Wastewater Management

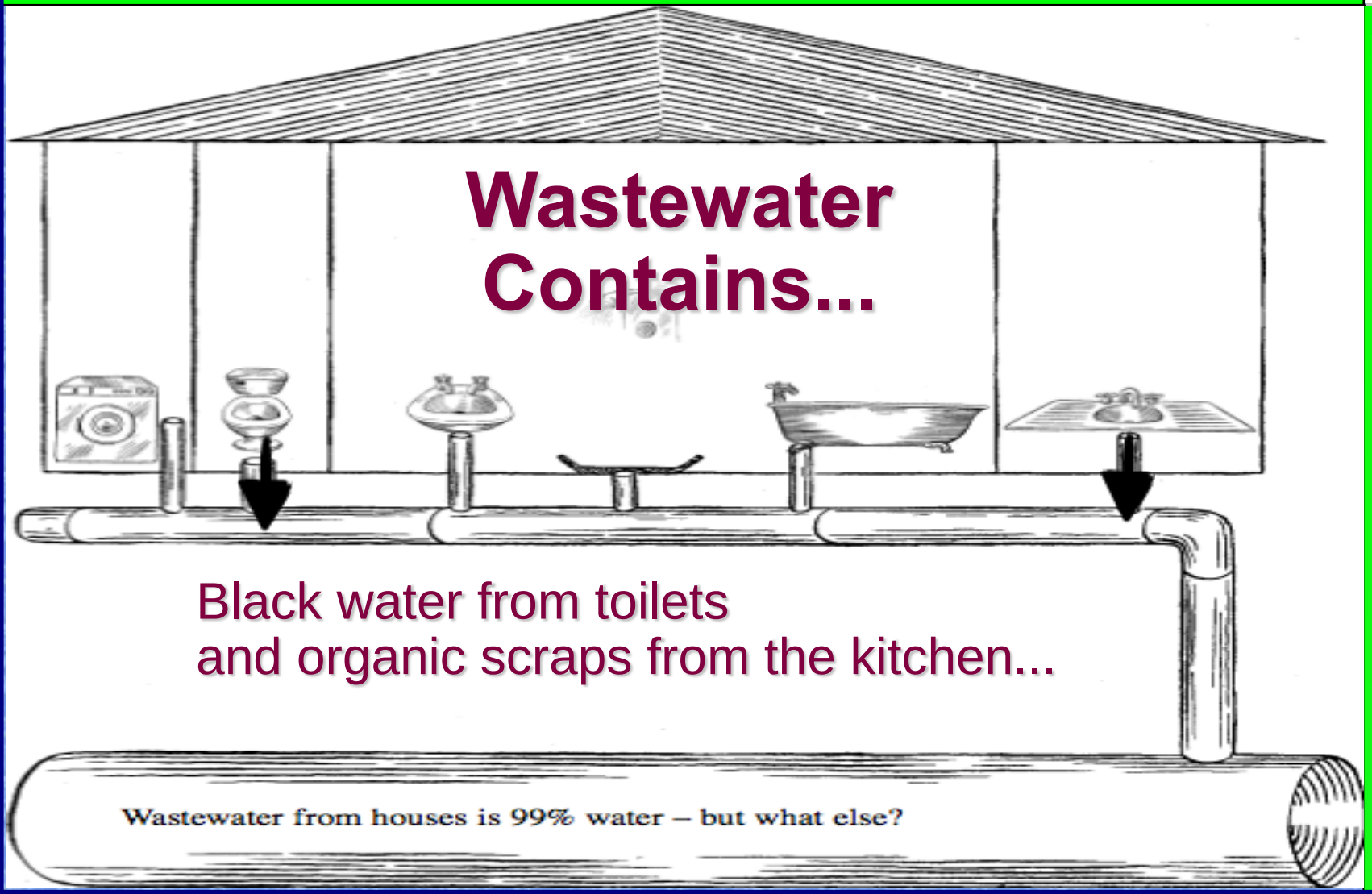
1. Target:
   Review and Enhance the Understanding of Wastewater Management
- Attendees:
  Wastewater Professionals, Treatment Works Personnel and Managers
- Form:
  Slide Presentation Followed by Open Discussion
- Time Frame:
  60 minutes for Slide Show and 60 Minutes for Discussion

Wastewater Management

Ministry of Water and Electricity
General Department of Wastewater

Wastewater Management

Wastewater Management



Wastewater Management

What Else?

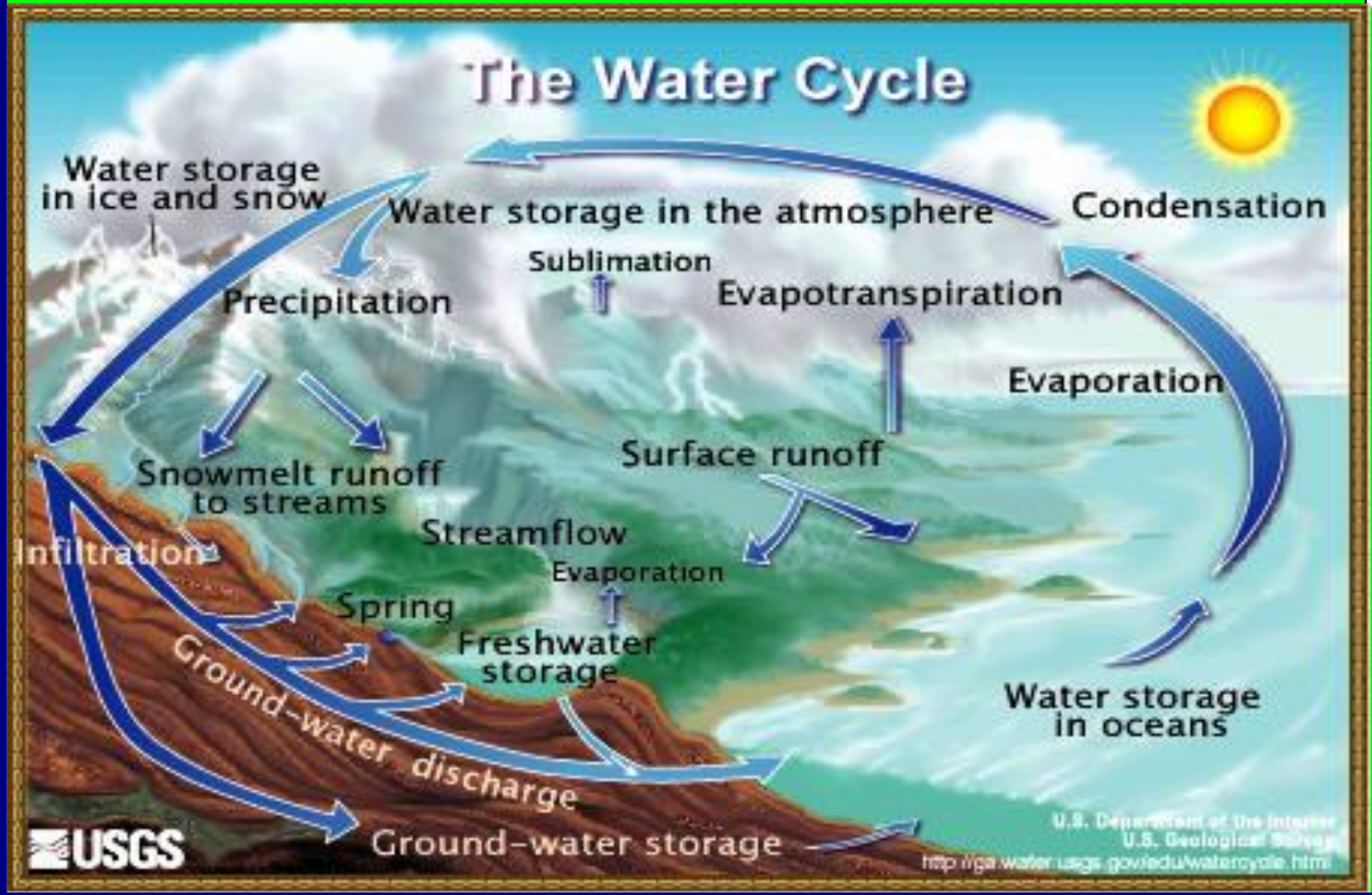
Grey water containing shampoo, hair, fat, laundry powder, fabric conditioners, toilet paper, chemicals, detergent, household cleaners, dirt...

Wastewater from houses is 99% water – but what else?

Waterborne Diseases

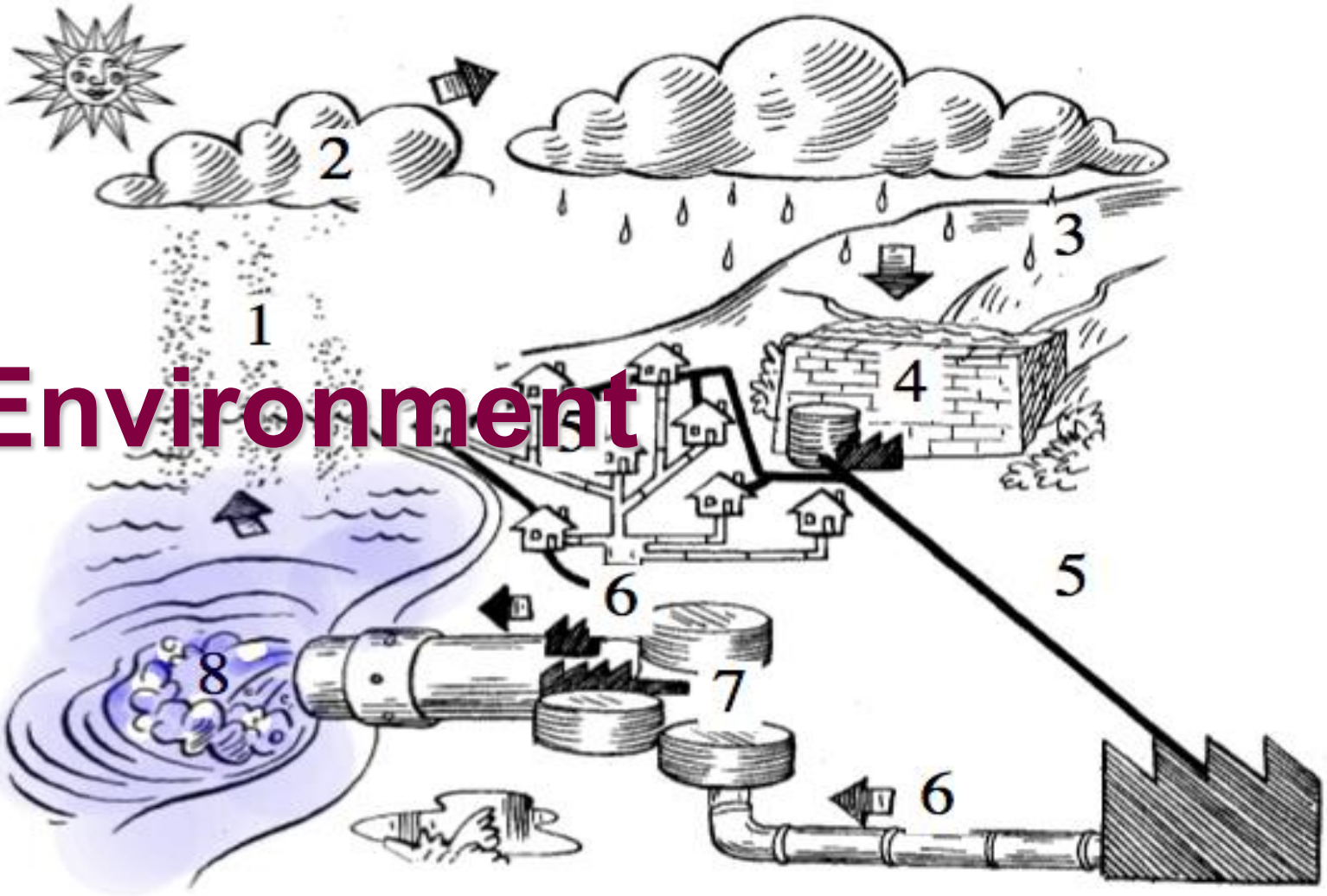
Diseases	*Symptoms*
Cryptosporidiosis	Diarrhea
Cyclosporiasis	Nausea
Giardiasis	Fever
Microsporidiosis	Abdominal Pain
Cholera	Weight Loss

The Water Cycle



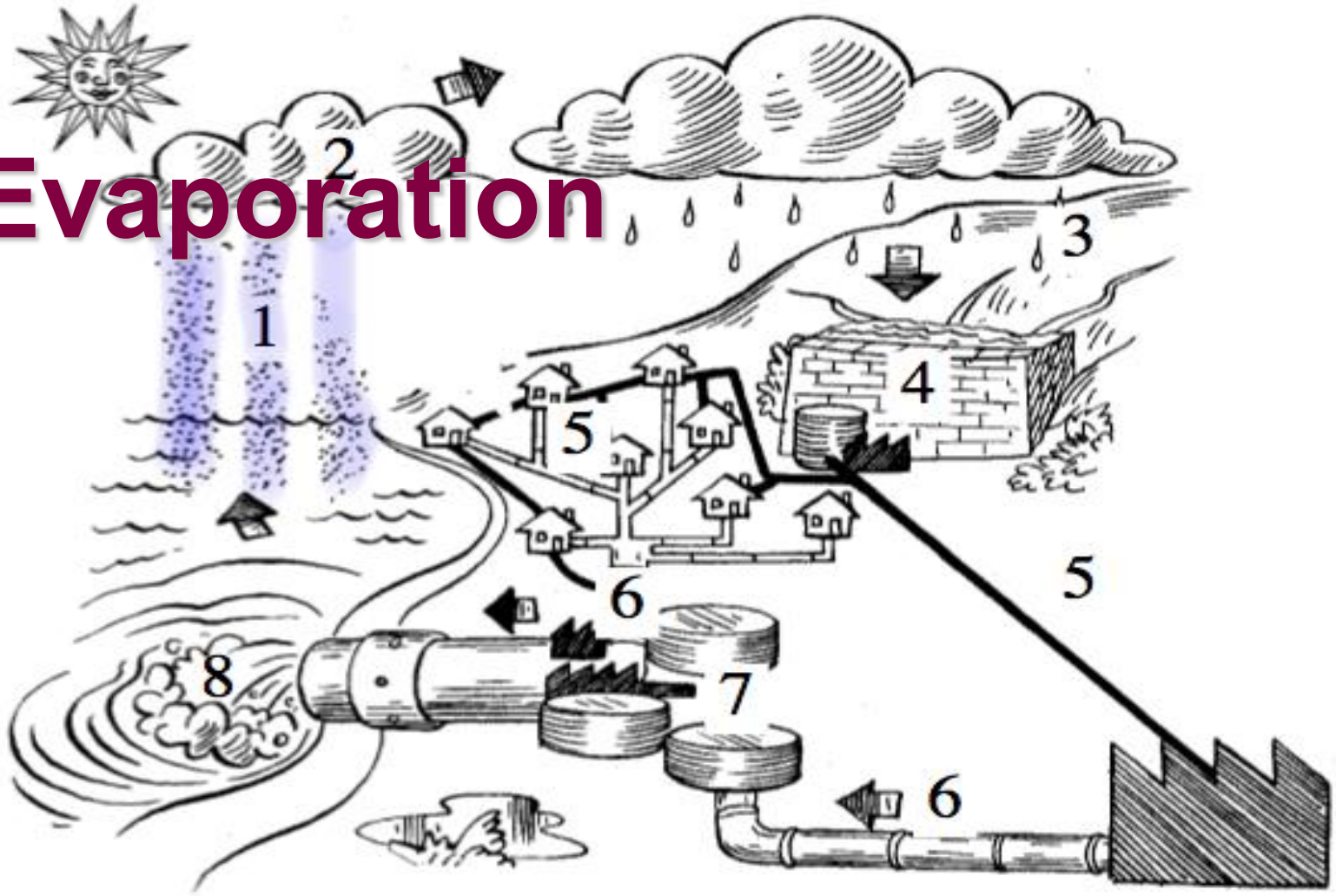
Wastewater Management Presentation

The Water Cycle

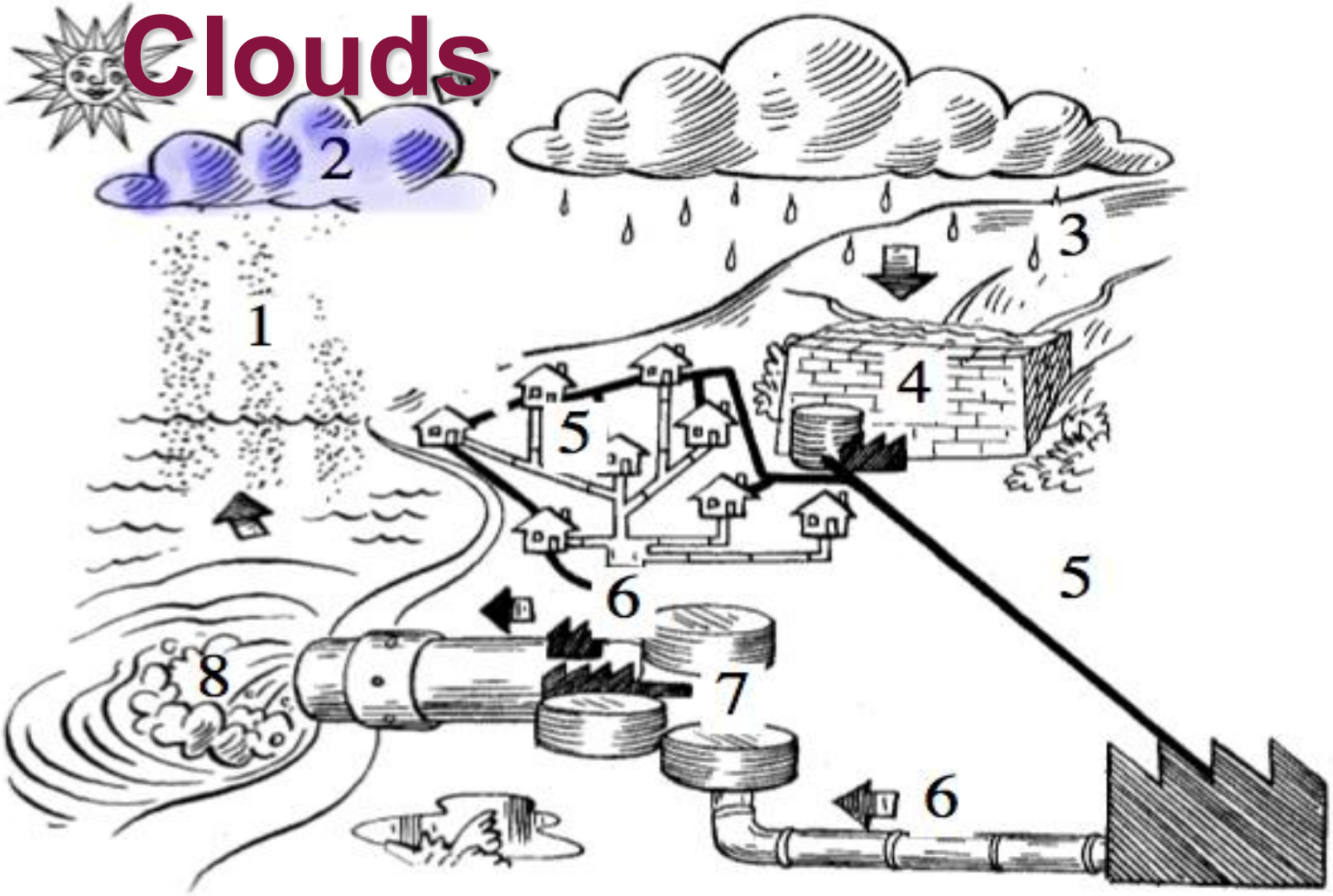


Environment

The Water Cycle



The Water Cycle



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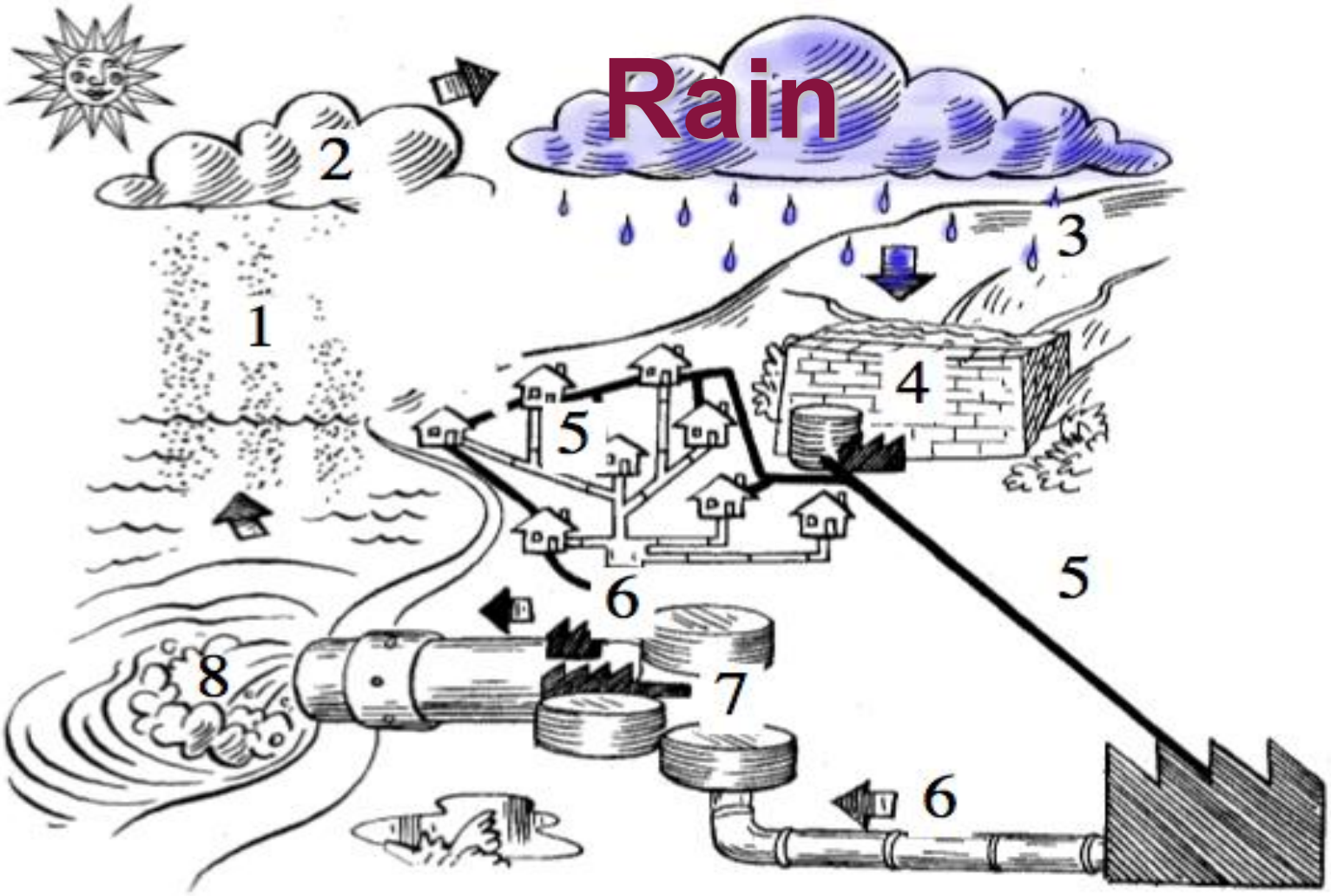
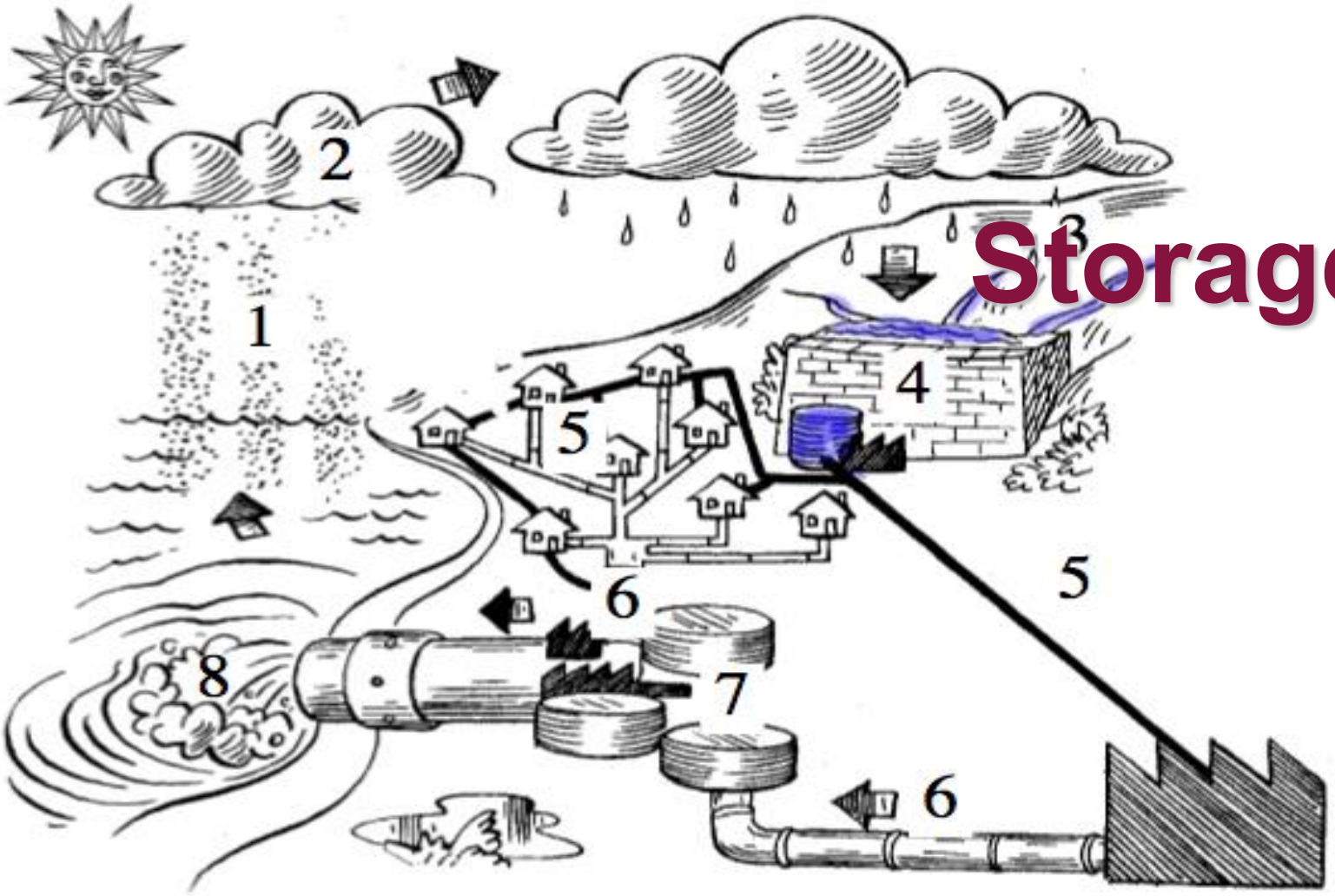
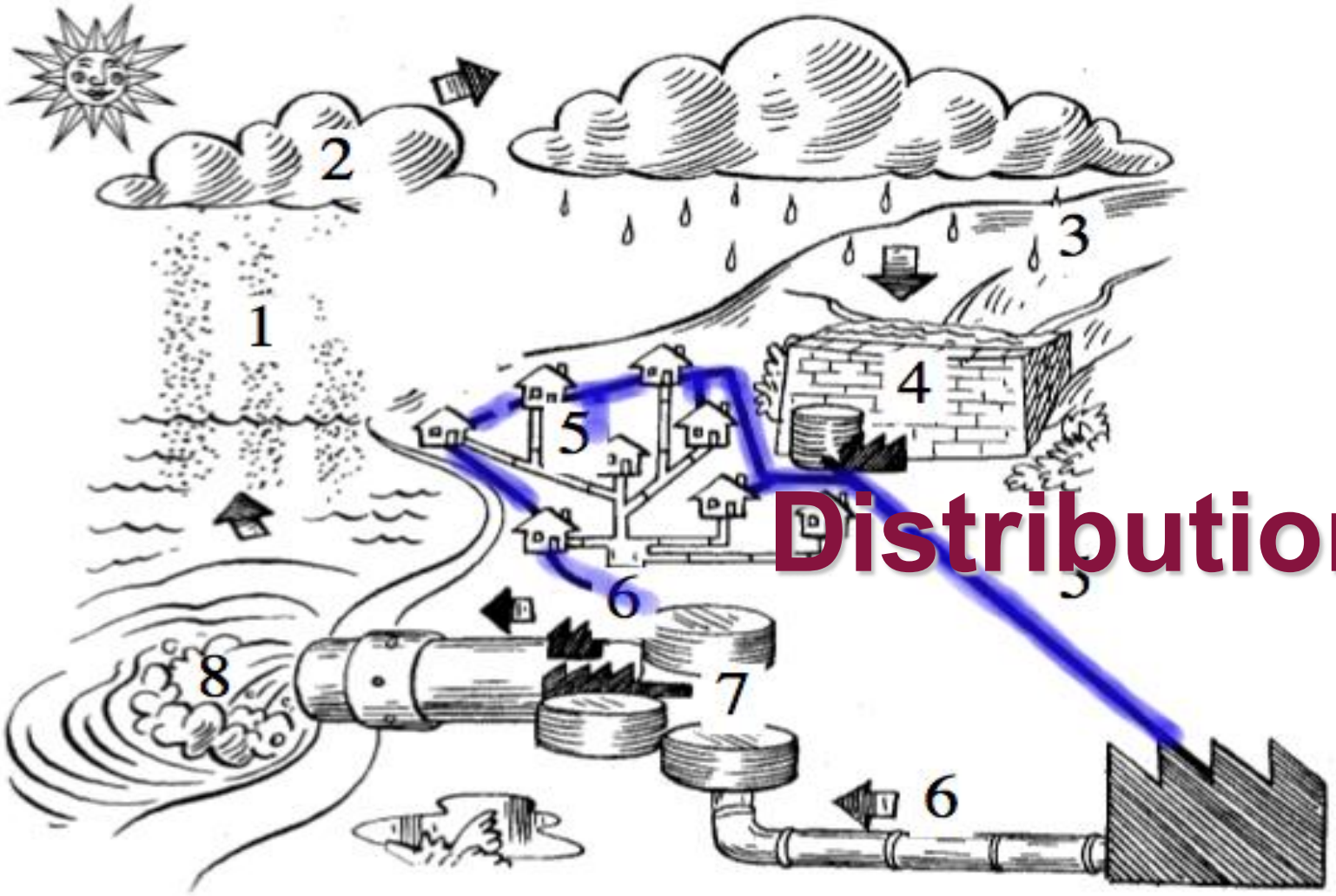


The Water Cycle

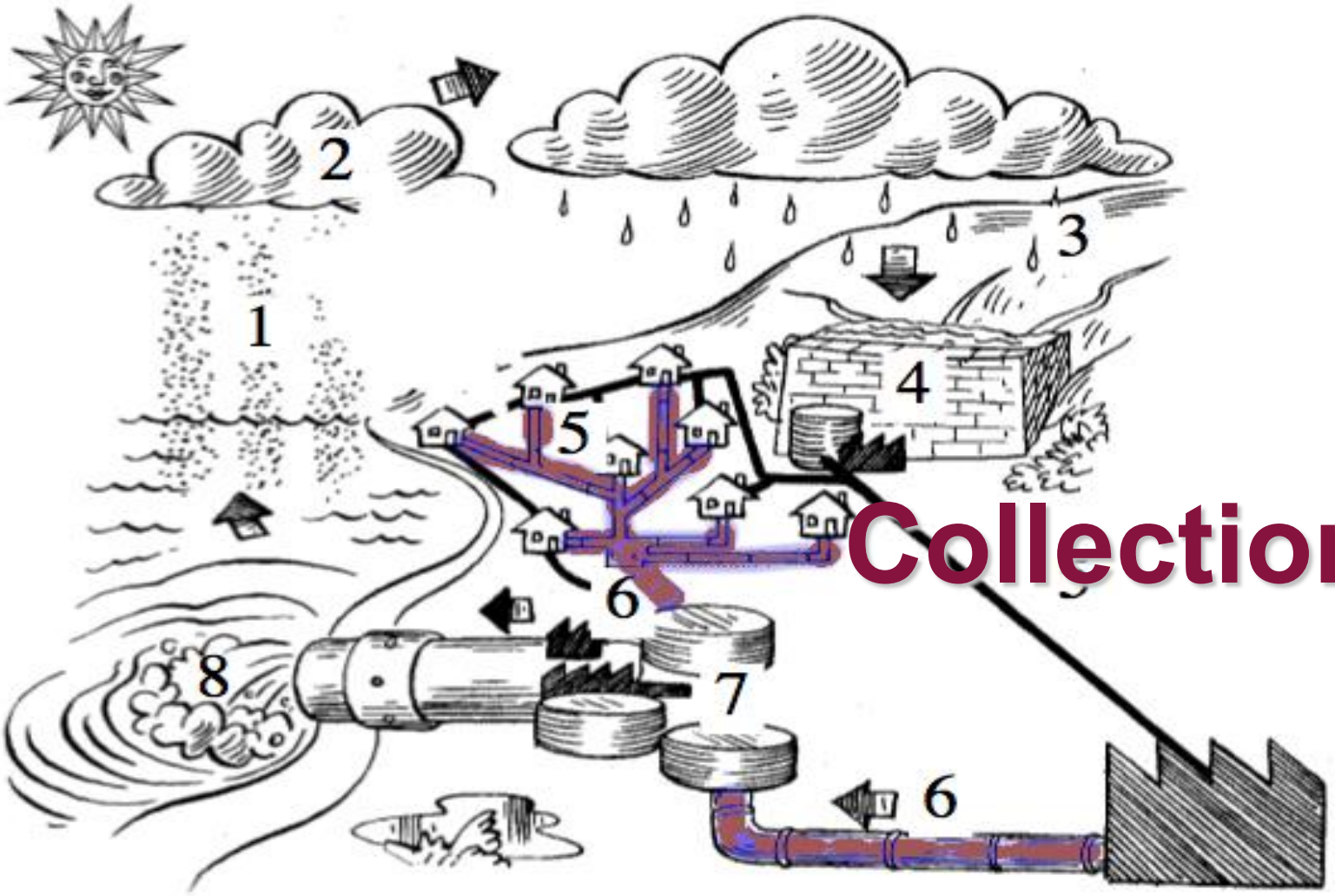


Storage

The Water Cycle

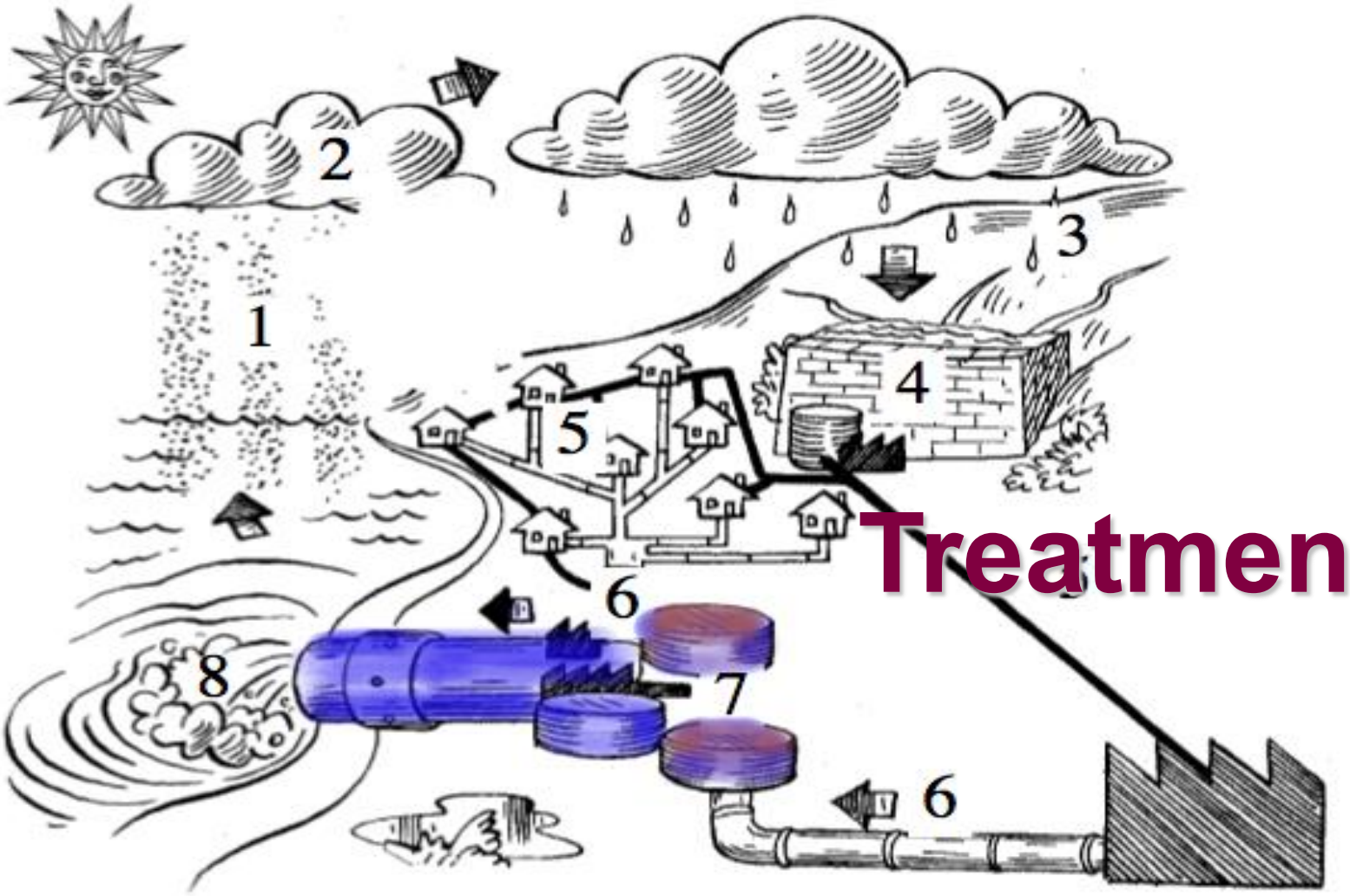


The Water Cycle

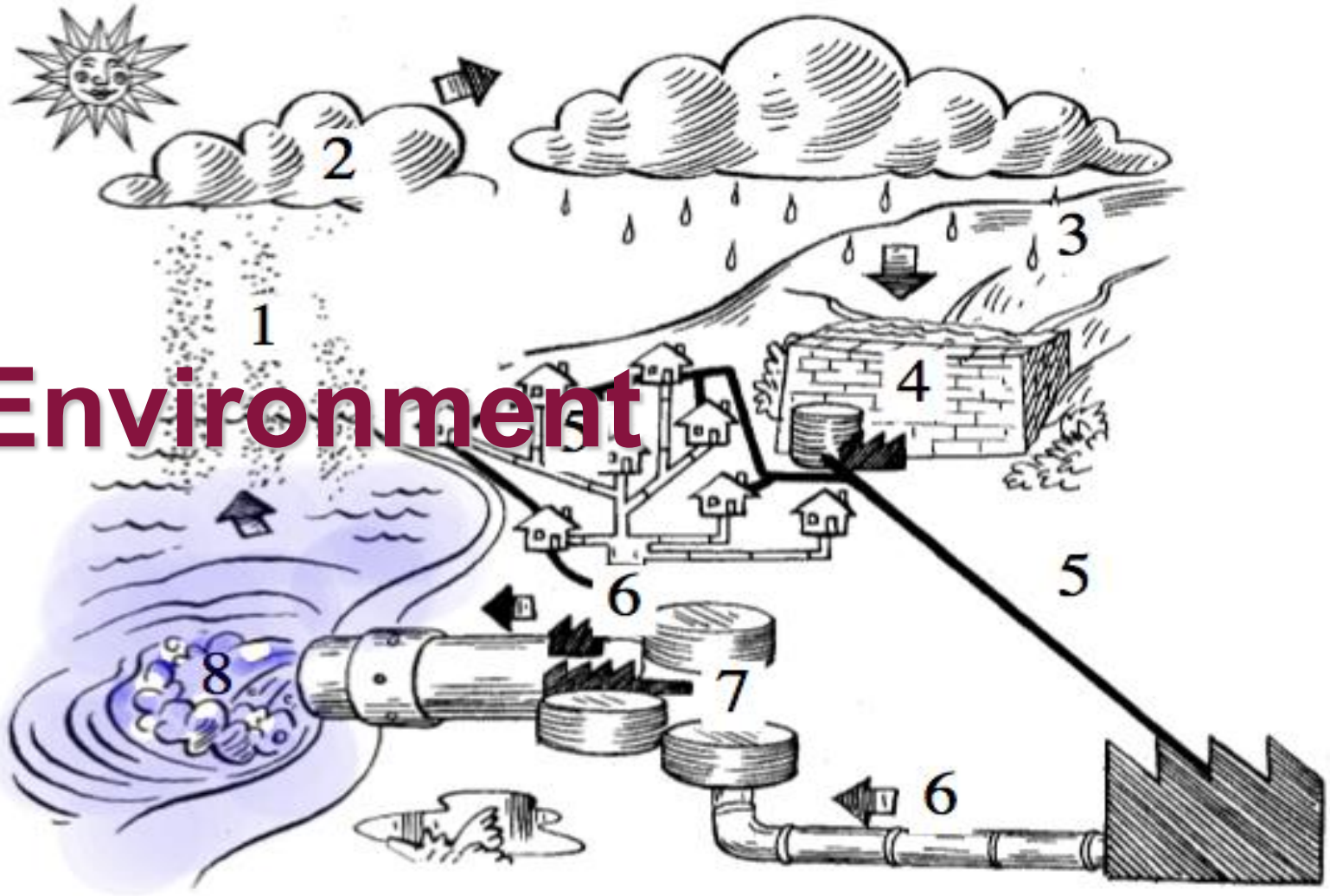


Collection

The Water Cycle

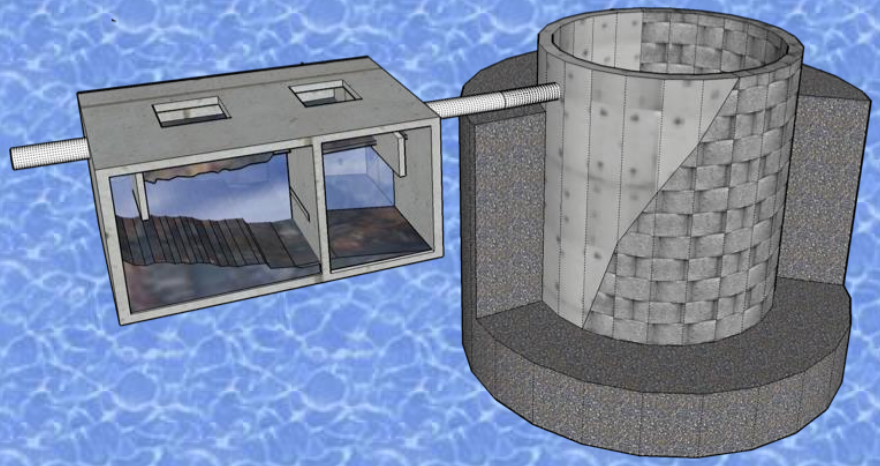


The Water Cycle



Environment

Methods of Treating Wastewater

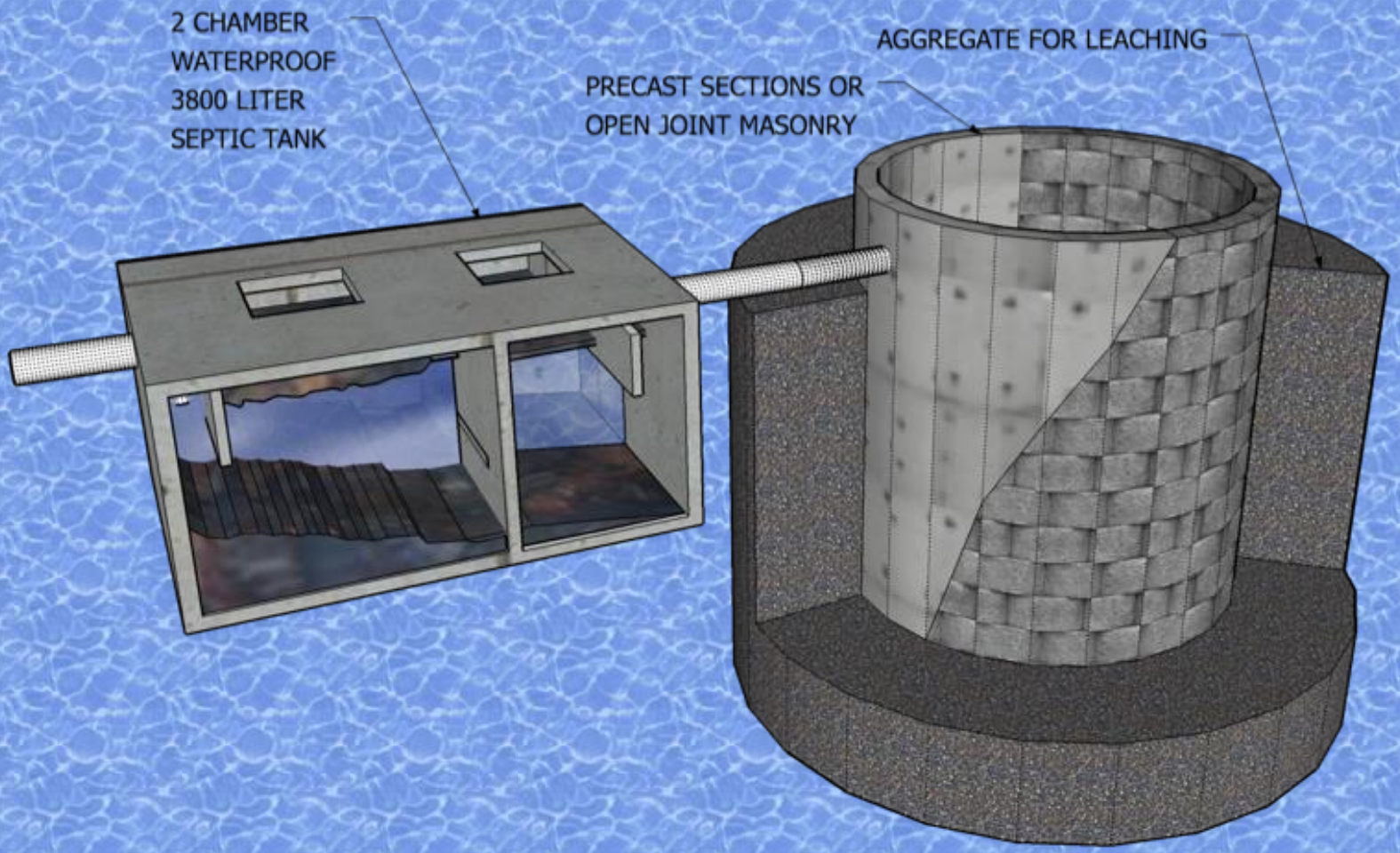


Wastewater Management Presentation

Septage Dumping

Wastewater Management Presentation

Onsite Treatment
(Septic Tank and Leaching Chamber)



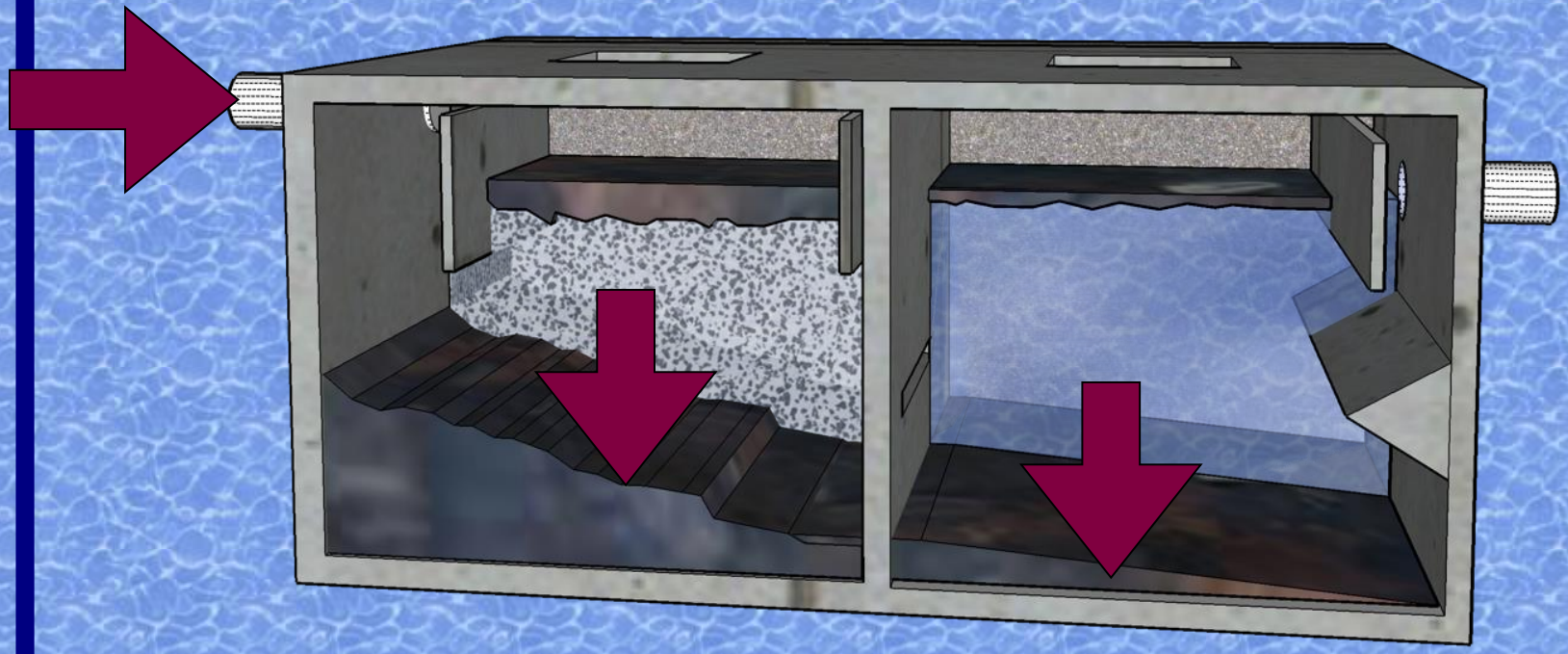
Decentralized Treatment Package Plants

Wastewater Management Presentation

Centralized Treatment Plant

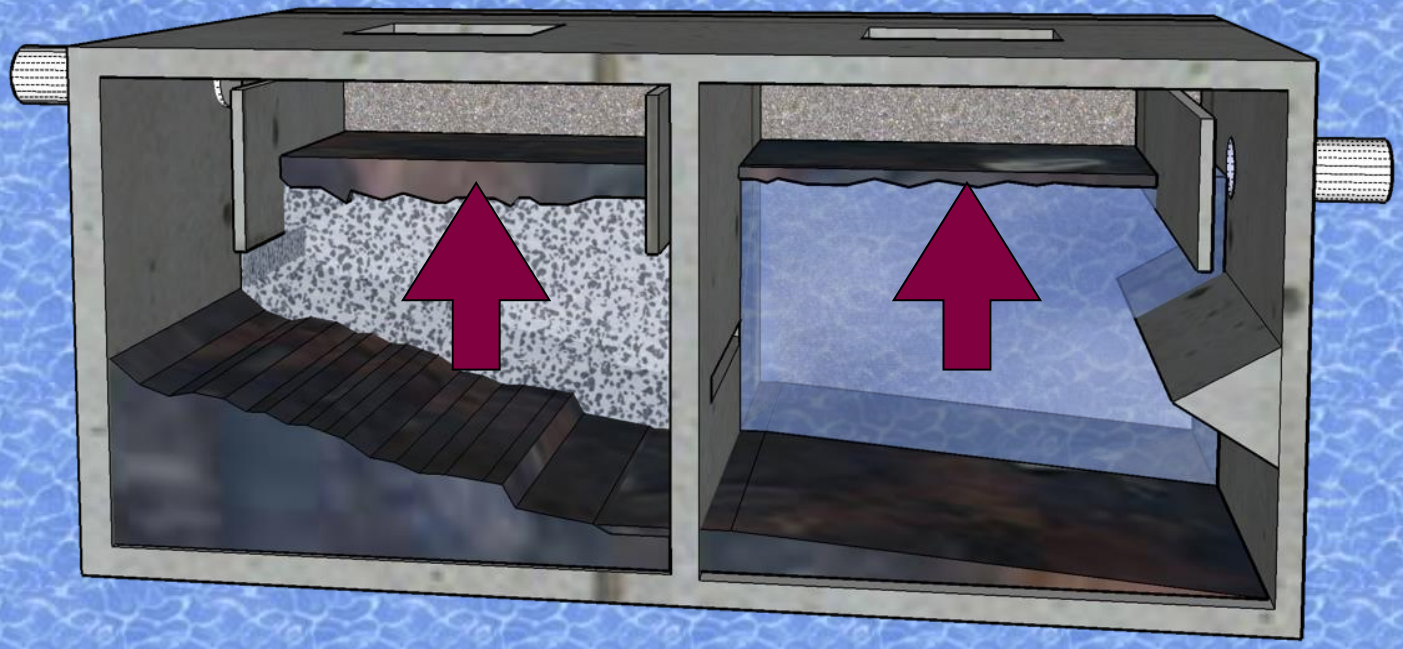
How a Septic Tank Works

- Solids settle to the bottom (sludge)



How a Septic Tank Works

- Solids settle to the bottom (sludge)
- Fats, Oils and Grease (FOG) Floats to the Top



How a Septic Tank Works

- Solids settle to the bottom (sludge)
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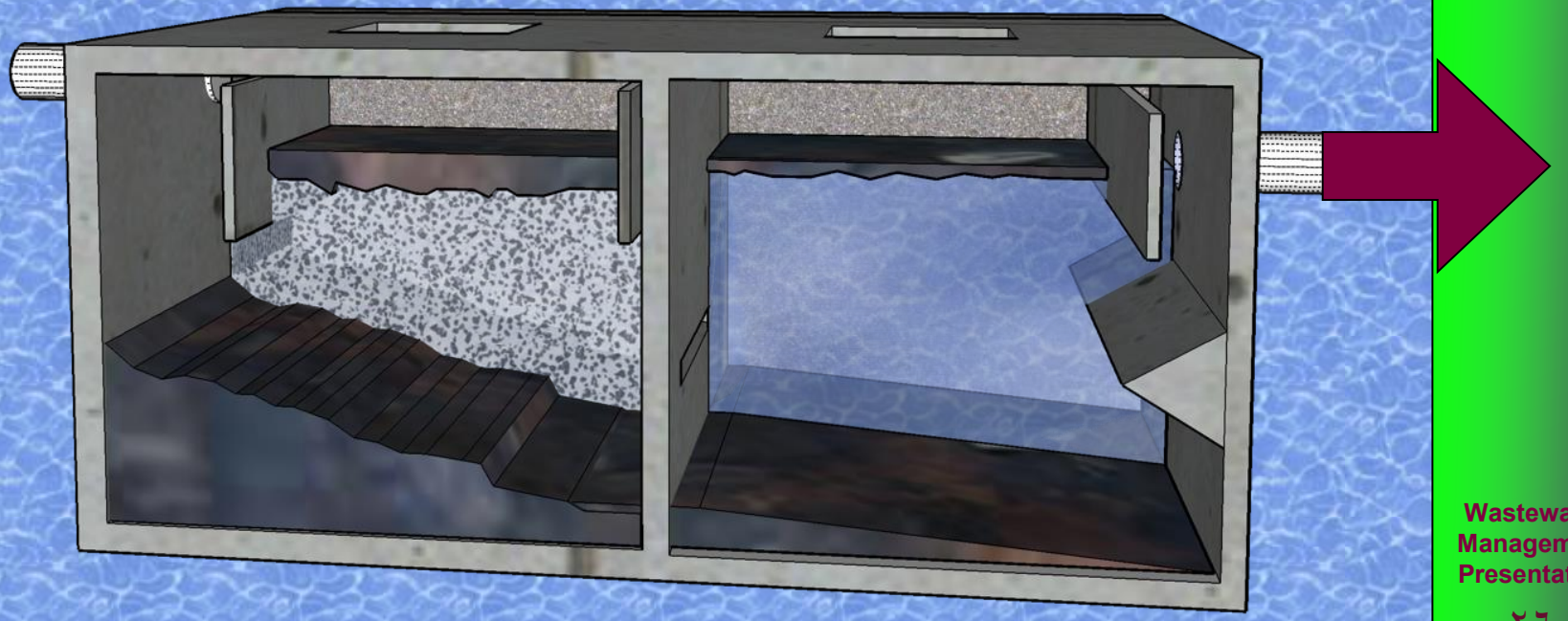
- Microbes Eat the Waste

How a Septic Tank Works

- Solids settle to the bottom (sludge)
- Fats, Oils and Grease (FOG) Floats to the Top
- Microbes Eat the Waste
- The Partially Treated Water Returns to the Soil



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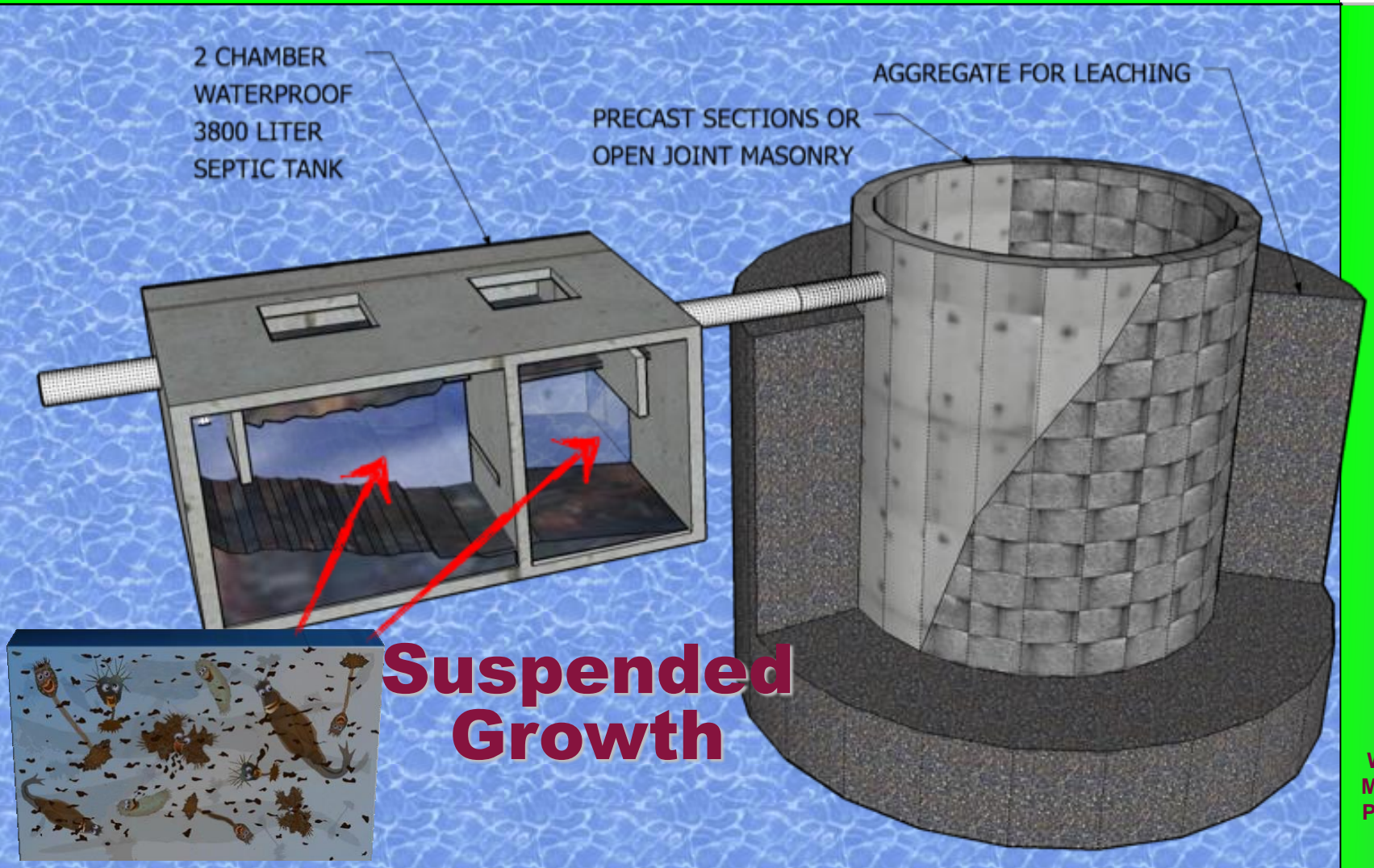
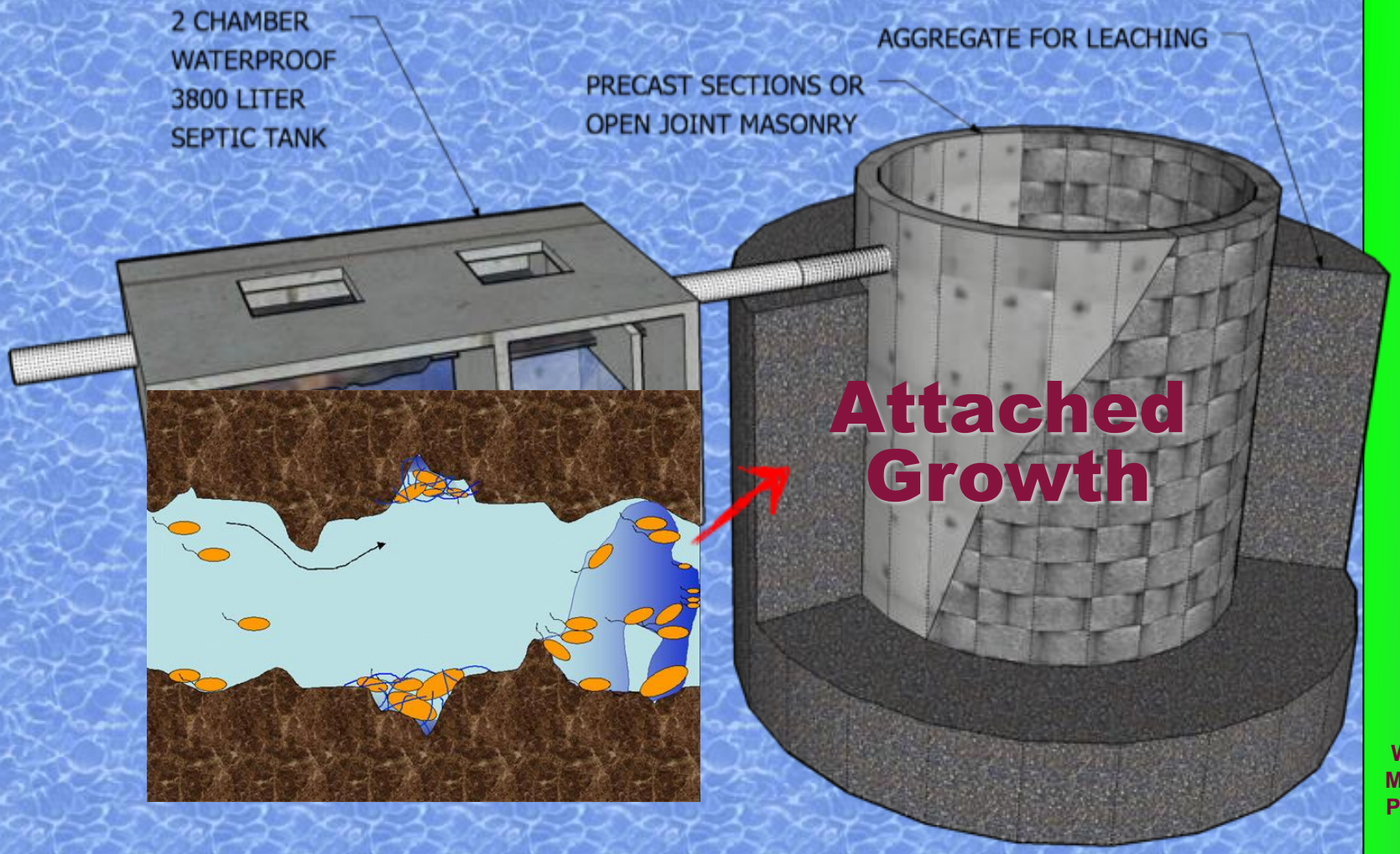


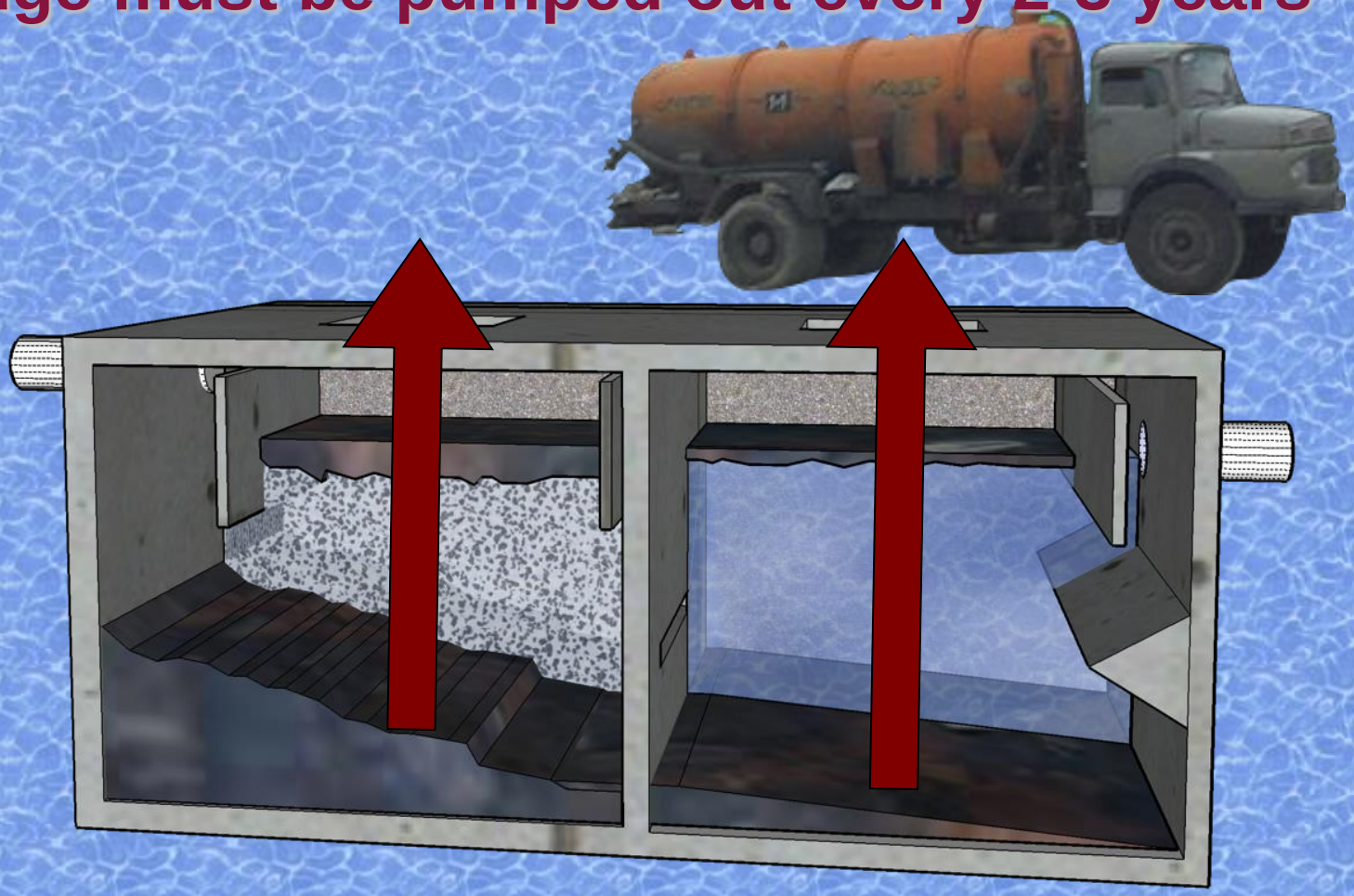
Suspended Growth

How a Septic Tank Works

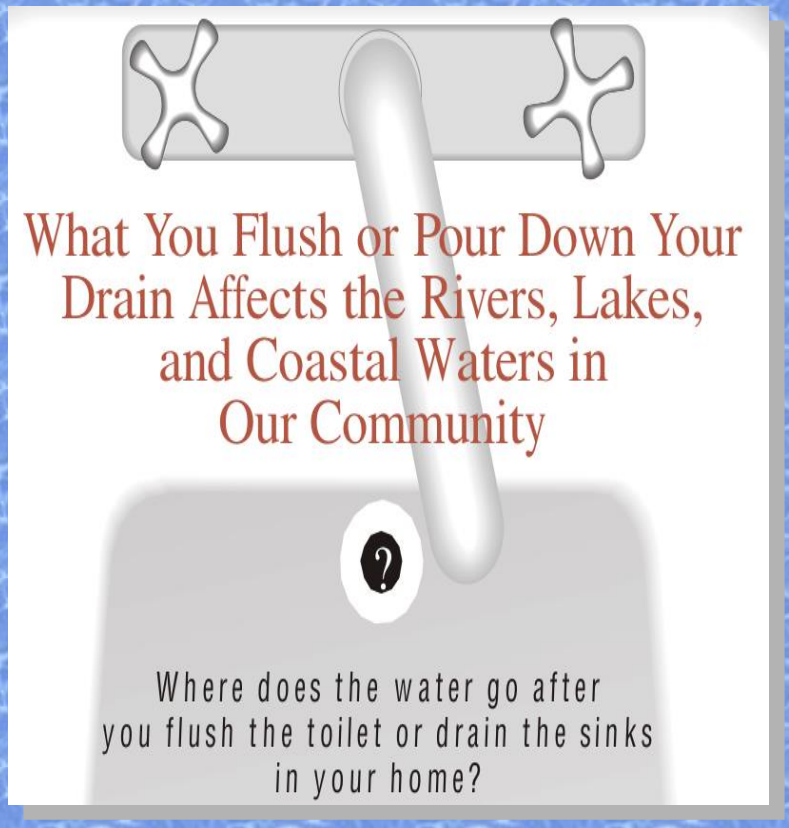


How a Septic Tank Works

Sludge must be pumped out every 2-3 years



Where Does The Water Go?



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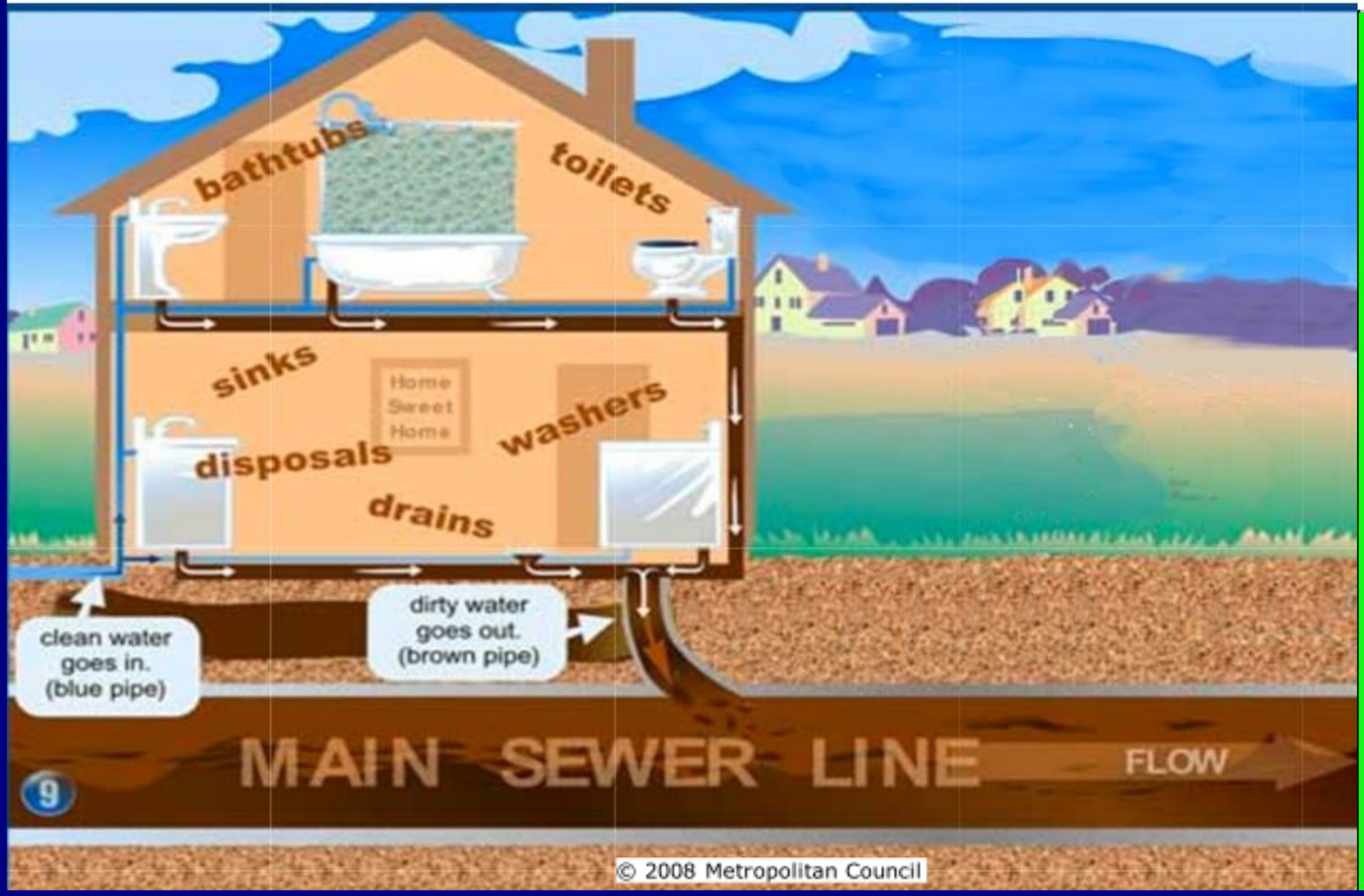

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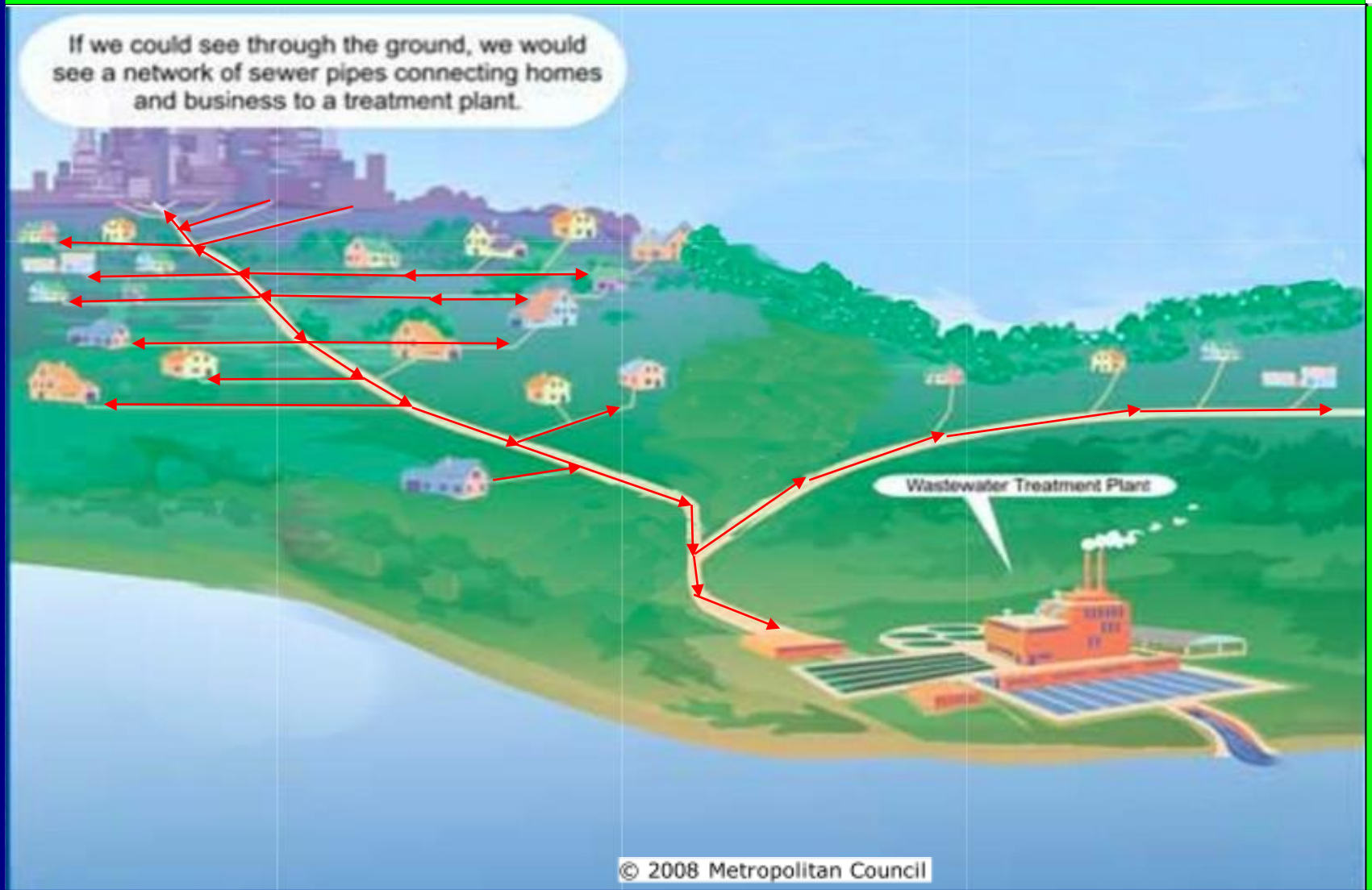
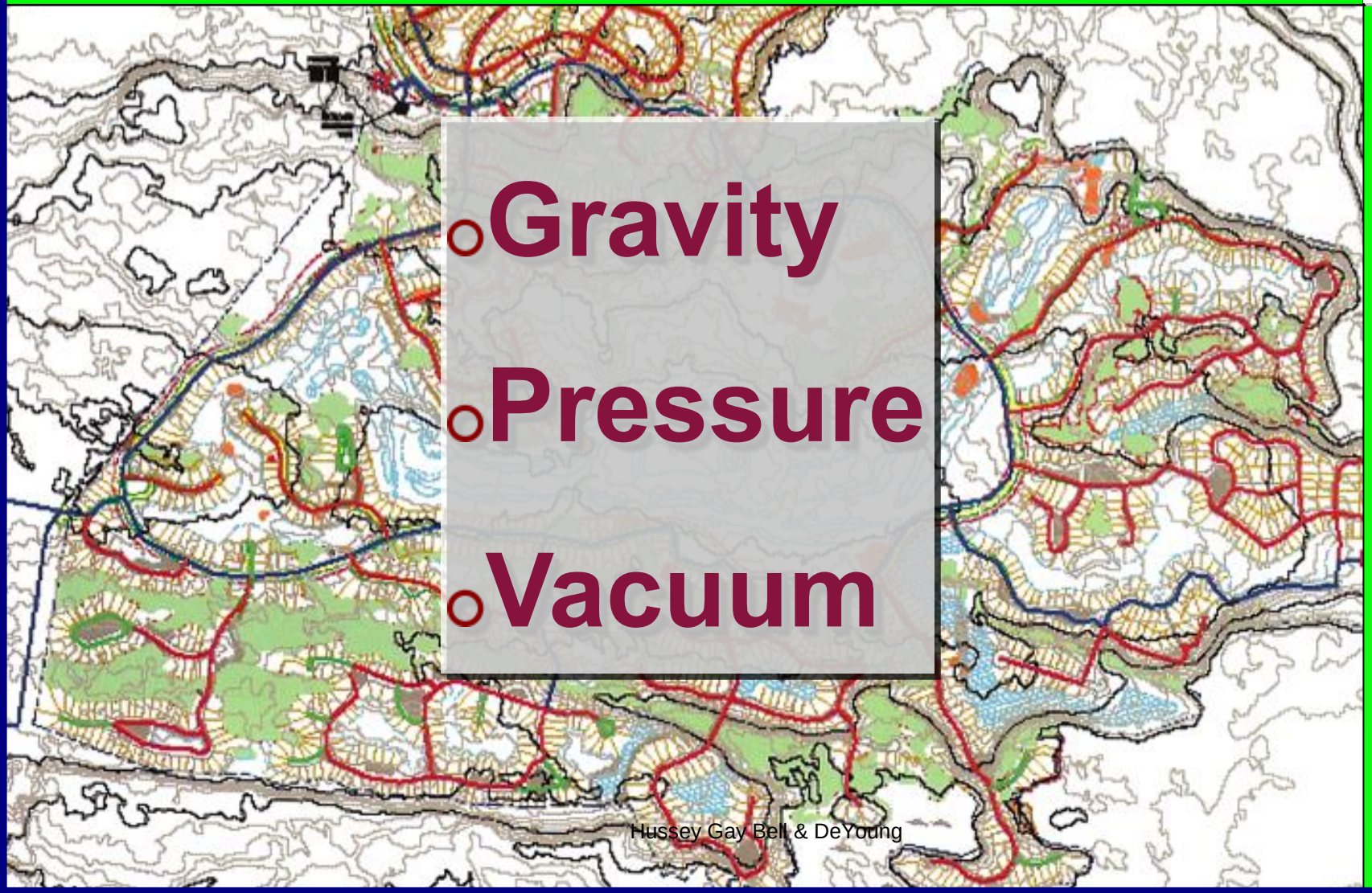


Where Does The Water Go?

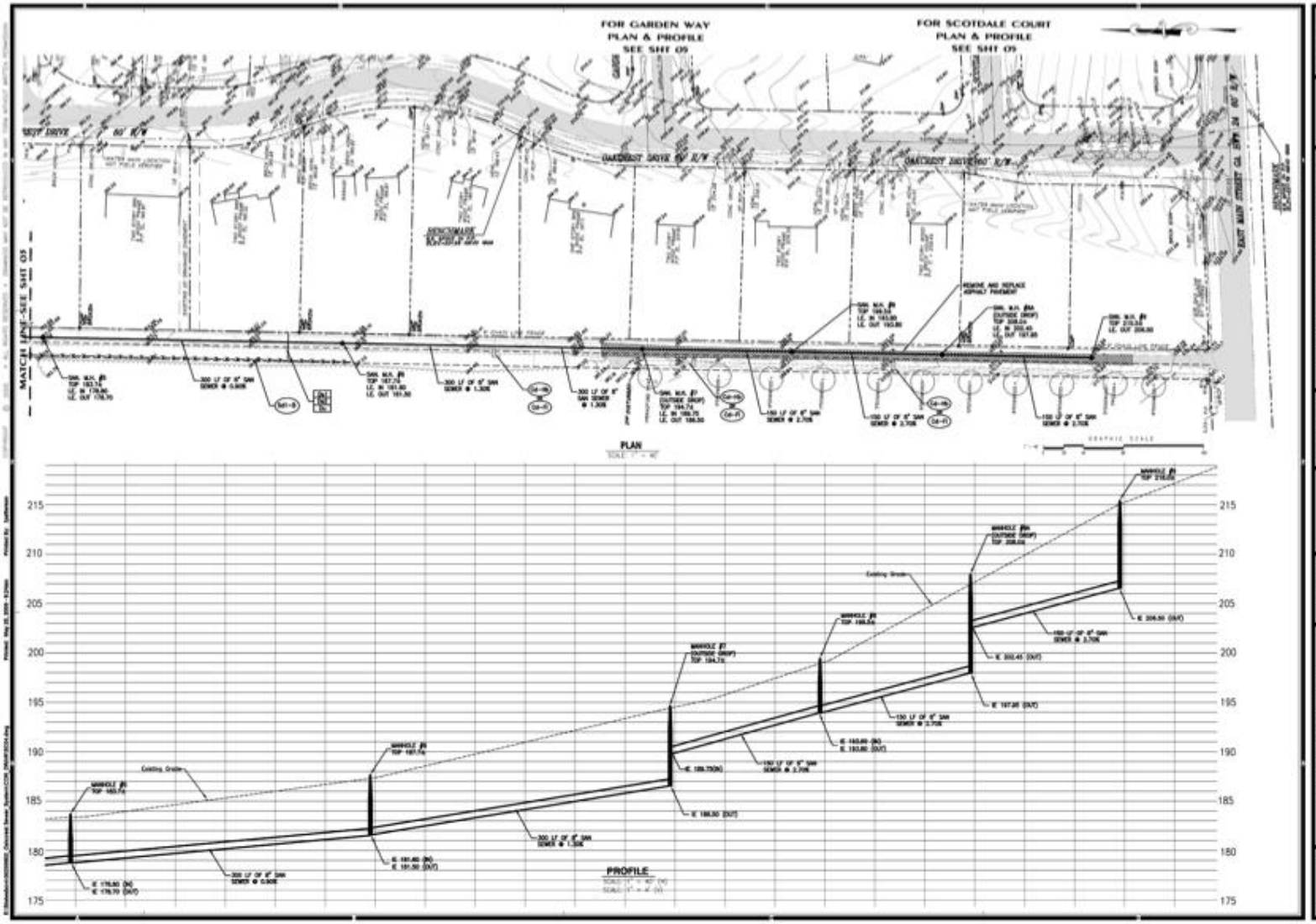
Networks



- Gravity
- Pressure
- Vacuum

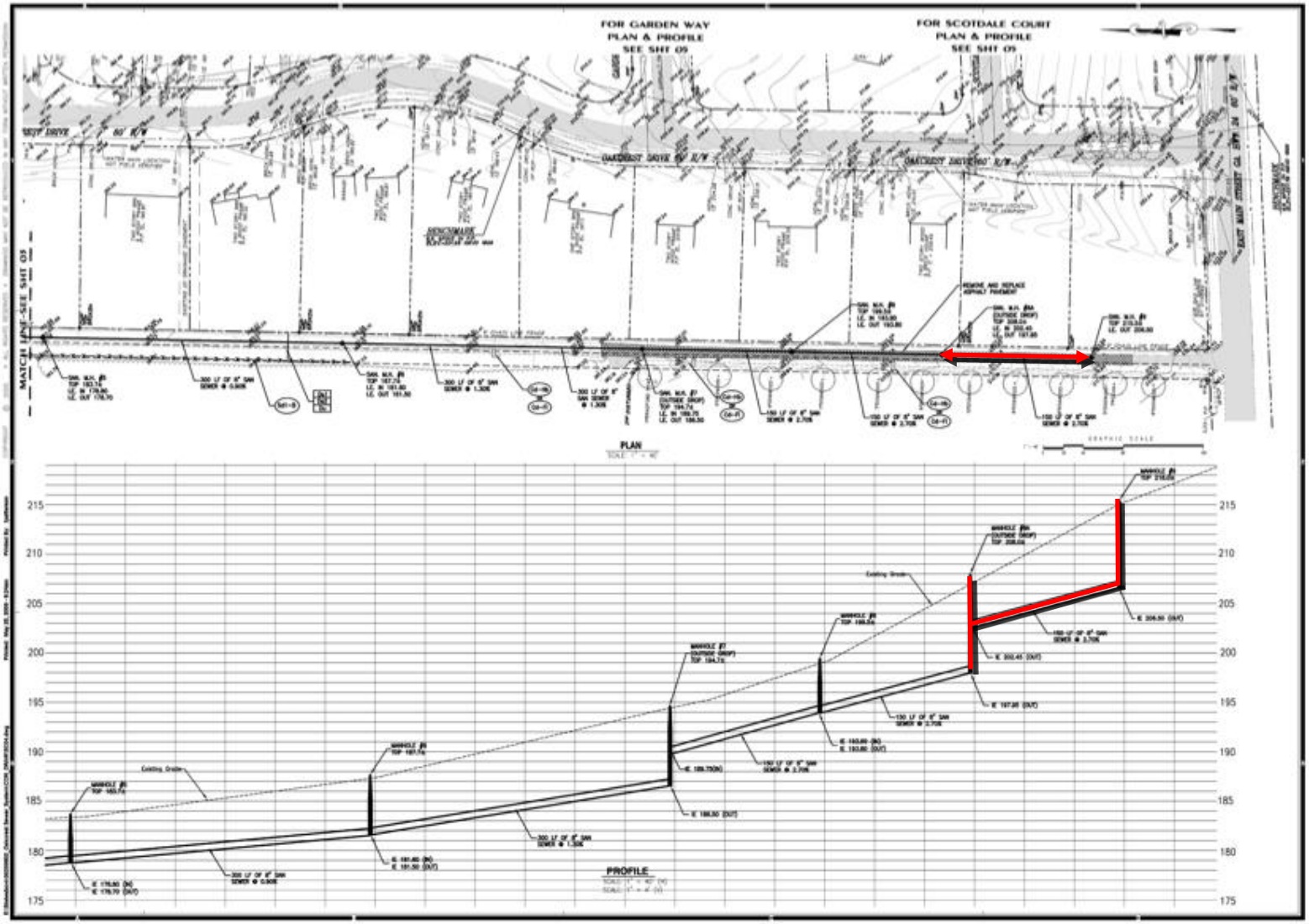
Hussey Gay Bell & DeYoung

Gravity Networks



Wastewater Management Presentation

Gravity Networks



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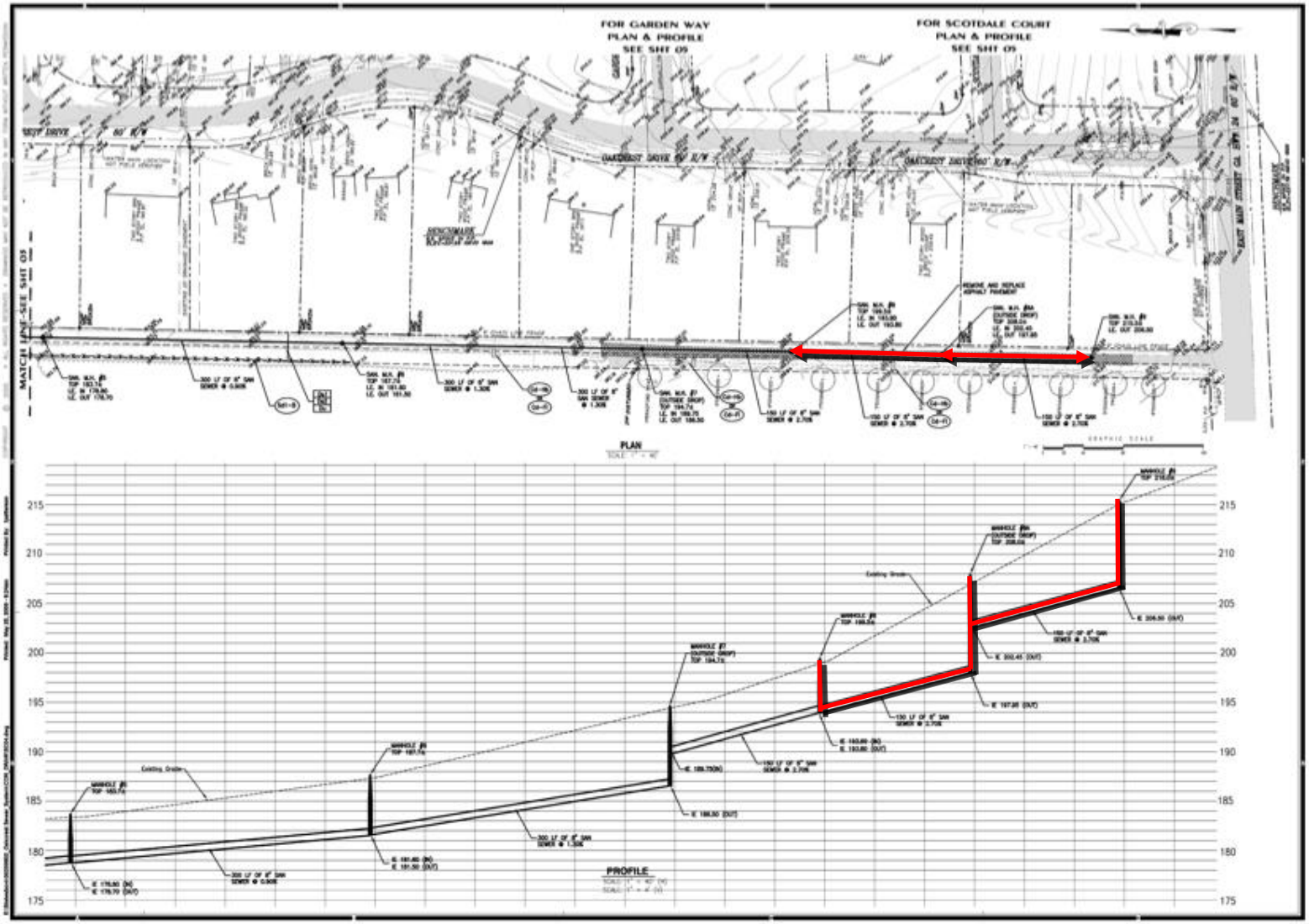

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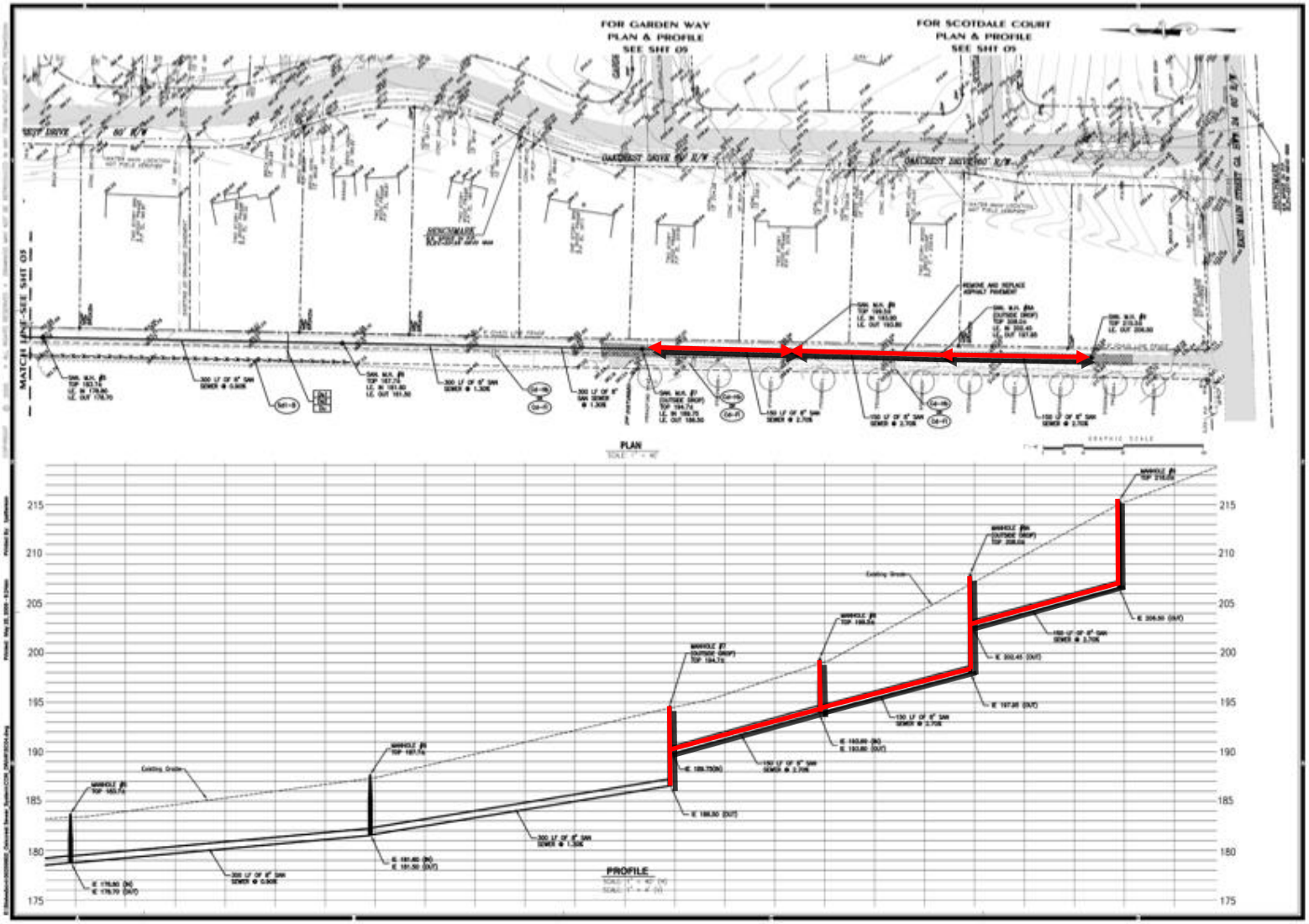

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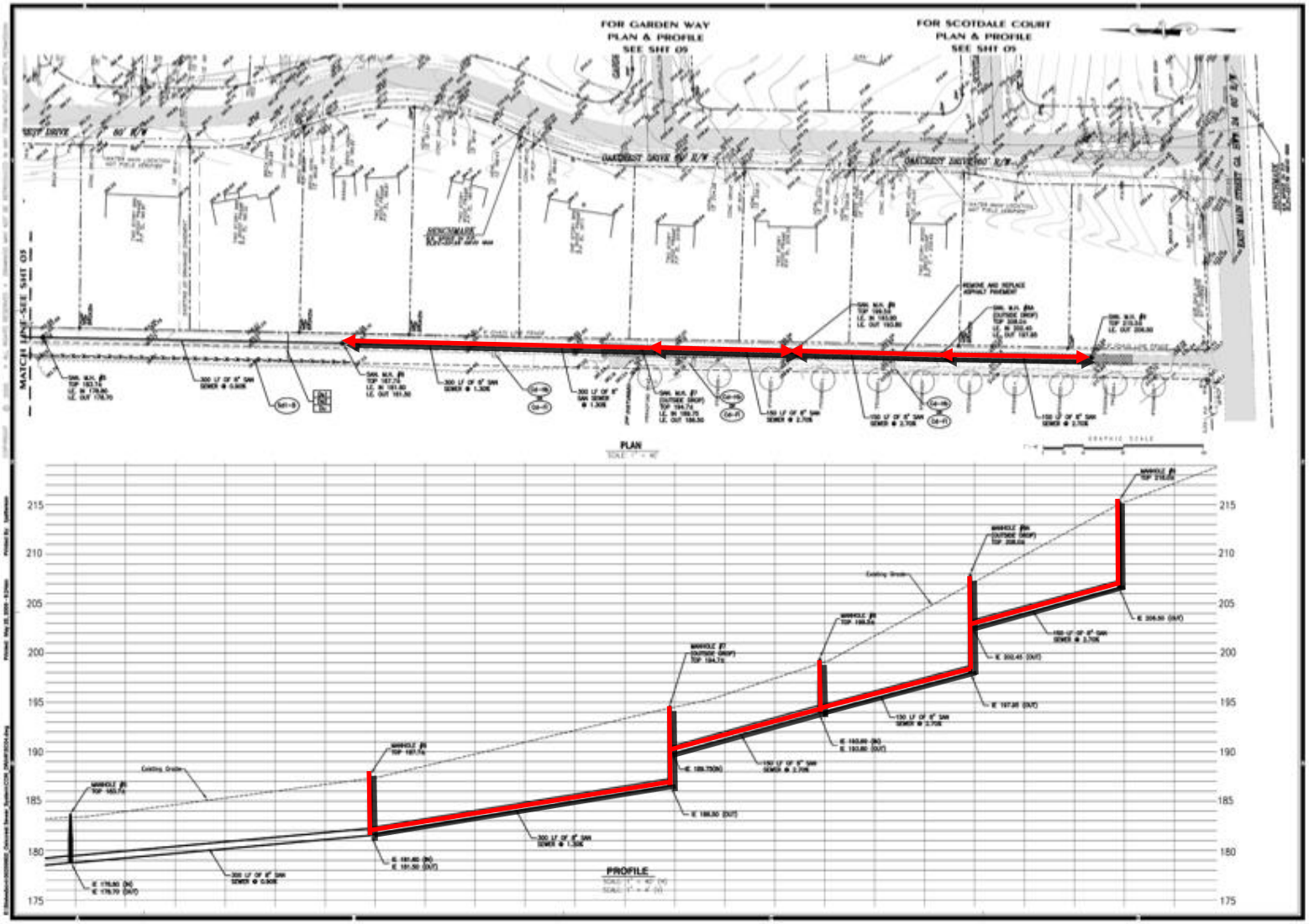

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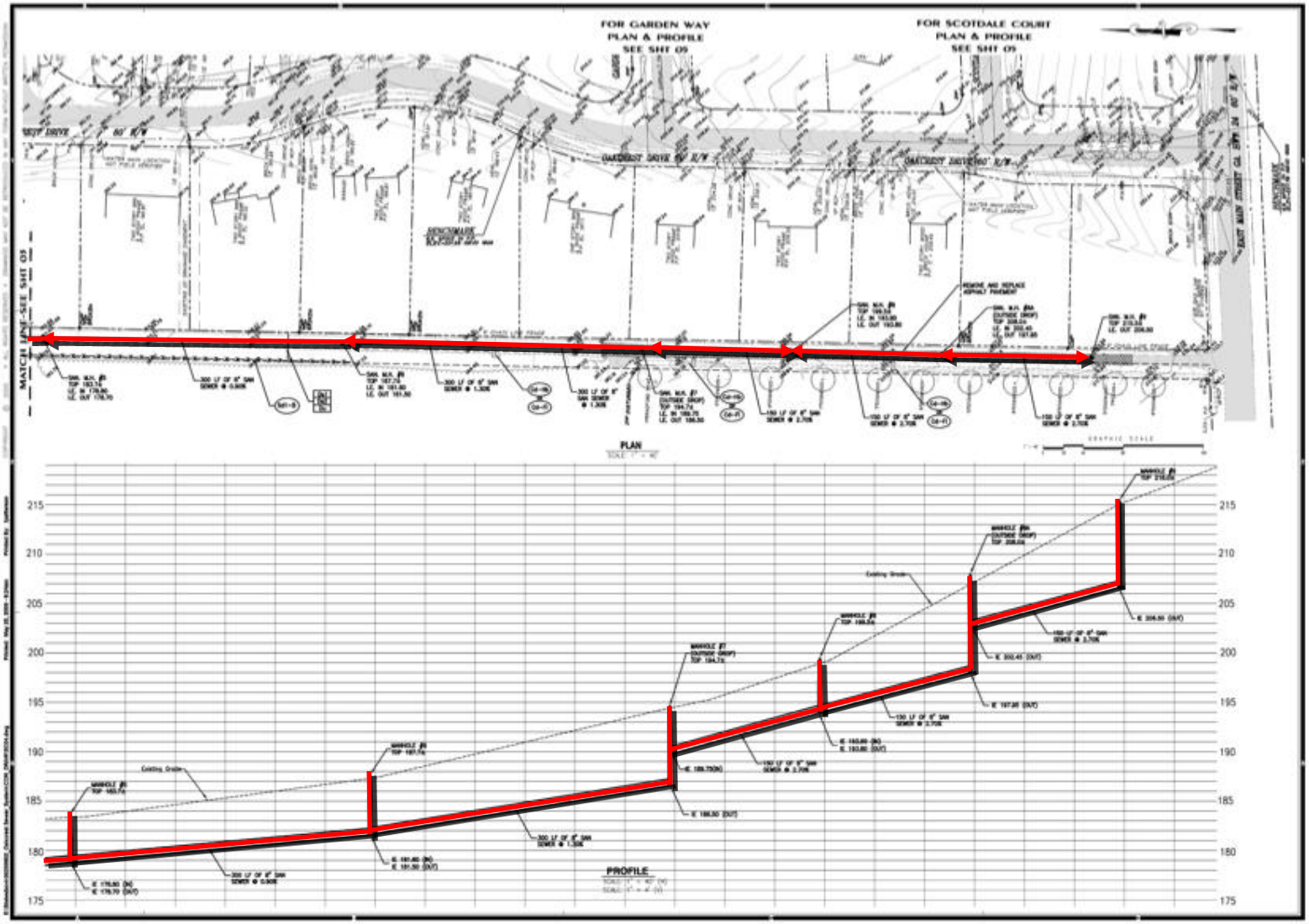
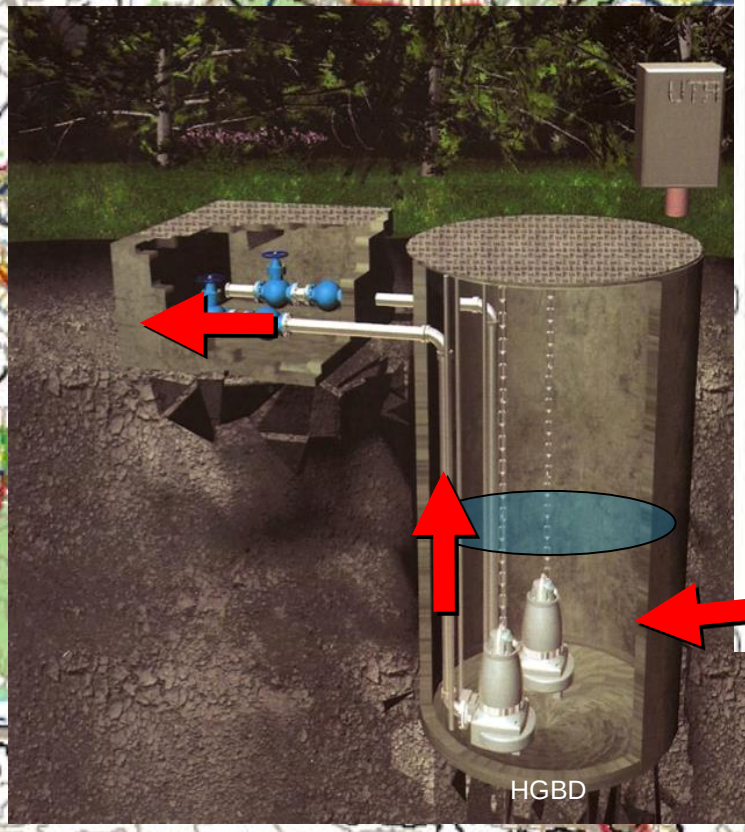
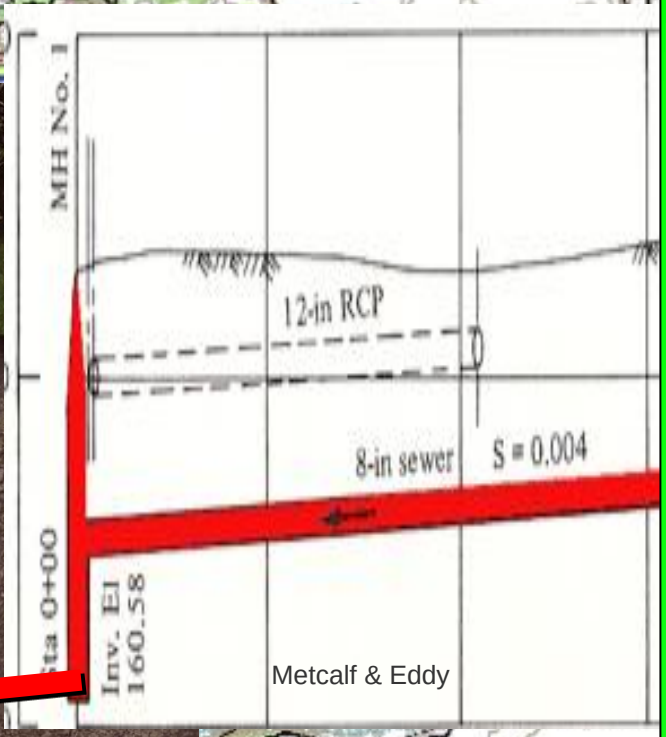


Wastewater Management Presentation

Pressure Networks
Pump Station

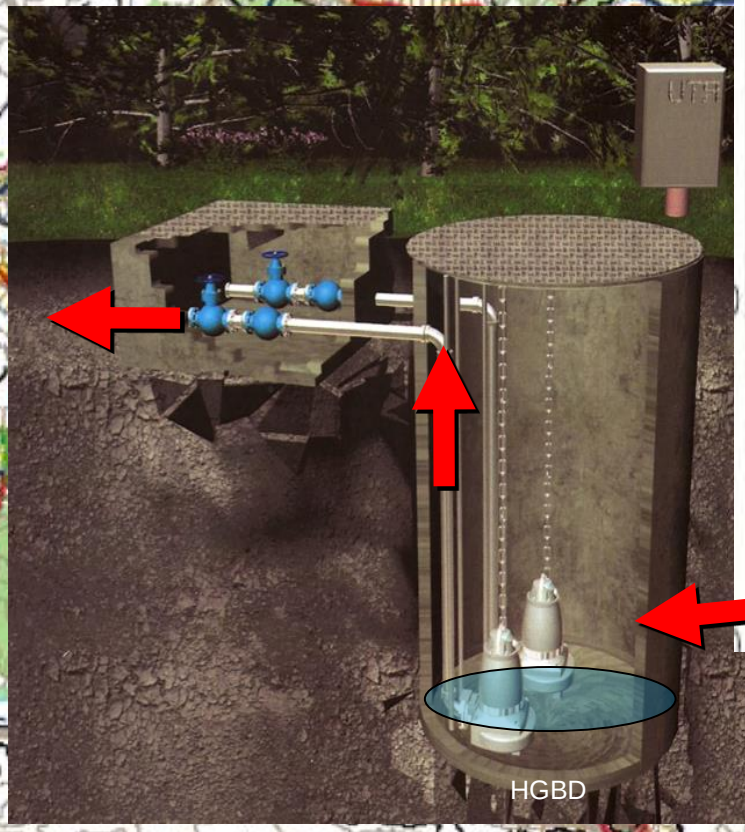


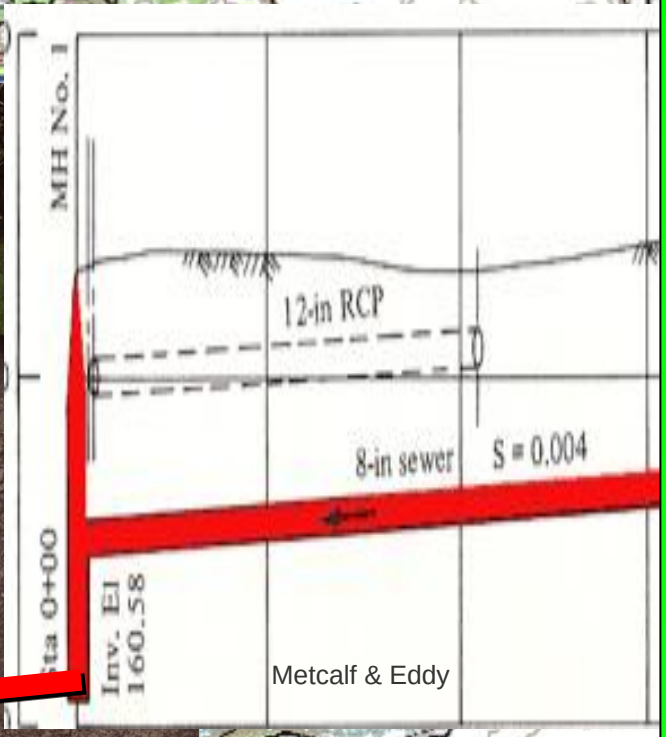
HGBD



Metcalf & Eddy

Pressure Networks
Pump Station

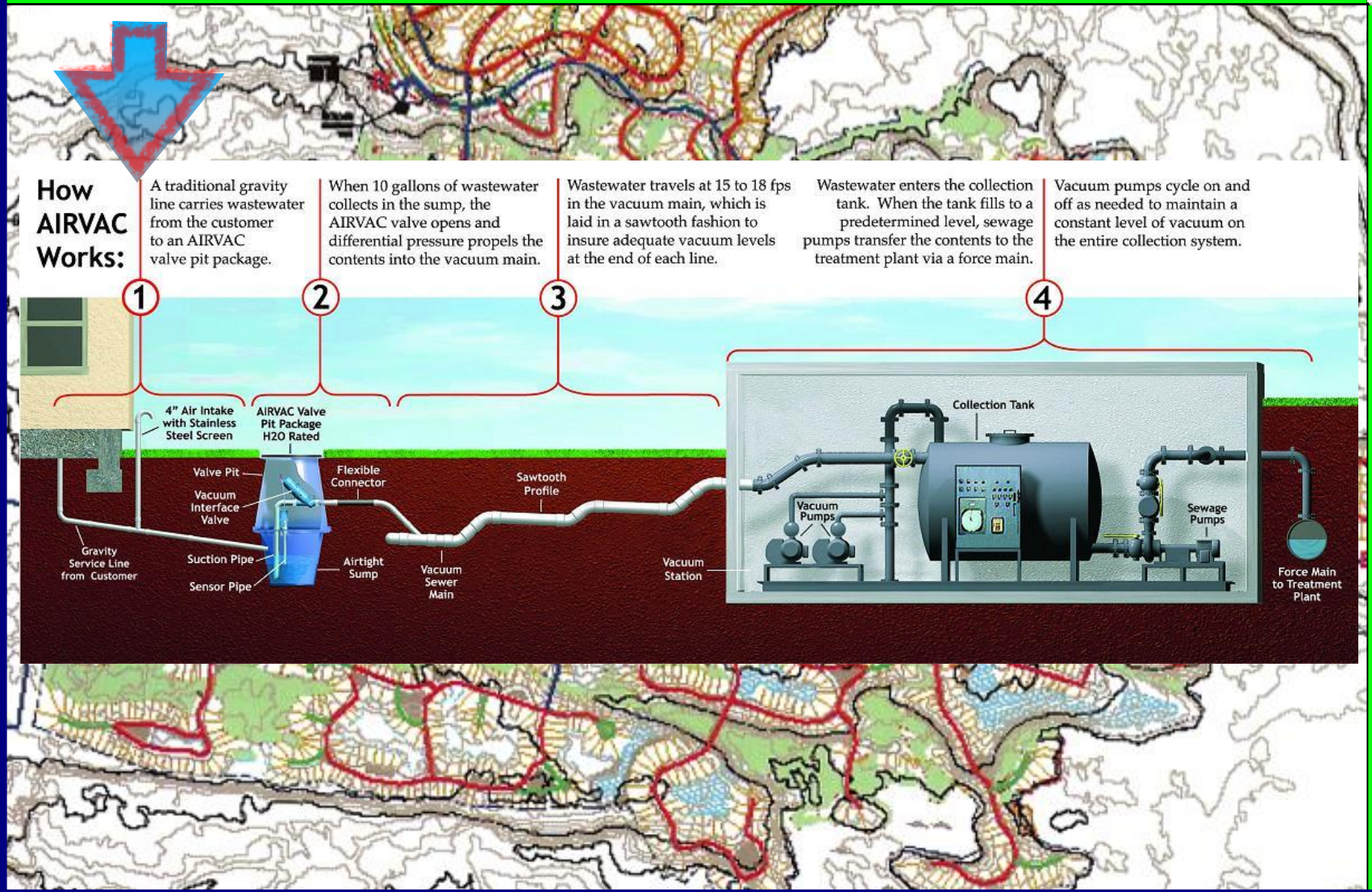




Pressure Networks

Wastewater Management Presentation

Vacuum Networks



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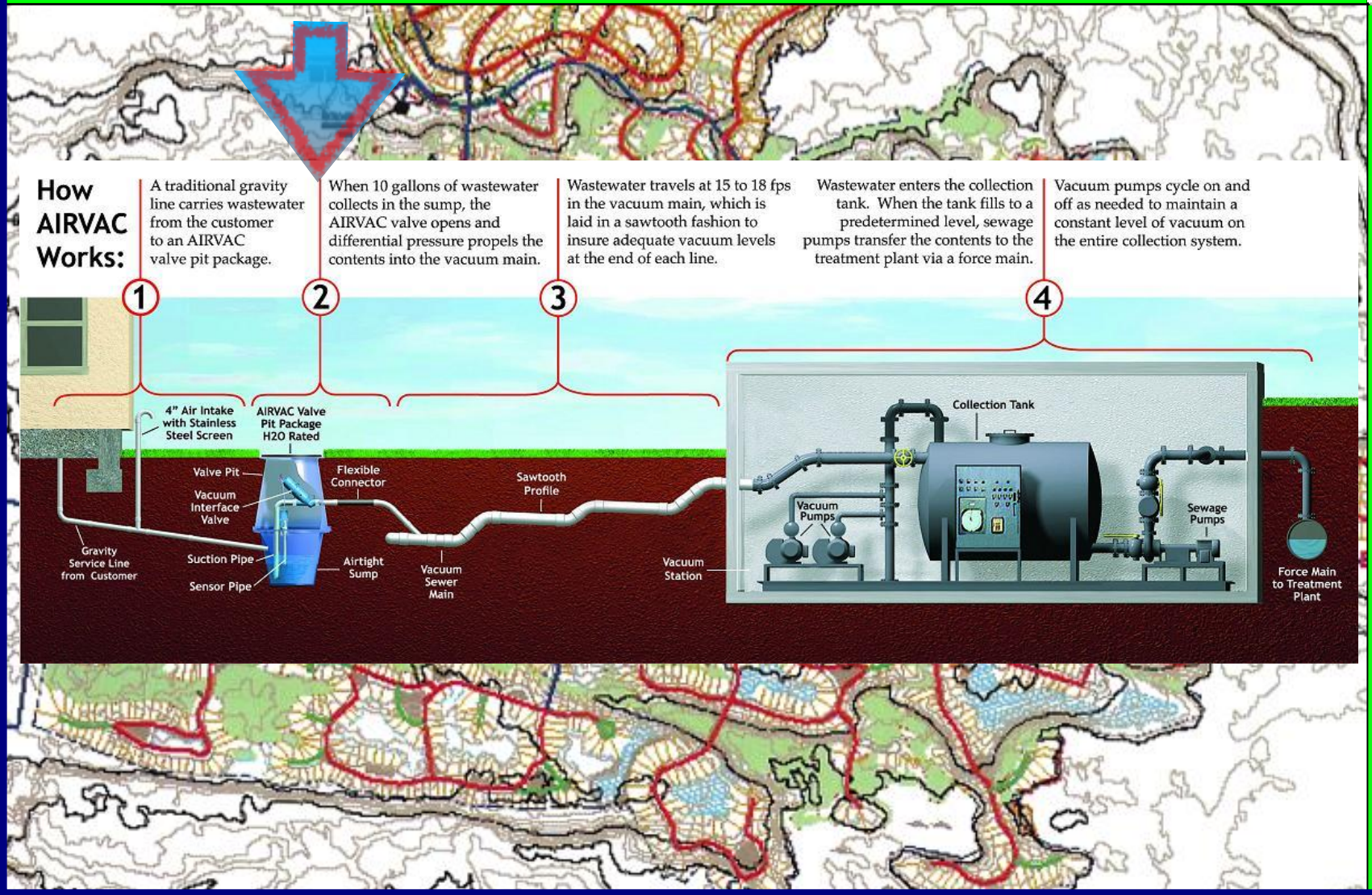

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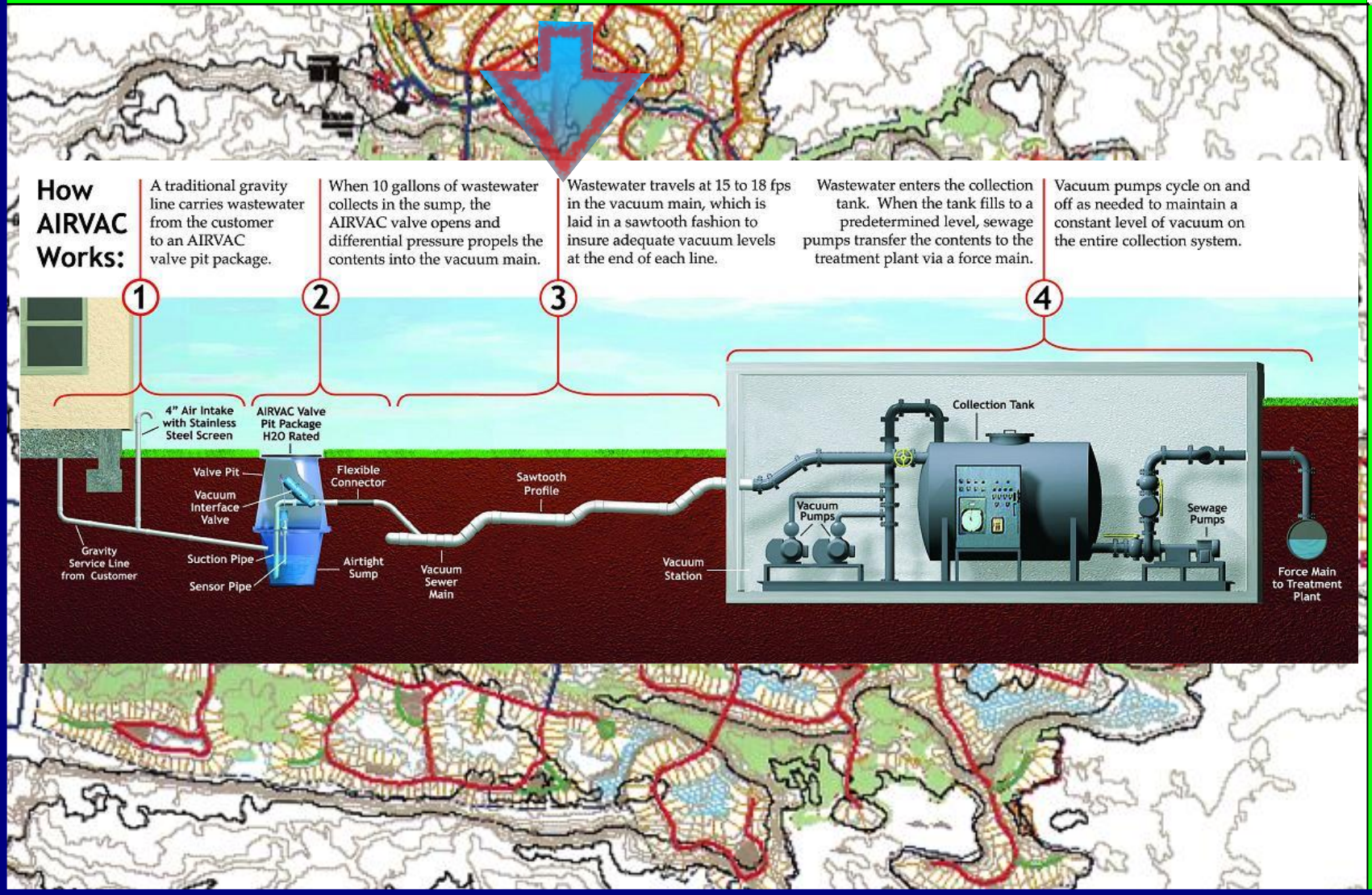
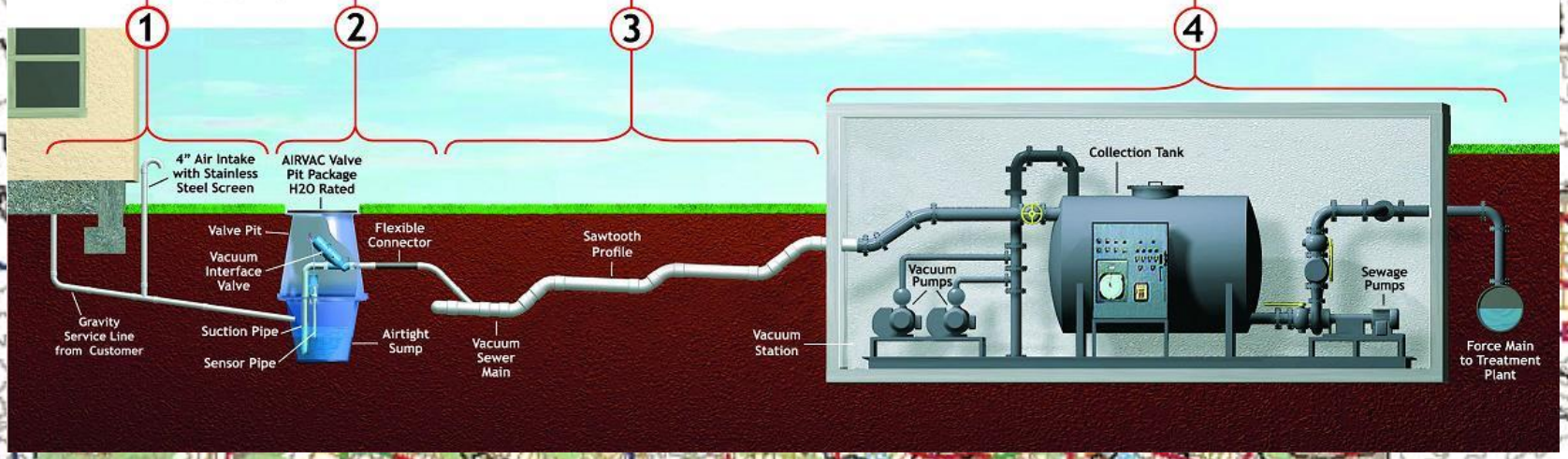


Vacuum Networks

How AIRVAC Works:

1. A traditional gravity line carries wastewater from the customer to an AIRVAC valve pit package.
2. When 10 gallons of wastewater collects in the sump, the AIRVAC valve opens and differential pressure propels the contents into the vacuum main.
3. Wastewater travels at 15 to 18 fps in the vacuum main, which is laid in a sawtooth fashion to insure adequate vacuum levels at the end of each line.
4. Wastewater enters the collection tank. When the tank fills to a predetermined level, sewage pumps transfer the contents to the treatment plant via a force main.

Vacuum pumps cycle on and off as needed to maintain a constant level of vacuum on the entire collection system.



How Does A Treatment Plant Work?

HGBD - President Street WWTP - Savannah GA

How Does A Treatment Plant Work?

There are many methods to treat wastewater. We will look at some typical ways a little later...

HGBD - President Street WWTP - Savannah GA

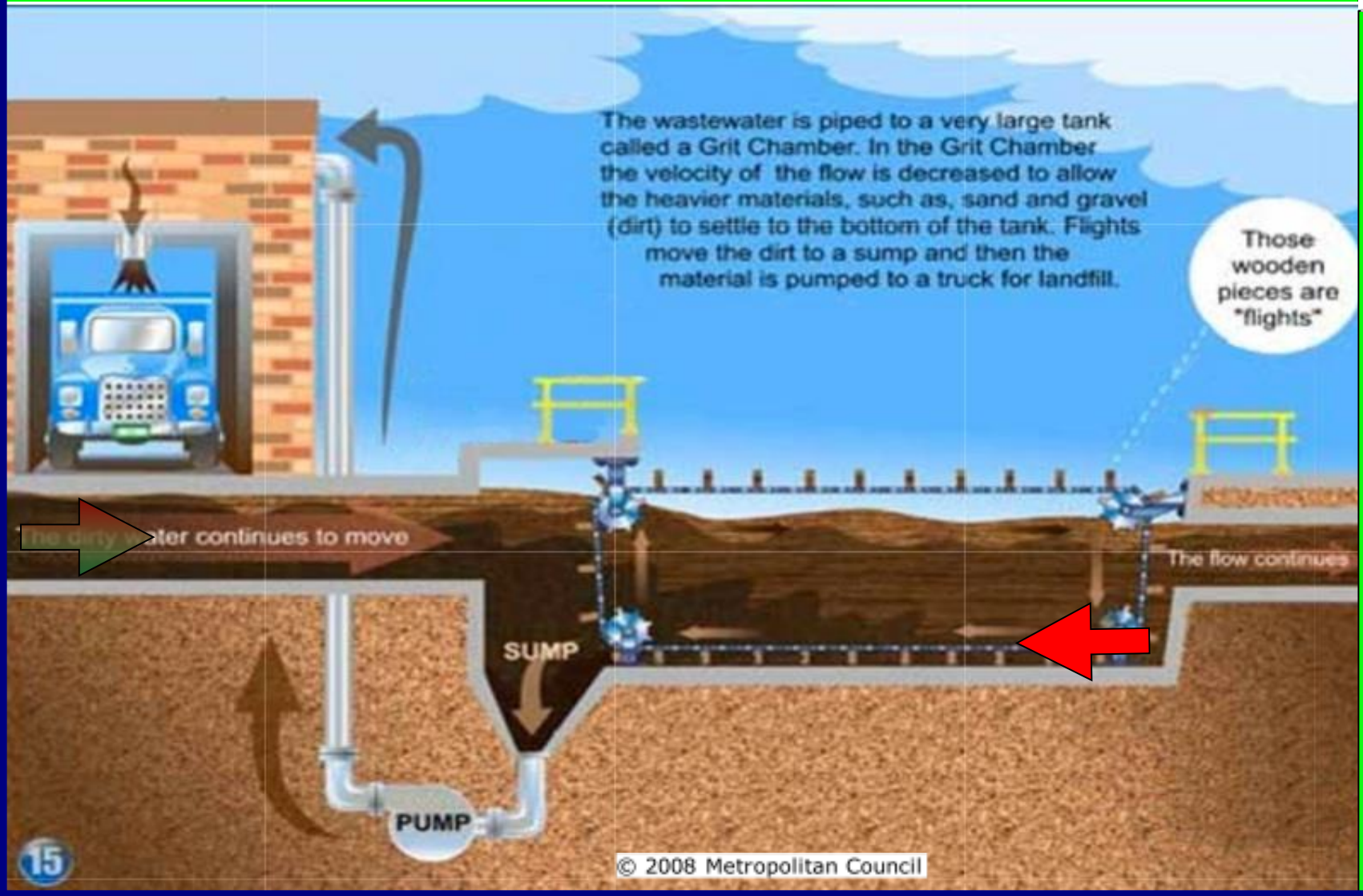
How Does A Treatment Plant Work?

Screen

Wastewater Management Presentation

How Does A Treatment Plant Work?

How Does A Treatment Plant Work?



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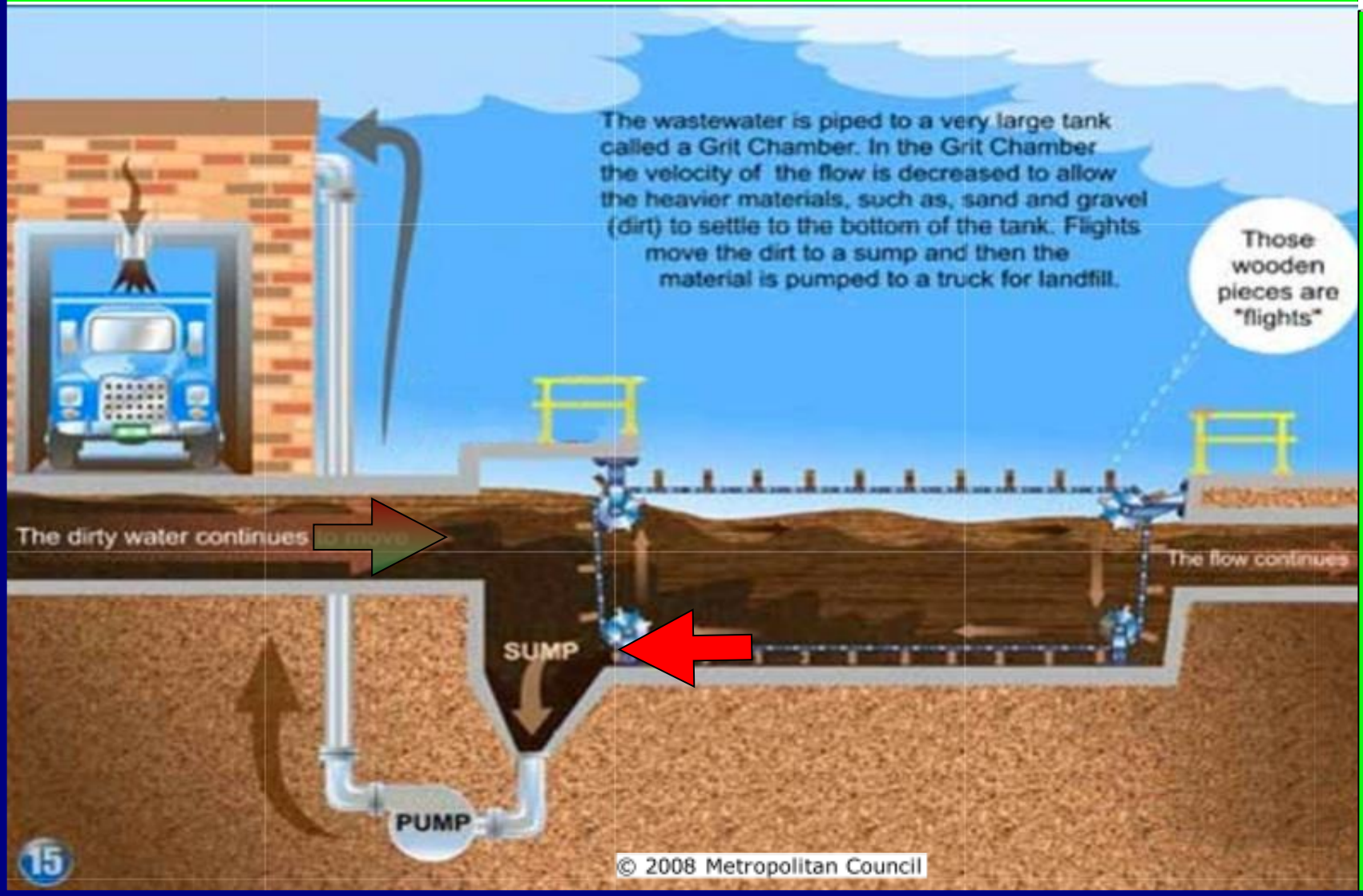

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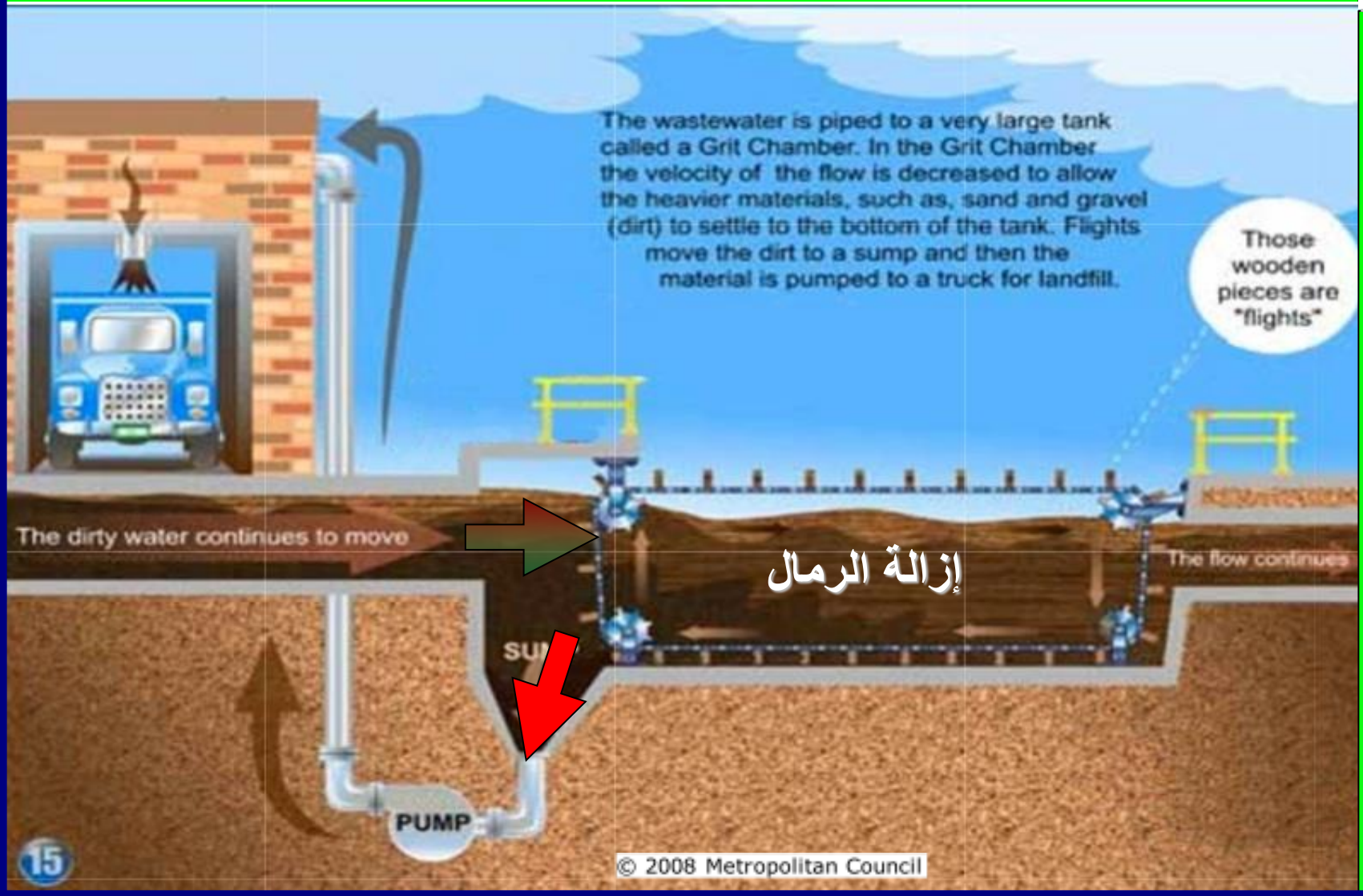

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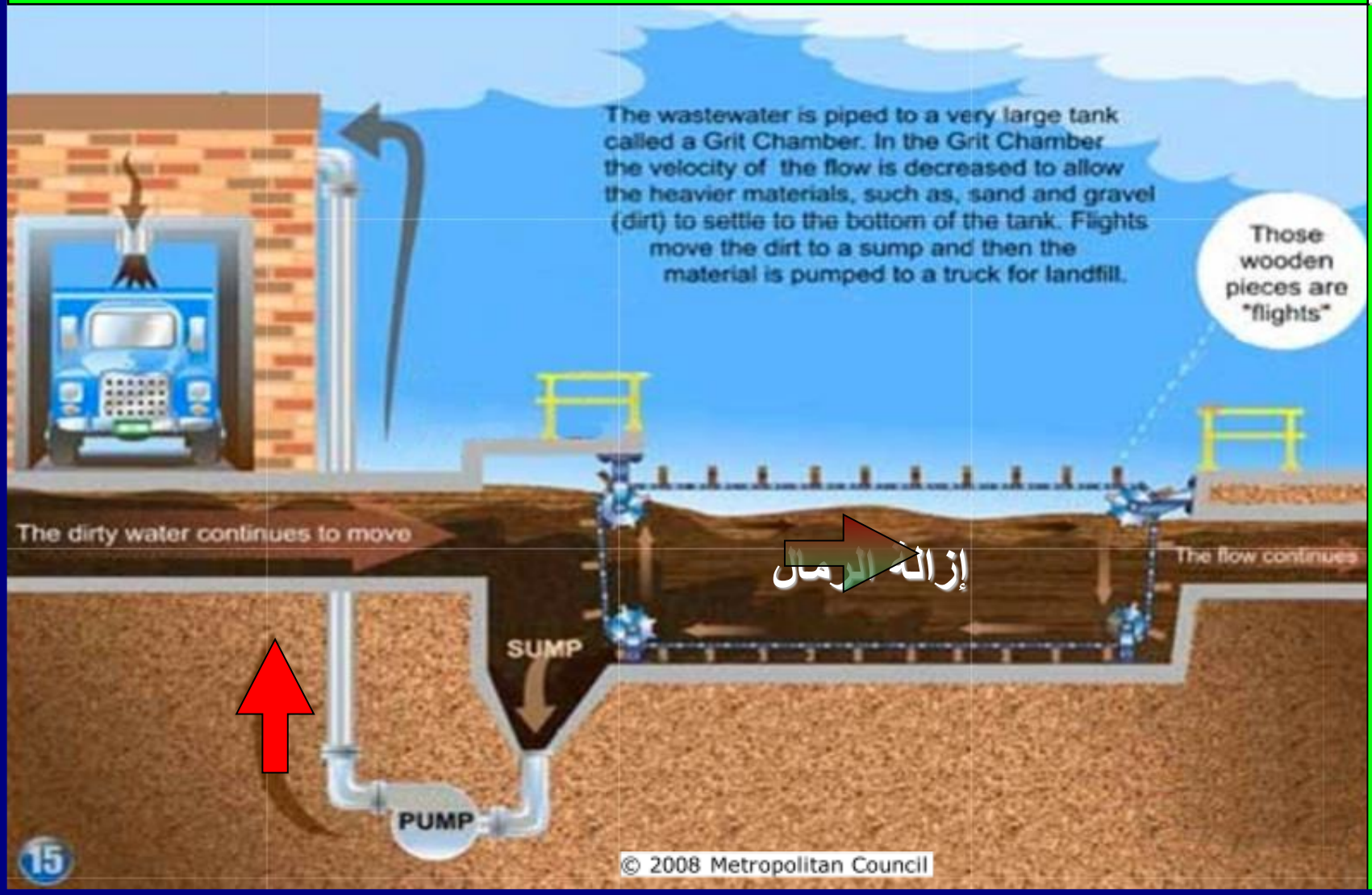

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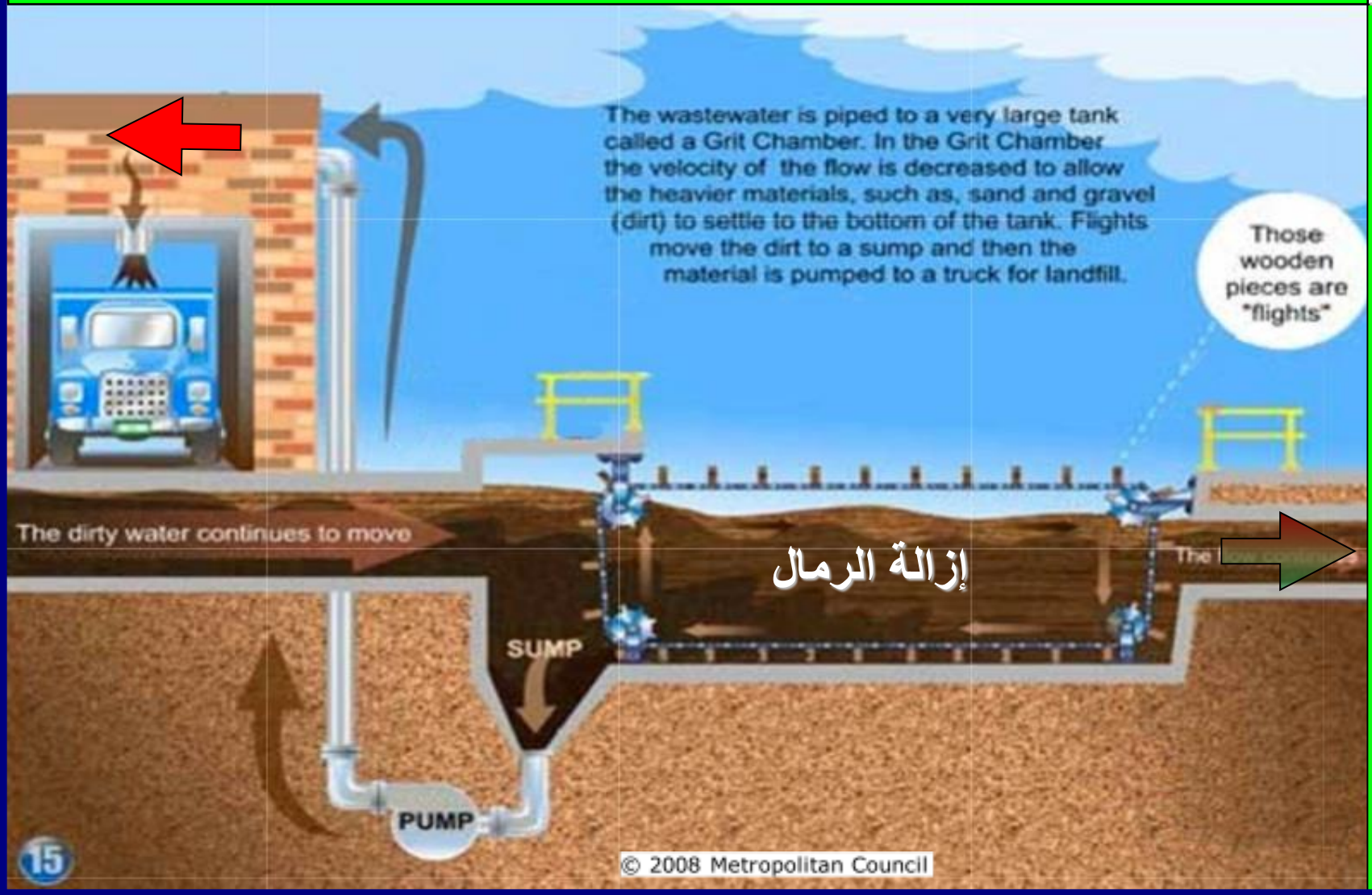

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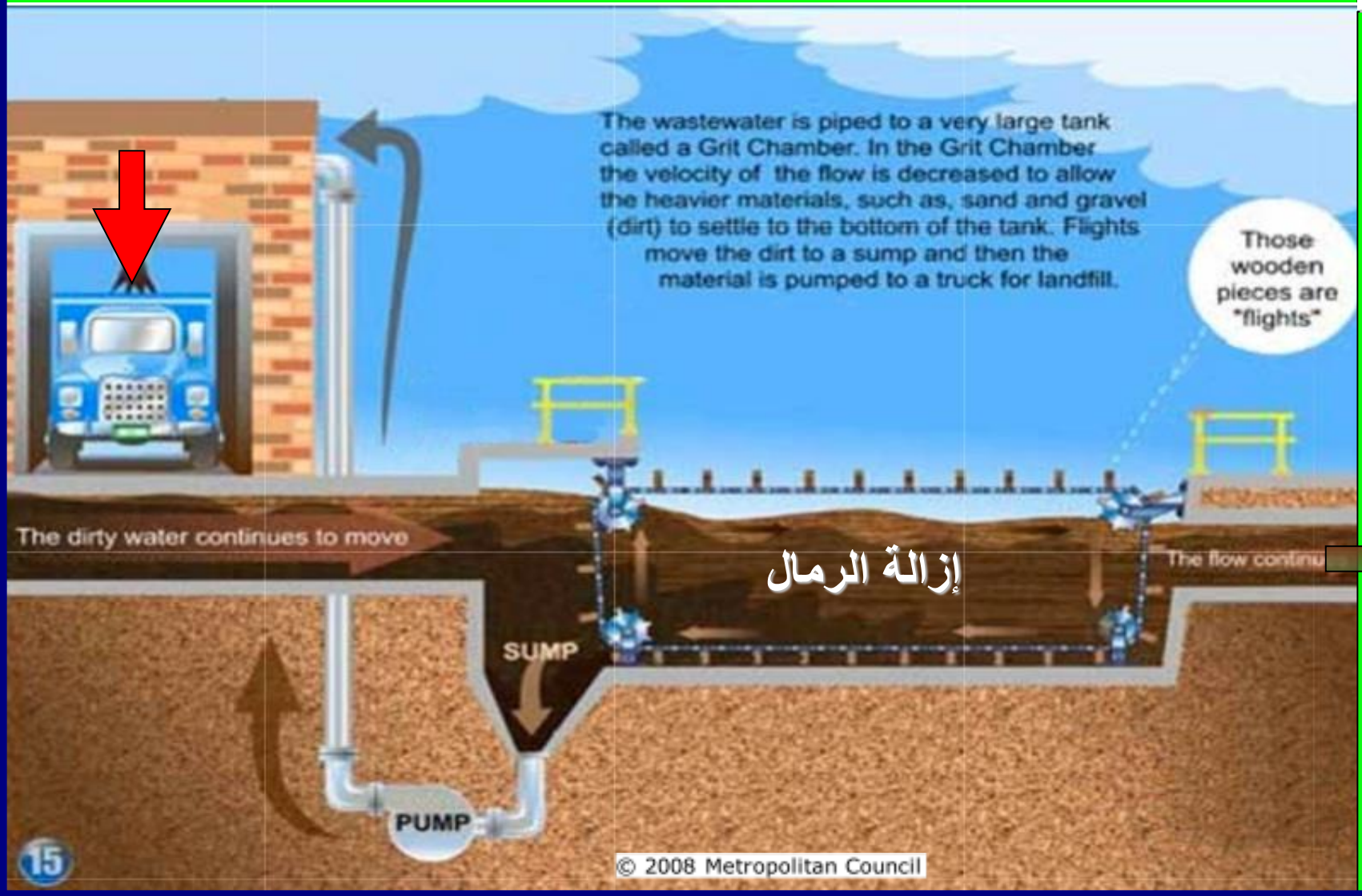

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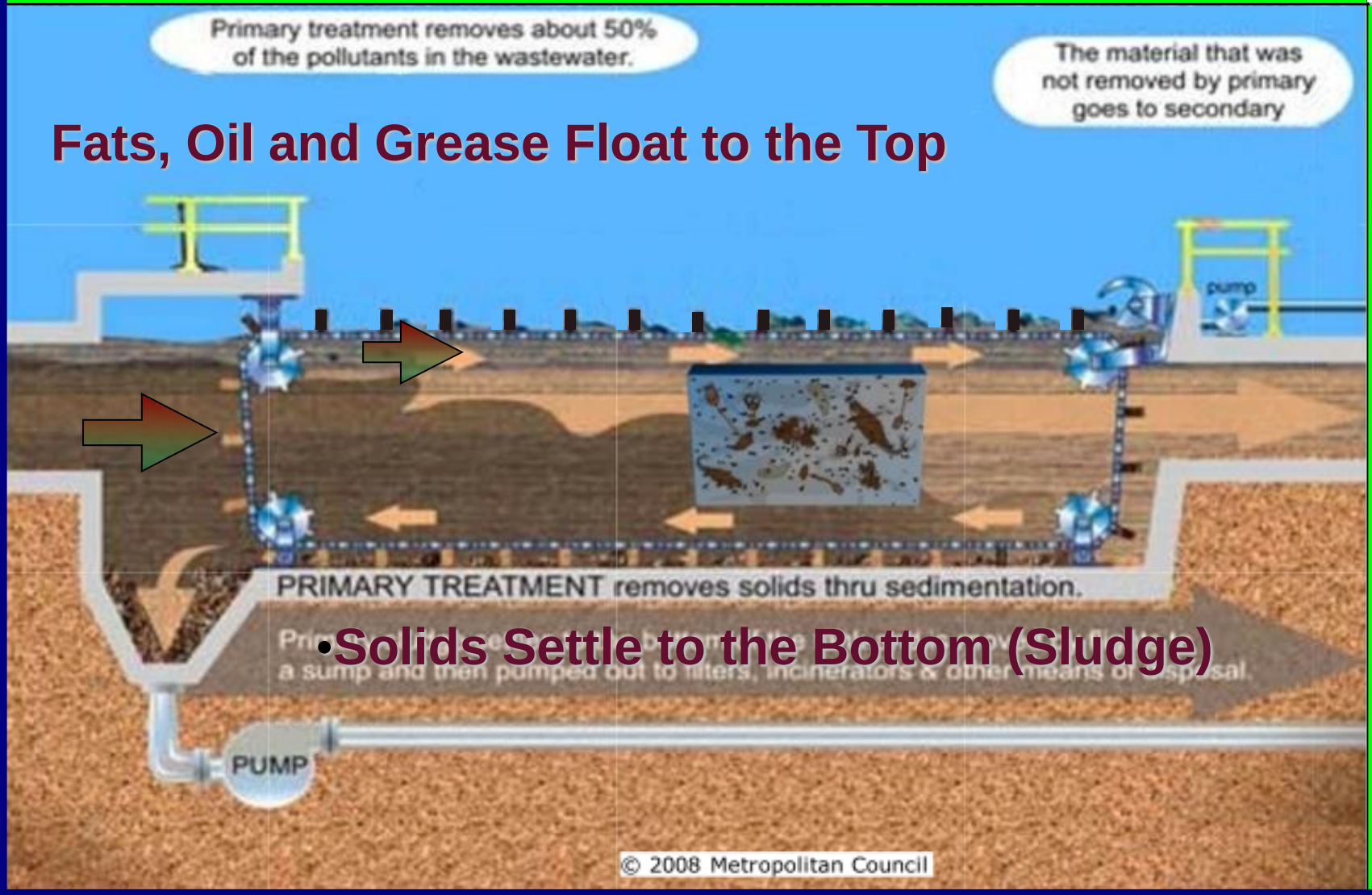

Fats, Oil and Grease Float to the Top

- Solids Settle to the Bottom (Sludge)

How Does A Treatment Plant Work?

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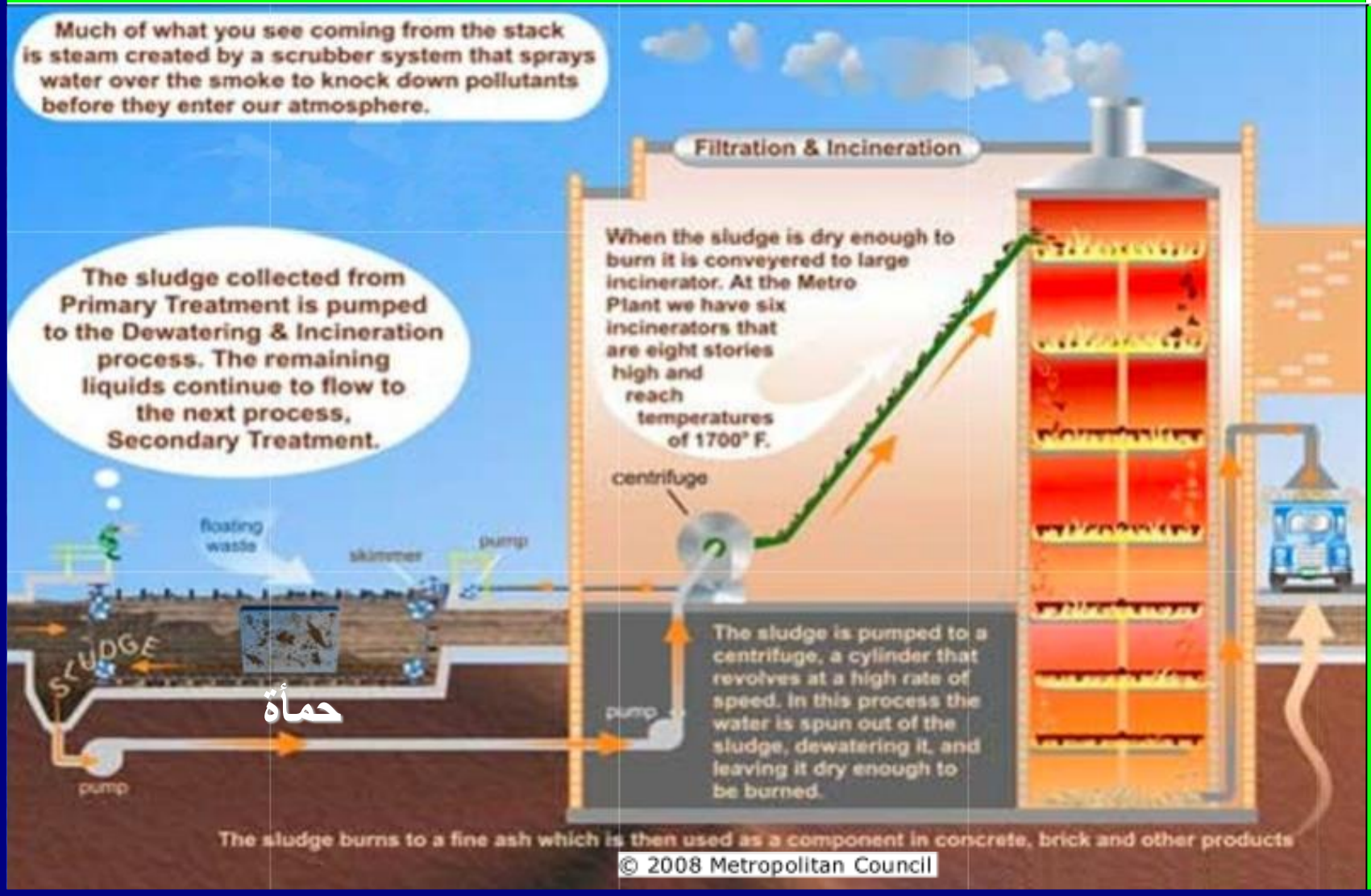
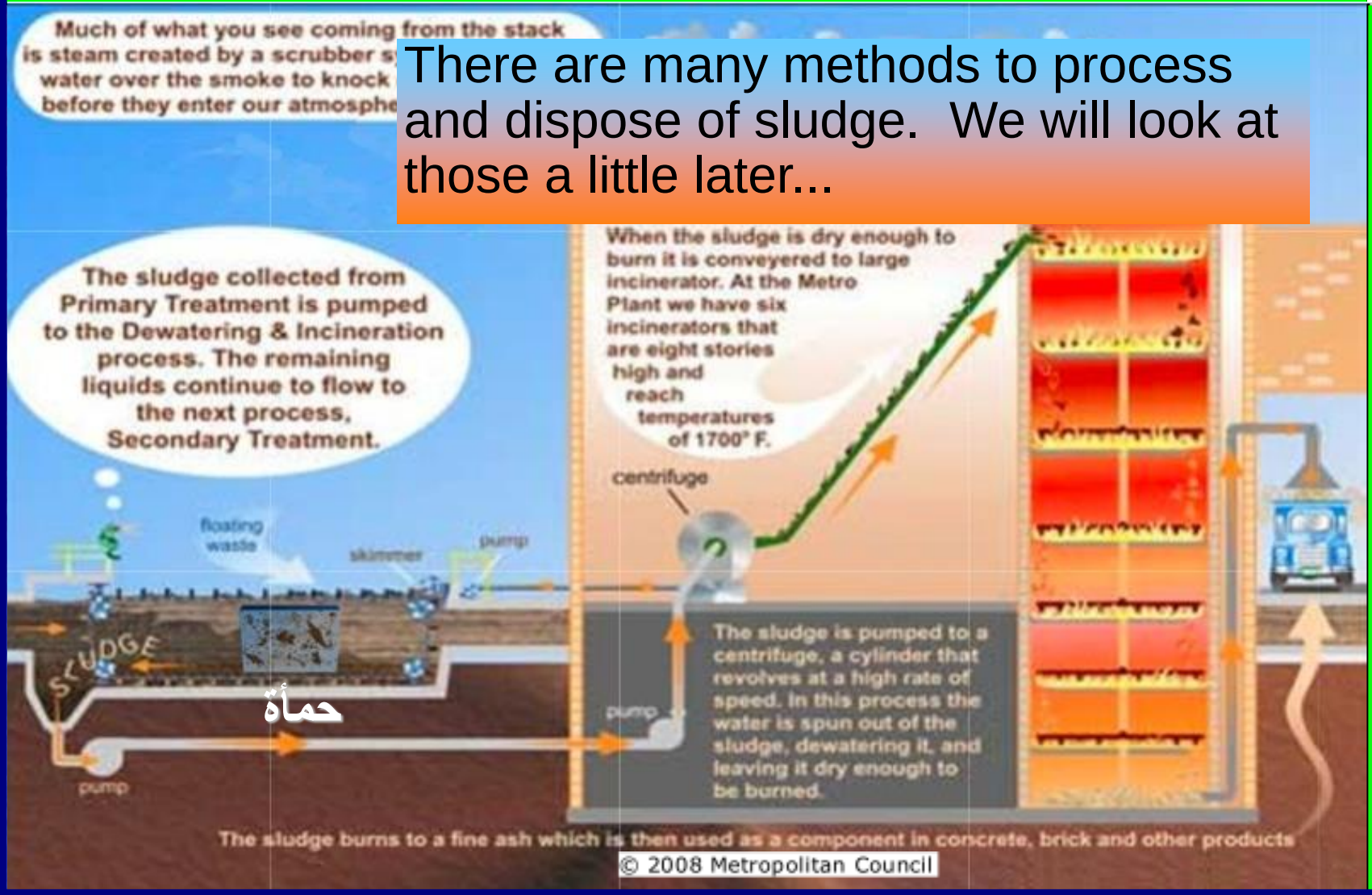


How Does A Treatment Plant Work?

There are many methods to process and dispose of sludge. We will look at those a little later...



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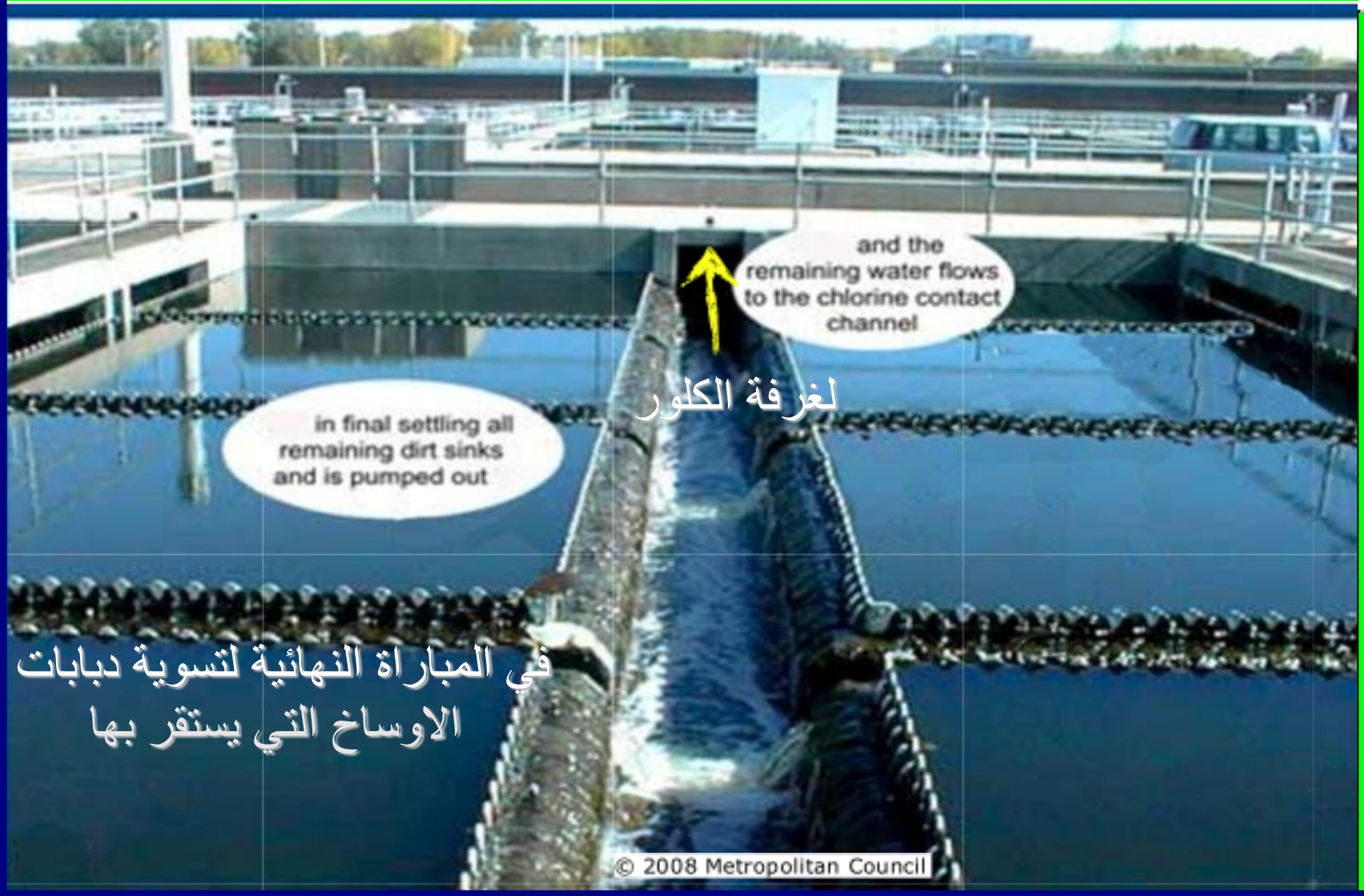

How Does A Treatment Plant Work?

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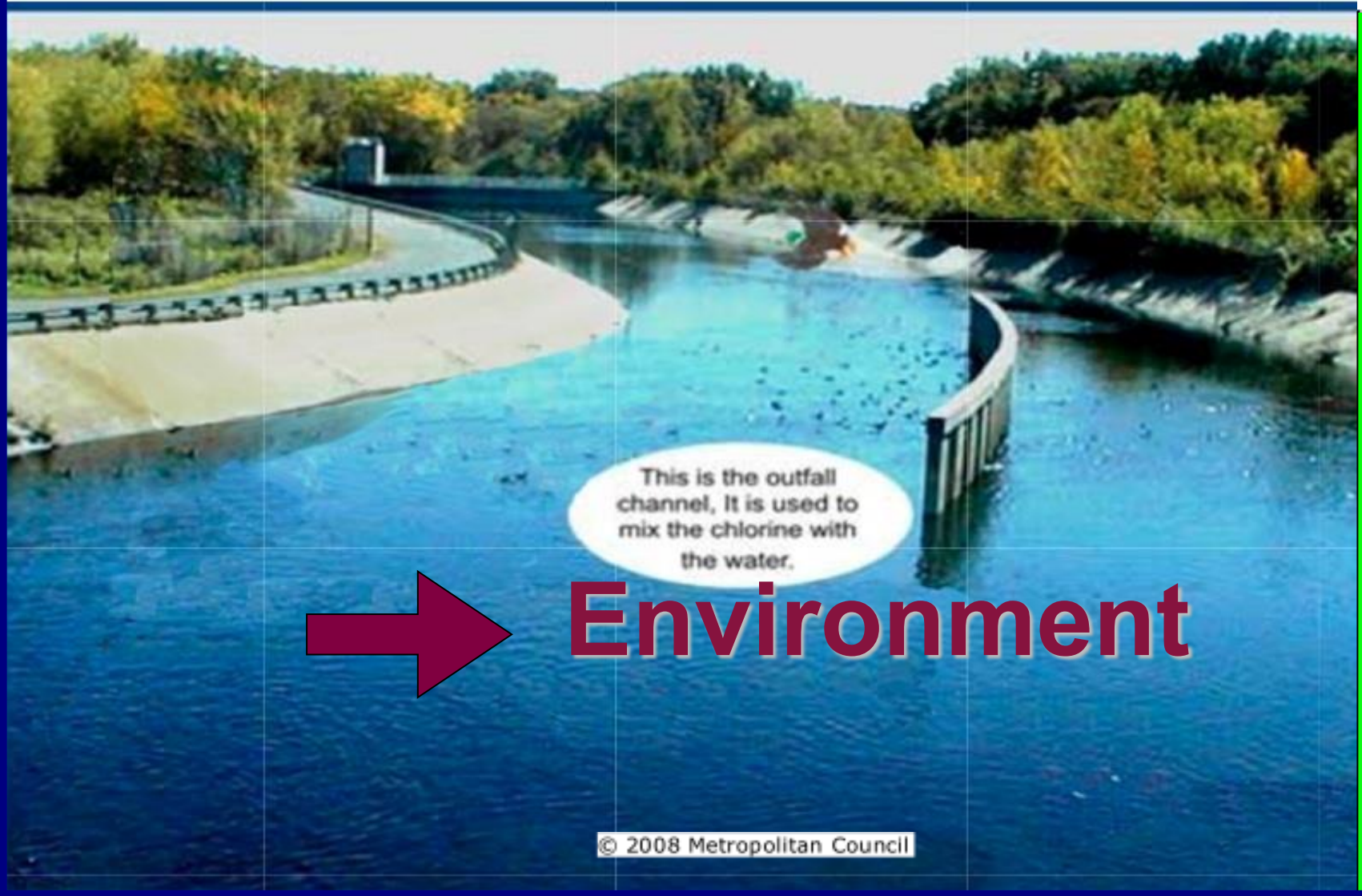

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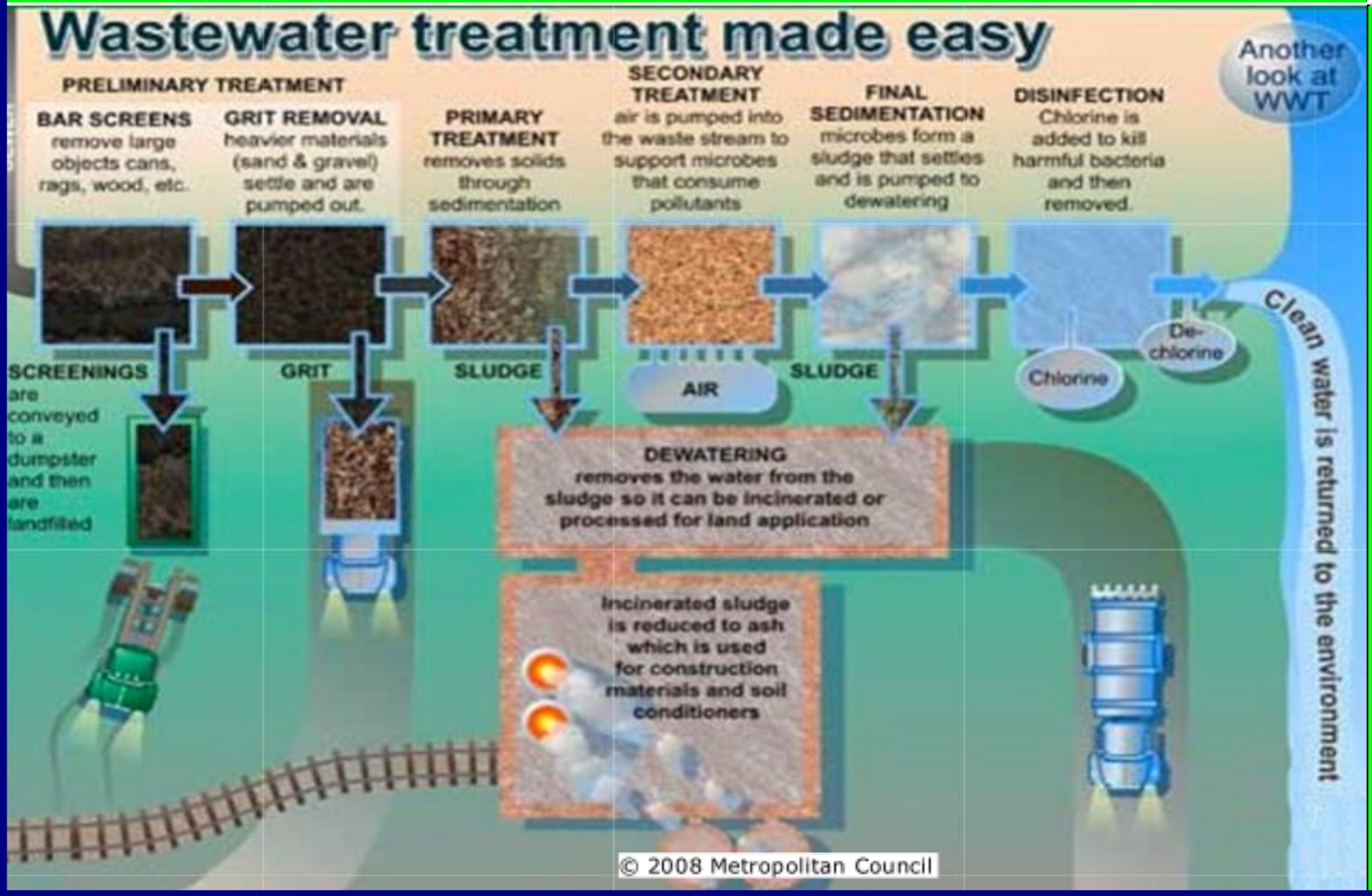
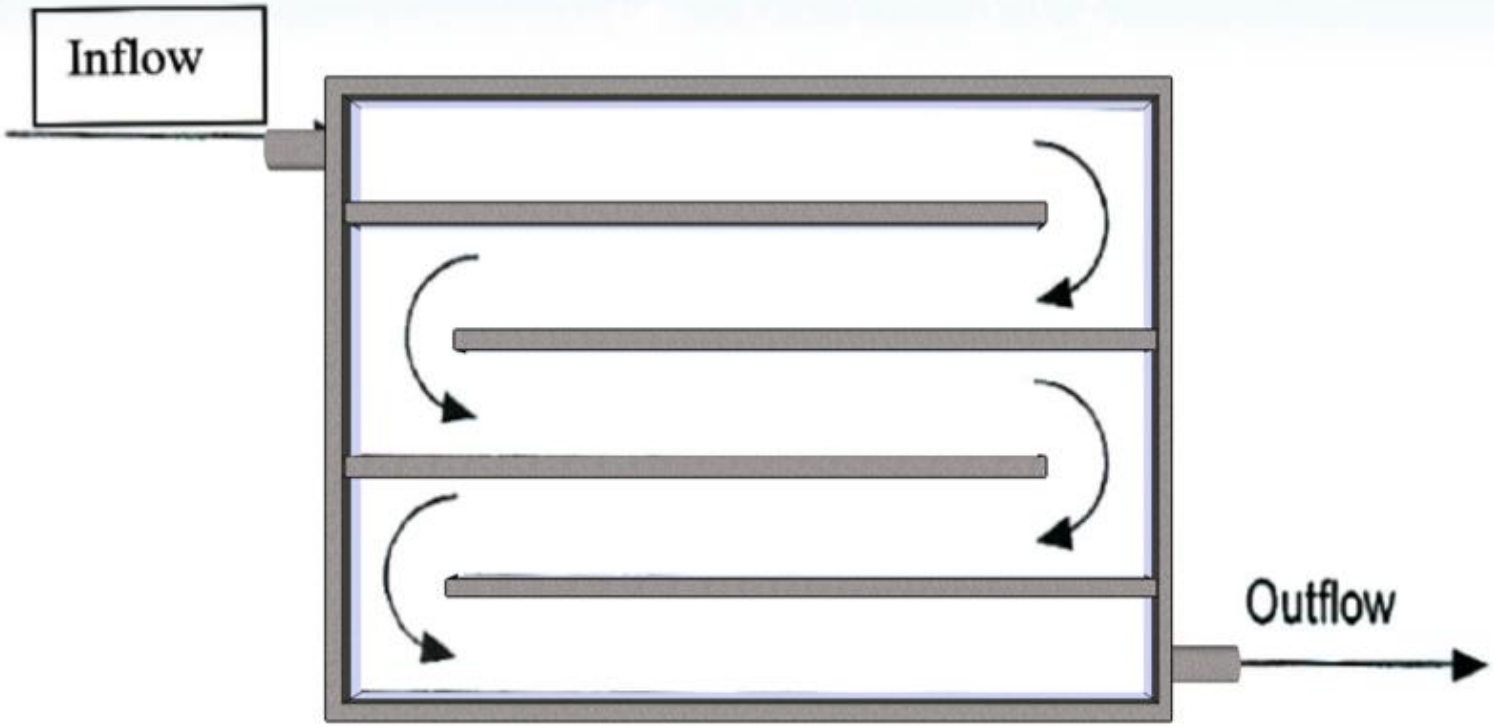


Treatment Methods

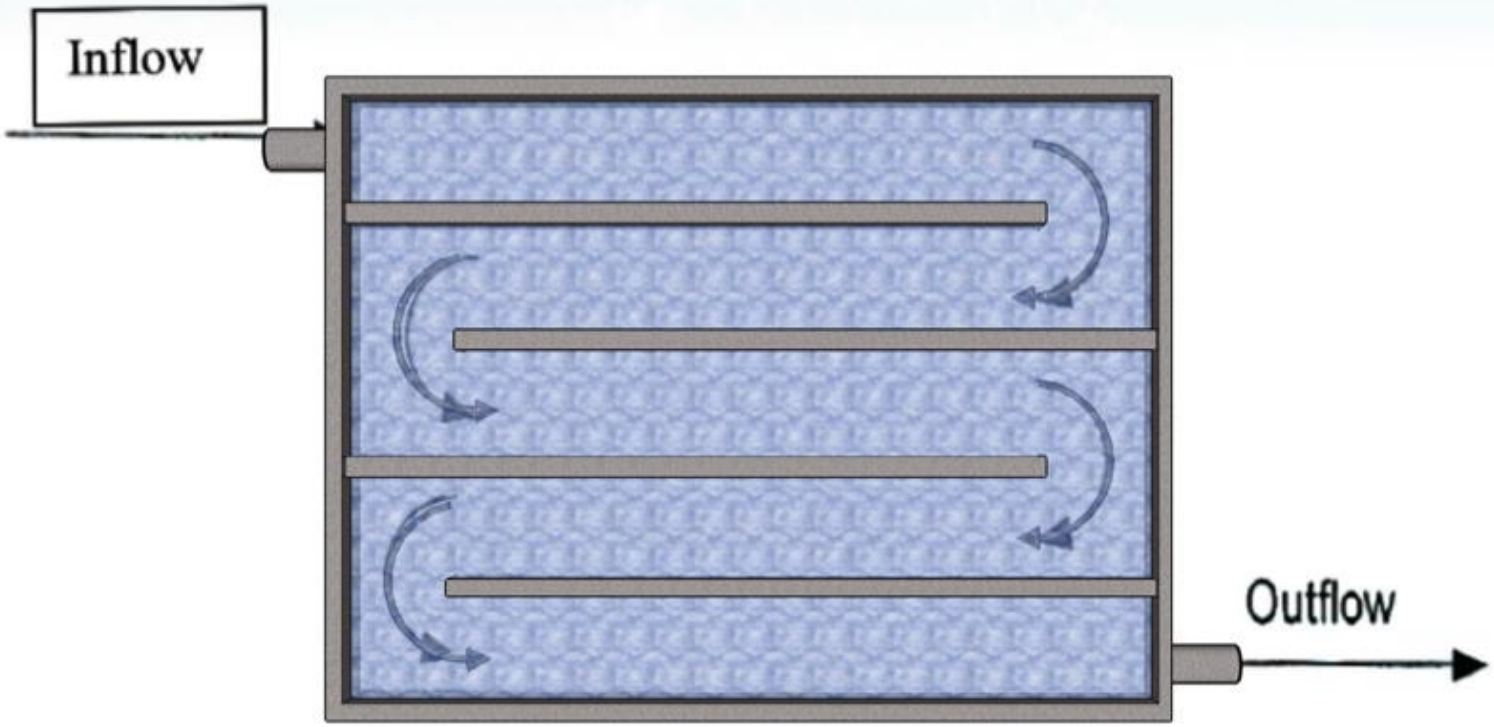
- Extended Aeration of Activated Sludge
- Oxidation Ditches
- Aerated Lagoons
- Stabilization Ponds
- Membrane Bio Reactors

Treatment Methods
Extended Aeration



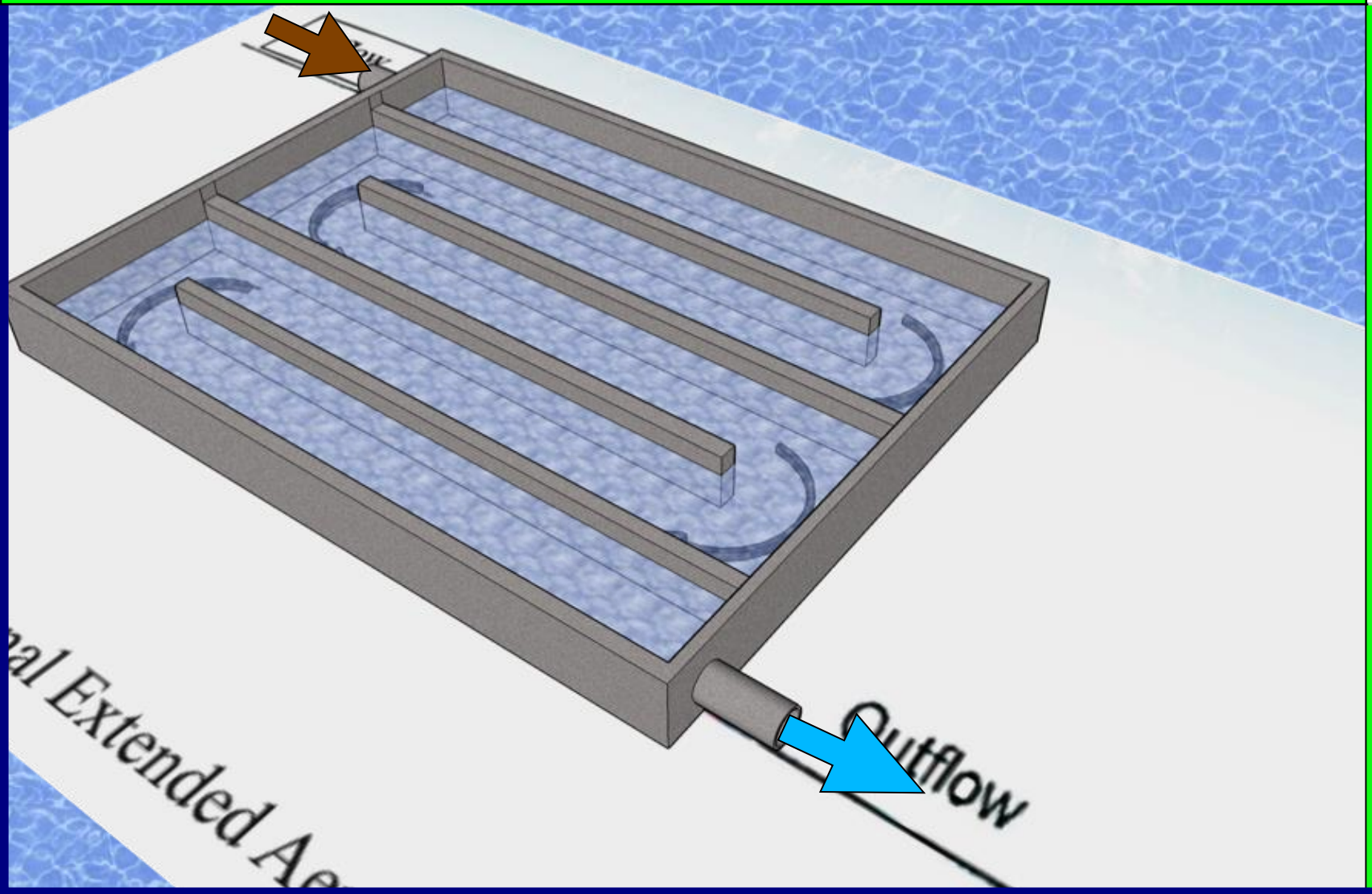
(a) Conventional Extended Aeration

Treatment Methods
Extended Aeration

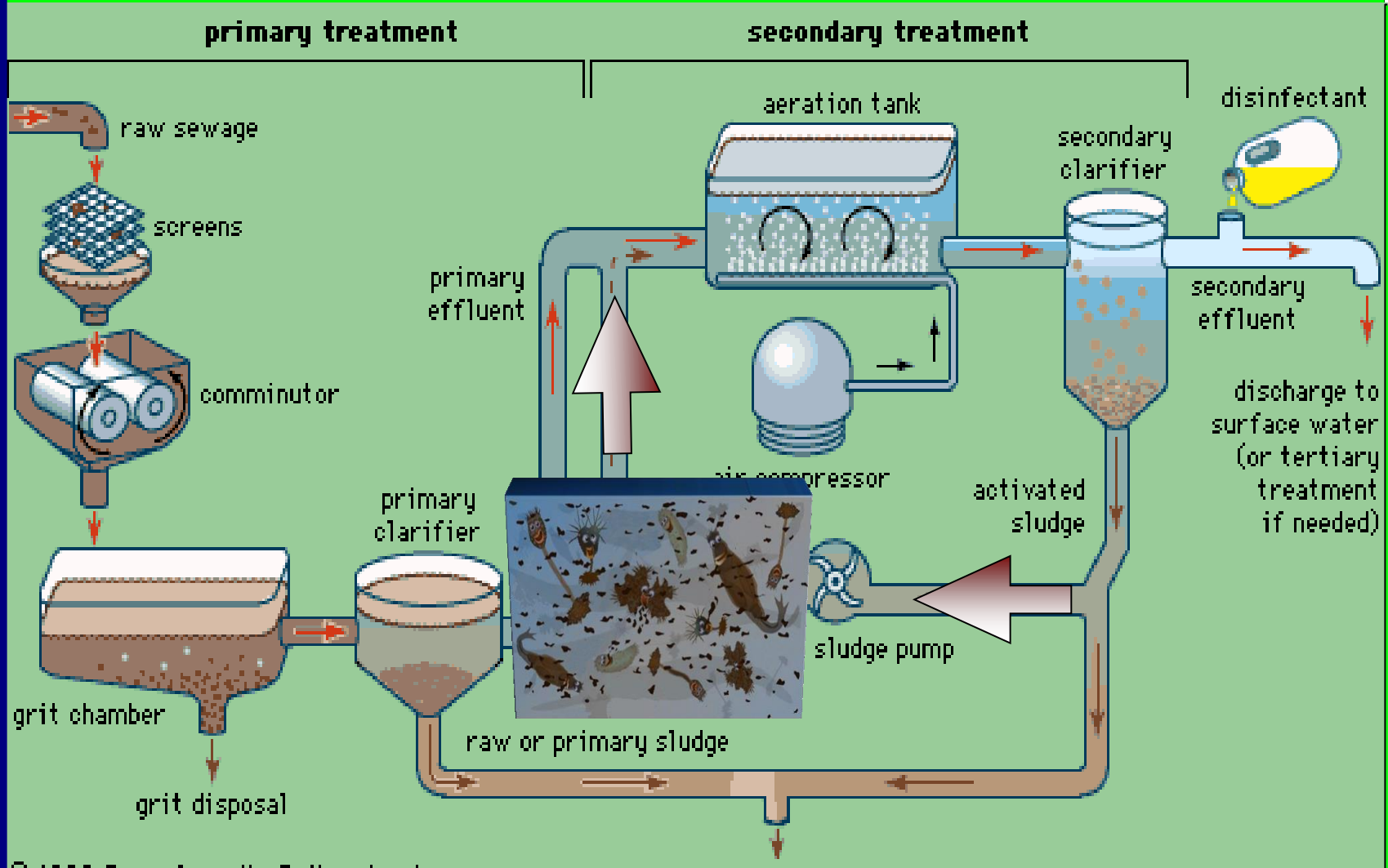


(a) Conventional Extended Aeration

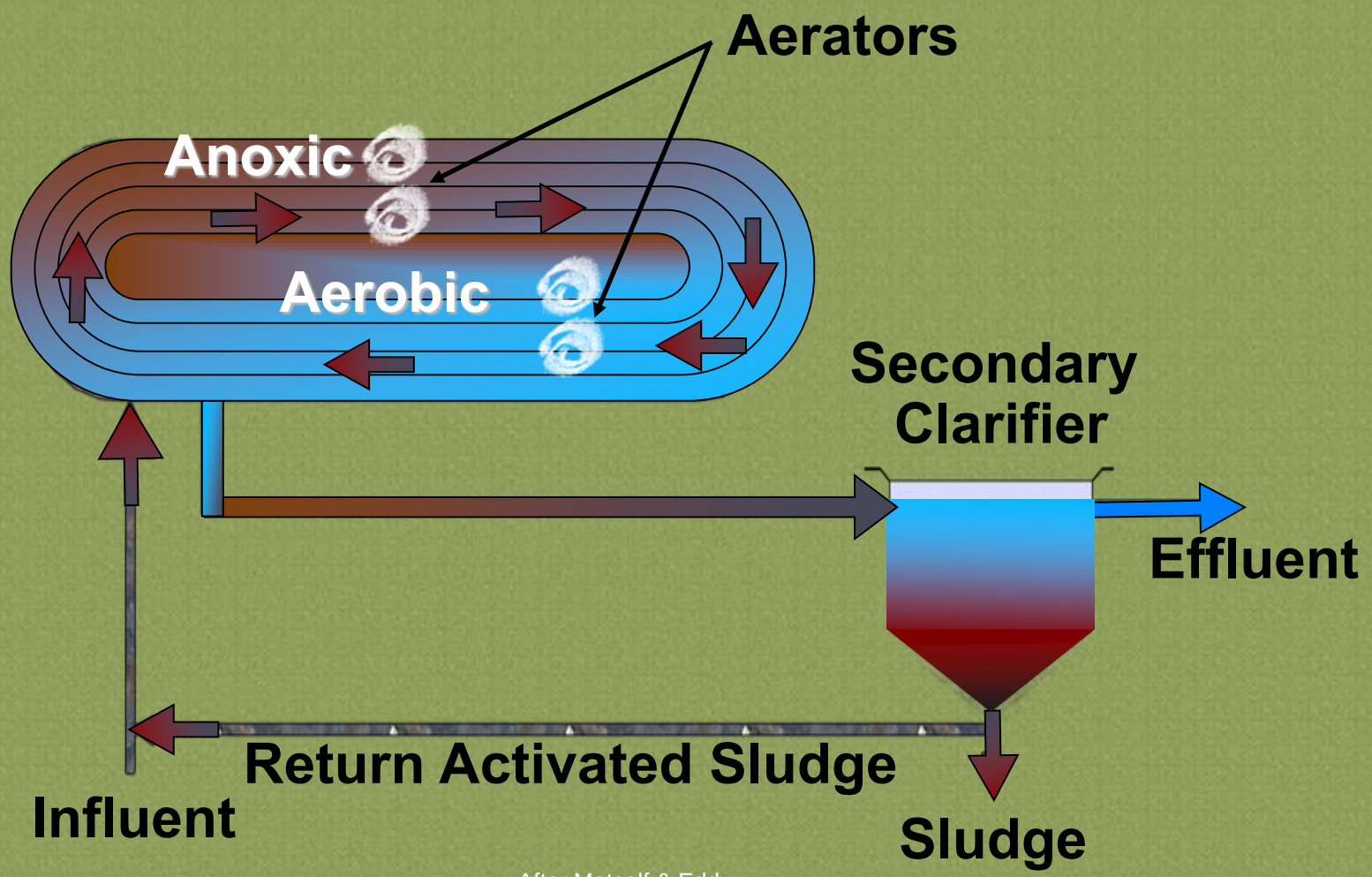
Treatment Methods
Extended Aeration



Treatment Methods
Activated Sludge

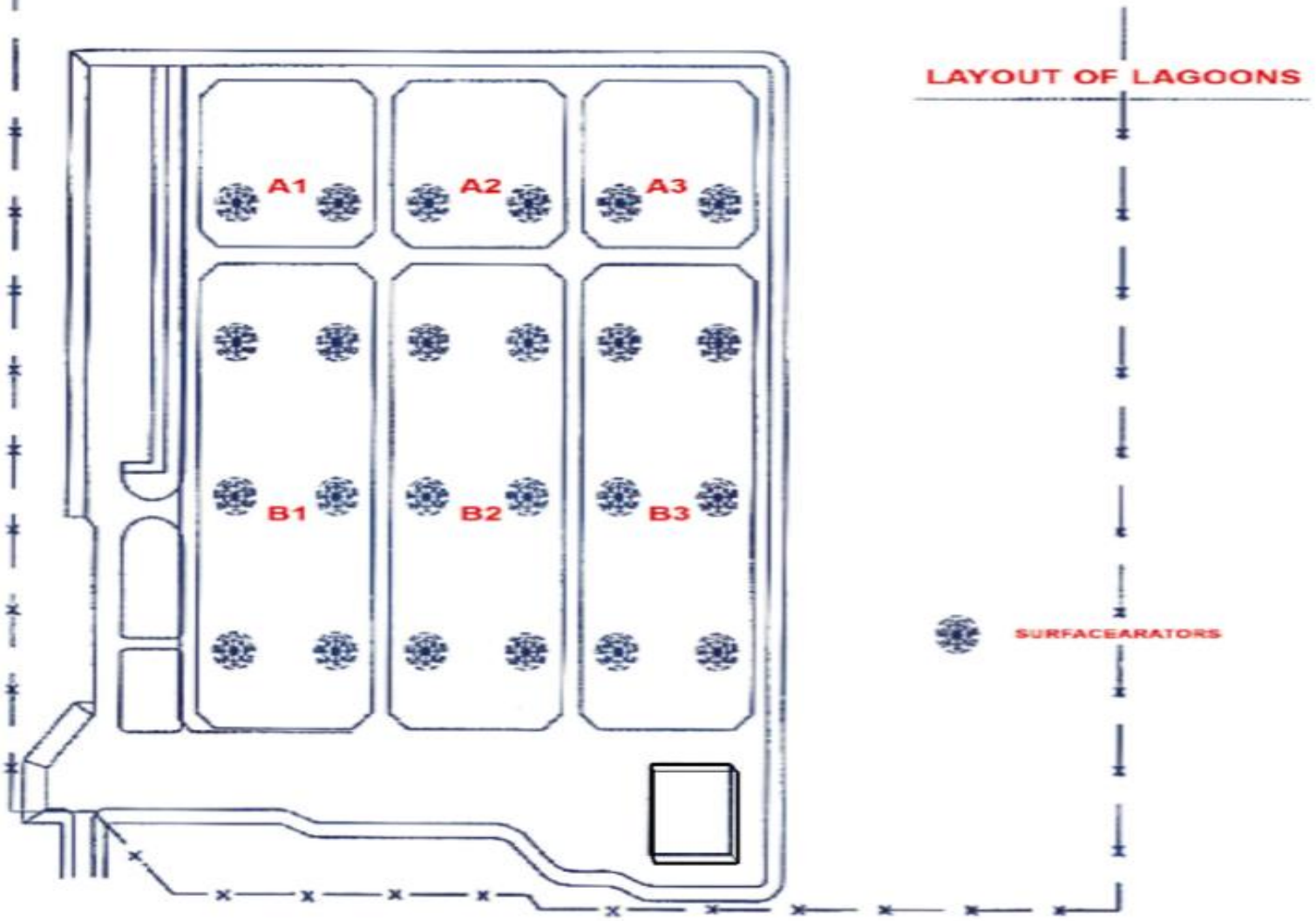


Treatment Methods
Oxidation Ditches

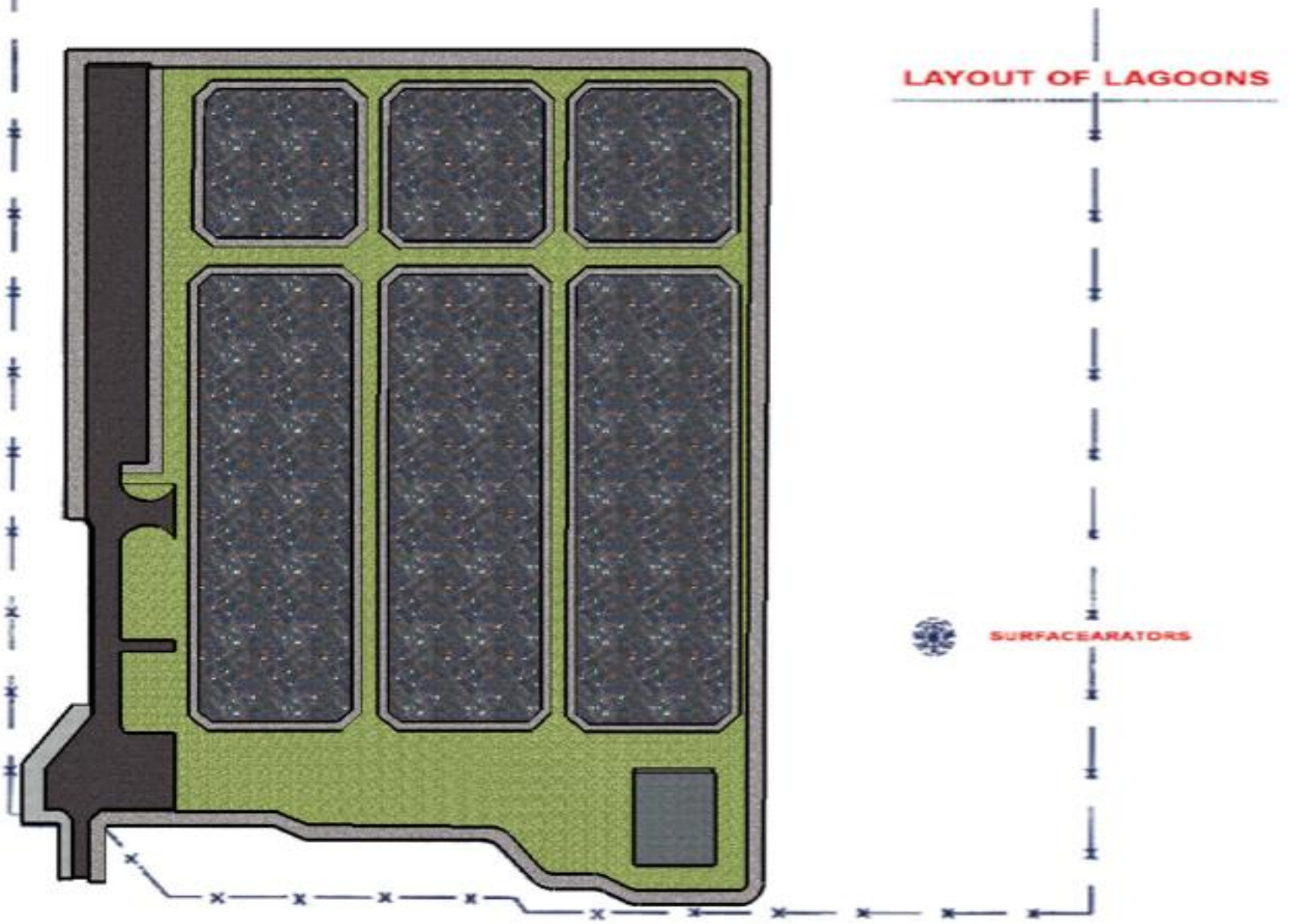


After Metcalf & Eddy

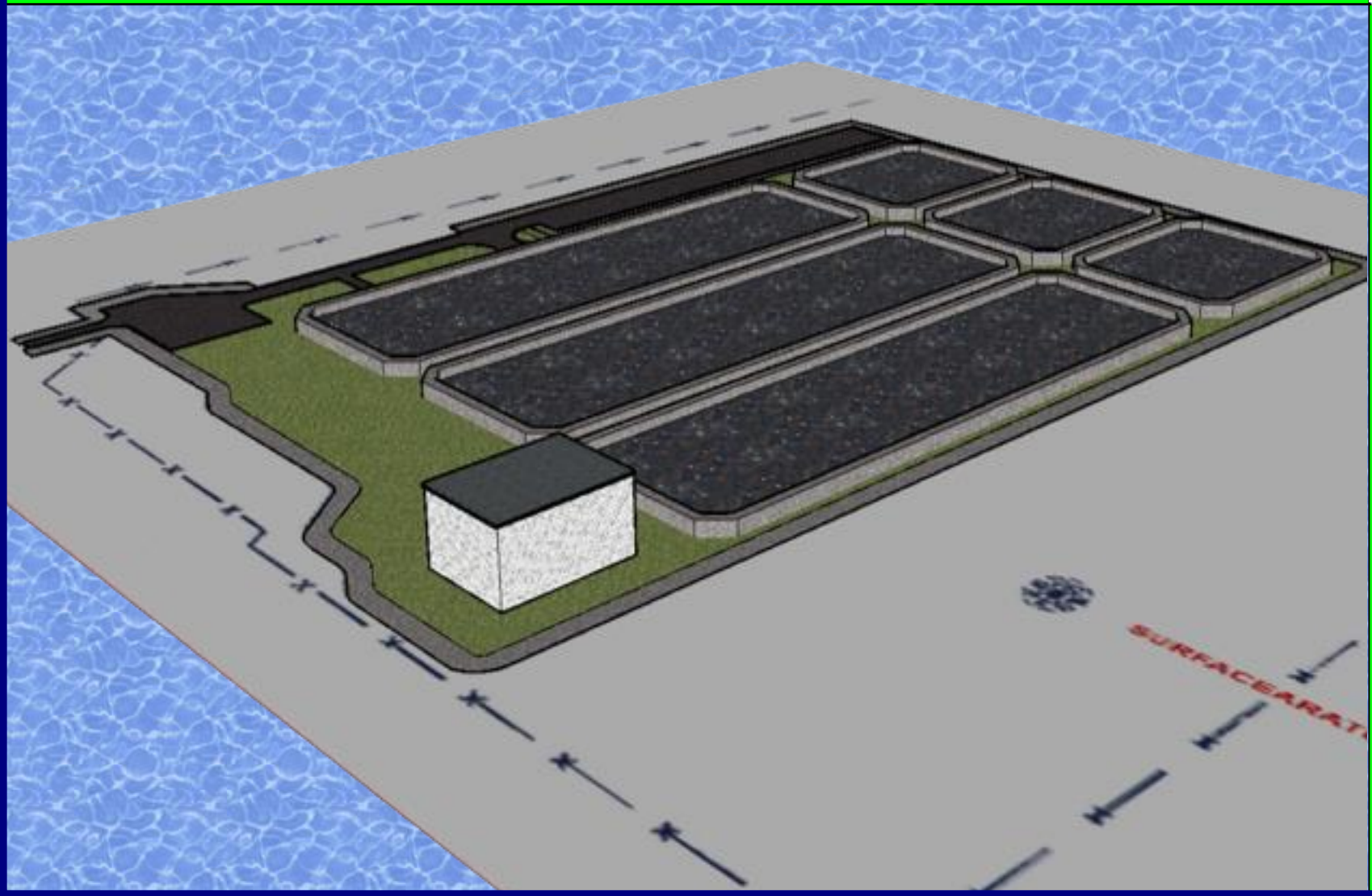
Treatment Methods
Aerated Lagoons



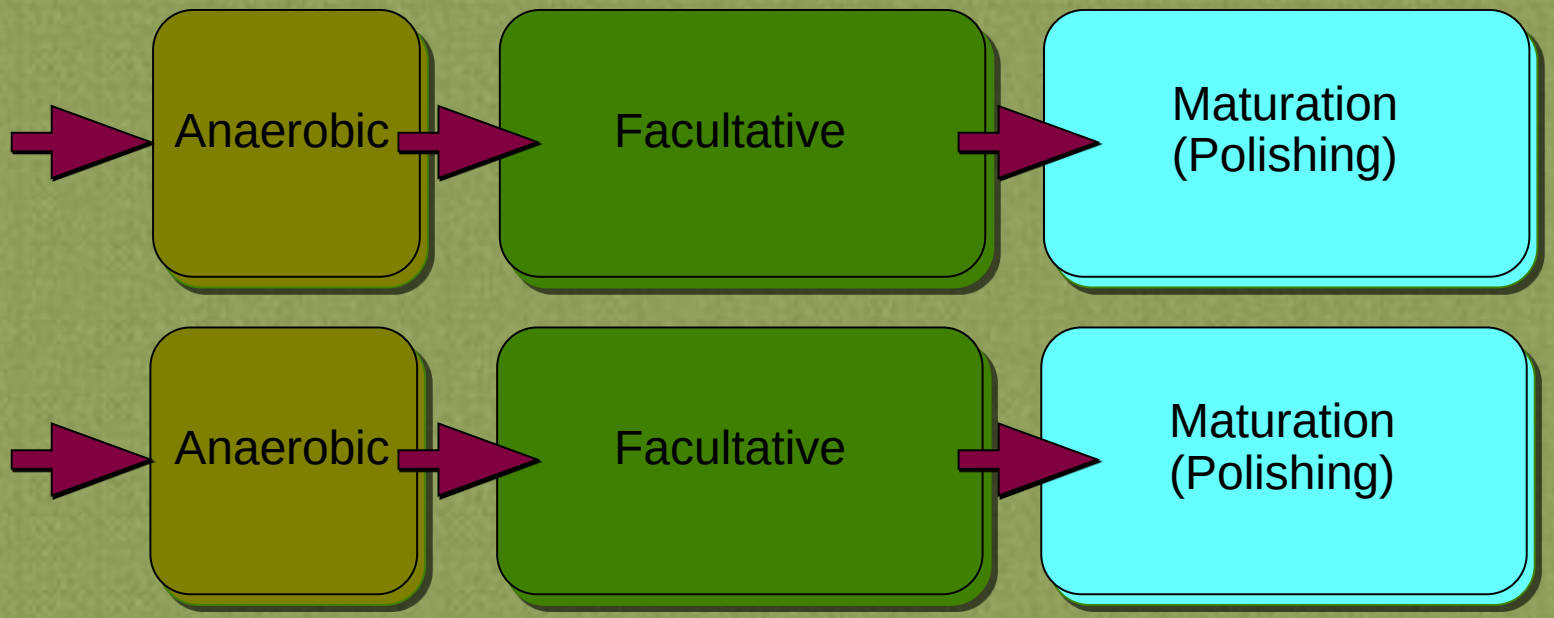
Treatment Methods
Aerated Lagoons



Treatment Methods
Aerated Lagoons

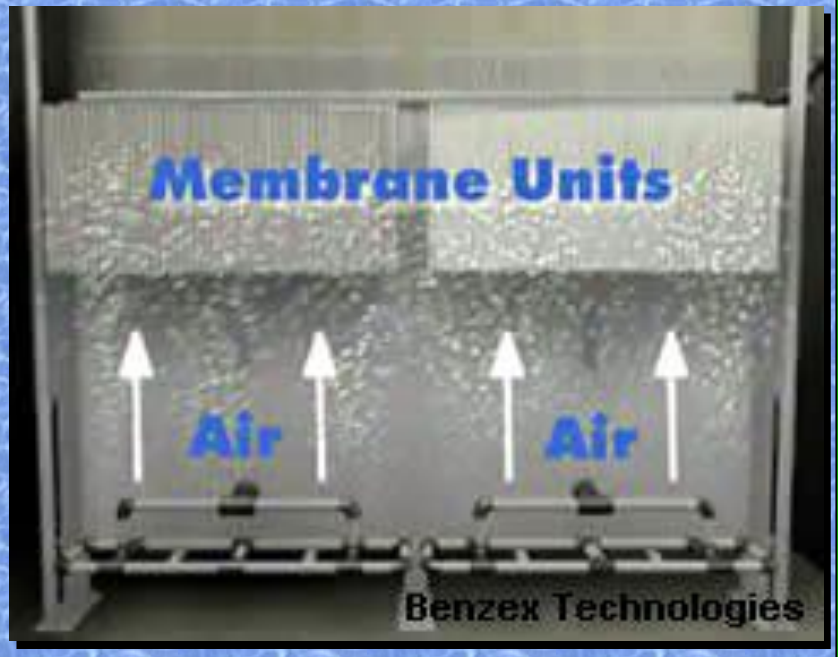


Treatment Methods
Stabilization Ponds



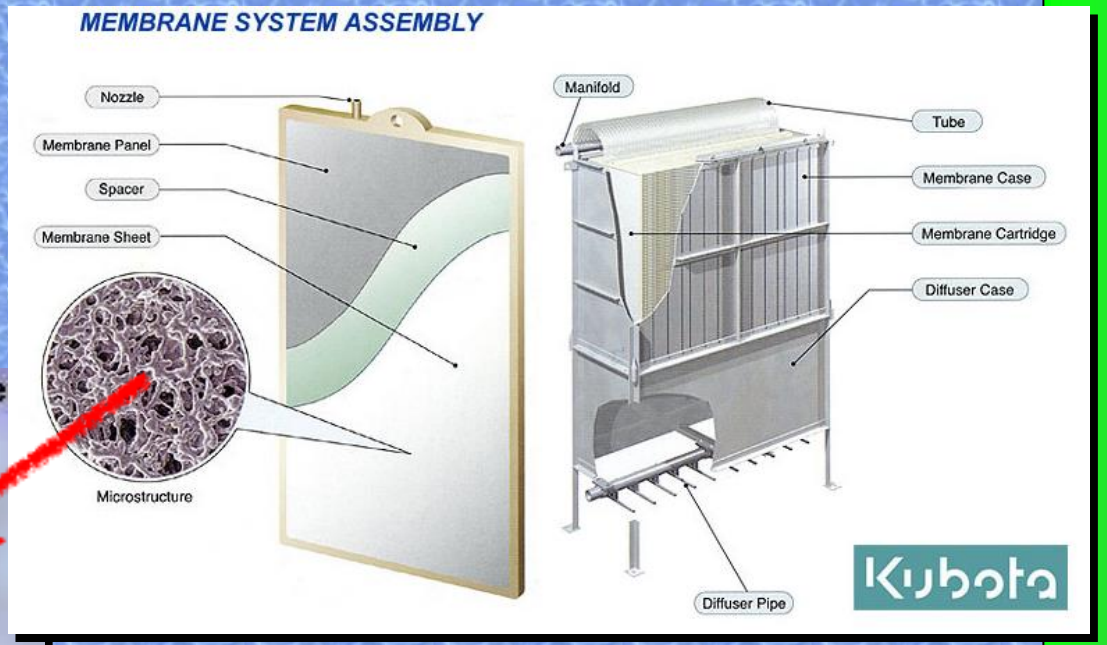
Treatment Methods
Stabilization Ponds

Advanced Treatment
Membrane Bio Reactor (MBR)

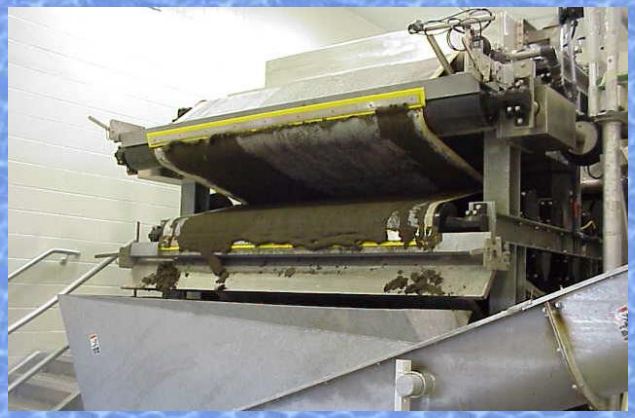


- Microfiltration
- Removes Solids
- Water can be Used for Unrestricted Irrigation

Advanced Treatment
Membrane Bio Reactor (MBR)



Sludge Treatments



Sludge Treatment
Belt Press

City of Tomah, Wisconsin

Sludge Treatment Centrifuge

City of Shaw, ON, Canada

Sludge Treatment
Drying Bed

jaipaldatta - ETP at Mohan Nagar, India

Sludge Treatment
Reed Beds

Harris Environmental - Australia

Crawford Associates
Village of Tivoli, NY

Rutgers University

Sludge Reuse / Disposal

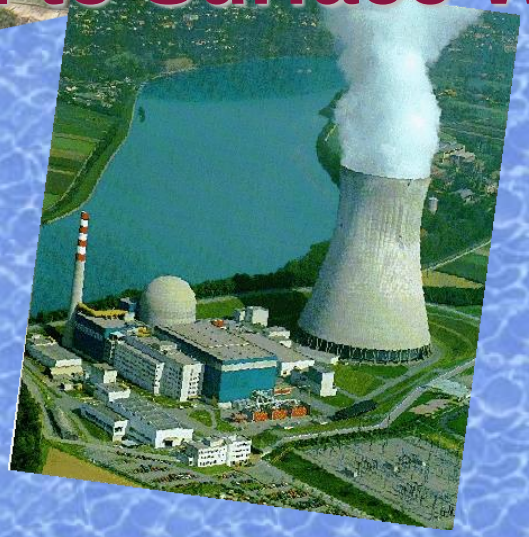
Agricultural Land Application

Injection

Lawn & Garden Fertilizer

Uses of Reclaimed Water

- Restricted Agriculture
- Unrestricted Agriculture
- Industry
- Ground Water Recharge
- Disposal to Surface Water



Uses of Reclaimed Water

Restricted Agriculture
Fruit Trees, Fodder Crops

Uses of Reclaimed Water

- Unrestricted agriculture
- Food crops, Public Places

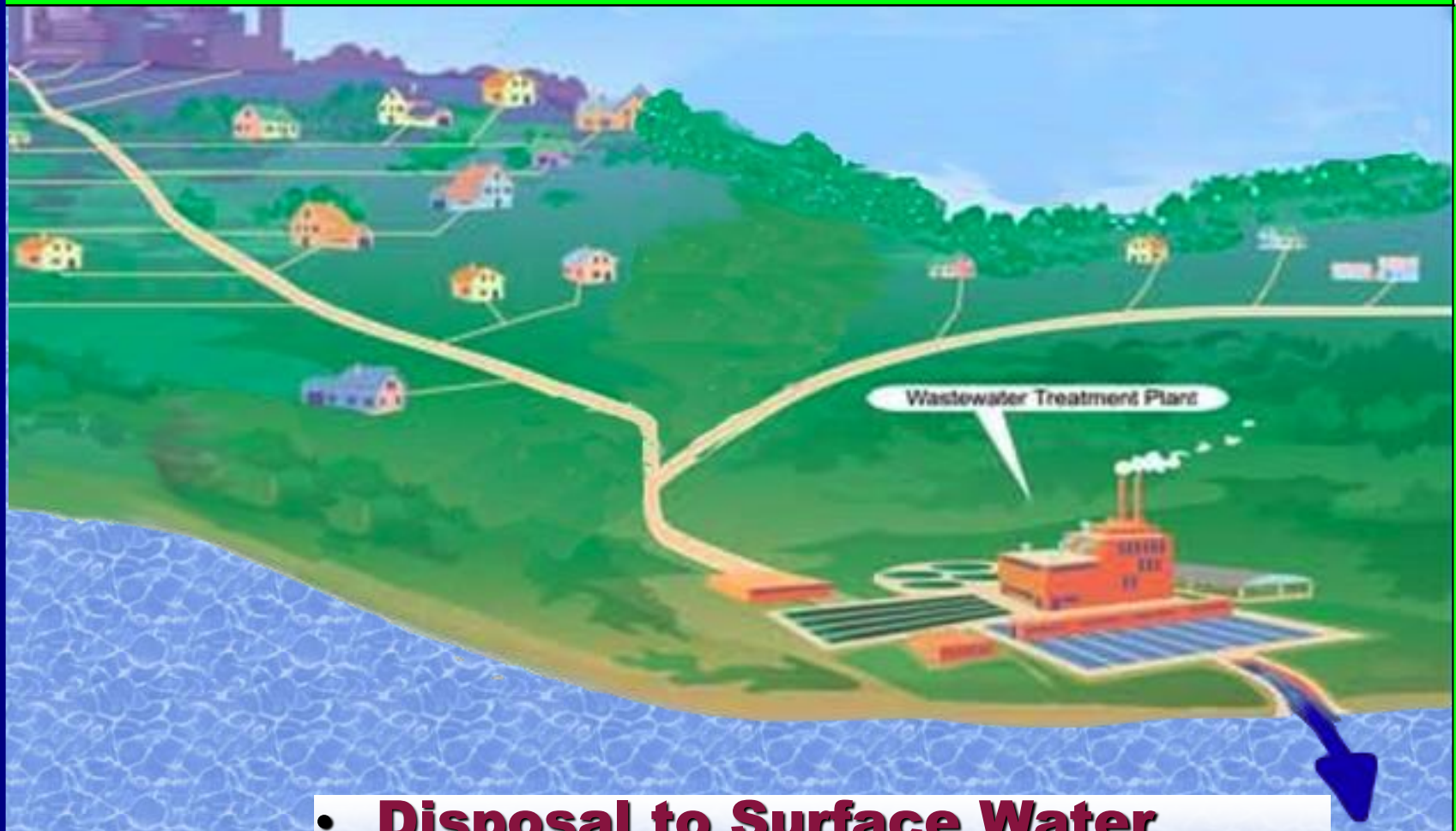
Uses of Reclaimed Water

- Industry
- Cooling Water
- Wash Water

Uses of Reclaimed Water

- **Groundwater Recharge**

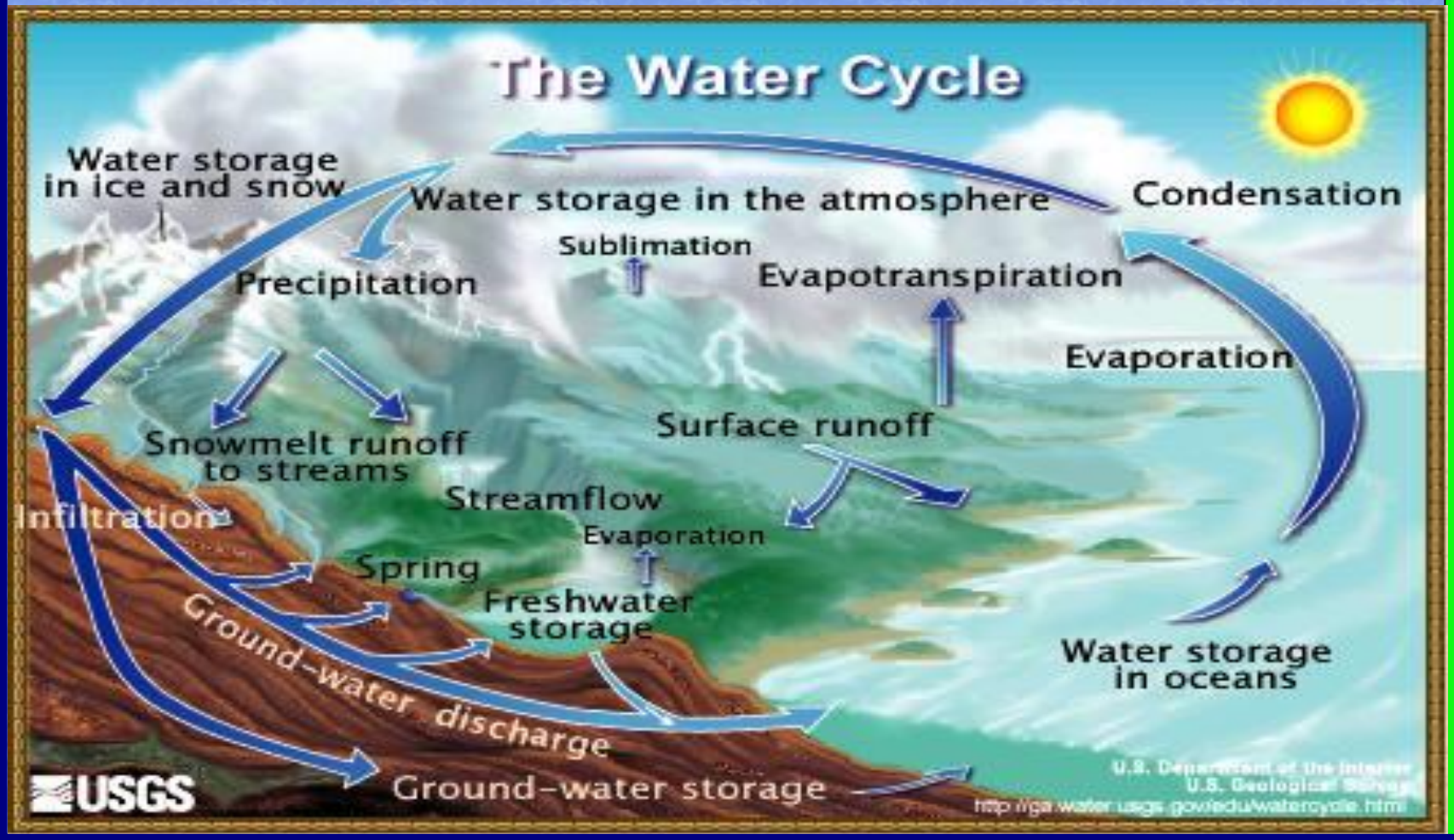
Uses of Reclaimed Water



- **Disposal to Surface Water**

Uses of Reclaimed Water

- The Natural Cleaning Process Continues



Where Will Treatment Plants Be?

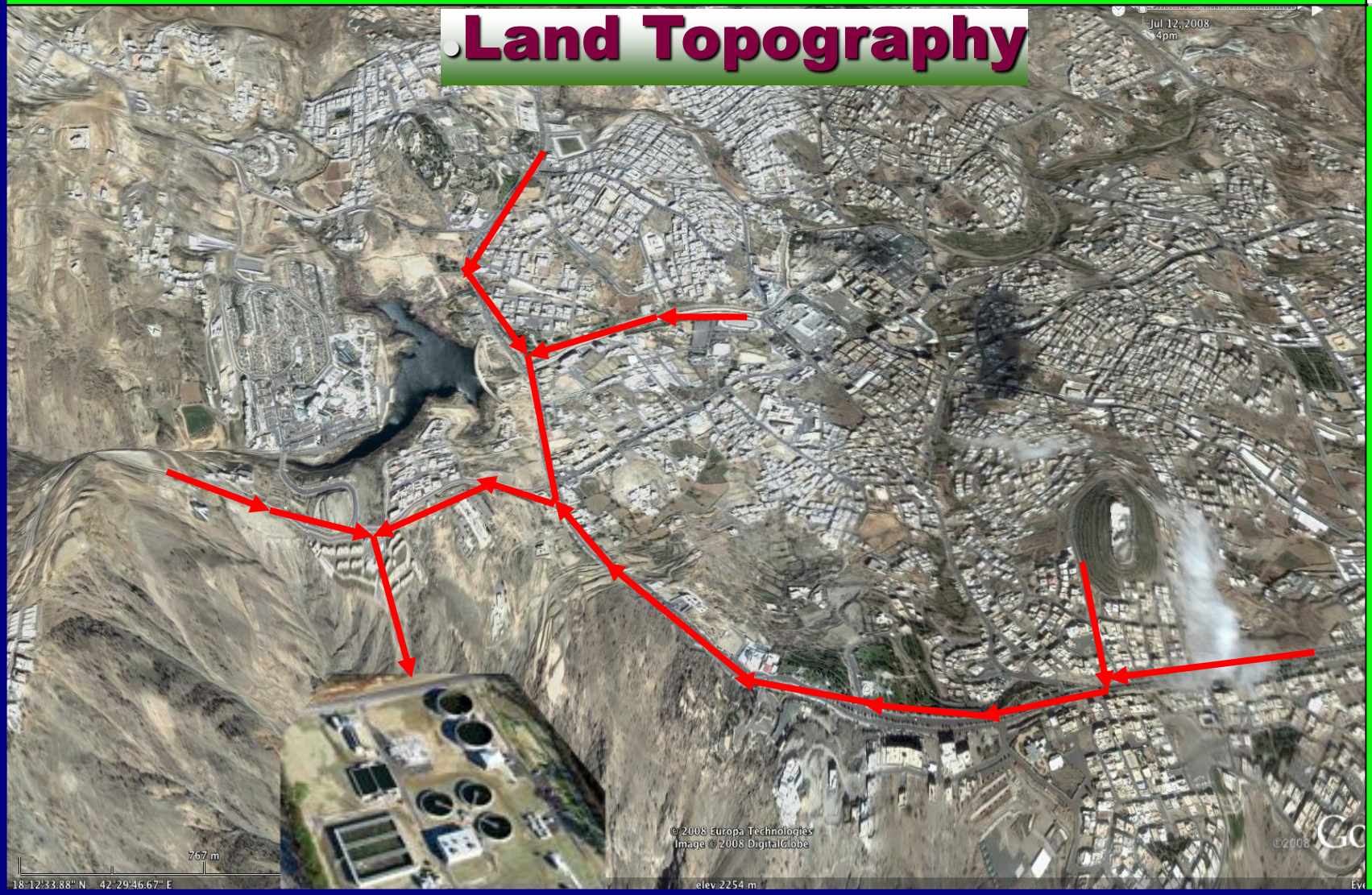
Factors Influencing Sewage Treatment Plant Site Selection

Treatment Plant Site Selection

Distance from residential and commercial areas

Treatment Plant Site Selection

- Land Topography



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Treatment Plant Site Selection

- Reuse Location

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Treatment Plant Site Selection

Treatment Plant Site Selection

- Natural, Aesthetic or Cultural Significance

Treatment Plant Site Selection

- **Land Requirements**

- HGBD, USA
  Sidoon, Lebanon

Wastewater Management Presentation

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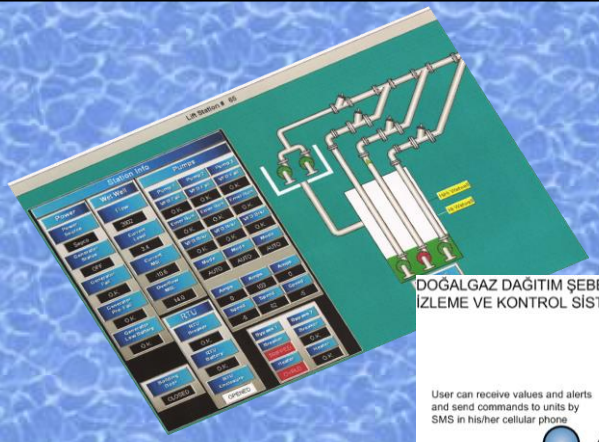

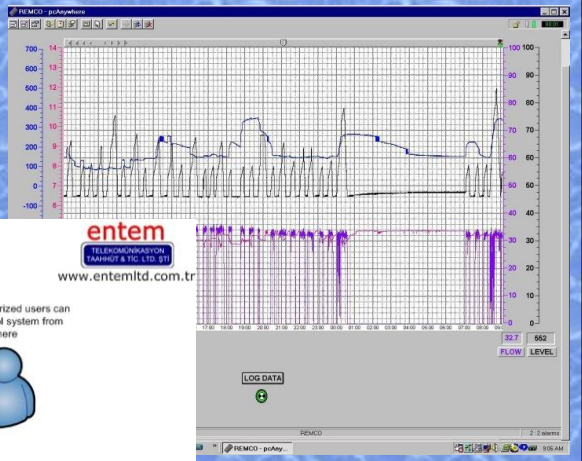

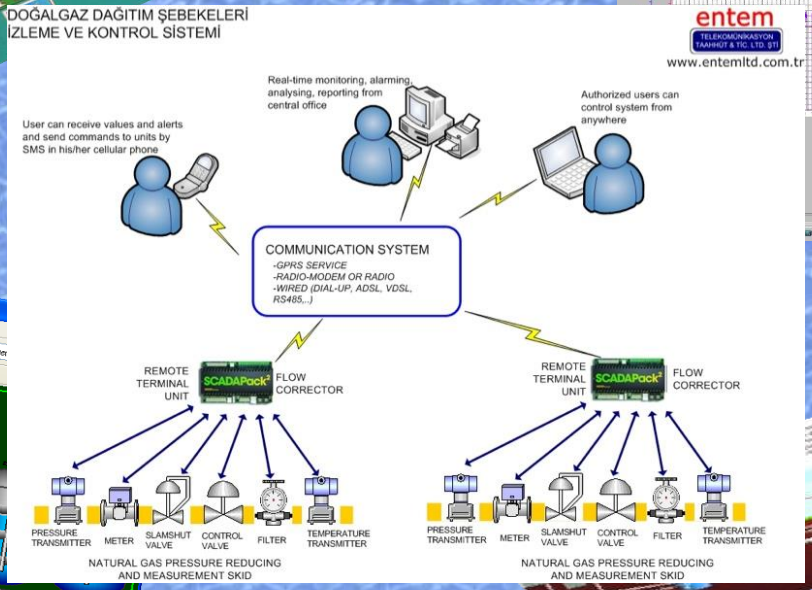

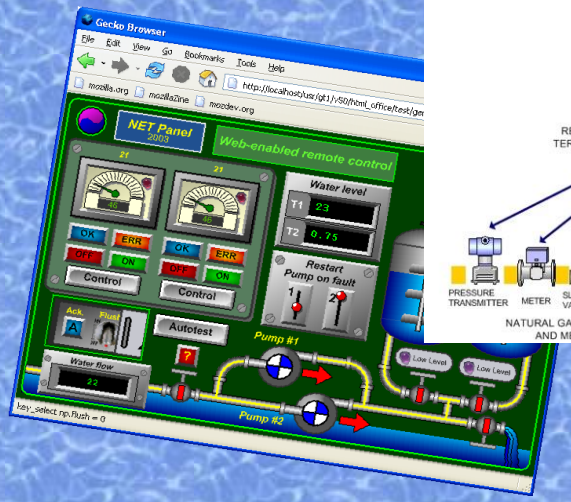

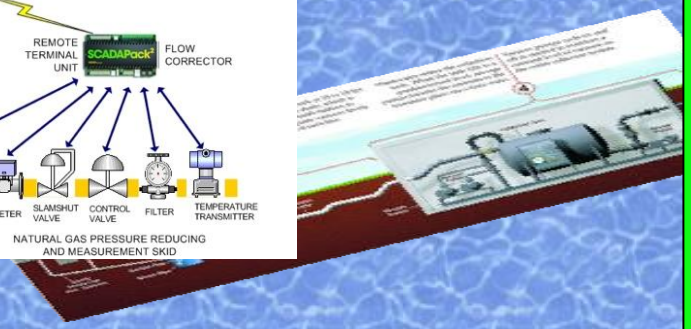

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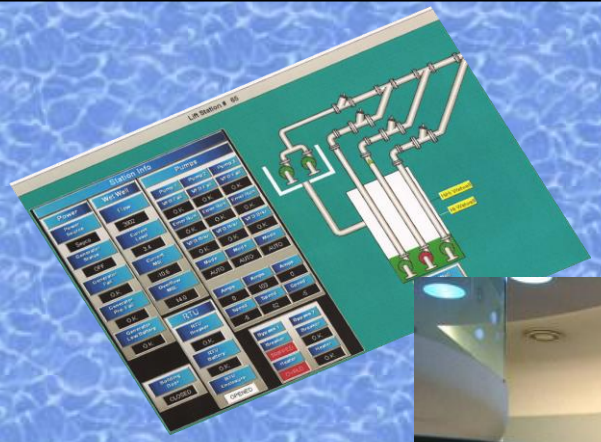

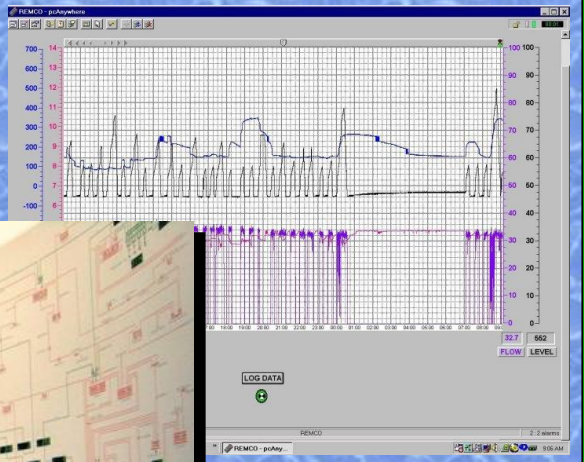

Wastewater Management Presentation

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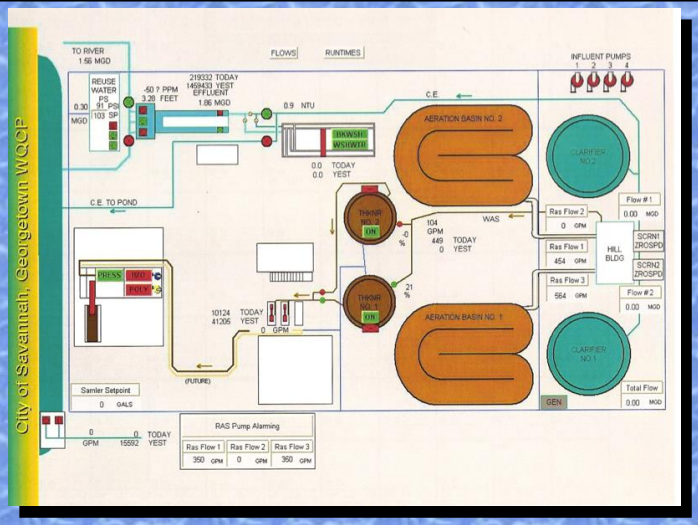

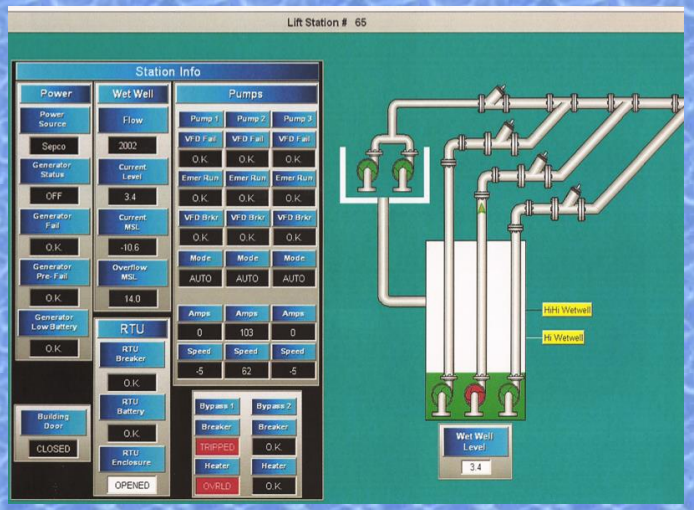

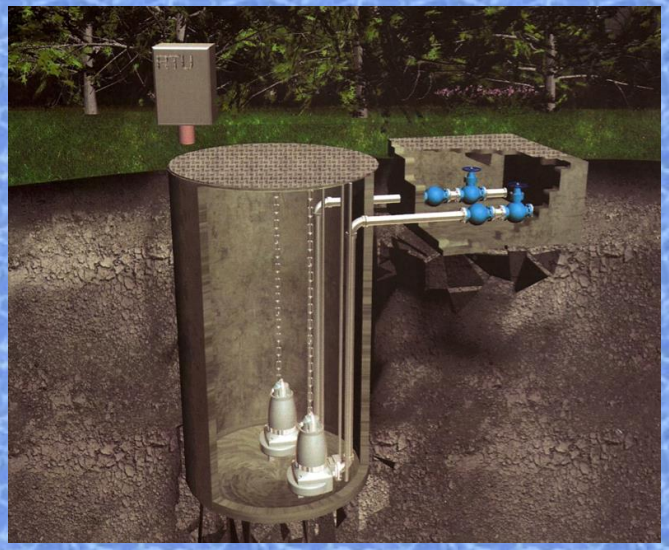

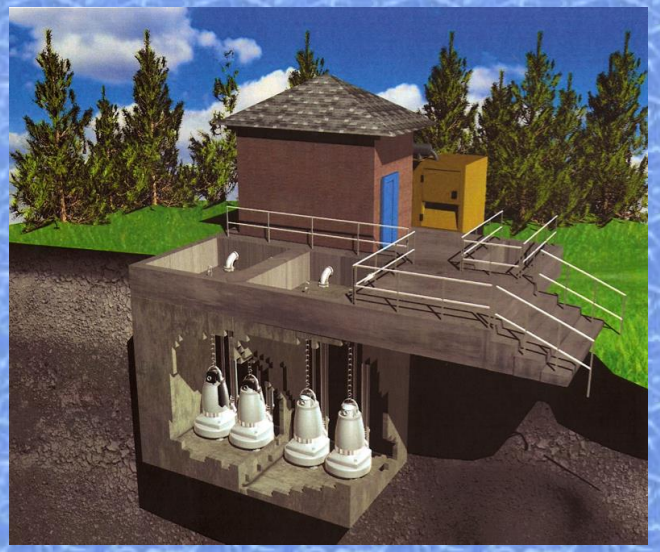

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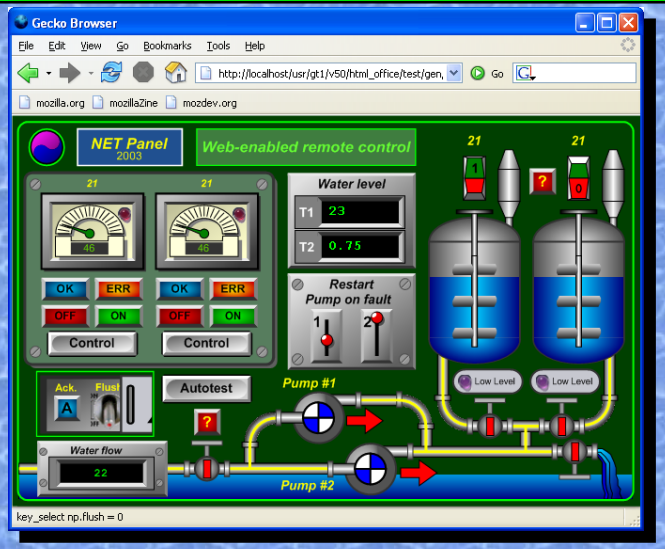

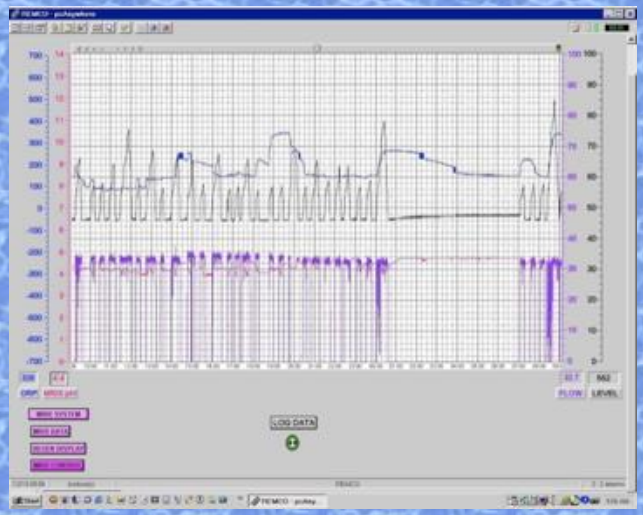

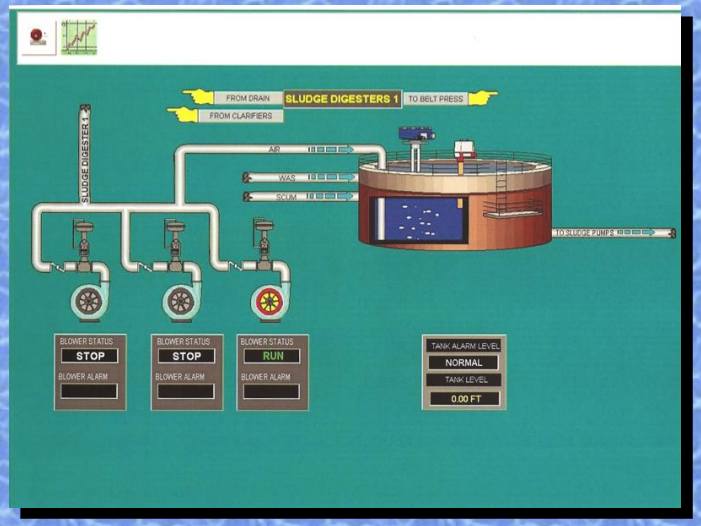

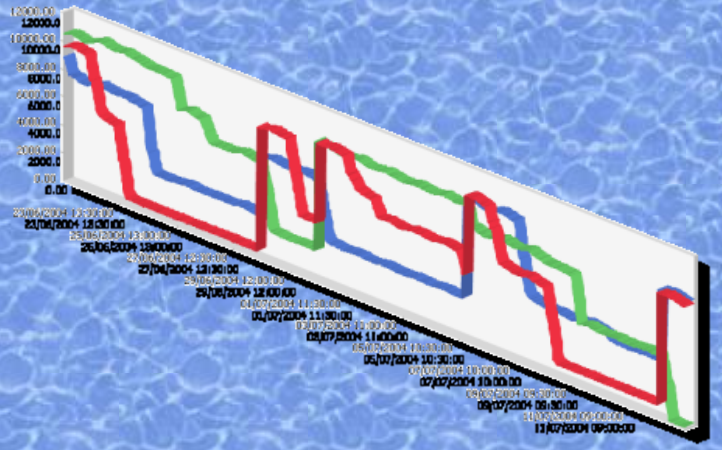

Wastewater Management Presentation

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Public Awareness
Fats, Oil and Grease

Dumping fats, oil, and grease can clog sewer lines, causing sewage back-ups and flooding. Sewage backups can damage personal and public property. Here's how you can help

DO NOT dump cooking oil, poultry fat and grease into the kitchen sink or the toilet bowl

DO place cooled cooking oil, poultry and meat fats in sealed non-recyclable containers and discard with your regular garbage.

New York City Department of Environmental Protection

Wastewater Management Presentation

Public Awareness
Motor Oil

When poured down house or storm drains, used motor oil may travel to your local stream, bay, or harbor, where it can harm underwater vegetation and aquatic life.

DO NOT dump used motor oil into street or house drains.

DO put used motor oil in a sturdy container, such as a plastic milk jug, and take it to your local service station for recycling.

New York City Department of Environmental Protection

Wastewater Management

Ministry of Water and Electricity
General Department of Wastewater

الإدارة العامة للصرف الصحي
معاً نحو معالجة مياه الصرف الصحي وإعادة استخدامها
wastewater
Department

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