2018 Geotechnical Annual Review, Minto Mine, YT

Prepared for

Minto Explorations Ltd.

Prepared by

SRK Consulting (Canada) Inc.
1CM002.063
August 2018

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srk consulting

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1 Introduction

On June 26-27, 2018, 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 is the sixth year of geotechnical inspections of the site completed by SRK, with the first inspection completed in September 2012 (SRK 2012a). Previous inspections were completed by EBA Engineering Consultants Ltd.

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 engineer after the spring thaw of each year (by June).

2 Conditions

The geotechnical inspection was completed by Peter Luedke, EIT, and Peter Mikes, PEng, of SRK. SRK staff were accompanied by various Minto staff throughout the visit based on availability. Brandon Chambers was SRK's primary contact for information while on-site about the activities during the past year, while Lesley Sandve provided background and instrumentation support during review of the instrumentation data.

Weather during the site inspection was mostly overcast with a brief rain showers in the afternoon of June 26. Temperatures were estimated at approximately 10°C in the morning, and up to approximately 20°C in the afternoon. The site was generally dry throughout the inspection period.

3 Scope

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

- Big Creek Bridge;
- Mill and camp site;
- Dry Stack Tailings Storage Facility and Mill Valley Fill Extension (Stage 1 and 2);
- Fuel containment facility;
- Main Waste Dump;
- Ore stockpiles;
- Reclamation Overburden Dump;
- South Diversion Ditch;

- Tailings Diversion Ditch
- Southwest Waste Dump;
- Main Pit Dump;
- Main Pit and including South Wall Buttress, In-Pit Dump, and SAT Dump;
- Water Storage Dam;
- Area 118 and Area 2 Pit; and,
- Minto North Pit.

During the inspection, previous year's reports, instrumentation data, design reports and monitoring guidance documents were reviewed as required to guide the inspections. The instrumentation data was reviewed 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.

4 Monitoring and Instrumentation Data

Table 4.1 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. Data that has not been updated since the last geotechnical inspection is not included in the appendices. Appendix B provides a site-wide summary of the survey hub data including the direction of movement for each hub.

Table 4.1: Summary of Instrumentation Data

Facility	Instrumentation Type	List of Reviewed Instrumentation	Last Reading Date
Area 2 Pit	Inclinometers	A2I-1	June 2018
	Ground Temperature Cables	A2T-1	June 2018
Dry Stack Tailings Storage Facility and Mill Valley Fill Extension (DSTSF and MVFE)	Survey Hubs[1]	**Active:** DSSH06, DSSH10, DSSH12, DSSH14, DSSH15, DSSH18, DSSH19, DSSH20, DSSH24, DSSH26, DSSH27, DSSH29, DSSH31, *DSSH32*, MV1, MV2. **Destroyed in past year:** DSSH17	June 2018
	Inclinometers	**Active:** DSI-22, DSI-24 **Destroyed in past year:** DSI-23	June 2018
	Piezometers	**Active:** DSP-05 (A and B), DSP-06 (A and B), *DSP-07 (1 to 6), DSP-08 (1 to 6), DSP-10*	June 2018
	Ground Temperature Cables	DST-10, DST-11, DST-13, DST-14, DST-15	May 2018
Main Waste Rock Dump (MWD)	Inclinometers	MDI-2	June 2018
Southwest Waste Dump (SWD)	Survey Hubs[1]	**Active:** SWD-06, SWD-07, SWD-08, SWD-09, *SWD-10, SWD-11* **Destroyed in past year:** SWD-02A, SWD-4A, SWD-05A	May 2018
	Inclinometers	SDI-3	August 2017
	Piezometers	SDP-2 (A and B), SDP-3 (A and B), SDP-4 (A and B)	May 2018
	Ground Temperature Cables	SDT-1, SDT-2, SDT-3, SDT-4	May 2018
Main Pit	Survey Hubs [1]	**Active:** M79, M80, M81, M82, M83, M84, *M88, M89, M92, M93, M94, M95, M96, M97, M98* **Destroyed in past year:** M73, M75, M85, M86, M87	June 2018
Water Storage Pond Dam	Survey Hubs	WSP-1, WSP-3, WSP-4, WSP-5	May 2018
	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	May 2018
	Ground Temperature Cables	WDT-1, WDT-2, WDT-3, WDT-4, WDT-5, WDT-6, WDT-7, WDT-8	May 2018

Note(s):

(1) Instrumentation in italics are new instrumentation installed since the previous inspection.

4.1 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) were installed in 2013 in the southeast corner of the planned Area 2 Stage 3 Pit.

The inclinometer data is shown in Figure 1 of Appendix C. The data shows a shear occurred within the waste rock fill near the surface during the initial year of data collection, along with some minor displacement at lower depths with no significant movement prior to 2017. The reading collected since October 2018 appear to be erroneous with high check-sum values indicating the readings are of poor quality. The inclinometer probe is recommended to be inspected by a qualified technician, and additional training be provided to staff collecting readings to monitor the 'check-sum' values to ensure quality data is collected.

The ground temperature data indicates permafrost conditions down to an elevation of approximately 767 m. The bottom two sensors at elevations 765 m and 762m are consistently above 0 degrees and are situated in clay material. The ground temperatures have shown an increased cooling trend in the past year, which may be related to mining of the Area 2 Stage 3 Pit.

4.2 Dry Stack Tailings Storage Facility

Instrumentation data for the Dry Stack Tailings Storage Facility (DSTSF) and Mill Valley Fill Extension (MVFE) are provided in Appendix D.

Movements in the Dry Stack Tailings Storage Facility (DSTSF) were first identified in early 2009. The Mill Valley Fill Extension (MVFE) Stage 1 was designed to mitigate the movement and construction of the facility, which began in January 2012 and was completed in 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 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 19 of Appendix D. All survey hubs show no significant movement or a decelerating trend[1], except for survey hub DSSH24, located near the middle of the DSTSF. This hub is located on cover soils and movement may be due to seasonal freeze/thaw effects, with no significant movement observed during the past two winters. Additional data is needed to evaluate the long-term trend.

Two additional hubs (ASH05 and ASH06) are located further to the south of the DSTSF on the airport access road (Appendix D, Figure 20). ASH05 shows no significant movement trend. ASH06 showed slight movement in the spring of 2017, which may be related to disturbance as a result of a nearby pipeline installation. The hub showed no significant movement in the past year.

[1] Based on a comparison of June 2017 and June 2018 movement rates.

The survey hubs are currently read on a weekly basis. With the significant reduction in the movement rates in the past two years, a reduction to monthly readings is reasonable.

Piezometers

Piezometric data from the DSTSF are presented in Figures 20 to 23 in Appendix D.

DSP-05B (Figure 20, Appendix D) shows an increase in pore pressure that appears to have peaked near the beginning of 2018. This sensor is located approximately 2 m below the tailings. DSP-05A, located approximately 2 m above the base of the tailings continues to show a gradual increase in pore pressure. The cause of the pore pressure increase is unclear. The temperature at the sensor is approximately at the freezing point of water (-0.5°C) and the excess pore pressure as a result of an increase in the unfrozen water being unable to dissipate are a result of unfrozen conditions in the surround soils. As the survey hubs in the vicinity of the sensor shows decelerating movement, no additional action is recommended at this time.

Similarly, all sensors at DSP-07, except for the top sensor (DSP-07-01) show continued increases in pore pressure. These 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.

During construction of the MVFE Stage 2, excess pore pressures were generated at DSP-08 and DSP-10 (Figures 22 and 23, Appendix D). Pore Pressures at the top sensor at DSP-08, which shows a significant increase during the construction, continues to dissipate, while the underlying sensors show slight increases in pore pressure. DSP-10 is located at the base of the Minto Creek Valley where the MVFE Stage 2 fill thickness is the largest and is approximately 5 m below the original ground surface. Flow meter readings for the MVFE Stage 2 collection sump indicate that the drainage blanket at the base of the MVFE Stage 2 is functional. The high pore pressures are believed to be the result of winter construction and the preservation of frozen ground conditions within the foundation resulting in impeded dissipation of the generated pore pressure.

Ground Temperature Cables

Ground temperature profiles are provided in Figures 24 to 28 of Appendix D. The temperature readings below the active layer in the instrumentation installed in 2013 are generally in equilibrium with the surrounding soils or continue to show a slight cooling trend. The profiles indicate that warm permafrost is present at all locations, except in the lower portions of DST-11 and DST-13. 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 are presented in Figures 29 and 30 of Appendix D. Three inclinometers were installed between December 2016 and February 2017 in the eastern portion of the MVFES2, with two inclinometers remaining functional.

- DSI-22 is located at the toe of the MVFES2 and shows no significant movement (Figure 29, Appendix D).

- DSI-24 is located between the MVFES2 and the DSTSF (Figure 30, Appendix D). The data obtained from this instrument has been inconsistent with high check-sum values indicating the readings are of poor quality. Plots of the B-axis indicate a potential shear zone at a depth of 53 m, however as the data from the A-axis is of poor quality, the magnitude of the movement along the shear zone is unable to be determined.

4.3 Main Waste Dump

Instrumentation data for the Main Waste Dump (MWD) are provided in Appendix E. Two inclinometers, MDI-1 and MDI-2, have been installed at the MWD. Of the two, only MDI-2 is functional. The last reading of MDI-1 was obtained in November 2012.

Displacements in MDI-2 increased during the winter of 2017-18, with a movement rate of approximately 0.07 mm/day primarily occurring between the depths of 22 and 28 m below ground surface. The displacement is likely related to the construction of the Main Waste Dump Wrap which occurred during the same time period. There had been no significant movement trend detected in MDI-2 since 2012. Since completion of the site inspection, additional survey hubs have been installed in the Main Waste Dump Wrap area to monitor and confirm the movement trend.

4.4 Southwest Waste Dump

Instrumentation data for the Southwest Dump (SWD) are provided in Appendix F.

Survey hub movement data are presented in Figure 1 to 8 of Appendix F. All hubs show either no significant changes in horizontal movement, or a decelerating movement trend.

Two survey hubs were installed in the past year to replace hubs that were disturbed due to heaving caused by frost action as evidenced by exposed concrete.

- SWD-10 has replaced SWD-05A
- SWD-11 has replaced SWD-03A

The replacement hubs have been mounted on large boulders. The replacement hubs are expected to show some seasonable variability as a result of ground freezing and thawing, but horizontal movement rates are expected to be indicative of any ground movement.

Inclinometer data from SDI-3 is presented in Figure 9 of Appendix F. The displacement profile indicates an upper and lower shear zone with both shear zones having the same direction of movement orientated parallel to the slope of the bedrock surface. Movement rates in both shear zones are similar to those in 2017 with the upper shear zone moving approximately 0.4 mm/day and the lower zone moving approximately 0.06 mm/day.

The upper shear zone movement is suspected to be related to thawing of the permafrost colluvium with potentially high excess pore water pressures, which is supported by the slight warming trend in temperature data at SDT-2 and SDT-3. The movement rate of the upper shear zone is expected to decrease as the pore water pressure dissipates.

The lower shear zone is located 7 to 10 m above the bedrock contact in an ice-rich zone consisting of stratified ice (frequent 5 to 75 mm thick ice lenses). The conditions at this shear zone are similar to other movement zones observed at the DSTSF and south wall of the Main Pit believed to be caused by ice creep and/or plastic deformations.

Ground temperature data for the Southwest Dump are presented in Figures 10 to 13 of Appendix F, with the temperature cable location shown in Figure 1. The profiles indicate that warm permafrost is present at all locations with time graphs generally indicating a warming trend at all locations.

Piezometric data for the Southwest Dump are presented in Figure 14 of Appendix F. The pore pressures for all piezometers show a decreasing trend.

4.5 Main Pit and Main Pit Dump

Instrumentation data for the Main Pit are provided in Appendix G.

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 (SAT) 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. Several survey hubs were destroyed as a result of the MPD construction that have been recently replaced in May 2018.

Footprints of the South Wall Buttress, In-Pit Dump, SAT Dump, and MPD are provided in Figure 15 of Appendix A.

Survey hub movement data for the Main Pit are presented in Figures 1 to 16 of Appendix G.

Of the six hubs that remained active since the 2017 inspection, three show no significant movement (M79, M80, M81), while the remaining hubs shows an increase in movement that is likely related to the MPD, with the movement rates of two of these hubs (M83 and M84) decreasing since completion of the MPD. Survey hub M82 showed a slight increase in movement rates (from 0.1 mm/day to 0.2 mm/day) in October 2017.

Nine new survey hubs were installed on and around the MPD since the 2017 inspection. Survey hubs M88, M89, M92, M93, and M94 were installed in the fall of 2017 and all show either no significant movement, or decelerating movement. Survey hubs M95 to M98 were installed in May 2017 with less than one month of data collected at the time of the inspection. These hubs were installed on the MPD or at the toe with additional data required to evaluate the movement trends.

4.6 Water Storage Pond Dam

Instrumentation data for the Water Storage Pond 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 Westbays 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.

5 Results and Recommendations

Findings of the inspection are documented in the photographic compilation of figures in Appendix A. Nineteen figures provide a record of observations across the site.

A summary of the recommendations is provided in Table 5.1. Where appropriate, each recommendation includes a priority classification of low, medium, or high that should be addressed in 3, 1, and 0.5 years respectively.

Table 5.1: Summary of Recommendations

Area	Recommendations
Instrumentation	• **(High Priority) Accuracy of the inclinometer readings continues to be an issue. It is understood that the inclinometer probe has been sent for repairs more than once in the past year, and high check-sum values continues to be an issue. Additional investigation of the cause of the error is recommended and additional training be provided to staff as required.**
DSTSF	• **(High Priority) The extent of the cracking at the south end of the DSTSF should be surveyed and a wireline extensometer should be installed at a minimum of two locations where the cracking is significant to confirm that the cracks are a result of thaw settlement of the recently placed material and not due to deep-seated movement of the DSTSF. The wireline extensometer should be read on a monthly basis.** • **(High Priority): Two readings should be collected from DSI-24 on the same day confirm accuracy of the readings, and readings collected on a weekly basis until the quality of inclinometer data can be confirmed.** • As the movement rates at the DSTSF and MVFES2 have slowed significantly in the past two years, it is recommended that the monitoring frequency of the survey hubs be reduced from weekly to monthly.
Mill Valley Fill Extension Stage 1 and 2	• Continue to monitor the slope to the south of the Minto Creek Seepage Collection System as part of the monthly visual inspection for signs of retrogressive sloughing to determine if any slope stabilization measures are required.
Tailings Diversion Ditch	• **(High Priority) The vegetation in the western portion of the Tailings Diversion Ditch should be cleared.** • **(High Priority) The berm within the Overflow Spillway should be removed and replaced with either large diameter rocks (or equivalent) that would not significantly impede flow if the spillway is utilized.** • Construction of the Inlet Channel should be completed in a manner that meets all design requirements documented in the SRK design memo that include minimum channel dimensions, grades, rip-rap gradations and thicknesses. During construction, survey and visual inspections of the channel should be implemented to confirm adequate rip-rap gradations. • **(High Priority) Remaining construction should be completed prior to snowfall in order to be in-place by the 2019 freshet.**
Main Waste Dump and Main Waste Dump Expansion	• **(Medium Priority) Additional survey hubs are recommended to be placed on the MWD Wrap crest and toe to confirm no large-scale mass movement is occurring.**
Camp Site	• Continue to monitor the slough at the west end of the camp area, the erosion channels below the camp pad following larger rainfall events. • **(Medium Priority) Develop and implement measures to mitigate the erosion observed near the camp refrigeration trailer. Measures to consider include surface regrading, fill placement to direct flow away from the slope, installation of a sump/drainage system.**

Area	Recommendations
Big Creek Bridge	• Continue regular annual monitoring of sediment accumulation in the culverts and clean out if sediments continue to accumulate. • Limit the material graded from the road at the culvert locations, or muck out some of the gravel buildup, taking care not to damage the culvert. • If the alignment of Big Creek changes and it appears that the culverts may be utilized, tree clearing and sediment removal immediately upstream and downstream of the culverts is recommended.
Main Pit Dump, SAT Dump, & In-Pit Dumps	• Access to the areas above and below the over steepened slopes (Main Pit Dump) should be restricted, or the slopes should be regraded. Signs or barricades should be considered.
Area 2 Pit	• [Stage 2] – **High Priority: Move the transformer shed further from the crest and away from the observed cracks in the road.** – The safety berm should pulled back uphill of the cracking. Alternatively, access to the pit rim road should be limited and the utility lines be moved further to the north. • [Stage 3] – Continue to monitor the area of instability in the bull-nose area of the pit.

Note(s):

(1) High and medium priority actions are highlighted in **bold**.

(2) Low, medium, and high priority recommendations should be addressed in 3, 1, and 0.5 years respectively.

This report, "2018 Geotechnical Annual Review, Minto Mine, YT", was prepared by SRK Consulting (Canada) Inc.

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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.

6 References

EBA 2011. Main Waste Dump – 2011 Annual Review, Minto Mine, YT. EBA File Number: W14101068.037. September 30.

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: Photographic Report

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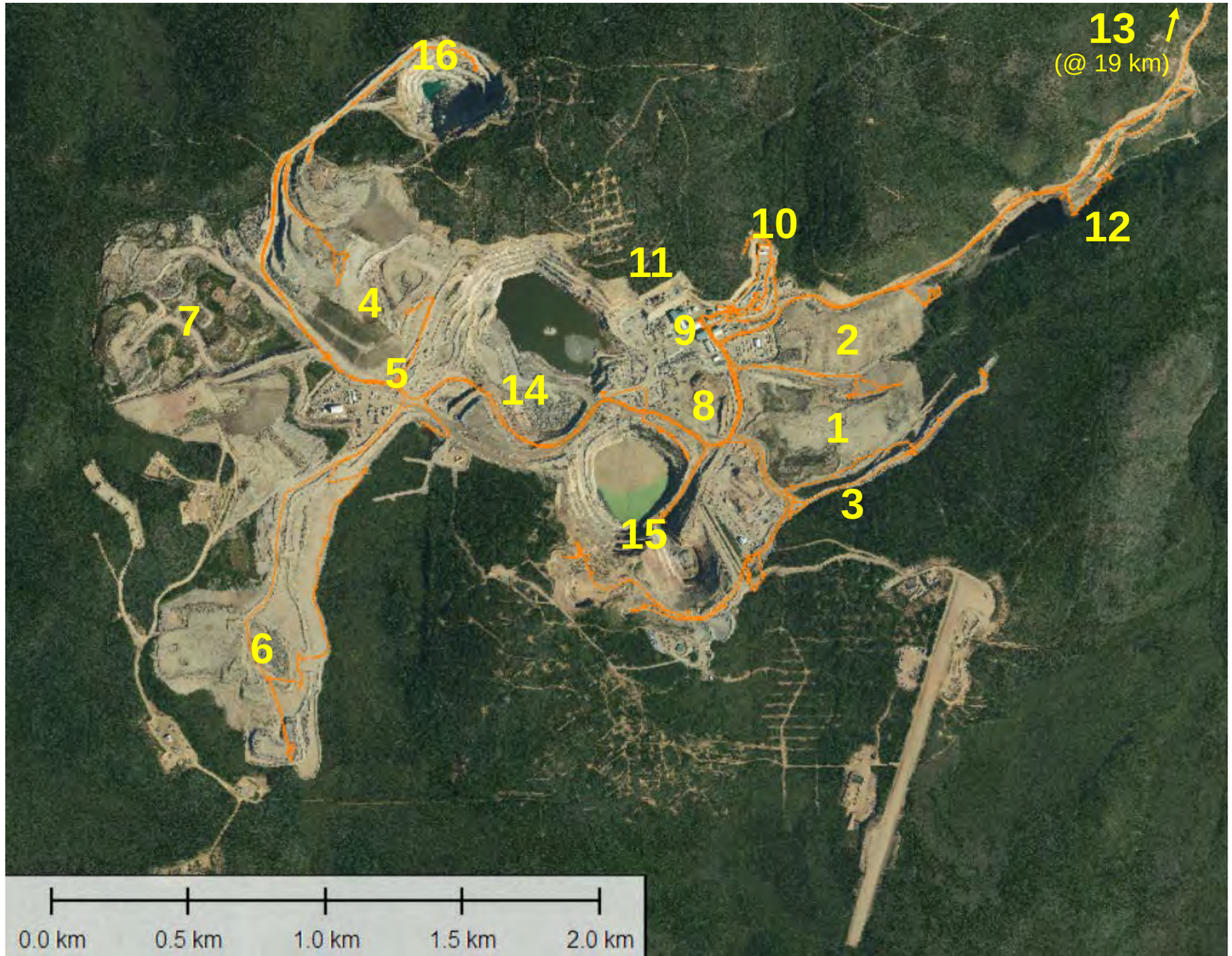


2017 Orthophoto.

Inspection Area Number

Inspection tracks
(Not all tracks were recorded)

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Site Overview
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **1**

1 Dry Stack Tailings Storage Facility

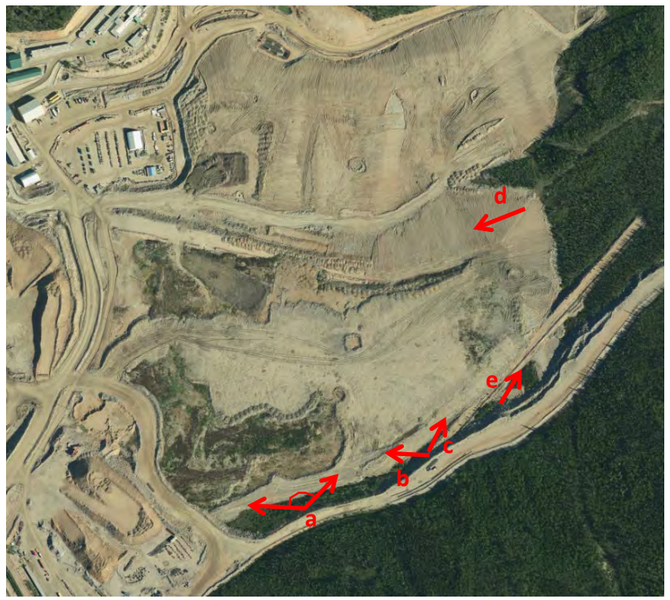
- Bulk regrading and cover placement over the DSTSF was completed in 2016 and 2017. Since the last inspection, additional cover material has been placed over the waste rock shell as well as on the south slope of the DSTSF to cover all the exposed tailings and create positive drainage of surface runoff to the north east.
- Additional 'fine tune' regrading of the cover surface remains to be completed.

- No clear signs of instability were observed.
- Cracking was observed (Photos A, B, and C) along the southern crest where overburden was recently placed. The cracking is orientated parallel to the southern crest of the DSTSF and is likely the result of settlement of the recently placed material.

- Photo D shows the eastern end of the covered DSTSF and the transition to the Mill Valley Fill Extension (right side).

Recommendations

- The extent of the cracking at the south end of the DSTSF should be surveyed and a wireline extensometer should be installed at a minimum of two locations where the cracking is significant to confirm that the cracks are a result of thaw settlement of the recently placed material and not due to deep-seated movement of the DSTSF.



srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Dry Stack Tailings Storage Facility
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **2**

2 Mill Valley Fill Extension Stage 1 and 2

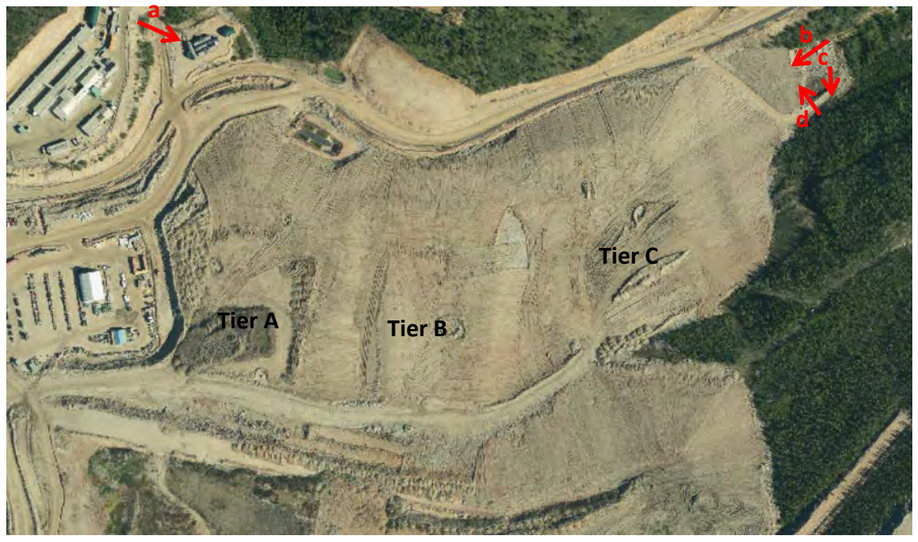
At the MVFE, the majority of regrading, cover material and overburden placement has been completed. Overburden and cover soil placement continues.

No major signs of instability were observed.

- Photo A provides an overview of the MVFE with cover soil spread on the north slopes. Overburden stockpiles are also present on MVFE footprint to be used as cover material in other areas at closure (mill, camp area, etc.).
- Photo B shows the Minto Creek Seepage Collection System. The system appears to be functioning as per design, no signs of seepage immediately downstream of the system.
- Photo C shows the excavated slope to the south of the Minto Creek Seepage Collection System. This slope was cut into an area of permafrost that has since thawed. The permafrost thaw does not appear to be retrogressing, with vegetation beginning to establish and no significant change compared to the 2017 inspection photographs.
- Photo D provides a view of the down-valley slope of the MVFE.

Recommendations

- Continue to monitor the slope to the south of the Minto Creek Seepage Collection System for signs of retrogressive sloughing to determine if any slope stabilization measures are required.



2017 Orthophoto

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Mill Valley Fill Extension Stages 1 and 2
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **3**

3 Tailings Diversion Ditch

- Since the 2017 inspection, the South Diversion Ditch (SDD) was redirected to flow into the Tailings Diversion Ditch (TDD) as a result of mining of the Area 2 Stage 3 Pit. Observations of the construction of the new intake structure and overflow spillway into the Area 2 Stage 3 Pit is provided in Figure 5.
- In general, the ditch appeared functional, with conditions the same as those in observed in previous inspections. No signs of instability or ditch obstructions were noted along the ditch alignment.
- Photos A and B: View of the upper, unarmored portion of the diversion ditch. Vegetation growth is significant over a small portion of the ditch. As a result of the redirection of the SDD into the TDD the flow capacity of the ditch may be less then the design requirements for the ditch. As a result, the vegetation is recommended to be removed.
- Photos C and D: View of the middle armored portion of the diversion ditch. Rip-rap is well placed and the ditch is free of debris. Only minor vegetation in the channel was observed.
- Photos E and F: View of the lower portion of the ditch and outlet. The ditch outlet was excavated through placed waste rock.

Recommendations

- The vegetation in the western portion of the Tailings Diversion Ditch should be cleared.

2017 Orthophoto

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Tailings Diversion Ditch
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **4**

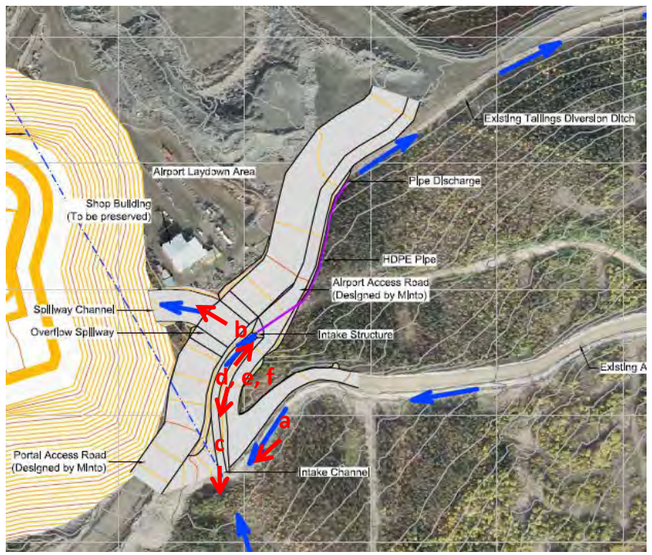
3 TDD Intake Structure and Overflow Spillway

- Since the 2017 inspection, construction of the TDD Intake Structure and Overflow Spillway has begun and is partially completed. Flow from the SDD has been diverted into the TDD, but construction intake channel remains to be completed. Design of the Intake Structure and Overflow spillway is documented in the SRK memorandum "Area 2 Stage 3 Pit Expansion – Intake Structure and Overflow Spillway – Final Design" dated May 31, 2017.

- Photo A: View of the Airport Access Road Ditch looking towards the TDD Intake Channel.
- Photo B: View of the Overflow Spillway through the Portal Access Road berm. The width of the opening is narrower than the design channel width of 25 m.
- Photo C: View of the spill point from the 'headwater pond' into the Intake Channel. The channel invert elevation was constructed 1 m higher than the design elevation and resulted in ponding upstream of the intake channel and channel depths less than the design requirements. Site staff are aware of the discrepancy and noted that the remaining construction will correct the deficiencies.
- Photos D and E: View of the Intake Channel and placed rip-rap. Some areas of exposed geotextile were observed. Additional rip-rap is required and is placed as part of the remaining construction.
- Photo F: View of the pond at the downstream end of the Intake Channel (upstream of the discharge pipeline and road-crossing spillway inlets).

Recommendations

- The Overflow Spillway should be widened to meet the required design channel base width (~25 meters) to minimize risk of a flood flow to the north east towards the DSTSF.
- Construction of the Inlet Channel should be completed in a manner that meets all design requirements documented in the SRK design memo that include minimum channel dimensions, grades, rip-rap gradations and thicknesses. During construction, survey and visual inspections of the channel should be implemented to confirm adequate rip-rap gradations.
- Remaining construction should be completed prior to snowfall in order to be in-place by the 2019 freshet.



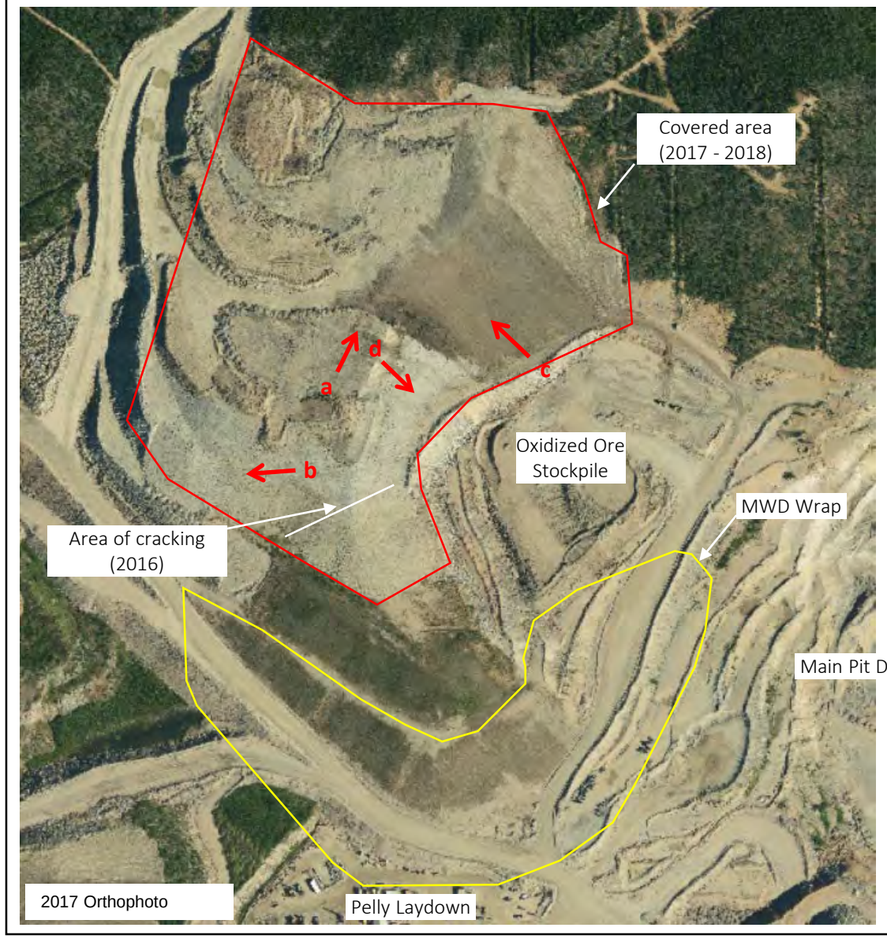
2014 Orthophoto with overlaid design of the intake structure and overflow spillway

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	**Tailings Diversion Ditch Intake Structure and Overflow Spillway**
		Date: August 2018 / Approved: PHM / Figure: **5**

4 Main Waste Dump and Main Waste Dump Expansion

- Since the 2017 inspection, additional waste rock has been placed to the southeast of the Main Waste Dump (MWD) as part of the MWD Wrap. Details of the inspection of the MWD Wrap are provided in Figure 7. The cover soil placement over the top surface of the MWDE has been completed and some additional stockpiled soil along the dump crests has been spread on the dump slopes. Additional 'fine-tune' grading is to be completed on the top surface and dump slopes.

- No major signs of instability were observed. Minor cracking of the placed material was observed and attributed to settlement after placement, especially in winter. Much of the area has recently been graded or is actively being graded which may have covered the full extent of cracking previously observed.
- No major changes to the gullying were observed during the inspection, erosion is expected on the newly covered faces, subsiding with time and vegetation development.
- Photo A: View of the regraded and covered top of the MWDE.
- Photo B: View of the regraded and covered west side of the MWDE.
- Photo C: Panoramic view of the south eastern face of the MWD where overburden has been placed
- Photo D: Panoramic view of the current regraded upper MWDE slopes with overburden places on the right and left side of the photo, and exposed regrading awaiting overburden placement in the center.



srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Main Waste Dump
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: 6

5 Main Waste Dump Wrap

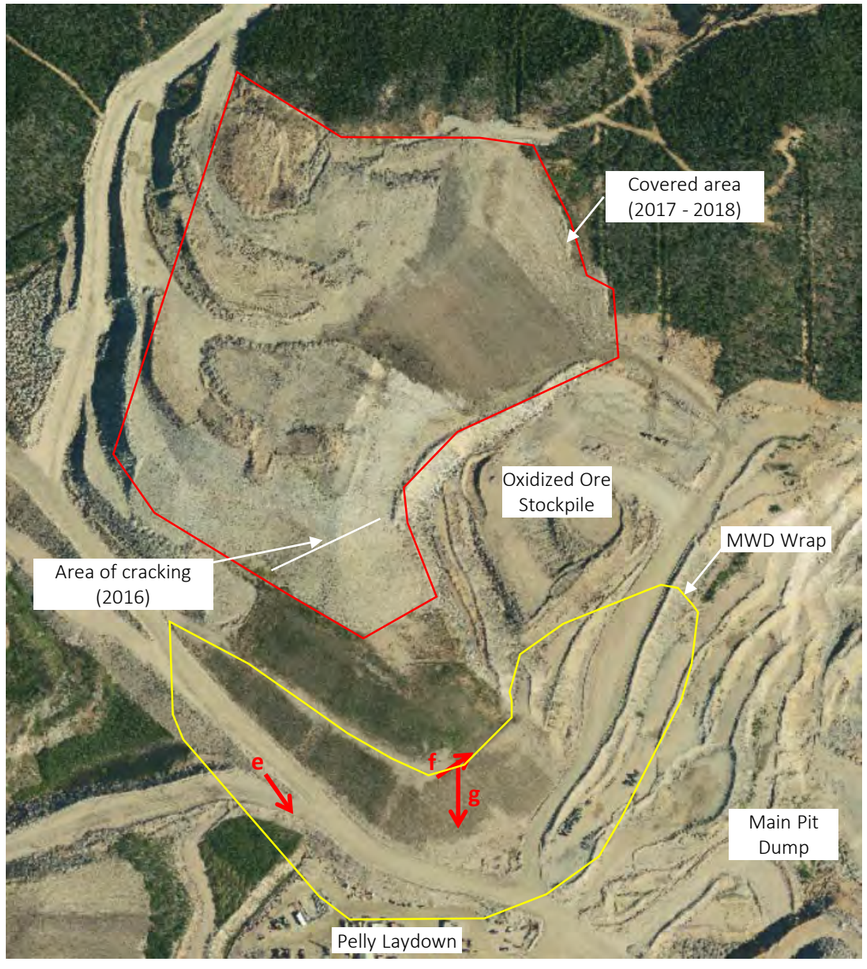
Observations

- Construction of the Main Waste Dump (MWD) Wrap began in 2017 with waste rock placement complete. The dump was design to decrease the overall slope of the MWD at closure. The regrading of the MWD Wrap has yet to be completed.

- Areas of differential settlement, small sinkholes and cracking were observed on both benches of the wrap. The settlement is believed to be due to winter placement of the material as well as due to the variable thickness of placed material.
- Photo E: View of cracking and differential settlement observed on the new haul road constructed adjacent to the Pelly laydown. This settlement was attributed to winter placement and different fill thickness on either side of the crack.
- Photo F and G: View of the differential settlement on the MWD wrap benches.

Recommendations

- Additional survey hubs are recommended to be placed on the MWD Wrap crest and toe to confirm no large-scale mass movement is occurring.

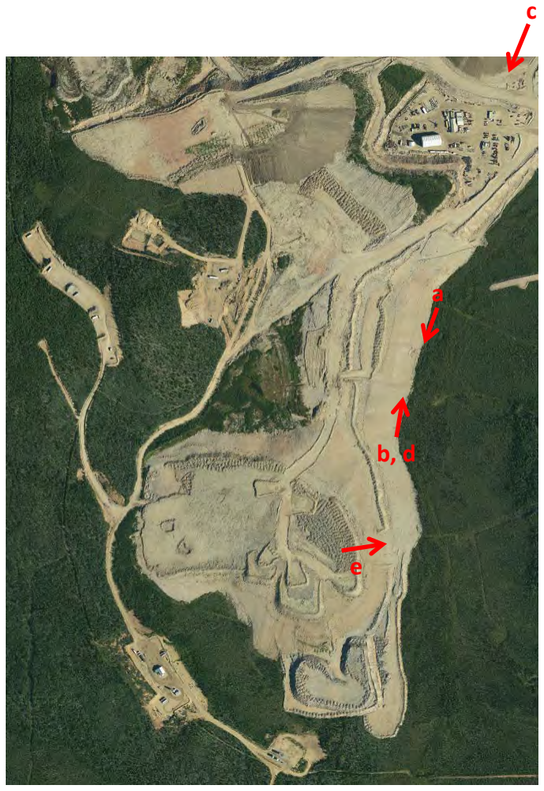


2017 Orthophoto

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Main Waste Dump Wrap
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 · Approved: PHM · Figure: 7

6 Southwest Waste Dump

- Since the 2017 inspection, most of the high grade ore stockpile has been removed from the SWD, with no additional regrading or cover placement completed in the past year.
- Minor differential settlement and cracking was observed and is attributed to winter placement/thawing.
- Photos A and B View of the east side of the dump, facing south (A) and facing north (B)
- Photo C: View of regraded slope on the east side of the dump and stockpiled overburden along the crest of the slope (taken from the MWD).
- Photos D: an example of the observed cracking approximately mid way up the dump face. Cracking is believed to be due to differential settlement as a result of the slope regrading, but may be due to the ongoing movement observed at the survey hubs installed at the dump toe. As noted in Appendix F, the survey hub movement rates all show a deceleration trend.
- Photo (e): View of the south east side looking down from the upper crest.



2017 Orthophoto

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Southwest Waste Dump
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **8**

6 Southwest Waste Dump (Continued)

Observations

- Photo F and G: Additional views of the observed cracking approximately mid way up the regraded dump face.
- Photo H, J, K, and L: Survey hubs SWD-09, SWD-11, SWD-06 and SWD-10 were previously replaced after being impacted by frost heave.
- Some seasonal ground movement have been observed as a result of freeze/thaw cycles at the new hubs (See Appendix F), however, the horizontal displacement graphs provide a more accurate measure of the movement rates compared to the decommissioned survey hubs.

- Photo I shows the newly constructed monitoring well enclosure at MW17-09-SWD

2017 Orthophoto

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Southwest Waste Dump (Continued)
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **9**

7 Reclamation Overburden Dump

Observations

- Conditions at the Reclamation Overburden dump (ROD) remain the same as noted in previous years' inspections:
    - Slumping, settlement and tension cracks are expected in the dump as it is constructed with frozen overburden with thawing expected.
    - Discontinuous tension cracks and differential settlement observed along the perimeter crest.
    - Ground undulation is typically 0.3 m and is prevalent throughout the facility.

- The dashed yellow line in Photo (a) shows the small slope failure first observed in 2014. As noted in previous inspections, vegetation has firmly been established within its footprint. The failure has not compromised the overall dump slope angle and as a result, the failure is not expected to reduce the overall stability of the dump.

8 Ore Stockpiles

- The ore stockpiles were investigated briefly in passing. All outer slopes appeared in good condition: no major slumping, bulges, cracks, or other signs of instability were observed.
- The ore was being excavated from the north side.
- Active excavation face best practices should be used to minimize the risk of equipment burial

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection **Reclamation Overburden Dump and Ore Stockpiles**
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 | Approved: PHM | Figure: **10**

9 Mill Site

Conditions of the mill area are similar to those observed in the 2017 inspection. Minor ongoing erosion was again noted on the slope to the north of the mill (Photos A, B1, B2, and C). Fallen rocks appear to have been cleared as needed from the road and walkway on an as needed basis (Photos B and C).

Photos D1 and D2 show the mill feed stockpile. The lock-blocks located beneath the mill feed conveyor are bulging toward the road.

2017 Orthophoto

Photograph vantage point

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Mill Site and Ore Stockpiles
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **11**

10 Camp Site

No significant changes were observed from the 2017 inspection

Photo A: Slope above the main camp site (north / west) appears stable, with some minor erosion of sands and gravels observed. Eroded sand/gravel is generally present at the base of the slope with occasional cobbles/boulders up to 300 mm.
Photo B: A small slump was previously observed at the west end of the camp area. No major changes have been noted.
Photo C: View of the channel to the north of the camp area. Similar to previous inspections, only minor sloughing into the ditch was observed. No water was observed in the upper diversion ditch.
Photo D1: View of the regraded camp pad south of the site services trailer. The sump continues to be effective, however sediment should be cleared from the sump inlet to prevent flooding and flow over the crest.
Photo D2: View of the camp pad crest looking south.
Photo E: View of erosion caused by ponding and subsequent runoff drainage undercutting the camp utilidor (along the camp pad crest). If left unmitigated, on-going erosion may result in damage to the utilidor.

Recommendations

- Continue to monitor the slough at the west end of the camp area, the erosion channels below the camp pad following larger rainfall events.
- Develop and implement measures to mitigate the erosion observed near the camp refrigeration trailer (Photo E). Measures to consider include surface regrading, fill placement to direct flow away from the slope, installation of a sump/drainage system.

Photograph vantage point

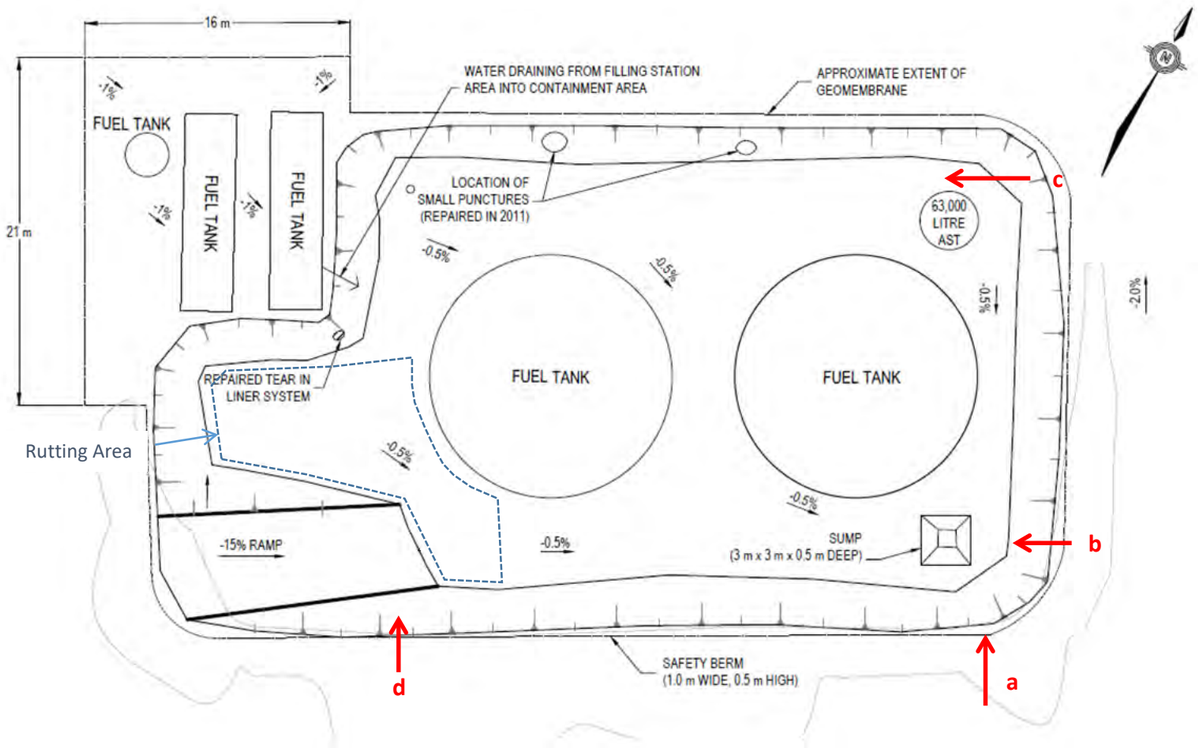
srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Camp Site
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **12**

11 Fuel Containment Facility

- Conditions at the fuel containment facility are unchanged from the previous inspection in 2017.
- Photos A to D show the condition of the liner on each side of the facility.
- The erosion gullies along the access ramp (Background of Photo B) appears to be unchanged compared to the 2017 inspection photos.
- Photos B and D shows areas of folding of the liner. No tears or defects in the liner were observed.
- Minor pooling was observed. The facility appears to drain into containment area as per design.
- No new rutting observed. Ruts are present in the southern half of the facility. Rutting is significant (approximate 2-3 inches deep) between the two tanks where equipment was turning. No liner is exposed as a result of the trafficking.

Recommendations

- The bedding layer over the geomembrane (150 mm thick) was not meant for heavy equipment. Vehicle access should be limited to the occasional visit with low ground pressure equipment.
- No actions required.



Source: Figure 1, EBA letter "Fuel Containment Facility – 2011 Annual Review, Minto Mine, YT", dated September 30, 2011.

Photograph vantage point

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Fuel Containment Facility
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **13**

12 Water Storage Pond Dam

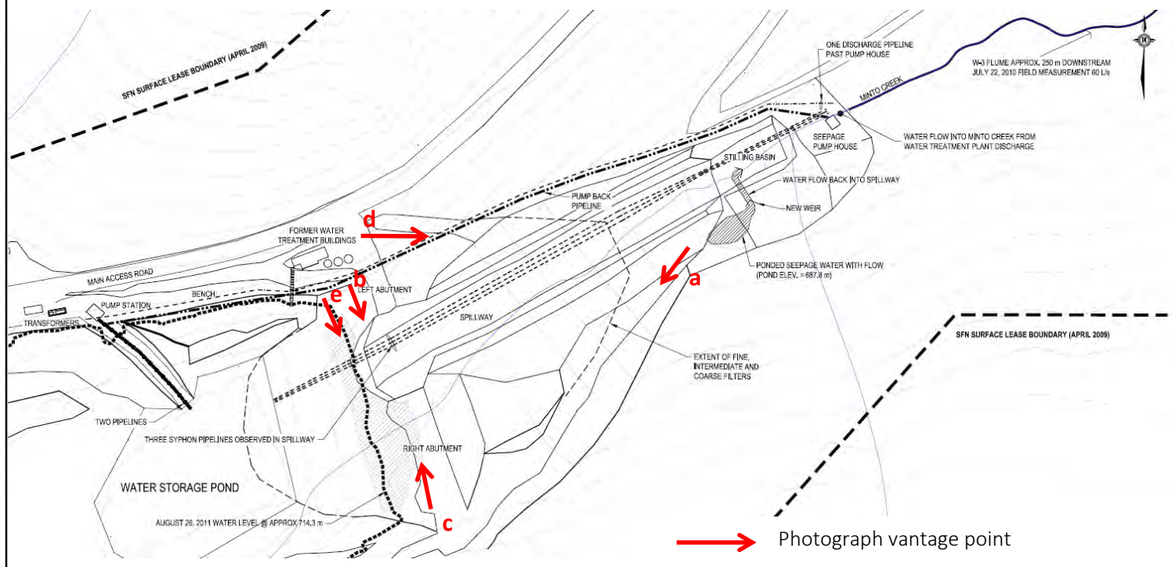
The June 2015 geotechnical inspection reported a large area of erosion on the left (north) abutment of the dam that was exposed as a result of the water level being lower than the normal operating level. The area was repaired in July 2015 by placing additional rip-rap as protection after consulting with the Engineer of Record for the dam (TetraTech). The repaired area could not be observed during in 2016 inspection, as the pond water level was within normal range, but was visible during the 2017 and 2018 inspection Photo (e).

- Similar to 2017, the pond elevation during the inspection was approximately 709.5 m (spillway elevation 716.2m)
- No signs of instability along the dam, or at the abutments.
- Seepage water downstream of the dam was clear and no accumulation of sediments was observed. Flow could not be heard through the rockfill near the previously identified seep.
- The weir present downstream of the dam had an estimated flow rate of approximately 1 L/s. Condition of the seepage water appears unchanged from the 2017 inspection. The water through the seep was clear, (no visual turbidity).
- Some sedimentation was apparent in the rockfill on the upstream left abutment. It appears this is sediment laden runoff from the mine site access road and former water treatment plant pad.

Photo A: View of the downstream slope taken from the ponded seepage water area looking towards the right abutment.
Photo B: Upstream side of the dam with the high water mark indicated by the line of wood debris.
Photo C: View of the piezometers along the crest of the dam
Photo D: View of the downstream slope of the dam taken from the right abutment.
Photo E: View of the upstream slope at the left abutment, near the previous repair, also showing the apparent sediment buildup.

Recommendations

- Continue regular monitoring of the dam as per the OMS Manual.
- Consider installation of sediment control near the former water treatment pad to limit deposition of fines within the rockfill.



Source: Figure 1, EBA letter "Water Storage Pond Dam– 2011 Physical Observation Report, Minto Mine, YT", dated September 30, 2011.

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection		
		Water Storage Pond Dam		
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018	Approved: PHM	Figure: **14**

13 Big Creek Bridge

- Conditions of the culverts are unchanged since the previous June 2017 inspection. All culverts are in satisfactory conditions with no major blockages or sediment accumulation at either end of the culverts. The first culvert west of the bridge is in satisfactory condition.
- Tree growth near the inlet of some of the culverts is occurring and may reduce the capacity of the culvert or lead to a blockage.
- A review of Google Earth Imagery from 1984 to 2016 indicates that Big Creek appears to be 'straightening out' upstream of the bridge (see channel alignment summary below) and moving away from the area of the culverts. The likelihood of the culverts being used appears to be low.

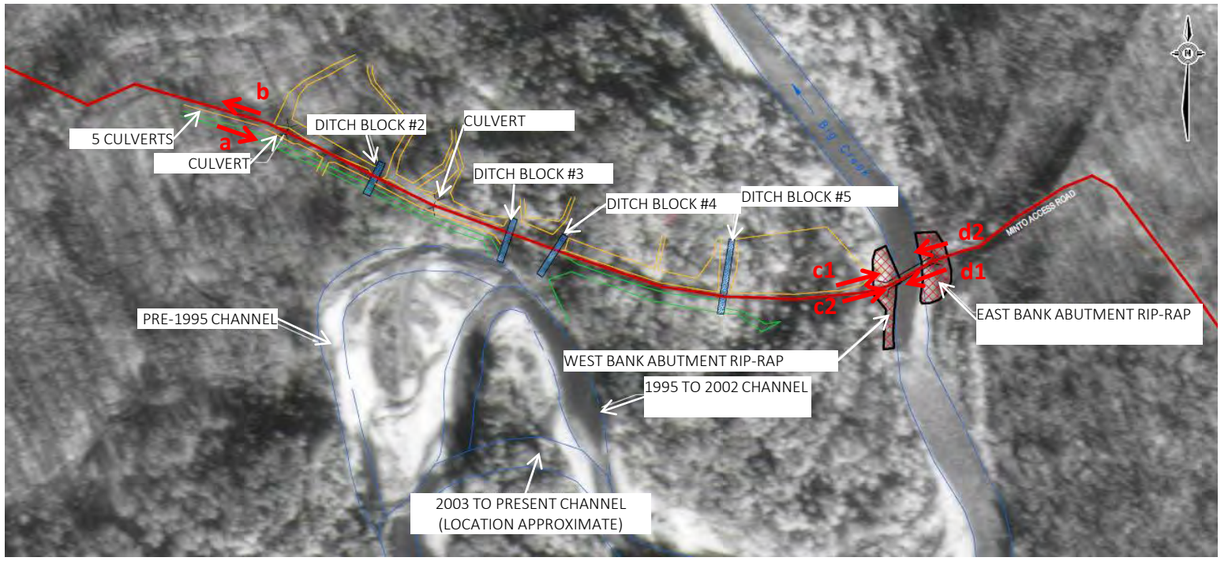
- Photos A and B show the upstream and downstream ends of the group of 5 culverts, each with diameter of 1.1 m. The culverts are in satisfactory condition, with no blockages at either end. Small portions of geotextile are exposed at either end, but is not impacting the culvert performance.
- Some material buildup around the end of the culverts indicate the road gravel has been graded out and is starting to block some of the culvert.

- Ditch Blocks #2 to #5 are unchanged from previous inspections and are in satisfactory condition. Ditch Block #1 has not been constructed.
- Photo C shows an example of the road graded material piling in front of the culvert.
- Photo D shows a view of the east abutment.
- Photos E1 and E2 show the west abutment.

- The bridge abutments and road approaches are in good condition, with no signs of instability observed.

Recommendations

- Continue regular annual monitoring of sediment accumulation in the culverts, and clean out if sediments continue to accumulate.
- Limit the material graded from the road at the culvert locations, or muck out some of the gravel buildup, taking care not to damage the culvert
- If the alignment of Big Creek changes and it appears that the culverts may be utilized, tree clearing and sediment removal immediately upstream and downstream of the culverts is recommended.



Source: Figure 1, EBA letter "Big Creek Bridge– 2011 Annual Review, Minto Mine, YT", dated September 30, 2011.

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Big Creek Bridge
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **15**

14 Main Pit Dump, SAT Dump, & In-Pit Dumps

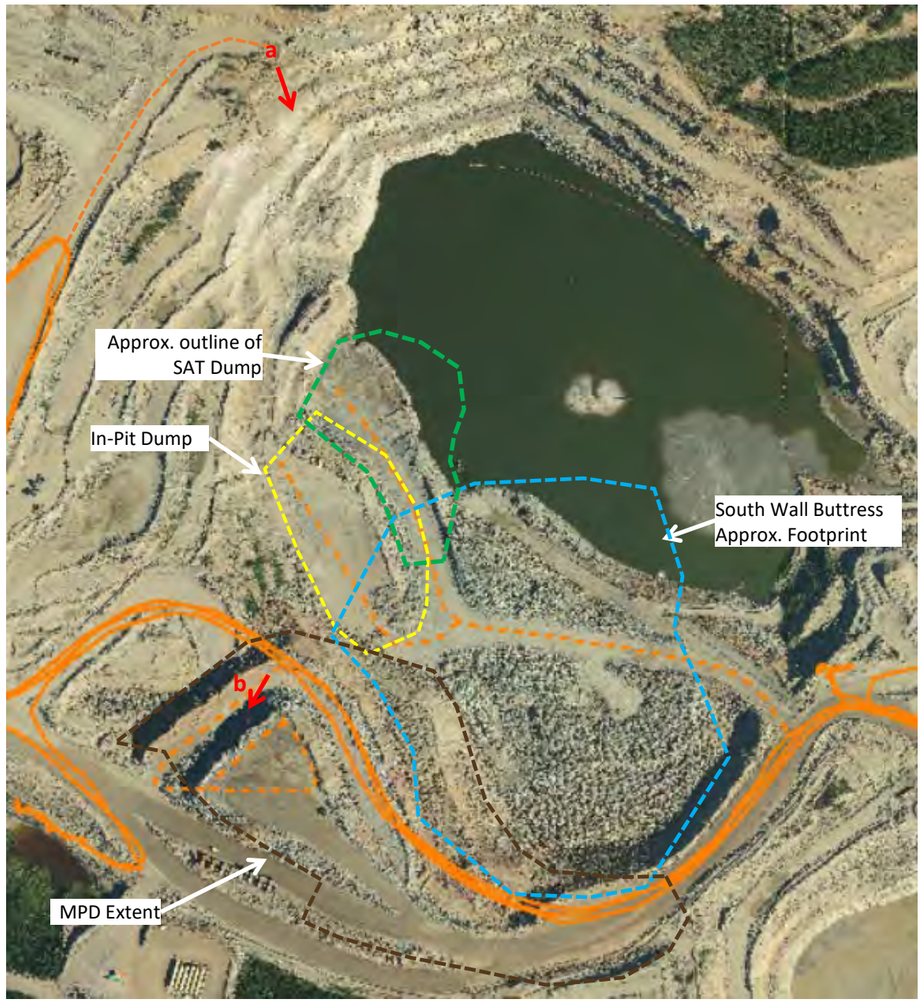
- Since the 2017 inspection, no material has been placed in the SAT or In-pit Dump. The bulk of the material placement on the MPD ceased following the end of the surface mining operation. At the time of the inspection, there was no active hauling in this area, however an over-steepened face was observed on the dump where waste rock was excavated from the dump for other uses.
- Photo A provides an overview of the Inpit Dump, SAT Dump, and Main Pit Dump at the time of the inspection

Main Pit Dump

- Photo B: Cracks were noted on the MPD approximately parallel to the south pit wall, similar to those noted in in the 2017 inspections. Due to the reconfiguration of the access roads prior to the 2018 inspection, these have been observed in the past year and are tracked by survey monitoring point M88, the attributed cause was settlement of the waste rock within Main Pit.

In-Pit Dump

- No change in condition was observed at the In-Pit Dump.



SAT Dump

- Minor cracks were observed parallel to the face of the SAT dump however appear unchanged. The cracking is to be expected as a result of consolidation of the underlying tailings. During placement, the cracks were routinely monitored by Minto staff and spray painted to monitor propagation, no new cracks were observed.
- Extensometers were set up along the dump crest and are regularly monitored.

Recommendations:

- Access to the areas above and below the over steepened slope should be restricted, or the slopes should be regraded. Signs or barricades should be considered.

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Main Pit, South Wall Buttress, and In-pit Dumps
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **16**

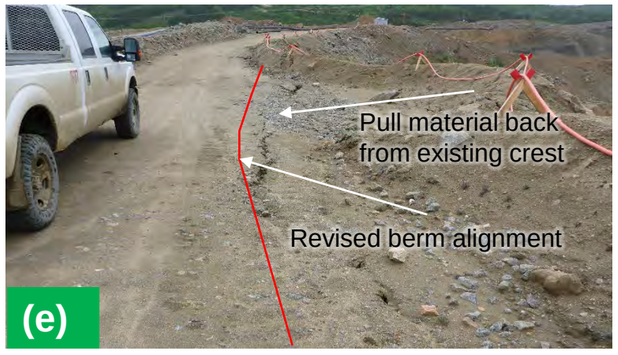
15 Area 2 Pit – Stage 2

Since the 2017 Inspection, mining of the Area 2 Stage 3 Pit has been completed.

- Photo A: View of the Area 2 Stage 2 Pit taken from the road between Stage 2 and Stage 3 looking north. The conditions of the highwall on the south, west, and north sides of the pit appear unchanged compared to the 2017 inspection photographs
- Photo B, C, D: Cracking was observed on the north east side of the Stage 2 Pit parallel to the access road.
    - An electric cable and transformer are located on the pit-side of the cracks are at risk should the overburden material slough into the pit.
    - The vehicle pull-out area is experiencing the greatest amount of cracking and deformation,
- Photo E provides an additional view of the cracking with an overlay of a potential remedial measures to move the infrastructure away from the edge and construct a new berm further away from the pit.

Source: 2017 Orthophoto, Inspection GPS tracks shown as orange lines

Photograph vantage point



Recommendations:

- **High Priority:** Move the transformer shed further from the crest and away from the observed cracks in the road.
- The safety berm should pulled back uphill of the cracking (Photo E). Alternatively, access to the pit rim road should be limited and the utility lines be moved further to the north.

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Area 2 Pit – Stage 2
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **17**

15 Area 2 Pit – Stage 3

Since the 2017 inspection, mining of the Area 2 Stage 3 Pit has been completed and the pit is no longer active.

- Photo A: View of the Area 2 Stage 3 Pit taken from the road between Stage 2 and Stage 3 looking southwest.
- Photo B: View of the Area 2 Stage 3 pit with the Stage 2 pit in the background, there was an active rockfall on the ‘bull-nose’ between the two pits at the time of inspection.

Source: 2017 Orthophoto, Inspection GPS tracks shown as orange lines

Photograph vantage point

Recommendations:

- Continue to monitor the area of instability in the bull-nose area of the pit.

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Area 2 Pit – Stage 3
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **18**

15 Area 118 Pit

The Area 118 Pit has been backfilled with coarse grained overburden from the Area 2 Stage 3 pit expansion that is unsuitable for reclamation covers (fines content < 10%).

A number of sinkholes and cracks have formed on the surface of the backflll due to differential settlement of the placed fill. While not a stability risk, soft ground, sinkholes and cracking may pose a trafficability risk. Access to this area should be limited.

Photo (a): View of the Area 118 Pit looking west.
Photo (b): View of some of the cracking and sinkholes near the north edge of the pit.

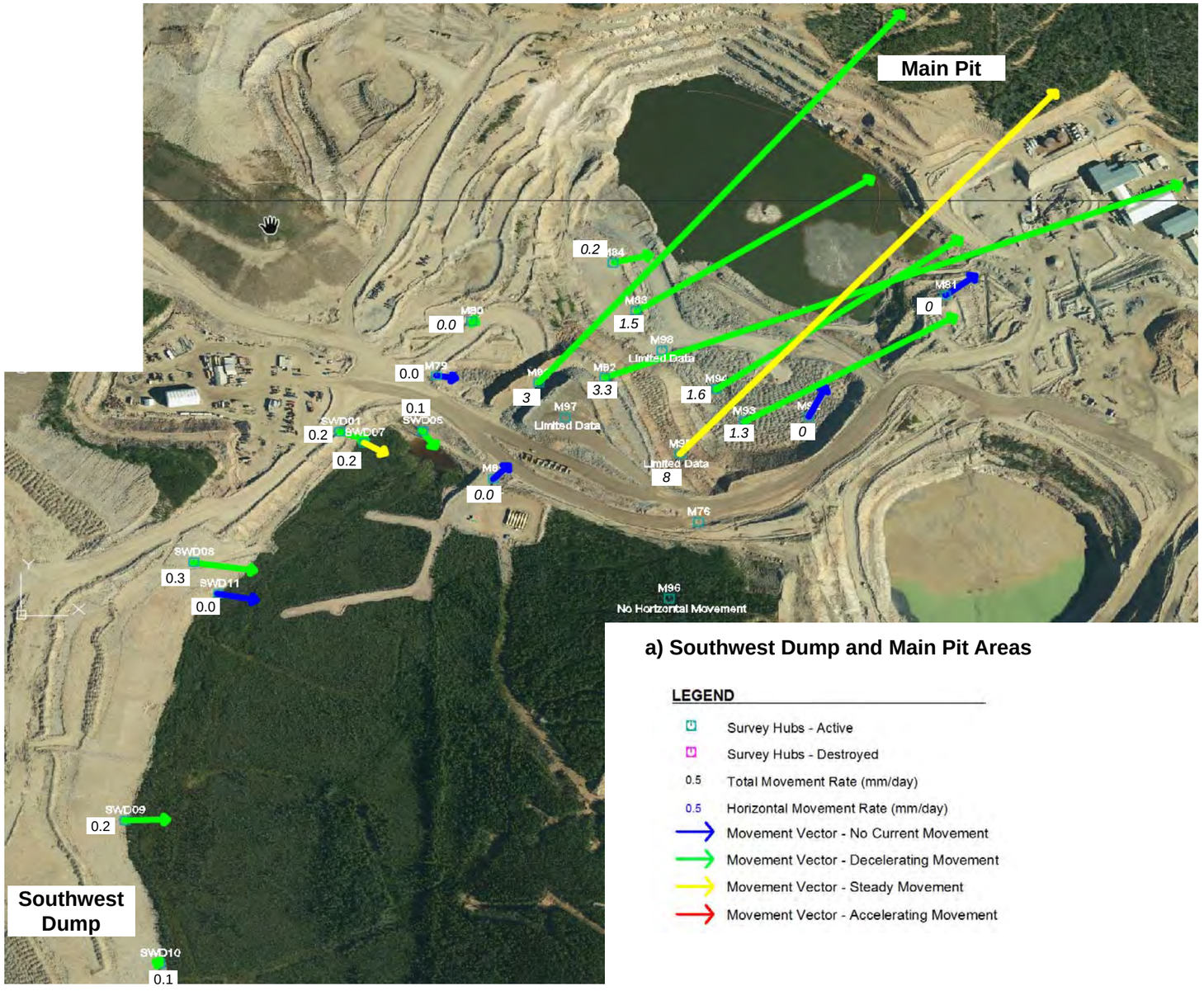
16 Minto North Pit

The Minto North Pit was visually observed from the rim at the north side of the pit. Mining at the pit was completed in October 1, 2016 with no additional mining operations planned at Minto North at this time.

The failure of the south pit wall (debris shown in Photo C occurred one day following completion of the pit and removal of all equipment and personnel, as was predicted based on pit wall monitoring. No additional pit slopes failures have occurred since.

srk consulting	Minto Explorations Ltd.	2018 Geotechnical Inspection
		Area 118 and Minto North Pits
Job No: 1CM002.063 Filename: AppA_2018InspectionPhoto.pptx	Minto Mine	Date: August 2018 / Approved: PHM / Figure: **19**

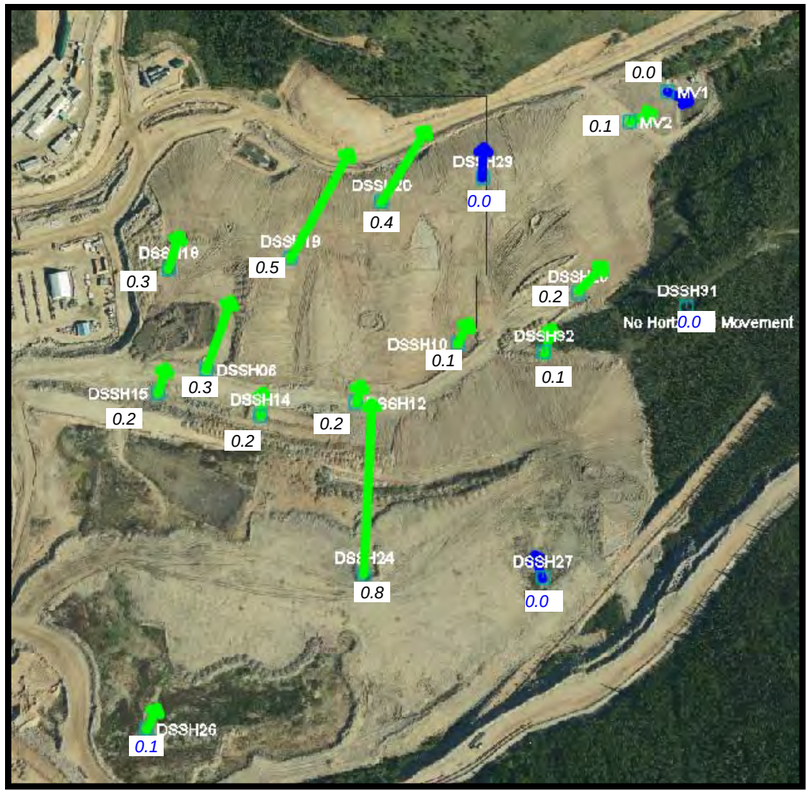
Appendix B: Survey Hub Summary



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



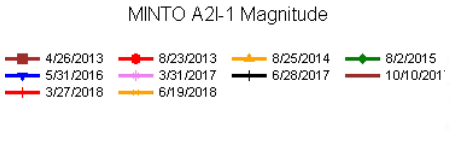
b) Dry Stack Tailings Storage Facility

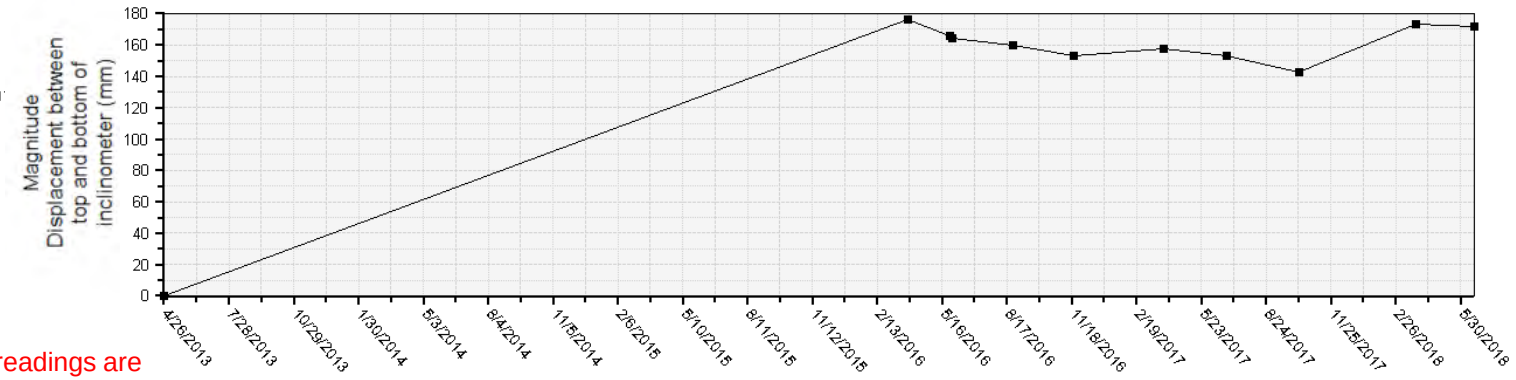
Notes:

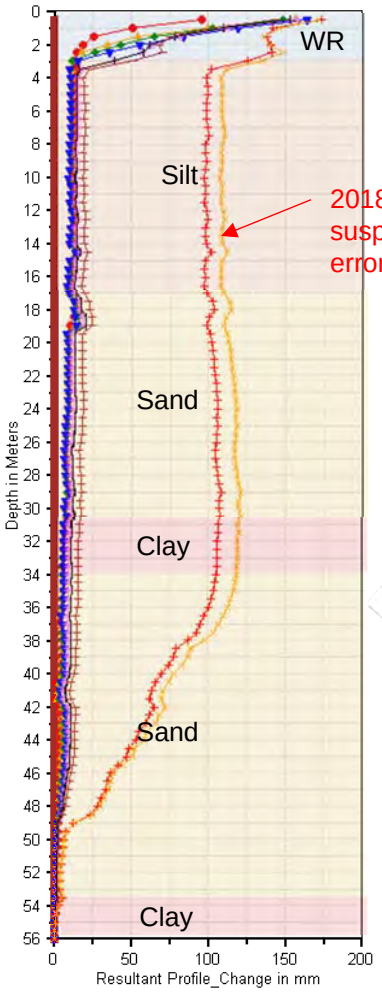
1. Movement vectors have been scaled by a factor of 250 (i.e. length equals 250 times the current velocity in mm/day) except for the blue vectors where no current movement is observed. The length of the blue vectors is arbitrary, but is included to show the direction of past movement.
2. The orthophoto was taken in 2017.

srk consulting	Minto Explorations Ltd.	2018 Survey Hub Data
		Survey Hub Summary
Job No: 1CM002.059 Filename: MintoSurveySummary11x17.pptx	Minto Mine	Date: August 2018 | Prepared by: PHM | Figure: 1

Appendix C: Area 2 Pit Instrumentation Data

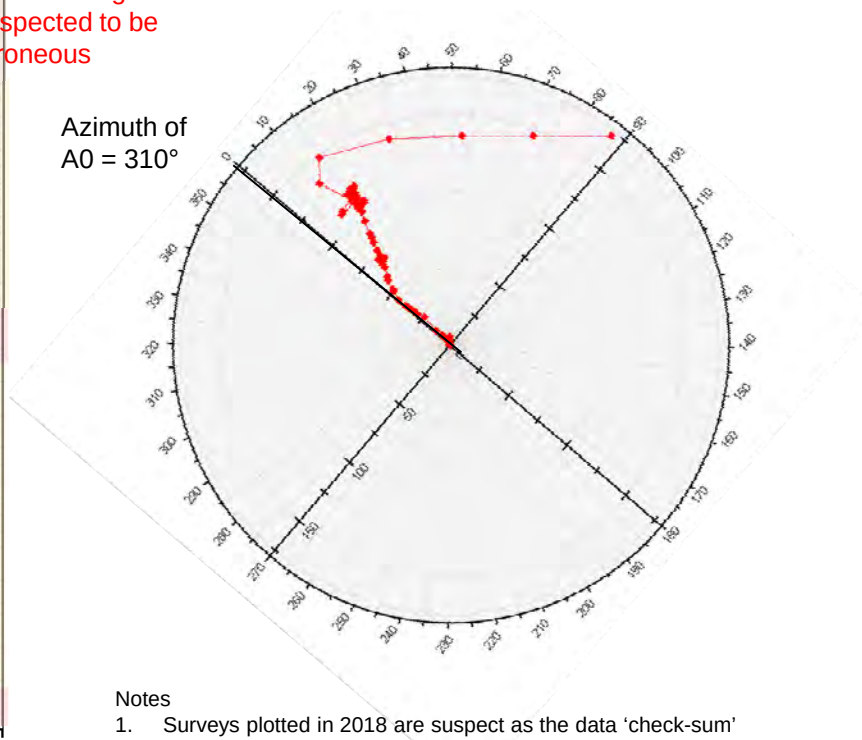






2018 readings are suspected to be erroneous

Azimuth of A0 = 310°



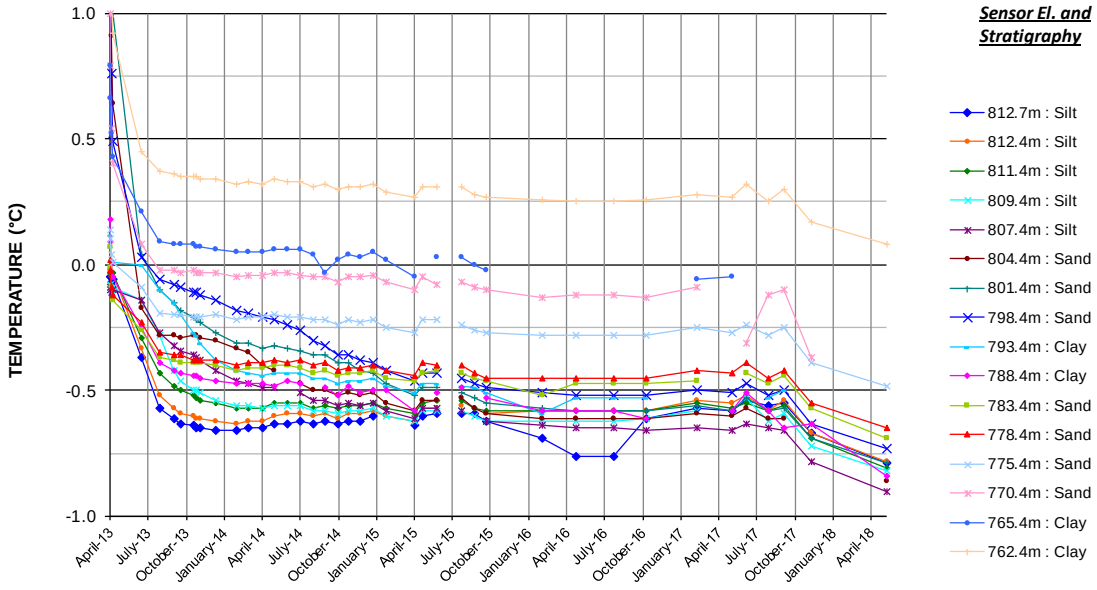
Notes

1. Surveys plotted in 2018 are suspect as the data 'check-sum' values are high.
2. 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 Explorations Ltd.	Area 2 Pit Instrumentation Data
		Inclinometer A2I-1
Job No: 1CM002.063 Filename: ApC_2017Area2Pit.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **1**

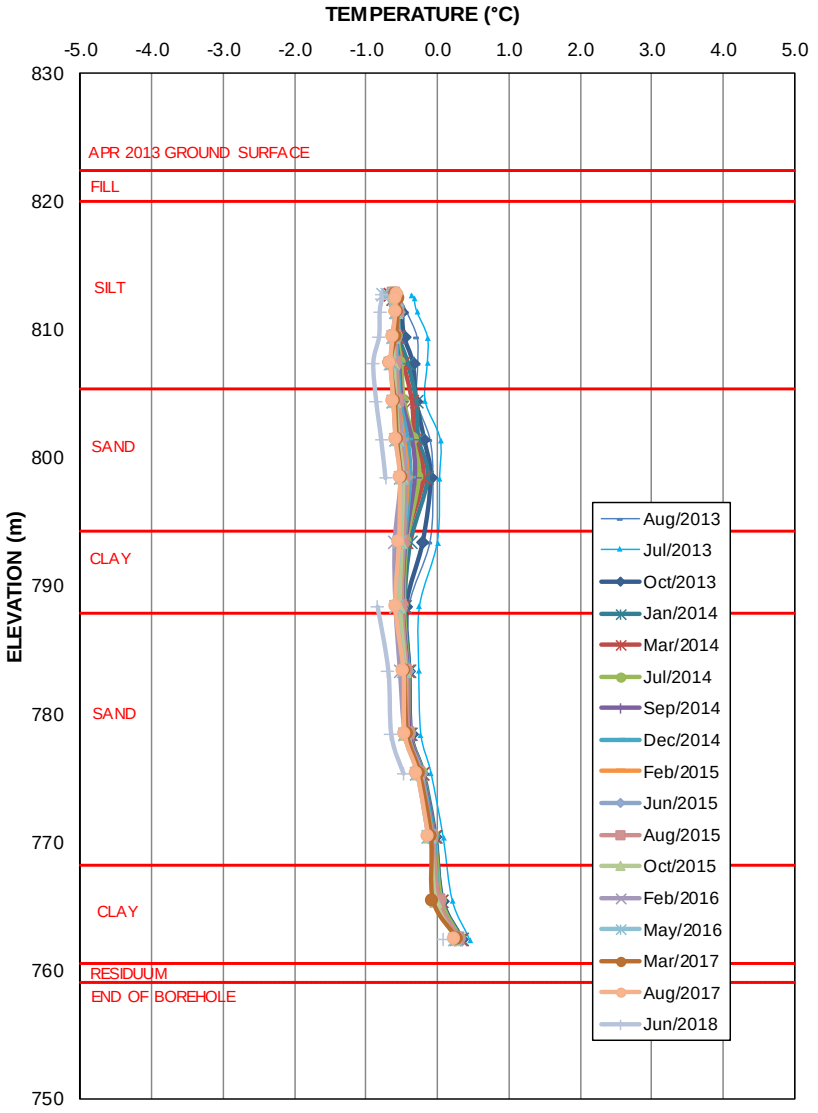


Sensor El. and Stratigraphy

- 812.7m : Silt
- 812.4m : Silt
- 811.4m : Silt
- 809.4m : Silt
- 807.4m : Silt
- 804.4m : Sand
- 801.4m : Sand
- 798.4m : Sand
- 793.4m : Clay
- 788.4m : Clay
- 783.4m : Sand
- 778.4m : Sand
- 775.4m : Sand
- 770.4m : Clay
- 765.4m : Clay
- 762.4m : Clay

Notes:

1. Cooling trend observed in beginning in the fall of 2017 may be due to mining of the Area 2 Stage 3 Pit.



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Area 2 Pit Instrumentation Data

Ground Temperature Cable – A2T-1

Job No: 1CM002.063

Filename: ApC_2018Area2Pit.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	2

Appendix D: Dry Stack Tailings Storage Facility Instrumentation Data

Active Survey Hubs					
Survey Hub	Last Reading	Movement Rate (mm/day)		Bearing (Cumulative)	Comments
		June 17	June 18		
DSSH06	6/3/2018	0.4	0.3	11	Decelerating. Hub was removed in January 2016 when construction of the MVFES2 began, and was re-installed in August 2016. The movement rate prior to MVFES2 construction was 1.0 mm/day.
DSSH10	6/3/2018	0.2	0.1	47	Decelerating. Hub was removed in January 2016 during construction of the MVFES2 and was re-installed in August 2016. The hub was repositioned in June 2017. The movement rate prior to MVFES2 construction was 0.9mm/day.
DSSH12	6/3/2018	0.2	0.2	17	Decelerating. Hub was removed in December 2015 when construction of the MVFES2 began, and was re-installed in August 2016. The movement rate prior to MVFES2 construction was 1.1mm/day.
DSSH14	6/3/2018	0.2	0.2	14	Decelerating
DSSH15	6/3/2018	0.2	0.2	24	Decelerating. Hub was removed in February 2016 when construction of the MVFES2 began, and was re-installed in August 2016. Appears to be some disturbance of the hub during the spring thaw of 2018. The movement rate prior to MVFES2 construction was 0.6 mm/day.
DSSH18	6/3/2018	0.5	0.3	29	Decelerating. Hub was removed in December 2015 when construction of the MVFES2 began, and was re-installed in August 2016. The movement rate prior to MVFES2 construction was 0.5 mm/day.
DSSH19	6/3/2018	0.7	0.5	29	Decelerating. Hub was removed in December 2015 when construction of the MVFES2 began, and was re-installed in August 2016.
DSSH20	6/3/2018	0.4	0.4	30	Decelerating. Movement since re-installation is primarily due to settlement.
DSSH24	6/3/2018	0.8	0.8	2	Steady movement based on a comparison of the summer movement rates. Vertical displacement indicates movement is related to freeze-thaw of the cover.
DSSH26	6/3/2018	0.1	0.1	38	Decelerating, horizontal movement rates listed.
DSSH27	6/3/2018	n/a	0.1	336	Decelerating.
DSSH29	5/27/2018	0.0	0.0	91	No significant horizontal movement trend
DSSH31	6/3/2018	0.0	0.0	356	No significant horizontal movement trend
DSSH32	6/3/2018	n/a	0.1	168	No significant horizontal movement trend
MV1	6/4/2018	0.1	0.0	109	No significant horizontal movement trend
MV2	6/4/2018	0.2	0.1	61	Decelerating
Destroyed in past year (prior to construction of MVFES2					
Survey Hub	Last Reading	Movement Rate (mm/day)		Bearing (Cumulative)	Comments
		June 17	At last reading		
DSSH17	6/25/2017	0.3	0.3	16	Horizontal movement was decelerating.

Notes:
1. Blue text indicates horizontal movement rates.

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

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DSTSF Instrumentation Data

DSTSF Survey Hub Summary

Job No: 1CM002.063

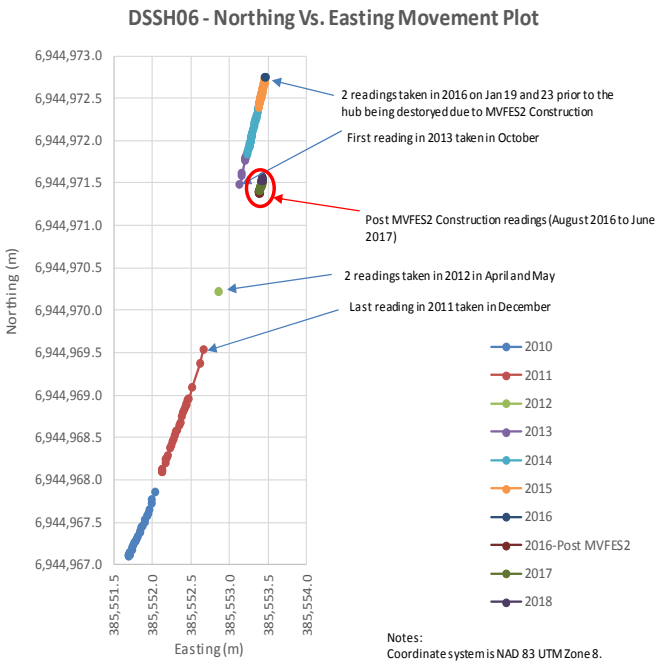
Filename: ApD_DSTSFPort.pptx

Minto Mine

Date: August 2018

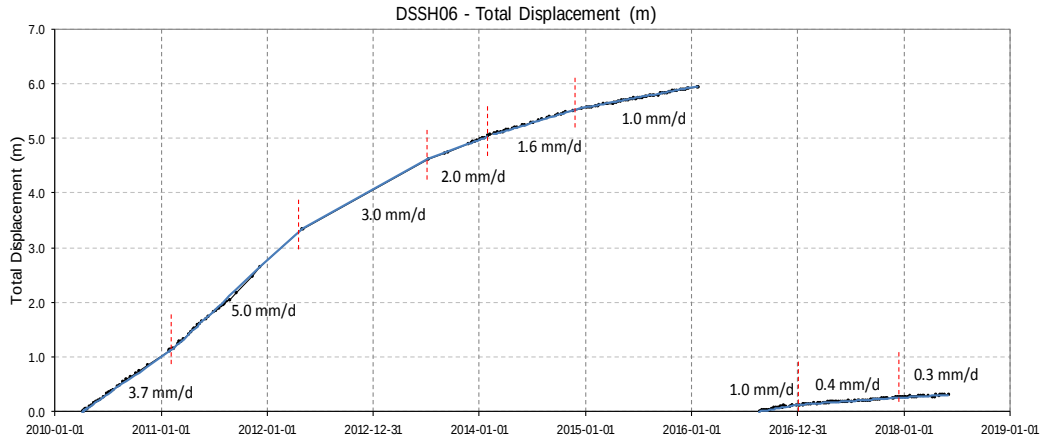
Prepared by: PHM

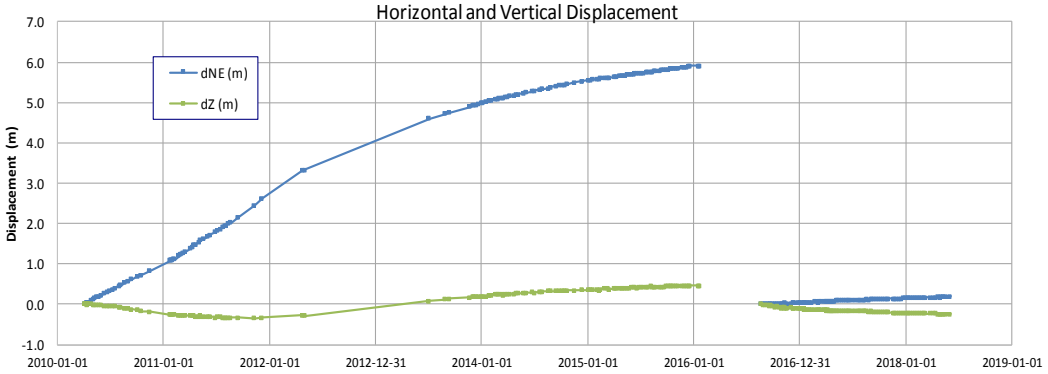
Figure: 1

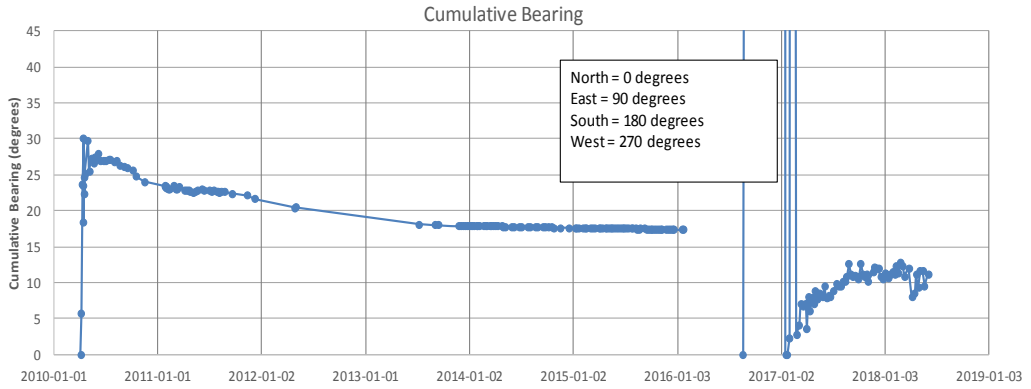


Note:

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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srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
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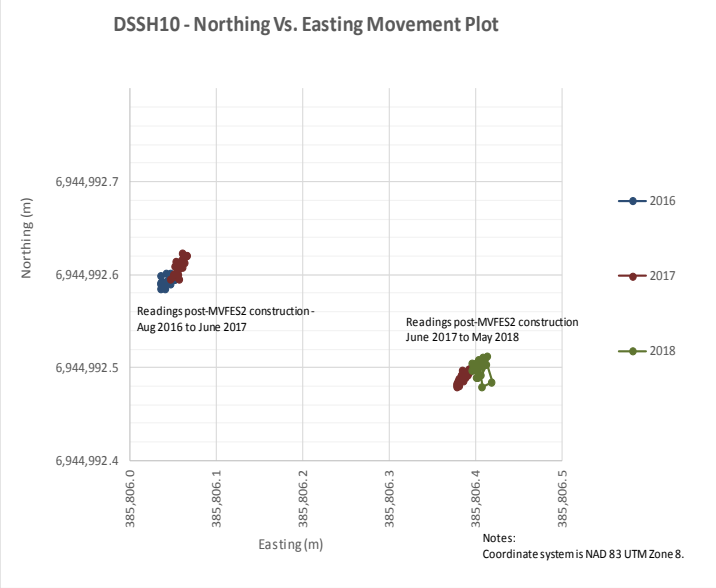
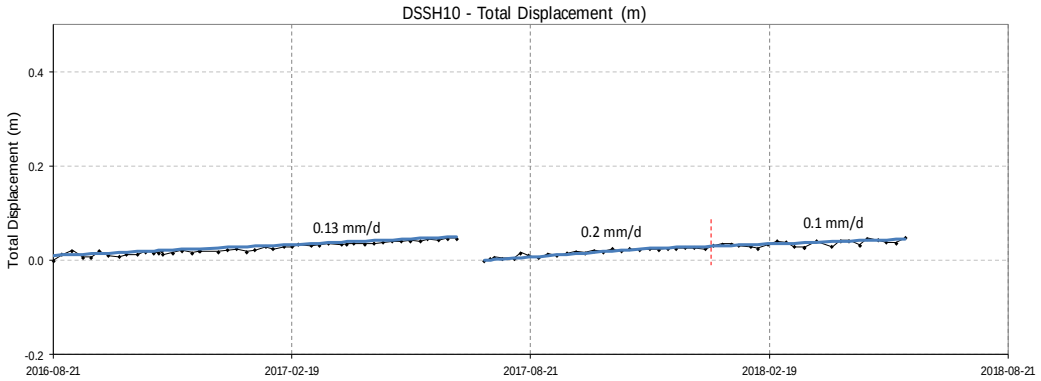
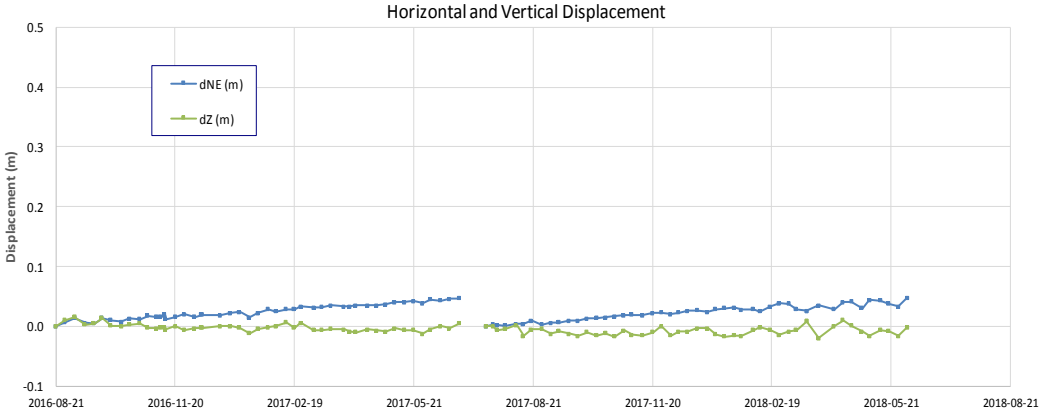
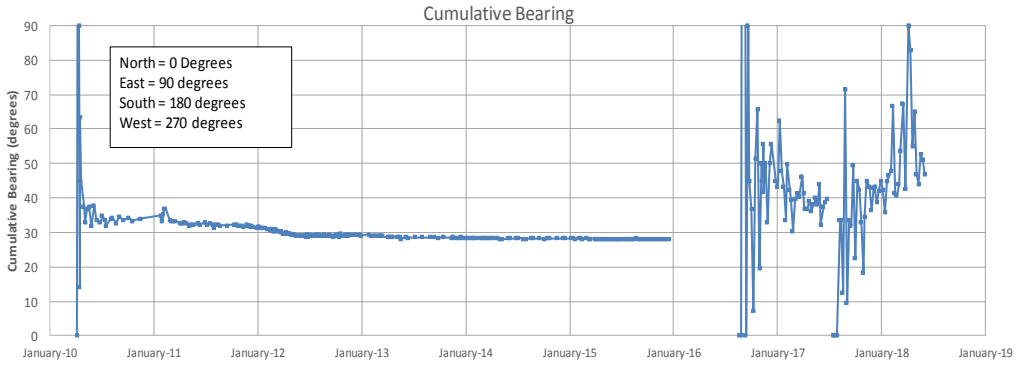


Note:

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 Explorations Ltd.	DSTSF Instrumentation Data
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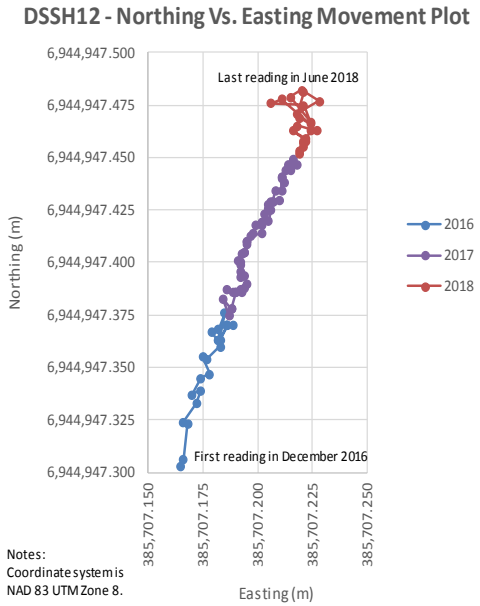
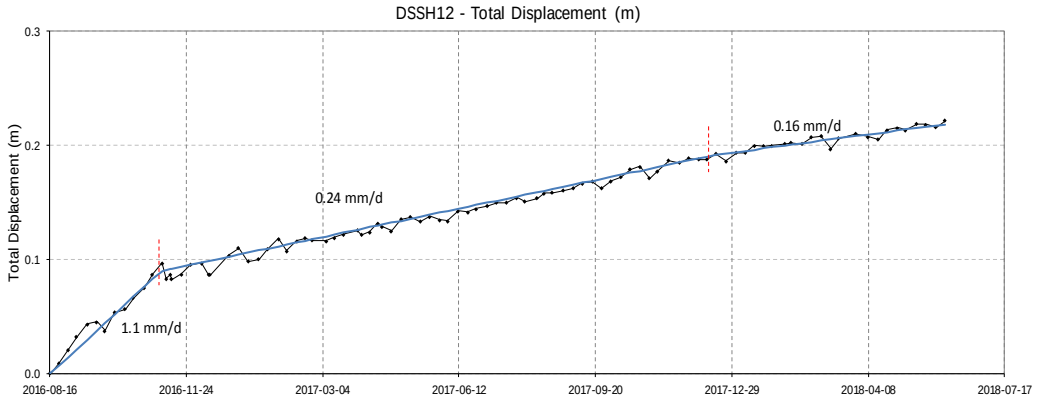
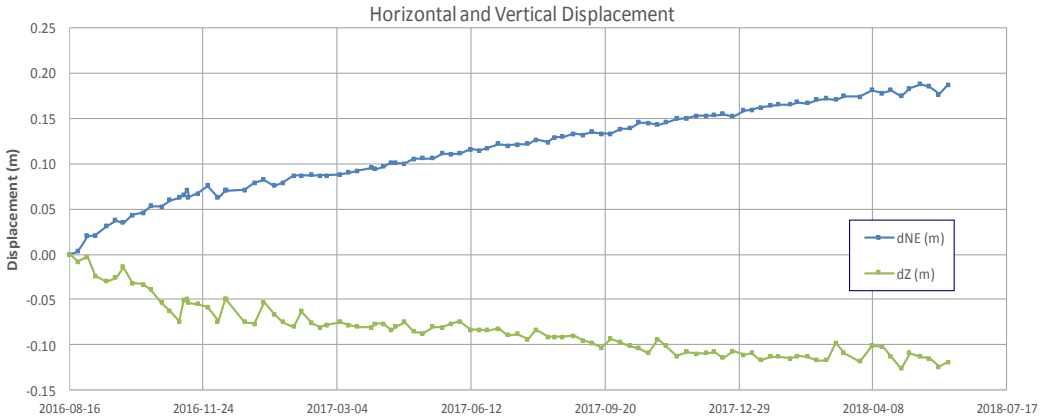
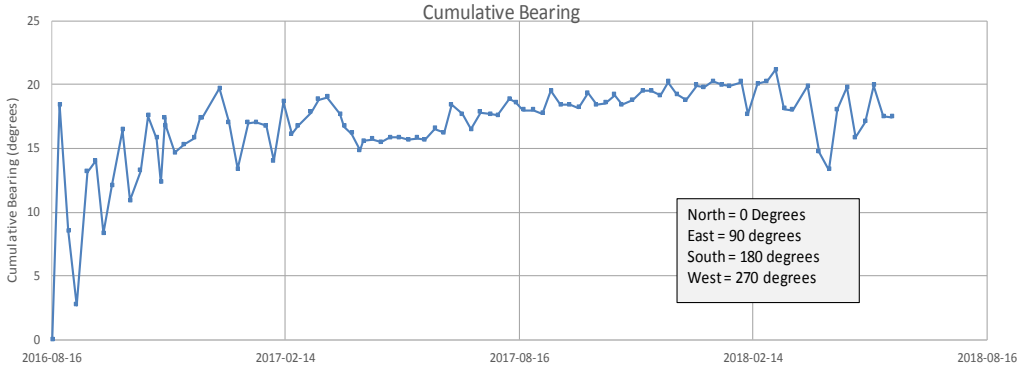


Note:

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 Explorations Ltd.	DSTSF Instrumentation Data
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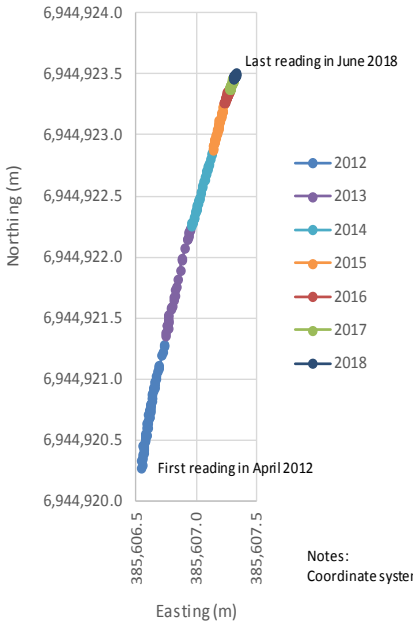
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **4**

DSSH14 - Northing Vs. Easting Movement Plot



Notes:
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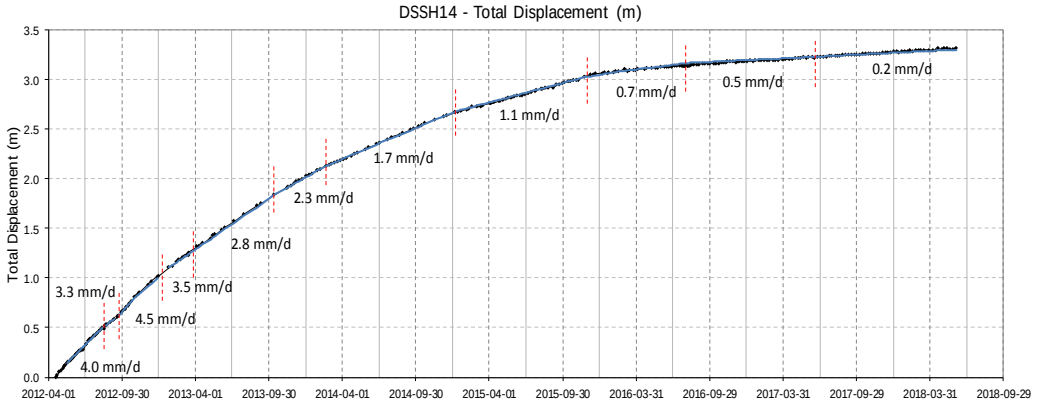

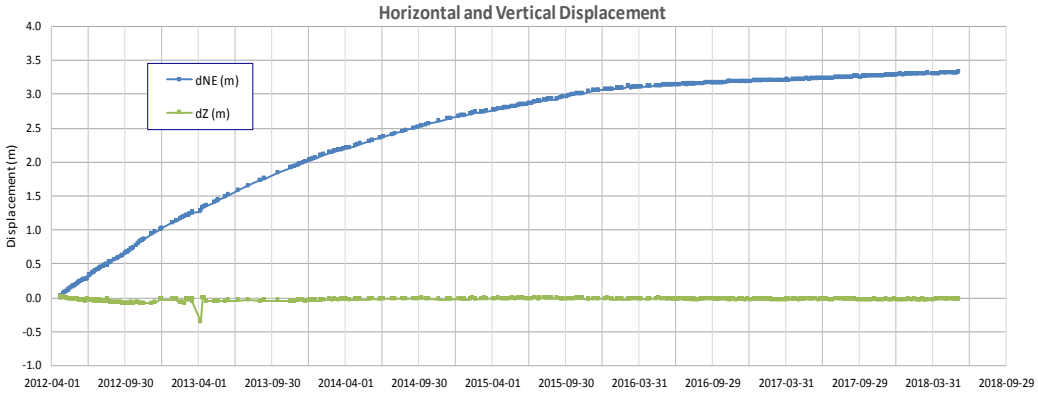

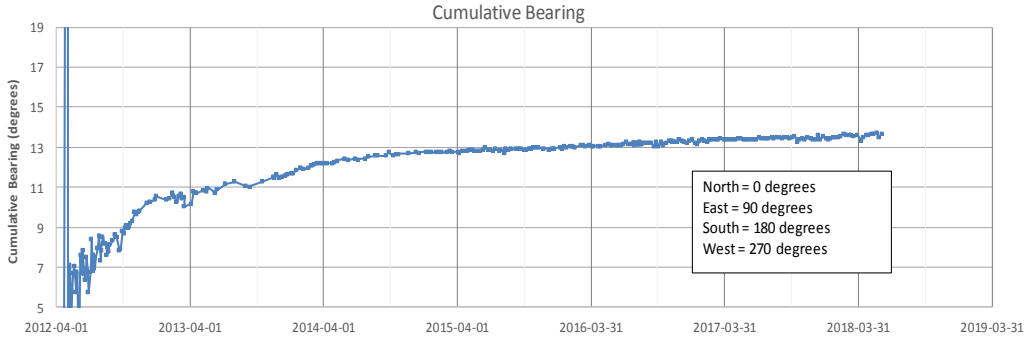

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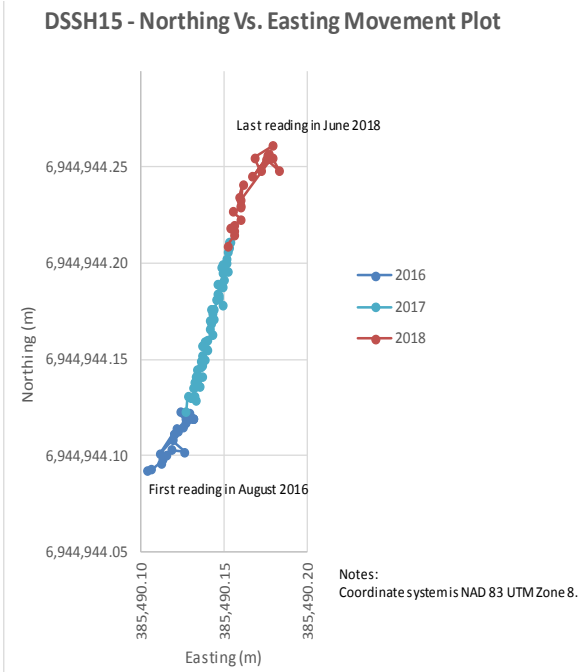
DSTSF Instrumentation Data

Survey Hub – DSSH14

Job No: 1CM002.063
Filename: ApD_2018DSTSFLandscape.pptx

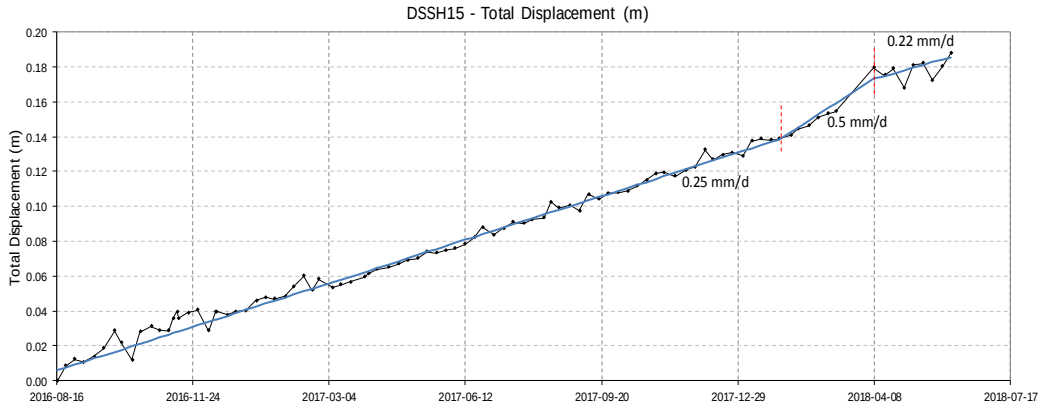
Minto Mine

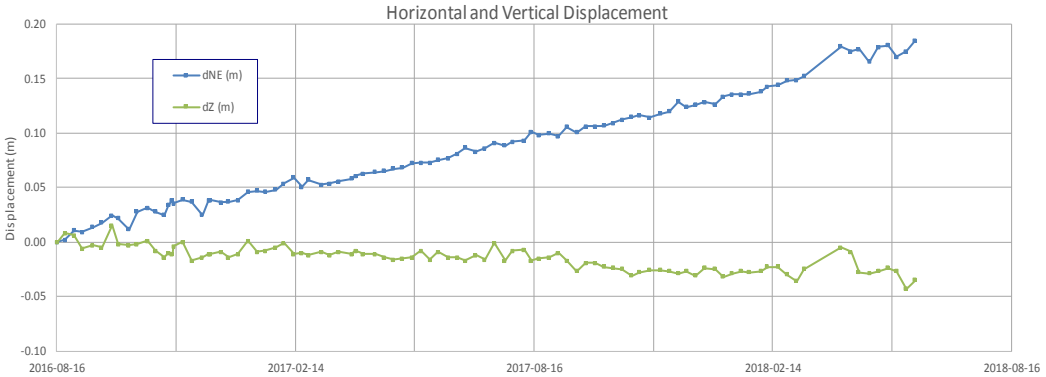
Date:	Prepared by	Figure:
August 2018	PHM	5

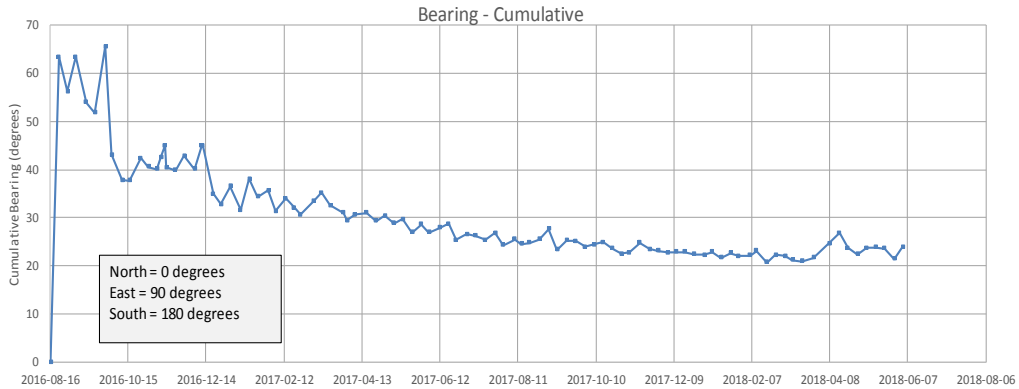


Note:

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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srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
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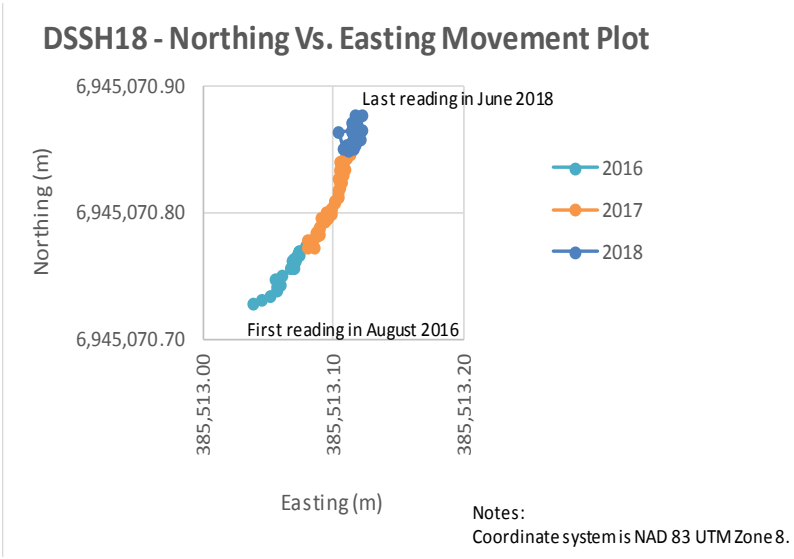
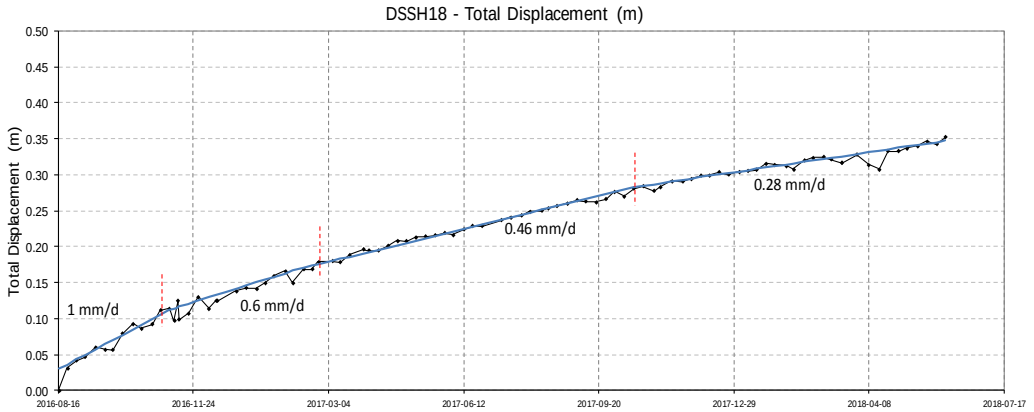
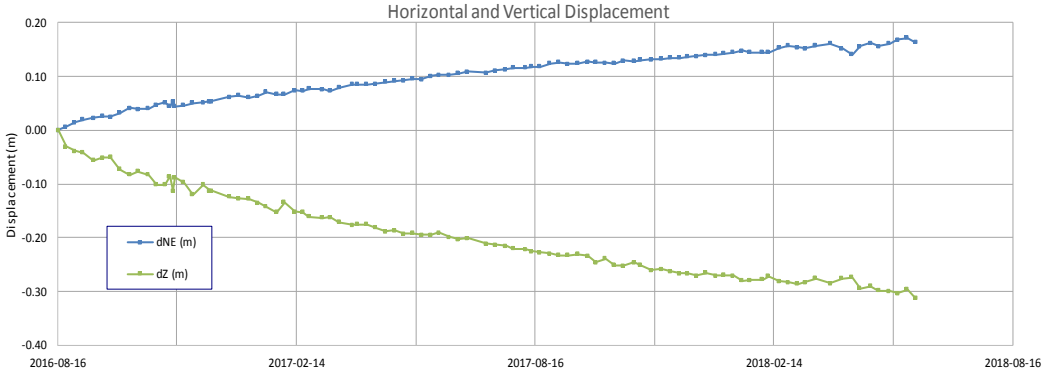


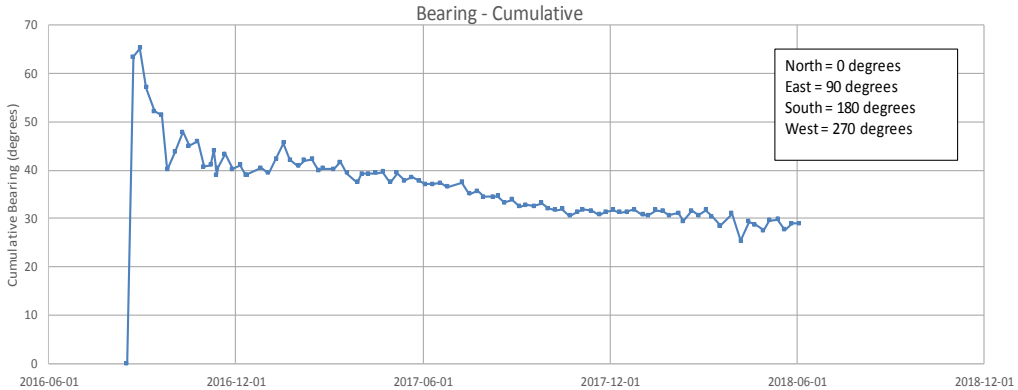
Notes:
Coordinate system is NAD 83 UTM Zone 8.

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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srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
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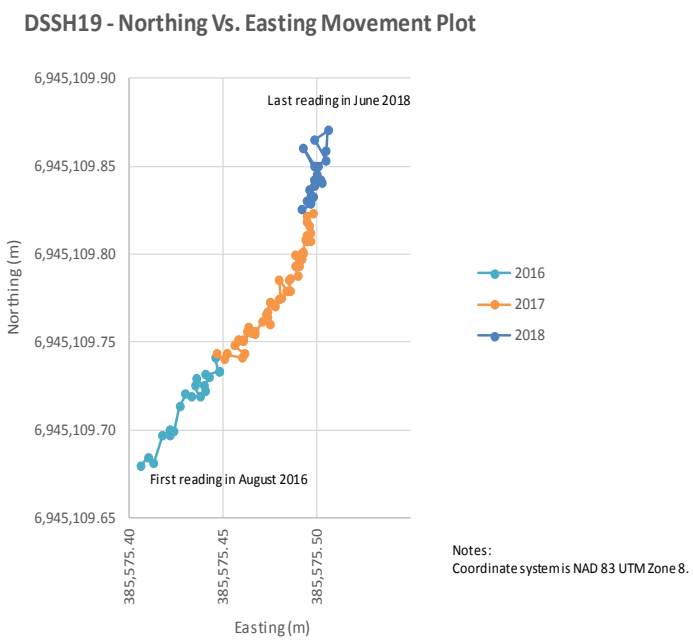
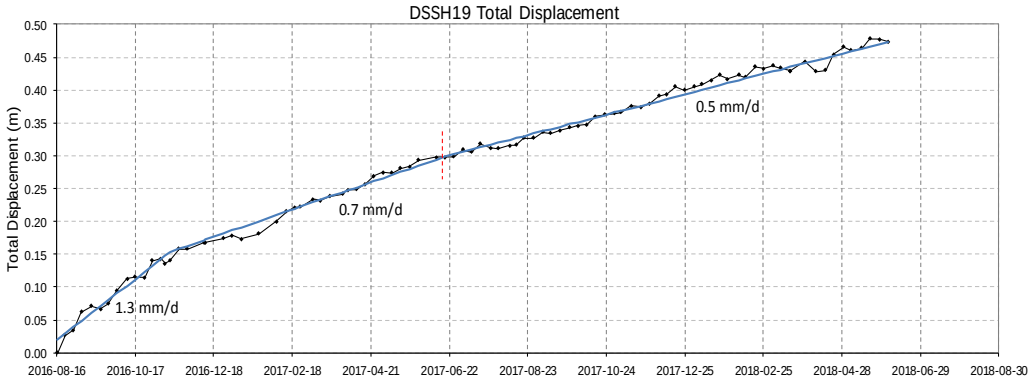
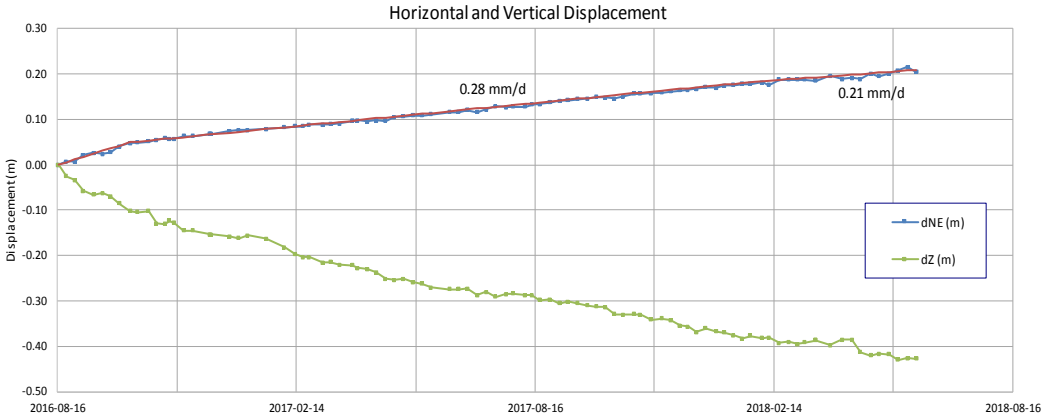


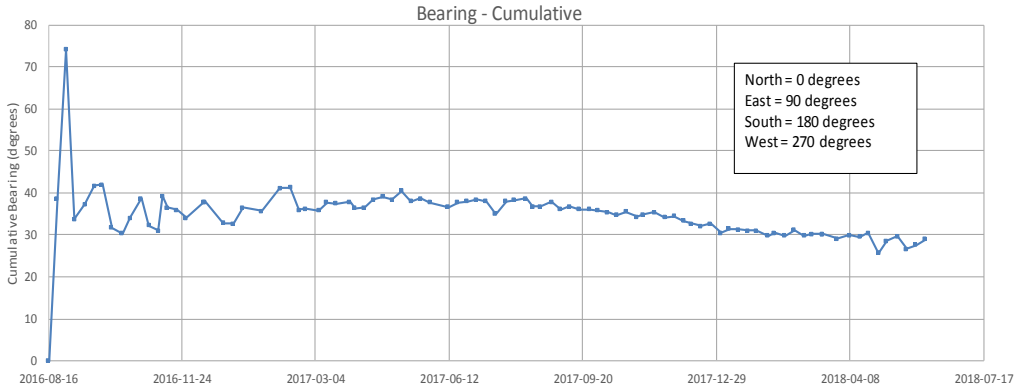
Notes:
Coordinate system is NAD 83 UTM Zone 8.

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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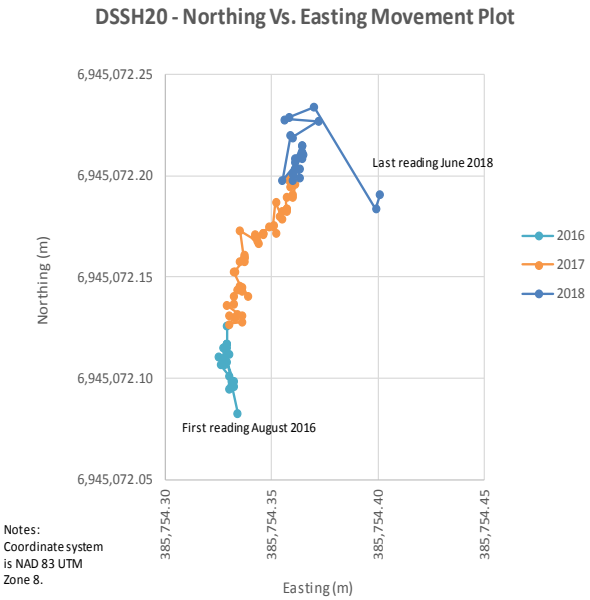
DSTSF Instrumentation Data

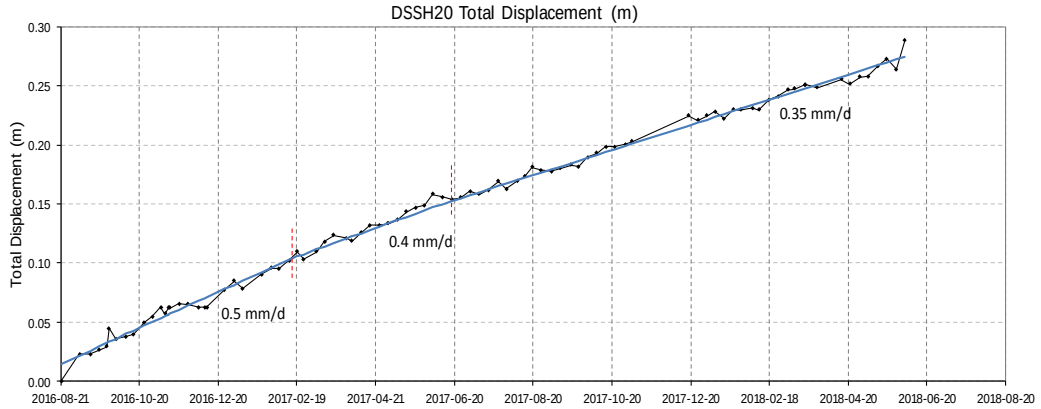
Survey Hub – DSSH19

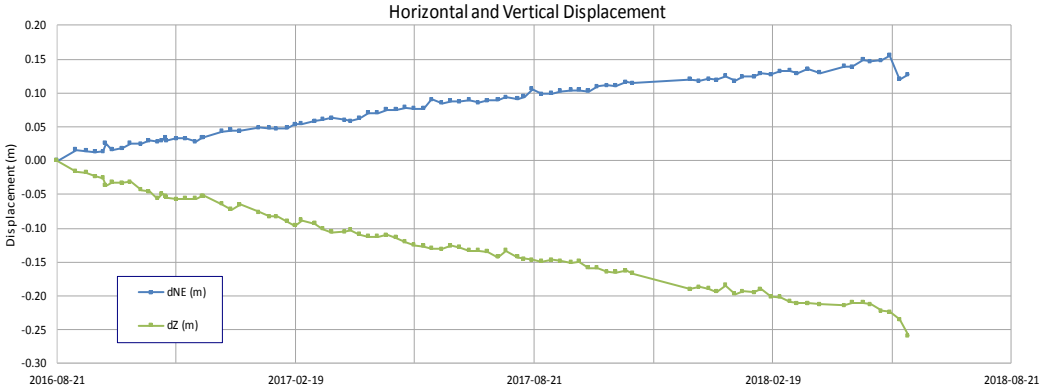
Job No: 1CM002.063
Filename: ApD_2018DSTSFLandscape.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	8

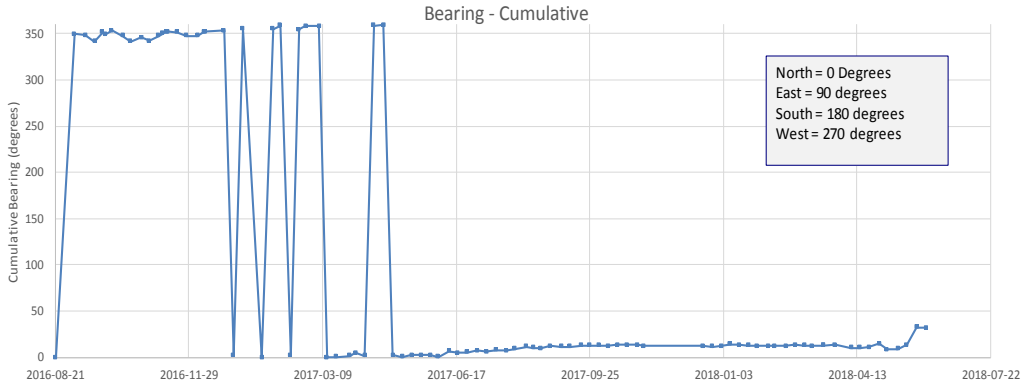






Note:

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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srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
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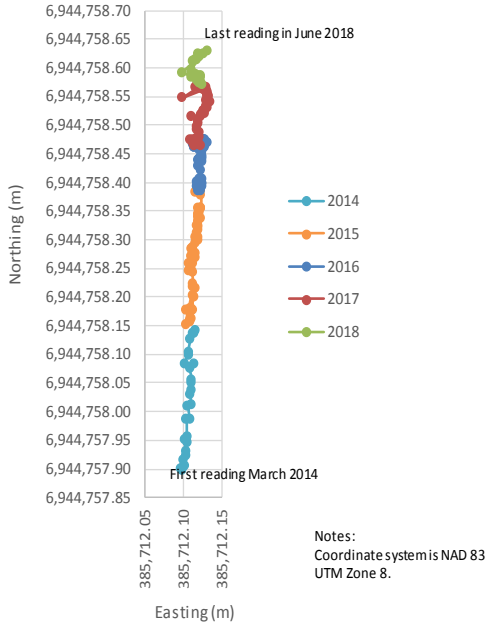
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **9**

DSSH24 - Northing Vs. Easting Movement Plot



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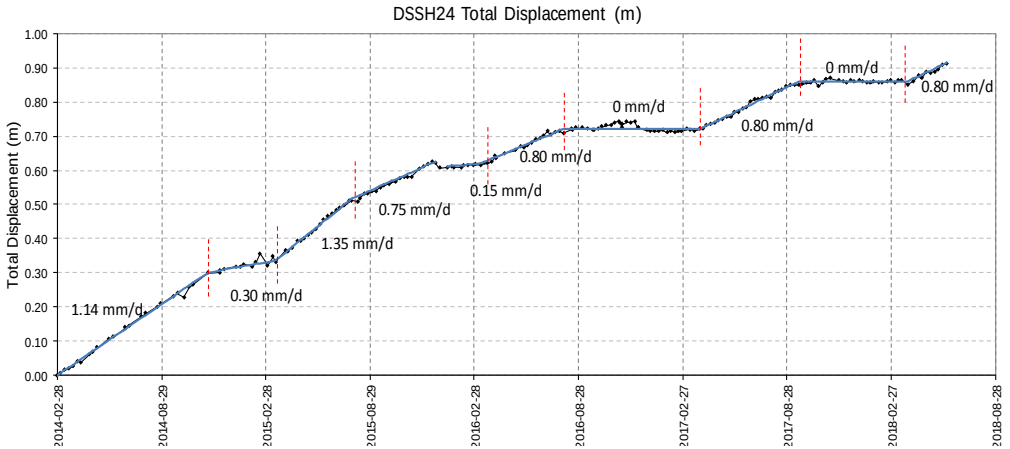

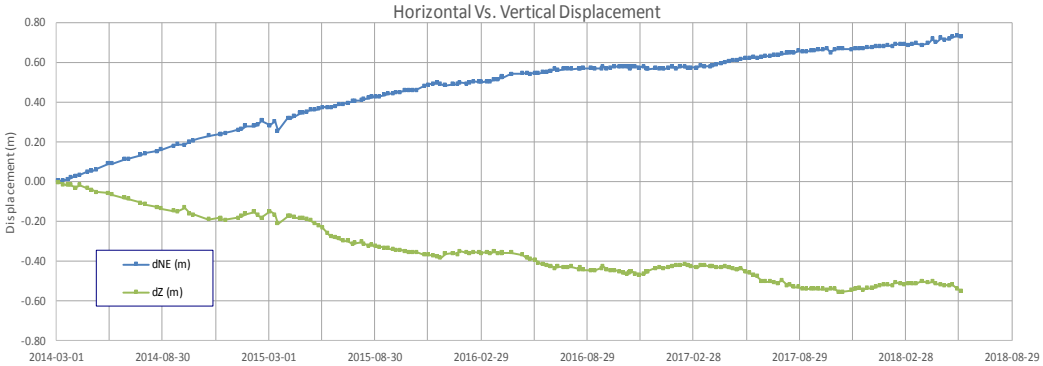

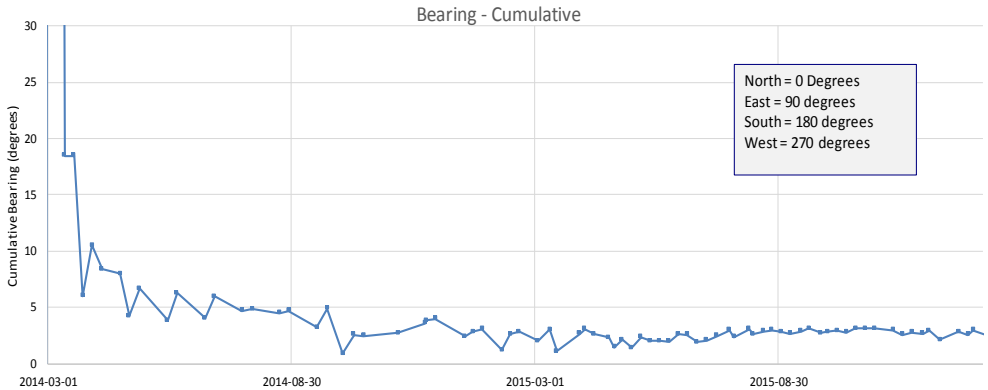

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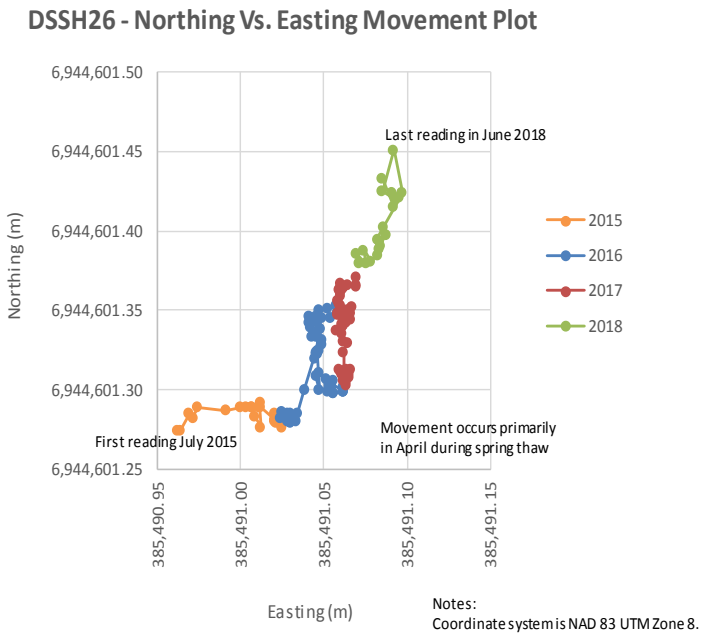
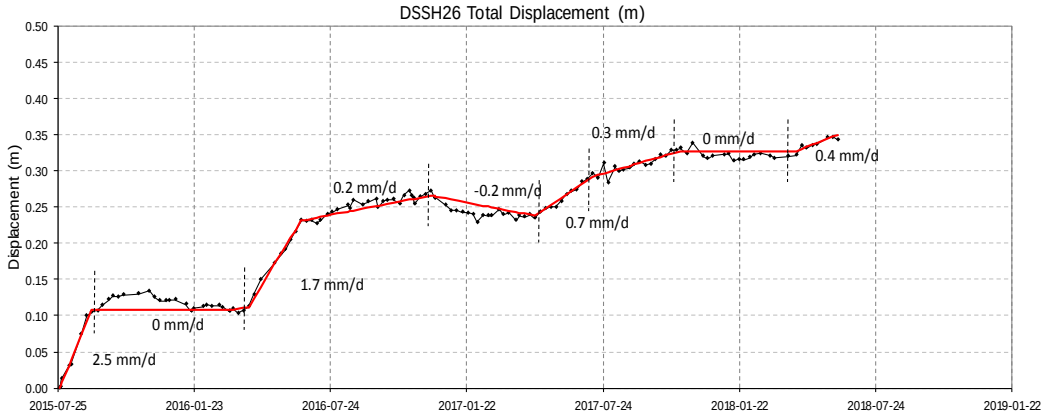
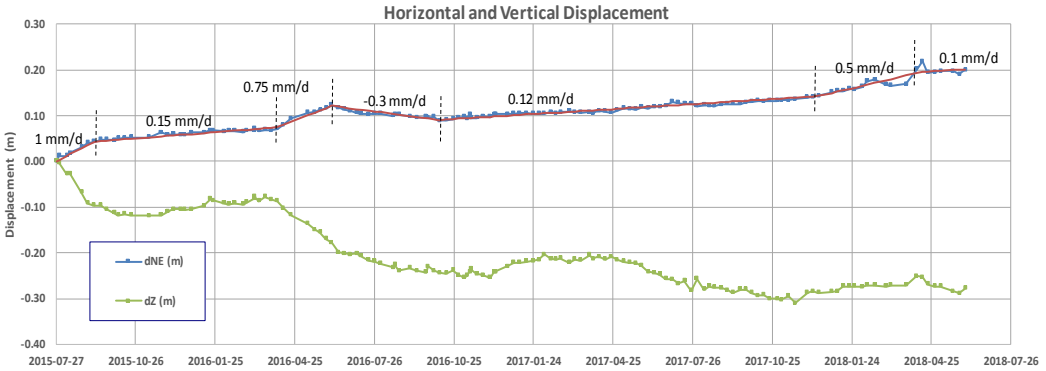
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Survey Hub – DSSH24
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **10**



Notes:
Coordinate system is NAD 83 UTM Zone 8.





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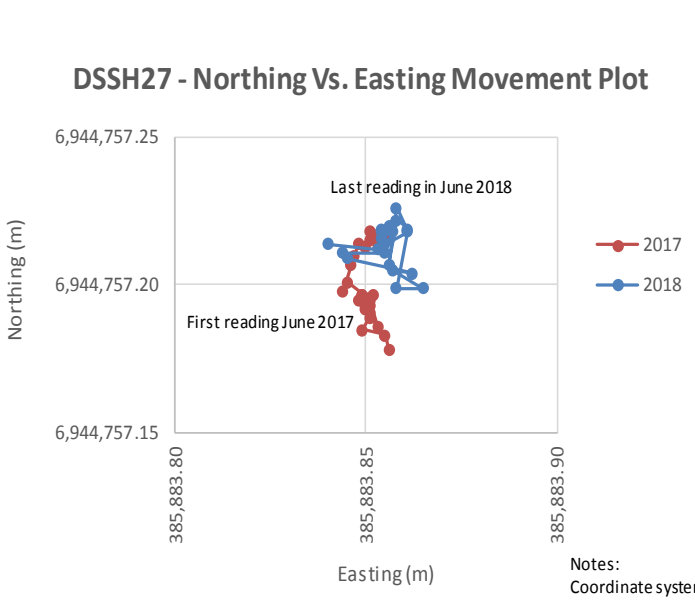
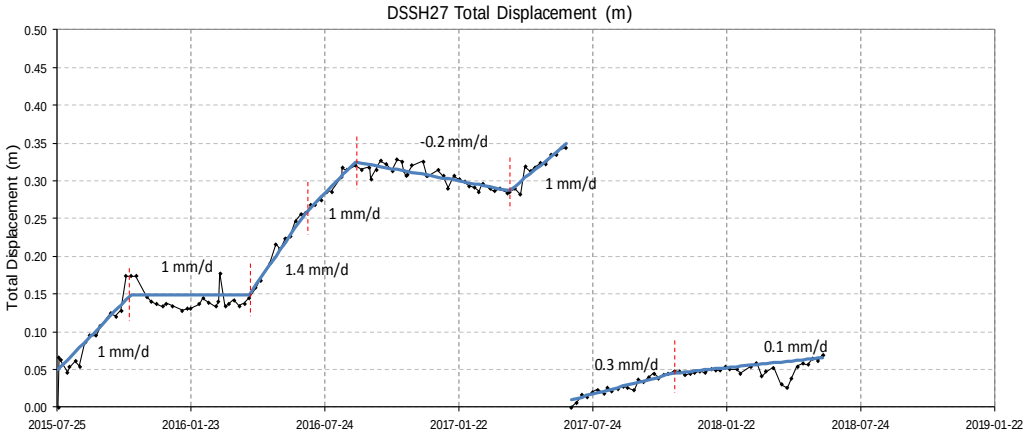
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Survey Hub – DSSH26
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **11**

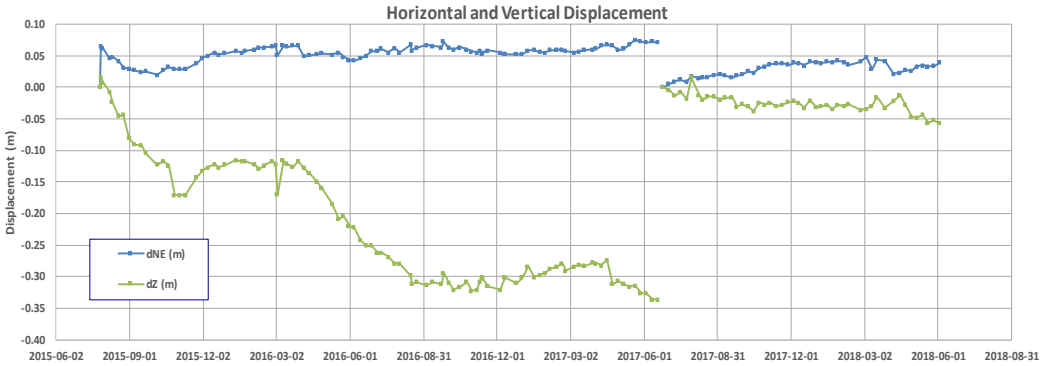


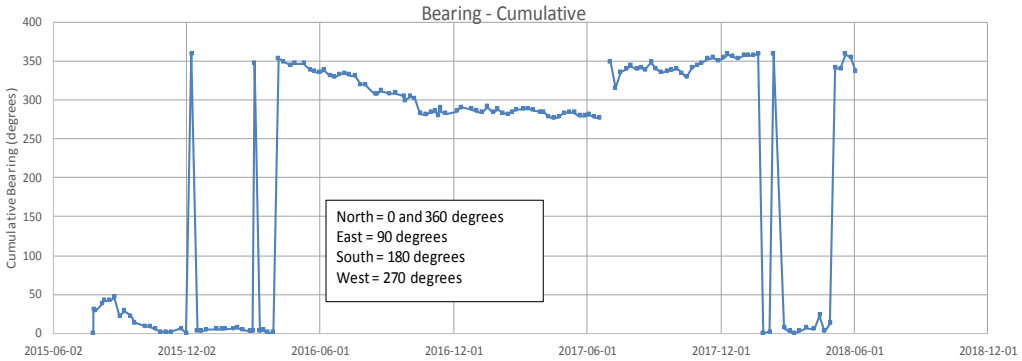
Notes:
Coordinate system is NAD 83 UTM Zone 8.

Note:

1. The survey hub was repositioned in June 2017.







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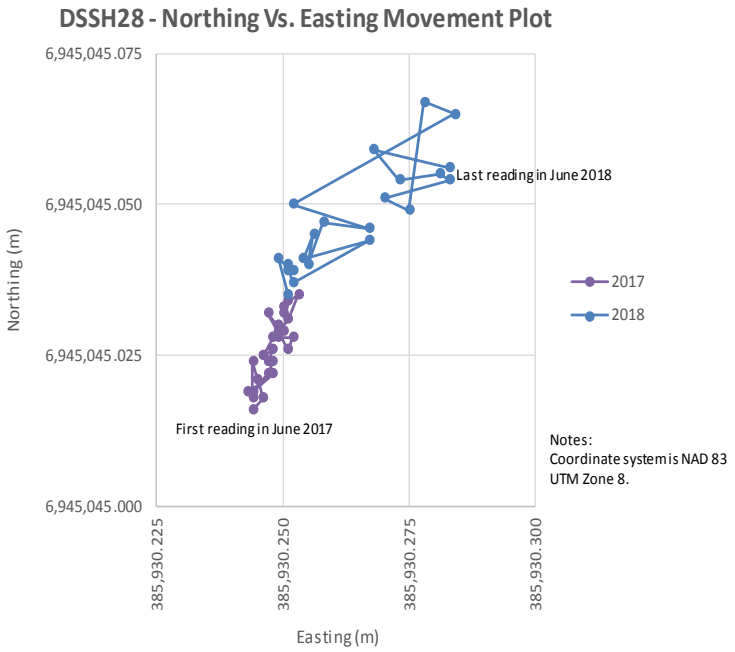
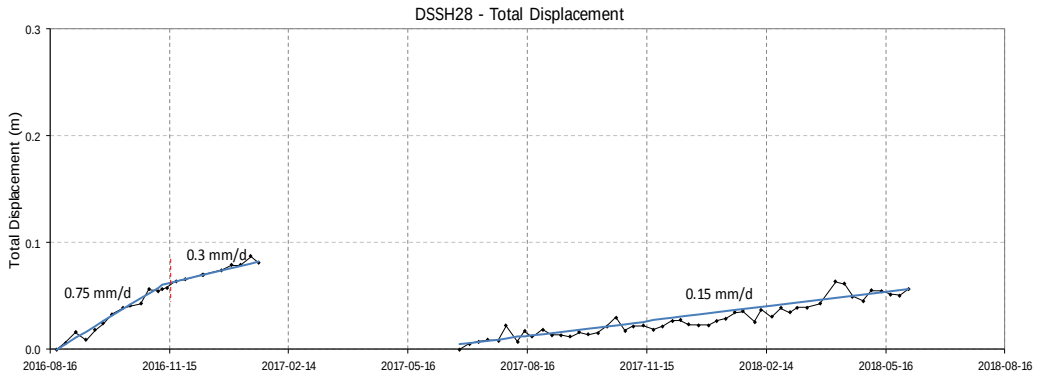
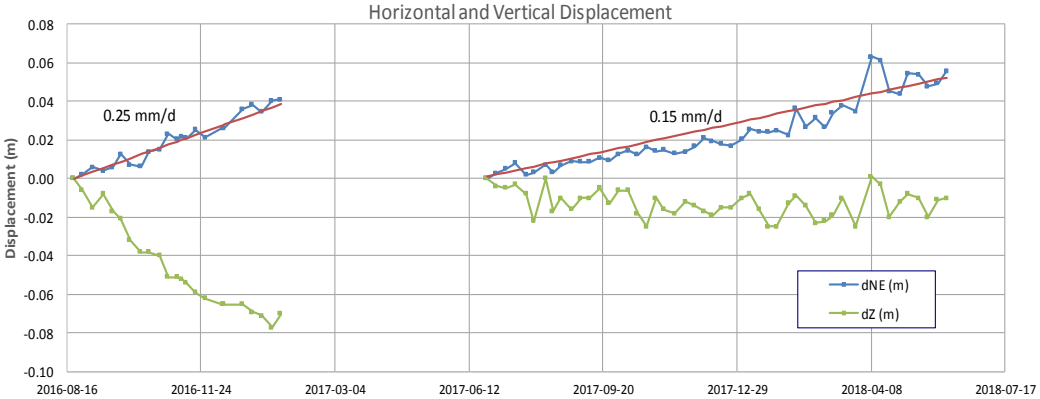
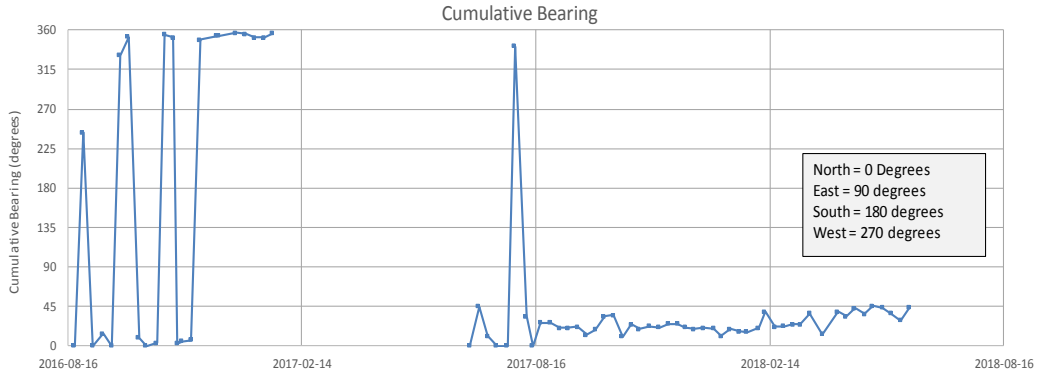
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Survey Hub – DSSH27
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by PHM / Figure: **12**









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srk consulting

Minto Explorations Ltd.

DSTSF Instrumentation Data

Survey Hub – DSSH28

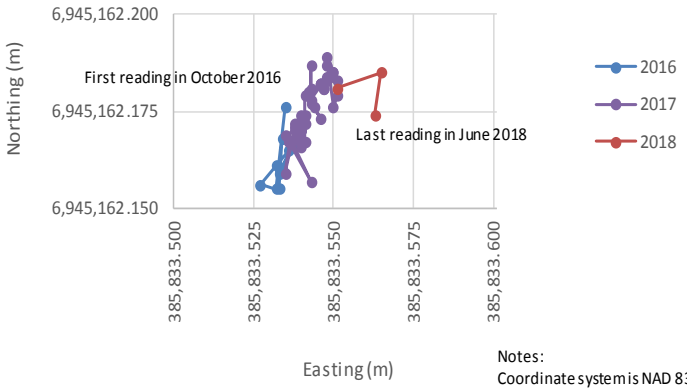
Job No: 1CM002.063

Filename: ApD_2018DSTSFLandscape.pptx

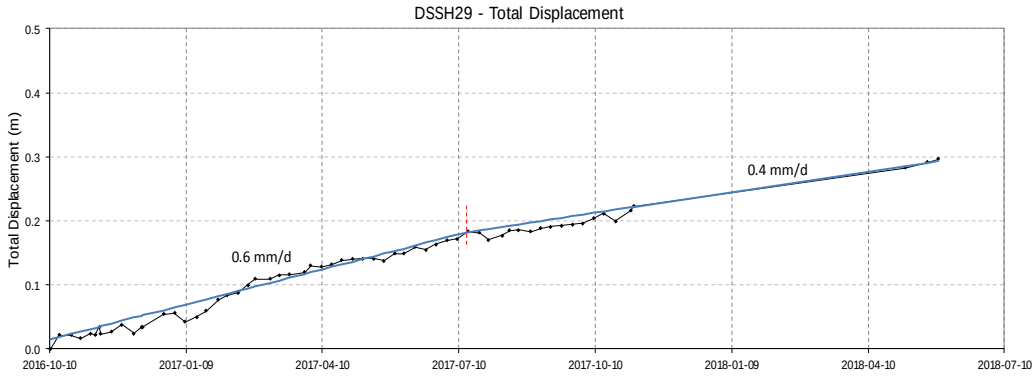
Minto Mine

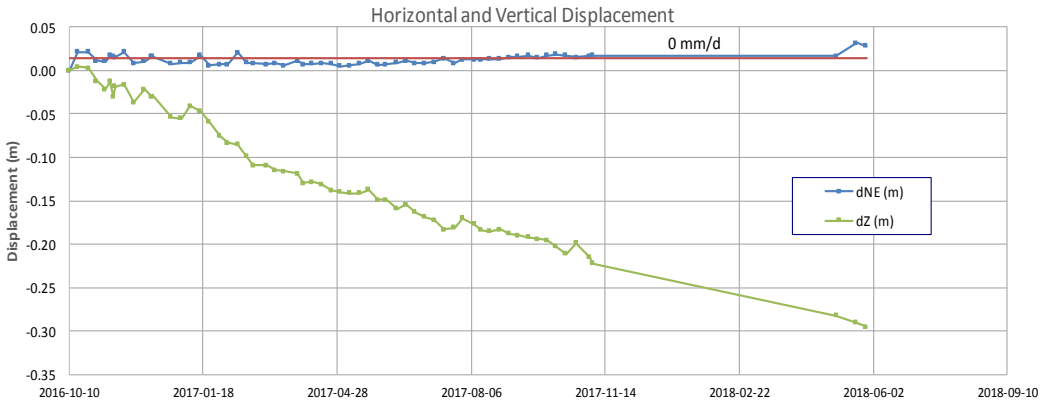
Date:	Prepared by	Figure:
August 2018	PHM	13

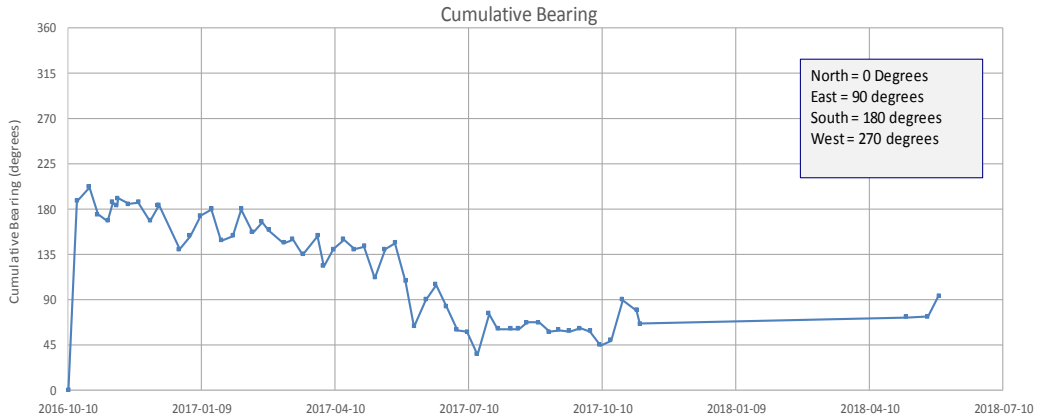
DSSH29 - Northing Vs. Easting Movement Plot



Notes:
Coordinate system is NAD 83 UTM Zone 8.







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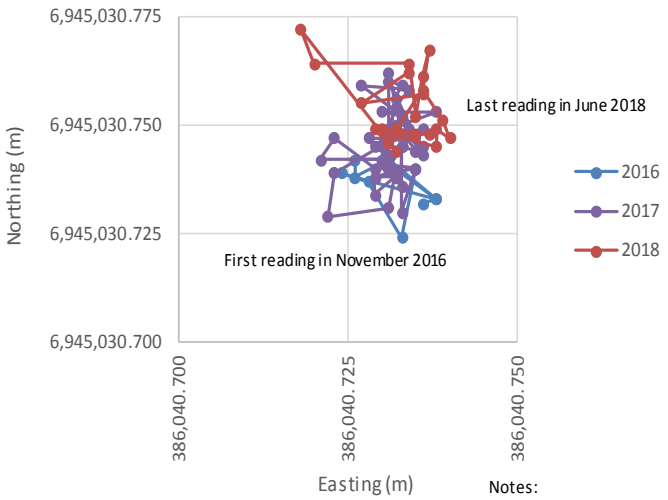
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Survey Hub – DSSH29
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by PHM / Figure: **14**

DSSH31 - Northing Vs. Easting Movement Plot



Notes:
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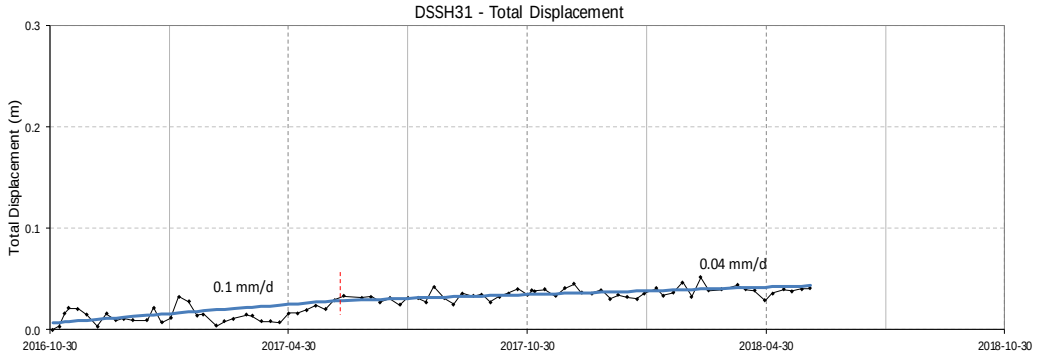

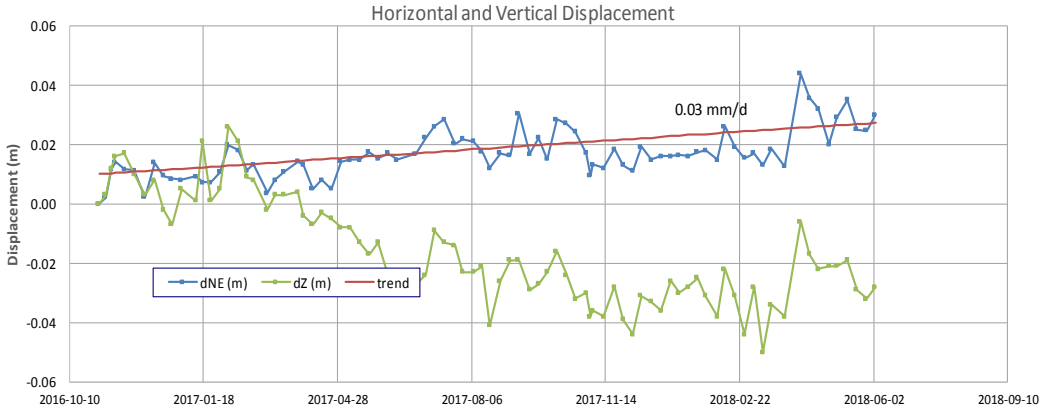

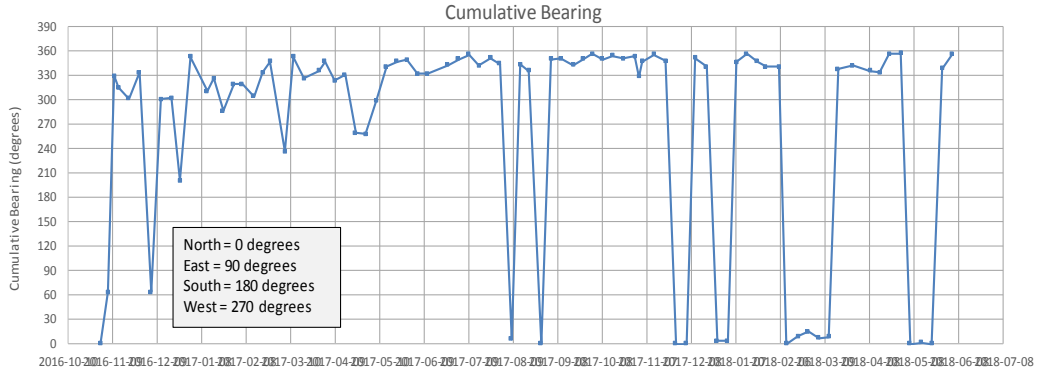

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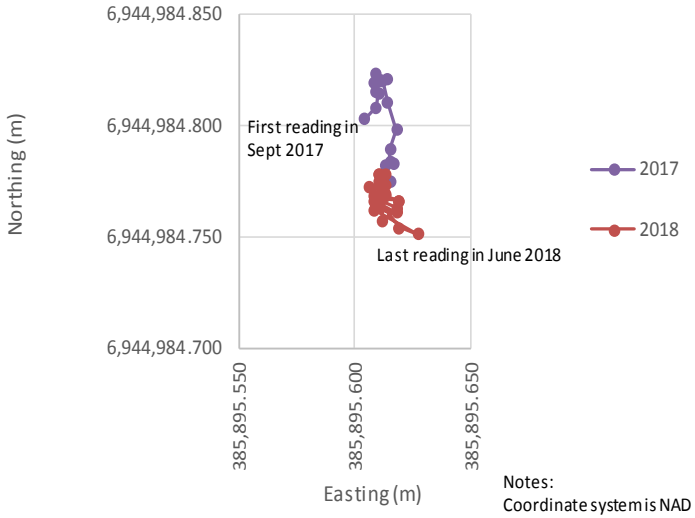
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Survey Hub – DSSH31
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **15**

DSSH32 - Northing Vs. Easting Movement Plot



Notes:
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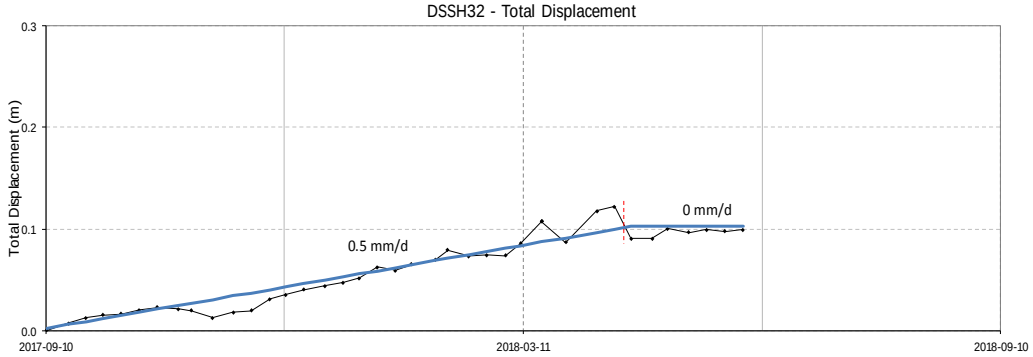

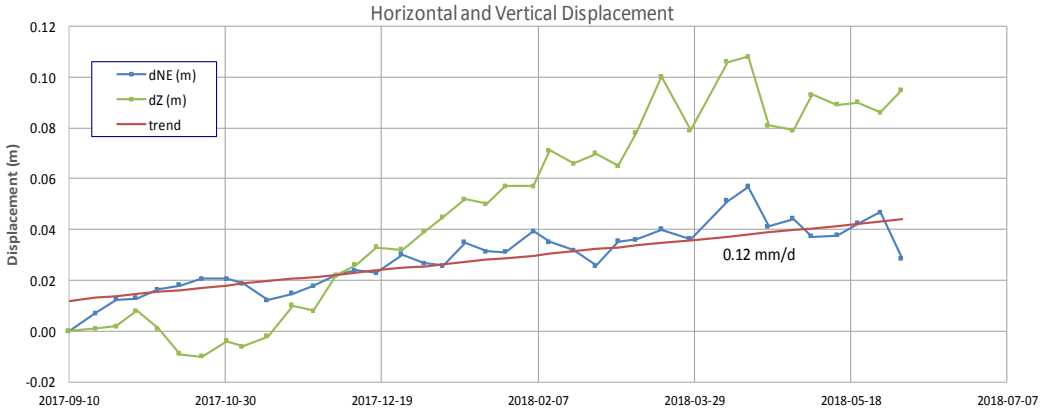

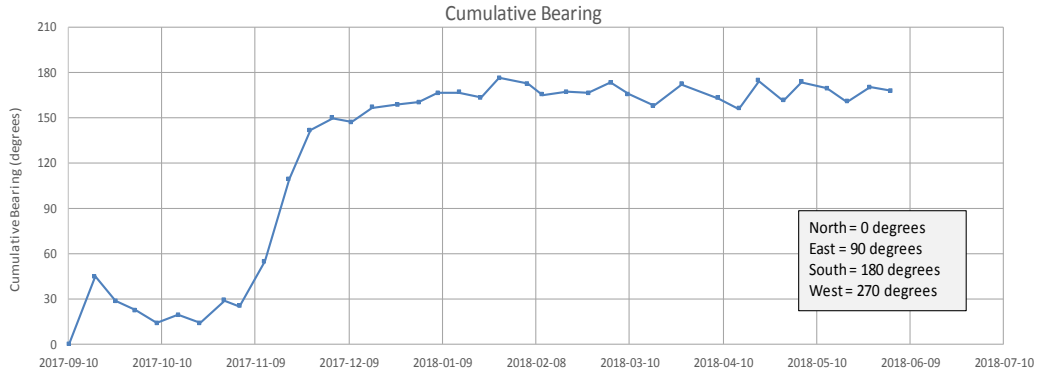

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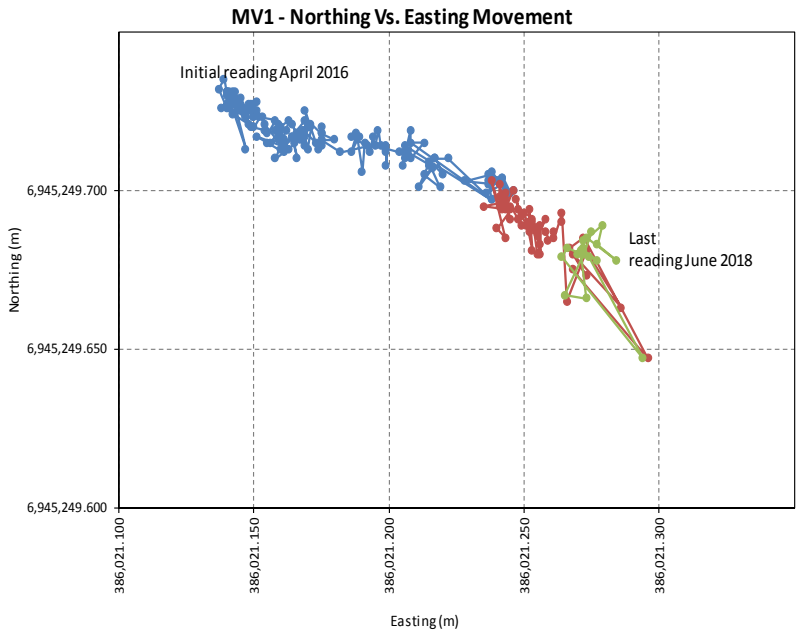
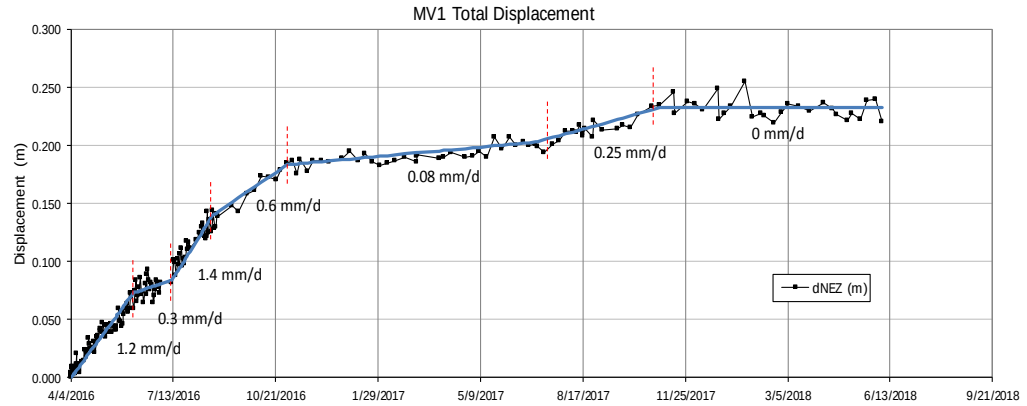
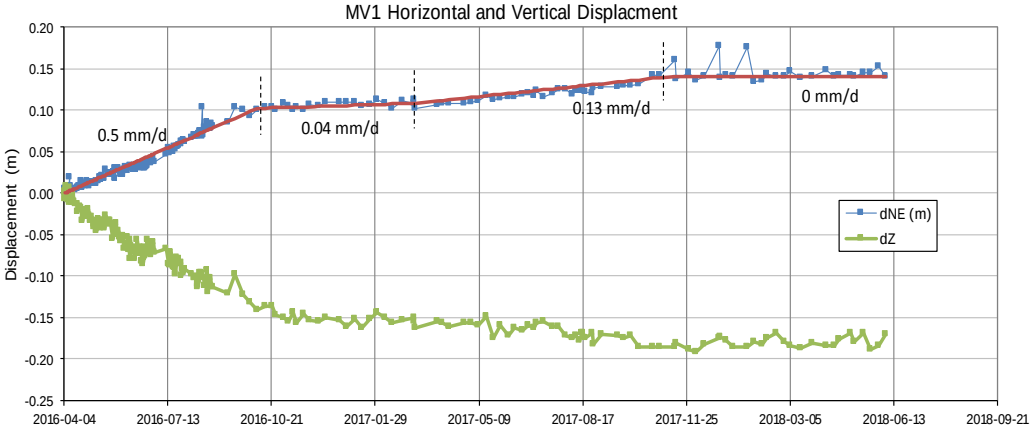
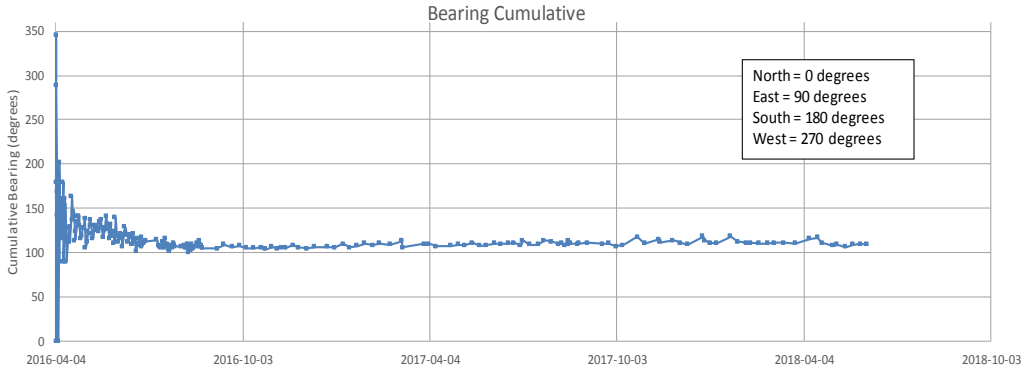
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Survey Hub – DSSH32
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **16**



Hub location







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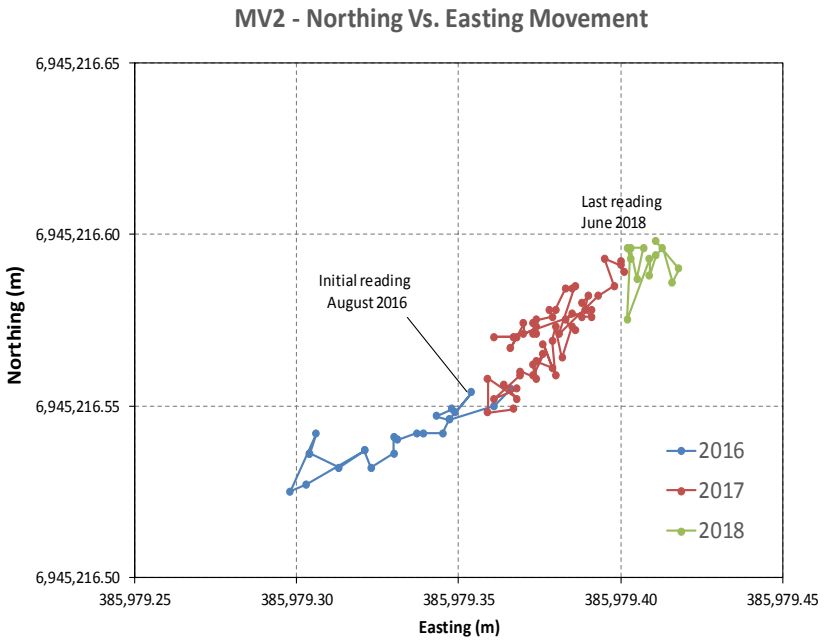
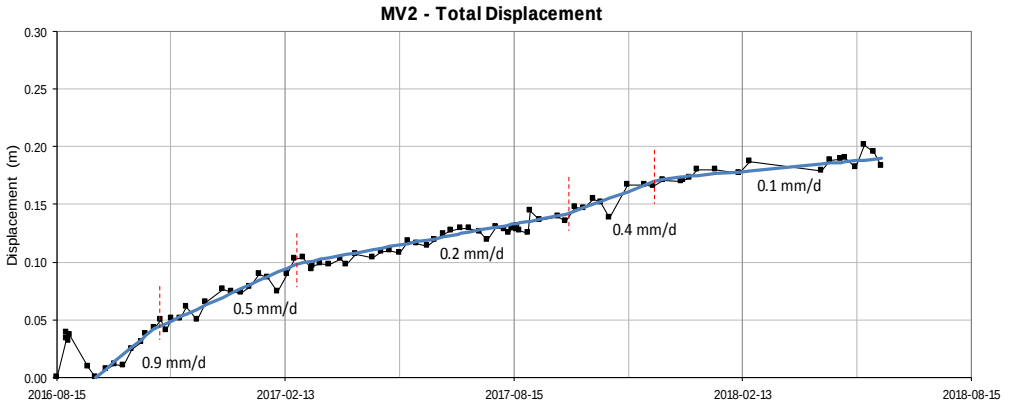
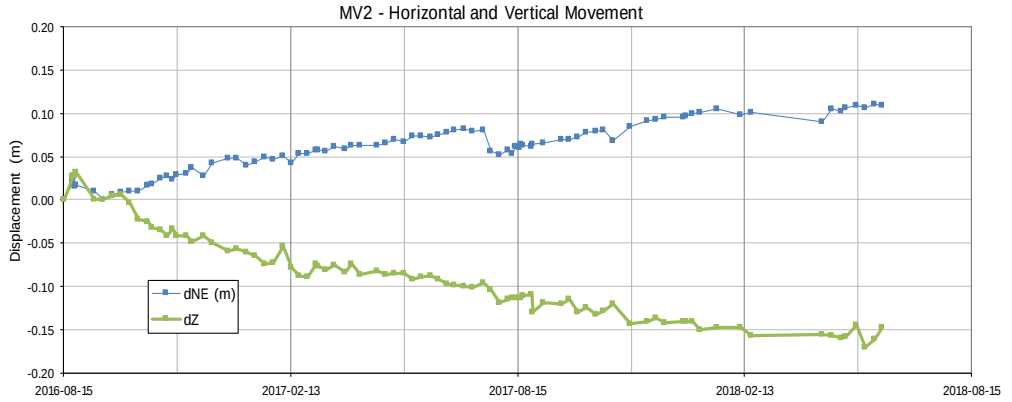
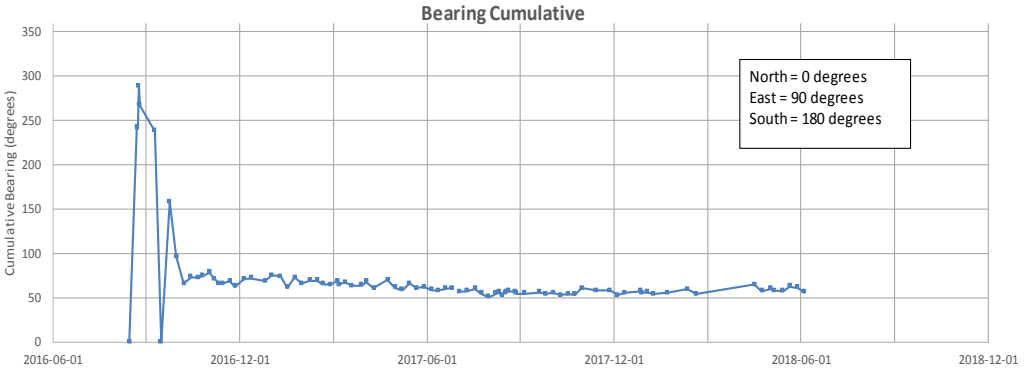
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Survey Hub – MV1
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by PHM / Figure: **17**









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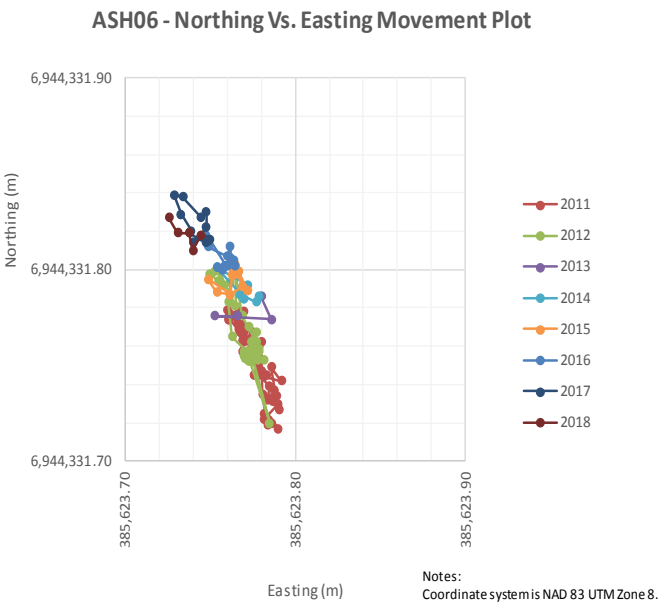
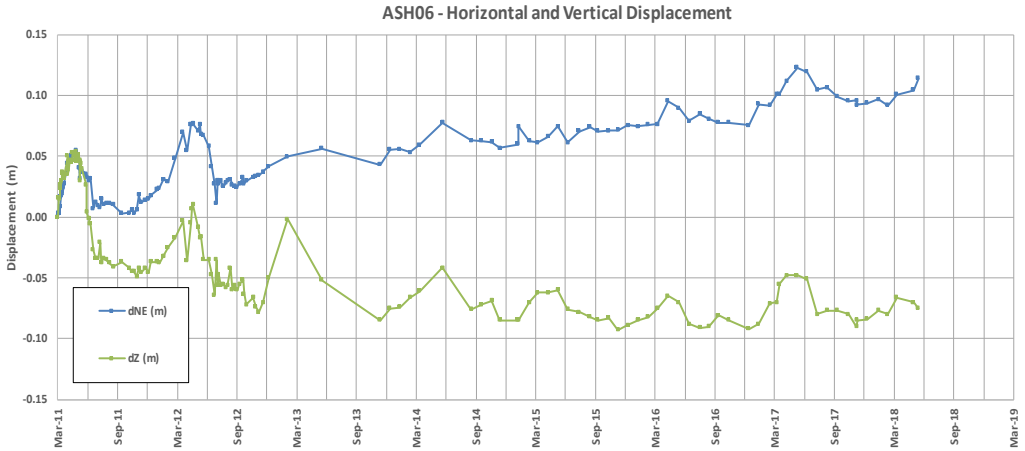
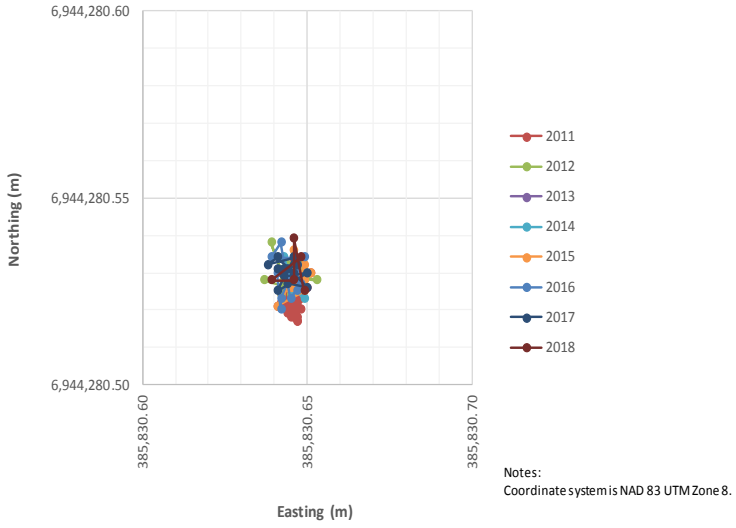
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Survey Hub – MV2
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by PHM / Figure: **18**





Notes:

1. Minto's survey reading comments on January 14, 207 notes ASH06 may have been disturbed as a result of a pipeline installation.



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Minto Explorations Ltd.

DSTSF Instrumentation Data

Survey Hubs – ASH05 and ASH06

Job No: 1CM002.063

Filename: ApD_2018DSTSFLandscape.pptx

Minto Mine

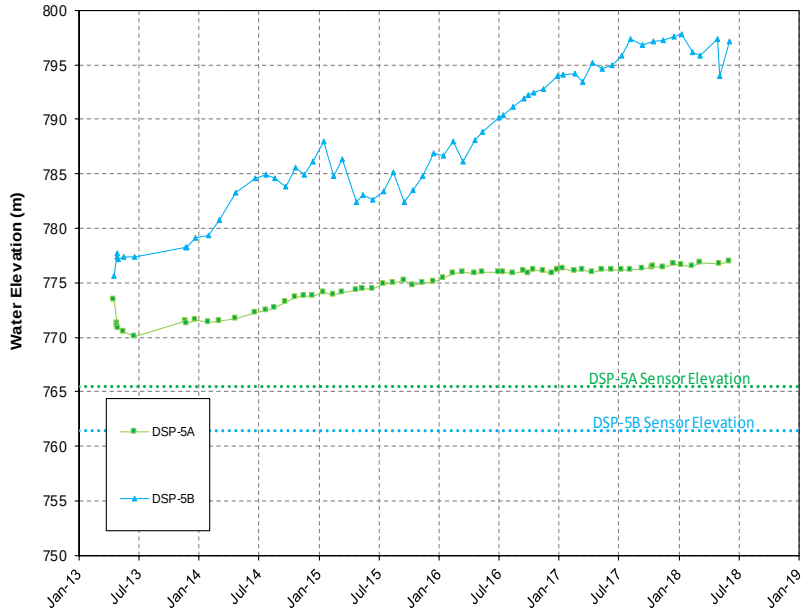
Date: August 2018

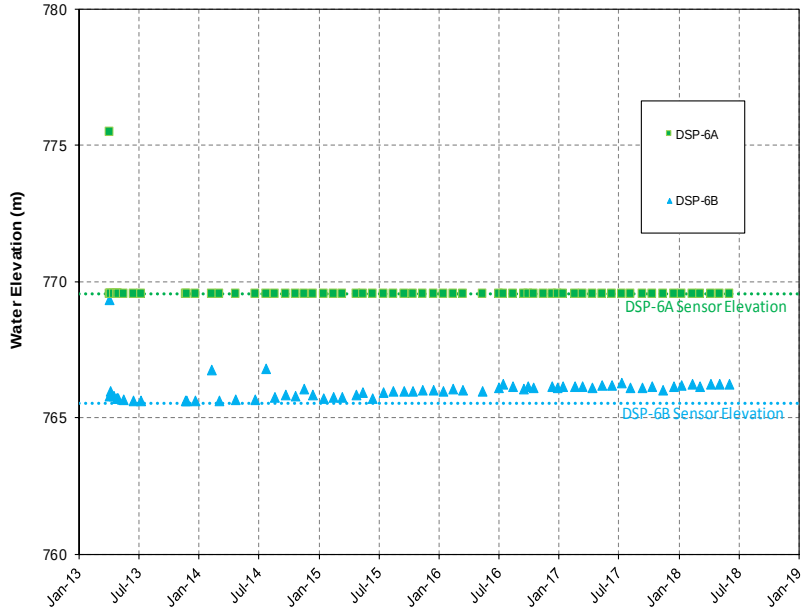
Prepared by PHM

Figure: **19**

Notes:

1. The pore pressure sensors at DSP-05 and 06 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 appears to have peaked within the past year. Temperature at the sensor is at the freezing point of water -0.5°. The sensor is located in an area of silt with stratified ice lenses.
3. Sensors at DSP-05A and DSP-06B both show gradual increasing pore pressure trends, while DSP-06A shows no pore pressure (pore pressure equal to the sensor elevation).





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Job No: 1CM002.063

Filename: ApD_2018DSTSFLandscape.pptx

Minto Explorations Ltd.

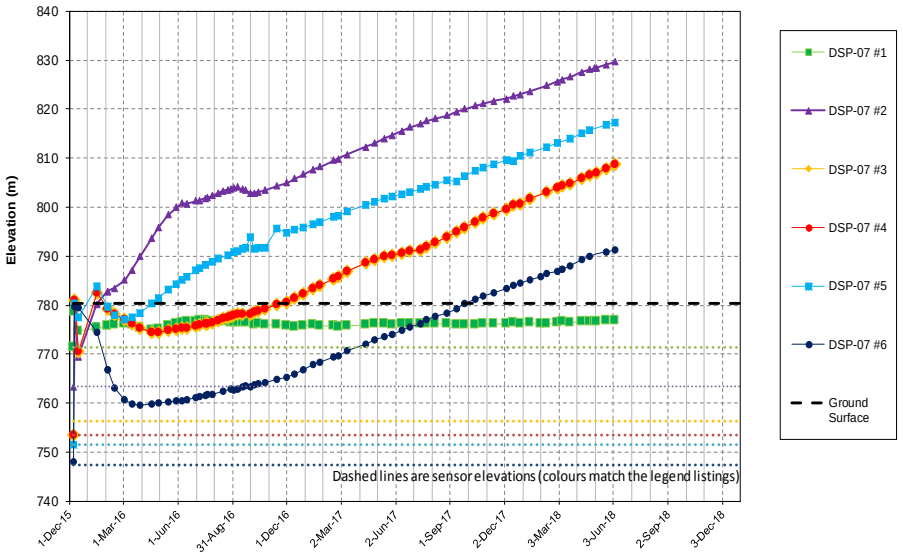
Minto Mine

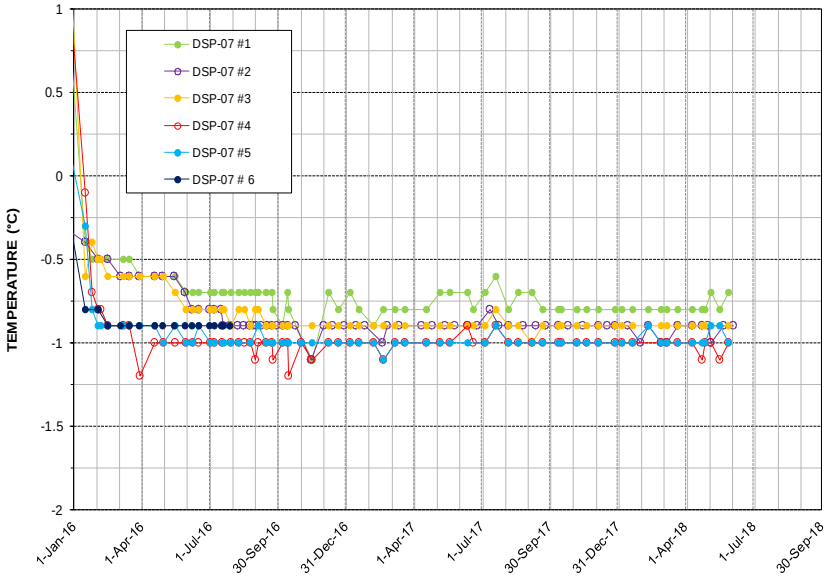
DSTSF Instrumentation Data

Piezometer – DSP-05 and DSP-06

Date:	Prepared by	Figure:
August 2018	PHM	**20**

Sensor #	Stratigraphy, Ice Description	Ice Description	Comment
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.	A shear zone at DSI-20 was identified in 2013-14 at an elevation of 752.5 -730m. The higher pore pressure observed at in the three sensors in the clay unit may be related to pore pressure induced by on going movement.
4			
5			
6	Weathered Bedrock; Highly weathered granite. Rust staining. Friable.	Nbn. No excess ice.	





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srk consulting

Job No: 1CM002.063

Filename: ApD_2018DSTSFLandscape.pptx

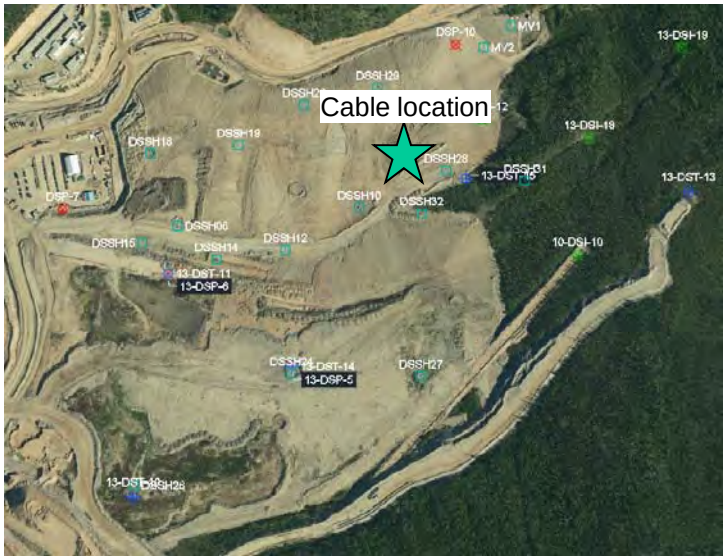
Minto Explorations Ltd.

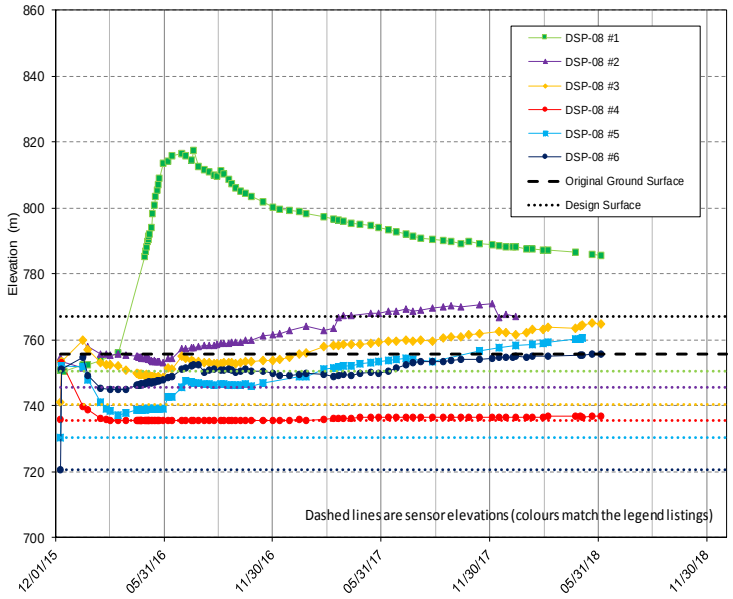
Minto Mine

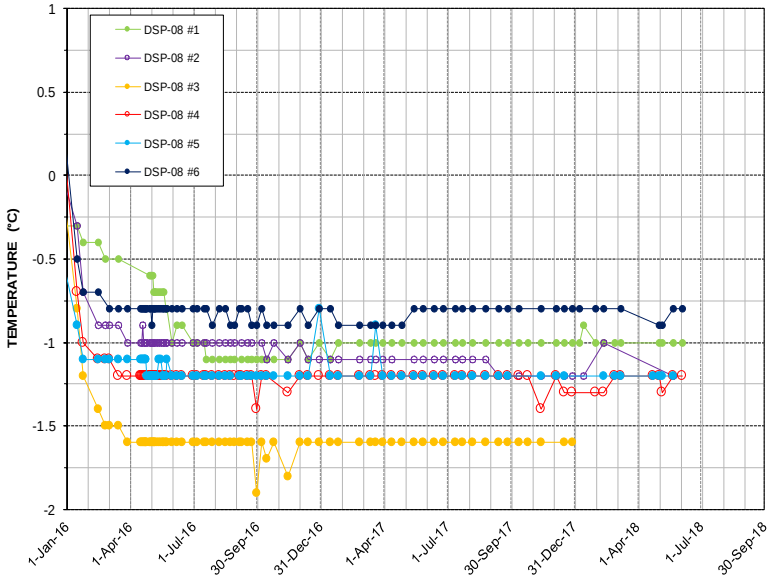
DSTSF Instrumentation Data

Piezometer – DSP-07

Date:	Prepared by	Figure:
August 2018	PHM	21







Notes:

1. Negative pressure readings are plotted at the elevation of the sensor in order to indicate dates readings were taken.
2. The pore pressure in Sensor 1 has increased by approx. 700 kPa (70 m of water). This sensor is located closest to surface (depth of 5m). Since the construction was completed, the readings have dissipated. The temperature at Sensor 1 has also dropped significantly compared to the other sensors at DSP-08. The higher pore pressures at Sensor 1 may be the result of freezing and the expansion of pore water into ice.

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\DSTFSurveyHubMonitoring_SRK.xlsm

srk consulting

Job No: 1CM002.063

Filename: ApD_2018DSTSFLandscape.pptx

Minto Explorations Ltd.

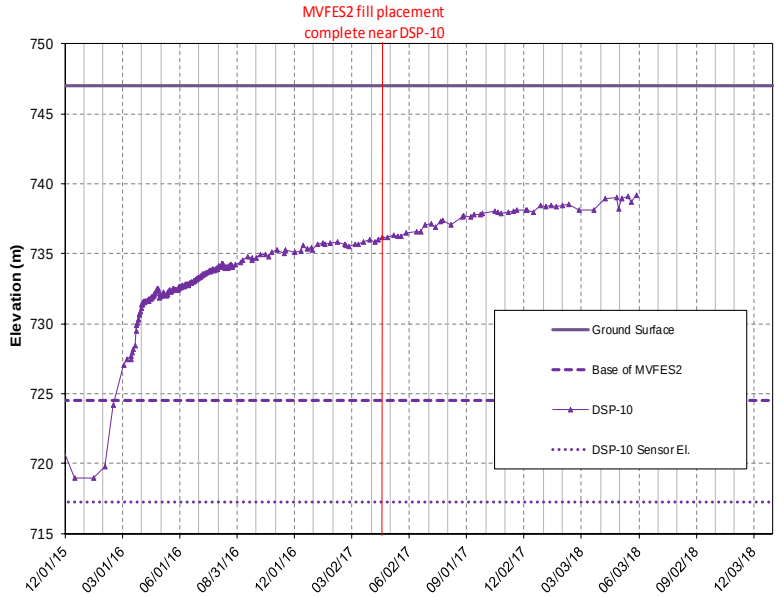
Minto Mine

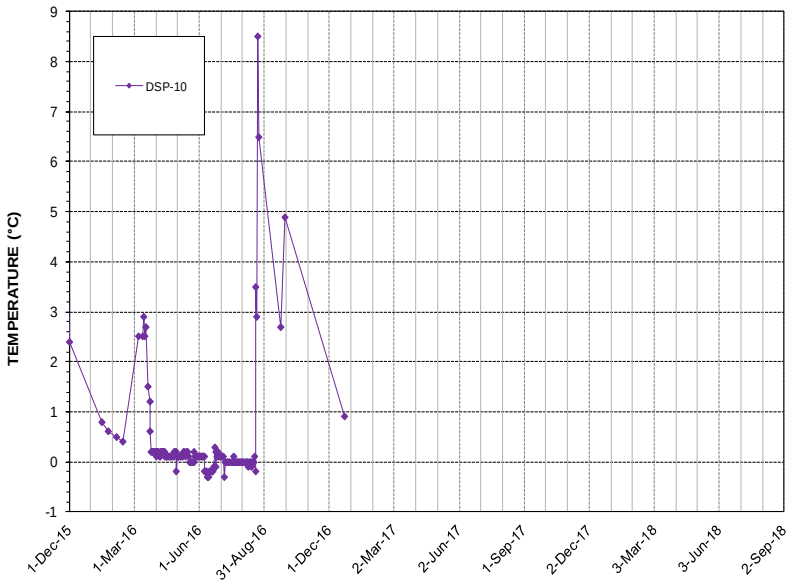
DSTSF Instrumentation Data

Piezometer – DSP-08

Date:	Prepared by	Figure:
August 2018	PHM	**22**

DSP-10





Notes:

1. The pore pressure sensor at DSP-10 is located approximately 5 m below the original ground surface below the MVFE Stage 2.
2. The increase in pore pressure at DSP-10 is related to the fill placement over the sensor (approximately 23 m thick).
3. Since fill placement has been completed, the rate of increase in pore pressure is low, but is ongoing.
4. Flow meter readings at the Minto Creek Detention Sump indicate that the blanket drain is functional and no water is building-up at the base of MVFE Stage 2.
5. The temperature readings at DSP-10 show a slight cooling trend up to July 2017. Between July and December 2017, temperature readings were above 0 degrees and highly variable. Since December 2017, the temperatures sensor has malfunctioned.

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\DSTFSurveyHubMonitoring_SRK.xlsm

srk consulting

Job No: 1CM002.063

Filename: ApD_2018DSTSFLandscape.pptx

Minto Explorations Ltd.

Minto Mine

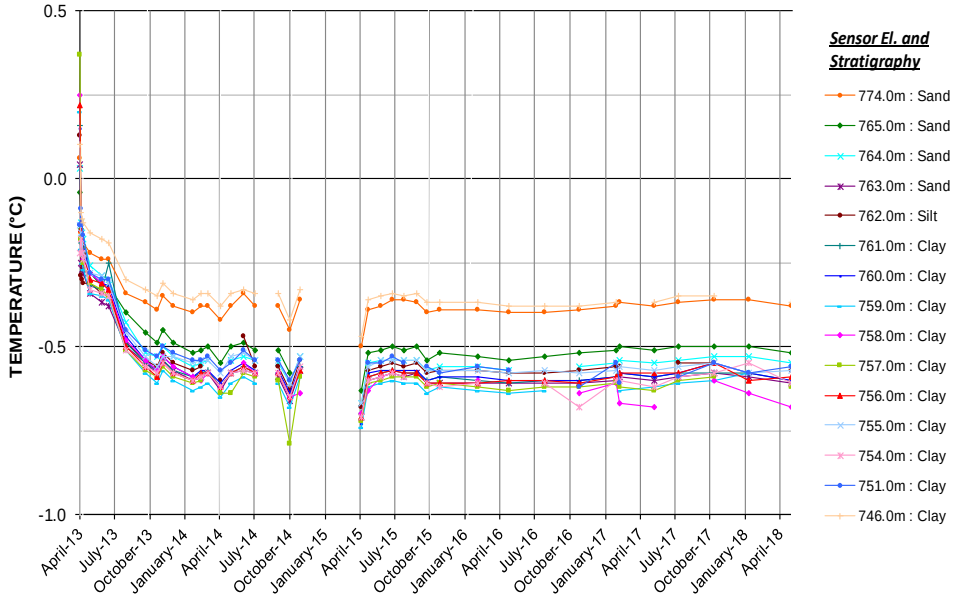
DSTSF Instrumentation Data

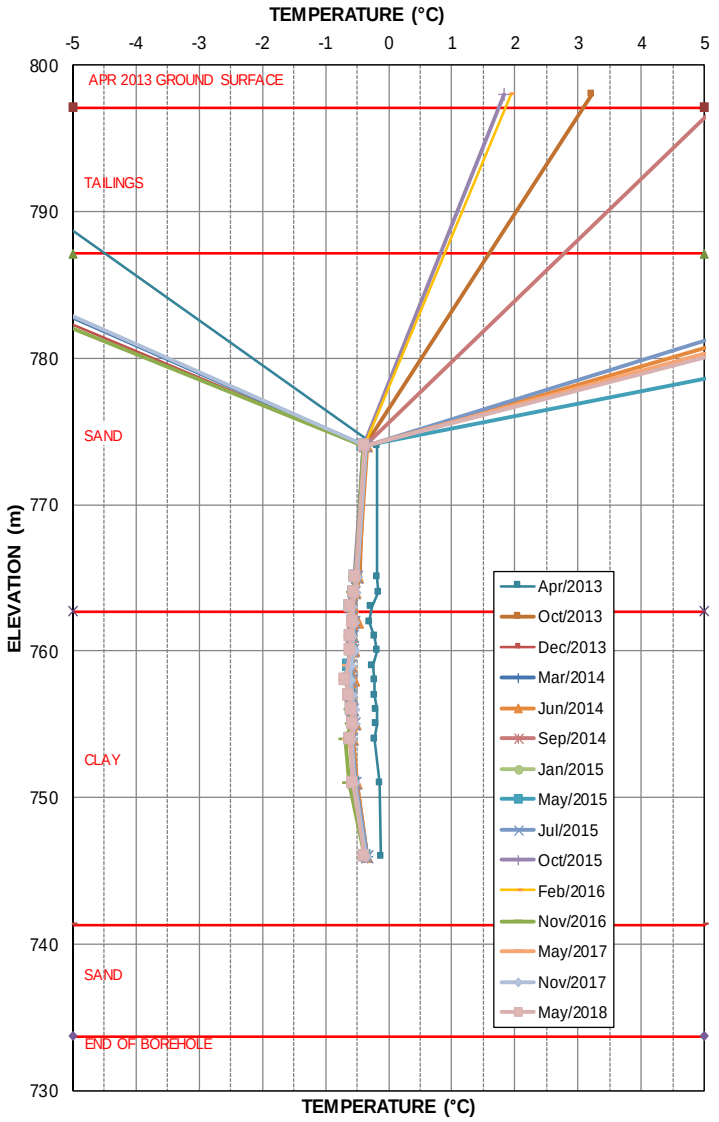
Piezometers – DSP-09 and DSP-10

Date: August 2018

Prepared by PHM

Figure: **23**





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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\DSTFSurveyHubMonitoring_SRK.xlsm

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Minto Explorations Ltd.

DSTSF Instrumentation Data

Temperature Cable – DST-10

Job No: 1CM002.063

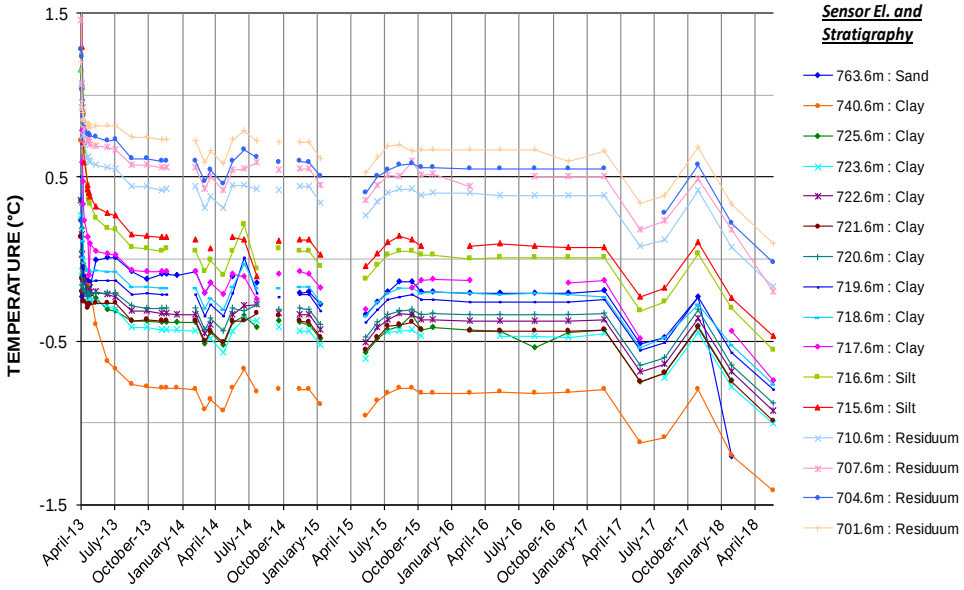
Filename: ApD_2018DSTSFLandscape.pptx

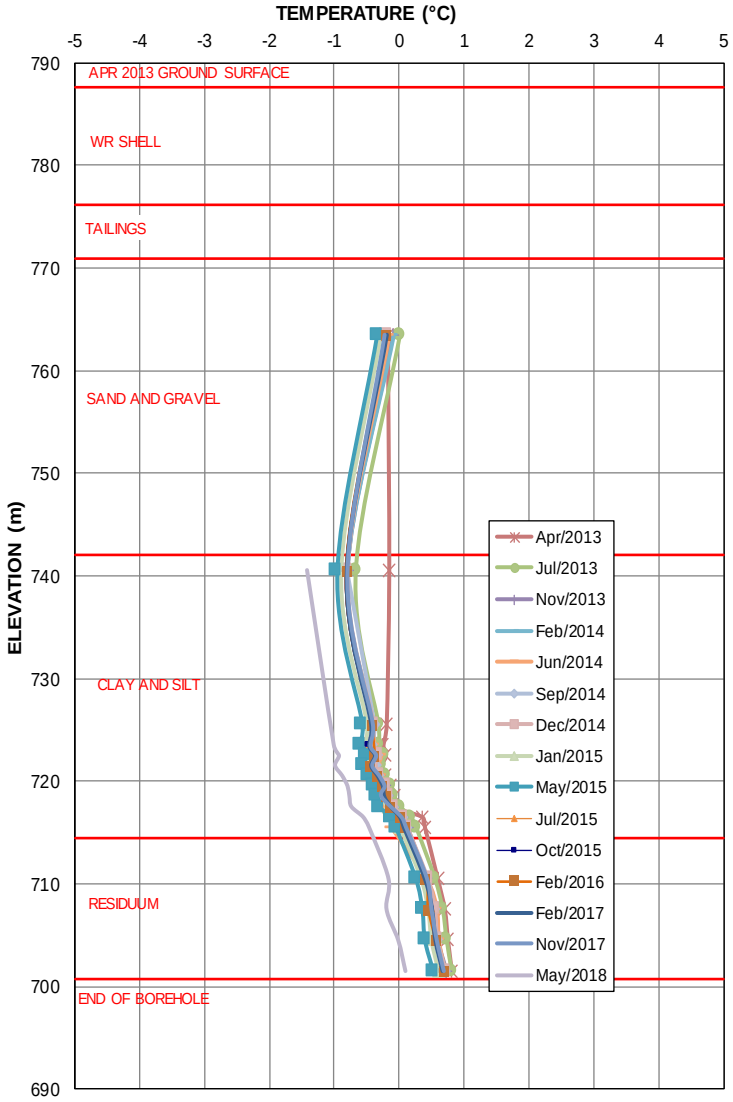
Minto Mine

Date: August 2018

Prepared by PHM

Figure: **24**





Source files:

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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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DSTSF Instrumentation Data

Temperature Cable – DST-11

Job No: 1CM002.063

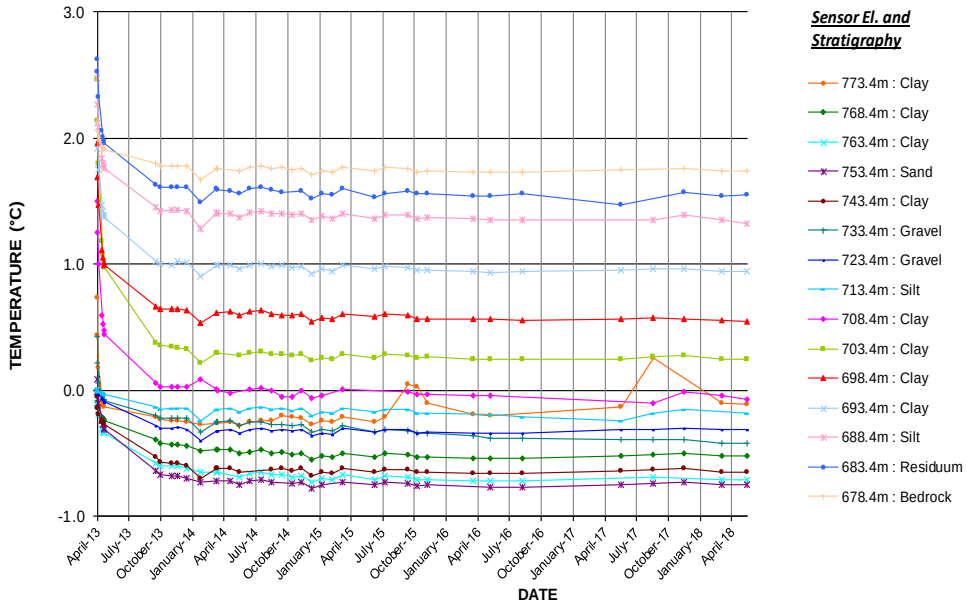
Filename: ApD_2018DSTSFLandscape.pptx

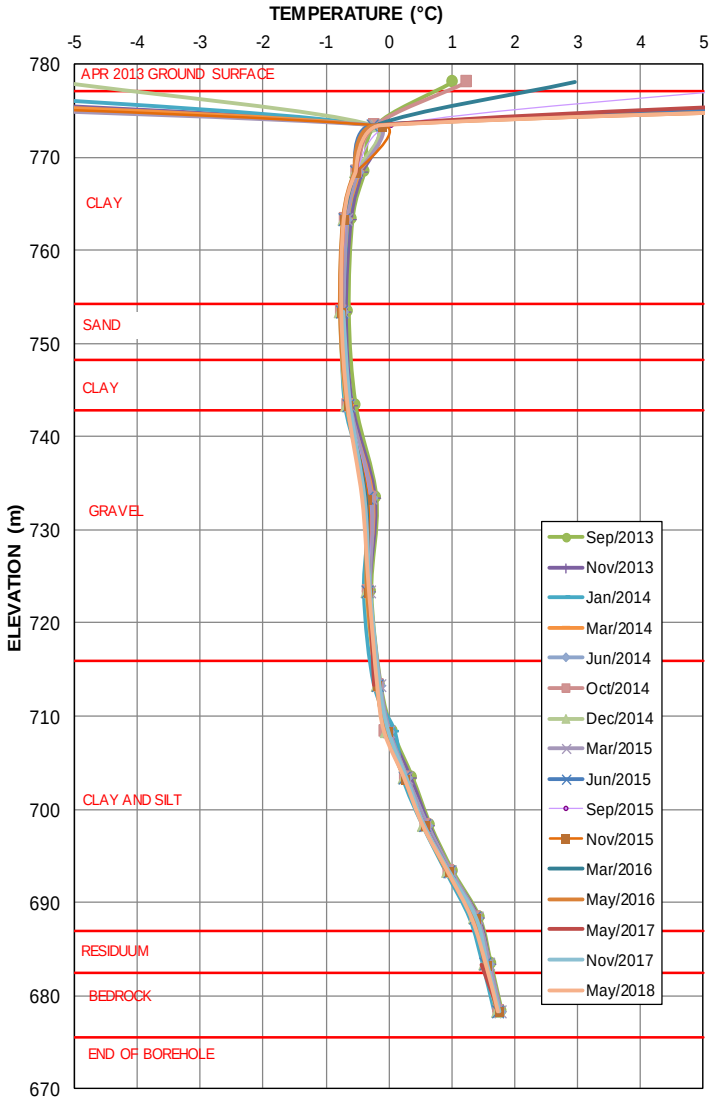
Minto Mine

Date: August 2018

Prepared by PHM

Figure: **25**





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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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DSTSF Instrumentation Data

Temperature Cable – DST-13

Job No: 1CM002.063

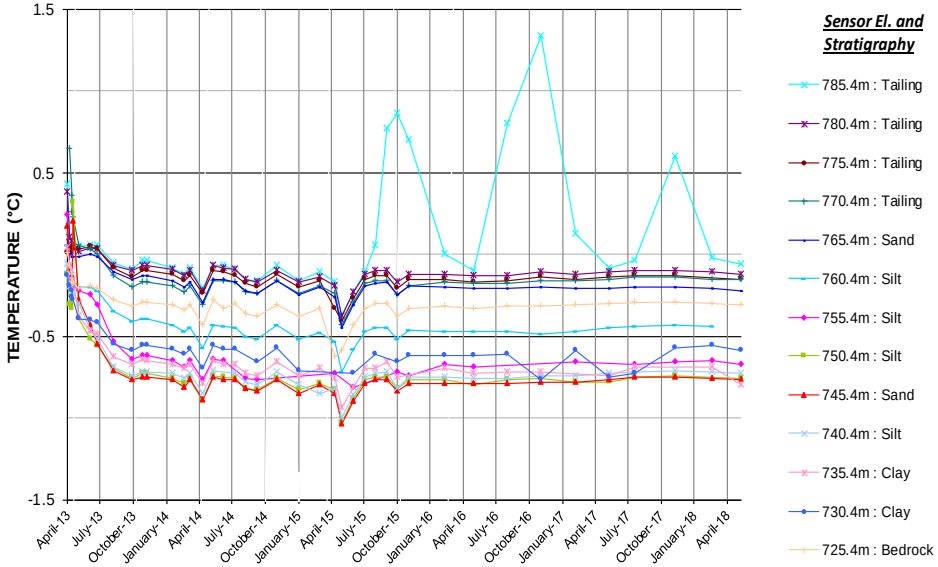
Filename: ApD_2018DSTSFLandscape.pptx

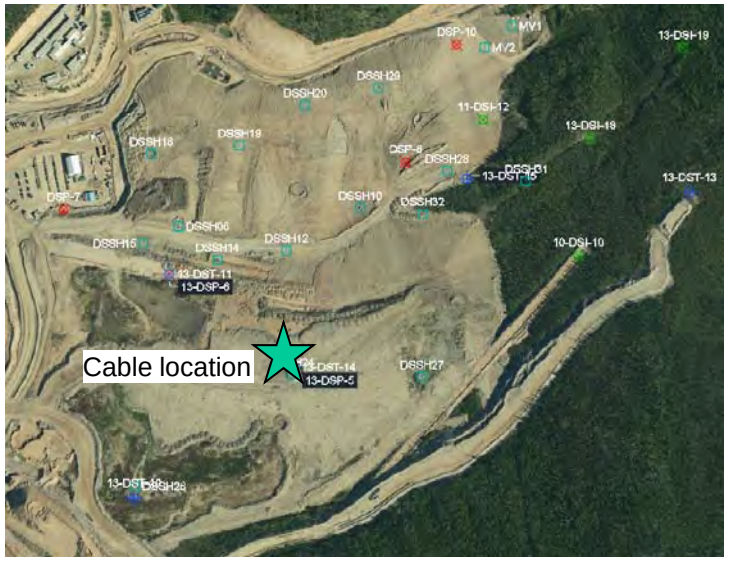
Minto Mine

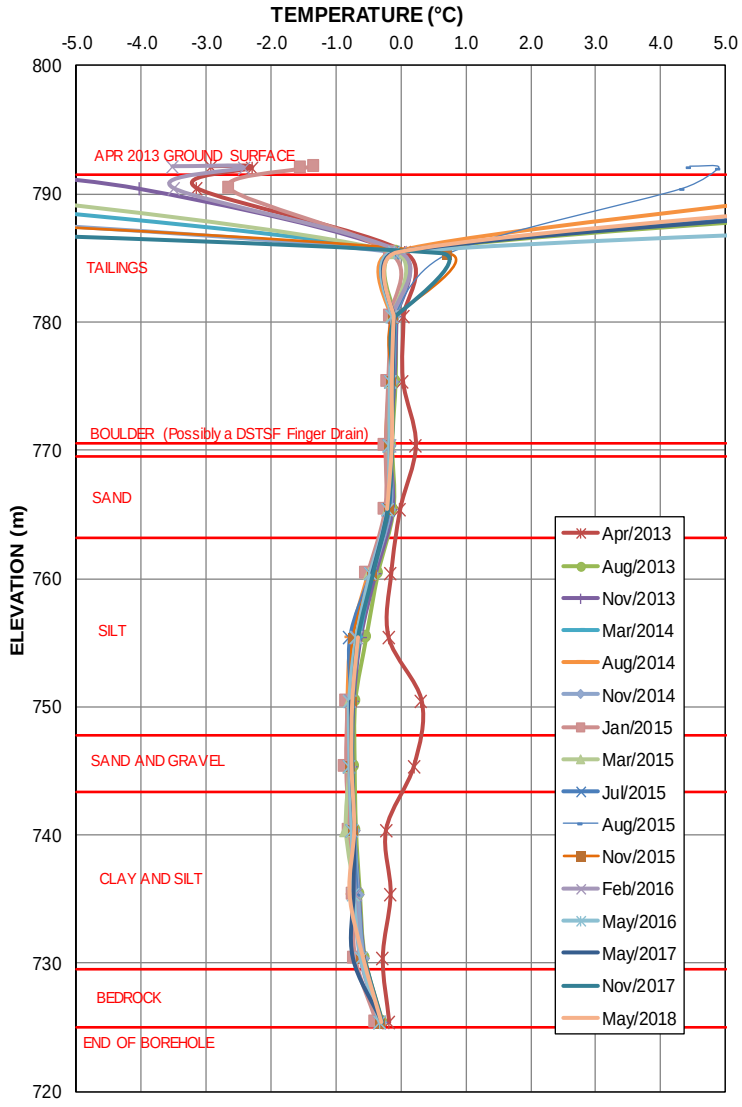
Date: August 2018

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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DSTSF Instrumentation Data

Temperature Cable– DST-14

Job No: 1CM002.063

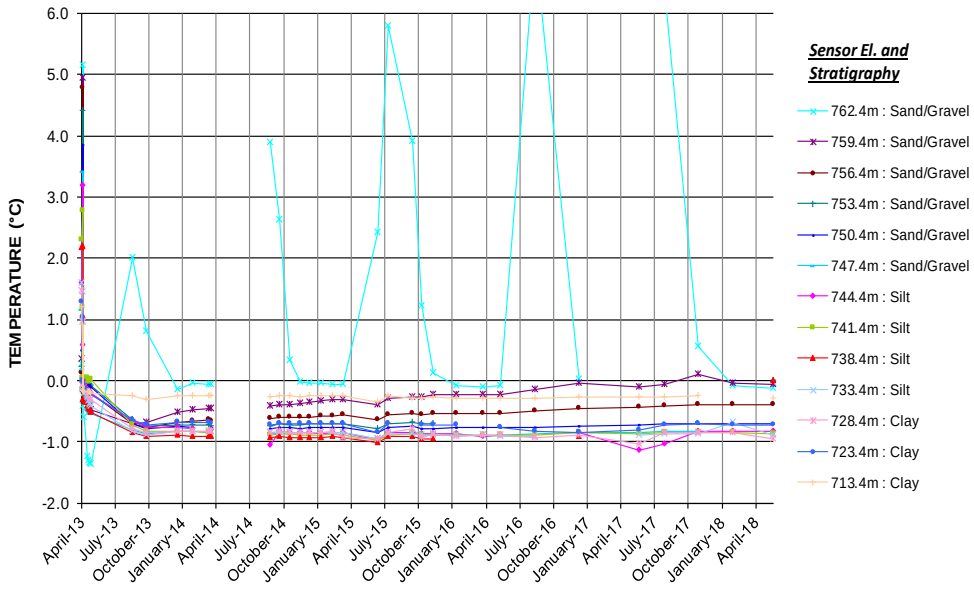
Filename: ApD_2018DSTSFLandscape.pptx

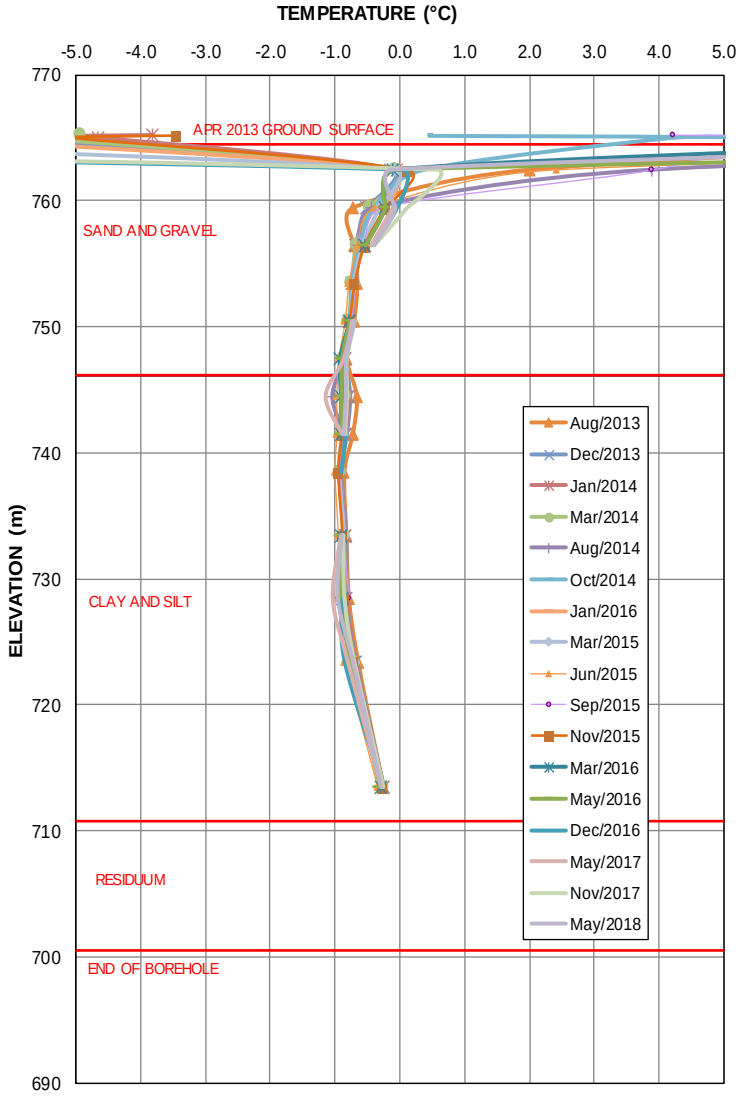
Minto Mine

Date: August 2018

Prepared by PHM

Figure: **27**





Source files:

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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 Explorations Ltd.

DSTSF Instrumentation Data

Temperature Cable – DST-15

Job No: 1CM002.063

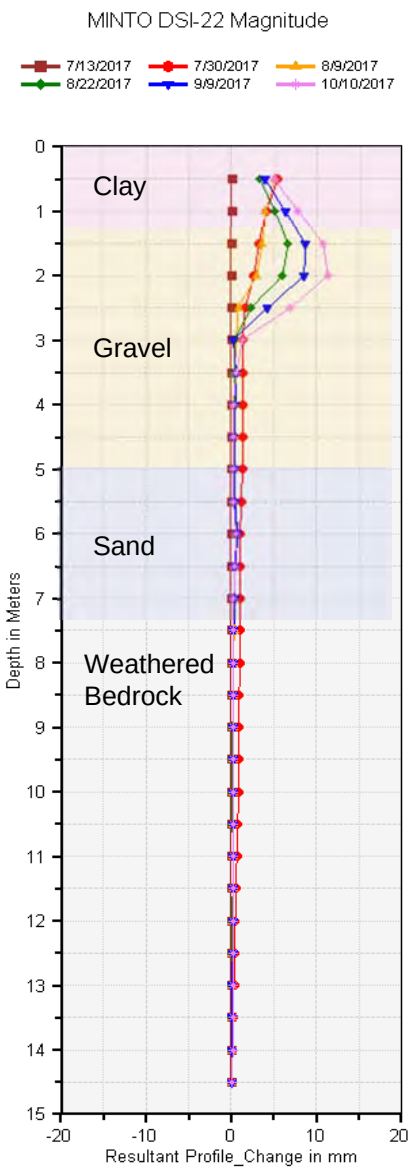
Filename: ApD_2018DSTSFLandscape.pptx

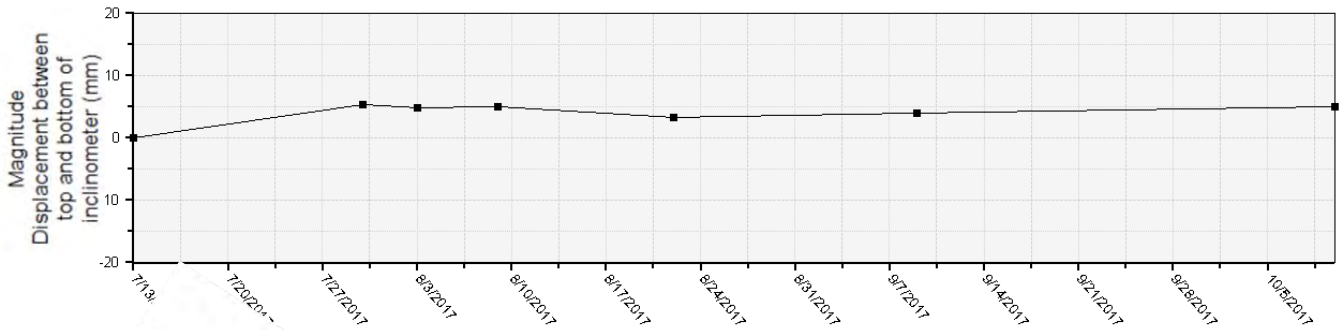
Minto Mine

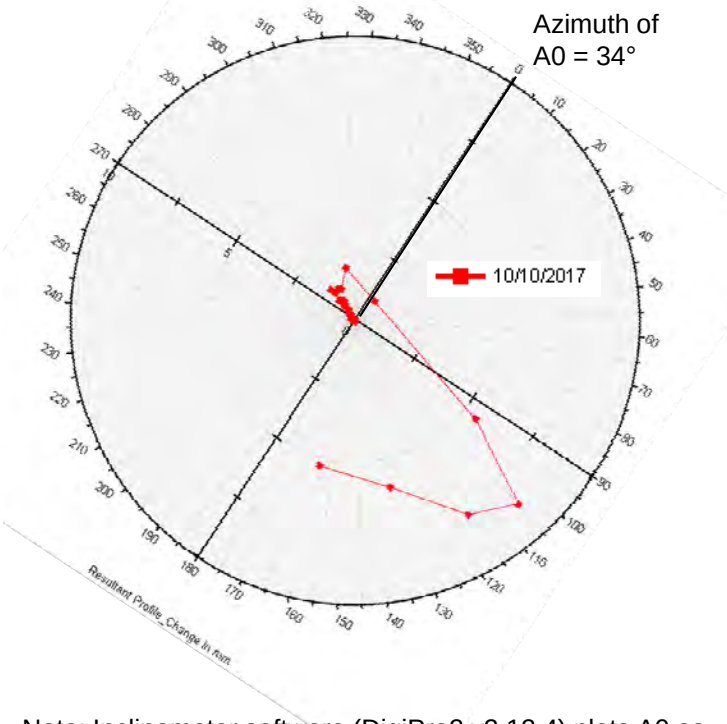
Date: August 2018

Prepared by PHM

Figure: **28**







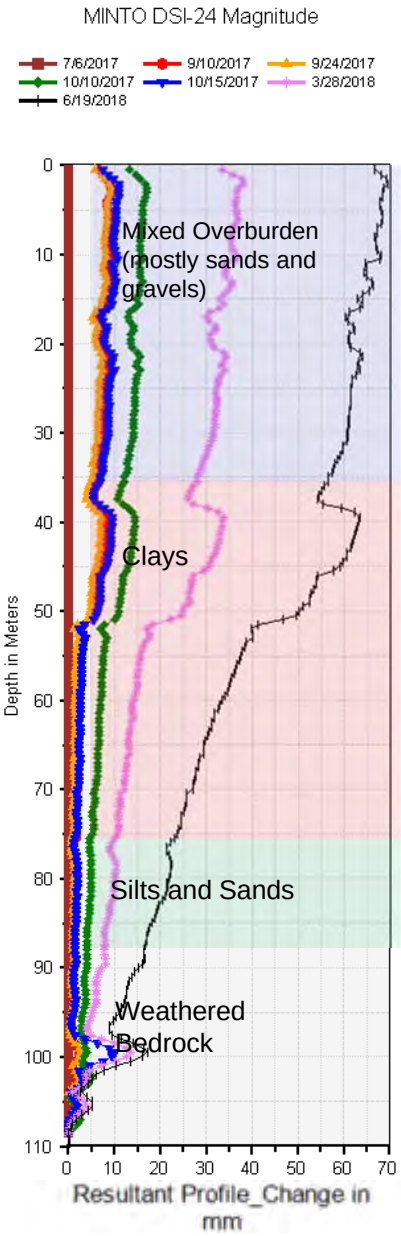
Azimuth of A0 = 34°

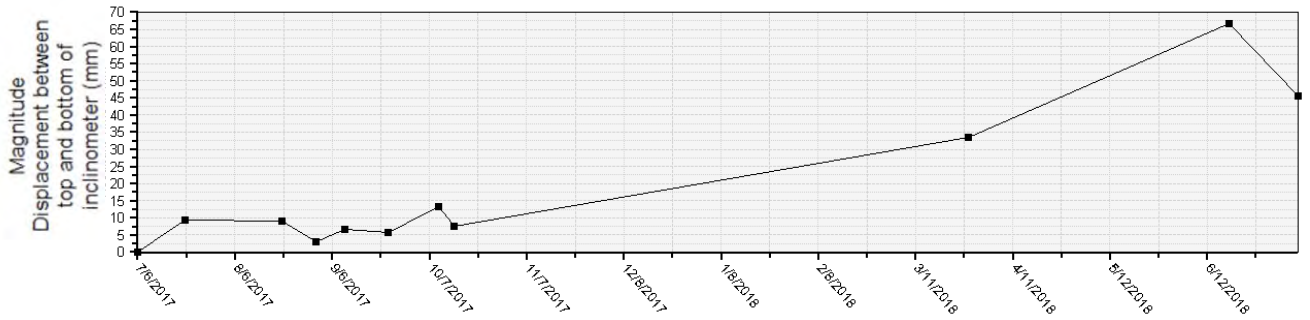
Note: Inclinometer software (DigiPro2 v2.12.4) plots A0 as 0 degrees. The plot above has been rotated such that the orientation matches the plan (north is up).

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

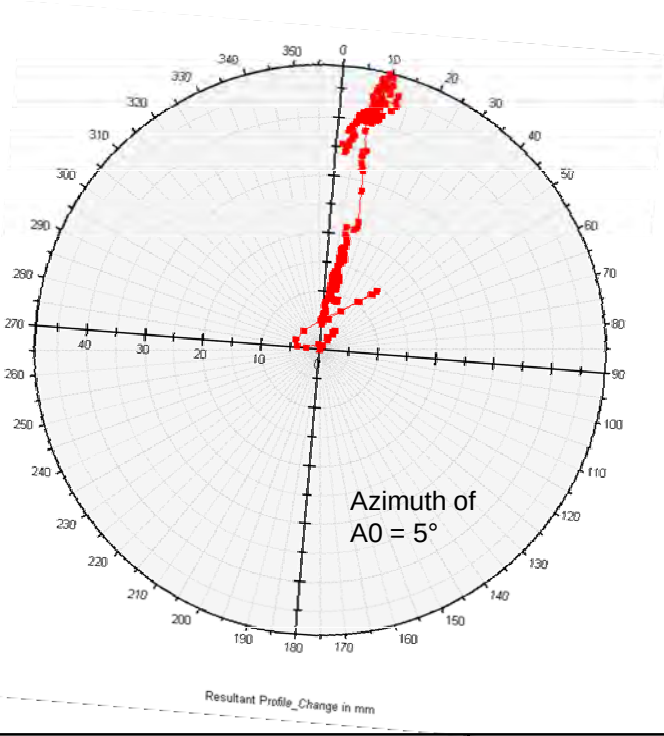
srk consulting	Minto Explorations Ltd.	DSTSF Instrumentation Data
		Inclinometer – DSI-22
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **29**





Notes:

1. Data collected from this inclinometer are questionable. The checksum values from the inclinometer surveys indicate high error values, which may account for the "drift" observed in the profile change to the right.
2. It is recommended that the inclinometer probe be sent for servicing and training be provided to the staff to observe the checksum values during readings to improve the quality of the readings.



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

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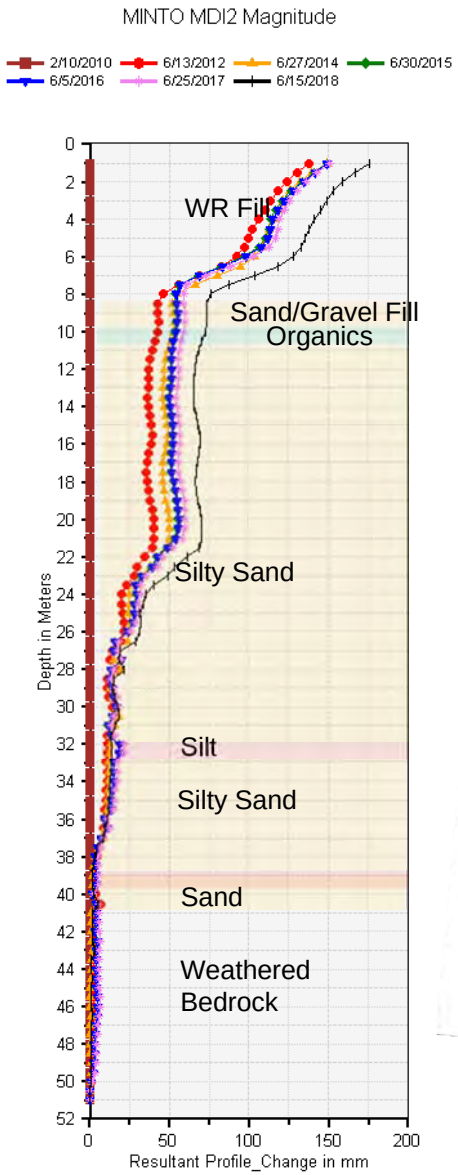
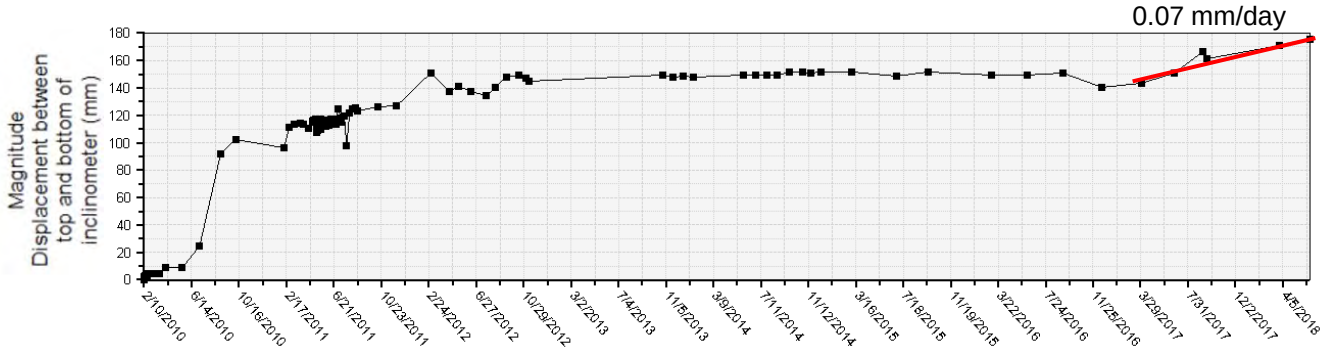
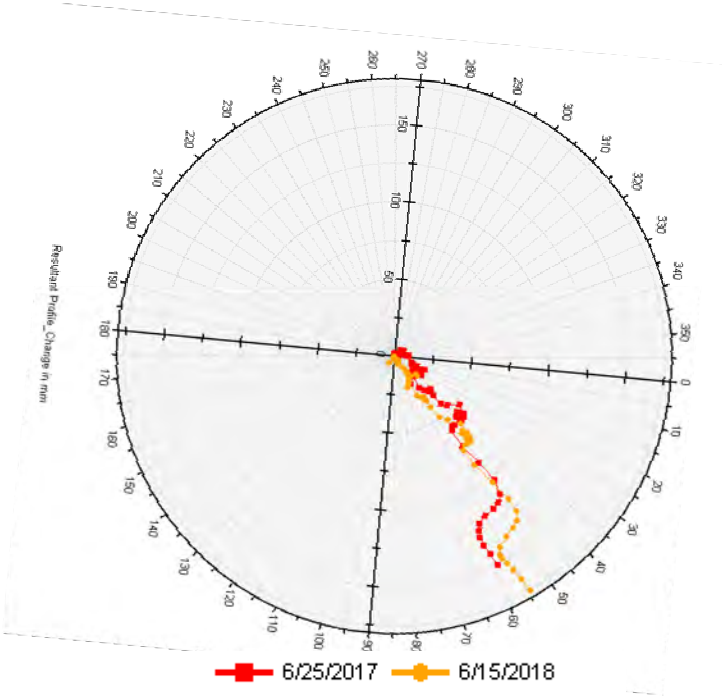
		Inclinometer – DSI-24
Job No: 1CM002.063 Filename: ApD_2018DSTSFLandscape.pptx	Minto Mine	Date: August 2018 | Prepared by PHM | Figure: **30**

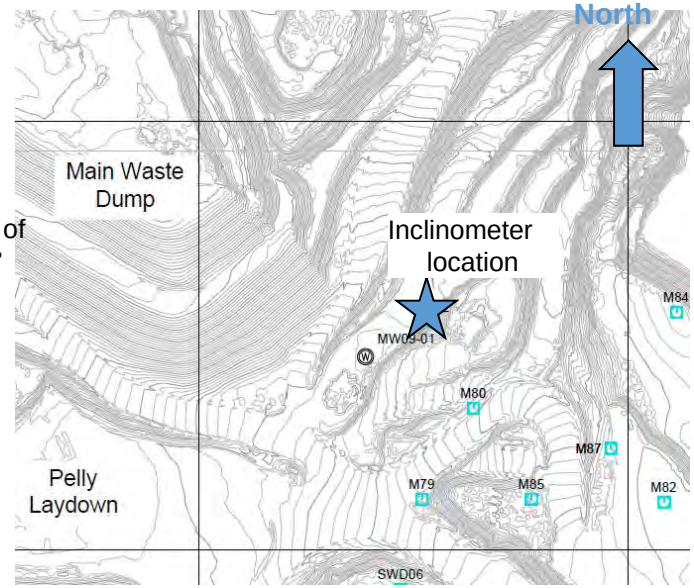
Appendix E: Main Waste Dump Instrumentation Data







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 Explorations Ltd.	MWD Instrumentation Data
Job No: 1CM002.063 Filename: ApE_2018MWDInstrumentation.pptx	Minto Mine	**Inclinometer – MDI-2**
		Date: August 2018 / Prepared by: PHM / Figure: **1**

Appendix F: Southwest Dump 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 in cyan color are active.*
4. *Survey hubs in magenta area destroyed.*
5. *Survey hubs with no movement rates listed have been inactive for over one year.*

South West Dump Active Survey Hubs

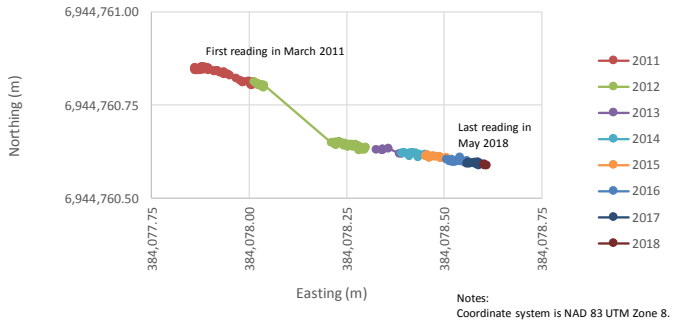
Survey Hub	Last Reading	Movement Rate (mm/day)		Bearing (Cumulative)	Comments
		May 17	May 18		
SWD-01	5/13/2018	0.18	0.18	109	
SWD-06	5/21/2018	0.20	0.13	145	Horizontal movement rate listed.
SWD-07	5/13/2018	0.24	0.24	120	Horizontal movement rate listed. Slight decelleration trend observable.
SWD-08	5/13/2018	0.33	0.33	99	Slight decelleration trend observable.
SWD-09	5/13/2018	0.55	0.23	77	
SWD-10	5/13/2018	-	0.10	294	
SWD-11	5/13/2018	-	0.00	105	Horizontal movement rate listed.

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

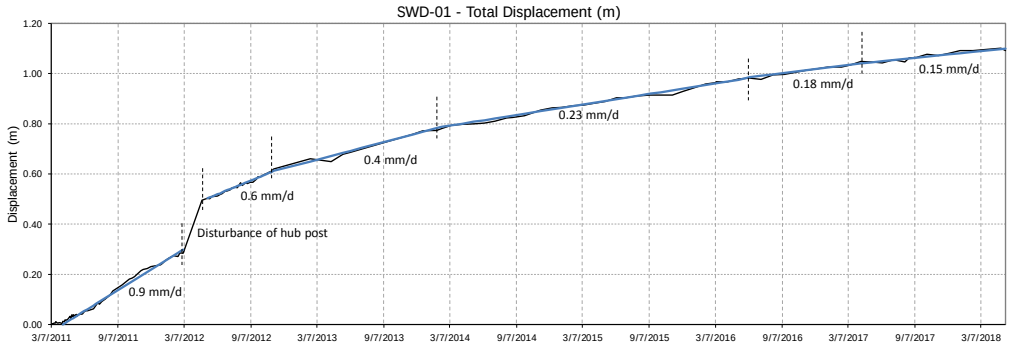
srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	**Southwest Dump Survey Hub Summary**
		Date: August 2018 / Prepared by: PHM / Figure: **1**

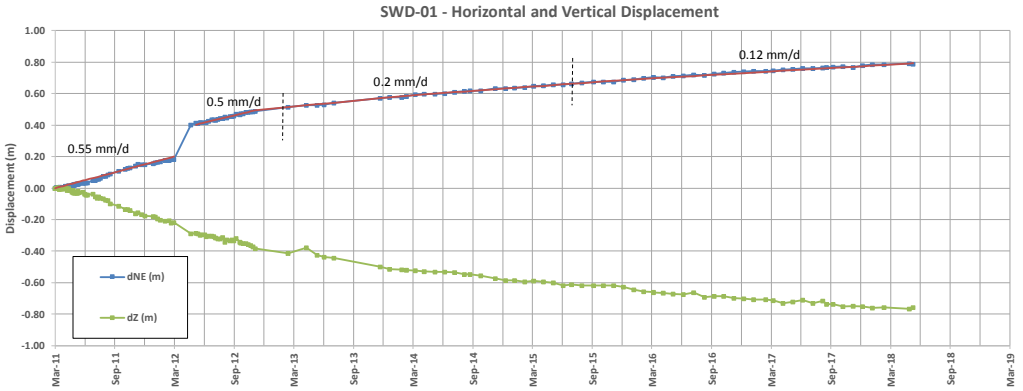
SWD01 - Northing Vs. Easting Movement Plot

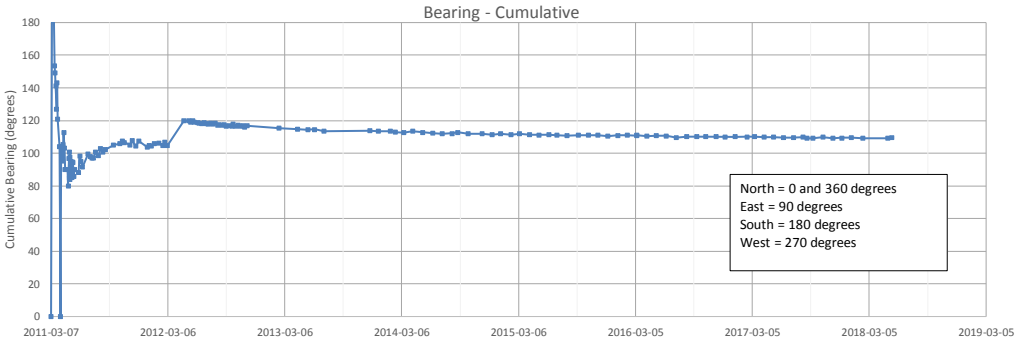


Notes:
Coordinate system is NAD 83 UTM Zone 8.

Hub location







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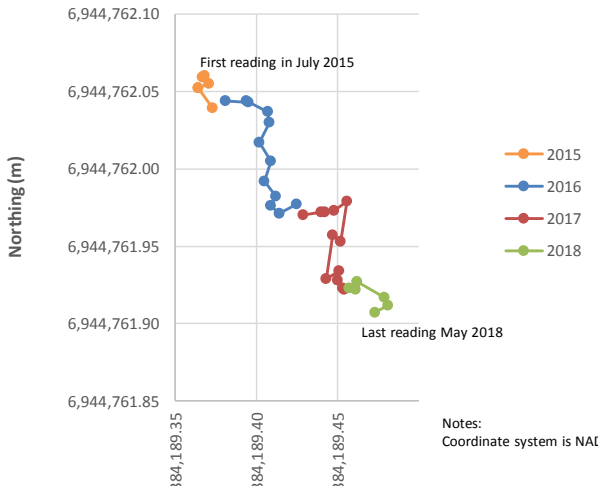
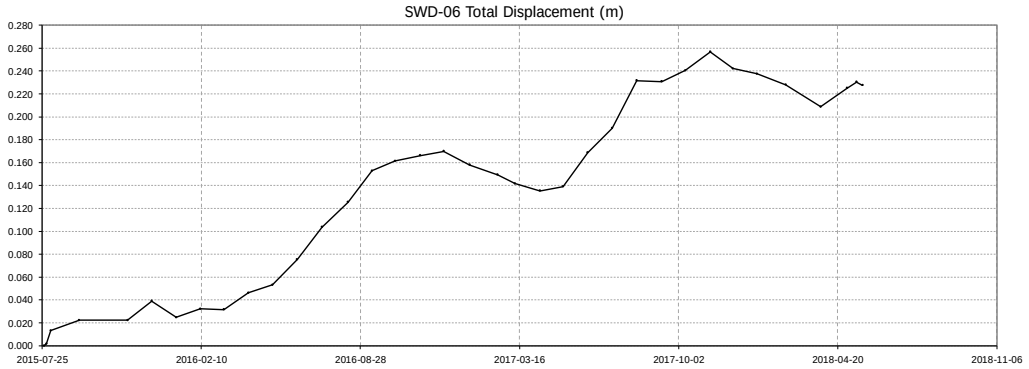
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\SWD_ASH_WSP_SurveyHubMonitoring_SRK.xlsm

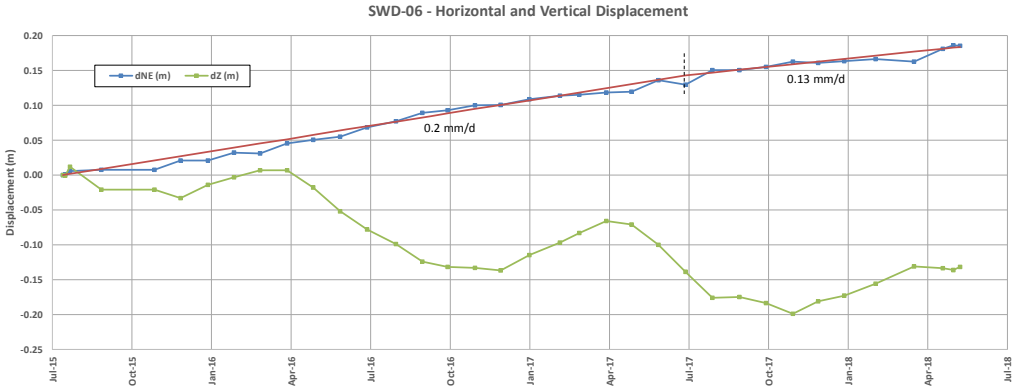
srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
		Survey Hub – SWD-01
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **2**

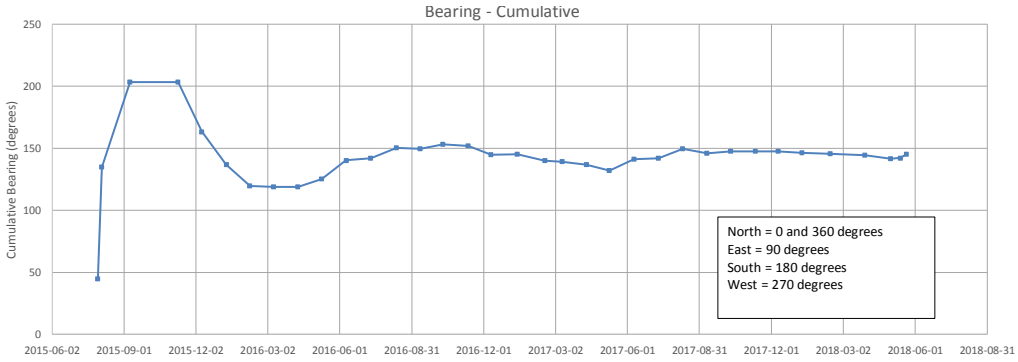
SWD06 - Northing Vs. Easting Movement Plot



Notes:
Coordinate system is NAD 83 UTM Zone 8.







Notes

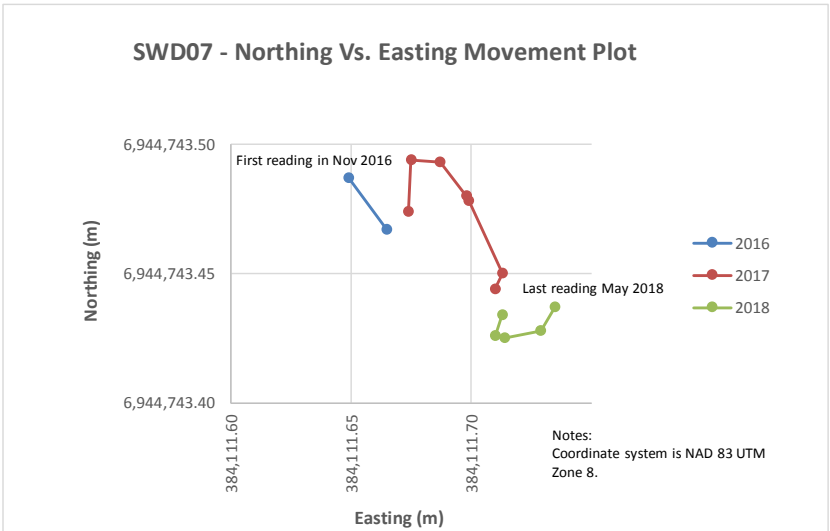
1. *Hub is a replacement for SWD-01A that was disturbed by frost heave.*
2. *The hub consists of a lock-block on surface, and as a result, seasonal ground movement as a result freeze/thaw cycles may occur that is not indicative of large-scale ground movement. As a result, the horizontal displacement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

Hub location

Source files:

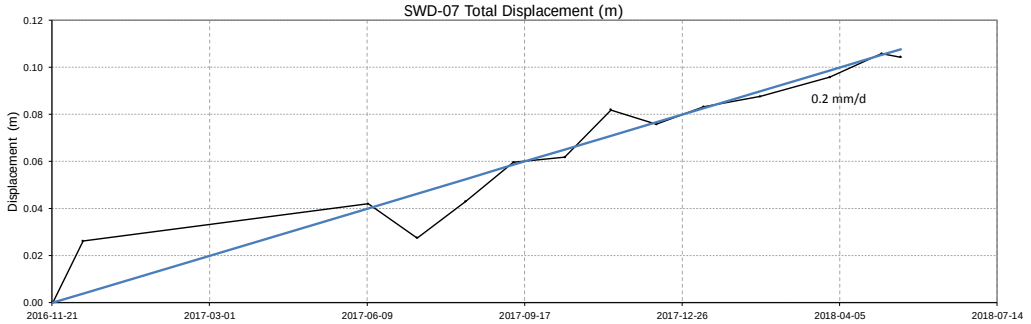
1. AutoCAD: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\GeotechInstrumentation.dwg
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\SWD_ASH_WSP_SurveyHubMonitoring_SRK.xlsm

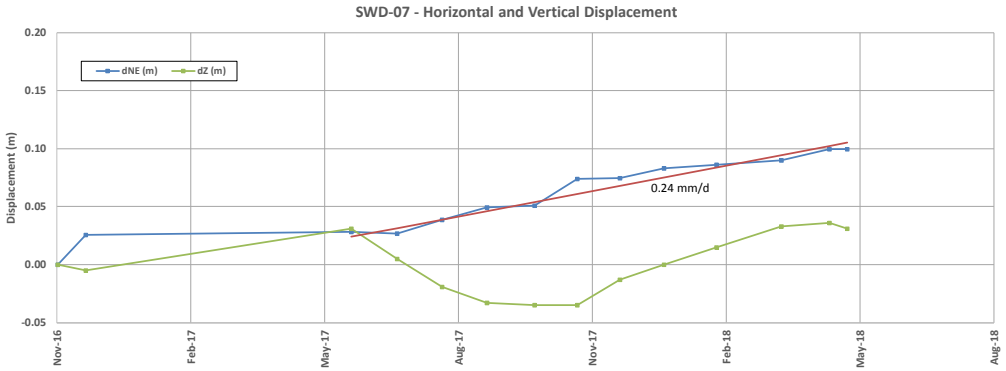
srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	**Survey Hub – SWD-06**
		Date: August 2018 / Prepared by: PHM / Figure: **3**

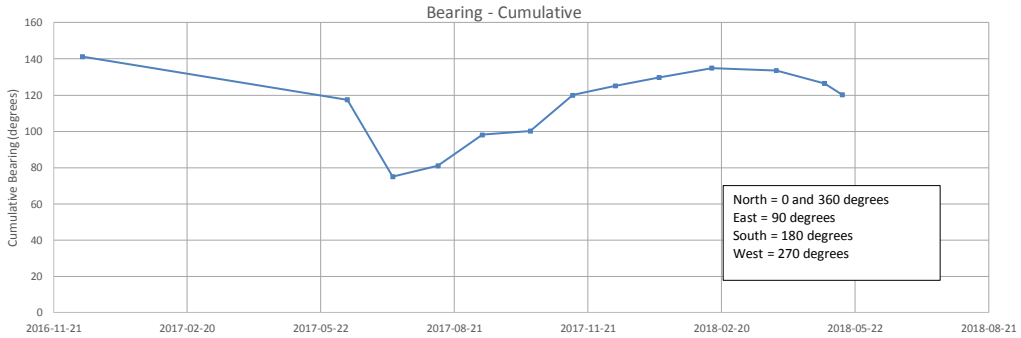


Notes

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





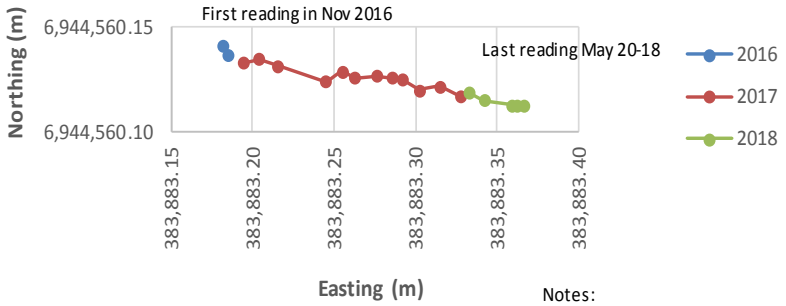


Source files:

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

srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	**Survey Hub – SWD-07**
		Date: August 2018 / Prepared by: PHM / Figure: **4**

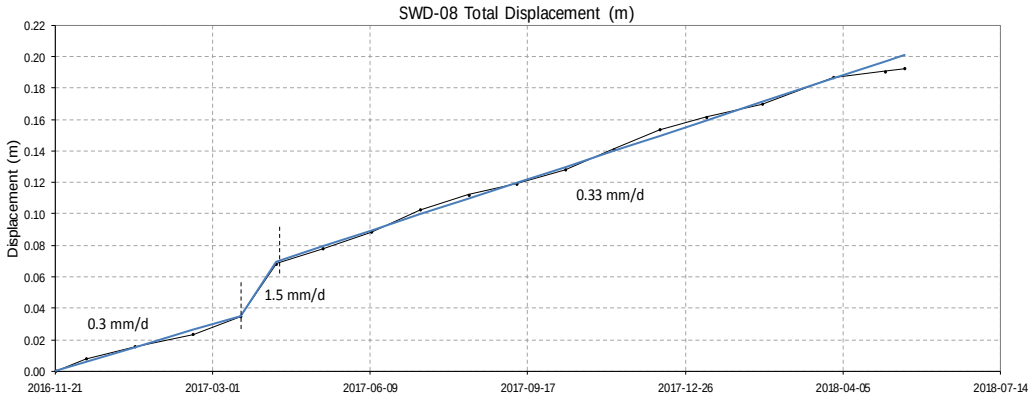
SWD08 - Northing Vs. Easting Movement Plot

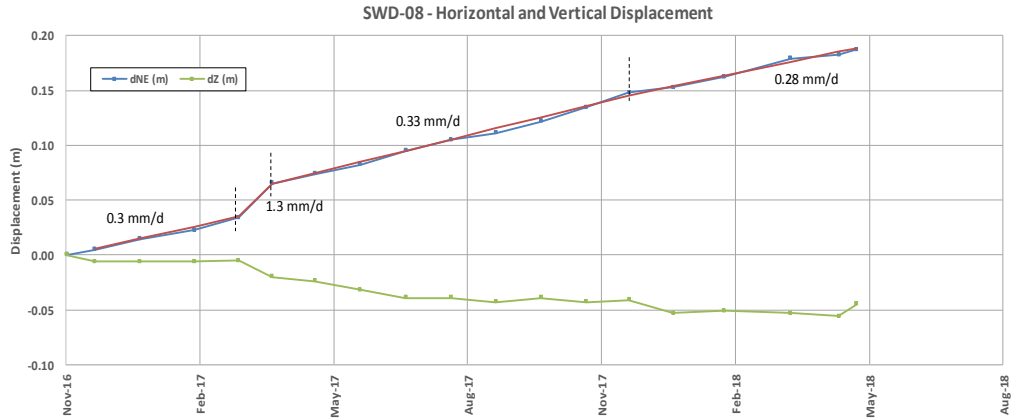


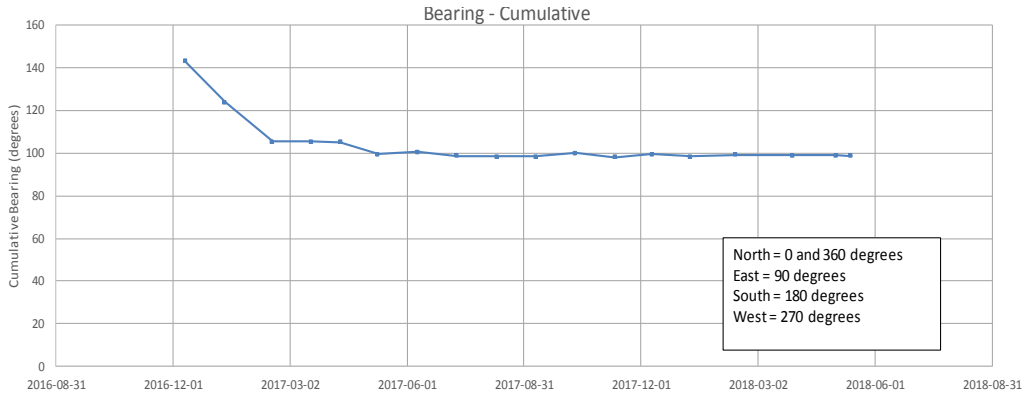
Notes:
Coordinate system is NAD 83 UTM Zone 8.

Notes

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



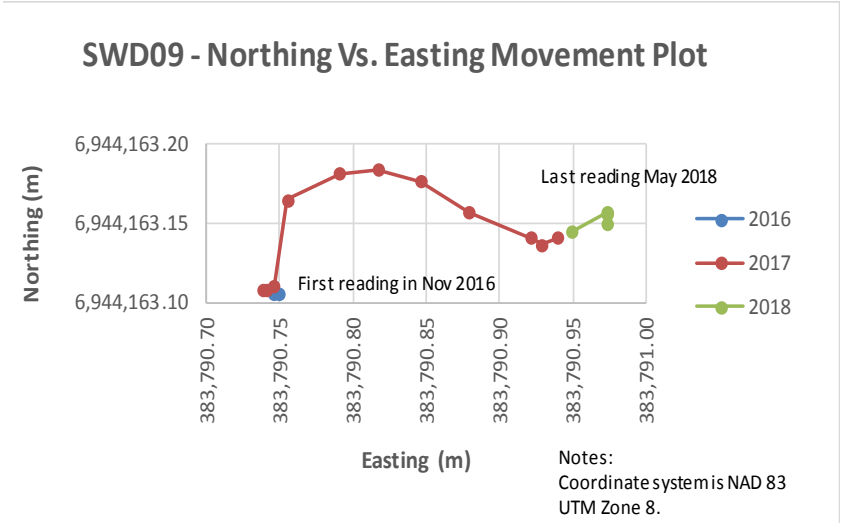




Source files:

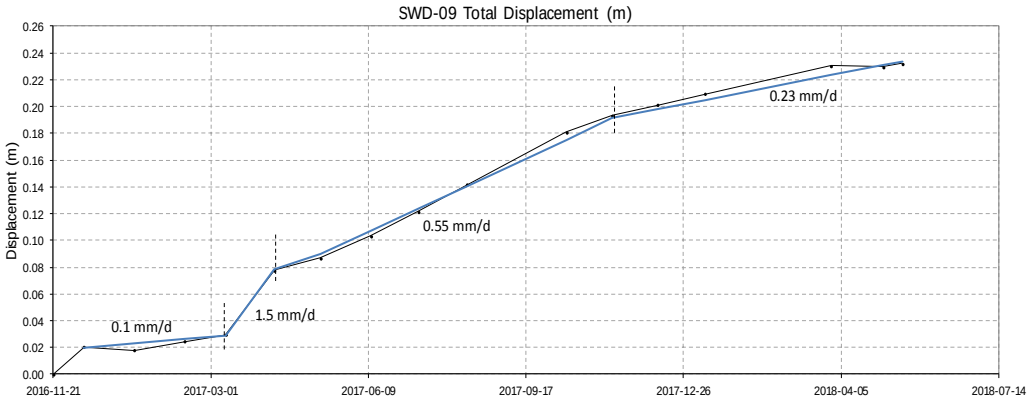
1. AutoCAD: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\GeotechInstrumentation.dwg
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\SWD_ASH_WSP_SurveyHubMonitoring_SRK.xlsm

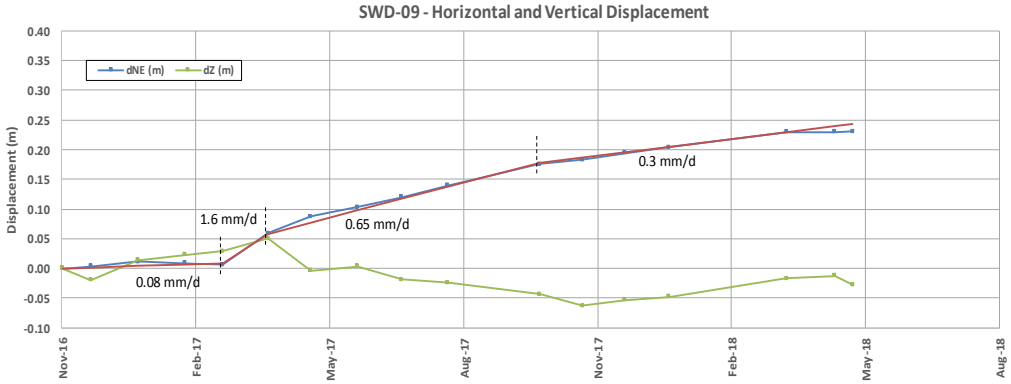
srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	**Survey Hub – SWD-08**
		Date: August 2018 / Prepared by: PHM / Figure: **5**

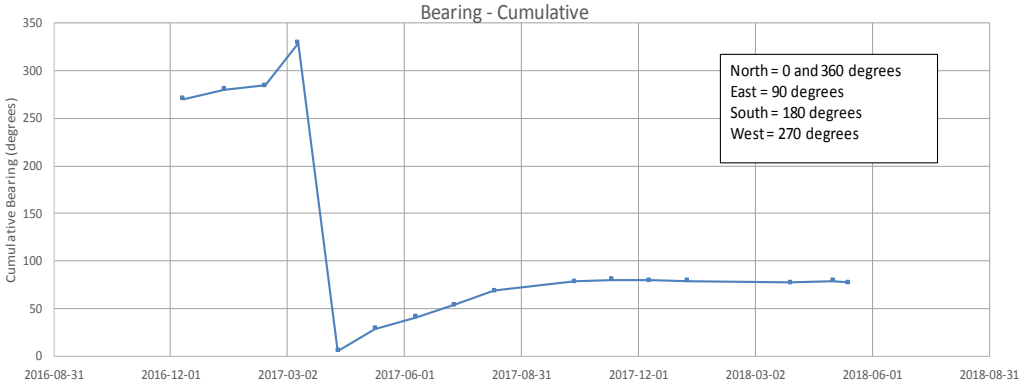


Notes

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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srk consulting

Job No: 1CM002.063

Filename: ApF_2018SWD Instrumentation.pptx

Minto Explorations Ltd.

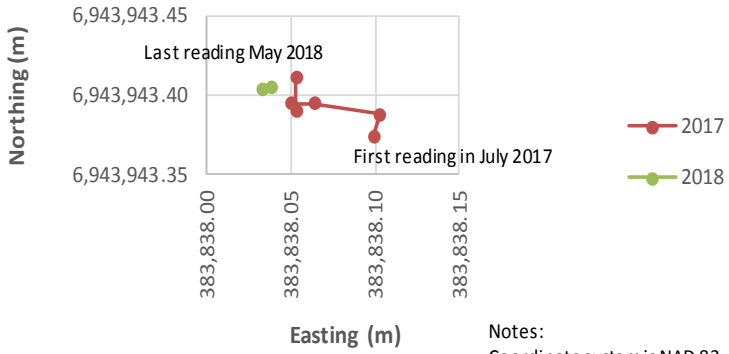
Minto Mine

SWD Instrumentation Data

Survey Hub – SWD-09

Date:	Prepared by	Figure:
August 2018	PHM	6

SWD10 - Northing Vs. Easting Movement Plot

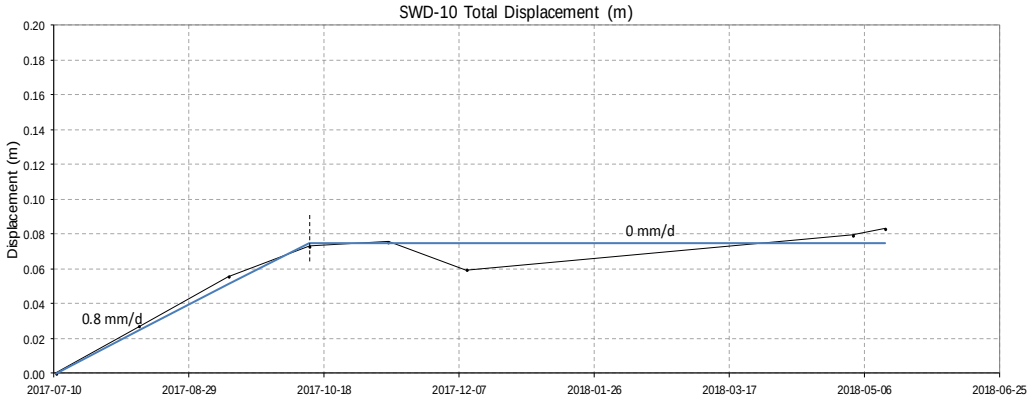


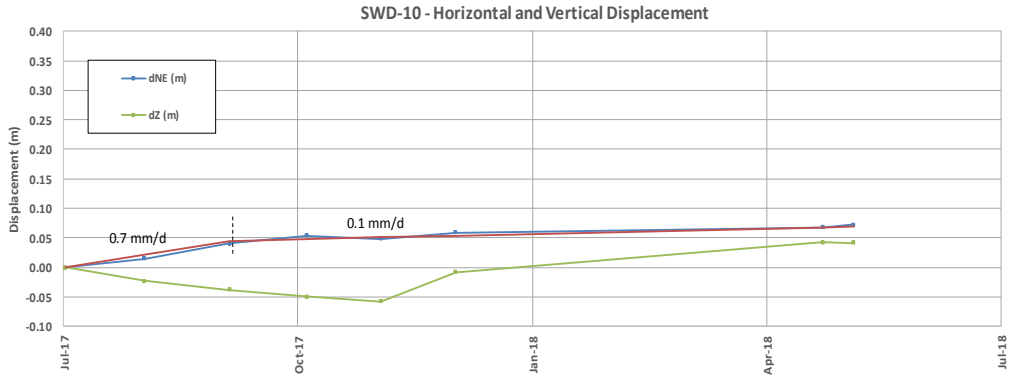
Notes:
Coordinate system is NAD 83

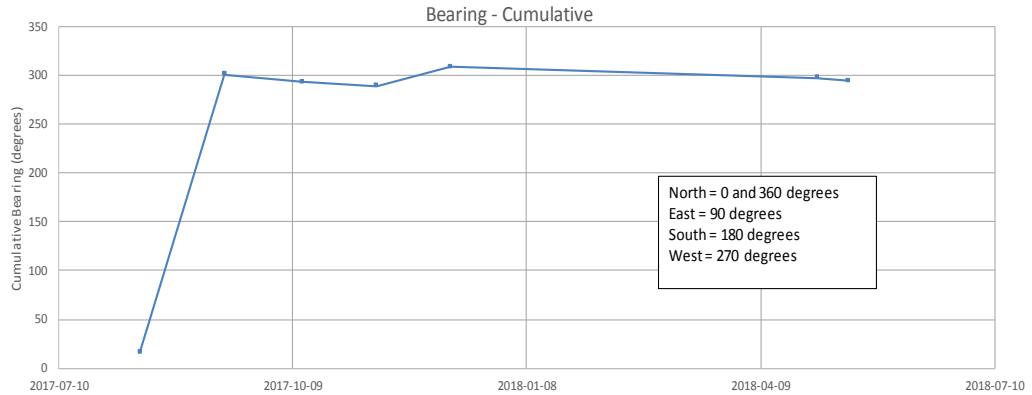
Notes

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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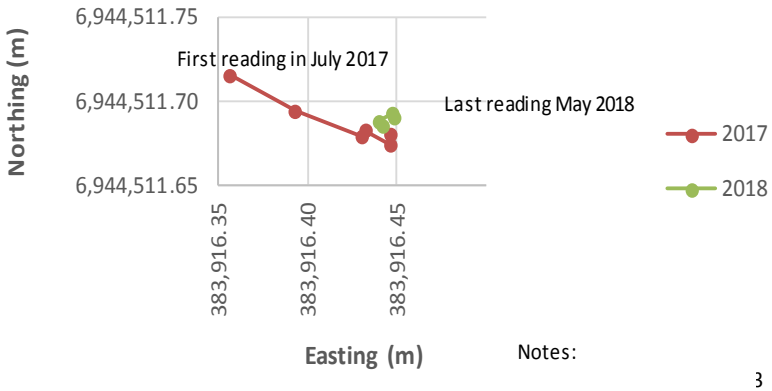
srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	**Survey Hub – SWD-10**
		Date: August 2018 / Prepared by: PHM / Figure: 7

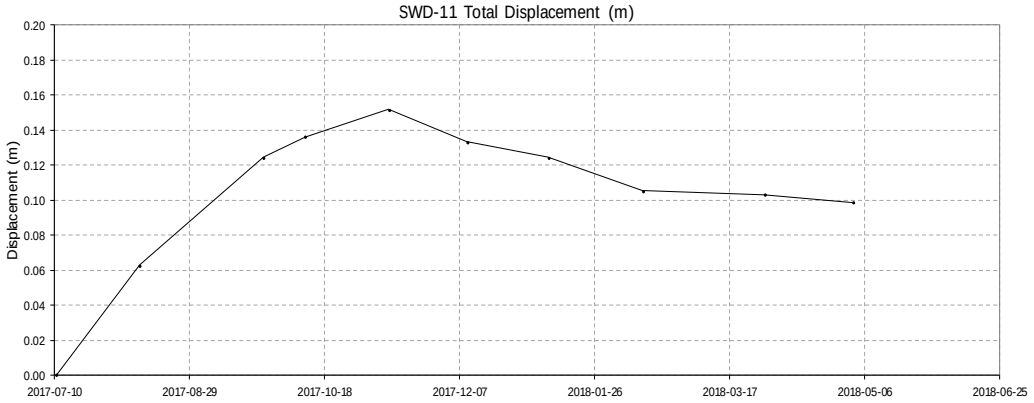
SWD11 - Northing Vs. Easting Movement Plot

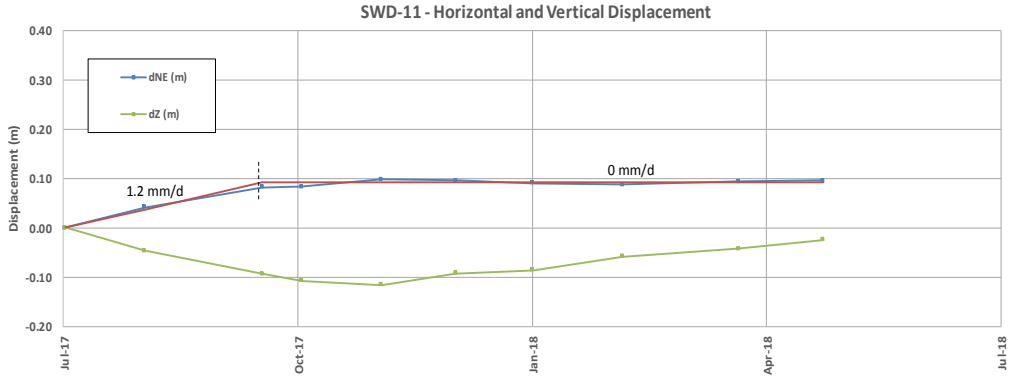


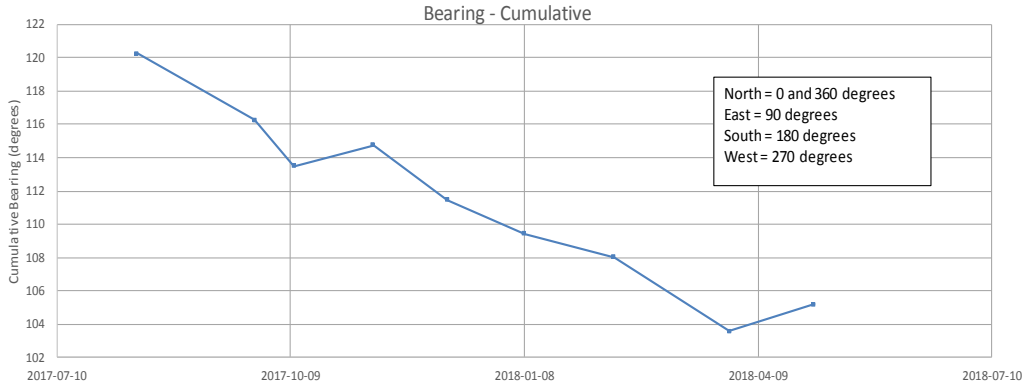
Notes:

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.*







Source files:

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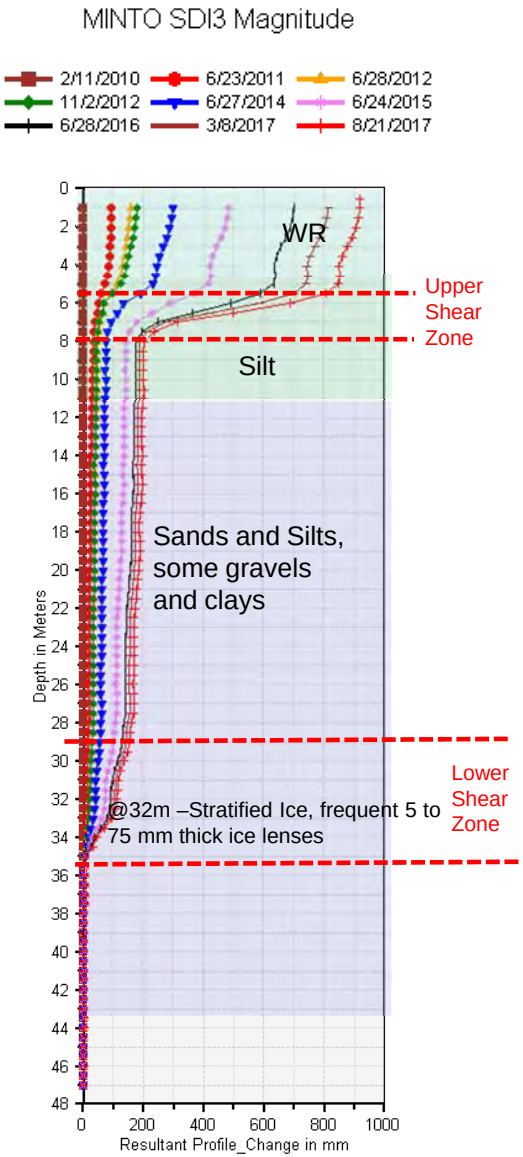
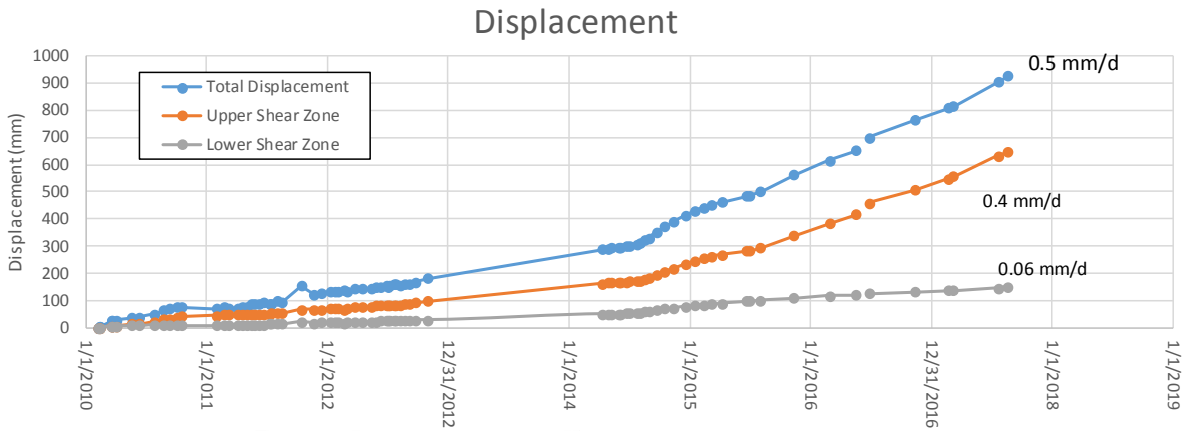
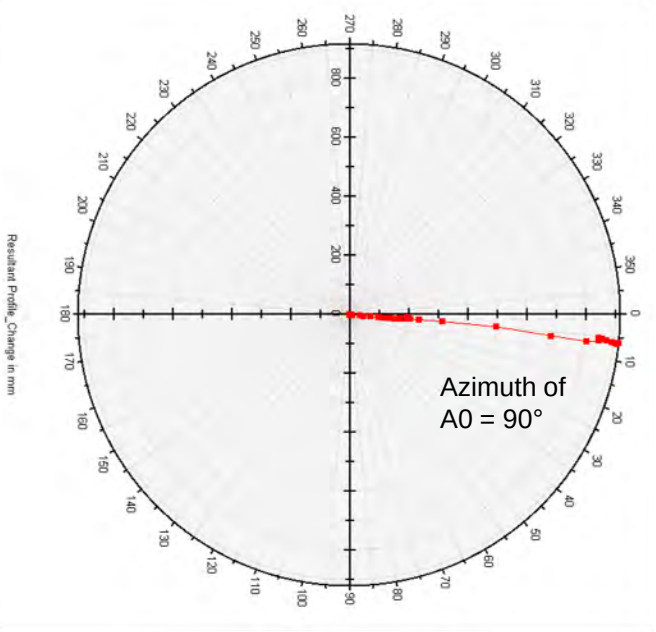
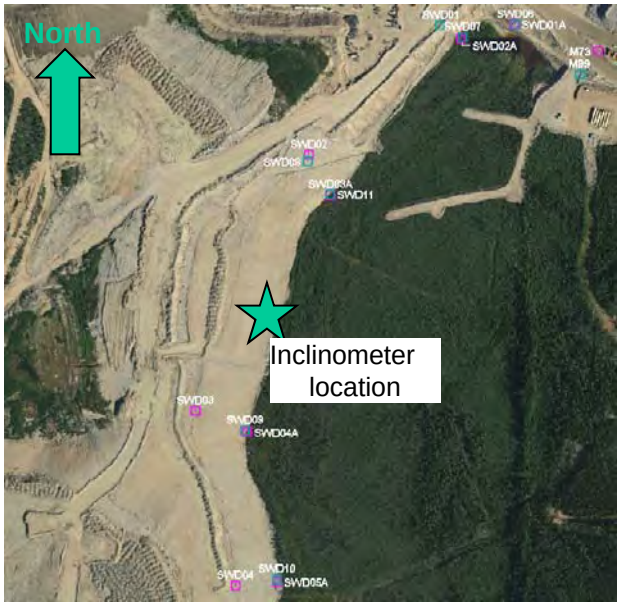
srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	**Survey Hub – SWD-11**
		Date: August 2018 / Prepared by: PHM / Figure: **8**







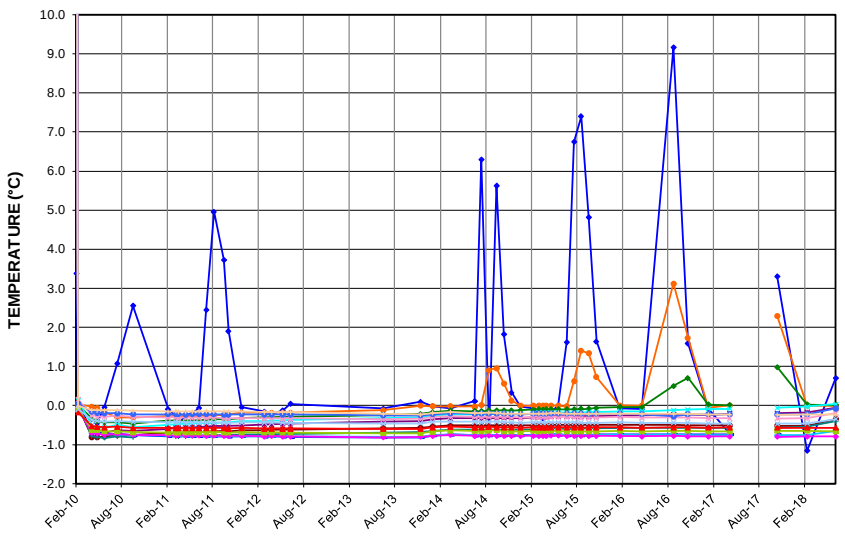


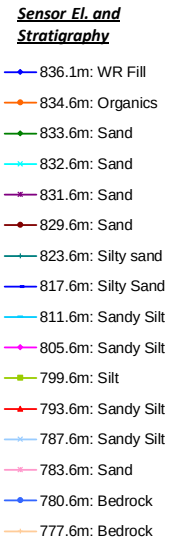
Note: Inclinometer software (DigiPro2 v2.12.4) plots A0 as 0 degrees. The plot above has been rotated such that the orientation matches the plan (north is up).

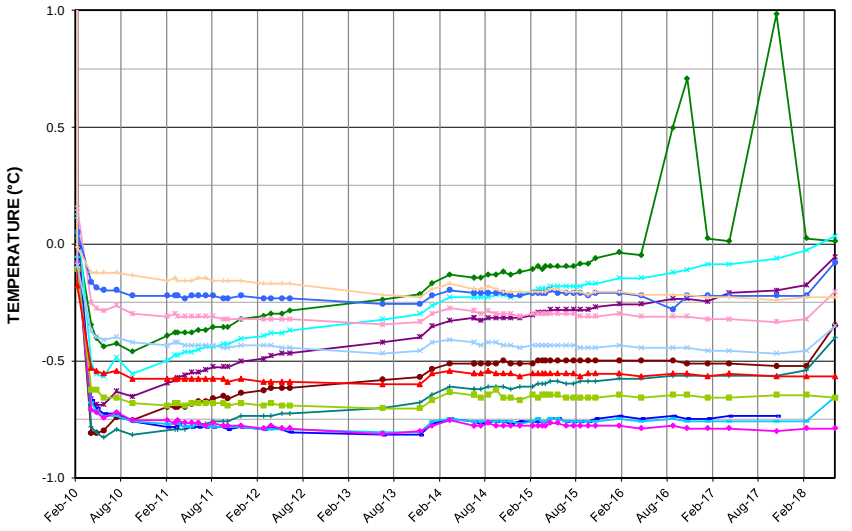
Source files:

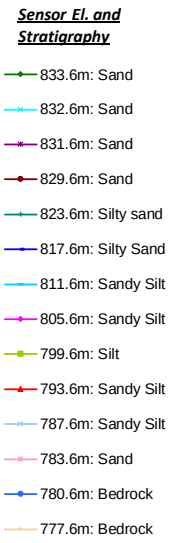
1. AutoCAD: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\GeotechInstrumentation.dwg
2. Instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\Minto SI Instrumentation Database.dpw

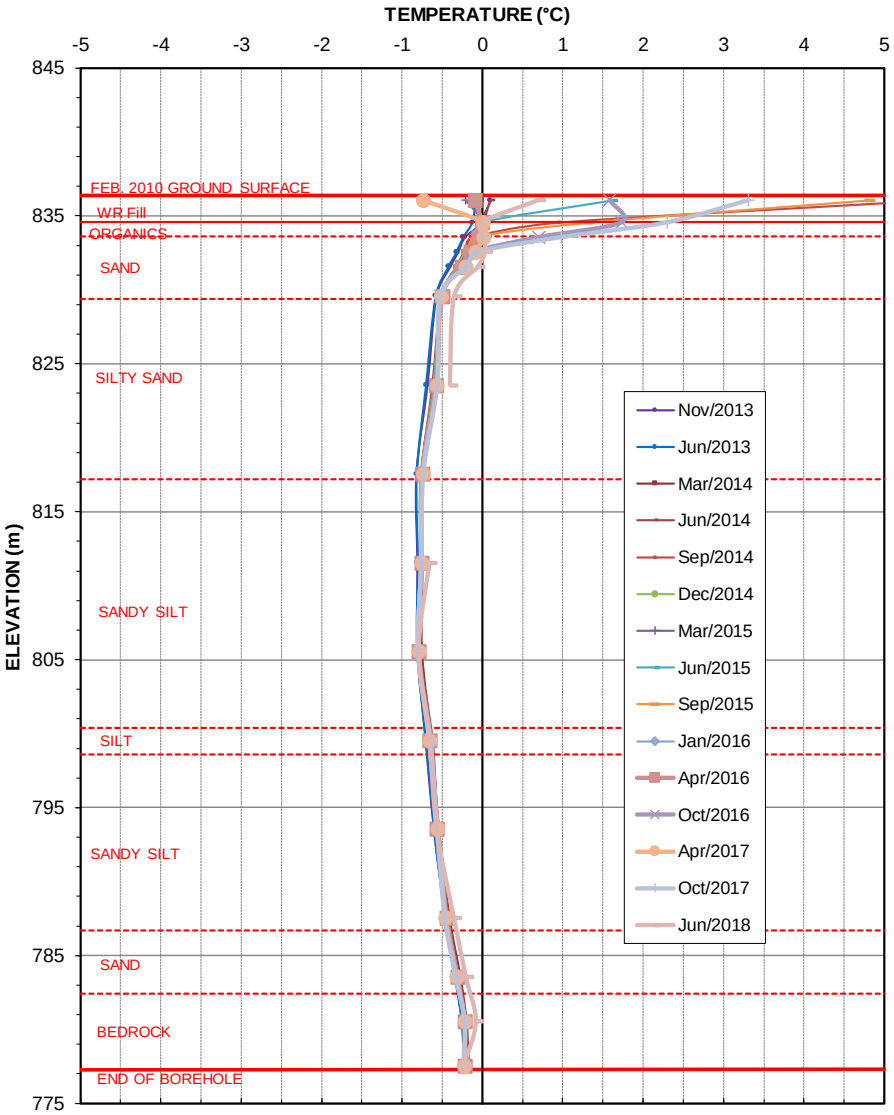
srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	**Inclinometer – SDI-3**
		Date: August 2018 / Prepared by: PHM / Figure: **9**











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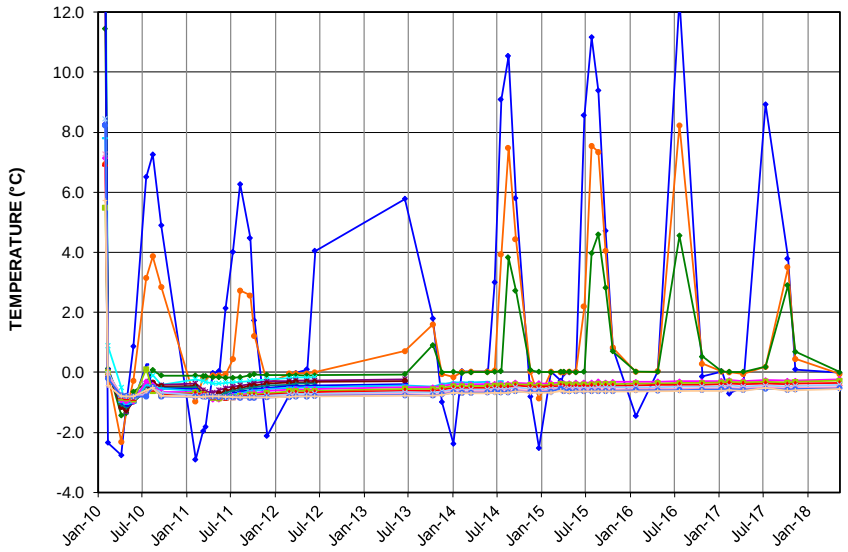
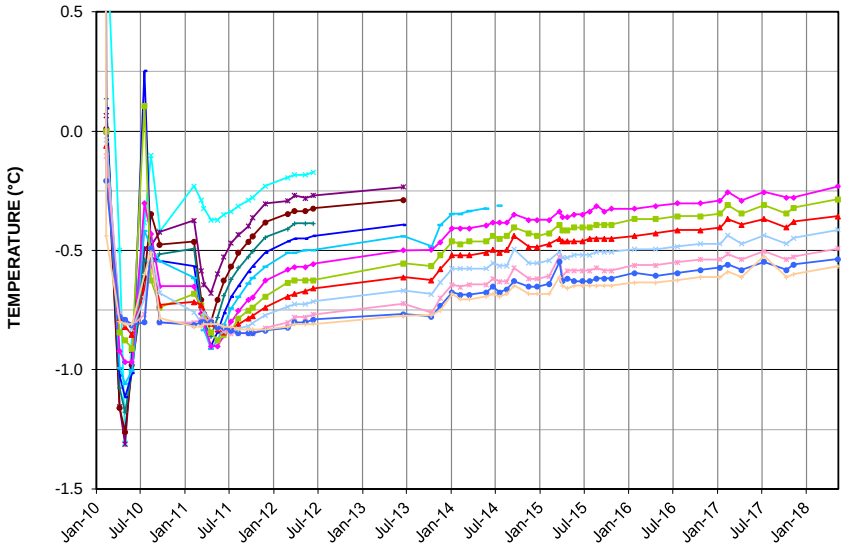
srk consulting	Minto Explorations Ltd.	SWD Instrumentation Data
		Temperature Cable – SDT-1
Job No: 1CM002.063 Filename: ApF_2018SWD Instrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **10**





Sensor El. and Stratigraphy

- 845.1m: WR Fill
- 844.9m: WR Fill
- 844.4m: Organics
- 843.9m: Sand
- 843.4m: Sand
- 842.9m: Sand
- 842.4m: Sand
- 841.9m: Sand
- 841.4m: Sand
- 840.4m: Sand
- 839.4m: Sandy Silt
- 838.4m: Sandy Silt
- 837.4m: Sandy Silt
- 836.4m: Sandy Silt
- 835.4m: Sandy Silt
- 834.4m: Sandy Silt

Sensor El. and Stratigraphy

- 843.9m: Sand
- 843.4m: Sand
- 842.9m: Sand
- 842.4m: Sand
- 841.9m: Sand
- 841.4m: Sand
- 840.4m: Sand
- 839.4m: Sandy Silt
- 838.4m: Sandy Silt
- 837.4m: Sandy Silt
- 836.4m: Sandy Silt
- 835.4m: Sandy Silt
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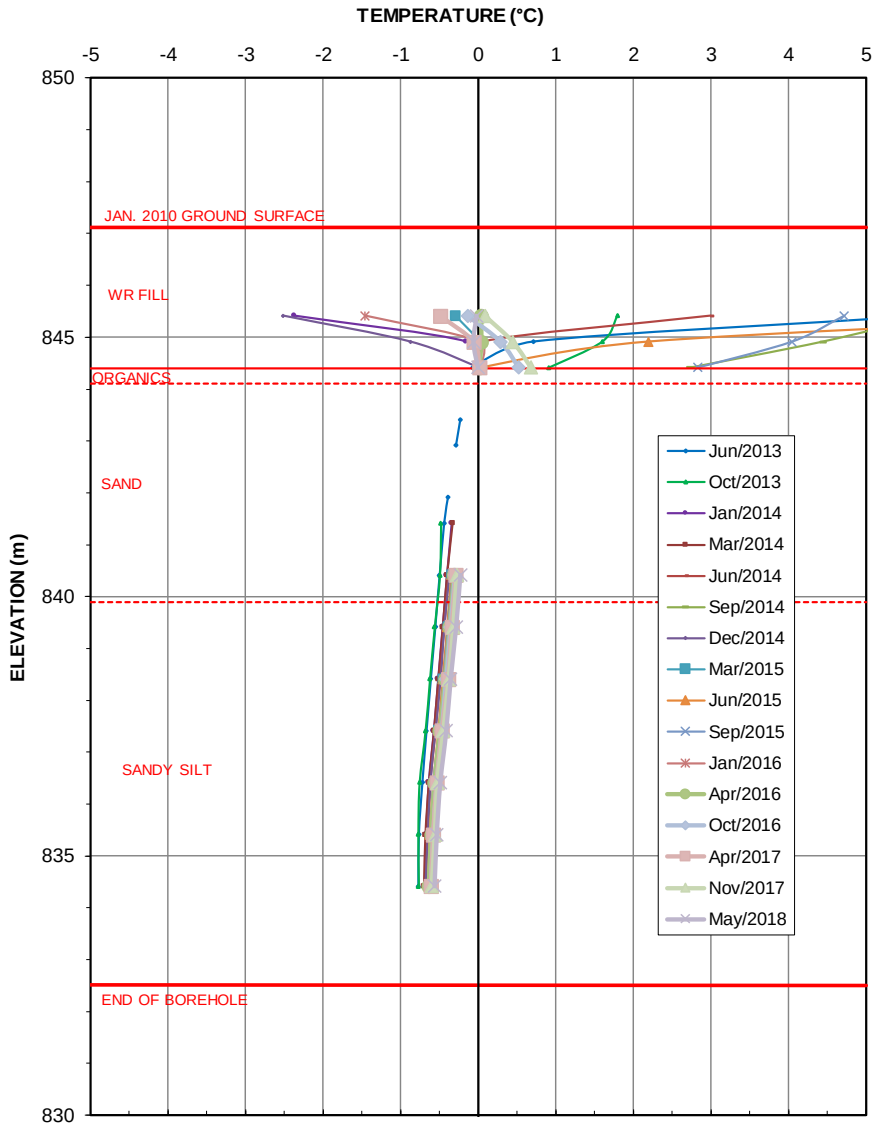

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Minto Explorations Ltd.

SWD Instrumentation Data

Temperature Cable – SDT-2

Job No: 1CM002.063

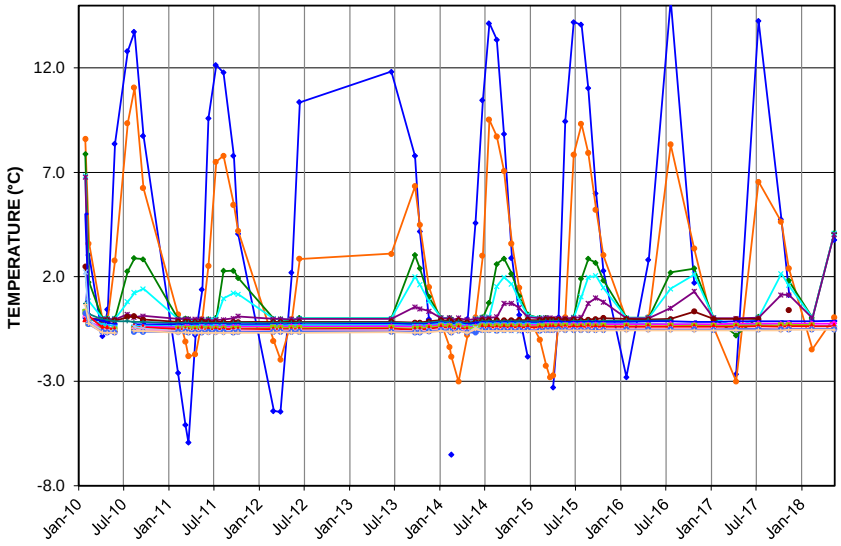
Filename: ApF_2018SWD Instrumentation.pptx

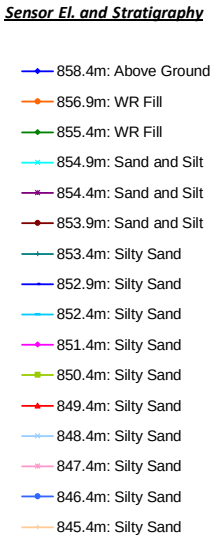
Minto Mine

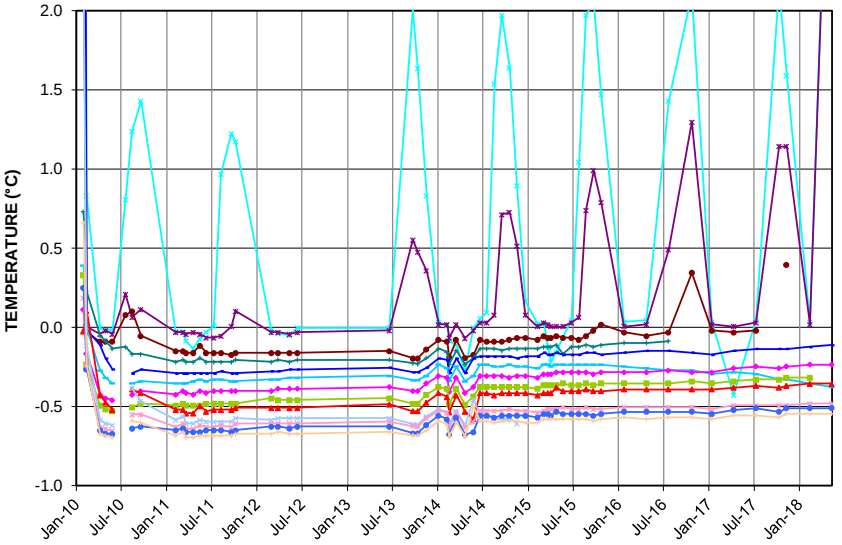
Date: August 2018

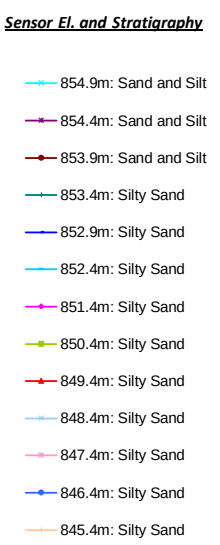
Prepared by PHM

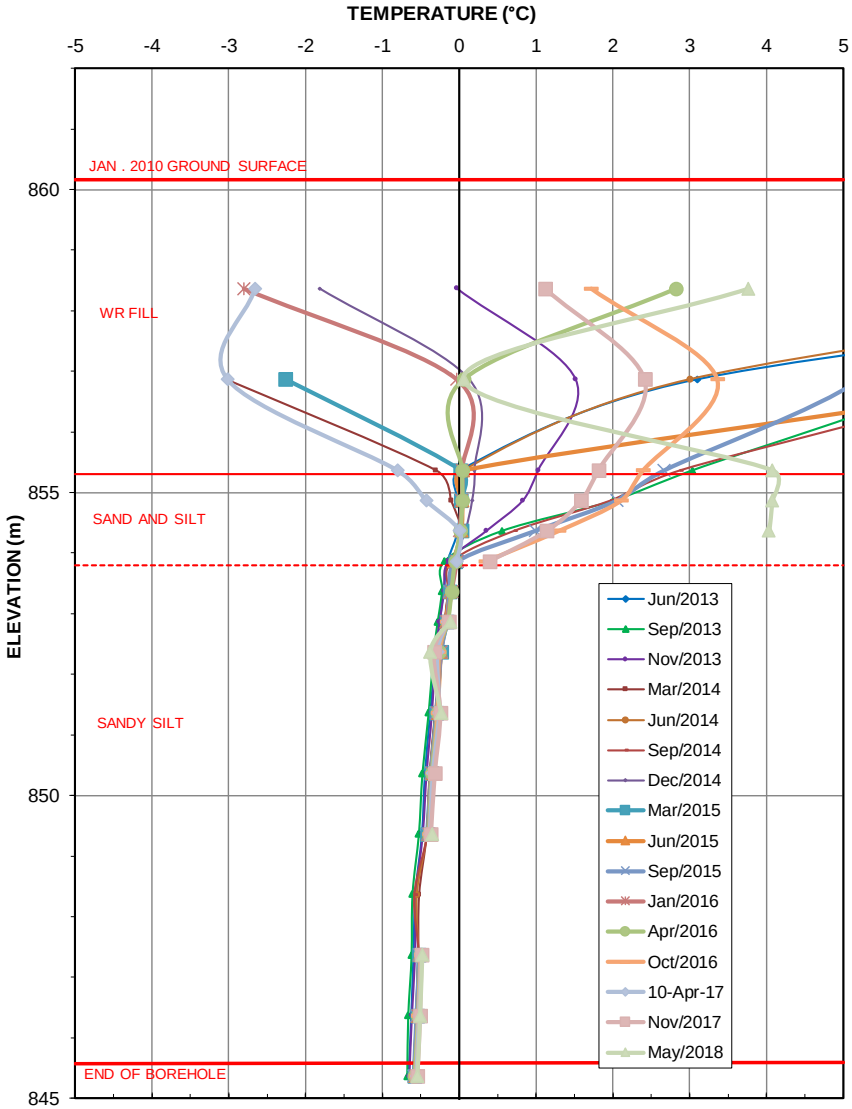
Figure: **11**











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Minto Explorations Ltd.

SWD Instrumentation Data

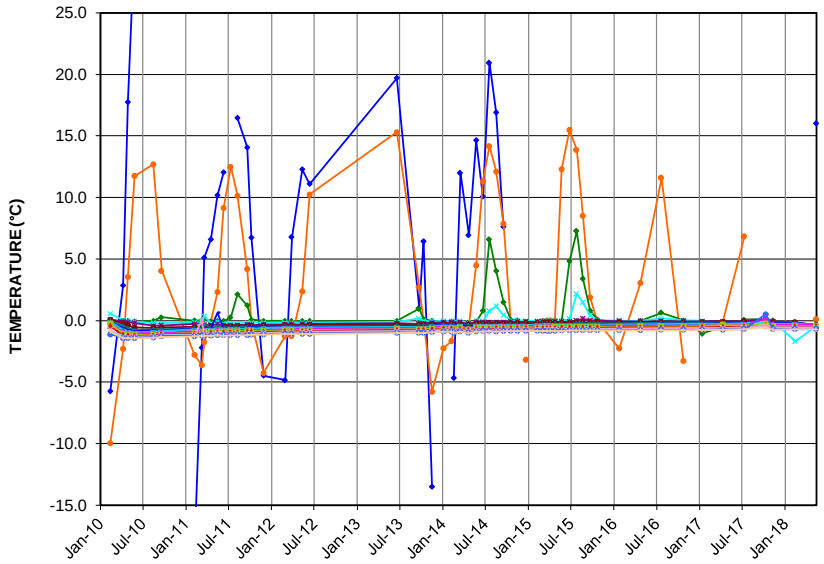
Temperature Cable – SDT-3

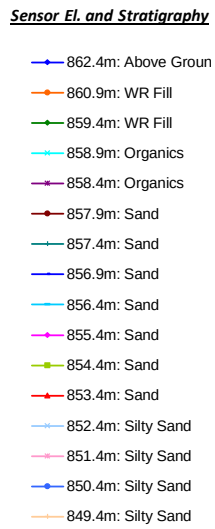
Job No: 1CM002.063

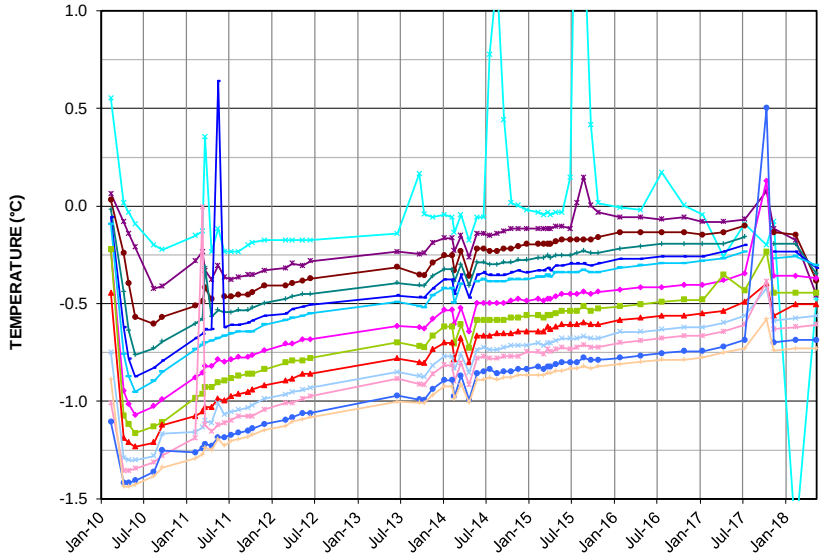
Filename: ApF_2018SWD Instrumentation.pptx

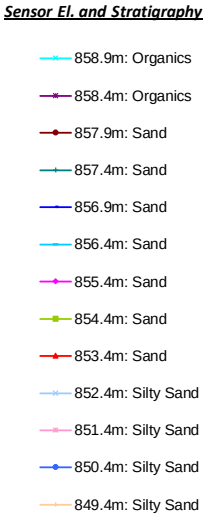
Minto Mine

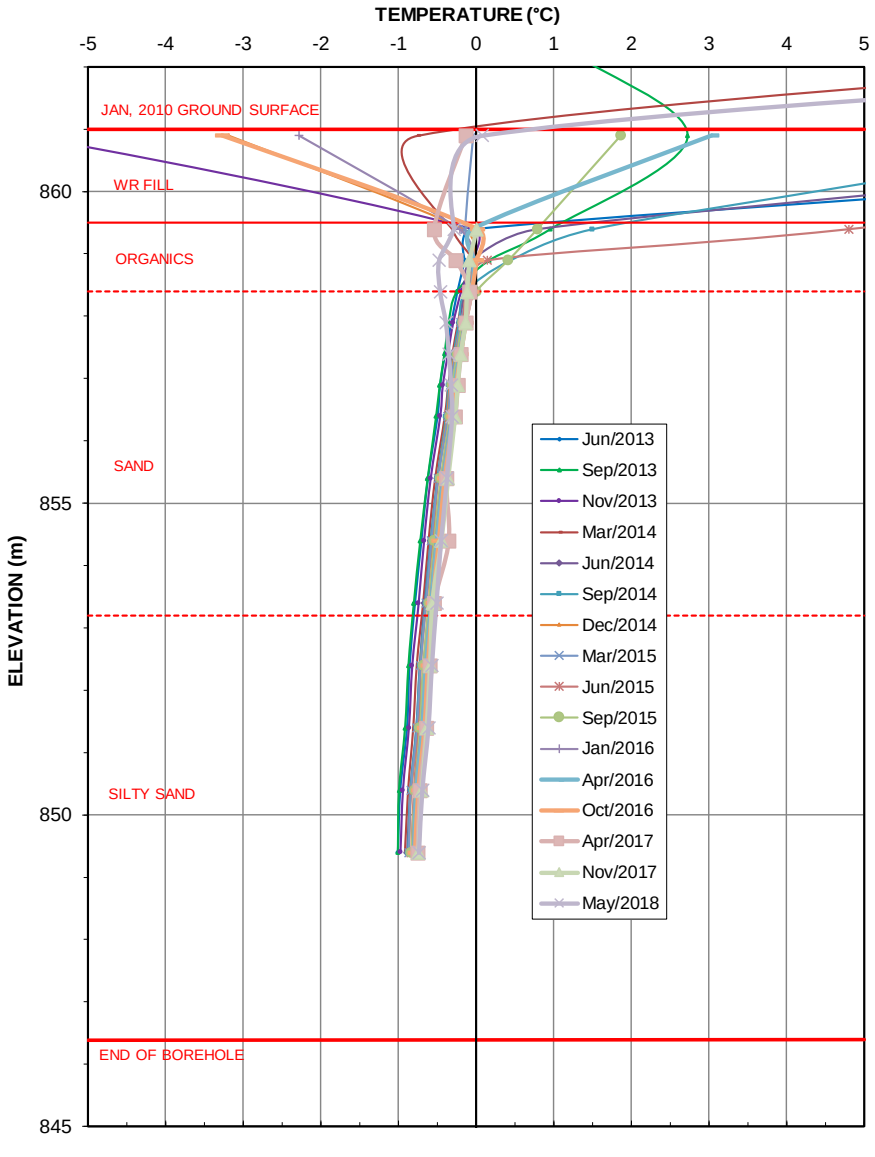
Date:	Prepared by	Figure:
August 2018	PHM	12











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srk consulting

Minto Explorations Ltd.

SWD Instrumentation Data

Temperature Cable – SDT-4

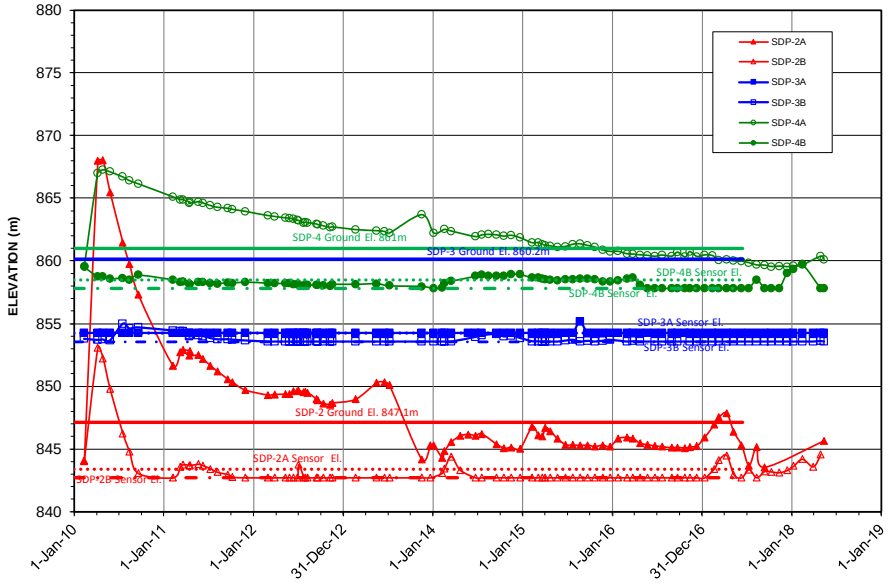
Job No: 1CM002.063

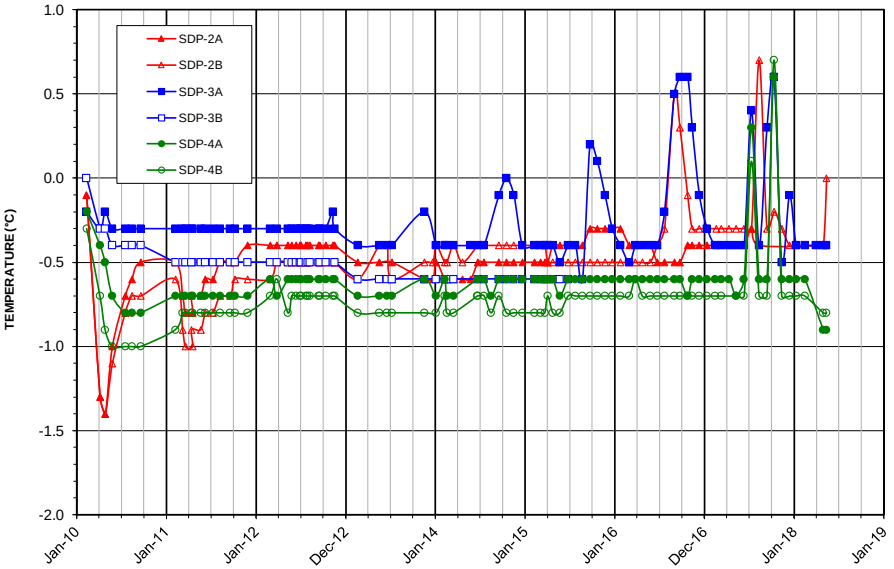
Filename: ApF_2018SWD Instrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	13

Southwest Dump Piezometers and Ground Temperature Cables





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SWD Instrumentation Data

Southwest Dump Piezometers

Job No: 1CM002.063

Filename: ApF_2018SWD Instrumentation.pptx

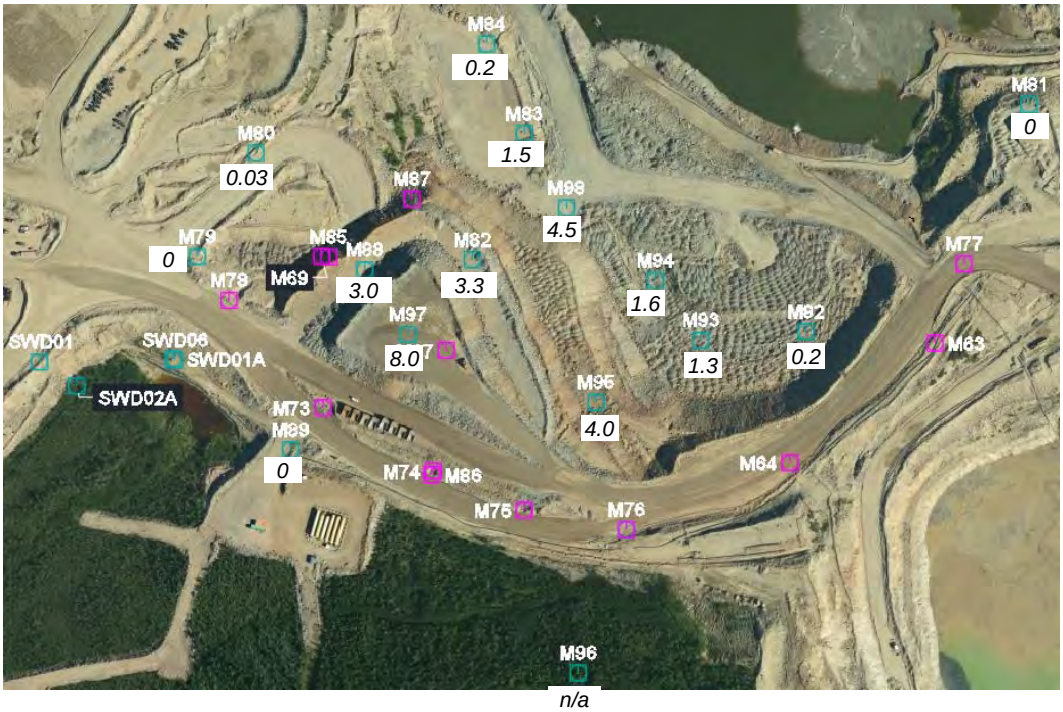
Minto Mine

Date:	Prepared by	Figure:
August 2018	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.*
3. *Survey hubs in cyan color are active.*
4. *Survey hubs in magenta area destroyed.*
5. *Survey hubs with no movement rates listed have been inactive for over one year.*



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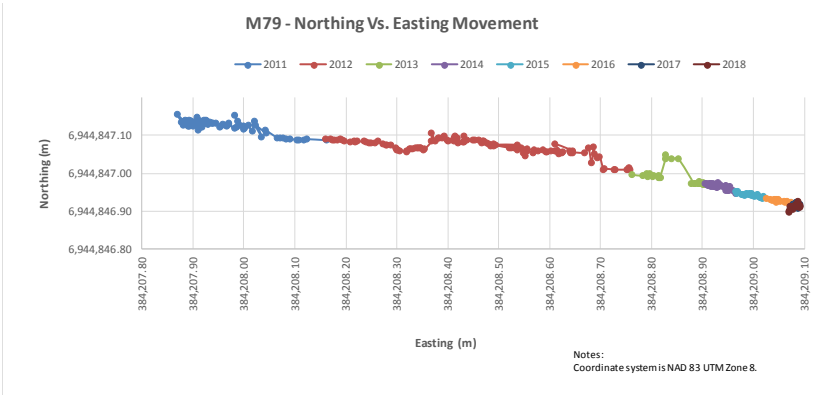
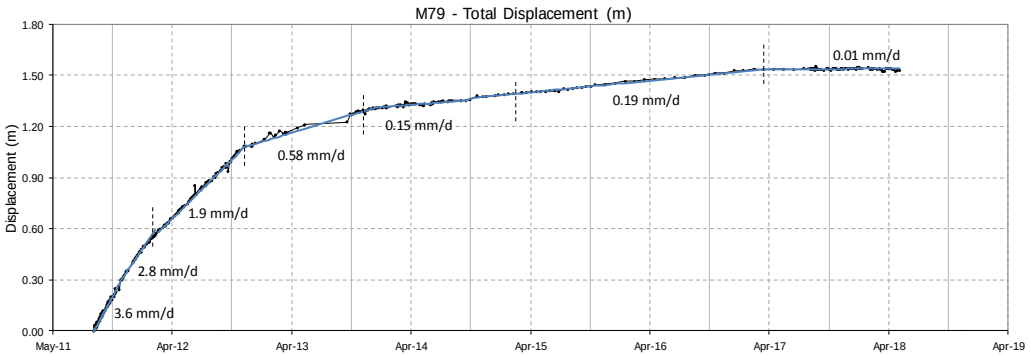
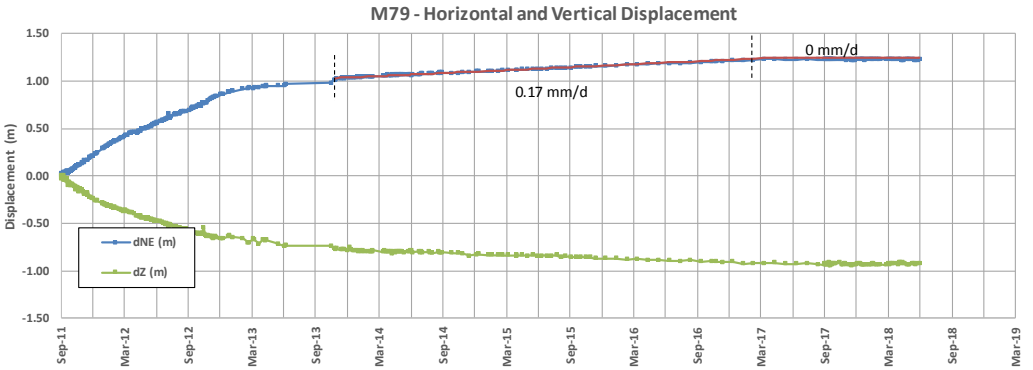
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMainPitSurveyHubs_SRK.xlsm

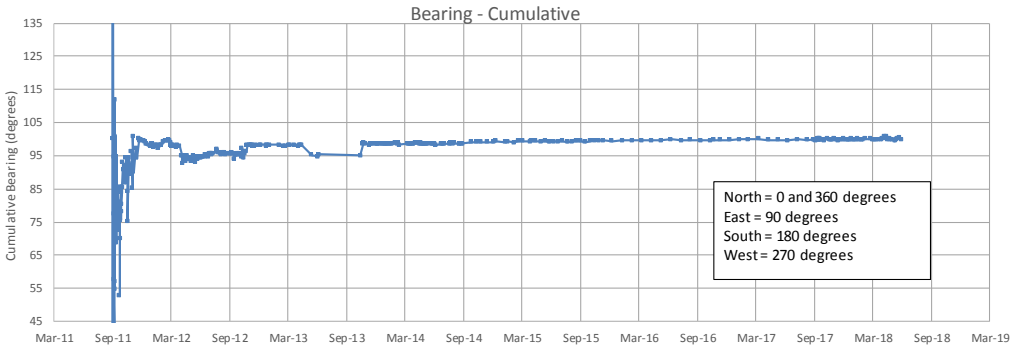
Main Pit Active Survey Hubs

Survey Hub	Last Reading	Movement Rate (mm/day)		Bearing (Cumulative)	Comments
		June 17	June 18		
M79	6/1/2018	0.2	0.0	100	No significant movement.
M80	6/4/2018	0.04	0.03	10	Minor movement and with deceleration trend observable.
M81	5/25/2018	0.0	0.0	100	No significant horizontal movement. Observed movement is largely fill settlement.
M82	6/4/2018	2.0	3.3	105	Increase in movement related to the construction of the MPD. Movement rate has decreased since completion of the dump.
M83	6/4/2018	0.7	1.5	52	Movement turning towards North, likely related to loading from MPD consturction. Movement decelerating since completion of MPD construction
M84	6/4/2018	0.1	0.2	64	Accelerated slightly compared to 2017(possibly due to MPD consturction), movment rate has been steady since October 2017.
M88	6/4/2018	-	3.0	40	Decellerating.
M89	6/4/2018	-	0.0	-	No significant movement.
M92	6/4/2018	-	0.2	27	Additional data needed to evaluate trends. It is possible no movement is occuring with the hub settling as a result of the spring thaw.
M93	6/4/2018	-	1.3	60	Decellerating since completion of MPD
M94	6/4/2018	-	1.6	55	Decellerating since completion of MPD
M95	6/4/2018	-	4.0	44	Additional data needed to evaluate trends
M96	6/4/2018	-	n/a	n/a	Additional data needed to evaluate trends
M97	6/4/2018	-	8.0	356	Additional data needed to evaluate trends
M98	6/4/2018	-	4.5	61	Additional data needed to evaluate trends









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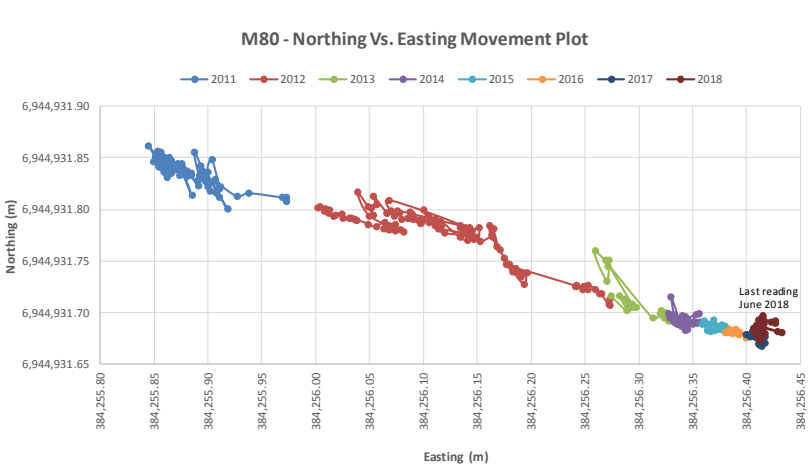
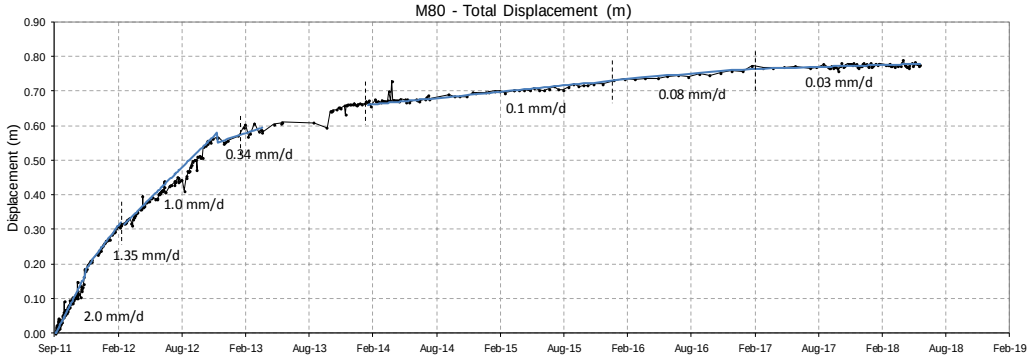
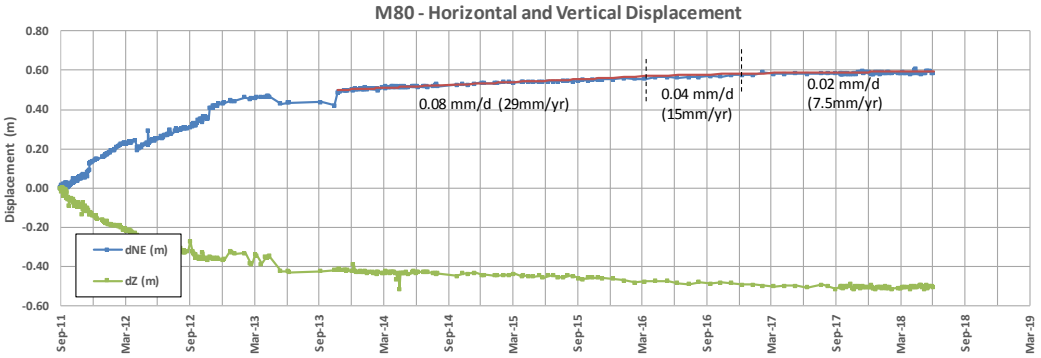
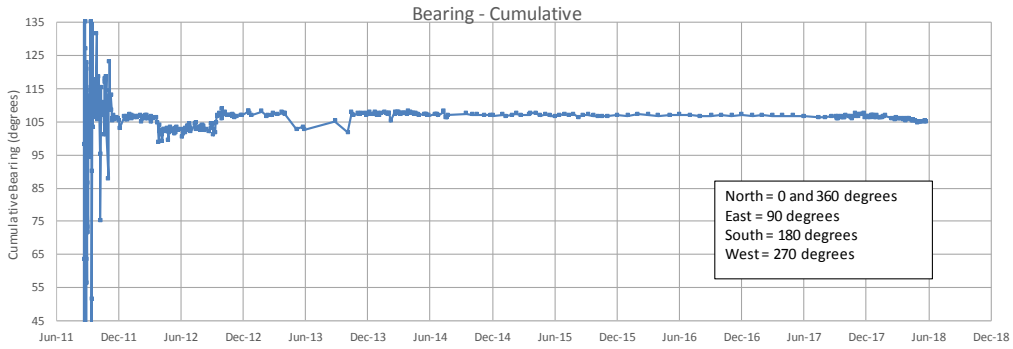
srk consulting	Minto Explorations Ltd.	Main Pit Instrumentation Data
		Survey Hub – M79
Job No: 1CM002.063 Filename: ApG_2017MainPitInstrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **2**









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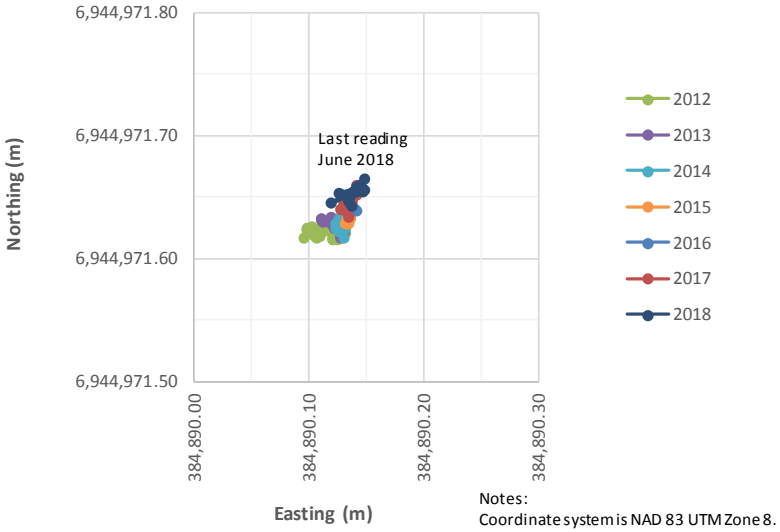
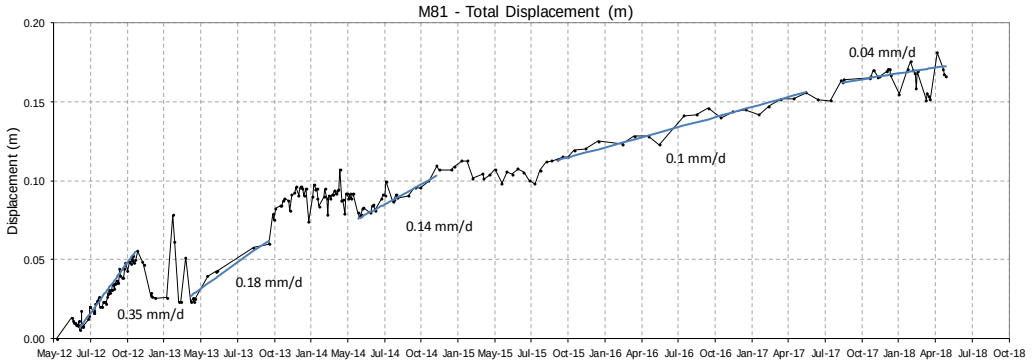
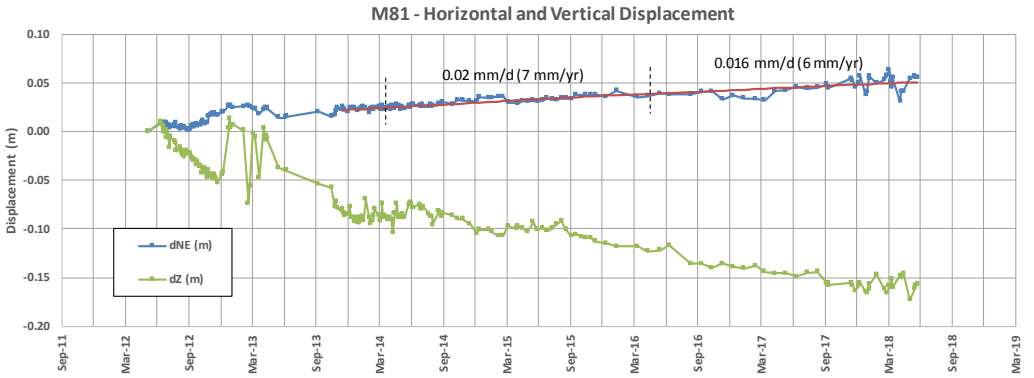
srk consulting	Minto Explorations Ltd.	Main Pit Instrumentation Data
		Survey Hub – M80
Job No: 1CM002.063 Filename: ApG_2017MainPitInstrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **3**

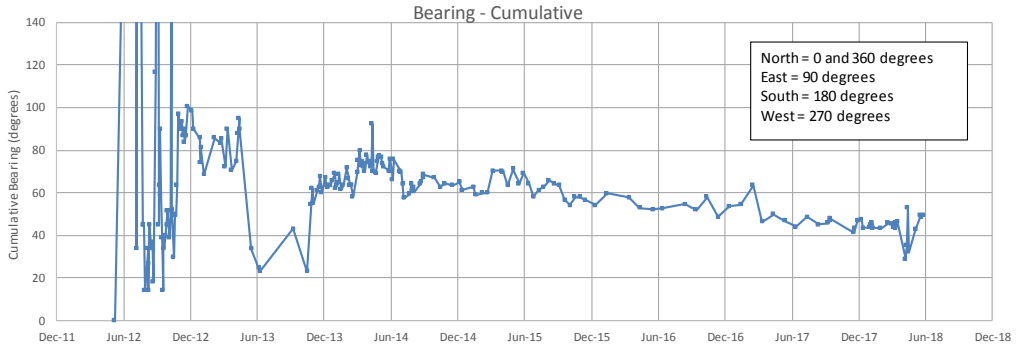
M81 - Northing Vs. Easting Movement Plot



Notes:
Coordinate system is NAD 83 UTM Zone 8.







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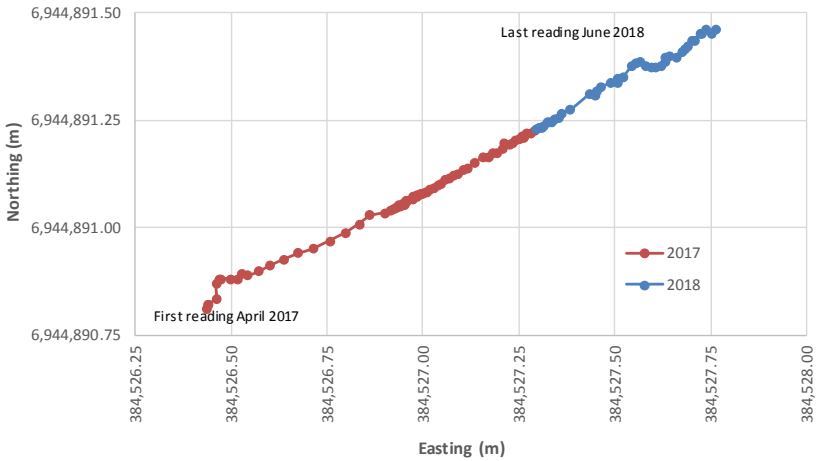
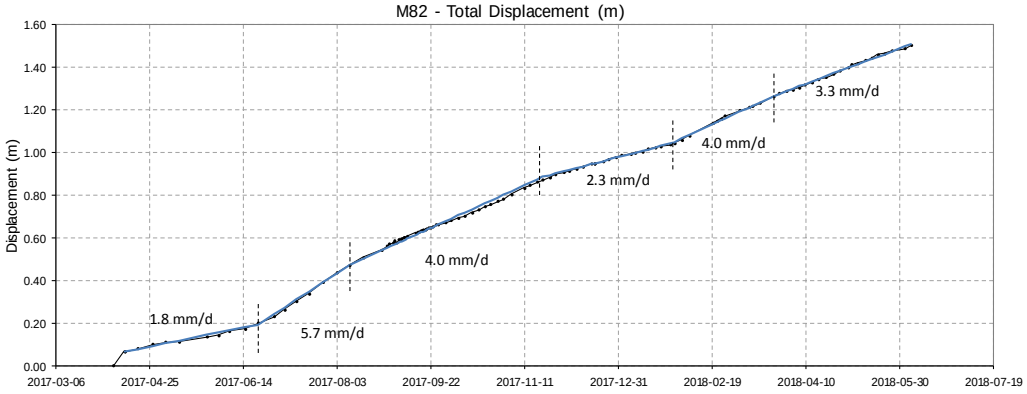
		Survey Hub – M81
Job No: 1CM002.063 Filename: ApG_2017MainPitInstrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **4**

M82 - Northing Vs. Easting Movement Plot

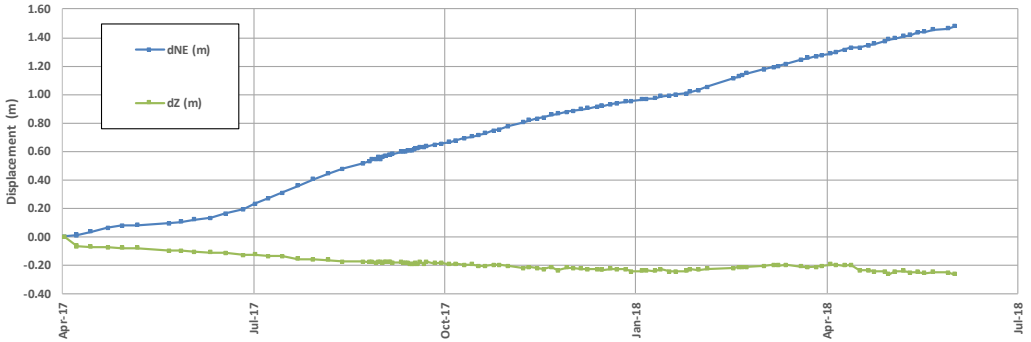


Notes:
Coordinate system is NAD 83 UTM Zone 8.

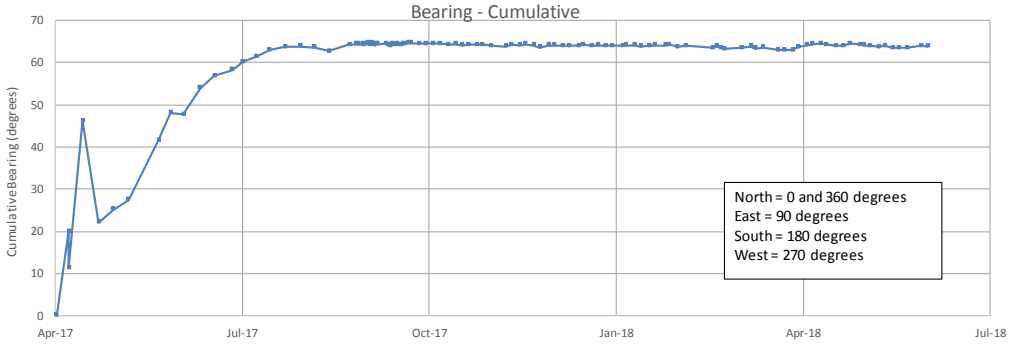
M82 - Total Displacement (m)



M82 - Horizontal and Vertical Displacement



Bearing - Cumulative



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Main Pit Instrumentation Data

Survey Hub – M82

Job No: 1CM002.063

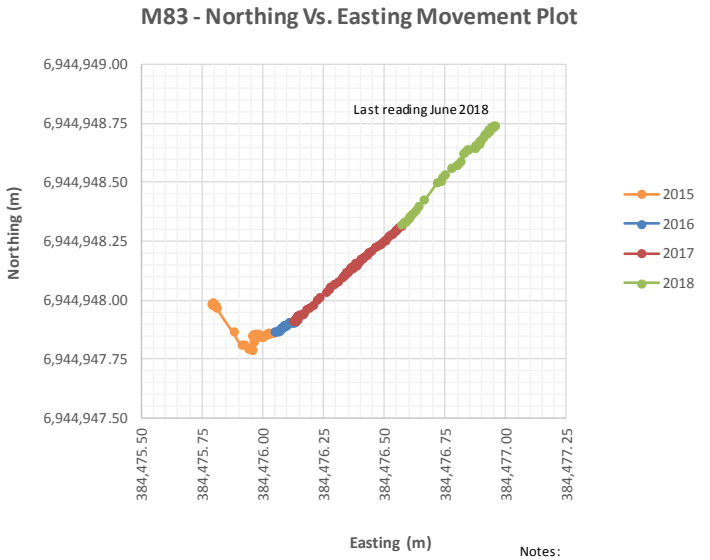
Filename: ApG_2017MainPitInstrumentation.pptx

Minto Mine

Date: August 2018

Prepared by PHM

Figure: **5**



Notes:
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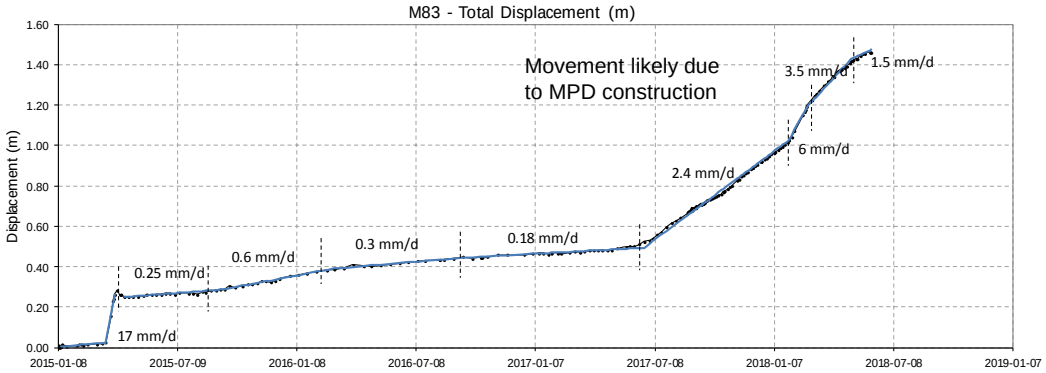

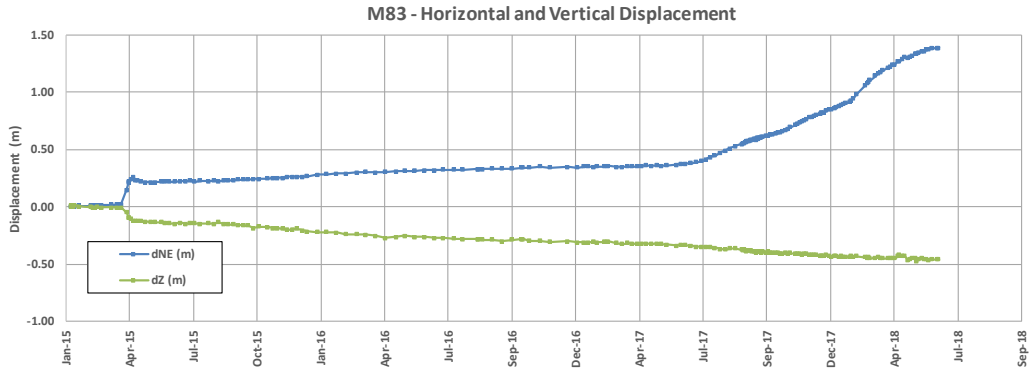

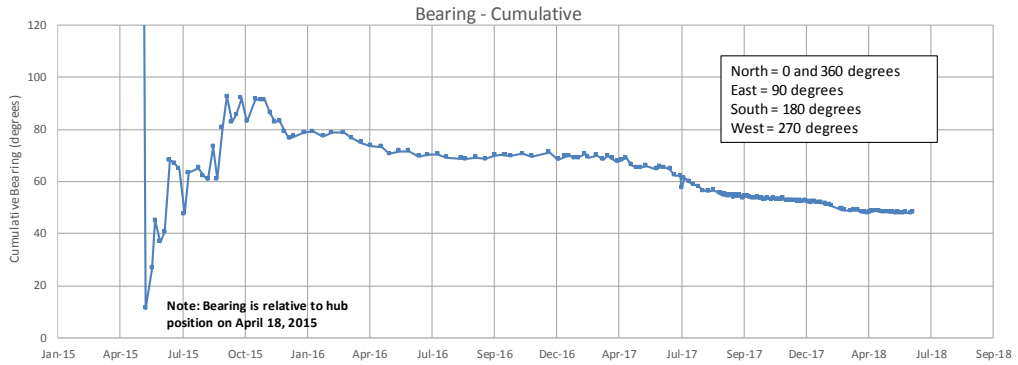

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Main Pit Instrumentation Data

Survey Hub – M83

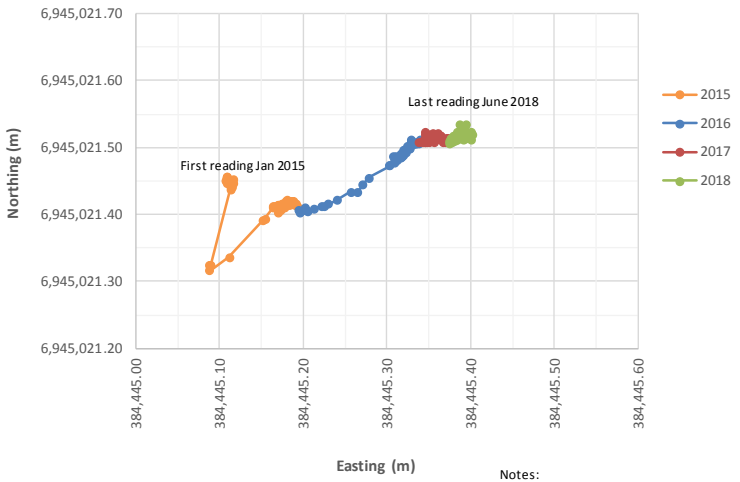
Job No: 1CM002.063

Filename: ApG_2017MainPitInstrumentation.pptx

Minto Mine

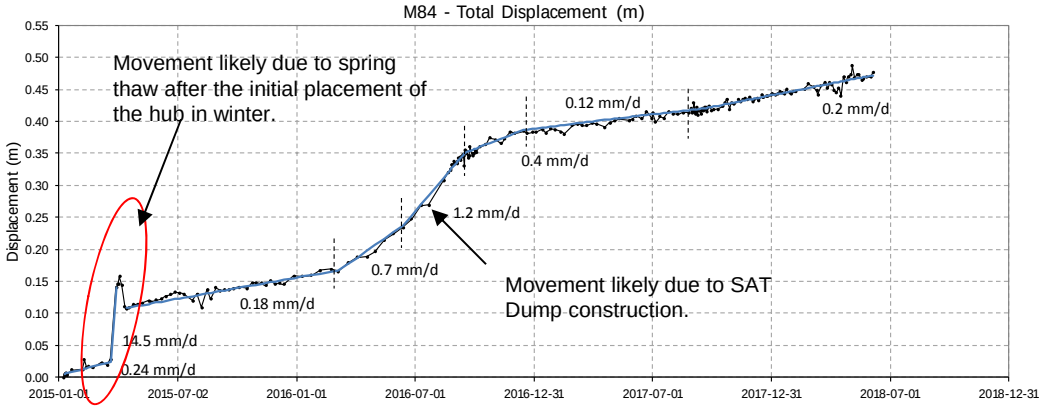
Date:	Prepared by	Figure:
August 2018	PHM	6

M84 - Northing Vs. Easting Movement Plot

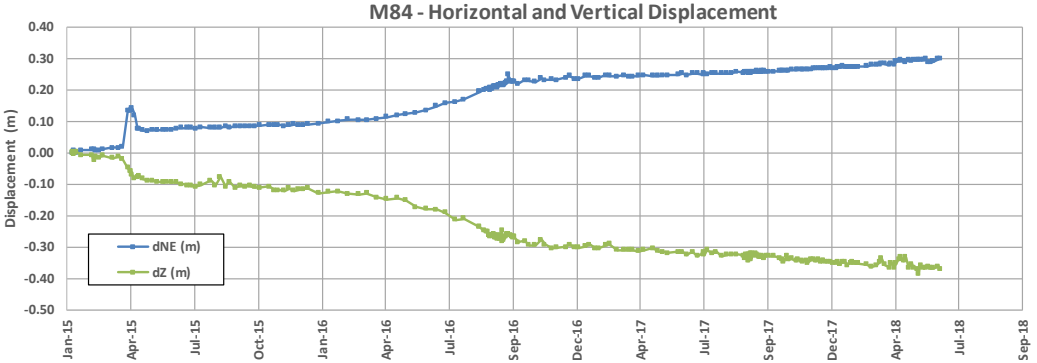


Notes:
Coordinate system is NAD 83 UTM Zone 8.

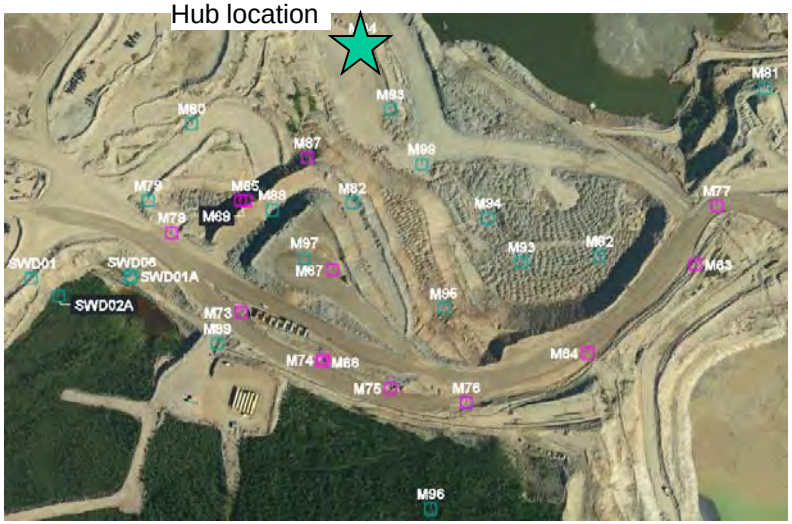
M84 - Total Displacement (m)



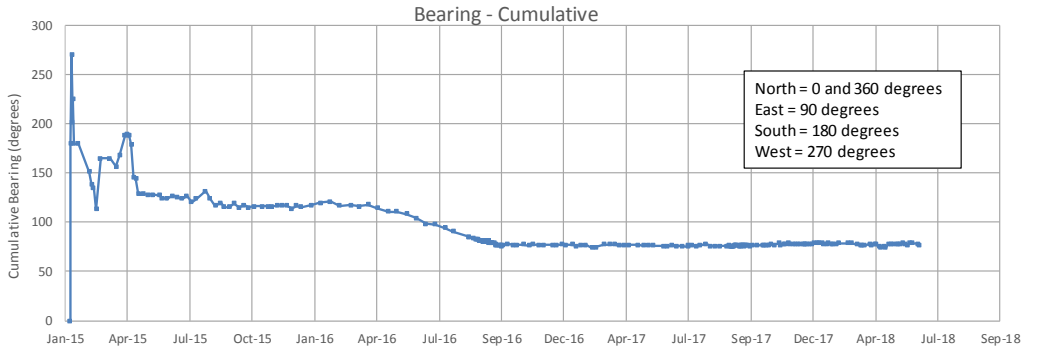
M84 - Horizontal and Vertical Displacement



Hub location



Bearing - Cumulative



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Main Pit Instrumentation Data

Survey Hub – M84

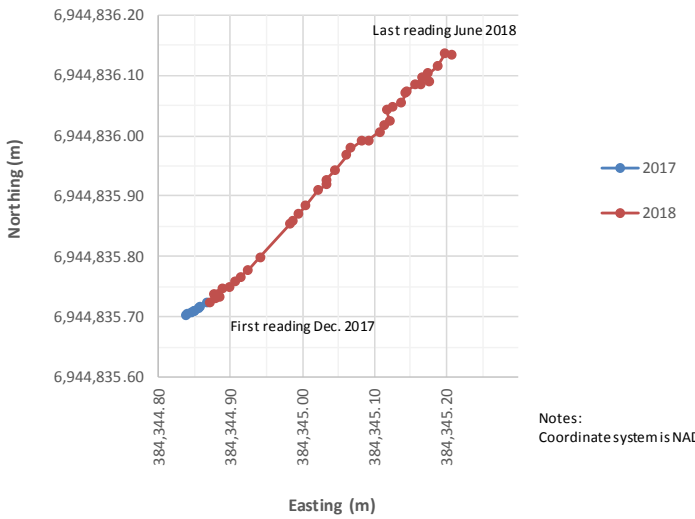
Job No: 1CM002.063

Filename: ApG_2017MainPitInstrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	7

M88 - Northing Vs. Easting Movement Plot



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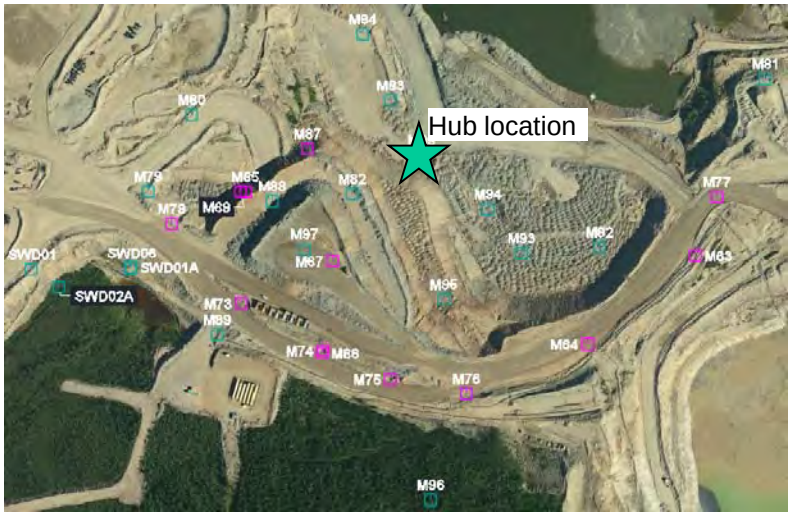

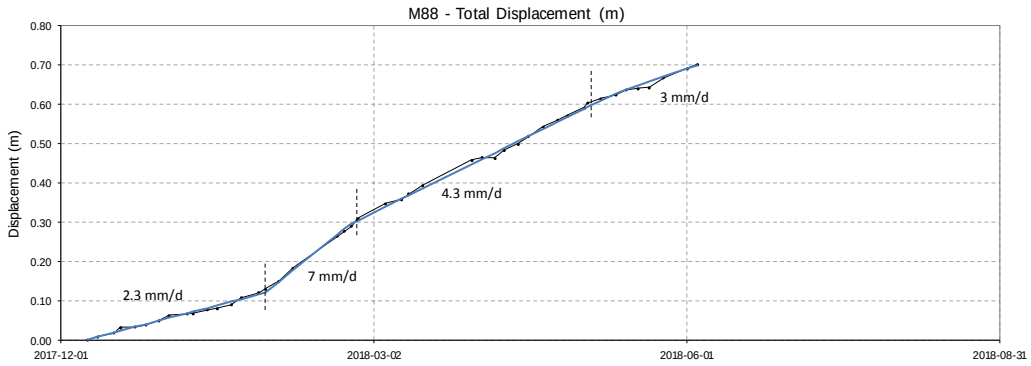

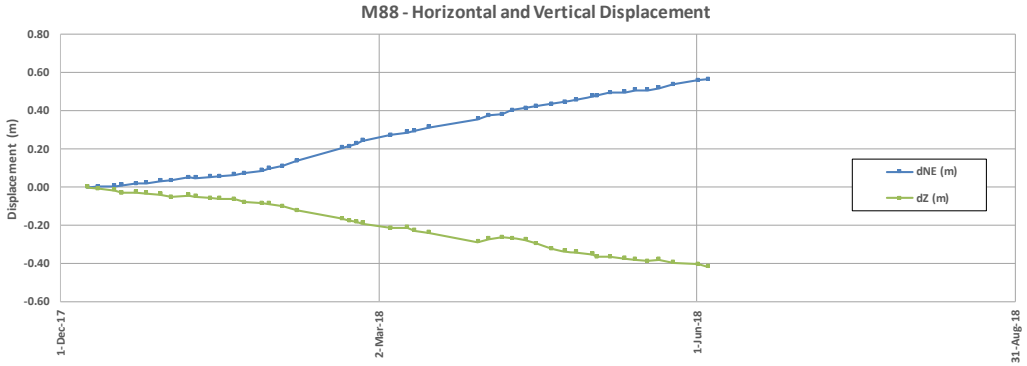

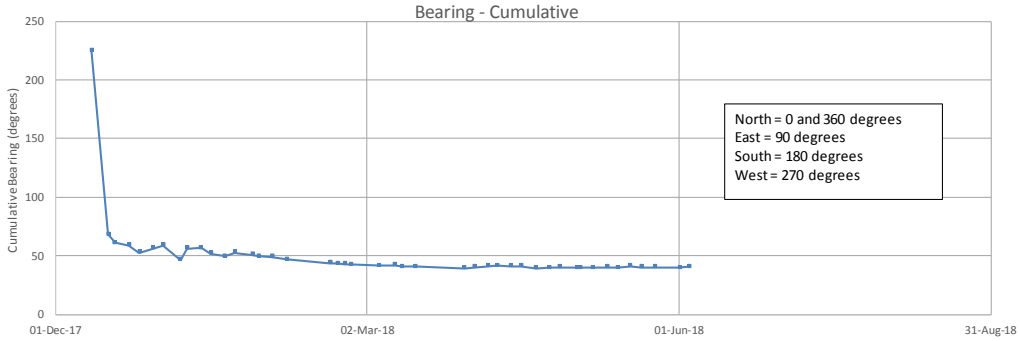

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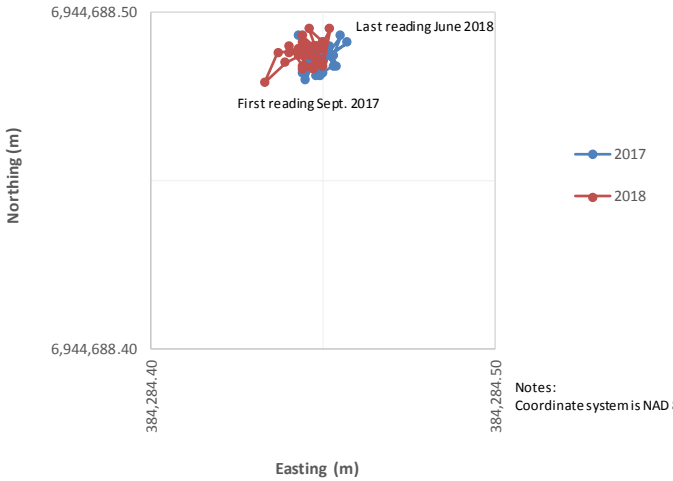
		Survey Hub – M88
Job No: 1CM002.063 Filename: ApG_2017MainPitInstrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **8**

M89 - Northing Vs. Easting Movement Plot



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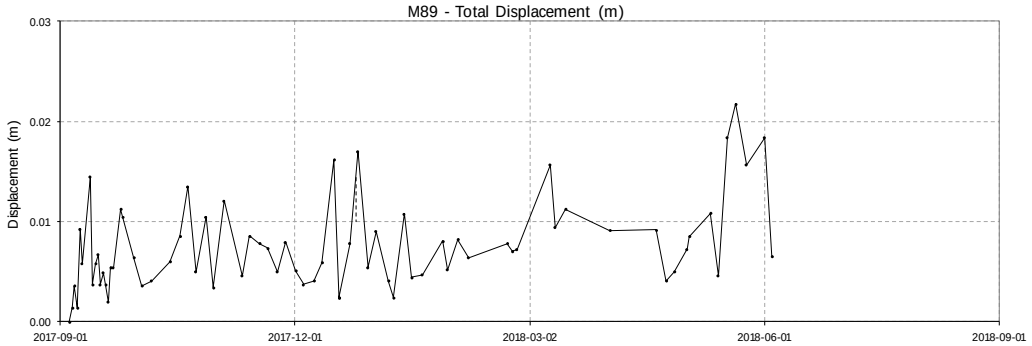

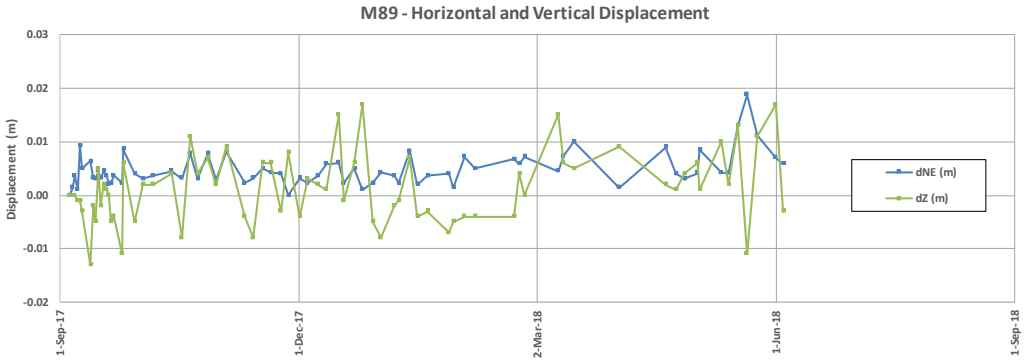

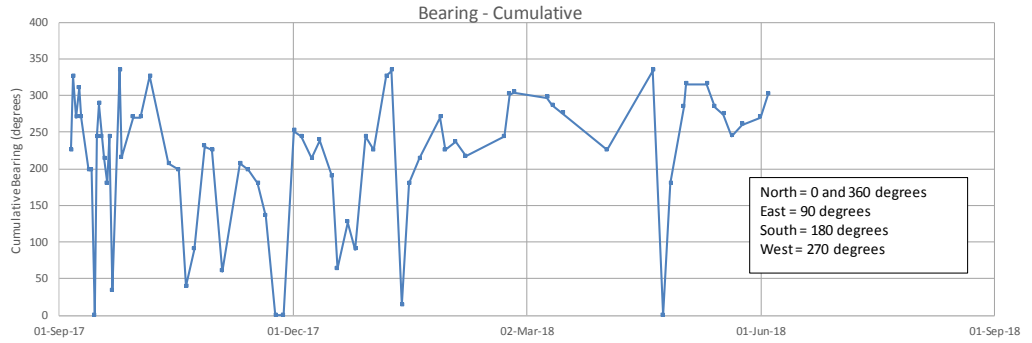

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Main Pit Instrumentation Data

Survey Hub– M89

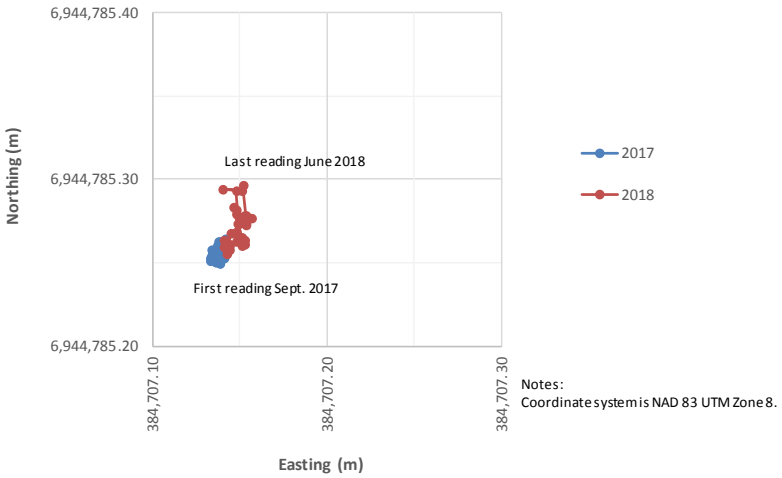
Job No: 1CM002.063

Filename: ApG_2017MainPitInstrumentation.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	9

M92 - Northing Vs. Easting Movement Plot



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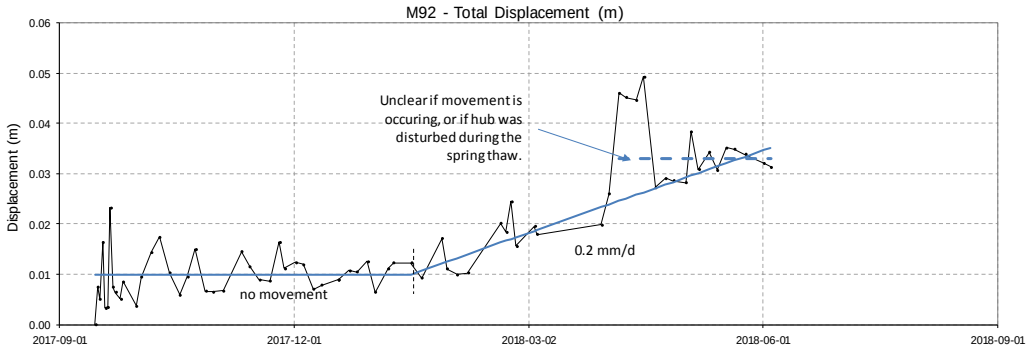

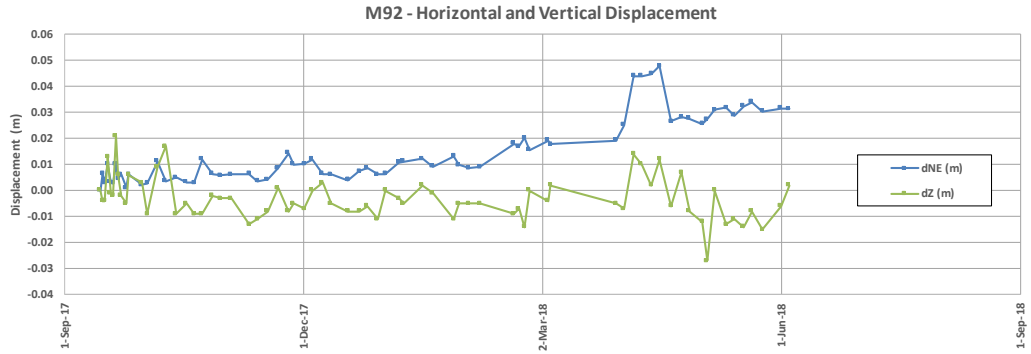

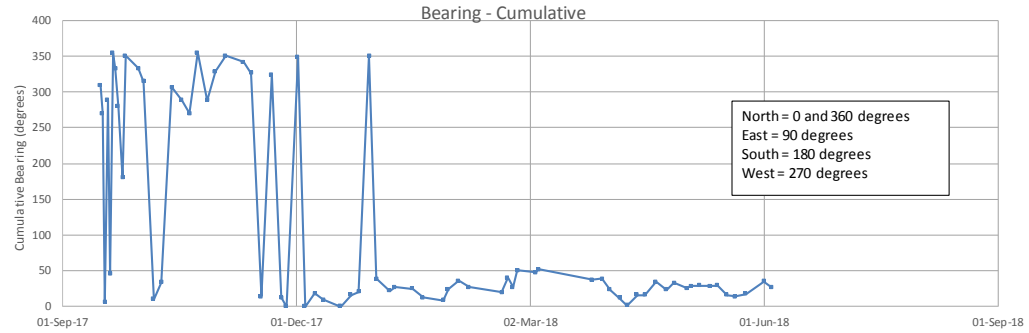

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Main Pit Instrumentation Data

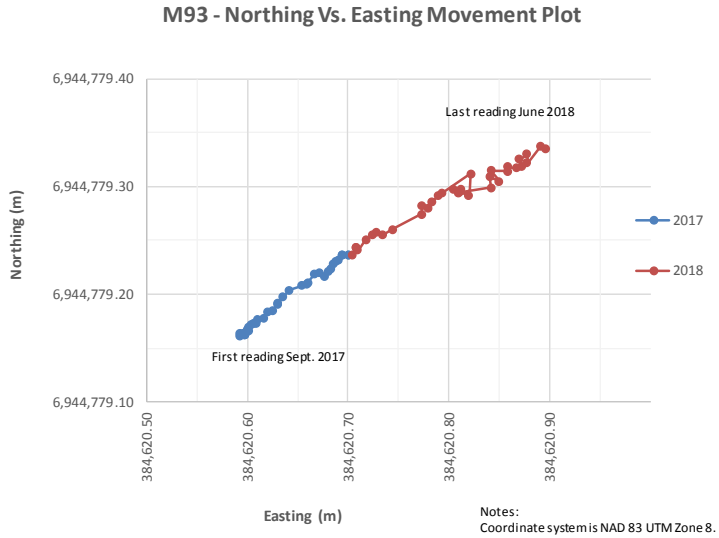
Survey Hub– M92

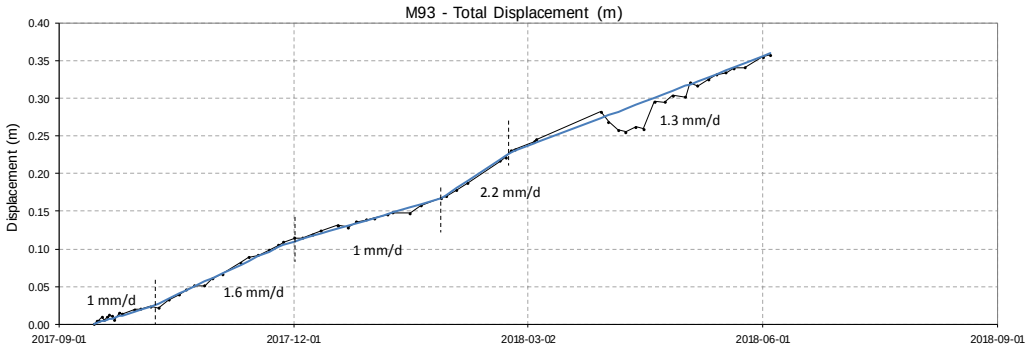
Job No: 1CM002.063

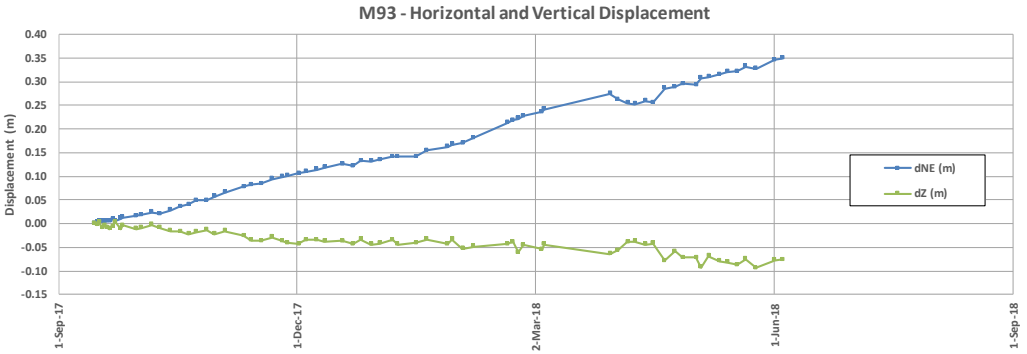
Filename: ApG_2017MainPitInstrumentation.pptx

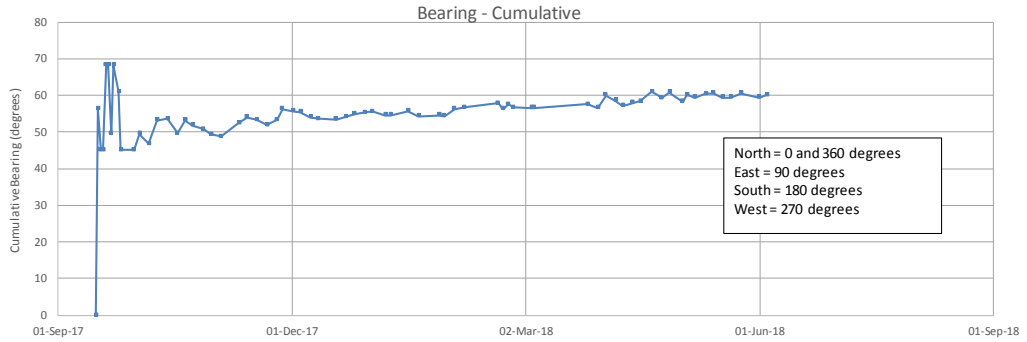
Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	**10**









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Minto Explorations Ltd.

Main Pit Instrumentation Data

Survey Hub – M93

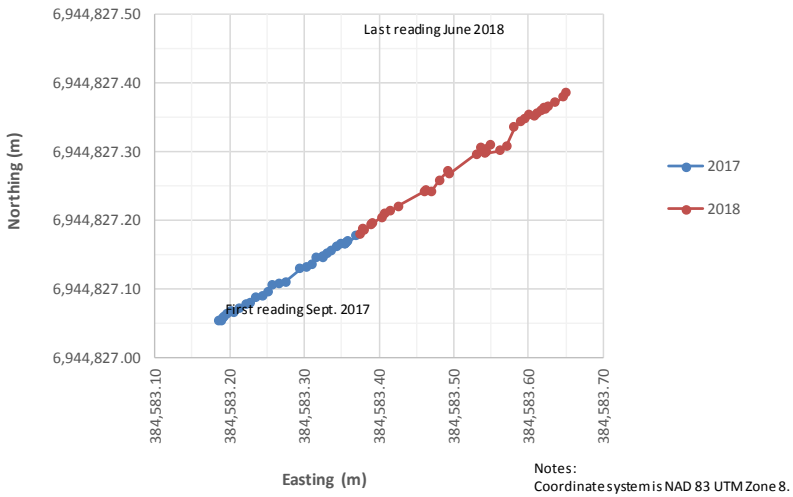
Job No: 1CM002.063

Filename: ApG_2017MainPitInstrumentation.pptx

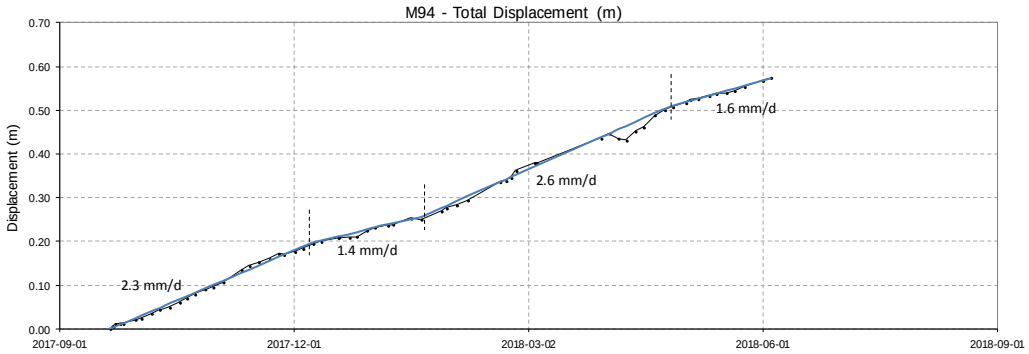
Minto Mine

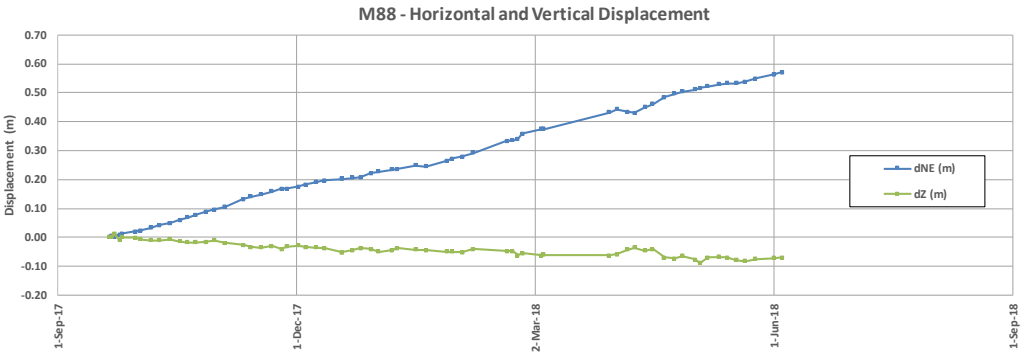
Date:	Prepared by	Figure:
August 2018	PHM	11

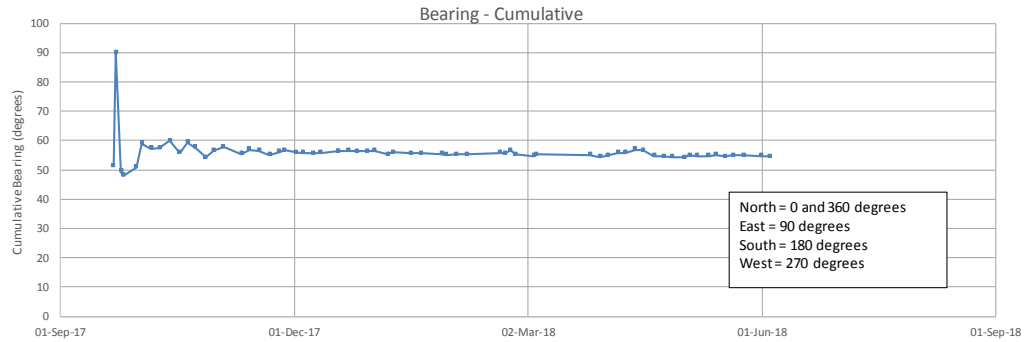
M94 - Northing Vs. Easting Movement Plot



Notes:
Coordinate system is NAD 83 UTM Zone 8.



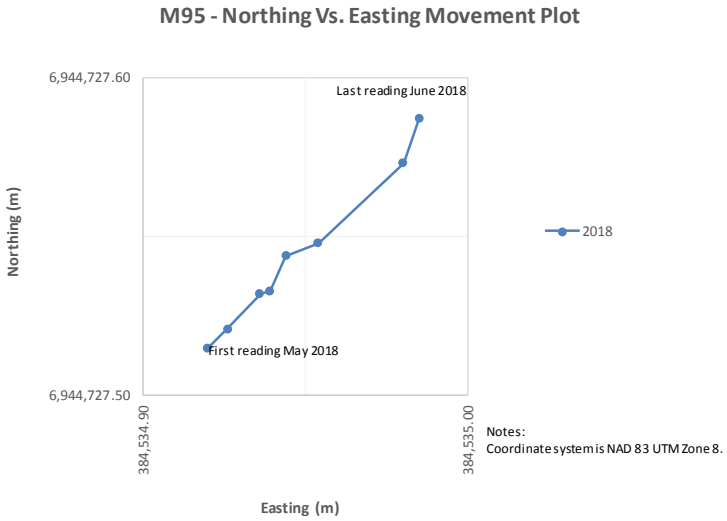


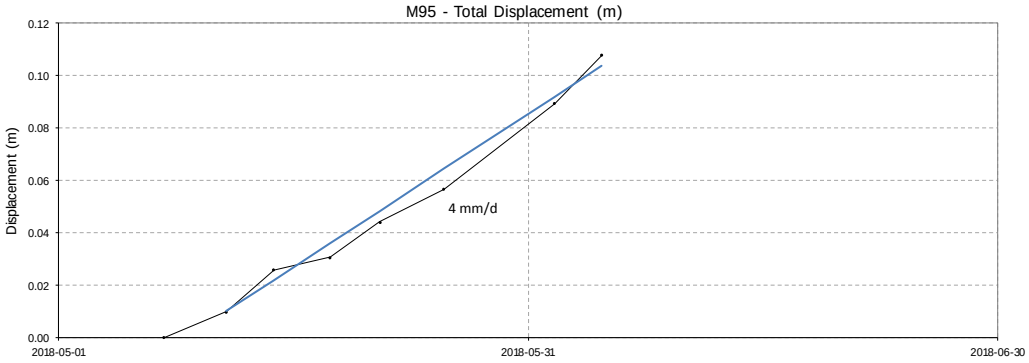


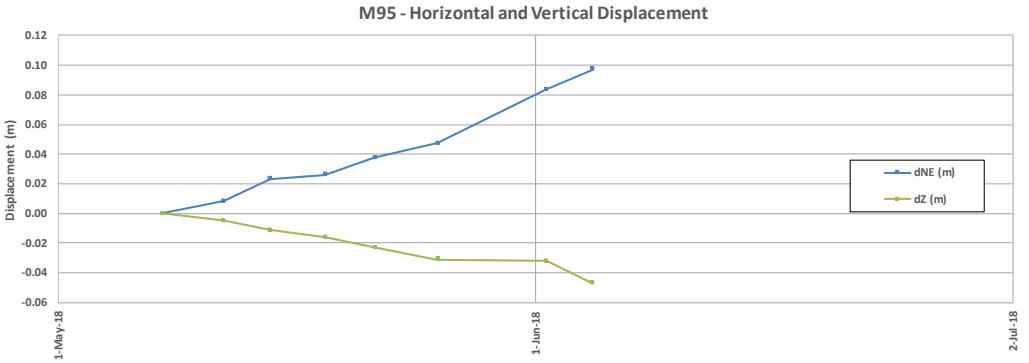
Source files:

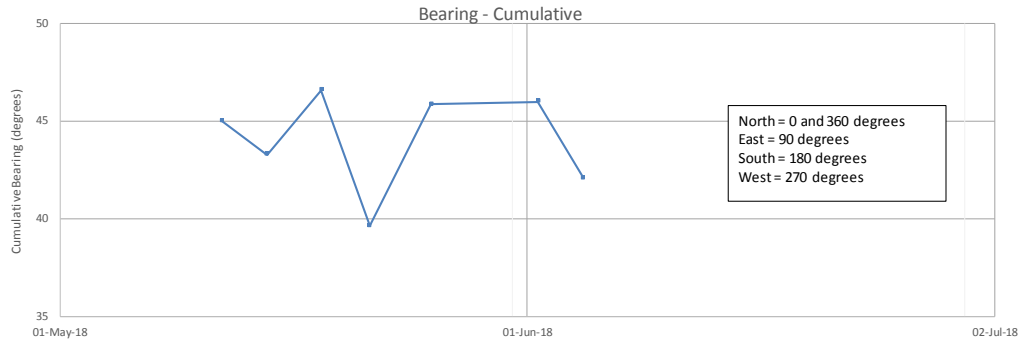
1. AutoCAD: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\GeotechInstrumentation.dwg
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMainPitSurveyHubs_SRK.xlsm

srk consulting	Minto Explorations Ltd.	Main Pit Instrumentation Data
		Survey Hub – M94
Job No: 1CM002.063 Filename: ApG_2017MainPitInstrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by PHM / Figure: **12**









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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\MintoMainPitSurveyHubs_SRK.xlsm

srk consulting

Minto Explorations Ltd.

Main Pit Instrumentation Data

Survey Hub – M95

Job No: 1CM002.063

Filename: ApG_2017MainPitInstrumentation.pptx

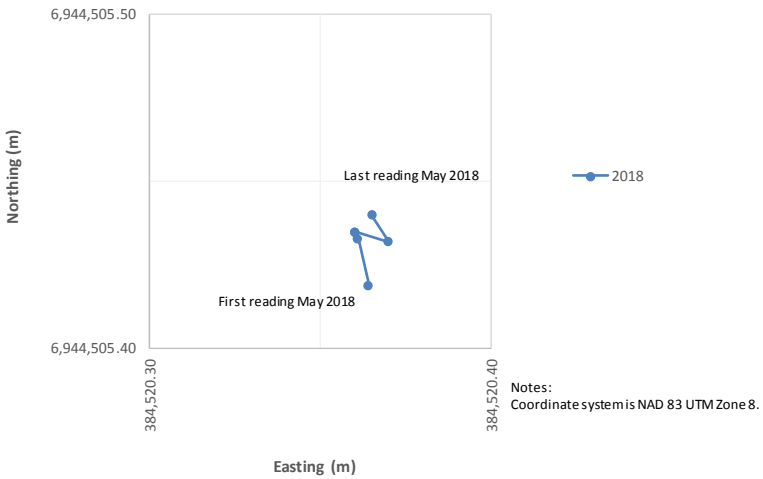
Minto Mine

Date: August 2018

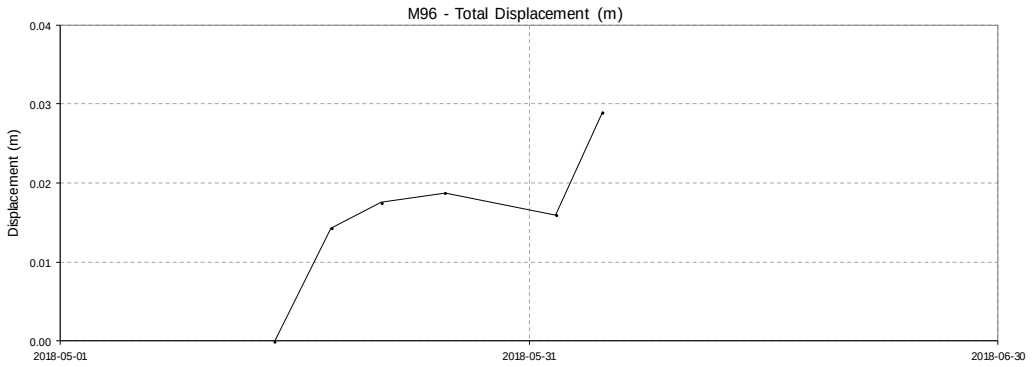
Prepared by PHM

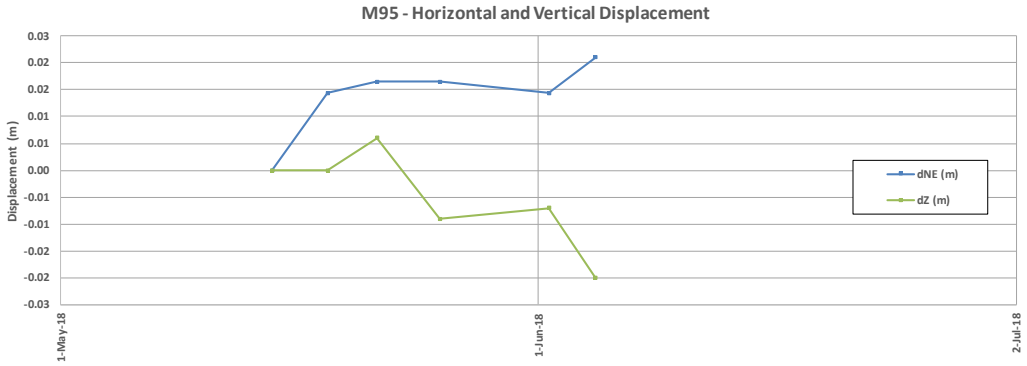
Figure: **13**

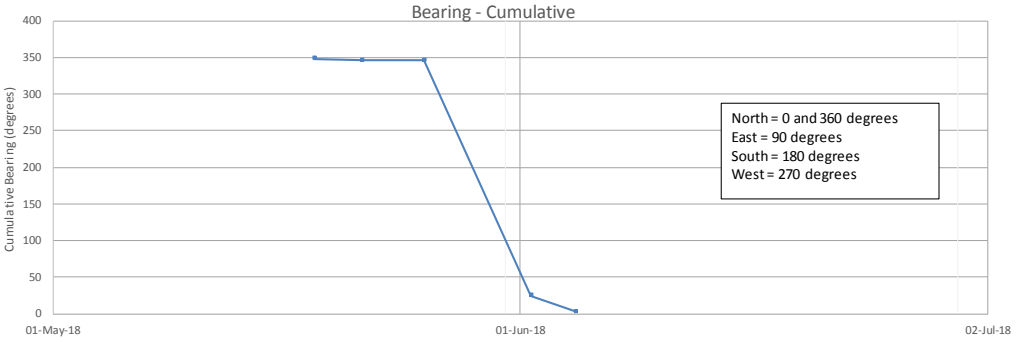
M96 - Northing Vs. Easting Movement Plot



Notes:
Coordinate system is NAD 83 UTM Zone 8.







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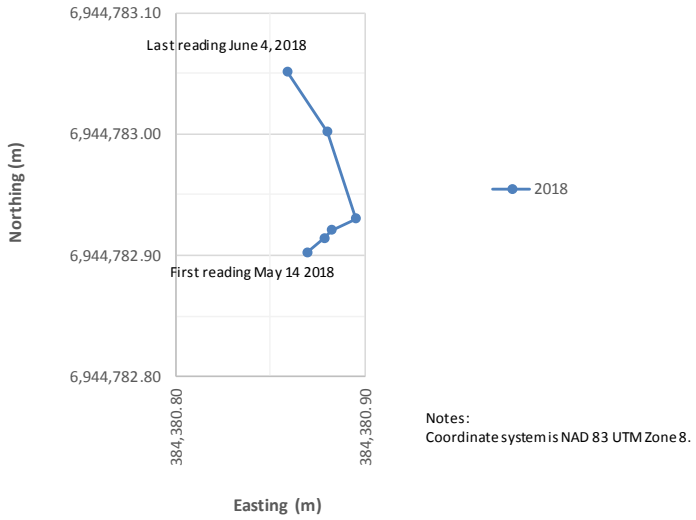
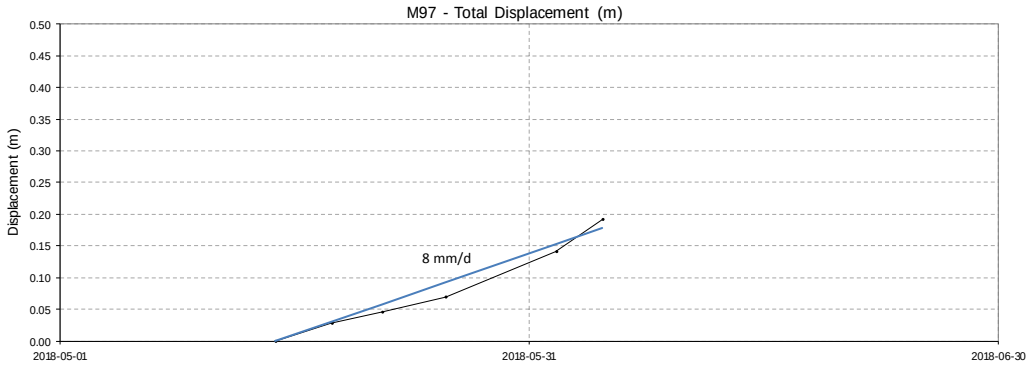
1. AutoCAD: \\VAN-SVR0\Projects\01_SITES\Minto\!040_AutoCAD\GeotechInstrumentation\GeotechInstrumentation.dwg
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMainPitSurveyHubs_SRK.xlsm

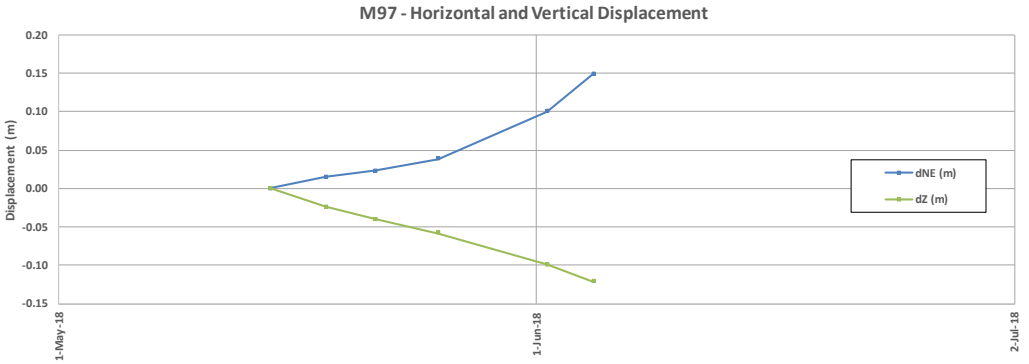
srk consulting	Minto Explorations Ltd.	Main Pit Instrumentation Data
		Survey Hub – M96
Job No: 1CM002.063 Filename: ApG_2017MainPitInstrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **14**

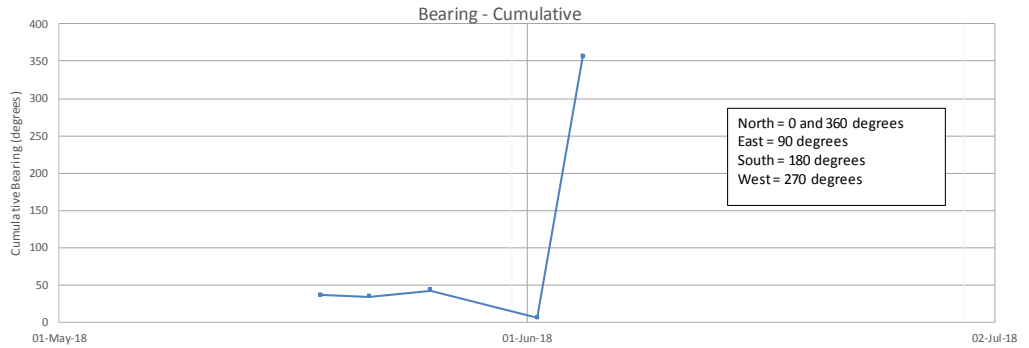
M97 - Northing Vs. Easting Movement Plot



Notes:
Coordinate system is NAD 83 UTM Zone 8.







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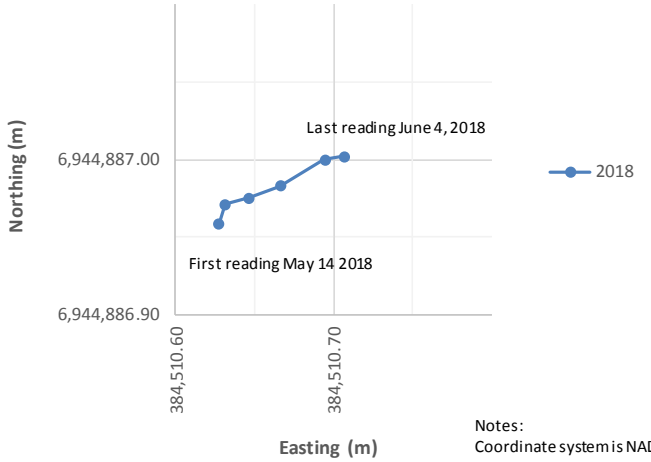
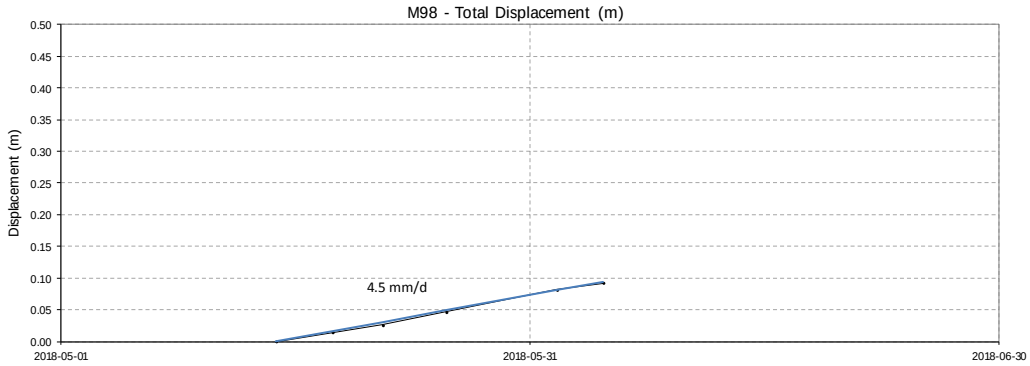
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMainPitSurveyHubs_SRK.xlsm

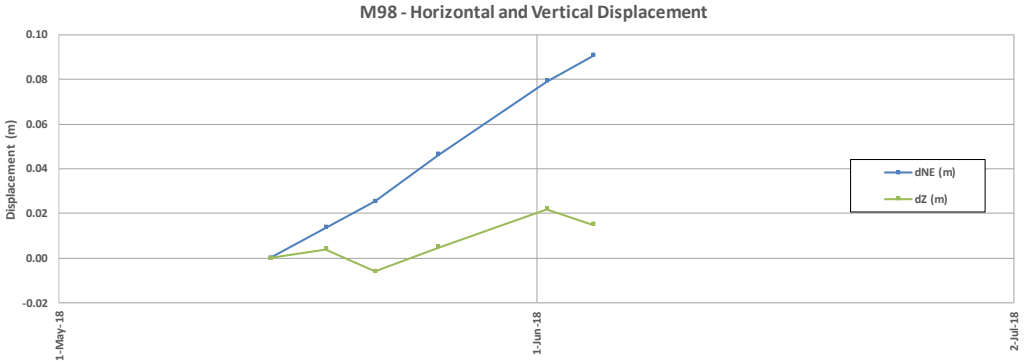
srk consulting	Minto Explorations Ltd.	Main Pit Instrumentation Data
		Survey Hub – M97
Job No: 1CM002.063 Filename: ApG_2017MainPitInstrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by: PHM / Figure: **15**

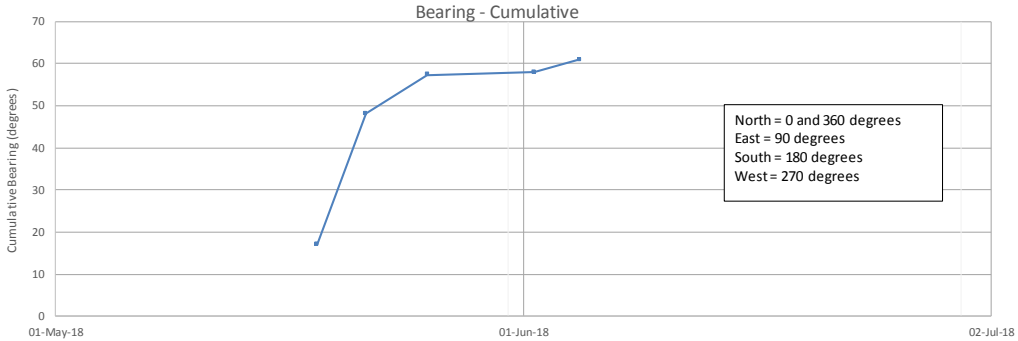
M98 - Northing Vs. Easting Movement Plot



Notes:
Coordinate system is NAD 83 UTM Zone 8.







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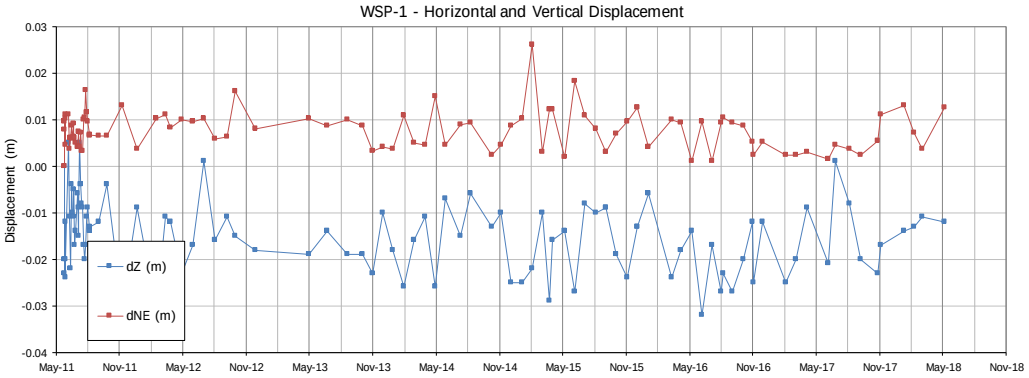
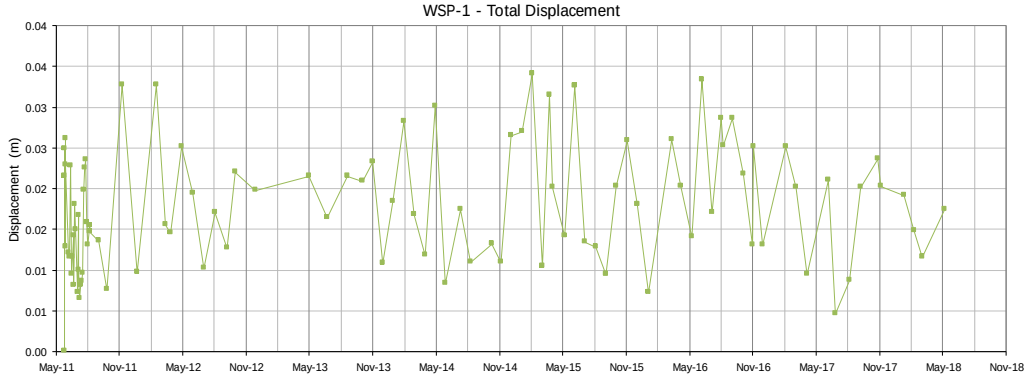
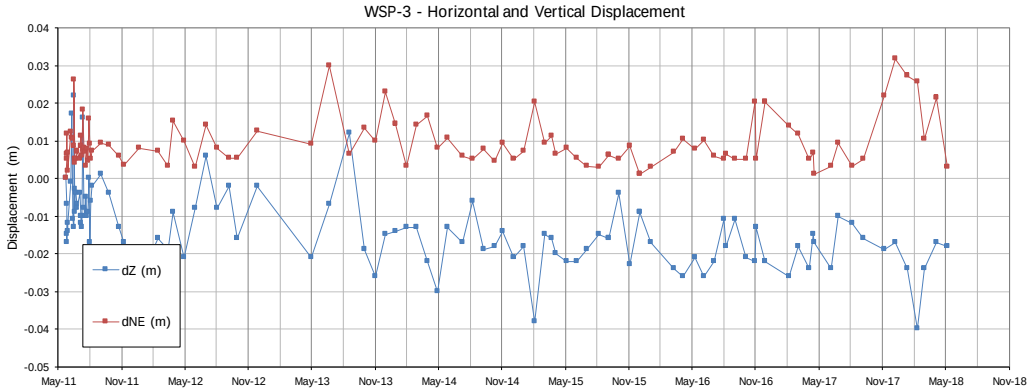
2. Excel instrumentation data: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\MintoMainPitSurveyHubs_SRK.xlsm

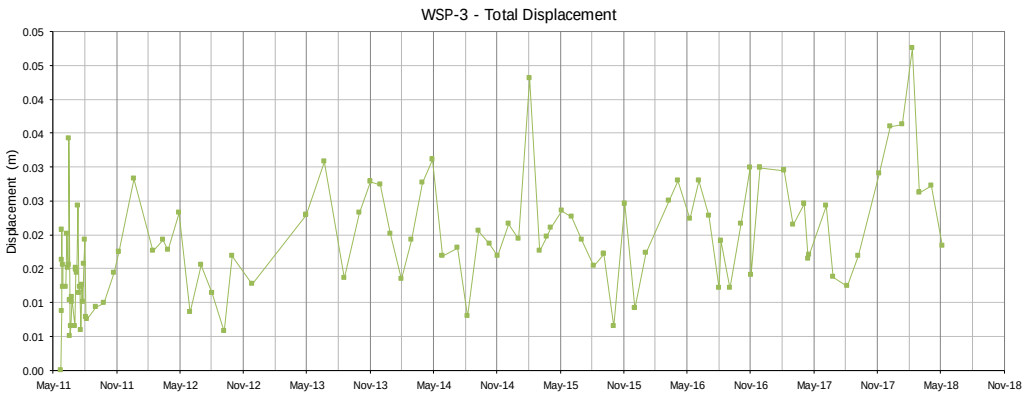
srk consulting	Minto Explorations Ltd.	Main Pit Instrumentation Data
		Survey Hub – M98
Job No: 1CM002.063 Filename: ApG_2017MainPitInstrumentation.pptx	Minto Mine	Date: August 2018 / Prepared by PHM / Figure: **16**

Appendix H: Water Storage Pond Instrumentation Data



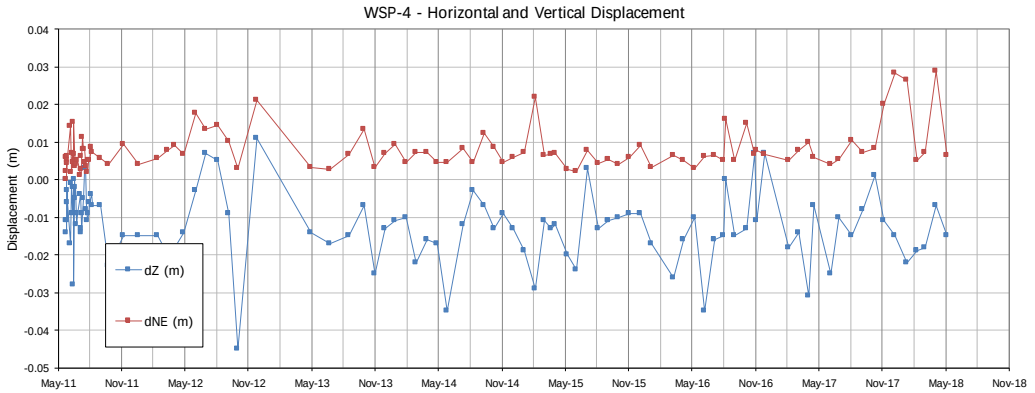


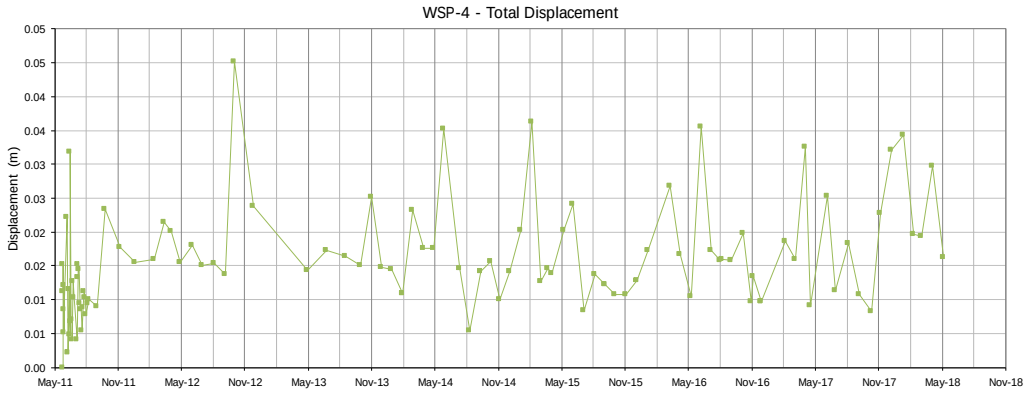


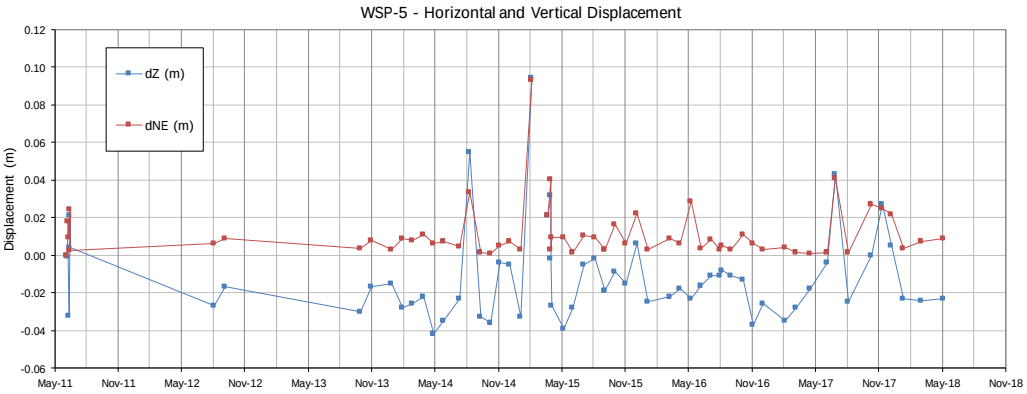


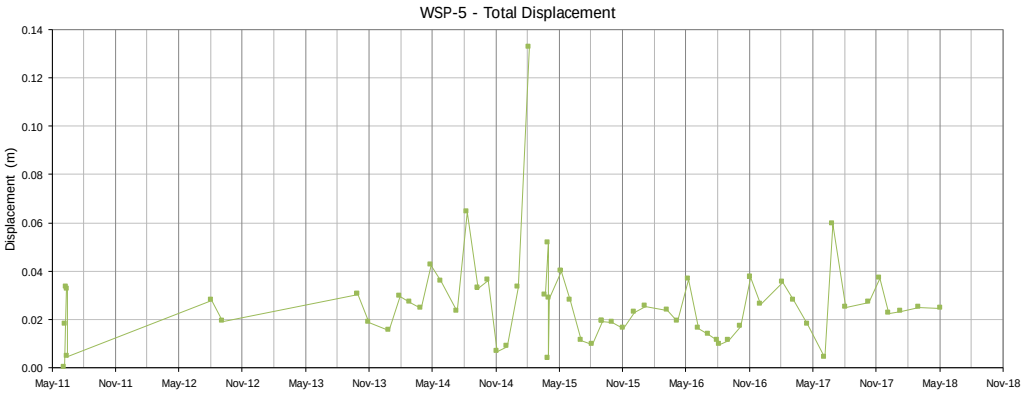
Source file: \\VAN-SVR0\Projects\01_SITES\Minto\!020_Site_Wide_Data\Geotechnical\Geotech Monitoring Data\SRK Data Set\SWD_ASH_WSP_SurveyHubMonitoring_SRK.xlsm

srk consulting	capstone MINTO MINE OPERATED BY MINTO EXPLORATIONS LTD.	Water Storage Pond Data **Survey Hubs – WSP-1 and WSP-3**
Job No: 1CM002.063 Filename: ApH_WaterStoragePondPort2018.pptx	Minto Mine	Date: August 2018 | Prepared by: PHM | Figure: **1**









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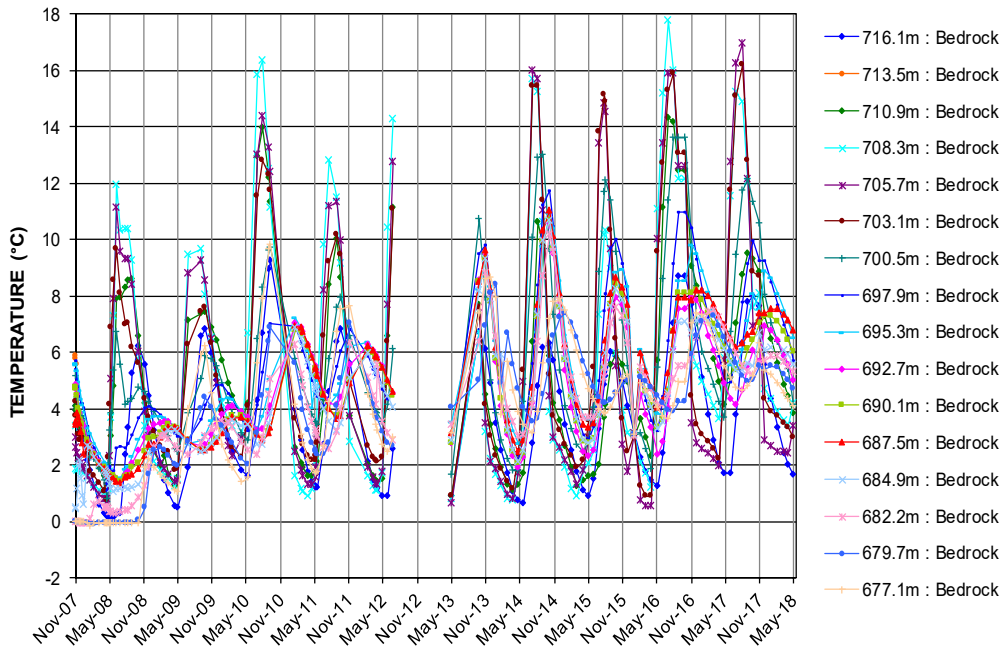
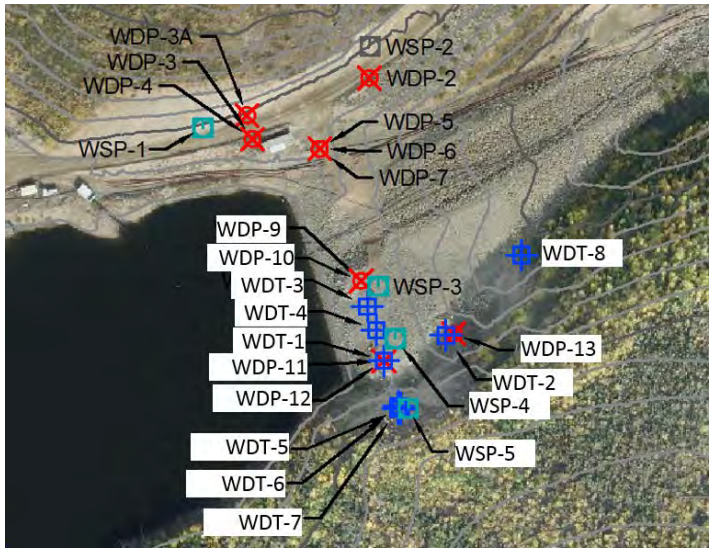
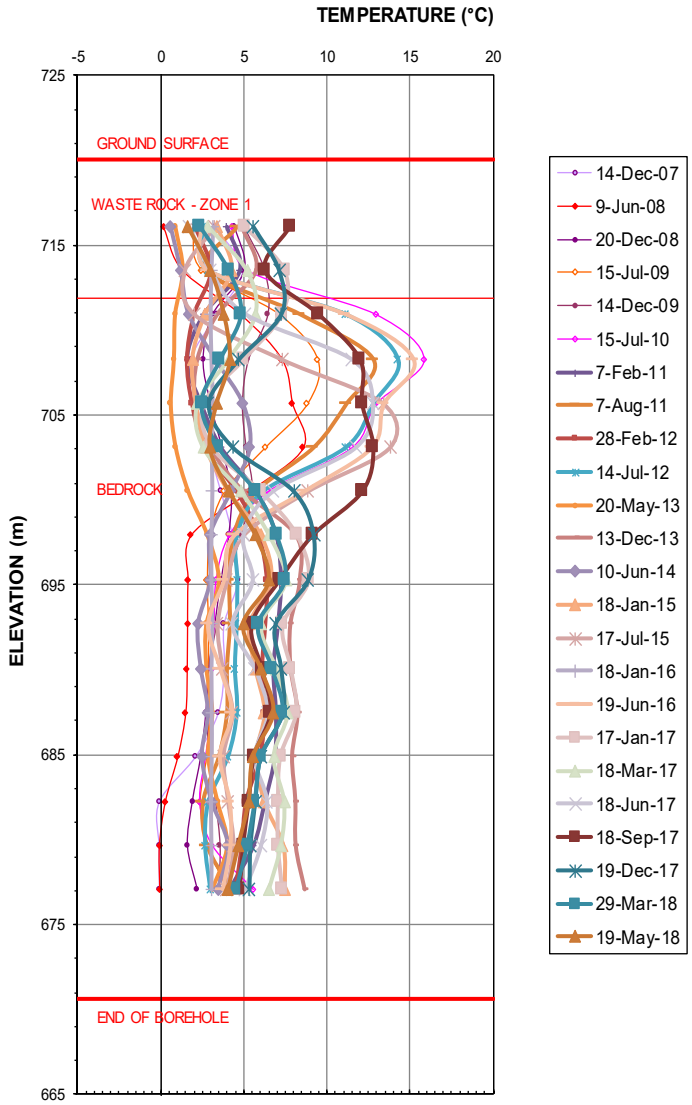
srk consulting	capstone MINTO MINE OPERATED BY MINTO EXPLORATIONS LTD.	Water Storage Pond Data **Survey Hubs – WSP-4 and WSP-5**
Job No: 1CM002.063 Filename: ApH_WaterStoragePondPort2018.pptx	Minto Mine	Date: August 2018 | Prepared by: PHM | Figure: **2**







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srk consulting

capstone MINTO MINE
OPERATED BY MINTO EXPLORATIONS LTD.

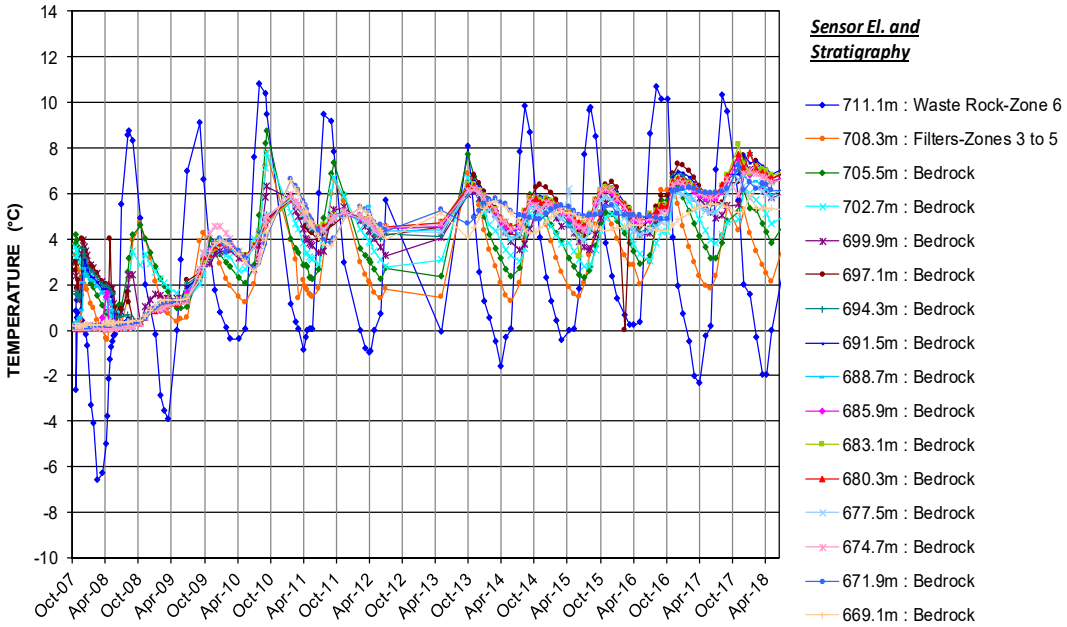
Water Storage Pond Data

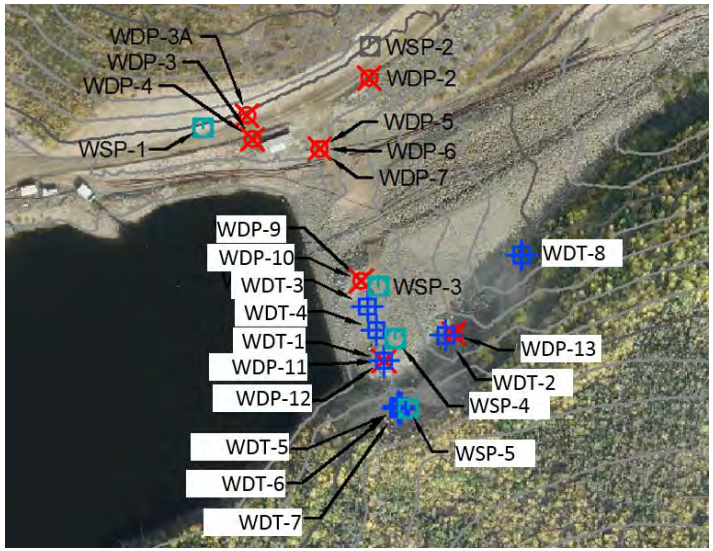
Temperature Cable – WDT-1

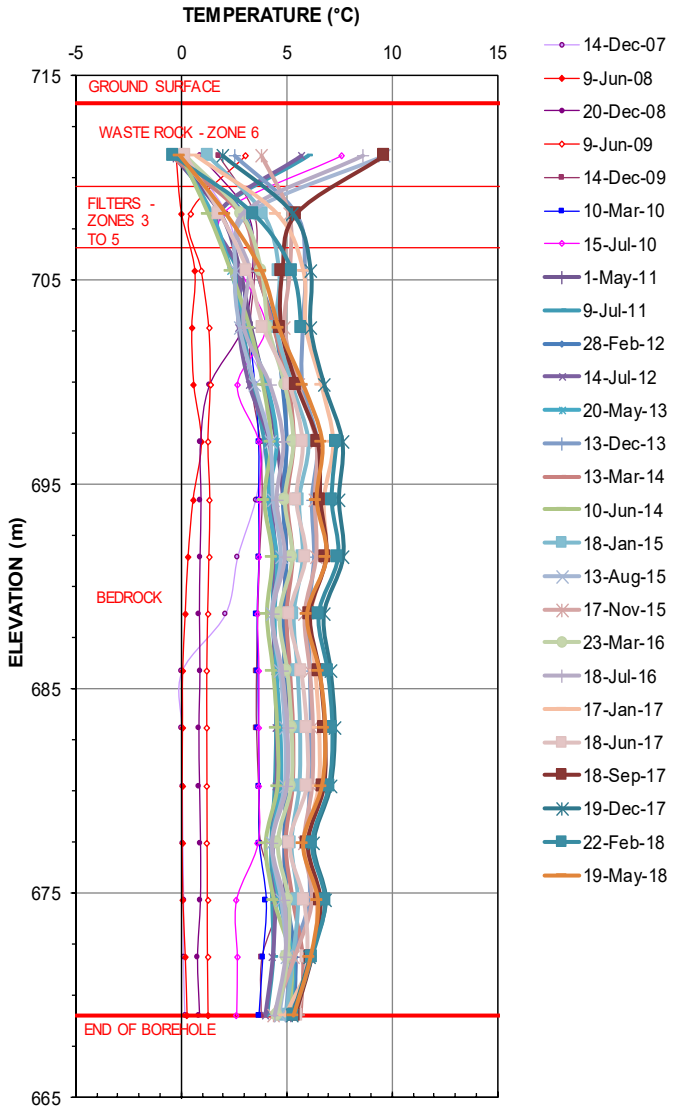
Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	3







Source files:

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capstone MINTO MINE
OPERATED BY MINTO EXPLORATIONS LTD.

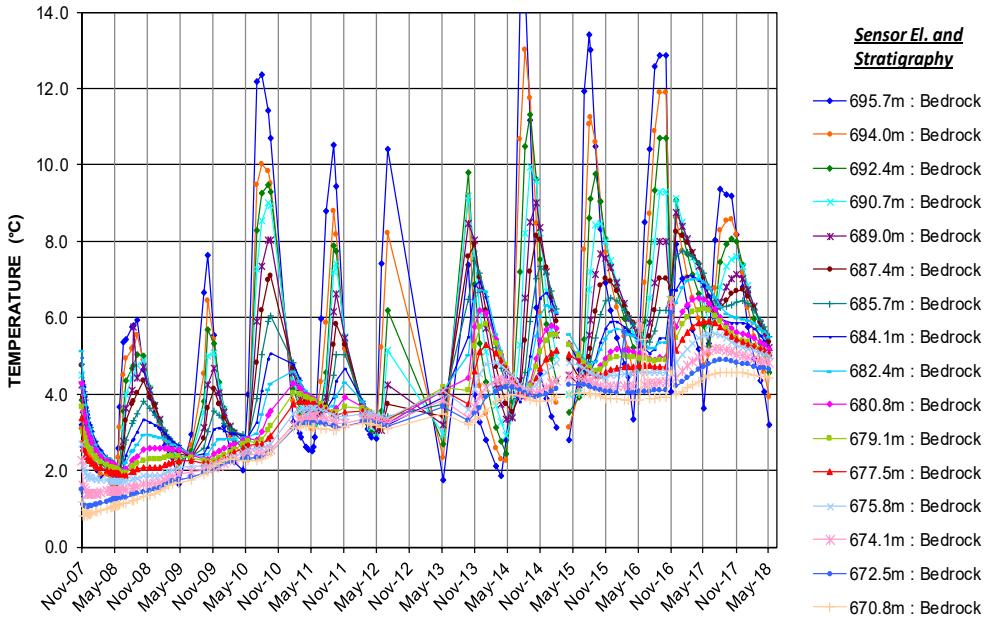
Water Storage Pond Data

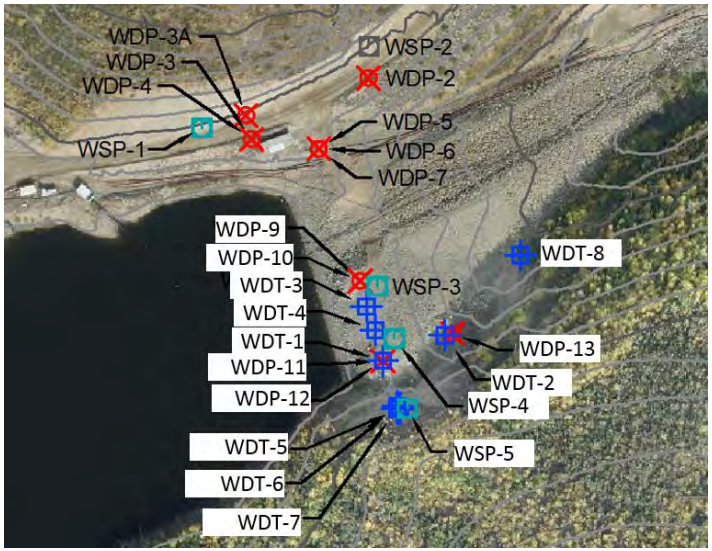
Temperature Cable – WDT-2

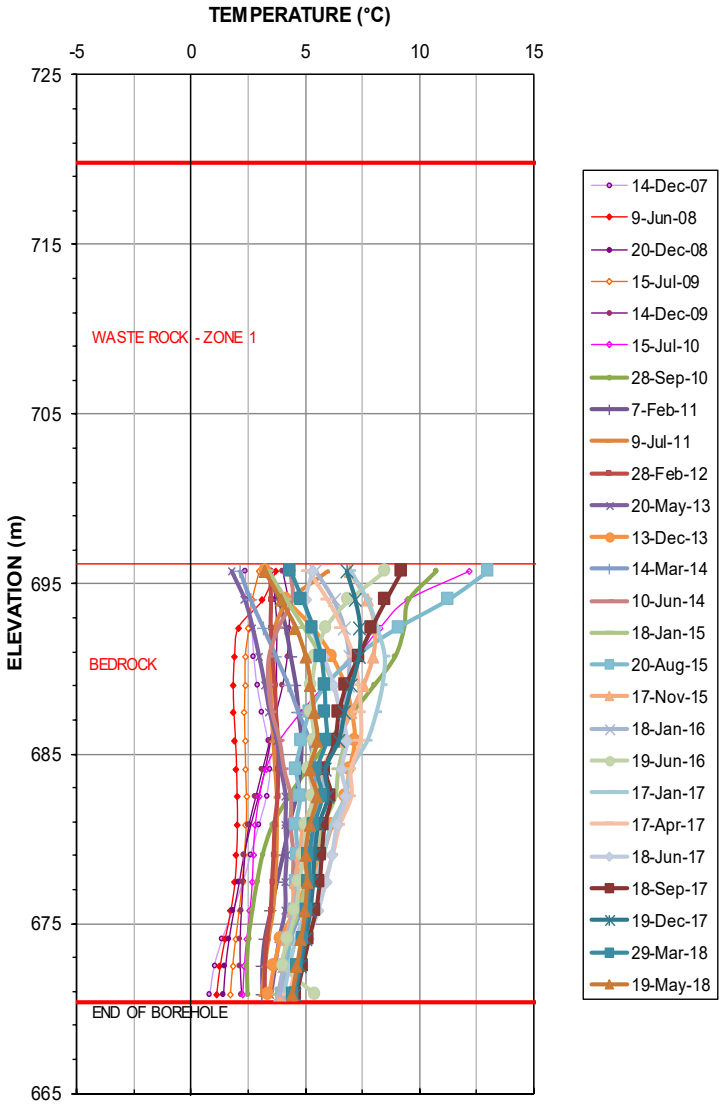
Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	4







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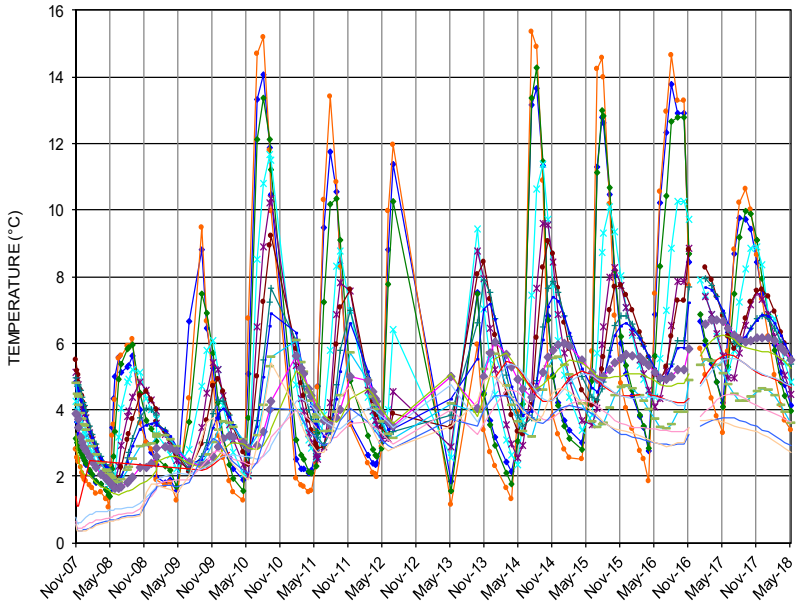
srk consulting

capstone MINTO MINE
OPERATED BY MINTO EXPLORATIONS LTD.

Water Storage Pond Data

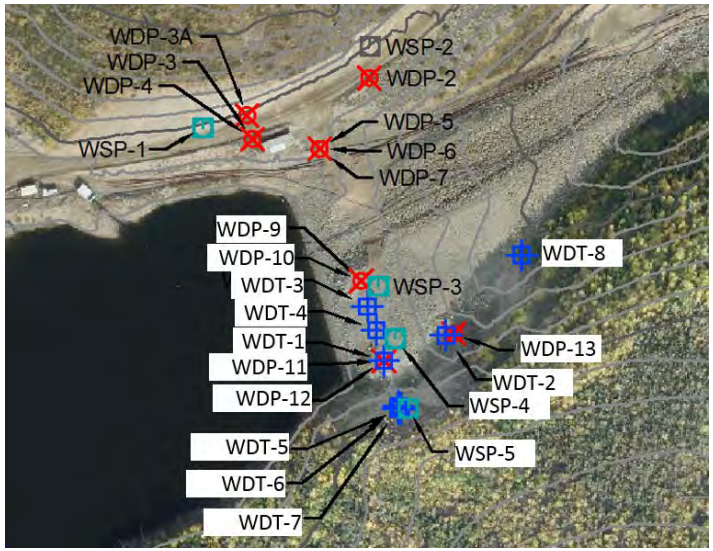
Temperature Cable – WDT-3

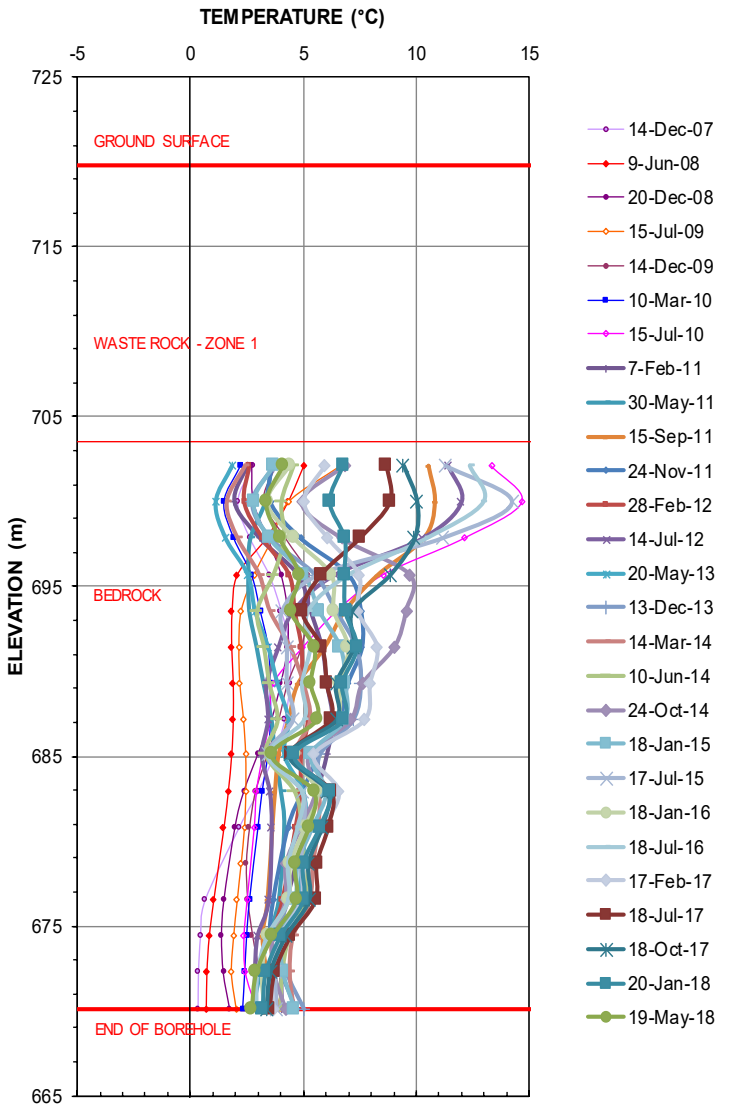
Job No: 1CM002.063	Minto Mine	Date: August 2018	Prepared by PHM	Figure: 5
Filename: ApH_WaerStoragePond2018.pptx			



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
- 678.7m : Bedrock
- 676.5m : Bedrock
- 674.4m : Bedrock
- 672.3m : Bedrock
- 670.1m : Bedrock





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

srk consulting

capstone MINTO MINE
OPERATED BY MINTO EXPLORATIONS LTD.

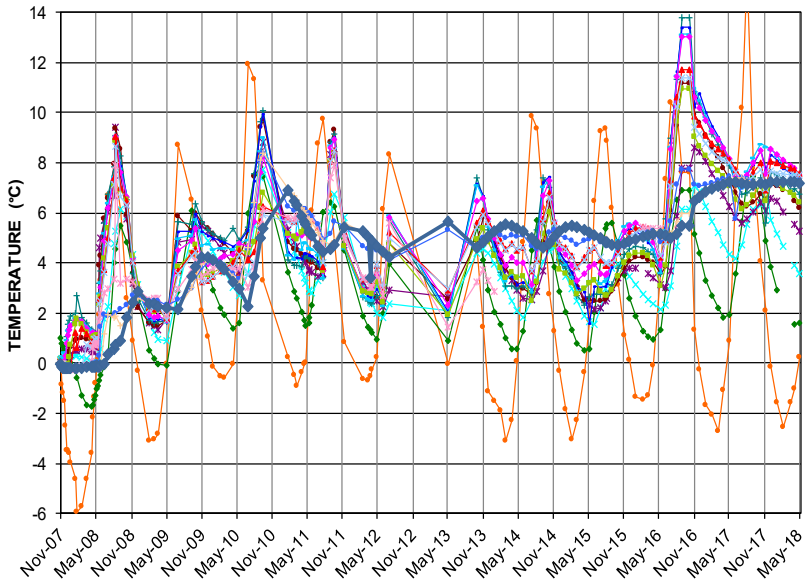
Water Storage Pond Data

Temperature Cable – WDT-4

Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

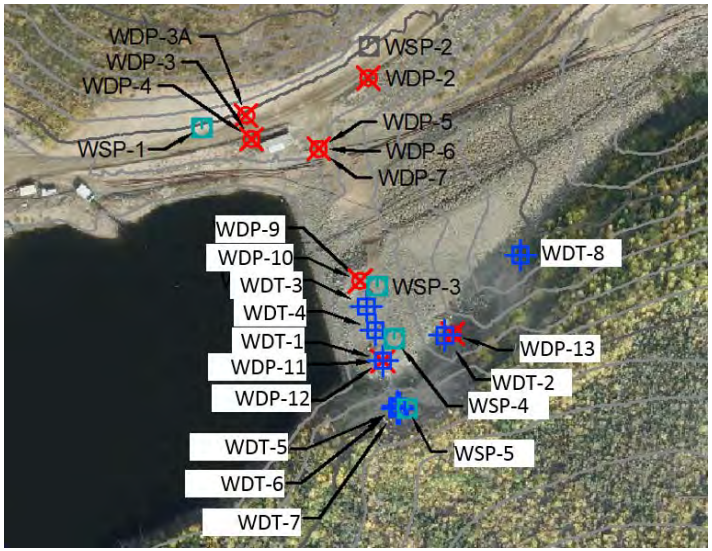
Minto Mine

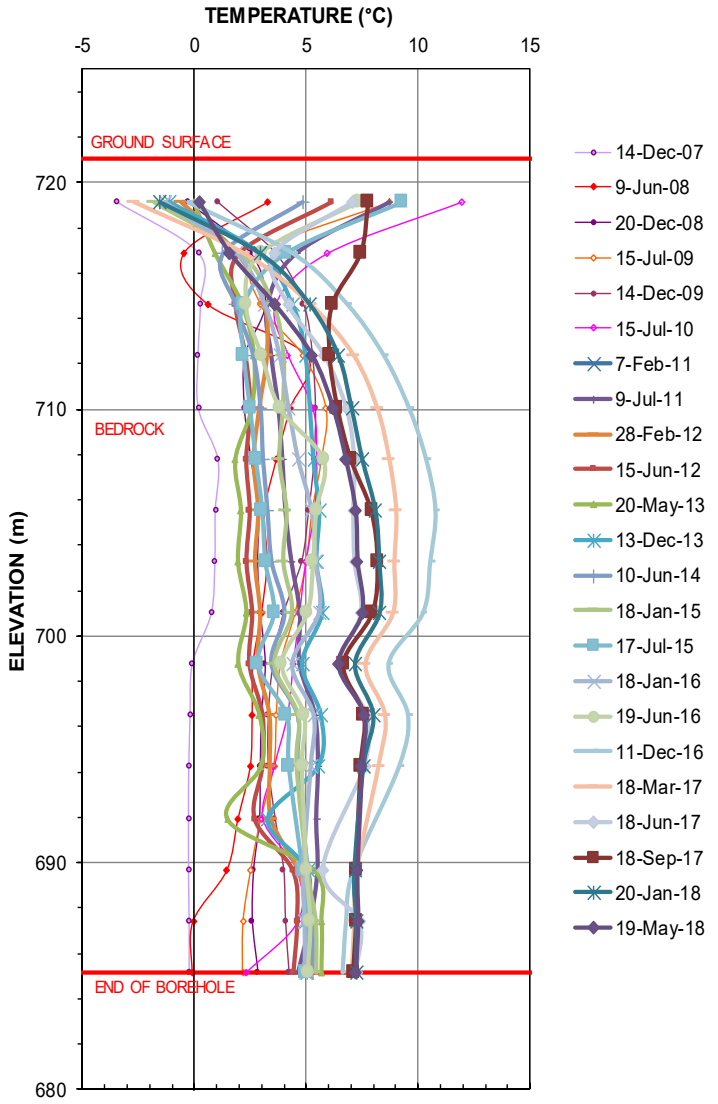
Date:	Prepared by	Figure:
August 2018	PHM	6



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





- 14-Dec-07
- 9-Jun-08
- 20-Dec-08
- 15-Jul-09
- 14-Dec-09
- 15-Jul-10
- 7-Feb-11
- 9-Jul-11
- 28-Feb-12
- 15-Jun-12
- 20-May-13
- 13-Dec-13
- 10-Jun-14
- 18-Jan-15
- 17-Jul-15
- 18-Jan-16
- 19-Jun-16
- 11-Dec-16
- 18-Mar-17
- 18-Jun-17
- 18-Sep-17
- 20-Jan-18
- 19-May-18

Source files:

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

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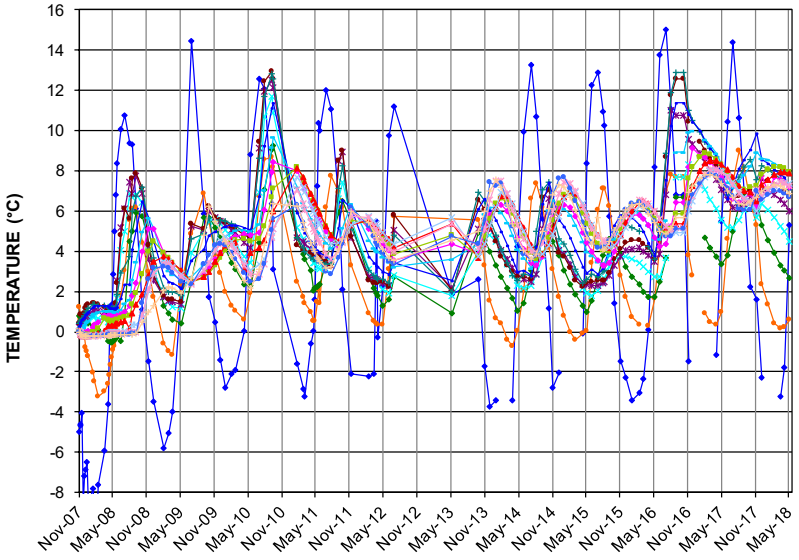
Water Storage Pond Data

Temperature Cable – WDT-5

Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

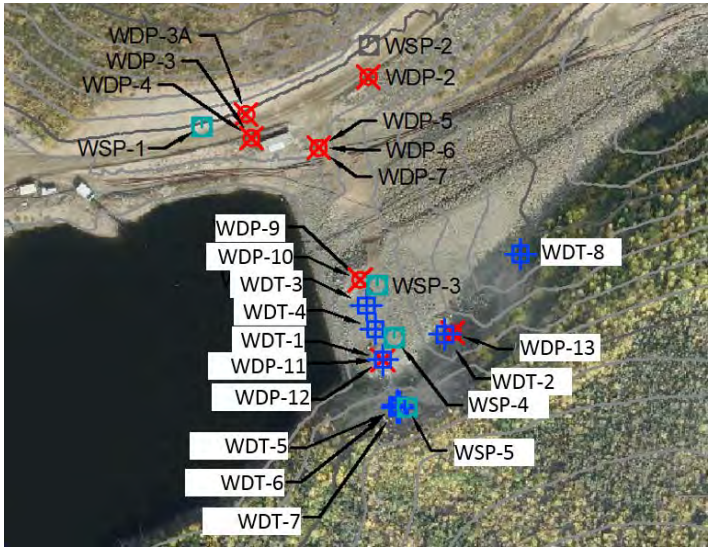
Minto Mine

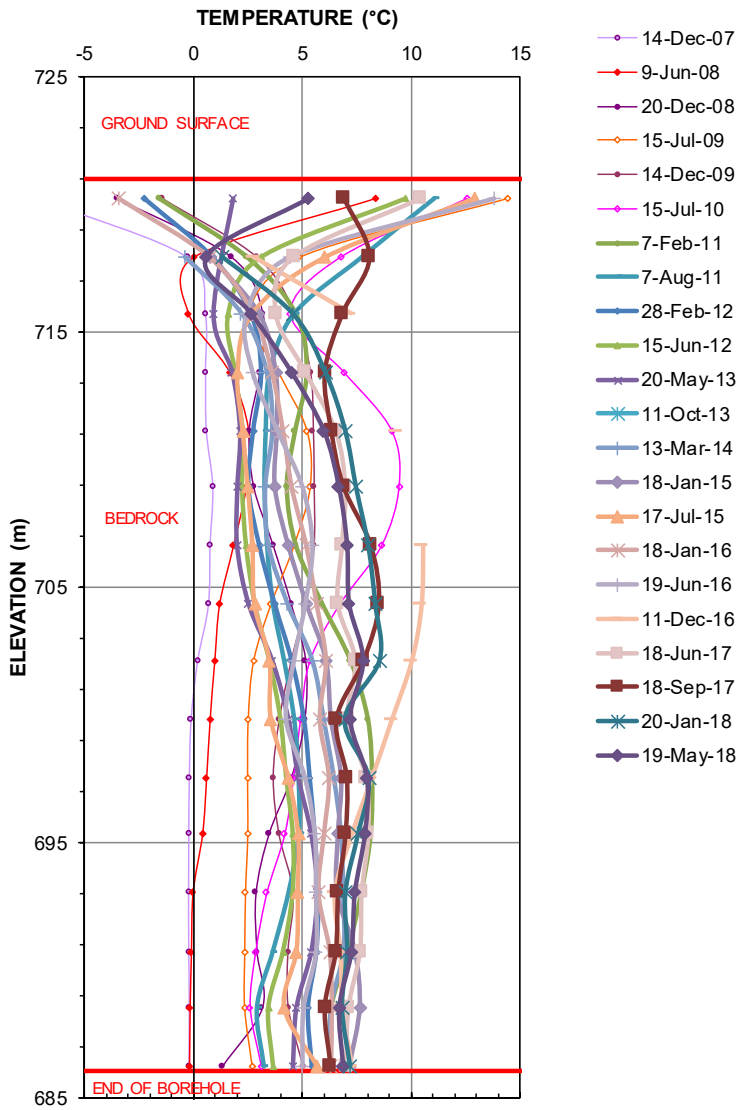
Date:	Prepared by	Figure:
August 2018	PHM	7



Sensor El. and Stratigraphy

- 720.2m : Bedrock
- 717.9m : Bedrock
- 715.7m : Bedrock
- 713.4m : Bedrock
- 711.1m : Bedrock
- 708.9m : Bedrock
- 706.6m : Bedrock
- 704.3m : Bedrock
- 702.1m : Bedrock
- 699.8m : Bedrock
- 697.5m : Bedrock
- 695.3m : Bedrock
- 693.0m : Bedrock
- 690.7m : Bedrock
- 688.5m : Bedrock
- 686.2m : Bedrock





- 14-Dec-07
- 9-Jun-08
- 20-Dec-08
- 15-Jul-09
- 14-Dec-09
- 15-Jul-10
- 7-Feb-11
- 7-Aug-11
- 28-Feb-12
- 15-Jun-12
- 20-May-13
- 11-Oct-13
- 13-Mar-14
- 18-Jan-15
- 17-Jul-15
- 18-Jan-16
- 19-Jun-16
- 11-Dec-16
- 18-Jun-17
- 18-Sep-17
- 20-Jan-18
- 19-May-18

Source files:

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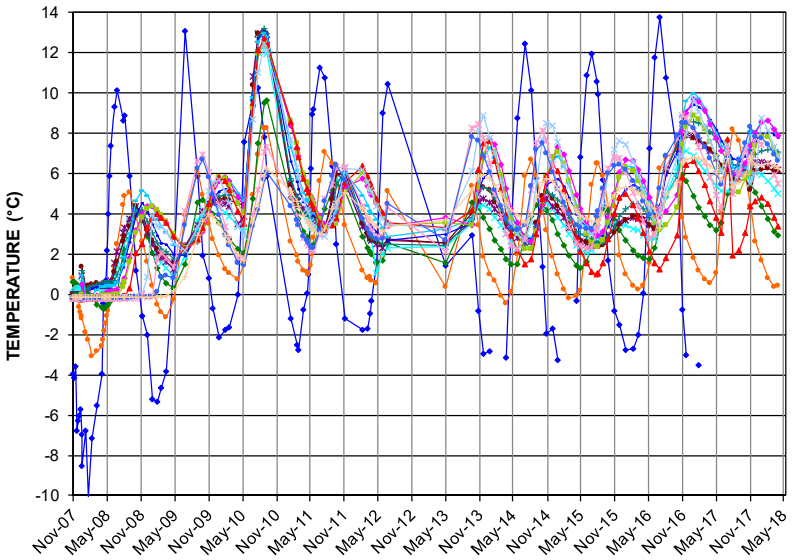
Water Storage Pond Data

Temperature Cable – WDT-6

Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	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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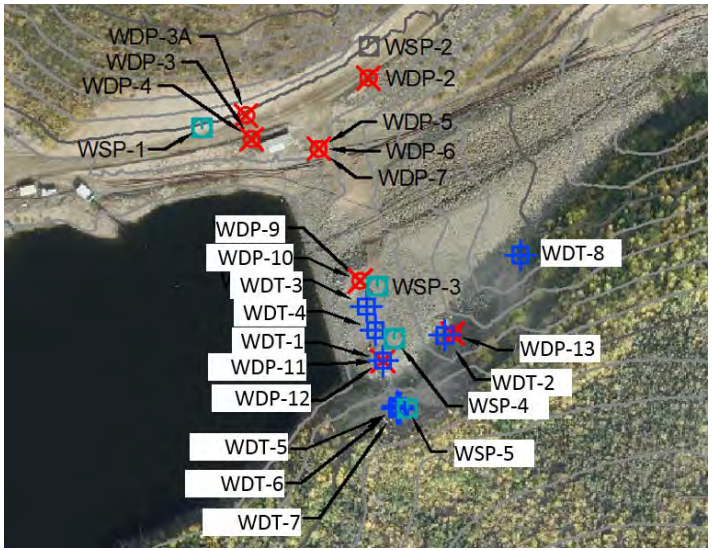
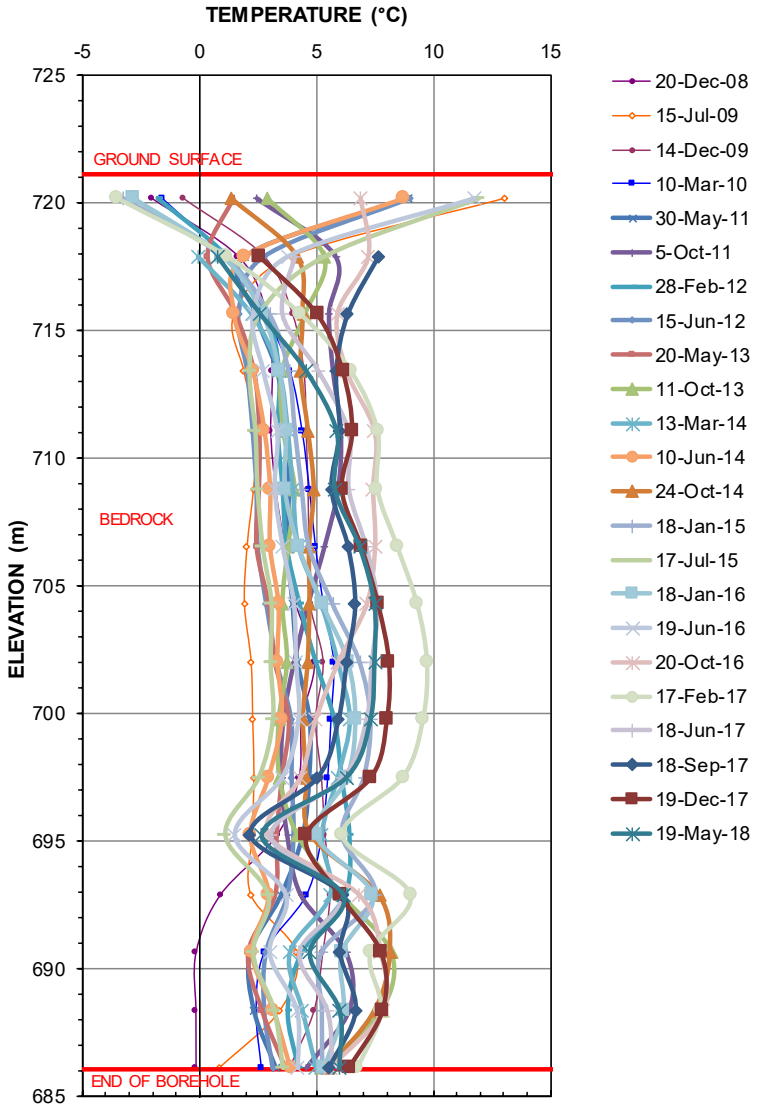
- 692.9m : Bedrock
- 690.6m : Bedrock
- 688.4m : Bedrock
- 686.1m : Bedrock





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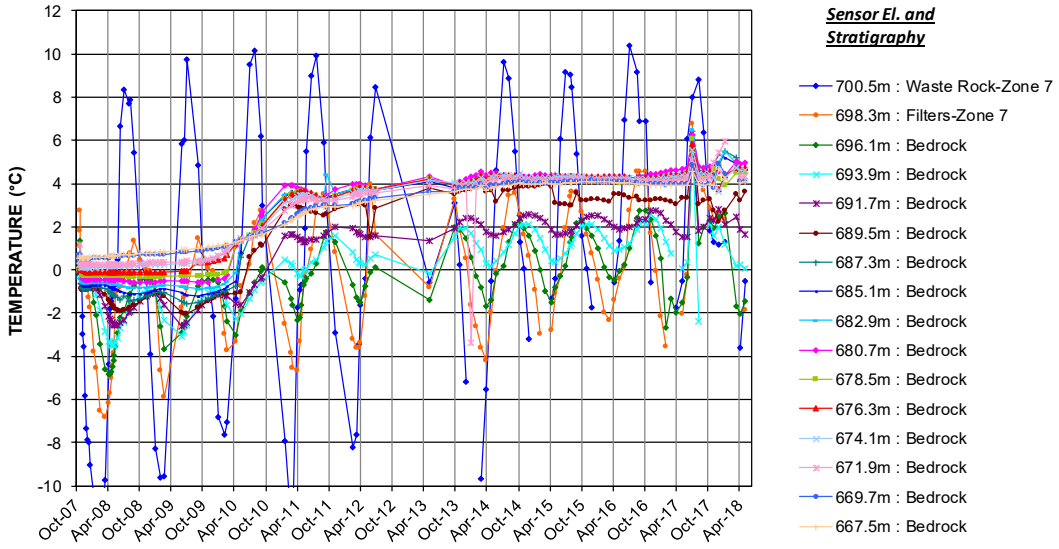
Water Storage Pond Data

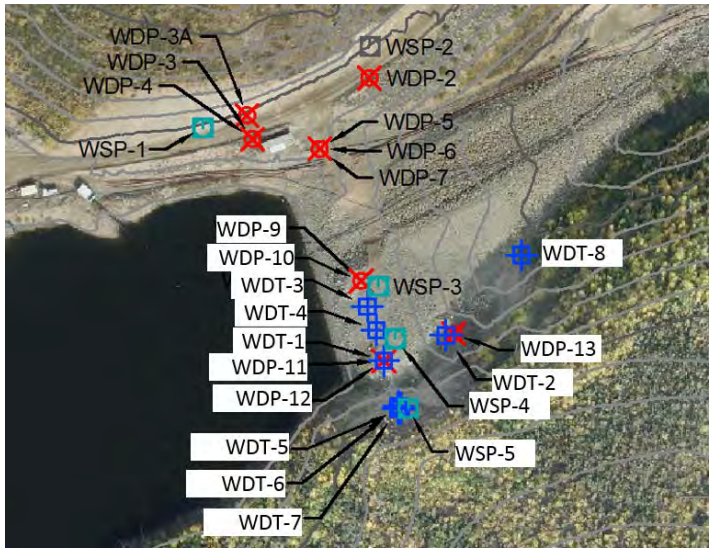
Temperature Cable – WDT-7

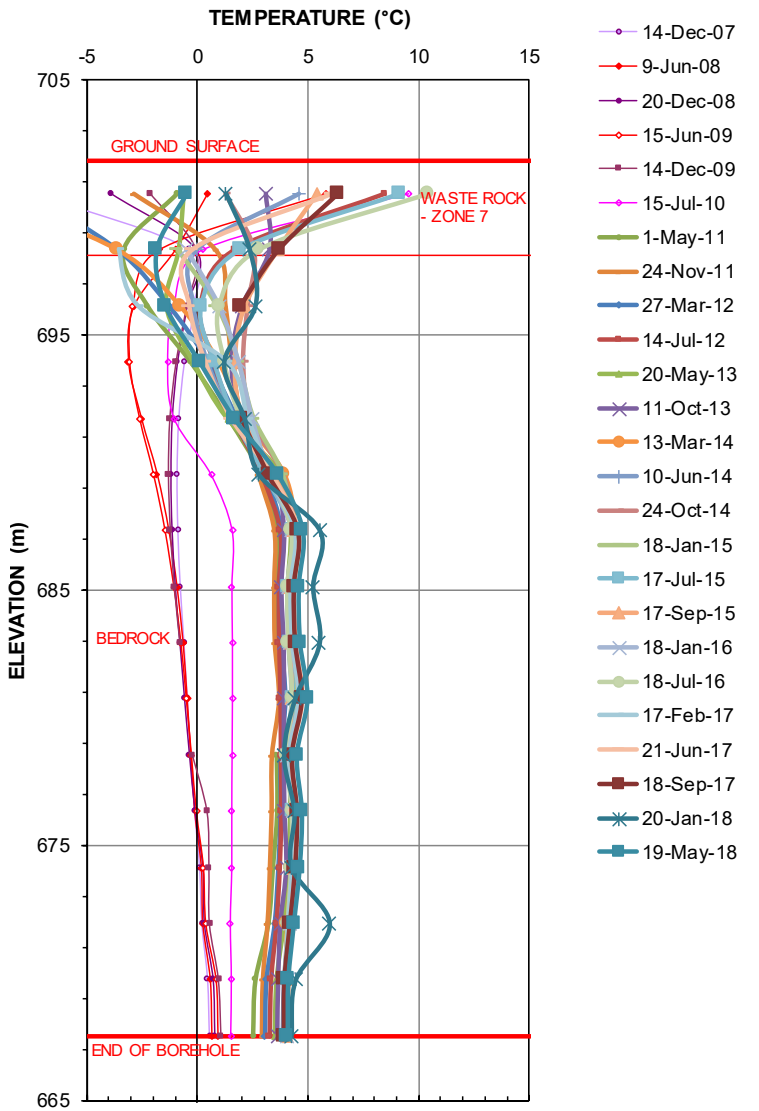
Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	9







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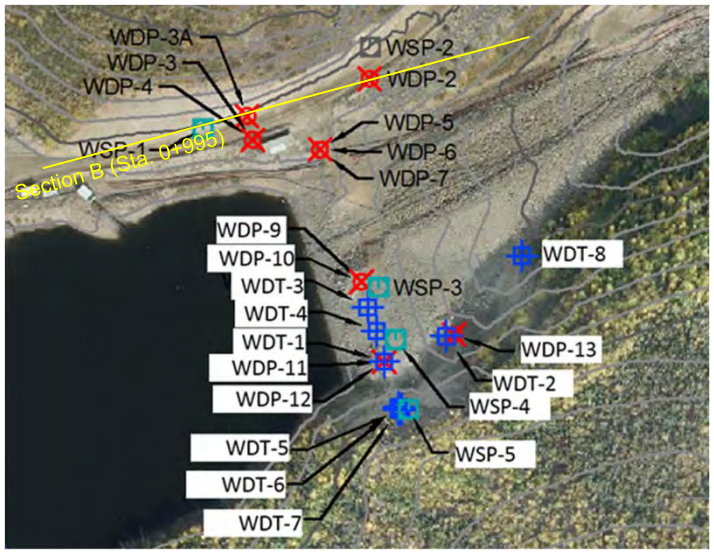
Water Storage Pond Data

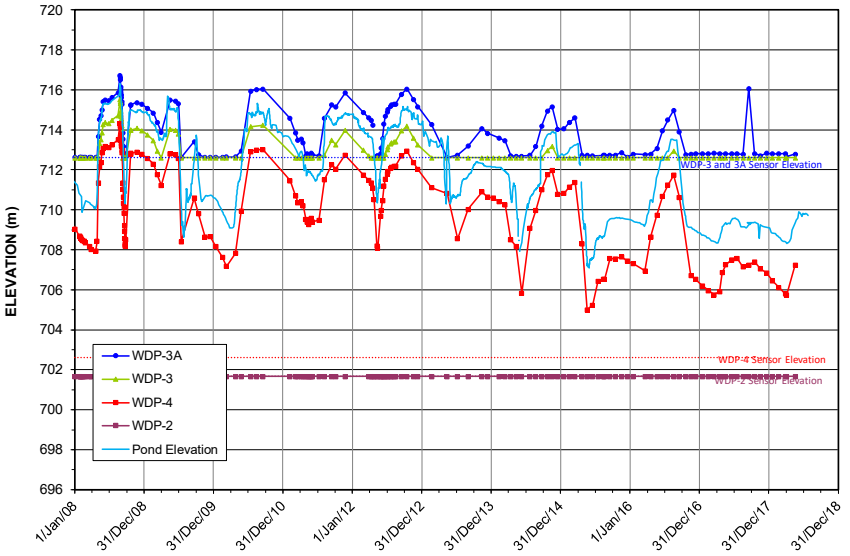
Temperature Cable – WDT-8

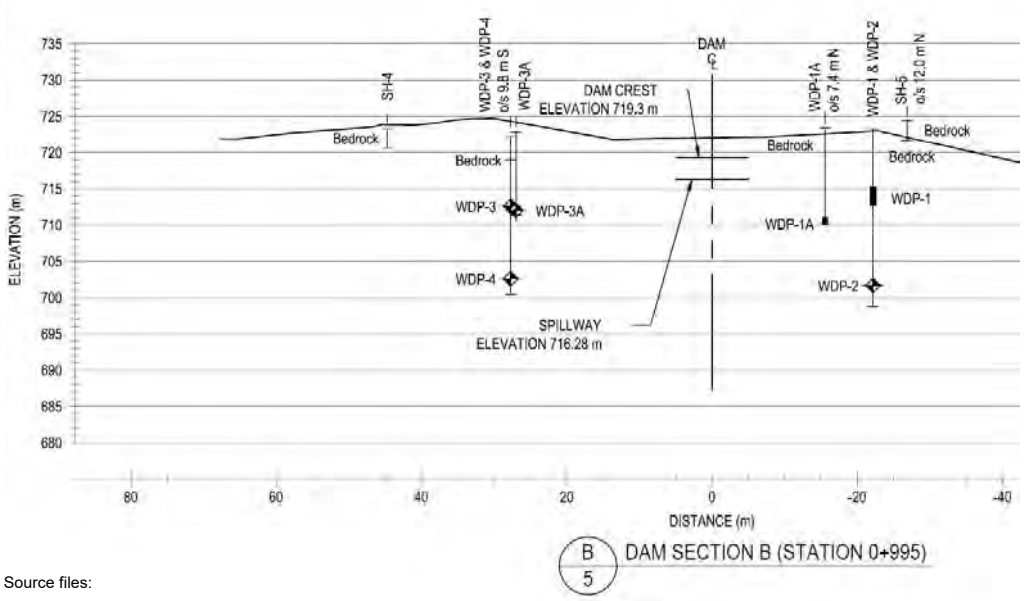
Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

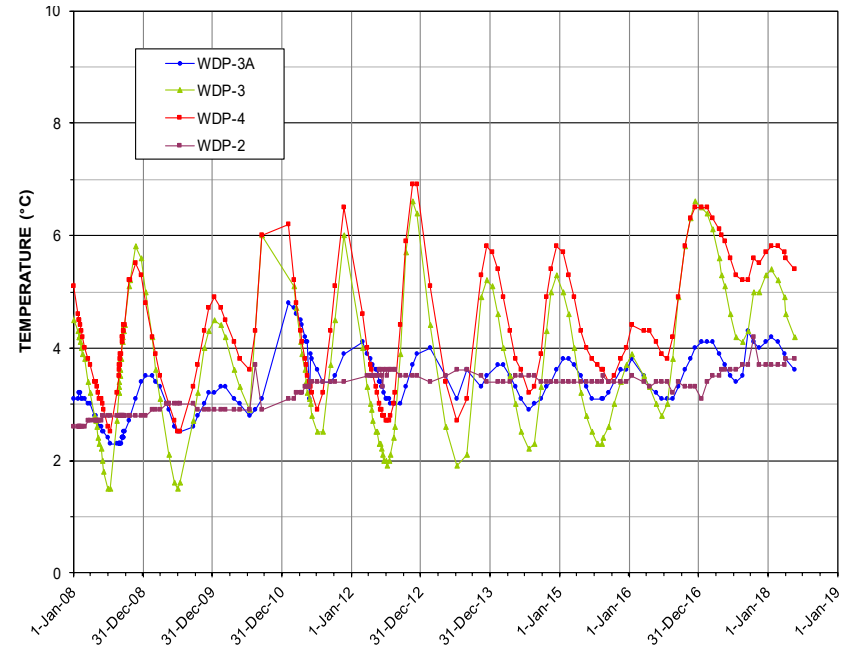
Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	10









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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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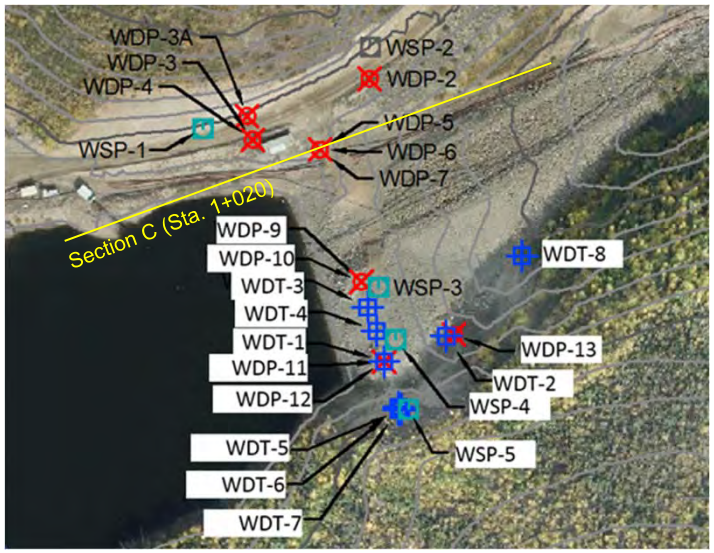
Water Storage Pond Data

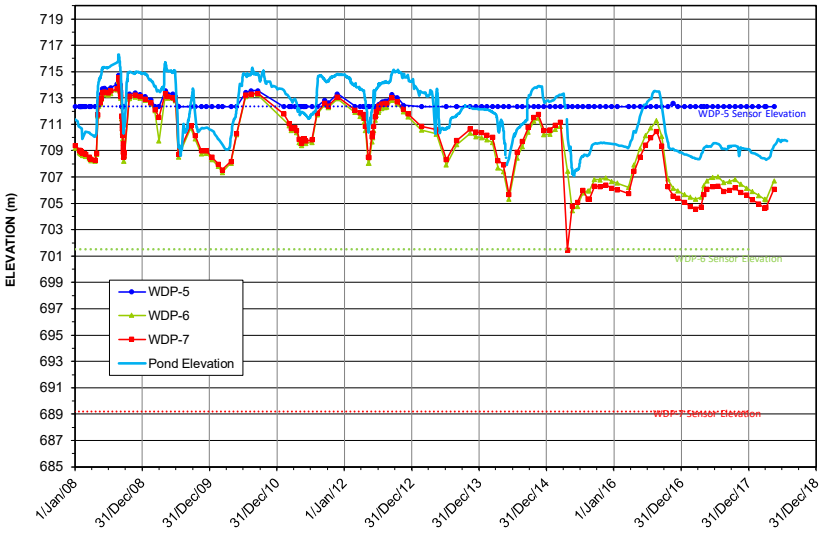
Piezometers – Left Abutment

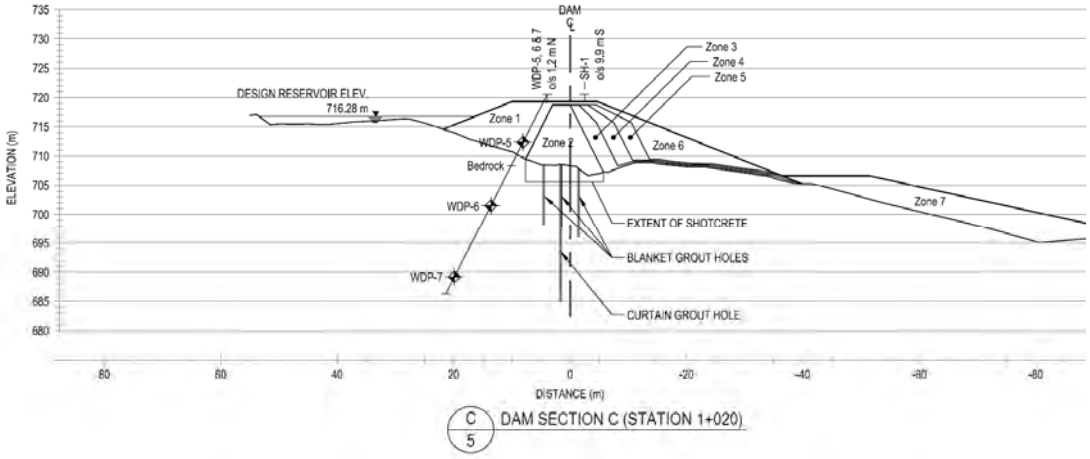
Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

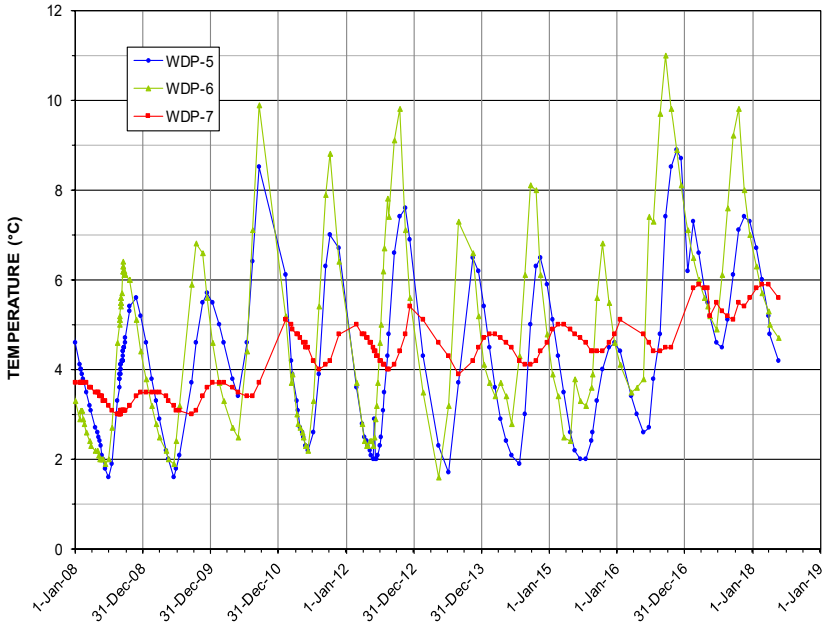
Minto Mine

Date: August 2018
Prepared by: PHM
Figure: 11









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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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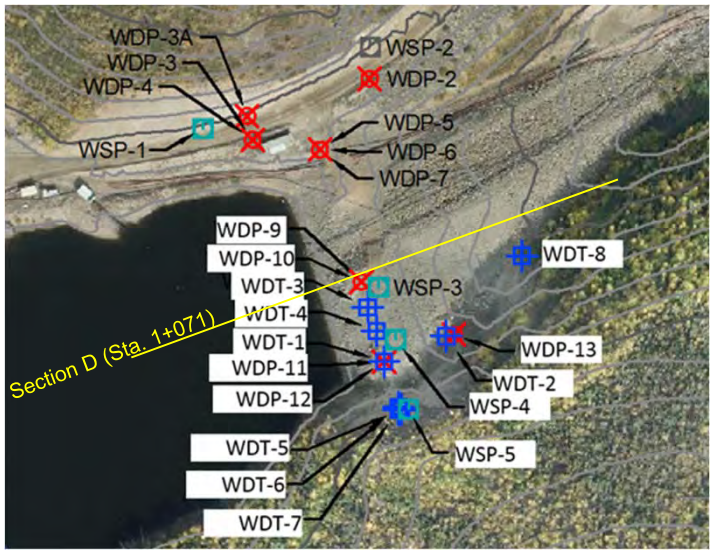
Water Storage Pond Data

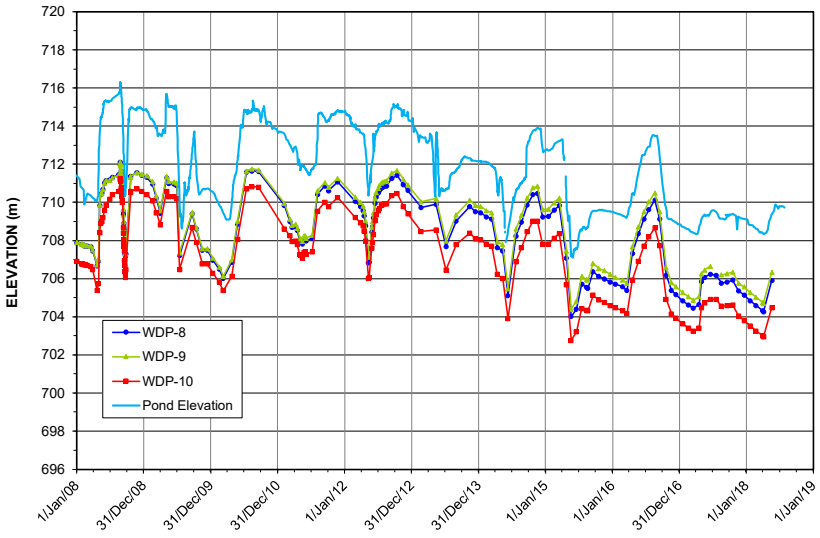
Piezometers – Section C (Station 1+020)

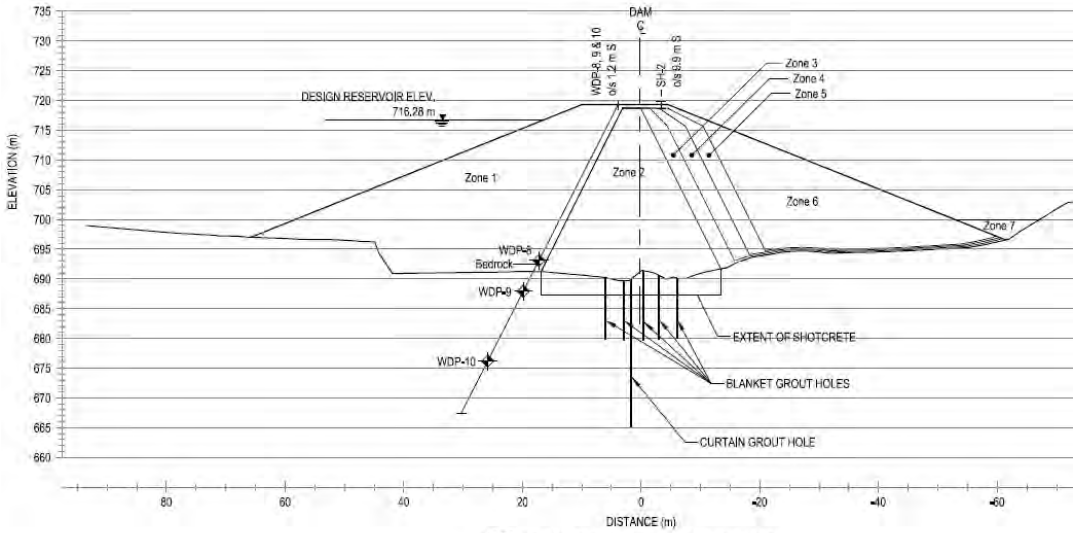
Job No: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

Minto Mine

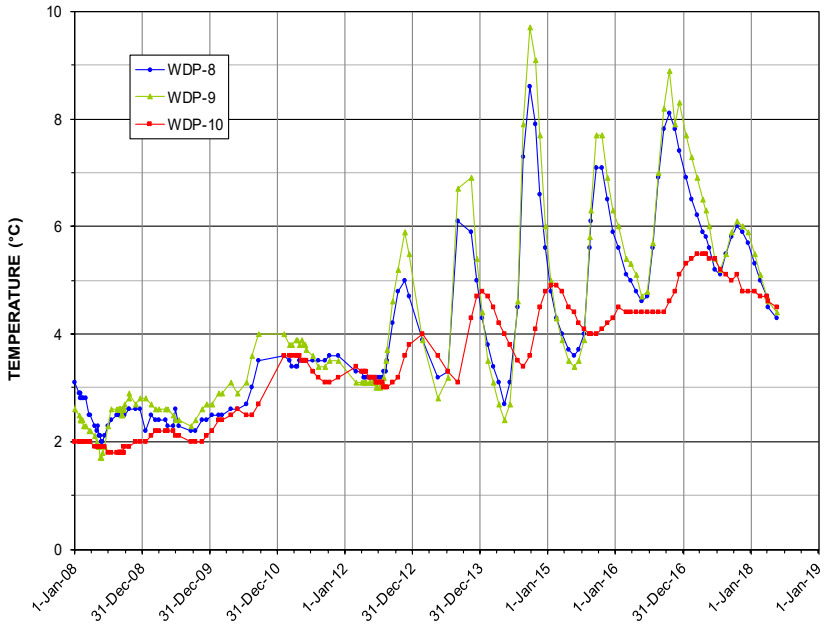
Date: August 2018 | Prepared by: PHM | Figure: 12







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



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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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Job No: 1CM002.063

Filename: ApH_WaerStoragePond2018.pptx

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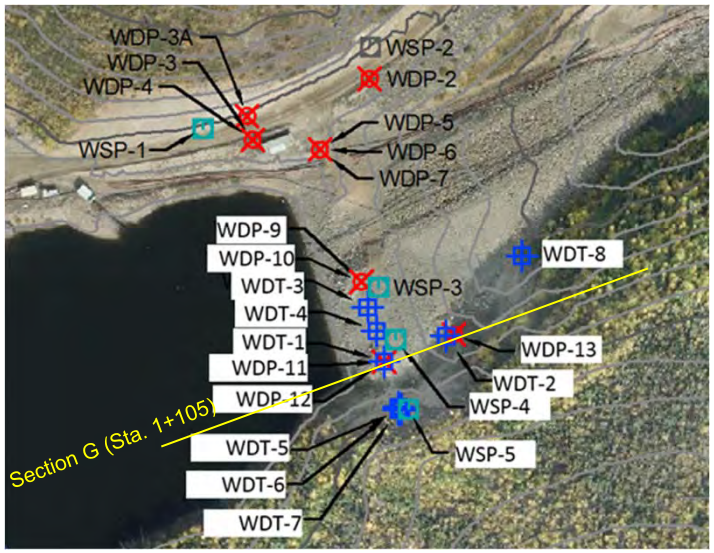
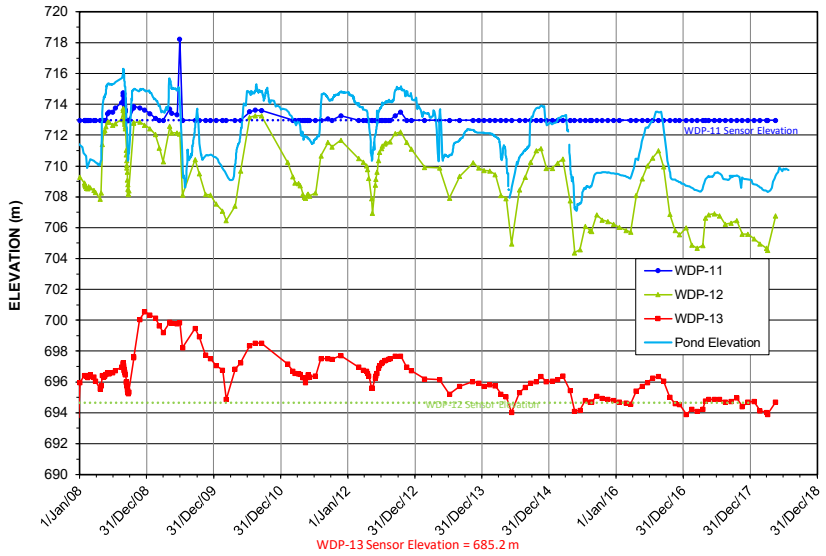
Minto Mine

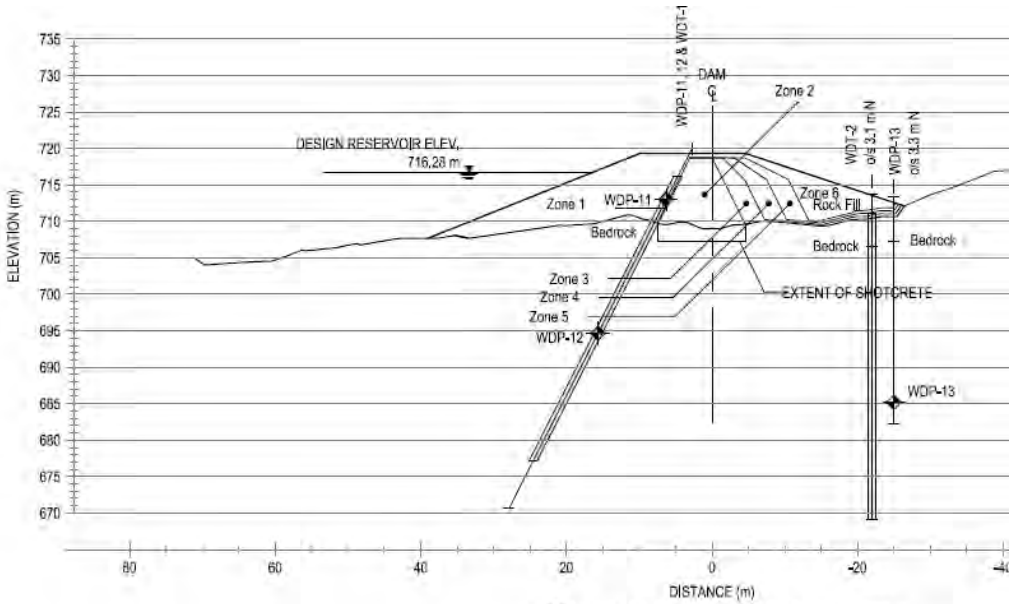
Water Storage Pond Data

Piezometers – Section D (Station 1+071)

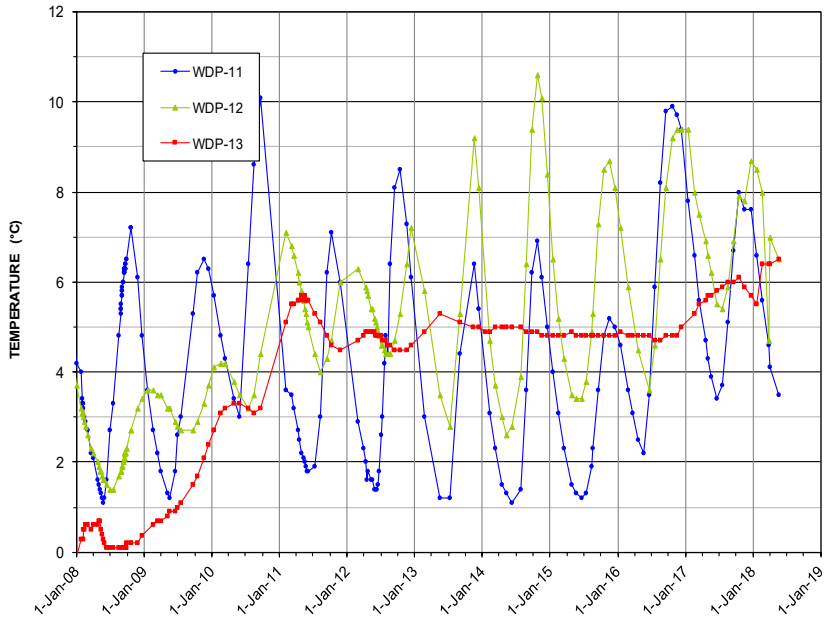
Date:	Prepared by	Figure:
August 2018	PHM	13







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



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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: 1CM002.063
Filename: ApH_WaerStoragePond2018.pptx

Minto Mine

Date:	Prepared by	Figure:
August 2018	PHM	14