TRIECA 2019 CONFERENCE

Thank you to our sponsors:

www.trieca.com

GOLD SPONSORS

AECOM

Credit Valley Conservation
inspired by nature

Stantec

AQUATECH

armtec
CANADACULVERT

CIVICA
Water Management Solutions

J.Lipani Turf

CROZIER
CONSULTING ENGINEERS

terrafix
geosynthetics inc.

UNILOCK
DESIGNED TO CONNECT.

GEMS

Hydro International

R&M
CONSTRUCTION

filtrexx
CANADA
LAND IMPROVEMENT SYSTEMS
let nature do it.

Profile
Solutions for your Environment

Lake Simcoe Region
conservation authority

York Region

MEDIA SPONSORS

Environmental & Science Engineering MAGAZINE

WATER CANADA

PRINT SPONSOR

WARREN'S
WATERLESS PRINTING INC.

HOSTS

CAN-IECA
CANADIAN CHAPTER

Toronto and Region Conservation Authority

Tremaine Road Extension from Steeles Avenue to No. 3 Side Road, Milton, Ontario: Managing Complex Environmental Challenges through Careful Planning and Monitoring

Presenters:

Derek Stewart, P. Geo., and Peter van Driel, P. Geo.

WSP Canada Group Limited

Project Owner: Regional Municipality of Halton

Engineering Design Lead:

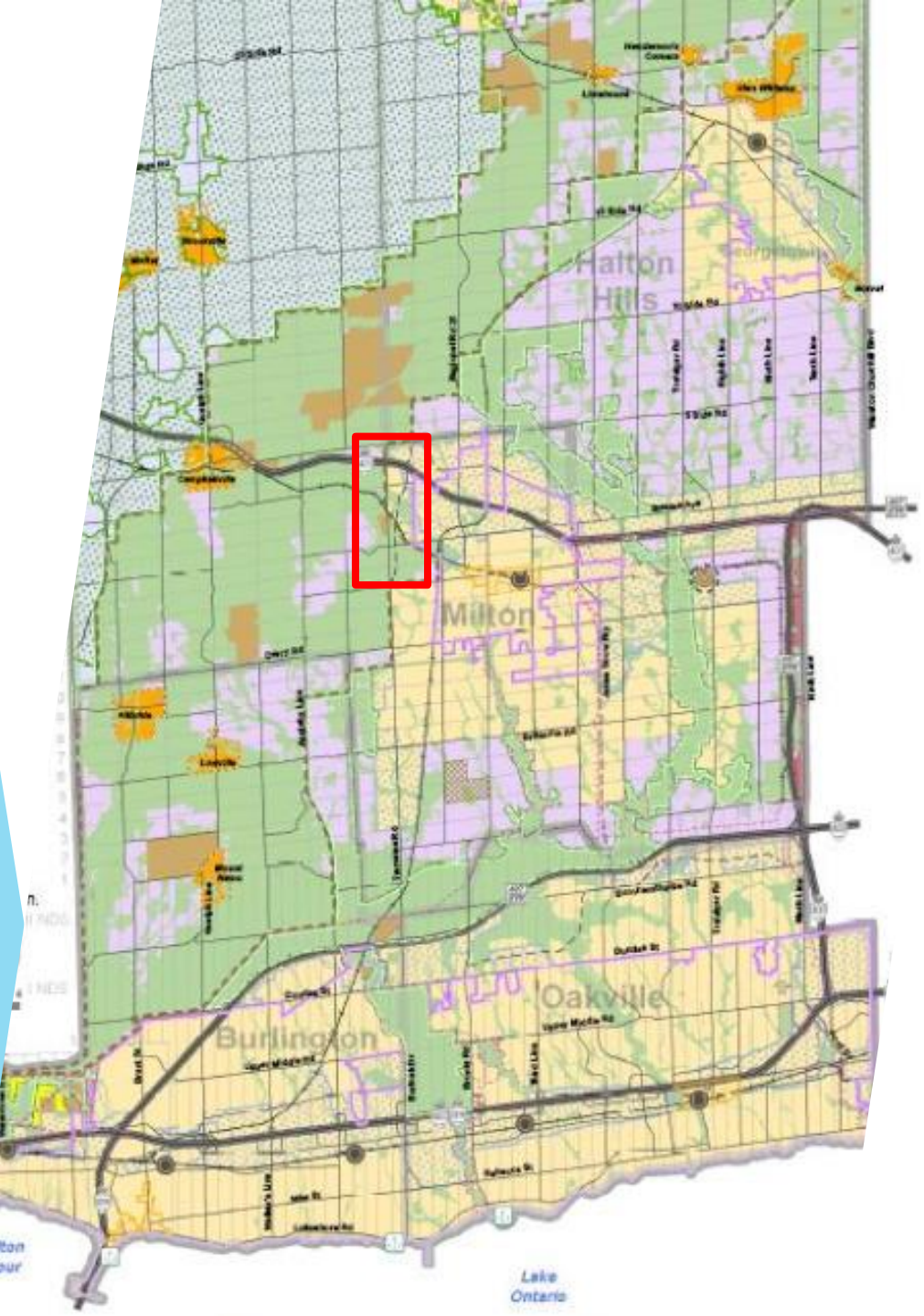
Bob Rook, P. Eng., WSP Canada Group Limited

Contractor: Dufferin Construction Corporation

Presentation Outline:

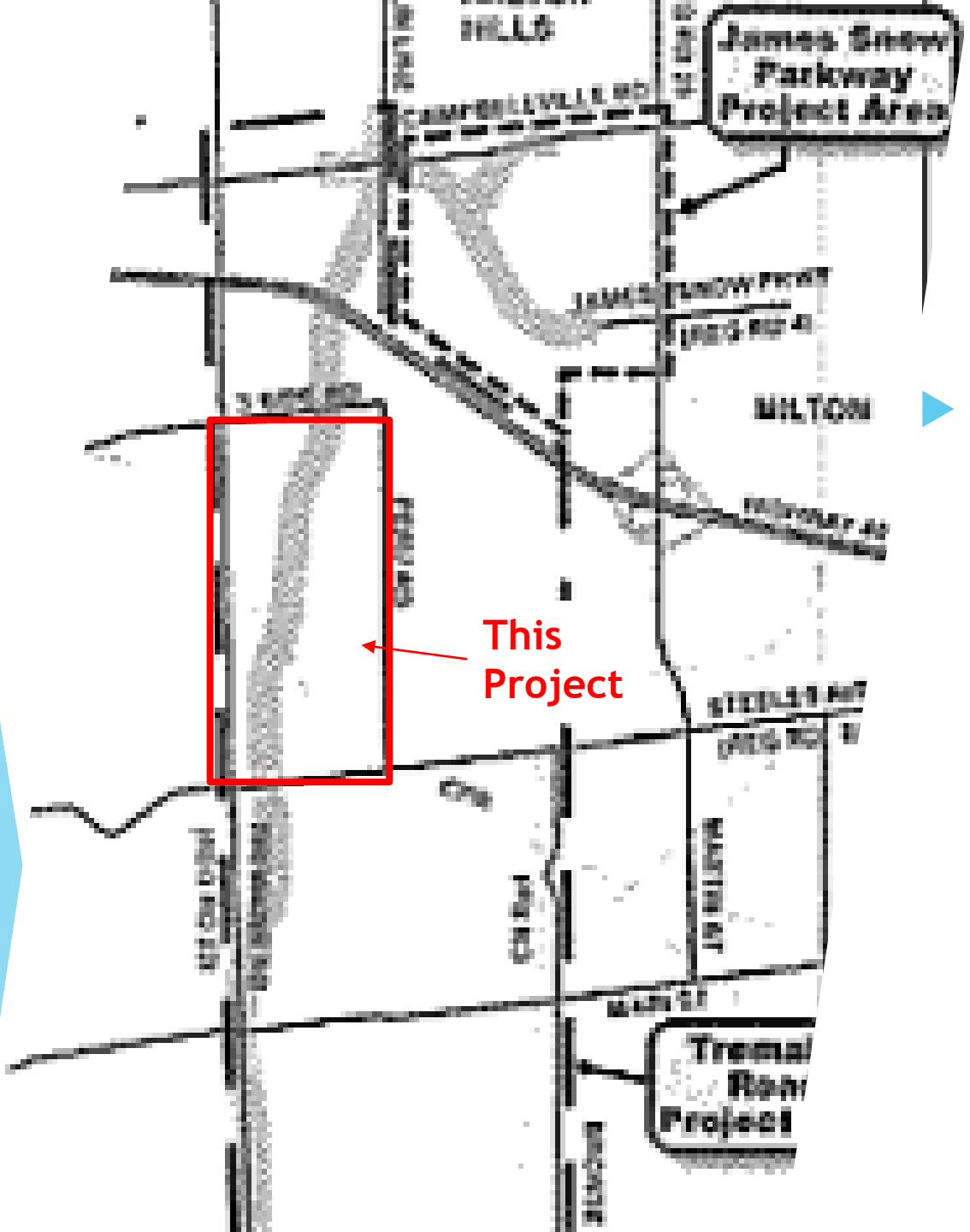
1. Project Background
2. Project Objectives
3. Site History
4. Pre-Construction Conditions
5. Environmental Challenges and Opportunities
6. Environmental Management Plan
7. Project Progress to Date

Project Location:



Part 1: Project Background:

- The Master Transportation/Transit Plan for the Sherwood Survey District of Milton (Prepared in 2003) identified **the need for a new interchange with Highway 401 at Tremaine Road, along with the widening of Tremaine Road from 2 to 4 lanes and the westerly extension of James Snow Parkway.**
- The Secondary Planning process was carried out with **extensive public consultation in keeping with the Municipal Class EA requirements.**



Part 1: Project Background:

- The preferred design for Tremaine Road within the project limits, as identified in the Environmental Study Report, involves the **realignment of Tremaine Road to a four lane semi-urban section from Main Street to Campbellville Road,** including a new interchange at Highway 401, and a roundabout at Main Street.

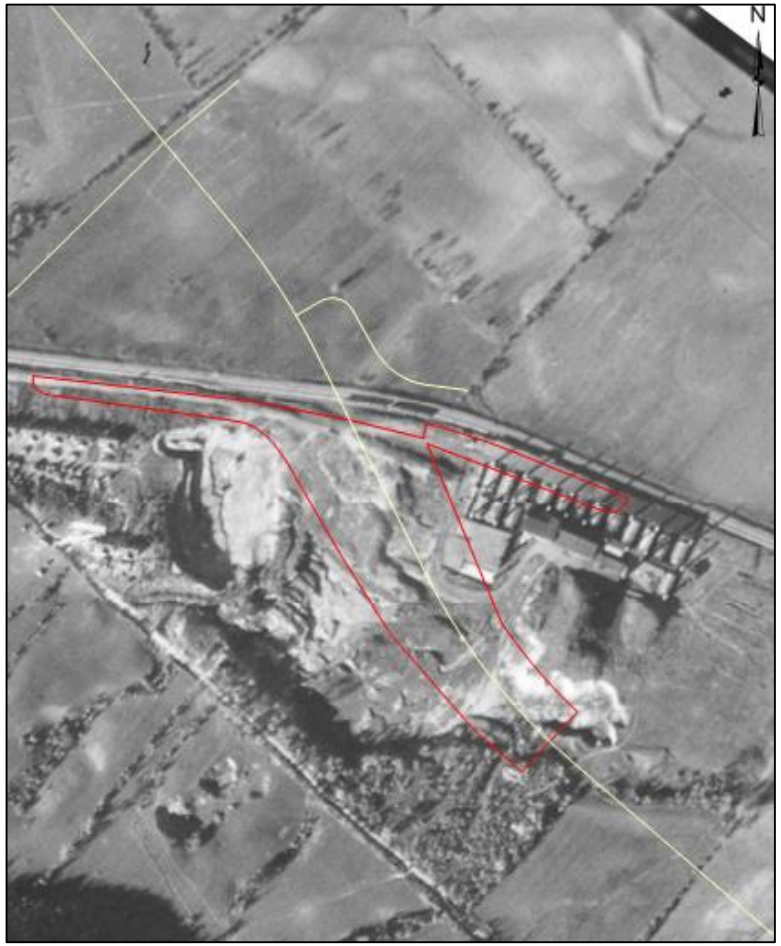
Part 2: Project Objectives:

- **How to realign Tremaine Road as a new four-lane road, through an environmentally sensitive landscape, and minimize the environmental impact.**

Part 2: Project Objectives:

- Understand Existing Conditions
- Protect Unique Attributes of Natural Environment As Much as Possible
- Evaluate Success through Environmental Monitoring
- Note Learning Opportunities

Part 3: Historical Land Use: Brick Works and Shale Quarry



1934 aerial photograph showing the historical brick works and shale quarry

September 2016 Google Earth Image of the Same Area

Part 3: Historical Land Use: Brick Works and Shale Quarry

www.images.ourontario.ca

www.images. Milton.halinet.on.ca

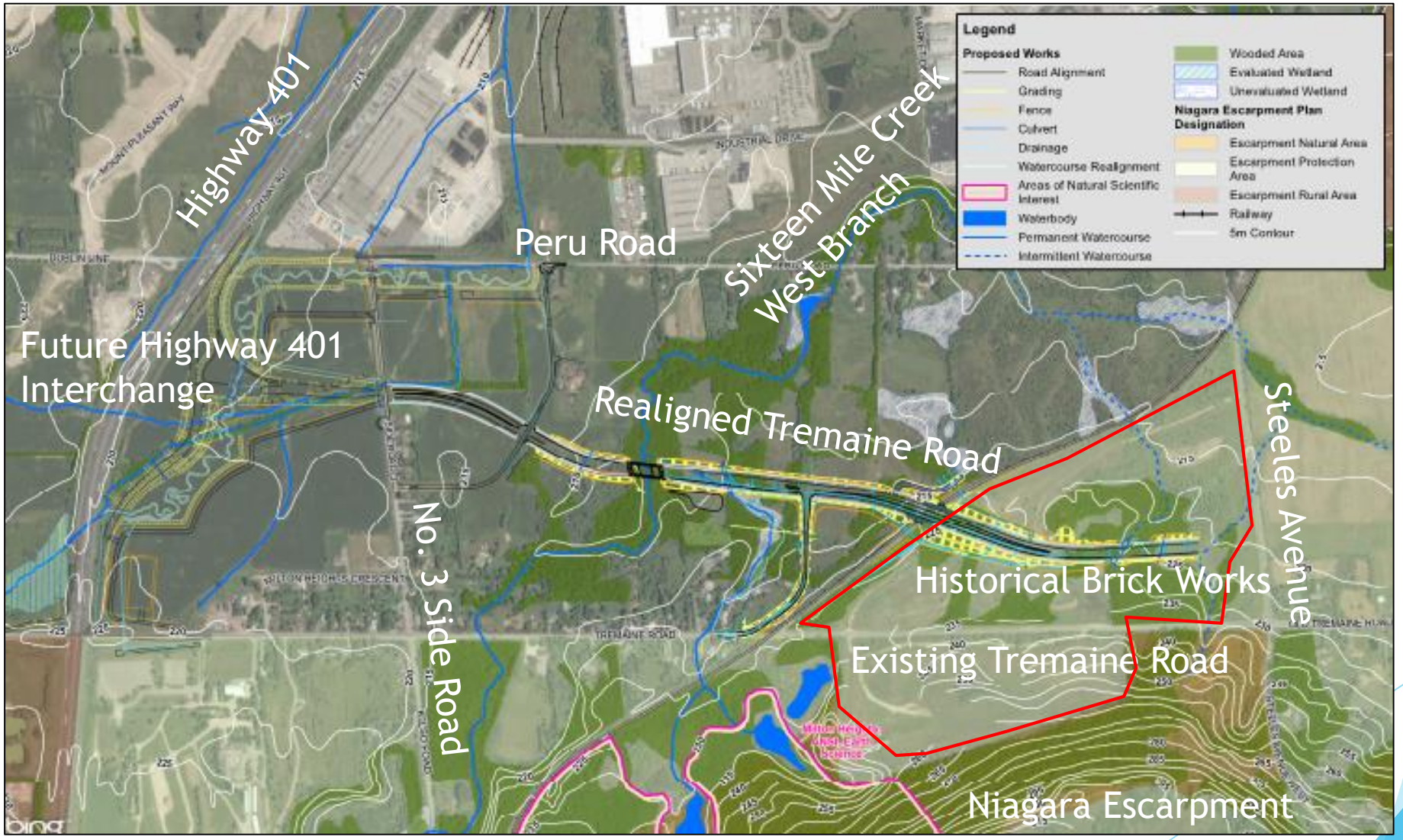
Part 4: Understand Existing Conditions:

- Natural Environment
- Geology
- Hydrogeology and Hydrology
- Soil and Groundwater Quality
- Land Use, Buildings, and Infrastructure (Current and Historical)
- Public Concerns
- Regulatory Framework

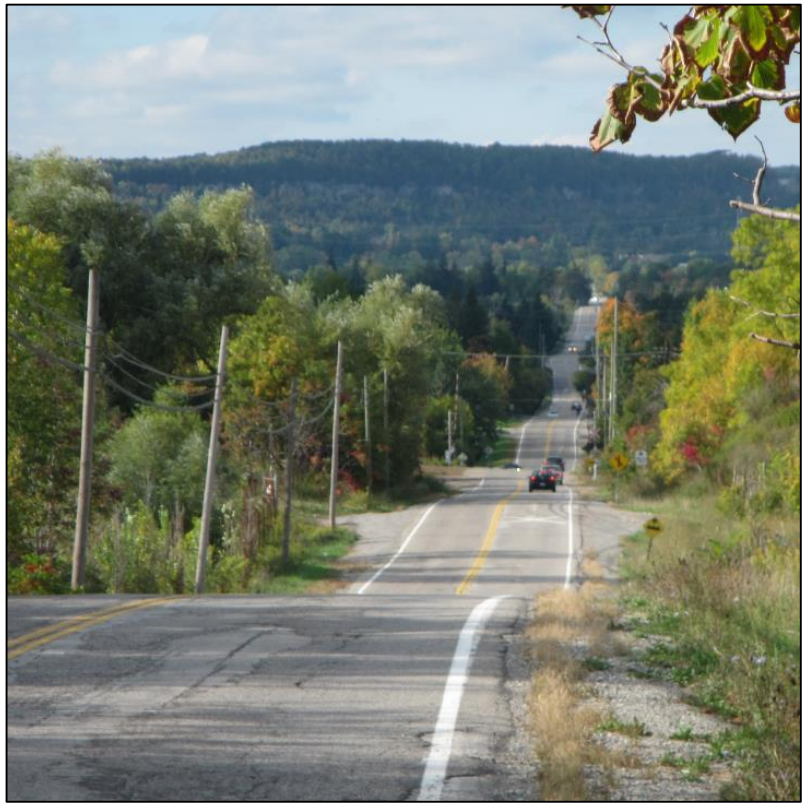
Part 4A: Existing Natural Environment:

- Niagara Escarpment (World Biosphere Reserve)
- Sixteen Mile Creek (Coldwater creek with rainbow trout and redside dace habitat)
- Tributary streams (Contributing fish habitat)
- Wetlands and Small Ponds
- Forests
- Residential homes

Part 4A: Existing Natural Environment



Part 4A: Existing Natural Environment and Land Use



Existing Tremaine Road
October 2016

Jannock Lands Wetlands
May 2017, with the Niagara Escarpment in the background.

Part 4A: Existing Environment Photographs

Former brick works, now covered by earth fill mixed with bricks.

Drainage culverts under brick fill areas, Long forgotten about.

Part 4A: Existing Environment Photographs

Wetlands north (down slope) from the Canadian Pacific Railway Tracks sustained by groundwater discharge.

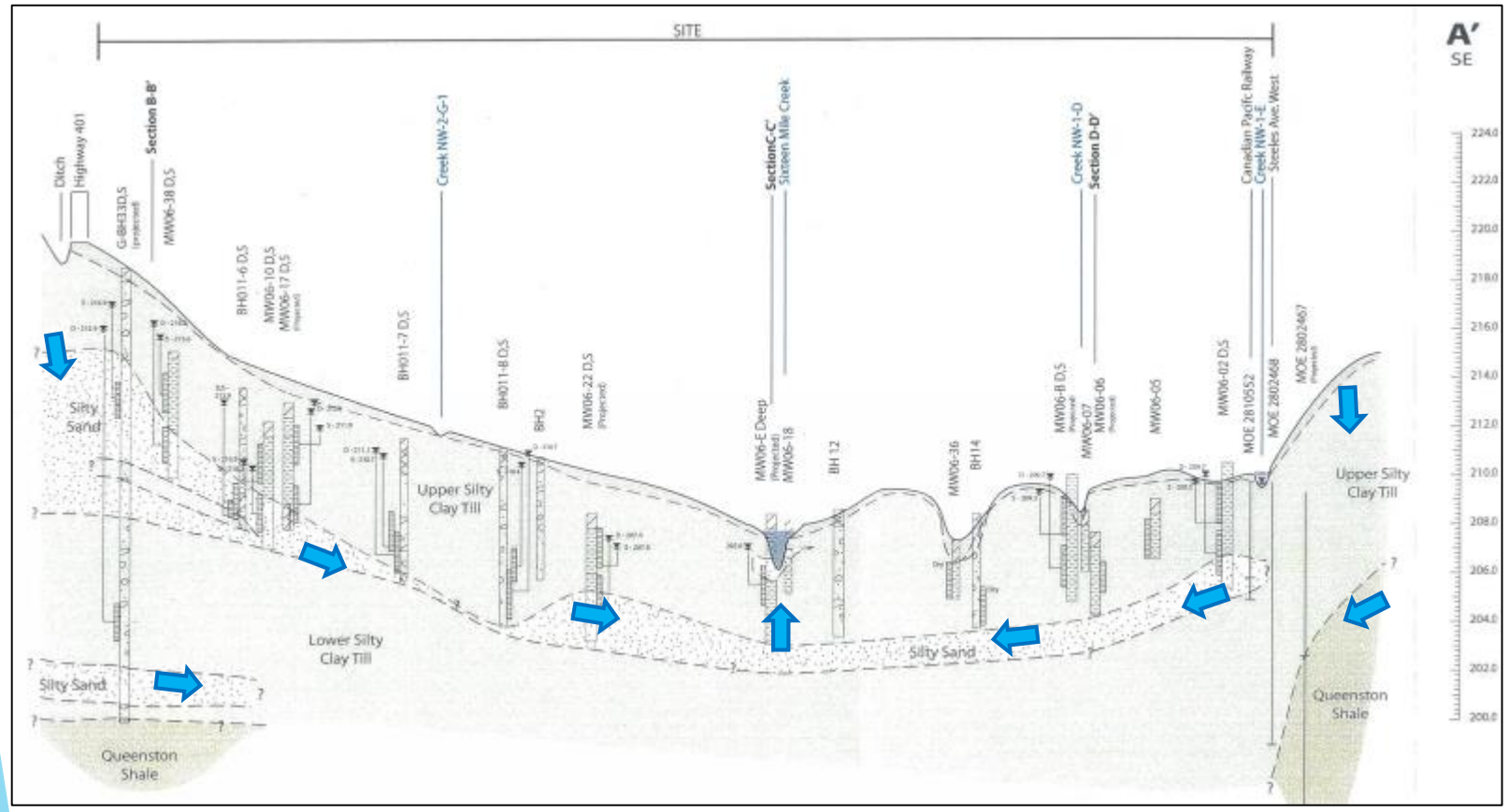
Part 4A: Existing Environment Photographs

Ground view, July 2018

Aerial view, July 2018

Sixteen Mile Creek Crossing

Part 4B: Existing Environment: Geology and Hydrogeology

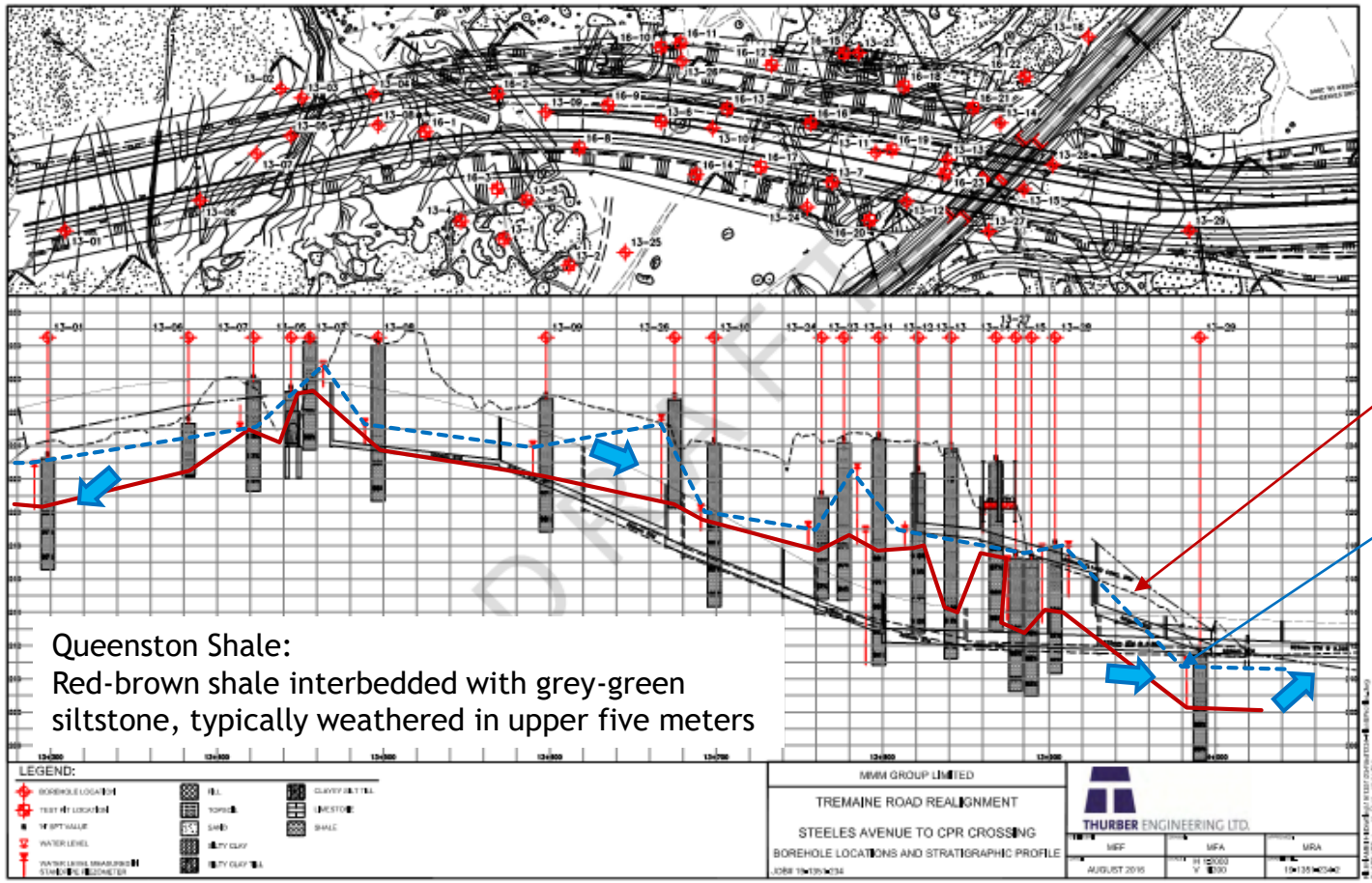


Interpreted Groundwater Flow Direction

Extensive geological and hydrogeological investigations done by AMEC (2003) on behalf of Milton Heights Landowners Group

Part 4B: Existing Environment: Geology and Hydrogeology

Southwest



Northeast

Earth Fill:
Silt, Clay, Ground-up Shale and Brick Rubble

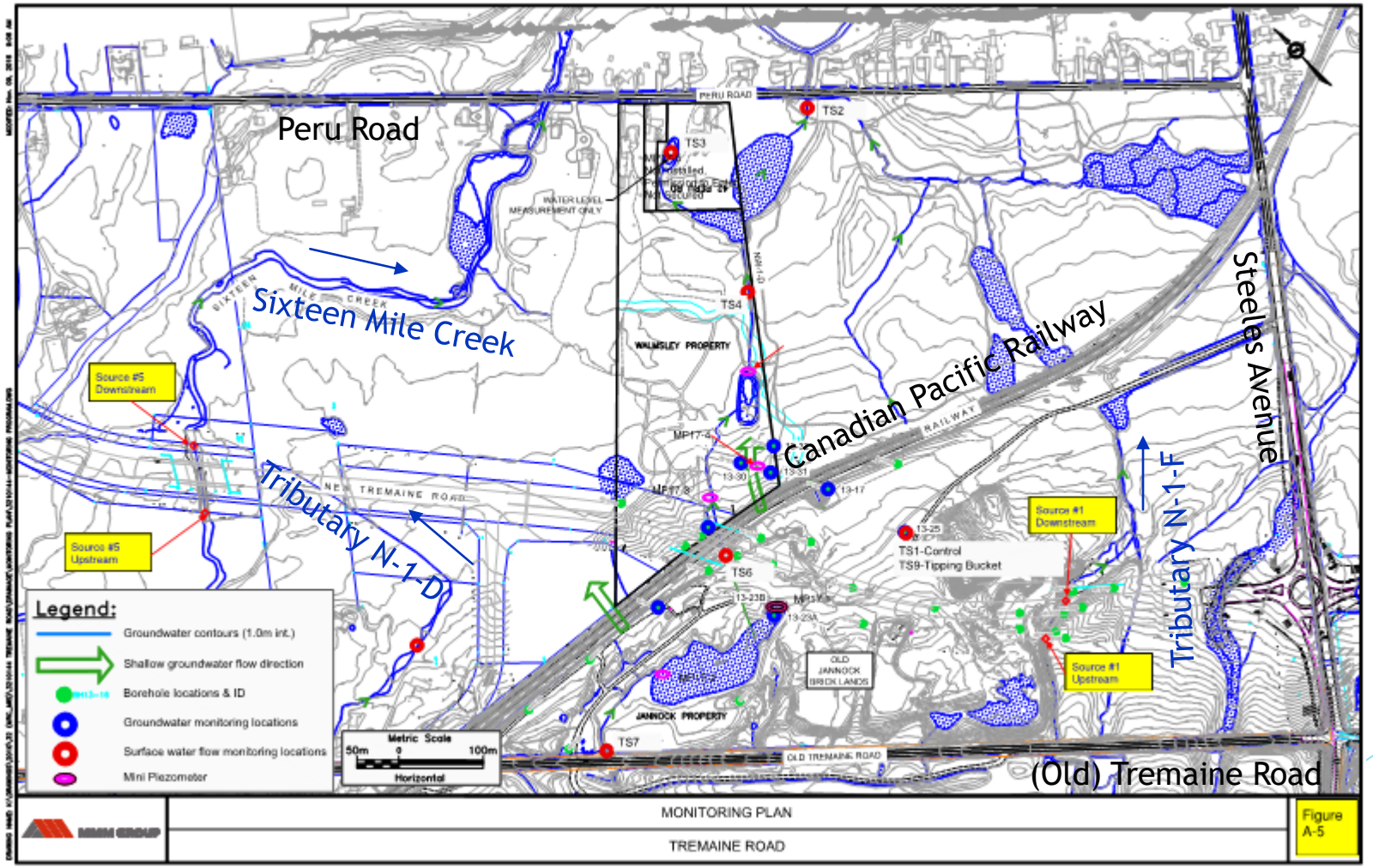
Perched Groundwater in the Earth Fill Unit, Regional Aquifer in the Upper Weathered Shale

→ Interpreted Groundwater Flow Direction

Geological Cross Section Prepared by Thurber Engineering Limited (August 2016)

Part 4B: Existing Environment: Hydrology and Monitoring Network

Northeast



Southwest

Part 4D: Existing Soil Quality (Former Brick Works/Quarry South of Tracks)

- **WSP carried out an extensive environmental investigation across the former brick quarry lands based on a 10x20x5 metre depth grid (total of 170 “cells”).**
- **These investigations identified a significant portion of the former brick quarry fill to be contaminated with PAHs and metals with concentration levels above the MECP Table 3 Site Condition Standards.**
- **The fill included a significant quantity of waste brick and other debris up to depths of 5 metres below ground surface.**

Existing Environment: Soil Quality (Former Brick Works/Quarry South of CPR Railroad)

Part 4D: Groundwater Quality

- Elevated concentrations of several dissolved metals (aluminum, arsenic, boron, cobalt, copper, iron, lead, molybdenum, and uranium) above PWQO criteria, in the former brick quarry area, and to a lesser extent, in the weathered shale aquifer.
- Elevated concentration of polycyclic aromatic hydrocarbons above PWQO criteria at two monitoring well locations in the former brick quarry area.
- A combination of splash aeration of dewatering discharge water treatment and an enhanced level of filtration will likely be required to ensure that construction dewatering discharge water meets PWQO criteria.

Part 4E: Public Concern

- Concern over protecting unique hydrological and hydrogeological conditions which sustained wetlands in the area.
- Protection of water quality in Sixteen Mile Creek.
- Landowners petitioned Halton Region for surface water and groundwater monitoring prior to construction to understand existing conditions, and mitigate impacts.

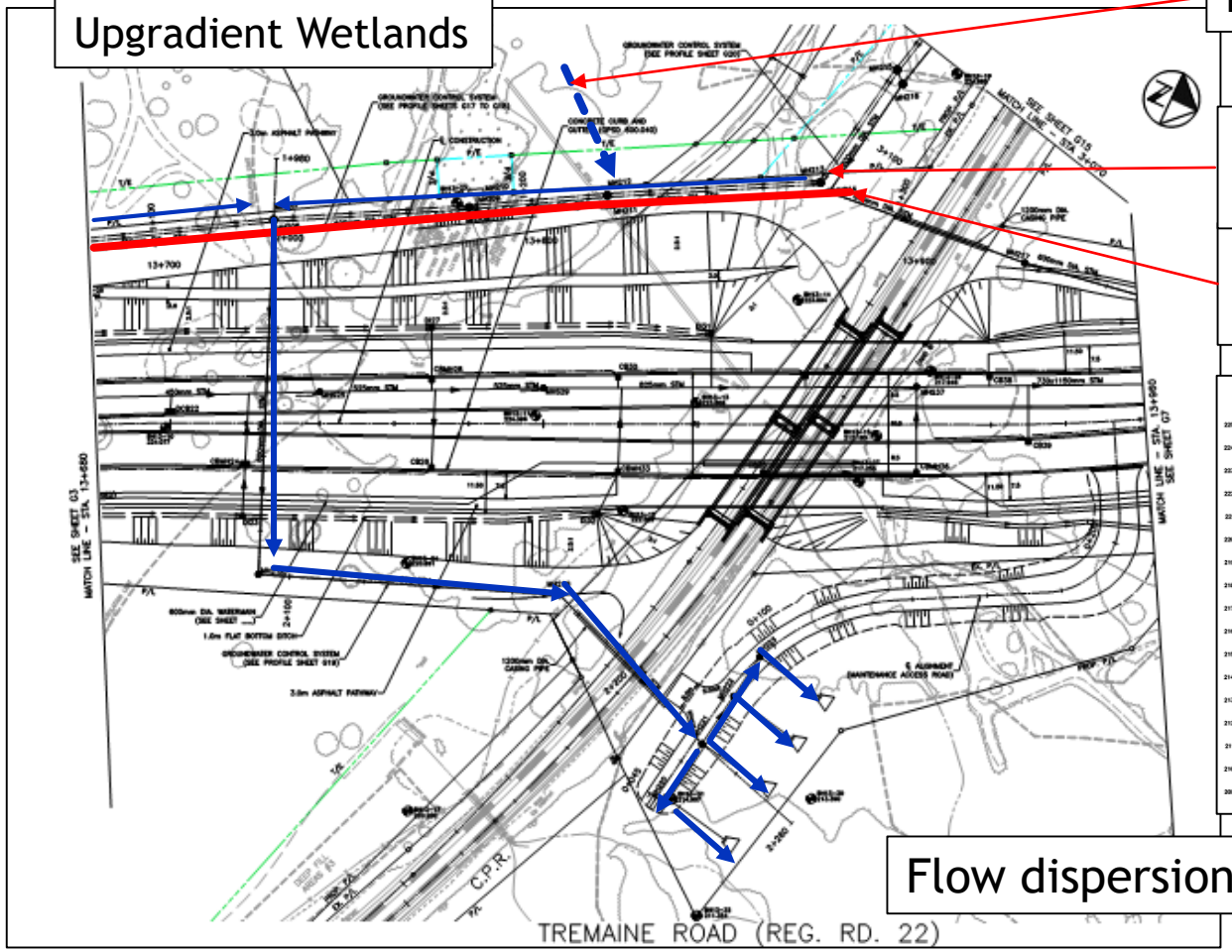
Part 4F: Regulatory Framework

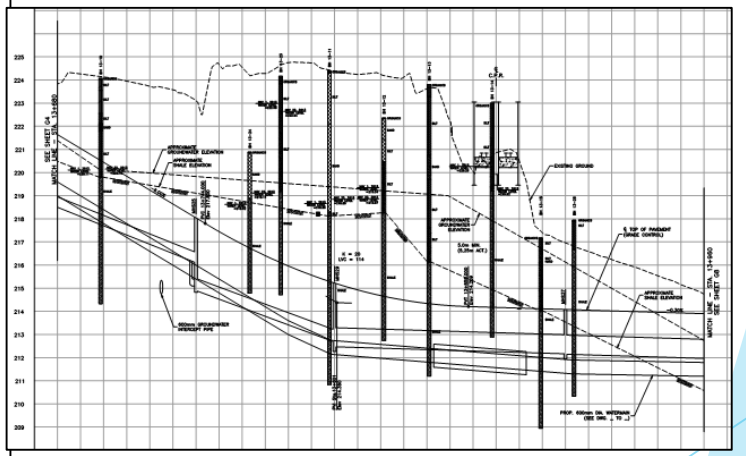
- Construction Dewatering required obtaining a Category 3 Permit-to-Take-Water from the Ontario Ministry of the Environment, Conservation, and Parks (MECP);
- Dewatering discharge water must meet Provincial Water Quality Objectives (PWQO);
- Authorization required from the Niagara Escarpment Commission and Conservation Halton;
- Fisheries protection timing windows applied to in-water works;
- Soil quality objectives as defined by O. Reg. 153/04 as amended.

Part 5: Environmental Challenges and Opportunities

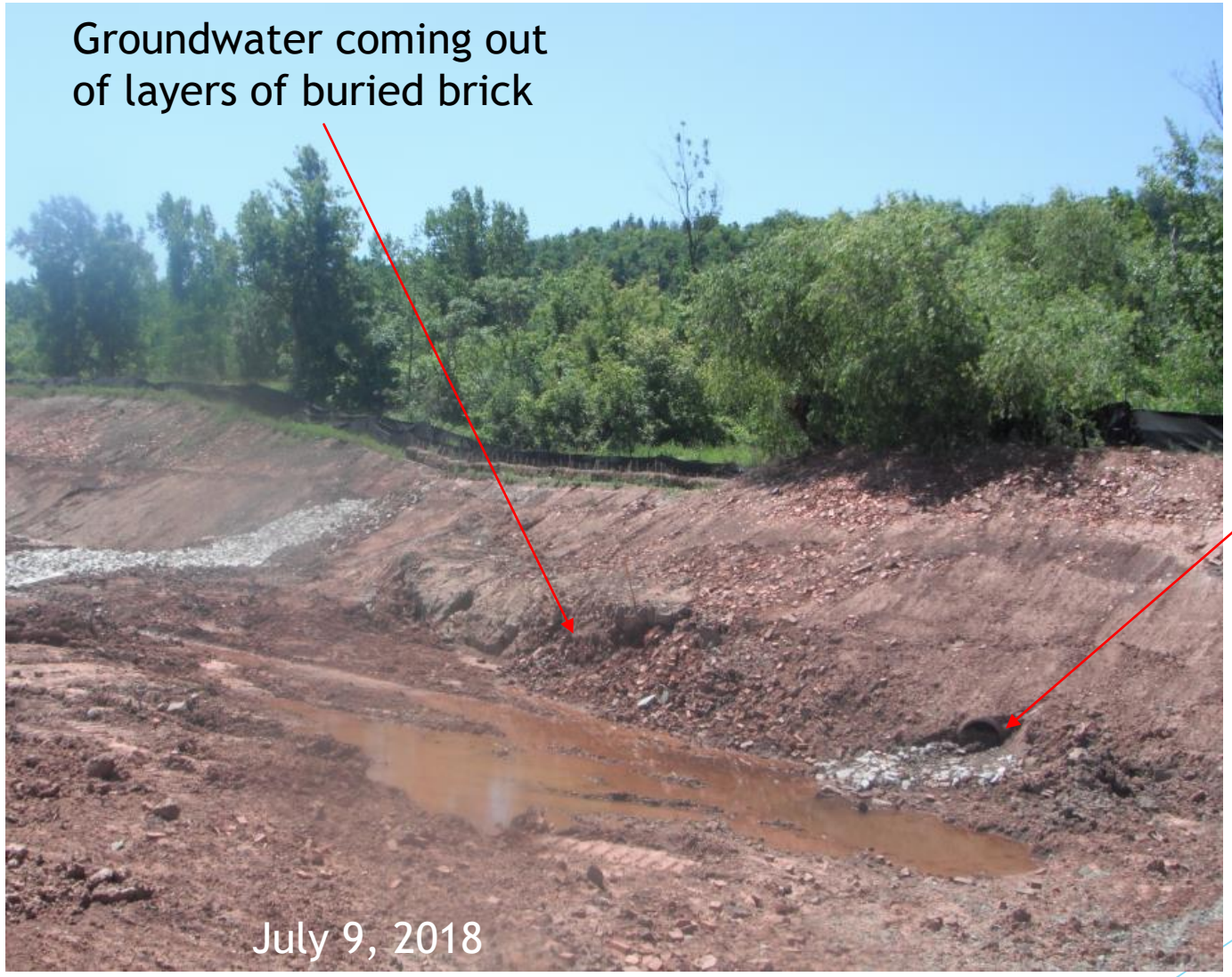
- Long-term management of groundwater around the grade separation area:
  - Maintain water flow to wetlands downslope of the grade separation.
  - Prevent wetlands upstream from being drained.
- Creek Crossings.
- On-Site Soil Management Plan.
- Sediment and Erosion Control.
- Construction Dewatering.

Part 5A: Groundwater Management Around the CPR Grade Separation



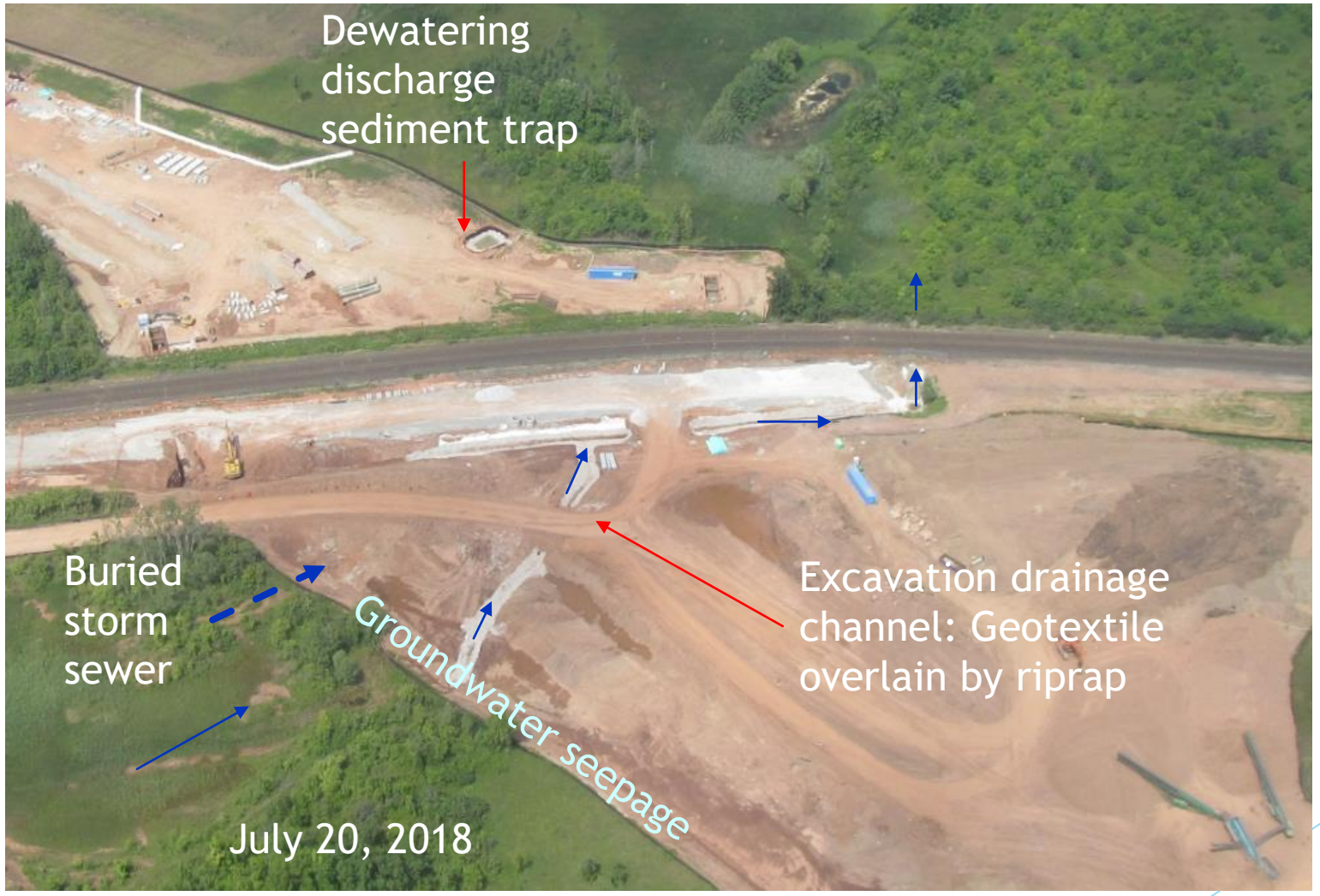


Part 5A: Groundwater Management Around the CPR Grade Separation

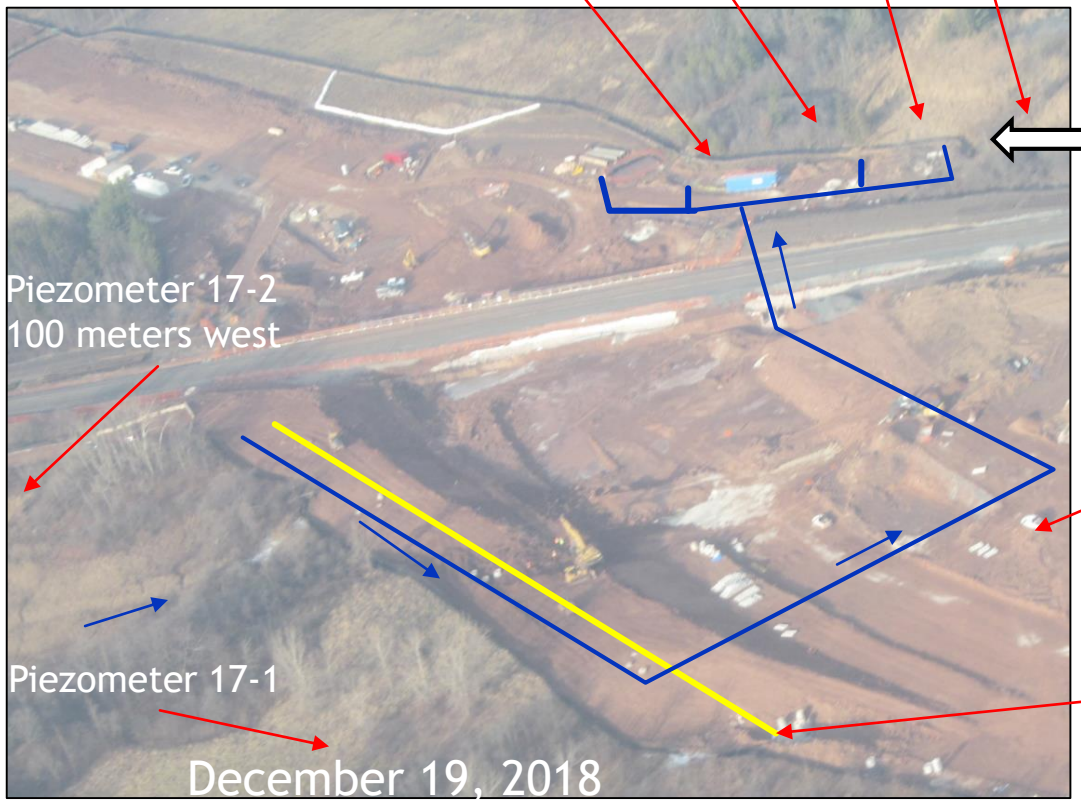


Buried storm sewer was exposed

Part 5A: Groundwater Management Around the CPR Grade Separation



Part 5A: Groundwater Management Around the CPR Grade Separation

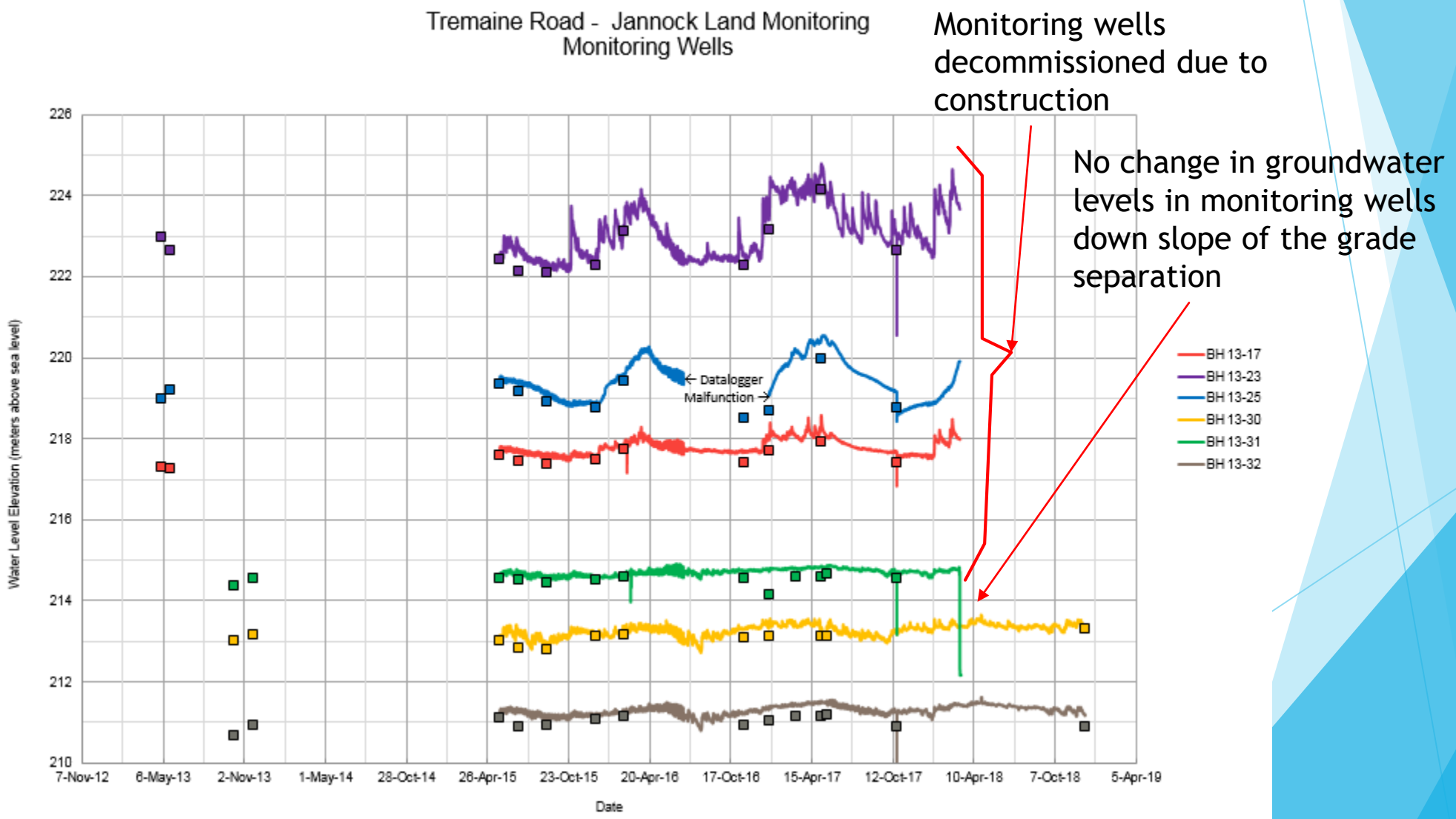


Groundwater discharge outfall pipe

Storm sewer conveying captured groundwater

Groundwater seepage cut-off wall (Clay plug)

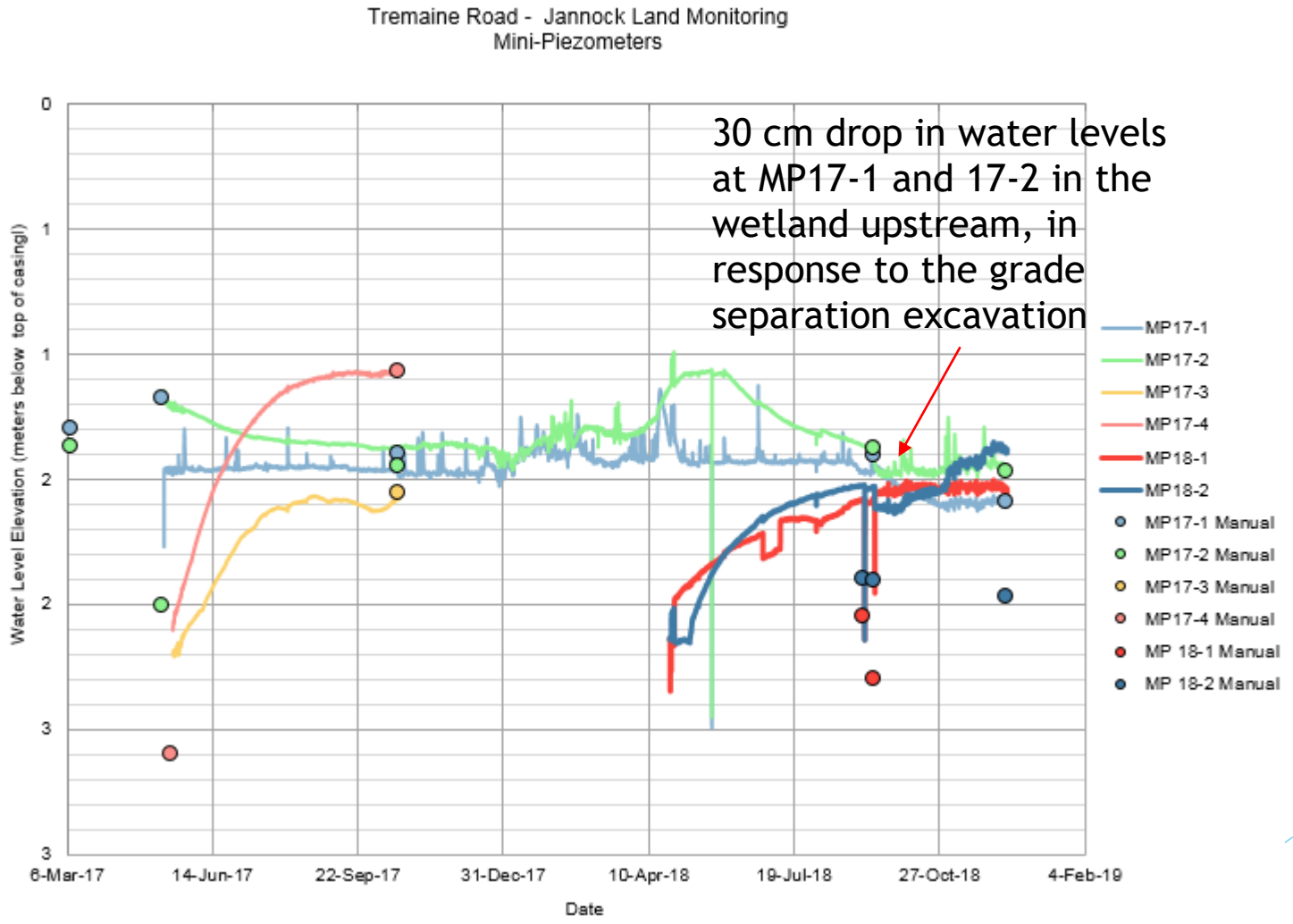
Discharge Groundwater Downstream to Mimic Pre-Construction Conditions



Monitoring wells decommissioned due to construction

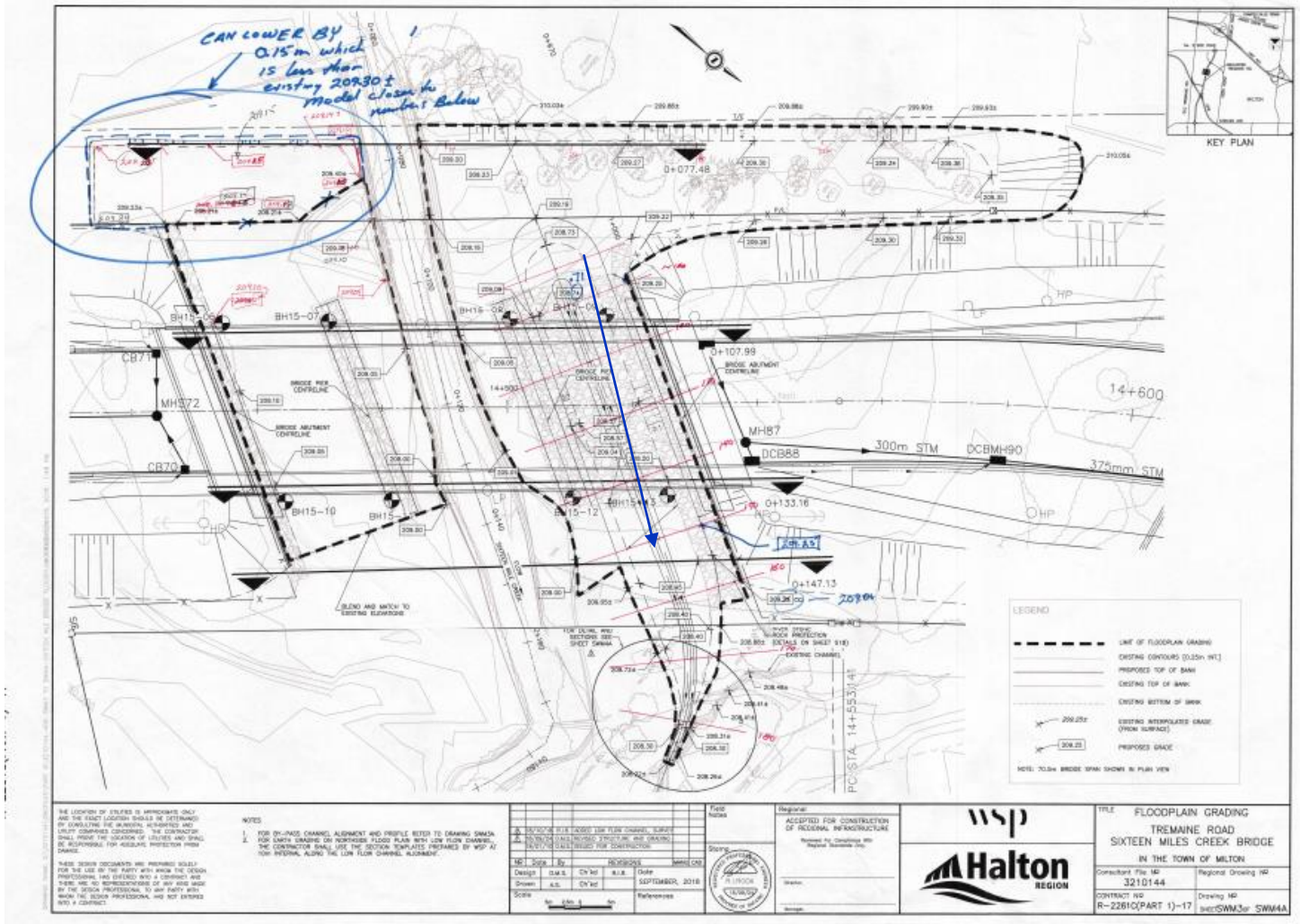
No change in groundwater levels in monitoring wells down slope of the grade separation

Minimize Lowering Water Levels in Wetlands Upstream of the CPR Grade Separatoin



CPR Grade Separation Area Excavation Photographs

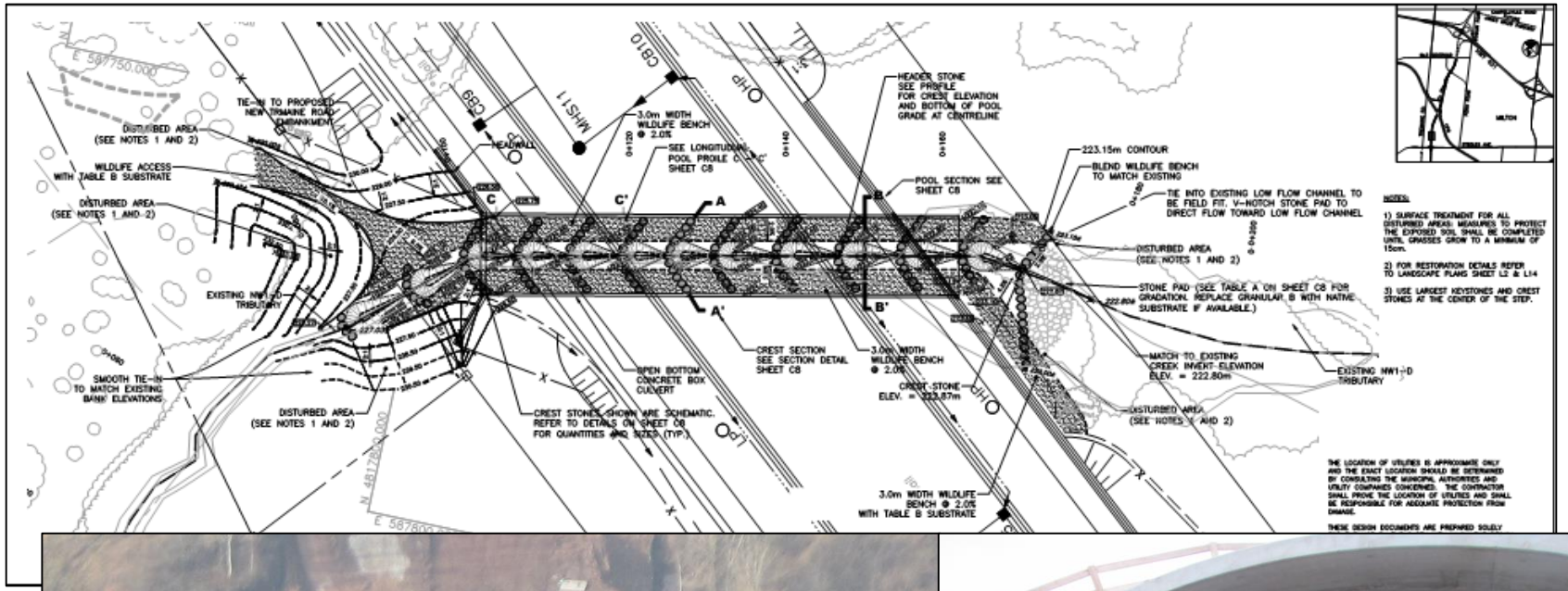
Part 5B: Sixteen Mile Creek Bridge Construction and Floodwater Conveyance



- By-pass channels created in the creek floodplain below the Tremaine Road bridge to increase conveyance of flood waters under the new bridge.

Part 5B: Sixteen Mile Creek Bridge Construction and Floodwater Conveyance

Part 5B: Creek Channel Realignments (Creek N-1-D)



Part 5B: Tributary Creek Culverts

Part 5C: Soil Management

- Potential re-use of the brick material as suitable fill was not possible as some of the bricks contained elevated concentration levels of barium which exceeded the MECP Site Condition Standards.
- Barium was used as an additive (barium carbonate) to bricks to control efflorescence (leaching of soluble salts which impart a white powdery surface to bricks).
- The buried brick debris was screened (a significant portion was mixed with soil) and disposed of off-site at a MECP licenced landfill.
- Approximately 65,000 tonnes of contaminated soil was sent to the landfill.

Part 5C: Soil Management Photographs

Part 5D: Erosion and Sediment Control

- Twice-daily turbidity monitoring of creeks flowing through the site
- Monitor dewatering discharge rates and water quality
- Regular erosion and sediment control inspections

Part 5D: Erosion and Sediment Control: Grade Separation Excavation Area

- **Problem: Murky water in drainage channel draining the grade separation cut area**

- **Solution: Line the drainage channel with geotextile overlain by riprap**

Part 5D: Erosion and Sediment Control: Grade Separation Excavation Area

Part 6: Learning Opportunities:

- Public Engagement: Important for directing environmental assessment.
- Value of lengthy and extensive environmental monitoring prior to construction.
- Detailed site characterization (Geotechnical, soil quality).
- Thorougn environmental monitoring.
- Adaptive Management.
- Expect the unexpected: Beaver dam on Sixteen Mile Creek.

Thank you!

TRIECA 2019 CONFERENCE

Thank you to our sponsors:

www.trieca.com

GOLD SPONSORS

AECOM

Credit Valley Conservation
inspired by nature

Stantec

AQUATECH

armtec
CANADACULVERT

CIVICA
Water Management Solutions

J.Lipani Turf

CROZIER
CONSULTING ENGINEERS

terrafix
geosynthetics inc.

UNILOCK
DESIGNED TO CONNECT.

GEMS

Hydro International

R&M
CONSTRUCTION

filtrexx
CANADA
LAND IMPROVEMENT SYSTEMS
let nature do it.

Profile
Solutions for your Environment

Lake Simcoe Region
conservation authority

York Region

MEDIA SPONSORS

Environmental & Science Engineering MAGAZINE

WATER CANADA

PRINT SPONSOR

WARREN'S
WATERLESS PRINTING INC.

HOSTS

CAN-IECA
CANADIAN CHAPTER

Toronto and Region Conservation Authority