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November 8, 2019

Jacqueline Ho *(submitted email only)*
Regulatory Specialist
Mackenzie Valley Land and Water Board
7th Floor – 4922 48th Street
Yellowknife, NT X1A 2P6

Email: jho@mvlwb.com

Dear Ms. Ho,

Reference: 2019 Annual Geotechnical Inspection – Water License MV2017L2-0007

Pursuant to Water License MV2017L2-0007, Teck Resources Limited respectfully submits the following for the closed Pine Point Mine:

- *Pine Point Mine Tailings Impoundment Area 2019 Dam Safety Inspection,* dated November 2019 prepared by Golder Associates

There are six recommendations, with suggested closure timelines from the EOR, as seen in the following table:

Structure	ID Number	Deficiency or Non-conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Recommended Deadline/Status
south dyke	2018-1	Vegetation encroaching on downstream face of south dyke	OMS Manual Section 5.5.2	Remove vegetation at west end of south dyke as per OMS manual. The south dyke is outside the Teck lease boundary and permission from land owner will be required to complete vegetation removal.	Completed October 2019.
polishing pond	2018-2	No written procedure for sludge removal	none	Update water treatment manual to include written maintenance procedure for removal of sludge from polishing pond including dewatering operations.	Three (3) months prior to scheduled maintenance of polishing pond (previously stated as 2019 (Golder 2019b))

Structure	ID Number	Deficiency or Non-conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Recommended Deadline/Status
TIA	2018-3	Inaccurate storage curve for facility	OMS Manual Section 4.3.3	Complete bathymetry and tailings topographic survey to define the facility storage curve. Review flood storage capacity and water handling practices, determine capacity of spillway and update freeboard limits. Incorporate these changes in the OMS manual. Consider preparing for high water levels in spring 2019 and requirement to treat water at the freshet.	Survey completed Q1 2019 Review facility hydrology and update OMS manual by Q4 2020
north dyke	2019-1	Vibrating wire piezometers – faulty readings. PP-VWP-18-03B PP-VWP-18-05 PP-VWP-18-08 PP-VWP-18-09	none	Troubleshoot vibrating wire piezometer calibration / data acquisition and data reduction. Faulty or damaged instruments should be repaired or replaced.	By End Q3 2020
TIA Instrumentation	2019-2	Instrumentation installed in 2018 requires integration into OMS procedures	4.2 and 4.3 of OMS	Establish procedures for frequency of data acquisition and review. Establish baseline readings and levels for alert and emergency response, with corresponding update of OMS manual.	By End 2020
TIA	2019-3	EPRP is out of date and does not reflect recent staff changes	CDA 2013	Update EPRP for changes to site manager and EOR. Update OMS to include change management procedure to update EPRP.	By End Q1 2020

Please do not hesitate to contact me if you have any further questions regarding the operation, maintenance and monitoring of our tailings facility.

Sincerely,

Michelle Unger
Manager, Environmental Performance

cc: Wendy Bidwell, Water Resource Officer Department of Environment & Natural Resources
Chief Louis Balsillie, Deninu K'ue First Nation, Fort Resolution
President Arthur Beck, Fort Resolution Métis Council, Fort Resolution
Richard Simon, DKFN Resource Management Coordinator (IMA)
Shawn McKay, FRMC Land and Environment Coordinator
Steven Hilts, Director Legacy Properties, Teck
Kathleen Willman, Manager Engineering and Remediation, Teck

Attachment:

- *Pine Point Mine Tailings Storage Facility 2019 Dam Safety Inspection,* dated November 2019 prepared by Golder Associates

REPORT

2019 Dam Safety Inspection

Pine Point Tailings Impoundment Area, Pine Point, NT

Submitted to:

Teck Metals Ltd.
601 Knighton Road
Kimberley, BC V1A 1C7

Attention: Michelle Unger, Pine Point Site Manager

Submitted by:

Golder Associates Ltd.
Suite 200 - 2920 Virtual Way Vancouver, BC, V5M 0C4 Canada

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Reference No. 18114183-209-R-Rev0-3000

8 November 2019

Distribution List

Electronic Copy - Teck Metals Ltd.

Electronic Copy - Golder Associates Ltd.

Executive Summary

This report presents the results of the 2019 annual dam safety inspection (DSI) for the tailings impoundment area (TIA) at the closed Pine Point Mine in the Northwest Territories.

The report was prepared by Golder Associates Ltd. (Golder) at the request of Teck Metals Ltd. (Teck).

The DSI site visit was completed on 12 August 2019 by the Engineer of Record (EOR), Ben Wickland, P.Eng., and by Martyn Willan, P.Eng., both from Golder. The site visit was accompanied by Morgan Lypka from Teck and Clell Crook of Maskwa Engineering Ltd. (Maskwa).

This report is to be read with the Study Limitations, provided at the end of the report, which form an integral part of this document.

Summary of Facility Description

The site is located approximately 75 km east of the town of Hay River and approximately 6.5 km south of Great Slave Lake in the Northwest Territories. The Pine Point TIA was closed and in active care and maintenance. The TIA is formed by the north, east, west and south dykes and covers an area approximately 2.5 by 2.8 km in plan, or approximately 700 ha.

Between 50 and 60 million tonnes of lead-zinc tailings are stored within the Pine Point TIA.

Summary of Key Hazards

Key potential hazards identified for the Pine Point TIA dykes and the observed status in 2019 include:

Overtopping

- The water level in the pond was within operating limits and the facility met freeboard criteria for the monitoring period.
- Minimum freeboard from dam crest to the main pond in the TIA was established based on CDA (2013) guidelines.
- The maximum pond level recorded at the polishing pond staff gauge was 201.09 m on 18 May 2019.
  - The pond level was 0.71 m below the maximum operating water level of 201.8 m and 0.51 m below the alert water level of 201.6 m (performance objectives for pond level are planned to be updated for climate data and the storage curve developed from bathymetric and topographic survey data collected in 2018 and 2019).
  - The corresponding minimum freeboard was
    - 2.4 m to the north dyke crest
    - 1.4 m to the main pond spillway
- A vibrating wire piezometer (PP-VWP-18-10) was installed in the main pond in 2018. Calibration of the piezometer to spot elevations recorded at the pond staff gauge was in progress at the time of reporting.

Internal Erosion (Piping)

- No conditions were observed during the 2019 DSI that would indicate piping, such as change in seepage rates, seepage from dam faces with fines, or sinkholes.

Instability

- No conditions were observed during the 2019 DSI that would indicate instability, such as cracks, settling, or bulging of the dykes. The dykes therefore appeared to be stable, in line with expectations based on previous slope stability analysis (SRK 2016), which indicated factors of safety in compliance with CDA (2013) guidelines.

Erosion

- Wave cut erosion
  - An erosion bench or scarp approximately 0.3 to 0.5 m high was observed on the upstream face of the north dyke, over a 700 m long section west of the dogleg. This erosion was immediately below the riprap placed on the slope in 2018 and above a bench in the slope. The erosion was attributed to wave and/or ice action. The maintenance repairs made in 2018 otherwise appeared to be in good condition, and should continue to be monitored.
- Surface erosion rills (gullies)
  - Minor rilling was observed during the 2019 DSI:
    - Rills up to 15 cm deep on the upstream and downstream slopes of the south dyke, similar to previous years
    - Rills up to 0.25 m deep on the upstream and downstream slopes of the west dyke, increased slightly from previous years
    - Rills up to 0.20 m deep on the downstream slope of the north dyke, increased slightly from previous years
    - Rills up to 0.10 m deep on the downstream slope of the east dyke, similar to previous years
    - No rills were observed to extend into the dyke crest and the crest width was intact
    - Erosion rills repaired in 2018 were in good condition

Consequence Classification

CDA (2013) guidelines provide a system to classify dams based on the consequences of a hypothetical failure or potential damage that can be caused in the event that a dam fails. Consequence classification is not related to the likelihood of a failure, but rather the potential impact if a hypothetical failure did occur. The south and east dykes were classified as “Low” consequence structures, while the west and north dykes were classified as “Significant” consequence structures based on CDA (2013).

The TIA was in the Closure – Active Care phase of mine life based on CDA (2014).

There were no changes in the dams, water management, guidelines, regulations, or potential downstream receptors related to dam consequence classification in the monitoring period. As such the consequence classifications remain unchanged from the 2018 DSI (Golder 2019a).

Summary of Key Observations

Dam conditions and maintenance requirements were evaluated primarily through site observations and considered:

- observations made by Golder during the 12 August 2019 DSI site visit
- observations made by Maskwa during routine inspection on 18 May and 2 October 2019
- a review of available data from site instrumentation/monitoring devices, and data from investigations conducted in 2018
- topographical and bathymetrical surveys and satellite photography

Instrumentation prior to 2018 included a single water level gauge at the culvert inlet to the polishing pond and flow meters located in the siphons at the polishing pond spillway. New instrumentation/monitoring devices installed at the TIA in September/October 2018 included:

- 15 vibrating wire piezometers which were connected to a remote monitoring system
  - 4 in tailings.
  - 5 beneath the tailings.
  - 3 in the north dyke.
  - 2 downstream of the north dyke.
  - 1 in the main pond.
  - 9 months of data (November 2018 to August 2019) was recorded, and interpretation and establishment of instrument baselines was in progress at the time of this report. Preliminary data are generally reported without corrections for barometric pressure.
- 12 standpipe groundwater monitoring wells
  - 6 in tailings.
  - 3 in soils beneath the tailings.
  - 2 downstream of the north dyke.
  - 1 to the west of the TIA.
  - monitoring data was not available at the time of this report.
- a climate station

The north, south, east, and west dykes of the TIA were generally in good condition at the time of the 2019 DSI. The following were observed:

- Erosion of the upstream face of the north dyke, approximately 0.3 m to 0.5 m deep, over a 700 m length west of the dogleg. The erosion was on the slope below the riprap placed in 2018. Monitoring for wave erosion should continue.
- Erosion rills with depths between approximately 0.10 and 0.25 m were observed on the north, east, and west dykes. Monitoring of the dykes for erosion rills should continue.
- Vegetation was present on the south dyke and should be removed following dam maintenance requirements.
    - vegetation clearance works were completed between 1 and 5 October 2019

Water treatment was initiated on 2 August 2019 and completed on 30 August 2019. A total of 81,163 m^3 of treated water was released during the 2019 water treatment period. The volume of water discharged was less than average, and attributed to reduced precipitation.

Summary of Significant Changes

None of the monitoring data reviewed indicated a concern with the integrity of the dykes. No significant changes to site conditions were observed that could reasonably be expected to compromise the stability of the dykes or surface water control systems. Conditions remained materially unchanged from the 2018 DSI, with the exception of additional instrumentation for monitoring the conditions in the TIA. Data from instrumentation are presented for record purposes and were not used to assess dam safety for the 2019 DSI.

Summary of Review of Operation, Maintenance, and Surveillance and Emergency Preparedness and Response Plan Manuals

The OMS manual was updated in June 2019 (Teck 2019b) including updates to: the Site Manager and Engineer of Record, the land use permit (MV2019X0006), the Contingency manual, the Water Treatment manual, minor updates to dam geometry based on survey data, list of instrumentation, and to reference Teck (2019a).

Additional updates were planned to incorporate details of instrumentation installed in 2018, topographical and bathymetric survey data, and quantitative performance objectives (QPOs), pending data reduction and calibration, and analysis. Updates to the OMS manual should also incorporate a change management procedure to review and update, if necessary, the emergency preparedness and response plan (EPRP).

The EPRP for the Pine Point TIA was last updated in February 2017. The EPRP was tested by emergency response drill on 18 December 2018.

Update of the EPRP is recommended due to recent changes in staff and proposed updates to the OMS manual.

Dam Safety Review

A dam safety review of the north, south and west dykes was conducted by SRK Consulting in 2014 (SRK 2016). CDA (2013) guidelines recommend that a dam safety review be conducted once every 10 years for embankments with a Significant dam classification, such as the west and north TIA dykes. The next dam safety review for these dykes should be undertaken no later than the end of 2024.

Summary Table of Deficiencies and Non-conformances

Deficiency / non-conformances and recommended actions are presented in Table E-1.

Table E-1: Summary of Dam Safety Inspection Recommended Actions

Structure	ID Number	Deficiency or Non-conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Recommended Deadline/Status
south dyke	2018-1	Vegetation encroaching on downstream face of south dyke	OMS Manual Section 5.5.2	Remove vegetation at west end of south dyke as per OMS manual. The south dyke is outside the Teck lease boundary and permission from land owner will be required to complete vegetation removal.	3	Completed October 2019.
polishing pond	2018-2	No written procedure for sludge removal	none	Update water treatment manual to include written maintenance procedure for removal of sludge from polishing pond including dewatering operations.	4	Three (3) months prior to scheduled maintenance of polishing pond (previously stated as 2019 (Golder 2019b))
TIA	2018-3	Inaccurate storage curve for facility	OMS Manual Section 4.3.3	Complete bathymetry and tailings topographic survey to define the facility storage curve. Review flood storage capacity and water handling practices, determine capacity of spillway and update freeboard limits. Incorporate these changes in the OMS manual. Consider preparing for high water levels in spring 2019 and requirement to treat water at the freshet.	2	Survey completed Q1 2019 Review facility hydrology and update OMS manual by Q4 2020
north dyke	2019-1	Vibrating wire piezometers – faulty readings. PP-VWP-18-03B PP-VWP-18-05 PP-VWP-18-08 PP-VWP-18-09	none	Troubleshoot vibrating wire piezometer calibration / data acquisition and data reduction. Faulty or damaged instruments should be repaired or replaced.	4	By End Q3 2020
TIA Instrumentation	2019-2	Instrumentation installed in 2018 requires integration into OMS procedures	4.2 and 4.3 of OMS	Establish procedures for frequency of data acquisition and review. Establish baseline readings and levels for alert and emergency response, with corresponding update of OMS manual.	4	By End 2020
TIA	2019-3	EPRP is out of date and does not reflect recent staff changes	CDA 2013	Update EPRP for changes to site manager and EOR. Update OMS to include change management procedure to update EPRP.	4	By End Q1 2020

Priority[a]	Description
1	High probability or dam safety issue considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
2	If not corrected/implemented could likely result in dam safety issues leading to injury, environmental impact or significant regulatory enforcement; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice – Further improvements are necessary to meet industry best practices or reduce potential risks.

a) Source: Teck 2019a.

ID = identification; OMS = operation, maintenance, and surveillance; DSR = dam safety review; CDA = Canadian Dam Association.

Table of Contents

TABLES

FIGURES

ILLUSTRATIONS

APPENDICES

Appendix A
Historical Cross-sections

Appendix B
Facility Data Sheet

Appendix C
Dam Safety Inspection Visit Report

Appendix D
Vibrating Wire Piezometer Data

Appendix E
Tailings Pond Water Levels

1.0 INTRODUCTION

As requested by Teck Metals Ltd. (Teck), Golder Associates Ltd. (Golder) prepared this 2019 annual dam safety inspection (DSI) report for the north, south, east and west dykes of the Tailings Impoundment Area (TIA) at the Pine Point Mine, Northwest Territories (NT). This report is to be read with the Study Limitations, provided at the end of the report, which form an integral part of this document.

1.1 Purpose, Scope, and Methodology

The DSI report was prepared in accordance with CDA (2013) guidelines, as well as the Teck *Guideline for Tailings and Water Retaining Structures* (Teck 2019a) and is intended to meet the requirement of the Pine Point Water Licence (MV2017L2-0007) for the production of an annual geotechnical inspection report.

This report includes:

- a summary of regulatory requirements, facility description, and background information
- a summary of the construction, operating, and/or repair activities (if any) for the reporting period
- review of
  - climate data and water balance
  - facility freeboards
  - monitoring data including site instrumentation
  - topographical and bathymetrical survey data
  - required operational documents
- dam consequence classification
- assessment of dam safety relative to potential credible failure modes
- findings and recommended actions
- site photographs and records of dam inspection

This report is based primarily on observations made by Golder during the 12 August 2019 DSI site visit, routine inspections carried out by Maskwa 18 May and 2 October 2019, and available monitoring / instrumentation data.

The previous DSI was carried out in August 2018 (Golder 2019a).

1.2 Regulatory Requirements

Applicable codes, guidelines, and regulations governing the Pine Point TIA are listed in the following sections.

1.2.1 Mines Act

Mackenzie Valley Resources Management Act, S.C. 1998, c.25, last amended 12 December 2017.

1.2.2 Water Act

Mackenzie Valley Waters Act, S.N.W.T, 2015, c.1, in force 1 September 2016.

1.2.3 Permits and Licences

- Water Licence, number MV2017L2-0007 - valid to 24 October 2027
- Type A land use permit, number MV2019X0006 - valid to 15 May 2024

The Pine Point TIA is closed and does not have a permit to operate.

1.2.4 Guidelines

- Canadian Dam Association (CDA)
  - *Dam Safety Guidelines* (CDA 2013)
  - *Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams* (CDA 2014)
- Mining Association of Canada (MAC) *A Guide to the Management of Tailings Facilities* (MAC 2017)
- Guideline for Tailings and Water Retaining Structures (Teck 2019a)

1.3 Facility Description

The site is located approximately 75 km east of the town of Hay River and 6.5 km south of Great Slave Lake in the Northwest Territories (Figure 1). The Pine Point TIA was closed and in a state of active care and maintenance at the time of reporting. A plan showing the layout of the TIA is presented in Figure 2. The TIA is located to the north of the former Pine Point mill site on terrain that slopes gently towards the northwest. The TIA covers an area approximately 2.5 by 2.8 km in plan, or roughly 700 ha, and includes north, south, east and west dykes that retain between 50 and 60 million tonnes of lead-zinc tailings from historical mining operations, as well as a permanent water pond on the north side. The TIA includes spillway from the main pond and a separate spillway from the polishing pond at the north side. The polishing pond spillway is typically used to release water after treatment. The tailings were covered with granular material, average thickness 0.2 m, to control dust.

The Teck surface lease covers an area of approximately 760 ha including 480 ha of the TIA and 280 ha of land to the north and east of the TIA. The lease boundary excludes approximately 180 ha of the TIA including the south dyke and 1.1 km of the west dyke (Figure 2).

The total length of dykes is approximately 8.5 km, and the maximum height of dykes approximately 9 m. The dykes were constructed of earthfill and extend fully along the north and west sides and along portions of the south and east sides. Describing the system clockwise from the south; the south dyke varies in height from flush with existing terrain at the southeast corner of the TIA to 4 m high at the southwest corner. The west dyke connects to the south dyke and has a maximum height of approximately 9 m. The north dyke connects the west dyke and east dykes and varies from 9 m in height at the connection with the west dyke to 1.5 m in height at the east dyke. The east dyke is between 1 and 2 m in height and continues on the east side until the natural ground surface rises above the dyke crest elevation. The east dyke is approximately 200 m long. Cross-sections of the dykes are presented in Figure 5 and Figure 6 based on 2018/2019 survey data. Historical cross-sections of the dykes (Golder 1981) are presented in Appendix A.

Water is typically released from the TIA each year following treatment to meet water license discharge criteria and to reduce pond levels prior to the winter. Water is released from the main pond to the polishing pond through a culvert that passes through the internal polishing pond dyke. Water passing through the culvert is injected with a lime solution, allowed to mix and sediment while passing through a serpentine polishing pond, then discharged via siphons through the polishing pond spillway.

Water treatment occurs in the summer months and typically runs for four to six weeks.

The Engineer of Record (EOR) for the Pine Point TIA is Dr. Ben Wickland, P.Eng., an employee of Golder.

The Site Manager for the Pine Point TIA is Ms. Michelle Unger, an employee of Teck.

The Tailings Surveillance Officer is Mr. Clell Crook, who completes routine inspections and event-driven/special inspections. Mr. Crook is an employee of Maskwa, located in Hay River, NT.

A facility data sheet for the Pine Point TIA is provided in Appendix B.

1.4 Background Information and History

Mine construction at Pine Point started in 1962, and mining began in 1964. High grade ore was shipped by rail starting in 1965. The mine operated at 5,000 tonnes per day initially, with expansion to 10,000 tonnes per day in 1973. The mine ceased operations in 1988, and the mill buildings and tailings conveyor (trestle) were dismantled and removed.

The TIA is located on the Taiga Plains (Great Slave Lake plain). Based on field observations during the 2018 site investigation the general, natural stratigraphy in the area of the Pine Point TIA consists of, from top to bottom:

- peat/organic soils - average of 0.3 m thick
- lacustrine deposits – average of 6.2 m thick
- till – average 5.4 m thick
- bedrock

At the time of this report, site investigations are planned for 2020 to document site and dam conditions and to inform dam design analyses and closure planning.

The site is within the discontinuous, sporadic permafrost zone; however, no frozen soil was encountered during the 2018 investigation, with measured ground temperatures above freezing.

The TIA dykes are founded on glacial deposits and on east-west trending beaches indicative of sand ridges formed by Great Slave Lake during an earlier period. The west dyke is the highest dyke at approximately 9 m. The dykes consist of a silt or clay upstream zone, which acts as a low hydraulic conductivity element, and a downstream zone developed with sand and gravel from local borrow sources. The downstream slopes are 2 horizontal to 1 vertical.

The dykes were raised and extended in several stages during the life of the mine by downstream method of construction. The last three crest level increases to the dykes were:

- **1976**—The crest of the north dyke was raised by 2.1 m to elevation 203.5 m and extended to the northeast corner of the pond. Construction of a segment of the east dyke was also carried out.
- **1981**—The west and south dykes were raised and the south dyke was extended eastwards.
- **1987**—The dykes were raised by 1 m or less to elevation 205.7 m in July and August 1987. Fill was added to the south, west, and a portion of the north dyke at this time.

A complete construction record report was not available for the facility. Similarly, a design report was not available.

A stability review of the west dyke was carried out as part of the 1987 raise (Golder 1987) and indicated that the dyke achieved a factor of safety for static loading of 1.5 with the inclusion of a 1.5 m high toe berm. This toe berm was developed in 1987, when the dyke crest was last raised. Additional stability analyses have been provided in SRK (2016).

The only remaining mining installation at the site is the closed TIA.

The tailings were covered with an average 0.2 m of gravel to control dust.

2.0 CONSTRUCTION AND OPERATION

The Pine Point Mine has not been in operation since 1988.

For the 2018/2019 monitoring period, there were no operations, no new tailings or wastes were deposited into the facility, and no construction.

Activities at the TIA included:

- maintenance repair by placement of geotextile and riprap fill on upstream face of the north dyke between 10 and 15 October 2018, reported in Golder (2019a) and inspected in 2019
- maintenance repair by placement of granular fill in rills on the downstream face of the north dyke between 10 and 15 October 2018, reported in Golder (2019a) and inspected in 2019
- maintenance including clearing vegetation on downstream face of the south dyke was completed between 1 and 5 October 2019
- instrumentation details from site investigations of the TIA, completed between 6 September and 12 October 2018, are provided in Section 4.2
- site investigations were conducted in 2018/2019 as part of closure planning, including installation of monitoring wells and closure wetland trial construction, details are reported by others
- topographic and bathymetric surveys and satellite photography of the TIA
- annual water treatment campaign, described in Sections 3.4 and 3.5.

3.0 CLIMATE DATA AND WATER BALANCE

3.1 Review and Summary of Climate Data

The climate characteristics at the Pine Point TIA were reviewed with respect to precipitation, the main driver for the water balance at the site. Air temperatures were also reviewed to provide support for the assessment of precipitation. Long-term climate characteristics based on climate data from 1953 to 2018 were established for a hydrological year (September to August) at the Pine Point TIA and compared to recent climate observations from September 2018 to August 2019. The recent climate at Pine Point was estimated based on observations from Environment and Climate Change Canada Hay River stations (Station IDs: 2202401 and 2202402) (ECCC 2019). Missing data from Station 2202401 was infilled with data from Station 2202402. Data from these stations were adjusted to account for regional and under-catch factors as well as sublimation, following the methods in Teck (2017a). A review of data provided by Barr Engineering Ltd. (Barr) for the onsite climate station is provided in Section 3.1.1.

The estimated annual rainfall, snowfall, total precipitation, and air temperature at the Pine Point TIA is presented in Table 1.

Table 1: Average Climate Characteristics at the Pine Point Mine (adjusted from Hay River stations)

Climate	Average Air Temperature (ºC)	Annual Precipitation (mm)		
		Rainfall	Snowfall[(a)]	Total Precipitation
Long-term annual average (September 1953 to August 2018)	-2.9	233	231	464
Monitoring Period (September 2018 to August 2019)	-2.3	138	116	254

(a) Adjusted to account for snowpack losses of 31%.

Climate data indicate that total precipitation in the period 1 September 2018 to 31 August 2019 was approximately 45% of the long-term average. Monthly rainfall, snowfall and total precipitation (i.e., long-term and for the monitoring period) are presented in Illustration 1 and indicate:

- Recorded snowfall was lower than the long-term averages during the winter months, with the exception of January 2019.
- Recorded rainfall was lower than the long-term averages for all months except November 2018, and January, March, and April 2019, when rainfalls were slightly higher than the long-term averages for those months.

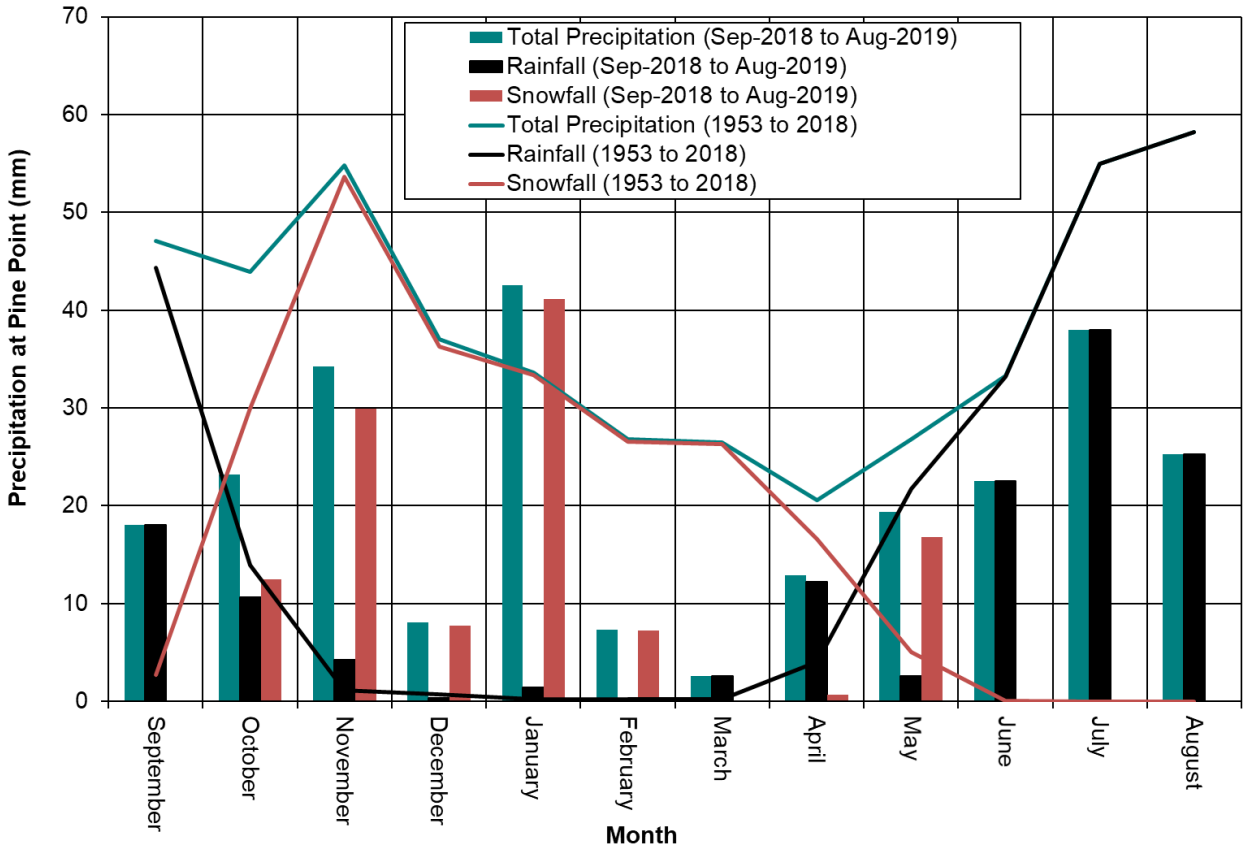


Illustration 1: Monthly Precipitation at the Pine Point Mine (adjusted from Hay River stations)

Air temperatures during the monitoring period were similar to long-term averages throughout the year, with the exception of December 2018 and March 2019 when the average temperatures were approximately 5 and 9°C higher than the long-term average, respectively. Recent and long-term average monthly air temperatures are presented in Illustration 2.

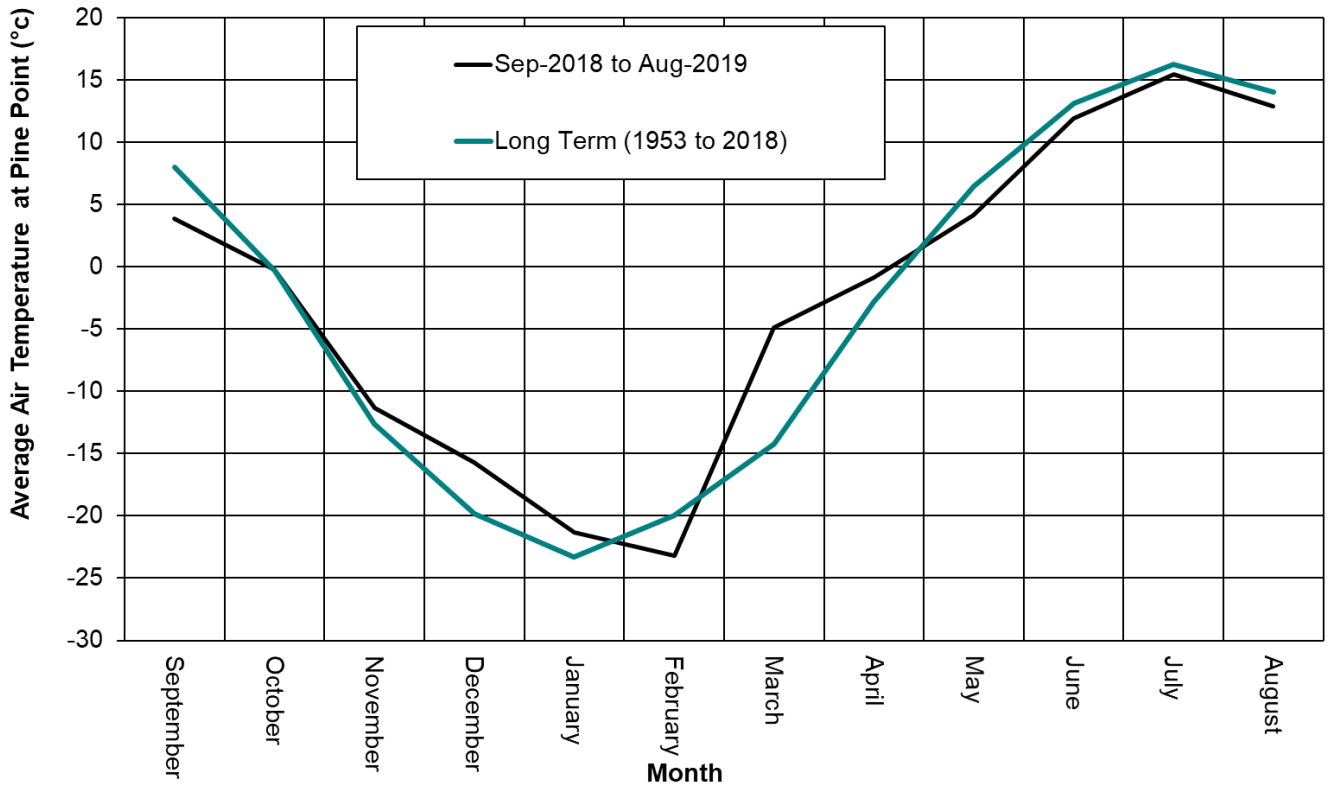


Illustration 2: Monthly Temperature at the Pine Point Mine (adjusted from Hay River stations)

3.1.1 On-site Climate Station Data

Barr Engineering Ltd (Barr) installed a site climate station in October 2018 with the capacity to record the following:

- air temperature
- relative humidity
- wind speed and direction
- solar radiation
- precipitation
- snow depths and snow water equivalent

Data was recorded for the period of 1 October 2018 to 31 August 2019. However, the climate station failed to record precipitation for the first three months of operation (October 2018 to December 2019).

The on-site climate data is not considered in this climate analysis due to the limited period for which data was available. Data from site are planned to be used in future analysis including verification of the adjustment factors used to correlate site conditions to the Hay River stations.

3.2 Water Balance

The TIA has a catchment area of approximately 9 km^2. Precipitation from rainfall and snow is assumed to be the only source of water reporting to the pond (no groundwater inflows are considered). Teck (2017b) indicates that the pond water level is lowered by approximately 0.7 m, on average, varying from 0.34 to 1.3 m, during water treatment. The recorded pond levels presented in Appendix E indicate a maximum variation of 2.3 m.

The water balance in Teck (2019b) was updated with climate data for the period of September 2018 to August 2019. The updated water balance is shown in Table 2. The water balance for the TIA uses total precipitation and subtracts measured discharge (from annual water treatment or other authorized discharge) to estimate total losses. Total losses include evapotranspiration and seepage losses.

Table 2: Tailings Impoundment Area Water Balance

Year[(a)]	Discharged Volume (m^3)[(b)]	Discharge (mm)[(c)]	Rainfall (mm)	Snowfall (mm)[(d)]	Total Precipitation (mm)[(e)]	Total Losses (mm)[(e)]
Average from 1993–2018	255,286	28	251	242	494	466
2018/2019	81,163	9	138	116	254	245

(a) From September to August the following year.

(b) From water treatment or other authorized discharges.

(c) Discharged volume represented as equivalent depth.

(d) Adjusted to account for snowpack losses of 31%.

(e) Normalized to the approximate catchment area of 9 km^2.

3.3 Freeboard and Storage

The maximum pond level observed at the polishing pond staff gauge in the monitoring period was 201.09 m, recorded on 18 May 2019 (Section 4.2.2). The pond level was 0.71 m below the maximum operating water level of 201.8 m and 0.51 m below the alert water level of 201.6 m (performance objectives for pond level are planned to be updated for climate data and the storage curve developed from bathymetric and topographic survey data collected in 2018 and 2019).

The corresponding minimum observed freeboard was

- 2.4 m to the north dyke crest
- 1.4 m to the main pond spillway

The main pond was at elevation of 200.37 m on 30 August 2019, at the end of the water treatment program and 200.39 m during the 2 October 2019 routine inspection.

Individual pond staff gauge readings are presented in Appendix E.

The storage curve for the TIA main pond is presented in Illustration 3, and Table 3, as developed from topographic and bathymetric survey from 2018/2019.

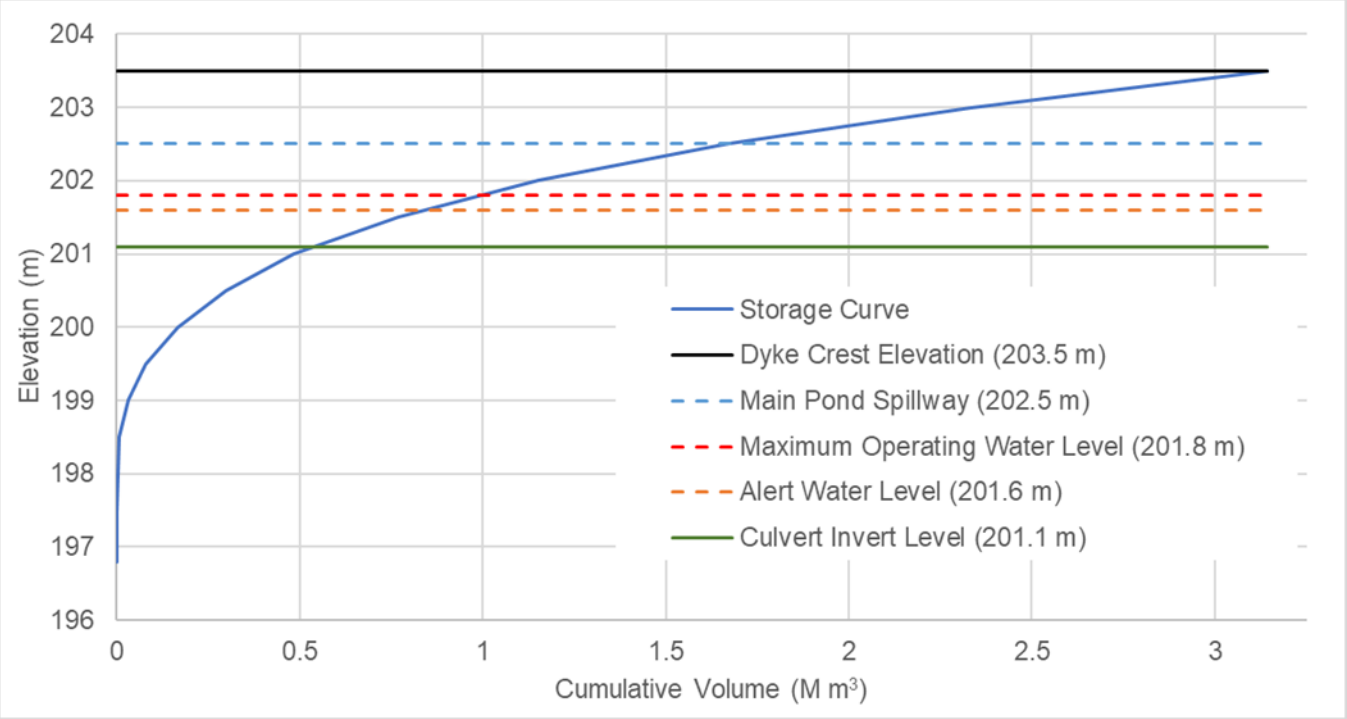


Illustration 3: TIA Main Pond Storage Capacity Curve (2018/2019 Survey) (pond performance objectives to be updated)

Table 3: TIA Main Pond Storage Capacity Curve (2018/2019 Survey)

Pond Elevation (m)	Storage Volume (m^3)
197	16
198	2,892
199	31,316
200	165,290
201	484,336
202	1,150,788
203	2,331,293
203.5	3,143,530

The alert and maximum operating pond water levels and freeboard for the TIA were updated in 2017 in the OMS manual and EPRP (Teck 2017a,b) based on historic levels. Quantifiable performance objectives for the TIA pond level from Teck (2017a) are presented in Table 4. These QPOs are planned to be updated for climate data and the storage curve developed from bathymetric and topographic survey data collected in 2018 and 2019.

Table 4: Quantitative Performance Objectives – Tailings Impoundment Area Pond Level (update planned)

Objective[a,b]	Pond Level (m)	Freeboard (m)	Actions if Observed
Alert Water Level	201.6	1.9	The site manager should be informed immediately, and water treatment should start as early as practicable. A site inspection should take place within one week of the initial alert level observation.
Maximum Operating Water Level	201.8	1.7	The site manager should be informed immediately and actions to reduce the water level within the pond should commence as a matter of urgency.

(a) Alert level established based on historical records and equivalent to the highest water level record for the site up to February 2017. Performance objectives for pond level are planned to be updated for climate data and the storage curve developed from bathymetric and topographic survey data collected in 2018 and 2019.

(b) Teck 2019b.

3.4 Water Discharge Volumes

Water was treated and discharged from the TIA during the annual water treatment program with a total volume of 81,163 m^3 of treated water released between 2 and 30 August 2019. The 2019 treated discharge volume was 31% of the historic average of approximately 262,250 m^3.

The pond water level was 200.69 m at the start of water treatment and 200.37 m at the completion of the water treatment program.

The water level in the TIA prior to freeze up in 2018 was higher than in previous years, however, as shown in Table 1, total precipitation (rainfall and snowfall) for the period 1 September 2018 to 31 August 2019 was significantly lower than the long-term average. This resulted in lower water levels in the TIA following freshet, which accounts for the lower volume of treated discharge compared to average.

3.5 Water Discharge Quality

Water quality results are submitted to the Mackenzie Valley Land and Water Board as part of the Annual Water Licence report in March the year following the operational period covered, i.e., in March 2020 for the 2019 operational period, in accordance with Water Licence No. MV2017L2-0007.

4.0 SITE OBSERVATIONS

Site inspections by the EOR and by Maskwa included:

- EOR
  - 12 August 2019 – DSI site visit
- Maskwa
  - 18 May 2019 – routine spring inspection
  - 2 October 2019 – routine fall inspection

The DSI site visit was carried out 12 August 2019 by:

- Golder
  - Dr. Ben Wickland, P.Eng. (EOR)
  - Mr. Martyn Willan, P. Eng.

The inspection was accompanied by:

- Teck
  - Ms. Morgan Lypka
- Maskwa
  - Mr. Clell Crook

The temperature during the visit was approximately 21°C and the weather was sunny, partly cloudy with a light wind. The August inspection report is presented in Appendix C and includes site photographs and observations.

4.1 Observations

General observations from the 2019 DSI site inspection include:

- The dykes were in good overall condition.
  - Rills up to 15 cm deep on the upstream and downstream slopes of the south dyke, similar to previous years
  - Rills up to 0.25 m deep on the upstream and downstream slopes of the west dyke, increased slightly from previous years

  - Rills up to 0.20 m deep on the downstream slope of the north dyke, increased slightly from previous years
  - Rills up to 0.10 m deep on the downstream slope of the east dyke
  - No rills were observed to extend into the dyke crest, crest width was intact
- Large rills on the downstream slope of the north dyke observed during 2018 had been repaired using coarse gravels and cobbles. Repairs were in good condition.
- An erosion scarp approximately 300 to 500 mm in height was observed over a 700 m section of the upstream face of the north dyke, below the riprap placed in 2018 as part of a maintenance repair, and above a bench in the slope. The 2018 repairs were otherwise in good condition.
  - the scarp did not extend back into the dam or expose the till
  - the scarp and riprap should be monitored as part of routine inspections
- Manual reading of VWP PP-VWP-18-09 (serial number #52443) at the dogleg indicated an instrument error.
- Vegetation was observed on the downstream slope of the south dyke, at the west end.
- Minor vegetation was observed on upstream and downstream slopes of the north dyke.
- Polishing pond dyke slopes were in good condition with no evidence of seepage.
- The pond water level, read at the staff gauge at the polishing pond culvert, was 200.558 m.

Main pond water levels during routine inspections were:

- 20 October 2018 – 200.48 m
- 18 May 2019 – 201.02 m
- 02 October 2019 – 200.39 m

4.2 Instrumentation Review

Geotechnical instrumentation was installed as part of site investigations completed in September/October 2018 (Figure 2). Prior to 2018 the only instruments were a staff gauge located at the polishing pond dyke which measured the main pond level, and flow meters on siphons from the polishing pond. Factual reporting of investigations including vibrating wire calibration sheets was in progress. Preliminary configurations of vibrating wire piezometer instrumentation are reported here. Data for groundwater monitoring wells installed to inform closure planning are reported elsewhere.

4.2.1 Vibrating Wire Piezometers

Fifteen VWP's were installed in 2018 as shown in Table 5.

Table 5: Summary of Vibrating Wire Piezometer Installations

Borehole ID	Teck Instrumentation ID	Sensor Depth (m bgs)	Tip Elevation[(a)] (m)	Monitored Unit
BH18-B-01	PP-VWP-2018-01A	10.8	199.39	Soil
	PP-VWP-2018-01B	9.5	200.69	Tailings
BH18-B-02	PP-VWP-2018-02A	9.5	203.04	Soil
	PP-VWP-2018-02B	8.0	204.54	Tailings
BH18-B-03	PP-VWP-2018-03A	12.2	192.86	Soil
	PP-VWP-2018-03B	7.8	197.26	Soil
	PP-VWP-2018-03C	6.3	198.76	Tailings
BH18-B-04	PP-VWP-2018-04A	5.4	199.43	Soil
	PP-VWP-2018-04B	4.4	200.43	Tailings
BH18-B-05	PP-VWP-2018-05	5.7	191.55	Soil
BH18-B-06	PP-VWP-2018-06	4.5	196.44	Soil
BH18-G-26	PP-VWP-2018-07	9.1	195.22	Dyke Fill
BH18-G-27	PP-VWP-2018-08	3.6	200.46	Dyke Fill
BH18-G-31	PP-VWP-2018-09	5.0	198.35	Dyke Fill
Main Pond Level	PP-VWP-2018-10	Main Pond	N/A	Main Pond Water Level

(a) Vertical datum: NAD83.

m bgs = meters below ground surface; N/A = not available.

VWPs are connected to a remote monitoring system installed between 6 and 7 November 2018 (with the exception of PP-VWP-18-05) by NavStar Geomatics Ltd. (NavStar). Components of the monitoring system include:

1) Vibrating wire piezometers are connected to a vibrating wire piezometer interface (VWL600) by cable.

2) Vibrating wire piezometer interfaces collect data from piezometers, on a pre-determined frequency, and transmit data wirelessly to the Gateway (FLP100).

3) The Gateway (FLP100) uses a satellite uplink to transmit data automatically to GeoExplorer Software (NavStar 2019).

An overview of the system is presented schematically in Illustration 4.

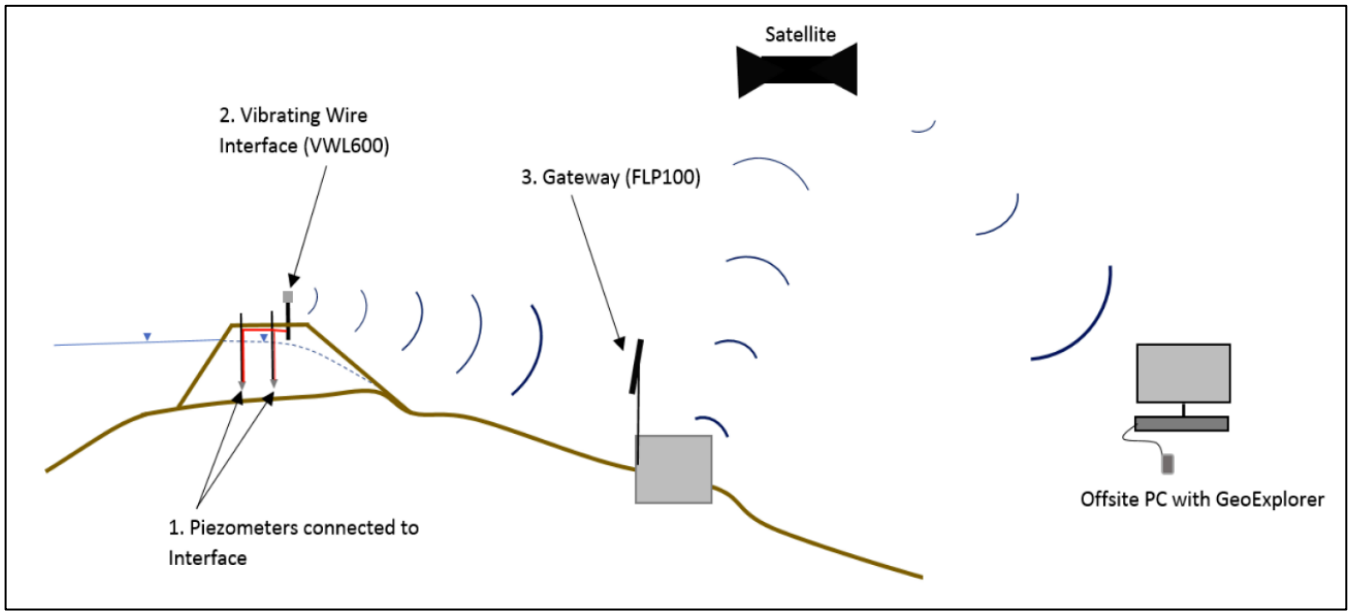


Illustration 4: Remote Monitoring System Schematic

Available VWP data is presented in Appendix D for record purposes only, and were generally not corrected for barometric pressure. Data from VWP were not used in the assessment of dam safety (Section 5.0). Interpretation and establishment of instrument baselines was in progress at the time of this report.

Data in Appendix D does not include atmospheric correction in the calculation of the recorded instruments, with the exception PP-VWP-2018-10, which monitors the pond water level. Atmospheric pressure corrections were applied to readings for PP-VWP-2018-10 up to 15 August 2019. No barometric pressure data were available after 15 August 2019.

Negative pressure readings indicate the that the tip is dry. Piezometric levels cannot be determined from VWP recording negative pressures.

PP-VWP-08-05 was not connected to the remote monitoring system in 2018, and no data was available. PP-VWP-18-03B, PP-VWP-18-08, and PP-VWP-18-09 were considered unreliable.

4.2.2 Main Pond Water Levels

Pond levels from May 2009 to August 2019 recorded at the staff gauge are presented in Illustration 5 and individual readings are presented in Appendix E. For clarity, only the maximum monthly recorded pond levels are presented in Illustration 5, along with the water level on 30 August 2019, at the end of water treatment, and on 2 October 2019, during the fall routine inspection.

Based on readings observed from the staff gauge, pond water levels in 2019 were generally consistent with those observed between 2009 and 2015 and lower than levels observed from 2016 to 2018. The pond elevation at the completion of water treatment was 200.37 m. The pond elevation on 2 October 2019, during the fall routine inspection, was 200.39 m.

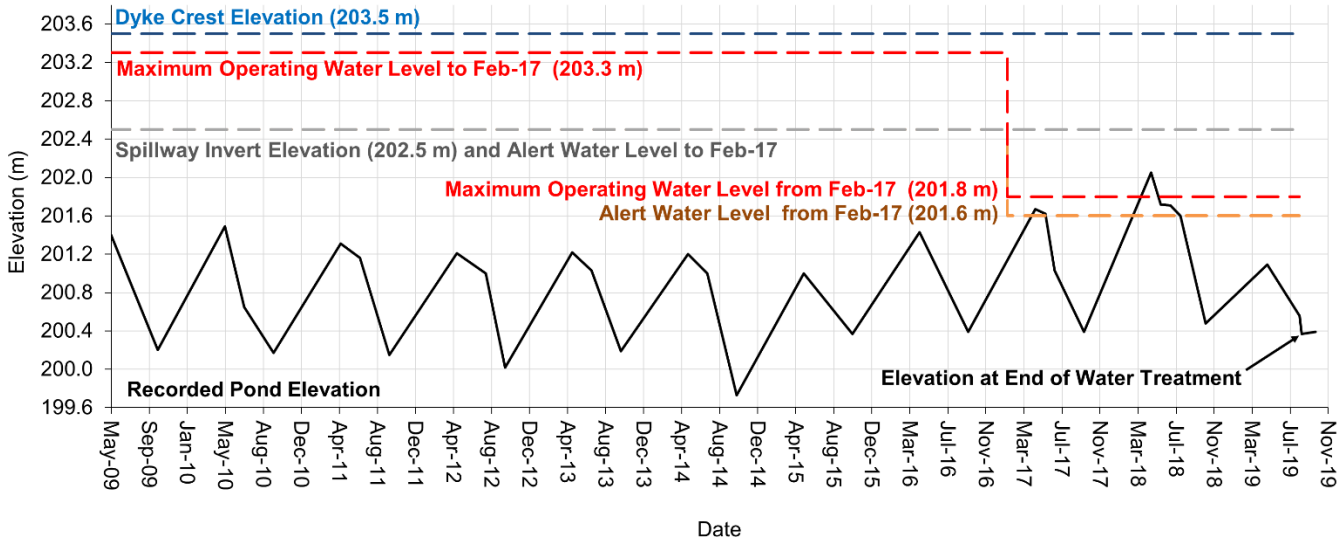
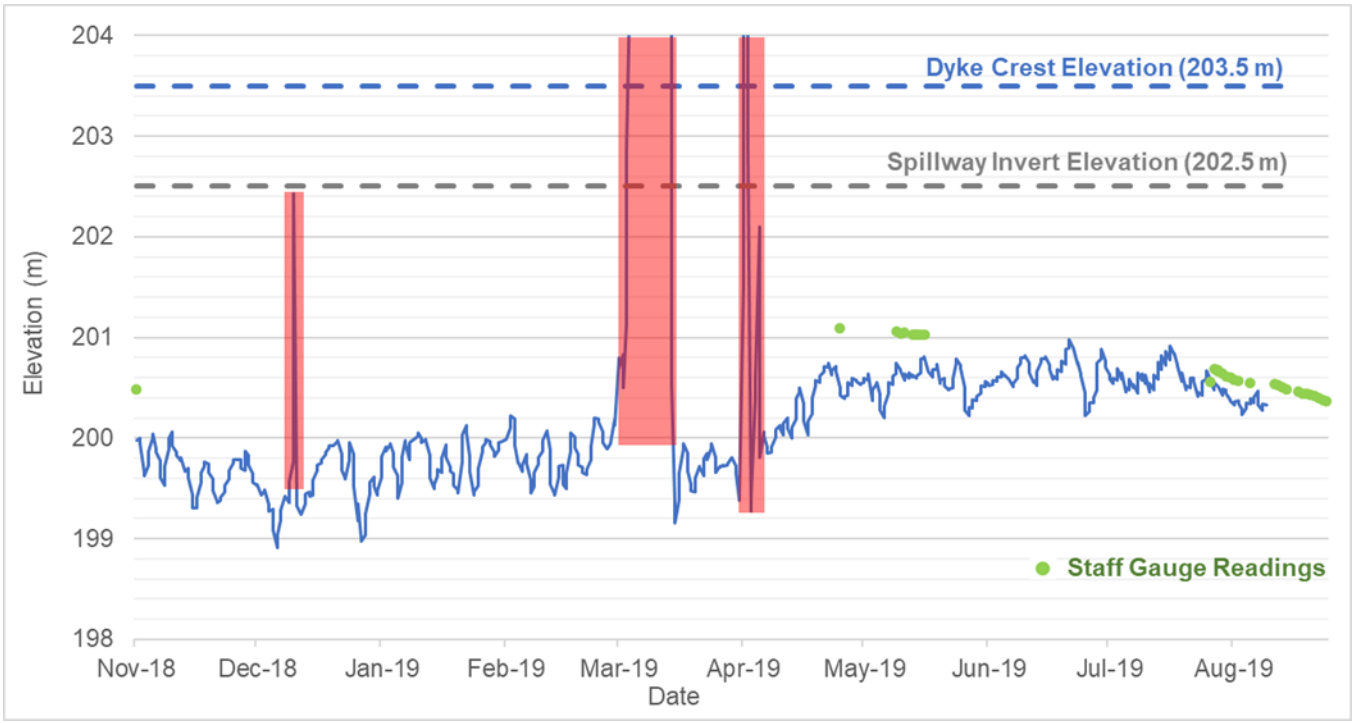


Illustration 5: Maximum Monthly Pond Level Measured by Staff Gauge – May 2009 to August 2019 (pond performance objectives to be updated – see Section 3.3)

Main pond levels were also recorded at VWP PP-VWP-18-10, which was installed in the pond, from November 2018 to August 2019, as presented in Illustration 6 along with elevations recorded at the staff gauge.

Spikes in pressure are considered to be errors, and are partly attributed to freeze/thaw of the instrument.

Point measurements of pond elevation at the staff gauge differed from readings at PP-VWP-18-10 by up to 0.6 m. Development of a calibration was in progress at the time of reporting.



Notes: Readings corrected for barometric pressure up to 15 August 2019; data not available after 15 August 2019.
Red shading indicates errors attributed to freeze/thaw.
Data in green from staff gauge readings.

Illustration 6: Main Pond Level Measured by Vibrating Wire Piezometer (PP-VWP-18-10)

4.3 Pond Water Quality

Water quality of the site is reported in the 2019 Annual Water License report submitted to Mackenzie Valley Land and Water Board.

4.4 Site Inspection Forms

A site inspection form for the 12 August 2019 site visit by Golder is provided in Appendix C.

5.0 DAM SAFETY ASSESSMENT

5.1 Dam Classification Review

Consequence classification is not related to the likelihood of a failure, but rather the potential impact if a hypothetical failure did occur.

CDA *Dam Safety Guidelines* (CDA 2013) present a dam classification system based on consequence of a hypothetical failure to define design requirements for water retaining structures and dams. The descriptions of the CDA (2013) dam classes are provided in Table 6.

Table 6: Dam Failure Consequence Classification

Dam Failure Consequences Classification	Population at Risk	Consequences of Failure		
		Loss of Life	Environment and Cultural Values	Infrastructure and Economics
Low	None[(a)]	There is no possibility of loss of life other than through unforeseeable misadventure	Minimal short-term loss or deterioration and no long-term loss or deterioration of: ■ fisheries habitat or wildlife habitat ■ rare or endangered species ■ unique landscapes or sites of cultural significance	Minimal economic losses mostly limited to the dam owner's property, with virtually no pre-existing potential for development within the dam inundation zone.
Significant	Temporary only[(b)]	Low potential for multiple loss of life	No significant loss or deterioration of: ■ important fisheries habitat or important wildlife habitat ■ rare or endangered species ■ unique landscapes or sites of cultural significance ■ restoration or compensation in kind is highly possible	Low economic losses affecting limited infrastructure and residential buildings, public transportation or services or commercial facilities, or some destruction of or damage to locations used occasionally and irregularly for temporary purposes.
High	Permanent[(c)]	10 or fewer	Significant loss or deterioration of: ■ important fisheries habitat or important wildlife habitat ■ rare or endangered species ■ unique landscapes or sites of cultural significance ■ restoration or compensation in kind is highly possible	High economic losses affecting infrastructure, public transportation or services or commercial facilities, or some destruction of or some severe damage to scattered residential buildings.
Very High	Permanent[(c)]	100 or fewer	Significant loss or deterioration of: ■ critical fisheries habitat or critical wildlife habitat ■ rare or endangered species ■ unique landscapes or sites of cultural significance ■ restoration or compensation in kind is possible but impractical	Very high economic losses affecting important infrastructure, public transportation or services or commercial facilities, or some destruction of or some severe damage to residential areas.
Extreme	Permanent[(c)]	More than 100	Major loss or deterioration of: ■ critical fisheries habitat or critical wildlife habitat ■ rare or endangered species ■ unique landscapes or sites of cultural significance ■ restoration or compensation in kind is impossible	Extremely high economic losses affecting critical infrastructure, public transportation or services or commercial facilities, or some destruction of or some severe damage to residential areas.

Source: CDA (2013).

(a) There is no identifiable population at risk.

(b) People are only occasionally and irregularly in the dam-breach inundation zone, for example stopping temporarily, passing through on transportation routes, or participating in recreational activities.

(c) The population at risk is ordinarily or regularly located in the dam-breach inundation zone, whether to live, work, or recreate.

Note 1. Definitions for populations 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 temporarily 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 residents); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimates of potential loss of life (to assist in decision-making if the appropriate analysis is carried out).

Note 2. Implications 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.

Dykes at the site are classified as 'Low' to 'Significant', based on CDA (2013). Only the north dyke retains water at any time; the south and west dykes only retain tailings, while the east dyke does not retain water or tailings but is required for freeboard. The criteria for classification are evaluated as follows:

- **Population at risk**—There is the possibility of a temporary population downstream of the west and south dykes due to exploration works by an external third party. The south and west dykes do not retain water and as such are unlikely to constitute a risk to exploration activities.
- **Loss of life**—There is a low potential for multiple loss of life associated with the presence of exploration drilling work in the area. The south and west dykes do not retain water and as such are unlikely to constitute a risk to exploration activities.
- **Environmental and cultural values**—A dyke failure would impact the local environment. There is a possibility of minimal short-term loss or deterioration of wildlife habitat as a result of a failure of the south and east dykes. Failure of the north or west dykes presents a higher risk, due to the impoundment of water; however, failure would not lead to a significant loss or deterioration of important wildlife habitat or areas of cultural significance; restoration or compensation for impacts is considered highly possible.
- **Infrastructure and economics**—None. There is no development or infrastructure downstream of the TIA.

Consequence classifications are summarized in Table 7.

Table 7: Dam Failure Consequence Classification for the North, East, West, and South Dykes

Dam	Dam Class	Population at Risk	Consequences of Failure		
			Loss of Life	Environment and Cultural Values	Infrastructure and Economics
north dyke	Significant	none	low to none	low to significant	none
east dyke	Low	none	low to none	low	none
west dyke	Significant	none	low to none	low to significant	none
south dyke	Low	none	low to none	low	none

Further to criteria in the *Dam Safety Guidelines* (CDA 2013), CDA has published a *Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams* (CDA 2014), which provides recommendations on criteria for different phases of mine life. The TIA is considered to be in the Closure – Active Care phase of mine life, based on regular monitoring of the dykes and regular treatment and release of water from the facility. The design criteria for the dam therefore follow CDA (2013). Should the TIA move to the Closure – Passive Care phase, where the system is considered stable, with no water treatment or regulation of the pond such that water may be passively released from the system, then the design criteria for the dam should be revisited based on recommendations of CDA (2014).

5.2 Review of Downstream and Upstream Conditions

There are no known changes in the upstream or downstream conditions for the Pine Point TIA in the monitoring period that could conceivably result in a change in dam consequence classification.

Exploration activities by an external party were in progress at the Pine Point Mine during 2018/2019. Teck staff reported these activities are occurring south and west of the facility. The exploration activities are considered unlikely to affect the dam consequence classification.

5.3 Design Basis Review

The design criteria related to floods and seismic and static stability based on CDA (2013) guidelines are summarized in Table 8.

Table 8: Minimum Design Criteria for the Pine Point TIA Dykes

Dykes	Dam Class	Annual Exceedance Probability – Floods	Annual Exceedance Probability – Earthquakes	Factors of Safety			
				Static		Pseudo-static	Post-earthquake
				Long-Term	Full or Partial Drawdown		
north and west	Significant	between 1/100 and 1/1,000	between 1/100 and 1/1,000	1.5	1.2–1.3	1.0	1.2–1.3
south and east	Low	1/100	1/100	1.5	1.2–1.3	1.0	1.2–1.3

Note: Design criteria based on CDA 2013.

In addition, CDA (2013) provides two calculations for freeboard; the most critical of the two scenarios sets the minimum freeboard to be adopted (as presented in Teck 2018):

- **Scenario 1**—no overtopping by 95% of the waves caused by the most critical wind with a return period of 1,000 years with the pond at its maximum normal operating elevation.
- **Scenario 2**—no overtopping by 95% of the waves caused by the most critical wind with a return period of 10 years (for Significant consequence structures), with the pond at the maximum level during the passage of the inflow design flood.

Details of how the Pine Point TIA achieves the required design criteria are discussed relative to the potential credible failure modes in the next sections.

5.3.1 Annual Exceedance Probability – Floods

An assessment of flood capacity to meet CDA (2013) guidelines is provided in the OMS manual (Teck 2019b). The net annual precipitation volumes for the 1-in-100-year and 1-in-1,000-year return events have been updated from Teck (2018) using available data to August 2019, and are presented in Table 9.

Table 9: Flood Capacity Analysis for Extreme Annual Total Precipitation Events

Return Period (years)	Total Annual Precipitation (mm)	Total Annual Losses[(c)] (mm)	Net Annual Precipitation[(d)] (mm)	Net Annual Precipitation Volume[(e)] (m^3)
100[(a)]	754	721	34	306,000
1,000[(b)]	864	825	39	351,000

(a) Design criteria for south and east dykes.

(b) Design criteria for north and west dykes.

(c) Total annual losses include evaporation, evapotranspiration, seepage, and infiltration. Total losses are calculated based on the relationship between total precipitation and total losses presented in Illustration 7.

(d) Net annual precipitation is total annual precipitation minus total annual losses.

(e) Net annual precipitation volume is net annual precipitation multiplied by a watershed area of 9 km^2.

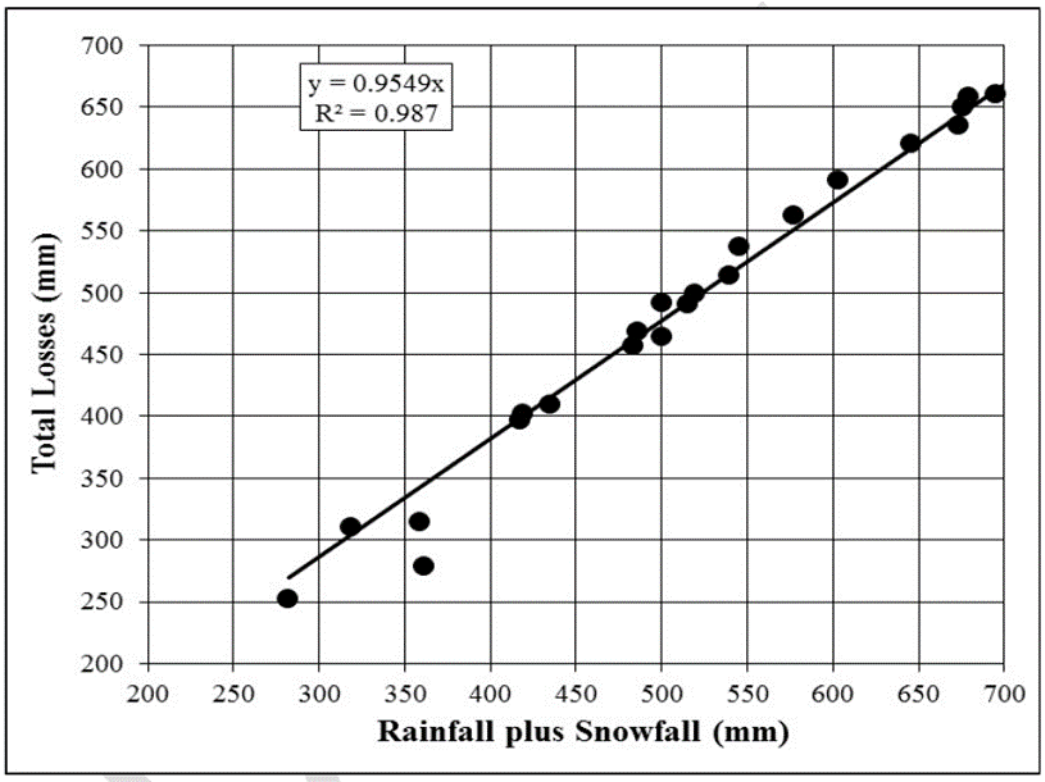


Illustration 7: Correlation between Total Losses and Total Precipitation (Teck 2019b)

5.3.2 Annual Exceedance Probability – Earthquakes

According to the 2015 National Building Code of Canada seismic hazard calculator (NRC 2015), peak ground acceleration for the Pine Point Mine site is:

- 0.002 g for the 1-in-100-year event (40% probability of exceedance in 50 years)
- 0.016 g for the 1-in-1,000-year event (5% probability of exceedance in 50 years)

The 2015 seismic information is the most recent available from Natural Resources Canada.

5.4 Hazards and Failure Modes Review

The dykes at the Pine Point TIA were evaluated against credible failure modes at the Pine Point TIA which could impact dyke safety:

- **Overtopping**—occurs when the pond level rises above the dyke crest level, resulting in flow over the dyke that may cause progressive erosion of the dyke and loss of the pond and tailings.
- **Piping**—occurs when there is development of internal erosion. This erosion can lead to loss of material, formation of a hole in the dyke, and rapid loss of water and tailings from the storage pond.
- **Instability**—occurs due to imbalance of forces resulting in movement of a part of the dyke with possible loss of integrity of the dyke.
- **Erosion**—occurs from either wave action or surface run-off, resulting in a loss of the dyke cross-section.

Additional failure modes are not considered credible for the Pine Point TIA and are therefore not discussed.

5.4.1 Overtopping

Design Basis

CDA (2013) provides two calculations for freeboard (vertical distance between the dyke crest and the pond water); the more critical of the two following scenarios sets the minimum freeboard (as presented in Section 5.3).

The minimum freeboard (1.7 m) was updated as part of Teck (2017a). Update of freeboard levels was planned with incorporation of 2018/2019 survey data.

Instrumentation – Water Level Gauge

Maximum monthly readings from May 2009 to August 2019 are presented in Illustration 5 and individual values are presented in Appendix E.

The gauge is installed to a datum at 201.032 m (i.e., reads 0 m), which is the elevation of the top of the flange at the culvert between the main and polishing ponds, and does not read freeboard directly. The pond level is calculated with reference to the datum.

As discussed in Section 4.2.2, Instrument PP-VWP-18-10 was installed in the main pond. Measured readings from PP-VWP-18-10 varied by up to 0.6 m from staff gauge measurements. The readings measured from PP-VWP-18-10 are therefore considered to be indicative of general trends in pond levels, i.e., rising or falling; however, are not considered to represent the actual pond water elevation. The VWP is also subject to freezing and thawing which produces erroneous readings.

Observed Performance

The main pond water levels measured by the staff gauge were below both the maximum operating water level (201.8 m) and below the alert water level (201.6 m) in the 2019 operating period (limits are planned to be reviewed – see Section 3.3).

Minimum freeboard requirements were therefore met.

The main pond was at elevation of 200.37 m on 30 August 2019, at the end of the water treatment program and 200.39 m at the time of the 2 October 2019 routine inspection.

5.4.2 Piping

Internal instability of a dyke can be caused by materials migrating out of the dyke caused by seepage of water passing through the dyke, leaving voids. This generally happens with dyke materials that do not have filter compatibility; that is, the fines fraction of one material can migrate into or through the voids of the adjacent material under a sufficient hydraulic gradient. Piping is induced by regressive erosion of particles towards an outside environment until a continuous pipe is formed. This can occur in some cases along conduits or pipes through a dyke structure, but can also occur through any soils subject to seepage pressures where soil layers fail to meet applicable filter (grain size compatibility) criteria.

Design Basis

Limited records from the construction of the dykes are available and no record of filter compatibility assessment was available between the tailings and the dyke construction fills. Evaluation of filter compatibility was planned at the time of this report.

Observed Performance

At the time of the 2019 DSI, the only significant volume of free water in the tailings area was ponded against a portion of the north dyke (similar to the conditions shown in Figure 2). The maximum hydraulic gradient through the dyke would be approximately 0.13 based on: a) an upstream water level of the maximum pond level recorded at the polishing pond staff gauge in 2019 (201.09 m) and b) an assumed water table at the level of the downstream dyke toe at the highest section of the north dyke adjacent to the pond.

There were no visible signs of seepage through the dykes during inspections, although vegetation growth continued to develop at the outside toe of portions of the north, west, and south dykes is considered indicative of soil moisture in these areas, similar to conditions in 2018. Ponded water at the downstream toe of the dykes may or may not be indicative of seepage through the dykes. Some of the wet areas beyond the perimeter of the disposal area were attributed to run-off of surface water, and were not considered indicative of seepage.

Some seepage with red staining was observed in the area downstream of the dogleg from the toe of the berm against the downstream slope. No sediment was observed in the seepage.

Some seepage is considered normal.

Erosion rills on the north and west dyke downstream faces were not considered to be related to a piping failure, as there was no pond in the TIA adjacent to the rills.

5.4.3 Instability

Design Basis

A stability review was completed as part of the 2014 dam safety review (DSR) (SRK 2016). This analysis used a horizontal peak ground acceleration of 0.019 g, based on the 2010 National Building Code seismic hazard calculator (NRC 2011) for the 1-in-1,000-year event. This value is higher than the peak ground acceleration (0.016g) calculated based on the updated 2015 National Building Code seismic hazard calculator (NRC 2011) for the 1-in-1,000-year event (Section 5.3.2).

Stability analyses were carried out for the north and west dykes by SRK (2016). The analyses results indicated the dykes met criteria for stability under static and pseudo-static (seismic) loading conditions.

All analyses were conducted based on sections and material properties determined as part of the 1981 geotechnical investigation stability report (Golder 1981), with some modification to the shear strength of the foundation materials.

Observed Performance

The inspections during the 2019 site visits did not identify any sign of slope instability such as cracks, settling, or bulging of the dykes. Erosion on the upstream face of the north dyke is not considered to impact the overall stability of the dyke.

The condition of the dykes, in relation to overall stability, has otherwise remained unchanged from previous site visits. The dyke slopes appeared to be stable and, as a result, the overall stability of the perimeter dykes has continued to be satisfactory.

Update of the stability analyses for the dykes are planned following completion of site investigations and site characterization in 2020.

5.4.4 Erosion

There are two types of surface erosion occurring at the Pine Point TIA. These are:

- **Wave cut erosion —** Present on the upstream face (tailings side) of the north dyke caused by high water levels, and associated wind-driven erosion or possibly ice action. Erosion has occurred previously, and was repaired in 2008 with a rebuilt slope developed at 2 horizontal to 1 vertical, and in 2018, where riprap was placed over the upstream face of a 700 m section of the north dyke.
  - The 2018 repairs were in good condition on 12 August 2019 with riprap in place. A 30 to 50 cm scarp was observed immediately below the riprap installed in 2018, above a bench in the slope. The scarp did not extend into the riprap. The scarp and riprap are required to be monitored as part of routine inspections (Teck 2019a).

  - A section of the north dyke located east of the 2018 riprap repair had an exposed scarp in the upstream face. The dam section at this location is wider, adjacent the dogleg, and vegetated. The erosion did appear to have progressed since 2018.

- **Surface erosion rills (gullies)**— Erosion rills (gullies) were present on the upstream and downstream sides of the north and west dykes, up to approximately 0.25 m deep. These rills did not extend into the dyke crest. The rills are typically progressive, and are required to be monitored, with maintenance completed following the OMS manual (Teck 2019b).

5.5 Operational Performance

The Pine Point TIA was closed site with no ongoing operations during the monitoring period.

Details of maintenance and activities during the monitoring period are provided in Section 2.0.

Details of water treatment and discharge during the monitoring period are provided in Section 2.0 and Section 3.0.

5.6 Operation, Maintenance, and Surveillance Manual Review

The OMS manual was updated in June 2019 (Teck 2019b) including update to: the Site Manager and Engineer of Record, the land use permit (MV2019X0006), the Contingency manual, the Water Treatment manual, minor updates to dam geometry based on survey data, list of instrumentation, and to reference Teck (2019a).

Additional updates were planned to incorporate details of instrumentation installed in 2018, topographic and bathymetric survey data, and quantitative performance objectives (QPOs), pending data reduction and calibration, and analysis. Updates to the OMS manual should also incorporate a change management procedure to review and update, if necessary, the emergency preparedness and response (EPRP).

5.7 Emergency Preparedness and Response Plan Review

The emergency preparedness and response plan (EPRP) for the Pine Point TIA was last updated in February 2017. The EPRP was tested by emergency response drill on 18 December 2018.

Update of the EPRP is recommended due to recent changes in staff and proposed updates to the OMS manual.

5.8 Dam Safety Review

The last DSR for the south, west, and north dykes of the Pine Point TIA was conducted by SRK Consulting in 2014 (SRK 2016). The next DSR for the facilities should be carried out by the end of 2024 to comply with CDA (2013) guidelines.

6.0 SUMMARY AND RECOMMENDATIONS

6.1 Summary of Construction and Activities

The following activities were completed at the Pine Point TIA in the monitoring period:

- topographic and bathymetric surveys and satellite photography
- routine inspections on 18 May and 2 October 2019
- DSI site inspection on 12 August
- water treatment started 2 August and finished 30 August 2019
- data collection from instruments installed in 2018
- maintenance repairs completed in fall 2018 (described in Golder 2019a), were inspected and in satisfactory condition

6.2 Summary of Climate and Water Balance

During the period of 1 September 2018 to 31 August 2019 the total annual precipitation was 254 mm, which was approximately 210 mm lower than the long-term average.

This relatively dry period resulted in lower inflows into the TIA, lower pond water levels and less treated discharge over the monitoring period compared to previous years.

6.3 Summary of Performance

Overall, the dykes appear to be in good condition and were achieving their intended purpose of retaining the tailings and ponded water in a satisfactory manner.

No significant changes to the dyke stability were observed. Overall stability of the dykes was therefore unchanged from the 2018 DSI. The repairs to the north dyke wave run-up erosion were observed to be in good condition.

6.4 Consequence Classification

The dam consequence classifications are unchanged in 2019, based on CDA (2013):

- north dyke: Significant
- west dyke: Significant
- east dyke: Low
- south dyke: Low

There have been no significant changes in the guidelines, regulations, potential downstream receptors or the nature of the structures since 2018.

6.5 Table of Deficiencies and Non-conformances

Table 10 summarizes deficiencies / non-conformances and recommended actions for the Pine Point TIA.

Table 10: Summary of Dam Safety Inspection Recommended Actions

Structure	ID Number	Deficiency or Non-conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Recommended Deadline/Status
south dyke	2018-1	Vegetation encroaching on downstream face of south dyke	OMS Manual Section 5.5.2	Remove vegetation at west end of south dyke as per OMS manual. The south dyke is outside the Teck lease boundary and permission from land owner will be required to complete vegetation removal.	3	Completed October 2019.
polishing pond	2018-2	No written procedure for sludge removal	none	Update water treatment manual to include written maintenance procedure for removal of sludge from polishing pond including dewatering operations.	4	Three (3) months prior to scheduled maintenance of polishing pond (previously stated as 2019 (Golder 2019b))
TIA	2018-3	Inaccurate storage curve for facility	OMS Manual Section 4.3.3	Complete bathymetry and tailings topographic survey to define the facility storage curve. Review flood storage capacity and water handling practices, determine capacity of spillway and update freeboard limits. Incorporate these changes in the OMS manual. Consider preparing for high water levels in spring 2019 and requirement to treat water at the freshet.	2	Survey completed Q1 2019 Review facility hydrology and update OMS manual by Q4 2020
north dyke	2019-1	Vibrating wire piezometers – faulty readings. PP-VWP-18-03B PP-VWP-18-05 PP-VWP-18-08 PP-VWP-18-09	none	Troubleshoot vibrating wire piezometer calibration / data acquisition and data reduction. Faulty or damaged instruments should be repaired or replaced.	4	By End Q3 2020
TIA Instrumentation	2019-2	Instrumentation installed in 2018 requires integration into OMS procedures	4.2 and 4.3 of OMS	Establish procedures for frequency of data acquisition and review. Establish baseline readings and levels for alert and emergency response, with corresponding update of OMS manual.	4	By End 2020
TIA	2019-3	EPRP is out of date and does not reflect recent staff changes	CDA 2013	Update EPRP for changes to site manager and EOR. Update OMS to include change management procedure to update EPRP.	4	By End Q1 2020

Priority[(a)]	Description
1	High probability or dam safety issue considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
2	If not corrected/implemented could likely result in dam safety issues leading to injury, environmental impact or significant regulatory enforcement; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice – Further improvements are necessary to meet industry best practices or reduce potential risks.

(a) Source: Teck 2019a.

ID = identification; OMS = operation, maintenance, and surveillance; DSR = dam safety review; CDA = Canadian Dam Association.

6.6 Ongoing/Planned Work

Ongoing and planned work at the Pine Point TIA includes:

- site investigation (2020) to support dam design analyses and closure planning
- update of the OMS manual and EPRP

7.0 CLOSURE

The reader is referred to the Study Limitations section, which follows the text and forms an integral part of this report.

Should you have any questions or require additional information please contact the undersigned.

Golder Associates Ltd.

REGISTERED PROFESSIONAL ENGINEER
8 Nov 2019
B.E. WICKLAND
LICENSEE
NWT/NU

Martyn Willan, M.Sc., P.Eng.
Geotechnical Engineer

Ben Wickland, Ph.D., P.Eng.
Associate, Senior Geotechnical Engineer

HLJ/MBW/BEW/cmm/et

https://golderassociates.sharepoint.com/sites/105211/project files/6 deliverables/issued/209-r-rev0-3000-pine point 2019 dsi/18114183-209-r-rev0-3000-pine point 2019 dam safety inspection 08nov_19.docx

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 8 Nov 2019
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

REFERENCES

CDA (Canadian Dam Association). 2013. Dam Safety Guidelines. Original 2007, revised 2013.

CDA. 2014. Technical Bulletin. Application of Dam Safety Guidelines to Mining Dams.

ECCC (Environment and Climate Change Canada). 2019. Daily Climate Observations in 2016, 2017, 2018, and 2019 for the Climate Station at Hay River. Meteorological Service of Canada. [Accessed September 2019]. http://climate.weather.gc.ca/historical_data/search_historic_data_stations_e.html?searchType=stnName&timeframe=1&txtStationName=HAY+RIVER+A&searchMethod=contains&optLimit=yearRange&StartYear=2017&EndYear=2017&Year=2017&Month=10&Day=24&selRowPerPage=25.

NavStar Inc. 2019. GeoExplorer Software version 3.1.0.0, 2019.

Golder (Golder Associates Ltd.). 1981. Geotechnical Investigation of Tailings Dyke Pine Point Mines, NT. November 1981.

Golder. 1987. Report to Cominco Pine Point Metals on Proposed 1987 Tailings Dyke Rise, Pine Point, NT. April 1987.

Golder. 2009. Report on Operation, Maintenance and Surveillance Manual for the Tailings Impoundment Area, Pine Point Mine, NT. Version 0. 16 March 2009.

Golder. 2019a. 2018 Dam Safety Inspection, Pine Point Tailings Impoundment Area. Golder Doc. No. 1788880-117-R-Rev2-5000. 22 February 2019.

Golder. 2019b. Update Dam Safety Recommendation, Pine Point Tailings Impoundment Area, NT. Golder Doc. No. 18114183-187-TM-RevA-2000. 8 July 2019.

MAC (Mining Association of Canada). 2017. A Guide to the Management of Tailings Facilities.

NRC (Natural Resources Canada). 2011. 2010 National Building Code of Canada Seismic Hazard Calculator. http://earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/calc-en.php.

NRC (Natural Resources Canada). 2016. 2015 National Building Code of Canada Seismic Hazard Calculator. [Accessed 25 October 2019]. http://earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/calc-en.php.

SRK (SRK Consulting Inc.). 2016. 2014 Dam Safety Review, Pine Point Tailings Impoundment, Pine Point Mine, Northwest Territories, 1CT008.048. March 2016.

Teck (Teck Metals Ltd.). 2017a. Operation, Maintenance and Surveillance Manual for the Pine Point Tailings Impoundment Area. PP-OMS-001.V001. 27 February 2017.

Teck. 2017b. Emergency Preparedness and Response Plan for the Pine Point Tailings Impoundment Area. PP-EPRP-001.V001. 27 February 2017.

Teck. 2018. Operation, Maintenance and Surveillance Manual for the Pine Point Tailings Impoundment Area. PP-OMS-001.V003. 1 June 2018.

Teck Resources Limited. 2019a. Guideline for Tailings and Water Retaining Structures, 31 January 2019.

Teck. 2019b. Operation, Maintenance and Surveillance Manual for Pine Point Tailings Impoundment Area. PP-OMS-001.V004. 28 June 2019.

STUDY LIMITATIONS

Golder Associates Ltd. (Golder) has prepared this document in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this document. No warranty, express or implied, is made.

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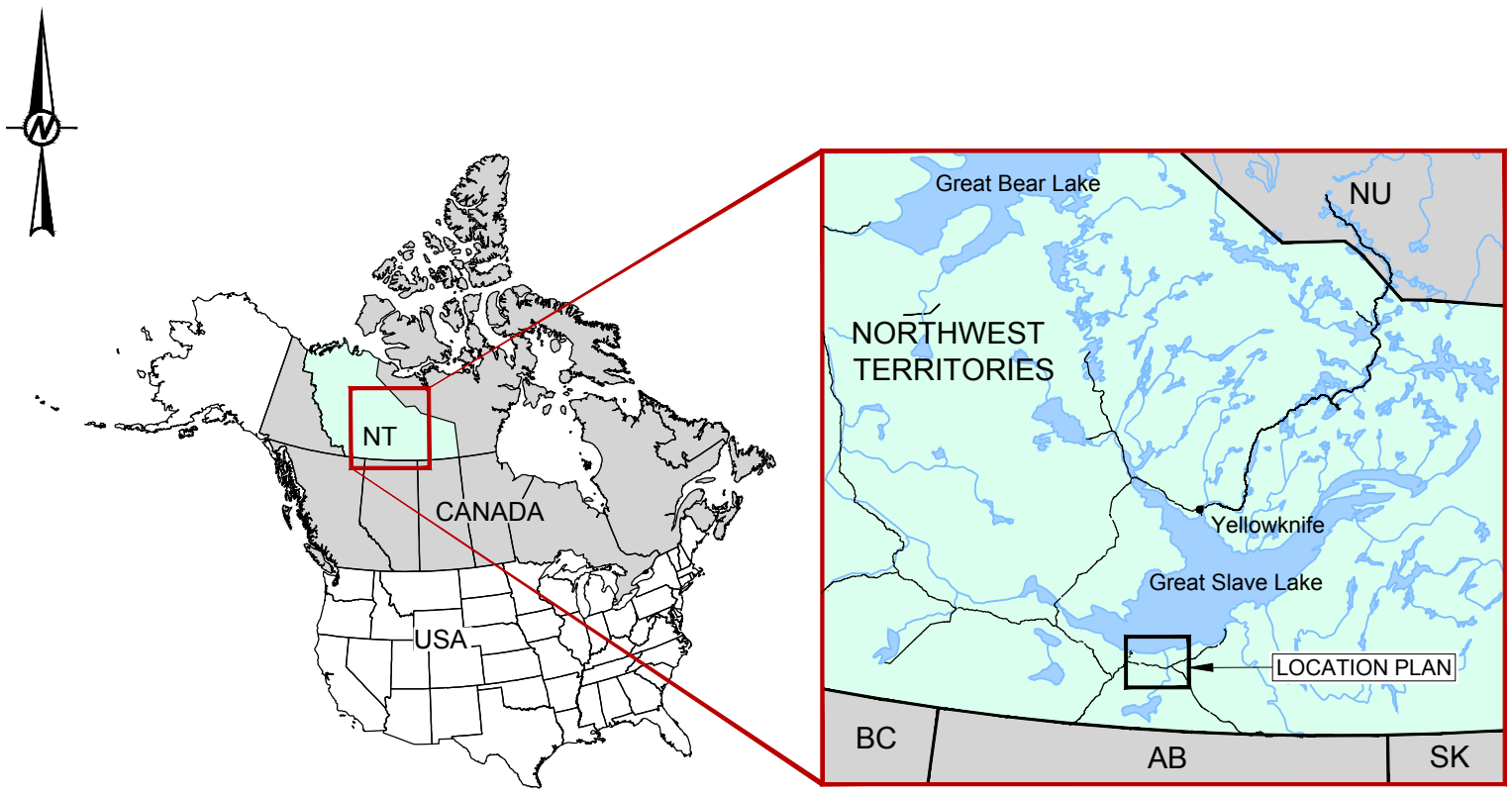
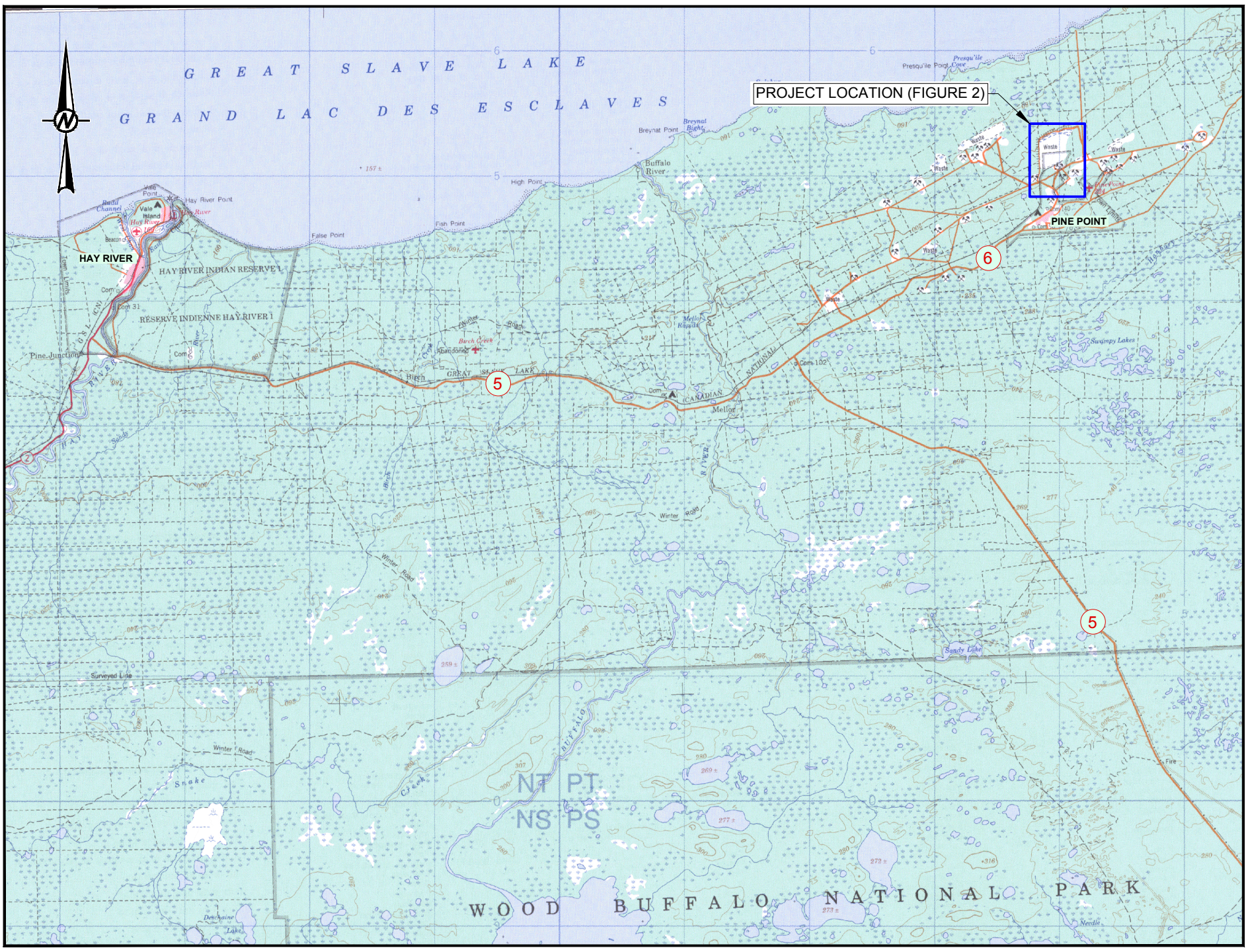


KEY PLAN
NOT TO SCALE



LOCATION PLAN
SCALE 1:400,000

LEGEND

	PROJECT LOCATION
5	HIGHWAY 5
6	HIGHWAY 6

NOTE

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE REPORT: 2019 DAM SAFETY INSPECTION PINE POINT TAILINGS IMPOUNDMENT AREA, PINE POINT, NT, Reference No. 18114183-209-R-Rev0-3000.

REFERENCE

TOPOGRAPHIC MAP 85B © 1988 HER MAJESTY THE QUEEN IN RIGHT OF CANADA. DEPARTMENT OF NATURAL RESOURCES. ALL RIGHTS RESERVED. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD27, COORDINATE SYSTEM: UTM ZONE 11.

0 10 20
1:400,000 KILOMETRES

CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

YYYY-MM-DD	2019-11-08
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PREPARED	J. FARAH
REVIEWED	M. WILLAN
APPROVED	B. WICKLAND

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
SITE LOCATION PLAN

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	1

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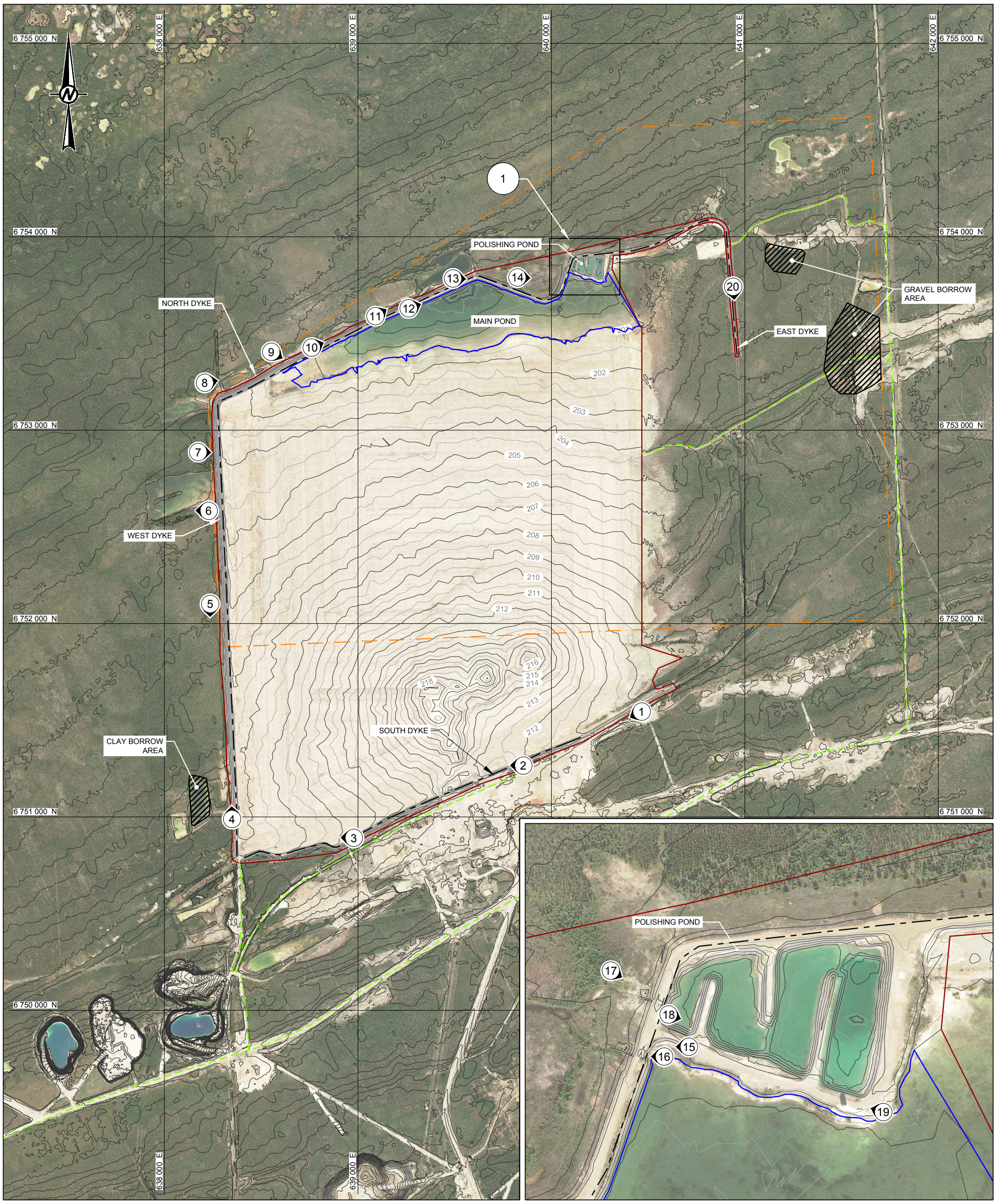

SITE PLAN
SCALE 1:20,000

SCALE 1:5,000 (1) POLISHING POND DETAIL

LEGEND

- (3) PHOTO LOCATION AND DIRECTION (APPENDIX C)
- APPROX. DYKE CRESTS
- APPROX. SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD

NOTES

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. GRID IS DISPLAYED IN UTM NAD83, ZONE 11.
3. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE REPORT: 2019 DAM SAFETY INSPECTION PINE POINT TAILINGS IMPOUNDMENT AREA, PINE POINT, NT, Reference No. 18114183-209-R-Rev0-3000.

REFERENCES

1. SURFACE LEASE BOUNDARY OBTAINED FROM BARR ENGINEERING LTD., FILENAME: PinePoint_SiteFeatures.zip, RECEIVED: 2018-06-26.
2. IMPOUNDMENT AREA TOPOGRAPHIC AND BATHYMETRIC SURVEY BY MASKWA ENGINEERING LTD., FILENAME: 18-034 Pine Point Tailings Topo Survey.dwg. SURVEY DATE: 2019-06-26, ORIGINAL SCALE 1:15,000. RECEIVED: 2019-08-12.
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

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0 500 1,000
1:20,000 METRES

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GOLDER

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PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
SITE LAYOUT AND INSPECTION PHOTOGRAPH LOCATIONS

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
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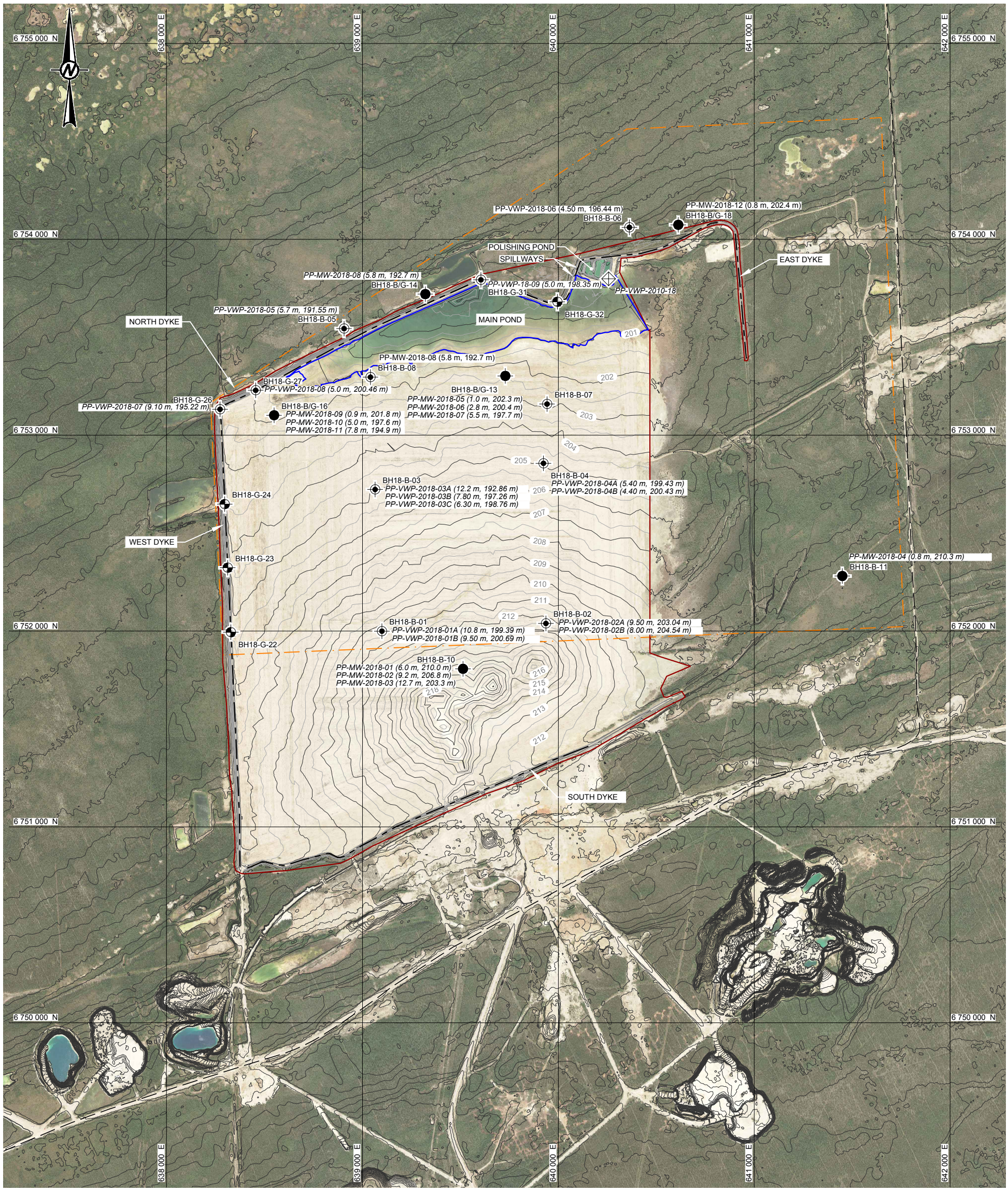

INVESTIGATION NAMING CONVENTION

BH18-B/G-01
- BH - BOREHOLE
- TYPE
- YEAR
- CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER

PIEZOMETER INSTALL
PP-VWP-2018-02A (8.00 m, 10 m)
- PP - PINE POINT
- VW - VIBRATING WIRE PIEZOMETER
- P - PIEZOMETER
- 2018 - YEAR
- 02 - NUMBER
- A - (DEPTH OF TIP m, ELEVATION OF TIP m)

MONITORING WELL INSTALL
PP-MW-2018-02A (9.22 m, 16 m)
- PP - PINE POINT
- MW - MONITORING WELL
- 2018 - YEAR
- 02 - NUMBER
- A - (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD

NOTES

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APPROVED	B. WICKLAND

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
TAILINGS IMPOUNDMENT AREA INSTRUMENTATION LOCATIONS

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
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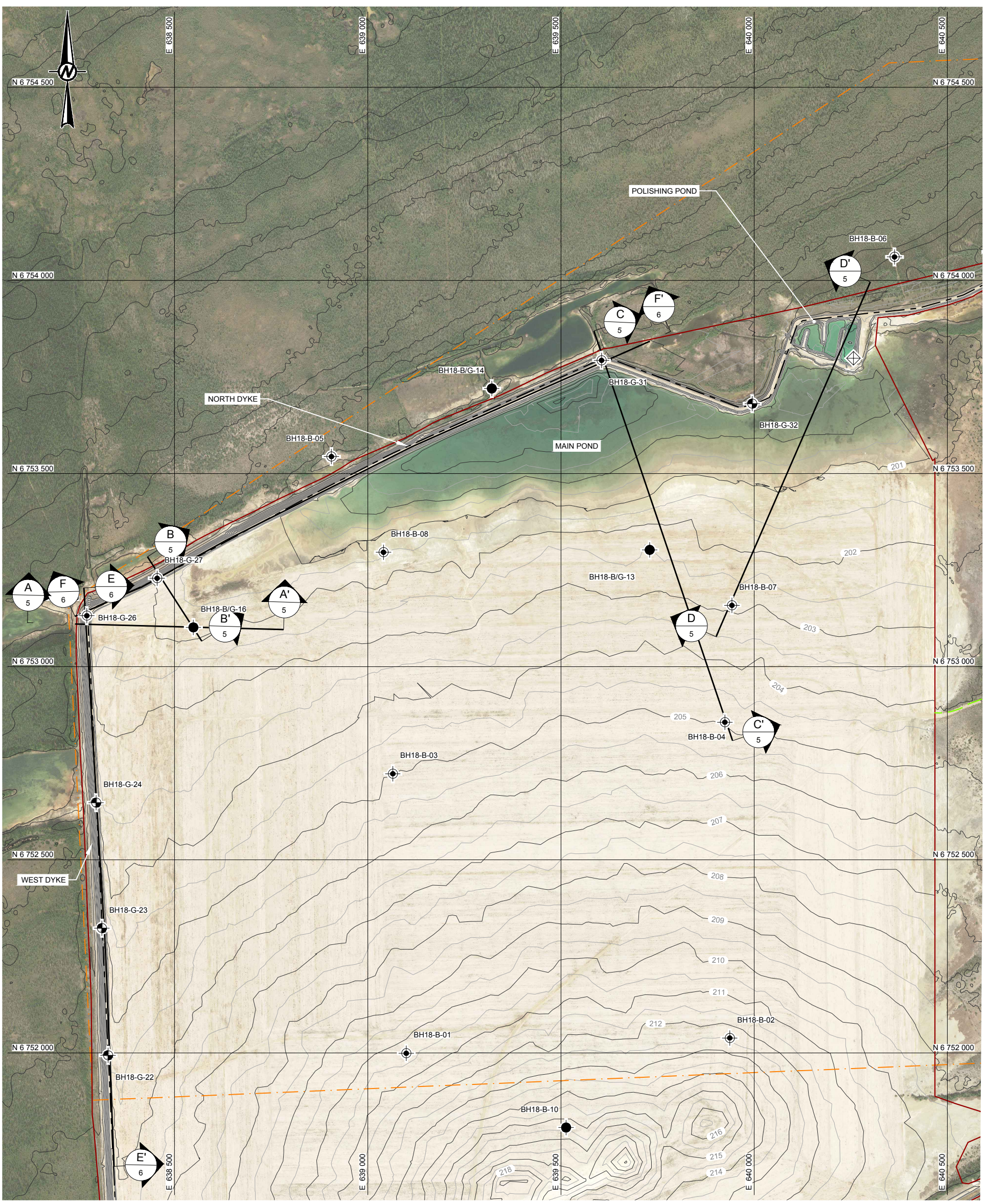

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD

NOTES

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. GRID IS DISPLAYED IN UTM NAD83, ZONE 11.
3. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE REPORT: 2019 DAM SAFETY INSPECTION PINE POINT TAILINGS IMPOUNDMENT AREA, PINE POINT, NT, Reference No. 18114183-209-R-Rev0-3000.

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1:10,000 METRES

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DESIGNED	H. JUPP
PREPARED	J. FARAH
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APPROVED	B. WICKLAND

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
CROSS SECTION LOCATIONS

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
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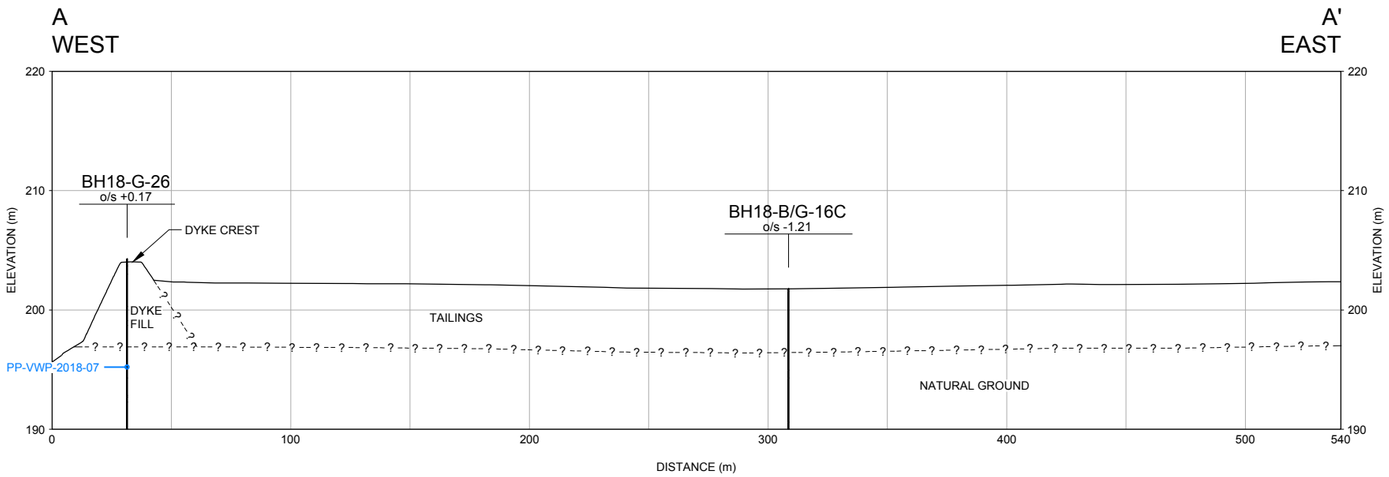

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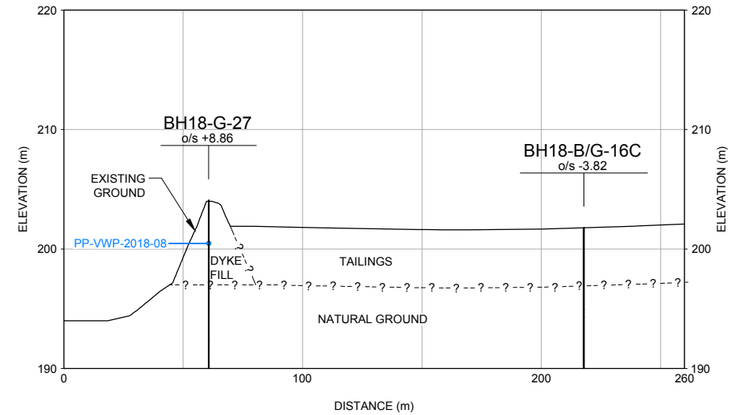

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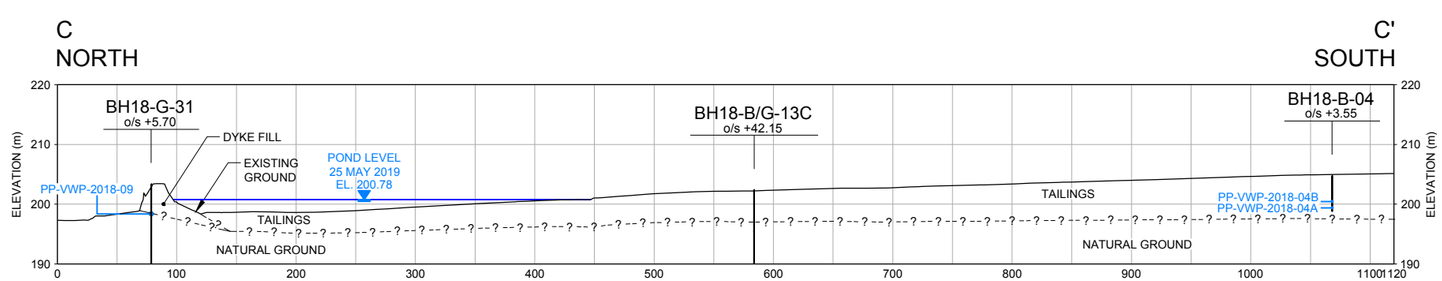

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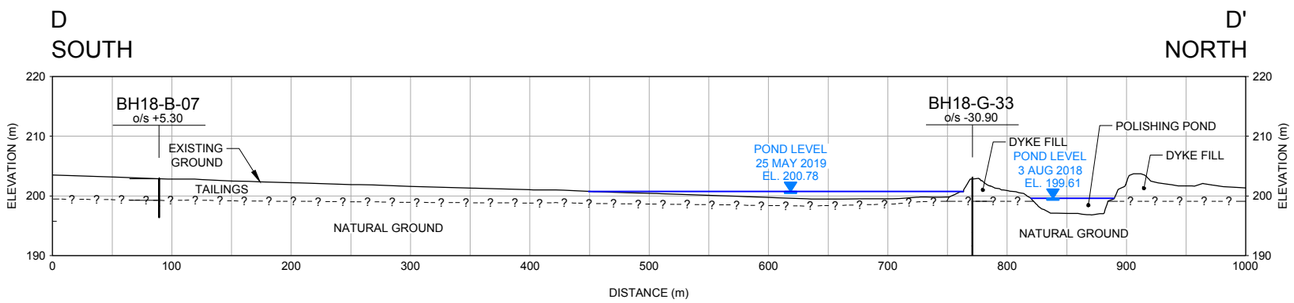

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1:500 METRES

0 25 50
1:1,000 METRES

0 50 100
1:2,500 METRES

0 100 200
1:5,000 METRES

LEGEND

EXISTING GROUND SURFACE (SEE REFERENCE 1)

INFERRED STRATIGRAPHY

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE STATED.
2. INDICATIVE STRATIGRAPHY IS BASED ON FIELD OBSERVATIONS FROM 2018 SITE INVESTIGATIONS.
3. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE REPORT: 2019 DAM SAFETY INSPECTION PINE POINT TAILINGS IMPOUNDMENT AREA, PINE POINT, NT, Reference No. 18114183-209-R-Rev0-3000.

REFERENCE

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CLIENT
TECK METALS LTD.

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
CROSS SECTIONS A TO D

CONSULTANT
GOLDER

YYYY-MM-DD	2019-11-08
DESIGNED	H. JUPP
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REVIEWED	M. WILLAN
APPROVED	B. WICKLAND

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	5

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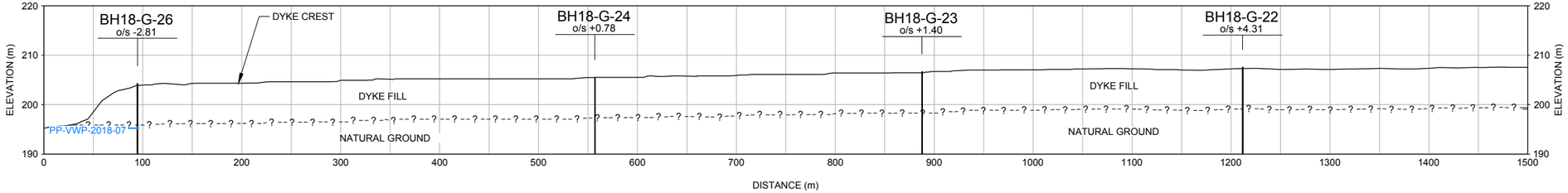
E

NORTH

E'

SOUTH



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VERTICAL SCALE 1:1000

E

CROSS SECTION E

4

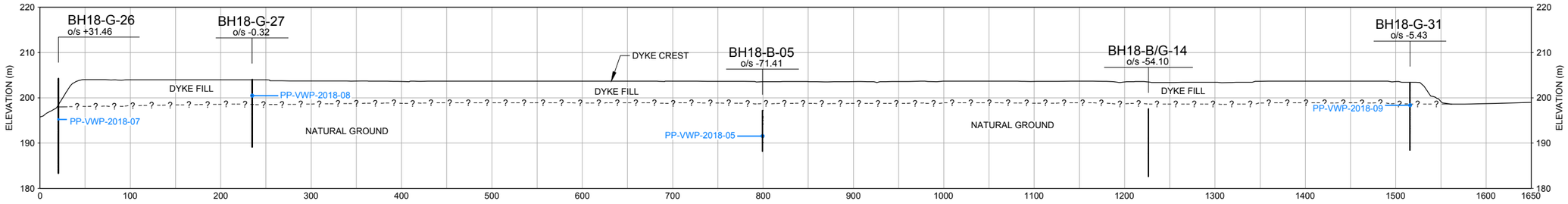
5X VERTICAL EXAGGERATION

F

WEST

F'

EAST



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F

CROSS SECTION F

4

5X VERTICAL EXAGGERATION

0 25 50
1:1,000 METRES

0 100 200
1:5,000 METRES

LEGEND

– – – – – – – EXISTING GROUND SURFACE (SEE REF 1)

– – ? – – ? – – ? – – ? – – INFERRED STRATIGRAPHY

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE STATED.
2. INDICATIVE STRATIGRAPHY IS BASED ON FIELD INVESTIGATION COMPLETED IN 2018 AND THICKNESSES ARE MEASURED AS AVERAGES.
3. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE REPORT: 2019 DAM SAFETY INSPECTION PINE POINT TAILINGS IMPOUNDMENT AREA, PINE POINT, NT, Reference No. 18114183-209-R-Rev0-3000.

REFERENCE

1. IMPOUNDMENT AREA TOPOGRAPHIC AND BATHYMETRIC SURVEY BY MASKWA ENGINEERING LTD., FILENAME: 18-034 Pine Point Tailings Topo Survey.dwg. SURVEY DATE 2019-06-26, ORIGINAL SCALE 1:15,000. RECEIVED 2019-08-12.

CLIENT
TECK METALS LTD.

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
CROSS SECTIONS E AND F

CONSULTANT

GOLDER

YYYY-MM-DD	2019-11-08
DESIGNED	H. JUPP
PREPARED	J. FARAH
REVIEWED	M. WILLAN
APPROVED	B. WICKLAND

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	6

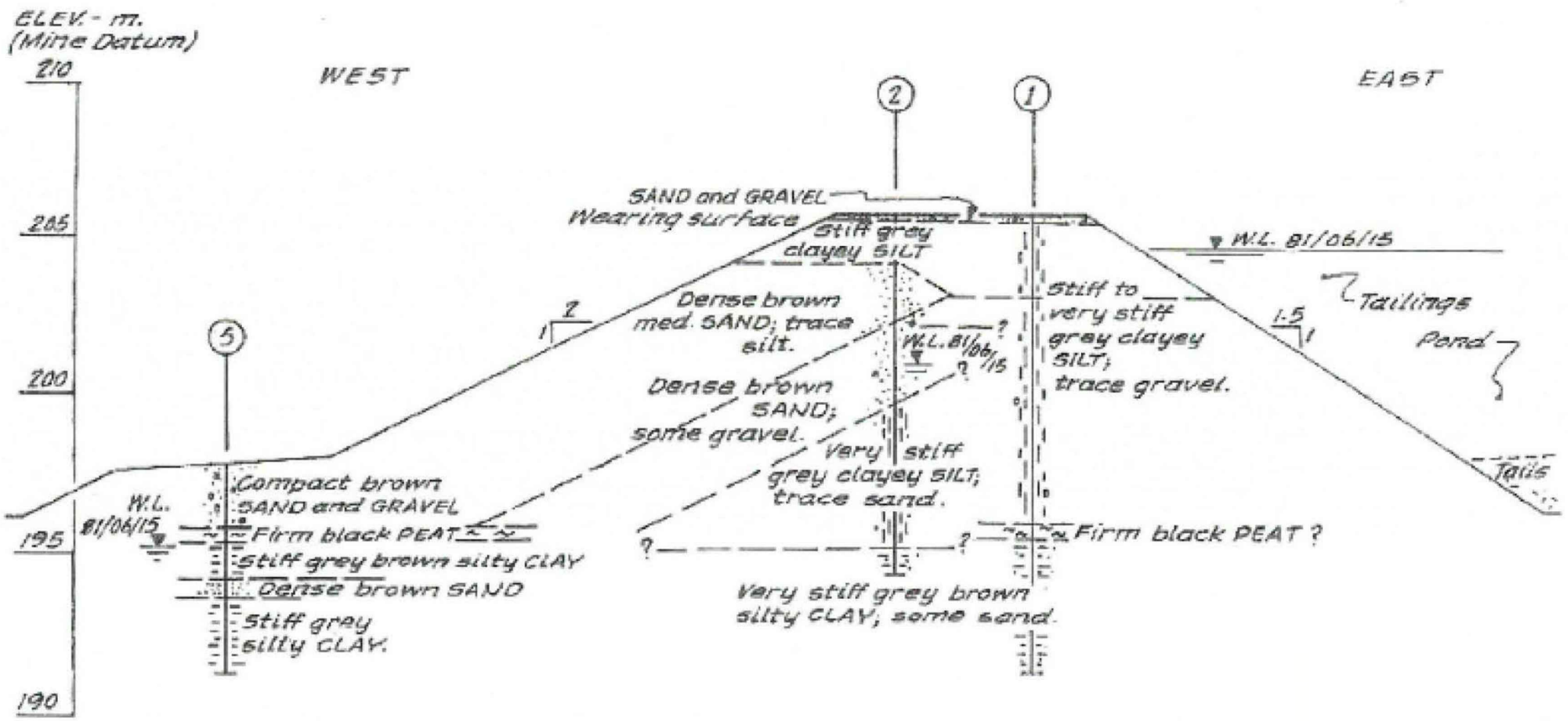
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25 mm

APPENDIX A

Historical Cross-sections

Last Edited By: jfarah Date: 2019-11-06 Time:11:19:38 AM | Printed By: JFarah Date: 2019-11-08 Time:10:13:45 AM
Path: \\golder.gds\gal\Victoria\CAD-GIS\Client\TECK_Metals\Pine_Point\99_PROJECTS\18114183\3000\3005\DOC 209\02_PRODUCTION\ | File Name: 18114183-3000-3005-08.dwg



LEGEND

(2) LOCATION OF BOREHOLE

NOTES

1. TYPICAL SECTION PARTIALLY INFERRED FROM CONSTRUCTION RECORDS.
2. BLACK PEAT REMOVED FROM UNDER TOE BERM OF WAEST DYKE SOUTH OF STA 35+00.
3. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE REPORT: 2019 DAM SAFETY INSPECTION PINE POINT TAILINGS IMPOUNDMENT AREA, PINE POINT, NT, Reference No. 18114183-209-R-Rev0-3000.

REFERENCE

1. TYPICAL SECTION OBTAINED FROM TECK. ORIGINAL SCALE 1:200.

0 5 10
1:200 (APPROX.) METRES

CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

YYYY-MM-DD	2019-11-08
DESIGNED	H. JUPP
PREPARED	J. FARAH
REVIEWED	M. WILLAN
APPROVED	B. WICKLAND

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
TYPICAL SECTION WEST DYKE

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	A-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
0 25 mm

Last Edited By: jfarah Date: 2019-11-06 Time:11:20:26 AM | Printed By: JFarah Date: 2019-11-08 Time:10:14:17 AM
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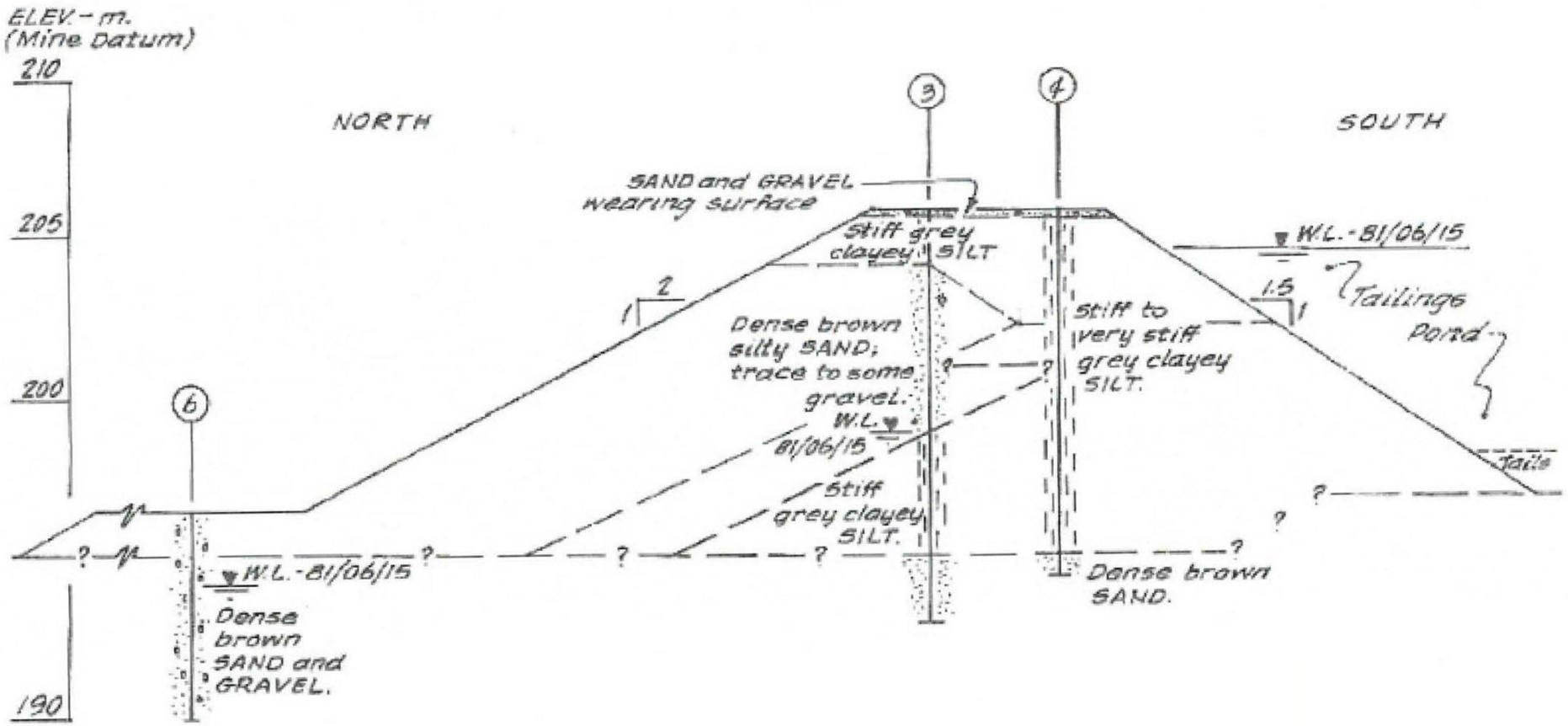

0 5 10
1:200 (APPROX.) METRES

LEGEND

(6) LOCATION OF BOREHOLE

NOTE

1. TYPICAL SECTION PARTIALLY INFERRED FROM CONSTRUCTION RECORDS.
2. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE REPORT: 2019 DAM SAFETY INSPECTION PINE POINT TAILINGS IMPOUNDMENT AREA, PINE POINT, NT, Reference No. 18114183-209-R-Rev0-3000.

REFERENCE

1. TYPICAL SECTION OBTAINED FROM TECK. ORIGINAL SCALE 1:200.

CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

YYYY-MM-DD	2019-11-08
DESIGNED	H. JUPP
PREPARED	J. FARAH
REVIEWED	M. WILLAN
APPROVED	B. WICKLAND

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
TYPICAL SECTION
NORTH DYKE

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	A-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
0 25 mm

APPENDIX B

Facility Data Sheet

Facility Data Sheet
Physical Description

Pine Point Tailings Impoundment Area

Tailings Impoundment Area (including dykes)	~7,000,000 m^2
Volume of Tailings	~50,000,000 to 60,000,000 m^3
Reservoir Capacity	930,000 m^3 (to maximum operating water level of 201.8 m)
Inflow Design Flood (IDF)	between 1/100 and 1/1,000 year return period (CDA 2013)
Design Earthquake	between 1/100 and 1/1,000 year return period (CDA 2013)
Spillway Capacity	Unknown
Catchment Area	9 km^2 (6 km^2 internal and 3 km^2 external)

South Dyke

Dam Type	Downstream raised Earthfill Dam
Maximum Dam Height	6 m
Dam Crest Width	5 m
Consequence Classification	Low (CDA 2013)
Access to Dam	From southeast and southwest corners of facility

West Dyke

Dam Type	Downstream raised Earthfill Dam
Maximum Dam Height	9 m
Dam Crest Width	6 m
Consequence Classification	Significant (CDA 2013)
Access to Dam	From southwest corner of facility

North Dyke

Dam Type	Downstream raised Earthfill Dam
Maximum Dam Height	9 m
Dam Crest Width	8 m
Consequence Classification	Significant (CDA 2013)
Access to Dam	From northeast corner of facility

East Dyke

Dam Type	Downstream raised Earthfill Dam
Maximum Dam Height	2 m
Dam Crest Width	6.5 m
Consequence Classification	Low (CDA 2013)
Access to Dam	From northeast corner of facility

APPENDIX C

Dam Safety Inspection Visit Report

TECHNICAL MEMORANDUM

DATE 16 August 2019 **Reference No.** 18114183-200-TM-Rev0-3000

TO Michelle Unger, Site Manager
Teck Metals Ltd.

CC Kathleen Willman and Morgan Lypka

FROM Ben Wickland and Martyn Willan **EMAIL Ben_Wickland@golder.com; Martyn_Willan@golder.com**

2019 DAM SAFETY INSPECTION TRIP REPORT, PINE POINT TAILINGS IMPOUNDMENT AREA, NT

1.0 SITE INSPECTION DETAILS

Date: 12 August 2019

Time: 11:15 am to 2:30 pm

Weather: Sunny, partly cloudy, light wind, 21° Celsius

Attendees:

- Golder Associates Ltd. (Golder): Ben Wickland, P.Eng., Engineer of Record, and Martyn Willan, P.Eng., Geotechnical Engineer
- Maskwa Engineering Ltd. (Maskwa): Clell Crook, Tailings Surveillance Officer
- Teck Metals Ltd. (Teck): Morgan Lypka, P.Eng. (BC) Tailings and Water Retaining Structures Engineer

1.1 South Dyke

East End

- No water in impoundment area adjacent to the dyke.
- Vegetation was developing on upstream slope, similar to previous years.
- Dyke was in good condition with minor rilling on upstream and downstream slopes up to ~15 cm deep.
  - rilling similar to previous years
  - rills did not extend into dyke crest
- Crest was in good condition with minor rutting from light vehicle traffic.
- Clear standing water in ditch on downstream side of dyke.
  - smaller area than observed in previous years

Golder Associates Ltd.
Suite 200 - 2920 Virtual Way Vancouver, BC, V5M 0C4 Canada T: +1 604 296 4200 +1 604 298 5253

Central

- Dyke was in good condition with minor rilling on upstream and downstream slopes.
  - rilling similar to previous years
  - rills did not extend into dyke crest
- Crest was in good condition with minor rutting from light vehicle traffic.
- No standing was water observed on crest, upstream, or downstream of the dyke.

West End

- No water in impoundment area adjacent to the dyke.
- Slopes were in good condition.
- Dyke crest narrow (~ 3 m) compared with dyke crests in other areas of the facility.
- Crest was in good condition with minor rutting from light vehicle traffic.
- Vegetation, including small trees (up to ~20 cm diameter) on downstream slope and encroaching on crest.
- Downstream toe area was wet and swampy with vegetation.

1.2 West Dyke

South End

- No water in impoundment area adjacent to the dyke.
- Minor cracking of tailings surface near upstream slope of dyke.
- Minor vegetation on the upstream and downstream dyke slopes.
- Dyke was in good condition with minor rilling on upstream and downstream slopes up to ~10 cm deep.
  - rilling was similar to previous years
  - rills did not extend into dyke crest
- Crest was in good condition with minor rutting from light vehicle traffic.
- Dry in downstream toe areas where water observed in previous inspections.

Central

- No water in impoundment area adjacent to the dyke.
- Dyke was in good condition with rilling on upstream and downstream slopes up to ~25 cm deep.
  - rilling had increased slightly from previous years
  - rills did not extend into dyke crest
- Crest was in good condition with minor rutting from light vehicle traffic.
- Woody vegetation on downstream slope.
- Downstream toe area was locally soft and moist with red staining and salts, consistent with observations in previous inspections.

North End

- No water in impoundment area adjacent to the dyke.
- Dyke was in good condition with rilling on upstream and downstream slopes up to ~25 cm deep.
  - rilling had increased slightly from previous years
  - rills did not extend into dyke crest
- Crest was in good condition with minor rutting from light vehicle traffic.
- Minor accumulation of dried grout on lower portion of downstream slope, below borehole BH19-G-24 in the dyke crest.
  - grout appeared to have exited through the downstream slope, rather than run down the slope
- Downstream toe area was generally dry, with locally soft, moist to wet ground.
  - red staining and salts observed along a drainage channel running towards the pond in a borrow area, consistent with previous observations
  - no free flowing water was observed in the channel

1.3 North Dyke

West End

- No water in impoundment area adjacent to the west end of the dyke.
- Dyke was in good condition with rilling on upstream and downstream slopes up to ~20 cm deep.
  - rilling had increased slightly from previous years

  - rills did not extend into dyke crest
- Minor vegetation on upstream and downstream slopes.
- Crest was in good condition with minor rutting from vehicle light traffic. The crest had a new step, approximately 25 cm m high and 70 cm wide on the downstream side, from earthworks in 2018.
- Large rills on the downstream slope observed in 2018 had been repaired.
  - coarse gravels and cobbles observed on surface
  - repairs were in good condition
- Water in a borrow area pond, in the downstream toe area, was clear with no visible movement or evidence of seepage or sediment accumulation.

Central

- Pond in impoundment against north dyke, with 2.5 to 3 m freeboard to the crest. The pond was smaller than observed in previous years.
  - lower pond water level was due to water treatment that was in progress during the inspection
- Woody debris (2 tree trunks) in the pond against the upstream dyke slope.
- Area of erosion on the upstream slope, over 700 m section west of dogleg, observed in 2018 had been repaired. The area previously had a large scarp (up to ~1 m) in the slope with erosion cutting back into the crest and exposing the till core.
  - riprap extended from the crest down the slope to a ~0.5 to 1 m wide bench above the pond water line
  - repairs were in good condition and riprap was generally stable
    - a few cobbles and boulders observed on the dam slope below the water line
  - a 30 to 50 cm scarp in the dam upstream slope was observed immediately below the riprap and above the bench in the slope
    - the scarp did not extend back into the dam or crest
    - the scarp and riprap should be monitored as part of routine inspections
  - at the eastern end of the riprap an exposed scarp in the upstream slope was observed that had not been repaired or armoured
    - area was within the turn of the dam, where the dam section is wider and vegetated
    - erosion did not appear to have progressed since 2018
- Crest was in good condition with minor rutting from light vehicle traffic.
- Dyke was in good condition with minor rilling on downstream slope up to ~15 cm deep.

- rilling had not increased significantly from previous years
- rills did not extend into dyke crest

- Access ramp from crest to downstream toe had been surfaced with gravel.
- Vegetation including sapling trees and rosehip bushes on the upstream and downstream slopes, and near the crest.
- Water in a borrow area ponds, in the downstream toe area, was clear with no visible movement or evidence of seepage or sediment accumulation.
- Manual check of vibrating wire piezometer PP-VWP-2018-09 (Serial Number #52443) at dogleg.
  - B value: 8962.8 and temperature -27.5° Celsius (error in reading)
  - instrument changed from Channel 1 to 2 at the interface/data logger

East End

- The impoundment water level was 0.558 m at the staff gauge at the culvert through the polishing pond dyke (Photograph 19), interpreted to be elevation 200.558 m.
- Spillway 1 – from main pond through north dyke
  - no seepage visible at downstream end
  - concrete wall in spillway in good condition
  - soil in spillway inlet area with an excavation of up ~50 cm at the base of the concrete wing wall on the upstream side of the spillway
  - small pond downstream of weir with vegetation in outlet area
  - concrete in the spillway was generally in good condition with some minor spalling, similar to previous inspections
- The dyke upstream slope and crest were in good condition.
- Vegetation including sapling trees and rosehip bushes on the upstream and downstream slopes near the crest.
- Downstream toe area at the start of the dogleg had minor seepage with red staining from the toe berm against the downstream slope.
  - ponded water in the downstream toe area was clear and showed no visible movement or accumulation of sediments.
- At the east end of the north dyke the downstream toe area was generally higher than the pond side. Sludge and soil from water treatment was stacked in the impoundment area to an elevation higher than the dyke crest.

Polishing Pond

- Water treatment was in progress. The culvert between the main and polishing pond was open.
- Turbidity curtains were installed in the polishing pond.
- Spillway 2 – from polishing pond through north dyke.
  - syphons were in place in the spillway with no discharge of water at the time of the inspection
  - ponded water downstream of the spillway, but no seepage was noted from soils around the spillway downstream end, where seepage had been noted in the past
  - channel downstream of the spillway was in good condition
  - concrete wall in spillway in good condition
  - concrete in the spillway was generally in good condition
  - spillway was clear of debris
- Polishing pond dyke slopes were in good condition with no evidence of seepage.
- North dyke downstream slopes and crest were in good condition.

1.4 East Dyke

- Tailings were impounded against the north end of the east dyke, in an area that had been cleared of vegetation. No ponded water was present.
- The dyke was in good condition with some minor rills up to ~10 cm deep on downstream slope.
- The upstream, downstream, and crest had vegetation.
- The downstream area was dry.
- The road to the south, at the end of the east dyke, was accessible.

2.0 RECOMMENDATIONS

No new recommendations are made based on the inspection.

Additional recommendations may be made as part of the annual dam safety inspection report following review of available data and maintenance records for the Pine Point TIA.

Status of recommendations from previous inspections and reviews is presented in Table 1.

Table 1: Status of Recommendations from Previous Inspections and Reviews

Structure	ID Number	Deficiency or Non-Conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Recommended Deadline/ Status
south dyke	2018-1	Vegetation encroaching on downstream face of south dyke	OMS Manual Section 5.5.2	Remove vegetation at west end of south dyke as per OMS manual. The south dyke is outside the Teck lease boundary and permission from landowner will be required to complete vegetation removal.	3	2019 / Permission form landowner obtained and work planned for Q3 2019
polishing pond	2018-2	No written procedure for sludge removal	none	Update water treatment manual to include written maintenance procedure for removal of sludge from polishing pond including dewatering operations.	4	3 months prior to scheduled maintenance of polishing pond / Not Started
TIA	2018-3	Inaccurate storage curve for facility	OMS Manual Section 4.3.3	Complete bathymetry and tailings topographic survey to define the facility storage curve, review flood storage capacity and water handling practices, determine capacity of spillway and update freeboard limits. Incorporate these changes in the OMS manual. Consider preparing for high water levels in spring 2019 and requirement to treat water at the freshet.	2	Survey by Q1 2019 / In progress, survey Completed
North Dyke	2018-4	Two large erosion rills in downstream slope ~70 m from northwest corner	OMS Manual Section 5.5.2	Fill with granular material.	2	Closed - Completed October 2018
North Dyke	2018-5	Erosion of 700 m of upstream slope west of the dogleg	OMS Manual Section 5.5.2	Repair North Dyke ■ 200 g/m^2 non-woven geotextile against exposed silty clay core ■ Riprap placed in 2 layers ▪ d_{50} 200 mm ▪ 100% passing 250 mm ▪ 0% passing 150 mm	2	Closed – Completed October 2018

Priority[a]	Description
1	High probability or dam safety issue considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
2	If not corrected/implemented could likely result in dam safety issues leading to injury, environmental impact or significant regulatory enforcement; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice – Further improvements are necessary to meet industry best practices or reduce potential risks.

a) Source: Teck 2019a.

ID = identification; OMS = operation, maintenance, and surveillance (Teck 2019b)

3.0 CLOSURE

This document is to be read with the Study Limitations section which follows the text and forms an integral part of this document.

We trust the above meets your present requirements. If you have any questions or would like to discuss, please contact the undersigned.

Golder Associates Ltd.

Martyn Willan, M.Sc., P.Eng.
Geotechnical Engineer

Ben Wickland, Ph.D., P.Eng.
Associate, Senior Geotechnical Engineer

MBW/BEW/cmm

Attachments: Study Limitations
Attachment 1: Inspection Photographs
Attachment 2: Dam Inspection Form

https://golderassociates.sharepoint.com/sites/105211/project files/6 deliverables/issued/200-tm-rev0-3000-dam inspection tia/18114183-200-tm-rev0-3000-dsi inspection tia_16aug_19.docx

REFERENCES

Golder (Golder Associates Ltd). 2019. 2018 *Dam Safety Inspection Pine Point Tailings Impoundment Area, Pine Point, NT*. 1788880-117-R-Rev2-5000. 22 February 2019.

Teck (Teck Resources Ltd.) 2019a. *Guideline for Tailings and Water Retaining Structures*. March 2019.

Teck. 2019b. *Operation, Maintenance and Surveillance Manual for Pine Point Tailings Impoundment Area.* SP&P: PP-OMS-V001.V004. 28 June 2019.

STUDY LIMITATIONS

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ATTACHMENT 1

Inspection Photographs

Photograph 1: South Dyke – Downstream Toe Area and Dam Slope at East End, Looking Southwest, 12 August 2019

Photograph 2: South Dyke – Upstream Slope of Central Portion, and Debris in Impoundment Area, Looking West, 12 August 2019

Photograph 3: South Dyke – Crest at West End with Vegetation on Downstream Slope, Looking West, 12 August 2019

Photograph 4: West Dyke – Downstream Slope and Toe Area Near South End, Looking North, 12 August 2019

Photograph 5: West Dyke – Downstream Slope and Toe at Central Area, Looking South, 12 August 2019

Photograph 6: West Dyke – Downstream Toe Area with Staining Along Drainage Near Former Seep Location, North End, Looking West, 12 August 2019

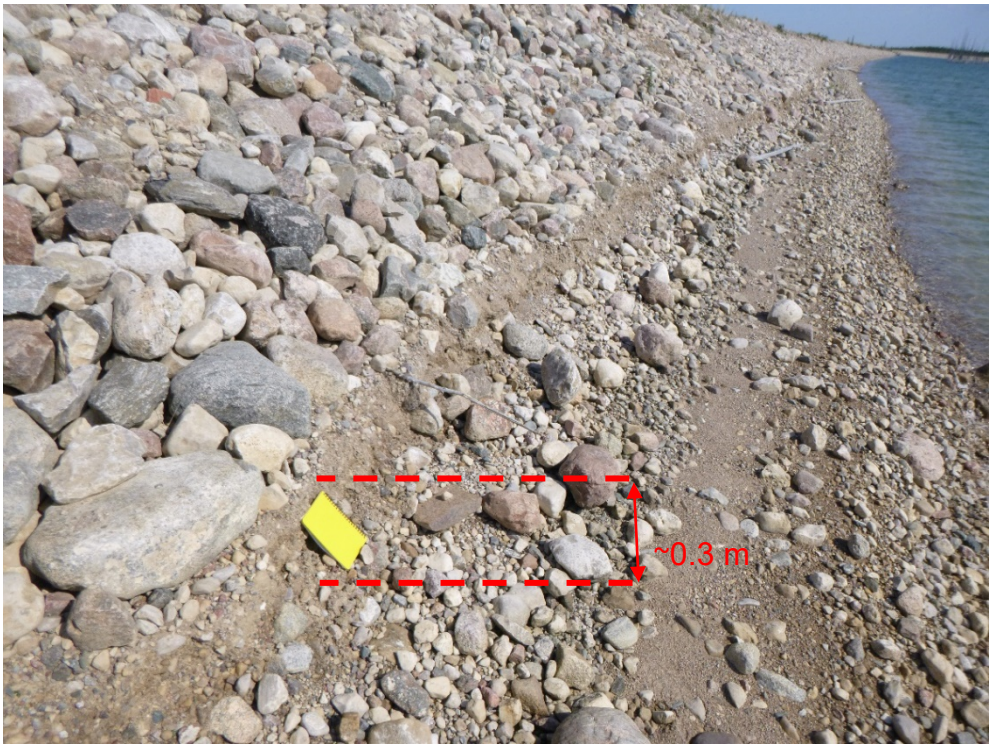
Photograph 7: West Dyke – Downstream Toe and Slope Near North End, Looking East, Minor Erosion Rills, 12 August 2019

Photograph 8: North Dyke – Downstream Slope, Near West End, Looking East, 12 August 2019

Photograph 9: North Dyke – Repaired Erosion Rills on Downstream Slope Near West End, Looking Southeast, 12 August 2019

Photograph 10: North Dyke – Crest Near West End, Looking Northeast, 12 August 2019

Photograph 11: North Dyke – Upstream Slope, Repaired with Riprap, Looking Northeast, 12 August 2019



Photograph 12: North Dyke – Upstream Slope, ~0.3 m Scarp Below Riprap Placed In 2018, Looking Northeast, 12 August 2019

Photograph 13: North Dyke – Upstream Slope West of Dogleg, Looking East, 12 August 2019

Photograph 14: North Dyke – Downstream Toe Area at Dogleg, Red Staining, Looking East, 12 August 2019

Photograph 15: Main Pond Spillway (Spillway No. 1) – Upstream Side, Looking South, 12 August 2019

Photograph 16: Main Pond Spillway – Excavation Near Toe of Wall on Upstream Side, Looking East, 12 August 2019

Photograph 17: Polishing Pond Spillway (Spillway No.2) – Outlet, Syphons in Place, Looking East, 12 August 2019

Photograph 18: Polishing Pond – Crest and Slope of Dyke (Polishing Pond on left), Looking East, 12 August 2019

Photograph 19: Main Pond Water Level Gauge at Culvert Intake to Polishing Pond (Elevation 200.558 m), 12 August 2019

Photograph 20: East Dyke – Crest, looking South, 12 August 2019

ATTACHMENT 2

Dam Inspection Form

Tailings Impoundment Inspection Form
Pine Point Tailings Impoundment

Date: 12 August 2019	Inspected By: Ben Wickland
Weather: Sunny, partly cloudy with light wind, 21ºC	
Tailings Pond Information:	
Pond Elevation: 200.558 m	Operating Limits: Alert Water Level: 201.6 m Maximum Operating Water Level: 201.8 m
Minimum Crest Elevation: 203.5	Freeboard: 2.5 to 3 m

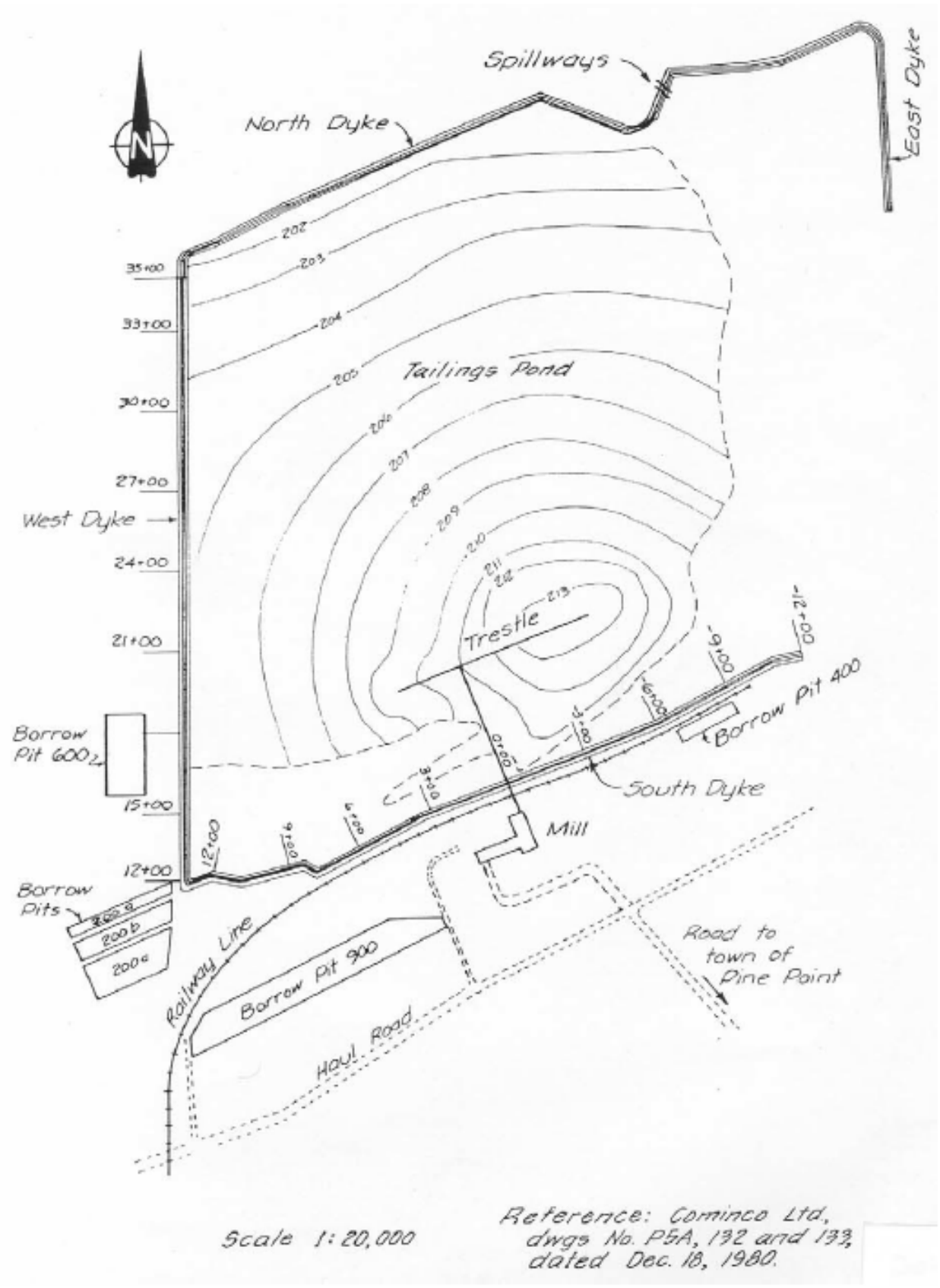
Dyke Inspection Check List (☑ = checked; X = not checked)

Check: Upstream Slope of Dyke, Crest and Downstream Slope of Dyke

South Dyke	**Checked**	**Comment**
Ponded Water	☑	No pond upstream of dyke Ponded water downstream of dyke at west and east ends
Erosion	☑	Minor rilling on upstream and downstream slopes up to 15 cm deep
Settlement/Depressions	☑	Minor rutting on crest from light vehicle traffic
Cracks/Movement	☑	None observed
Debris	☑	Debris in impoundment area
Vegetation	☑	Vegetation at east end requires clearing
Other -(photos)	N/A	Photographs – 1 to 3 (Attachment 1)
Notes:		
West Dyke		
Ponded Water	☑	No pond against dyke upstream slope Downstream of dyke standing water at central and north areas (staining along drainage course)
Erosion	☑	Rilling on upstream and downstream slopes up to 25 cm deep
Settlement/Depressions	☑	Minor rutting on crest from light vehicle traffic
Sinkholes	☑	None
Cracks/Movement	☑	Small cracks on tailings cover surface at upstream toe of dyke
Debris	☑	Trees/branches on pond side
Vegetation	☑	Minor vegetation on upstream and downstream slopes
Other -(photos)	N/A	Photographs – 4 to 7 (Attachment 1)
Notes:		Dried grout on downstream slope near BH-19-G-24

Tailings Impoundment Inspection Form Teck Metals Ltd.
Pine Point Tailings Impoundment

North Dyke	Checked	Comment
Ponded Water	☑	Freeboard approximately 2.5 to 3 m Pond water level lower than previous inspections Small ponds north of dyke in downstream toe area
Erosion	☑	Rilling on upstream and downstream slopes up to 20 cm deep Repairs of rills in 2018 with cobble and gravel Riprap placed on upstream slope of dam in good condition, with 0.3 to 0.5 m step in slope below riprap, and above ~0.7 to 1 m wide bench in slope above water line
Settlement/Depressions	☑	Minor rutting on crest from light vehicle traffic 0.25 m high step on crest at west end on downstream side
Sinkholes	☑	None
Cracks/Movement	☑	None
Debris	☑	Trees/branches in pond
Vegetation	☑	Increased vegetation on the downstream and upstream slopes up to the crest
Main Pond Spillway	☑	New excavation up to 50 cm depth around the base of the concrete wing wall on the upstream side of the spillway
Treatment Spillway	☑	Siphons in place
Other -(photos)	N/A	Photographs – 8 to 19 (Attachment 1)
Notes:		Seepage with red staining in area downstream of dogleg
East Dyke		
Ponded Water	☑	Dyke not retaining water Tailings upstream of dyke in non-vegetated area
Erosion	☑	Minor rilling on upstream and downstream slopes up to 10 cm deep
Settlement/Depressions	☑	None
Sinkholes	☑	None
Cracks/Movement	☑	None
Debris	☑	None
Vegetation	☑	On upstream and downstream slopes
Other -(photos)	N/A	Photograph 20 (Attachment 1)
Notes:		None


Spillways
East Dyke
North Dyke
N
202
203
204
205
Tailings Pond
206
207
208
209
210
211
212
213
Trestle
35+00
33+00
30+00
27+00
West Dyke
24+00
21+00
18+00
15+00
12+00
9+00
6+00
3+40
0+00
-2+00
Borrow Pit 600
Borrow Pit 400
South Dyke
Mill
Borrow Pits
200a
200b
200c
Railway Line
Borrow Pit 900
Haul Road
Road to town of Pine Point
Scale 1:20,000
Reference: Cominco Ltd, dwgs No. P5A, 132 and 133, dated Dec. 18, 1980.

Tailings Impoundment Inspection
Explanation of Details

Ponded Water:

Look for pools of water against the inside or outside slopes of the Dyke structure. The pooled water is a potential source of water to erode the dyke and therefore the presence of any water must be recorded. Ideally the GPS location should be noted in the comments area.

Another aspect of pooled water is that it may be a source of seepage water at the outside toe of the dyke therefore where pooled water is observed look for increased seepage at the toe. The presence of water at the dyke face can be an indication of increased water levels within the dyke which can decrease Dyke stability.

Erosion:

The presence of small rills, up to 0.3m deep, on the downstream face of the dyke are normal and of no concern. If the rills start eroding into channels greater than 0.3 m and are cutting into the crest more than 0.5 m then the rills must be filled to prevent further progress.

Erosion can also be caused by wave action on the pooled water. Erosion has been occurring on the inside slope of the North Dyke and will soon require placement of material to armor the dyke face. Erosion into the till core must be prevented therefore any excessive erosion must be reported. Ideally record the GPS location so the area can be found on future inspections.

Settlement/Depressions:

Settlement or depressions in the crest or slopes indicate groundwater erosion of the interior of the dyke. Look for any visible seepage at the toe of the dyke. This is a very serious problem and it must be investigated by a professional.

Ideally record the GPS location so the depression can be easily found.

Sinkholes:

Sinkholes are localized deep depressions and are another indication of interior erosion of the dyke. This is a very serious problem and it must be investigated by a professional.

Ideally record the GPS location so the depression can be easily found.

Cracks/Movement:

Cracks accompanied by movement are an indication of a dyke failure and material would probably be seen flowing from the toe of the dyke. This is a very serious situation which must be reported immediately and be investigated by a professional. Ideally record the GPS location so the area can be easily found.

Debris:

Accumulation of debris on the dyke can prevent inspection of the dyke and should be removed.

Vegetation:

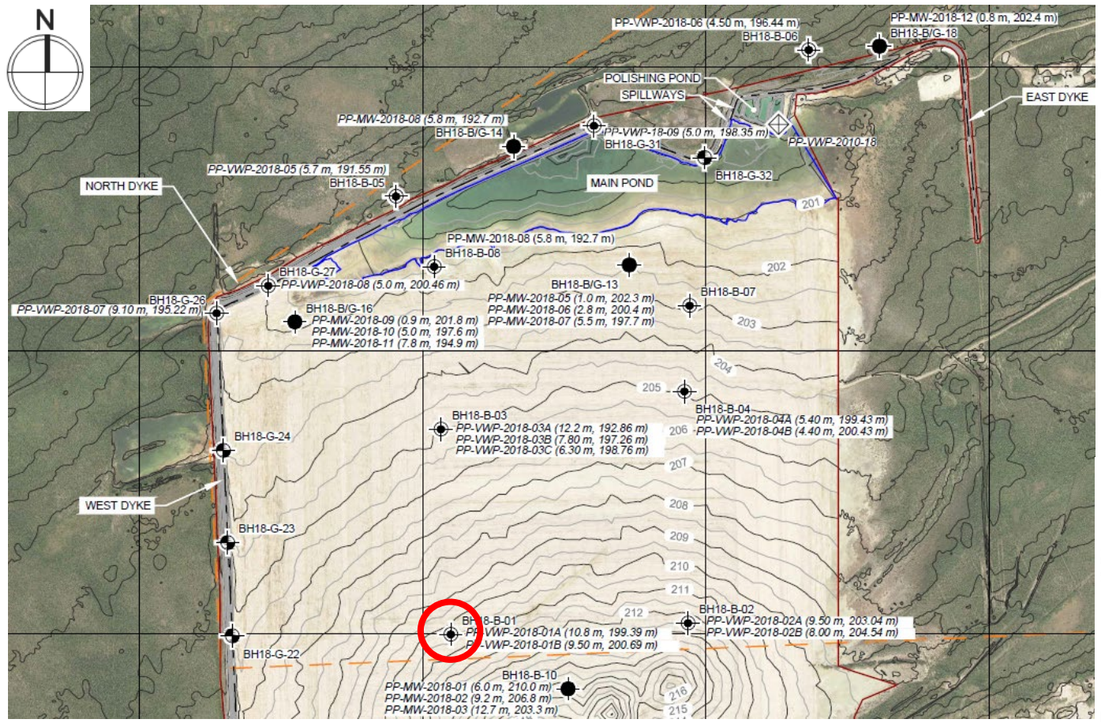
Small vegetation on the slopes of the dykes is good to minimize surface erosion. Larger vegetation hinders inspections of the dyke and can damage the dyke if root systems penetrate the till core or large root systems are ripped out by the wind. See OMS manual for requirement for treatment and removal of vegetation.

Photos:

A log of photos should be maintained.
Locations of key photos should be noted so future photos are taken from the same spot of area looking at the same feature.

APPENDIX D

Vibrating Wire Piezometer Data



INVESTIGATION NAMING CONVENTION

BH18-B/G-01

- BH – BOREHOLE
- B – BARR
- G – GOLDER
- B/G – BARR AND GOLDER
- TYPE
- YEAR
- CONSULTANT

PIEZOMETER INSTALL
PP-VWP-2018-02A (8.00 m, 10 m)

- PINE POINT
- YEAR
- NUMBER
- (DEPTH OF TIP m, ELEVATION OF TIP m)
- VIBRATING WIRE PIEZOMETER

MONITORING WELL INSTALL
PP-MW-2018-02A (9.22 m, 16 m)

- PINE POINT
- YEAR
- NUMBER
- (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)
- MONITORING WELL

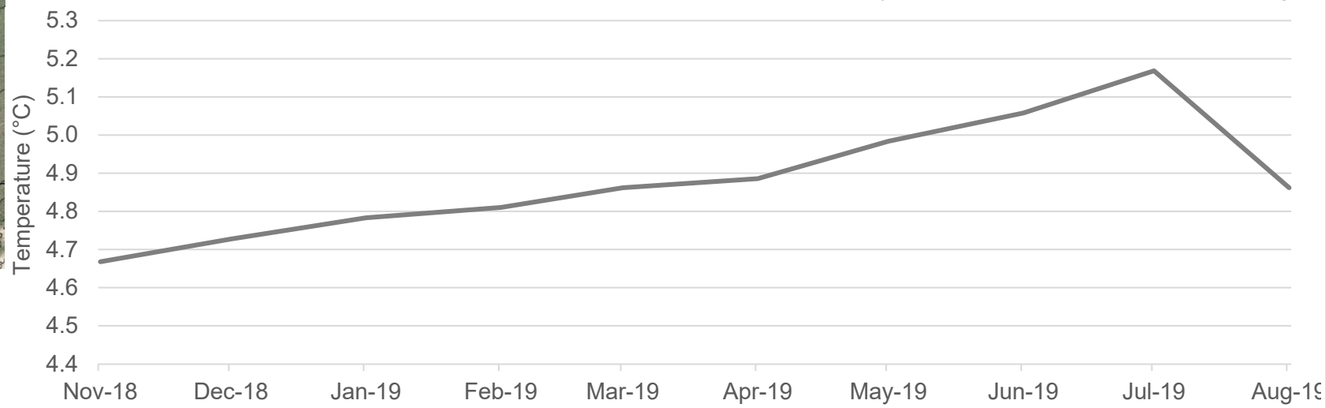
LEGEND

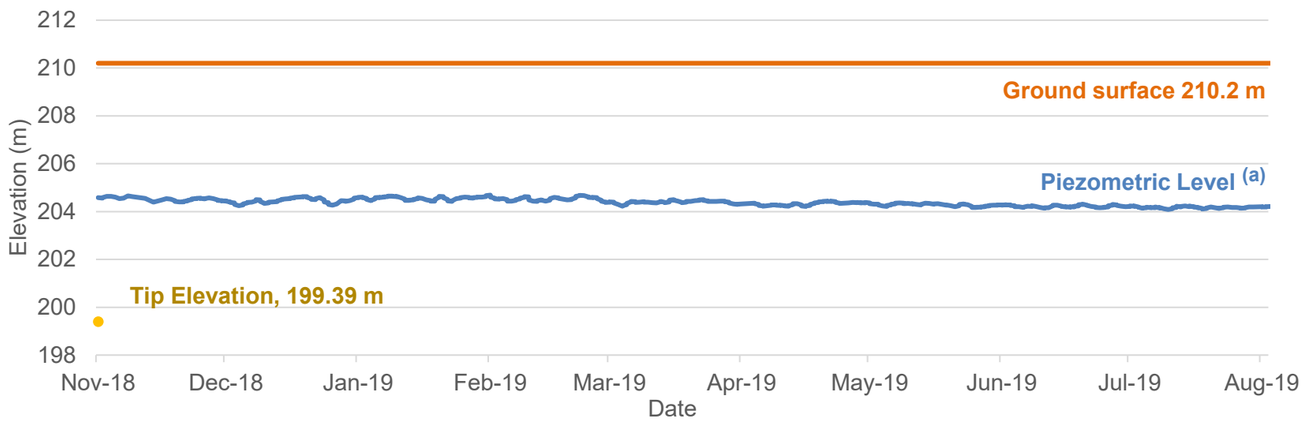
- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

1. SURFACE LEASE BOUNDARY OBTAINED FROM BARR ENGINEERING LTD., FILENAME: PinePoint_SiteFeatures.zip, RECEIVED: 2018-06-26.
2. IMPOUNDMENT AREA TOPOGRAPHIC AND BATHYMETRIC SURVEY BY MASKWA ENGINEERING LTD., FILENAME: 18-034 Pine Point Tailings Topo Survey.dwg. SURVEY DATE: 2019-06-26, ORIGINAL SCALE 1:15,000. RECEIVED: 2019-08-12.
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

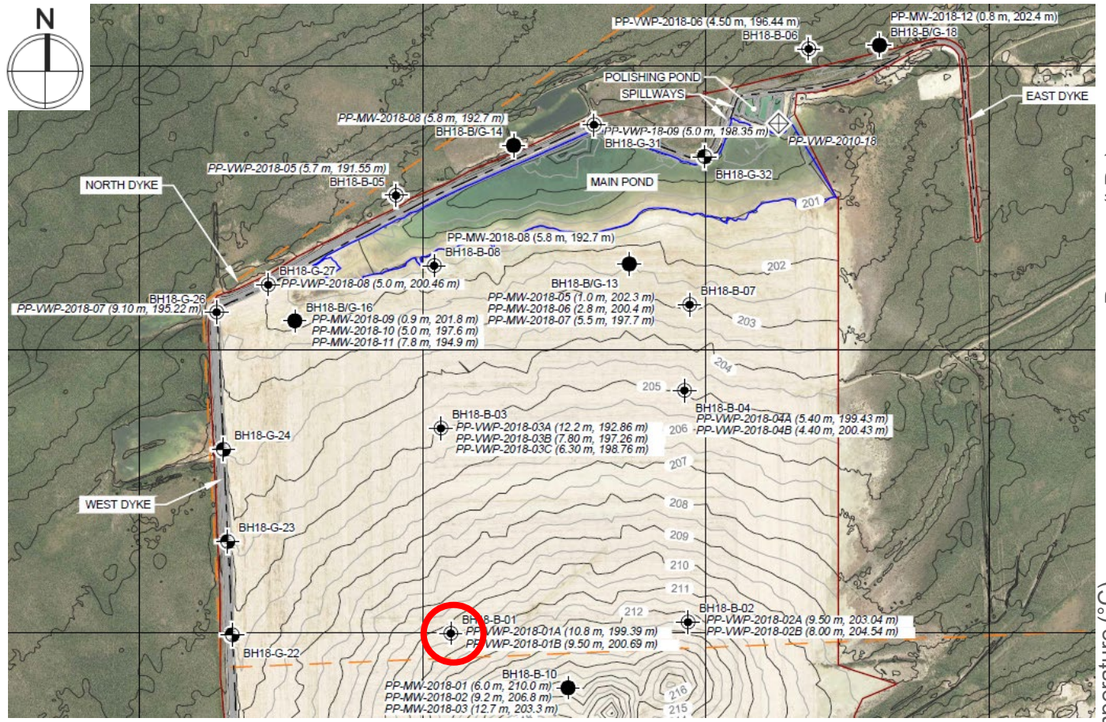
NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11





CLIENT	TECK METALS LTD.
CONSULTANT	GOLDER
YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW
PROJECT	PINE POINT TAILINGS IMPOUNDMENT AREA 2019 DAM SAFETY INSPECTION PINE POINT, NT
TITLE	BOREHOLE BH18-B-01 VIBRATING WIRE PIEZOMETER PP-VWP-18-01A
PROJECT NO.	18114183
PHASE/TASK/DOC	3000/3500/209
REV.	0
FIGURE	D-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm
0



0 500 1,000

1:20,000 METRES

INVESTIGATION NAMING CONVENTION

BH18-B/G-01

- BH – BOREHOLE
- TYPE
- YEAR
- CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER

PIEZOMETER INSTALL *PP-VWP-2018-02A (8.00 m, 10 m)*

- PINE POINT
- VIBRATING WIRE PIEZOMETER
- YEAR
- NUMBER
- (DEPTH OF TIP m, ELEVATION OF TIP m)

MONITORING WELL INSTALL *PP-MW-2018-02A (9.22 m, 16 m)*

- PINE POINT
- MONITORING WELL
- YEAR
- NUMBER
- (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

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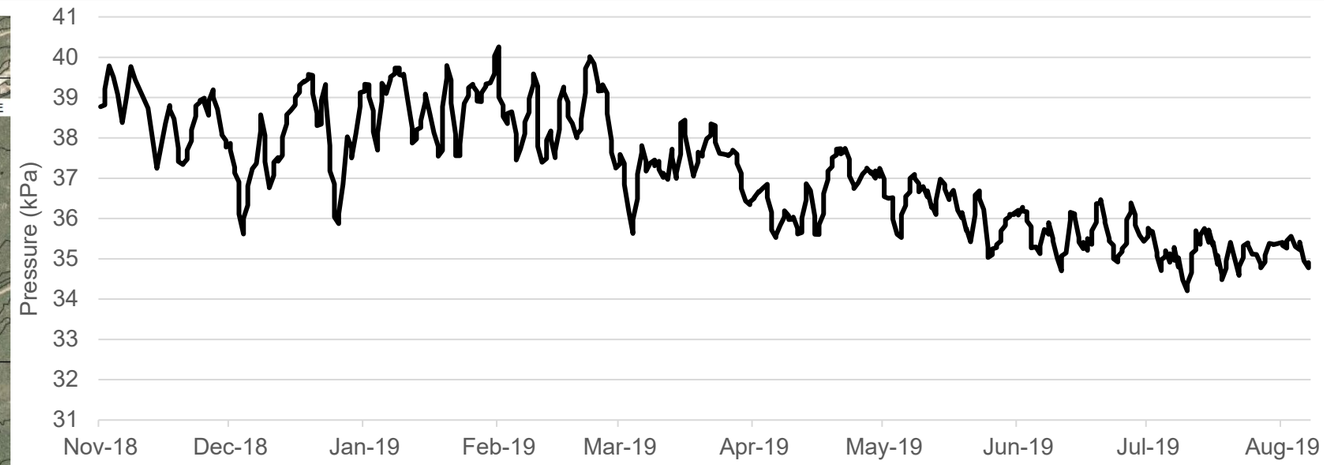
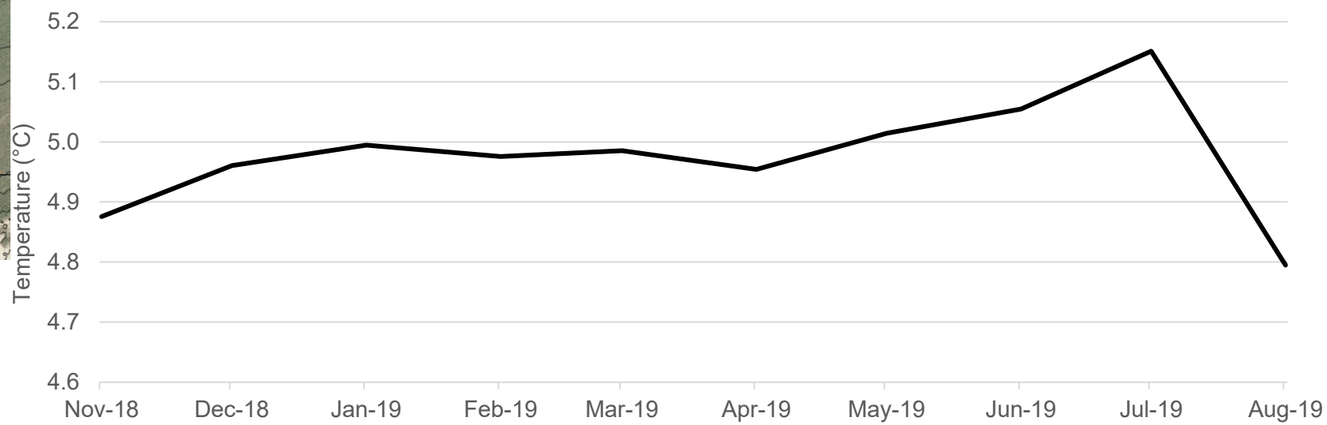
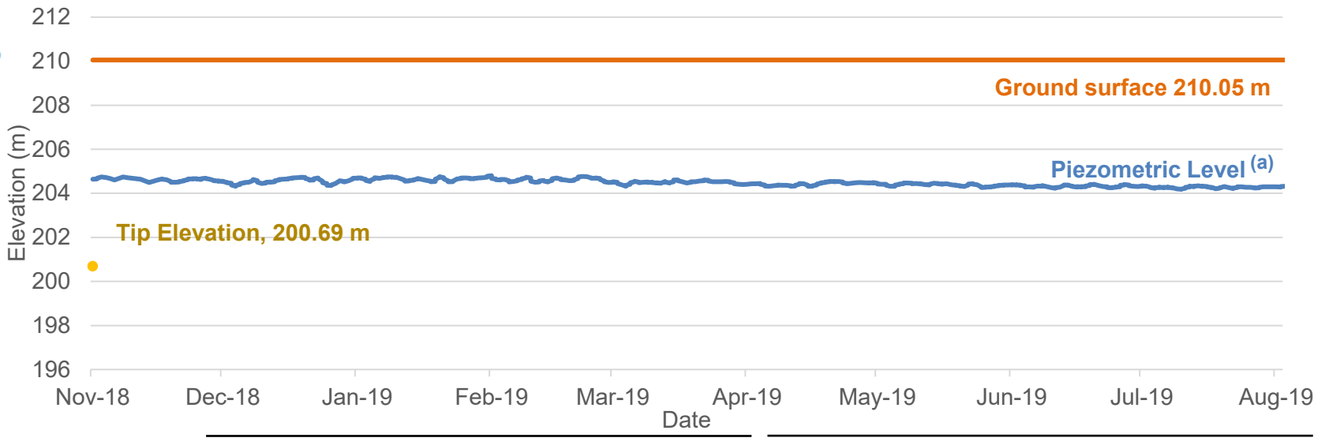
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11







CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
BOREHOLE BH18-B-01
VIBRATING WIRE PIEZOMETER PP-VWP-18-01B

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	D-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
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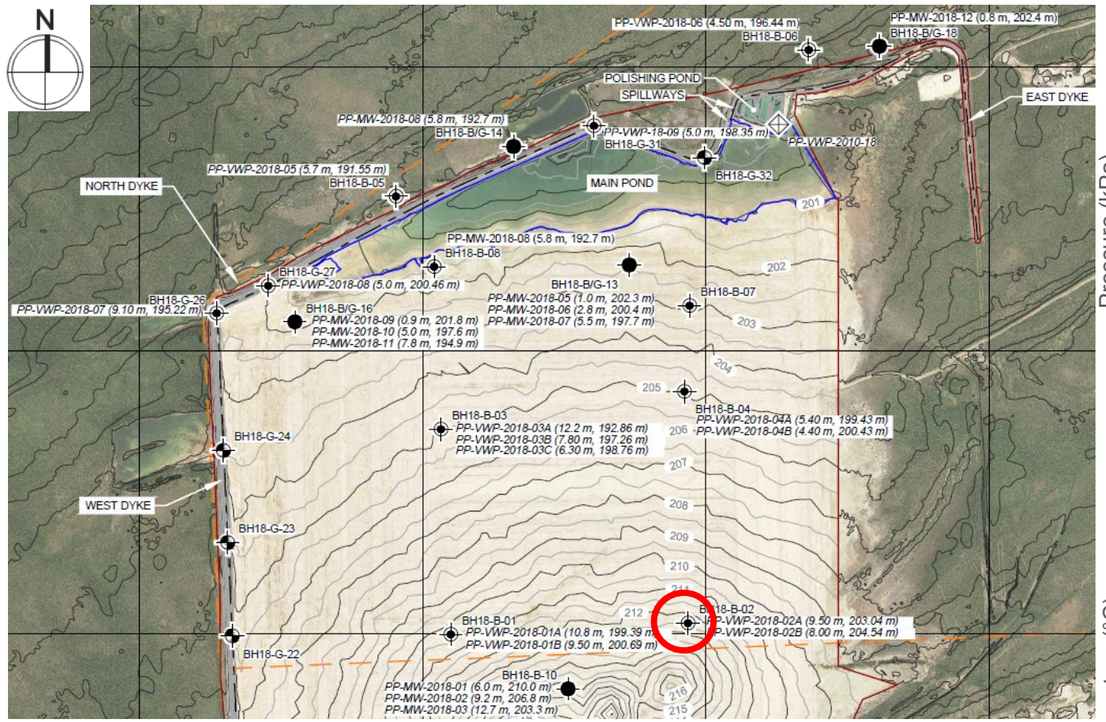

0 500 1,000
1:20,000 METRES

INVESTIGATION NAMING CONVENTION

BH18-B/G-01
- TYPE: BH - BOREHOLE
- YEAR
- CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER

PIEZOMETER INSTALL
PP-VWP-2018-02A (8.00 m, 10 m)
- PINE POINT
- YEAR
- NUMBER
- (DEPTH OF TIP m, ELEVATION OF TIP m)
- VIBRATING WIRE PIEZOMETER

MONITORING WELL INSTALL
PP-MW-2018-02A (9.22 m, 16 m)
- PINE POINT
- YEAR
- NUMBER
- (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)
- MONITORING WELL

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

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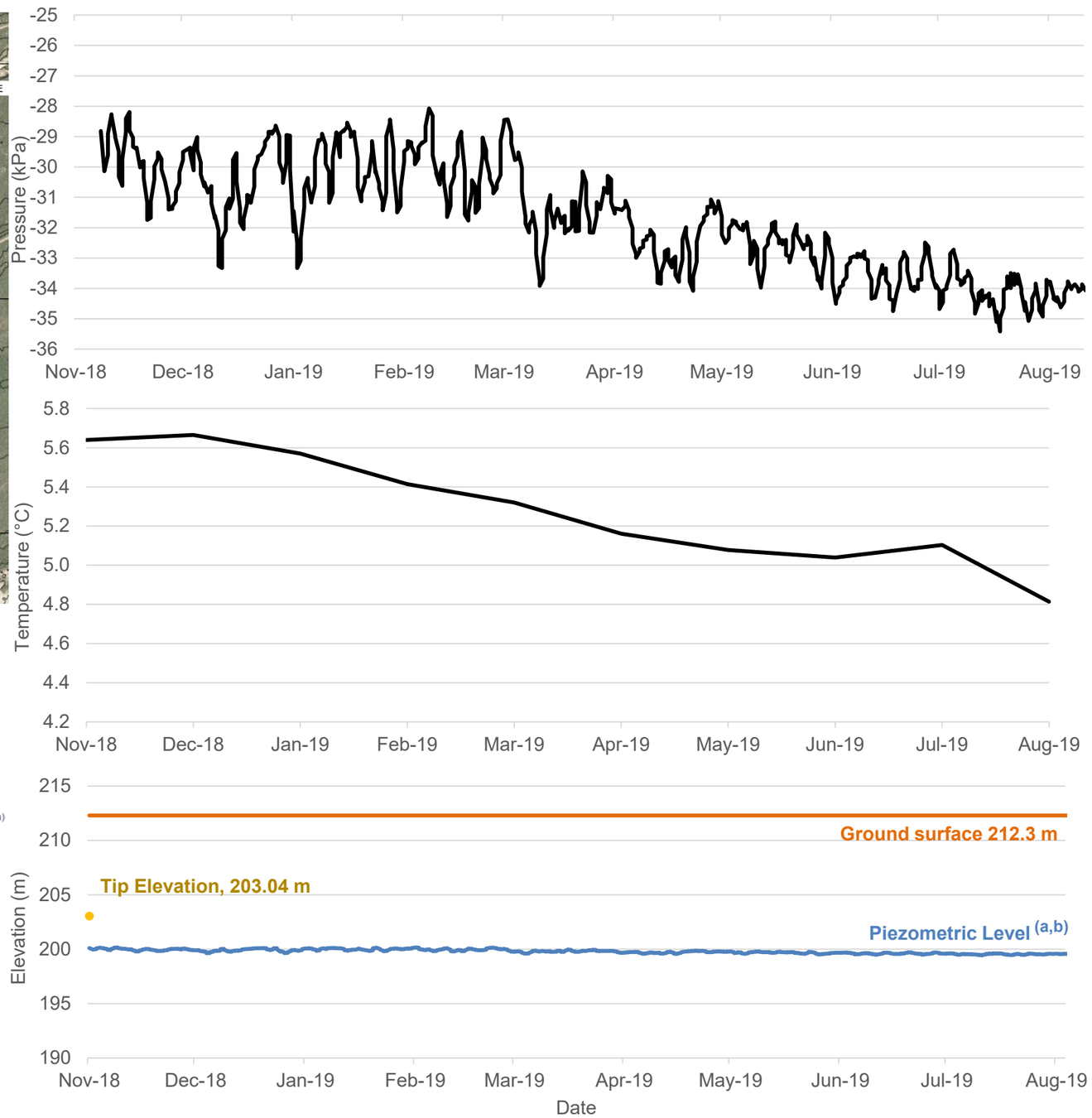
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.



NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
(b) PIEZOMETRIC LEVELS BELOW TIP ELEVATION INDICATES DRY CONDITION AT TIP ELEVATION. PIEZOMETRIC SURFACE BELOW TIP ELEVATION NOT INDICATIVE OF PIEZOMETRIC LEVEL
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11

CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

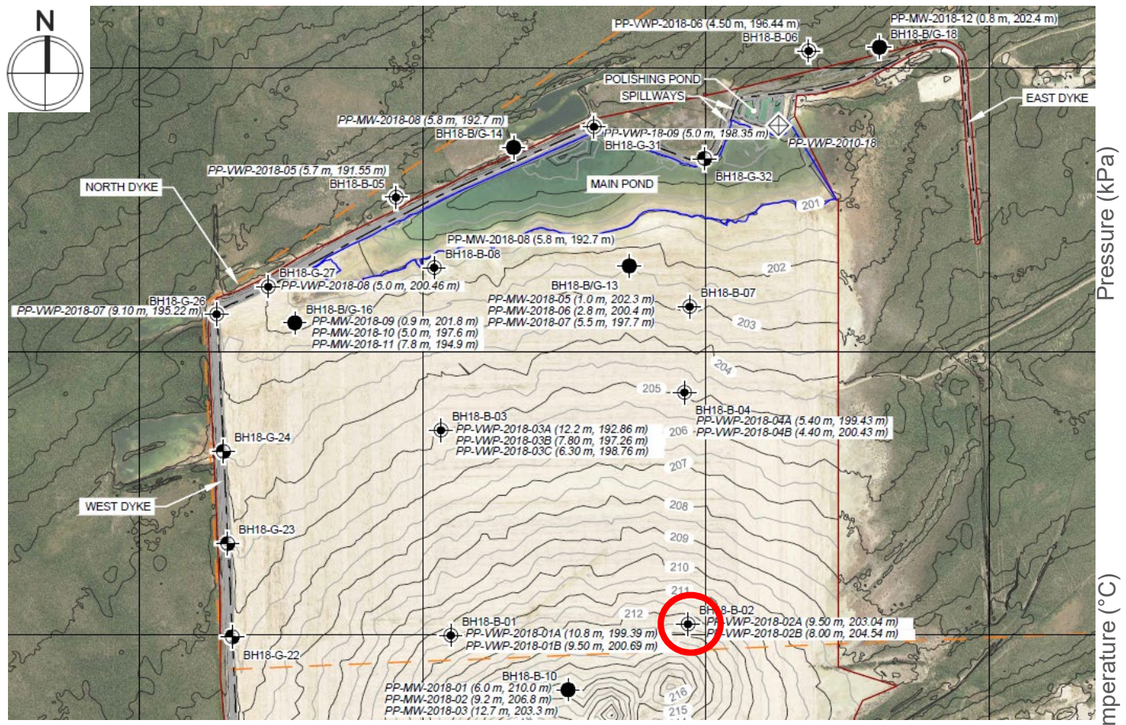
YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW

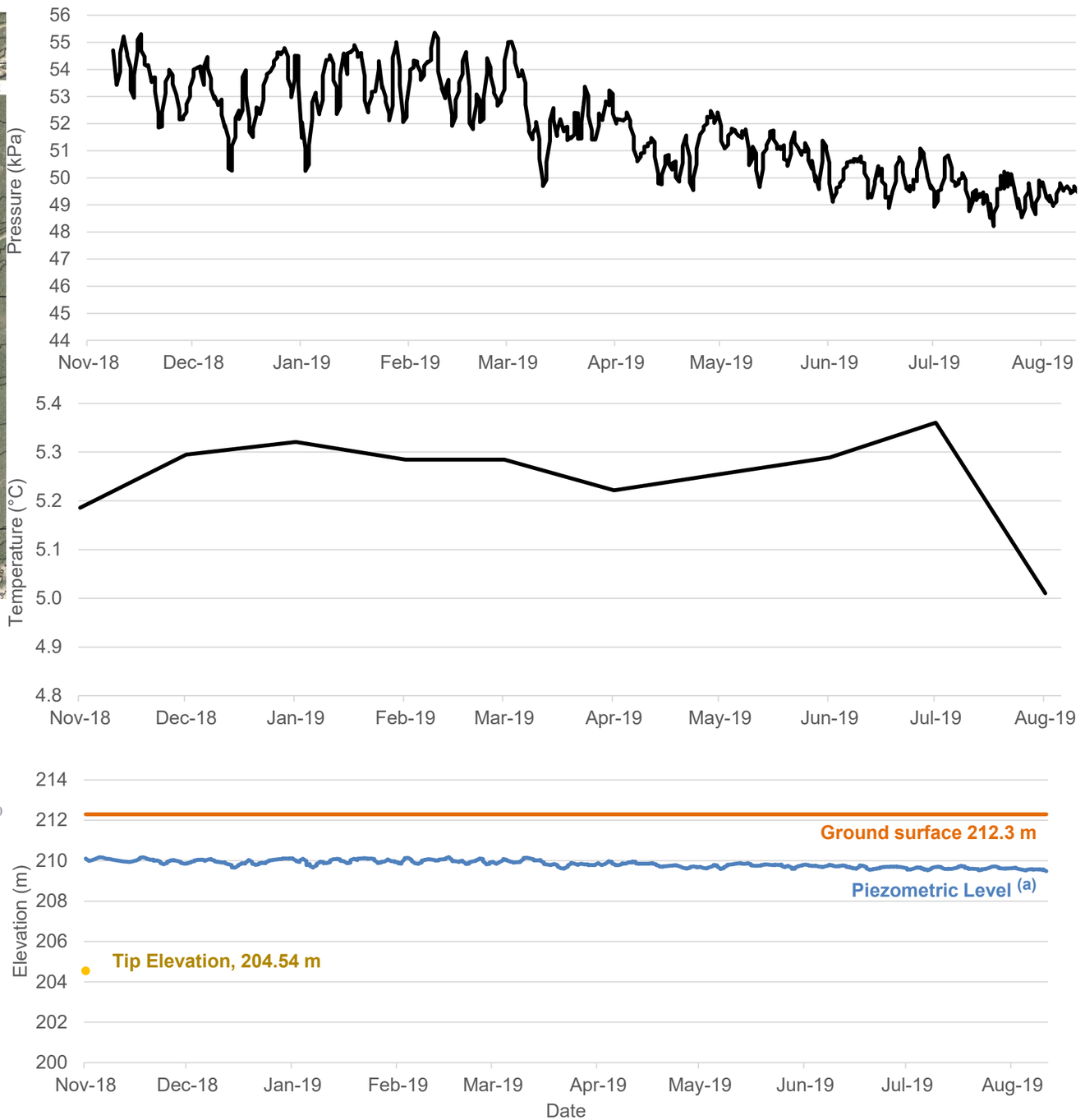
PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
BOREHOLE BH18-B-02
VIBRATING WIRE PIEZOMETER PP-VWP-18-02A

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	D-3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
0 25 mm





INVESTIGATION NAMING CONVENTION

BH18-B/G-01
- BH – BOREHOLE
- TYPE
- YEAR
- CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER

PIEZOMETER INSTALL: *PP-VWP-2018-02A (8.00 m, 10 m)*
- PP – VIBRATING WIRE PIEZOMETER
- PINE POINT
- YEAR
- NUMBER
- (DEPTH OF TIP m, ELEVATION OF TIP m)

MONITORING WELL INSTALL: *PP-MW-2018-02A (9.22 m, 16 m)*
- PP – MONITORING WELL
- PINE POINT
- YEAR
- NUMBER
- (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

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3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11

CLIENT
TECK METALS LTD.

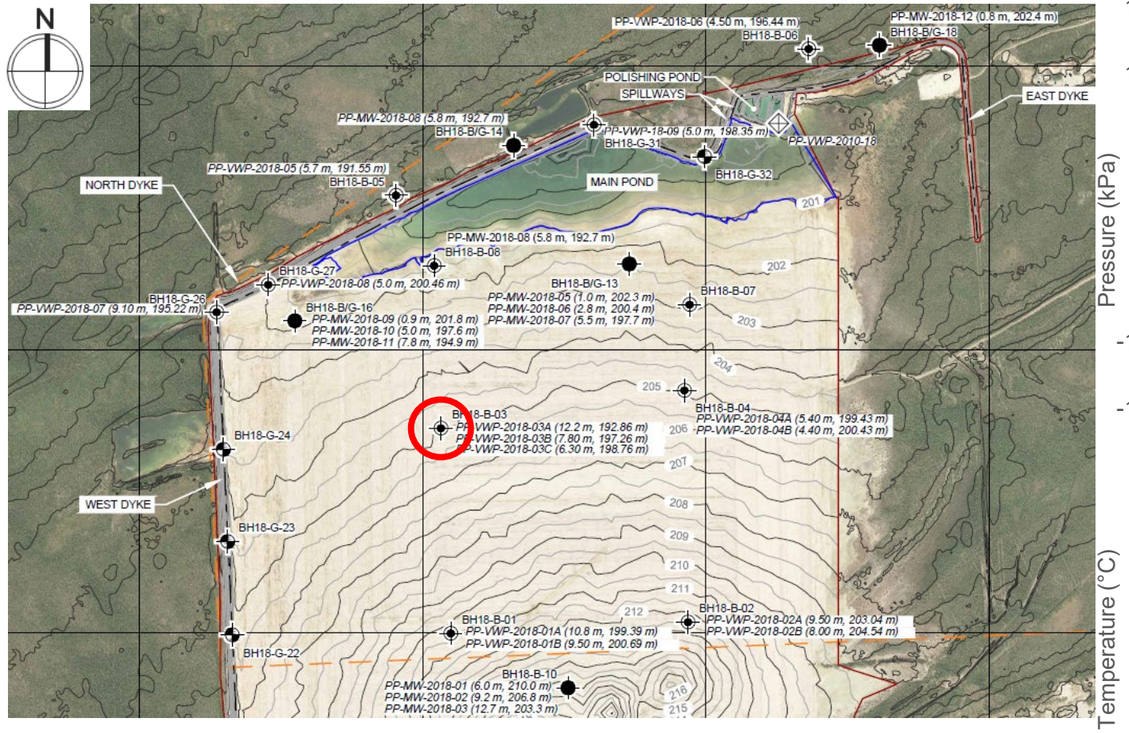
CONSULTANT
GOLDER

YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
BOREHOLE BH18-B-02
VIBRATING WIRE PIEZOMETER PP-VWP-18-02B

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	D-4



0 500 1,000

1:20,000 METRES

INVESTIGATION NAMING CONVENTION

BH18-B/G-01

- BH - BOREHOLE
- TYPE
- YEAR
- CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER

PIEZOMETER INSTALL
PP-VWP-2018-02A (8.00 m, 10 m)

- PINE POINT
- YEAR
- NUMBER
- (DEPTH OF TIP m, ELEVATION OF TIP m)
- VIBRATING WIRE PIEZOMETER

MONITORING WELL INSTALL
PP-MW-2018-02A (9.22 m, 16 m)

- PINE POINT
- YEAR
- NUMBER
- (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)
- MONITORING WELL

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

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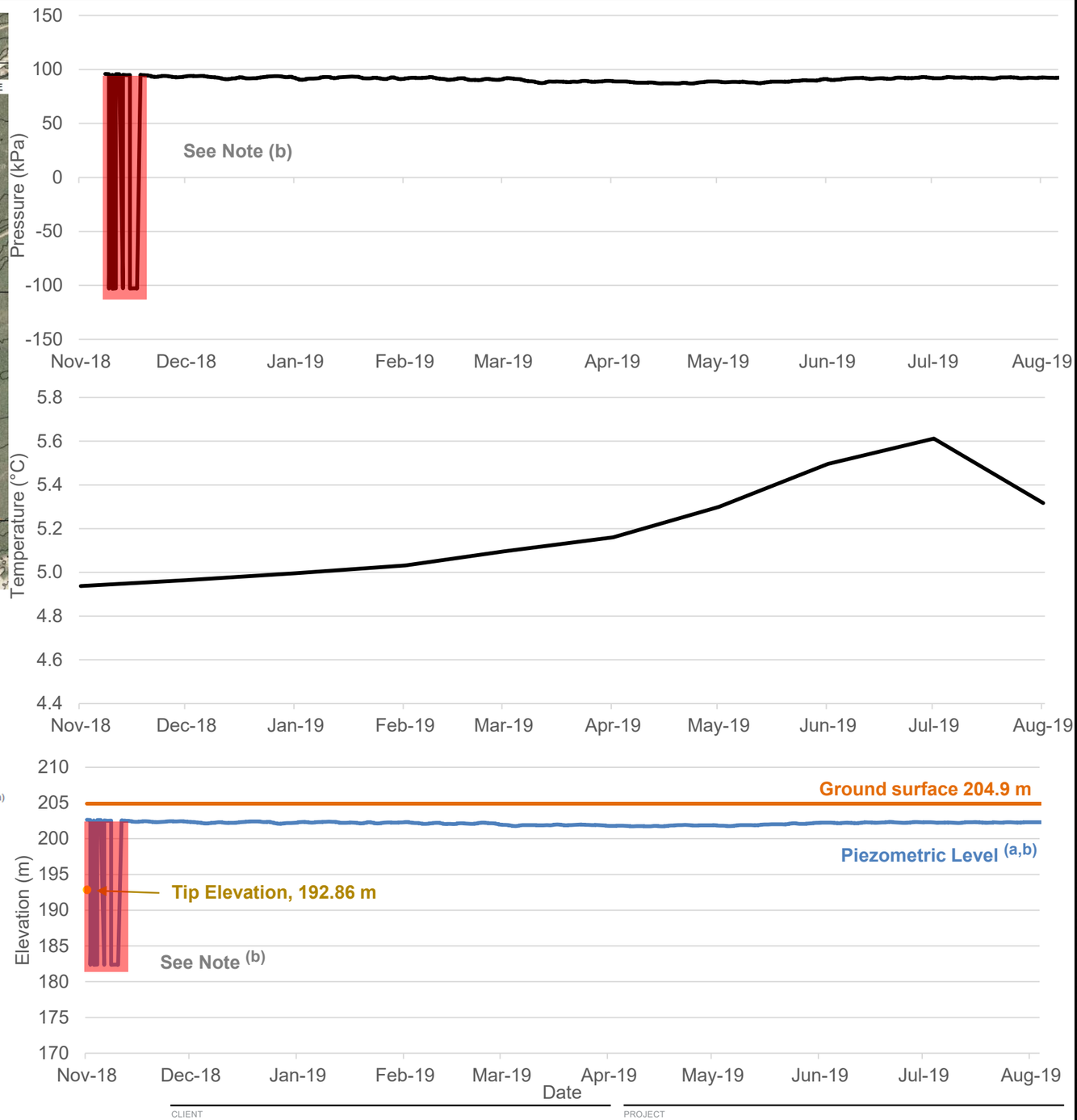
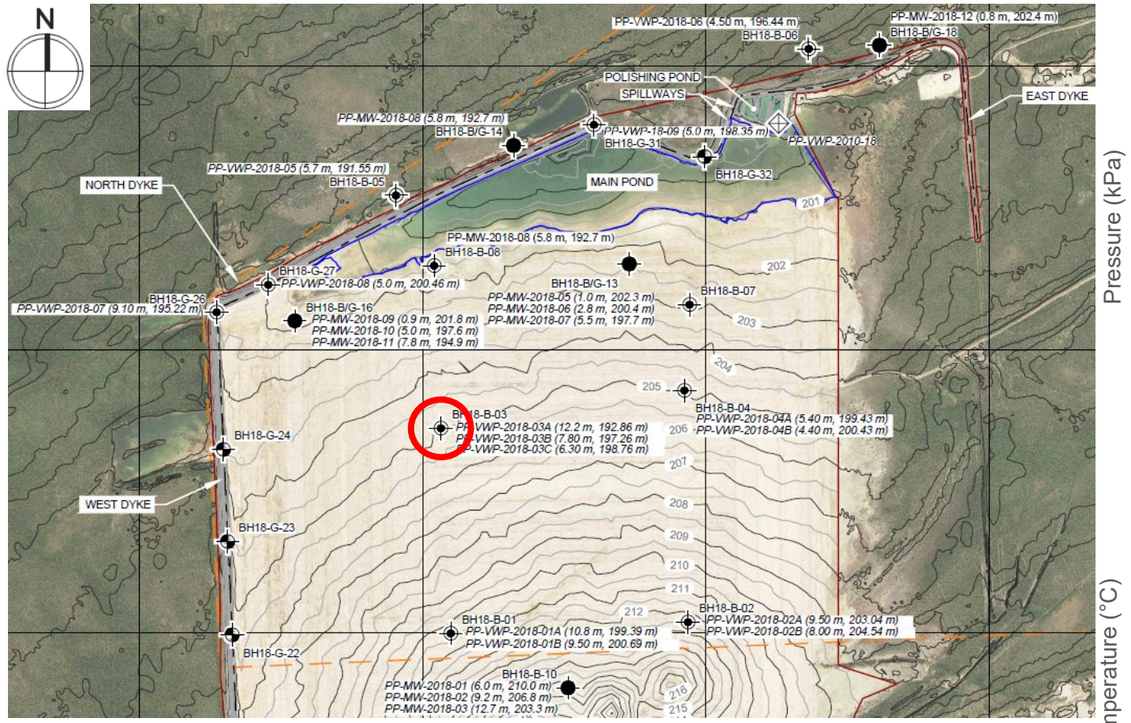
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
(b) VARIATION BETWEEN 8 AND 18 NOVEMBER 2018 IS INDICATIVE OF INSTRUMENT NORMALIZATION FOLLOWING INSTALLATION
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11



CLIENT	TECK METALS LTD.
CONSULTANT	GOLDER
YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW
PROJECT	PINE POINT TAILINGS IMPOUNDMENT AREA 2019 DAM SAFETY INSPECTION PINE POINT, NT
TITLE	BOREHOLE BH18-B-03 VIBRATING WIRE PIEZOMETER PP-VWP-18-03A
PROJECT NO.	18114183
PHASE/TASK/DOC	3000/3500/209
REV.	0
FIGURE	D-5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
0 25 mm



0 500 1,000

1:20,000 METRES

INVESTIGATION NAMING CONVENTION

BH18-B/G-01

- BH - BOREHOLE
- TYPE
- YEAR
- CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER

PIEZOMETER INSTALL
PP-VWP-2018-02A (8.00 m, 10 m)

- PINE POINT
- VIBRATING WIRE PIEZOMETER
- YEAR
- NUMBER
- (DEPTH OF TIP m, ELEVATION OF TIP m)

MONITORING WELL INSTALL
PP-MW-2018-02A (9.22 m, 16 m)

- PINE POINT
- MONITORING WELL
- YEAR
- NUMBER
- (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

1. SURFACE LEASE BOUNDARY OBTAINED FROM BARR ENGINEERING LTD., FILENAME: PinePoint_SiteFeatures.zip, RECEIVED: 2018-06-26.
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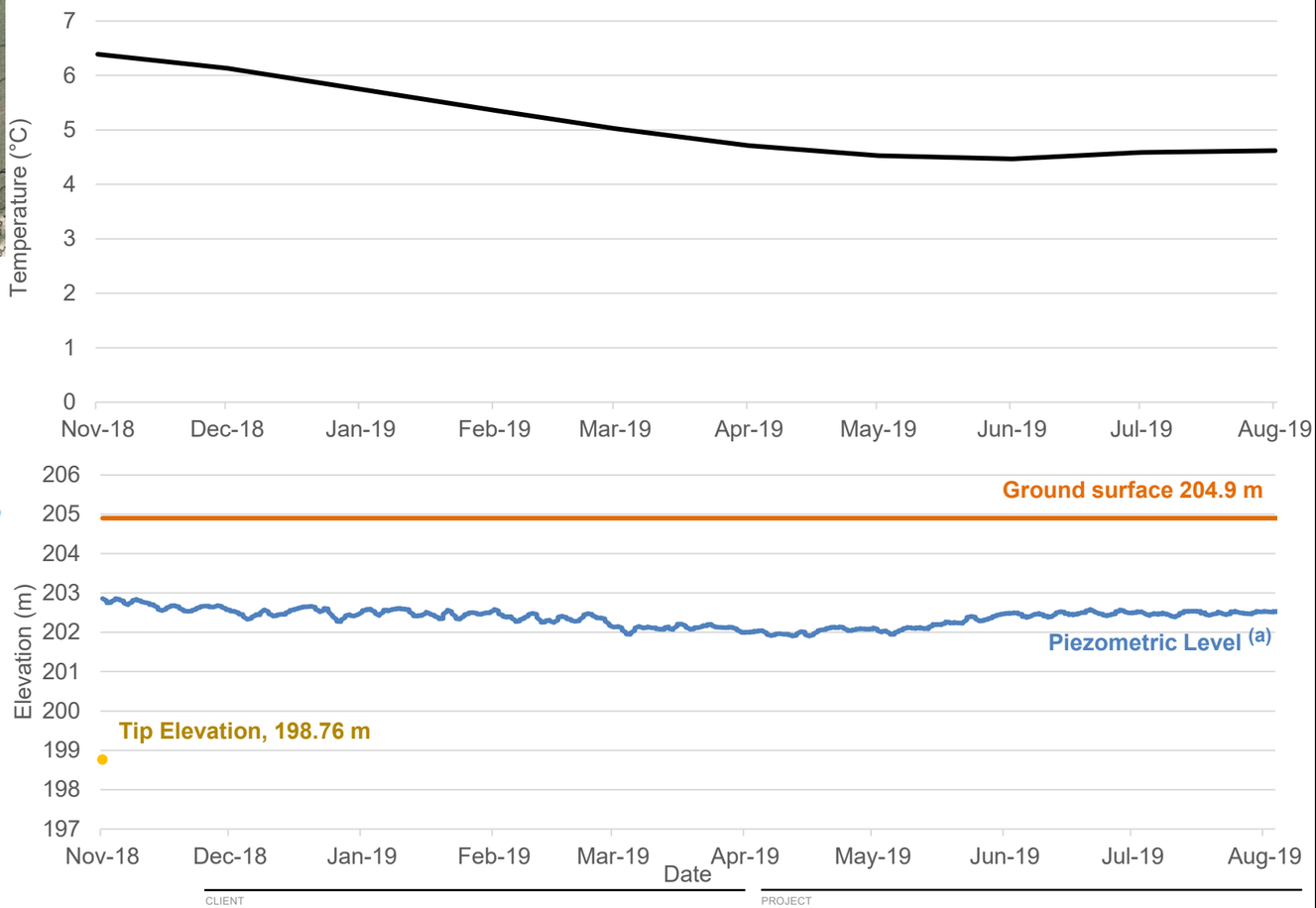
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11



CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

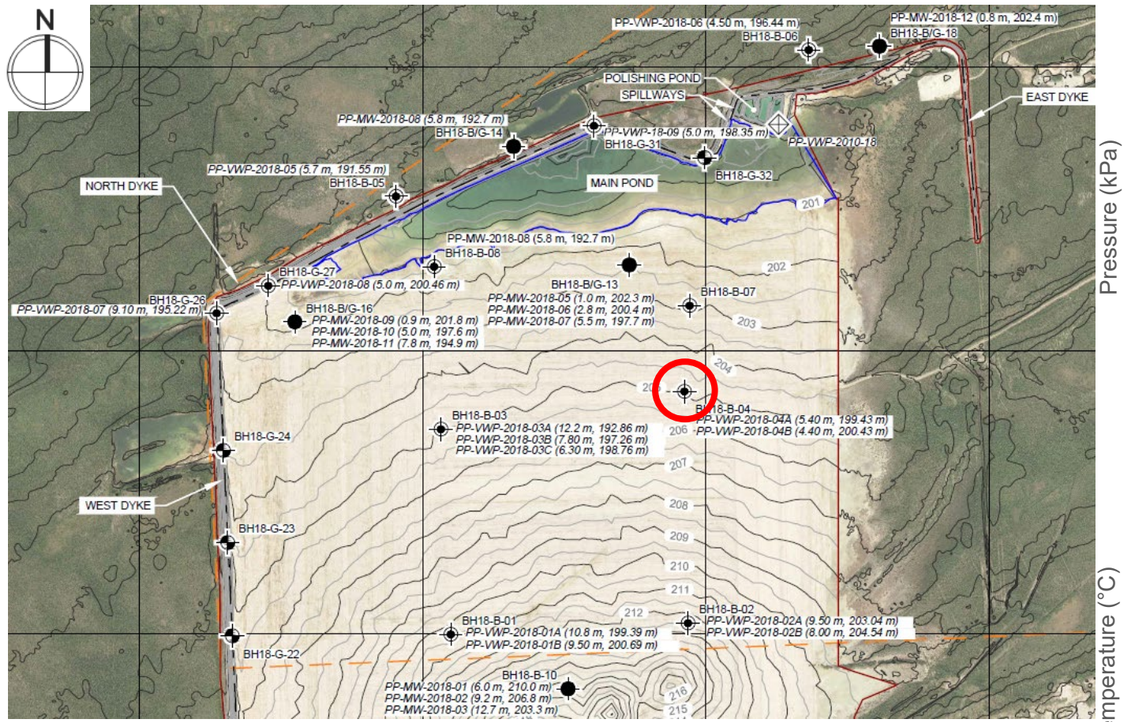
YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
BOREHOLE BH18-B-03
VIBRATING WIRE PIEZOMETER PP-VWP-18-03C

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	D-6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
0 25 mm



0 500 1,000
1:20,000 METRES

INVESTIGATION NAMING CONVENTION

BH18-B/G-01
- BH18: YEAR
- B/G: TYPE (BH - BOREHOLE)
- B: CONSULTANT (B - BARR, G - GOLDER, B/G - BARR AND GOLDER)
- 01: NUMBER

PIEZOMETER INSTALL
PP-VWP-2018-02A (8.00 m, 10 m)
- PP: PINE POINT
- VWP: VIBRATING WIRE PIEZOMETER
- 2018: YEAR
- 02A: NUMBER
- (8.00 m, 10 m): (DEPTH OF TIP m, ELEVATION OF TIP m)

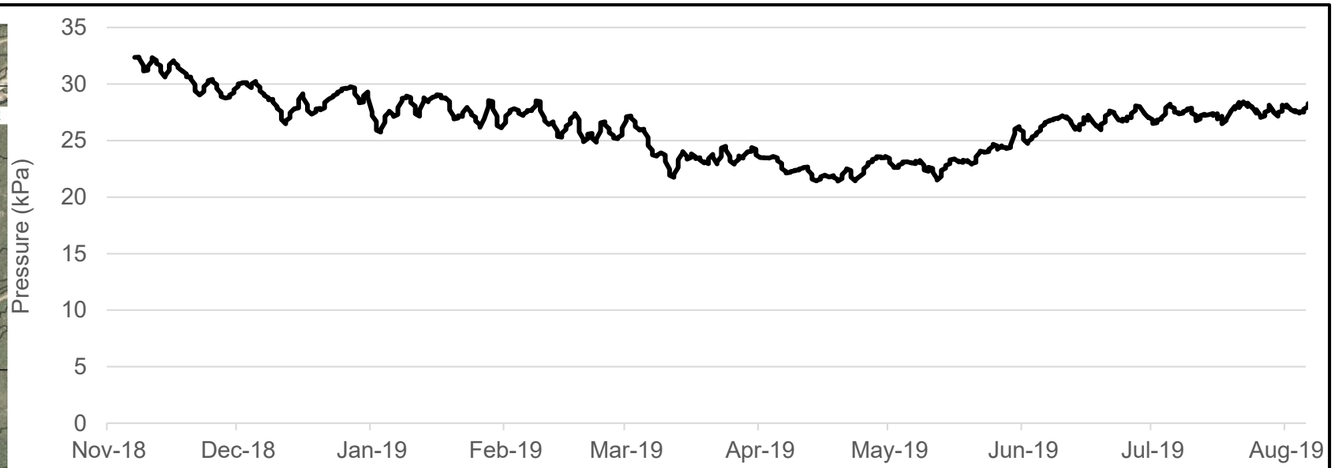
MONITORING WELL INSTALL
PP-MW-2018-02A (9.22 m, 16 m)
- PP: PINE POINT
- MW: MONITORING WELL
- 2018: YEAR
- 02A: NUMBER
- (9.22 m, 16 m): (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

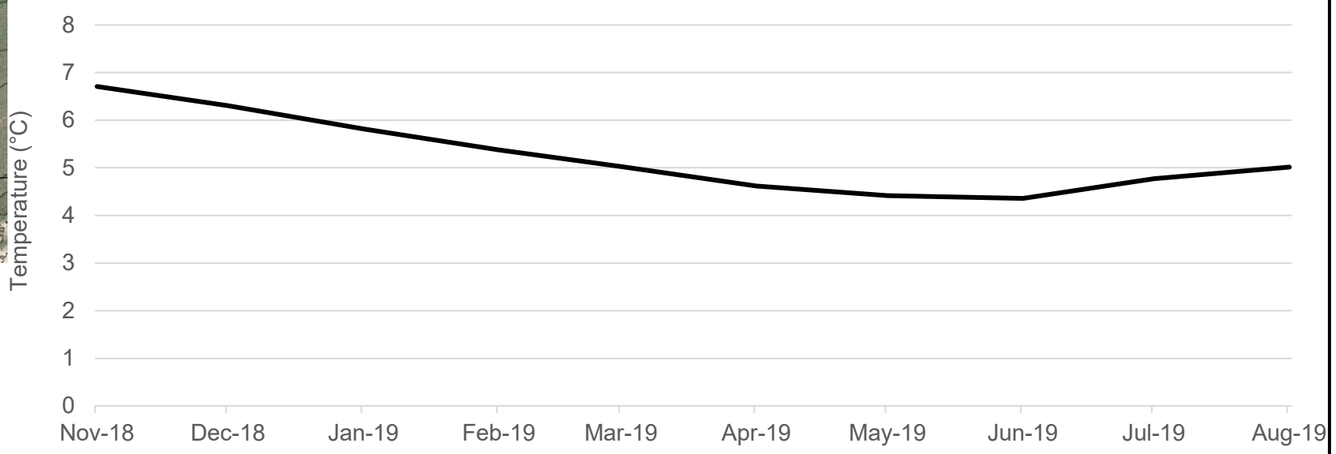
LEGEND
- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

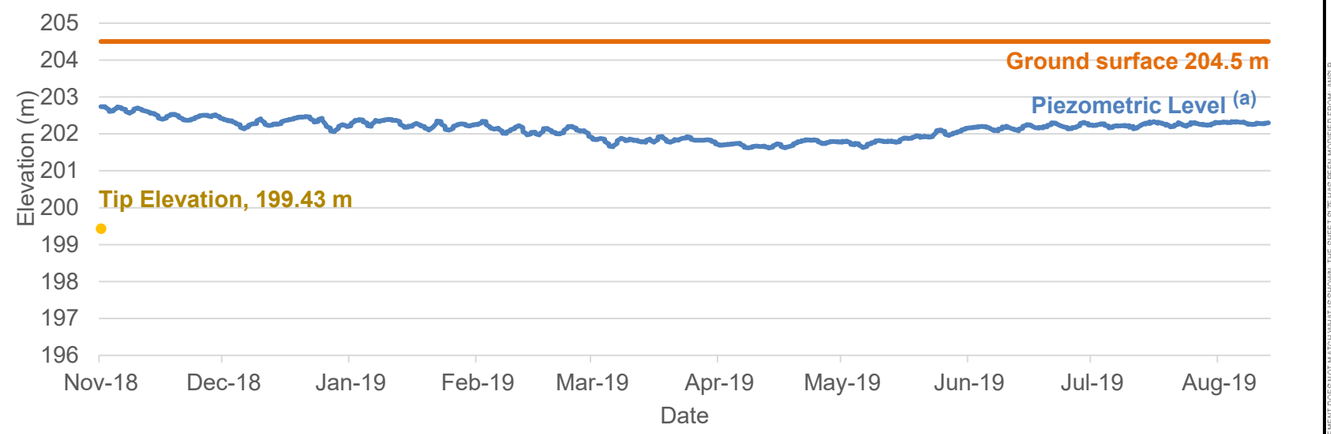
REFERENCES

1. SURFACE LEASE BOUNDARY OBTAINED FROM BARR ENGINEERING LTD., FILENAME: PinePoint_SiteFeatures.zip, RECEIVED: 2018-06-26.
2. IMPOUNDMENT AREA TOPOGRAPHIC AND BATHYMETRIC SURVEY BY MASKWA ENGINEERING LTD., FILENAME: 18-034 Pine Point Tailings Topo Survey.dwg. SURVEY DATE: 2019-06-26, ORIGINAL SCALE 1:15,000. RECEIVED: 2019-08-12.
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11

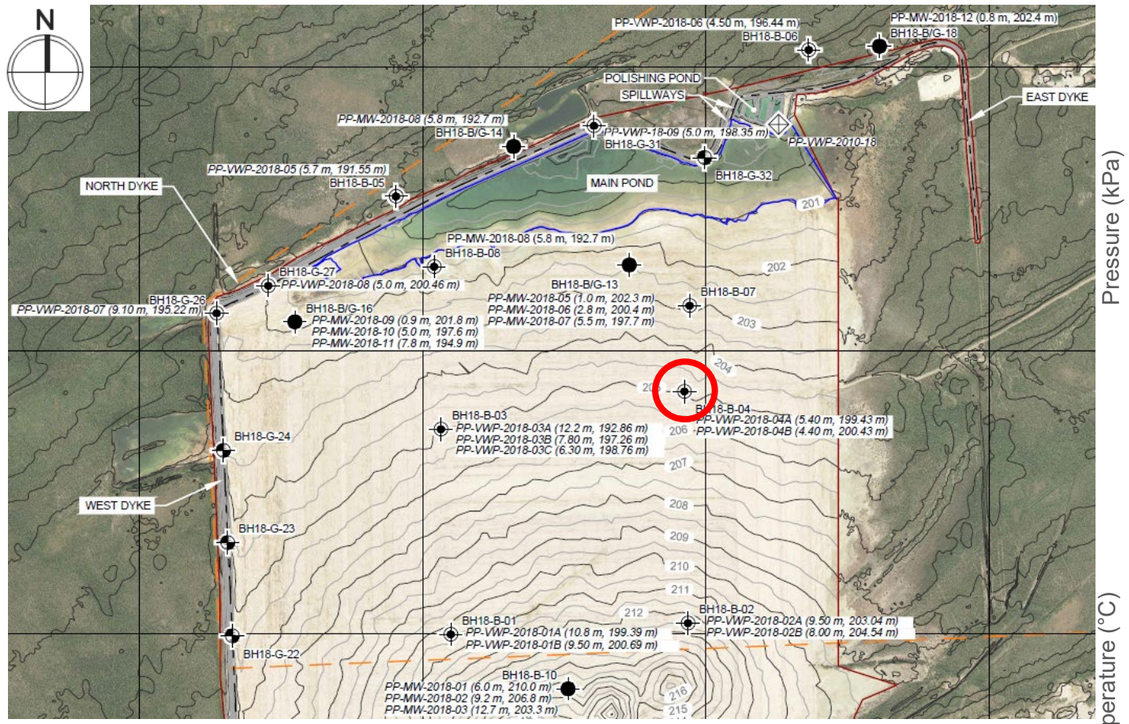






CLIENT	TECK METALS LTD.
CONSULTANT	GOLDER
YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW
PROJECT	PINE POINT TAILINGS IMPOUNDMENT AREA 2019 DAM SAFETY INSPECTION PINE POINT, NT
TITLE	BOREHOLE BH18-B-04 VIBRATING WIRE PIEZOMETER PP-VWP-18-04A
PROJECT NO.	18114183
PHASE/TASK/DOC	3000/3500/209
REV.	0
FIGURE	D-7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
0 25 mm



0 500 1,000
1:20,000 METRES

INVESTIGATION NAMING CONVENTION

BH18-B/G-01
- BH — TYPE: BH - BOREHOLE
- 18 — YEAR
- B — CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER
- 01 — NUMBER

PIEZOMETER INSTALL
PP-VWP-2018-02A (8.00 m, 10 m)
- PP — PINE POINT
- VW — VIBRATING WIRE PIEZOMETER
- 2018 — YEAR
- 02A — NUMBER
- (8.00 m, 10 m) — (DEPTH OF TIP m, ELEVATION OF TIP m)

MONITORING WELL INSTALL
PP-MW-2018-02A (9.22 m, 16 m)
- PP — PINE POINT
- MW — MONITORING WELL
- 2018 — YEAR
- 02A — NUMBER
- (9.22 m, 16 m) — (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

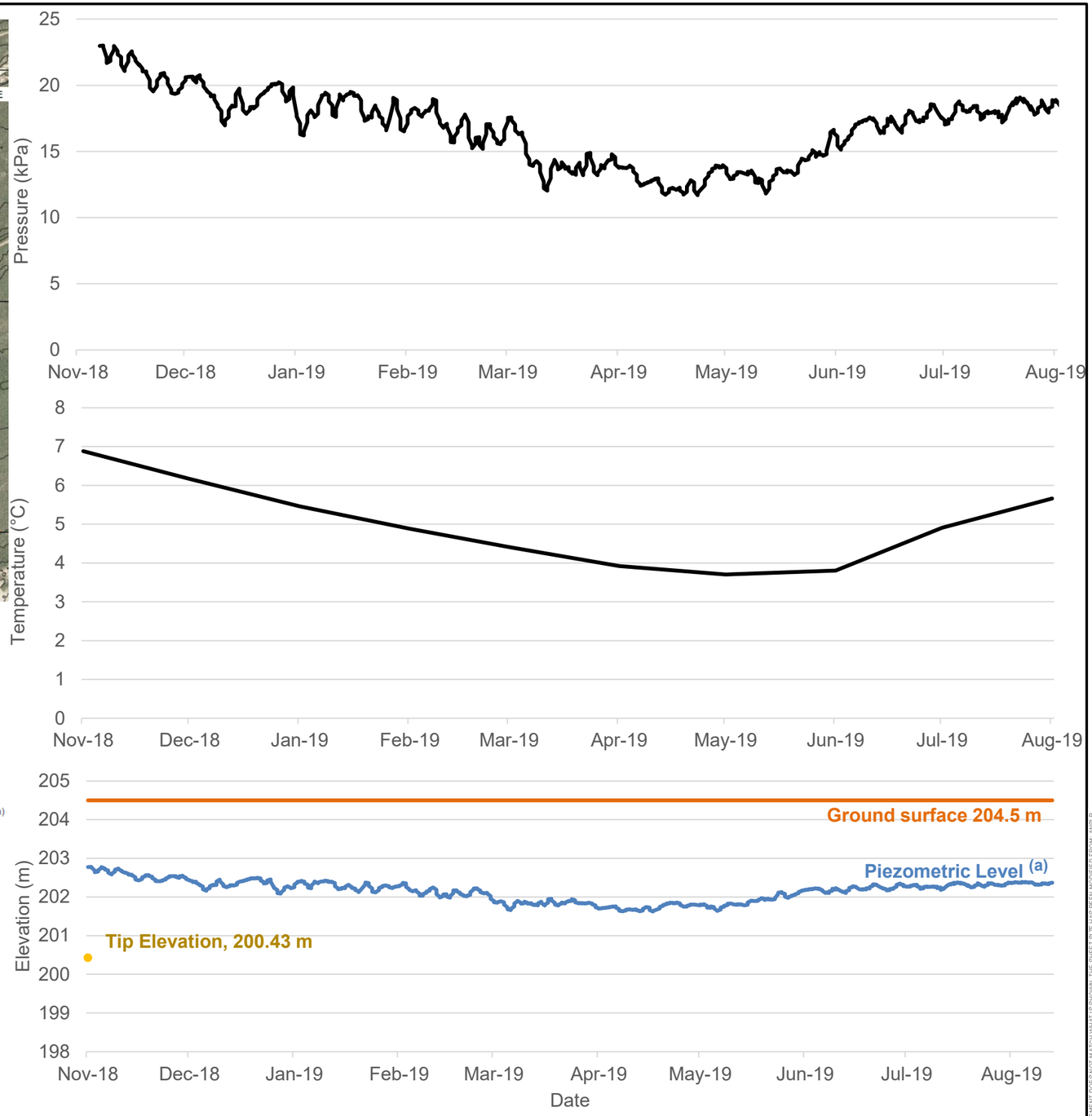
LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

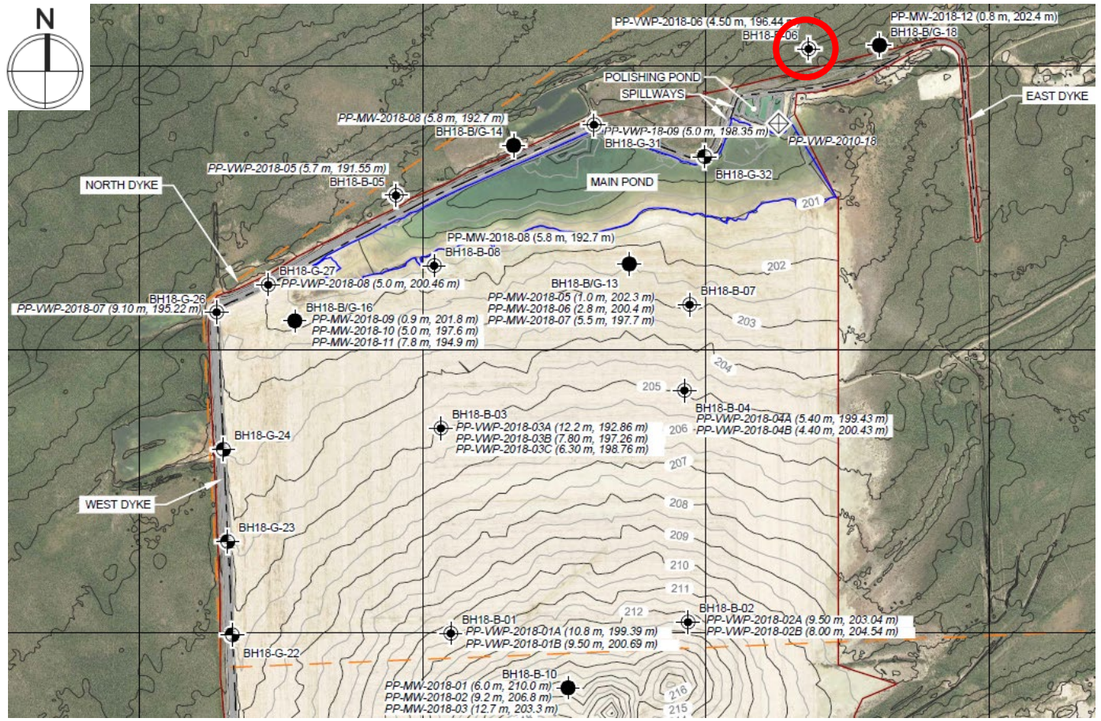
1. SURFACE LEASE BOUNDARY OBTAINED FROM BARR ENGINEERING LTD., FILENAME: PinePoint_SiteFeatures.zip, RECEIVED: 2018-06-26.
2. IMPOUNDMENT AREA TOPOGRAPHIC AND BATHYMETRIC SURVEY BY MASKWA ENGINEERING LTD., FILENAME: 18-034 Pine Point Tailings Topo Survey.dwg. SURVEY DATE: 2019-06-26, ORIGINAL SCALE 1:15,000. RECEIVED: 2019-08-12.
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11



CLIENT	TECK METALS LTD.
CONSULTANT	GOLDER
YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW
PROJECT	PINE POINT TAILINGS IMPOUNDMENT AREA 2019 DAM SAFETY INSPECTION PINE POINT, NT
TITLE	BOREHOLE BH18-B-04 VIBRATING WIRE PIEZOMETER PP-VWP-18-04B
PROJECT NO.	18114183
PHASE/TASK/DOC	3000/3500/209
REV.	0
FIGURE	D-8

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm
0



0 500 1,000

1:20,000 METRES

INVESTIGATION NAMING CONVENTION

BH18-B/G-01

- BH18 – YEAR
- B – TYPE: BH - BOREHOLE
- G – CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER

PIEZOMETER INSTALL

PP-VWP-2018-02A (8.00 m, 10 m)

- PP – PINE POINT
- VWP – VIBRATING WIRE PIEZOMETER
- 2018 – YEAR
- 02A – NUMBER
- 8.00 m – (DEPTH OF TIP m, ELEVATION OF TIP m)

MONITORING WELL INSTALL

PP-MW-2018-02A (9.22 m, 16 m)

- PP – PINE POINT
- MW – MONITORING WELL
- 2018 – YEAR
- 02A – NUMBER
- 9.22 m – (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

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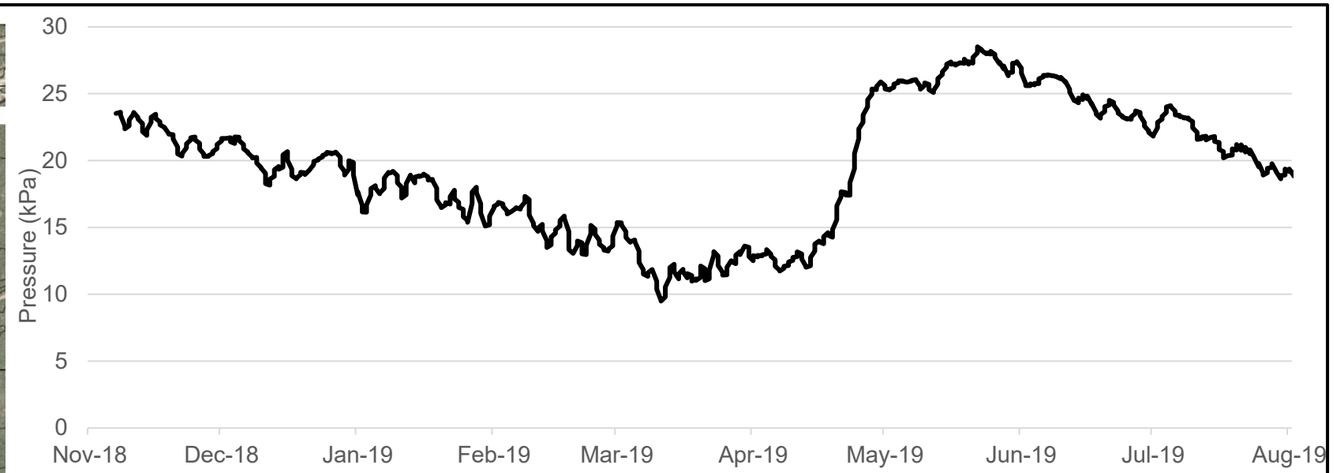
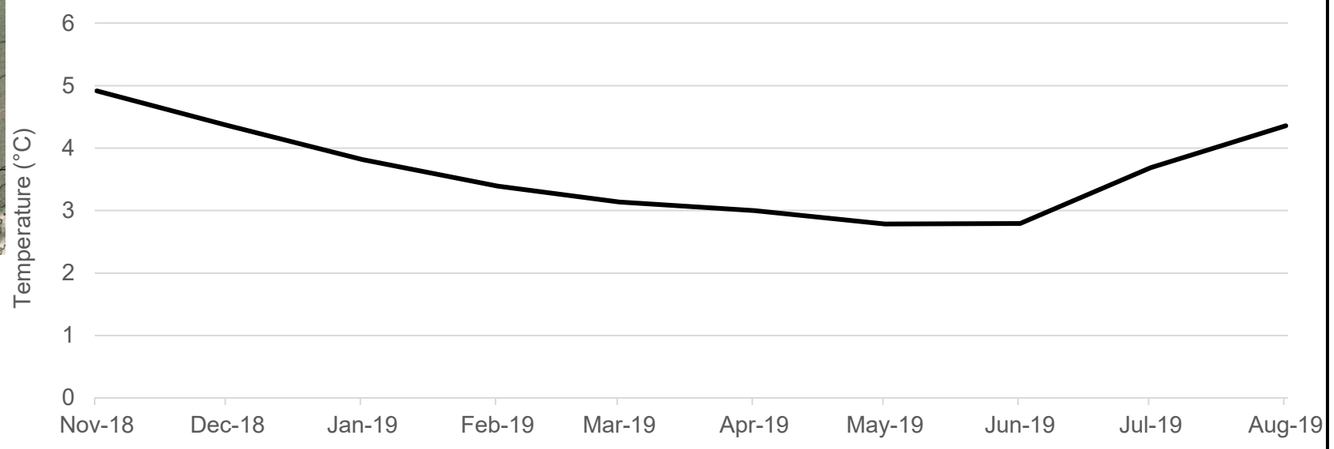
NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11





CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

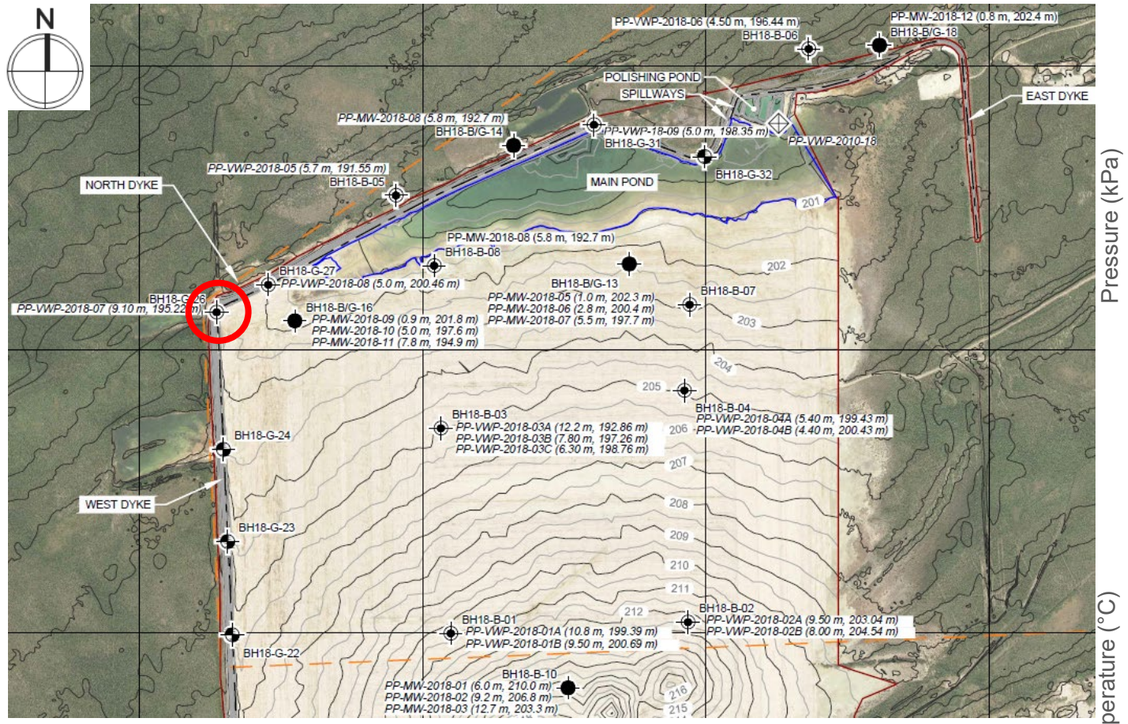
YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
BOREHOLE BH18-B-06
VIBRATING WIRE PIEZOMETER PP-VWP-18-06

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	D-9

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm
0



0 500 1,000

1:20,000 METRES

INVESTIGATION NAMING CONVENTION

BH18-B/G-01

- BH18 – YEAR
- B – TYPE (BH - BOREHOLE)
- G – CONSULTANT (B - BARR, G - GOLDER, B/G - BARR AND GOLDER)

PIEZOMETER INSTALL
PP-VWP-2018-02A (8.00 m, 10 m)

- PP – PINE POINT
- VWP – VIBRATING WIRE PIEZOMETER
- 2018 – YEAR
- 02A – NUMBER
- 8.00 m – (DEPTH OF TIP m, ELEVATION OF TIP m)

MONITORING WELL INSTALL
PP-MW-2018-02A (9.22 m, 16 m)

- PP – PINE POINT
- MW – MONITORING WELL
- 2018 – YEAR
- 02A – NUMBER
- 9.22 m – (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

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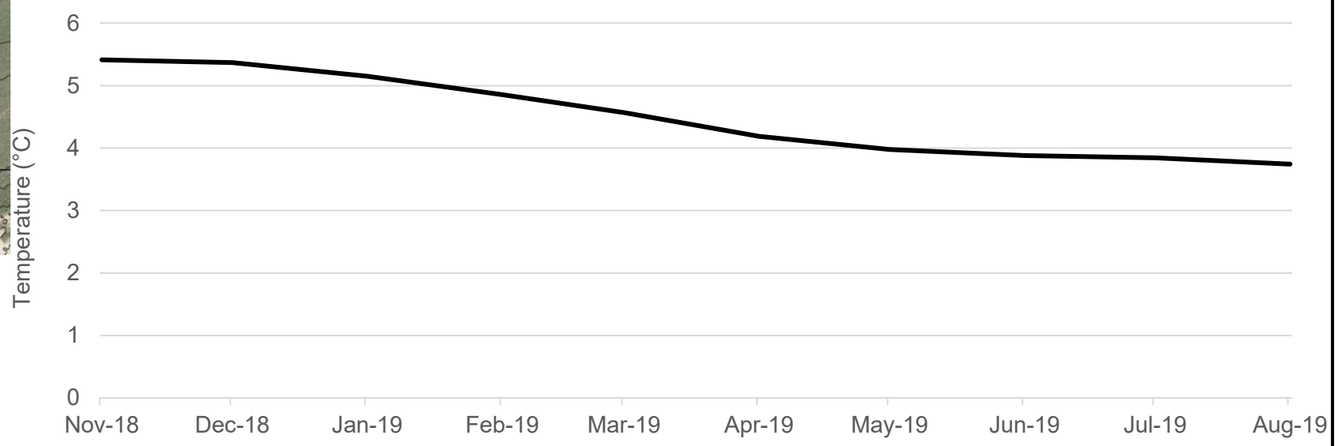
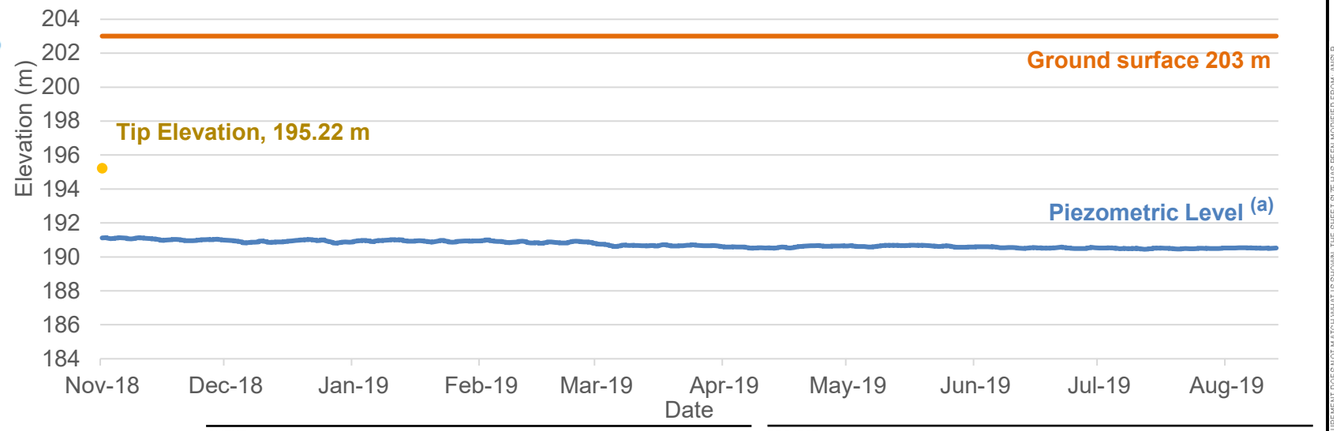
2. IMPOUNDMENT AREA TOPOGRAPHIC AND BATHYMETRIC SURVEY BY MASKWA ENGINEERING LTD., FILENAME: 18-034 Pine Point Tailings Topo Survey.dwg. SURVEY DATE: 2019-06-26, ORIGINAL SCALE 1:15,000. RECEIVED: 2019-08-12.
3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

NOTES:
(a) PLOTTED DATA DOES NOT INCLUDE ATMOSPHERIC PRESSURE CORRECTION. DATA EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
(b) PIEZOMETRIC LEVELS BELOW TIP ELEVATION INDICATES DRY CONDITION AT TIP ELEVATION. PIEZOMETRIC SURFACE BELOW TIP ELEVATION NOT INDICATIVE OF PIEZOMETRIC LEVEL
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11





CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

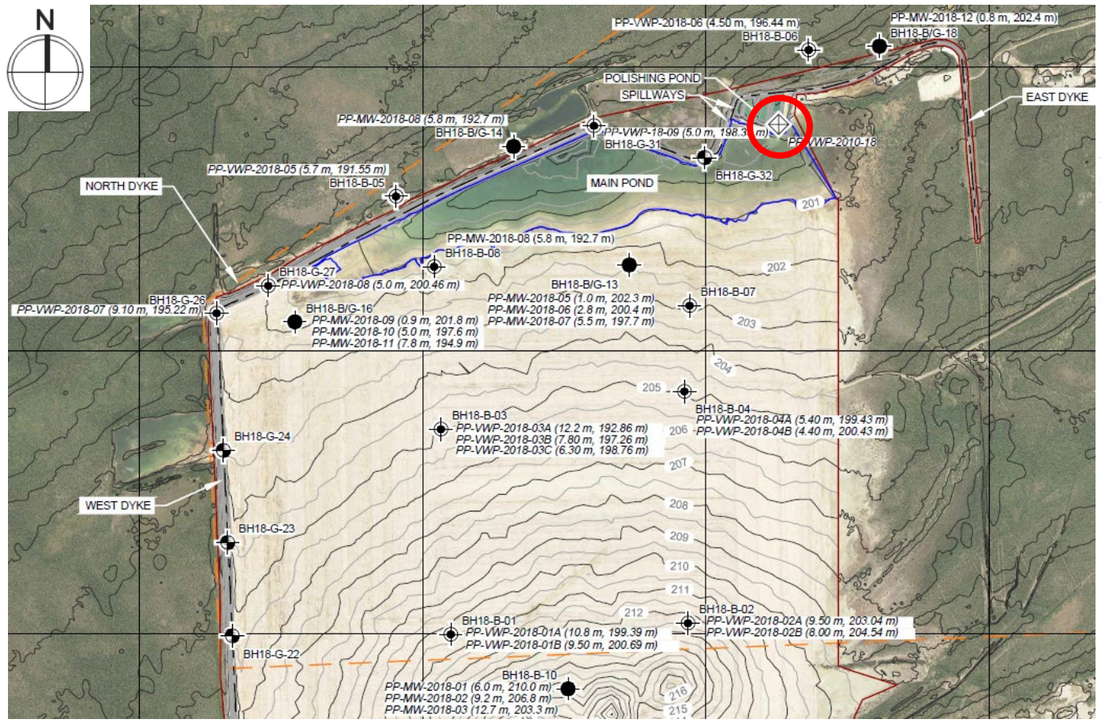
YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW

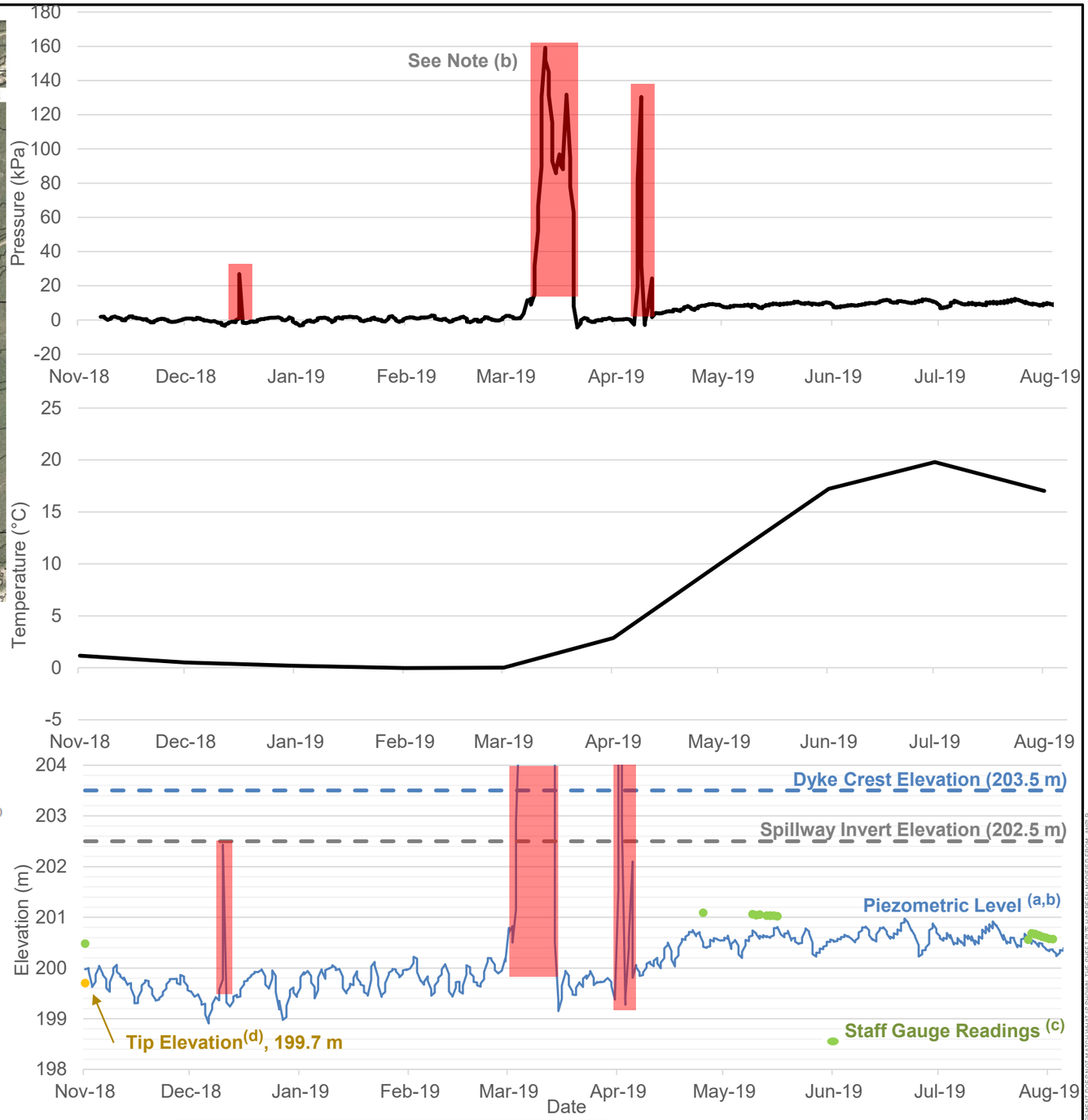
PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
BOREHOLE BH18-B-26
VIBRATING WIRE PIEZOMETER PP-VWP-18-07

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
18114183	3000/3500/209	0	D-10

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B
0 25 mm





INVESTIGATION NAMING CONVENTION

BH18-B/G-01

- TYPE: BH - BOREHOLE
- YEAR: 18
- CONSULTANT: B - BARR; G - GOLDER; B/G - BARR AND GOLDER

PIEZOMETER INSTALL *PP-VWP-2018-02A (8.00 m, 10 m)*

- PINE POINT: VIBRATING WIRE PIEZOMETER
- YEAR: 18
- NUMBER: 02
- (DEPTH OF TIP m, ELEVATION OF TIP m)

MONITORING WELL INSTALL *PP-MW-2018-02A (9.22 m, 16 m)*

- PINE POINT: MONITORING WELL
- YEAR: 18
- NUMBER: 02
- (DEPTH TO TOP OF SCREEN m, ELEVATION OF TOP OF SCREEN m)

LEGEND

- BOREHOLE
- BOREHOLE WITH TAILINGS FOCUSED SAMPLING
- BOREHOLE WITH NESTED WELL
- BOREHOLE WITH PIEZOMETER
- MAIN POND PIEZOMETER
- APPROXIMATE DYKE CRESTS
- APPROXIMATE SURFACE LEASE BOUNDARY (SEE REFERENCE 1)
- EXTENT OF MAIN POND (SEE REFERENCE 2)
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 1 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- EXTENT OF TOPOGRAPHIC/BATHYMETRIC SURVEY (SEE REFERENCE 2)
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- PIEZOMETER LOCATION

REFERENCES

1. SURFACE LEASE BOUNDARY OBTAINED FROM BARR ENGINEERING LTD., FILENAME: PinePoint_SiteFeatures.zip, RECEIVED: 2018-06-26.
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3. SURROUNDING AREA TOPOGRAPHIC SURVEY AND ORTHOPHOTO BY PHOTOSAT, FILENAME: pine_point_wo4077_survey.zip. SURVEY DATE 2019-07-14. RECEIVED: 2019-09-03 FROM TECK.

NOTES:

(a) ATMOSPHERIC PRESSURE CORRECTION APPLIED TO VWP ELEVATIONS UP TO 15 AUG ONLY. DATA AFTER 15 AUG EXPECTED TO VARY BY -4.3 KPA TO 2.5 KPA WITH CORRECTION
(b) RED SHADING INDICATES ERRORS ATTRIBUTED TO FREEZE/THAW
(c) STAFF GAUGE LOCATED AT CULVERT INVERT TO POLISHING POND
(d) PIEZOMETER TIP ELEVATION ASSUMED.
1. ELEVATIONS SHOWN IN UTM NAD83, ZONE 11

CLIENT
TECK METALS LTD.

CONSULTANT
GOLDER

YYYY-MM-DD	2019-11-06
PREPARED	HLJ
DESIGNED	HLJ
REVIEWED	MBW
APPROVED	BEW

PROJECT
PINE POINT TAILINGS IMPOUNDMENT AREA
2019 DAM SAFETY INSPECTION
PINE POINT, NT

TITLE
MAIN POND
VIBRATING WIRE PIEZOMETER PP-VWP-18-10

PROJECT NO.	PHASE/TASK/DOC.	REV.	FIGURE
18114183	3000/3500/209	0	D-11

APPENDIX E

Tailings Pond Water Levels

Date	Water Elevation (m)
May-09	201.45
Oct-09	200.20
May-10	201.49
Jul-10	200.65
Oct-10	200.17
May-11	201.31
Jul-11	201.16
Oct-11	200.15
May-12	201.21
Aug-12	201.00
Oct-12	200.02
May-13	201.22
Jul-13	201.03
Oct-13	200.19
May-14	201.20
Jul-14	201.00
Oct-14	199.73
May-15	201.00
Oct-15	200.37
May-16	201.43
Oct-16	200.39
May-17	201.67
Jun-17	201.62
Jul-17	201.03
Oct-17	200.39
May-18	202.05
Jun-18	201.72
Jul-18	201.71
Aug-18	201.60
Oct-18	200.48
May-19	201.09
Aug-19[(a)]	200.69
Aug-19[(b)]	200.56
Aug-19[(c)]	200.37
Oct-19	200.39

a) 2 August 2019 - Start of Water treatment.

b) 12 August 2019 – DSI Site Visit.

c) 30 August 2019 – End of Water Treatment.

golder.com