



# An Introduction To Wastewater Treatment Systems

McHenry County WRAP

July 10, 2019

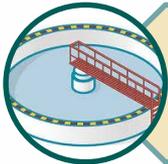
Presented By:

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AP

Vice President



Background Information



Conventional Municipal Wastewater Treatment Systems



Other Wastewater Treatment Systems



Closing Remarks



Q&A

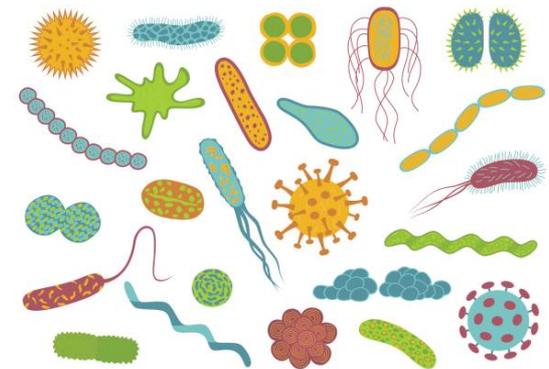
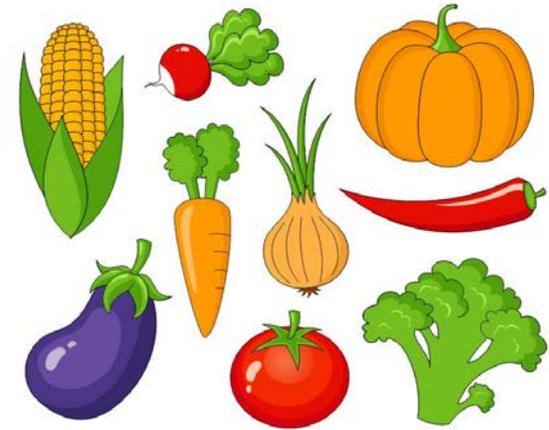
## Wastewater Sources

- Residential
- Commercial/Institutional
  - ❖ Domestic Waste
  - ❖ Other Waste (i.e. Restaurants)
- Industrial
  - ❖ Domestic
  - ❖ Process Waste



## Wastewater Characteristics

- Organics (Food/Digested Food)
- Fats, Oils and Grease
- Nutrients (Phosphorus & Nitrogen)
- Bacteria
- Viruses
- Cleaning Chemicals
- Pharmaceuticals
- Soaps/Detergents
- Other Inorganics





# Background Information

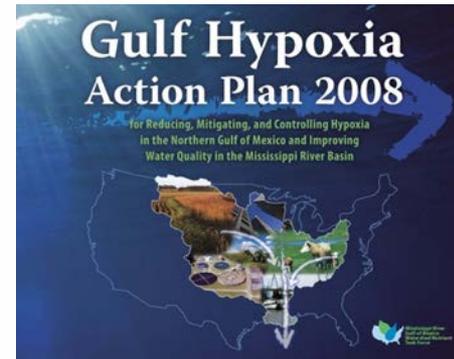
## Brief Regulatory History

- 1948 – Water Pollution Control Act
- 1972 & 1977 – Clean Water Act and Amendments
- 1987 – Water Quality Act
- 1993 – 40 CFR Part 503 Rules
- 1994 – National Combined Sewer Overflow Policy
- Ongoing – State Regulations For Ongoing Issues



## Nutrient Drivers

- Federal → Reduce Gulf Hypoxia Zone
- State → Nutrient Loss Reduction Action Plan
- Local → Watershed Studies, Nutrient Assessment Reduction Plans (NARP) and Total Maximum Daily Load (TMDL) Studies





# Background Information

## Typical NPDES Effluent Regulatory Requirements

- ◆ Typical Parameters With Concentration Limits
  - ❖ Chemical Biological Oxygen Demand (CBOD)
  - ❖ Suspended Solids
  - ❖ pH
  - ❖ Fecal Coliform
  - ❖ Chlorine Residual
  - ❖ Ammonia Nitrogen
  - ❖ Total Phosphorus
  - ❖ Dissolved Oxygen
- ◆ Other Parameters Sometimes Monitored → Heavy Metals & Nitrogen
- ◆ Parameters Typically Measured 1 Day – 3 Days / Week
- ◆ Monthly and Weekly Averages and Daily Maximums Dependent On Size of Treatment Facility and Receiving Stream & Downstream Water Bodies
- ◆ Wastewater Treatment Facilities Must Send Discharge Monitoring Reports to the IEPA Monthly



# Background Information

## Additional Typical NPDES Regulatory Requirements

- ◆ Additional Report Submittals
  - ❖ Fiscal Data
  - ❖ Biosolids Generation/Disposal
  - ❖ Capacity, Management, Operations and Maintenance (CMOM) Plan
  - ❖ Pretreatment Ordinance Updates
  - ❖ Phosphorus Discharge Optimization Plan
  - ❖ Phosphorus Removal Feasibility Study
  - ❖ Nutrient Assessment Reduction Plan (NARP)
- ◆ Acute Toxicity Biomonitoring Tests in Advance of Permit Submittal (18<sup>th</sup>, 15<sup>th</sup>, 12<sup>th</sup> & 9<sup>th</sup> Month Before Permit Expiration)
- ◆ Many Recent Permits Are Receiving A Special Condition That Requires Discharges To Meet 0.5 mg/l Total P By 2030



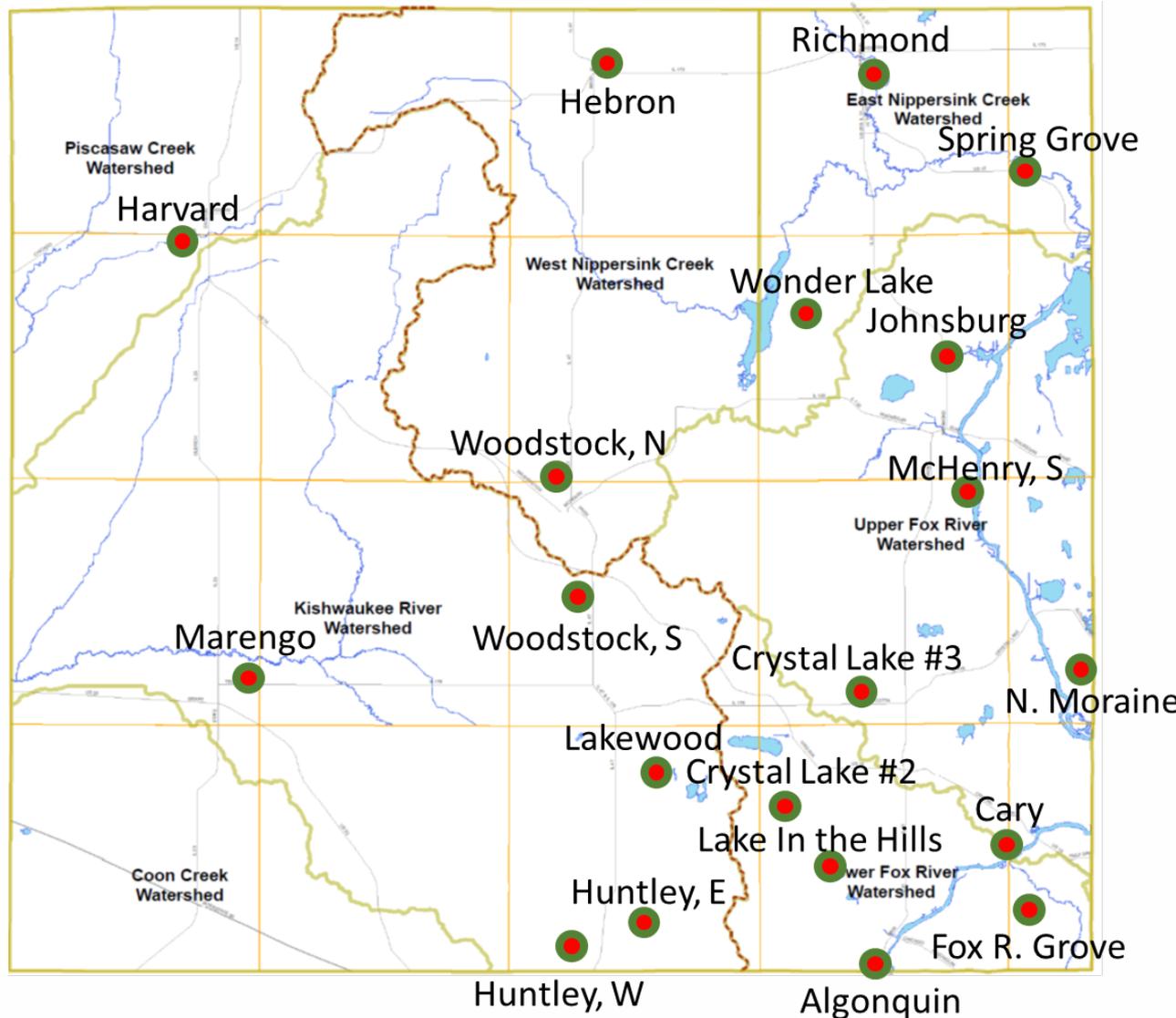
# Municipal Wastewater Treatment

## Sanitary Sewer Collection Systems





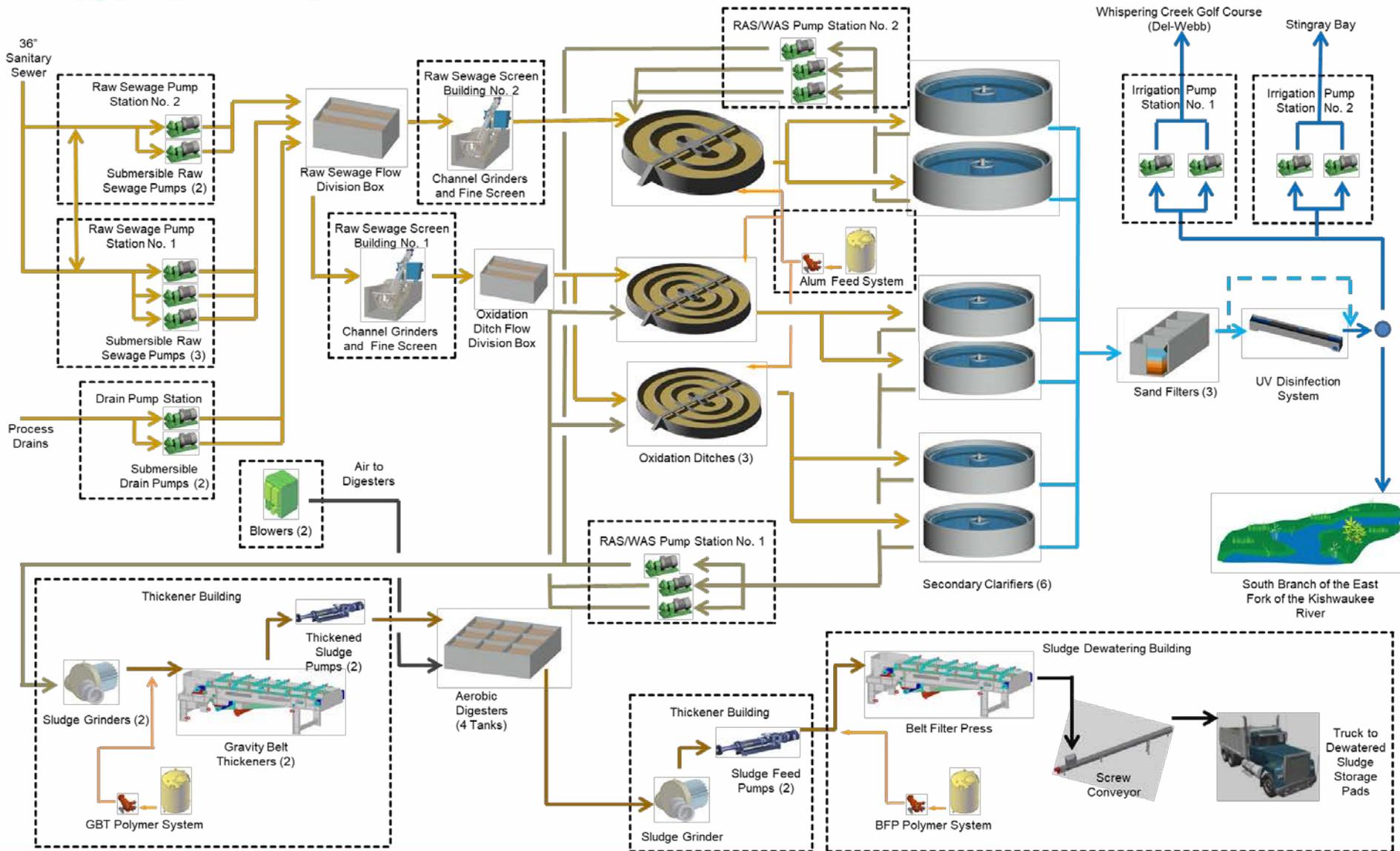
# Municipal Wastewater Treatment



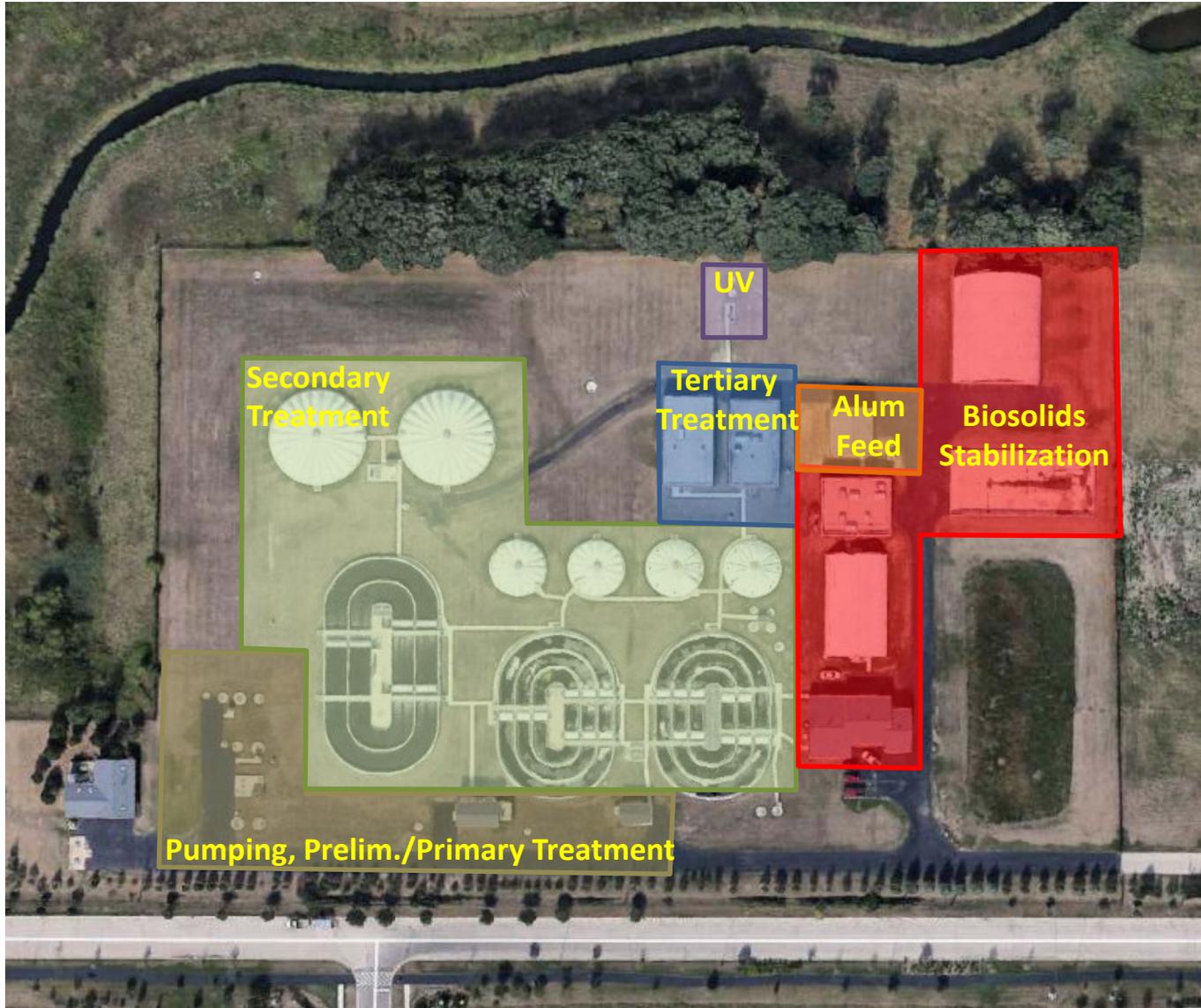
Municipal/Sanitary  
District  
Wastewater  
Treatment  
Facilities In  
McHenry County



# Municipal Wastewater Treatment



# Municipal Wastewater Treatment





# Municipal Wastewater Treatment



Screen



Aeration Basin & Clarifiers



UV Disinfection



Screen



Sand Filter

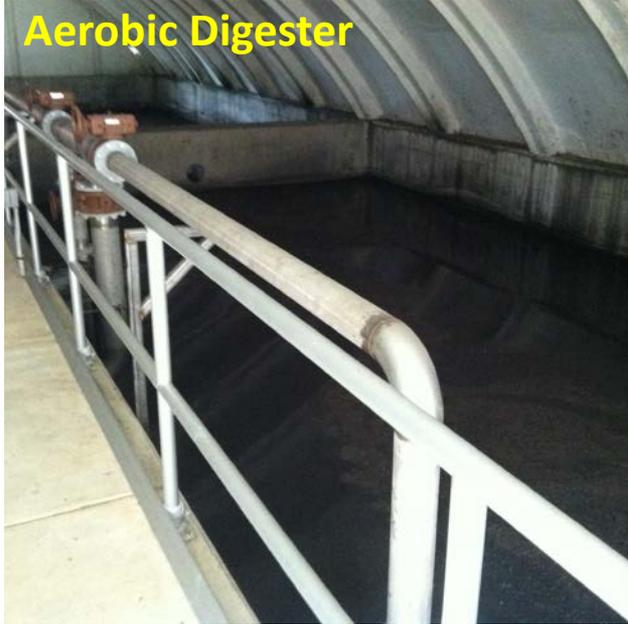


UV Disinfection



# Municipal Wastewater Treatment

**Aerobic Digester**



**Belt Filter Press**

**Sludge Storage**



**Blower**

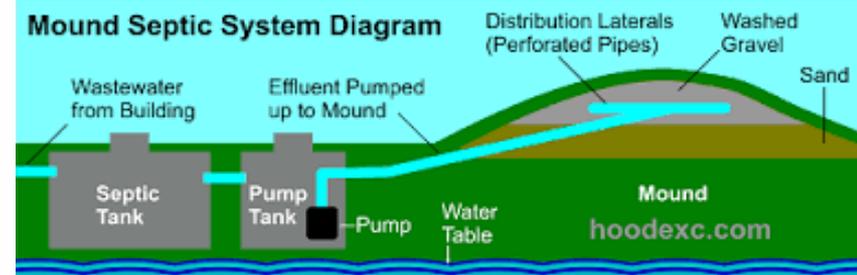
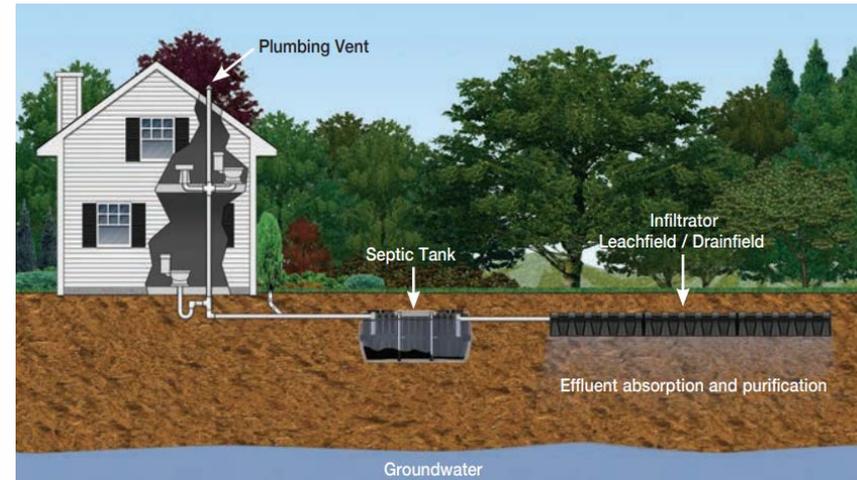
## Lagoon Treatment & Land Application

- ◆ Land Application Treatment Systems Typically Utilize a Lagoon, or Series of Lagoons, For Biological Treatment Process
- ◆ Effluent Typically Contains Higher Levels of CBOD, Ammonia and Nutrients
- ◆ Rely on Land (Vegetation & Soil) To Provide Level of Treatment
- ◆ Lagoon Sized To Store Wastewater During Non-growing Season and High Precipitation Time Periods
- ◆ Required Land Application Area Dependent on Soil Conditions



## Private Sewage Disposal Systems

- 💧 Typical Types
  - ❖ Septic Systems
  - ❖ Mound Systems
  - ❖ Aerobic Treatment Units (With Discharge To Subsurface Seepage System)
- 💧 Treatment Process
  - ❖ Primary Treatment In Tank
  - ❖ Secondary Treatment In Soil Strata of Leach Field
- 💧 Design Considerations
  - ❖ Water Use/Sq. Ft. of Bedrooms
  - ❖ Garbage Disposal
  - ❖ Water Softener
  - ❖ Topography
  - ❖ Soil Permeability
  - ❖ Groundwater Table
  - ❖ Separation From Well
- 💧 Maintenance Considerations



- Need To Apply Correct Treatment System Based On the Conditions → Consider Soils, Aquifer Contamination Sensitivity & Receiving Stream Condition
- Proper Funding and Maintenance Program Key To Sustainable Treatment System
- Long Term Surface and Groundwater Quality Dependent on Complete Stakeholder Involvement





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