

Response to Reviewer Comments

NIRB File No. 26YN041

Project: *Arctic Water Solutions: Harnessing Native Northern Plants for Nature-Based Wastewater Treatment in Canada's Arctic*

Applicant: Prof. Wenxi Liao, School of Environmental Sciences, University of Guelph

The University of Guelph research team thanks the Nunavut Impact Review Board (NIRB) and all reviewing parties for their careful consideration of the project proposal. We have carefully reviewed and addressed all comments received from the reviewing parties, as detailed in the tables below.

1. Kitikmeot Inuit Association (KitIA)

Letter from Jennifer Amagoalik, Project Officer, Department of Land, Environment and Resources, KitIA. Dated August 19, 2026.

Reviewer Comment	Response
Waste Management <i>As stated in the project proposal, effluent will be collected to be treated through the Biofilters. Preventative measures such as accidental spill responses should be made with proper equipment and materials.</i>	We thank KitIA for this comment and have revised the design in the project. The biofilter design now incorporates multiple layers of spill prevention and containment. Each biofilter column (plastic tube) is housed within a modified plastic barrel serving as a secondary containment vessel (double-layer design). This double-layer configuration ensures that any accidental release of effluent is captured before it can contact the land surface. Wastewater treatment experiments will only be conducted under direct supervision of the University of Guelph team. Dedicated spill-response equipment and materials (absorbent pads, containment barriers, PPE) will be maintained on site at all times during wastewater treatment experiments. A spill response procedure will be prepared prior to field deployment and communicated to all project personnel.
Community Involvement <i>KitIA encourages the proponent to hire local Inuit Beneficiaries to help support the project. Locating and collecting local plants described for the project would be beneficial for both members of the community and project proponent.</i>	We appreciate this recommendation and are committed to hiring local Inuit Beneficiaries to support the project. As suggested, we will actively recruit community members, including Elders, to assist with locating and collecting native Arctic plant species for transplantation into the biofilters. Their knowledge of the local landscape and plant communities would be invaluable to this work, and their involvement aligns with the spirit of community-based research we seek to foster. We welcome continued engagement with KitIA to facilitate local hiring and are committed to identifying meaningful training and employment opportunities for Inuit Beneficiaries throughout the duration of the project.

2. Government of Nunavut (GN)

Letter from Justin Buller, Interim Avatiliriniq Coordinator, Government of Nunavut. Dated August 20, 2026.

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<i>The GN has reviewed the proposed project and related documents and has no comments or concerns to raise with the Board at this time.</i>	The University of Guelph research team thanks the Government of Nunavut for reviewing the project proposal and for confirming that no comments or concerns are raised at this time.

3. Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Letter from Saba Qazi, A/Manager, Impact Assessment, CIRNAC. GCdocs# 149470338. Dated August 20, 2026.

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CIRNAC #1: Freeze-Thaw Containment Integrity and Permafrost Protection <i>The Project proposes to operate six 210 L outdoor biofilters and associated wastewater-transfer and collection equipment near Canadian High Arctic Research Station from 2027 to 2028. Although wastewater would not be introduced when research personnel are absent, the biofilters may be irrigated with tap water, and the application does not specify how much liquid may remain in the filter media, vessels, piping or collection containers during freezing conditions. It also does not describe winterization, freeze protection, equipment temperature ratings or secondary containment. Freezing of retained liquid could damage vessels, fittings or piping and result in a release to the ground. CIRNAC recommends that the Proponent:</i> <i>Implement measures to prevent freezing and the release of wastewater from biofilters, piping, and collection containers during unattended periods;</i> <i>Provide adequate secondary containment to prevent wastewater from entering surrounding lands or waters;</i> <i>Inspect the biofilters, piping, collection containers, and containment areas regularly for leaks or damage; and</i> <i>Maintain appropriate spill-response procedures and cleanup materials at the Project site.</i>	We thank CIRNAC for this detailed comment. The following measures will be implemented: - Freeze protection: During the non-experimental periods, tap water irrigation will be limited to the minimum volume needed to sustain plant survival, with the outlet pipe closed to retain moisture within the media/biofilter. During winter, when temperatures remain consistently below freezing and plants are dormant, tap water irrigation will be stopped entirely to prevent pipe freezing and ice accumulation within the system. - Secondary containment (double-layer design): Each biofilter column is housed within a modified plastic barrel to prevent any potential accidental spill on the land. - Regular inspections: Wastewater experiments will only be conducted when the University of Guelph team is present on site. During intervals between site visits, CHARS staff will conduct periodic visual inspections of the biofilters, piping, and containment barrels using an inspection checklist to be provided by the research team. - Spill response: Dedicated spill-response equipment and materials, including absorbent pads, containment barriers, and PPE, will be maintained on site throughout all experimental periods. A spill response plan will be prepared prior to field deployment and communicated to all project personnel and relevant CHARS staff.
CIRNAC #2: Biochar Media Quality and Substrate Contaminant Management <i>The application does not identify the source or initial quality of the biofilter media or describe how wastewater-affected media would be contained, stored, handled and disposed of (or regenerated) during maintenance and decommissioning. Biofilter media that has contacted wastewater may retain contaminants. Improper handling, storage or disposal of this material could result in contaminants entering surrounding land, surface</i>	We thank CIRNAC for raising this point. The following commitments are made: - Pre-deployment characterization: Prior to field deployment, all biochar batches will undergo laboratory characterization, including analysis of inorganic and organic contaminants such as heavy metals and PAHs. - Guideline conformance: The biochar media to be used in this project is commercially produced and certified in Canada, and is approved for agricultural use by the Canadian Food Inspection Agency (CFIA). Biochar characterization results will be assessed against the CCME Soil Quality Guidelines for the Protection of Environmental Health prior to field delivery.

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water or groundwater. CIRNAC recommends that the Proponent consider: • Conducting pre-deployment laboratory characterization on all biochar media batches such as total elemental analysis for heavy metals, and PAH quantification, etc.; • Demonstrating that biochar media parameters conform to Canadian Council of Ministers of the Environment Soil Quality Guidelines for Environmental Health prior to field delivery; and • Utilizing impermeable catchment trays or secondary containment beneath all filter units during operation and media handling.	• Secondary containment during operation and media handling: Each biofilter unit is enclosed within a secondary containment barrel. Impermeable catchment trays or equivalent secondary containment will be used beneath all units during media handling and decommissioning. Wastewater-contacted media will be collected, packaged, and transported back to the University of Guelph for proper disposal at the end of the project.
CIRNAC #3: Native Plant Harvesting and Active-Layer Permafrost Thermal Protection The Project proposes collecting fewer than 20 native Arctic plants from the Cambridge Bay area for transplantation into the biofilters. The application indicates that collection would occur under an appropriate permit but does not describe how collection sites would be selected or restored. Given the slow growth rates of tundra vegetation (radial stem increments frequently under 0.5 mm/year), additional information regarding non-destructive collection or site restoration practices would help demonstrate how ground stability and permafrost integrity will be preserved. CIRNAC recommends that the Proponent consider: • Using existing access routes and minimizing disturbance to surrounding vegetation; • Backfilling and restoring collection areas to a stable condition immediately following plant removal; • Replacing salvaged surface material and vegetation over disturbed areas, where practical, to promote revegetation and protect the ground surface; and • Inspecting collection areas following restoration and addressing any erosion, settlement, or other instability resulting from Project activities.	We thank CIRNAC for this comment and acknowledge the importance of protecting permafrost integrity during plant collection. The following clarifications and commitments are provided: • Plant species and collection location: Plants will be harvested on-site at or near CHARS from locally abundant, weedy species (e.g., <i>Tephrosia palustris</i>) that colonise disturbed ground. These species are small in stature (15–150 cm tall) and are not ecologically sensitive, being widely distributed in sewage lagoons and wetland areas across the region. Fewer than 20 individual plants will be collected for the entire experiment, limiting the overall footprint of disturbance. • Non-destructive collection: Existing access routes will be used to reach collection sites, minimising disturbance to surrounding vegetation. Plants will be removed carefully by hand tools only, with the root ball and surrounding soil kept as intact as possible to support successful transplantation and subsequent site restoration. • Immediate site restoration: Collection areas will be backfilled and restored to a stable condition immediately following plant removal. Salvaged surface material will be replaced over disturbed areas where practical. • Post-restoration inspection: Collection and restoration sites will be inspected following restoration activities to identify and address any erosion, settlement, or instability. At the end of the experiment, all harvested plants will be returned to their original collection locations as requested.
CIRNAC #4: Consultation with Interested Parties CIRNAC recommends that the Proponent continue engaging with the Hamlet of Cambridge Bay, the Ekalukutiak Hunters and Trappers Organization, and any other relevant organizations and individuals regarding its project proposal. As part of these consultation activities, several issues should be considered, including but not limited to:	We fully support this recommendation and commit to the following: • Inuit Qaujimajatuqangit (IQ) and community knowledge: We will seek guidance from local knowledge holders on plant species identification, appropriate conduct on the land, and any sites of cultural or environmental significance in the project area. Wherever possible, we will recruit local community members to assist in locating and collecting native plants, consistent with the encouragement expressed by KitlA, and are committed to identifying

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• <i>Incorporation of Inuit Qauijimajatuqangit and community knowledge in project activities;</i> • <i>Mitigation measures to prevent any disturbance to wildlife and the environment;</i> • <i>Mitigation measures to prevent disturbance to sites of cultural, archaeological, and/or environmental significance;</i> • <i>The experience of community members who may participate in traditional harvesting activities within or in close proximity to the project area;</i> • <i>Training and employment opportunities for Inuit and community members;</i> • <i>Procurement opportunities for local and Inuit-owned businesses; and</i> • <i>Regular updates on the status of project activities.</i>	meaningful training and employment opportunities throughout the project. • Wildlife and environmental disturbance: Operations are confined to the existing CHARS station grounds near the triplex. All activities will be conducted in a manner that minimises disturbance to wildlife and the surrounding environment, and any issues observed will be documented and reported promptly to the appropriate parties. • Cultural and archaeological sites: Consultation with the Cambridge Bay community has already been initiated. During an initial site visit in July 2026, we met with the Chief Administrative Officer (CAO) of the Hamlet of Cambridge Bay to discuss the project. We have also engaged with KitIA, including a meeting with the Senior Lands Officer and a formal review of and response to KitIA's comments submitted to NIRB. Outreach to the Ekaluktutiak Hunters and Trappers Organization (EHTO) has been initiated and we will continue to pursue a meeting with their representatives. • Employment, training, and procurement: We are committed to exploring local hiring opportunities, particularly for plant collection and routine system support, consistent with the encouragement expressed by KitIA. Materials and supplies will be procured from local and Inuit-owned businesses in Cambridge Bay wherever possible. • Regular updates: We commit to providing regular updates on project activities to all relevant parties, including the Hamlet of Cambridge Bay, KitIA, the Ekaluktutiak Hunters and Trappers Organization, CHARS staff, and other interested parties, throughout the duration of the project.

We appreciate the opportunity to respond to these comments and are committed to continued collaboration with all reviewing parties and local communities. Please do not hesitate to contact us should any further information be required.

Sincerely,

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