashboard soon.

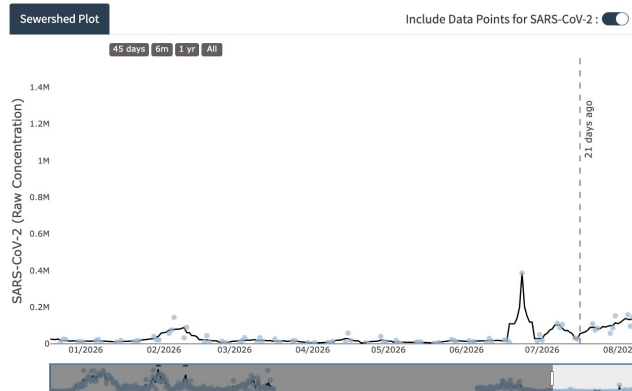


Alameda (East Bay)

Trend: **Increase 85% [65%, 108%]**

Most Recent Sample Date: **08/06/2026**

Data Source: **CDPH Drinking Water and Radiation Lab**



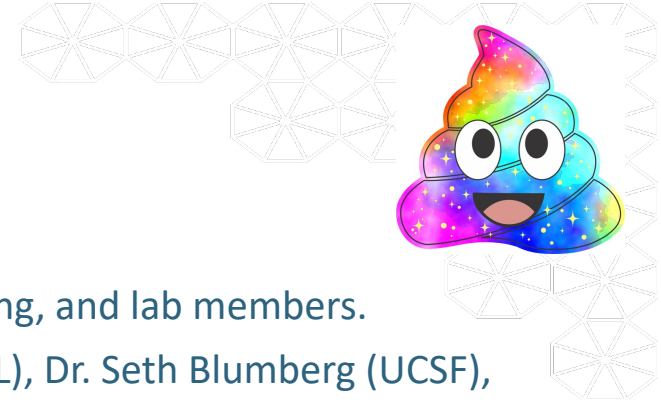
Adjust the time range using the slider above

Acknowledgements

- Nelson Research Group:
Prof. Kara Nelson, Dr. Rose Kantor, Dr. Alma Bartholow, Dr. Audrey Wang, and lab members.
- Research collaborators: Dr. Staci Kane (LLNL), Dr. Monica Borucki (LLNL), Dr. Seth Blumberg (UCSF), Stephanie Bertsch-Merbach (CDPH), and many others.
- Popping the Science Bubble organizing team.
- You – thanks for listening! 😊



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