Lilydale Regional Park
“North Knob” Stabilization Meeting

February 1, 2018
Meeting Agenda

1. Introductions & Project Background
   – General
   – Cherokee Heights Ravine
2. Engineering Design Items
   – North Knob Slope Design/Geometry
   – Disposal Site
   – Restoration-3D simulation
3. Schedule
   – Bidding
   – Construction
4. Questions/Discussion
Location Map
History of Site

Former location of Twin Cities Brickyards
STORMWATER MODELING
Brickyard Area of Lilydale Regional Park
St. Paul, Minnesota

FIGURE 4-1
**RECOMMENDATIONS**

Brickyard Area of Lilydale Regional Park, St. Paul, Minnesota

**FIGURE 5-1**

- **Barr Footer:** ArcGIS 10.3, 2015-01-29 09:43
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**Legend:**
- **0 Feet**
- **West Clay Pit**
- **Middle Clay Pit**
- **Brickyard Access Trail - Bruce Vento Spur**
- **Brickyard Access Trail - Bluff Section**
- **Brickyard Trail - Connector Section**
- **Sinkhole**
- **East Clay Pit**
- **Falls**
- **Cherokee Regional Park Parking/Picnic Area**
- **North Ravine Falls**
- **Brickyard Trail - Lower Section**
- **Brickyard Trail - Fossil/Brick Oven Section**
- **North Knob**
- **North Ravine**
- **North Knob Ravine**
- **West Clay Pit**
- **Middle Clay Pit**
- **North Ravine**
- **Cherokee Heights Ravine**
- **North Ravine**
- **Cherokee Heights Culvert**
- **Fremont Avenue Culvert**
- **Cherokee Heights Culvert**
- **North Cherokee Heights Culvert**
- **ESRI Imagery, 4/4/2012.**
- **Fossil Site 1**
- **Fossil Site 2**
- **Fossil Site 3**
- **Fossil Site 4**
- **Lower North Stream Channel**
- **Waterfall**
- **Seep**
- **Bruce Vento Scenic Overlook**
- **Echo Cave**
- **Brick Oven**
- **Brickyard Trail Section**
- **Break Points**
- **Culvert Crossing**
- **Railroad**
- **Undeveloped Footpath**
- **Paved Trail**
- **Ravine/Stream Channel**
- **Included in Study**

**Recommendations:**
- **Inspect for Erosion**
- **Replace Culvert**
- **Stabilize Ravine**
- **Stabilize Slope**
- **Stabilize Trail**
- **Restrict Access**
- **Fossil Bed Proposed to Remain Open**
- **Fossil Bed Proposed to Close**
- **Wetland**
- **Clay Pit Wall**
- **Study Limits**

**Sites:**
- **Brickyard Access Trail - Bluff Section**
- **Brickyard Trail - Lower Section**
- **Brickyard Trail - Fossil/Brick Oven Section**
- **Brickyard Trail - Lower Falls**
- **North Ravine Falls**
- **North Cherokee Heights Culvert**
- **East Clay Pit Falls**
- **North Knob**
- **North Ravine**
- **Cherokee Heights Ravine**
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**Maps:**
- **RECOMMENDATIONS**
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**Location:**
- **Brickyard Area of Lilydale Regional Park, St. Paul, Minnesota**

**Sites:**
- **Brickyard Access Trail - Bluff Section**
- **Brickyard Trail - Lower Section**
- **Brickyard Trail - Fossil/Brick Oven Section**
- **Brickyard Trail - Lower Falls**
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- **North Cherokee Heights Culvert**
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- **Included in Study**
Pre-construction condition (March 2015)

4’ gully across path-culvert 100% blocked and washout around
Culvert Repair (April 2015)

Culvert removed, ravine channel regraded and culvert replaced.
75% blockage after rain event. Upstream channel diverted during rain event and resulted in erosion west of culvert.
Post Rain Event (May 28, 2015)

100% blockage after additional rain events.
Sediment from North Knob area will continue to be deposited into Pickerel Lake and Mississippi River until North Knob stabilized.
Funding Request Summary

**February 2016** - request $4.584 million to Minnesota Board of Water and Soil Resources (BWSR) - Unsuccessful.

**May 2016** - resubmitted request to BWSR for Disaster Relief Funds (DRAP) for $1.905 million focusing on steep slope stability.

**December 2016** - Received $925,000 in DRAP funds.

Need for additional funds for restoration

- Received $164,500 Conservation Partners Legacy to enhance 61 acres of forest and prairie habitat in Cherokee Regional Park. Portion of funds will go towards bluff restoration.

- Reviewing application for restoration funds from Natural Resource Trust Fund in partnership with Ramsey Conservation District and Great River Greening. February 2018 deadline.
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Cherokee Heights Ravine Improvement Alternatives Considered

1. **Downstream channel stabilization**
   - Engineered and bioengineering techniques
   - Selective planting and vegetation management

2. **Peak flow reduction (US storage/culvert modifications)**
   - Upstream storage & infiltration reduced bluff slope stability
   - Significant excavation changed park aesthetics
   - Loss of trees and park space

3. **Downstream piped system**
   - Riprap channel & piped system to Mississippi River
   - High construction cost
Cherokee Heights Ravine
2018-2019 Improvements

1. Downstream channel stabilization
2. Underground stormwater treatment systems
Cherokee Heights Ravine Improvements
Funding Sources

Project to be funded by BWSR Clean Water Fund grant award and contributing cities:

- Mendota Heights
- West St. Paul
- St. Paul
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4. Questions/Discussion
2015 Aerial Image (Post-June 2014 Failure)

- Failed Soils and New Stream Channel
- Lower Waterfall
- Brickyard Trail
- Brickyard Trail
- Seepage
- Large 2014 Failure Area
- Upper Waterfall
Slope Failure Area & Lower North Stream Channel
Slope Failure Area & Lower North Stream Channel

Large June 2014 slope failure from below with inset showing seepage (July 2014 site visit)
Slope Failure Area & Lower Stream Channel

Large slide, looking up through eroded stream channel (December 4 2017 site visit)
Lower Stream Channel & Washed-out Culvert
North Knob Stabilization
Improvement Alternatives Considered

1. **Mechanical Stabilization – soil nails**
   - Unnatural aesthetics
   - High cost

2. **Mechanical Stabilization – piles**
   - Constructability issues
   - High cost

3. **Mechanical Stabilization – walls**
   - Unnatural aesthetics
   - Constructability issues
   - High cost

4. **Graded Slope Stabilization**
   - Selected alternative due to aesthetics, cost and constructability
Conceptual Slope Stabilization Options
Soil Nails
Conceptual Slope Stabilization Options

Piles
Conceptual Slope Stabilization Options
Walls, Graded Slope, Soils Nails
Conceptual Slope Stabilization Options
Graded Slope, Toe Protection
Final Grading Cross-Section

- Area of excavation
- Soil Fill
- Rock Buttress and Armored Toe of Slope
- Stable Slope
Final Grading Concept

Lower Trail

Waterfall Overlook

Grading Area

Alternate Grading Area
Restoration - 3D Simulation

Existing

Proposed
Restoration - Simulation
Restoration - Examples
Restoration - Examples
Disposal Area
Work Elements

- Clearing & grubbing – slope and disposal area
- Excavation & grading
- Graded filter blanket for seepage conveyance
- Riprap armoring at toe of slope
- Erosion control & site restoration
- Topsoil and vegetation
Grading and Earthwork Summary

• North Knob
  – 43,000 – 45,000 sq. ft. slope grading (2.5 hockey rinks)
  – 13,500 C.Y. of cut (8 ft. soil over 1 football field)
  – 3,300 C.Y. of filter rock and riprap toe protection
    (5 ft. covering 1 hockey rink)

• Disposal Site
  – 50,000 sq. ft. grading (1 football field)
  – 10,000 cubic yards of fill (5.5 ft. over 1 football field)
Schedule

- WSCO Meeting – February 1, 2018
- Bidding – February/March 2018
- Construction – Summer 2018
Questions/Discussion