

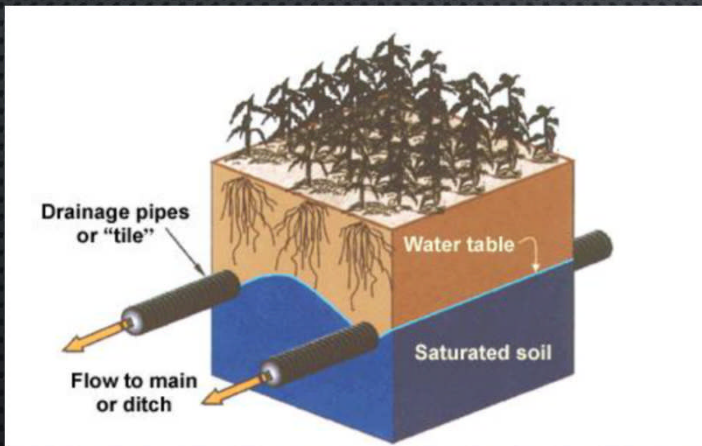
# AGRICULTURAL SUBSURFACE DRAINAGE FINAL REPORT

JOINT HOUSE AND SENATE AG COMMITTEES

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3/15/17

# SCIENTIFIC REVIEW



- PREFERENTIAL FLOW
- PRECIPITATION AND CLIMATE
- CROPPING SYSTEMS AND TILLAGE
- PHOSPHORUS SOURCE, RATE, PLACEMENT AND TIMING
- SOIL TEST PHOSPHORUS LEVELS
- DRAINAGE DEPTH AND SPACING

# CURRENT LOCAL RESEARCH

- UVM REVISIONS TO P INDEX-590 NMP STANDARD
- DRAINAGE CONTROL STRUCTURES
- PHOSPHORUS REMOVAL SYSTEMS WITH MEDIA
- CONSTRUCTED WETLANDS
- TILE MONITORING
- SURFACE VERSUS SUBSURFACE COMPARISONS



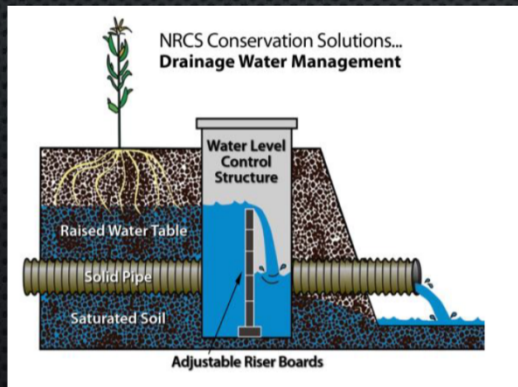
# KNOWLEDGE GAPS



- REGULATORY FRAMEWORK IN EXISTENCE
- INSTALLATIONS DESIGNS
- MANAGEMENT AROUND TILE DRAIN SYSTEMS
- EVALUATING THE IMPACTS OF TILE AND THE BENEFITS OF CONSERVATION PRACTICES

# RECOMMENDATIONS FROM LITERATURE REVIEW

- ASSESSMENT OF TILE DRAINAGE SYSTEMS IN LAKE CHAMPLAIN BASIN
- RESEARCH NEEDS



- Estimation of the extent of tile in LCB
- Quantification of P conc. And loads in drain flows
- Comparison of p conc. And load in drain flow with surface runoff
- Evaluation of factors controlling p transmission in tile drainage
- Evaluation of the effectiveness of management practice to reduce P losses in tile drain flow

# RECOMMENDATIONS FROM ADVISORY GROUP



“Education, improved NMPs, maintaining status quo, developing site-specific risk assessment methodologies and BMPs for design and installations were highest ranked on feasibility.”

Management Options: Feasibility Status	1 Highly Feasible	2 Feasible	3 Not Feasible	Total	Weighted Average
Status Quo	53% 8	20% 3	27% 4	15	1.7
Inventory of Tile Drainage	27% 4	27% 4	47% 7	15	2.2
Site-Specific Risk Assessment Methodology	27% 4	73% 11	0% 0	15	1.7
Nutrient Management Plans (Additional Considerations to Account for Tile Drainage)	60% 9	40% 6	0% 0	15	1.4
Best Practices in Tile Drain Design and Installation	27% 4	67% 10	7% 1	15	1.8
Treatment Technologies	13% 2	67% 10	20% 3	15	2.1
Permitting of Tile Drainage Installations	14% 2	64% 9	21% 3	14	2.1
Licensing of Installers	53% 8	33% 5	13% 2	15	1.6
Education / Field Management Options	71% 10	29% 4	0% 0	14	1.3
Moratoriums	7% 1	33% 5	60% 9	15	2.5
Complete Ban	0% 0	7% 1	93% 14	15	2.9

**Table 1. Summary of Tile Drain Advisory Group Ranking of Tile Drainage Options Based on Feasibility Status**

# RECOMMENDATIONS FROM ADVISORY GROUP



BMPs for design and installation, education, improved NMPs, site-specific risk assessment methodology, and treatment technologies all ranked closely for options likely to impact water quality.

Management Options: Impact Status	1 Highly Impact	2 Neutral	3 No Impact	Total	Weighted Average
Status Quo	7% 1	29% 4	64% 9	14	2.6
Inventory of Tile Drainage	21% 3	21% 3	57% 8	14	2.4
Site-Specific Risk Assessment Methodology	53% 8	40% 6	7% 1	15	1.5
Nutrient Management Plans (Additional Considerations to Account for Tile Drainage)	60% 9	33% 5	7% 1	15	1.5
Best Practices in Tile Drain Design and Installation	73% 11	20% 3	7% 1	15	1.3
Treatment Technologies	36% 5	64% 9	0% 0	14	1.6
Permitting of Tile Drainage Installations	13% 2	47% 7	40% 6	15	2.3
Licensing of Installers	40% 6	40% 6	20% 3	15	1.8
Education / Field Management Options	57% 8	43% 6	0% 0	14	1.4
Moratoriums	14% 2	43% 6	43% 6	14	2.3
Complete Ban	13% 2	27% 4	60% 9	15	2.5

**Table 2. Summary of Tile Drain Advisory Group Ranking of Tile Drainage Options Based on Impact Status**

# RECOMMENDATIONS FROM ADVISORY GROUP

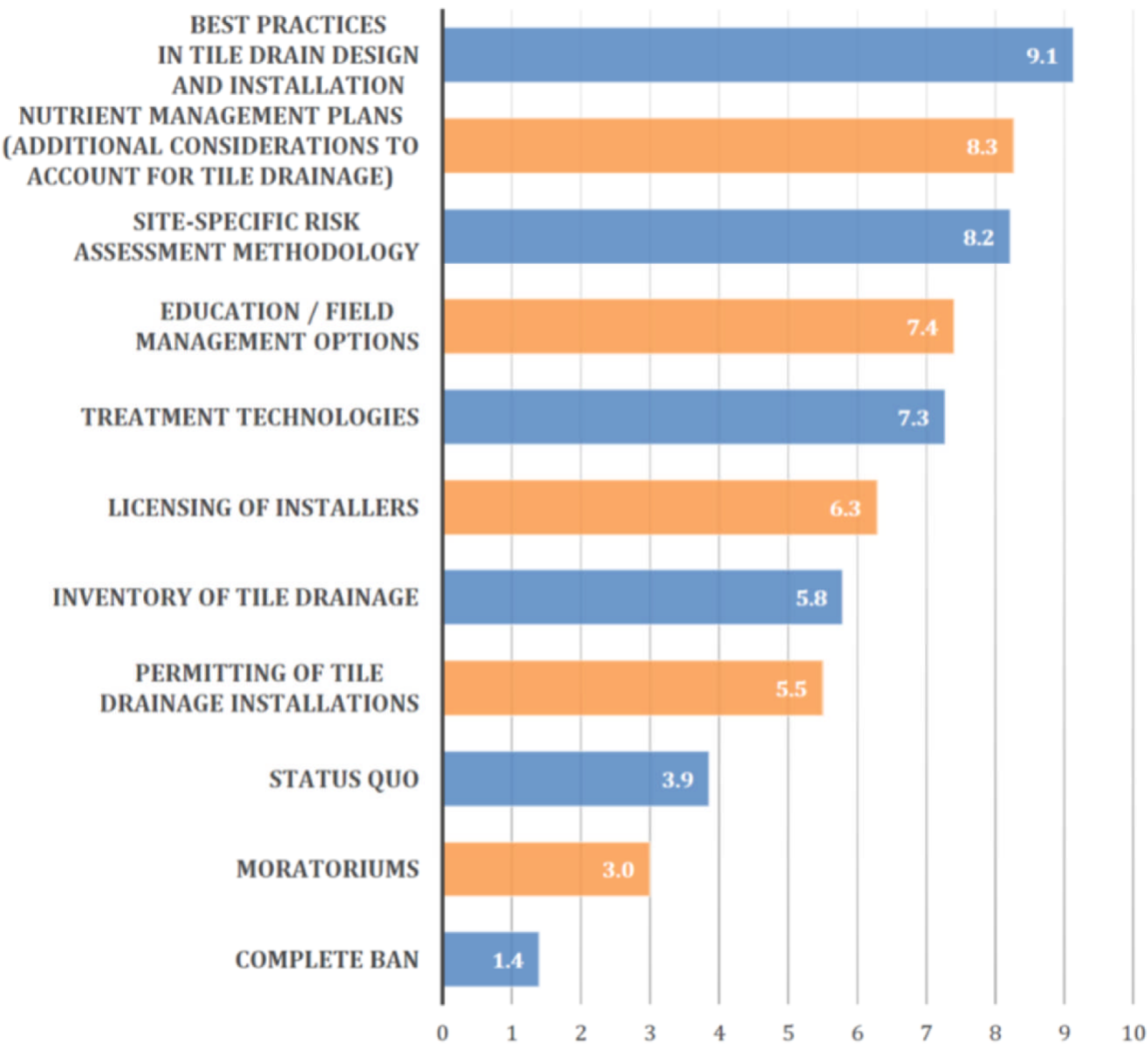


Table 3. Summary of Tile Drain Advisory Group Overall Rankings for Preferred Tile Management Options



# JOINT AGENCY RECOMMENDATIONS

## EXTENSIVE EDUCATION AND TRAINING FOR FARMERS

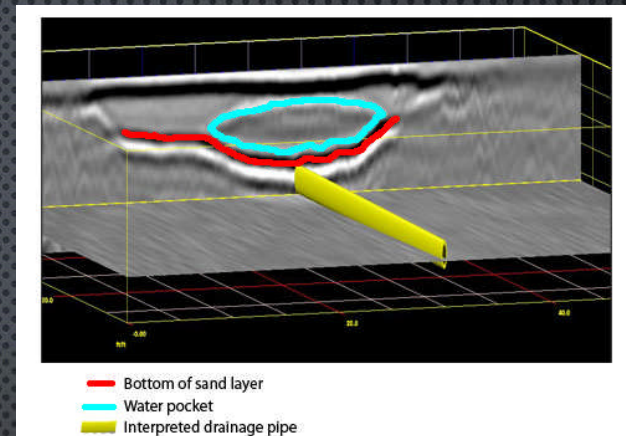
- *RAP EDUCATION FOCUSED ON TILE*
- *WORKSHOPS PRIOR TO INSTALLATION (REQUIRES AUTHORITY)*
- *COVER WATER QUALITY, SCIENCE, TECHNOLOGY, AND LEGAL ISSUES*



## STRONG IMPLEMENTATION OF THE RAPS ON TILE DRAINED FIELDS

- *FIELDS ABOVE 20PPM NEED REDUCTION STRATEGIES OUTLINED IN NMPS AND MORE FOCUS ON IMPLEMENTATION ON TILED FIELDS DURING INSPECTIONS*
- *FLOODPLAIN FIELDS WITH TILE WILL WEIGH HEAVILY AGAINST AN EXEMPTION*
- *IMPLEMENT THE REVISED P INDEX UNDER NMP STANDARDS*
- *INCREASED BUFFERS ALLOW SPACE FOR TECHNOLOGY*

# JOINT AGENCY RECOMMENDATIONS



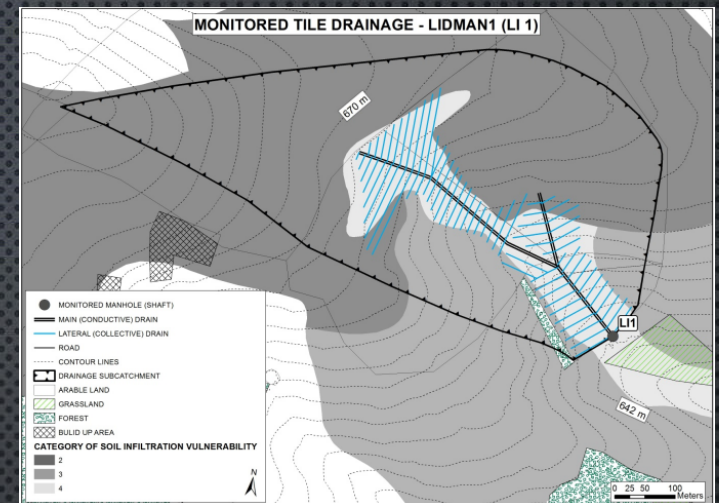
## ESTABLISH A FARMER WORKGROUP TO DEVELOP SHORT AND LONG-TERM EFFORTS FOR TILE DRAIN MANAGEMENT

- RAP DEVELOPMENT COMMITTEE
  - FWA, CVFC, CRFWA, FB, RV, AND VDPA

## SUPPORT THOROUGH EVALUATION OF THE EXTENT OF CURRENTLY INSTALLED TILE DRAINS

- DENSITY
- NUMBER OF OUTLETS (PRIORITIZE BMPs)
- MAPPING (THREE TIERS FROM DEC LIT REVIEW)

# JOINT AGENCY RECOMMENDATIONS



## NOTIFICATION OF TILE DRAIN INSTALLATIONS

- INTERIM PROCESS TO UNDERSTAND THE LOCATION, DEPTH AND SPACING OF NEW INSTALLATIONS
- EDUCATION ABOUT TECHNOLOGIES
- FALL 2017

## ADDITIONAL RESEARCH

- FIELD PRACTICES
- END OF TILE TREATMENTS
- SURFACE VS TILE LOSS COMPARISON
- TECHNOLOGIES TO SUPPORT FUTURE EFFORTS

# JOINT AGENCY RECOMMENDATIONS



## INCENTIVES TO ENCOURAGE ALTERNATIVES TO TILE

- EASEMENTS TO REQUIRE CONSERVATION PRACTICES
- EASEMENTS THAT LIMIT INSTALLATION WITH INCENTIVE PAYMENTS
- SHORT TERM AGREEMENTS TO LIMIT INSTALLATION

## OVERALL SUMMARY

- WORK WITH FARMER WORKGROUP
- FORWARD TO TILE DRAIN ADVISORY GROUP
- REVISE RAPS IN 2022

# QUESTIONS OR COMMENTS ABOUT PROCESS OR RECOMMENDATIONS

