

Wastewater Recycling Webinar- August 12, 2021



Wastewater Microgrids for Community Water Recycling

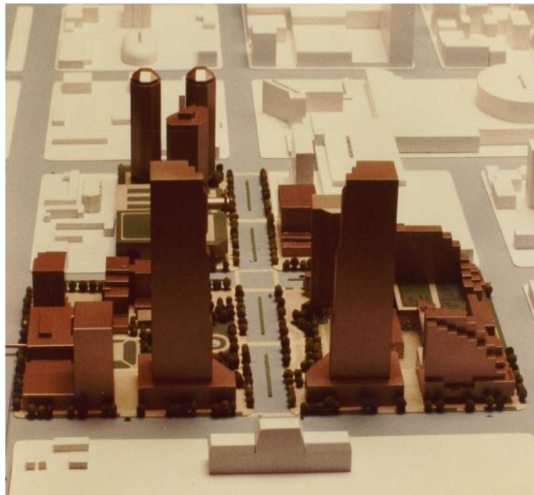
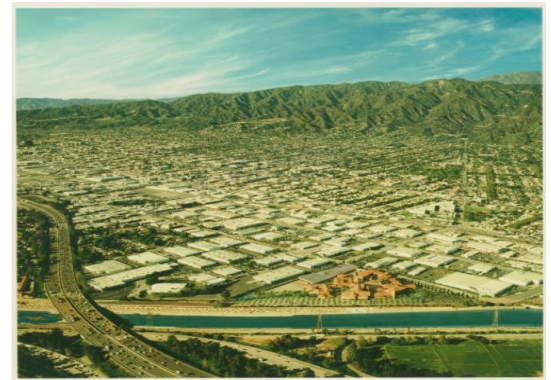
Rinaldo Veseliza
Environmental Architect
AIA, LEED AP

Presentation Agenda

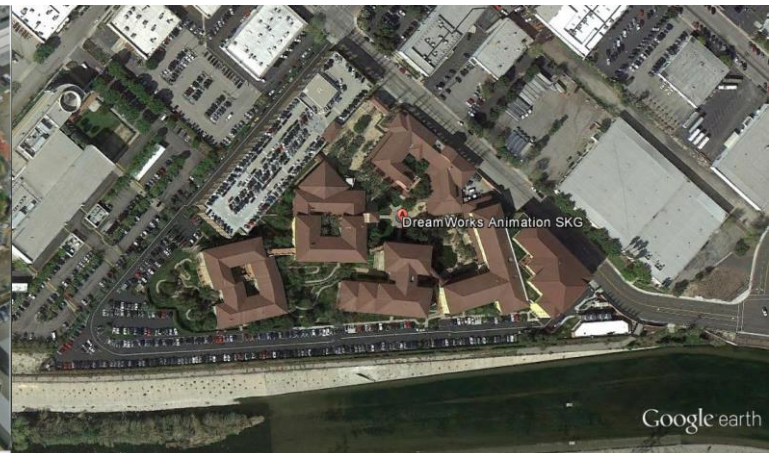
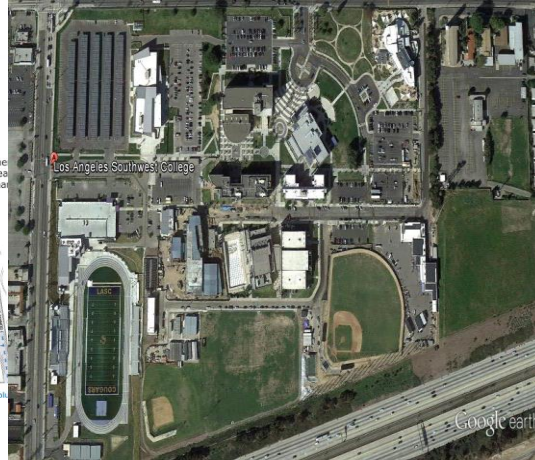
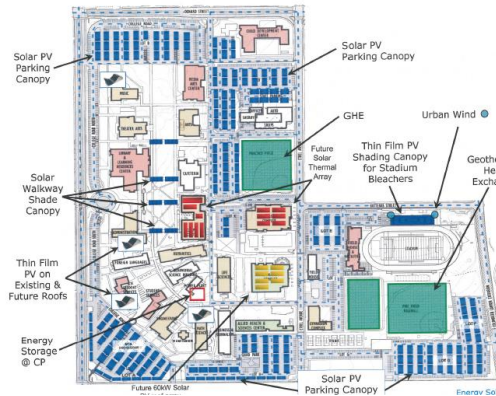


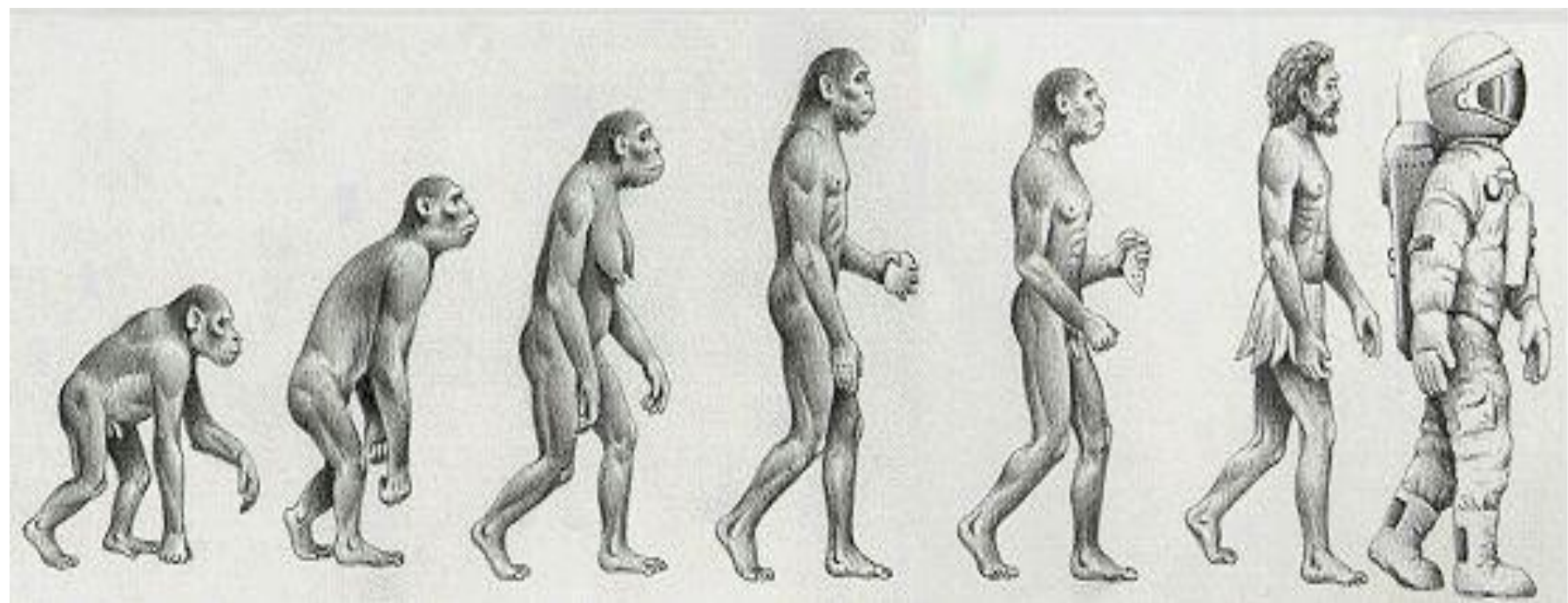
- Environmental Architecture & Stewardship
- Modular water systems in the world 20-30 years
- World-wide demand for clean drinkable water
- Santa Monica Leadership in Sustainability
 - Water Garden (1990) and SMURRF (2000)
- Malibu Septic Systems and Pollution
- Scalable Modular Technology for Community Blocks
- Bay Area Wastewater Treatment Systems -Wasted
- Decentralized Solar Power Microgrids
- Q&A

Projects

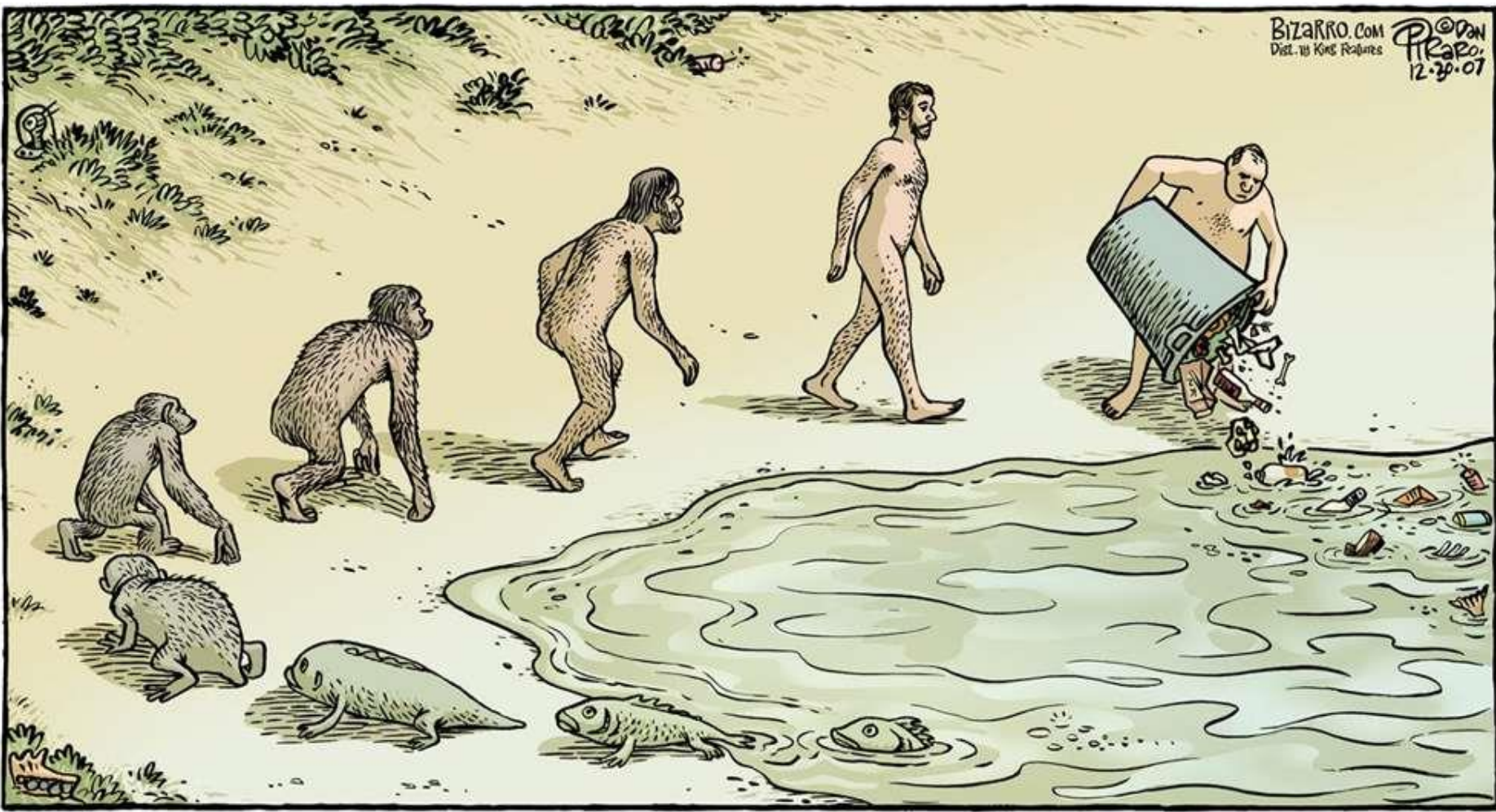


Projects 2





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2.7 million-gallon sewage spill in Richardson Bay

By Peter Fimrite, Marisa Lagos and Jill Tucker Published 4:00 am, Saturday, February 2, 2008

ADVERTISEMENT



Special to the Chronicle / Liz Mangelsdorf

Residents and officials throughout Marin County were upset Friday that they were not notified for almost a day that 2.7 million gallons of treated and raw sewage had spilled into Richardson Bay.

Sewage System Failures



- Out of Sight, Out of Mind
- Seismic Impact
- Corrosion Controls
- Valve Automation
- Designed for Overflows
- Lack of Detection
- Toxic Substances
- Septic Systems Failures
- Methane Gases

- LEAKS
- LEAKS
- SPILLS
- SPILLS
- LEAKS
- CONTAMINATION
- POLLUTION
- POLLUTION
- GLOBAL WARMING

Bay Area Sewage Treatment Plants

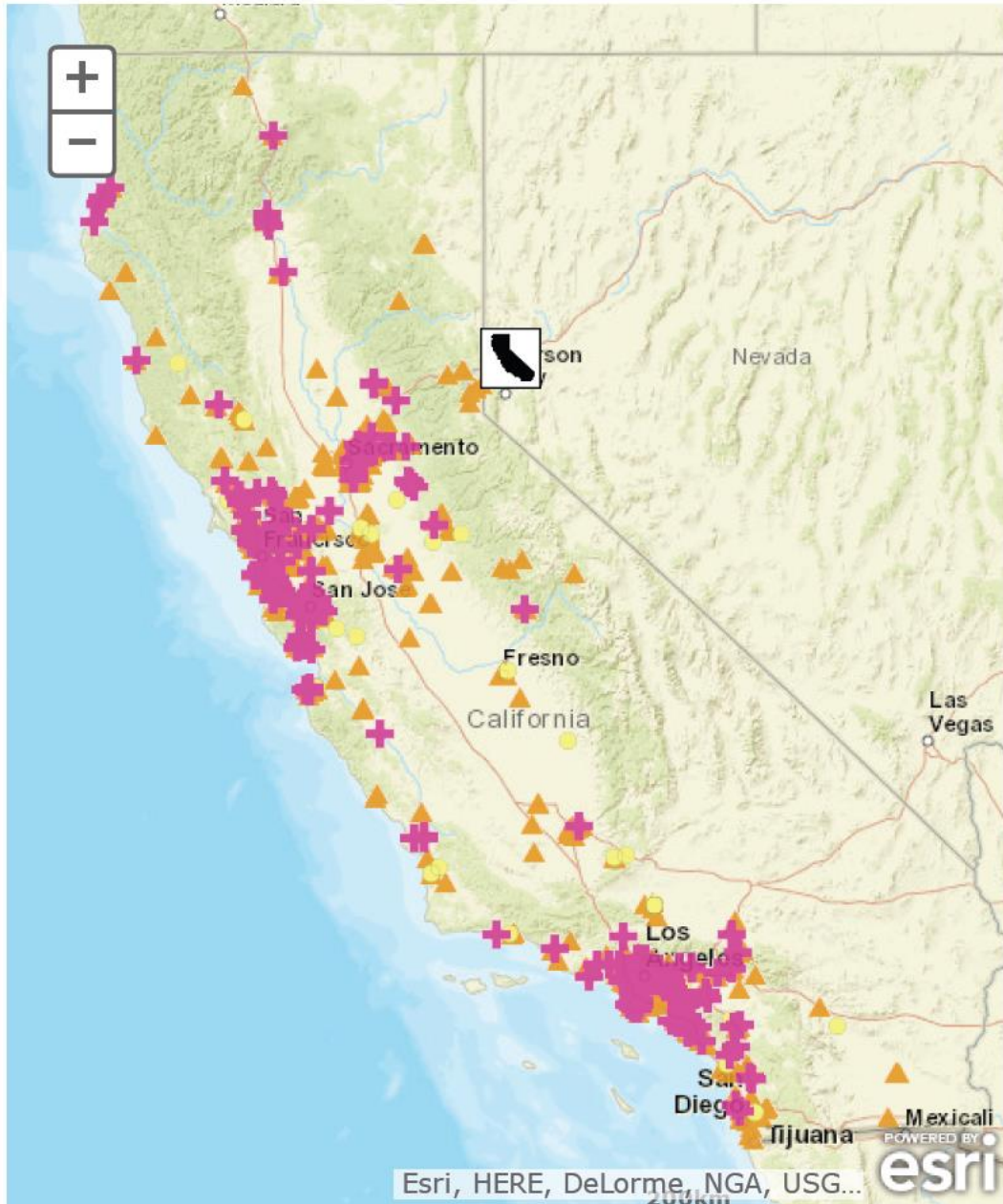
- Designed for Gravity Flow
- 1955 Primary Treatment
- Upgraded 1972 for Secondary Treatment
- Upgraded 1985 to handle increased flow
- Processes and removes activated sludge waste to 97%
- Water disinfected with Hypochlorite
- Hypochlorite removed
- **Water Dumped into Bay**



SANITARY SEWER OVERFLOWS: 12/24/2015 - 04/24/2016

Spill type: + [Category 1](#) ○ [Category 2](#) ▲ [Category 3](#)
Click on a map icon for incident information.

Note: Map does not include spills from sewage treatment plants.



- Show all incidents
- Show on [More Info](#) with valid GPS coordinates

Filter by Volume: [Change basemap](#) ▼
0 - 1,000,000+ gal.

Minimum:
 ▼

Maximum:
 ▼

[Set Volume](#)

Filter by date:
12/24/2015 - 04/24/2016

Start:
 ▼ ▼ ▼

End:
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[Set Dates](#)

Filter by Agency:
(All)

▼
[Set Agency](#) [Show All](#)

Current Plans



Eastward view of secondary treatment tanks

Along the shore of the southern San Francisco Bay, the San José-Santa Clara Regional Wastewater Facility (RWF) stands as the largest tertiary-level treatment facility in the western U.S. Two key purposes:

- Protect the health, environment, and economy of the South Bay by cleaning wastewater to near-drinking water standards before discharging it into the Bay

San José-Santa Clara Regional Wastewater Facility

700 Los Esteros Road, San José, CA 95134



San José-Santa Clara
Regional Wastewater Facility

mgd = million gallons per day

Capital Improvement Program

- To continue reliable service, the aging facility is being rebuilt under publicly-approved Plant Master Plan
- \$2 billion rebuild over 30 years is among Bay Area's largest infrastructure projects, similar to building the San José Mineta International Airport
- Construction projects are prioritized through rolling 5-year

Facts and Figures



- 1956: City of San José built the original wastewater facility and continues to administer and operate the facility
- Annual operations budget: ~ \$80 million annually
- Funded by rate revenue from contracting agencies, which in turn set rates that include their respective sanitary sewer system costs
- Employs ~ 200 staff

Water Recycling

- RWF treats an average 110 mgd of wastewater, ~ 13% goes to adjacent South Bay Water Recycling (SBWR) pump station
- SBWR distributes annual average of 14 mgd to ~ 750 customers in San José, Santa Clara, and Milpitas

Goals to Stop Wasting Water



- Replenish Underground Wells and Aquifers
- Make recycled water available to each household with no added cost
- Recycle all water and sludge from waste treatment plants and existing septic systems
- Recycle the sludge into power pellets and fertilizer
- Clean up septic waste and stormwater runoff from streams and beaches
- Create microgrids to create recycled water locally
- Reduce disaster impact by decentralizing utilities

EDITOR'S LETTER

By Kevin Westerling

Chief Editor, editor@wateronline.com

When Bill Gates Drank Poop Water

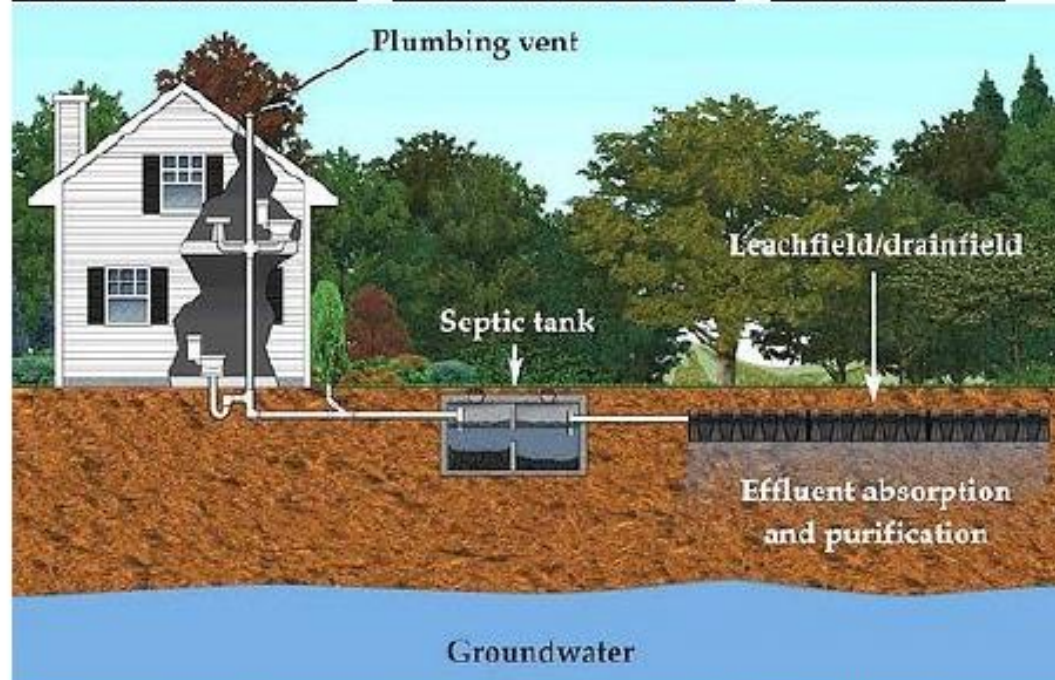
You may have seen it on *The Tonight Show Starring Jimmy Fallon* or learned about it from *Forbes*, CNN, *Wired*, NPR, or *Popular Mechanics*.

When Bill Gates drank water purified from sewage, promoting a new technology funded by the Gates Foundation, it blew people's minds. The general public, however, is a different story, and squeamishness surrounding "toilet to tap" (a term advocates avoid) has been a major hurdle in getting this needed resource implemented.

- Direct and indirect potable reuse will need to be increasingly utilized as the stresses of population growth and drought converge,
- Gates normalized the idea for millions overnight, creating waves of mainstream influence that continue to resonate and turn the tide toward widespread public acceptance.

A crash course in septic systems and how they're damaging the environment

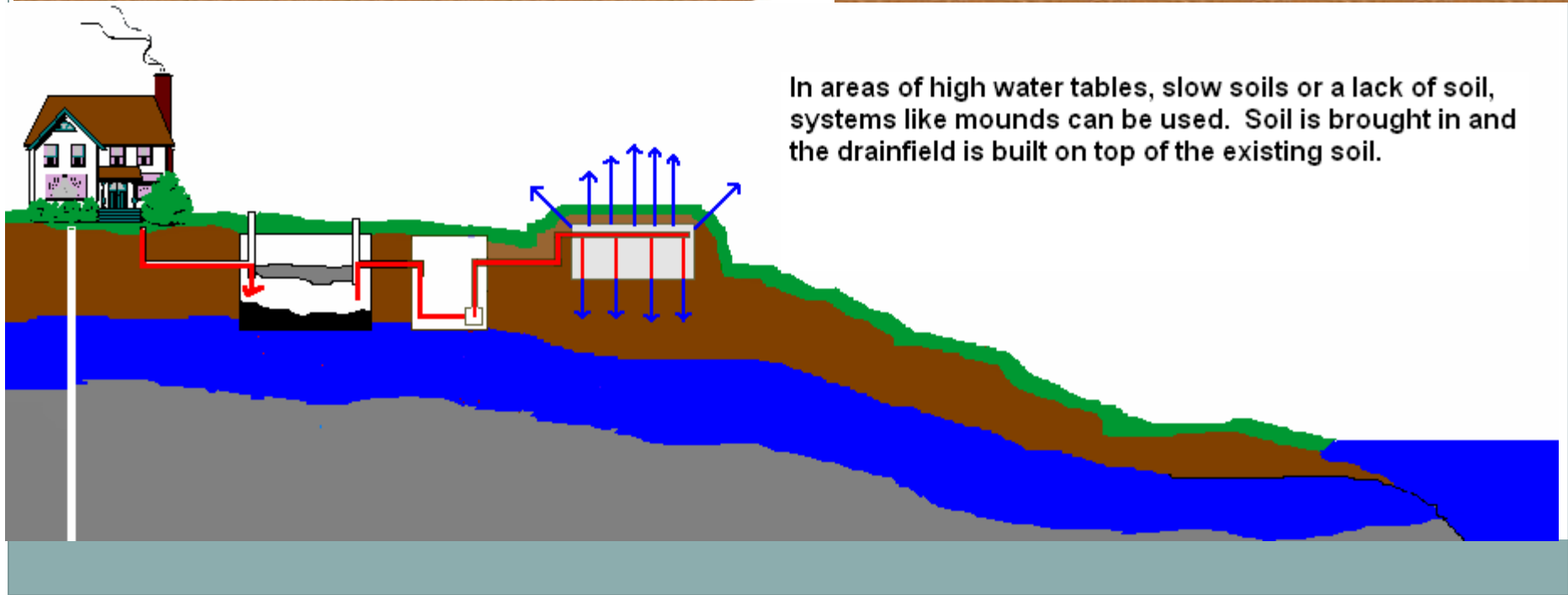
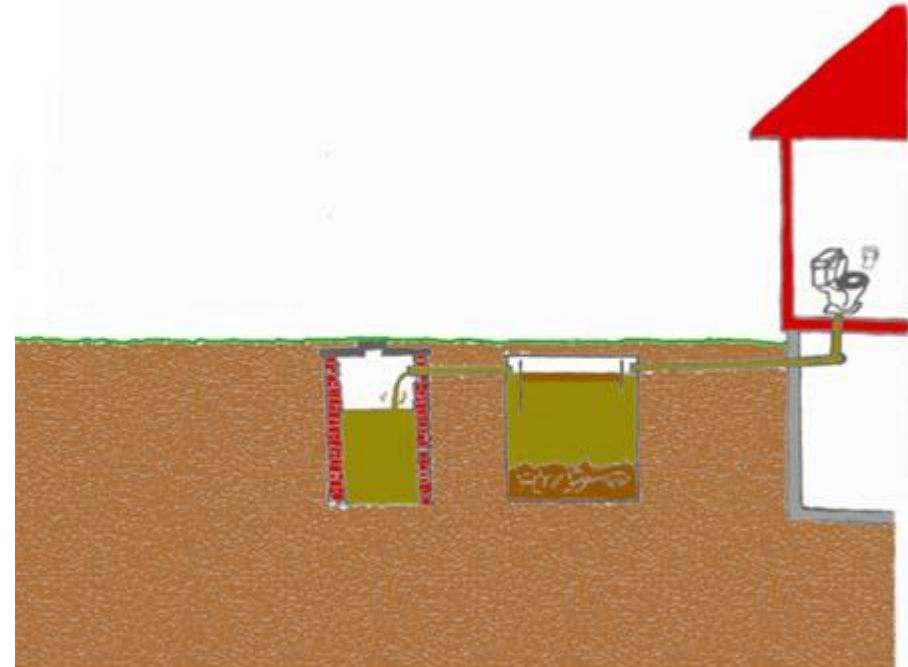
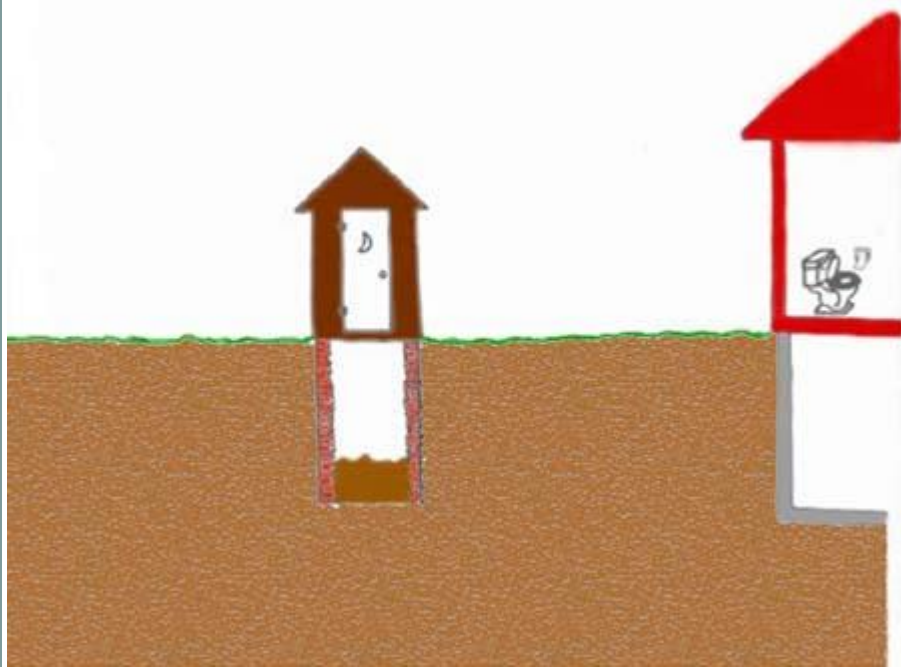
FEBRUARY 23, 2011 | ADAM LINDQUIST | 1 COMMENT



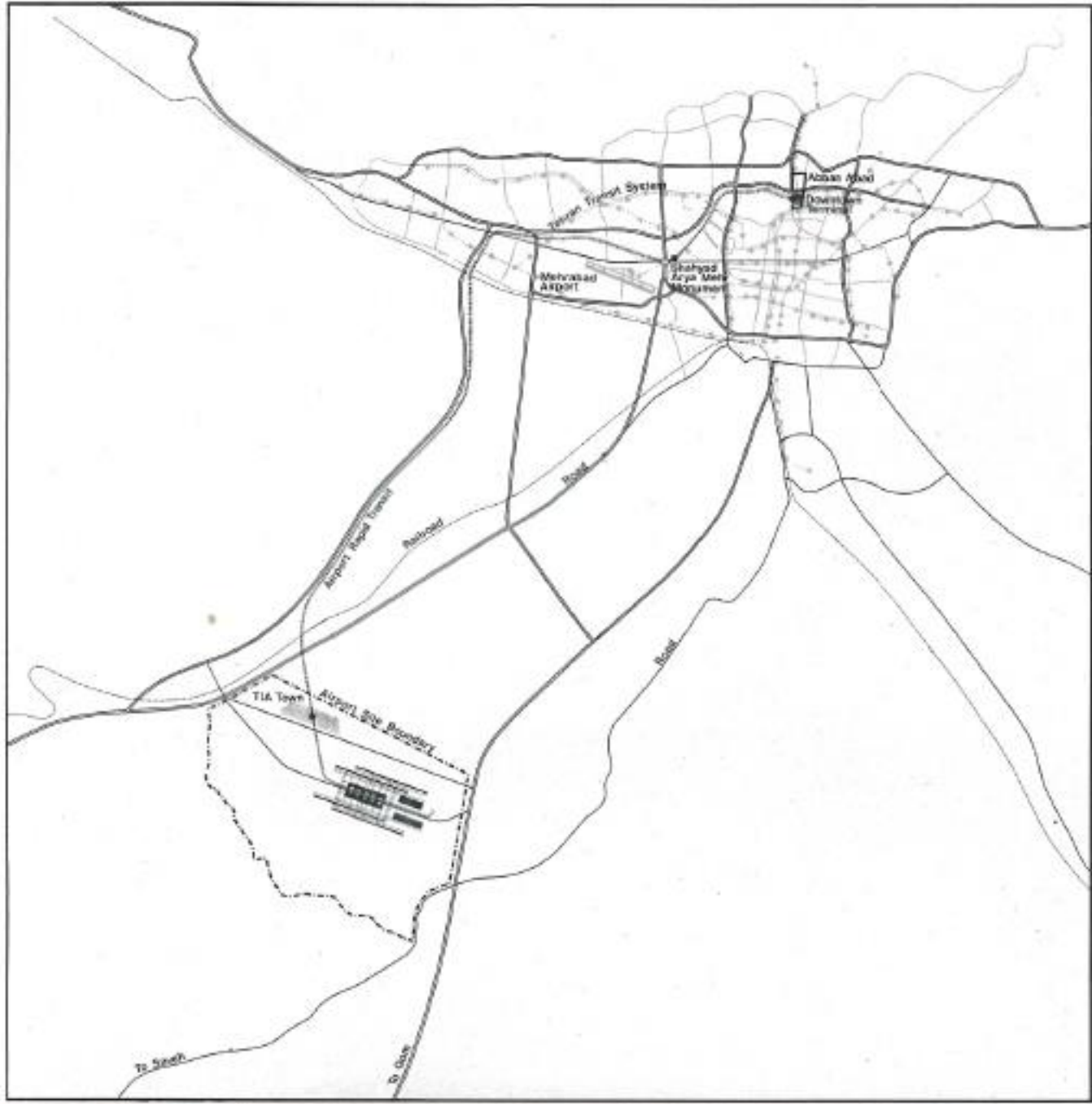
(<http://www.flickr.com/photos/nainanora/5471794815/>)

In his State of the State Address on February 3, 2011, Maryland Governor Martin O'Malley made the following statement:

the pollution that's caused by storm-water run-off. But among the big four causes of pollution in the Bay, there is one area of reducing pollution where so far we have totally failed, and in fact it's actually gotten much worse, and that is pollution from the proliferation of septic systems throughout our State – systems which by their very design are intended to leak sewage ultimately into our Bay and into our water tables.

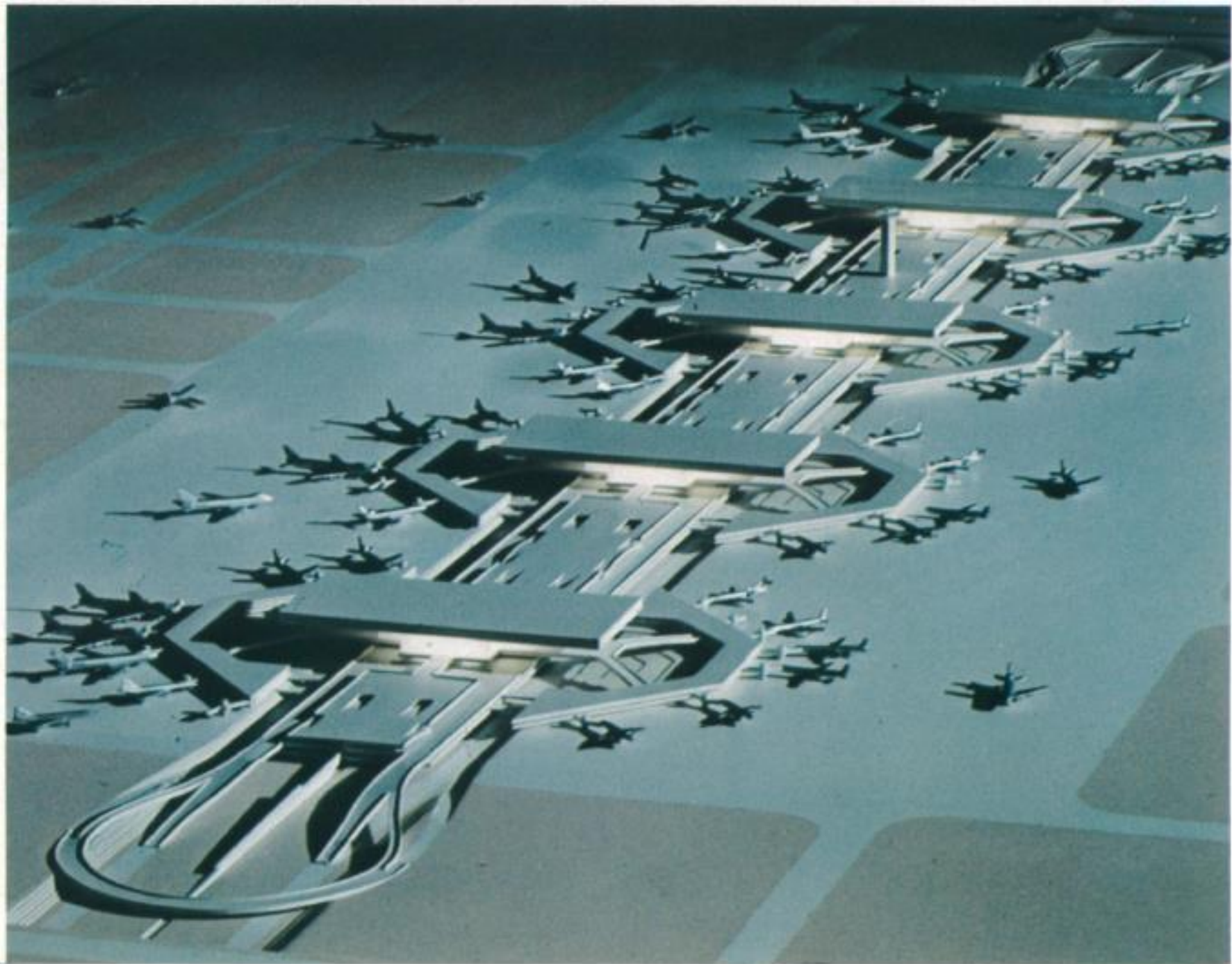


In areas of high water tables, slow soils or a lack of soil, systems like mounds can be used. Soil is brought in and the drainfield is built on top of the existing soil.



AEROPORTO PER TEHRAN

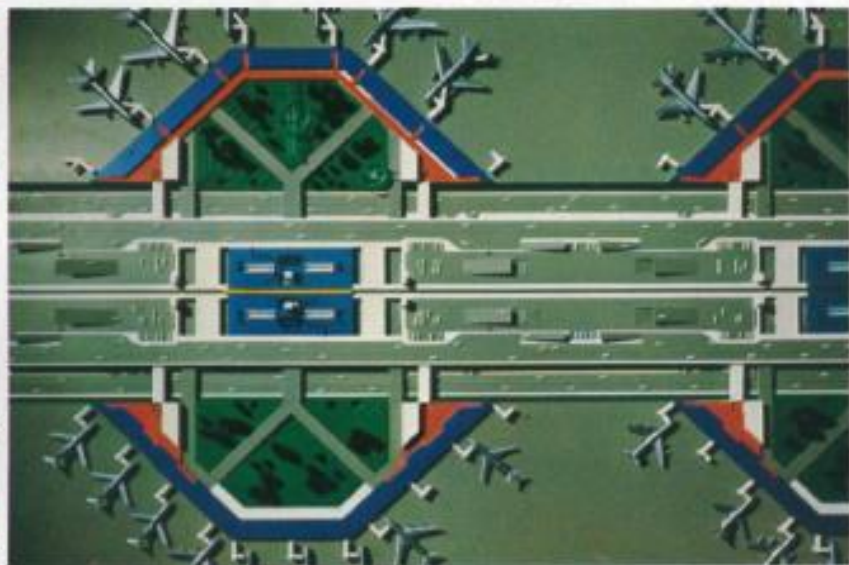
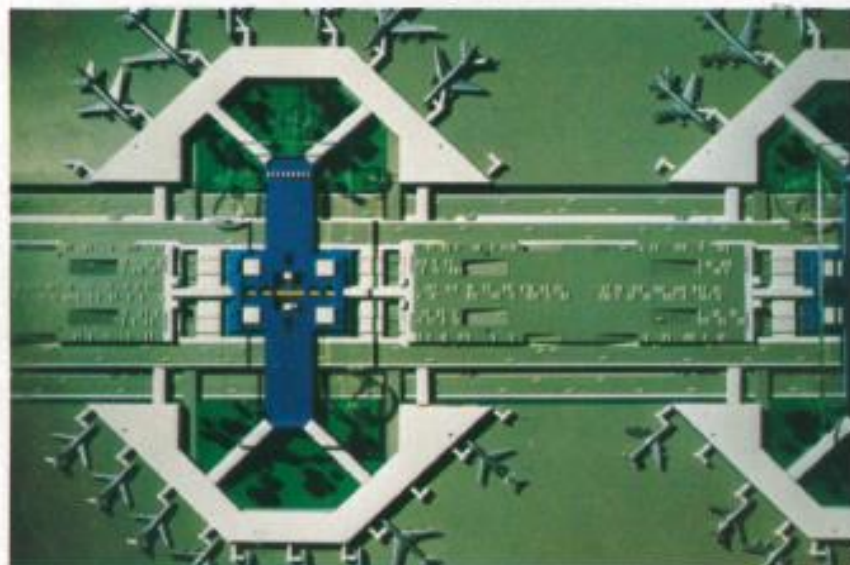
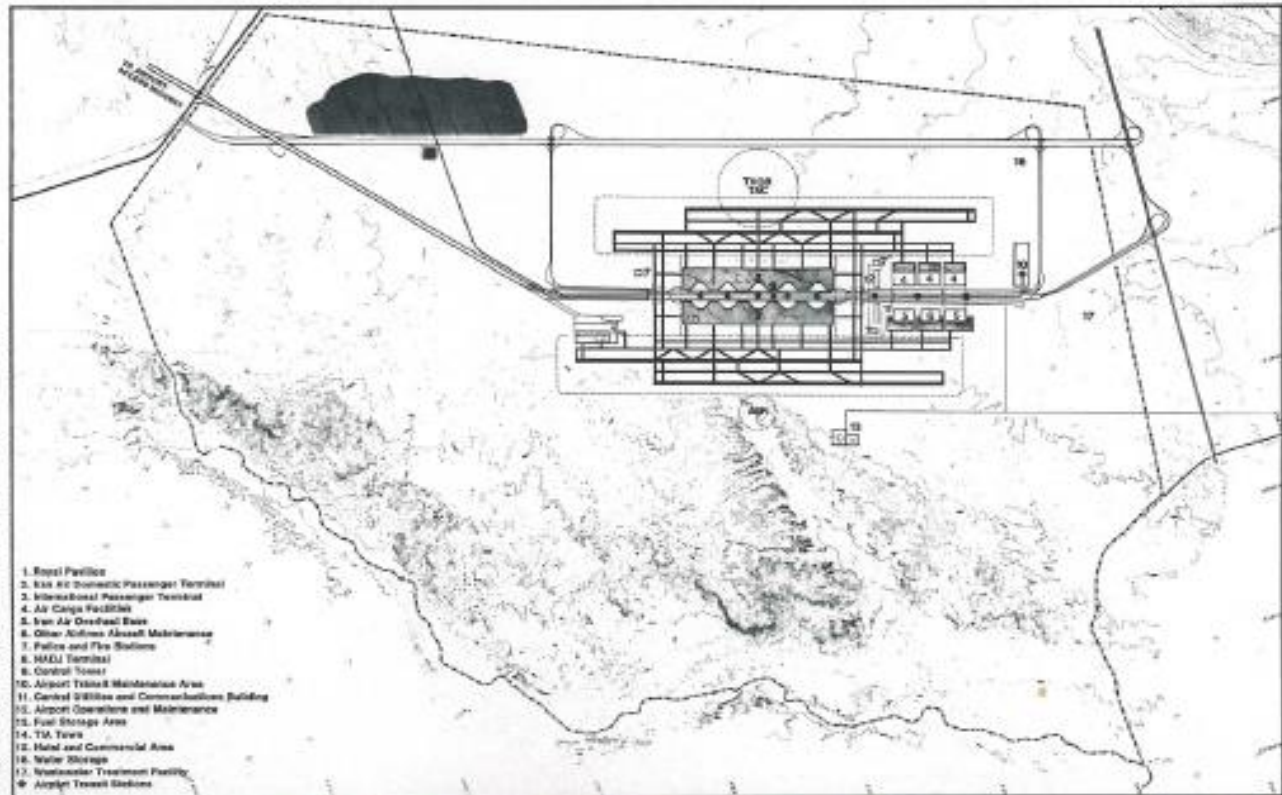
linear modular airport terminal
aérogare linéaire modulaire



AEROPORTO DI TEHRAN
 ARCHITETTI:
 TIPPETTS-ABBETT-
 MCCARTHY-STRATTON
 ARCHITETTI ASSOCIATI;
 W. PROKOSCH, R. J. HODGE,
 D. R. PEIRCE,
 A. FARMANFARMAIAN
 1975-...

The architects Tippetts-Abbett-McCarthy-Stratton of New York have asked Domus to publish a preview of their design for the new Tehran airport.

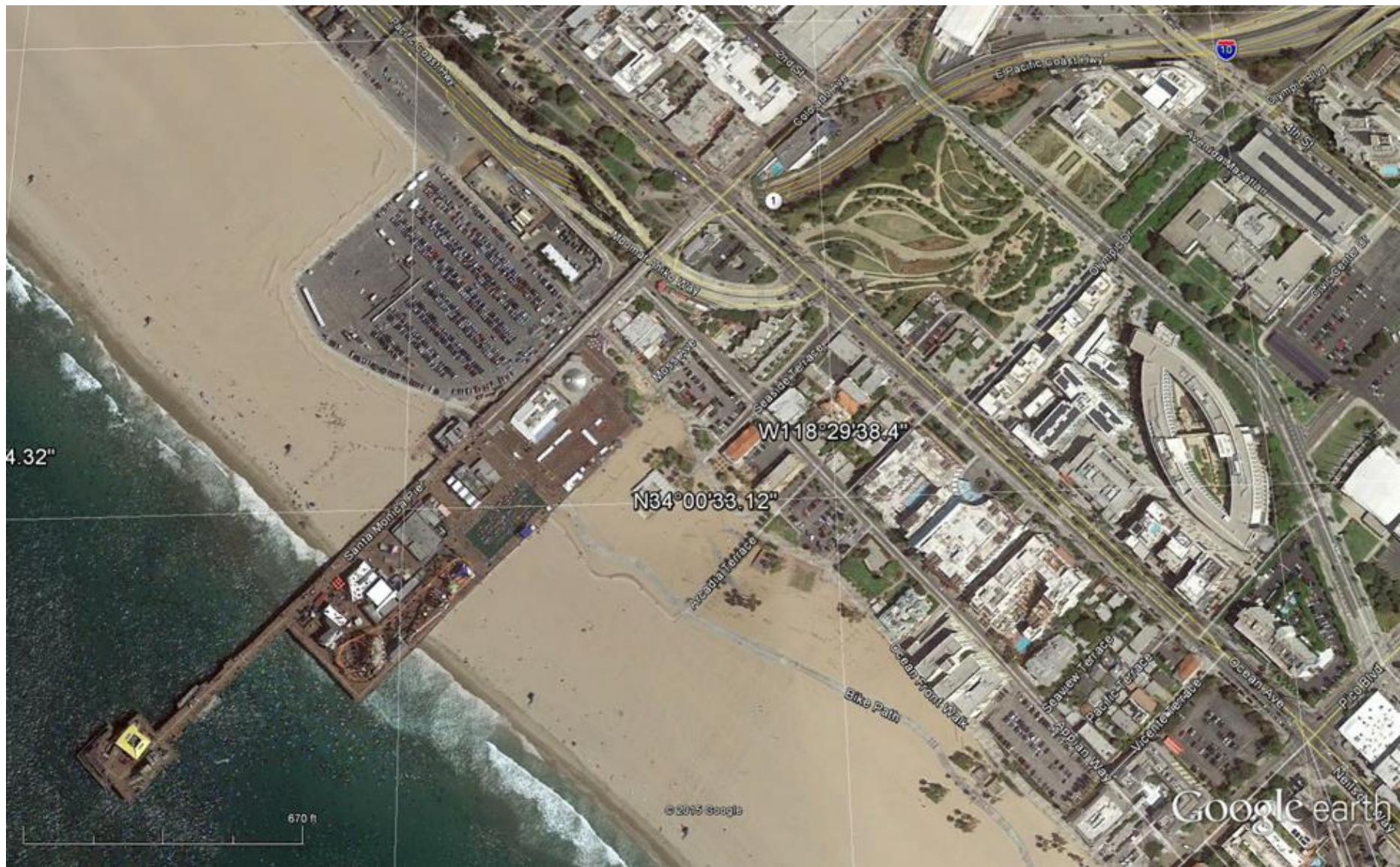
This *modular* and *linear* design is the most recent instrumental form for an airport. An airport, this one, that will connect almost in a straight line the USA and the Far East (in addition to branch flights) and which represent, also formally, a new dimension. Air links bring peoples closer. It is a mistake, in my opinion, to say that this makes the living world smaller. To my mind, it broadens the scope for relations among populations, leading consequently to that civilised coexistence which our final geographical knowledge of this has made ineluctable. *Gio Ponti*







IAMNOTASTALKER.COM

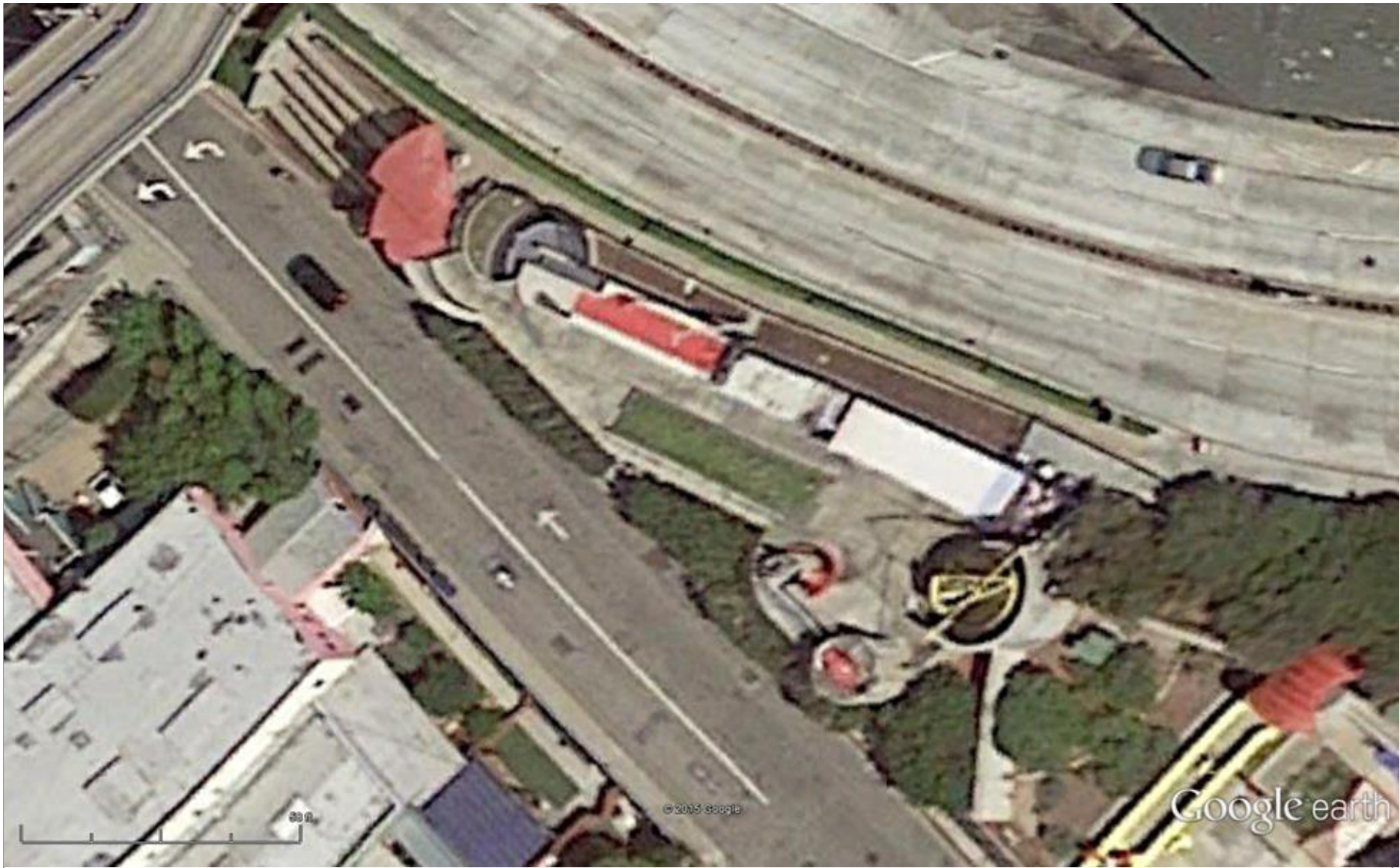


4.32"

670 ft

© 2015 Google

Google earth



Lessons Learned from Malibu to HMB

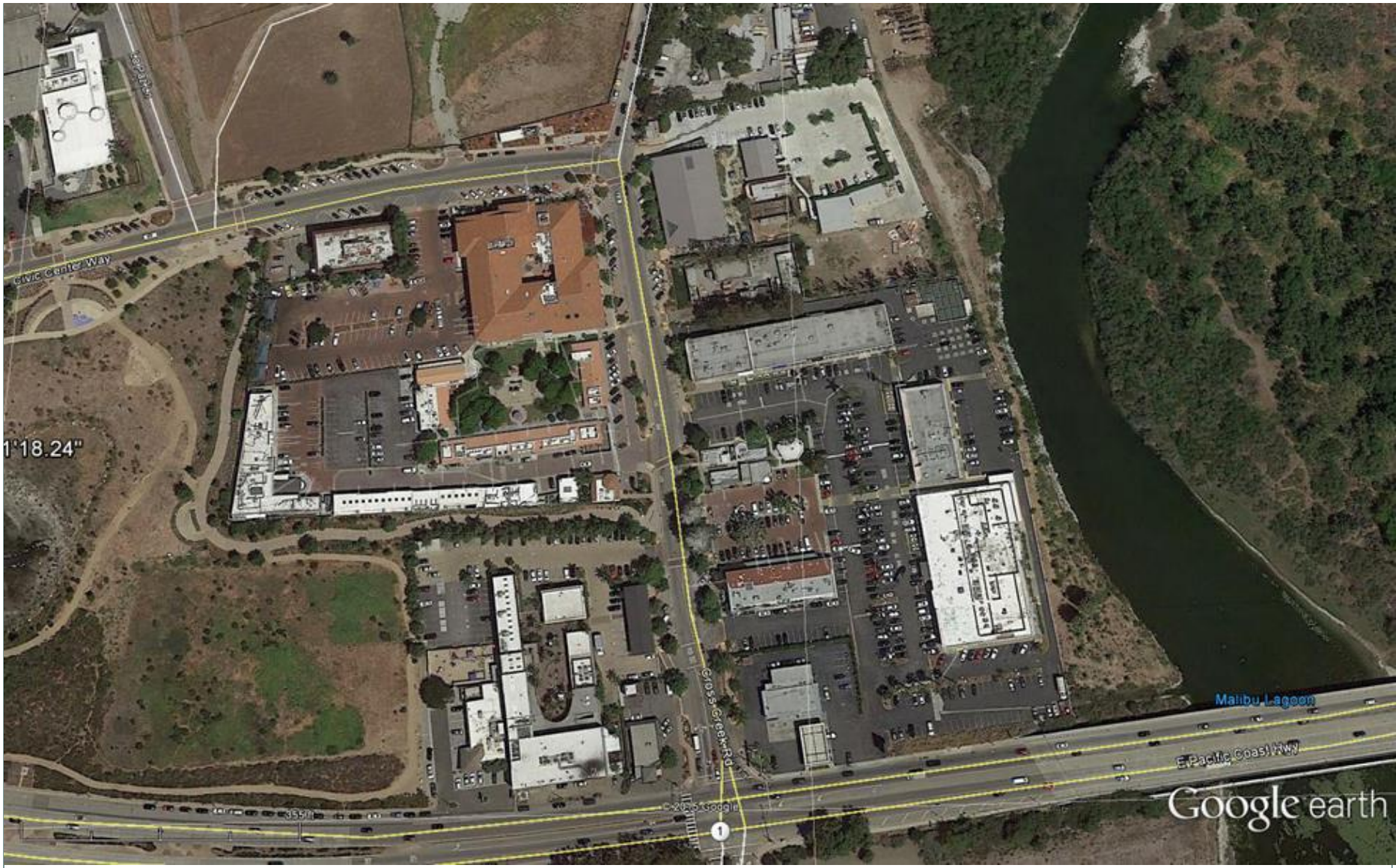


Malibu

- Polluted oceanfront, rivers and streams
- Long and Narrow Land
- Hills and Ocean boundaries
- Limited access
- Relies on Tourism
- Septic Only
- No Growth Fear/Politics

HMB

- Polluted oceanfront, rivers and streams
- Long and Narrow Land
- Hills and Ocean boundaries
- Limited access
- Relies on Tourism
- Septic and Sewer
- No Growth Fear/Politics



1" = 18.24"

Google earth





3103 ft

© 2015 Google
Data SLMF, SFLM, SA, GPC,
Image © 2015 TerraMetrics

Google earth



W118°41'44.16"

N34°02'16.8"

W118°41'18.24"

W118°40'

N34°01'50.88"
© 2015 Google

1069 ft

Google earth



304 ft

© 2015 Google

Google earth



Water board, city struggle over septic permitting issues

Posted: Wednesday, June 24, 2009 12:00 am

[2 comments](#)

Malibu city officials say the city is not entirely responsible for the poor water quality of its local ocean and lagoon waters, and should not have to front the full cost to mitigate pollution problems.

By Olivia Damavandi / Staff Writer

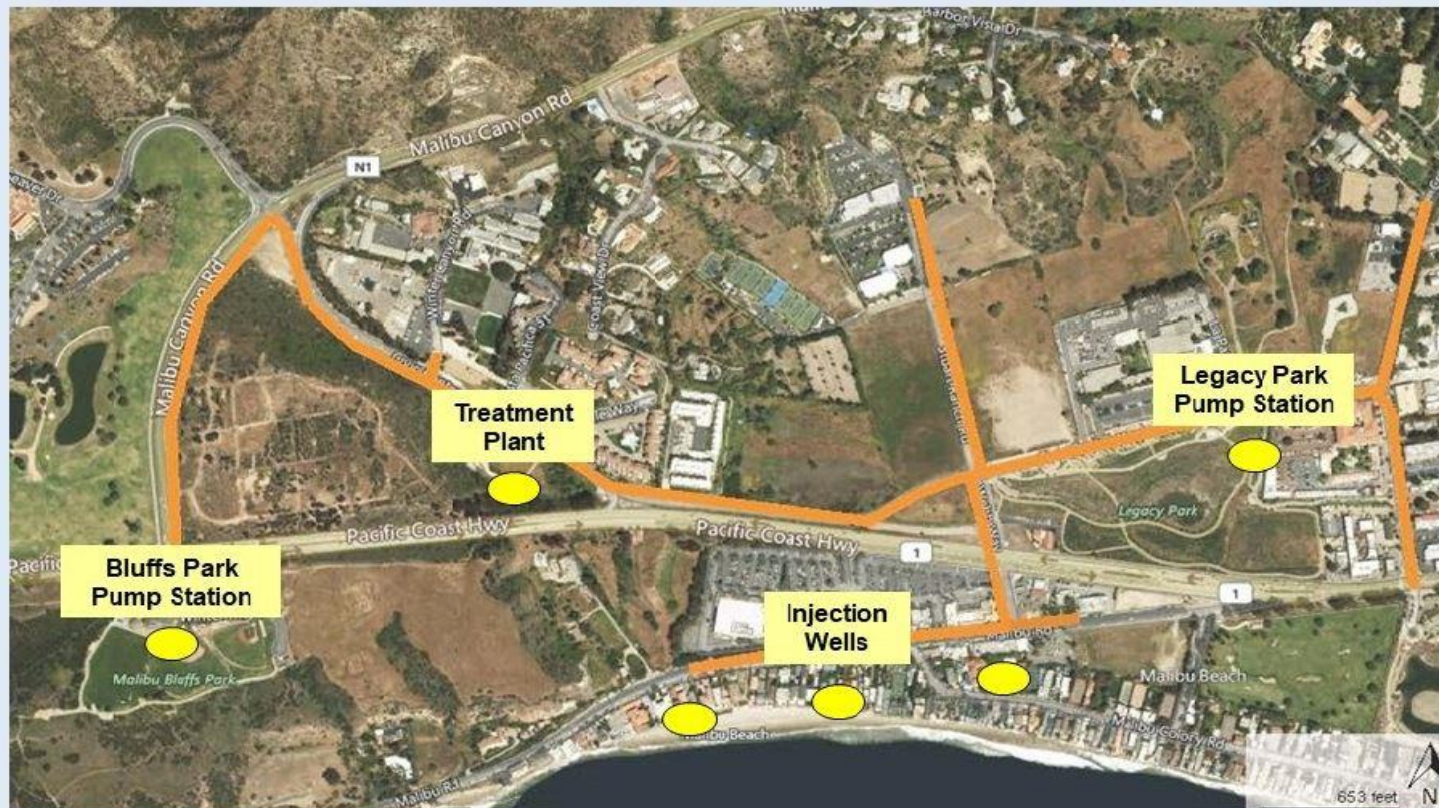
A palpable tension existed last week when Malibu city officials and Los Angeles Regional Water Quality Control Board members met at City Hall to renegotiate their memorandum of understanding for the management of onsite wastewater treatment systems, commonly known as septic systems, within the city. The tension is the result of continuing problems over water quality in Malibu's ocean and lagoon waters, and who is responsible for the pollution.


That, however, did not sit well with a member of the Malibu Surfing Association, which issued the statement, "The bottom line is the toilet is full and it's overflowing and the City of Malibu wants to do another study to see if they should call a plumber."

Malibu Solution after 20 years of delay



Phase One General Project Overview



 Pipeline System

SUMMARY OF PHASE ONE (AS OF MAY 2019):

- All developed properties are now connected, including all City-owned properties
- New commercial development anticipated to be completed and connected in May
- Remaining properties are undeveloped
- Currently treating an average flow of 50,000 – 70,000 gallons per day
- All treated flow has been in compliance with permit requirements
- Approximately 32,000 linear feet (six miles) of wastewater and recycled water lines were installed
- Currently supplying 47,500 – 66,500 gallons per day of recycled water
- Phase One Cost: \$60.1 million

Alternative Cost for Local Microgrid Solution

70,000 GPD= 7 Plants (@ 10,000 GPD each) x \$400 K each install = \$ 2.8 million

\$2,495,000 - 11948 Beach Club Way, Malibu

MLS® #SR15233144

\$2,495,000

2 Bedroom, 3.00 Bathroom, 1,924 sqft
Residential on 0 Acres

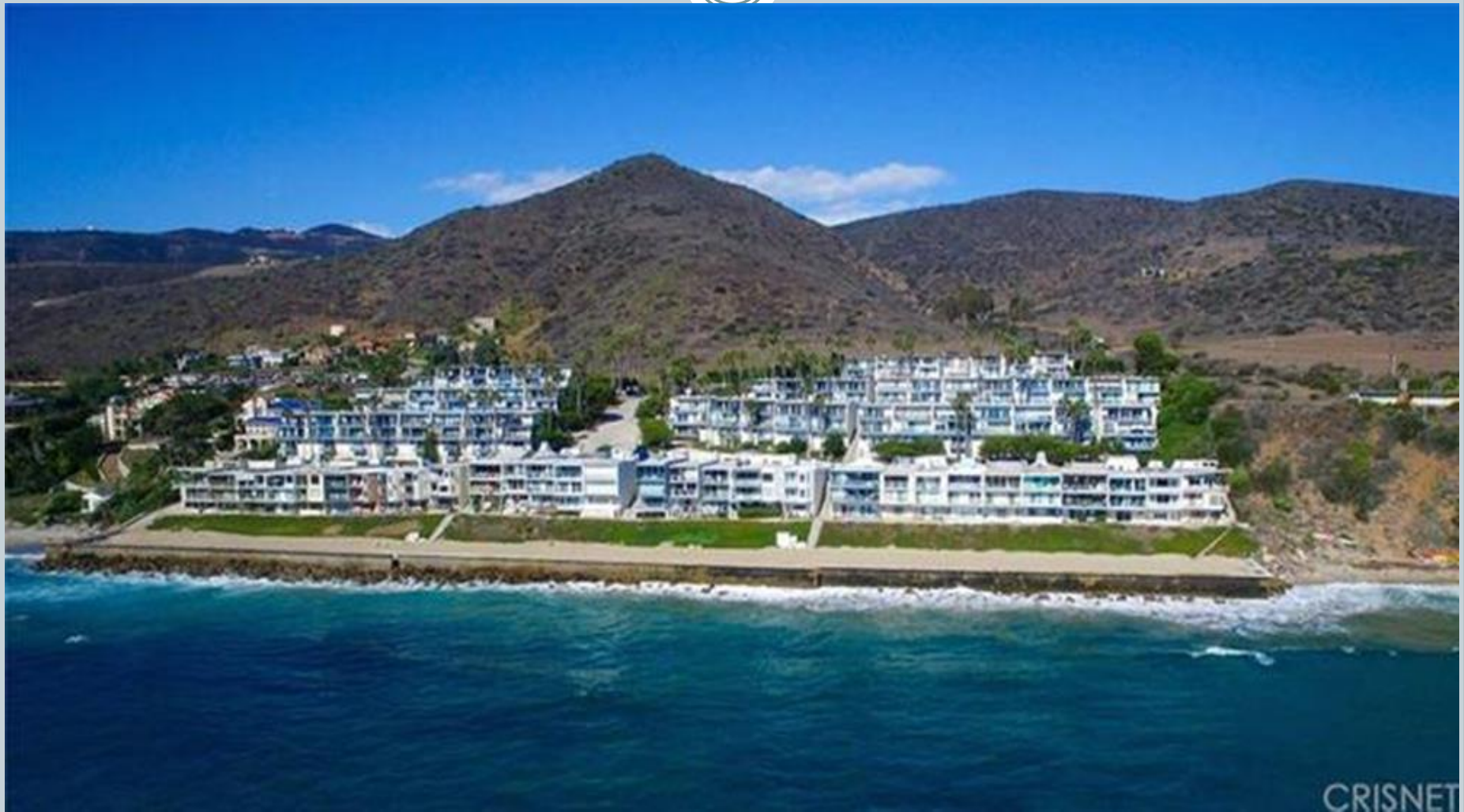
N/A, Malibu, CA

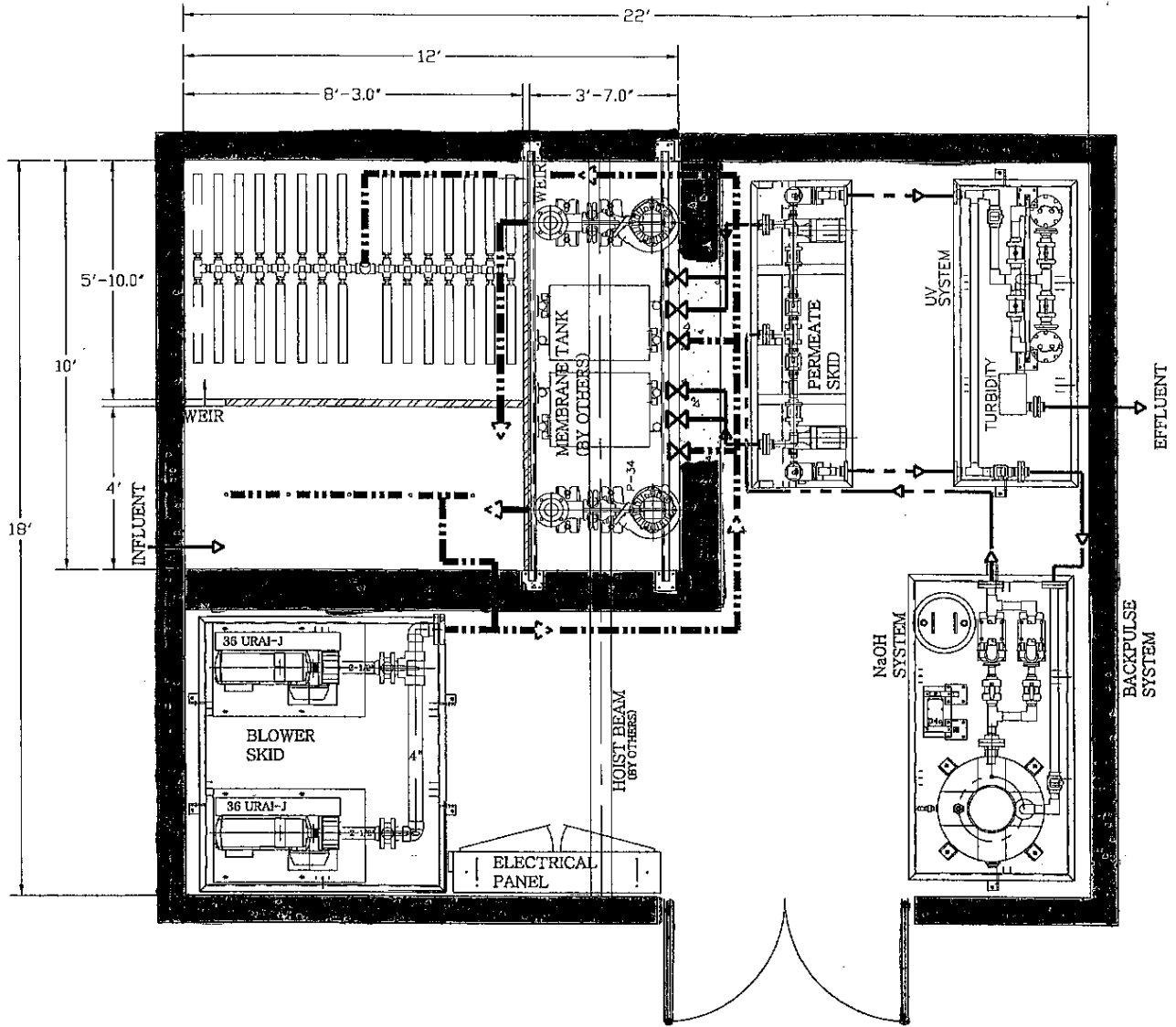
Spectacular FRONT ROW Malibu Bay Club Townhome! Explosive unobstructed ocean views from everywhere! Recently updated with wood floors, granite counters, and more! Truly turn key with a premier front row location! Steps to the sand! Open floor plan with skylights and a gourmet center island kitchen. Family room with built ins and a fireplace. Second level, over-sized master suite with large walk in closet and killer ocean views, even from the master bath! Gated community with pool. Hurry, this will not last!

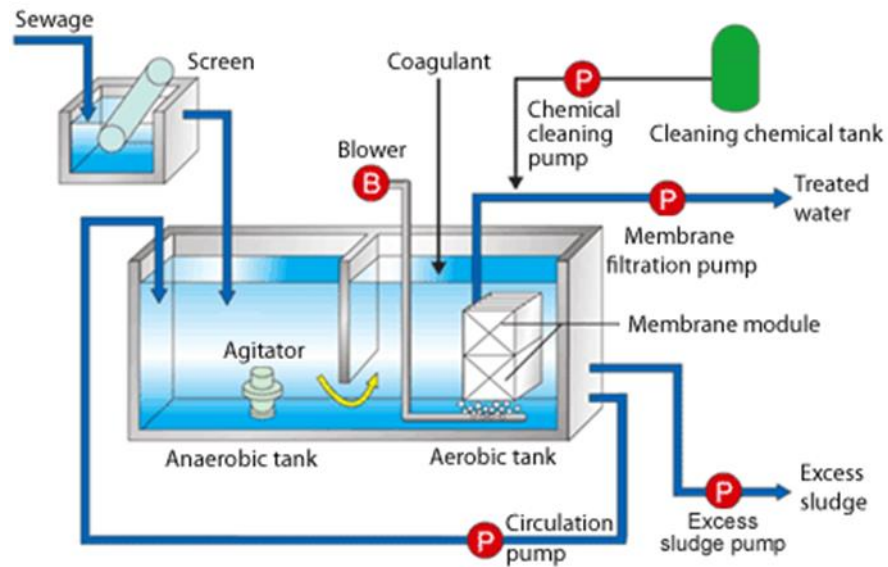
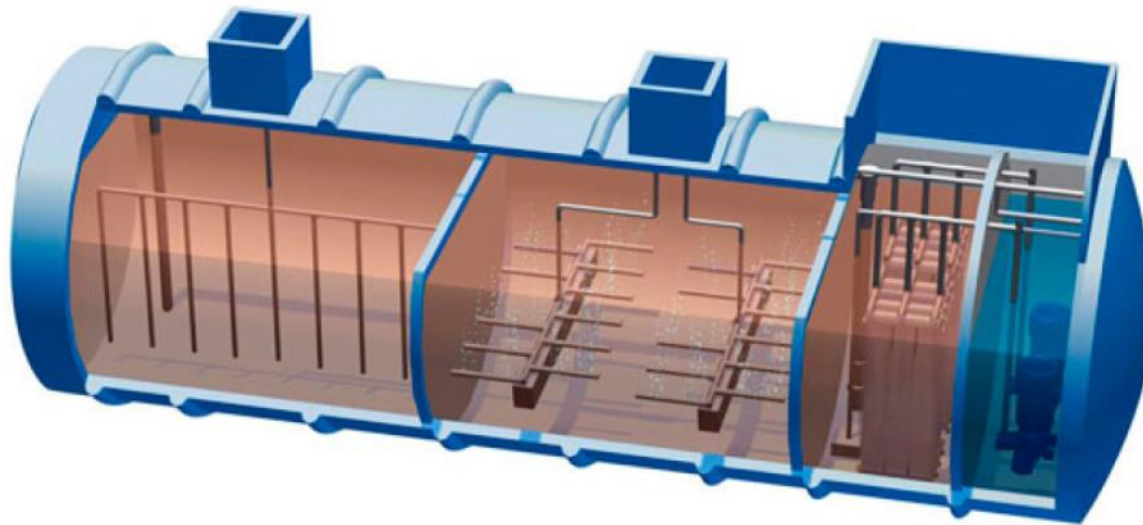
Built in 1972



Malibu Beach Club Condos





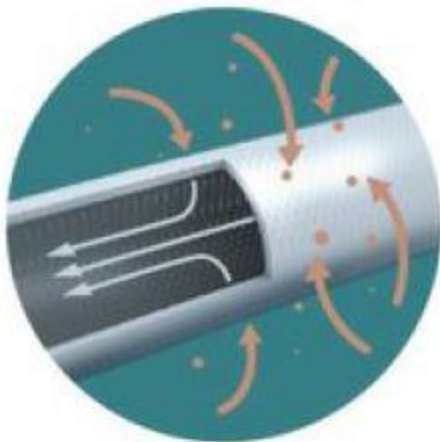


Advanced water purification

Advanced water purification is a three-step process that cleans water to a level similar to that of distilled water.

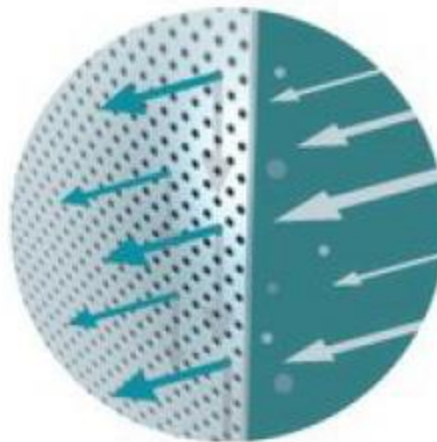
Microfiltration

Water is sucked through thousands of tiny straws — each no wider than three hundredths the thickness of a human hair — that filter out bacteria, protozoa and suspended particles.



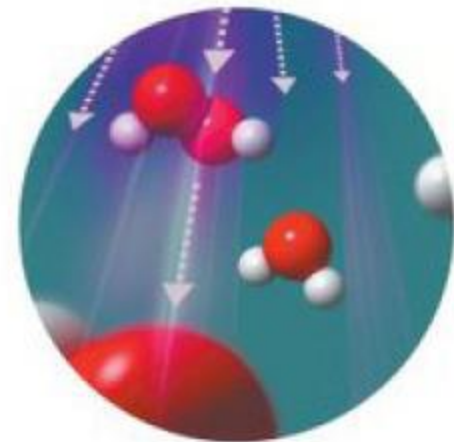
Reverse osmosis

Water, under great pressure, is then forced through a semipermeable membrane with holes small enough to let only water molecules pass through.



Ultraviolet light

Intense ultraviolet light breaks up remaining organic molecules. Hydrogen peroxide then oxidizes the remnants of broken molecules, disinfecting the water.



Existing Modular Technology



ZENON WASTEWATER TREATMENT SYSTEM



From commercial projects in the United States to upscale resort developments in the Caribbean with strict water conservation guidelines, ZENON's membrane technology offers cost-effective development opportunities that are in harmony with the environment.

ZENON has the best wastewater purifying systems to meet or exceed the world's toughest discharge requirements. This is why land developers have consistently chosen our membrane systems for schools, shopping malls, golf courses and resorts.

The modular membrane systems can be installed in virtually any location. In fact, with their small footprints, ZENON systems are a key part of many award-winning designs because they blend easily into the surroundings and are free of unpleasant odors.

If a wastewater treatment plant already exists, membrane technology is able to immediately upgrade the quality of the effluent and the capacity of the plant by up to three times, with no additional tank construction. These units are simple to operate and can even be controlled remotely by computer.

The effluent quality produced by the membrane system is so high that it can be immediately reused for landscape irrigation or for toilet flush water. The reuse of treated wastewater reduces the amount of fresh water drawn from the environment by up to 85%, greatly reducing operating costs.

Water Treatment & Tertiary Systems

Z-BOX S

up to 400,000 gpd (1,514 m³/d)

- Fully integrated process and control components
- Less than 6-foot (1.8-meter) tall system readily fits into any building
- Side-loading membrane door for easy access



Z-BOX M

up to 350,000 gpd (1,325 m³/d)

- Equipped with rugged reinforced membranes to withstand the harshest environments and the most difficult-to-treat water sources
- Fully integrated, skid-mounted system



Z-BOX L

up to 3.25 MGD (12,300 m³/d)

- Easily fits beneath a 9-foot (2.7-meter) ceiling
- Side loading membrane door for easy access



Wastewater Treatment Systems

Z-MOD S

up to 80,000 gpd (303 m³/d)

- Fully integrated wastewater treatment plant
- Can be buried or installed above ground (smaller flows available for below ground systems)
- Complete plug-and-play design with all components in a single tank
- Can operate at MLSS concentrations between 3,000 and 15,000 mg/L



Z-MOD M

up to 110,000 gpd (416 m³/d)

- Fully integrated skid-mounted system
- Can operate at MLSS concentrations between 3,000 and 15,000 mg/L



Z-MOD L

up to 1 MGD (3,785 m³/d)

- Containerized or skid-mounted components
- Dual-train systems
- Can operate at MLSS concentrations between 3,000 and 15,000 mg/L



Modular Building Size Systems



Packaged plants for water
and wastewater treatment



Smart solutions for water reuse and wastewater treatment

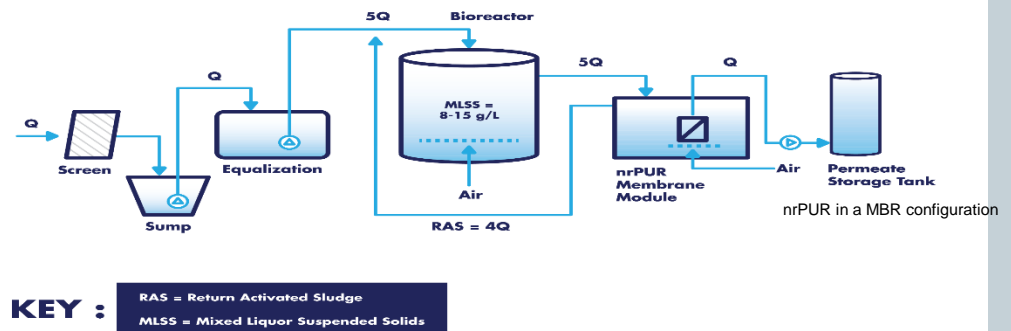
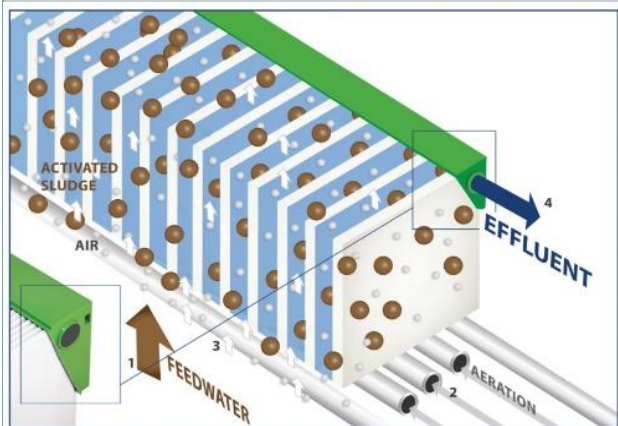
nrPUR – UF Membrane Platform

nrPUR is a pre-assembled and factory-tested permeate platform with integrated automation, permeate pumps, air scour blowers and instrumentation. With a completely modular design, nrPUR is scalable from less than 2,500 gpd (10 m³/d) to over 1,000,000 gpd (4,000 m³/d) making it ideal for onsite wastewater treatment.

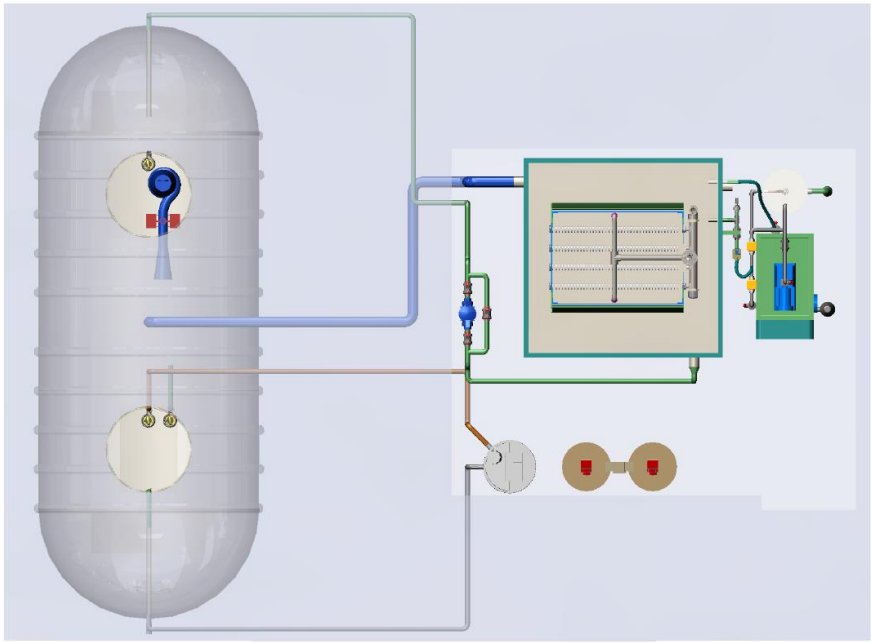
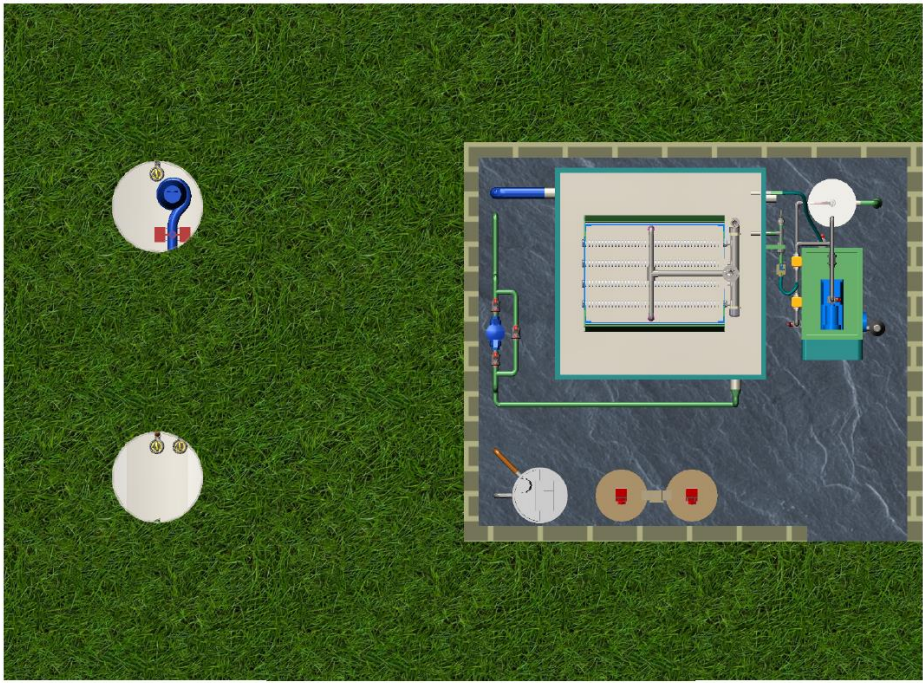
The nrPUR's UF membranes offer the optimal mechanism for the advanced separation of suspended solids and act as a physical barrier to any solids larger than 0.1 micron, ensuring the highest quality treated water for discharge or reuse.

Optimal solution for water reuse

nrPUR can be easily combined with biological treatment to supply a complete advanced wastewater treatment solution such as a Membrane BioReactor (MBR). Alternatively, the nrPUR system can be used to upgrade existing conventional wastewater treatments plants (e.g. Activated Sludge, Rotating Biological Contactors, etc) to improve discharge quality and produce safe water for reuse.

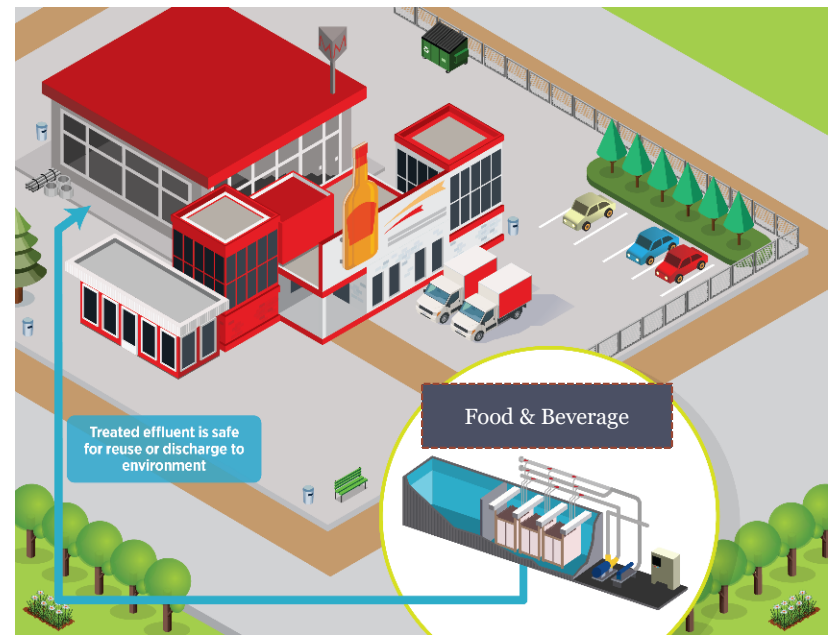
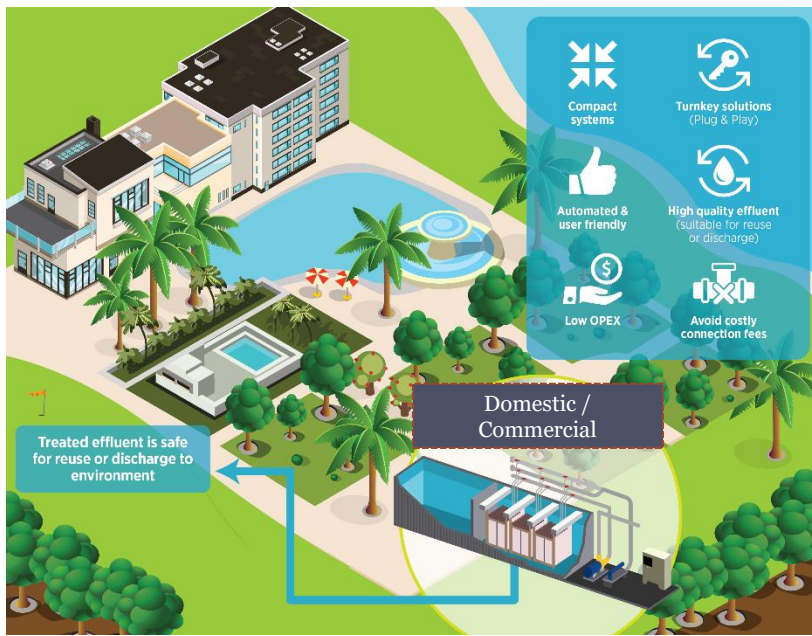


Example: Below ground configuration - > 10,000 gpd





Turn-key solutions for organic wastewater treatment



For more information:

Sales@enereau.com

www.enereau.com

Infrastructure



- 60 year old pipes, stations, pumps need replacement
- Long distances, One-way to Plant. No returns
- Difficult & Expensive to retrofit, upgrade, expand
- Meeting the needs of growing communities
- Recycling at 13-15%
- Sewage spills pollute environment, aquifers
- Storm water runoff most difficult to handle.
- Cannot see leaks, spills, breaks and pollution



SEWER SYSTEM IMPROVEMENT PROGRAM | Grey. Green. Clean.

San Francisco's Wastewater Treatment Facilities

Serving over 800,000 customers, the San Francisco Public Utilities Commission (SFPUC) owns and operates San Francisco's combined sewer system, which collects and treats both sewage and stormwater runoff.

On a typical day, a vast network of pipes creates a "city under the City" that transports and delivers San Francisco's wastewater to one of our two local treatment plants: the Southeast Treatment Plant or the Oceanside Treatment Plant. During a storm North Point Wet-Weather Facility is activated to treat additional flow. Each treatment facility plays an integral role in handling and treating the City's flows before being discharged into the San Francisco Bay or the Pacific Ocean.

Stormwater enters the combined sewer system through the thousands of catch basins along the street. Since most of San Francisco is paved over, the rainwater that falls from the skies usually ends up in our sewers. Each non-rainy day an average of 80 million gallons of wastewater is collected and transported to one of the two treatment plants. When it rains, our wastewater system can collect and treat up to 575 million gallons a day (MGD).

GET INVOLVED!

We offer free bike and walking tours of our wastewater treatment plants and green infrastructure projects. Visit our website for upcoming tours and more info about the SSIP upgrades. sfwater.org/ssip

North Point Wet Weather Facility



- Built in 1951
- Only active during wet weather
- Treats up to 150 MGD during rain storms
- Located at Bay Street and The Embarcadero

OUR COMBINED SEWER SYSTEM

3
Treatment Facilities

1,000+
Miles of Pipes

80
Million Gallons
Treated Non-Rainy Day

575
Million Gallons
Treated Rainy Day

40
Billion Gallons
Treated Annually



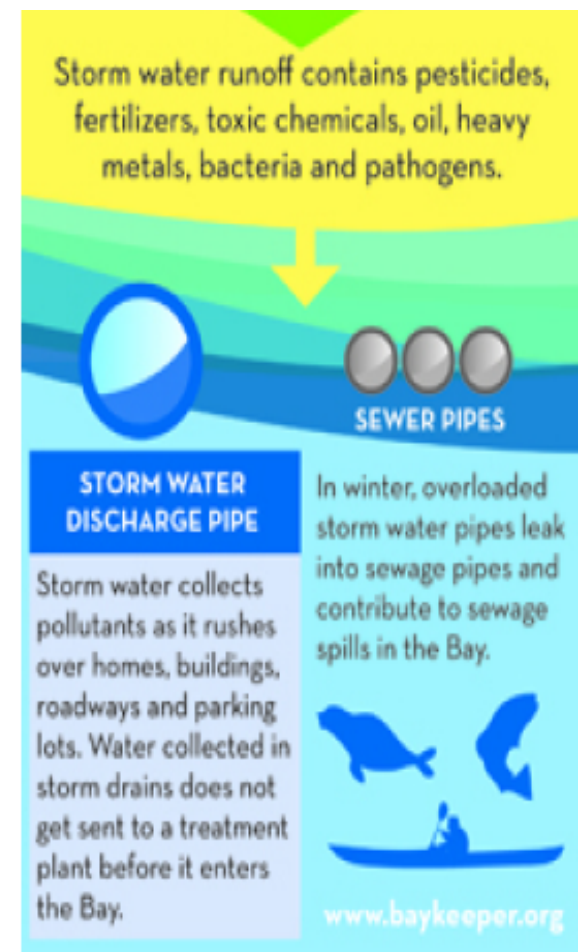
Facility Map



Water Pollution Control Plant: flow routing and influent and effluent sampling stations.

The wastewater treatment process consists of screening, grit removal, primary sedimentation, secondary (biological nutrient removal) treatment, secondary clarification, filtration, disinfection, and dechlorination.

- Many Bay Area creeks cannot support healthy fish populations because of pesticide contamination.
- Fertilizers contribute to growth of algae and reduced oxygen in the Bay.
- Bay fish are unsafe to eat because of high PCBs and mercury concentrations.
- Copper causes salmon to lose their ability to find their spawning streams.
- Nickel is lethal to shorebirds.
- Oil and grease are toxic to the hearts of fish.
- Bacteria and other pathogens make waterways unsafe for recreational activities like boating and swimming.
- Dirt from construction zones and eroded creeks clouds the water, destroying habitat and impeding healthy plant growth.
- Trash such as plastic bags and bottles clogs waterways and can suffocate and disable wildlife. Cigarette butt filters release toxic chemicals and become lodged in the digestive tracts of seals, birds, and many sea creatures.



Recycling water and energy

EBMUD's wastewater treatment plant is more than a treatment plant –it's a green factory. Biodegradable wastes in sewage, food scraps and grease from local restaurants, plus waste streams from wineries and poultry farms are mixed together in large tanks and "digested" by microorganisms. The biogas emitted by the microorganisms is captured



Sausalito-Marín City Sanitary District

Wastewater Collection, Treatment and Safe Disposal to Protect Our Community's Health and the Bay

Wednesday April 20, 2016 | [Odor Control Status](#) | [Site Map](#)

Capital Improvement Projects

Projects that are under construction or in final design

During the next five years, the District will carry out over \$30 million in critically needed improvements to our community's sewer pipelines, pumps, manholes and treatment facilities. The goal: to upgrade the sanitary systems so that it will continue to reliably protect public health and the environment, while achieving regulatory requirements.

Below are links with updates on current construction projects.

Secondary Sediment Tanks Rehabilitation Project

Conclusion



- Technology is there, people are not !!!!!!!
- Clean Water Act has been dormant in many cases
- Educate, Motivate, Activate and Litigate
- Great opportunity to save water for multiple purposes by going local and modular
- Reduce costs to Cities for infrastructure
- Reduce inefficiencies in transport
- Recapture the Aquifers, Rivers and Bays
- Purify runoff and waste streams locally
- HEAL THE BAY

Future for CA Wastewater Re-use



- In 2014 WaterReuse estimated that by 2020 over 2,300 MGD treated wastewater will be discharged to surface waters or the ocean.
- Over 1,000 MGD could be used for indirect potable re-use which would meet the residential, commercial and industrial water needs for 8,000,000 people, or 20% of projected population of CA in 2020
- A number of communities throughout the country are evaluating the use for direct potable re-use to supplement their current water supply

Recommendations



- Discontinue expansion of existing Sewage Treatment Plants except to maintain and purify (Tertiary)
- Due to sea level rise, start construction of retention and underwater storage facilities along the coastline, creating platforms and foundations for waterfront parks
- Mandate Wastewater microgrids with tertiary treatment at the local community level at 10,000 GPD modular units, combining existing proven technology for local recycling
- Ban the use of Septic systems and require tertiary treatment at the residential level.

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Q & A

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