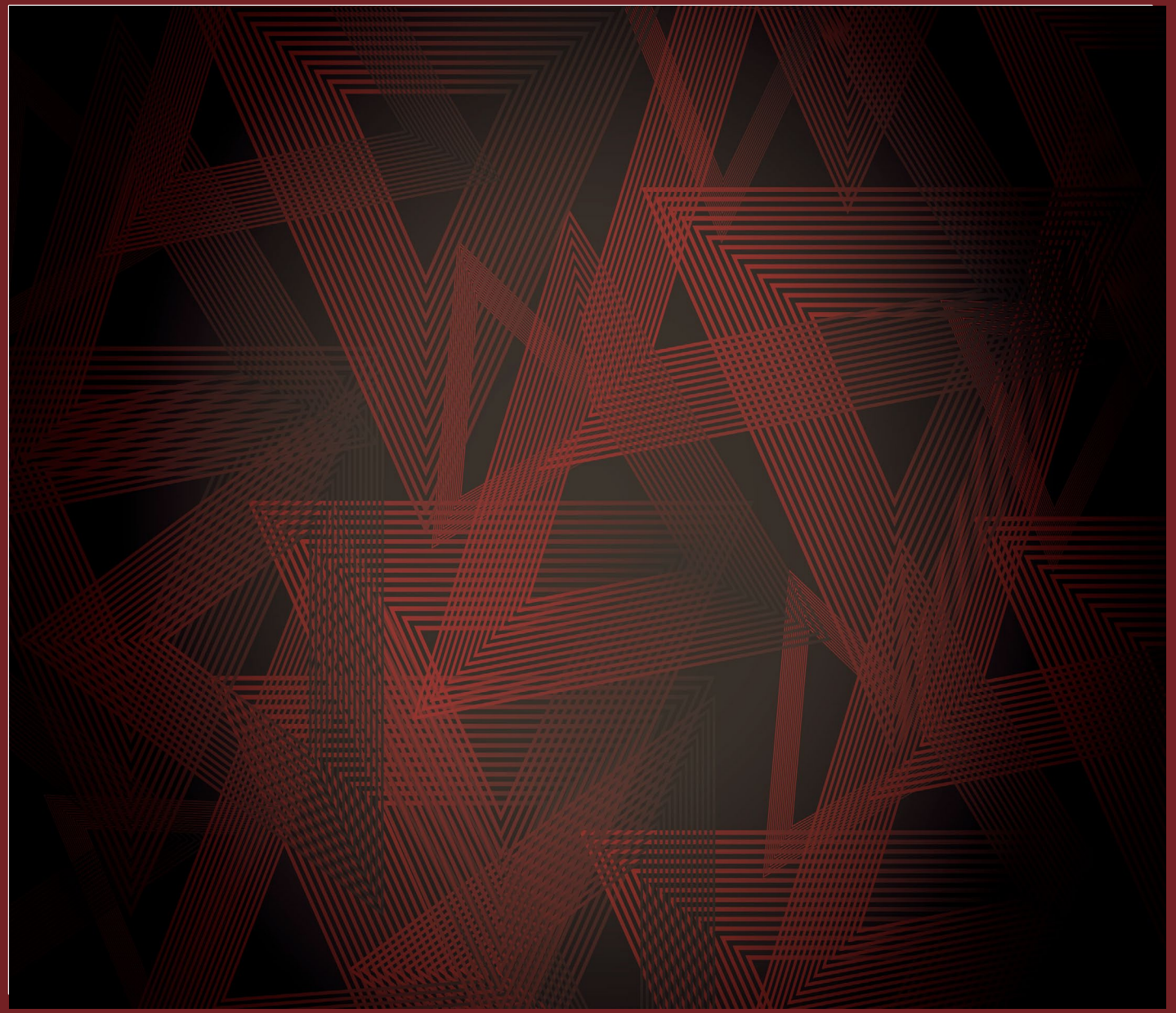


# UNDERSTANDING NITROGEN LOADING AND CREDIT LAND

*Claire A. Golden, MassDEP*

*2024 MEHA Title 5 Seminar*

*Taunton, MA*

*February 21, 2024*

# AGENDA

- Review of Nitrogen Sensitive Areas (NSAs)
- Issues to Review Regarding the Facility
- Using I/As and/or Credit Land to Address NSAs
- Issues to Keep in Mind Regarding Credit Land
- Upgrades in Areas Subject to NSAs
- Questions


This presentation represents the requirements of 310 CMR 15.000, Title 5 of the State Environmental Code, and is for educational and informational purposes only.  Please note that municipalities may have regulations that are more restrictive than Title 5.

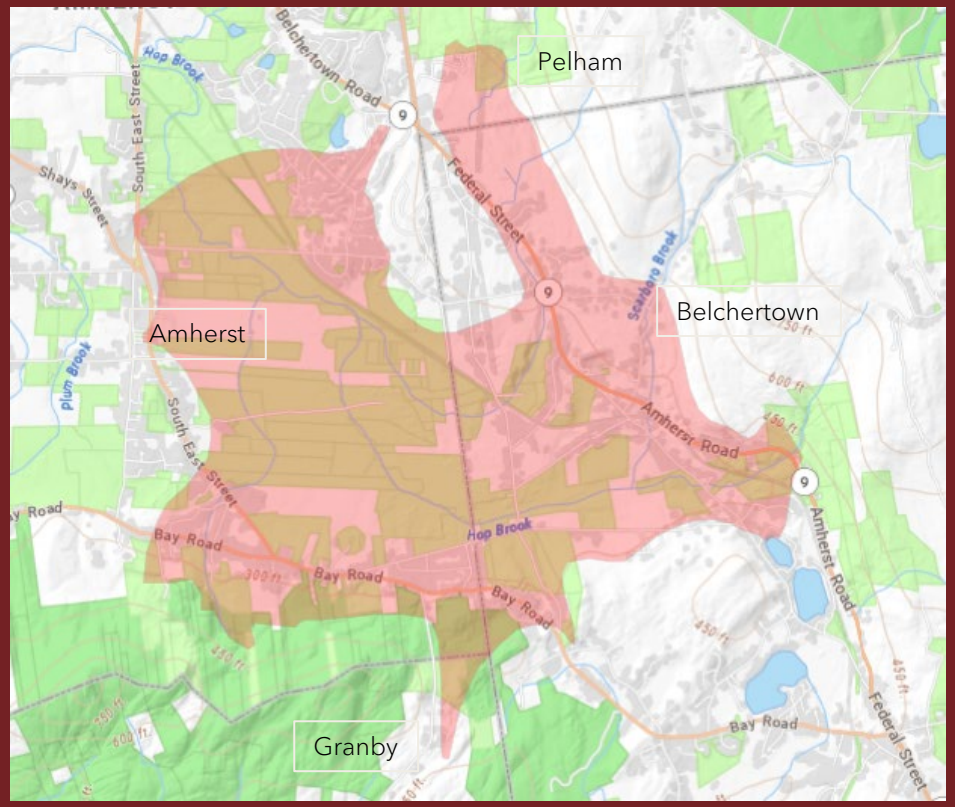
Any reference to a proprietary technology in the presentation or in answer to a question is solely for illustration and does not constitute an endorsement of or comment upon said technology by the presenter or MassDEP.

# REVIEW OF NITROGEN SENSITIVE AREAS(NSAs)

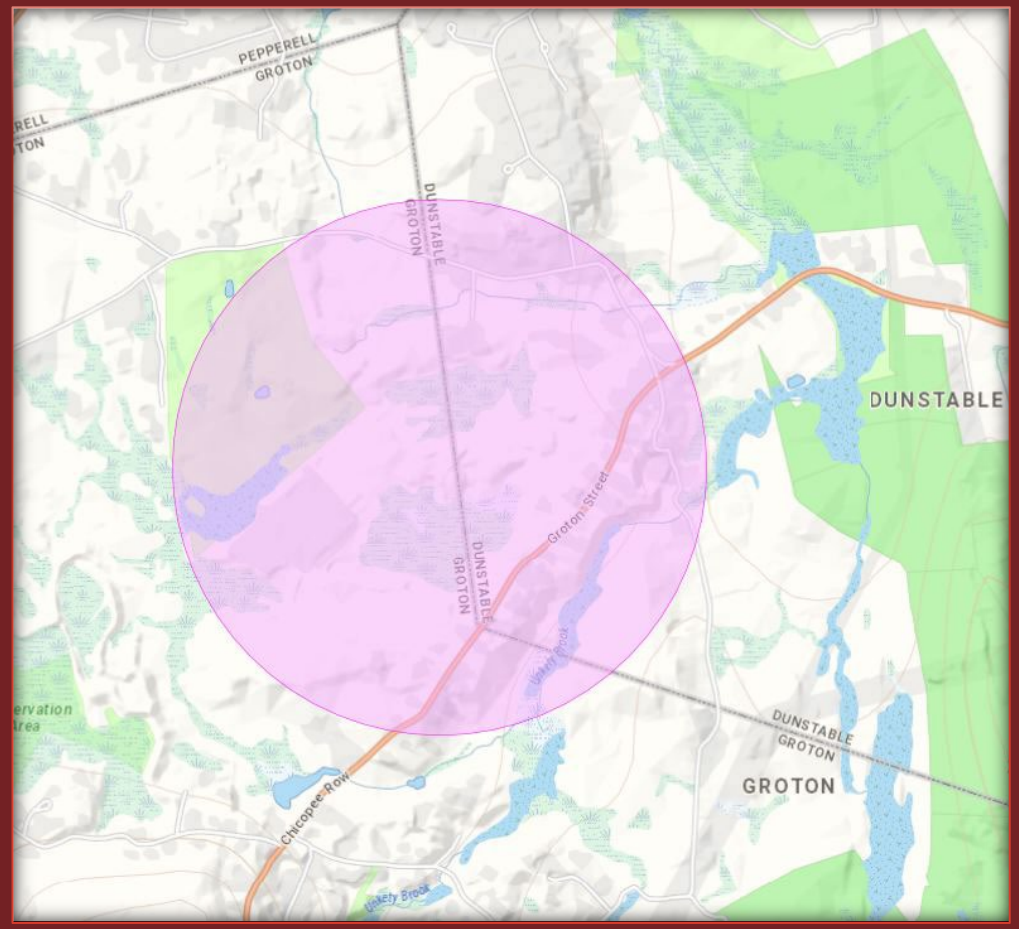
# NITROGEN SENSITIVE AREAS (310 CMR 15.214)

- Zone IIs
- Interim Wellhead Protection Areas (IWPAs)
- Areas served by on-site septic systems and private water supplies

# EXAMPLE OF A ZONE II




The area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can realistically be anticipated.




# EXAMPLE OF AN IWPA

Circle around PWS with a radius calculated by the approved pumping rate of the well.

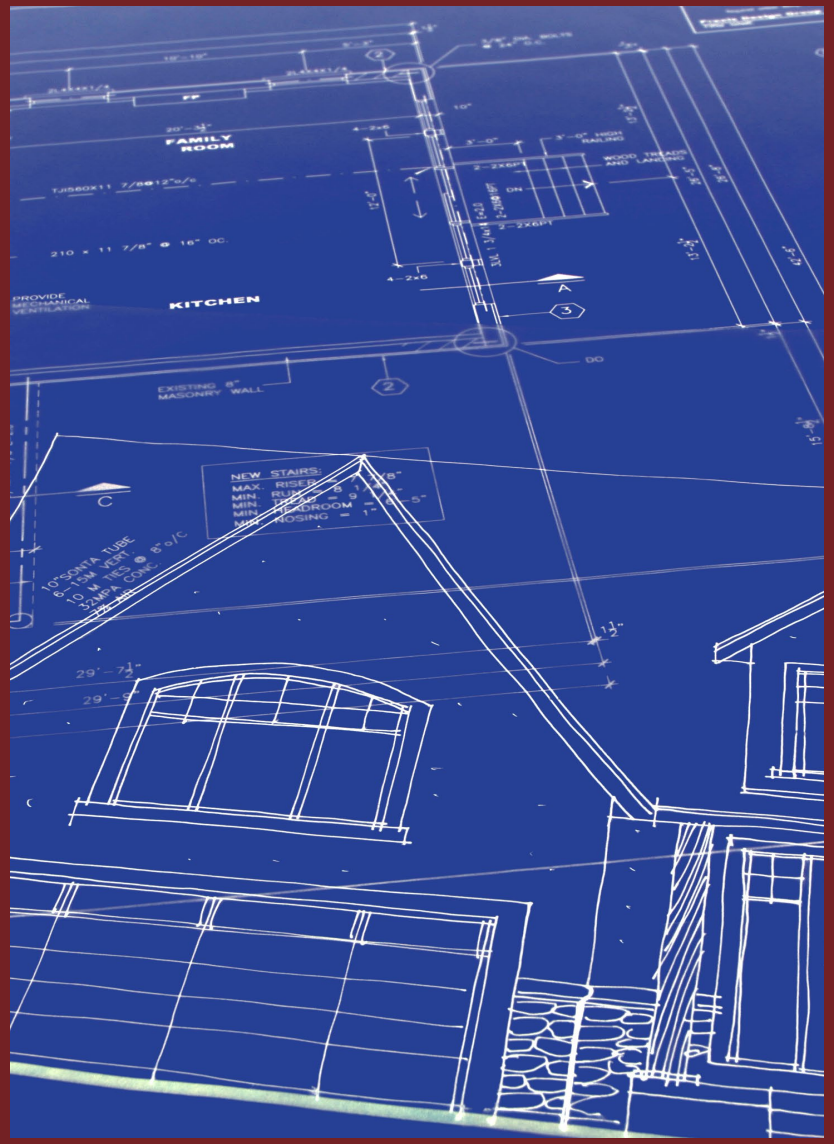
Essentially the default protective radius around the PWS if a Zone II has not yet been delineated.

# NITROGEN LOADING LIMITATIONS
## ZONE II, IWPA AND PRIVATE WELL AREAS ONLY

No facility owner for New Construction in Nitrogen Sensitive Areas designated in 310 CMR 15.214(1)(a) shall install a system designed to receive or allow a system to receive more than 440 gallons of design flow per day per acre except as set forth in 310 CMR 15.202 (use of recirculating sand filters), 310 CMR 15.216 (aggregate flows) or 310 CMR 15.217 (enhanced nitrogen removal).

Remember: an acre in Title 5 = 40,000 sf, not 43,560 sf.
Therefore, an acre can accommodate a 4-bedroom dwelling.

# ISSUES TO REVIEW REGARDING THE FACILITY




# DOUBLE CHECK THE FOLLOWING:

Does the room count make sense?

What about the basement? Is it finished or planned to be? If so, is it being counted?

Is the attic finished? If so, is it being counted as a room(s)?

If there are more rooms that qualify as bedrooms, is the BOH comfortable with deed restrictions, if not, they don't have to approve.

There should be clear communications with the developer, owner, etc. from the beginning so there are no misunderstandings down the line.

# USING I/AS AND/OR CREDIT LAND TO ADDRESS NSAs

# 310 CMR 15.217

## Nitrogen-Reducing I/A Technologies

- Must be MassDEP-approved
- Must be approved under
  - Piloting Use Approval
  - Provisional Use Approval
  - General Use Approval
- Must meet all requirements of the appropriate approval
  - Facility type limitation (residential, multi-residential, non-residential)
  - Design flow limitation

# NITROGEN LOADING ALLOWED WITH USE OF I/AS

Depending on the technology, the type of approval, the type of facility and the design flow, permittable loading may be either:

- 550 gpd/acre
- 660 gpd/acre

- Must be in the same NSA
- Must be owned or controlled by facility needing it
- Cannot be subject to any man-made nitrogen loading
- Cannot be used for raising/ breeding/ keeping animals
- Be pervious
- Be outside Zone As, V-Zones and Regulatory Floodways
- Cannot be land under water
- Cannot be already designated as nitrogen credit land
- Meet criteria set forth in *Guidelines for Title 5 Aggregation of Flows and Nitrogen Loading*

# 310 CMR 15.216

## Use of Credit Land in Zone IIs and IWPAs

- Must be located within the subdivision if applicable
- If < 2,000 gpd, must be adjacent to the facility land
- ≥ 2,000 gpd, must be adjacent and downgradient
- Must be owned or controlled by facility needing it
- Cannot be subject to any man-made nitrogen loading
- Cannot be used for raising/breeding/keeping animals
- Be pervious
- Be outside Zone As, V-Zones and Regulatory Floodways
- Cannot be land under water
- Cannot be already designated as nitrogen credit land
- Meet criteria set forth in *Guidelines for Title 5 Aggregation of Flows and Nitrogen Loading*

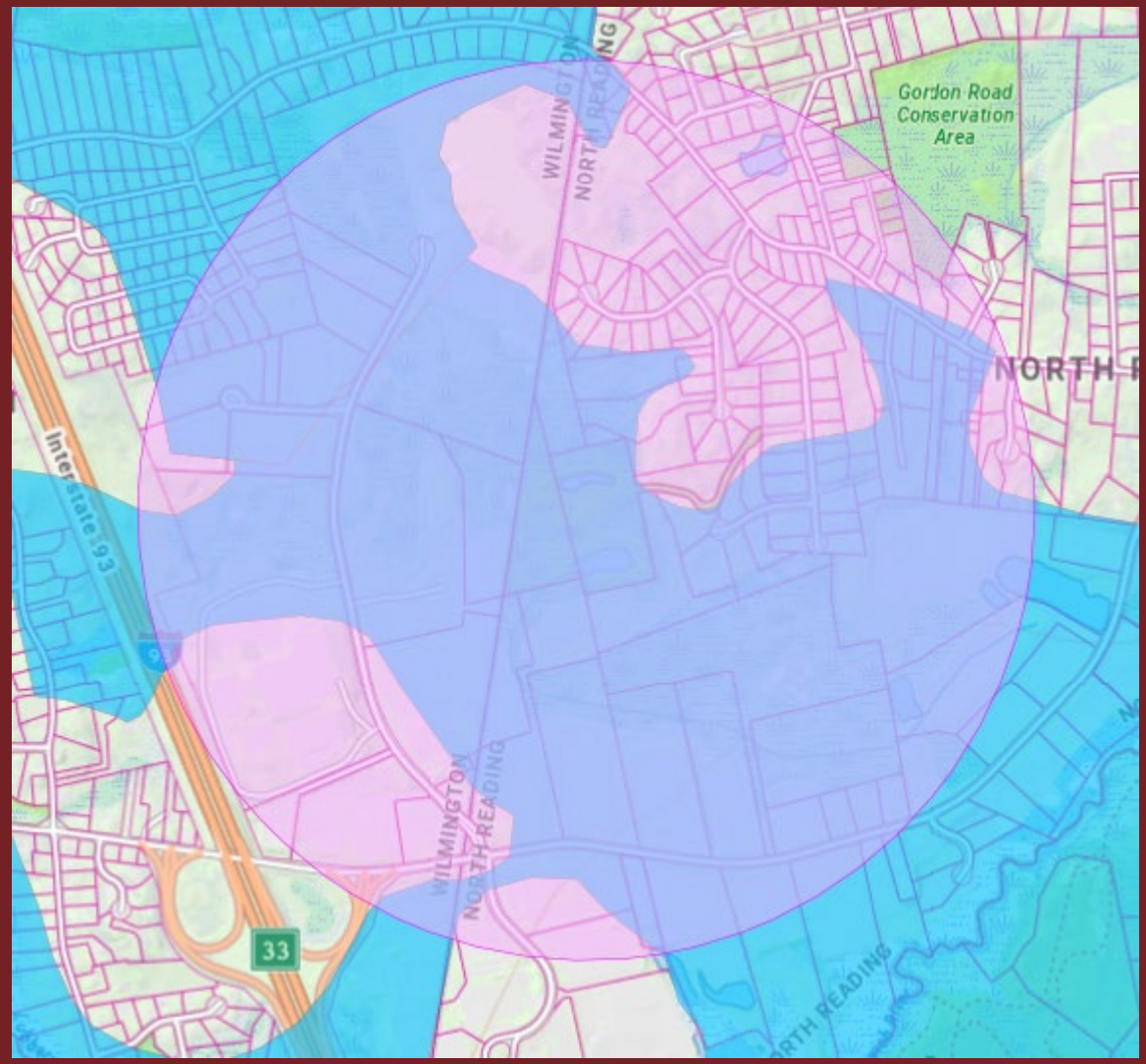
# 310 CMR 15.216

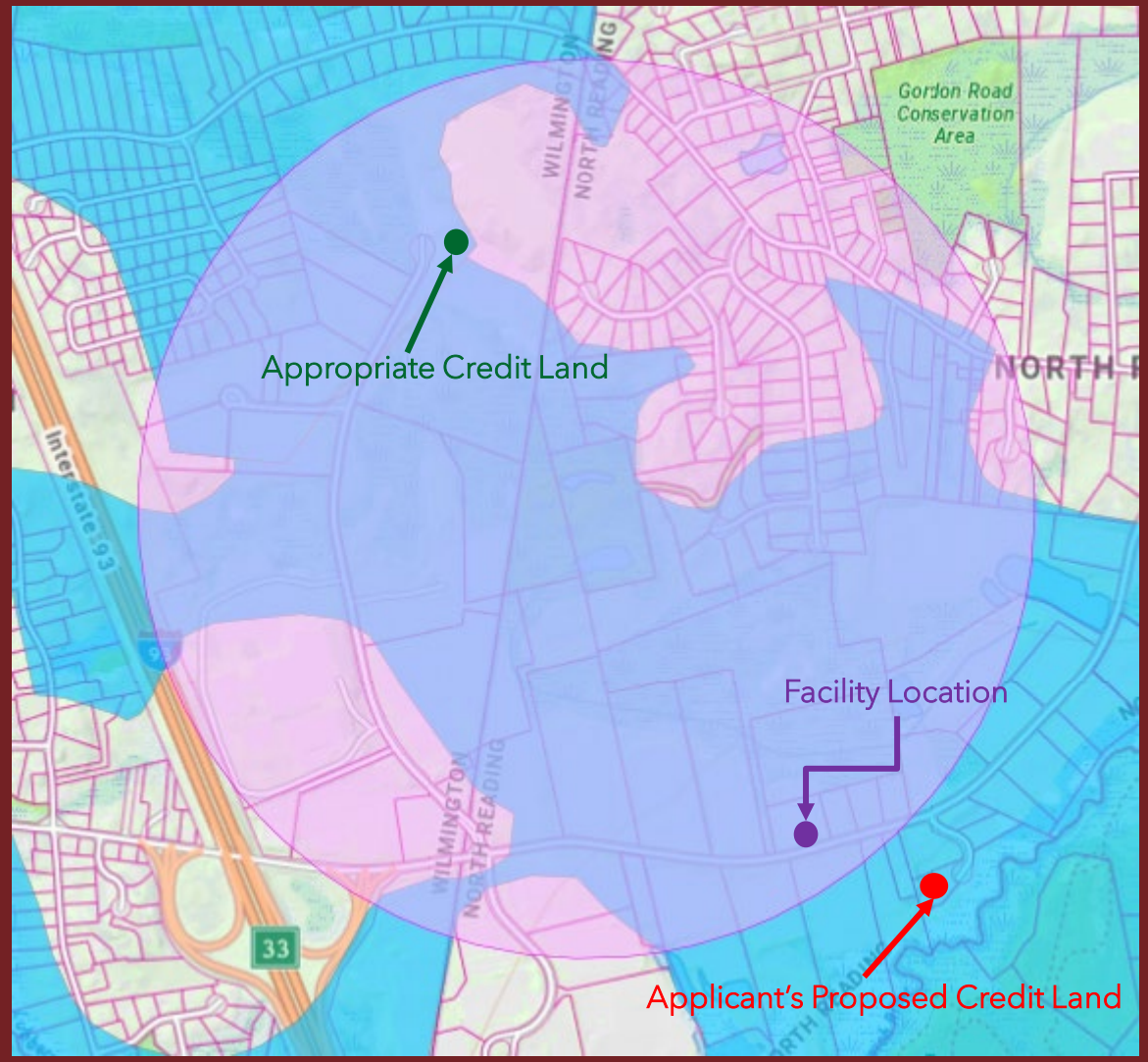
## Use of Credit Land in Private Well Areas


EXAMPLES

# What to do in this case?

- Facility needing credit land is located in multiple NSAs.
- The NSAs also straddle two towns.




Gordon Road
Conservation
Area
Appropriate Credit Land
Interstate 93
Facility Location
33
Applicant's Proposed Credit Land

# EQUATIONS FOR NITROGEN LOADING CALCULATIONS WITH AND WITHOUT ALTERNATIVE TECHNOLOGIES

$$Loading\ Rate = \frac{Design\ Flow}{Area}$$

*Where:*

*Design flow of the facility (gpd)*

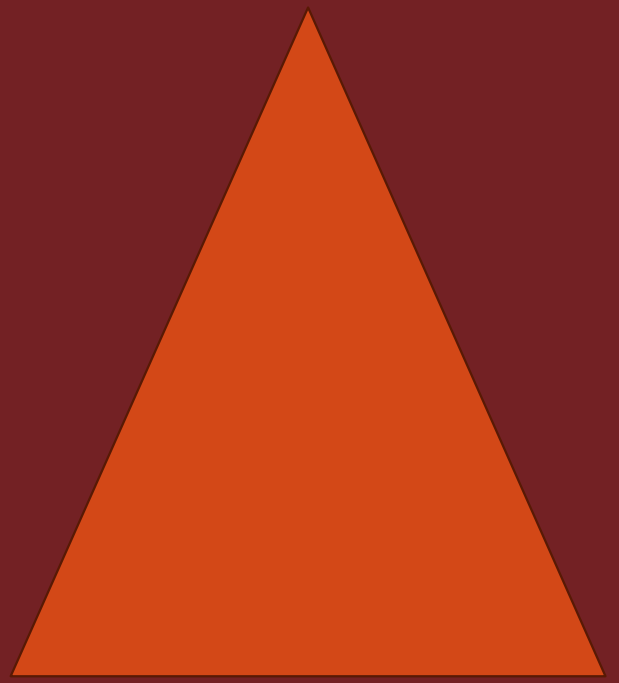
*Area = Area of the facility land and any credit land (acre*)*

* 1 acre = 40,000 sf (not 43,560 sf)

$$LR = \frac{Q_F}{(AF + ACL)/40{,}000}$$

*Where*

$Q_F$ *Design flow of the facility (gpd)*
$A_F$ *Area of the facility land (sq feet)*
$A_{CL}$ *Area of the credit land (sq feet)*
$LR$ *Loading rate (gpd/acre)*



*and by rearranging these terms…..*

$$LR = \frac{40{,}000 \cdot QF}{A_F + ACL}$$

$$LR = \frac{40{,}000 \cdot Q_F}{A_F + A_{CL}}$$

$$A_{CL} = \frac{40{,}000 \cdot Q_F}{LR} - A_F$$

$$Q_F = \frac{A_F + A_{CL}}{40{,}000} \cdot LR$$

*Where:*

| | |
|---|---|
| $Q_F$ | *Design flow of the facility (gpd)* |
| $A_F$ | *Area of the facility land (sq feet)* |
| $A_{CL}$ | *Area of the credit land (sq feet)* |
| $LR$ | *Loading rate (gpd/acre)* |

# EXAMPLE NO. 1

Vacant lot in IWPA

21,000 sf lot

Proposed 3 bedroom house

Will an I/A work or is credit land needed too?

$$LR = \frac{40{,}000 \cdot Q_F}{A_F + A_{CL}}$$

$$= \frac{40{,}000 \cdot 330}{21{,}000 + 0}$$

$$= 628 \text{ gpd/acre}$$

Use of an I/A approved for 660 gpd/acre would be sufficient to permit this expansion without credit land.

# EXAMPLE NO. 2 – ITERATION #1

Existing lot in Zone II

36,000 sf lot

Existing 4 bedroom home

2 additional bedrooms are proposed

This is new construction!

Will an I/A work or is credit land needed too?

$$LR = \frac{40{,}000 \cdot Q_F}{A_F + A_{CL}}$$

$$= \frac{40{,}000 \cdot 660}{36{,}000 + 0}$$

$$= 733 \text{ gpd/acre}$$

Use of an I/A approved for nitrogen reduction will not work alone since it exceeds 660 gpd/ac!

# EXAMPLE NO. 2 – ITERATION #2

Existing lot in Zone II

36,000 sf lot

Existing 4 bedroom home

2 additional bedrooms are proposed

This is new construction!

Plan on an I/A approved for 550 gpd/acre

Is this sufficient?

$$A_{CL} = \frac{40{,}000 \cdot Q_F}{LR} - A_F$$

$$= \frac{40{,}000 \cdot 660}{550} - 36{,}000$$

$$= 12{,}000\ sf$$

No.
Credit land is required.
What if a 660 gpd/acre I/A is used?

# EXAMPLE NO. 2 – ITERATION #3

Existing lot in Zone II

36,000 sf lot

Existing 4 bedroom home

2 additional bedrooms are proposed

This is new construction!

Plan on an I/A approved for 660 gpd/acre

Is this sufficient?

$$A_{CL} = \frac{40{,}000 \cdot Q_F}{LR} - A_F$$

$$= \frac{40{,}000 \cdot 660}{660} - 36{,}000$$

$$= 4{,}000\ sf$$

No, it is not suffifient.
Credit land is still required but it is substantially less.

# ISSUES TO KEEP IN MIND REGARDING CREDIT LAND

# A FEW REMINDERS

- Does the land meets all the requirements as laid out in the MassDEP Guidelines?
- Do/does the property owner(s) granting the easement of credit land understands all responsibilities and restrictions and that the easement travels with the land?
- Are all legal documents, easements and restrictions filed at the registry of deeds?
- If the credit land is in another own, you may want to coordinate with that BOH to make sure their files reflect the connection so there is no misunderstanding.
- Remember that the restrictions and easements may remain in place for decades through a number of owners.

# UPGRADES IN AREAS SUBJECT TO NITROGEN LOADING LIMITATIONS

# UPGRADES AND NITROGEN

- If an existing septic system fails and is in an area subject to nitrogen loading, the loading across the property should be calculated.
- If the loading exceeds 440 gpd/acre, reference should be made to MassDEP's policy, *Title 5 Program's Guidance on System Upgrades in Areas Subject to Nitrogen Loading Limitations*.
- Title 5, under Maximum Feasible Compliance (MFC) (310 CMR 15.404) references the goal of Title 5 always being full compliance
- MFC may include use of a nitrogen-reducing I/A technology.
- If use of a I/A technology for remedial use was also need because of site constraints, a technology approved for both remedial use and nitrogen removal could be used.

https://www.mass.gov/doc/nitrogen-loading-limitations-system-upgrades-in-sensitive-areas-policy-brpdwmpep-p99-5/download


Any
Questions

# MassDEP REGIONAL CONTACTS

| | | | |
|---|---|---|---|
| CERO | Alex White | alex.white@mass.gov | 857-276-7462 |
| NERO | Claire Golden | claire.golden@mass.gov | 617-997-8874 |
| | Wastewater Helpline | | 978-694-3215 |
| SERO | Drew Osei (Cape/Islands) | andrew.osei@mass.gov | 857-383-7042 |
| | Brett Rowe (SE MA) | brett.rowe@mass.gov | 617-519-8604 |
| WERO | Matt Sokop | matthew.sokop@mass.gov | 617-894-4738 |

# MassDEP TITLE 5 PROGRAM AND I/A BOSTON CONTACTS

| | | |
|---|---|---|
| Marybeth Chubb | marybeth.chubb@mass.gov | 617-418-9719 |
| Harshraj Thakor | harshraj.thakor@mass.gov | 617-447-4557 |