SOURCE TO STREAM 2023 Conference

Canada's Premier Stormwater and Erosion and Sediment Control Conference

Thank you to our sponsors!

EXECUTIVE SPONSORS

CULTEC

Canadian Society for Civil Engineering / Société canadienne de génie civil

ADS – Our reason is water.™

CUPOLEX® ENGINEERING SOLUTIONS INC.

ENVIROPOD™

York Region

filtrexx® CANADA SUSTAINABLE TECHNOLOGIES – let nature do it.®

DICORP – DOWN TO EARTH BUSINESS

GEO MORPHIX™

Hydro International

NEXT STORM

Greck

Sustainable Technologies EVALUATION PROGRAM

OPPORTUNITIES SPONSOR

AECOM

MEDIA SPONSORS

WATER CANADA

HOSTS

Presented by:

Toronto and Region Conservation Authority

In association with:

Lake Simcoe Region conservation authority

Credit Valley Conservation – inspired by nature

Unique Implementation Challenges of Installing Large Corridor Channel Realignment: Too Much Dirt, Too Much Water, and Not Enough Time

Source to Stream Conference • March 23, 2023

Lindsay Davis, P. Geo, M.Sc., CAN-CISEC
Michael Lawson, B.Sc., C.E.T., CAN-CISEC, EP

Overview

- Discuss balancing environmental timing windows and site constraints during construction in large-scale corridor construction
- Phasing construction to keep project moving forward towards completion
- Implementing a design through staged channel and corridor activation

Natural Channel Construction Considerations

Construction Initiation

- Involvement of larger project team for site-wide activities to determine the most appropriate phasing approaches
- Construct water diversion facilities (i.e., temporary diversion channel) and install ESC measures
- Commence construction and ensure conformance to the drawings as work progresses to limit any timely or costly setbacks

Natural Channel Construction Considerations

Active Construction Period

- Working within the floodplain requires careful consideration of construction timing and water management
- Communicating with stakeholders to ensure that timelines and environmental constraints are adhered to
- Phasing works across multiple fisheries windows requires detailed planning

Natural Channel Construction Considerations

Phasing Work to Facilitate Future Phases

- Planning and communicating a phased approach to satisfy the client's needs and the regulatory agencies interests
- Ensuring the integrity of the channel is maintained and stable
- Preparing the site for a shutdown period and commencement of floodplain works

Natural Channel Construction Considerations

Completion of Natural Channel Corridor

- Successfully completing the final stage of works while limiting environmental impacts
- Managing the final stages to ensure that conformance of the design is met to the satisfaction of all project disciplines
- Creating a natural channel corridor design that will provide improved habitat for aquatic and terrestrial species

Natural Channel Design

Design practice that mimics geomorphic and ecological functions

- Replace degraded channels with naturalized watercourses
- Offers significant improvements to channel form and function
- Wetland habitat creation

Channel Diversion and ESC Measures

Temporary Diversion Channel

- Maintains flows downstream of the site allowing work to be completed in dry conditions and without interference to the existing watercourse

Channel Diversion and ESC Measures

Sediment control around perimeter of the work area

- Protects natural areas and reduces sediment inputs to the floodplain from site earthworks
- Needs to be installed correctly and function as anticipated
- Requires monitoring, maintenance and modification

Channel Corridor Construction

Initial Construction Activities

- Mass excavation of the corridor creates excess cut material for the site
- Typically completed by an earthworks contractor
- Consideration of water management as the excavation impounds water from precipitation events
- Coordination with landscape contractor to minimize extent of exposed soils

Channel Corridor Construction

Low flow Channel Works

- Completed offline with a temporary diversion channel
- Further excess soil is created necessitating additional stockpiling needs
- Maintaining a dry work area requires water management techniques (i.e., cut-off swales, sediment basins, Hickenbottom® outlets, etc.)

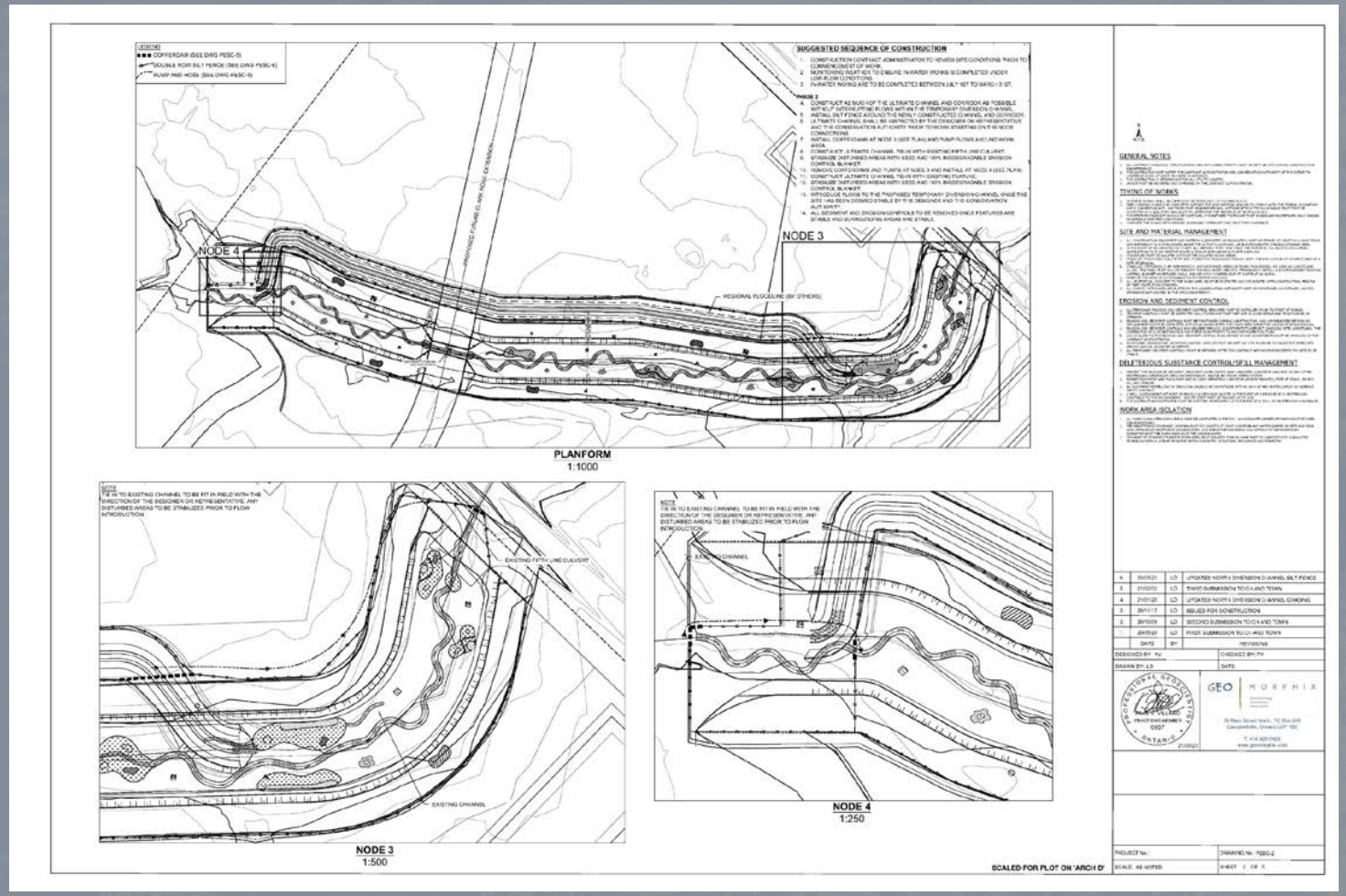
Environmental Constraints and Site Works

Various windows create critical scheduling and coordination

- Environmental windows are the primary driver for the schedule of channel works
- Other site works can impact the timing required for environmental windows and delay progress
- Consideration of a phased activation approach for large scale corridors that cannot be completed in one construction season

Environmental Constraints and Site Works	January	February	March	April	May	June	July	August	September	October	November	December
Warmwater Fishery Window												
Breeding Bird Window												
Landscape Works												
Earthworks and Servicing *Weather dependent												

Initial Phase of Channel Construction



- Offline channel works can be completed during the drier months of the year including winter
- The associated landscaping must be done during appropriate seasons
- Other phases might be reliant on activation of the low flow channel

Initial Phase of Channel Construction

- Best Management Practices used in all phases of construction

Initial Phase of Channel Construction

- Ensuring all specified materials are inspected and confirmed prior to installation

Initial Phase of Channel Construction

- Low flow channel and corridor designed to provide capacity for flooding during storm events

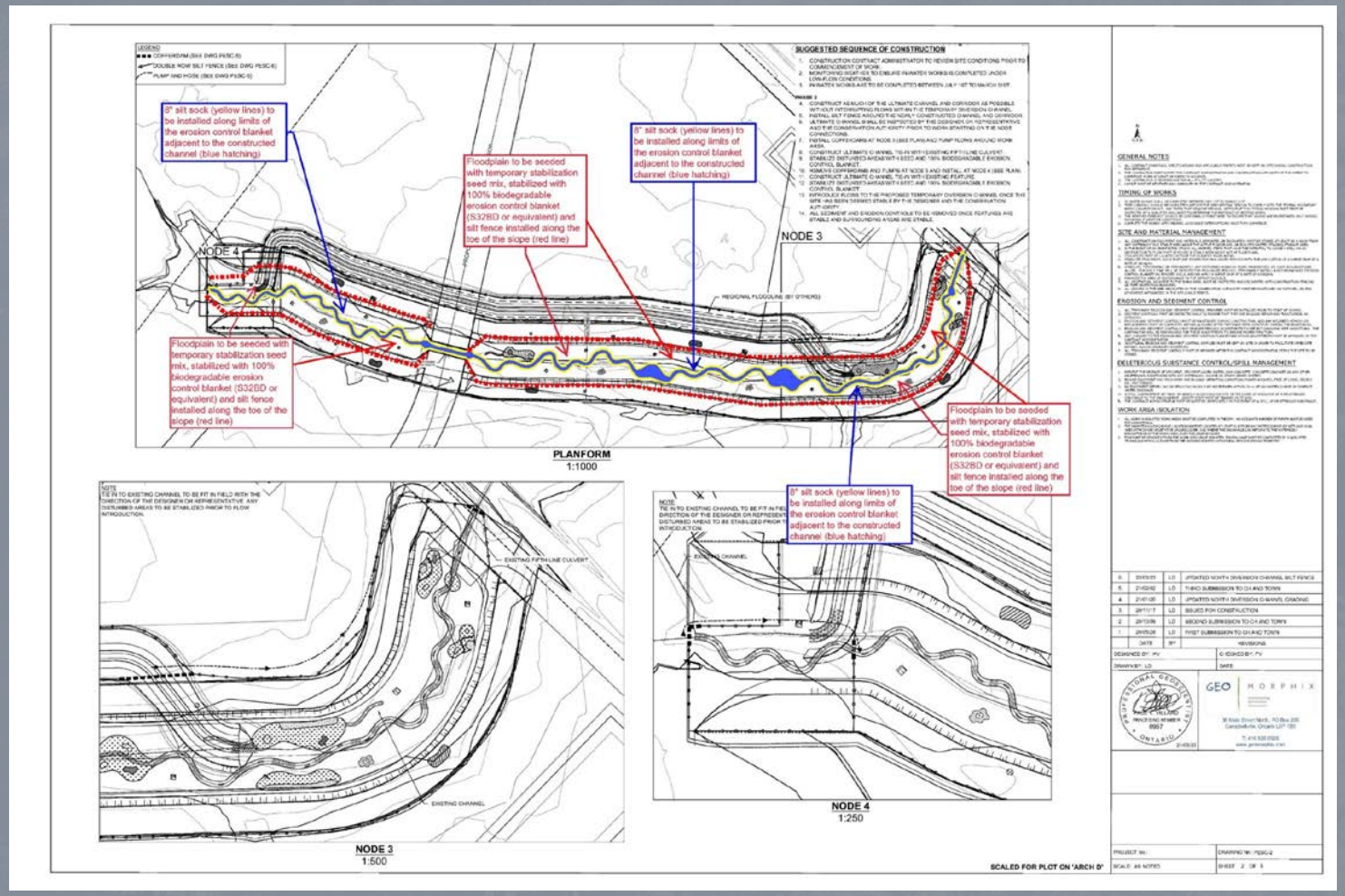
Initial Phase of Channel Construction

- Coordination with other development site works was required

Initial Phase of Channel Construction

November 2021

Interim Phase of Channel Construction



- Staging the channel construction and activation in phases
- Coordination with all disciplines of the project team
- Communication and approvals from the regulatory agencies
- Using mechanical stabilization can facilitate channel openings outside of growing season

Interim Phase of Channel Construction

- Proper installation of erosion control measures prevents loss of topsoil and seed, and provides stability to channel banks

Interim Phase of Channel Construction

- Using 100% biodegradable materials
- Specifications differ between products so it is important to review products prior to installation
- Proper installation with continuous soil contact and secured with an adequate number of biodegradable stakes

Interim Phase of Channel Construction

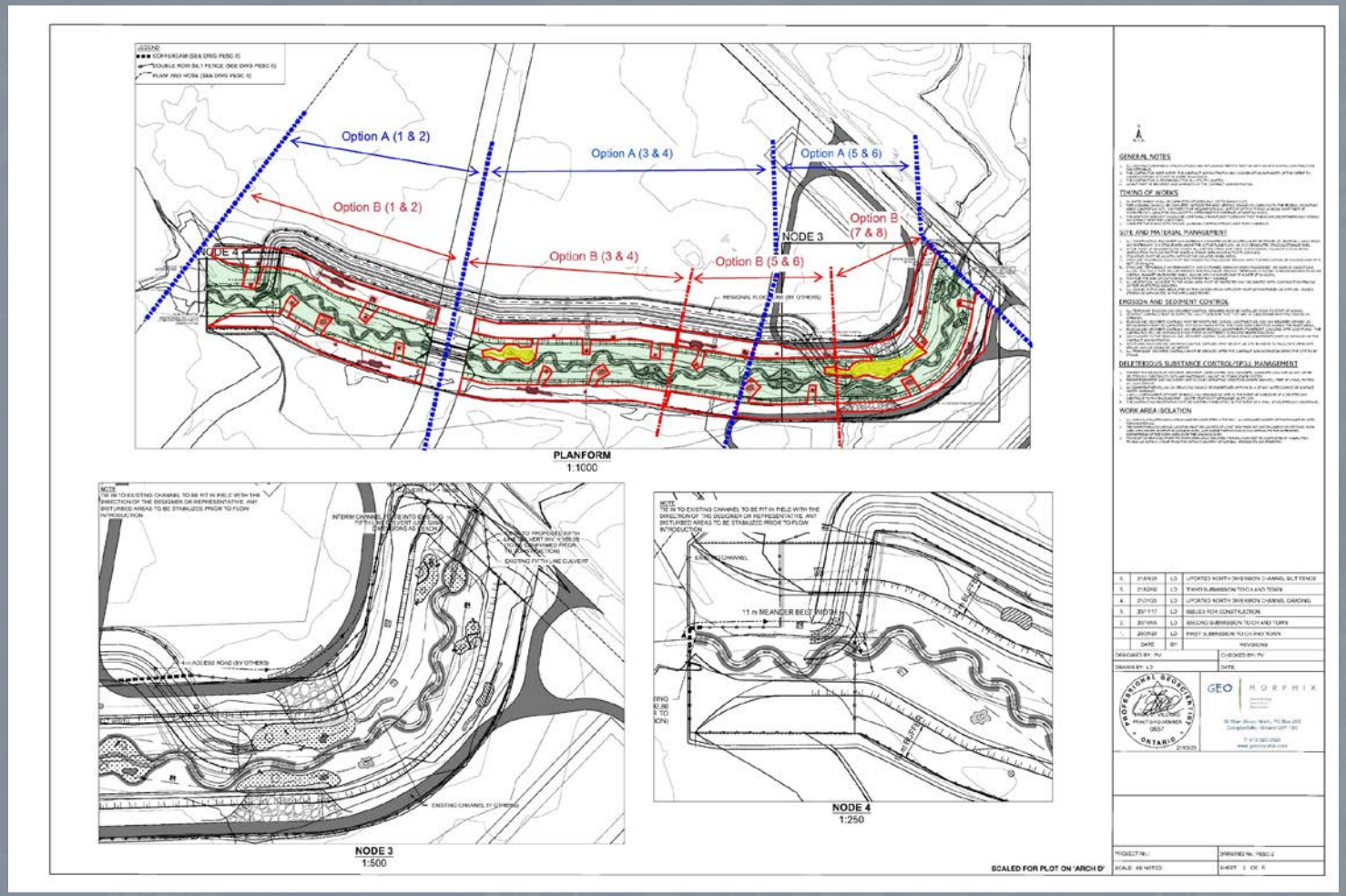
Bypass pumping during flow activation stages

- Channel and floodplain stabilization completed prior to flow activation
- Contractor to complete this phase as efficiently as possible
- Intake and discharge areas setup to prevent impacts to water quality and fish

Interim Phase of Channel Construction

March 2022

Final Phase of Channel Construction



- Final stage within the floodplain and slopes including landscaping and habitat features completed after activation of the low flow channel
- Ensuring the contractors are ready to re-mobilize when planting conditions are suitable
- Regular inspections to ensure works are progressing efficiently

Final Phase of Channel Construction

- Vegetation can establish within limits of low flow channel prior to and during habitat feature installation and landscaping

Final Phase of Channel Construction

- Complete the final works in sections to limit negative impacts to the receiving watercourse

Final Phase of Channel Construction

- Supplemental watering to promote vegetation establishment and prevent die-off

Final Phase of Channel Construction

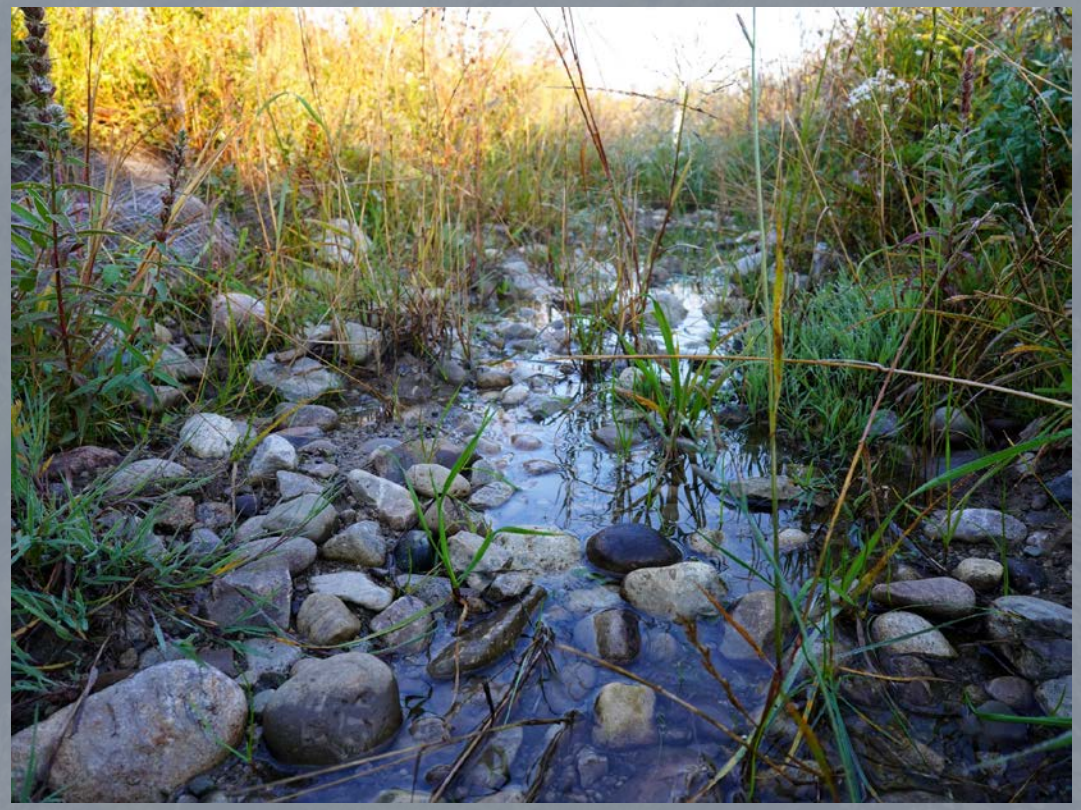
June 2022

Post-Construction Results

- Channel design is completed with a fully stabilized corridor before the end of the growing season

Post-Construction Results

- Habitat features are established within the corridor complete with a fully functional low flow channel



Post-Construction Results

October 2022

Conclusion

- Progression of the development site works and environmental requirements in large-scale corridor channel construction can be achieved simultaneously
- Phasing construction to keep project moving forward and towards completion requires effective communication with regulatory agencies
- Successful implementation of a design through phased channel and corridor activation

Thanks to the entire team that helped make this project a success

Questions?

SOURCE TO STREAM 2023 Conference

Canada's Premier Stormwater and Erosion and Sediment Control Conference

Thank you to our sponsors!

EXECUTIVE SPONSORS

CULTEC

Canadian Society for Civil Engineering / Société canadienne de génie civil

ADS – Our reason is water.™

CUPOLEX® ENGINEERING SOLUTIONS INC.

ENVIROPOD™

York Region

filtrexx® CANADA SUSTAINABLE TECHNOLOGIES – let nature do it.®

DICORP DOWN TO EARTH BUSINESS

GEO MORPHIX™

Hydro International

NEXT STORM

Greck

Sustainable Technologies EVALUATION PROGRAM

OPPORTUNITIES SPONSOR

AECOM

MEDIA SPONSORS

WATER CANADA

HOSTS

Presented by:

Toronto and Region Conservation Authority

In association with:

Lake Simcoe Region conservation authority

Credit Valley Conservation inspired by nature