R.A. Smith National

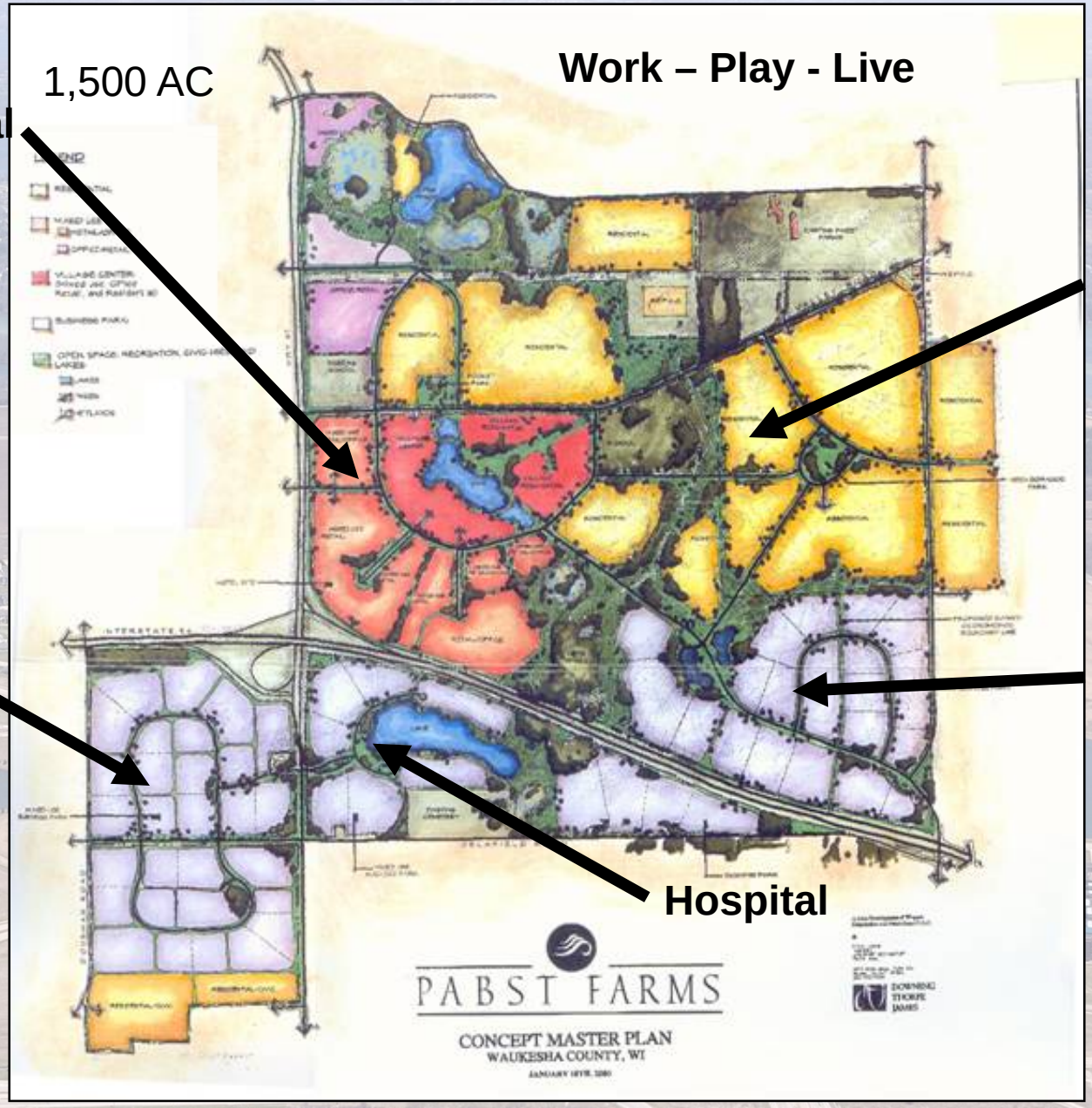
Stormwater Infiltration at Pabst Farms: a 15-year Retrospective

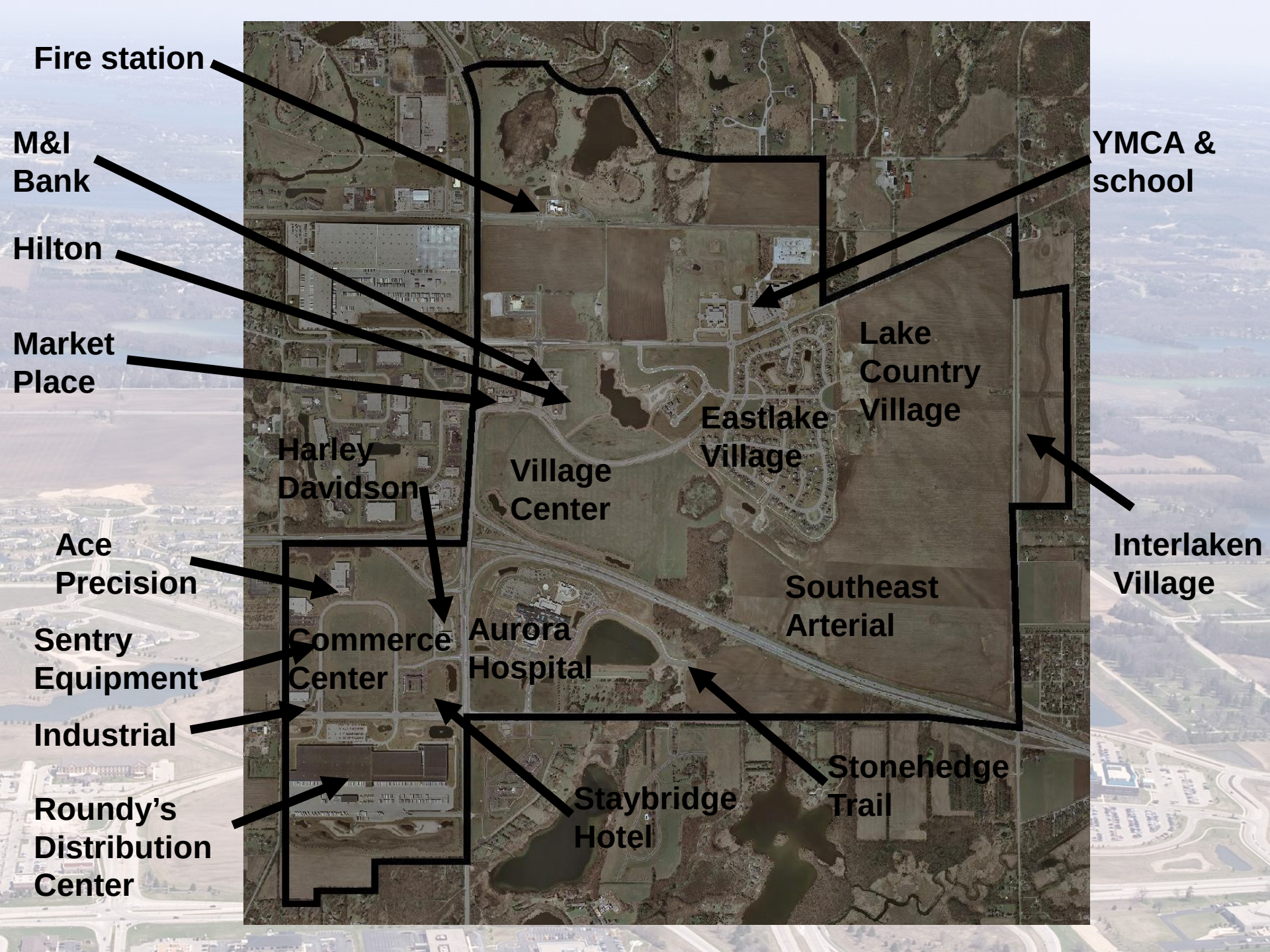
PABST FARMS

Paul McIlheran, P.E., CPSWQ

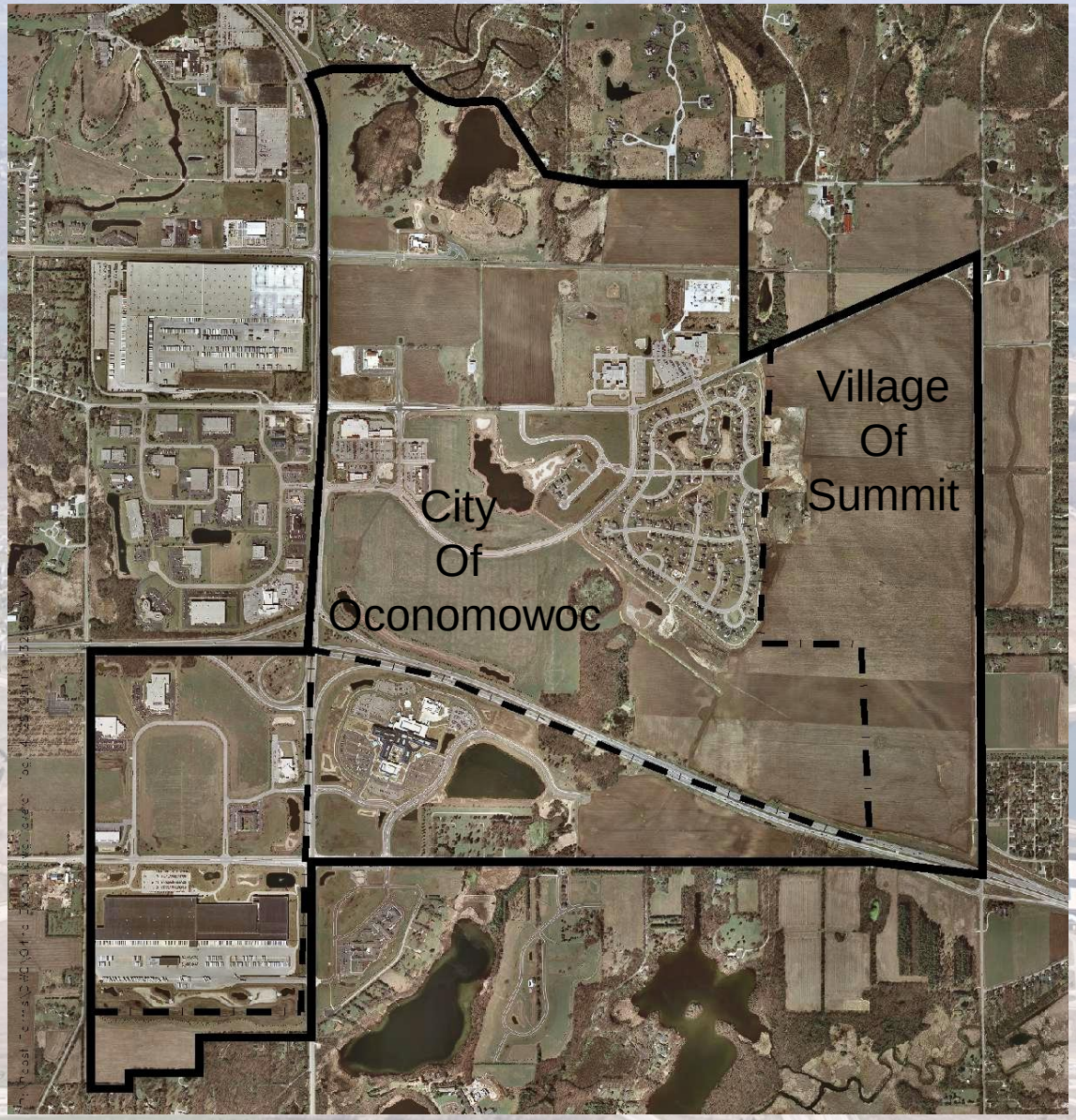
PROJECT BACKGROUND

Concept Master Plan circa 2000



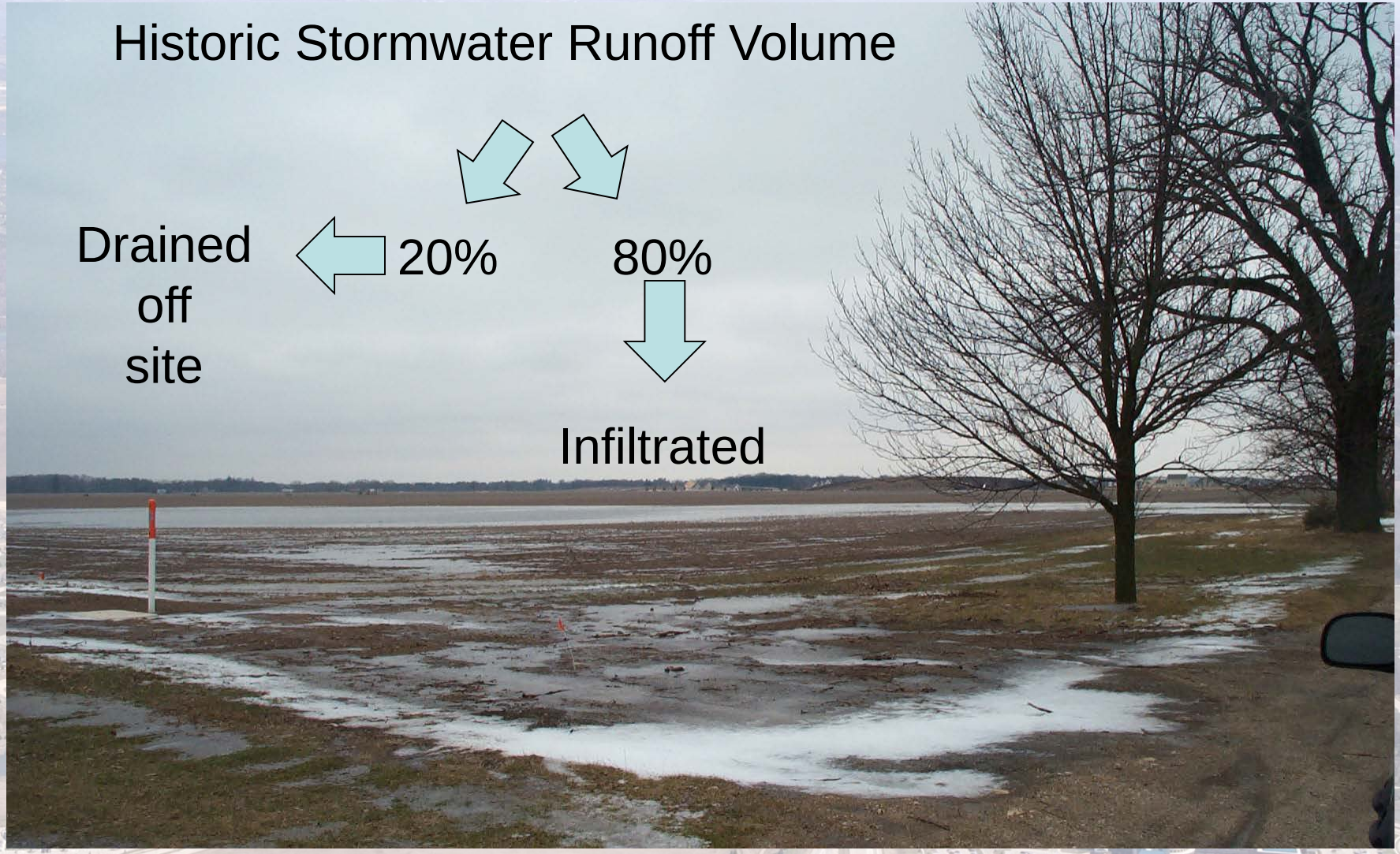

Fire station
M&I Bank
Hilton
Market Place
Harley Davidson
Ace Precision
Sentry Equipment
Industrial
Roundy's Distribution Center
Commerce Center
Aurora Hospital
Village Center
Eastlake Village
Lake Country Village
YMCA & school
Interlaken Village
Southeast Arterial
Stonehedge Trail
Staybridge Hotel

Project Spans Two Communities

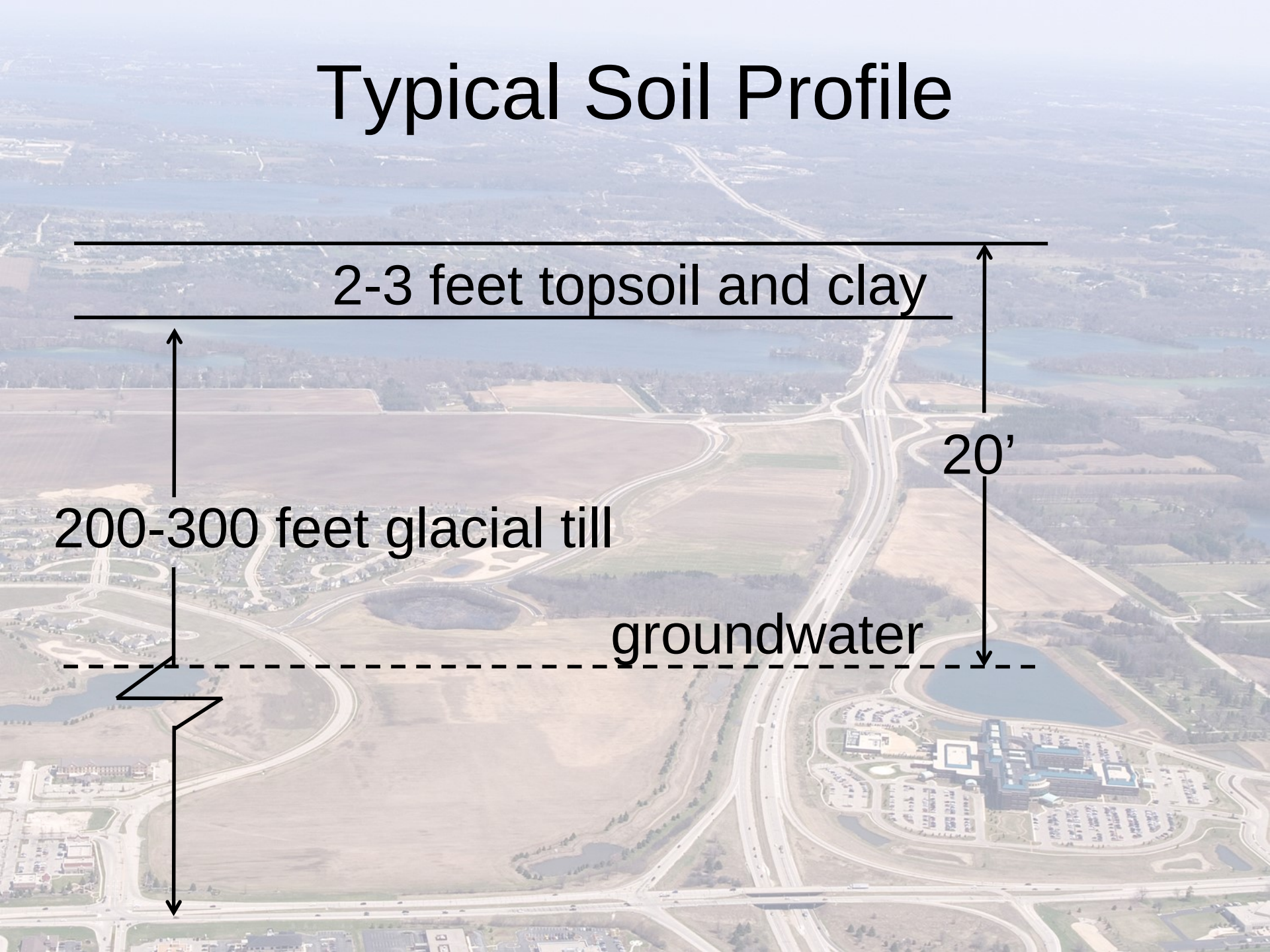


Lots of nearby lakes

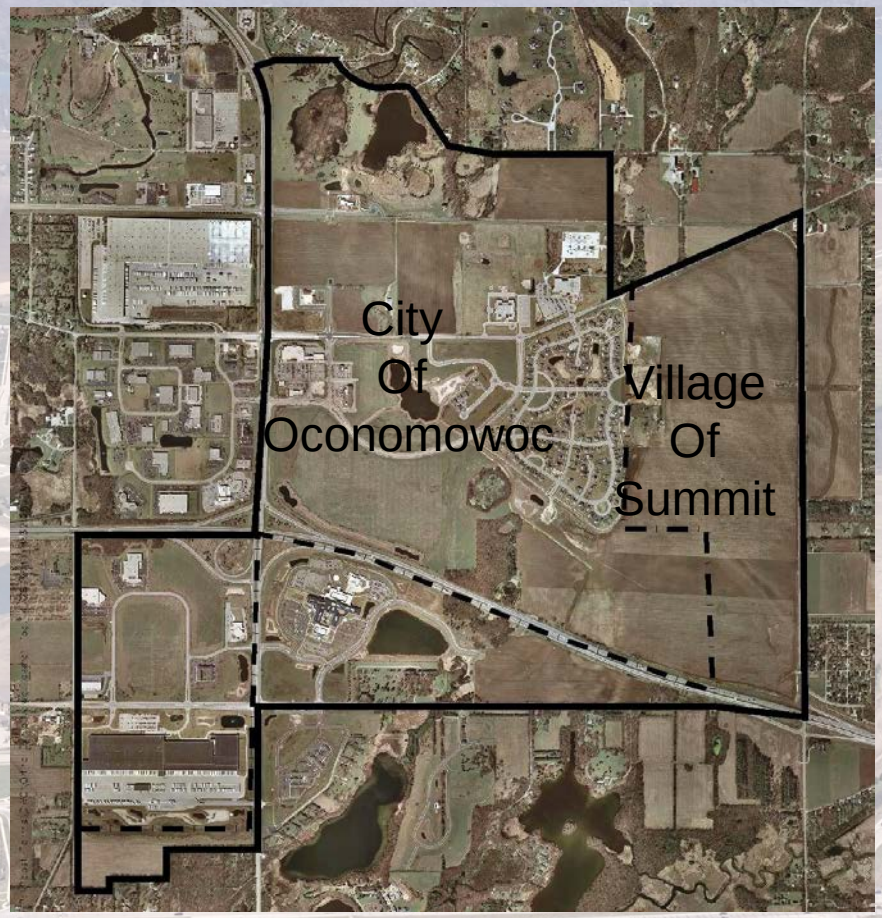
Historic Stormwater Runoff Volume



Typical Soil Profile



Stormwater Management District



- Ensure design consistency
- Address concerns
  - Lakes
  - Runoff
  - Groundwater

STORMWATER MANAGEMENT DISTRICT

Stormwater District

commissioners

2 – Village
2- City
1- Developer

Need four votes to pass!

Plan Approval Authority

Enforcement Authority

Funding Authority

Plan Approvals

District Technical Standards

Infiltration prior to DNR infiltration requirement

Community Stormwater Facility Standards

Introduction

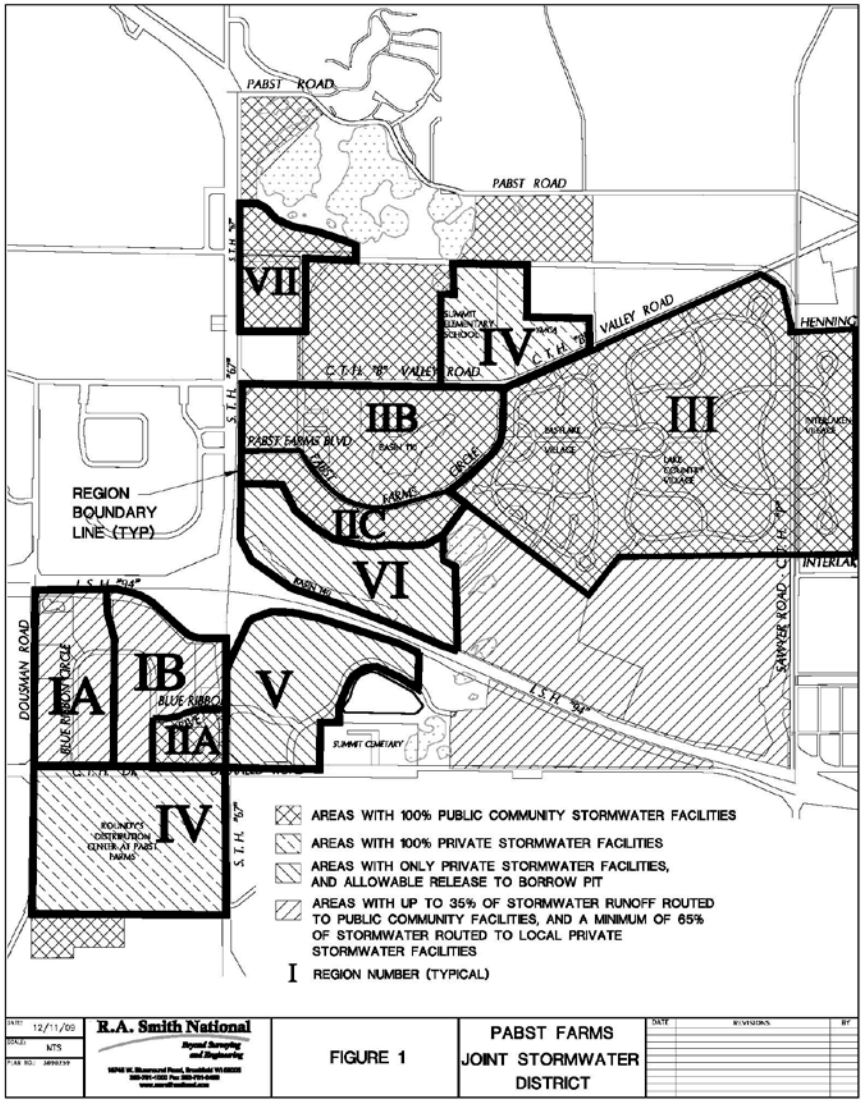
Depending on the timing of development, community stormwater facilities or conveyance systems in a certain area may not yet be available when an individual site is developed. If the community facility is not yet constructed, the individual site must retain all its stormwater runoff permanently or temporarily until the appropriate community facility is created. However, if the community facility is built, but there is not yet a conveyance system to the facility, a temporary conveyance system can be created, to avoid having to retain all site stormwater runoff on-site.

Technical Standards:

Allowable Stormwater Release – areas with 100% public community stormwater facilities

- Community stormwater management facilities in these areas are to be designed to accommodate 100% of individual site stormwater runoff, based on the assumptions listed under 'Hydrologic Assumptions'.
- Community stormwater management facilities may not release stormwater from the Pabst Farms development at a rate or volume that is greater than the stormwater release under existing conditions, to conform to the intent of the approved PABST FARMS CONCEPTUAL STORMWATER PLAN prepared by Earth Tech dated September 2000.
- If there is a need for additional impervious area on a particular site, the individual site will

District Technical Standards



Different standards for different regions

Private vs Public Infiltration Basins

Maintenance Checklist

Appendix D
Pabst Farms Joint Stormwater District
Stormwater Facility Inspection Checklist

Landowner Name: _____ Parcel Location: _____
Inspector Name: _____

Stormwater Facilities include infiltration basins as well as stormwater quality BMPs upstream of the infiltration basin. These stormwater quality BMPs are typically wet ponds, but could also include grass swales, filter strips, or a proprietary stormwater quality device.

Maintenance Item	Date	Comment (Satisfactory/ Unsatisfactory, action taken)
Semi-annual and post major storm event inspection:		
Debris cleanout: remove all debris that may clog facilities		
Erosion / Sediment: check for signs of erosion and repair and reseed as needed. Check for accumulation of sediment, and remove as needed.		
Annual Inspection (inspect each spring):		
General Inspection: Inspect infiltration basins and wet ponds for settling, cracking, erosion, leakage, and condition of the outlet structure. Inspect grass swales for channelization or undesirable woody vegetation. Make		

Private basin owners must submit yearly
District suggested format

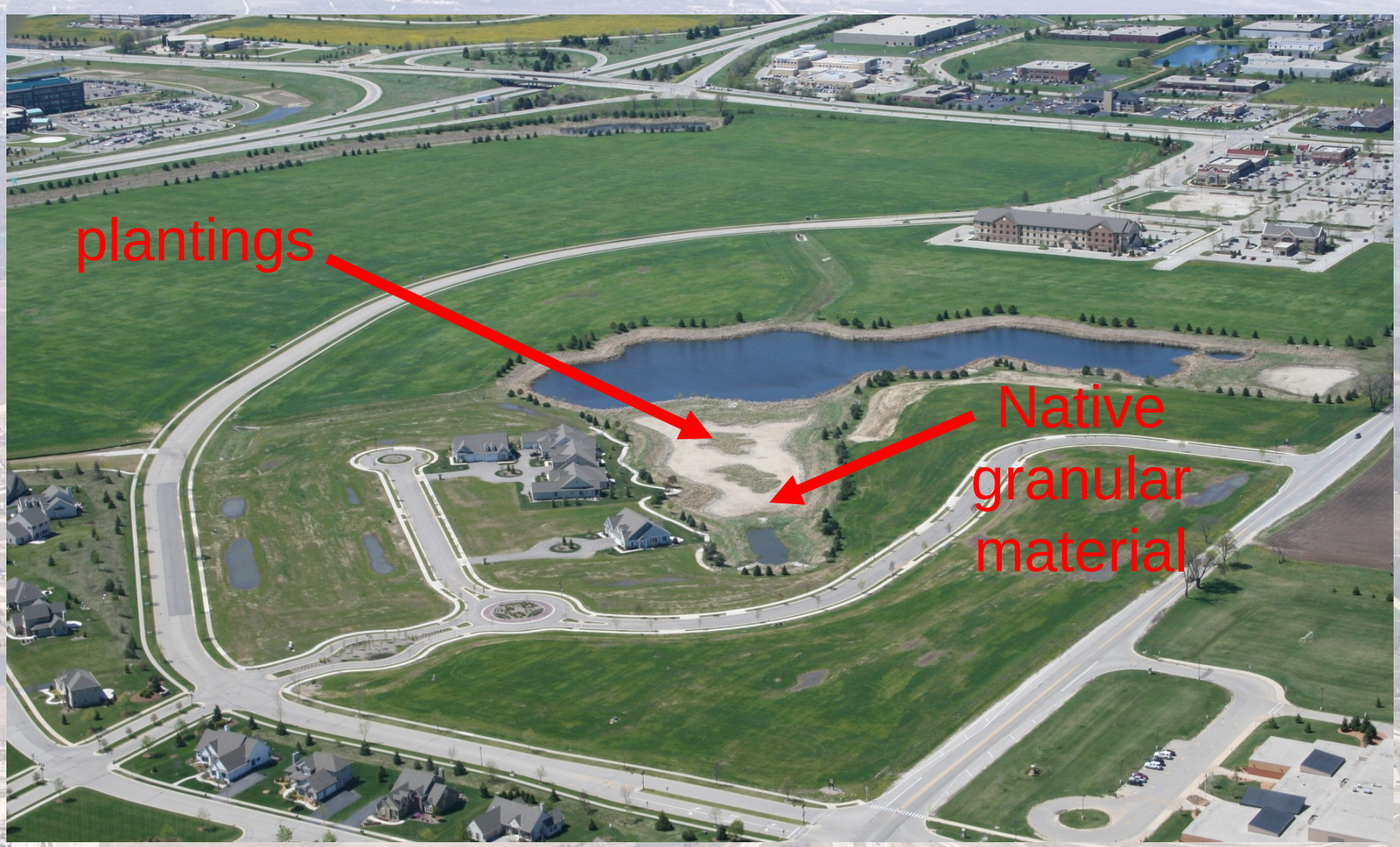
Challenges of 100-year 100% infiltration design

- Groundwater proximity
- Immediate infiltration performance
- Frozen condition performance
- Catastrophic overflow path

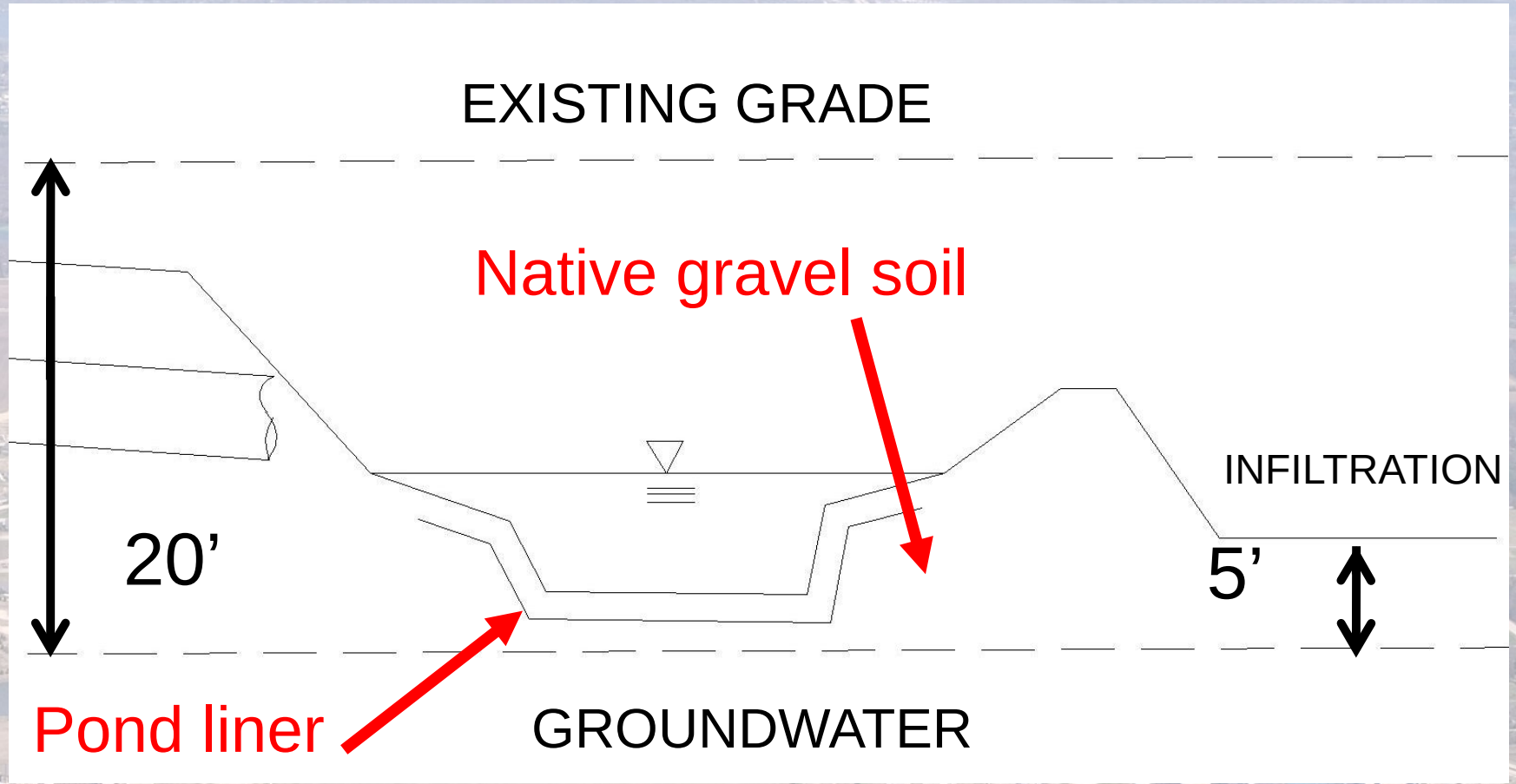
Key Design Standards

80% TSS removal on average annual basis before infiltration: help preserve infiltration capacity

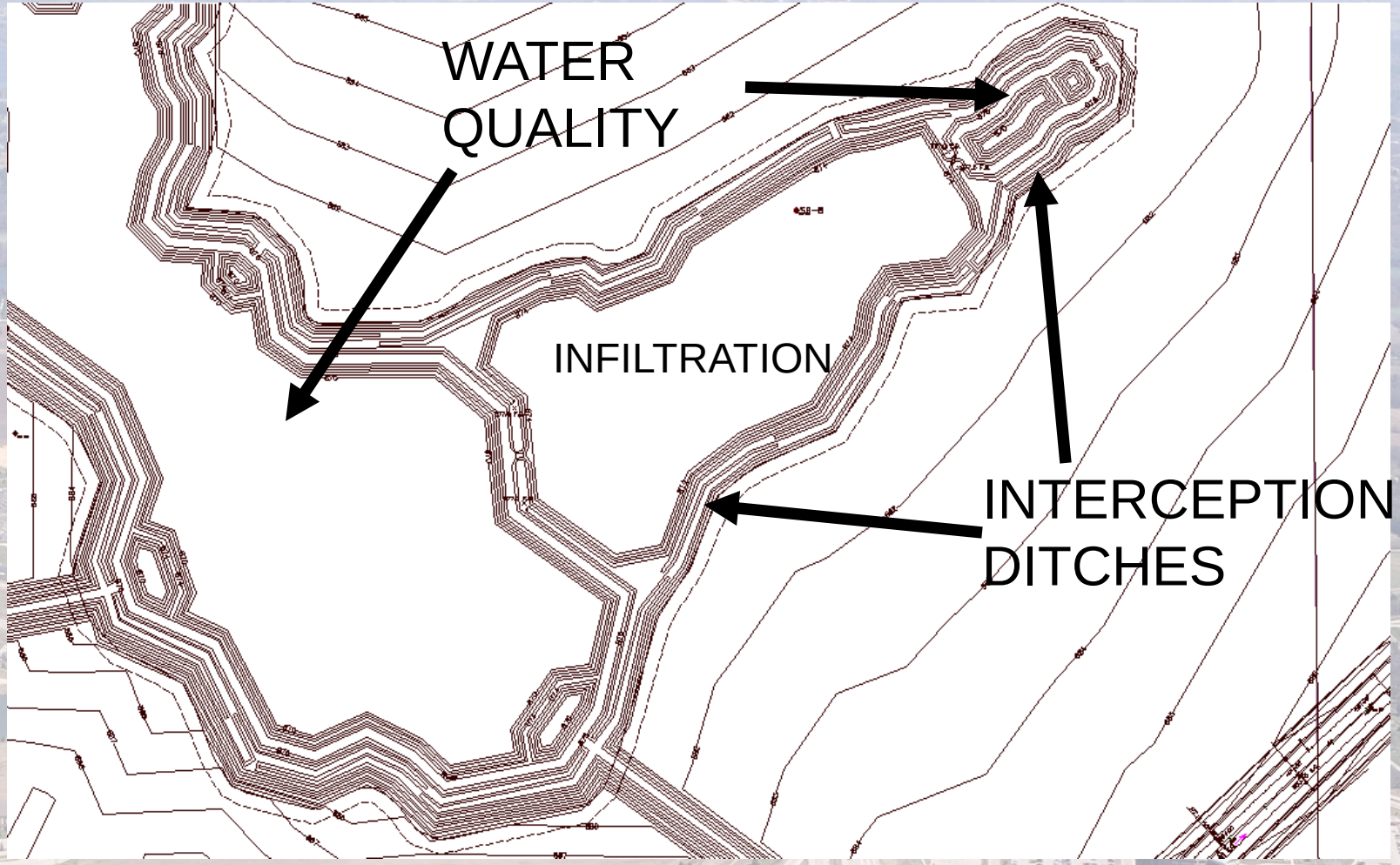
Open native granular surface on infiltration basins deliver immediate performance



Pond Liners Protect Groundwater



Interception Ditches Adjacent to Fields



Interception Ditches

Use Conservative Infiltration Rate

TABLE 3 – FIELD INFILTRATION TEST RESULTS				
Test Location[1]	Test Depth[2] (feet)	Approximate Test Elevation	Field Measured Infiltration Rate[3] (in/hr)	USDA Soil Type
I-1	3.5±	871.1±	>30	Cobbly Sand
I-3	14.5±	873.0±	19.5	Gravelly Sand
I-4	18.5±	872.9±	23.6	Gravelly Sand

1) Test locations are shown on Figure 1, enclosed in Appendix A
2) Depth is referenced to the ground surface at the test location
3) Field measured infiltration rate includes reduction factor for vertical infiltration considerations, as addressed above.

Apply design correction factor (2.5)

Post construction test verification

Apply area reduction factor (25-50%)

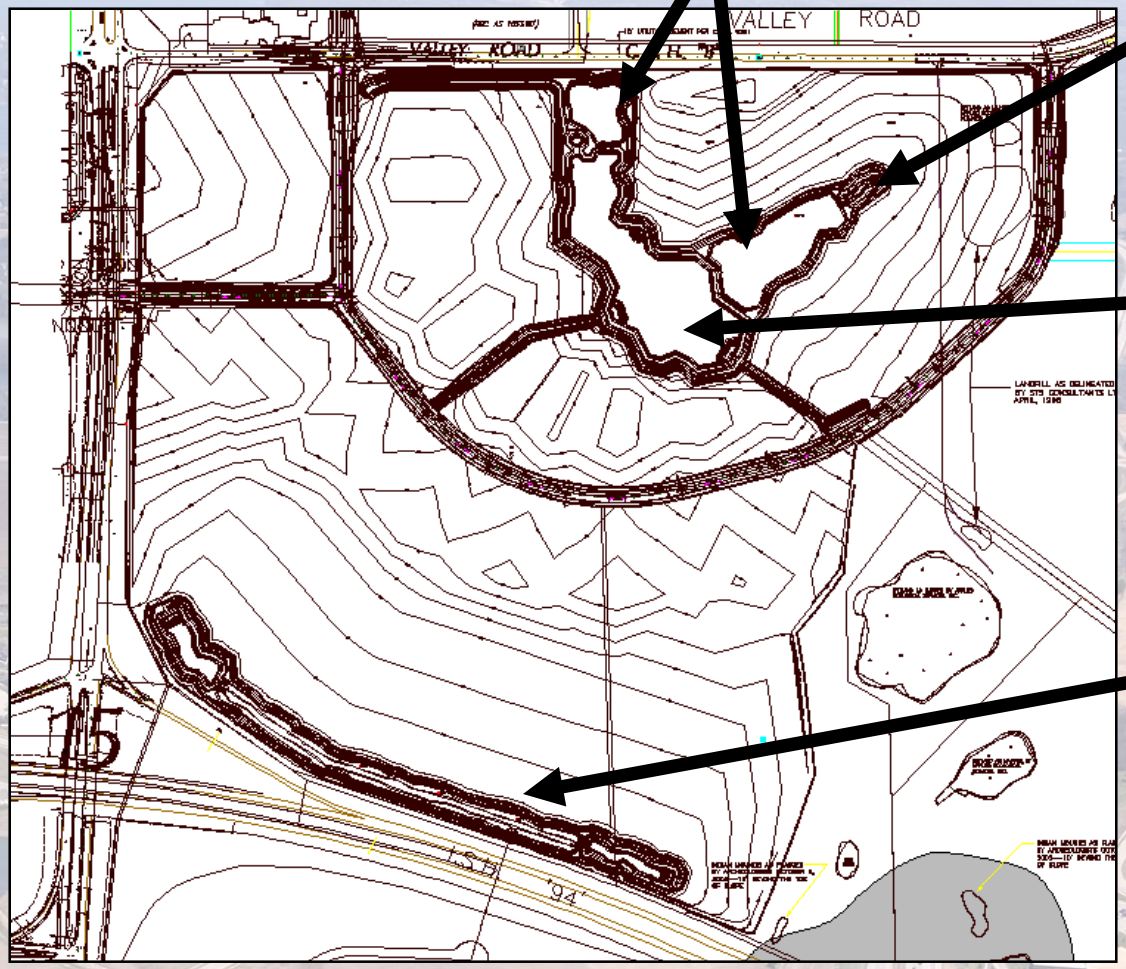
Design rate

Details: Notch at edge of infiltration basin – stop sediment

PROJECTS

Centralized Infiltration

Goal: set up regional stormwater for future development
100% infiltration including the 100-year event



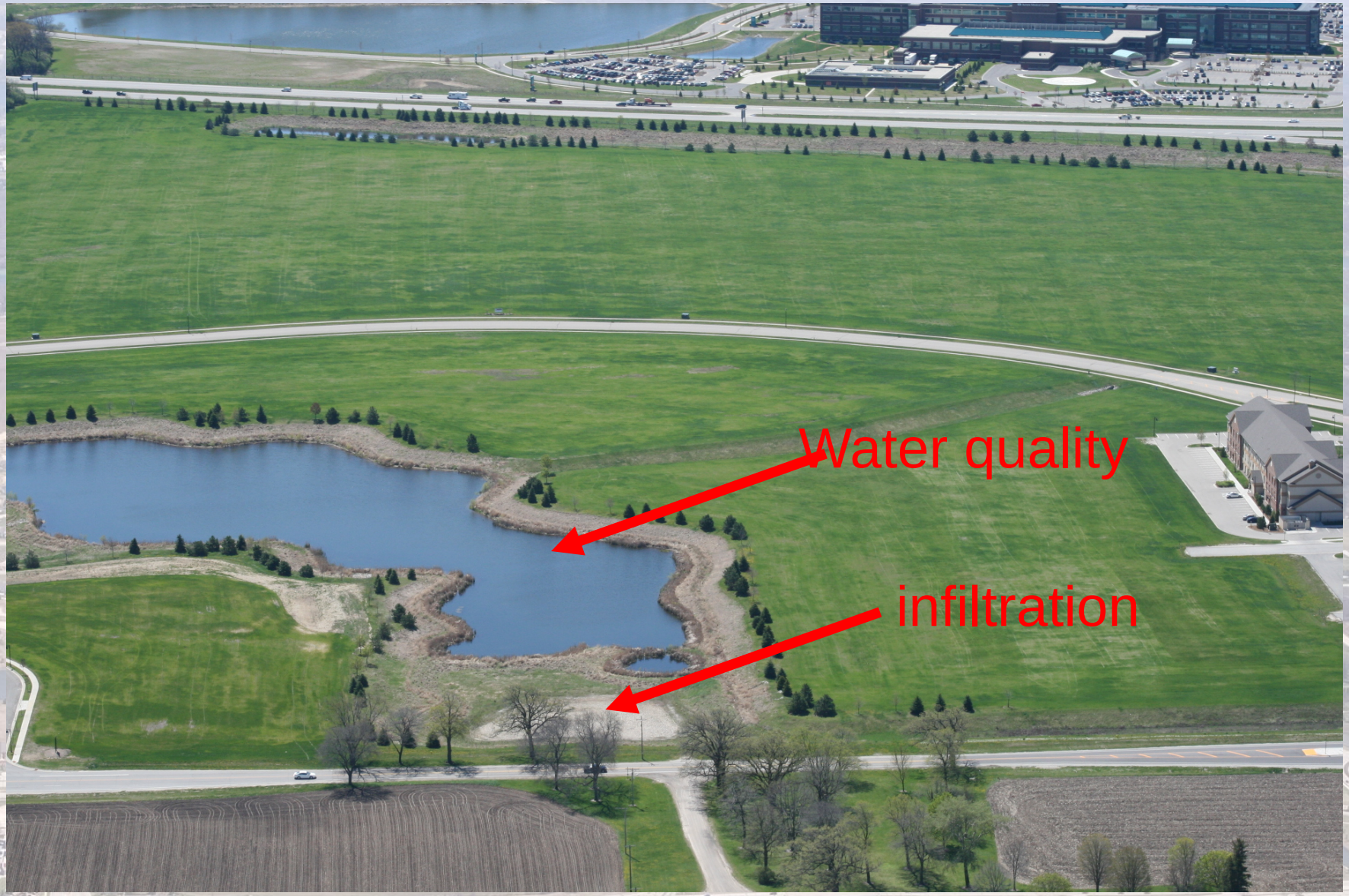
INFILTRATION

WATER QUALITY POND

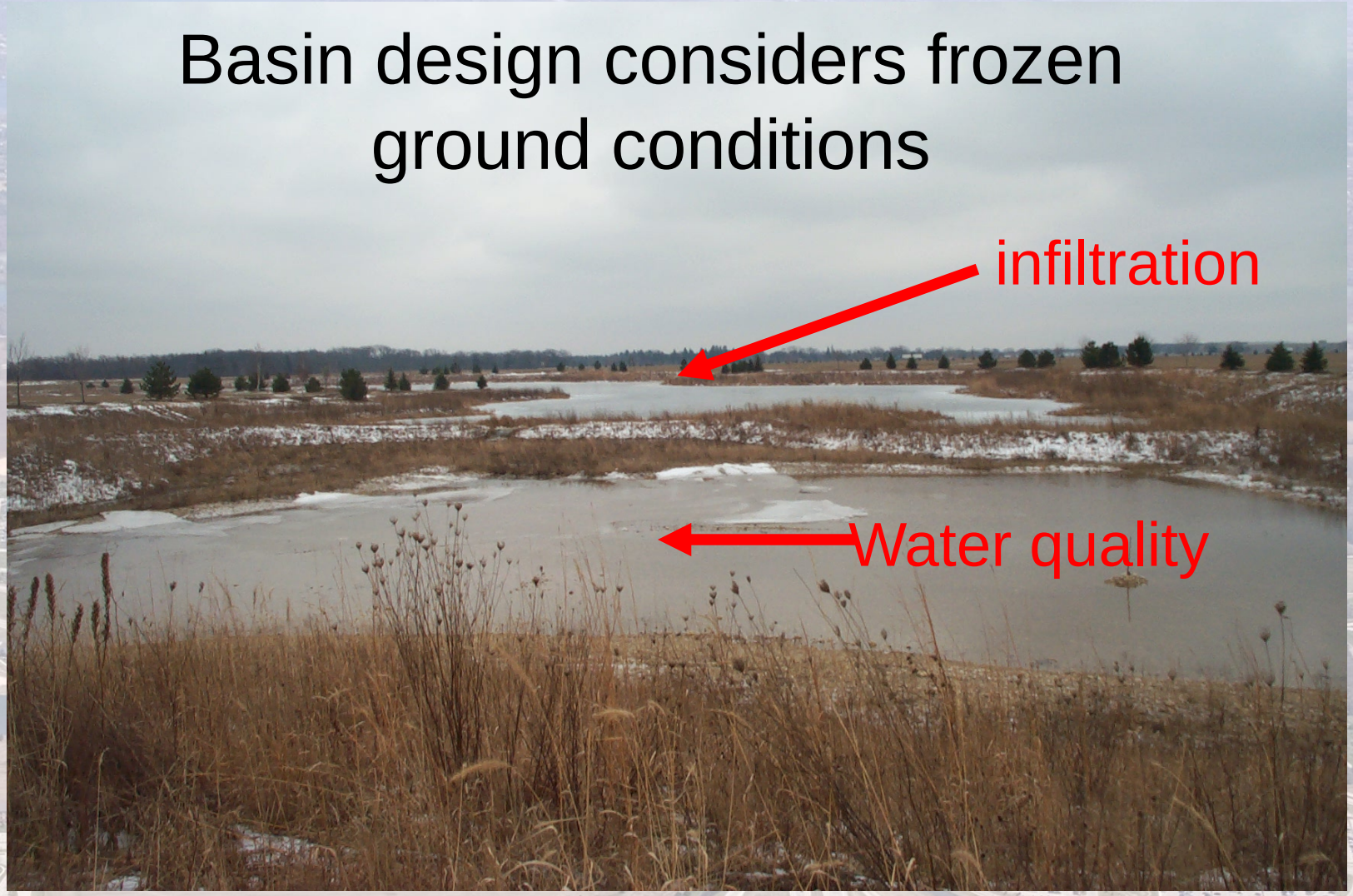
6 ACRE WATER QUALITY & FEATURE POND

WATER QUALITY & INFILTRATION

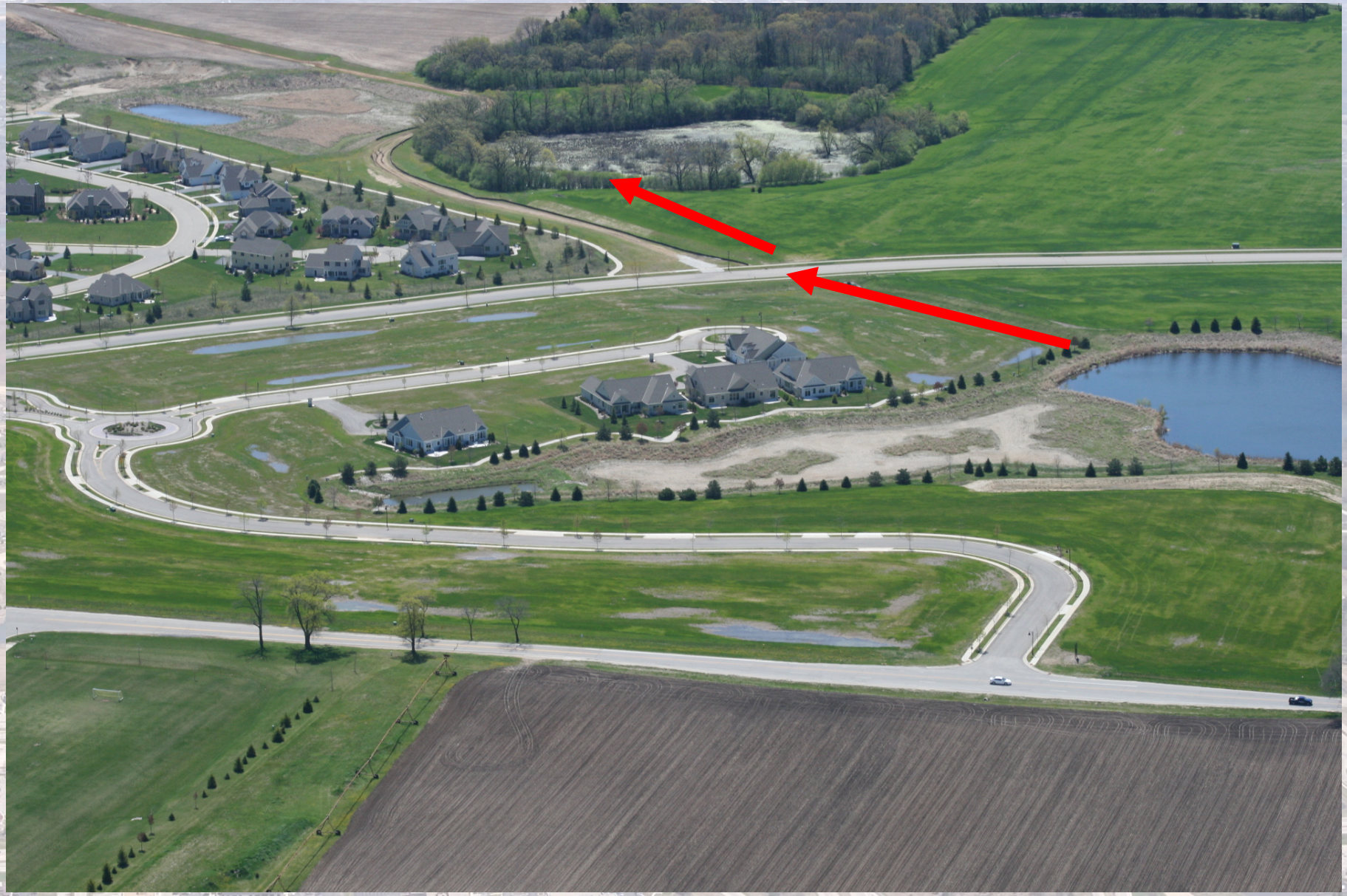
1 million CY dirt moved to get 1% slope


Water quality
infiltration

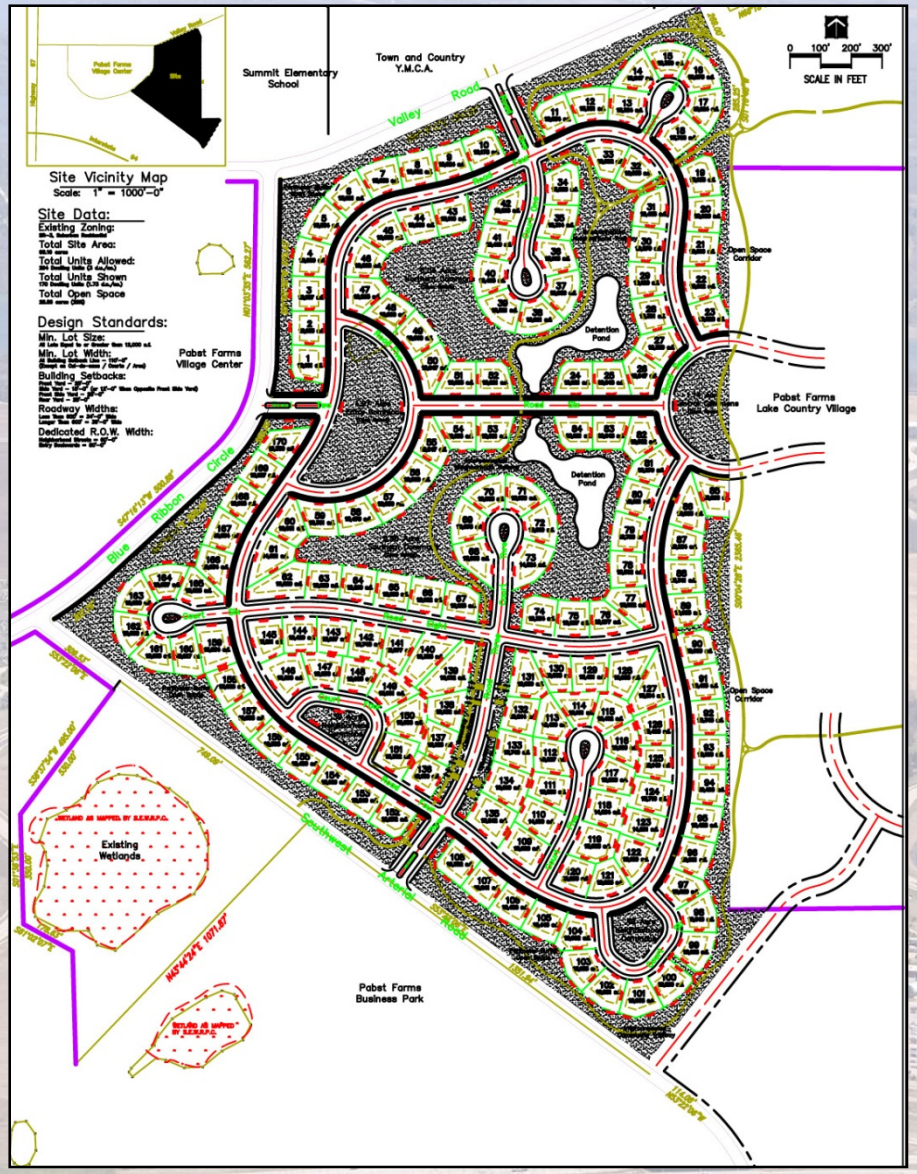
Basin design considers frozen ground conditions



Catastrophic overflow path

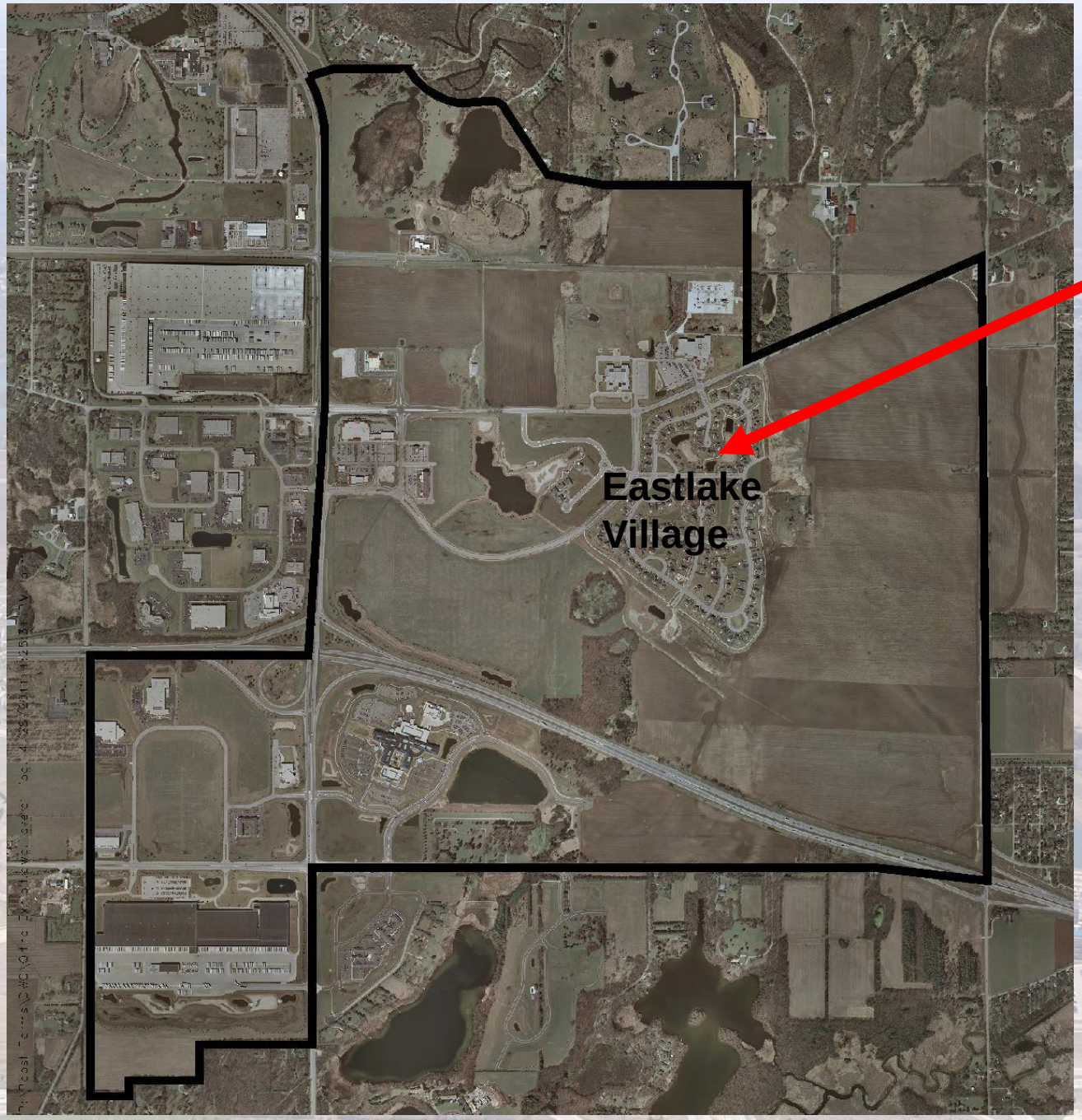


Residential Infiltration

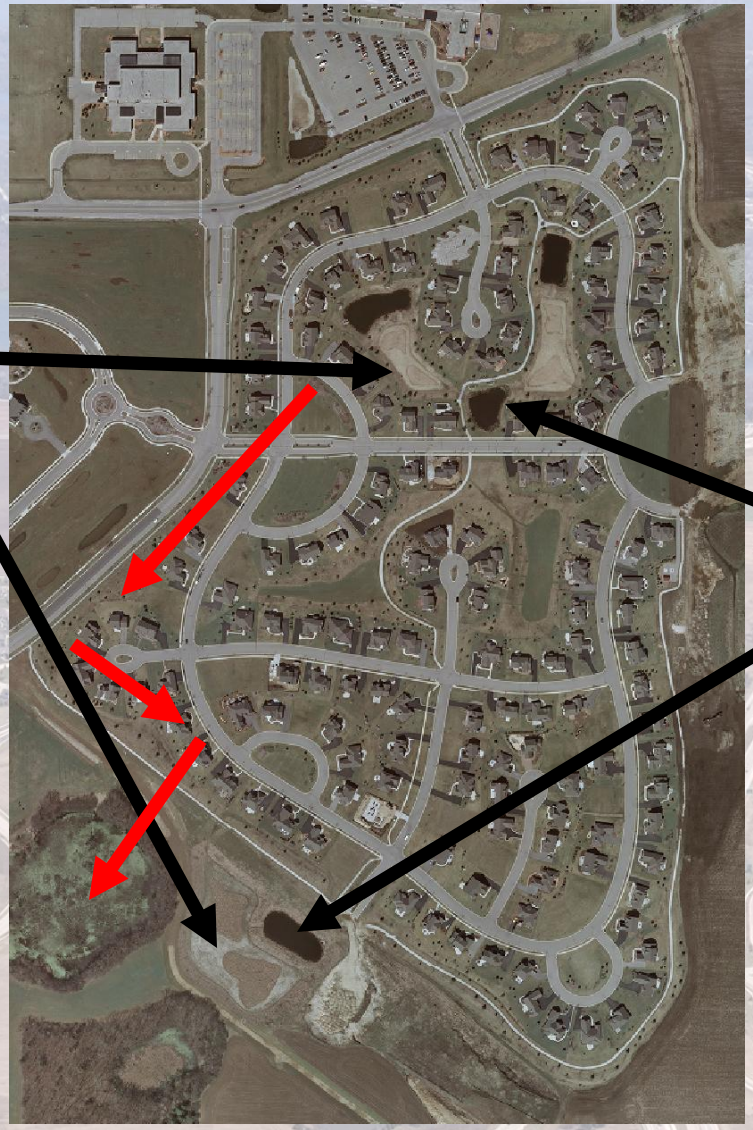


100 ac

170 lots


Eastlake
Village

District owned infiltration basins



infiltration

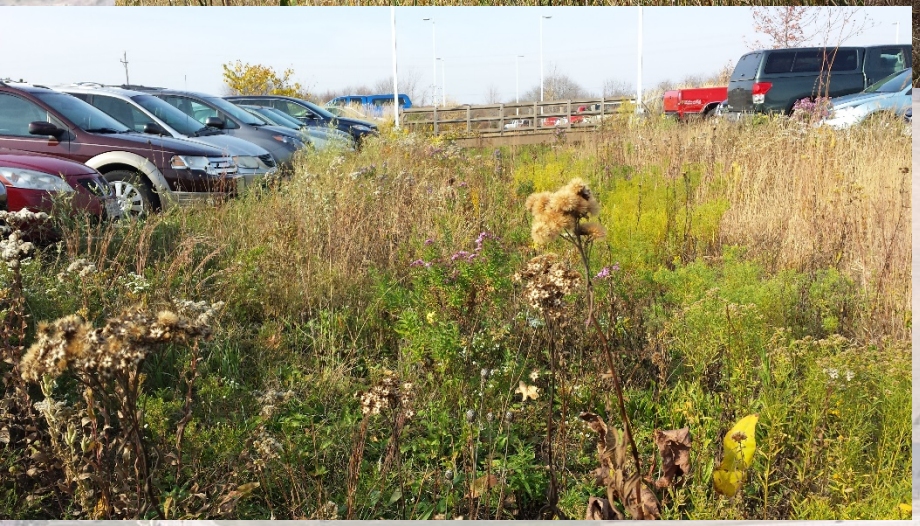
plantings

DEEP ROOTED GRASS
NATIVE GRANUAL MATERIAL

Results

2014/2015 Inspections

Generally – BMPs in good shape



Pond Liners

Pond Liners

Muskrat damage

Pond Liners

Liner material?

Outlet structure obstruction

Mow to eliminate woody plants

Sediment in Infiltration Basin

Pond Overloaded?

Crust Develops in Infiltration Basins

Annual tilling breaks up crust

Basins are chisel plowed annually

Plans show ‘vegetated treatment node’

Plans show ‘water quality swale’

CRITICAL MAINTENANCE

- Trap muskrats
- Maintain ponds to reduce infiltration basin loading
- Repair erosion
- Annually mow to remove woody vegetation
- Clean and deep till infiltration basins

Large scale infiltration works at Pabst Farms

Soils
Developer commitment
District oversight
Maintenance

Contact Information

Paul McIlheran, P.E., CPSWQ, Associate
Senior Project Engineer
R.A. Smith National, Inc.
paul.mcilheran@rasmithnational.com
262-317-3245