Old Town Clyde River – Site Assessment and Human Health & Ecological Risk Assessment

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NUNAMI STANTEC

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Agenda

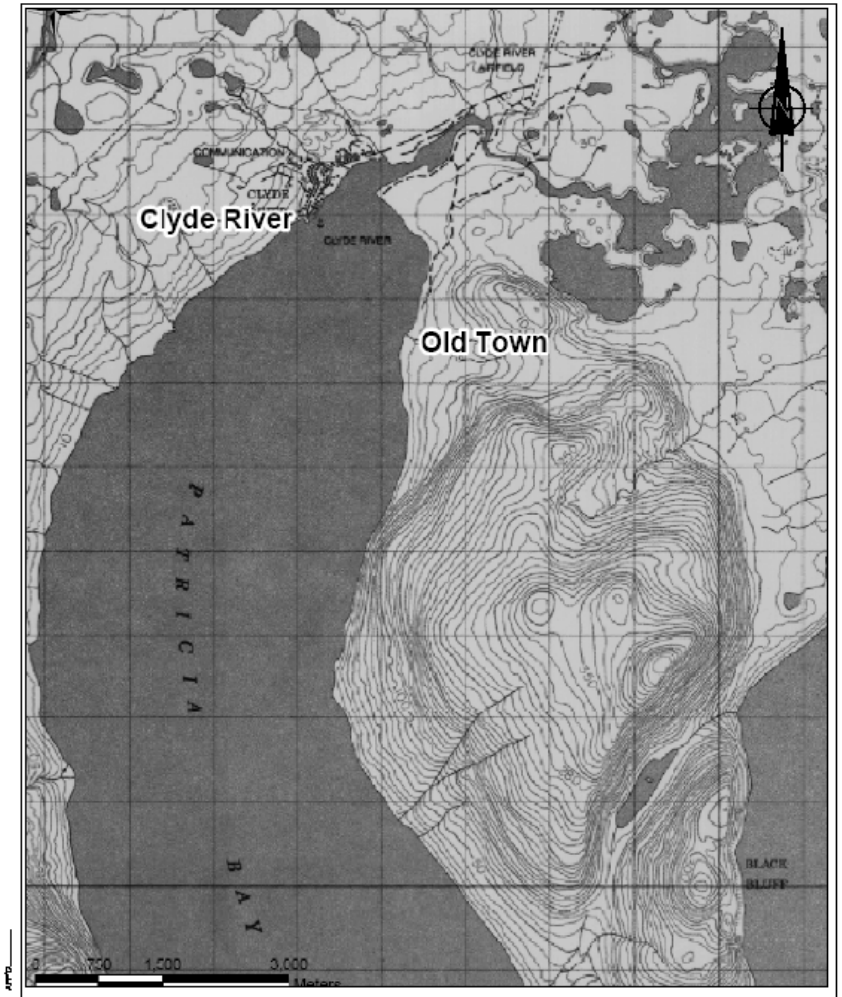
- Nunami Stantec Limited – Stantec's Joint Venture
- Old Town Clyde River Site Location and History
- Previous Site Investigations
- 2010 Investigations
- Major Challenges
- Human Health and Ecological Risk Assessment
- Identification of On-site Impacts
- Project Added Value
- Next Steps
- Questions

Nunami Stantec Limited – Introduction

- Established in 2006
- A majority Inuit-owned company based in Rankin Inlet, Nunavut
- A partnership between the Sakku Investment Corporation and Stantec Consulting Limited
- Provides wide range of services to organizations throughout all three regions of Nunavut

Old Town Clyde River Site Location and History

- Located in the Qikiqtaaluk (Baffin) region of Nunavut
- 5 km east of current Clyde River
- The old town site was the location of the community of Clyde River between 1923 and 1970
- In 1970 the community moved to current location on the west side of Patricia Bay



Importance of the Old Town Site

- Important fishing and hunting ground
- Recreation area used for camping
- Some streams in the area are used as source of drinking water
- Burial grounds

Historical Investigations

1997 ESG, Royal Military College

- Environmental Site Assessment
- Soil, water, biota, and debris samples
- Hydrocarbon impacted soil, petroleum products and non-hazardous and hazardous waste identified

2004 Jacques Whitford Limited

- Phase III Environmental Site Assessment and Conceptual Remediation Plan
- Delineation of impacted soil not achieved
- A portion of hazardous, non-hazardous waste quantified

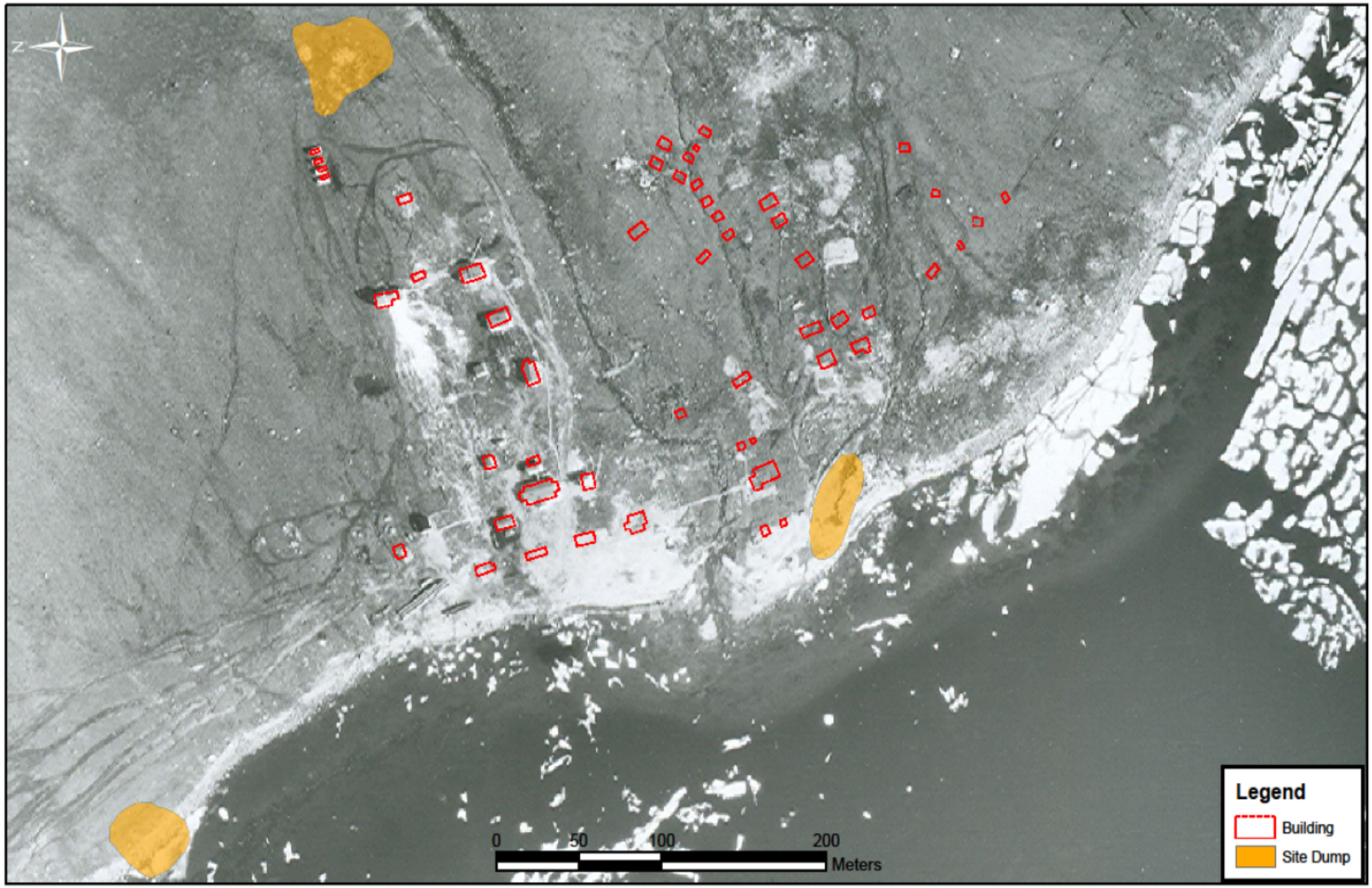
Historical Investigations (Cont'd)

2008 Nunami Jacques Whitford Limited

- Phase III Environmental Site Assessment and RAP
- Expansion in the areas of investigation
- Additional PHC and metal impacted soil and groundwater identified in several areas; however, complete delineation still not achieved
- Several additional contaminants were identified
  - Naphthalene in soil
  - Asbestos containing wastes
- Hazardous and non-hazardous wastes were mostly quantified.

Additional assessment with a Human Health and Ecological Risk Assessment was recommended

Current Site Conditions



Current Site Conditions (cont'd)

- Impacted Soils
  - Hydrocarbon impacted soils
  - Metals impacted soils
  - Aluminum powder waste

Current Site Conditions (cont'd)

- Impacted groundwater
- Scattered surface and buried debris
- Hazardous waste
- Fuel tanks
- PHC product waste
- Remains of the concrete structures
- Locals exposed to hazards and risks that remain on the site

2010 – Environmental Site Assessment

Scope of work included:

- Data Gap Analysis
- Geophysical survey of areas containing potential buried debris
- Excavation of 134 test pits to the top of permafrost
- Installation of 14 drive point monitoring stations
- Collection of soil, sediment, surface water, groundwater, waste oil / used fuel, waste materials
- Confirmation of waste volumes identified historically
- Human health and ecological risk assessment

Major Challenges

- Limited site access
- Limited equipment locally available in the community
- Logistical issues
- Scale of the area of investigation (1.5 x 2 km)
- Permafrost within a meter of the ground surface
- Achieving vertical and horizontal delineation of various contaminants in soil and groundwater
- Remote arctic environment

2010 Environmental Site Assessment – Major Findings

Soil

- Petroleum hydrocarbons BTEX and F1-F3
- Metals mainly aluminum, copper, hexavalent chromium, lead, selenium, silver and zinc
- Polyaromatic hydrocarbons (PAHs) including phenanthrene and/or naphthalene

Groundwater

- Metals like aluminum, arsenic, chromium, copper, iron, lead, manganese, nickel, thallium and zinc
- PHCs BTEX /F1-F4, not detected in groundwater; however, concentrations of these parameters were identified during the 2008 field program

2010 Environmental Site Assessment – Major Findings

Surface Water

- Aluminum, antimony, arsenic, copper, iron, lead, manganese, nickel, thallium, uranium and zinc
- TDS, ammonia, color, pH and sodium exceeding the criteria

Sediments

- None identified

Other Issues

- Three areas of heavy staining / aluminum powder
- PCBs were not detected in soil during either of the 2008 or 2010 field programs

Human Health and Ecological Risk Assessment (HHERA)

- Purpose
  - Determine if on-site concentrations of contaminants pose unacceptable risk to human and ecological receptors
  - Develop site specific guidelines for the Contaminants of Concern
- HHERA was based on a conservative approach of considering maximum on-site concentrations of the contaminants
- HHERA used the data collected during the 2008 and 2010 field assessments for:
  - Soil
  - Sediment
  - Surface water
  - Vegetation
  - Small mammal (lemming)
  - Marine Invertebrates (clams)

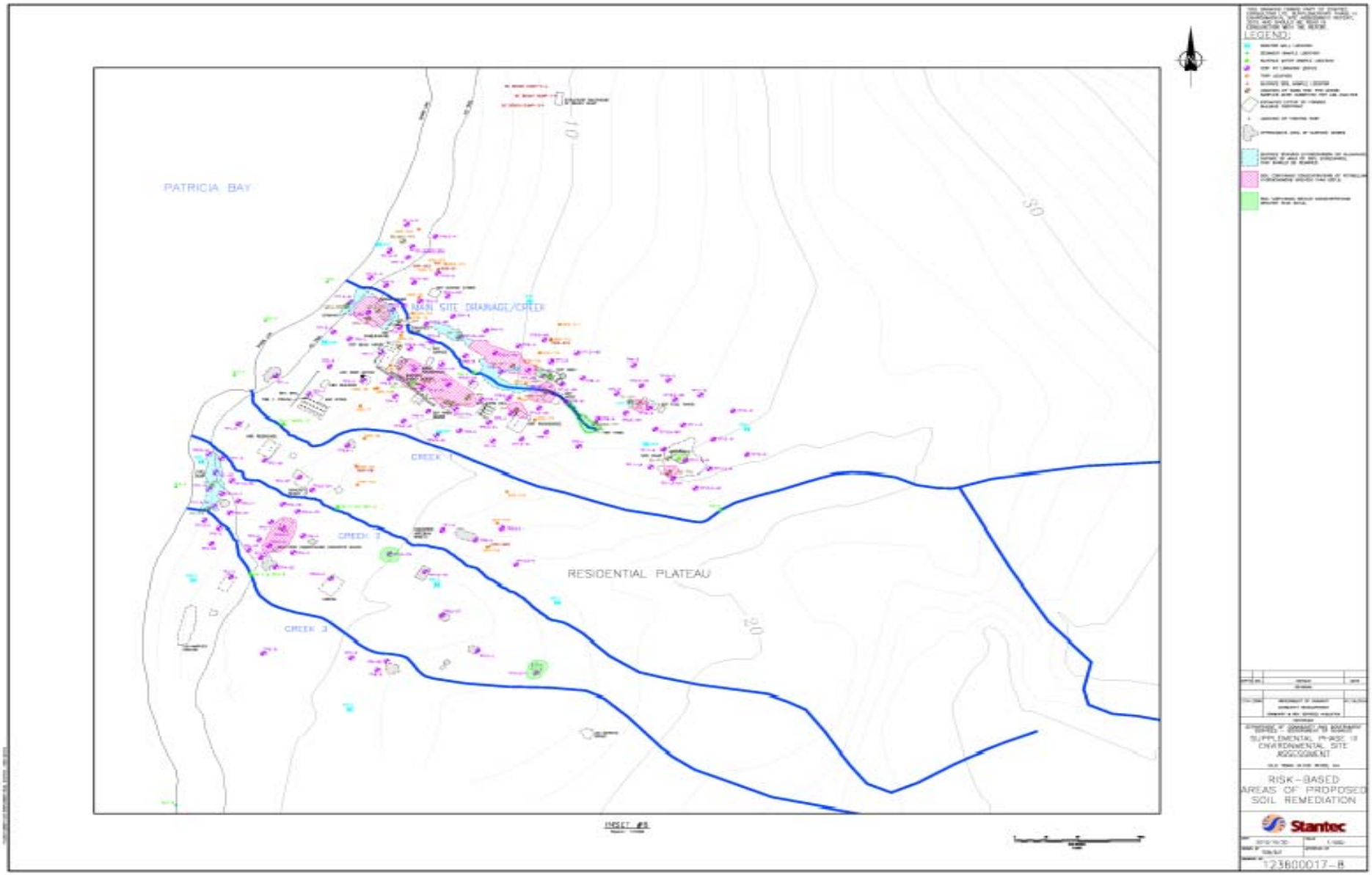
Identification of Potential Receptors

- Human Receptors
  - Inuit Campers
  - Construction workers for Remediation.
- Ecological Receptors
  - Peary Land Collared Lemming
  - Arctic Hare
  - Barrenground Caribou
  - Arctic Fox
  - Rock Ptarmigan
  - Snowy Owl
  - Plants
  - Soil Invertebrates
- Exposure pathways assessed were dermal, ingestion and inhalation

Development of Site Specific Guidelines

Contaminants of Concern	CCME General Criteria Residential (mg/kg) in Soil	Site Specific Target Level (mg/kg) in Soil	Protective of
Aluminum	-	158,000	Human Health
Lead	140	474	Human Health
F1	210	240	Ecological Health
F2	150	3700	Ecological Health
F3	300	1800	Ecological Health
Copper	63	939	Ecological Health
Nickel	50	258	Ecological Health

Contaminated Soil Areas



Identification of On-site Impacts

- 575 m^3 of metals contaminated soil
- 4,900 m^3 of petroleum hydrocarbon contaminated soil
- 1,000 m^3 of soil containing significant petroleum hydrocarbon or aluminum staining
- 17 m^3 of hazardous wastes
- 187 m^3 of special wastes
- 1,254 m^3 of non-hazardous wastes
- 1,854 litres of waste petroleum products

Project Added Value

- The risk assessment was completed with site assessment
- Project plan development by multidisciplinary team members, which identified the need for additional areas of investigation
- The risks on the site were quantified
- Site Specific Criteria when used in conjunction with the proposed remedial action plan will result in a smaller disturbed area when the remediation is undertaken
- Using site specific criteria reduced the contaminated soil volumes by 25 to 30%

Next Steps

- Remedial Action Plan (Completed)
- On going Community Consultation
- Remediation Design and Specs
- The Project is going into Tender – Early Next Year
- Remediation of the Site – 2012 to 2014


Questions ?