2024 Camlaren Tailings and Soil Containment Area Annual Geotechnical Inspection Report

Gordon Lake Group of Sites

Prepared for:

Public Services and Procurement Canada

Prepared by:

K'alo-Stantec Limited

December 4, 2024

Project No.: 123515016

K'alo-Stantec

2024 CAMLAREN TAILINGS AND SOIL CONTAINMENT AREA ANNUAL GEOTECHNICAL INSPECTION REPORT

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Table of Contents

List of Tables

LIST OF FIGURES

LIST OF APPENDICES

EXECUTIVE SUMMARY

K'alo-Stantec Limited (K'alo-Stantec) provides design, construction, performance monitoring, and regulatory and community engagement support for the Gordon Lakes Group (GLG) of Sites. The project is directed by Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC). K'alo-Stantec's scope of work includes annual geotechnical inspection and reporting for one historical tailings facility, the Camlaren Tailings and Soil Containment Area (TSCA). Work is carried out as part of the Long-Term Monitoring Plan (LTMP). The LTMP includes a requirement to perform annual geotechnical inspections for the Camlaren TSCA for a five-year period, beginning in 2019.

Visual Inspection – A visual inspection of the Camlaren TSCA and associated facilities was performed by Steve Bundrock and Steffen Karl of Stantec on July 16, 2024.

In general, the facility was observed to be in good condition and no substantial changes have occurred when compared against observations collected during the Year 1 to Year 5 LTM inspections. Some historical deficiencies, such as minor cracking and deformation, appeared to be self-healed in 2024.

Significant Changes in the Areas – There does not appear to be recently constructed human developments or infrastructure near the TSCA facility.

Instrumentation and Monitoring – Instrumentation at the TSCA facility was installed in September 2018 and included two (2) thermistors, two (2) standpipe monitoring wells, and three (3) locations for vibrating wire piezometers with double nested sensor tips. Outside of the perimeter of the facility, four (4) standpipes were installed as part of the TSCA perimeter monitoring related to SNP sampling. Instrumentation results were incorporated in this DSI and can be reviewed in Section 5.0.

Dam Safety Deficiencies and Non-Conformances – There were two priority 3 deficiencies identified during the 2024 DSI. These deficiencies were related to fresh animal burrows and minor surface erosion. The safety deficiencies and non-conformances identified as part of the Year 1 to Year 5 LTM inspections were compiled, reviewed, and updated, and priorities were assigned based on the work completed by others. Historical LTM Reports did not provide a table of deficiencies and/or non-conformances. Instead, deficiencies and non-conformances were identified throughout the text of those reports.

The statements made in this Executive Summary are subject to the project conditions described in the Closure (Section 8.0) and are to be read in conjunction with the remainder of this report.

1.0 INTRODUCTION

The Gordon Lake Group (GLG) Remediation Project was established in 2016 and included the remediation of nine abandoned mine sites located approximately 80 km NW of Yellowknife, Northwest Territories (NT), and included the following sites: 1) Burnt Island, 2) Camlaren, 3) Goodrock, 4) Kidney Pond, 5) Murray Lake, 6) Storm, 7) Treacy, 8) Try Me, and 9) West Bay.

In 2016, Stantec Consulting Ltd. (Stantec) was contracted by Public Services and Procurement Canada (PSPC), on behalf of Crown Indigenous Relations and Northern Affairs Canada (CIRNAC), to provide engineering and technical support, as well as construction contract supervision, acting as Departmental Representative (DR), at the GLG Sites during the project.

Following the completion of remediation activities in 2019, Stantec was contracted by PSPC to implement the Long-Term Monitoring Plan (LTMP) for the remediated facilities. The LTMP included the requirement to perform an annual geotechnical inspection of the engineered TSCA at Camlaren, one of the Gordon Lake Sites. Stantec completed the annual geotechnical inspection in 2019 and 2020, while Englobe completed the annual geotechnical inspection in 2021 and 2022 and AECOM completed the annual geotechnical inspection in 2023. K'alo-Stantec was retained to complete the 2024 annual geotechnical inspection. The results of the 2024 geotechnical inspection are presented in this report.

1.1 PROJECT SCOPE

The scope of the annual geotechnical inspection and the results presented in this report are based on our observation of the Camlaren TSCA, our understanding of the history of the LTM Program for the GLG Sites, and applicable guidelines and regulations. As part of the 2024 annual geotechnical inspection, K'alo-Stantec completed the following tasks:

1. Visually inspected the Camlaren TSCA facility. The observations from the inspection are summarized in Section 3.1.3.
2. Compiled, reviewed, and updated the existing dam safety deficiencies identified in the Year 1 to Year 5 LTM Reports. Historical LTM Reports did not provide a table of deficiencies and/or non-conformances. Instead, deficiencies and non-conformances were identified throughout the body text of those reports.
3. Identified new dam safety deficiencies, if any, and provided recommendations to address those deficiencies.
4. Prepared a report summarizing the results of the annual geotechnical inspection, including a summary of the regulatory review, the existing information review, the visual inspection and identified dam safety deficiencies and recommended actions (this report).

The Canadian Dams Association (CDA) defines dam deficiencies and non-conformances as follows (CDA, 2007):

- "Deficiency - An inadequacy, or uncertainty in the adequacy, of the dam system to meet its performance goals in accordance with good dam safety practices"; and,

- "Non-Conformance - An inadequacy in the non-physical controls (procedures, processes and management systems) necessary to maintain the safety of the dam."

In accordance with the scope of work for the Project, the 2024 annual geotechnical inspection scope was limited to the identification of dam safety-related physical deficiencies and a compilation, review, and update of the status of deficiencies and non-conformances identified during the DSIs which supported the Year 1 to Year 5 LTM Reports. The identification of non-conformances is typically performed during DSRs. Identification of other items that are not considered dam safety deficiencies or non-conformances, such as maintenance items that are not thought to impact dam safety or occupational health and safety items, were considered to be outside of the scope of this annual geotechnical inspection.

2.0 APPLICABLE GUIDELINES AND REGULATIONS

Tailings dams for closed mine sites in the Northwest Territories are regulated by the Mackenzie Valley Land and Water Board (MVLWB). To facilitate the care and maintenance of closed tailings facilities, MVLWB issued "Guidelines for the Closure and Reclamation of Advanced Exploration and Mine Sites in the Northwest Territories" (2013) (MVLWB Closure Guidelines, 2013). These guidelines recommend that dams and associated structures be designed, constructed, and maintained in accordance with the CDA Dam Safety Guidelines (2007). It should be noted that, following the issuance of the MVLWB Guidelines, the CDA Guidelines were updated in 2013; more recently, a technical bulletin was published by the CDA in 2014 which provided additional clarification regarding the application of the Dam Safety Guidelines to mining dams (CDA, 2014). These guidelines recommend that DSIs are performed on an annual or semi-annual basis depending upon the classification of the structure, that they include a visual examination of the dam and an examination of dam performance instrumentation, and that they be performed by professional engineers. CIRNAC has also advised K'alo-Stantec of their internal Dam Safety Management System and associated data sheets.

3.0 EXISTING INFORMATION REVIEW AND FACILITY DESCRIPTION

A limited amount of background information for the Camlaren TSCA was identified for the 2024 annual geotechnical inspection report. Fundamental existing information for this facility was presented in the 2018 Design Basis Report and the 2018 As-Built Report which includes:

- Stantec Consulting Ltd., September 11, 2018, Updated Report: Gordon Lake Group Design Basis, Submitted to PWGSC and INAC, File No: 121414585 (Stantec, 2018a).
- Stantec Consulting Ltd., December 21, 2018, FINAL – 2018 As-Built Construction – Camlaren TSCA, Part of GLG (Stantec, 2018b). Report prepared for Public Works and Government Services Canada and Indigenous and Northern Affairs Canada.

Aside from those listed above, K'alo-Stantec is not aware of other previous inspections, DSRs, or reviews related to the adequacy of the design and performance of the TSCA, such as geotechnical reviews, stability analyses, or water management analyses prior to 2019.

Based on these reports, engineering and construction details related to the TSCA involved stabilization of mine waste by regrading slopes and installing an engineered cover, as follows:

- Slopes were stabilized by regrading the perimeter dams to a slope of 3.1H:1V to 3.3H:1V.
- An engineered cover was placed over the tailings surface, consisting of a Bituminous Geomembrane (BGM) and an underlying, 0.5 m thick layer of sand for preventing water infiltration.
- Erosion protection was placed on the top of the engineered cover which consisted of willow branch vegetation. Coarse sand with rockfill and coco mats were also placed to provide erosion protection for the slopes of the TSCA.
- Lined surface ditches were constructed at the northwestern and southern perimeters of the TSCA to encourage drainage away from the TSCA and to prevent pooling of runoff against the embankment.
- Instrumentation was installed and a monitoring program was established for assessing the long-term performance of the TSCA.

The TSCA is oval-shaped in plan-view, roughly 200 m (north to south) by 130 m (west to east), and covers an area of approximately 2.5 hectares (ha). The top of the TSCA is dome-shaped and slopes outwards at a grade of approximately 4% to shed surface water runoff towards the perimeter of the facility. The TSCA has three embankments that form a uniform structure (i.e., there are no distinct geomorphological or structural boundaries) referred to as the North, East, and West Embankment. On average, the embankments are roughly 2 to 4 m high but are up to 5 m high at their highest section at the north embankment.

The composite BGM cover was placed over the entire TSCA and embankments. At the embankment toes, the BGM was placed on a prepared bedrock foundation and was covered with a sand/bentonite mixture. In areas of naturally low topography, the BGM liner was not secured to bedrock; instead, rockfill toe drains were constructed to relieve a potential build-up of pore pressures within the TSCA.

Perimeter ditches were constructed at the northwestern perimeter (Northern Ditch, referred to as Ditch 1 on the design drawings) and the southern perimeter (Southern Ditch, referred to as Ditch 2 on the design drawings). The ditches were lined with the BGM liner and were covered with riprap. The BGM liner extended from the side slopes and into the ditch bottom to prevent water infiltration into the TSCA.

3.1 FACILITY DESCRIPTION

3.1.1 Camlaren Tailings and Soil Containment Area

The GLG Sites were active between the late 1930s and 2008 with several companies involved in mining operations. Activities ranged from exploratory drilling to open-pit mining and were generally undertaken independently between the mine sites. Camlaren Mine was a former gold mine located on Muir Island in the southern portion of Gordon Lake. In 1980, a milling plant was erected. Tailings from the mine were deposited in the Camlaren tailings area which operated into the 1980s and was then abandoned.

The TSCA was an engineered mine waste containment facility that encompassed the Camlaren Mine tailings, formerly part of the tailings containment area (TCA), as well as impacted material (soil, tailings, waste rock) and non-hazardous debris (metal, wood, etc.) from the other GLG Sites. Impacted material and non-hazardous waste from the GLG Sites were transported to Camlaren in the winter of 2018, with a majority of material transported from February 4 to March 13, 2018. Some of the waste was transported via helicopter in the summer of 2018. Construction of the TSCA was completed between July and September, 2018. A summary of construction activities for the TSCA facility are provided in the 2018 As-Built Construction Report (Stantec, 2018b).

General characteristics of the TSCA are summarized in Table 3.1.

Table 3.1 TSCA Characteristics

TSCA General Properties	
TSCA Area	2.5 ha
TSCA Peak Elevation	300.54 m
TSCA Top Slope	3 – 4%
Berm Composition	Sand fill dam with BGM composite cover
Composite BGM Cover	BGM liner placed on sand bedding and covered with 0.5 m of sand
Discharge Facilities	Perimeter ditches: Northern Ditch (Ditch 1) and Southern Ditch (Ditch 2)
Design for Extreme	Designed to withstand seismic loads and 1 in 1,000-year

Characteristics of the TSCA dams are presented in table 3.2.

Table 3.2 TSCA Dam Characteristics

Item	**North Dam**	**East Dam**	**South Dam**
Embankment Composition	Sand fill dam with BGM composite cover		
Embankment Purpose	Main tailings containment dam converted into solid mine waste		
Nominal Height (m)	5	4 – 4.5	2
Berm Crest Elevation (m)	297.75	297.5 – 297.75	297.75
Nominal Length (m)	160	160	60
Downstream Slope	3H:1V		
Chainages (m)	0 to 0+160	0+160 to 0+330	0+330 to 0+390

3.1.2 Dam Classification

In 2020, Stantec completed a review of the TSCA structure to determine whether it met the definition of a dam in accordance with the 2013 Canadian Dam Association (CDA) Dam Safety Guidelines and other applicable CDA technical bulletins. Findings were summarized in a report titled, “Camlaren TSCA Embankment Classification Assessment” (Stantec, 2020b).

It was determined that the TSCA embankments should be considered to be dam structures since a breach of the perimeter containment, regardless of the triggering mechanism, would likely trigger a flow of the contents beyond the perimeter containment. Although it was determined that the TSCA embankments should be considered to be dam structures, this study did not include dam classification in terms of dam hazard consequence category in accordance with CDA standards. For the DSI, it was assumed that the hazard potential classification would be low. However, it is recommended that the structure be classified in accordance with CDA hazard classification procedures, outlined in Table 3.3. The hazard classification procedure should include a dam breach assessment and an evaluation of the potential downstream losses in terms of human life, environment, and/or cultural/heritage losses.

Table 3.3 CDA Dam Consequence Classifications

Dam Class	Population at Risk[1]	Incremental Losses		
		Loss of Life[2]	Environmental and Cultural Values	Infrastructure and Economics
Low	None	0	• Minimal short-term loss	Low economic losses
			• No long-term loss	Area contains limited infrastructure or services
Significant	Temporary only	Unspecified	• No significant loss or deterioration of fish or wildlife habitat	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
			• Loss of marginal habitat only	
			• Restoration or compensation in kind highly possible	
High	Permanent	10 or fewer	• Significant loss or deterioration of important fish or wildlife habitat	High economic losses affecting infrastructure, public transportation, and commercial facilities
			• Restoration or compensation in kind highly possible	
Very High	Permanent	100 or fewer	• Significant loss or deterioration of critical fish or wildlife habitat	Very high economic losses affecting important infrastructure or services (e.g. highway, industrial facility, storage facilities for dangerous substances)
			• Restoration or compensation in kind possible but impractical	
Extreme	Permanent	More than 100	• Major loss of critical fish or wildlife habitat	Extreme losses affecting critical infrastructure or services (e.g. hospital, major industrial complex, major storage facilities for dangerous substances)
			• Restoration or compensation in kind impossible	

Note 1. Definition for population at risk:
None - There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure.
Temporary - People are only temporary in the dam-breach inundation zone (e.g. seasonal cottage use, passing through on transportation routes, participating in recreational activities).
Permanent - The population at risk is ordinarily located in the dam-breach inundation zone (e.g. as permanent resident); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimate of potential loss life (to assist in decision-making if the appropriate analysis is carried out).
Note 2. Definition for loss of life:
Unspecified - The appropriate level of safety required at a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example, might not be higher if the temporary population is not likely to be present during the flood season.

3.1.3 Operations, Maintenance, and Surveillance

Stantec prepared an Operation, Maintenance, and Surveillance (OMS) Manual for the TSCA in 2019. The OMS was developed under the assumption that the TSCA would be operated similar to a landform structure. The OMS should be updated any time there is a change in the status, classification, condition, or operation of the TSCA (Stantec, 2020c).

The OMS Manual specifies that TSCA surveillance will be carried out through bi-annual inspections by a qualified geotechnical engineer registered in NT. As part of the inspections, instrumentation monitoring shall be performed.

Bi-annual inspections are to be performed for the first five years after capping construction and following extreme weather events. The inspections are to be conducted in a similar manner as a dam safety inspection (DSI), in accordance with CDA guidelines. Bi-annual inspections are to focus on visual observations to detect any deficiencies in the TSCA performance. After satisfactory TSCA performance is documented during the first five years, inspections may be carried out at a lesser frequency, as specified in the OMS Manual.

Trigger levels and potential action plans for response to surveillance observations were presented in the GLG Long-Term Monitoring Plan (Stantec, 2018c) and the OMS Manual (Stantec, 2020c).

Triggers for corrective actions include the following:

- Differential settlement greater than 0.5 m (including instrumentation casings).
- Slopes slumping with horizontal cracking/movement greater than 0.3 m.
- Slopes or cover erosion resulting in a loss of material thickness greater than 0.25%.
- Frost heave effects greater than 0.2 m.
- Vegetation (primarily tree species) growth that may develop roots deeper than 0.3 m.
- Animal activities, such as burrowing, at depths greater than 0.3 m.
- Erosion control coco-matting (full semi-circle, approximate length of 5 m) deemed to be no longer effective.
- Ditch erosion exposes the bituminous geomembrane (BGM) liner (i.e., visible liner).
- Ditch blockage of debris/objects impeding flow or causing ponding.

These scenarios constitute a trigger for follow-up actions, and review and/or modification of the remedial/reclamation approach will be required.

During the development of the OMS Manual and the TSCA Surveillance section, it was also recommended that trigger criteria be established with regard to the piezometric levels. In earlier stages, it

was assumed that the trigger levels should be established at 296.0 m at all piezometers, or as an average value across the TSCA, based on previous slope stability analyses.

4.0 VISUAL INSPECTIONS

Visual inspection of the Camlaren TSCA was completed on July 16, 2024, by Stantec's Steve Bundrock, P.Eng. and Steffen Karl, P.Eng.

The visual inspections were performed on foot and aerially via helicopter. No subsurface investigations, material sampling, or testing was performed. The intent of the inspections was to visually identify dam safety concerns, potential signs of distress in the structures (such as cracking, settlement, slumping, heave, erosion, or significant seepage), and to compare 2024 observations with historical records to evaluate for potential changes related to the condition of the structure.

Field observations at the Camlaren TSCA were recorded on the DSI checklists and in photos provided in Appendix A. Photographs were taken to record key observations and the general conditions of the TSCA. The following subsections summarize key observations made during the inspection of the Camlaren TSCA.

4.1 CAMLAREN TSCA INSPECTION

Observations from the Camlaren TSCA DSI are presented are summarized below.

- In general, the Camlaren TSCA facility was in good condition with no significant signs of slumping, cracking, heave, significant erosion, or other distress.
- The condition of the dam was consistent with that documented in the 2023 DSI (AECOM, 2024), with the exception that a historical, partially healed crack appeared to be fully healed, and a surface crack zone adjacent to a historical depression appeared to be partially healed.
- No known, notable maintenance activities were completed at the Camlaren TSCA facility in 2023 or 2024.
- Toe drains on the north and southeast corner of the facility were dry; no seepage was observed at the time of inspection and it was noted that there was no accumulation of fine material in or downstream of the toe drains.
- Perimeter ditches were clear with no blockages and limited vegetation growth.
- The northern ditch was dry while the southern ditch had standing water in localized sections due to an inconsistent ditch invert.
- The exposed geofabric/liner identified previously at the west ditch appeared to be mostly self-healed with limited visible exposure in 2024.
- A surface depression was observed at the top of the TSCA near the northern perimeter, estimated to be 0.3 m deep and 12 m long (east to west) X 5 m wide (north to south). When compared to visible conditions in photos collected in 2020, surficial cracking adjacent to the depression was partially healed in 2024. Two smaller depressions approximately 0.15 m deep

were observed in the vicinity of the larger surface depression. These depressions were initially observed in 2020 and do not appear to be increasing in size, depth, surficial extent, or number.

- The partially healed cracking identified in the April 5, 2024, Inspection Report (AECOM, 2024) was not observed and is assumed to be fully healed.
- Minor, historical erosion of the crest and slopes was evident in multiple locations. It was noted that material placed with the intent of erosion control, such as trees and coir logs, were re-directing surficial runoff and causing channelized flow and minor erosion. Some of the historical, deeper erosional gullies appeared to be partially healed.
- Erosion protection consisting of coarse sand with cobbles and covered with coco mats in a semi-circular arrangement was noted to be functioning adequately. However, some anchors were removed as a result of strong winds impacting the south and east slopes of the facility.
- Vegetation consisting of grasses and shrubs continued to establish in some areas of the crest and slopes. Compared to historical observations, most of the observed growth occurred on the north, east, and south sides of the facility where willow live staking was completed. It was estimated that a third of the willows that were live staked were showing signs of growth.
- Numerous animal burrows, historical and fresh, were observed at the facility. Many of these animal burrows were observed in the sand to the west of the west perimeter ditch and are not currently impacting the facility; however, the number of burrowing animals onsite may increase if left unmanaged, which could result in burrows at locations with increased impacts. The start of a potential fox den was observed near the east crest of the facility.
- Instrumentation appeared to be in good condition at the time of inspection. Installation details are included in the geotechnical investigation report (Stantec, 2020a) and Section 5.0.

4.2 GROUND SETTLEMENT

During the 2024 inspection, a surface depression up to 0.3 m deep, 12 m long (east to west), and 5 m wide (north to south) was observed at the top of cover of the TSCA near the northern perimeter. Two smaller depressions, roughly 0.15 m deep, were observed near this larger feature and near the location of VB2 in 2024. These features were initially observed in 2019 and there appeared to be no change in the dimension or depth in 2024. Surficial cracking in the vicinity of the ground depressions appeared to be partially healed in 2024.

The depressions could be caused by settlement related to the consolidation of tailings or as a result of ice melt within waste rock, presumed to be placed in 2018. As described in the design basis report (Stantec, 2018a), this type of settlement was anticipated. The identified settlement was not deep enough to prompt the trigger level identified in the OMS Manual.

Areas of settlement should continue to be monitored in bi-annual inspections.

No settlement was observed at perimeter slopes adjacent to the toe drain during the inspection.

4.3 EROSION

Historical erosion was observed at the top of TSCA cover and on perimeter slopes, including the following:

- Historical erosion channels on the northern slope near MW3. These channels were eroded through the coco-matting.
- Historical erosion channels on the northwest slope, generally 130 mm deep. Since the cover thickness in the area is 300 mm, the noted erosion triggered the LTM adaptive management requirements as per Table B-2 of the LTM Plan (i.e., slopes or cover erosion resulting in >25% loss of material thickness) (Stantec, 2018c).
- Multiple historical erosion channels on the western slope, generally 120 mm deep. Since the cover thickness in the area is 200 to 300 mm, the noted erosion triggered the LTM adaptive management requirements as per Table B-2 of the LTM Plan (i.e., slopes or cover erosion resulting in >25% loss of material thickness) (Stantec, 2018c).
- The liner was historically exposed in two locations on the western slope. An area approximately 200 cm by 600 cm was exposed in both cases. The eroded cover in this area was 50 to 100 mm thick. This erosion triggered the LTM adaptive management requirements as per Table B-2 of the LTM Plan (i.e., slopes or cover erosion >25% loss of material thickness) (Stantec, 2018).

In addition, it was noted in 2024 that some of the coco-matting anchors were pulled out of the ground at some locations due to wind, particularly on the south and east slopes of the TSCA facility. Vegetation was observed to be establishing slowly as a result of willow live staking efforts, primarily on the north, east, and south sides of the facility. It was estimated that a third of the willows that were live staked showed signs of growth in 2024.

Observations collected in 2024 indicated that the historical erosion channels noted above appeared to be partially healed and that surficial erosion observed in 2024 was minor.

4.4 COVER THICKNESS INVESTIGATION

In 2020, five shallow test pits were hand-dug with a shovel to investigate the cover thickness at the west and northwest embankment, as summarized in Table 4.1.

Table 4.1 Summary of Test Pits

Test Pit ID	General Location	Test Pit Depth (mm)	Confirmed BGM Liner
TP1	NW, mid-slope	400	Yes
TP2	NW, mid-slope	230	Yes
TP3	W, mid-slope, near	110	Yes
TP4	N, mid-slope	600	No
TP5	W, mid-slope	250	Yes
TP6	W, mid-slope	170 to 220	Yes

Test pit results indicated that the cover material in some areas along the west and northwest slopes did not meet the 0.5 m depth specification. This was previously documented in the As-Built report, and recommendations were made to place additional cover material based on the thickness determined by survey results (Stantec, 2018b).

As described in Section 4.3, historical erosion channels were observed, indicating that erosion has further reduced the thickness of the cover in some areas. Several factors may be contributing to accelerated erosion, including the use of sandy cover materials, steep slopes, and ineffective revegetation efforts. Based on the triggers identified in Section 4.3, it is recommended that additional fill be placed on the west and northwest slopes.

Special erosion control may be required to control erosion in these areas (e.g. geosynthetic solutions). Alternatively, the west slope could be flattened by filling the ditch and moving the existing ditch alignment further to the west\ or converting to a “French drain” type. A preliminary trade-off study may be required to evaluate these options with regard to long-term performance and economic feasibility.

4.5 ANIMAL BURROWS

In 2024, a burrow was observed on the cover surface of the TSCA near the east crest of the facility. In addition, numerous fresh burrows were noted in 2024 in the sand to the west of the west perimeter ditch, located outside of the TSCA footprint. These burrows did not extend deeper than 0.5 m and the BGM liner appeared to be intact. Although these burrows did not trigger the LTM adaptive management as per the LTM Plan, they should be filled in with granular material. Monitoring of animal activity should be performed in subsequent LTM/DSI inspections.

4.6 DITCHES

Perimeter ditches appeared to be performing well with no significant erosion or sediment accumulation noted in 2024. Historical exposure of the liner at the west ditch appeared to be partially healed with limited exposure in 2024. Although partially healed, historical exposure of the BGM liner triggers the LTM adaptive management as per the LTM Plan.

At the time of inspection, there was standing water in localized sections of the southern ditch due to an undulating ditch invert. Similar observations have been made in previous LTM/DSI inspections. It is recommended to continue monitoring the extent at which water pools in the ditches; if the situation worsens, it is recommended to fill the depressions with low permeability soil and to place a piece of BGM liner over the top and to seal it to the underlying BGM around the edges.

5.0 INSTRUMENTATION

Instrumentation at the Camlaren facility was installed in September 2018 and included two (2) thermistors, two (2) standpipe monitoring wells, and three (3) locations for vibrating wire piezometers with double nested sensor tips. Outside of the perimeter of the facility, four (4) standpipes were installed as part of the TSCA perimeter monitoring related to SNP sampling. A summary of the instrumentation is presented in Table 5.1 and locations are depicted on Drawing 1. Installation details for the instrumentation are provided in the OMS Manual (Stantec, 2020c).

Table 5.1 Instrumentation Summary

ID	Type of Installation	Northing	Easting	Ground Surface Elevation (m)	Borehole Depth (m)
MW1	Monitoring Well	6986005	388356	298.73	5.3
MW2	Monitoring Well	6986051	388352	298.96	7.1
MW3*	Monitoring Well	6986073	388393	292.41	7.2
MW4*	Monitoring Well	6985962	388376	294.52	3.8
MW5*	Monitoring Well	6985922	388236	296.58	4.8
MW6*	Monitoring Well	6986066	388238	295.45	5.4
VB1	Vibrating Wire Piezometer	6985957	388335	298.11	6.4
VB2	Vibrating Wire Piezometer	6986026	388381	297.99	6.1
VB3	Vibrating Wire Piezometer	6986079	388353	298.48	7.0
VT1	Thermistor String	6986005	388351	298.89	5.9
VT2	Thermistor String	6986055	388352	298.84	7.0

*Indicates a monitoring well located outside of the TSCA footprint

Data from the thermistors and VWPs were downloaded by K'alo-Stantec personnel on August 20, 2024.

5.1.1 Vibrating Wire Piezometers

Figures 5.1, 5.2, and 5.3 depict the piezometer readings in terms of total head for each VWP at three locations (VB1, VB2, and VB3, respectively) for the period ranging from September 14, 2018, to August 20, 2024. At these three locations, the top piezometer tip measures pore pressures in the tailings while the bottom tip measures pore pressures at the bottom of the borehole, near the contact with bedrock or native ground. Barometric adjustments were not applied to the data due to a lack of barometric readings. In general, the top and bottom piezometers indicated correlating trends throughout this period.

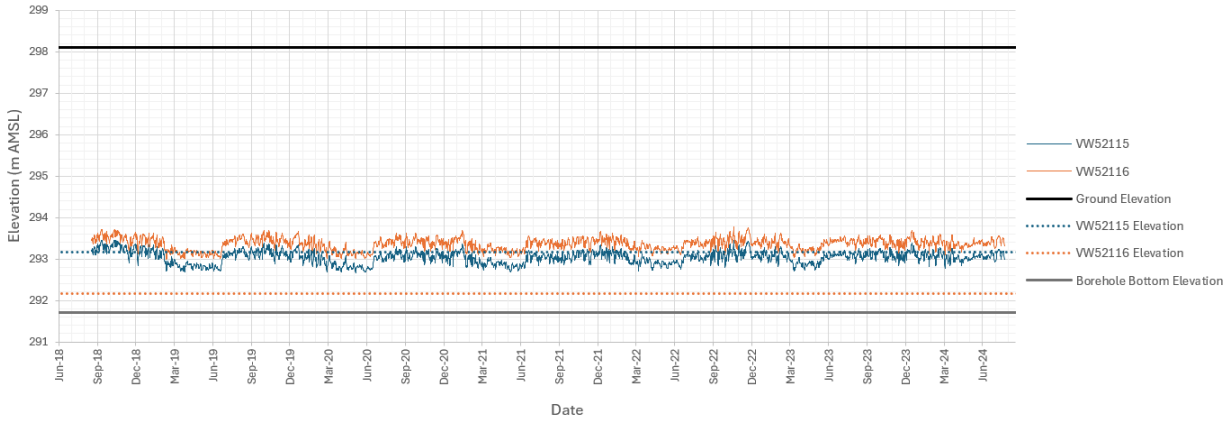

Figure 5.1 Total Head Elevation at Piezometer VB1

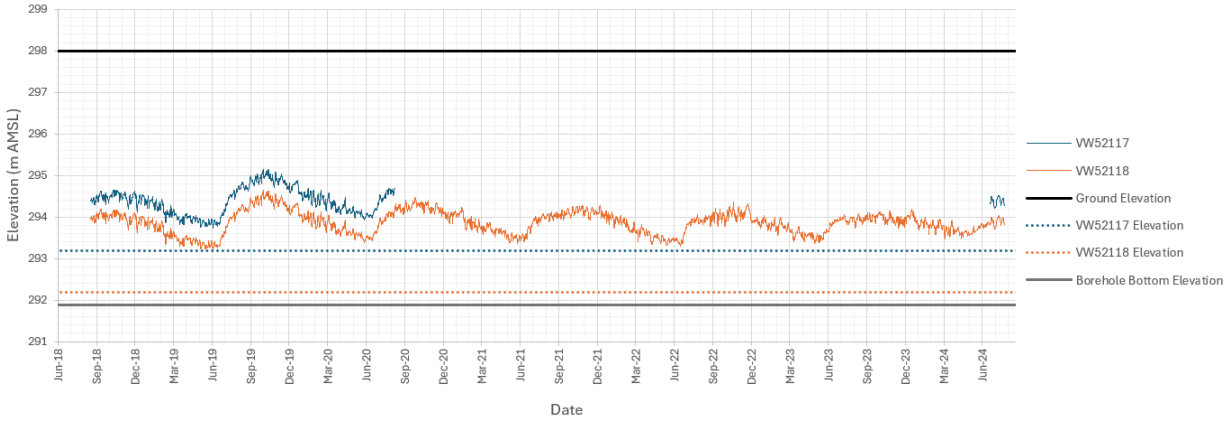

Figure 5.2 Total Head Elevation at Piezometer VB2

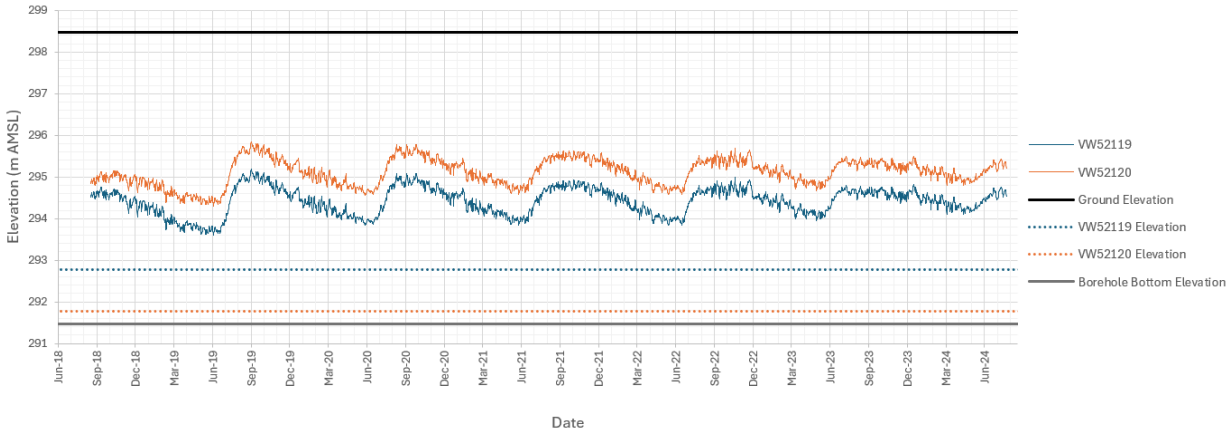

Figure 5.3 Total Head Elevation at Piezometer VB3

A review of the piezometric data for six (6) full seasons indicated that the piezometric levels are cyclic over a 12-month period. Piezometric levels were lowest in the spring or early summer (approximately May to June). During the summer and early fall, piezometric levels began to rise and reach seasonal highs in October or November. From their peak, piezometric levels gradually decreased until May or June, at which point the cycle started over.

When compared to plots presented in the Year 2 to Year 5 LTM Reports, total head values measured in 2024 correlated well with historical readings, though slight differences were observed in the Year 2 to Year 4 plots when compared to the Year 6 plot. Additional context for the suspected cause of this inconsistency can be reviewed in the LTM Year 5 Report (AECOM, 2024).

At VB2, an apparent downward vertical gradient was observed based on the total head difference between the top and bottom piezometer tips. The difference in the total head measured was relatively constant (i.e. two piezometric lines are parallel). Data did not record at VB2's top piezometer tip from September 2020 to July 2024 but has been resolved.

At VB1 and VB3, an apparent upward vertical gradient was observed. Similar to readings collected at VB1, the difference in total head measured by the two piezometers at VB1 and VB3 were relatively consistent. Downward vertical gradients could cause contaminant transport from the TSCA to the underlying groundwater regime.

5.1.2 Thermistors

Figures 5.4 and 5.5 show the monthly average temperature profiles as measured by thermistors from September 2023 to September 2024 for the TSCA mine waste at VT1 and VT2, respectively. Thermistor plots predating September 2023 can be reviewed in the Year 1 to Year 5 LTM Reports.

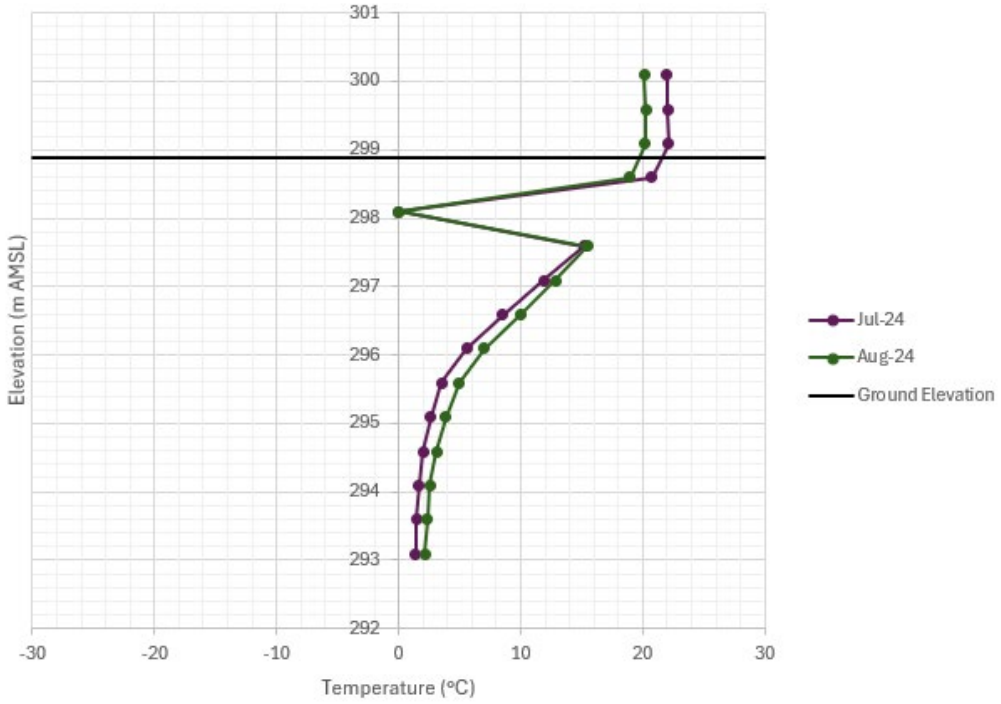

Figure 5.4 VT1 Year 5 to Year 6 Monthly Average Temperature Profiles

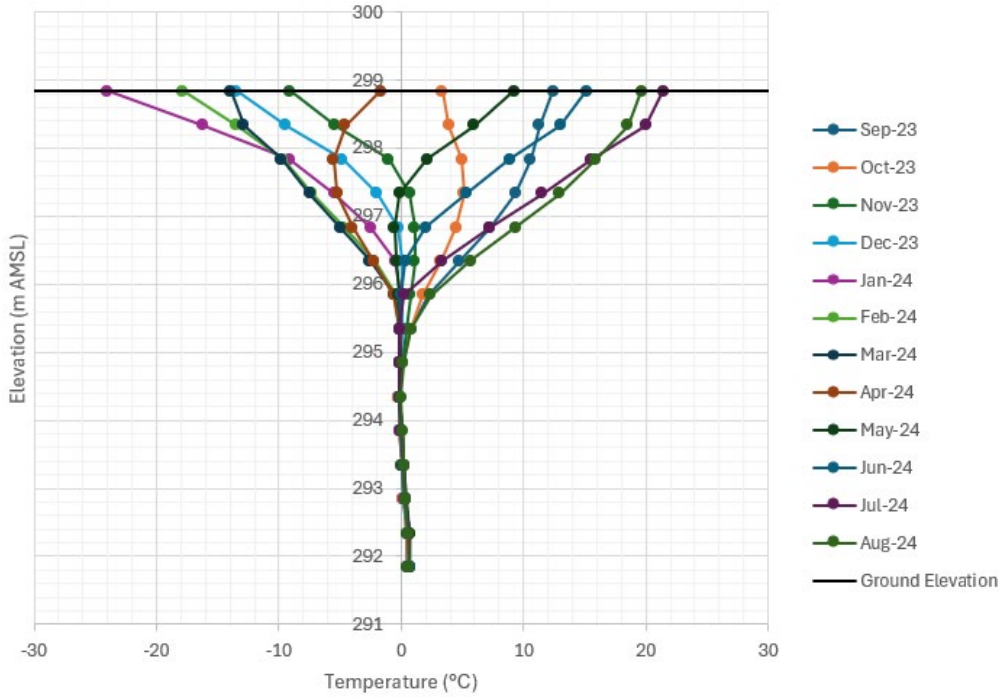

Figure 5.5 VT2 Year 5 to Year 6 Monthly Average Temperature Profiles

Thermistor VT1 had missing data from September 2022 to August 2024. This instrument has since been repaired, though node five appeared to be malfunctioning.

Temperature data downloaded from VT2 indicated a range of temperatures at surface level, ranging from approximately -25°C during the winter months and 22°C during the summer months. At VT1, a similar summer temperature of 22°C was recorded. Since the top node was located at/near ground level, these temperatures correlate closely with ambient air temperatures. Temperatures fluctuated seasonally. At depth, the active permafrost zone appeared to extend to approximately 4 m deep at VT2. At VT1, temperatures remained above 1.4°C, indicating thawed ground throughout the profile. Based on historical data, temperatures remaining above 1.4°C, and comparing these results to VT2, it appears that the data at VT1 is erroneous and requires further assessment.

6.0 DEFICIENCIES, NON-CONFORMANCES, AND RECOMMENDED ACTIONS

This section presents a summary of the dam safety deficiencies, non-conformances, and recommended actions identified for the Camlaren TSCA facility as a part of the 2024 DSI. It also includes a compilation and review of existing dam safety deficiencies identified as part of the Year 1 to Year 5 LTM inspections.

To assist CIRNAC in prioritizing the importance of each deficiency as well as prioritizing actions and resourcing to implement follow-up actions, the deficiencies and non-conformances have been ranked using the three-level priority system presented in Table 6.1. Priorities were assigned based on the work performed by others and have not been categorized previously.

Table 6.1 Dam Safety Deficiencies Priority System

Priority	Description
1.	A dam safety deficiency considered immediately hazardous to life, the environment, or infrastructure and/or significant non-compliance with CDA guidelines.
2.	A dam safety deficiency that could lead to injury or impacts to the environment or infrastructure.
3.	Non-compliance with CDA guidelines that is not anticipated to impact health or the environment but does not comply with best practice.

6.1 NEW DAM SAFETY DEFICIENCIES IDENTIFIED DURING THE 2024 DSI

Two new dam safety deficiencies were identified during the 2024 DSI. These deficiencies included observation of fresh animal burrows and fresh, minor erosion. It is recommended that animal burrows are backfilled with granular material with continued monitoring for animal activity in subsequent DSIs. Minor erosion is recommended to be monitored for worsening conditions with consideration to implement a more permanent solution, such as flattening embankment slopes, providing additional coarse material, or removing material that contributes to channelized flow.

6.2 REVIEW OF EXISTING DAM SAFETY DEFICIENCIES AND NON-CONFORMANCES

Table 6.2 and Table 6.3 presents a summary of the existing dam safety deficiencies and non-conformances, respectively, first identified as part of the Year 1 LTM program (Stantec, 2020e) for the Camlaren TSCA. These tables were compiled based on the first five years of the LTM program reports and priorities were assigned based on the work completed by others. The tables describe the status of each deficiency and updates for each deficiency based on the results of the Year 6, 2024 DSI.

Table 6.2 Existing Dam Safety Deficiencies

No.[1]	LTM Year	Priority Level [2]	Status	Description of Deficiency	Recommended Action and Comment	2024 DSI Comment
DS-1	1 (2019)	3	Completed	Two animal burrows were identified on the south and southeast slope of the TSCA. Animal burrows had a depth of 0.4 m.	Backfill animal burrows and continue to monitor for animal activity.	Animal burrows were backfilled by hand on July 8, 2019.
DS-2	1 (2019)	2	Mostly Completed/Ongoing	Damaged wires related to animal activity were noted at VT1.	Repair wiring to restore functionality of instrument.	Repair was completed by DNV in September 2019. In the Year 2 (2020) inspection, it was noted that the wiring had been reversed and required further attention. Based on the plots generated for 2024, it appeared that additional repairs are required at VT1 since temperatures remained above 1.4°C through permafrost.
DS-3	1 (2019), 2 (2020), 6 (2024)	2	Ongoing	Three depressions, up to 0.3 m deep, were observed at the top of the TSCA cover near the north perimeter.	Continue to monitor these features.	These features were not recorded in Year 2 to Year 5 but were observed in 2024 and appeared to be similar in shape, size, and geometry when compared to 2019 observations.
DS-4	1 (2019)	2	Completed	Cracking observed at the top of the cover near the north perimeter – appeared to be related to the localized depression.	Continue to monitor cracking in subsequent DSIs.	Cracking was presumed to be partially healed based on Camlaren Mine Tailings Soil Containment Area Geotechnical Inspection Report (AECOM, 2024). Partially healed cracks were not noted in Year 6 DSI and are assumed to be fully healed.
DS-5	1 (2019), 2 (2020), 3 (2021), 6 (2024)	2	Ongoing	Erosion noted on the north and northwest slopes of the TSCA facility. Fine material appeared to be washed out, leaving coarse material.	Continue to monitor this erosion and repair if needed.	Minor surface erosion observed in 2024. Some of the historical, deeper erosional gullies appeared to be partially healed. Continue to monitor erosion and consider implementing a more permanent solution, such as flattening embankment slopes, placing coarse material, or removing materials that channel flows.
DS-6	2 (2020)	3	Mostly Completed/Ongoing	Animal burrows were noted on the southwest slope and northeast embankment.	Backfill animal burrows with granular material. Monitor animal activity in subsequent site inspections.	Fresh (and existing) animal burrows were observed in 2024. Continue to monitor animal activity in subsequent site inspections and backfill animal burrows with granular material.

DS-7	2 (2020), 3 (2021)	2	Ongoing	Slow vegetation growth and loose coco-mats was noted.	Refasten coco-mats, consider alternatives for erosion control or vegetation establishment. Coco-mats should be inspected for degradation or displacement on an annual basis, or, until it has been established that embankment erosion has ceased.	Erosion protection consisting of coarse sand with cobbles, covered with coco-matting in a semi-circular arrangement, appeared to be functioning adequately. Some anchors were removed as a result of strong winds impacting the south and east slopes of the facility. Consider repairing coco-matting and adding anchors. Vegetation consisting of grasses and shrubs continued to establish in some areas of the crest and slopes. It was estimated that a third of the willows that were live staked were showing signs of growth.
DS-8	2 (2020)	2	Ongoing	Possible long-term settlement observed.	Resurvey entire covered area if settlement persists.	Continue monitoring and consider establishing an InSAR radar system for remote deformation monitoring.
DS-9	2 (2020)	3	Ongoing	Thermistor wires at VT1 were switched.	Correct VT1 thermistor wiring.	Issues appeared to persist at VT1 – see Section 5.1.2 for additional context. Consider repairing thermistor VT1.
DS-10	2 (2020), 3 (2021)	3	Completed	A blockage was noted at MW1.	Remove the blockage in MW1.	No blockage was present in 2024. Issue resolved.
DS-11	1 (2019), 2 (2020)	3	Ongoing	Undulating invert of the south ditch was observed.	Repair undulating ditch bottom. Fill in depressions.	Continue to monitor ditches for standing water.
DS-12	1 (2019), 2 (2020)	2	Completed	Exposed liner at the west ditch was observed.	Provide additional riprap at the west ditch. Fill in depressions and patch the liner over the filled area.	The exposed liner at the west ditch appeared to be partially healed with limited exposure in 2024. Issue resolved.
DS-13	2 (2020)	3	Completed	Instrumentation was noted to lack protection from potential wildlife interference.	Install wooden boxes with cover over the instrumentation.	Limited wildlife on the island. Instrumentation is functioning well without protection. Issue resolved.
DS-14	2 (2020)	2	Ongoing	Insufficient piezometers were noted at critical areas.	Install additional piezometers in critical areas to assess for slope stability in the north and to better quantify the phreatic surface within the TSCA.	Ongoing – Install additional piezometers as recommended in previous DSIs/LTM Reports.

DS-15	3 (2021)	2	Completed	At the toe of the south embankment, and from Station 0+320 to 0+335, the toe of the slope intersected slightly within the south perimeter ditch resulting in minor undercutting of the embankment.	Remove the over-steepened portion of the existing soil liner material at this location and replace with riprap material similar to the riprap used to line the existing south ditch.	Not observed in 2024.
DS-16	5 (2023)	3	Ongoing	Aluminum debris pile noted to the north of the TSCA.	Monitor this area for observed changes in the Year 6 monitoring program.	The area was not inspected in 2024. Visually inspect the area in 2025 and remove material if present.
DS-17	5 (2023)	2	Ongoing	Thermistor VT1 did not collect data after September 18, 2022.	Inspect this sensor and repair/replace if further monitoring is required.	Issues appeared to persist at VT1 – see Section 5.1.2 for additional context. Consider repairing thermistor VT1.
DS-18	5 (2023)	3	Completed	VB2 data collection was disrupted and data had not collected after September 4, 2020.	Repair or replace during Phase II long-term monitoring.	Issue resolved. Data collection resumed in July 2024.
DS-19	5 (2023)	3	Ongoing	MW2 was blocked.	Inspect the assumed blockage at MW2 with a portable borehole camera in Year 6.	Blockage could not be observed from the surface. Inspect in 2025 and remove the blockage if issue persists.
DS-20	5 (2023)	3	Completed	Data loggers were full or close to full.	Clear old data from data loggers, replace batteries as needed, and re-deploy at appropriate collection intervals.	Data loggers were cleared. Issue resolved.
DS-21	5 (2023)	2	Ongoing	Stained soil was identified at four separate locations. One of these locations exhibited a slight hydrocarbon odour.	Remove stained soil with a shovel, place in five-gallon pails, and remove from site. Collect confirmatory sample at each location to be analyzed for PHCs and BTEX.	Stained soil was not visible in 2024. Continue to observe for stained soil and if identified, collect samples and lab test.

Notes:

(1) Table was compiled based on the findings and recommendations identified by others as part of the Year 1 to Year 5 LTM Reports. Findings and recommendations were not presented in a similar format for the Year 1 to Year 5 LTM Reports.

(2) Existing priority levels were not specified in the previous LTM reports and/or DSIs. Priority levels were assigned in 2024 based on the work completed by others.

Table 6.3 Existing Dam Safety Non-Conformances

No.(1)	LTM Year	Priority Level (2)	Status	Description of Non-Conformance	Recommended Action and Comment	2024 DSI Comment
NC-1	2 (2020)	2	Ongoing	Piezometric trigger levels, instrumentation monitoring	Review piezometric levels plus thermistors bi-annually. More frequent monitoring would provide better interpretation. Establish piezometric trigger levels for the purpose of dam safety and an action plan to mitigate levels if triggers are reached. Update the LTM Plan and OMS Plan accordingly. Automated remote monitoring is also recommended.	Consider implementing recommendations from Year 2 LTM Report.
NC-2	3 (2021)	2	Ongoing		Review as-built drawings completed following 2018 to address minor inconsistencies observed onsite.	Consider implementing recommendations from Year 3 LTM Report.
NC-3	2 (2020), 3 (2021)	2	Ongoing	Dam was not classified in accordance with CDA guidelines.	Classify the dam as per CDA guidelines. Re-evaluate the classification assessment report. Refer to classification report for additional recommendations. Reclassify the current structure from a dam to a mine waste structure. Complete further appropriate review and determination using site-acquired water level monitoring data and additional geotechnical boreholes to determine the strength of the tailings.	Consider implementing recommendations from Year 2 and Year 3 LTM Reports.
NC-4	2 (2020)	3	Ongoing	Quantify the acceptable amount of settlement expected within the first 2-3 years following construction.	Continue bi-annual inspection schedule. The next inspection should be performed after freshet in spring/summer 2021. Special attention should be paid to monitoring settlement of the top cover. Measurements of stick-ups and instrumentation casings should be included in the bi-annual monitoring.	Consider implementing recommendations from Year 2 LTM Report.

Notes:
(1) Table was compiled based on the non-conformances identified by others as part of the Year 1 to Year 5 LTM Reports. Non-conformances were not presented in a similar format for the Year 1 to Year 5 LTM Reports.
(2) Existing priority levels were not specified in the previous LTM reports and/or DSIs. Priority levels were assigned in 2024 based on the work completed by others.

7.0 LIMITATIONS

Professional judgments are presented in this report. These are based partly on the existing information presented in this document, our visual observations during the site visit, and partly on our experience with similar projects. The findings, recommendations, professional opinions, and conclusions that are presented, are within the limits prescribed by available information at the time the assessment discussed in this document was prepared in accordance with generally accepted professional engineering practice. K'alo-Stantec's services were performed with the usual thoroughness and competence of the engineering profession. No other representation, expressed or implied, is included or intended in our proposals, contracts, or reports.

The conclusions in this report are limited in terms of accuracy to the time, scope, and purpose for which the report was prepared and do not necessarily represent the conditions at any other time. Unless expressly stated otherwise, assumptions, data, and information supplied by, or gathered from other sources upon which K'alo-Stantec opinion as set out herein is based, has not been verified by K'alo-Stantec and K'alo-Stantec makes no representation as to its accuracy and disclaims all liability with respect thereto.

This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context. K'alo-Stantec disclaims any liability to any third party in respect of any reliance on this document by any third party without the prior written consent of K'alo-Stantec.

8.0 REFERENCES

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Drawings

TSCA Summary of Monitoring Components

388100 388150 388200 388250 388300 388350 388400 388450

6986100 6986050 6986000 6985950 6985900 6985850 6985800

CAM_SO_01
Approximate SNP Station 2016-8c
SNP Station 2016-11b1
SNP Station 2016-7d (MW6)
SNP Station 2016-7a (MW3)
VB3
VT2
MW2
TSCA
CAM_SO_04
CAM_SO_03
CAM_SO_05
CAM_SO_07
CAM_SO_06
CAM_SO_09
VB2
VT1
MW1
VB1
SNP Station 2016-7b (MW4)
SNP Station 2016-11b2
SNP Station 2016-7c (MW5)
Approximate SNP Station 2016-8b
SNP Station 2016-11b4
CAM_SO_10
CAM_SO_12
CAM_SO_08
CAM_SO_11
Gordon Lake
1 2 3 4 5 6 7 8 9

N

0 10 20 30 40 m
1:1,300

Sources: MapMart Orthomagery (2011), GeoBase, CANVEC

V:\1214\active\121413xxx\121413573 Gordon Lake Assessment\geomatics\mapping\mxd\report\2020_YR2_Long_Term_Monitoring_Plan\121414585_150_Camlaren_2020_Y2LTMP.mxd mhuskinsthupe

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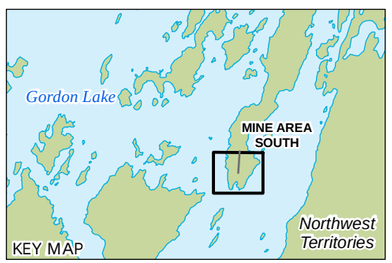
Legend
- Approximate Discharge Location
- Surface Water Sample Location
- Groundwater Sample Location
- TSCA Monitoring Well
- TSCA Thermistor
- TSCA Vibrating Wire Piezometer
- Backfilled Remedial Excavation
- Remedial Excavation
- Tailings and Soil Containment Area (TSCA)
- Excavated Waste Rock
- Trail
- Waterbody
- Aerial Viewpoint
- Viewpoint



NAD 1983 UTM Zone 12N

October 2020
121414585

Client/Project
Public Services and Procurement Canada
Phase I Long-Term Monitoring Year 2 Report

Figure No.
Drawing 1

Title
Camlaren - Mine Area South
Summary of Long-Term Monitoring Components

APPENDIX A

TSCA Dam Safety Inspection Checklist

Stantec

Gordon Lake Group of Sites
File – 123514963

July 31, 2024
Camlaren TSCA

2024 TSCA Safety Inspection Checklist

Inspection Details				
TSCA Safety Inspector(s)	Steve Bundrock, P.Eng., Steffen Karl, P.Eng.			
Inspection Timing	Date	16 July 2024	Time	11:00AM
Weather (precip/temp/sun)	Partly Cloudy, 20-26°C			
Weather preceding Inspection	Partly Cloudy, 20-26°C			
Previous Dam Safety Inspection	Date	29 September 2023 (by Others)	HPC (CDA)	Assumed to be low
Next Dam Safety Inspection	Scheduled for 2025.			

Basic Information			
TSCA Purpose	Final storage for mine waste collected from the Gordon Lake Group of Sites and contained in this engineered facility – Tailings and Soil Containment Area (TSCA).		
Owner	CIRNAC		
Catchment Area	TSCA area only, 2.5 ha	Nominal Berms Height	5 m
Pond Area	N/A	Nominal Length	200 m
Berm Crest Elevation	297.5 m	Nominal Width	150 m
TSCA Peak Elevation	300.6 m	Berms Slopes	3:1
Water level during visit	N/A	TSCA Slope	4%1
Berm Composition	Sand fill dam with BGM composite cover.		
Composite BGM Cover	BGM liner placed on sand bedding and covered with 0.5 to 0.6 m of sand cover.		
Discharge Facilities	Perimeter ditches, northern and southern.		

Berm Crests	
Cracking	None observed. The partially healed cracking identified in the April 5, 2024, Camlaren Mine Tailings Soil Containment Area Geotechnical Inspection report (AECOM 2024), was not encountered during the 2024 review and is assumed to be fully healed.
Deviation of Alignment	None.
Narrowing of crest width	None.
Sinkholes / Potholes / Rutting	Past minor surface erosion of crest and slope evident in multiple locations, in some cases where water is channeled by the trees and coir logs placed for erosion control. All evidence of past erosion is minor with no significant erosion concerns identified anywhere on structure.
Low Areas	None.
Vegetation	Vegetation consisting of grasses and shrubs growing in some areas of crest and slope of the berm. The majority of this growth is on the north, east, and south sides where willow live-staking was completed. Only some of the willows survived with less than a third of willow plants showing growth.

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Gordon Lake Group of Sites
File – 123514963

July 31, 2024
Camlaren TSCA

2024 TSCA Safety Inspection Checklist

Animal burrows	One start of a partial den (potentially fox) was observed on the surface of the TSCA near the east crest. Burrow was not dug deeper than approximately 0.5 m.

TSCA Top Surface	
Erosion Protection	Sand cover and willow branches to control erosion and promote vegetation.
Depressions, sinkholes	A surface depression was observed approximately 0.3 m deep at the TSCA top near the northern perimeter. The size is approximately 12 m E-W and 5 m N-S. 10 m W of MW#2. The surface crack zone consisting of several cracks adjacent to the depression area was partially healed. This depression was not noted in AECOM 2024 but looks similar to that identified in the 2020 site review. Recommendations: backfill the depression zone with granular material up to surround level. Two (2) small depressions (new) near VB#2, approximately 0.15 m.
Excess vegetation	None.
Animal burrows	One start of a partial den (potentially fox) was observed on the surface of the TSCA near the east crest. Burrow was not dug deeper than 0.5 m.
Rubbish/Driftwood	None.

Downstream Slopes (all around TSCA)	
Erosion Protection (quality, evidence of erosion)	Coarse sand with cobble size stones covered with coco mats placed in semi-circles to mitigate potential erosion. Willow live-staking was performed to encourage vegetation of slope. Evidence of minor surface erosion observed , however, no severe erosion concerns identified anywhere. Previous deeper erosion channels appear to be partially healed. Coco matting wind-blown with anchors pulled out at some locations, especially south and east slope.
Uniform Slope/Evidence of Slides	Slopes smooth and regular. No evidence of slides.
Vegetation (hydrophilic, excessive)	Some willow and grasses growing sporadically.
Animal burrows	None observed on slopes.

Downstream Toes	
Toe Submerged	No.
Soft Toe	No.
Boils or concentrated seeps	None.
Seepage areas (seepage clear?)	No seepage observed in the downstream of toe drain.
Staining	No.
Vegetation (hydrophilic, excessive)	No.

Perimeter Ditches

2024 TSCA Safety Inspection Checklist

Control Mechanism	None.
Flow During Inspection	Inactive.
Material	Rockfill riprap.
Seepage into ditches	None.
Cracks	None observed. Exposed geofabric/liner previously identified appeared to be mostly self healed with limited to no current exposure.
Erosion / Spalling	None.
Staining	None.
Blockages	Standing water in the South Ditch, due to uneven bottom.
Energy Dissipation	No issue observed.
Animal Borrows	A number of animal borrows (potentially fox) were observed in the sand to the west of the west perimeter ditch. No impact to the ditch or toe.

Monitoring and Instrumentation
Monitoring wells and instrumentation including vibrating wire piezometers and thermistors installed throughout the site. Active monitoring occurring during site visit but some software communication issues encountered.

Other	
Wildlife (beavers, etc)	None.
Public Access	None.
Additional Notes	Review of instrumentation data is recommended in light of the long-term performance.

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Gordon Lake Group of Sites
File – 123514963

July 31, 2024
Camlaren TSCA

2024 TSCA Safety Inspection Checklist

Photo 1: Camlaren TSCA from the air.

2024 TSCA Safety Inspection Checklist

Photo 2: Camlaren TSCA from the air.

2024 TSCA Safety Inspection Checklist

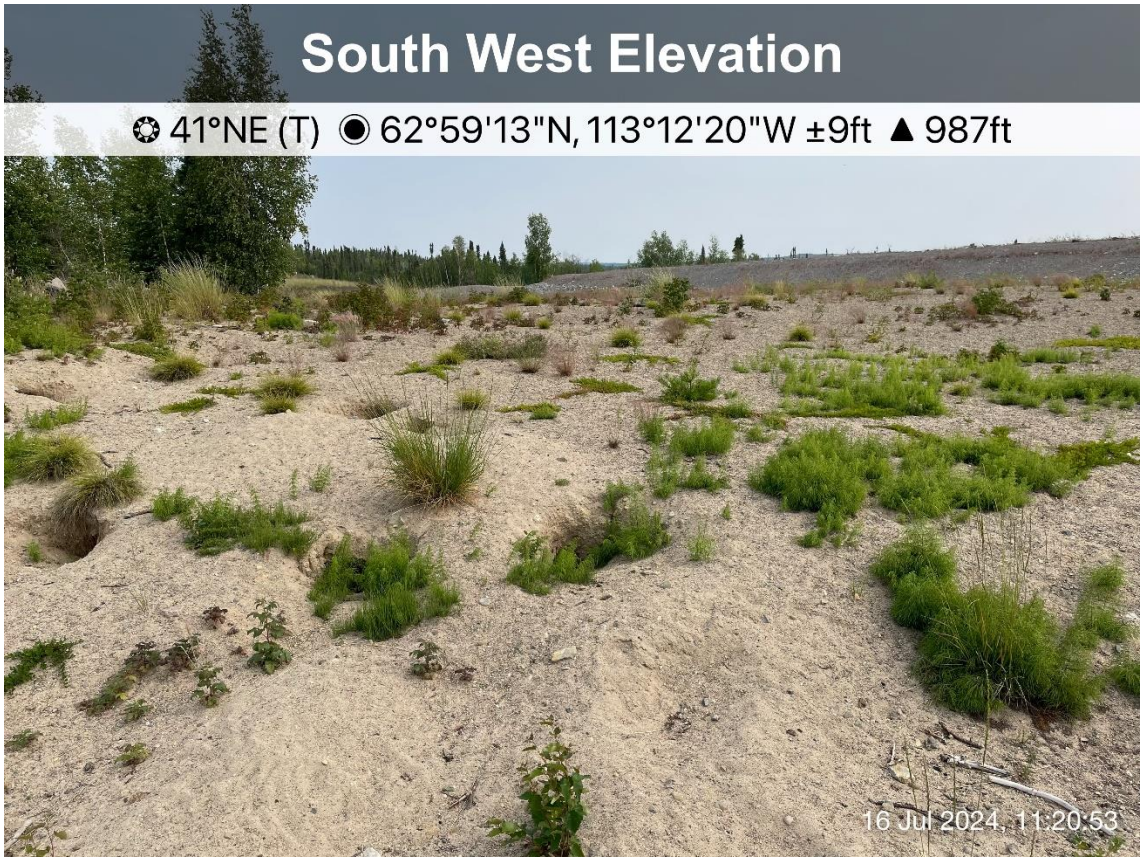

Photo 3: Animal borrows to the west of west drainage ditch.

2024 TSCA Safety Inspection Checklist

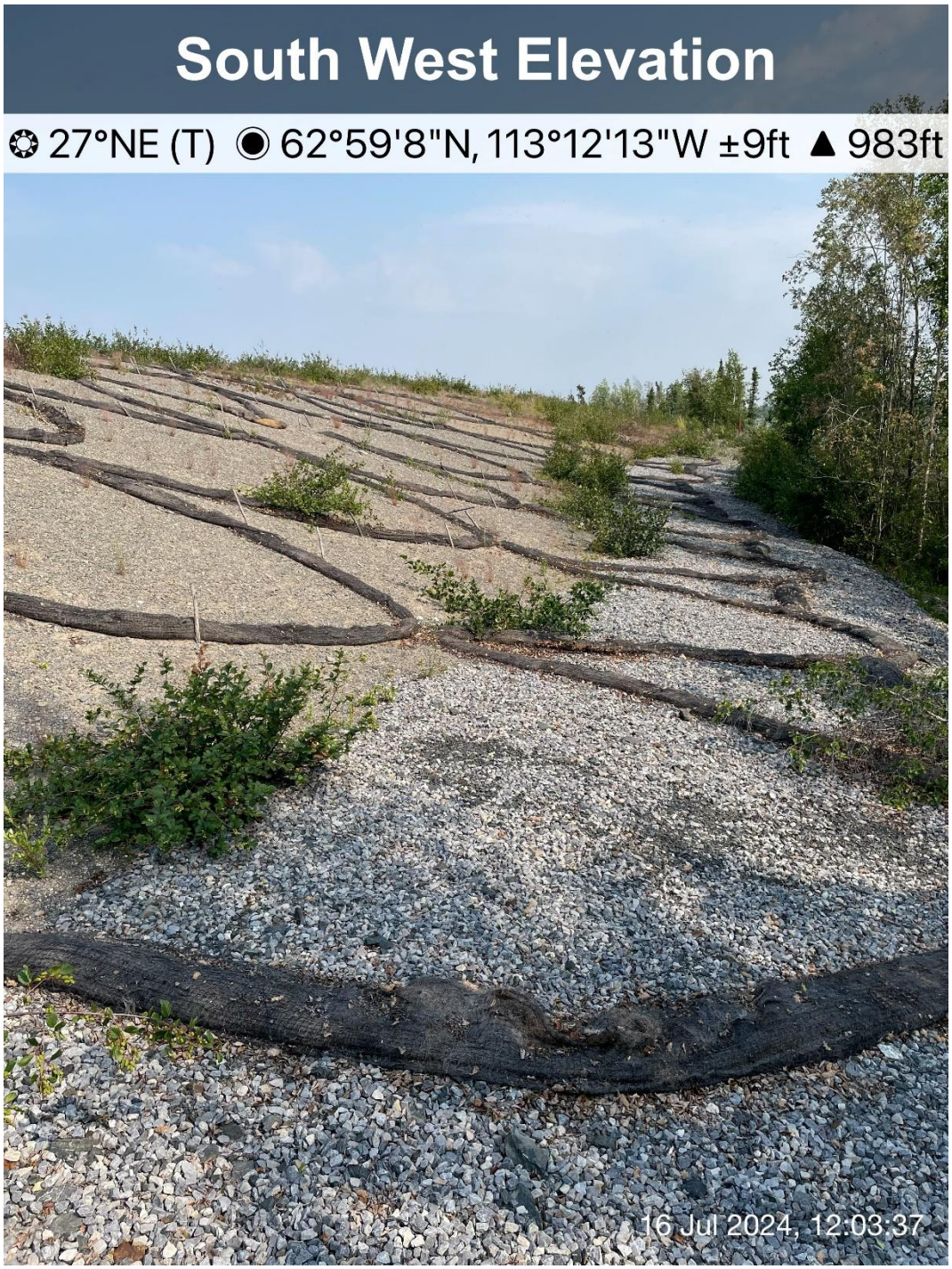

Photo 4: East slope – Sporadic willows growing.

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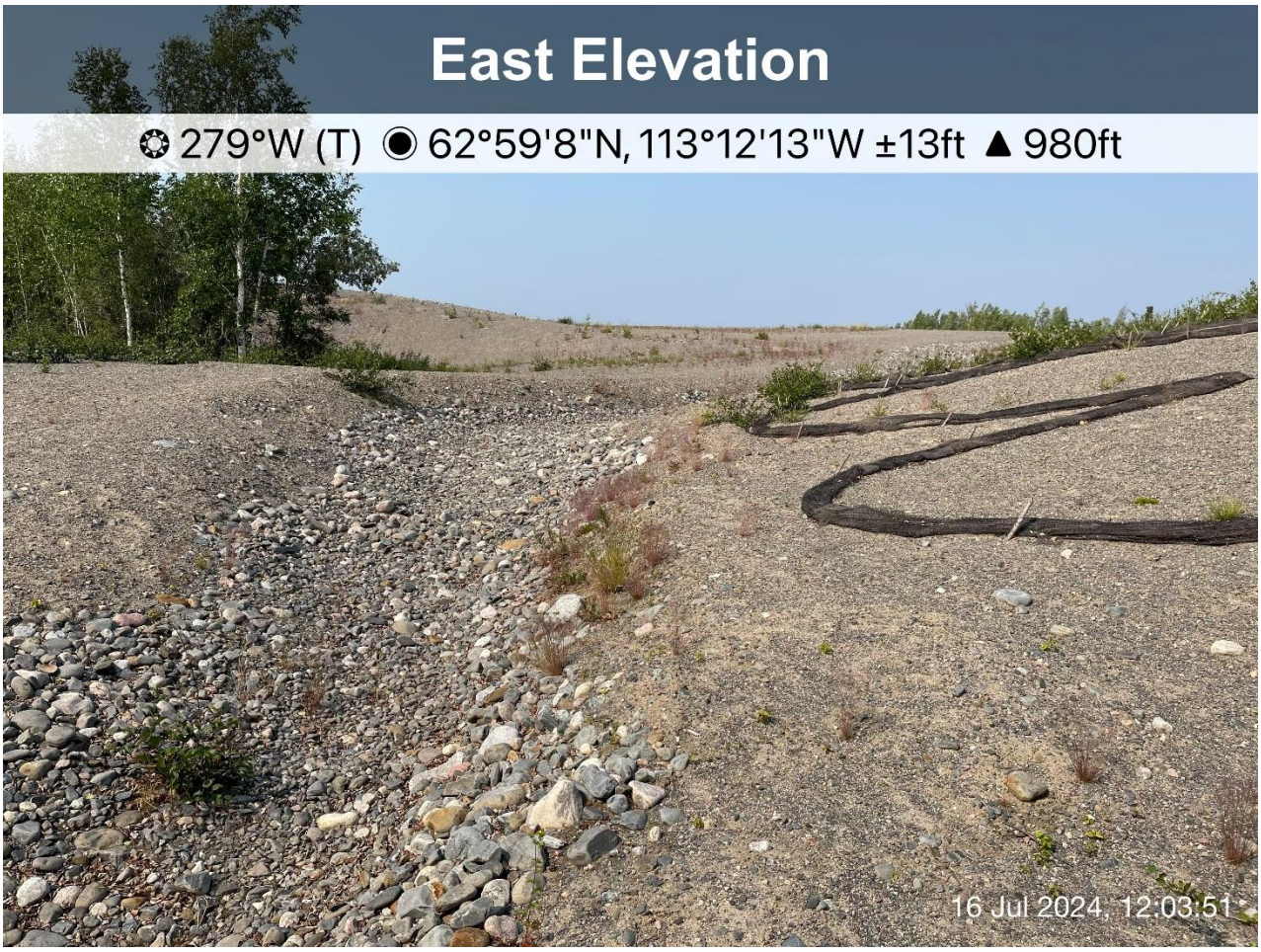

Photo 5: Southeast perimeter ditch.

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Photo 6: Southwest perimeter ditch and slope.

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Photo 7: South perimeter ditch and slope.

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Photo 8: TSCA north slope with partially healed erosion channels – looking toward perimeter ditch.

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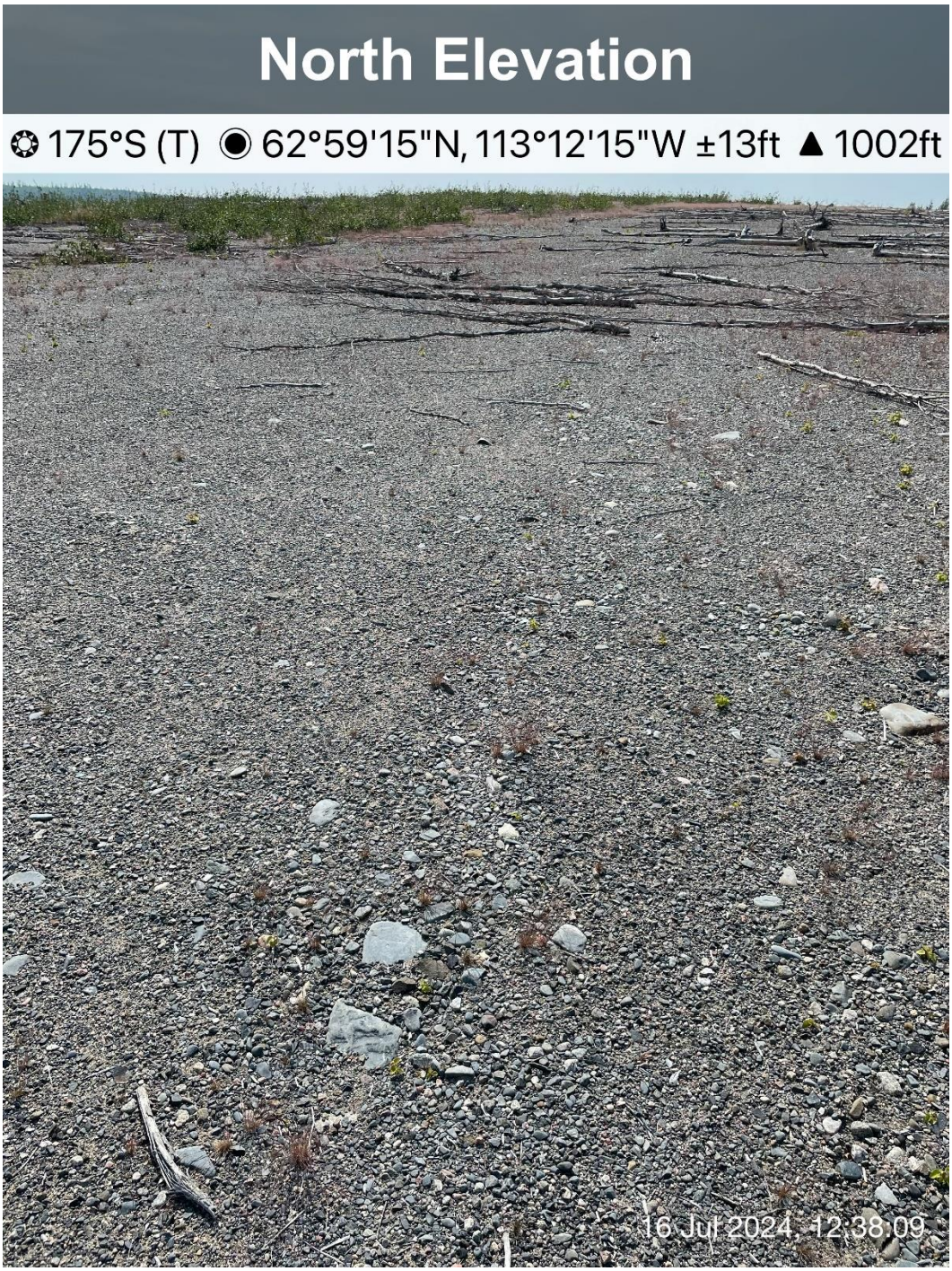

Photo 9: Willow branches cover the top of the TSCA to mitigate potential erosion – partially healed erosion channel visible.

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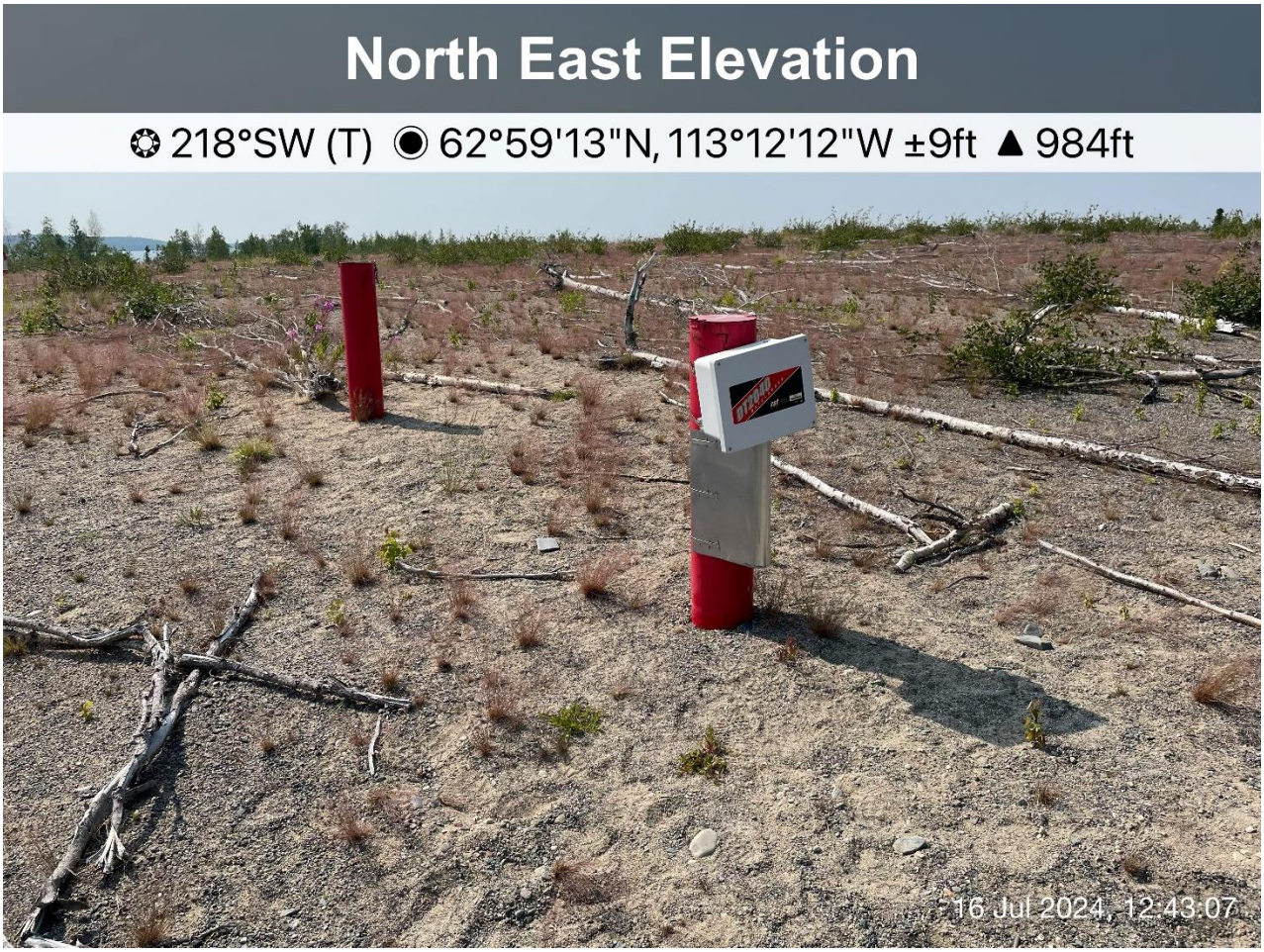

Photo 10: Typical instrument installation.

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Photo 11: Start of partial animal burrow near east crest of TSCA.

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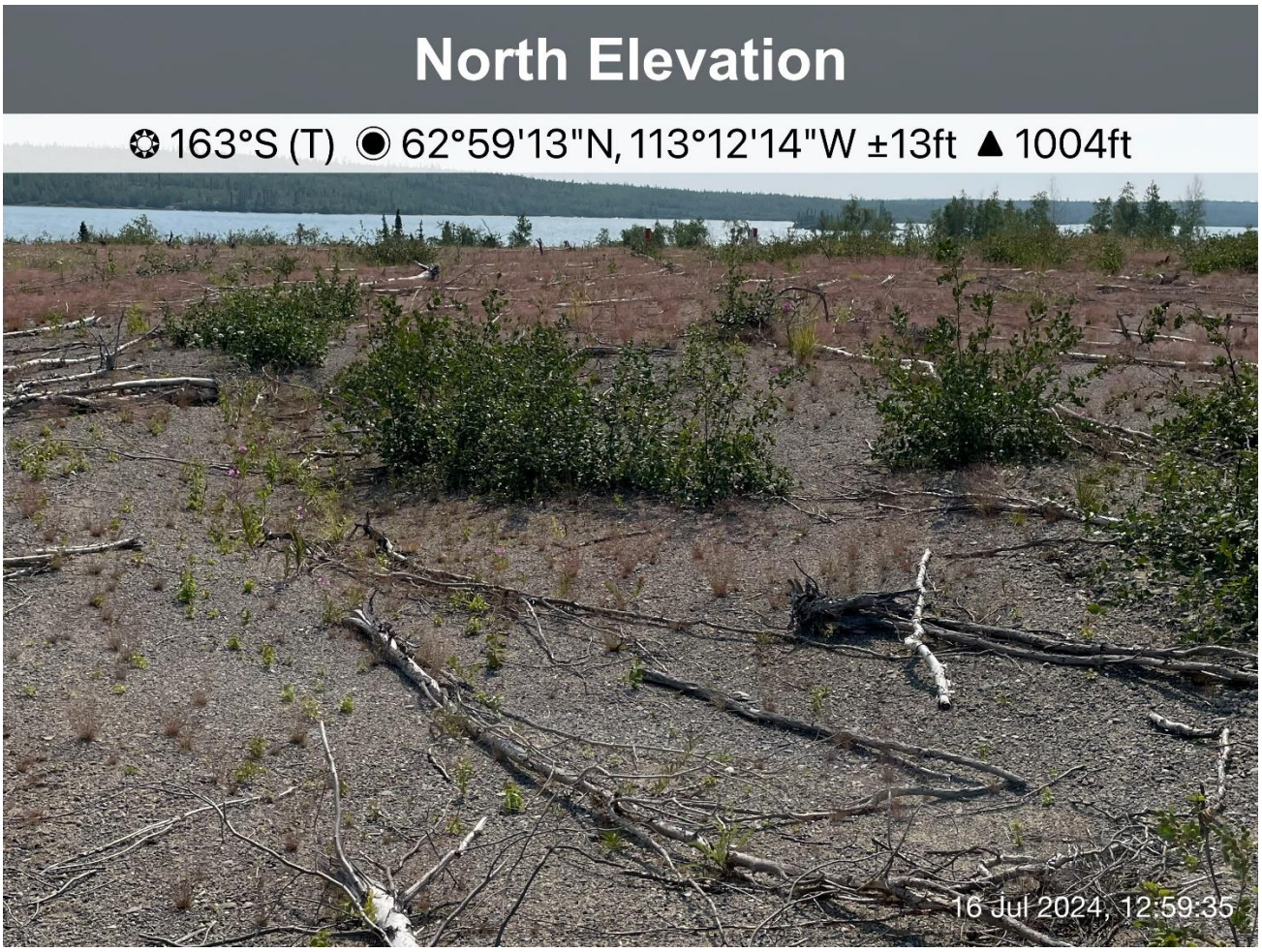

Photo 12: Surface depression near northern perimeter of TSCA.

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Photo 13: TSCA top towards North Perimeter, surface crack zone around depression area – partially healed.

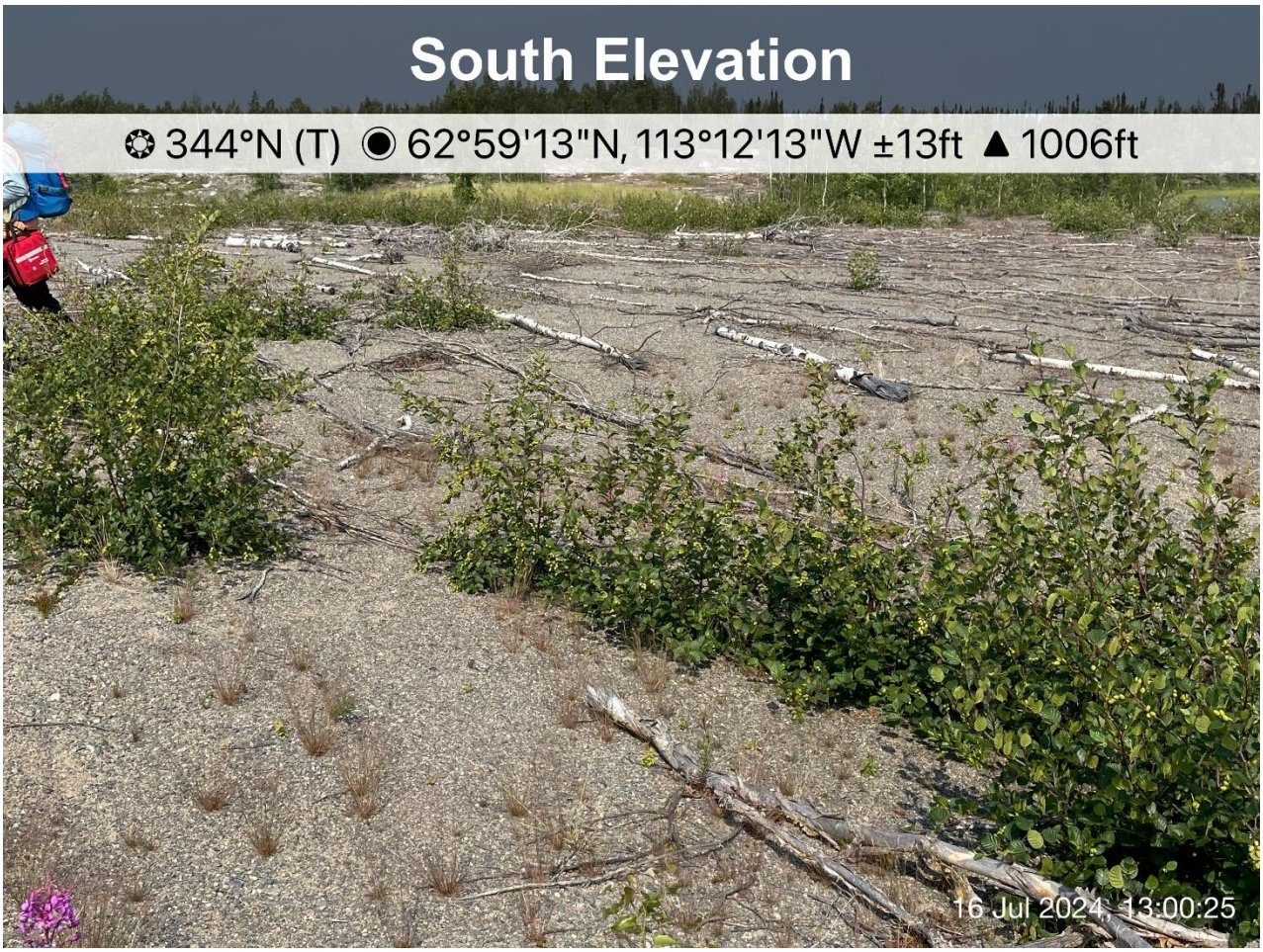

Photo 14: Surface depression near northern perimeter of TSCA.