



Water Resources Division
Resource Management Directorate
Nunavut Regional Office
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Your file - Votre référence
1BR-KEI1722
Our file - Notre référence
GCDOCS#103906303

June 24, 2022

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
E-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada's Review of 1BR-KEI1722 Water Licence Renewal and Amendment Application for CAM-E Keith Bay Site Remediation Project in West Kitikmeot Region of Nunavut

Dear Mr. Dwyer,

Thank you for the May 24, 2022 invitation to review the 1BR-KEI1722 water licence renewal and amendment application submitted by the Contaminated Sites Directorate of Crown-Indigenous Relations and Northern Affairs Canada.

The Water Resources Division of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC-Waters) examined the application pursuant to its mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act*. Please find CIRNAC-Waters comments and recommendations in the attached Technical Memorandum.

If there are any questions or concerns, please contact me at david.zhong@rcaanc-cirnac.gc.ca or Andrew Keim at andrew.keim@rcaanc-cirnac.gc.ca.

Sincerely,

David Zhong,
Regulatory & Science Advisor



Technical Review Memorandum

Date: June 24, 2022

To: Richard Dwyer, Manager of Licensing, Nunavut Water Board

From: David Zhong, Regulatory & Science Advisor, CIRNAC

Subject: Crown-Indigenous Relations and Northern Affairs Canada's Review of
1BR-KEI1722 Water Licence Renewal and Amendment Application for
CAM-E Keith Bay Site Remediation Project in West Kitikmeot Region of
Nunavut

Region: Kitikmeot

A. BACKGROUND

The CAM-E Keith Bay, former intermediate Distant Early Warning Line facility, is located approximately 75 kilometres east of Kugaaruk, in the West Kitikmeot Region of Nunavut, at the following general geographical coordinates: Latitude: 68° 18' 13.4"N, Longitude: 88° 05' 10.7" W; Latitude: 68° 18' 13.4" N, Longitude: 88° 10' 51.39" W; Latitude: 68° 14' 10.8" N, Longitude: 88° 51' 51.39" W; Latitude: 68° 14' 10.8" N, Longitude: 88° 05' 10.7" W – Project Extents.

The facility, which was constructed in 1957 by the Department of National Defence (DND), operated until 1963 after which the responsibility for the site and facility was transferred to Indigenous and Northern Affairs Canada (INAC, now Crown-Indigenous Relations and Northern Affairs Canada, CIRNAC). Between 2011 – 2014 INAC retained consultants to conduct a number of investigations and assessments of the site following which a Remedial Action Plan, Archeological Assessment Report and an Environmental Impact Assessment Report were generated. Based on the Canadian Council of Ministers of the Environment (CCME), National Classification System for Contaminated Sites (NCSCS), the CAM-E Keith Bay site was identified as a Class I or high priority site requiring clean-up action.

On January 17, 2012, the Nunavut Water Board (NWB) issued the 1BR-KEI1722 Water Licence to INAC (the Licensee) for the CAM-E Keith Bay Site Remediation Project. Remediation of the site included demolishing most of the infrastructure. As part of the construction work, the beach airstrip and access roads were upgraded. Two landfill facilities were constructed to house the demolition waste, a non-hazardous waste landfill and a Tier II landfill.

On May 16, 2022, the licensee submitted an amendment and renewal application of the 1BR-KEI1722 Water Licence for the implementation of the CAM-E Keith Bay Long Term Monitoring Program.



On May 24, 2022, NWB solicited comments on an amendment and renewal application for the 1BR-KEI1722 Water Licence submitted by the licensee.

The Water Resources Division of CIRNAC (CIRNAC-Waters) provides the following comments and recommendations pertaining to the application. A summary of the subjects of recommendations can be found in Table 1. Documents reviewed as part of this submission can be found in Table 2 of Section B. Detailed technical review comments can be found in Section C.



Table 1: Summary of Recommendations

Recommendation Number	Subject
R-01	Monitoring Potential Contaminant Transport via Groundwater Flow
R-02	Quality Assurance and Quality Control

B. DOCUMENTS REVIEWED AND REFERENCED

The following table (Table 2) provides a list of the documents reviewed under the submission and reference during the review.

Table 2: Documents Reviewed and Referenced

Document Title	Author, File No., Rev., Date
CAM-E Keith Bay Water Licence Amendment Application	Charlotte Lamontagne, CIRNAC, 2021-12-07
CAM-E Keith Bay Water Use Licence Application	Charlotte Lamontagne, INAC, 2016-07-11
CAM-E Keith Bay - Map	CIRNAC, 2021-02-12
CAM-E Keith Bay Drawings1	
CAM-E Keith Bay Drawings 2	Stantec
2021-12-09-NPC #149627-CAM-E	Nunavut Planning Commission, 2021-12-09
CAM-E Keith Bay NPC Conformity Letter - Not Required	Nunavut Planning Commission, 2016-01-27
CAM-E Keith Bay NIRB Screening	Nunavut Impact Review Board, 2016-05-13
CSP - 1819 - CAM-E LONG TERM MONITORING PLAN 1246567	Public Services and Procurement Canada, 2019-12-17
CSP - 2021 - CAM-E KEITH BAY 2020 LONG TERM MONITORING (LTM) REPORT - FINAL 1293233	BluMetric Environmental, 2021-02-18
1BR-KEI1722 Approved License	Nunavut Water Board, 2017-01-17
Licence No. 1BR-KEI1722 Amendment No. 1	Nunavut Water Board, 2017-11-29
1BR-KEI1722 Water Licence Errata	Nunavut Water Board, 2019-02-07
Abandoned Military Site Remediation Protocol, Volume II – Technical Supporting Documentation	Indian and Northern Affairs Canada, 2009-03



C. RESULTS OF REVIEW

1. Monitoring potential contaminant transport via groundwater flow

Comment:

The CAM-E Keith Bay project site is in a permafrost region, where capping the contaminants below the thermal active layer can be an effective mitigation measure to limit contaminant transport. The annual freeze-thaw cycle in the thermal active layer and the infiltration of surface water in the summer (e.g., from precipitation and surface flow), however, would generate groundwater flows that have the potential to transport contaminants within and beyond the engineered confines of the landfills. Ground temperature monitoring and groundwater monitoring would be required to obtain the necessary information to assess and quantify if and to what extent contaminant transport via groundwater flow has been happening below the surface.

Ground temperature monitoring data reported in the Cam-E Keith Bay Long Term Monitoring Event 2020 Long Term Monitoring Report indicated that the depth of the thermal active layer, where the annual freeze-thaw cycle occurs, in the Tier 2 facility was between 1.9 and 3.0 meters below ground in 2019 and 1.7 and 2.0 meters below ground in 2020.

The Cam-E Keith Bay Long Term Monitoring Event 2020 Long Term Monitoring Report also reported that “[W]ater levels were taken at the seven (7) groundwater monitoring wells. All monitoring wells were frozen, thus no ground water samples were collected.” and that “[N]o soil or surface water samples were collected as there were no observed seepage points or staining.”

In the CAM-E Long Term Monitoring Plan, it was stated that “[A]n attempt to collect baseline groundwater samples was made in 2017; however, six of the seven wells were either dry or frozen at the time of sampling. MW17-01 at the Non-Hazardous Waste Landfill had a sufficient volume of water to collect a baseline sample in September 2017. An additional attempt at sampling was made in 2018; however, all wells were again either dry or frozen.” It was also stated that “[S]oil sampling during post construction monitoring will be limited to locations where seepage or staining has been identified as part of the visual inspection.” Furthermore, the 2009 INAC Abandoned Military Site Remediation Protocol (AMSRP) had identified this issue and suggested that groundwater monitoring cannot be considered the prime indicator of landfill performance because of the observed high occurrence of unreliable monitoring wells at the abandoned military sites in Nunavut, which varied from 17% to 100% and with an average 45%. Unreliable monitoring wells are defined as wells where water could not be sampled on a regular basis because they were damaged, frozen/dry, or they contained an insufficient volume of water.



Given the above observations, it is possible that no groundwater samples would be obtained in the future.

Although the CAM-E Long Term Monitoring Plan included a variety of monitoring approaches, including visual monitoring of the surface of landfill facilities and the natural environment, surface seepage and soil monitoring, ground temperature monitoring and groundwater monitoring, it did not, however, include any alternative approaches to assess or quantify potential contaminant transport via groundwater flow below the surface when no groundwater samples can be obtained.

CIRNAC-Waters is concerned that without groundwater samples, potential contaminant transport via groundwater flow below the surface within and beyond the engineered confines of the landfill facilities would not be properly monitored and assessed. Recognizing the difficulties in obtaining groundwater samples, CIRNAC-Waters encourages the licensee to explore alternative approaches to monitoring and assessing the performances of the landfills in terms of potential contaminant transport via groundwater flow for scenario in which no groundwater samples will be obtained.

Recommendation:

(R-01) CIRNAC-Waters recommends that the licensee continue its efforts in groundwater monitoring in the future.

2. Quality assurance and quality control

Comment:

The CAM-E Long Term Monitoring Plan included a section on quality assurance and quality control (i.e., section 3), as required by Part J, item 9 of the 1BR-KEI1722 Water Licence.

Groundwater monitoring included both sampling and in-situ (or field) measurements of pH and conductivity. Although quality control and quality assurance measures were summarized in the CAM-E Long Term Monitoring Plan, no measures on the quality control and quality assurance for in-situ measurements of pH and conductivity was provided. In addition, quality assurance did not include standard measures such as travel and field blanks.

Recommendation:

(R-02) CIRNAC-Waters recommends that the quality assurance and quality control protocols include measures for in-situ measurements and applicable standard quality assurance measures.