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Erosion and Sediment Control Innovation in Highway Construction

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What is innovation?

- **Innovation** means “to make changes in something established, especially by introducing new methods, ideas or products”.

What did we need to change?



What did we need to change?



Why did we need to change?

Assumed temporary erosion control (TEC) was happening, but...

- Erosion risk not assessed in design
- Areas to apply TEC not specified for construction
- Temporary ESC specification primarily for sediment control measures
- Most TEC measures/items only available for protecting seed
- No way to pay Contractors for other types of TEC

How did we propose to change?

- Use a risk based approach
- Define high risk areas for erosion in design
- Identify high risk areas in construction contracts
- Provide measures and pay items for TEC by Contractor choice
- Require adaptive management to monitor use and allow for adjustments
- Pilot the new approach in some contracts

Pilot Project Details - Origins

- NWR Environmental Section required design consultant to complete Erosion and Sediment Overview Risk Assessment (ESORA) per MTO ESC Guide
- Multi-disciplinary team of experts from MTO engineering, operations, and policy, with consultant specialists, designers and trainers, and non-MTO Contractor:
 - Held workshop to develop new approach for project construction
 - Developed non-standard special provisions to facilitate trial implementation

Pilot Project Details – Contract Specs

Temporary Erosion Control (TEC) SP

- Covers requirements for supply, application, maintenance and removal of TEC under m2 pay item
- Defines acceptable TEC
- Methods, means and materials are Contractor's choice
- Requires TEC in high risk areas called Temporary Erosion Control Areas (TECAs):
 - Materials or products to cover exposed earth
 - Methods to avoid the need to cover exposed earth
 - Contractor paid for TEC for either choice to provide incentive for change

Pilot Project Details - Contract Specs

Adaptive Management for Temporary ESC SP

- Covers requirements for adaptive management of ESC in TECAs including materials, products and/or methods under Lump Sum basis of payment
- Defines adaptive management process for TECAs and key personnel accountable for ESC:
 - Requires ESC training for key personnel and orientation for others on site
 - Requires daily monitoring and documentation of ESC in ESC Diary
 - Requires weekly meetings, proactive/timely management of ESC issues and planning ahead for up-coming work

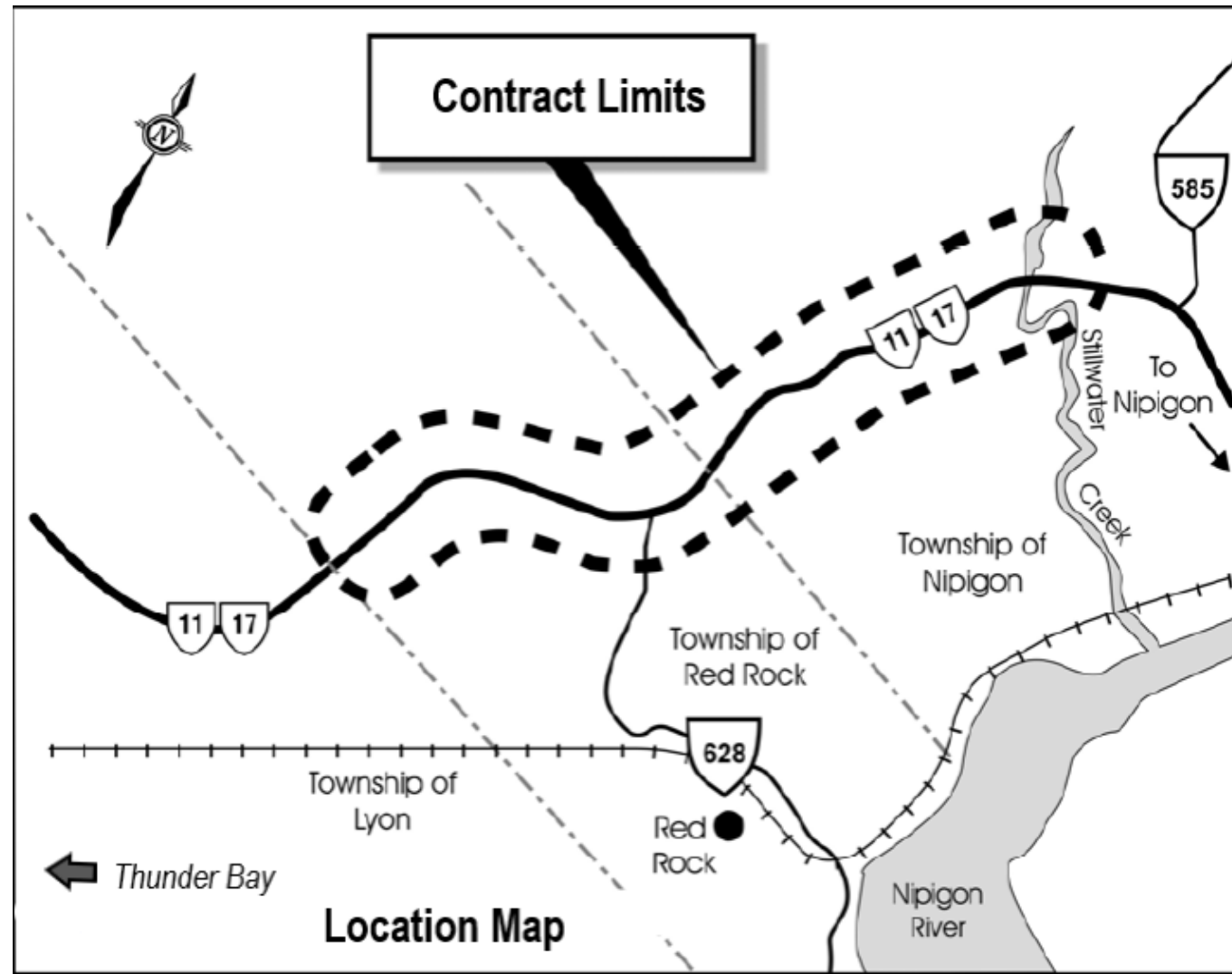
Pilot Project Details - Objectives



Pilot Project Details - Objectives

- Show improvement not perfection
- Promote better use of resources
- Fill the erosion control “gap”
- Promote shift to “erosion control at the source”
- Encourage Contractors to take a greater role in ESC and complete work differently
- Improve communications on ESC issues
- Show that “stabilizing as you go” can work during highway construction

Pilot Project Details – Project Location

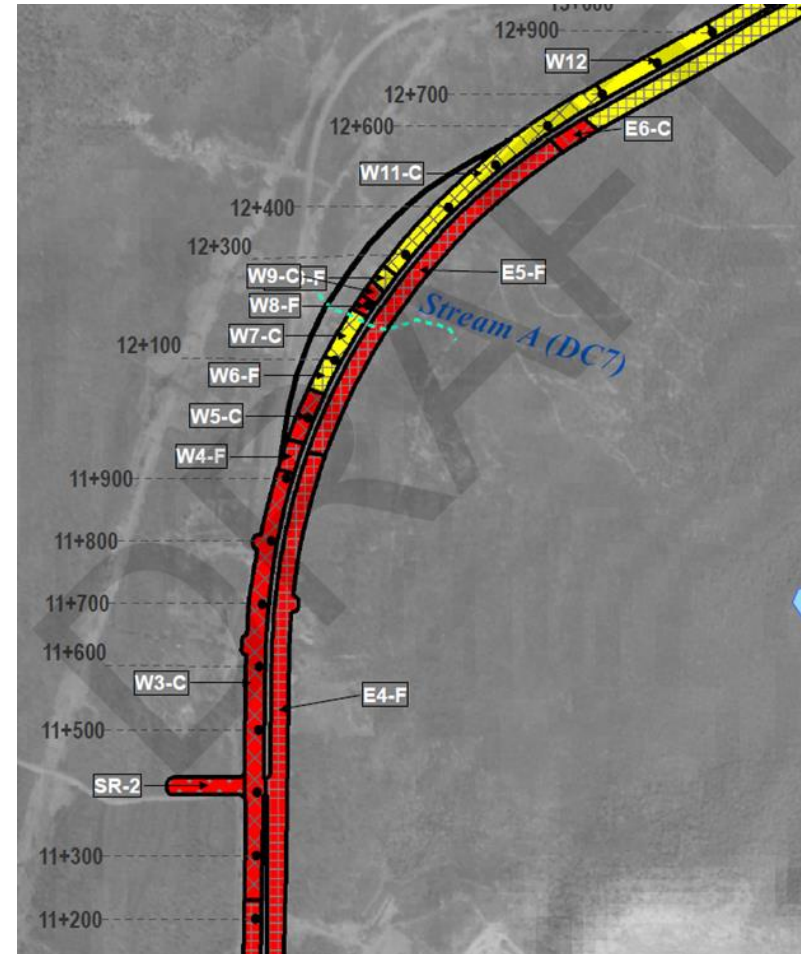


Pilot Project Details – Description of Work

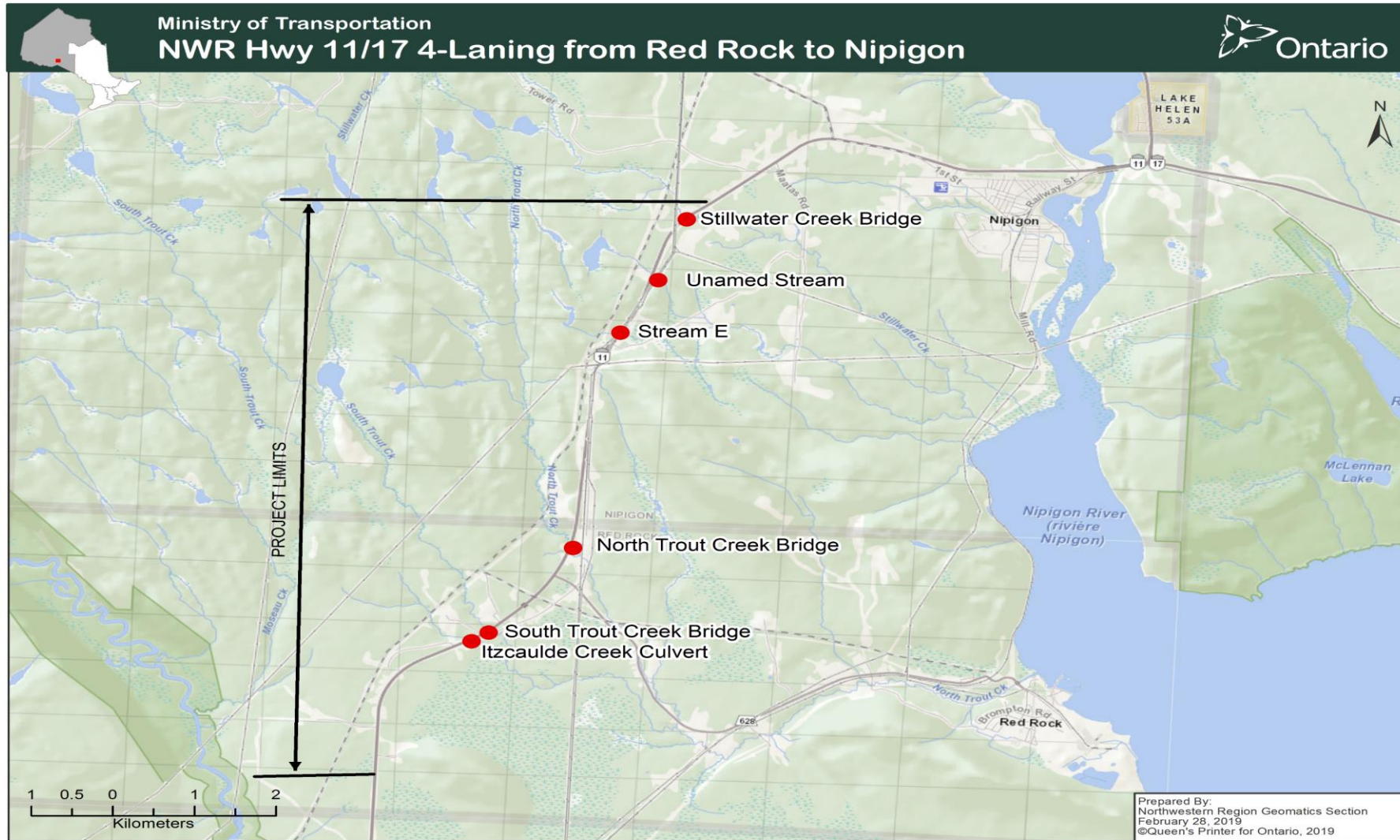
- Four-Laning of Highway 11/17
- Grading, Granular Base, Drainage, Hot Mix Paving, Electrical and Structural
- Predominantly constructed on a new alignment
- Included:
 - four new bridges
 - one open bottom sheet pile culvert
 - numerous non-structural culverts

Erosion and Sediment Overview Risk Assessment (ESORA)

- Factual description of:
 - Soil types and erodibility
 - Sensitivity of receptors e.g. watercourses, private property, SAR habitat, etc.
- Objective evaluation of erosion risk
- Mapping of areas (polygons) of similar risk



Pilot Project Details – High Risk Areas



Pilot Project Details – High Risk Areas

Unnamed tributary to South Trout Creek (Stream "B") 401040 E, 5422840 N zone 16	Cold	Very sensitive, groundwater feeder creek. Designated as an Environmental Protection Area in the Township of Red Rock's Official Plan.	high High
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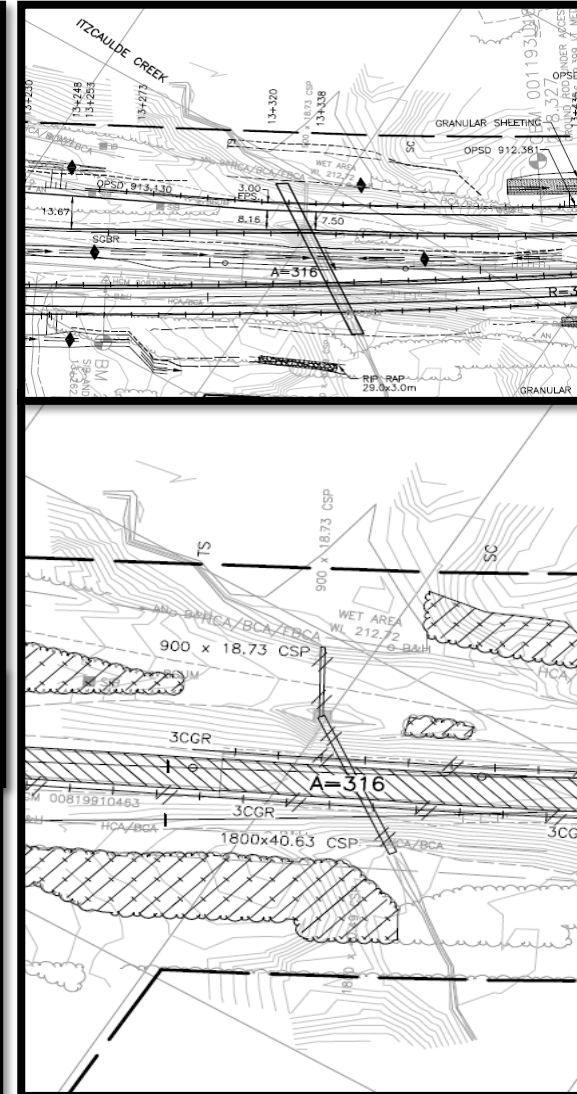
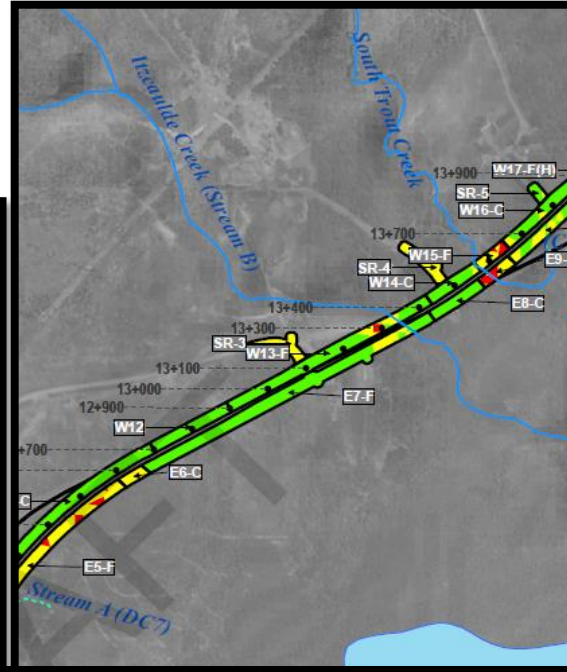
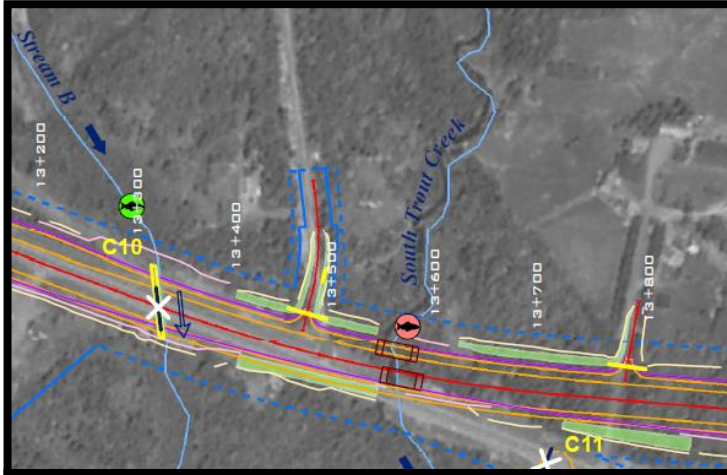


Photo 1: Alder swamp upstream of the proposed ROW (August 2011, facing north).

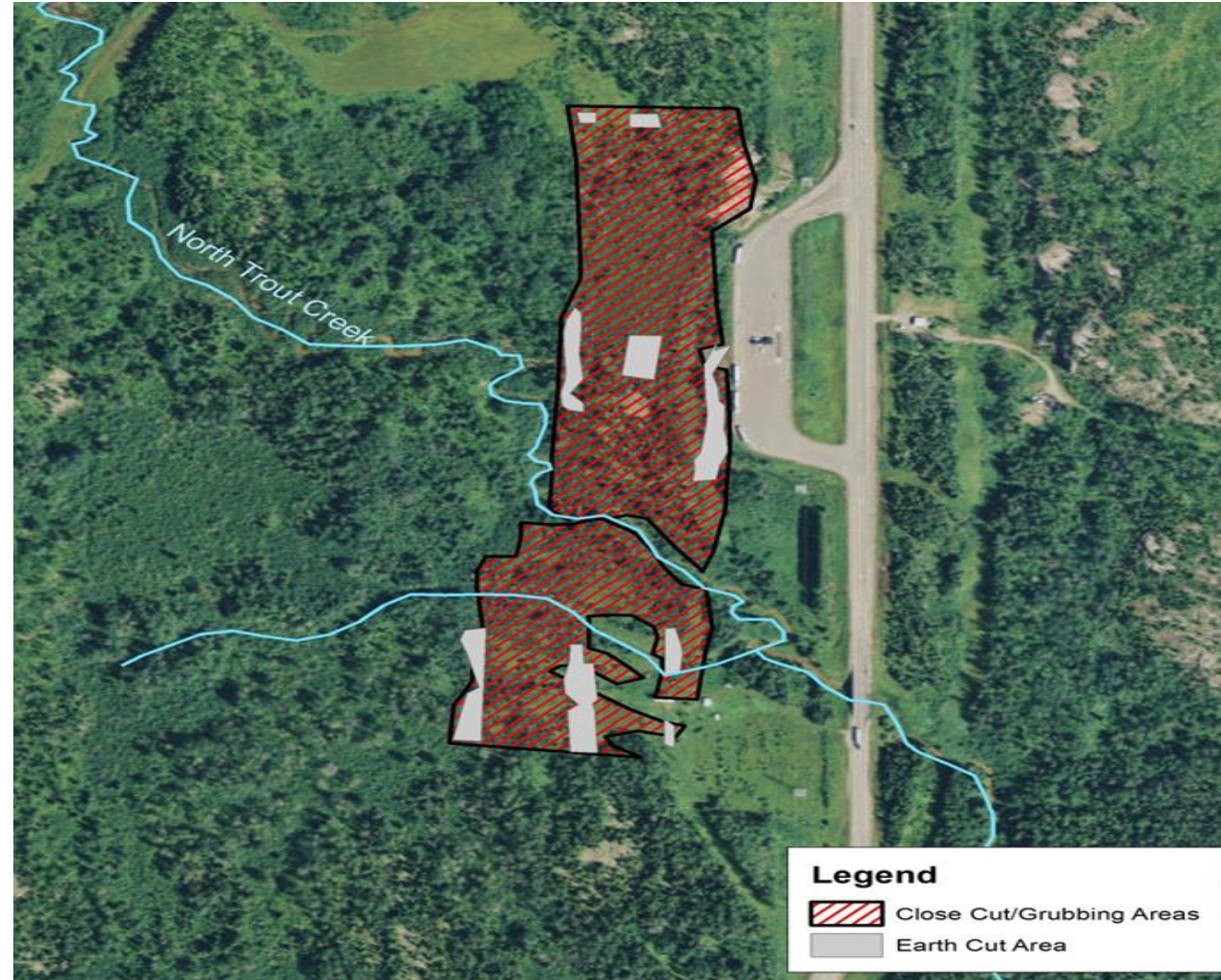


Photo 2: Aquatic conditions found throughout the alder swamp (August 2011, facing north).



Photo 3: Facing downstream of the existing highway. This is within the area of the proposed highway ROW (August 2011, facing south).

Pilot Project Details – High Risk Areas



Pilot Project Details – During Construction



Pilot Project Details – During Construction



Pilot Project Details – During Construction



Pilot Project Details – During Construction



Pilot Project Details – During Construction



Pilot Project Details – During Construction



Pilot Project Details – During Construction



Pilot Project Details – During Construction



What did we learn?

- Retain roots and cut veg as TEC by deferring grubbing; decouple it from close cut clearing
- TEC can work but advancing permanent erosion control works better
- Unit rate for payment for TEC works best to allow for efficient adjustment
- Flexibility of leaving products/methods to the Contractor worked well
- Adaptive management process helped keep temporary erosion control in focus

What did we learn?

- Add requirement for CA to certify grades in TECAs within 48 hours
- Consider increasing tolerances for ditches requiring topsoil and seed
- Keeping extra quantities on retainer reduces approval time when switching to a sturdier final cover
- **Cost of TEC and Adaptive Management items was only 1% of overall cost of job**

What are we doing next?

- Obtaining feedback and recommendations from pilot participants
- Compiling results of all pilot projects
- Looking for best way to adopt these concepts and recommendations into current standard specifications
- Seeking internal approval to implement updated standards when complete

Acknowledgements

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