

# Canadian High Arctic Research Station: Feasibility Study

## Executive Summary

### Background

The Canadian High Arctic Research Station (CHARS) was first announced in the Government of Canada's 2007 *Speech from the Throne*. Under the rubric of *Strengthening Canada's Sovereignty and Place in the World*, the Government committed to:

*...build a world-class Arctic research station that will be on the cutting edge of Arctic issues, including environmental science and resource development. This station will be built by Canadians, in Canada's Arctic, and it will be there to serve the world.*

This Station is also a key deliverable under *Canada's Northern Strategy: Our North, Our Heritage, Our Future*. The department of Indian and Northern Affairs Canada (INAC) (now known as Aboriginal Affairs and Northern Development Canada (AANDC)) is the lead department on the Northern Strategy and the department with the federal mandate for fostering, through scientific investigation and technology, knowledge of the Canadian north and of the means of dealing with conditions related to its further development. As such, AANDC will lead the development of the new research Station.

### Introduction

To properly plan for CHARS, AANDC embarked on an in-depth feasibility study to better understand:

- Lessons learned from Canadian and International Research Stations;
- Where the station should be located;
- What the mandate and the science and technology (S&T) needs and priorities of the station should be;
- What design elements need to be considered for the building, operations and activities of CHARS; and,
- The limitations and benefits of various procurement options for CHARS.

This summary provides an overview of the CHARS feasibility study.

## **Review of Canadian and International Research Facilities**

The network of Arctic science and technology (S&T) facilities across Canada and polar facilities internationally are operated by a variety of owners and many have been in the business for many decades, several for over 50 years. They have survived trend shifts, evolving operating funds and have developed niches that have made them relevant throughout these changing environments. The team developing CHARS has benefitted from visiting many of these facilities and speaking with the staff to better understand the pitfalls and opportunities in planning for CHARS.

There is a strong recognition that facilities (on land and sea) and networks already exist to support Arctic/Polar research in Canada. The Government of Canada recently strengthened the physical aspect of this network through the Arctic Research Infrastructure Fund (ARIF) (\$85 million awarded to 20 different projects at 46 sites). Once CHARS is operational, the intention is for it to serve as an anchor for this network of Arctic research centres. Overall, ARIF has affirmed that delivering on infrastructure projects in Canada's North has particular challenges and requirements not found in southern Canada, such as:

- The long lead times required to plan for transporting supplies to remote locations during the short northern summers;
- Delays in shipping and construction due to weather that can impact the already short building season;
- The hiring of qualified project managers and contractors with knowledge and/or experience in Northern construction and sustainable/green (Leadership in Energy and Environmental Design (LEED)) standard technologies;
- The availability of local labour (a resource that can become depleted when other construction projects are taking place at the same time in a small community);
- The high costs of shipping, materials and labour;
- Meeting land-claims obligations; and,
- The importance of securing community support and 'buy-in' for infrastructure to promote research activities in and around communities, partnerships and networks.

Additionally, a wide-range of research facilities operating in other climates have also been visited in order to learn about cross-over issues such as laboratory layouts, general space usage/needs and trends.

## Site Location

The determination of the location for the Station was done through a two-step process. The first step consisted of establishing a set of criteria around the conditions that the location should be able to support, which included:

- Being in the High Arctic – the 2007 Speech from the Throne (defined by being north of the Arctic Circle);
- Being on the Northwest Passage – Government of Canada’s interest in a strong presence;
- Being located within a community – lessons learned from isolated research facilities;
- Transportation access – need identified by stakeholders; and,
- Science and technology potential – need identified by stakeholders.

Based on these criteria, a preliminary assessment of communities in the High Arctic was conducted and in February 2009, the Minister of INAC (now known as AANDC), the Honourable Chuck Strahl announced that the Canadian High Arctic Research Station would be located in Cambridge Bay, Resolute Bay or Pond Inlet, all located within Nunavut.

Following the announcement, AANDC established a process for ensuring that key stakeholders were involved in the project and were kept informed of the progress through existing processes where possible and through new ones when necessary. Work on the location of the Station involved information gathering from, and the principal engagement of: the three candidate communities; a multi-stakeholder Experts and Users Group convened to advise on the Feasibility Study; Government of Canada departments and agencies; and, bilateral discussions with other interested stakeholders.

Over the course of the summer in 2009, INAC (now known as AANDC) began work with the three communities and undertook two visits to each location. These three communities were found to be able to support and respond to the diverse needs identified for CHARS in different ways. Each exhibited a set of strengths based on user demands (northerners, private sector, government, academic, etc.), available resources (both programming and infrastructure), and research interests (natural, health and social sciences). An analysis was conducted on each of the communities in order to ascertain and highlight the strengths that could be tapped into as well as the weaknesses that would need to be considered.

In particular, this analysis focused on protected areas, transportation of goods and passengers, demographics, climate, research undertaken around the communities, research potential that the communities could support, community infrastructure and organizations that could be linked into, and, available building sites.

On August 24, 2010, Prime Minister Stephen Harper announced that Cambridge Bay would be the hosting community for CHARS.

### ***Nunavut Land Claims Agreement***

Since CHARS will be located in Nunavut, the Nunavut Land Claims Agreement will need to be considered throughout the planning stages for the Station and once the Station is operational.

The Canadian High Arctic Research Station project will respect the applicable provisions of the Agreement. At the moment, Article 23, Inuit employment with government, Article 24, government contracts, and Article 26, Inuit impact and benefit agreements, have been identified as sections of the Agreement which may impose certain obligations on the building and operation of the Canadian High Arctic Research Station.

### **CHARS Mandate**

On December 3, 2010 the Minister of INAC (now known as AANDC), the Honourable John Duncan announced the CHARS mandate including the S&T priorities on which the station would focus.

### ***Mission***

To be a world-class research station in Canada's Arctic that is on the cutting edge of Arctic issues. The Station will anchor a strong research presence in Canada's Arctic that serves Canada and the world. It will advance Canada's knowledge of the Arctic in order to improve economic opportunities, environmental stewardship, and the quality of life of Northerners and all Canadians.

### ***Objectives***

Mobilize Arctic science and technology:

- To develop and diversify the economy in Canada's Arctic;
- To support the effective stewardship of Canada's Arctic lands, waters, and resources;
- To create a hub for scientific activity in Canada's vast and diverse Arctic;
- To promote self-sufficient, vibrant, and healthy Northern communities;
- To inspire and build capacity through training, education, and outreach;
- To enhance Canada's visible presence in the Arctic and strengthen Canada's leadership on Arctic issues.

### **Principles**

- Address pressing issues in Canada's Arctic by conducting world-class research and delivering excellent and relevant science and technology
- Complement the network of Arctic expertise and facilities across Canada's Arctic and the whole of the country
- Promote partnerships and collaboration among the private, Aboriginal, academic, and public sectors both domestically and internationally
- Work with Aboriginal peoples of Canada's Arctic and recognize the importance of traditional knowledge in advancing Arctic research
- Integrate across disciplines and across activities - from problem identification, through research and development, to solutions
- Ensure effective use of data, information, and technology through open and timely access and knowledge application
- Be a world leader in green technologies for the Arctic

### **Priorities**

World-class research excellence is Canada's standard. This will be met by focusing on priorities and targeting basic and applied research in areas of strength and opportunity. Delivering on science and technology priorities will focus funding, build partnerships, and lever Canada's research base to address economic and social challenges and maximize competitive advantage. Although CHARS' priorities may evolve, they will initially be aligned with the following themes:

<b>Priority</b>	<b>Outcomes</b>
Resource Development	<ul style="list-style-type: none"><li>• Resource development that is economically and environmentally sound and promotes social development;</li><li>• Renewable resources and unconventional energy sources that contribute to greater energy security and sustainability.</li></ul>
Exercising Sovereignty	<ul style="list-style-type: none"><li>• Efficient and effective monitoring and surveillance of Canada's vast Arctic;</li><li>• Effective management of Canada's Arctic waters a under changing conditions;</li><li>• Improved response to, and mitigation of, environmental and other disasters.</li></ul>
Environmental Stewardship & Climate Change	<ul style="list-style-type: none"><li>• Effective environmental stewardship through greater knowledge of natural and human systems and their interconnections;</li><li>• Strengthened mitigation efforts through greater understanding of changes in the Arctic climate and the links to global systems, and increased capacity to adapt.</li></ul>
Strong & Healthy Communities	<ul style="list-style-type: none"><li>• Improved infrastructure and diversified economic opportunities;</li><li>• Improved health outcomes and community wellness and resiliency.</li></ul>

## **Science and Technology Needs**

In delivering on those priorities, Canada has two unique advantages: the breadth and diversity of ecosystems that make up Canada's North; and, human capital of Canada's North, comprised of the communities and the 110,000 people located in this region and the significant cadre of world-leading Arctic researchers.

Through a series of workshops, commissioned papers and reports, advice on S&T to be undertaken at the Station was sought from academia, government (federal and territorial), the private sector, and Aboriginal organizations representing a broad range of scientific disciplines, institutional experiences and geographic scope. This advice focused on developing the following S&T needs for CHARS.

### ***Components***

#### **1) A world-class facility**

The Canadian High Arctic Research Station will provide a year-round facility for world-class science and technology in Canada's Arctic.

#### **2) Cutting-edge science and technology**

CHARS will ensure Canadians lead the way in addressing the challenges facing Canada's Arctic by conducting world-class research and delivering excellent and relevant science and technology.

#### **3) A strong research presence across Canada's Arctic**

CHARS will be at the centre of a strong Canadian network of Arctic research infrastructure capable of meeting science and technology needs that match the size and diversity of Canada's Arctic.

### ***Geographic Area***

For the purpose of CHARS, Canada's Arctic is defined as the lands and waters that lie north of the permafrost line. This is the same definition as was used for International Polar Year.

### ***Scientific Scope***

CHARS will take an integrated approach to its science and technology activities. These activities may include: monitoring and surveillance; research, modeling, and prediction; technology development and transfer; knowledge application; and training, education, and outreach as well as the logistics needed to ensure effective delivery. The science and technology undertaken by CHARS will be interdisciplinary and include natural, physical and traditional sciences, economic and social sciences, health and life sciences, the humanities, and engineering and technology development.

## **Design Elements**

The feasibility study provides the necessary background information needed to develop the pre-construction planning guidelines and the architectural vision for the Station.

### ***The Functional Program***

The functional program sets out the types of spaces that will be required in the Station, such as laboratories, offices, living area, commercial space and supporting spaces. The goals of the functional design are to ensure that the facility is sustainable, flexible, integrated into the community and that it is designed with stringent user protocols and safety standards.

No decisions yet have been made on whether to locate all of the building components in one building or to distribute them throughout the community. The groupings and distribution of components throughout the community would be based on the optimal relationship between the site, surroundings, CHARS activities and opportunities for collaboration and efficiencies. Additionally, discussions with Cambridge Bay organizations could lead to some of the CHARS component spaces being integrated into existing or expanded community infrastructure. For instance, health and recreation facilities as well as some accommodation could offer such community integration possibilities.

### ***Description of Spaces***

The Feasibility Study describes the type and quantity of the spaces (e.g. Laboratory, Office, Storage, Meeting, Accommodation, Kitchen, Meeting, Recreational, Mechanical, Maintenance and Field Logistics) that would make up CHARS. This list of spaces and quantity of each type will be further refined and the size of each area will be determined during the design phase, primarily through the development of the S&T program and consultations with stakeholders.

### ***Technical Requirements***

The approach to building CHARS provides both opportunities and challenges which are specific to building a world-class S&T facility in the High Arctic. This section outlines the unique Canadian Arctic requirements to be considered for building CHARS. For example, it notes that the Station design should:

- Provide a showcase for CHARS' cultural, scientific and technological outputs;
- Reflect the culture, scale, resources and other community factors unique to Cambridge Bay;
- Welcome, encourage, foster and promote the use of the facility in the community of Cambridge Bay;
- Incorporate necessary northern building requirements and the natural features of the site, including topography, wind patterns and solar access;
- Incorporate the use of LEED and LABS 21 guidelines to reduce energy consumption and be a leader in sustainability; and,

- Include state-of-the-art telecommunications to ensure that CHARS is fully connected with Canada and the World.

## **Next Steps**

### ***Engagement – Ongoing***

Broad stakeholder engagement on CHARS has been ongoing and will be maintained through the design, and construction phases, and when the Station becomes fully operational. The level, length and timing will be scaled and scheduled so that the information required throughout the CHARS development process and the opportunities for input are coordinated appropriately. The Feasibility Study provides a preliminary overview of who will be consulted, how they will be consulted, and the outcomes expected. Adjustments will be made throughout the process in order to integrate changes and accommodate project needs.

### ***Design and Construction – 2011 to 2017***

In 2011/12 a design team and the construction management firm will be solicited. The Feasibility Study outlines the procurement options that were considered to design and build CHARS. A construction management approach was chosen.

The design concepts and initial design development are expected in 2012 and the design development, construction document preparation, and construction tendering process finalized in 2012 – 2014. Construction is expected to take place between 2013 and 2017, with CHARS operational 2017 and onwards.

### ***CHARS S&T Program – 2011 and Ongoing***

A 'Blueprint' for the CHARS S&T program will be developed to serve as a guiding document for all S&T programming associated with CHARS. This document will build on the CHARS priority themes and desired outcomes as outlined in the mandate by detailing targeted S&T questions with an assessment of status, gaps and performance measures for each outcome. The S&T questions are intended to be the mechanism for ensuring relevance of the CHARS S&T program. The *Blueprint* will be a living document and will evolve as S&T questions are answered and new issues, questions, and priorities arise.

### ***Operations***

The overall governance and management of the Station remains to be determined and will be developed as the CHARS S&T program evolves.

To view the full CHARS Feasibility Study, or for more information about CHARS, please go to:

[Science.gc.ca/chars](http://Science.gc.ca/chars)