ONSITE WASTEWATER • RURAL DEVELOPMENT • WATER REUSE

Onsite Wastewater in Rural Development

Challenges, Practical Solutions, and Opportunities

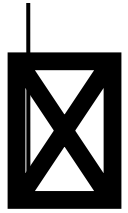
Scott Yarosh
Apache County

Joelle Wirth, R.S.
Environmental Consultant

Protective • Practical • Affordable • Adapted to Rural Conditions

Disclaimer:

EVERYTHING IN THIS PRESENTATION IS THE SOLE VIEWPOINT OF THE PRESENTER. ALL MATERIALS BEING PRESENTED REPRESENTS THE PRESENTER'S OWN OPINION AND DOES NOT REFLECT THE OPINIONS OF NOWRA, APACHE COUNTY, THE STATE OF ARIZONA, THE ORGANIZATION HOSTING THIS EVENT, OR QUITE POSSIBLY ANYONE ELSE!





"I'm from the government
and
I'm here to help."
Ronald Reagan

WELCOME

Hello, I'm Scott Yarosh, Apache County AZ Wastewater and Environmental Code Enforcement Inspector

- ~5,100 Square Miles Coverage Area
- Former Probation Surveillance Officer
- ~9,300 Square Miles including parts of the Navajo Nation





WE ALL TAKE FOR GRANTED





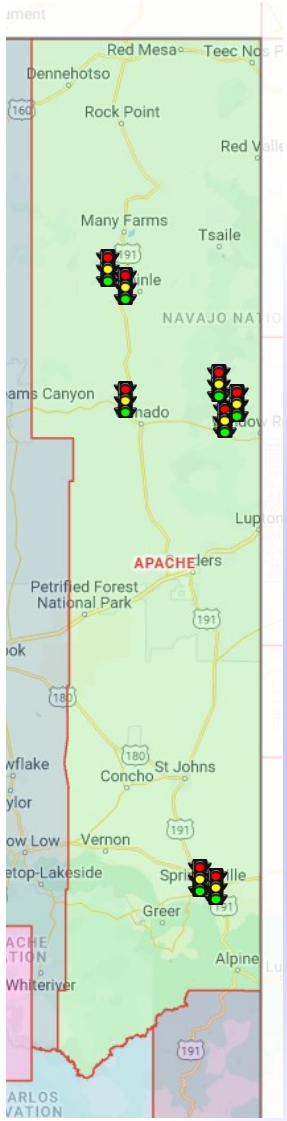


Presented by Scott Yarosh

WHAT RURAL REALLY IS

REAL-WORLD OFF-GRID EXAMPLES

WHAT IS RURAL? LET'S COMPARE



Apache County, Arizona

Size – 11,218 Square Miles
Total Population – 66,045*

29,186 Household Units*

5.9 People per Square Mile*
108 Acres for every
man, woman, and child

8 Stop Lights



Massachusetts

Size – 10,554 Square Miles
Total Population - 7,033,112*

3,072,289 Household Units*

901.6 People per Square Mile*

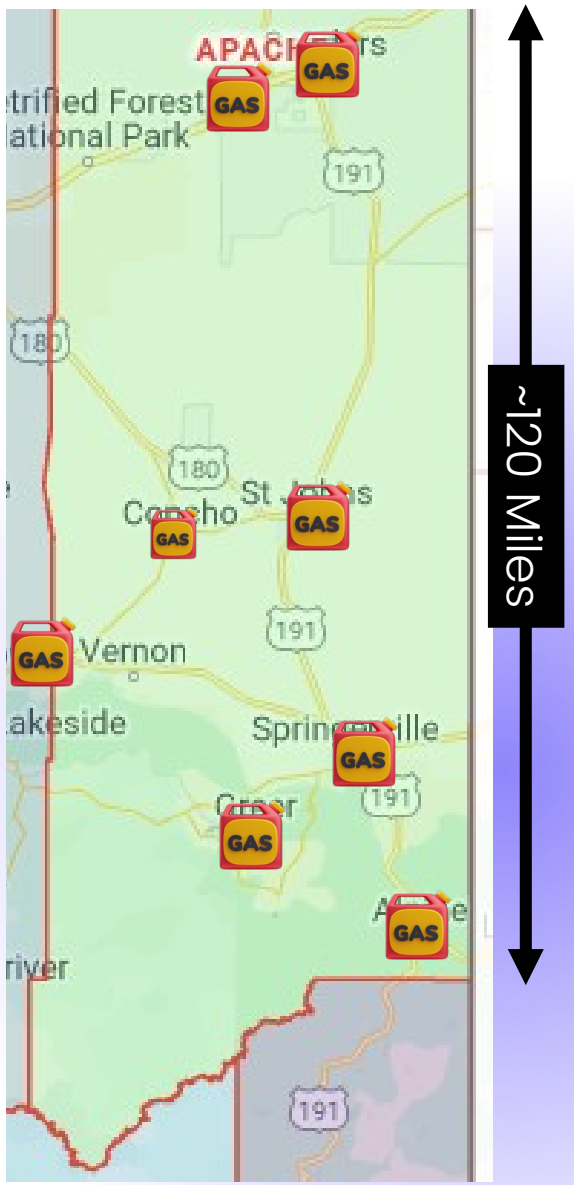
*2020 Census (www.census.gov)
Landmass

(Property) not connected to or served by publicly or privately managed utilities (such as electricity, water, or sewer)

OFF GRID:

merriam-webster.com

~ ACCESS TO BASIC NEEDS ~



Bashas'
Your Arizona hometown grocer

THE Market
-AT ST. JOHNS-

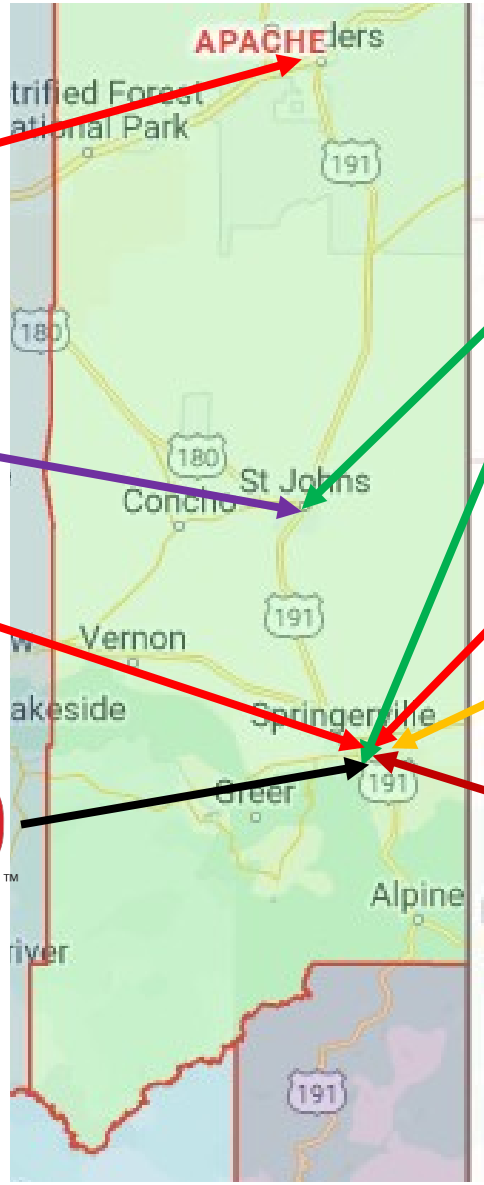
Bashas'
Your Arizona hometown grocer

SAFEWAY

SUBWAY

SONIC

DQ



PUBLIC WATER FILL STATION LOCATIONS

Bulk Water



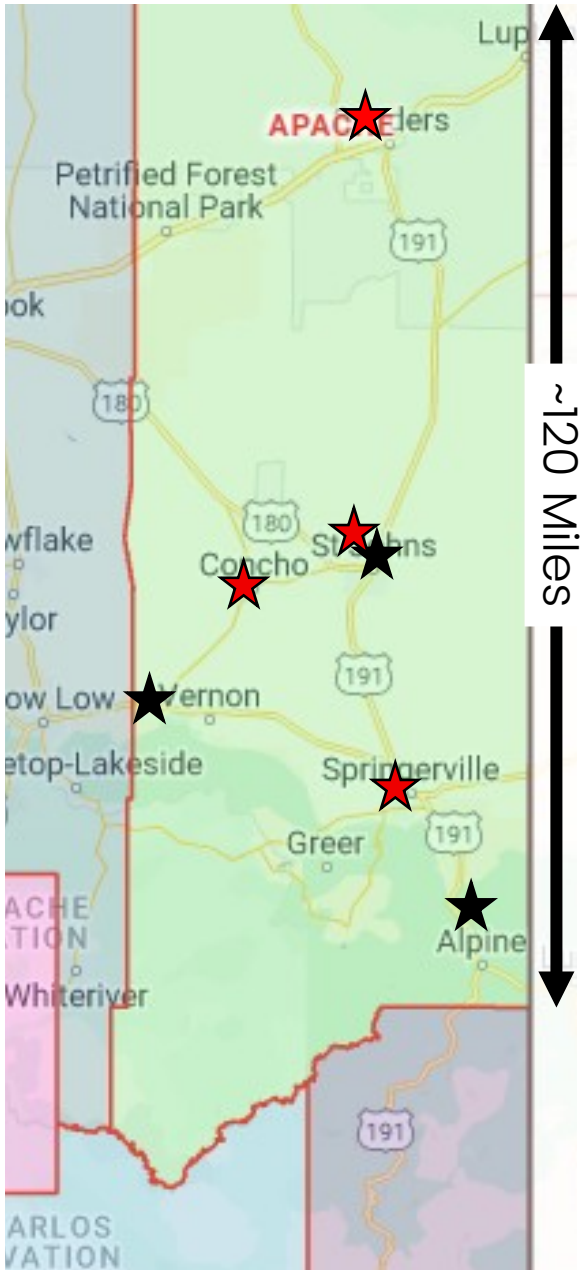


Container









2 HOUR DRIVE AWAY FROM A PUBLIC WATER FILL STATION





ACTUAL PEOPLE HAULING WATER



A WEEK OF WATER ~ 20 GALLON!



Reality of what people are calling home





















GOTTA GO !













“WASHING DISHES”







POPULATION DENSITY COMPARISON

• LOCATION	• SIZE – SQUARE MILES	• POPULATION • (2020 CENSUS.GOV)	• PEOPLE / SQ MILE
• **Los Angeles (city), California**	• 469	• 3,898,747	• **8,304**
Denver, Colorado	• 153	• 715,509	• **4,674**
• **Massachusetts**	• 7,801*	• 7,033,112	• **901**
• **Maricopa County, Arizona (Phoenix metro)**	• 9,201	• 4,689,558	• **480**
• **Apache County, Arizona**	• 11,198	• 66.045	• **5.9**
• **Wyoming**	• 97,088	• 576,851	• **5.9**

CHALLENGES !

YouTube UNIVERSITY



DIY Septic System for OFF GRID Sh
Tiny House Living



Living off grid, easy safe RV Septic



DIY Tiny Home Septic System
YouTube



A Better, Low Cost DIY Septic System For...
YouTube

WILLINGNESS

ABILITY



etter, Low Cost DIY Septic System For...
YouTube



gallon drum septic tank and chambers...
YouTube



tic System with IBC Totes
ows a simple off-grid septic...

All images on this slide come from YOUTUBE.COM

WHY DOES THIS MATTER?

People in rural areas with low population densities, minimum access to water and resources ARE NOT the same as heavy populated metro areas and may have a lower population RISK EXPOSURE

From Rural Reality to Practical Solutions

People still need sanitation when conventional infrastructure is unavailable.
How can a protective framework respond to the conditions people actually live in?

RURAL WASTE WATER • CHALLENGES & OPPORTUNITIES • ONSITE WASTEWATER

WATER REUSE

Rural Waste Water Challenges and Opportunities for Water Reuse

Joelle Wirth, R.S.
Environmental Consultant

A practical framework for rural water resilience

INNOVATION • EQUITY • STEWARDSHIP

Water Scarcity Changes the Options

01 Municipal reuse does not directly serve every household.

02 Options must fit available water, power, maintenance access, and household resources.

03 Evaluate water savings and reduced wastewater hauling as separate potential benefits.

The benefits depend on the household, system design, and authorized reuse pathway.

What Makes a Rural Solution Work?

01 **Water scarcity**
and groundwater decline

02 **Soil, slope, and**
space constraints

03 **Rural infrastructure**
gaps

04 **Regulatory defaults to**
high-cost technologies

CONVERGENCE

Same Rural Setting. Very Different Resources.



CONVENTIONAL RURAL HOME

May have greater capacity for a conventional system, power, service, and replacement costs.



SMALL / OFF-GRID HOME

May rely on hauled water and need a simpler sanitation path that can actually be maintained.

SAME PUBLIC-HEALTH OBJECTIVE • DIFFERENT RESOURCES • DIFFERENT PRACTICAL PATHWAYS

Match Requirements to Risk

Start with the outcome we need to protect — then scale treatment, evidence, and oversight to actual site risk.

SITE

Groundwater, soils, slope, lot size, water supply, and separation distances.

EXPOSURE

Population density, potential human contact, nearby wells, and receiving environments.

PERFORMANCE

Use treatment and management that can demonstrate the required protective outcome.

OVERSIGHT

Match inspection, maintenance, monitoring, and operator needs to the level of risk.

THE GOAL IS NOT LESS PROTECTION. IT IS MORE WAYS TO ACHIEVE PROTECTION.

INTERIM SERVICE PATH

What Basic sanitation can mean for rural households

Private and improved

Basic sanitation means a private household toilet that hygienically separates people from human waste.

A step, not the endpoint

Safe containment, upkeep, and a route to safely managed service remain important.

Match the household

A pit privy with slab or a composting toilet may be options where a full water-carriage system is out of reach.

A service level is a planning lens, not a substitute for a permit.

SITE OPTION

Outhouse (earth pit privy)

Siting must protect groundwater and wells.

Plan for handwashing, upkeep, and closure.



Conceptual illustration. Site design and local approval determine use.





Water Supply Guides System Design

01 **Design for drought**

Start with resilient operating assumptions.

02 **Account for groundwater decline**

Plan for changing depth and vulnerability.

03 **Evaluate reuse**

Confirm a useful, authorized end use.

04 **Treat onsite wastewater as water infrastructure**

Connect parcel-scale choices to basin-scale stewardship.



Optimize the site before escalating technology

LOWER COST

Higher fit

Use site, soil, water, and management choices
before specifying expensive treatment units.

01

Soil-based optimization

02

Reuse integration

03

Management strategies

04

Avoid unnecessary high-cost units

THE GAP IS NOT TECHNOLOGY ALONE

Some basic sanitation options may be capable of providing a protective level of service — but existing regulatory frameworks do not always recognize them or provide a practical permitting pathway.

RECOGNITION

Some basic and alternative sanitation approaches may fall outside conventional regulatory categories.

IMPLEMENTATION

Without a recognized pathway, available options can remain difficult or impossible to use legally.

ENGAGEMENT

Regulators, communities, designers, researchers, and service providers need a shared way to evaluate risk and performance.

The opportunity is to create protective pathways for appropriate options — not to lower the standard of protection.

Speaker point: Recognition is the bridge between available technology and safe, lawful implementation.



DISTRIBUTION OPTION

A gravity dose can spread effluent in pulses

A tank stores a dose before release.

A Flout or siphon can work without a pump.

Adequate fall and hydraulic design are essential.



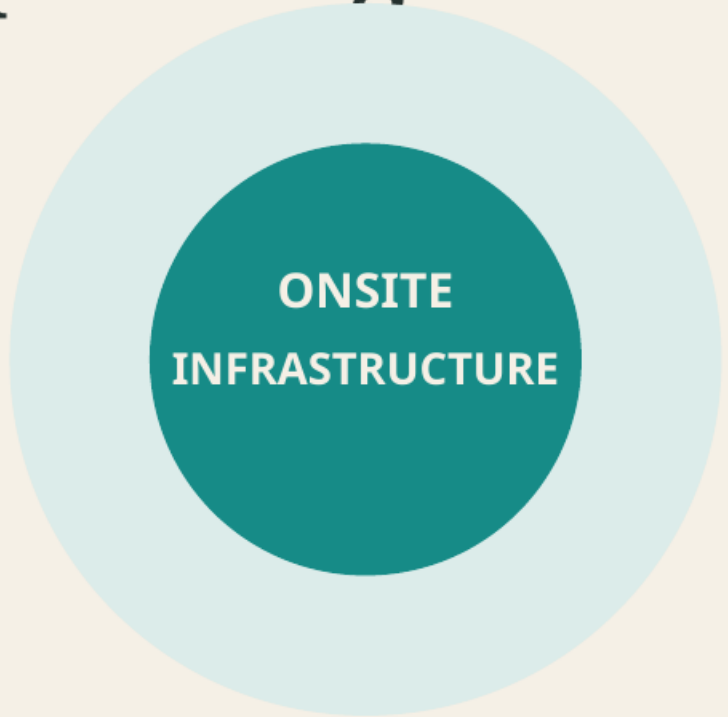
Conceptual illustration. Site design and local approval determine use.

LONG-TERM RURAL SERVICE

Decentralized systems belong in rural infrastructure planning

01

Part of resilient rural water planning



02

Evaluate reuse benefits

03

Supports rural growth

04

Treat systems as infrastructure

PARCEL-SCALE SYSTEMS • DEVELOPMENT-SCALE VALUE

A PROTECTIVE PATHWAY FOR EVERYONE

Start with the outcome we need to achieve, then match the pathway to the site, household, and risk.

1	**PROTECT PUBLIC HEALTH**	Safe separation, containment, treatment, and management of human waste.
2	**PROTECT THE ENVIRONMENT**	Match requirements to groundwater, soils, exposure risk, and site conditions.
3	**RECOGNIZE PRACTICAL OPTIONS**	Create pathways for appropriate basic and alternative sanitation approaches — not only conventional systems.
4	**MAKE PROTECTION ACHIEVABLE**	Consider affordability, water availability, maintenance, and access to services.

EQUITY DOES NOT MEAN LOWERING THE STANDARD. IT MEANS CREATING AN ACHIEVABLE PATH TO MEET IT.

Match Requirements to Risk

Start with the outcome we need to protect — then scale treatment, evidence, and oversight to actual site risk.

SITE

Groundwater, soils, slope, lot size, water supply, and separation distances.

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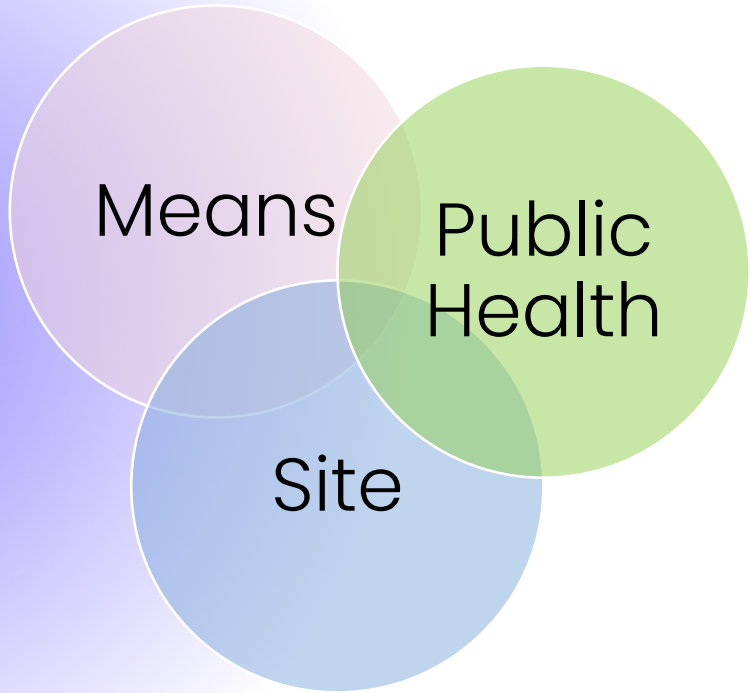
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OVERSIGHT

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THE GOAL IS NOT LESS PROTECTION.
IT IS MORE WAYS TO ACHIEVE PROTECTION.



#1 – Public Health is always the first concern
#2 – ALL site conditions must be considered, not just soil, or number of fixtures must include distance away from other households

Questions & Discussion

Scott Yarosh • Joelle Wirth, R.S.

THE TECHNOLOGY CAN CHANGE. THE STANDARD OF PROTECTION SHOULD NOT.