

Pave Paradise & Put Up A Borrow Pit

A Case Study on Monitoring Constructed Wetlands







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complex world

CLEAR SOLUTIONS"



Outline

Introduction

- Constructed Wetlands/Borrow Pits
- Borrow Pit Design Standards
- Monitoring Program
- Constructed Wetland Monitoring Framework
- Summary



Introduction



- What: Highway 63 Twinning Project
- Where: Atmore to Fort McMurray, AB
- When: 2005 2016
- Why: Increase safety

Introduction







Constructed Wetlands/ Borrow Pits

• What is a Borrow Pit?

- "Holes in the ground"
- Material for construction
- Large construction projects
 - ->40 built for Hwy 63
- Fill with water

How can they be considered "constructed wetlands"?



Borrow Pit Design Standards - Then





Borrow Pit Design Standards - Now





Borrow Pit Design Standards - Now





Monitoring Program -Initiation

OBJECTIVE

Determine if borrow pits are naturalizing

HOW DO WE MEASURE "NATURALIZATION"?

1. APPRORIATE PARAMETERS

2. REFERENCE WETLANDS



Monitoring Program -Parameters





Monitoring Program – Reference Wetlands

SELECTION CRITERIA

1 reference for 3 borrow pits

Similar wetland classification

Within same watershed

Similar size

Easy access

Minimally disturbed





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Monitoring Program -Summary



3 Year Monitoring Cycle

2 Sampling Sessions Per Year 5 Reference Wetlands



Monitoring Program Evolution





Constructed Wetland Monitoring Framework





Constructed Wetland Monitoring Framework





Constructed Wetland Monitoring Framework - Parameters





Constructed Wetland Monitoring Framework - Parameters



Water Quality

• pH, EC, Ammonia, Alkalinity, Total Organic Carbon, Hardness, Orthophosphate and Phosphorous



Vegetation

- Floristic Quality Index
- Species Richness



Wildlife

• Species Functional Group Presence

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Aquatic Invertebrates

- Taxon Richness
- ETSD Index



Constructed Wetland Monitoring Framework - Vegetation





Coefficient of Conservatism



of Native Species





Constructed Wetland Monitoring Framework - Wildlife





Constructed Wetland Monitoring Framework – Aquatic Invertebrates





Constructed Wetland Monitoring Framework – Aquatic Invertebrates





Constructed Wetland Monitoring Framework – Ranking System

Weighted Score Parameter **Measures** Compare borrow bit data to reference data with interdecile system Highest Possible Score 28



Constructed Wetland Monitoring Framework – Ranking System

Total Score	Naturalization Progress Rank
No "Graduati	on" rank has
been d	lefined



WATER QUALITY

Constructed Wetland Monitoring Framework – 2017 Results





Constructed Wetland Monitoring Framework – Moving Forward



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Summary

- Initial Highway 63 wetland monitoring
 - Monitored numerous borrow pits
 - Monitored 6 parameters
 - Most wetland 'graduated'

• Pilot study for "Constructed Wetland Monitoring Framework"

- Provincial guideline for monitoring AT wetlands
- Parameters reduced to 4
- Natural Progression Ranking Scale
- Most wetlands ranked "Low"
- Test & refine the Framework for the next ~ 5 years



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Questions?