Environment and Climate Change Canada | Environnement et Changement climatique Canada

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ECCC File: 6500 000 004/005
NWB File: 8AC-ALT----

July 20, 2018

Via email at: licensing@nwb-oen.ca

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Mr. Dwyer:

RE: 8AC-ALT---- – Department of National Defense – Canadian Forces Station Alert Project – Renewal Application for Type A Water License – ECCC Technical Review Comments

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned Type A Water License Renewal Application and is submitting the attached technical review comments via email. ECCC's specialist advice is provided based on our mandate, in the context of the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act*.

Should you require further information, please do not hesitate to contact Eva Walker at (867) 669-4744 or eva.walker@canada.ca.

Sincerely,

Susanne Forbrich
Regional Director

cc: ECCC Review Team
Georgina Williston, Head, Environmental Assessment North (NT and NU)

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ENVIRONMENT AND CLIMATE CHANGE CANADA'S TECHNICAL REVIEW COMMENTS TO THE NUNAVUT WATER BOARD

RESPECTING THE CANADIAN FORCES STATION ALERT PROJECT APPLICATION FOR A TYPE A WATER LICENCE SUBMITTED BY DEPARTMENT OF NATIONAL DEFENSE

JULY 20, 2018

Canada

Executive Summary

The Department of National Defense (the Proponent) has applied for a Type A Water Licence for Canadian Forces Station Alert (the Project) located on the eastern tip of Ellesmere Island, Nunavut. The Alert station typically holds 120 personnel but there can be up to 220 personnel on site at one time. The station was originally licensed under a Type B water licence application but as a result of the need for bleed water (continually circulating water) to keep pipes thawed and a new wastewater treatment system built in 2010 the station now qualifies for a Type A water licence.

Environment and Climate Change Canada (ECCC) has participated in the Water Licence (WL) review process to date providing comments and information requests to the Nunavut Water Board (NWB) on the WL application. ECCC is continuing its participation in this WL review process by way of this submission to the NWB.

This submission summarizes the results of ECCC's technical review of the water licence application and the additional information provided by the Proponent on February 9, 2017 and June 1, 2018 in their responses to ECCC's information requests. In Nunavut, ECCC provides specialist expert information or knowledge to the NWB as required under Article 13 of the Nunavut Agreement. The comments and recommendations provided relate to ECCC's mandate in the context of the *Canadian Environmental Protection A*ct and the pollution prevention provisions of the *Fisheries Act*.

ECCC has identified outstanding comments with respect to wastewater effluent quality, frequency of the effluent monitoring, operation and maintenance of the treatment system (terraced wetland) and the use of bleed water at the station.

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1.0 List of Acronyms

BOD – Biological Oxygen Demand

CEPA – *Canadian Environmental Protection Act*

DND – Department of National Defense

ECCC – Environment and Climate Change Canada

NWB – Nunavut Water Board

TSS – Total Suspended Solids

WL – Water Licence

WTP – Water Treatment Plant

2.0 Introduction

The Department of National Defense (the Proponent) has applied for a Type A Water Licence for Canadian Forces Station Alert (the Project) located on the eastern tip of Ellesmere Island, Nunavut. The Alert station typically holds 120 personnel but there can be up to 220 personnel on site at one time. The station was originally licensed under a Type B water licence application but as a result of the need for bleed water (continually circulating water) to keep pipes thawed and a new wastewater treatment system built in 2010 the station now qualifies for a Type A water licence. The Nunavut Water Board (NWB) acknowledged the Type A WL application July 21, 2016 and the Technical Review process started. Environment and Climate Change Canada (ECCC) has participated in the WL review process to date providing information requests to the NWB. ECCC is continuing its participation in this WL review process by way of this submission.

ECCC provides specialist expert information or knowledge to the NWB in accordance with the expertise that ECCC has available, as required under Article 13 of the Nunavut Agreement.

A brief summary of the legislation from which ECCC's mandate is derived is provided in Section 3.0. ECCC's comments and recommendations are provided in Section 4.0, a summary of ECCC's recommendations in Section 5.0, and Closing Remarks in Section 6.

3.0 ECCC's Mandate, Roles, and Responsibilities

The mandate of ECCC is determined by the statutes and regulations under the responsibility of the Minister of Environment and Climate Change. In delivering this mandate, ECCC is responsible for the development and implementation of policies, guidelines, codes of practice, inter-jurisdictional and international agreements, and related programs. ECCC's specialist advice is provided in the context of the *Canadian Environmental Protection Act* (CEPA) and the pollution prevention provisions of the *Fisheries Act*.

ECCC administers the pollution prevention provisions of the *Fisheries Act*, which prohibits the deposit of a deleterious substance into fish-bearing waters. ECCC also participates in the regulation of toxic chemicals and the development and implementation of environmental quality guidelines pursuant to CEPA.

Additional information on ECCC's mandate can be found at https://www.canada.ca/en/environment-climate-change/corporate/acts-regulations/acts-administered.html

4.0 ECCC's Technical Review Comments

This technical report summarizes the results of ECCC's technical review of the Type A WL application as well as the additional information that was submitted by the Proponent on February 9, 2017 and June 1, 2018 in their response to ECCC's information requests. ECCC based its analysis on the principle that the Project should be operated in a manner that ensures the highest level of environmental protection so that the well-being of Canadians is enhanced and the natural environment is conserved. To that end, ECCC has undertaken a science-based review of issues within ECCC's mandate with the aim of providing expert advice on the Proponent's assessment of the effects and proposed mitigation.

4.1 ECCC #1 - Effluent Quality

References:

- CFS Alert Wetland Report 2016, March 2017, Fleming College
- 2017 Annual Report Appendix B
- Letter from DND to ECCC Feb. 9, 2017

Issue:

Following the 2010 construction and commissioning of the terraced wetland system, a collaborative monitoring program was conducted by the Department of National Defense (DND) and Fleming College to assess performance of the wastewater treatment system. Study results show that over the assessment period of 2011 to 2016 the quality of effluent has varied widely from year to year, and within each year. For example, in Table 4.1 of the March 2017 Fleming College report biological oxygen demand of a one liter of sample, which was measured over five days (BOD_5) ranged from average values of 13 to 401 mg/L over the six years, with the biggest variability in 2015 where measurements ranged from 17 to 1780 mg/L. For total suspended solids (TSS), the averages for the six years ranged from 48 to 880 mg/L, with wide swings in concentrations during each year, and the maximum variability observed in 2015 with values of 29 to 5660 mg/L. The 2017 Fleming College report discusses several reasons for the variability, including fluctuating wastewater strength, the influence of spring melt, and issues with berm stability and washout. Fluctuations in the effluent quality indicate that much of the time, discharges exceeded water licence standards.

ECCC suggests that the Proponent explore options to reduce variability associated with the influent quality (refer to Table 4.2 in the 2017 Fleming College report), to improve "end-of-system" effluent quality.

The Proponent stated in the letter to ECCC dated Feb. 9, 2017 that they were currently conducting a study to assess options to improve the wastewater treatment system. Options that were being considered by the Proponent included the option of adding mechanical treatment, stabilization/equalization of influent quality through water management, and potentially the addition of a front-end treatment process. These changes would result in improvements to effluent quality at the end of the terraced wetlands system, and to overall treatment consistency of the effluent. The Proponent stated that the results of this study would be available fall/winter of 2017; however, it is unclear what the status of the report is.

Recommendation(s):

ECCC recommends that the Proponent investigate options to improve overall consistency of the effluent treatment system performance to ensure effluent discharged from the terraced wetlands system is protective of marine environment.

4.2 ECCC #2 - Effluent Quality Monitoring

References:

- CFS Alert Wetland Report 2016, March 2017, Fleming College
- 2017 Annual Report Appendix B

Issue:

The comprehensive six-year study of the terraced wetland system ran from 2011 to 2016. With the conclusion of the study in 2017, effluent quality sampling frequency was reduced to two monthly grab samples. One sample was taken June 29th, 2017 and a second sample was taken July 12, 2017. ECCC notes that given the variability of the wastewater, this sampling frequency is insufficient to provide confidence that the effluent quality is being appropriately characterized and will not provide adequate compliance data.

Recommendation:

ECCC recommends that the NWB work with the Proponent to establish ongoing monitoring of the effluent on a frequency which is sufficient to characterize the full range of variability, and that captures the worst case effluent quality.

4.3 ECCC #3 - Treatment System – Operation and Maintenance

References:

- From letter from DND to ECCC Feb. 9, 2017
- CFS Alert Wetland Report 2016, March 2017, Fleming College

Issue:

Maintenance of the terraced wetland system appears to be a significant factor in performance of the effluent treatment system. For example, a considerably better level of treatment was recorded in 2016 than in 2015. This could be attributed to two factors. Firstly, it may have been an artifact of the timing of sampling, as the freshet was missed; and secondly, it may be attributed to the overwinter stability of the berms, which did not breach and lead to previously-observed problems with short-circuiting flows, and increased suspended solids loadings.

The 2017 Fleming College report (Section 1.2) states:

> *Portions of the terraces (also called berms in this report) typically erode during the spring freshet and are often not repaired until late in August. Fortuitously, the berms modified last in the 2015 field season remained relatively intact for the 2016 field season and overall functioned better than in previous years.*

Maintenance work to fix breaches in the berms occurred late in the 2015 season and resulted in significant improvement to 2016 flow detention and flow direction. This greatly improved the overall performance of the wetland system in treating wastewater.

The report goes on to make the following recommendation (Section 4.3):

> *Ice damage and erosional forces associated with the spring freshet will likely mean that yearly maintenance to the berms will be required. Strengthening of the berms to minimize ice damage will be challenging but is something that should be considered.*
>
> *Determining the best way to strengthen berms, redirect flows, and slow flow rates at the Alert site will likely require a team approach that involves civil engineers from the firm overseeing wetland maintenance and some representation from DND. Possible solutions may include the use of geotextile or rubberized pond liner in areas particularly prone to erosional forces.*

The letter from the Proponent to ECCC dated Feb. 9, 2017 stated that a study was to be conducted in July and August 2017 with the intent to reduce the total volume of flow through the system, and identify other methods that could be used to reduce erosion and TSS. It is unknown if this study was conducted.

Further study of the terraced wetland system was recommended by Fleming College (2017 report section 4.3 Recommendations), with the use of a tracer to track flow rates and paths both early in the season, and again late in the season. This would provide information on the ability of the system to retain wastewater, and on the seasonal variability of flows. This information can be used in the evaluation of the degree of front-end treatment needed, and in finding ways to optimize the system through managing flows.

Recommendations:

ECCC recommends that:

a) An operation and maintenance plan be developed for the terraced wetlands system which includes provisions for effective berm maintenance and erosion prevention measures;

b) The 2017 erosion study results be provided to the NWB and stakeholders if available; and

c) Further study of the terraced wetlands system be done to characterize retention time and flows, both at freshet and late in the season.

4.4 ECCC #4 - Bleed Water

References:

- Letter from DND to ECCC Feb. 9, 2017
- CFS Alert Wetland Report 2016, March 2017, Fleming College (page 13)

Issue:

There is a contradiction between the Proponent's Feb. 9, 2017 letter to ECCC, which states the use of bleed water was discontinued in 2013, and the March 2017 Fleming report (page 13) which states:

> *Clean water (bleed water) is allowed to constantly bleed through the collection and distribution systems to prevent freezing; therefore wastewater is always flowing to the terraced wetland. This wastewater is a combination of bleed water, garburated food wastes, along with greywater and sanitary sewer waste. This means that the consistency of the wastewater can be quite variable and range in strength from very dilute to moderately strong, depending on the time of day or the type of activities occurring at the station.*

The volumes of water use reported in the Type A licence application support the use of bleed water by the station as well.

However, ECCC notes that the use of bleed water introduces significant variability into the wastewater quality, and it is not clear whether bleed water can be managed to optimize wastewater strength (i.e. dilution) to a consistent quality. If it is the intent of the Proponent to reduce or eliminate bleed water use (as stated in the letter dated Feb. 9, 2017) then a review of options to improve wastewater quality needs to be based on an understanding that the influent quality will be more concentrated. If the use of bleed water will be ongoing (as indicated by the Fleming report and supported by volumes shown in the WL Application and Annual Reports to the NWB from DND) then the wastewater characterization as documented in the

2017 Fleming report warrants investigation of treatment options that can deal with widely fluctuating effluent quality.

Recommendation:

ECCC recommends that the Proponent clarify the status of bleed water, and identify options to reduce and/or equalize its use as appropriate for optimizing treatment.

5.0 Summary of Recommendations

5.1 ECCC #1 - Effluent Quality

ECCC recommends that the Proponent investigate options to improve overall consistency of the effluent treatment system performance to ensure effluent discharged from the terraced wetlands system is protective of marine environment.

5.2 ECCC #2 - Effluent Quality Monitoring

ECCC recommends that the NWB work with the Proponent to establish ongoing monitoring of the effluent on a frequency which is sufficient to characterize the full range of variability, and that captures the worst case effluent quality.

5.3 ECCC #3 - Treatment System – Operation and Maintenance

ECCC recommends that:

a) An operation and maintenance plan be developed for the terraced wetlands system which includes provisions for effective berm maintenance and erosion prevention measures;

b) The 2017 erosion study results be provided to the NWB and stakeholders if available; and

c) Further study of the terraced wetlands system be done to characterize retention time and flows, both at freshet and late in the season.

5.4 ECCC #4 - Bleed Water

ECCC recommends that the Proponent clarify the status of bleed water, and identify options to reduce and/or equalize its use as appropriate for optimizing treatment.

6.0 Acknowledgements

ECCC acknowledges and appreciates the effort that the Proponent has taken to address concerns brought forward by parties throughout the WL process. ECCC would like to thank NWB for this opportunity to provide input to the DND Station Alert Project WL review and looks forward to continuing its participation.

ECCC's technical review comments and recommendations are not to be interpreted as any type of acknowledgement, compliance, permission, approval, authorization, or release of liability related to any requirements to comply with federal or territorial statutes and regulations.