

# Harrietsfield C&D Landfill

## Reclamation of a Former Construction Debris Facility

Project Background  
Site Remediation  
Site Condition Photos – before and during clean-up  
Aerial Photos – progression of site conditions  
Remediation Preliminary Results  
Questions

Presenter: Rob McCullough  
June 2022



## Site Overview Prior to Site Investigation



**Overall Aerial View – October 2018**

## Historic Photos of operations





Initial Site Reconnaissance

Topographic Survey

Geophysics

Landfill cap assessment

Preliminary test pit program

Environmental monitoring (surface water, leachate, groundwater, sediment)

Regulatory permits required:

Approval for Construction and Operation – C&D Debris Disposal Facility

Amendment to contractor's Wastewater Treatment Facility for onsite treatment



## Topographic Survey



**Aerial View – October 2018**



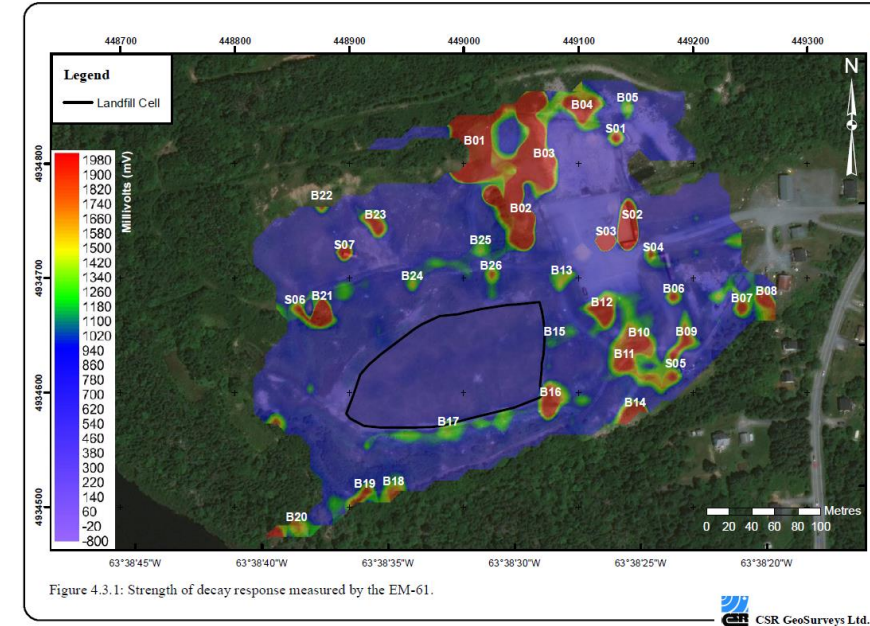
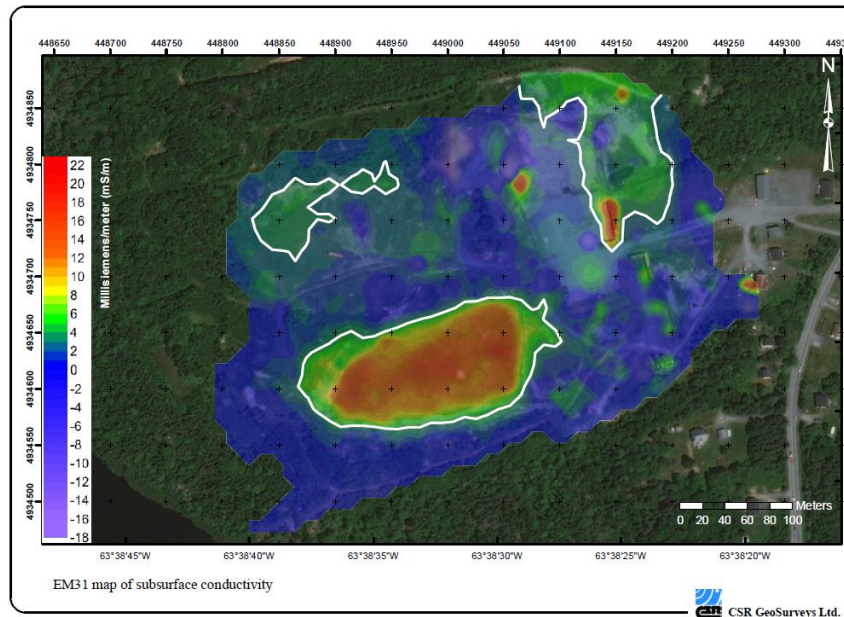
# Topographic Survey



Topographic View – Before Site Activities



# Geophysics EM31 & EM 61



## Geophysical Mapping



## Preliminary Test Pit Program



**Test Pit Program and Monitoring Well Installation**



# Additional Site Assessment

GAP analysis – additional groundwater wells, test pits

Leachate pump test and disposal (150 m<sup>3</sup>).

Design and construct leachate treatment pad and access.

Finalize Site Assessment report to detail closure option and estimated cost



## Leachate Treatment Pad



- Remediation of proposed Contact Water / Leachate treatment Pad Location





# \*Preliminary Design Work



Climate Lens Assessment for Federal funding

- Climate Resiliency and Green House Gas Emissions Study

Complete a 48-hour pump test to design and develop groundwater interception trench.

Pilot Scale Leachate Treatment

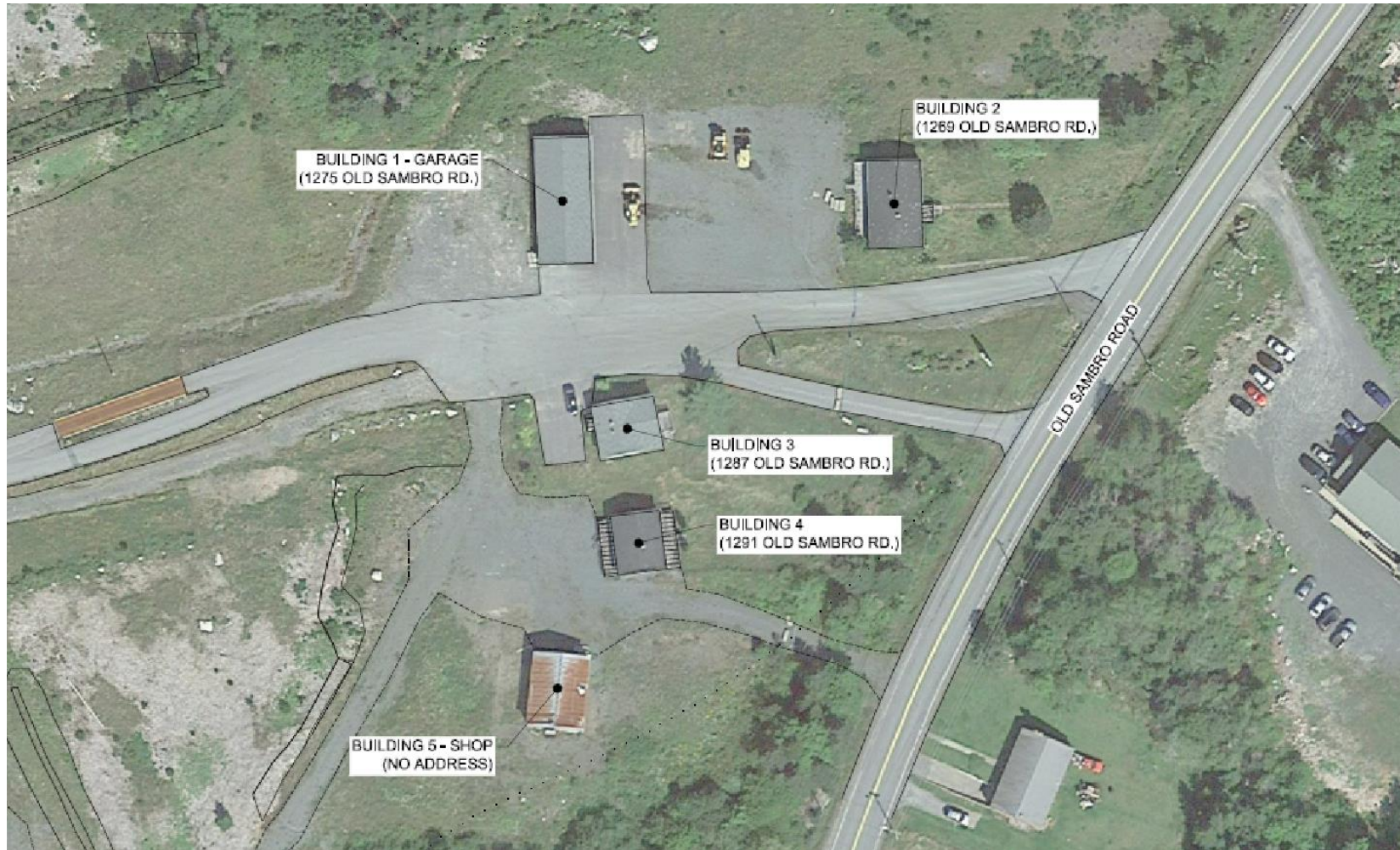
Waste characterization work completed to delineate and segregate debris/fill areas into two waste disposal categories:

1. Waste materials that can remain on-site (within future capped landfill area)
2. Waste materials that require off-site disposal.





## Hazmat Assessment of on-site buildings and Sea Cans/Bins





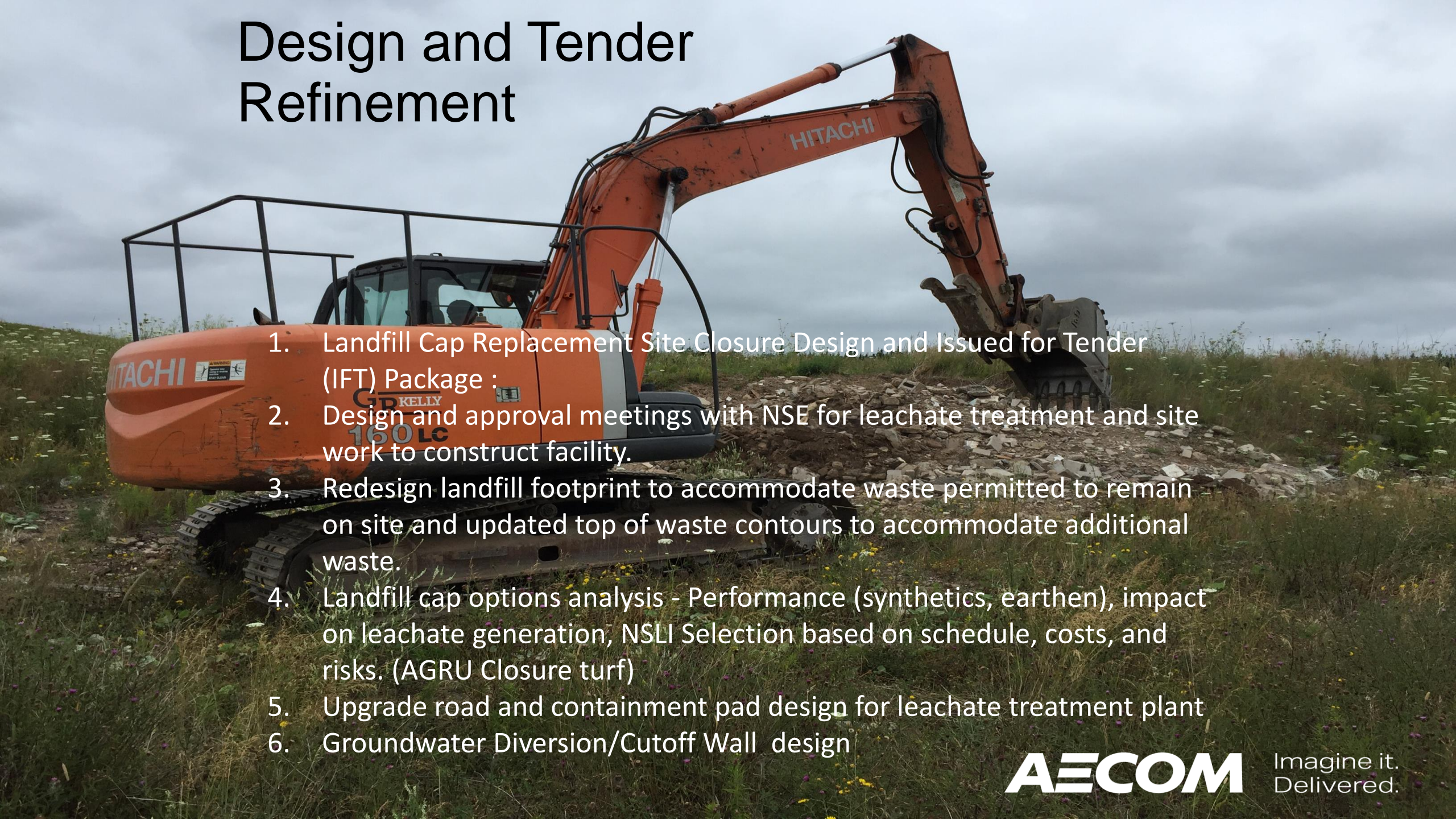
## HazMAT and Non-HazMAT Disposal



Seacans and Waste Bins Hazmat: asbestos, paint, tires, compressed gas, tar, hydrocarbons



# Design and Tender Refinement

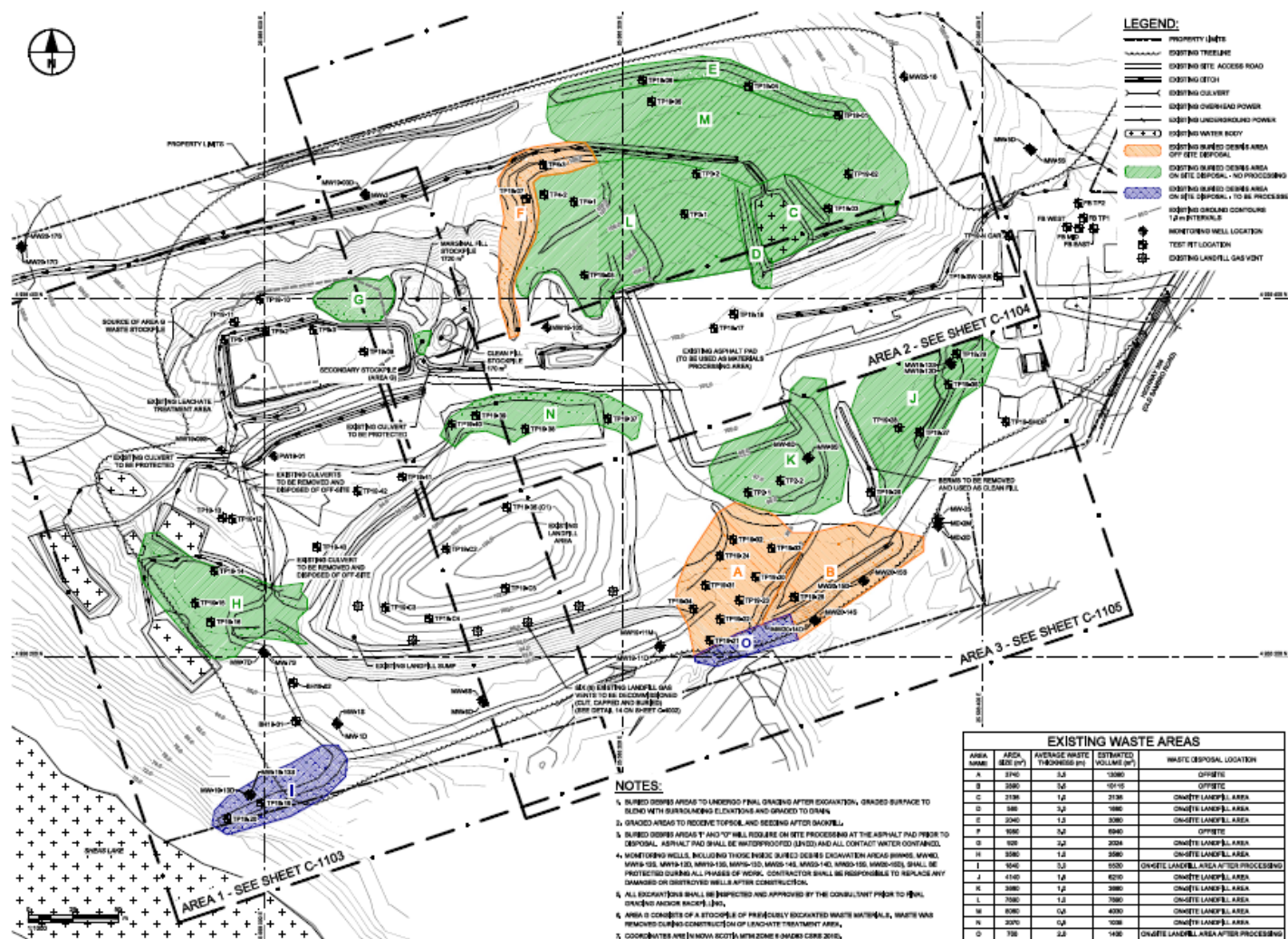
- 
- An orange Hitachi excavator is shown in a field, working on a pile of rocks and debris. The excavator's arm is extended, and its bucket is positioned over the pile. The background consists of a grassy field under a cloudy sky. The text of the list is overlaid on the excavator's body and the ground.
1. Landfill Cap Replacement Site Closure Design and Issued for Tender (IFT) Package :
  2. Design and approval meetings with NSE for leachate treatment and site work to construct facility.
  3. Redesign landfill footprint to accommodate waste permitted to remain on site and updated top of waste contours to accommodate additional waste.
  4. Landfill cap options analysis - Performance (synthetics, earthen), impact on leachate generation, NSLI Selection based on schedule, costs, and risks. (AGRU Closure turf)
  5. Upgrade road and containment pad design for leachate treatment plant
  6. Groundwater Diversion/Cutoff Wall design







# Buried Debris Areas & Overall Excavation Plan





# Leachate Treatment Process

## Leachate Treatment:

Additional work required to assess leachate pre-treatment methods (leachate bench tests) to reduce hydrogen sulphide ( $H_2S$ ) and for on-site discharge requirements

Contractor was selected for pilot study and full leachate treatment in cell. Obtained NSE Industrial approvals for on-site terrestrial discharge to sedimentation ponds and to Shea's Lake:

- Bathymetric survey
- Diffuser design



## Leachate Treatment



### **Terrapure (GFL) Water Treatment System on Containment Pad**

**Approximately 4 million (L) of leachate was removed from the initial drawdown prior to construction activities began on the cell.**

**2.7 million (L) was removed from the site as reject water that did not meet discharge criteria for treated Leachate.**

**Plant processed leachate and then site contact water throughout construction.**



# Site Remediation

Contract Awarded August 2020 , Site work began late August 2020

Construction of staging area, contact water/processing area

Hazmat Removal followed by deconstruction of on-site buildings.

Initial excavation of the three areas on site that required off site removal.



**AECOM**

Imagine it.  
Delivered.



## Site Conditions – during clean-up

- Building HAZMAT



- Building Demolition





## Site Conditions – during clean-up



Contact water containment pond

1.1 million L of contact water was collected and treated through the construction phase



## Site Conditions – during clean-up

- Clearing of borrow area



- Borrow source excavation and development





## Site Conditions – during clean-up



- Compaction testing on berm



- Construction of perimeter berm



## Site Conditions – during clean-up



### Buried Debris Area (BDA) Excavations

BDA's were excavated and waste placed in the cell or removed off-site

One BDA was excavated at a time for on-site disposal thus not creating large areas of potential contact water generation.

Existing Landfill Cap Material Removed and Stockpiled



## Site Conditions – during clean-up



On-site waste disposal



## Site Conditions – during clean-up



Confirmation samples were collected, areas were graded to as close to original ground as practical to allow restoration of site with acceptable drainage.



## Site Conditions – during clean-up



- Landfill sump extension



– Sump



## Site Conditions – during clean-up



- Trench excavation for interceptor piping



– Interceptor pipeline installation



## Site Conditions – during clean-up



- Erosion control
  - Erosion Control, check dams, hay bales, hay mulch, hay blankets, coco mats and hydro seed were installed over the entire site for erosion sediment control of finished grades.
- Hydroseeding



## Site Conditions – during clean-up



- Surface water diversion berm



## Site Conditions – during clean-up



- Anchor trench for liner installation



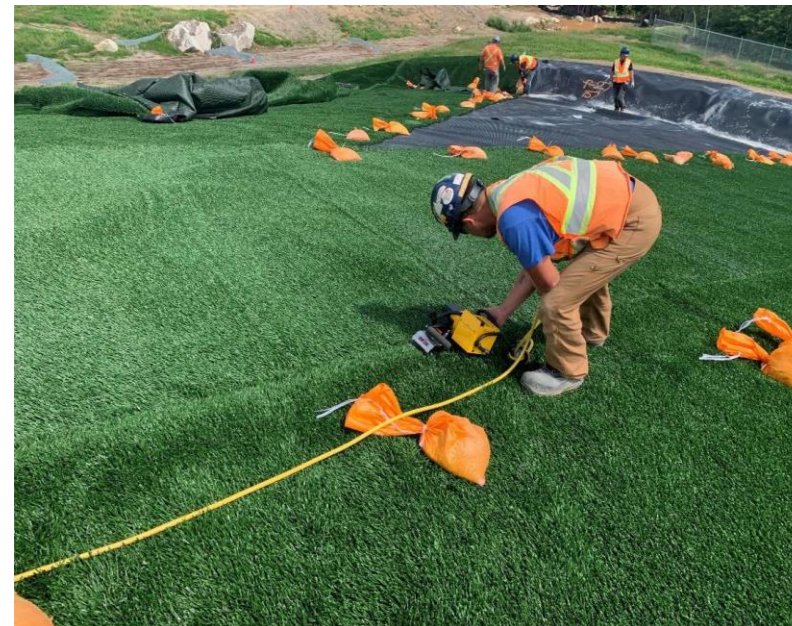
– Micro drain liner installation



## Site Conditions – during clean-up



- Liner installation



– Closure Turf installation



## Site Conditions Areal View October 2018 (pre-site work)



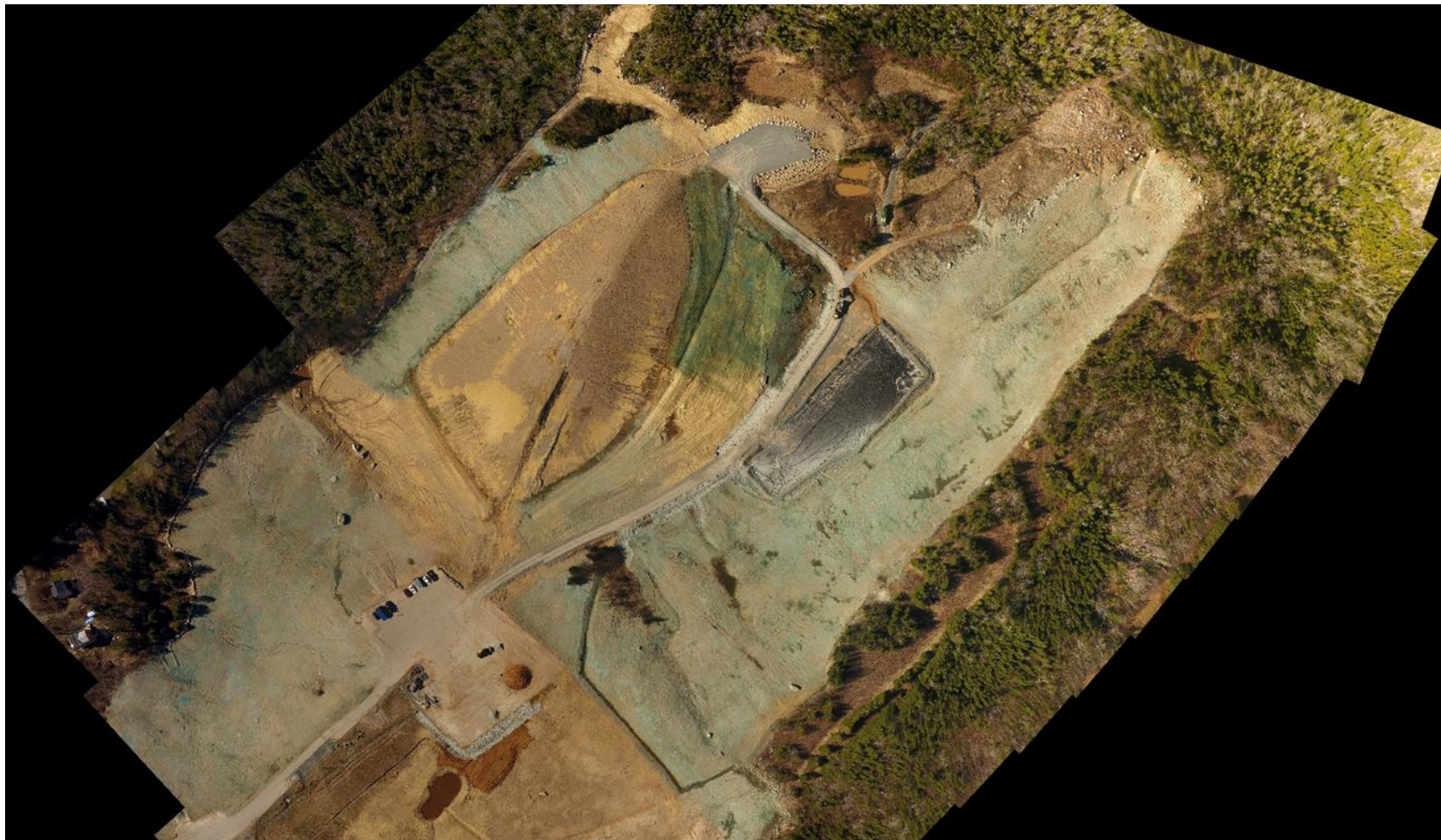


## October 2020- Cell Stripped and loading with new waste





## April 2021- Waste complete Erosion control Hydroseed/Hay Mulch in place.





## October 2021- New cell cap in place and applying sand ballast. Vegetation cover established on site





# Results of the Work





# Soil Remediation Areas





## Site Remediation – Off Site Disposal

Waste Material Source	Disposal Facility	Approximate Truck Loads	Approximate Quantity (tonnes)
BDA A/B/O	Halifax C&D - Antrim	1,847	35,488
BDA A/B/O	Groundfix Remediation Services	659	16,271
BDA F	Groundfix Remediation Services	168	3,881
BDA A	Envirosoil	18	336
Building 1 Foot Print	Envirosoil	12	233
Area of Concern on Landfill Cap – PAH Contaminated Soil	Envirosoil	1	17
<b>Total</b>		2,705	56,225

- Originally estimate 40,900 tonnes to be disposed of off site.
- Additional 15,325 tonnes removed



## Site Remediation – On Site Disposal



- Approximately 48,500 cubic meters of material
- Approximately 2,900 cubic meters required processing (bulky materials)

### Materials Approved for On-Site Disposal (C&D)

- i. Creosote-treated timbers;
- ii. Pressure-treated wood;
- iii. Laminated wood;
- iv. Plywood;
- v. Built-up glued wood sections;
- vi. Particle/chip board;
- vii. Painted wood;
- viii. Sawdust/wood chips;
- ix. Gypsum board;
- x. Structural materials: Plastic/vinyl building materials;
- xi. Insulation - fiberglass, Styrofoam;
- xii. Shingles - asphalt;
- xiii. Built-up roofing;
- xiv. Carpeting;
- xv. Vinyl flooring and linoleum;
- xvi. Ceiling tiles;
- xvii. Wiring;
- xviii. Nails;
- xix. Metal joiners, frames, and structural components;
- xx. Lighting fixtures (no PCB ballasts); and
- xxi. Piping.

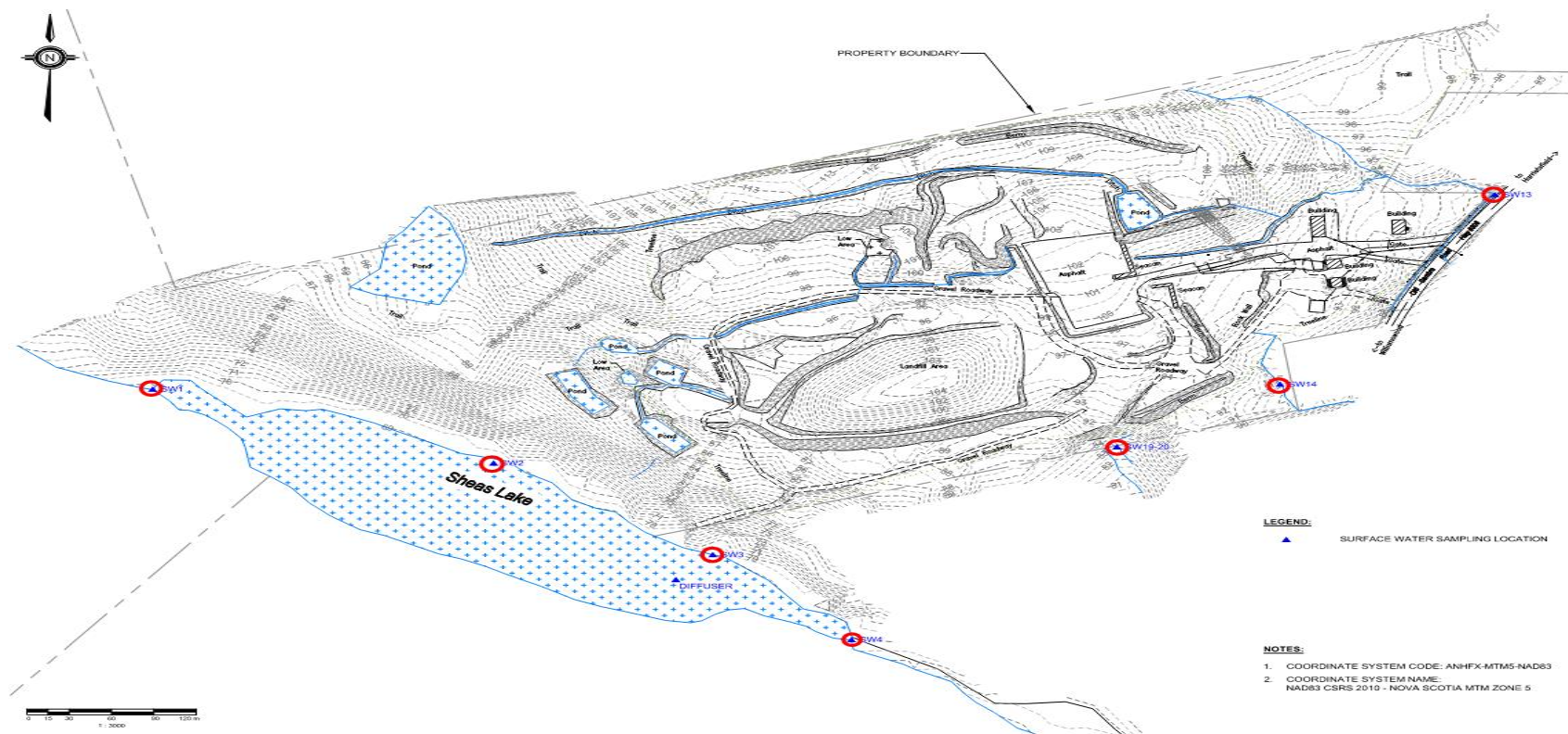


# Leachate Treatment

Date	TOC Elevation	Bottom of Cell (mbtoc)	Leachate Depth (m)	Leachate Elevation	Thickness of Leachate	
				(mbtoc)	(m)	
12/3/2019	97.00	7.88	2.34	94.66	5.54	← Pre-Construction
6/15/2020	97.00	7.88	3.45	93.55	4.43	
7/9/2020	97.00	7.88	3.72	93.28	4.16	
8/11/2020	97.00	7.88	7.88	89.12	0.00	← Original Leachate Treatment Program
9/15/2020	97.00	7.88	7.88	89.12	0.00	
10/16/2020	97.00	7.88	7.24	89.76	0.64	
11/07/2020	97.00	7.88	7.88	89.12	0.00	
12/2/2020	98.09	8.97	6.02	92.07	2.95	← End of Leachate Treatment ~ 4,000,000 L
1/13/2021	98.09	8.97	5.34	92.75	3.63	
2/12/2021	98.09	8.97	5.28	92.81	3.69	
3/7/2021	98.09	8.97	5.26	92.83	3.71	
4/6/2021	98.09	8.97	5.31	92.78	3.66	
5/12/2021	98.09	8.97	5.33	92.76	3.64	
6/13/2021	98.09	8.97	5.41	92.68	3.56	
7/15/2021	98.09	8.97	5.42	92.67	3.55	
8/16/2021	98.09	8.97	5.55	92.54	3.42	← Cell Capped (Oct 2021)
3/7/2022	98.09	8.97	6.21	91.88	2.76	
3/16/2022	98.09	8.97	6.24	91.85	2.73	← 2022 Leachate Removal ~ 700,000L
4/6/2022	98.09	8.97	7.78	90.31	1.19	
4/13/2022	98.09	8.97	7.70	90.39	1.27	
5/5/2022	98.09	8.97	7.59	90.50	1.38	← Current Leachate Level (May 5)



# Surface Water Sampling Locations









## Groundwater And Surface Water Results

- Quarterly Groundwater Sampling Program
  - 31 on-site wells
- Bi-weekly surface water sampling program
  - 7 locations around site
- The annual report (October 2021) indicated upward trends in some parameters in surface water and groundwater
  - This was expected given the ongoing remedial construction.
- Quarterly reports since the end of construction have begun to suggest a downward or level trend, however, there has not been enough time since October 2021 to be able to confirm if this is part of a greater trend.
- More sampling data is required (1 year – 4 quarters, minimum) to assess conditions post construction



## On-going Monitoring and Maintenance

- Long term monitoring of the groundwater and surface water
- On going domestic well testing
  - 8 off-site properties
- On going monthly inspections of the landfill cap system
- ClosureTurf® monitoring and maintenance program
  - Condition of the liner
  - Any repairs necessary, weld tears
  - Sand ballast inspection
  - Flow channels and hydrobinder® areas
  - Sump and leachate level
- Trending will continue on groundwater and surface water data



# Questions

