



**Happy  
Campers!**



**INFILTRATOR<sup>®</sup>**  
water technologies



# Understanding RV and Camper Wastewater Streams

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*The materials being presented represent the speaker's own opinions and do NOT reflect the opinions of NOWRA.*

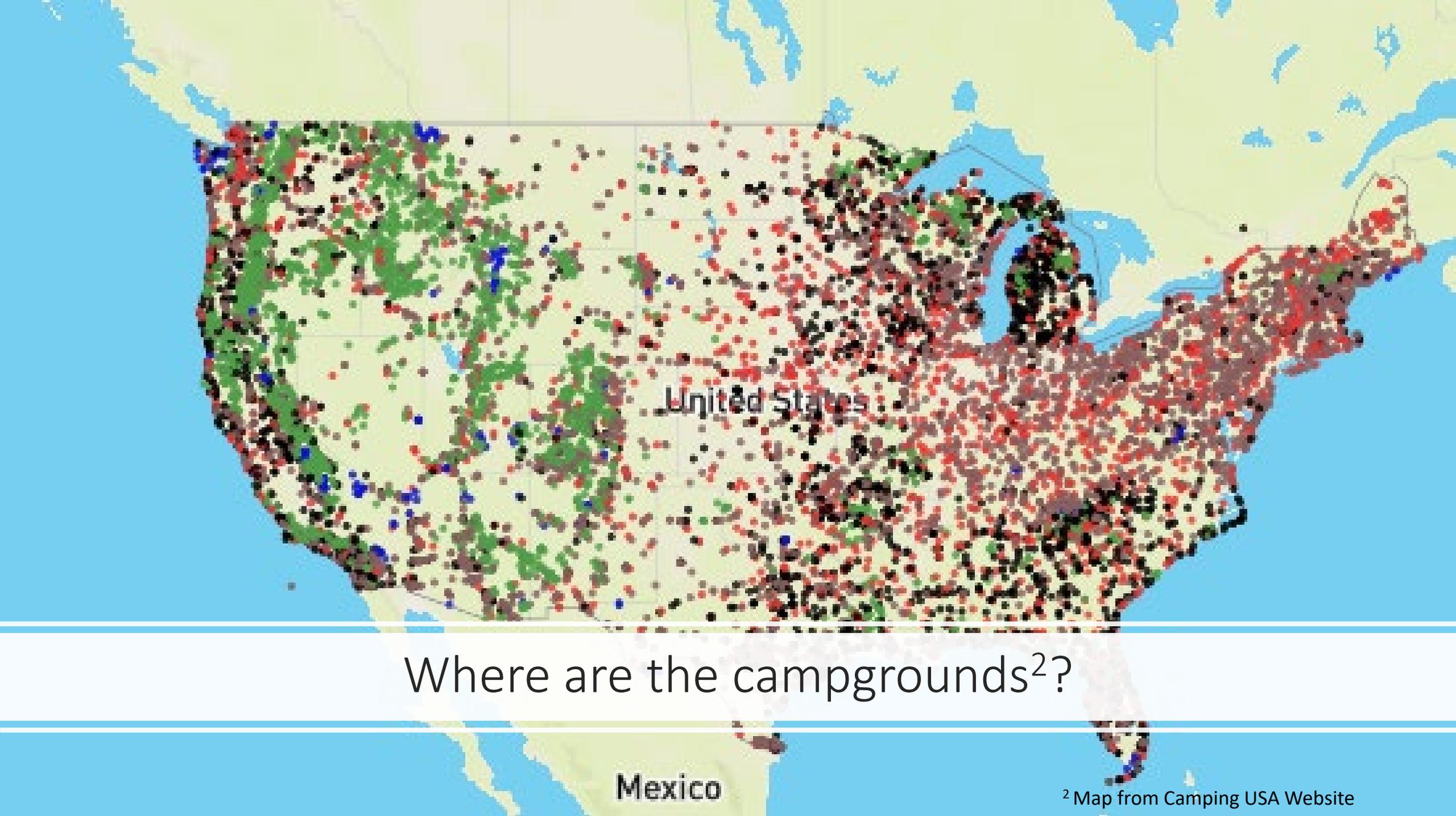


- 3.9 M households started camping in 2020  
(5X higher than in 2019)
- 55% of those cited C-19 as the reason
- 2/3 of the newbies will continue
- RV sales growth in had a strong 2020, and 2021 is expected to be +19.5%



## U.S. Camping Growth<sup>1</sup>:

<sup>1</sup> The 2021 North American Camping Report



United States

Mexico

Where are the campgrounds<sup>2</sup>?

<sup>2</sup> Map from Camping USA Website

# RV 101 – Intro to the RV Wastewater System and How to Treat It.

Anatomy and Physiology  
of an RV

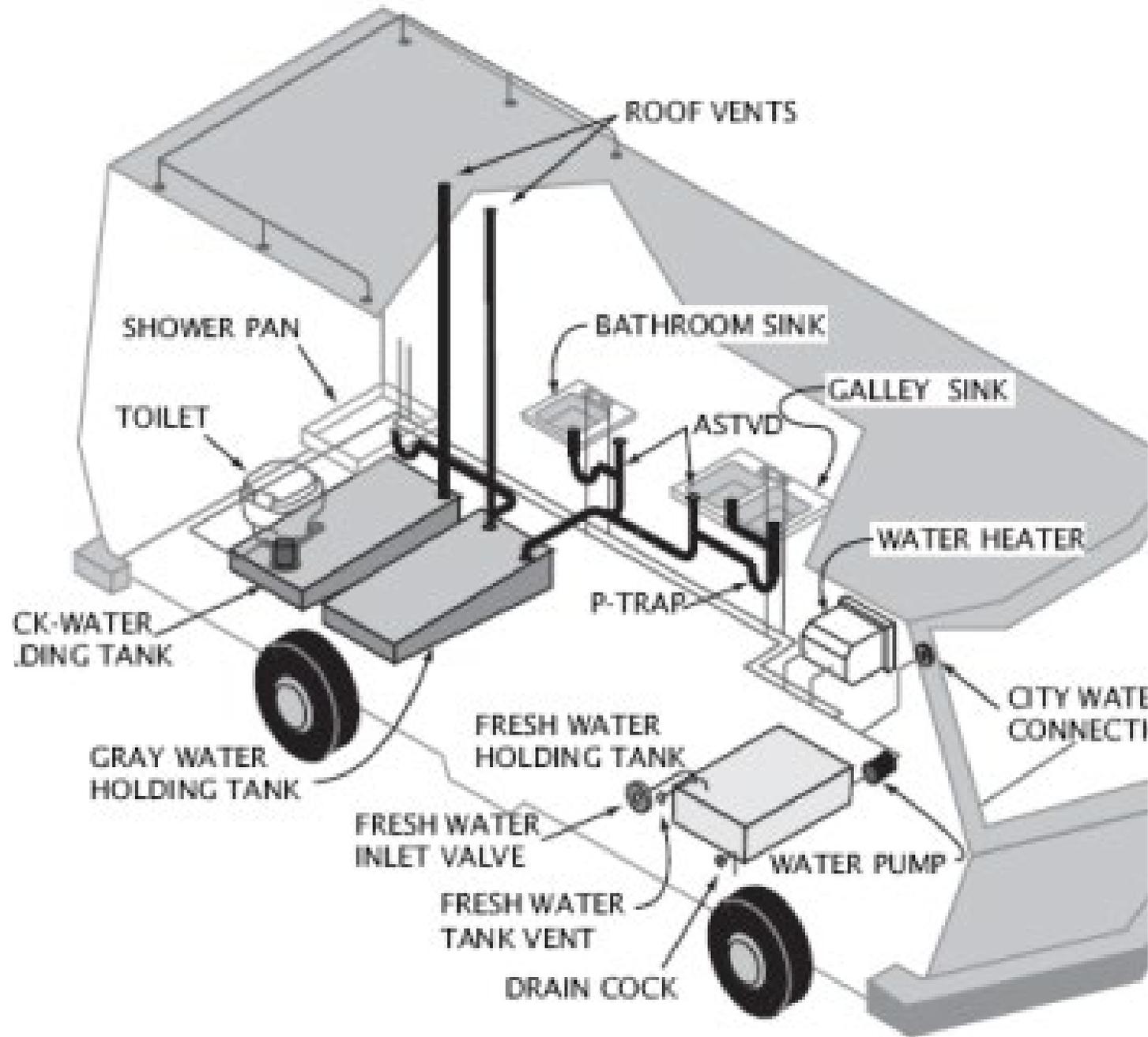
Designing a treatment  
system

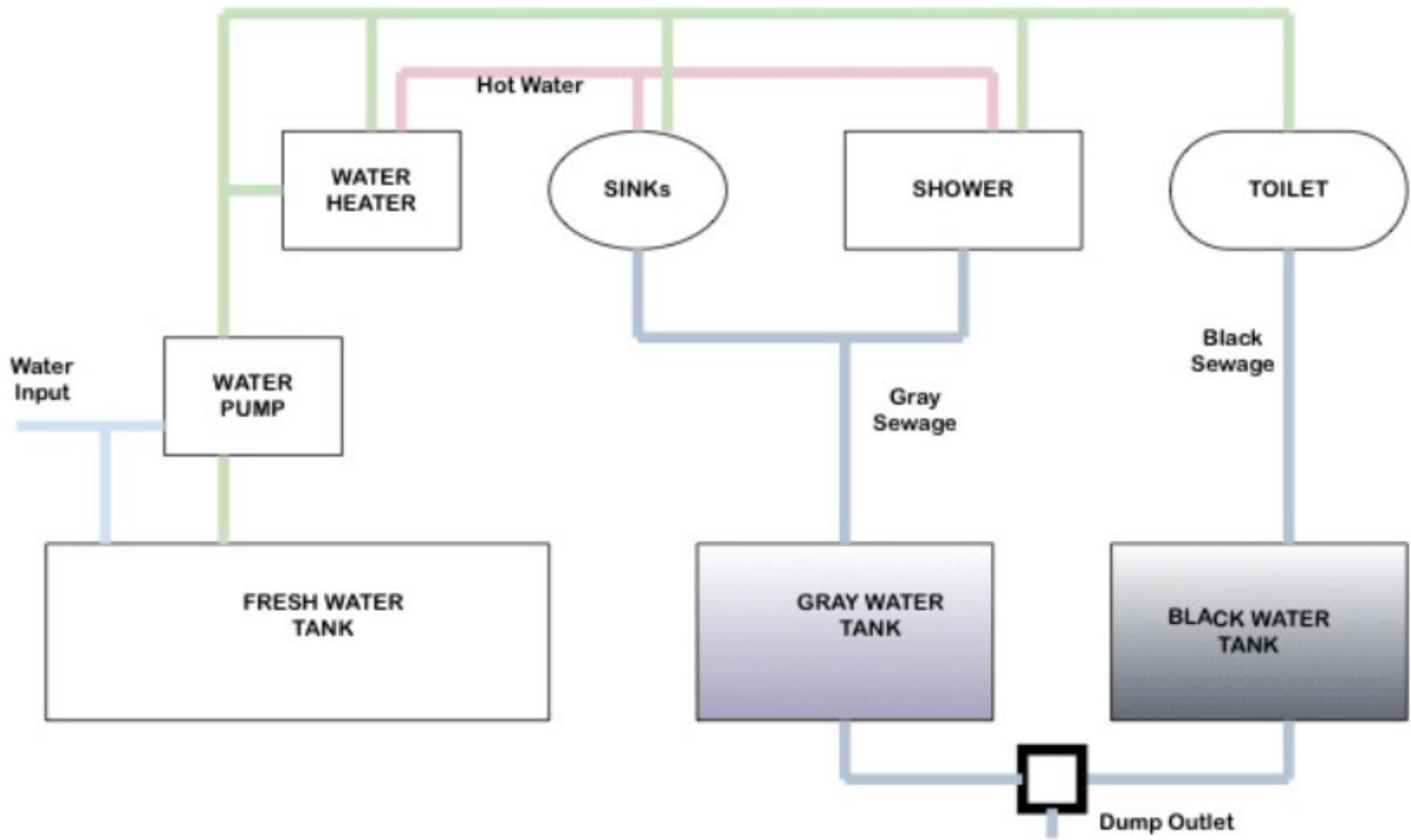
- Types of RV parks and how they differ
- Additives

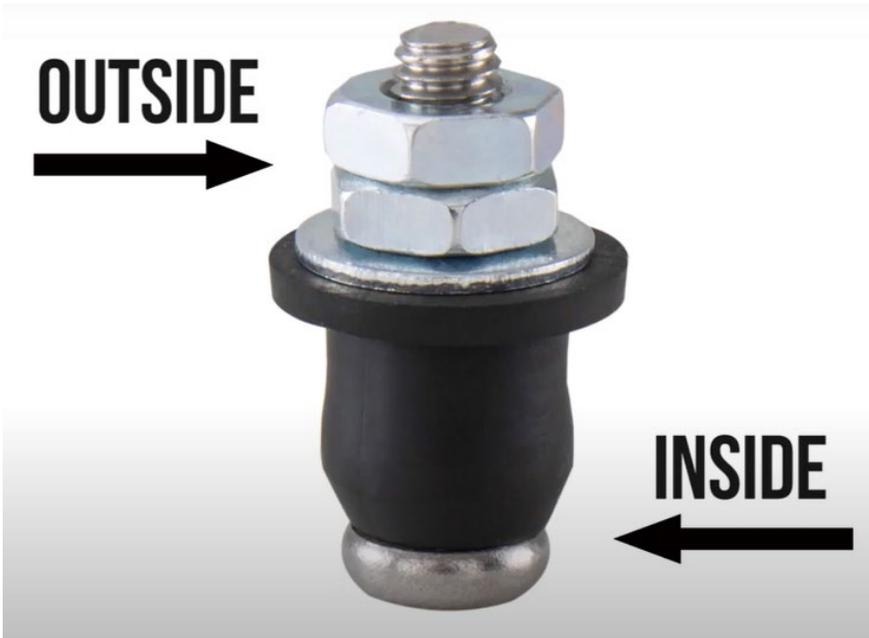
# Anatomy and Physiology of an RV

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- Water and wastewater tanks
  - Sensors
  - Valves
    - Normally closed



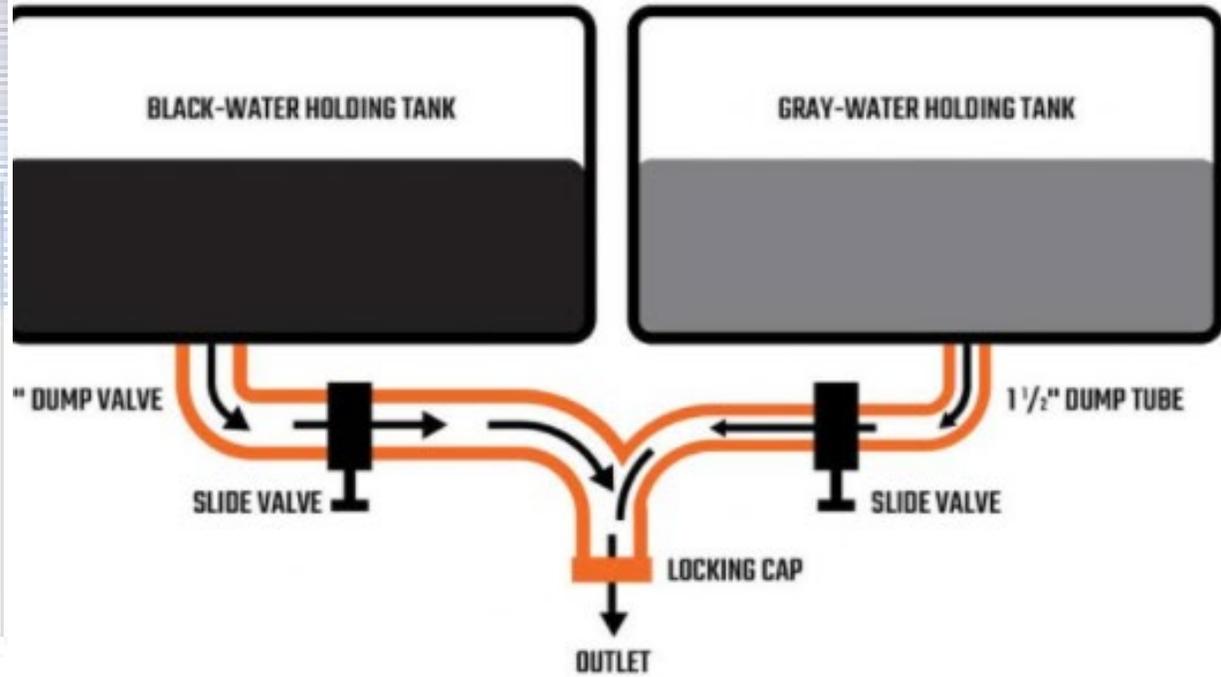




# Holding Tank Sensors



# Valves and Dumping



High BOD, TKN, and  
Nitrogen

A solid orange horizontal bar is positioned below the text, spanning most of the width of the white box.

# Low Water Use

- Tiny showers – rarely tubs
- Washing machines take up room
- Still cooking and doing dishes
- RV's dump sites – may be even higher strength





# Toilets – 2 Quarts to ½ Gallon of Water/Flush



Before use

Slightly step on  
to store water



After use

Step to the floor for  
thorough flushing



# Water Softeners





# Big Business

- 7 pages on Amazon
- Fresh, grey and black water
- Liquids, pods, and powders

## Holding Tank Additives



# Holding Tank Additives Advertising

“...Holding Tank Treatments offer the most powerful, longest-lasting control of tank odors **without formaldehyde**. Additives **break down effluent** and help tanks rinse cleaner during pump-out.”

“...RV toilet treatment scientifically proven to **break down waste & tissue**”

“...removes **grease buildup in your gray water tank...**”

“...Immediately starts **digesting solid waste and all brands of toilet paper...**it will **dissolve years of heavy sludge and smelly scum**”

# Holding Tank Treatment Objectives

- ✓ Eliminate odors
- ✓ Prevent clogs and waste buildup
- ✓ Keep sensors clean and working properly
- ✓ Works with Hookups and Dry Camping

# Types of Treatments

**Chemical**

**Enzymes**

**Minerals/Salt**

**Bacteria/Enzyme Mix**

# Chemicals

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✓ ~~Eliminates odors~~ Masks toilet smells with strong fragrance

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✗ Prevents clogs and waste buildup

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✗ Helps remove solid waste clinging to sensor probes

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✓ Works with Hookups and Dry Camping

# BOD/COD Formaldehyde & Broponol

Biochemical Oxygen Demand (BOD)	<1	1209	55	23
Chemical Oxygen Demand (COD)	6	2738	121	46
Total Suspended Solids (TSS)	6	1	3	6
Chloride	5	6	8	5
Total Phosphorus	<1	<1	4.7	57.5
Total Kjeldahl Nitrogen (TKN)	<1	<1	1	<1
pH	5.2	5.7	6.3	6.1

# Deadly Holding Tank Additives

• Active ingredient is  
**100% biodegradable**

Improved  
Waste Digestion &  
Tank Cleaning!

**DANGER ☠ POISON**

MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. A STRONG SENSITIZER - CAUSES SEVERE BURNS. VAPOR HARMFUL. READ INSTRUCTIONS AND CAUTIONS ON BACK PANEL.

CONTENTS: 6 – 8-OZ. BOTTLES  
TOTAL NET CONTENTS 48 FL. OZ. (1.5 QTS.) (1.4 L)

# Enzymes

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✗ Eliminates odors

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✓ Prevents clogs and waste buildup

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✓ Helps remove solid waste clinging to sensor probes

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✓ Works with Hookups and Dry Camping

# Enzymes Holding Tank Additives



# BOD/COD – Enzyme w/ Fragrance

Biochemical Oxygen Demand (BOD)	<1	1209	55	23
Chemical Oxygen Demand (COD)	6	2738	121	46
Total Suspended Solids (TSS)	6	1	3	6
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Total Phosphorus	<1	<1	4.7	57.5
Total Kjeldahl Nitrogen (TKN)	<1	<1	1	<1
pH	5.2	5.7	6.3	6.1

# Mineral/Salt

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✓ Eliminates odors

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✗ Prevents clogs and waste buildup

---

✗ Helps remove solid waste clinging to sensor probes

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✓ Works with Hookups and Dry Camping

# Zinc

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- Common component in mineral treatments
- Zinc can be dangerous to touch or inhale – so loose powders are not recommended
- Decent solution for hot weather when temperatures go up encapsulated versions are recommended by some



**WARNING:** Avoid contact with eyes. Avoid prolonged contact with skin or contact with open cuts. Do not swallow. Wash thoroughly after handling. Avoid breathing dust. Keep out of reach of children.

# Bacteria/ Enzyme Combo

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✓ Eliminates odors

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✓ Prevents clogs and waste buildup

---

✓ Helps remove solid waste clinging to sensor probes

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✓ Works with Hookups and Dry Camping



# RV Roof Vent Options



# Evaluating Flow at RV Campgrounds



**Same same but different**

# The Site

Location

Age

- Size limits
- Leaky collection

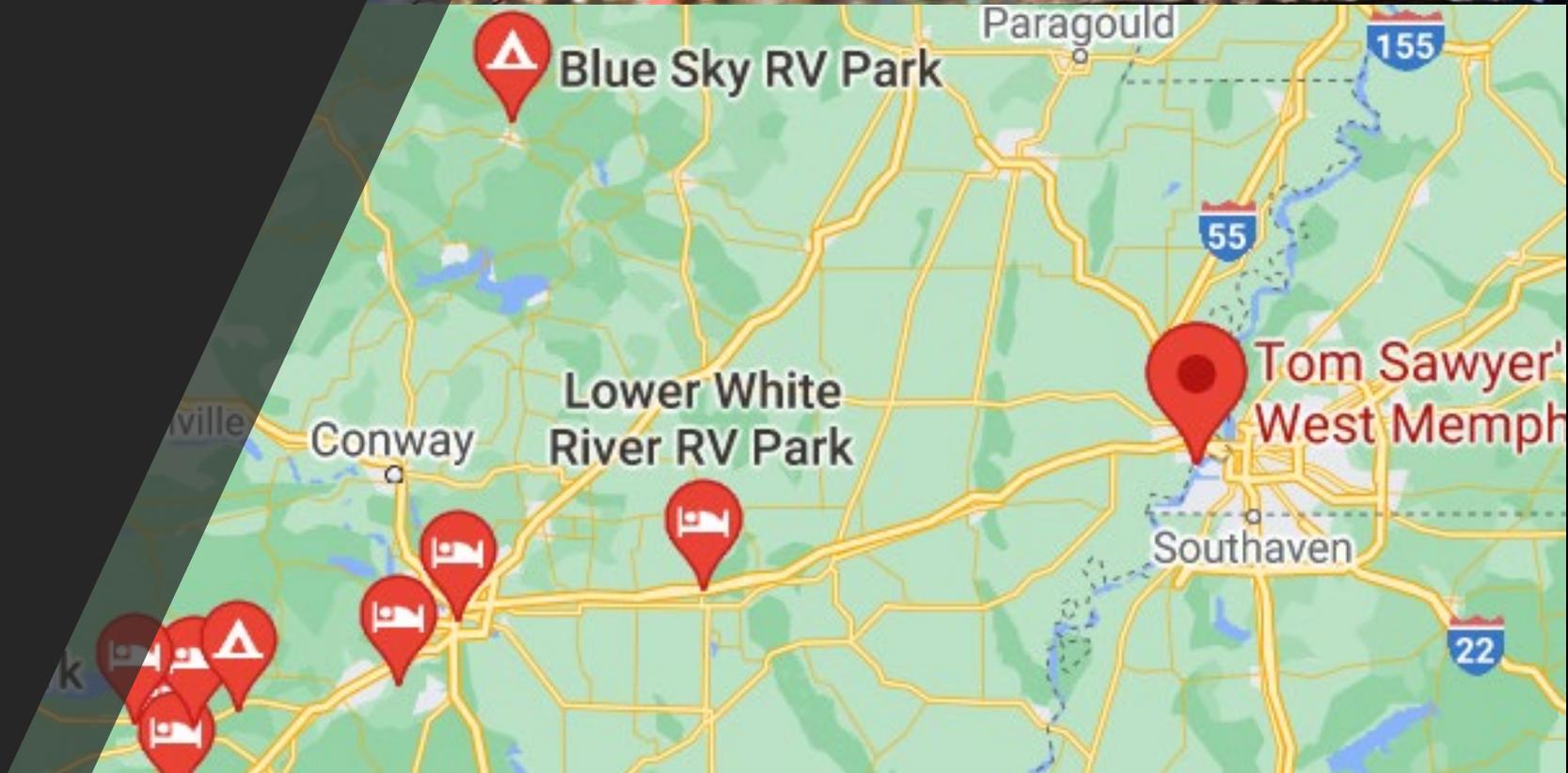
Seasonal/Year-Round

Public/Private

- Transient/Long Term

Full/Partial Hookups

Amenities



# Age

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## **Basic Back In – w/table**

Sites 18-22 (RV's 30' or less length)

## **Patio – Back In w/picnic table**

## **Standard Back In – w/table**

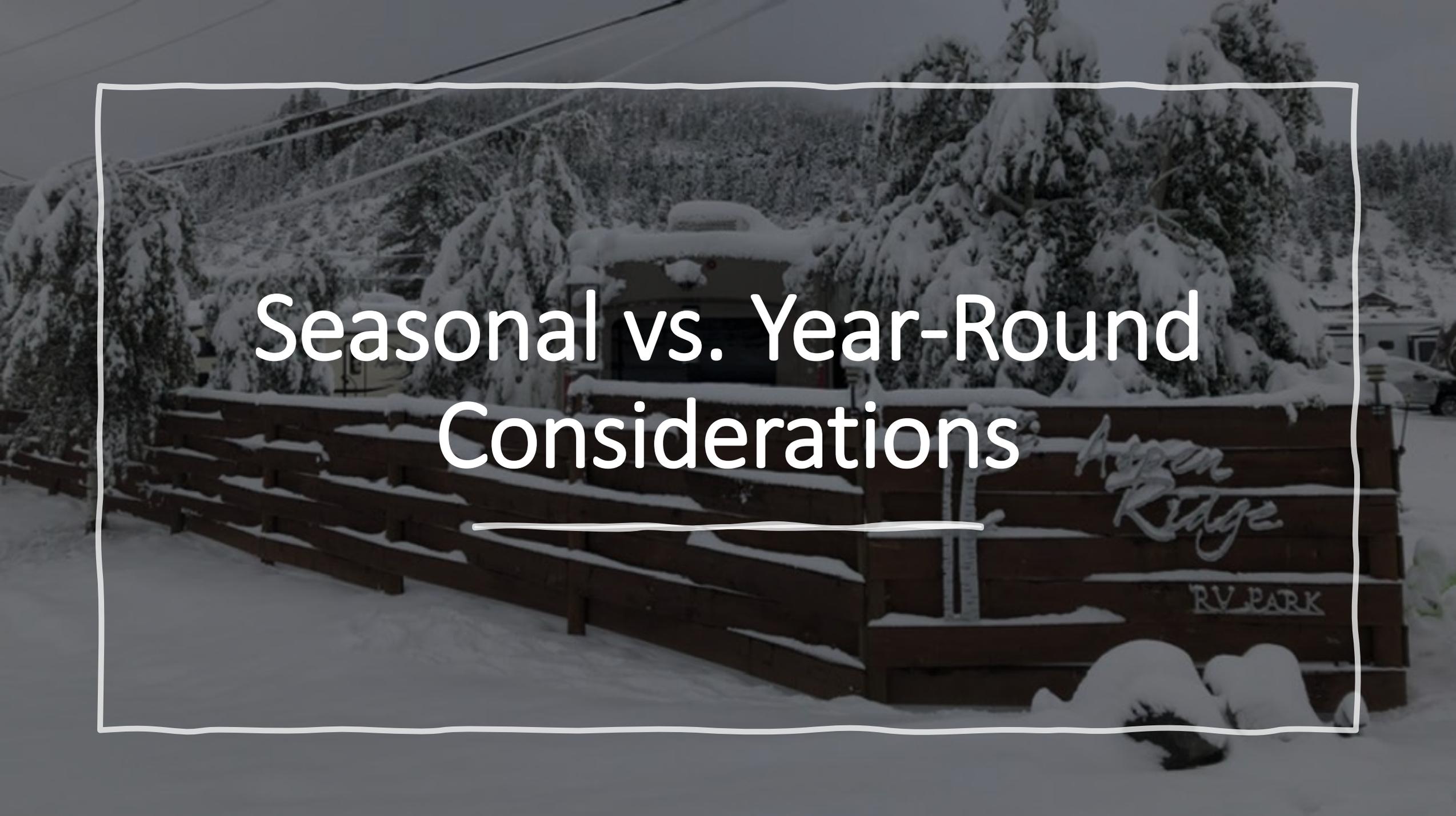
## **Pull In/Back Out w/table**

Sites 39-41 (must call to book)

## **Pull Through – w/table**

Sites 32-38 & 42-44



A grayscale photograph of a winter scene at a campsite. In the foreground, a wooden fence runs across the frame, with snow piled up against its base. The fence has the words "Aspen Ridge" written in a cursive font and "RV PARK" in a blocky font. In the background, a cabin with a snow-covered roof is visible, surrounded by snow-laden evergreen trees. The entire scene is covered in a thick layer of snow, and the sky is overcast.

# Seasonal vs. Year-Round Considerations

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# Public vs. Private Considerations

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- Public
  - More transients
  - Less oversight
- Private may have more long-term campers

**\$37/Day - Gravel pad, 50/30 amp electric, water, sewer**

**\$29/Day - Gravel pad, 30 amp elec, no water, no sewer**

**\$26/Day - Gravel pad, no electric, no water, no sewer**

Water Spigot



## Partial Hookups

- Dump station use
- Public use areas
  - Showers
  - Laundry
  - Cleaners

## Full vs Partial Hookups

# Amenities

- Food Service
  - Grease
- Event Spaces



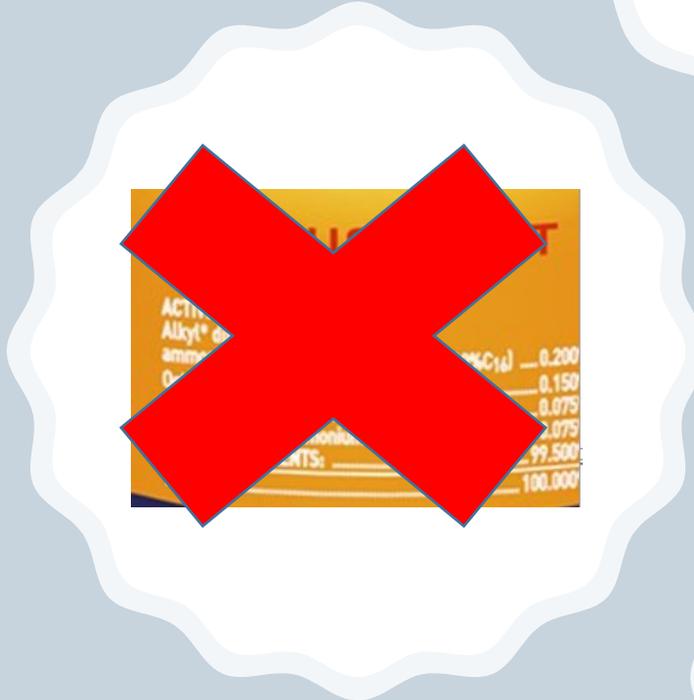
# Public Areas= Sanitizing



# Safe Sanitizers for Wastewater Treatment

- Chloring Bleach
  - Sodium Hypochlorite
- Citric Acid
- Hydrochloric Acid
- Peroxide
- NOT Quaternary Ammonia
  - Active Ingredient contains the words ammonium chloride

Multi-Surface Disinfectant Cleaner	
<b>ACTIVE INGREDIENT:</b>	
Hydrogen Peroxide.....	4.25%
<b>OTHER INGREDIENTS:</b> .....95.75%	
<b>TOTAL:</b> .....	100.00%



<b>ACTIVE INGREDIENT</b>	
Citric Acid.....	2.50%
<b>INERT INGREDIENTS**</b> .....97.50%	
<b>TOTAL</b> .....	100.00%
**(Includes detergents and other grease cutting agents)	

# Treatment Train Needs

Tight collection systems

Use over-sized trash/septic tanks

Use effluent filters

Use FLOW EQ

Units in parallel – good for seasonal variations in flow

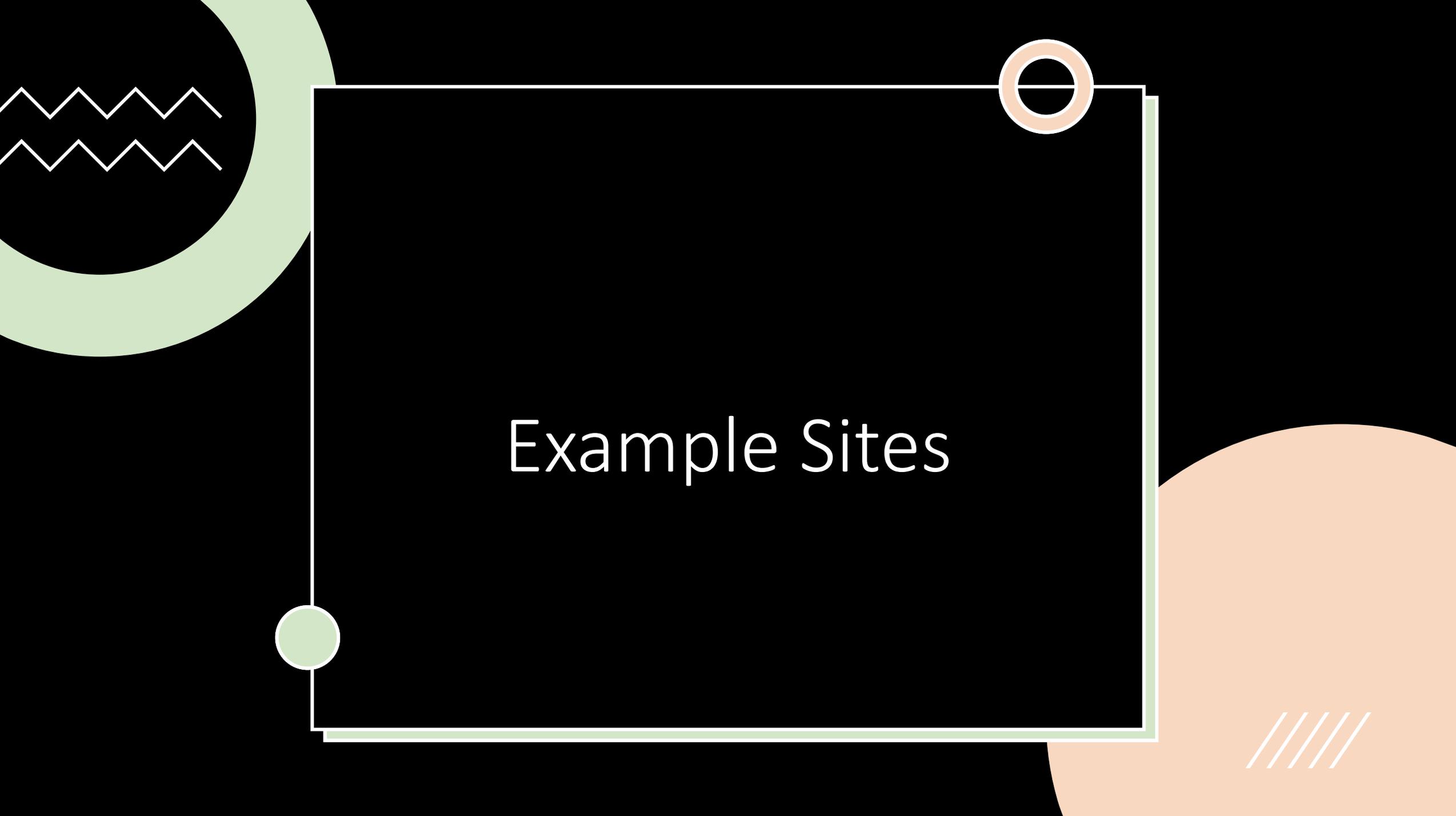
# Questions?

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785-213-4771



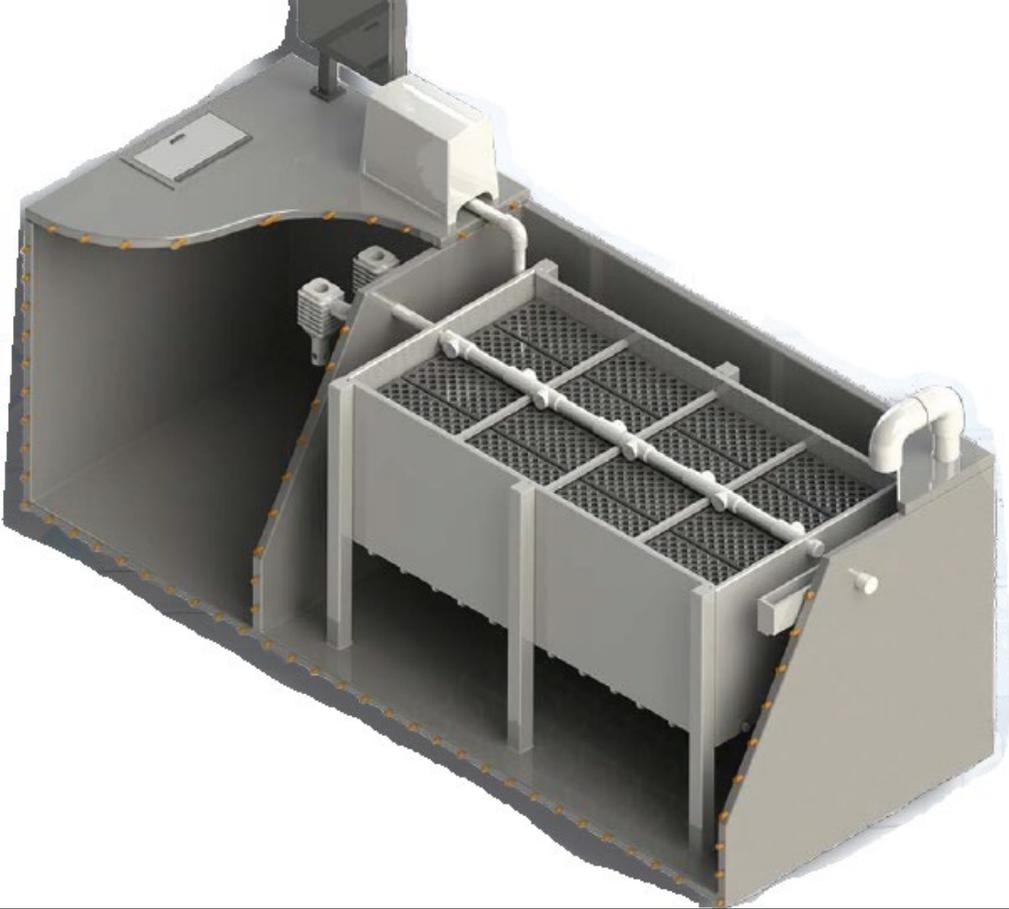
The background is black with several decorative elements: a large light green circle in the top left containing a white zigzag pattern; a smaller light green circle at the bottom left; a light orange circle at the top right; a large light orange shape at the bottom right containing four white diagonal lines; and a white double-line border around the central text area.

# Example Sites

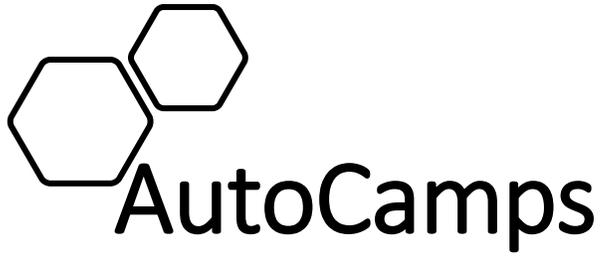
# Site 1 – Washington State

- Built in 2012
- 114 full hook ups
- Rigs up to 100 feet long
- Off the interstate
- Mix of full time and transient
- Year-round facility
- Event center
- Laundry and public/private restrooms fitness center game room





Site 2 Joshua Tree AutoCamp

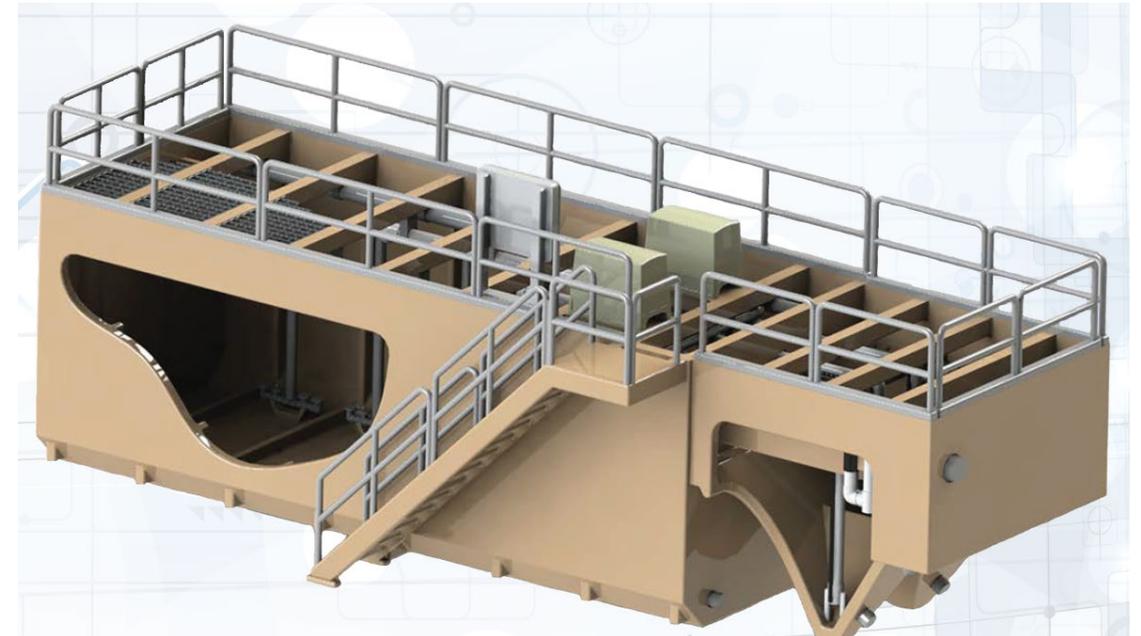
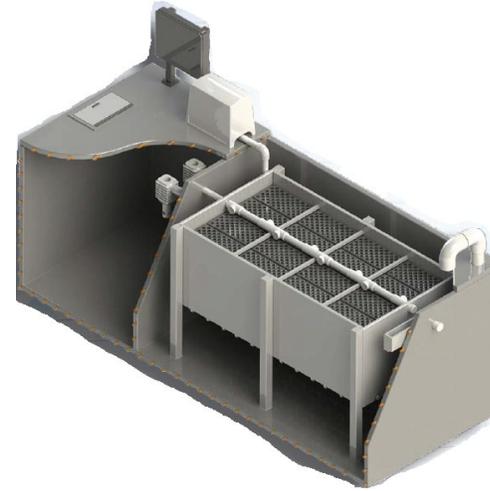


- Yosemite
- Russian River
- Cape Cod
- **Joshua Tree**
- Zion
- Catskills



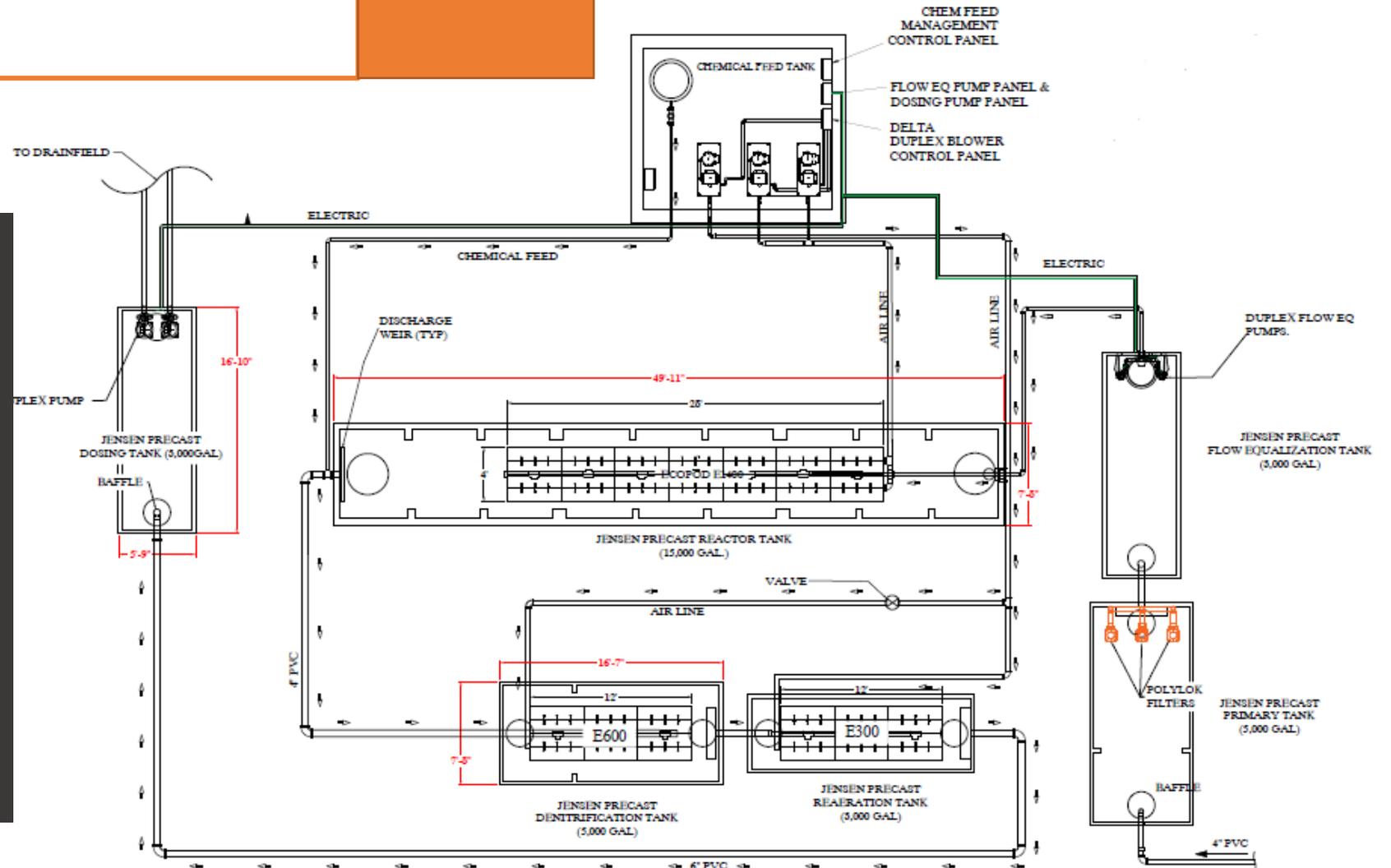
# Fall 2018 - Preliminary Engineering Report

- 5,500 gpd at 500 mg/L BOD
- San Bernardino County
- Effluent TN: **50% removal**
- Joshua Basin Water District
- Effluent TN: **<10 mg/L**



# Chose Attached Growth Process

- Primary
- Flow EQ
- BOD/Nitrification
- Denitrification
- Polishing
- Dose Tank



# Summer 2021 - Installation

