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YANKEE DOODLE TAILINGS IMPOUNDMENT
2021 ANNUAL INSPECTION REPORT

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EXECUTIVE SUMMARY

This 2021 Annual Inspection Report (AIR) was prepared by Knight Piésold Ltd. (KP) and the Engineer of Record (EOR) and complies with MCA 82-4-381: Annual Inspections. The EOR for the Yankee Doodle Tailings Impoundment (YDTI) is currently Mr. Daniel Fontaine, P.E. of KP, who accepted the role of EOR on September 10, 2021. Mr. Ken Brouwer, P.E. of KP had previously held the role of EOR since September 2015 and remains available to the KP and Montana Resources, LLP (MR) team as a Principal technical reviewer. The annual inspection of the YDTI was completed by Mr. Fontaine on September 13, 2021, who was accompanied by Mr. Mike Harvie (Manager of Engineering and Geology) of MR throughout the inspection.

This report provides an overview of the observations of the YDTI facilities and covers the YDTI, including the associated embankments, tailings distribution works, reclaim water systems, monitoring devices, stormwater diversions, and other ancillary structures associated with the operation, maintenance, and surveillance of the YDTI. This AIR includes:

- observations made by the EOR during visual inspections and review of the available monitoring data
- observations made based on videos collected using an Unmanned Aerial Vehicle (UAV)
- observations made by others from KP and MR during various visual inspections and field reviews of the impoundment
- discussion of information collected during the ongoing Central Pedestal Area construction monitoring program
- discussion of the subsurface and surface monitoring programs
- discussion of the Quantitative Performance Parameters (QPPs)
- discussion of recent important trends and additional future considerations
- identification of recommended actions required for ongoing operation and maintenance of the facility

The YDTI continues to be developed and operated in a manner consistent with the designs, the QPPs, and the operating protocols established for the facility. No piezometric trigger elevation exceedances were observed at QPP monitoring sites during 2021 and the facility was observed to be in good condition during the annual inspection. YDTI construction activities since the previous annual inspection include the construction of the majority of the elevation (EL.) 6,450 ft West Embankment, initial construction of the EL. 6,450 ft rockfill surcharge along the upstream side of the Central Pedestal Area, and construction of the EL. 6,250 ft, 6,300 ft, 6,350 ft and 6,400 ft lifts at the corner of the North-South and East-West Embankments. MR also undertook construction work for the realignment of the Reclaim Water Pipeline along Rampart Mountain.

Construction activities were routinely completed and monitored as outlined in the CMP (KP, 2018c), and construction progress was regularly reviewed by the EOR by means of weekly inspection reports and Monthly Quality Control progress reports completed by MR, Quarterly Field Reviews by both KP and MR representatives, and the Central Pedestal Area construction monitoring program progress reports.

A risk assessment (KP, 2018d) was undertaken during preparation of the design document associated with continued construction of the embankments to a crest elevation of 6,450 ft. The risk assessment identified potential failure modes and the factors affecting likelihood and consequences associated with each failure mode. It was recognized that design and operating enhancements could provide further opportunities for risk mitigation, and these enhancements continue to be progressively implemented at the YDTI. There was uncertainty identified in the risk assessment due to the reliance on modelling predictions and observational monitoring related to several factors was planned, including tailings beach development, pore pressure changes within the embankment, and water inventory changes. The trends related to these factors are regularly discussed in the quarterly and annual surveillance reporting, and a status update related to each is provided in this report.

A Corrective Action Plan (CAP) was prepared by MR in response to the 2020 AIR recommendations on February 11, 2021. The CAP identified the actions proposed or undertaken to address the 2020 recommendations. Recommendation #2 from the 2020 CAP was deferred by MR due to ongoing EL. 6,450 North-South Embankment construction, otherwise all other recommendations were addressed.

The EOR has identified the following recommendations for consideration in 2022 based on a review of the information collected and conditions observed in 2021:

1. **Maintain reductions in freshwater use from the Silver Lake Water System to the extent reasonably practicable and continue the Pilot Project to incrementally reduce the water inventory in the YDTI supernatant pond towards the target of approximately 15,000 acre-ft (continuation of 2020 recommendation).**
2. **Modify the tailings distribution system by extending Line 2 to allow discharge at location NS-1 and NS-2 when the EL. 6,450 ft raise of the embankment is completed adjacent to these discharge locations (deferral from 2020 recommendations).**
3. **Modify the tailings distribution system to include two additional discharge locations as follows:**
   - **one located between the current locations of EW-1 and NS-1.**
   - **one located between the current locations of NS-1 and NS-2.**
4. **Implement additional alluvium facing at the interface between the rockfill surcharge and tailings beach between Section 23+00 NW and Section 13+00 N along the upstream face of the EL. 6,400 ft surcharge lift.**
5. **Infill low areas along the downstream side of the North-South Embankment and regrade the embankment crest from approximately Section 43+00 N towards the north.**
6. **Complete maintenance work in the upper HsB area to improve drainage and limit ponding in this area.**
7. **Develop and implement a new system to collect flows along the Seep 10 bench and convey these flows to the HsB Pond. Re-grade the Seep 10 bench surface to enhance drainage collection and limit ponding of water to the extent practicable.**
8. **Investigate options for automating collection of the HsB Weir flow monitoring data using the Sensemetrics remote monitoring system platform.**

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APPENDICES

ABBREVIATIONS

ACC............ Anaconda Copper Company
AIR............ Annual Inspection Report
AR............ Atlantic Richfield Company
BMFOU............ Butte Mine Flooding Operable Unit
BPPS............ Berkeley Pit Pumping System
CAP............ Corrective Action Plan
CMP............ Construction Management Plan
CPP............ Construction Performance Parameters
DAR............ Data Analysis Report
DH............ Drillhole
E............ East
EAP............ Emergency Action Plan
EL............ Elevation
EOR............ Engineer of Record
GNSS............ Global Navigational Satellite System
HDPE............ High-Density Polyethylene
HsB............ Horseshoe Bend
HsBCS............ Horseshoe Bend Capture System
InSAR............ Interferometric Synthetic-Aperture Radar
IPI............ In-place-inclinometer
IRP............ Independent Review Panel
KP............ Knight Piésold Ltd.
MBMG............ Montana Bureau of Mines and Geology
MDEQ............ Montana Department of Environmental Quality
MCA............ Montana Code Annotated
MGPD............ Million gallons per day
MR............ Montana Resources, LLP
N............ North
Pilot Project............ Berkeley Pit and Discharge Pilot Project
Q............ Quarter
QPPs............ Quantitative Performance Parameters
RDS............ Rockfill Disposal Site
RMS............ Remote Monitoring System
S............ South
SLWS............ Silver Lake Water System
TAC............ The Anaconda Company
TARP............ Trigger-Action Response Plan
TOMS............ Tailings Operations, Maintenance, and Surveillance
tpd............ Short Tons per day
TSX............ TerraSAR-X
UAV............ Unmanned Aerial Vehicle
VWP............ Vibrating Wire Piezometer

W .... West
WED .... West Embankment Drain
WET .... Water and Environmental Technologies
WTP .... Water Treatment Plant
YDTI .... Yankee Doodle Tailings Impoundment

1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 GENERAL

Montana Resources, LLP (MR) operates an open pit copper and molybdenum mine in Butte, Montana. MR has owned and operated the mine site since the 1980's and is currently mining the Continental Pit with a nominal concentrator throughput rate of approximately 45,000 short tons per day (tpd). The property was acquired from Atlantic Richfield Company (AR) and the former Anaconda Copper Company (ACC) who had previously mined the Berkeley Pit since 1955. The key components of the MR facilities include the:

- Continental Pit
- Mill and processing facilities (the Concentrator)
- Yankee Doodle Tailings Impoundment (YDTI)
- Historical leach facilities
- Horseshoe Bend (HsB) area and Precipitation Plant

1.1.2 YANKEE DOODLE TAILINGS IMPOUNDMENT

Tailings produced from the process are stored in the YDTI. The YDTI was originally constructed in 1963 and the embankments have been constructed to elevation (EL.) 6,400 ft using rockfill from the Berkeley Pit (until 1982) and from the Continental Pit (beginning in 1986). The YDTI comprises a valley-fill style impoundment created by a continuous rockfill embankment that for descriptive purposes is divided into three embankment sections: the North-South Embankment, the East-West Embankment, and the West Embankment. The current maximum embankment height is approximately 750 ft along the southern end of the impoundment upstream of the HsB area.

The jurisdiction for the YDTI resides with the Montana Department of Environmental Quality (MDEQ). The YDTI is not subject to dam hazard potential classification within the State (Montana Code Annotated (MCA) 85-15-209) as embankments for tailings impoundments and water reservoirs subject to permits issued by MDEQ are specifically exempt from provisions of the Montana Dam Safety Act (MCA 85-15-107). MR currently holds one MDEQ operating permit, following amalgamation of the four previous operating permits. An amendment to the operating permit was approved in August 2019 to allow for continued use of the YDTI, which will be facilitated by continued construction of the embankment to a crest elevation of 6,450 ft and operation of the West Embankment Drain (WED). The final permit was issued in early 2020. Construction of the EL. 6,450 ft lift of the embankment is underway and expected to be complete in late 2022.

The MR facilities, mine operations, and YDTI operational procedures are described in additional detail in the MR report entitled *'Yankee Doodle Tailings Impoundment – Tailings Operations, Maintenance and Surveillance (TOMS)* Manual' (MR/KP, 2021). The best practices employed at the site continue to progressively evolve, taking advantage of the best practicable new technologies and techniques to enhance dam safety. The design, construction, operation, maintenance, and surveillance of the YDTI involves a multidisciplinary team of professionals. The team works closely together to achieve the fundamental objective of ongoing continuous improvement of the safety of the impoundment.

1.1.3 HORSESHOE BEND AREA

The HsB area is shaped like an inverted 'U', bounded to both the east and west by historically leached mine rock and to the north by the East-West Embankment. The HsB area contains infrastructure related to YDTI seepage collection and mine leach operations along with miscellaneous mine buildings, including the truck maintenance workshop. The project arrangement is shown on Figure 1.1. Sources contributing to seepage from the YDTI facility includes tailings slurry water that percolates into the tailings beach, meteoric recharge to the tailings surface, and seepage from the supernatant pond. Groundwater discharges downstream (south) of the facility in the following four areas:

- Number 10 Seep (Seep 10)
- Leach seeps (reporting to Houligan Pond and the Precipitation Plant circuit)
- Historical Drain
- HsB seeps (north of the Precipitation Plant and reporting to the upper HsB area

The flows collected at Seep 10 are conveyed to the upper HsB area where they combine with the HsB seeps, flows from the historical drain, and local runoff prior to the Cell 10 Pump. The pump conveys the flows to the #10 Cell of the Precipitation Plant for processing. The Cell 10 discharge pipe flow is measured using a calibrated Parshall flume (the Precipitation Flume) prior to discharging to the HsB Pond.

Leaching of uncrushed low grade rockfill historically occurred in the area immediately south of the YDTI. Barren leach solution recirculation activities were terminated on July 13, 2021 following a months long process of gradually reducing recirculation. The remaining pregnant leach solution and drainage from precipitation and runoff from the leach areas is gradually being collected with surface drainage ditches along the east and northeast side of the HsB area. The surface ditches convey the water to one of either three historical pre-processing storage ponds: Houligan, Surge, or Holding. Leach solution is discharged from these ponds to the Precipitation Plant for processing. The leach operation was historically a gaining system that resulted in overflow to the HsB Pond depending on the operation of the recirculation pumps. All flow is now discharged to the HsB Pond. The flow is measured using a calibrated weir plate with water level measurement (the Precipitation Weir) prior to discharge to the HsB Pond; however, unmeasured flow bypasses also occur due to the system arrangement.

The HsB Pond is a long, narrow basin approximately 100 ft wide and 2,000 ft long. Flow rates in the HsB area have been measured regularly since 1996 using a weir established by the Montana Bureau of Mines and Geology (MBMG). Flow through the HsB Pond is continuously measured using a weir plate and level meter near the south end of the pond.

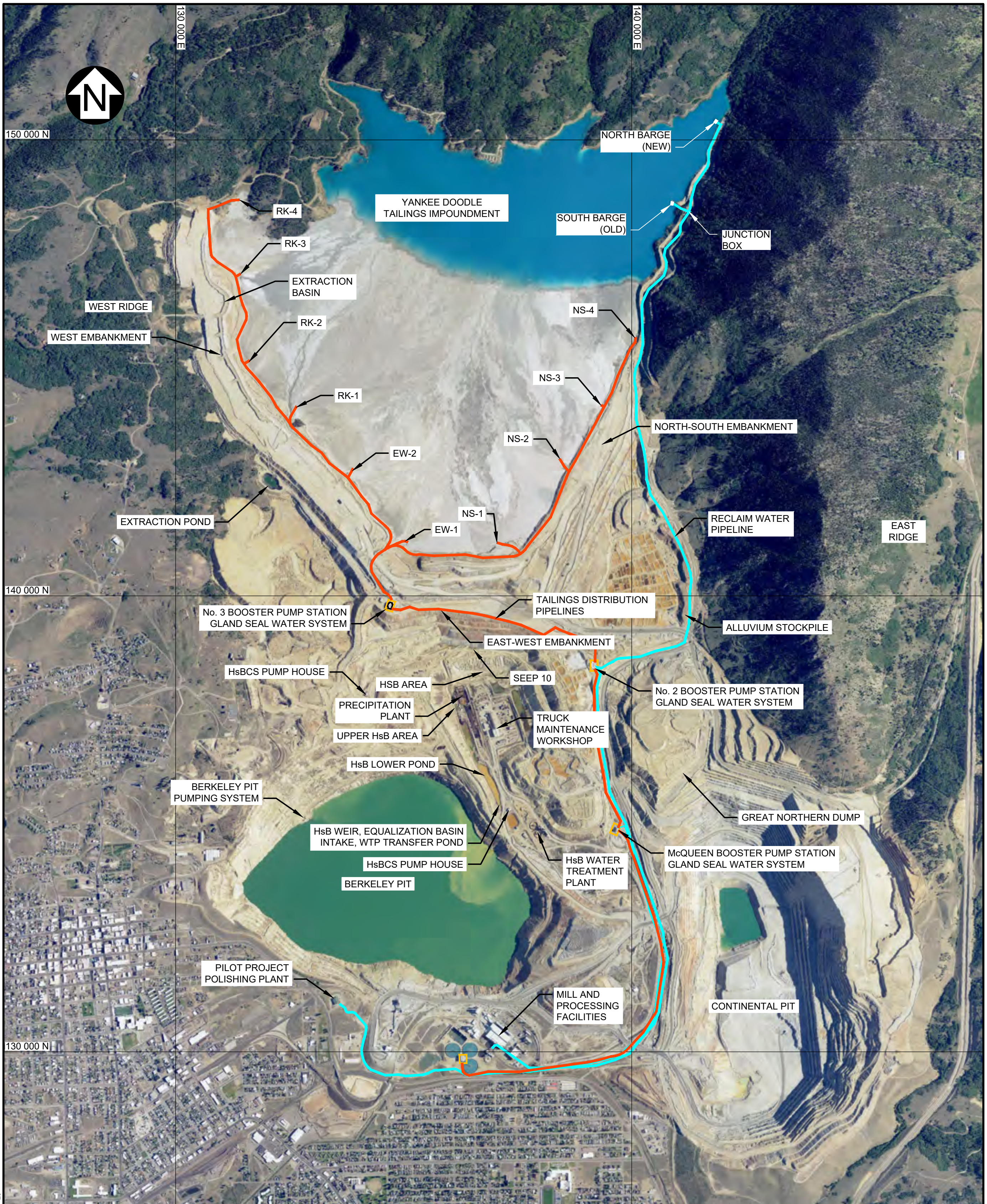
1.1.4 BERKELEY PIT AND DISCHARGE PILOT PROJECT

The Berkeley Pit and Discharge Pilot Project (the Pilot Project), commissioned in 2019 and associated with the Butte Mine Flooding Operable Unit (BMFOU) of Superfund, facilitates the treatment and release of up to 10 million gallons per day (MGPD) of water from the YDTI. One goal of the pilot project is to progressively reduce the YDTI supernatant pond volume to approximately 15,000 acre-ft over the next 2 to 3 years. The Pilot Project is not entirely within MR's control and a variety of factors and interruptions are possible that could impact the timeline.

As part of the Pilot Project, Berkeley Pit water is pumped using the Berkeley Pit Pumping System (BPPS), consisting of a floating barge system and land-based pump house, to the Number 5 Cell in the Precipitation

Plant. Approximately 3 million gallons per day (MGPD) of Berkeley Pit water is treated and introduced into the site water management system when the BPPS is operating. Flow rates are typically measured by an in-line flowmeter on the BPPS. The flow is gravity discharged from the Precipitation Plant Cell 5 using High-Density Polyethylene (HDPE) pipelines. Under normal conditions flows are conveyed along the west side of the HsB Pond to a small transfer pond and pump located to the west of the HsB Weir. A second HDPE pipeline is available for upset conditions and the flows are conveyed directly to the HsB Pond.

Flow discharged to the transfer pond is either pumped to either the Horseshoe Bend Water Treatment Plant (HsB WTP) or the Horseshoe Bend Capture System (HsBCS). The HsBCS flows are conveyed via two HsBCS pump houses and metered into the tailings (which have additional lime to facilitate treatment of this water) at a manifold after the No. 3 (Tailings) Booster Pump House. The combined flow is discharged into the YDTI, and the supernatant pond provides residence time for water treatment objectives to be achieved. Flows directed to the HsB WTP are treated before being conveyed to the Concentrator for incorporation into the tailings circuit and additional treatment at the YDTI.



NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS ARE BASED ON ANACONDA MINE GRID.
2. AERIAL IMAGERY FROM JULY 29, 2021 PROVIDED BY MONTANA RESOURCES, LLP.

SCALE A: 1500 0 1500 3000 4500 6000 7500 ft

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MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

PROJECT ARRANGEMENT

Knight Piésold CONSULTING

P/A NO. VA101-126/25

REF NO. 2

FIGURE 1.1

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SAVED: M:\1\01\00126\25\A\Acad\FIGS\A16, 12/22/2021 2:54:41 PM , RMCLELLAN PRINTED: 1/10/2022 2:52:21 PM, FIG 1.1, RMCLELLAN

XREF FILE(S): 5ft_01_2021-07-29; IMAGE FILE(S): 5ft_01_2021-07-29

1.2 SCOPE OF REPORT

This 2021 Annual Inspection Report (AIR) was prepared by Knight Piésold Ltd. (KP) and complies with MCA 82-4-381: Annual Inspections. The report provides an overview of the observations of the YDTI facilities and covers the YDTI, including the associated embankments, tailings distribution works, reclaim water systems, monitoring devices, stormwater diversions, and other ancillary structures associated with the operation, maintenance, and surveillance of the YDTI. This AIR presents information contained in historical and more recent reports and includes:

- observations made by the Engineer of Record (EOR) during visual inspections and review of the available monitoring data
- observations made based on videos collected using an Unmanned Aerial Vehicle (UAV)
- observations made by others from KP and MR during various visual inspections and field reviews of the impoundment
- discussion of information collected during the ongoing Central Pedestal Area construction monitoring program
- discussion of the subsurface and surface monitoring programs
- discussion of the Quantitative Performance Parameters (QPPs)
- discussion of recent important trends and additional future considerations
- identification of recommended actions required for ongoing operation and maintenance of the facility

KP has provided engineering services for the YDTI in support of on-going mining operations since 2015 and, in collaboration with the EOR, prepares the AIR. The structure of this report is generally consistent with the scope of the last several inspection reports (KP, 2018a; KP, 2019a; KP, 2020a; KP, 2021a).

An annual Data Analysis Report (DAR) summarizing the instrumentation and monitoring records and trends for the YDTI has been prepared separately from the AIR since 2017 (KP, 2018b; KP 2019b; KP, 2020b; KP, 2021b). The 2021 DAR will again be prepared in 2022 to present the YDTI instrumentation and monitoring records for the 2021 calendar year, when the necessary records are available.

1.3 ENGINEER OF RECORD

The EOR for the YDTI is currently Mr. Daniel Fontaine, P.E. of KP, who accepted the role of EOR on September 10, 2021. Mr. Ken Brouwer, P.E. of KP had previously held the role of EOR since September 2015. The transition of the EOR responsibilities was outlined in a letter to MR (KP, 2021c) and notification was provided to the MDEQ as required by MCA 82-4-375(4). The former EOR, Mr. Brouwer, remains available to the KP and MR team as a Principal technical reviewer.

1.4 REFERENCE COORDINATE SYSTEM AND DATUM

Coordinates and elevations in this report are referenced to the site coordinate system known as the ‘Anaconda Mine Grid’ established by The Anaconda Company (TAC) in 1957. The Anaconda Mine Grid is based on the ACC Datum established in 1915. The MR Site Coordinate System is based on the Anaconda Mine Grid and utilizes International Feet. All elevations are stated in Anaconda Mine Grid coordinates with respect to the ACC Vertical Datum unless specifically indicated otherwise.

2.0 INSPECTIONS AND OBSERVATION METHODS

2.1 GENERAL

Various inspections and data reviews of the YDTI were completed throughout 2021 and were used to inform the observations and recommendations detailed in this AIR. The information compiled confirms the YDTI continues to be constructed and operated in a manner consistent with the designs, QPPs, and operating protocols established for the facility. Key inspections and monitoring methods of the YDTI discussed herein include the following:

- EOR Annual Site Inspection
- Four quarterly construction field reviews of the YDTI
- Piezometric and deformation monitoring instrumentation and techniques
- Central Pedestal Area construction monitoring program
- Quantitative Performance Parameters

Other inspections of the YDTI completed during 2021 that generally inform the summary and conclusions presented herein also include the following:

- Weekly inspections of active YDTI construction areas performed by the MR Engineering Department. The inspections are summarized in weekly inspection reports provided to KP to document construction progress and used to track quantities of materials placed by the MR Operations Department.
- The MR Engineering Department performs a detailed inspection of the facility at least monthly and documents the inspection using an inspection log template from the TOMS Manual (MR/KP, 2021). Copies of the associated records are provided to the EOR periodically.
- Monitoring of 2021 site investigation activities performed by Kevin Davenport, P.Eng., Jesse Collison, P.Geo., and Gwen James, E.I.T. of KP between approximately June and December 2021.

MR and KP routinely monitor piezometric conditions, the supernatant pond elevation, tailings delivery system usage, beach elevation at tailings discharge locations, and flowrates at several water management locations. Real-time piezometric records and flow rates at the Seep 10 Weir are available to MR and KP via the web-based Remote Monitoring System (RMS) via the Sensemetrics web and mobile applications. Surveillance data is comprehensively reviewed by KP on a quarterly and annual basis, and summary reports are provided to MR, MDEQ, and the Independent Review Panel (IRP). The following surveillance reporting completed in 2021 was considered in conjunction with observations from the various inspections listed above to inform the discussion and conclusions contained in this report:

- The 2020 DAR (KP, 2021b), which summarized the monitoring and instrumentation data for the impoundment for the 2020 calendar year.
- Quarterly piezometric monitoring updates summarizing the piezometric data for QPP monitoring sites for Q1, Q2, and Q3 2021 (KP, 2021d; KP, 2021e; KP, 2021f).
- Quarterly summaries of water monitoring data, including the supernatant pond elevation, tailings beach development records, and flow records for Q1, Q2, and Q3 2021. (KP, 2021g; KP, 2021h; KP, 2021i).

2.2 MEANS OF OBSERVATION

2.2.1 UNMANNED AERIAL VEHICLE

Aerial videos of the YDTI were collected by Water and Environmental Technologies (WET) using an UAV in June 2021. The desired flight paths were outlined by KP, and the video footage captured by the UAV was used to prepare a comprehensive series of site tour videos, similar to those prepared in June of 2020. The site tour videos were reviewed by the EOR, KP and MR, and provide valuable documentation of the construction progress and conditions as observed in June 2021. Select images extracted from the site tour videos are included in Appendix A (Photos 1 to 26).

2.2.2 ANNUAL INSPECTION SITE VISIT

The annual inspection of the YDTI was completed by the Mr. Daniel Fontaine, P.E., the EOR, on September 13, 2021. Mr. Fontaine was accompanied by Mr. Mike Harvie (Manager of Engineering and Geology) of MR throughout the inspection. The facility was observed to be in good condition, and active construction was ongoing in the Central Pedestal Area (EL. 6,300 ft and EL. 6,350 ft lifts) as well as the realignment of the reclaim water pipeline access ramp during the site visit. Observations from the annual site inspection are presented in Section 3. Select Photographs from the annual inspection are included in Appendix A (Photos 27 through 76). An overview of the facility observed from the Sentintel-2 satellite image on September 15, 2021 is included on Figure 2.1.

2.2.3 2021 QUARTERLY CONSTRUCTION FIELD REVIEWS

Quarterly construction field reviews were performed during 2021 as per the requirements outlined in the Construction Management Plan (CMP) (KP, 2018c). Mr. Mike Harvie (Manager of Engineering and Geology) of MR performed two (Quarter 1 (Q1) and Q2) of the four 2021 quarterly construction field reviews as the official designate of the EOR. Mr. Harvie completed these reviews, similar to the four quarterly field reviews completed in 2020, due to the COVID-19 pandemic and associated travel restrictions. Mr. Harvie provided photos, videos, and other documents that were reviewed by KP to inform the opinions and conclusions provided in the quarterly field review letters completed by KP (KP, 2021j; KP, 2021k). The Q1 field review was performed on March 19-20 and Q2 on June 23-27.

The Q3 (August 18, 2021) (KP, 2021l) and Q4 (November 17, 2021)field reviews were completed by Mr. Fontaine and Mr. Jason Gillespie, P.Eng. of KP, respectively. The format of the field review summary letter was revised by KP starting with the Q3 period. The quarterly summary letters now include a more detailed construction summary, including end of quarter progress images and placement tonnages provided by MR, along with the observations and recommendations from the field review. The 2021 Q3 Construction Summary and Field Review (KP, 2021l) is included as Appendix B. The Q4 summary letter is in progress and will be completed by KP in early 2022 once end of year construction data is available.

NOTES:

1. TAILINGS DISCHARGE AND SUPERNATANT POND ELEVATIONS WERE SURVEYED ON SEPTEMBER 15, 2021. ALL ELEVATIONS ARE RELATIVE TO THE ANACONDA DATUM.
2. THE MINIMUM BEACH LENGTH AT THE NORTHERN EXTREMITY OF THE N-S EMBANKMENT IS MEASURED FROM THE TAILINGS BEACH AND UPSTREAM EMBANKMENT INTERFACE, AT THE INTERSECTION OF THE N-S EMBANKMENT AND NATURAL TOPOGRAPHY OF RAMPART MOUNTAIN, TO THE TAILINGS BEACH AND POND SURFACE INTERFACE.
3. SENTINEL-2 VISIBLE SATELLITE IMAGE TAKEN ON SEPTEMBER 17, 2021.

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MONTANA RESOURCES, LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

SENTINEL-2 SATELLITE IMAGERY
FACILITY OVERVIEW
SEPTEMBER 15, 2021

Knight Piésold CONSULTING

P/A NO.	REF. NO.
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FIGURE 2.1 REV 0

2.2.4 PIEZOMETRIC INSTRUMENTATION AND MONITORING

Pore pressures are monitored at 109 active instrumentation locations at the YDTI and in the West Ridge and HsB areas. These sites include 39 standpipe piezometers/monitoring wells, 68 drillholes with active vibrating wire piezometers (VWPs) and two Elexon Geo4Sight installations (multi-node deformation and pore water pressure instruments). Piezometric data are accessible to KP via the RMS and data from QPP sites are reviewed weekly by KP and MR. Most existing standpipe piezometers and monitoring wells have been outfitted for continuous monitoring by suspending a VWP sensor within the PVC riser and connecting the sensor via radiotelemetry to the RMS.

The 2020 and 2021 geotechnical investigations included the installation of Elexon Geo4Sight instrumentation (multi-node wireless deformation and pore water pressure monitoring instruments) at two locations upstream of the embankment crest on Sections 8+00W (Drillhole (DH) DH20-S2) and 0+00 (DH21-S4). These instruments provide detailed pore water pressure profiles within tailings, rockfill and foundation materials. Pore pressure sensors (markers) are spaced at 6 ft and 18 ft vertical spacing within rockfill and tailings materials, respectively. Geo4Sight data are downloaded and reviewed approximately monthly.

2.2.5 DEFORMATION INSTRUMENTATION AND MONITORING

KP and MR continue to monitor surface and subsurface embankment deformations using in-situ instrumentation and remote sensing techniques. Surface deformations are actively monitored using satellite-based interferometric synthetic aperture radar (inSAR), laser scanning, manual DGPS survey-monitoring and using Global Navigational Satellite System (GNSS) instrumentation. These techniques are further described below.

InSAR remote sensing provides comprehensive spatial assessment satellite-based surface displacements throughout the YDTI Embankments, with measurements collected every 11 days. Data were processed by TRE-Altamira in the following formats during 2021:

- Long-term inSAR evaluations (SqueeSAR) use satellite data from 2-dimensional TerraSAR-X (TSX) satellite constellation to monitor millimeter precision vertical, east-west and line-of-sight surface displacements. Data are typically processed and reported twice per year in July and November. The long-term reports (TRE, 2021a; TRE, 2021b) covering the period of April to November are included n Appendix C.
- Short-term inSAR monitoring (Bulletins) use 1-dimensional TSX data from an ascending orbit to monitor line-of-sight surface deformations over a 22-day observation period. These shorter-term analyses were intended to provide more regular inSAR reporting as compared with the SqueeSAR analyses to support active construction monitoring during 2021. Bulletin analyses were completed every 11-days from approximately April through October 2021, with results made available within a week of acquiring the second inSAR dataset. Bulletin analyses are capable of detecting deformations occurring at between approximately 3 and 50 in/year.

Lateral surface deformations within the Central Pedestal Area of the East-West Embankment were monitored using weekly Maptek I-Site laser scans from mid-June 2021. Scanning results were used to screen for elevated construction-related deformations within the downstream slope of the embankment. Weekly scans were received in June through October and monthly scanning is planned for Q4 2021 and into 2022.

Manual DGPS survey-monitoring of surface deformations in proximity to the active Central Pedestal Area embankment and surcharge construction was completed from June through December 2021 at 15 monument locations. This technique monitors both lateral and vertical deformations and was useful for monitoring influence from nearby embankment construction. Daily measurements were collected by KP from June through October followed by measurements three times per week completed by MR during November and December 2021. Continuation of the current survey program is scheduled for 2022 during active central pedestal construction.

GNSS instruments are installed on the embankment surface to monitor surface deformation at four locations (DH19-S3, DH19-S4, DH19-S5, and DH19-S7) within the East-West Embankment central pedestal area. Surface deformation data (vertical and lateral deformation components) from GNSS instrumentation are available in near real-time via the RMS throughout the year. The GNSS data exhibit relatively high noise levels typical of this type of instrumentation and are considered suitable for assessment of long-term deformation trends and to monitor for changes in deformation rates and/or behavior on a monthly or longer timestep. GNSS data provide valuable deformation data for comparison with inSAR and DGPS monitoring results and maintain coverage during the snow-season, while inSAR data collection is unavailable.

Subsurface deformations are measured within the embankments at four inclinometer sites (DH19-S3, DH19-S4, DH19-S5, and DH19-S7), which are co-located with the GNSS surface displacement instrumentation discussed above. The inclinometers are instrumented with in-place-inclinometer (IPI) sensors and monitor deformations oriented in two directions. The IPI instrumentation exhibits relatively high noise unless temporal-averaging is applied. KP typically analyzes IPI deformation data using monthly averaging applied to both the baseline and monitoring readings to remove noise and better monitor for long-term deformation trends. Two additional inclinometers were installed during 2021 to expand monitoring coverage. Regular monitoring of these sites will commence in 2022.

Site investigation programs completed in 2020 and 2021 included the installation of Elexon Geo4Sight instrumentation (multi-node wireless deformation monitoring instruments) at two locations upstream of the embankment crest on Sections 8+00W (DH20-S2) and 0+00 (DH21-S4) This instrumentation monitors angular deformation within tailings, rockfill and foundation materials, similar to an inclinometer, and have been useful for monitoring sub-surface deformations associated with ongoing construction. These instruments will continue to be monitored and reported during 2022.

2.2.6 CENTRAL PEDESTAL CONSTRUCTION MONITORING PROGRAM

A focused construction monitoring program for the ongoing construction of the Central Pedestal Area (downstream side of the East-West and North-South Embankments between approximately Section 12+00W and 18+00N) was initiated in June 2021 and continued throughout 2021. Approvals for each sequential construction lift was provided by the EOR (KP, 2021m, 2021n, 2021o, 2021p) and are included in Appendix D. Construction progress and monitoring letters, typically completed monthly, were produced by KP to document and present trends identified during the construction period. Monitoring period letters have been completed since from the start of construction June through November 2021.

The monitoring program includes the following:

- On-site construction supervision by a KP field engineer and/or MR site representative with duties including daily visual inspection, construction progress monitoring and QA/QC activities.

- Piezometric monitoring using tiered-thresholds and an associated Trigger-Action Response Plan (TARP) for select monitoring instruments beneath and downstream of the construction areas, which have been designated as Construction Performance Parameters (CPPs) as described in the Monitoring Period #1 Summary Letter included in Appendix E.
- Deformation monitoring techniques to monitor surface and subsurface embankment deformation in addition to the CPPs and TARPs. Deformation monitoring was completed using manual survey, in-situ instrumentation, and remote sensing techniques including:
  - Short-Term inSAR bulletin analyses.
  - MapTek laser scans of the Central Pedestal Area.
  - Crack mapping and progression monitoring.
  - Periodic review of GNSS surface deformation instrumentation data.
  - Periodic review of inclinometer data for assessment of subsurface deformation magnitudes/rates.

2.2.7 QUANTITATIVE PERFORMANCE PARAMETERS

The ongoing development and operation of the YDTI considers continuously achieving four key performance objectives as fundamental requirements for maintaining consistency with the design of the facility. These objectives incorporate the following:

- The YDTI supernatant pond remains separated from the embankments by large tailings beaches.
- The embankments and adjacent tailings beaches remain well drained, and piezometric elevations within the embankments remain below prescribed levels.
- Sufficient freeboard is maintained at all times to manage risks associated with extreme floods and seismic events.
- The embankment geometry, including downstream slope angle and crest width, remains consistent with the design criteria.

QPPs were selected during development of the MR TOMS Manual (MR/KP, 2021) to enable a high-level comparative assessment with the performance objectives listed above. The QPPs are intended to be easily measured and evaluated on-site without complex calculation. QPPs are therefore a good reference to quickly assess the performance of the YDTI. The QPPs from the MR TOMS Manual are included in Table 2.1 of this report for reference.

Table 2.1 Quantitative Performance Parameters

Location	QPP	Value
YDTI Supernatant Pond	Total Freeboard	> 22 ft
YDTI Tailings Beach	Minimum beach length	> 200 ft
YDTI Embankments	Downstream Overall Slope	No steeper than 2H:1V
	Minimum Crest Width	> 200 ft
East-West Embankment Piezometers	Water level: MW94-08	< 5,680 ft
	Water level: MW94-11	< 5,693 ft
	Water level: DH15-S3 VW1	< 5,690 ft
	Water level: DH15-S4 VW1	< 5,740 ft
	Water level: DH15-S4 VW2	< 5,800 ft
	Water level: DH15-S5 VW1	< 5,785 ft
	Water level: DH17-S1 VW2	< 5,741 ft
	Water level: DH18-S3 VW3	< 6,044 ft
	Water level: DH19-S7-VW1	< 5,770 ft
North-South Embankment Piezometers	Water level: MW12-01	< 5,940 ft
	Water level: MW12-05	< 6,200 ft
	Water level: DH18-S1 VW2	< 6,010 ft
	Water level: DH18-S2 VW2	< 6,029 ft
West Embankment Piezometers	Water level: VWP-DP1	< 6,374 ft
	Water level: VWP-DP2	< 6,366 ft
	Water level: DH15-12 VW1	< 6,372 ft
	Water level: DH15-12 VW2	< 6,372 ft
	Water level: DH15-12 VW3	< 6,372 ft

Note(s):

1. Table 2.1 above reproduced from Table 5.1 of the Tailings Operations, Maintenance and Surveillance (Toms) Manual (MR/KP, 2021).

MR routinely monitors piezometric conditions using more than 250 monitoring instruments at over 100 locations within the YDTI embankments, tailings mass, HsB area, and surrounding areas as part of their operational surveillance plan for the tailings facility as described in the TOMS Manual (MR/KP, 2021). Real-time piezometric records and flow rates at the Seep 10 Weir are available to MR and KP via the web-based RMS. The RMS uses a series of alerts to continuously evaluate for QPP trigger exceedances and to provide status updates that inform system maintenance needs. Advanced plotting and reporting tools were implemented beginning in 2019 to visualize the real-time data (piezometric level, change in level, sensor status, etc.).

3.0 OBSERVED CONDITIONS AND CHANGES

3.1 CONSTRUCTION PROGRESS AND CHANGES

YDTI construction continued since the previous annual inspection and throughout 2021, with the facility continuing to be observed in good condition. Construction activities were routinely completed and monitored as outlined in the CMP (KP, 2018c), and construction progress was regularly reviewed by the EOR by means of weekly inspection reports and Monthly Quality Control progress reports completed by MR, Quarterly Field Reviews by both KP and MR representatives, and the Central Pedestal Area construction monitoring program progress reports. Active construction areas during 2021 and facility changes noted below are illustrated on Figures 3.1 to 3.4. The main construction activities and notable changes at the YDTI and since the 2020 Annual Inspection are described below.

West Embankment:

- Construction of the EL. 6,450 ft West Embankment continued in 2021 with construction materials provided and placed by MR mining equipment. Fill placement was completed within Zone U and Zone D1 of this construction lift, including the majority of the tailings pipeline corridor.
- The Zone U lift and tailings pipeline corridor is nearly complete, with the notable exception of the northern end of the embankment where relocation of a municipal water pipeline is required before construction is completed.
- Zone D1 construction is in progress and is still to be completed on the downstream side of the embankment approximately between Section 82+00W and 110+00W.

East-West Embankment

- Fill placement within the EL. 6,450 ft rockfill surcharge along the upstream side of the Central Pedestal Area commenced in 2021. This area remains partially completed and requires the relocation of the tailings distribution pipelines up to the EL. 6,450 ft lift near discharge location EW-1 for construction to continue.
- Construction of the EL. 6,250 ft, 6,300 ft, 6,350 ft and 6,400 ft lifts of the East-West Embankment, in conjunction with the North-South Embankment in the Central Pedestal Area, was initiated in 2021 following the decommissioning of the old haul ramp and relocation of the tailings pipelines to the downstream edge of the new tailings pipeline ramp completed in 2020. Appropriate subgrade preparation and approvals were completed by KP and MR prior to lift construction.
- The majority of the northwest trending limb of the EL. 6,450 ft embankment and rockfill surcharge has been completed.
- Minor surficial cracking was observed at the downstream toe of the recent construction works, as well as at various locations along the outside edge of the tailings pipeline ramp in the general vicinity of drillhole DH20-S1. Cracking continues to be monitored by MR as part of the Central Pedestal Area construction monitoring program.

North-South Embankment

- Construction of the EL. 6,250 ft, 6,300 ft, 6,350 ft and 6,400 ft lifts of the North-South Embankment commenced in 2021 in combination with Eat-West Embankment construction as described above.

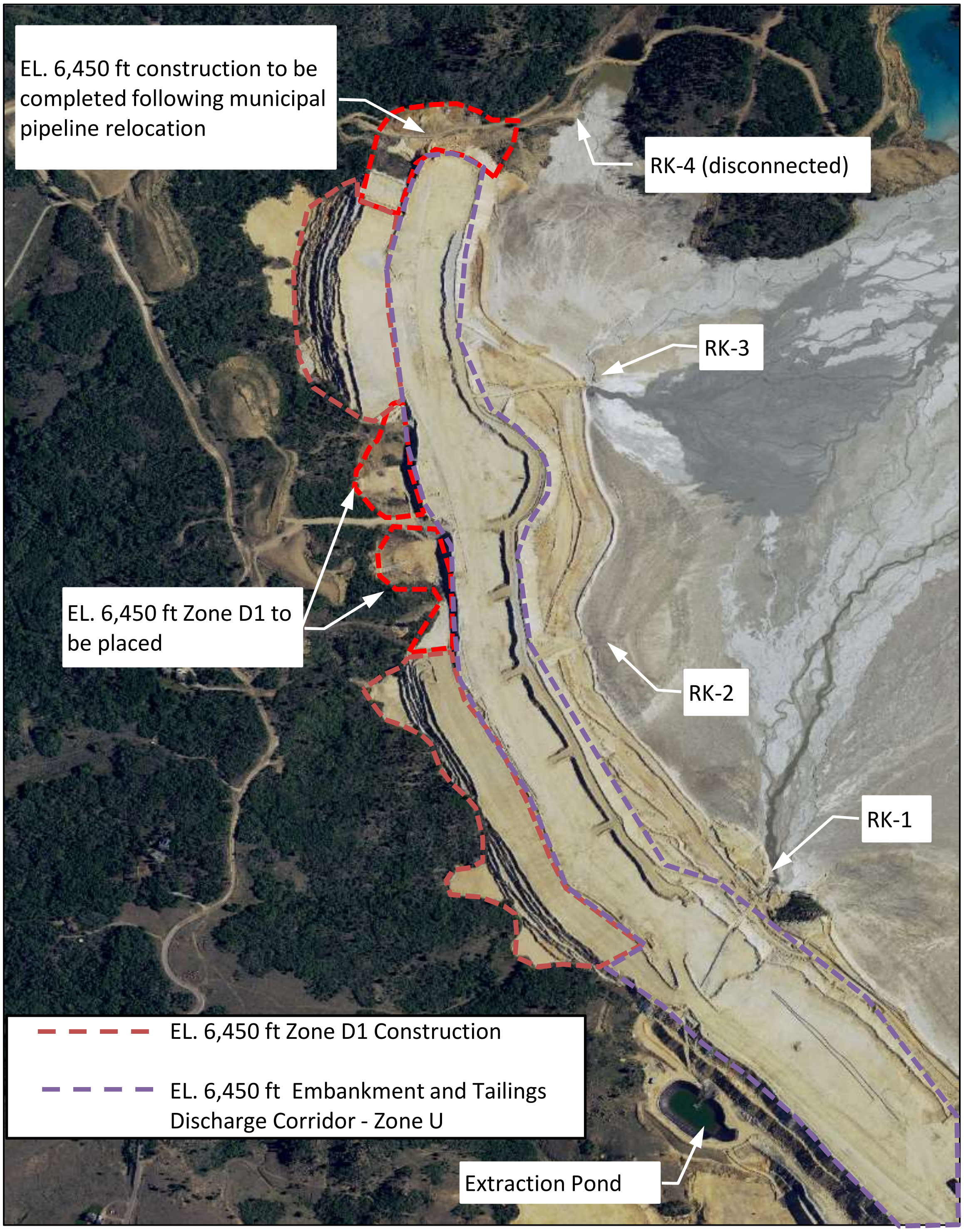
- Various locations of settlement were observed along the EL. 6,400 ft embankment crest north of approximately Section 43+00N. This settlement is focused in an area of more recently placed rockfill in the downstream step-out construction along the North-South Embankment which was completed in early 2020.
- Dormant cracking along the tailings discharge corridor remains to be present and minor surficial cracking was identified at the downstream toe of the recent construction works. These locations are monitored by MR.
- Cracking was also observed along the loosely placed berm along the EL. 6,400 ft lift and appeared to be developing as construction of the EL. 6,350 ft lift advances along the downstream toe of the embankment. MR is monitoring this cracking as part of the ongoing construction monitoring program.

Horseshoe Bend Area

- The overflow pipeline between the upper HsB area and the Cell 10 Pump area has been removed and the embankment breached in response to a recommendation of the Q3 field review and the EOR recommendations outlined in Section 6.2. This maintenance work has resulted in a lower pond level in the upper area.
- The Holding Pond has been breached at the southern end and now flows directly into the Surge Pond.
- The Surge Pond level has been significantly reduced and flows collected in the pond are now conveyed by a series of pipelines and surface ditches to the HsB Pond. The previously identified unrecorded overflow from the Surge Pond is no longer occurring.
- Leach seepage flows continue to be collected in the Houligan Pond; however, the pond water level has decreased due to the flow management changes in the Holding and Surge Ponds.
- Foundation preparation has been initiated for the relocated Precipitation Plant in the general vicinity of the Water Treatment Plant. Construction of the new Precipitation Plant is expected to continue in 2022.

Other Construction Activities

- Construction work continued for the realignment of the Reclaim Water Pipeline. This included widening the access road along the north abutment of the North-South Embankment. MR has substantially completed the rockfill placement connecting the cut along Rampart Mountain. Minor work is required along the northern end of the cut before completion of the access to the reclaim barges.



NOTES:

1. AERIAL IMAGERY FROM JUNE 25, 2021 PROVIDED BY MONTANA RESOURCES, LLP.

2. CONSTRUCTION AREAS ARE ESTIMATED TO REPRESENT AREAS OF INTEREST DURING 2021.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 ANNUAL INSPECTION REPORT
WEST EMBANKMENT
AREAS OF INTEREST

Knight Piésold CONSULTING

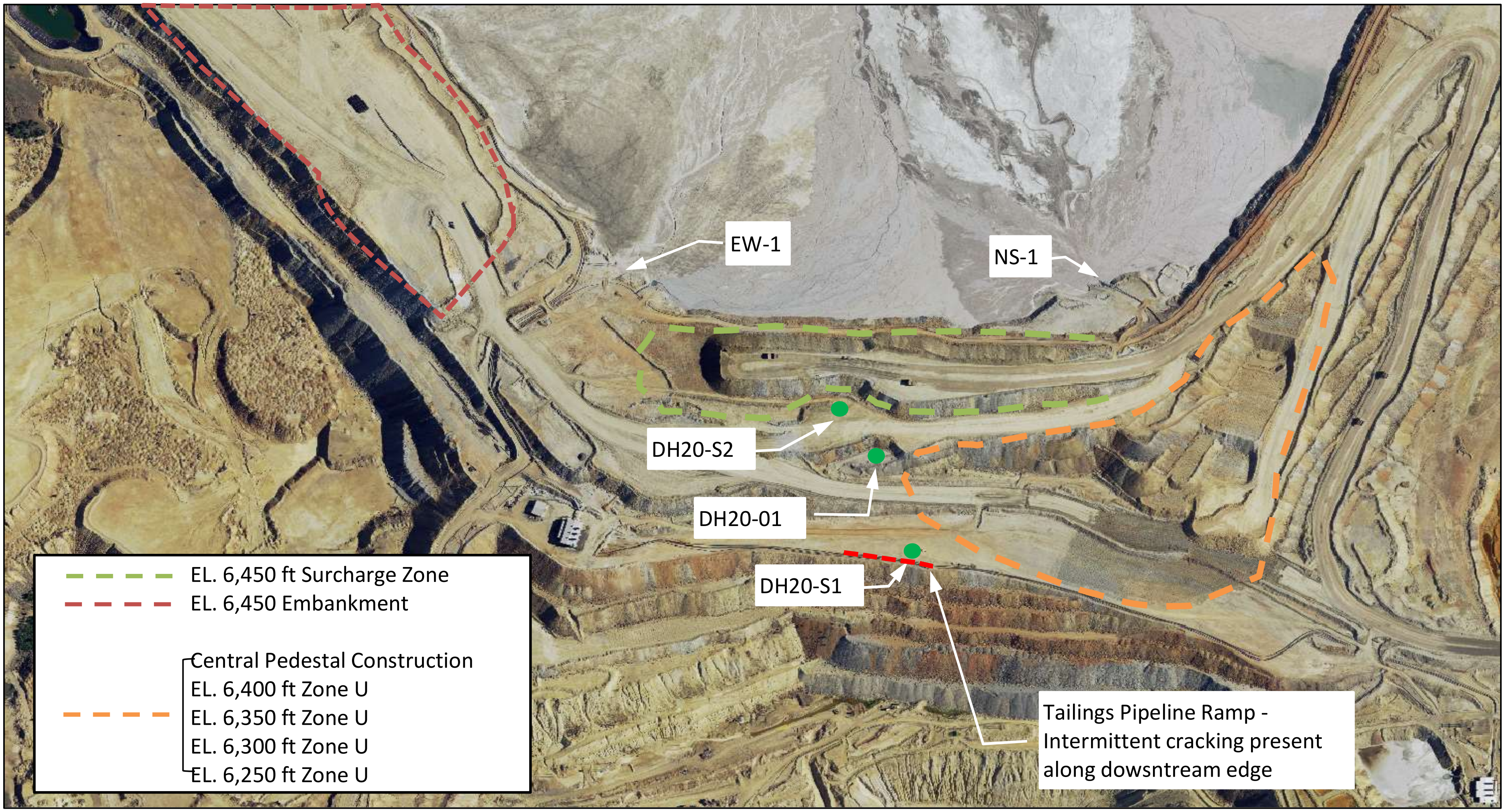
P/A NO. VA101-126/25

REF. NO. 2

FIGURE 3.1

REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JAN'22	ISSUED WITH REPORT	JRG	DDF



NOTES:

1. AERIAL IMAGERY FROM JUNE 25, 2021 PROVIDED BY MONTANA RESOURCES, LLP.
2. CONSTRUCTION AREAS ARE ESTIMATED TO REPRESENT AREAS OF INTEREST DURING 2021.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JAN'22	ISSUED WITH REPORT	JRG	DDF

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 ANNUAL INSPECTION REPORT
EAST-WEST EMBANKMENT
APPROXIMATE AREAS OF INTEREST

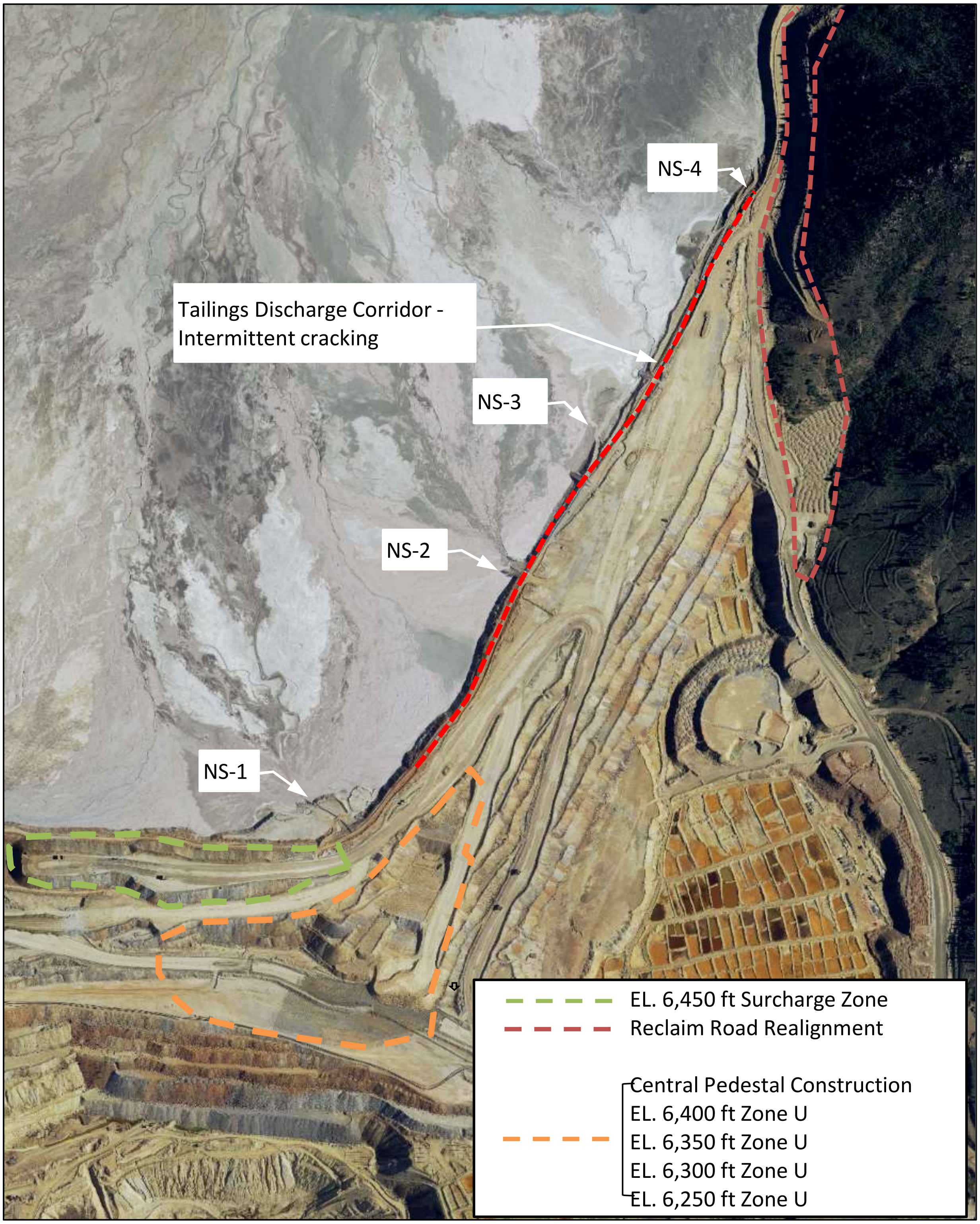
Knight Piésold CONSULTING

P/A NO. VA101-126/25

REF. NO. 2

FIGURE 3.2

REV 0



NOTES:

1. AERIAL IMAGERY FROM JUNE 25, 2021 PROVIDED BY MONTANA RESOURCES, LLP.

2. CONSTRUCTION AREAS ARE ESTIMATED TO REPRESENT AREAS OF INTEREST DURING 2021 .

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 ANNUAL INSPECTION REPORT
NORTH-SOUTH EMBANKMENT
AREAS OF INTEREST

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	2

FIGURE 3.3 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JAN'22	ISSUED WITH REPORT	JRG	DDF

NOTES:

1. AERIAL IMAGERY FROM JUNE 25, 2021 PROVIDED BY MONTANA RESOURCES, LLP.

2. CONSTRUCTION AREAS ARE ESTIMATED TO REPRESENT AREAS OF INTEREST DURING 2021.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JAN'22	ISSUED WITH REPORT	JRG	DDF

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 ANNUAL INSPECTION REPORT
HORSESHOE BEND
AREAS OF INTEREST

Knight Piésold CONSULTING

P/A NO. VA101-126/25

REF. NO. 2

FIGURE 3.4

REV 0

3.2 HORSESHOE BEND AREA FLOW RATES

The HsB area water management systems generally functioned normally throughout the year with some observed changes to flow routing upstream of the HsB Weir as described in Section 3.1. Quarterly summaries of water monitoring data, including the supernatant pond elevation, tailings beach development records, and flow records for Q1, Q2, and Q3 2021 helped inform these observations for 2021. The Q4 water data summary will be completed in 2022, once data is available. Observations on flow conditions in the HsB area in 2021 are summarized as:

- Flowrates at Number 10 Seep (Seep 10) have been measured since April 2019 using an ultrasonic lookdown sensor to automatically measure the stilling pond level near the weir. The trend of the Seep 10 flows observed during 2021 is similar to the 2020 trend, with lower flowrates observed in the beginning of the year, increasing during Q2 and reaching a peak throughout late Q2 and Q3 (KP, 2021i) indicating some seasonal variation in flows collected in this location.
- The average flowrate measured at the Precipitation Weir in Q3 2021 was approximately 1,410 gpm, which is significantly higher than the average flowrate in Q3 2020. The increase of flows since Q4 2020 is attributed to MR gradually reducing and eliminating recirculation of barren leach solution.
- The unmeasured overflow from the Precipitation Plant recirculation pump house head tank was observed throughout 2021. A second unmeasured flow located at the Houligan Pond, bypassing the Precipitation Plant and discharging into the HsB Pond continued in the early part of 2021, but stopped flowing after breaching the Holding Pond and operational changes at the Surge Pond (described in Section 3.1).
- Average monthly flowrates at the HsB Weir through Q3 2021 gradually increased from March 2021 in comparison to those observed in 2020. This gradual increase of flows is attributed to the reduced and eventual elimination of recirculating flows to the leach areas.

3.3 TAILINGS BEACH DEVELOPMENT

The tailings beach continued to be well managed in 2021 and the shortest tailings beach length continues to be typically observed at the northern end of the North-South Embankment at the location of the NS-4 discharge. Discharge location RK-4 was disconnected in 2019 and remained disconnected throughout 2021 during the ongoing construction of the EL. 6,450 ft embankment lift. It is expected that this discharge location and tailings discharge corridor with be re-aligned and re-established following the relocation of the municipal pipeline and EL. 6,450 ft construction. Minor ponding was observed at the northern end of the West Embankment near the RK-4 location during Q4 of 2021. This minor ponding is not connected to the supernatant pond. Weekly tailings discharge elevations and daily discharge location records continues to be provided by MR and are summarized in the quarterly construction field reviews (KP, 2021k; KP, 2021k; KP, 2021l). Each of the nine connected discharges were active in 2021.

The interface of the tailings beach and rockfill surcharge between discharge locations EW-1 and NS-1, upstream of the central pedestal area of the embankment, was reviewed by KP during the Q3 (KP, 2021l) and Q4) construction field reviews where it was observed that the tailings beach elevation in this area is relatively low when compared to the beach elevation at the adjacent discharge locations (EW-1 and NS-1). Minor pore pressure fluctuations had been observed by several East-West Embankment VWPs, which were inferred to be in response to associated pooling and infiltration of tailings slurry water into and beneath the central rockfill surcharge in this area (KP, 2021e). This is further described in Section 4.3.

3.4 SUPERNATANT POND

The results of the annual bathymetric survey and assessment of the YDTI supernatant pond undertaken in 2021 (MR, 2021) are presented in Table 3.1 along with data for the last five years. Results of the evaluation indicate an estimated pond volume of approximately 27,200 acre-ft, which corresponds to a 4,900 acre-ft decrease in the estimated pond volume compared to the previous bathymetric survey conducted in 2020. The annual survey also indicated a very minimal (<1 ft) rise in supernatant pond elevation over the same period, and a decrease in pond area by approximately 66 acres.

Table 3.1 Bathymetry Survey Results (MR, 2021)

Attribute	Year 2021	Year 2020	Year 2019	Year 2018	Year 2017
Methodology	2021 June Composite	2020 June Composite	2019 June Composite	2018 June Composite	2017 June Composite
Pond Area	547 acres	613 acres	774 acres	837 acres	798 acres
Tailings Area	971 acres	918 acres	727 acres	642 acres	658 acres
Total Impoundment Area	1,518 acres	1,531 acres	1,501 acres	1,479 acres	1,456 acres
Pond Volume	27,163 acre-ft	32,084 acre-ft	34,392 acre-ft	33,447 acre-ft	31,264 acre-ft
Avg. Water Depth	68.6 ft	56.2 ft	41.1 ft	42.9 ft	45.9 ft
Max Water Depth	110.5 ft	112.7 ft	112.0 ft	109.2 ft	109.1 ft
Min Water Depth	9.0	2.4 ft	2.8 ft	0.4 ft	2.7 ft
Measured Water Elevation	6,360.6 ft	6,360.3 ft	6,357.9 ft	6,351.7 ft	6,345.0 ft
Data Points Used	22,801	24,509	23,562	100,707	55,787

Note(s):

1. Bathymetry results as per MR memo (MR, 2021) and survey completed June 23 through 25, 2021.

MR continues to monitor the supernatant pond elevation and measures the elevation on a weekly basis. The pond elevation at the end of Q3 2021 was recorded at EL. 6,358.8 ft (KP, 2021i), which was a decrease of 1.8 ft since the annual bathymetric survey. The rate of change of the supernatant pond elevation is affected by the ongoing discharge of water off-site due to the Pilot Project. The Pilot Project has continued to operate since being commissioned in September 2019 and has resulted in gradual reduction in pond volume over the past two years.

3.5 QUANTITATIVE PERFORMANCE PARAMETERS

3.5.1 PIEZOMETRIC

No piezometric trigger elevation exceedances were observed at QPP monitoring sites during 2021. Monitoring findings for QPP and select non-QPP piezometric monitoring sites were reviewed weekly by KP and were formally documented in quarterly instrumentation letters during 2021. Discussion of key piezometric trends and conditions monitored during 2021 is provided in Section 4.3.

3.5.2 GEOMETRIC

The geometry of the YDTI embankments was reviewed during site investigations and confirmed based on the annual survey completed by MR. The geometric properties as the related to the QPPs as defined in Table 2.1 can be summarized as:

- **Total Freeboard**: The lowest point on the embankment crest indicated by MR is located along the East-West Embankment where the tailings discharge pipelines cross the top of the dam just above the No. 3 Tailings Booster Pump House. The elevation at this location was reported by MR to be EL. 6,397 ft. The maximum allowable pond elevation based on the lowest point of the embankment crest and freeboard QPP (22 ft) is approximately 6,375 ft, which is approximately 14 ft higher than the maximum operating pond elevation recorded during 2021 of EL. 6,361 ft (recorded in April and May of 2021). This confirms that freeboard allowances were maintained (with significant contingency) throughout 2021.
- **Minimum Beach Length:** The shortest tailings beach length continues to be typically observed at the northern end of the North-South Embankment at the location of the NS-4 discharge. The tailings beach length is reviewed on a semi-monthly basis and remained well in excess of 1,000 ft at this location throughout 2021.
- **Downstream Overall Slope:** The downstream slope geometry has continued to be developed by incorporating 50 to 70 ft wide benches between successive 50 to 100 ft high angle of repose rockfill lifts along the embankment. This configuration has resulted in overall downstream slopes of approximately 2H:1V of flatter.
- **Minimum Crest Width:**
    - The crest width is approximated by KP at the embankment freeboard compliance elevation (EL. 6,383 ft), which is based on the maximum annual YDTI pond elevation (EL. 6,361 ft) plus the 22 ft of freeboard requirement.
    - Ongoing construction in the Central Pedestal Area has recently increased the minimum embankment width in the narrowest portion of the crest at EL. 6,400 ft at the corner of the Central Pedestal Area. The current width along this section of the embankment, including the embankment crest and surcharge ranges between approximately 500 ft and 900 ft. The width of the East-West Embankment is exaggerated by the rockfill surcharge that was extended over the tailings beach area in 2015 and 2016 which has since been raised to EL. 6,450 ft.
    - The minimum crest width along the North-South Embankment ranges from approximately 500 ft in the vicinity of Section 13+00N to over 700 ft near Section. 33+00N. The crest width continues to be exaggerated at EL. 6,400 ft along the northern half of the embankment due to construction of the downstream step-out of the embankment completed in 2020.
    - The minimum crest width along the West Embankment is located at approximately Section 88+00W and was measured to be approximately 500 ft.

4.0 DISCUSSION OF IMPORTANT TRENDS

4.1 GENERAL

The YDTI continues to be developed and operated in a manner consistent with the designs, the QPPs, and the operating protocols established for the facility. A risk assessment (KP, 2018d) was undertaken during preparation of the design document associated with continued construction of the embankments to a crest elevation of 6,450 ft. The risk assessment identified potential failure modes and the factors affecting likelihood and consequences associated with each failure mode. It was recognized that design and operating enhancements could provide further opportunities for risk mitigation, and these enhancements continue to be progressively implemented at the YDTI, taking advantage of the best practicable new technologies and techniques to enhance dam safety. Risk mitigation opportunities incorporated into the design and operating procedures of the YDTI since 2015 include:

- Modifications to the tailings distribution system for improved beach development along all three embankments.
- Stress densification of tailings below the rockfill surcharge to strengthen tailings adjacent to the East-West Embankment, improve seismic performance of the facility, and reduce potential flowability of the underlying tailings mass.
- Water management changes, including substantial reductions to freshwater use from the Silver Lake Water System (SLWS) and development of the Pilot Project to facilitate additional water inventory reductions within the YDTI supernatant pond.
- Continued investigation of the geotechnical and hydrogeological conditions within the embankment rockfill, tailings, and foundation materials underlying the embankment following a phased investigation plan developed by KP.
- Expansion of the piezometric monitoring network and development of surface and subsurface deformation monitoring programs.
- Automation of monitoring systems that are at the leading end of practice (IRP, 2020).
- Improved data analysis frequency and reporting rigor.
- Updates to the MR Emergency Action Plan (EAP).

The risk assessment also identified opportunities to utilize the observational method during ongoing development of the facility, which was noted to be particularly relevant for the transitional period between implementing the modifications to the tailings distribution system and achieving a new steady-state condition associated with the revised discharge strategy. There was uncertainty identified due to the reliance on modelling predictions related to tailings beach development and water balance modelling, and foreseeable deviations were considered along with the planned observational monitoring related to several factors, including tailings beach development, pore pressure changes within the embankment, and water inventory changes. The trends related to these factors are regularly discussed in the quarterly and annual surveillance reporting, and a status update related to each is provided briefly below.

4.2 TAILINGS BEACH DEVELOPMENT

Beach development continues to be reviewed frequently to inform design and operating enhancements that could provide further opportunities for risk mitigation. Beach development along the North-South

Embankment was recognized as a key risk factor in the risk assessment and related to the potential for piping initiated by natural flooding. The risk assessment identified that improving uniformity of the tailings beach adjacent to the embankments is a potential mitigation measure and thus beach development is monitored closely as part of the surveillance plans for the facility. Adjustments to the tailings distribution system were recommended in the 2019 AIR (KP, 2020a), and the 2020 AIR (KP 2021a).

Surveillance of the facility continued through 2021 and no significant changes in beach development were observed since the relocation of discharge location NS-3 closer to NS-2 and the extension of Line 3 to include a new discharge point, NS-4, located further to the north than the existing location of NS-3 as recommended in the 2019 AIR.

The 2019 AIR also included a recommendation (#2) to consider extension of Line 2 (which currently services the East-West Embankment) to allow discharge at location NS-1 and possibly NS-2 in the future. It is recognized that the ability to discharge from either of two lines or at two locations concurrently along the North-South Embankment would improve flexibility for operations and enhance beach development along this embankment. MR evaluated options for adjustment of Line 2 in 2020 and concluded that it would not be practicable to complete the extension of Line 2 until the EL. 6,450 ft raise of the embankment is completed adjacent to discharge locations NS-1 and NS-2. A deferral notification was provided to the EOR by MR and was presented in the 2020 AIR. The recommendation will be maintained in this report and implemented when it is practicable to do so.

Development of relative low spots along the tailings beach between existing discharge locations were identified during various site inspections and field reviews. It is recommended that MR consider development of two additional discharge locations, one between EW-1 and NS-1, and one between NS-1 and NS-2 to allow for these areas to be infilled with tailings and to improve capabilities related to beach wetting for dust management. MR should also consider equal spacing between the discharge locations during the pipeline realignment as part of the EL. 6,450 ft embankment and tailings discharge corridor construction. Is it also recommended that discharge location RK-4 be reconnected as soon as practicable following completion of the municipal pipeline realignment.

Placement of additional alluvium facing at the interface between the rockfill surcharge and tailings beach between discharge locations EW-1 and NS-1 along the upstream face of the EL. 6,400 ft surcharge lift is recommended prior to the decommissioning of the tailings discharge corridor.

4.3 EMBANKMENT PIEZOMETRIC CONDITIONS

4.3.1 GENERAL

The conceptual hydrogeological model for the YDTI embankments presented in the Site Characterization Report (KP, 2017) suggests that a basal saturated zone exists within the bottom 50 to 200 ft of embankment rockfill and that isolated perched saturated zones are present within the overlying rockfill. Site investigation programs completed since 2016 (KP, 2018e; KP, 2019c; KP, 2019d; KP, 2020c; KP, 2020d; KP, 2021q) and piezometric data collected (KP, 2018b; KP, 2019b; KP, 2020b) continue to refine and corroborate this conceptual hydrogeological model. Pore water pressure trends associated with both tailings discharge and embankment construction continue to be observed. Key piezometric trends monitored during 2021 for each YDTI embankment and for the tailings mass are summarized below.

Detailed analysis of pore water pressure trends from 2021 will be presented in a Data Analysis Report (DAR) to be issued in early 2021 and key trends have been discussed in the quarterly instrumentation letters as part of the dam safety monitoring programs.

4.3.2 EAST-WEST EMBANKMENT

Piezometric conditions within the East-West Embankment have generally continued to decrease slightly through 2021, continuing the long-term trends observed since late-2016 following the implementation of multiple-point tailings discharge. Rates of pore water pressure decrease have slowed through 2020 and 2021 indicating that embankment piezometric conditions may be approaching a new equilibrium condition. Key East-West Embankment piezometric monitoring trends include:

- QPP sensors installed within basal rockfill near the East-West Embankment toe on Sections 0+00 and 8+00W monitored minor decreasing piezometric conditions throughout 2021.
- QPP and non-QPP sensors installed beneath the East-West Embankment crest and tailings pipeline ramp also generally monitored minor pore water pressure decreases within the embankment rockfill during 2021.
- Only minor construction related pore pressure increases were observed within perched saturated zones on Section 0+00 in response to the EL. 6,250 ft embankment lift construction within the central pedestal area during July 2021. These increases ranged between 2 and 3 ft at DH17-S2 VW5 and DH19-S7 VW7, respectively, and dissipated following local rockfill placement. No further increases have been observed during El. 6,300, 6,350 or 6,400 ft central lift construction.
- QPP sensors DH15-S4 VW1 and DH15-S4 VW2 (Section 8+00W) monitored short-term pore water pressure increases during Q2 2021 in response to temporary ponding and infiltration of tailings slurry water beneath the central rockfill surcharge. Tailings discharge was relocated (from NS-1) in response and pore water pressures subsequently dissipated. It is important to note that piezometric elevations at DH15-S4 remained well below the TOMS threshold elevations during the event. This piezometric response to ponding along the upstream face of the rockfill surcharge indicates that embankment pore water pressures are connected and significantly influenced by infiltration into the rockfill at this location. Alluvial facing of the rockfill surcharge may help minimize supernatant water infiltration into the surcharge (see Section 6.2).

No piezometric QPP exceedances were observed during 2021 at instrumentation installed within the East-West Embankment.

4.3.3 NORTH-SOUTH EMBANKMENT

Piezometric monitoring instruments within the embankment rockfill at the North-South Embankment generally indicate relatively stable or slightly decreasing pore water pressures since Q3 2020. This trend follows observation of stable or slightly increasing trends observed previously since 2018. Fluctuations in piezometric elevations within the North-South Embankment and underlying foundation materials have been attributed to nearby tailings discharge and construction of the downstream step-out of the embankment in 2019 and early 2020. Dissipation of foundation pore water pressures observed within the older alluvium unit within drillhole DH18-S1 have continued following completion of the EL. 6,400 step-out lift construction in April 2020. No North-South Embankment piezometric QPP exceedances were monitored during 2021.

4.3.4 WEST EMBANKMENT

Piezometric elevations within the foundation of the West Embankment have been relatively constant through 2019 and 2020 following an increasing trend from 2015 to 2019 that was attributed to increasing supernatant pond and tailings elevations resulting from ongoing operations. Piezometric conditions through Q3 2021 continued to remain stable due to the draining influence of the WED (KP, 2021b; KP, 2021i). No QPP pore water pressure exceedances were observed during 2021 for sites installed within the West Embankment and WED.

Piezometric monitoring between the West Embankment and West Ridge continues to indicate that hydrodynamic containment (eastward flow gradient from the West Ridge towards the YDTI) remains present as of December 2021 within both critical monitoring areas (the Deep Isolated Fracture System and West Ridge Potentiometric Low). Comparison of West Ridge piezometric data and YDTI pond elevation indicates that the WED is not presently required to maintain hydrodynamic containment; however, it does enhance the security of the hydrodynamic seepage containment system along the West Ridge.

4.3.5 TAILINGS MASS

Pore water pressure instrumentation installed within the tailings mass upstream of the East-West Embankment central pedestal area generally monitored minor pressure increases (approximately 1 to 10 ft) during 2021, which continues the increasing trend observed throughout 2020. Piezometric elevations generally remain well below the historical levels observed in late-2016 prior to the implementation of multiple-point tailings discharge and extensive tailings beach development that has occurred subsequently. There are presently no QPP thresholds set for tailings pore water pressures.

4.4 EMBANKMENT DEFORMATION TRENDS

KP and MR have rigorously monitored embankment surface and subsurface deformations throughout 2021 to characterize deformation conditions and monitor elevated deformations associated with ongoing embankment construction. Deformation monitoring relies on both in-situ instrumentation and remote sensing techniques described in Section 2.2.5 and have been formally reported in quarterly YDTI instrumentation and monitoring letters. Key deformation monitoring findings from 2021 include:

- Observed surface deformations within regions of historical rockfill generally continued to occur at constant rates throughout 2021 without observation of progressive (accelerating) deformations. Deformation magnitudes are consistent with expectations for end-dumped rockfill and settlement rates are interpreted to vary based on rockfill thickness and time following placement. Settlement following construction of at the North-South Embankment has resulted is localized low points, which are recommended for remedial infill (see Section 6.2) now that deformation rates have slowed.
- Elevated surface and subsurface deformation rates have been observed localized within and around the footprints of newly placed rockfill within the EL. 6,450 ft rockfill surcharge and Central Pedestal Area embankment lifts (the completed EL. 6,250 ft and 6,300 ft lifts, and in progress EL. 6,350 ft and 6,400 ft lifts). The onset of elevated deformation rates corresponds with the advancement of construction and rates begin to slow upon completion of construction in a given area, as expected. Findings do not indicate the development of unexpected deformations within the downstream embankment slope nor evidence of progressive (accelerating) deformations.

Detailed analyses of deformation trends have been included in the 2021 quarterly instrumentation and monitoring letters and in monthly construction monitoring data reviews. In addition, detailed analysis of 2021 trends and conditions will be included in the 2021 DAR following the end of 2021.

4.5 WATER INVENTORY AND WATER MANAGEMENT CHANGES

The YDTI supernatant pond provides a source of water to support continuous mill operations and the elevation of the pond surface rises as the volume of tailings in the facility increases. The risk assessment (KP, 2018c) identified that reducing the normal operating pond volume towards a target volume of approximately 15,000 acre-ft would reduce risks associated with facility performance following natural flooding.

MR implemented changes to the Silver Lake Water Supply (SLWS) use practices in 2016 and 2017 as part of the goal of gradually reducing the operating pond volume (KP, 2020b) and substantially reduced freshwater and make-up water demands for ore processing. MR and KP recognized that changing SLWS practices was an achievable way to influence the water inventory in the YDTI and that other opportunities existed to further reduce water stored within the facility.

The water inventory (estimated during the annual bathymetric survey) increased marginally in 2018 and 2019, as presented in Table 3.1, despite the changes to SLWS practices; however, ongoing reduction in SLWS (as practicable) along with the commissioning of the Pilot Project in 2019 has resulted in a notable impact on the supernatant pond volume in recent years. The Pilot Project is not entirely within MR's control and a variety of factors and interruptions are possible that could impact the timeline; however, the EOR is pleased with the progress achieved since late 2019.

MR has made recent improvements to the HsB water management systems as outlined in Section 3 to limit unmeasured overflows and reduce the volume of ponded water in the HsB area. Continued improvements in the routing and monitoring of the flows in this area, as well as along the Seep 10 bench, are recommended. This includes the development and implementation of a new system to collect flows along the Seep 10 bench and convey these flows to the HsB Pond. This is expected to include re-grading of the Seep 10 bench surface to enhance drainage collection and limit ponding of water to the extent practicable. It is also recommended that MR investigate options for automating collection of the HsB Weir flow monitoring system using the Sensemetrics remote monitoring system platform.

5.0 ADDITIONAL CONSIDERATIONS AND DISCUSSION

There has been a noticeable improvement in the documentation and presentation of the construction dump planning by MR. KP and MR continue to hold bi-weekly construction planning calls to discuss short and long-term construction and MR has produced a construction dump plan which projects the substantial completion of the EL. 6,450 ft embankment in approximately Q3 2022. It is understood that MR will continue to focus on the Central Pedestal Area construction to EL. 6,400 ft before completing the remaining EL. 6,450 ft lift along the East-West Embankment and commencing construction of the North-South Embankment. KP recommends that MR infill low areas along the downstream side of the North-South Embankment and regrade the embankment crest from approximately Section. 43+00N towards the north prior to construction of the EL. 6,450 ft lift.

KP has produced a design report (KP, 2021r) outlining the proposed design of the HsB Rockfill Disposal Site (RDS) foundation layer and drainage measures at the downstream toe of the East-West Embankment. MR has initiated various tasks in preparation of construction in this area, including cessation of leaching operations and initial dewatering of collection ponds in the HsB area. It is expected that significant works, including the relocation of the Precipitation Plant, will be undertaken in 2022.

Annual site investigation programs were completed from 2015 through 2021 and along the embankments, within the tailings mass and in the HsB area to investigate and characterize geotechnical and hydrogeological conditions of these areas. Characterization of fill, natural soils and bedrock have been investigated using sonic/rotary drilling, seismic cone penetration testing, downhole seismic testing, laboratory index testing and using geophysical methods. Piezometric (nested VWPs, Geo4Sight) and deformation instrumentation (inclinometers, Geo4Sight, GNSS, survey-monuments) have been installed throughout these areas to characterize groundwater conditions (i.e., gradients, depth-to-water, etc.), deformation behavior and to facilitate operational monitoring. Additional pore pressure, deformation and flow monitoring instrumentation is planned as part future investigations and the RDS construction program.

6.0 RECOMMENDATIONS AND ACTIONS

6.1 2020 RECOMMENDATIONS AND ACTIONS

KP identified the recommendations below in the 2020 AIR for consideration in 2021. MR issued a Corrective Action Plan (CAP) in response to the 2020 AIR recommendations on February 11, 2021, which is included as Appendix F1. The CAP identified the actions proposed or already undertaken to address the five recommendations. The MR actions completed in 2021 to address each of the 2020 recommendations were as follows:

1. *Maintain reductions in freshwater use from the Silver Lake Water System to the extent reasonably practicable and continue the Pilot Project to incrementally reduce the water inventory in the YDTI supernatant pond towards the target of approximately 15,000 acre-ft.*

COMPLETED/ONGOING. MR continued to operate with reduced freshwater and make-up water from the SLWS. The Polishing Plant has continued to operate since being commissioned in September 30, 2019 and has resulted in a net volume deficit of approximately 1910 million gallons (5,860 acre-ft) as of the end of Q3. This recommendation has been continued in the 2021 AIR.

2. *Modify the tailings distribution system by extending Line 2 to allow discharge at location NS-1 and NS-2 when the EL. 6,450 ft raise of the embankment is completed adjacent to these discharge locations.*

DEFERRED. MR evaluated options for adjustment of Line 2 in 2020 and concluded that it would not be practicable to complete the extension of Line 2 until the EL. 6,450 ft raise of the embankment is completed adjacent to discharge locations NS-1 and NS-2. A deferral notification was provided to the EOR by MR and is included in Appendix F2. The deferred implementation of the extension of Line 2 is reasonable based on current site conditions. The recommendation will be maintained in this report and implemented in 2022.

3. *Further develop the construction sequence and dumping plan for the EL. 6,450 ft lift focused on the next 12 to 24 months, including a more detailed summary of the sequence and anticipated progress of embankment construction on approximately a quarterly basis.*

COMPLETED. MR provided quarterly 2021 dumping plans for the construction of the EL. 6,450 ft lift beginning in Q1. Quarterly dump plans included tonnage projections and locations and were typically provided at the beginning of each quarter. MR also provided a conceptual dump plan in October 2021 outlining the proposed quarterly construction sequence for 2022. It is anticipated that MR will update and refine the 2022 quarterly construction plans as construction progresses. MR and KP implemented bi-weekly construction meetings to review and discuss short- and long-term construction planning in early 2021. These are expected to continue through 2022.

4. *Cease recirculation of barren leach water to the rock disposal sites (RDSs) directly adjacent to the YDTI embankments over the next several years.*

COMPLETED. MR ceased the recirculation of the barren leach water on July 13, 2021. The historic leach areas are continuing to drain down and flows managed with the HsB area water management systems.

5. *Develop an updated five-year plan that includes consideration for continued phased site investigation, installation of additional monitoring instrumentation, and potential replacement of non-functional or abandoned monitoring instruments.*

COMPLETED. On behalf of MR, KP has developed a five-year instrumentation, investigation and monitoring plan that provides a forward-looking framework for continuation of the phased site investigation programs and instrumentation installations. The five-year plan, included in Appendix F3, outlines the proposed site investigation, instrumentation, and monitoring plan to be completed during annual sonic drilling investigations between 2022 and 2026. The objectives of the programs are to increase the spatial coverage of the geotechnical and hydrogeological characterization and instrumentation networks. The plan includes drilling of up to 26 drillholes, installation of additional surface deformation instruments and continued use of inSAR remote sensing. Drillhole quantities and locations, proposed instrumentation installations, monitoring methods and laboratory testing requirements will be reviewed and modified annually based on findings of preceding investigations, feedback from the IRP or evolving project objectives.

6.2 2021 RECOMMENDATIONS

The YDTI continues to be operated and developed consistent with the designs, the QPPs, and operating protocols established for the facility. The EOR has identified the following recommendations for consideration in 2022 based on a review of the information collected and conditions observed in 2021:

1. **Maintain reductions in freshwater use from the Silver Lake Water System to the extent reasonably practicable and continue the Pilot Project to incrementally reduce the water inventory in the YDTI supernatant pond towards the target of approximately 15,000 acre-ft (continuation of 2020 recommendation).**
2. **Modify the tailings distribution system by extending Line 2 to allow discharge at location NS-1 and NS-2 when the EL. 6,450 ft raise of the embankment is completed adjacent to these discharge locations (deferral from 2020 recommendations).**
3. **Modify the tailings distribution system to include two additional discharge locations as follows:**
   - **one located between the current locations of EW-1 and NS-1.**
   - **one located between the current locations of NS-1 and NS-2.**
4. **Implement additional alluvium facing at the interface between the rockfill surcharge and tailings beach between Section 23+00 NW and Section 13+00 N along the upstream face of the EL. 6,400 ft surcharge lift.**
5. **Infill low areas along the downstream side of the North-South Embankment and regrade the embankment crest from approximately Section 43+00 N towards the north.**
6. **Complete maintenance work in the upper HsB area to improve drainage and limit ponding in this area.**
7. **Develop and implement a new system to collect flows along the Seep 10 bench and convey these flows to the HsB Pond. Re-grade the Seep 10 bench surface to enhance drainage collection and limit ponding of water to the extent practicable.**
8. **Investigate options for automating collection of the HsB Weir flow monitoring data using the Sensemetrics remote monitoring system platform.**

7.0 REFERENCES

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8.0 CERTIFICATION

This report was prepared and reviewed by the undersigned.

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Approval that this document adheres to the Knight Piésold Quality System: DDF

APPENDIX A

Site Photos

(Pages A-1 to A-38)

2021 ANNUAL INSPECTION REPORT

AERIAL DRONE SURVEY (JUNE 2021)

PHOTO 1 – North-South Embankment downstream shell, looking northwest from southeast end of YDTI.

PHOTO 2 – North-South Embankment downstream shell, looking northwest towards the top of the mine haul ramp at EL. 6,400 ft

PHOTO 3 – Old Reclaim Barge and New Reclaim Water Pipeline Ramp cut construction progress.

PHOTO 4 – Reclaim water pipeline road and New Reclaim Water Pipeline Ramp cut construction progress.

PHOTO 5 – Reclaim water pipeline road and New Reclaim Water Pipeline Ramp cut construction progress, looking south.

PHOTO 6 – Tailings beach beyond the northern end of the North-South Embankment near NS-4, looking south.

PHOTO 7 – Tailings beach and supernatant pond interface, looking northwest from the reclaim water pipeline road.

PHOTO 8 – Upstream side of the North-South Embankment between discharge locations NS-2 (left side) and NS-1 (right side), looking south.

PHOTO 9 – Discharge location NS-1 along the North-South Embankment facing southeast.

PHOTO 10 – East-West Embankment downstream slope and Number 10 Seep bench area, looking north.

PHOTO 11 – Overview of Central Pedestal Area of the East-West Embankment, Seep 10 Bench, and HsB Area, looking north.

PHOTO 12 – Central pedestal area of the East-West Embankment, looking northeast.

PHOTO 13 – Booster Station #3, East-West pipeline ramp, and EL. 6,450 ft rockfill surcharge in Central Pedestal Area of the East West Embankment, looking northeast.

PHOTO 14 – Upstream interface of East-West Embankment, in between NS-1 and EW-1, and EL. 6,450 ft rockfill surcharge construction progress, looking south.

AERIAL DRONE SURVEY (JUNE 2021)

PHOTO 15 – East-West pipeline ramp, decommissioned East-West haul road, EL. 6,450 ft lift (left) and EL. 6,450 surcharge (right), looking north from east of Booster Station #3.

PHOTO 16 – East-West Embankment upstream face at discharge location EW-1 facing south.

PHOTO 17 – East-West Embankment downstream slope along the northwest dumps area.

PHOTO 18 – East-West Embankment EL. 6,450 ft lift (left) and EL. 6,450 ft rockfill surcharge subgrade preparation (right) with view of beach adjacent to discharge locations EW-1 and EW-2, looking north.

AERIAL DRONE SURVEY (JUNE 2021)

PHOTO 19 – East-West Embankment upstream side at discharge location EW-2, facing southwest.

PHOTO 20 – East-West Embankment and West Embankment upstream side, near Rocky Knob and discharge location RK-1, facing west.

PHOTO 21 – West Embankment upstream interface north of Rocky Knob, by discharge location RK-2 (temporarily disconnected during drone survey), facing west near the Extraction Pond.

PHOTO 22 – West Embankment upstream interface north of Rocky Knob, looking west by discharge location RK-3 and Bumtown.

PHOTO 23 – Northern end of West Embankment, upstream interface, looking northwest near decommissioned discharge location RK-4.

PHOTO 24 – West Embankment downstream shell, looking southeast.

PHOTO 25 – West Embankment downstream shell, north of Rocky Knob and Extraction Pond, looking southeast.

PHOTO 26 – Overview of WED Extraction Pond.

PHOTO 27 – North-South Embankment downstream side, looking southwest from New Reclaim Water Pipeline ramp.

PHOTO 28 – New Reclaim Water Pipeline Ramp (left) and North-South Embankment (right), facing south from New Reclaim Water Pipeline hillside cut.

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 29 – New Reclaim Water Pipeline Ramp hillside cut (left) and ramp (right) tie-in area, facing east from North-South Embankment EL. 6,400.

PHOTO 30 – Tailings beach by tailings discharge location NS-4 and New Reclaim Water Pipeline Ramp hillside cut, facing north.

ANNUAL INSPECTION PHOTOS (OCTOBER 15, 2021)

PHOTO 31 – Tailings beach, tailings pipeline, and rockfill drill pad for 2021 SCPT drilling program, facing north near tailings discharge location NS-3 along North-South Embankment.

PHOTO 32 – Tailings beach near tailings discharge locations NS-2 and NS-3 along North-South Embankment, facing south.

PHOTO 33 – Tailings discharge pipelines, tailings discharge location NS-1, and East-West Embankment EL. 6,450 ft surcharge zone, facing west.

PHOTO 34 – East-West Embankment EL. 6,450 surcharge zone (left), tailings pipeline (middle), and tailings beach (right), west of tailings discharge location NS-1, facing west.

PHOTO 35 – East-West Embankment upstream interface and tailings beach in between tailings discharge locations EW-1 and NS-1, facing east.

PHOTO 36 – Upstream interface of East-West Embankment – Tailings discharge location EW-1, tailings beach, and East-West Embankment EL. 6,450 ft surcharge zone.

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 37 – 2021 Embankment SI drill rig on the EL. 6,450 ft surcharge zone (left). E-W Embankment EL. 6,400 ft lift (right), facing east.

PHOTO 38 – EL. 6,400 ft lift and EL. 6,300 ft lift construction progress, facing southeast from the EL. 6,450 ft surcharge zone.

PHOTO 39 – East-West Embankment EL. 6,300 ft lift construction, facing south from EL. 6,400 ft lift crest in Central Pedestal Area.

PHOTO 40 – East-West Embankment EL. 6,300 ft lift construction progress, facing southeast from EL. 6,400 ft lift crest in Central Pedestal Area.

PHOTO 41 – East-West Embankment Central Pedestal Area, including East-West pipeline ramp and EL. 6,300 ft lift construction, facing east near Booster Station #3.

PHOTO 42 – Cracks monitored along the upstream side of the East-West pipeline ramp by the eastern toe of the EL. 6,250 ft lift, facing east.

PHOTO 43 – 7 percent haul ramp and Central Pedestal Area mid-slope bench access, facing southwest from Booster Station #3.

PHOTO 44 – East-West Embankment downstream slopes and WED Extraction Pond emergency overflow pipelines, west of Booster Station #3, facing southeast near Extraction Pond. Boulders for energy dissipation and final alignment of pipeline discharge remains to be completed.

PHOTO 45 – WED Extraction Pond facing northwest.

PHOTO 46 – WED Extraction Pond facing northeast.

PHOTO 47 – WED Extraction Pond flowmeter on pipeline conveying recovered flow to tailings discharge location RK-1, facing north.

PHOTO 48 – West Embankment upstream interface – EL. 6,450 ft lift (left), tailings discharge location, RK-2, and tailings beach, facing northwest.

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 49 – West Embankment upstream side – Tailings discharge location RK-1 by Rocky Knob (left) and EL. 6,450 ft lift (right), facing southeast.

PHOTO 50 – Cracking observed along recently placed areas of the EL. 6,450 ft lift on the West Embankment.

PHOTO 51 – Downstream side of the West Embankment, facing east from West Ridge topsoil stockpile.

PHOTO 52 – Downstream side of northern end of West Embankment, 5 ft lifts of D1 material placed downstream of U material. Facing north from West Ridge topsoil stockpile.

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 53 – Downstream side of West Embankment south of the Ridge Road. U material placement complete, D1 material placement ongoing in 2021. Facing southeast.

PHOTO 54 – Horseshoe Bend overview from East-West Embankment EL. 6,350 ft, facing southeast.

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 55 – Holding Pond and Surge Pond in the HsB Area, looking southeast from Number 10 Seep Bench.

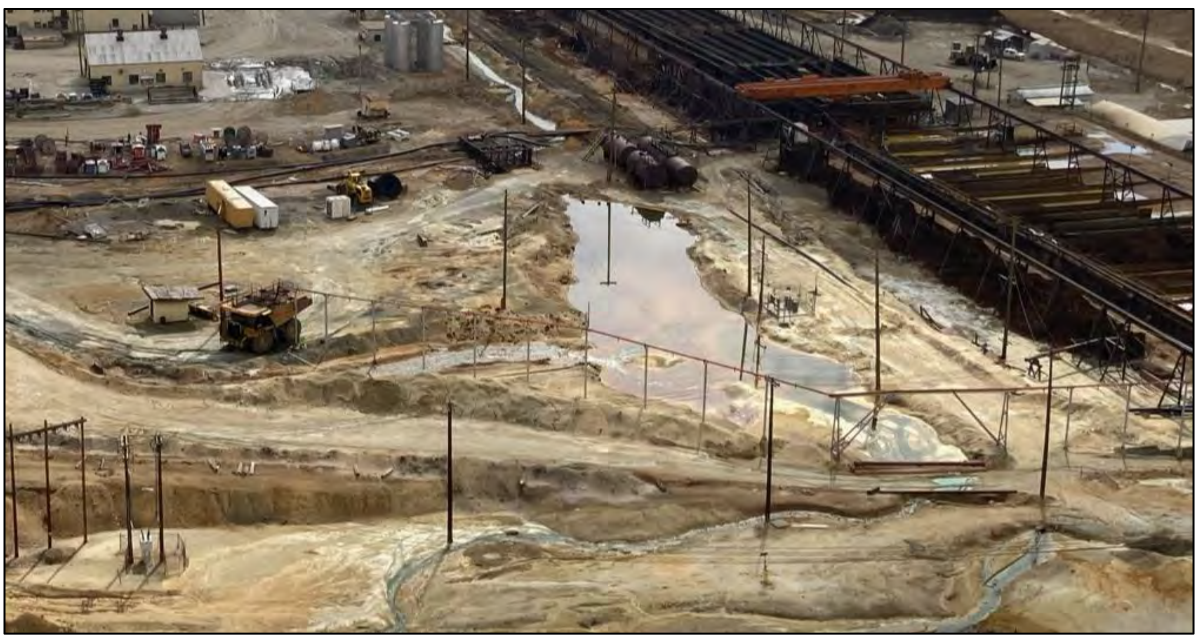

PHOTO 56 – Houligan Pond in the HsB Area, looking south from Number 10 Seep Bench.

2021 ANNUAL INSPECTION REPORT

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 57 – Upper HsB Area, looking southwest from Number 10 Seep Bench.

PHOTO 58 – HsB Pond in the HsB Area, looking south from Number 10 Seep Bench.

2021 ANNUAL INSPECTION REPORT

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 59 – Overview of daylighting seeps along the YDTI downstream toe in the HsB Area, facing west.

PHOTO 60 – North end of the Upper HsB Pond near the Precipitation Plant Flume, looking southwest.

PHOTO 61 – Seepage along the YDTI downstream toe in the HsB Area, facing east.

PHOTO 62 – Precipitation Plant Recirculation Pump House. There is overflow seen at the head tank under the stairs.

PHOTO 63 – Bulkhead replacement for discharge lines from the #5 and #6 Cells.

PHOTO 64 – Seepage collection area at the west side of the Upper HsB Area.

PHOTO 65 – Culvert and seepage discharging flow from Upper HsB Area to Cell 10 pump area.

PHOTO 66 – Cell 10 Pump with overflow to the HsB Pond.

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 67 – Precipitation Plant overflow pipelines outflow, south of Cell 10 Pump facing north.

PHOTO 68 – Seepage at the Number 10 Seep bench area, looking west.

PHOTO 69 – Seepage at the Number 10 Seep bench area, looking east.

PHOTO 70 – Seepage at the Number 10 Seep bench area, looking east.

PHOTO 71 – Seepage at the Number 10 Seep bench area, looking northeast.

PHOTO 72 – Number 10 Seep V-notch weir staff gauge reading slightly below 0.4.

PHOTO 73 – Overview of Number 10 Seep stilling pond.

PHOTO 74 – Continental Pit, looking southeast from Sunflower Hill.

2021 ANNUAL INSPECTION REPORT

ANNUAL INSPECTION PHOTOS (SEPTEMBER 13, 2021)

PHOTO 75 – Continental Pit, looking south from Sunflower Hill.

PHOTO 76 – Berkeley Pit, looking southwest from Sunflower Hill.

APPENDIX B

2021 Q3 Construction Field Review and Summary

(Pages B-1 to B-27)

November 2, 2021

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Dear Mark,

RE: 2021 Q3 Field Review and Construction Summary

1.0 INTRODUCTION

This letter summarizes the construction progress and field review completed on the Yankee Doodle Tailings Impoundment (YDTI) during the third quarter (Q3) of 2021. This document is intended to satisfy the Engineers quarterly inspection frequency as outlined in the Earthworks Inspection and Test Plan in Table 3.4 of the Construction Management Plan (CMP) (KP, 2018). The construction summary is informed by weekly construction progress reports and Monthly Quality Reports, which are completed by Montana Resources, LLP (MR) to satisfy the inspection requirements outlined in the CMP, as well as the quarterly construction field review undertaken by the Engineer or proxy designate at MR.

The 2021 Q3 construction field review of the YDTI was completed on August 18, 2021 by Mr. Daniel Fontaine, P.E. of Knight Piésold Ltd. (KP). Select photos from the field review are included in the attached Photo Log. Mr. Fontaine was accompanied during the inspection by Mr. Mike Harvie of MR Mining Engineering Department and Mr. Ethan Alban, E.I.T. of KP. Mr. Harvie had completed the past six quarterly field reviews, starting in Q1 of 2020, as a designate of the Engineer of Record (EOR) due to the travel restrictions relating to the ongoing COVID-19 pandemic. The EOR for the YDTI is currently Mr. Daniel Fontaine, P.E. of KP, who accepted the role in September 2021. Mr. Ken Brouwer, P.E. of KP had previously held the role of EOR since September 2015.

2.0 QUARTERLY PROGRESS SUMMARY

2.1 CONSTRUCTION SUMMARY

Various construction activities continued during Q3 of 2021. Construction progress throughout the quarter generally aligns with the construction plans provided by MR for Q3/Q4 of 2021. Material placement and construction tracking continues to be completed by MR and the Q3 construction survey, as provided by MR, is presented on Figure 2.1. A KP site representative continues to remain on-site to assist MR with daily collection of construction monitoring data and to observe construction progress as part of the focused construction monitoring program in the Central Pedestal Area (Embankment Section 12+00W through 8+00N).

Embankment Zone U construction continued at various locations along the embankment and included select placement along the EL. 6,450 ft lift along East-West Embankment and considerable construction of the EL. 6,250, EL. 6,300 and EL. 6,350 ft lifts of the North-South Embankment in the Central Pedestal Area.

Appropriate subgrade preparation was completed and documented as per the CMP prior to construction within the Central Pedestal Area.

Rockfill surcharge construction along the East-West Embankment and tailings discharge corridor construction and embankment facing along the West and East-West Embankments at EL. 6,450 ft continued intermittently through the quarter. MR continued construction of the relocated reclaim water pipeline access road at the eastern extent of the North-South Embankment, and undertook various minor road widening and other minor miscellaneous construction activities.

2.2 TONNAGE ESTIMATES

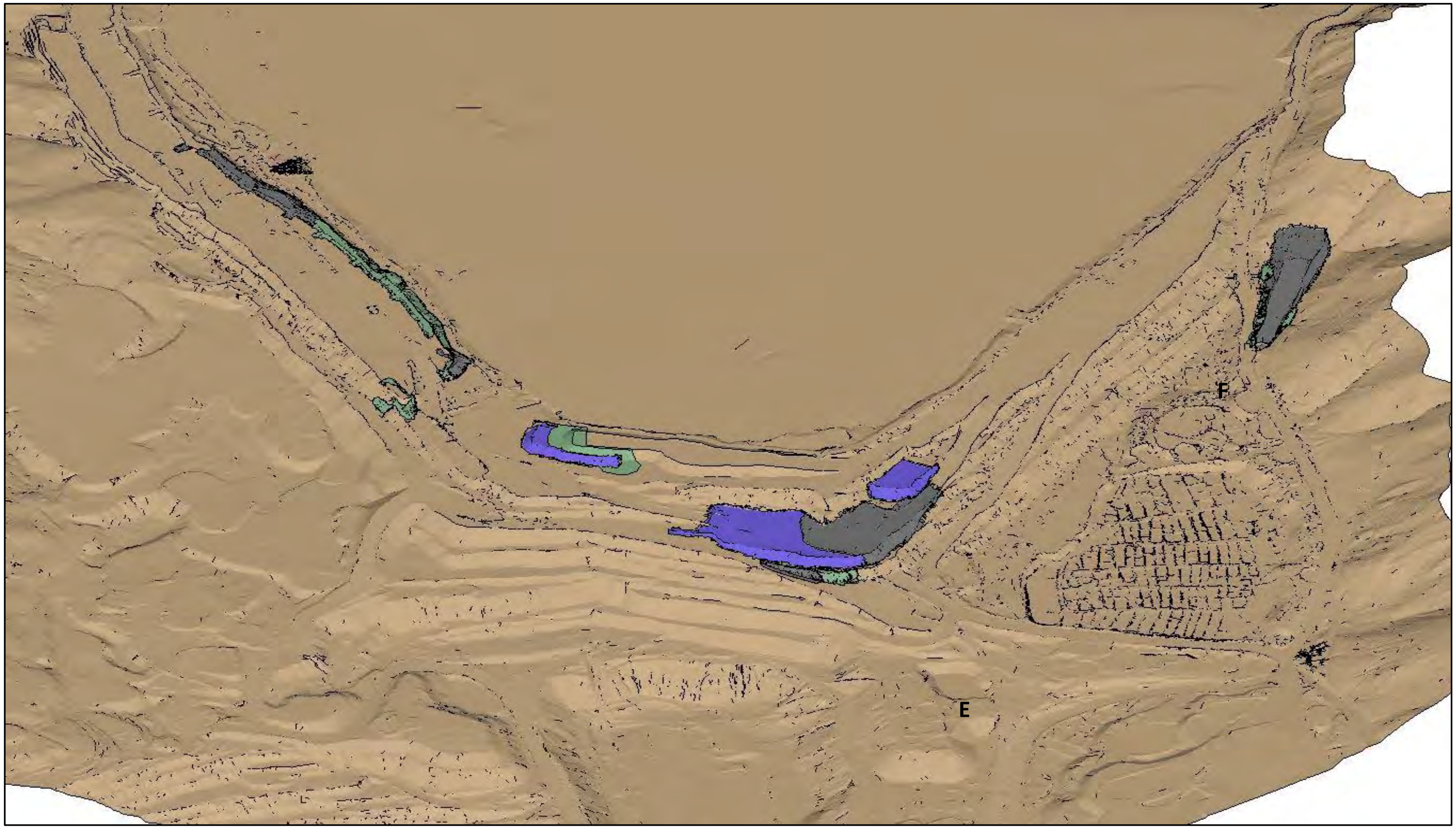
Material tonnages (provided by MR) have typically been estimated using haul truck pit cards which are submitted by haul drivers and include some level of uncertainty based on the driver's knowledge of the construction areas. In recent months MR has implemented a CAT – MineStar Edge (MineStar) survey procedure to verify material tonnages and placement locations on a monthly basis. MR plans to complete monthly MineStar surveys within 24 hours of month end, which will confirm pit card tonnages and provide a more accurate material placement summary. MR indicated that the pit card tonnages are more reflective of the Q3 construction areas presented on Figure 2.1, based on the timing of the MineStar survey. Pit card tonnage estimates for Q3 are provided in Table 2.1.

Table 2.1 Q3 Construction Placement Summary

Location	Mass - Pit Cards[1]			
	July	Aug	Sept	Total
	(Tons)			
EL. 6,450 ft - Tailings Discharge Corridor and Facing	8,970	920	0	9,890
West Embankment EL. 6,450 ft - Zone D1	0	0	0	0
N-S / E-W Embankment EL. 6,250 - Zone U	361,560	0	0	361,560
N-S / E-W Embankment EL. 6,300 - Zone U	0	1,001,980	1,013,570	2,015,550
N-S / E-W Embankment EL. 6,350 - Zone U	0	0	115,910	115,910
N-S / E-W Embankment EL. 6,400 - Zone U	0	0	0	0
East-West Embankment EL. 6,450 ft - Zone U Surcharge	288,250	26,910	147,680	462,840
East-West Embankment EL. 6,450 ft - Zone U	0	5,750	0	5,750
Reclaim Water Line Access Road	1,144,030	558,320	182,870	1,885,220
Road Widening	0	0	0	0
Misc. Construction	5,400	15,860	6,900	28,160
Tons Placed	**1,808,210**	**1,609,740**	**1,466,930**	**4,884,880**

Note(s):

1. End of quarter material tonnages provided by Montana Resources, LLP.



LEGEND: July August September

NOTES:

1. END OF QUARTER SURVEY AND MATERIAL TONS PROVIDED BY MONTANA RESOURCES, LLP.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	02NOV'21	ISSUED WITH LETTER	JRG	DDF

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 Q3 CONSTRUCTION FIELD REVIEW
YDTI CONSTRUCTION SURVEY

Knight Piésold CONSULTING

P/A NO. VA101-126/25

REF. NO. VA21-01715

FIGURE 2.1

REV 0

2.3 TAILINGS DISCHARGE ACTIVITY

Tailings discharge activity was inferred using the weekly tailings discharge elevations and daily discharge activity information provided by MR. Tailings discharge records indicate that eight of the ten discharge locations were active during Q3. The approximate beach elevation at each discharge location at the end of 2021 Q2 and Q3 and the change in elevation over that time period are summarized in Table 2.2.

Table 2.2 Tailings Discharge Point Elevations and Quarterly Change

Discharge Location	Valve (s)	Valve Active During Q3	Q2 2021 Beach Elevation	Q3 2021 Beach Elevation	Elevation Difference (Q2 to Q3)
			ft	ft	
		Y / N	Date: 06/29/2021	Date: 09/02/2021	ft
EW - 1	2-1, 3-1	Y, Y	6,390.1	6,390.1	0.0
EW - 2	2-2	Y	6,387.1	6,387.1	0.0
RK - 1	1-1, 2-3	Y, Y	6,386.0	6,386.8	0.9
RK - 2	1-2	N	6,380.7	6,380.7	0.0
RK - 3	1-3	Y	6,377.8	6,377.8	0.1
RK - 4	1-4	N	6,371.3	6,371.3	0.0
NS - 1	3-2	Y	6,385.3	6,387.9	2.6
NS - 2	3-3	Y	6,382.9	6,384.1	1.1
NS - 3	3-4	Y	6,378.5	6,379.5	1.0
NS - 4	3-5	Y	6,370.5	6,372.5	2.0

Note(s):

1. Weekly discharge elevation survey provided by MR. End of quarter elevations are closest provided dates to month end.
2. Highlighted cells indicate locations with beach elevation change during the quarter.

Additional observations of the tailings discharge system and beach development are as follows:

- Tailings discharge records indicate that locations EW-1 and EW-2 were recorded to be active during Q3, although no change in elevation was recorded at these locations.
- The elevation difference between NS-1 and NS-4 was approximately 15.4 ft at the end of Q3, which is a small increase compared to the end of Q2.
- The elevation difference between the EW discharge locations was approximately 3.0 ft at the end of Q2, with EW-1 higher than EW-2. This is a the same as the measured conditions at the end of Q2.
- The elevation difference between RK-1 and RK-4 was approximately 15.5 ft, which is an increase compared to the end of Q2. Discharge location RK-4 remains disconnected during the ongoing construction of the EL. 6,450 ft embankment lift. It is expected that this discharge location and tailings discharge corridor will be realigned and re-established following EL. 6,450 ft lift construction.

3.0 FIELD REVIEW OBSERVATIONS

3.1 GENERAL

The quarterly construction field review is intended to observe construction progress, review construction practices, and provide recommendations for priority actions. The field review is a visual inspection and does not constitute supervision of construction and does not represent a guarantee that all deficient or nonconforming works have been identified. The 2021 Q3 construction field review was completed between

8:30am and 2:30pm on August 18, 2021. Weather during the inspection was cool and cloudy with intermittent periods of fog and light rain.

The general arrangement of the YDTI, along with locations corresponding with the additional field review photos included in the attached Photo Log, is presented on Figure 3.1. Areas of interest identified during the field review along the North-South, East-West, and West Embankments are outlined on Figures 3.2 through 3.4, and within the Horseshoe Bend (HsB) area on Figure 3.5.

The photos and visual observations from the field review were compared by KP to similar information collected during previous field reviews and construction progress reporting completed by MR to inform the opinions and recommendations presented in this letter. A checklist providing a summary of the areas inspected during the field review along with relevant observations is attached as Table 3.1.

3.2 HORSESHOE BEND AND SEEP 10 AREAS

Observations during inspection of the HsB Weir area indicate that Muddler Pump was overflowing to lower HsB Pond. The HsB Weir was functioning normally, and flows were being routed towards the Equalization Basin or the HsB Water Treatment Plan Influent Pump House with no overflow observed towards the Berkeley Pit.

The Precipitation Flume monitoring the outflow from Cell 10 of the Precipitation Plant was inspected with flows appearing consistent with past inspections; however, the lookdown sensor was not recording data due to a build up of sediment within the stilling well. Efforts made to clear the sediment from the stilling well were unsuccessful and further maintenance by MR will be required to return the flume measurement device to service. Overflow from the Cell 10 Pump area was observed bypassing the pump and flow monitoring systems and entering the HsB Pond. Flows within the upper HsB area appear consistent with conditions observed previously. The pipeline between the upper HsB area and the Cell 10 Pump area appears to be flowing at partial pipe flow with drainage accumulating and ponding behind the berm between these two areas. Maintenance should be performed by MR to limit the water accumulation and ponding within the upper HsB area shown on Photo 3.1.

Photo 3.1 Water ponding within the upper HsB Area

The Precipitation Weir overflow discharge pipes were flowing normally; however, there was unmeasured overflow/leakage observed from the recirculation pumphouse head tank (reporting to the Cell 10 Pump area). A second unmeasured flow is known to occur at the Hooligan Pond via a weir and pipe (KP, 2021a). Site reconnaissance was performed to identify the route followed by the Hooligan Pond bypass flows before entering the HsB Pond. Flows are conveyed in a surface drainage ditch along the East side of the Precipitation Plant and below a railroad and access road in HDPE pipelines. The flows then follow another surface drainage ditch before entering an old concrete pipeline, flowing towards the north, that ultimately discharges near the constriction between the upper and lower HsB Pond areas.

Photos of the Seep 10 and HsB areas were visually compared with photos from the 2021 Q2 field review to produce the general observations summarized below:

- Overflows observed at the recirculation pumphouse head tank and near the Cell 10 Pump area are generally consistent with observations during the 2021 Q1 and Q2 field reviews.
- Groundwater discharges observed in the HsB Seeps and Leach Seeps areas appear generally consistent with previous reviews.
- The Seep 10 flow paths, surface collection ditches and stilling pond appear consistent with previous reviews. The reading on the staff gauge installed at the stilling pond was observed to be approximately 0.38 at the time of the inspection. The staff gauge appears to have been cleaned since the Q2 field review, addressing a recommendation from that review (KP, 2021b).

3.3 WEST EMBANKMENT

Construction activities for the EL. 6,450 ft lift along the West Embankment were inactive at the time of the field review. Placement of U material is nearly complete with the notable exception of the northern end of the embankment, where relocation of a municipal water pipeline is required before construction proceeds in this area. MR is in the process of securing the appropriate approvals to relocate this pipeline.

Slash piles, pushed outside of the embankment footprint along the tree line, were observed periodically along the downstream toe of West Embankment as shown on Photo 3.2. KP understands that MR has secured burn permits for these materials. These slash piles should be relocated from the tree line and piled where they can be burned when weather conditions allow. It will be more difficult to relocate the slash piles following construction of the downstream portion of the embankment.

Photo 3.2 Example of slash piles pushed up to the tree line along the West Embankment

The limit of D1 material placement was observed to be generally consistent with progress photos from the end of Q2. Construction of Zone D1 is complete within the Drain Pod 1 area and on the southern end of the embankment. A section of D1 material placement remains incomplete between approximately Section 87+00W and 110+00W as shown on Photos 3.3 and 3.4. It is recommended that D1 material placement be completed within this area as appropriate material becomes available. Preferably fill placement in this area will advance before significant snowfall occurs, requiring snow removal and making construction more complicated.

Photo 3.3 Incomplete D1 material placement at Ridge Road facing South

Photo 3.4 Incomplete D1 material placement at Ridge Road facing North

Construction of the tailings discharge corridor along the West Embankment appears to be largely completed, and the tailings distribution pipeline has been extended along the EL. 6,450 ft crest of the West Embankment as far as discharge location RK-3. Further extension to RK-4 is pending completion of municipal water pipeline relocation and completion of U material placement as discussed above. Tailings beaches were observed to be well developed along the West Embankment and should be manageable in the near-term without discharge location RK-4 until construction is complete at the northern end of the embankment.

3.4 EAST-WEST EMBANKMENT

Construction activities along the East-West Embankment at the time of the field review were limited to grading of the tailings discharge corridor. The EL. 6,450 ft lift of the embankment and rockfill surcharge is complete along the majority of the northwest trending limb of the embankment. The rockfill surcharge in the central pedestal area was partially complete, requiring relocation of the tailings distribution pipelines up to the EL. 6,450 ft lift near discharge location EW-1 for construction to continue. Pipe fusing activities were underway to facilitate this relocation.

The interface of the tailings beach and rockfill surcharge between discharge locations EW-1 and NS-1 upstream of the central pedestal area of the embankment was inspected during the field review. Minor pore pressure fluctuations have been observed by several East-West Embankment VWPs, which were inferred to be in response to associated pooling and infiltration of tailings slurry water into and beneath the central rockfill surcharge in this area (KP, 2021c). The following observations from the field review support this interpretation:

- the tailings beach elevation in this area is relatively low when compared to the beach elevation at the adjacent discharge locations (EW-1 and NS-1)
- recently settled tailings were observed in the area still undergoing initial drainage and desaturation
- the rockfill materials observed at the interface between the surcharge and tailings beach are relatively coarse-grained

- tailings were observed to be intermingled with these coarse-grained rockfill materials at the edge of surcharge

Preparation for construction of the East-West Embankment within the central pedestal area was observed with cross ripping of the recently relocated haul ramp completed in preparation for the EL. 6,300 ft lift. Construction of this lift was progressing along the North-South Embankment and is discussed further in the following section.

3.5 NORTH-SOUTH EMBANKMENT

Construction of the EL. 6,300 ft lift along the North-South Embankment was underway during the field review. Rockfill dumping was occurring at the corner of the embankment on the downstream step-out between Sections 3+00N and 8+00N. The lift subgrade surface, comprising the previously placed EL. 6,250 ft lift, had been cross ripped in preparation for the advancing lift above. Toe stakes were present to identify the dumping limit.

The North-South Embankment crest is constructed to EL. 6,400 ft and is over widened in preparation for lifting to EL. 6,450 ft. Construction of the EL. 6,450 ft lift along the North-South Embankment is planned for 2022 following completion of the downstream step-out at the southern end and completion of the crest raise along the East-West Embankment. The downstream slope of the North-South Embankment was observed during the field review. No signs of instability or seepage were observed.

Tailings beach development at the northern end of the North-South Embankment has been noticeably enhanced since the addition of discharge location NS-4.

3.6 RECLAIM WATER PIPELINE RELOCATION

Construction along the new reclaim water pipeline corridor was observed during the inspection. The work comprises a substantial bedrock cut along Rampart Mountain at approximately EL. 6,500 ft above the existing reclaim pipeline access road connecting to a rockfill ramp located adjacent to and downstream of the North-South Embankment. A contractor is responsible for the cut portions of the reclaim corridor with MR constructing the rockfill ramp. Construction is nearly complete with only minor work required along the cut and at the interface to tie into the rockfill ramp. The newer reclaim barge was observed to be disconnected and relocated further to the north in preparation for realignment of the reclaim pipeline along this new corridor.

SAVED: M:\1\01\00126\25\A\Acad\FIGS\A12, 10/27/2021 2:27:12 PM , RMCLELLAN PRINTED: 11/2/2021 8:42:48 AM, FIG 3.1, RMCLELLAN
XREF FILE(S): 5ft_01 2021-07-29 IMAGE FILE(S): 5ft_01 2021-07-29

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS ARE BASED ON ANACONDA MINE GRID.
2. PHOTO LOCATIONS CORRESPOND TO PHOTO LOG ISSUED WITH 2021 Q3 QUARTERLY CONSTRUCTION FIELD REVIEW SUMMARY.
3. AERIAL IMAGERY FROM JULY 29, 2021 PROVIDED BY MONTANA RESOURCES, LLP.

SCALE A: 1500 0 1500 3000 4500 6000 7500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	02NOV'21	ISSUED WITH LETTER	JRG	RMM	DDF

MONTANA RESOURCES, LLP

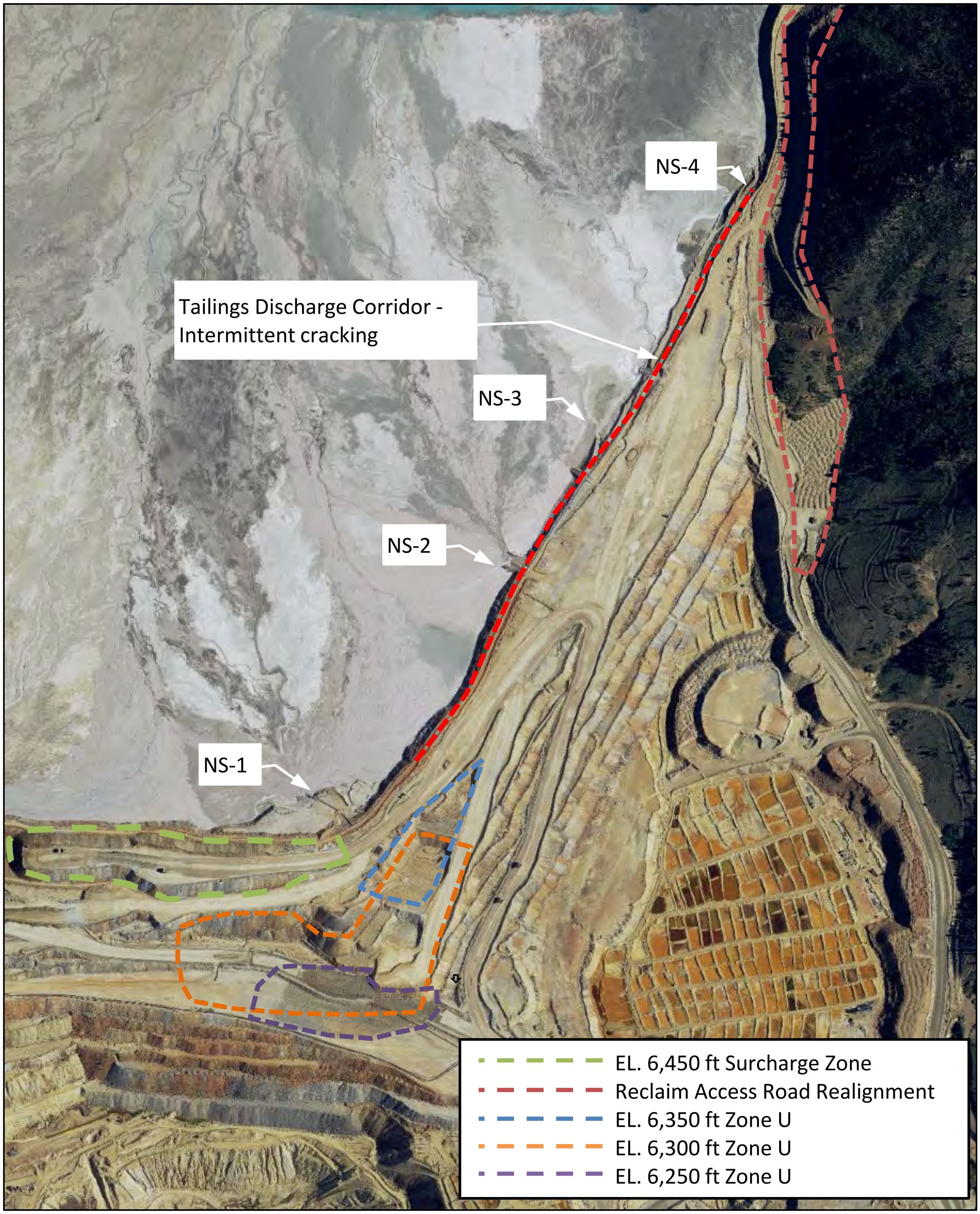
YANKEE DOODLE TAILINGS IMPOUNDMENT

**2021 Q3 CONSTRUCTION FIELD REVIEW
GENERAL ARRANGEMENT
AND PHOTO LOCATION MAP**

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-126/25	VA21-01715

FIGURE 3.1 REV 0



NOTES:

1. AERIAL IMAGERY FROM JUNE 25, 2021 PROVIDED BY MONTANA RESOURCES, LLP.

2. CONSTRUCTION AREAS ARE ESTIMATED TO REPRESENT AREAS OF INTEREST FOR Q3.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	02NOV'21	ISSUED WITH LETTER	JRG	DDF

MONTANA RESOURCES, LLP

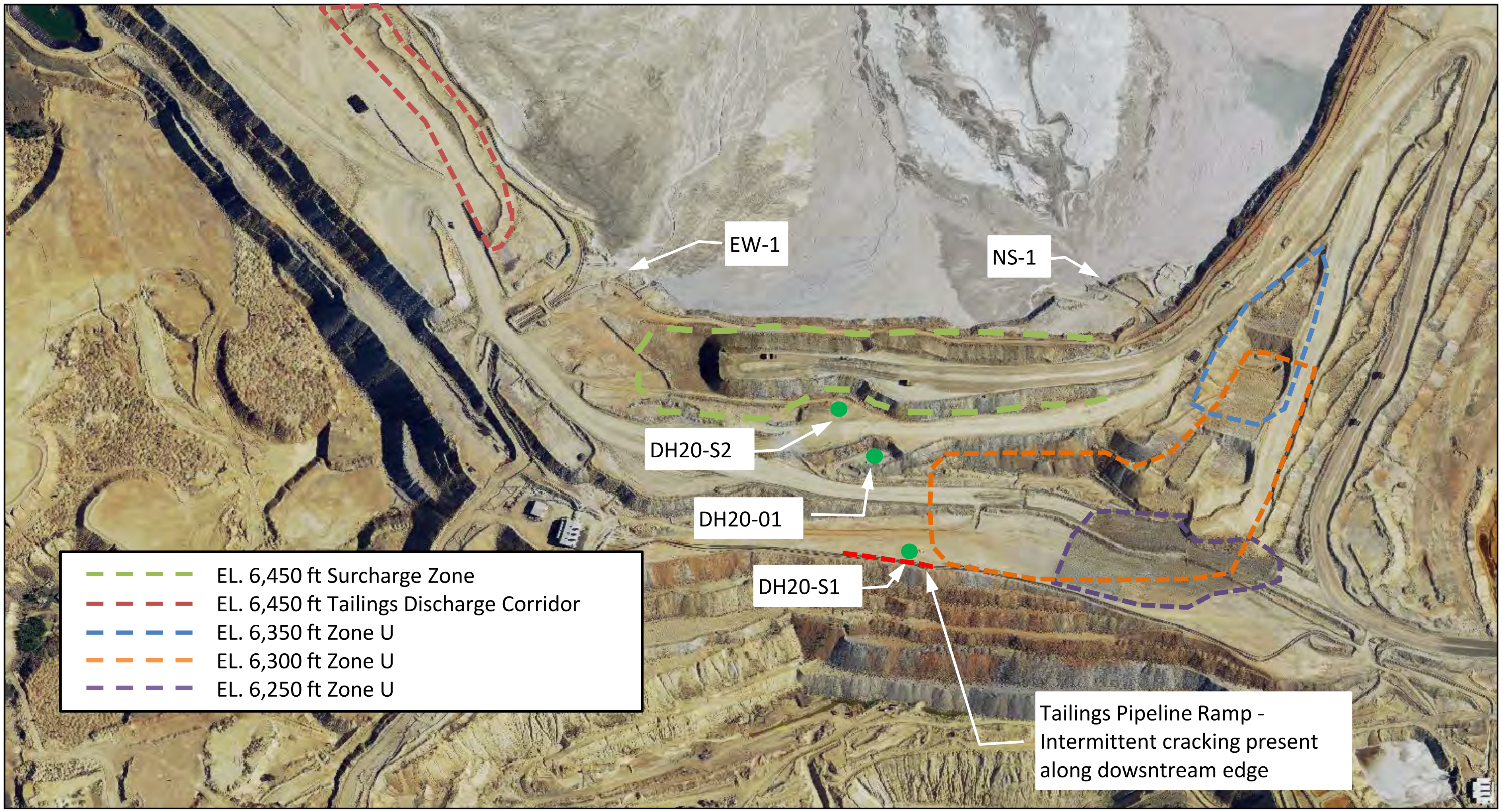
YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 Q3 CONSTRUCTION SUMMARY
NORTH-SOUTH EMBANKMENT
AREAS OF INTEREST

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01715

FIGURE 3.2 REV 0



NOTES:

1. AERIAL IMAGERY FROM JUNE 25, 2021 PROVIDED BY MONTANA RESOURCES, LLP.
2. CONSTRUCTION AREAS ARE ESTIMATED TO REPRESENT AREAS OF INTEREST FOR Q3.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	02NOV'21	ISSUED WITH LETTER	JRG	DDF

MONTANA RESOURCES, LLP

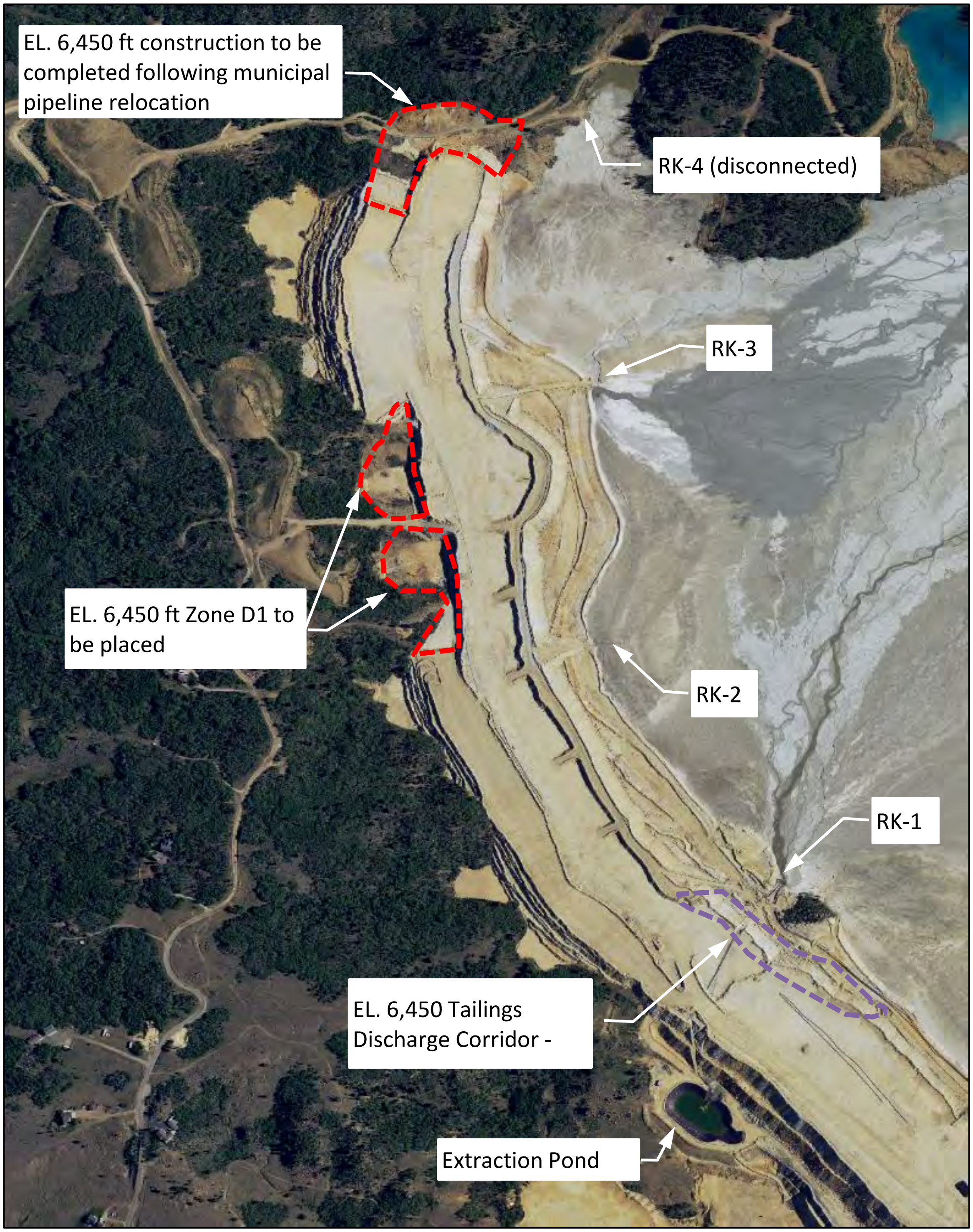
YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 Q3 CONSTRUCTION SUMMARY
EAST-WEST EMBANKMENT
AREAS OF INTEREST

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01715

FIGURE 3.3 REV 0



NOTES:

1. AERIAL IMAGERY FROM JUNE 25, 2021 PROVIDED BY MONTANA RESOURCES, LLP.

2. CONSTRUCTION AREAS ARE ESTIMATED TO REPRESENT AREAS OF INTEREST FOR Q3.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	02NOV'21	ISSUED WITH LETTER	JRG	DDF

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 Q3 CONSTRUCTION SUMMARY
WEST EMBANKMENT
AREAS OF INTEREST

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01715

FIGURE 3.4 REV 0

NOTES:

1. AERIAL IMAGERY FROM JUNE 25, 2021 PROVIDED BY MONTANA RESOURCES, LLP.

2. CONSTRUCTION AREAS ARE ESTIMATED TO REPRESENT AREAS OF INTEREST FOR Q3.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 Q3 CONSTRUCTION SUMMARY
HORSESHOE BEND
AREAS OF INTEREST

Knight Piésold CONSULTING

P/A NO. VA101-126/25

REF. NO. VA21-01715

FIGURE 3.5

REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	02NOV'21	ISSUED WITH LETTER	JRG	DDF

4.0 OTHER ITEMS

MR provided a 2022 construction dump plan in early October and continues to develop a long-range Continental Pit Mine Plan. The 2022 dump plan satisfies the request for a more detailed construction sequence and schedule as outlined in the 2020 Annual Inspection Report (KP, 2021d). KP and MR continue to review and discuss short and long-term construction planning during bi-weekly meetings.

Weekly construction reports and Monthly Quality Reports were completed in a timely matter throughout the quarter. There has been a noted improvement in the delivery of the reports in a reasonable time period. All required weekly and monthly reports for Q3 were received at the time of this letter.

5.0 SUMMARY AND RECOMMENDATIONS

The following recommendations resulted from the field review:

- Perform maintenance at the Precipitation Flume to remove sediment from the stilling well and return this measurement device to service
- Perform maintenance to limit the water accumulation and ponding within the upper HsB area
- Relocate slash piles currently pushed up along the tree line at the downstream toe of the West Embankment to locations suitable for burning when weather conditions allow
- Complete D1 material placement along the West Embankment between approximately Stn. 87+00W and 110+00W as soon as practicable

We trust this letter appropriately summarizes the construction activities at the YDTI during Q3 2021. The field observations (photos, videos, and descriptions) indicate that the YDTI construction generally conforms with the procedures and specifications outlined in the Construction Management Plan (KP, 2018) and IFC Design Drawings. The information, descriptions and conclusions presented are based on a visual assessment of the information provided and observations during the field review. The construction summary and field review does not constitute supervision of construction and does not represent a guarantee that all deficient of non-conforming works have been identified.

Yours truly,
Knight Piésold Ltd.

PROFESSIONAL PROVINCE OF J. R. R. GILLESPIE # 42239 BRITISH COLUMBIA ENGINEER 2021-11-02

MONTANA 2021-11-02 DANIEL DYLAN FONTAINE No. 59785 PE LICENSED PROFESSIONAL ENGINEER

Prepared: Jason Gillespie, P.Eng.
Senior Engineer

Prepared: Daniel Fontaine, P.E.
Specialist Engineer | Associate Engineer of Record

MONTANA KEN J. BROUWER 50020 PE REGISTERED PROFESSIONAL ENGINEER 2021-11-02

Reviewed: Ken Brouwer, P.E.
Principal Engineer

Approval that this document adheres to the Knight Piésold Quality System: KJB

Attachments:

Table 3.1 Rev 0 2021 Construction Field Review Checklist
2021 Q3 Construction Field Review Photo Log

References:

Knight Piésold Ltd. (KP, 2018). Yankee Doodle Tailings Impoundment: Construction Management Plan (KP Reference No. VA101-126/12-5 Rev. 3), May 1, 2018.

Knight Piésold Ltd. (KP, 2021a). Q2 2021 – YDTI Quarterly Water Data Summary (KP Reference No. VA21-01264), dated August 19, 2021.

Knight Piésold Ltd. (KP, 2021b). 2021 Q2 Construction Field Review (KP Reference No. VA21-01400), dated September 21, 2021.

Knight Piésold Ltd. (KP, 2021c). Q2 2021 – YDTI Quarterly Piezometric and Deformation Monitoring Update (KP Reference No. VA21-01320), dated August 24, 2021.

Knight Piésold Ltd. (KP, 2021d). Yankee Doodle Tailings Impoundment 2020 Annual Inspection Report (KP Reference No. VA101-126/21-2 Rev. 0). May 11, 2021.

Copy To: Mike Harvie, Corey Warner, Amanda Griffith

TABLE 3.1

MONTANA RESOURCES, LLP
YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 CONSTRUCTION FIELD REVIEW CHECKLIST

Date: August 18, 2021 **Time:**

Inspectors:
Name: Daniel Fontaine, P.E. | Title: Specialist Engineer, Knight Piésold Ltd. (KP) | Signature: See Report Closure Page

Inspection Type: DAILY | WEEKLY | MONTHLY | June | OTHER EVENT (Specify): Q3 Inspection

Weather Conditions: Precipitation (24 hr.): | Wind Speed:
Temperature (°F): | Sky (circle): Clear | Partly Cloudy | Cloudy

Instrumentation Data Collected: Yes No **Details:**

Samples Collected: Yes No **Details:**

WEST EMBANKMENT

LOCATION	INSPECTION COMPLETED	ITEM	ITEM PRESENT YES	ITEM PRESENT NO	PHOTO	COMMENTS
Crest of Dam	✓	Cracking, Subsidence, Depressions		X		
		Erosion		X		
		Lateral Deformation		X		
Upstream Face	✓	Cracking, Subsidence, Depressions		X		
		Erosion		X		
		Pipeline Corridor	X		X	Pipelines ramp up at RK-1 and run along EL. 6,450 ft lift.
Downstream Face	✓	Cracking, Subsidence, Depressions		X		
		Erosion		X		
		Seeps, Damp or Soft areas		X		
Active Embankment Construction		Location and Elevation Reviewed			NA	Construction inactive.
		Surface Preparation			NA	Construction inactive.

EAST-WEST EMBANKMENT

LOCATION	INSPECTION COMPLETED	ITEM	ITEM PRESENT YES	ITEM PRESENT NO	PHOTO	COMMENTS
Crest of Dam	✓	Cracking, Subsidence, Depressions		X		
		Erosion		X		
		Lateral Deformation		X		
Upstream Face	✓	Cracking, Subsidence, Depressions	X			Minor cracking at Terramac ramp; area buttress by tailings
		Erosion		X		
		Pipeline Corridor	X		X	Piplines currently run along EL. 6,400 ft lift, relocation pending completion of EL. 6,450 ft lift pipeline corridor.
Downstream Face	✓	Cracking, Subsidence, Depressions		X		Crack monitoring on-going during active construction.
		Erosion		X		
		Seeps, Damp or Soft areas		X		
Seep 10 Bench	✓	Overview of HsB Photo	X		X	
	✓	Seep 10 Stilling Basin	X		X	Staff gauge reading approximately 0.38.
	✓	Seep 10 V-Notch Weir	X		X	
	✓	Seep 10 Inflows	X		X	
Active Embankment Construction	✓	Location and Elevation Reviewed	X		X	Active construction along N-S Embankment EL. 6,300 ft lift.
		Surface Preparation	X		X	Signs of surface preparation (cross ripping) observed.
Pipe Ramp Construction	✓	Cracking, Subsidence, Depressions	X			Existing cracking along this ramp. Monitoring program underway during active haul ramp infill construction.
		Erosion		X		
		Survey Stake Locations for Expansion		X		Pipeline ramp construction complete. Survey stakes present to guide haul ramp infill construction in the area.

NORTH-SOUTH EMBANKMENT

LOCATION	INSPECTION COMPLETED	ITEM	ITEM PRESENT YES	ITEM PRESENT NO	PHOTO	COMMENTS
Crest of Dam	✓	Cracking, Subsidence, Depressions		X		Uneven crest surface grade due to rockfill settlement
		Erosion		X		
		Lateral Deformation		X		
Upstream Face	✓	Cracking, Subsidence, Depressions	X			Minor cracking (dormant) along pipeline corridor
		Erosion		X		
		Pipeline Corridor	X		X	
Downstream Face	✓	Cracking, Subsidence, Depressions		X		
		Erosion		X		
		Seeps, Damp or Soft areas		X		
Active Embankment Construction	✓	Location and Elevation Reviewed	X		X	Construction of EL. 6,300 ft lift in progress.
		Surface Preparation	X		X	Signs of surface preparation (cross ripping) observed.

Montana Resources

Knight Piésold CONSULTING

TABLE 3.1

MONTANA RESOURCES, LLP
YANKEE DOODLE TAILINGS IMPOUNDMENT

2021 CONSTRUCTION FIELD REVIEW CHECKLIST

YANKEE DOODLE TAILINGS IMPOUNDMENT						
LOCATION	INSPECTION COMPLETED	ITEM	ITEM PRESENT		PHOTO	COMMENTS
			YES	NO		
General	✓	Pond Elevation and Location Reviewed	X		X	~ EL. 6,360 ft; pond location constrained by beaches
		Lowest Crest Elevation Determined		X		Freeboard well in excess of design requirements.
Tailings Discharges	✓	Active Discharge Locations	X			RK-3, NS-2
		Pipeline leakage		X		None observed
		Pipeline wear/damage		X		None observed
Reclaim Water Pipeline	✓	Pipeline wear/damage		X		None observed
		Pipeline leakage		X		None observed

HORSESHOE BEND				
LOCATION	INSPECTION COMPLETED	ITEM	PHOTO	COMMENTS
Horseshoe Bend and Precipitation Plant	✓	Upper HSB Pond	X	
	✓	Lower HsB Pond	X	
	✓	HsB Pump and Water Level	X	Water accumulation and ponding observed with upper HsB area requires maintenance.
	✓	HsB Seepage to Upper Pond	X	HsB seeps appear consistnt with previous reviews.
	✓	HsB Seepage to Hooligan Pond	X	Leach seeps appear consistent with previous reviews.
	✓	Precipitation Plant Overflow Box Leak	X	Leakage observed.
	✓	Precipitation Plant Overflow/Cell 10 Pump	X	Unmeasured overflow from Cell 10 Pump area observed.
	✓	HsB Weir	X	
	✓	Muddler Pump and Overflow	X	Overflow from Muddler Pump observed.
		Leach Pump Head Tank (Weir)	NA	
		BMFOU Pilot Project Facilities	NA	

Additional Notes:

✓	Extraction Pond	X	Emergency Pipelines - Discharges not placed in energy dissipation basin.

\\knightpiesold.local\VA-Prj$\1\01\00126\25\A\Correspondence\VA21-01715 - 2021 Q3 Construction Field Review and Summary\Table\[Q3 2021 Inspection Log.xlsx]Q3 Field Review

NOTES:

1. CHECKLIST COMPLETED BY KP REPRESENTATIVE DANIEL FONTAINE AND REVIEWED BY KP AUTHORS OF THIS SUMMARY LETTER.

0	2NOV'21	ISSUED WITH LETTER VA21-01715	DDF	JRG
REV	DATE	DESCRIPTION	PREP'D	RVW'D

2021 Q3 CONSTRUCTION FIELD REVIEW PHOTO LOG

PHOTO 1 – HsB Weir and Pond facing North

PHOTO 2 – Cell #10 Pump and Cell #5 Pipelines – Overflow to HsB Pond

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2021 Q3 CONSTRUCTION FIELD REVIEW PHOTO LOG

PHOTO 3 – Precipitation Plant – Recirculation pump house overflow

PHOTO 4 – East-West Embankment – General overview of the various seeps at the toe of the embankment

PHOTO 5 – Seep 10 Weir Staff Gauge reading approximately 0.38

PHOTO 6 – HsB Area – Holding and Surge Ponds, viewed from the Seep 10 Bench (EL. 5,900 ft)

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2021 Q3 CONSTRUCTION FIELD REVIEW PHOTO LOG

PHOTO 7 – West Embankment – EL. 6,450 ft lift, viewed from the topsoil stockpile along the West Ridge

PHOTO 8 – West Embankment – EL. 6,450 ft Zone D1 construction at the Bumtown area

Knight Piésold CONSULTING

2021 Q3 CONSTRUCTION FIELD REVIEW PHOTO LOG

PHOTO 9 – West Embankment – North end of the EL. 6,450 ft lift, to be completed following municipal water pipeline relocation

PHOTO 10 – West Embankment – Tailings beach, viewed from the old tailings discharge corridor near discharge location RK-4

PHOTO 11 – West Embankment – EL. 6,450 ft crest, viewed from the north end of the embankment, looking South

PHOTO 12 – West Embankment – EL. 6,450 tailings discharge corridor looking North

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2021 Q3 CONSTRUCTION FIELD REVIEW PHOTO LOG

PHOTO 13 – East-West Embankment – EL. 6,450 Zone U Surcharge construction, viewed from the North-South Embankment

PHOTO 14 – Tailings beach and supernatant pond location – viewed from the tailings discharge corridor near discharge location NS-4

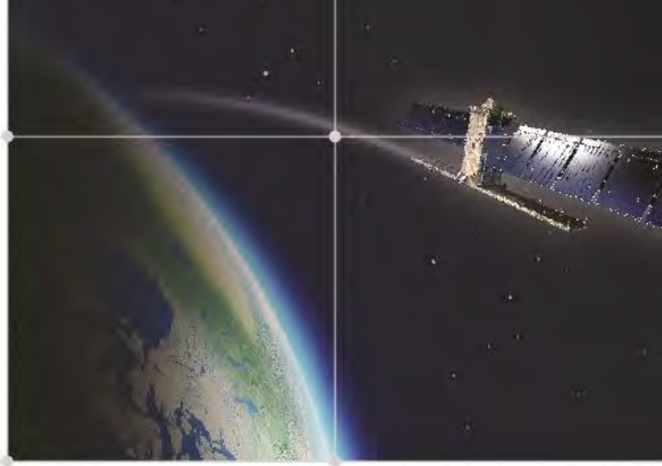
PHOTO 15 – Reclaim Pipeline Access Road – Construction progress, viewed from the north end of the existing reclaim access road

PHOTO 16 – North-South Embankment – EL. 6,250. EL. 6,300 ft Zone U construction progress

APPENDIX C

InSAR Monitoring Reports

(Pages C-1 to C-103)



InSAR Analysis of Ground Displacement for Montana Resources operations in Butte - June 2021 update

Technical Report

August 2021

TRE
ALTAMIRA
A CLS Group Company

Report Specifications

Client:	**Knight Piesold Ltd.**
Attention:	Kevin Davenport, Senior Engineer
Address:	Suite 1400 - 750 West Pender Street Vancouver British Columbia Canada V6C 2T8

Reference:	
Title:	InSAR Analysis of Ground Displacement over Butte Mine
TRE ALTAMIRA Delivery Reference:	JO21-1442-CA 1.0
Client Reference (PO):	334524

Prepared by:	**TRE ALTAMIRA Inc.**
Author(s):	Riccardo Tortini
Approved by:	Sara Del Conte
Date:	20 August 2021
Version:	1.0

Executive Summary

This report describes the results of the semi-annual ground displacement InSAR analysis over Montana Resources' operations in Butte, Montana (USA). TRE Altamira used its SqueeSAR® algorithm to process high-resolution TerraSAR-X (TSX) images to analyze ground displacement.

The TSX imagery was acquired from two orbits to provide 2-D (vertical and E-W) ground displacement. Imagery was collected from mid-April to mid-June 2021 as dictated by the presence of snow at the site. The full period covered by this analysis was 15 April 2020 – 18 June 2021 in the ascending orbit and 17 April 2020 – 20 June 2021 in the descending orbit.

The following points summarize the findings:

- Overall rates of vertical motion at the Yankee Doodle Tailings Impoundment range from -13.02 in/yr (strongest subsidence observed) to +1.30 in/yr (strongest uplift observed):
- Settlement is seen along three sections on the East-West embankment. The highest rates of vertical motion along each section measure as follows:
    - Section 8+00 W: -5.82 in/yr
    - Section 0+00: -8.45 in/yr
    - Seep 10 Bench: -1.22in/yr
- Displacement rates are generally lowest near the toe of the embankment and are listed below:
    - Section 8+00 W: -0.44 in/yr
    - Section 0+00: -1.41 in/yr
    - Seep 10 Bench: -0.02 in/yr
- Strongest motion observed at the Berkeley Pit (South Wall):
    - -2.27 in/yr of settlement
    - 1.39 in/yr of eastward motion
- Strongest motion observed at the Continental Pit (South Wall):
    - -1.56 in/yr of settlement
    - 5.08 in/yr of eastward motion

TerraSAR-X image acquisitions over the site are currently proceeding with an 11-day revisit frequency in both the ascending and descending orbits.

Table of Contents

Acronyms and Abbreviations

AOI	Area of Interest
ATS	Average Time Series
CS	Cross-Section
DS	Distributed Scatterer(s)
GIS	Geographic Information System
InSAR	Interferometric Synthetic Aperture Radar
LOS	Line of Sight
MP	Measurement Point
PS	Permanent Scatterer(s)
SAR	Synthetic Aperture Radar
SNT	Sentinel Satellite
SqueeSAR®	The most recent InSAR algorithm patented by TRE
TS	Time Series
YDTI	Yankee Doodle Tailings Impoundment

1. Introduction

Montana Resources (MR) has contracted TRE Altamira Inc. (TREA), overseen by Knight Piésold, to carry out an InSAR assessment over MR's Butte, Montana Operations. TREA used its proprietary SqueeSAR algorithm and high-resolution TSX imagery to identify ground movement between March 2020 – June 2021, with particular focus on the Yankee Doodle Tailings Impoundment.

1.1. Area of Interest

The mine site is located directly Northeast of the town of Butte, Montana, USA. The 32.56 mi^2 area of interest (AOI) (Figure 1) is predominantly industrial with large mining pits and related infrastructure occupying a large portion of the AOI. The mine is in mostly forested alpine terrain and grassland, with the town of Butte, Montana occupying the bottom portion of the AOI. The high radar reflectivity of the mine site and man-made structures within Butte are conducive to the application of InSAR.

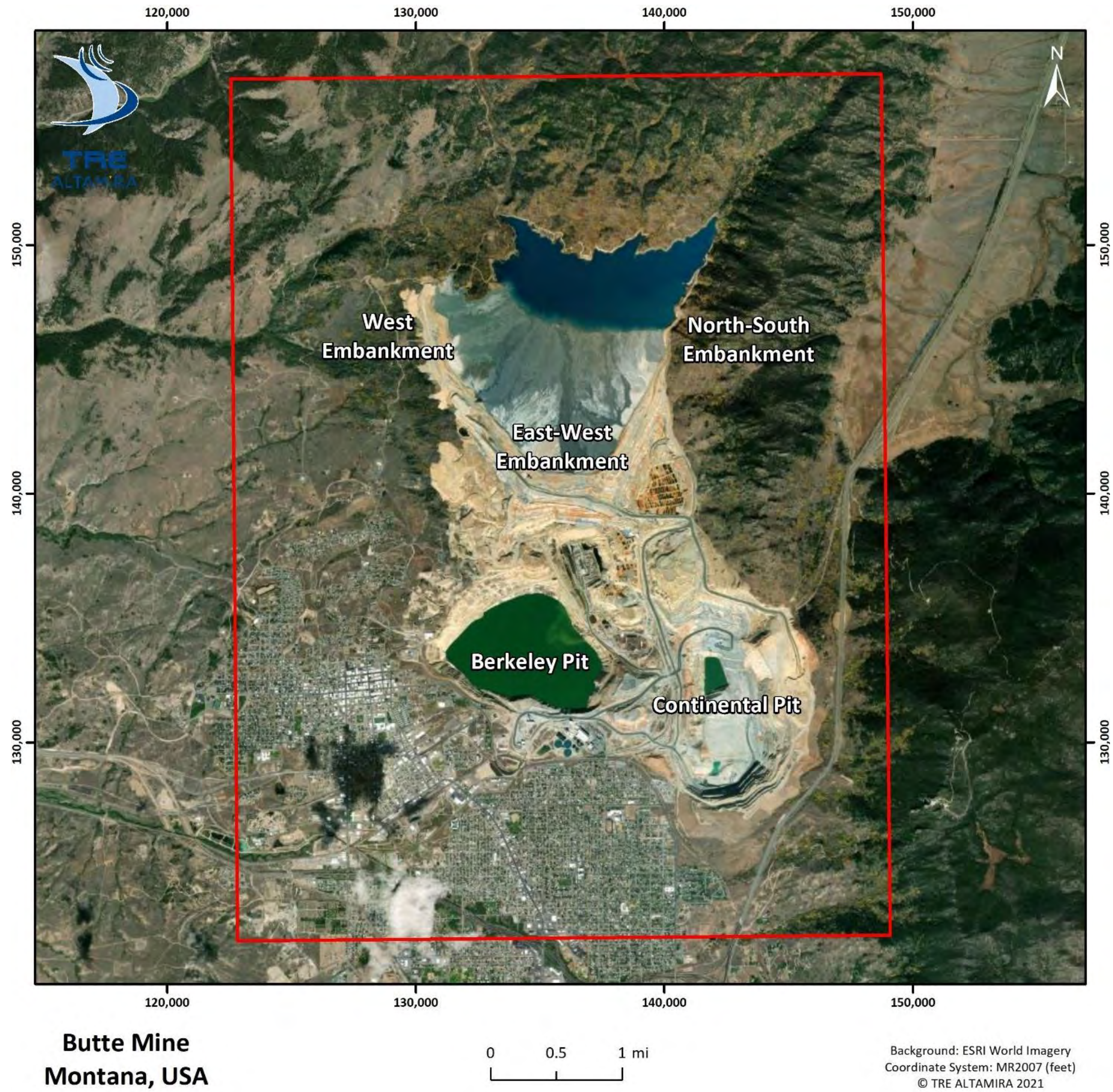


Figure 1: Butte Mine: area of interest.

2. Radar Data

The radar data available over Butte consists of high-resolution images acquired by the TSX and PAZ satellites (Table 1) from both the ascending (satellite travelling from South to North and imaging to the east) and descending (satellite travelling from North to South and imaging to the west) orbits between April 2020 and June 2021. The archive consists of 26 ascending and 28 descending images collected at an 11-day interval (Figure 2) prior to late August, when PAZ (a TSX clone) imagery was added to the archive in order to ensure an appropriate amount of imagery was available for a SqueeSAR analysis in the fall season. Appendix 2 provides additional information on the satellite acquisition parameters. Winter images were not acquired due to the presence of snow.

Table 1: Satellite acquisition parameters and image acquisition information.

Satellite	Pixel Resolution	Orbit	LOS Angle (Θ)	# of Images	Date Range
TSX & PAZ	3m x 3m	Ascending	40.0°	26	15 April 2020 – 18 June 2021
		Descending	29.8°	28	17 April 2020 – 20 June 2021

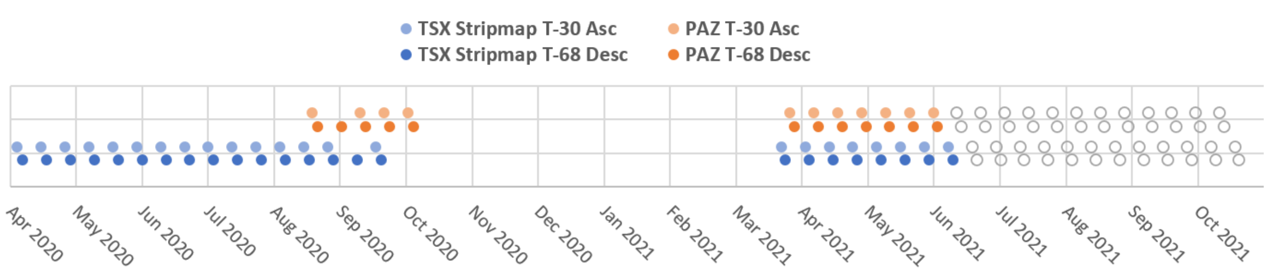


Figure 2: Temporal distribution of TSX radar images.

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3. Overview of Results

This section provides a summary of the techniques used and a general overview of the results, while Section 4 describes areas of displacement in more detail.

3.1. LOS Results

SqueeSAR identifies measurement points (MPs) from objects on the ground that display a stable return to the satellite in every image of the archive. In InSAR analyses, all measurements are 1-D readings along the sensor's line-of-sight (LOS) as the true vector of displacement is projected onto the LOS. The same displacement will produce different readings when viewed from different angles. The LOS displacement rates are calculated from a linear regression of the ground movement measured over the entire period covered by the satellite images. Each measurement point corresponds to a Permanent Scatterer (PS) or a Distributed Scatterer (DS), and color-coded according to its annual rate of movement and direction:

- In LOS analysis, negative values (red) indicate surface displacement away from the satellite, while positive values (blue) indicate surface displacement towards the satellite.

The TSX LOS SqueeSAR analysis provided a density of 8,720 MPs/mi^2 in the ascending orbit, and 9,602 MPs/mi^2 in the descending orbit (Table 2). The precision of the measurements, as indicated by the average standard deviation values, is ±0.05 and ±0.04 in/yr, respectively. The density and precision of the SqueeSAR measurement points is expected to continue improving as more images are acquired.

Table 2: Properties of the April 2020 – June 2021 TSX & PAZ LOS analyses.

Attribute	Ascending	Descending
Date Range	15 April 2020 – 18 June 2021	17 April 2020 – 20 June 2021
N. of Images	26	28
Total points (PS + DS) **Number of PS** **Number of DS**	283,288 253,946 29,342	311,951 279,935 32,016
Average Point Density (pts/mi^2)	8,720	9,602
Average Displacement Rate Standard Deviation (in/yr)	±0.05	±0.04
Reference Point Location	5,782,618.86 E -12,527,771.18 N	5,781,321.24 E -12,526,874.64 N

The cumulative displacement, measured in inches, for the ascending and descending LOS data are shown in Figure 3 and Figure 4, respectively. These data are used as input to produce 2-D (vertical and East-West) results, and they generally provide a higher density of measurement points.

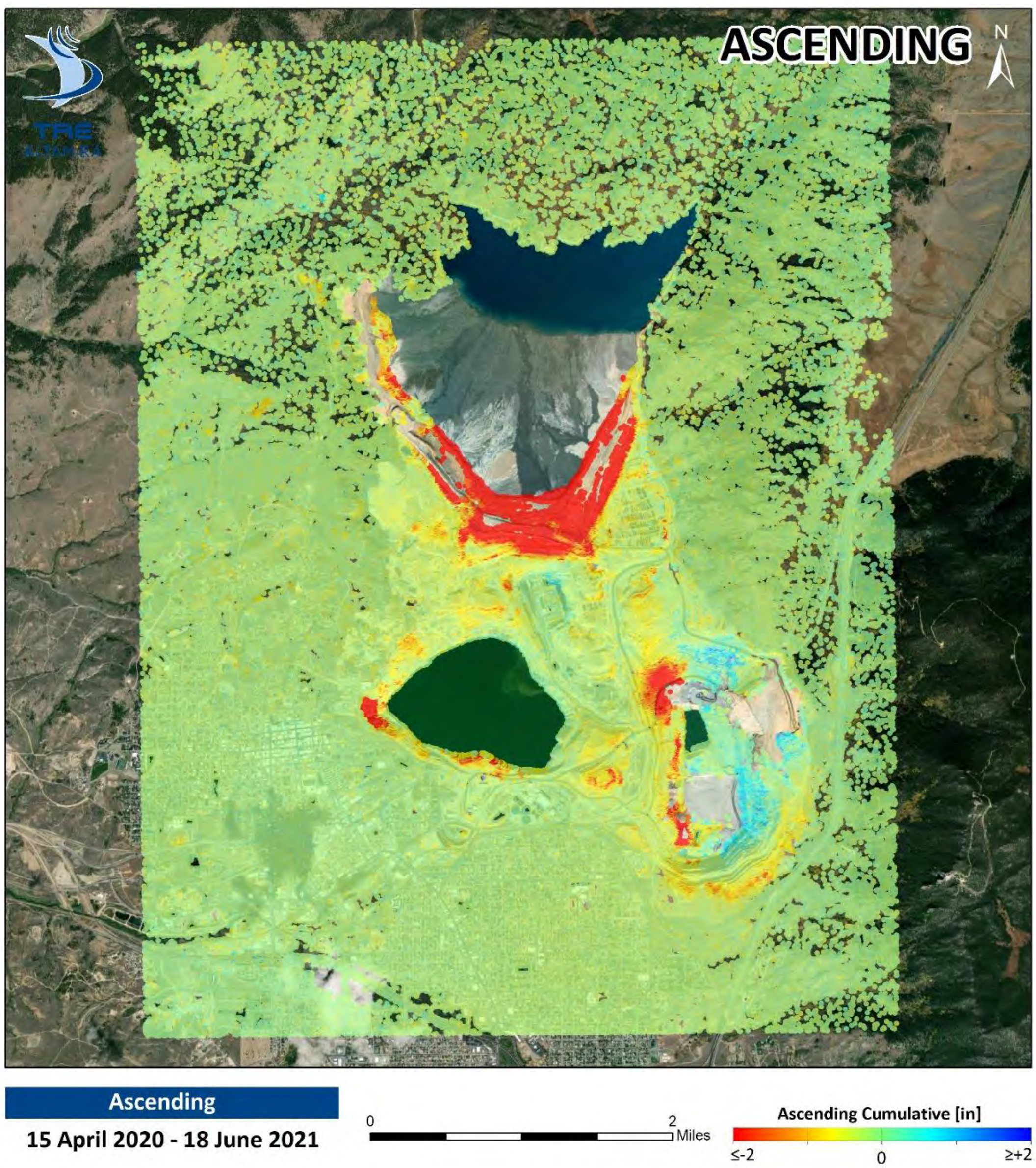


Figure 3: Overview of the ascending LOS cumulative displacement over the full AOI.

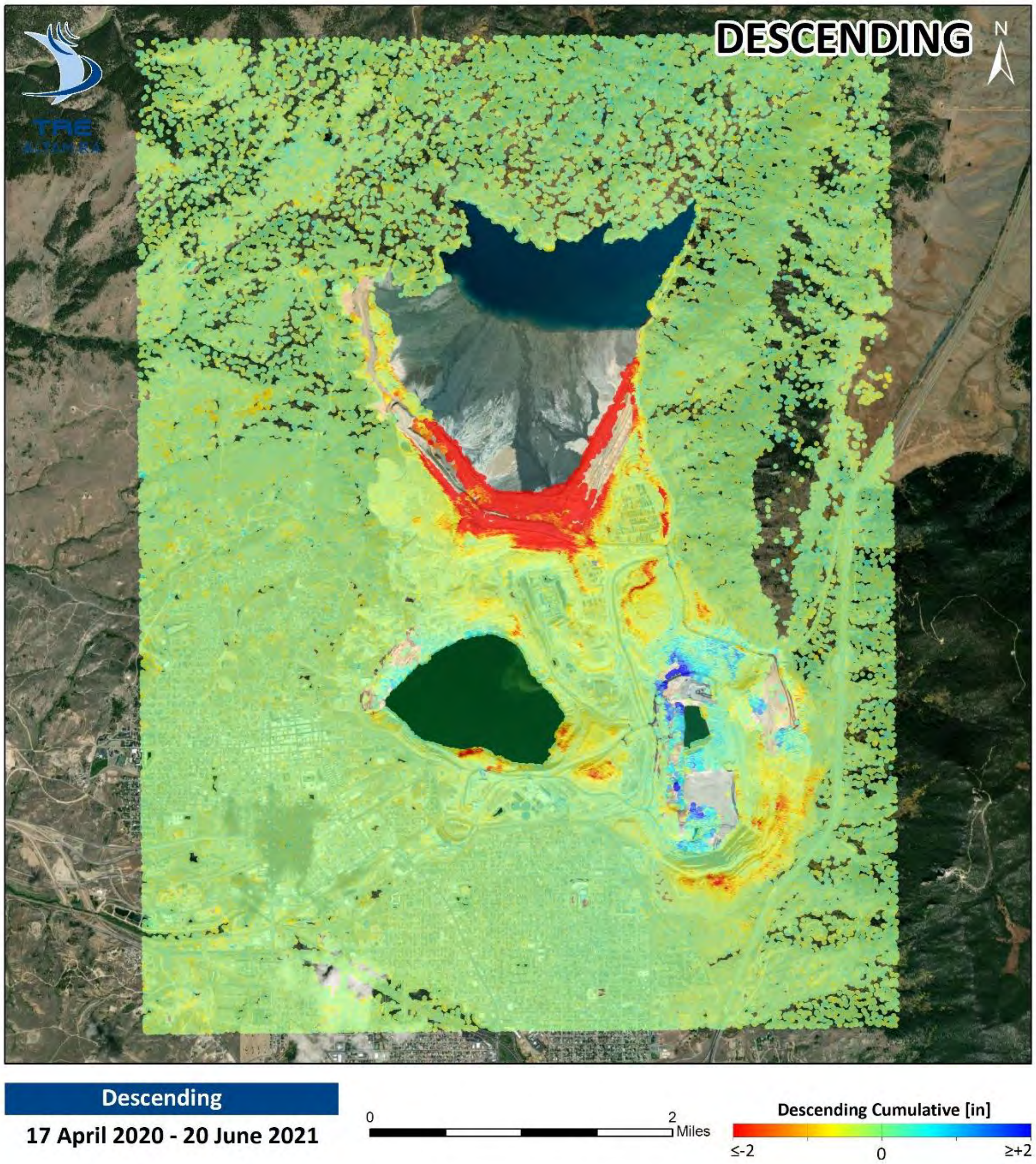


Figure 4: Overview of the descending LOS cumulative displacement over the full AOI.

3.2. 2-D Results

The trigonometric combination of SqueeSAR results obtained from different orbits (i.e. ascending and descending), over the same area and overlapping period, produces 2-D (vertical and East-West) measurements of ground movement in a gridded format. Since the LOS measurement points are in different location and acquired on different dates, the 2D analyses are set to a 30 m (98.6 ft) grid where each LOS measurement point is averaged to calculate the vertical and East-West time-series for each grid cell (Figure 5).

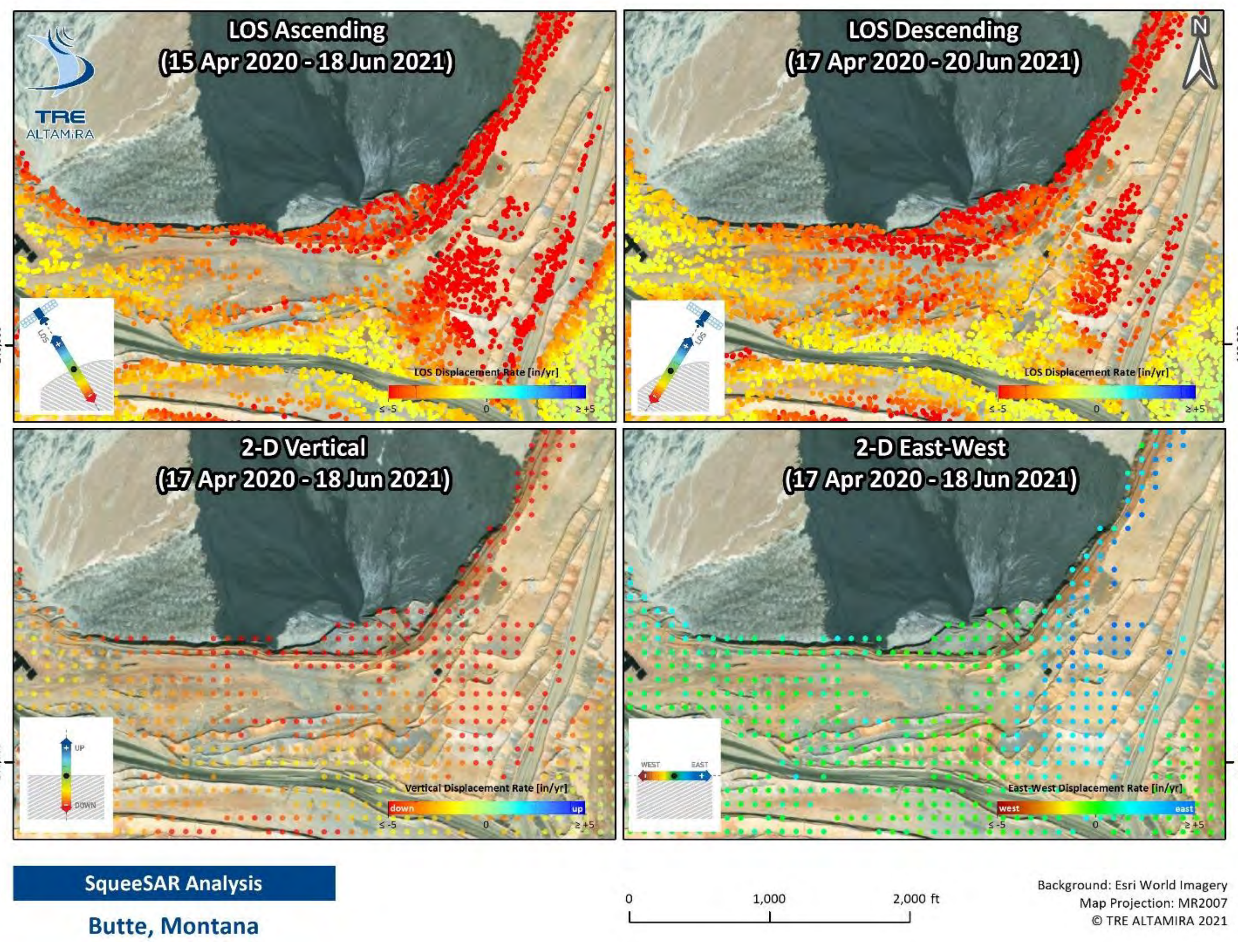


Figure 5: Example of motion decomposition combining ascending and descending acquisitions geometry at the East-West Embankment of the Yankee Doodle Tailings Impoundment.

Average annual displacement rates in a 2-D analysis are calculated from a linear regression of the ground movement measured over the entire period of the analysis and all measurements are relative to a reference point. Each point is color-coded according to the direction and magnitude of movement:

- In the vertical direction, negative values (red) indicate downward movement (i.e. subsidence), while positive values (blue) indicate upward movement (i.e. uplift).
- In the East-West direction, negative values (red) indicate westward motion, while positive values (blue) indicate eastward motion.

The 2-D processing used the temporally overlapping images (i.e. 17 April 2020 to 18 June 2021) and spatially overlapping coverage of the LOS (ascending and descending) data to obtain true vertical and East-West horizontal movements with millimetric precision.

The 2-D analysis provided a density of 1,631 MPs/mi^2. The precision of the measurements, as indicated by the average standard deviation values, is ±0.04 in/yr (Table 3).

Table 3: Properties of the April 2020 – June 2021 2-D analysis.

Attribute	Vertical / East-West
Date Range	17 April 2020 – 18 June 2021
N. of Images	52
Total Measurement Points	52,985
Average Point Density (pts/mi^2)	1,631
Average Displacement Rate Standard Deviation (in/yr)	±0.04
Reference Point Location	5,779,384.37 E -12,527,959.69 N

Figure 6 shows the cumulative vertical displacement while Figure 7 shows the cumulative horizontal (East-West) displacement over the full AOI that occurred during the processed analysis period.

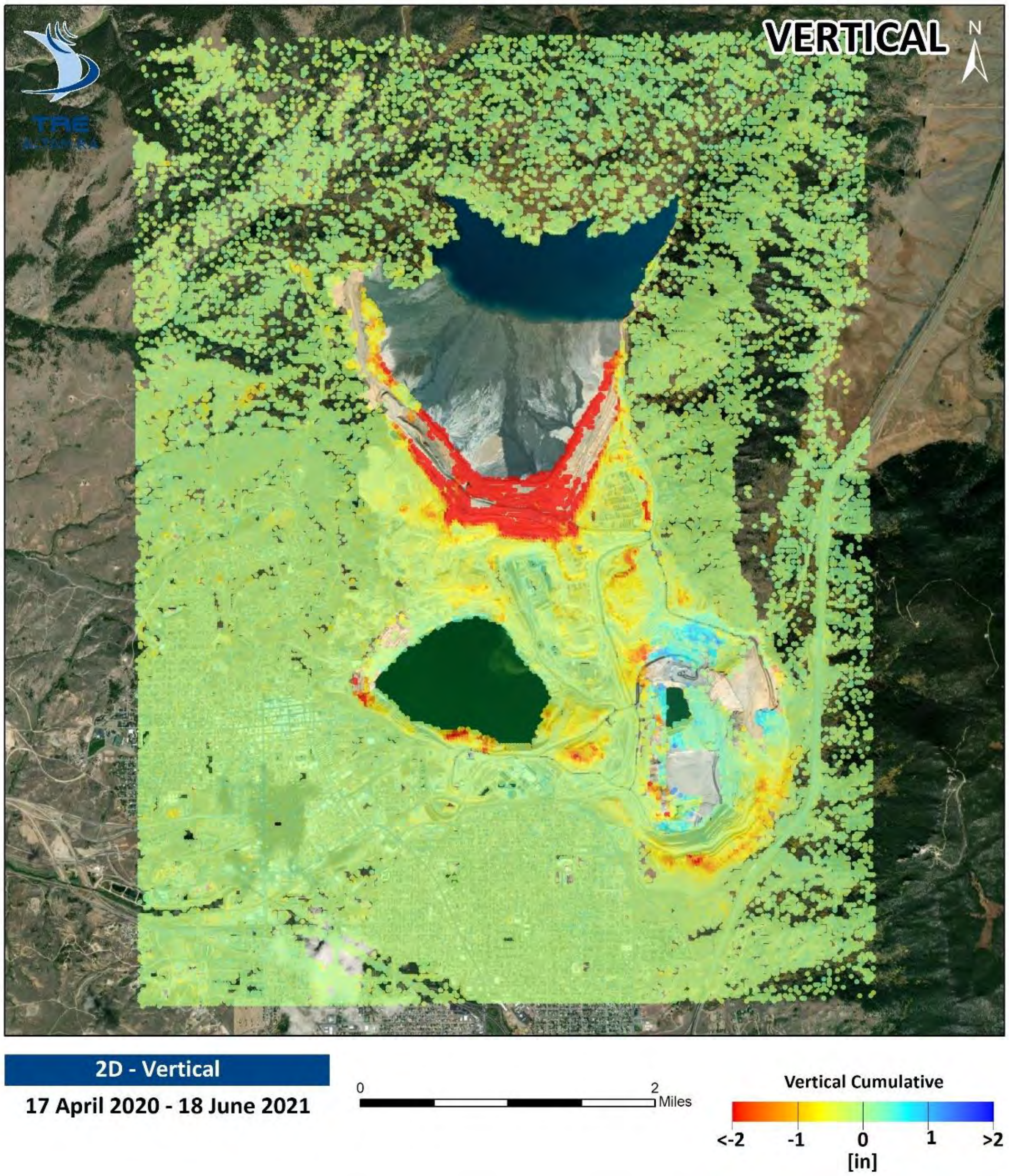


Figure 6: Overview of the cumulative vertical displacement over the full AOI.

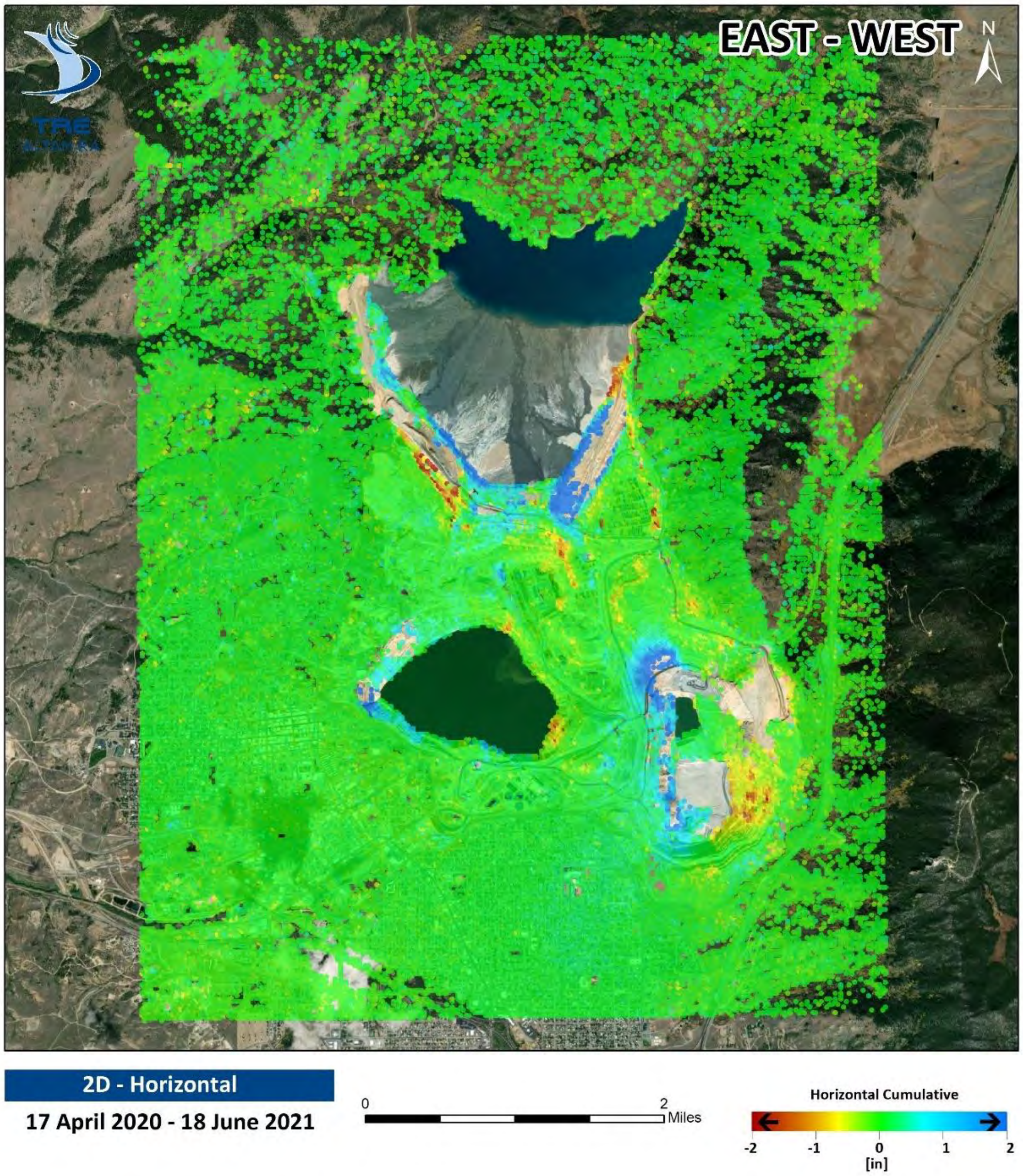


Figure 7: Overview of the cumulative East-West displacement over the full AOI.

4. Analysis

4.1. Yankee Doodle Tailings Impoundment

The analysis of the YDTI is separated into three parts as requested by Knight Piesold Ltd:

(i) Time series plot of the cumulative vertical deformation profiles along strategic sections (i.e. Section 0+00, Section 8+00W, and Seep 10 Bench).

(ii) Time series plots of the cumulative vertical deformation and average vertical displacement rate for the north-south step out (6250ft, 6300ft, 6350ft lifts).

(iii) Time series plot of the average vertical displacement rate for InSAR points corresponding with our construction monitoring survey-monuments.

Figure 8 and Figure 9 show the Yankee Doodle Tailings Impoundment average vertical displacement rate and cumulative vertical deformation plan views.

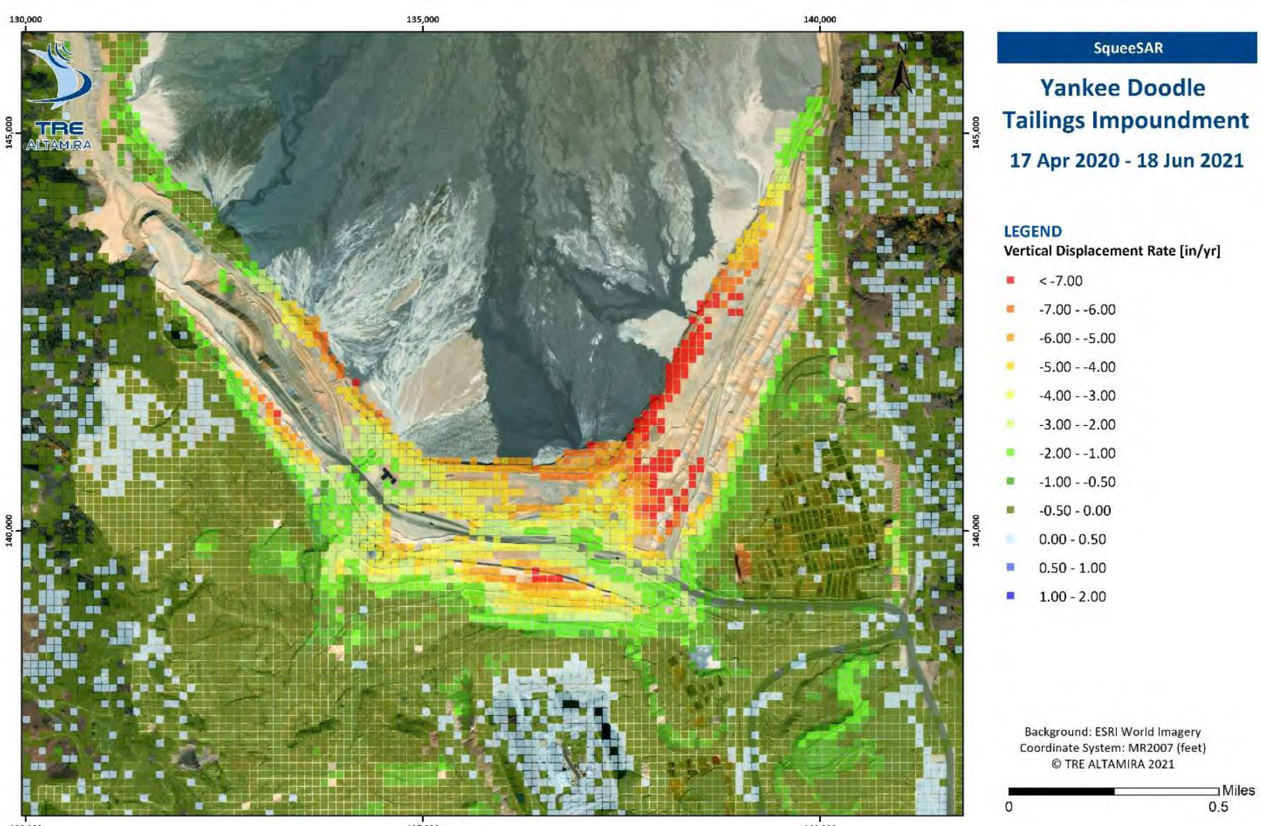


Figure 8: Yankee Doodle Tailings Impoundment average vertical displacement rate plan view.

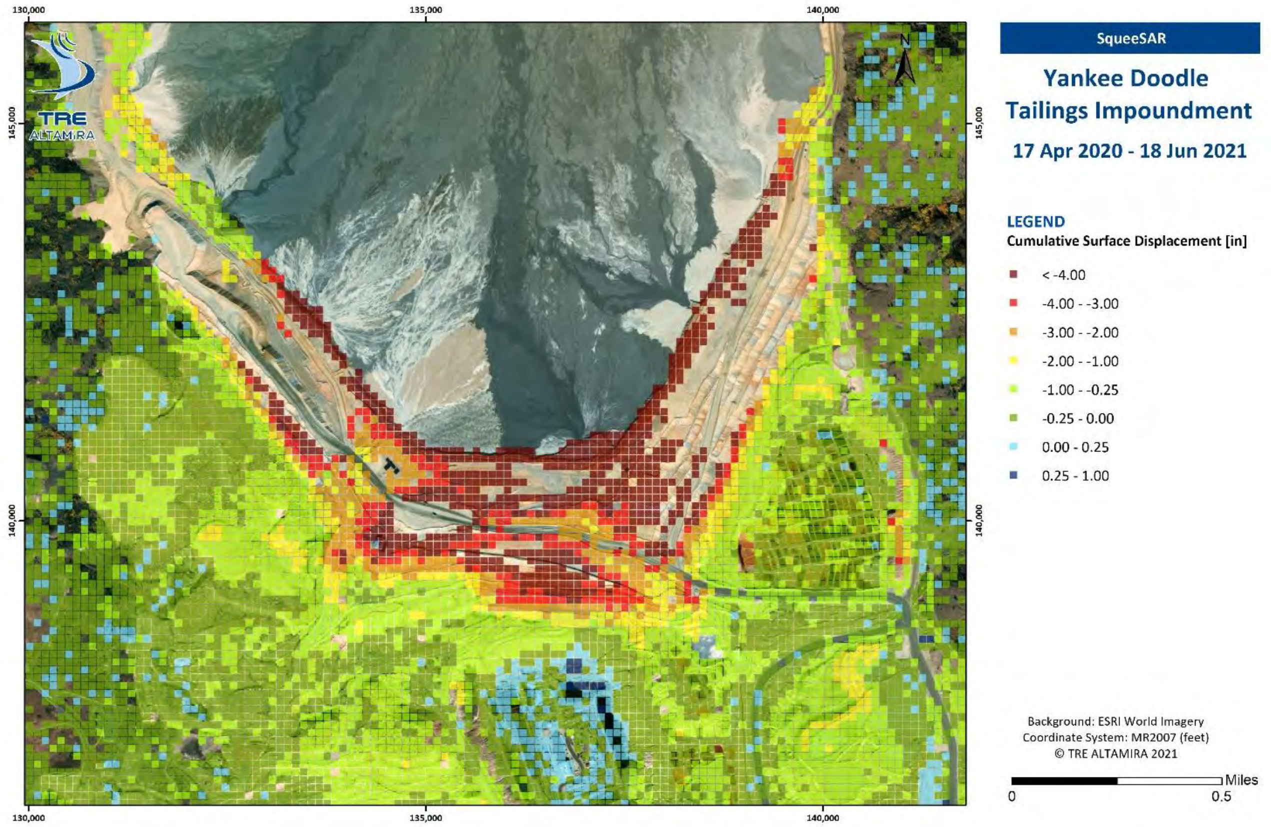


Figure 9: Yankee Doodle Tailings Impoundment cumulative vertical deformation plan view.

4.1.1. Time Series Analysis

Three averaged time series plots were created over key features of the YDTI using the vertical dataset (Figure 10). The time series were produced by averaging all measurement points identified within each polygon representative of the extent of the North-South step outs (Figure 11). The 6,350 ft lift shows the most vertical motion (11.66 in/yr) followed by the 6,300 ft lift (6.54 in/yr) and the 6,250 ft lift (4.21 in/yr).

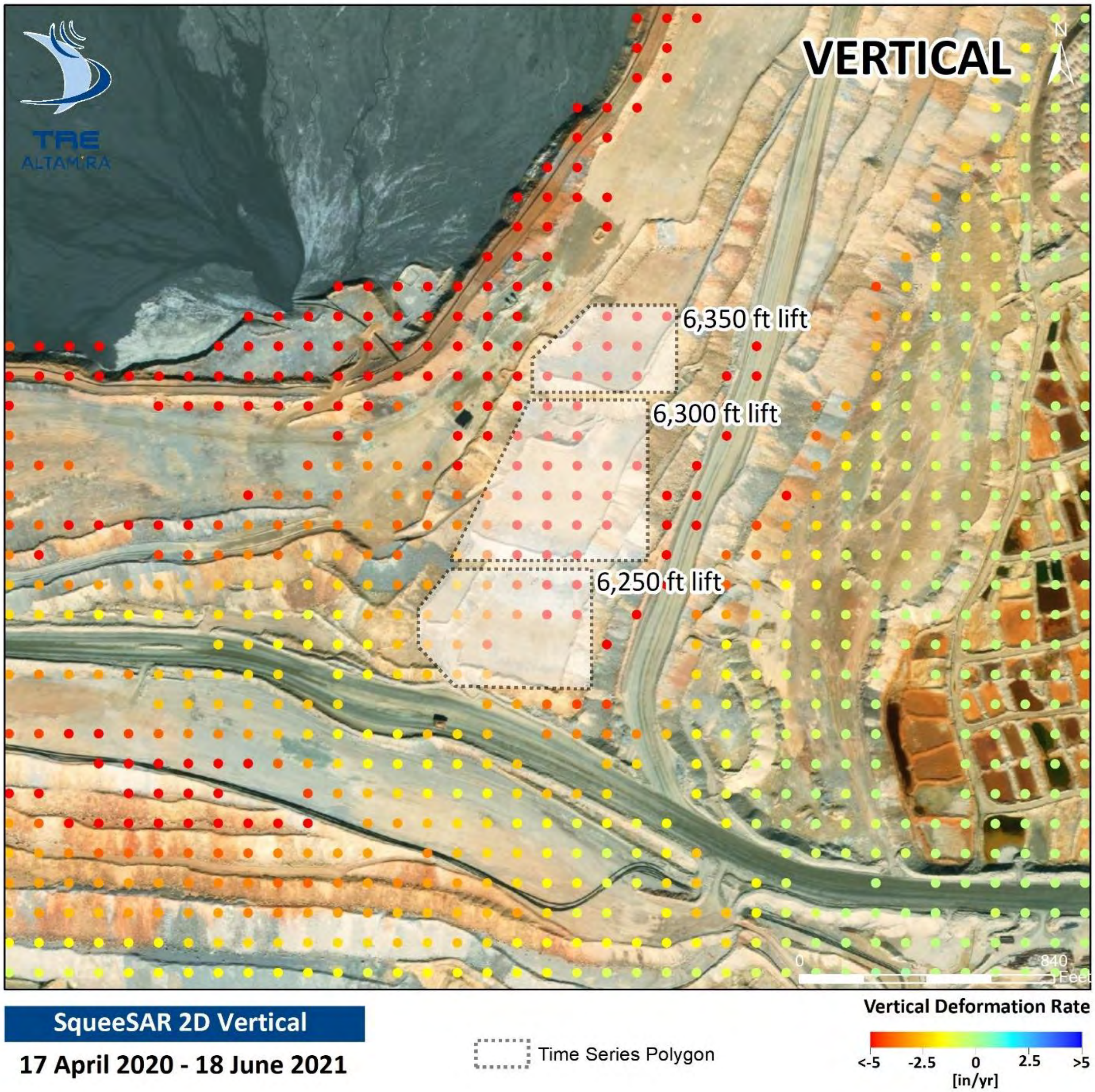


Figure 10: Lift time series polygon locations over the YDTI overlaid to the vertical displacement dataset.

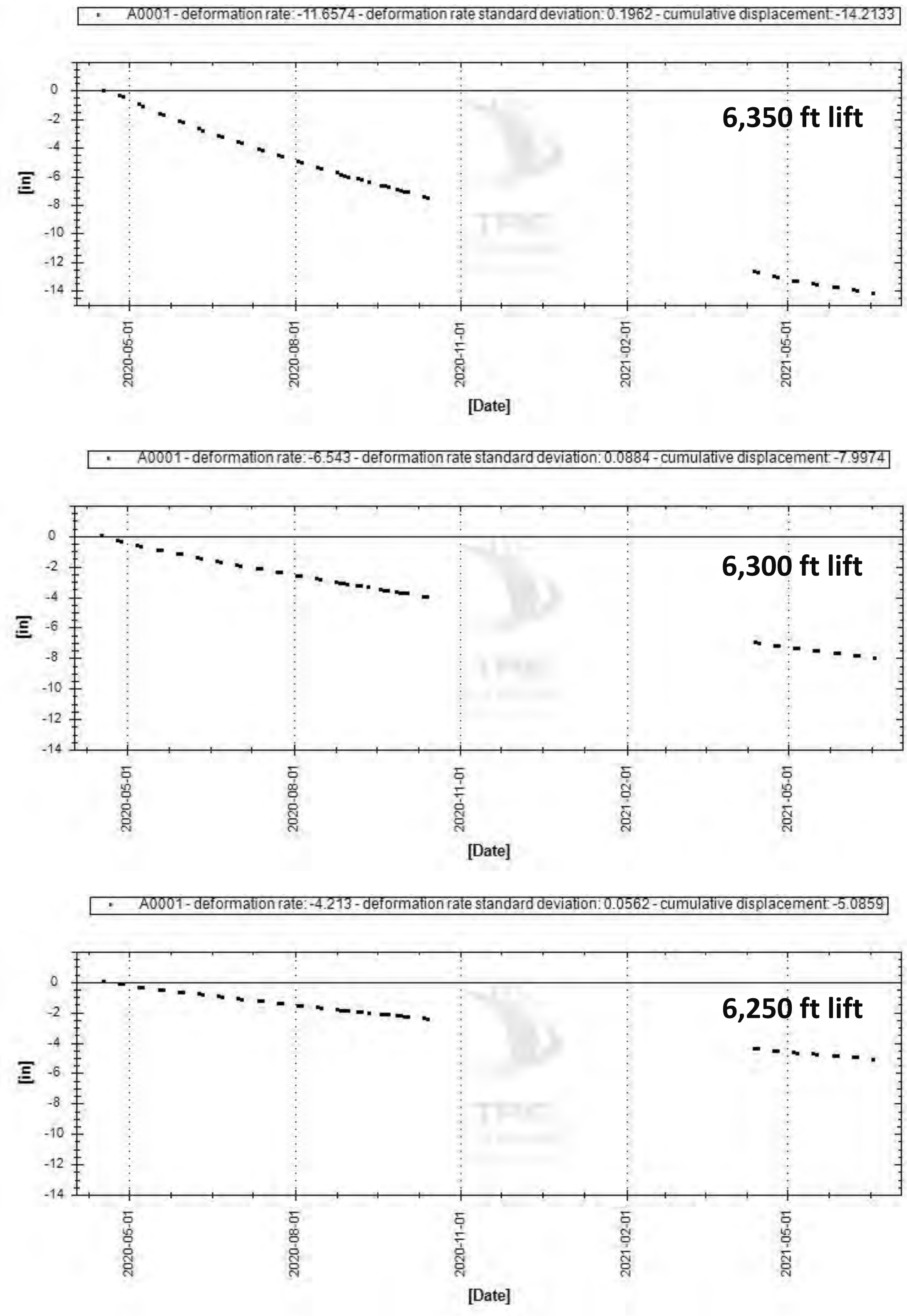


Figure 11: Average time series the 6,350 ft lift (top), 6,300 ft lift (middle), and 6,250 ft lift (bottom).

Time series plot of the average vertical displacement rate for InSAR points corresponding with Knight Piesold's construction monitoring survey-monuments are in Figure 12. A circular buffer around each survey location (200 ft radius) was used to average the vertical displacements. Time series plots are shown in Figure 13 – Figure 17. The DS-2 monitoring survey-monument shows the most vertical motion (6.07 in/yr) followed by the DS-1 (4.47 in/yr) and US-2 (4.33 in/yr), with the SB monitoring survey-monument showing the least vertical motion (<0.5 in/yr).

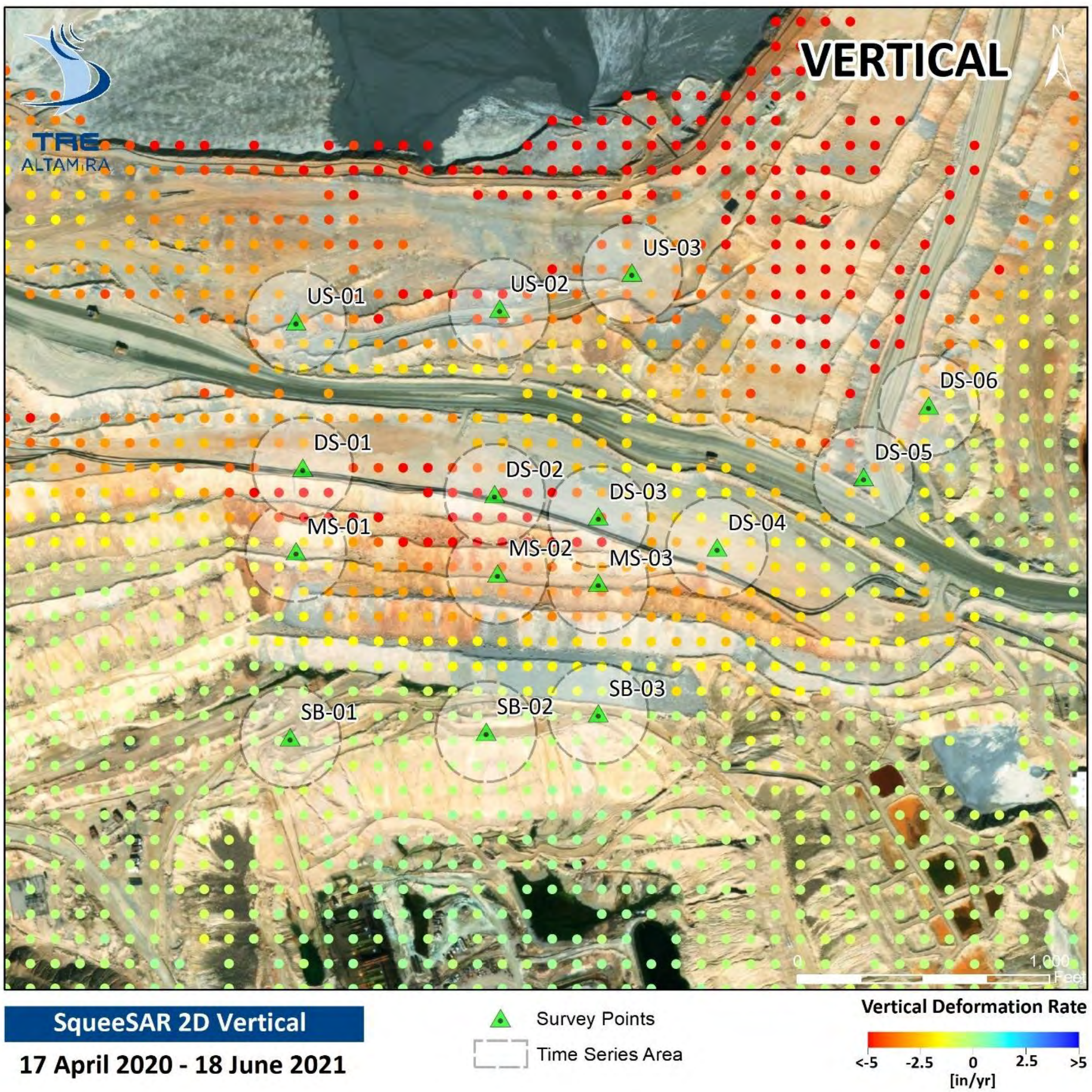


Figure 12: Survey point and time series polygon locations over the YDTI overlaid to the vertical displacement dataset.

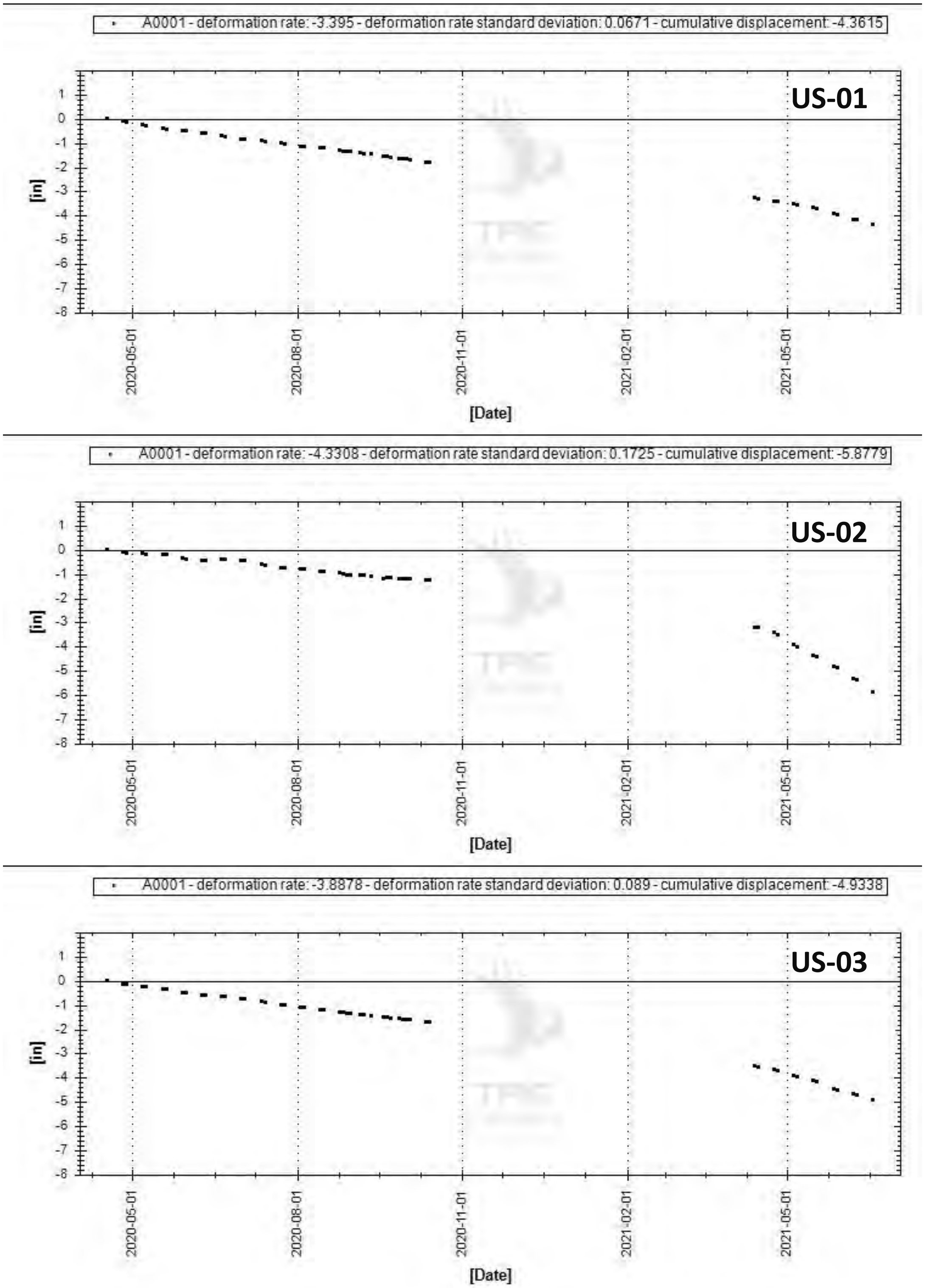
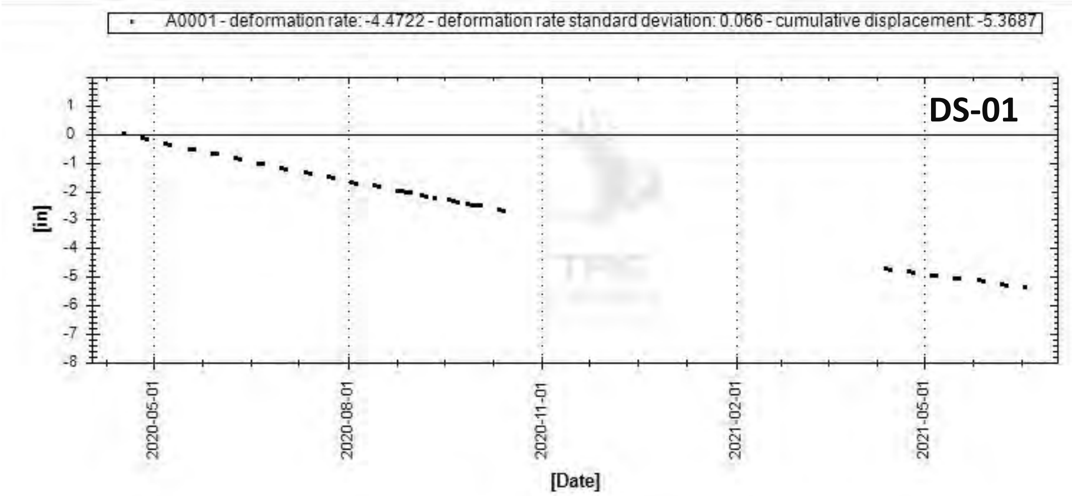
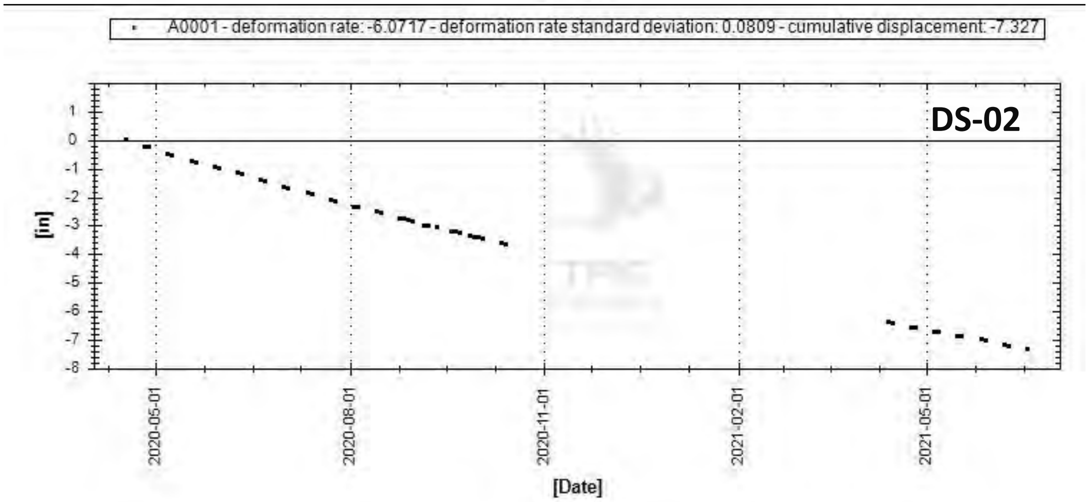


Figure 13: Average time series the US-01 (top), US-02 (middle), and US-03 (bottom) survey point.





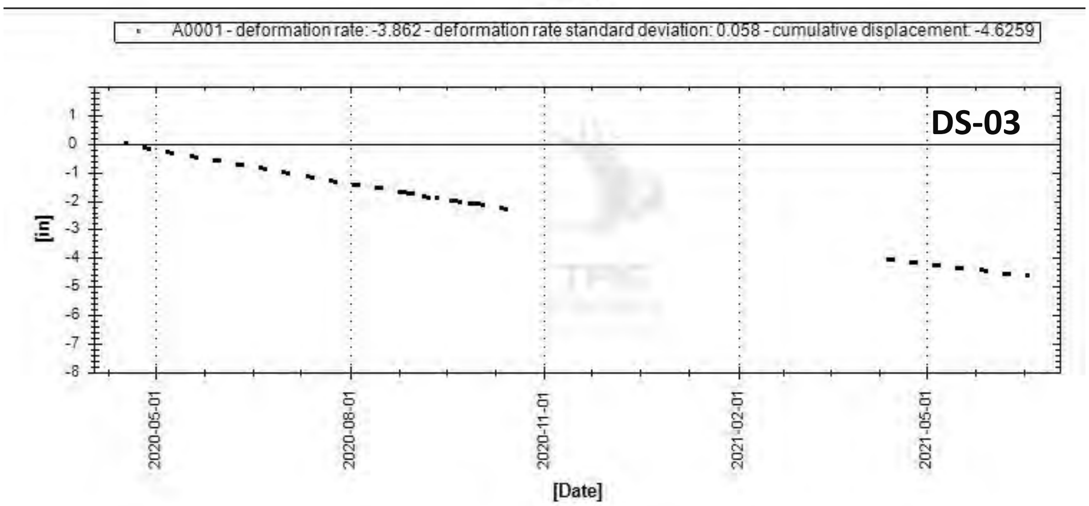


Figure 14: Average time series the DS-01 (top), DS-02 (middle), and DS-03 (bottom) survey point.

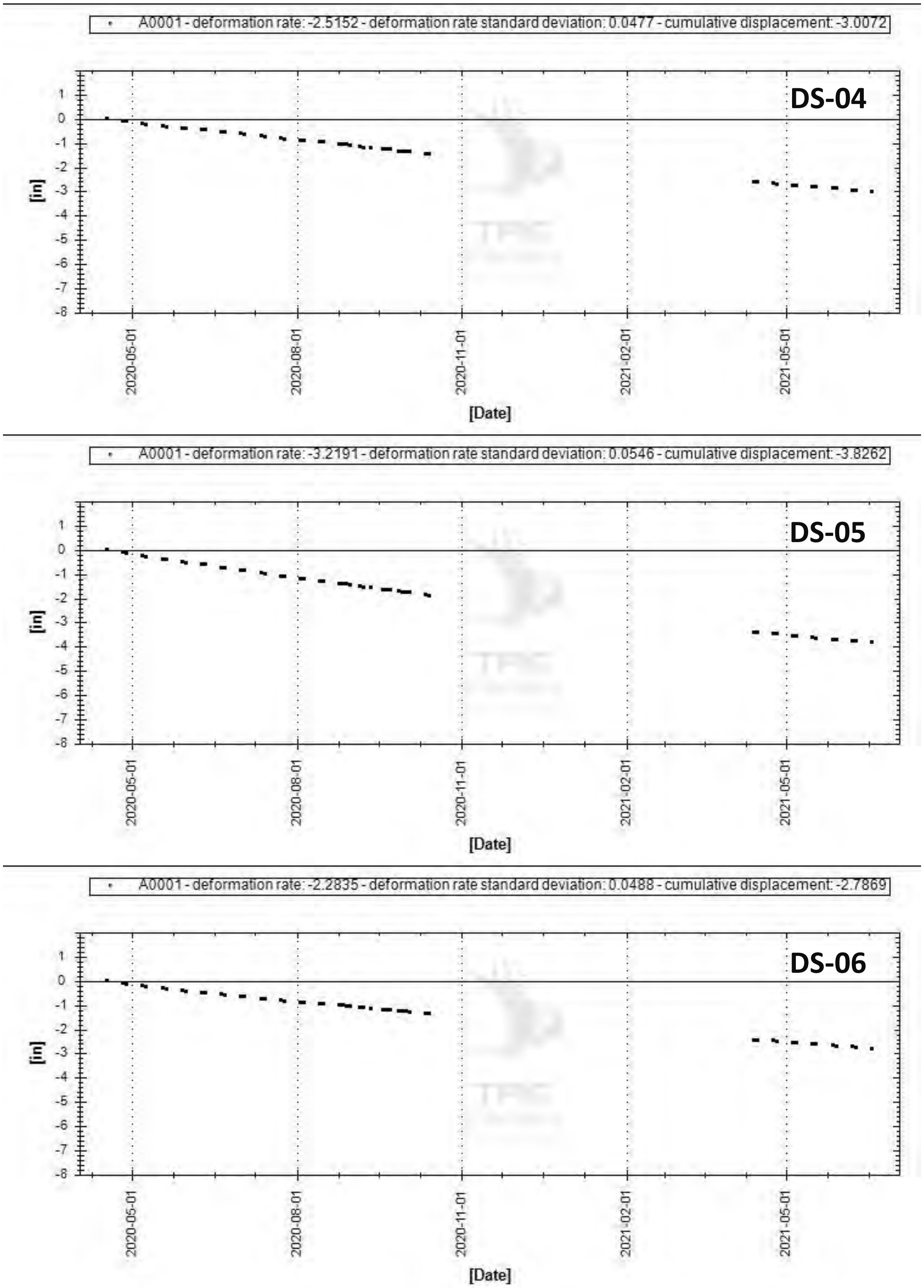
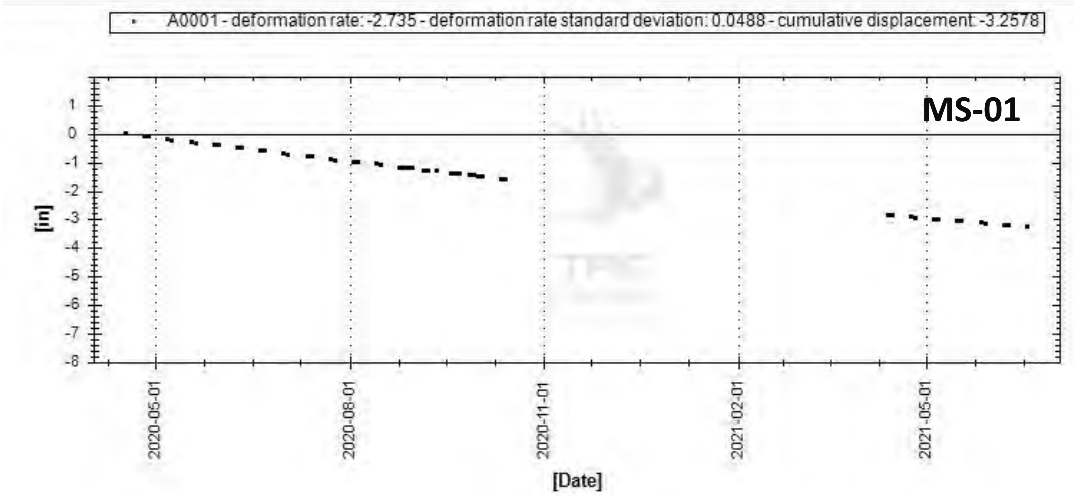
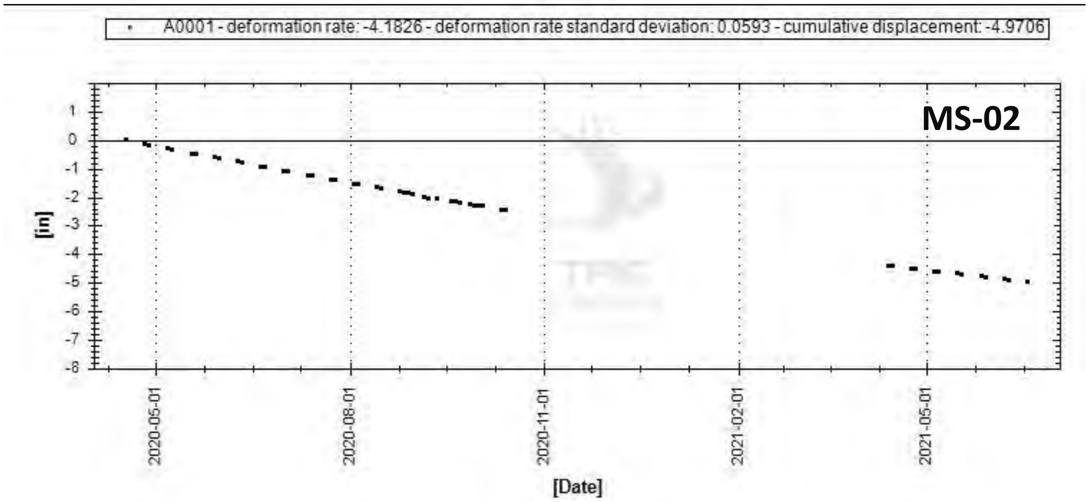


Figure 15: Average time series the DS-04 (top), DS-05 (middle), and DS-06 (bottom) survey point.





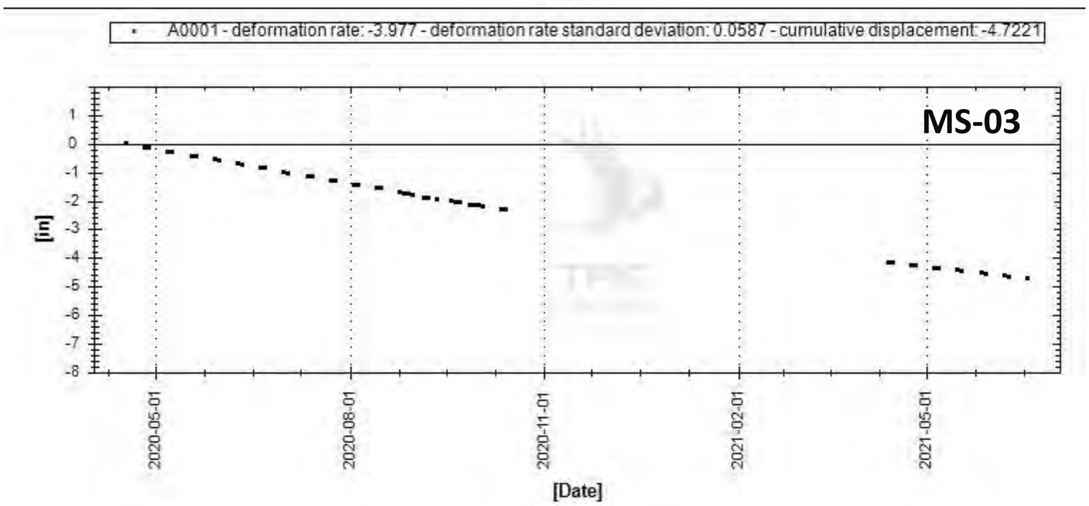


Figure 16: Average time series the MS-01 (top), MS-02 (middle), and MS-03 (bottom) survey point.

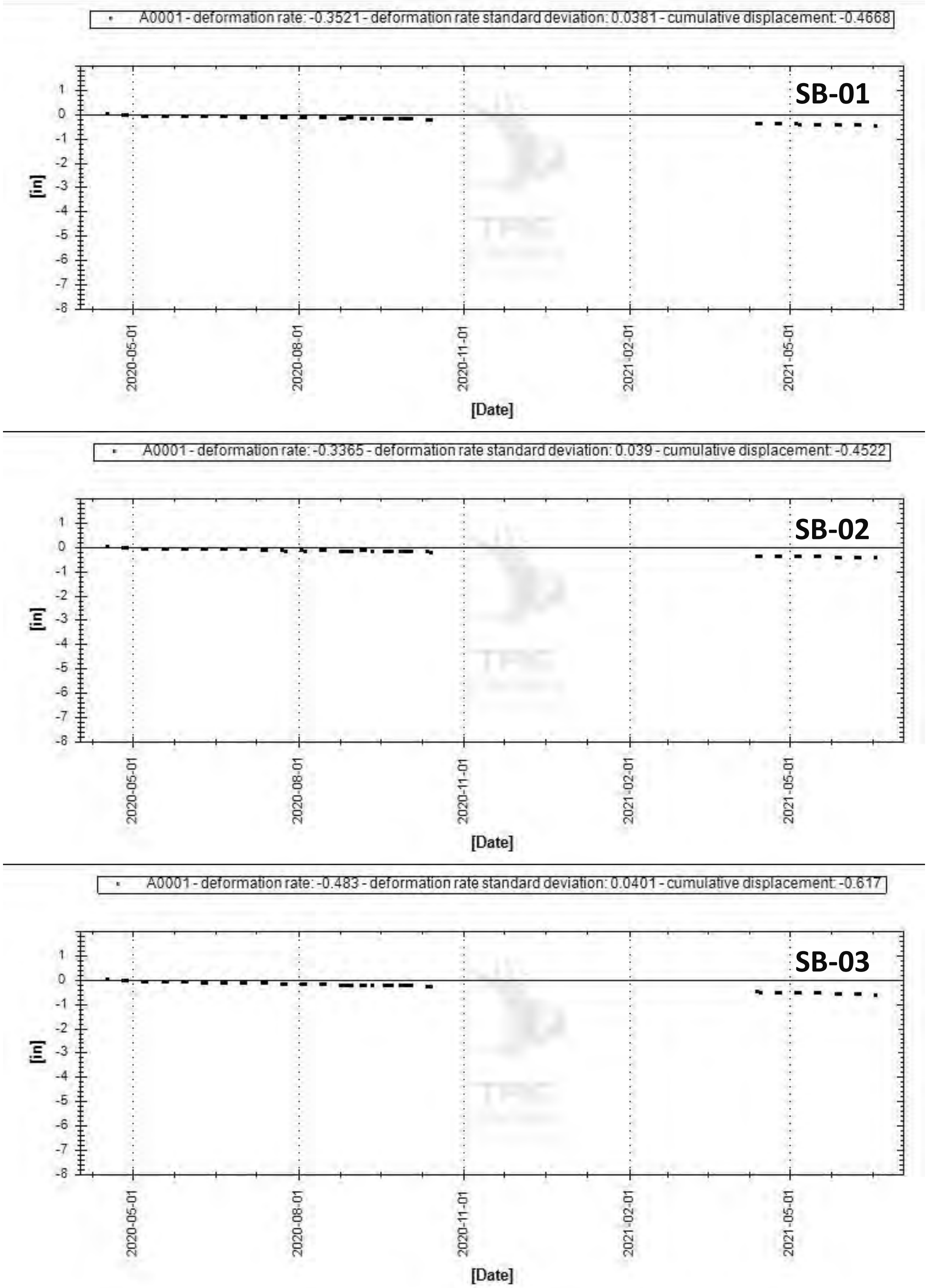


Figure 17: Average time series the SB-01 (top), SB-02 (middle), and SB-03 (bottom) survey point.

4.1.2. Cross-Section Analysis

Three cross-sections were created over key features of the YDTI (i.e. 8+00 W, 0+00, Seep 10 Bench) using the 2-D vertical dataset (Figure 18). The cross-section profiles were produced averaging all measurement points identified within 250 ft of the cross-section line, meaning that all measurement points within a 500 ft buffer were used to produce the profiles.

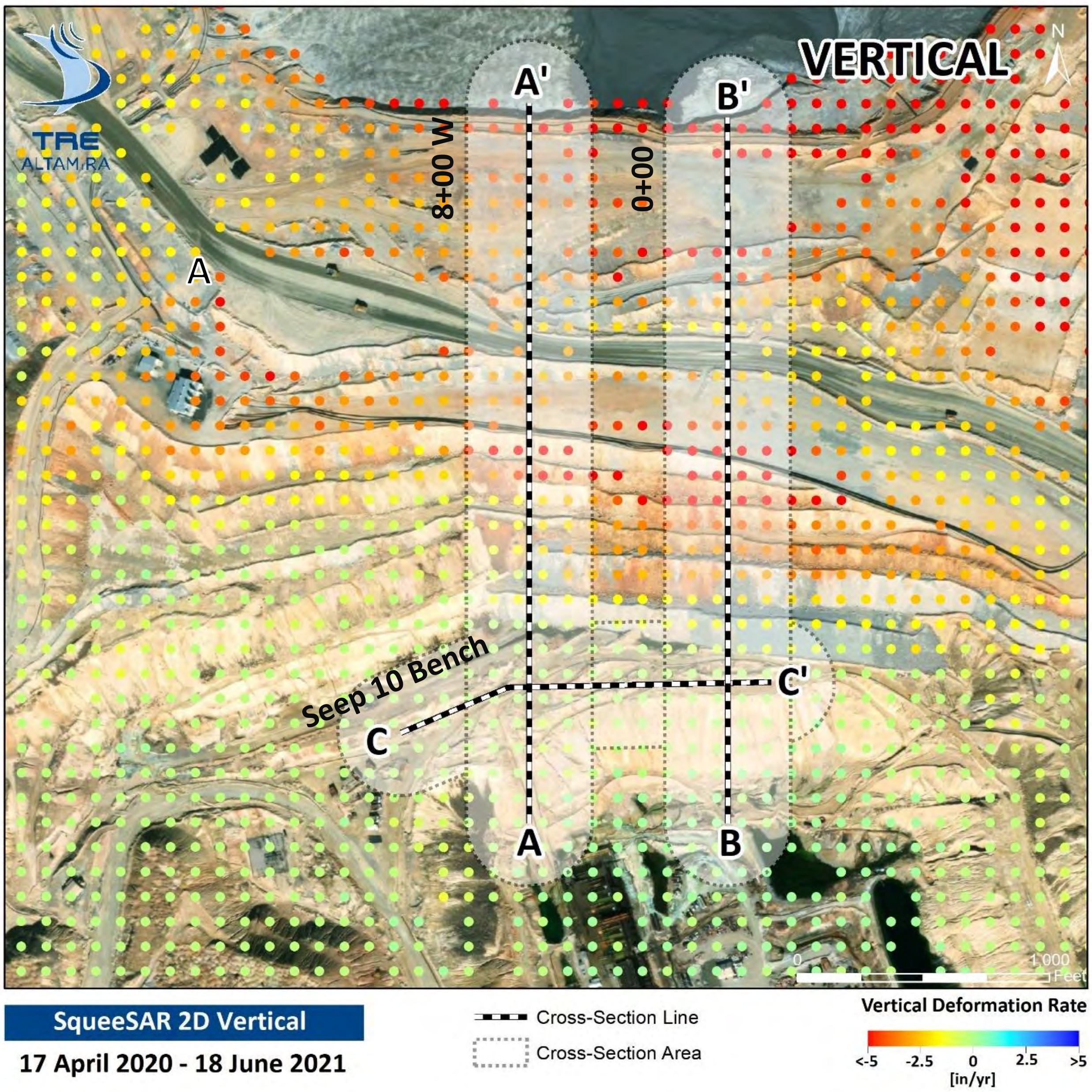


Figure 18: Cross-section locations over the YDTI using the vertical displacement dataset.

In the cross-section graphs (Figure 19 - Figure 21), vertical motion is represented by progressively darker blue lines with most recent image (i.e. June 18th, 2021) in red. The wide gap between profiles is representative of the winter season (i.e. no images in the data set).

Findings in the cross-section results include:

- A-A': Vertical motion reaches up to -1.60 inches at the 860 m (~2,800 ft) mark.
- B-B': Vertical motion of up to -0.80 inches of settlement between the 750 ft and 850 m (~2,500-2,800 ft) mark.
- C-C': Settlement of up to -0.60 inches at the 450 m (~1,500 ft) mark.

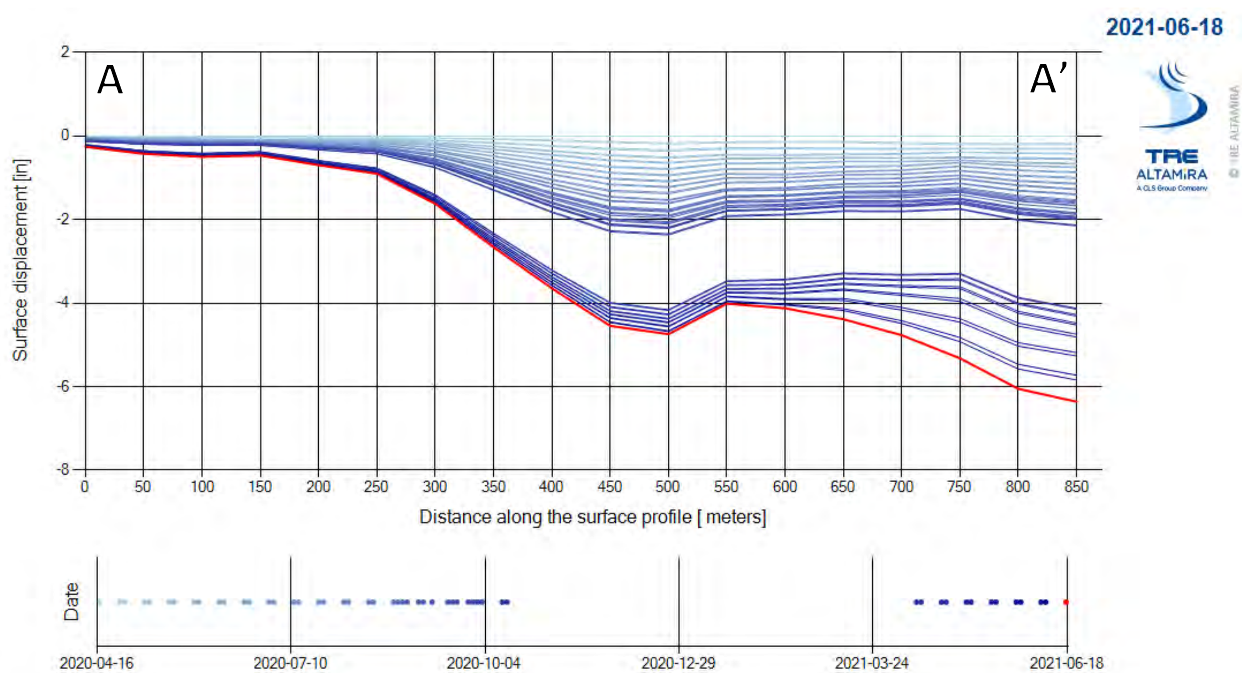


Figure 19: Evolution of the surface profile over the A-A' cross-section.

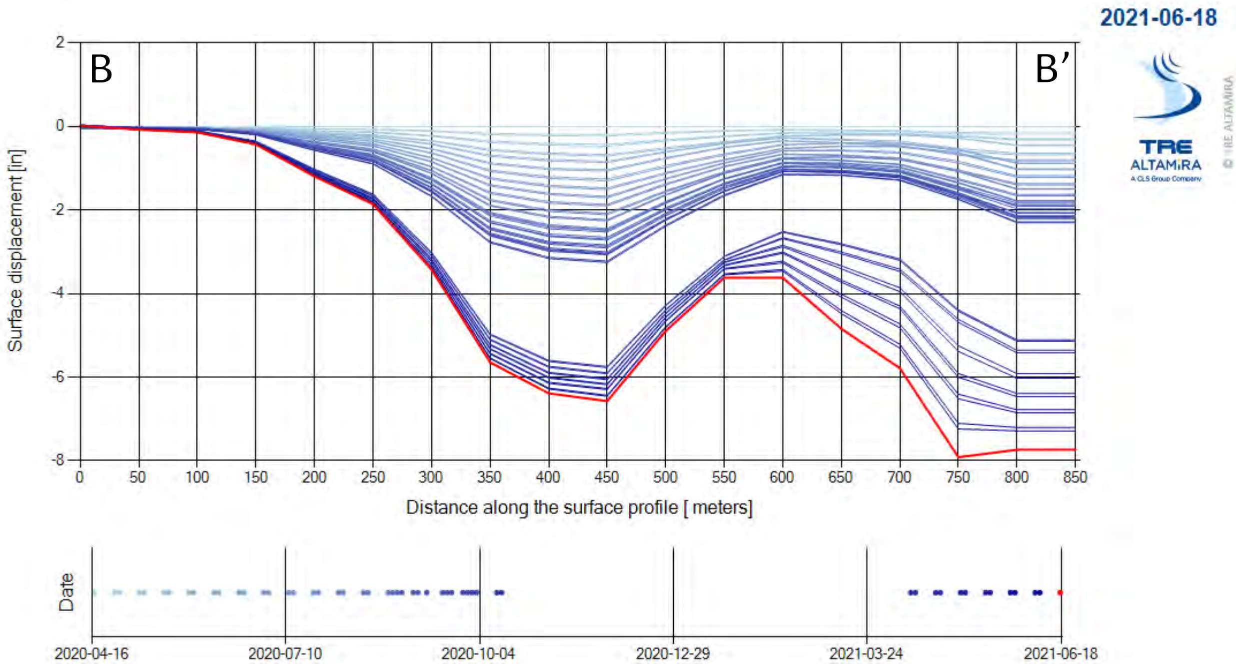


Figure 20: Evolution of the surface profile over the B-B' cross-section.

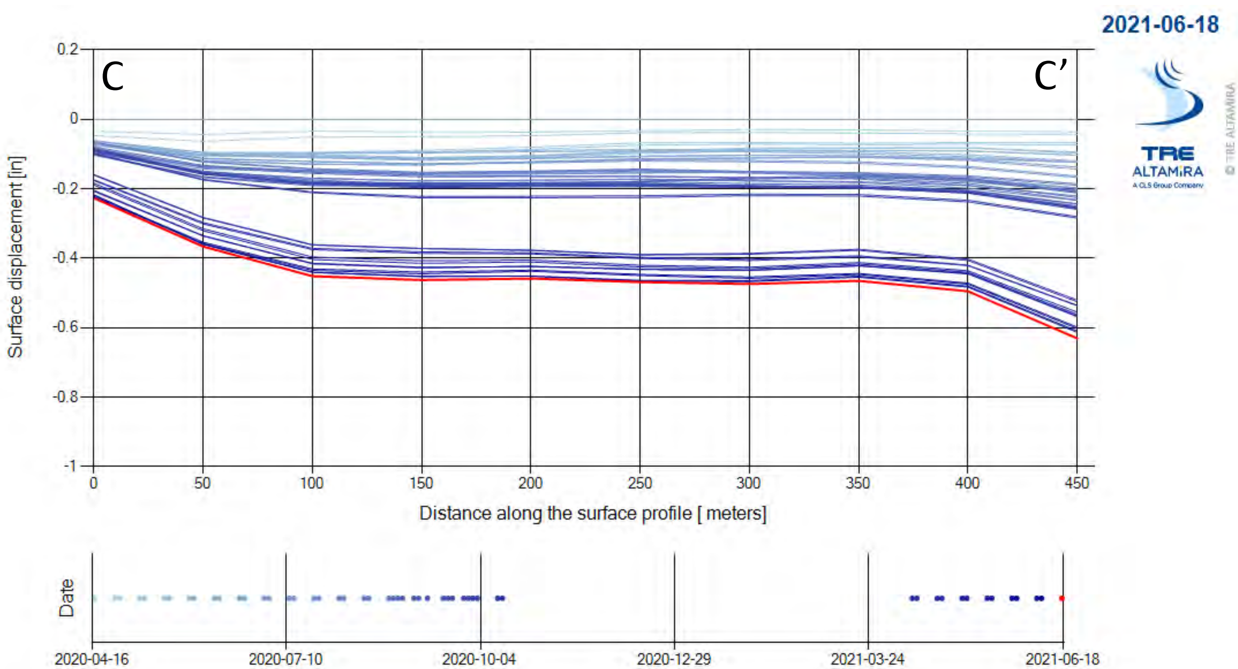


Figure 21: Evolution of the surface profile over the C-C' cross-section. Note the different Y axis value range.

4.1.2.1. Section 8+00 W

The analysis of six time series along Section 8+00 W indicated that the highest displacement rates were observed within the rockfill surcharge (Figure 22). Vertical displacement ranged from -4.87 in/yr within the rockfill surcharge upstream of the embankment to -0.01 in/yr at the toe of the embankment. Horizontal displacement ranged from -0.17 in/yr towards the west at SEC8W-5 (Figure 24) to 1.19 in/yr towards the east at SEC8W-1 (Figure 23). Time series plots are shown in Figure 23 and Figure 24.

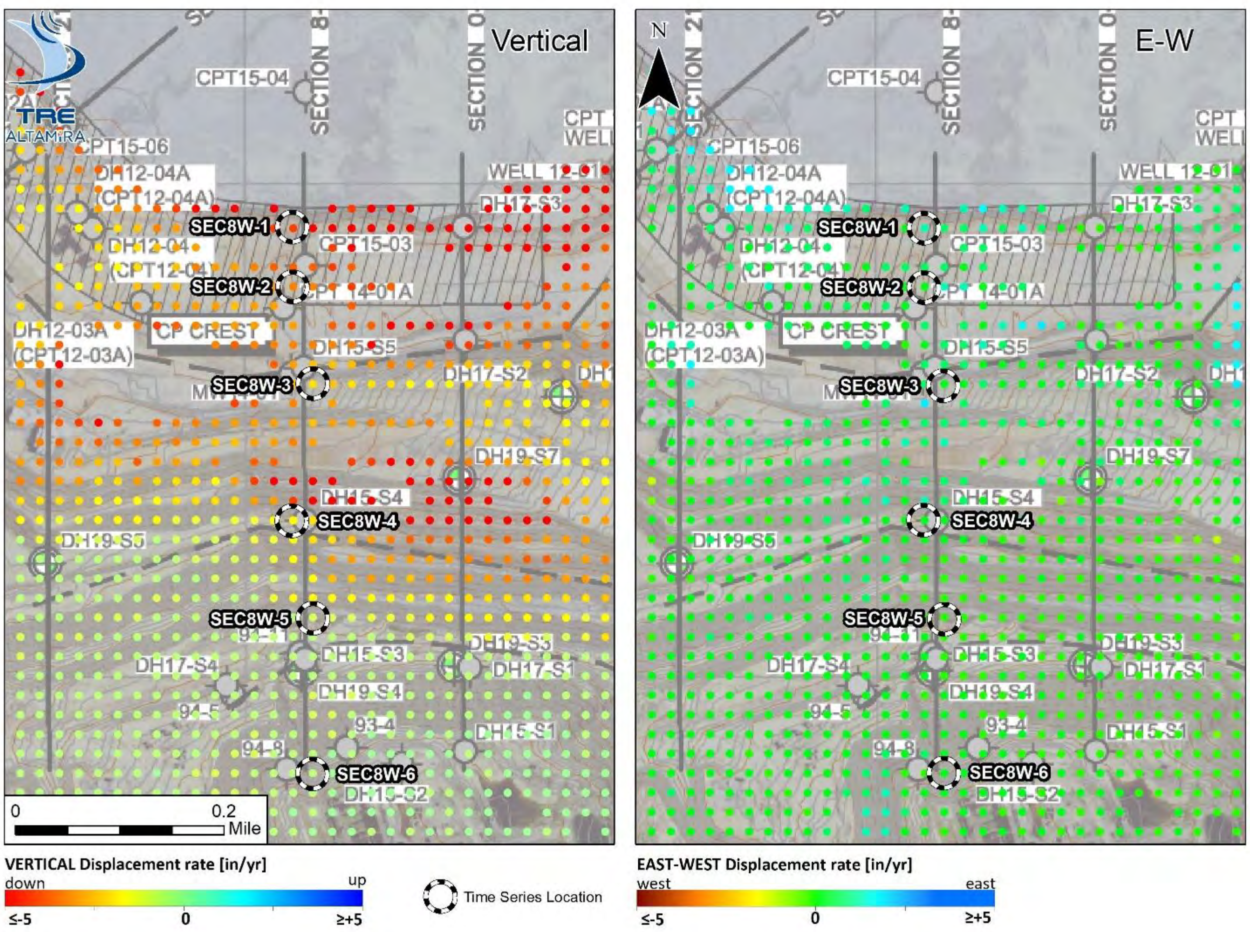


Figure 22: Location of TS analyzed along the Sec 8+00 W transect. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.

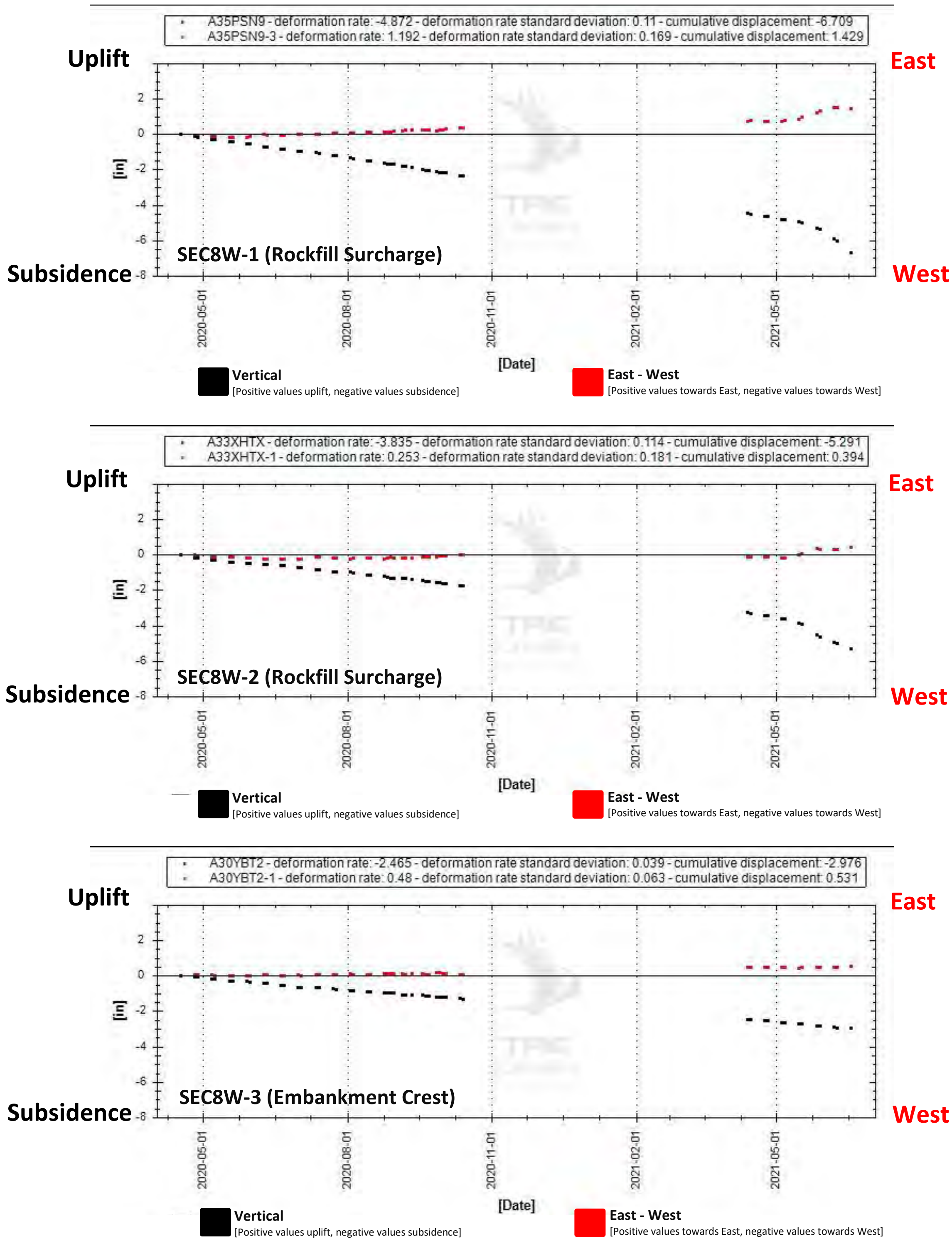


Figure 23: SEC8W-1 – SEC8W-3 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.

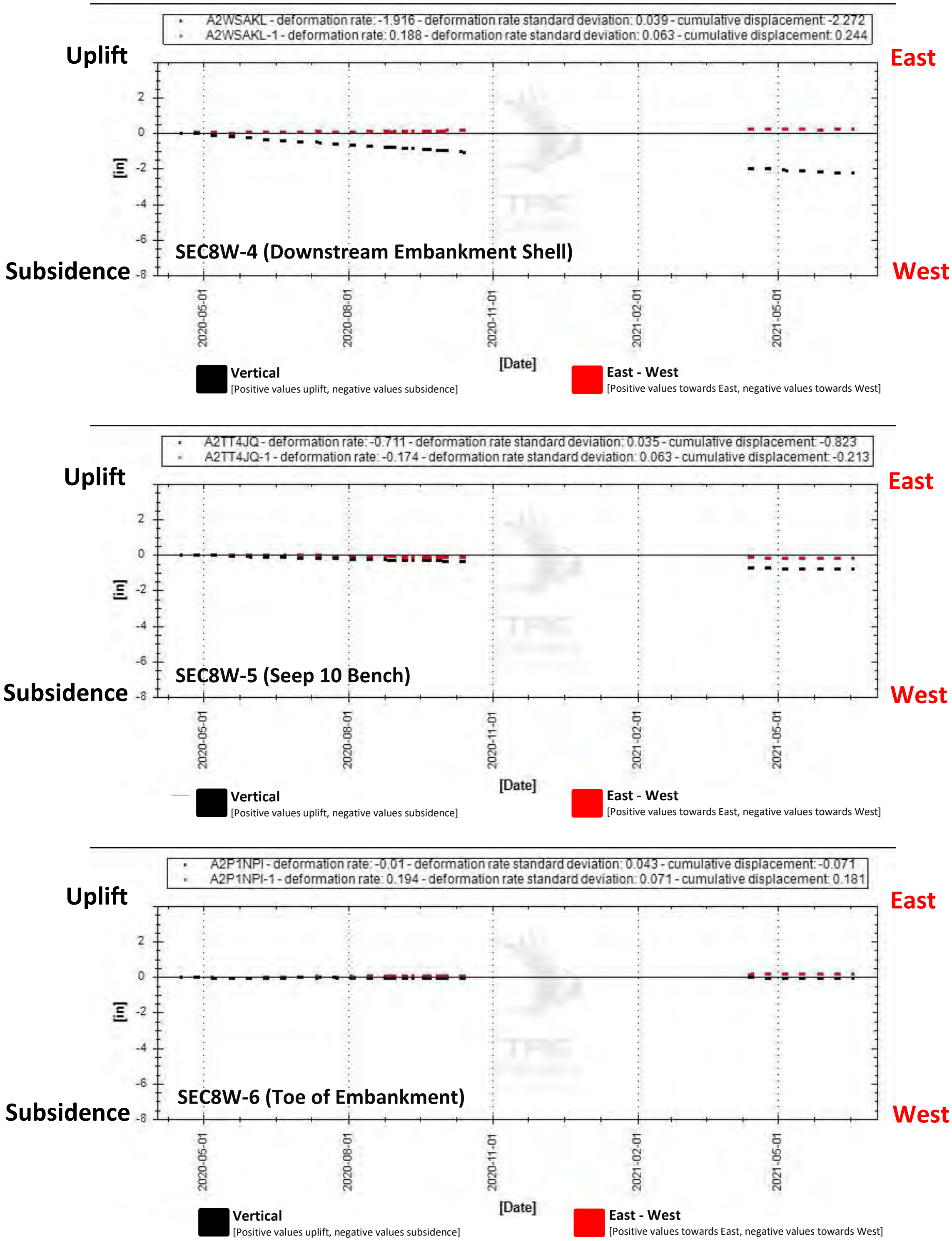


Figure 24: SEC8W-4 – SEC8W-6 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.

4.1.2.2. Section 0+00

Eight time series were used to analyze displacement along Section 0+00 (Figure 25). Vertical displacement ranged from -5.89 in/yr at SEC0-1 within the rockfill surcharge (Figure 26) to -1.56 in/yr at SEC0-8 at the toe of the embankment (Figure 28). Horizontal displacement ranged from -0.35 in/yr towards the west at SEC0-8 (Figure 28) to 0.64 in/yr towards the east at SEC8W-3 (Figure 26). Time series plots are shown in Figure 26 - Figure 28.

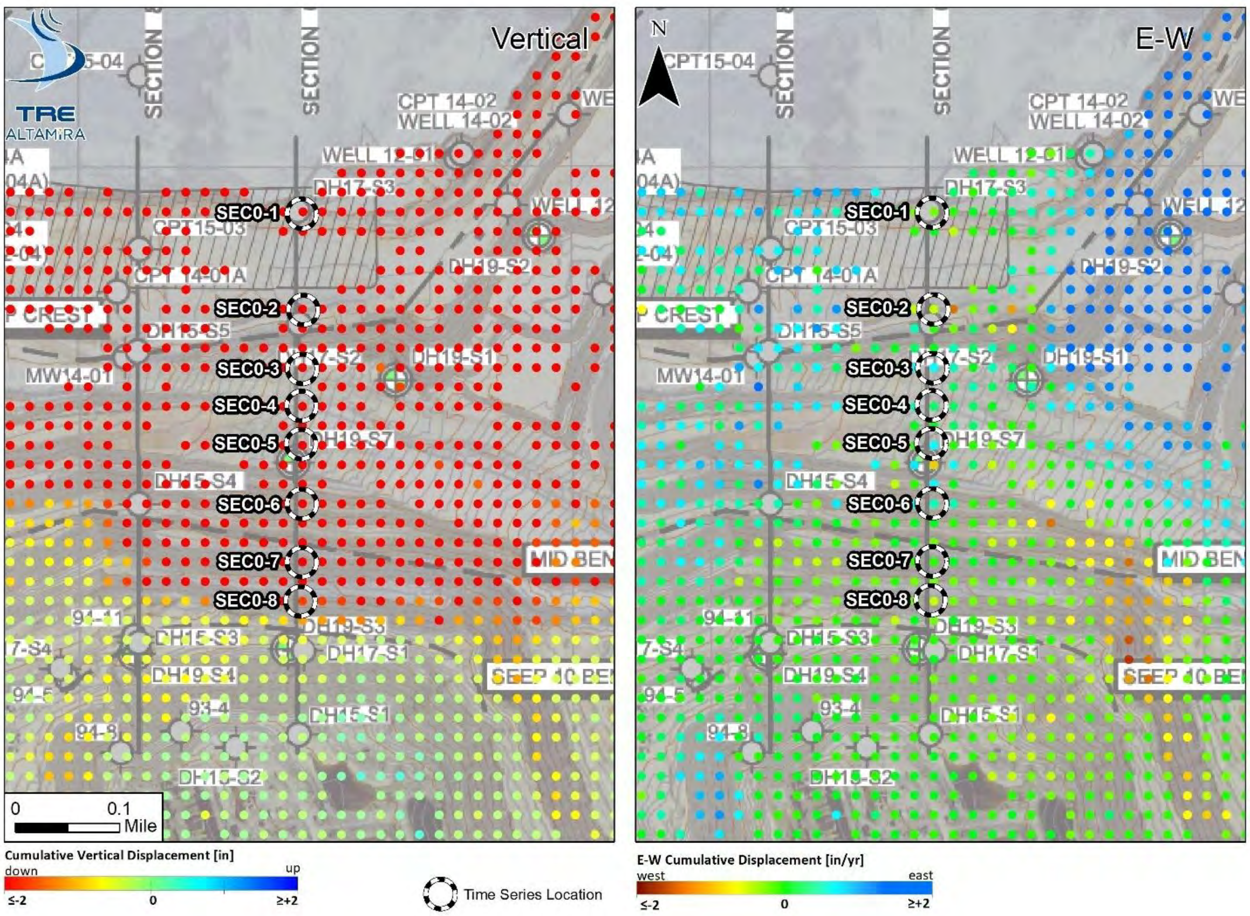


Figure 25: Location of TS analyzed along the Sec 0+00 transect. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.

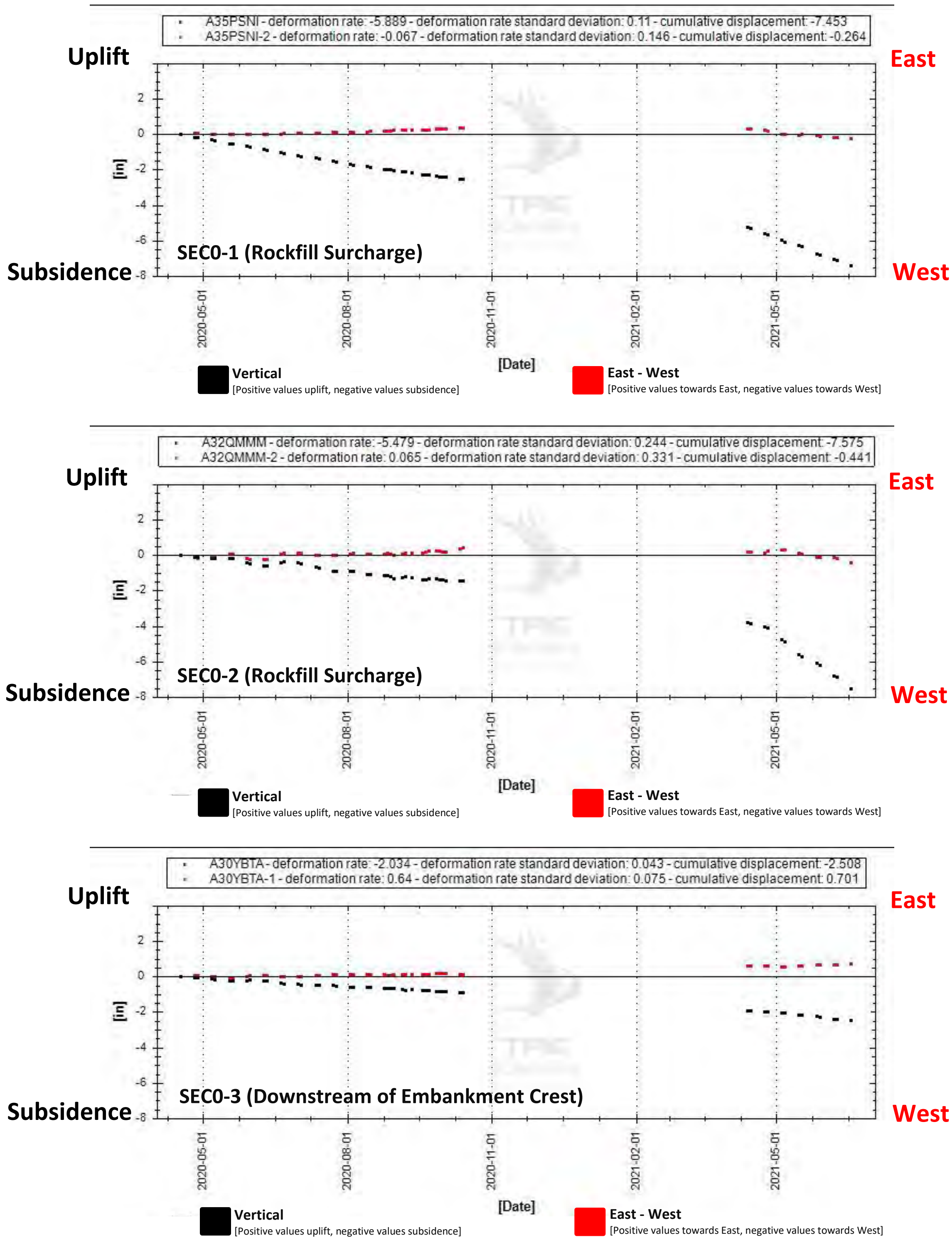
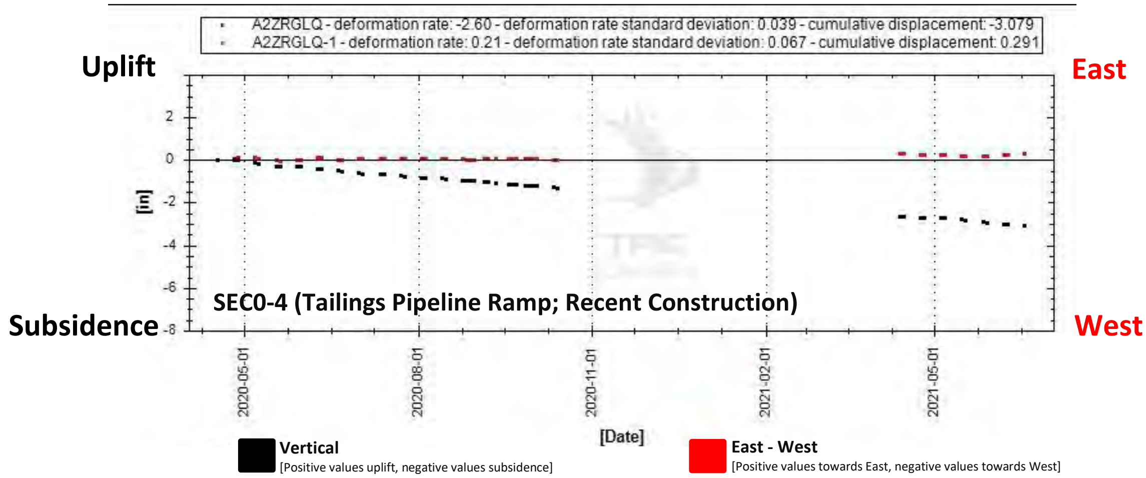
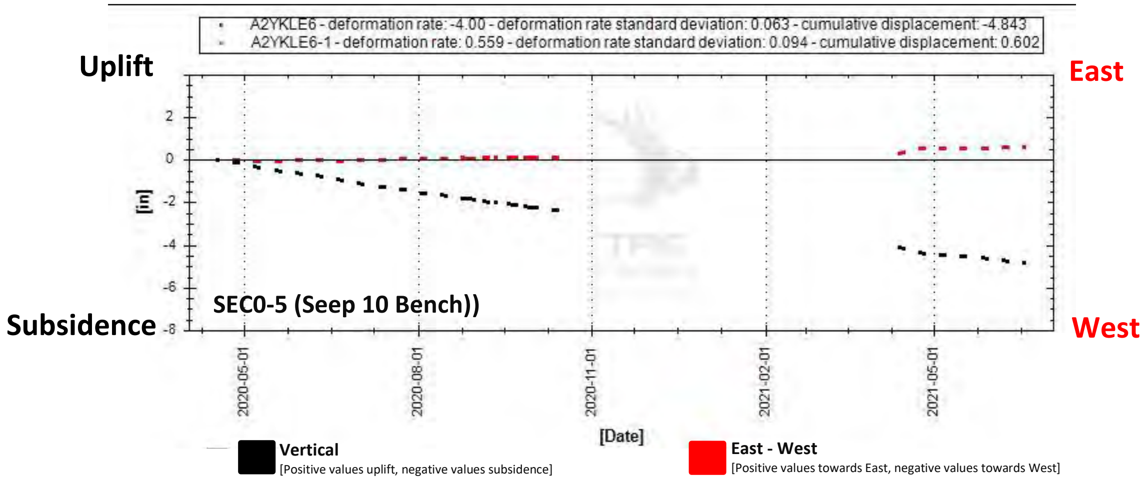


Figure 26: SEC0-1 – SEC0-3 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.





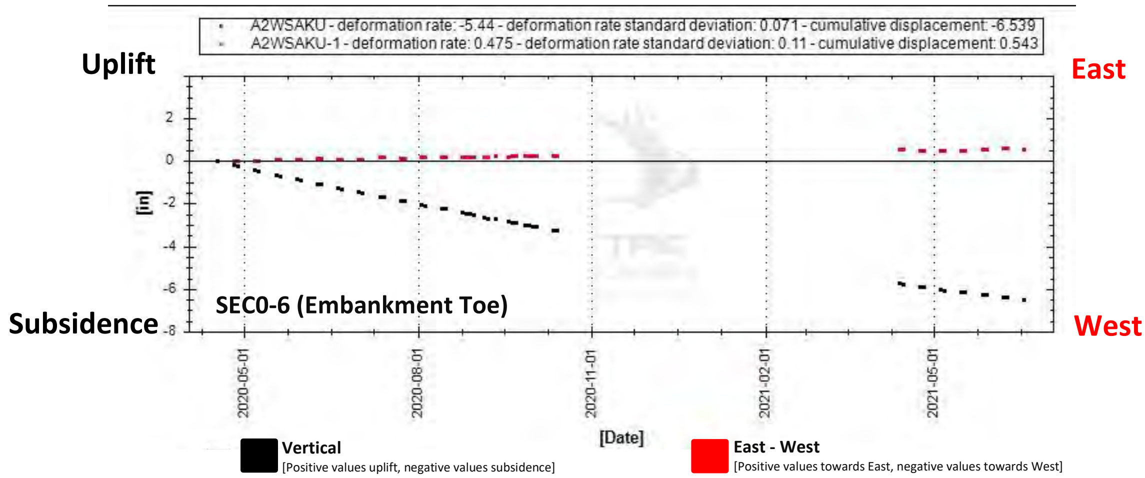
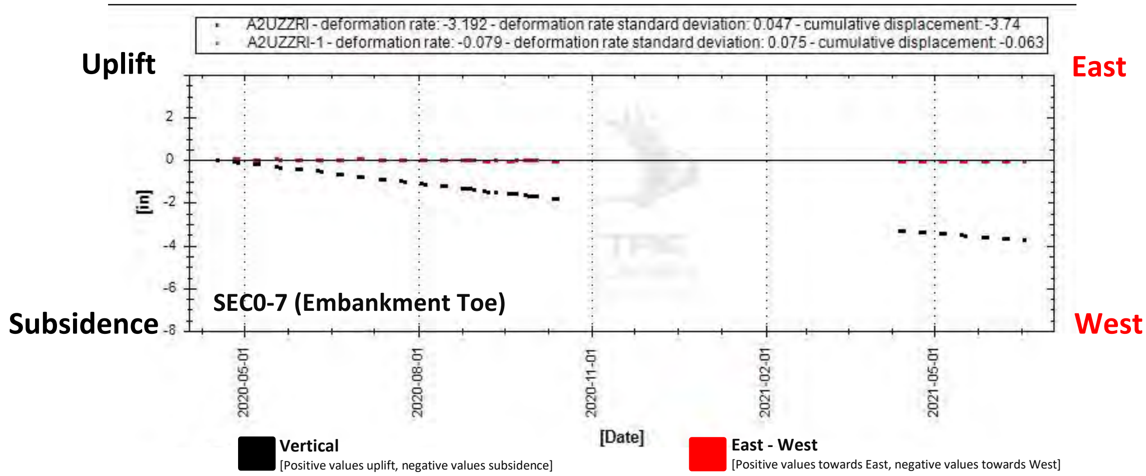


Figure 27: SEC0-4 – SEC0-6 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.



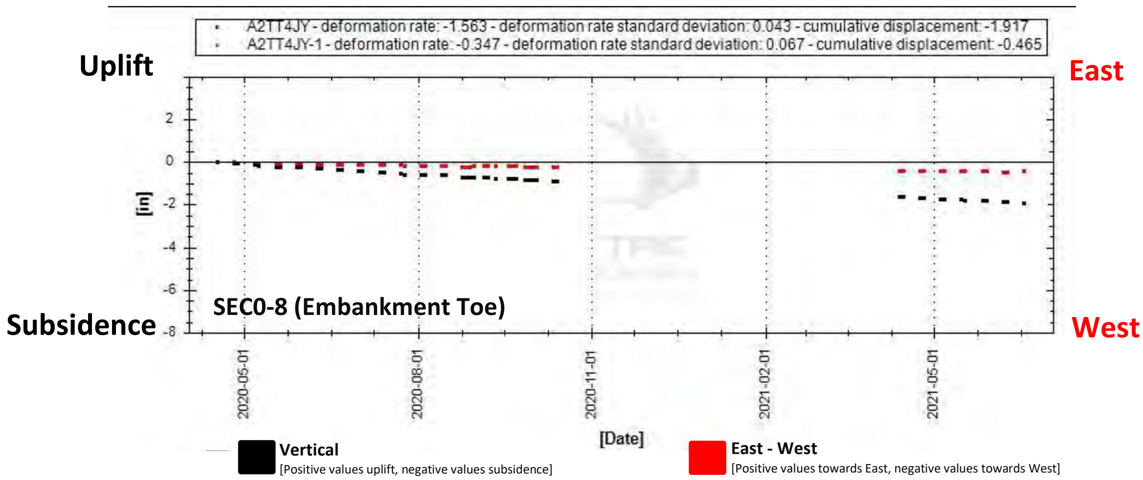


Figure 28: SEC0-7 and SEC0-8 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.

4.1.2.3. Seep 10 Bench

Movement along Seep 10 Bench (Figure 29) was analyzed by plotting the vertical and East-West motion (SEEP10-1 – SEEP10-6; Figure 30 to Figure 31). The highest rates of displacement along the Seep 10 Bench occurred east of Section 0+00, and in particular at SEEP10-5 with up to -1.23 in/yr of settlement associated with 0.43 in/yr of westward motion (Figure 31).

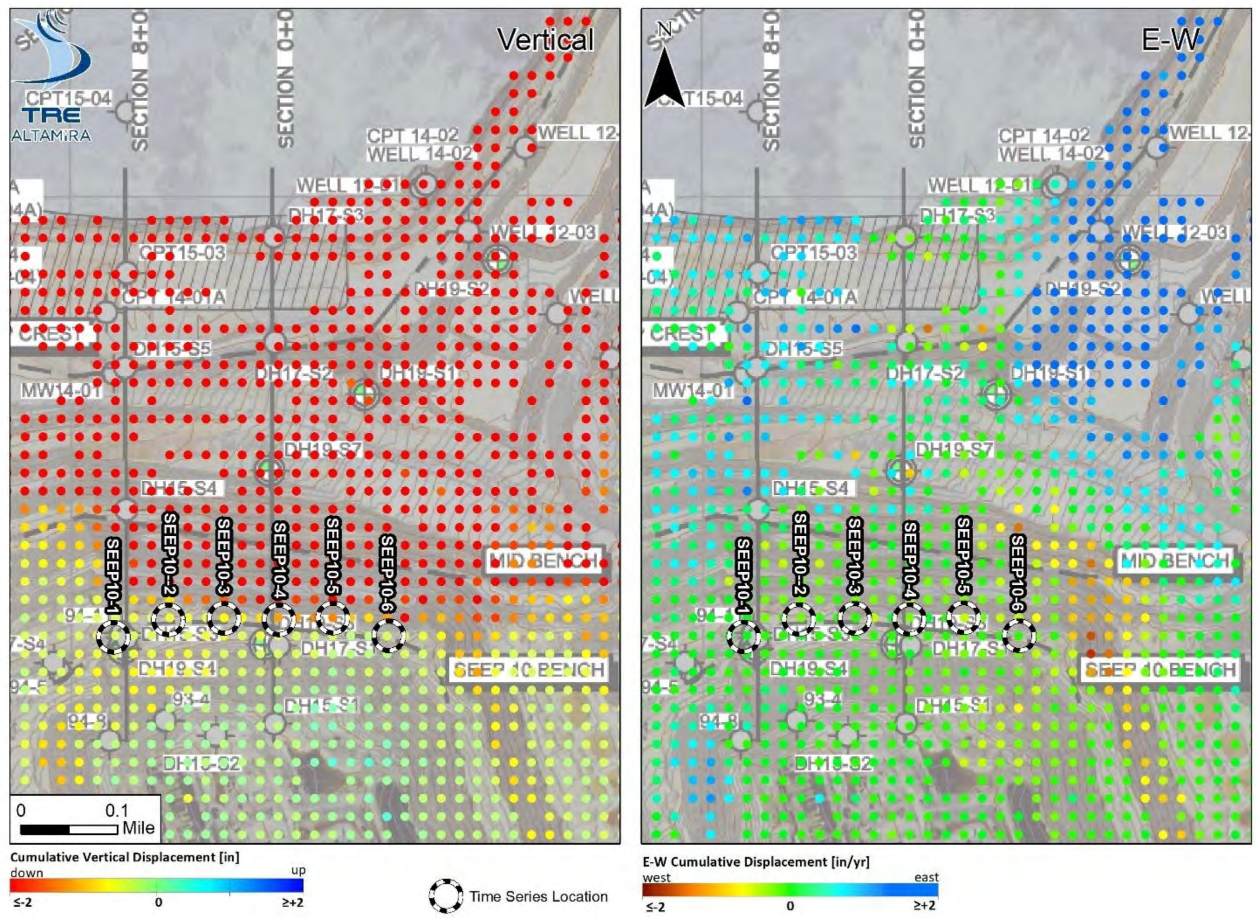


Figure 29: Location of TS analyzed along the Seep 10 Bench transect. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.

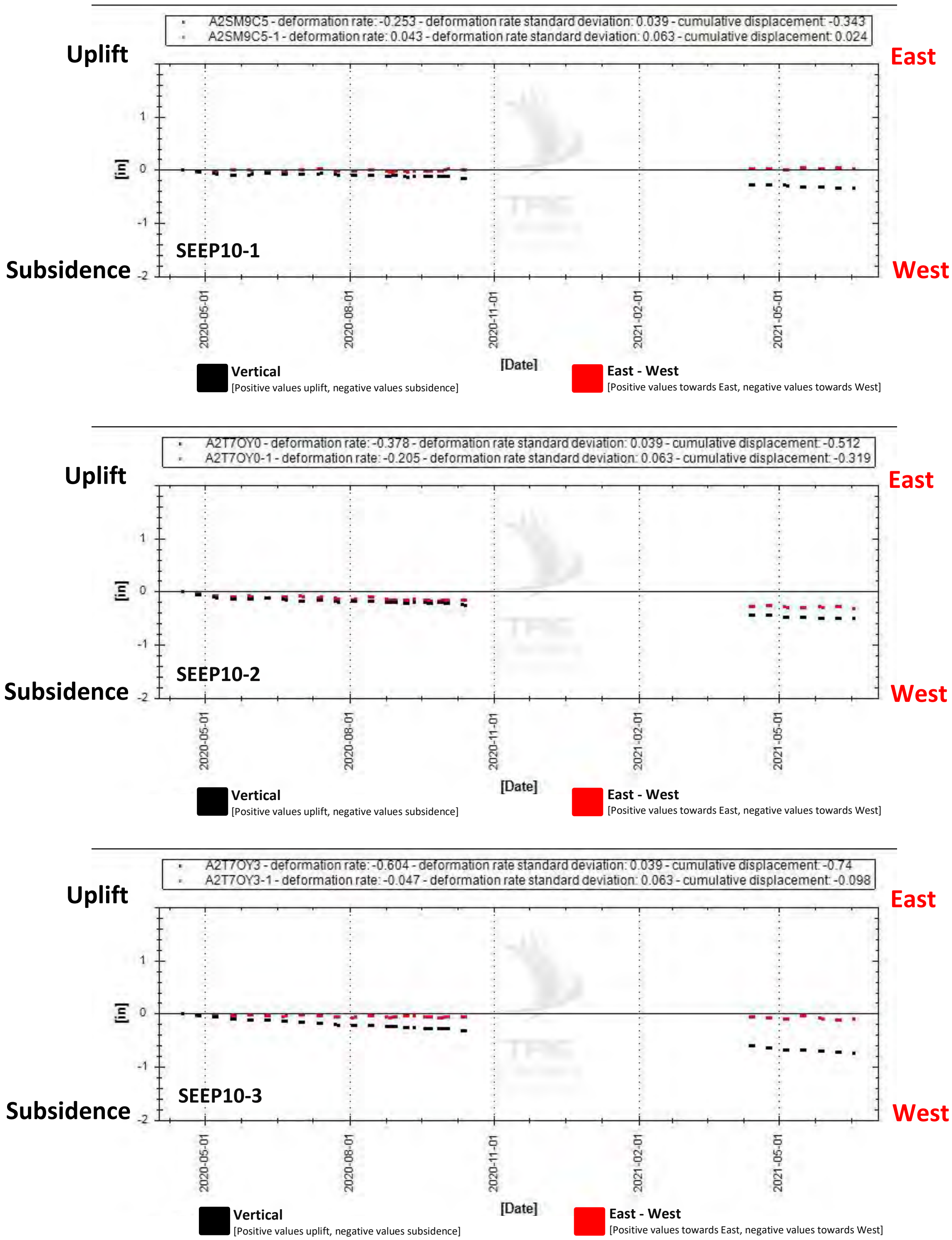
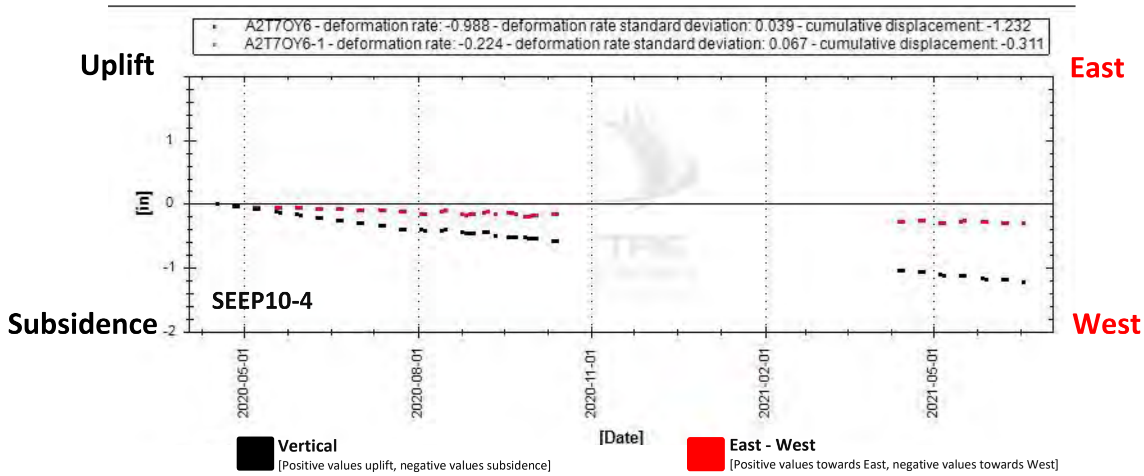
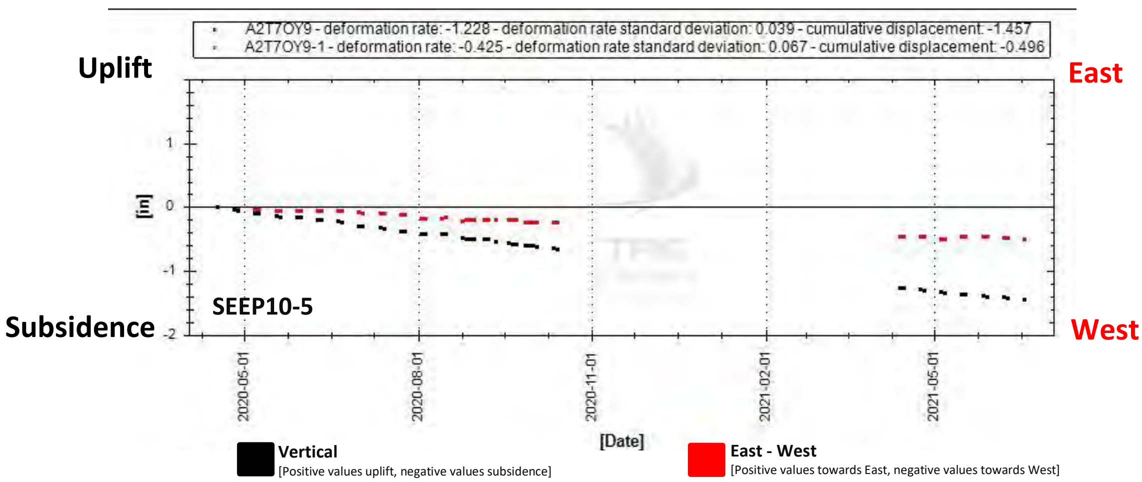


Figure 30: SEEP10-1 – SEEP10-3 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.





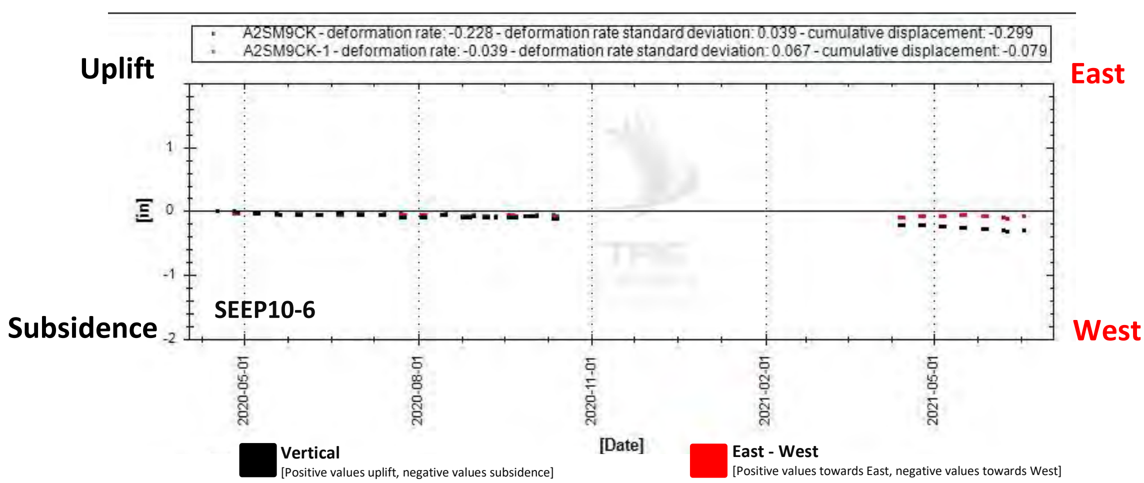


Figure 31: SEEP10-4 and SEEP10-6 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

4.2. Berkeley Pit

In the past specific interest was shown in movement over the Southeast corner of the Berkeley Pit following a failure that occurred on 11 December 2020. The cut-off date of the image collection for the previous analysis was 14 October 2020 and the SqueeSAR data set was investigated for potential early warning signs of ground movement prior to the collapse. Motion around the area of the Berkeley pit was found to be linear prior to the failure.

Similarly to the October 2020 update, the Berkeley Pit was analyzed using five time series (Figure 33 - Figure 34). The fastest vertical motion was recorded at Berkeley-1 which showed up to -2.27 in/yr, whereas Berkeley-2 showed the fastest horizontal motion, up to 1.27 in/yr in an eastward direction. Motion at Berkeley-5 near the previously mentioned failure decreased to -0.45 in/yr with an eastward component of 0.06 in/yr. The legend for Figure 32 is reduced to ±1 inch/year to better illustrate the motion observed.

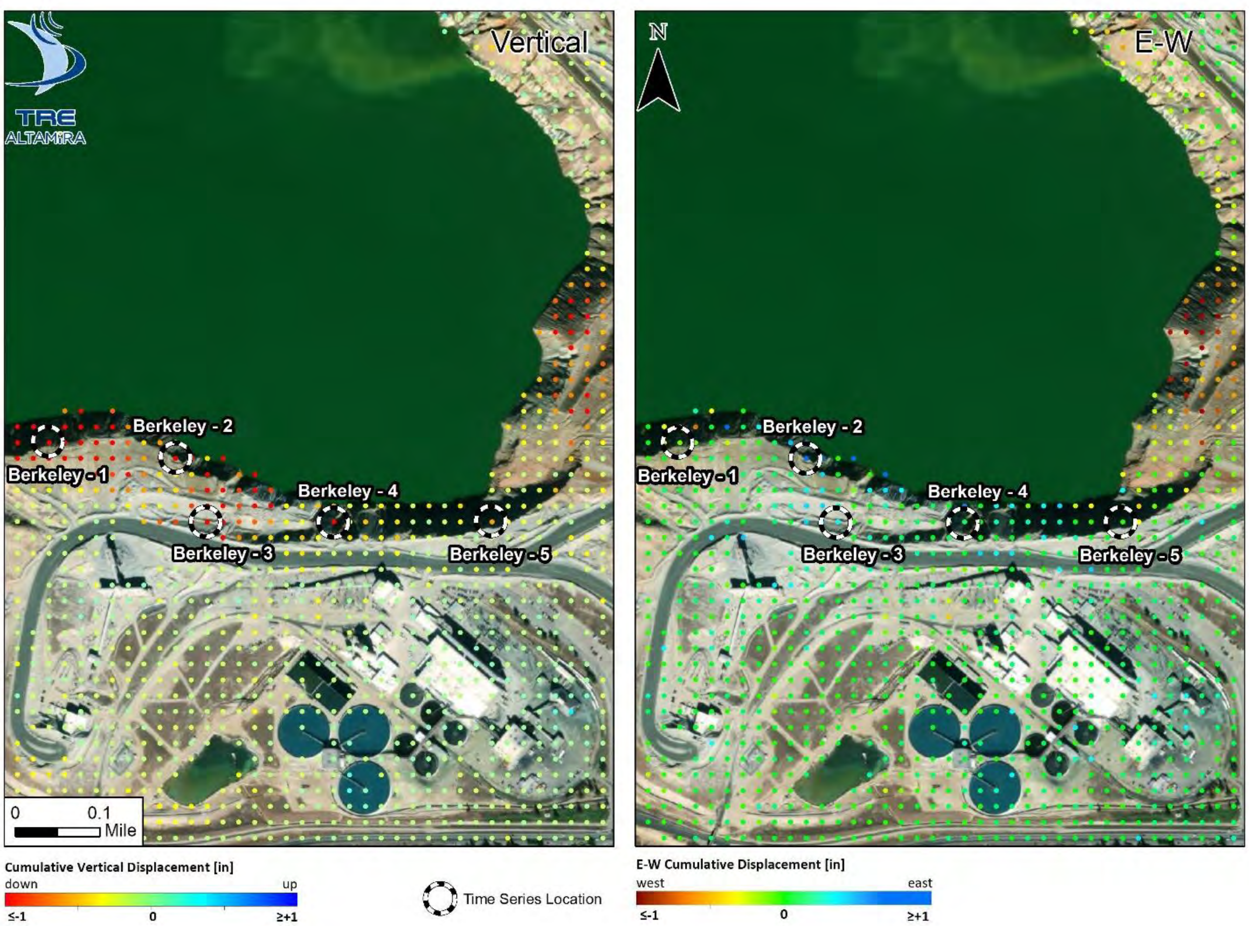
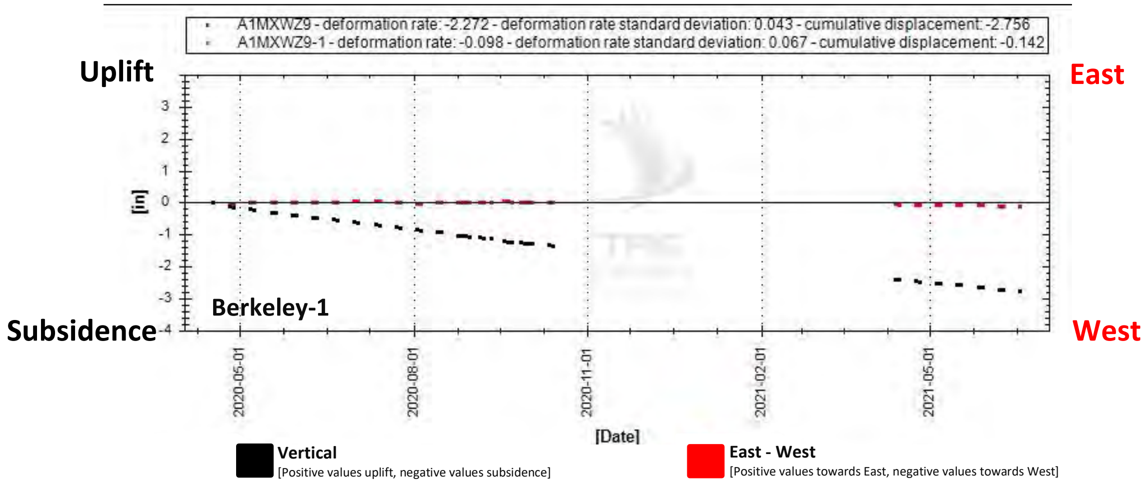
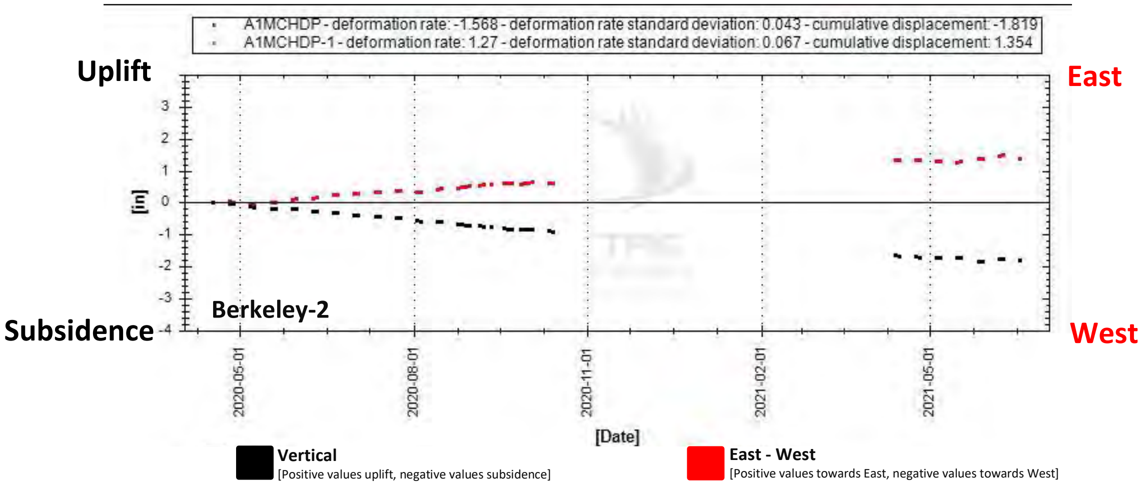


Figure 32: Location of TS analyzed at Berkeley Pit. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.





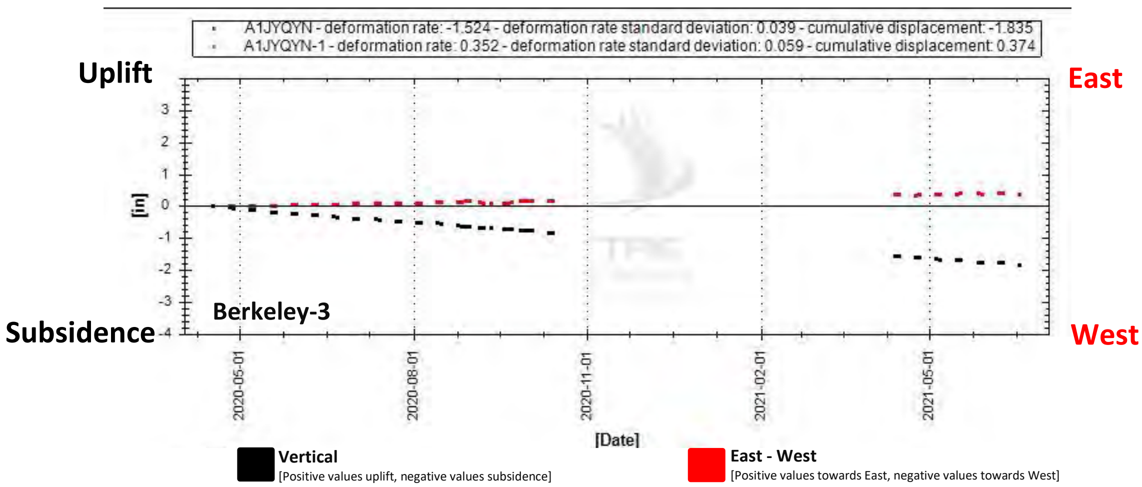
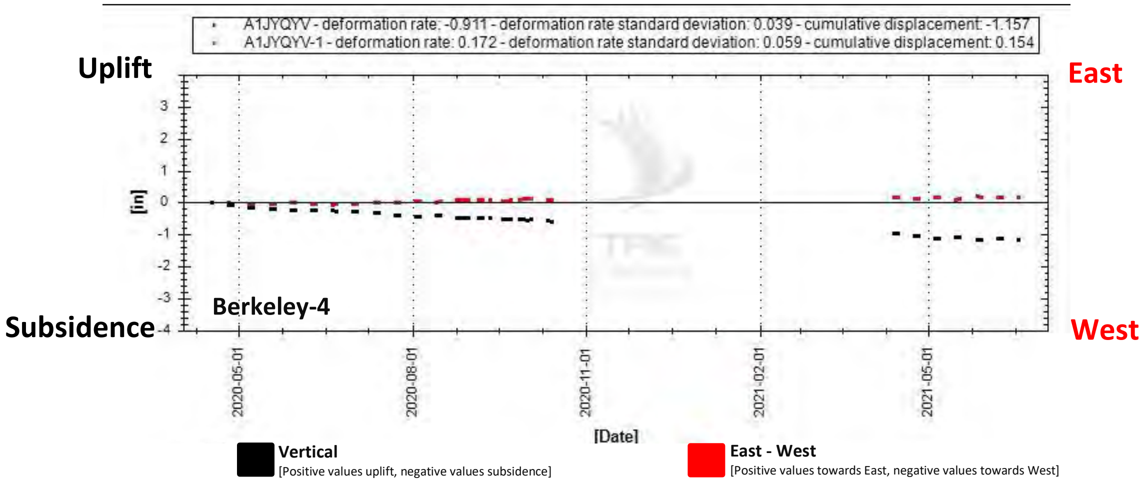


Figure 33: Berkeley-1 - Berkeley-3 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.



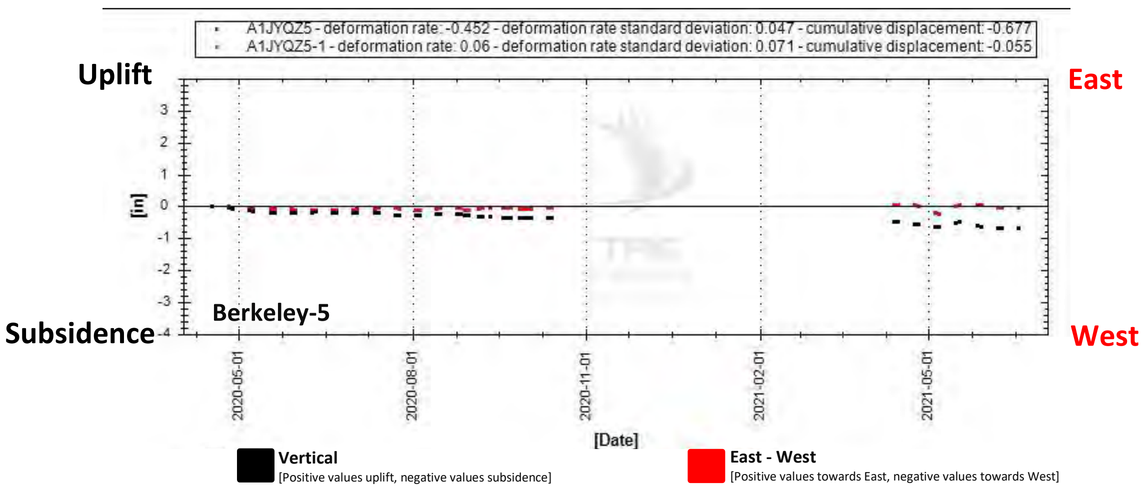


Figure 34: Berkeley-4 and Berkeley-5 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

4.3. Continental Pit

Similarly to the October 2020 update, areas of known concern within the Continental Pit were analyzed using 11 time series (Figure 36 - Figure 39). Vertical motion at the Northwest corner of the pit reached up to -1.21 in/yr vertically with a 2.41 in/yr eastward component (Continental-5). Motion of up to +0.95 in/yr was monitored in the Northeast sector with a westward component of 0.05 in/yr (Continental-3). On the west wall of the pit (Continental-9) motion decreased to 1.45 in/yr in the vertical but increased to 3.33 in/yr to the east. The legend for Figure 35 is reduced to ±1 inch to better illustrate the motion.

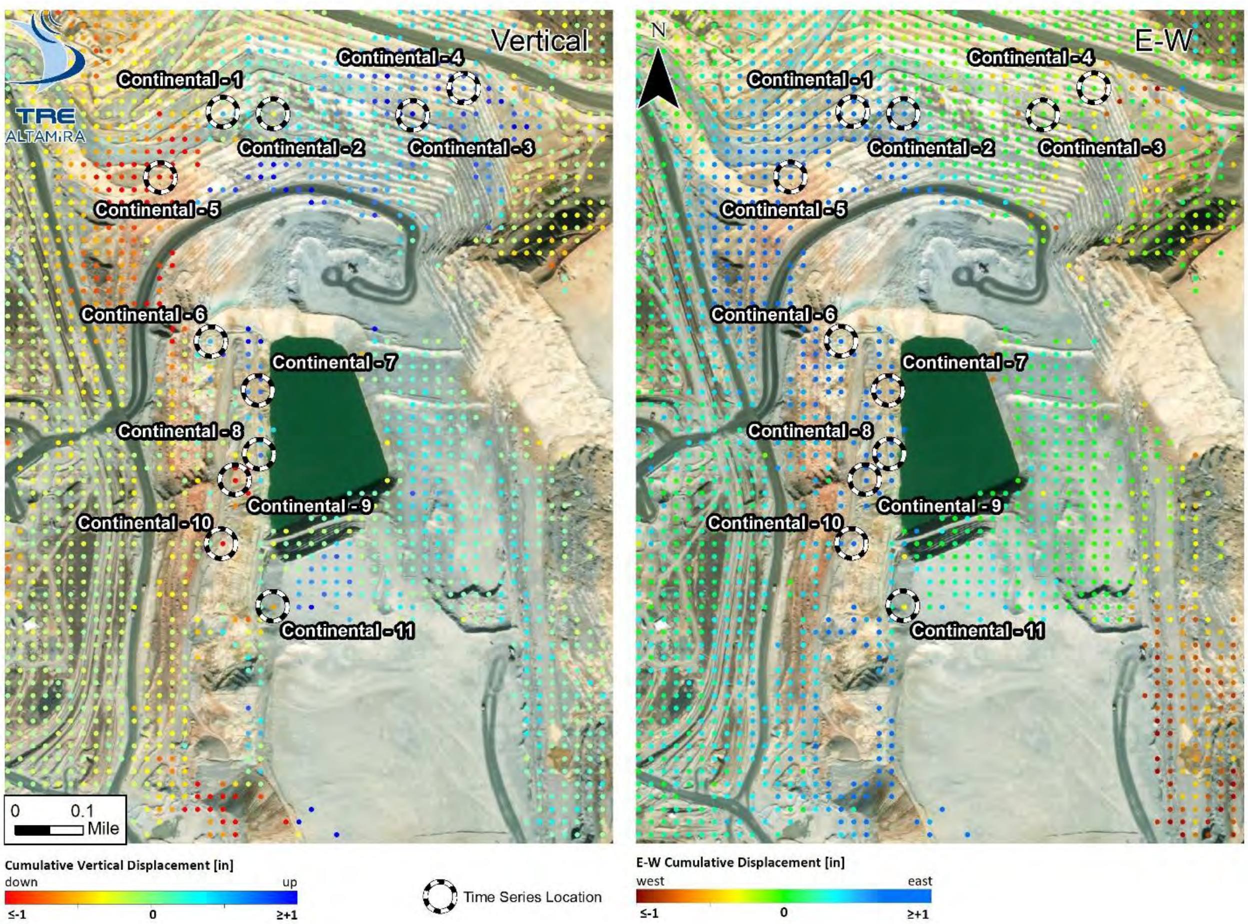
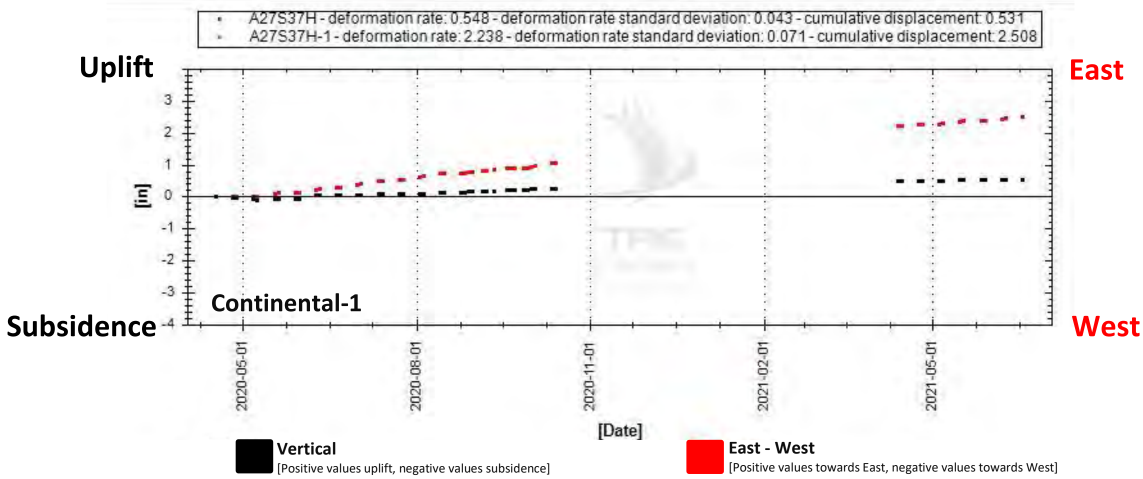
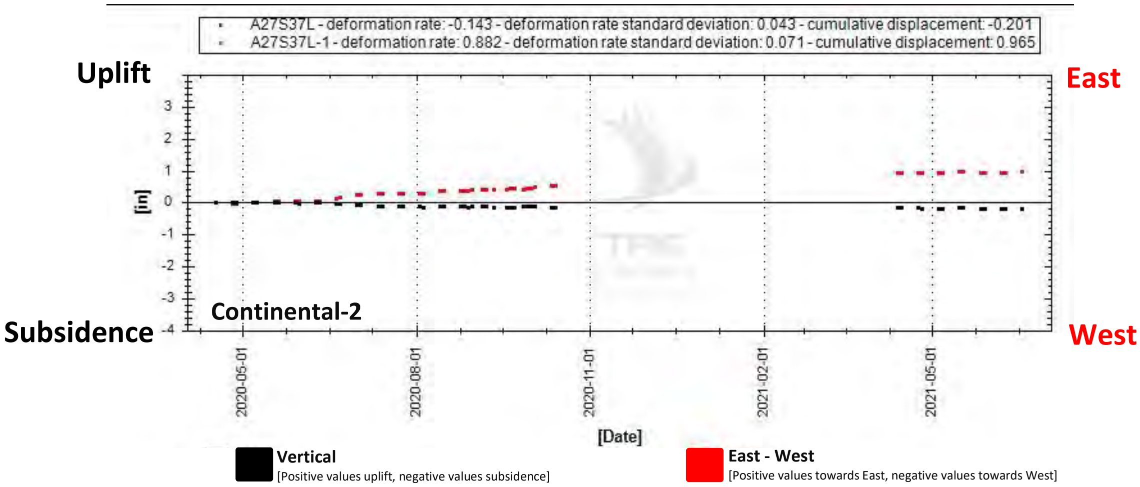


Figure 35: Location of the TS analyzed at Continental Pit. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.





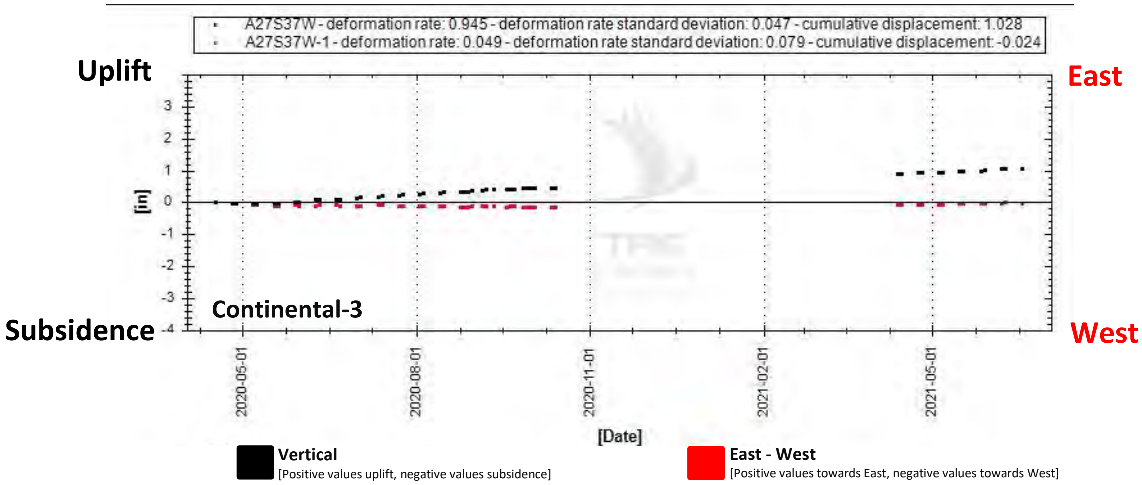


Figure 36: Continental-1 - Continental-3 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

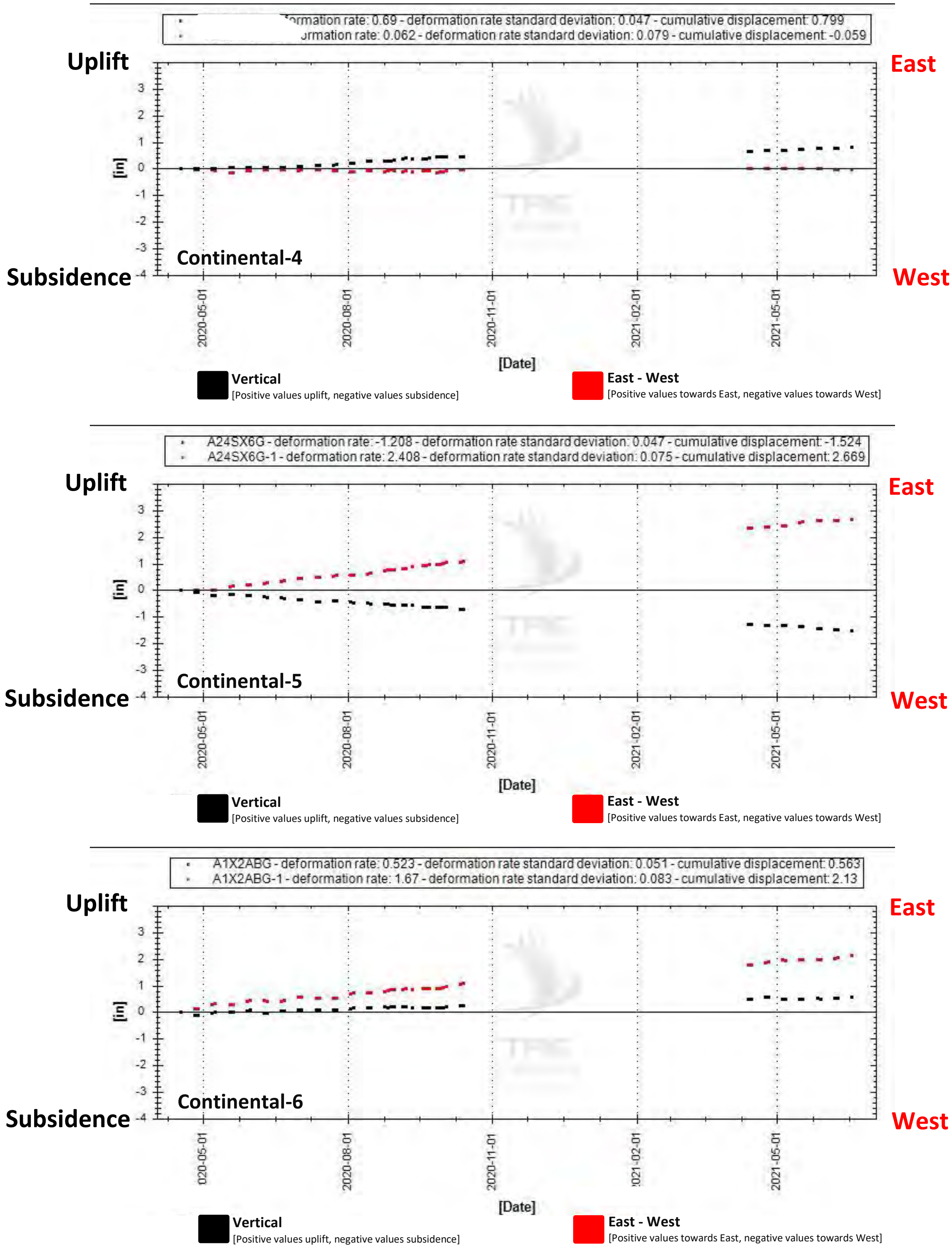


Figure 37: Continental-4 - Continental-6 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

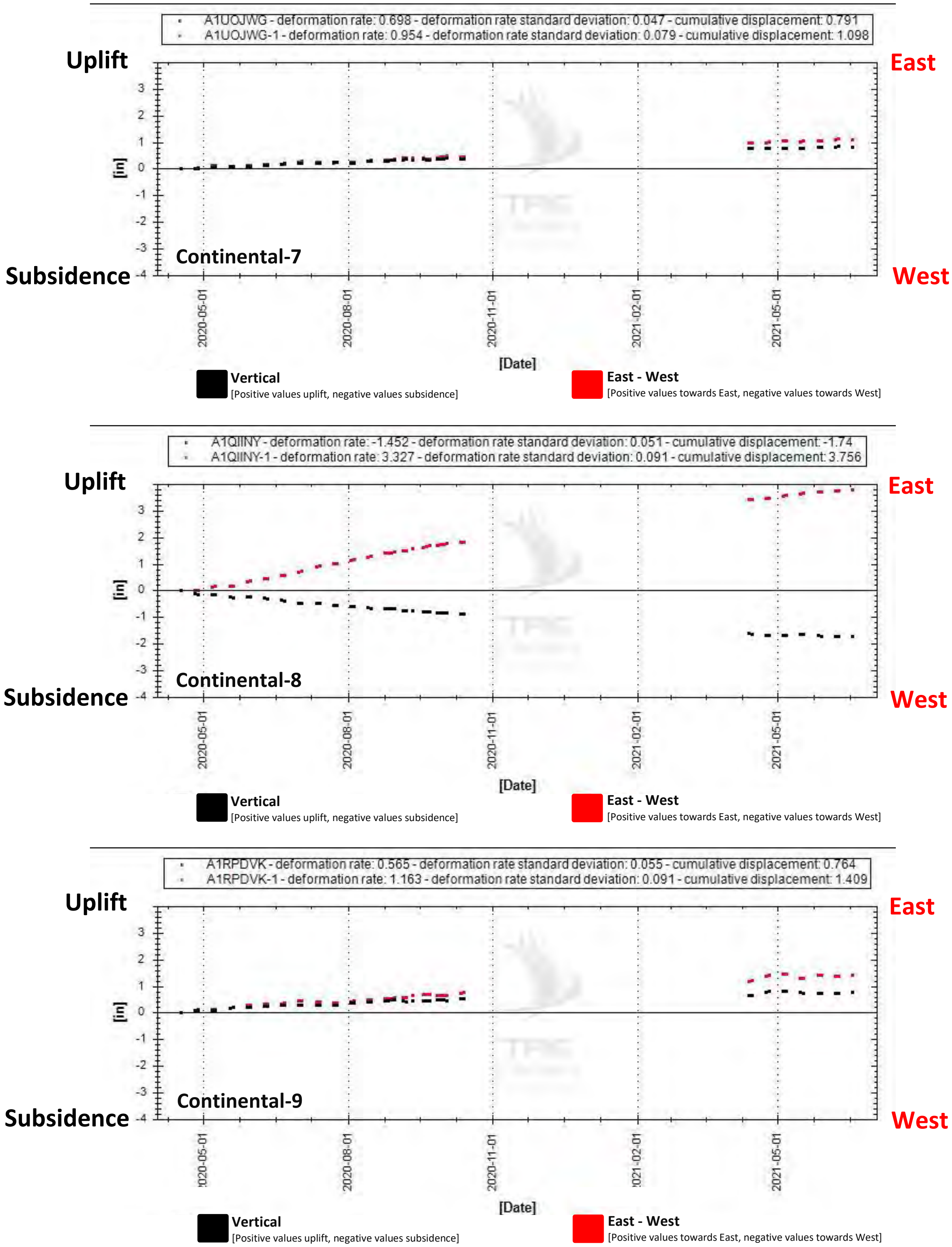
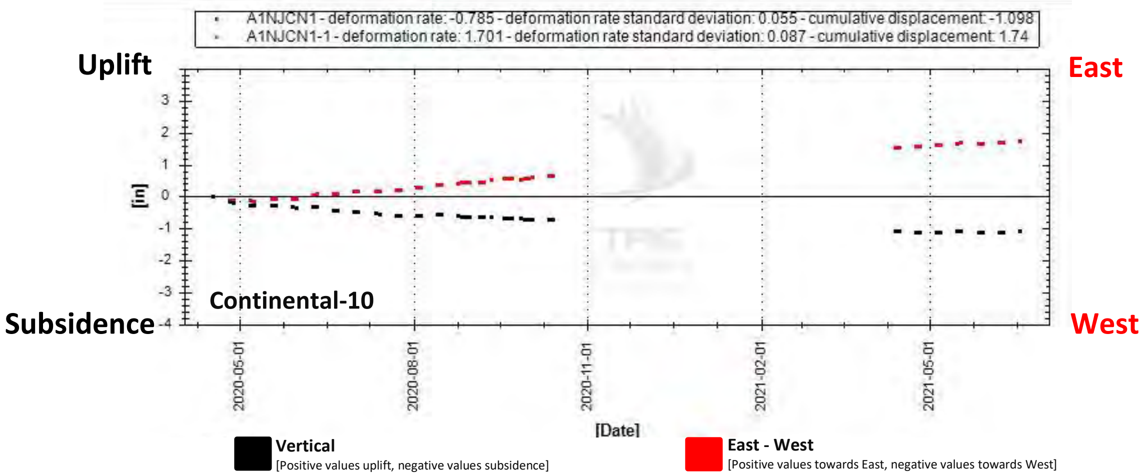


Figure 38: Continental-7 - Continental-9 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.



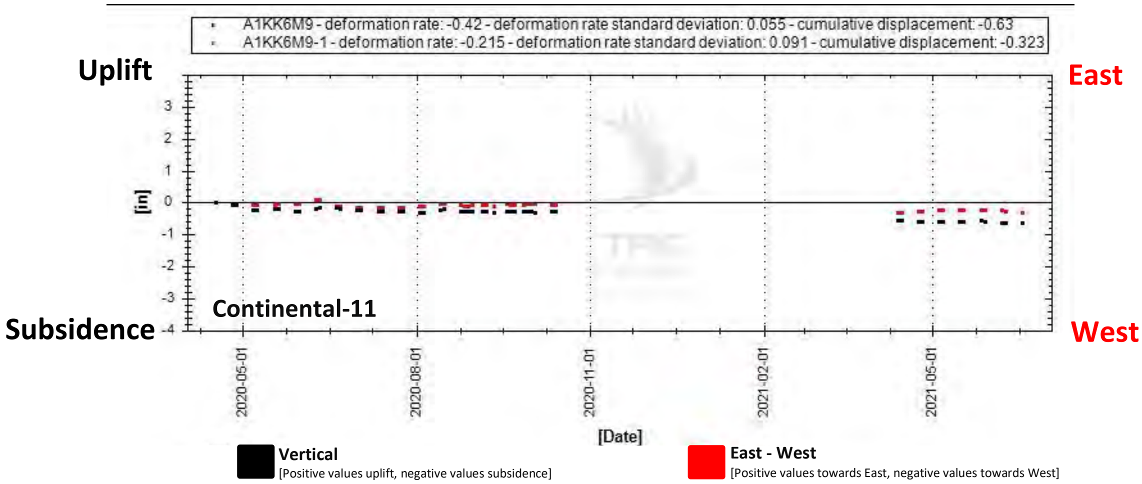


Figure 39: Continental-10 and Continental-11 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

5. Summary and Recommendations

Using a combination of time series and cross-sections TRE Altamira provided a summary of historical displacement of the Yankee Doodle Tailings Impoundment, the Berkeley Pit, and the Continental Pit at Montana Resources' operations in Butte, Montana (USA). Movement along three sections within the North-South and East-West Embankments are showing consistent settlement of several inches per year near the crest, with rates slowing down towards the toe of the embankments. No signs of incipient movement were detected in the area of the failure within the Berkeley Pit.

Appendix 1: Delivered Files

List of Deliverables

Table 4 list the deliverables including the present report, the InSAR data files and an updated version of the TRE toolbar, a software tool for assisting with the loading, viewing and interrogation of the data in ESRI ArcGIS 10.x software (For set-up procedure and functionalities, see the attached manual *TREAltamira Toolbar 5.8.5 User Manual.pdf*).

Table 4: List of deliverables.

Description	File name
SqueeSAR Data	**Ascending (LOS):** BUTTE_TSX_T30_A_JUN2021_Imperial_LocalGrid.shp **Descending (LOS):** BUTTE_TSX_T68_D_JUN2021_Imperial_LocalGrid.shp **2-D:** Vertical: BUTTE_TSX_VERT_JUN2021_Imperial_LocalGrid.shp East-West: BUTTE_TSX_EAST_JUN2021_Imperial_LocalGrid.shp
MXD project file containing all the data (ESRI ArcGIS version 10.0 and 10.6)	BUTTE_JUNE2021_v10.mxd BUTTE_JUNE2021_v10-8.mxd
Technical Report	Butte_InSAR_Report_June_2021.pdf
TRE Toolbar (ESRI® ArcGIS 10.x)	TREAltamira_Toolbar_5_8_5 TREAltamira Toolbar 5.8.5 User Manual.pdf

Database Structure

The SqueeSAR vector data are delivered in a shapefile format and projected to the local mine coordinates (MR2007). The shapefile of each elaboration contains details about the measurement points identified, including displacement rate, elevation, cumulative displacement and quality index. The information associated within the database files (dbf) are described in Table 5.

Table 5: Description of the fields contained in the database of the vector data. *Field is only present in LOS data sets.

Field	Description
CODE	Measurement Point (MP) identification code.
HEIGHT*	Topographic Elevation referred to WGS84 ellipsoid of the measurement point [ft].
H_STDEV*	Height standard deviation of the measurement point [ft].
VEL	MP displacement rate [in/yr].

- **Ascending LOS:** Positive values correspond to motion toward the satellite (i.e. uplift and/or westward movement); negative values correspond to motion away from the satellite (i.e. downward and/or eastward movement).
- **Descending LOS:** Positive values correspond to motion toward the satellite (i.e. uplift and/or eastward movement); negative values correspond to motion away from the satellite (i.e. downward and/or westward movement).
- **Vertical (VEL_V):** Positive values indicate uplift; negative values indicate downward movement.
- **E-W Horizontal (VEL_E):** Positive values indicate eastward movement; negative values westward movement.

V_STDEV	Displacement rate standard deviation [in/yr].
ACC*	Acceleration rate [in/yr^2].
A_STDEV*	Standard deviation of the acceleration value [in/yr^2].
COHERENCE*	Quality measure between 0 and 1.
STD_DEF*	Displacement time series error bar [in]
EFF_AREA*	This parameter represents the effective extension of the area [ft^2] covered by Distributed Scatterers (DS). For permanent scatterers (PS), its value is set to 0.
Dyyyymmdd	Series of columns that contain the displacement values of successive acquisitions relative to the first acquisition available [in].

TREmaps

TREmaps® is our proprietary online GIS platform to view and interrogate the InSAR datasets. TREmaps has been completely revamped to include features and functionality previously available only within the TRE ArcGIS toolbar. Little or no training is required, and no specialized GIS software is necessary. With internet access, the platform allows data to be overlaid on an optical image and to perform various operations on the data.

Functionalities include:

- Time-Series tool to view the history of displacement for each measurement point
- Average Time-Series tool to view the average history of displacement for a group of selected points.
- Cross-section tool to view the evolution of the ground surface over time
- Data download and data export (of subsets of data) to common formats (SHP, KML, GeoDB, CSV)
- Dynamic filtering tool to filter a subset of the results by a specified time period
- Client data integration.

TREmaps is hosted by Microsoft Azure, with all the advantages of data security and the cloud-based environment, with minimal downtime and robust internet connectivity. TREmaps runs directly on most Internet browsers and is accessed through a secure client login.

To log in, please go to:

https://tremaps5.tre-altamira.com/treaviewer

For assistance on any of the functions, please click the Help icon on the viewer or go to:

https://site.tre-altamira.com/tremaps-getting-started/

Appendix 2: Additional Radar Data Details

InSAR-based approaches measure surface displacement on a one-dimensional plane, along the satellite line-of-sight (LOS). The LOS angle varies depending on the satellite and on the acquisition parameters while another important angle, between the orbit direction and the geographic North, is nearly constant.

An ascending orbit denotes a satellite travelling from South to North and imaging to the east, while a descending orbit indicates a satellite travelling from North to South and imaging to the west. Table 6 lists the values of the angles for this study, while Figure 40 and Figure 41 show the geometry of the image acquisitions over the site for the ascending and descending orbits, respectively. The symbol Θ (theta) represents the angle the LOS forms with the vertical and δ (delta) the angle formed with the geographic North.

Table 6: Satellite viewing angles for the study.

Satellite	Wavelength	Orbit	Beam Mode/ Track	Symbol	Angle
TerraSAR-X	X-Band 3.11 cm	Ascending	30	**θ**	39.99^{o}
				δ	8.73^{o}
		Descending	68	**θ**	29.75^{o}
				δ	12.07^{o}

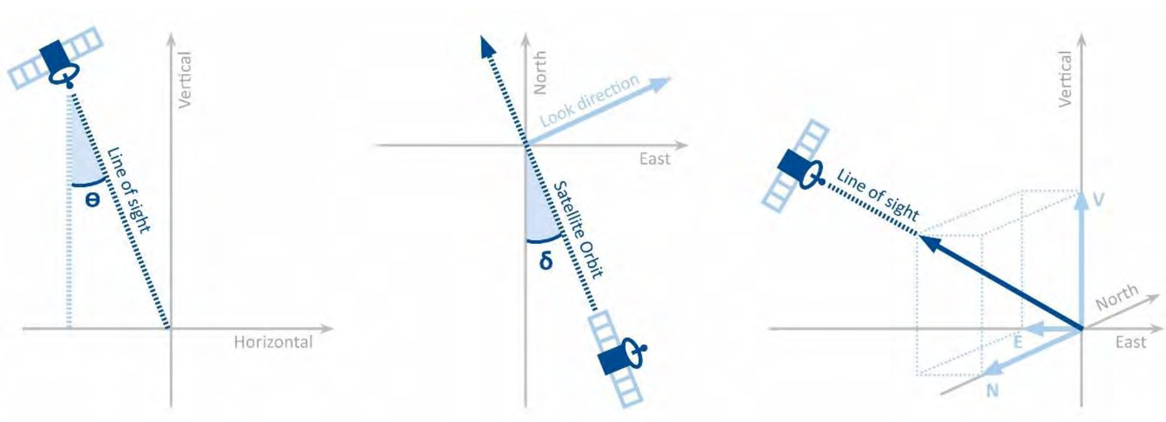


Figure 40: Geometry of the image acquisitions along the ascending orbit.

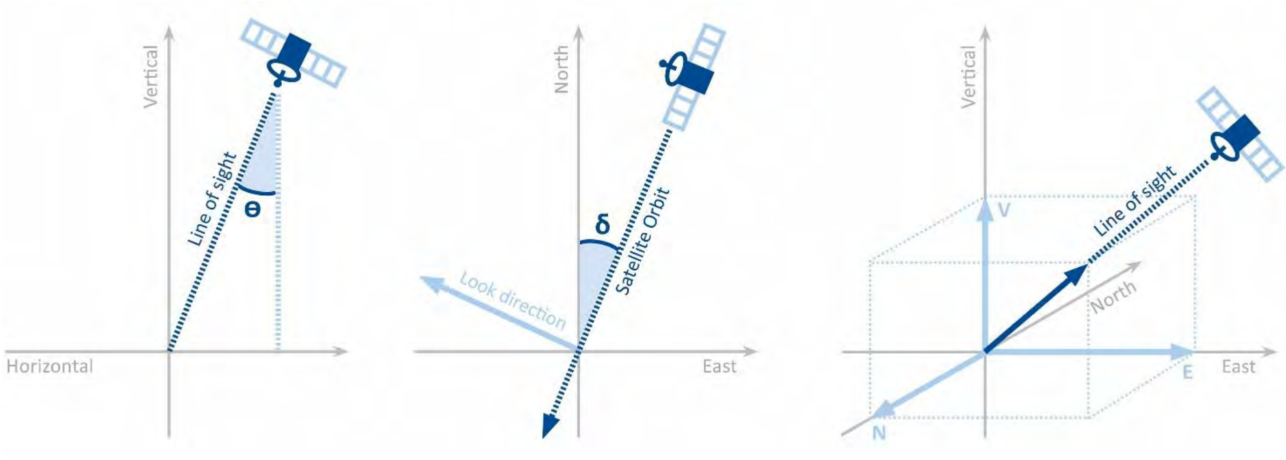
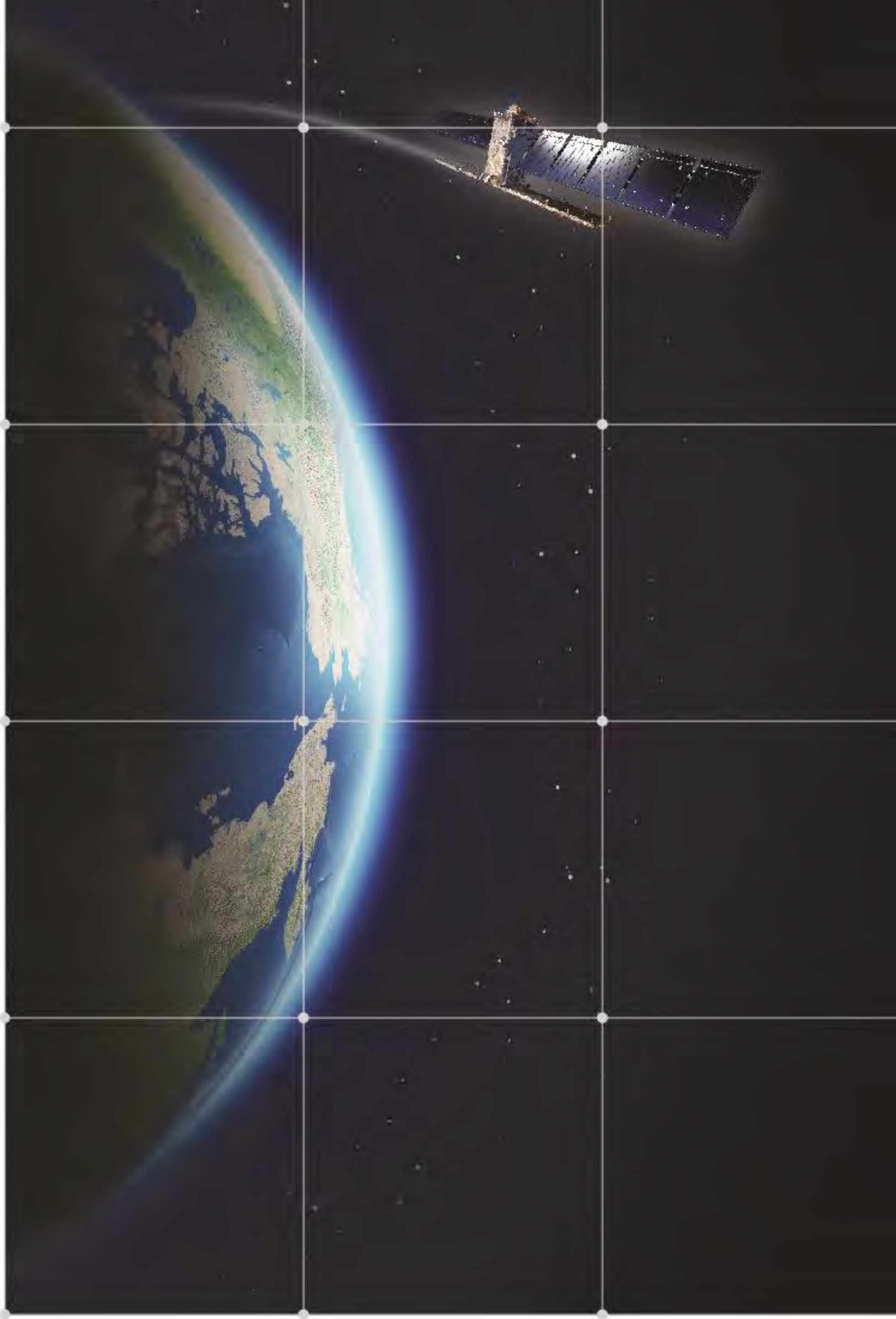


Figure 41: Geometry of the image acquisitions along the descending orbit.



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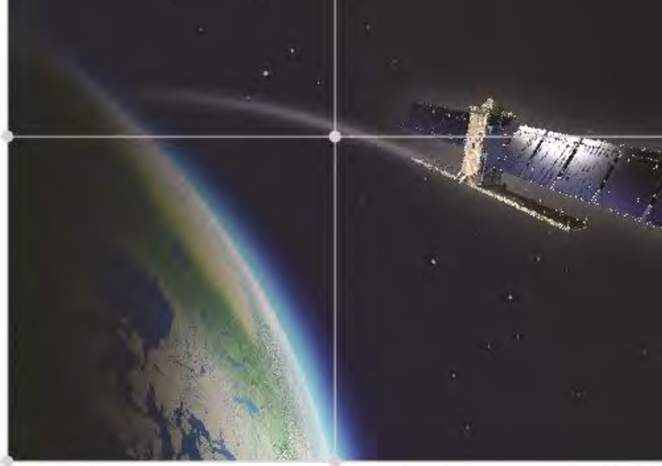

InSAR Analysis of Ground Displacement for Montana Resources operations in Butte - November 2021 update

Technical Report **December 2021**

TRE ALTAMIRA
A CLS Group Company

Report Specifications

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Address:	Suite 1400 - 750 West Pender Street Vancouver British Columbia Canada V6C 2T8

Reference:	
Title:	InSAR Analysis of Ground Displacement over Butte Mine
TRE ALTAMIRA Delivery Reference:	JO21-1442-CA 2.0
Client Reference (PO):	334524

Prepared by:	**TRE ALTAMIRA Inc.**
Author(s):	Riccardo Tortini
Approved by:	Sara Del Conte
Date:	17 December 2021
Version:	1.0

Executive Summary

This report describes the results of the semi-annual ground displacement InSAR analysis over Montana Resources' operations in Butte, Montana (USA). TRE Altamira used its SqueeSAR® algorithm to process high-resolution TerraSAR-X (TSX) images acquired from two orbits and covering the period mid-April to early-November 2021 to assess 2-D (vertical and E-W) ground displacement. The winter period is not covered due to presence of snow on site.

The following points summarize the findings:

- Overall rates of vertical motion at the Yankee Doodle Tailings Impoundment decreased from the previous update, ranging from -11.67 in/yr (strongest subsidence observed) to +0.35 in/yr (strongest uplift observed).
- Settlement continues to be seen along three sections on the East-West embankment. The highest rates of vertical motion along each section measure as follows:
    - Section 8+00 W: -7.27 in/yr (increase)
    - Section 0+00: -8.12 in/yr (stable)
    - Seep 10 Bench: -1.70 in/yr (increase)
- Displacement rates are generally lowest near the toe of the embankment and are listed below:
    - Section 8+00 W: -0.05 in/yr (decrease)
    - Section 0+00: -1.49 in/yr (stable)
- Strongest motion observed at the Berkeley Pit (South Wall):
    - -2.15 in/yr of settlement (stable)
    - 1.33 in/yr of eastward motion (stable)
- Strongest motion observed at the Continental Pit (South Wall):
    - -1.31 in/yr of settlement (decrease)
    - 2.45 in/yr of eastward motion (decrease)

TerraSAR-X image acquisitions over the site were halted on October 28th and resumed on December 11th, 2021, in the ascending orbit. They will proceed with an 11-day revisit frequency until February 4th, 2022, to allow the creation of 22-day *ad hoc* bulletins upon request.

Table of Contents

Acronyms and Abbreviations

AOI	Area of Interest
ATS	Average Time Series
CS	Cross-Section
DS	Distributed Scatterer(s)
GIS	Geographic Information System
InSAR	Interferometric Synthetic Aperture Radar
LOS	Line of Sight
MP	Measurement Point
PS	Permanent Scatterer(s)
SAR	Synthetic Aperture Radar
SNT	Sentinel Satellite
SqueeSAR®	The most recent InSAR algorithm patented by TRE
TS	Time Series
YDTI	Yankee Doodle Tailings Impoundment

1. Introduction

Montana Resources (MR) has contracted TRE Altamira Inc. (TREA), overseen by Knight Piésold, to carry out an InSAR assessment over MR's Butte, Montana Operations. TREA used its proprietary SqueeSAR algorithm and high-resolution TSX imagery to identify ground movement between March 2020 – November 2021, with particular focus on the Yankee Doodle Tailings Impoundment.

1.1. Area of Interest

The mine site is located directly Northeast of the town of Butte, Montana, USA. The 32.56 mi^2 area of interest (AOI) (Figure 1) is predominantly industrial with large mining pits and related infrastructure occupying a large portion of the AOI. The mine is in mostly forested alpine terrain and grassland, with the town of Butte, Montana occupying the bottom portion of the AOI. The high radar reflectivity of the mine site and man-made structures within Butte are conducive to the application of InSAR.

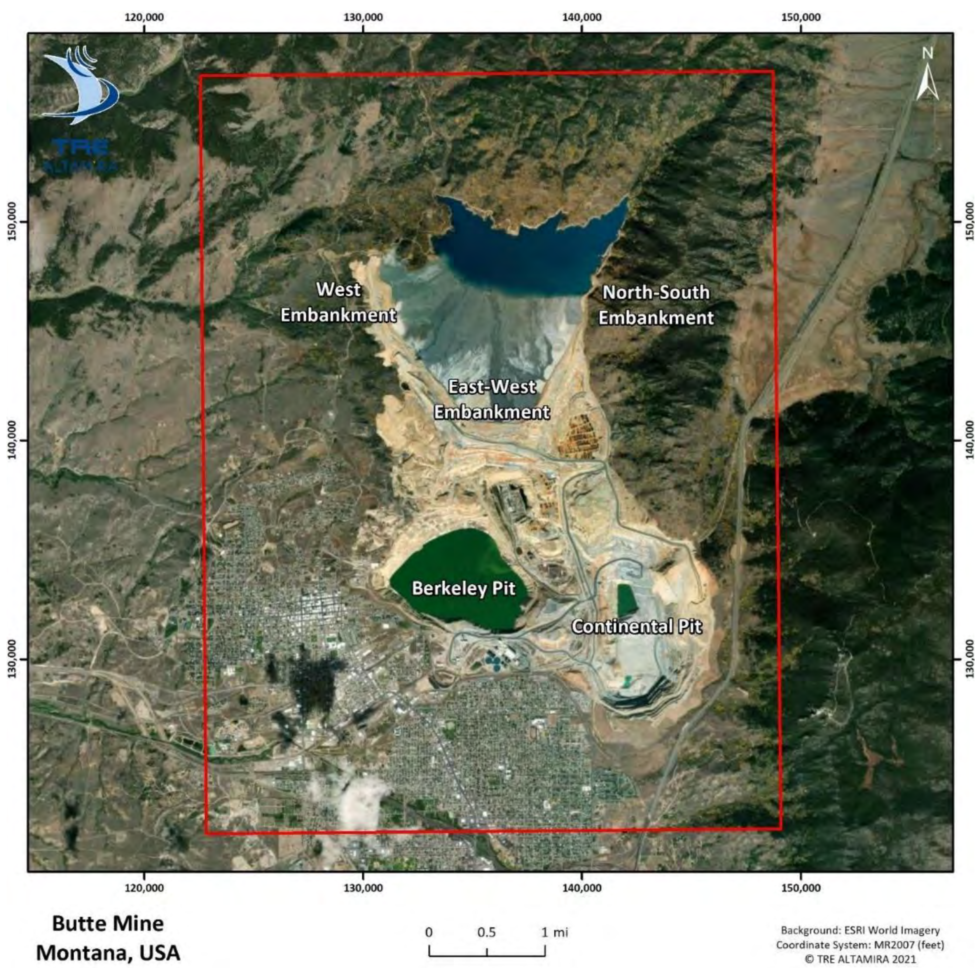


Figure 1: Butte Mine: area of interest.

2. Radar Data

The radar data available over Butte consists of high-resolution images acquired by the TSX and PAZ satellites (Table 1) from both the ascending (satellite travelling from South to North and imaging to the east) and descending (satellite travelling from North to South and imaging to the west) orbits between April 2020 and June 2021. The archive consists of 26 ascending and 28 descending images collected at an 11-day interval (

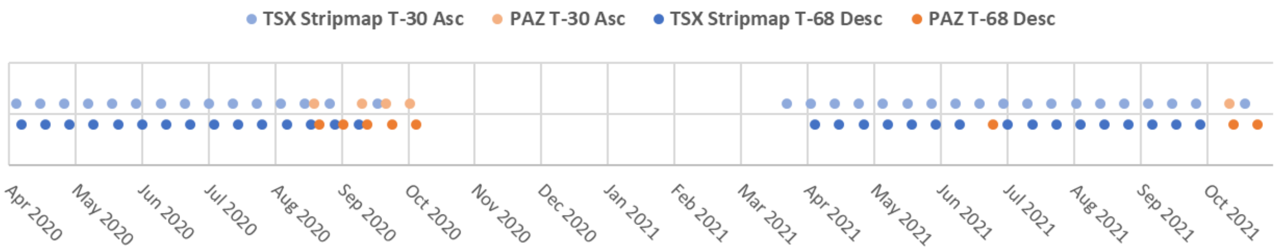


Figure 2) prior to late August, when PAZ (a TSX clone) imagery was added to the archive in order to ensure an appropriate amount of imagery was available for a SqueeSAR analysis in the fall season. Appendix 2 provides additional information on the satellite acquisition parameters. Winter images were not acquired due to the presence of snow.

Table 1: Satellite acquisition parameters and image acquisition information.

Satellite	Pixel Resolution	Orbit	LOS Angle (Θ)	# of Images	Date Range
TSX & PAZ	3 x 3 m (9.84 x 9.84 ft)	Ascending	40.0º	38	15 April 2020 – 28 October 2021
		Descending	29.8º	40	17 April 2020 – 03 November 2021

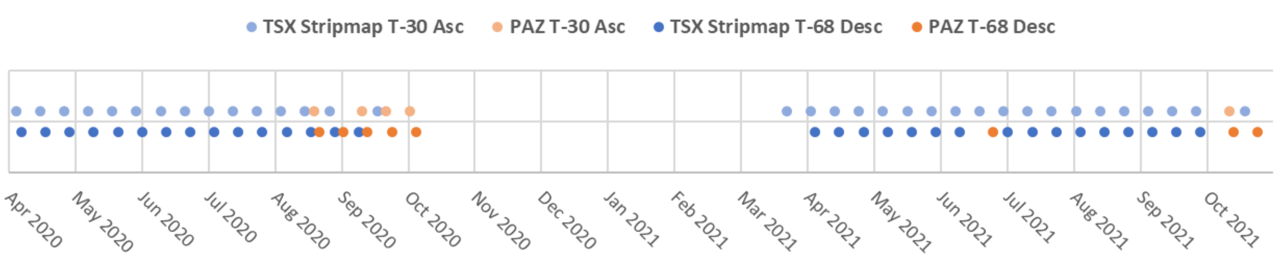


Figure 2: Temporal distribution of TSX radar images processed.

3. Overview of Results

This section provides a summary of the techniques used and a general overview of the results, while Section 4 describes areas of displacement in more detail.

3.1. LOS Results

SqueeSAR identifies measurement points (MPs) from objects on the ground that display a stable return to the satellite in every image of the archive. In InSAR analyses, all measurements are 1-D readings along the sensor's line-of-sight (LOS) as the true vector of displacement is projected onto the LOS. The same displacement will produce different readings when viewed from different angles. The LOS displacement rates are calculated from a linear regression of the ground movement measured over the entire period covered by the satellite images. Each measurement point corresponds to a Permanent Scatterer (PS) or a Distributed Scatterer (DS), and color-coded according to its annual rate of movement and direction:

- In LOS analysis, negative values (red) indicate surface displacement away from the satellite, while positive values (blue) indicate surface displacement towards the satellite.

The TSX LOS SqueeSAR analysis provided a density of 8,733 MPs/mi^2 in the ascending orbit, and 9,600 MPs/mi^2 in the descending orbit (Table 2). The precision of the measurements, as indicated by the average standard deviation values, is ±0.04 and ±0.03 in/yr, respectively. The precision of the SqueeSAR measurement points is expected to continue improving as more images are acquired.

Table 2: Properties of the April 2020 – November 2021 TSX & PAZ LOS analyses.

Attribute	Ascending	Descending
Date Range	15 April 2020 – 28 October 2021	17 April 2020 – 03 November 2021
N. of Images	38	40
Total points (PS + DS) **Number of PS** **Number of DS**	283,730 235,878 47,852	311,886 279,935 31,951
Average Point Density (pts/mi^2)	8,733	9,600
Average Displacement Rate Standard Deviation (in/yr)	±0.04	±0.03
Reference Point Location (m)	5,116,515.67 E -12,513,834.00 N	5,115,693.80 E 12,512,859.02 N

The cumulative displacement, measured in inches, for the ascending and descending LOS data are shown in Figure 3 and Figure 4, respectively. These data are used as input to produce 2-D (vertical and East-West) results and generally provide a higher density of measurement points.

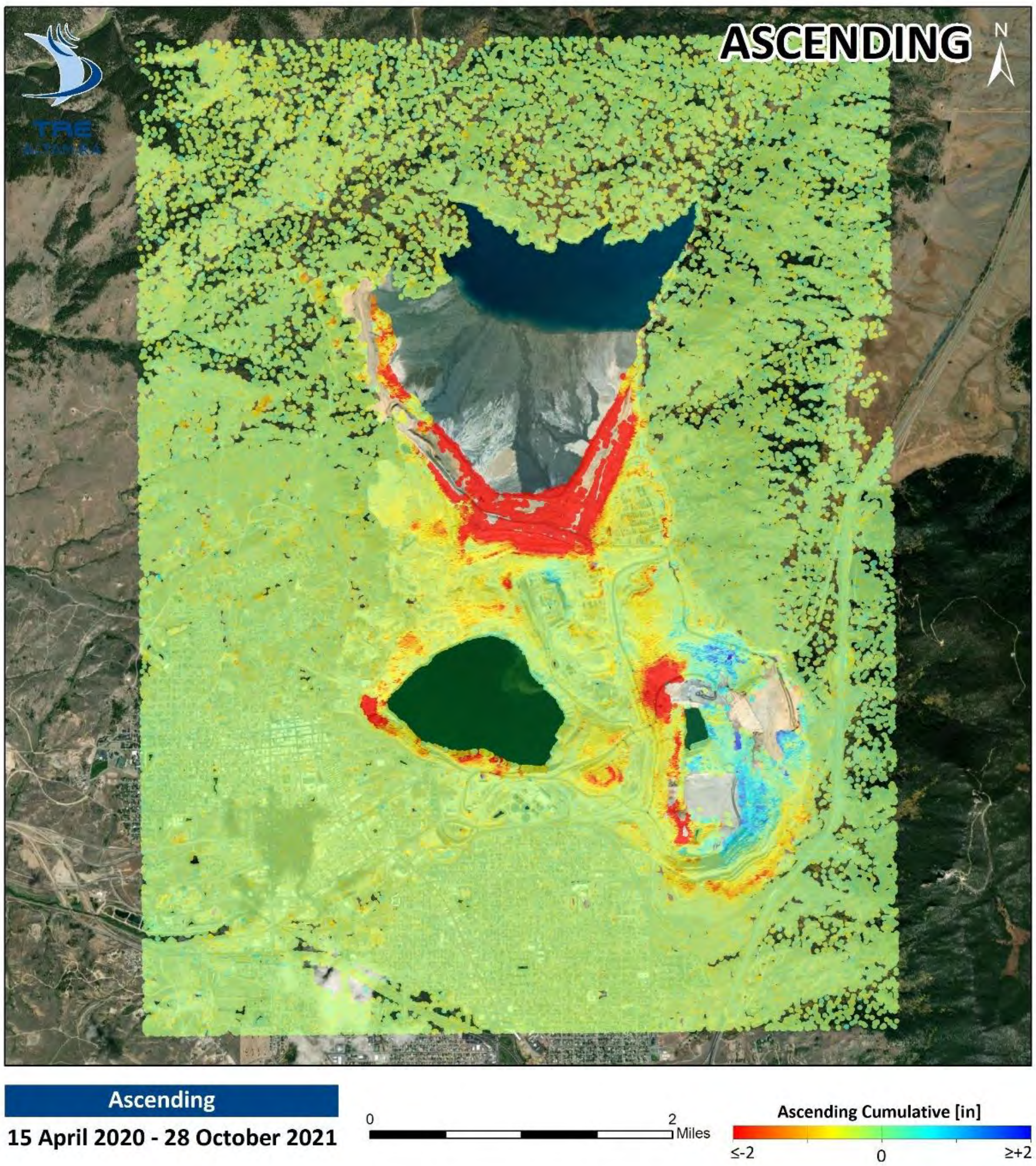


Figure 3: Overview of the ascending LOS cumulative displacement over the full AOI.

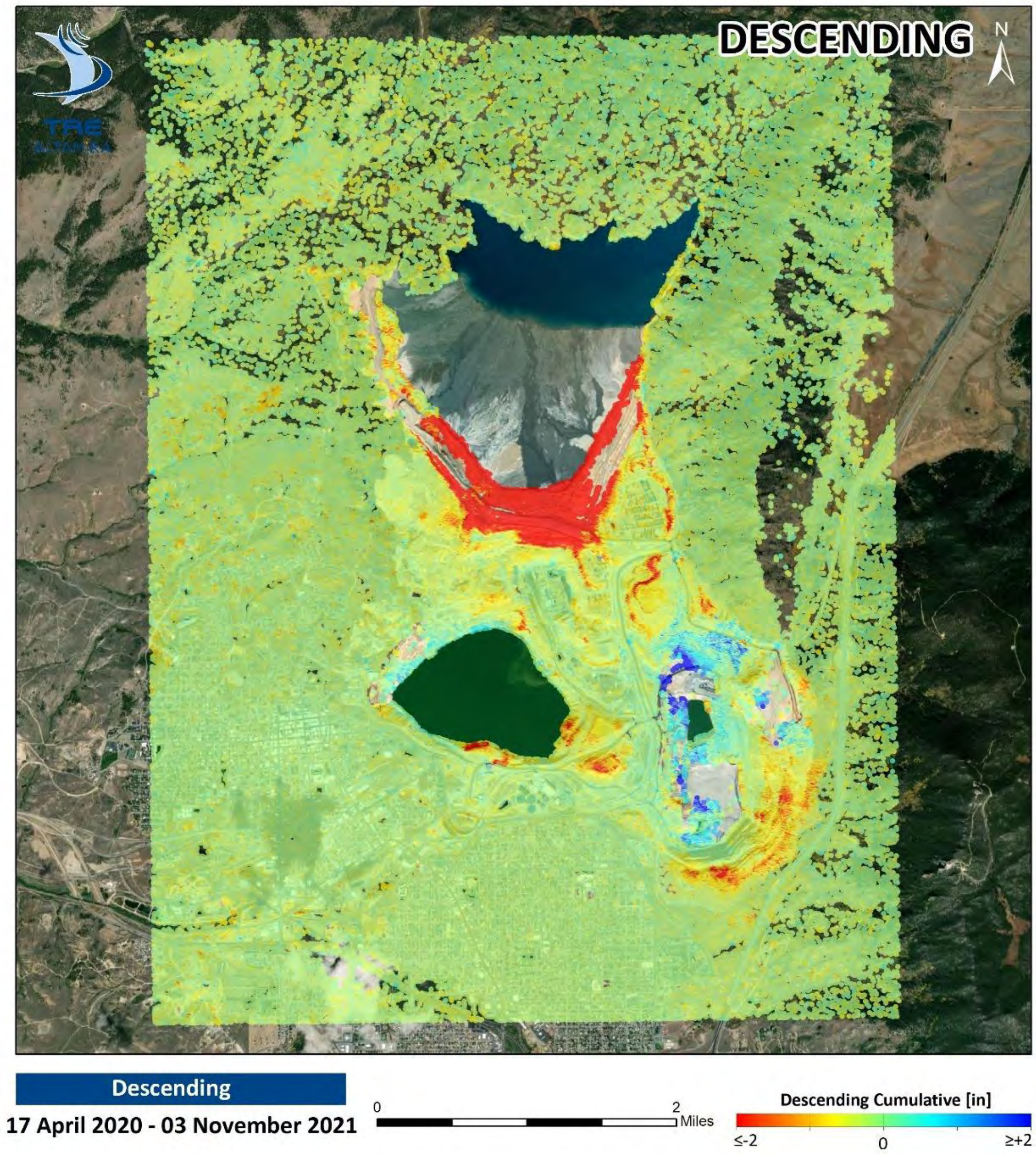


Figure 4: Overview of the descending LOS cumulative displacement over the full AOI.

3.2. 2-D Results

The trigonometric combination of SqueeSAR results obtained from the ascending and descending orbits, over the same area and overlapping period, produces 2-D (vertical and East-West) measurements of ground movement in a gridded format. Since the LOS measurements are identified at different locations and are acquired on different dates, the 2-D analyses are set to a 30 m (98.6 ft) grid where each LOS measurement point is averaged to calculate the vertical and East-West time-series for each grid cell (Figure 5).

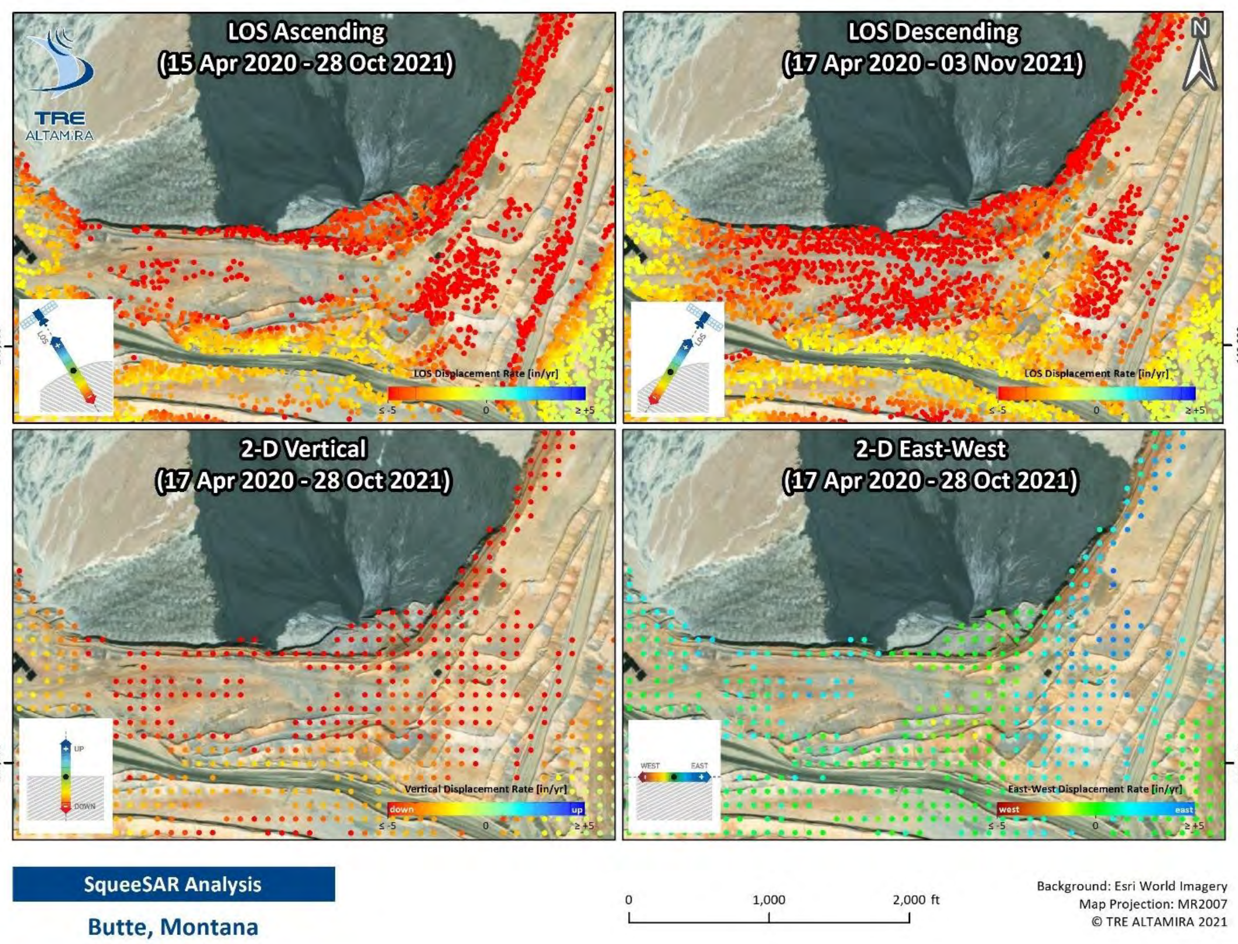


Figure 5: Example of motion decomposition combining ascending and descending acquisitions geometry at the East-West Embankment of the Yankee Doodle Tailings Impoundment.

Average annual displacement rates in a 2-D analysis are calculated from a linear regression of the ground movement measured over the entire period of the analysis and all measurements are relative to a reference point. Each point is color-coded according to the direction and magnitude of movement:

- In the vertical direction, negative values (red) indicate downward movement (i.e. subsidence), while positive values (blue) indicate upward movement (i.e. uplift).
- In the East-West direction, negative values (red) indicate westward motion, while positive values (blue) indicate eastward motion.

The 2-D processing used the temporally overlapping images (i.e. 17 April 2020 to 28 October 2021) and spatially overlapping coverage of the LOS (ascending and descending) data to obtain true vertical and East-West horizontal movements with millimetric precision.

The 2-D analysis provided a density of 1,628 MPs/mi^2. The precision of the measurements, as indicated by the average standard deviation values, is ±0.03 in/yr (Table 3).

Table 3: Properties of the April 2020 – October 2021 2-D analysis.

Attribute	Vertical / East-West
Date Range	17 April 2020 – 28 October 2021
N. of Images	76
Total Measurement Points	53,019
Average Point Density (pts/mi^2)	1,628
Average Displacement Rate Standard Deviation (in/yr)	±0.03
Reference Point Location (m)	5,114,495.23 E -12,515,358.89 N

Figure 6 shows the cumulative vertical displacement while Figure 7 shows the cumulative horizontal (East-West) displacement over the full AOI that occurred during the processed analysis period.

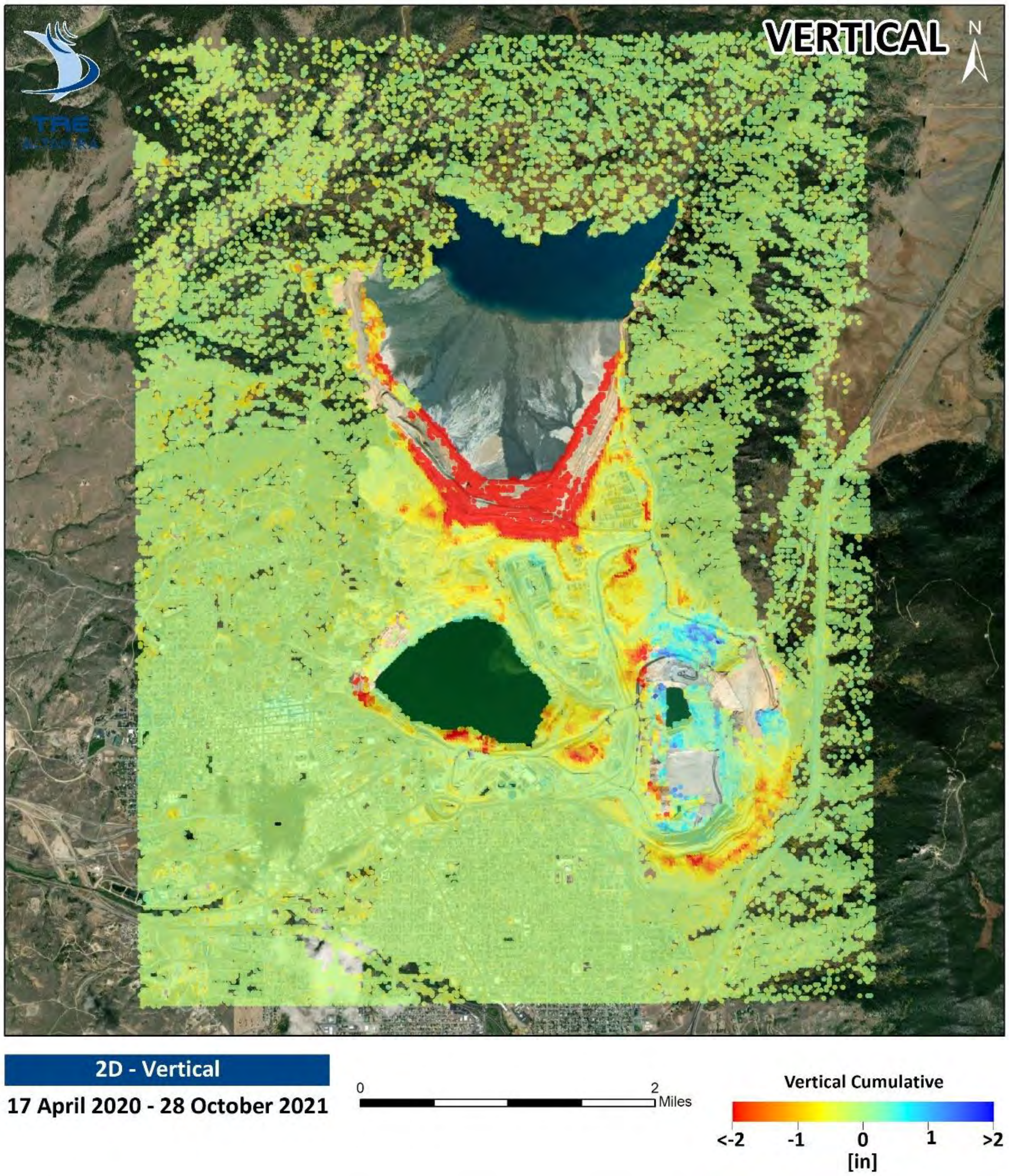


Figure 6: Overview of the cumulative vertical displacement over the full AOI.

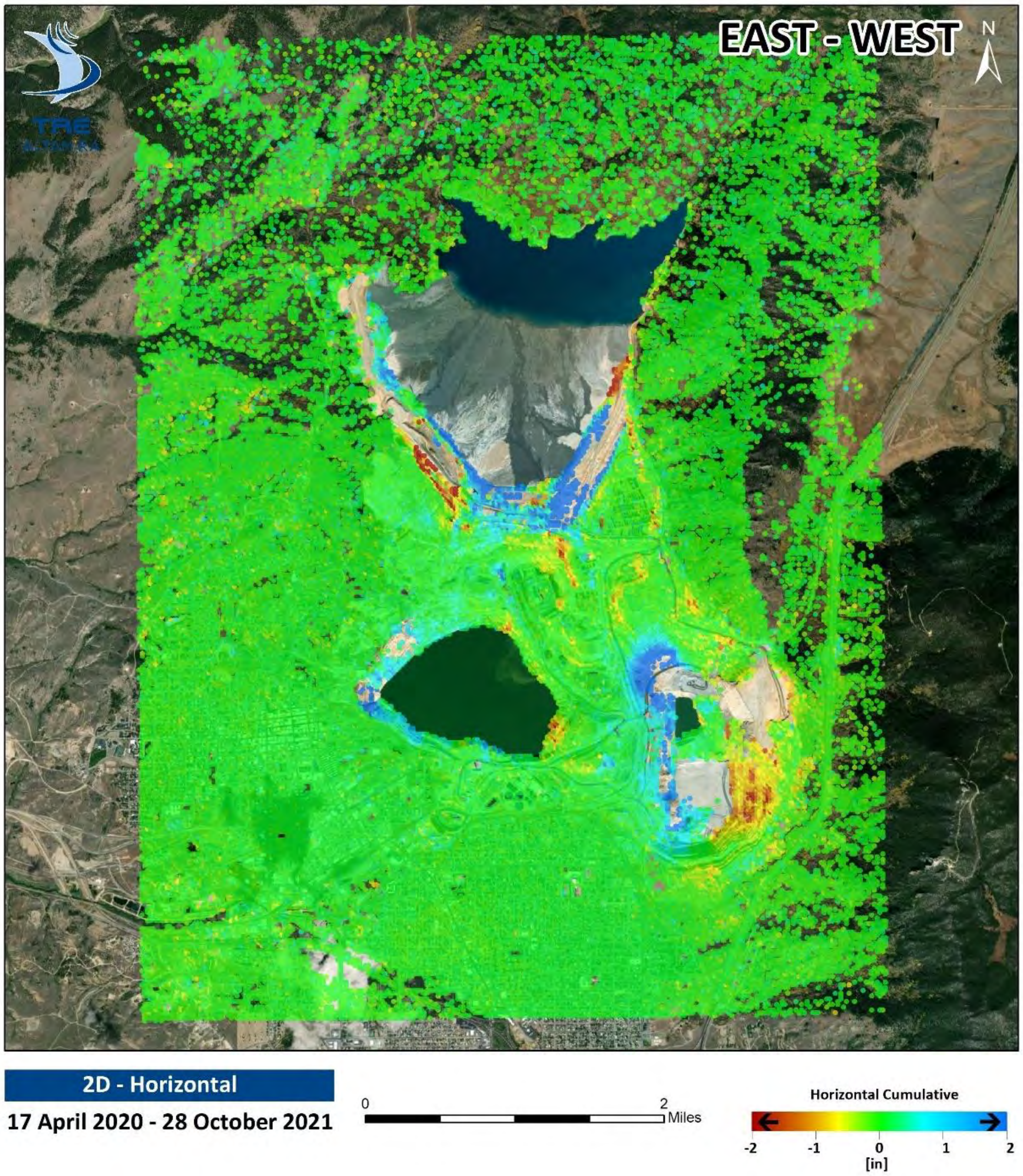


Figure 7: Overview of the cumulative East-West displacement over the full AOI.

4. Analysis

4.1. Yankee Doodle Tailings Impoundment

The analysis of the YDTI is separated into two parts as requested by Knight Piesold Ltd:

(i) Time series plot of the cumulative vertical deformation profiles along strategic sections (i.e. Section 0+00, Section 8+00W, and Seep 10 Bench).

(ii) Time series plot of the average vertical displacement rate for InSAR points corresponding with Knight Piesold's construction monitoring survey-monuments.

Figure 8 and Figure 9 show the Yankee Doodle Tailings Impoundment average vertical displacement rate and cumulative vertical deformation plan views.

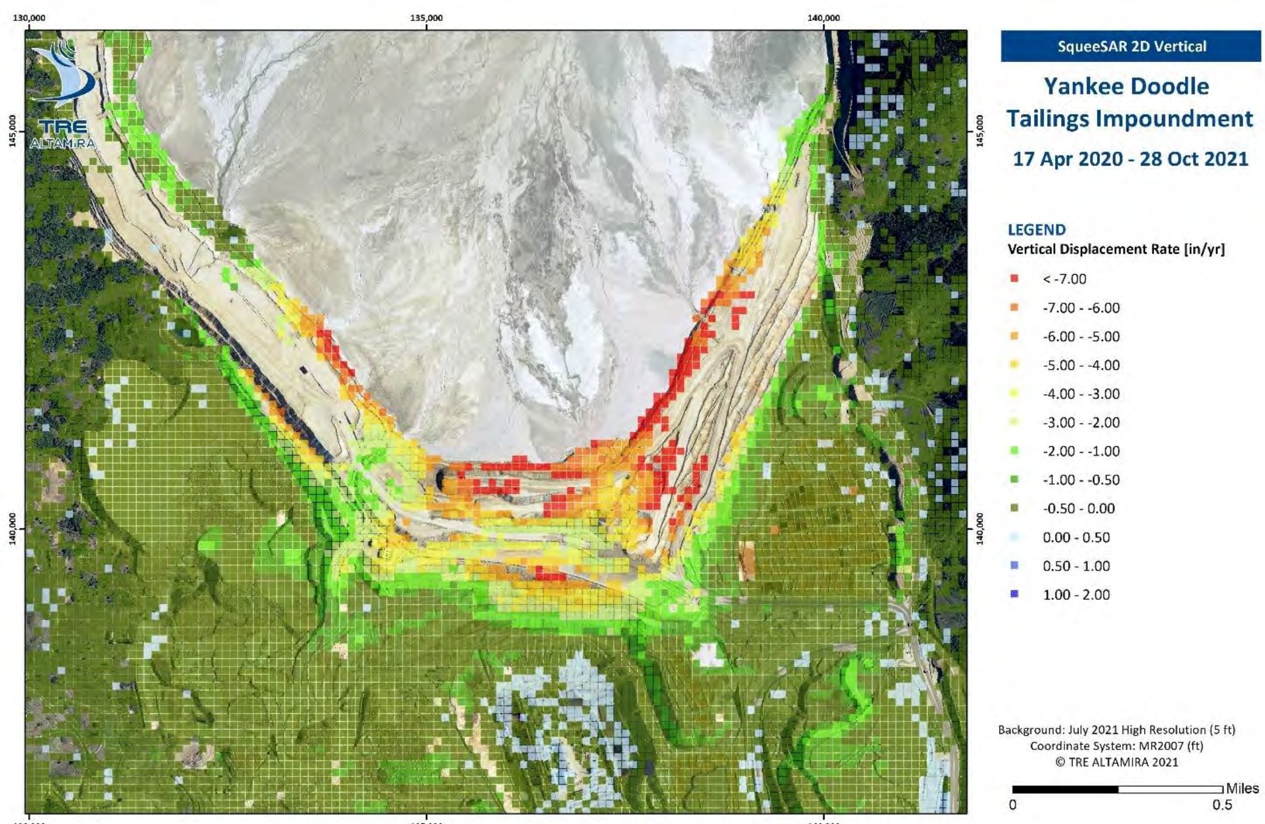


Figure 8: Yankee Doodle Tailings Impoundment average vertical displacement rate plan view.

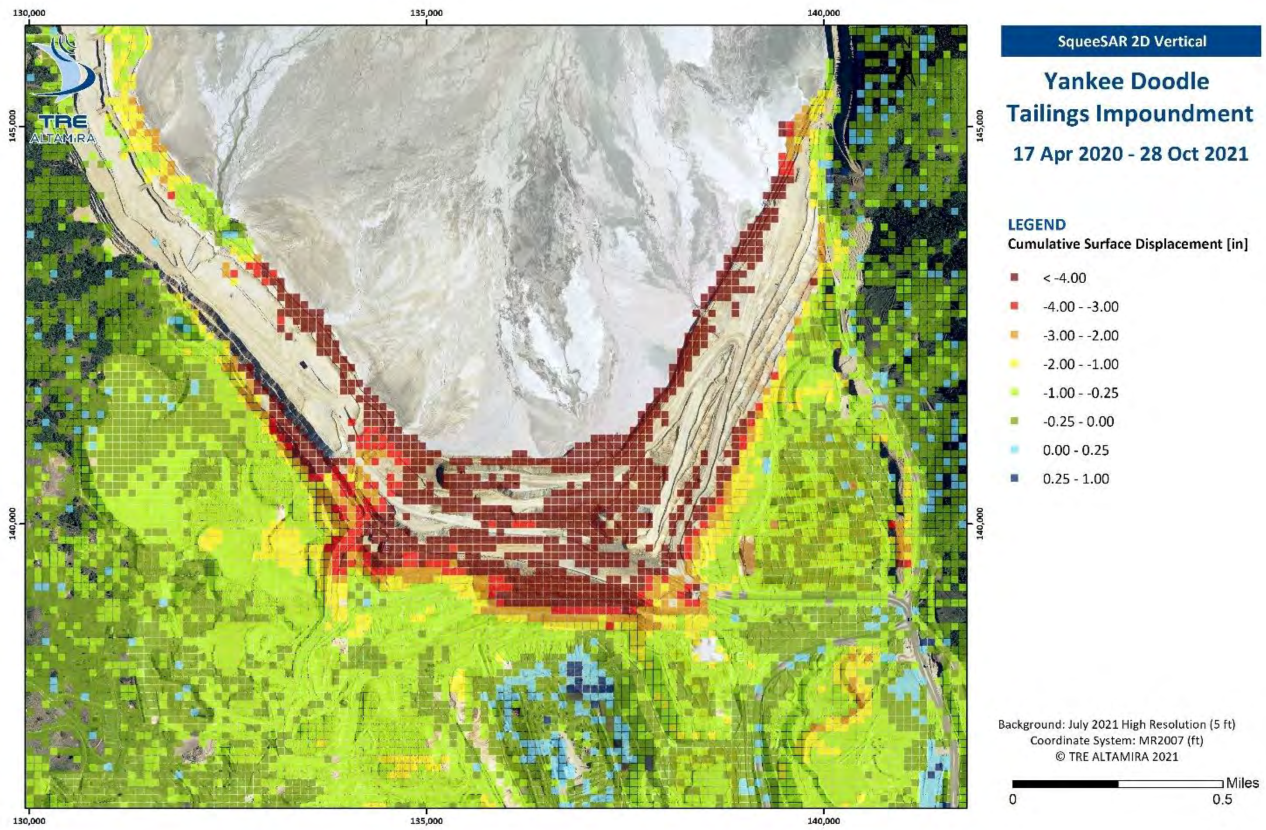


Figure 9: Yankee Doodle Tailings Impoundment cumulative vertical deformation plan view.

4.1.1. Time Series Analysis

Time series plot of the average vertical displacement rate for InSAR points corresponding with Knight Piesold's construction monitoring survey-monuments are in Figure 10. A circular buffer around each survey location (200 ft radius) was used to average the vertical displacements. Time series plots are shown in Figure 11 – Figure 15. The US-02 monitoring survey-monument shows the most vertical motion (6.47 in/yr) followed by the DS-02 (6.01 in/yr), US-03 (4.96 in/yr), and DS-03 (4.53 in/yr). These time series all show a recent acceleration, starting in September 2021 for DS-02 and DS-03 and October 2021 for US-02 and US-03. The SB monitoring survey-monument showing the least vertical motion (<0.5 in/yr).

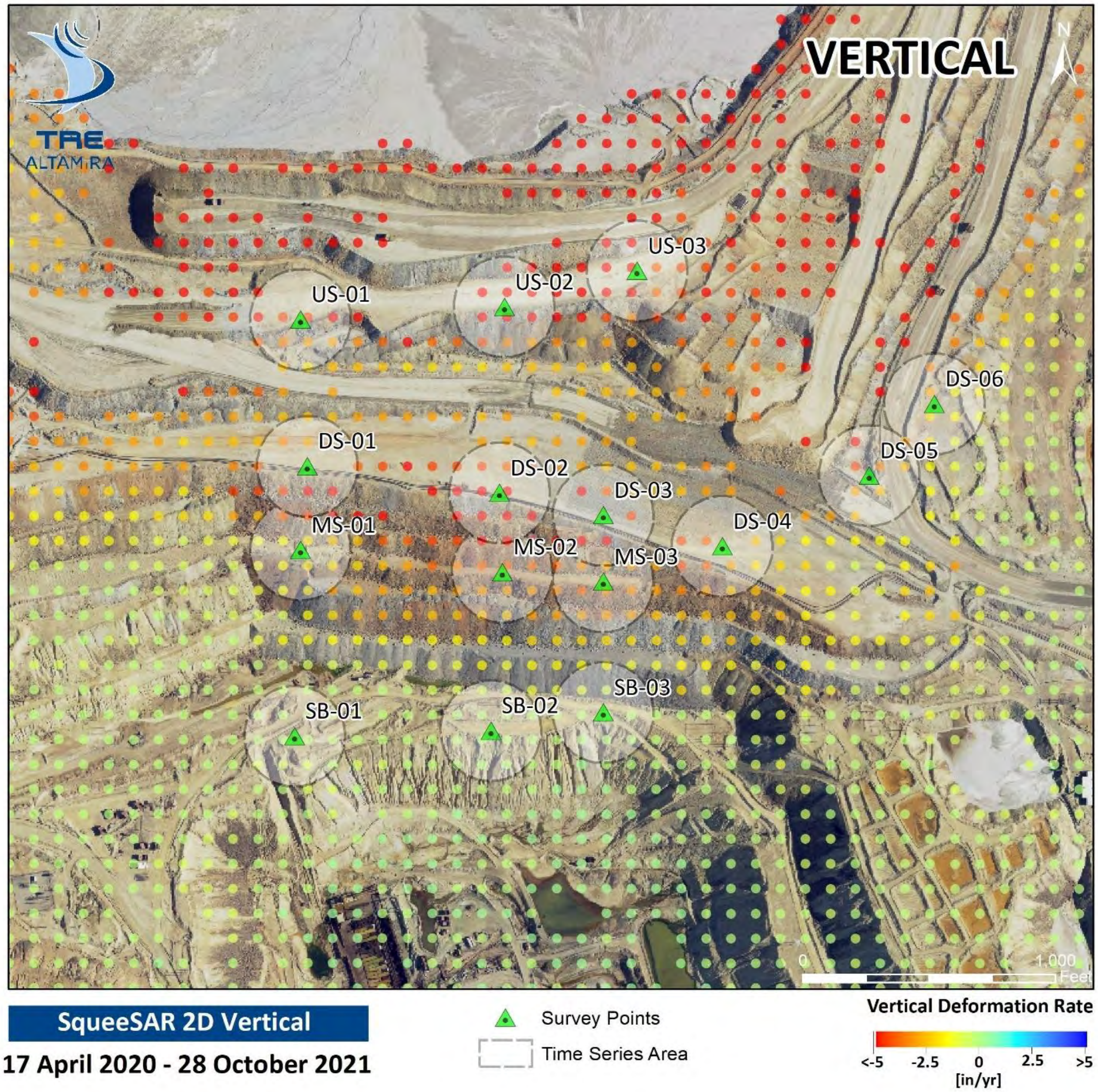
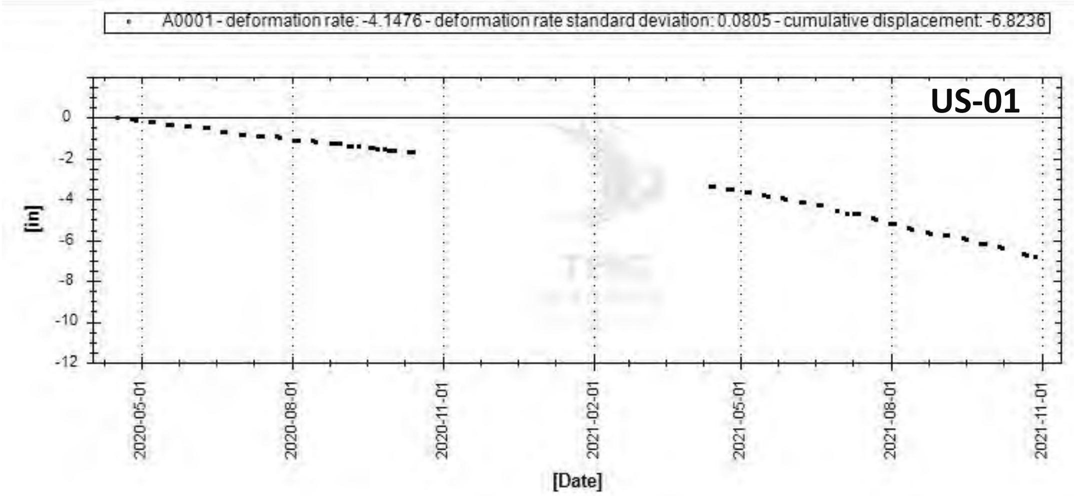
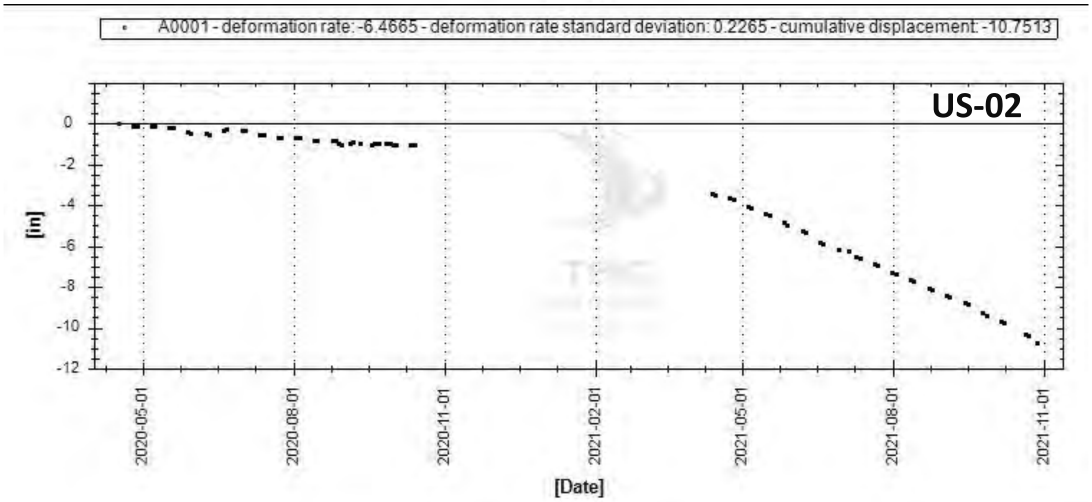


Figure 10: Survey point and time series polygon locations over the YDTI overlaid to the vertical displacement dataset.





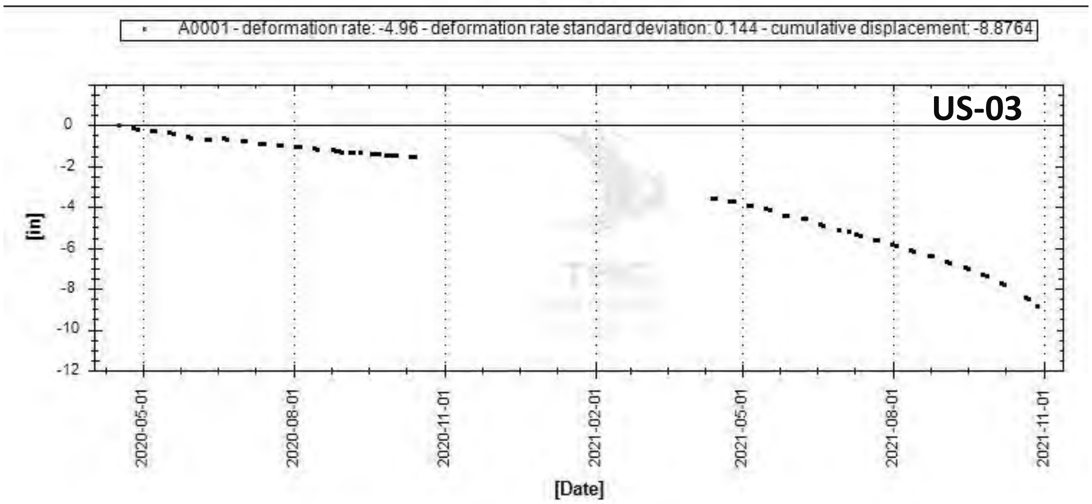
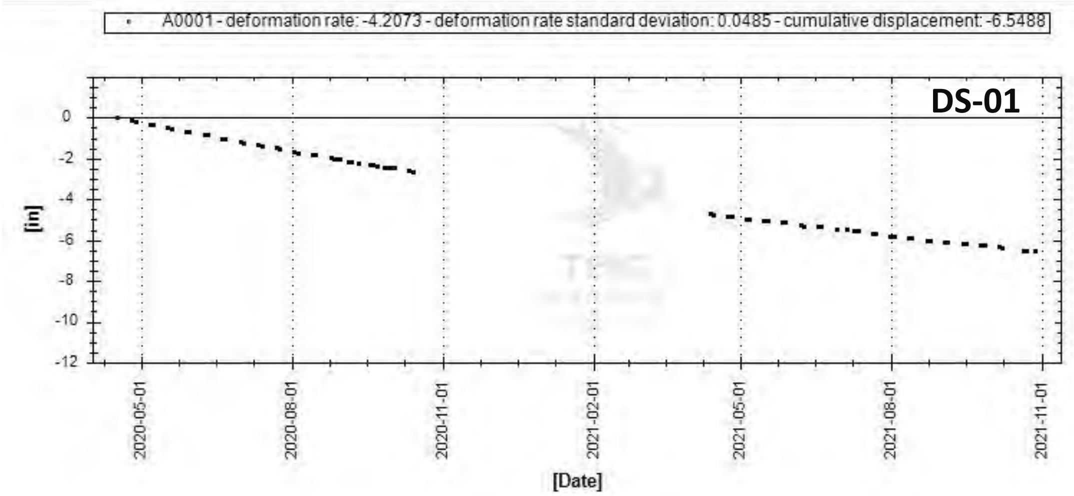
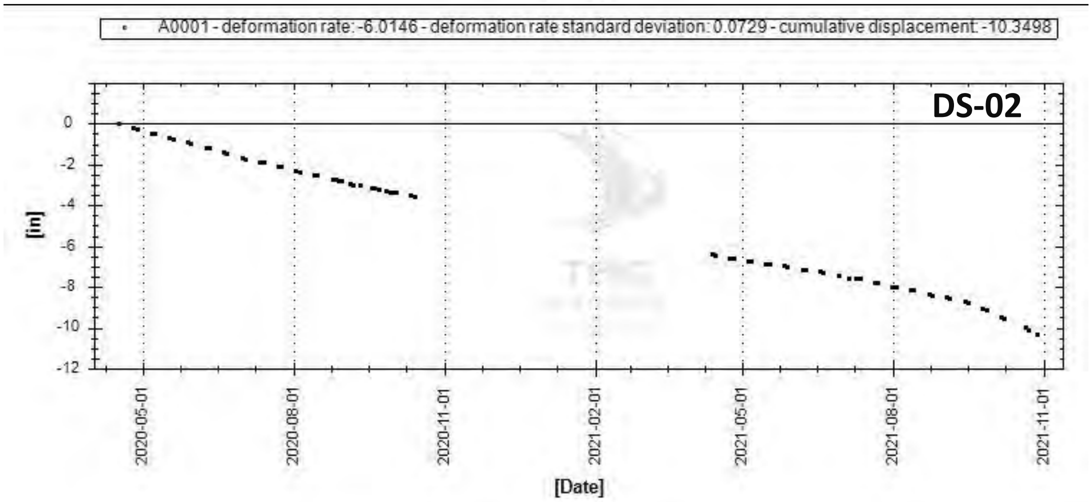


Figure 11: Average time series the US-01 (top), US-02 (middle), and US-03 (bottom) survey point.





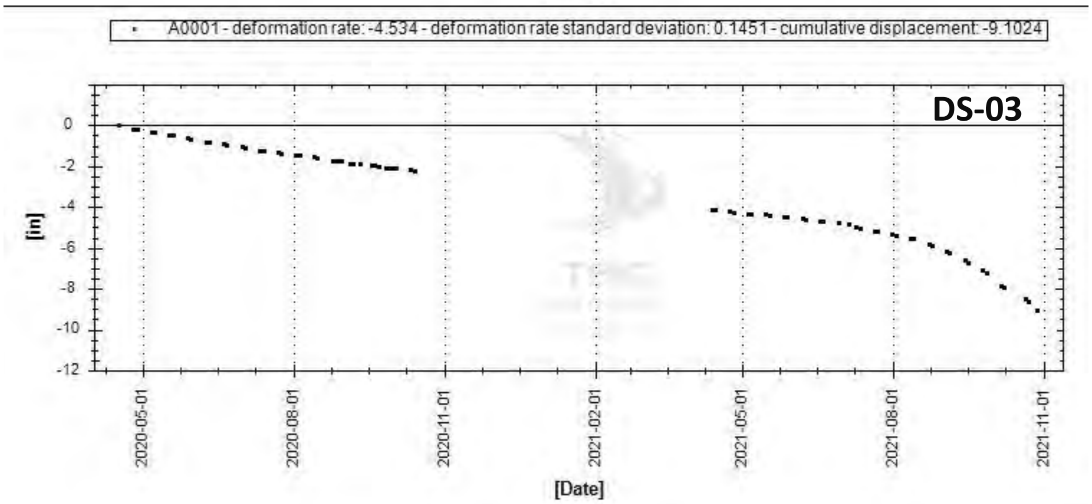


Figure 12: Average time series the DS-01 (top), DS-02 (middle), and DS-03 (bottom) survey point.

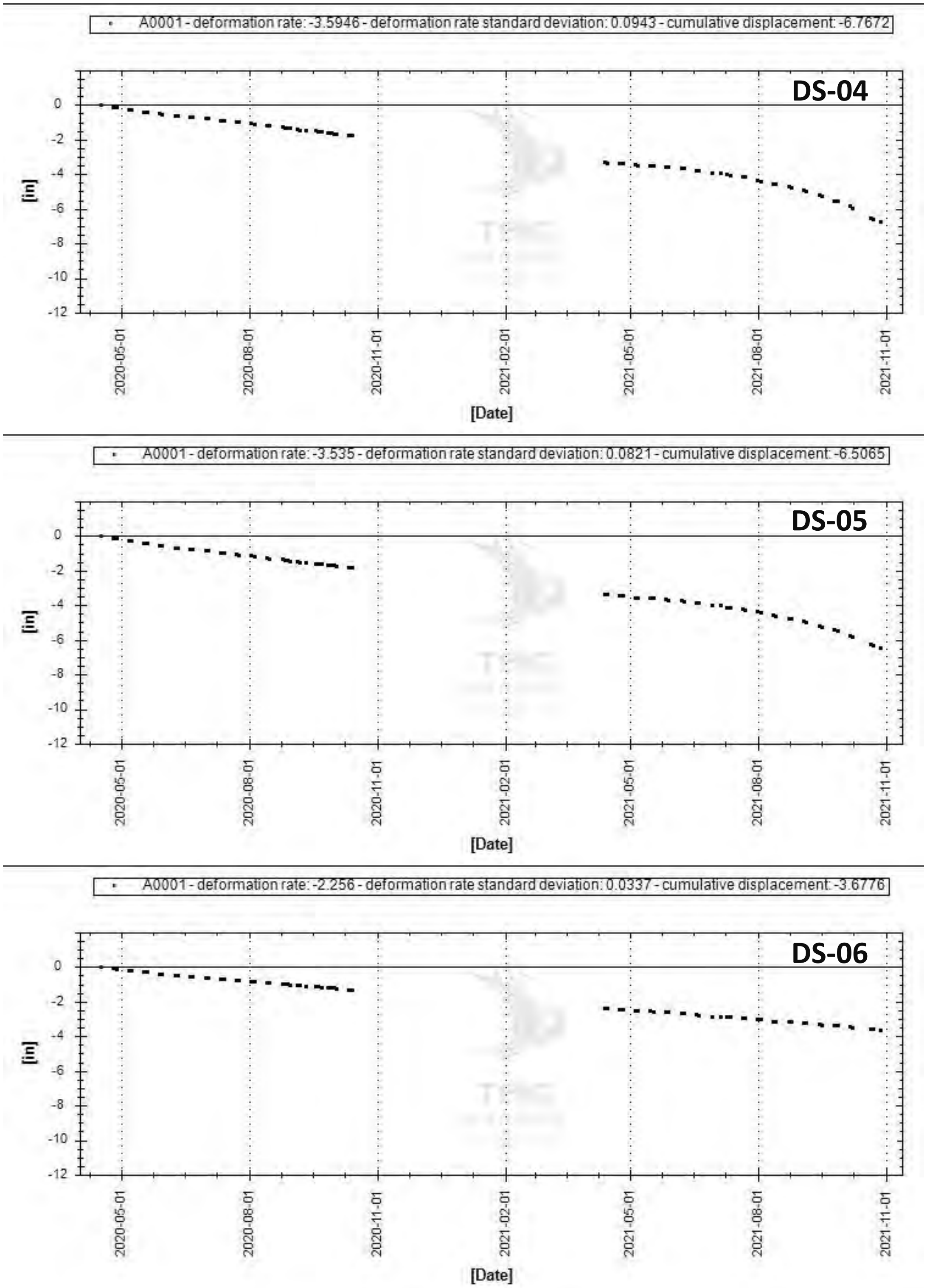


Figure 13: Average time series the DS-04 (top), DS-05 (middle), and DS-06 (bottom) survey point.

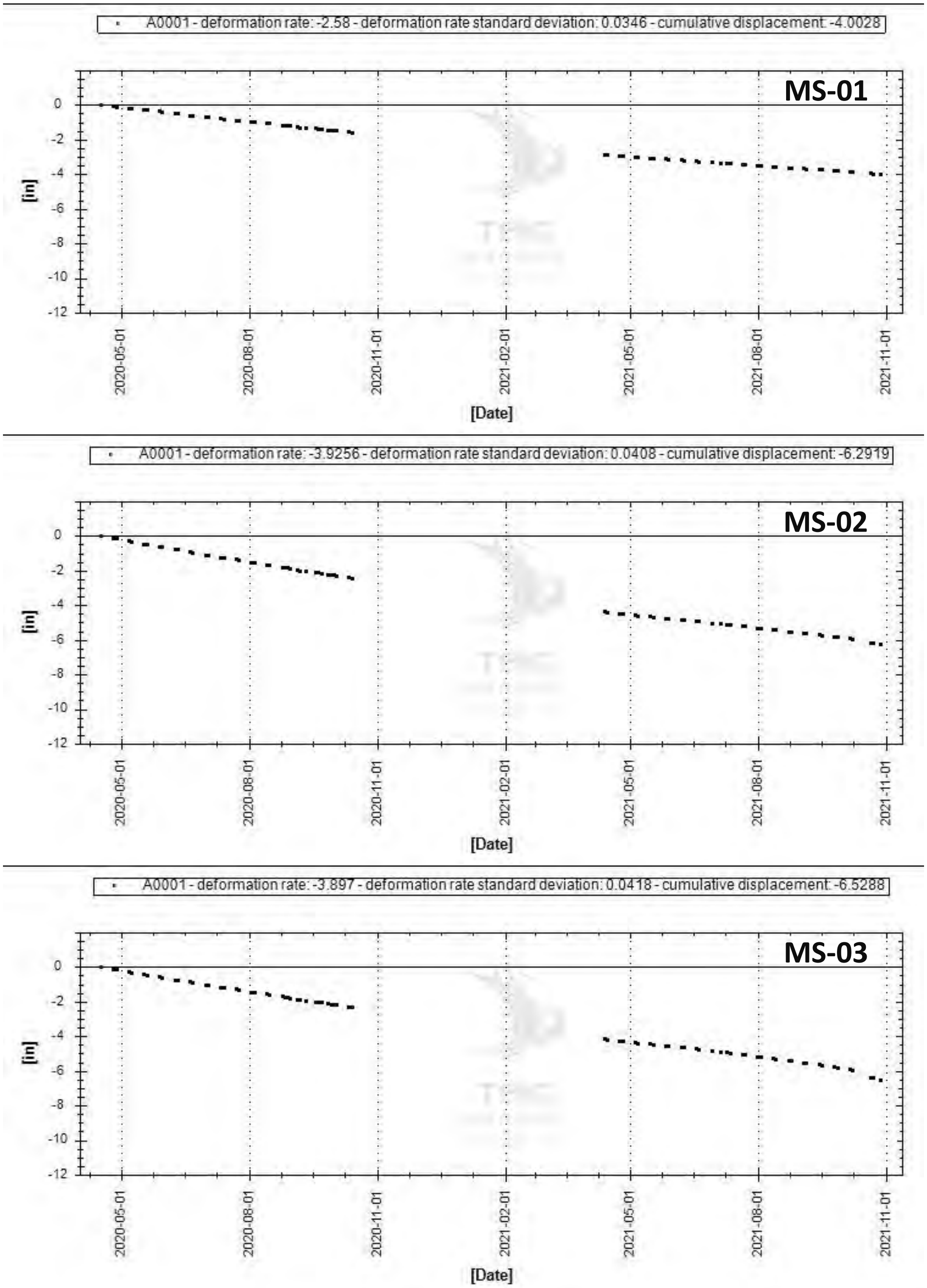


Figure 14: Average time series the MS-01 (top), MS-02 (middle), and MS-03 (bottom) survey point.

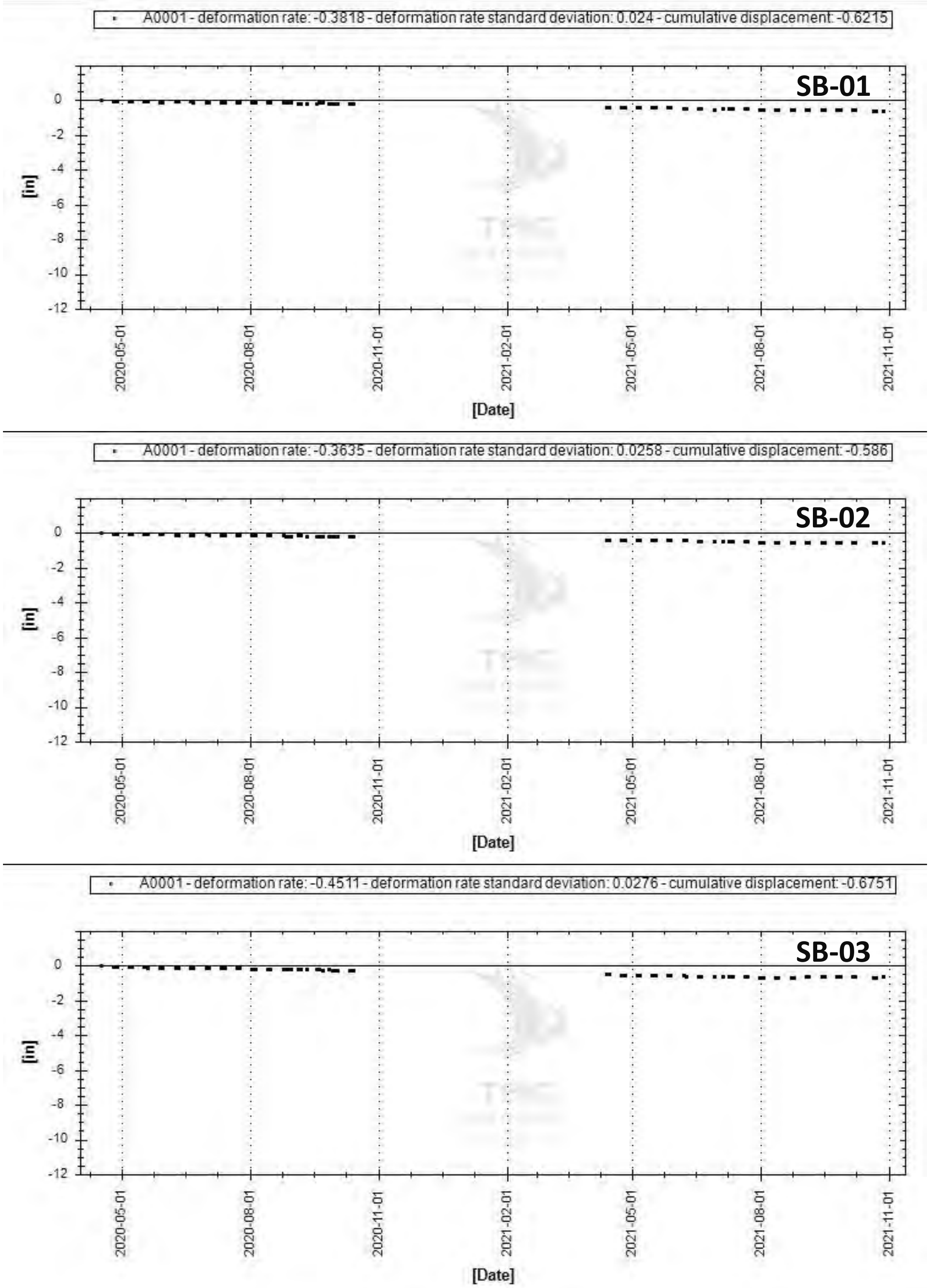


Figure 15: Average time series the SB-01 (top), SB-02 (middle), and SB-03 (bottom) survey point.

4.1.2. Cross-Section Analysis

Three cross-sections were created over key features of the YDTI (i.e. 8+00 W, 0+00, Seep 10 Bench) using the 2-D vertical dataset (Figure 16). The cross-section profiles were produced averaging all measurement points identified within 250 ft of the cross-section line, meaning that all measurement points within a 500 ft buffer were used to produce the profiles.

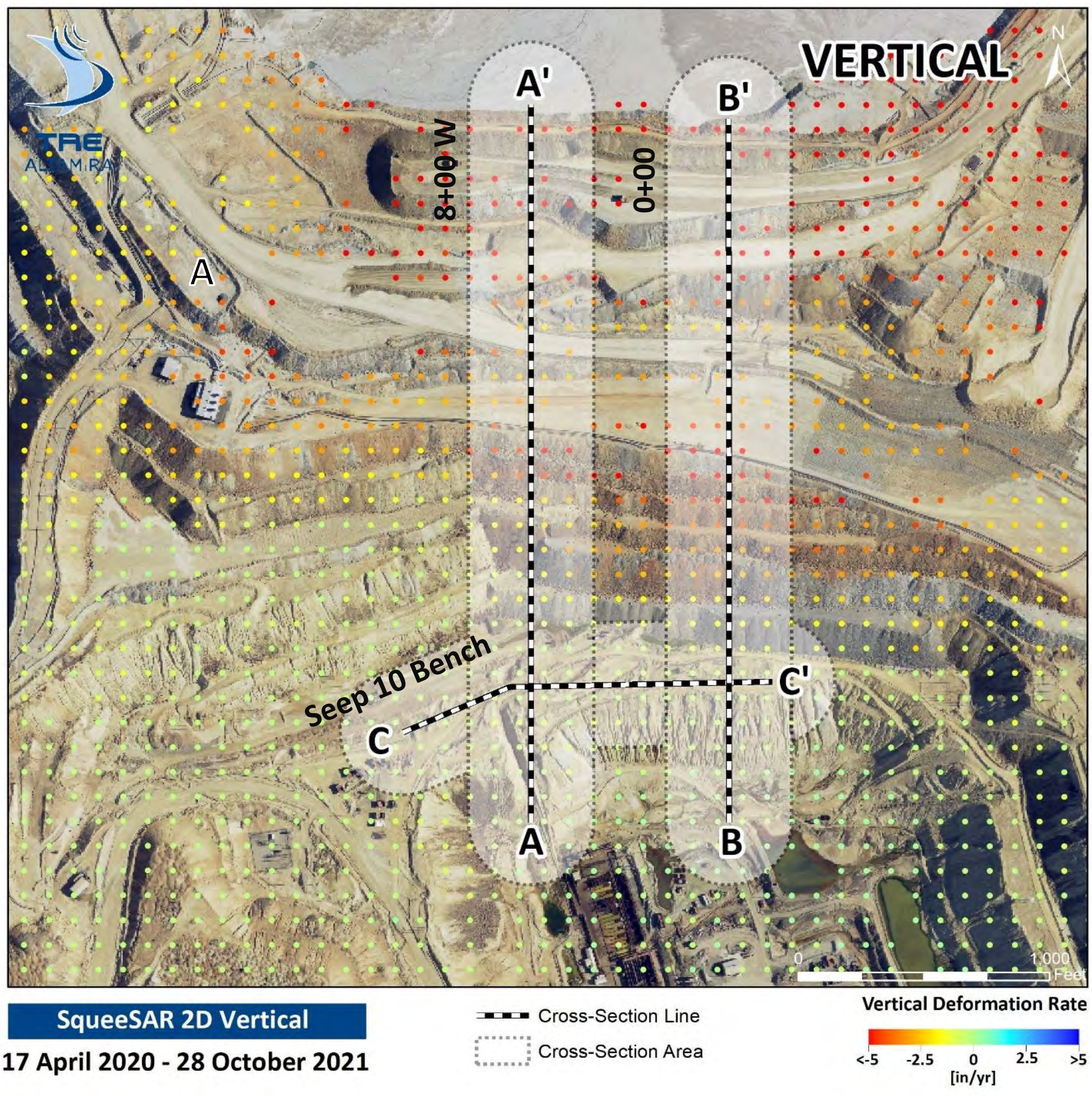


Figure 16: Cross-section locations over the YDTI using the vertical displacement dataset.

In the cross-section graphs (Figure 17 - Figure 19), vertical motion is represented by progressively darker blue lines with most recent image (i.e. October 28th, 2021) in red. The wide gap between profiles is representative of the winter season (i.e. no images in the data set).

Findings in the cross-section results include:

- A-A' (Sec 8+00 W): Vertical motion reaches up to -13 inches at the 2,550-2,700 ft mark.
- B-B' (Sec 0+00): Vertical motion of up over -12 inches of settlement at the 2,400-2,700 ft mark.
- C-C' (Seep 10 Bench): Settlement of up to -1 inch at the 1,350-1,500 ft mark.

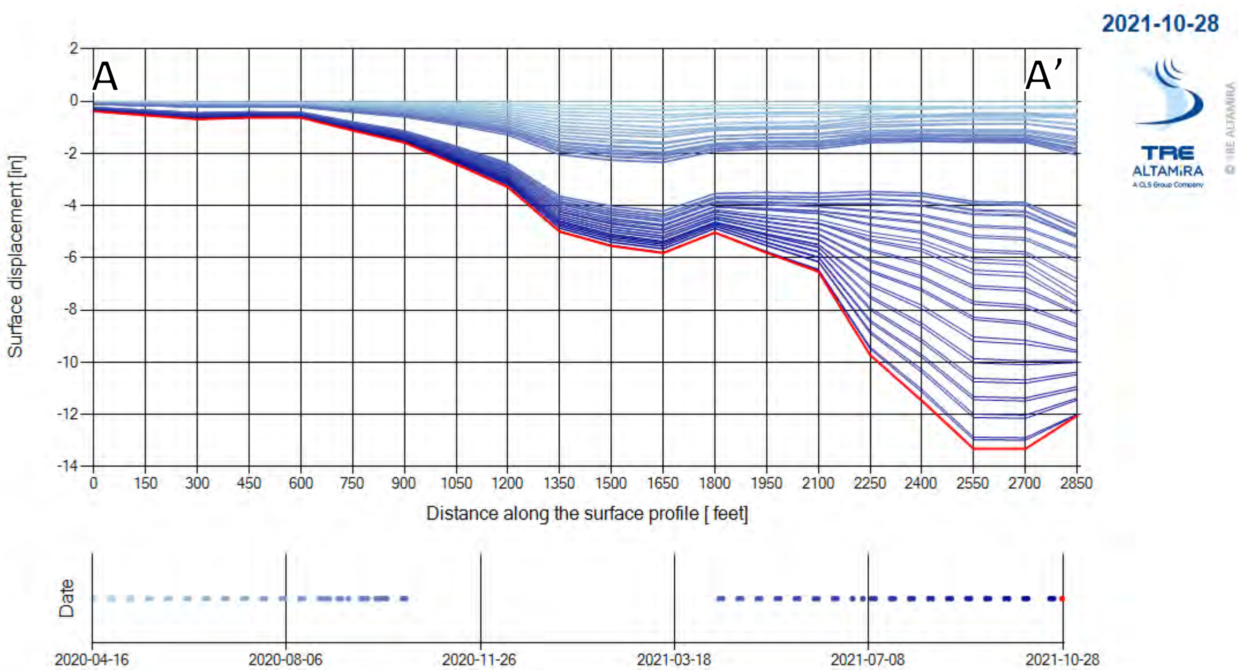


Figure 17: Evolution of the surface profile over the A-A' cross-section (Sec 8+00 W).

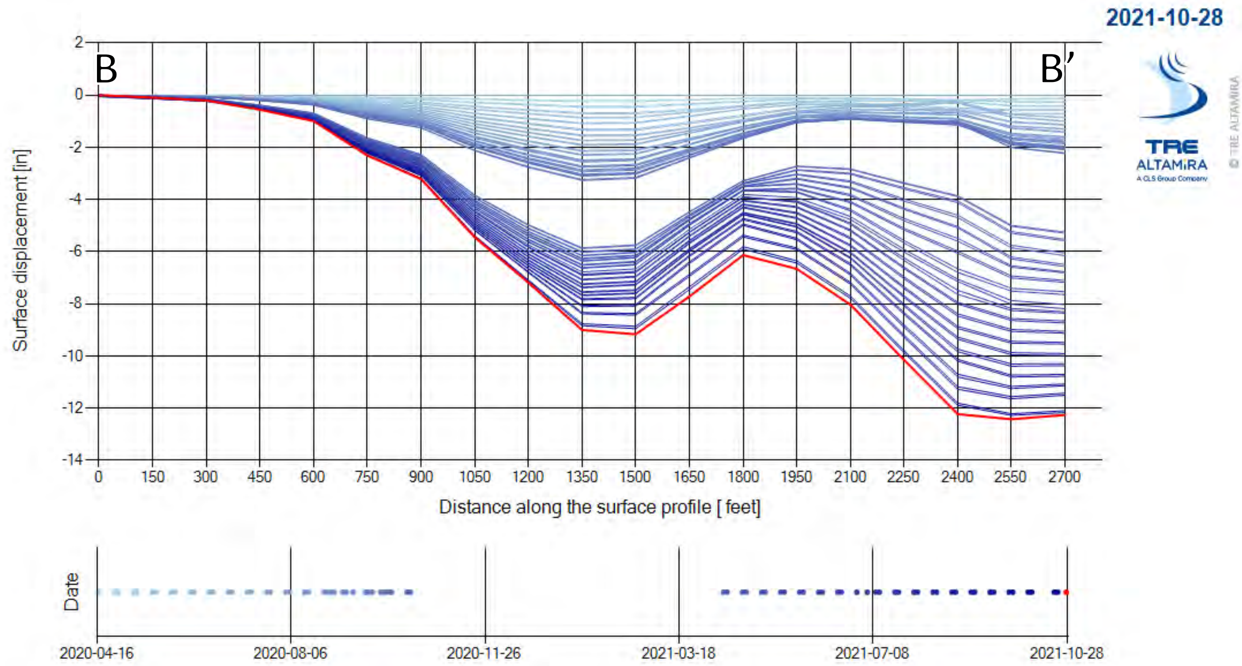


Figure 18: Evolution of the surface profile over the B-B' cross-section (Sec 0+00).

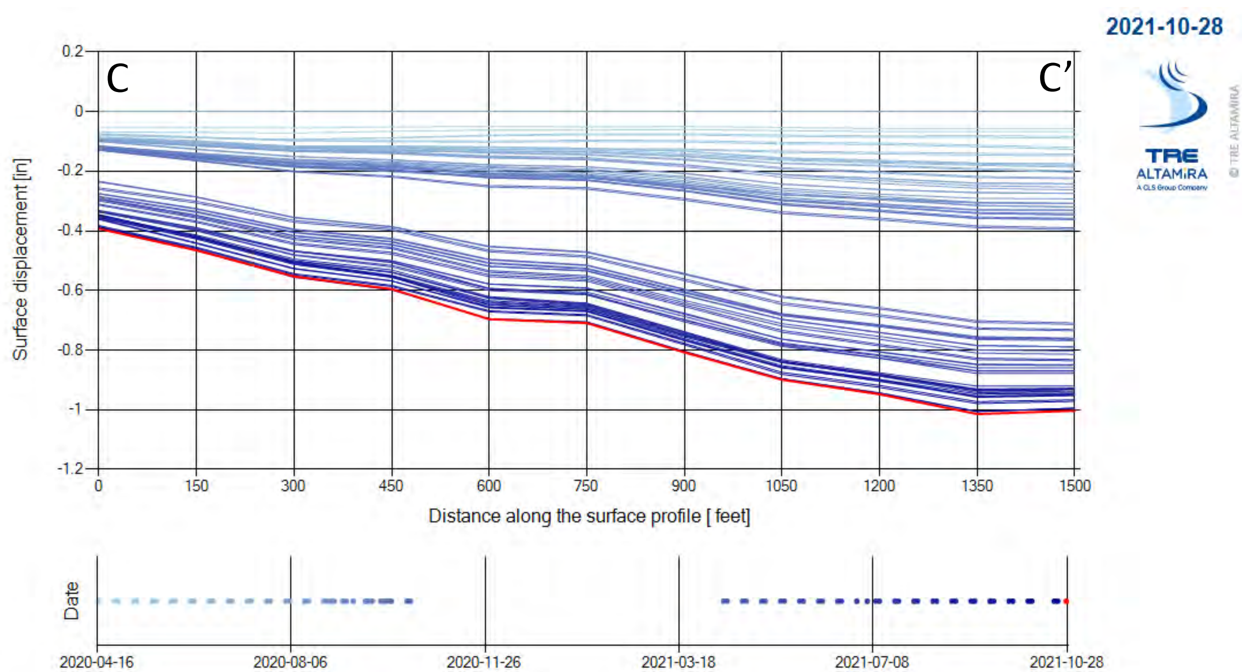


Figure 19: Evolution of the surface profile over the C-C' cross-section (Seep 10 Bench). Note the different Y axis value range.

4.1.3. Section 8+00 W

The analysis of six time series along Section 8+00 W indicated that the highest displacement rates were observed within the rockfill surcharge (Figure 20). Vertical displacement ranged from -7.27 in/yr within the rockfill surcharge upstream of the embankment to -0.05 in/yr at the toe of the embankment. Horizontal displacement ranged from -0.14 in/yr towards the west at SEC8W-5 (Figure 22) to 1.73 in/yr towards the east at SEC8W-2 (Figure 21). Time series plots are shown in Figure 21 and Figure 22.

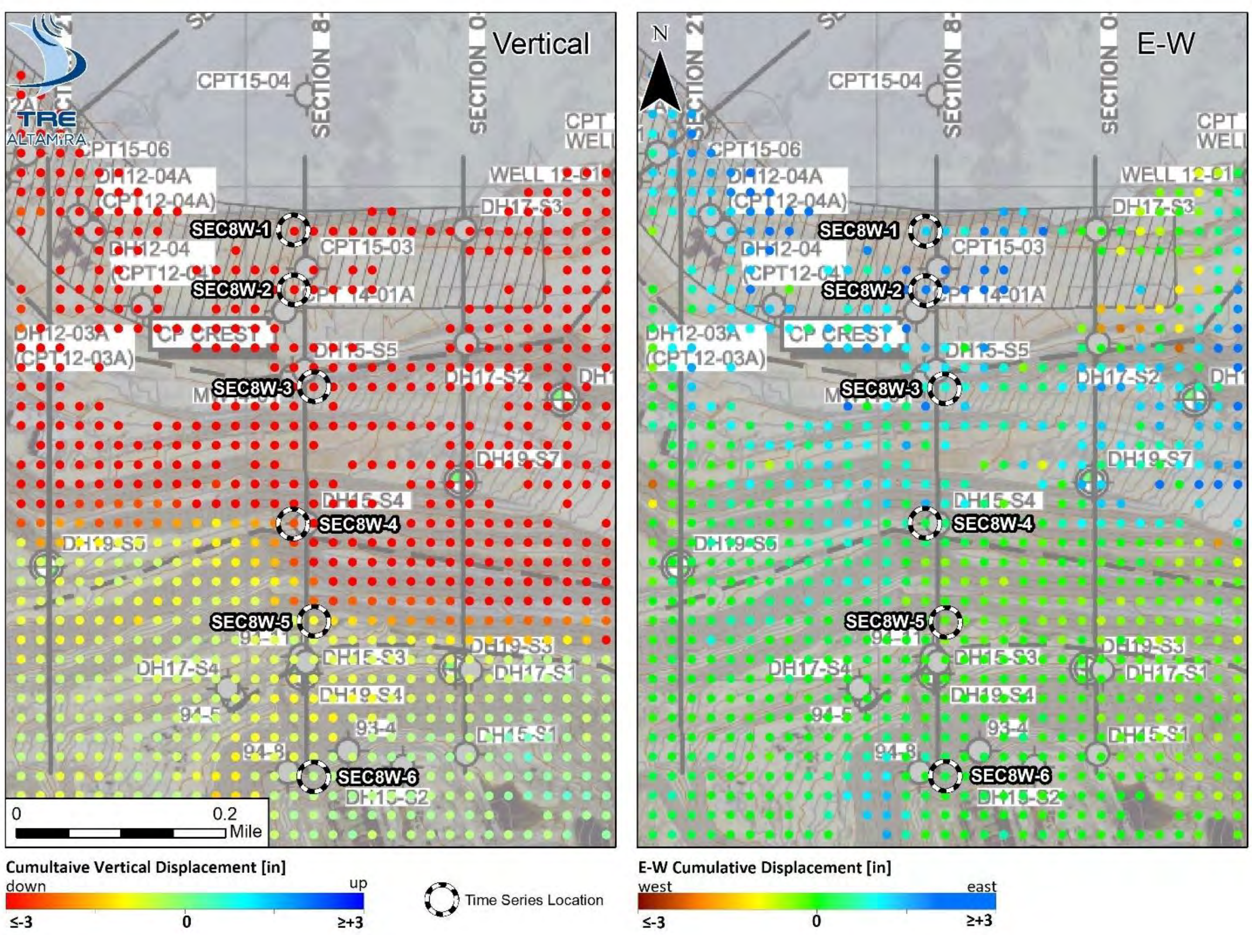


Figure 20: Location of TS analyzed along the Sec 8+00 W transect. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.

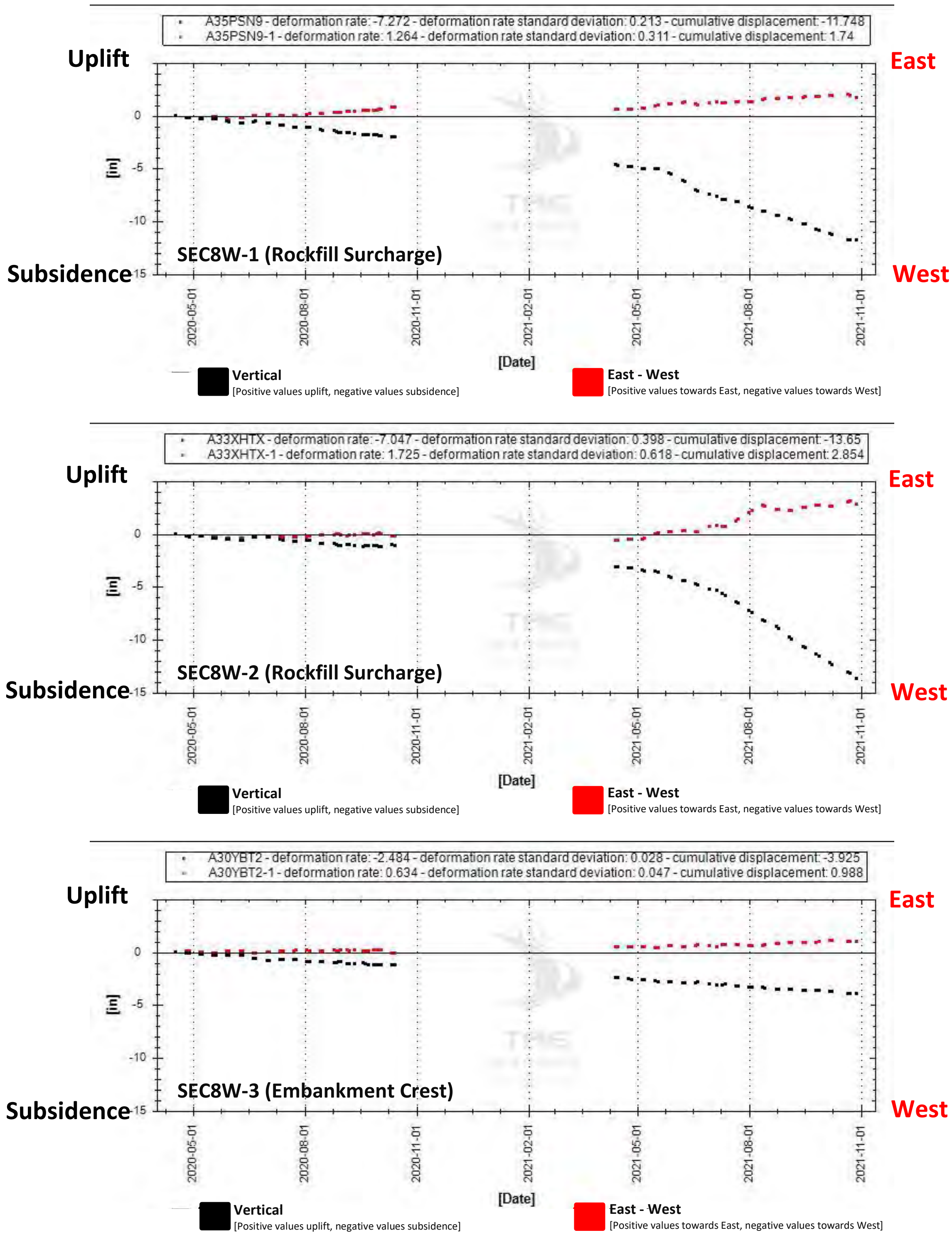


Figure 21: SEC8W-1 – SEC8W-3 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.

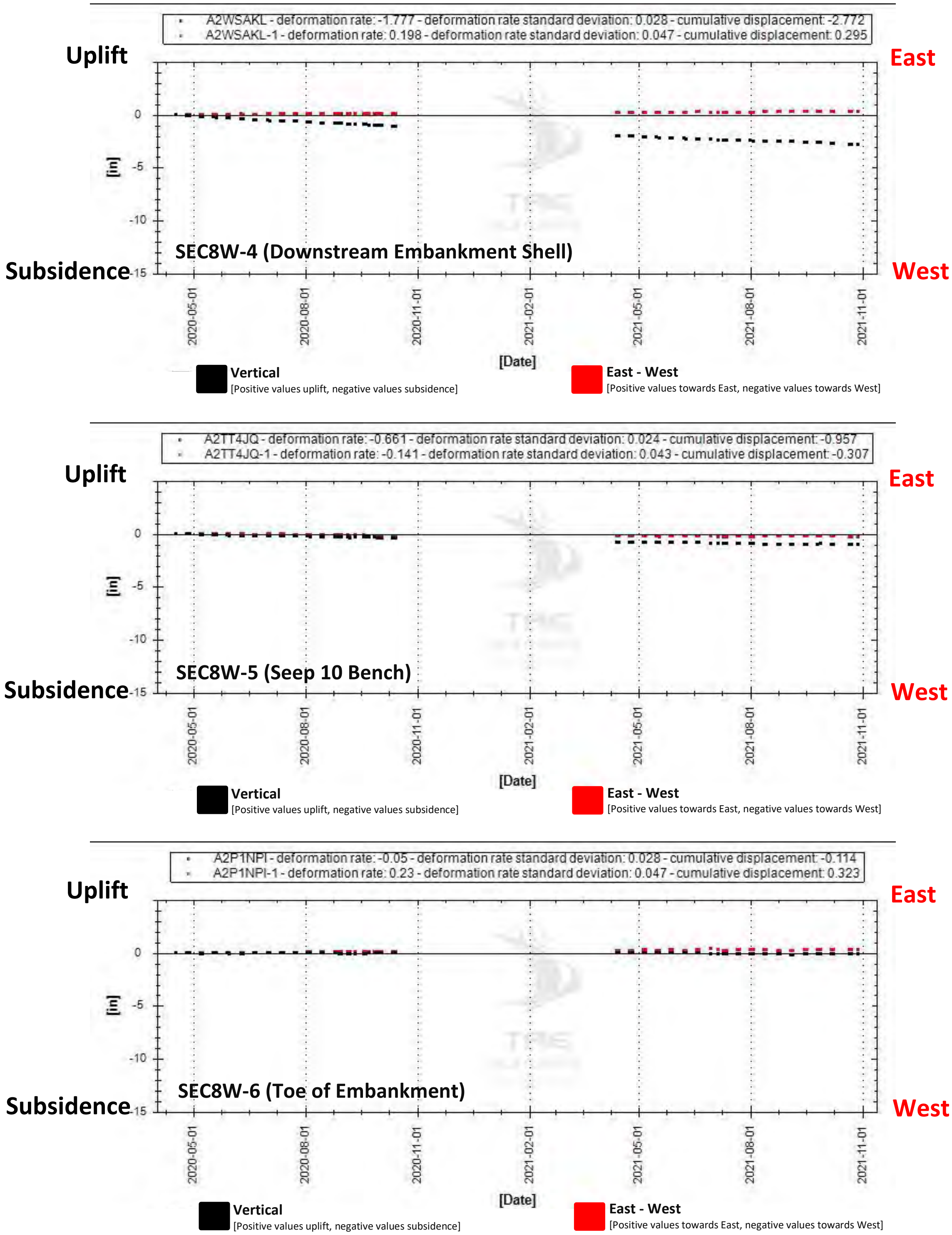


Figure 22: SEC8W-4 – SEC8W-6 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.

4.1.4. Section 0+00

Eight time series were used to analyze displacement along Section 0+00 (Figure 23). Vertical displacement ranged from -8.12 in/yr at SEC0-2 within the rockfill surcharge (Figure 24) to -1.49 in/yr at SEC0-8 at the toe of the embankment (Figure 26). Horizontal displacement ranged from -0.90 in/yr towards the west at SEC0-2 (Figure 26) to 0.90 in/yr towards the east at SEC8W-3 (Figure 24). Time series plots are shown in Figure 24 - Figure 26.

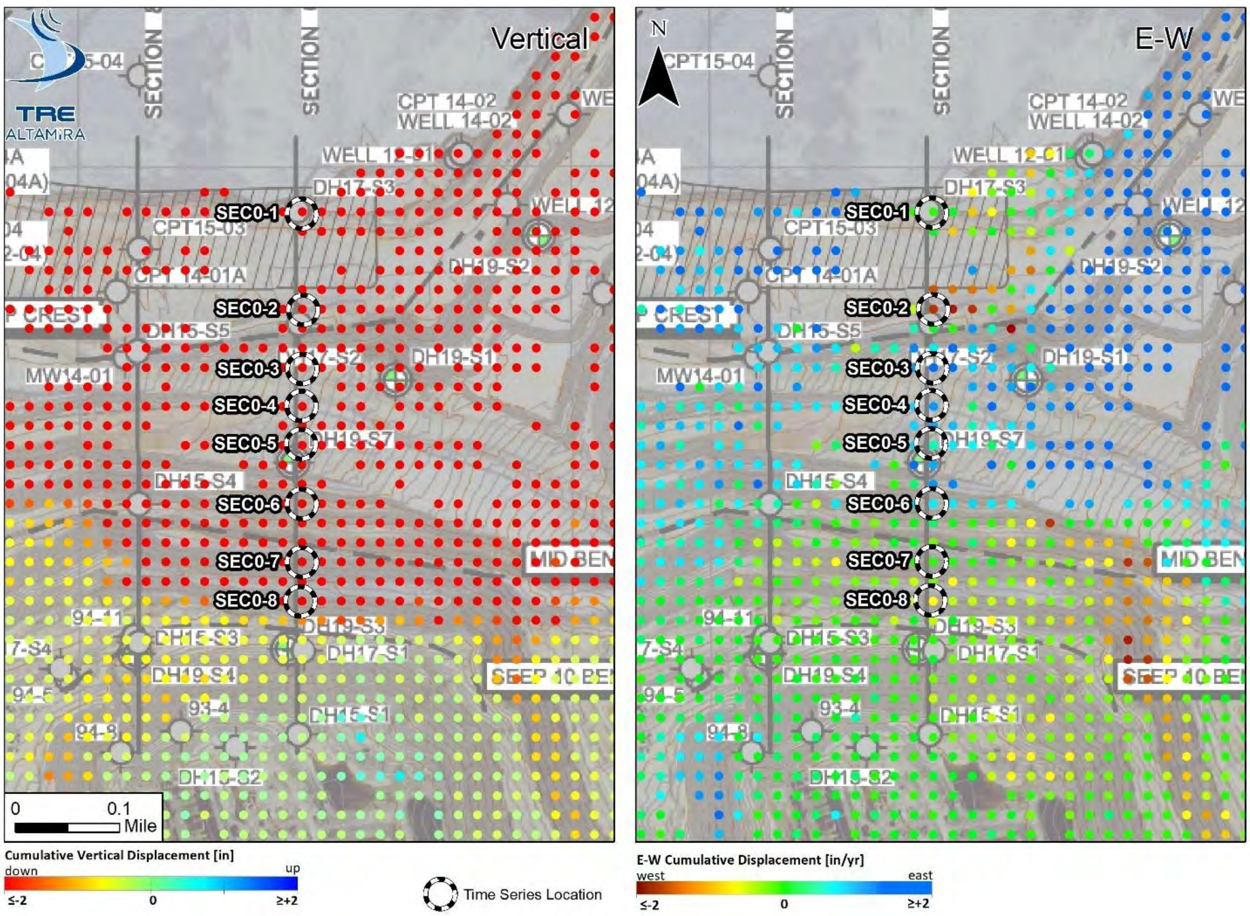
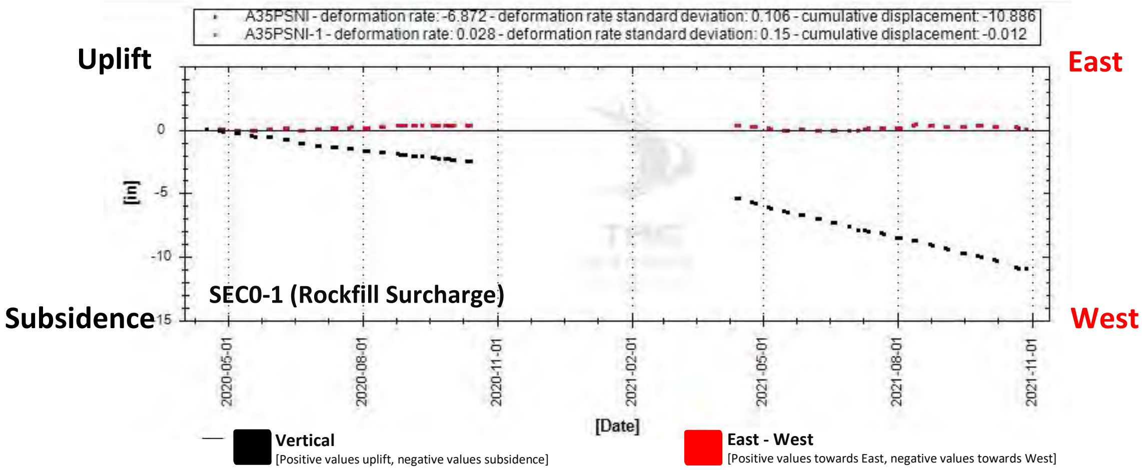
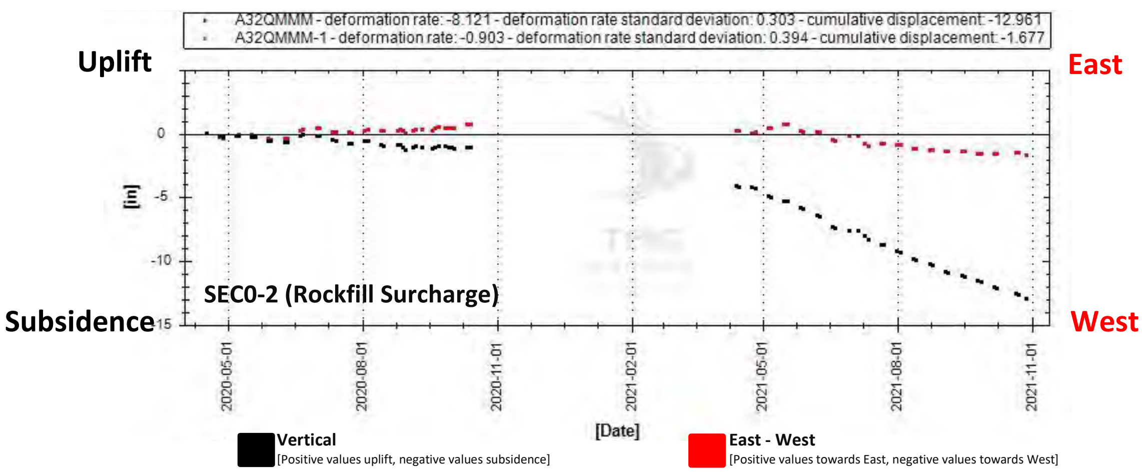


Figure 23: Location of TS analyzed along the Sec 0+00 transect. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.





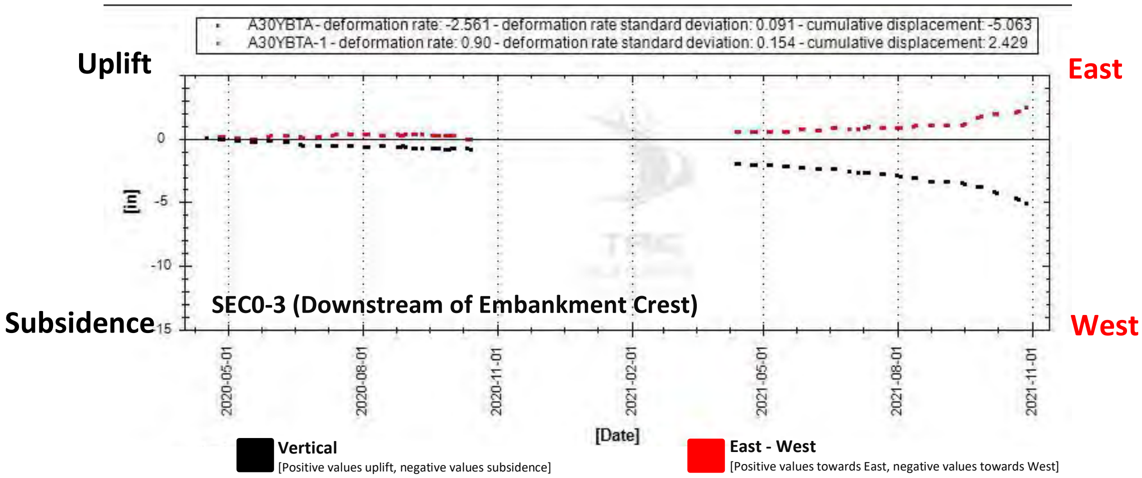
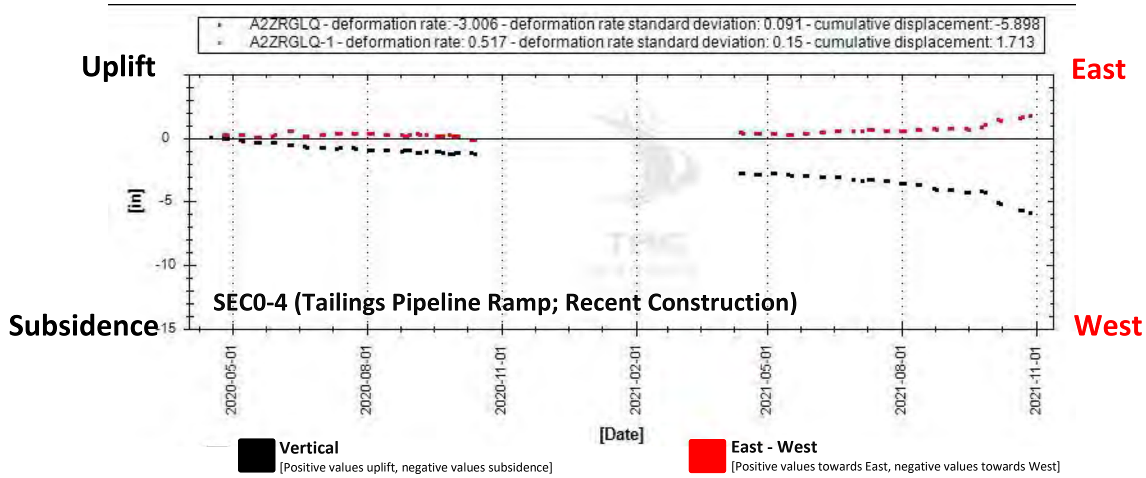
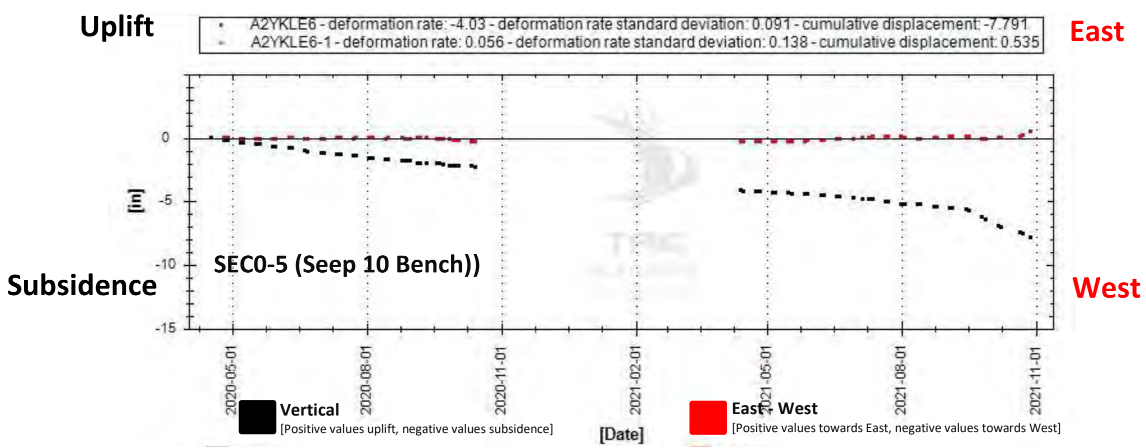


Figure 24: SEC0-1 – SEC0-3 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.





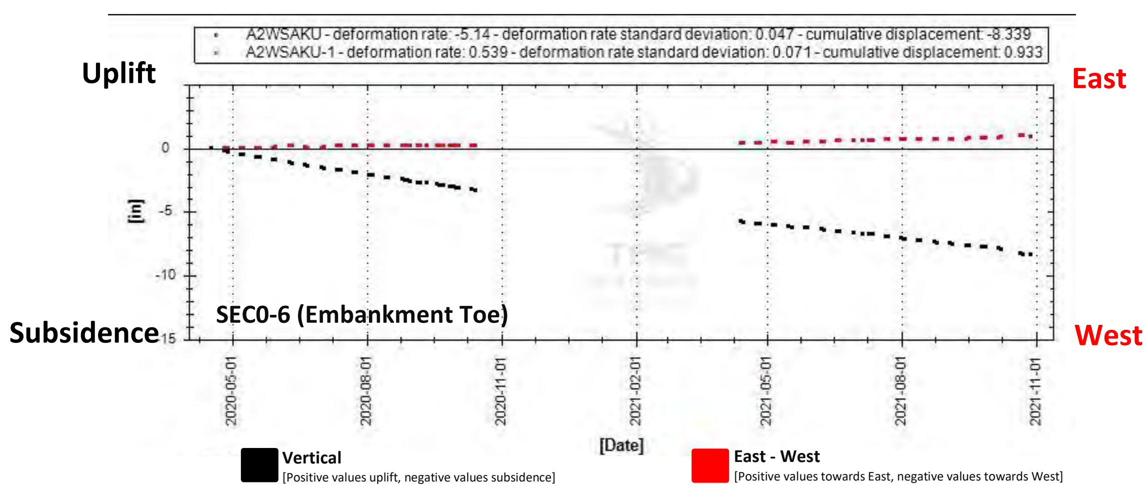
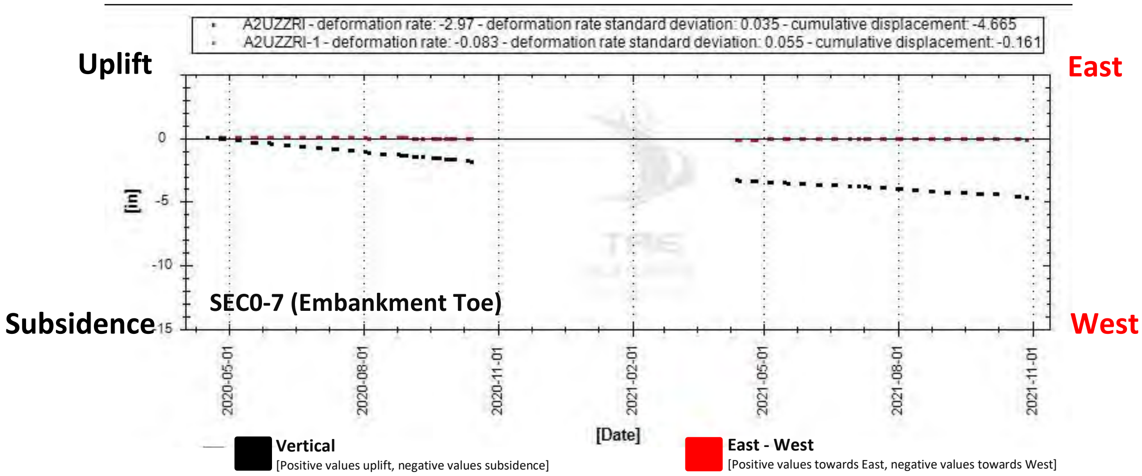


Figure 25: SEC0-4 – SEC0-6 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.



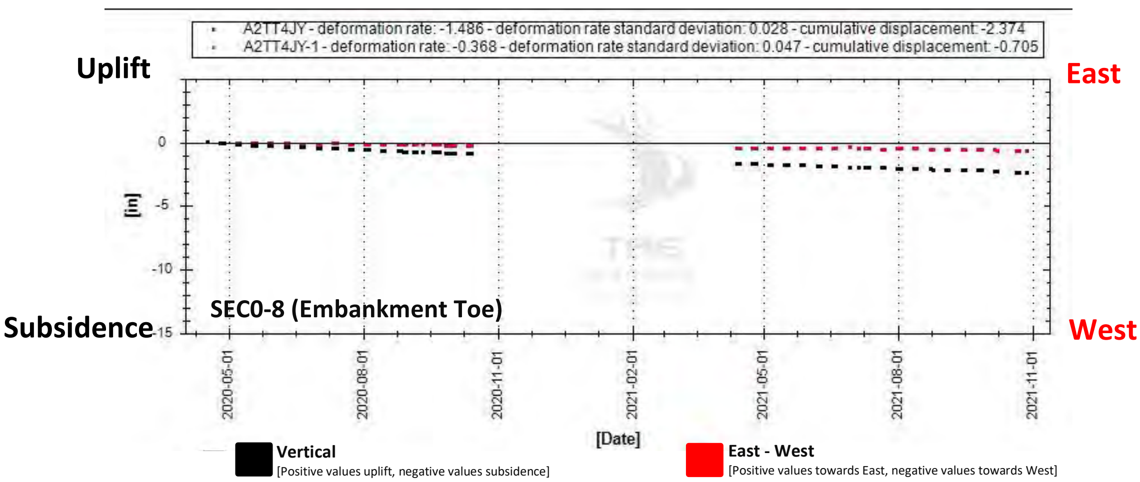


Figure 26: SEC0-7 and SEC0-8 displacement time series. Black represents the vertical displacement while red represents the E-W horizontal component of the motion.

4.1.5. Seep 10 Bench

Movement along Seep 10 Bench (Figure 27) was analyzed by plotting the vertical and East-West motion (SEEP10-1 – SEEP10-6; Figure 28 to Figure 29). The highest rates of displacement along the Seep 10 Bench occurred east of Section 0+00, and in particular at SEEP10-5 with up to -1.70 in/yr of settlement associated with 0.69 in/yr of westward motion (Figure 29).

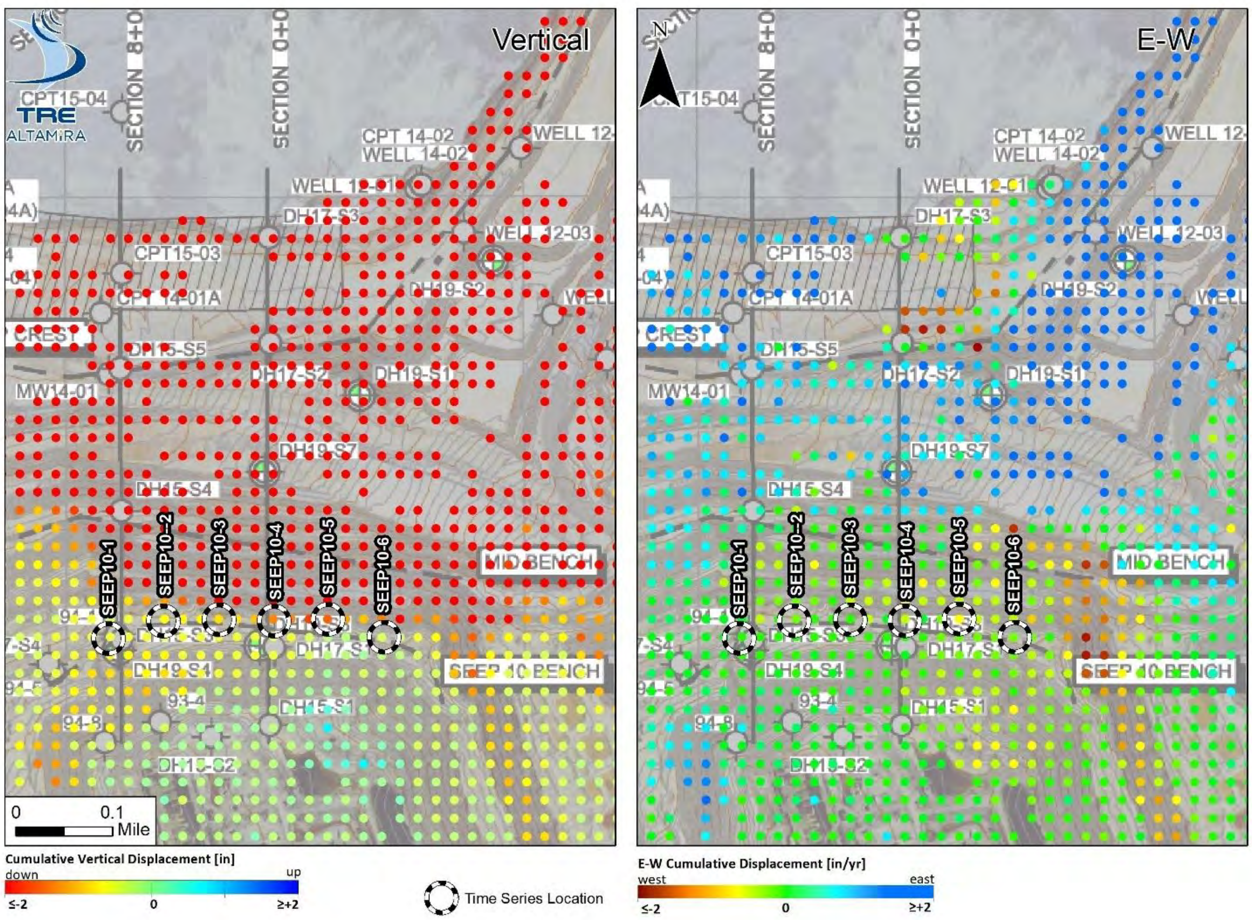


Figure 27: Location of TS analyzed along the Seep 10 Bench transect. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.

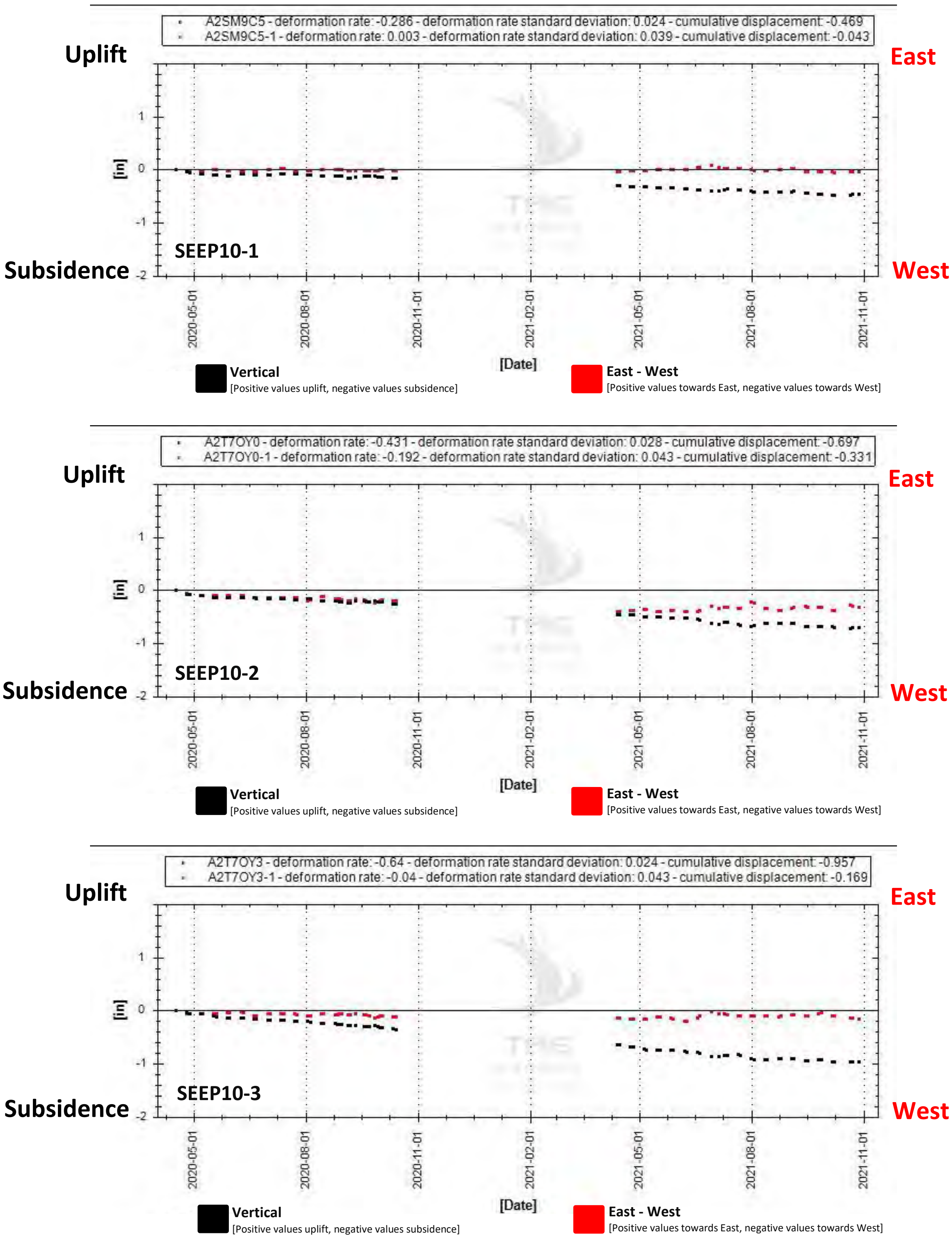
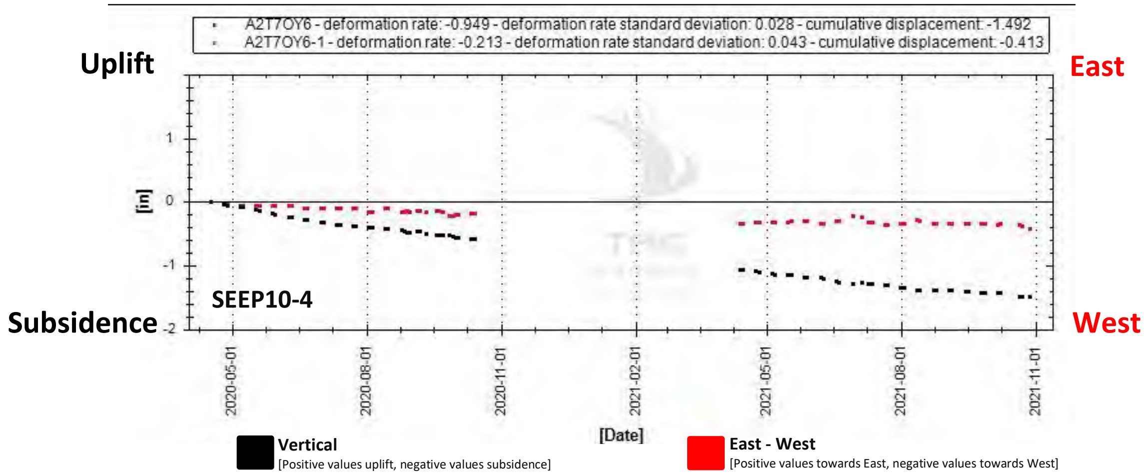
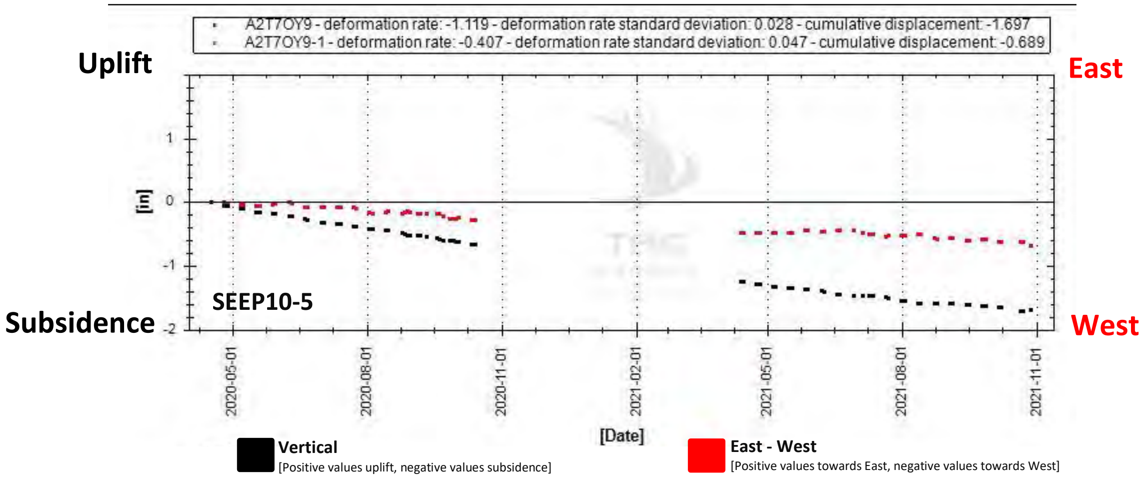


Figure 28: SEEP10-1 – SEEP10-3 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.





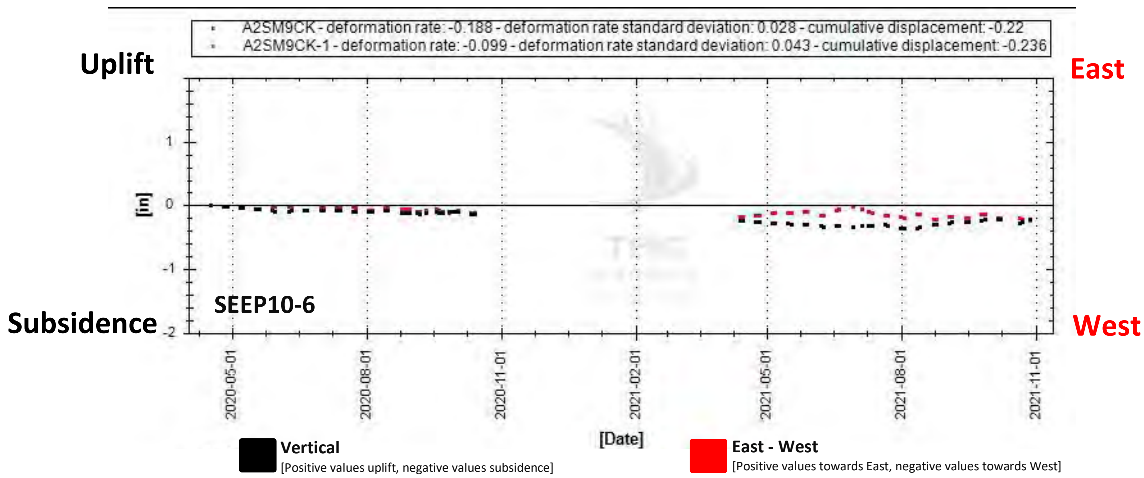


Figure 29: SEEP10-4 and SEEP10-6 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

4.2. Berkeley Pit

In the past specific interest was shown in movement over the Southeast corner of the Berkeley Pit following a failure that occurred on 11 December 2020. The cut-off date of the image collection for the previous analysis was 14 October 2020 and the SqueeSAR data set was investigated for potential early warning signs of ground movement prior to the collapse. Motion around the area of the Berkeley Pit was found to be linear prior to the failure.

Similarly to the June 2021 update, the Berkeley Pit was analyzed using five time series (Figure 31 - Figure 32). The fastest vertical motion was recorded at Berkeley-1 which showed up to -2.15 in/yr, whereas Berkeley-2 showed the fastest horizontal motion, up to 1.33 in/yr in an eastward direction. Motion at Berkeley-5 near the previously mentioned failure remained at -0.45 in/yr with an eastward component of 0.04 in/yr. The legend for Figure 30 is reduced to ±1 inch/year to better illustrate the motion observed.

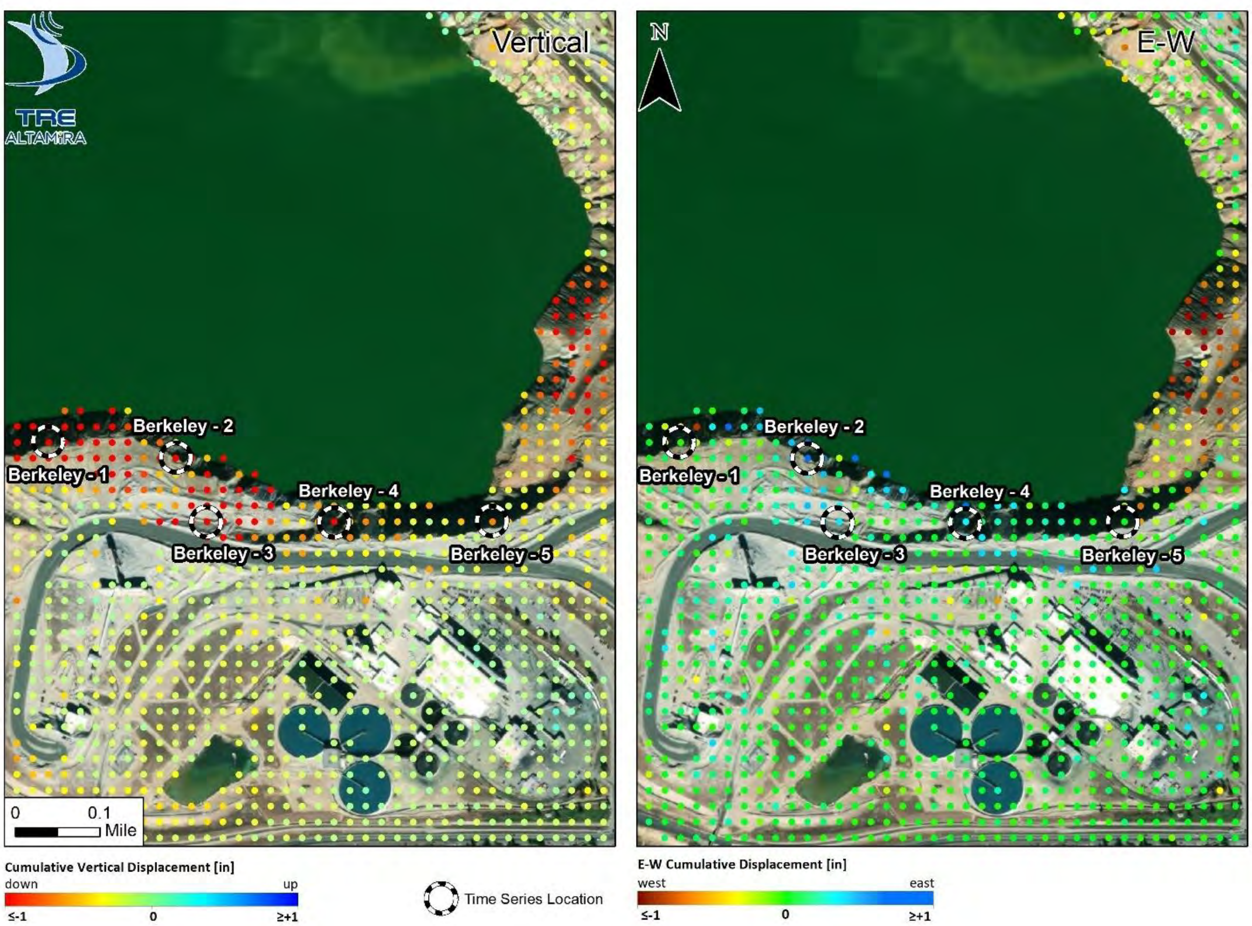
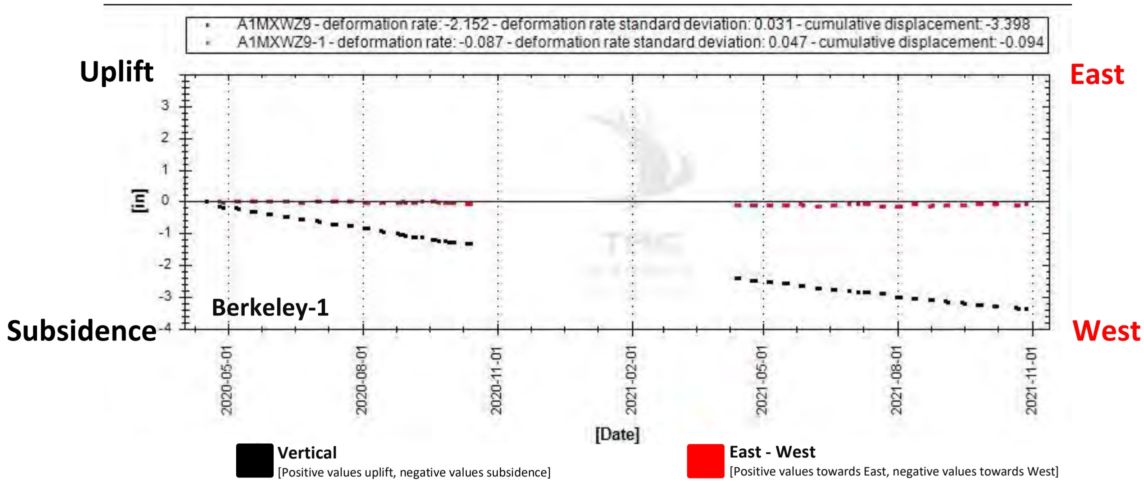
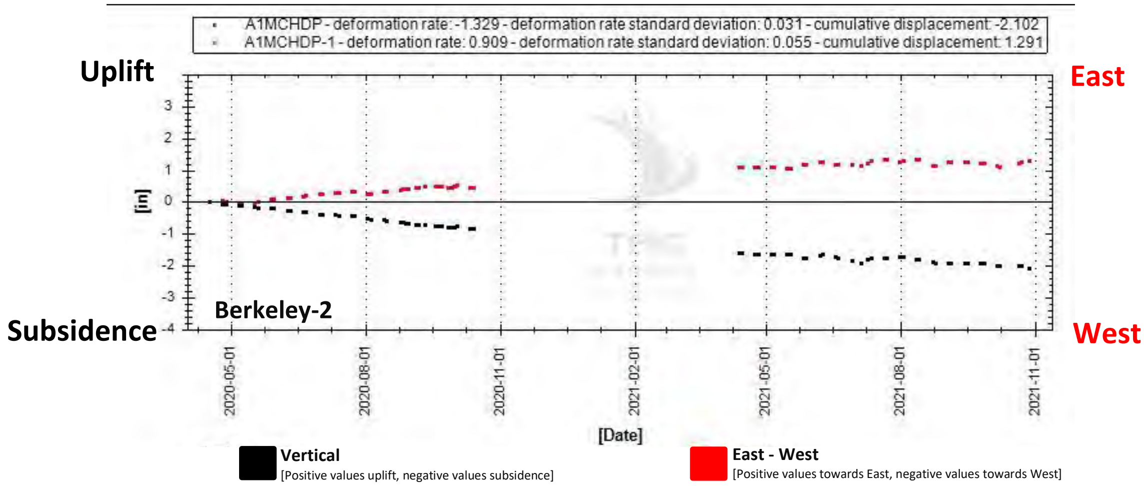


Figure 30: Location of TS analyzed at Berkeley Pit. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.





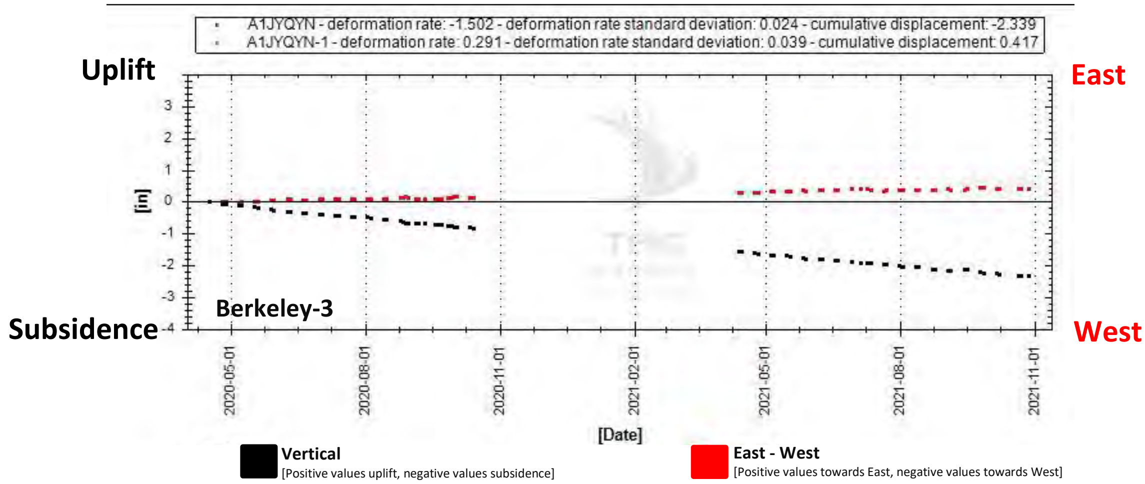


Figure 31: Berkeley-1 - Berkeley-3 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

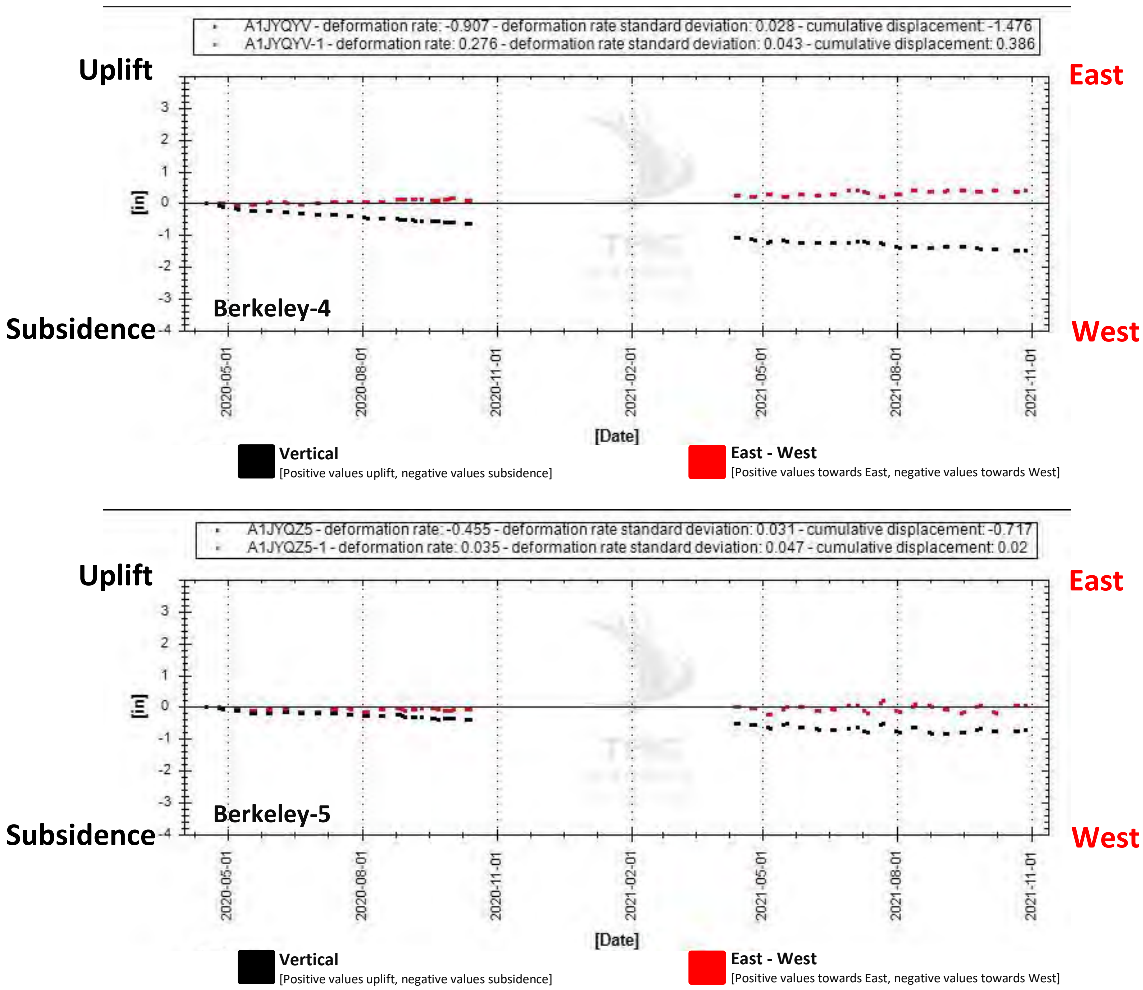


Figure 32: Berkeley-4 and Berkeley-5 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

4.3. Continental Pit

Similarly to the June 2021 update, areas of known concern within the Continental Pit were analyzed using 11 time series (Figure 34 - Figure 37). Vertical motion at the Northwest corner of the pit reached -1.31 in/yr vertically with a 2.45 in/yr eastward component (Continental-5). Motion of up to +1.07 in/yr was monitored in the Northeast sector with a westward component of 0.08 in/yr (Continental-3). On the west wall of the pit (Continental-9) motion decreased to -1.21 in/yr in the vertical and to 2.89 in/yr to the east. The legend for Figure 33 is reduced to ±1 inch to better illustrate the motion.

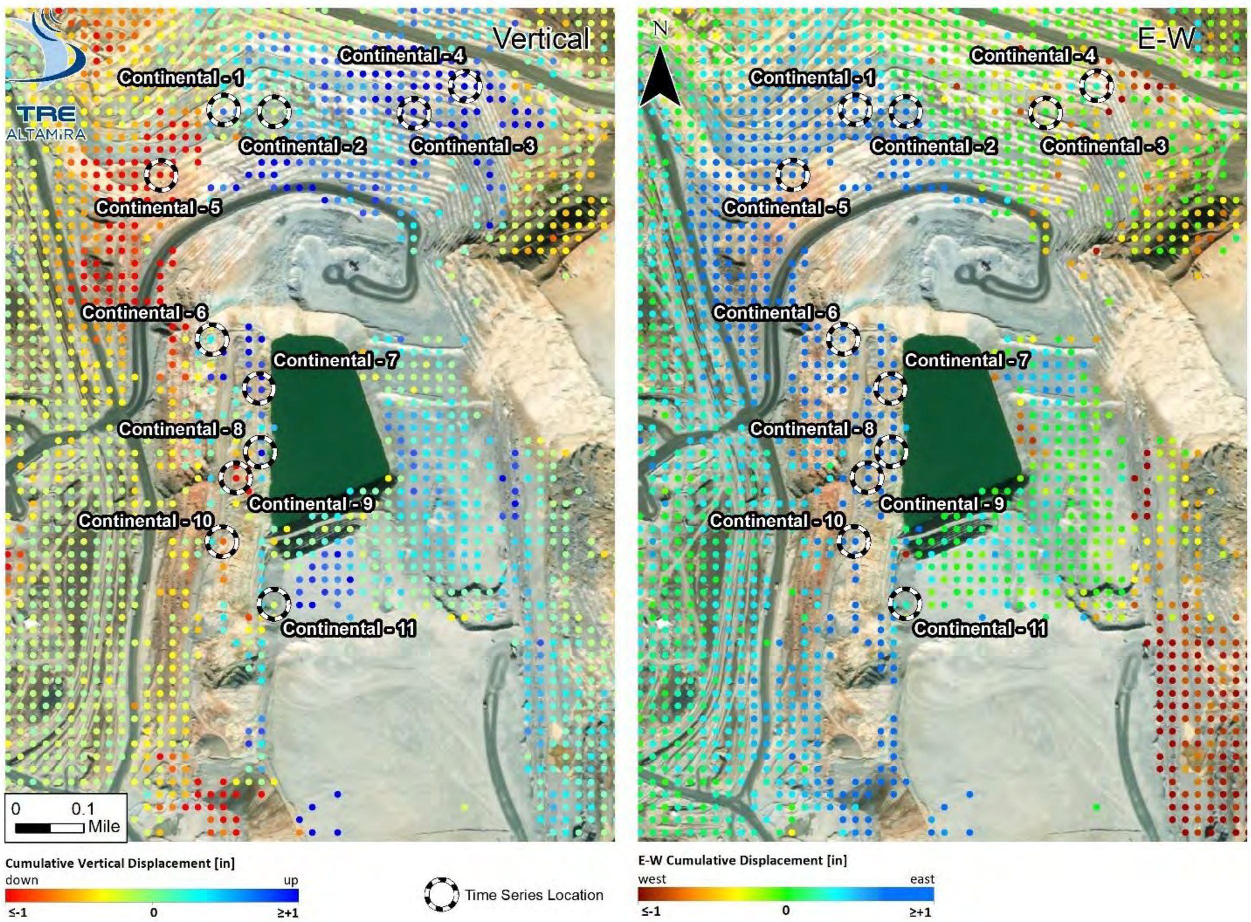


Figure 33: Location of the TS analyzed at Continental Pit. Vertical displacement is represented in the left panel while the right panel shows the East-West movement.

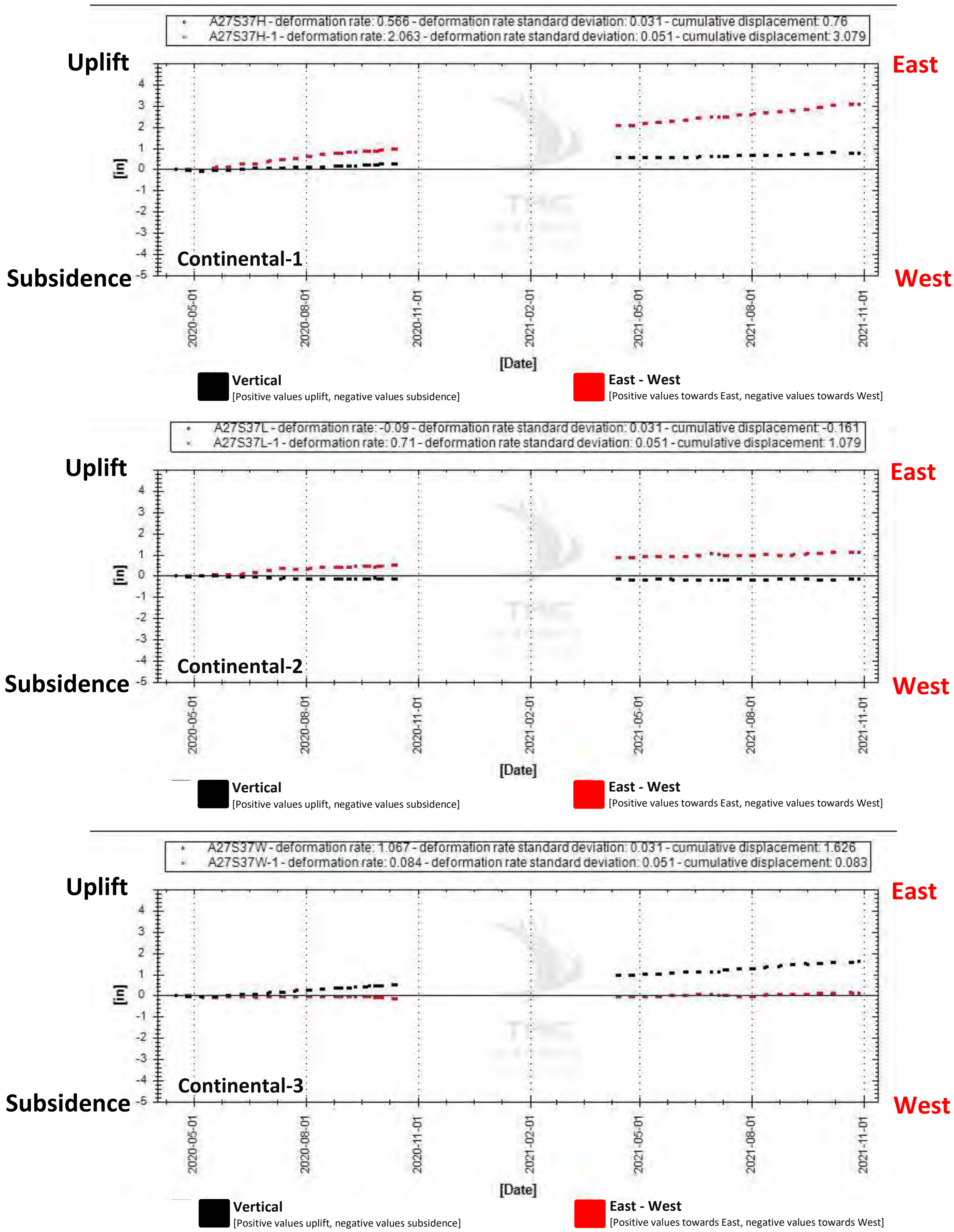
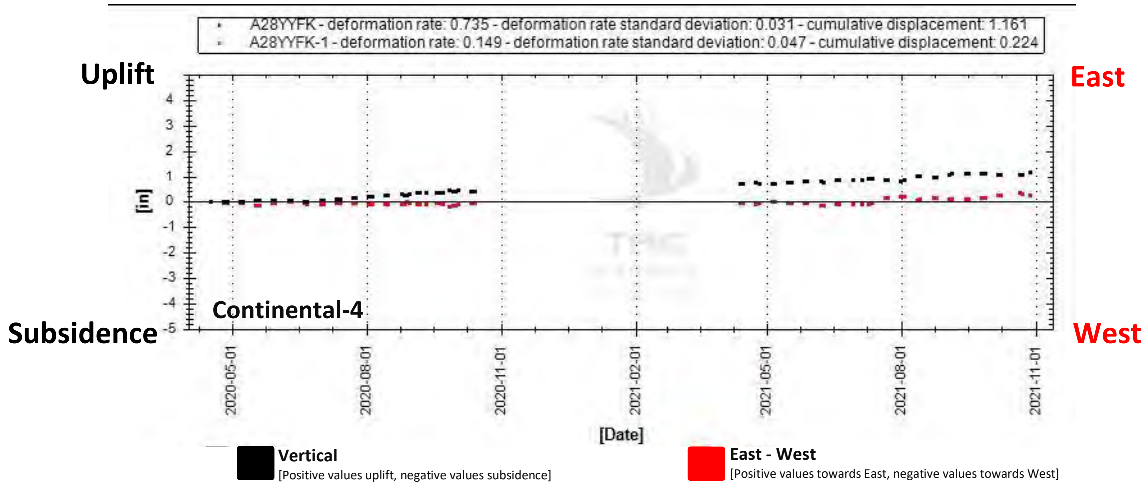
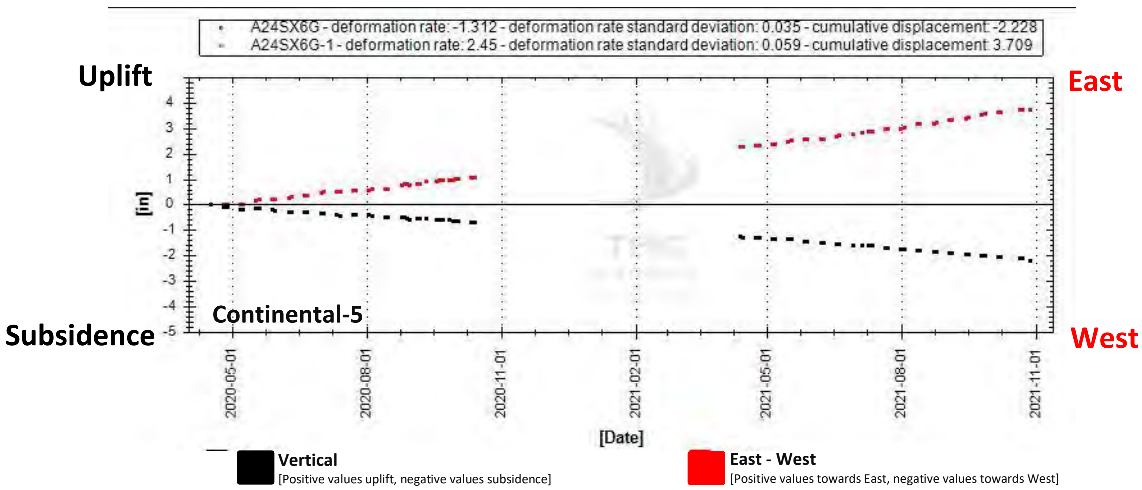


Figure 34: Continental-1 - Continental-3 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.





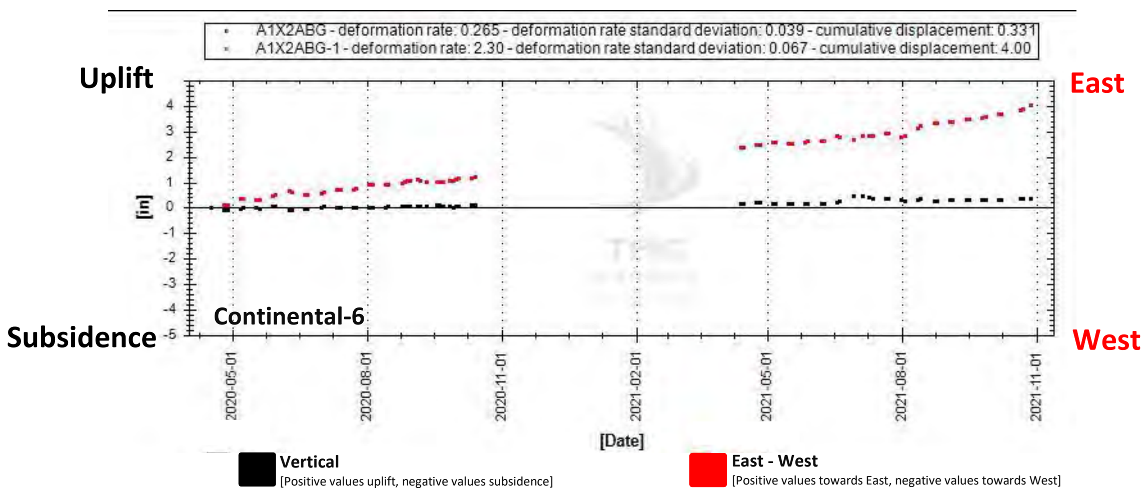


Figure 35: Continental-4 - Continental-6 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

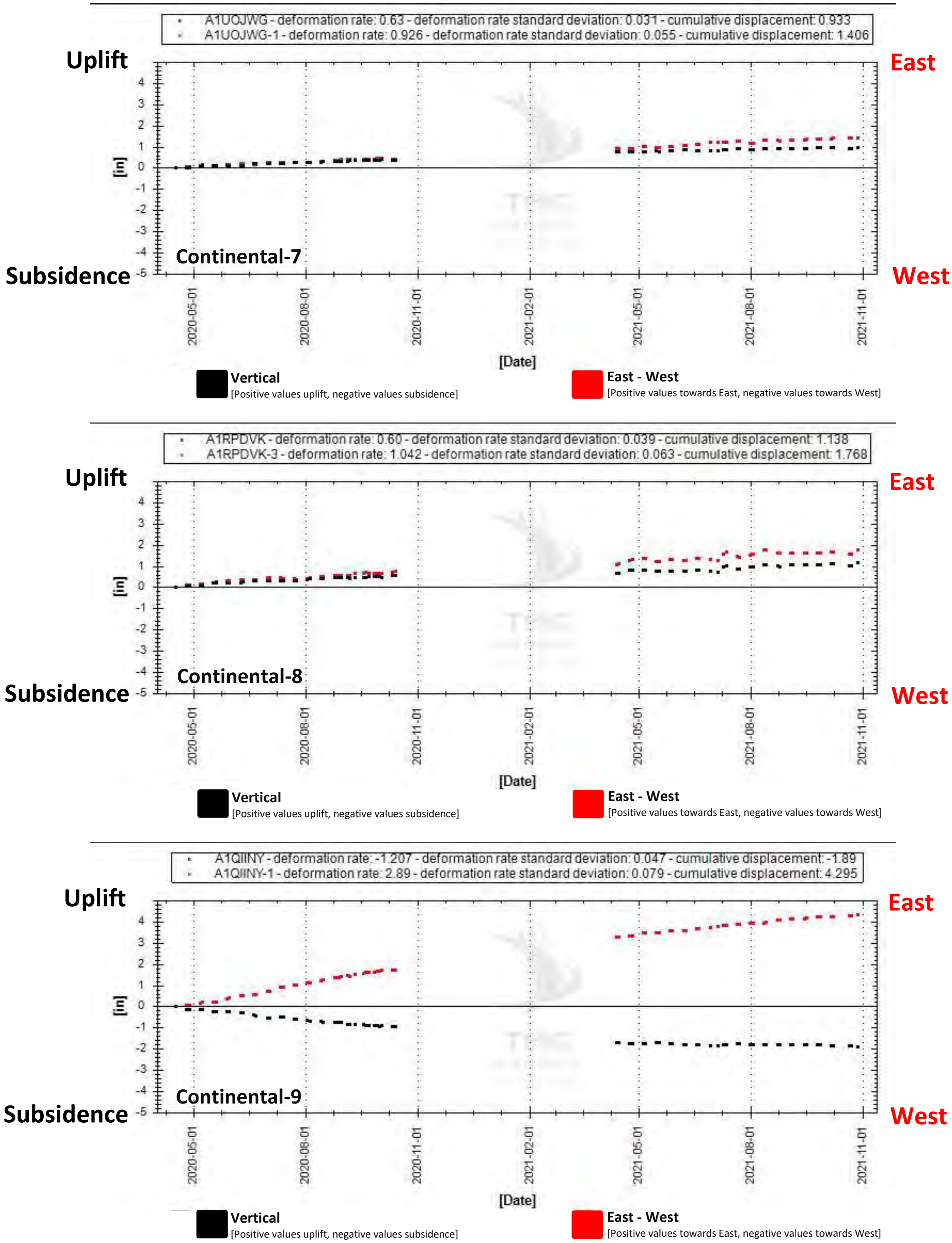
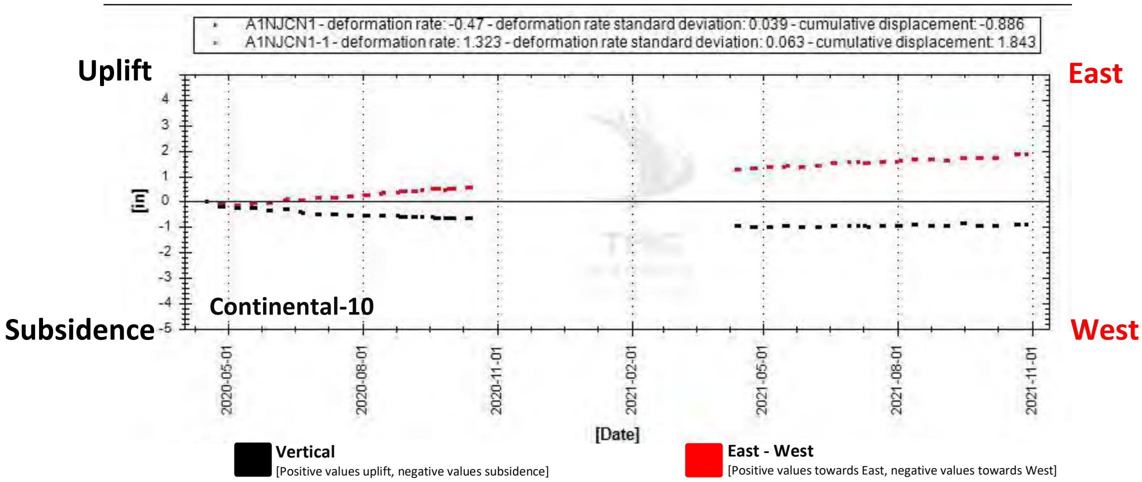


Figure 36: Continental-7 - Continental-9 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.



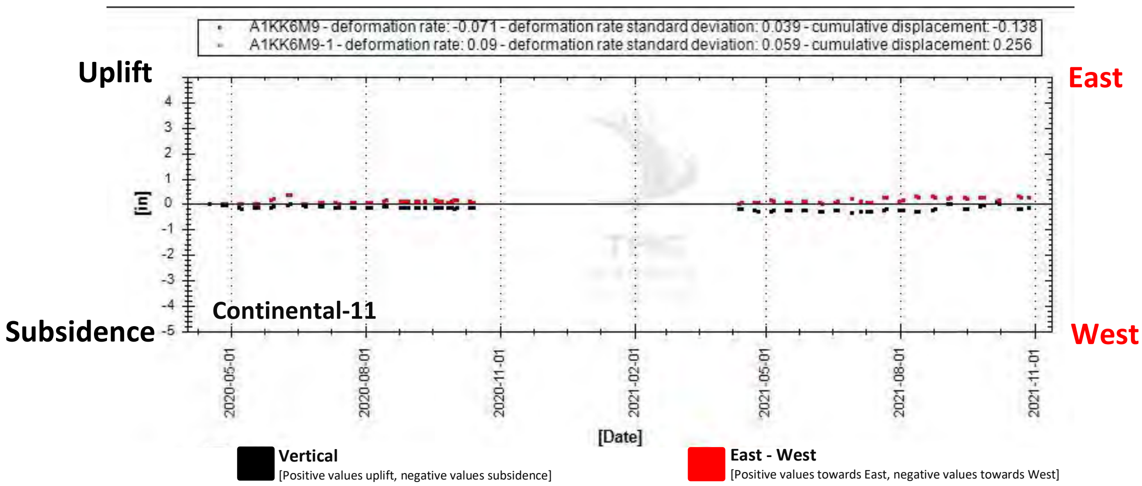


Figure 37: Continental-10 and Continental-11 displacement time series. Black dots represent the vertical displacement while red dots represent the E-W horizontal component of the motion.

5. Summary and Recommendations

Using a combination of time series and cross-sections TRE Altamira provided a summary of historical displacement of the Yankee Doodle Tailings Impoundment, the Berkeley Pit, and the Continental Pit at Montana Resources' operations in Butte, Montana (USA). Movement along three sections within the North-South and East-West Embankments are showing an increase at Section 8+00 W and Seep 10 Bench near the crest, with rates slowing down towards the toe of the embankments. No signs of incipient movement were detected in the area of the failure within the Berkeley Pit.

Appendix 1: Delivered Files

List of Deliverables

Table 4 list the deliverables including the present report, the InSAR data files and an updated version of the TRE toolbar, a software tool for assisting with the loading, viewing and interrogation of the data in ESRI ArcGIS 10.x software (For set-up procedure and functionalities, see the attached manual *TREAltamira Toolbar 5.8.5 User Manual.pdf*).

Table 4: List of deliverables.

Description	File name
SqueeSAR Data	**Ascending (LOS):** BUTTE_TSX_T30_A_OCT2021_Imperial_LocalGrid.shp **Descending (LOS):** BUTTE_TSX_T68_D_NOV2021_Imperial_LocalGrid.shp **2-D:** Vertical: BUTTE_TSX_VERT_OCT2021_Imperial_LocalGrid.shp East-West: BUTTE_TSX_EAST_OCT2021_Imperial_LocalGrid.shp
MXD project file containing all the data (ESRI ArcGIS version 10.0 and 10.6)	BUTTE_JUNE2021_v10.mxd BUTTE_JUNE2021_v10-8.mxd
Technical Report	Butte_InSAR_Report_Nov_2021.pdf
TRE Toolbar (ESRI® ArcGIS 10.x)	TREAltamira_Toolbar_5_8_5 TREAltamira Toolbar 5.8.5 User Manual.pdf

Database Structure

The SqueeSAR vector data are delivered in a shapefile format and projected to the local mine coordinates (MR2007). The shapefile of each elaboration contains details about the measurement points identified, including displacement rate, elevation, cumulative displacement and quality index. The information associated within the database files (dbf) are described in Table 5.

Table 5: Description of the fields contained in the database of the vector data. *Field is only present in LOS data sets.

Field	Description
CODE	Measurement Point (MP) identification code.
HEIGHT*	Topographic Elevation referred to WGS84 ellipsoid of the measurement point [ft].
H_STDEV*	Height standard deviation of the measurement point [ft].
VEL	MP displacement rate [in/yr].

- **Ascending LOS:** Positive values correspond to motion toward the satellite (i.e. uplift and/or westward movement); negative values correspond to motion away from the satellite (i.e. downward and/or eastward movement).
- **Descending LOS:** Positive values correspond to motion toward the satellite (i.e. uplift and/or eastward movement); negative values correspond to motion away from the satellite (i.e. downward and/or westward movement).
- **Vertical (VEL_V):** Positive values indicate uplift; negative values indicate downward movement.
- **E-W Horizontal (VEL_E):** Positive values indicate eastward movement; negative values westward movement.

V_STDEV	Displacement rate standard deviation [in/yr].
ACC*	Acceleration rate [in/yr^2].
A_STDEV*	Standard deviation of the acceleration value [in/yr^2].
COHERENCE*	Quality measure between 0 and 1.
STD_DEF*	Displacement time series error bar [in]
EFF_AREA*	This parameter represents the effective extension of the area [ft^2] covered by Distributed Scatterers (DS). For permanent scatterers (PS), its value is set to 0.
Dyyyymmdd	Series of columns that contain the displacement values of successive acquisitions relative to the first acquisition available [in].

TREmaps

TREmaps® is our proprietary online GIS platform to view and interrogate the InSAR datasets. TREmaps has been completely revamped to include features and functionality previously available only within the TRE ArcGIS toolbar. Little or no training is required, and no specialized GIS software is necessary. With internet access, the platform allows data to be overlaid on an optical image and to perform various operations on the data.

Functionalities include:

- Time-Series tool to view the history of displacement for each measurement point
- Average Time-Series tool to view the average history of displacement for a group of selected points.
- Cross-section tool to view the evolution of the ground surface over time
- Data download and data export (of subsets of data) to common formats (SHP, KML, GeoDB, CSV)
- Dynamic filtering tool to filter a subset of the results by a specified time period
- Client data integration.

TREmaps is hosted by Microsoft Azure, with all the advantages of data security and the cloud-based environment, with minimal downtime and robust internet connectivity. TREmaps runs directly on most Internet browsers and is accessed through a secure client login.

To log in, please go to:

https://tremaps5.tre-altamira.com/treaviewer

For assistance on any of the functions, please click the Help icon on the viewer or go to:

https://site.tre-altamira.com/tremaps-getting-started/

Appendix 2: Additional Radar Data Details

InSAR-based approaches measure surface displacement on a one-dimensional plane, along the satellite line-of-sight (LOS). The LOS angle varies depending on the satellite and on the acquisition parameters while another important angle, between the orbit direction and the geographic North, is nearly constant.

An ascending orbit denotes a satellite travelling from South to North and imaging to the east, while a descending orbit indicates a satellite travelling from North to South and imaging to the west. Table 6 lists the values of the angles for this study, while Figure 38 and Figure 39 show the geometry of the image acquisitions over the site for the ascending and descending orbits, respectively. The symbol Θ (theta) represents the angle the LOS forms with the vertical and δ (delta) the angle formed with the geographic North.

Table 6: Satellite viewing angles for the study.

Satellite	Wavelength	Orbit	Beam Mode/ Track	Symbol	Angle
TerraSAR-X	X-Band 3.11 cm	Ascending	30	θ	39.98°
				δ	8.73°
		Descending	68	θ	29.75°
				δ	12.07°

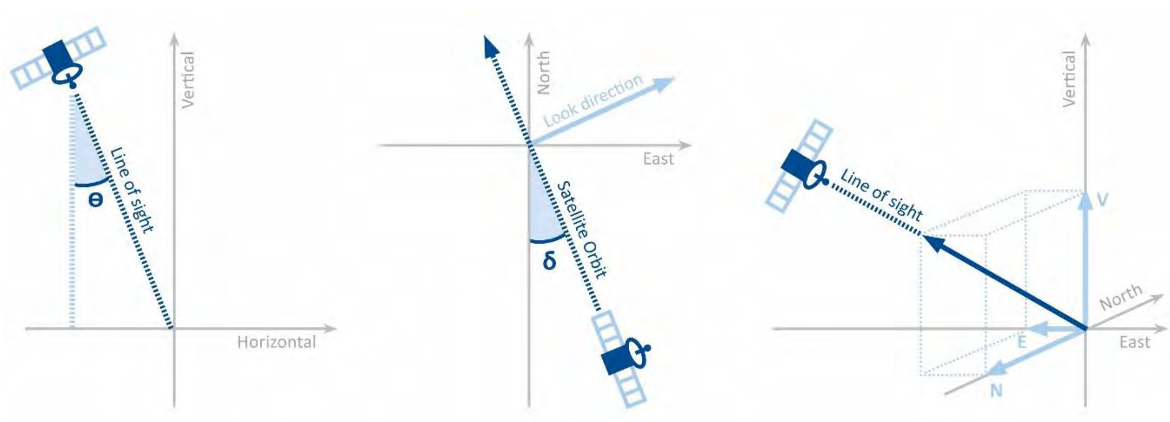


Figure 38: Geometry of the image acquisitions along the ascending orbit.

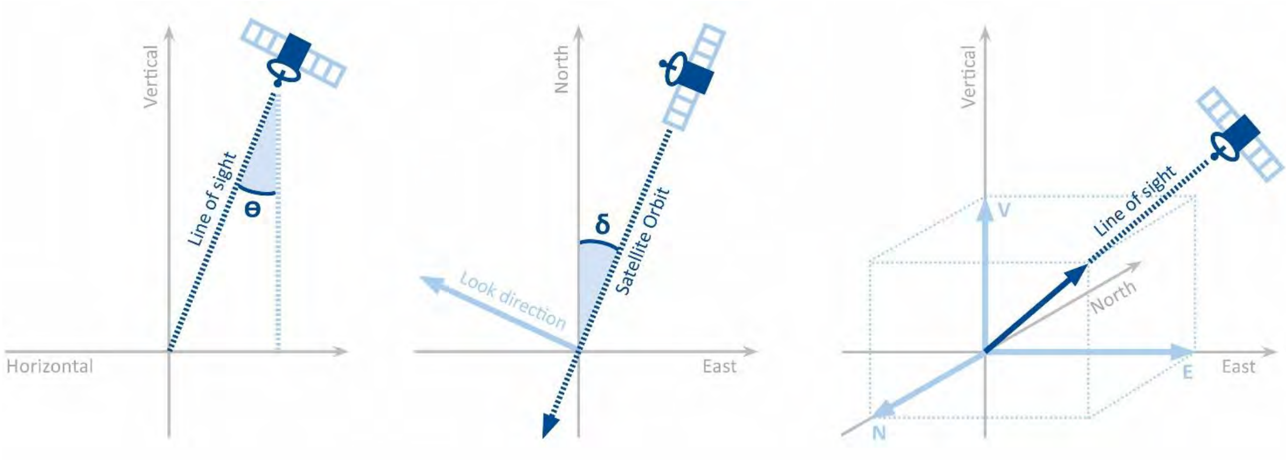
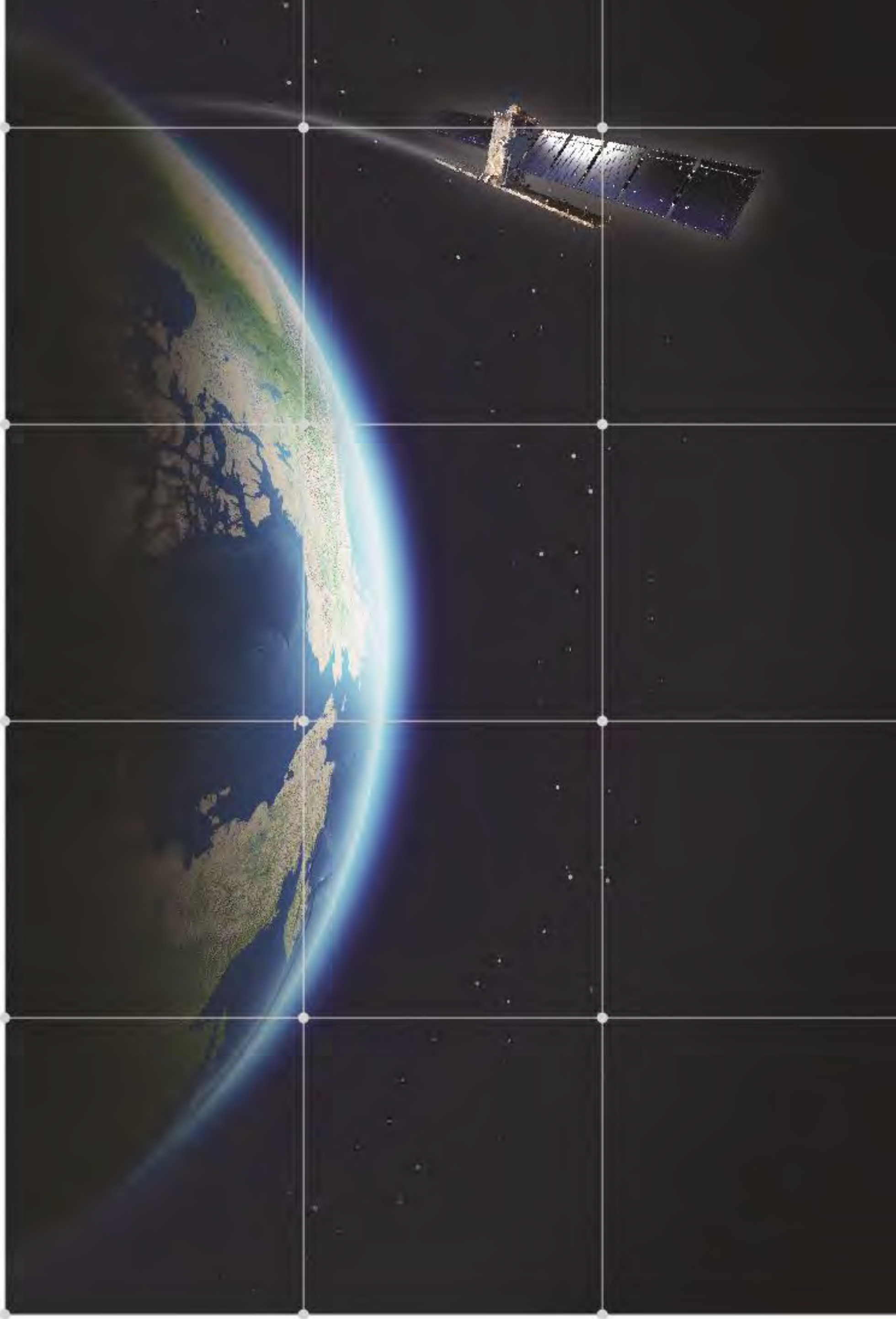


Figure 39: Geometry of the image acquisitions along the descending orbit.



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APPENDIX D

EOR Central Pedestal Area Construction Approvals

(Pages D-1 to D-14)

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MEMORANDUM

Date:	June 17, 2021	**File No.:**	VA101-00126/25-A.01
		Cont. No.:	VA21-01148
To:	Mr. Mike Harvie		
Copy To:	Mr. Corey Warner, Mr. Johnathan Hoover, Mr. Mark Thompson		
From:	Ken Brouwer, Dan Fontaine, Jason Gillespie, Kevin Davenport		
Re:	**Approval to Commence EL. 6,250 ft Construction of the North-South Embankment**		

1.0 INTRODUCTION

Montana Resources, LLP (MR) is preparing for initial construction of the Elevation (EL.) 6,250 lift near the corner of the East-West and North-South Embankments from approximately Section 0+00 through 8+00N. MR and Knight Piésold Ltd. (KP) are developing a supplemental construction monitoring program to monitor piezometric levels and deformation of the newly placed and existing rockfill materials during construction in this area. The construction monitoring program will be detailed in a standalone letter and is expected to include the following components:

- Piezometric and surface deformation Construction Performance Parameters (CPPs) and associated Trigger-Action Response Plans (TARPs) to define thresholds and response plans related to monitoring of the embankment response to construction activities.
- Plans to utilize additional deformation monitoring techniques to periodically monitor surface and subsurface embankment deformation in addition to the above CPPs and TARPs. These techniques include:
  - InSAR bulletin analyses.
  - MakTek laser scans of the East-West Embankment Central Pedestal Area.
  - Crack mapping and progression monitoring.
  - Periodic review of Global Navigation Satellite System (GNSS) surface deformation instrumentation.
  - Periodic review of inclinometer for assessment of subsurface deformation magnitudes/rates.

End of year construction projections were provided to KP by MR for Q3 and Q4 2021 outlining the material tonnages for each 50 ft-thick lift in this construction area. The planned dumping progression and estimated embankment quantities (tonnages) are indicated by models ‘A’ through ‘D’ on Figure 1.

MR has requested approval from the Engineer of Record (EOR, Ken Brouwer, P.E.) to proceed with construction activities for the placement of lift ‘A’ up to approximately elevation (EL.) 6,250 ft.

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T +1 604 685 0543 | E vancouver@knightpiesold.com | www.knightpiesold.com

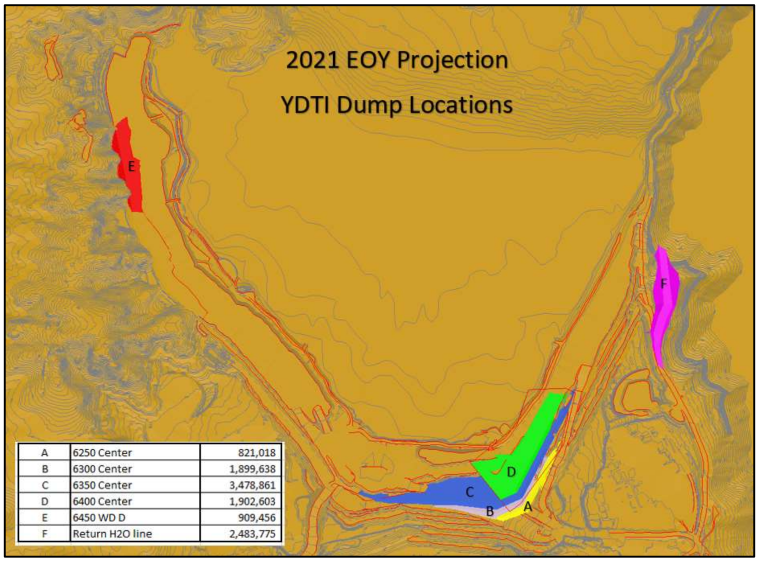

Figure 1 2021 YDTI Construction Projections (Provided by MR)

2.0 BASELINE DATA COLLECTION

MR commenced monitoring of baseline conditions to support the construction monitoring program. The following is a high-level summary of baseline data availability:

- Long-term piezometric elevation and pore water pressure data are available from vibrating wire piezometers at nine sites planned for CPP monitoring, and baseline piezometric data from the relevant instrumentation has been collected automatically via the Remote Monitoring System (RMS). These data will continue to be available continuously via the RMS.
- Manual Differential Global Positioning System (DGPS) deformation data are being collected from 15 CPP surface deformation monitoring sites recently installed for the construction monitoring program. Three daily readings (from June 14th through 16th, 2021) are presently available from each site. Additional daily readings will be collected by MR staff leading up to and following commencement of EL. 6,250 ft lift construction.
- MapTek laser scans were initiated to monitor lateral deformation magnitudes and rates throughout the downstream shell of the East-West Embankment within the Central Pedestal Area. A total of eight baseline scans have been completed (between June 13th and June 16th, 2021) and data are available to KP for assessment. Weekly laser scans are planned during the EL. 6,250 ft lift construction.
- Site-wide InSAR (2D Terra-SAR-X) coverage remains active, and MR has contracted TRE-Altamira to generate short-term Bulletin analyses throughout the construction period to screen for development of larger than anticipated line-of-sight deformations. Bulletins provide coverage over a 22-day period and are available every 11-days (due to an 11-day overlap)

3.0 CONSTRUCTION PRACTICES AND FIELD REVIEW

A KP engineer will be present on site during initial construction activities as a representative of the EOR. Approval was provided by the EOR for MR to complete initial foundation preparation of the construction area during a call between KP and MR on June 15th, 2021. Construction activities, including foundation preparation and fill placement, are to be completed as per the Construction Management Plan (KP, 2018).

Foundation preparation is to be reviewed and documented by the representative of the EOR prior to initial material placement.

4.0 APPROVAL TO COMMENCE PLACEMENT

KP has reviewed the available baseline data. KP and the EOR are satisfied that sufficient manual survey and laser scan data have been collected and adequate monitoring systems are in place to commence placement of the EL. 6,250 lift. It is understood that this EL. 6,250 ft lift is scheduled to be completed in approximately 1 month. KP and MR will continue to develop and refine the construction monitoring program during this construction period. The details of the construction monitoring program and approval to commence placement of subsequent lifts will be dependent on the results of the on-going monitoring programs for the EL. 6,250 ft lift.

Yours truly,
Knight Piésold Ltd.

Prepared:
Jason Gillespie, P.Eng.
Senior Engineer

Reviewed:
Kevin Davenport, P.Eng.
Senior Engineer

MONTANA
2021-06-17
DANIEL DYLAN FONTAINE
No. 59785 PE
LICENSED
PROFESSIONAL ENGINEER

Reviewed:
Daniel Fontaine, P.E.
Specialist Engineer | Associate

MONTANA
KEN J. BROUWER
50020 PE
REGISTERED
PROFESSIONAL ENGINEER
2021-06-17

Reviewed:
Ken Brouwer, P.E.
Principal Engineer
Engineer of Record

Approval that this document adheres to the Knight Piésold Quality System: KJB

References:

Knight Piésold Ltd. (KP, 2018). Yankee Doodle Tailings Impoundment: Construction Management Plan (KP Reference No. VA101-126/12-5 Rev. 3). May 1, 2018.

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MEMORANDUM

Date:	July 16, 2021	**File No.:**	VA101-00126/25-A.01
		Cont. No.:	VA21-01356
To:	Mr. Mike Harvie		
Copy To:	Mr. Corey Warner, Mr. Johnathan Hoover, Mr. Mark Thompson		
From:	Ken Brouwer, Dan Fontaine, Jason Gillespie, Kevin Davenport		
Re:	**Approval to Commence EL. 6,300 ft Construction of the Central Pedestal Area**		

1.0 INTRODUCTION

Montana Resources, LLP (MR) is nearing completion of the elevation (EL.) 6,250 ft lift near the corner of the East-West and North-South Embankments from approximately Section 0+00 through 8+00N. The Knight Piésold Ltd. (KP) Engineer of Record (EOR) previously provided approval to commence the EL. 6,250 ft lift placement on June 17, 2021 (KP, 2021). Commencement of the EL. 6,300 lift will follow completion of the EL. 6,250 lift, which is anticipated to be completed between July 16 and 20, 2021.

MR and KP have implemented supplemental construction monitoring of piezometric levels and surface deformations to detect changing conditions associated with construction loading. Ongoing construction monitoring includes the following components:

- Daily visual inspection by a KP engineer
- Piezometric monitoring of select instruments relative to Construction Performance Parameter (CPP) thresholds and an associated Trigger-Action Response Plans (TARPs)
- Surface deformation monitoring using the following techniques to identify changes in deformation rates and behavior due to construction (should they occur):
    - Daily DGPS surface deformation monitoring
    - InSAR bulletin analyses (seven 22-day bulletins completed to date)
    - MapTek laser scans of the East-West Embankment Central Pedestal Area (5 weekly scans completed to date)
    - Crack mapping and progression monitoring
    - Periodic review of Global Navigation Satellite System (GNSS) surface deformation instrumentation
    - Periodic review of inclinometer for assessment of subsurface deformation magnitudes/rates

End of year construction projections were provided to KP by MR for Q3 and Q4 2021 outlining the material tonnages for each 50 ft-thick lift in this construction area. The planned dumping progression and estimated embankment quantities (tonnages) are indicated by models 'A' through 'D' on Figure 1.

MR has requested approval from the EOR (Ken Brouwer, P.E.) to proceed with construction activities for the placement of lift 'B' up to approximately EL. 6,300 ft.

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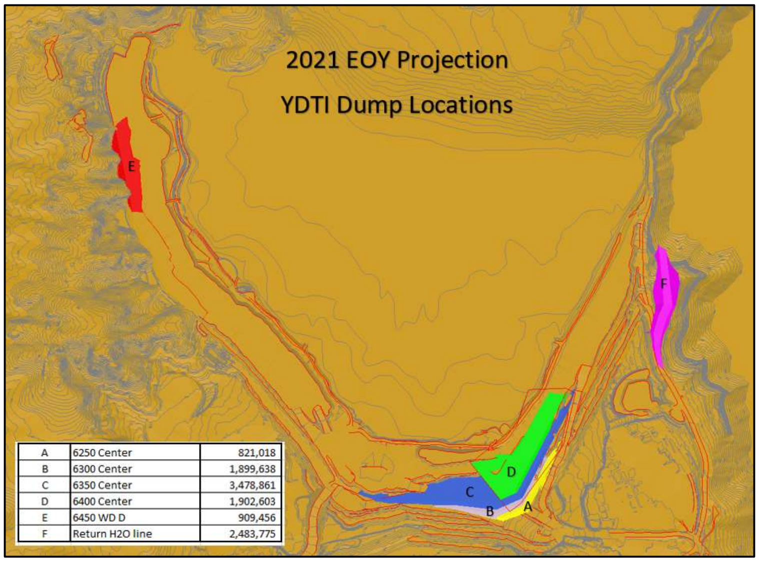

A	6250 Center	821,018
B	6300 Center	1,899,638
C	6350 Center	3,478,861
D	6400 Center	1,902,603
E	6450 WD D	909,456
F	Return H2O line	2,483,775

Figure 1 2021 YDTI Construction Projections (Provided by MR)

2.0 SUMMARY OF CONSTRUCTION MONITORING TO-DATE

MR commenced construction monitoring prior to and throughout EL. 6,250 construction using the techniques described in Section 1. A high-level summary of monitoring results to date are provided below:

- Piezometric elevations at designated CPP monitoring sites have monitored generally stable trends throughout EL. 6,250 ft lift construction. CPP instruments on Section 0+00 remain well below the assigned piezometric threshold elevations and those on Section 8+00W, for which thresholds remain under development, remain consistent with conditions monitored prior to the start of construction.
- DGPS-based surface deformation monitoring has generally indicated consistent deformation rates throughout EL. 6,250 lift construction and data are not indicative of progressive (accelerating deformations).
- InSAR surface deformation bulletins are available for pre-construction conditions (5 bulletins) and during EL. 6,250 lift construction (2 bulletins; June 7th to June 29th and June 18th to June 10th, 2021). Surface deformations monitored during construction are generally consistent with baseline conditions and have not monitored progressive (accelerating) deformation resulting from EL. 6,250 ft lift construction or elevated deformations within the embankment shell downstream of the construction area.
- Laser scans of the East-West Embankment Central Pedestal Area (downstream embankment shell) have monitored relatively constant lateral deformation rates throughout EL. 6,250 ft lift construction and are not indicative of progressive (accelerating) deformations.

3.0 CONSTRUCTION MANAGEMENT PRACTICES

A KP engineer will continue to be present on site during initial construction of the EL. 6,300 lift as a representative of the EOR. Construction activities, including foundation preparation and fill placement, are to be completed as per the Construction Management Plan (KP, 2018). Foundation preparation is to be reviewed and documented by the representative of the EOR prior to initial material placement.

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4.0 APPROVAL TO COMMENCE PLACEMENT

KP has reviewed the available monitoring data collected during EL. 6,250 ft lift construction. Piezometric and deformation monitoring do not indicate development of adverse conditions due to construction. KP and the EOR are satisfied that placement of the EL. 6,300 lift can commence and that adequate monitoring systems are in place to continue monitoring as construction progresses. KP and MR will continue to develop and refine the construction monitoring program during this construction period. The details of the construction monitoring program and approval to commence placement of subsequent lifts will be dependent on the results of the on-going monitoring programs for the EL. 6,300 ft lift.

Yours truly,
Knight Piésold Ltd.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. T. DAVENPORT # 45840

Prepared: 2021-07-16

Kevin Davenport, P.Eng.
Senior Engineer

MONTANA 2021-07-16 DANIEL DYLAN FONTAINE No. 59785 PE LICENSED PROFESSIONAL ENGINEER

Reviewed:

Daniel Fontaine, P.E.
Specialist Engineer | Associate

MONTANA KEN J. BROUWER 10020 PE REGISTERED PROFESSIONAL ENGINEER 2021-07-16

Reviewed:

Ken Brouwer, P.E.
Principal Engineer
Engineer of Record

Approval that this document adheres to the Knight Piésold Quality System: KJB

References:

Knight Piésold Ltd. (KP, 2018). Yankee Doodle Tailings Impoundment: Construction Management Plan (KP Reference No. VA101-126/12-5 Rev. 3). May 1, 2018.

Knight Piésold Ltd. (KP, 2021). Memorandum on Approval to Commence EL. 6,250 ft Construction of the North-South Embankment (KP Reference No. VA21-001148), dated June 17, 2021.

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MEMORANDUM

Date:	September 24, 2021	**File No.:**	VA101-00126/25-A.01
		Cont. No.:	VA21-01727
To:	Mr. Mike Harvie		
Copy To:	Mr. Corey Warner, Mr. Johnathan Hoover, Mr. Mark Thompson		
From:	Daniel Fontaine, Ken Brouwer, Jason Gillespie, Kevin Davenport		
Re:	**Approval to Commence EL. 6,350 ft Construction of the Central Pedestal Area**		

1.0 INTRODUCTION

Montana Resources, LLP (MR) is nearing completion of the elevation (EL.) 6,300 ft lift near the corner of the East-West and North-South Embankments from approximately Section 3+00W through 8+00N (the Central Pedestal Area). The EL. 6,300 lift is anticipated to be completed in late September 2021.

MR provided Q3 and Q4 construction projections for 2021 to Knight Piésold Ltd. (KP) during Q2 of 2021. The planned dumping progression and estimated embankment quantities (tonnages) for each sequential 50 ft-thick lift in the Central Pedestal Area are indicated by models ‘A’ through ‘D’ on Figure 1.

The KP and the Engineer of Record (EOR) of the Yankee Doodle Tailings Impoundment (YDTI) previously provided approval to proceed with construction of the EL. 6,250 ft lift on June 17, 2021 (KP, 2021a) and the EL. 6,300 ft lift on July 16, 2021 (KP, 2021b). MR has requested approval from KP and the EOR to proceed with construction activities for the placement of lift ‘C’ up to approximately EL. 6,350 ft. The EL. 6,350 ft lift is projected to take several months to construct depending on material availability.

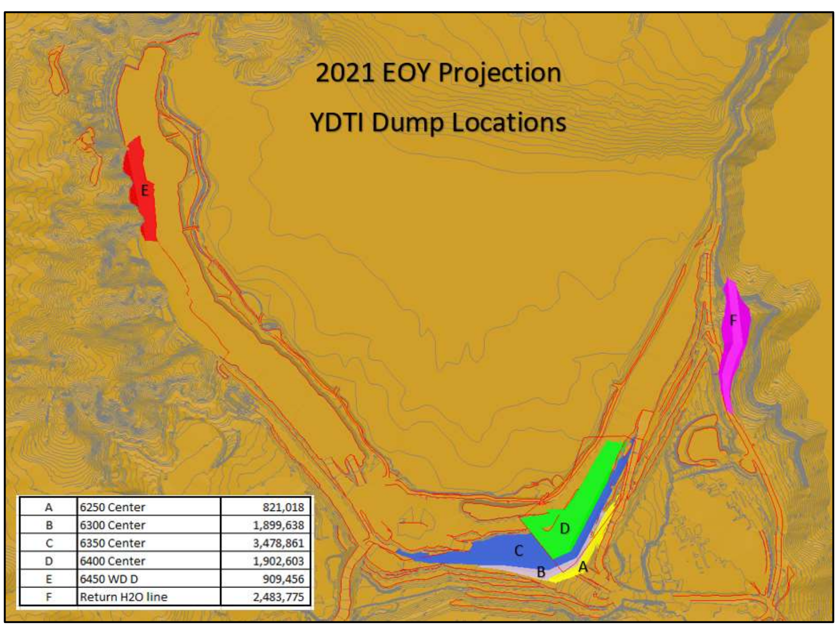

Figure 1 **2021 YDTI Construction Projections (Provided by MR)**

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2.0 CONSTRUCTION MONITORING PROGRAM

2.1 OVERVIEW

MR and KP have implemented supplemental construction monitoring of piezometric levels and surface deformations to detect changing conditions associated with construction loading in the Central Pedestal Area. The construction monitoring program includes:

- Daily visual inspection by a KP engineer
- Piezometric monitoring of select instruments relative to Construction Performance Parameter (CPP) thresholds and an associated Trigger-Action Response Plans (TARPs)
- Surface deformation monitoring using the following techniques to identify changes in deformation rates and behavior due to construction (should they occur):
  - Daily DGPS surface deformation monitoring
  - InSAR bulletin analyses (thirteen 22-day bulletins completed to date)
  - MapTek laser scans of the East-West Embankment Central Pedestal Area (16 weekly scans completed to date)
  - Crack mapping and progression monitoring
  - Periodic review of Global Navigation Satellite System (GNSS) surface deformation instrumentation
  - Periodic review of inclinometer for assessment of subsurface deformation magnitudes/rates

2.2 SUMMARY OF CONSTRUCTION MONITORING TO-DATE

MR commenced construction monitoring prior to and throughout EL. 6,250 and 6,300 ft lift construction using the techniques described in Section 2.1. A high-level summary of monitoring results to date are provided below:

- Piezometric elevations at designated CPP monitoring sites have monitored generally stable trends throughout EL. 6,250 ft and 6,300 ft lift construction. Minor pore pressure increases and subsequent dissipation were observed within a perched zone during EL. 6,250 ft lift construction. CPP instruments on Section 0+00 and 8+00W, including within the perched zone, remain well below the assigned piezometric threshold elevations.
- DGPS-based surface deformation monitoring has generally indicated consistent deformation rates downstream of the construction area throughout EL. 6,250 ft and EL. 6,300 ft lift construction and data are not indicative of progressive (accelerating deformations).
- InSAR surface deformation bulletins are available for pre-construction conditions (5 bulletins) and during EL. 6,250 ft and 6,300 ft lift construction (8 bulletins). Surface deformations monitored during construction are generally consistent with baseline conditions and have not monitored progressive (accelerating) deformation resulting from lift construction or elevated deformations within the embankment shell downstream of the construction area.
- Laser scans of the East-West Embankment Central Pedestal Area (downstream embankment shell) have monitored relatively constant lateral deformation rates throughout EL. 6,250 ft and 6,300 ft lift construction and are not indicative of progressive (accelerating) deformations.

3.0 CONSTRUCTION MANAGEMENT PRACTICES

A KP engineer will continue to be present on site during initial construction of the EL. 6,350 lift as a representative of the EOR. Construction activities, including foundation preparation and fill placement, are to be completed as per the Construction Management Plan (KP, 2018). Foundation preparation is to be reviewed and documented by the representative of the EOR prior to initial material placement.

4.0 APPROVAL TO COMMENCE PLACEMENT

KP has reviewed the available monitoring data collected during EL. 6,250 ft and EL. 6,300 ft lift construction periods. Piezometric and deformation monitoring do not indicate development of adverse conditions due to construction.

KP and the EOR are satisfied that placement of the EL. 6,350 lift can commence and that adequate monitoring systems are in place to continue monitoring as construction progresses. KP and MR will continue to develop and refine the construction monitoring program during this construction period. The details of the construction monitoring program and approval to commence placement of subsequent lifts will be dependent on the results of the on-going monitoring programs for the EL. 6,350 ft lift.

Yours truly,
Knight Piésold Ltd.

PROFESSIONAL
PROVINCE OF
K. T. DAVENPORT
48840
BRITISH COLUMBIA
ENGINEER

Prepared: Jason Gillespie, P.Eng.
Senior Engineer

Prepared: 2021-09-24
Kevin Davenport, P.Eng.
Senior Engineer

MONTANA
2021-09-24
DANIEL DYLAN
FONTAINE
No. 59785 PE
LICENSED
PROFESSIONAL ENGINEER

Reviewed: Daniel Fontaine, P.E.
Specialist Engineer | Associate
Engineer of Record

Approval that this document adheres to the Knight Piésold Quality System: DDF

References:

Knight Piésold Ltd. (KP, 2018). Yankee Doodle Tailings Impoundment: Construction Management Plan (KP Reference No. VA101-126/12-5 Rev. 3). May 1, 2018.

Knight Piésold Ltd. (KP, 2021a). Memorandum on Approval to Commence EL. 6,250 ft Construction of the North-South Embankment (KP Reference No. VA21-001148), dated June 17, 2021.

Knight Piésold Ltd. (KP, 2021b). Memorandum on Approval to Commence EL. 6,300 ft Construction of the Central Pedestal Area (KP Reference No. VA21-001356), dated July 16, 2021.

Knight Piésold CONSULTING

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MEMORANDUM

Date:	November 10, 2021	**File No.:**	VA101-00126/25-A.01
		Cont. No.:	VA21-01996
To:	Mr. Mike Harvie		
Copy To:	Mr. Corey Warner, Mr. Johnathan Hoover, Mr. Mark Thompson		
From:	Daniel Fontaine, Jason Gillespie, Kevin Davenport		
Re:	**Approval to Commence EL. 6,400 ft Construction of the Central Pedestal Area**		

1.0 INTRODUCTION

Montana Resources, LLP (MR) is continuing construction of the elevation (EL.) 6,350 ft lift of the East-West and North-South Embankments from approximately Section 8+00W through 18+00N (the Central Pedestal Area). MR has requested approval from Knight Piésold Ltd. (KP) and the Engineer of Record (EOR) of the Yankee Doodle Tailings Impoundment (YDTI) to commence construction of the EL. 6,400 ft lift in this same area. Previous approvals to proceed with construction of the EL. 6,250 ft (KP, 2021a), EL. 6,300 ft (KP, 2021b) and EL. 6,350 ft (KP, 2021c) lifts has been provided by KP and the EOR.

2.0 CONSTRUCTION AREA FOR APPROVAL

MR has requested approval to begin construction of the EL. 6,400 ft lift to allow for concurrent placement of material within the EL. 6,350 and 6,400 lifts. This placement strategy considers the projected U material quality and current extents of the EL. 6,350 ft lift construction. The EL. 6,350 ft is being undertaken in two zones, with the outer 150 feet of material (downstream edge) still to placed. The Construction Management Plan (CMP) (KP, 2018) specifies that "*the most durable and high strength Zone U material is to be placed in the critical sections of the embankment. Critical sections are considered to include the embankment face and highest sections of the Zone U materials."* The approval of EL. 6,400 ft lift construction would allow MR to commence construction in a similar practice (two zones) and selectively place the higher quality U materials in the defined critical sections to the most practicable extent. Construction of the EL. 6,350 ft and EL. 6,400 ft lifts is expected to continue through Q2 of 2022.

3.0 CONSTRUCTION MONITORING PROGRAM

3.1 OVERVIEW

MR and KP continue monitoring piezometric levels, surface deformations and subsurface deformations to detect changing conditions associated with construction loading in the Central Pedestal Area. The construction monitoring program includes the following:

- Daily visual inspection by a KP engineer and/or MR site representative
- Piezometric monitoring of select instruments relative to pre-defined Construction Performance Parameter (CPP) thresholds and associated Trigger-Action Response Plans (TARPs)
- Surface deformation monitoring using the following techniques to identify changes in deformation rates and behavior due to construction (should they occur):

- Daily DGPS surface deformation monitoring
- InSAR Bulletin monitoring (17 bulletins completed to date, each covering a 22-day period). Bulletins are not planed to be completed during the snow season (November through April)
- MapTek laser scans of the East-West Embankment Central Pedestal Area (22 weekly scans completed to date)
- Weekly crack mapping and progression monitoring
- Monthly review of Global Navigation Satellite System (GNSS) surface deformation instrumentation data
- Monthly review of inclinometer data for assessment of subsurface deformation magnitudes/rates
- Periodic review of Geo4Sight instrumentation data to assess subsurface deformation magnitudes/rates

3.2 SUMMARY OF CONSTRUCTION MONITORING TO-DATE

The monitoring program was initiated prior to, and has remained active throughout, construction in the Central Pedestal Area using the techniques described in Section 3.1. A high-level summary of monitoring findings from October 1 through 31, 2021, while construction of the EL. 6,300 ft, and 6,350 ft lifts was active, is provided below:

- Piezometric elevations at designated CPP monitoring sites have monitored generally stable trends throughout construction and have not monitored any increasing pore water pressure trends during EL. 6,300 ft and 6,350 ft construction. CPP instruments on Section 0+00 and 8+00W, including within the perched zone, remained well below the assigned CPP piezometric threshold elevations.
- DGPS-based manual surface deformation monitoring has observed elevated surface deformation rates localized around the EL. 6,450 ft Surcharge and Central Pedestal Area construction areas resulting from construction loading. The onset of elevated deformations corresponds with progression of rockfill placement and rates have slowed following completion of construction within a given area. Data are not indicative of progressive (accelerating) deformations following construction. Monuments installed further from construction have monitored little or no change in deformation rates over the construction period.
- InSAR surface deformation bulletins are available for pre-construction conditions (5 bulletins) and during construction (12 bulletins). Bulletins have observed elevated deformations within the footprint of newly constructed lifts and localized around the construction area. Deformation rates have been observed to slow following completion of rockfill placement within a given area. No detectable deformations have been observed along the Seep 10 bench or mid-slope of the central tailings pipeline ramp. These findings are consistent with expectations and DGPS survey-monitoring.
- Laser scans of the East-West Embankment Central Pedestal Area (downstream embankment shell) have monitored relatively constant lateral deformation rates throughout construction and have not identified progressive (accelerating) deformations.
- Minor hairline cracking has been observed both upstream and downstream of Central Pedestal Area construction and has progressed spatially along with rockfill placement. Some lengthening of cracks has been observed but cracks have generally remained of hairline aperture and with no discernable vertical offset.

Surface deformation monitoring results to-date have exhibited a consistency between the data provided by the multiple monitoring methods including DGPS, GNSS, inSAR Bulletins, and laser scans. InSAR Bulletins are unlikely to provide usable data during the winter season and are planned to be discontinued from approximately November through April, weather depending. KP recommends that inSAR Bulletins continue to be run until snow adversely impacts the data quality or usability. The likely discontinuation of inSAR bulletins during winter places more importance on collection of regular and high-quality DGPS survey data during the winter months. KP is satisfied that the current DGPS monitoring (or an equivalent technique) and regular laser scans are sufficient to identify and characterize construction-related deformations trends through the winter so long as similar deformation trends continue (i.e, no unexpected or accelerating deformations are observed) and CPP pore water pressures remain within the Low Risk classification.

4.0 CONSTRUCTION MANAGEMENT PRACTICES

It is anticipated that an MR site representative will take over the on-site monitoring responsibilities from the KP engineer in November 2021. KP will continue to suapport the monitoring program remotely. Construction activities, including foundation preparation and fill placement, will continue to be completed as per the CMP. Foundation preparation is to be documented by the representative and reviewed by KP prior to initial material placement.

5.0 APPROVAL TO COMMENCE PLACEMENT

KP has reviewed the available monitoring data collected during EL. 6,250 ft, EL. 6,300 ft and EL. 6,350 ft lift construction to date. Piezometric and deformation monitoring do not indicate development of adverse conditions due to construction. KP and the EOR are satisfied that placement of the EL. 6,400 ft lift can commence and that adequate monitoring systems are in place to continue monitoring as construction progresses.

KP and MR will continue to develop and refine the construction monitoring program during this construction period as appropriate. KP may recommend stopping construction in this area based on results of the monitoring data or if monitoring practices are not maintained to an appropriate standard (i.e., DGPS data collection frequency and quality not being met). The details of the construction monitoring program and approval to commence placement of subsequent lifts will be dependent on the results of the on-going monitoring programs.

Yours truly,
Knight Piésold Ltd.

PROFESSIONAL PROVINCE OF J. R. R. GILLESPIE # 42239 BRITISH COLUMBIA ENGINEER
2021-11-10

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Approval that this document adheres to the Knight Piésold Quality System: DDF

References:

Knight Piésold Ltd. (KP, 2018). Yankee Doodle Tailings Impoundment: Construction Management Plan (KP Reference No. VA101-126/12-5 Rev. 3). May 1, 2018.

Knight Piésold Ltd. (KP, 2021a). Memorandum on Approval to Commence EL. 6,250 ft Construction of the North-South Embankment (KP Reference No. VA21-001148), dated June 17, 2021.

Knight Piésold Ltd. (KP, 2021b). Memorandum on Approval to Commence EL. 6,300 ft Construction of the Central Pedestal Area (KP Reference No. VA21-001356), dated July 16, 2021.

Knight Piésold Ltd. (KP, 2021c). Memorandum on Approval to Commence EL. 6,350 ft Construction of the Central Pedestal Area (KP Reference No. VA21-001727), dated September 24, 2021.

APPENDIX E

YDTI Central Pedestal Construction - Monthly Summary Letter No. 1

(Pages E-1 to E-83)

Knight Piésold CONSULTING

Management System Certified by: bsi ISO 9001 ISO 14001 ISO 45001 CERTIFIED

October 6, 2021
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Dear Mike,

RE: YDTI Central Pedestal Construction – Monthly Summary Letter No. 1 (MP#1 - June 22 through July 31, 2021)

1.0 INTRODUCTION

Montana Resources, LLP (MR) owns and operates an open pit copper-molybdenum mine adjacent to the city of Butte, Montana. Tailings produced from ore processing are stored within the Yankee Doodle Tailings Impoundment (YDTI), which is a valley-fill style impoundment contained within rockfill embankments. Knight Piésold Ltd. (KP) is the designer of the Elevation (EL.) 6,450 ft lift of the North-South (N-S) and East-West (E-W) Embankments and actively monitors ongoing construction activities performed by MR, as per the Construction Management Plan (CMP; KP, 2018). KP supports MR to routinely monitor hydrogeological and geotechnical conditions as part of their operation surveillance plan for the tailings storage facility, as described in the Tailings Operations, Maintenance and Surveillance (TOMS) Manual (MR/KP, 2020).

MR is continuing construction of the YDTI embankments up to EL. 6,450 ft. The current fill placement area is located along the downstream side of the East-West and North-South Embankments between approximately Section 12+00W and 8+00N (the Central Pedestal Area) and along the EL. 6,450 ft rockfill surcharge zone in the Central Pedestal Area. KP and MR have developed and implemented a supplemental construction monitoring program that includes monitoring the piezometric and deformation response within the newly placed and existing rockfill materials during construction in this area.

This letter summarizes the construction monitoring program, construction progress, and observations for MP#1 (Monitoring Period #1) from June 22 through July 31, 2021. This is the first monitoring letter related to this construction monitoring program. Subsequent monitoring summaries will be provided on a monthly basis.

2.0 CONSTRUCTION MONITORING PROGRAM

2.1 OVERVIEW

The focused construction monitoring program for the Central Pedestal Area supplements the existing YDTI dam safety monitoring as prescribed in the TOMS Manual (MR/KP, 2020). Components of the construction monitoring program include program:

- On-site construction supervision by a KP field engineer with duties including daily visual inspection, construction progress monitoring and QA/QC activities.

- Piezometric monitoring using tiered-thresholds and an associated Trigger-Action Response Plan (TARP) for select monitoring instruments beneath and downstream of the construction areas, which have been designated as Construction Performance Parameters (CPPs). The TARP is included as Appendix A.
- Plans to utilize deformation monitoring techniques to periodically monitor surface and subsurface embankment deformation in addition to the above CPPs and TARPs. Deformation monitoring is being completed using manual survey, in-situ instrumentation, and remote sensing techniques including:
  - InSAR bulletin analyses.
  - MakTek laser scans of the East-West Embankment Central Pedestal Area.
  - Crack mapping and progression monitoring.
  - Periodic review of Global Navigation Satellite System (GNSS) surface deformation instrumentation data.
  - Periodic review of inclinometer data for assessment of subsurface deformation magnitudes/rates.

2.2 PIEZOMETRIC MONITORING

Piezometric threshold elevations and a TARP are active for CPP pore pressure instrumentation installed on East-West Embankment Sections 0+00 and 8+00W to monitor piezometric change relative to December 31, 2020 piezometric elevations (pre-construction). Data from 33 CPP instruments are accessible to KP via the Remote Monitoring System (RMS). Locations of the CPP monitoring sites are shown on Figure 1. The active CPPs are summarized in Table 1.

2.3 DEFORMATION MONITORING

Construction loading within the embankment and rockfill surcharge in Central Pedestal Area is expected to result in elevated deformation rates within the rockfill and localized around newly placed rockfill material. This expectation is consistent with previous analysis of embankment deformations which have indicated that:

- Settlement and downslope (southward) creep deformations within the Central Pedestal Area at relatively constant or slightly decreasing rates have been monitored by inSAR, GNSS and inclinometers. No progressive (accelerating) surface deformations have been observed in previous studies (KP, 2021d).
- The highest deformation rates have been observed within recently placed rockfill materials (i.e. within and localized around new construction) and within the rockfill surcharge area (rockfill overlying tailings upstream of the embankment crest).

Construction deformation monitoring will be undertaken to identify and monitor any potential local deformations to newly placed rockfill and to screen for development of unexpected deformations within the downstream shell of the Central Pedestal Area, which may be indicative of elevated embankment instability risk. The monitoring methods listed below were implemented to actively monitor embankment deformation. Additional detail regarding the utility of each technique is provided in KP (2021c & 2021d).

- Daily survey-monitoring of monuments using Differential Global Positioning System (DGPS).
- InSAR bulletin analyses available every 11-days to monitor line-of-sight deformations over a rolling 22-day monitoring period.
- Weekly laser scans to monitor for lateral displacement with coverage of the downstream slope of the East-West Embankment within the Central Pedestal Area (Sections 0+00 through 12+00W).
- Weekly tension crack mapping and monitoring of any aperture and/or length change.

- Monthly review of surface deformation data from three GNSS instruments located downstream of the construction area.
- Monthly review of inclinometer and Geo4Sight instrumentation for assessment of subsurface deformation magnitudes/rates.

Survey monument and deformation instrument locations are shown on Figure 2.

Subsurface deformations within the embankments downstream of the construction area are monitored within the Seep 10 Bench and the Central Tailings Pipeline Ramp using three inclinometer sites (DH19-S3, DH19-S4, and DH19-S7) and calculated relative to a July 1, 2020 baseline date.

3.0 CONSTRUCTION SUMMARY

3.1 OVERVIEW

Construction activity in the Central Pedestal Area during MP#1 comprised rockfill placement for the EL. 6,250 ft lift along the East-West and North-South Embankments within the haul ramp infill area and the EL. 6,450 ft central rockfill surcharge lift. The extent of rockfill placement within these areas as of July 31, 2021 is illustrated on Figure 3.

Rockfill (‘U’ material) was sourced from the Continental Pit and end-dumped by the MR haul fleet in maximum 50-ft lifts. Existing fill surfaces within the construction areas were prepared as per the CMP (KP, 2018) prior to rockfill placement.

3.2 EMBANKMENT CONSTRUCTION

KP provided MR approval to begin construction of the initial EL. 6,250 ft lift (the first 50 ft lift in the Central Pedestal Area to be monitored by this supplemental construction monitoring program) on June 17, 2021 (KP, 2021a). Construction activities related to this lift during MP#1 are summarized below:

- Subgrade preparation for the EL. 6,250 ft lift began on June 21, 2021 and was sequentially advanced to allow lift construction to advance westward. Subgrade approval was provided by KP prior to rockfill placement.
- Placement of rockfill (‘U’ material) began on June 22, 2021 and progressed westward from approximately Section 8+00N to Section 0+00. Construction of this lift was completed by July 31, 2021.

KP also provided MR with approval to commence EL. 6,300 ft lift construction on July 16, 2021(KP, 2021b); however, the lift construction did not commence during MP#1.

3.3 ROCKFILL SURCHARGE CONSTRUCTION

Construction of the EL. 6,450 ft central rockfill surcharge commenced in February 2021 and continued through MP#1. Rockfill placement (‘U’ material) was advanced from East to West from approximately Section 0+00 to 12+00W during MP#1.

3.4 QUALITY DOCUMENTATION

Earthworks and quality documentation related to the Central Pedestal Area construction were generally completed as outlined in the CMP (KP, 2018). The following Quality Control (QC) and Quality Assurance (QA) documentation was completed by KP and MR during MP#1:

- **Non-conformance Report (NCR):** NCR 006 was issued when a small volume of 'U' material was placed outside of the approved subgrade area. KP reviewed the NCR, and the material was approved as placed with no remedial actions required.
- **Subgrade Inspection Records (SIR):** SIRs 030 and 031 were completed by KP following review and approval of the EL. 6,250 ft lift's prepared subgrade.
- **Daily and Weekly Progress Reports:** Daily and weekly construction and monitoring progress reports were completed by KP throughout MP#1.
- **As-built Survey (available electronically):** An as-built survey was completed by MR for the EL 6,250 ft lift and was provided to KP on September 10, 2021.

4.0 CONSTRUCTION MONITORING PROGRAM OBSERVATIONS

4.1 PIEZOMETRIC MONITORING

No CPP threshold exceedances occurred during MP#1, and all instruments remain within the Low-Risk TARP classification. CPP sites monitored relatively stable pore water pressures throughout the monitoring period and only minor construction-induced pore pressure increases were observed. Key monitoring findings include:

- Pore pressures monitored within the basal system on Sections 0+00 and 8+00W generally monitored stable or slightly decreasing trends during the MP#1 construction period. Instrumentation in drillholes DH15-S4 (VW1 and VW2) and DH15-S5 (VW1) monitored minor increases (ranging from 1 to 5 ft increase) beginning mid-June; however, these are interpreted to have resulted from temporary pooling of tailings discharge along the upstream face of the rockfill surcharge as discussed in KP (2021c) and are not a response to embankment construction. These elevated pore water pressures have subsequently dissipated and remained well within the Low-Risk TARP classification (37 ft below the Moderate-Risk threshold) throughout MP#1.
- Minor construction related pore pressure increases were observed within perched saturated zones on Section 0+00 in response to the EL. 6,250 ft lift of the haul ramp infill. These increases ranged between 2 and 3 ft at DH17-S2 VW5 and DH19-S7 VW7, respectively, as shown on Figure B.3 (Appendix B). The monitored increases remain approximately 23-33 ft below the 35 ft CPP threshold and both CPPs remain within the Low-Risk TARP classification.
- Majority of the CPP instruments that were unsaturated prior to construction have remained so throughout MP#1. DH17-S2 VW5 became saturated on June 23, 2021 as a result of seasonal variations and similar trends were observed in previous years prior to construction.

4.2 DEFORMATION MONITORING

4.2.1 SURFACE DEFORMATION MONITORING

Surface deformation monitoring during MP#1 has observed elevated deformations within the footprint of and localized around the EL. 6,450 ft lift of the rockfill surcharge and EL. 6,250 ft lift of the haul ramp infill, as expected. Findings do not indicate the development of unexpected deformations within the downstream embankment shell nor evidence of progressive (accelerating) surface deformations. Key monitoring findings are summarized below.

Localized surface deformations were observed around EL. 6,450 ft rockfill surcharge as construction progressed from East to West during MP#1 (and prior). These elevated deformations are consistent with previous monitoring results and expectations for placement of additional surcharge load (KP, 2021d). Deformation rates increased coincident with advancement of rockfill placement and decreased following completion of construction in a given area. No evidence of progressive (accelerating) surface deformations were observed. Key findings include:

- Ten InSAR bulletins available during EL. 6,450 ft surcharge construction (from April 13 through August 1, 2021; Appendix C3) illustrate the westward advancement of elevated surface deformation rates as surcharge construction progressed beginning in February 2021. Line-of-site deformation rates range between approximately -3 and -15 in/year (-0.2 and -1 inches per 22-day bulletin monitoring period) and are localized concentrically around the footprint of the new construction. Negative rates indicate deformation away from the satellite. Higher deformation rates are observed along the upstream toe of the surcharge as compared to the downstream toe (near the embankment crest), as expected. Review of sequential bulletins generally indicate that elevated deformation rates begin to decrease following rockfill placement in a given area.
- Survey-monitoring of monuments situated downstream of EL. 6,450 ft surcharge construction (US-01, US-02, and US-03) monitored relatively consistent and predominantly vertical surface deformations near the downstream extent of the construction area during MP#1. Measurements exhibit typical DGPS noise levels resulting in deformation rates that fluctuate up to +/-0.1 ft/day. Monitored average vertical deformation rates during MP#1 ranged between approximately 8 to >10 in/year and are generally consistent with inSAR bulletin monitoring.

Minor elevated, localized surface deformation rates were observed around the EL. 6,250 ft embankment lift as construction progressed on the haul ramp infill from Section 8+00N towards Section 0+00.No evidence of progressive (accelerating) surface deformations were observed and no significant deformations were monitored downstream of the construction area as discussed below. Key findings include:

- The four InSAR bulletins available during construction of the EL. 6,250 ft lift did not detect elevated surface deformation rates within or surrounding the construction area. This indicates that any increases in deformation rates resulting from construction, if present, fall beneath the detection limit of the bulletin technique (<3 in/year, <0.2 in/22-days).
- Survey-monitoring of monuments situated downstream of EL. 6,250 ft embankment construction (DS-01, DS-02, DS-03, DS-04, DS-05, and DS-06) monitored minor increases in surface deformation rates (predominantly settlement) during MP#1 that correspond to advancement of construction loading. Average MP#1 deformation rates ranged from approximately 8 to >10 in/year with higher deformation rates observed in the central and western sections of the pipeline ramp. An apparent increase in deformation rate was observed at all downstream monuments corresponding to the period of active EL. 6,250 ft lift construction.
- GNSS surface deformation data from drillhole DH19-S7 located on the central tailings pipeline ramp on Section 0+00 (Appendix C2) are indicative of constant or slowing deformations throughout MP#1. Data from this period fall along the long-term trendline projected from 2020 monitoring results.
- Thirteen new surface cracks were identified as the EL. 6,250 ft lift progressed onto the existing Central Tailings Pipeline Ramp (newer fill) in the area shown on Figure 3. These cracks are inferred to result from differential settlement experienced by the pipeline ramp (higher magnitude) as opposed to the historical pipeline ramp and haul road (lower magnitude). The observed settlement cracks have hairline aperture and little to no vertical offset. Subsequent weekly crack aperture and length monitoring has not identified further crack development following passage of loading. Historical cracking was observed in the same area that is inferred to result from Central Tailings Pipeline Ramp construction in 2020.

No significant increases in surface deformation rates (vertical or lateral) were identified downstream of the EL. 6,250 ft embankment lift construction area within the downstream shell of the East-West Embankment. InSAR bulletin and laser scan remote sensing and survey-monitoring were used to screen for elevated deformations in this area. Key findings include:

- The four InSAR bulletins during construction of the EL. 6,250 lift have not detected deformations within the downstream shell of the central pipeline ramp (East-West Embankment) or on the Seep 10 Bench. Deformations are periodically visible along the downstream crest of the tailings pipeline ramp; however, these are consistent with pre-construction deformation rates (approximately 3 to 6 in/year). Baseline line-of-site deformation rates within these areas are understood to be less than the bulletin detection limit (<3 in/year, <0.2 in/22-days). The absence of detectable, elevated deformation rates in this area is interpreted in conjunction with in-situ and manual monitoring results to indicate that construction has not resulted in elevated deformations outside the immediate construction area.
- Laser scans of the downstream East-West Embankment shell within the Central Pedestal Area do not appear to have monitored discernable elevated deformation rates immediately downstream of the EL. 6,250 ft lift construction or progressive (accelerating) deformations. Lateral deformations have previously been characterized as being predominantly in the southward (downslope) direction using inSAR and GNSS instrumentation (KP, 2021d); however, rates observed by the six laser scans completed during MP#1 have fluctuated between southward and northward directions (Appendix C4). This is interpreted to indicate that the lateral embankment deformations monitored during MP#1 fall below the detection limit.
- Survey-monitoring of monuments along a bench midway down the downstream slope (MS-01, MS-02, and MS-03) and along the Seep 10 Bench (SB-01, SB-02, and SB-03) monitored generally constant deformation rates throughout MP#1 ranging between approximately 5 to >10 in/year with predominant vertical settlement. North-South and East-West deformations were relatively minor.
- GNSS instrumentation installed on the Seep 10 Bench at drillholes DH19-S3 and DH19-S4 (on section 0+00 and 8+00W, respectively) have continued to indicate relatively constant surface displacement rates that are consistent with conditions monitored prior to construction (Figure C2.1 through C2.4)

4.2.2 SUBSURFACE DEFORMATION MONITORING

Inclinometer data from MP#1 were generally consistent with previous findings from 2020 and 2021 and do not indicate any evidence of progressive (accelerating) embankment deformation resulting from construction activity. Key findings include:

- Seep 10 Bench inclinometers DH19-S3 and DH19-S4 both continued to monitor minor southward deformations within the basal rockfill and/or foundation material at a relatively constant rate (KP, 2021c). The deformation rates or degree of settlement influence do not appear to have been impacted by construction activities, as expected.
- Inclinometer DH19-S7 installed immediately downstream of the EL 6,250 ft lift construction on Section 0+00 continues to experience high levels of settlement-induced casing distortion, consistent with the settlement rates monitored by inSAR and GNSS during 2020 and 2021 (pre-construction). Construction loading during EL. 6,250 ft lift placement had no discernable influence on subsurface deformation behavior at this site. Incremental deformation rates have remained relatively constant within the rockfill, alluvium and weathered bedrock through MP#1.

Data from the inclinometers are presented in Appendix D on incremental and cumulative bottom-referenced deformation plots. These data are reviewed monthly by KP as part of the ongoing construction and dam safety monitoring programs.

Limited subsurface deformation data are available within the upstream embankment shell from Elexon Geo4Sight instrumentation (multi-node wireless angular deformation instrumentation; KP, 2021c) installed within drillhole DH20-S2 on Section 8+00W. This instrumentation has observed influence from EL. 6,450 ft surcharge construction from approximately February through July 2021. As discussed in KP (2021c), angular deformations have primarily been monitored within relatively finer grained rockfill material of the 1972 and Triangle Infill lift tops. These angular deformations are inferred to be predominantly due to settlement/compression of these materials in response to construction loading. The magnitude of angular deformations increased throughout MP#1, as shown on Figure D.11. KP will continue to monitor the Geo4Sight instrumentation and anticipates that these settlement rates will slow with time following completion of construction.

5.0 SUMMARY

KP and MR have developed and implemented a supplemental construction monitoring program to monitor for elevated piezometric conditions and/or deformation rates resulting from embankment construction within Central Pedestal Area. Construction activity in the Central Pedestal Area during MP#1 comprised rockfill placement for the EL. 6,250 ft lift along the East-West and North-South Embankments within the haul ramp infill area and the EL. 6,450 ft central rockfill surcharge lift.

Findings of the monitoring program indicate that construction has not substantially impacted pore water pressures within the Central Pedestal Area and all CPP monitoring sites remain within the Low-Risk classification as of July 31, 2021. Elevated deformations have been observed within the newly constructed lifts and localized concentrically around the construction, as expected. None of the monitored deformations are indicative of progressive (accelerating) deformations but rather increase with advancement of construction and decrease thereafter. No detectable increases in surface or subsurface deformation rates with the downstream shell of the East-West Embankment were detected during MP#1. KP and the YDTI Engineer-of-Record provided approval for MR to proceed with the EL. 6,300 ft lift of the haul ramp infill in the Central Pedestal Area based on observations during MP#1.

Knight Piésold CONSULTING

The monitoring program presented herein will be continued as construction in the Central Pedestal Area continues during 2021 and into 2022. We trust the above information meets your immediate needs. Please do not hesitate to contact the undersigned should you have any questions.

Yours truly,
Knight Piésold Ltd.

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2021-10-06

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2021-10-06

Prepared: ______________________
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MONTANA LICENSED PROFESSIONAL ENGINEER
2021-10-06
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No. 59785 PE

Reviewed: ______________________
Daniel Fontaine, P.E.
Specialist Engineer | Associate
Engineer of Record

Approval that this document adheres to the Knight Piésold Quality System: DDF

Attachments:

Table 1 Rev 0	Construction Performance Parameters Piezometric Condition Summary
Figure 1 Rev 0	El. 6,450 Construction Monitoring Piezometric Performance Monitoring Sites
Figure 2 Rev 0	El. 6,450 Ft Lift Construction Monitoring Survey Monuments and Tension Crack Locations
Figure 3 Rev 0	El. 6450 Ft Lift Embankment Construction Progress as of July 31, 2021
Appendix A	Piezometric Construction Performance Parameters and Trigger Action Response Plan
Appendix B	Piezometric Monitoring Plots
Appendix C	Surface Deformation Monitoring Plots
Appendix D	Subsurface Deformation Monitoring Plots

References:

Knight Piésold Ltd. (KP, 2018). Construction Management Plan (KP Reference No. VA101-126/12-5 Rev 3), dated May 1, 2018.

Knight Piésold Ltd. (KP, 2021a). Memo – Approval to Commence EL. 6,250 ft Construction of the North-South Embankment (KP Reference No. VA21-01148), dated June 17, 2021.

Knight Piésold Ltd. (KP, 2021b). Memo – Approval to Commence EL. 6,300 ft Construction of the Central Pedestal Area (KP Reference No. VA21-01356), dated August 24, 2021.

Knight Piésold Ltd. (KP, 2021c). Letter – Q2 2021 YDTI Piezometric and Deformation Monitoring Summary (KP Reference No. VS21-01320), dated June 30, 2021.

Knight Piésold Ltd. (KP, 2021d). Report – 2020 Data Analysis Report (KP Reference No. VA101-126/23-5 Rev 0), dated June 30, 2021.

Montana Resources, LLP. and Knight Piésold Ltd. (MR/KP, 2020). 2020 Tailings Operations, Maintenance and Surveillance (TOMS) Manual (Reference No. VA101-126/23-1 Rev 4), dated May 13, 2020.

Copy To: Mark Thompson, Corey Warner, Travis Birkenbuel (Montana Resources)

TABLE 1

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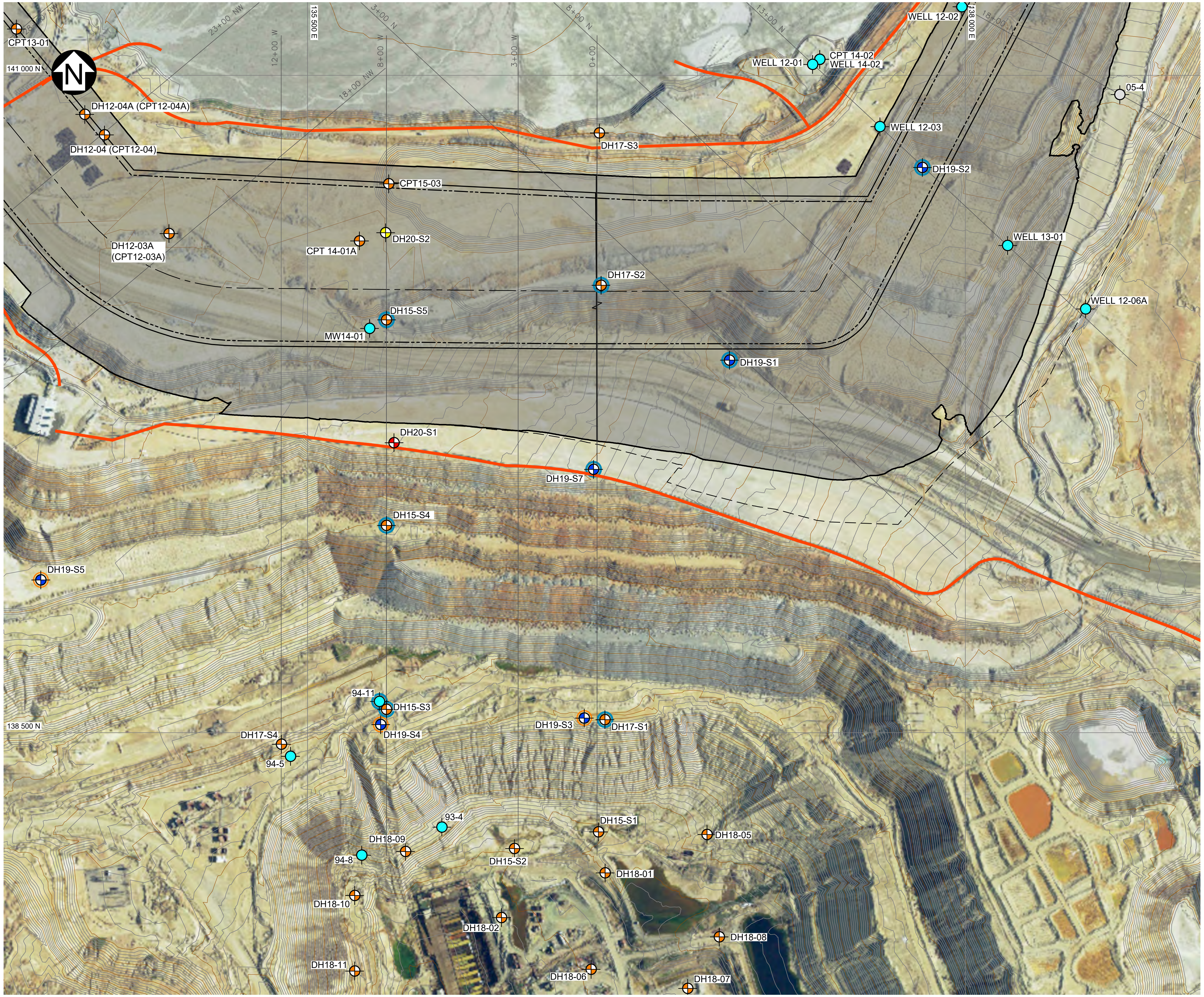
MONTANA RESOURCES, LLP
YANKEE DOODLE TAILINGS IMPOUNDMENT
CONSTRUCTION PERFORMANCE PARAMETERS PIEZOMETRIC CONDITION SUMMARY

Construction Performance Parameter	Drillhole ID	Sensor ID	Piezometric Elevation on December 31, 2020 (ft)	TARP Piezometric Thresholds (ft)^{2}	Piezometric Elevation (ft)	Pore Pressure (ft H2O)	Monthly Change in Piezometric Elevation (ft)	Comments
Basal Zone Piezometric Conditions Section 0+00	DH17-S2	DH17-S2 VWP3	5892.89	5932.89	5892.76	-0.13	-0.31	
	DH19-S7	DH19-S7 VWP1	5750.51	5790.51	5748.86	61.73	-0.79	
		DH19-S7 VWP2	5783.52	5824.13	5783.85	-0.28	-0.04	
	DH17-S1	DH17-S1 VWP1	5682.02	5703.06	5677.18	-5.88	-1.03	
		DH17-S1 VWP2	5719.45	5739.45	5716.73	3.82	-0.45	
		DH17-S1 VWP3	5749.87	5769.87	5749.78	0.78	-0.20	
Perched Zone Piezometric Conditions Section 0+00	DH17-S2	DH17-S2 VWP4	6026.19	6061.19	6024.59	1.77	-1.77	
		DH17-S2 VWP5	6201.15	6236.15	6209.03	1.17	1.32	
		DH17-S2 VWP6	6228.97	6277.97	6230.70	-12.27	5.27	Sensor is unsaturated
	DH19-S7	DH19-S7 VWP3	5983.68	6019.13	5984.03	-0.10	-0.15	
		DH19-S7 VWP4	6013.48	6050.13	6013.85	-1.28	0.05	
		DH19-S7 VWP5	6051.38	6086.38	6053.79	3.75	0.35	
		DH19-S7 VWP6	6150.35	6185.35	6150.85	41.69	0.22	
		DH19-S7 VWP7	6168.71	6203.71	6169.84	35.71	2.69	
Basal Zone Piezometric Conditions Section 8+00W	DH15-S5	DH15-S5 VWP1	5761.50	5801.50	5760.53	92.89	-0.04	
		DH15-S5 VWP2	5850.41	5890.41	5844.30	-3.79	0.50	
	DH15-S4	DH15-S4 VWP1	5715.75	5755.75	5713.04	88.10	-1.46	
		DH15-S4 VWP2	5773.24	5813.24	5771.61	46.67	-3.93	
	DH15-S3	DH15-S3 VWP1	5665.89	5685.89	5665.37	54.47	-0.33	
	94-11	94-11 VWP1	5674.23	5714.23	5673.52	20.48	-0.11	
Perched Zone Piezometric Conditions Section 8+00W	DH15-S5	DH15-S5 VWP3	6021.46	6054.59	6020.95	-3.65	-0.14	
		DH15-S5 VWP4	6220.86	6255.86	6220.83	0.37	0.19	

NOTES:
1. CURRENT PIEZOMETRIC ELEVATION' DATA SHOWN ABOVE WERE DOWNLOADED FROM THE SENSEMETRICS WEB-PLATFORM ON JULY 31, 2021.
2. TARP THRESHOLDS ARE RELATIVE TO MEASURED DECEMBER 31, 2020 PIEZOMETRIC ELEVATIONS AS SPECIFIED IN VA21-01362.

Legend
- Low Risk Situation
- Moderate Risk Situation
- Considerable Risk Situation

0	24SEP'21	ISSUED WITH LETTER VA21-01362	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D



NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. TARP - TRIGGER-ACTION RESPONSE PLAN
3. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
4. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.

LEGEND:

- DRILLHOLE WITH NESTED FIBER-OPTIC PIEZOMETERS AND GEOPHYSICAL CASING
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- MONITORING WELL/ STAND PIPE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- DRILLHOLE - VIBRATING WIRE PIEZOMETER
- DRY MONITORING WELL
- CPP MONITORING SITES
- TAILINGS PIPELINE
- PROPERTY LINE

SCALE A 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 CONSTRUCTION MONITORING PIEZOMETRIC PERFORMANCE MONITORING SITES

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE 1 REV 0

0	05OCT'21	ISSUED WITH LETTER	SY3	RMM	KTD
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SAVED: M:\1\01\00126\25\A\Acad\FIGS\B15, 9/24/2021 2:32:57 PM , RMCLELLAN PRINTED: 10/5/2021 2:47:13 PM, FIG 1, RMCLELLAN

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
3. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.
4. TENSION CRACKS ARE MANUALLY SURVEYED WITH DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) INSTRUMENT.
5. TENSION CRACKS TC1 TO 5 HAVE BEEN COVERED DUE TO SUBGRADE PREPARATION AND EL. 6250 LIFT PLACEMENT, THUS ARE NO LONGER ACCESSIBLE AND OBSERVABLE FOR PROGRESSION MONITORING.

LEGEND:

- UPSTREAM SURVEY-MONITORING LOCATION (3)
- DOWNSTREAM SURVEY-MONITORING LOCATION (6)
- MID SLOPE SURVEY-MONITORING LOCATION (3)
- SEEP 10 BENCH SURVEY-MONITORING LOCATION (3)
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- TAILINGS PIPELINE
- TENSION CRACK

SCALE A 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 FT LIFT CONSTRUCTION MONITORING SURVEY MONUMENTS AND TENSION CRACK LOCATIONS

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE 2 REV 0

0	05OCT'21	ISSUED WITH LETTER	KTD	RMM	DDF
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SAVED: M:\1\01\00126\25\A\Acad\FIGS\B55, 9/24/2021 2:40:39 PM , RMCLELLAN PRINTED: 10/5/2021 2:55:07 PM, FIG 2, RMCLELLAN

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
3. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.

LEGEND:

- PROJECTED FILL AREA
- FILL PLACEMENT AREA
- UPSTREAM SURVEY-MONITORING LOCATION (3)
- DOWNSTREAM SURVEY-MONITORING LOCATION (6)
- MID SLOPE SURVEY-MONITORING LOCATION (3)
- SEEP 10 BENCH SURVEY-MONITORING LOCATION (3)
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- DRILLHOLE - VIBRATING WIRE PIEZOMETER
- CPP MONITORING SITES
- TAILINGS PIPELINE

SCALE A 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 FT LIFT
EMBANKMENT CONSTRUCTION PROGRESS
AS OF JULY 31, 2021

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE 3 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05OCT'21	ISSUED WITH LETTER	SY3	RMM	DDF

SAVED: M:\1\01\00126\25\A\Acad\FIGS\B60, 10/5/2021 3:27:21 PM , RMCLELLAN PRINTED: 10/5/2021 3:31:02 PM, FIG 3, RMCLELLAN

APPENDIX A

Piezometric Construction Performance Parameters and Trigger Action Response Plan

(Table A.1)

Knight Piésold CONSULTING

TABLE A.1

MONTANA RESOURCES LLP.
YANKEE DOODLE TAILINGS IMPOUNDMENT

CONSTRUCTION PERFORMANCE PARAMETERS AND TRIGGER-ACTION RESPONSE PLANS FOR 2021 CONSTRUCTION MONITORING PROGRAM

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ID	Construction Performance Parameter	Low Risk Situation	Moderate Risk Situation	Considerable Risk Situation
1.0 Embankment Piezometric Conditions				
1.1	**Basal Zone Piezometric Conditions Section 0+00**	**Monitored Section 0+00 piezometric elevations satisfy both of the following conditions:** • VWPs in drillhole DH17-S1 monitor no more than 20 ft increase from December 31, 2021 piezometric elevations • VWPs in drillholes DH17-S2 and DH19-S7 monitor no more than 40 ft increase from December 31, 2021 piezometric elevations • DH17-S2 VW1 & VW3 • DH19-S7 VW1 & VW2 • DH17-S1 VW1, VW2 & VW3 **Response:** N/A **Monitoring:** • Weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Monitored Section 0+00 piezometric elevations meet one of the following conditions:** • VWPs in drillhole DH17-S1 monitor more than 20 ft increase from December 31, 2021 piezometric elevations • VWPs in drillholes DH17-S2 or DH19-S7 monitor more than 40 ft increase from December 31, 2021 piezometric elevations • DH17-S2 VW1 & VW3 • DH19-S7 VW1 & VW2 • DH17-S1 VW1, VW2 & VW3 **Response:** • Increase piezometric CPP reporting frequency **Monitoring:** • Semi-weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Monitored Section 0+00 piezometric elevations meet one of the following conditions:** • VWPs in drillhole DH17-S1 monitor more than 40 ft increase from December 31, 2021 piezometric elevations • VWPs in drillholes DH17-S2 and DH19-S7 monitor more than 40 ft increase from December 31, 2021 piezometric elevations • VWPs in drillholes DH17-S2 or DH19-S7 monitor more than 40 ft increase and VWPs in drillhole DH17-S1 monitor more than 20 ft increase from December 31, 2021 • DH17-S2 VW1 & VW3 • DH19-S7 VW1 & VW2 • DH17-S1 VW1, VW2 & VW3 **Response:** • Stop construction loading • Assess whether construction loading can continue safely or if alternative placement areas should be utilized to allow pore water pressure dissipation. • Increase piezometric CPP reporting frequency **Monitoring:** • Daily piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS
1.2	**Perched Zone Piezometric Conditions Section 0+00**	**Piezometric elevations monitored by sensors within the following Section 0+00 drillholes remain within 35 ft of conditions monitored on December 31, 2020:** • DH17-S2 VW4,VW5 & VW6 • DH19-S7 VW3, VW4, VW5, VW6 & VW7 **Response:** N/A **Monitoring:** • Weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Piezometric elevations monitored by sensors within one of the following Section 0+00 drillholes monitor an increase of 35 ft or greater relative to conditions monitored on December 31, 2020:** • DH17-S2 VW4, VW5 & VW6 • DH19-S7 VW3, VW4, VW5, VW6, VW7 **Response:** • Increase piezometric CPP reporting frequency **Monitoring:** • Semi-weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Piezometric elevations monitored by sensors within Section 0+00 drillholes satisfy one of the following conditions:** • VWPs in both drillholes monitor an increase of 35 ft or greater relative to conditions monitored on December 31, 2020 • VWPs in DH19-S7 monitor an increase of 70 ft or greater relative to conditions monitored on December 31, 2020 • DH17-S2 VW4, VW5 & VW6 • DH19-S7 VW3, VW4, VW5, VW6 & VW7 **Response:** • Stop construction loading • Assess whether construction loading can continue safely or if alternative placement areas should be utilized to allow pore water pressure dissipation. • Increase piezometric CPP reporting frequency **Monitoring:** • Daily piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS
1.3	**Basal Zone Piezometric Conditions Section 8+00W**	**Monitored Section 8+00W piezometric elevations satisfy both of the following conditions:** • VWPs in drillhole DH15-S3 monitor no more than 20 ft increase from December 31, 2021 piezometric elevations • VWPs in drillholes DH15-S4 and DH15-S5 monitor no more than 40 ft increase from December 31, 2021 piezometric elevations • DH15-S5 VW1 & VW2 • DH15-S4 VW1 & VW2 • DH15-S3 VW1 **Response:** N/A **Monitoring:** • Weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Monitored Section 8+00W piezometric elevations meet one of the following conditions:** • VWPs in drillhole DH15-S3 monitor more than 20 ft increase from December 31, 2021 piezometric elevations • VWPs in drillholes DH15-S4 or DH15-S5 monitor more than 40 ft increase from December 31, 2021 piezometric elevations • DH15-S5 VW1 & VW2 • DH15-S4 VW1 & VW2 • DH15-S3 VW1 **Response:** • Increase piezometric CPP reporting frequency **Monitoring:** • Semi-weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Monitored Section 8+00 piezometric elevations meet one of the following conditions:** • VWPs in drillhole DH15-S3 monitor more than 40 ft increase from December 31, 2021 piezometric elevations • VWPs in drillholes DH15-S4 and DH15-S5 monitor more than 40 ft increase from December 31, 2021 piezometric elevations • VWPs in drillholes DH15-S4 or DH15-S5 monitor more than 40 ft increase and VWPs in drillhole DH15-S3 monitor more than 20 ft increase from December 31, 2021 • DH15-S5 VW1 & VW2 • DH15-S4 VW1 & VW2 • DH15-S3 VW1 **Response:** • Stop construction loading • Assess whether construction loading can continue safely or if alternative placement areas should be utilized to allow pore water pressure dissipation. • Increase piezometric CPP reporting frequency **Monitoring:** • Daily piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS
1.4	**Seep 10 Perched Zone Piezometric Conditions Section 8+00W**	**Drillhole DH15-S5 VW3 continues to monitor unsaturated conditions (zero or negative pore pressures) observed on December 31, 2020:** • DH15-S5 VW3 **Response:** N/A **Monitoring:** • Weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Drillhole DH15-S5 VW3 monitors resaturation (positive pore water pressure) from the unsaturated conditions monitored on December 31, 2020 but remains within 30 ft of the resaturation piezometric elevation** • DH15-S5 VW3 **Response:** • Increase piezometric CPP reporting frequency **Monitoring:** • Semi-weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Piezometric elevations monitored by drillhole DH15-S5 VW3 increase 30 ft or greater relative to conditions monitored on December 31, 2020** • DH15-S5 VW3 **Response:** • Stop construction loading • Assess whether construction loading can continue safely or if alternative placement areas should be utilized to allow pore water pressure dissipation. • Increase piezometric CPP reporting frequency **Monitoring:** • Daily piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS
1.5	**Upper Perched Zone Piezometric Conditions Section 8+00W**	**Piezometric elevations monitored drillhole DH15-S5 VW4 remain within 35 ft of conditions monitored on December 31, 2020:** • DH15-S5 VW4 **Response:** N/A **Monitoring:** • Weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Piezometric elevations monitored drillhole DH15-S5 VW4 increase by 35 ft or greater relative to conditions monitored on December 31, 2020** • DH15-S5 VW4 **Response:** • Increase piezometric CPP reporting frequency **Monitoring:** • Semi-weekly piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS	**Piezometric elevations monitored drillhole DH15-S5 VW4 increase by 70 ft or greater relative to conditions monitored on December 31, 2020** • DH15-S5 VW4 **Response:** • Stop construction loading • Assess whether construction loading can continue safely or if alternative placement areas should be utilized to allow pore water pressure dissipation. • Increase piezometric CPP reporting frequency **Monitoring:** • Daily piezometric construction CPP reporting • Hourly piezometric threshold evaluation by RMS

\\KPL\VA-Prj$\1\01\00126\25\A\Correspondence\VA21-01362 - Monthly El. 6,450 Construction Progress and Monitoring Summary (June 22 to July 31)\Appendices\Appendix A - Piezometric CPP and TARP\[Table A.1 - CPP and TARP Structure - rA.xlsm]Table E.1 - QPOs & TARPs

NOTES:

1. THE ENGINEER-OF-RECORD (EoR) SHALL BE NOTIFIED WHEN OBSERVED CONDITIONS TRANSITION BETWEEN 'RISK SITUATIONS' (E.G. MOVE FROM LOW TO MODERATE RISK, ETC.).

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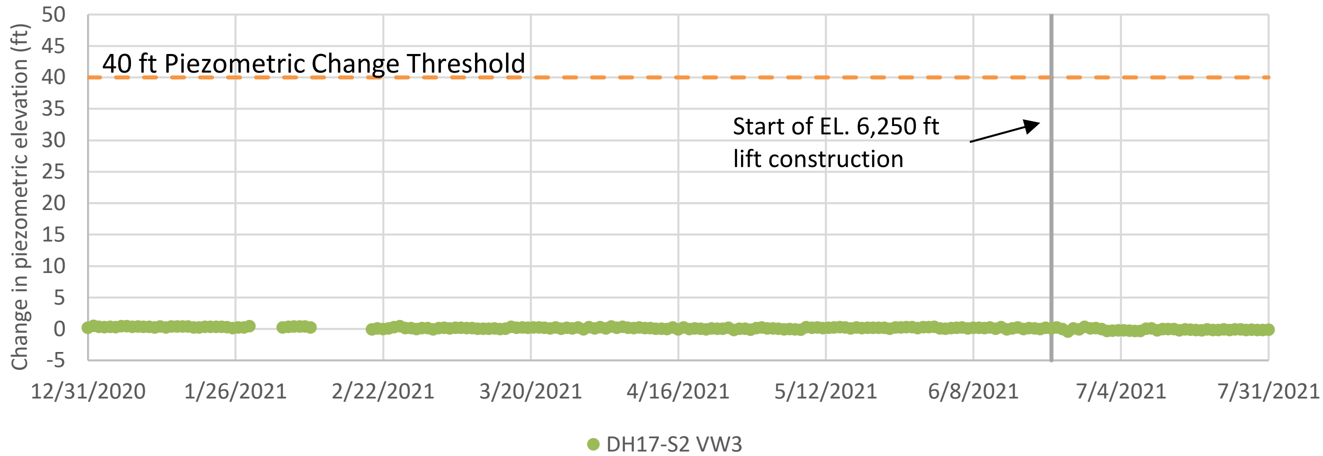
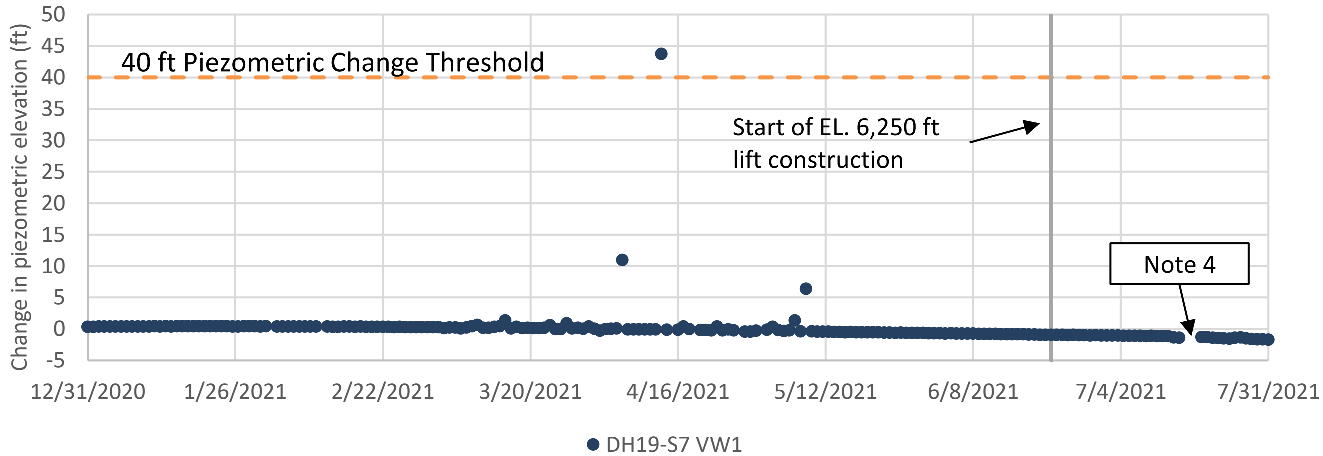
REV	DATE	DESCRIPTION	PREP'D	RVW'D

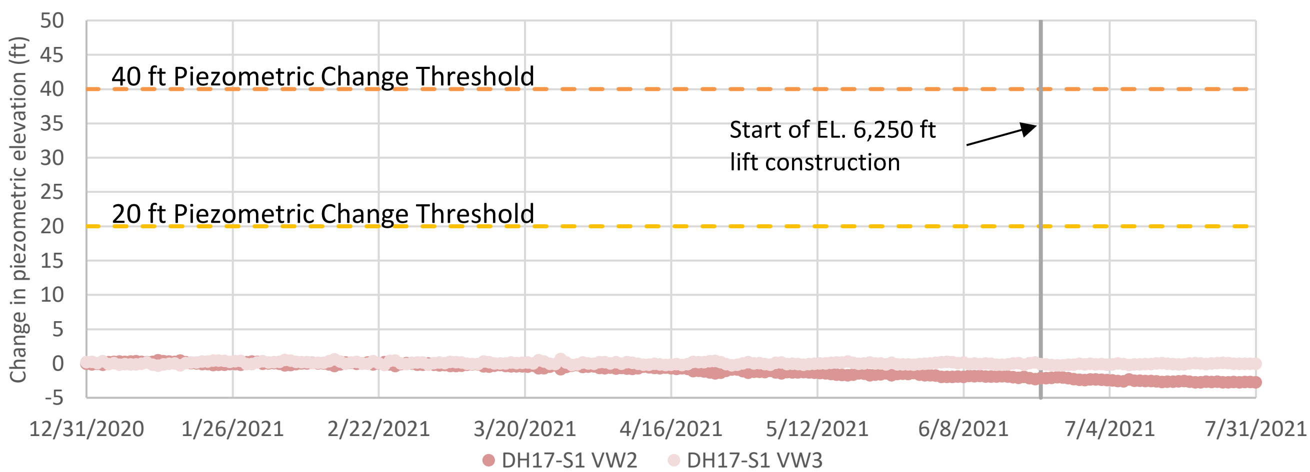
APPENDIX B

Piezometric Monitoring Plots

(Figures B.1 to B.8)







NOTES:

1. CHANGE IN PIEZOMETRIC ELEVATION IS CALCULATED RELATIVE TO THE DAILY AVERAGE PIEZOMETRIC ELEVATION MEASURED ON DECEMBER 31, 2020.
2. SENSOR DH19-S7 VW2 HAS BEEN OMITTED FROM PLOTS AS IT HAS BEEN UNSATURATED SINCE INSTALLATION IN 2019.
3. DATA FROM SENSOR DH17-S1 VW1 HAS BEEN OMITTED AFTER NOVEMBER 7, 2020 AS THE SENSOR BECAME UNSATURATED.
4. SENSORS DH19-S7 VW1 AND VW2 EXPERIENCED A MINOR INTERRUPTION ON JULY 14, 2021 DURING MIGRATION TO A NEW DATA LOGGER.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

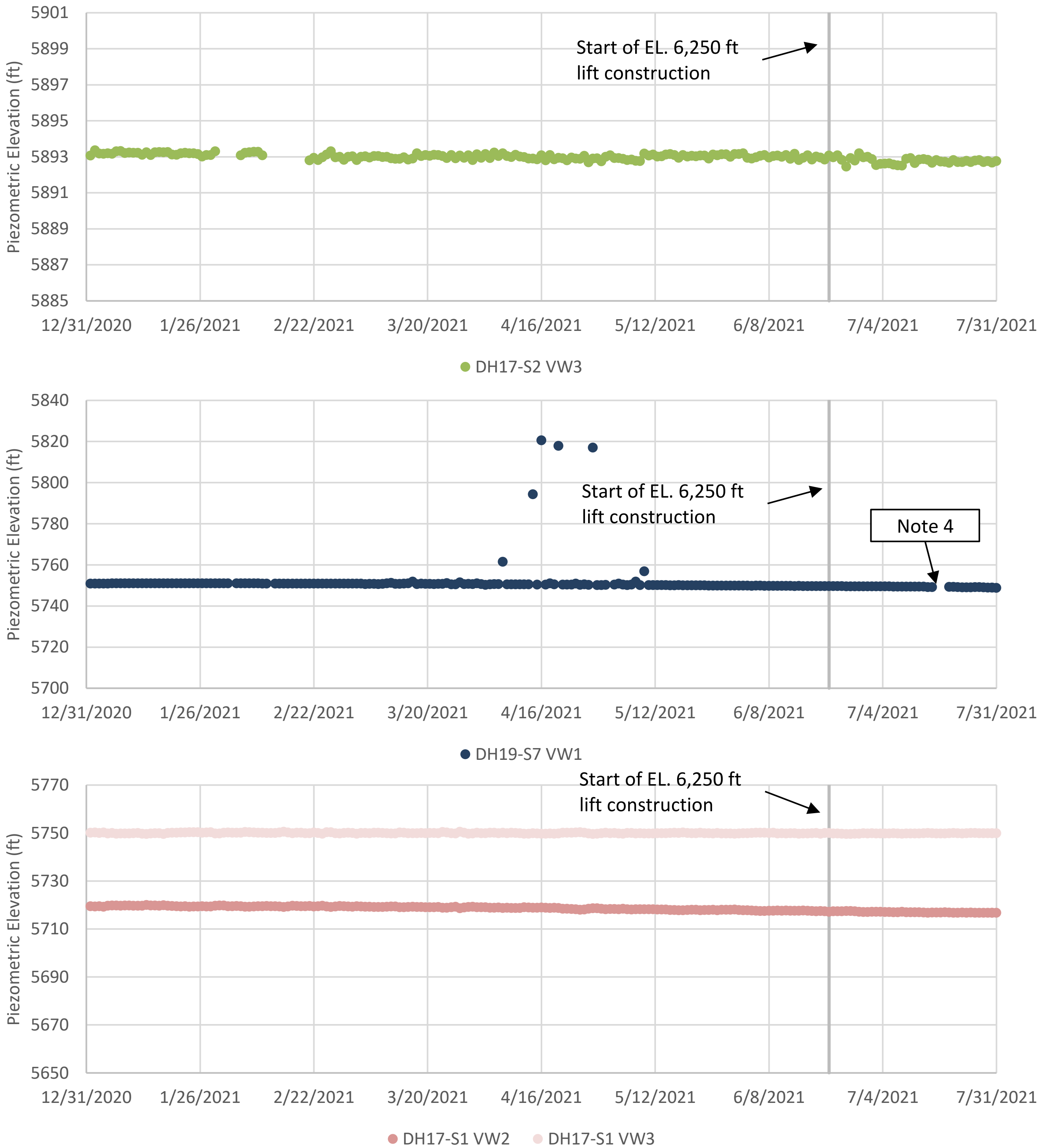
CHANGE IN PIEZOMETRIC ELEVATIONS MEASURED IN SECTION 0+00 BASAL ZONE

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE B.1 REV 0

0	24SEP'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D



NOTES:

1. PIEZOMETRIC ELEVATION IS RELATIVE TO THE ANACONDA MINE GRID.
2. SENSOR DH19-S7 VW2 HAS BEEN OMITTED FROM PLOTS AS IT HAS BEEN UNSATURATED SINCE INSTALLATION IN 2019.
3. DATA FROM SENSOR DH17-S1 VW1 HAS BEEN OMITTED AFTER NOVEMBER 7, 2020 AS THE SENSOR BECAME UNSATURATED.
4. SENSORS DH19-S7 VW1 AND VW2 EXPERIENCED A MINOR INTERRUPTION ON JULY 14, 2021 DURING MIGRATION TO A NEW DATA LOGGER.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

PIEZOMETRIC ELEVATIONS MEASURED IN BASAL ZONE SENSORS ALONG SECTION 0+00

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P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE B.2 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
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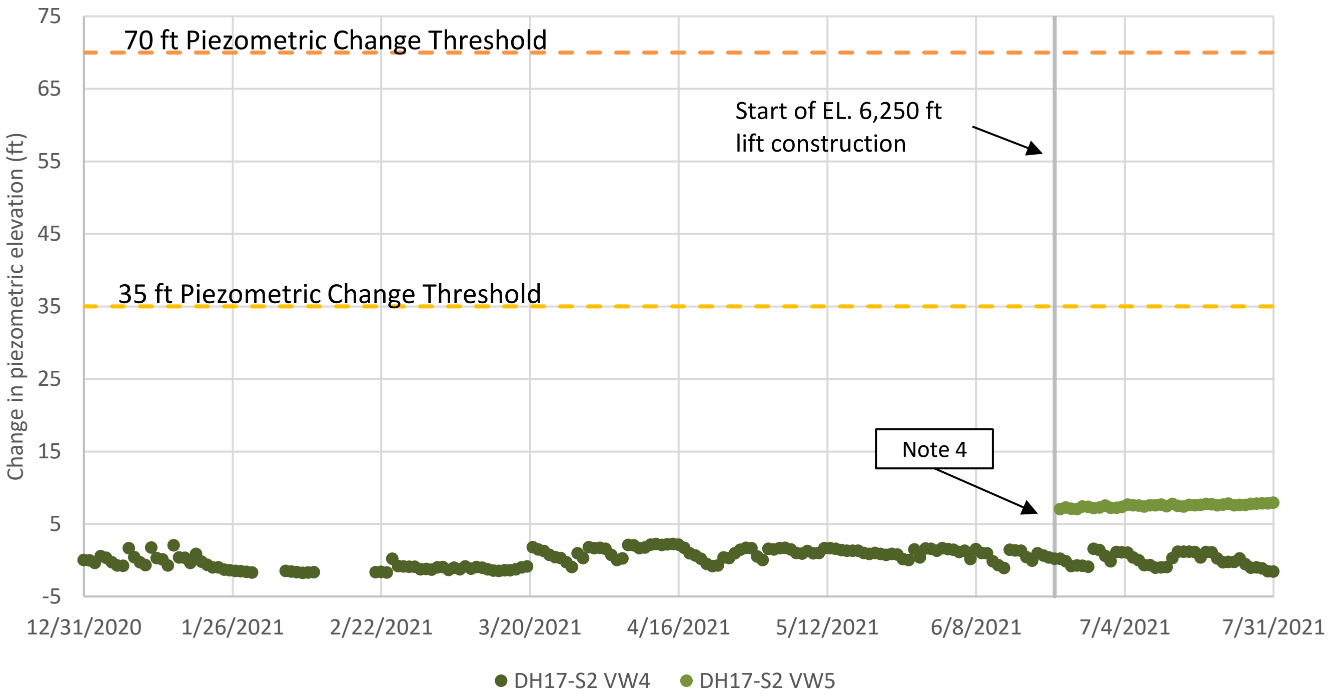

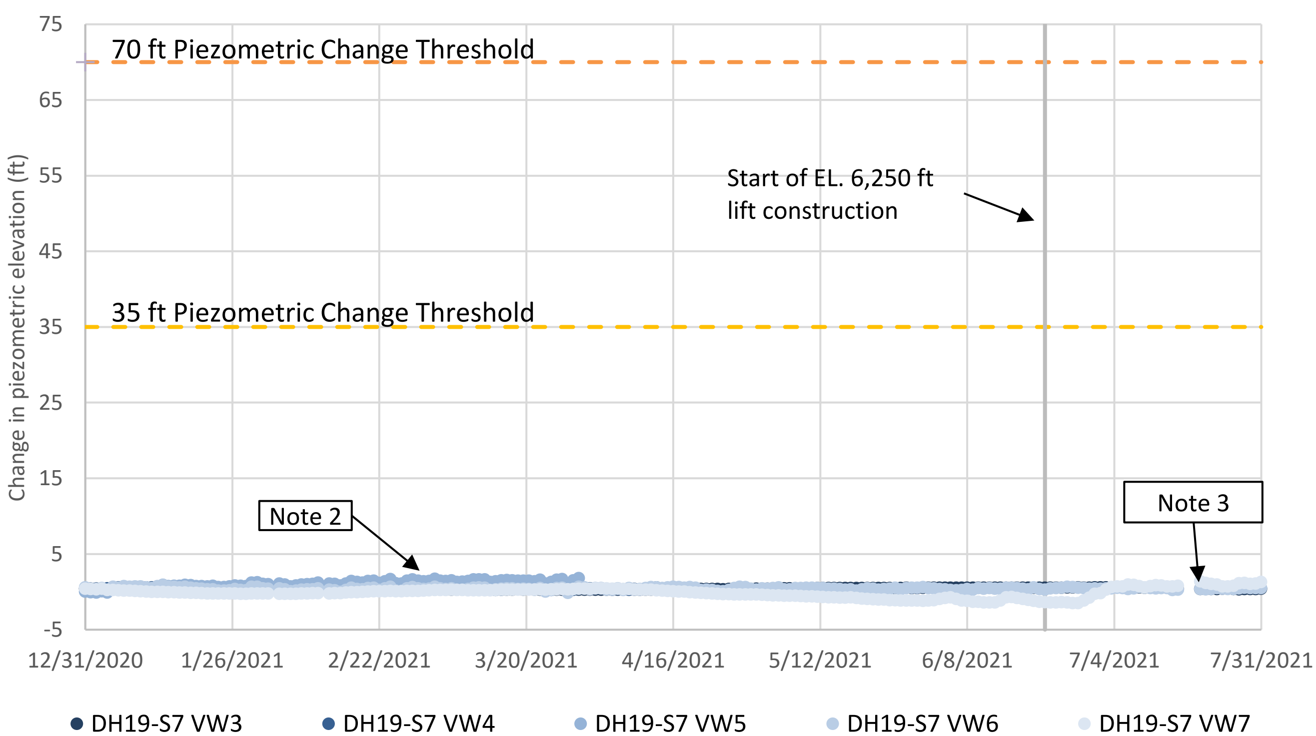

NOTES:

1. CHANGE IN PIEZOMETRIC ELEVATION IS CALCULATED RELATIVE TO THE DAILY AVERAGE PIEZOMETRIC ELEVATION MEASURED ON DECEMBER 31, 2020.
2. SENSOR DH17-S2 VW3 HAS BEEN OMITTED FROM PLOTS AS IT HAS BEEN UNSATURATED SINCE INSTALLATION IN 2019.
3. SENSORS DH19-S7 VW4, VW5, VW6, AND VW7 EXPERIENCED A MINOR INTERRUPTION ON JULY 14, 2021 DURING MIGRATION TO A NEW DATA LOGGER.
4. DH17-S2 VW5 BECAME RESTARUATED SINCE JUNE 23, 2021 DUE TO SEASONAL VARIATIONS.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

CHANGE IN PIEZOMETRIC ELEVATIONS MEASURED IN SECTION 0+00 PERCHED ZONE

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P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE B.3 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
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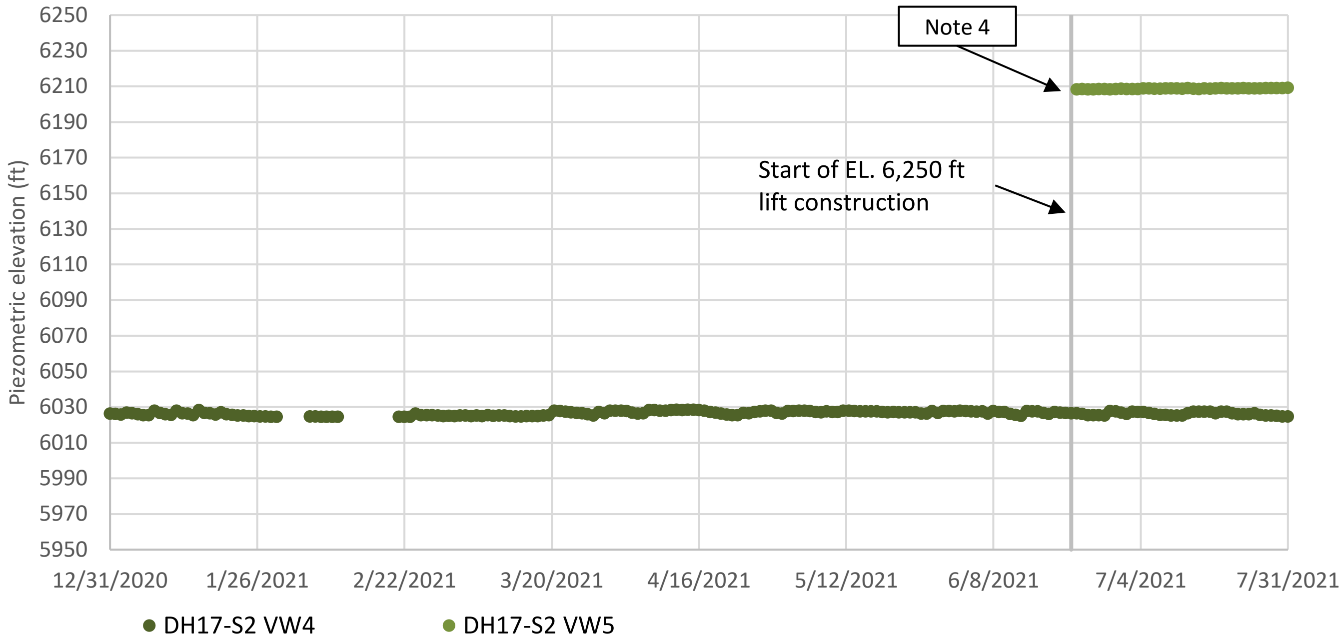

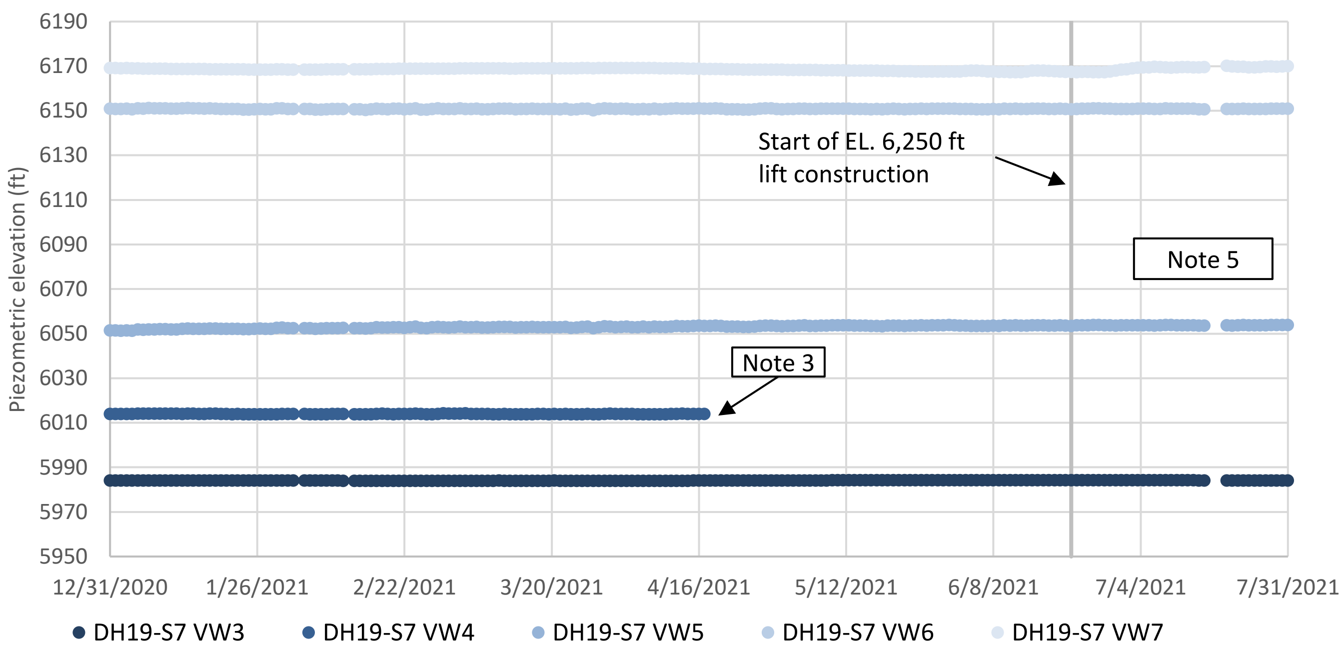

NOTES:

1. PIEZOMETRIC ELEVATION IS RELATIVE TO THE ANACONDA MINE GRID.
2. SENSOR DH19-S7 VW2 HAS BEEN OMITTED FROM PLOTS AS IT HAS BEEN UNSATURATED SINCE INSTALLATION IN 2019.
3. SENSOR DH19-S7 VW4 HAS BEEN OMITTED FROM PLOTS AS IT HAS BEEN UNSATURATED SINCE MARCH 28, 2021.
4. DH17-S2 VW5 BECAME RESTARUATED SINCE JUNE 23, 2021 DUE TO SEASONAL VARIATIONS.
5. SENSORS DH19-S7 VW4, VW5, VW6, AND VW7 EXPERIENCED A MINOR INTERRUPTION ON JULY 14, 2021 DURING MIGRATION TO A NEW DATA LOGGER.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

PIEZOMETRIC ELEVATIONS MEASURED IN PERCHED ZONE SENSORS ALONG SECTION 0+00

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P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE B.4 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
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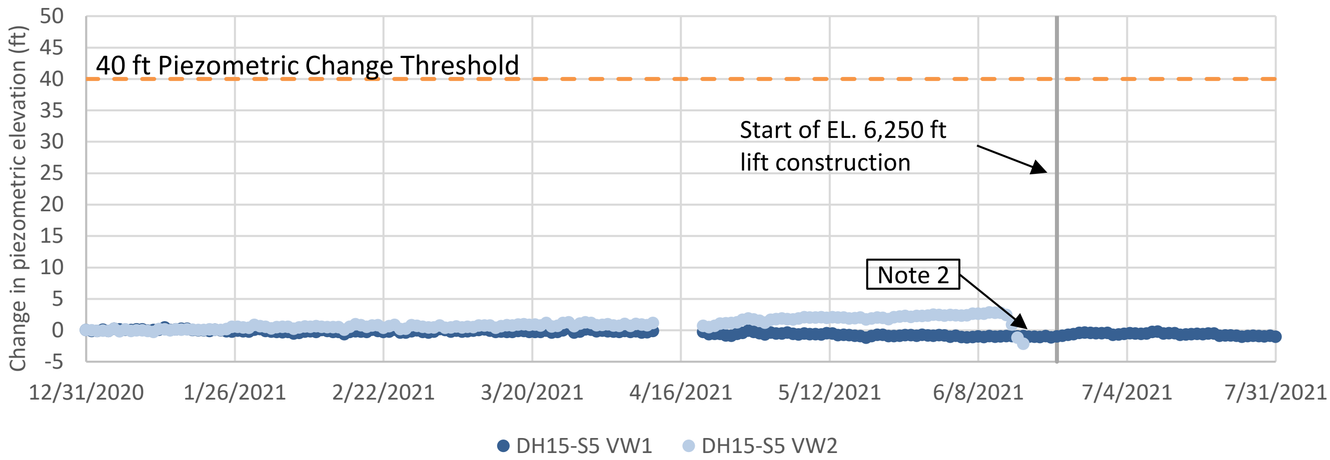

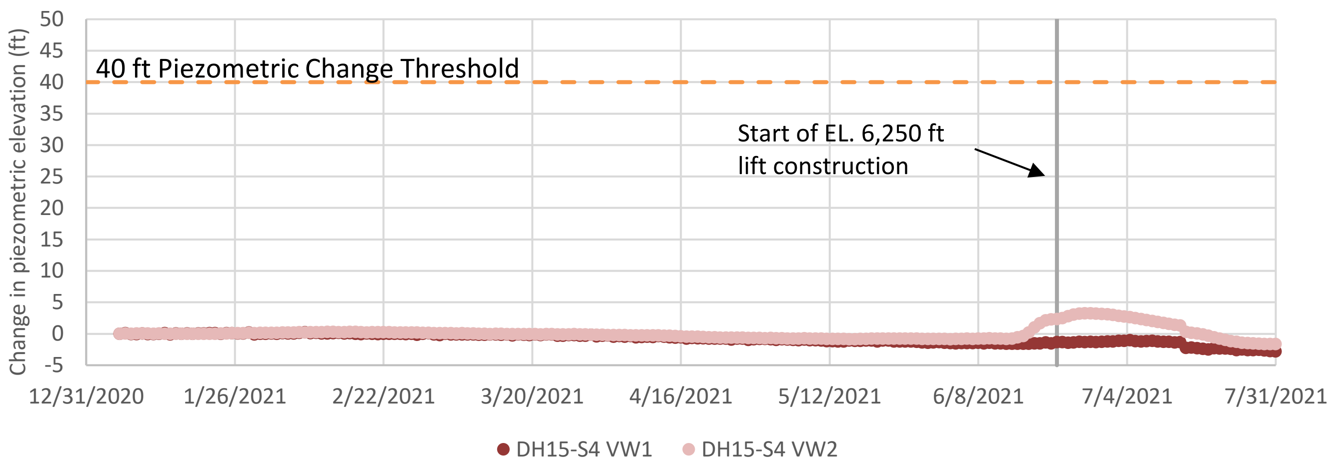

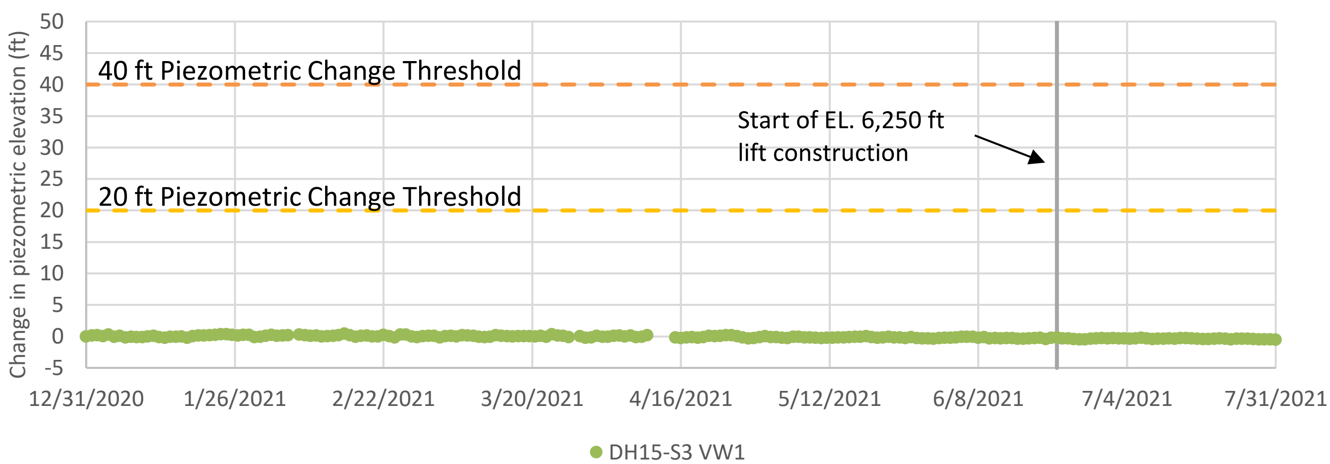

NOTES:

1. CHANGE IN PIEZOMETRIC ELEVATION IS CALCULATED RELATIVE TO THE DAILY AVERAGE PIEZOMETRIC ELEVATION MEASURED ON DECEMBER 31, 2020.
2. DATA FROM SENSOR DH15-S5 VW2 HAS BEEN OMITTED FROM PLOTS AFTER JUNE 16, 2021 AS THE SENSOR HAS BECOME UNSATURATED.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

CHANGE IN PIEZOMETRIC ELEVATIONS MEASURED IN SECTION 8+00W BASAL ZONE

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE B.5 REV 0

0	24SEP'21	ISSUED WITH LETTER	SY3	KTD
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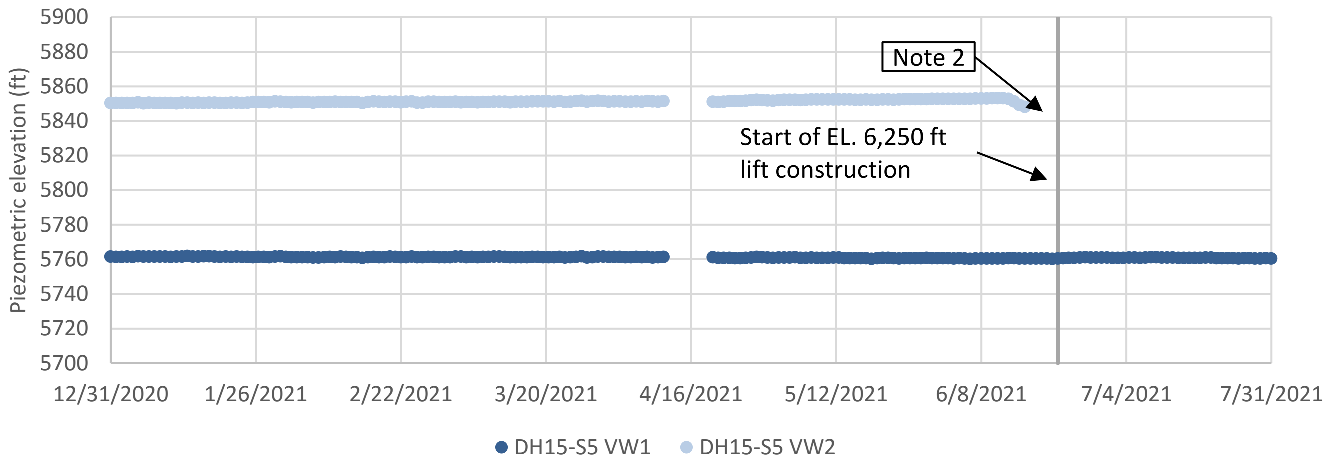
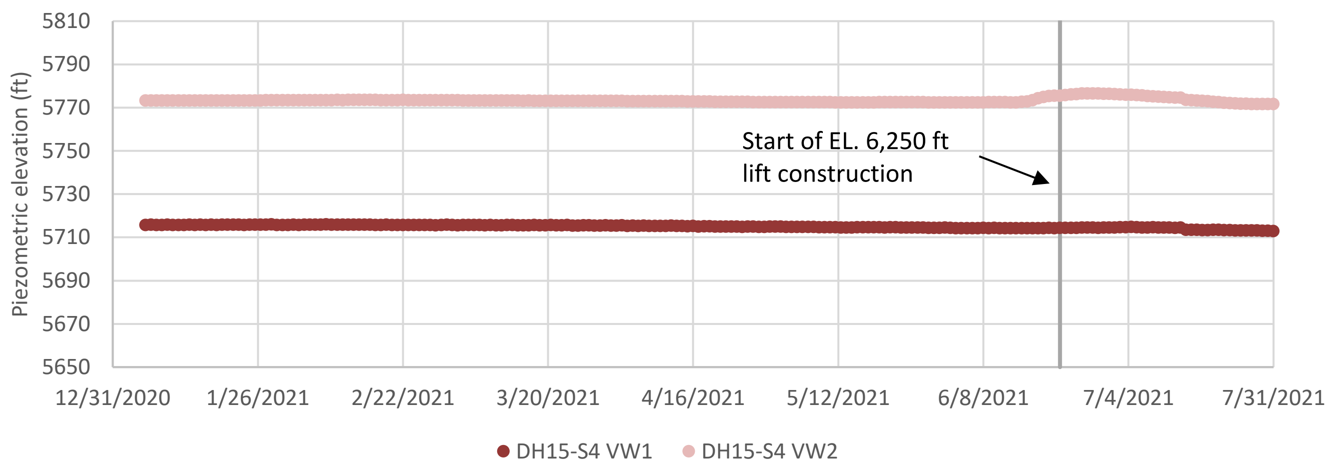
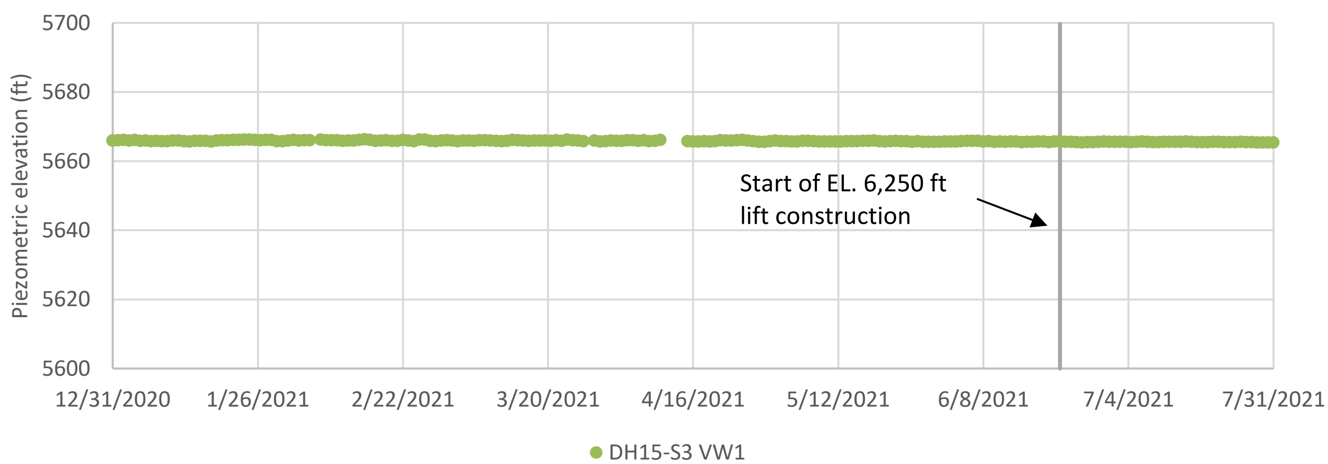






NOTES:

1. PIEZOMETRIC ELEVATION IS RELATIVE TO THE ANACONDA MINE GRID.
2. DATA FROM SENSOR DH15-S5 VW2 HAS BEEN OMITTED FROM PLOTS AFTER JUNE 16, 2021 AS THE SENSOR HAS BECOME UNSATURATED.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

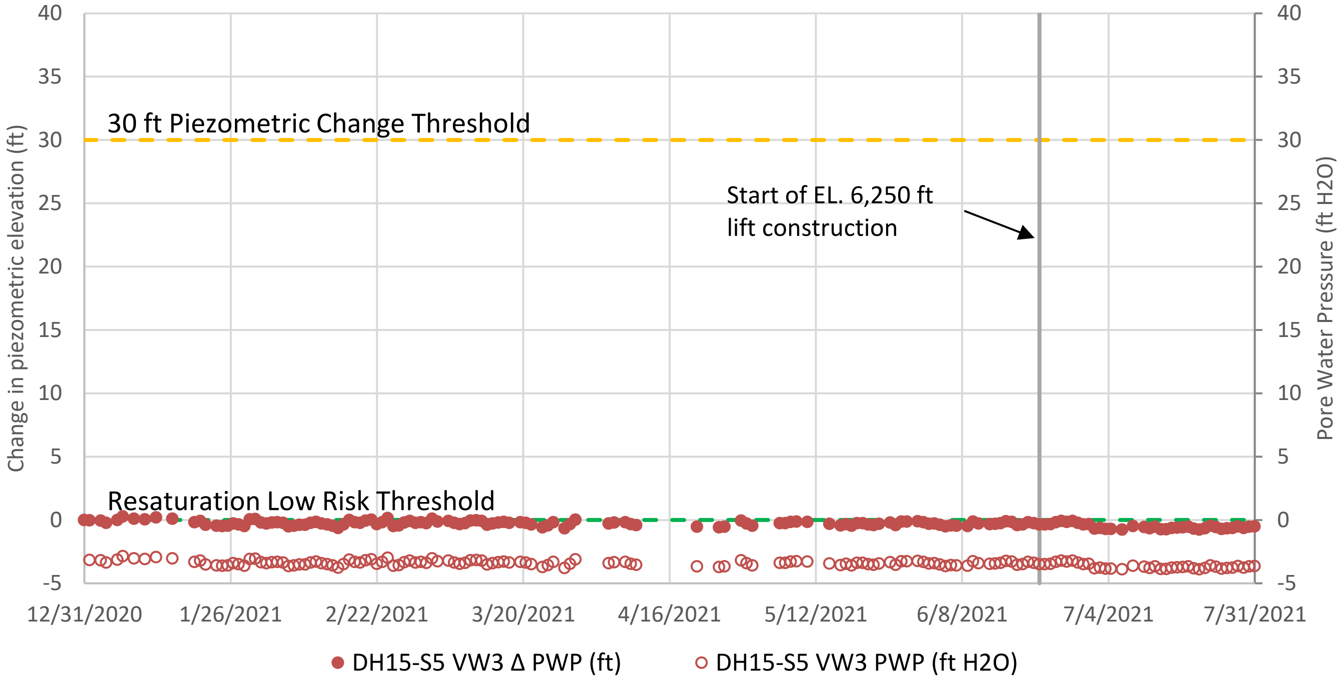
PIEZOMETRIC ELEVATIONS MEASURED IN BASAL ZONE SENSORS ALONG SECTION 8+00W

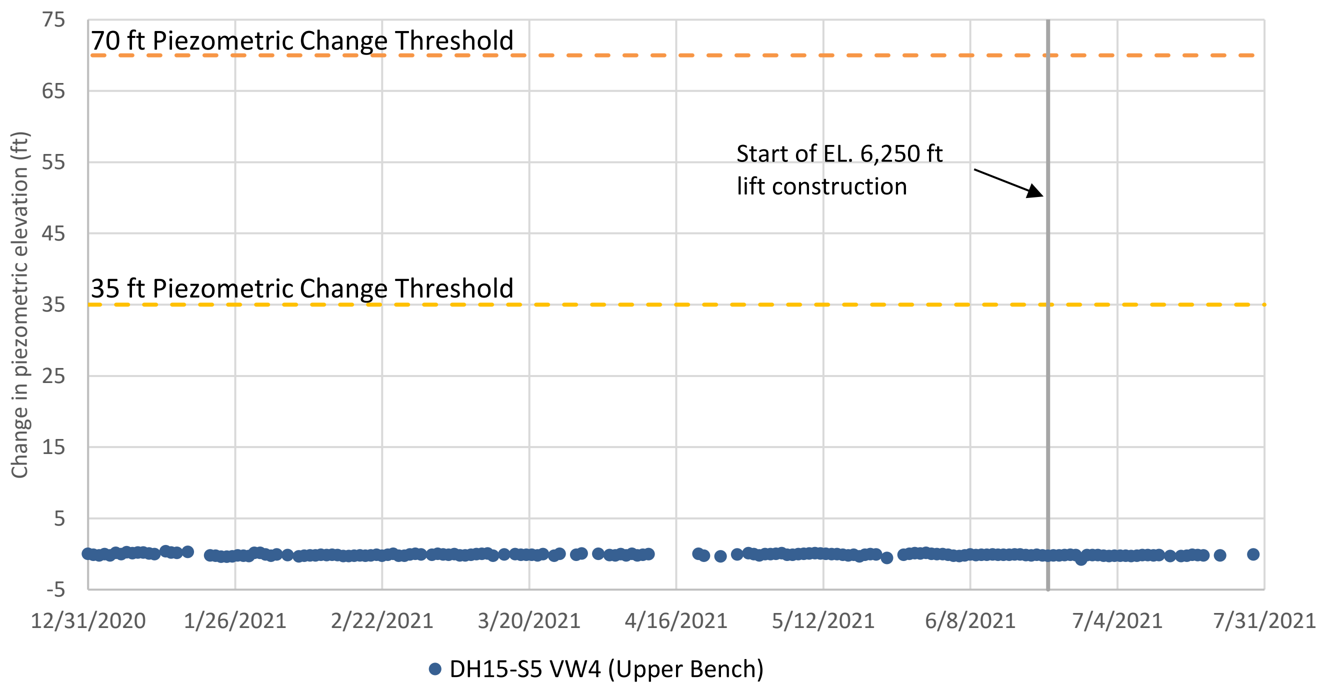
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE B.6 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	24SEP'21	ISSUED WITH LETTER	SY3	KTD





NOTES:

1. CHANGE IN PIEZOMETRIC ELEVATION IS CALCULATED RELATIVE TO THE DAILY AVERAGE PIEZOMETRIC ELEVATION MEASURED ON DECEMBER 31, 2020.
2. SENSOR DH15-S5 VW3 HAS BEEN UNSATURATED SINCE INSTALLATION IN 2015.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

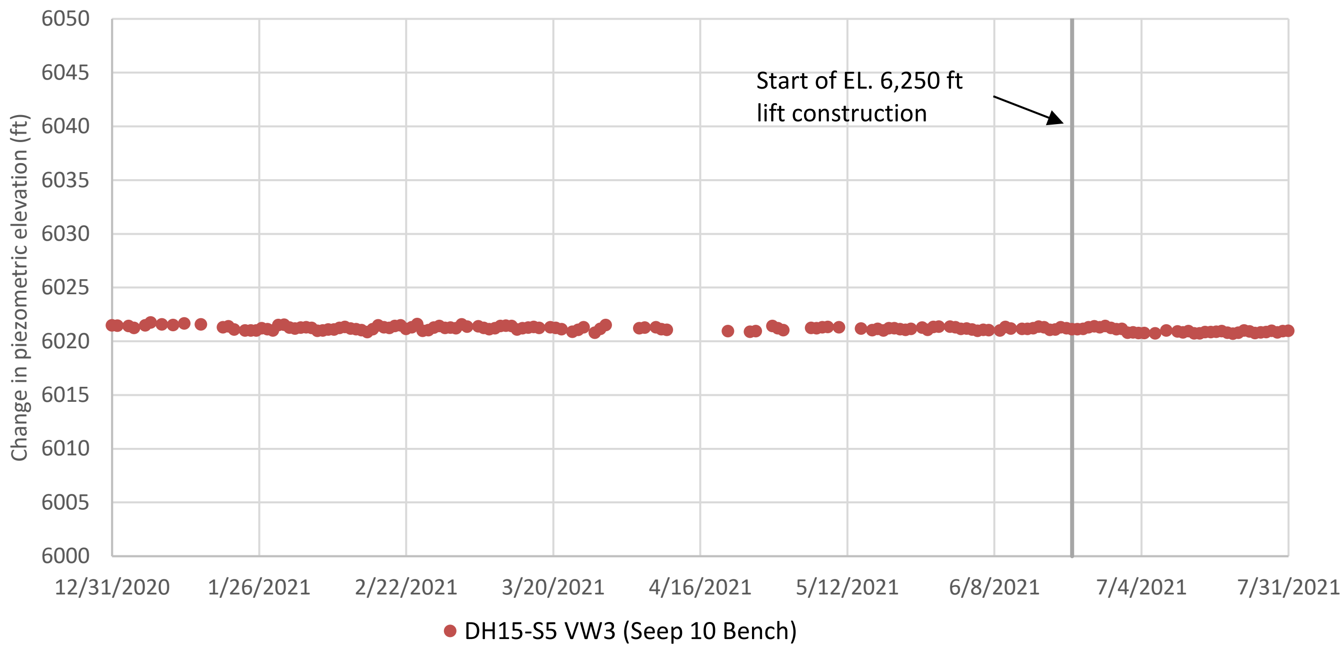
CHANGE IN PIEZOMETRIC ELEVATIONS MEASURED IN SECTION 8+00W PERCHED ZONE

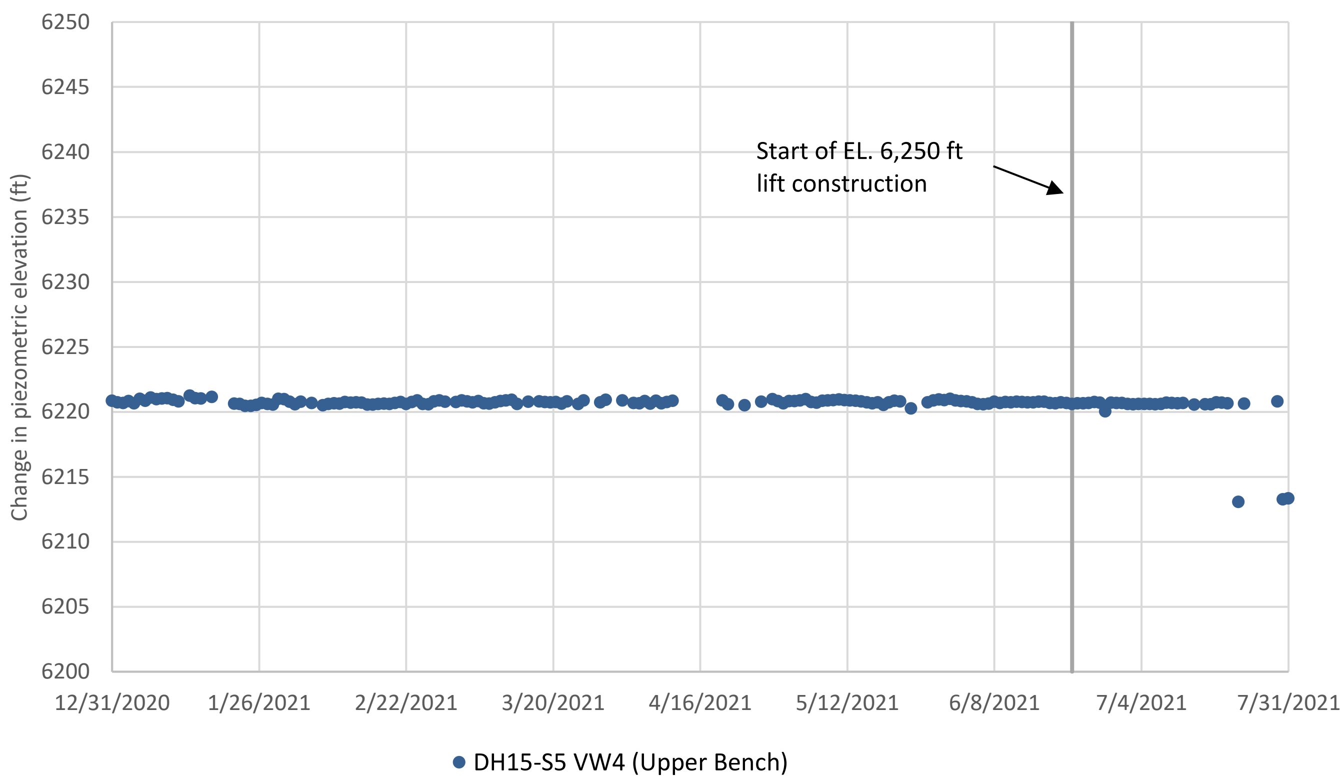
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE B.7 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	24SEP'21	ISSUED WITH LETTER	SY3	KTD





NOTES:

1. PIEZOMETRIC ELEVATION IS RELATIVE TO THE ANACONDA MINE GRID.
2. SENSOR DH15-S5 VW3 HAS BEEN UNSATURATED SINCE INSTALLATION IN 2015.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

PIEZOMETRIC ELEVATIONS MEASURED IN PERCHED ZONE SENSORS ALONG SECTION 8+00W

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE B.8 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	24SEP'21	ISSUED WITH LETTER	SY3	KTD

APPENDIX C

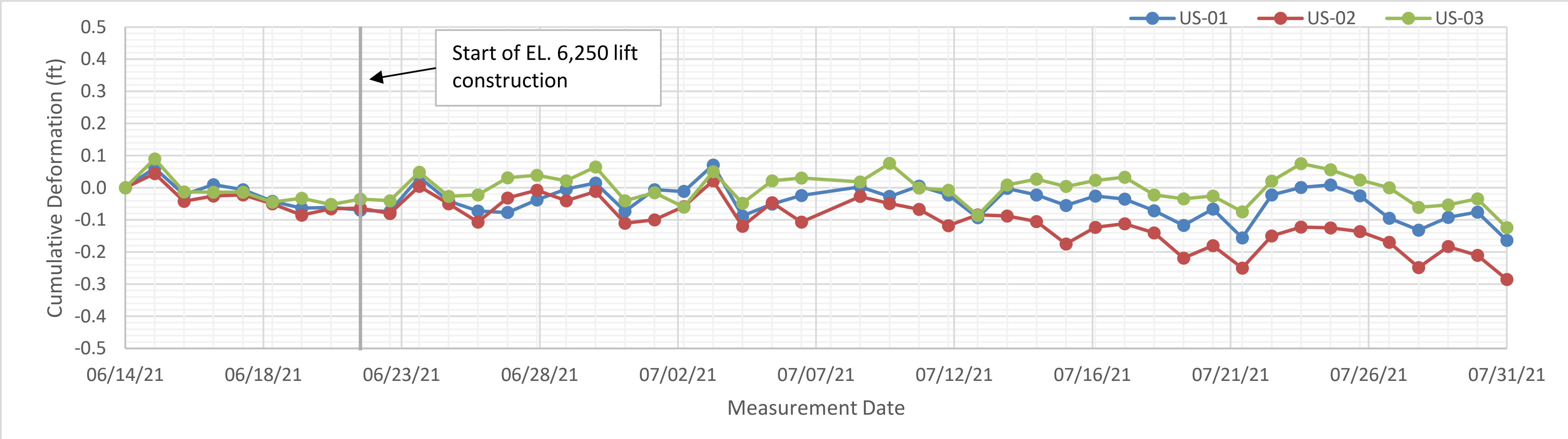
Surface Deformation Monitoring Plots

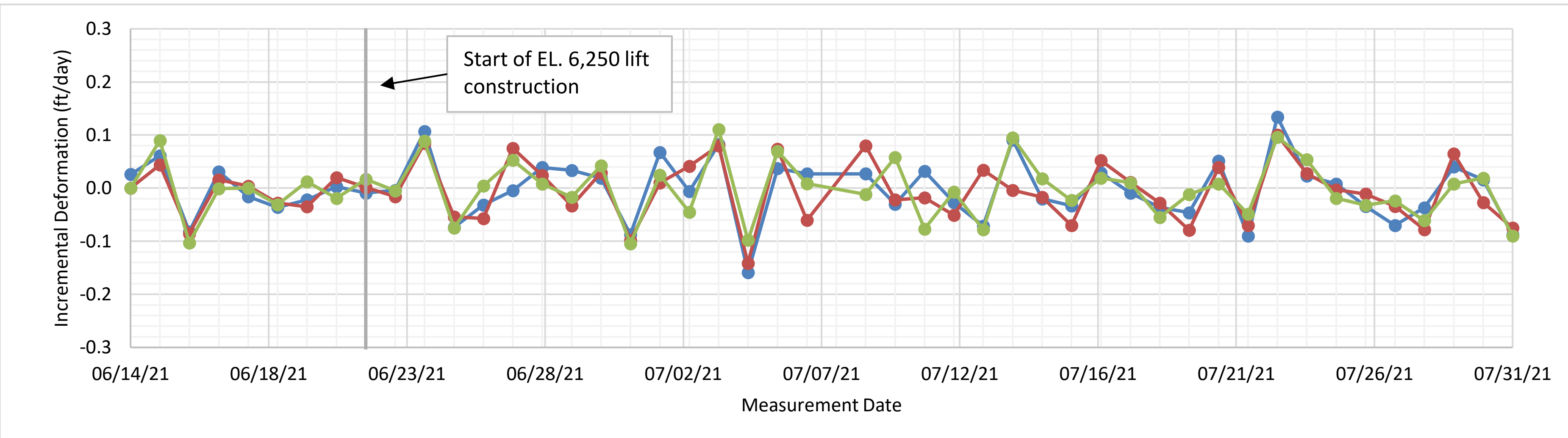
Appendix C1	DGPS Manual Survey Displacement Plots
Appendix C2	GNSS and InSAR Surface Displacement Plots
Appendix C3	Sequential InSAR Bulletins
Appendix C4	Sequential MapTek Scan – Northing
Appendix C5	Sequential Tension Crack Progression Plots

APPENDIX C1

DGPS Manual Survey Displacement Plots

(Figures C1.1 to C1.12)





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

0	05OCT'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
UPSTREAM SURVEY MONUMENTS
VERTICAL DEFORMATION

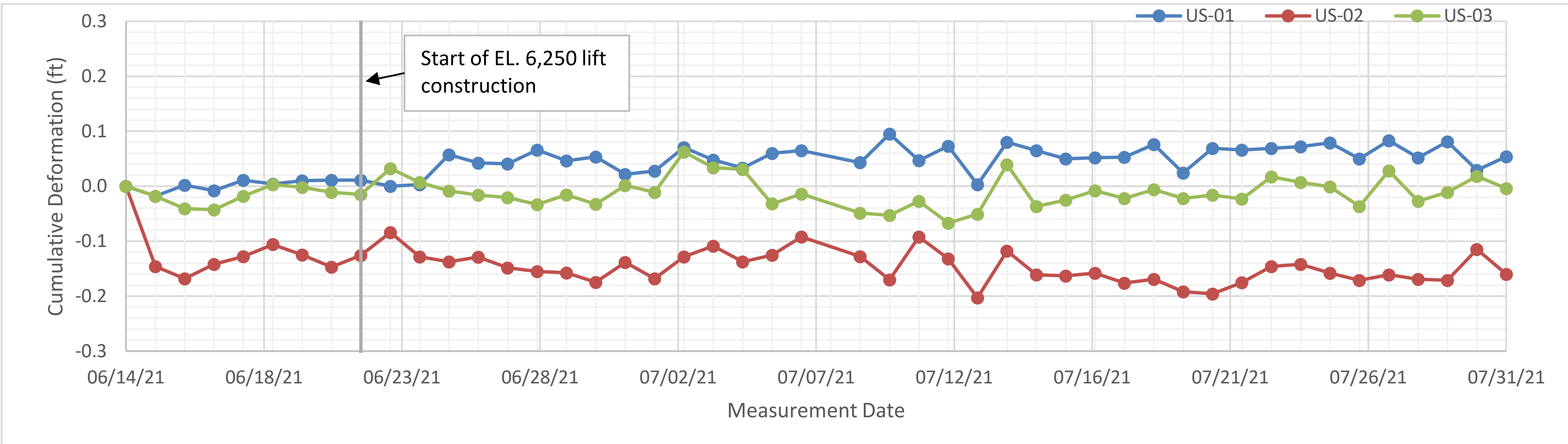
Knight Piésold CONSULTING

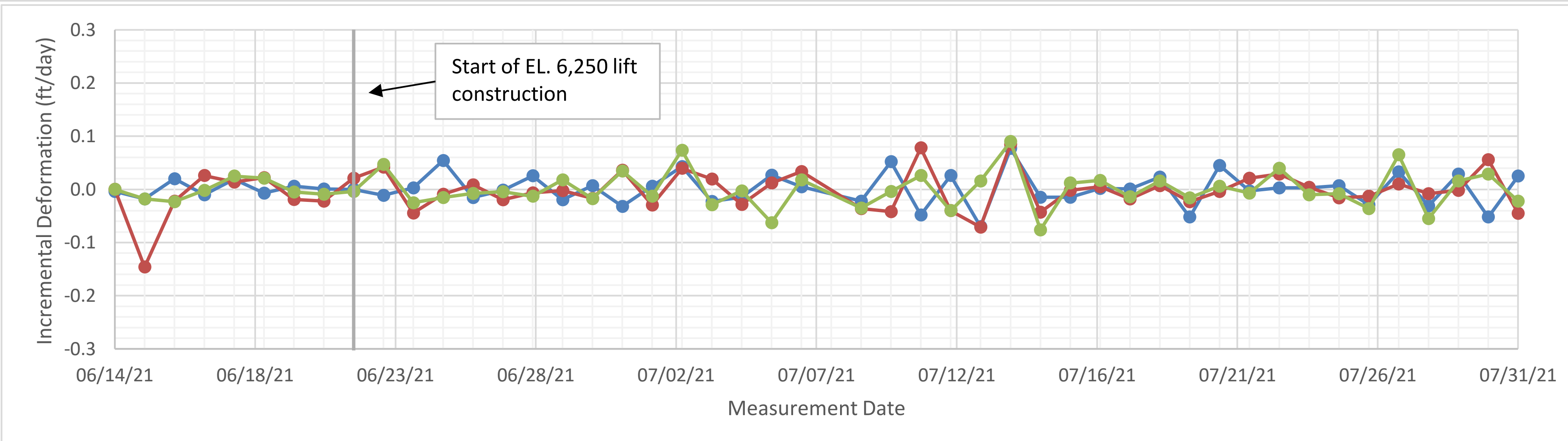
P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE C1.1

REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

0	05OCT'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
UPSTREAM SURVEY MONUMENTS
NORTH-SOUTH DEFORMATION

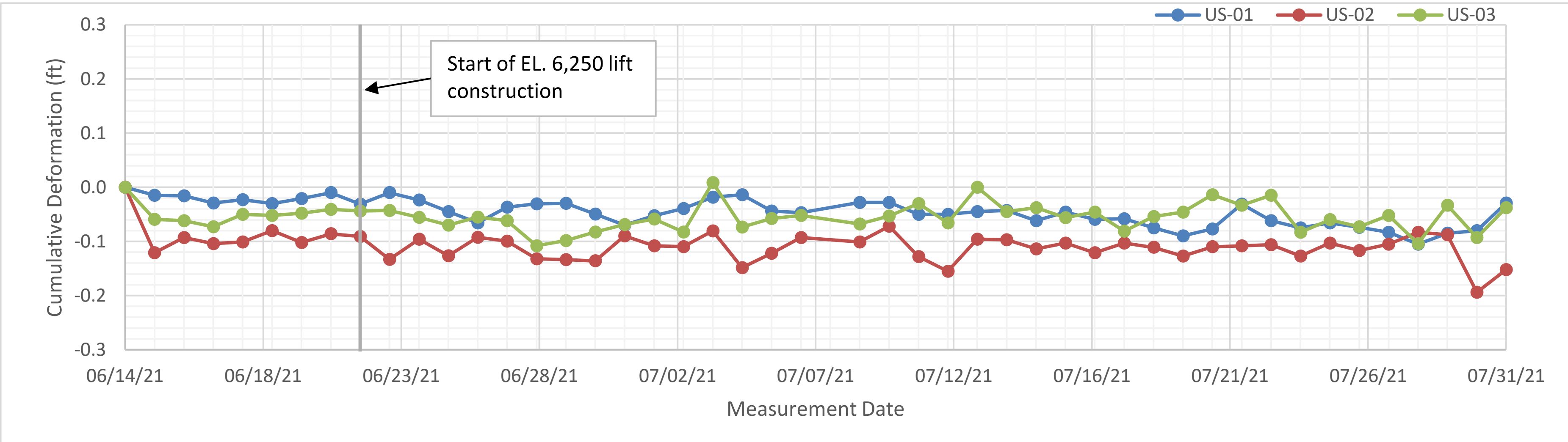
Knight Piésold CONSULTING

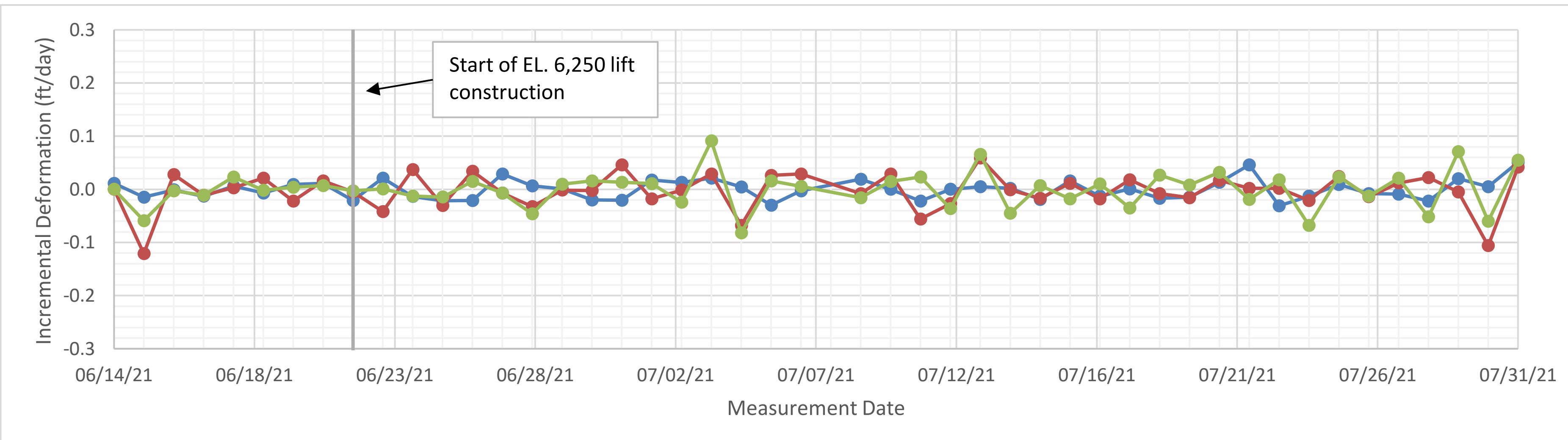
P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE C1.2

REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05OCT'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
UPSTREAM SURVEY MONUMENTS
EAST-WEST DEFORMATION

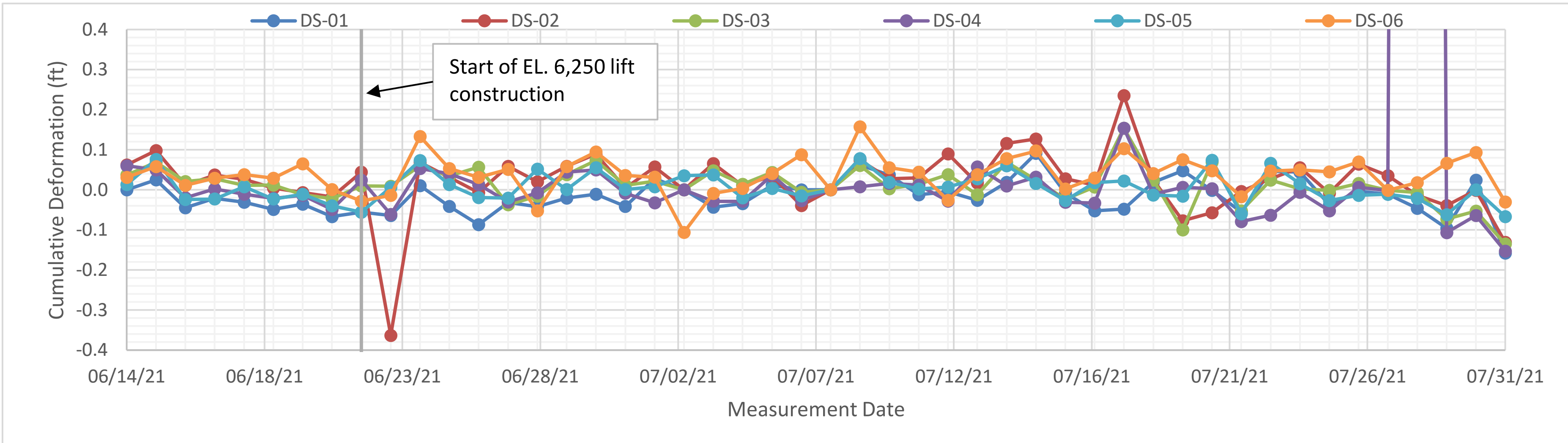
Knight Piésold CONSULTING

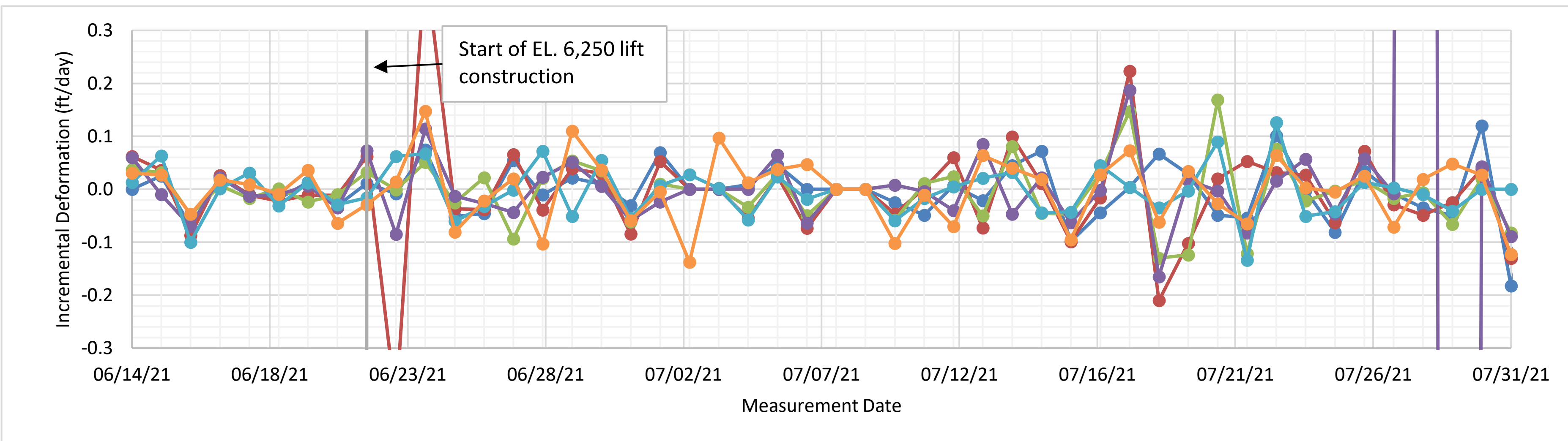
P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE C1.3

REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05OCT'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

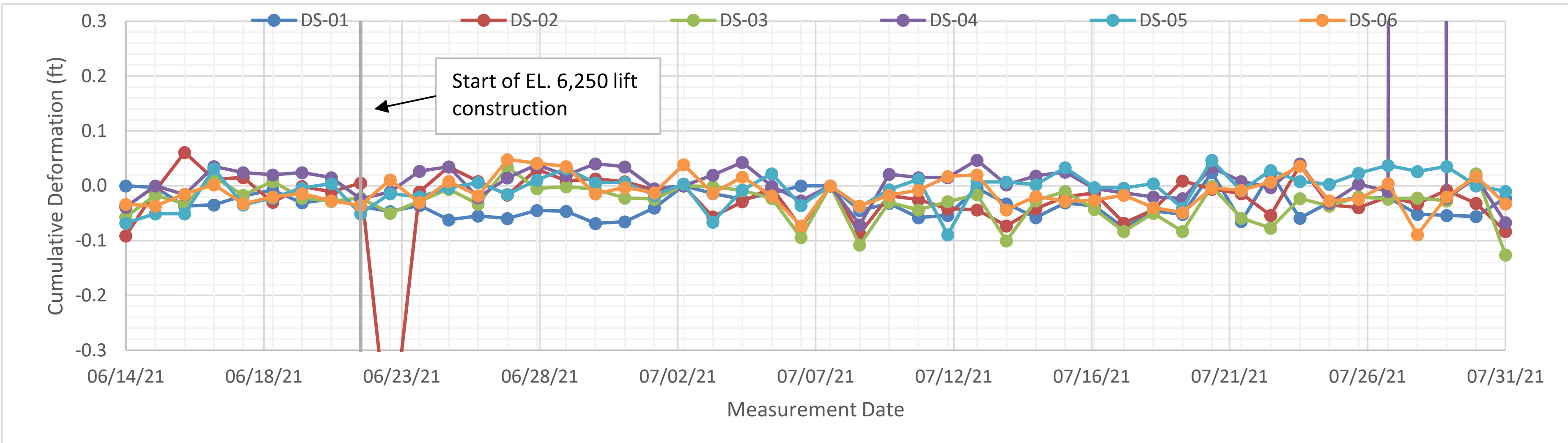
YANKEE DOODLE TAILINGS IMPOUNDMENT

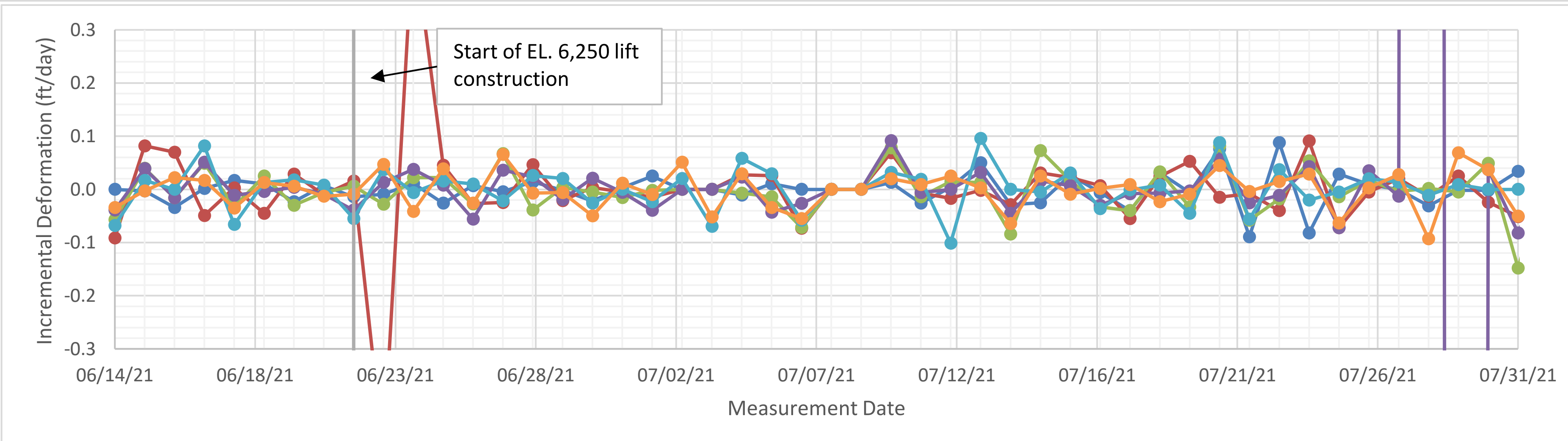
EL. 6,450 CONSTRUCTION MONITORING
DOWNSTREAM SURVEY MONUMENTS
VERTICAL DEFORMATION

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01362

FIGURE C1.4 | REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05OCT'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
DOWNSTREAM SURVEY MONUMENTS
NORTH-SOUTH DEFORMATION

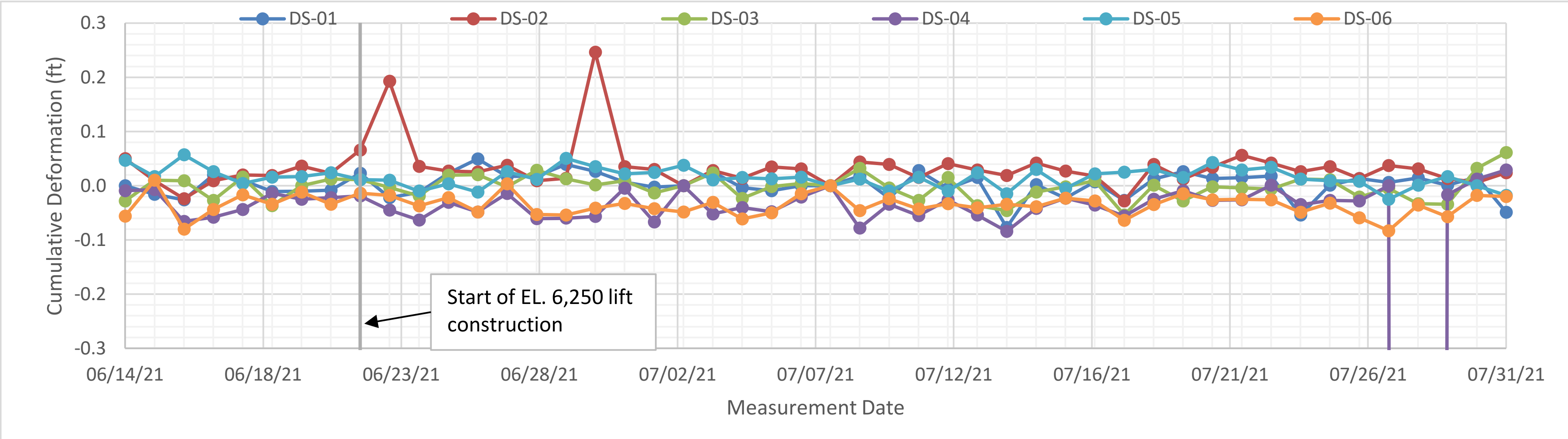
Knight Piésold CONSULTING

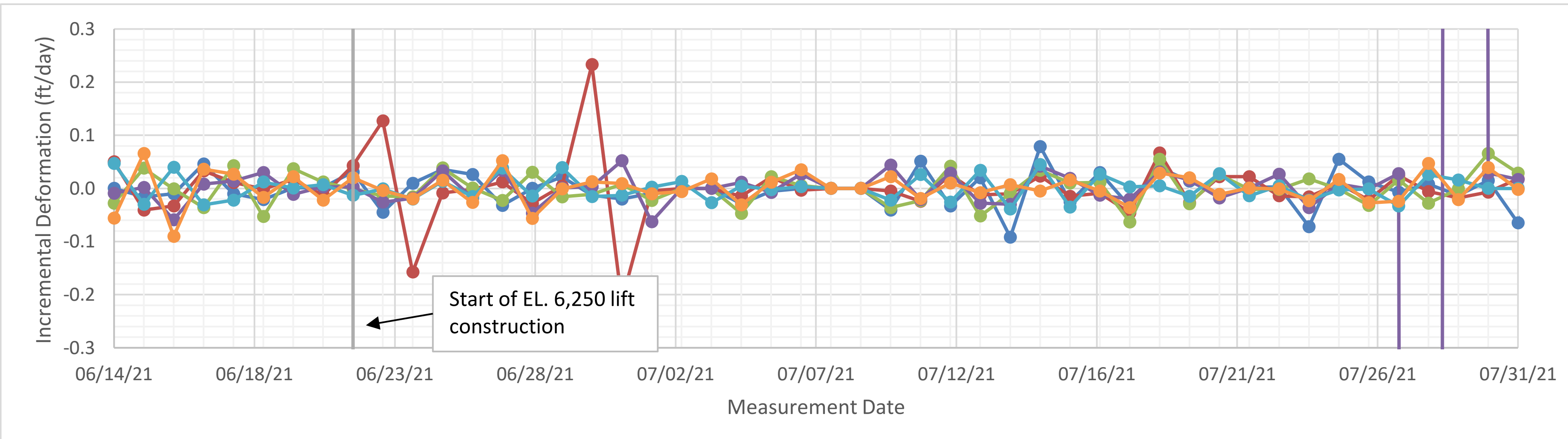
P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE C1.5

REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05OCT'21	ISSUED WITH LETTER	SY3	KTD

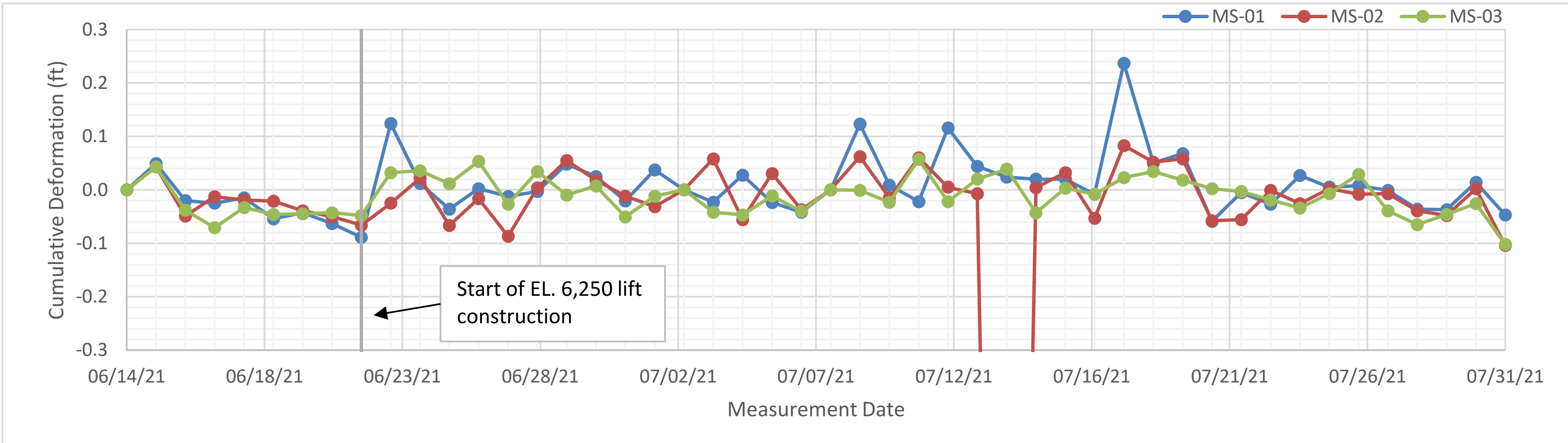
MONTANA RESOURCES LLP.

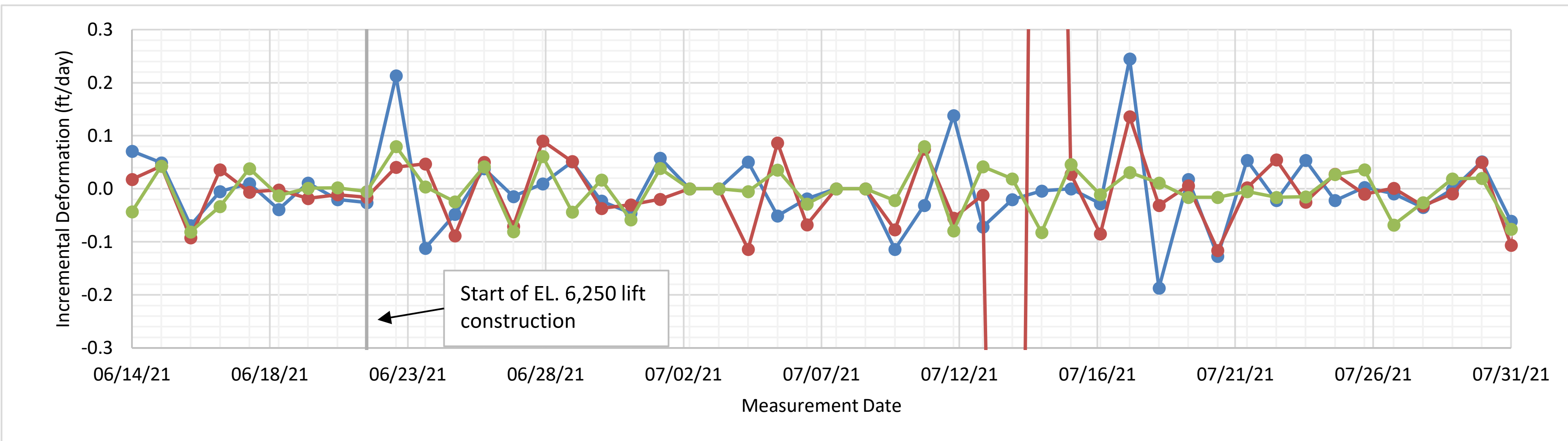
YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
DOWNSTREAM SURVEY MONUMENTS
EAST-WEST DEFORMATION

Knight Piésold CONSULTING

P/A NO.	REF. NO.	
VA101-126/25	VA21-01362	
FIGURE C1.6		REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

0	05OCT'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

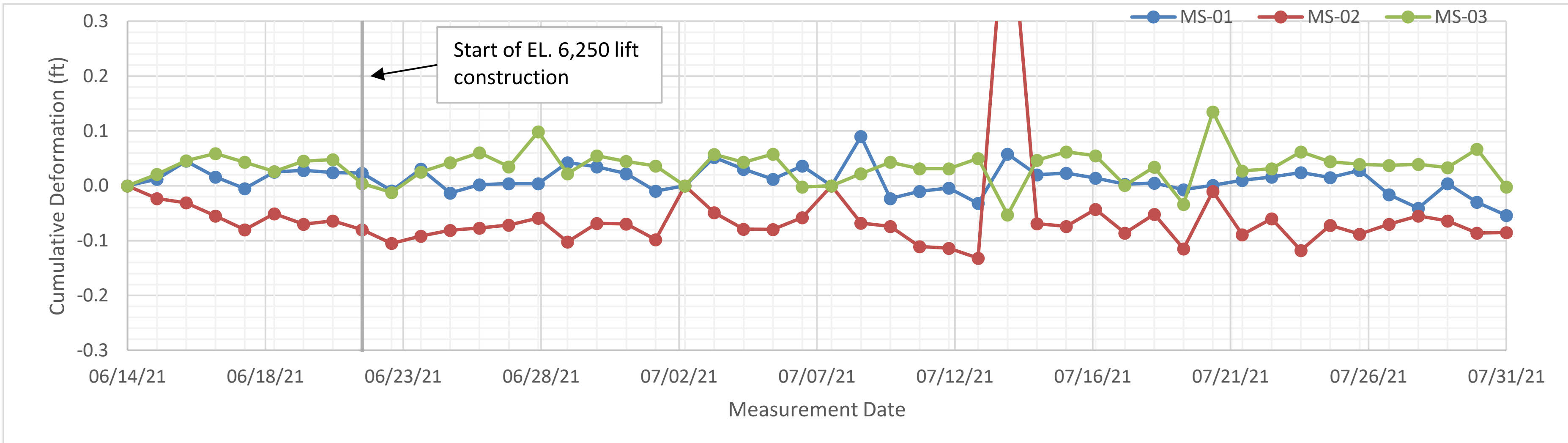
MONTANA RESOURCES LLP.

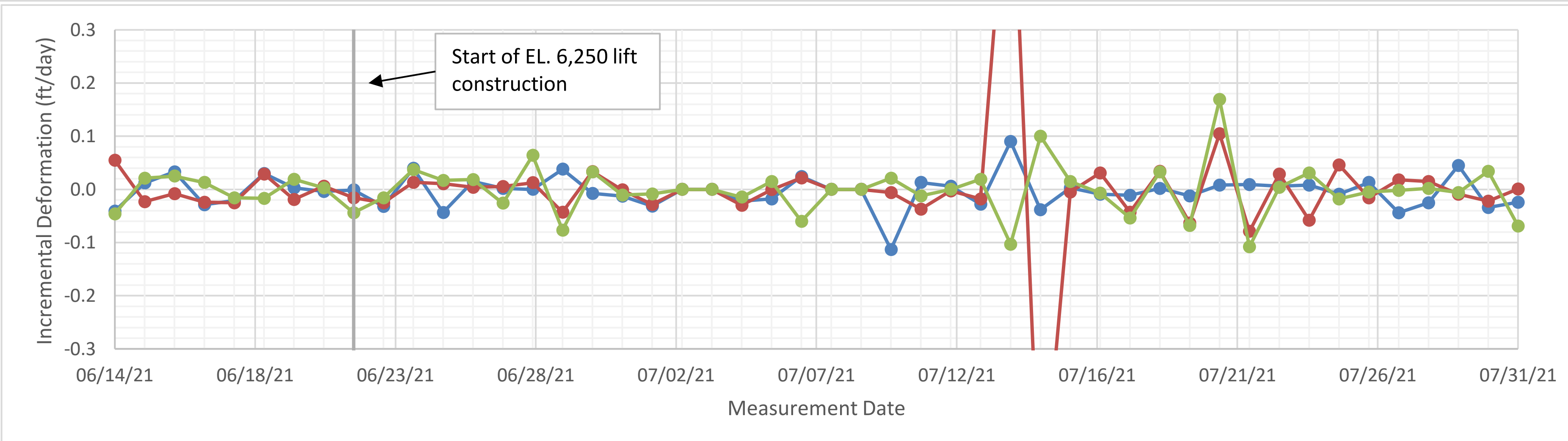
YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
MIDSLOPE SURVEY MONUMENTS
VERTICAL DEFORMATION

Knight Piésold CONSULTING

P/A NO.	REF. NO.	
VA101-126/25	VA21-01362	
FIGURE C1.7		REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05OCT'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
MIDSLOPE SURVEY MONUMENTS
NORTH-SOUTH DEFORMATION

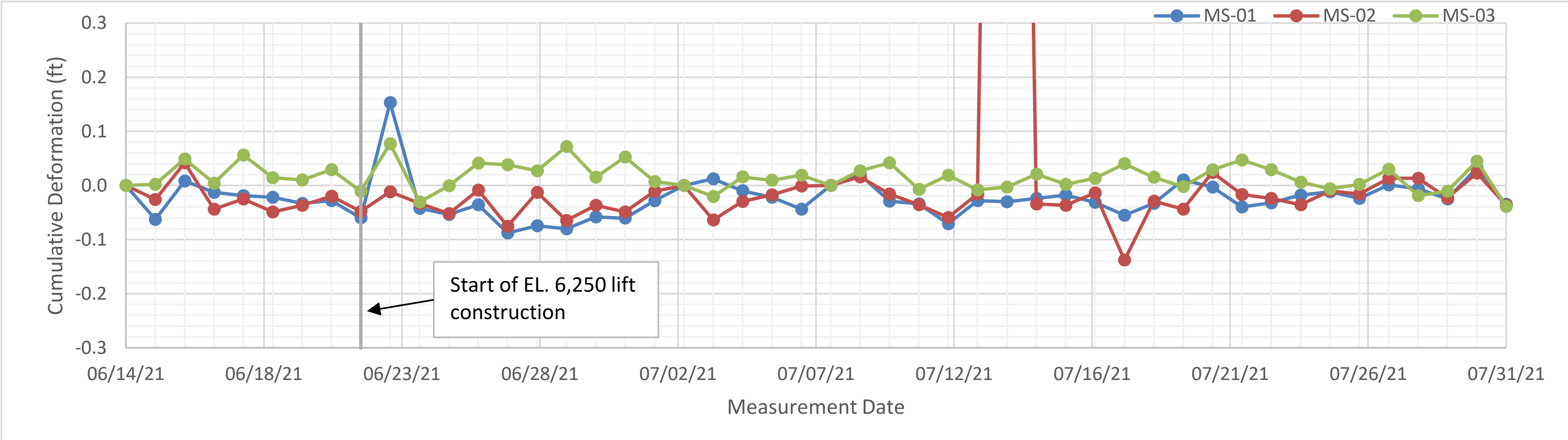
Knight Piésold CONSULTING

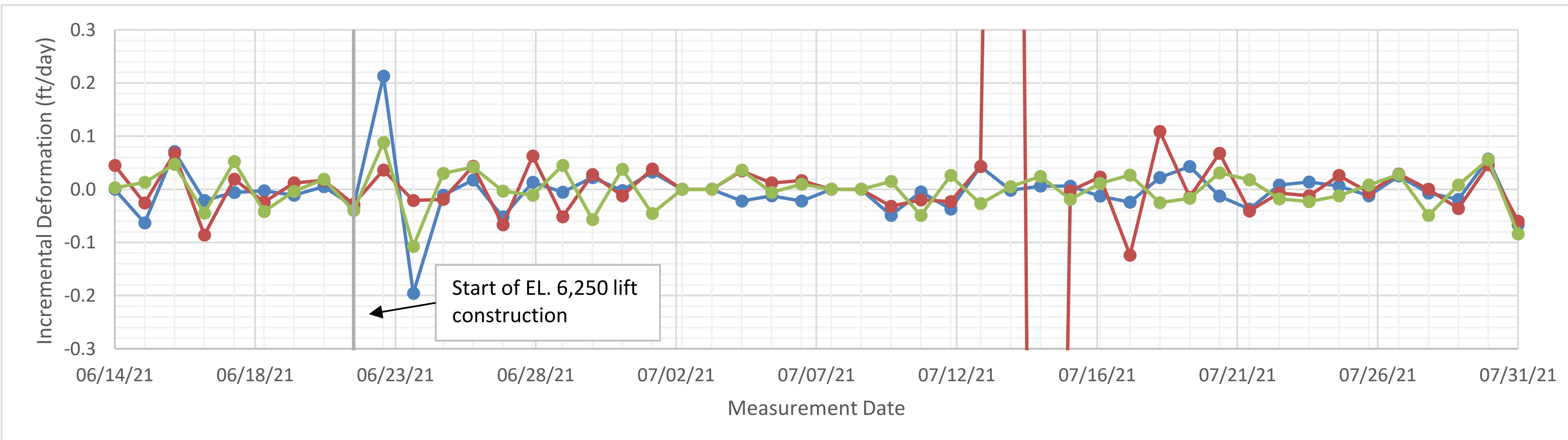
P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE C1.8

REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05OCT'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
MIDSLOPE SURVEY MONUMENTS
EAST-WEST DEFORMATION

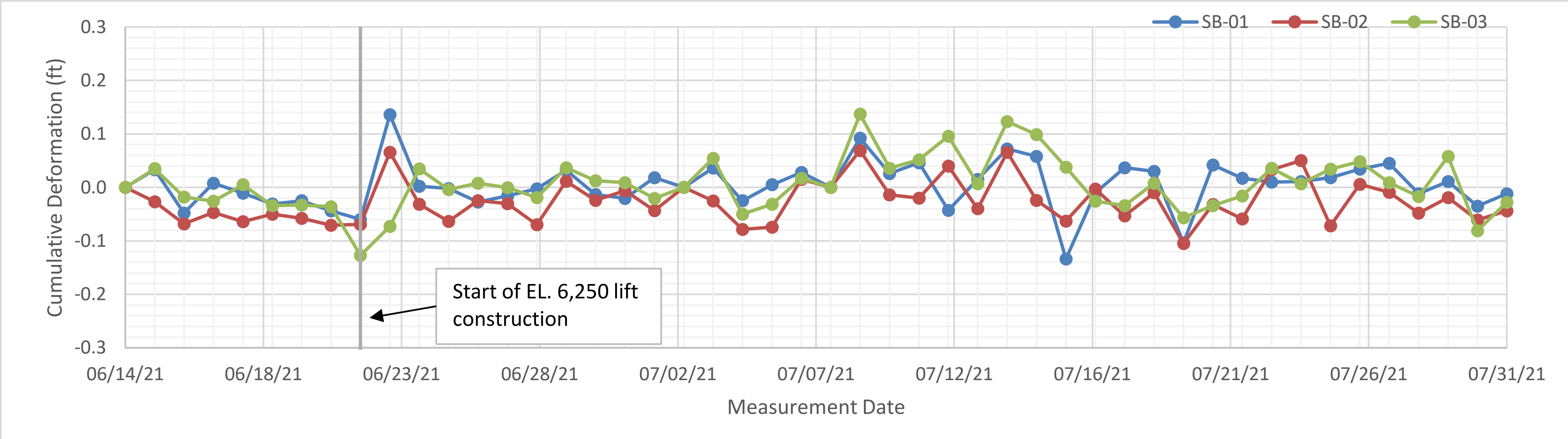
Knight Piésold CONSULTING

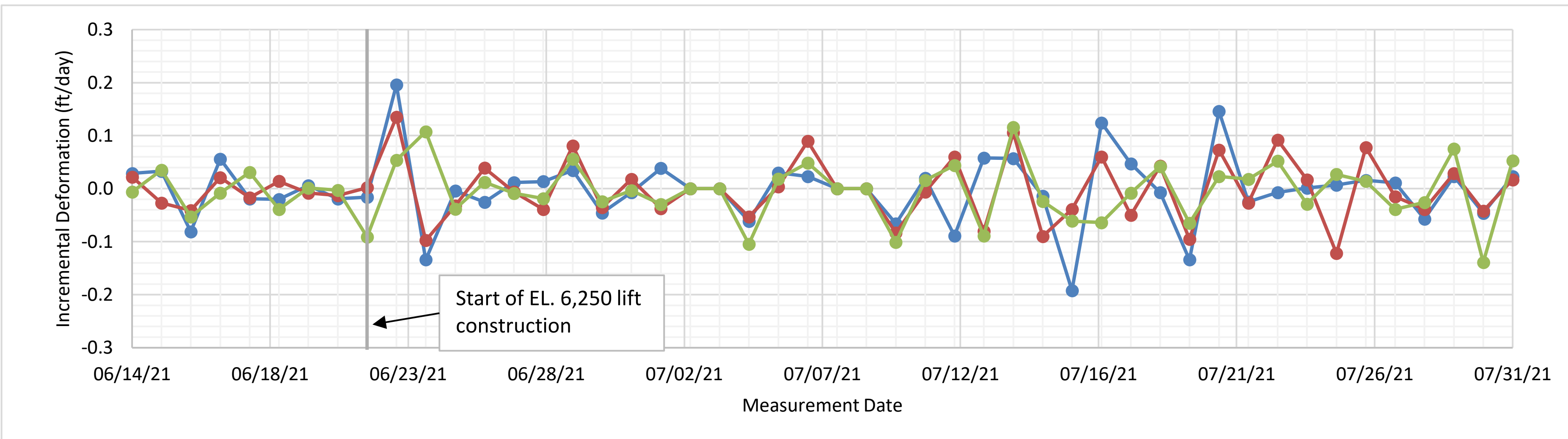
P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE C1.9

REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05OCT'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
SEEP 10 BENCH SURVEY MONUMENTS
VERTICAL DEFORMATION

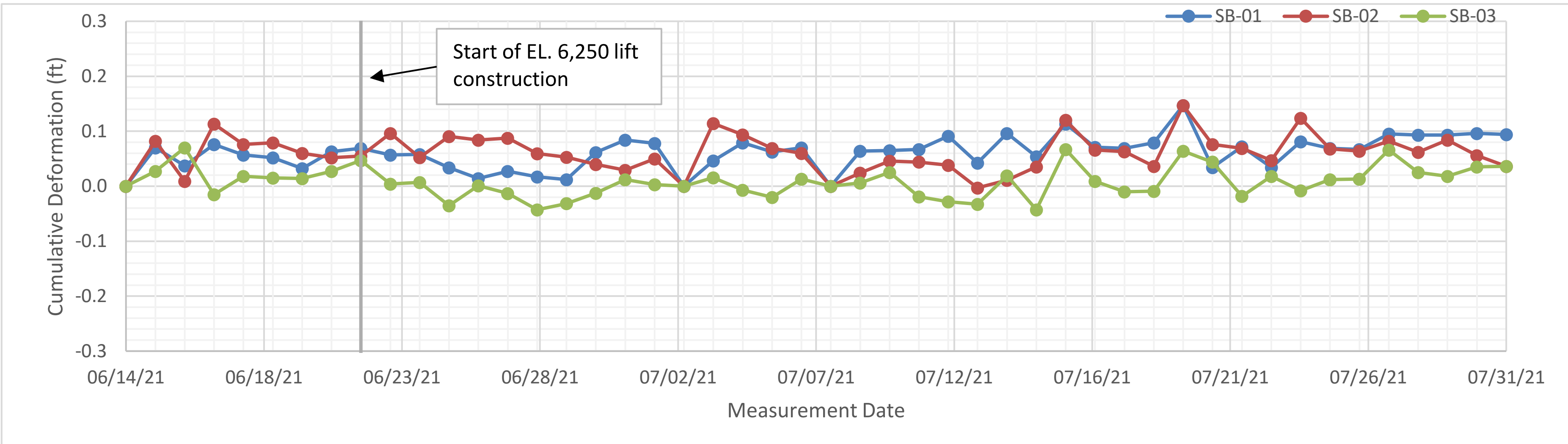
Knight Piésold CONSULTING

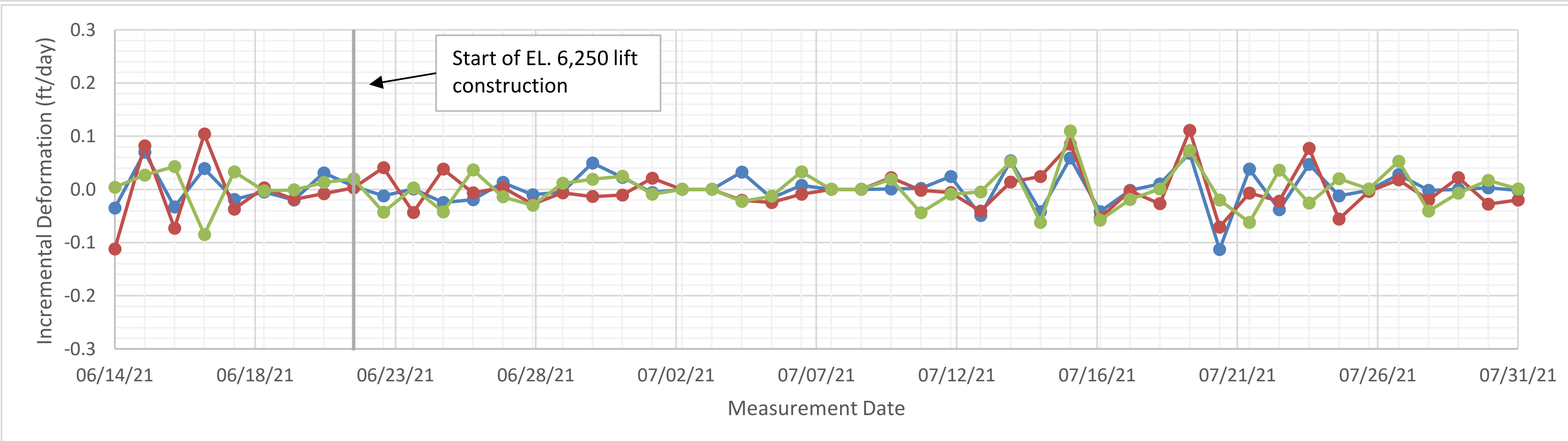
P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE C1.10

REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

0	05OCT'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

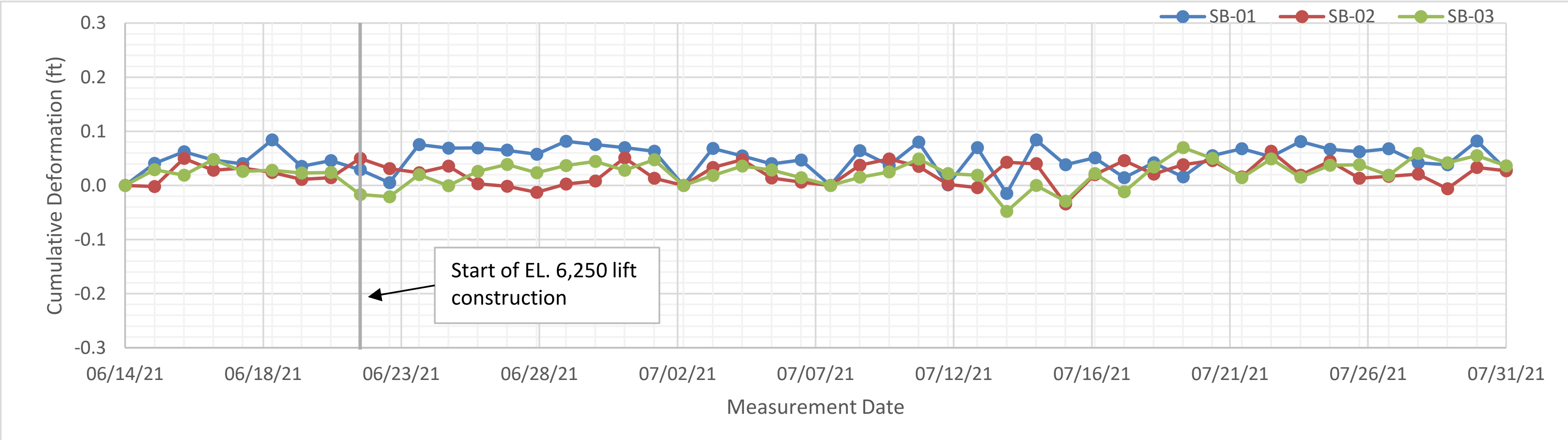
YANKEE DOODLE TAILINGS IMPOUNDMENT

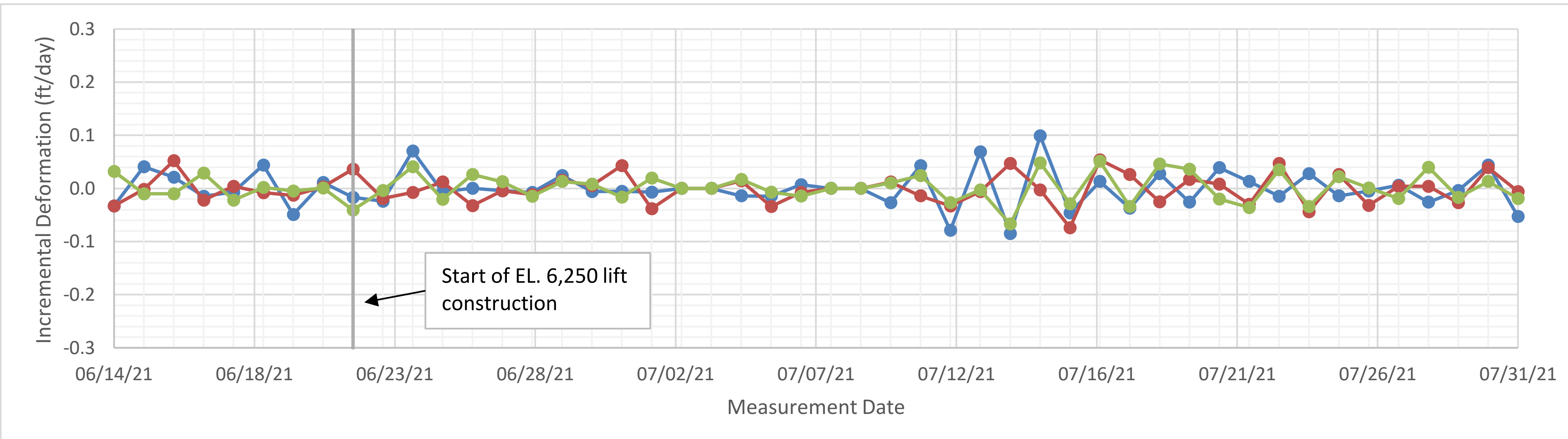
EL. 6,450 CONSTRUCTION MONITORING
SEEP 10 BENCH SURVEY MONUMENTS
NORTH-SOUTH DEFORMATION

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01362

FIGURE C1.11 REV 0





NOTES:

1. INSTRUMENTATION ACCURACY OF TRIMBLE DGPS IS +/- 0.05 ft
2. MONUMENT LOCATIONS ARE SHOWN ON FIGURE 3 (VA21-01362)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05OCT'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6,450 CONSTRUCTION MONITORING
SEEP 10 BENCH SURVEY MONUMENTS
EAST-WEST DEFORMATION

Knight Piésold CONSULTING

P/A NO. VA101-126/25

REF. NO. VA21-01362

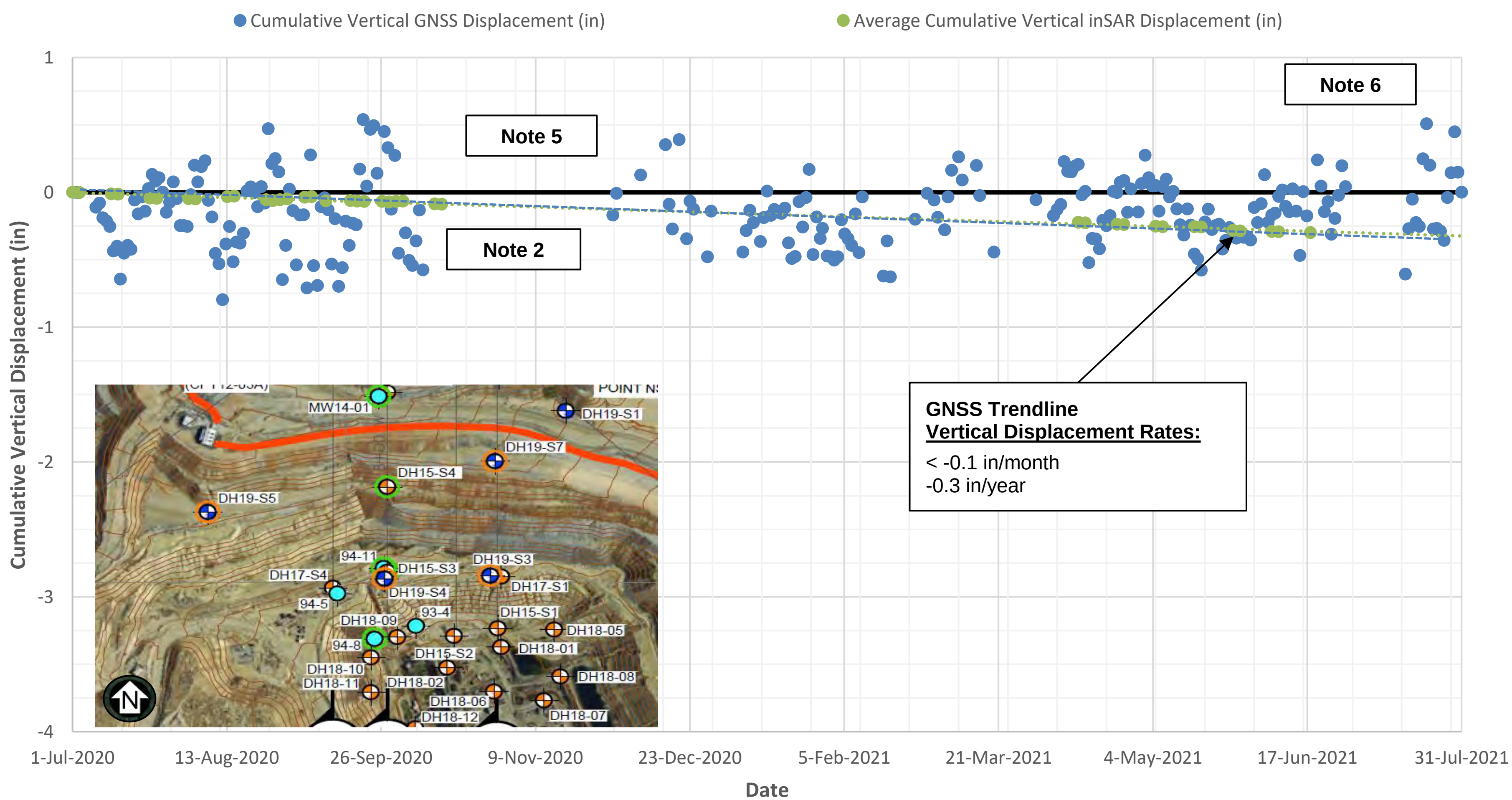
FIGURE C1.12

REV 0

APPENDIX C2

GNSS and InSAR Surface Displacement Plots

(Figures C2.1 to C2.8)



NOTES:

1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. THE AVERAGE CUMULATIVE VERTICAL INSAR DISPLACEMENT IS CALCULATED BY AVERAGING TIME-SERIES DISPLACEMENTS FROM NINE INSAR DATA POINTS LOCATED ADJACENT TO DH19-S3.
5. NO LONG TERM (SQUEESAR) INSAR DATA ARE AVAILABLE FROM OCTOBER 2, 2020 TO APRIL 13, 2021 DUE TO THE ONSET OF WINTER CONDITIONS.
6. NO DATA WERE COLLECTION FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	3AUG'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL DISPLACEMENTS MONITORED AT DH19-S3 (JULY 1, 2020 THROUGH JULY 31, 2021)

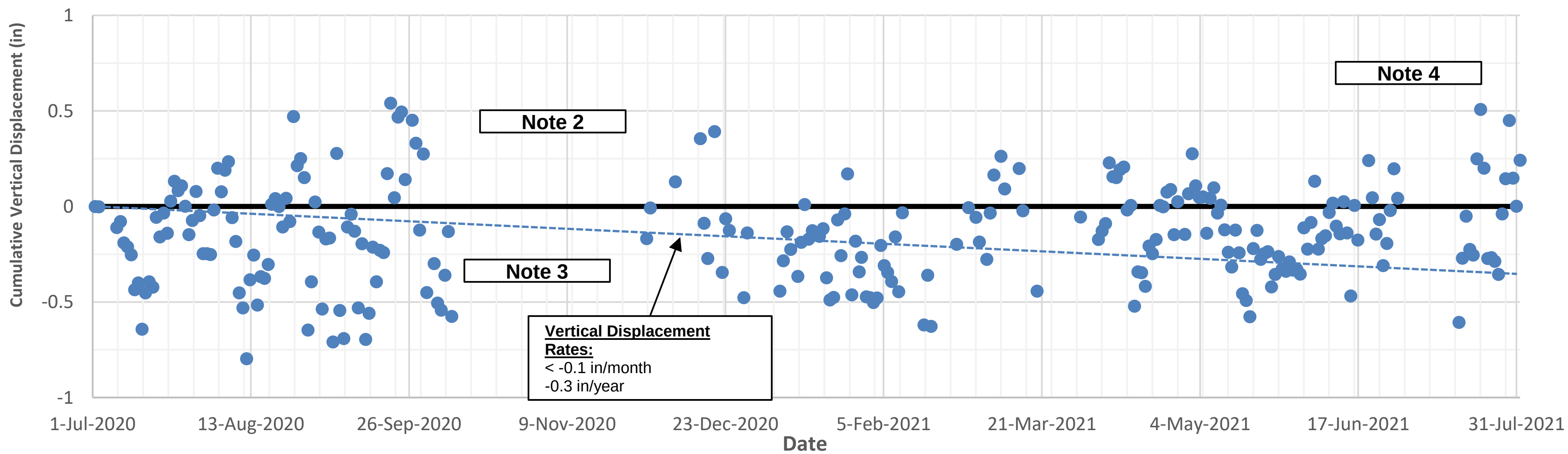
Knight Piésold CONSULTING

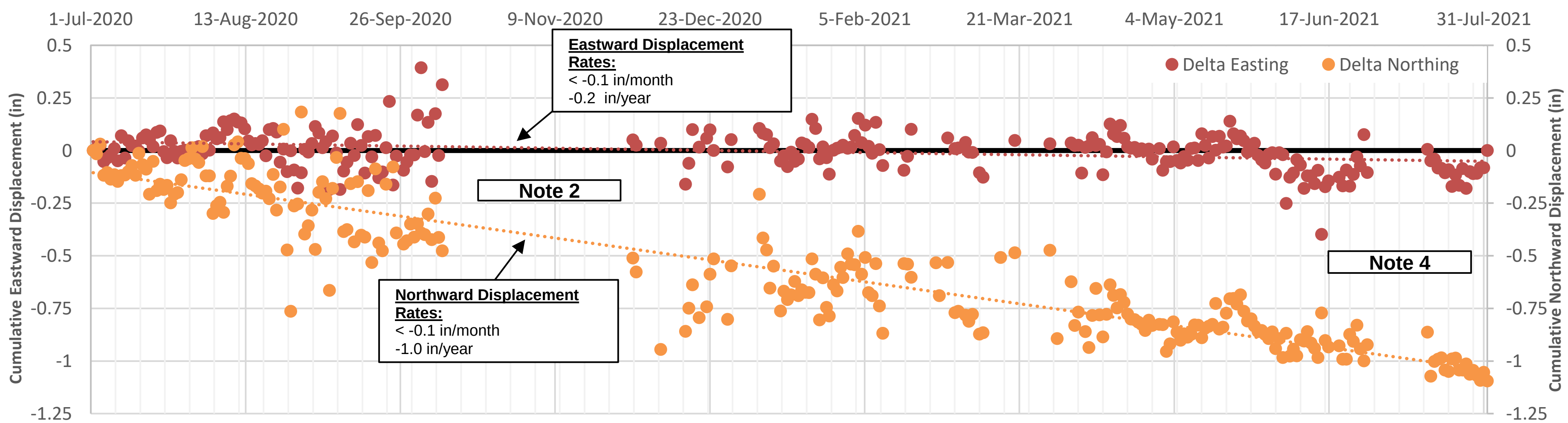
P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C2.1

REV 0





NOTES:
1. CUMULATIVE VERTICAL AND LATERAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. NO DATA WERE COLLECTION FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.

0	3AUG'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

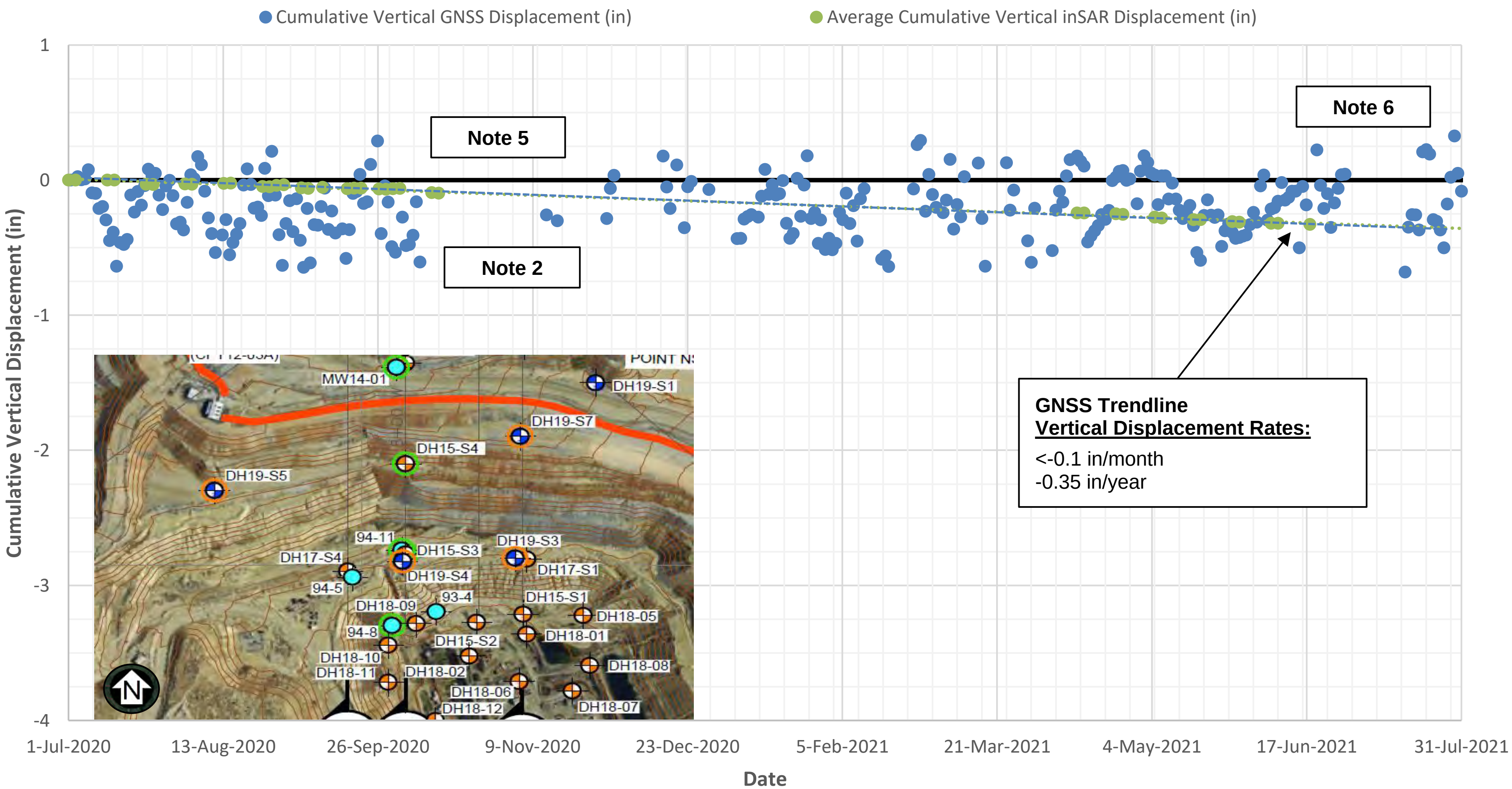
YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL & LATERAL DISPLACEMENTS MONITORED AT DH19-S3 (JULY 1, 2020 THROUGH JULY 31, 2021)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE C2.2 REV 0



NOTES:
1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. THE AVERAGE CUMULATIVE VERTICAL INSAR DISPLACEMENT IS CALCULATED BY AVERAGING TIME-SERIES DISPLACEMENTS FROM NINE INSAR DATA POINTS LOCATED ADJACENT TO DH19-S4.
5. NO LONG TERM (SQUEESAR) INSAR DATA ARE AVAILABLE FROM OCTOBER 2, 2020 TO APRIL 13, 2021 DUE TO THE ONSET OF WINTER CONDITIONS.
6. NO DATA WERE COLLECTION FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	3AUG'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

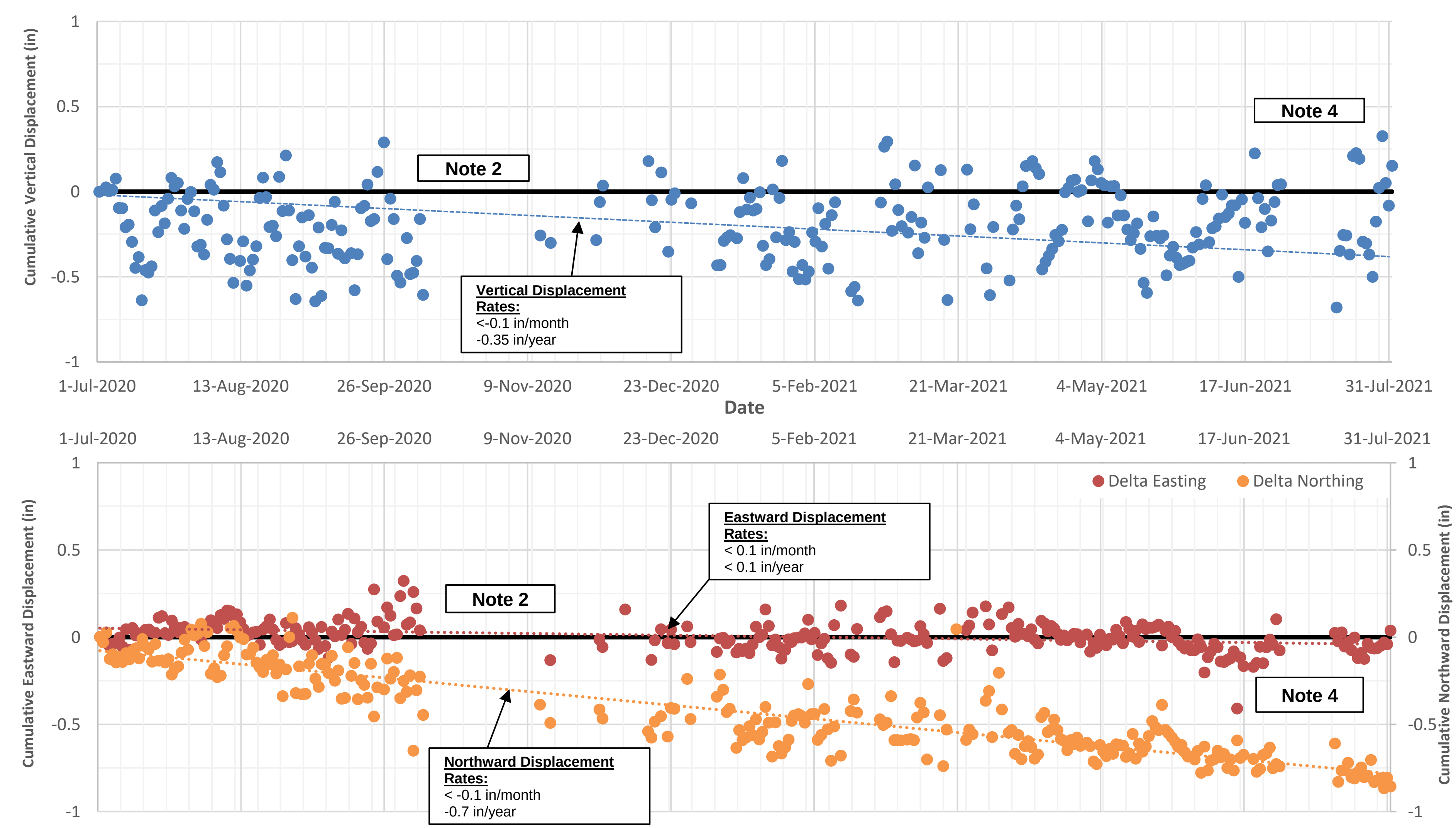
YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL DISPLACEMENTS MONITORED AT DH19-S4 (JULY 1, 2020 THROUGH JULY 31, 2021)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE C2.3 REV 0



NOTES:

1. CUMULATIVE VERTICAL AND LATERAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. NO DATA WERE COLLECTION FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.

0	3AUG'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL & LATERAL DISPLACEMENTS MONITORED AT DH19-S4 (JULY 1, 2020 THROUGH JULY 31, 2021)

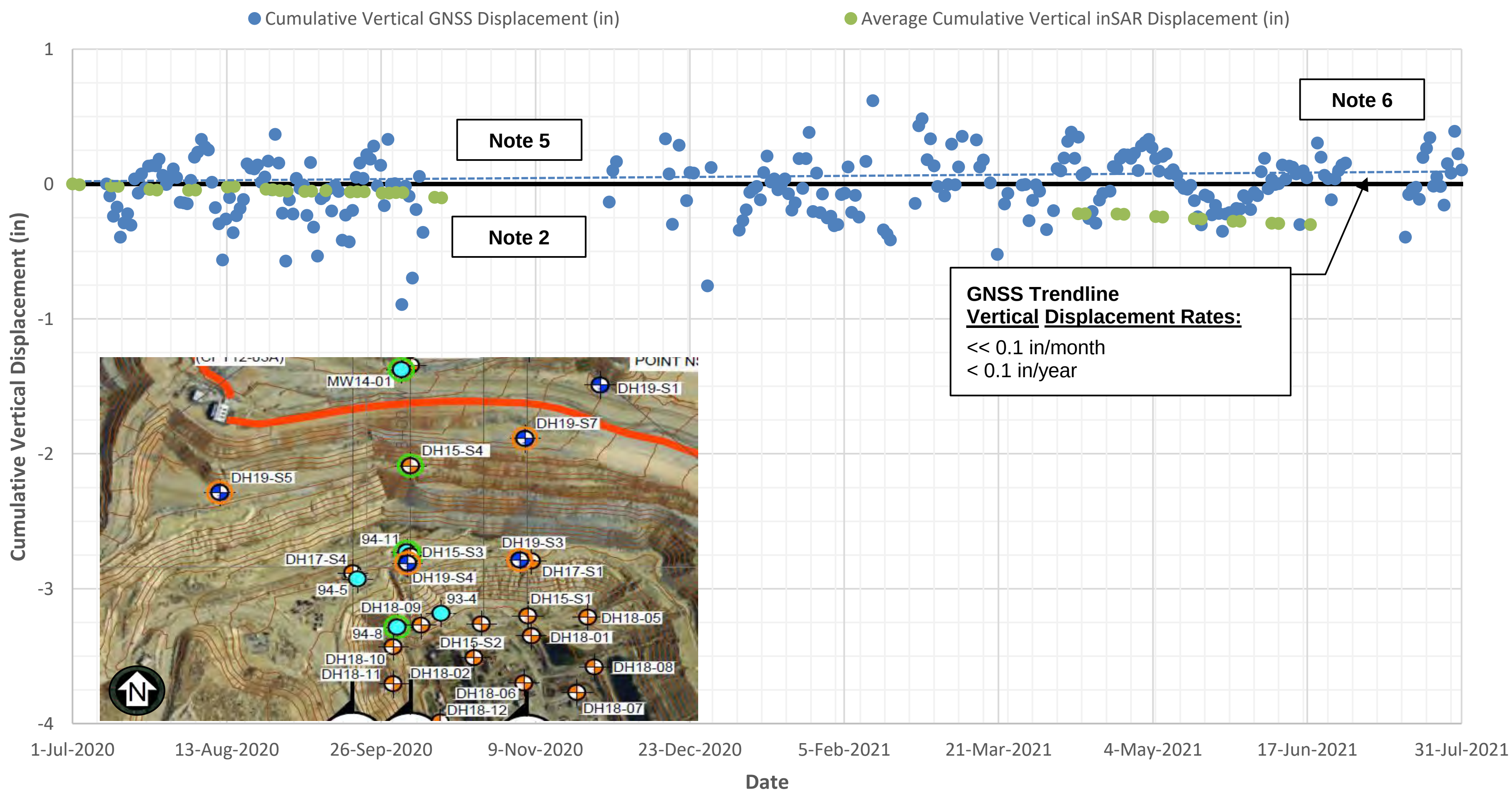
Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C2.4

REV 0



NOTES:

1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. THE AVERAGE CUMULATIVE VERTICAL INSAR DISPLACEMENT IS CALCULATED BY AVERAGING TIME-SERIES DISPLACEMENTS FROM NINE INSAR DATA POINTS LOCATED ADJACENT TO DH19-S5.
5. NO LONG TERM (SQUEESAR) INSAR DATA ARE AVAILABLE FROM OCTOBER 2, 2020 TO APRIL 13, 2021 DUE TO THE ONSET OF WINTER CONDITIONS.
6. NO DATA WERE COLLECTION FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
7. THE +1 STD. DEV. SERIES IS THE AVERAGE INSAR DEFORMATION RATE PLUS THE STANDARD DEVIATION OF DATA POINTS LOCAL TO THE INSTRUMENTATION SITE.

0	3AUG'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

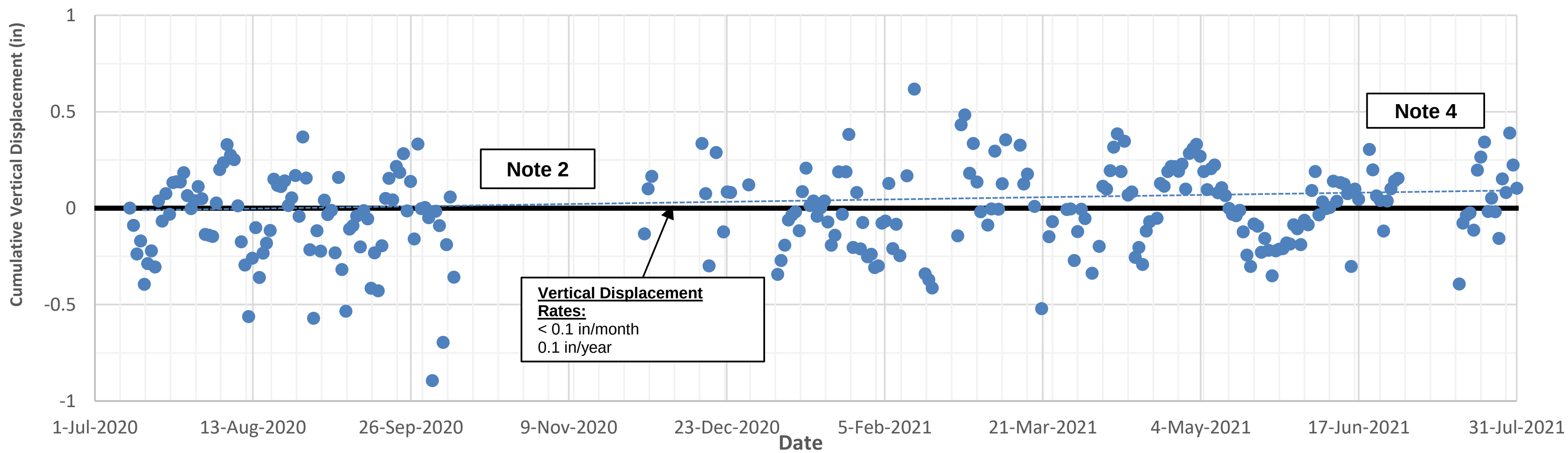
MONTANA RESOURCES LLP.

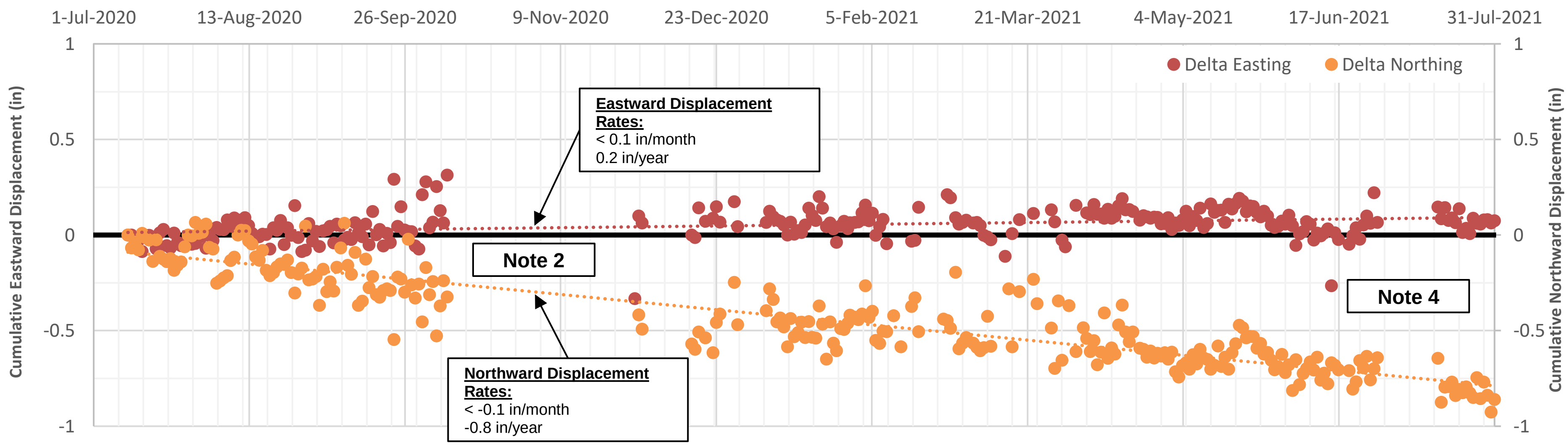
YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL DISPLACEMENTS MONITORED AT DH19-S5 (JULY 1, 2020 THROUGH JULY 31, 2021)

Knight Piésold CONSULTING

P/A NO.	REF. NO.	
VA101-00126/25	VA21-01362	
FIGURE C2.5		REV 0





NOTES:

1. CUMULATIVE VERTICAL AND LATERAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. NO DATA WERE COLLECTION FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	3AUG'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL & LATERAL DISPLACEMENTS MONITORED AT DH19-S5 (JULY 1, 2020 THROUGH JULY 31, 2021)

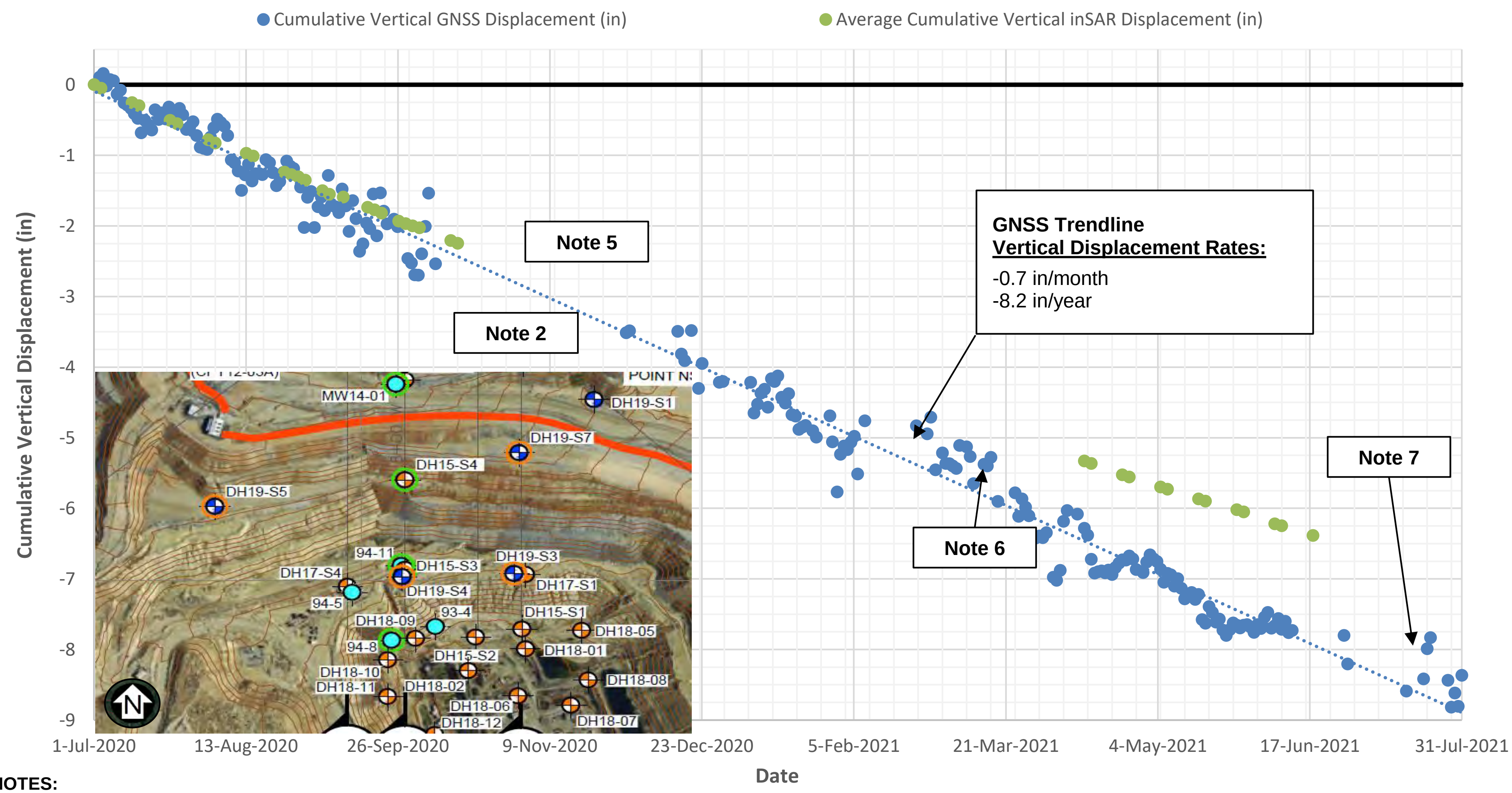
Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C2.6

REV 0



NOTES:
1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. THE AVERAGE CUMULATIVE VERTICAL INSAR DISPLACEMENT IS CALCULATED BY AVERAGING TIME-SERIES DISPLACEMENTS FROM NINE INSAR DATA POINTS LOCATED ADJACENT TO DH19-S7.
5. NO LONG TERM (SQUEESAR) INSAR DATA ARE AVAILABLE FROM OCTOBER 2, 2020 TO APRIL 13, 2021 DUE TO THE ONSET OF WINTER CONDITIONS.
6. NO DATA WERE COLLECTED FROM FEBRUARY 9 TO 21, 2021 DUE TO A DEPLETED DATA LOGGER BATTERY.
7. NO DATA WERE COLLECTION FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
8. THE -1 STD. DEV. SERIES IS THE AVERAGE INSAR DEFORMATION RATE MINUS THE STANDARD DEVIATION OF DATA POINTS LOCAL TO THE INSTRUMENTATION SITE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	3AUG'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

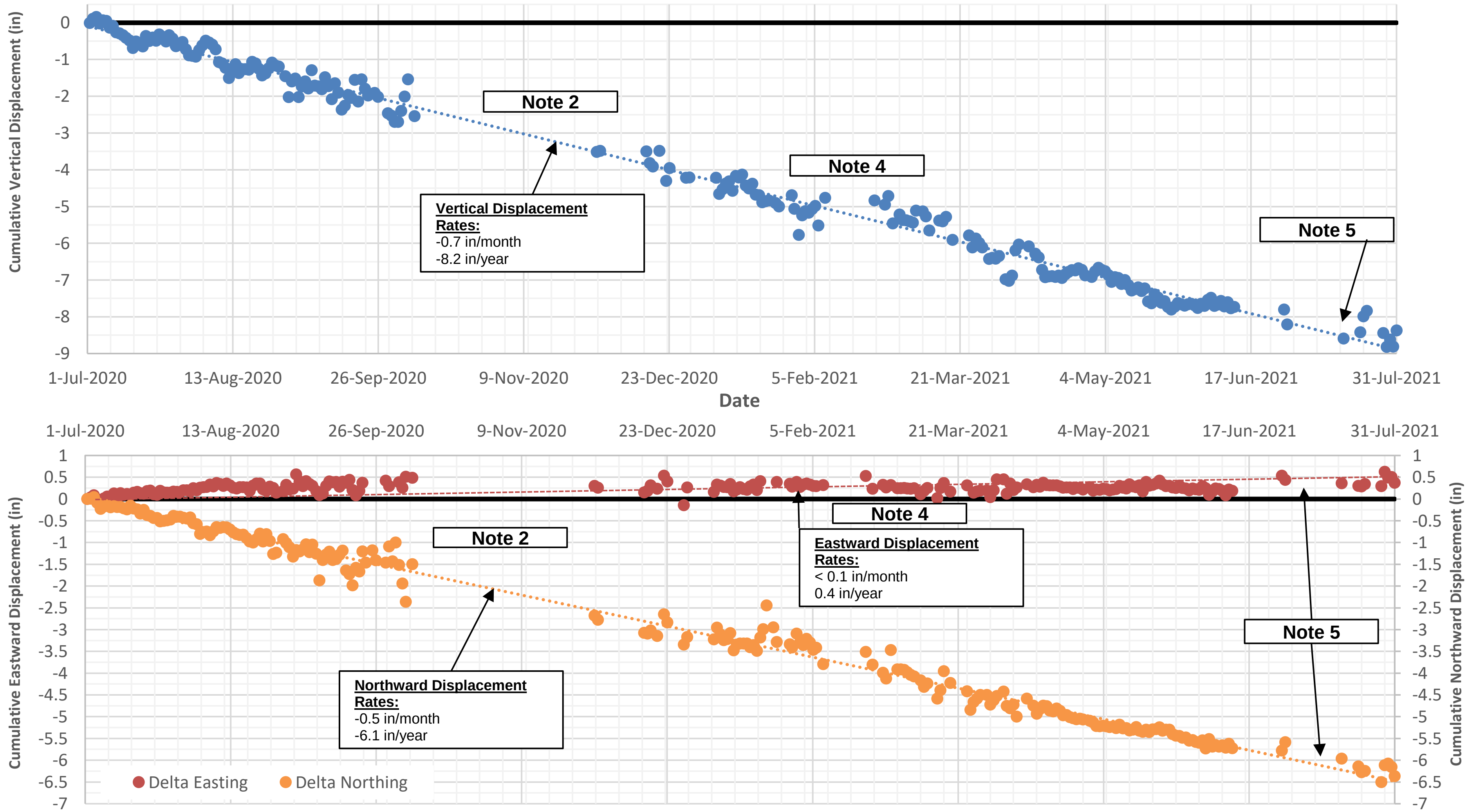
YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL DISPLACEMENTS MONITORED AT DH19-S7 (JULY 1, 2020 THROUGH JULY 31, 2021)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE C2.7 REV 0



NOTES:
1. CUMULATIVE VERTICAL AND LATERAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. NO DATA WERE COLLECTED FROM FEBRUARY 9 TO 21, 2021 DUE TO A DEPLETED DATA LOGGER BATTERY.
5. NO DATA WERE COLLECTION FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.

0	3AUG'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL & LATERAL DISPLACEMENTS MONITORED AT DH19-S7 (JULY 1, 2020 THROUGH JULY 31, 2021)

Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C2.8

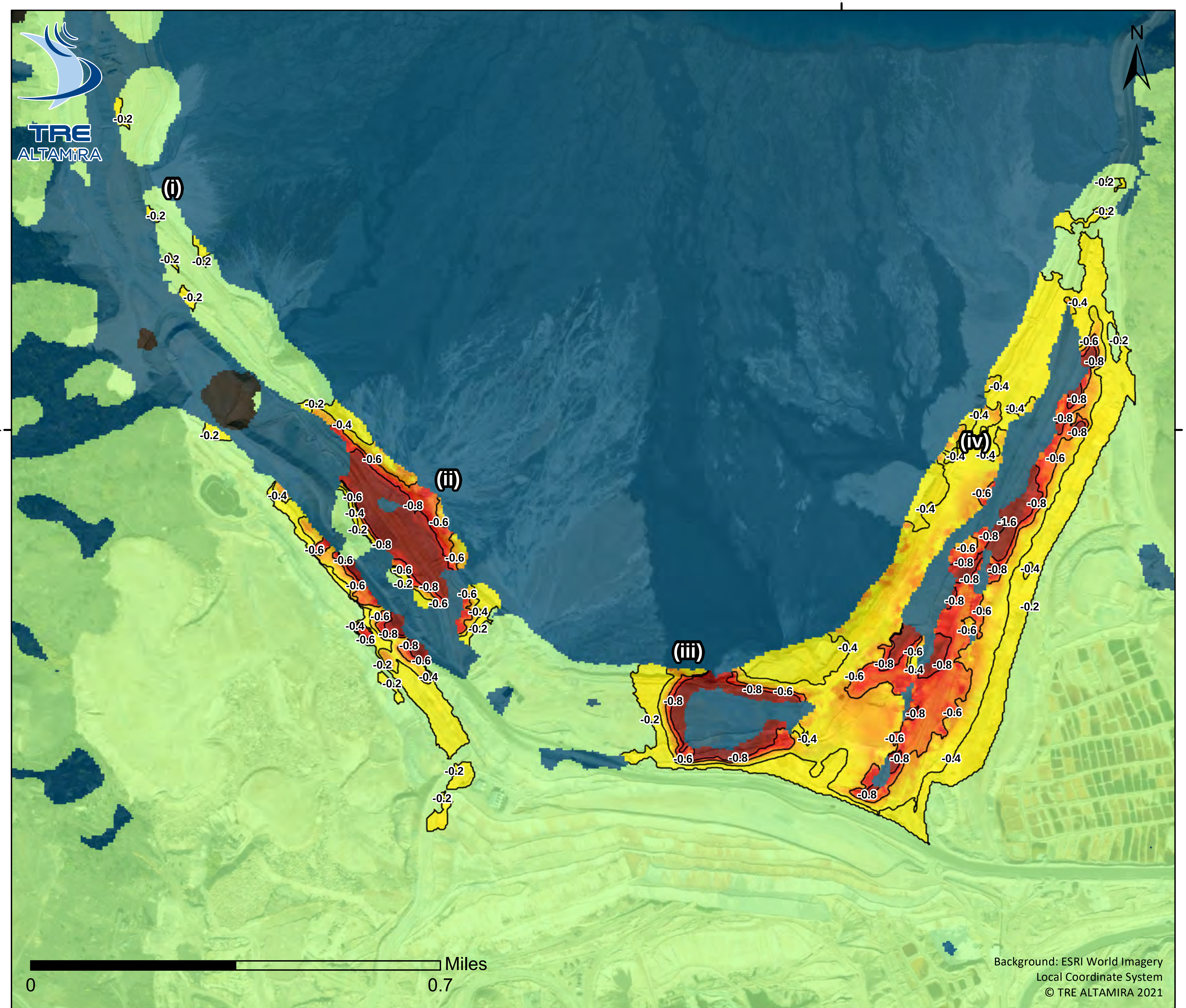
REV 0

APPENDIX C3

Sequential InSAR Bulletins

(Pages C3-1 to C3-9)

137,533



143,058

143,058

InSAR Bulletin

Yankee Doodle Tailings Impoundment

13 Apr 2021 - 05 May 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.3 inches

East-West Embankment) Up to -1.5 inches in the **(ii)** northern and **(iii)** southern regions

(iv) East Embankment Up to -1.4 inches

Main areas of movement detected during the current 22-day period:

(i) West Embankmant Up to -0.3 inches

PROCESSING DATA

Date range (UTC)	13 Apr - 05 May 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	295 [ft]

LEGEND

LOS Displacement [in]

≤ -1 -0.5 0 +0.5 ≥ +1

Displacement contour lines

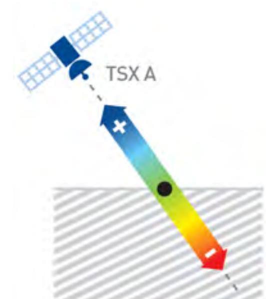
Visibility

Surface variation

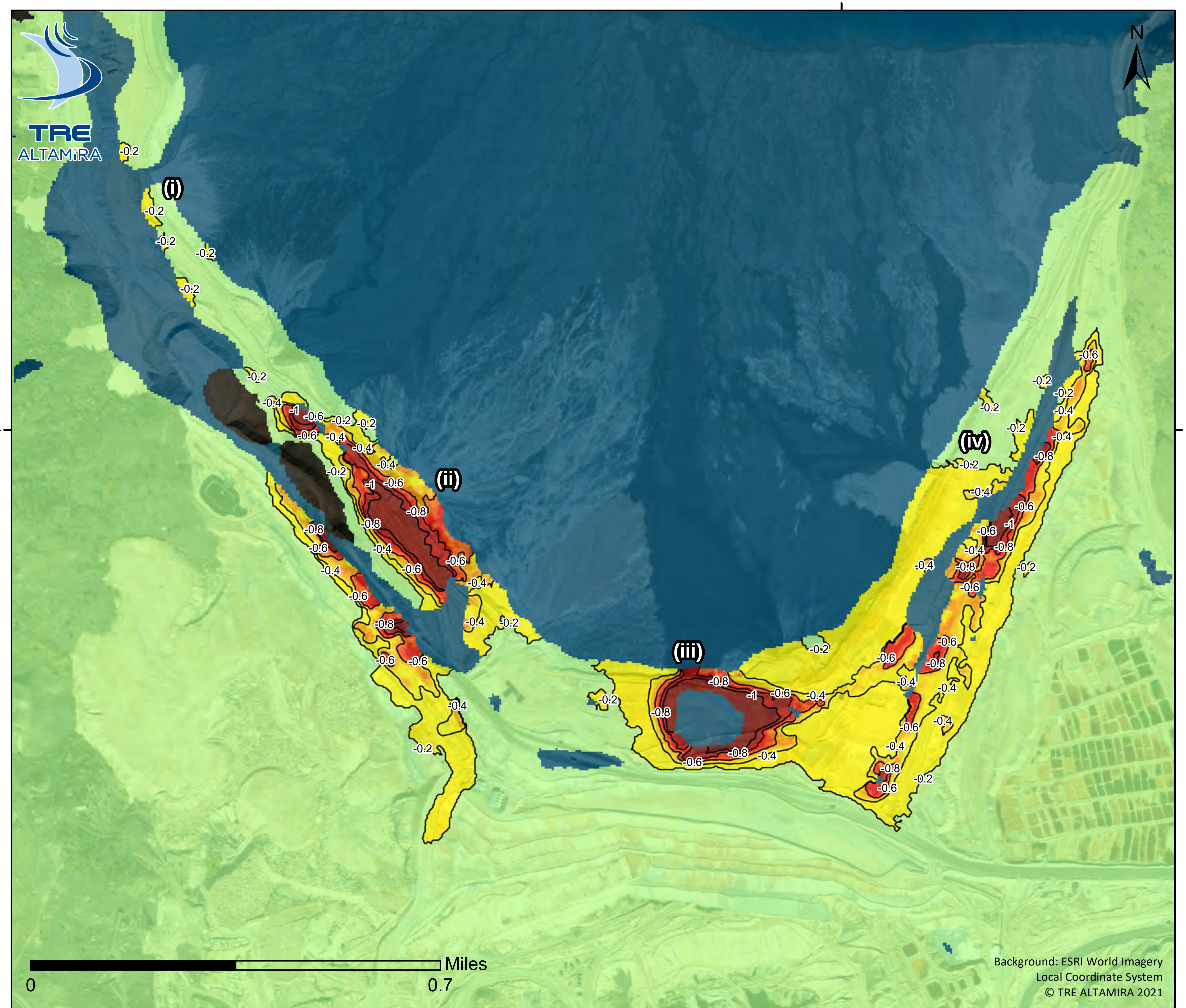
No Information

Possible motion

Movement Detection Threshold: ±0.2 in



 137,533



InSAR Bulletin

Yankee Doodle Tailings Impoundment

24 Apr 2021 - 16 May 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.4 inches

East-West Embankment (ii) Up to -1.8 inches in the northern region and **(iii)** up to -2.2 inches in the southern region

(iv) East Embankment Up to -1.4 inches

PROCESSING DATA

Date range (UTC)	24 Apr - 16 May 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	280 [ft]

LEGEND

LOS Displacement [in]

≤ -1 | -0.5 | 0 | +0.5 | ≥ +1

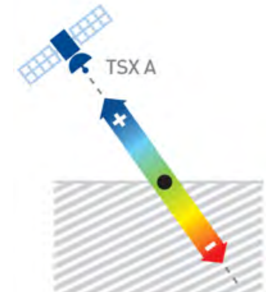
Displacement contour lines

Visibility

Surface variation

No Information

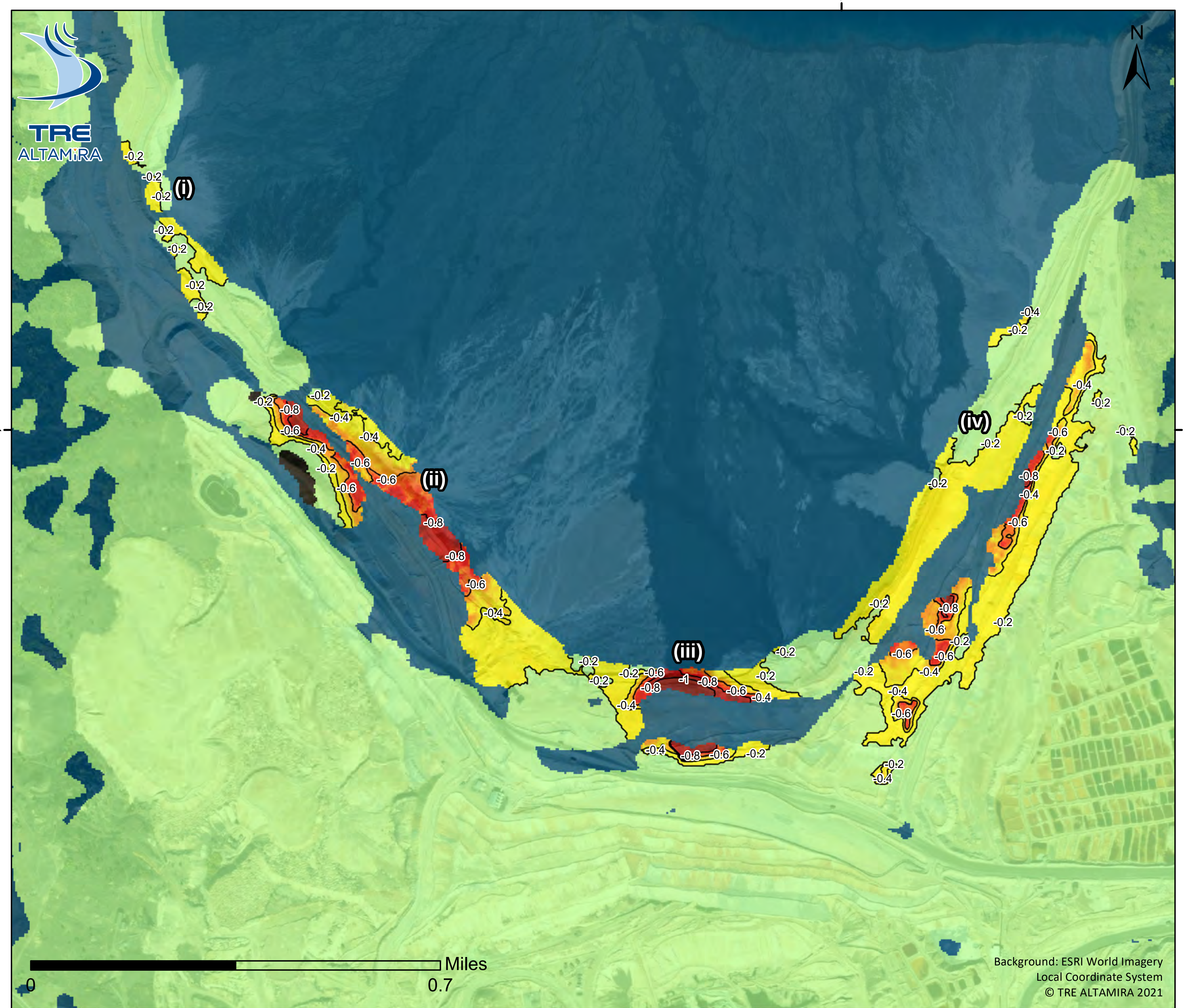
Possible motion



Movement Detection Threshold: ±0.2 in

137,533

143,058



143,058

InSAR Bulletin

Yankee Doodle Tailings Impoundment

05 May 2021 - 27 May 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.4 inches

East-West Embankment (ii) Up to -1.8 inches in the northern region and **(iii)** up to -2.2 inches in the southern region

(iv) East Embankment Up to -1.4 inches

PROCESSING DATA

Date range (UTC)	05 May - 27 May 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	440 [ft]

LEGEND

LOS Displacement [in]

≤ -1 | -0.5 | 0 | +0.5 | ≥ +1

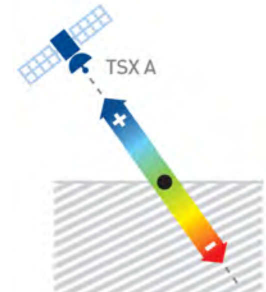
Displacement contour lines

Visibility

Surface variation

No Information

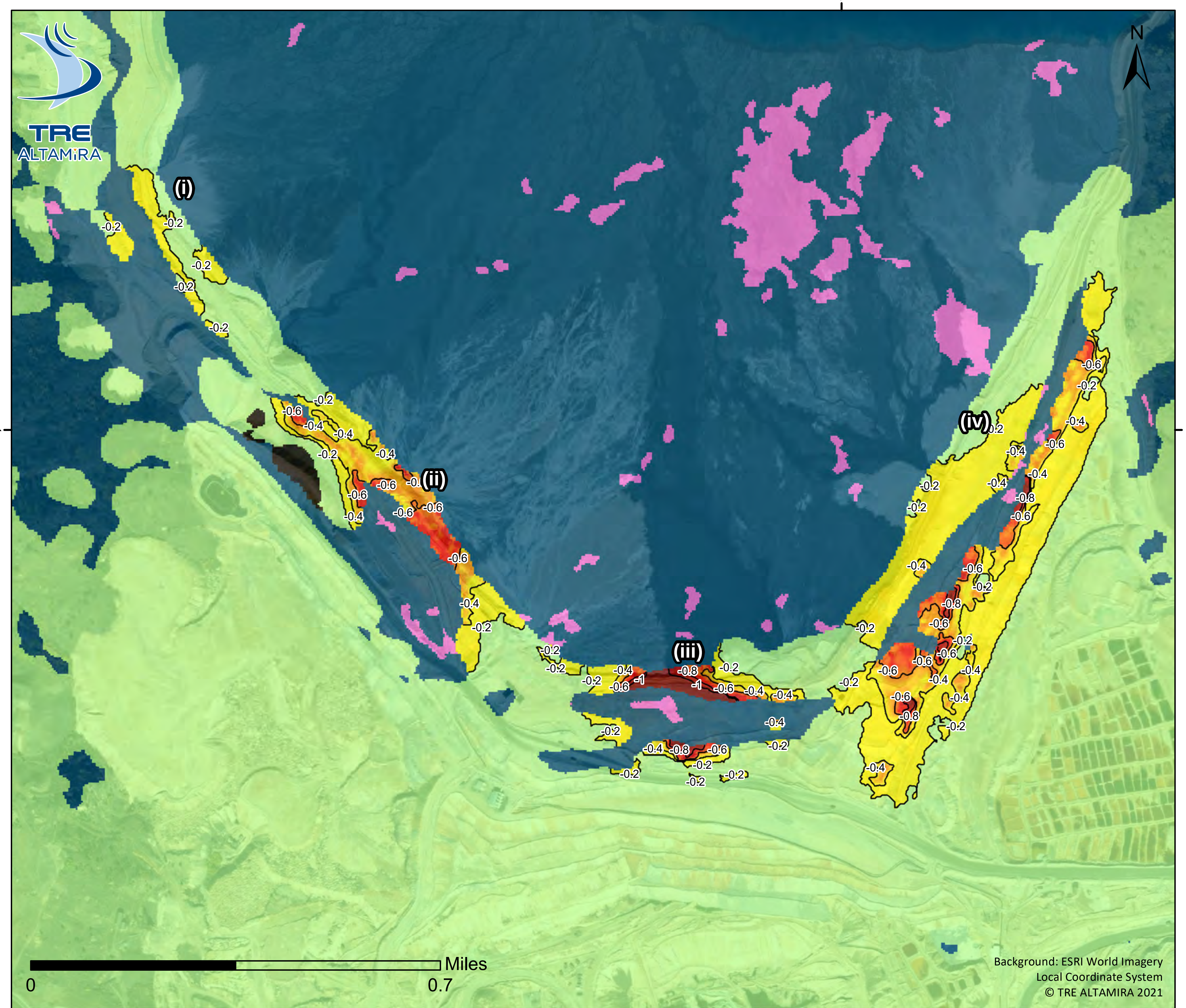
Possible motion



Movement Detection Threshold: ±0.2 in

 137,533

137,533



143,058

143,058

137,533

InSAR Bulletin

Yankee Doodle Tailings Impoundment

16 May 2021 - 07 Jun 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.4 inches

East-West Embankment (ii) Up to -0.8 inches in the northern region and **(iii)** up to -1.8 inches in the southern region

(iv) East Embankment Up to -1.0 inches

PROCESSING DATA

Date range (UTC)	16 May - 07 Jun 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	560 [ft]

LEGEND

LOS Displacement [in]

≤ -1 | -0.5 | 0 | +0.5 | ≥ +1

Displacement contour lines

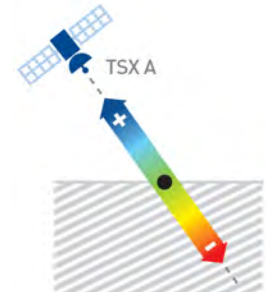
Visibility

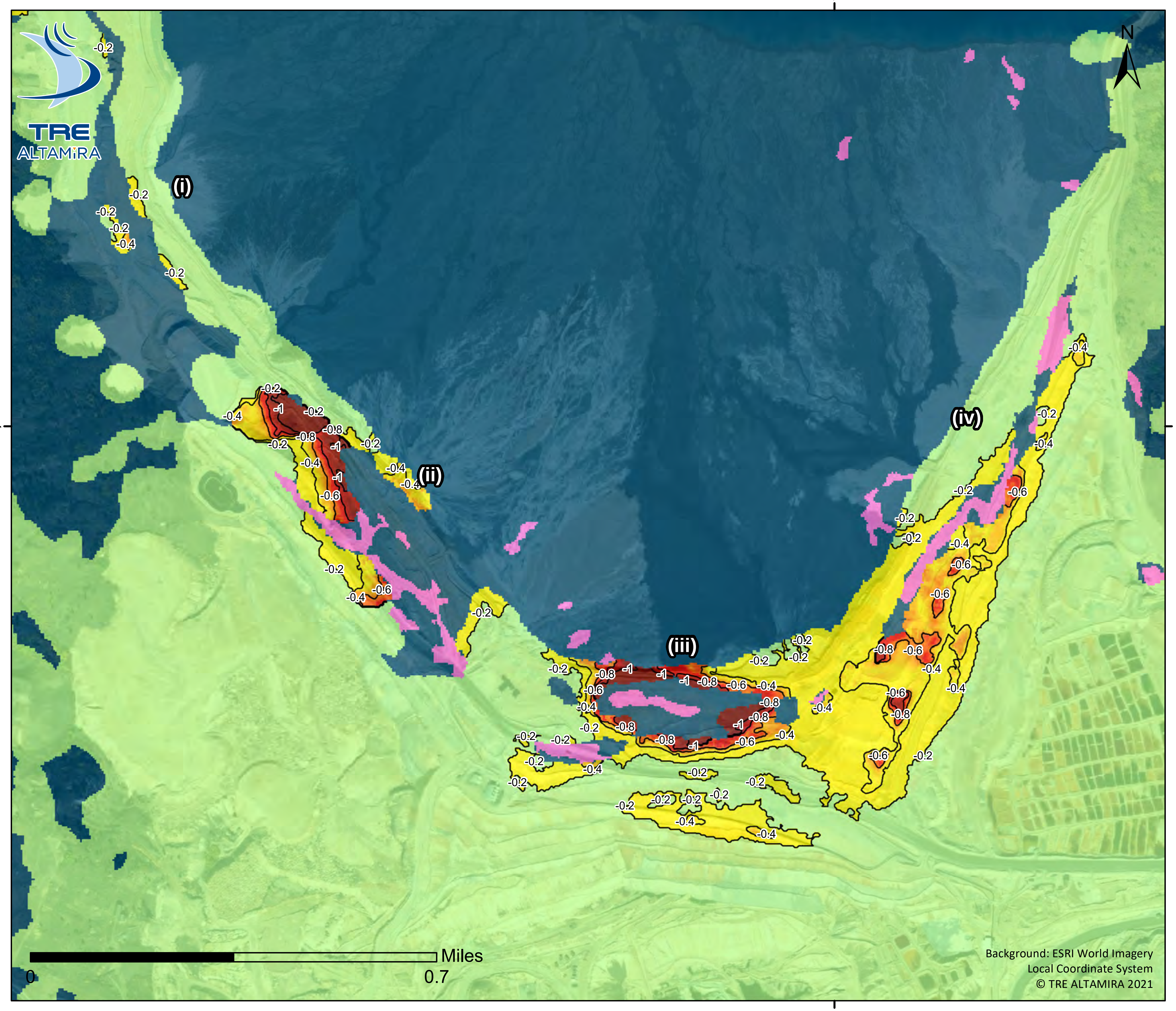
Surface variation

No Information

Possible motion

Movement Detection Threshold: ±0.2 in





InSAR Bulletin

Yankee Doodle Tailings Impoundment

27 May 2021 - 18 Jun 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.6 inches

East-West Embankment (ii) Up to -1.5 inches in the northern region and **(iii)** up to -1.9 inches in the southern region

(iv) East Embankment Up to -0.9 inches

PROCESSING DATA

Date range (UTC)	27 May - 18 Jun 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	16 [ft]

LEGEND

LOS Displacement [in]

≤ -1 -0.5 0 +0.5 ≥ +1

Displacement contour lines

Visibility

Surface variation

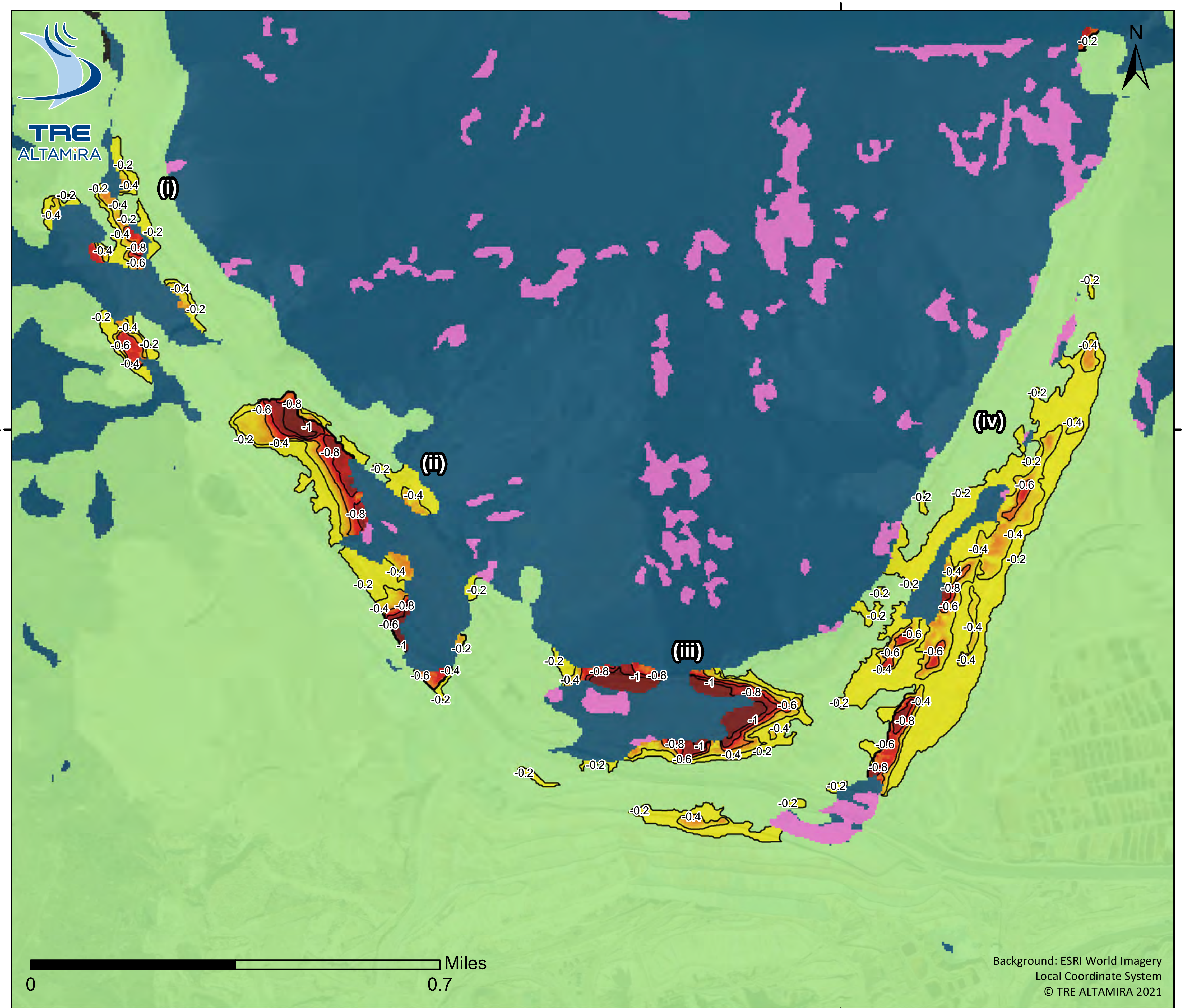
No Information

Possible motion

Movement Detection Threshold: ±0.2 in

TSX A

137,533



143,058 143,058

137,533

InSAR Bulletin

Yankee Doodle Tailings Impoundment

07 Jun 2021 - 29 Jun 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.9 inches

East-West Embankment (ii) Up to -1.3 inches in the northern region and **(iii)** up to -2.2 inches in the southern region

(iv) East Embankment Up to -1.0 inches

PROCESSING DATA

Date range (UTC)	07 Jun - 29 Jun 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	308 [ft]

LEGEND

LOS Displacement [in]

≤ -1 -0.5 0 +0.5 ≥ +1

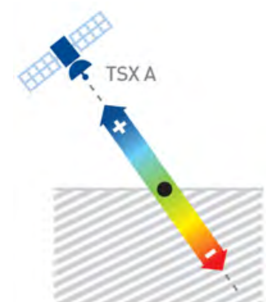
Displacement contour lines

Visibility

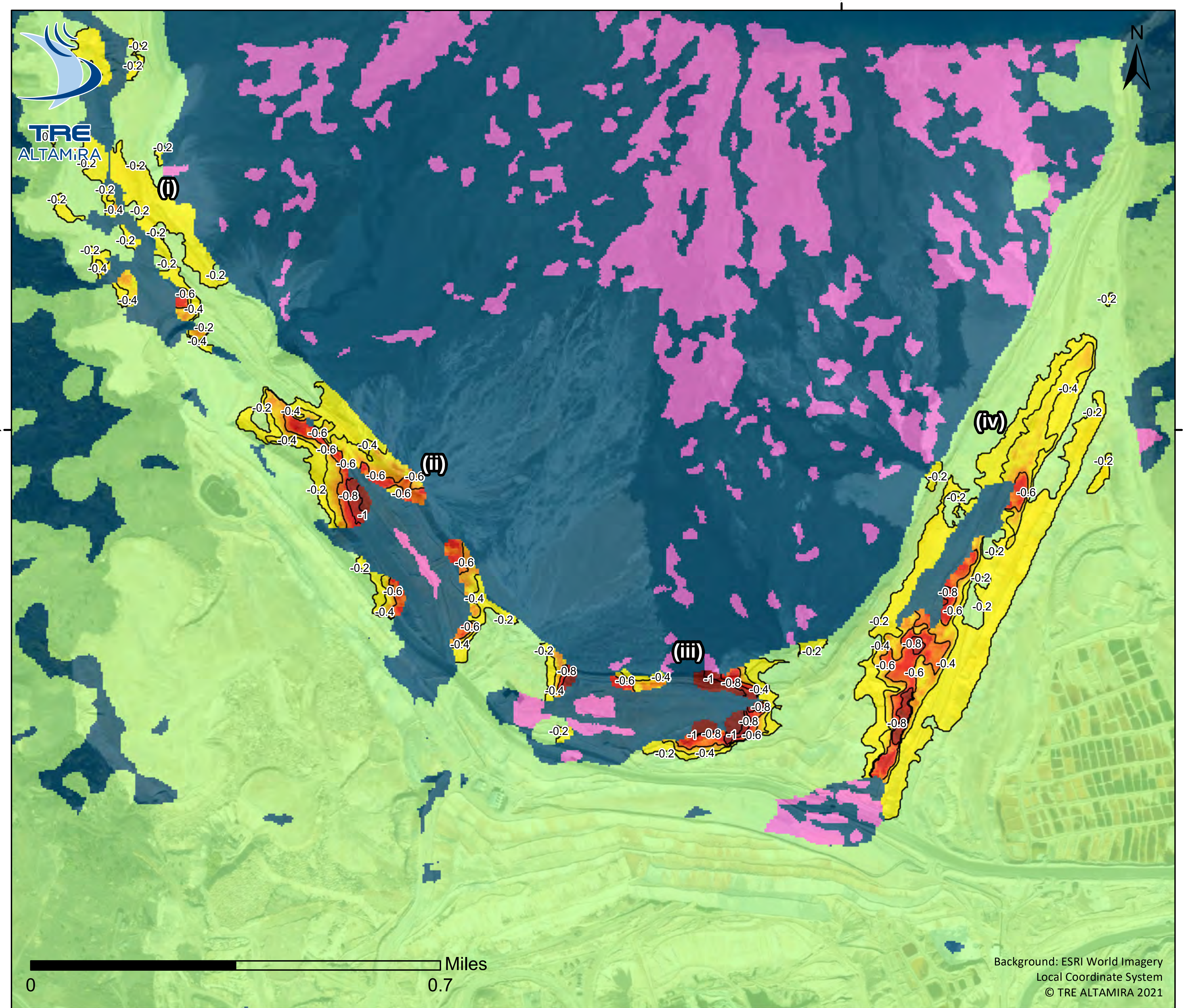
Surface variation

No Information

Possible motion



Movement Detection Threshold: ±0.2 in



InSAR Bulletin

Yankee Doodle Tailings Impoundment

18 Jun 2021 - 10 Jul 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.8 inches

East-West Embankment (ii) Up to -1.6 inches in the northern region and **(iii)** up to -2.2 inches in the southern region

(iv) North-South Embankment Up to -1.0 inches

PROCESSING DATA

Date range (UTC)	18 Jun - 10 Jul 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	800 [ft]

LEGEND

LOS Displacement [in]

≤ -1 -0.5 0 +0.5 ≥ +1

Displacement contour lines

TSX A

Visibility

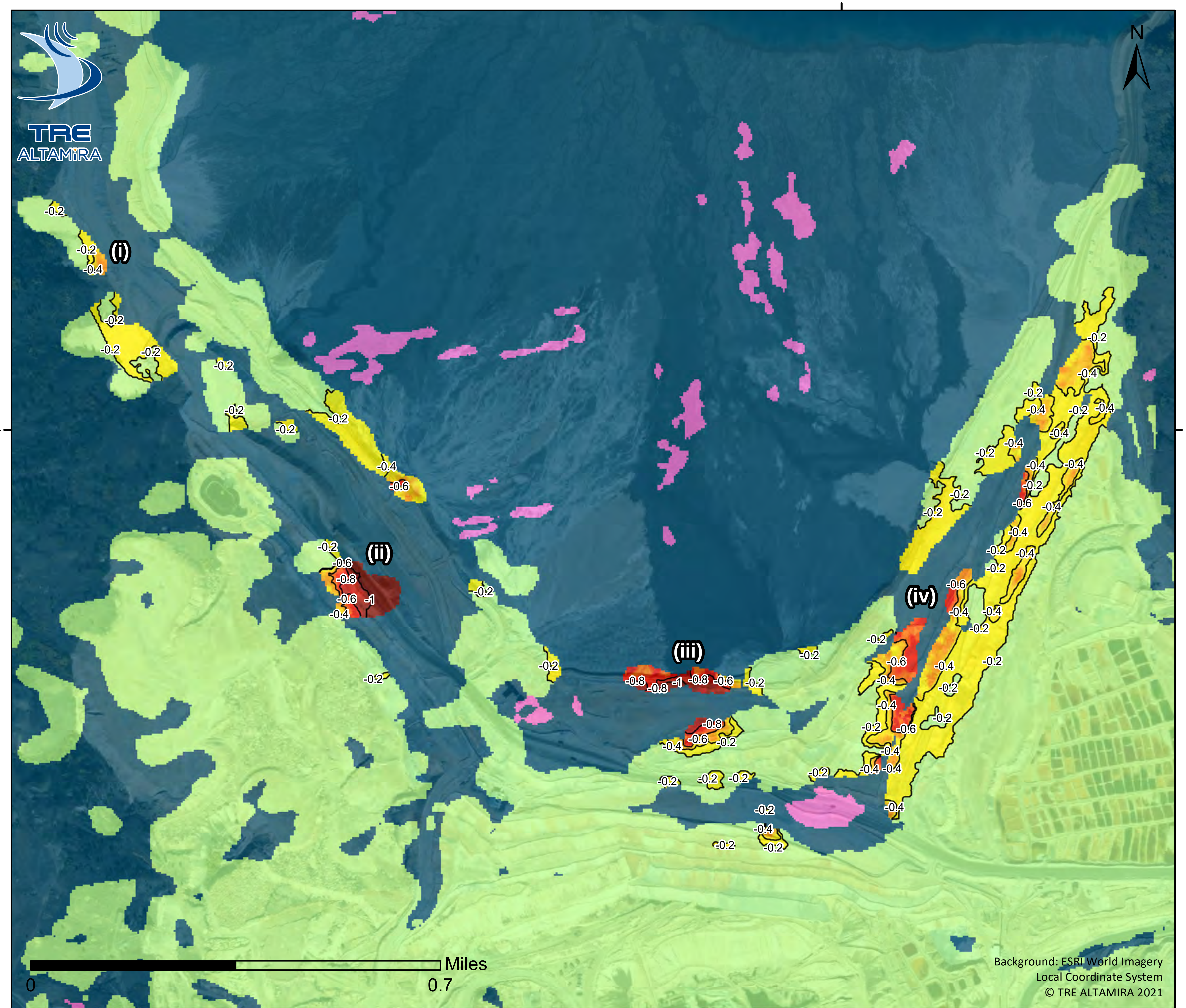
Surface variation

No Information

Possible motion

Movement Detection Threshold: ±0.2 in

137,533



137,533

InSAR Bulletin

Yankee Doodle Tailings Impoundment

29 Jun 2021 - 21 Jul 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.6 inches

East-West Embankment (ii) Up to -1.9 inches in the northern region and **(iii)** up to -1.2 inches in the southern region

(iv) North-South Embankment Up to -0.8 inches

The coverage and the accuracy of the measurements might be affected by the high normal baseline

PROCESSING DATA

Date range (UTC)	29 Jun - 21 Jul 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	1024 [ft]

LEGEND

LOS Displacement [in]

≤ -1 -0.5 0 +0.5 ≥ +1

Displacement contour lines

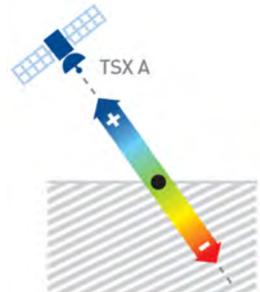
Visibility

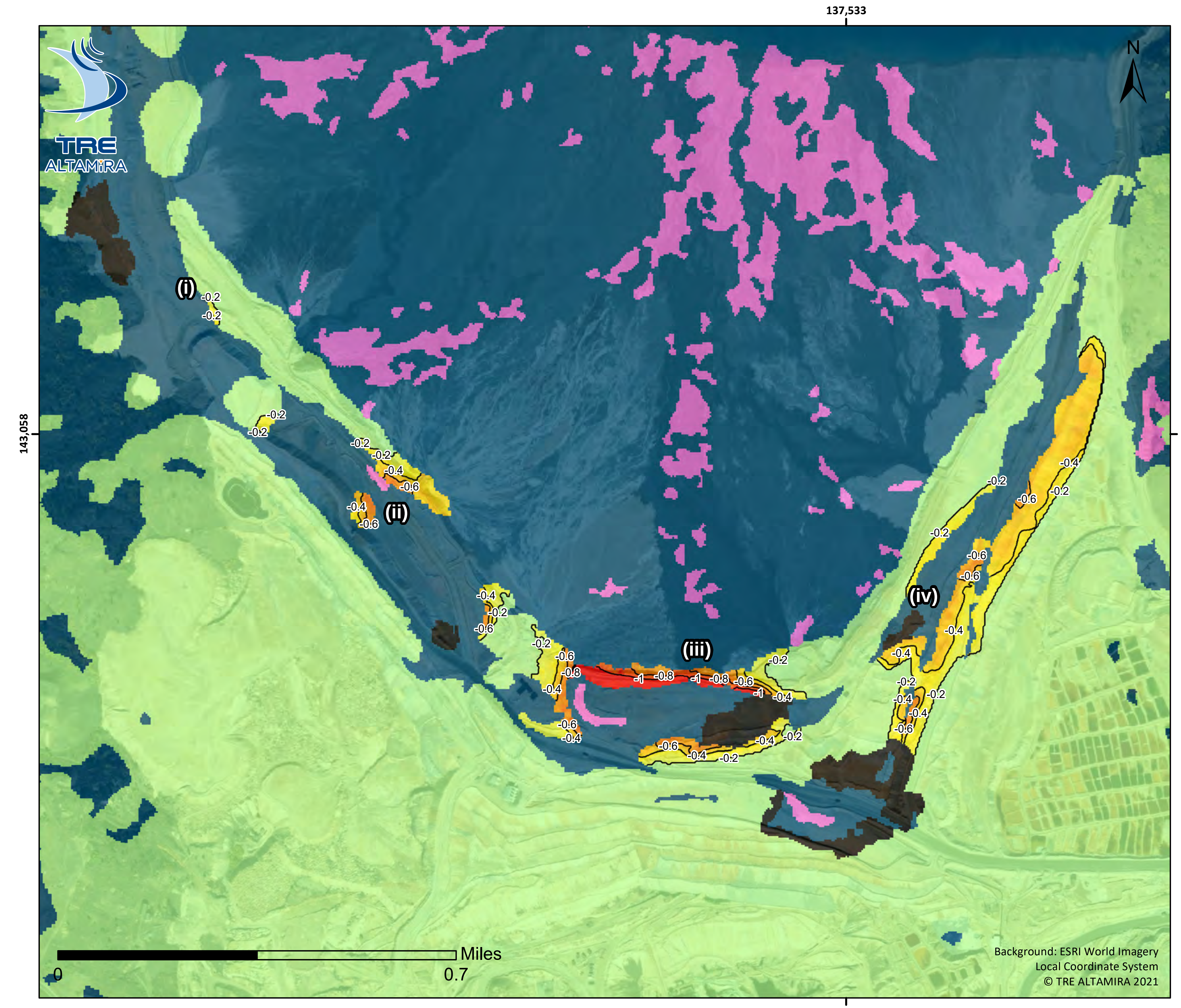
Surface variation

No Information

Possible motion

Movement Detection Threshold: ±0.2 in





InSAR Bulletin

Yankee Doodle Tailings Impoundment

10 Jul 2021 - 01 Aug 2021

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -0.4 inches

East-West Embankment (ii) Up to -0.8 inches in the northern region and **(iii)** up to -1.8 inches in the southern region

(iv) North-South Embankment Up to -0.8 inches

PROCESSING DATA

Date range (UTC)	10 Jul - 01 Aug 2021
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	203 [ft]

LEGEND

LOS Displacement [in]

≤ -1   -0.5   0   +0.5   ≥ +1

Displacement contour lines

Visibility

Surface variation

No Information

Possible motion

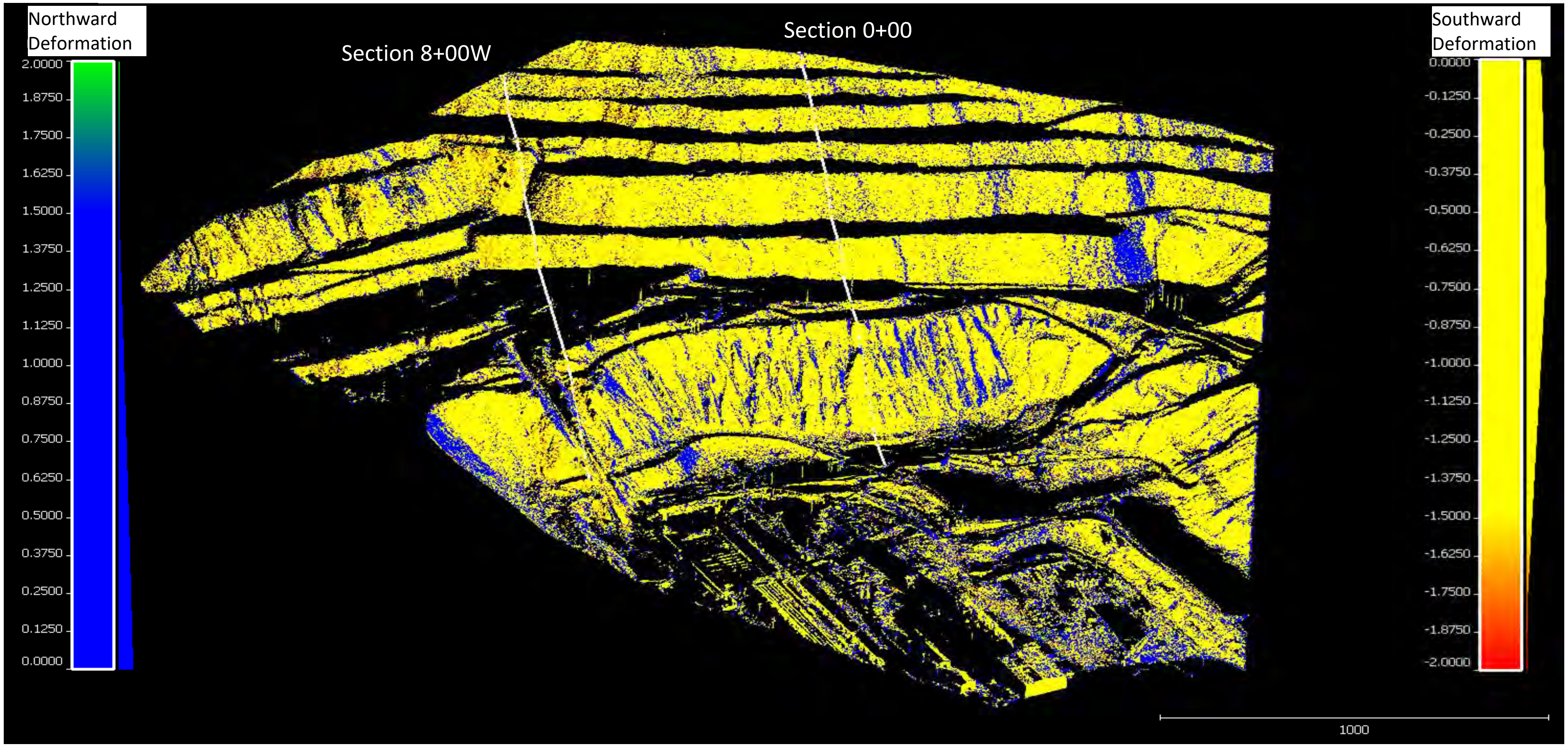
TSX A

Movement Detection Threshold: ±0.2 in

APPENDIX C4

Sequential MapTek Scan – Northing

(Figures C4.1 to C4.8)



NOTES:

1. POSITIVE DISPLACEMENT REPRESENTS NORTHWARD DEFORMATION
2. NEGATIVE DISPLACEMENT REPRESENTS SOUTHWARD DEFORMATION
3. DEFORMATIONS ARE CALCULATED RELATIVE TO A JUNE 16, 2021 BASELINE SURVEY

0	29SEP'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE NORTH-SOUTH DEFORMATION
MAPTEK LASER SCAN
JUNE 16, 2021 (LOOKING NORTHEAST)

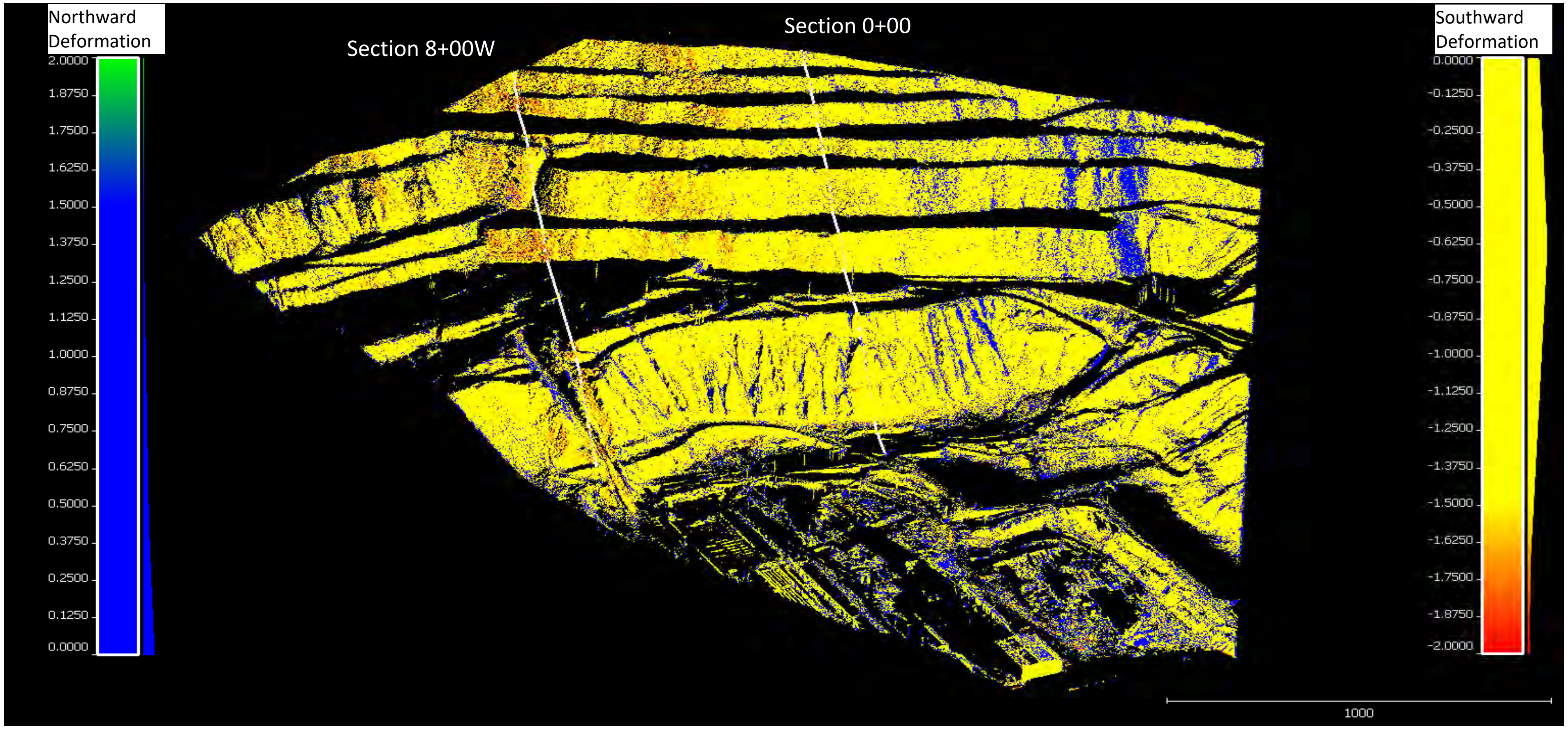
Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C4.1

REV 0



NOTES:

1. POSITIVE DISPLACEMENT REPRESENTS NORTHWARD DEFORMATION
2. NEGATIVE DISPLACEMENT REPRESENTS SOUTHWARD DEFORMATION
3. DEFORMATIONS ARE CALCULATED RELATIVE TO A JUNE 16, 2021 BASELINE SURVEY

0	29SEP'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE NORTH-SOUTH DEFORMATION
MAPTEK LASER SCAN
JUNE 23, 2021 (LOOKING NORTHEAST)

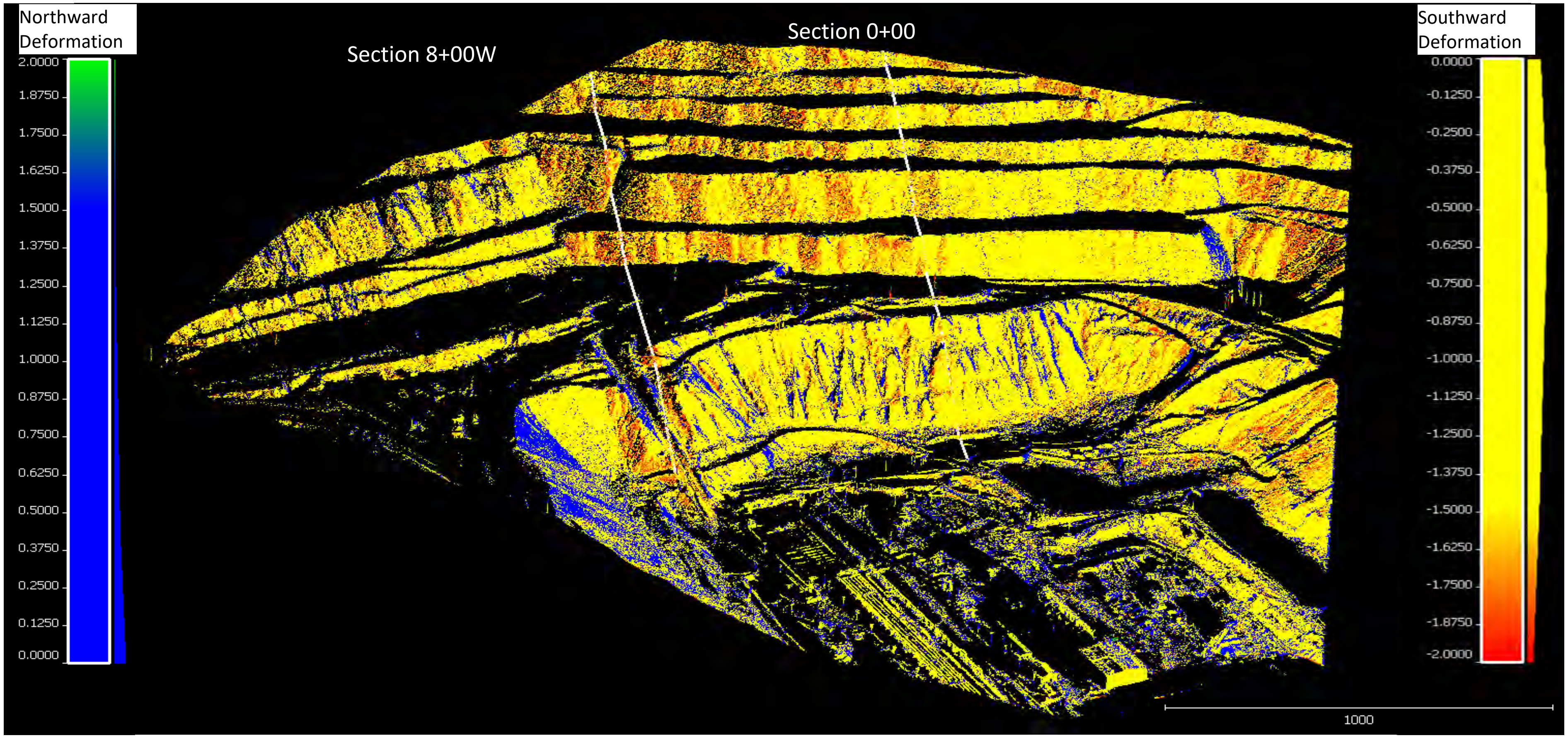
Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C4.2

REV 0



NOTES:
1. POSITIVE DISPLACEMENT REPRESENTS NORTHWARD DEFORMATION
2. NEGATIVE DISPLACEMENT REPRESENTS SOUTHWARD DEFORMATION
3. DEFORMATIONS ARE CALCULATED RELATIVE TO A JUNE 16, 2021 BASELINE SURVEY

0	29SEP'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE NORTH-SOUTH DEFORMATION
MAPTEK LASER SCAN
JUNE 30, 2021 (LOOKING NORTHEAST)

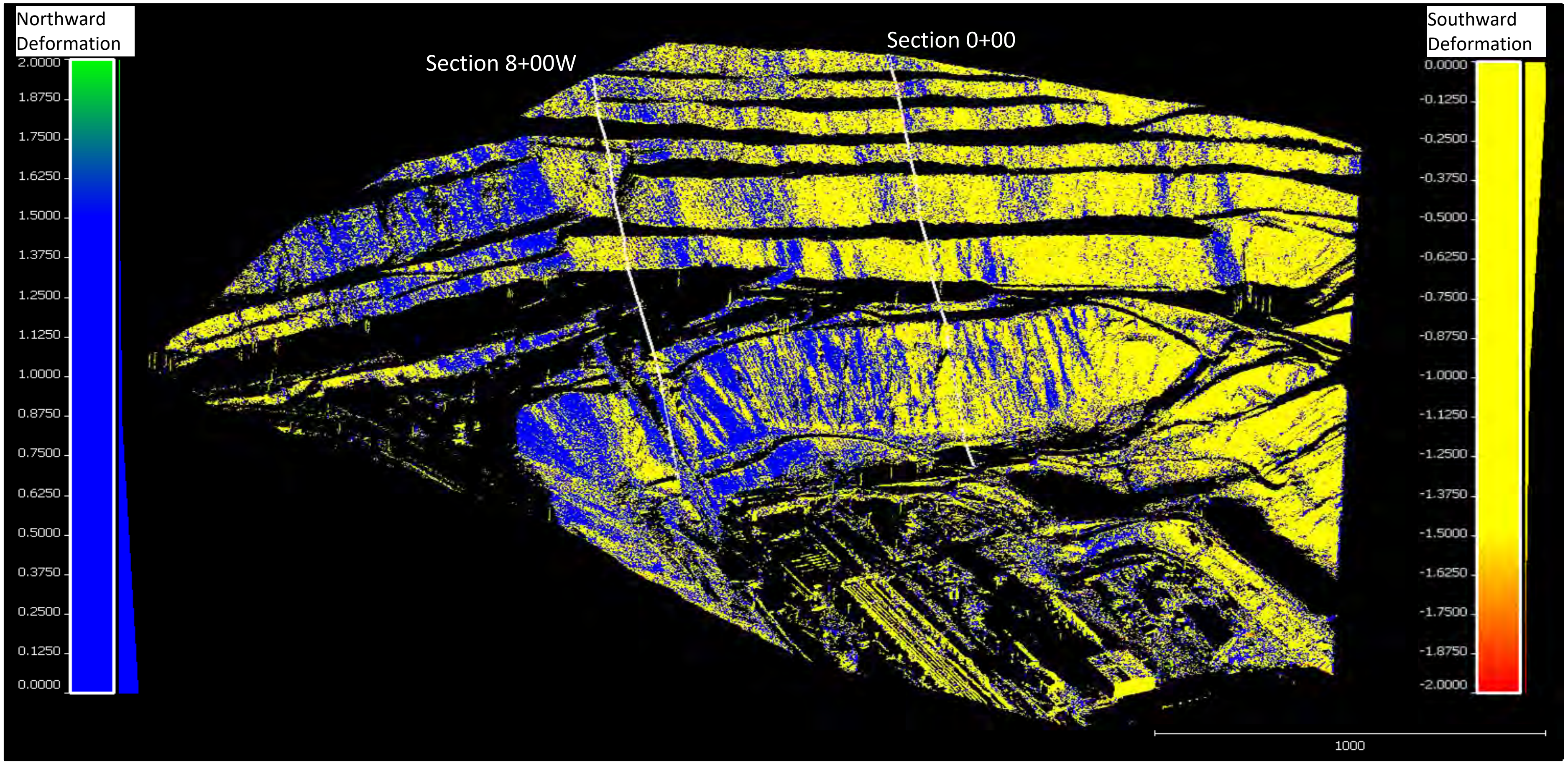
Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C4.3

REV 0



NOTES:

1. POSITIVE DISPLACEMENT REPRESENTS NORTHWARD DEFORMATION
2. NEGATIVE DISPLACEMENT REPRESENTS SOUTHWARD DEFORMATION
3. DEFORMATIONS ARE CALCULATED RELATIVE TO A JUNE 16, 2021 BASELINE SURVEY

0	29SEP'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE NORTH-SOUTH DEFORMATION
MAPTEK LASER SCAN
JULY 7, 2021 (LOOKING NORTHEAST)

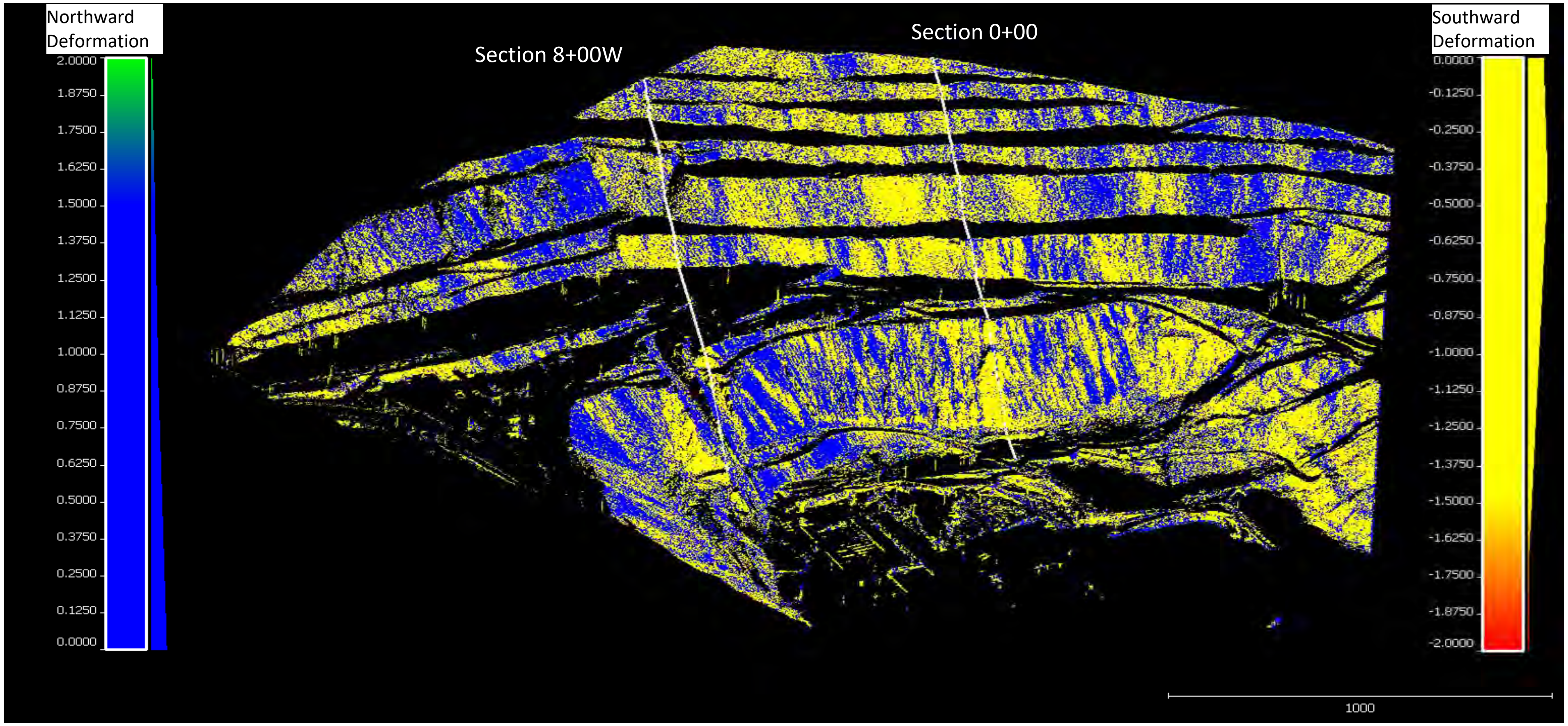
Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C4.4

REV 0



NOTES:

1. POSITIVE DISPLACEMENT REPRESENTS NORTHWARD DEFORMATION
2. NEGATIVE DISPLACEMENT REPRESENTS SOUTHWARD DEFORMATION
3. DEFORMATIONS ARE CALCULATED RELATIVE TO A JUNE 16, 2021 BASELINE SURVEY

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	29SEP'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE NORTH-SOUTH DEFORMATION
MAPTEK LASER SCAN
JULY 14, 2021 (LOOKING NORTHEAST)

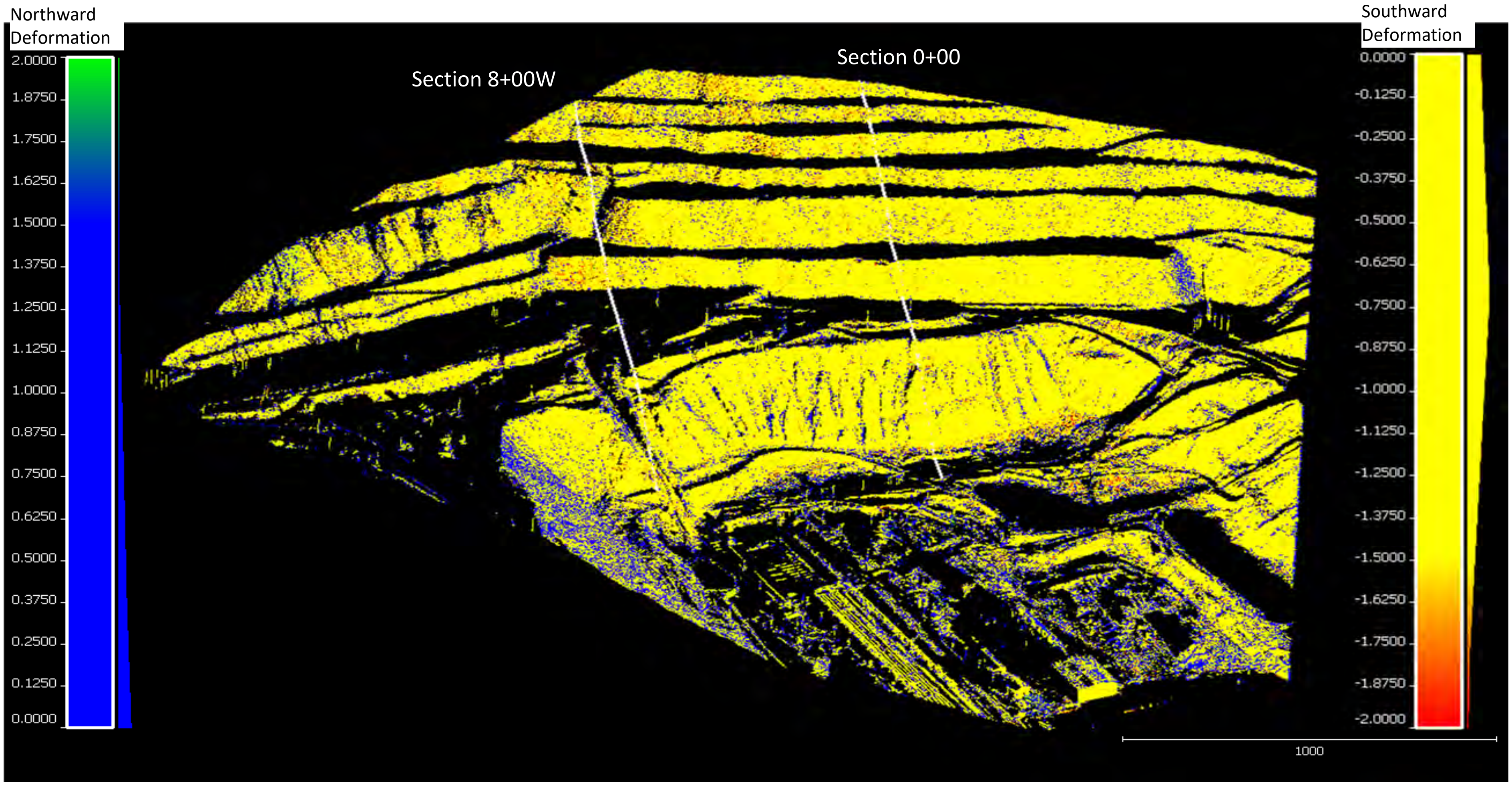
Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE C4.5

REV 0



NOTES:

1. POSITIVE DISPLACEMENT REPRESENTS NORTHWARD DEFORMATION
2. NEGATIVE DISPLACEMENT REPRESENTS SOUTHWARD DEFORMATION
3. DEFORMATIONS ARE CALCULATED RELATIVE TO A JUNE 16, 2021 BASELINE SURVEY

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	29SEP'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLP.

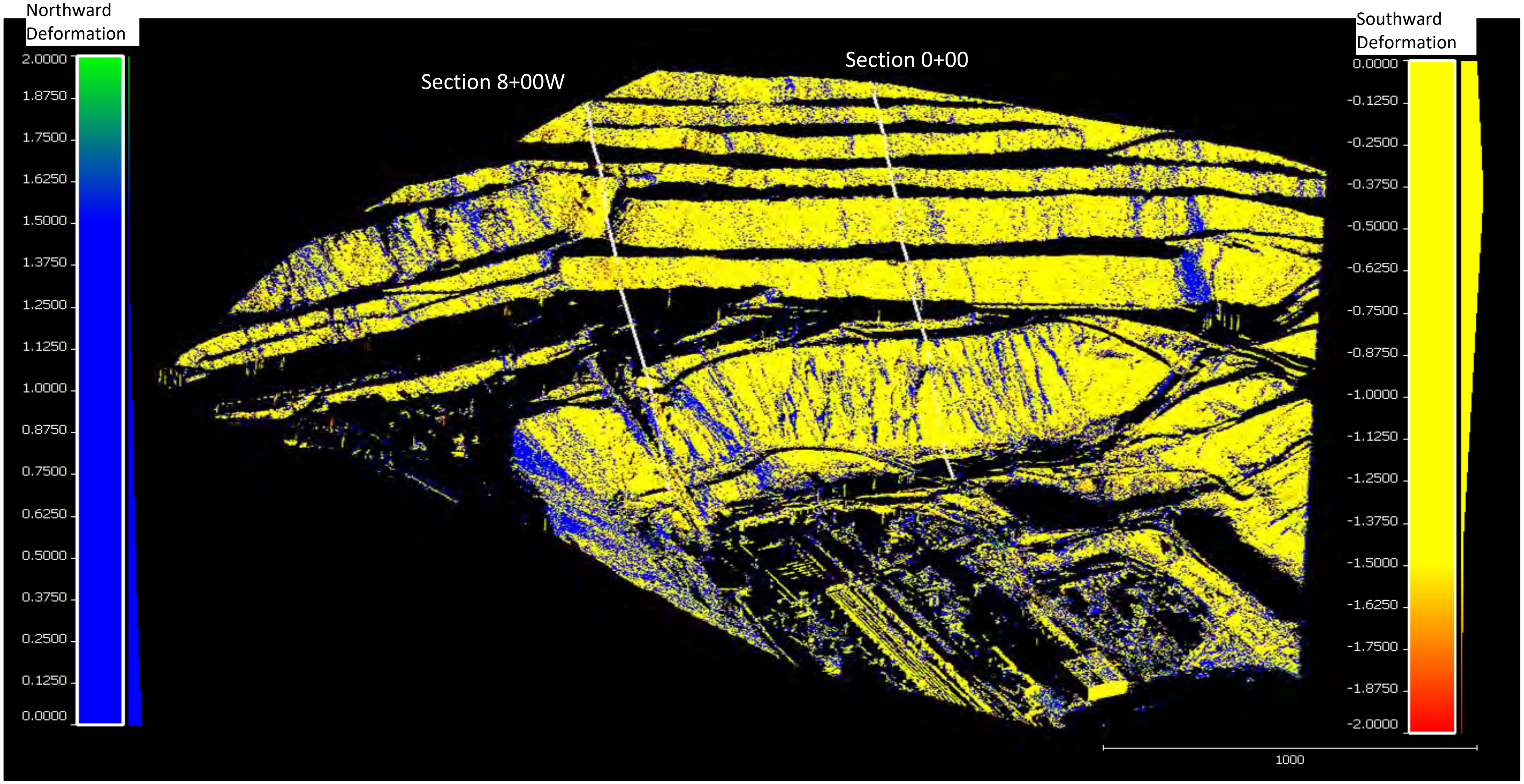
YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE NORTH-SOUTH DEFORMATION
MAPTEK LASER SCAN
JULY 21, 2021 (LOOKING NORTHEAST)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE C4.6 REV 0



NOTES:

1. POSITIVE DISPLACEMENT REPRESENTS NORTHWARD DEFORMATION
2. NEGATIVE DISPLACEMENT REPRESENTS SOUTHWARD DEFORMATION
3. DEFORMATIONS ARE CALCULATED RELATIVE TO A JUNE 16, 2021 BASELINE SURVEY

MONTANA RESOURCES LLP.

YANKEE DOODLE TAILINGS IMPOUNDMENT

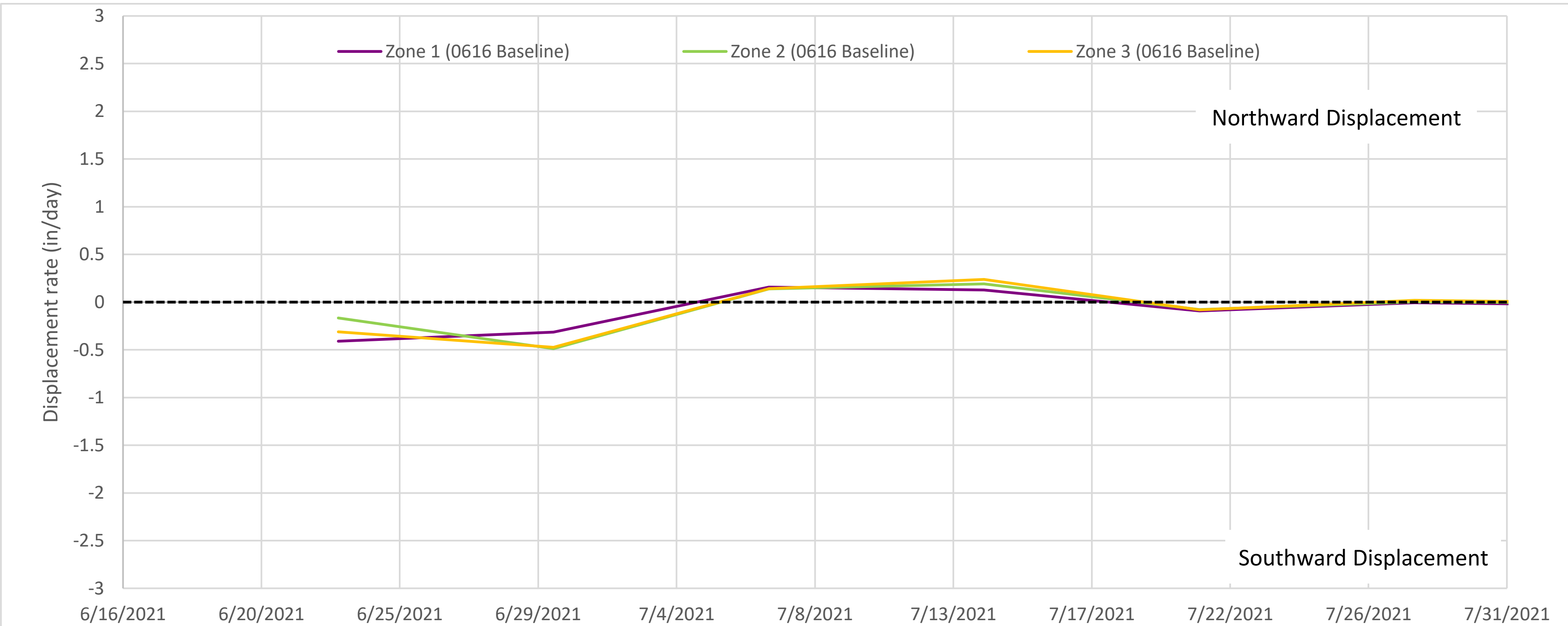
CUMULATIVE NORTH-SOUTH DEFORMATION
MAPTEK LASER SCAN
JULY 28, 2021 (LOOKING NORTHEAST)

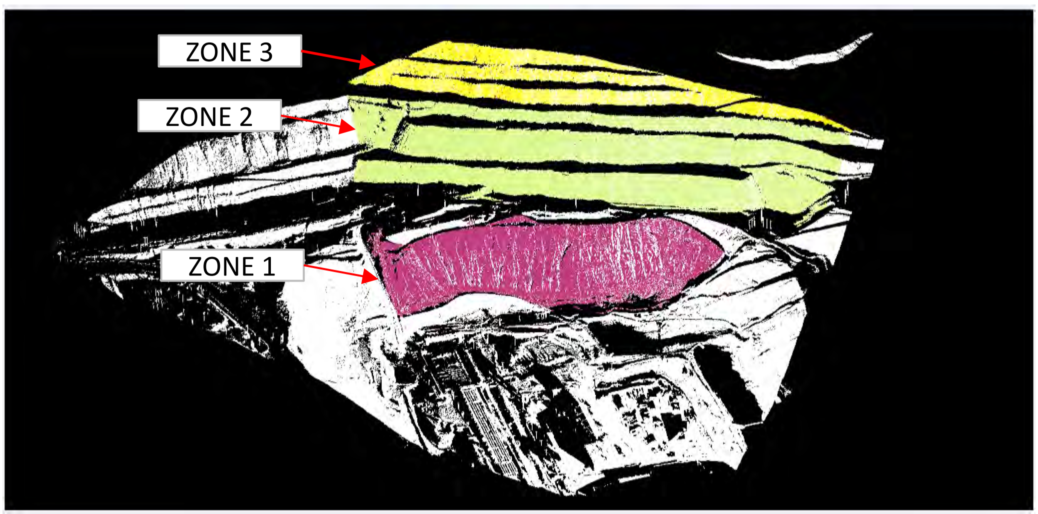
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-00126/25	VA21-01362

FIGURE C4.7 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	29SEP'21	ISSUED WITH LETTER	SY3	KTD





NOTES:

1. POSITIVE DISPLACEMENT RATE SUGGEST DISPLACEMENT AWAY FROM THE SCANNER AND DISPLACING NORTHWARDS.
2. NEGATIVE DISPLACEMENT RATES SUGGEST DISPLACEMENT TOWARDS THE SCANNER AND DISPLACING SOUTHWARDS.
3. RATES PRESENTED ARE AVERAGE RELATIVE TO A JUNE 16, 2021 BASELINE SCAN. NOISE DIMINISHES OVER TIME AS THE AVERAGING PERIOD BECOMES LONGER.

MONTANA RESOURCES

YANKEE DOODLE TAILINGS IMPOUNDMENT

AVERAGE NORTHING DEFORMATION RATE OF YDTI DOWNSTREAM SLOPE FACE (JUNE 16 TO JULY 31, 2021)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01362

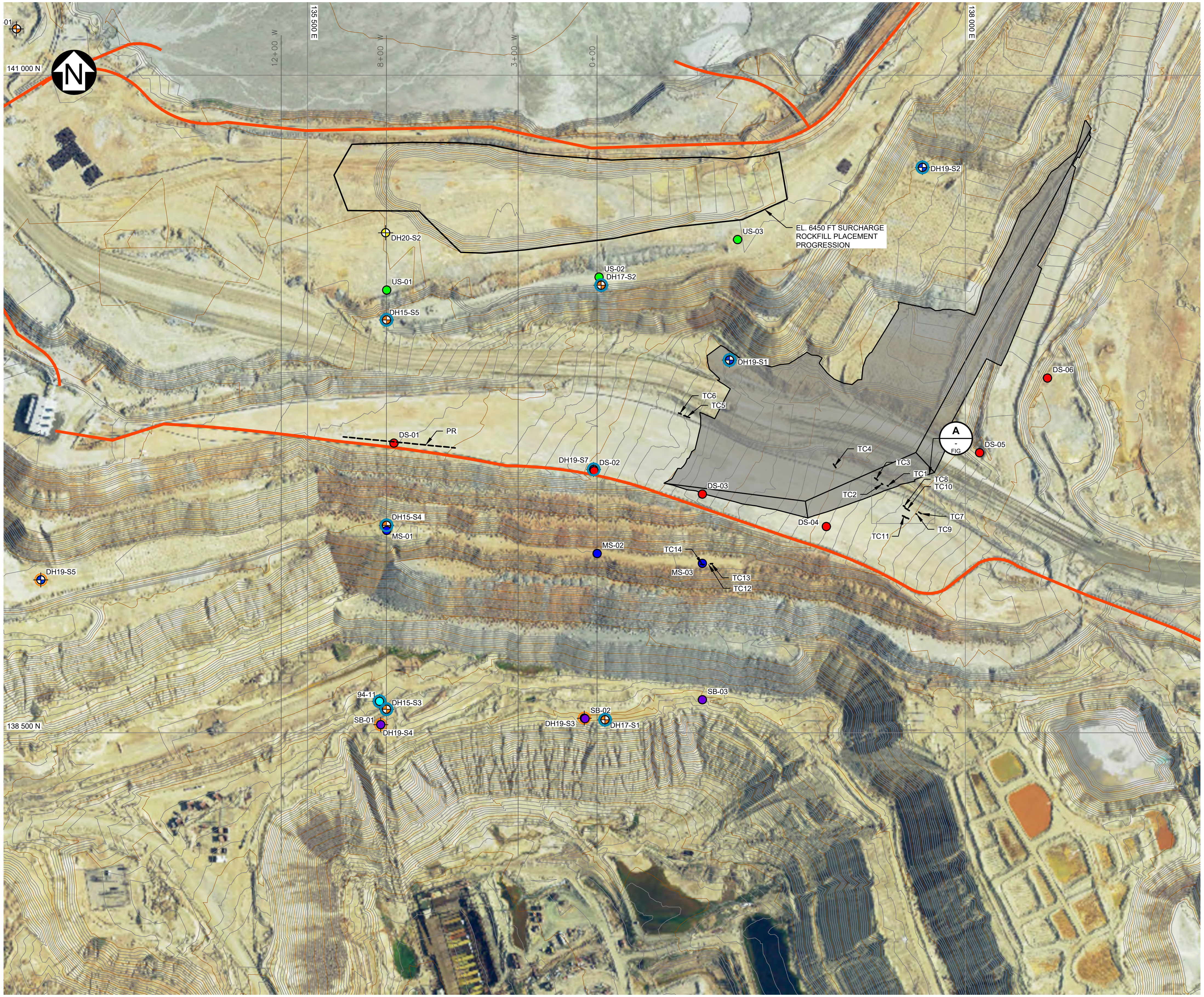
FIGURE C4.8 REV 0

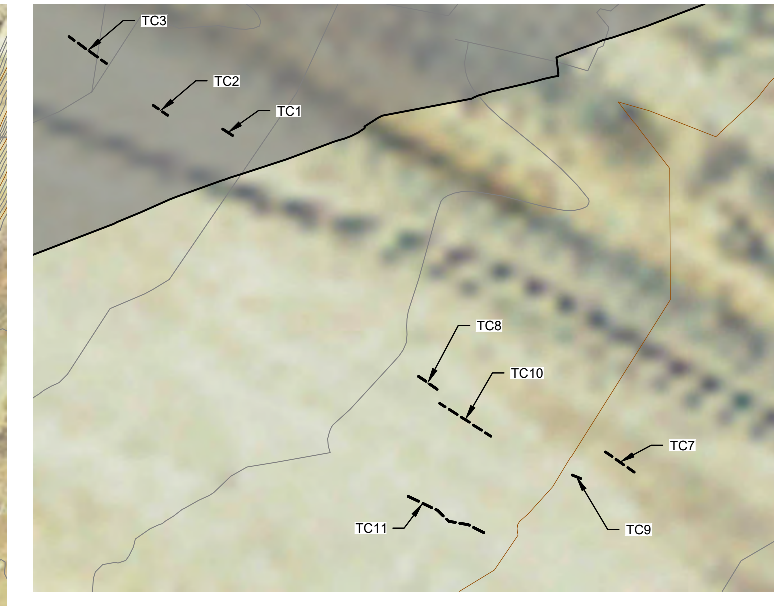
REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	29SEP'21	ISSUED WITH LETTER	SY3	KTD

APPENDIX C5

Sequential Tension Crack Progression Plots

(Figures C5.1 to C5.6)





A - FIG **DETAIL**
SCALE B

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
3. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.
4. TENSION CRACKS ARE MANUALLY SURVEYED WITH DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) INSTRUMENT.
5. TENSION CRACKS WERE SURVEYED ON JUNE 14, 2021.

LEGEND:

- UPSTREAM SURVEY-MONITORING LOCATION (3)
- DOWNSTREAM SURVEY-MONITORING LOCATION (6)
- MID SLOPE SURVEY-MONITORING LOCATION (3)
- SEEP 10 BENCH SURVEY-MONITORING LOCATION (3)
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- DRILLHOLE - VIBRATING WIRE PIEZOMETER
- CPP MONITORING SITES
- TAILINGS PIPELINE
- TENSION CRACK

SCALE B: 30 0 30 60 90 120 150 ft
SCALE A: 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 FT LIFT
CONSTRUCTION MONITORING PROGRAM
EXISTING MONITORING SITES & TENSION CRACKS

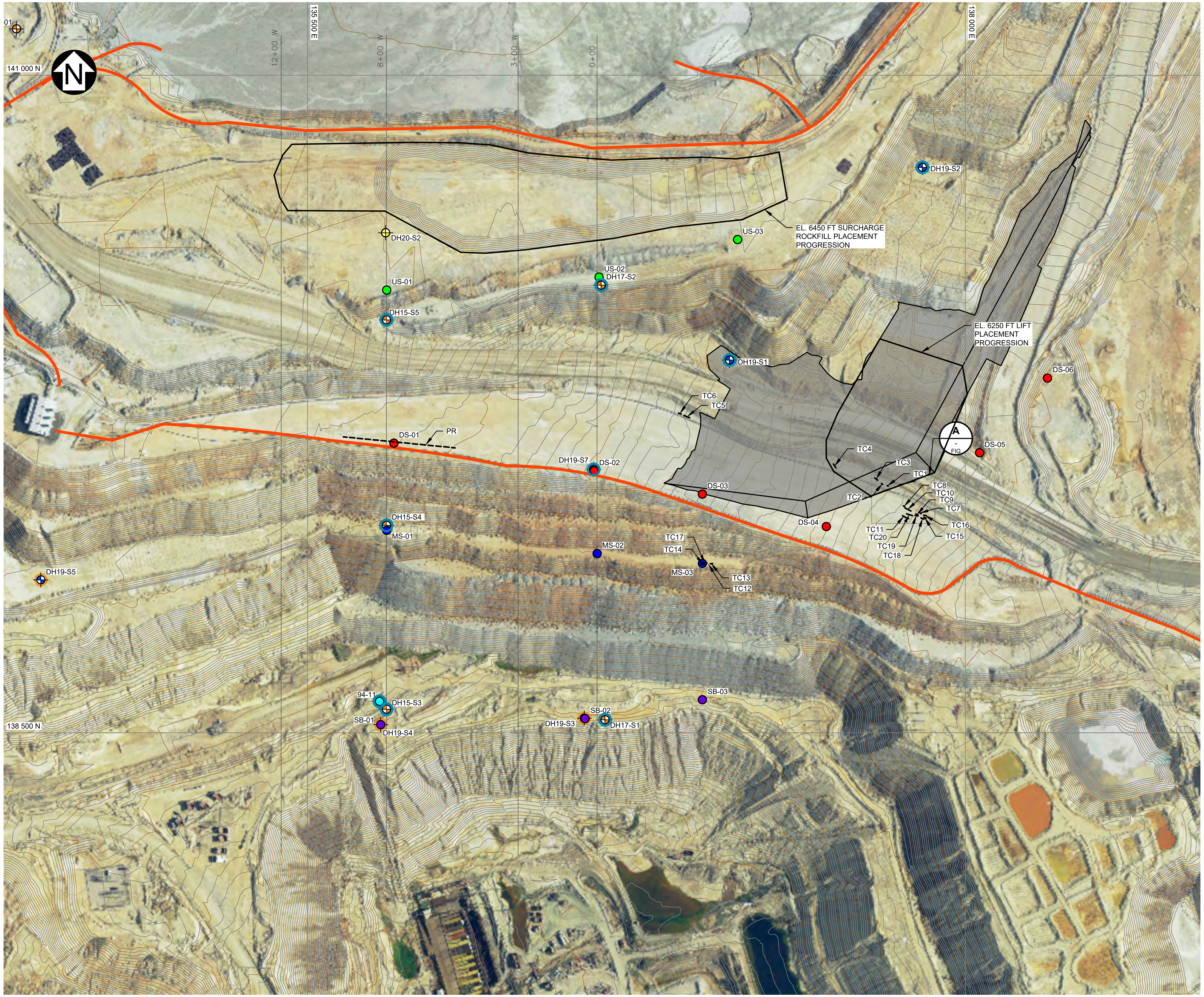
Knight Piésold CONSULTING

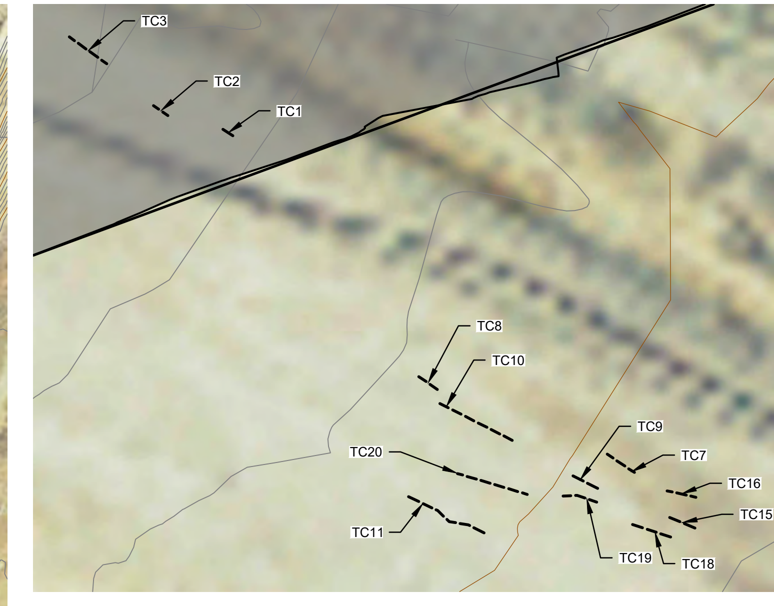
P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE C5.1 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05OCT'21	ISSUED WITH LETTER	SY3	RMM	DDF

SAVED: M:\1\01\00126\25\A\Acad\FIGS\B30, 9/13/2021 7:57:40 AM , RMCLELLAN PRINTED: 10/5/2021 2:13:37 PM, FIG C5.1, RMCLELLAN





A - FIG **DETAIL**
SCALE B

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
3. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.
4. TENSION CRACKS ARE MANUALLY SURVEYED WITH DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) INSTRUMENT.
5. TENSION CRACKS TC1 TO 5 HAVE BEEN COVERED DUE TO SUBGRADE PREPARATION AND EL. 6250 LIFT PLACEMENT, THUS ARE NO LONGER ACCESSIBLE AND OBSERVABLE FOR PROGRESSION MONITORING.
6. TENSION CRACKS WERE SURVEYED ON JUNE 26, 2021.

LEGEND:

- UPSTREAM SURVEY-MONITORING LOCATION (3)
- DOWNSTREAM SURVEY-MONITORING LOCATION (6)
- MID SLOPE SURVEY-MONITORING LOCATION (3)
- SEEP 10 BENCH SURVEY-MONITORING LOCATION (3)
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- DRILLHOLE - VIBRATING WIRE PIEZOMETER
- CPP MONITORING SITES
- TAILINGS PIPELINE
- TENSION CRACK

SCALE B: 30 0 30 60 90 120 150 ft

SCALE A: 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 FT LIFT
CONSTRUCTION MONITORING PROGRAM
EXISTING MONITORING SITES & TENSION CRACKS

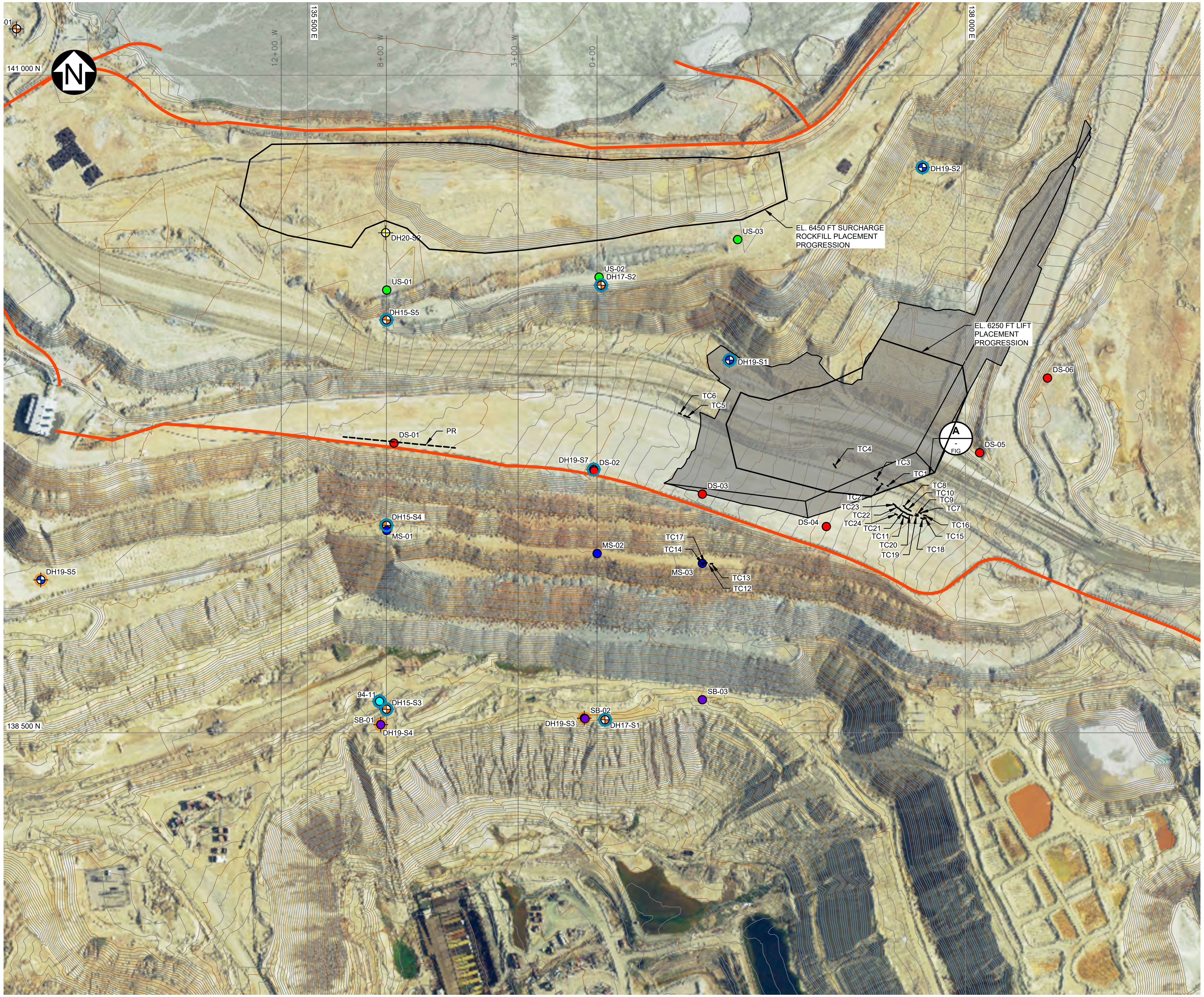
Knight Piésold CONSULTING

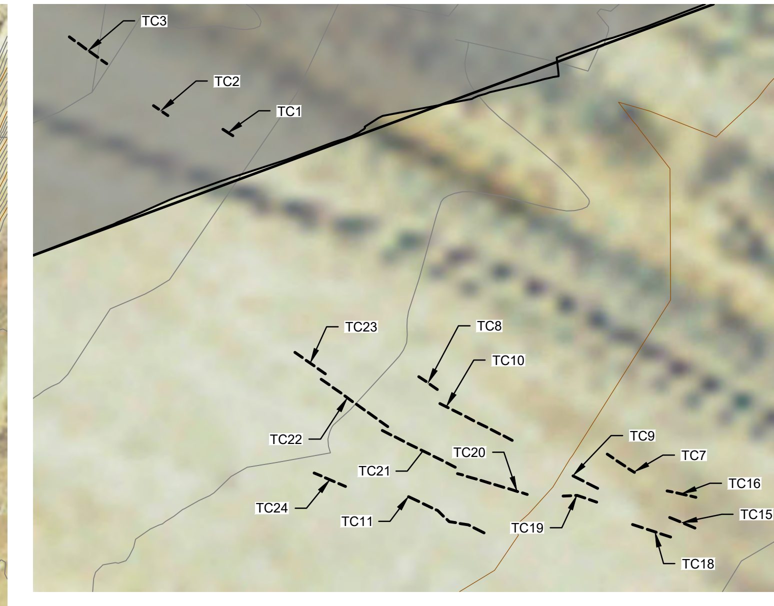
P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE C5.2 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05OCT'21	ISSUED WITH LETTER	SY3	RMM	DDF

SAVED: M:\1\01\00126\25\A\Acad\FIGS\B29, 9/13/2021 8:08:38 AM , RMCLELLAN PRINTED: 10/5/2021 2:18:48 PM, FIG C5.2, RMCLELLAN





A - FIG **DETAIL**
SCALE B

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
3. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.
4. TENSION CRACKS ARE MANUALLY SURVEYED WITH DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) INSTRUMENT.
5. TENSION CRACKS TC1 TO 5 HAVE BEEN COVERED DUE TO SUBGRADE PREPARATION AND EL. 6250 LIFT PLACEMENT, THUS ARE NO LONGER ACCESSIBLE AND OBSERVABLE FOR PROGRESSION MONITORING.
6. TENSION CRACKS WERE SURVEYED ON JULY 4, 2021.

LEGEND:

- UPSTREAM SURVEY-MONITORING LOCATION (3)
- DOWNSTREAM SURVEY-MONITORING LOCATION (6)
- MID SLOPE SURVEY-MONITORING LOCATION (3)
- SEEP 10 BENCH SURVEY-MONITORING LOCATION (3)
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- DRILLHOLE - VIBRATING WIRE PIEZOMETER
- CPP MONITORING SITES
- TAILINGS PIPELINE
- TENSION CRACK

SCALE B: 30 0 30 60 90 120 150 ft

SCALE A: 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 FT LIFT
CONSTRUCTION MONITORING PROGRAM
EXISTING MONITORING SITES & TENSION CRACKS

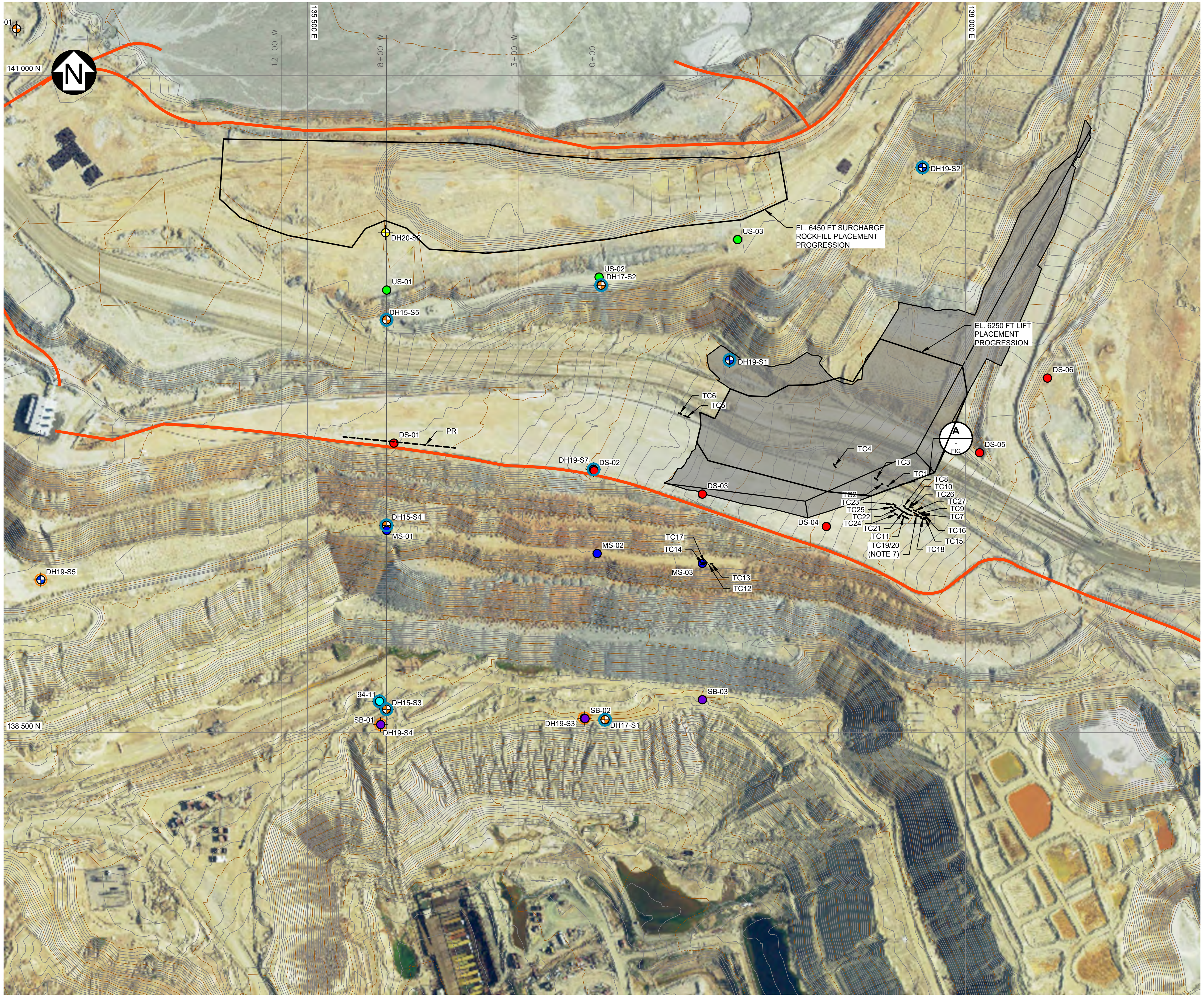
Knight Piésold CONSULTING

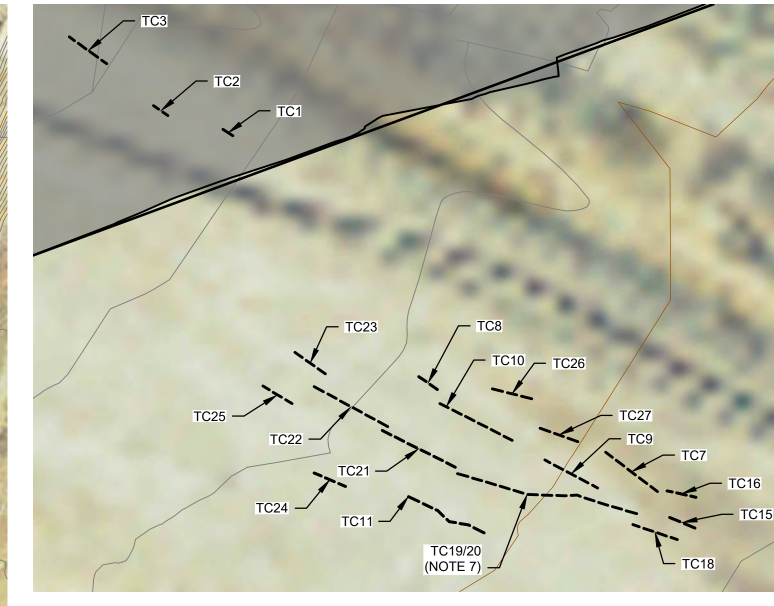
P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE C5.3 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05OCT'21	ISSUED WITH LETTER	SY3	RMM	DDF

SAVED: M:\1\01\00126\25\A\Acad\FIGS\B28, 9/13/2021 8:18:23 AM , RMCLELLAN PRINTED: 10/5/2021 2:25:51 PM, FIG C5.3, RMCLELLAN
XREF FILE(S): TOPO - 5' - May 2021; 5ft_01_2020; 6250 Center Solid IMAGE FILE(S): 2020 Aerial Photo





A
DETAIL
SCALE B

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
3. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.
4. TENSION CRACKS ARE MANUALLY SURVEYED WITH DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) INSTRUMENT.
5. TENSION CRACKS TC1 TO 5 HAVE BEEN COVERED DUE TO SUBGRADE PREPARATION AND EL. 6250 LIFT PLACEMENT, THUS ARE NO LONGER ACCESSIBLE AND OBSERVABLE FOR PROGRESSION MONITORING.
6. MEASURED WEEKLY CHANGES IN TENSION CRACK APERTURE WIDTH, VERTICAL OFFSET, AND LENGTH (IF ANY) ARE LISTED IN WPR-04 TABLE 2.
7. TC19 AND TC20 CONJOINED WITH A CUMULATIVE INCREASE OF 23.8 ft, AS PER DPR 032.
8. TENSION CRACKS WERE SURVEYED ON JULY 16, 2021.

LEGEND:

- UPSTREAM SURVEY-MONITORING LOCATION (3)
- DOWNSTREAM SURVEY-MONITORING LOCATION (6)
- MID SLOPE SURVEY-MONITORING LOCATION (3)
- SEEP 10 BENCH SURVEY-MONITORING LOCATION (3)
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- DRILLHOLE - VIBRATING WIRE PIEZOMETER
- CPP MONITORING SITES
- TAILINGS PIPELINE
- TENSION CRACK

SCALE B: 30 0 30 60 90 120 150 ft
SCALE A: 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 FT LIFT CONSTRUCTION MONITORING PROGRAM EXISTING MONITORING SITES & TENSION CRACKS

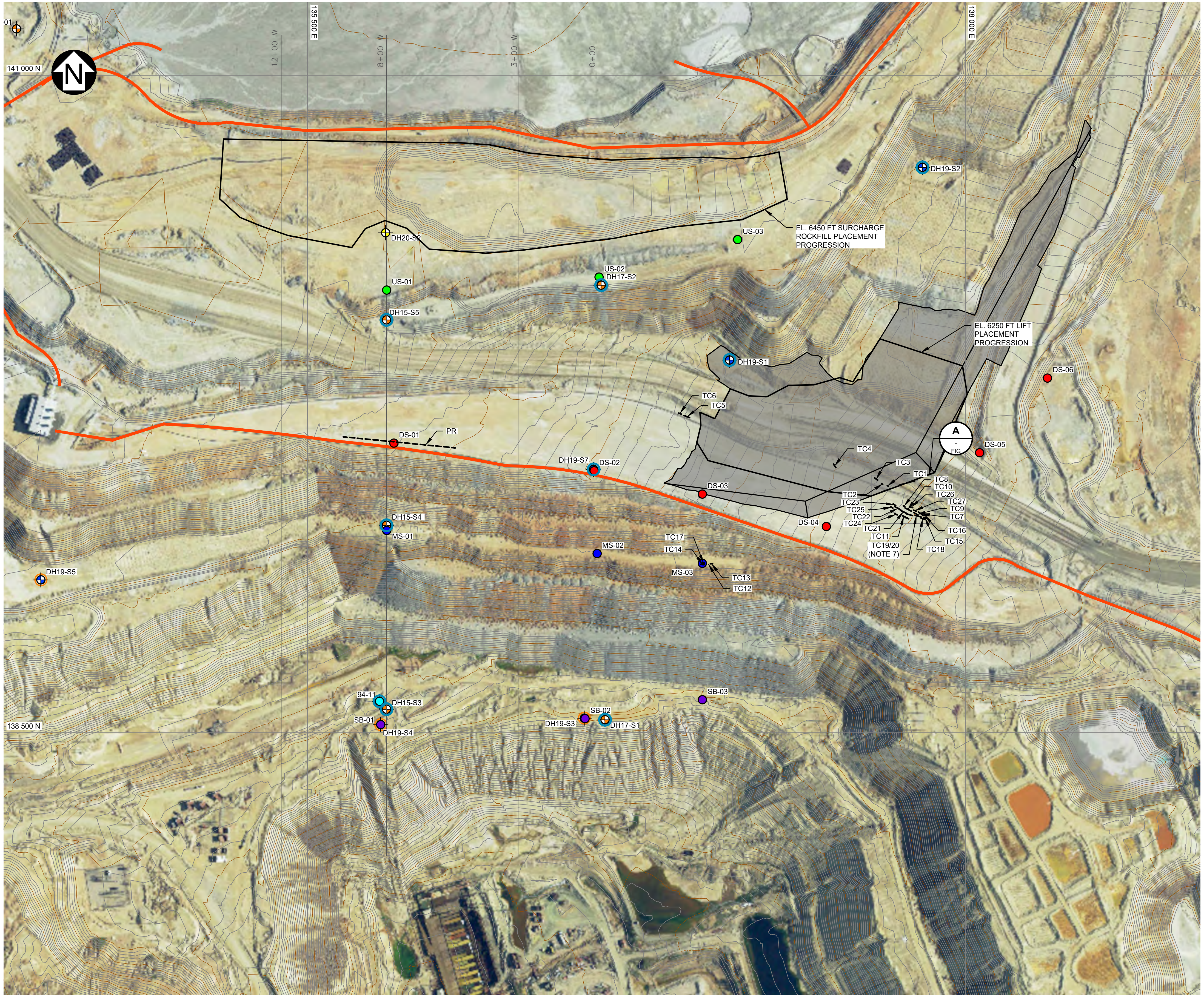
Knight Piésold CONSULTING

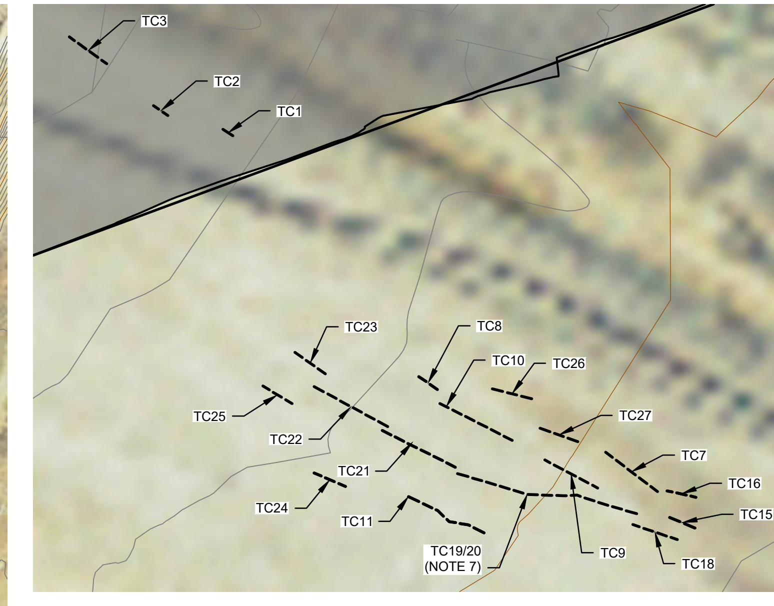
P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE C5.4 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05OCT'21	ISSUED WITH LETTER	SY3	RMM	DDF

SAVED: M:\1\01\00126\25\A\Acad\FIGS\B27, 9/13/2021 8:24:22 AM, RMCLELLAN PRINTED: 10/5/2021 2:29:05 PM, FIG C5.4, RMCLELLAN





A DETAIL
SCALE B

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
3. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.
4. TENSION CRACKS ARE MANUALLY SURVEYED WITH DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) INSTRUMENT.
5. TENSION CRACKS TC1 TO 5 HAVE BEEN COVERED DUE TO SUBGRADE PREPARATION AND EL. 6250 LIFT PLACEMENT, THUS ARE NO LONGER ACCESSIBLE AND OBSERVABLE FOR PROGRESSION MONITORING.
6. MEASURED WEEKLY CHANGES IN TENSION CRACK APERTURE WIDTH, VERTICAL OFFSET, AND LENGTH (IF ANY) ARE LISTED IN WPR-04 TABLE 2.
7. TC19 AND TC20 CONJOINED IN REPORTING WEEK OF 07/12/21 TO 07/18/21 WITH A CUMULATIVE INCREASE OF 23.8 ft, AS PER DPR-023.
8. TENSION CRACKS WERE SURVEYED ON JULY 23, 2021

LEGEND:

- UPSTREAM SURVEY-MONITORING LOCATION (3)
- DOWNSTREAM SURVEY-MONITORING LOCATION (6)
- MID SLOPE SURVEY-MONITORING LOCATION (3)
- SEEP 10 BENCH SURVEY-MONITORING LOCATION (3)
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- DRILLHOLE - VIBRATING WIRE PIEZOMETER
- CPP MONITORING SITES
- TAILINGS PIPELINE
- TENSION CRACK

SCALE B: 30 0 30 60 90 120 150 ft

SCALE A: 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 FT LIFT
CONSTRUCTION MONITORING PROGRAM
EXISTING MONITORING SITES & TENSION CRACKS

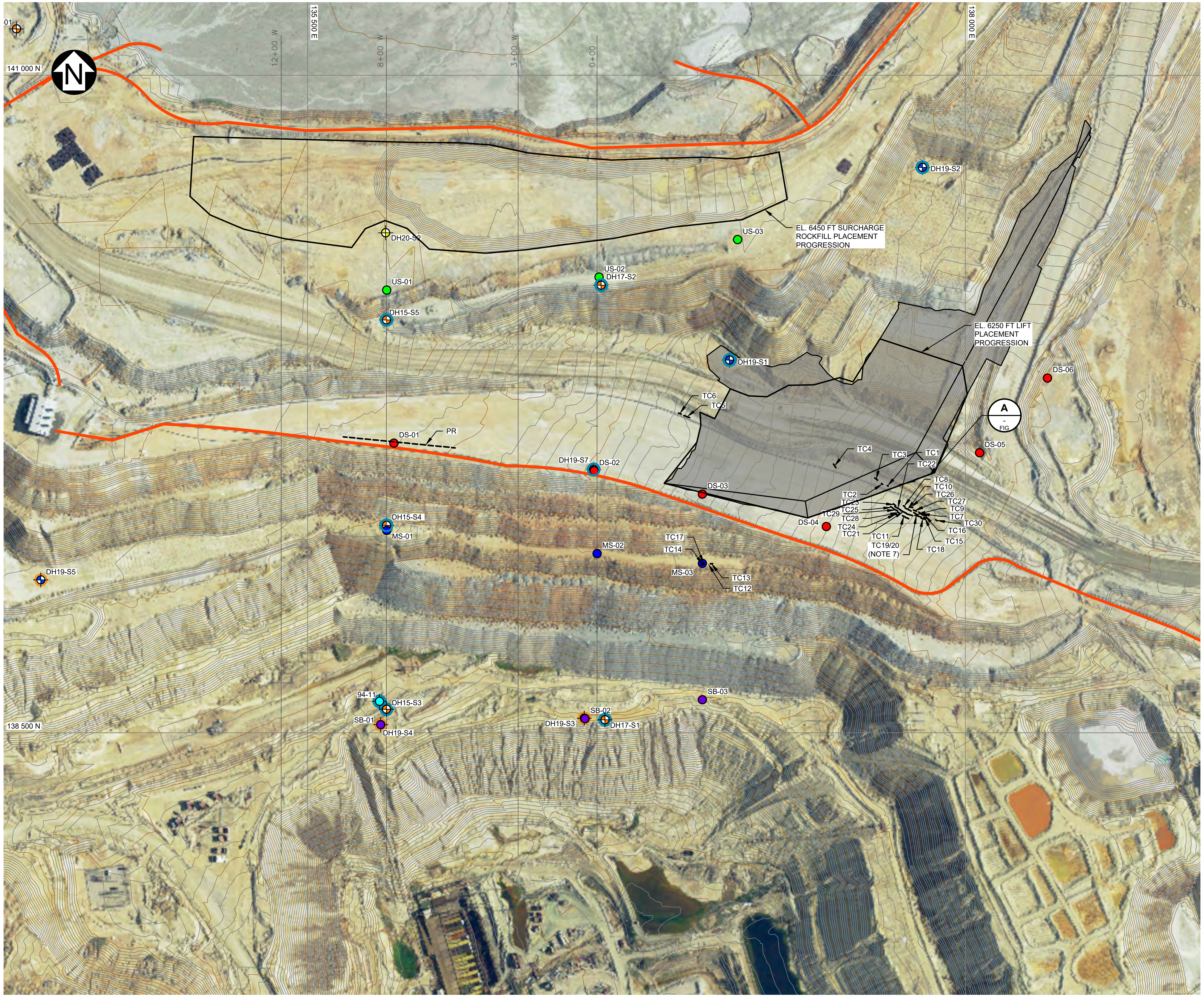
Knight Piésold CONSULTING

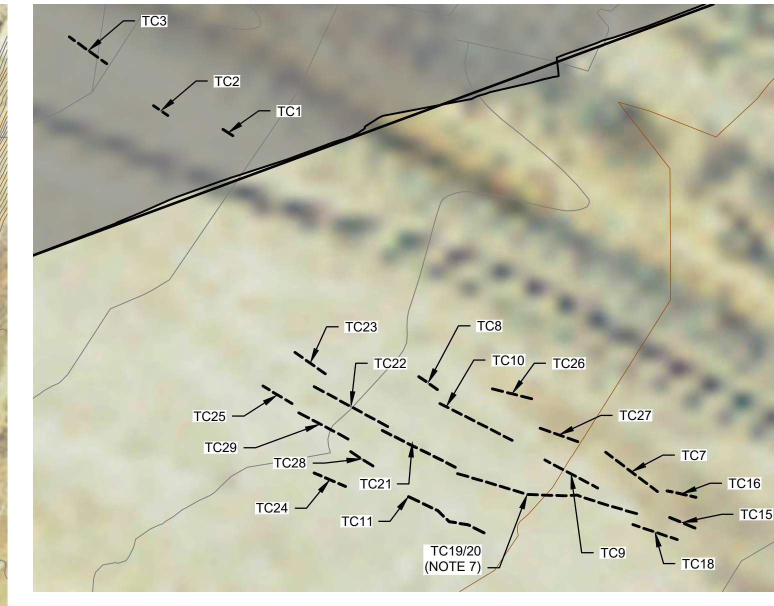
P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE C5.5 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05OCT'21	ISSUED WITH LETTER	SY3	RMM	DDF

SAVED: M:\1\01\00126\25\A\Acad\FIGS\B56, 9/13/2021 8:32:35 AM , RMCLELLAN PRINTED: 10/5/2021 2:33:02 PM, FIG C5.5, RMCLELLAN





A — **DETAIL**
SCALE B

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. THE AERIAL PHOTO SHOWN IS FROM JULY 9, 2020.
3. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLP IN MAY 2021.
4. TENSION CRACKS ARE MANUALLY SURVEYED WITH DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) INSTRUMENT.
5. TENSION CRACKS TC1 TO 5 HAVE BEEN COVERED DUE TO SUBGRADE PREPARATION AND EL. 6250 LIFT PLACEMENT, THUS ARE NO LONGER ACCESSIBLE AND OBSERVABLE FOR PROGRESSION MONITORING.
6. MEASURED WEEKLY CHANGES IN TENSION CRACK APERTURE WIDTH, VERTICAL OFFSET, AND LENGTH (IF ANY) ARE LISTED IN WPR-06 TABLE 2.
7. TC19 AND TC20 CONJOINED WITH A CUMULATIVE INCREASE OF 23.8 ft, AS PER DPR 032.
8. TENSION CRACKS WERE SURVEYED ON JULY 23, 2021.

LEGEND:

- PROJECTED FILL AREA
- UPSTREAM SURVEY-MONITORING LOCATION (3)
- DOWNSTREAM SURVEY-MONITORING LOCATION (6)
- MID SLOPE SURVEY-MONITORING LOCATION (3)
- SEEP 10 BENCH SURVEY-MONITORING LOCATION (3)
- GEO4SIGHT AND NESTED VIBRATING WIRE PIEZOMETERS
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER
- 2019 DRILLHOLE - VIBRATING WIRE PIEZOMETER AND IN-PLACE INCLINOMETER
- DRILLHOLE - VIBRATING WIRE PIEZOMETER
- CPP MONITORING SITES
- TAILINGS PIPELINE
- TENSION CRACK

SCALE B: 30 0 30 60 90 120 150 ft
SCALE A: 200 0 200 400 600 800 1000 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EL. 6450 FT LIFT
CONSTRUCTION MONITORING PROGRAM
EXISTING MONITORING SITES & TENSION CRACKS

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-126/25	VA21-01362

FIGURE C5.6 REV 0

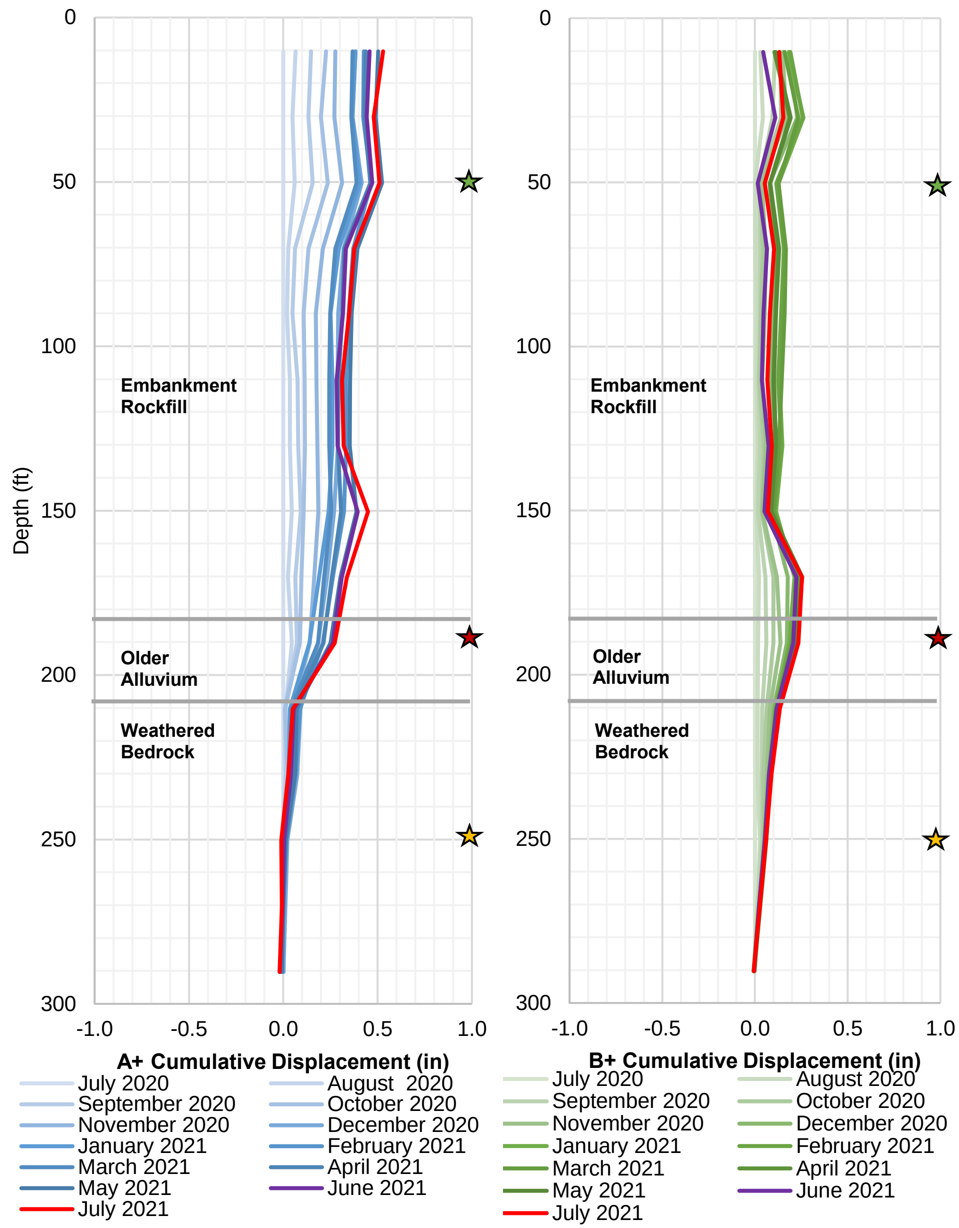
REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05OCT'21	ISSUED WITH LETTER	SY3	RMM	DDF

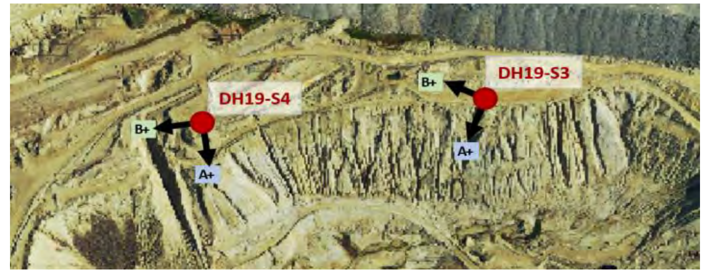
SAVED: M:\1\01\00126\25\A\Acad\FIGS\B57, 9/14/2021 9:14:11 AM , RMCLELLAN PRINTED: 10/5/2021 2:37:27 PM, FIG C5.6, RMCLELLAN

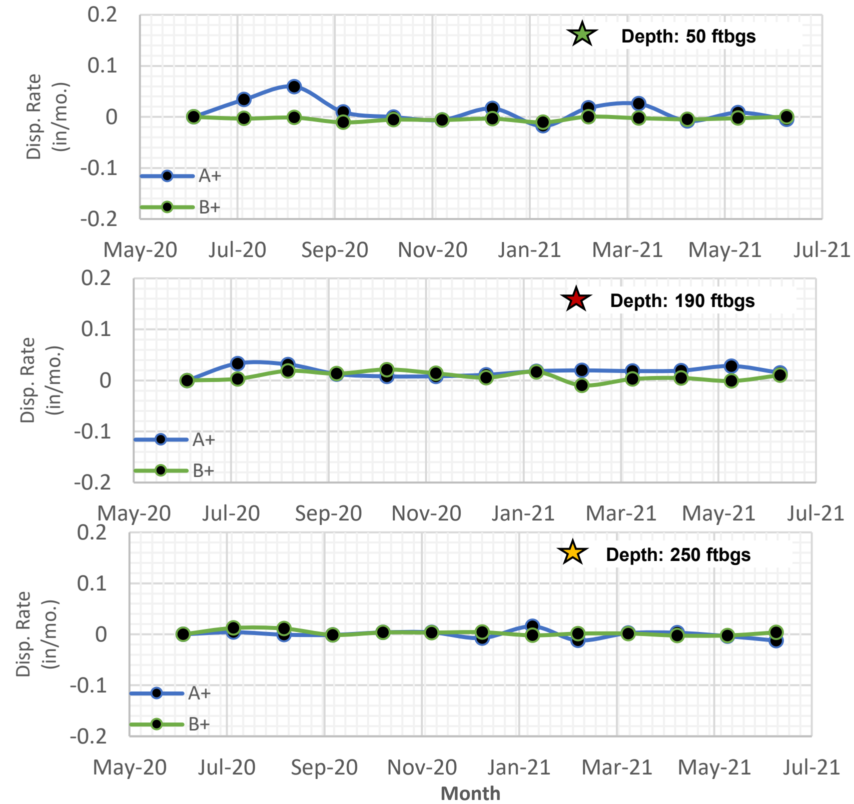
APPENDIX D

Subsurface Deformation Monitoring Plots

(Figures D.1 to D.9)







NOTES:

1. CUMULATIVE DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.

0	3AUG'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES, LLP

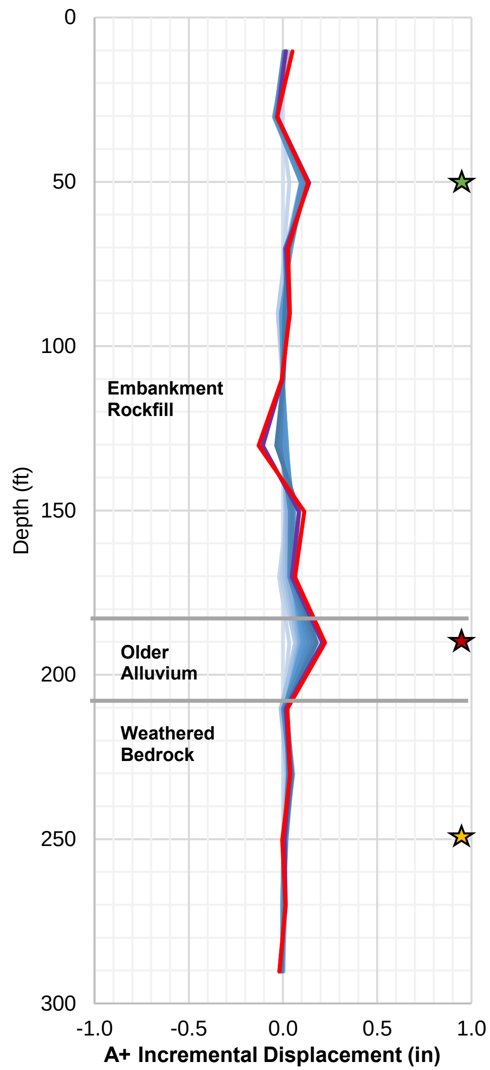
YANKEE DOODLE TAILINGS IMPOUNDMENT

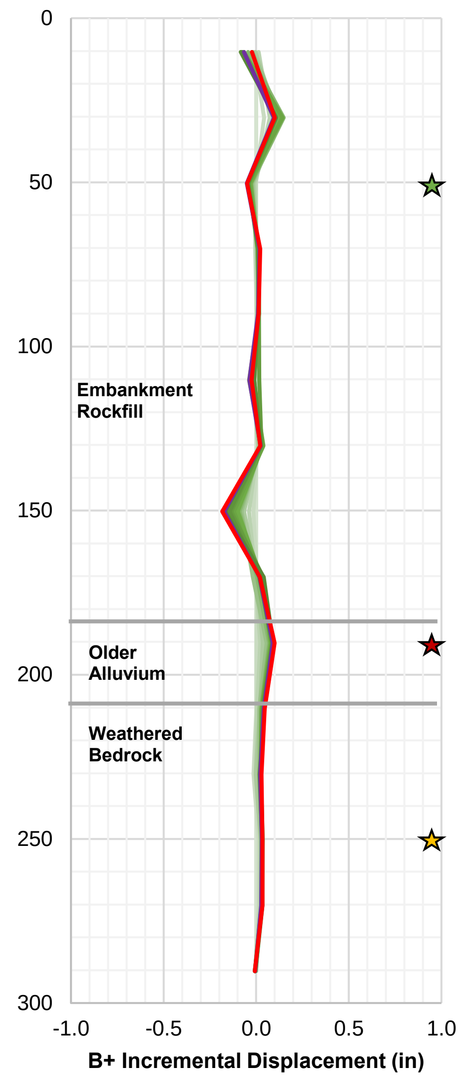
MONTHLY AVERAGE CUMULATIVE SUBSURFACE DEFORMATION DRILLHOLE DH19-S3 (JULY 2020 THROUGH JULY 2021)

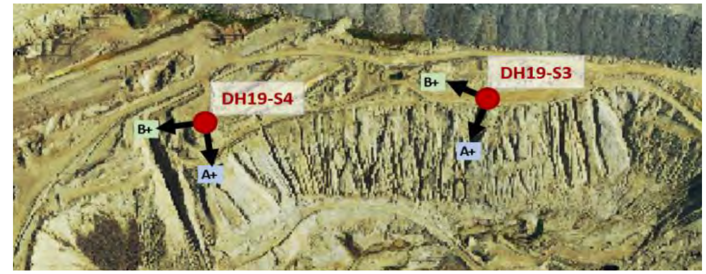
Knight Piésold CONSULTING

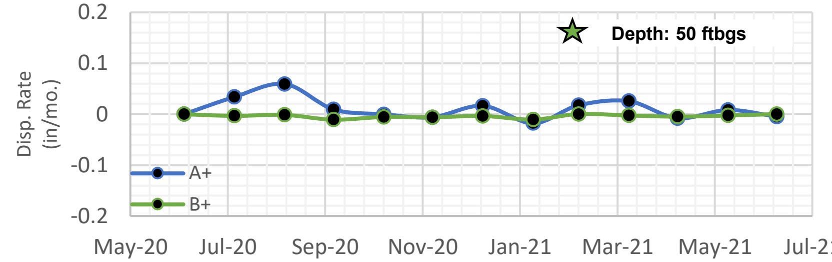
P/A NO.	REF. NO.
VA101-126/25	VA21-01362

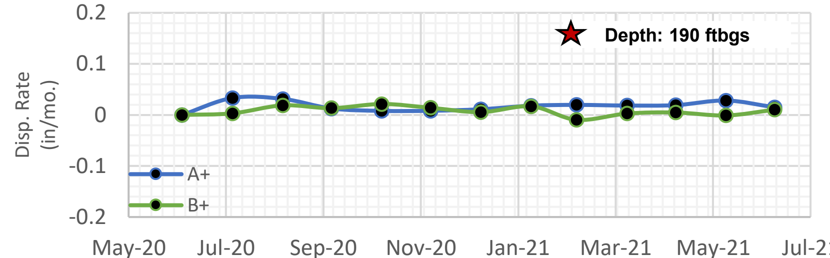
FIGURE D.1 REV 0

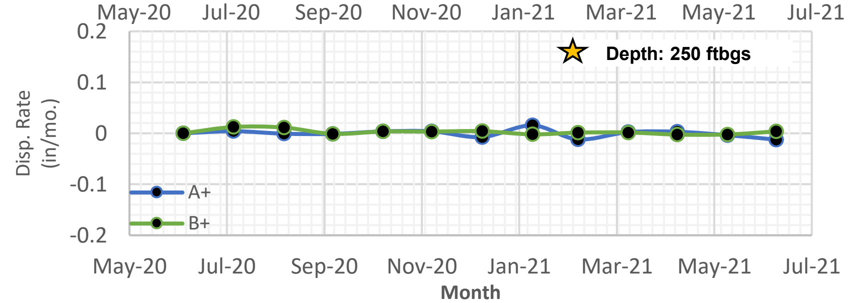












NOTES:
1. INCREMENTAL DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.

0	3AUG'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES, LLP

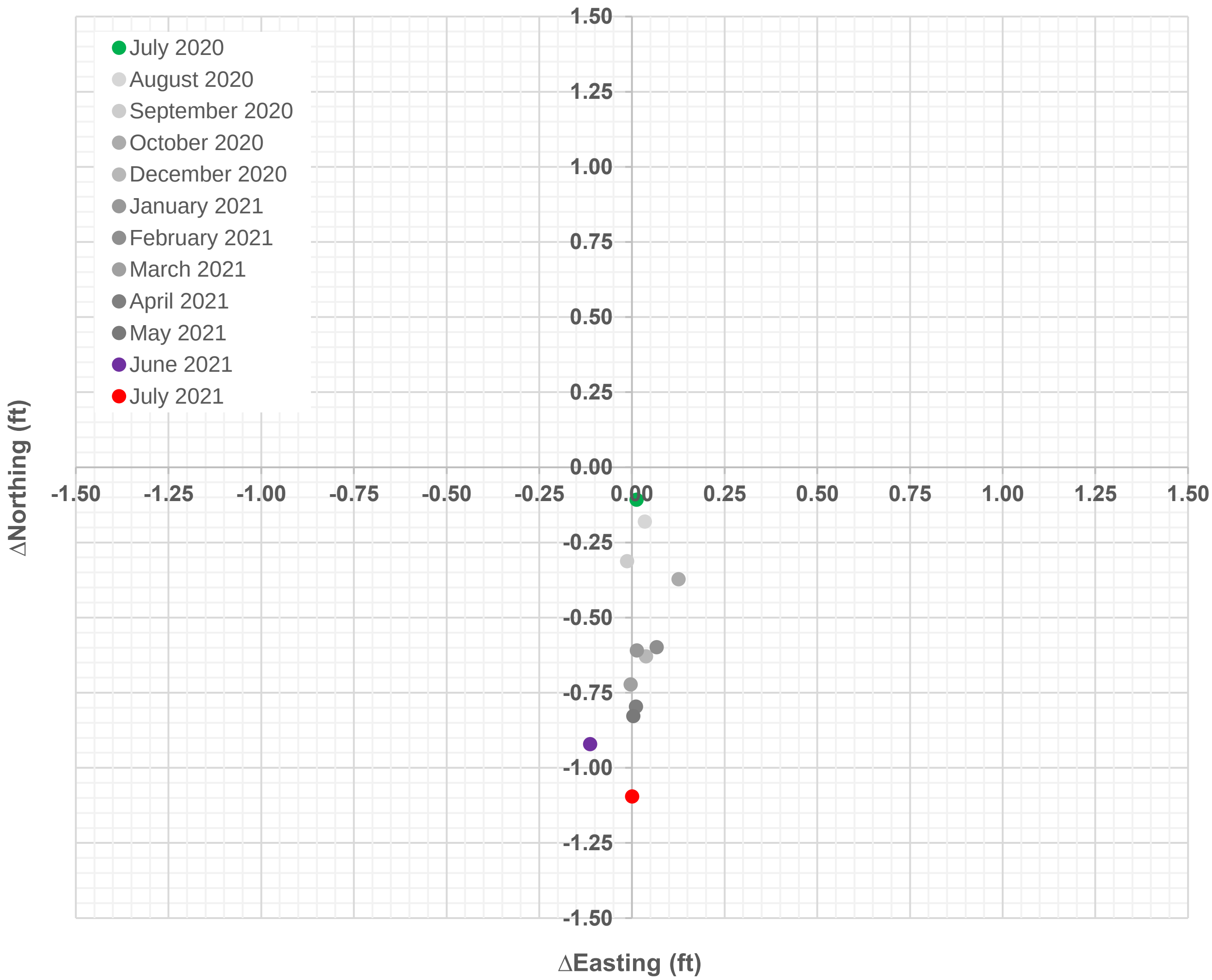
YANKEE DOODLE TAILINGS IMPOUNDMENT

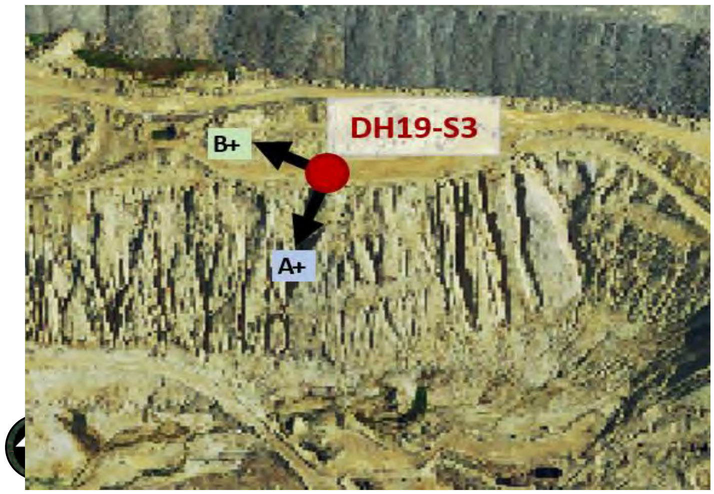
MONTHLY AVERAGE INCREMENTAL SUBSURFACE DEFORMATION DRILLHOLE DH19-S3 (JULY 2020 THROUGH JULY 2021)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01362

FIGURE D.2 REV 0





NOTES:

1. COLLAR WANDER IS MONITORED USING GNSS INSTRUMENTATION INSTALLED AT THE INCLINOMETER COLLAR LOCATION.
2. THE PLOT ABOVE PRESENTS COLLAR POSITION BASED ON NORTH AND EAST CHANGE RELATIVE TO A JULY 1, 2020 BASELINE GNSS SURVEY.
3. NO DATA ARE AVAILABLE FOR NOVEMBER, 2020 WHILE THE INSTRUMENTATION WAS OFFLINE DUE TO A POWER MANAGEMENT ISSUE.

0	3AUG'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES, LLP

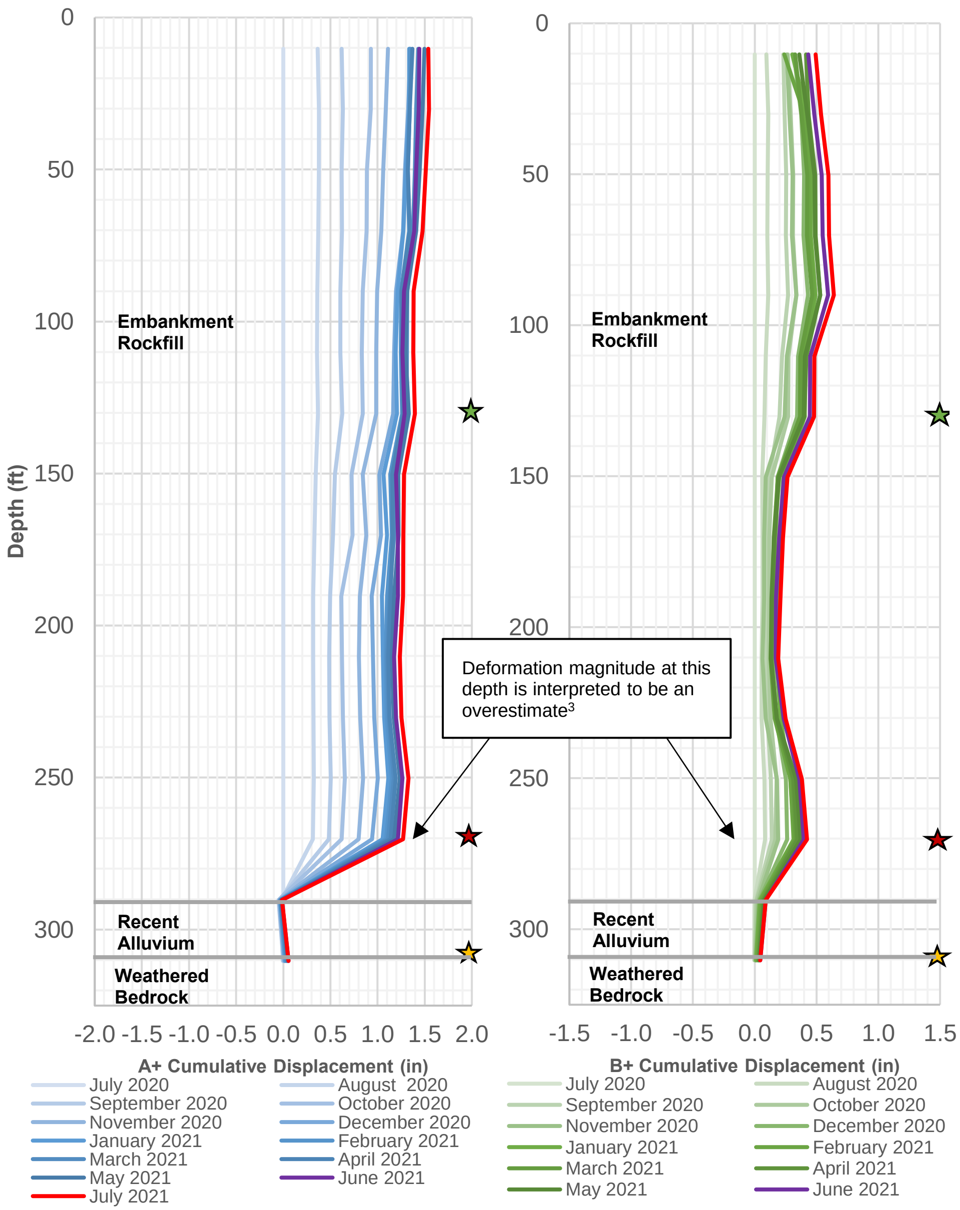
YANKEE DOODLE TAILINGS IMPOUNDMENT

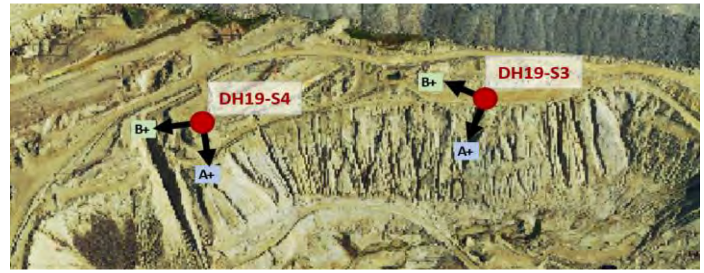
DH19-S3 GNSS-BASED INCLINOMETER COLLAR WANDER (JULY 1 THROUGH JULY 31, 2021)

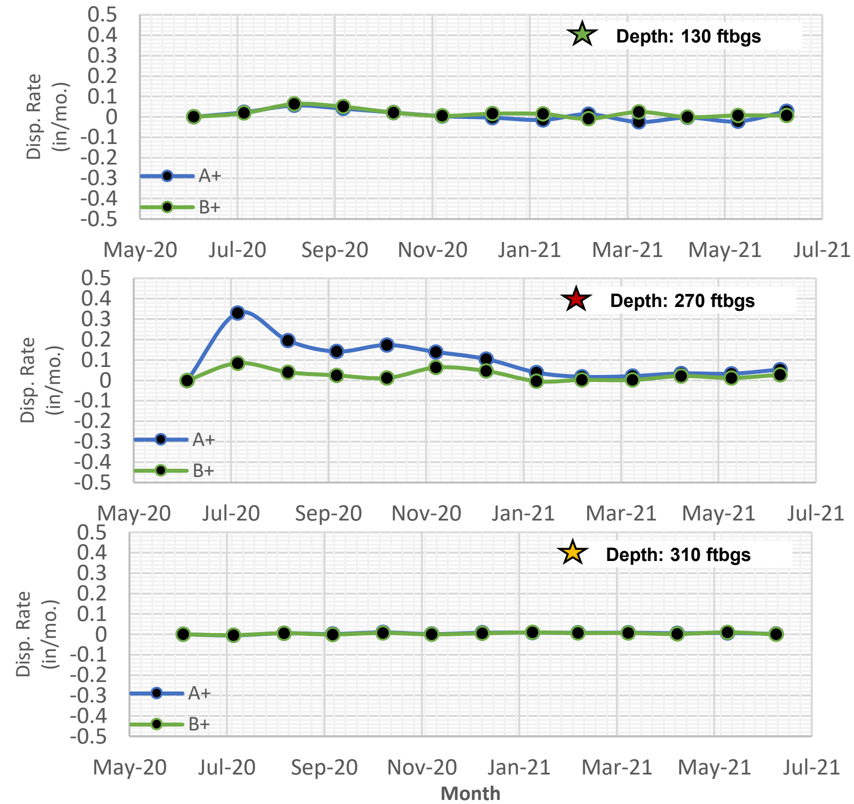
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01362

FIGURE D.3 REV 0







NOTES:

1. CUMULATIVE DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.
3. DEFORMATION MAGNITUDE BETWEEN 290 FTBG AND 310 FTBG IS INTEPRETED TO BE AN OVERESTIMATE DUE TO IPI CONNECTING ROD FLEXION.

0	03AUG'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES, LLP

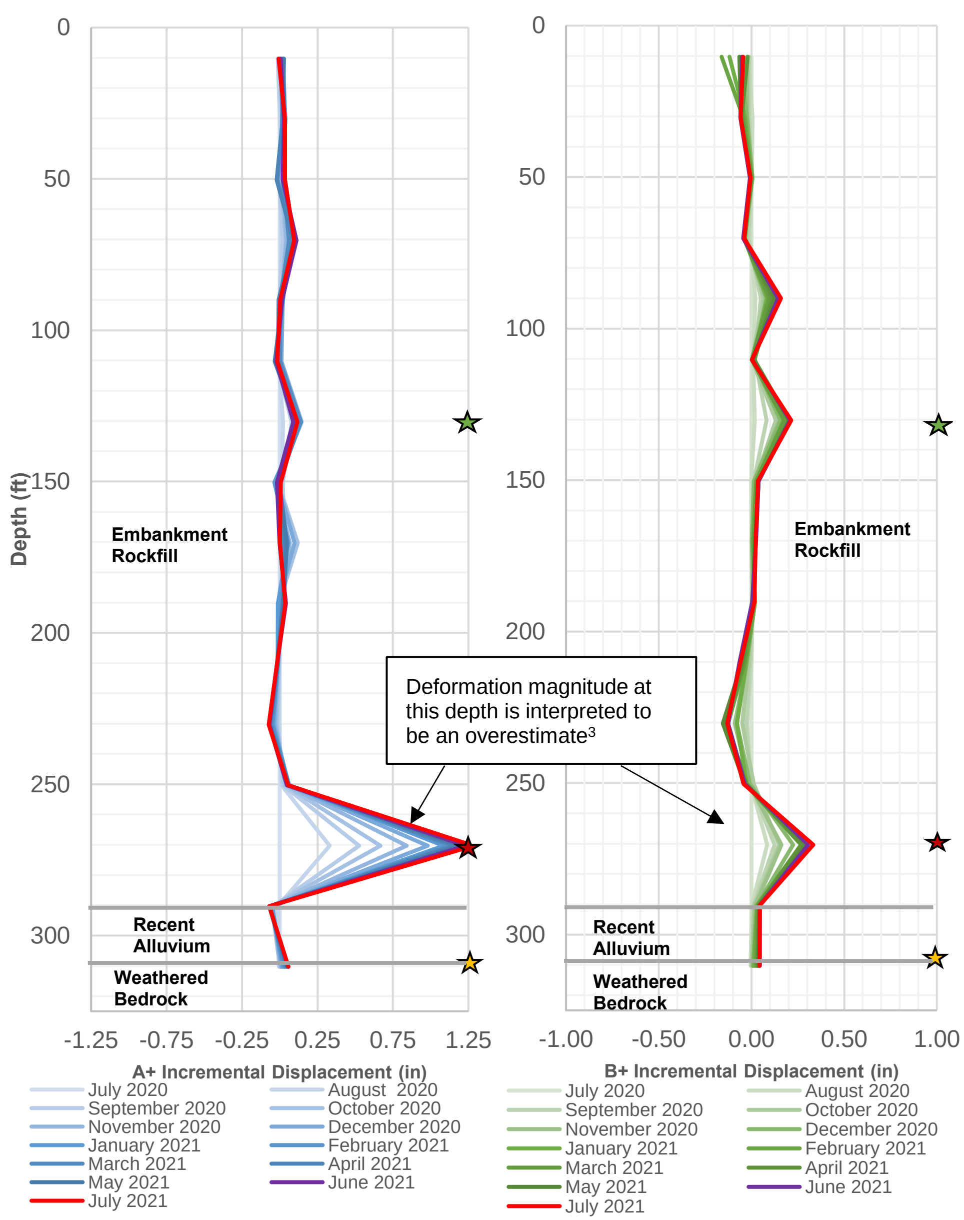
YANKEE DOODLE TAILINGS IMPOUNDMENT

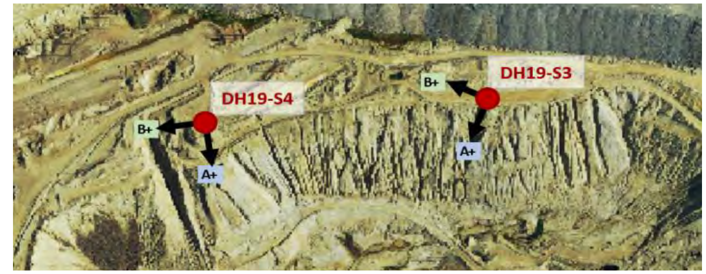
MONTHLY AVERAGE CUMULATIVE SUBSURFACE DEFORMATION DRILLHOLE DH19-S4 (JULY 2020 THROUGH JULY 2021)

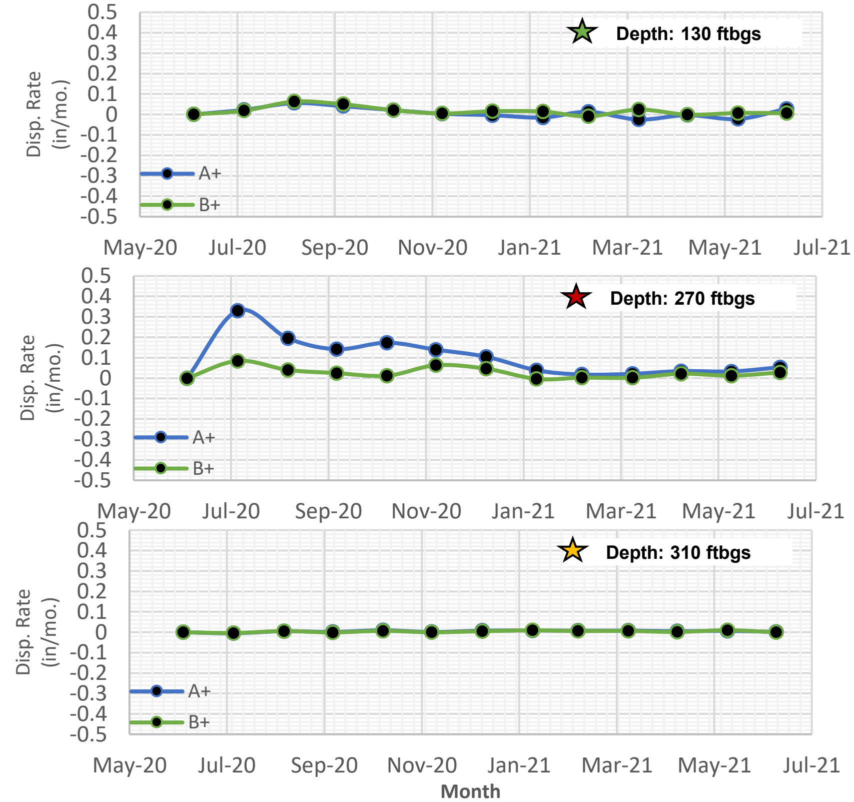
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01362

FIGURE D.4 REV 0







NOTES:

1. INCREMENTAL DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.
3. DEFORMATION MAGNITUDE BETWEEN 250 FTBG TO 290 FTBG IS INTERPRETED TO BE AN OVERESTIMATE DUE TO IPI CONNECTING ROD FLEXION.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	03AUG'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

MONTHLY AVERAGE INCREMENTAL SUBSURFACE DEFORMATION DRILLHOLE DH19-S4 (JULY 2020 THROUGH JULY 2021)

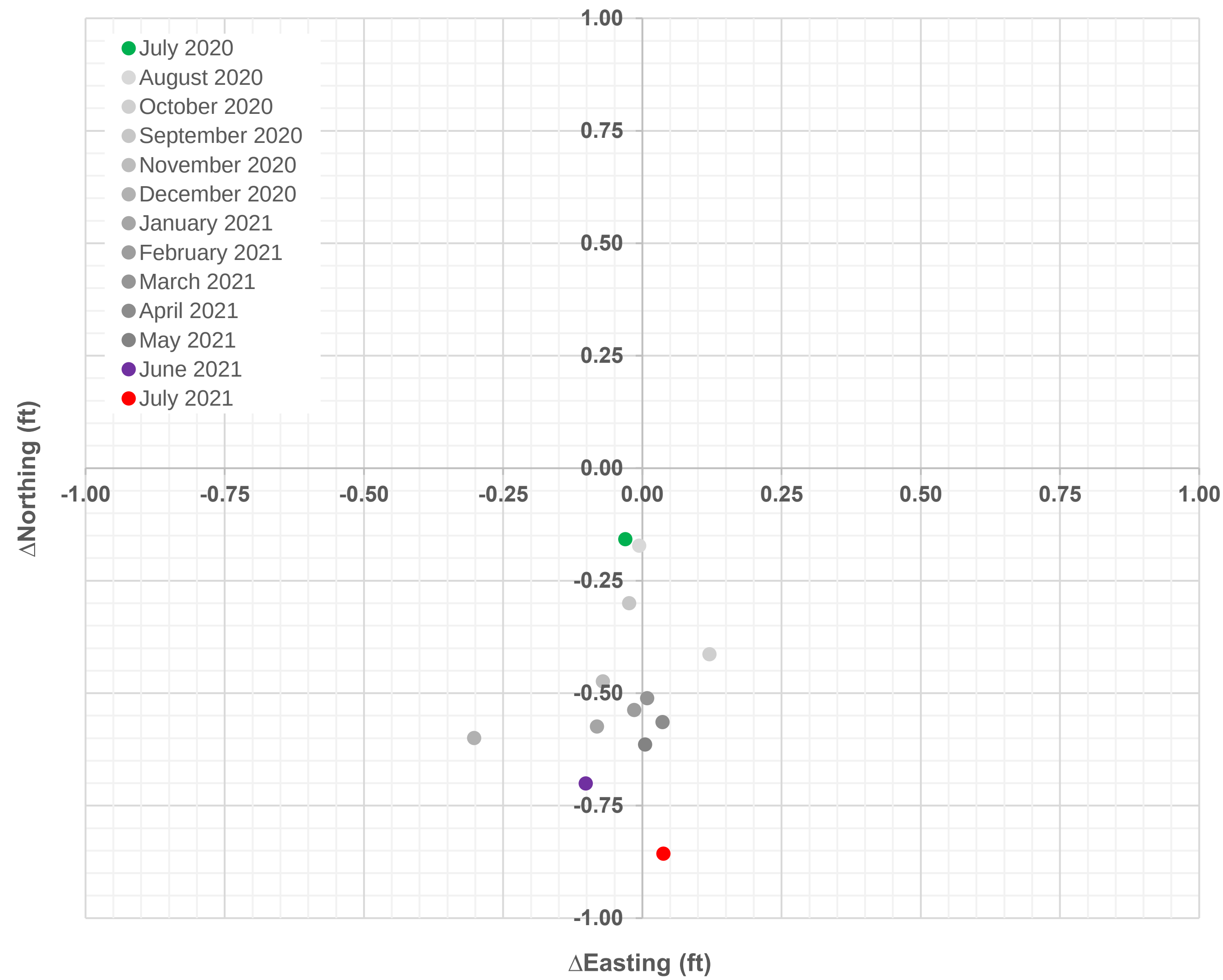
Knight Piésold CONSULTING

P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE D.5

REV 0



NOTES:
1. COLLAR WANDER IS MONITORED USING GNSS INSTRUMENTATION INSTALLED AT THE INCLINOMETER COLLAR LOCATION.
2. THE PLOT ABOVE PRESENTS COLLAR POSITION BASED ON NORTH AND EAST CHANGE RELATIVE TO A JULY 1, 2020 BASELINE GNSS SURVEY.
3. NO DATA ARE AVAILABLE FOR NOVEMBER, 2020 WHILE THE INSTRUMENTATION WAS OFFLINE DUE TO A POWER MANAGEMENT ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	03AUG'21	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH19-S4 GNSS-BASED INCLINOMETER COLLAR WANDER (JULY 1, 2020 THROUGH JULY 31, 2021)

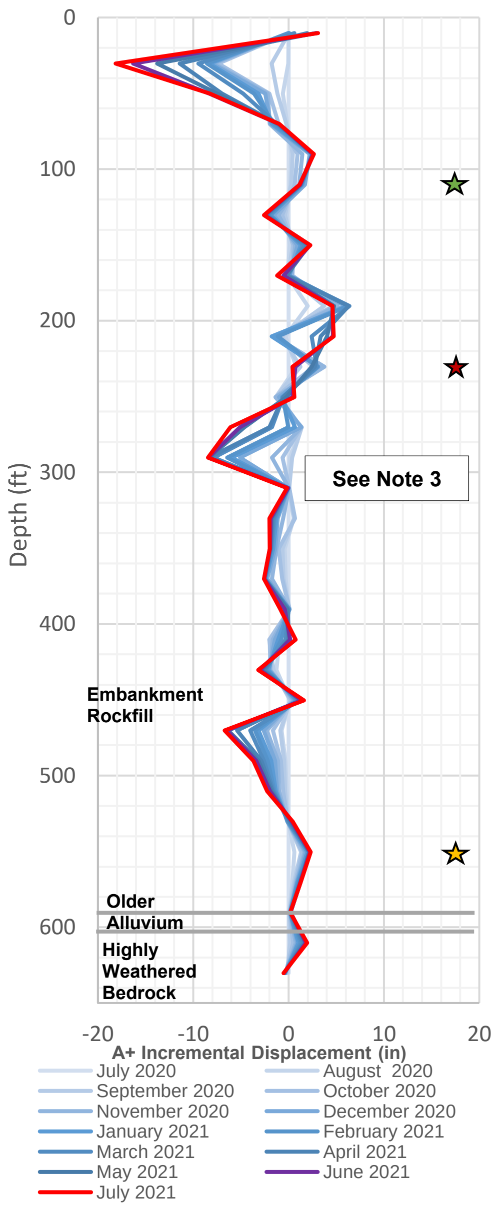
Knight Piésold CONSULTING

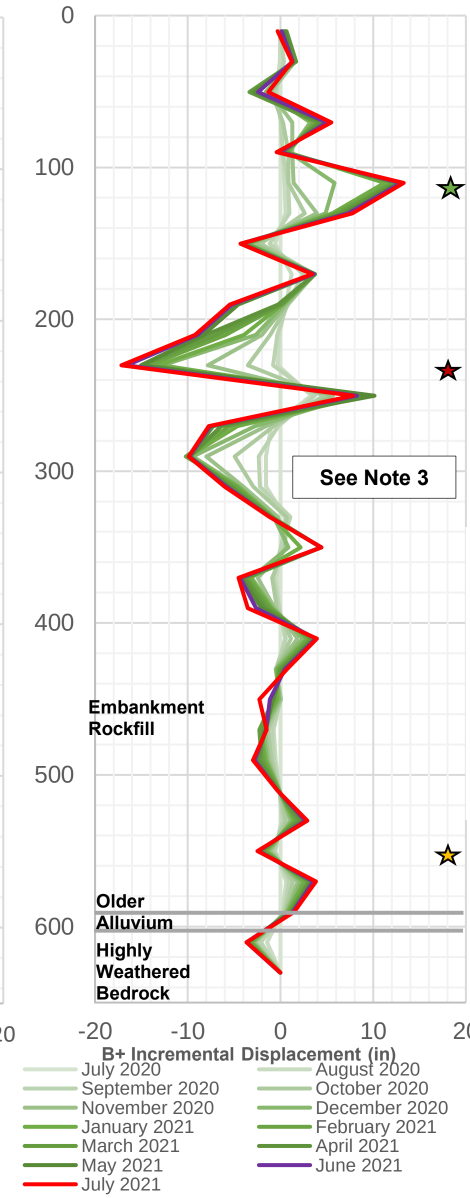
P/A NO. VA101-126/25

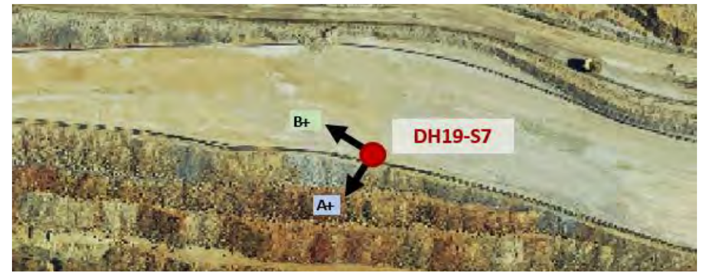
REF. NO. VA21-01362

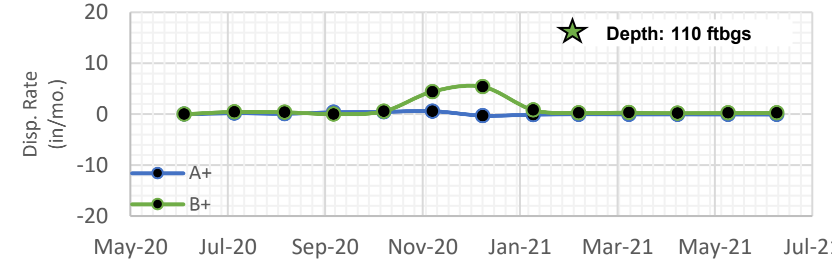
FIGURE D.6

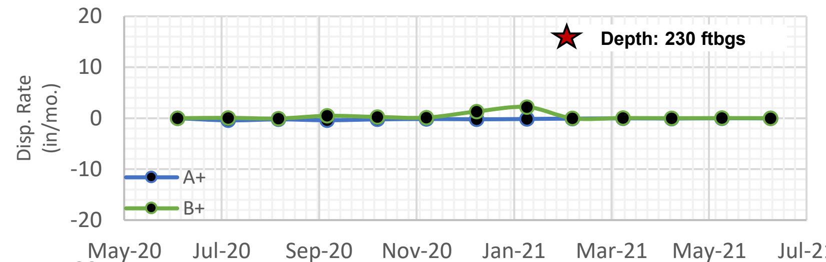
REV 0

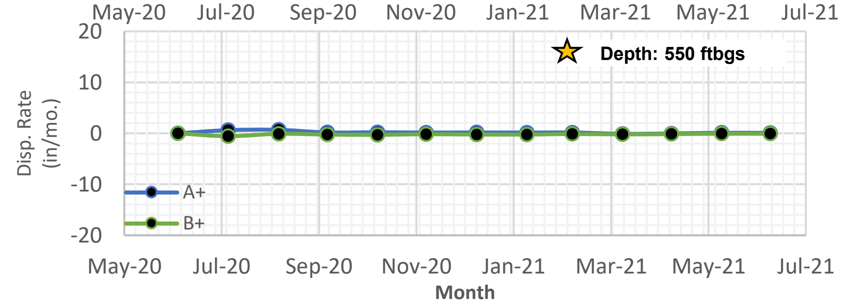












NOTES:
1. INCREMENTAL DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.
3. DEFORMATION DATA THROUGHOUT THE EMBANKMENT ROCKFILL ARE INTTERPRETED TO RESULT PREDOMINANTLY FROM SETTLEMENT-DERIVED CASING DISTORTION WITHIN HISTORICALLY LEACHED ROCKFILL AND ARE NOT REPRESENTATIVE OF IN-SITU LATERAL DISPLACEMENT.

0	24SEP'2021	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES, LLP

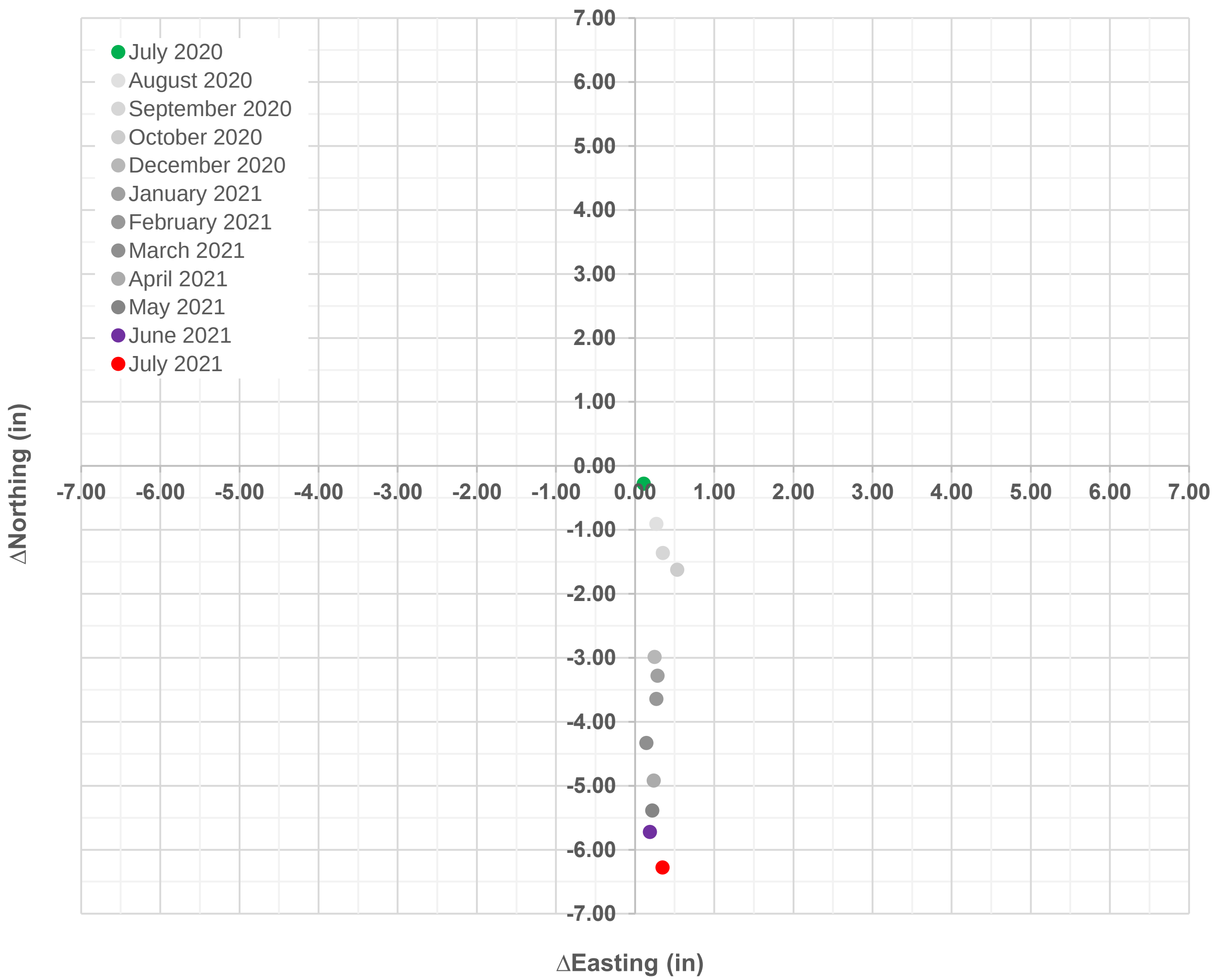
YANKEE DOODLE TAILINGS IMPOUNDMENT

MONTHLY AVERAGE INCREMENTAL SUBSURFACE DEFORMATION DRILLHOLE DH19-S7 (JULY 2020 THROUGH JULY 2021)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/25	VA21-01362

FIGURE D.7 REV 0



NOTES:

1. COLLAR WANDER IS MONITORED USING GNSS INSTRUMENTATION INSTALLED AT THE INCLINOMETER COLLAR LOCATION.
2. THE PLOT ABOVE PRESENTS COLLAR POSITION BASED ON NORTH AND EAST CHANGE RELATIVE TO A JULY 1, 2020 BASELINE GNSS SURVEY.
3. NO DATA ARE AVAILABLE FOR NOVEMBER, 2020 WHILE THE INSTRUMENTATION WAS OFFLINE DUE TO A POWER MANAGEMENT ISSUE.

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH19-S7 GNSS-BASED INCLINOMETER COLLAR WANDER (JULY 1, 2020 THROUGH JULY 31, 2021)

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	24SEP'2021	ISSUED WITH LETTER	SY3	KTD

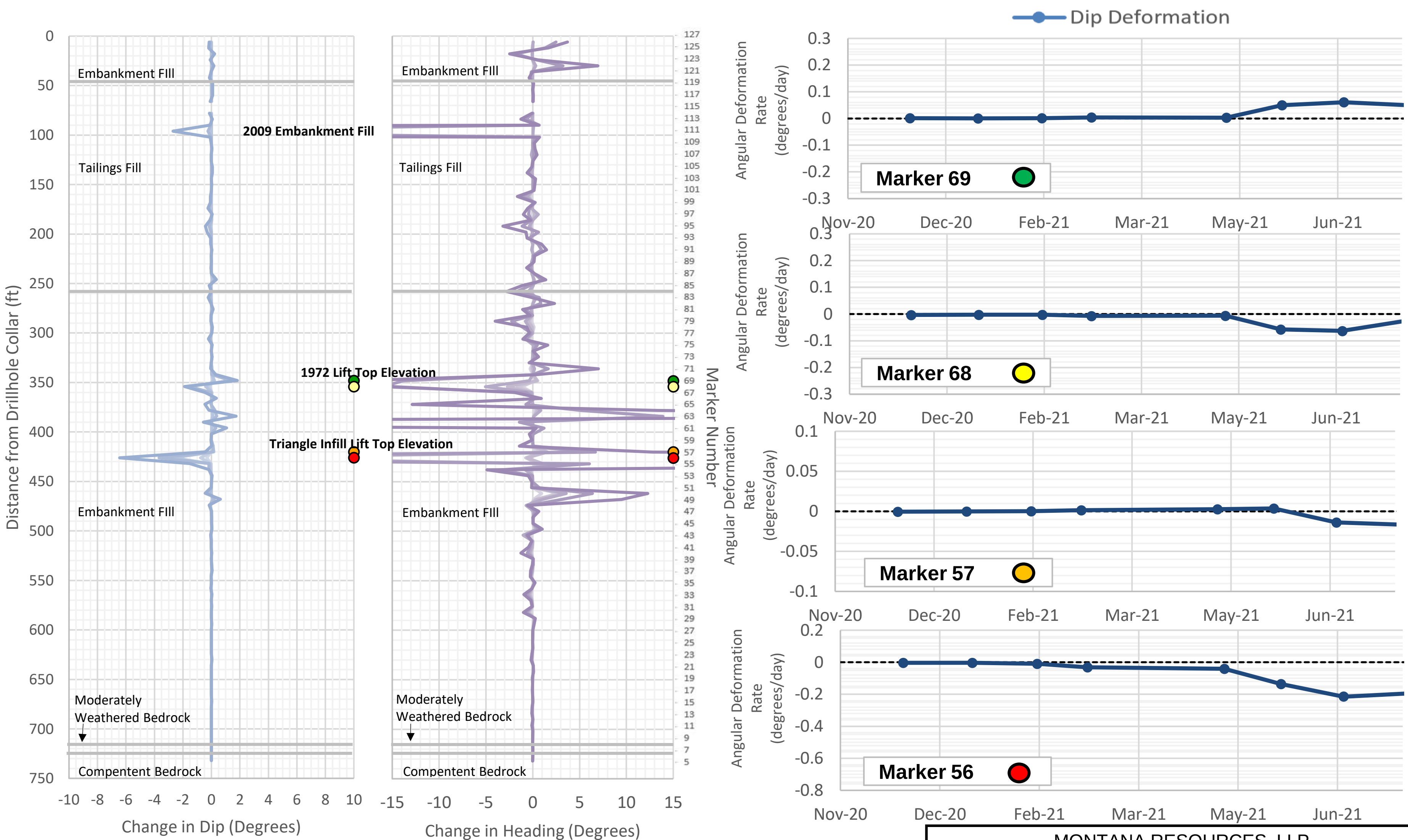
Knight Piésold CONSULTING

P/A NO. VA101-126/25

REF. NO. VA21-01362

FIGURE D.8

REV 0



NOTES:

1. MONTHLY AVERAGE DEFORMATIONS ARE PRESENTED AND ARE RELATIVE TO A MONTHLY AVERAGE BASELINE FROM NOVEMBER 24, 2020 TO JULY 31, 2021.
2. DIP IS MEASURED FROM THE HORIZONTAL GROUND SURFACE TO THE SENSOR'S Y-AXIS. NEGATIVE CHANGE-IN-DIP INDICATES A STEEPENING SENSOR ORIENTATION.
3. HEADING IS MEASURED CLOCKWISE (CW) FROM THE MAGNETIC NORTHING. POSITIVE CHANGE-IN-HEADING INDICATES CW ANG. DEFORMATION.

0	30SEP'21	ISSUED WITH LETTER	SY3	KTD
REV	DATE	DESCRIPTION	PREP'D	RVW'D

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH20-S2 GEO4SIGHT ANALYSIS ANGULAR DEFORMATION PROFILES AND RATES (NOVEMBER 2020 THROUGH JULY 2021)

Knight Piésold CONSULTING

P/A NO. VA101-00126/25

REF. NO. VA21-01362

FIGURE D.9

REV 0

APPENDIX F

Correction Action Plan Documentation

Appendix F1 MR 2020 Corrective Action
Appendix F2 MR 2020 Corrective Action 2 Deferral Notification
Appendix F3 5-Year Site Investigation, Instrumentation and Monitoring Plan

APPENDIX F1

MR 2020 Corrective Action

(Pages F1-1 to F1-4)

Montana Resources

600 Shields Ave.
Butte, Montana 59701

February 11, 2021

Montana Department of Environmental Quality
Hard Rock Mining Bureau
Attn: Herb Rolfes
P.O. Box 200901
Helena, MT 59620

Re: 2020 Annual Inspection Report for Yankee Doodle Tailings Impoundment and Corrective Action Plan for Recommendations

Dear Mr. Rolfes:

The Engineer of Record (EOR) annual inspection of the Montana Resources, LLP (MR) Yankee Doodle Tailings Impoundment (YDTI) was conducted on October 15, 2020, by Mr. Allen Gipson (P.E. in Colorado and Wyoming) on behalf of Mr. Ken Brouwer, P.E., the Engineer of Record (EOR), due to public health restrictions relating to travel associated with the COVID-19 pandemic. Mr. Gipson was accompanied during the site inspection by Mr. Mike Harvie (Manager of Engineering and Geology) of MR.

The EOR annual inspection is required under Section 82-4-381 of the Montana Code Annotated (MCA), which also requires the mine operator to prepare a Corrective Action Plan (CAP) summarizing the recommendations of the EOR and an implementation schedule for the corrective actions. KP prepared the 'Yankee Doodle Tailings Impoundment – 2020 Annual Inspection Report' (AIR), following the inspection.

This letter documents MR's CAP in response to the five recommendations presented by the EOR:

1. Maintain reductions in freshwater use from the Silver Lake Water System to the extent reasonably practicable and continue the Pilot Project to incrementally reduce the water inventory in the YDTI supernatant pond towards the target of approximately 15,000 acre-ft.

2. Modify the tailings distribution system by extending Line 2 to allow discharge at location NS-1 and NS-2 when the EL. 6,450 ft raise of the embankment is completed adjacent to these discharge locations.

3. Further develop the construction sequence and dumping plan for the EL. 6,450 ft lift focused on the next 12 to 24 months, including a more detailed summary of the sequence and anticipated progress of embankment construction on approximately a quarterly basis.

4. Cease recirculation of barren leach water to the rock disposal sites (RDSs) directly adjacent to the YDTI embankments over the next several years.

5. Develop an updated five-year plan that includes consideration for continued phased site investigation, installation of new monitoring instrumentation, and potential replacement of lost or abandoned monitoring instruments.

MR has developed the following CAP that is expected to effectively address the recommendations contained in the AIR.

1. **Maintain reductions in freshwater use from the Silver Lake Water System to the extent reasonably practicable and continue the Pilot Project to incrementally reduce the water inventory in the YDTI supernatant pond towards the target of approximately 15,000 acre-ft.**

MR continued to operate with reduced freshwater use in 2020, with an average SLWS flowrate of approximately 1.1 MGPD, which is comparable with the average flowrate since mid-2017. MR anticipates comparable average use of freshwater in 2021.

Since commissioning the Pilot Project in September 2019, through December 2020, approximately 770 M gallons (2,400 ac-ft) of YDTI water has been discharged to Silver Bow Creek. MR is optimistic that the YDTI supernatant pond target inventory of approximately 15,000 acre-ft can be achieved over the next 2 to 4 years through a combination of the discharging water from the YDTI using the pilot project and continuing to operate the concentrator with reduced freshwater use. However, the Pilot Project is not entirely within MR's control due to a variety of factors and Polishing Plant issues and other interruptions are possible that could impact the timeline.

2. **Modify the tailings distribution system by extending Line 2 to allow discharge at location NS-1 and NS-2 when the EL. 6,450 ft raise of the embankment is completed adjacent to these discharge locations.**

As noted in the 2019 CAP, MR recognizes that the ability to discharge from either of two lines or at two locations concurrently along the North-South Embankment would improve flexibility for operations and enhance beach development along the embankment. MR evaluated options for the adjustment of this line in 2020, and determined that realignment of Line 2 would not be practicable during 2020 due to the embankment construction that was occurring along the East-West Embankment and is proposed to continue adjacent to NS-1 and NS-2 in 2021.

MR proposes the Line 2 realignment be deferred until the 6450 raise on the YDTI embankment is completed in the embankment section adjacent to NS-1 and NS-2 so the line does not have to be removed and replaced twice. MR anticipates the construction will be complete in this area in late 2021, and Line 2 can then be realigned in early 2022, and complete by Q2.

3. **Further develop the construction sequence and dumping plan for the EL. 6,450 ft lift focused on the next 12 to 24 months, including a more detailed summary of the sequence and anticipated progress of embankment construction on approximately a quarterly basis.**

MR will develop a short-term mine plan that estimates the schedule and quantity of rockfill available for construction by the end of Q2 2021. The schedule will consider the period from Q3 2021 through Q2 2023 (inclusive).

The rockfill schedule will include forecasting of rockfill availability on a monthly basis for the first six months, then quarterly, and will include identification of proposed use for the rockfill and maps identifying placement location.

4. Cease recirculation of barren leach water to the rock disposal sites (RDSs) directly adjacent to the YDTI embankments over the next several years.

MR will progressively decrease the recirculation flowrate by initially slowing down and then turning off the Precipitation Pump House pumps that recirculate the flow. Excess flow that is not recirculated will discharge to the HsB Pond via the PPT overflow weir or Hooligan by-pass. The excess flow will be treated in the HsB WTP or HsB Capture System. MR is targeting a 0.5 – 1.0 million gallons per day drawdown of the recirculating load to the RDSs.

MR commenced preliminary decommissioning of the leach circuit recirculation system in Q4 2020 by turning off the Cell 11 recirculation pump. The rate at which the recirculation system can be turned down depends on the drain down of the leach RDSs, annual precipitation and the availability of treatment system capacity. While the total volume of leach water in circulation is uncertain, MR anticipates that by reducing the leach circuit recirculating load in this manner, active pumping of leach water to RDSs can be ceased in 2022.

5. Develop an updated five-year plan that includes consideration for continued phased site investigation, installation of additional monitoring instrumentation, and potential replacement of non-functional or abandoned monitoring instruments.

MR will engage KP to develop a five-year instrumentation, investigation and monitoring plan that provides a forward-looking framework for continued phased site investigation, installation of additional monitoring instrumentation and replacement of damaged or abandoned instrumentation, where appropriate. MR suggests that the five-year plan should be informed by the results of the upcoming update to the risk assessment and in consideration of planned El. 6,450 embankment construction and findings of operational monitoring and site investigation programs completed to date. An adaptive management approach will continue to be used to allow selection and placement of instrumentation to be optimized to expand on existing monitoring network, enhance monitoring for key potential failure modes identified during the updated risk assessment, and maintain sufficient monitoring coverage as construction progresses.

If there are any questions or concerns regarding the CAP and schedule please contact me at (406) 496-3211.

Sincerely,

Mark Thompson

Vice President of Environmental Affairs
Montana Resources, LLP

Attachments:

A. Engineer of Record – Verification

Montana Resources

600 Shields Ave.
Butte, Montana 59701

ATTACHMENT A:

Engineer of Record (EOR) Verification

I have reviewed and verify that the corrective actions proposed by MR should reasonably be expected to effectively address the recommendations contained in the 2020 Annual Inspection Report.

Reviewed: 2021-02-11

Ken Brouwer, P.E.
Engineer of Record,
Knight Piésold Ltd.

APPENDIX F2

MR 2020 Corrective Action Plan 2 Deferral Notification

(Pages F2-1 to F2-2)

Montana Resources

Montana Resources, LLP
600 Shields Ave.
Butte, Montana USA 59701
(406) 496-3200
(406) 723-9542 fax
www.montanaresources.com

December 18, 2020

Knight Piésold Limited
Attn: Ken Brouwer
Suite 1400, 750 West Pender Street
Vancouver, BC V6C 2T8

Re: 2019 Yankee Doodle Tailings Impoundment Correction Action Plan – Corrective Action 2 Deferral Notification

This letter has been prepared to notify the Mr. Ken Brouwer, the Engineer of Record (EOR) for the Yankee Doodle Tailings Impoundment (YDTI), that one of the Corrective Actions presented in the Corrective Action Plan (CAP) on January 31, 2020 will be deferred until 2021. Montana Resources, LLP (MR) prepared the 2019 CAP and implementation schedule to address the five Recommendations identified by the EOR in the 2019 Annual EOR Inspection Report for the YDTI (KP, 2020).

MR have completed the Corrective Actions for Recommendations 1, 3, 4 and 5. The 2-part Corrective Action for Recommendation 2 however will not be completed in its entirety in 2020. Recommendation 2 and MR's Corrective Action included the following:

Recommendation 2: ***Relocate discharge location NS-3 closer to NS-2 and extend Line 3 to include a new discharge point, NS-4, located further to the north than the current location of NS-3. In addition, extend Line 2 to allow discharge at location NS-1 while considering the potential for further extension to NS-2 in the future.***

Corrective Action 2: *MR agrees that adjusting the location of NS-3 and constructing an additional discharge point (NS-4) located a few hundred feet further along the North-South Embankment (as shown on Figure 1 below) would enhance beach development at the northern end of the embankment. MR will make these adjustments to Line 3 during Q2 or Q3 2020.*

MR recognizes that the ability to discharge from either of two lines or at two locations concurrently along the North-South Embankment would improve flexibility for operations and enhance beach development along the embankment. MR will evaluate options for adjusting Line 2 to allow discharge at NS-1 and NS-2, and will make adjustments to the system in 2020 provided that a reasonably practicable option is identified with no detrimental impact to operations.

MR completed the Part 1 of Corrective Action 2 in August 2020 with the relocation of NS-3 closer to NS-2 and installation of NS-3, a new tailings discharge location at the northern end of the N-S embankment.

The second part of Corrective Action 2, which includes the adjustment of Line 2 to allow discharge at NS-1 and NS-2, however will not be complete. MR evaluated options for the adjustment of this line in 2020. The evaluation included consideration of the realignment alternatives, and the current embankment construction schedule and sequencing. MR determined that realignment of Line 2 would not be worthwhile or practicable during 2020 due to the embankment construction that is currently occurring along the East-West Embankment and is proposed to continue adjacent to NS-1 and NS-2 in 2021-22. MR propose the Line 2 realignment be deferred until the 6450 raise on the YDTI embankment is completed in the embankment sections adjacent to NS-1 and NS-2 so the line does not have to be removed and replaced twice. MR anticipate the construction will be complete in this area in mid-2022, and Line 2 can then be realigned in Q2 of 2022, and complete by Q3.

If there are any questions or concerns regarding this deferral, please contact me at (406) 496-3215.

Sincerely,

Mike Harvie
Manager of Engineering and Geology
Montana Resources, LLP

Copy to: Garrett Smith, MDEQ
Daniel Fontaine, KP
Roanna Dalton, KP

APPENDIX F3

5-Year Site Investigation, Instrumentation and Monitoring Plan

(Pages F3-1 to F3-16)

Knight Piésold CONSULTING

Management System Certified by: bsi ISO 9001 ISO 14001 ISO 45001 CERTIFIED

December 22, 2021

Knight Piésold Ltd.
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Vancouver, British Columbia
Canada, V6C 2T8
T +1 604 685 0543
E vancouver@knightpiesold.com
www.knightpiesold.com

Mr. Mike Harvie
Manager of Engineering and Geology
Montana Resources, LLP
600 Shields Avenue
Butte, Montana
USA, 59701

Dear Mike,

RE: 5-Year Site Investigation, Instrumentation and Monitoring Plan for Yankee Doodle Tailings Impoundment

1.0 INTRODUCTION

Montana Resources, LLP (MR) operates an open pit copper and molybdenum mine in Butte, Montana. Tailings produced from ore processing are stored within the Yankee Doodle Tailings Impoundment (YDTI), which is a valley-fill style impoundment with rockfill embankments that has been progressively constructed since the 1960s. Knight Piésold Ltd (KP) supports MR to characterize hydrogeological and geotechnical conditions within the historical embankments and to routinely monitor impoundment conditions as part of the operational surveillance plan for the tailings facility, as described in the TOMS Manual (MR/KP, 2020). The Engineer of Record (EOR) for the YDTI is currently Mr. Daniel Fontaine, P.E. of KP, who accepted the role in September 2021. Mr. Ken Brouwer, P.E. of KP had previously held the role of EOR since September 2015.

KP and MR have progressively advanced characterization of the YDTI embankments, tailings mass and foundation materials, while developing a robust instrumentation network and associated monitoring programs. An initial 5-year phased site investigation and instrumentation plan was developed as part of the Amendment 10 permit application for continued use of the YDTI facilitated by continued construction of the embankment to a crest elevation of 6,450 ft (KP, 2017). The final permit was issued in early 2020. Construction of the EL. 6,450 ft lift of the embankment is underway and is expected to be complete in late 2022. The majority of the 5-year plan was implemented through a series of site investigation programs completed from 2017 through 2021. Modifications were made based on findings of preceding investigations, in response to feedback from the Independent Review Panel (IRP), and/or to achieve updated project objectives.

This letter presents an updated 5-year site investigation, instrumentation, and monitoring plan for the YDTI covering the period of 2022 through 2026. Program objectives and descriptions of program components are stated, including proposed drillhole locations, subsurface and surface instrumentation, monitoring programs and laboratory testing.

2.0 AMENDMENT 10 INSTRUMENTATION PLAN AND CURRENT STATUS

The initial 5-year investigation and instrumentation plan included within the Amendment 10 design document recommended completion of 21 proposed drillholes at locations within the East-West and North-South Embankments. The primary objectives were to:

- Investigate the nature and distribution of rockfill and foundation materials within the historical East-West and North-South Embankments using sonic drilling, geological logging, and laboratory testing.
- Expand the existing piezometric monitoring network by installing nested vibrating wire piezometers (VWPs) in all drillholes to characterize and monitor embankment pore water pressures.

Forty-seven drillholes and instrument installations were completed at the YDTI and in the Horseshoe Bend (HsB) area during annual site investigation programs from 2017 through 2021. These were comprised of the following:

- Fifteen (15) of the initially proposed 21 drillholes from the 5-year plan were completed (about 70%) at approximately the planned locations. Six (6) proposed drillholes have yet to be completed due to access limitations and/or changes in site investigation priorities.
- An additional 8 drillholes were completed at locations not within the initial 5-year plan to meet revised characterization or monitoring objectives.
- Completion of 4 seismic cone penetration tests (SCPT) at locations within the Seep 10 bench and Historical Western Leach Area that were not included within the initial scope.
- An additional 12 drillholes and 12 SCPT soundings were completed within the HsB area during 2018 and 2019. These drilling and instrument installations were completed to characterize geotechnical and hydrogeological conditions downstream of the central East-West Embankment toe with the objective of supporting rockfill buttressing/rock disposal site construction downstream of the embankment within this area. These drillholes were not included in the original 5-year plan.

The instrumentation included in some originally proposed drillholes was modified or additional instruments were added to better achieve characterization or monitoring objectives. Changes include the addition of surface and subsurface deformation instruments and different pore water pressure instruments as described in Sections 3 and 4. The details of the active instrumentation network are provided Section 3.

The drillhole locations originally proposed in the 5-year plan for the Amendment 10 permit application are summarized in Appendix A, and the completion status for each is summarized in Table A.1. Proposed drillholes not completed during the 2017 through 2021 programs were considered for inclusion in the updated 5-year plan proposed for 2022 through 2026, as described herein.

3.0 SUMMARY OF ACTIVE INSTRUMENTATION AND MONITORING

The YDTI monitoring network includes the following active instrumentation as of December 2021 to monitor piezometric conditions within the embankments, tailings, and foundation materials. The current instrumentation monitoring network is shown on Figure 1.

- Nested VWPs installed in 38 drillholes to monitor embankment, tailings, and foundation pore water pressures and at 10 and 28 locations within the Horseshoe Bend and West Ridge areas, respectively.
- Inclinometers installed in 6 drillholes (DH19-S3, DH19-S4, DH19-S5, DH19-S7, DH21-S2 and DH21-S3) to monitor subsurface deformations within embankment and foundation materials.
- Elexon Geo4Sight instrumentation (multi-node pore water pressure and angular deformation instruments) installed at two locations (DH20-S2 and DH21-S4) to monitor pore water pressures and subsurface angular deformations within tailings and embankment rockfill.
- GNSS surface deformation instruments installed at four locations (DH19-S3, DH19-S4, DH19-S5 and DH19-S7) and one GNSS reference station (DH16-04).

- Geophysical casings installed at one location (DH20-01) to facilitate borehole nuclear magnetic resonance testing.

The active YDTI monitoring program also utilizes inSAR (interferometric synthetic aperture radar) remote sensing to monitor surface deformations throughout the embankments. These programs run during the snow-free season (approximately mid-April through November) and include the following components:

- Long-term, high resolution inSAR monitoring (SqueeSAR; 2-dimensional Terra-SAR-X) with reports completed twice per year (July and November).
- Short-term, frequent inSAR monitoring (Bulletins; 1-dimensional Ascending Terra-SAR-X) with reports completed every 11-days and each covering a monitoring period of 22-days. These bulletin analyses were initiated in April 2021 for construction monitoring purposes.

Instrumentation data are available to KP and MR via a remote monitoring system (RMS) that was installed in 2017 and has been progressively expanded thereafter. VWP and GNSS data are available in near real time via the online Sensemetrics platform. InSAR data are not included in the system but are reported on by the provider (TRE-Altamira) and analyzed by KP. Elexon Geo4Sight instrumentation are incompatible with Sensemetrics and are downloaded by MR and analyzed by KP external to the RMS. The RMS will continue to operate during the next 5-year period (and beyond) and new instrumentation will be added following installation (as applicable).

4.0 PROPOSED 5-YEAR INVESTIGATION, INSTRUMENTATION AND MONITORING PLAN

4.1 OBJECTIVES OF UPDATED 5-YEAR INVESTIGATION PLAN

The objectives of the updated 5-year site investigation, instrumentation and monitoring plan include expanding spatial coverage of subsurface investigations from 2022 through 2026 to:

- Advance characterization of the nature and distribution of rockfill and foundation materials within the East-West and North-South Embankments.
- Further investigate rockfill saturation within the embankments including the influence of rockfill material properties and distribution on drainage within the embankment including within the downstream lateral extent of previously identified 1974, 1972 and Triangle-Infill lift top zones.
- Install additional pore water pressure and subsurface deformation monitoring instrumentation to progressively supplement the operational instrumentation network within the East-West and North-South Embankments.

Drilling investigations and instrumentation programs will rely on techniques proven to be of highest value during completion of the initial 5-year plan. These techniques include sonic drilling, geological logging, geotechnical laboratory testing, instrument installation and borehole geophysical testing. Results will continue to be summarized in annual site investigation reports and will be used to support ongoing monitoring, site characterization, stability modelling and design work.

Proposed drilling and subsurface instrumentation, surface instrumentation, remote sensing, and laboratory testing programs for 2022 through 2026 are summarized in the following sections.

4.2 DRILLHOLES AND SUBSURFACE INSTRUMENTATION

A total of 26 drillholes are proposed for completion between 2022 and 2026 at new locations to supplement the existing coverage. Some of the drillhole locations may be reallocated to facilitate replacement of existing instrumentation should they become damaged by construction activity and/or in-situ conditions (deformations, corrosion, etc.). Proposed drillhole locations are shown on Figure 1 and anticipated drillhole specifications (coordinates, estimated depths and planned instrumentation) are provided in Table 1. The following drilling and completion methods are proposed:

- Sonic drilling with continuous core collection for geological logging is recommended for all proposed YDTI drilling. Drilling should be completed using a telescoping methodology (where required) to advance drillholes to depths of up to approximately 800 ft. This method minimizes rod friction and reduces the potential for drilling difficulties (i.e., sheared casing, twist off).
- The majority of proposed drillholes include completion with pore water pressure monitoring instrumentation to characterize and monitor piezometric conditions within rockfill, tailings and foundation materials. The following instrumentation types will be implemented depending on drillhole location specific objectives:
    - **Nested VWP installations:** Nested VWP installations (multiple VWPs per drillhole) were routinely installed during investigation programs from 2015 through 2021 to monitor pore water pressures within the rockfill at multiple depths using the fully grouted method. These are relatively inexpensive and provide valuable piezometric data within drillholes where a high vertical measurement resolution is unnecessary (e.g., within tailings, shallow embankment drillholes, relatively uniform rockfill). The quantity of VWPs per drillhole is generally limited to approximately 8 sensors due to annular space limitations. Nested VWPs are proposed within 14 drillholes where lower piezometric instrumentation resolution is warranted.
    - **Elexon Geo4Sight installations:** Two Elexon Geo4Sight installations were completed during 2020 and 2021 (DH20-S2 and DH21-S4) and measure pore water pressure and angular deformation at uniform 6 ft and 18 ft vertical spacing within the embankment rockfill and tailings, respectively. These instruments were specified to provide highly detailed pore water pressure profile data at two important locations within the upstream embankment slope on Sections 0+00 and 8+00W and have proven of significant value for characterization. The cost of the instrumentation is high, and their future use should be limited to select drillhole locations where very detailed pore pressure characterization is required or where deformation monitoring beyond the feasible maximum inclinometer installation depth (>750 ft) is desired. Geo4Sight instruments are presently proposed at two locations (DH-I and DH-M) within the Central Pedestal Area where both deformation monitoring and highly detailed pore water pressure characterization beneath the embankment crest will have significant value.

   - **Multi-Point VWP installations:** Multi-point VWP instrumentation is a potential additional pore water pressure instrumentation option where an intermediate level of vertical resolution between a nested VWP and Geo4Sight completion is required. These instruments comprise conventional VWP sensors configured at regularly spaced intervals and with all sensors wired into a single multi-lead cable. This configuration allows for a higher number of sensors (e.g., 20 ft sensor spacing) to be included within a single drillhole at a cost that is between that of a conventional nested VWP installation and Geo4Sight instrumentation. No multi-point VWP installations were installed between 2015 and 2021; however, KP is optimistic that this instrumentation is suitable for the site-specific application (as it is essentially just conventional VWP instrumentation) and recommends this installation method be trialed at key sites with their continued use if positive performance is confirmed at the trial locations. These instruments are initially proposed for 7 drillholes; however, this plan will be re-evaluated following completion of initial trial installations.
- Additional subsurface deformation instrumentation (inclinometers or Geo4Sight) is proposed within 12 drillholes to expand coverage within the East-West and North-South Embankments. The following uses of inclinometers and Geo4Sight are proposed:
   - **Inclinometers:** Inclinometers are proposed to be installed within 10 drillholes with anticipated depths of less than 750 ftbgs (practical depth limitation) and will often be co-located with pore water pressure instrumentation. The significant rockfill settlement observed throughout the YDTI embankments requires that settlement protection be included for all future inclinometer installations. Inclinometers completed with corrugated-pipe settlement protection were successfully installed during the 2021 investigation and KP recommends that similar installation methods be used for future inclinometers. Inclinometers are planned to be surveyed manually using a traversing probe as opposed to using in-place-inclinometer or shape-accel-array instrumentation. The traversing probe provides higher vertical resolution than either instrumentation option, is more settlement tolerant (due to short gage length), provides information for data QA/QC and is cost efficient. Automated instrumentation may be installed at a later date, if needed to achieve monitoring objectives.
   - **Elexon Geo4Sight instrumentation:** The initial Geo4Sight installations (DH20-S2 and DH21-S4) are providing valuable subsurface angular deformation data to support monitoring of embankment response to construction and, as noted above, also provide highly detailed pore water pressure measurements. Use of Geo4Sight markers to monitor embankment deformations is relatively novel and requires significant interpretation as compared to conventional inclinometers. Two additional installations are proposed (DH-I and DH-M) to meet pore water pressure monitoring objectives but will also benefit the deformation monitoring program.
- Borehole nuclear magnetic resonance (NMR) geophysical testing was completed during the 2019 and 2020 investigation programs to provide a continuous characterization of volumetric moisture content within rockfill at the drillhole locations. This technique uses static- and electro-magnetic fields to measure in-situ moisture content. This operating principal has been found to interfere and damage VWP instrumentation when co-located within the same drillhole and, as a result, has required that dedicated geophysical drillholes be completed where testing is desired. The ability to collect both NMR and VWP pore pressure data from the same drillhole would be of significant value; however, no available method has yet been identified to accomplish this objective. KP recommends that the following options be investigated to potentially allow for NMR and instrumentation:
   - It is possible that NMR equipment provided by a different manufacturer (such as QTEC) may not result in damage to VWP instrumentation. A trial to confirm may be advisable.

- NMR implementation during drilling using either CPT or direct-push tooling may be a feasible alternative to collect NMR data prior to the installation of instrumentation downhole. This is not presently a standard practice; however, KP intend to keep informed on evolving techniques should they become practicable.

KP will evaluate the above options and may include additional NMR testing should one of the above options prove feasible. No stand-alone drilling for NMR testing has been included in the 5-year plan in favor of relying on instrumentation to directly characterize and monitor rockfill saturation.

The proposed drilling, instrumentation and geophysical methods included in this 5-year plan will be re-evaluated each year prior to execution of the drilling program based on performance on previous programs, in response to feedback from the IRP, and to better meet evolving project objectives. The sequence of drillhole completion and number of drillholes may be modified based on construction sequencing or to accommodate additional project drilling objectives.

4.3 SURFACE INSTRUMENTATION AND REMOTE SENSING

Surface deformations are presently monitored using a combination of in-situ GNSS instrumentation and inSAR remote sensing. The continuation of both programs will be beneficial to the deformation monitoring program. The existing GNSS network should be expanded over the next five years to include coverage throughout the East-West and North-South Embankments. These instruments have provided valuable deformation monitoring data that is continuously available and provides monitoring during the snow season, which inSAR does not presently provide.

The following additional GNSS instrumentation and inSAR monitoring programs are proposed:

- An additional 8 GNSS installations will be completed at the locations shown on Figure 2 and summarized in Table 2 to supplement the existing surface deformation instrumentation network. These include:
  - East-West Embankment (Central Pedestal Area):
    - Section 8+00W: DH-A (planned for 2022), DH15-S5.
    - Section 0+00: DH-B (planned for 2022), DH17-S2.
  - East-West Embankment (outside the Central Pedestal Area):
    - Section 28+00NW: DH18-S1.
    - Section 43+00NW: DH18-S2.
  - North-South Embankment:
    - Section 28+00N: DH-E (planned for 2025).
    - Section 43+00N: DH18-S4.
- KP recommends that the current inSAR monitoring programs (TRE-Altamira; Terra-SAR-X) be continued from 2022 through 2026 to provide surface deformation monitoring with comprehensive coverage of the YDTI embankments. This should include the following components during the snow-free monitoring season (approximately April through November):
  - Long-term inSAR analyses (SqueeSAR) with reporting completed and provided to KP and MR during July and November each year.
  - Short-term inSAR analyses (Bulletins) completed during active EL. 6450 embankment construction and for a period thereafter as deformations slow following completion. These analyses compare inSAR data over a 22-day period and reported every 11-days. The Bulletin analyses proved of significant value to the construction monitoring programs during 2021 and will continue to be useful as EL. 6,450 ft embankment construction continues.

The continued use of inSAR and installation of additional GNSS instrumentation should be tailored around planned construction activities. InSAR will need to be periodically re-baselined following large scale embankment earthworks (such as following EL. 6,450 embankment construction) to maintain comprehensive coverage. Installation of GNSS instruments may be completed progressively throughout the 5-year period (as construction allows) and temporary removal and reinstallation of the instruments will likely be required to facilitate construction at the instrument locations.

4.4 LABORATORY TESTING

Sampling and laboratory testing has been an important component supporting geotechnical and hydrogeological characterization and included in all investigations completed from 2015 through 2021. Continued widespread use of index testing (particle size distribution, Atterberg limits and specific gravity testing) and gravimetric moisture content testing is recommended for all proposed drillholes. Testing will continue to be completed predominantly on sonic core samples, with some potential for tube sampling where possible in less dense or historically leached rockfill.

A comprehensive evaluation of available site and laboratory data commenced in 2021 to update the engineering models, as a part of updating the embankment stability analysis framework. The evaluation is near completion and has identified a need for supplementing the strength characterization of the embankment rockfill and overburden with additional laboratory testing. The proposed supplementary laboratory program will focus on defining the remolded undrained shear strength of saturated materials and determining its spatial variability. Testing of samples collected from existing core (2015 through 2021) from the Horseshoe Bend and central pedestal areas will be prioritized, followed by the North-South Embankment and the western portion of the East-West Embankment. Laboratory testing for both rockfill and overburden samples will include particle-size distributions, three- to four-point isotopically consolidated and undrained triaxial testing, three-point direct simple shears, and cyclic direct simple shears. Proctors will also be completed for rockfill samples. A range of densities, from as loose as possible to some percentage (to be determined) of proctor, will be used to prepare the samples.

Laboratory testing requirements and methods will be re-evaluated prior to each investigation program and revised or refined, as required.

5.0 CLOSING

Site investigation, instrumentation and monitoring programs completed after submission of the Amendment 10 permit application have significantly advanced characterization of the YDTI embankments, tailings and foundation materials including the geotechnical and hydrogeological characteristics. Instrumentation installed during these programs facilitates robust dam safety monitoring programs and includes both deformation and pore water pressure instrumentation. The addition of an RMS has allowed near real time access to VWP and GNSS data and allows for automated reporting and alerting.

KP has proposed a new 5-year phased site investigation, instrumentation, and monitoring plan to be completed during annual sonic drilling investigations between 2022 and 2026. The objectives of the programs are to increase the spatial coverage of the geotechnical and hydrogeological characterization and instrumentation networks. The plan includes drilling of up to 26 drillholes, installation of additional surface deformation instruments, and continued use of inSAR remote sensing. Drillhole quantities, proposed instrumentation, monitoring methods and laboratory testing requirements may be subsequently modified based on findings of preceding investigations, feedback from the IRP, and evolving project objectives. Proposals will be re-evaluated annually in coordination with MR and the IRP before scoping/planning each drilling investigation program.

We trust this letter meets your needs at this time. Please do not hesitate to contact the undersigned with any questions.

Yours truly,
Knight Piésold Ltd.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
K. T. DAVENPORT
43840
2021-12-22

MONTANA
2021-12-22
DANIEL DYLAN FONTAINE
No. 59785 PE
LICENSED
PROFESSIONAL ENGINEER

Prepared:		Reviewed:	
	Kevin Davenport, P.Eng. Senior Engineer		Daniel Fontaine, P.E. Specialist Engineer | Associate Engineer-of-Record

Approval that this document adheres to the Knight Piésold Quality System: DDF

Attachments:

Table 1 Rev 0	Proposed 5-Year Drillhole and Subsurface Instrumentation Plan (2022-2026)
Table 2 Rev 0	Proposed Additional GNSS Surface Deformation Instruments (2022-2026)
Figure 1 Rev 0	Proposed and Existing Drillholes and Subsurface Instrumentation
Figure 2 Rev 0	Proposed and Existing Surface Deformation Instrumentation
Appendix A	Amendment 10 Instrumentation Plan and Completion Status

References:

Knight Piésold (KP, 2017). Design Basis Report, Rev 2, (KP Reference No. VA101-126/12-1), June 30, 2017. Vancouver, BC.

Montana Resources and Knight Piésold (MR/KP, 2020). Yankee Doodle Tailings Impoundment – Tailings Operations, Maintenance and Surveillance (TOMS) Manual, Rev 4, dated May 2020.

Copy To: Mark Thompson, Amanda Griffith (Montana Resources)

/ktd

Knight Piésold CONSULTING

TABLE 1

MONTANA RESOURCES, LLP.
YANKEE DOODLE TAILINGS IMPOUNDMENT

5-YEAR SITE INVESTIGATION, INSTRUMENTATION AND MONITORING PLAN
PROPOSED 5-YEAR DRILLHOLE AND SUBSURFACE INSTRUMENTATION PLAN (2022-2026)

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Embankment	Section	Proposed Drillhole ID	Anticipated Drillhole Depth	Easting (ft)	Northing (ft)	Elevation (ft)	Completion Description
East-West Embankment	Section 8+00W	DH-A	525	135,760	139,286	6,146	Multi-Point VWPs & Inclinometer
	Section 0+00	DH-B	450	136,600	139,181	6,141	Multi-Point VWPs & Inclinometer
	Section 8+00W	DH-C	700	135,775	139,628	6,305	Nested VWPs & Inclinometer
	Section 8+00W	DH-D	325	135,720	138,721	5,928	Nested VWPs
	Section 0+00	DH-E	250	136,581	138,675	5,915	Nested VWPs
	Section 3+00N	DH-F	225	137,043	138,629	5,902	Nested VWPs
	Section 12+00W	DH-G	550	135,250	139,232	6,152	Nested VWPs
	Section 12+00W	DH-H	700	135,275	139,682	6,317	Nested VWPs
	Section 12+00W	DH-I	725	135,285	140,129	6,399	Elexon Geo4Sight & VWPs
	Section 12+00W	DH-J	675	135,288	140,417	6,400	Multi-Point VWPs
	Section 3+00N	DH-K	475	137,050	139,145	6,146	Nested VWPs
	Section 3+00N	DH-L	625	137,050	139,682	6,294	Nested VWPs
	Section 3+00N	DH-M	625	137,050	140,129	6,347	Elexon Geo4Sight & VWPs
	Section 3+00N	DH-N	725	137,070	140,523	6,419	Nested VWPs
	Section 43+00NW	DH-O	250	132,777	141,818	6,340	Nested VWPs
	Section 18+00NW	DH-P	650	134,588	139,903	6,350	Nested VWPs
	Section 28+00NW	DH-Q	500	134,017	140,843	6,399	Multi-Point VWPs & Inclinometer
	Section 43+00NW	DH-R	350	132,993	141,980	6,446	Multi-Point VWPs & Inclinometer
North-South Embankment	Section 43+00N	DH-S	475	139,627	143,101	6,343	Nested VWPs & Inclinometer
	Section 13+00N	DH-T	530	138,169	140,525	6,281	Nested VWPs & Inclinometer
	Section 58+00N	DH-U	225	139,742	144,615	6,398	Nested VWPs
	Section 13+00N	DH-V	600	137,630	140,752	6,390	Multi-Point VWPs & Inclinometer
	Section 28+00N	DH-W	600	138,451	142,146	6,398	Multi-Point VWPs & Inclinometer
	Section 43+00N	DH-X	450	139,200	143,396	6,395	Nested VWPs & Inclinometer
	Section 28+00N	DH-Y	225	139,234	141,679	6,196	Nested VWPs
	Section 43+00N	DH-Z	250	138,574	140,314	6,135	Nested VWPs

\\KPL\VA-Prj$\1\01\00126\25\A\Correspondence\VA21-02063 - 5-Year Site Investigation, Instrumentation and Monitoring Plan\Tables\[Tables 1 and 2.xlsm]Table 1 - Proposed Drillholes

NOTES:

1. DRILLHOLE COORDINATES ARE PRESENTED IN ANACONDA MINE-GRID.

2. PROPOSED DRILLHOLE LOCATIONS AND QUANTITIES AS WELL AS PLANNED INSTRUMENTATION MAY BE MODIFIED SUBSEQUENT TO ISSUANCE OF THE 5-YEAR PLAN BASED ON INCREMENTAL FINDINGS OF EACH INVESTIGATION AND UPDATED PROJECT OBJECTIVES ETC.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	22DEC'21	ISSUED WITH LETTER VA21-02063	KTD	DDF

Knight Piésold CONSULTING

TABLE 2

MONTANA RESOURCES, LLP.
YANKEE DOODLE TAILINGS IMPOUNDMENT

5-YEAR SITE INVESTIGATION, INSTRUMENTATION AND MONITORING PLAN
PROPOSED ADDITIONAL GNSS SURFACE DEFORMATION INSTRUMENTS (2022-2026)

Print Dec/22/21 12:48:38

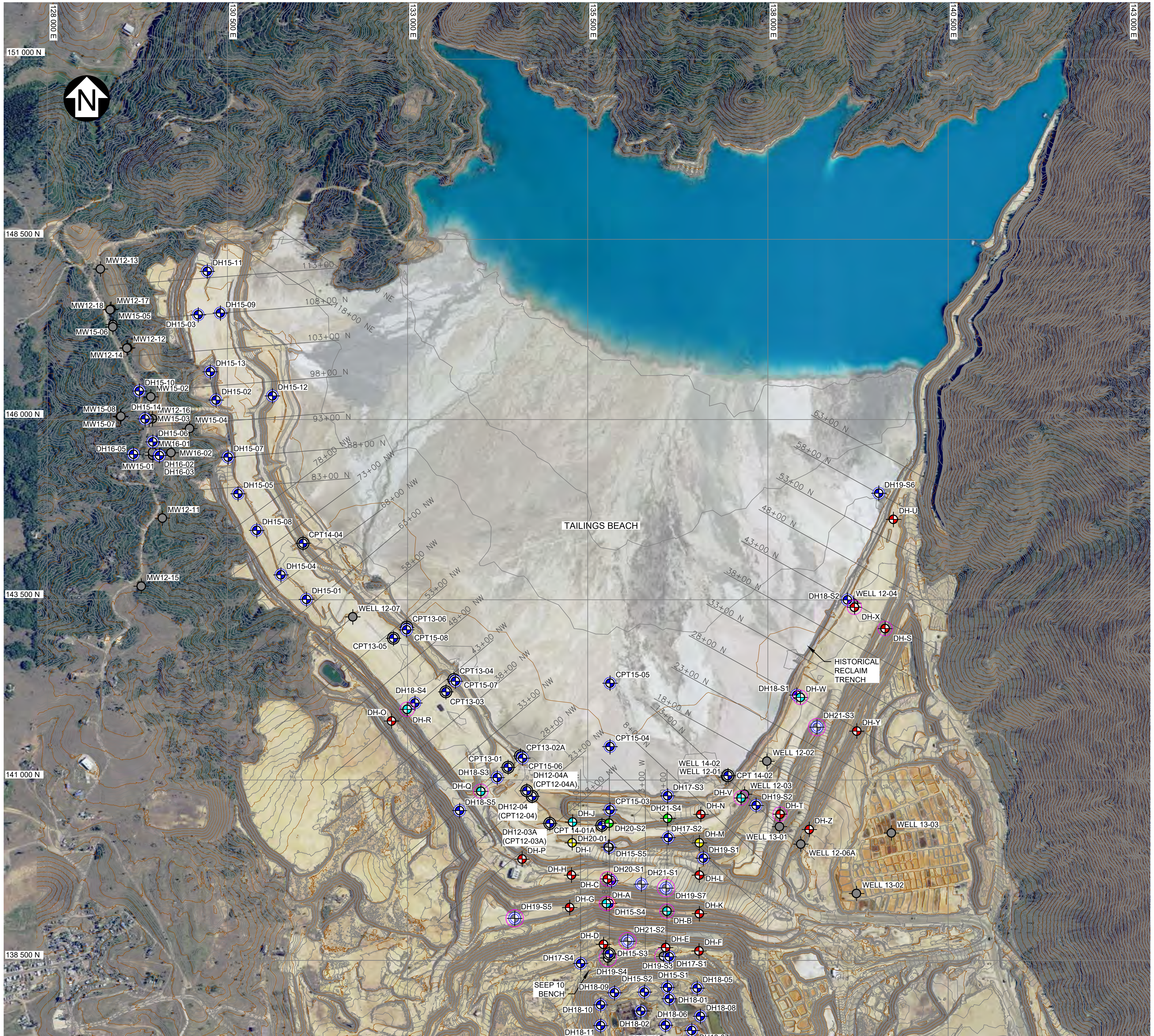
Embankment	Section	Proposed Location ID	Easting (ft)	Northing (ft)	Elevation (ft)	Completion Description
East-West Embankment	Section 8+00W	DH-A	135,760	139,286	6,146	GNSS & Thread
	Section 0+00	DH-B	136,600	139,181	6,141	GNSS & Thread
	Section 8+00W	DH15-S5	135,775	139,628	6,305	GNSS
	Section 0+00	DH17-S2	135,720	138,721	5,928	GNSS
	Section 28+00NW	DH-Q	134,017	140,843	6,399	GNSS & Thread
	Section 43+00NW	DH-R	132,993	141,980	6,446	GNSS & Thread
	Section 28+00N	DH-W	138,451	142,146	6,398	GNSS & Thread
	Section 43+00N	DH-X	139,200	143,396	6,395	GNSS

\\KPL\VA-Prj$\1\01\00126\25\A\Correspondence\VA21-02063 - 5-Year Site Investigation, Instrumentation and Monitoring Plan\Tables\[Tables 1 and 2.xlsm]Table 2 - Proposed GNSS

NOTES:

1. PROPOSED INSTRUMENTATION COORDINATES ARE IN ANACONDA MINE-GRID.

0	22DEC'21	ISSUED WITH LETTER VA21-02063	KTD	DDF
REV	DATE	DESCRIPTION	PREP'D	RVW'D



LEGEND:

- PROPOSED DRILLHOLE WITH NESTED PIEZOMETERS
- PROPOSED DRILLHOLE WITH NESTED PIEZOMETERS AND INCLINOMETER
- PROPOSED DRILLHOLE WITH MULTI-POINT PIEZOMETERS AND INCLINOMETER
- PROPOSED DRILLHOLE WITH NESTED VIBRATING WIRE PIEZOMETERS AND GEO4SIGHT INSTRUMENTATION
- EXISTING DRILLHOLE WITH NESTED VIBRATING WIRE PIEZOMETERS AND GEO4SIGHT INSTRUMENTATION
- EXISTING GEOPHYSICAL CASING
- EXISTING INCLINOMETER
- EXISTING INCLINOMETER WITH NESTED VIBRATING WIRE PIEZOMETERS
- EXISTING NESTED VIBRATING WIRE PIEZOMETERS
- EXISTING SINGLE VIBRATING WIRE PIEZOMETER
- EXISTING THERMISTOR WITH VIBRATING WIRE PIEZOMETER
- EXISTING INSTRUMENTED MONITORING WELL OR STANDPIPE

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. AERIAL IMAGE OF YDTI WAS TAKEN JULY 29, 2021.
3. TOPOGRAPHY BASED ON SURVEY COMPLETED IN JULY 2021.
4. PROPOSED DRILLHOLES AND ANTICIPATED SPECIFICATIONS ARE DESCRIBED IN KP LETTER (VA21-02063).

SCALE A 500 0 500 1000 1500 2000 2500 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

PROPOSED AND EXISTING DRILLHOLES AND SUBSURFACE INSTRUMENTATION

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-126/25	VA21-02063

FIGURE 1 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	22DEC'21	ISSUED WITH REPORT	KTD	RMM	DDF

SAVED: M:\1\01\00126\25\A\Acad\FIGS\B102, 12/14/2021 1:31:59 PM, RMCLELLAN PRINTED: 12/22/2021 11:21:46 AM, FIG 1, RMCLELLAN

LEGEND:

PROPOSED GNSS INSTRUMENTATION

EXISTING GNSS INSTRUMENTATION

NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. AERIAL IMAGE OF YDTI WAS TAKEN JULY 29, 2021.
3. TOPOGRAPHY BASED ON SURVEY COMPLETED IN JULY 2021.

SCALE A 500 0 500 1000 1500 2000 2500 ft

MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

PROPOSED AND EXISTING SURFACE DEFORMATION INSTRUMENTATION

Knight Piésold CONSULTING

P/A NO.	REF NO.	
VA101-126/25	VA21-02063	
FIGURE 2		REV 0

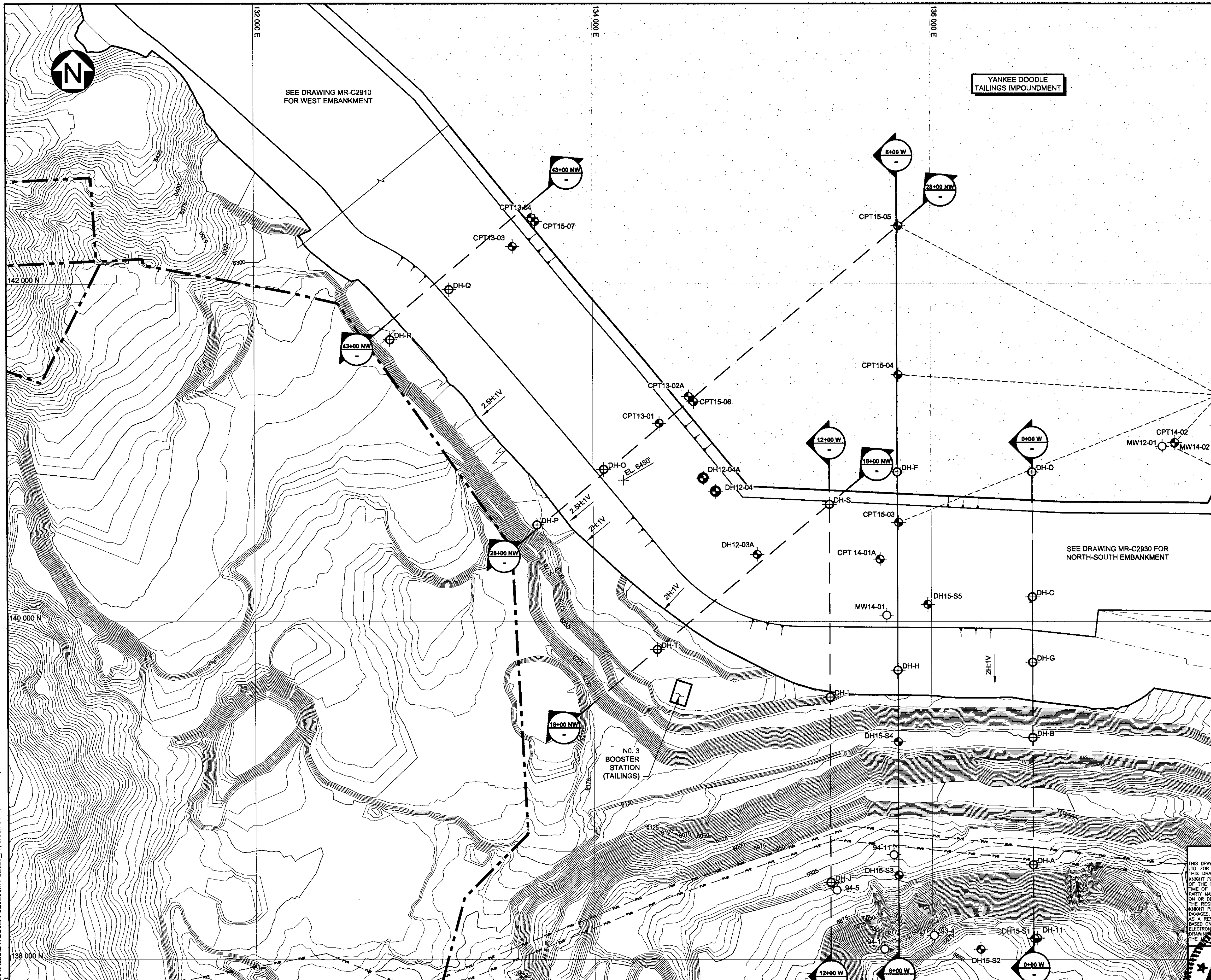
REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	22DEC'21	ISSUED WITH REPORT	KTD	RMM	DDF

SAVED: M:\1\01\00126\25\A\Acad\FIGS\B\103, 12/14/2021 1:34:53 PM , RMCLELLAN PRINTED: 12/22/2021 11:24:26 AM, FIG 2, RMCLELLAN

APPENDIX A

Amendment 10 Instrumentation Plan and Completion Status

MR-C2920 R1
MR-C2930 R1
Table A.1



LEGEND:

- TAILINGS BEACH
- DH-A FUTURE INSTRUMENTATION SITE
- VIBRATING WIRE PIEZOMETER
- MONITORING WELL
- PIEZOMETER DATA MONITORING HUB (TYPICAL)
- PIEZOMETER CABLE ROUTING (APPROX.)
- PROPERTY BOUNDARY
- TRANSMISSION LINE
- EXISTING INSTRUMENTATION PLANE
- FUTURE INSTRUMENTATION PLANE

NOTES:

1. THIS DRAWING SHALL BE READ WITH ACCOMPANYING DRAWINGS AND CONSTRUCTION MANAGEMENT PLAN.
2. COORDINATE GRID IS ANACONDA MINE GRID.
3. SEE INSTRUMENTATION DETAILS ON DRAWING MR-C2921.

NOT FOR CONSTRUCTION

SCALE A 300 0 300 600 900 1200 1500 ft

- DISCLAIMER -
THIS DRAWING WAS PREPARED BY KNIGHT PIESOLD LTD. FOR THE ACCOUNT OF THE CLIENT LISTED ON THIS DRAWING. THE MATERIAL ON IT REFLECTS KNIGHT PIESOLD'S BEST JUDGEMENT IN THE LIGHT OF THE INFORMATION AVAILABLE TO IT AT THE TIME OF PREPARATION. ANY USE WHICH A THIRD PARTY MAKES OF THIS DRAWING, OR ANY RELIANCE ON OR DECISIONS TO BE MADE BASED ON IT, ARE THE RESPONSIBILITY OF SUCH THIRD PARTIES. KNIGHT PIESOLD ACCEPTS NO RESPONSIBILITY FOR DAMAGES, IF ANY, SUFFERED BY ANY THIRD PARTY AS A RESULT OF DECISIONS MADE OR ACTIONS BASED ON THIS DRAWING. COPIES RESULTING FROM ELECTRONIC TRANSFER OR REPRODUCTION OF THIS DRAWING ARE UNCONTROLLED AND MAY NOT BE THE MOST RECENT REVISION OF THIS DRAWING.

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MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

EAST-WEST EMBANKMENT
6450 CREST
INSTRUMENTATION PLAN

KEN J. BROUWER 10020 PE June 30, 2017 REGISTERED PROFESSIONAL ENGINEER

DRG. NO.	DESCRIPTION
MR-C2930	NORTH-SOUTH EMBANKMENT - 6450 CREST - INSTRUMENTATION PLAN
MR-C2921	EAST-WEST EMBANKMENT - 6450 CREST - INSTRUMENTATION DETAILS
MR-C2910	WEST EMBANKMENT - 6450 CREST - INSTRUMENTATION PLAN

REFERENCE DRAWINGS

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED

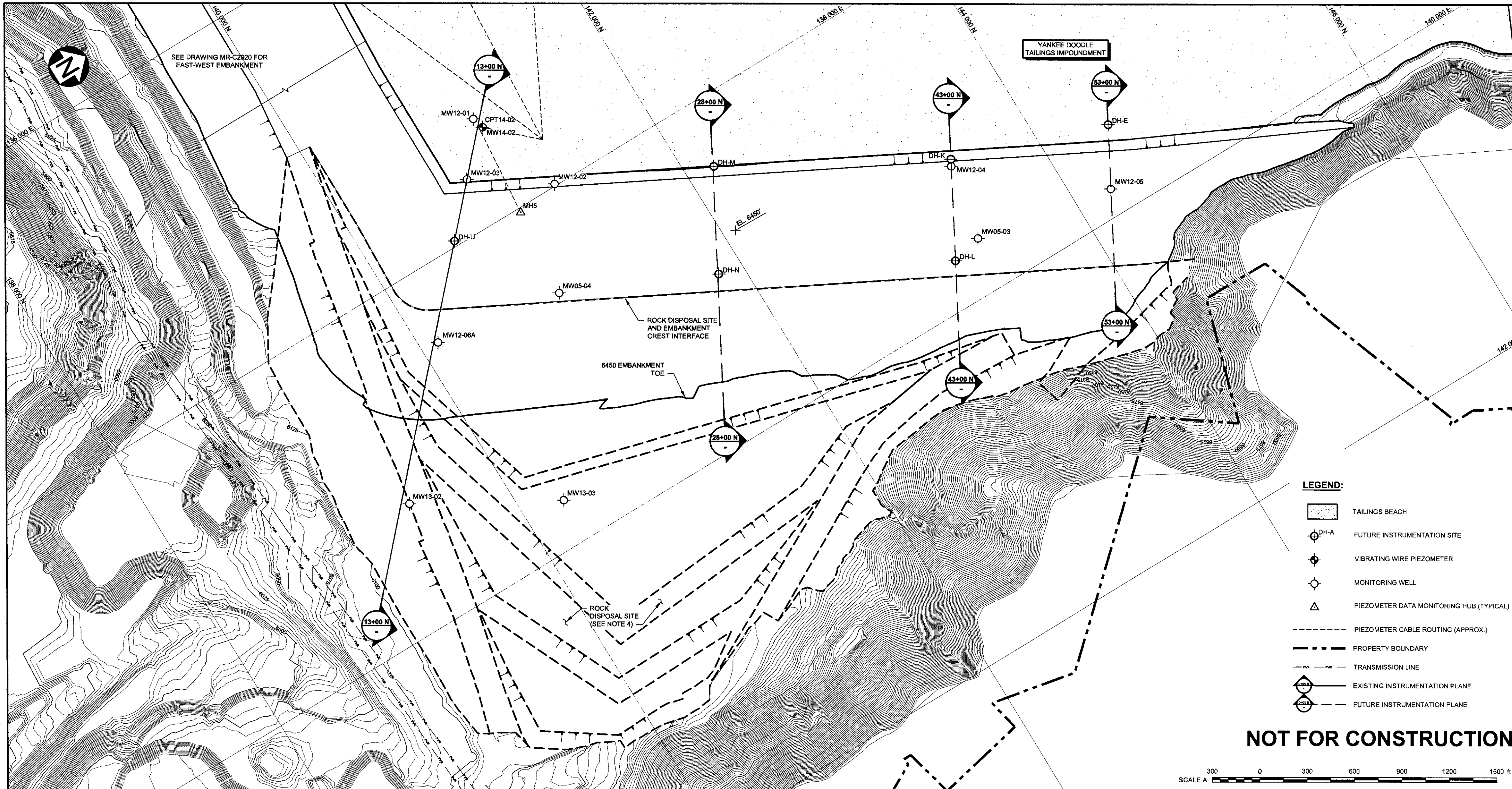
REVISIONS

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
1	30JUN'17	NOT FOR CONSTRUCTION	JDZ	NSD/MJC	DDF	KJB
0	09NOV'16	NOT FOR CONSTRUCTION	JRG	ABN	DDF	KJB

REVISIONS

	DRAWING NO.	REVISION
VA101-126/12	MR-C2920	1

SAVED: M:\1\01\00126\12\A\Acad\DWGS\MR-C2920\MR-C2920_r1, 6/30/2017 9:28:56 AM, MCOUTTS PRINTED: 6/30/2017 9:45:20 AM, MR-C2920, MCOUTTS
XREF FILE(S): IMAGE FILE(S):



NOT FOR CONSTRUCTION

NOTES:

1. THIS DRAWING SHALL BE READ WITH ACCOMPANYING DRAWINGS AND CONSTRUCTION MANAGEMENT PLAN.
2. COORDINATE GRID IS ANACONDA MINE GRID.
3. ORIGINAL GROUND CONTOUR INTERVAL IS 5 FEET.
4. ROCK DISPOSAL SITE LOCATION AND LAYOUT PROVIDED BY MONTANA RESOURCES IN NOVEMBER 2015.
5. SEE INSTRUMENTATION DETAILS ON DRAWING MR-C2931.

REFERENCE DRAWINGS

DRG. NO.	DESCRIPTION
MR-C2931	NORTH-SOUTH EMBANKMENT - 6450 CREST - INSTRUMENTATION DETAILS
MR-C2920	EAST-WEST EMBANKMENT - 6450 CREST - INSTRUMENTATION PLAN
MR-C2910	WEST EMBANKMENT - 6450 CREST - INSTRUMENTATION PLAN

REVISIONS

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
1	30JUN'17	NOT FOR CONSTRUCTION	JDZ	MJC	DDF	KJB
0	09NOV'16	NOT FOR CONSTRUCTION	JRG	ABN	DDF	KJB

REVISIONS

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED

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MONTANA RESOURCES, LLP

YANKEE DOODLE TAILINGS IMPOUNDMENT

**NORTH-SOUTH EMBANKMENT
6450 CREST
INSTRUMENTATION PLAN**

VA101-126/12

DRAWING NO. MR-C2930

REVISION 1

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TABLE A.1

MONTANA RESOURCES, LLP.
YANKEE DOODLE TAILINGS IMPOUNDMENT

5-YEAR SITE INVESTIGATION, INSTRUMENTATION AND MONITORING PLAN
SUMMARY OF AMENDMENT 10 INSTRUMENTATION PLAN COMPLETION

Print Dec/22/21 11:05:10

Embankment	Section	Status	Amendment 10 Pre-Drill ID	Completed Drillhole ID	Completion Description
East-West Embankment	43+00NW	Complete	DH-Q	DH18-S1	Nested VWPs
		Incomplete	DH-R	-	-
	28+00NW	Complete	DH-O	DH18-S3	Nested VWPs
		Complete	DH-P	DH18-S5	Nested VWPs
	18+00NW	Incomplete	DH-T	-	-
	12+00W	Incomplete	DH-S	-	-
		Incomplete	DH-I	-	-
		Complete	DH-J	DH17-S4	Nested VWPs
	8+00W	Complete	DH-F	DH20-S2	Elexon Geo4Sight Instruments
		Complete	DH-H	DH20-S1	Geophysical Casing
North-South Embankment	0+00	Complete	DH-D	DH21-S4	Elexon Geo4Sight Instruments & Nested VWPs
		Complete	DH-C	DH17-S2	Nested VWPs
		Complete	DH-G	DH19-S7	Nested VWPs & Inclinometer
		Incomplete	DH-B	-	-
		Complete	DH-A	DH17-S1/DH19-S3	Nested VWPs & Inclinometer
	13+00N	Complete	DH-U	DH19-S2	Nested VWPs (Damaged and Abandoned)
	28+00N	Complete	DH-M	DH18-S1	Nested VWPs
		Complete	DH-N	DH21-S3	Nested VWPs & Inclinometer
	43+00N	Complete	DH-K	DH18-S2	Nested VWPs
		Incomplete	DH-L	-	-
	58+00N	Complete	DH-E	DH19-S6	Nested VWPs

\\KPL\VA-Prj$\1\01\00126\25\A\Correspondence\VA21-02063 - 5-Year Site Investigation, Instrumentation and Monitoring Plan\Tables\[Tables 1 and 2.xlsm]Table A.1

NOTES:

1. DRILLHOLE LOCATIONS WERE INITIALLY PROPOSED IN THE AMENDMENT 10 DESIGN BASIS REPORT (KP, 2017) IN DRAWINGS C2920 AND C2930 FOR THE EAST-WEST AND NORTH-SOUTH EMBANKMENTS, RESPECTIVELY.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	22DEC'21	ISSUED WITH LETTER VA21-02063	KTD	DDF