Arctic Canada
PWGSC Western & Atlantic Regions
And
DFO-SCH Central & Arctic Region
Pangnirtung Harbour Development
2008-2014
Background

• Nunavut was formed as Canada’s 3rd Territory on April 1, 1999;
• Nunavut has an Ocean Coastline of 104,000 km (approx 43% of Canada’s Coastline) encompasses 1/5th of Canada’s Geography (or 1.9 million km²);
• Nunavut has a population of approximately 30,000 (85% are Inuit);
• The Government of Nunavut (GNU) functions within a framework of a Land Claim Agreement and operates under a Consensus system, there are no political parties;
• The GNU derives approx 91% of its budget from Federal Transfers and could not fund these harbour
• PMO announced December 12, 2007, seven harbours to be developed as part of sovereignty;
• Viewed as an opportunity to encourage development of the commercial fishery in the Davis Strait;
• Pangnirtung was chosen as the first of the seven to be built.
WELCOME TO PANGNIRTUNQ
Challenges with Construction in Northern Canada

- Remoteness
- Climate
- Resources
Remoteness

- 2400 km - Montreal to Pangnirtung, Nunavut via sealift.
Climate
Climate: summer enroute to Pangnirtung.
Pre-development: harbour at low tide.
Pre-development: harbour at low tide.
Pre-development: harbour at high tide of approximately +7.4 m.
Ice movement within the harbour.
Project Specific Challenges

• +7.4 meter tidal range;
• Limited existing site information (i.e. geotechnical, hydrographic, topographic, etc.);
• Limited Arctic Marine experience in the industry; and
• Short time frame to investigate existing conditions, design, tender and construct, all within the Federal Governments 2 year, Accelerated Infrastructure Program, time constraint.
2 Phase Delivery Method for the Pangnirtung Harbour

DFO SCH undertook Phase 1; west breakwater construction, supply and installation of floating docks and inner basin dredging (-1.5 m), dredge materials from inner basin used to fill the sealift marshalling area.

PWGSC undertook Phase 2; new channel dredging (-2.4m), outer basin dredging (-4.4m) and fixed wharf construction.
Preliminary Work: Environmental AMEC

- Disposal at Sea Permit application to Environment Canada:
  - Requirements included stakeholder consultation, water and sediment sampling as well as benthic habitat survey;
- The Nunavut Impact Review Board (NIRB) provided environmental oversight and project approval in the NU Territory:
  - Requirements included an Environmental Management Plan;
- Navigable Waters Protection Act (NWPA) Authorization application to Transport Canada; and
- Fisheries Act Authorization application for the Harmful Alteration, Disruption or Destruction (HADD) of fish habitat to Fisheries and Oceans – Habitat Management Division.
Preliminary Work: Design

**Determination Drilling**

• Undertook geotechnical investigation in order to characterize site for detailed design.
Implementation

Phase 1

Tower Arctic and Community of Pangnirtung

• Inner basin dredging;
• Sealift marshalling area construction;
• West breakwater construction; and
• Installation of the floating docks for the small vessels.
Implementation
Phase 2

McNally Almiq Joint Venture (MAJV)

• Outer basin and channel dredging as well as fixed wharf construction;
• Contract for a Design Build approach to reduce the contractor risk as much as possible given the lack of experience and information available with regards to marine construction in the Arctic environment;
• Worley Parsons as a sub-consultant provided the design;
• McNally Construction Ltd provided the 6.5 cu yd clam bucket and dredge, 2x300 yd³ dump scows, 2x500 hp tugs to perform dredging. Required a 10 day tow from Pt Tupper to Pang;
• Almiq Construction installed and operated a 30 man construction camp. They were responsible for the civil works for the fixed wharf and the provision of electrical shore power.
Quality Assurance

**SHM Canada Consulting**
• Responsible for resident supervision of the steel sheet piling (SSP) fixed wharf and sealift marshalling area construction as well as inner basin dredging.

**Shepherd and Stevens**
• Responsible for interim and ‘as-built’ survey information including the ‘Disposal at Sea’ fjord site.
Phase 1: Inner Basin Dredging
Phase 1: West Breakwater Construction
Phase 1: Inner Basin Dredging Low Tide
Phase 2: Channel Dredging- material transported 1.5 km to centre of fjord and disposed in approximately 120 meters of water.
Phase 1: Floating Dock Installation
Phase 2: Fixed SSP Wharf Construction
Phase 2: Fixed SSP Wharf
Conclusion

Public Works and Government Services
Western & Atlantic Regions

DFO Small Craft Harbours
Central and Arctic Region
Questions?