2021 Geotechnical Annual Review

Minto Mine, Yukon

Minto Explorations Ltd.

SRK Consulting (Canada) Inc. ■ 1CM002.073 ■ October 2021

srk consulting

FINAL

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Useful Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

DSTSF	Dry Stack Tailings Storage Facility
MWD	Main Waste Dump
MVFE	Mill Valley Fill Extension
SWD	Southwest Dump
TDD	Tailings Diversion Ditch
WSP	Water Storage Pond

1 Introduction

1.1 Purpose of Review

On September 2-3, 2021, SRK Consulting (Canada) Inc. completed a geotechnical inspection of the Minto Mine site. The purpose of the inspection was to document the physical condition of the site based on visual observations and to provide geotechnical assessment, noting potential signs of physical instability such as erosion, differential settlement, sloughing or bulging of material, seepage, etc. The inspection is documented in the photographic compilation provided in Appendix A. This report summarizes the findings and recommendations.

This report is in partial fulfillment of the requirements of Minto Explorations Ltd.'s existing Water License QZ14-031 Clause 100 and Quartz Licence QML-001 Paragraph 13.2 that require the physical stability of all engineered structures, works and installations be inspected by an independent engineer after the spring thaw of each year (by June). In 2021, the June independent engineer inspection by SRK was unable to be completed due to COVID travel restrictions in the Yukon. As a result, the June inspection was completed internally by Minto as part of their routine quarterly inspections and SRK undertook the next scheduled quarterly visual inspection in September 2021.

1.2 Site Conditions

The Minto Mine was in production from July 2007 to late 2018 when the mine was placed in temporary care and maintenance. In 2019, the mine transitioned back into production with underground mining starting on September 2, 2019 and milling on October 10, 2019. Waste rock produced from underground is either disposed of underground or in the SAT Dump in the Main Pit.

The 2021 geotechnical inspection was completed by Peter Mikes, PEng (YK) and Kisa Elmer, PEng (YK), of SRK. SRK staff were accompanied by Klaus Gil, Senior Tailings Engineer with Minto, throughout the visit. Mr. Gil was SRK's primary contact for information while on-site about the activities during the past year and provided background and support during review of the instrumentation data. Weather during the site inspection was partly cloudy with estimated temperatures between 5°C and 20°C with dry ground conditions on site.

1.3 Scope

The following engineered structures, works, and installations were inspected during the site visit:

- Dry Stack Tailings Storage Facility (DSTSF) and Mill Valley Fill Extension (MVFE) (Stage 1 and 2)
- Tailings Diversion Ditch (TDD)
- Main Waste Dump (MWD), including Main Waste Dump Expansion, and Main Waste Dump Wrap
- Southwest Waste Dump (SWD)
- Reclamation Overburden Dump

- Ore stockpiles
- Mill and camp site
- Fuel containment facility
- Water Storage Pond (WSP) Dam
- Big Creek Bridge
- Main Pit Dump
- Main Pit including South Wall Buttress, In-Pit Dump, and SAT Dump
- Area 2 Pit
- Area 118 Pit and Backfill Dump
- Minto North Pit

As a part of the inspection, SRK reviewed, previous year's reports, instrumentation data, design reports and monitoring guidance documents as required to guide the inspections. The instrumentation data was reviewed prior to the inspection to check for indications of unusual performance or change in trends. Section 4 of this report presents a list of data reviewed, including the last data collection date.

2 Site Inspection Observations

A summary of SRK's observations during the site inspection is provided in Table 1. Site observations are listed per each inspection area. A photographic record of the observations is provided in Appendix A.

Table 1: Site Inspection Observations

Area Number	Name	Inspection Observations
1	Dry Stack Tailings Storage Facility (DSTSF)	▪ No observations of global instability. ▪ No signs of further instability of the slump of the cover material observed in 2019 at the south end, near the grade transition point of the old TDD alignment (see Photo 1-2, Appendix A). Slump was observed in 2019 to be approx. 25 m wide with the cracks at the top of the slump appear to be self-healing. ▪ Variable vegetation establishment was observed across the areas of the covered and regraded WR Shell that were seeded in 2019. ▪ Settlement cracking noted in the 2020 inspection the in southern portion of the cover (orientated parallel to the southern crest) was not observed and was obscured by vegetation. ▪ Multiple erosion gullies observed on the north and east slopes of the cover (see Photo 1-7, Appendix A). ▪ The protective cover over Piezometer DSP-06 and Thermistor DST-11 was observed to be displaced during the inspection and the instrumentation exposed. The cover should be replaced following each reading to prevent damage and prevent rain entering the borehole and influencing the thermistor readings.
2	Mill Valley Fill Extension (MVFE)	▪ No observations of global instability. ▪ Multiple erosion gullies within the cover soil observed on the north and east slopes of the cover where runoff concentrates (see Photos 2-3, 2-4, and 2-5, Appendix A). ▪ The excavated slope to the south of the Minto Creek Seepage Collection System (MCSCS) that is excavated into permafrost soils has no observable changes compared to the previous years' inspection. The access road headed down to the MCSCS was upgraded in the past year with an armoured ditch constructed to direct surface runoff away from the MCSCS. ▪ No signs of seepage visible at the toe of the MVFE. The MCSCS appears to be functioning as per design, with no signs of seepage below the system.
3	Tailings Diversion Ditch (TDD)	▪ Construction of the TDD Intake Structure and Overflow Spillway into the Area 2 Stage 3 Pit remains incomplete with construction of the intake channel side-slopes and riprap placement remaining. ▪ Runoff from the Underground Access Road flows into the TDD Intake Structure and has deposited sediments in the basin (Photos 3-1 and 3-2, Appendix A). A berm is also present that prevents use of the overflow spillway into the Area 2 Pit. Any flow that overtops the TDD Intake Structure would be directed down the Underground Access Road to the north. Most of this flow would bypass the DSTSF to the west, but some flow would pass between gaps in the road berm and flow overtop the DSTSF cover. ▪ Conditions in the TDD remain the same as previous inspections with no major obstructions or signs of instability along the TDD were observed. ▪ Minor vegetation was observed in the upper portion of the unarmoured ditch (see Photos 3-3 and 3-4, Appendix A). The vegetation growth will be required to be removed within the next year and should continue to be monitored as part of routine inspections.

Area Number	Name	Inspection Observations
		■ Remaining armoured portion of the ditch was generally free from vegetation (see Photo 3-5, Appendix A). ■ TDD outlet showed no signs of instability or obstructions (see Photo 3-6, Appendix A).
4	Main Waste Dump (MWD)	■ No observations of global instability. ■ Erosion gullies observed in cover material. ■ Trees have been planted in portions of the MWD Expansion area where resloping and cover placement have been completed. ■ The longitudinal crack noted in the 2019 inspection in the resloped area above the former PAG Oxide stockpile (Photo 4-23, Appendix A) was not observed in the 2020 or 2021 inspection. The cracking was approx. 50 m long with the area below the cracks appearing with a concave slope due to potential differential settlement.
5	Main Waste Dump Wrap	■ Differential settlement, cracking and small sinkholes are prevalent on the top bench, likely attributed to snow within the fill during winter construction (Photo 5-1, Appendix A). The condition of the area is consistent with the previous year's inspection. ■ In 2020, the upper lift of the MWD Wrap was partially resloped. Since the 2020 inspection, waste rock has been excavated from the toe of the wrap resulting in an over-excavated slope and a risk of surficial slope failures/rockfall. Coarse rock is present at the base of the slope that acts as a small barrier to rockfall, but until the wrap has been regraded, traffic should be restricted near the toe. (Photo 5-2, Appendix A).
6	Southwest Waste Dump (SWD)	■ A crack approx. 180 m long observed along the access road immediately west (upslope) of areas where overburden stockpiles are present. – The crack was first observed in the 2019 annual inspection. In the past year, the crack has grown in length by approximately 40 m to the south and is up to 40 cm wide (up from 35 cm wide in 2020 annual inspection) and has an approximate 20 cm vertical displacement (up from 10 cm in the 2020 inspection. See Photos 6-3, 6-4, and 6-5, Appendix A. – The crack is located above survey hub SWD12 and any large-scale slope deformation would be expected to be detected by SWD012 located downslope of the crack. The survey hub has shown a steady total displacement rate of 0.65 mm/day in the past year (See Section 3.4), which is a slight deceleration compared to the movement rate at the time of the inspection in 2020 (0.70 mm/day). – The crack should continue to be visually monitored as part of routine inspections for any change in condition.
7	Reclamation Overburden Dump (ROD)	■ Conditions are the same as noted in previous years' inspections. ■ Vegetation has established in many areas the dump area on suitable overburden piles (Photo 7-1 and 7-2, Appendix A). ■ Previous notes include: – Slumping, settlement, and tension cracks are expected in the dump as it is constructed with frozen overburden and thawing is expected – Discontinuous tension cracks and differential settlement have been observed along the perimeter crest – Ground undulation is typically 0.3 m and is prevalent throughout the facility ■ This area was not inspected on foot during the 2021 inspection
8	Ore Stockpiles	■ The ore stockpiles were investigated briefly in passing and appeared to be in good condition. No obvious signs of instability were noted.

Area Number	Name	Inspection Observations
9	Mill Site	▪ No observations of global instability of the highwall north of the mill were observed Minor erosion and spalling of loose rocks is ongoing. A fence was installed at the base of the slope in 2019 as a mitigation with no evidence of fence damage observed due to falling materials
10	Camp Site	▪ Observations were consistent with previous years' inspection. ▪ No signs of instability were observed. ▪ The erosion gully noted in the 2020 inspection was repaired with fill and the camp pad graded to direct runoff to the north (Photo 10-1, Appendix A). ▪ No change was observed to the erosion gullies located between the camp and main access road (Photo 10-4, Appendix A).
11	Fuel Containment Facility	▪ The highwall to the north of the facility did not show signs of global instability. ▪ Significant new rutting that has exposed the base liner between the access ramp and the sump occurred within the past year (Photos 11-2 to 11-5, Appendix A. The rutting also has cause damage to the access ramp. ▪ Several areas of exposed geotextile were observed with one tear in the geotextile found with approximate dimensions of 5 cm x 8 cm (Photo 11-5, Appendix A). No damage to the liner beneath the liner could be felt, however liner damage cannot be ruled out. In addition, there could be other areas along the ruts where damage has occurred but could not be detected due to sloughing of the rut edges that may have covered up liner damage. ▪ An investigation is recommended to assess for potential damage to the liner. The damaged geosynthetics should be repaired and additional sand material should be placed within the facility to fill the ruts. The investigation should be completed carefully using hand shovels to expose the geotextile/liner along the ruts to allow for the condition of the materials to be carefully inspected. ▪ The equipment that caused the rutting appeared to have driven straight down the ramp to the sump, then backed up and turned around at the base of the ramp prior to traveling back up the ramp. Areas where the equipment tires turned over top of the liner would be most susceptible to damage and particular attention should be paid during the investigation in these areas. ▪ No change in condition of the exposed liner on the sides of the facility were observed.
12	Water Storage Pond (WSP) Dam	▪ The water level within the pond (~713.4 m) was approximately 4 m higher compared to the 2020 inspection. Otherwise, observations are consistent with previous years' inspection. ▪ No observations of global instability. ▪ Some deadfall/logs are accumulating on the upstream slope of the dam (Photos 12-5 and 12-6, Appendix A). ▪ Some of the rip rap used to armour the upstream and downstream slopes was observed to be weak and friable. ▪ No change in appearance was noted in the small potential sinkhole or animal burrow observed in 2019 at the downstream slope, near the southern edge and approximately 5 m NW of WDT-8 and approximately 50 m downstream of the crest. Dimensions are approximately 0.3 m diameter and was able to lower measuring tape to about 1.4m below ground surface (Photo 12-5, Appendix A). No action is required to address this feature. If it is an animal burrow, it does not appear to be active and at this location, would not develop deep enough though the embankment or abutment to be able to act as a preferential pathway. ▪ Seepage water downstream of the dam was clear and no accumulation of sediments was observed (Photo 12-8 to 12-10, Appendix A). ▪ Seepage flow at the weir outlet was estimated to be less than 1 L/s however a portion of the flow appeared to be by-passing the weir to the south (Photo 12-9,

Area Number	Name	Inspection Observations
		Appendix A). The seepage then reports to the collection sump at W17 and is pumped back to the WSP.
13	Big Creek Bridge	■ Observations of the bridge are consistent with previous years' inspection ■ The bridge abutments and road approaches are in good condition, with no signs of instability observed. ■ The tree growing in western abutment should be removed as it impedes the inspections and could trap debris/impede flow during a larger flood event.
14	Main Pit Dump, SAT Dump, In-Pit Dumps, and W-15 Sump	■ No observations of global instability. ■ SAT dump showed no signs of cracking or movement (Photo 14-7, Appendix A). ■ The longitudinal cracking on the crest of the In-Pit Dump above the SAT Dump is filling with sediment with no signs of additional movement (see Photo 14-8, Appendix A). ■ The condition of the cracks in the MPD appear to be unchanged compared to the 2020 inspection. ■ Top bench of the Main Pit Dump has an undulating surface with some differential settlement. ■ During the inspection, waste rock material was being excavated from the south side of the top bench of the Main Pit Dump to be processed and used as road construction material. If significant volume of material is expected to be used is it recommended that the north end of the dump be used as the source material as it would reduce the driving force in the area of the dump that is currently moving. ■ Evidence of overtopping of the W15 Sump and pooling on the access road north of the sump was observed. The water appears to have infiltrated through a sinkhole beneath haul road, which would infiltrate into the pit.
15	Area 2 Pit	■ Observations were consistent with previous years' inspection. ■ No observations of global instability. ■ The cracks observed along the access road on the northeast side of the pit rim appears to have widened compared to the previous inspection. This road has been barricaded from use. No signs of instability were observed below the access road from across the pit. ■ The erosion gully in the wall of the Stage 3 pit does not appear to have increased in size (Photo 15-6, Appendix A).
16	Area 118 Pit and Backfill Dump	■ Observations were consistent with previous years' inspection. ■ No observations of global instability.
17	Minto North Pit	■ Observations were consistent with previous years' inspection. ■ Mining at the pit was completed in October 2016. ■ The failure of the south pit wall (Photo 17-1, Appendix A) occurred one day following completion of mining in the pit and removal of all equipment and personnel and was predicted based on pit wall monitoring. No additional pit slope failures have occurred since.

3 Monitoring and Instrumentation Data

Minto's Physical Monitoring Program (PMP) is a component of the Environmental Monitoring, Surveillance and Reporting Plan. The objective of the PMP is to monitor the performance of key mine infrastructure and workings. The PMP consists of two main components: regular geotechnical inspections, and instrumentation to measure ground conditions and deformations. The PMP was last updated in February 2021 and specifies the inspection and monitoring frequencies.

Table 2 lists instrumentation data reviewed as part of the inspection, with the date of the most recent data. Changes to the list of instrumentation compared to the last inspection are listed below the table in the notes. Instrumentation plots are provided in the appendices. Appendix B provides a site-wide summary of the survey hub data indicating the current movement rates and directions for each hub.

Table 2: Summary of Instrumentation Data

Facility	Instrumentation Type	List of Reviewed Instrumentation	Last Reading Date
Area 2 Pit	Survey Hubs	A210, A215, A216, A217, A218, DS01, DS02, DS03, DS04	August 2021
	Inclinometers	A2I-1	June 2021
	Ground Temperature Cables	A2T-1	June 2021
DSTSF and MVFE	Survey Hubs	DSSH06, DSSH10, DSSH12, DSSH14, DSSH15, DSSH18, DSSH19, DSSH20, DSSH24, DSSH26, DSSH27, DSSH28, DSSH29, DSSH31, DSSH32, MV1, MV2.	Varies between May 31 and July 30, 2021
	Inclinometer	DSI-24	June 2021
	Piezometers	**Active:** DSP-05B, DSP-06(A and B), DSP-07 Sensors #1 through 4 **Non-functional[1]**: DSP-05A, DSP-07 Sensors #5 and #6	June 2021
	Ground Temperature Cables	DST-10, DST-11, DST-13, DST-14, DST-15	June 2021
MWD	Survey Hubs	**Active**: MWDH01, MWDH02, MWDH03, MWDH04 **Non-functional[2]**: MWDH05, MWDH06	Varies between Feb. and May 2021
	Inclinometers	MDI-2	May 2021
SWD	Survey Hubs	SWD-01, SWD-06, SWD-07, SWD-08, SWD-09, SWD-10, SWD-11, SWD-12	Varies between June and August 2021
	Piezometers	**Active**: SDP-2 (A and B), SDP-3 (A and B)	June 2021
	Ground Temperature Cables	**Active**: SDT-1, SDT-2, SDT-3	June 2021
Main Pit	Survey Hubs	**Active**: M79, M80, M81, M82, M83, M84, M88, M89, M92, M93, M94, M95, M96, M97, M98 **In-active[3]**: M89, M96	Varies between March and August 2021
WSP	Survey Hubs	WSP-1, WSP-3, WSP-4, WSP-5	August 2021

Facility	Instrumentation Type	List of Reviewed Instrumentation	Last Reading Date
	Piezometers	WDP-2, WDP-3, WDP-3A, WDP-4, WDP-5, WDP-6, WDP-7, WDP-8, WDP-9, WDP-10, WDP-11, WDP-12, WDP-13	August 2021
	Ground Temperature Cables	WDT-1, WDT-2, WDT-3, WDT-4, WDT-5, WDT-6, WDT-7, WDT-8	August 2021

Notes:

[1] Piezometers DSP-7 Sensors 5 and 6 have not produced a successful reading since February 8, 2020. Piezometer DSP-05a has not produced a successful reading since November 11, 2018. Piezometer DSP-06b began to produce successful readings on November 22, 2020 after not producing a reading since November 11, 2018.

[2] Survey hubs MWDH05 and MWDH06 were destroyed in the fall of 2020 because of regrading of the Main Waste Dump Wrap. These two hubs showed some settlement but no significant movement since their installation.

[3] Main Waste Dump Survey hubs M89 and M96 were not monitored in the past year. Since installation, both hubs had not shown any movement and were removed from the monitoring program.

3.1 Area 2 Pit

Area 2 Pit instrumentation data is provided in Appendix C and includes a ground temperature cable (A2T-1) and an inclinometer (A2I-1) that were installed in 2013 in the southeast corner of the planned Area 2 Stage 3 Pit, as well as ten survey hubs installed at various locations around the perimeter of the pit.

The inclinometer data is shown in Figure 1 of Appendix C. The data shows a shear zone developing between depths of 36 m and 50 m starting in the fall of 2017, which corresponds to the mining of the Area 2 Stage 3 Pit. The observed shear zone includes multiple discrete zones between 36 and 50 m. The movement rate then slowed, and since 2019 shows a slight acceleration trend that has increased the movement rate from approximately 0.1 mm/day in 2019 to 0.15 mm/day in 2021.

The ground temperature data is sown in Figure 2 of Appendix C. A2T-1 is measured at the same location as the inclinometer and indicates permafrost conditions are present to an approximate depth of 60 m below ground surface.

Survey hub movement data are presented in Figure 3 of Appendix C. Four survey hubs (DS01 through DS04) are located near the Underground Shop along the east crest of the pit that are monitored weekly because of their proximity to the Underground Shop. Data from these hubs show steady and decreasing movement rates that range between 0.03 and 0.3 mm/day. No signs of additional cracking or deformation were noted in the area during the site inspection (Section 2). The movement is likely due to mining of the Area 2 Stage 3 Pit and changes to the thermal ground regime resulting in thawing of permafrost soils. The other survey hubs on the west and northern portion of the Area 2 Pit also show steady or decreasing movement rates ranging from 0.01 mm/day to 0.11 mm/day.

3.2 Dry Stack Tailings Storage Facility and Mill Valley Fill Extension

Instrumentation data for the DSTSF and MVFE are provided in Appendix D.

Movements in the DSTSF were first identified in early 2009. The MVFE Stage 1 was designed to mitigate the movement with construction of the facility occurring between January 2012 and 2013. The survey hubs used to monitor rates of the DSTSF showed a deceleration ranging from 20 to 60 percent since the start of the MVFE Stage 1 placement. Construction of a second extension (MVFE Stage 2) began in late 2015 and was completed in the summer of 2016. The MVFE Stage 2 doubled the size of the Stage 1 buttress and resulted in further decreases to the movement rates.

Survey Hubs

Survey hub movement data are presented in Figure 1 to 18 of Appendix D. Following construction of the MVFE Stage 2, the survey hubs were expected to slow with the movement rates asymptotically approaching zero. The timing for when no movement is expected is uncertain. The hubs have generally been performing as expected since the construction of the MVFE Stage 2. Rates of movement within the DSTSF are substantially lower compared to before the construction of the MVFE Stage 2 with most survey hubs continuing to show a decelerating trend with the rate of deceleration decreasing in the past year. Several hubs show steady movement, but additional time is needed to evaluate if deceleration has stopped. Two survey hubs show possible acceleration trends:

- DSSH12 (Figure 4) shows an apparent acceleration in the last reading on July 31, 2021, with the horizontal movement rate increasing from 0.13 mm/day to 0.4 mm/day. Additional readings are needed to confirm the trend. A seasonal increase in movement was also observed in 2019 with the hub subsequently continuing to decelerate.
- DSSH26 (Figure 11) shows an apparent acceleration in the last reading on May 31, 2021 with the horizontal movement rate increasing from 0.07 mm/day to 0.25 mm/day. Additional readings are needed to confirm the trend because the hub may have shifted because of the spring thaw and settlement of the cover beneath the hub. This hub has previous shown a deceleration trend since its installation in 2015.

Two additional hubs (ASH05 and ASH06) are located further to the south of the DSTSF on the airport access road (Appendix D, Figure 19). ASH05 shows no significant movement trend. ASH06 showed slight movement in the spring of 2017, which is believed to be the result of disturbance caused by a nearby pipeline installation. The hub showed no significant movement in the past year.

Piezometers

Piezometric data from the DSTSF are presented in Figures 20 to 22 in Appendix D.

DSP-05B (Figure 20, Appendix D) showed an increase in pore pressure that appears to have peaked near the beginning of 2018 and has since fluctuated between 793 m and 798 m. This sensor is located approximately 2 m below the tailings in the foundation. DSP-05A, located approximately 2 m above the base of the tailings continued to show a gradual increase in pore pressure until November 2018 when the sensor became unresponsive. Readings measured at DSP-05A were significantly less than those at DSP-05B. Temperatures at both sensors are approximately at the freezing point of water (less than 0.5°C) and the excess pore pressures are believed to be the result of an increase in the unfrozen water

being unable to dissipate as a result of unfrozen conditions in the surrounding soils. As the survey hubs in the vicinity of the sensor show decelerating movement, no additional action is recommended.

DSP-06 (Figure 21, Appendix D) also includes two vibrating wire piezometers: DSP-06A is 2 m above the base of the tailings and DSP06B is 2 m below the base of the tailings. DSP-06A shows no pore pressure, while DSP-06B showed a gradual increasing pore pressure trend that peaked in February 2019 and has since decreased.

All sensors at DSP-07 (Figure 22, Appendix D) have shown continued increases in pore pressure since their installation in 2015. Readings in 2019 all showed steady pore pressures, but since 2020, the sensors resumed an increasing trend, except for DSP-07-03 that shows a decrease in pore pressures. All sensors are in zones with significant amounts of ground ice with ground temperatures ranging from -1° to -0.6°. Survey hubs in the vicinity of these sensors also show decelerating movement.

Ground Temperature Cables

Ground temperature profiles are provided in Figures 23 to 27 of Appendix D. The profiles indicate that warm permafrost is present at all locations, except in the lower portions of DST-11 and DST-13 that are below the depth of permafrost. DST-11 is located near the crest of the DSTSF, while DST-13 is located approximately 300 m east of the DSTSF in an undisturbed location.

Inclinometers

Inclinometer data from DSI-24 are presented in Figure 28 of Appendix D. The inclinometer is located between the MVFES2 and the DSTSF. The profile plot indicates a main shear zones at depths of 45 m and 53 m. The last reading collected on June 19, 2021 shows an increase in the movement rate (0.19 mm/day), which had previously shown a deceleration trend with an average movement rate of 0.055 mm/day in 2021. Additional readings are needed to confirm if the acceleration is real, or due to variability, or is an erroneous reading.

3.3 Main Waste Dump

The MWD instrumentation data are provided in Appendix E and includes an inclinometer and six survey hubs that were installed in the summer of 2018 following construction of the MWD Wrap.

Displacements in MDI-2 increased during the winter of 2017-18 (likely related to the construction of the MWD Wrap), with a movement rate of approximately 0.07 mm/day primarily occurring between the depths of 22 and 28 m below ground surface. The movement rate has slowed since completion of the dump, with a current rate of 0.01 mm/day over the past year.

Six survey hubs were installed on the MWD Wrap in August 2018. Hubs MWDH01, MWDH02, MWDH03 and MWDH04 show no current movement. Survey hubs MWDH05 and MWDH06 were destroyed in the fall of 2020 during regrading of the Main Waste Dump Wrap. These two hubs showed some settlement but no significant movement during their monitoring period.

3.4 Southwest Waste Dump

Instrumentation data for the SWD are provided in Appendix F.

Survey hub movement data are presented in Figure 1 to 9 of Appendix F. Survey Hub SWD07 shows a possible acceleration trend, SWD10 shows no significant movement, SWD12 shows a steady displacement rate, and the remainder show decreasing movement rates.

Survey hubs SWD12 and SWD09 are located downslope of the longitudinal crack observed during site inspection (See Figure A-4 and Photos 6-3, 6-4 and 6-5 in Appendix A for crack location and photographs). The movement of these hubs may be due creep or thawing of ice-rich soils present beneath the lower portions of the dump near the valley bottom (east side). In addition, the stockpiled cover material downslope of the crack likely contributes a driving force to the movement. The future spreading of the cover will likely reduce the driving force and movement rate. The foundation soils the upper (western) portion of the dump consists of colluvial soils with low ice content (EBA 2008). The survey hub movement direction is perpendicular to the dump crest with no indication of down valley movement (towards the Main Pit). The crack location was plotted overtop of an interpreted overburden isopach plan (Figure 14, Appendix F). The isopach indicates that the overburden is generally thin in the in the area of the crack and downslope; however, this is based on one drillhole in the vicinity of the crack and the accuracy of that borehole was unable to be confirmed at this time. The survey hubs are recommended to continue to be monitored at a quarterly basis.

Ground temperature data for the SWD are presented in Figures 10 to 12 of Appendix F, with the temperature cable locations shown in Figure 1. The profiles indicate that warm permafrost is present at all locations with time graphs generally indicating a warming trend.

Piezometric data for the SWD are presented in Figure 13 of Appendix F. The pore pressures for all piezometers show a decreasing trend.

3.5 Main Pit and Main Pit Dump

The initial indication of movement in the Main Pit south wall was observed in April 2009. A waste rock buttress was subsequently designed and constructed. Substantial completion of the buttress (South Wall Buttress) was completed in 2013. A detailed assessment and history of the physical stability associated with the Main Pit south wall is provided in the letter report “Detailed Review of Foundation Performance at Select Mine Waste Facilities and Main Pit South Wall” (SRK 2012b).

The Main Pit is a disposal location for waste rock with an NP:AP ratio less than 3 (referred to as “SAT” material at Minto) with the material to be placed below the final water elevation of the pit. In addition to the South Wall Buttress, several In-Pit Dumps have been constructed in the pit at various times that did not have the same stringent compaction requirements. The In-Pit Dump noted in Appendix A was end dumped into the pit water with a high dump height and significant cracking and settlement has been observed since. In April 2015, construction of a new dump (SAT Dump) began that will be constructed on top of the tailings and will also buttress the In-Pit Dump.

In February 2017, construction of the Main Pit Dump (MPD) began over areas of the south wall of the Main Pit that do not contain SAT. Placement of waste in the MPD occurred intermittently throughout the 2017 and 2018, with a large volume of material placed in the fall of 2017 and over the winter of 2017-18. MPD construction stopped following the completion of the Area 2 Stage 3 Pit in the Spring of 2018.

Survey hub movement data for the Main Pit Dump are presented in Figures 1 to 14 of Appendix G, with the footprints of the MPD are provided in Figure 1 of Appendix G. All hubs show either no significant changes in horizontal movement, or a decelerating movement trend. The highest movement rate of 1.3 mm/day occurs at hub M97, which is located at the top of the MPD, and has decreased from a rate of 1.6 mm/day in July 2020.

3.6 Water Storage Pond Dam

Instrumentation data for the WSP Dam are provided in Appendix H and consists of eight ground temperature cables, 13 vibrating wire piezometers, and five survey hubs.

Survey hub movement data are presented in Figure 1 and 2 of Appendix H. No significant movement was observed.

Ground temperature data are presented in Figures 3 to 10 of Appendix H. All temperature sensors are above zero and have shown an increasing trend since installation that appears to be stabilizing. Temperatures at depth are typically within the range of observed groundwater temperatures in nearby Westbay monitoring wells MW-12-05 and MW-12-06.

Piezometric data are presented in Figures 11 to 14 of Appendix H. In general, pressures continue to follow historical patterns and fluctuate with the pond water elevation.

4 Recommendations

A summary of the recommendations is provided in Table 4 with the priority rankings (1 to 4) defined by the descriptions in Table 3.

Table 3: General Description of Priority Rankings

Priority	Description
1	A high probability or actual safety issue considered immediately dangerous to life, health or the environment, or a significant regulatory concern.
2	If not corrected, could likely result in safety issues leading to injury, environmental impact or significant regulatory action; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in safety issues.
4	Best Management Practice as a suggestion for continuous improvement towards industry best practices that could further reduce potential risks. This typically includes ongoing construction items within the appropriate construction cycle.

Notes: Based on the Health, Safety and Reclamation Code (HSRC) for Mines in British Columbia.

Table 4: Summary of Recommendations

Area	ID No.	Recommendations	Priority (Table 3)	Recommended Deadline
General	2021-01	▪ The 2020 inspection recommended an InSAR satellite survey study to be completed to increase the understanding of movement of the various waste facilities at site (DSTSF, SWD, and Main Pit Dump). At this time of this inspection, Minto has proceeded with the study that is being undertaken by SRK and 3VGeomatics, but the study results are not yet available for consideration in this report.	4	End of 2021
	2021-02	▪ Several instrumentation cables and PVC pipes were observed to be exposed with no protective covers. Minto staff responsible for obtaining readings should be reminded to replace the cover following readings to prevent water ingress and damage due to freeze thaw.	3	End of 2021
DSTSF and MVFE	2021-03	▪ As part of the routine visual inspections, continue to monitor the following for any changes in condition: – the cracking present at the south end of the DSTSF, as well as – erosion gullies observed in the cover material on the northern and eastern slopes.	4	n/a
TDD	2021-04	▪ Implement upgrades to the TDD Intake Structure to prevent future sedimentation accumulation within the channel next freshet. The upgrades should be completed in a manner that meets the design objectives documented in the SRK design memo and should consider the following: – Raising the elevation of the TDD intake pipes to prevent sediments from entering the pipes. – Regrading of the Underground Access Road to prevent sedimentation from entering the intake structure. Runoff from the road should be directed to the opposite side of the road and conveyed into the Area 2 Pit (via a sump/pipeline system, lined channel/slope, or equivalent). – Flows that exceeds the capacity of the TDD Intake Structure will flow down the Underground Access Road to the north. Either a berm should be constructed along the access road to prevent this water from flowing onto the DSTSF cover, or the Underground Access Road should be regraded to direct overtopping flows to the Area 2 Pit.	2	Construction should be implemented as soon as practical in 2022 (Frozen ground conditions make completion of the investigation in 2021 impractical).
MWD Wrap	2021-05	▪ Complete the regrading of MWD Wrap to grade over the over-steepened slope at the toe of the dump. In its current state, there is a higher risk of surficial slope failures and rockfall. Coarse rock is present at the base of the slope that acts as a small barrier to rockfall, but until the wrap has been regraded, traffic should be restricted near the toe.	3	Measures to ensure that equipment and personnel are kept away from dump toe should be implemented by the end of 2021. There is no recommended deadline for completion of the dump regrading.
SWD	2021-06	▪ Continue to monitor the cracking upslope of the cover soil stockpiles as part of the routine inspections specified in the PMP.	4	n/a

Area	ID No.	Recommendations	Priority (Table 3)	Recommended Deadline
Fuel Containment Facility	**2021-07**	▪ **An investigation is needed to inspect the condition of the geotextile and liner in the area along the new rutting in the facility.** The inspection should be completed using hand shovels to carefully expose the geosynthetics to allow for a thorough assessment of the condition of the geosynthetic materials. All areas of damaged geosynthetics should be repaired by a qualified professional and new sand material should be used to fill in the ruts after the repairs have been made.	**2**	Construction should be implemented as soon as practical in 2022. (Frozen ground conditions make completion of the investigation in 2021 impractical).
WSP	2021-08	▪ Continue to monitor the identified potential sinkhole located 5 m NW of WDT-08 as part of the routine visual inspections for any change in condition. Photographs records should be maintained to aid in monitoring.	4	n/a
	2021-09	▪ Deadfall/logs should be removed from the upstream face of the dam. Should any extreme precipitation event occur, the deadfall could plug/reduce the conveyance capacity of the spillway resulting in uncontrolled overtopping of the dam.	3	Prior to Freshet 2022.
Main Pit Dump, SAT Dump & In-Put Dumps	2021-10	▪ Waste rock materials being processed for construction material should be excavated from the northern edge of the top bench instead of the south end as observed during the inspection to assist in unloading of the dump in the area currently experiencing movement.	4	n/a
	2021-11	▪ The sinkhole north of the W15 Sump should be filled and the erosion channel graded to minimize infiltration into the pit in the event of any future overtopping of the sump.	3	**CLOSED** Sinkhole filled and area graded in October 2021.
Area 2 Pit	2021-12	▪ Continue to monitor the crests and slopes as part of the monthly visual inspection for signs of worsening cracking to determine if any slope stabilization measures are required.	4	n/a

Closure

This report, 2021 Geotechnical Annual Review, was prepared by

Peter Mikes, P.Eng.
Principal Consultant

and reviewed by

Kisa Elmer, P.Eng
Consultant

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

References

EBA Engineering Consultants, Ltd., 1994. Geotechnical Evaluation for Mill & Camp site (0201-95-11509), Minto Project, Report to Minto Explorations Ltd.

EBA Engineering Consultants, Ltd., 2008. Geotechnical Design Proposed Southwest Waste Dump, Minto Mine, Yukon. EBA Project No. W14101068.005. September.

SRK Consulting (Canada) Inc., 2012a. 2012 Geotechnical Annual Review, Minto Mine, YT. Prepared for Minto Explorations Ltd. SRK Project Number: 1CM002.006.400. November.

SRK Consulting (Canada) Inc., 2012b. Letter Report: Detailed Review of Foundation Performance at the South Waste Dump and Stability of the Main Pit South Wall. Prepared for Minto Explorations, Ltd. SRK Project Number: 219500.050. November 19.

Appendix A Photographs

Note: Big Creek Bridge located off map near the 19km marker on the main site access road

No.	Inspection Area Name
1	Dry Stack Tailings Storage Facility (DSTSF)
2	Mill Valley Fill Extension (MVFE) Stages 1 and 2
3	Tailings Diversion Ditch (TDD)
4	Main Waste Dump (MWD) and Expansion
5	Main Waste Dump (MWD) Wrap
6	Southwest Waste Dump (SWD)
7	Reclamation Overburden Dump
8	Ore Stockpiles
9	Mill Site
10	Camp Site
11	Fuel Containment Facility
12	Water Storage Pond (WSP) Dam
13	Big Creek Bridge
14	Main Pit, Main Pit Dump (MPD), South Wall Buttress, In-Pit Dumps
15	Area 2 Pit
16	Area 118 Pit and Backfill Dump
17	Minto North Pit

GlobalMapper File: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\Minto2020.gmw

2021 Inspection GPS Track Log

srk consulting

MINTO

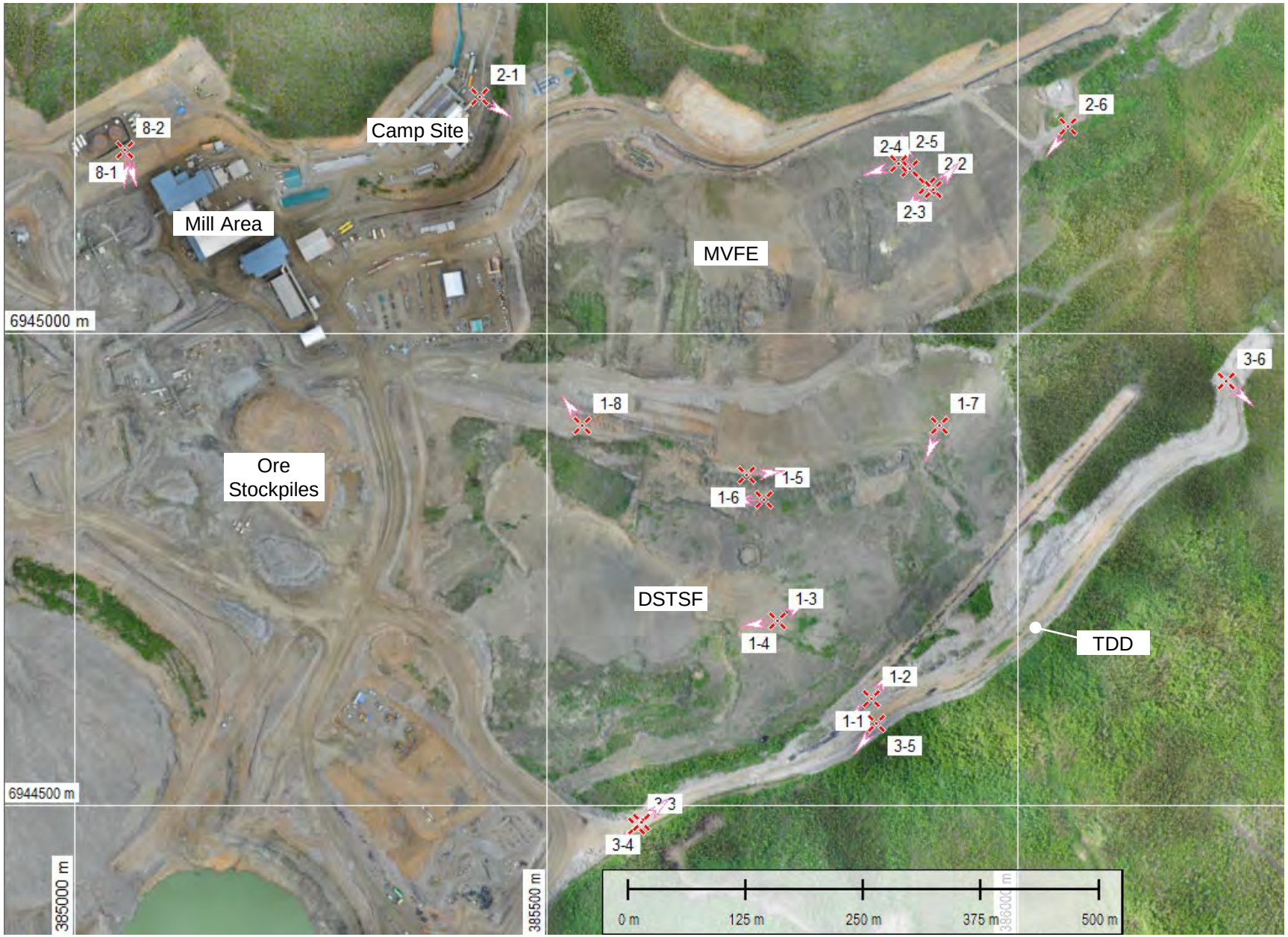
Site Inspection Photo Log

Inspection Areas and Photo Log

Job No: 1CM002.073
Filename: AppA-InspectionAreaTrackLog.pptx

Minto Mine

Date: October 2021 | Approved: PHM | Figure: **A-P-1**



srk consulting

MINTO

Site Inspection Photolog

DSTSF, MVFE TDD, and Ore Stockpile Photo Locations

Job No: 1CM002.073

Filename: AppA_PhotoLocations_Landscape.pptx

Minto Mine

Date: October 2021

Approved: PHM

Figure: **A-P-2**

Source file:
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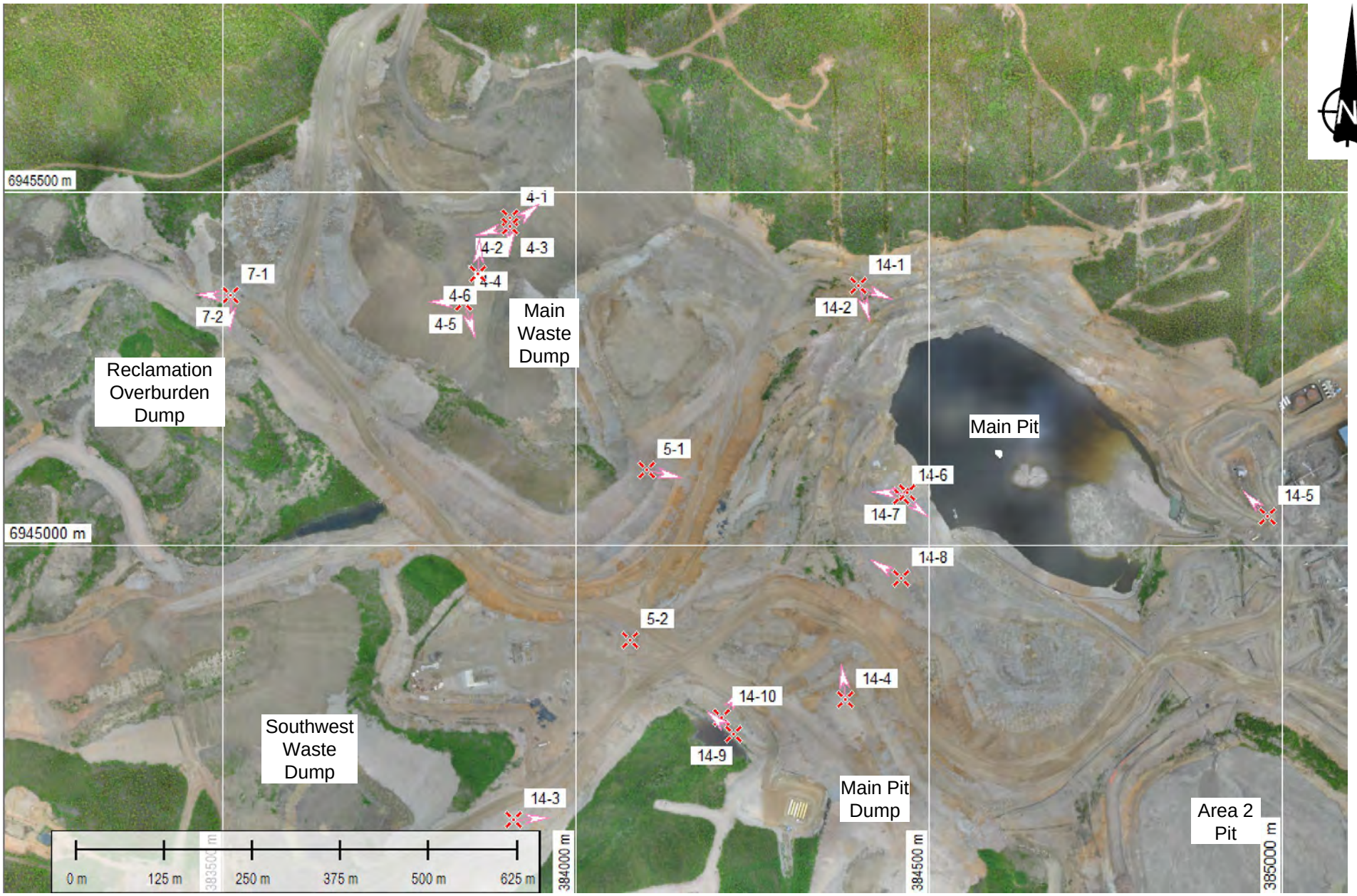

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srk consulting

MINTO

Site Inspection Photolog

Main Waste Dump (MWD), Main Pit Dump (MPD), and Reclamation Overburden Dump (ROD)

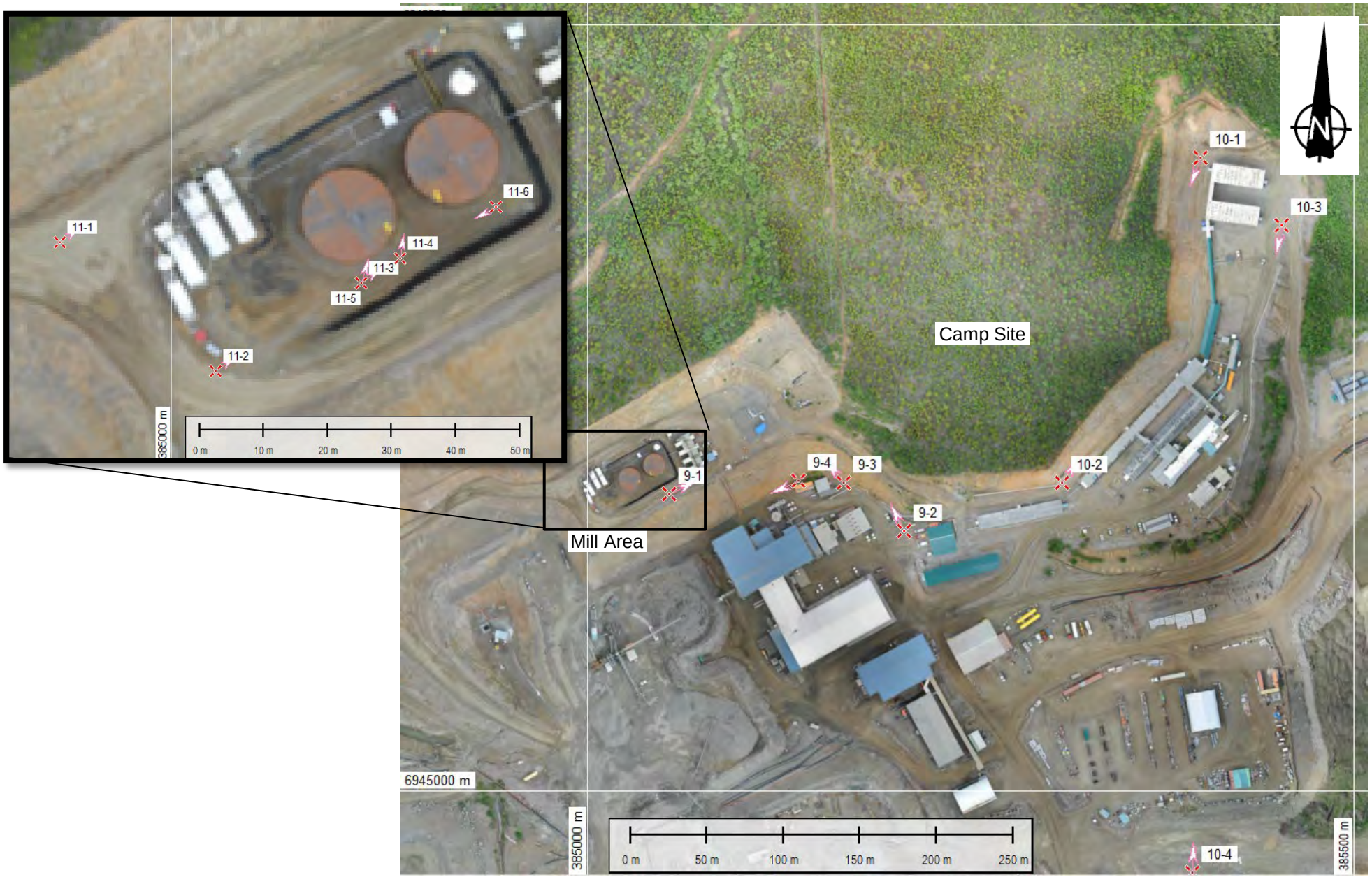
Job No: 1CM002.073

Filename: AppA_PhotoLocations_Landscape.pptx

Minto Mine

Date:	Approved:	Figure:
October 2021	PHM	**A-P-3**

srk consulting	MINTO	Site Inspection Photo Log **Southwest Waste Dump Photo Locations**		
Job No: 1CM002.073 Filename: AppA_PhotoLocations_Portrait.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-P-4**



srk consulting

MINTO

Site Inspection Photolog

Mill Area, Camp Area, and Fuel Containment Facility

Job No: 1CM002.073

Filename: AppA_PhotoLocations_Landscape.pptx

Minto Mine

Date: October 2021

Approved: PHM

Figure: **A-P-5**

Source file:
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srk consulting

MINTO

Site Inspection Photolog

Water Storage Pond (WSP) Dam

Job No: 1CM002.073

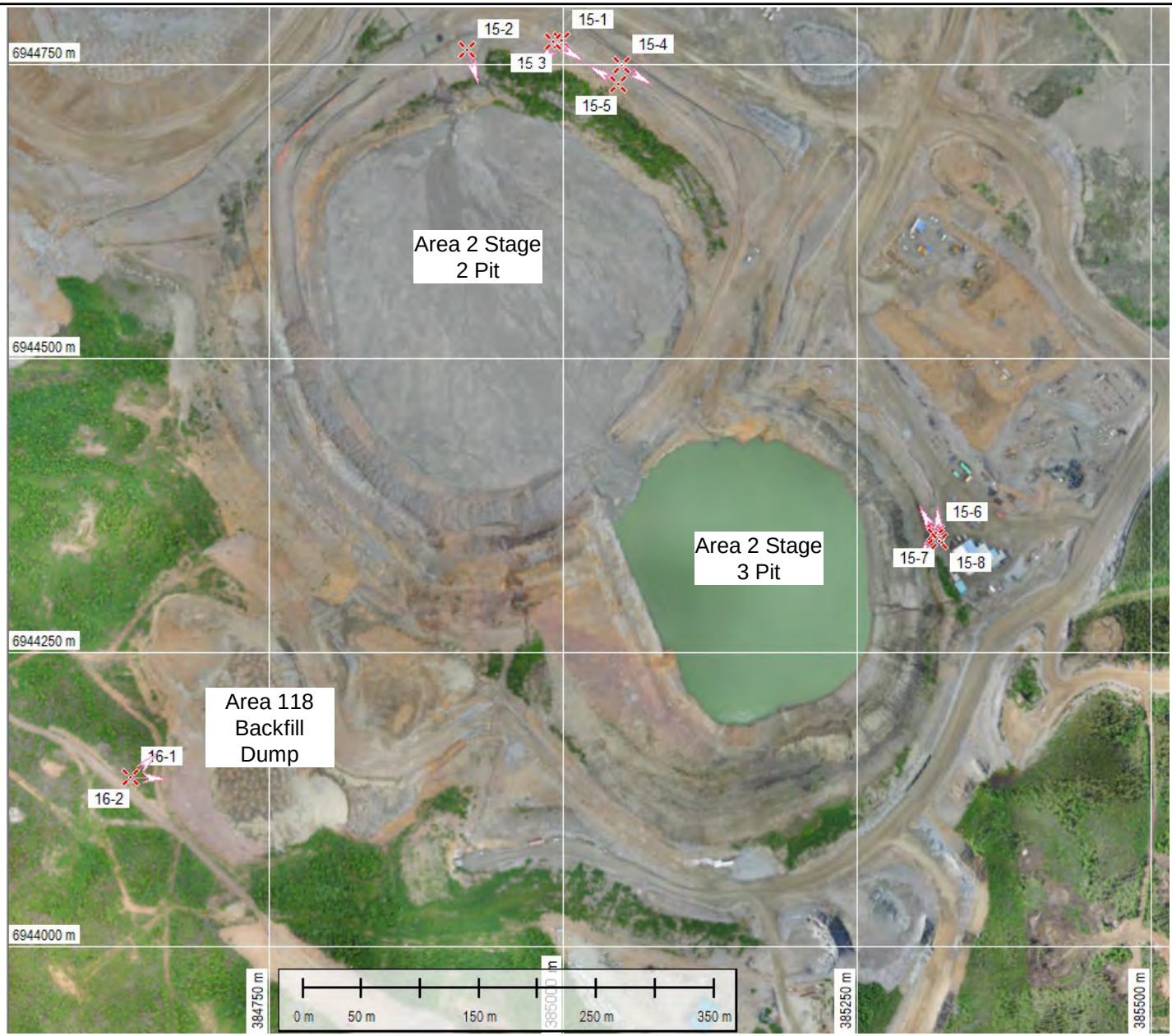
Filename: AppA_PhotoLocations_Landscape.pptx

Minto Mine

Date: October 2021

Approved: PHM

Figure: **A-P-6**



srk consulting	MINTO	Site Inspection Photolog
		Area 2 Pit, Area 118 Pit & Backfill Dump
Job No: 1CM002.073 Filename: AppA_PhotoLocations_Landscape.pptx	Minto Mine	Date: October 2021 / Approved: PHM / Figure: **A-P-7**

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srk consulting	MINTO	Site Inspection Photolog
		Minto North Pit
Job No: 1CM002.073 Filename: AppA_PhotoLocations_Landscape.pptx	Minto Mine	Date: October 2021 / Approved: PHM / Figure: **A-P-8**

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Photo 1-1: Southwest corner of DSTSF (looking west)

Photo 1-2: Southeast end of the DSTSF from TDD road (looking east)

srk consulting	MINTO	Site Inspection Photo Log **Dry Stack Tailings Storage Facility (DSTSF)**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-01-01**

Photo 1-3: Covered DSTSF surface in a well naturally-vegetated area.

Photo 1-4: Covered DSTSF surface in an area with no vegetation.

srk consulting	MINTO	Site Inspection Photo Log		
		Dry Stack Tailings Storage Facility (DSTSF)		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-01-02**

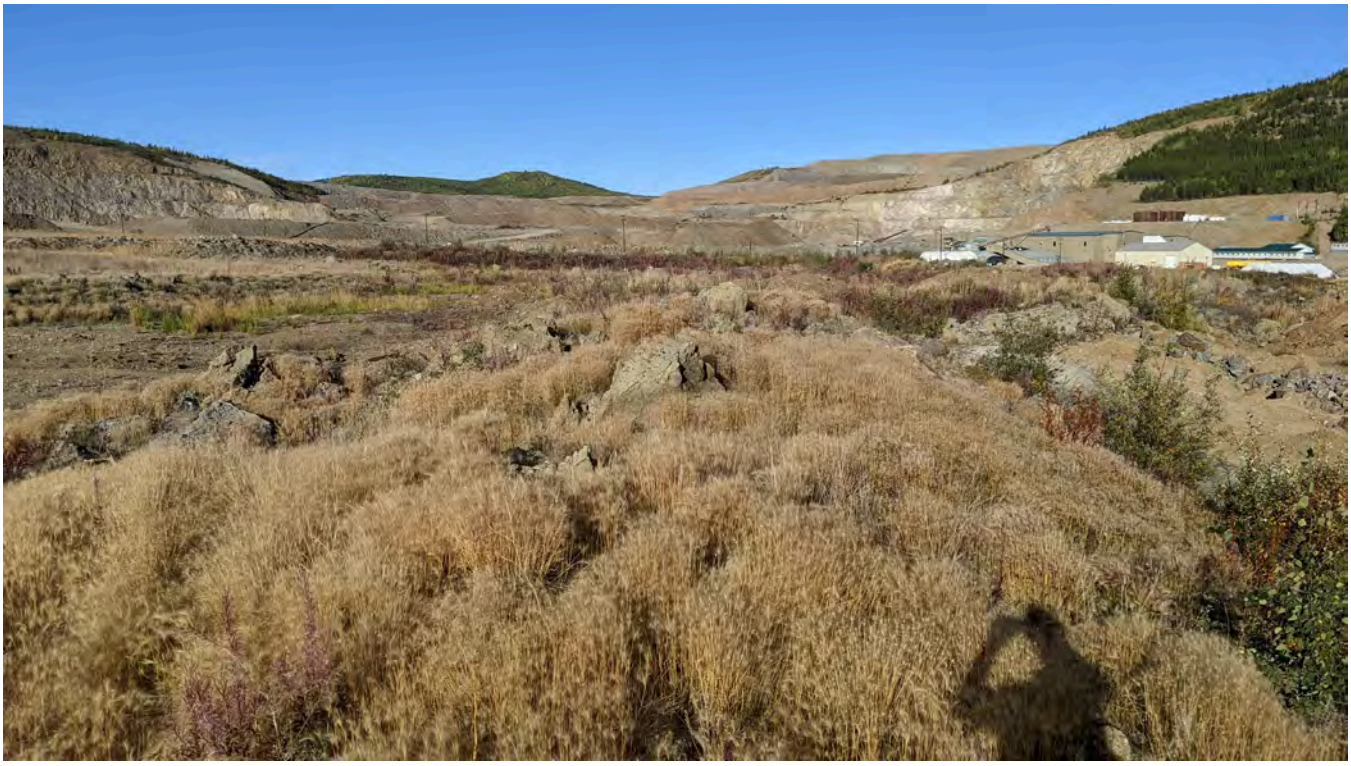


Photo 1-5: Area of stockpiled cover material south of the ungraded waste rock shell.

Photo 1-6: DSTSF crest along the northern end looking east. A 2m high overburden stockpile is on the right side of the picture.

srk consulting	MINTO	Site Inspection Photo Log **Dry Stack Tailings Storage Facility (DSTSF)**		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-01-03**

Photo 1-7: Erosion gully on regraded cover slope at the northeast corner of the DSTSF.

Photo 1-8: Piezometer DSP-06 and Thermistor DST-11 on the DSTSF waste rock crest. The instrumentation was found to be uncovered and exposed to the elements. Precipitation down the borehole could influence the instrumentation readings.

Photo 2-1: Overview of the MVFE from the camp site (looking southeast).

Photo 2-2: Looking west across Tier C, minor erosion gullies visible down Tier B of the MVFE.

srk consulting	MINTO	Site Inspection Photo Log		
		Mill Valley Fill Extension (MVFE)		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-02-01**

Photo 2-3: Erosion gullies – looking east towards the WSP.

Photo 2-4: Erosion gullies, looking north towards the main access road.

srk consulting	MINTO	Site Inspection Photo Log		
		Mill Valley Fill Extension (MVFE)		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-0\2-02**

Photo 2-5: View of the north regraded, covered, and vegetated slopes of the MVFE looking towards camp.

Photo 2-6: The road down to the MVFE Sump has been upgraded with a armored drainage channel constructed on the south side of the road to prevent sediment transport to the MVFE Sump area.

srk consulting	MINTO	Site Inspection Photo Log		
		Mill Valley Fill Extension (MVFE)		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-02-03**

Photo 3-1: TDD Intake Channel. Photo taken from the Airport Access Road looking upstream. Grading of the Underground Access Road results in surface runoff being directed into TDD intake. The intake area was cleaned-out prior to the inspection.

Photo 3-2: TDD Intake Channel. View of the location where the Underground Access Road runoff enters the TDD area. The overflow spillway is non functional. Flows that exceed the TDD intake will continue down the Underground access road. Most of this flow would be directed west of the DSTSF.

srk consulting	MINTO	Site Inspection Photo Log		
		Tailings Diversion Ditch (TDD)		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-03-01**

Photo 3-3: Vegetation in the upper portion of the TDD looking upstream.

Photo 3-4: Vegetation in the upper portion of the TDD looking downstream.

Photo 3-5: Typical view of the lower portion of the TDD with riprap. Sparce vegetation growing in the channel.

Photo 3-6: TDD Outlet. No flow was observed at the time of the inspection.

srk consulting	MINTO	Site Inspection Photo Log
		Tailings Diversion Ditch (TDD)
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-03-03**

Photo 4-1: MWD regraded slope (looking southeast). A stockpile of cover soil is visible that is located above a portion of the dump that remains to be regraded.

Photo 4-2: MWD regraded slope (looking northeast). Photo is in the location of the cracking of the cover soil noted in the 2019 inspection. The crack was not observed in the 2020 or 2021 inspection. The cover surface in this area has a concave slope.

srk consulting	MINTO	Site Inspection Photo Log **Main Waste Dump (MWD)**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-04-01**

Photo 4-3: Upper portion of the MWD has been planted with trees in 2021.

Photo 4-4: Regraded MWD slope looking towards the Reclamation Overburden Dump.

Photo 4-5: View from the top of the MWD Expansion looking down to the top of the original MWD.

Photo 4-6: Stockpiled cover material at the top of the MWD Expansion.

srk consulting	MINTO	Site Inspection Photo Log		
		Main Waste Dump (MWD)		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-04-03**

Photo 5-1: Cracking on the crest of the lower bench of the MWD Wrap.

Photo 5-2: Waste Rock excavated from the toe of the MWD Wrap (looking north) that has resulted in an over-steepened slope.

Photo 6-1: Overview of the north end of the SWD and ROD from the Main Waste Dump.

Photo 6-2: Overview of the SWD from the Main Waste Dump.

srk consulting	MINTO	Site Inspection Photo Log **Southwest Waste Dump (SWD)**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-6-01**

Photo 6-3: Longitudinal cracking along the crest of the SWD first observed in 2019.

Photo 6-4: Longitudinal cracking along the crest of the SWD first observed in 2019..

srk consulting	MINTO	Site Inspection Photo Log		
		Southwest Waste Dump (SWD)		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-6-02**

Photo 6-5: Longitudinal cracking along the crest of the SWD first observed in 2019 at its widest point.

Photo 6-6: Regraded SWD slope below the longitudinal cracks.

srk consulting	MINTO	Site Inspection Photo Log		
		Southwest Waste Dump (SWD)		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-6-03**

Photo 6-5: HGW Pad at the south end of the SWD

Photo 6-6: Overview of the SWD taken from the south end of the SWD..

srk consulting	MINTO	Site Inspection Photo Log **Southwest Waste Dump (SWD)**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-6-04**

Photo 7-1: Reclamation Overburden Dump looking south.

Photo 7-2: Reclamation Overburden Dump looking west.

srk consulting	MINTO	Site Inspection Photo Log **Reclamation Overburden Dump**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-07-01**

Photo 8-1: Crusher Stockpile west of the mill.

Photo 8-2: Ore Stockpiles south of the mill.

srk consulting	MINTO	Site Inspection Photo Log **Ore Stockpiles**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-08-01**

Photo 9-1: Highwall behind the mill area taken from the Fuel Tank Farm looking east.

Photo 9-2: Highwall behind the mill area looking northwest from near the south end of camp.

srk consulting	MINTO	Site Inspection Photo Log **Mill Site**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-9-01**

Photo 9-3: Historical seepage location located at the northeast corner of the mill area. No seepage was observed at the time of the inspection.

Photo 9-4: Minor slope erosion on the highwall.

srk consulting	MINTO	Site Inspection Photo Log		
		Mill Site		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-09-02**

Photo 10-1: Highwall behind Selkirk Manor looking south from the north end of camp.

Photo 10-2: Highwall behind camp looking northwest from near the south end of camp.

srk consulting	MINTO	Site Inspection Photo Log		
		Camp Site		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-10-01**

Photo 10-3: Repaired erosion gulley noted in the 2020 inspection at the north end of camp. (looking south).

Photo 10-4: Historical erosion gullies below the camp pad. The condition of the gullies is unchanged from previous inspections and the camp pad is graded to prevent runoff entering the top of the gullies.

srk consulting	MINTO	Site Inspection Photo Log **Camp Site**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-10-02**

Photo 11-1: Highwall behind Fuel Containment Facility.

Photo 11-2: Entrance ramp to the facility with a new large rut near the edge and new rutting between the ramp and sump (far end).

srk consulting	MINTO	Site Inspection Photo Log		
		Fuel Containment Facility		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-11-01**

Photo 11-3: Tire ruts between the ramp and sump has exposed the base geotextile and liner in areas.

Photo 11-4: Exposed geosynthetics in the rut. A thin plastic is present overtop of the geotextile (that overtops the liner) that appears to be a sacrificial warning layer to prevent liner damage.

Photo 11-5: A small geotextile tear was found in the rut that is approximately 5cm x 8 cm. Liner damage could not be detected within the tear.

Photo 11-6: View of the ruts and liner along the side wall of the facility.

srk consulting	MINTO	Site Inspection Photo Log		
		Fuel Containment Facility		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-11-03**

Photo 12-1: Overview of the WSP from the MVFE looking northeast.

Photo 12-2: WSP Crest taken from the north abutment looking south.

srk consulting	MINTO	Site Inspection Photo Log		
		Water Storage Pond		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-12-01**

Photo 12-3: WSP spillway looking downstream.

Photo 12-4: WSP spillway looking south from the dam crest.

srk consulting	MINTO	Site Inspection Photo Log **Water Storage Pond**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-12-02**

Photo 12-5: Upstream north abutment. The water level in the pond is higher than the previous year, which has resulted in the accumulation of logs across the upstream face of the dam.

Photo 12-6: Accumulation of logs along the south abutment of the dam.

Photo 12-7: Potential minor sinkhole or burrow on the downstream south abutment near ground temperature cable WDT-08. No apparent change in condition since first observed in the 2019 inspection.

Photo 12-8: Seepage at the toe of the dam immediately upstream of the seepage collection sump. Seepage was clear with no signs of sediment transport.

Photo 12-9: View of the seepage weir downstream of the dam.

Photo 12-10: Ponding seepage downstream of the WDP Dam looking south. Seepage was clear with no signs of sediment transport.

srk consulting	MINTO	Site Inspection Photo Log **Water Storage Pond**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-12-05**

Photo 13-1: Western bridge abutment.

Photo 13-2: Western abutment. A Tree is growing on the upstream side of the western abutment.

srk consulting	MINTO	Site Inspection Photo Log		
		Big Creek Bridge		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-13-01**

Photo 13-3: Big Creek looking upstream from the western abutment. An eddy is present upstream of the west abutment. The condition of the eddy and creek is the same as the 2020 inspection.

Photo 13-4: Downstream end of the eastern abutment. A rope is suspended from the bridge by the Minto Environmental department for environmental monitoring of the creek.

srk consulting	MINTO	Site Inspection Photo Log		
		Big Creek Bridge		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-13-02**

Photo 14-1: Main Pit and Main Pit Dump looking south.

Photo 14-2: Main Pit looking east.

srk consulting	MINTO	Site Inspection Photo Log **Main Pit, Main Pit Dump (MPD), South Wall Buttress & In-Pit Dumps**		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-14-01**

Photo 14-3: Veiw of the Main Pit Dump from the Southwest Dump.

Photo 14-4: West wall of the Main Pit.

srk consulting	MINTO	Site Inspection Photo Log **Main Pit, Main Pit Dump (MPD), South Wall Buttress & In-Pit Dumps**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-14-02**

Photo 14-5: Vent raise located west of the Main Pit.

Photo 14-6: Main Pit Reclaim Barge and In-Pit Dumps.

srk consulting	MINTO	Site Inspection Photo Log **Main Pit, Main Pit Dump (MPD), South Wall Buttress & In-Pit Dumps**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-14-03**

Photo 14-7: SAT Dump. An additional lift of SAT material has been placed on the SAT Dump in the past year. If the Main Dam does not proceed, this additional material will need to be relocated below the long-term water level.

Photo 14-8: Historical cracking of the In-Pit Dump above the SAT Dump. The cracks are filling-in and near-by survey hubs indicate no current movement.

srk consulting	MINTO	Site Inspection Photo Log **Main Pit, Main Pit Dump (MPD), South Wall Buttress & In-Pit Dumps**
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021 | Approved: PHM | Figure: **A-14-04**

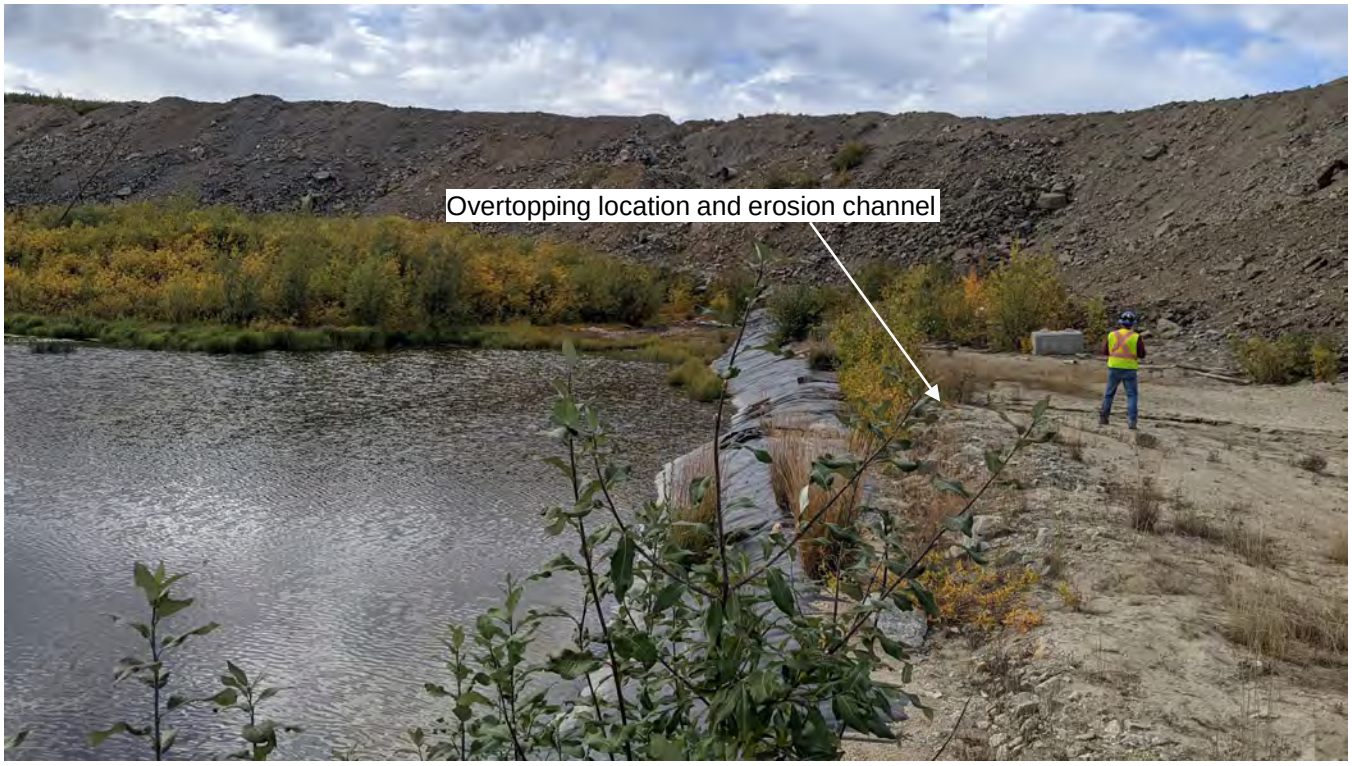


Photo 14-9: W15 Sump south of the Main Pit. The sump appears to have overtopped in the past year with water infiltrating through a sinkhole into the pit.

Photo 14-10: Lower end of the erosion channel and sinkhole beneath the haul road..

srk consulting	MINTO	Site Inspection Photo Log **Main Pit, Main Pit Dump (MPD), South Wall Buttress & In-Pit Dumps**		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-14-05**

Photo 15-1: Area 2 Stage 2 Pit backfilled with tailings looking southwest

Photo 15-2: Area 2 Stage 2 Pit looking south.

srk consulting	MINTO	Site Inspection Photo Log		
		Area 2 Pit		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-15-01**

Photo 15-3: Cracking along inactive access road along pit rim.

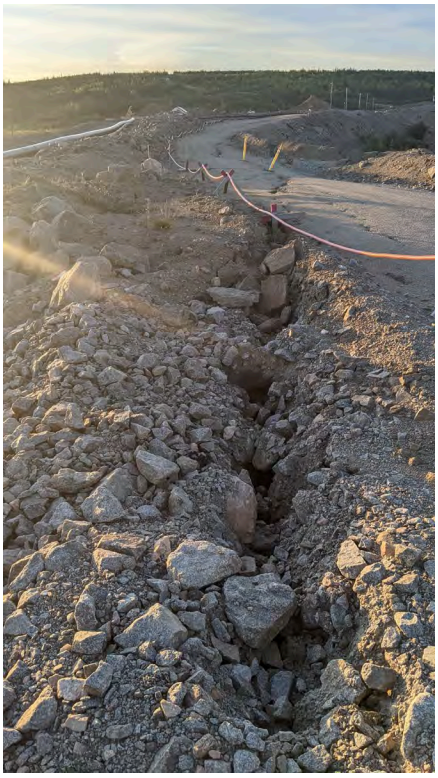


Photo 15-4: Cracking along inactive access road along pit rim.

Photo 15-5: Cracking along the pit rim.

Photo 15-6: Area 2 Stage 3 Pit looking south.

srk consulting	MINTO	Site Inspection Photo Log		
		Area 2 Pit		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-15-03**

Photo 15-7: Cracking along the Area 2 Stage 3 Pit rim.

Photo 15-8: Cracking along the Area 2 Stage 3 Pit rim near the Underground Shop.

srk consulting	MINTO	Site Inspection Photo Log		
		Area 2 Pit		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-15-04**

Photo 16-1: South end of the Area 118 Pit

Photo 16-2: North end of the Area 118 Pit

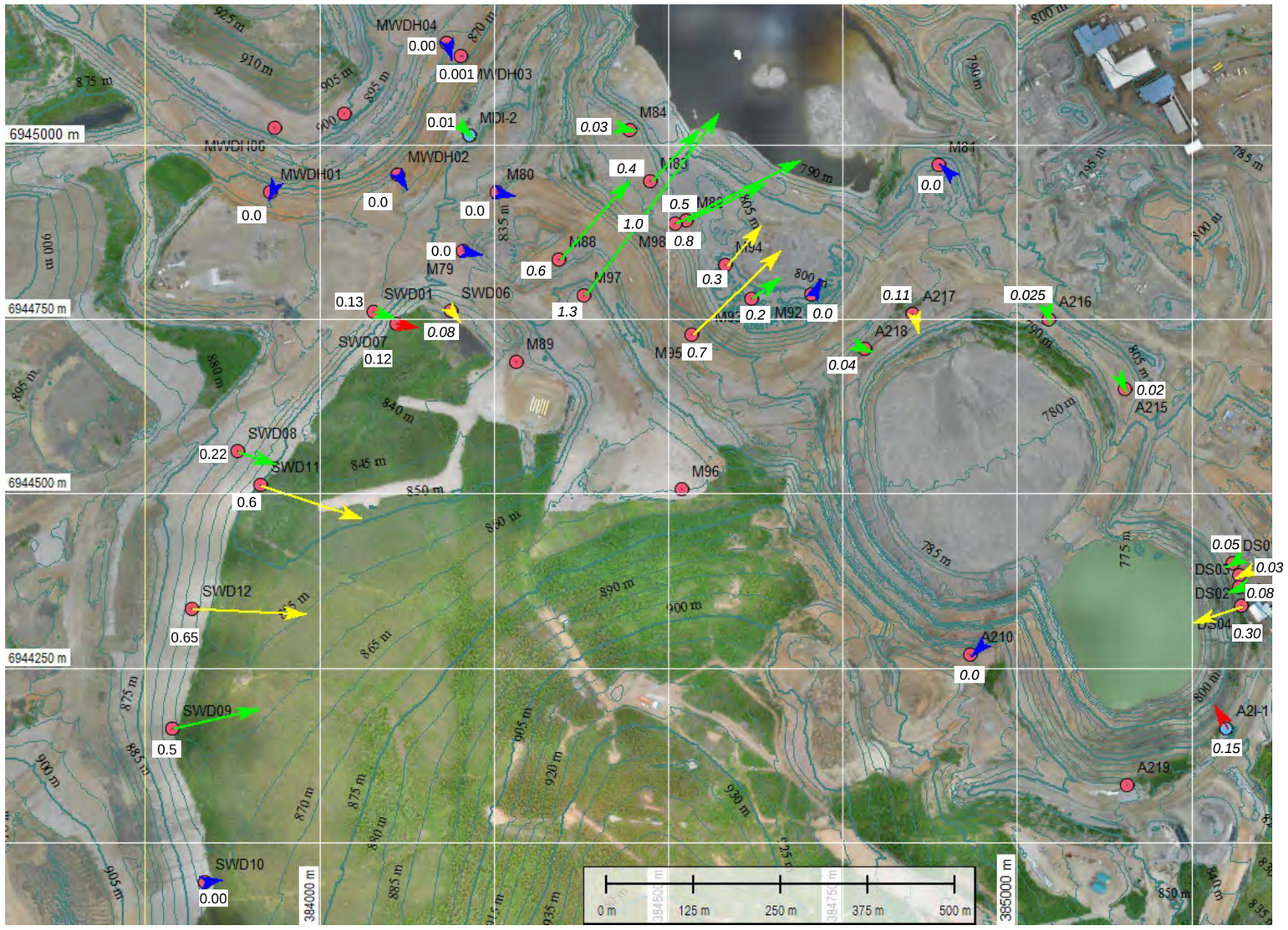
srk consulting	MINTO	Site Inspection Photo Log		
		Area 118 and Backfill Dump		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-16-01**

Photo 17-1: Previous pit wall failure in Minto North Pit (looking southwest).

Photo 17-2: North pit wall.

srk consulting	MINTO	Site Inspection Photo Log		
		Minto North Pit		
Job No: 1CM002.073 Filename: MintoAGI_Photolog.pptx	Minto Mine Geotechnical Annual Review	Date: October 2021	Approved: PHM	Figure: **A-17-01**

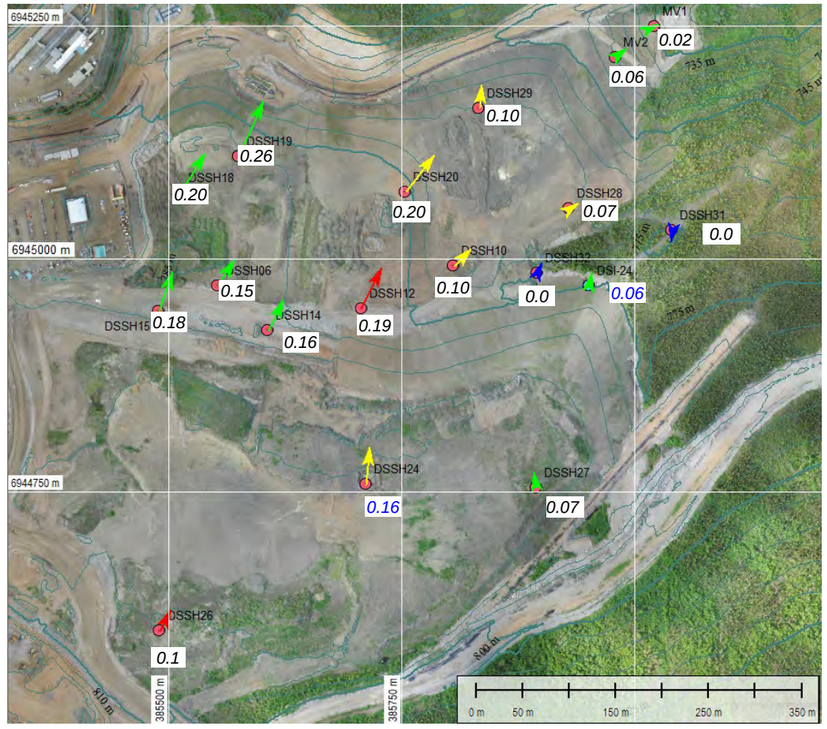
Appendix B Survey Hub Summary



a) Southwest Dump and Main Pit Areas

LEGEND

- Survey Hubs - Active
- Survey Hubs - Destroyed
- 0.5 Total Movement Rate (mm/day)
- 0.5 Horizontal Movement Rate (mm/day)
- Movement Vector - No Current Movement
- Movement Vector - Decelerating Movement
- Movement Vector - Steady Movement
- Movement Vector - Accelerating Movement



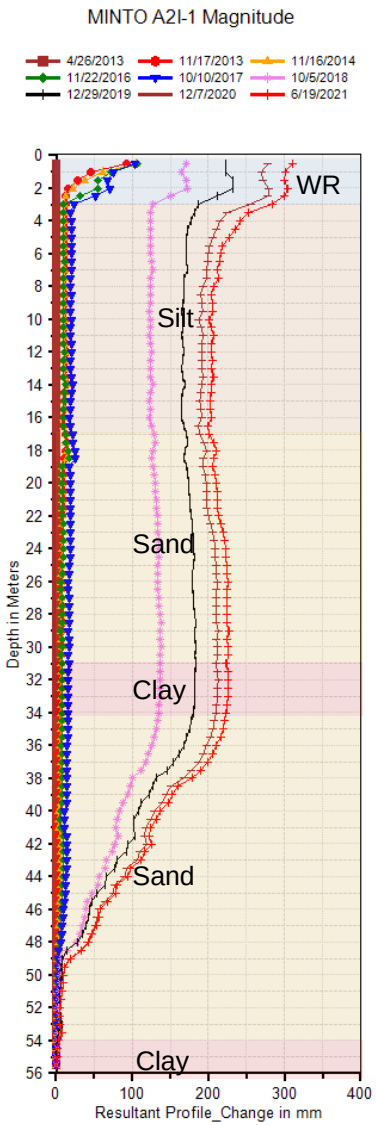
b) Dry Stack Tailings Storage Facility

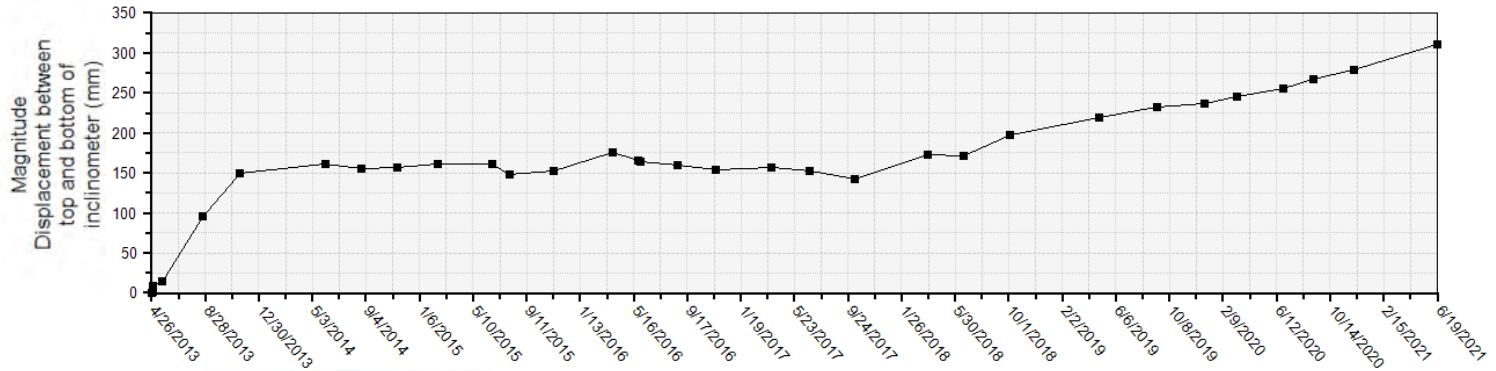
Notes:

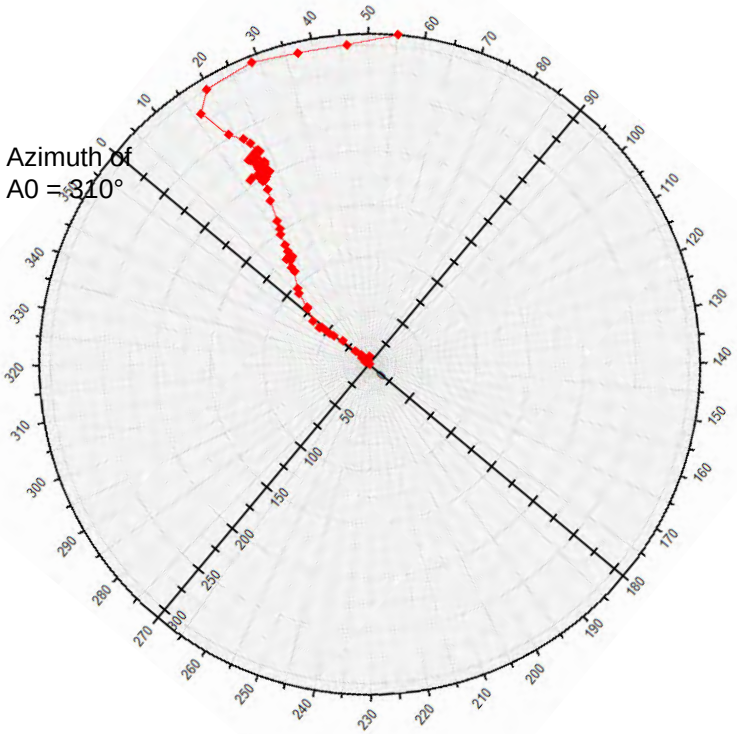
1. Movement vectors have been scaled by a factor of 250 (i.e. length equals 250 times the current velocity in mm/day) except for the blue vectors where no current movement is observed. The length of the blue vectors is arbitrary and is included to show the direction of past movement.

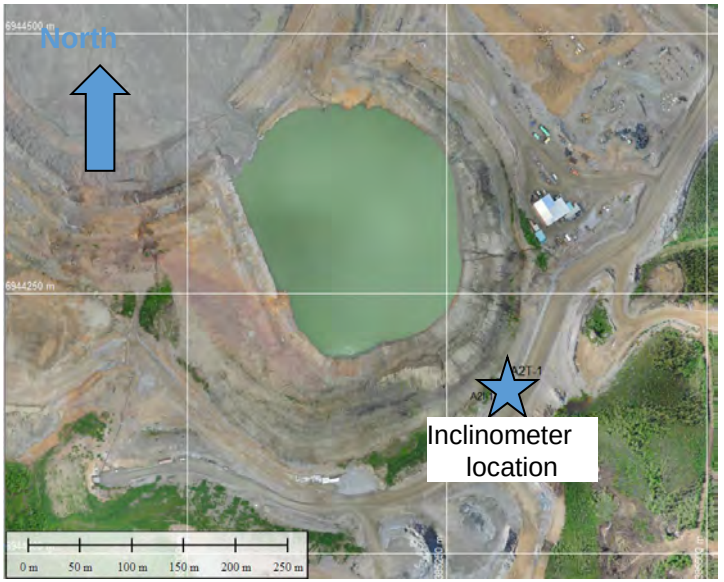
srk consulting	MINTO	2021 Survey Hub Data
		Survey Hub Summary
Job No: 1CM002.073 Filename: MintoSurveySummary11x17.pptx	Minto Mine	Date: October 2021 · Prepared by: PHM · Figure: 1

Appendix C Area 2 Pit Instrumentation Data









Notes

1. Inclinometer software (DigiPro2 v2.12.4) plots A0 as 0 degrees. The plot above has been rotated such that the orientation matches the plan (north is up).

Source files:

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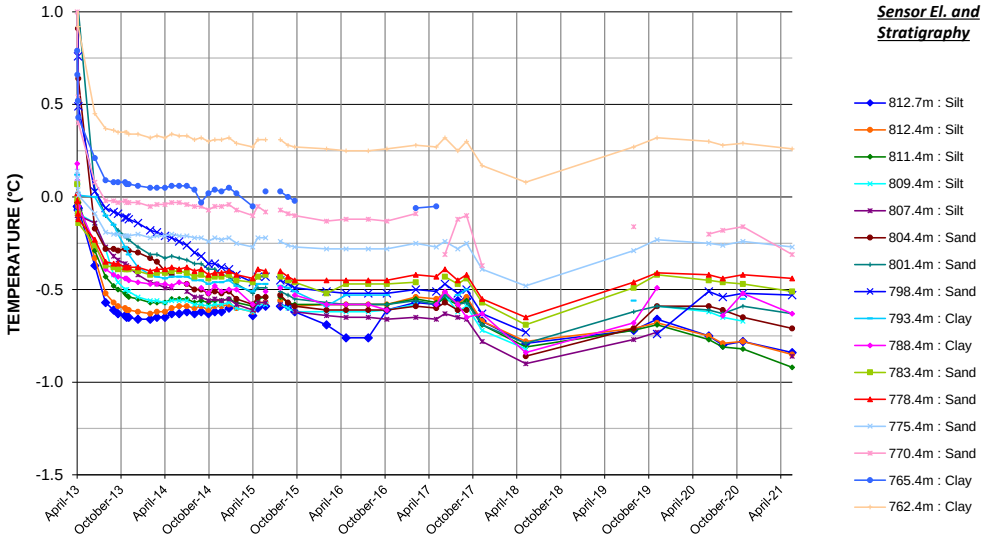
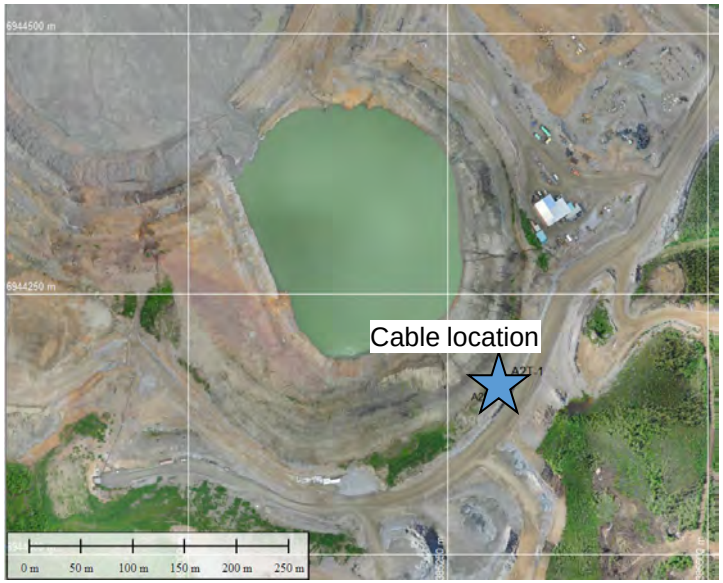
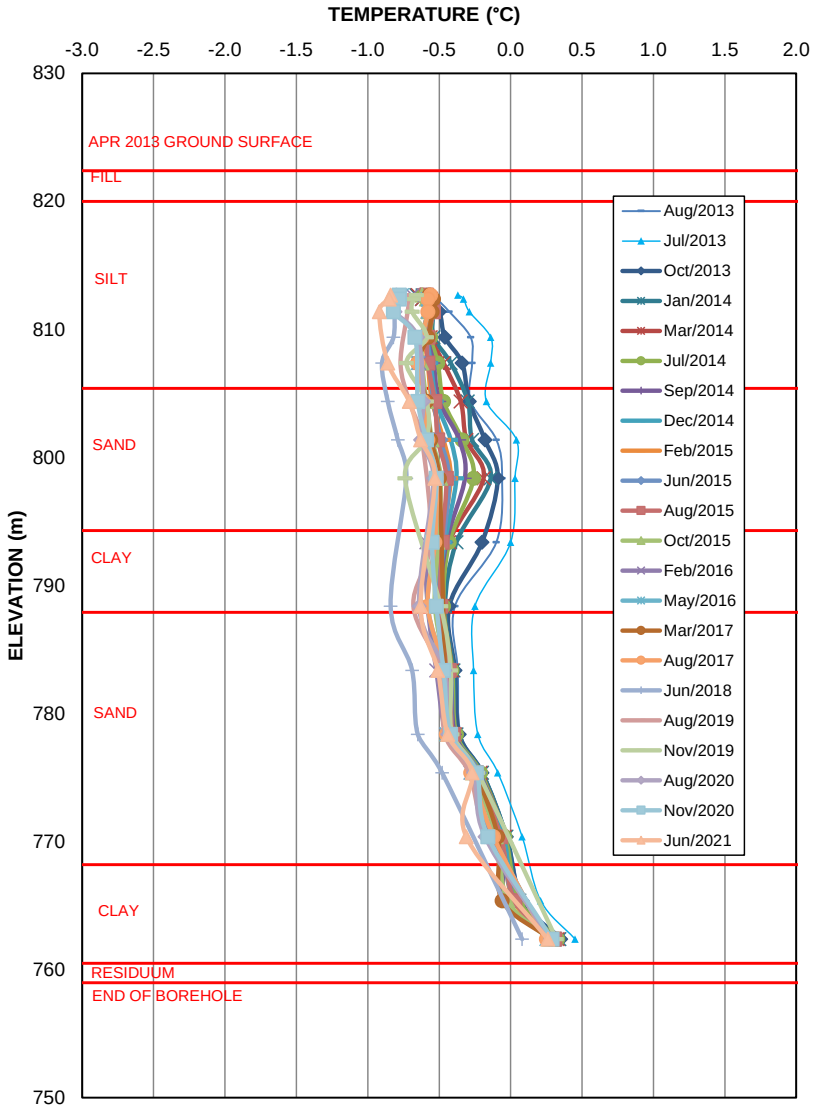
2. Instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\Minto SI Instrumentation Database.dpw

srk consulting	MINTO	Area 2 Pit Instrumentation Data		
		Inclinometer A2I-1		
Job No: 1CM002.073 Filename: ApC_2021Area2Pit.pptx	Minto Mine	Date: October 2021	Prepared by PHM	Figure: 1







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srk consulting

MINTO

Job No: 1CM002.073

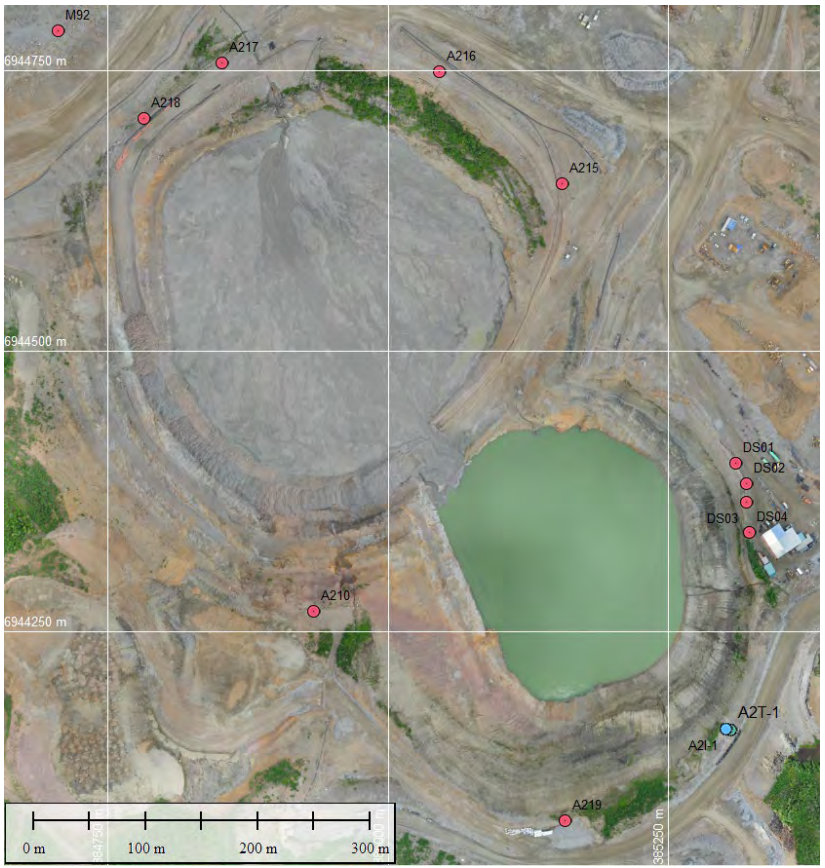
Filename: ApC_2021Area2Pit.pptx

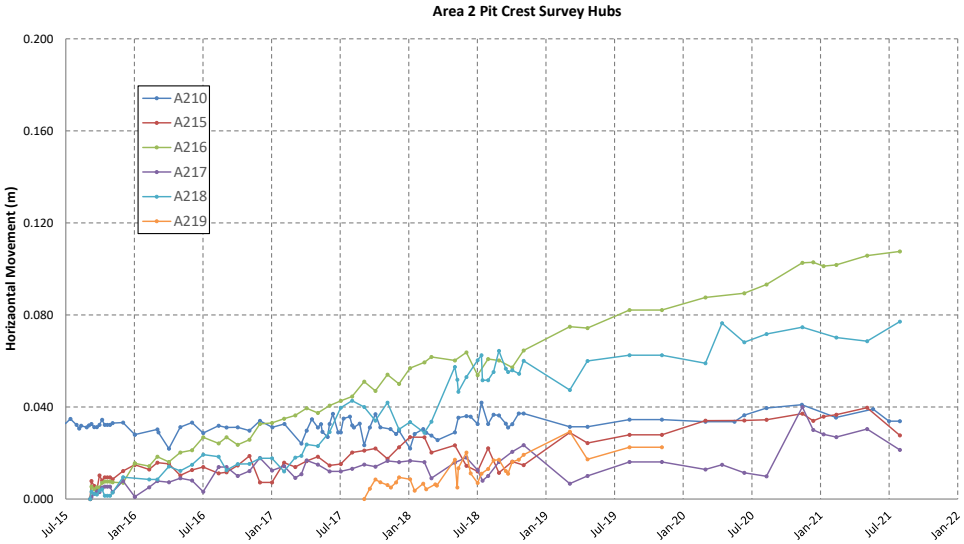
Minto Mine

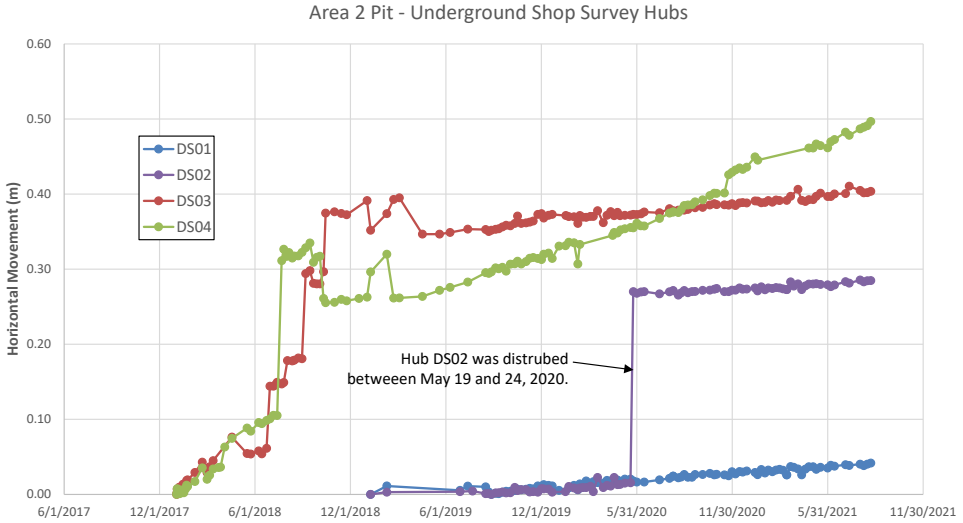
Area 2 Pit Instrumentation Data

Ground Temperature Cable – A2T-1

Date:	Prepared by	Figure:
October 2021	PHM	2







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Area 2 Pit Instrumentation Data

Survey Hubs

Job No: 1CM002.073

Filename: ApC_2021Area2Pit.pptx

Minto Mine

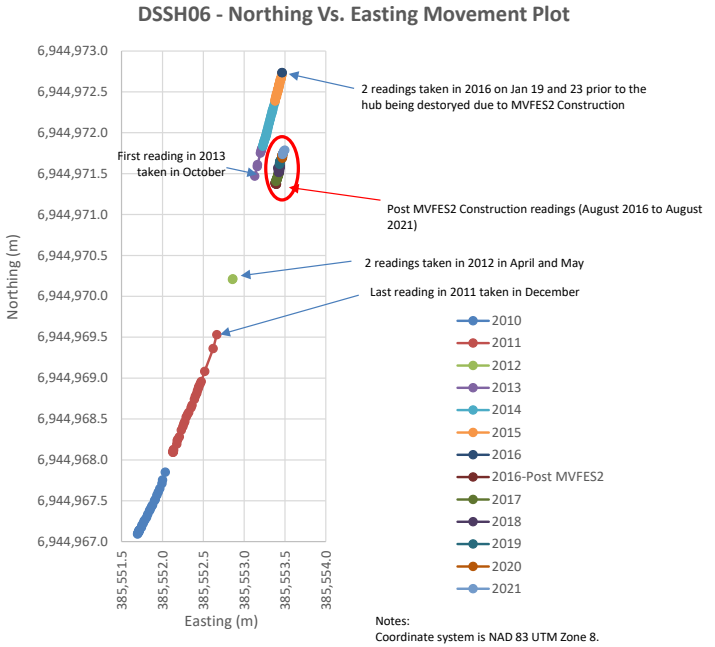
Date:	Prepared by	Figure:
October 2021	PHM	3

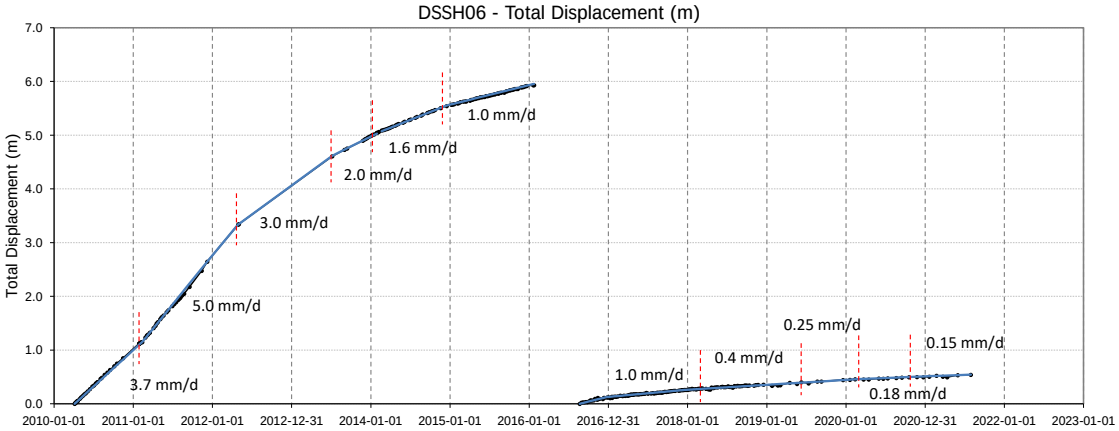
Appendix D DSTSF Instrumentation Data

Active Survey Hubs					
Survey Hub	Last Reading	Movement Rate (mm/day)		Bearing (over past year)	Comments
		Current (as of last reading)	One year prior to last reading		
DSSH06	7/30/2021	0.15	0.24	30	Decelerating, movement direction shifting to the east.
DSSH10	5/31/2021	0.10	0.10	42	Steady movement rate for the past two years. No apparent vertical displacement.
DSSH12	7/30/2021	0.19	0.19	26	Possible acceleration trend. Additional readings needed to confirm. Vertical displacement rate continues to show deceleration.
DSSH14	5/31/2021	0.16	0.16	24	Slight deceleration trend observable in the horizontal displacement data. Movement direction shifted towards the east by 2 degrees in past year.
DSSH15	5/31/2021	0.18	0.19	18	Slight deceleration trend observable.
DSSH18	5/31/2021	0.20	0.20	32	Deceleration trend observable in the horizontal displacement graph.
DSSH19	5/31/2021	0.26	0.26	24	Slight deceleration trend observable.
DSSH20	5/31/2021	0.20	0.20	38	Total displacement graph shows an apparent acceleration trend due to an increase in settlement. Horizontal displacement graph shows a deceleration trend. Movement direction shifted towards the east by 6 degrees in past year (likely due to settlement).
DSSH24	5/31/2021	0.16	0.16	5	Steady movement rate in the past year. Less variability in the total displacement graph due to the reduction in the reading frequency in 2019. Rate of settlement is decreasing.
DSSH26	5/31/2021	0.25	0.07	27	Possible acceleration trend in the horizontal displacement graph. Additional readings needed to confirm.
DSSH27	2/2/2021	0.07	0.16	180	Decelerating.
DSSH28	7/30/2021	0.07	0.07	32	Steady movement rate.
DSSH29	5/31/2021	0.10	0.10	6	Vertical settlement has increased in past year, while the horizontal displacement is steady, with the last reading indicating no significant movement.
DSSH31	5/31/2021	0.00	0.00	277	No significant horizontal movement trend
DSSH32	5/31/2021	0.00	0.00	24	No significant horizontal movement trend
MV1	5/31/2021	0.02	0.05	61	Decelerating
MV2	5/31/2021	0.06	0.09	51	Slight deceleration trend observable in the horizontal displacement data.

Notes:
1. See subsequent figures for each survey hub for the interpretations of the movement rates with time.
2. Blue text indicates horizontal movement rates, while the black text are total movement rates.
3. Bearing direction is measured from true north.

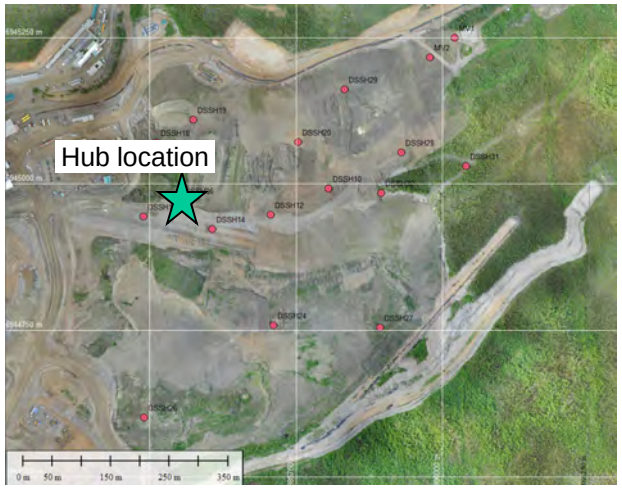
Source file: Excel instrumentation data: \\WAN-SVR0\Projects\01_SITES\Minto\020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\DSTFSurveyHubMonitoring_SRK.xlsm

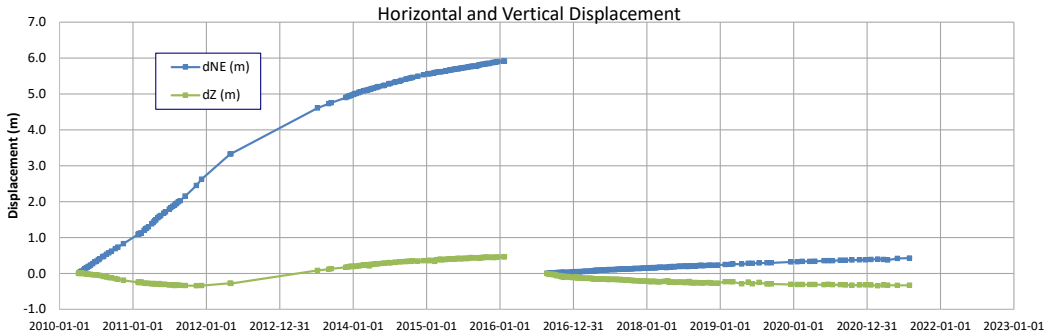


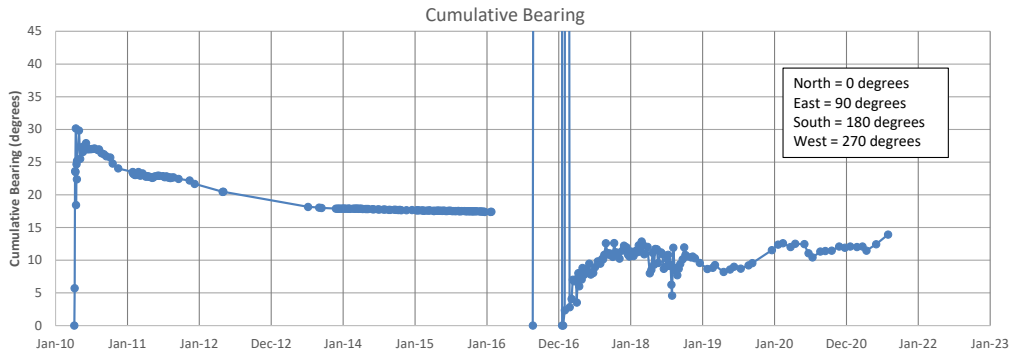


Note:

1. The survey hub was removed in January 2016 prior to MVFES2 construction. The hub was reinstalled in August 2016 following completion of construction.







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MINTO

DSTSF Instrumentation Data

DSTSF – DSSH06

Job No: 1CM002.073

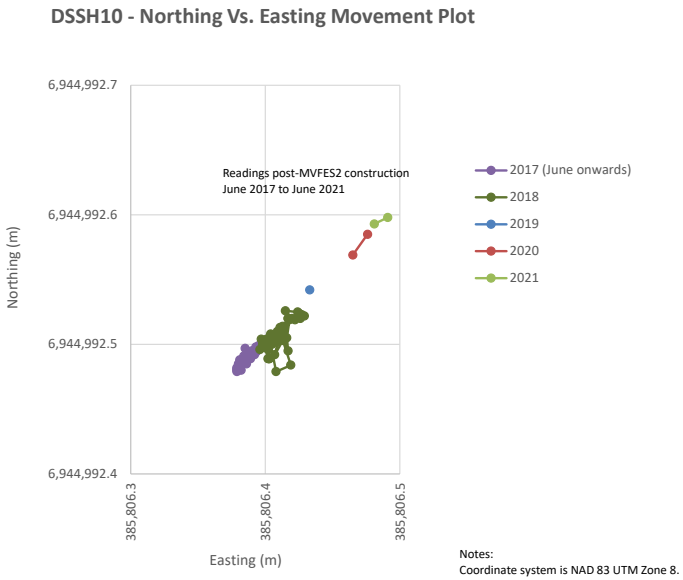
Filename: ApD_2021DSTSFLandscape.pptx

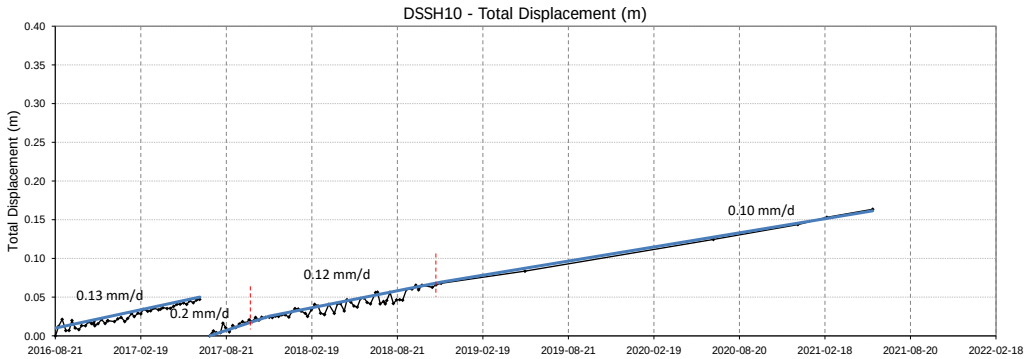
Minto Mine

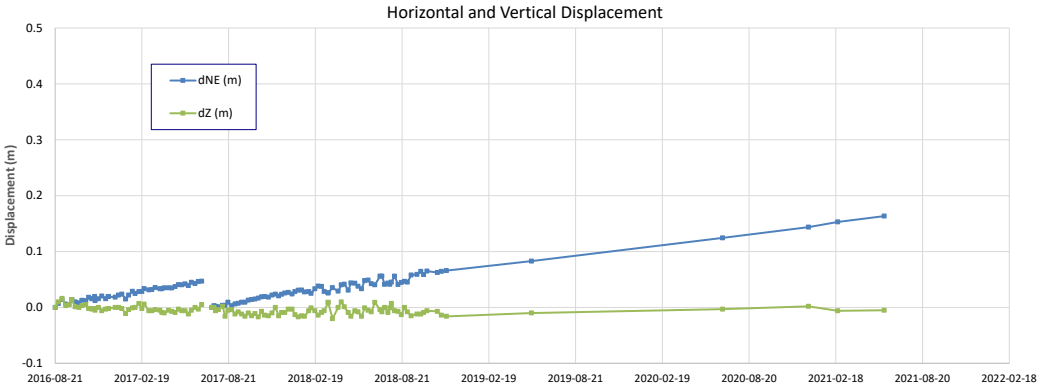
Date: October 2021

Prepared by PHM

Figure: **2**

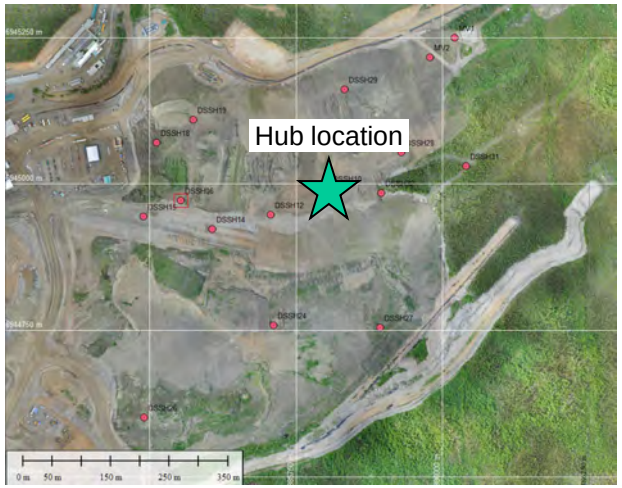


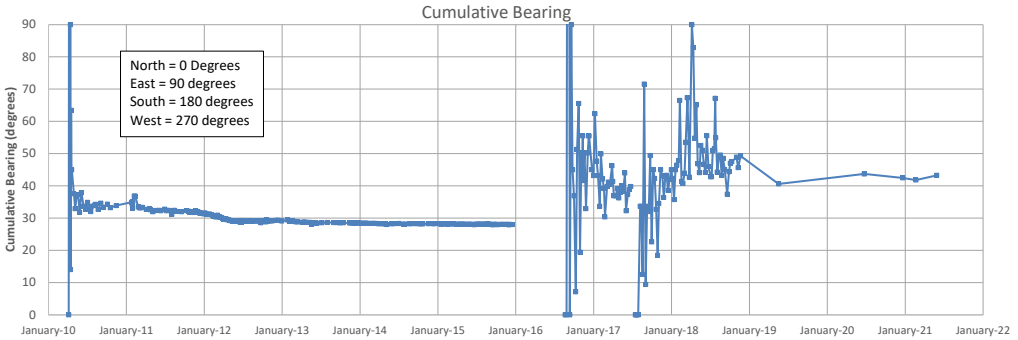




Note:

1. The survey hub was removed in December 2016 prior to MVFES2 construction. The hub was reinstalled in August 2016 following completion of construction and was repositioned in June 2017.





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srk consulting	MINTO	DSTSF Instrumentation Data
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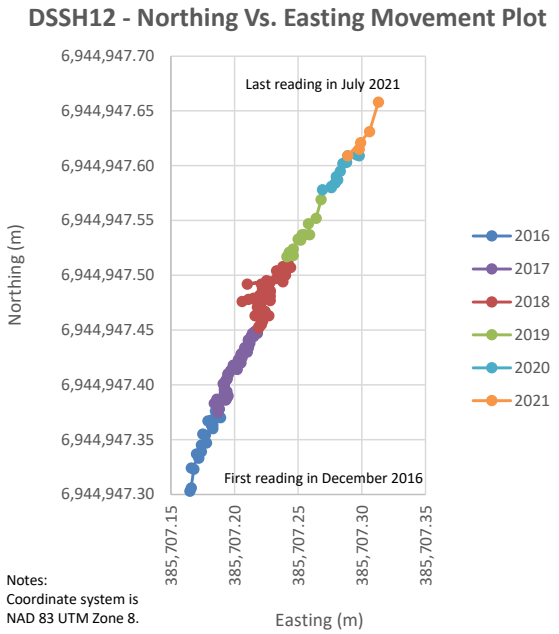
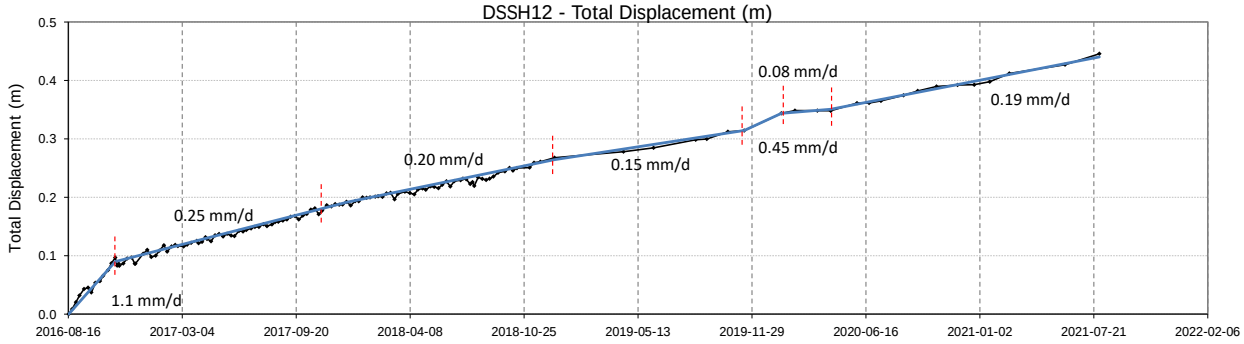
Job No: 1CM002.073 Filename: ApD_2021DSTSFLandscape.pptx	Minto Mine	Date: October 2021 / Prepared by: PHM / Figure: **3**

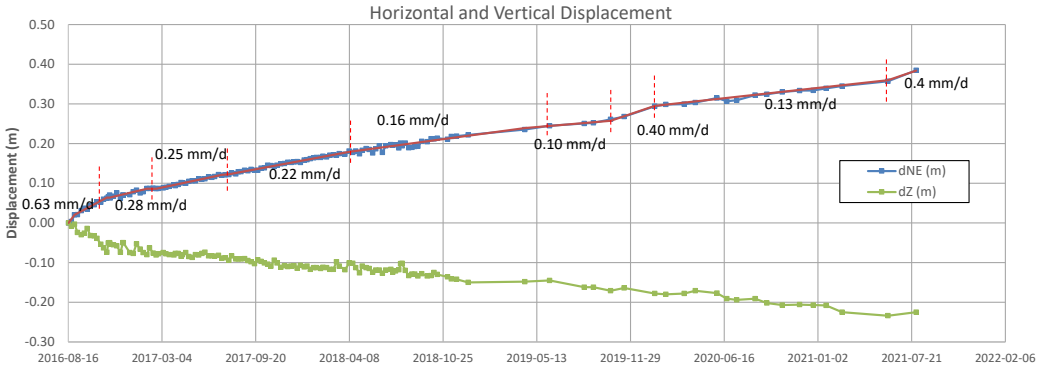


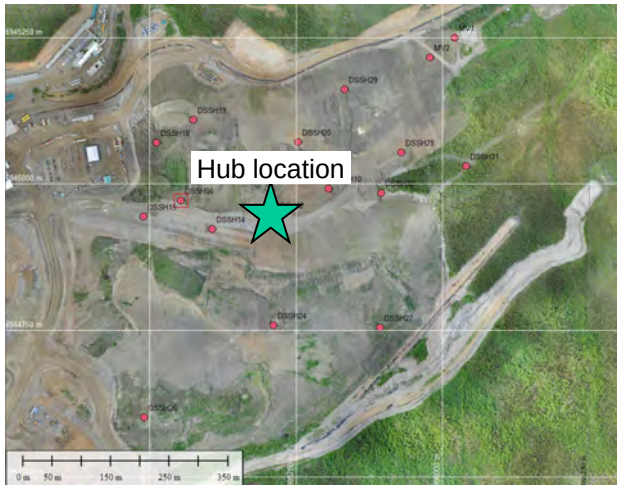
Notes:
Coordinate system is NAD 83 UTM Zone 8.

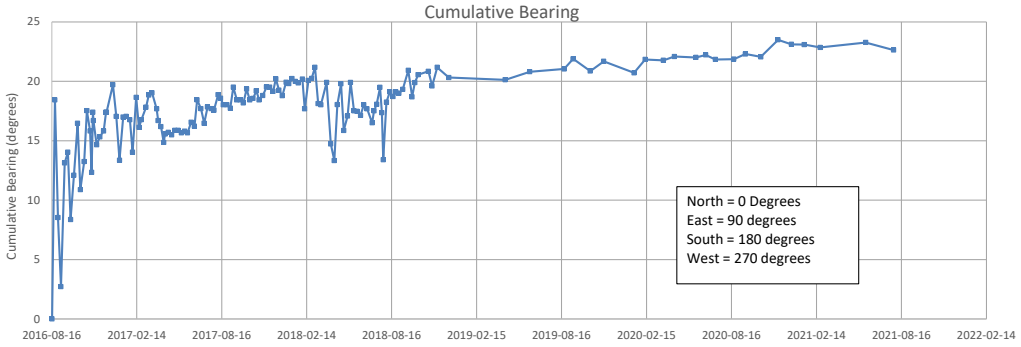
Note:

1. The survey hub was removed in January 2016 prior to MVFES2 construction. The hub was reinstalled in December 2016 following completion of construction.









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srk consulting

MINTO

DSTSF Instrumentation Data

Survey Hub – DSSH12

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

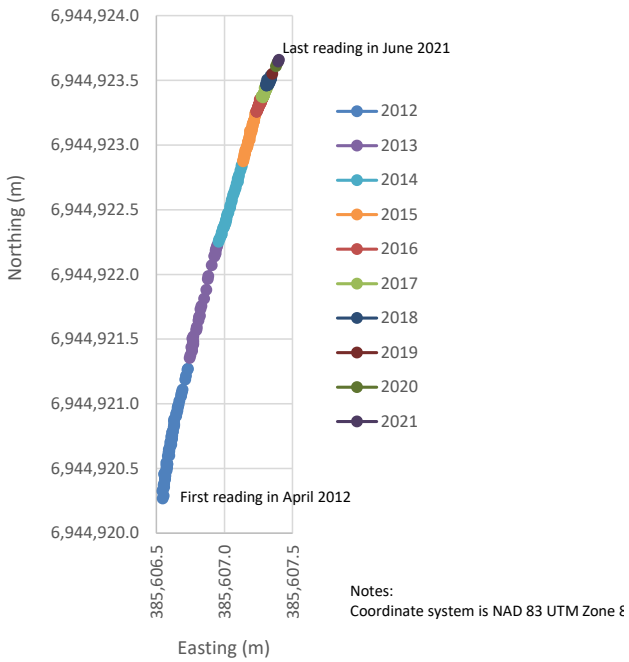
Minto Mine

Date: October 2021

Prepared by: PHM

Figure: 4

DSSH14 - Northing Vs. Easting Movement Plot



Notes:
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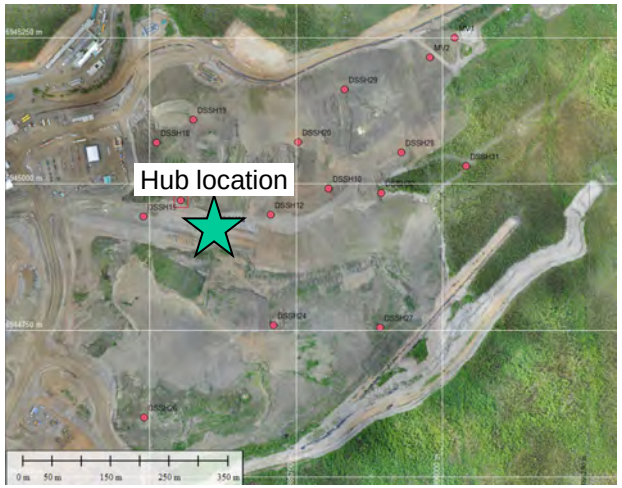

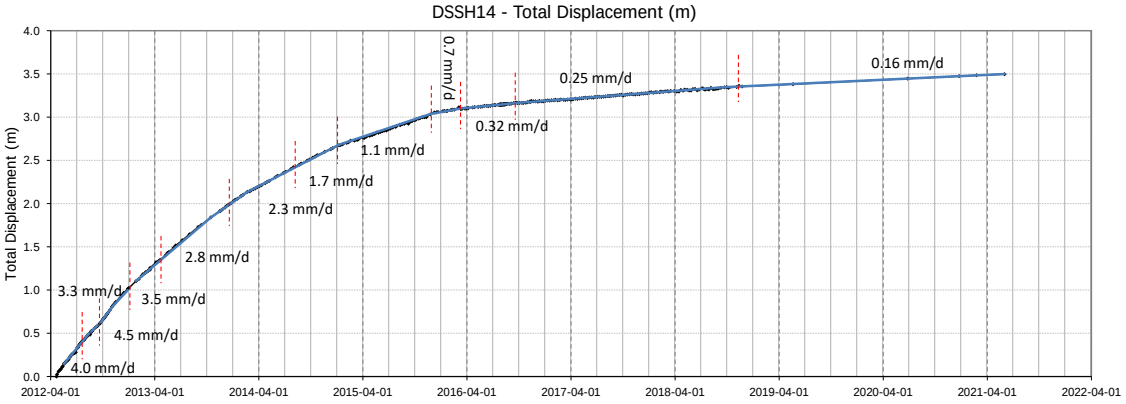

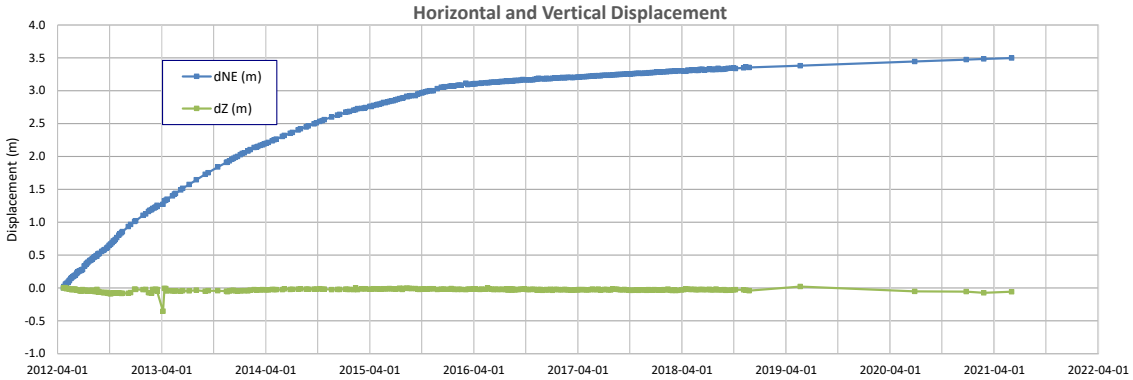

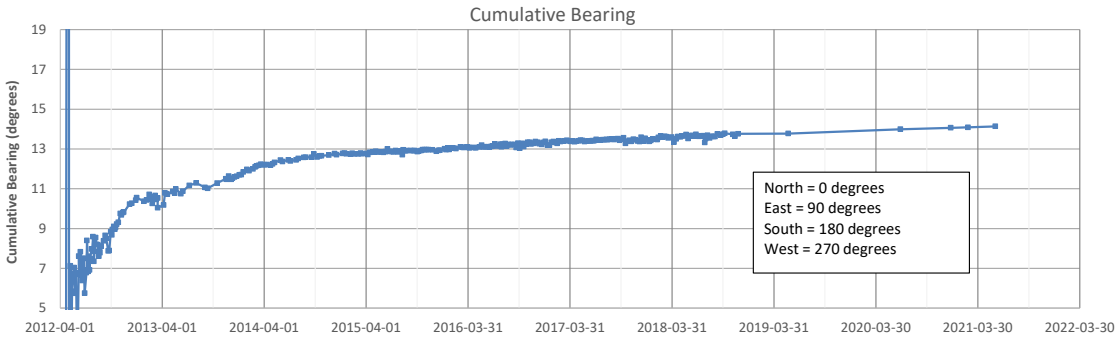

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DSTSF Instrumentation Data

Survey Hub – DSSH14

Job No: 1CM002.073

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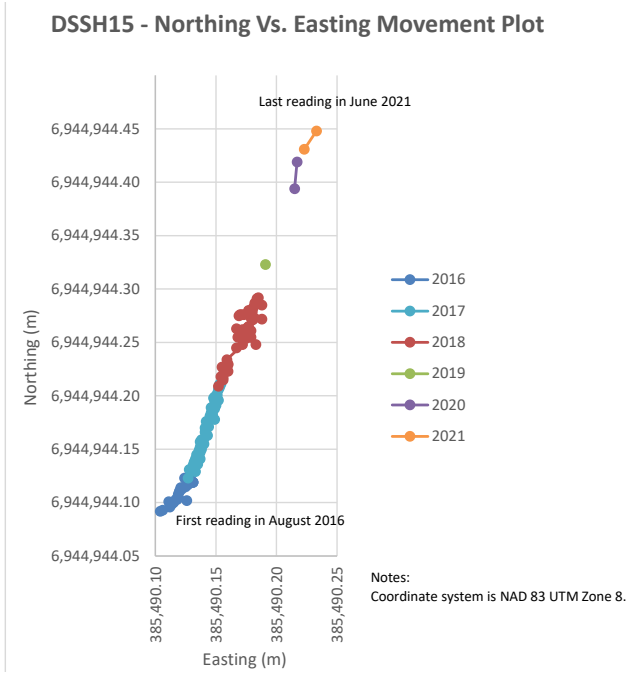
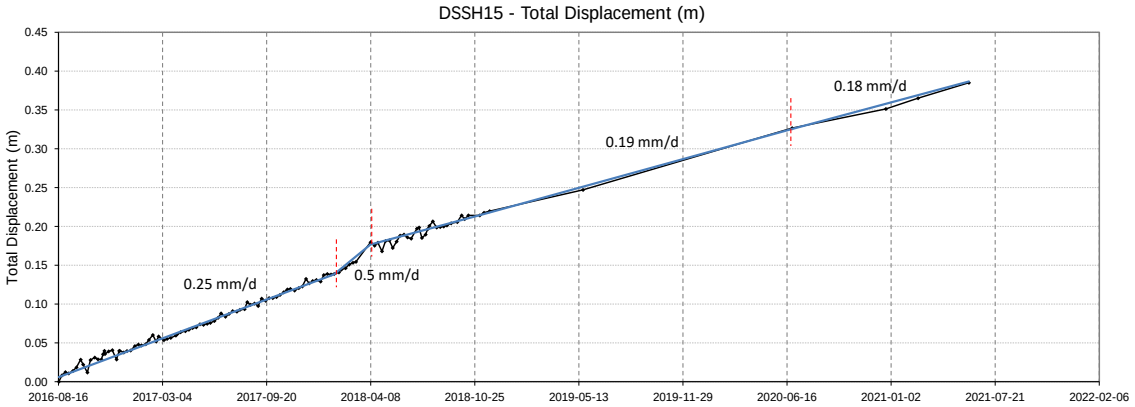
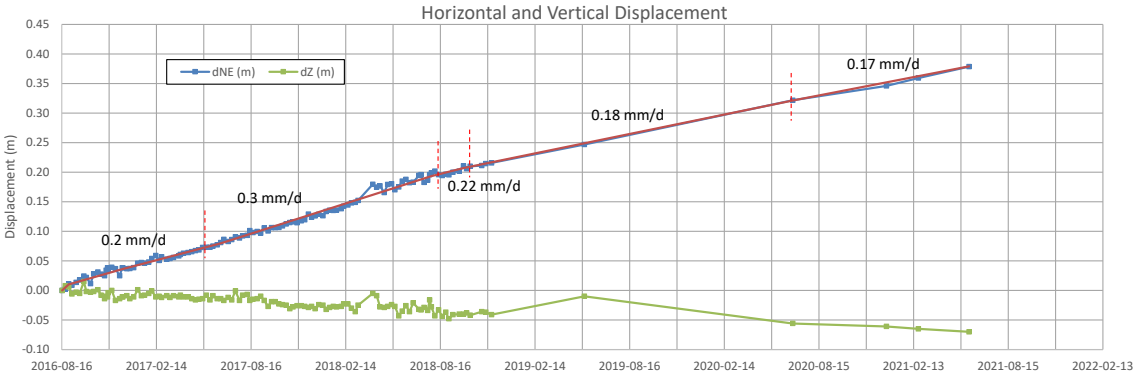
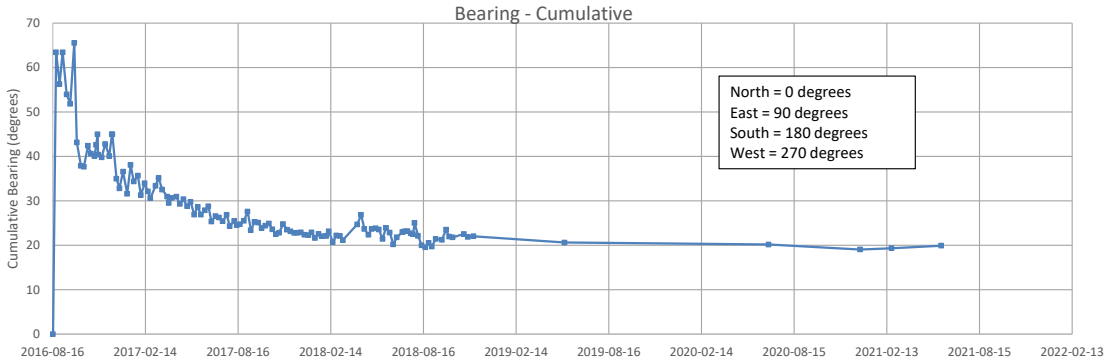
Figure: 5



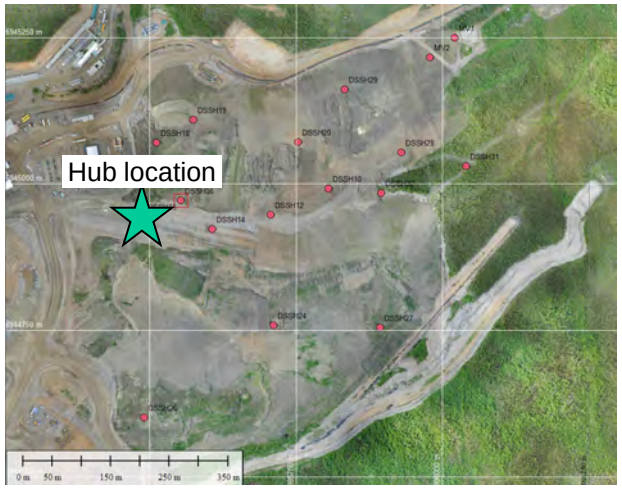






Note:

1. The survey hub was removed in February 2016 prior to MVFES2 construction. The hub was reinstalled in August 2016 following completion of construction.



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DSTSF Instrumentation Data

Survey Hub – DSSH15

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

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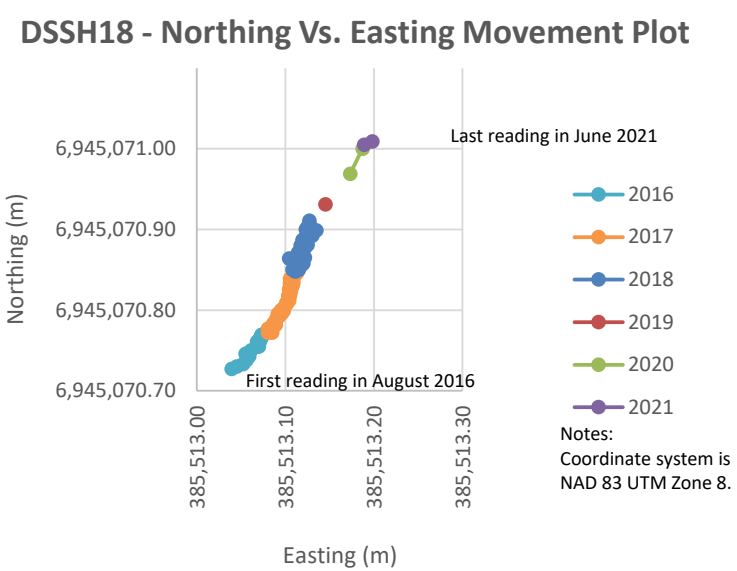
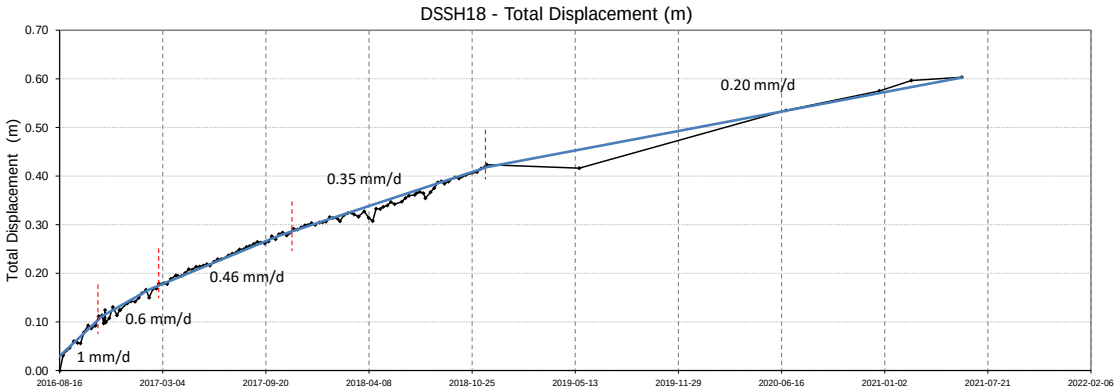
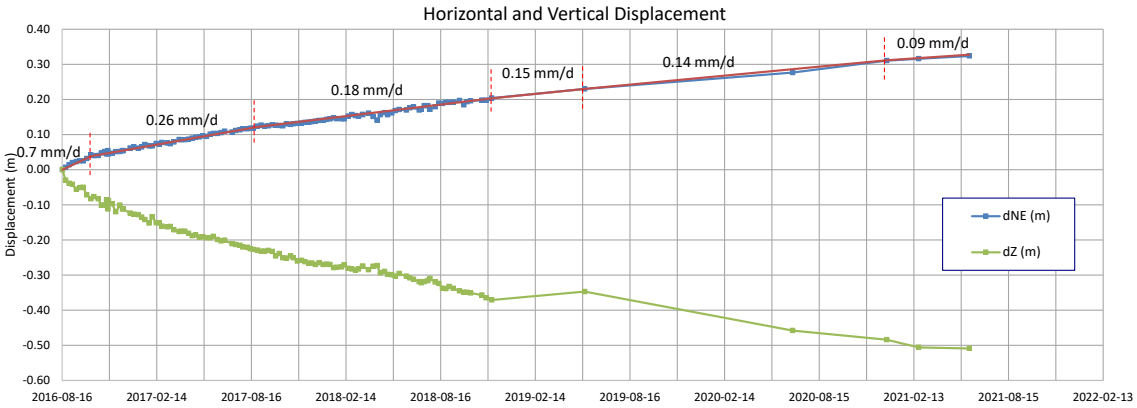
Figure: 6

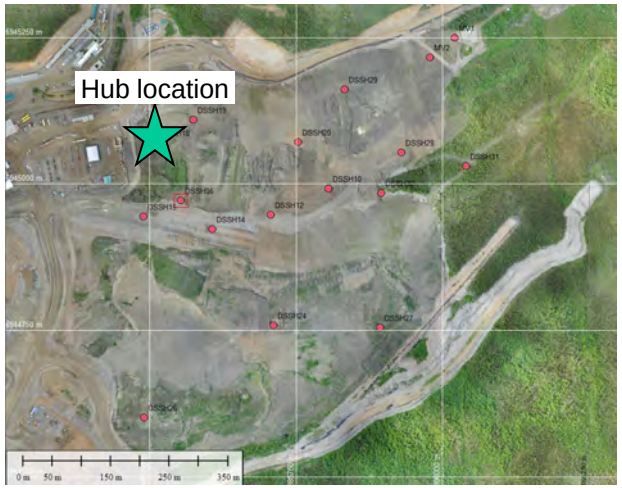


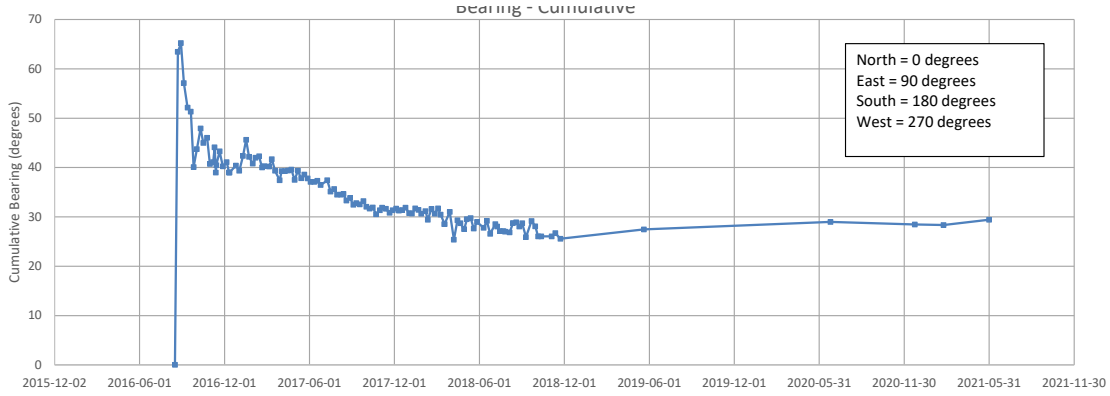




Note:

1. The survey hub was removed in December 2015 prior to MVFES2 construction. The hub was reinstalled i August 2016 following completion of construction.





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DSTSF Instrumentation Data

Survey Hub – DSSH18

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

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Date: October 2021

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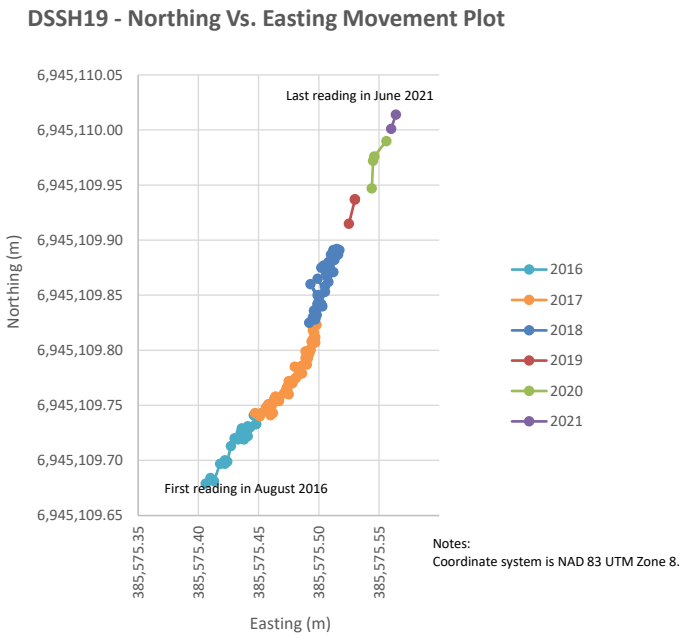
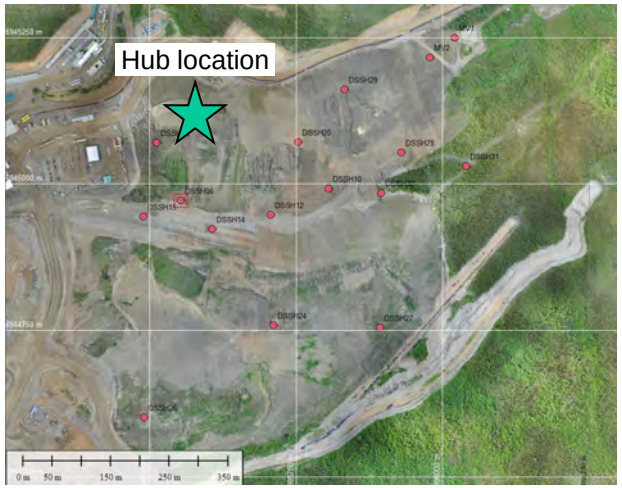
Figure: 7

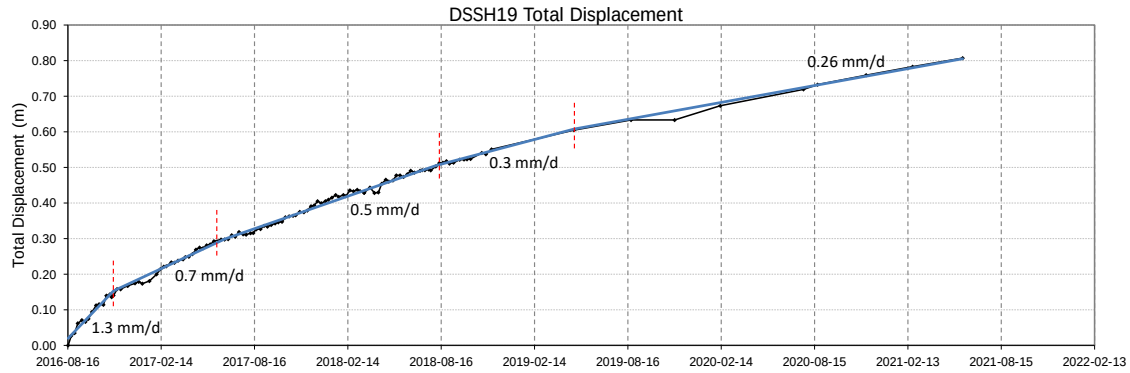


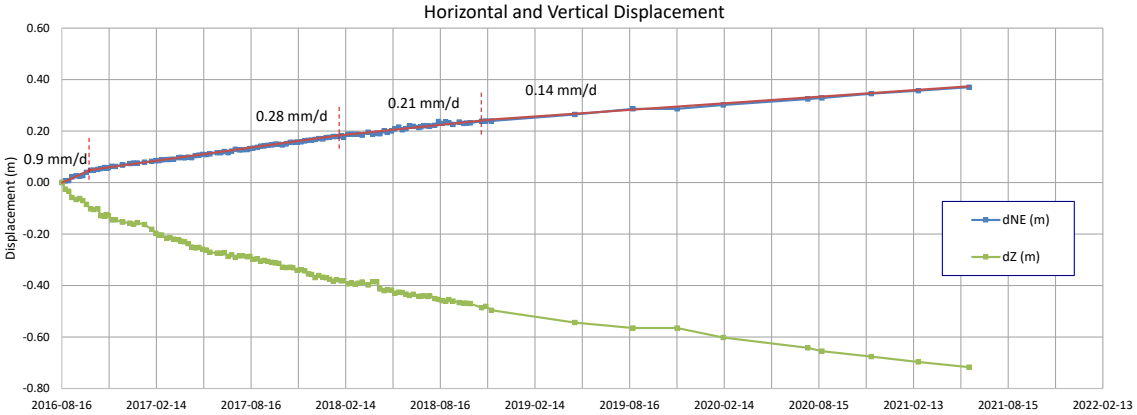
Notes:
Coordinate system is NAD 83 UTM Zone 8.

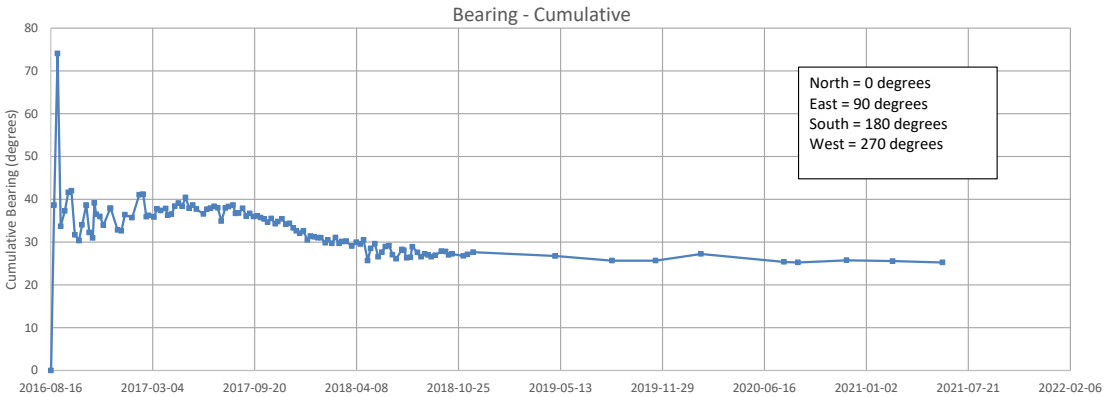
Note:

1. The survey hub was removed in December 2015 prior to MVFES2 construction. The hub was reinstalled in August 2016 following completion of construction.









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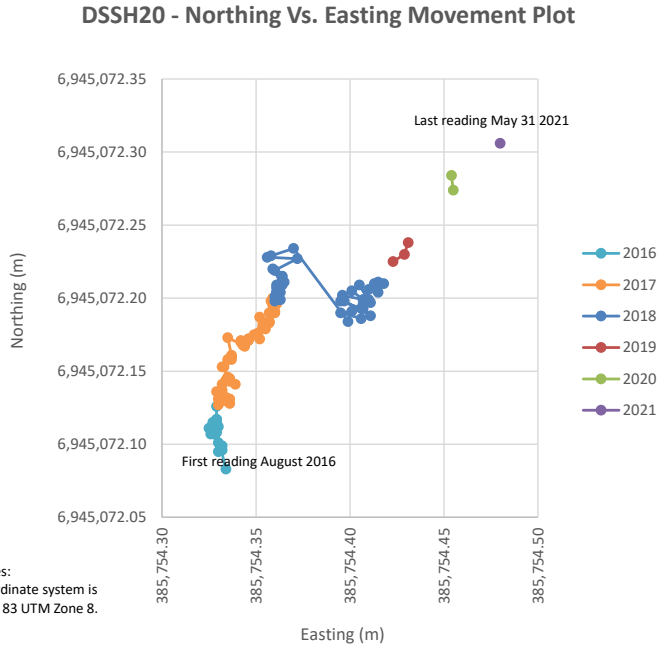
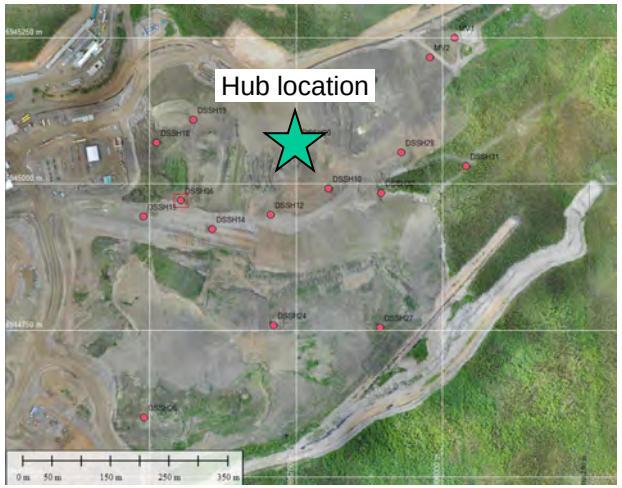
		Survey Hub – DSSH19
Job No: 1CM002.073 Filename: ApD_2021DSTSFLandscape.pptx	Minto Mine	Date: October 2021 / Prepared by PHM / Figure: **8**

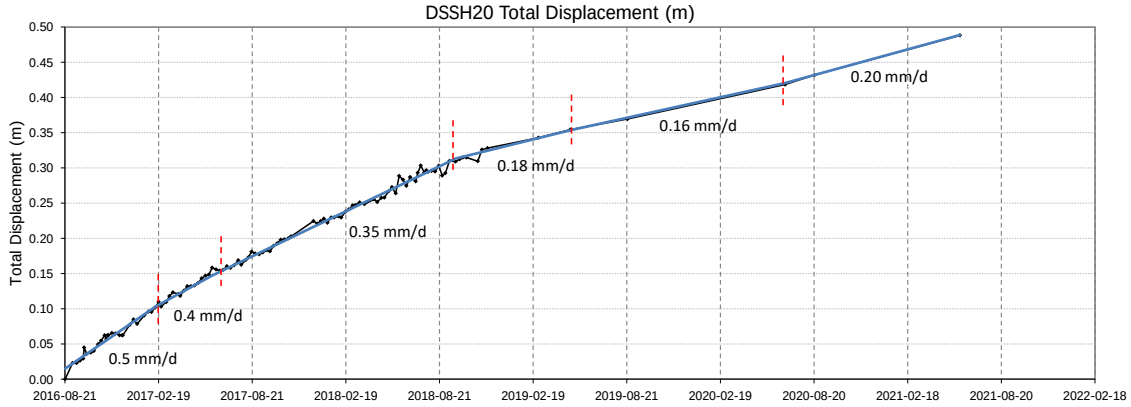


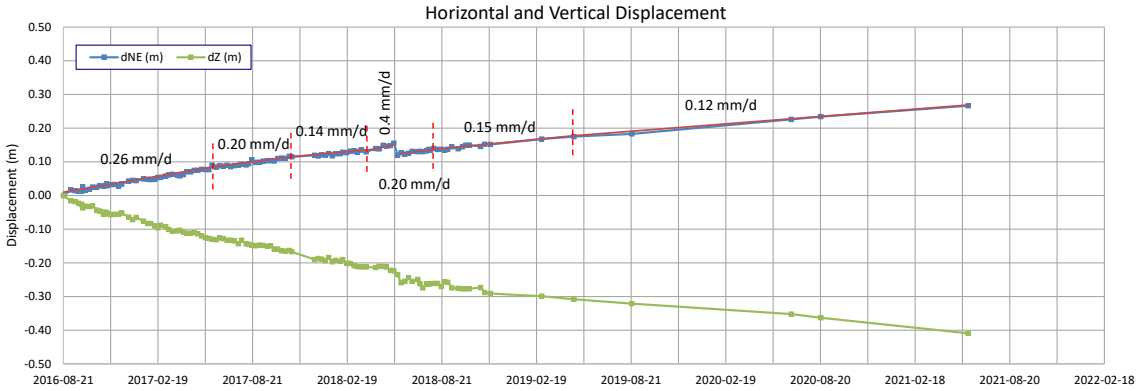
Notes:
Coordinate system is
NAD 83 UTM Zone 8.

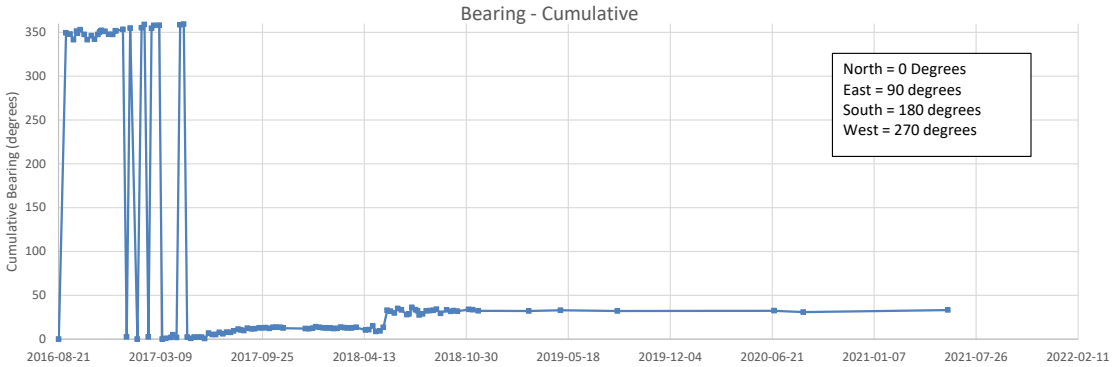
Note:

1. The survey hub was removed in December 2015 prior to MVFES2 construction. The hub was reinstallec August 2016 following completion of construction.









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DSTSF Instrumentation Data

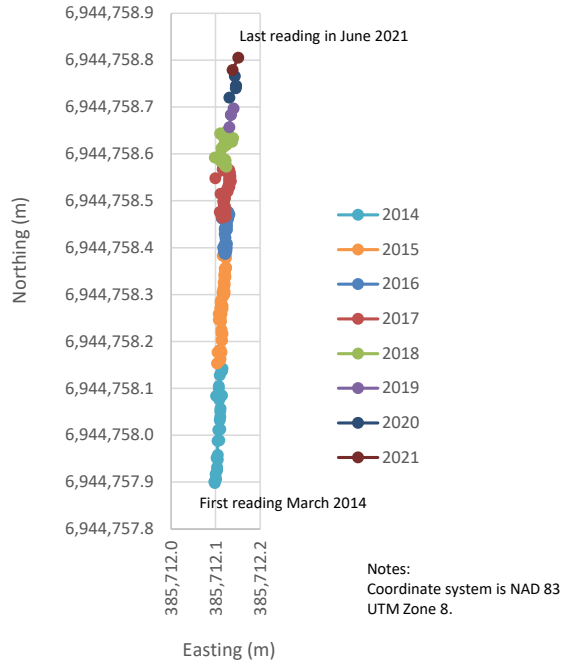
Survey Hub – DSSH20

Job No: 1CM002.073
Filename: ApD_2021DSTSFLandscape.pptx

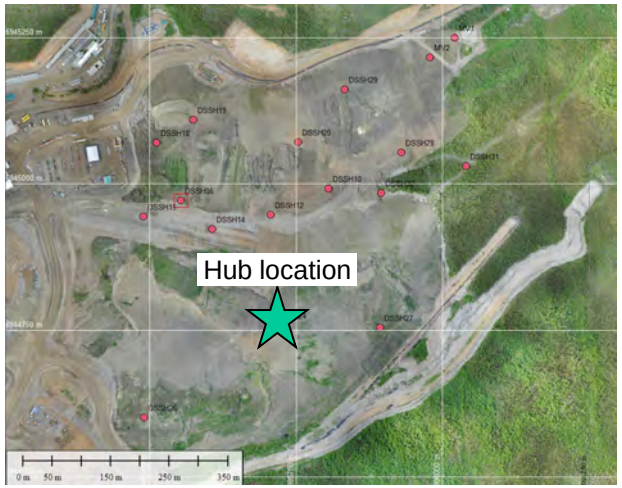
Minto Mine

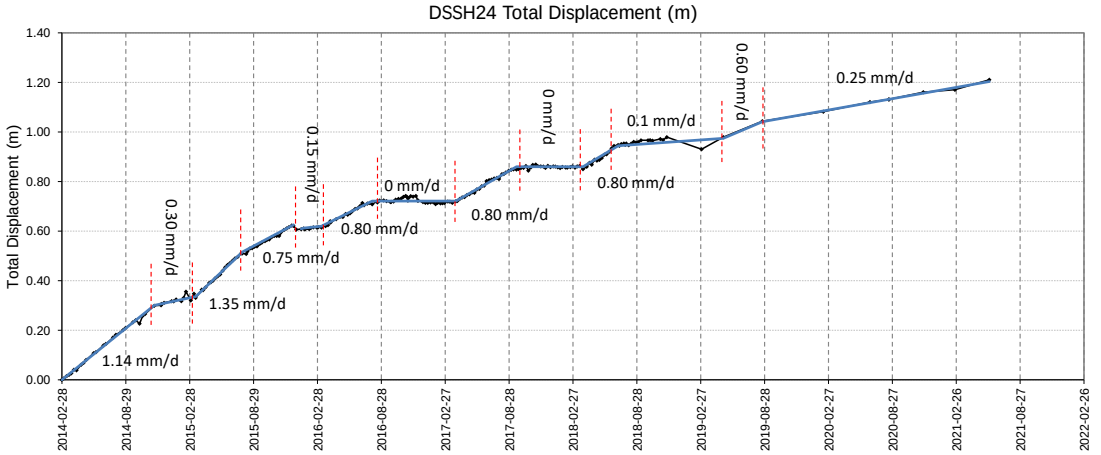
Date: October 2021
Prepared by: PHM
Figure: 9

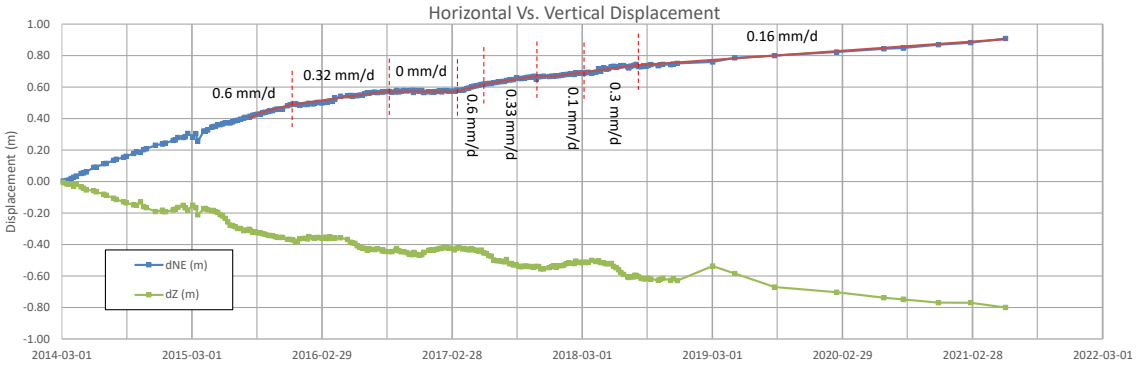
DSSH24 - Northing Vs. Easting Movement Plot

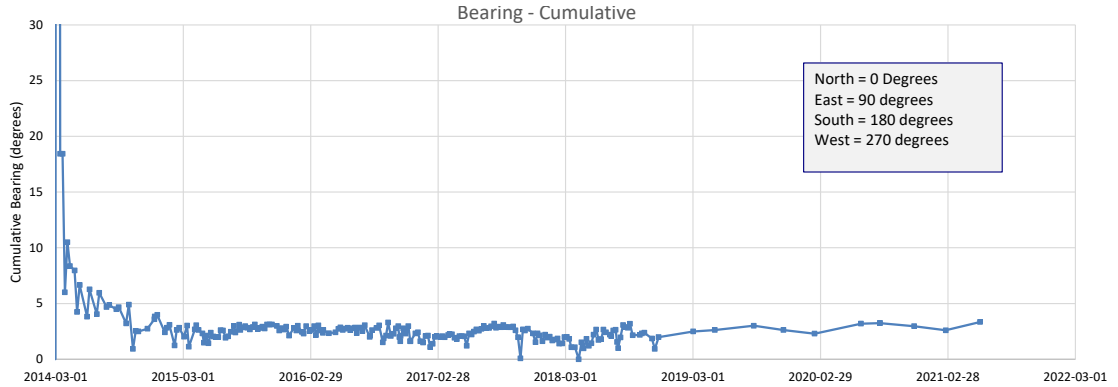


Notes:
Coordinate system is NAD 83
UTM Zone 8.









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DSTSF Instrumentation Data

Survey Hub – DSSH24

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

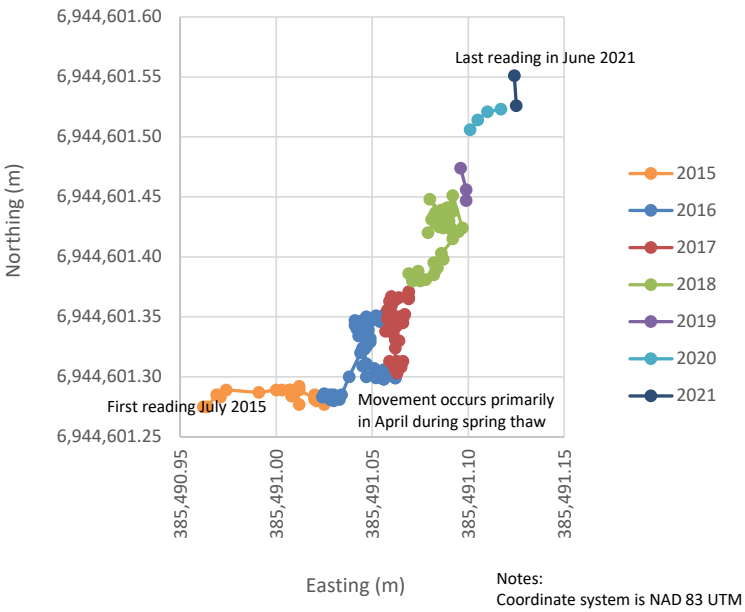
Minto Mine

Date: October 2021

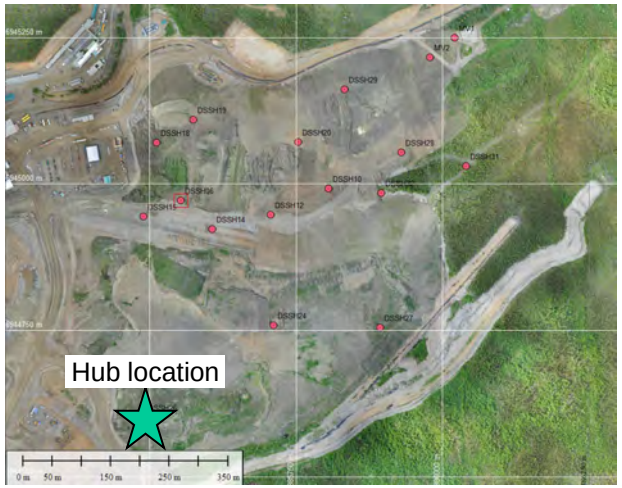
Prepared by PHM

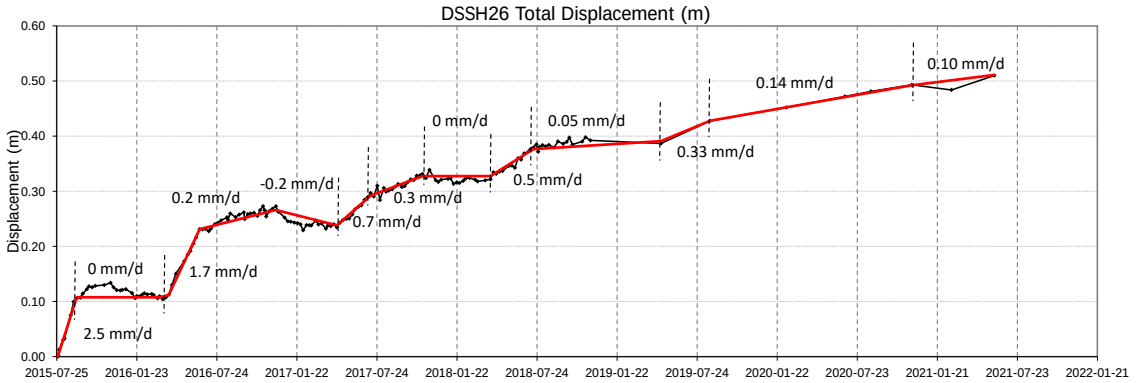
Figure: **10**

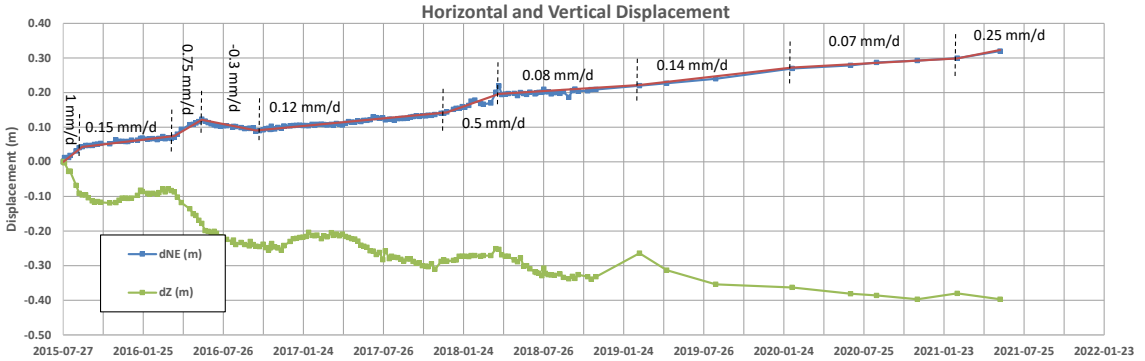
DSSH26 - Northing Vs. Easting Movement Plot

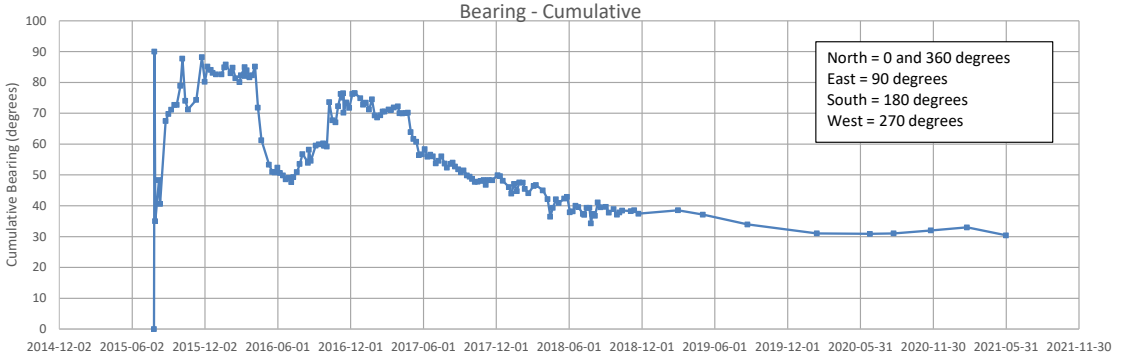


Notes:
Coordinate system is NAD 83 UTM Zone 8.









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DSTSF Instrumentation Data

Survey Hub – DSSH26

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

Date: October 2021

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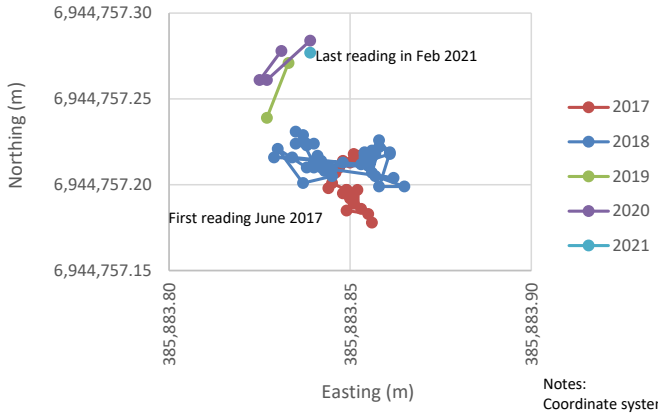
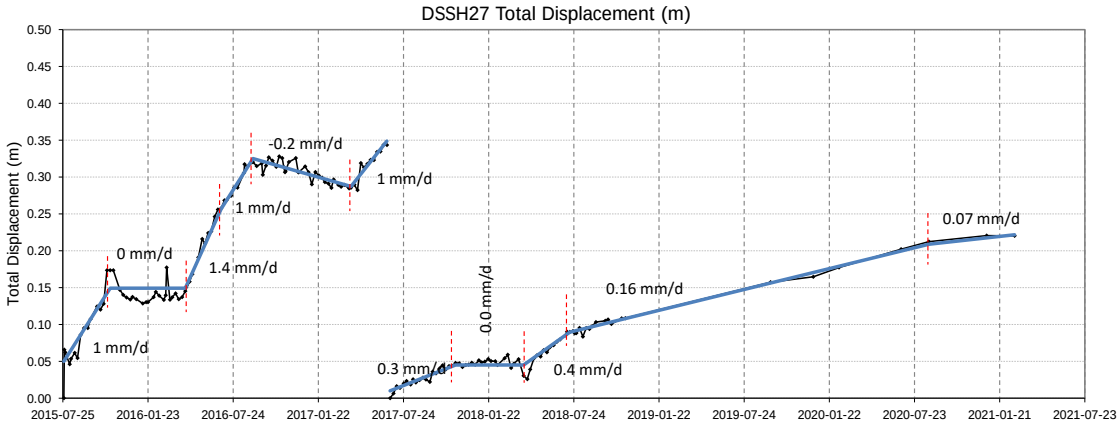
Figure: **11**

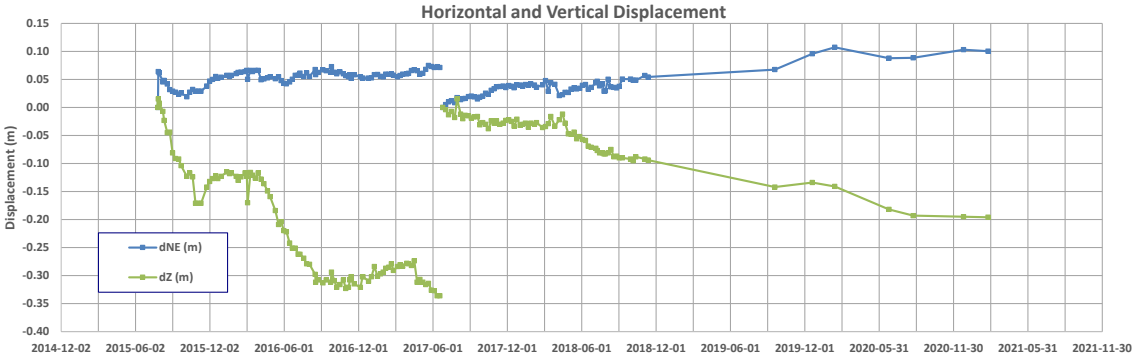


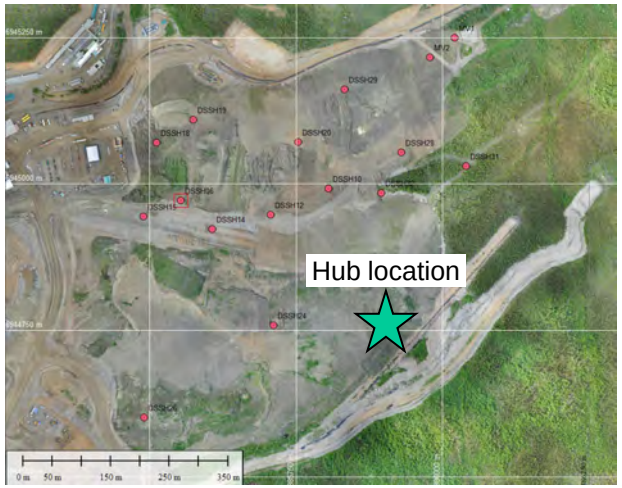
Notes:
Coordinate system is NAD 83 UTM Zo

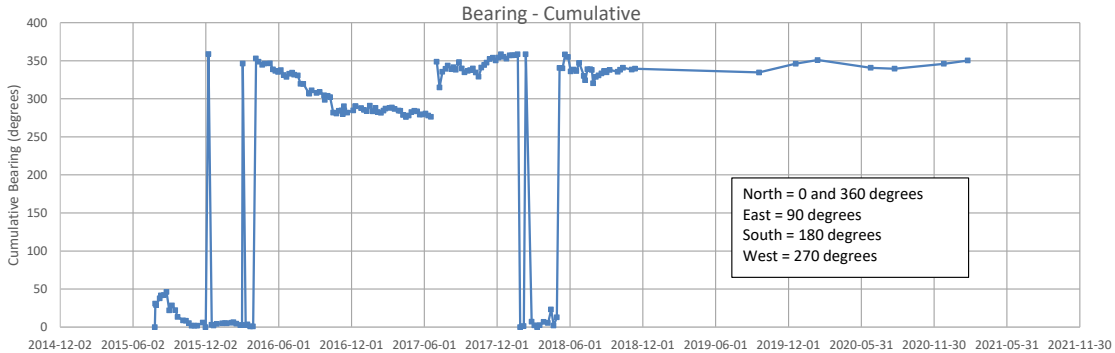


Note:

1. The survey hub was repositioned in June 2017.







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DSTSF Instrumentation Data

Survey Hub – DSSH27

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

Date: October 2021

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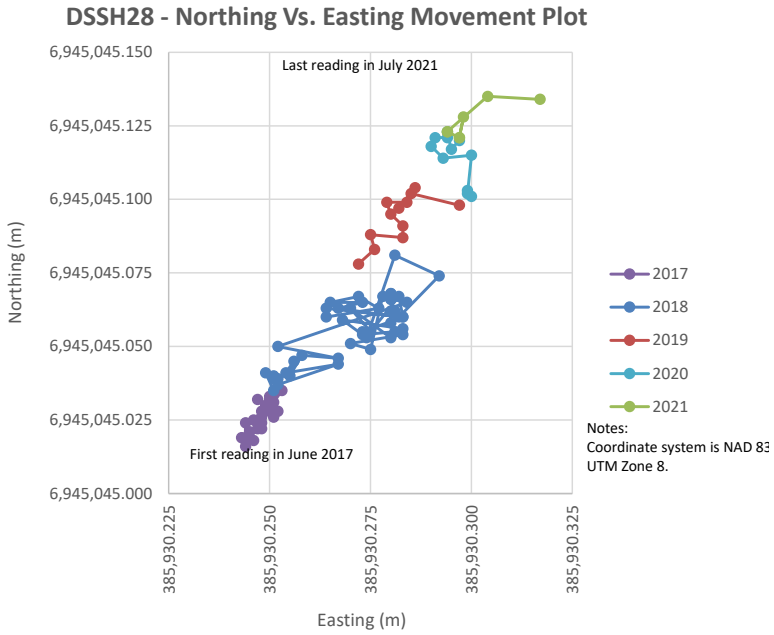
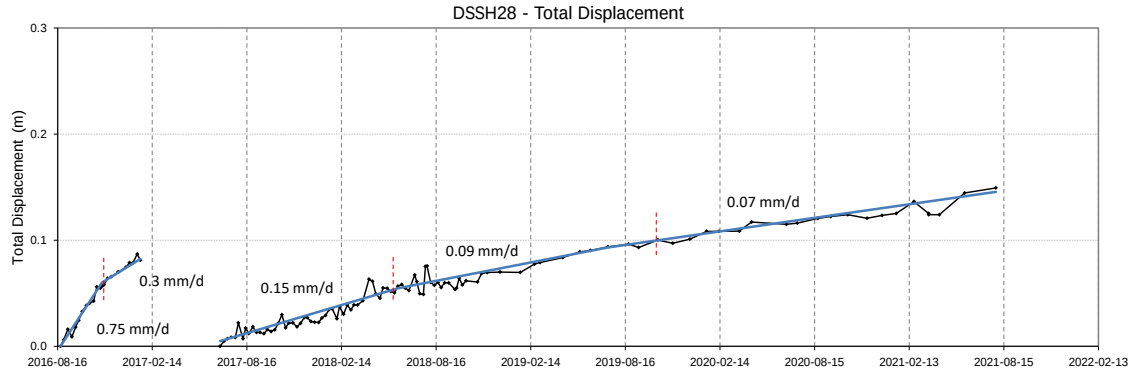
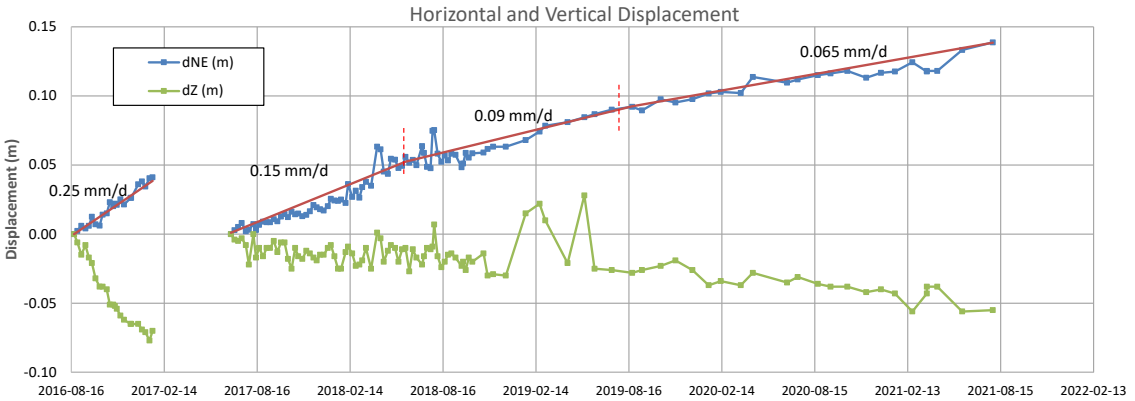
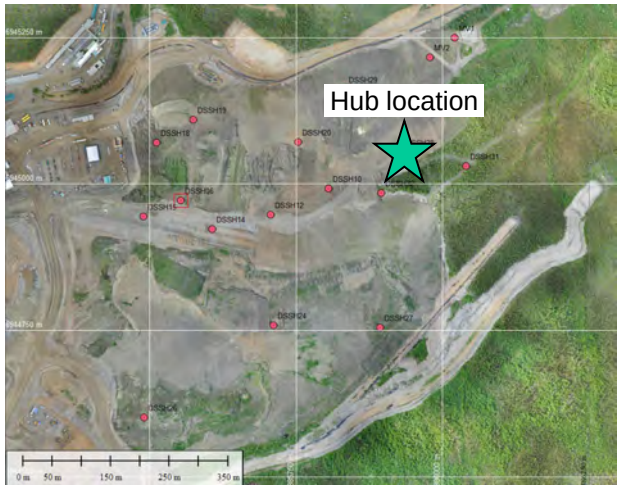
Figure: **12**

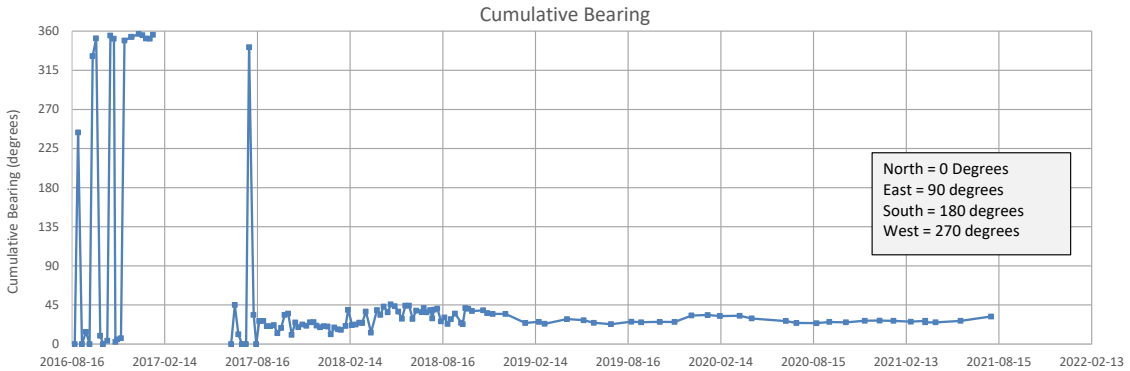


Notes:
Coordinate system is NAD 83 UTM Zone 8.









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DSTSF Instrumentation Data

Survey Hub – DSSH28

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

Date: October 2021

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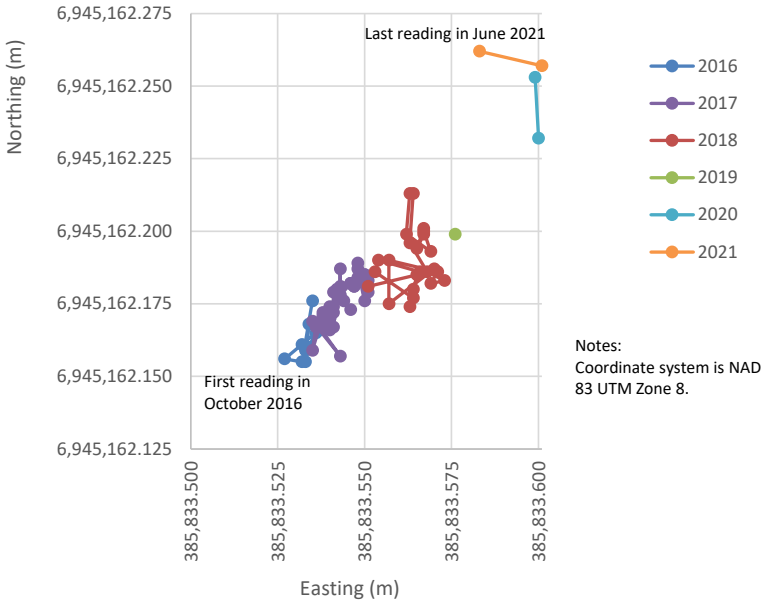
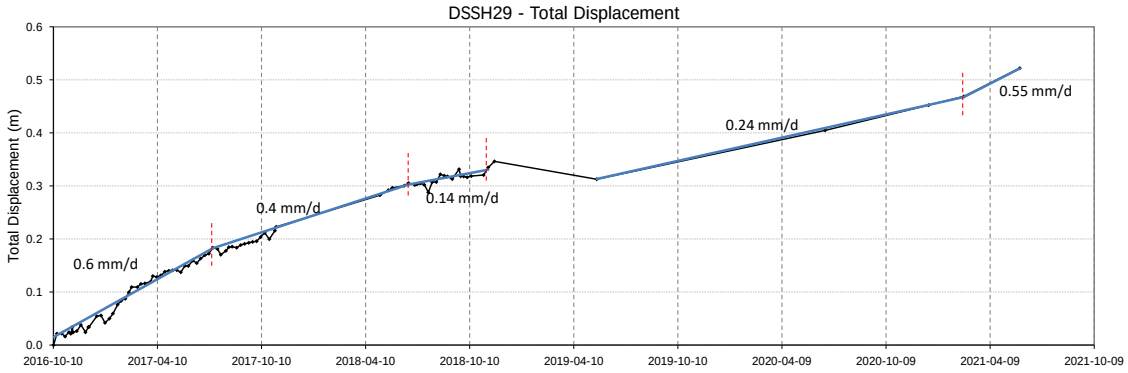
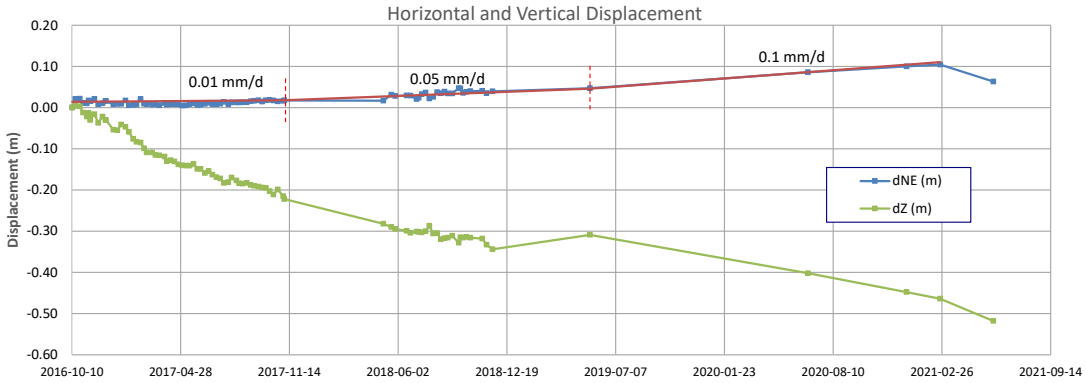
Figure: 13

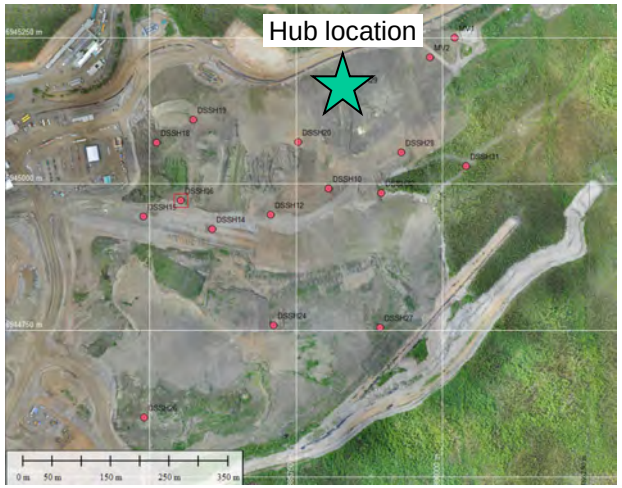
DSSH29 - Northing Vs. Easting Movement Plot

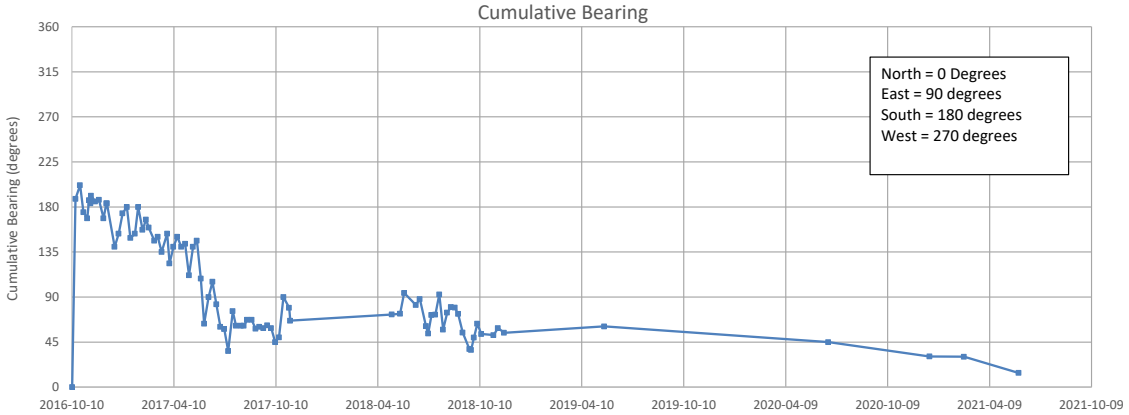


Notes:
Coordinate system is NAD 83 UTM Zone 8.









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DSTSF Instrumentation Data

Survey Hub – DSSH29

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

Date: October 2021

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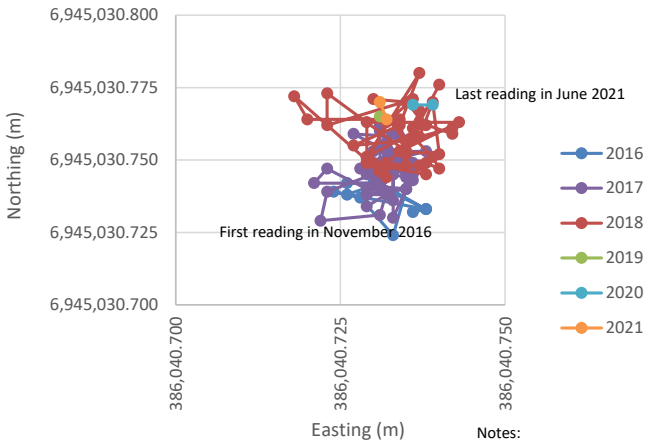
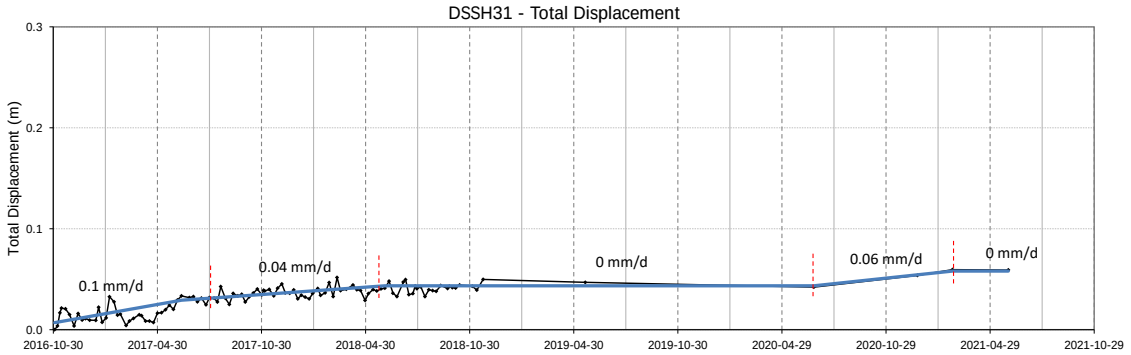
Figure: 14

DSSH31 - Northing Vs. Easting Movement Plot

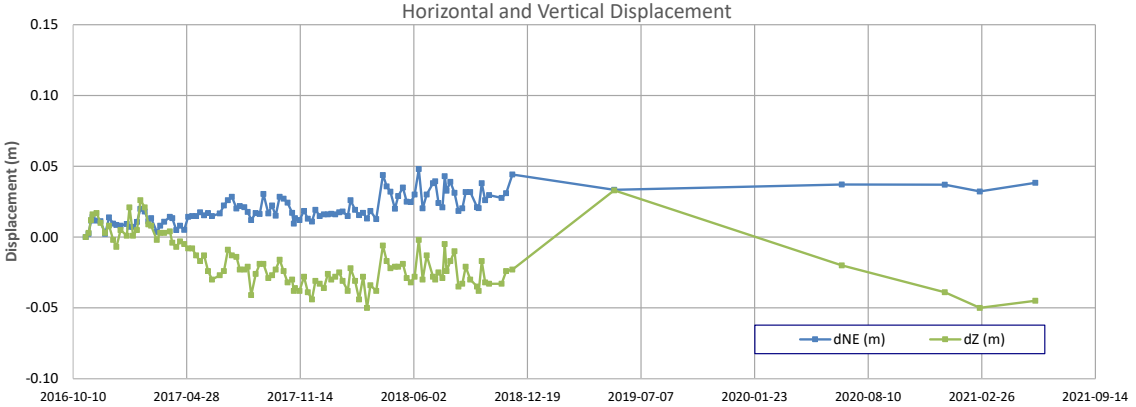


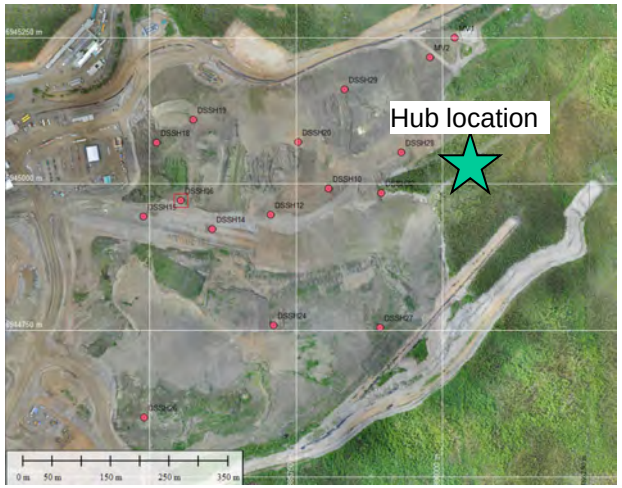
Notes:
Coordinate system is NAD 83 UTM Zone 8.

DSSH31 - Total Displacement

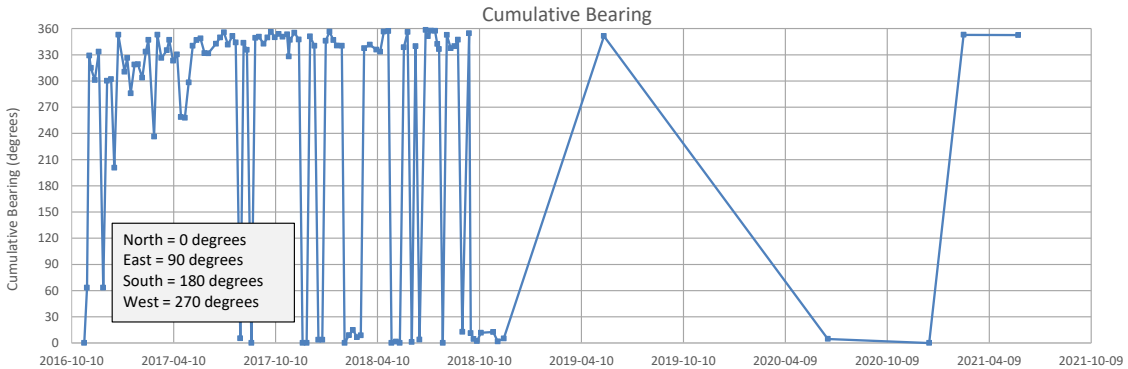


Horizontal and Vertical Displacement





Cumulative Bearing



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Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

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DSTSF Instrumentation Data

Survey Hub – DSSH31

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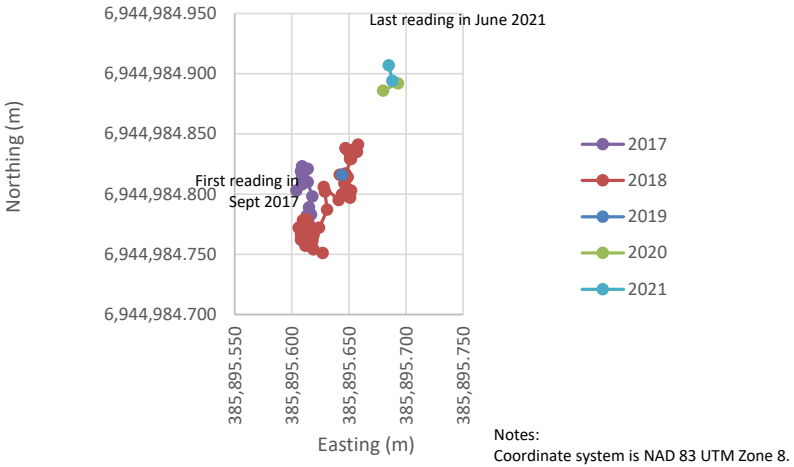
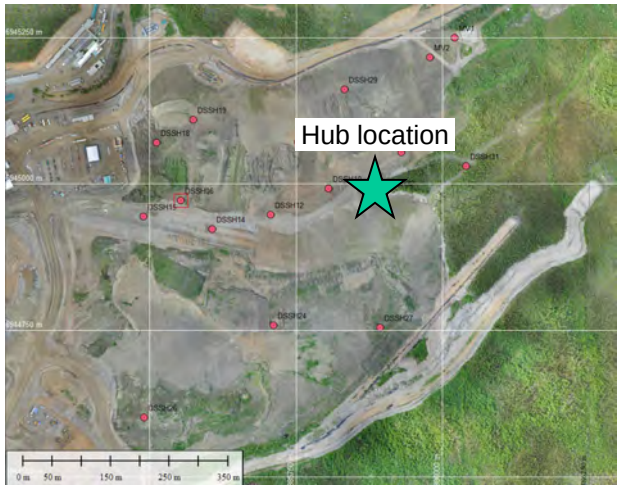
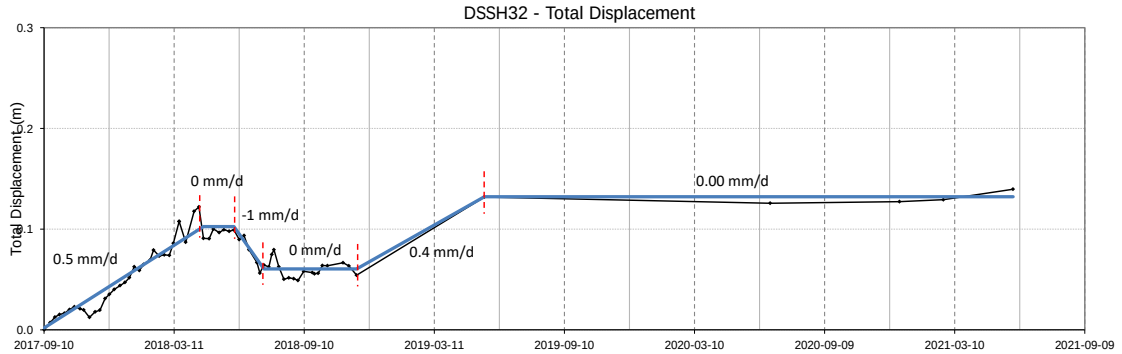
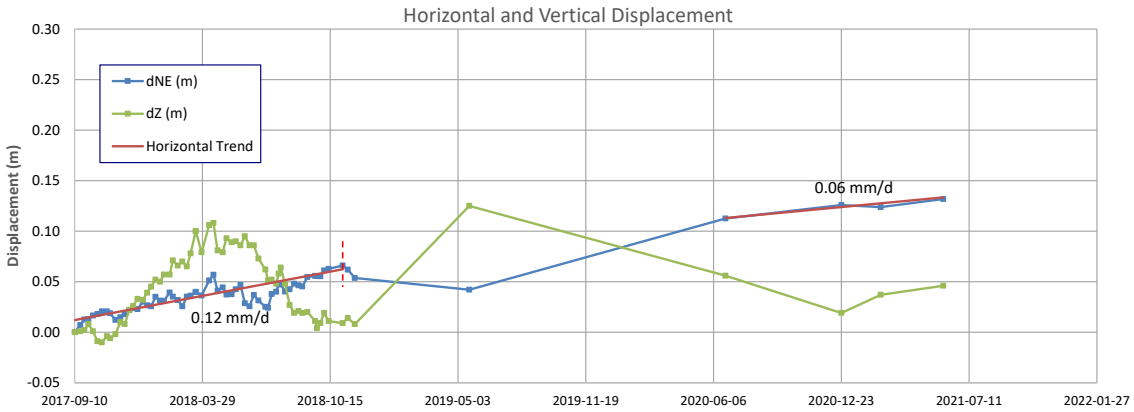
DSSH32 - Northing Vs. Easting Movement Plot

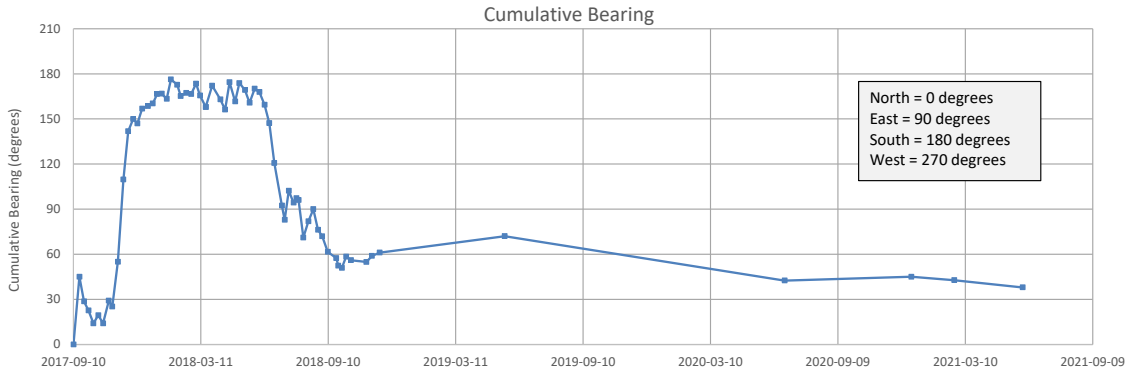


Notes:
Coordinate system is NAD 83 UTM Zone 8.









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DSTSF Instrumentation Data

Survey Hub – DSSH32

Job No: 1CM002.073

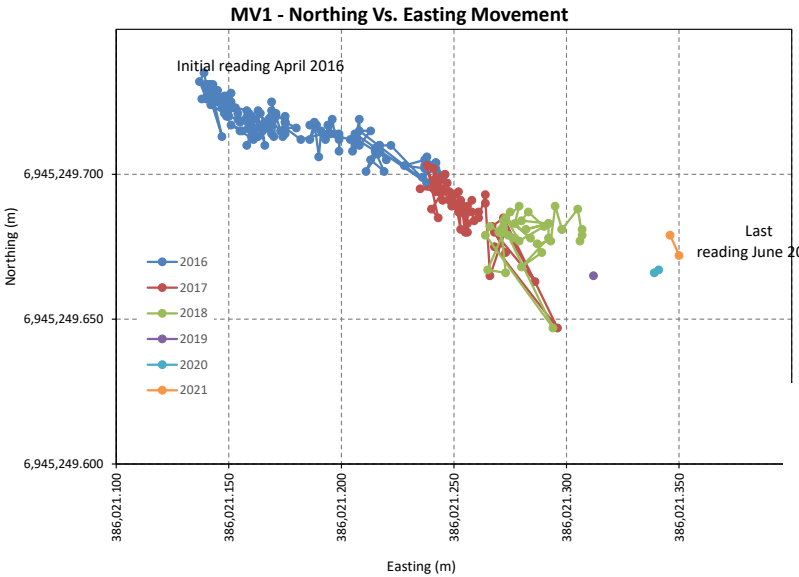
Filename: ApD_2021DSTSFLandscape.pptx

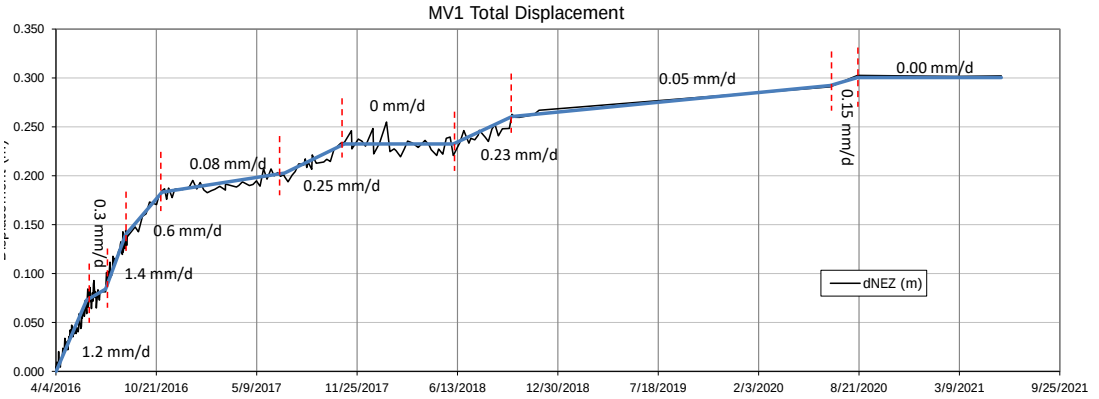
Minto Mine

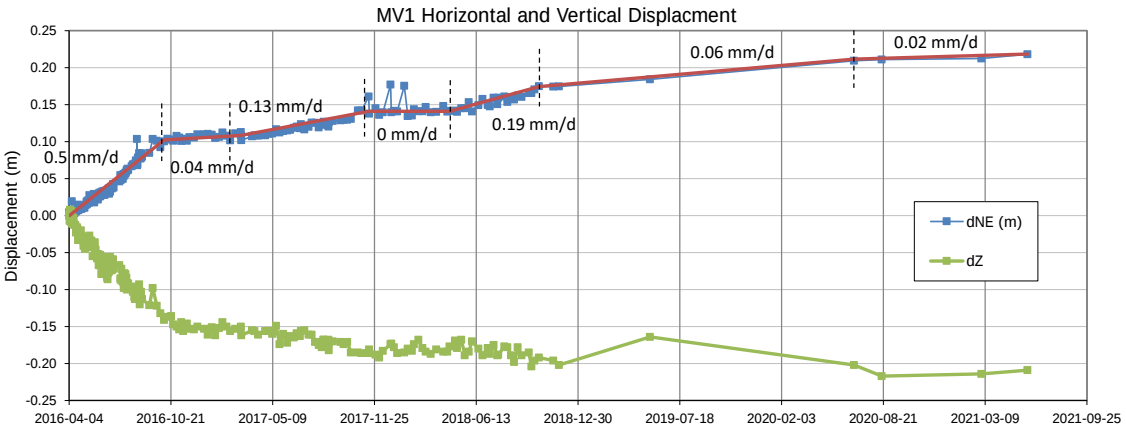
Date: October 2021

Prepared by PHM

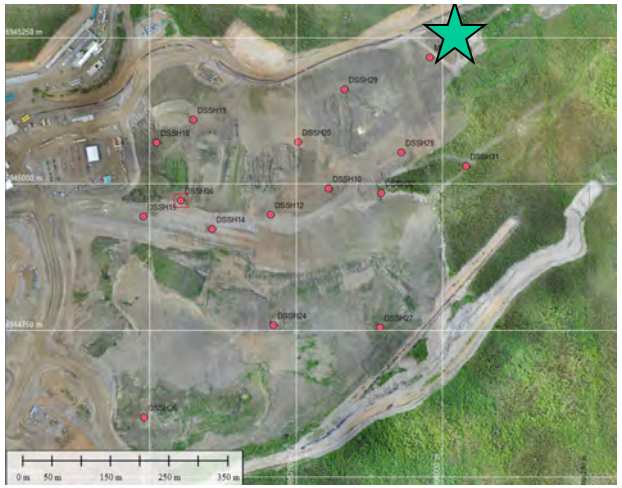
Figure: **16**

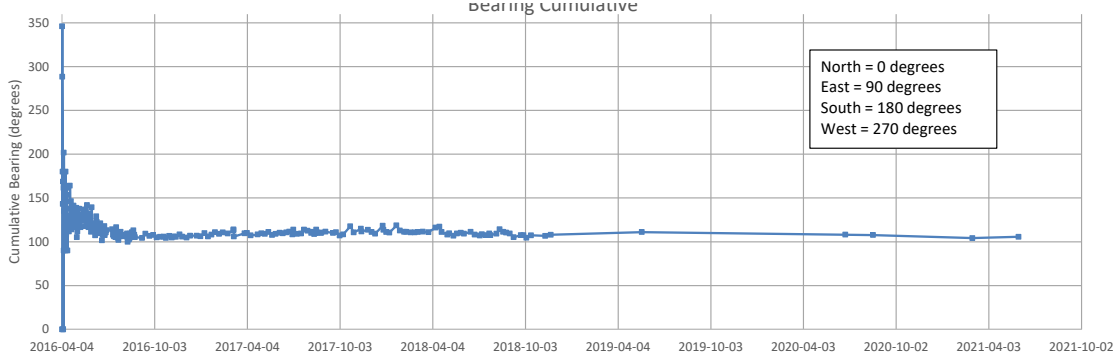






Hub location





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DSTSF Instrumentation Data

Survey Hub – MV1

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

Date:	Prepared by	Figure:
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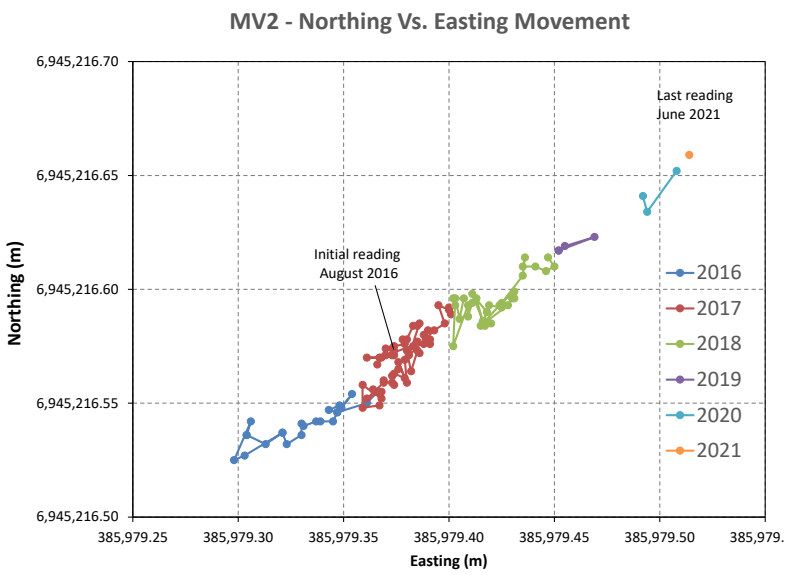
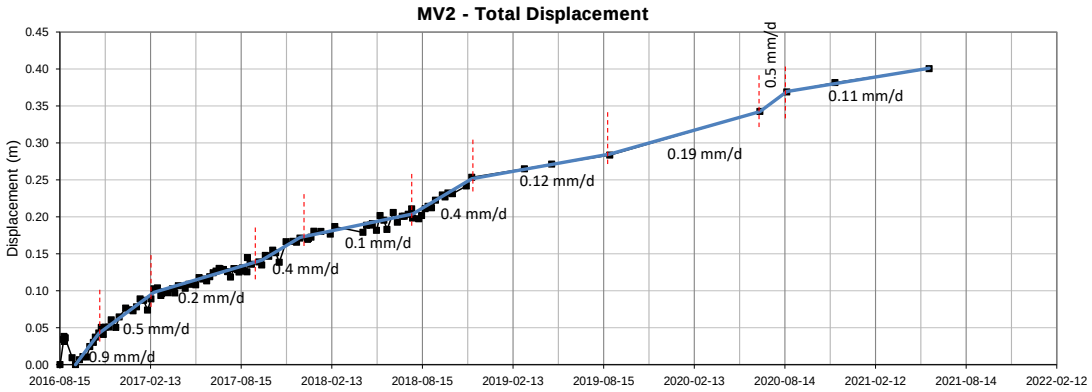
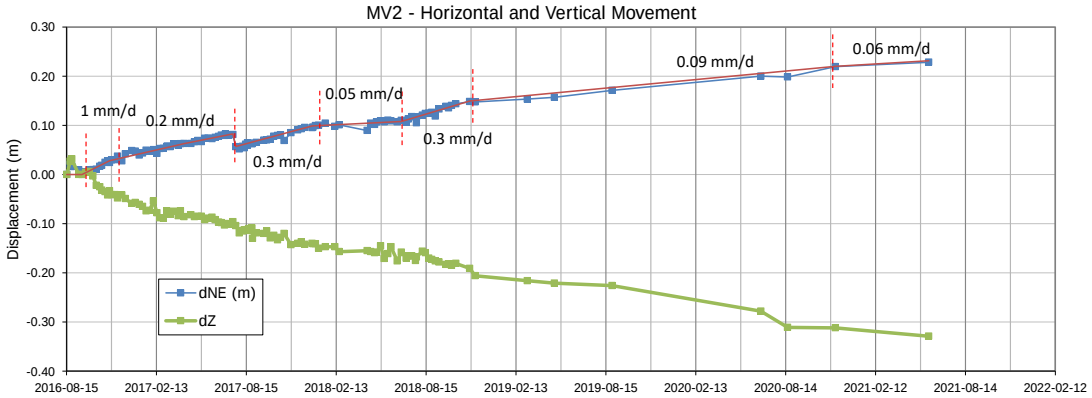
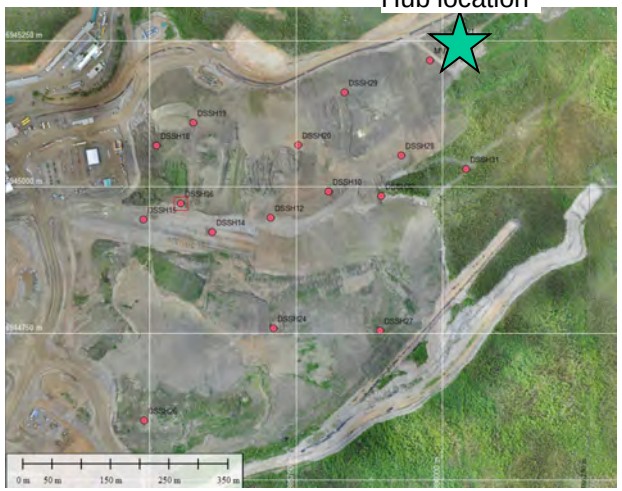
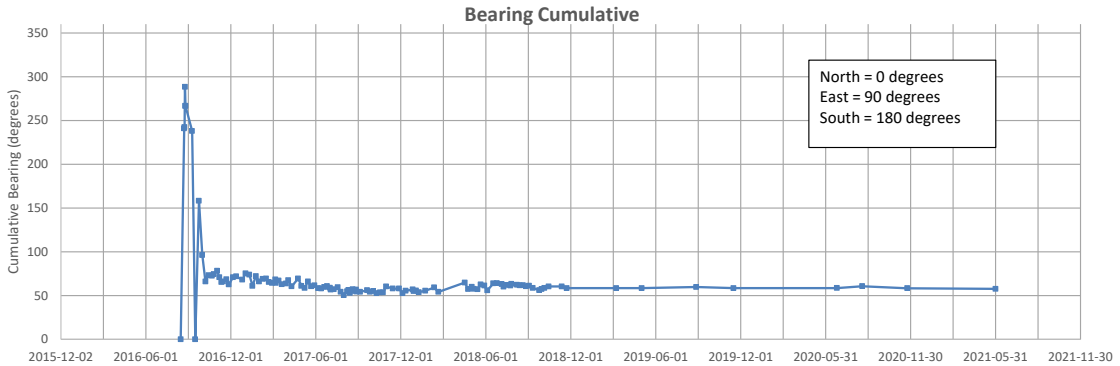






Hub location





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DSTSF Instrumentation Data

Survey Hub – MV2

Job No: 1CM002.073

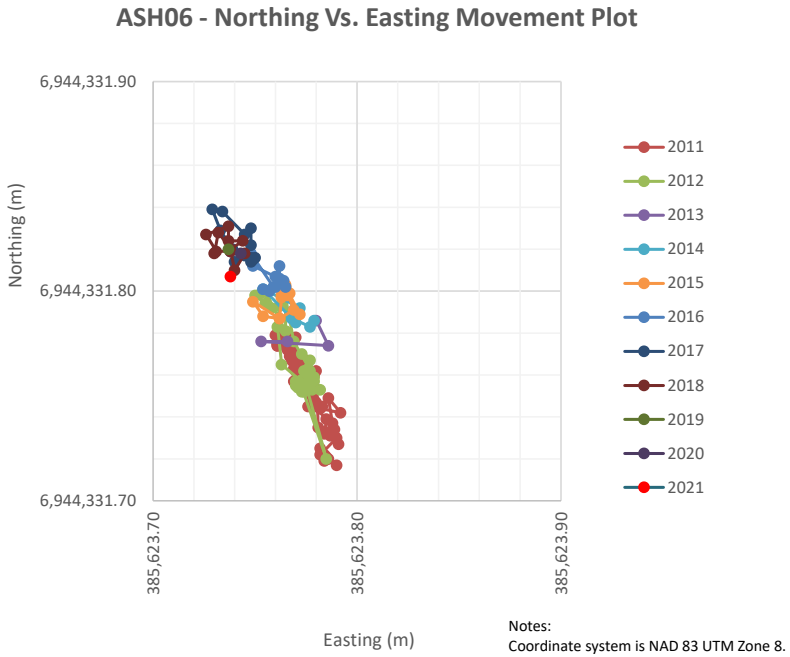
Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

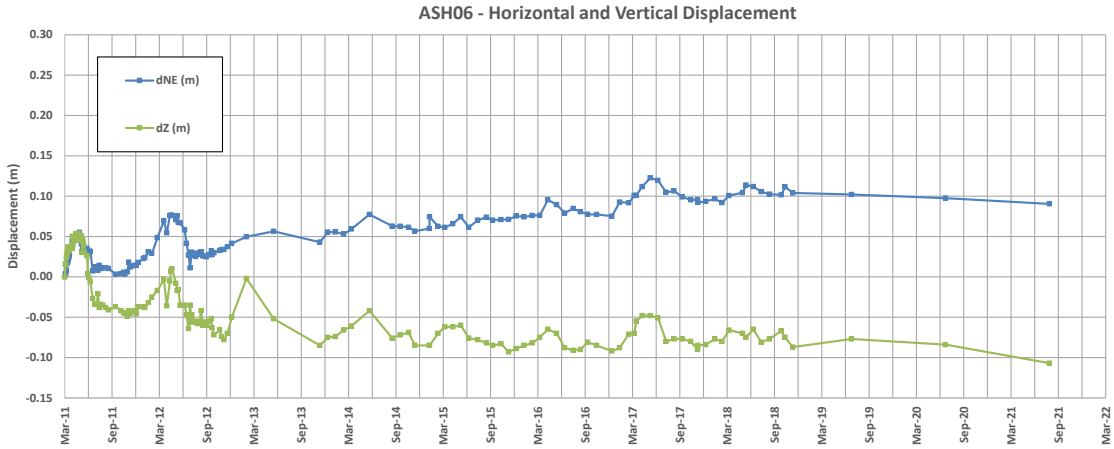
Date: October 2021

Prepared by PHM

Figure: **18**

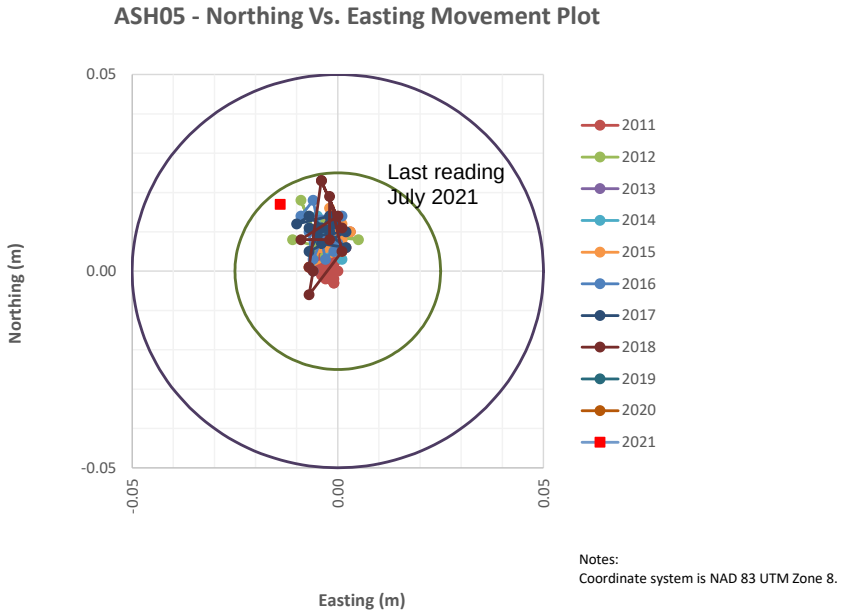


Notes:
Coordinate system is NAD 83 UTM Zone 8.



Notes:

1. Minto's survey reading comments on January 14, 2017 notes ASH06 may have been disturbed as a result of a pipeline installation.



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DSTSF Instrumentation Data

Survey Hubs – ASH05 and ASH06

Job No: 1CM002.073

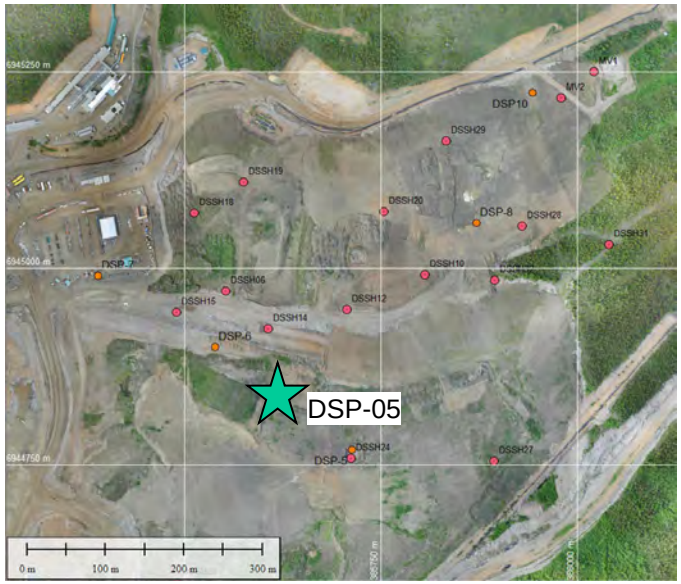
Filename: ApD_2021DSTSFLandscape.pptx

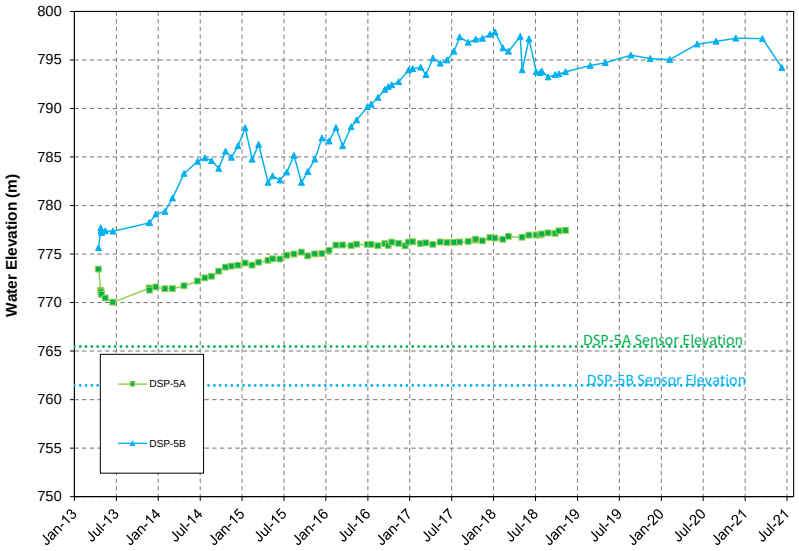
Minto Mine

Date: October 2021

Prepared by: PHM

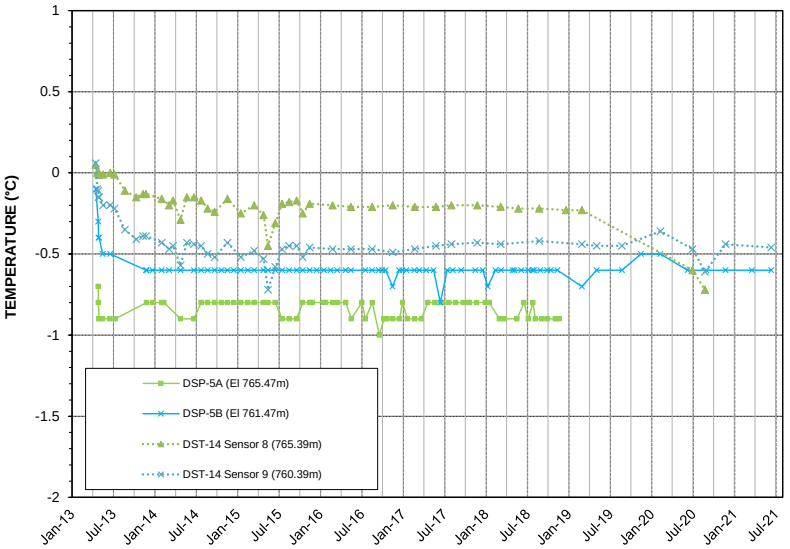
Figure: **19**





Notes:

1. The pore pressure sensors at DSP-05 are located approximately 2 m above original ground in tailings (A) and 2 m below original ground.
2. The bottom sensor at DSP-05 (B) shows an increase in pore pressure that peaked in 2018, and is since fluctuating between 793 and 797 m. The sensor is located in an area of silt with stratified ice lenses and the temperature at the sensor is near the freezing point of water -0.6°. The temperature plot also shows thermistor data from nearby ground temperature cable DST-14 for sensors at similar elevations.
3. Sensors at DSP-05A also shows gradual increasing pore pressure trend, with the sensor becoming malfunctional in February 2019.



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DSTSF Instrumentation Data

Piezometer – DSP-05

Job No: 1CM002.073

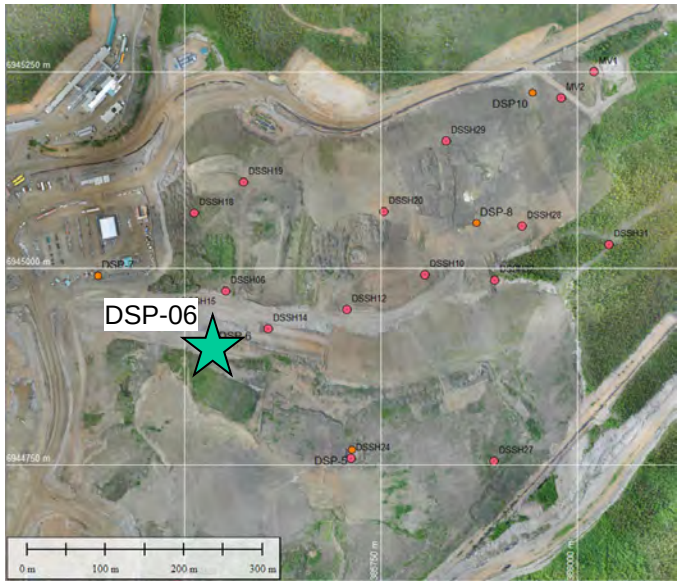
Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

Date: October 2021

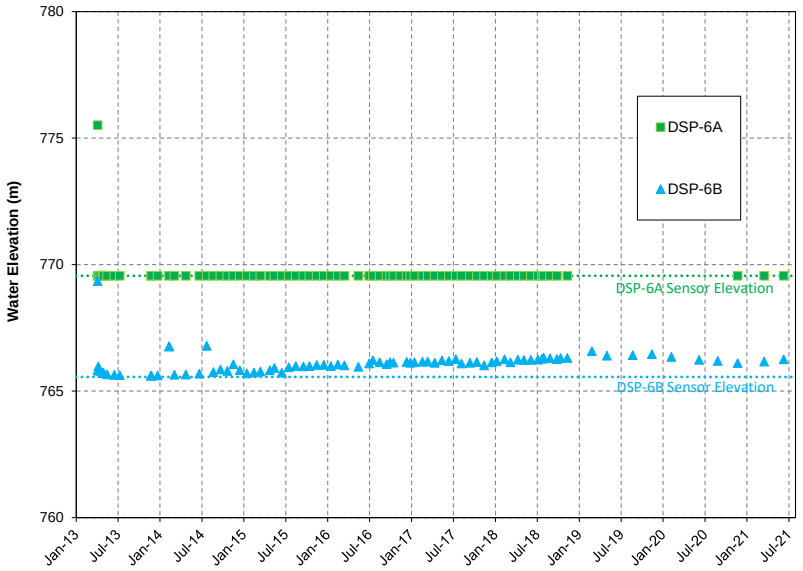
Prepared by PHM

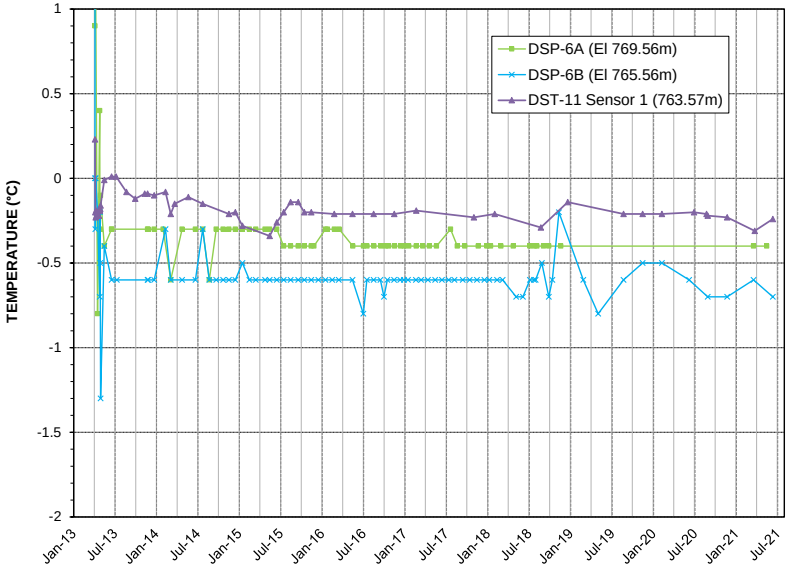
Figure: **20**



Notes:

1. The pore pressure sensors at DSP-06 are located approximately 2 m above original ground in tailings (A) and 2 m below original ground (B).
2. DSP-06A shows no pore pressure (pore pressure equal to the sensor elevation).
3. The bottom sensor at DSP-06B showed a gradual increasing pore pressure trend that peaked in February 2019 and has since decreased.





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DSTSF Instrumentation Data

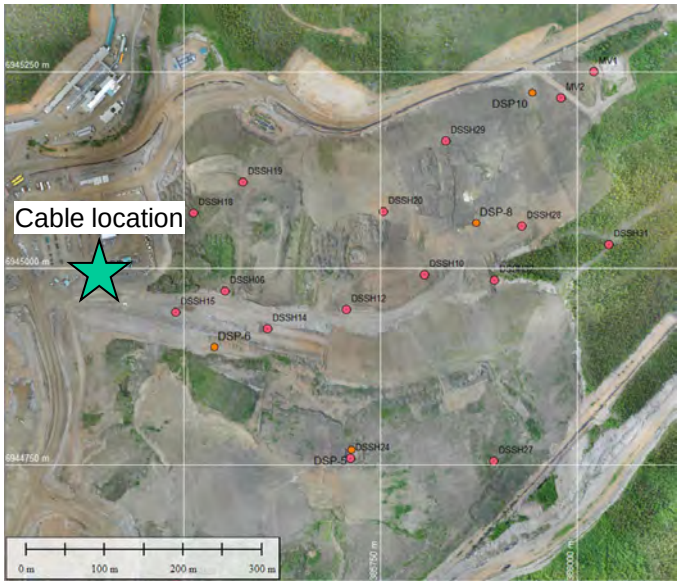
Piezometer – DSP-06

Job No: 1CM002.073

Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

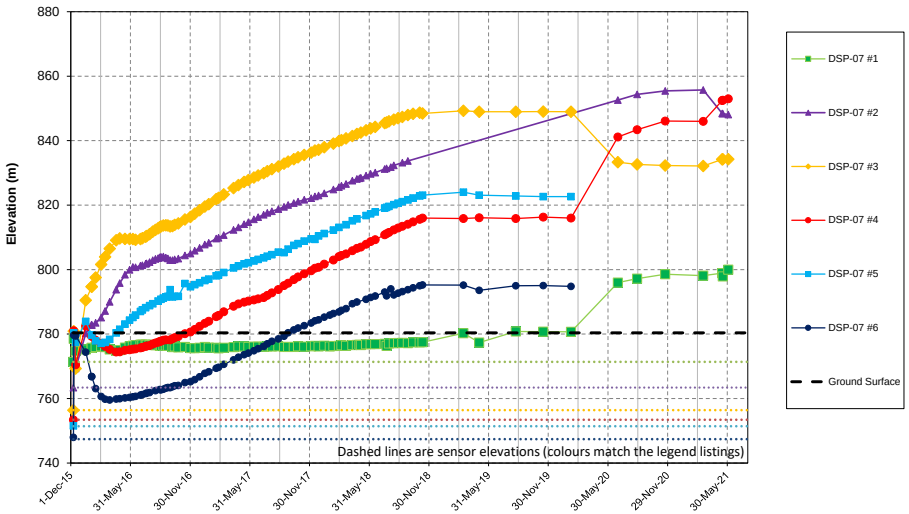
Date:	Prepared by	Figure:
October 2021	PHM	21

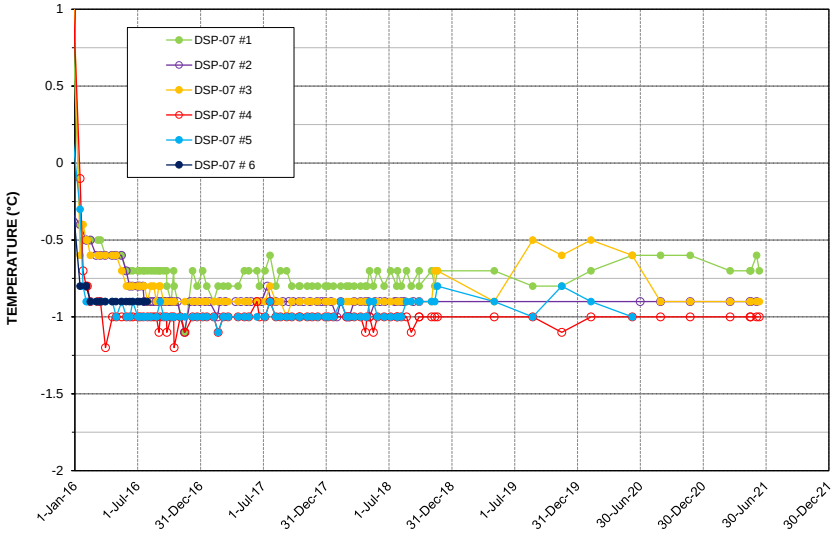


Sensor #	Stratigraphy, Ice Description	Ice Description
1	Silt. Some clay, little sand, trace gravel, soft, wet, medium plastic, varved.	Vr, Ice/moisture content up to 50%.
2	Sand, few gravel, loose, unrounded, no fines.	Vr. Mostly no visible ice, some small random ice lenses up to 1.5 cm thick.
3	Clay, some silt, trace gravel and sand, wet, high plastic. (MC=50%)	Vr; Approx. 50% ice, lenses between 2 and 20 mm thick, parallel and nearly horizontal, interbedded with clay.
4		
5		
6	Weathered Bedrock; Highly weathered granite. Rust staining. Friable.	Nbn. No excess ice.

Notes:

1. Sensors #5 and #6 are no longer operational.





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DSTSF Instrumentation Data

Piezometer – DSP-07

Job No: 1CM002.073

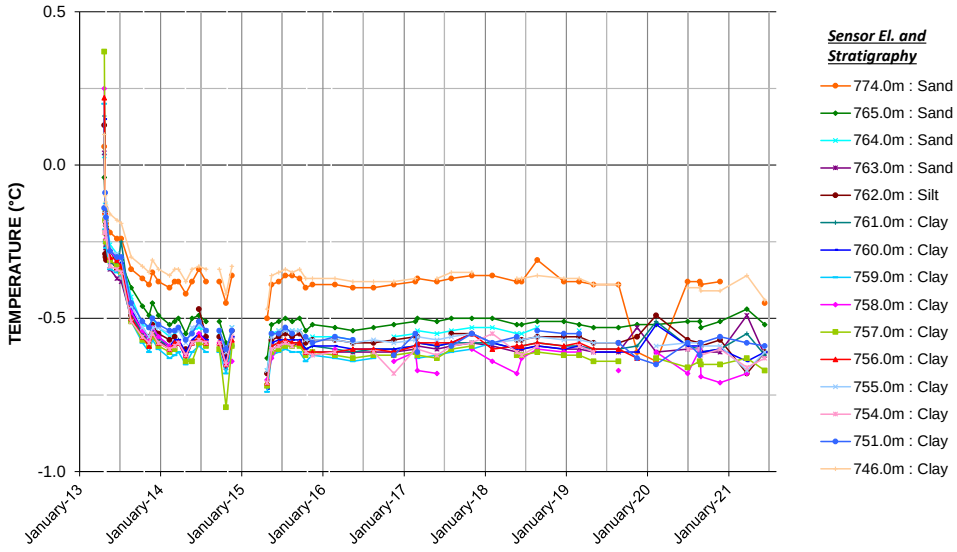
Filename: ApD_2021DSTSFLandscape.pptx

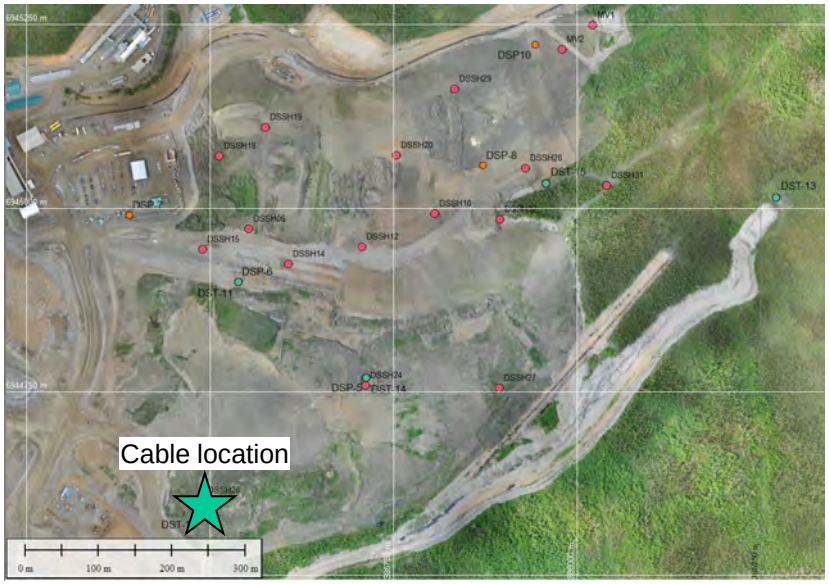
Minto Mine

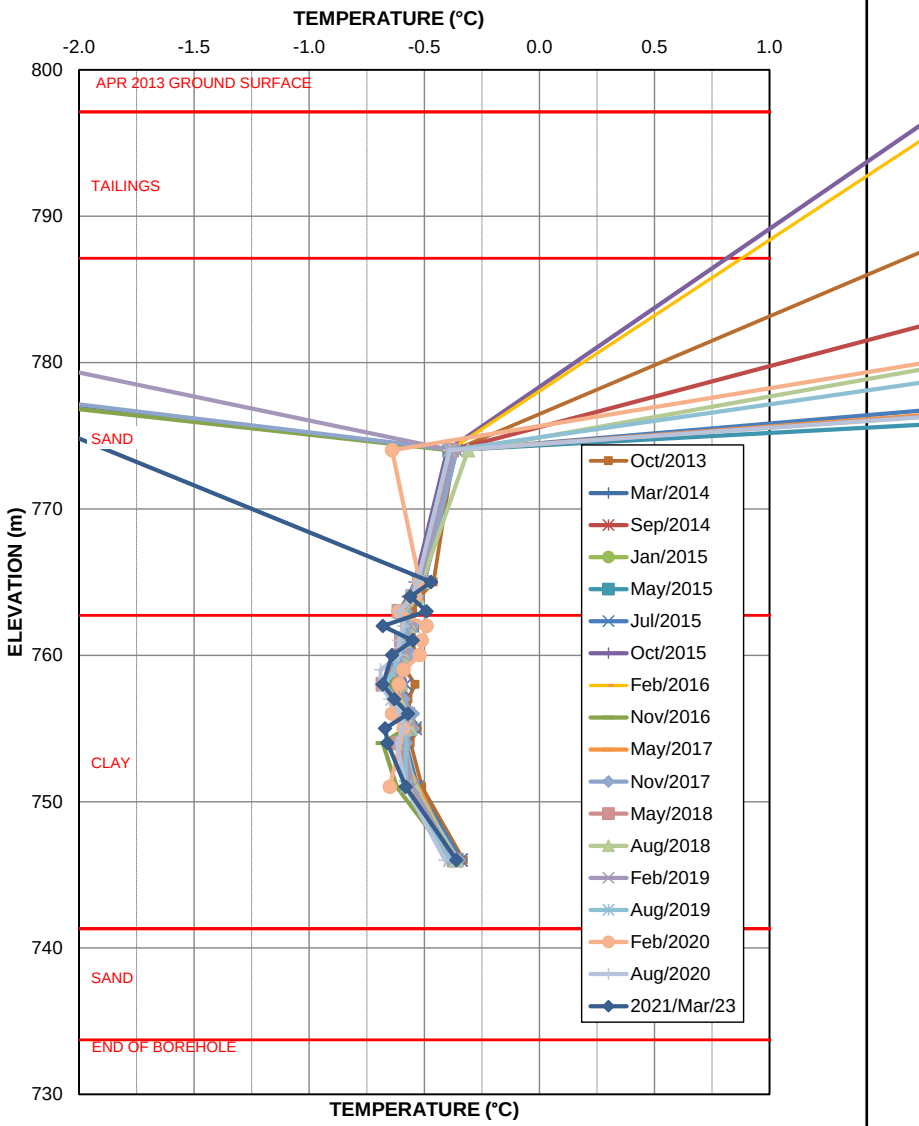
Date: October 2021

Prepared by PHM

Figure: 22







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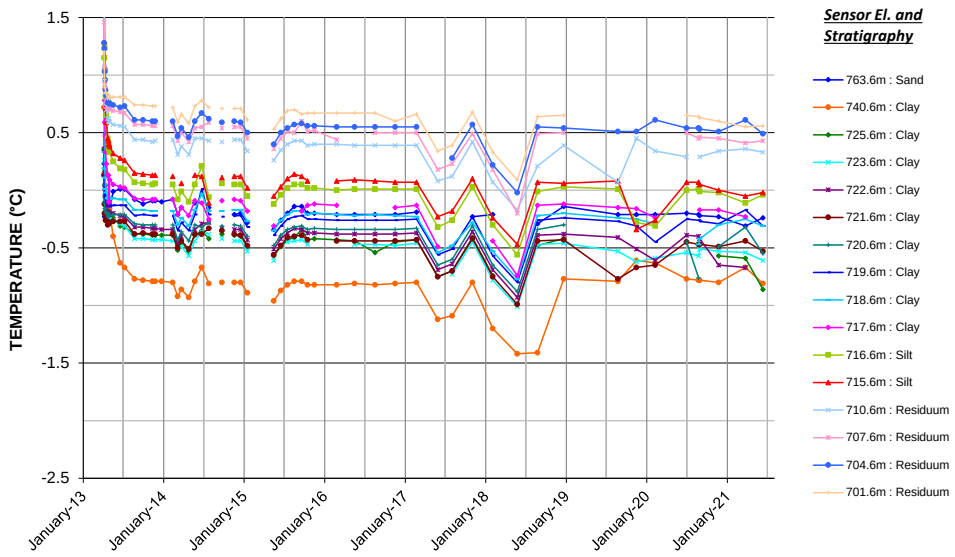
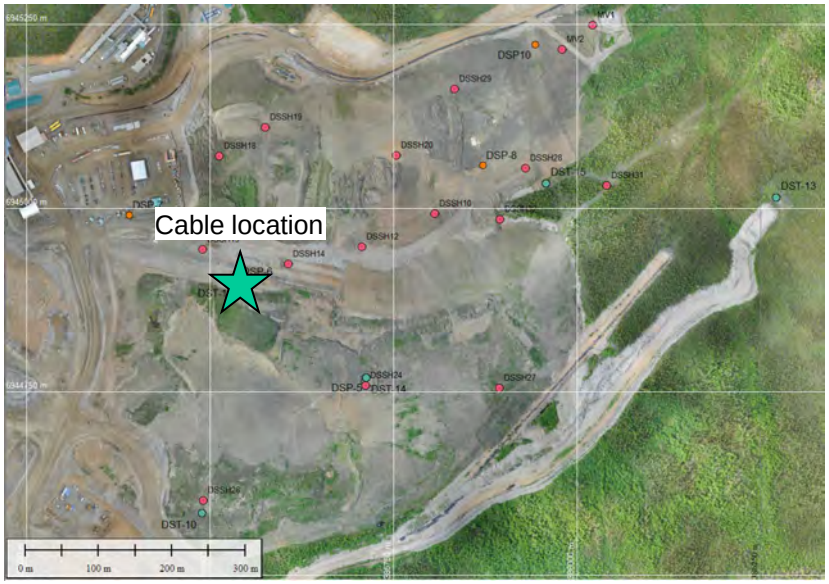
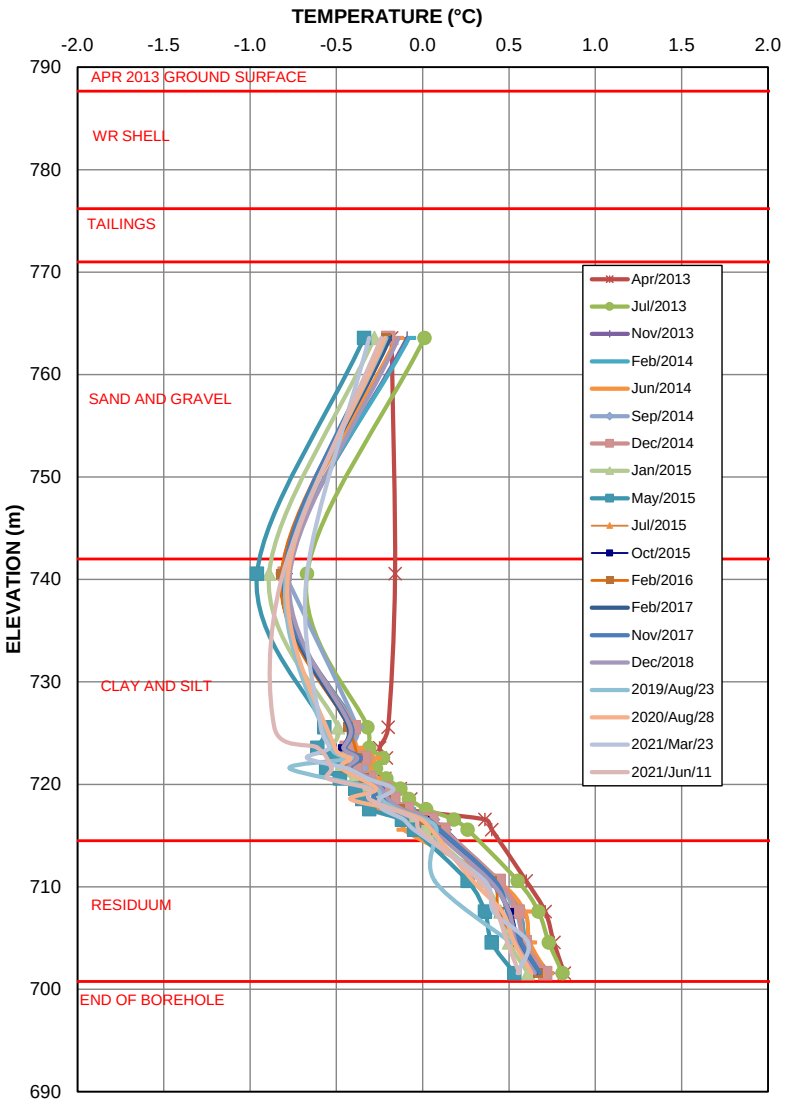
Job No: 1CM002.073 Filename: ApD_2021DSTSFLandscape.pptx	Minto Mine	**Temperature Cable – DST-10**
		Date: October 2021 / Prepared by: PHM / Figure: **23**







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MINTO

DSTSF Instrumentation Data

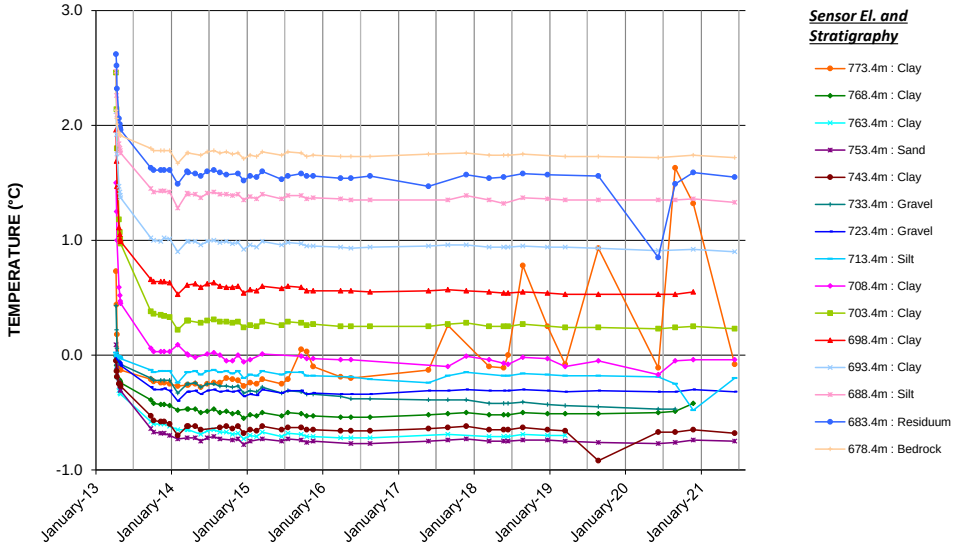
Temperature Cable – DST-11

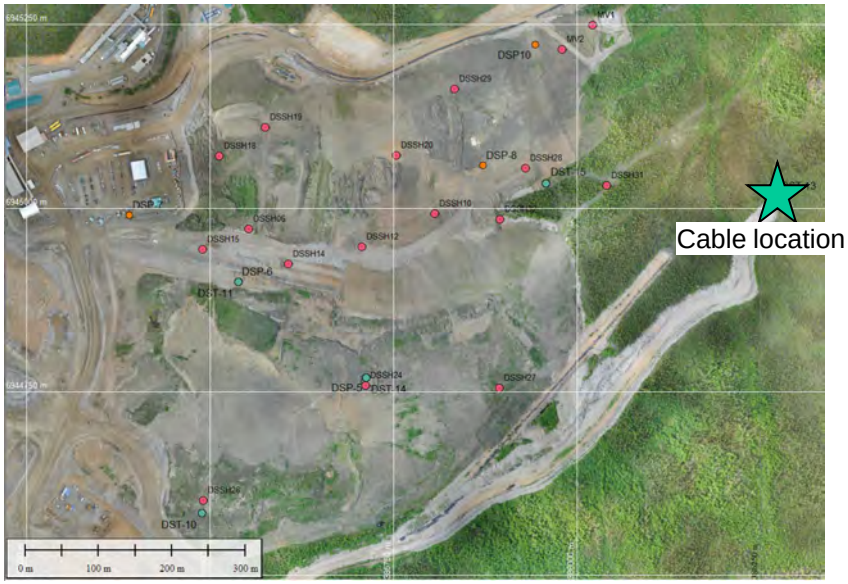
Job No: 1CM002.073

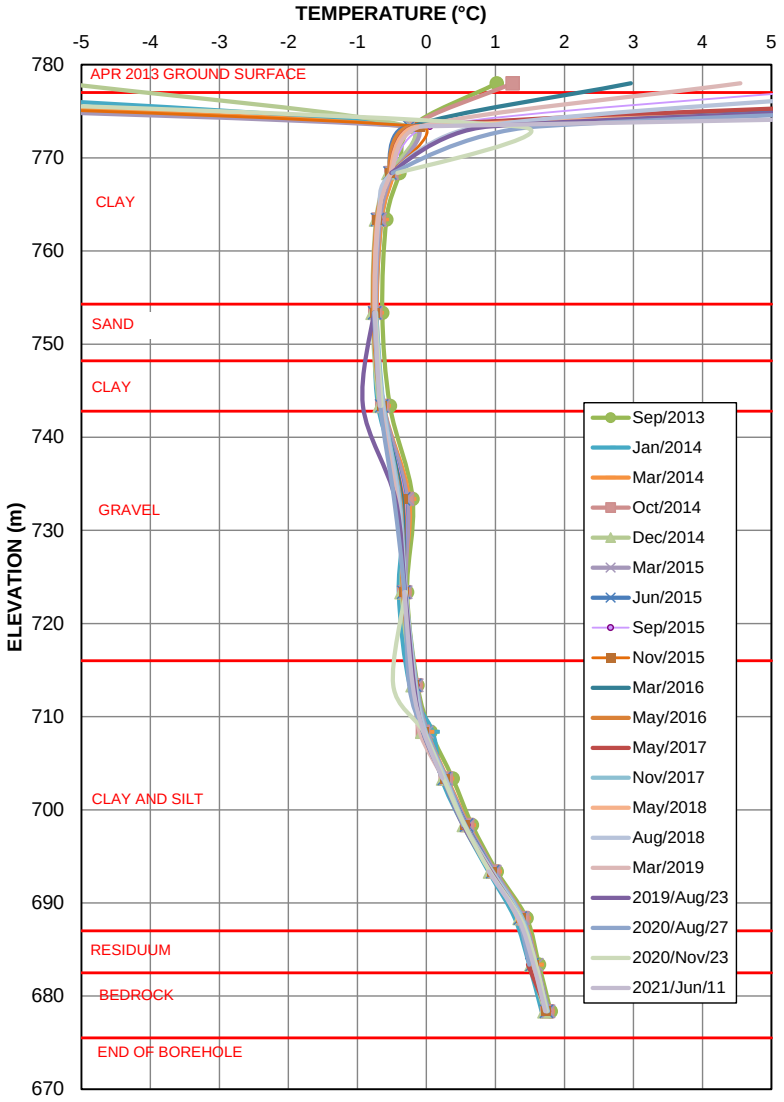
Filename: ApD_2021DSTSFLandscape.pptx

Minto Mine

Date:	Prepared by	Figure:
October 2021	PHM	24







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MINTO

DSTSF Instrumentation Data

Temperature Cable – DST-13

Job No: 1CM002.073

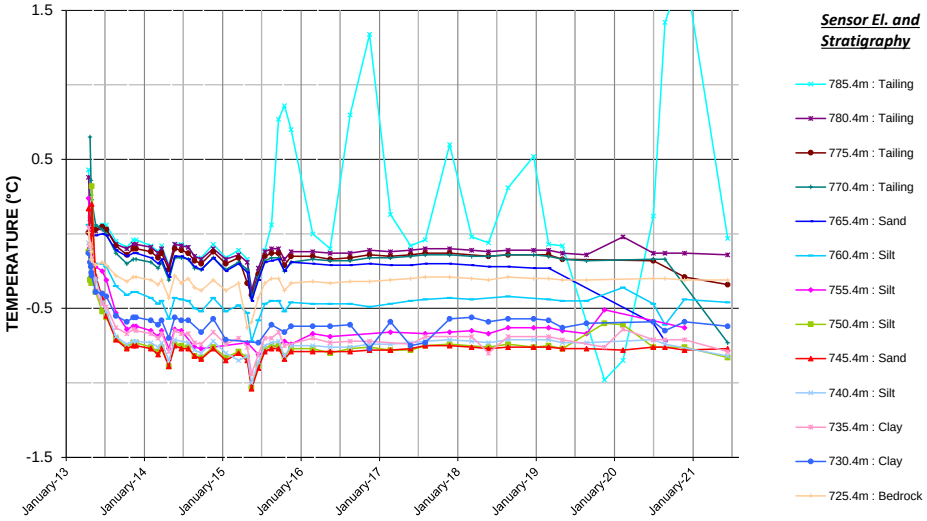
Filename: ApD_2021DSTSFLandscape.pptx

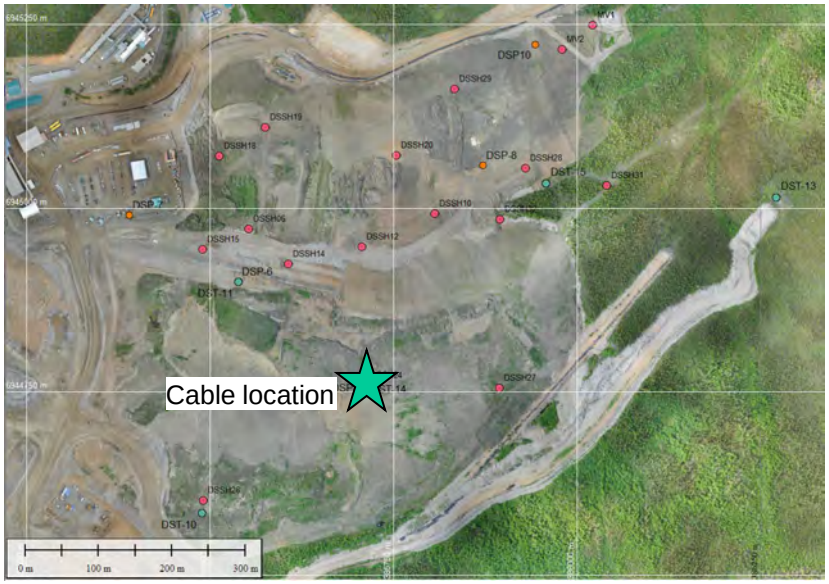
Minto Mine

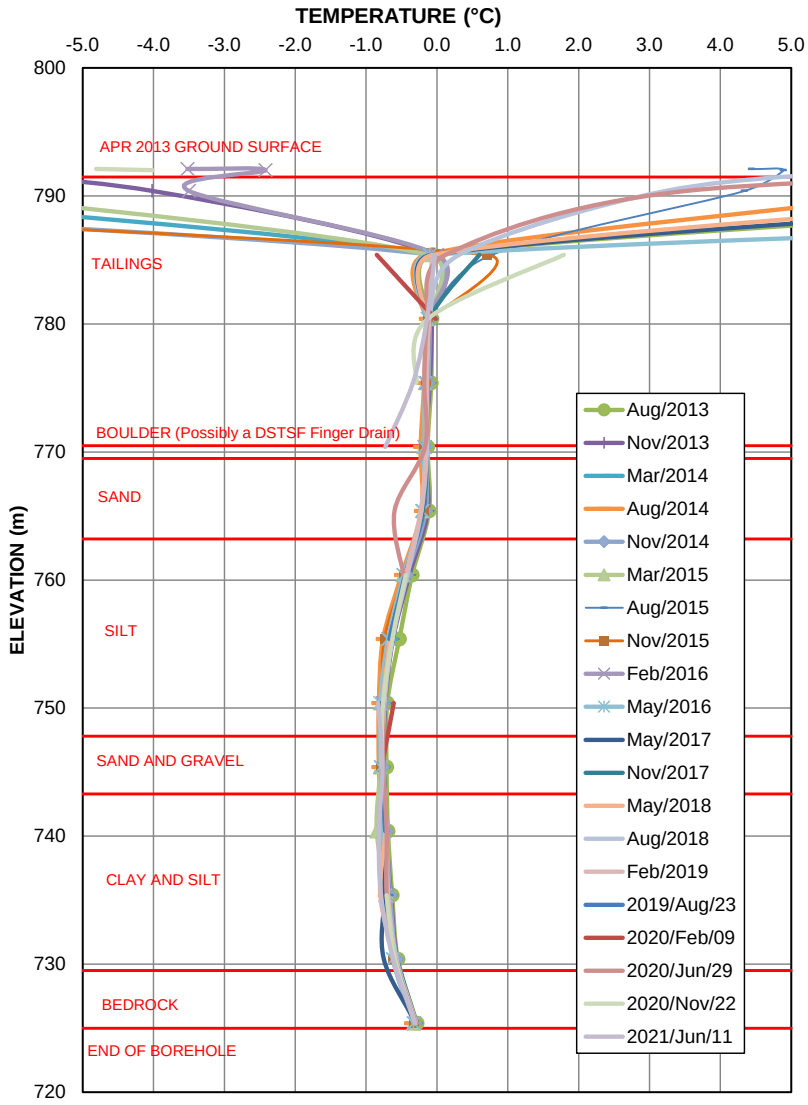
Date: October 2021

Prepared by PHM

Figure: **25**







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MINTO

DSTSF Instrumentation Data

Temperature Cable– DST-14

Job No: 1CM002.073

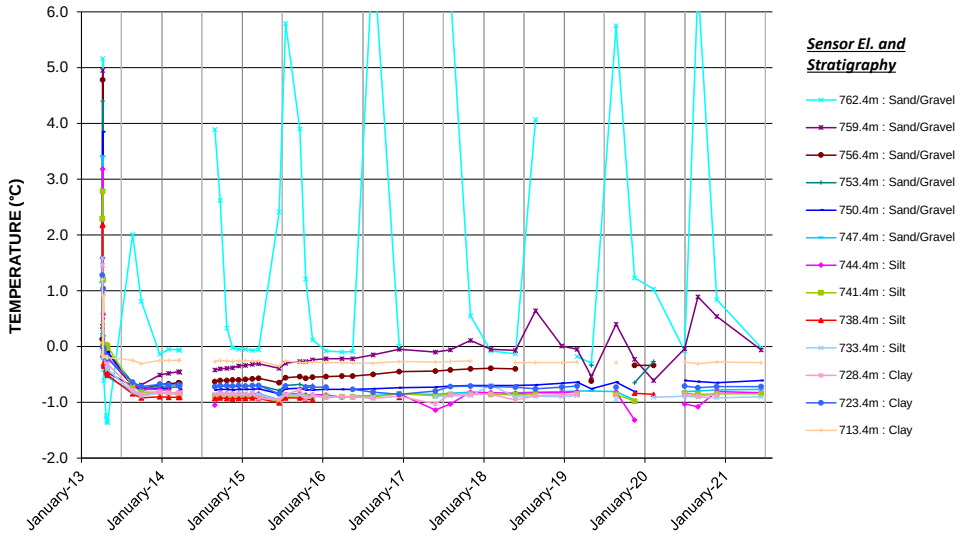
Filename: ApD_2021DSTSFLandscape.pptx

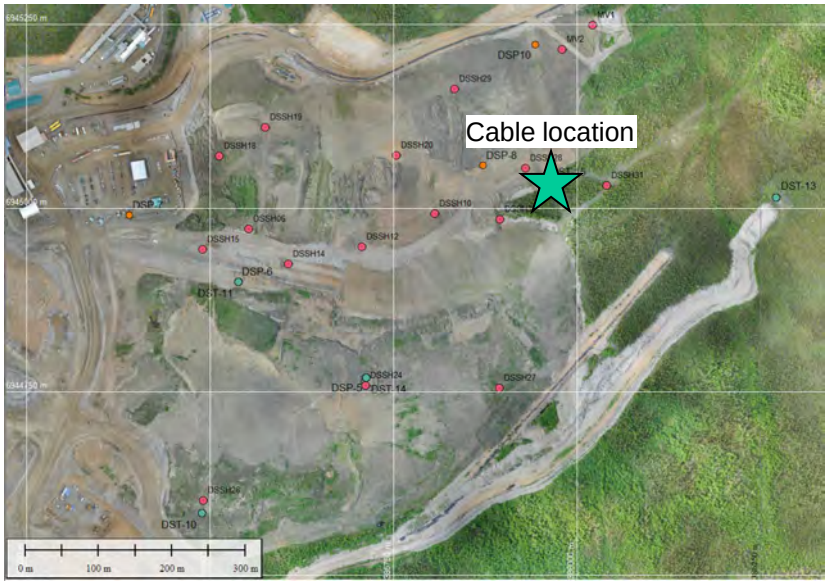
Minto Mine

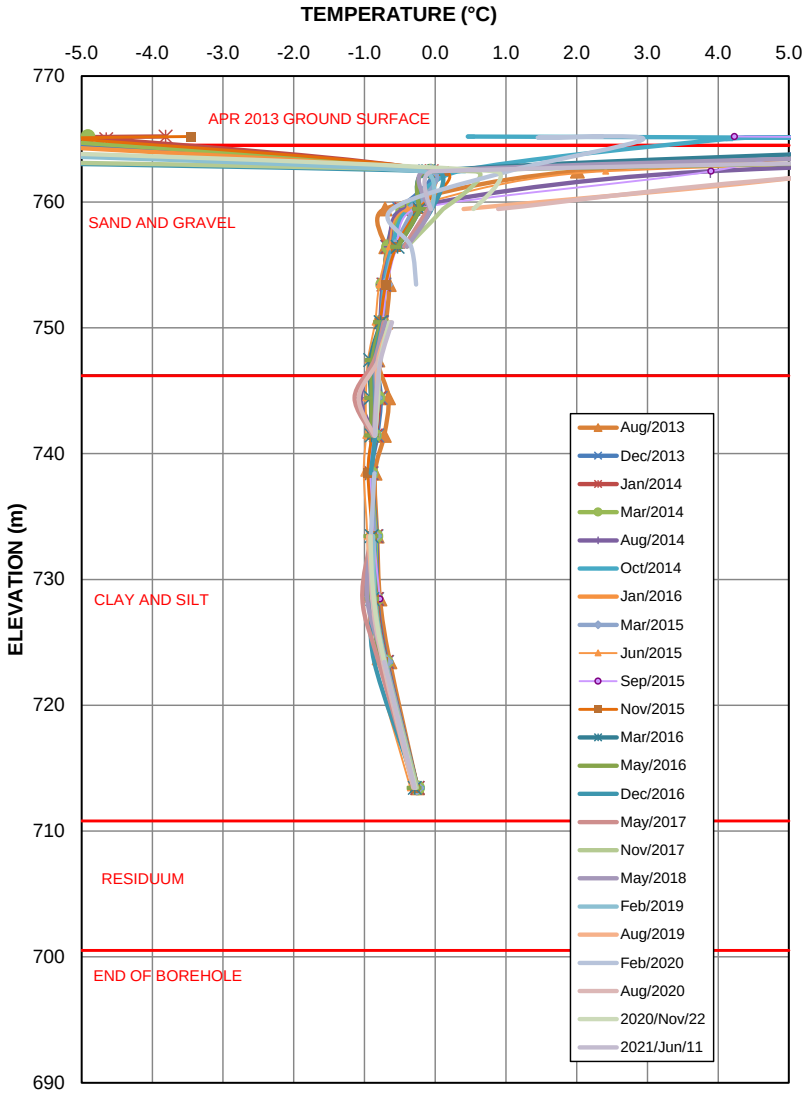
Date: October 2021

Prepared by PHM

Figure: **26**







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2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\DSTFSurveyHubMonitoring_SRK.xlsm

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MINTO

DSTSF Instrumentation Data

Temperature Cable – DST-15

Job No: 1CM002.073

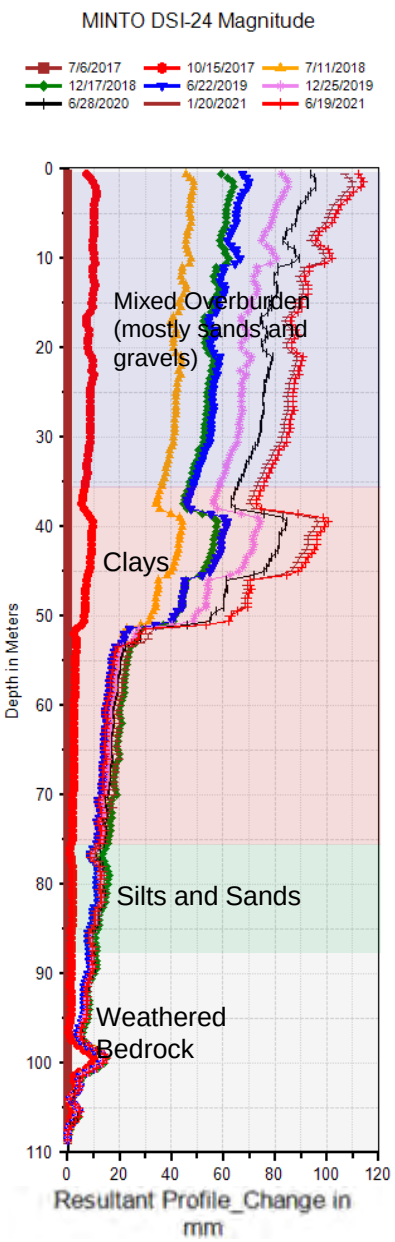
Filename: ApD_2021DSTSFLandscape.pptx

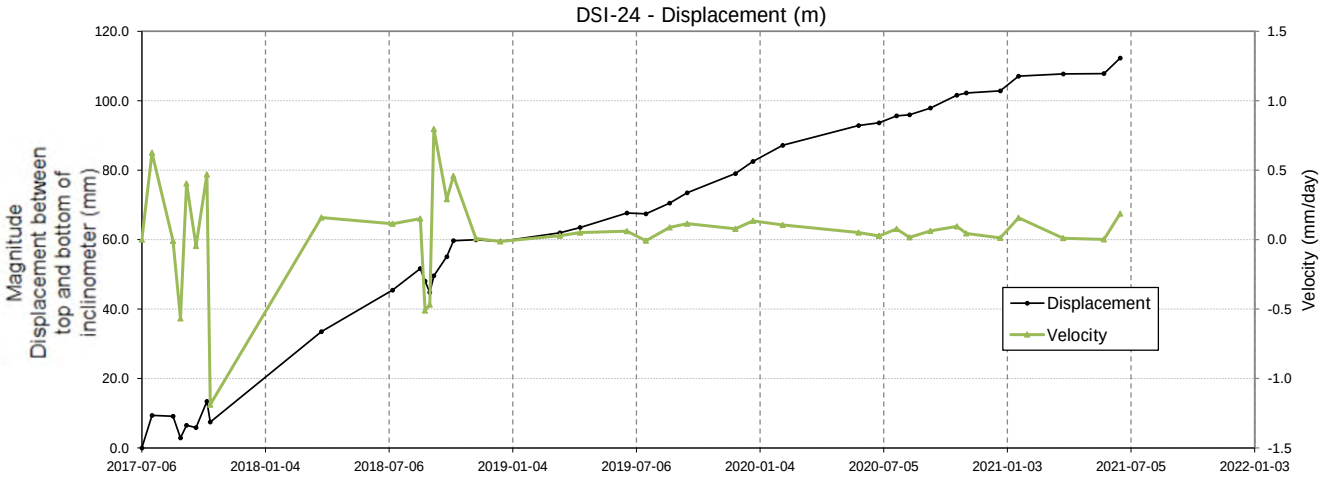
Minto Mine

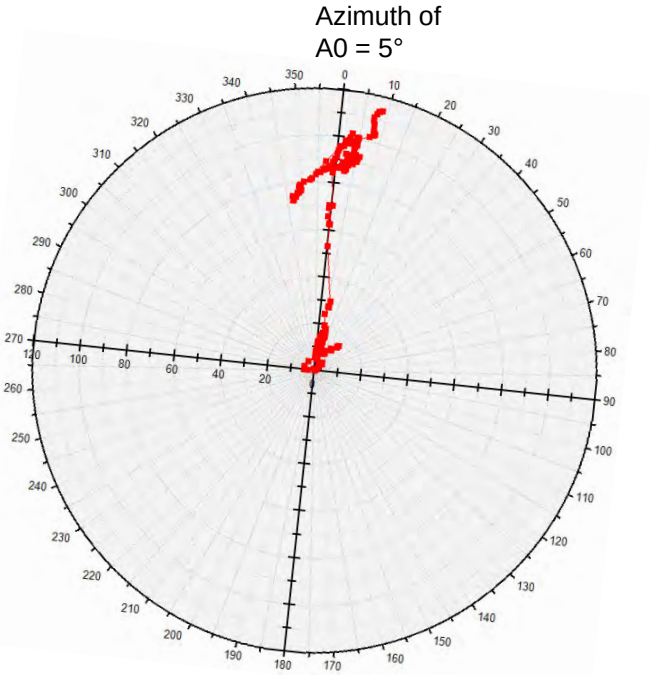
Date: October 2021

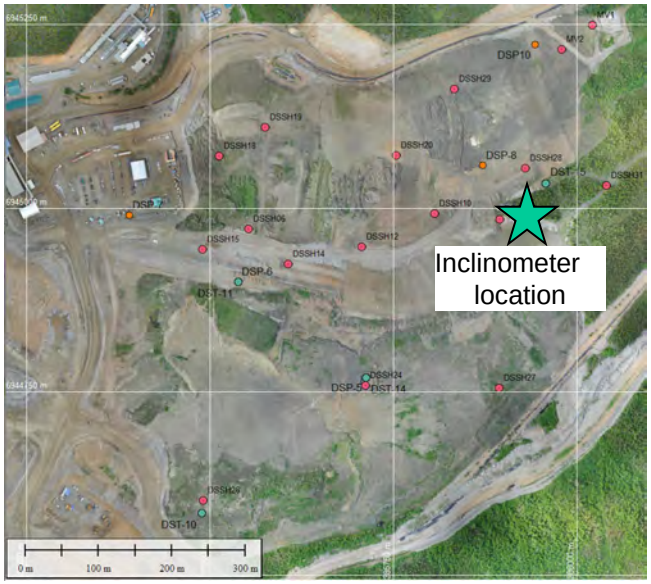
Prepared by PHM

Figure: **27**









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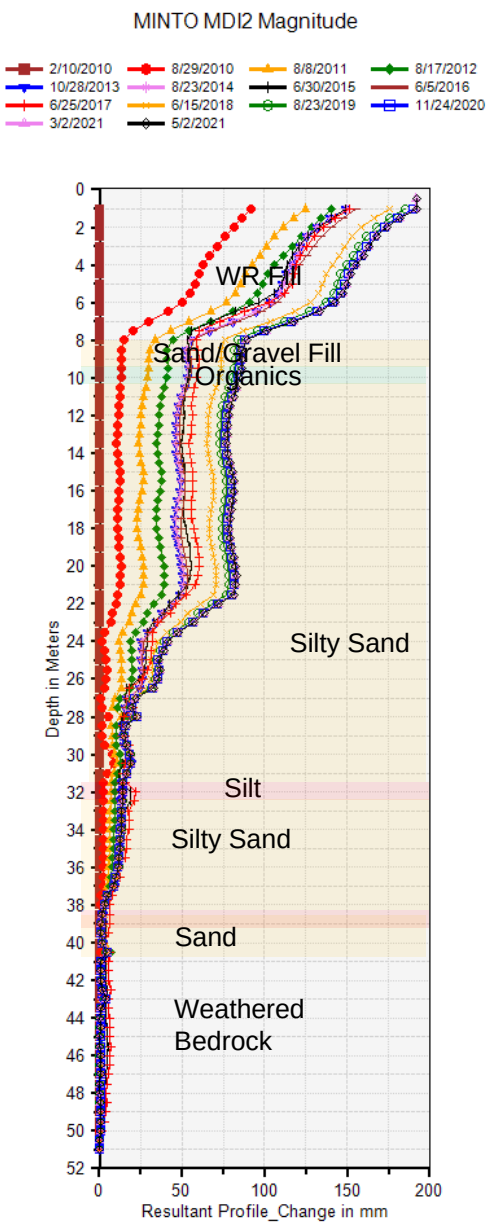
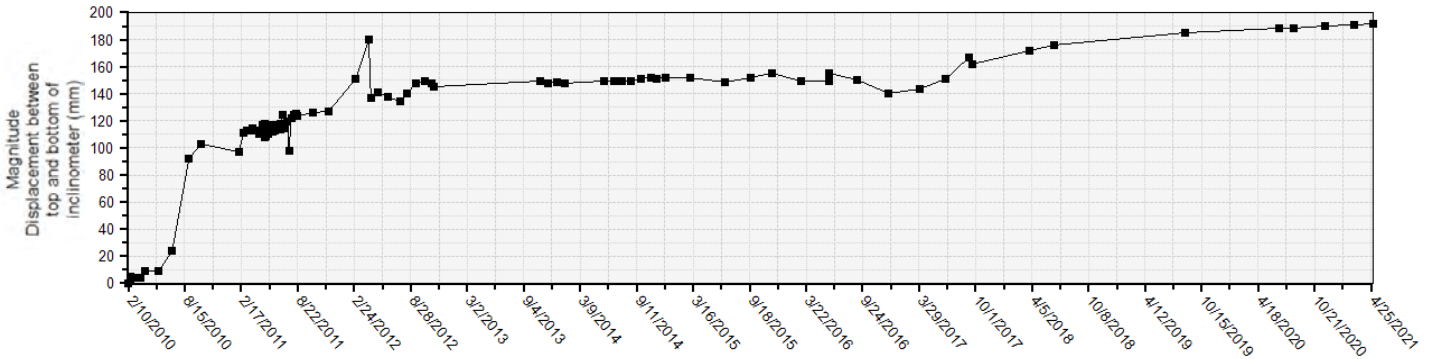
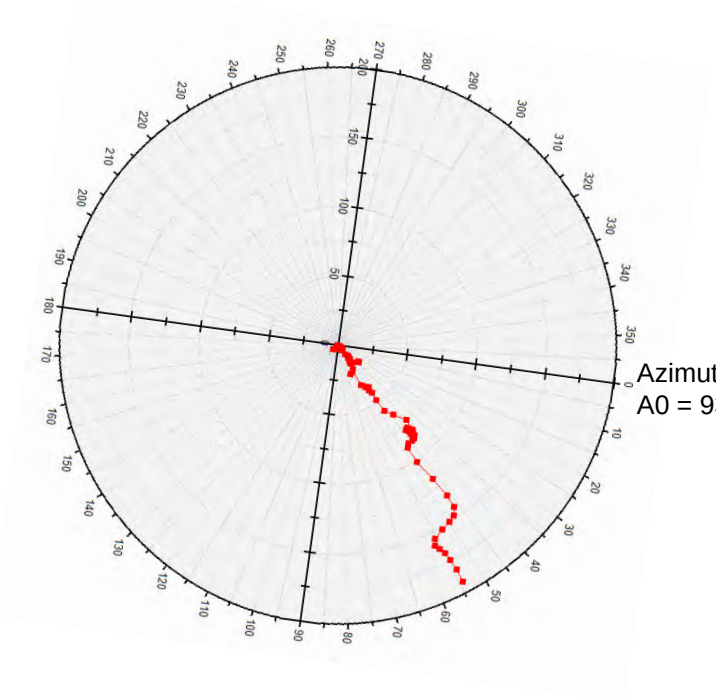
2. Instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\Minto SI Instrumentation Database.dpw

srk consulting	MINTO	DSTSF Instrumentation Data	
		Inclinometer – DSI-24	
Job No: 1CM002.073 Filename: ApD_2021DSTSFLandscape.pptx	Minto Mine	Date: October 2021	Prepared by PHM	Figure: **28**

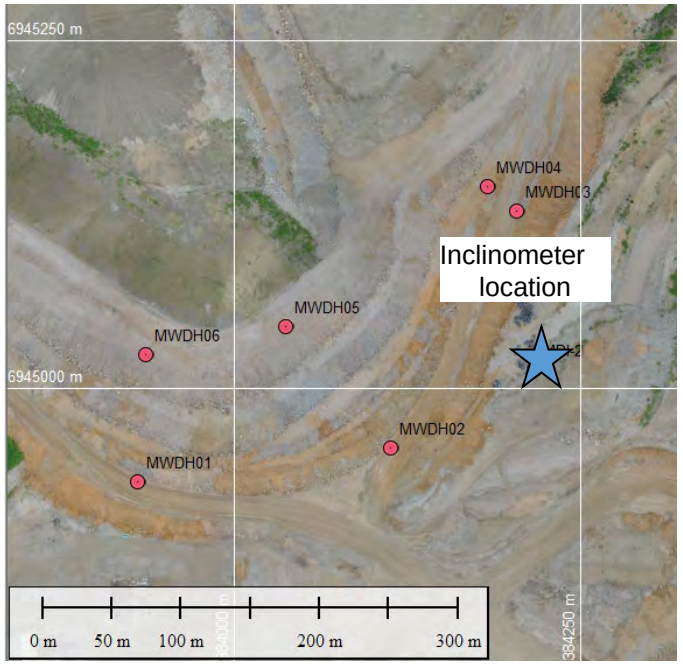
Appendix E MWD Instrumentation Data







Azimuth of
A0 = 93°



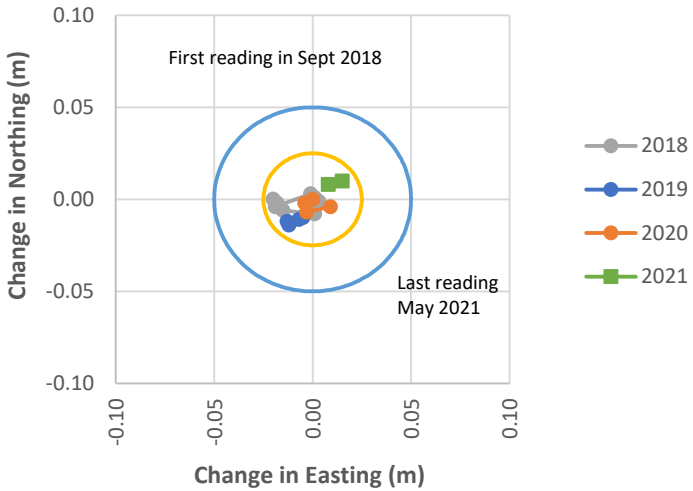
Note: Inclinometer software (DigiPro2 v2.12.4) plots A0 as 0 degrees. The plot above has been rotated such that the orientation matches the plan (north is up).

Source files:

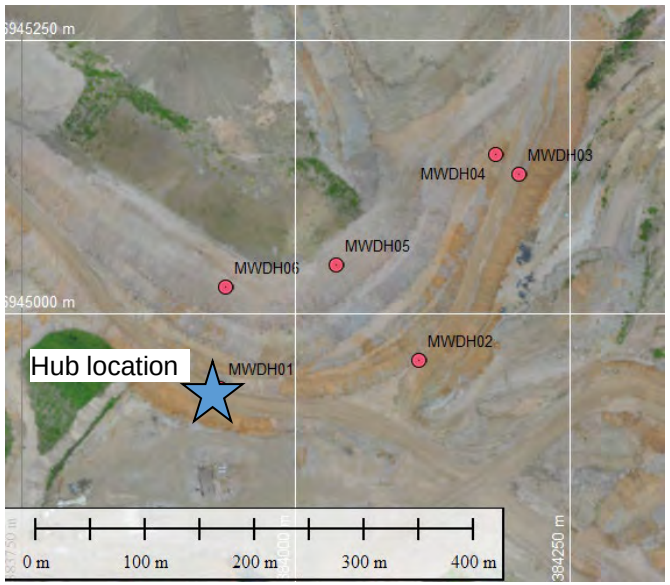
1. AutoCAD: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\GeotechInstrumentation.dwg
2. Instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\Minto SI Instrumentation Database.dpw

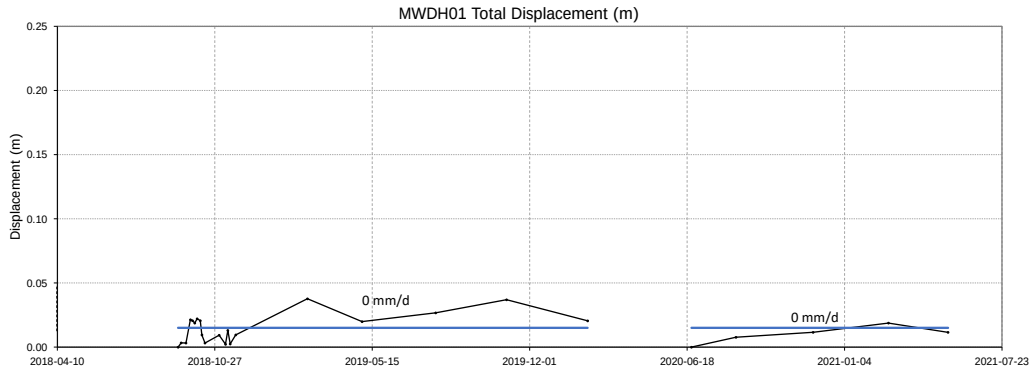
srk consulting	MINTO	MWD Instrumentation Data	
Job No: 1CM002.073 Filename: ApE_2021MWDInstrumentation.pptx	Minto Mine	**Inclinometer – MDI-2**	
		Date: October 2021	Prepared by PHM
		Figure: **1**	

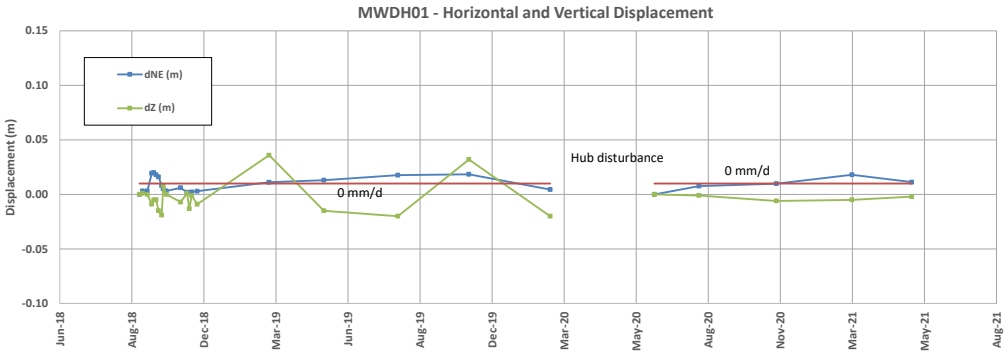
MWDH01 - Northing Vs. Easting Movement Plot

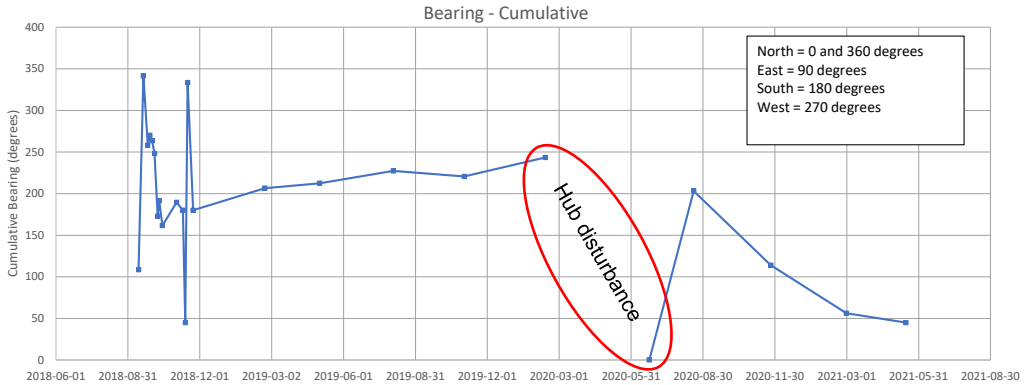


Note: Survey hub was disturbed sometime between February and June 2020. Plot above resets the change in displacement to 0 on June 2020.









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2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MWD_Hub_Monitoring_SRK.xlsm

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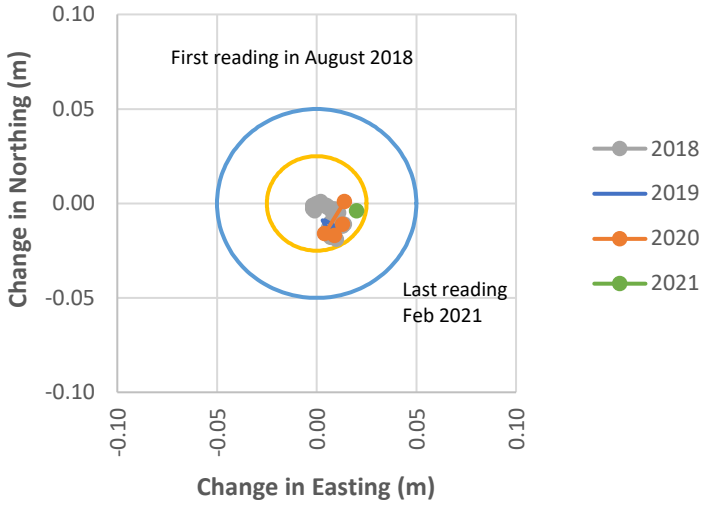
MINTO

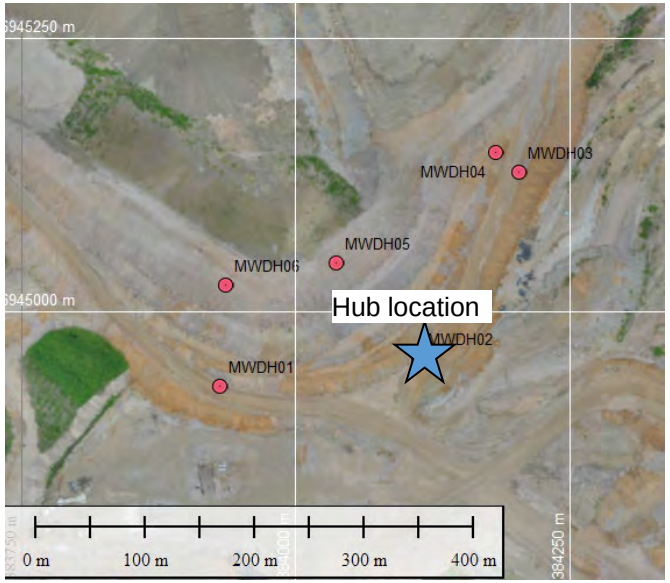
MWD Instrumentation Data

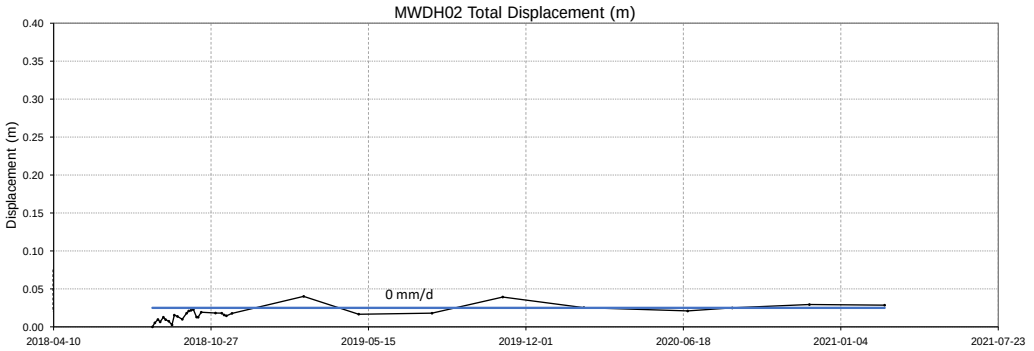
Survey Hub – MWDH01

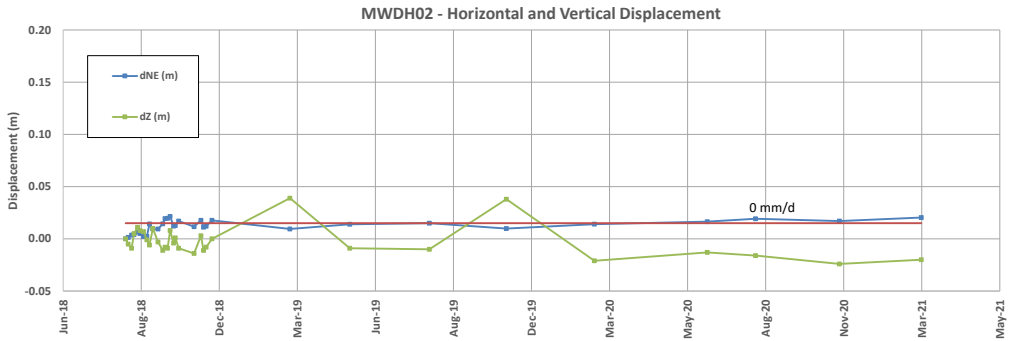
Job No: 1CM002.073	Minto Mine	Date: October 2021	Prepared by PHM	Figure: 2
Filename: ApE_2021MWDInstrumentation.pptx			

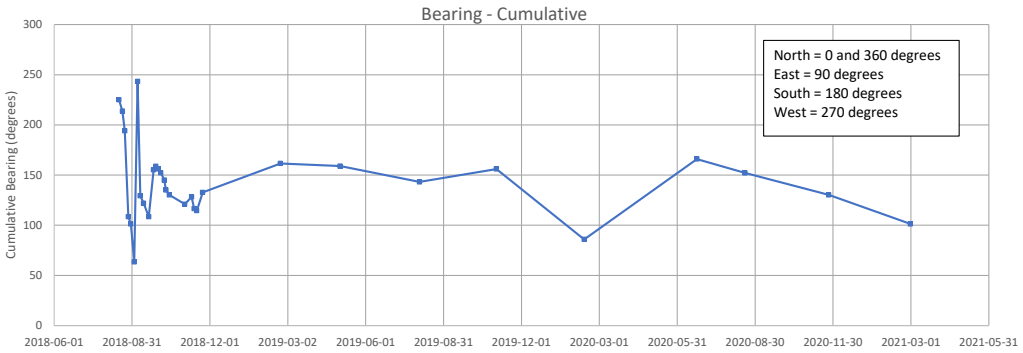
MWDH02 - Northing Vs. Easting Movement Plot











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2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MWD_Hub_Monitoring_SRK.xlsm

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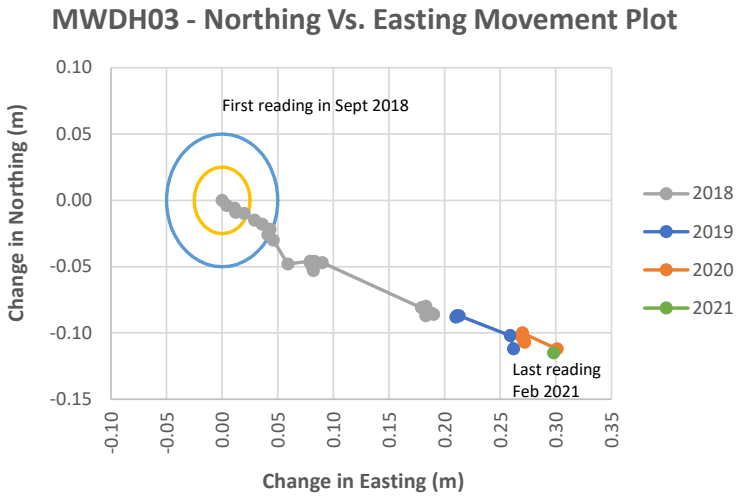
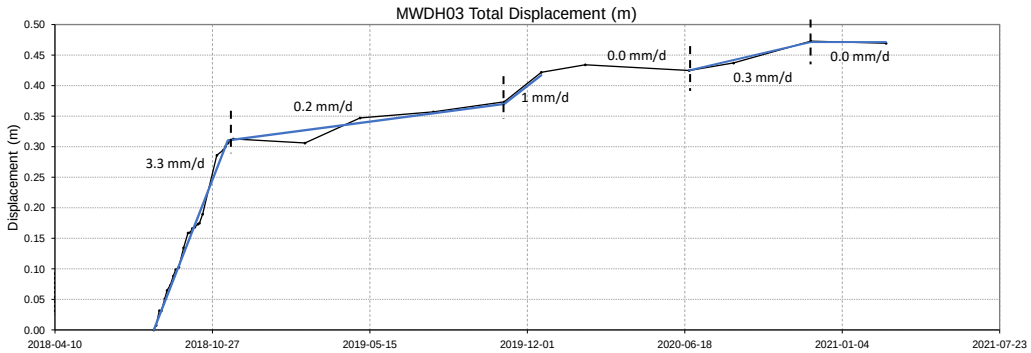
MINTO

MWD Instrumentation Data

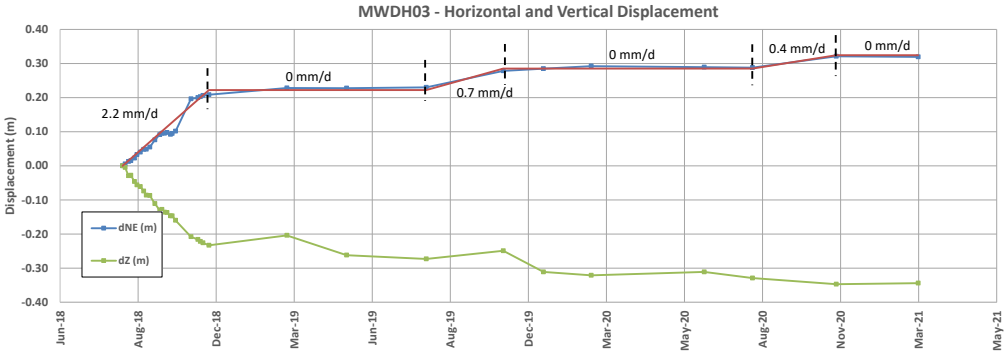
Survey Hub – MWDH02

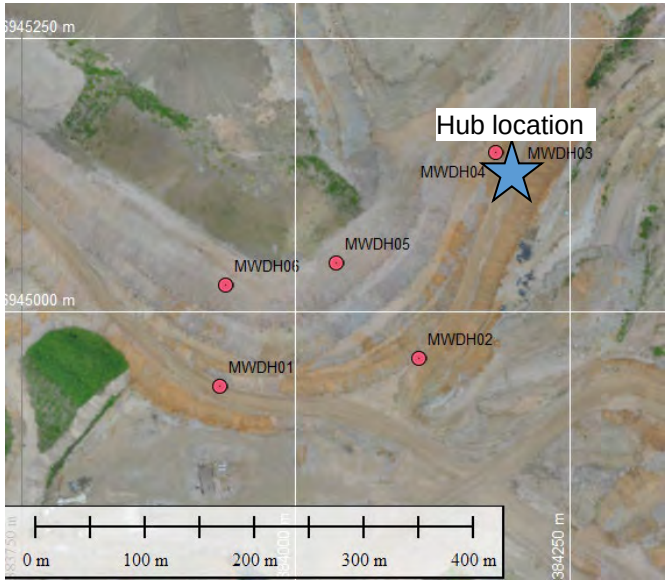
Job No: 1CM002.073	Minto Mine	Date: October 2021	Prepared by PHM	Figure: 3
Filename: ApE_2021MWDInstrumentation.pptx			

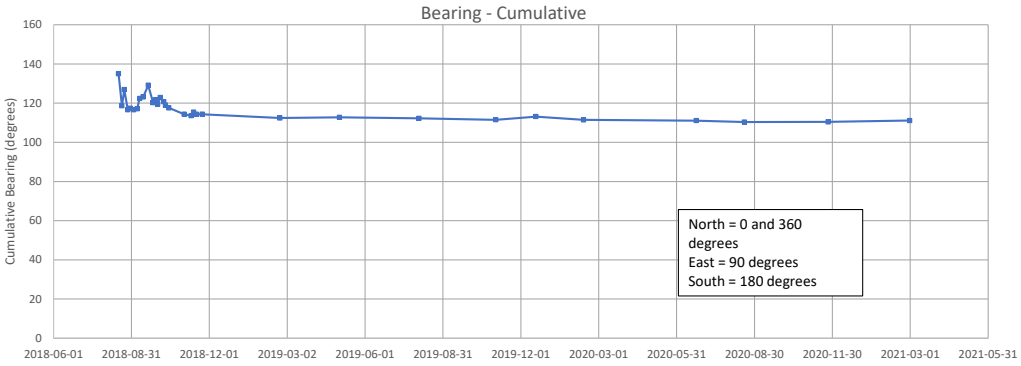




Hub movement occurs primarily in the fall and is likely due to frost heave.







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2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MWD_Hub_Monitoring_SRK.xlsm

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MINTO

MWD Instrumentation Data

Survey Hub – MWDH03

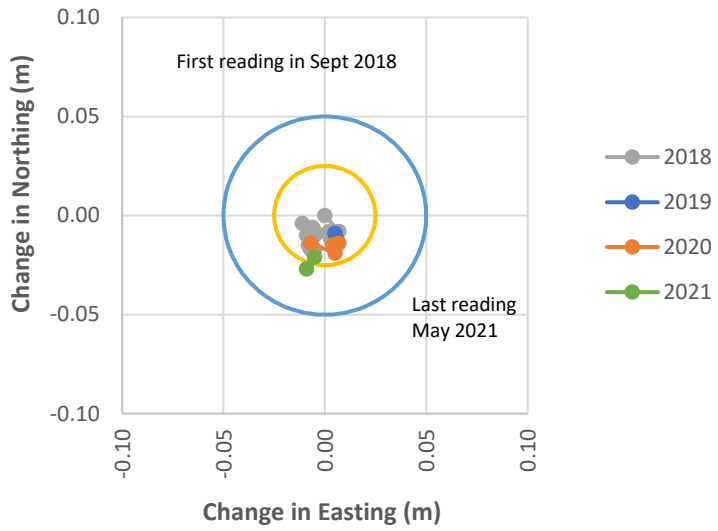
Job No: 1CM002.073

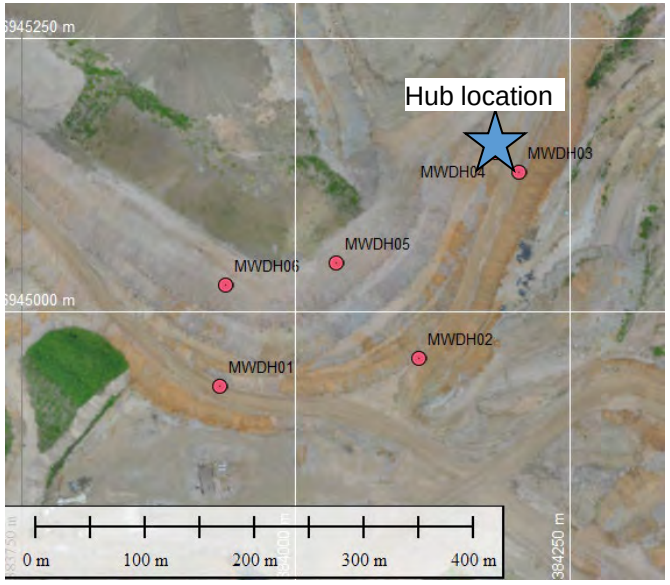
Filename: ApE_2021MWDInstrumentation.pptx

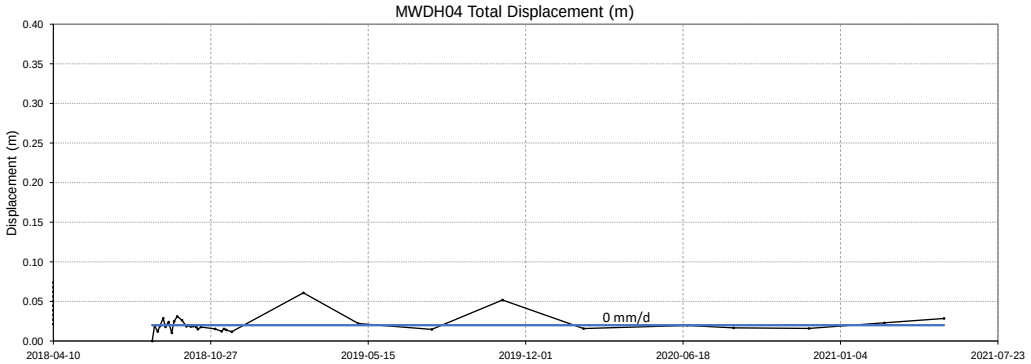
Minto Mine

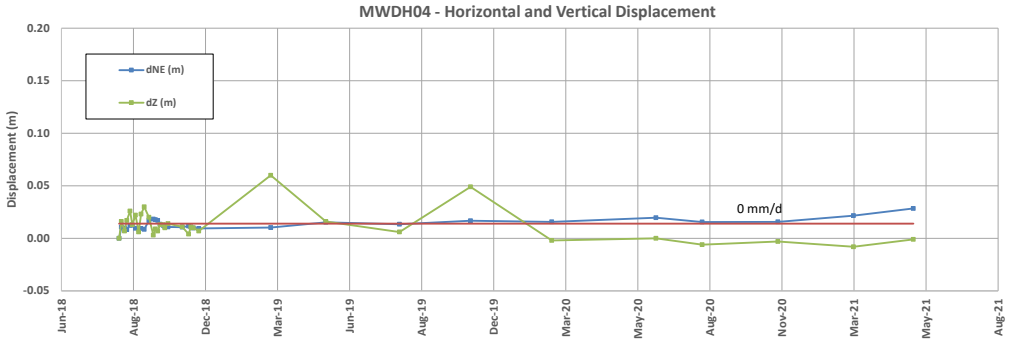
Date:	Prepared by	Figure:
October 2021	PHM	4

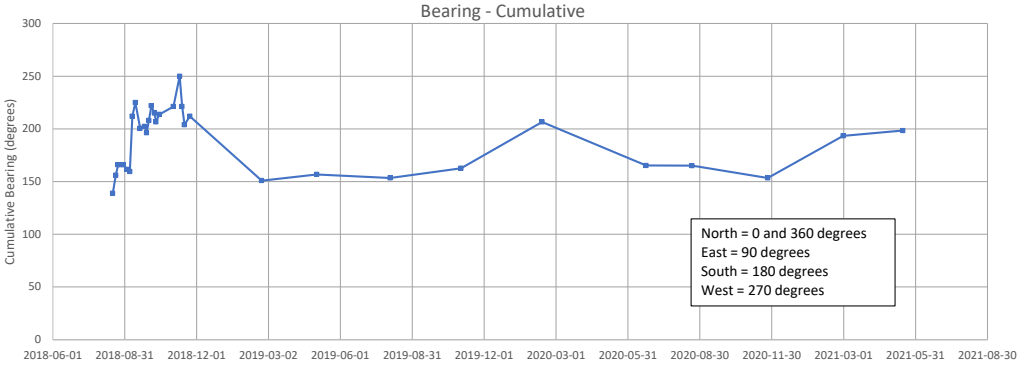
MWDH04 - Northing Vs. Easting Movement Plot











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2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MWD_Hub_Monitoring_SRK.xlsm

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MINTO

MWD Instrumentation Data

Survey Hub – MWDH04

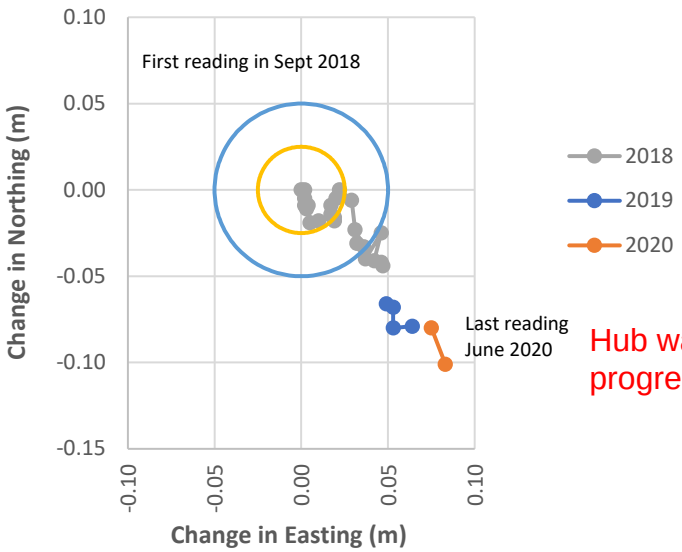
Job No: 1CM002.073

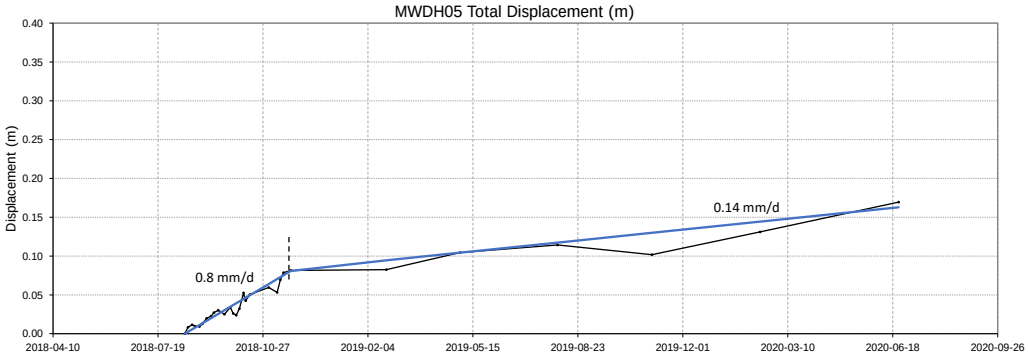
Filename: ApE_2021MWDInstrumentation.pptx

Minto Mine

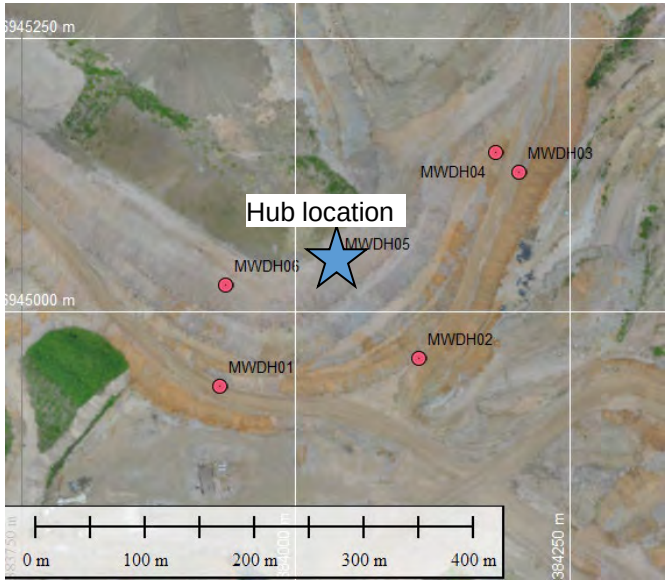
Date:	Prepared by	Figure:
October 2021	PHM	5

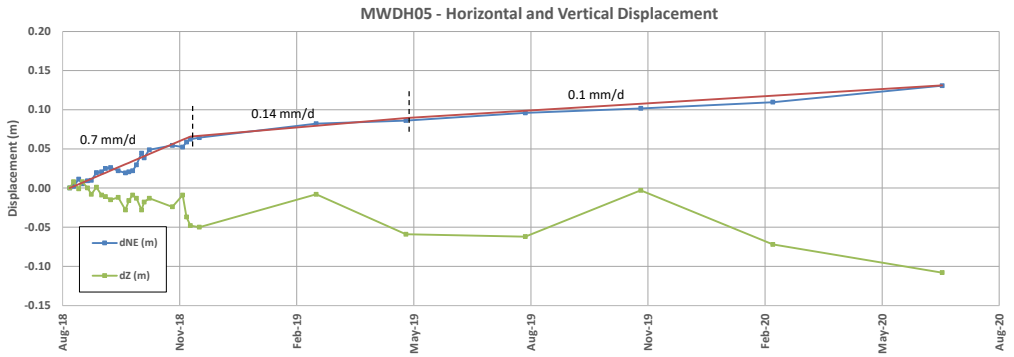
MWDH05 - Northing Vs. Easting Movement Plot

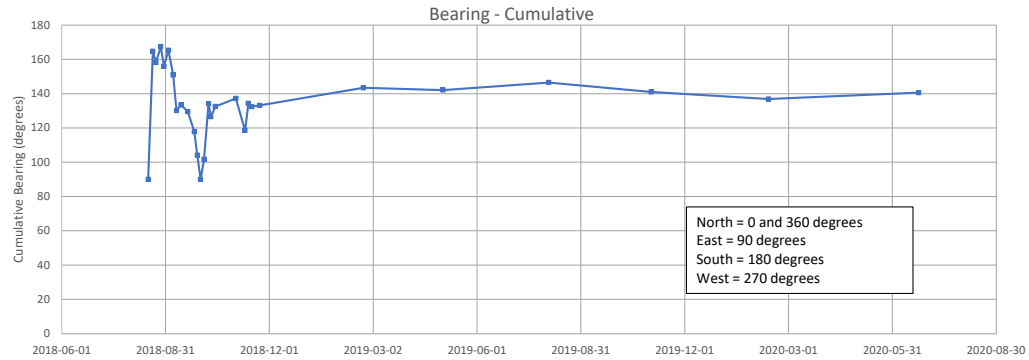




Hub was destroyed in the summer of 2020 due to progressive reclamation and resloping of the MWD Wrap.







Source files:

1. AutoCAD: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\GeotechInstrumentation.dwg
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MWD_Hub_Monitoring_SRK.xlsm

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MINTO

MWD Instrumentation Data

Survey Hub – MWDH05

Job No: 1CM002.073

Filename: ApE_2021MWDInstrumentation.pptx

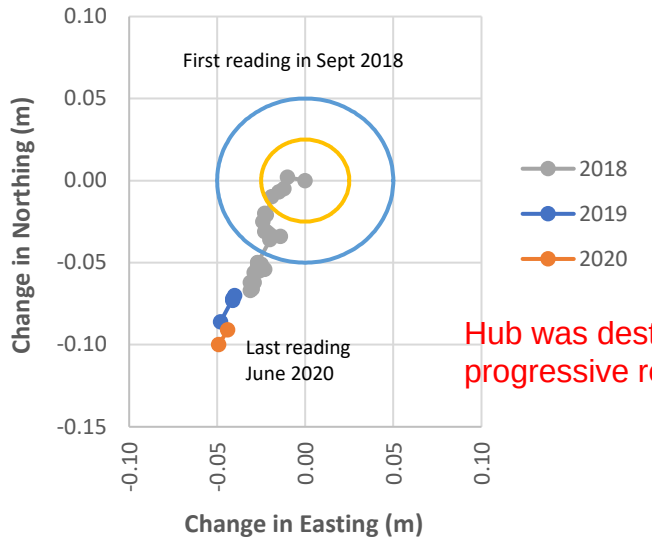
Minto Mine

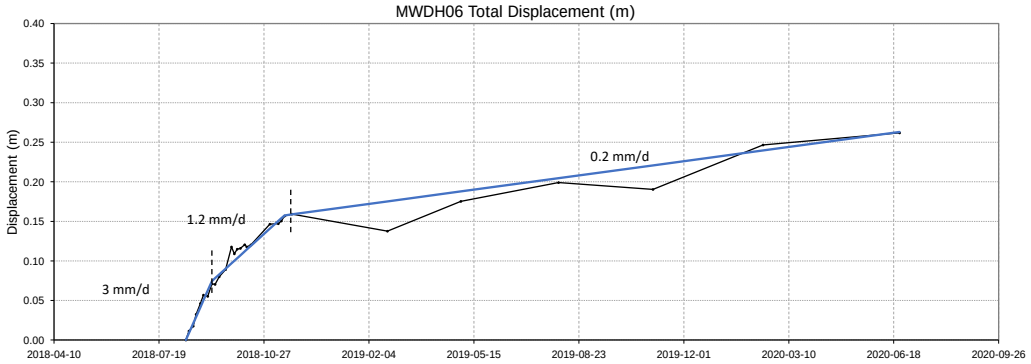
Date: October 2021

Prepared by: PHM

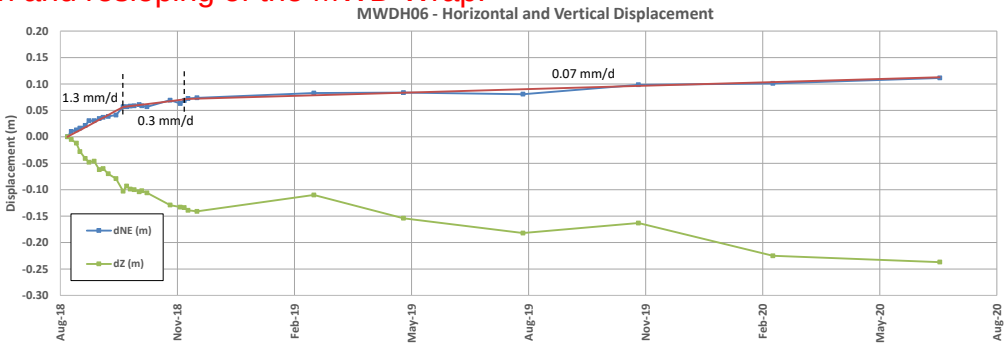
Figure: 6

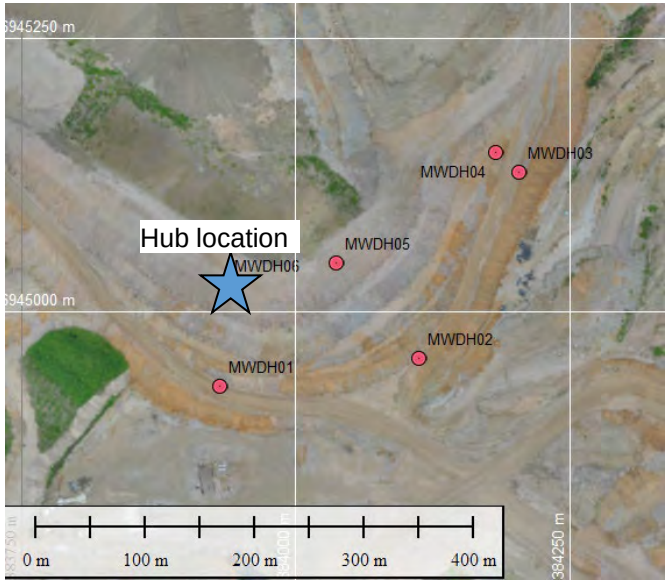
MWDH06 - Northing Vs. Easting Movement Plot

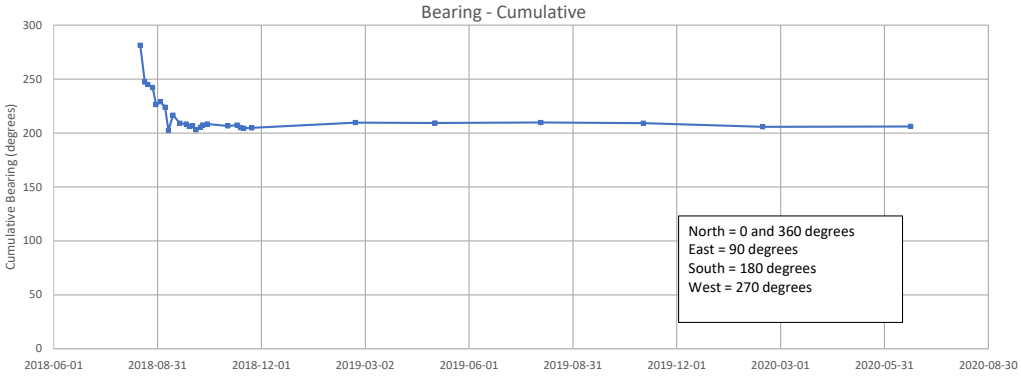




Hub was destroyed in the summer of 2020 due to progressive reclamation and resloping of the MWD Wrap.







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MWD Instrumentation Data

Survey Hub – MWDH06

Job No: 1CM002.073

Filename: ApE_2021MWDInstrumentation.pptx

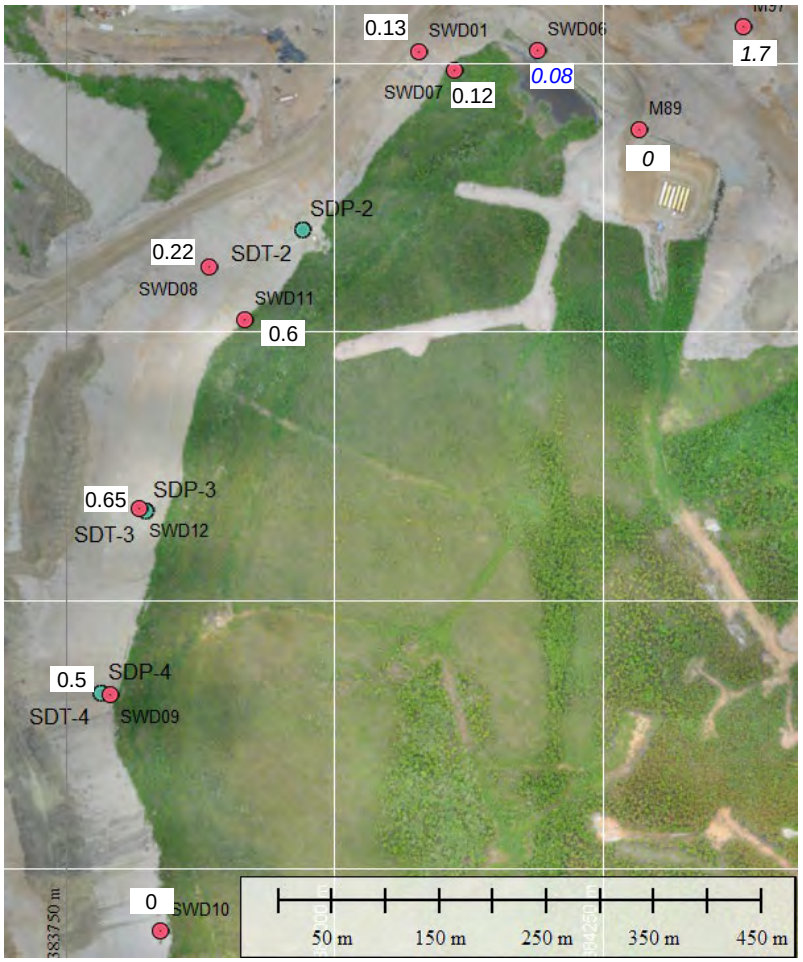
Minto Mine

Date: October 2021

Prepared by: PHM

Figure: 7

Appendix F SWD Instrumentation Data



Legend/Notes

1. *Values in black are total movement rates in units of mm/day*
2. *Values in blue are horizontal movement rates in mm/day.*
3. *Survey hubs with no movement rates listed have been inactive for over one year.*

South West Dump Active Survey Hubs

Survey Hub	Last Reading	Movement Rate (mm/day)		Bearing (over past year)	Comments
		Current (as of last reading)	One year prior to last reading		
SWD-01	8/11/2021	0.13	0.13	110	Slight decelleration trend observable (horizontal rate reduced from 0.1mm/day to 0.06 mm/day).
SWD-06	8/11/2021	0.08	0.08	143	Horizontal movement rate listed. Similar pattern of seasonal fluctuation due to freeze/thaw of survey hub.
SWD-07	8/11/2021	0.12	0.07	102	Possible acceleration trend. Difficult to determine due to seasonal freeze/thaw fluctuations.
SWD-08	8/11/2021	0.22	0.26	108	Slight decelleration trend observable.
SWD-09	8/11/2021	0.50	0.80	77	Slight decelleration trend observable.
SWD-10	8/11/2021	-	-	-	No significant movement
SWD-11	8/11/2021	0.60	0.60	108	Similar pattern of seasonal fluctuation due to freeze/thaw of survey hub.
SWD-12	6/23/2020	0.65	0.70	93	Steady displacement since installation in Fall 2018

Source files:

1. AutoCAD: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\GeotechInstrumentation.dwg
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\SWD_ASH_WSP_SurveyHubMonitoring_SRK.xlsm

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SWD Instrumentation Data

Southwest Dump Survey Hub Summary

Job No: 1CM002.073

Filename: ApF_2021SWD Instrumentation.pptx

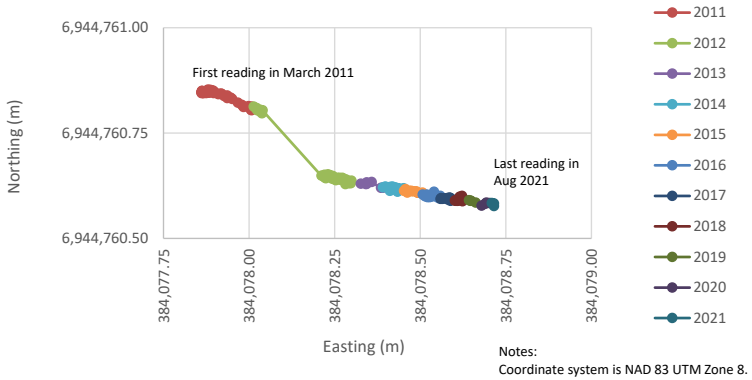
Minto Mine

Date: October 2021

Prepared by PHM

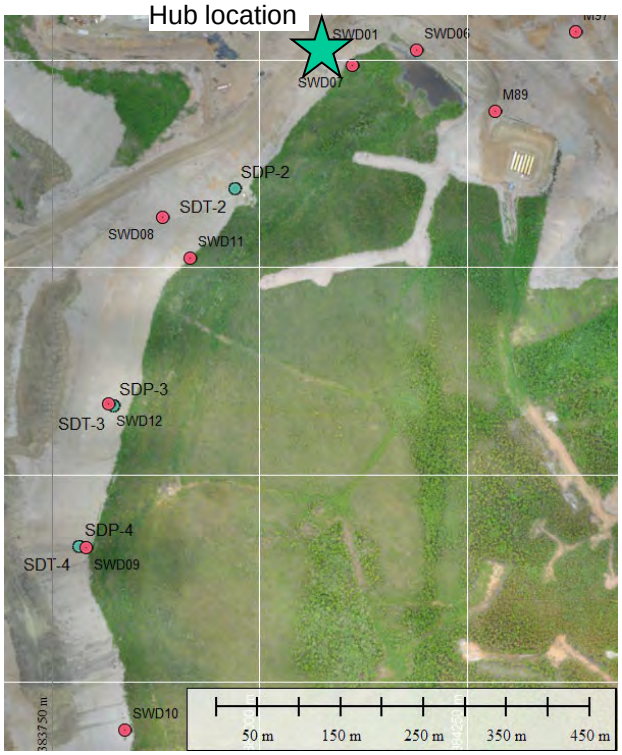
Figure: 1

SWD01 - Northing Vs. Easting Movement Plot

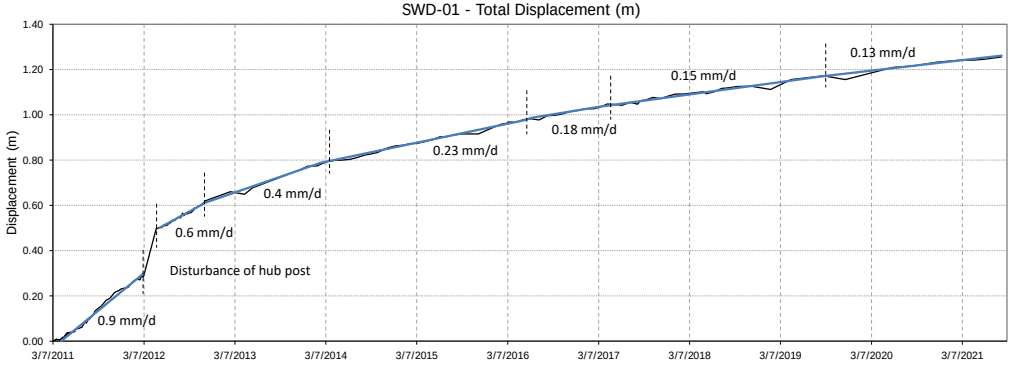


Notes:
Coordinate system is NAD 83 UTM Zone 8.

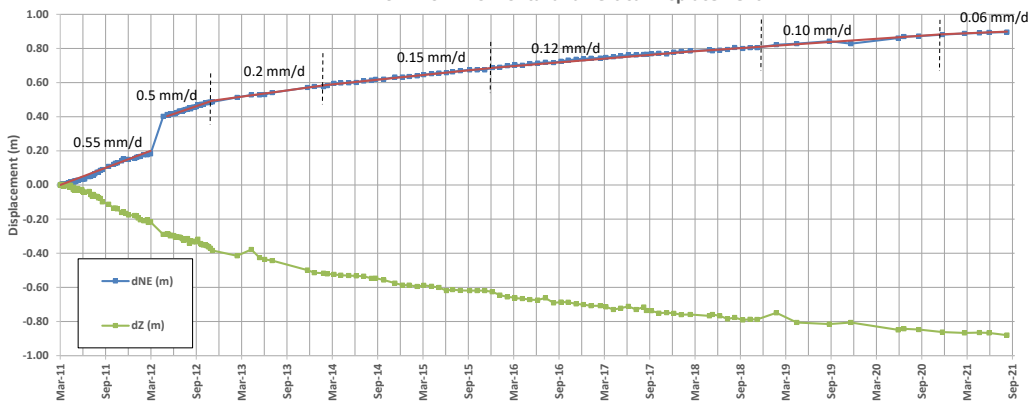
Hub location



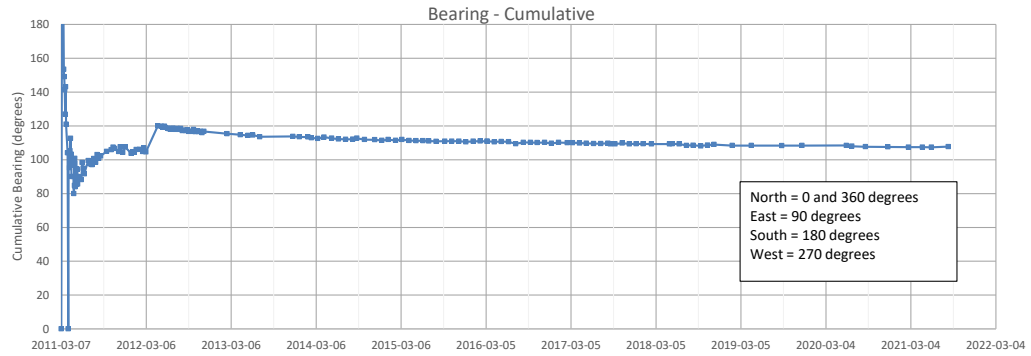
SWD-01 - Total Displacement (m)



SWD-01 - Horizontal and Vertical Displacement



Bearing - Cumulative



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SWD Instrumentation Data

Survey Hub – SWD-01

Job No: 1CM002.073

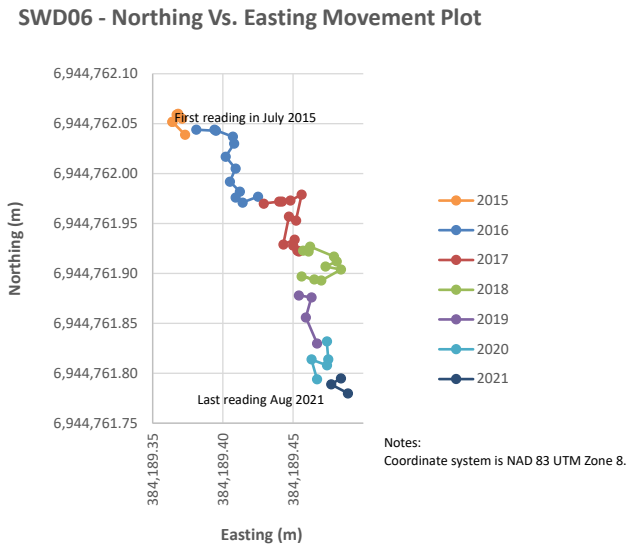
Filename: ApF_2021SWD Instrumentation.pptx

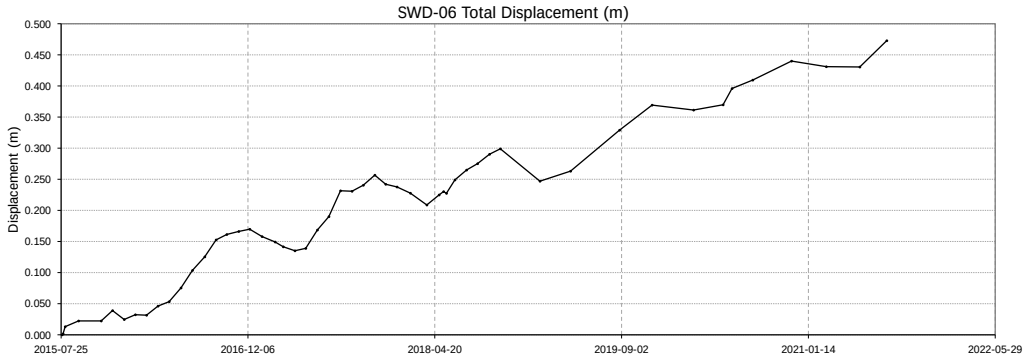
Minto Mine

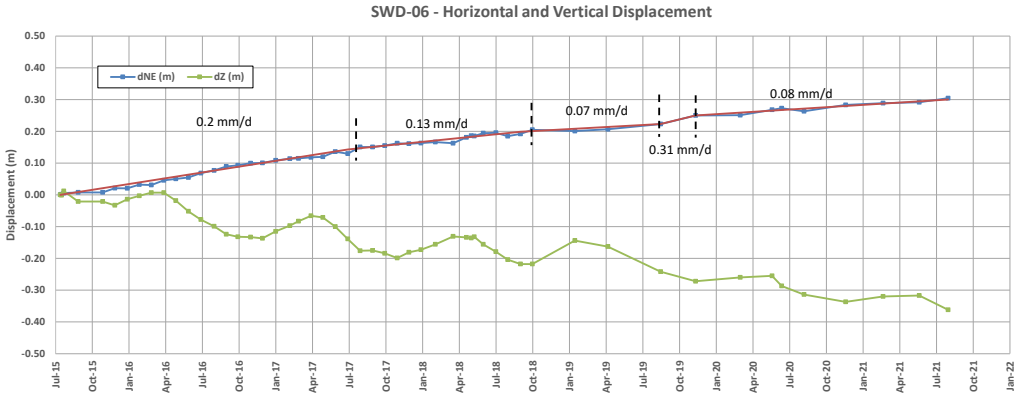
Date: October 2021

Prepared by: PHM

Figure: 2

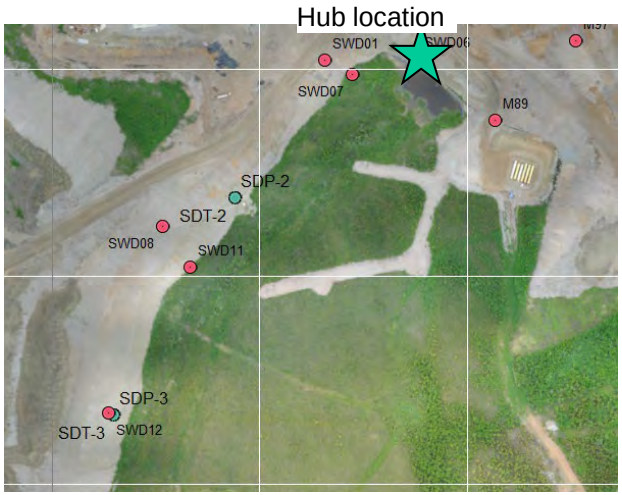


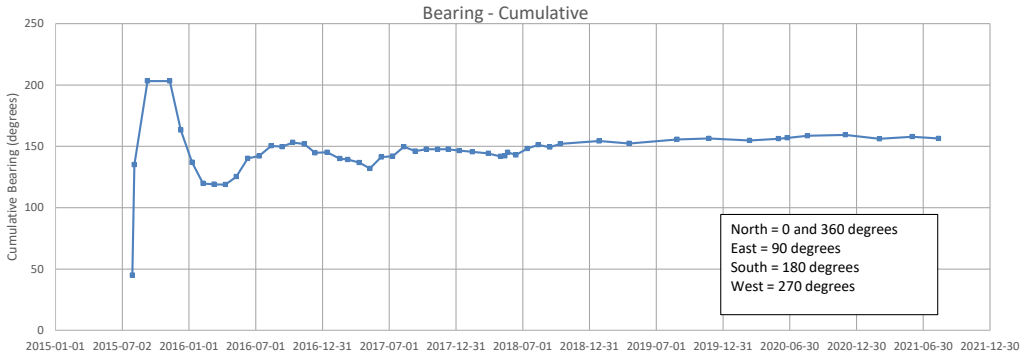




Notes

1. *Hub is a replacement for SWD-01A that was disturbed by frost heave.*
2. *The hub consists of a lock-block on surface, and as a result, seasonal ground movement as a result freeze/thaw cycles may occur that is not indicative of large-scale ground movement. As a result, the horizontal displacement plot is likely to be the most useful plot for monitoring movement.*





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SWD Instrumentation Data

Survey Hub – SWD-06

Job No: 1CM002.073

Filename: ApF_2021SWD Instrumentation.pptx

Minto Mine

Date: October 2021

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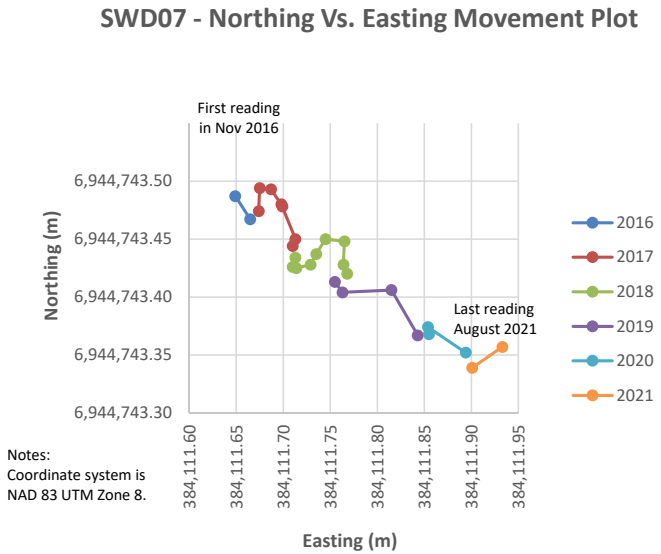
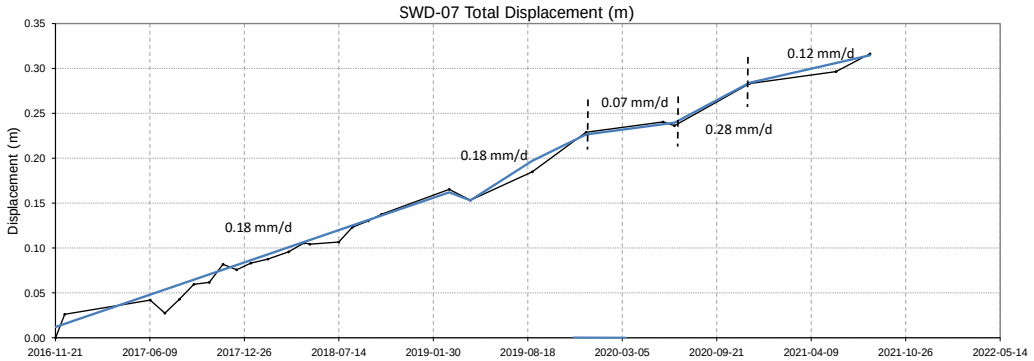
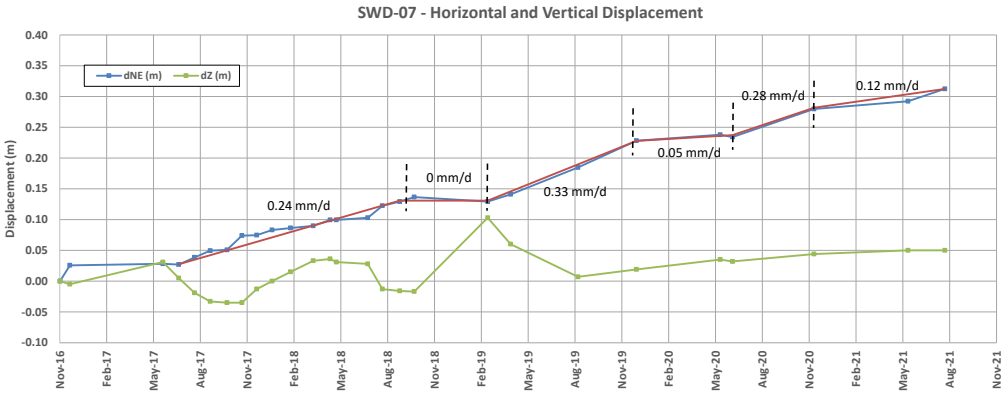
Figure: **3**

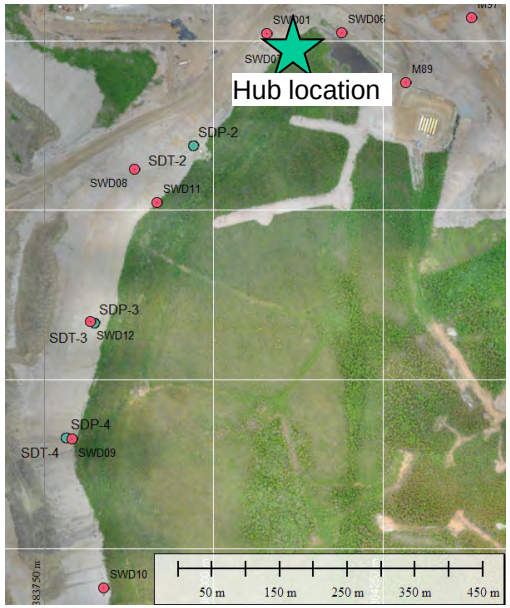


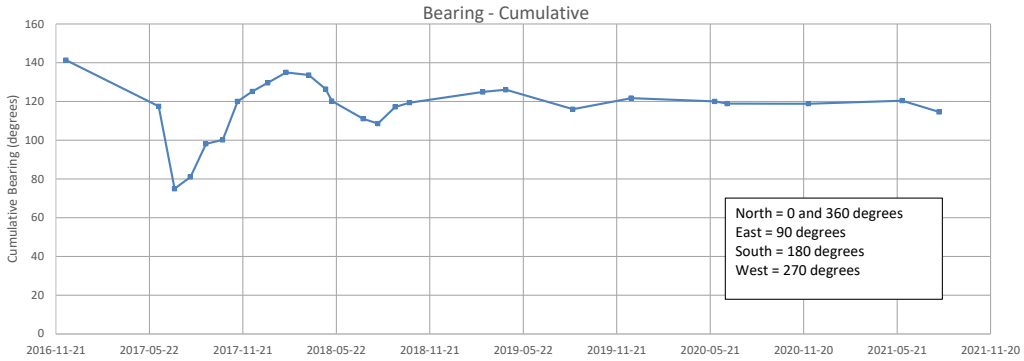




Notes

1. *Hub is a replacement for SWD-02A that was disturbed by frost heave.*





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SWD Instrumentation Data

Survey Hub – SWD-07

Job No: 1CM002.073

Filename: ApF_2021SWD Instrumentation.pptx

Minto Mine

Date: October 2021

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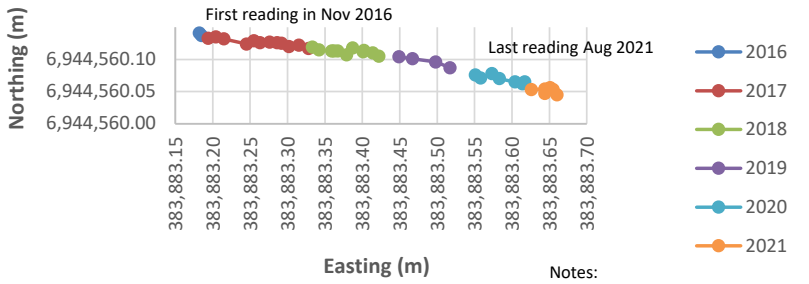
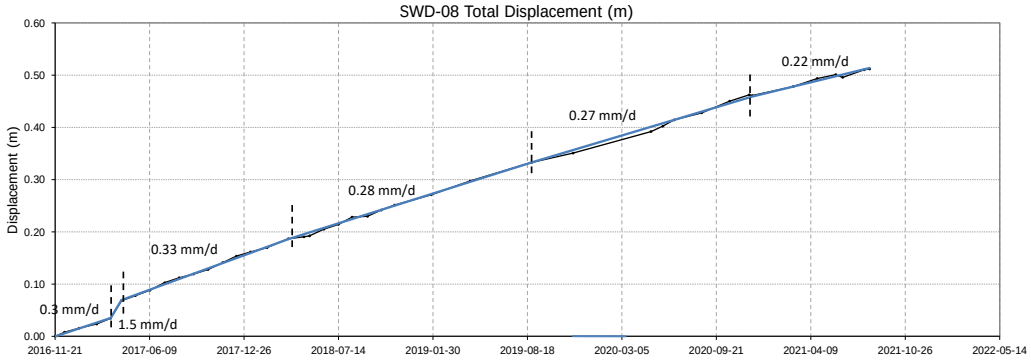
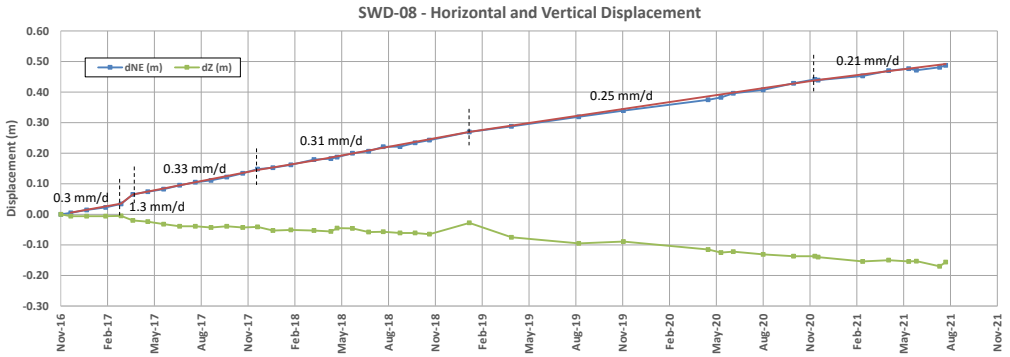
Figure: 4

SWD08 - Northing Vs. Easting Movement Plot



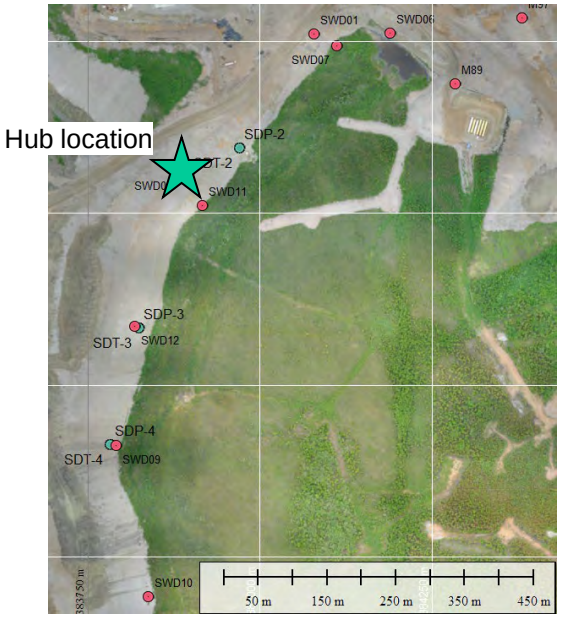
Notes:
Coordinate system is NAD 83 UTM Zone 8.

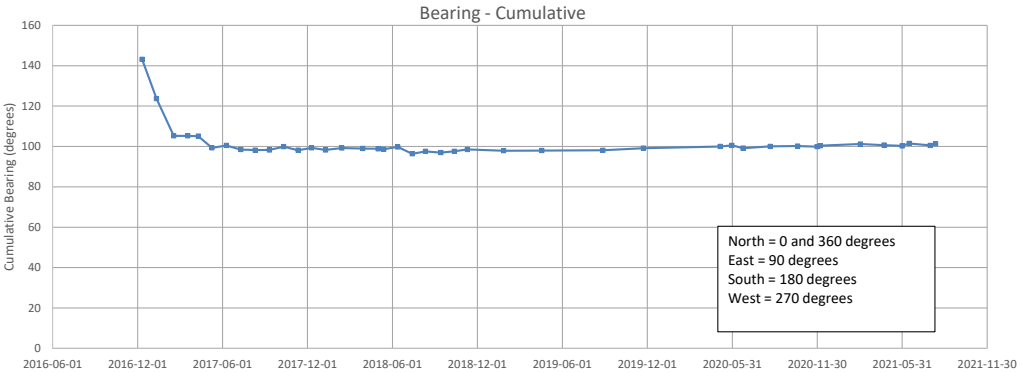




Notes

1. *Hub is a replacement for SWD-02 that was disturbed as a result of regrading of the SWD.*





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SWD Instrumentation Data

Survey Hub – SWD-08

Job No: 1CM002.073

Filename: ApF_2021SWD Instrumentation.pptx

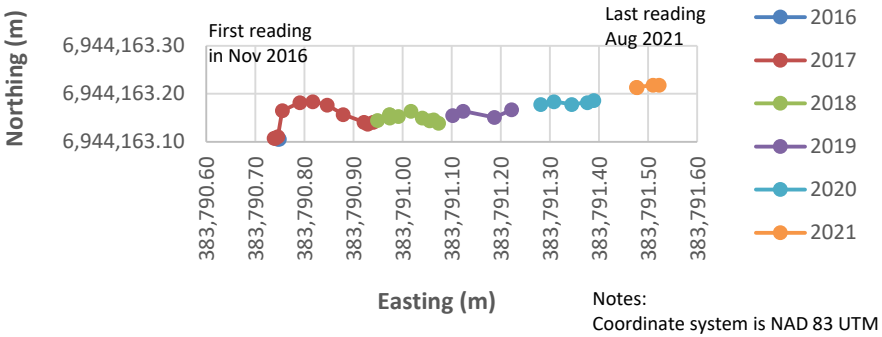
Minto Mine

Date: October 2021

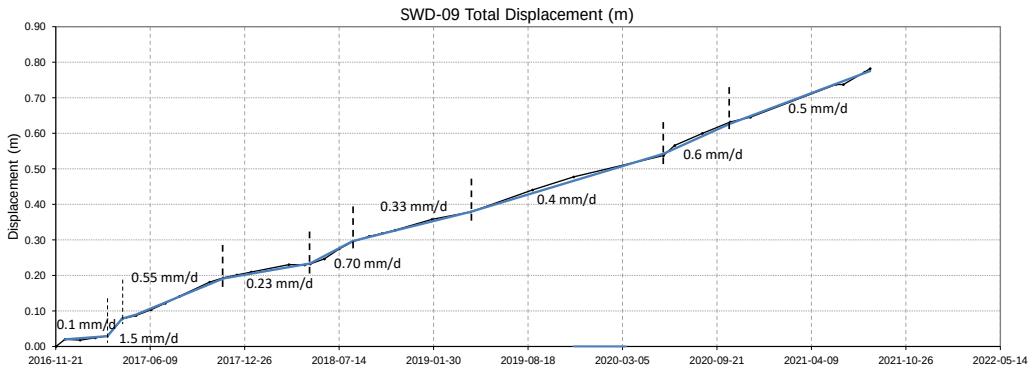
Prepared by: PHM

Figure: **5**

SWD09 - Northing Vs. Easting Movement Plot

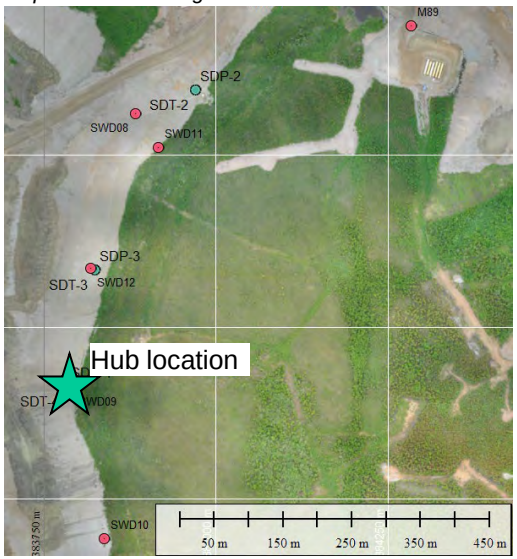


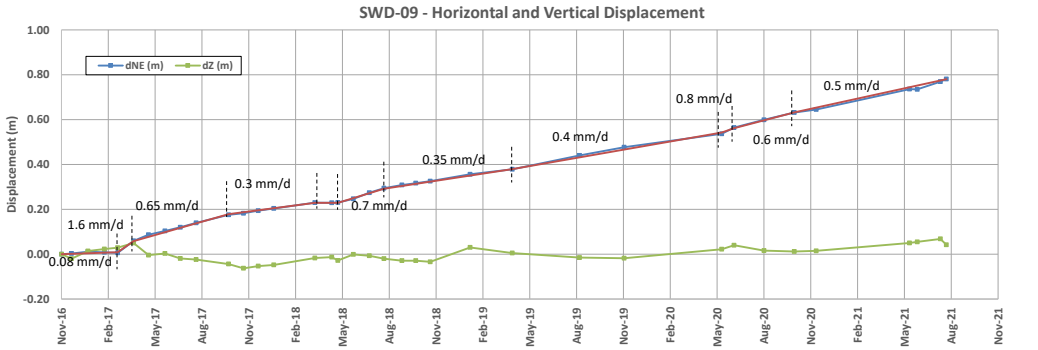
Notes:
Coordinate system is NAD 83 UTM Zone 8.

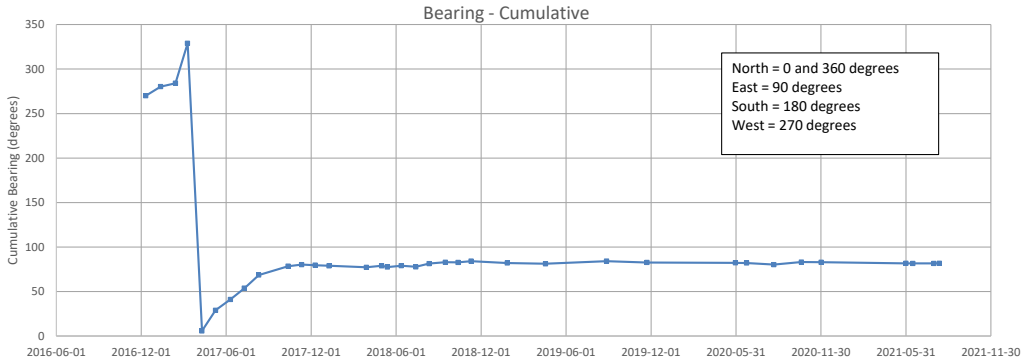


Notes

1. *Hub is a replacement for SWD-04A that was disturbed by frost heave.*
2. *The hub consists of a large boulder on surface, and as a result, seasonal ground movement as a result freeze/thaw cycles may occur that is not indicative of large-scale ground movement. As a result, the horizontal displacement plot is likely to be the most useful plot for monitoring movement.*







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SWD Instrumentation Data

Survey Hub – SWD-09

Job No: 1CM002.073

Filename: ApF_2021SWD Instrumentation.pptx

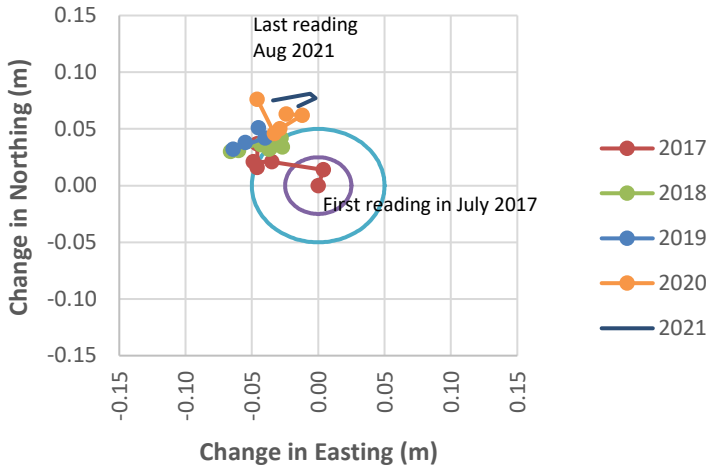
Minto Mine

Date: October 2021

Prepared by PHM

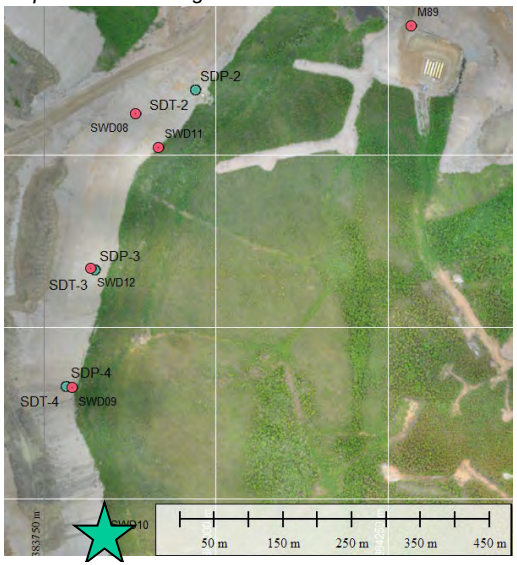
Figure: 6

SWD10 - Northing Vs. Easting Movement Plot

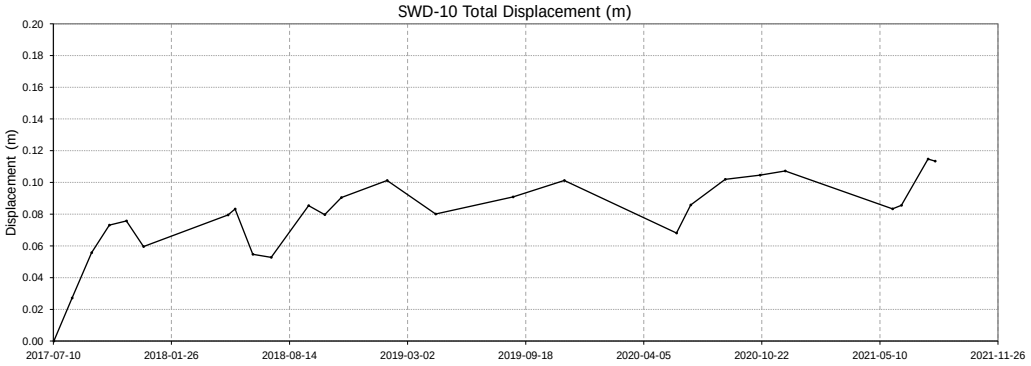


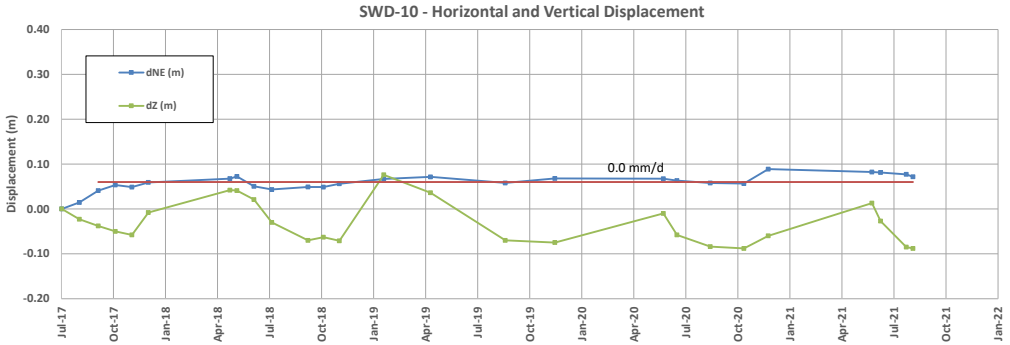
Notes

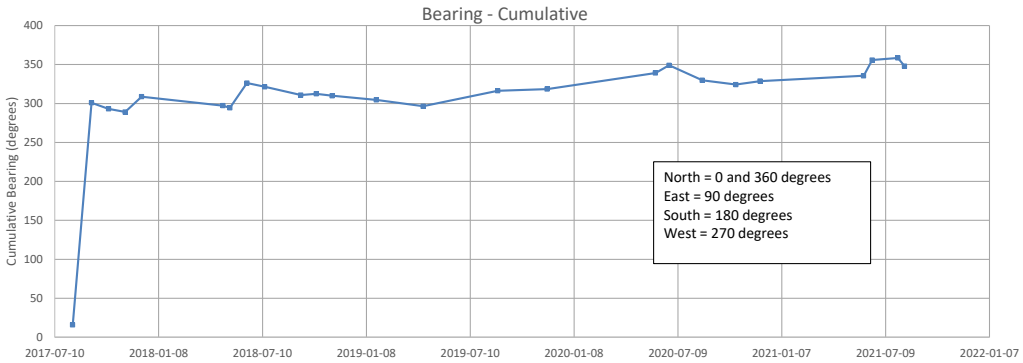
1. *Hub is a replacement for SWD-05A that was disturbed by frost heave.*
2. *The hub consists of a large boulder on surface, and as a result, seasonal ground movement as a result freeze/thaw cycles may occur that is not indicative of large-scale ground movement. As a result, the horizontal displacement plot is likely to be the most useful plot for monitoring movement.*



Hub location







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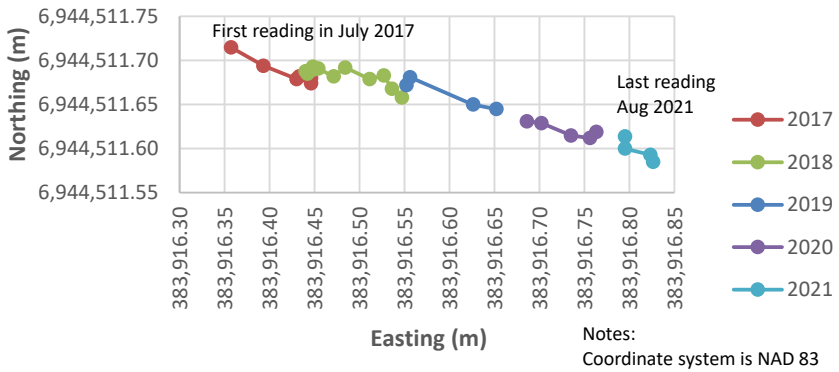
SWD Instrumentation Data

Survey Hub – SWD-10

Job No: 1CM002.073	Minto Mine	Date: October 2021	Prepared by PHM	Figure: 7
Filename: ApF_2021SWD Instrumentation.pptx			

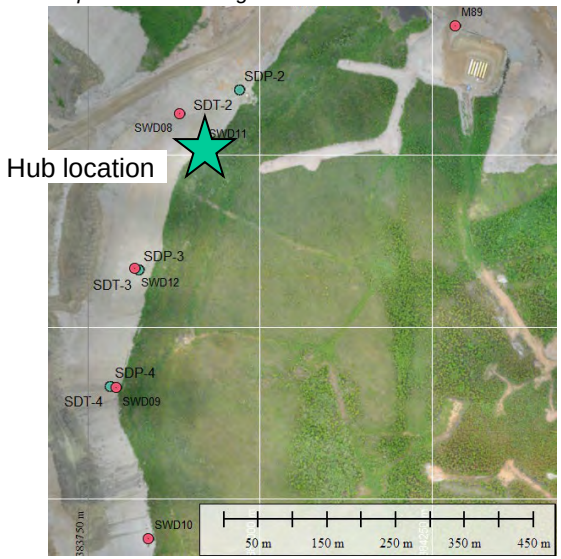
SWD11 - Northing Vs. Easting Movement Plot

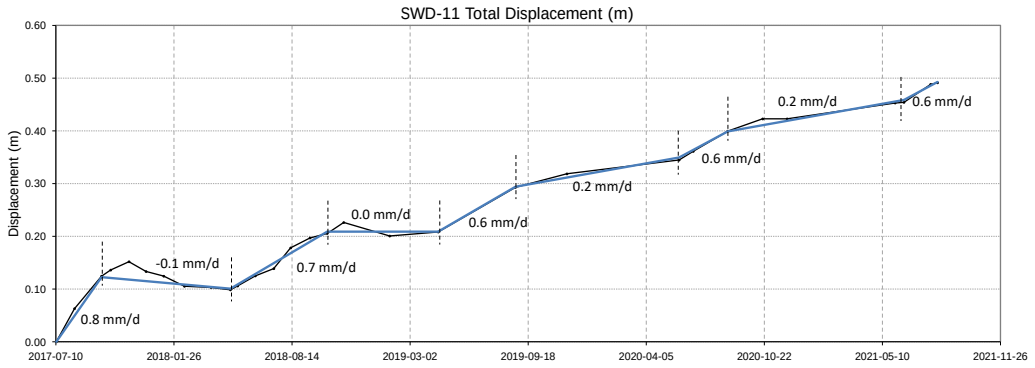


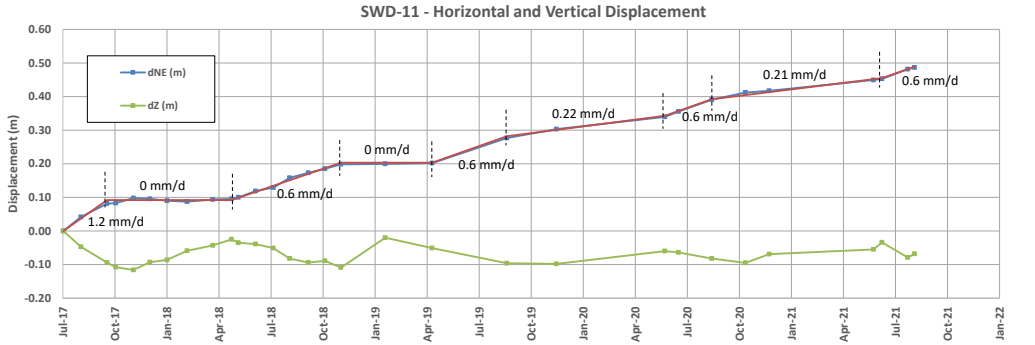
Notes:
Coordinate system is NAD 83 UTM Zone 8.

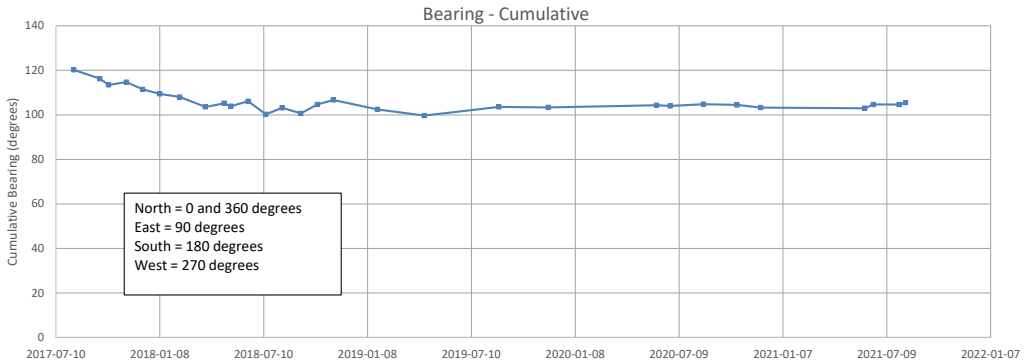
Notes

1. *Hub is a replacement for SWD-03A that was disturbed by frost heave.*
2. *The hub consists of a large boulder on surface, and as a result, seasonal ground movement as a result freeze/thaw cycles may occur that is not indicative of large-scale ground movement. As a result, the horizontal displacement plot is likely to be the most useful plot for monitoring movement.*









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SWD Instrumentation Data

Survey Hub – SWD-11

Job No: 1CM002.073

Filename: ApF_2021SWD Instrumentation.pptx

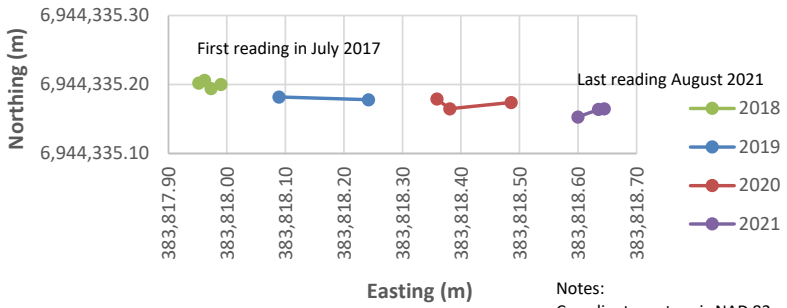
Minto Mine

Date: October 2021

Prepared by PHM

Figure: **8**

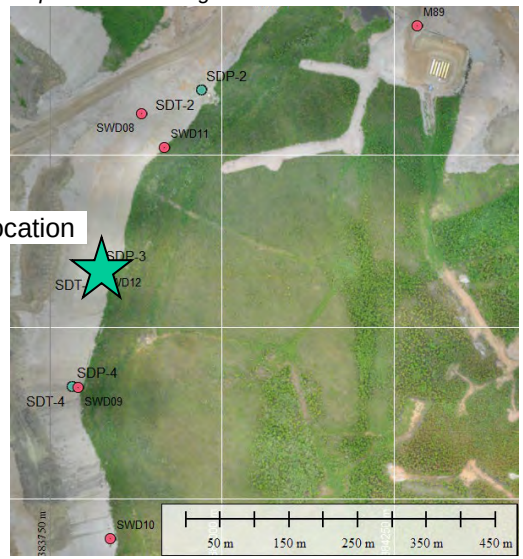
SWD12 - Northing Vs. Easting Movement Plot

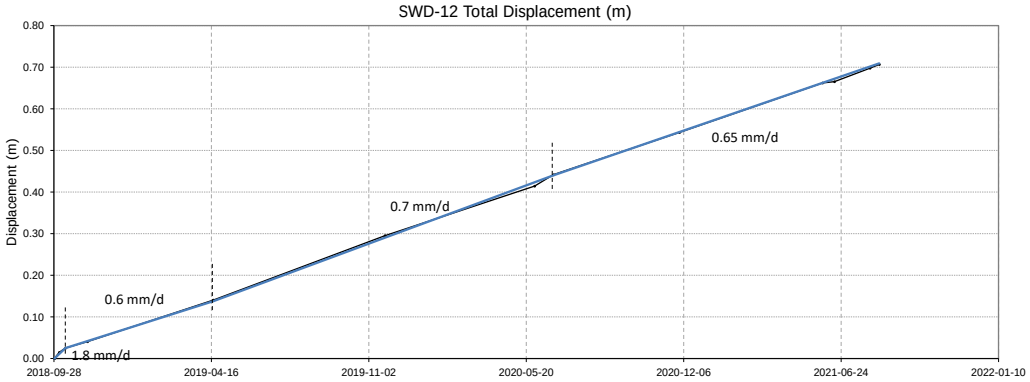


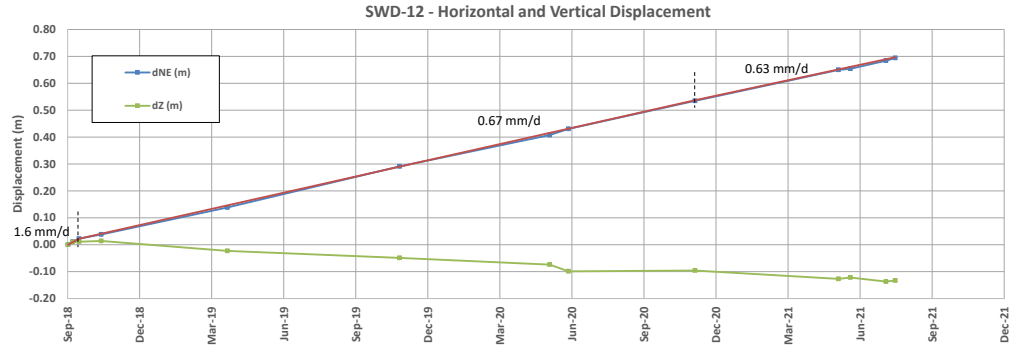
Notes:
Coordinate system is NAD 83 UTM Zone 8.

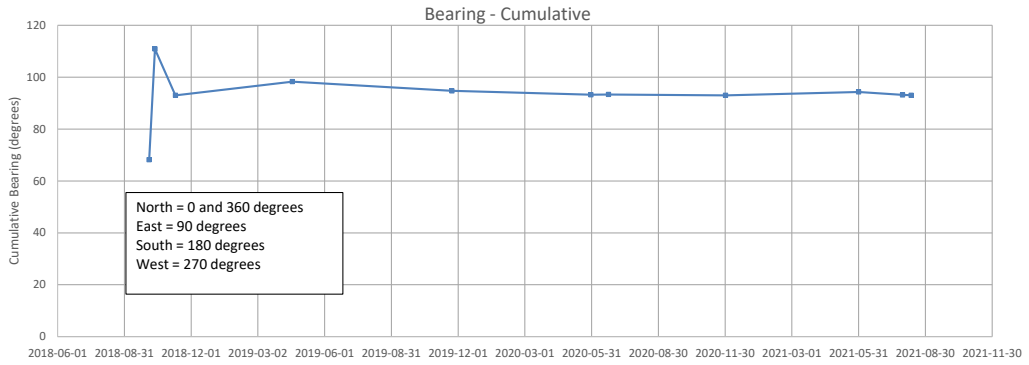
Notes

1. *Hub is a replacement for inclinometer SDI-3 that sheared off in August 2017.*
2. *The hub consists of a large boulder on surface, and as a result, seasonal ground movement as a result freeze/thaw cycles may occur that is not indicative of large-scale ground movement. As a result, the horizontal displacement plot is likely to be the most useful plot for monitoring movement.*









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SWD Instrumentation Data

Survey Hub – SWD-12

Job No: 1CM002.073

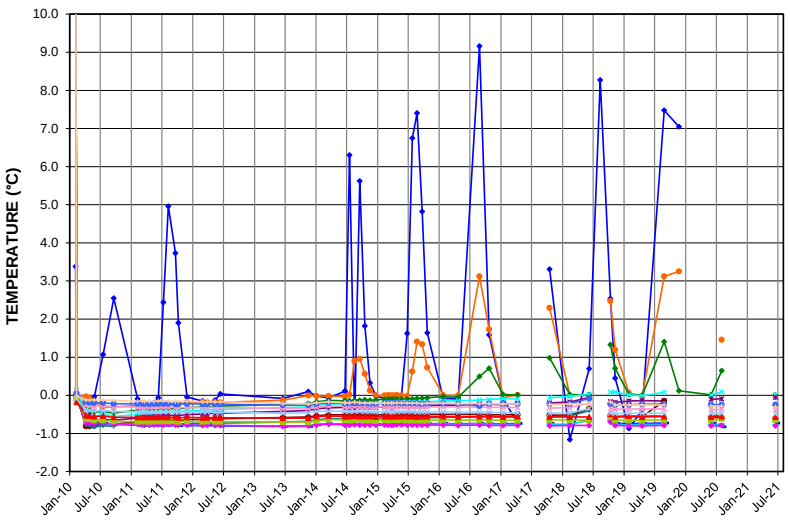
Filename: ApF_2021SWD Instrumentation.pptx

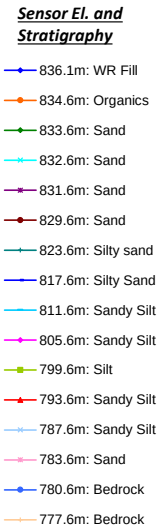
Minto Mine

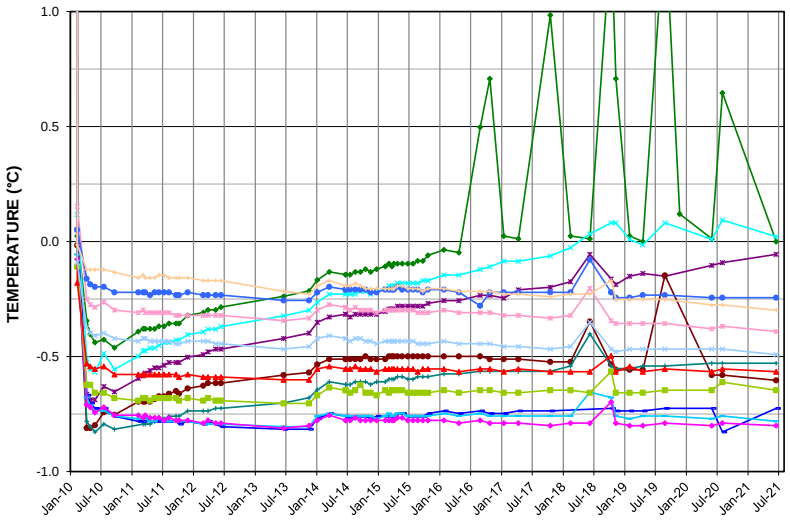
Date: October 2021

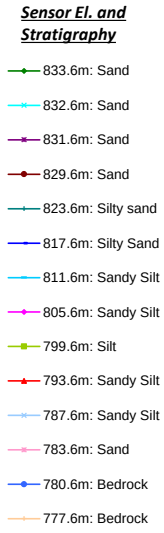
Prepared by PHM

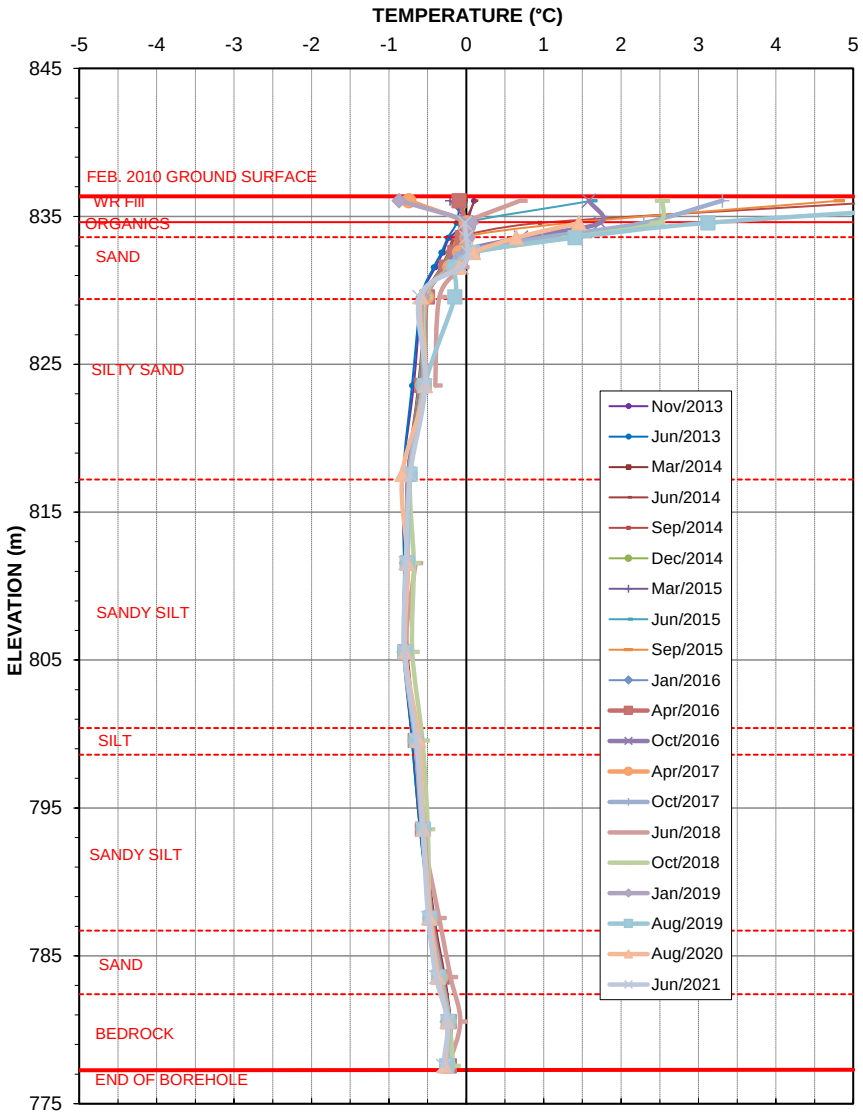
Figure: 9











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SWD Instrumentation Data

Temperature Cable – SDT-1

Job No: 1CM002.073

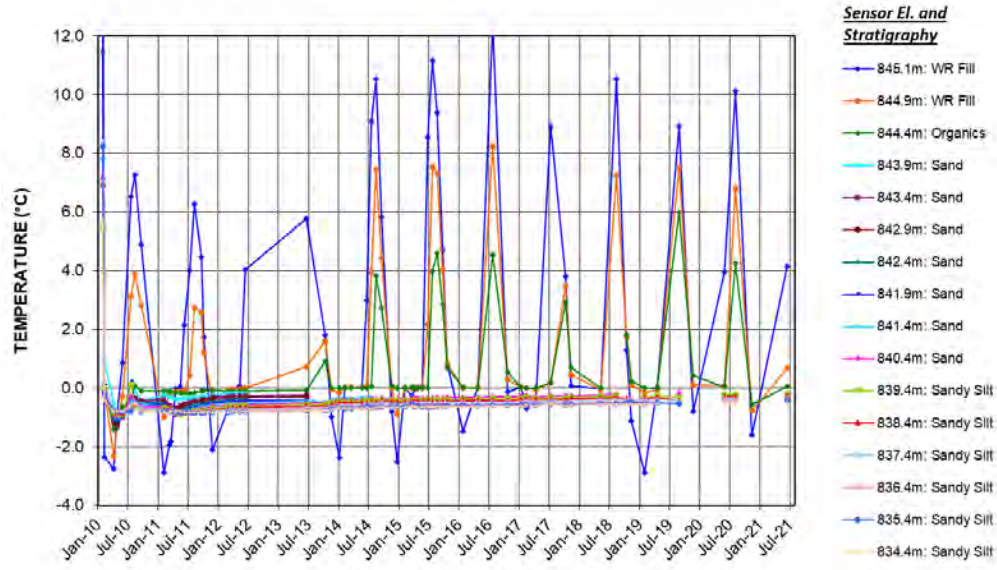
Filename: ApF_2021SWD Instrumentation.pptx

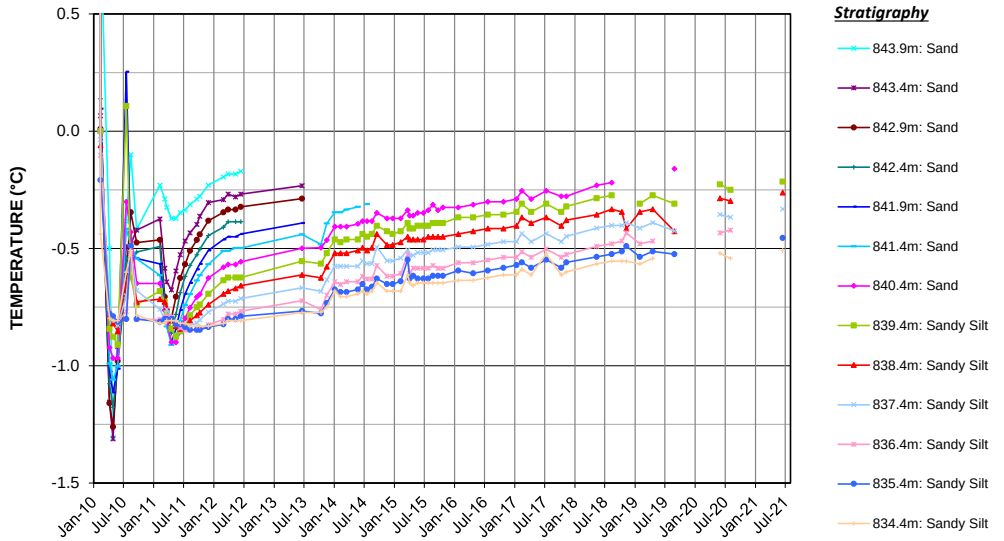
Minto Mine

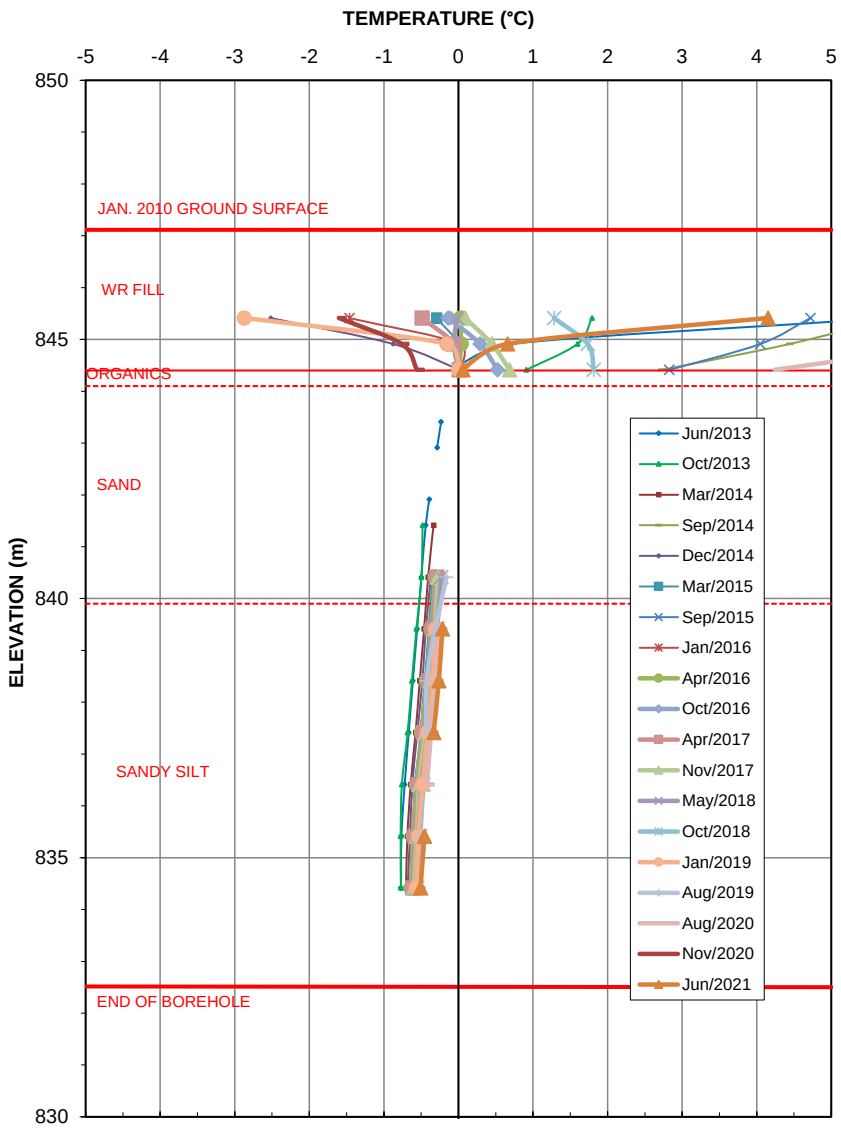
Date: October 2021

Prepared by PHM

Figure: **10**







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SWD Instrumentation Data

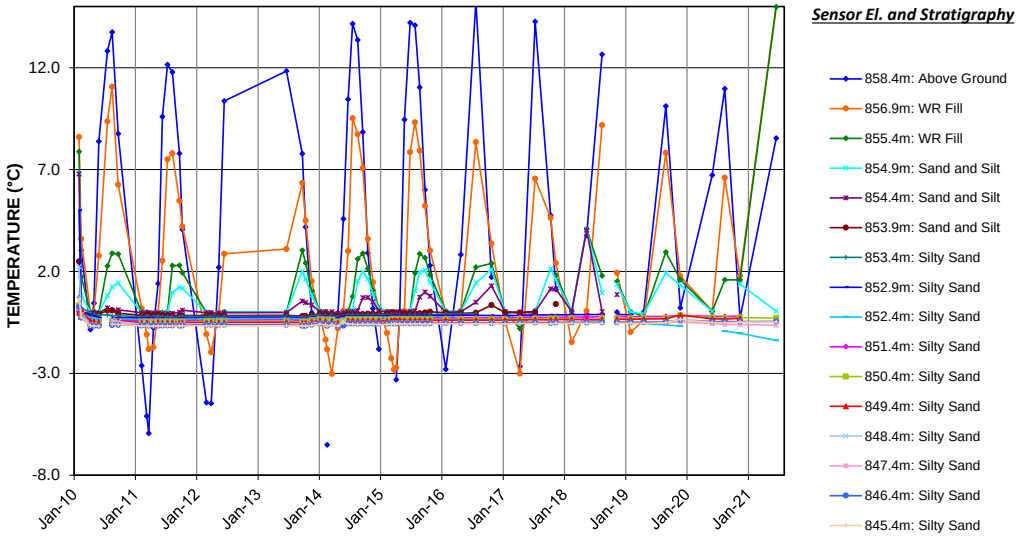
Temperature Cable – SDT-2

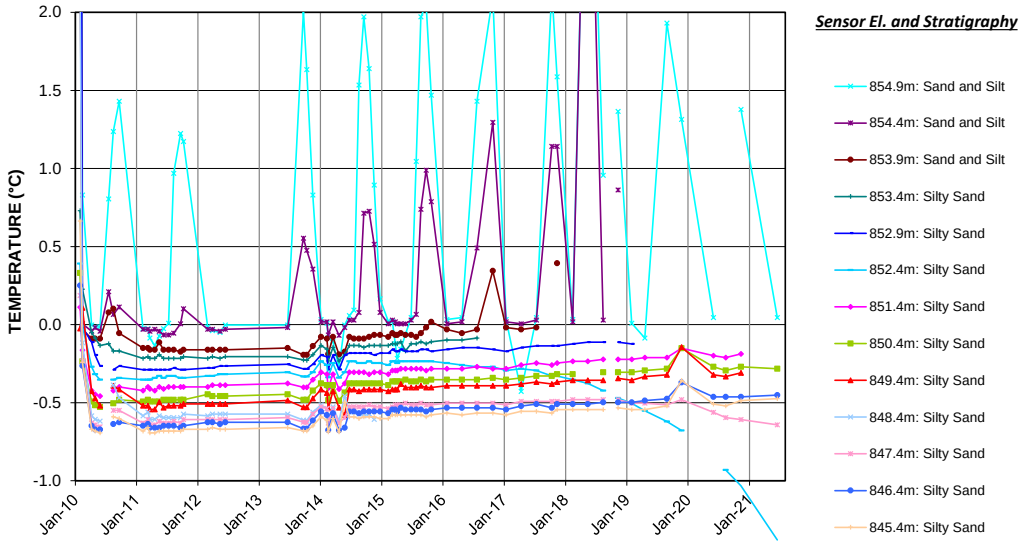
Job No: 1CM002.073

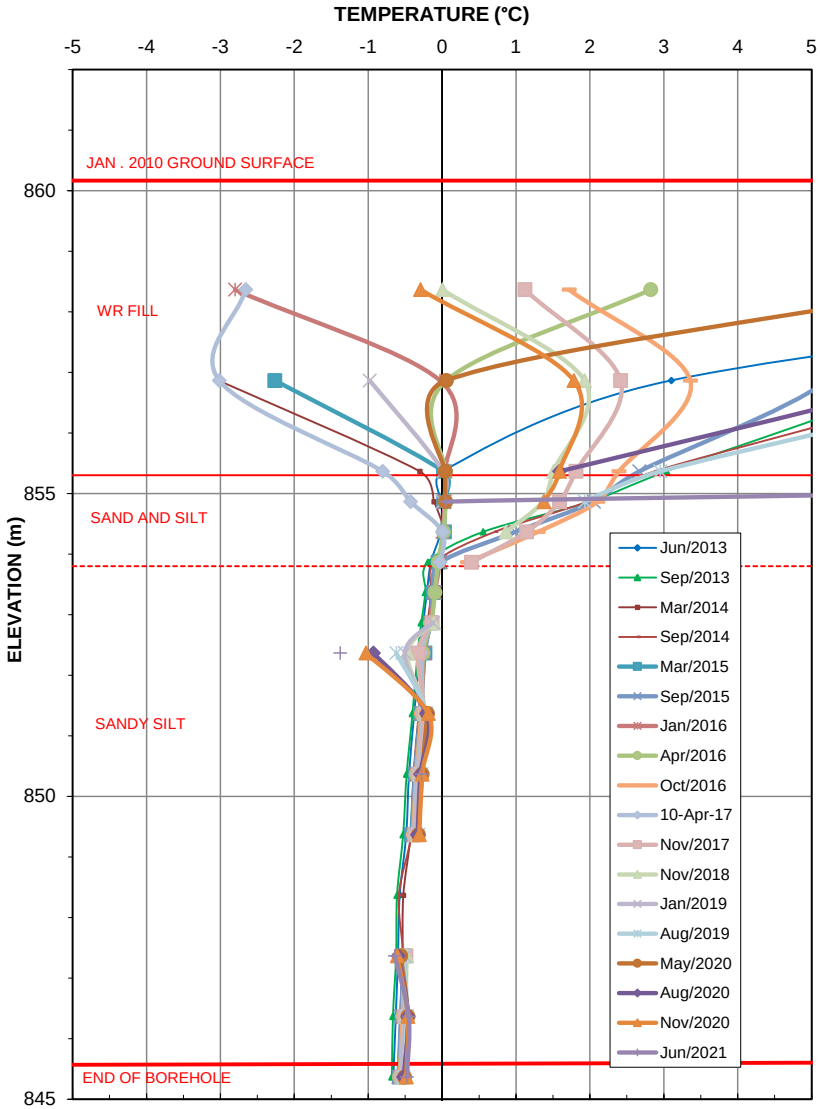
Filename: ApF_2021SWD Instrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
October 2021	PHM	11







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Job No: 1CM002.073

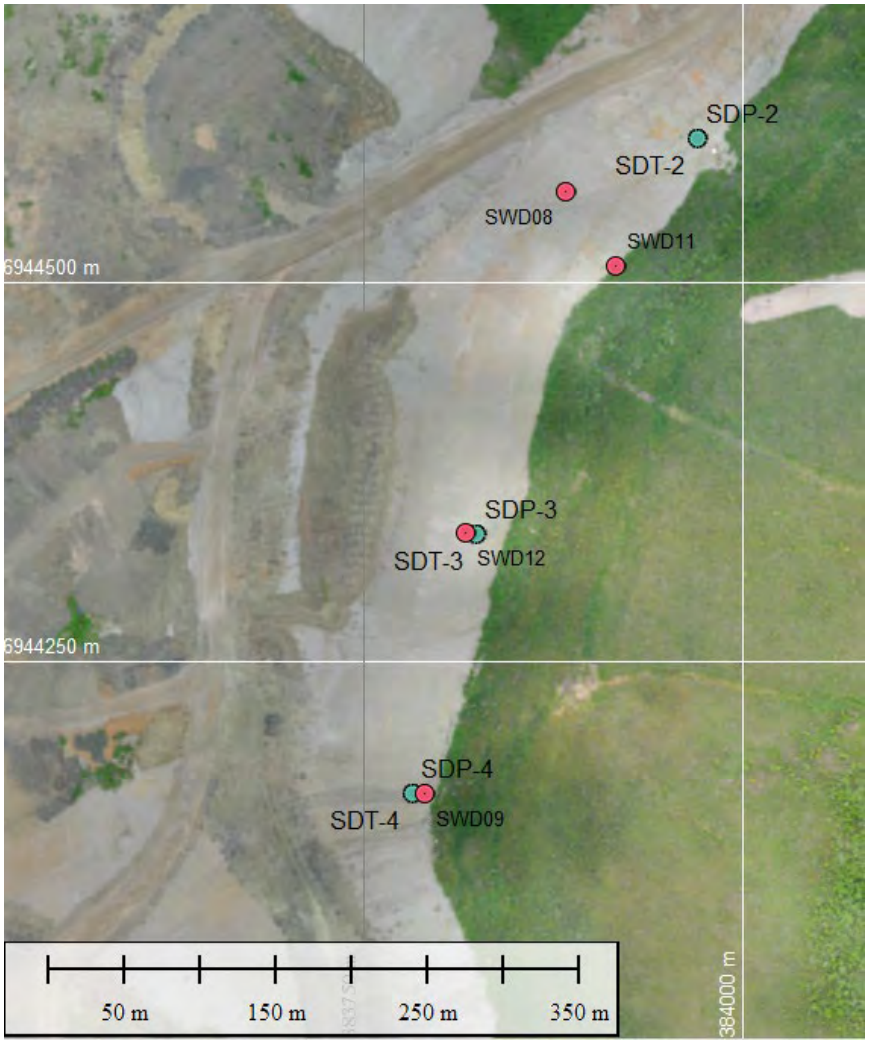
Filename: ApF_2021SWD Instrumentation.pptx

Minto Mine

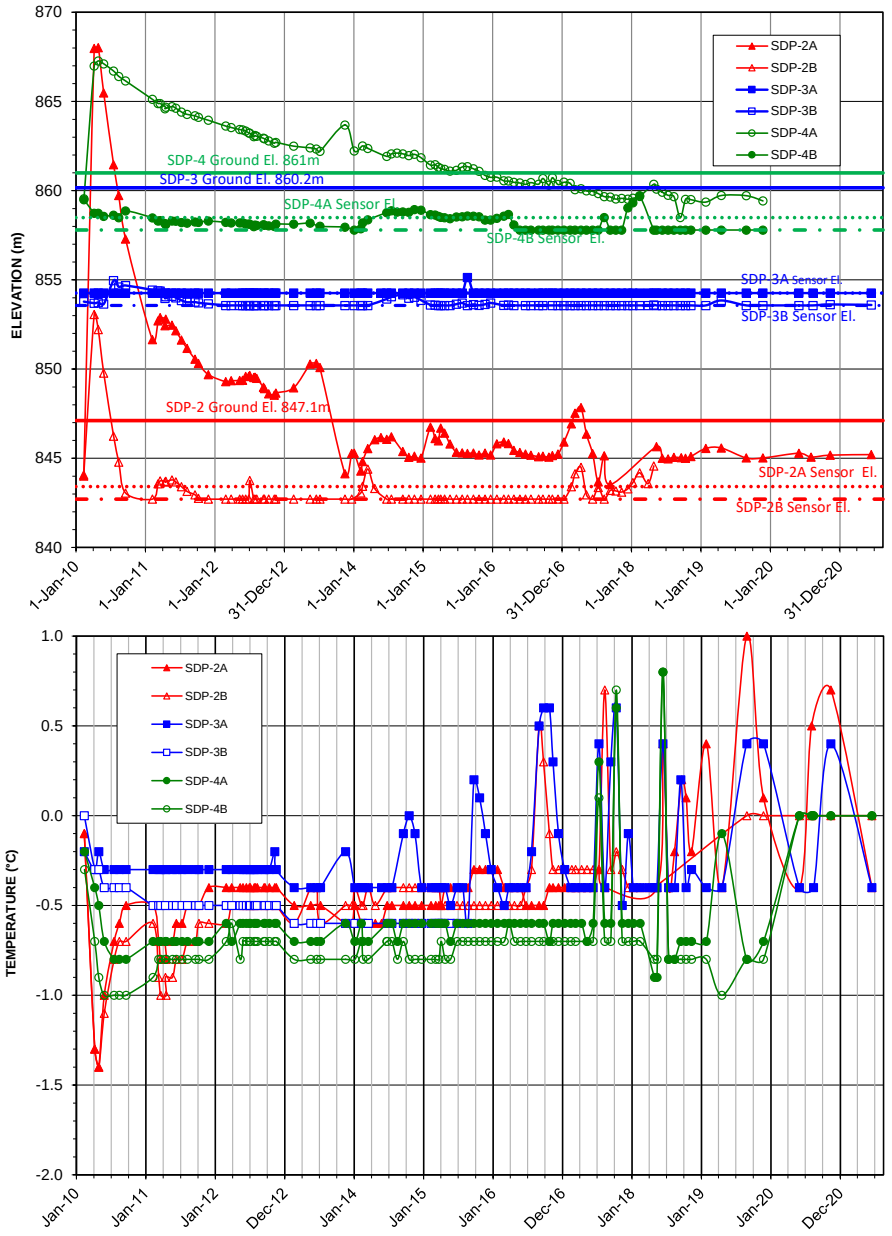
SWD Instrumentation Data

Temperature Cable – SDT-3

Date:	Prepared by	Figure:
October 2021	PHM	12



Southwest Dump Piezometers and Ground Temperature Cables



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SWD Instrumentation Data

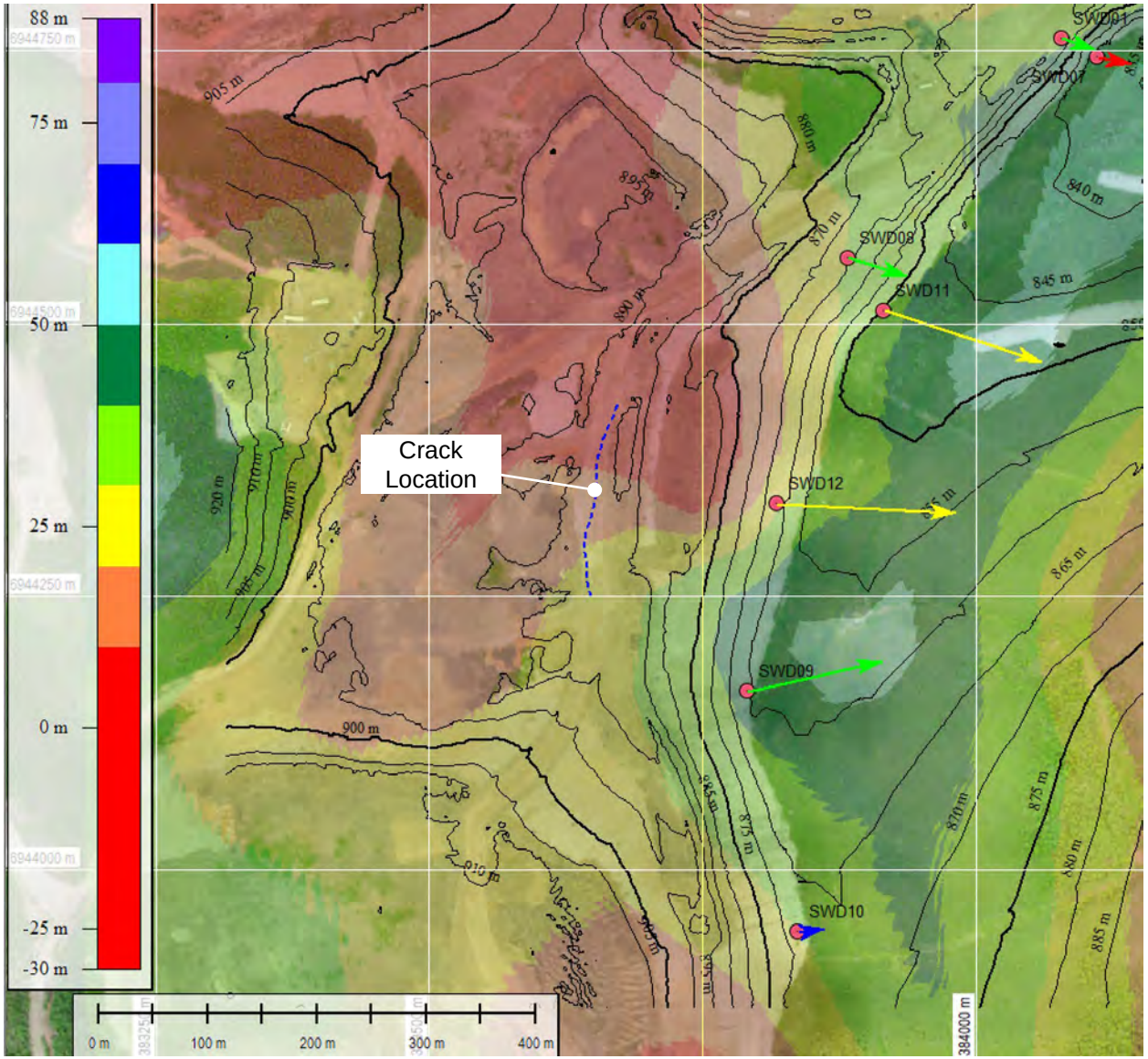
Southwest Dump Piezometers

Job No: 1CM002.073

Filename: ApF_2021SWD Instrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
October 2021	PHM	13



Movement Vector - No Current Movement

Movement Vector - Decelerating Movement

Movement Vector - Steady Movement

Movement Vector - Accelerating Movement

Source file:
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Job No: 1CM002.073

Filename: ApF_2021SWD Instrumentation.pptx

Minto Mine

SWD Instrumentation Data

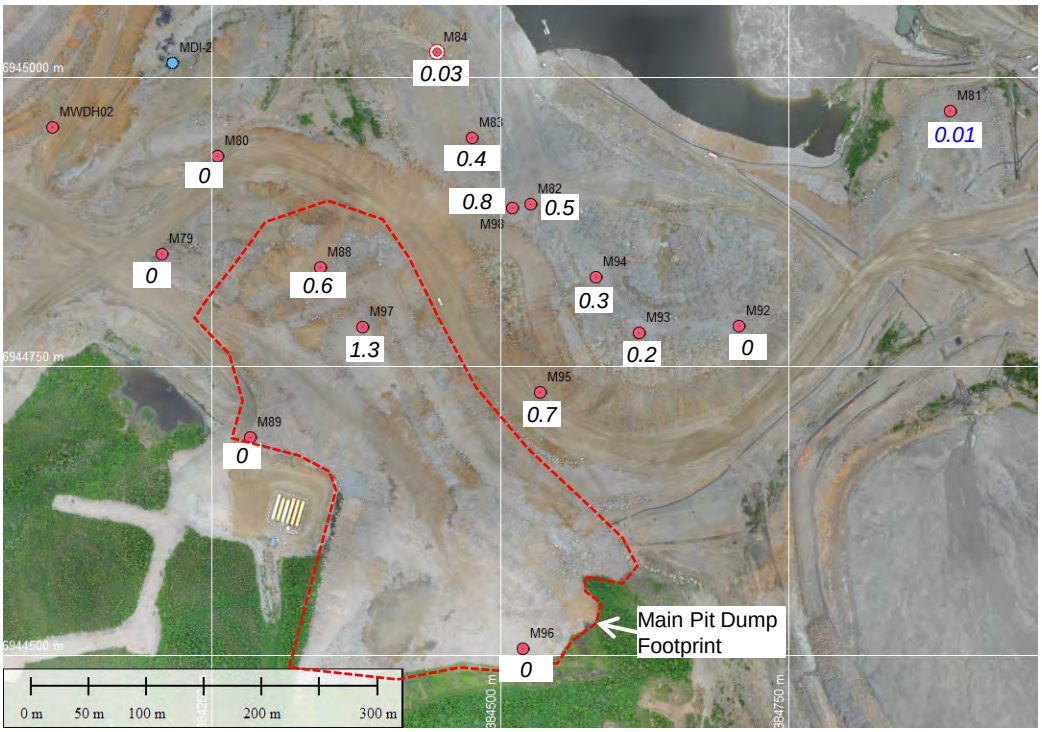
Southwest Dump Crack Location Compared to Overburden Isopach

Date:	Prepared by	Figure:
October 2021	PHM	14

Appendix G Main Pit Instrumentation Data

Legend/Notes

1. *Values in black are total movement rates in units of mm/day*
2. *Values in blue are horizontal movement rates in mm/day.*



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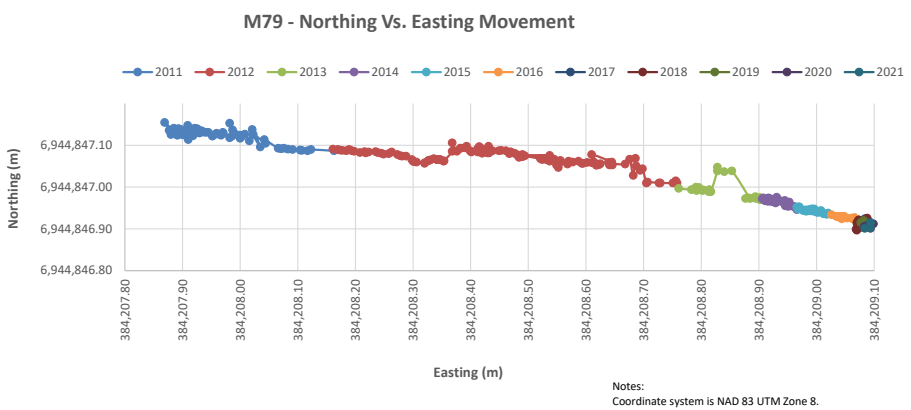
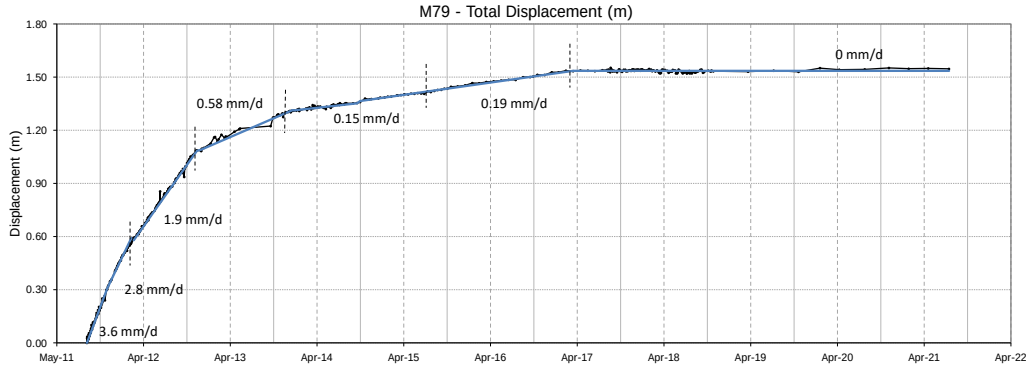
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMainPitSurveyHubs_SRK.xlsm

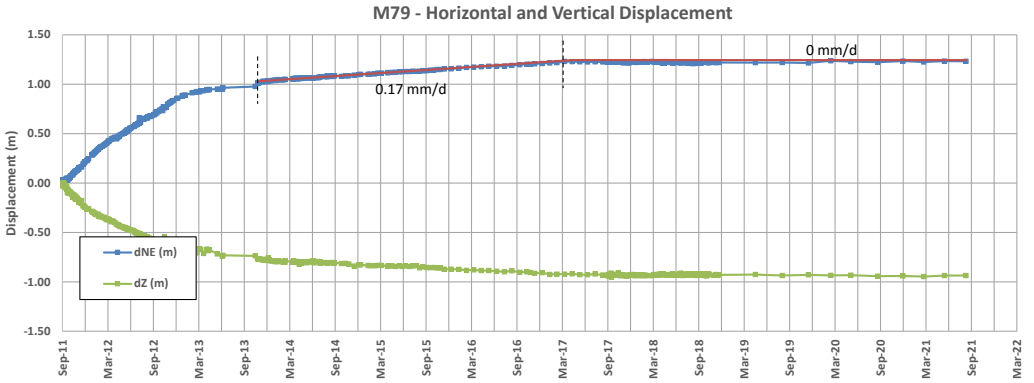
Main Pit Active Survey Hubs

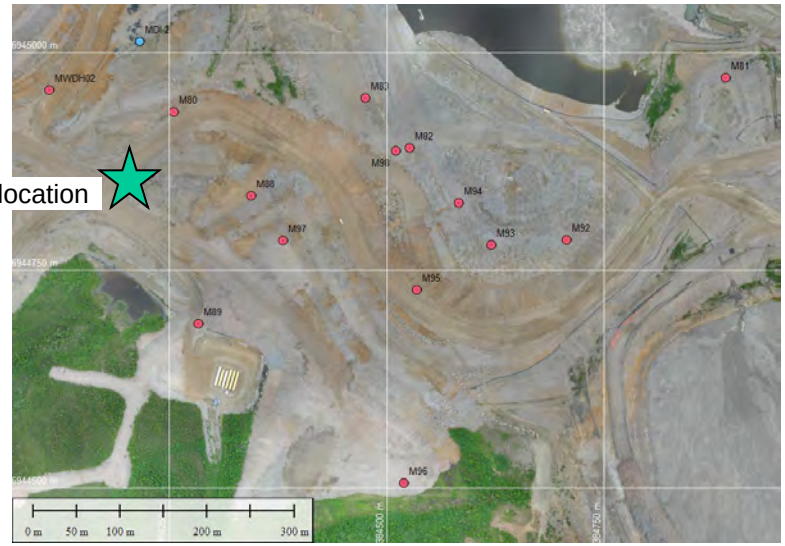
Survey Hub	Last Reading	Movement Rate (mm/day)		Bearing (over past year)	Comments
		Current (as of last reading)	One year prior to last reading		
M79	8/10/2021	0	0	n/a	No significant movement.
M80	8/10/2021	0	0	n/a	No significant movement.
M81	8/9/2021	0.01	0.01	345	No significant horizontal movement (horizontal rates listed).
M82	8/9/2021	0.5	0.8	64	Decelerating since completion of MPD.
M83	8/9/2021	0.4	0.6	43	Decelerating since completion of MPD.
M84	5/15/2021	0.03	0.1	98	Decelerating.
M88	8/9/2021	0.6	0.8	42	Slight deceleration trend observable.
M92	8/10/2021	0	0	n/a	No significant movement.
M93	8/10/2021	0.2	0.3	52	Decelerating.
M94	8/10/2021	0.3	0.3	41	Steady movement, vertical deplacement rate is decellerating, movement direction is turning north.
M95	8/10/2021	0.7	0.7	46	Steady movement.
M97	3/17/2021	1.3	1.6	36	Decelerating.
M98	7/12/2020	0.8	1.2	63	Decelerating.

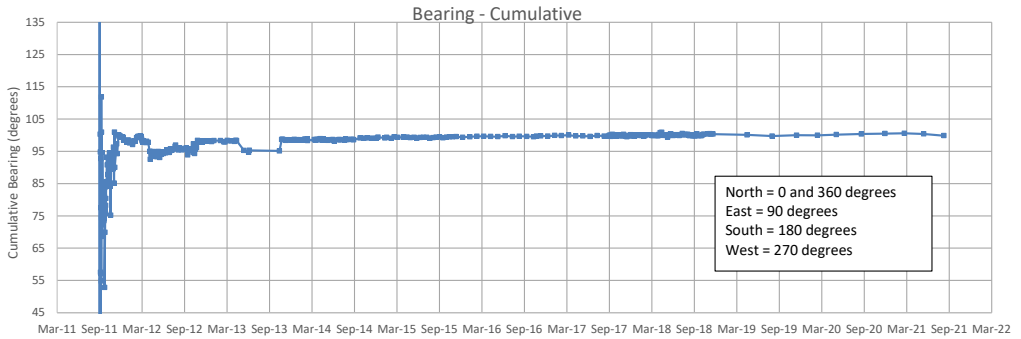


Notes:
Coordinate system is NAD 83 UTM Zone 8.









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Main Pit Instrumentation Data

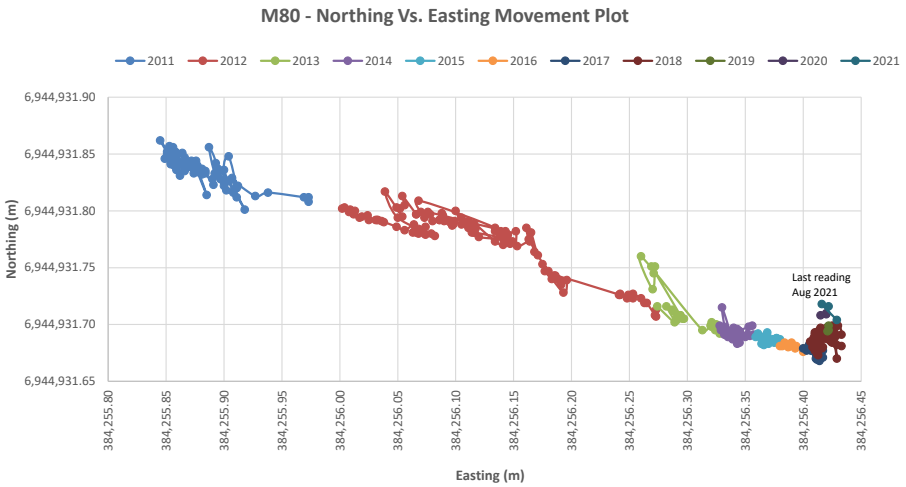
Survey Hub – M79

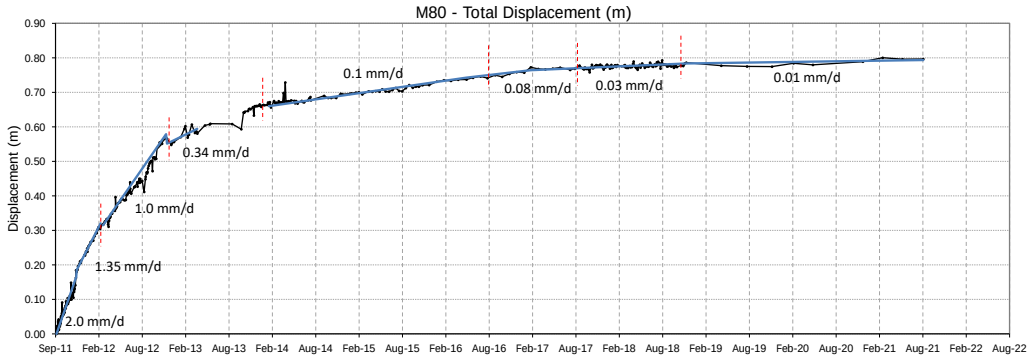
Job No: 1CM002.073

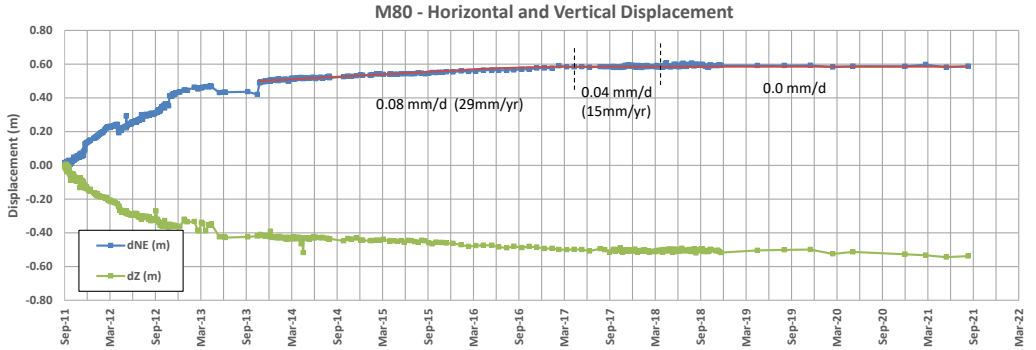
Filename: ApG_2021MainPitInstrumentation.pptx

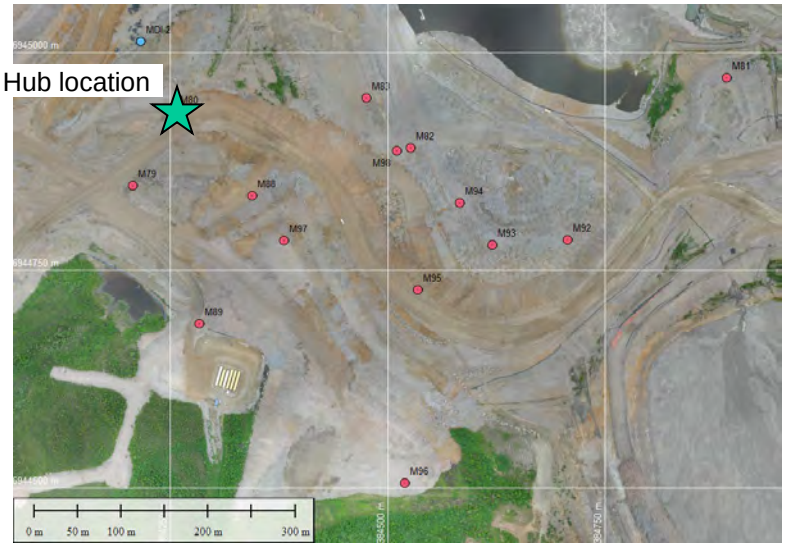
Minto Mine

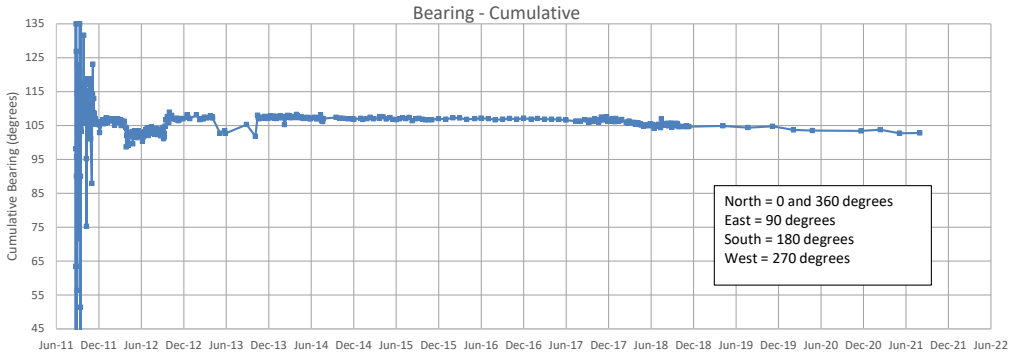
Date:	Prepared by:	Figure:
October 2021	PHM	2











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Main Pit Instrumentation Data

Survey Hub – M80

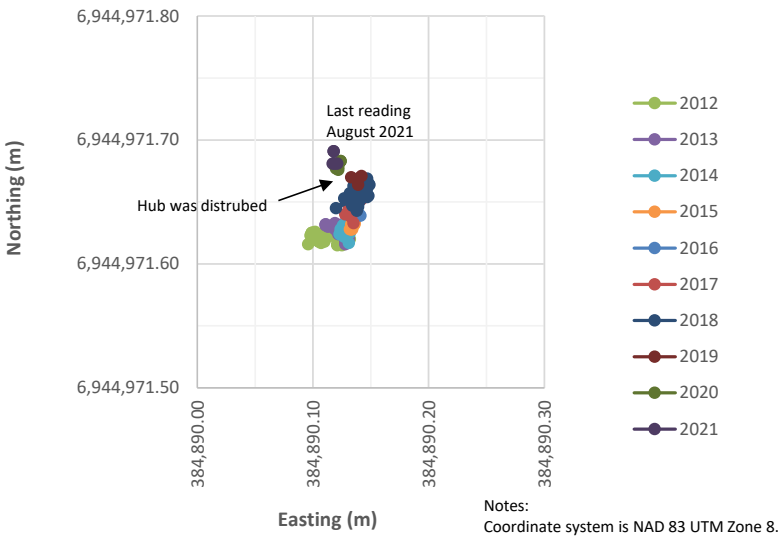
Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
October 2021	PHM	3

M81 - Northing Vs. Easting Movement Plot



Notes:
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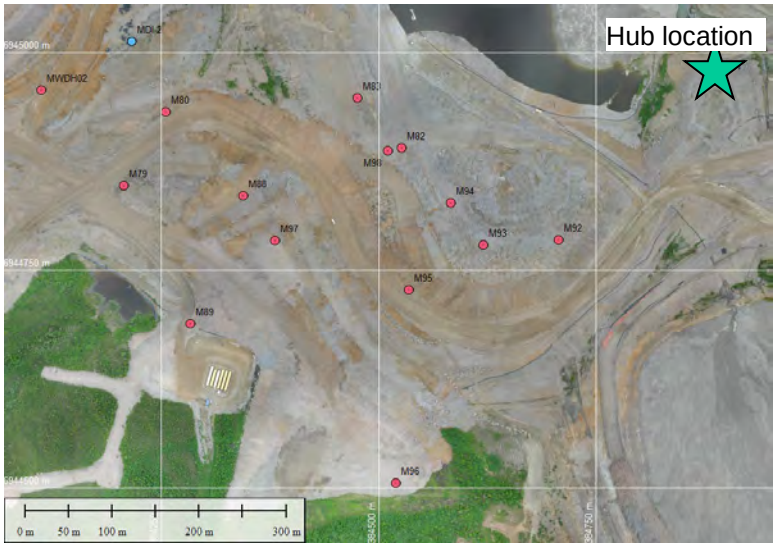

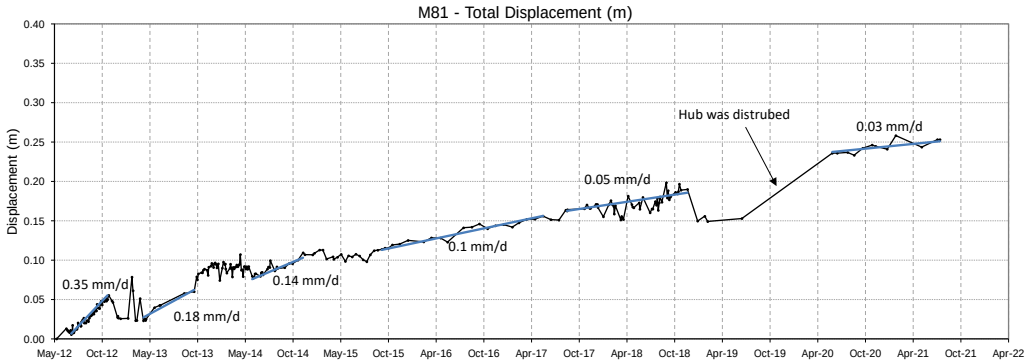

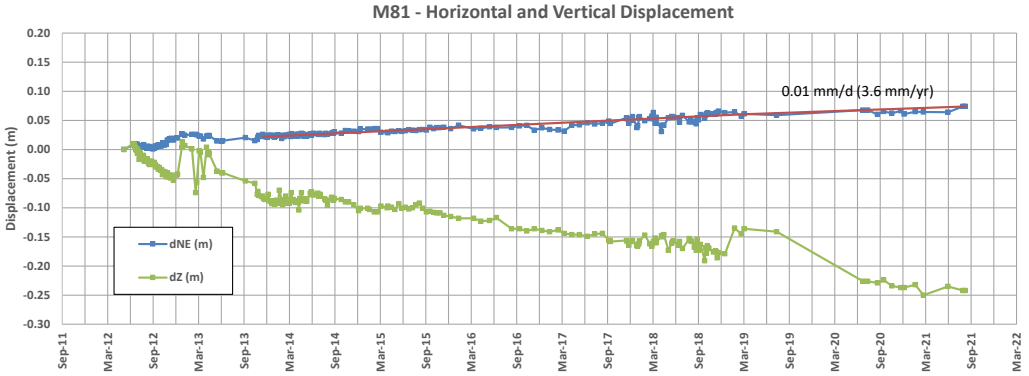

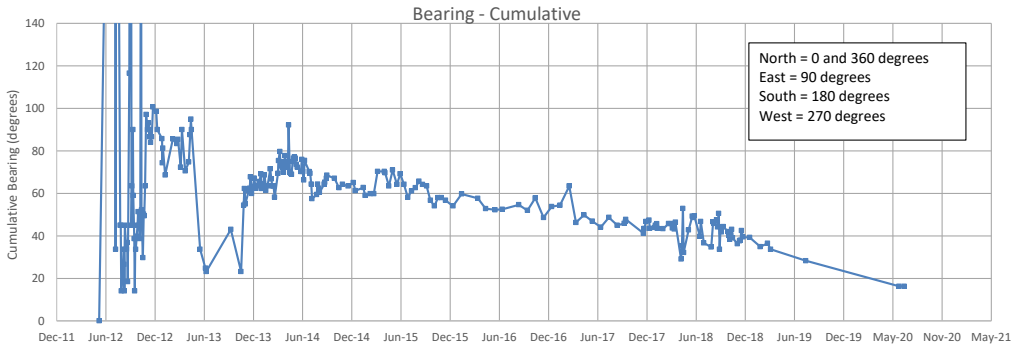

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Main Pit Instrumentation Data

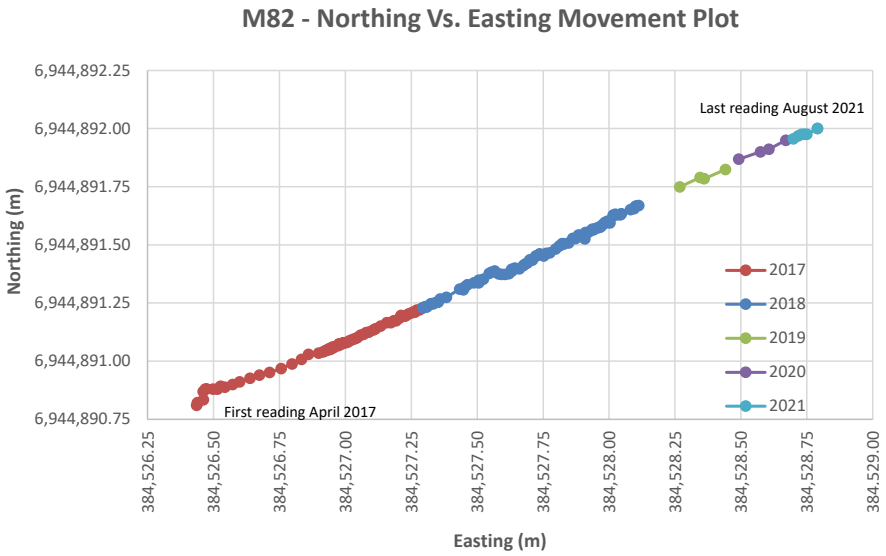
Survey Hub – M81

Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
October 2021	PHM	4



Notes:
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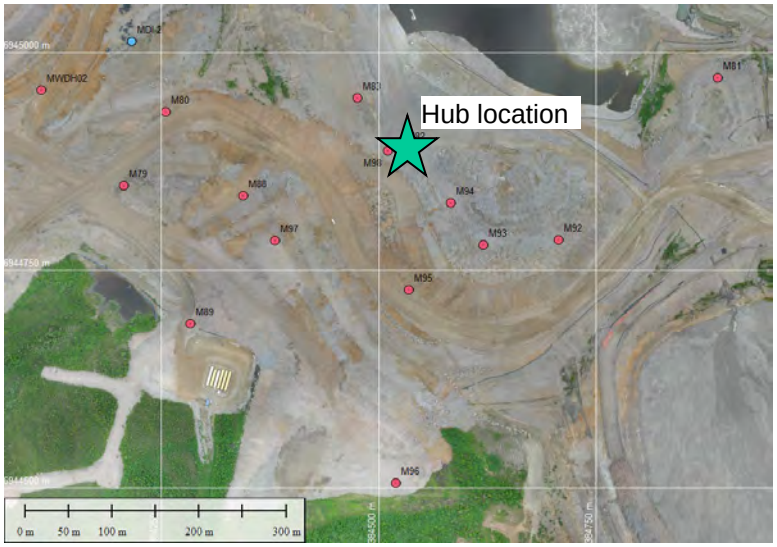

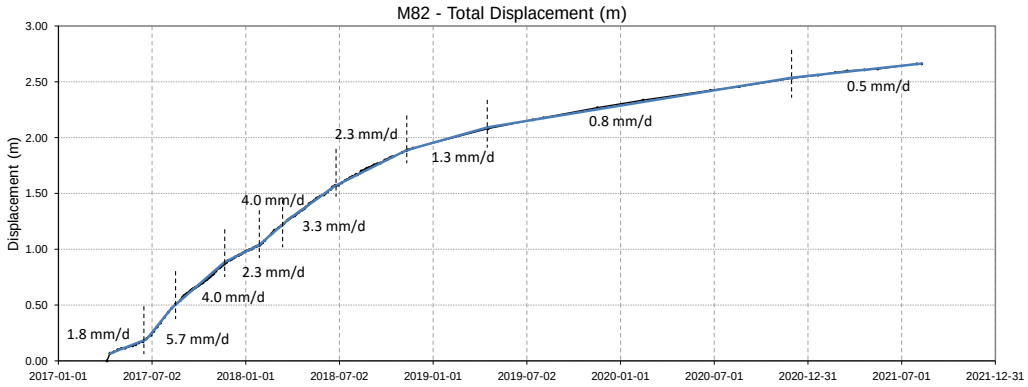

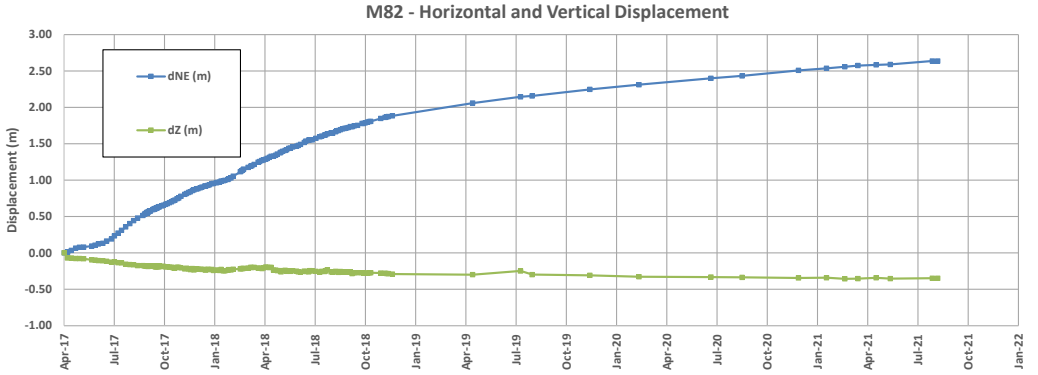

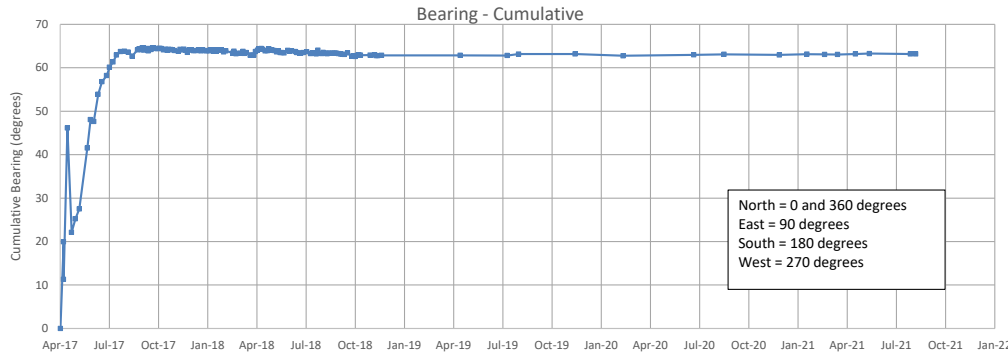

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Main Pit Instrumentation Data

Survey Hub – M82

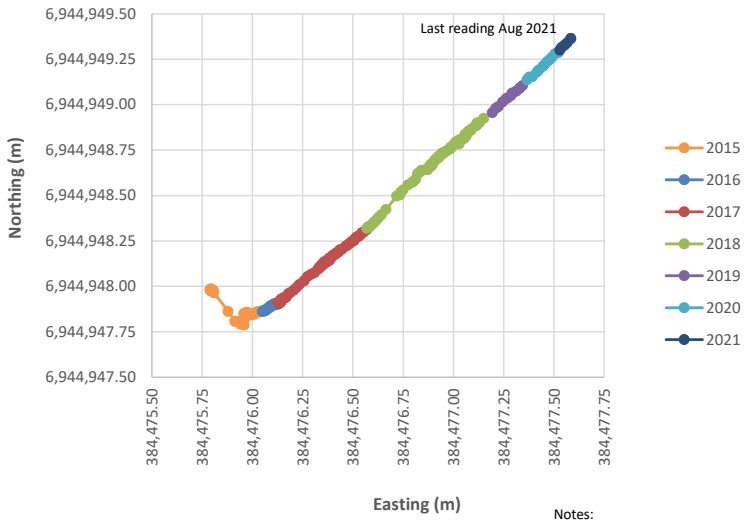
Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
October 2021	PHM	5

M83 - Northing Vs. Easting Movement Plot



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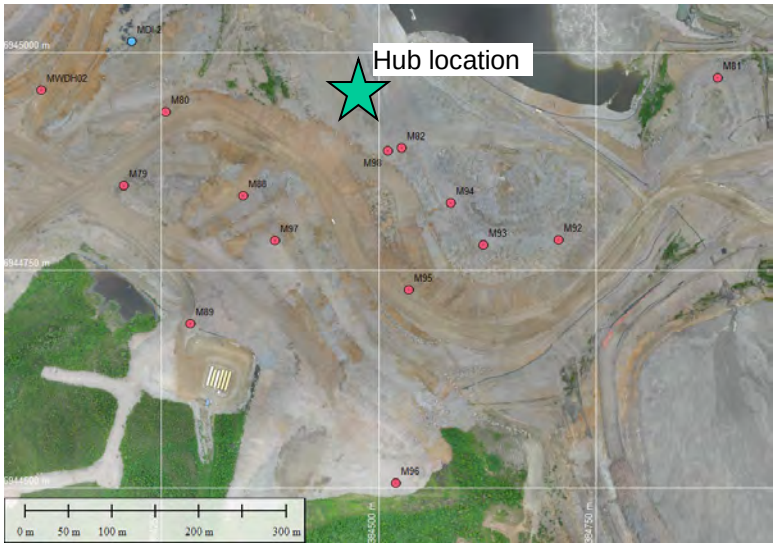

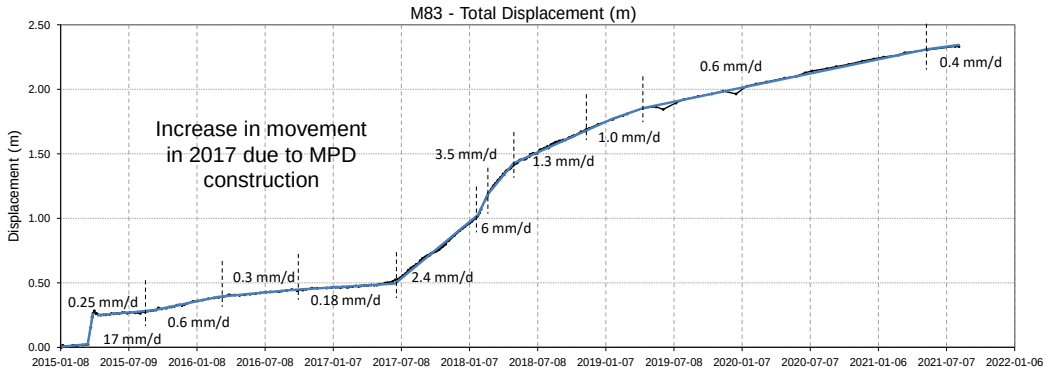

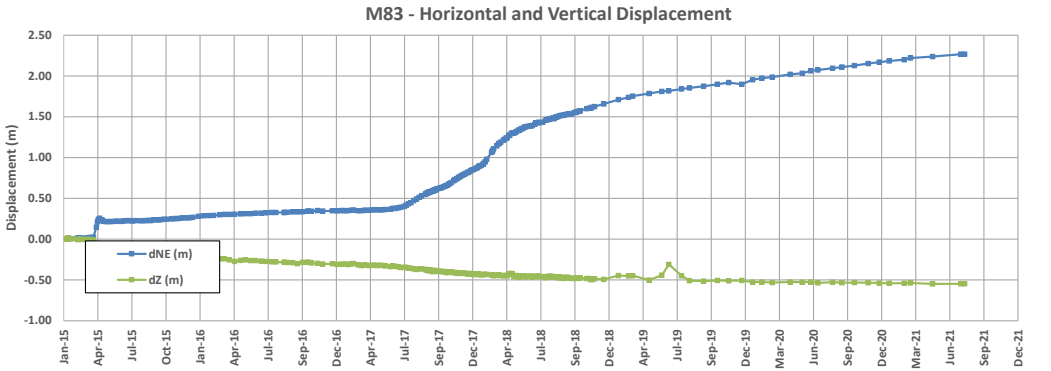

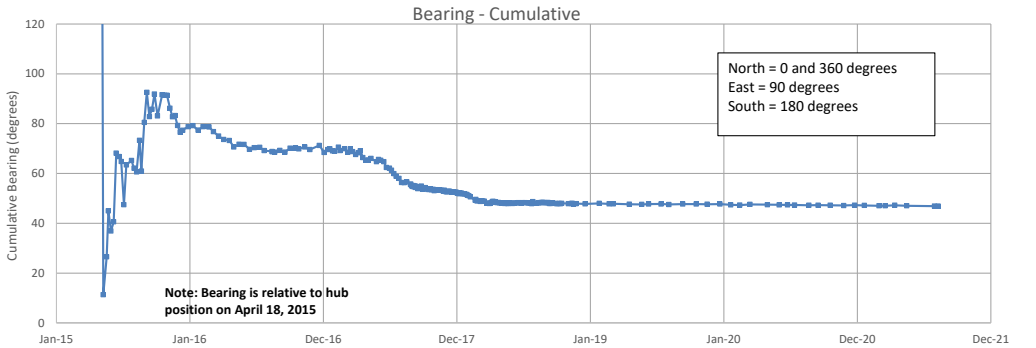

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Main Pit Instrumentation Data

Survey Hub – M83

Job No: 1CM002.073

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Minto Mine

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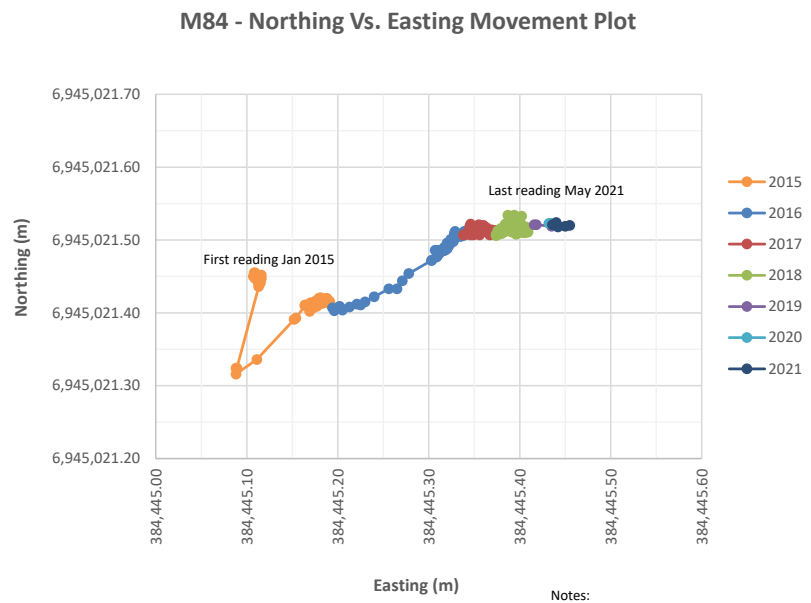
Figure: **6**



Notes:
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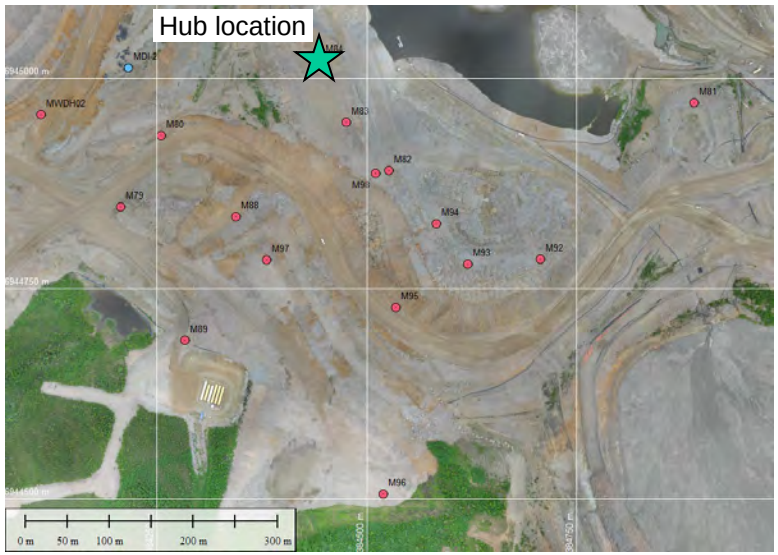

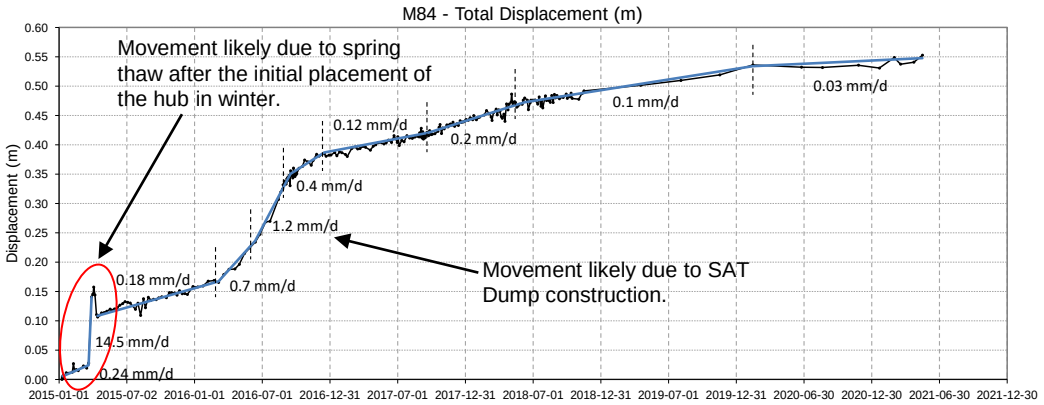

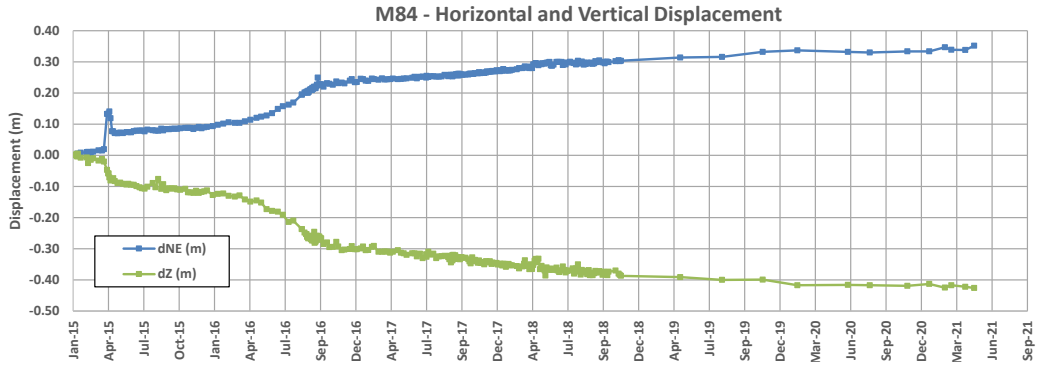

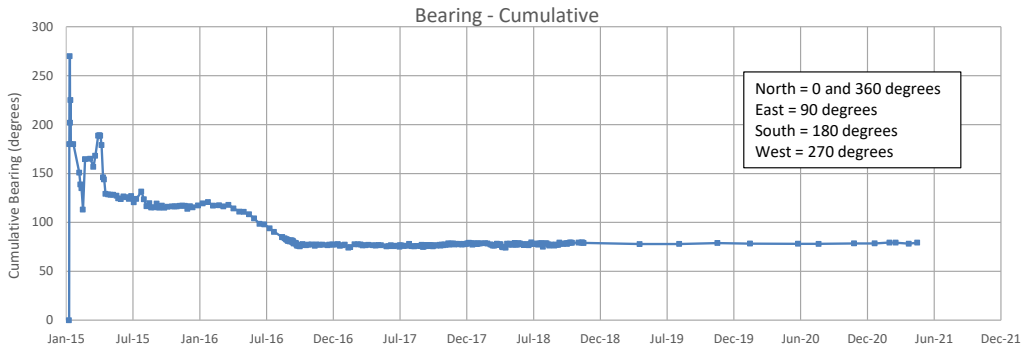

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Main Pit Instrumentation Data

Survey Hub – M84

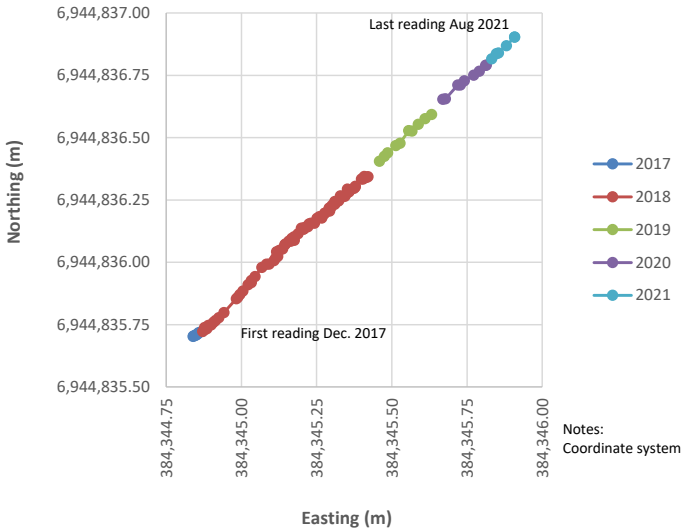
Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
October 2021	PHM	7

M88 - Northing Vs. Easting Movement Plot



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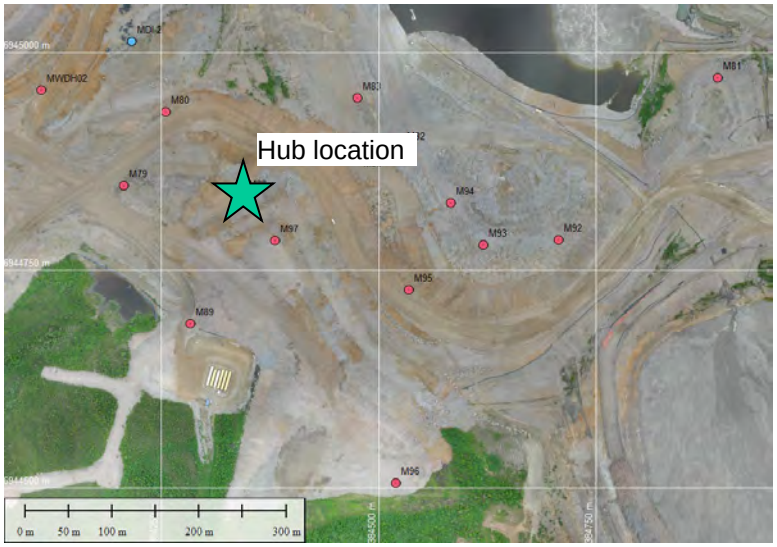

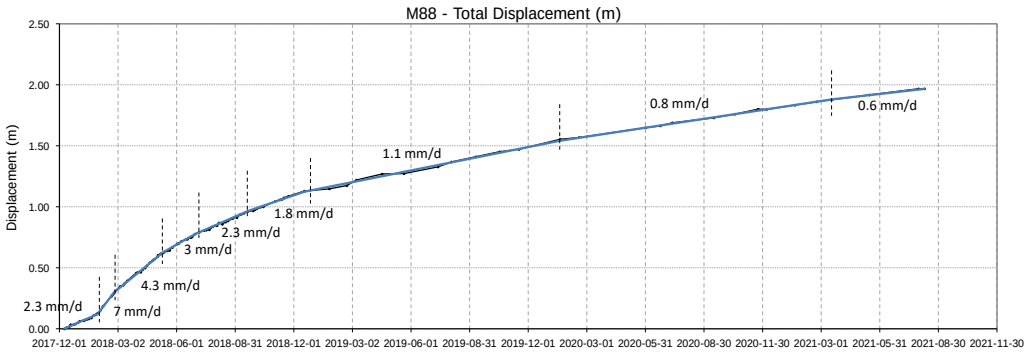

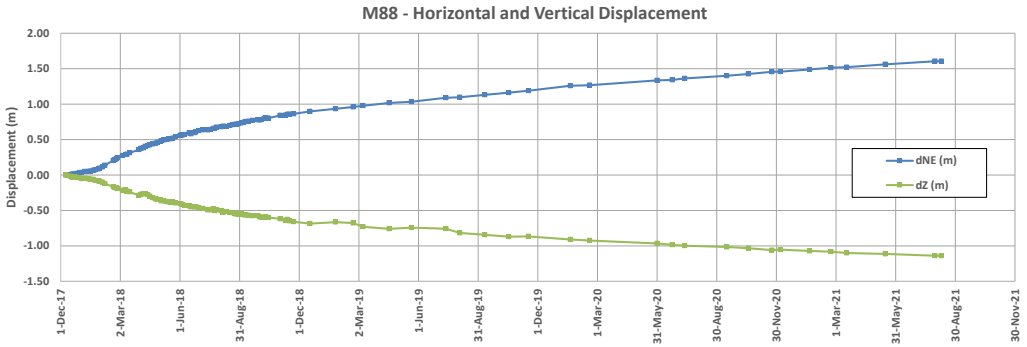

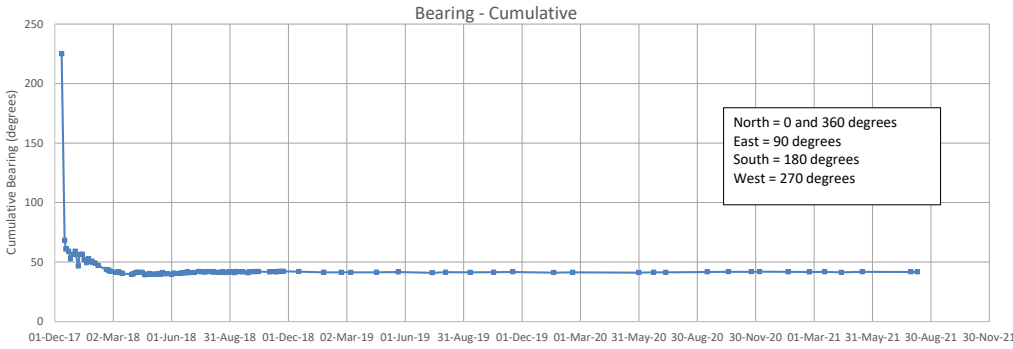

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Main Pit Instrumentation Data

Survey Hub – M88

Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

Minto Mine

Date: October 2021

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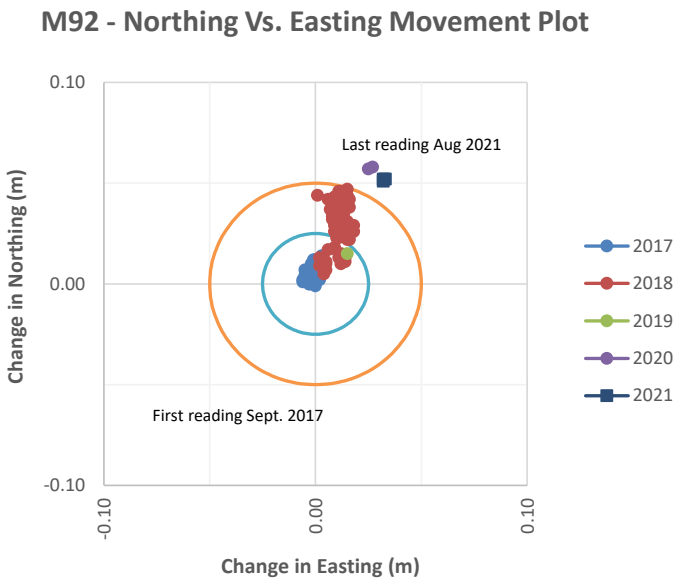
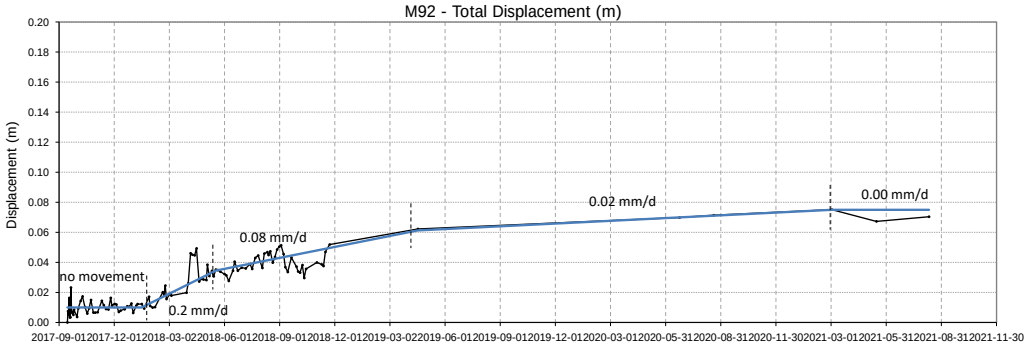
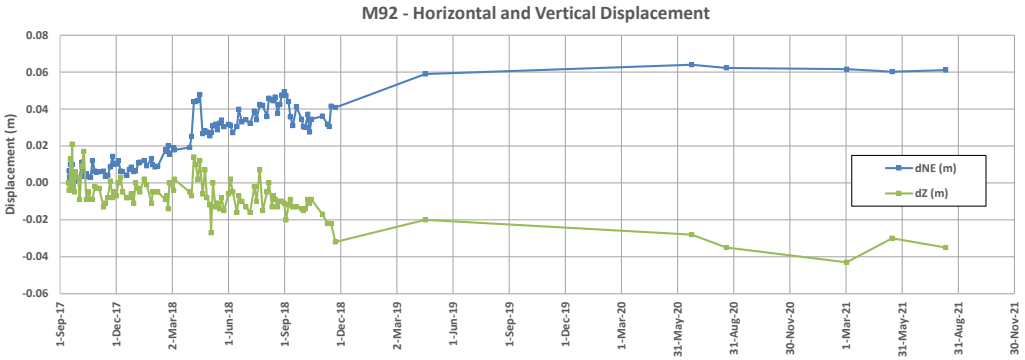
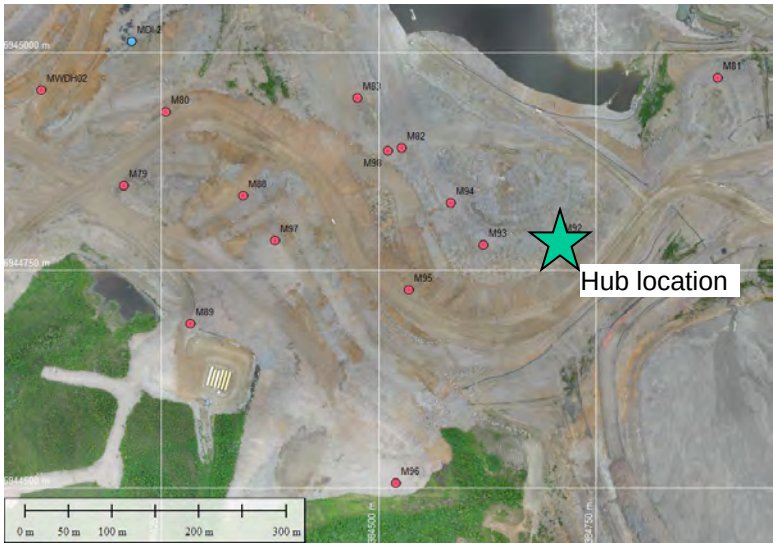
Figure: **8**









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Main Pit Instrumentation Data

Survey Hub– M92

Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

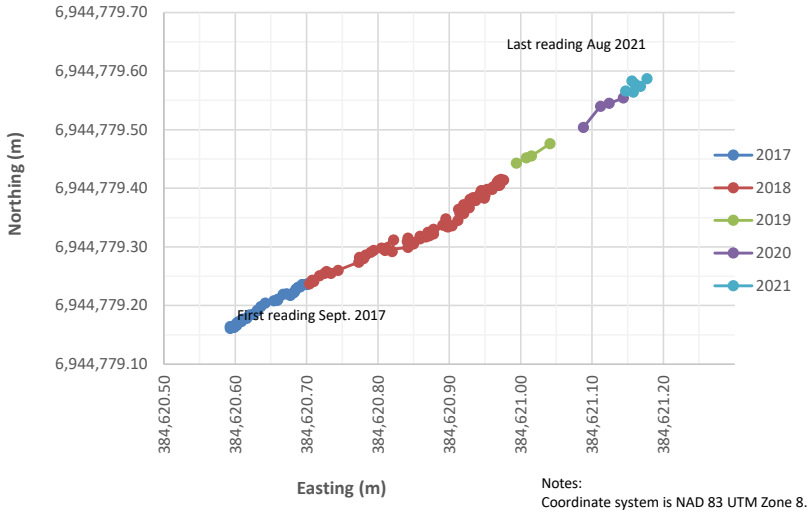
Minto Mine

Date: October 2021

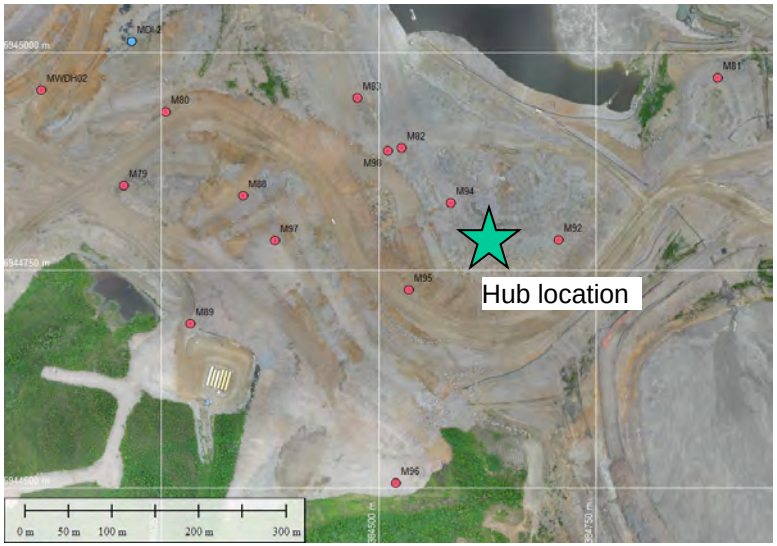
Prepared by PHM

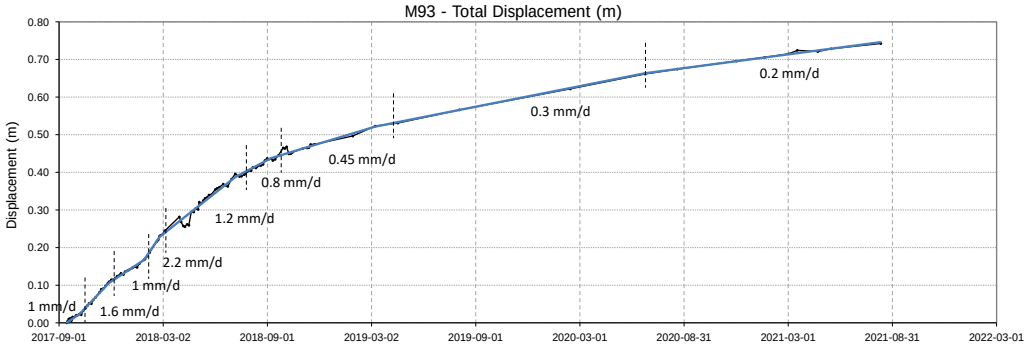
Figure: **9**

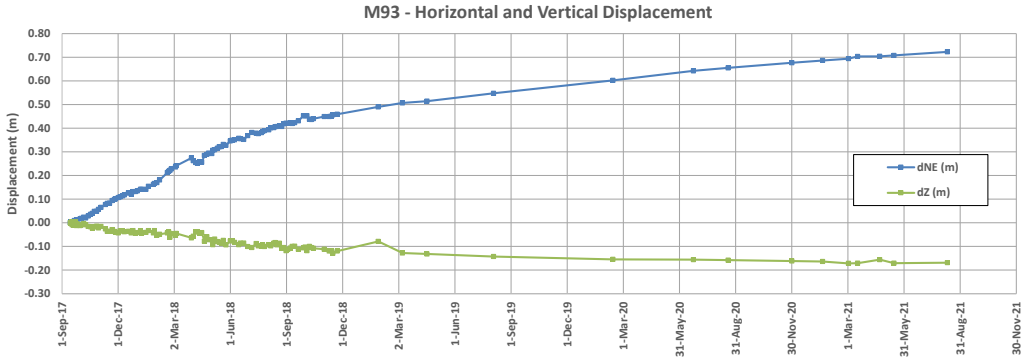
M93 - Northing Vs. Easting Movement Plot

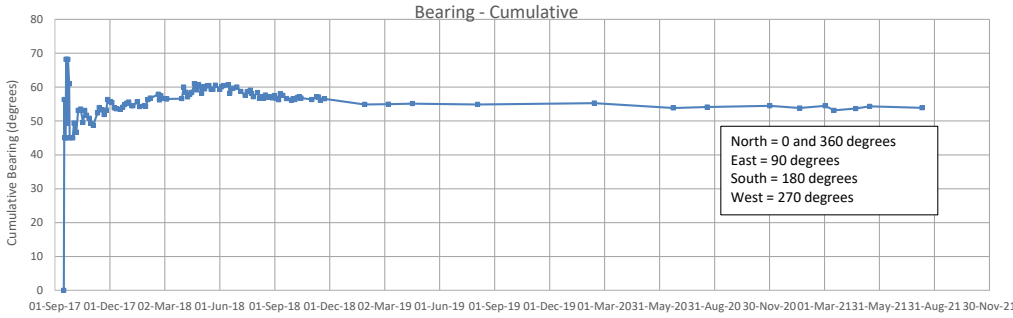


Notes:
Coordinate system is NAD 83 UTM Zone 8.









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Main Pit Instrumentation Data

Survey Hub – M93

Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

Minto Mine

Date: October 2021

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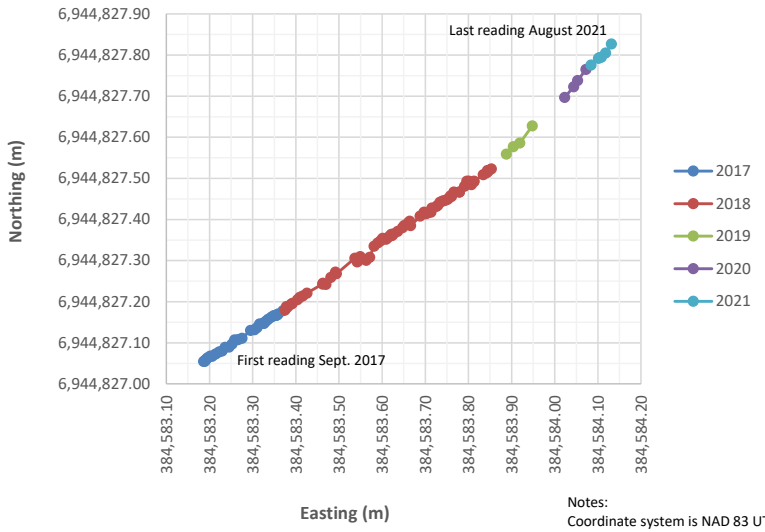
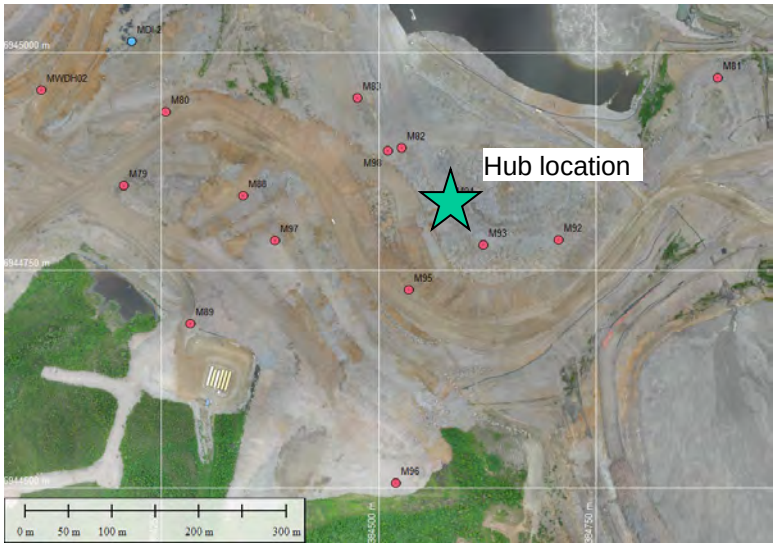
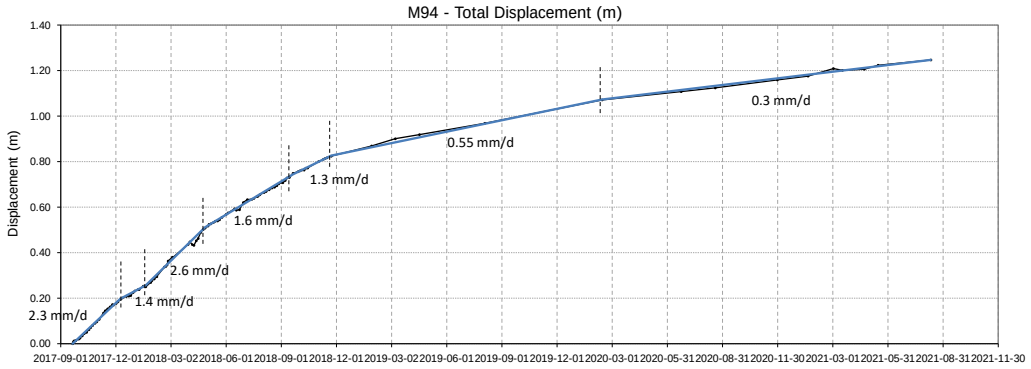
Figure: **10**

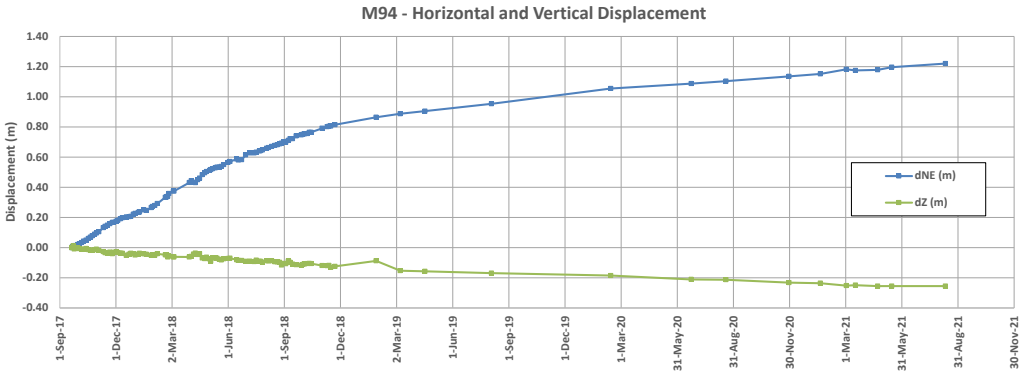
M94 - Northing Vs. Easting Movement Plot

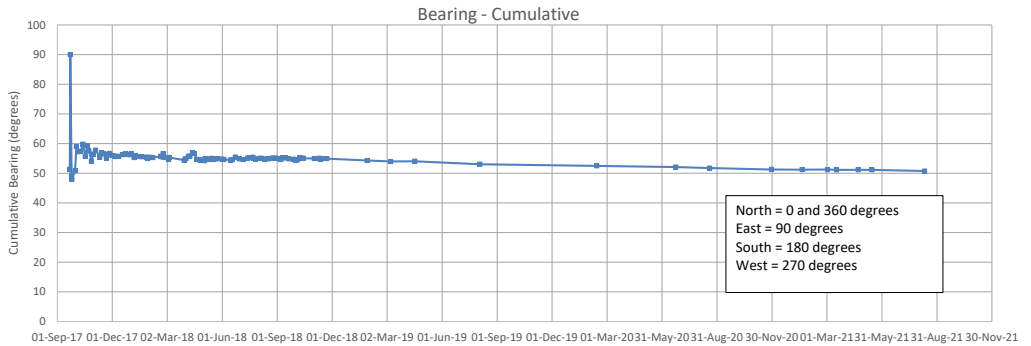


Notes:
Coordinate system is NAD 83 UTM Zone 8.









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Main Pit Instrumentation Data

Survey Hub – M94

Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

Minto Mine

Date: October 2021

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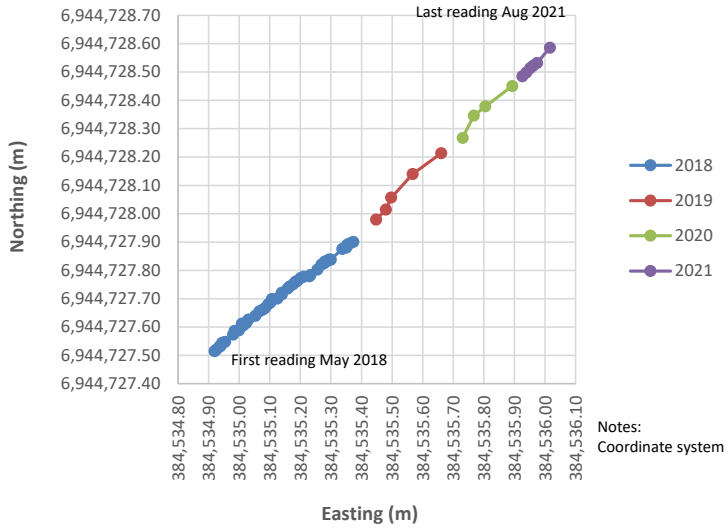
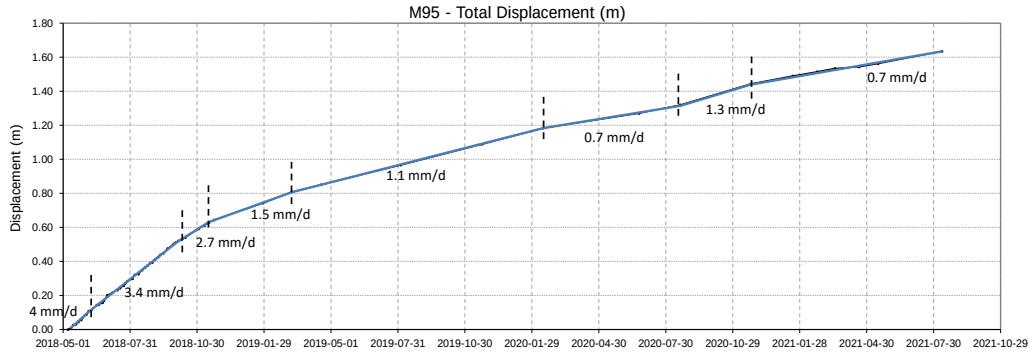
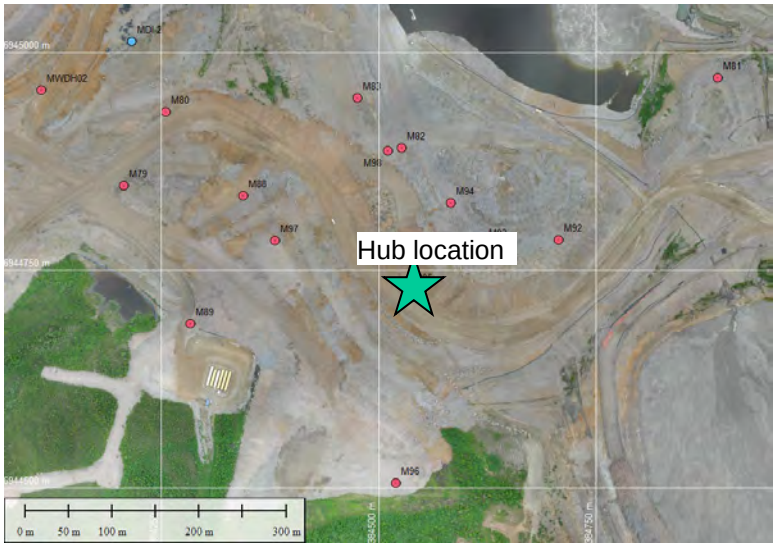
Figure: **11**

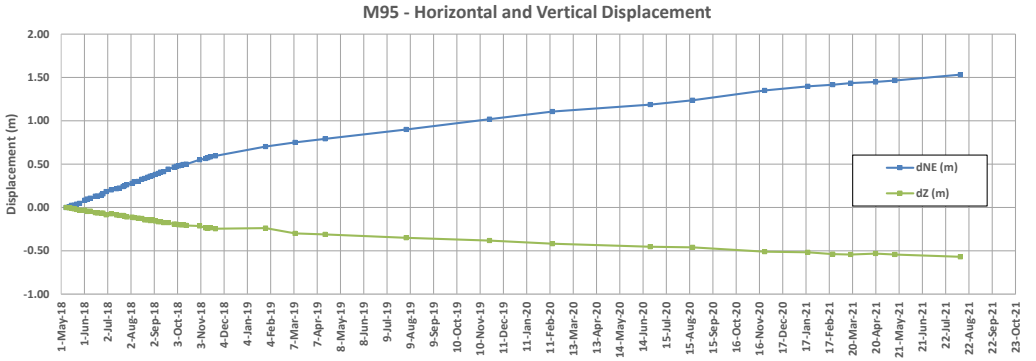
M95 - Northing Vs. Easting Movement Plot

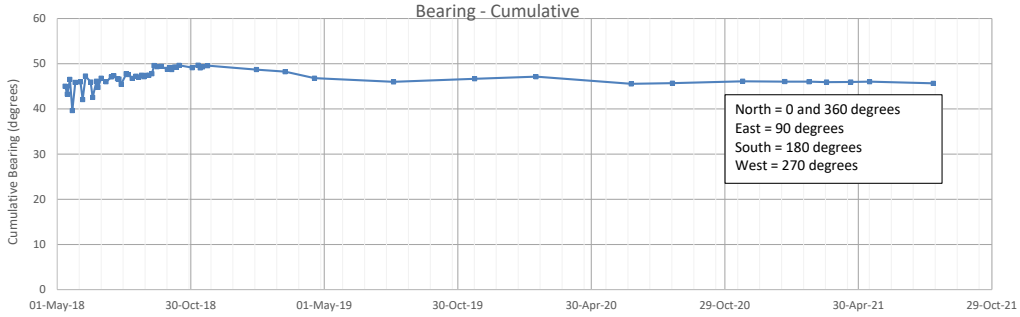


Notes:
Coordinate system is NAD 83 UTM Zone









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Main Pit Instrumentation Data

Survey Hub – M95

Job No: 1CM002.073

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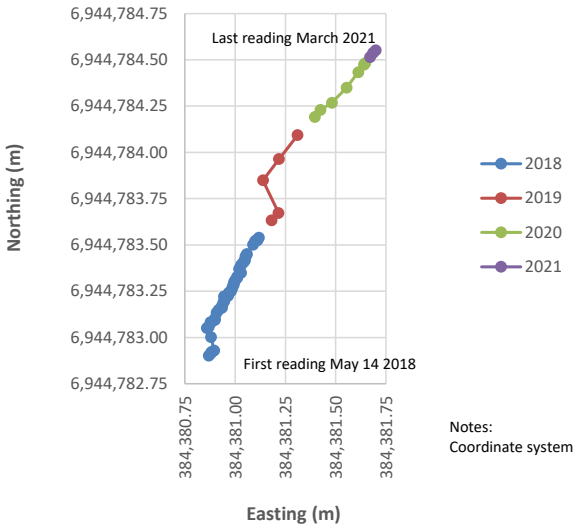
Figure: **12**

M97 - Northing Vs. Easting Movement Plot



Notes:
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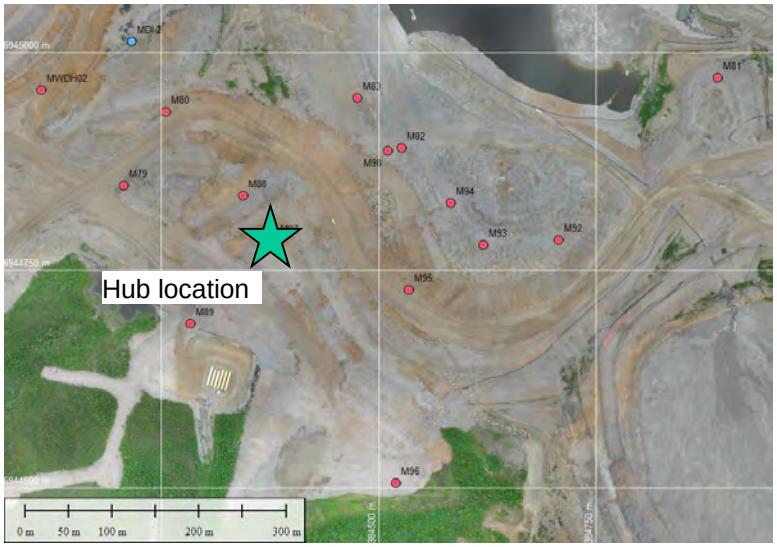

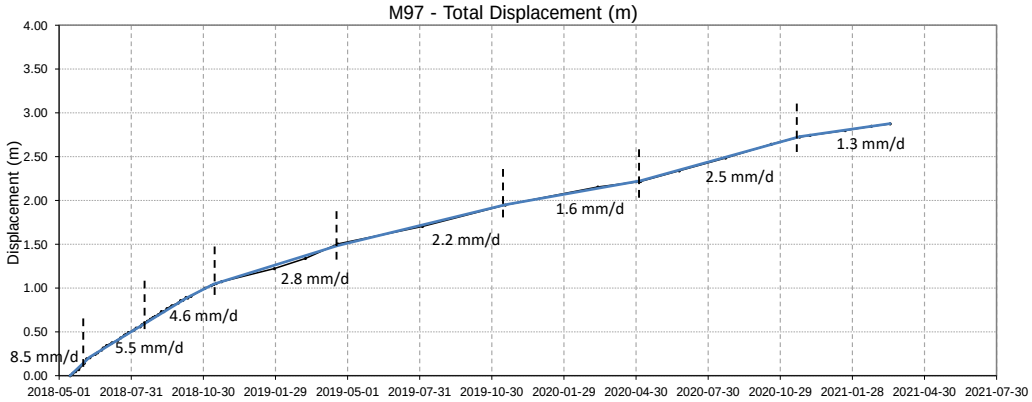

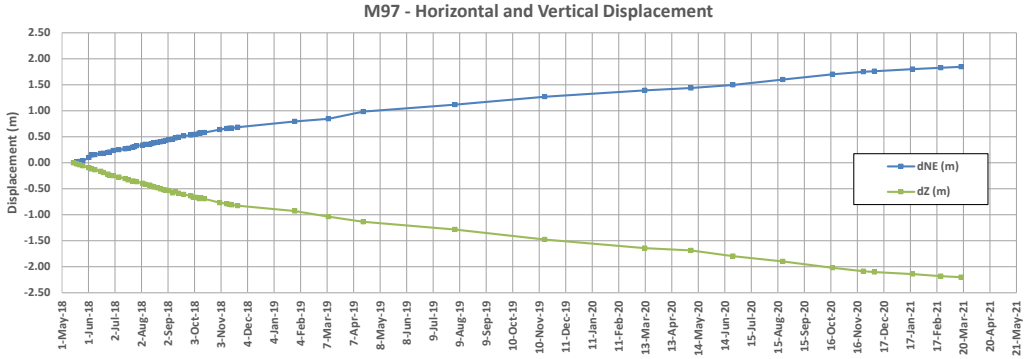

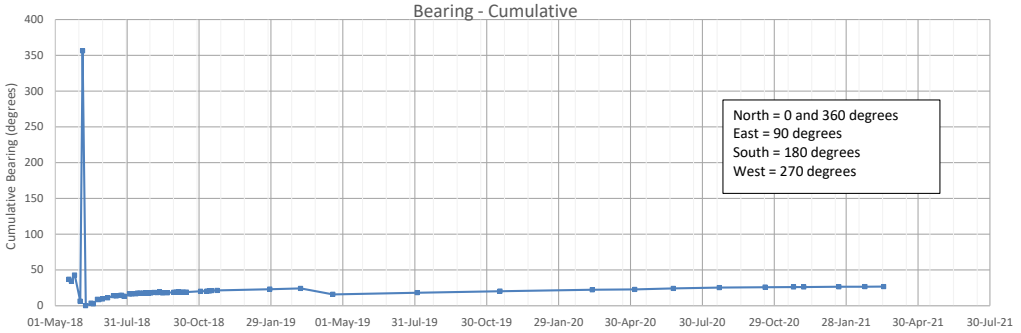

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Main Pit Instrumentation Data

Survey Hub – M97

Job No: 1CM002.073

Filename: ApG_2021MainPitInstrumentation.pptx

Minto Mine

Date: October 2021

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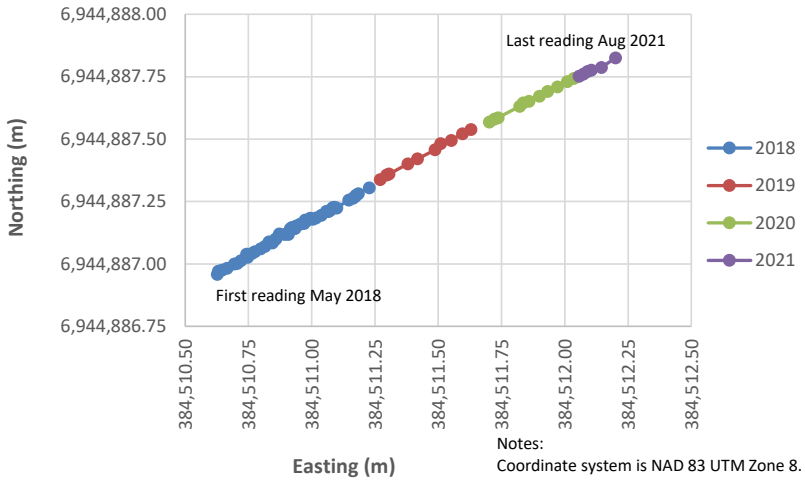
Figure: **13**

M98 - Northing Vs. Easting Movement Plot



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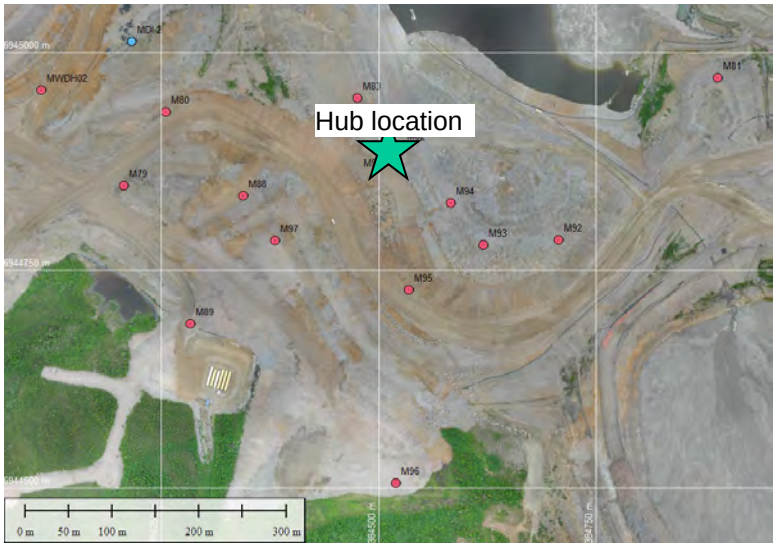

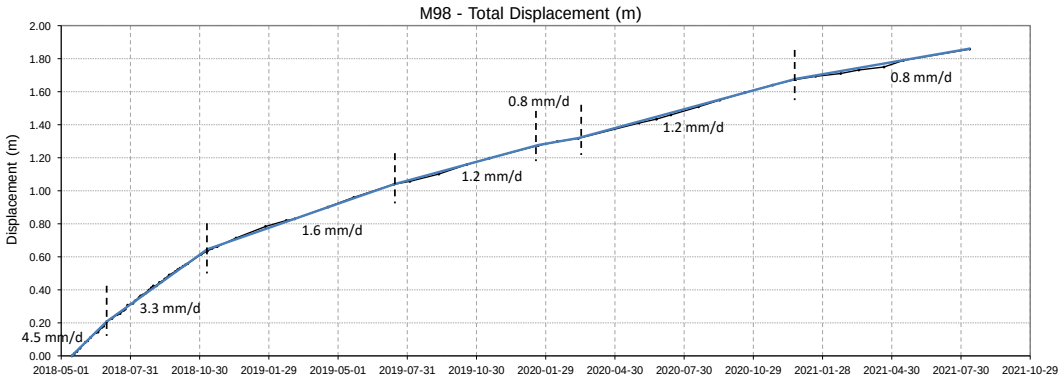

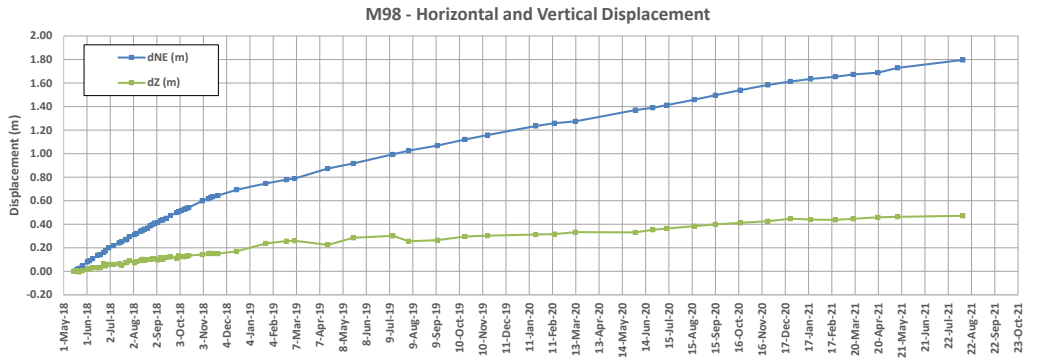

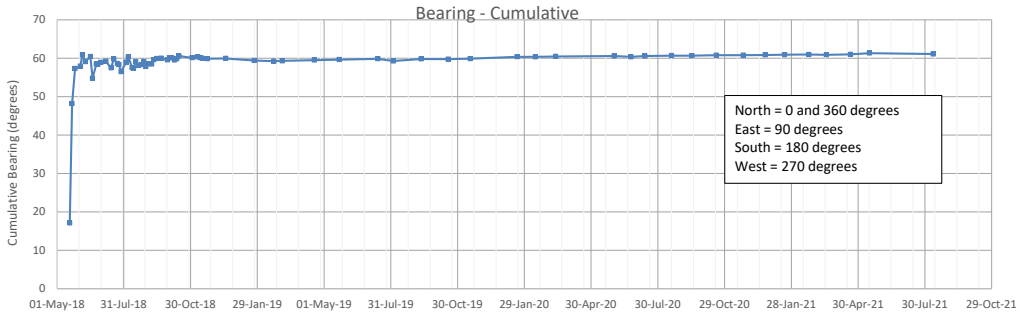

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Main Pit Instrumentation Data

Survey Hub – M98

Job No: 1CM002.073

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Date: October 2021

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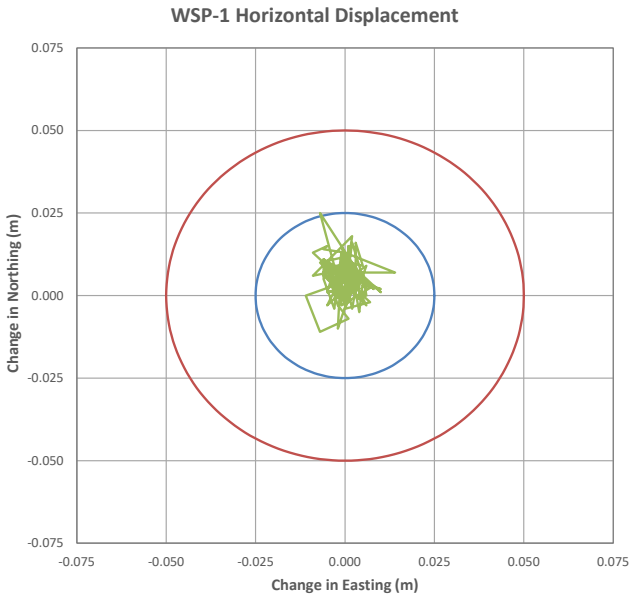
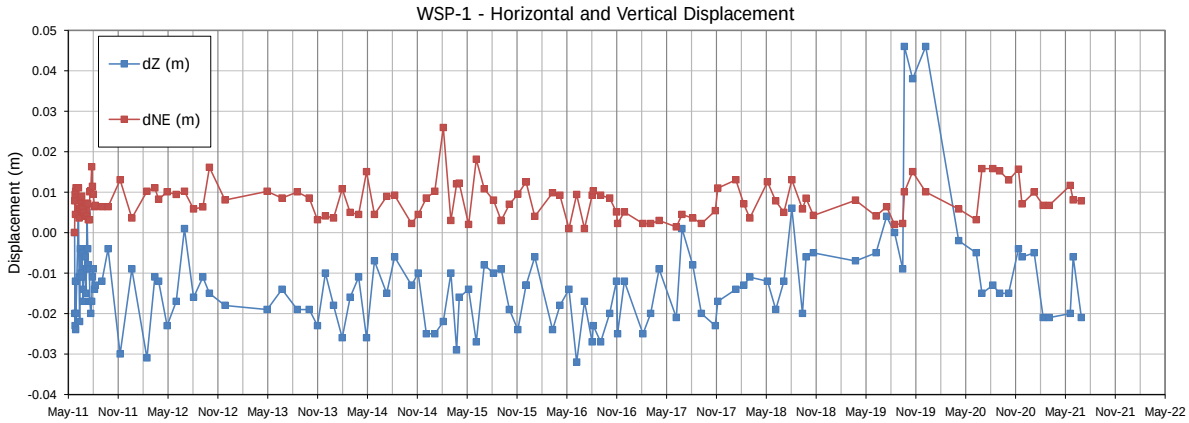
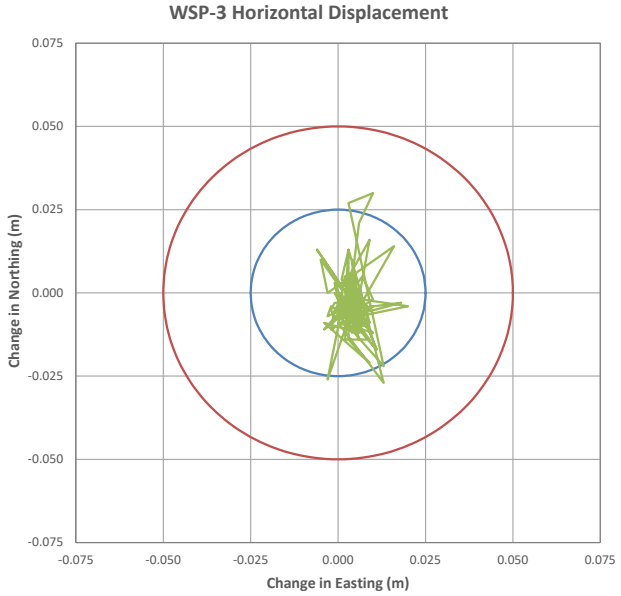
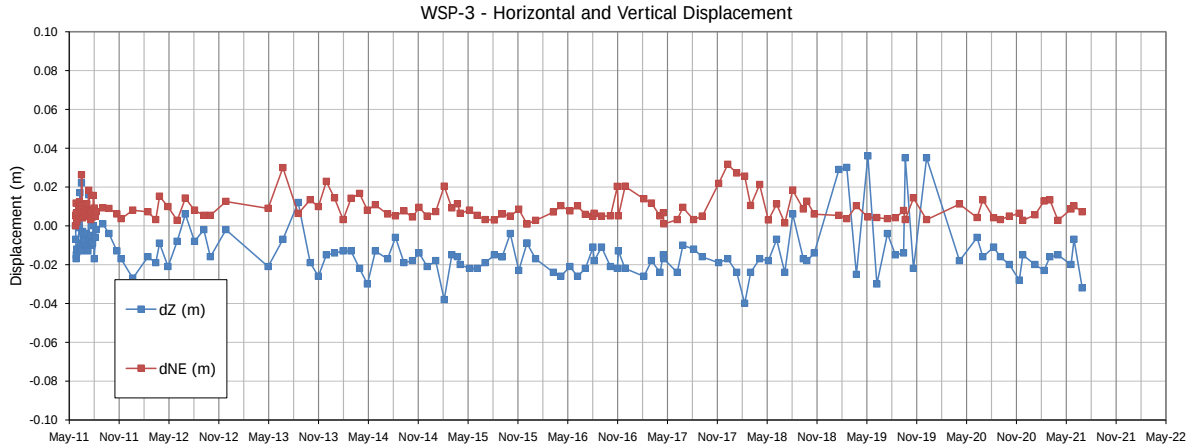
Figure: **14**

Appendix H WSP Instrumentation Data









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MINTO

Water Storage Pond Data

Survey Hubs – WSP-1 and WSP-3

Job No: 1CM002.073

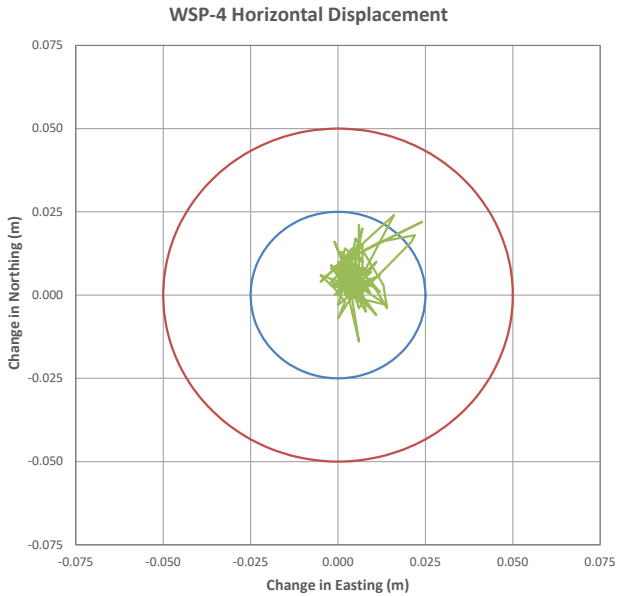
Filename: ApH_WaerStoragePond2021.pptx

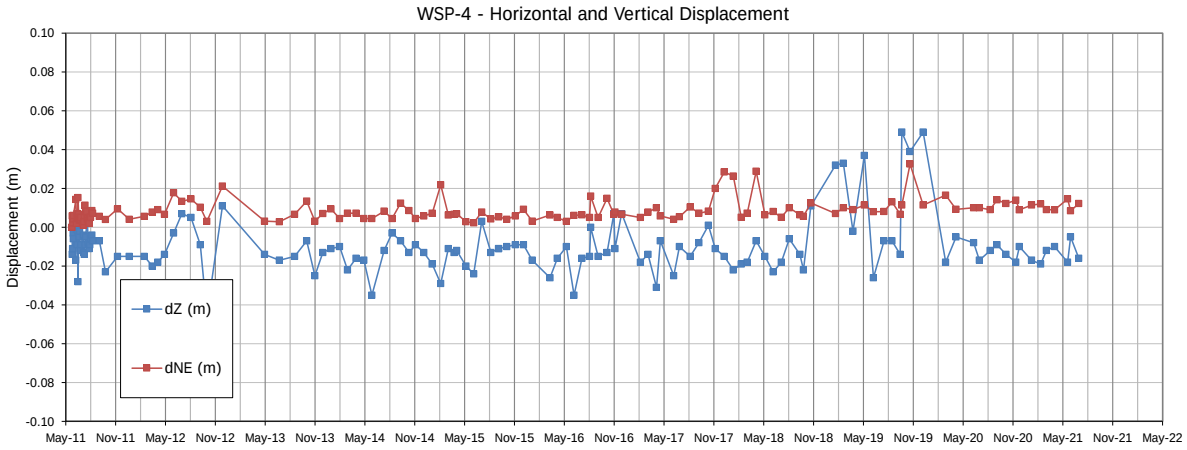
Minto Mine

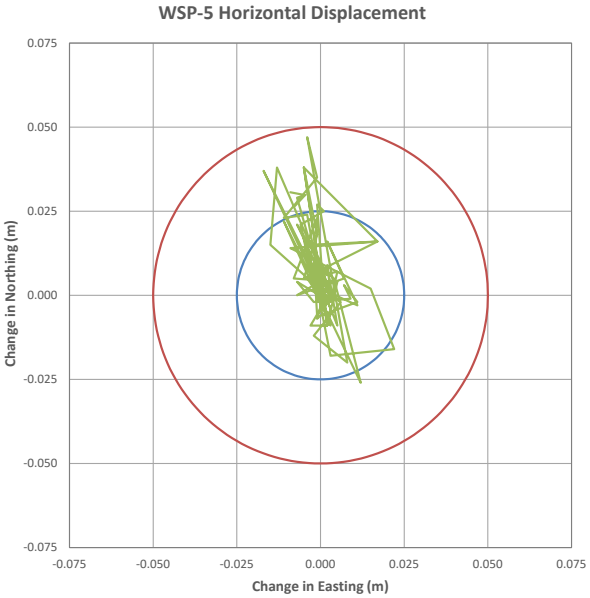
Date: October 2021

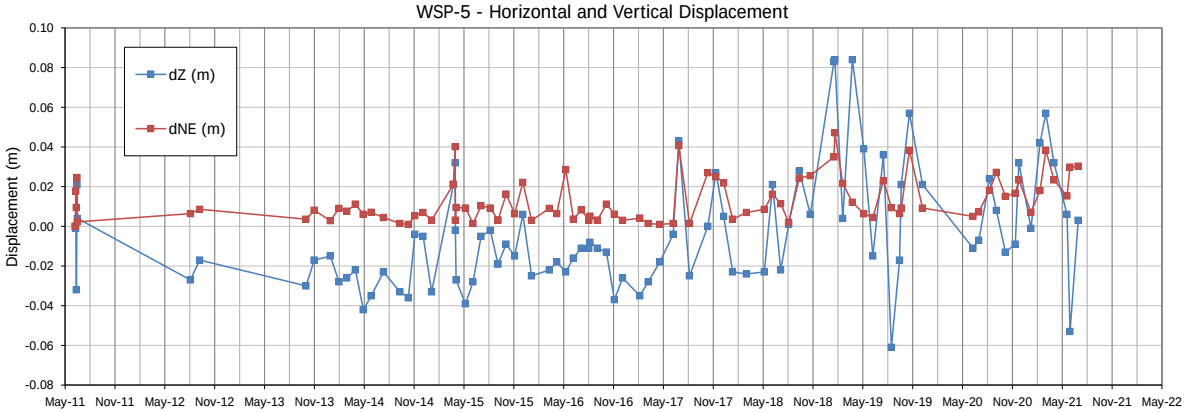
Prepared by PHM

Figure: **1**









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MINTO

Water Storage Pond Data

Survey Hubs – WSP-4 and WSP-5

Job No: 1CM002.073

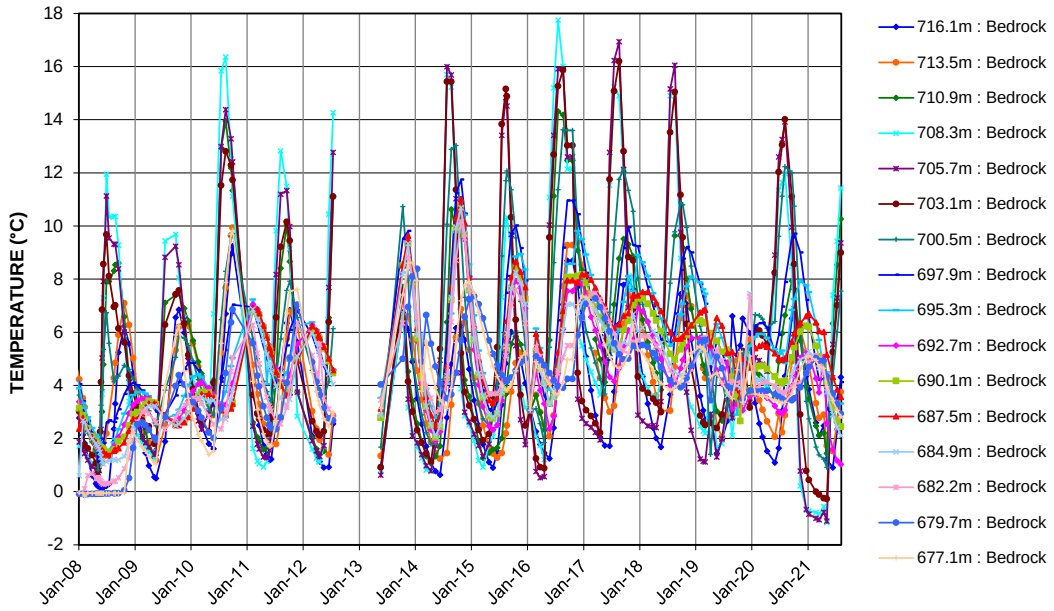
Filename: ApH_WaerStoragePond2021.pptx

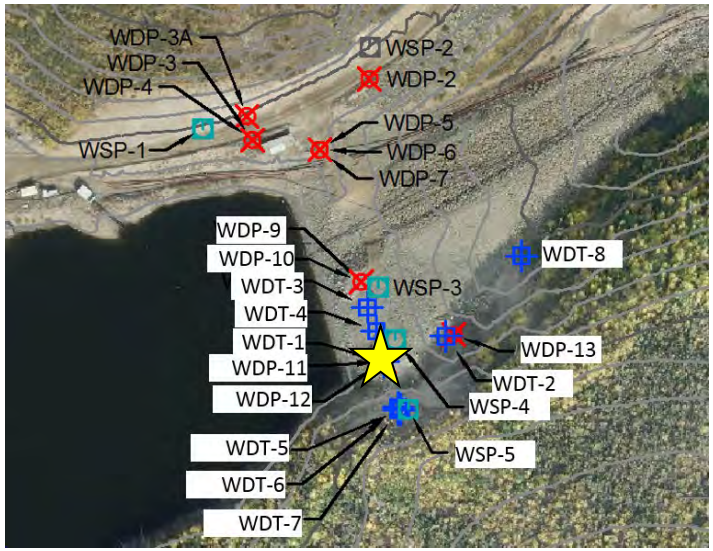
Minto Mine

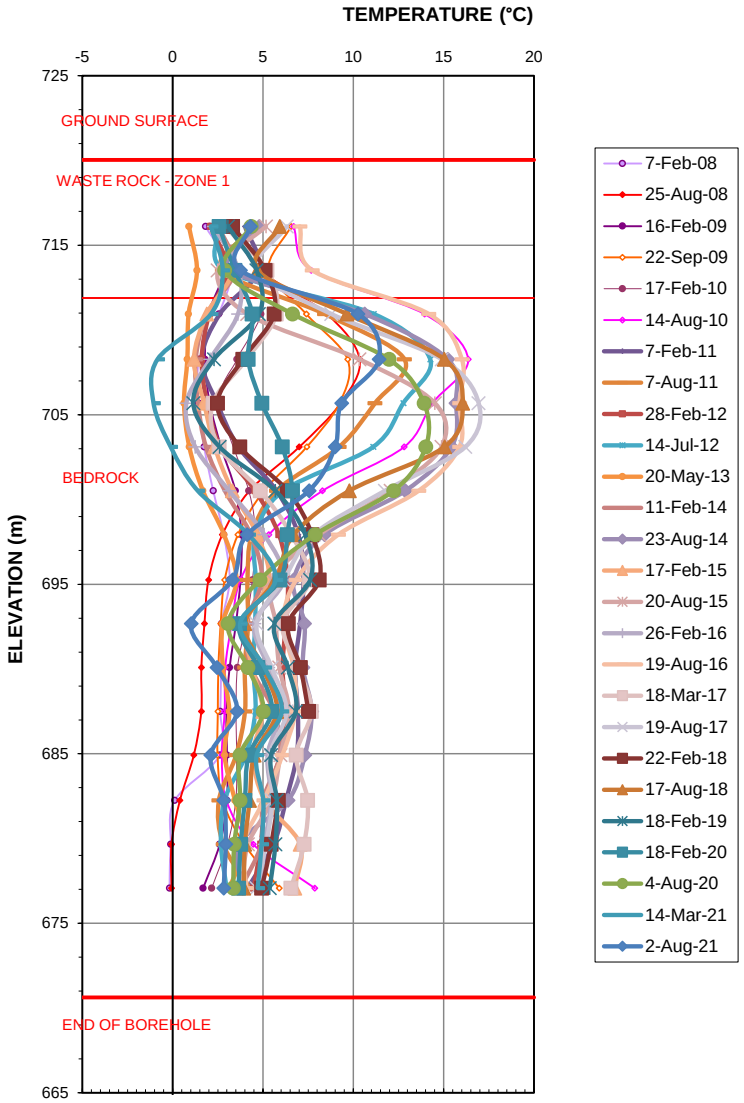
Date: October 2021

Prepared by PHM

Figure: **2**







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Water Storage Pond Data

Temperature Cable – WDT-1

Job No: 1CM002.073

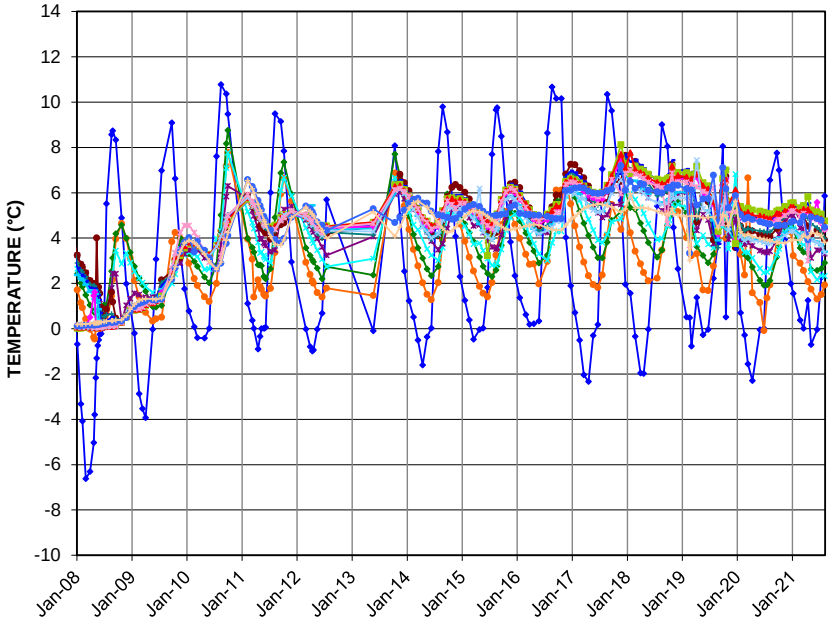
Filename: ApH_WaerStoragePond2021.pptx

Minto Mine

Date: October 2021

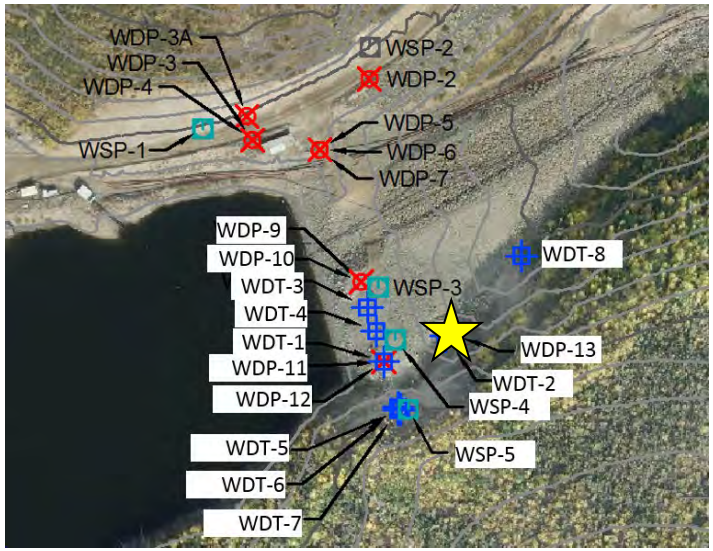
Prepared by: PHM

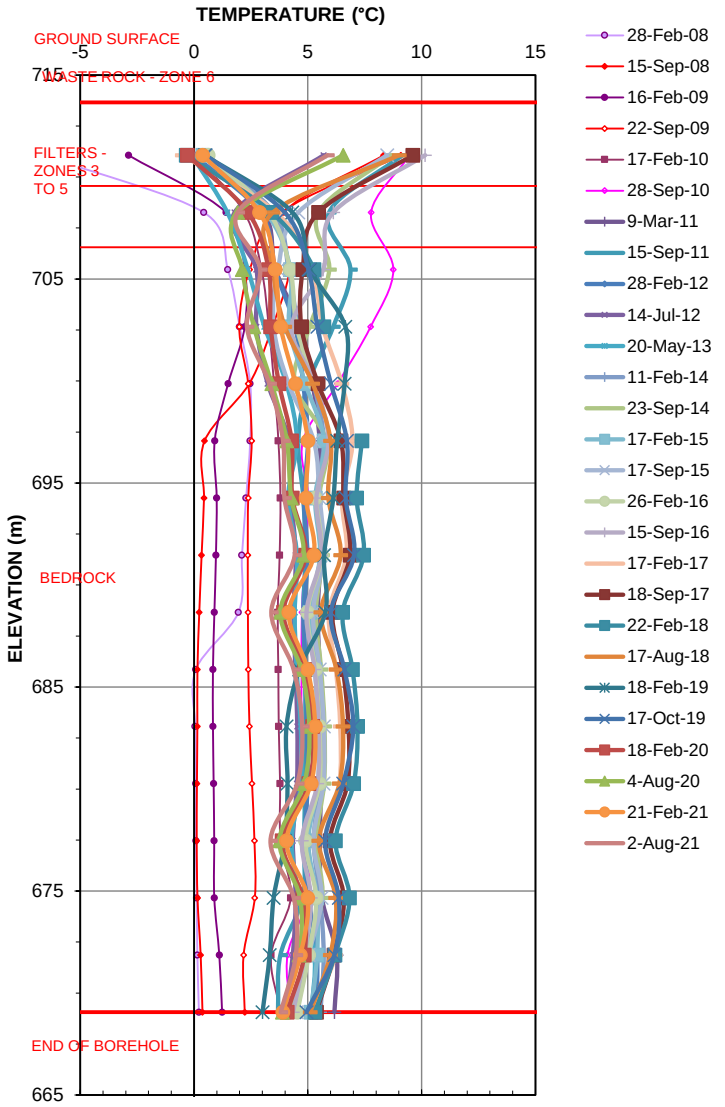
Figure: 3



Sensor El. and Stratigraphy

- 711.1m : Waste Rock-Zone
- 708.3m : Filters-Zones 3 to 5
- 705.5m : Bedrock
- 702.7m : Bedrock
- 699.9m : Bedrock
- 697.1m : Bedrock
- 694.3m : Bedrock
- 691.5m : Bedrock
- 688.7m : Bedrock
- 685.9m : Bedrock
- 683.1m : Bedrock
- 680.3m : Bedrock
- 677.5m : Bedrock
- 674.7m : Bedrock
- 671.9m : Bedrock
- 669.1m : Bedrock





- 28-Feb-08
- 15-Sep-08
- 16-Feb-09
- 22-Sep-09
- 17-Feb-10
- 28-Sep-10
- 9-Mar-11
- 15-Sep-11
- 28-Feb-12
- 14-Jul-12
- 20-May-13
- 11-Feb-14
- 23-Sep-14
- 17-Feb-15
- 17-Sep-15
- 26-Feb-16
- 15-Sep-16
- 17-Feb-17
- 18-Sep-17
- 22-Feb-18
- 17-Aug-18
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- 17-Oct-19
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- 4-Aug-20
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- 2-Aug-21

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MINTO

Water Storage Pond Data

Temperature Cable – WDT-2

Job No: 1CM002.073

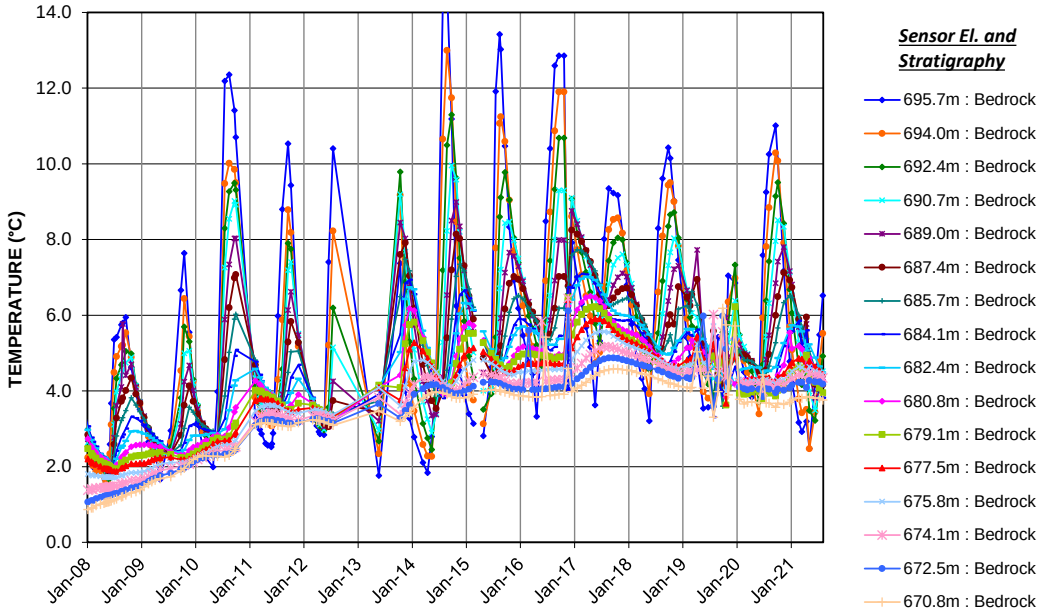
Filename: ApH_WaerStoragePond2021.pptx

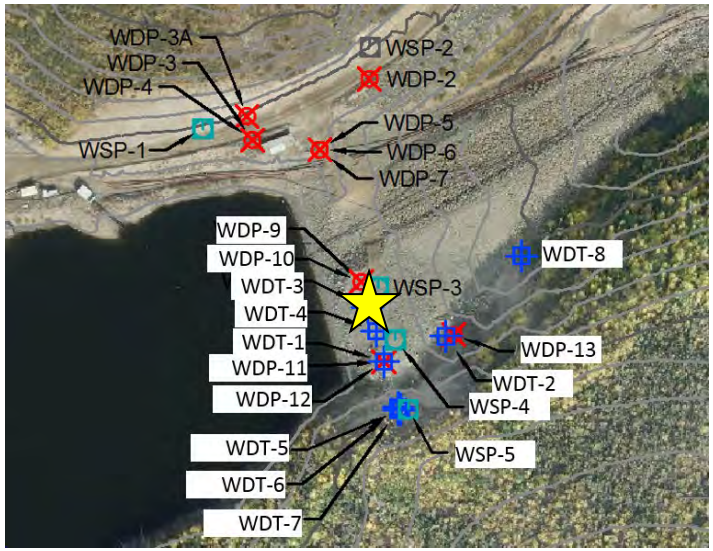
Minto Mine

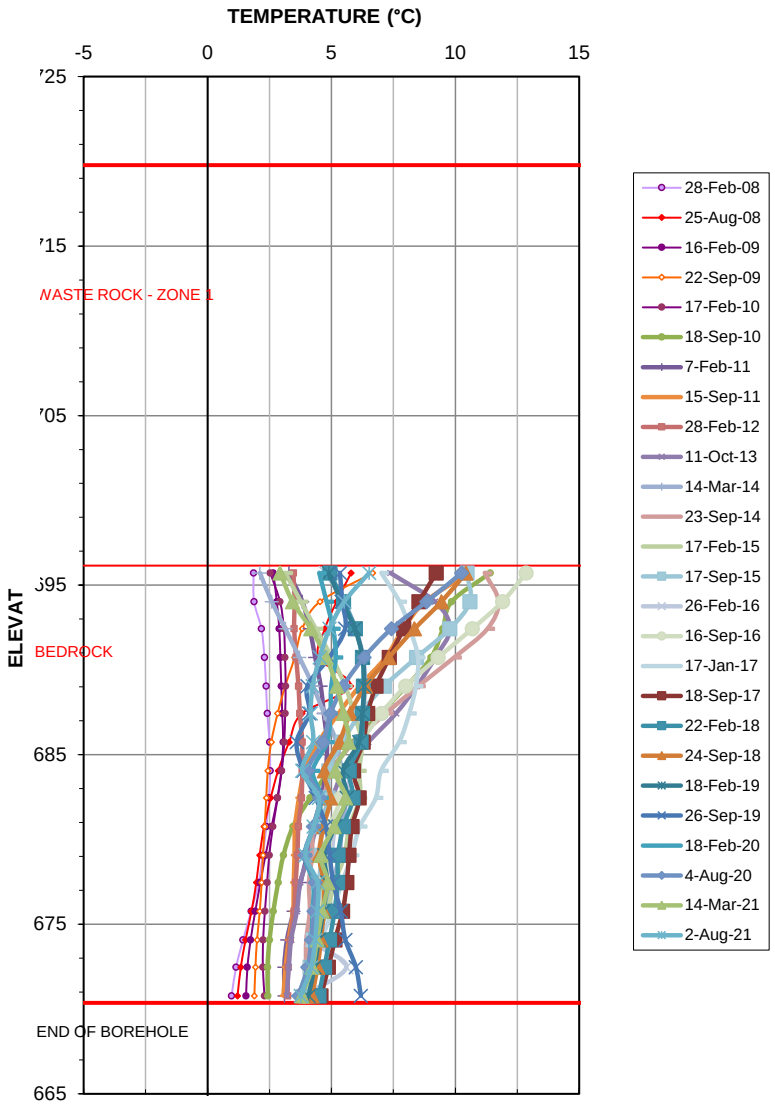
Date: October 2021

Prepared by PHM

Figure: 4







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Water Storage Pond Data

Temperature Cable – WDT-3

Job No: 1CM002.073

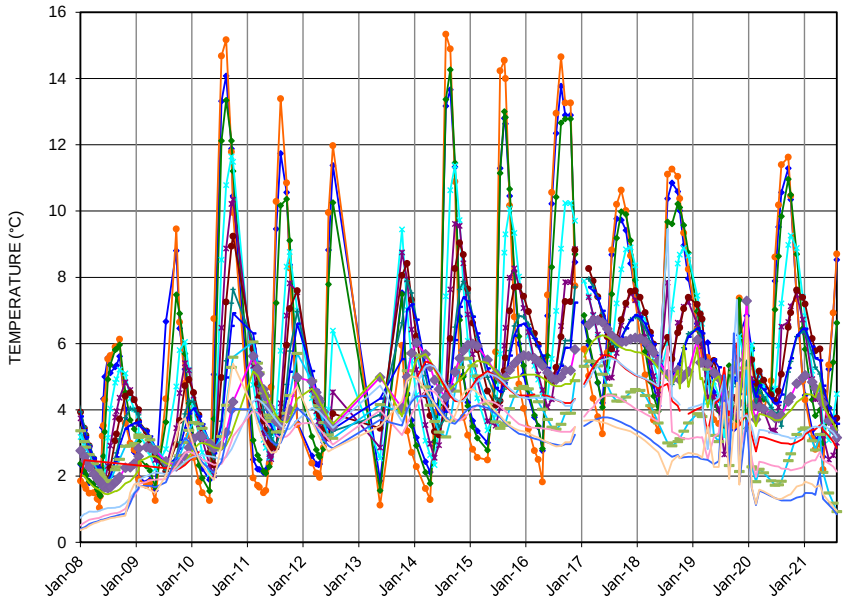
Filename: ApH_WaerStoragePond2021.pptx

Minto Mine

Date: October 2021

Prepared by PHM

Figure: 5



Sensor El. and Stratigraphy

- 702.1m : Bedrock
- 700.0m : Bedrock
- 697.8m : Bedrock
- 695.7m : Bedrock
- 693.6m : Bedrock
- 691.4m : Bedrock
- 689.3m : Bedrock
- 687.2m : Bedrock
- 685.1m : Bedrock
- 683.0m : Bedrock
- 680.8m : Bedrock
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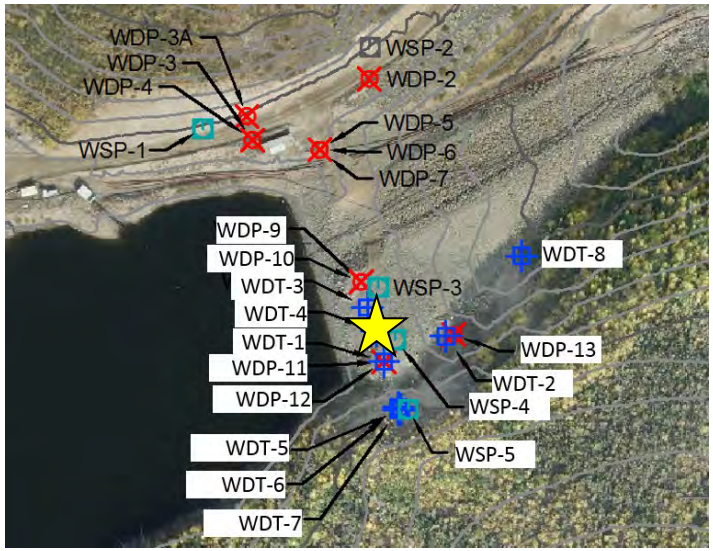
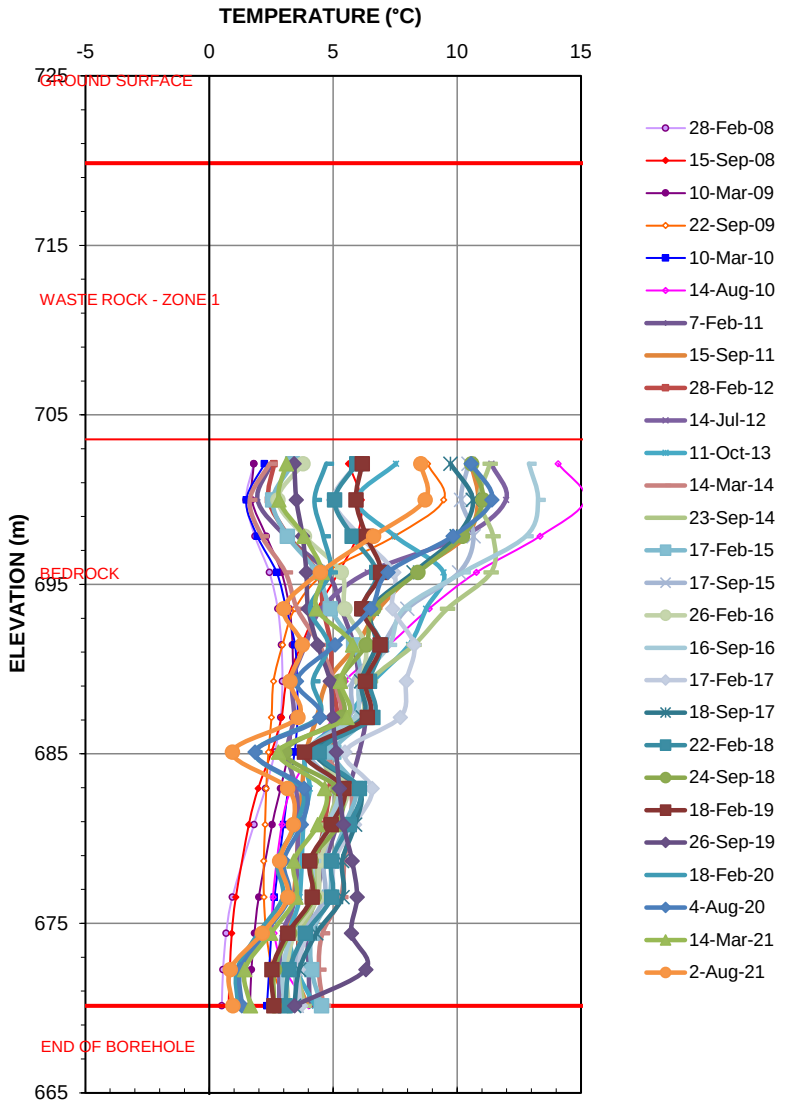
- 676.5m : Bedrock
- 674.4m : Bedrock
- 672.3m : Bedrock
- 670.1m : Bedrock





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Water Storage Pond Data

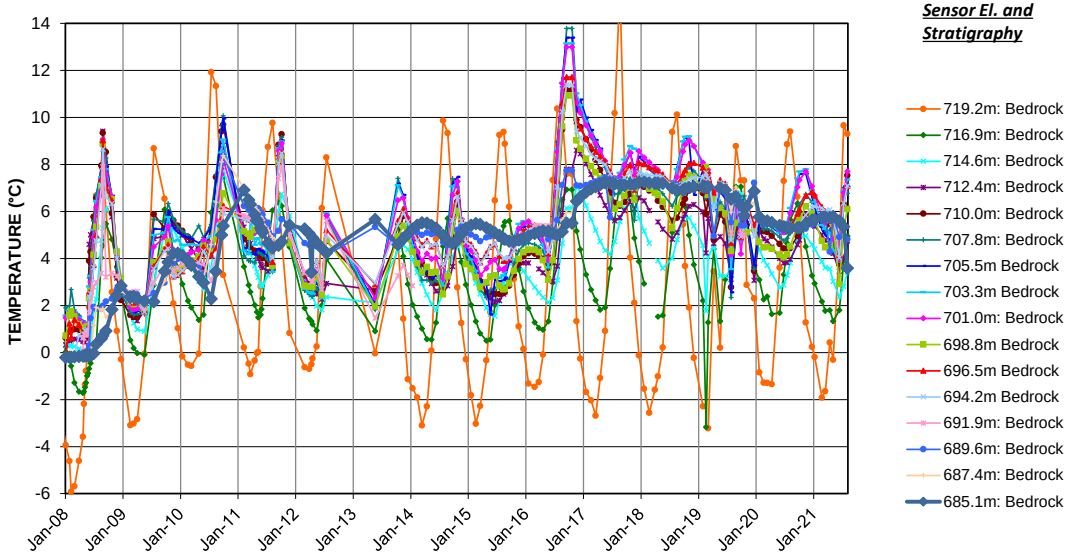
Temperature Cable – WDT-4

Job No: 1CM002.073

Filename: ApH_WaerStoragePond2021.pptx

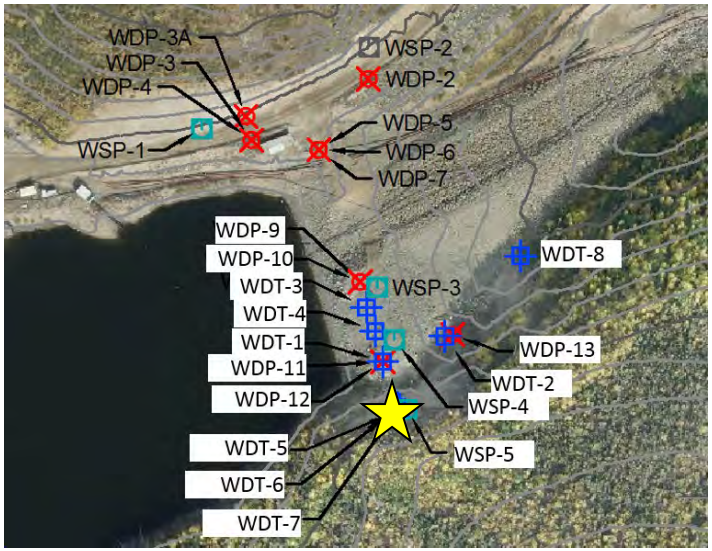
Minto Mine

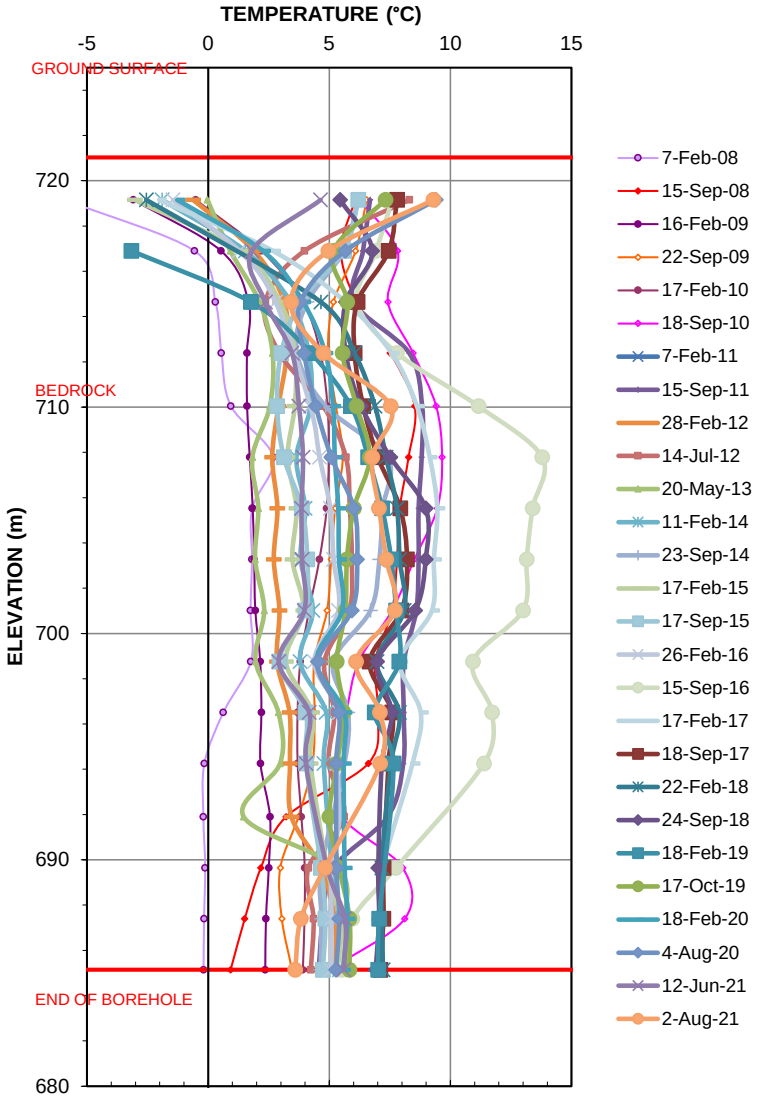
Date:	Prepared by	Figure:
October 2021	PHM	6



Sensor El. and Stratigraphy

719.2m: Bedrock
716.9m: Bedrock
714.6m: Bedrock
712.4m: Bedrock
710.0m: Bedrock
707.8m: Bedrock
705.5m Bedrock
703.3m Bedrock
701.0m: Bedrock
698.8m Bedrock
696.5m Bedrock
694.2m Bedrock
691.9m: Bedrock
689.6m: Bedrock
687.4m: Bedrock
685.1m: Bedrock





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7-Feb-11
15-Sep-11
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20-May-13
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12-Jun-21
2-Aug-21

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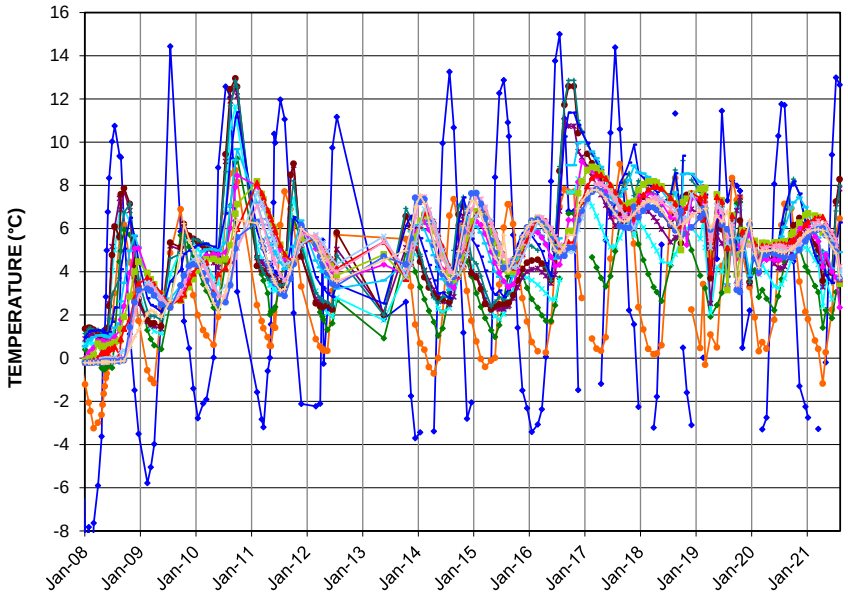
Water Storage Pond Data

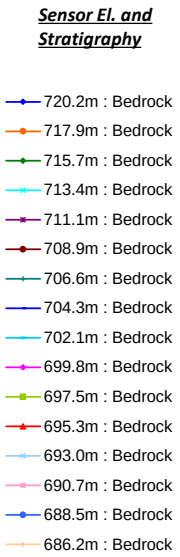
Temperature Cable – WDT-5

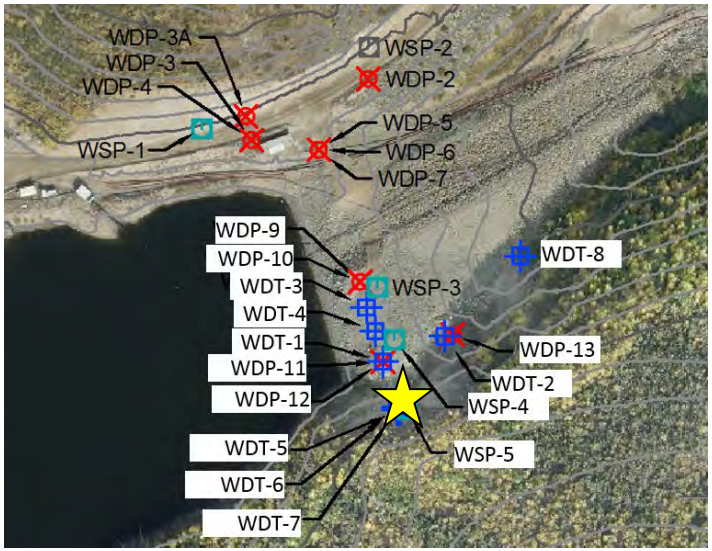
Job No: 1CM002.073
Filename: ApH_WaerStoragePond2021.pptx

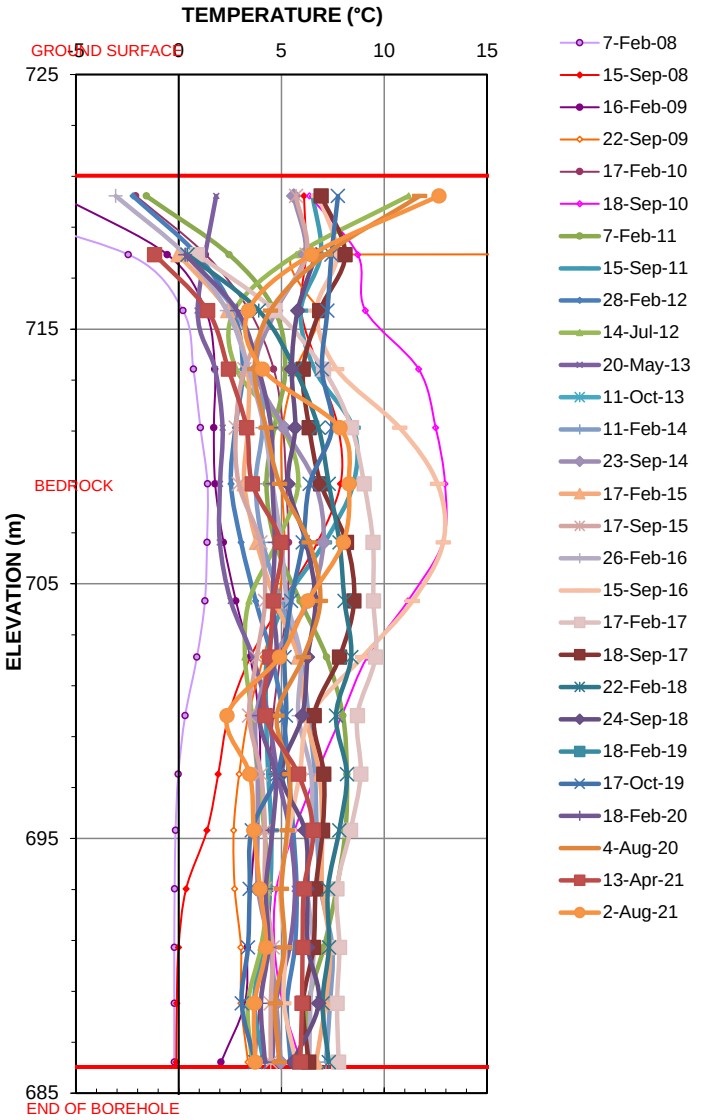
Minto Mine

Date: October 2021
Prepared by: PHM
Figure: 7









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Water Storage Pond Data

Temperature Cable – WDT-6

Job No: 1CM002.073

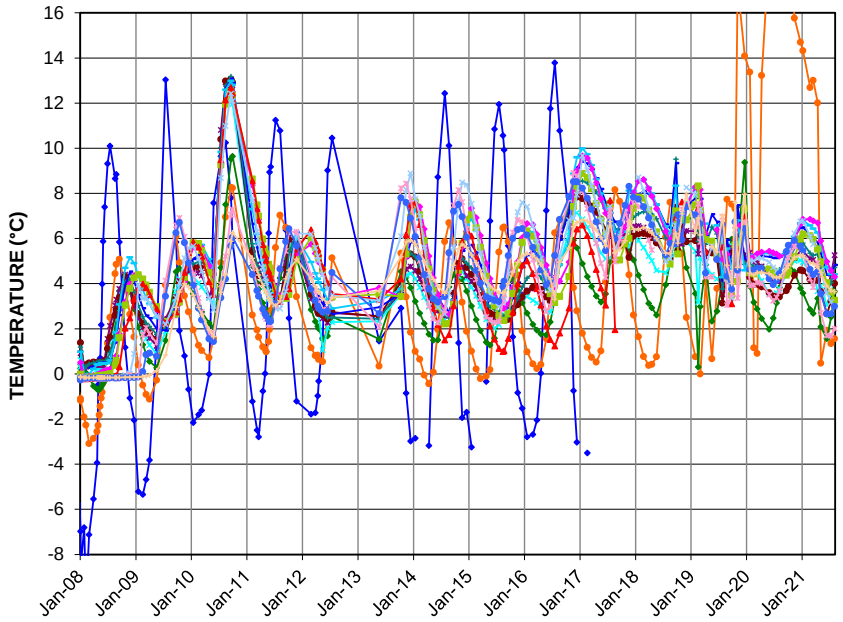
Filename: ApH_WaerStoragePond2021.pptx

Minto Mine

Date: October 2021

Prepared by: PHM

Figure: **8**



Sensor El. and Stratigraphy

- 720.1m : Bedrock
- 717.9m : Bedrock
- 715.6m : Bedrock
- 713.4m : Bedrock
- 711.0m : Bedrock
- 708.8m : Bedrock
- 706.5m : Bedrock
- 704.3m : Bedrock
- 702.0m : Bedrock
- 699.7m : Bedrock
- 697.5m : Bedrock
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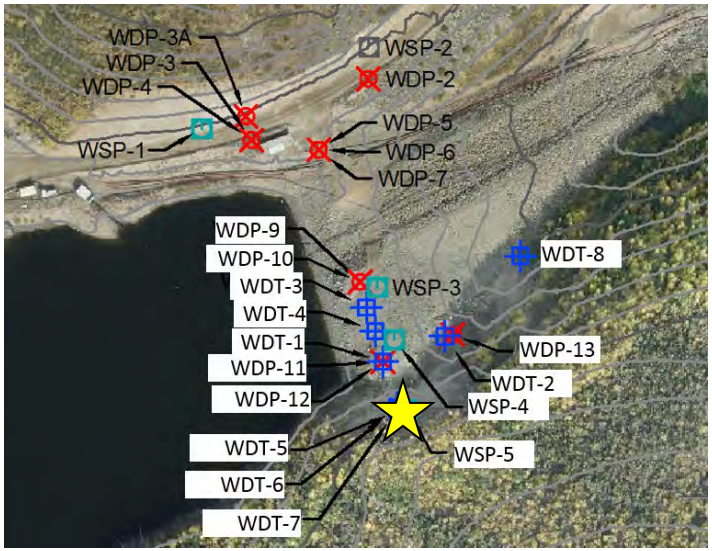
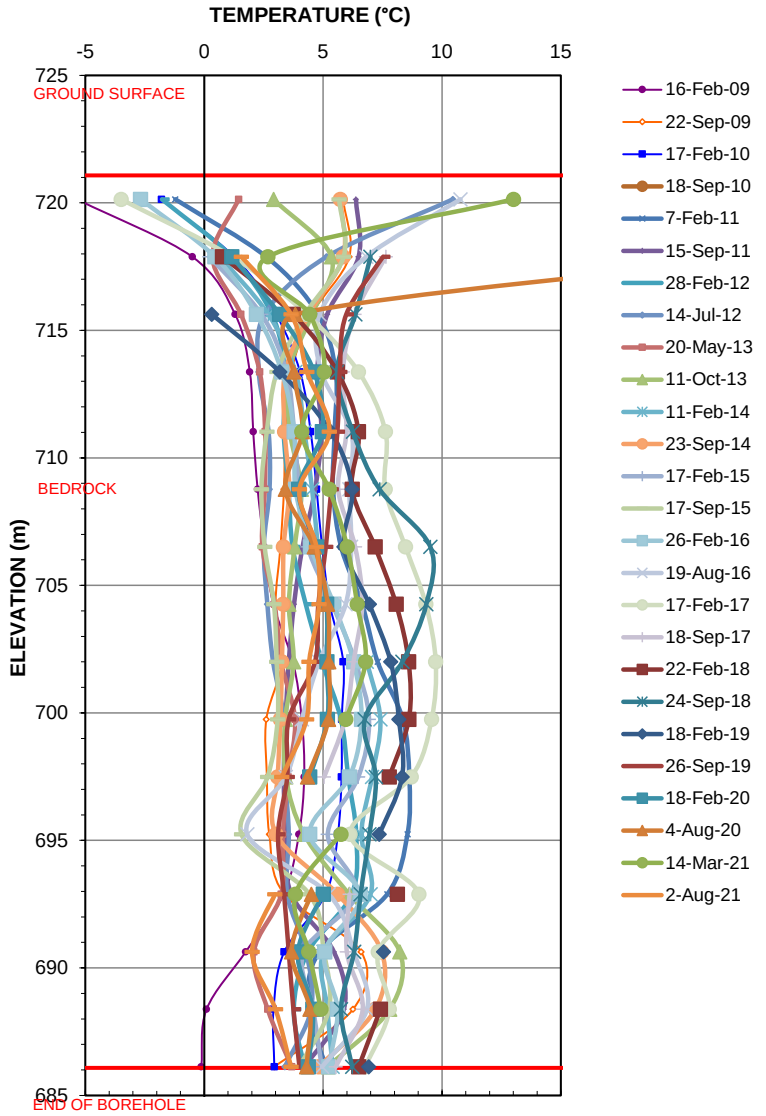
- 692.9m : Bedrock
- 690.6m : Bedrock
- 688.4m : Bedrock
- 686.1m : Bedrock





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Water Storage Pond Data

Temperature Cable – WDT-7

Job No: 1CM002.073

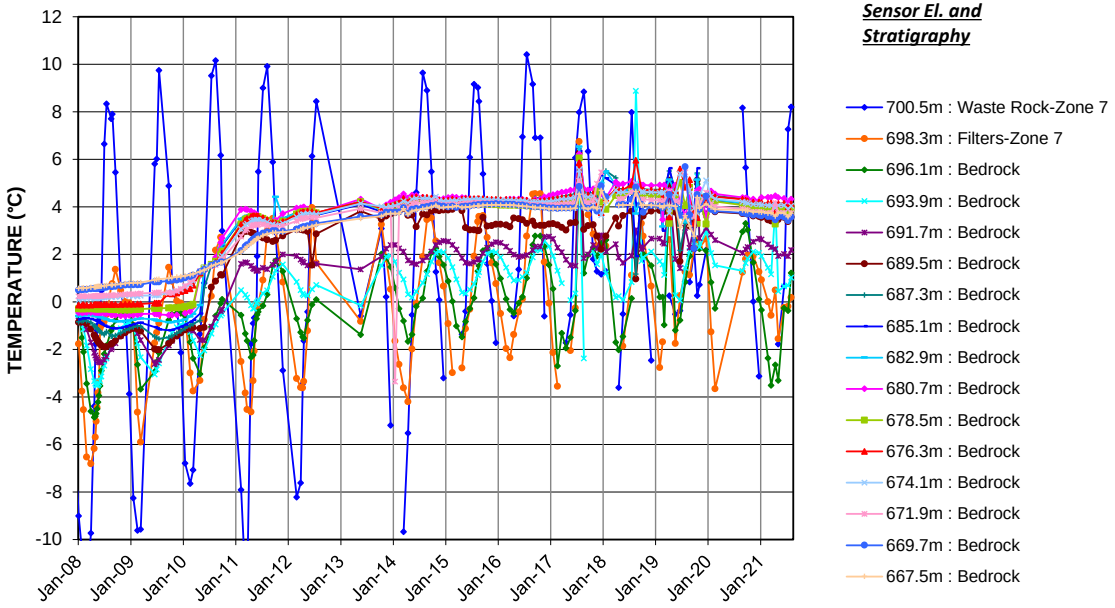
Filename: ApH_WaerStoragePond2021.pptx

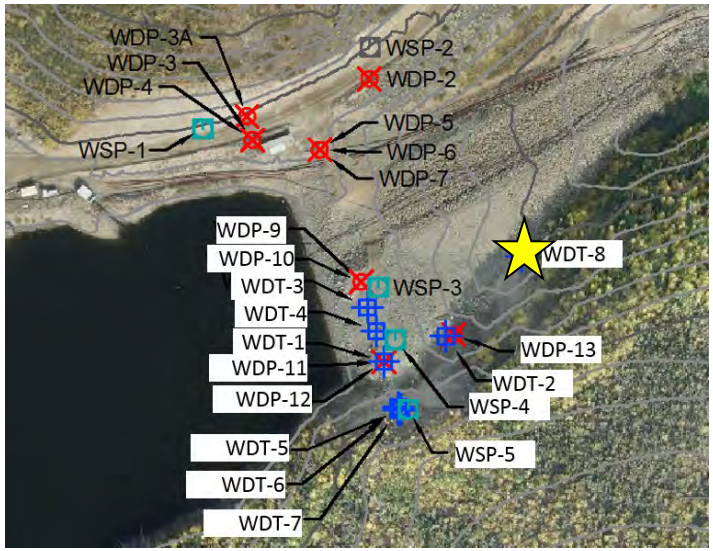
Minto Mine

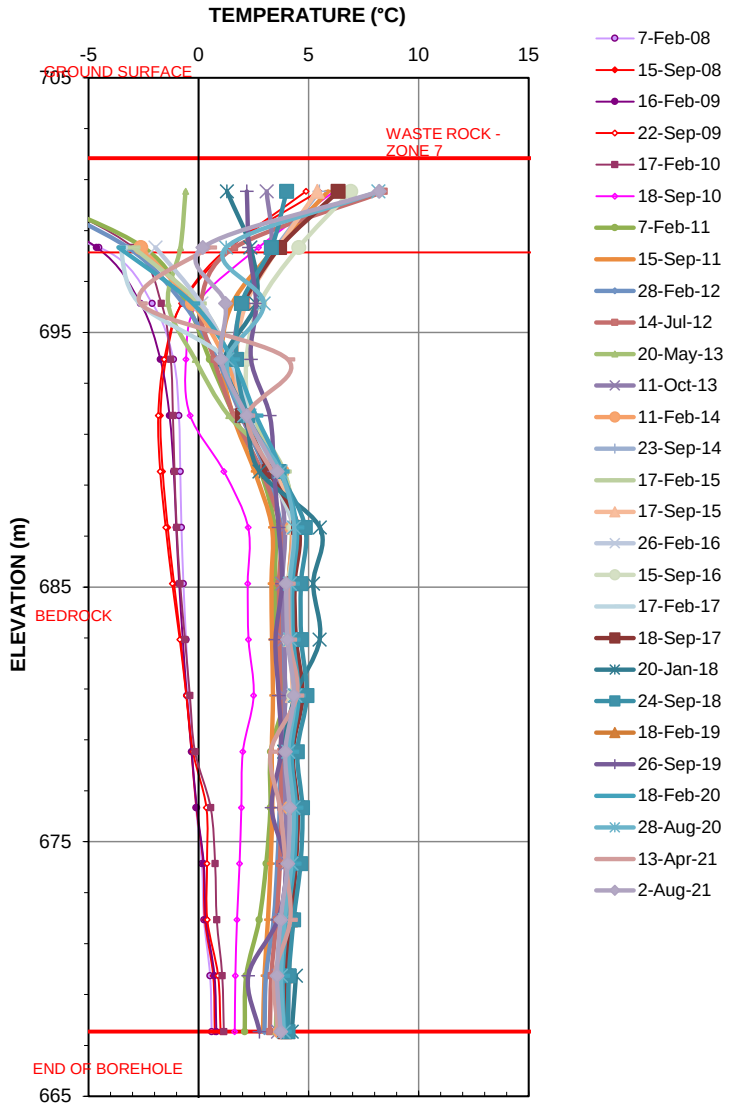
Date: October 2021

Prepared by PHM

Figure: **9**







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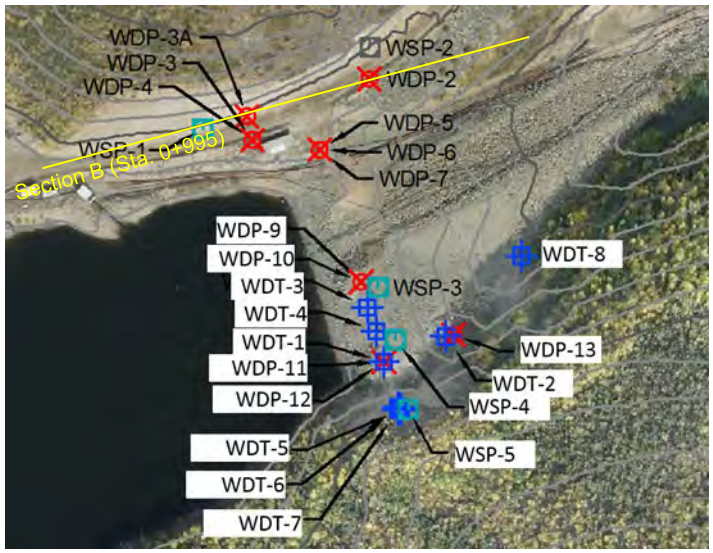
Water Storage Pond Data

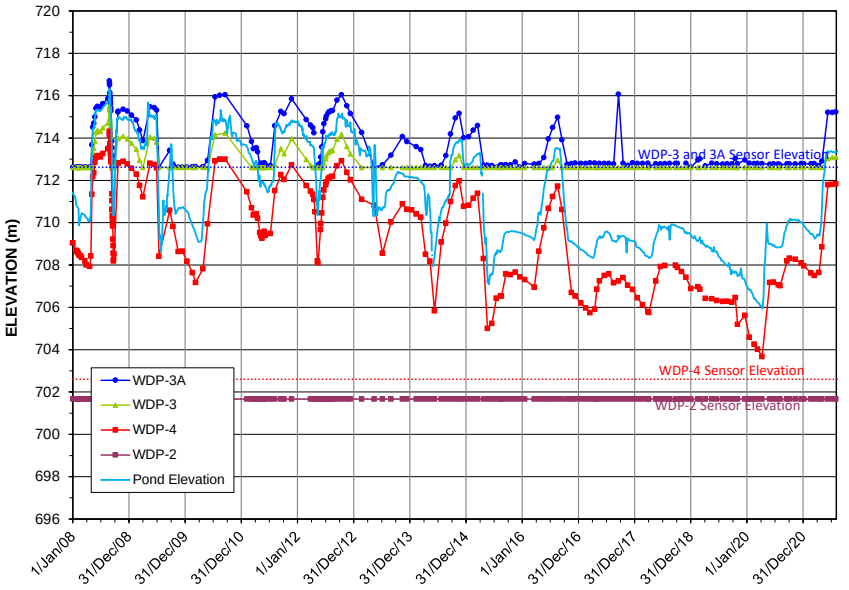
Temperature Cable – WDT-8

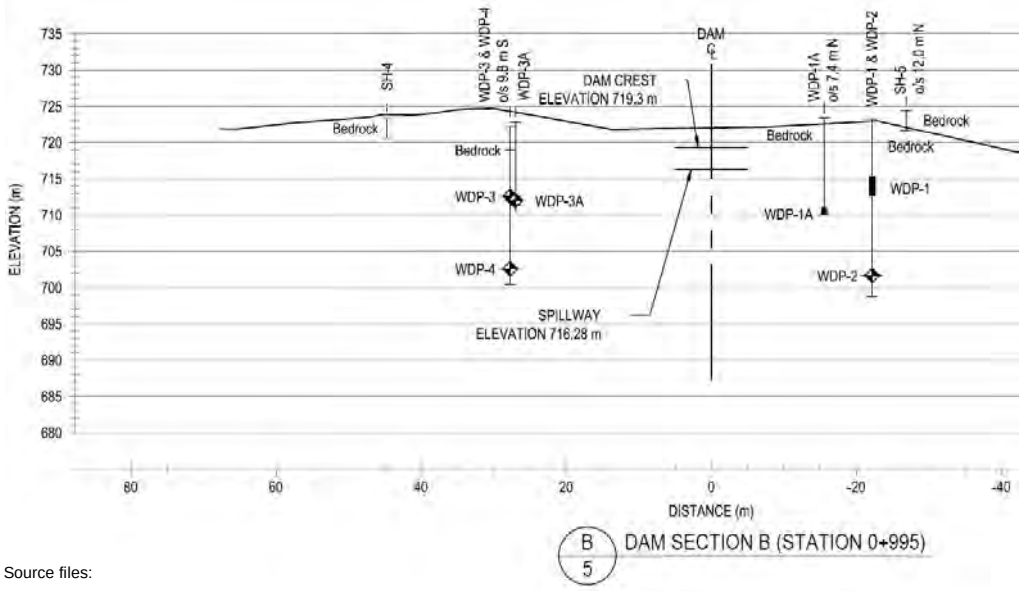
Job No:	1CM002.073
Filename:	ApH_WaerStoragePond2021.pptx

Minto Mine

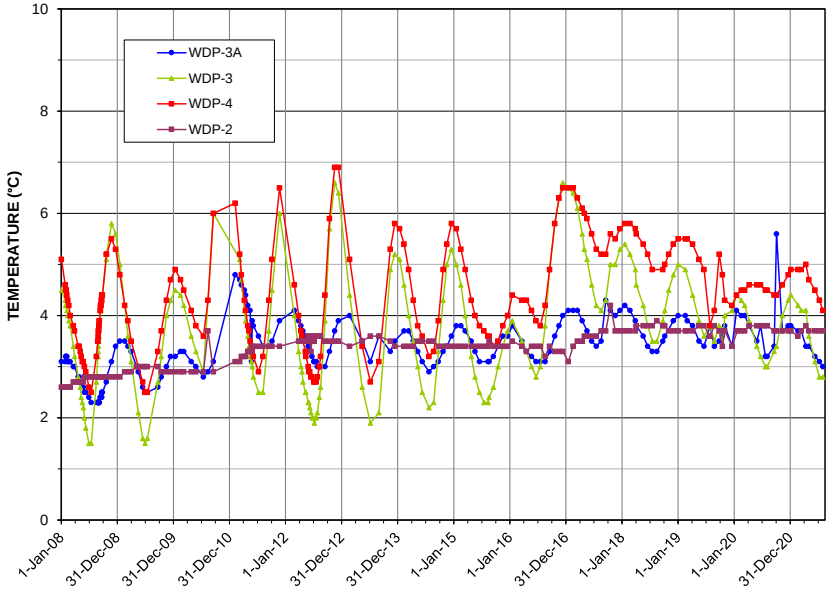
Date:	Prepared by	Figure:
October 2021	PHM	10







B
5
DAM SECTION B (STATION 0+995)



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3. Cross Section B from EBA (2011) report: Water Storage Pond Dam Geotechnical Instrumentation and Seepage Data Review" dated December 23, 2011.

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MINTO

Water Storage Pond Data

Piezometers – Left Abutment

Job No: 1CM002.073

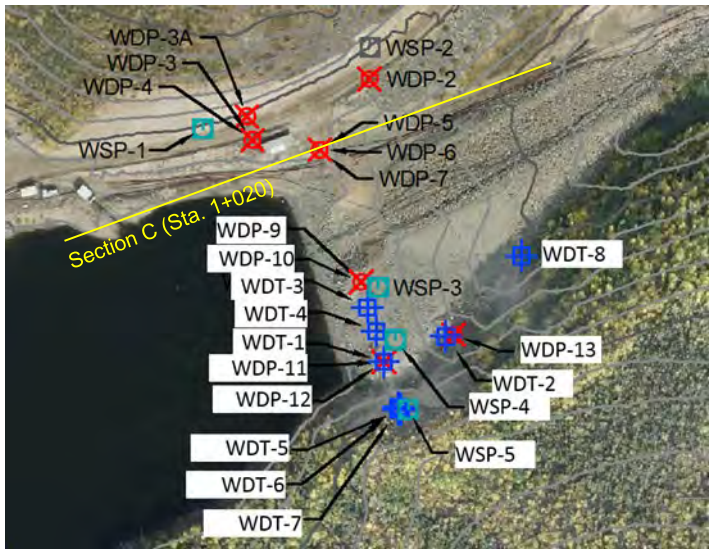
Filename: ApH_WaerStoragePond2021.pptx

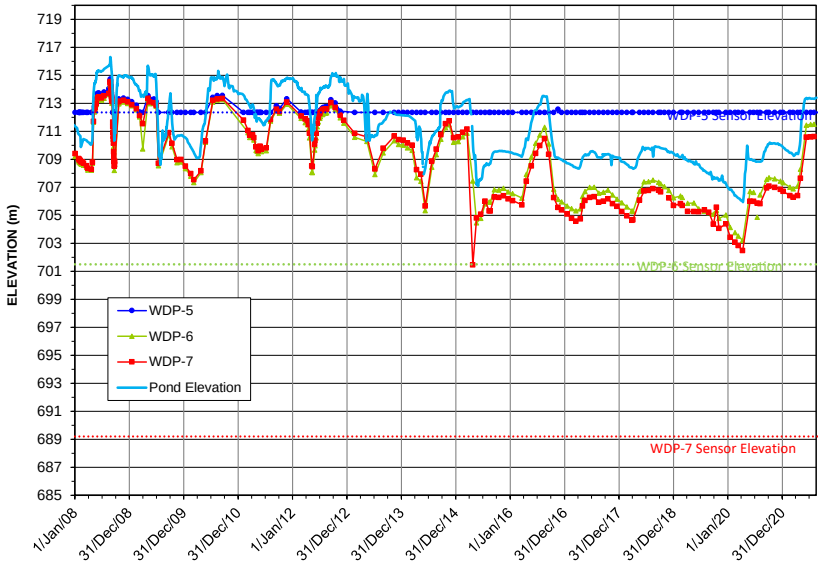
Minto Mine

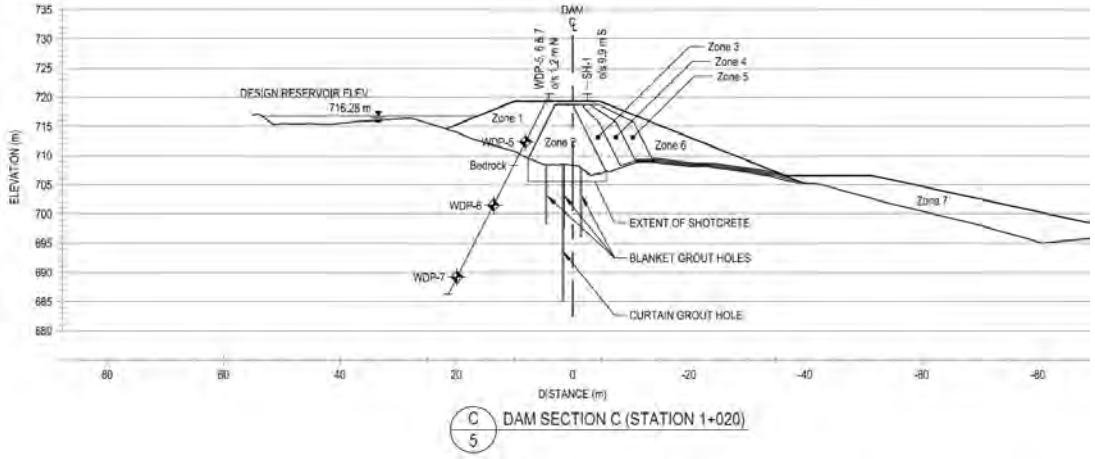
Date: October 2021

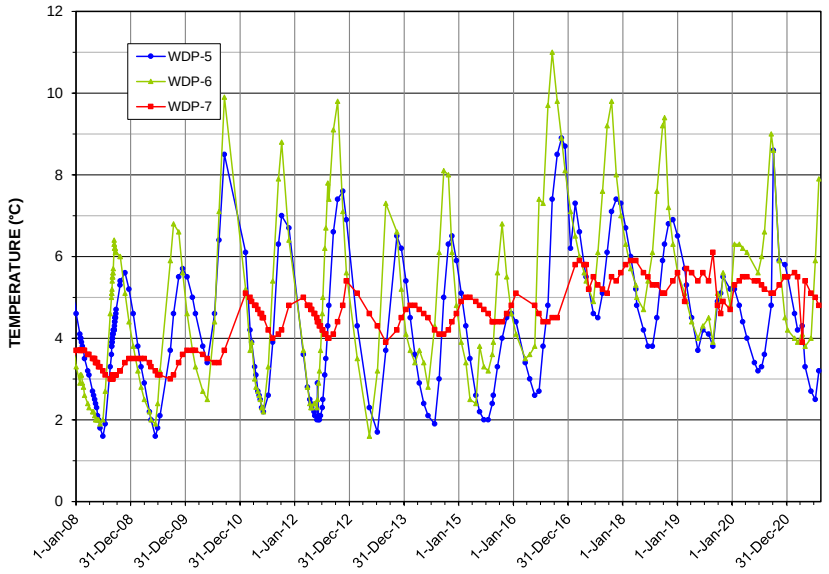
Prepared by PHM

Figure: **11**









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2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMasterSWDInstrumentation_2016Geotech.xlsm
3. Dam section from EBA (2011) report: Water Storage Pond Dam Geotechnical Instrumentation and Seepage Data Review" dated December 23, 2011.

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MINTO

Water Storage Pond Data

Piezometers – Section C (Station 1+020)

Job No: 1CM002.073

Filename: ApH_WaerStoragePond2021.pptx

Minto Mine

Date: October 2021

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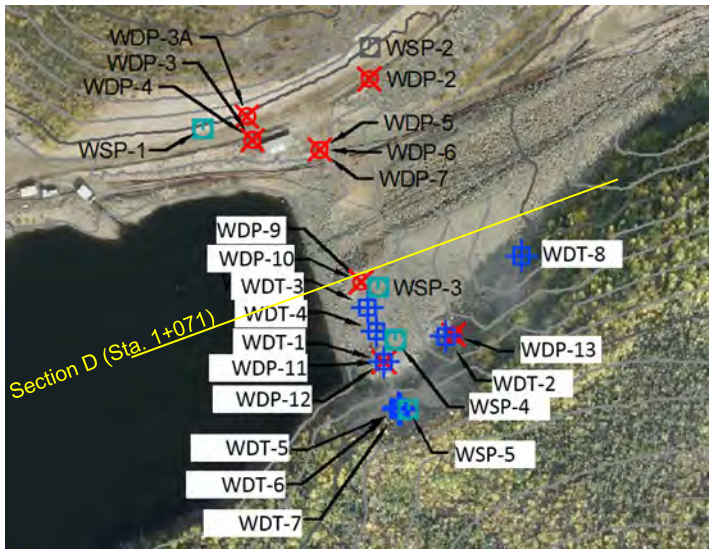
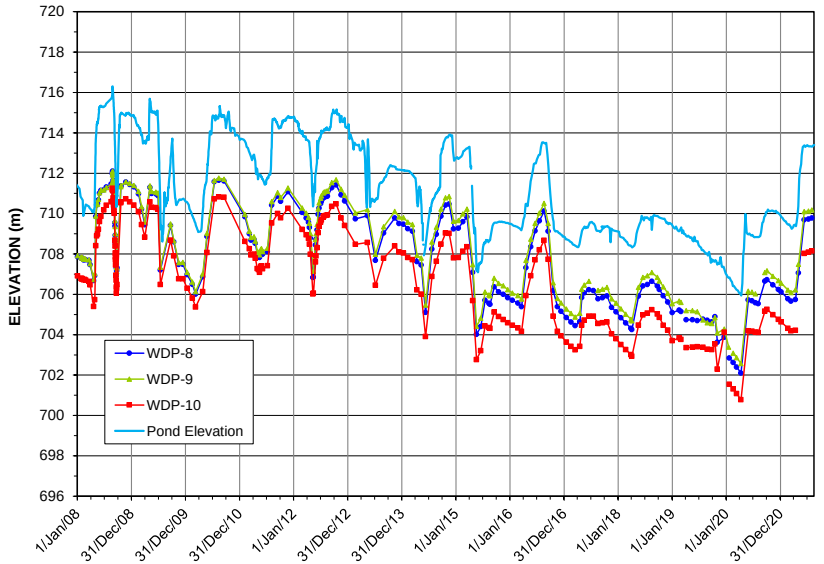
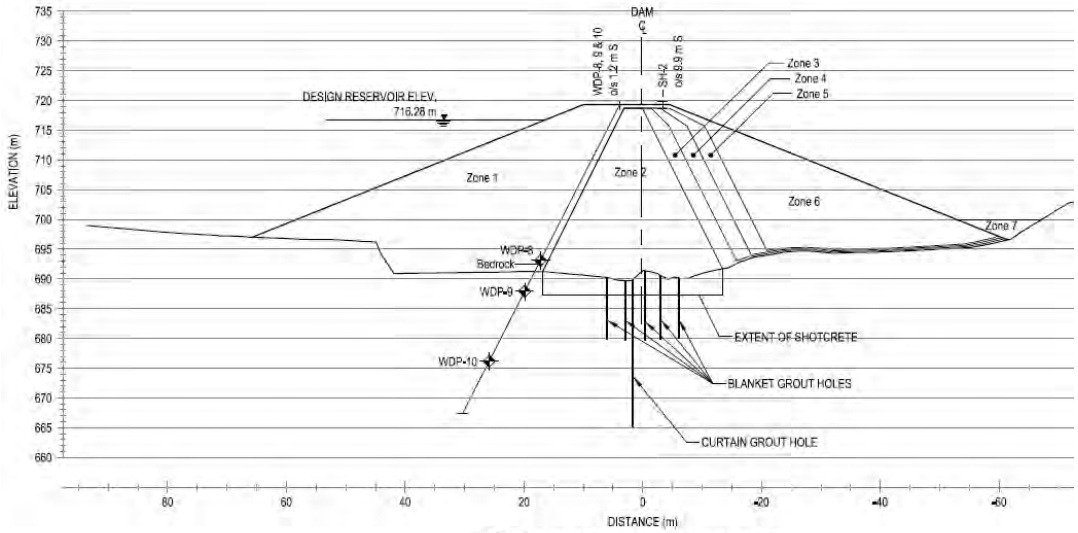
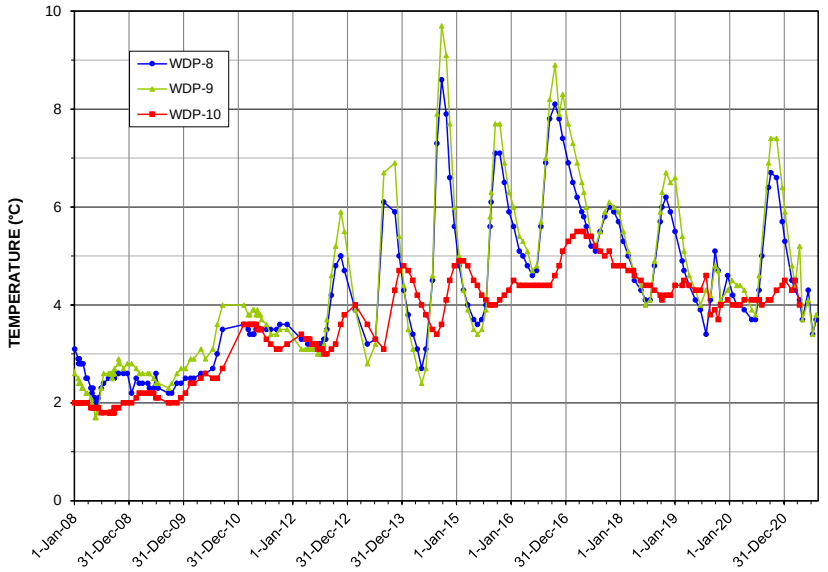
Figure: 12







D-5 DAM SECTION D (STATION 1+071)



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2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMasterSWDInstrumentation_2016Geotech.xlsm
3. Dam section from EBA (2011) report: Water Storage Pond Dam Geotechnical Instrumentation and Seepage Data Review" dated December 23, 2011.

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Water Storage Pond Data

Piezometers – Section D (Station 1+071)

Job No: 1CM002.073

Filename: ApH_WaerStoragePond2021.pptx

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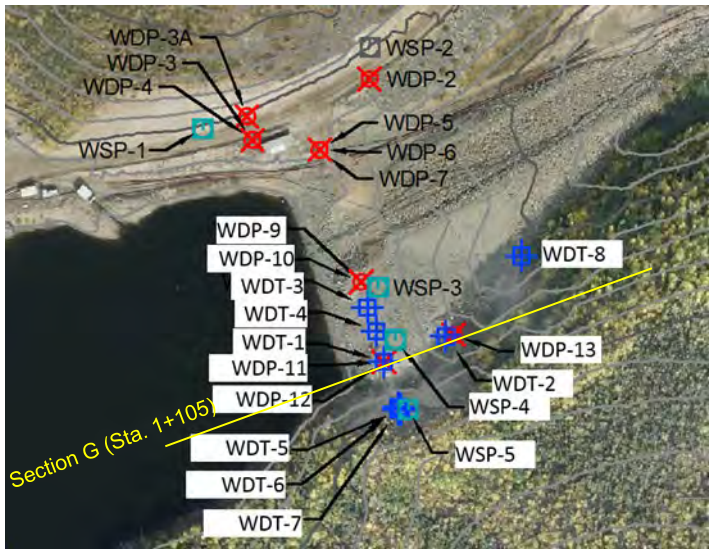
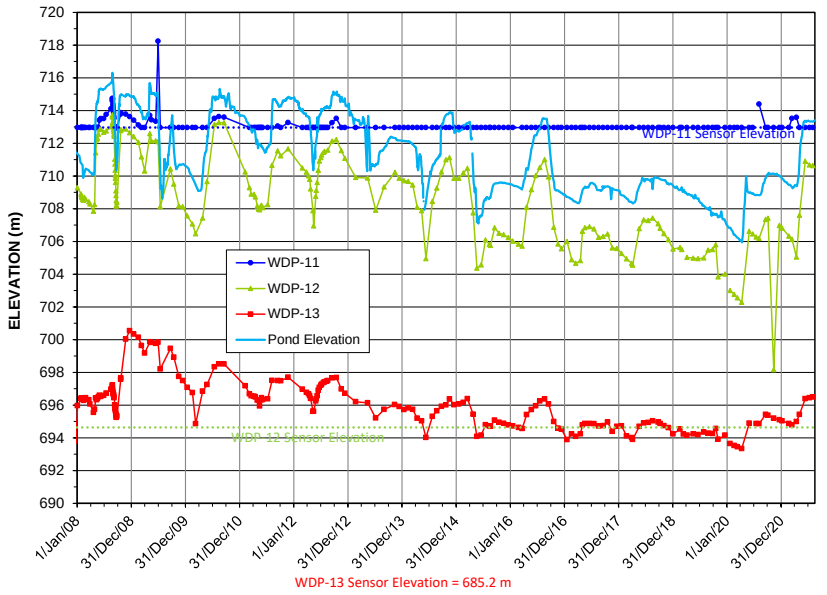
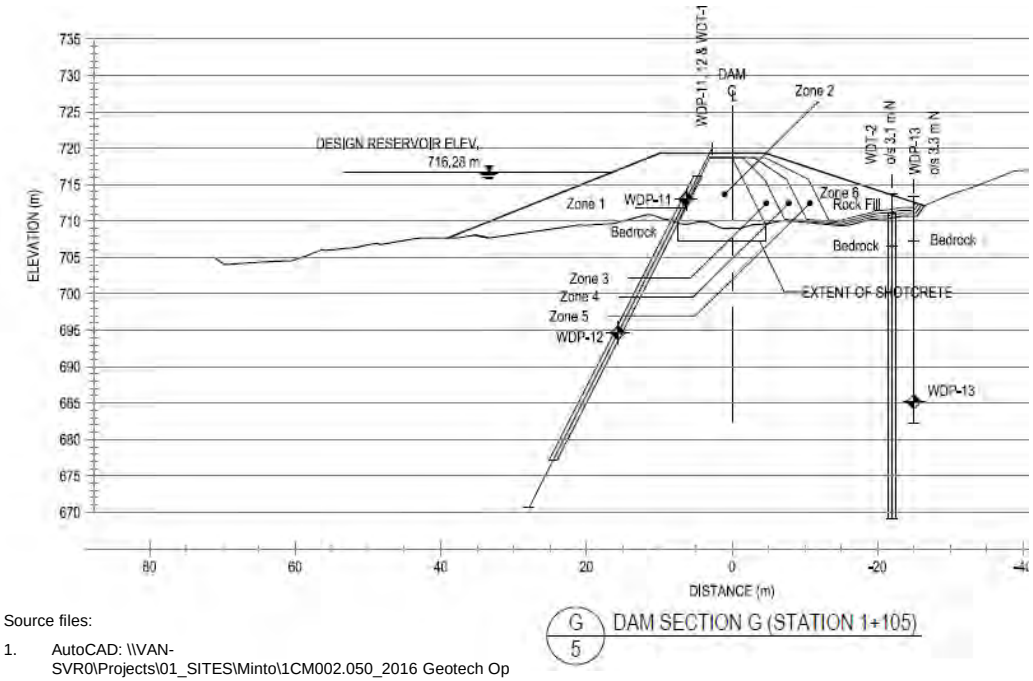
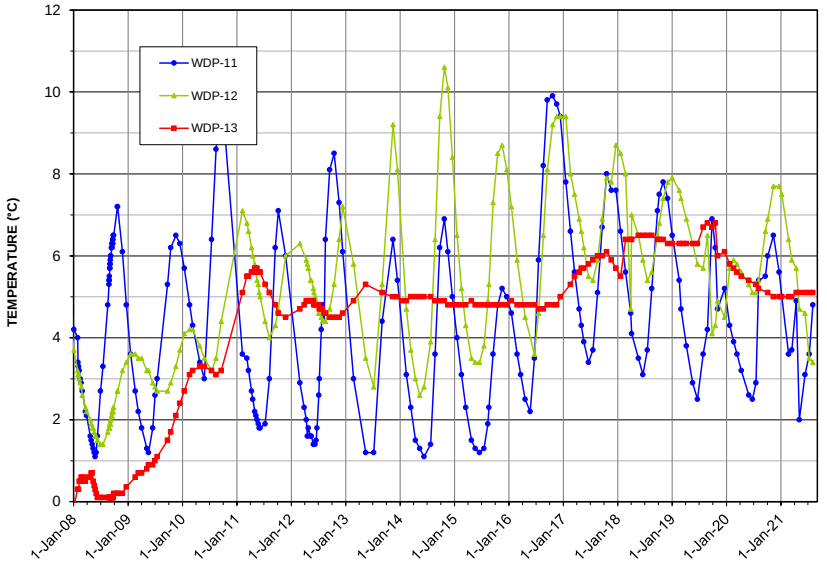
Figure: 13







G/5 DAM SECTION G (STATION 1+105)



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2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMasterSWDInstrumentation_2016Geotech.xlsm
3. Dam section from EBA (2011) report: Water Storage Pond Dam Geotechnical Instrumentation and Seepage Data Review" dated December 23, 2011.

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Water Storage Pond Data

Piezometers – Section G (Station 1+105)

Job No: 1CM002.073

Filename: ApH_WaerStoragePond2021.pptx

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Figure: 14