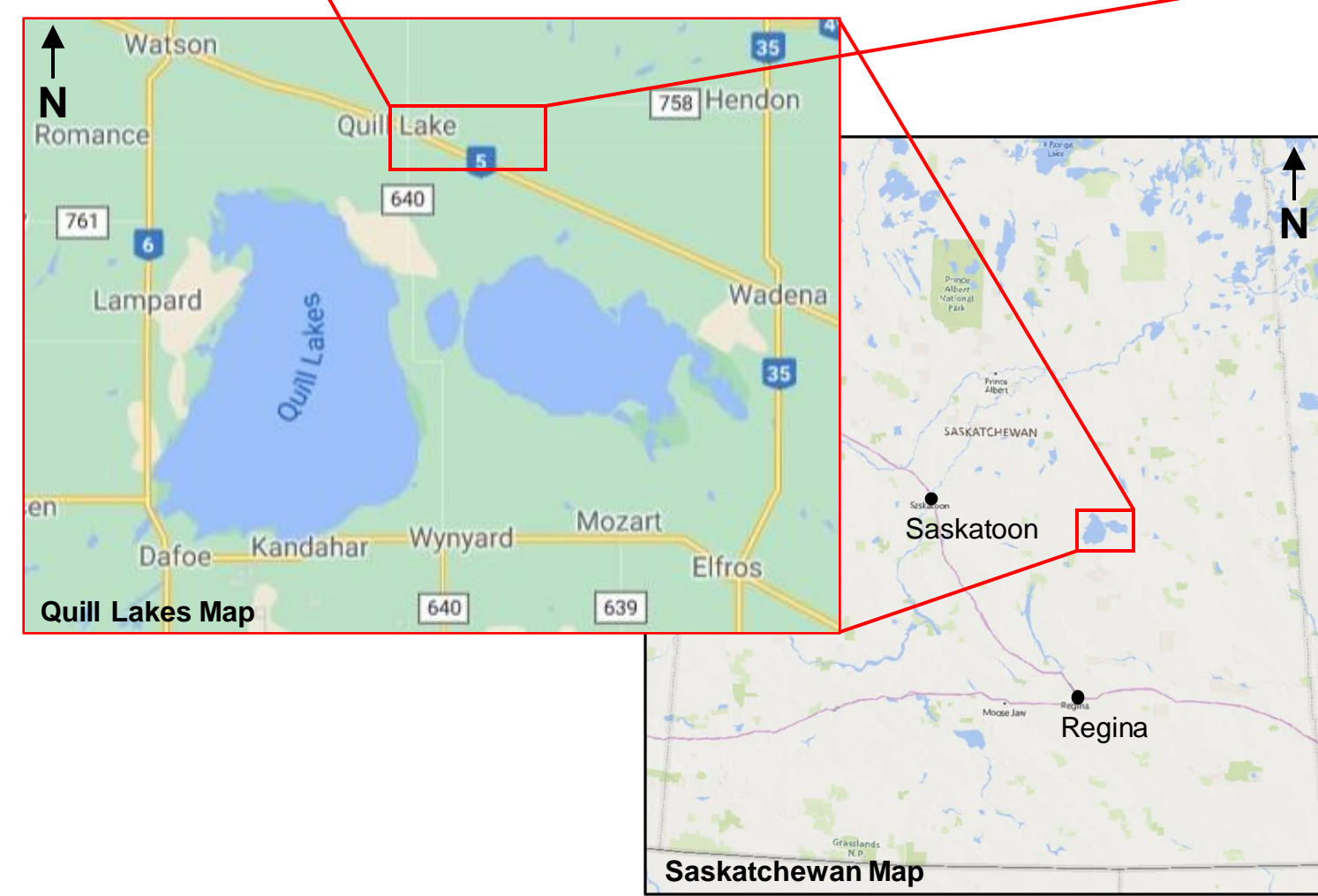
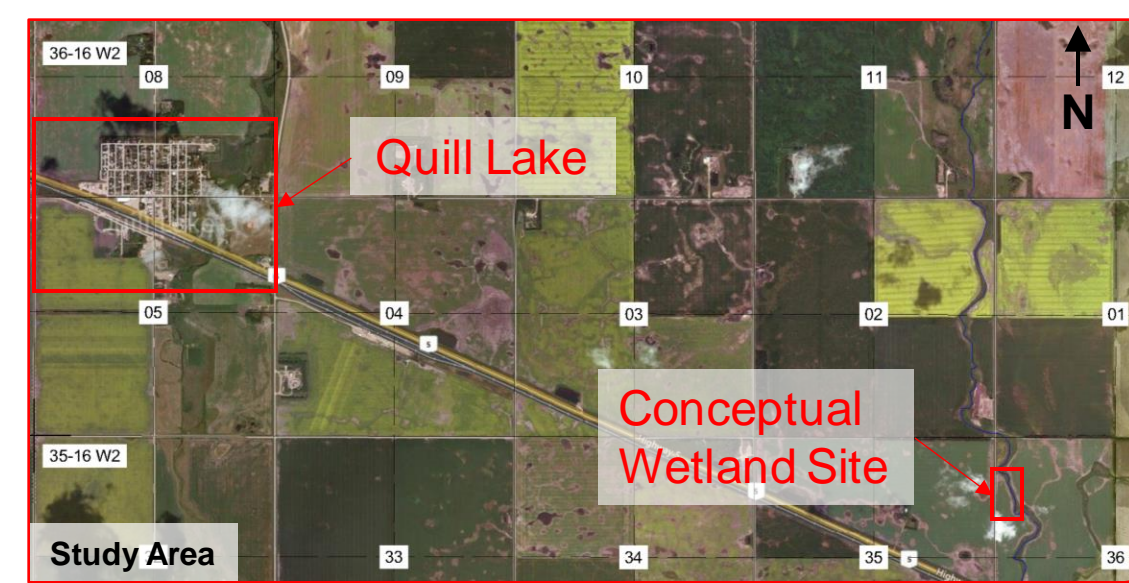




Introduction

The Quill Lakes Basin located in East-Central Saskatchewan is a problematic area for water quantity and quality issues. In order to combat these issues on a local scale, the development and design of an engineered wetland has been proposed.



Project Objectives

- Acknowledge water issues in the Quill Lakes Basin
- Develop a solution that incorporates the needs of all stakeholders
- Provide a complete design for an engineered wetland in a specified region of the Quill Lakes Basin
- Complete a sustainability analysis on the design to ensure that it is feasible
- Provide recommendations for future engineered wetland designs and develop interest in utilizing them for other water management projects

Methods & Process

- Perform a site visit to make observations on the area
- Collect historical and relevant data for the area of study
- Choose a location for the proposed project
- Conduct hydrological modelling using HEC-HMS
- Verify HEC-HMS results using collected data
- Estimate nutrient removal using the P-k-C* model
- Estimate T.S.S. removal using the w-C* model
- Determine design parameters for the wetland
- Design an engineered wetland within the determined constraints using the calculated and collected data

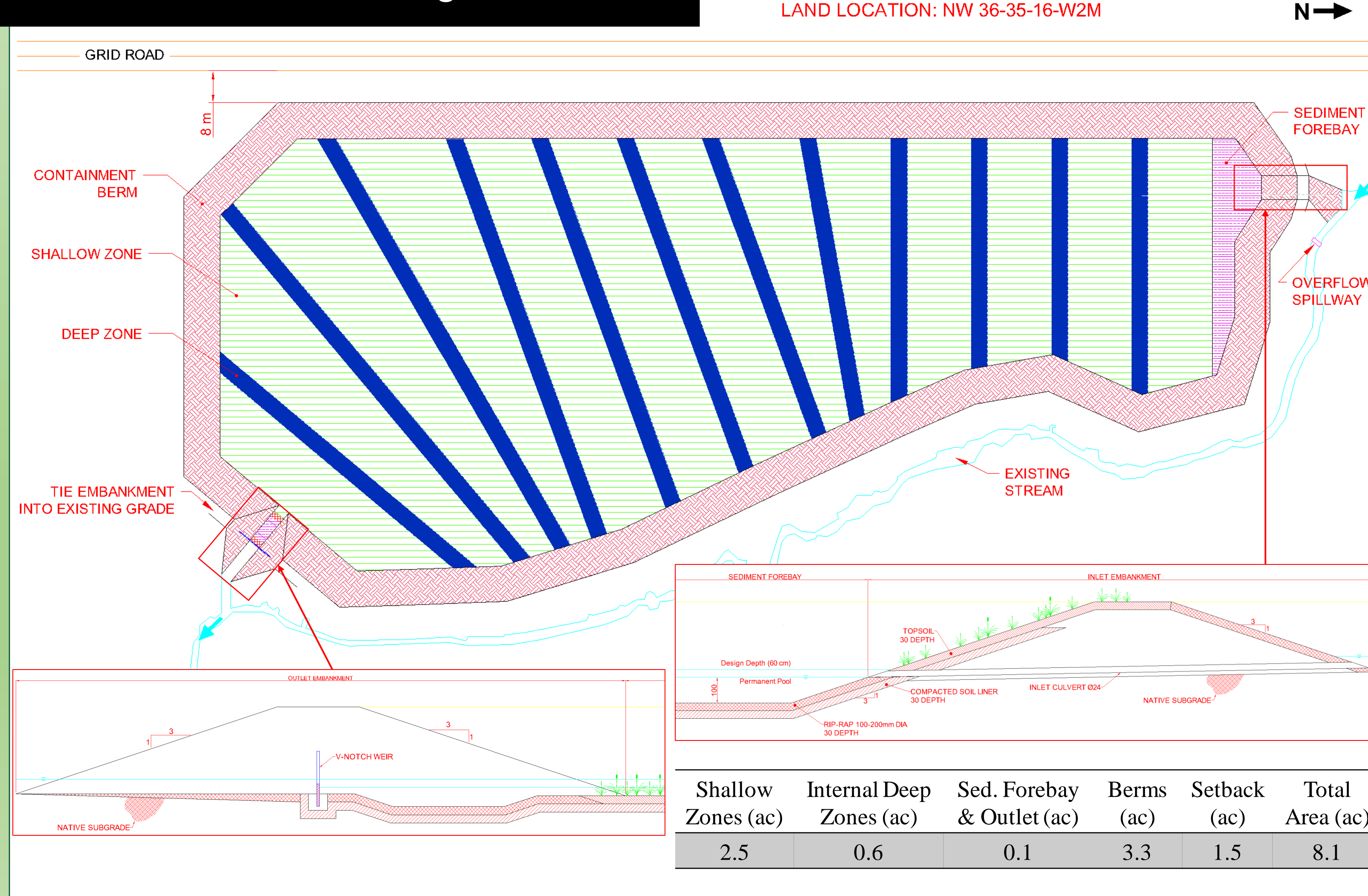
Results

Parameter	Value
Design Volumetric Inflow Rate	1,500 m ³ /d
Nominal Detention Time	6 days
Active Storage Depth	0.3 – 2 m
Annual Effluent Volume Reduction	1.67 %
Annual Feeder Stream Runoff Volume Reduction	0.30 %
Monthly Total Nitrogen % Reduction	(-8) to 43 %
Monthly Total Phosphorous % Reduction	(-16) to 36 %
Monthly Total Suspended Solids % Reduction	13 to 85 %

Impact Analysis

- Environmental**
- + Habitat Creation
 - + Nutrient Reduction
 - + Flood Control
 - + Carbon Sequestration
- Economic**
- + Reduce Economic Impact of Flooding
 - + UN SDG Goal 12
- Social**
- + Tourism & Hunting
 - + UN SDG Goal 17
- UN SDG Goals 6, 13, 15
 - Soil Salinization
 - Nutrient Release
 - Opportunity Loss for Ag.
 - Cost of Seeding, Earthmoving & Land
 - Mosquitos & Odour

Wetland Design



Conclusion & Recommendations

- Conclusions**
1. Engineered wetland provides environmental services, reduces runoff, and progresses towards UN 17 SDGs.
 2. Some drainage is required by producers to effectively manage their land.
 3. Consolidation of natural wetlands should be minimized to protect biodiversity.
- Recommendations**
1. Check water quality/flow rate assumptions with sampling.
 2. Investigate soil salinity adjacent to control structures and compacted soil liner.
 3. Develop pilot project in the prairies to evaluate the nutrient removal and carbon sequestration capabilities of natural wetlands.

Acknowledgments

- Ben Lichtenwald, U of R
- David Tratch, WaterMark
- Doug Johnson, WSA
- Dwight Odelein
- Aura Lee MacPherson, SAWS
- Dean Milton, U of R
- Dr. John-Mark Davies, WSA
- Dr. Cesar-Perez Valdivia, WSA
- Dr. Roger Petry, RCE Saskatchewan