



# NUNAMIUTUQAQ

BUILDING FROM THE LAND





# INNOVATING THROUGH INUIT KNOWLEDGE

Pitquhirnikkut Ilihautiniq / Kitikmeot Heritage Society (PI/KHS) is an Inuit-led cultural organization based in Cambridge Bay, Nunavut. Incorporated in 1996, we have spent 25 years dedicated to the renewal of Inuinnait culture and the Inuinnaqtun language, and to innovating through the wisdom and experience of our ancestors. We operate the May Hakongak Cultural Centre in Cambridge Bay, which functions as a community-focused gallery, library, archives and museum space. We focus on the urgent needs of Inuinnait—a distinct regional group of Inuit living in the Central Canadian Arctic in the communities of Cambridge Bay, Kugluktuk, Gjoa Haven and Kugluktuk. We're leading a coordinated effort to reverse the loss of Inuinnaqtun by partnering with Elders, language specialists, and academic linguists to document the language, mentor the next generation of competent speakers, and develop digital tools for knowledge sharing. In addition to language initiatives, we research and design exhibits for local, national and international audiences, deliver oral history and traditional knowledge projects, and facilitate community land camps.

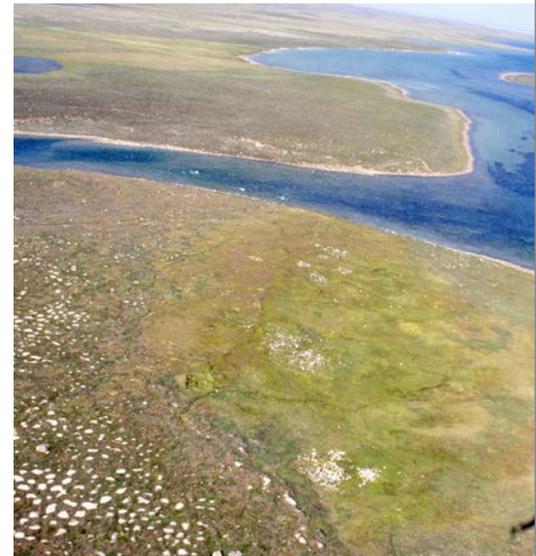
We have been laying the foundation to develop a new cultural campus in Cambridge Bay dedicated to the documentation, revitalization and mobilization of our knowledge. Responding to the growing demand within our community for cultural reconnection, this highly customized environment will support activities that bridge generations and rebuild language fluency and the transfer of knowledge. It is a space in which architecture and design are focused on supporting language immersion, traditional ways of learning, and Inuinnait visions for cultural production.



## AT HOME ON THE LAND

For centuries, Inuinnait have been at home on the land. Our environment provides everything we need to survive in the extreme climate of the Arctic. Our winter houses, igluit, are made of snow. Our tents, tupiit, created from the skins of caribou and other animals that sustain us with food. Driftwood and the tree line to the southern edge of our territory provides the wood we need to frame our tents, buildings and transportation.

With the introduction of outside cultures, ideas and materials to our region, the strong connections between our domestic spaces and surrounding landscape have changed. Our people were moved off the land and into urban settlements. Residential schooling distanced our children from their homelands and weakened the generational transfer of knowledge and language that allowed them to make it their own. The spaces we now occupy in our communities are high cost, made with low-grade and imported materials, and configured in designs not suited to our culture, lifestyle, or climate. Living in such buildings takes a toll on mental and physical health.





## MAINTAINING THE BALANCE

Like Inuinnait society, the Arctic environment continues to change. We recognize that the environment that has so long sustained our people is facing the dangerous effects of climate change. Action must be taken now. We are working to preserve, protect and renew our language and culture, at a time when the foundations of our identity and lifestyle—the land—is equally at risk.

With 25 years of experience leading linguistic and cultural revitalization, we see the opportunity and necessity of taking a leadership position to usher in change and move towards sustainability. Even deeper than this decades-long history as a cultural organization, is our responsibility to maintain the balance between humans and the land that has long been upheld by our ancestors.



# PILOTING NEW DIRECTIONS FOR CHANGE

How can Inuinnait redefine cultural space and belonging in a rapidly changing environment? In May of 2021, we began working with Green Building Technologies (GBT) at the Southern Alberta Institute of Technology (SAIT) to design a 1,100 square foot cultural workspace that seeks an answer to this question. This workspace bridges the extensive local and traditional knowledge of Inuinnait with recent advances in renewable energy and energy efficient materials and technologies—many of which have not yet undergone testing in the Arctic. This building will function as a bold new vision for how our culture and language can once more serve as a strong foundation for the buildings we create.

Our new workspace has been custom-designed by Inuinnait Elders and cultural experts to facilitate traditional activities such as the preparation of skins, fabrication of traditional tools, sewing, and more. It will offer a dynamic space for community programming and research, all the while having its performance as a building closely monitored and adjusted through workshops and site-based activities to ensure its compatibility with desired cultural uses. In addition to these functions, the structure will build towards a stronger future for Inuit and environmentally responsive architecture; we will test and monitor the performance of the building and its energy efficient materials and technologies to help us target Net-Zero goals. It will help us develop key partnerships, track lessons learned, test the supply chain, develop realistic cost estimates, and build local capacity for the construction of future cultural buildings in Cambridge Bay and other northern communities.

All of this work is leading towards our construction of a larger, net-zero targeted cultural campus for Cambridge Bay. This campus, bridging Inuit-driven architecture and renewable technologies with the surrounding landscape, will function as a hub for documenting and mobilizing culture and language research across the Inuinnait region. The findings from our pilot building will inform future, culturally-focused structures in our community and across the Arctic as a whole.

**It is our intention for this building to genuinely emerge from the land we live in, aligned with its environment, its people, and its priorities for an Inuinnait future. As we move forward with this ambitious project, we walk in the footsteps of our ancestors and will continue to rely on the innovation and ingenuity of our culture to solve climate and building challenges in the North.**





# BY THE NORTH, FOR THE NORTH

For millennia, our ancestors thrived in one of the world's harshest climates, their lives completely intertwined with the land, sea, and everything in between. The insight we need to create better buildings in the North must be found in the North itself and in our knowledge. As we look to the health and wellbeing of our communities and our culture, the buildings we make—and our lives within them—must be integrated with the environment, harmonized with our surrounding landscape, rather than at odds with it. For that reason, our research is grounded in three key concepts:

**EXPLORING INUIT ARCHITECTURE:** Since 2016, we have been recovering and documenting Inuinait architectural concepts, principles and terminology through conversations and workshops with local Elders, land users, and knowledge holders. Our long-term archaeology partnership with Dr. Max Friesen at the University of Toronto has documented the evolution of regional architecture and its adaptation to systems of environmental and social change over the last 4,000 years. Multiple workshops have seen participants reflect on the overlap between language revitalization and cultural revival through the lens of traditional architecture. How we live and what we do in lived spaces has changed. Conversations have uncovered Inuinnaqtun terms that we no longer use, simply because our buildings and homes today lack the space designed to conduct cultural activities.

**UNDERSTANDING LOCAL KNOWLEDGE AND NEEDS:** Consultations with our community have taken place as meetings, workshops, design charrettes and dozens of interviews with local construction and energy industry experts, home and cabin owners, Elders and knowledge holders, traditional architecture experts and the municipal government. In-depth conversations have outlined a vision for our cultural workshop space and the function of each room. Elders shared key components of Inuit vernacular architecture to carry into the design. Homeowners and local contractors described challenges with current infrastructure, the technologies they have tried, tested and are using, and what features should exist in modern Arctic buildings. All of these conversations help to ensure that our new cultural workshop reflects our community's experience, needs and priorities.

**BUILDING CAPACITY:** In addition to informing a future cultural campus, our pilot cultural workshop aims to build awareness of renewable energy and energy efficient infrastructure among community members and industry experts in Cambridge Bay. Local contractors, builders, and a renewable energy firm have been involved from the onset of our project. Together, we are learning from identified challenges and solutions, and forwarding the community's expertise by exploring and testing new research areas in building design. By promoting and building Cambridge Bay's entrepreneurship and capacity, we are ensuring that our construction project will be supported and managed locally, in addition to long-term operation and maintenance.



We hope that the unique design and green energy focus of this building will help to highlight and celebrate Cambridge Bay as a hub for Inuit-led environmental research in Nunavut.

In 2010, the Municipality of Cambridge Bay released a Climate Change Adaptation Action Plan that outlines key strategies to adapt to the increasing effects of climate change. Priority areas of action include increasing community awareness about climate change, developing guidelines and standards for planning for climate change at the community level, and formalizing local knowledge provided by Elders, land users and community members. We have developed our project to further their goals by:

- 1) Developing and circulating our first infrastructure climate resilience assessment for consideration for future buildings; designing the building based on future weather patterns and identifying risk mitigation strategies. Future climate adaptation work will be also shared with the Hamlet.
- 2) Developing our own Climate Action Strategy; determining our current carbon footprint and developing a vision, goal and strategies for GHG reduction at the organizational level.
- 3) Applying and testing new energy efficient materials and renewable power sources through a community-guided framework that maximizes their scalability/replicability to other local buildings including small and affordable homes.

**In order to move culturally and environmentally conscious architecture forward in the North, we are committed to sharing all of our research, findings and results as open data through our project website:**

**[www.nunamiutuqaq.ca](http://www.nunamiutuqaq.ca)**

# THE FUTURE OF CULTURALLY ROOTED INFRASTRUCTURE

Inuinnait Elders fondly remember the traditional buildings they grew up in. They often speak of them as animate dwellings: spaces that actively shape daily life, and that need, in turn, to be cared for. These buildings breathe and communicate with the outside world, absorbing sunlight and fresh air, while keeping out dampness and cold. Like the weather and animals, they are an integral and intimate companion to human existence.

In alignment with these architectural values, our cultural workspace is designed to be a part of its human and natural environment. The building responds to the natural features and topography of its landscape. The building's southeastern facing position and large solar awning have been designed to actively absorb the sun's heat and light during colder months, and to minimize passive solar overheating during the warmth of summer. The building's design centres on a large circular room for collective activity in homage to qalgiit, traditional snow houses built to accommodate community gathering. Three walls of windows bring in natural light and create a space that minimizes physical barriers between the indoors and outdoors. Vaulted ceilings in the main room converge at a central overhead skylight, bringing natural light in from above. The building's entrance has been designed as a buffer between the outdoor temperatures and the inner main room, functioning much like the 'cold trap' entrance of traditional igluit. Equal attention has been given to the ways in which the building's temperature intersects with the cultural activities that will occur there, with colder areas designated for work with meat and hides, and warmed floors for Elders and community members to conduct their work. The building specifically allows for different temperatures to store skins, fabrics, tools, etc., each of which has their own optimal temperature profile.

Three additional rooms within the building serve specific cultural purposes. A mechanical room encloses the necessary parts of any modern building, providing a space to hide electrical panels, batteries, and water, heating and ventilation systems. A kitchen equips the building with plenty of fridge and freezer space for food and other items needing low temperatures, as well as washing and cleaning. Finally, a meeting room will allow for solitude, separate from the main room and hub of activity. It is a space for reflection, conducting interviews and engaging in work not compatible with large groups or activities.

An enclosed veranda at the rear of the building faces into the wind, and has been designed as a site for drying meats and hides in the summer, and as a walk-in freezer for storing foods and cultural materials during winter months.

## **In the following pages, we present Kuugalak.**

The name Kuugalak references the waterway adjacent to the building; one that local Elders say used to run wide and deep, but which has been reduced to a small creek due to climate change. As we focus on climate adaptation and cultural revitalization, our aim is for Kuugalak to be both a symbol and a place where our knowledge and our connection to the landscape flows deep through the community once again.



**“This building will be utilized for our future generations to come and to learn and remember the importance of Inuit traditional knowledge.”**

Bessie Omilgoetok, PI/KHS Honourary Chair

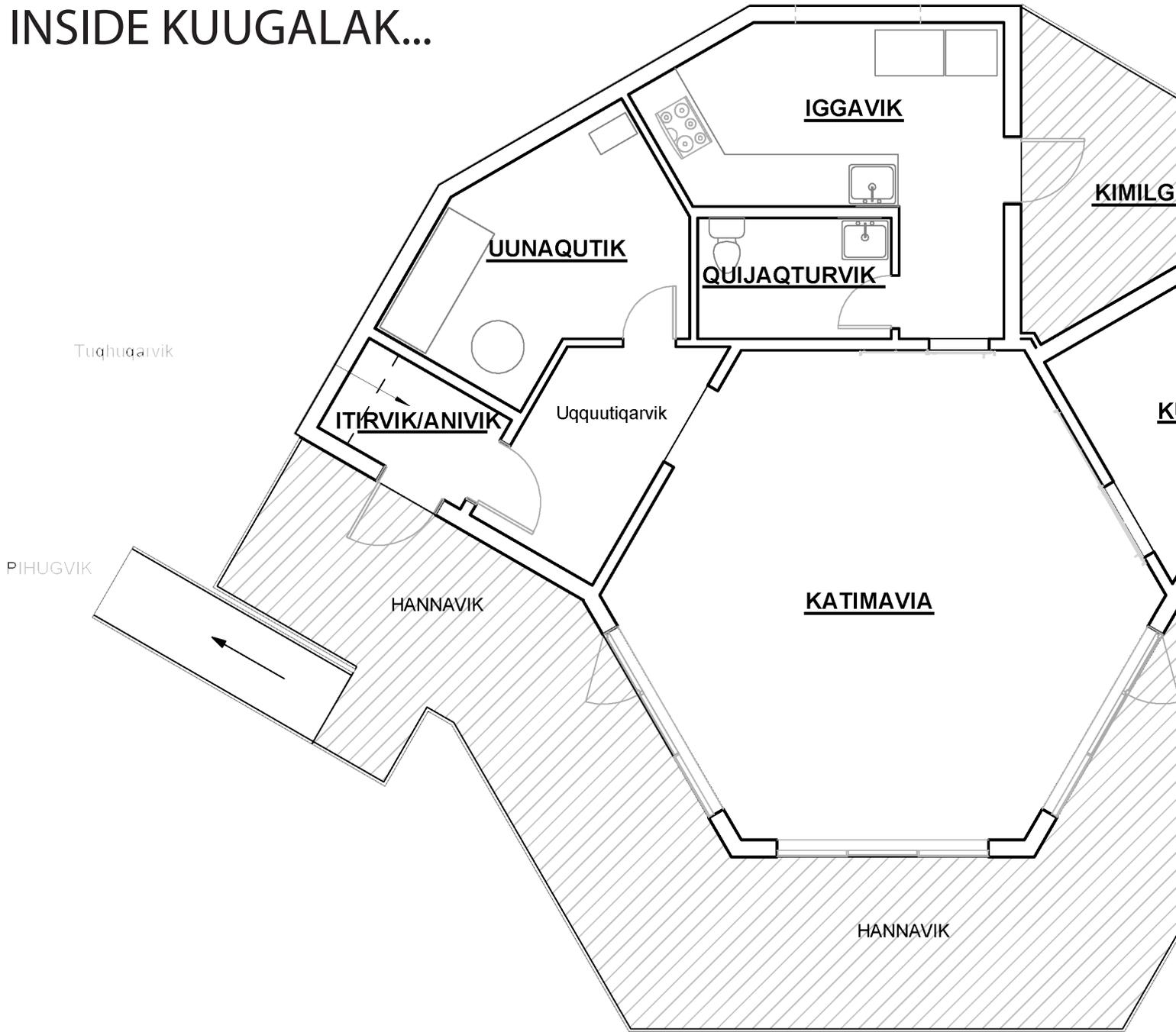








# INSIDE KUUGALAK...



UTTIT

UINGINNAILRUQ

HANNAVIK

KITCHEN

DECK

E/M ROOM

POWDER ROOM

BUFFER ZONE

VESTIBULE

WARM ZONE

MEETING ROOM

RAMP

VERANDA

MAIN LODGE

VERANDA

VERANDA



# BUILDING FOR A SUSTAINABLE FUTURE

One of the main research questions driving our building is how to create more climate resilient, energy efficient buildings for the Canadian Arctic. Research has been carried out with an objective of being highly energy efficient, exceeding current community construction standards and setting a precedent for high performance buildings in the North. Our latest energy models show significant energy and GHG reductions compared to standard building practices in Nunavut (as represented through base case NBC 2015 compliance specifications). This includes a reduction in electricity consumption and heating fuel, and renewable energy (solar PV) production.

Specific design measures to exceed current standard practices in Nunavut include energy conservation and renewable energy generation. High building envelope performance includes R-60 wall panels made from magnesium oxide (MgO) and R-60 flat roof, high performance windows, and increased airtightness with minimized thermal bridging. Energy efficient systems include boilers, HRV, plumbing, mechanical, electrical, and lighting in order to reduce energy demands. Energy generation will be facilitated through photovoltaic solar panels, under QEC's CIPP program. Space has been included to add batteries in future years to contribute to energy storage and building resiliency. Key concepts from traditional Inuit architecture—including passive solar and solar shading techniques, building orientation, fenestration, and foundation and permafrost considerations also increase energy efficiency through integration into the design of our building. The traditional architectural strategies provide an important foundation for design to ensure the new building's resilience in the northern climate. Local and low embodied carbon materials and high-performance products from Northern and Indigenous-owned businesses have been prioritized for our build.





Additional key infrastructure concerns are guiding this project:

**WATER, WASTE AND EMBODIED CARBON REDUCTION:** In addition to high energy efficiency, other green design features, such as water efficient fixtures and low carbon materials are included in the building. We have conducted an embodied carbon analysis to guide us in our choices of building materials, along with life cycle and disposal considerations. The Municipality of Cambridge Bay does not have a recycling program or engineered landfill and burns all waste. By pre-building select components of pilot structure through training workshops in Calgary and dismantling it we are only shipping what we need, therefore reducing the amount of waste going to the community dump, reducing GHG emissions from shipping, waste transportation and incineration.

**ENSURING FUTURE CLIMATE RESILIENCY:** Our first Climate Risk Assessment conducted in June-July 2021 highlighted several potential infrastructure and site vulnerabilities to a changing climate; some of the major concerns being permafrost degradation, terrain instability and seasonal meltwater and drainage issues that could impact the piece of land that we are leasing for construction. A series of geotechnical studies at the site will assess the extent of these concerns and adjust the foundation design of our new building to adapt to them.

**MAINTAINING NATURAL ECOSYSTEMS:** Upon construction completion, the property will be returned to a natural tundra environment more suitable to cultural activities. Local Elders have prioritized leaving the drainage area undisturbed, and protecting all natural features during construction. Plans are in place with several local professionals to guide attempts to 're-wild' the property with a focus on plants that are edible, medicinal and used for cultural purposes. Landscaping the property will also help us mitigate the impacts of climate change, such as by slowing down the rain and melt water to protect our foundations.

# MONITORING AND EVALUATING OUR SUCCESS

There is currently very little information available about the performance of energy-efficient and renewable materials and technologies in Arctic environments. A key objective of our pilot workspace project is to conduct monitoring and analysis of energy, water and indoor air quality of the building with the goal of maximizing occupants satisfaction and decreasing reliance on a fossil fuel based grid. We will determine the ability of newer construction methods and mechanical systems to maintain optimum humidity levels to provide occupant comfort while avoiding building performance issues and mold incidence through all arctic seasons, which is a widespread issue in all Arctic communities. We will also collect data to better understand the return on investment for choosing high energy efficiency solutions over business as usual design and construction, and help build the business case for green building design in the Arctic.

The building will be closely monitored and adjusted to ensure its compatibility with desired cultural uses. Our monitoring and evaluation plan includes the collection of:

- Insights into energy and water consumption.
- Insights into current ventilation strategies and their impacts on indoor air quality.
- Data to better understand the return on investment for choosing high energy efficiency solutions over business as usual design and construction.
- Information to help identify roadblocks, whether technical or regulatory, in the current municipal and territorial systems.
- Data on solar power and other renewable energy production that can inform decision making for both the community and the territorial utility.
- Insights into the relationships between construction method, energy efficiency and indoor air quality as measured by CO<sub>2</sub>, humidity, particulate matter and other criteria.
- Qualitative assessments of occupants' comfort as a function of consistent temperature throughout the building and indoor air quality, especially humidity.
- Opportunities to train local industry and community to be able to install, operate, maintain, and analyse systems and their data.

A bilingual (Inuinnaqtun/English) user portal/visualization tool will be created for our building to share real-time information regarding the building's performance and mechanical/environmental response to the cultural events being held there. This will help communicate and monitor data to optimize building operations and educate users, with an understanding that shared learning helps to build stronger communities of practice and resilience.





## SERVING OUR COMMUNITY

The proposed workshop space was designed by community members with the wellness of our own community in mind. It will provide direct cultural and social benefits to both those living in Cambridge Bay and the wider Inuinait community by offering culturally-anchored services and resources not otherwise available to many. It also seeks to encourage and strengthen local peoples' economic and educational pursuit of traditional practices and ways of life, and directly supports traditional economies. In 2021 alone, we invested over \$800,000 into our community through employment, payment for services, and the sourcing of cultural resources. We have specifically been promoting and building local entrepreneurship from the earliest stages of our project with the goal of supporting future stages of the facility's construction, operation and maintenance. Local contractors have been included from the start of project design to identify the support they will require to scale and engage with this work. In May 2022, we will bring a group of industry professionals from Cambridge Bay to Calgary to work directly with SAIT's team on a pre-build of the structure's envelope and mechanical systems so that all knowledge and practices associated with our building continue to reside in the North. Our project has provided local companies with the opportunity to try out new building solutions and explore innovative green energy research in a manner that commercial construction typically does not allow.





The programming for our new cultural workshop is designed to recognize and respond to the needs of diverse community members. We specialize in assisting local women through Elder mentorship and training programs—in parenting, language, and life skills—that provide safe and empowering spaces for them to share their own life experiences and knowledge. Much of our programming is geared towards supporting more vulnerable community groups. The new building will continue to host activities for local life management programs, new parenting programs, and after school programming. We are specifically designing our building to cater to our range of clientele’s physical and accessibility needs—from ensuring that features such as windows to countertops and cupboards can be reached by Elders, to making the space easily navigable for the visually impaired. Alongside our existing May Hakongak Centre—which we will continue to operate with a specific focus on library service—we will continue to offer free programming to our clients, as well as an engaging space to spend their days in self-guided learning (whether through our museum, archives or library), and a variety of resources and facilities—from computers, to workshops, to our business innovation hub—to build their strengths and passions into viable economic pursuits.



# A PROJECT FOR TRUTH AND RECONCILIATION

Our project is guided through four key sections of the Truth and Reconciliation Commission's Calls to Action.

**EDUCATION:** A place of Inuinnaqtun immersion, Kuugalak will foster a rich working environment for staff to develop and facilitate culturally-based curricula and programs, and for generations to share and transfer knowledge.

**CULTURE AND LANGUAGE:** Committed to Inuinnaqtun immersion, and guided by a regional language committee, we will ensure that the preservation, revitalization and strengthening of Inuinnaqtun is led by local and regional priorities.

**MUSEUMS AND ARCHIVES:** Our building intersects with museum and archives design, policies, collections and licensing that have been uniquely created by Inuinnaqtun to reflect the specific needs of our people and priorities. Documentation of activities in the workshop space will join a digitized regional archives created by our organization to ensure that all of its content is accessible to, and used by, communities and classrooms across the country.

**BUSINESS AND RECONCILIATION:** This project maximizes the inclusion and advancement of local businesses, and has prioritized their input and feedback from initial stages of this project. We are committed to working with Indigenous and local designers to complete the non-structural design of our building features to ensure that final design speaks to and integrates with the local landscape.



# PROJECT TEAM

## **PITQUHIRNIKKUT ILIHAUTINIQ / KITIKMEOT HERITAGE SOCIETY**



Founded in 1996, the Pitquhirnikkut Ilihautiniq / Kitikmeot Heritage Society is guided by an Inuinnaq Executive Director and Inuinnaq Board, and is one of the territory's longest established heritage organizations. We address projects of importance to the revival of Inuit culture, language and history and focus on the critical needs of Inuinnaq—a distinct regional group of Inuit living in the Central Canadian Arctic. The Inuinnaqtun language—the foundation of Inuinnaq culture—has less than 600 fluent speakers remaining. By most estimates, it is a language that will be extinct in less than two generations. Faced with an urgent timeline, we have made an unwavering commitment to support the renewal of Inuinnaq culture and the revitalization of Inuinnaqtun.

## **SAIT'S GREEN BUILDING TECHNOLOGIES ACCESS CENTRE (GBTAC)**



For more than a decade, GBTAC researchers from SAIT's Applied Research and Innovation Services have worked with SAIT students, faculty, industry organizations, and businesses to develop green technology, programs, systems and services. As an applied research facility, the Green Building Technology Lab and Demonstration Centre provide hands-on training and industry-based experience. The on-campus research facilities are flexible, living laboratories, designed to study the many aspects of buildings and their environment including : net-zero energy and carbon emissions, materials and building science, site ecology, renewable energy solutions, and healthy buildings. Working in cooperation with builders, government, regulatory bodies and numerous stakeholders, the GBTAC team brings new products and processes to the green building marketplace and aims to transform the green building industry.

## **QILLAQ INNOVATIONS**



Qillaq Innovations is a 100% Inuit owned company based in Cambridge Bay, Nunavut. Qillaq Innovations offers a variety of essential services such as construction and contracting, earth works and heavy equipment, petroleum products and services.

## CHOU CONSULTING



CHOU Consulting & Development was established in 2013 in Cambridge Bay Nunavut as a consulting and development company focused on growing the north through construction and entrepreneurship. Pushing the typical construction methods used in the North, CHOU is currently working on a pilot project using GreenStone ICE Panels (Insulated Composite Envelope) as an RTM (Ready to Move) home to investigate the logistics and affordability of off-site construction in helping to provide access to homeownership throughout the Territory of Nunavut.

## AURORA ENERGY SOLUTIONS



Aurora Energy Solutions Inc. is a %100 Inuit owned company based in Cambridge Bay, Nunavut. Aurora provides renewable energy system installations and program consulting. Consulting services also include power system analysis, data collection, and surveying.

## BLUE SKY ENGINEERING & CONSULTING INC.



Blue Sky Energy Engineering & Consulting Inc. is a multi-disciplined engineering and consulting company that provides services focused on energy conservation, process optimization and engineering. Blue Sky Engineering is facilitating our carbon inventory and climate action plan development.

## MADE POSSIBLE WITH SUPPORT FROM

The expected final cost of our building's completion is \$2 million inclusive of research, land, materials, and ongoing performance monitoring. This builds on previous and ongoing funding from CanNor, CIRNAC, Nunavut Tunngavik Inc., the Government of Nunavut, Crown-Indigenous Relations & Northern Affairs Canada, and Indigenous Clean Energy to support feasibility and pre-construction phases, as well as building construction.



FOR MORE INFORMATION, PLEASE VISIT  
[WWW.NUNAMIUTUQAQ.CA](http://WWW.NUNAMIUTUQAQ.CA)



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