

Using I/A Technology or Credit Land to Address Nitrogen Loading Limitations

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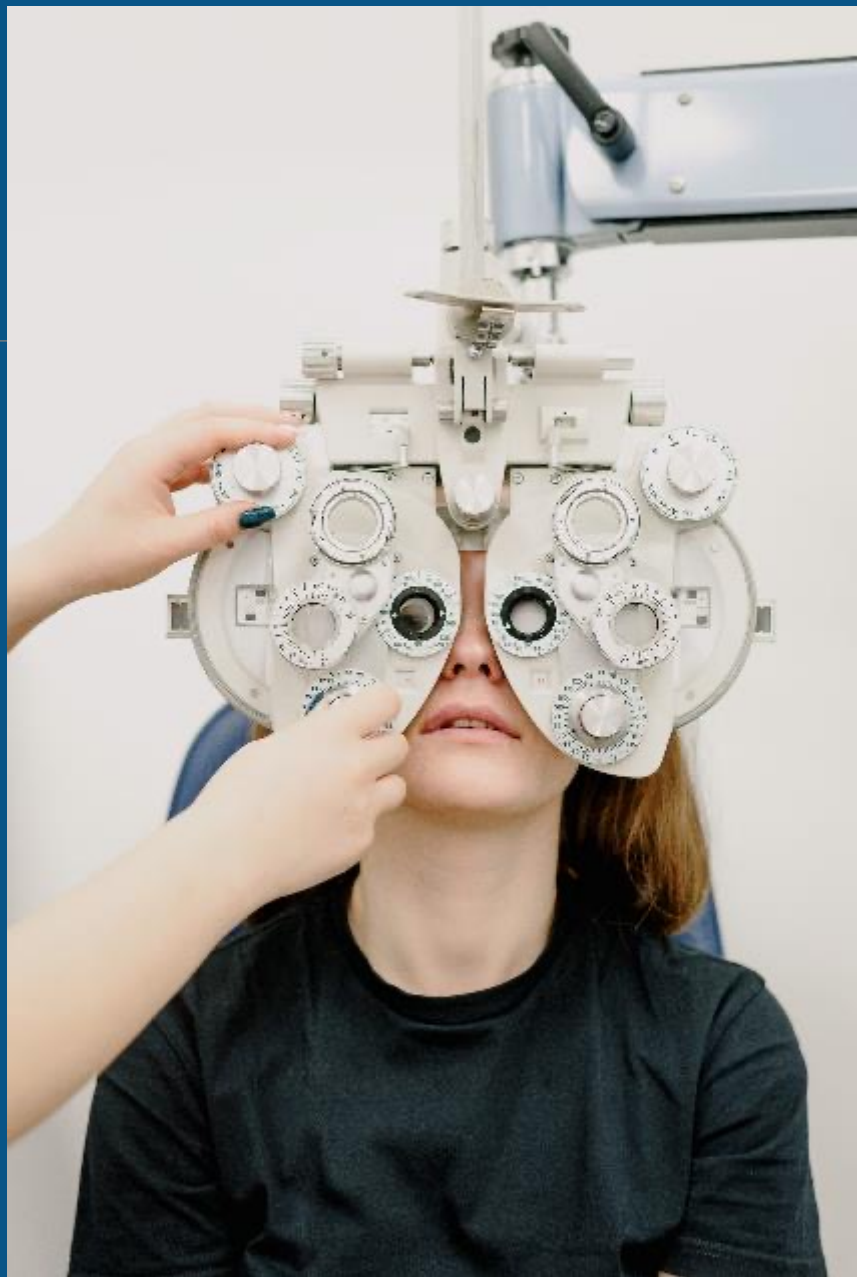
Barnstable County Department of Health and Environment Wastewater Division



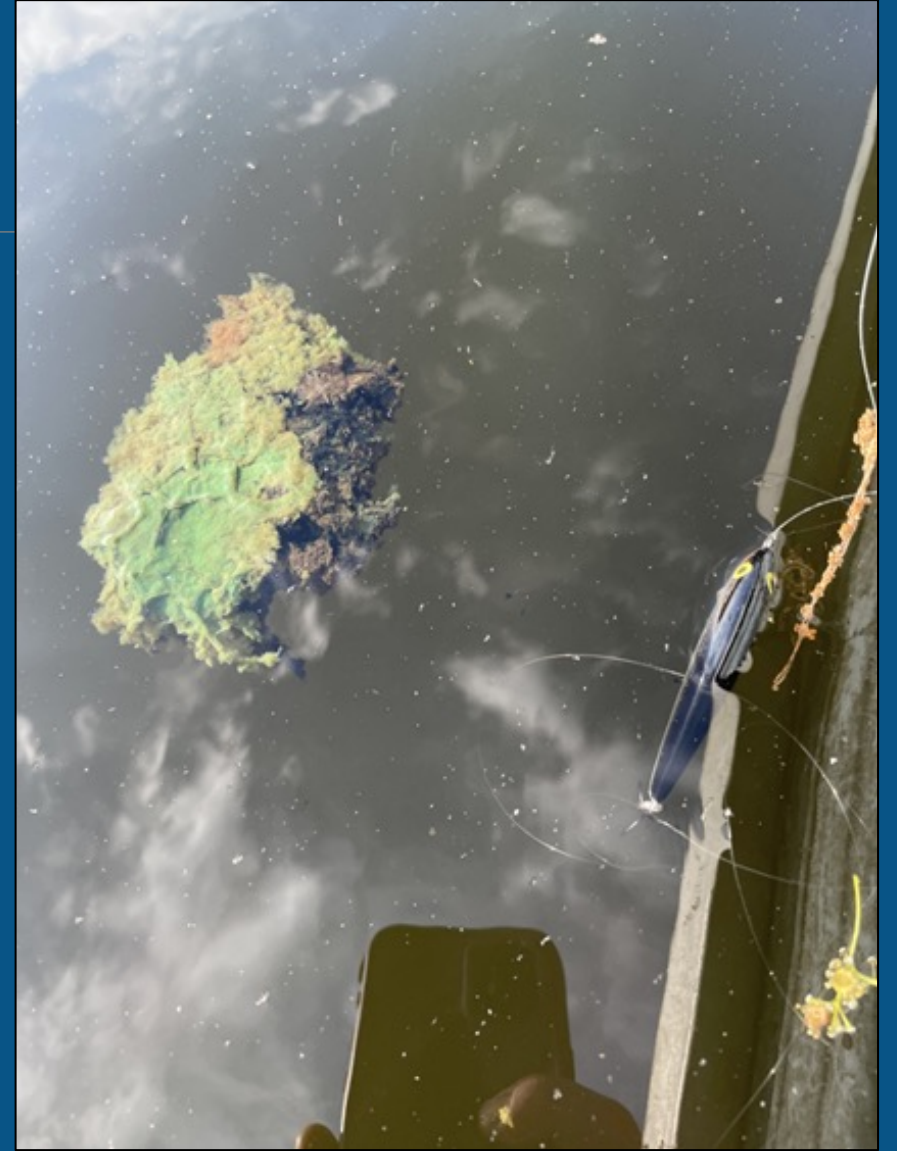
Clean Water Center

- 30-40 seat hybrid-capable conference room
- Public lobby with educational displays
- Compost toilets and waterless urinals
- Hybrid-capable meeting room
- 10 staff offices
- Break room





Is it worse or is it
looking better?













Cape Cod's Water Quality is Bad and Getting Worse!



Cape Cod's water quality is getting worse, report finds

The New York Times

A Toxic Stew on Cape Cod: Human Waste and Warming Water

Climate change is contributing to electric-green algae blooms. Massachusetts wants a cleanup of the antiquated septic systems feeding the mess, but it could cost billions.



As temperatures rise, a 'nightmare' of toxic algae plagues the hidden gems of Cape Cod

By David Abel Cape Staff, Updated July 31, 2020, 10:43 a.m.



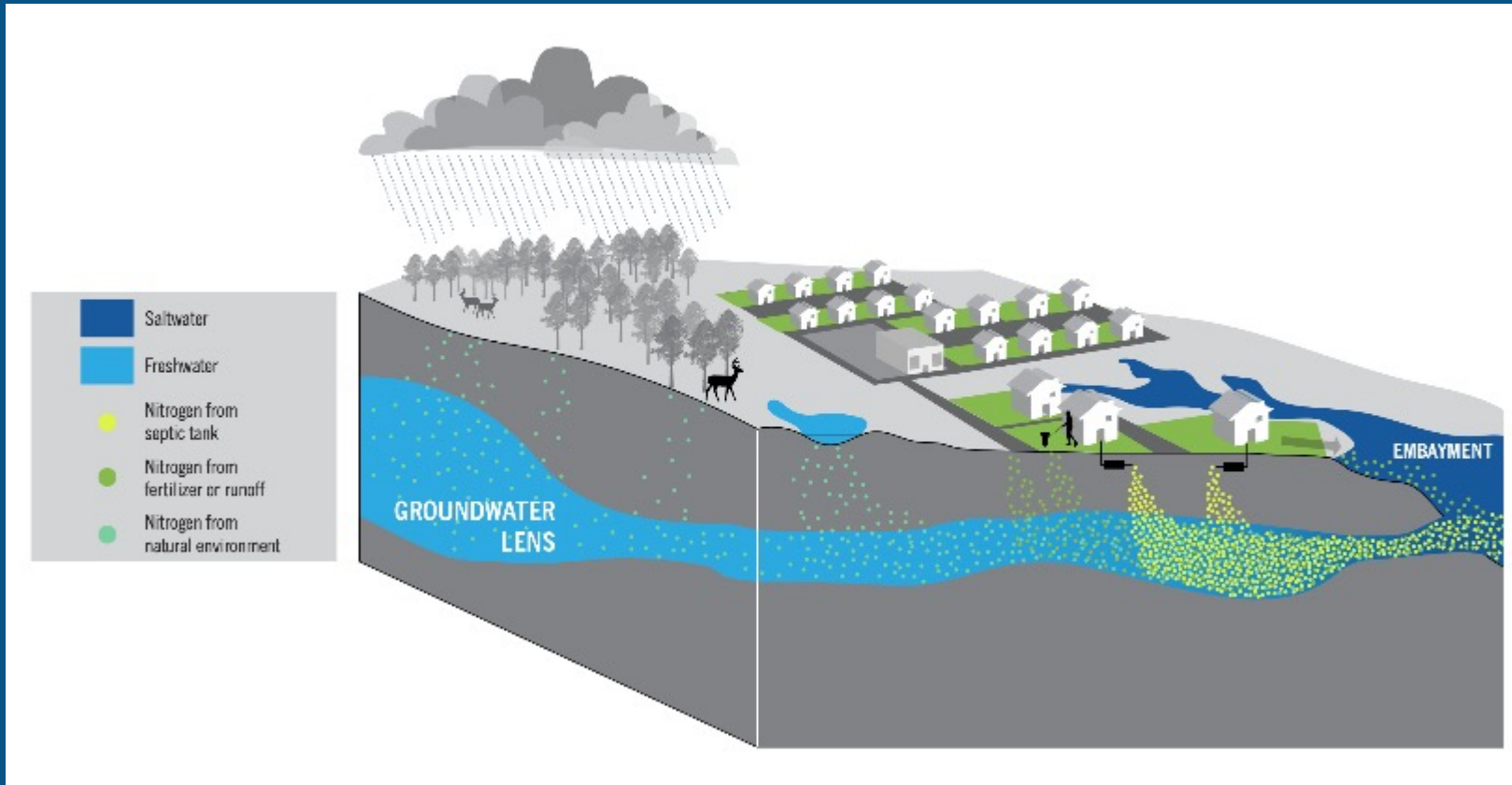
Rising temperatures a boon for harmful bacteria in Cape Cod's fresh and salt water



Doug Fraser

Cape Cod Times

Nutrient Pollution Sources



Source: Cape Cod Commission 208 Plan

Stormwater (rainwater wash-off)

- Agriculture (farms and cranberry bogs)
- Dogs and horses
- Manicured lawns/ golf courses
- Wildlife (waterfowl, terrestrial mammals)
- Natural processes (bank erosion, tree fall, leaves)

Atmospheric deposition (airborne)

- Fossil fuel combustion
- Dust

Wastewater (direct water usage)

- Bathrooms
- Kitchen
- Laundry
- Food production
- Manufacturing (textiles)

Two Types of Nitrogen Sensitive Areas

A

Areas surrounding
public water supply wells

B

Areas surrounding
nitrogen sensitive estuaries

Two Options for PWS NSA's

1

Nitrogen Reducing
I/A Technology

2

Nitrogen Credit Land

Two Options for NRNSA's

1

Best Available Nitrogen Reducing
Technology

2

Watershed Permit

Wastewater Treatment Infrastructure



Hypothetical Watershed

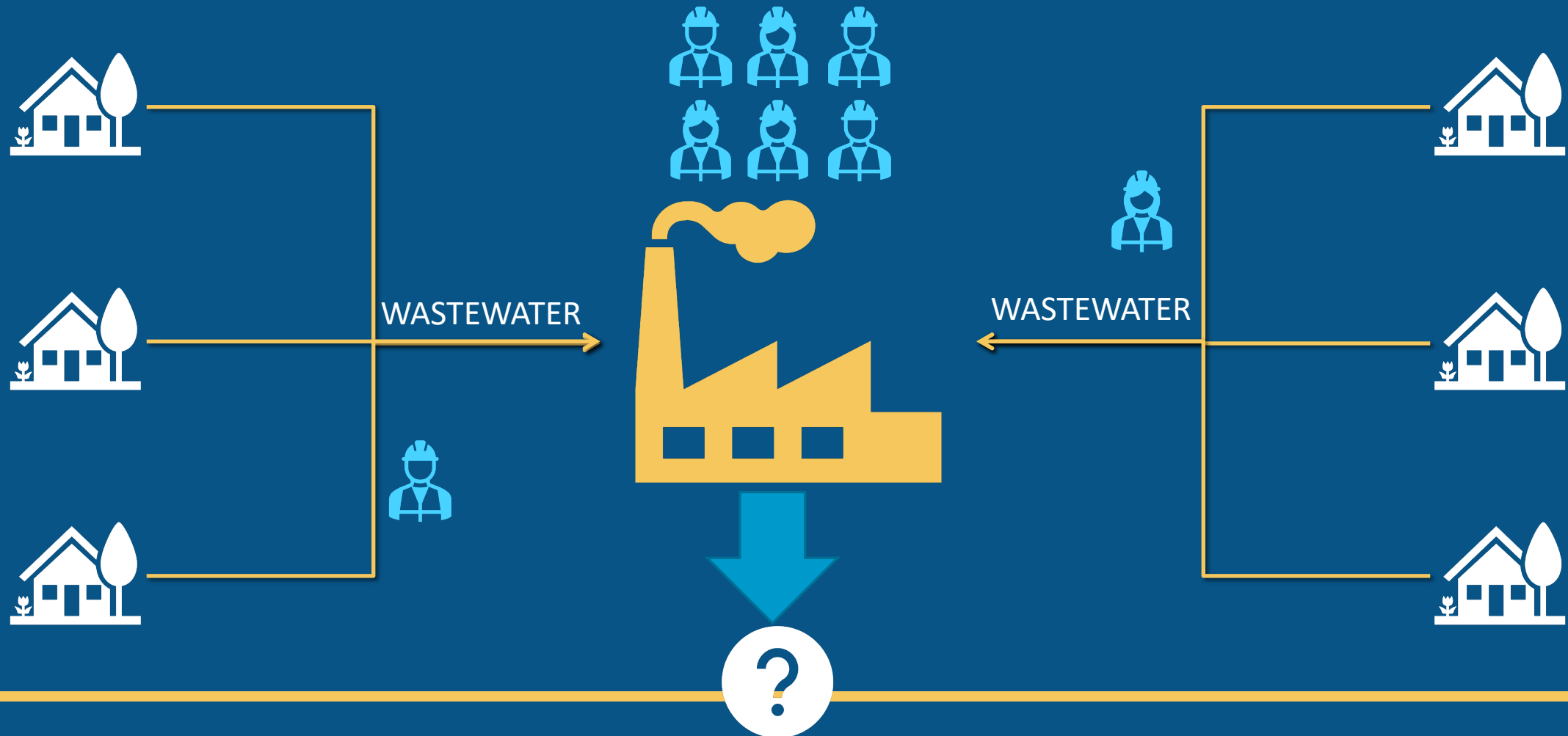


Problem:
Too Much
Nitrogen or
Phosphorus

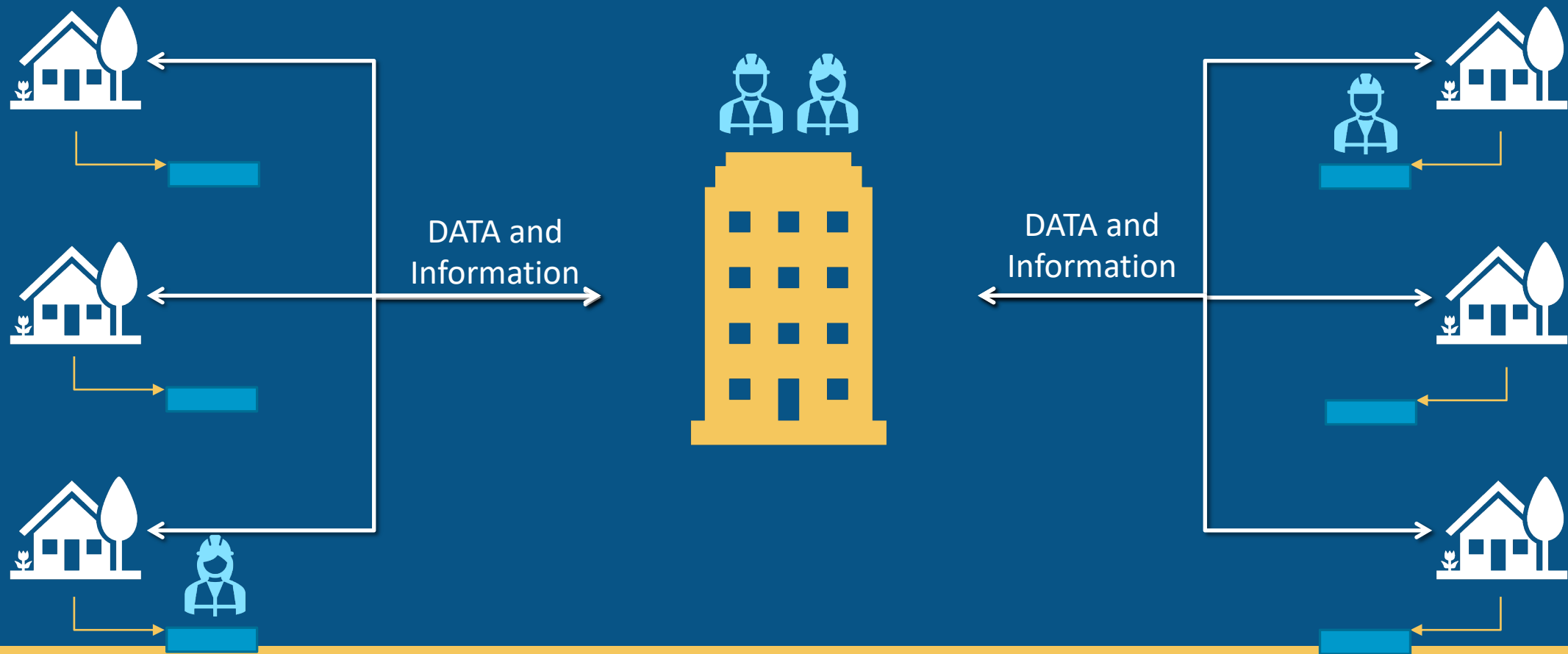
Infrastructure (*noun*)

the basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise.

Centralized Treatment Infrastructure



Decentralized Treatment Infrastructure

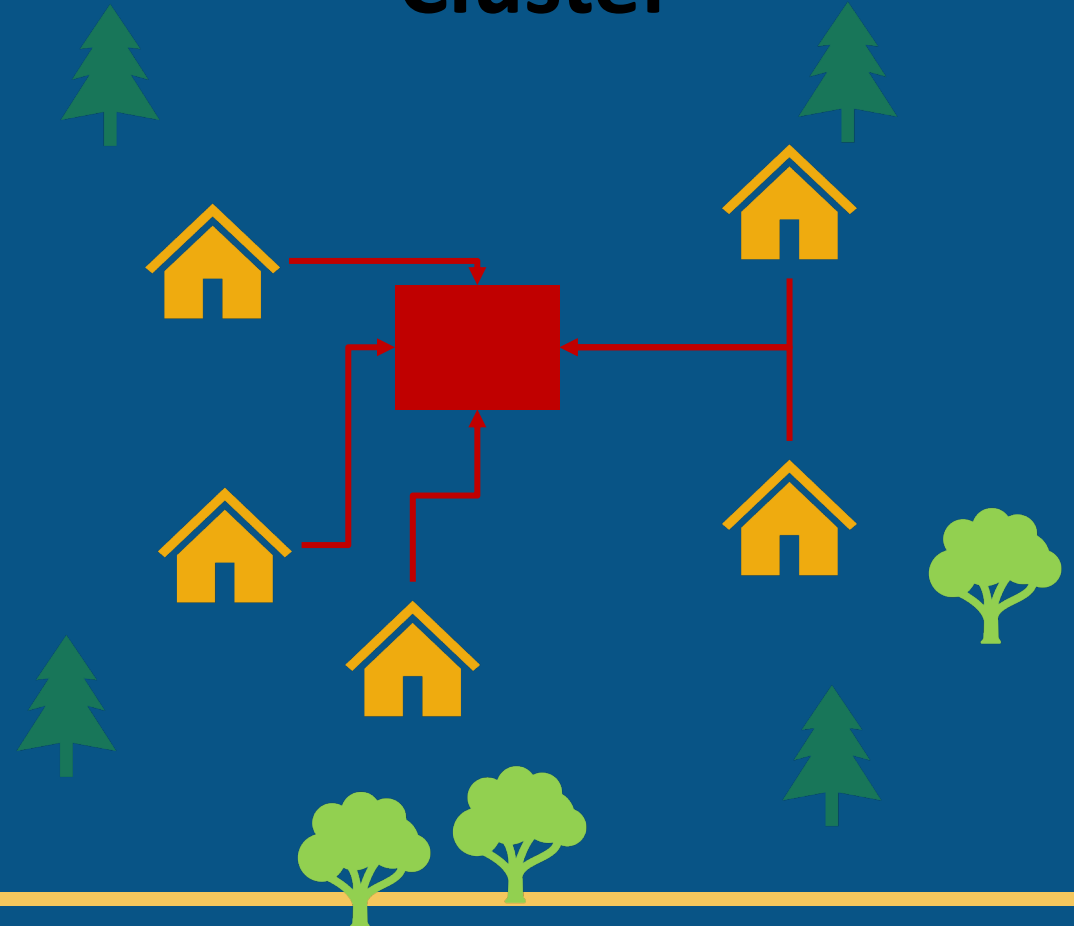


Types of Decentralized Infrastructure

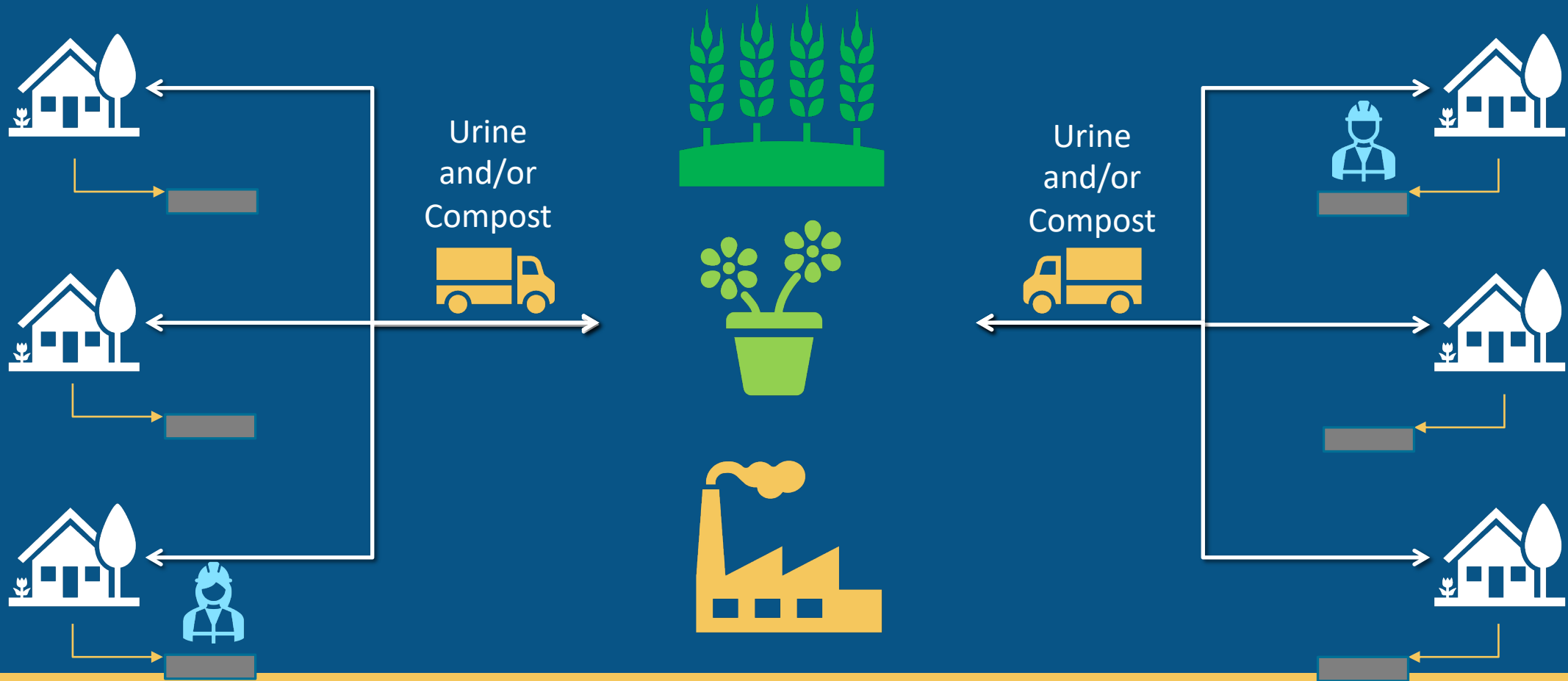
Onsite



Cluster

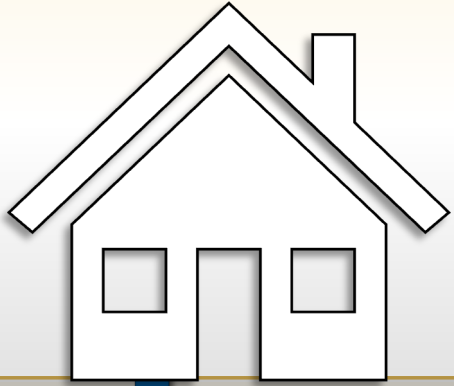


Ecological Sanitation Infrastructure



What Kinds of Decentralized
Technology are Available?

Disposition of Nutrients in a "Standard" System



Septic Tank
~25% Phos in Solids

Septic Tank Effluent
~75 mg/L N
~8-10 mg/L P

Soil Absorption Area

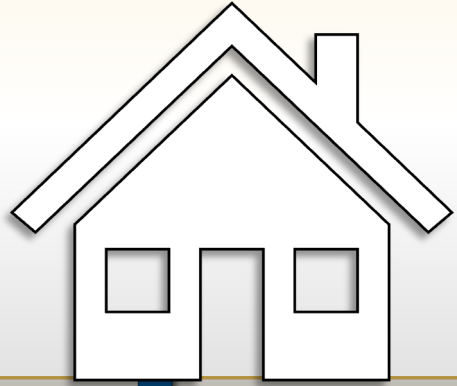
~35% Nitrogen Gas

~65% Nitrogen
~75% Phosphorus

Groundwater



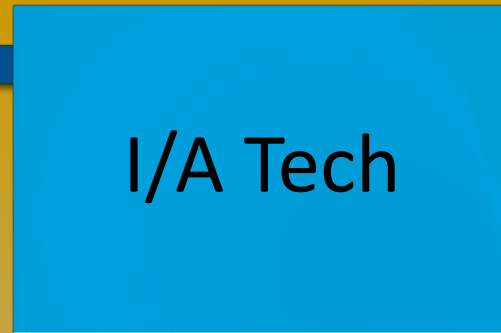
“Black Box” System for N Removal



~85-90% Nitrogen Gas

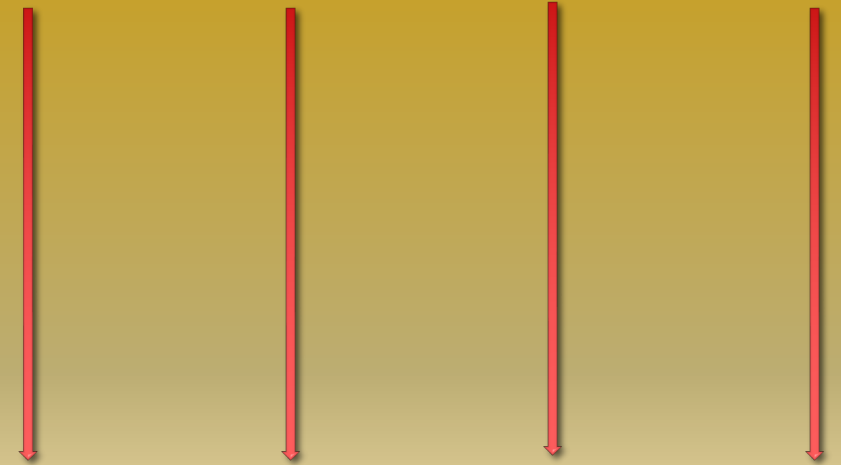


~5% Nitrogen Gas

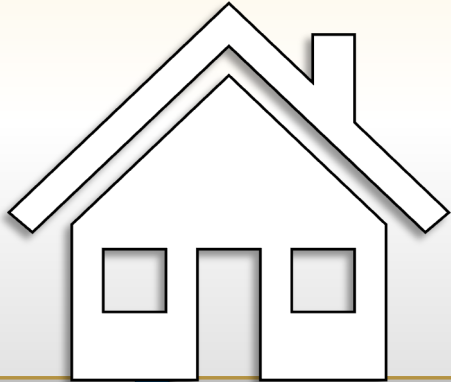


< 10% Nitrogen
~75% Phosphorus

Groundwater



“Layered” System for N Removal



Septic Tank
~25% Phos in Solids

Pump Chamber

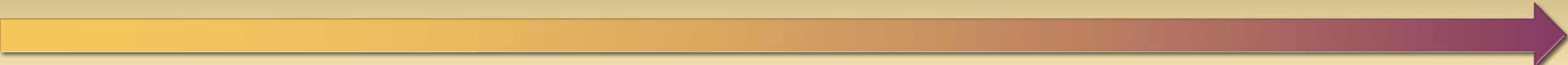
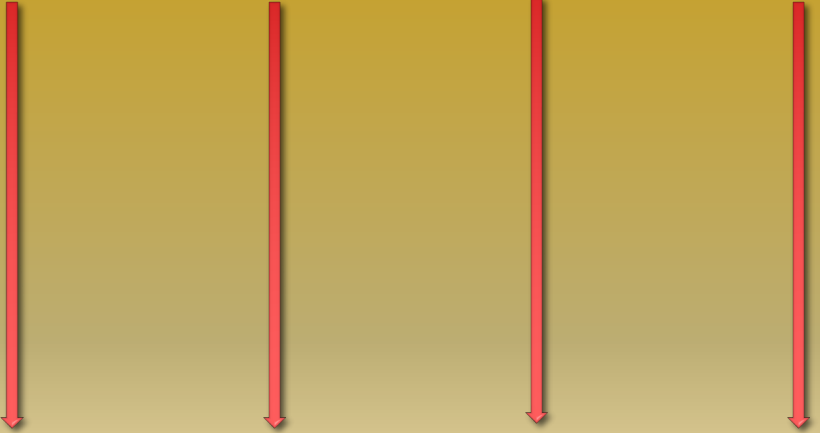
Nitrification Zone
Denitrification Zone



~85-90% Nitrogen Gas

<10% Nitrogen
~75% Phosphorus

Groundwater



Currently Best-Performing Technologies

Less than 10
mg/L TN

Nitroe by Kleantu

Nitrex by Lombardo Associates

Layer Cake “Nonproprietary Woodchip Systems” (Not all Designs)

Between 10
and 15 mg/L
TN

FujiClean

HydroAction

BioMicrobics MBBR

Others in
the mix

Advantex

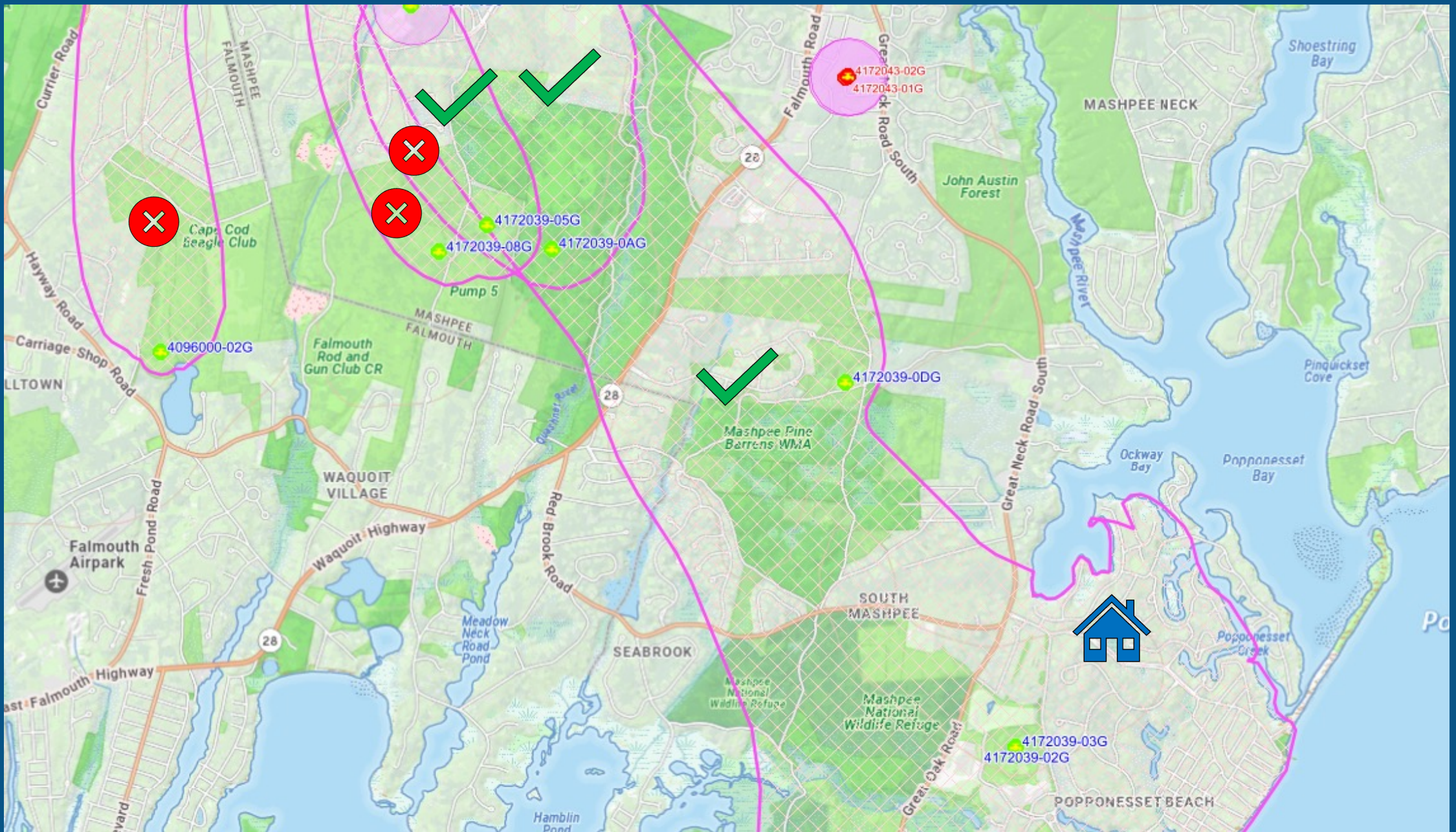
Nitrogen Credit Land




Credit Land and Zone II's

15.216: Aggregate Determinations of Flows and Nitrogen Loadings

- (2) To qualify as Nitrogen Credit Land, the land must:
- (a) be within the same Nitrogen Sensitive Area as the facility if the facility is in a Nitrogen Sensitive Area;
 - (b) be within the same subdivision in an area where the use of both on-site systems and drinking water wells are proposed to serve the facility;
 - (c) not have any manmade sources of nitrogen, including, but not limited to, wastewater discharges and nitrogen based fertilizer located thereon;
 - (d) not be used for raising, breeding or keeping of animals;
 - (e) be pervious;
 - (f) be outside of Zone As, Velocity Zones and Regulatory Floodways;
 - (g) not be covered by any surface water body including, but not limited to, a river, stream, lake, pond, or ocean;
 - (h) not be currently designated as nitrogen credit land; and
 - (i) meet the criteria set forth in the Department's Guidelines for Title 5 Aggregation of Flows and Nitrogen Loading.



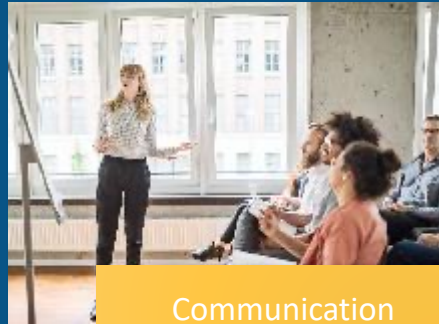
How do we Manage the Lifecycle of Decentralized Systems?



RME's and Lifecycle Management



Planning



Communication



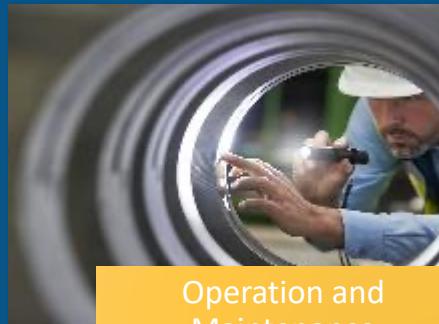
Technology and Research



Finance



Design and Construction



Operation and Maintenance



Monitoring and Compliance



Records and Reporting

acronyms that are not what we
are talking about







Responsible Management Entities

An organization or collection of organizations tasked with overseeing the cradle-to-grave lifecycle of decentralized wastewater treatment infrastructure



5-year project to develop and implement a

Regional RME Program

Regional Responsible Management Entity Primary Goals

Help towns
meet TMDL's

Reduce risk
to
homeowners

Cost
Effective

Financially
Self-
Sustainable

Maintain
Flexibility

How do we Pay for Decentralized Treatment Infrastructure?



Some possible funding routes

- Community Septic Management Program
- Bank Loans
- Public Subsidies
 - Tax credits
 - Loan forgiveness
 - Need-based grants

Barnstable County's Community Septic Management Loan Program (formerly CSMLP)



0% and 2% Interest Rate Eligibility

Income Qualifiers
and
Project Qualifiers

Income Qualifiers

Lowest interest rate goes to those who need more help.

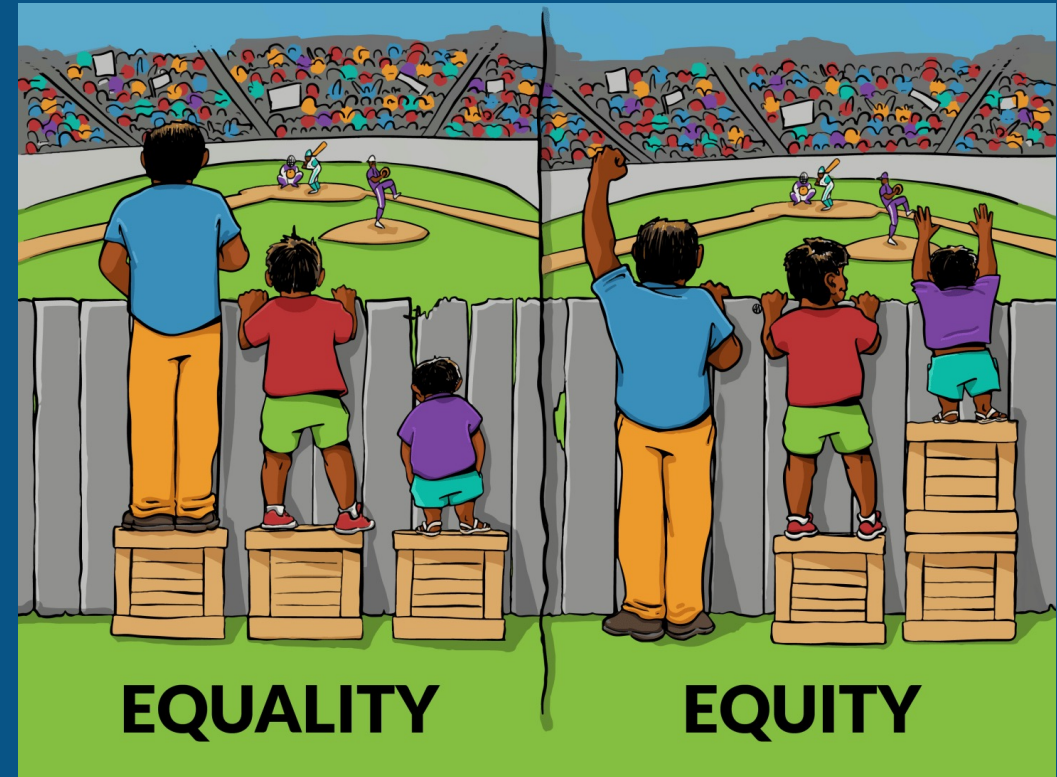
0% - 120% of AMI or less

2% - 120-180% of AMI

4% - 180% of AMI or higher

Image Credit:

Interaction Institute for Social Change | Artist: Angus Maguire.



0% and 2% Interest Project Qualifiers

Single Family Homes
Primary Residence

What projects are eligible for 0% or 2%?

Installation of a nutrient-reducing I/A technology as part of a watershed permit or other town-coordinated nutrient reduction program

Installation of a sewer connection

What projects are eligible for 4%?

Installation of an I/A technology for a reason other than as part of a watershed permit or other town-coordinated nutrient reduction program

Installation of a sewer connection

Installation of “standard” Title 5 System

Thank You!

MASSTC	Septic Utility Program	AquiFund
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