
Celebrate
PUBLIC WORKS!
APWA WA
OCT 9-10, KENNEWICK WA
2024 FALL CONFERENCE

Using vermifiltration for effective wastewater treatment

Sierra Smith, BS
Perca Director of Research and Development

George Damoff, PhD
Perca Chief Science Officer

PERCA

LEARNING OBJECTIVES

Objective 1 - Define the Perca vermifiltration system and learn how it operates.

Objective 2 - Identify key benefits of utilizing the Perca vermifiltration system.

Objective 3 - Discuss the environmental and community impact of the Perca vermifiltration system as a wastewater treatment solution.

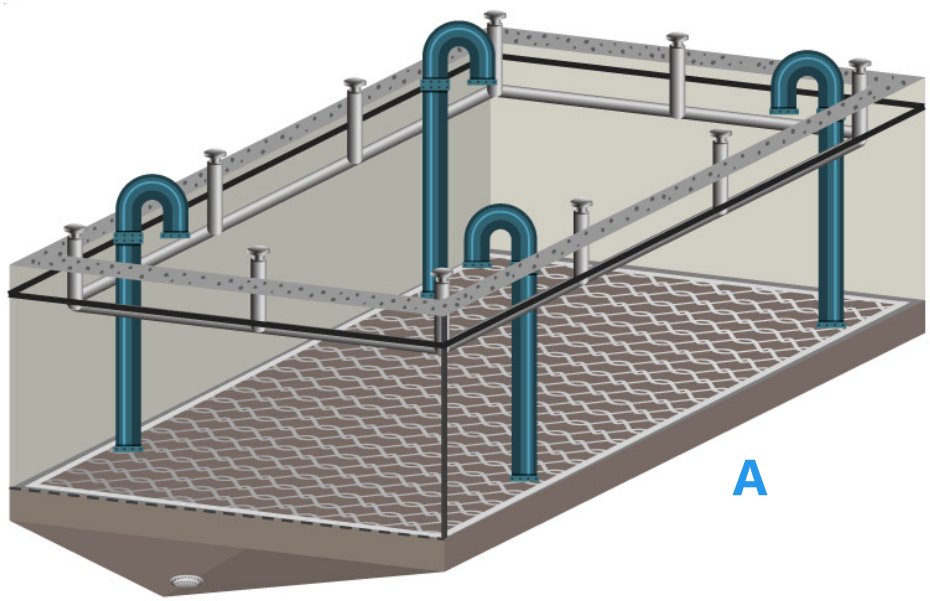
Vermifiltration is a bioinspired wastewater treatment system that unites soil science concepts with earthworm ecology.

Vermifiltration works!

Over 55 million gallons processed

TSS Removal	**91.0%**
BOD Removal	**96.4%**
PCB Removal	**97.8%**
TKN Removal	**93.9%**

Celebrate PUBLIC WORKS! APWA WA

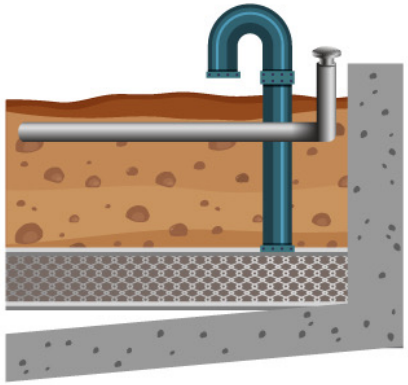


A

A. Scaled bed footprint

B. Substrate, habitat, organisms

C. Proprietary dosing & drainage



B

C

A closer look…

Macroorganisms

Earthworm sp/spp

Fungi

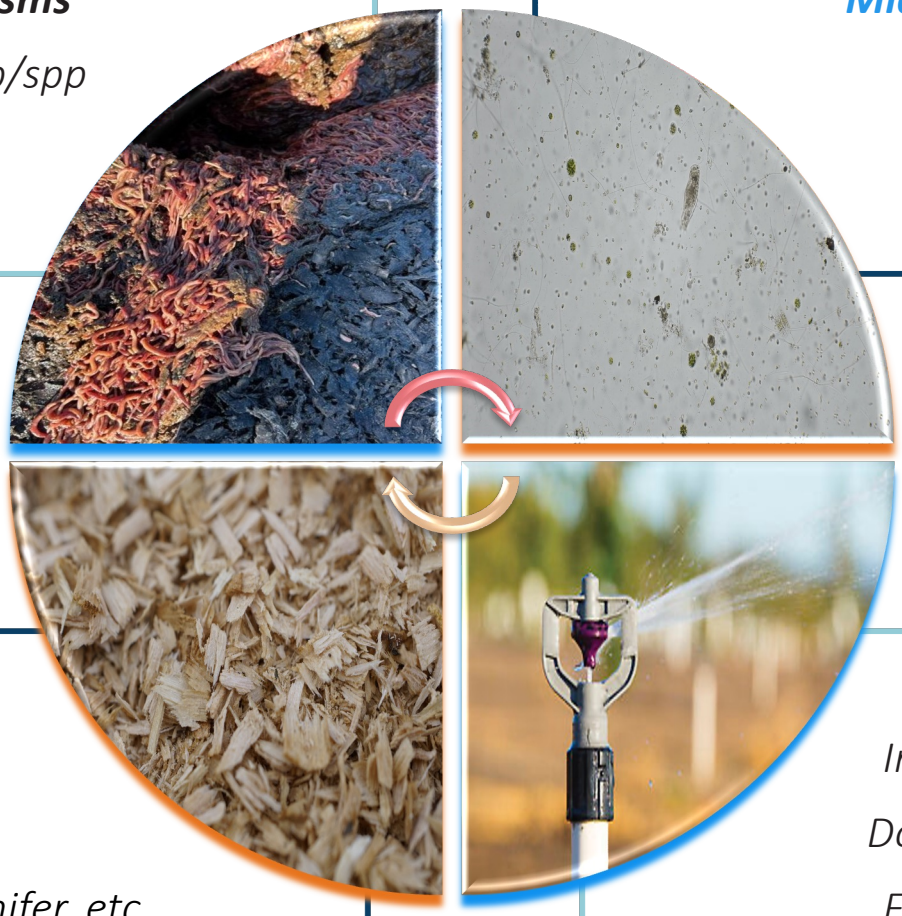
Invertebrates

Microorganisms

Bacteria

Protozoa

Nematodes



Substrate

Bamboo

Wood chips,

apple, conifer, etc.

Application

Irrigation designs

Dosing and timing

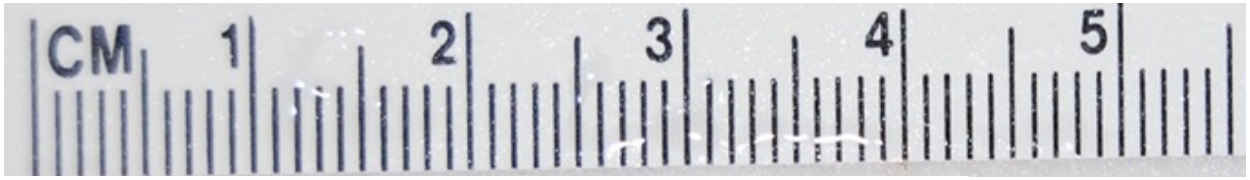
Filtration efficacy

PERCA

Celebrate PUBLIC WORKS! APWA WA

Eisenia fetida (Savigny, 1826)

Thrives in organic soils



Also use: *E. andrei*, *E. veneta*

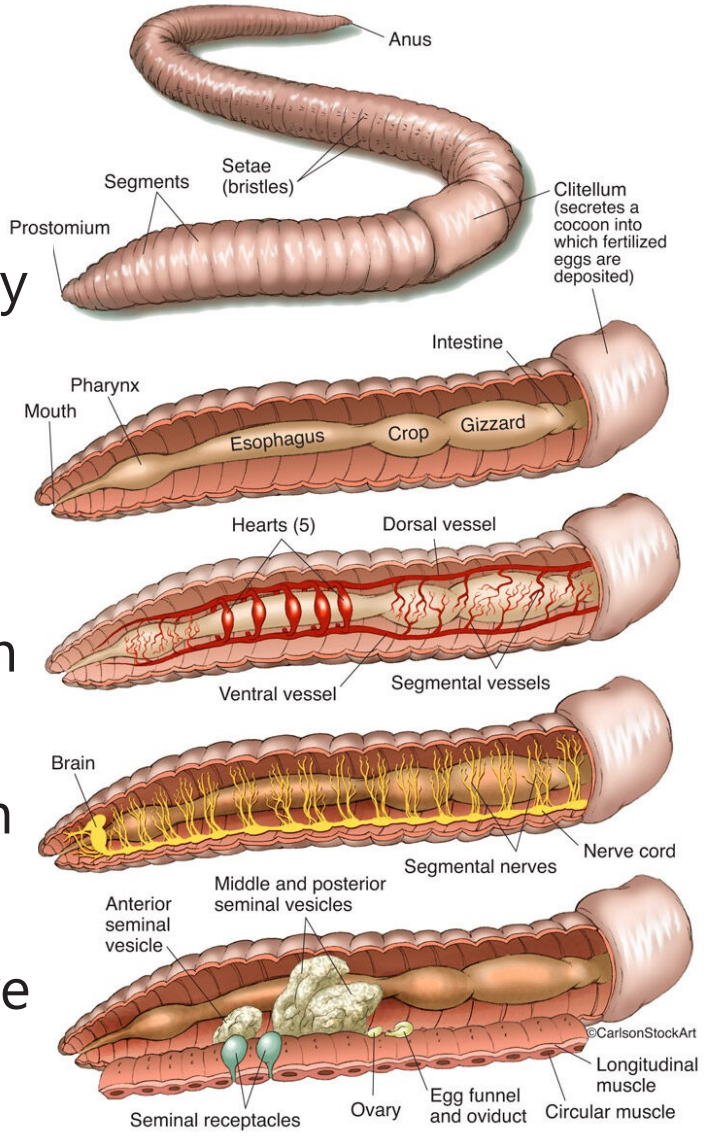
Surface anatomy

Digestive system

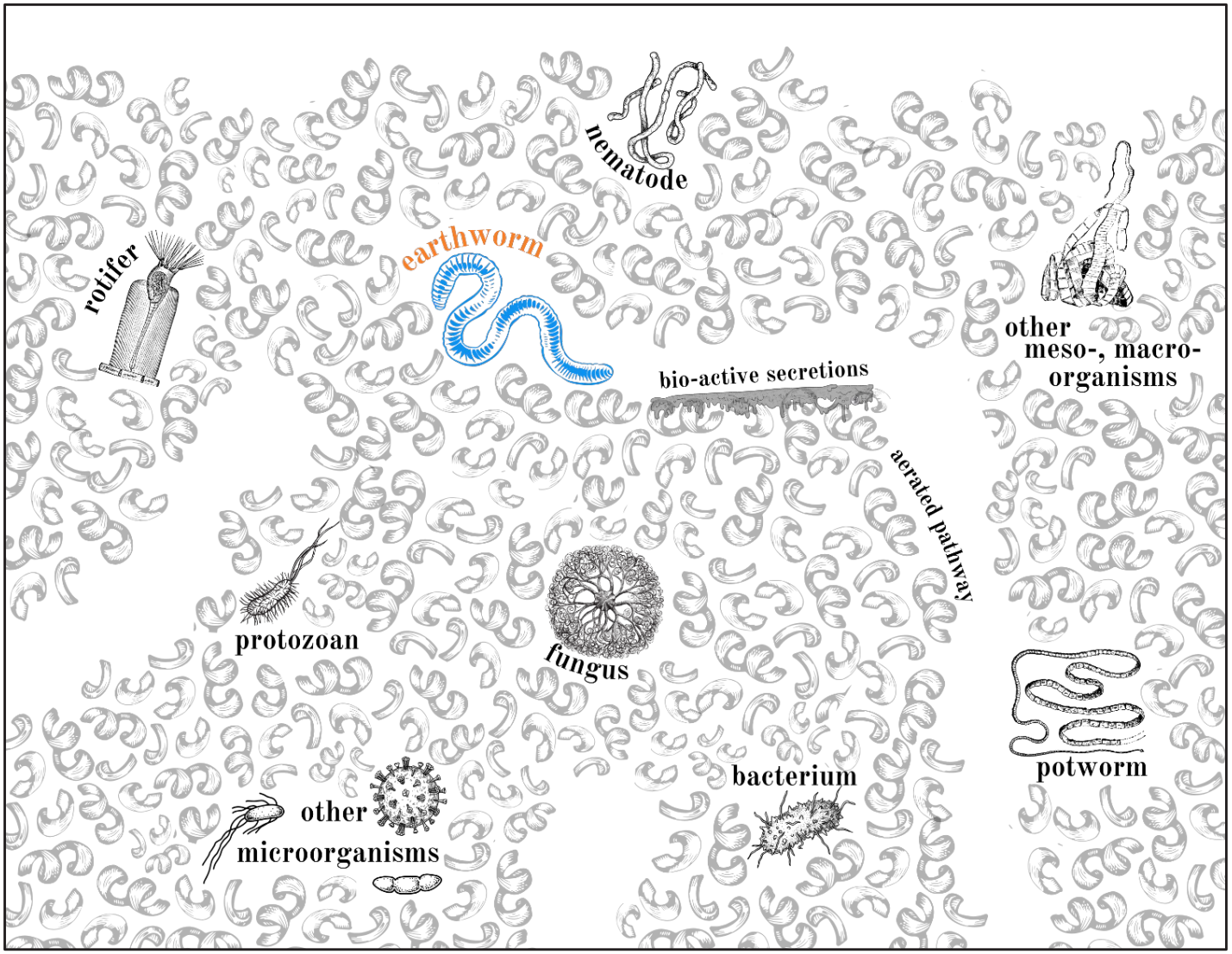
Circulatory system

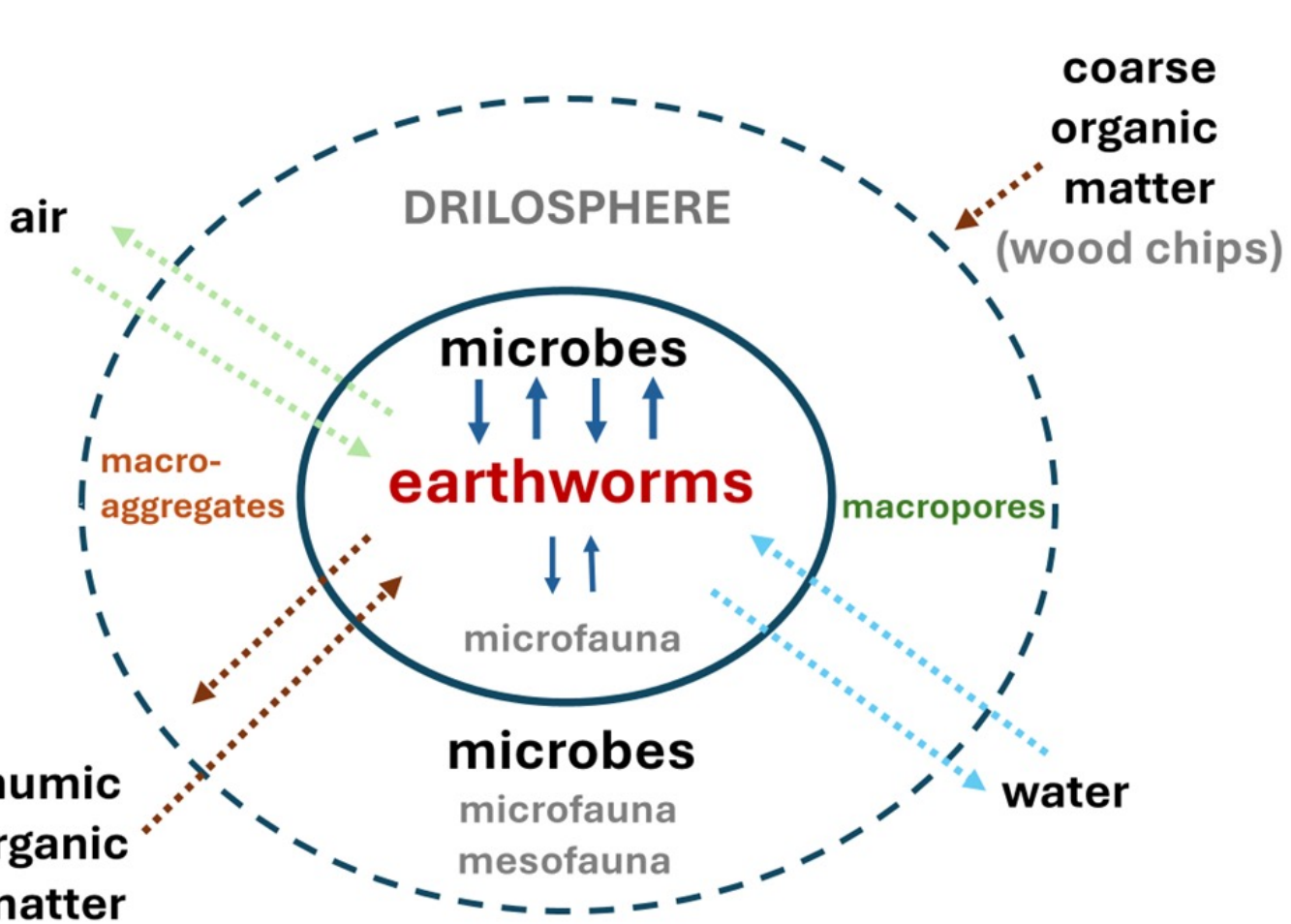
Nervous system

Reproductive system



A complex simple-looking organism


nematode
rotifer
earthworm
other
meso-, macro-
organisms
bio-active secretions
aerated pathway
protozoan
fungus
potworm
bacterium
other
microorganisms


coarse
organic
matter
(wood chips)
air
DRILOSPHERE
microbes
macro-
aggregates
earthworms
macropores
microfauna
microbes
microfauna
mesofauna
humic
organic
matter
water

What is Perca?

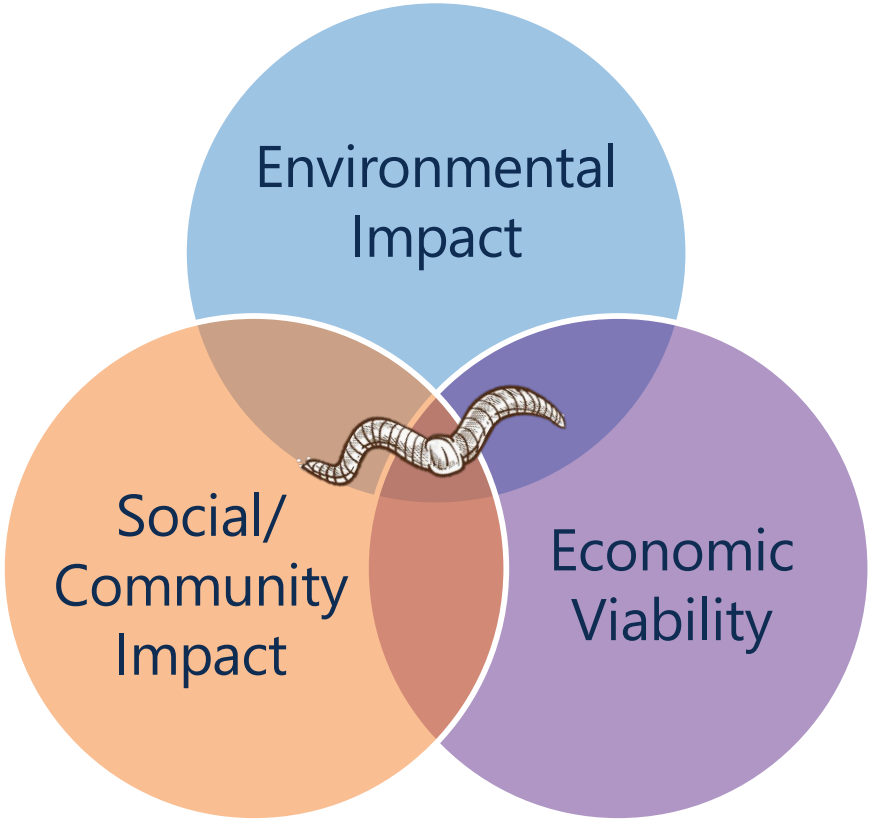
Perca uses ***vermifiltration*** for large scale pollutant and toxic chemical removal from wastewater.

Using this eco-innovative technology, Perca sequesters, remediates, and controls standard pollutants (TSS, BOD, fecal coliforms, etc.) and toxic chemicals like PCBs, PFAS, hydrocarbons (oils), and more.

Market Disruption:
The Emergence of Green Remediation

Green remediation is the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions.

– U.S. EPA

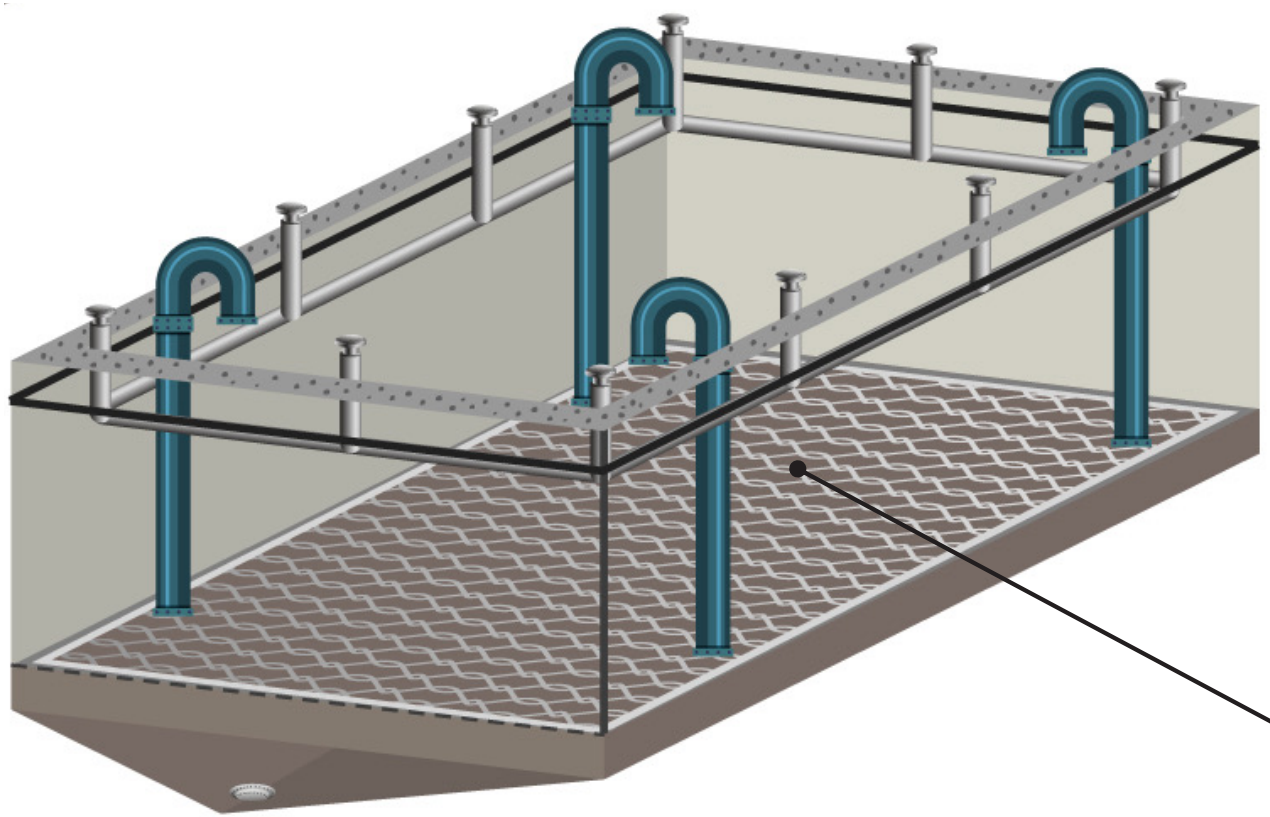


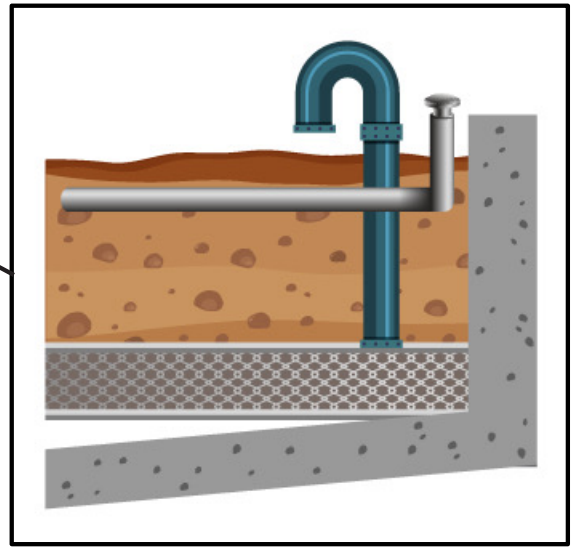
A Success Story

Vermi-Tech in Real Numbers

PCB REDUCTION RESULTS - Using Worms / Biology			
picograms/liter (parts/quadrillion)			
DATE	PRETREATMENT	POST TREATMENT	REDUCTION %
5/1/22	16,800	753	95.5%
6/1/22	172,400	908	99.5%
7/20/22	144,300	265	99.8%
8/2/22	12,100	254	97.9%
9/6/22	69,400	485	99.3%
10/5/22	14,000	388	97.2%
11/2/22	92,200	2,710	97.1%
12/13/22	53,000	288	99.5%
1/10/23	24,100	22	99.9%
2/7/23	303,100	737	99.8%

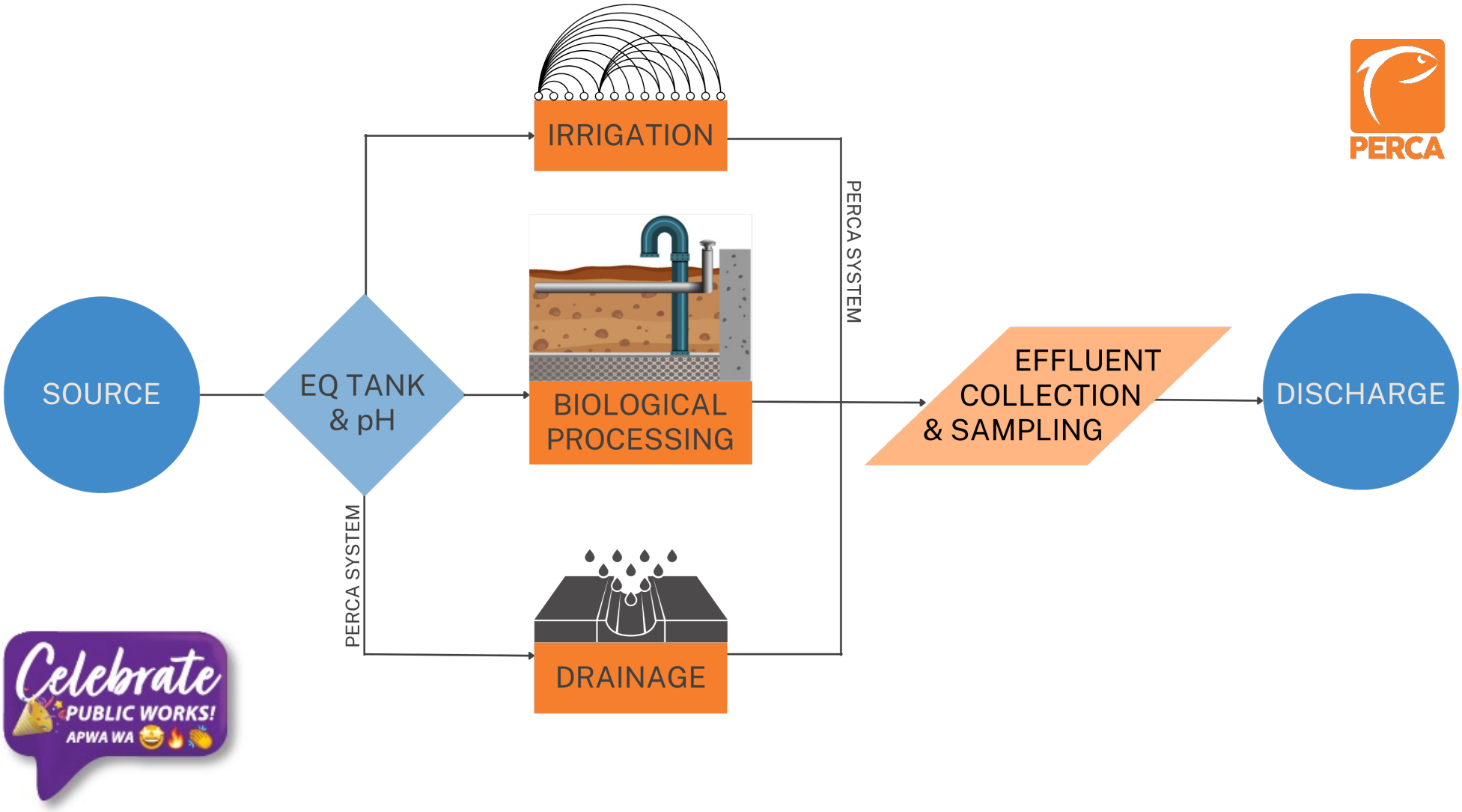
Testing results are from an existing vermitreatment facility that was approaching closure due to perpetual, non-compliant wastewater discharge





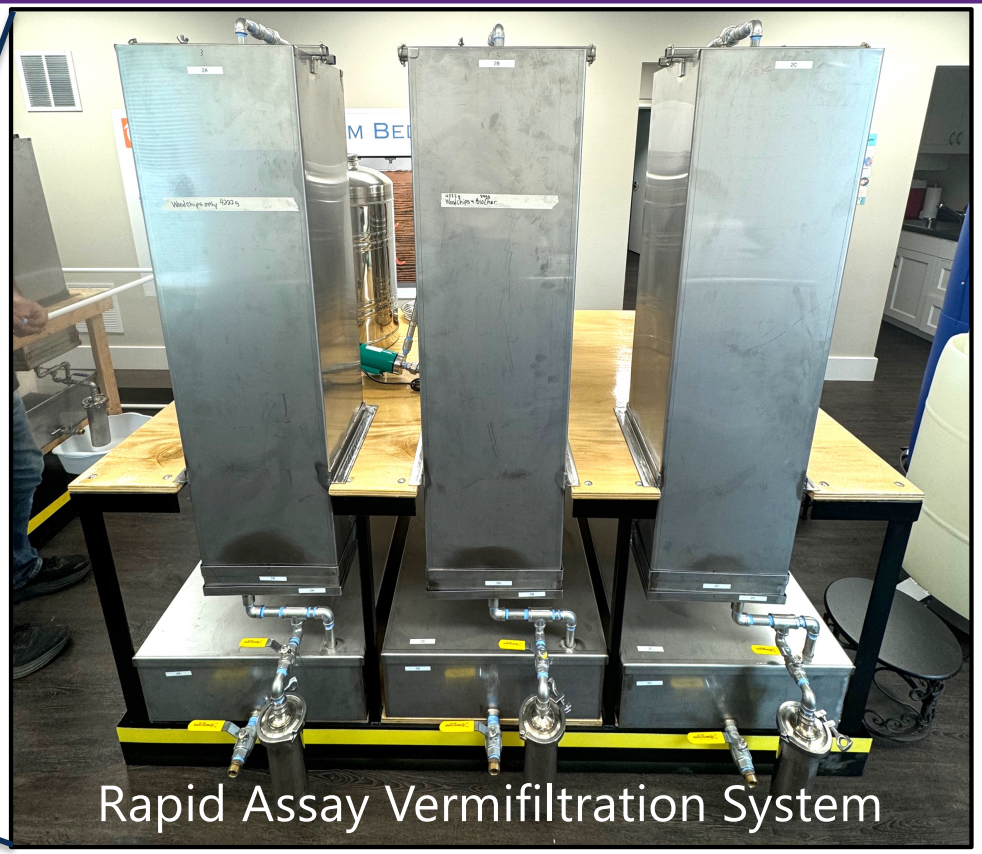
Celebrate PUBLIC WORKS! APWA WA

PERCA

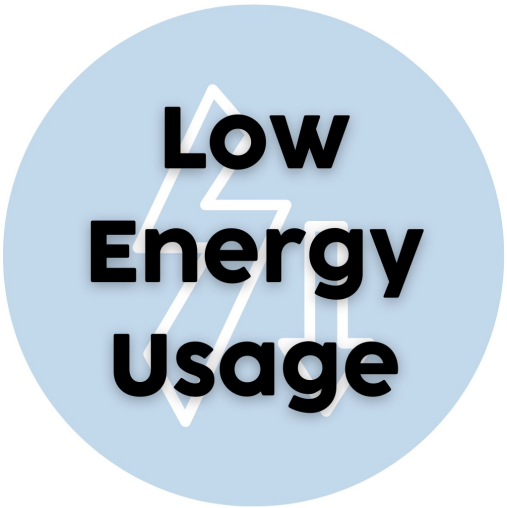

IRRIGATION
PERCA SYSTEM
SOURCE
EQ TANK
& pH
BIOLOGICAL
PROCESSING
EFFLUENT
COLLECTION
& SAMPLING
DISCHARGE
PERCA SYSTEM
DRAINAGE
PERCA
Celebrate
PUBLIC WORKS!
APWA WA

VermiTech Innovation Center

VIC located in Walla Walla, WA

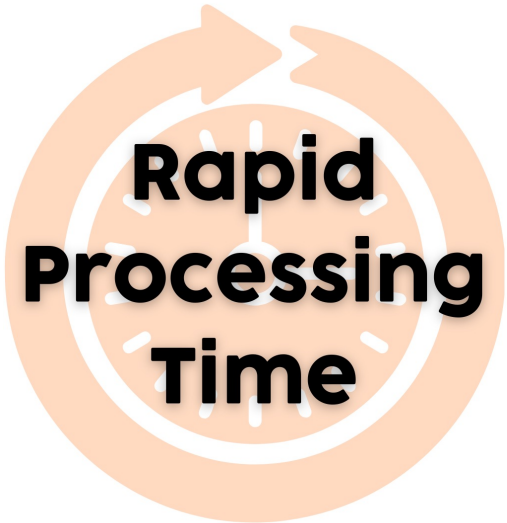


Rapid Assay Vermifiltration System


Low
Energy
Usage


No
Additional
Biological
Purchases


Low to
No Odor


Rapid
Processing
Time


Relative
Footprint

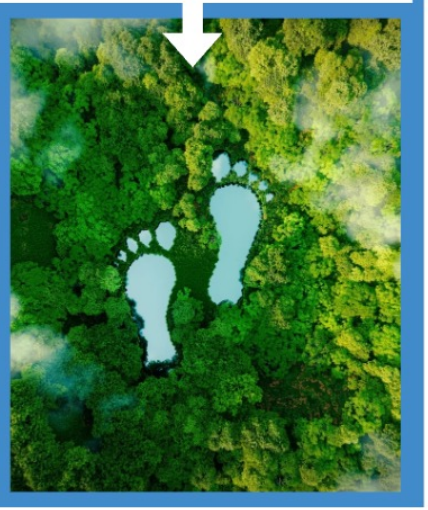

Little to No
Negative
Byproducts

Environmental Impacts

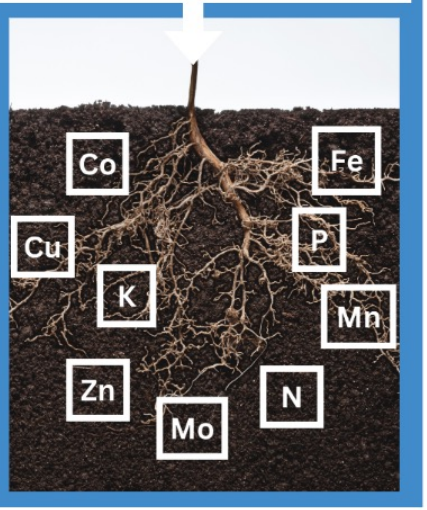
Nature – Based

No Negative Byproducts

Low Energy Footprint



Nutrient Bio-availability



PERCA

Community Impact

Clean water is a basic human right, and it shouldn't be cost-prohibitive for a community to treat their water.

Low Cost Alternative System

Minimal Operational Costs and Time

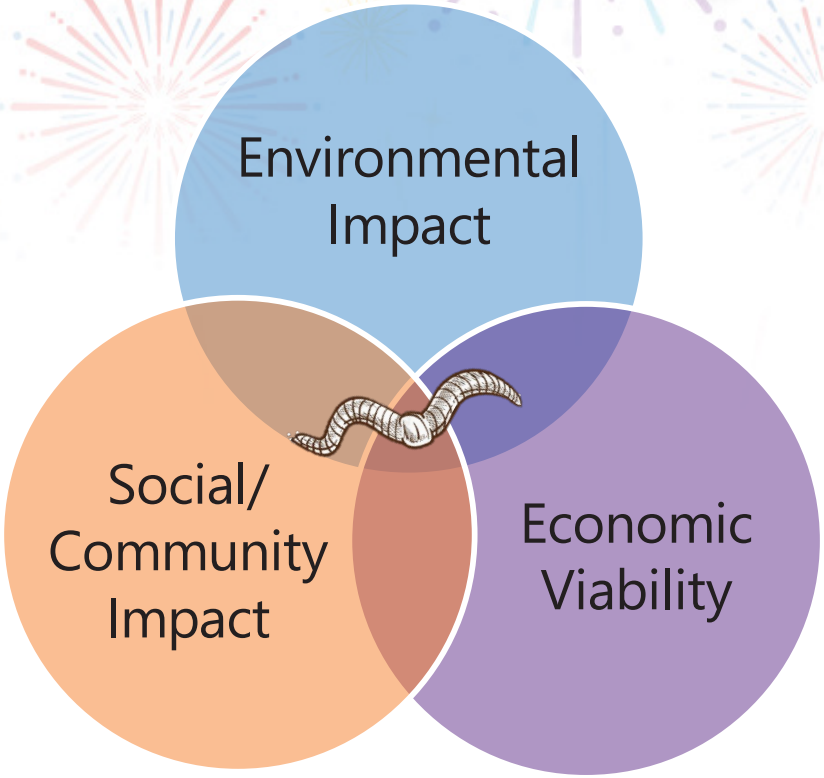
Adaptable and Versatile

Eco-Conscious and Responsible

Celebrate PUBLIC WORKS! APWA WA

Thank You

Questions or Comments?



PERCA