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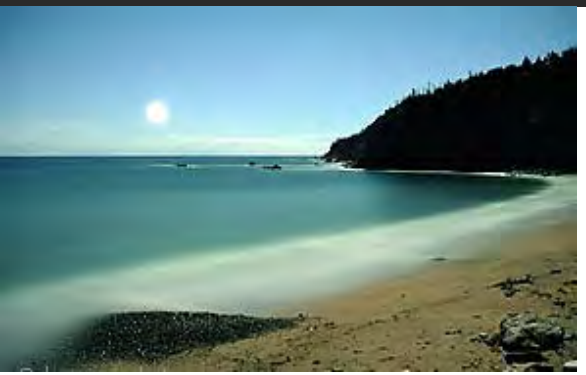
Sydney Tar Ponds Remediation – Future Land Use and Sustainable Remediation

Sydney Tar Ponds, Sydney, Nova Scotia

Cape Breton Island



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Sydney Steel Plant

1899 – begin construction
1901 – largest North American steel mill begins production
1912 – steel mill is producing half of the steel made in Canada

History of the Site

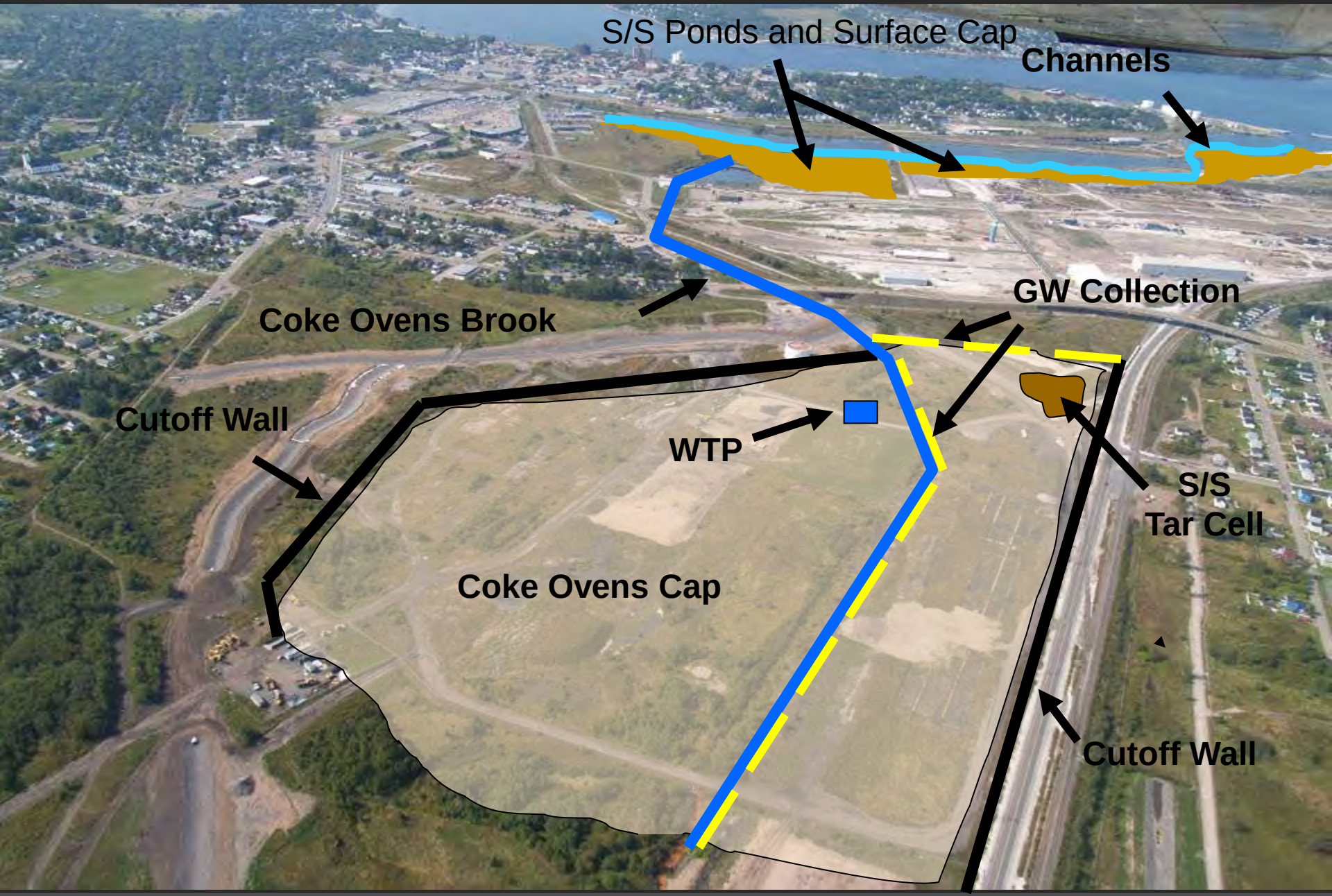
Employed ~ 6,000 workers at its peak.

Produced mainly rails; 1st global producer of shatter free rails.

Legacy Contaminated Site and Technology Selection

- 100 years of coking operations and steel making
- Tar Ponds: 81 acres and 750,000 tonnes of contaminated sediment
- Coke Ovens: 178 acres with soil, groundwater, and sediment contamination throughout

Solution



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Project Schedule

- Detailed Design Started in October 2006
- Construction Commenced in 2008
- Construction Completion Scheduled for 2014 – complete in 2013

Solidification / Stabilization

General S/S Approach

- Control incoming flows from Coke Oven/Wash Brook by diverting them around the work area
- Control water coming from other sources using barriers
- Create a new channel within the isolated areas
- Complete *in situ* treatment of tar ponds sediments through solidification/stabilization
- Cap S/S treated Sediments

Solidification and Stabilization Steps to Completion

- Characterization
- Design Criteria
  - Environmental
  - Future land use
  - GSR/LEB/fish enhancement
- Bench Scale Testing
- *In Situ* Pilot Scale Testing
  - Mix Optimization
- Tender
- Full Scale Construction

S/S Site-Specific Acceptance Criteria

Property	Test Method	Criteria
Strength (UCS)	ASTM D 1633 Method B	= or > 0.17MPa (25psi)
Hydraulic Conductivity	ASTM 5084 (Flex Wall)	< or = 1 x 10^{-6}cm/sec
Leachate	Modified SPLP 1312 (as monolithic structural integrity procedure)	Site Specific Leachate Criteria based on MCP GW 3 (ceiling values apply) and pre/post leachate comparison

Water Control: Pumping Stations – Multiple Stages

Staged

Minimum Flow
0 L/second

Median Flow
400 L/second

Peak Flow
14,000 L/second

Water Control for Stabilization and Solidification

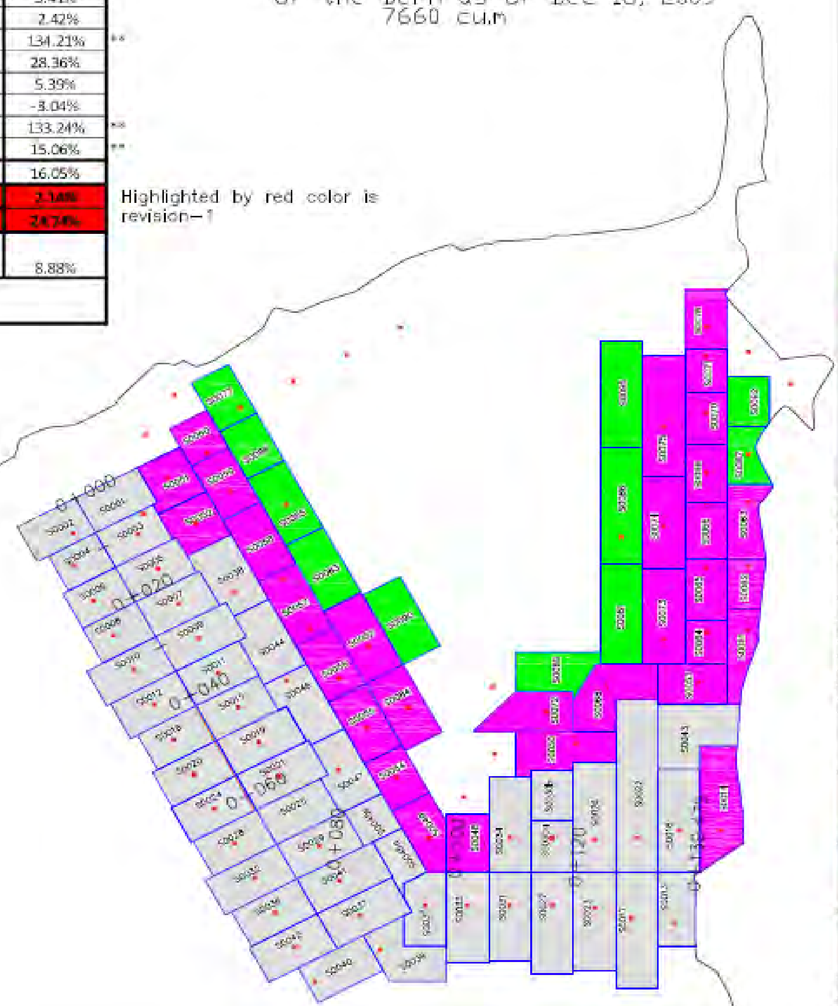
- Water Control by barriers, pumping, and local dewatering
- The dryer the contaminants, the less cement is used, thus lowering the overall costs.
- Too dry and it is too difficult to mix.

Data Management

Date Treated	Cell Number	Treated Area (sq.m)	Quantity of Sediments Treated (cu.m)	Quantity of Import Treated (cu.m)	Total Material Treated (cu.m)	Model Estimates (cu.m) (Sediments)	In field %Variation from Model	
14-Dec-09	S0077	68.719	171.04	0.00	171.04	137.00	24.85%	
14-Dec-09	S0081	125.678	202.47	0.00	202.47	205.00	-1.23%	
14-Dec-09	S0083	92.729	193.71	0.00	193.71	184.00	5.28%	
14-Dec-09	S0085	94.248	193.96	0.00	193.96	184.00	5.41%	
14-Dec-09	S0086	143.157	201.99	0.00	201.99	207.00	2.42%	
14-Dec-09	S0087	58.625	142.87	0.00	142.87	61.00	134.21%	**
15-Dec-09	S0088	66.608	165.59	0.00	165.59	129.00	28.36%	
15-Dec-09	S0089	87.598	166.52	0.00	166.52	158.00	5.39%	
15-Dec-09	S0090	98.196	185.20	0.00	185.20	191.00	-3.04%	
15-Dec-09	S0092	61.465	135.28	0.00	135.28	58.00	133.24%	**
15-Dec-09	S0095	134.050	193.3	0.00	193.30	168.00	15.06%	**
Weekly Total		1031.07	1951.93	0.00	1951.93	1682.00	16.05%	
December - Time & Material		363.85	870.22	281.16	1151.38	852.00	2.14%	
December - Contract		8883.94	8315.00	0.00	8315.00	6666.00	24.74%	
South Pond Total to date		8115.87	16989.21	2631.02	19620.23	15603.00	8.88%	

The Total % of Area completed of the South Pond is 6.24%

**Note: High in field % variations are due to the additional material generated from TP6A ditch construction



Sydney Tar Ponds Agency

NOTES:

LEGEND:
1.0m Contour (Limit of S/S Treatment)
TREATED AREA NOV 02 to DEC 04
TREATED AREA DEC 07 to 11
TREATED AREA DEC 14 to 18
LOCATION OF TEST/CENTER COORDINATE

Revision or Issue

Remediation of the Tar Ponds and Coke Ovens Sites

TP6B AS-BUILT
CONSTRUCTION PROGRESS
REPORTED FOR AS OF DEC14-09 to DEC18-09

CBCL LIMITED
Consulting Engineers

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Odour Management – A Significant Lesson Learned

Odour Management Plan

Development of an Odour Management Plan

- Define Roles for Contractor, Design Engineer and Client
- Define Protocols
- Odour Complaint Hotline

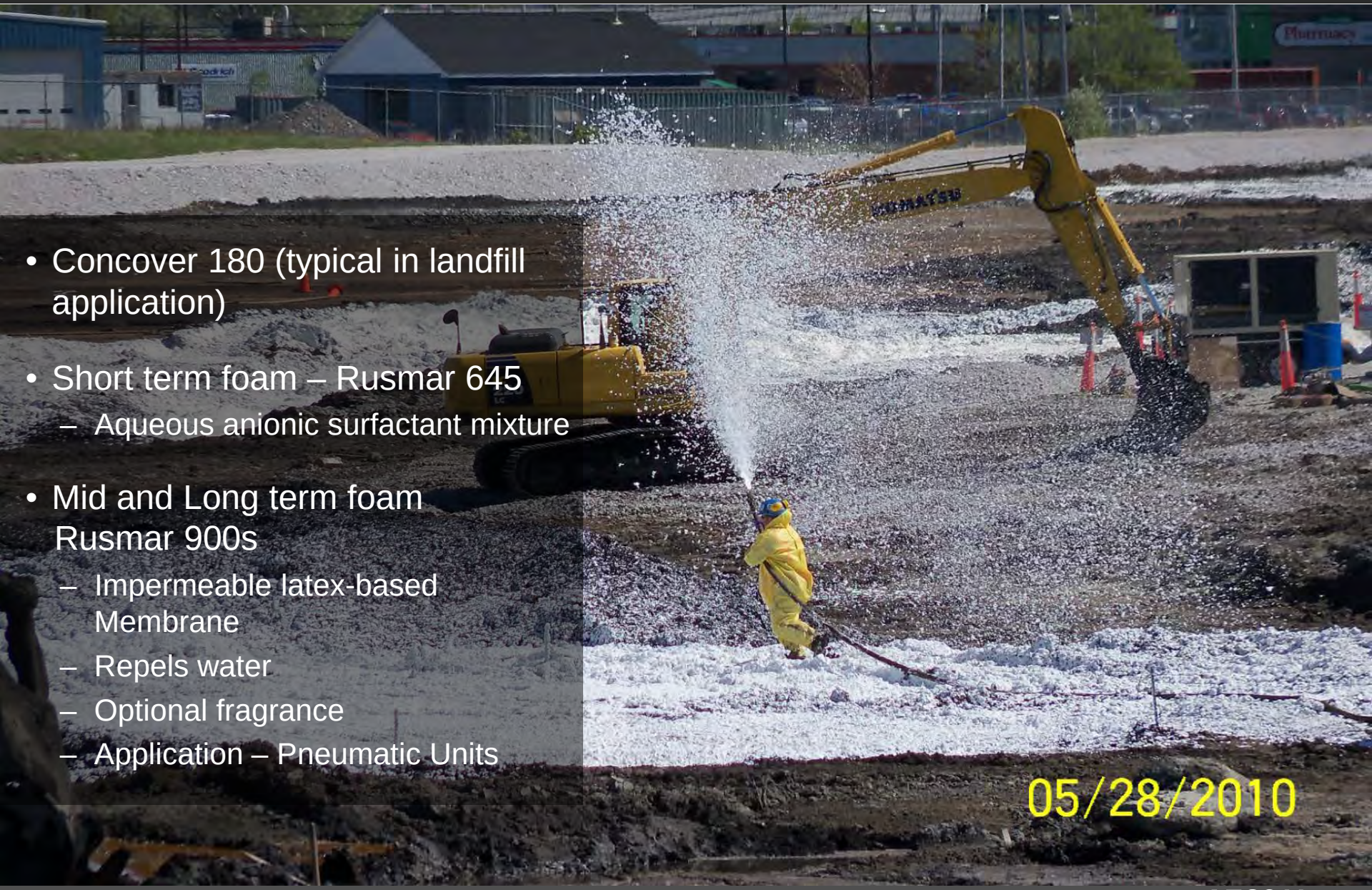
Dedicated “Odour Champion”

- Respond to Work Activities
- Ensure Adequate Supply of Odour Suppressant Products

Odour Management Plan

- Reduce Area of Exposed Materials
- Dedicated Crew
- Acquire and Apply Control Products
- When, Where and What to Apply

Odour Suppressing Foam



- Concover 180 (typical in landfill application)
- Short term foam – Rusmar 645
  - Aqueous anionic surfactant mixture
- Mid and Long term foam Rusmar 900s
  - Impermeable latex-based Membrane
  - Repels water
  - Optional fragrance
  - Application – Pneumatic Units

Green and Sustainable Remediation

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Future Land Use

- Recreation
  - Walking/cycling trails
  - Green Space
- Light Commercial
- Sydney “Common” Area

Future Land Use

Highlights of the Plan:

A Commons Area including:
- Sports fields
- Outdoor concert venue
- Walking trails
- Wildlife stations
- Parking area
- Urban forest

A Greenway Trail Network with:
- Bridges
- Boardwalks
- Interpretive stations
- Outdoor exercise stations
- Rest areas

New Roads and Sidewalks for:
- Community connectors
- Business campus
- Land banking for future growth
- Commercial expansion along SPAR road

Photos from: Ekistics Planning & Design “Former Tar Ponds Site Future Use ” Sowing the Seeds of Change http://www.tarpondscleanup.ca/futureuse/

Local Economic Benefits

Underlying objectives:

- To ensure that economic benefits accrued to the greatest extent possible to Cape Breton
- To realize the sustainability imperative, i.e., that real economic value, beyond the remediation itself, would endure

Measures of success:

- Upwards of 50% of the monies have been spent in Cape Breton
- Through “set-aside” provisions, First Nations companies attained experience – now successfully competing on the open market – outstanding success
- Establishment of the Center for Sustainability in Energy and the Environment at Cape Breton University

Sustainability Model – Tar Ponds Project

Economy

Local Economic Benefits and Long-term Economic Growth of the Region

Environmental

Clean up of one of the most contaminated sites in Canada

Social

Health benefits, long-term viability of Region

The Ponds Go Green

- Phase 1 and 2 complete with the final Pump Station in place
- Permanent channel to convey surface water through the site
- Grass begins to grow on the capped Tar Ponds site

August 2008

September 2013

10 Years is a Long Haul – Vision of the Finished Product

2005 Sediment Sampling

2013

The Best Playground in all of Cape Breton

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The Final Phase Takes Shape

Public Land Use – People and Culture

Accomplishment Through Adaptation

2001 School Contest
Vision of the Cleaned Up Tar Ponds

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Future Site Use is Now Current Site Use

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Questions?

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