Minto Mine
Water Licence QZ96-006

Mine Waste Structures
Deformation Monitoring Plan and Report

Prepared by:
Minto Mine
December 2012

Contents

List of Figures:

List of Tables:

List of Appendices:

1 Introduction

This document has been prepared by Minto Explorations Ltd. (Minto), a subsidiary of Capstone Mining Corporation, with respect to the Minto Mine.

The following document is intended to fulfill the requirements of Clause 80 of Minto's water use license QZ96-006 (WUL) by providing a program that seeks to:

a) identify all existing deformation instrumentation and survey monuments;

b) provide a summary of the history of deformation of all Waste management structures since measurements and observations were initiated;

c) identify the need for additional instrumentation or survey monuments; and

d) propose monitoring schedules for each Waste management structure including, but not necessarily limited to, visual inspections, monitoring of deformation instrumentation and survey monuments, and monitoring of thermistors, piezometers, or other instrumentation that may be in place or may be proposed to be installed.

There are currently six major waste structures on site:

1. Main Waste Dump
2. Ice-rich Overburden Dump
3. Reclamation Overburden Dump
4. Southwest Dump
5. South Wall Buttress
6. Dry Stack Tailings Storage Facility

2 Main Waste Dump

The Main Waste Dump (MWD) is not currently an active dump site and has not received new material for over three years with the exception of small volumes of overburden hauled to the MWD as part of progressive reclamation work in June and July of 2012. The dump is built on a solid rock foundation and has thus far exhibited no signs of creep movement. Deformation monitoring is limited to visual inspections on an annual basis, and two inclinometers (MDI-1 and MDI-2) located approximately 65 and 80m, respectively, from the toe of the dump.

The inclinometers are intended to measure movement in the soils above bedrock. MDI-1, which intersects bedrock at 16m depth, has shown no measurable movement since its first reading in February of 2010. MDI-2 shows approximately 148mm of near-surface movement over 999 days, which averages 0.15mm/d. This occurs only in the top 7m of the hole; the hole is drilled 50.5m deep. There is a second movement plane between 21 and 23m depth in the hole, which has moved at approximately 0.05mm/d. This movement in the overburden soil could be attributed to the inclinometer's proximity to the South Wall Failure rather than loading from the dump.

3 Ice-Rich Overburden Dump

The Ice-Rich Overburden Dump (IROD) was originally created as a free-standing rockfill structure to contain a volume of ice-rich overburden behind it; it has since been entirely surrounded by the rockfill of the southwest dump, which now extends, at a minimum, 210m down-slope of it. The crest and contents of the IROD are visually inspected once per year. The IROD contains no regularly monitored survey hubs or other monitoring instrumentation, nor are any expected to be installed.

4 Reclamation Overburden Dump

The Reclamation Overburden Dump (ROD) receives the bulk of the mine's overburden. Due to the nature of the material placed within the dump, small-scale sloughs are expected in the dump and have been noted. Annual visual inspections have not noted large tension cracks that could be indicative of differential settlement. The dump is inspected annually, and contains no survey hubs or instrumentation. The bulk of the material in the ROD will be used for reclamation of the mine at closure, and consideration is given to short term stability and segregation based on material types when placing materials.

5 Southwest Dump

The Southwest Dump (SWD) currently receives the majority of the mine's waste rock. The south end is the area of the most active development, and has been designated as the location for mid- and high-grade waste deposition as per the mine's *Waste Rock and Overburden Management Plan* for Phase IV mining. The toe of this dump is monitored by seven GPS survey posts, which indicate movement at rates ranging from 0.00 to 0.75 mm/d in a generally eastern direction. A plot of hub locations and movement vectors is presented in Appendix A.

The following figures contain data from survey hubs located at the toe of the Southwest Dump.

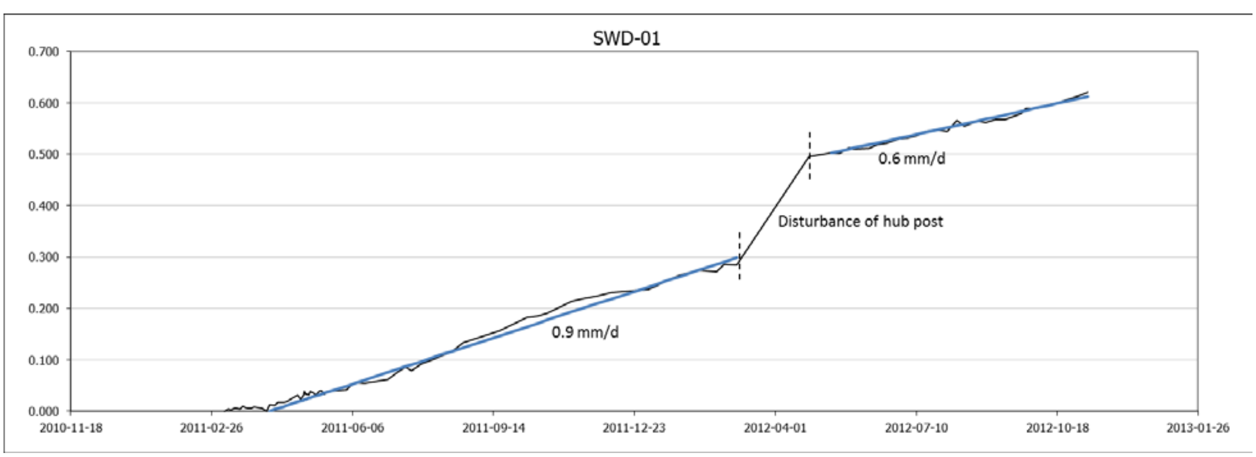


Figure 5-1: Southwest Dump SWD-01 Survey Hub Data

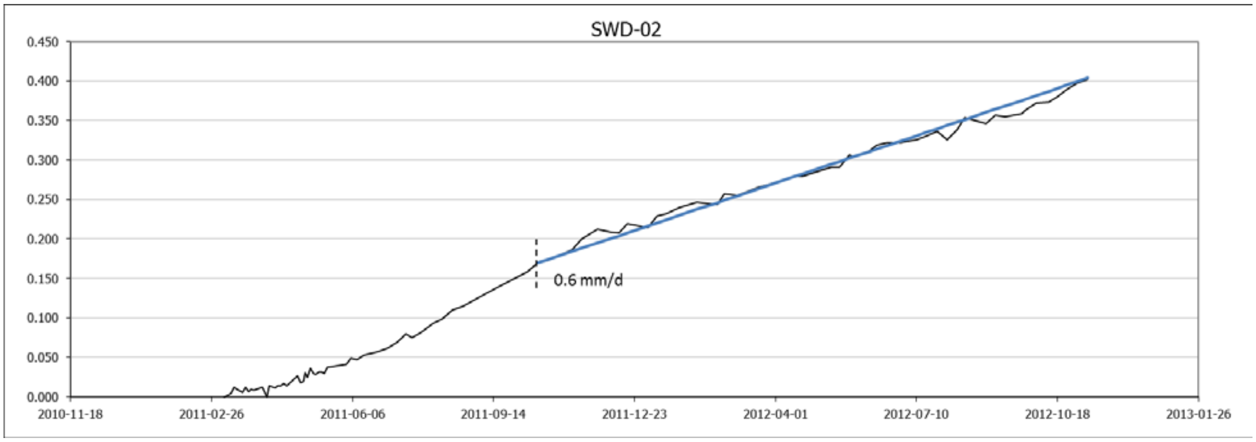


Figure 5-2: Southwest Dump SWD-02 Survey Hub Data

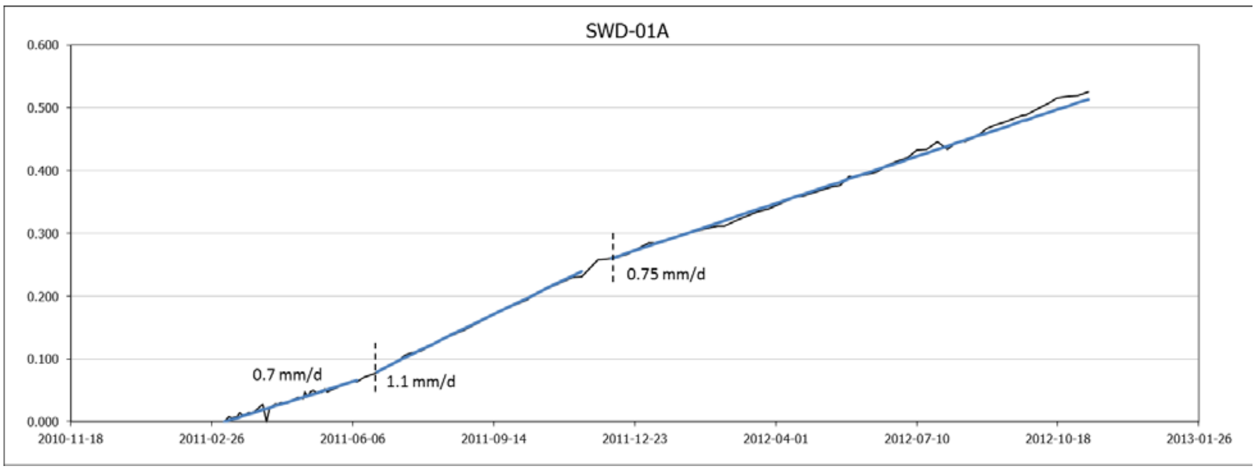


Figure 5-3: Southwest Dump SWD-01A Survey Hub Data

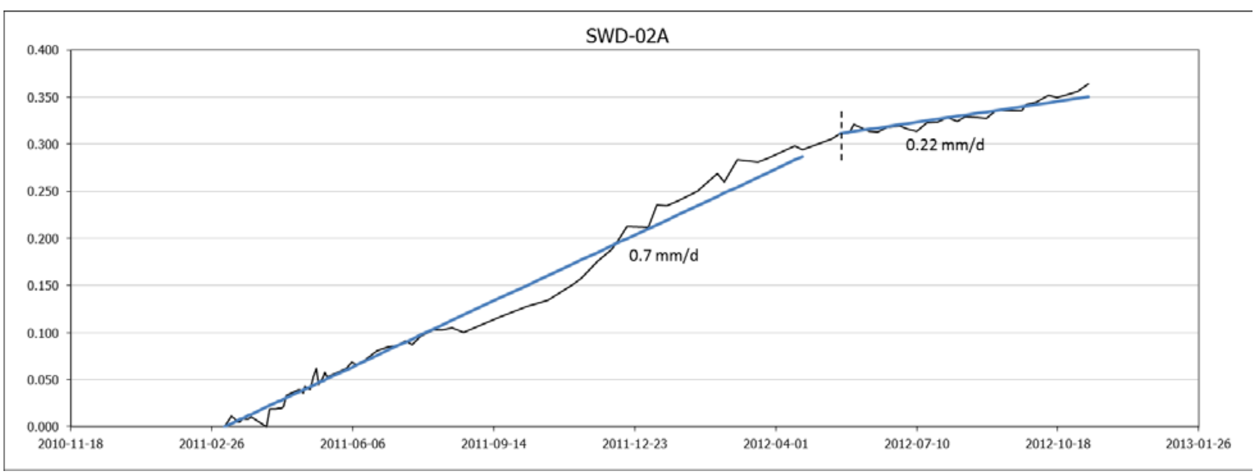


Figure 5-4: Southwest Dump SWD-02A Survey Hub Data

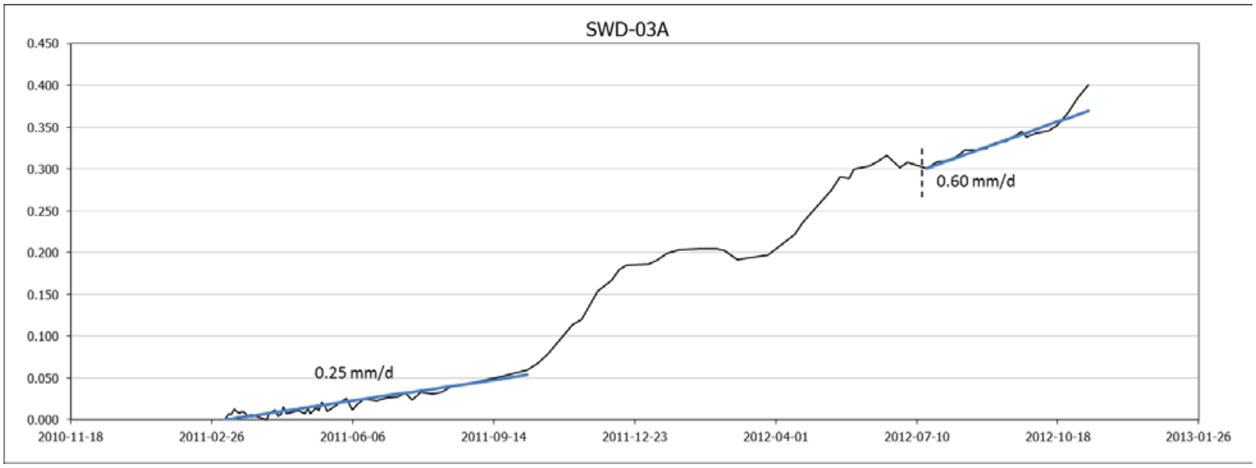


Figure 5-5: Southwest Dump SWD-03A Survey Hub Data

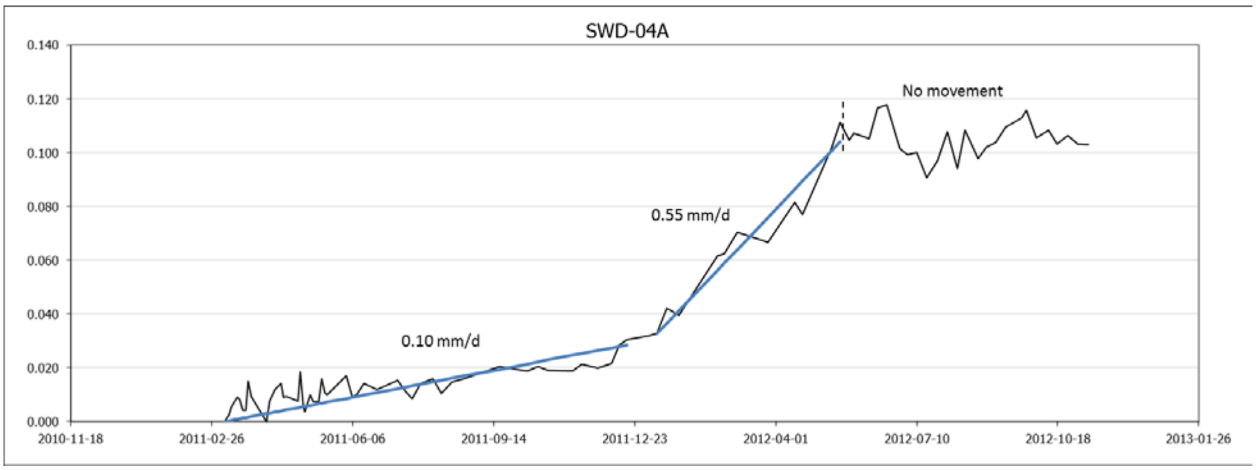


Figure 5-6: Southwest Dump SWD-04A Survey Hub Data

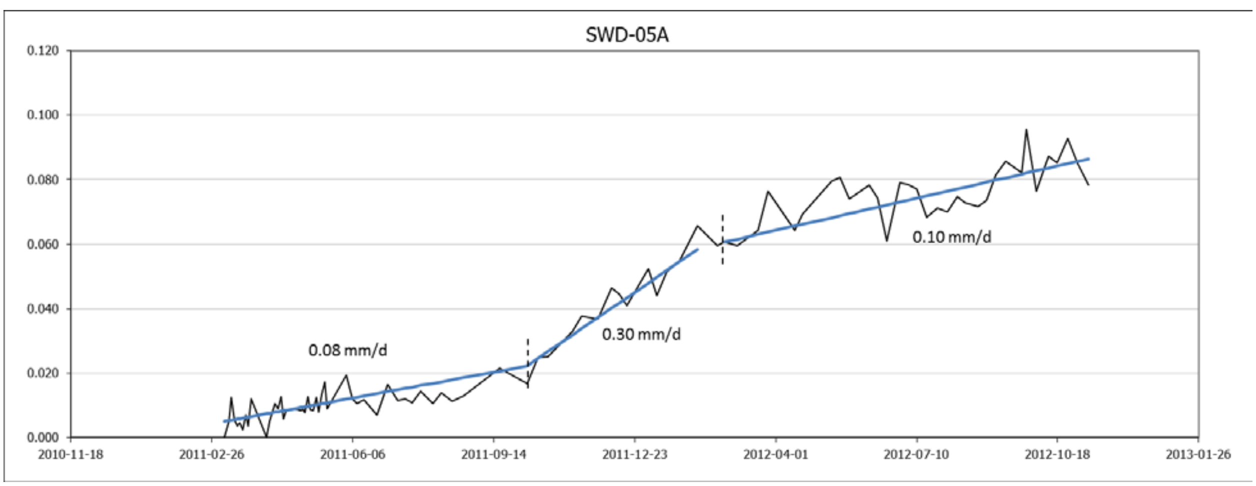


Figure 5-7: Southwest Dump SWD-05A Survey Hub Data

The movement rates seen in the northeast corner of the dump indicates influence by the Area 1 pit South Wall failure; however, the movement rates seen at the toe of the dump are considerably slower than those near the rim of the pit.

The SWD is also monitored by two inclinometers. SDI-1 is located directly adjacent to survey hub SWD-01A near the rim of the Area 1 pit. It shows approximately 280mm of displacement along a shear plane between 39 and 42m depth, moving at an average rate of 0.28 mm/d. The rate of this movement is plotted in Figure 5-8 ; it shows movement at a near constant rate since monitoring began in February of 2010.

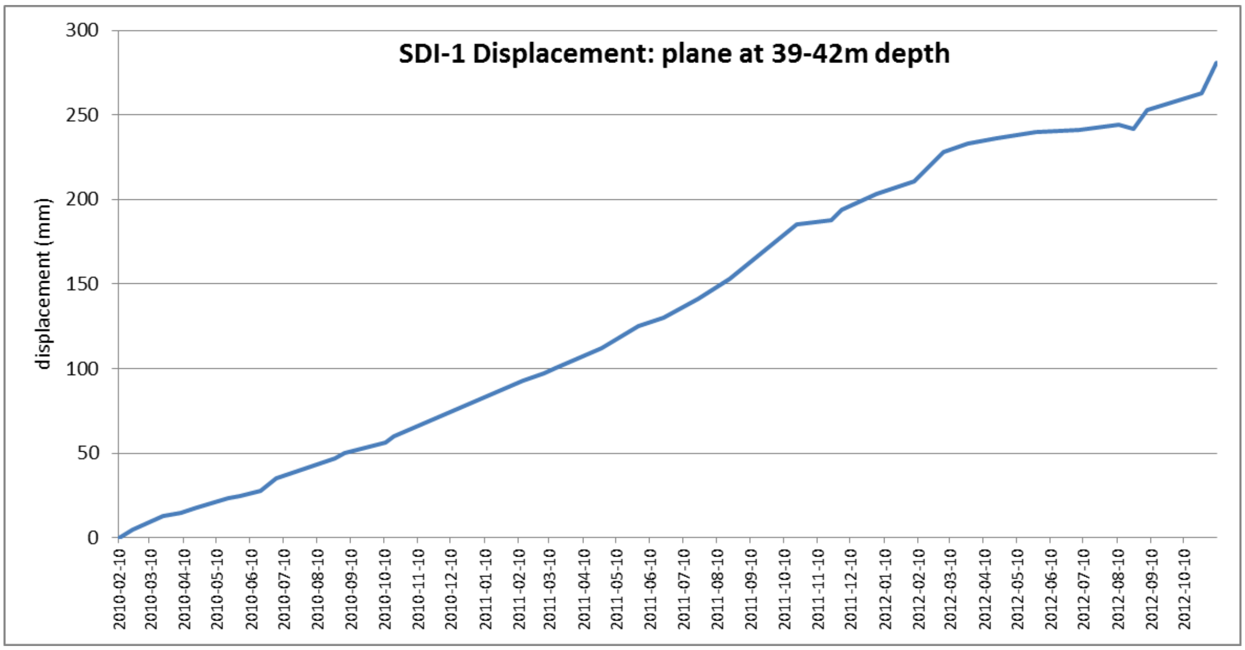


Figure 5-8: Southwest Dump SDI-1 Inclinometer Data

In addition to the failure plane above the bedrock contact, the soil overburden at the SDI-1 location shows a gradual increase in displacement nearer to surface; this can be seen in Figure 5-9 on a plot of the hole profile as of November 8, 2012.

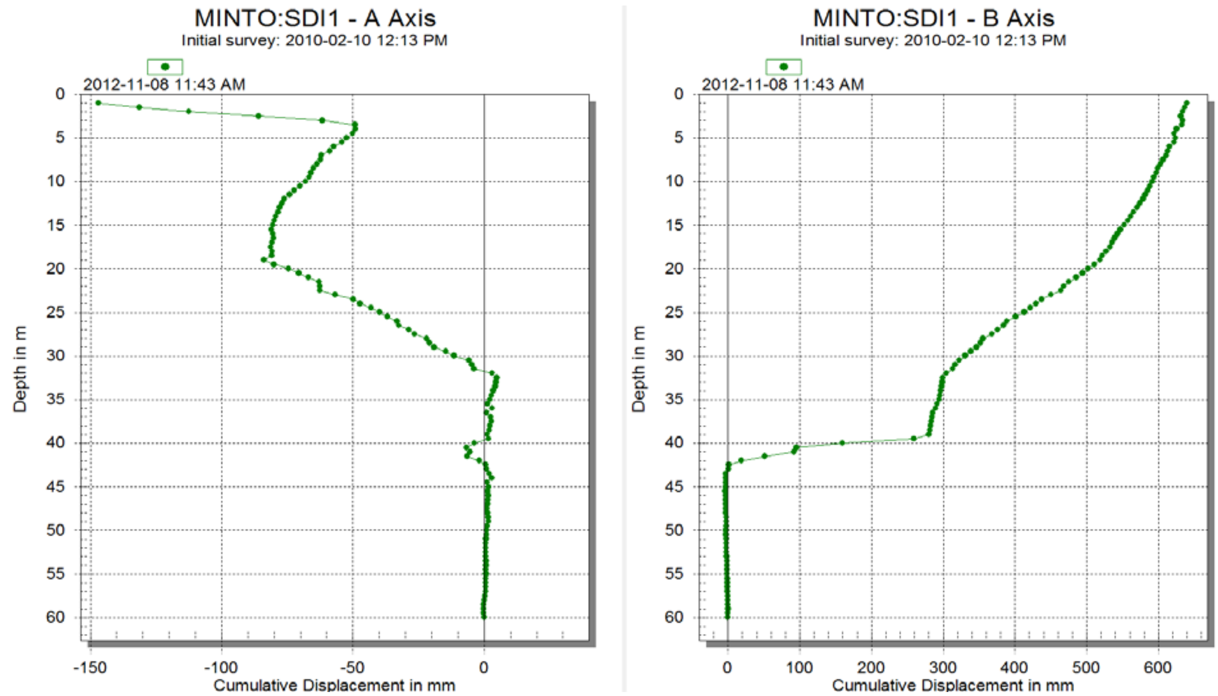


Figure 5-9: Southwest Dump SDI-1 Inclinometer Data

SDI-3, at the toe of the Southwest Dump, shows movement along a zone starting at 35m depth and continuing up to 27.5m with total displacement of 37mm over 995 days for a rate of 0.037 mm/d. There is also a larger displacement in the top 7m of the hole.

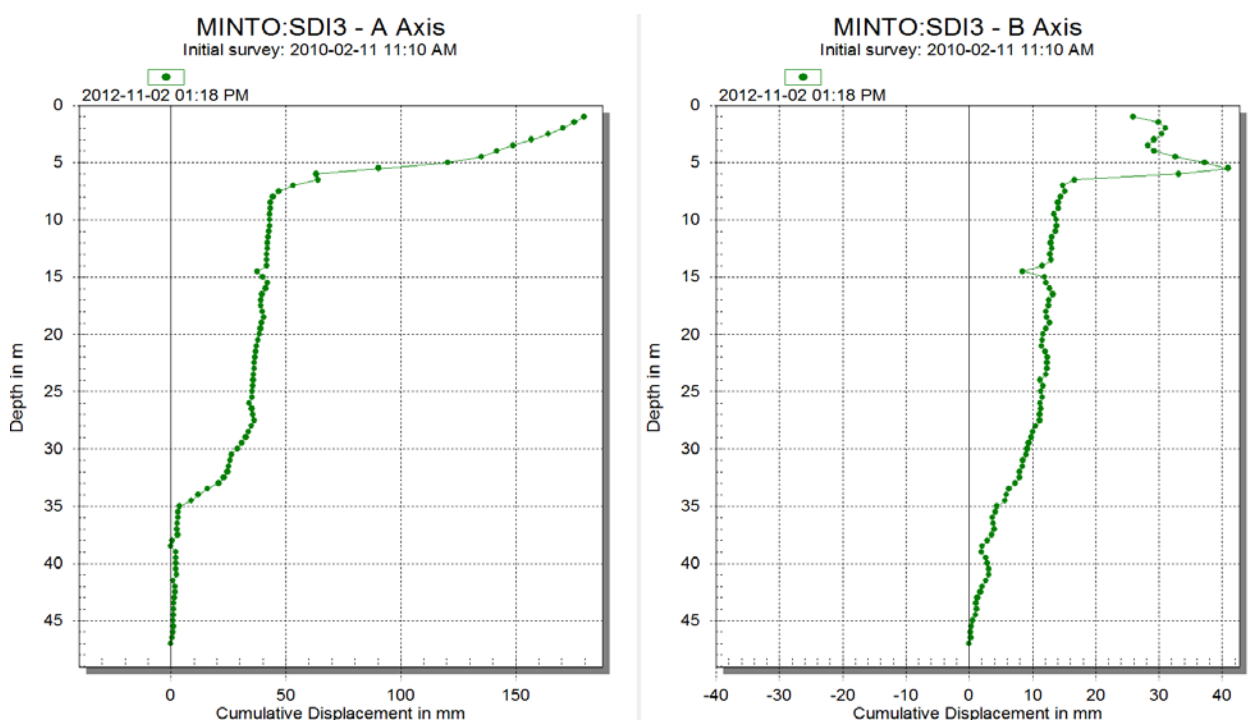


Figure 5-10: Southwest Dump SDI-3 Inclinometer Data

6 Area 1 Pit South Wall Buttress

6.1 Background

Movement along a plane above the overburden contact in the Area 1 Pit was observed during the mining of the Stage 3 pushback in April of 2009; this movement eventually led to a failure of the south wall on May 5, 2009.

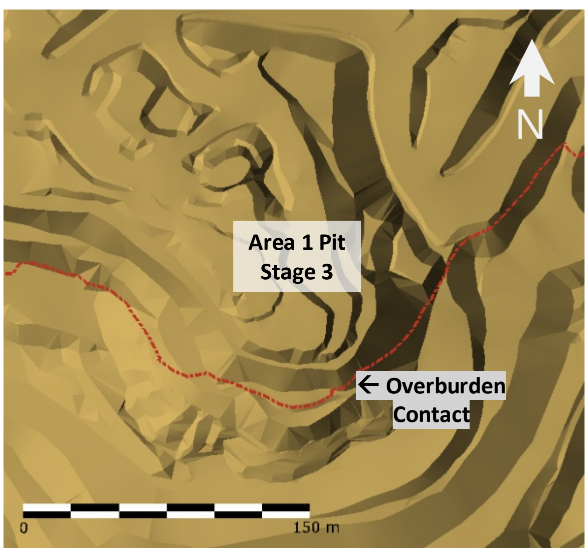
Figure 6-1: Movement along failure plane in overburden, south wall, Main pit, Stage 3 pushback, April 2009.

Figure 6-2: Displacement along the plane of movement: south wall, Main pit, Stage 3 pushback, April 2009.

After completing the mining of Stage 3 in March of 2010, a small (approx. 210,000 m^3) buttress was dumped in up to the 766m elevation to prevent movement near the toe of the overburden layer; this is shown in Figure 6-4.

This interim measure, having successfully stabilized the Stage 3 wall, was removed in the course of Stage 5 mining.

Figure 6-3: Main pit, May 2009 south wall failure.



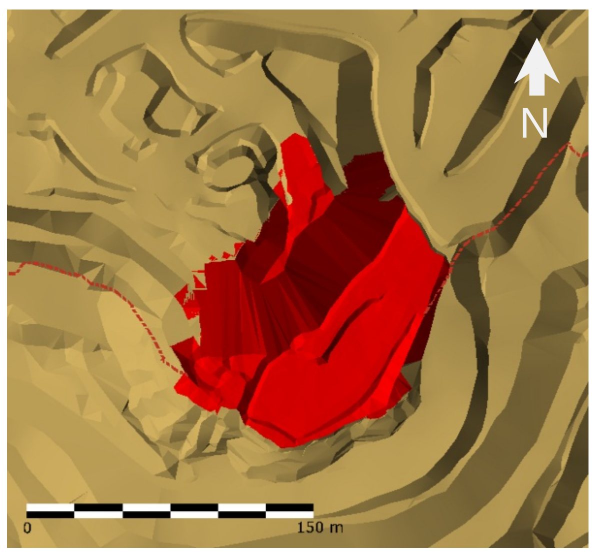


Figure 6-4: Completed Stage 3 pushback of the Area 1 pit (left) and temporary buttress constructed to stabilize overburden contact (right).

With the failure of the south wall during the mining of Stage 3, the Stage 5 pushback design was created with a large unloading cut at the 810m elevation and 30° slopes in overburden. Mining of Stage 5 began in the summer of 2010 and finished in April of 2011.

The original intention was for the final Stage 5 high wall to be supported by an 850,000 m^3 buttress, which would have formed a blanket of approximately 40m thickness, preventing localized failure of the overburden layer. The original design concept for this buttress is illustrated in Figure 6. Several slight variations on this design were created, with some, such as that appearing in the *Preliminary Phase IV Waste Management Plan* submitted as part of the Phase IV environmental assessment application, measuring as much as 1.30 Mm^3.

Monitoring via inclinometers and survey hubs during the mining of Stage 5 in the winter of 2010/2011 suggested a larger-scale translational failure. Analysis showed that the bulk of a 50m-thick silty / sandy overburden layer was sliding into the pit along a thin layer of ice-rich permafrost clay. After several months of accelerating movement, this translational failure resulted in a substantial piece of the slope sliding into the pit in late April 2011, bounded at the back by a large tension crack. This created an over-steepened overburden face that underwent a progressive failure, sloughing continuously throughout the summer of 2011 until winter conditions halted further degradation of the slope.

Figure 6-5: South wall failure, Area 1 pit, April 2011.

Construction of the wraparound buttress pictured in Figure 6-6 began shortly after the slope failure and continued until May 30, 2011, at which time the dump advanced to a point where it could not be safely constructed using the original design. This, and concerns about the ability of the design to stabilize the slope, necessitated a new analysis of the data and a new design, which EBA Engineering (EBA) performed in July of 2011.

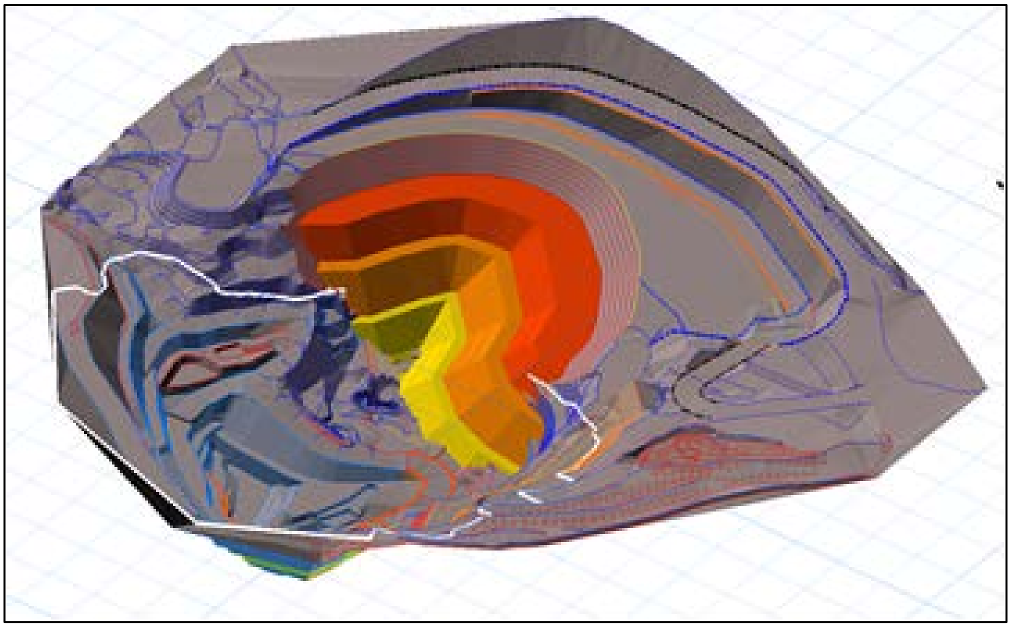


Figure 6-6: Original buttress concept, to be built after completion of the Area 1 pit (perspective view, looking southeast).

This analysis showed that considerably larger buttress would be required to halt the movement of the overburden slope.

6.2 Buttress Design

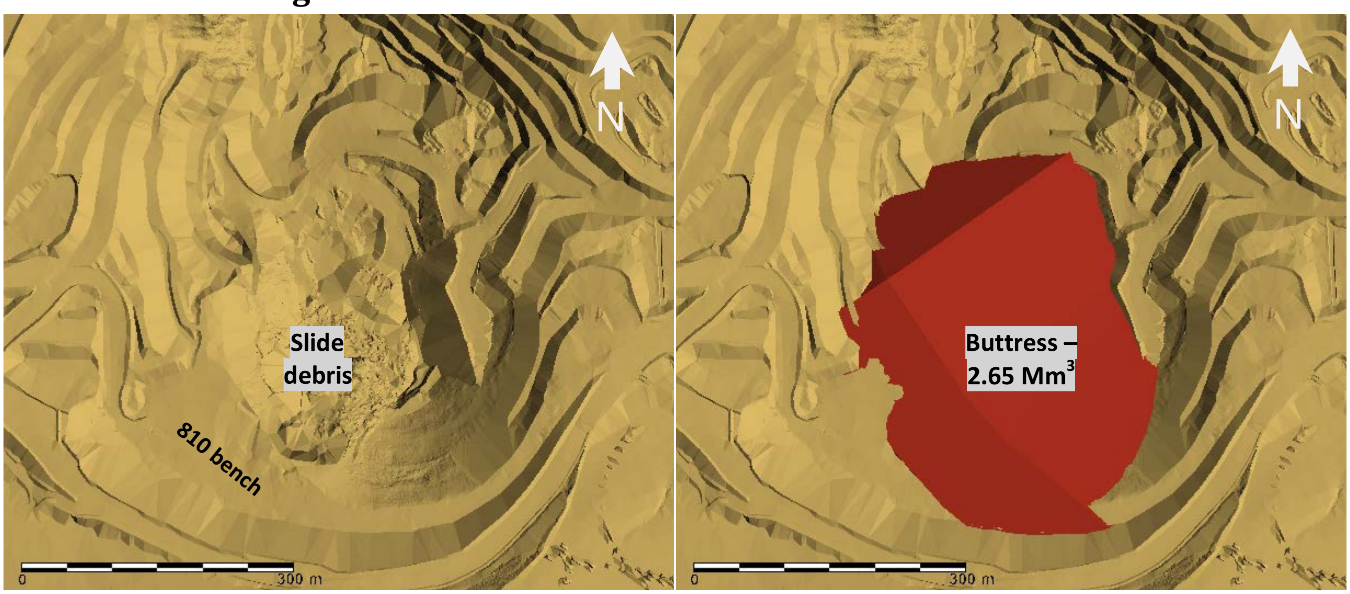


Figure 6-7: Post-failure survey of the Area 1 pit (left) and final buttress design for the south wall of the Area 1 pit (right).

EBA's report specified a 2.65 Mm^3 buttress with a 4:1 front face slope, constructed out of compacted rock fill: Figure 6-7 shows the design.

The buttress was to be constructed in lifts measuring 2m in thickness, each of which is compacted with four passes of a vibratory smooth-drum compactor. EBA has indicated this is sufficient to raise the friction angle of the rock fill to 40 degrees, thereby giving the final design a factor of safety of 1.3 against further movement.

A substantial portion of the buttress does not actively work to resist movement of the overburden layer, but instead serves only as a base upon which the rest of the structure sits; thus, the compaction was not required on material below the 760m elevation, which was end-dumped from this height. This elevation was also chosen to ensure that natural segregation would leave coarse material at the toe of the structure, and to stay safely above the level of the slide debris. Finally, water was also a significant factor, being at approximately the 750-753m elevation of the Area 1 pit during the construction of the base lift.

The intersection of the overburden contact with the final pre-failure as-built of the south wall is shown in Figure 6-8. It can be seen that the overburden contact intersects the south wall as low as 740m at the south corner of the pit, and as high as the 770m elevation at the west corner of the pushback. This is also illustrated in a section view of the buttress, shown in Figure 6-9.

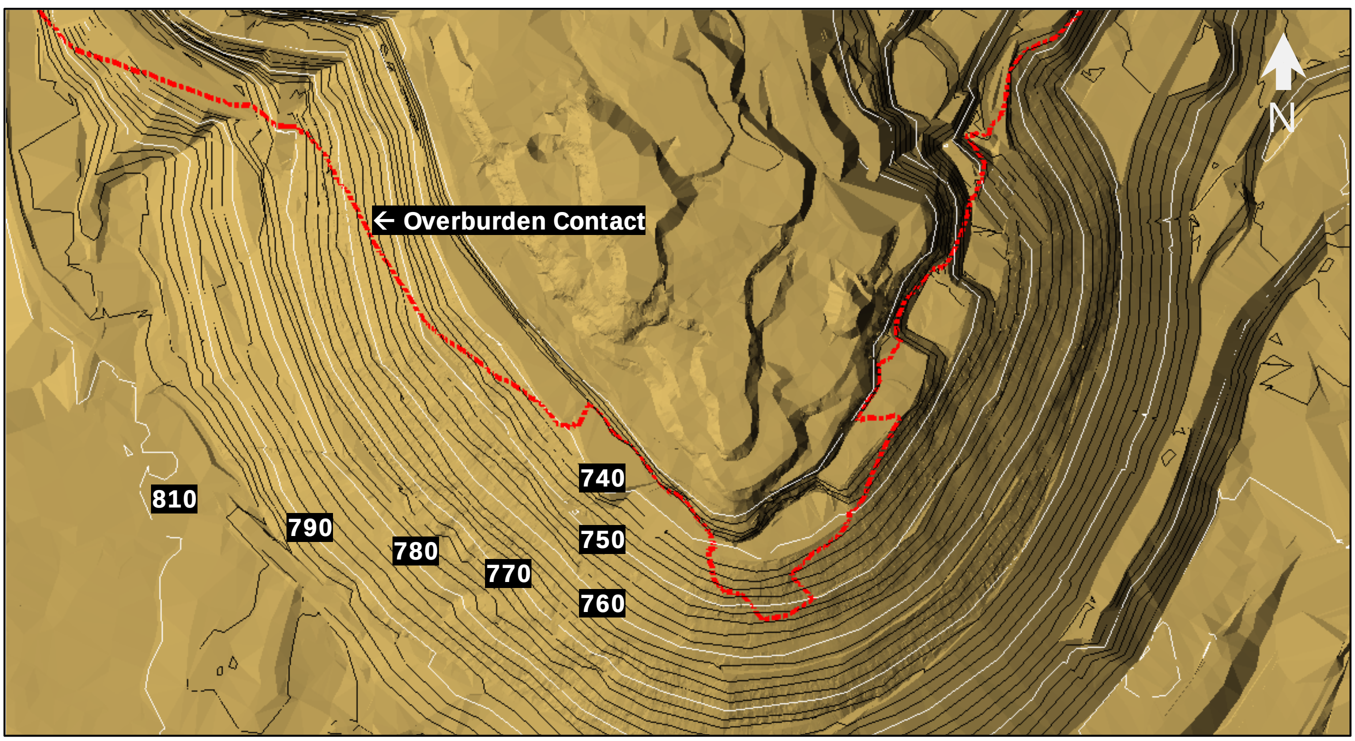


Figure 6-8: Overburden contact (red) where it intersects the final pre-failure as-built of the south wall.

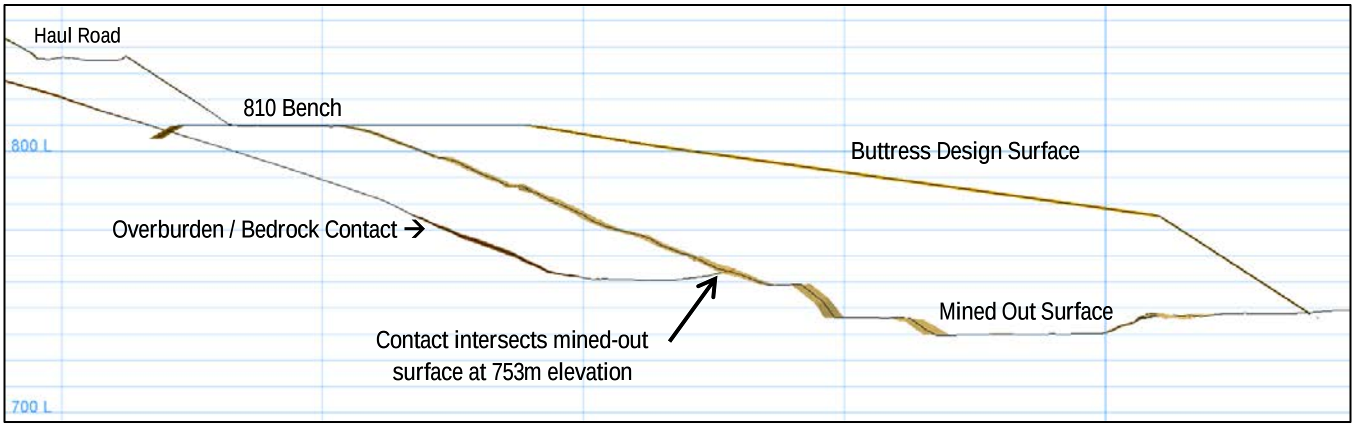


Figure 6-9: Detailed section view through centerline of buttress at 0.00° Azimuth, looking west.

6.3 Construction Progress to Date

As of November 18, 2012, construction is 70% complete: Figure 6-10 shows the relationship between the volume of fill placed and the elevation reached as the buttress is constructed. Also plotted are the dates at which certain elevations were reached.

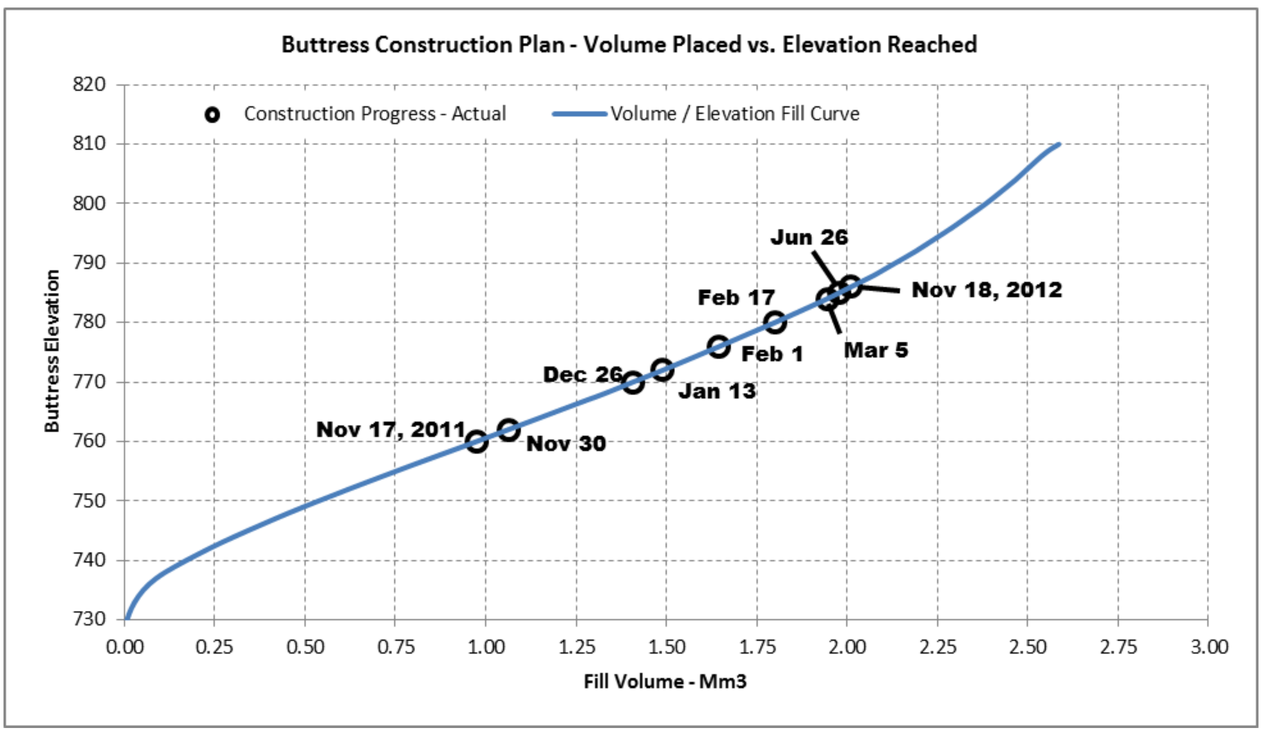


Figure 6-10: Buttress volume vs. elevation graph, showing dates at which certain elevations were reached.

6.4 Construction Forecast

Construction of the buttress slowed in April of 2012; only small volumes of waste have been placed since; the reason for the slower construction is that at and above the 786m elevation, which corresponds to the spill elevation of the pit as per the currently approved Tailings Management Plan, the buttress must be constructed of low-grade waste rock.

The Mill Valley Fill Extension has a similar waste rock grade construction restriction.. Given the higher creep rates of the DSTSF, the MVFE was given a higher priority than the South Wall Buttress: all available low-grade waste has reported to the MVFE and other construction projects, such as roads and berms that require it. With the Mill Valley Fill Extension nearing completion, buttress construction is expected to resume in December 2012.

6.5 Buttress Performance and Monitoring

The design and stability analysis document, prepared by EBA, does not predict movement rates: it is a static analysis that shows only whether or not the ground will yield given the geometry of a particular two-dimensional section and the material properties of each distinct layer; i.e. bedrock, overburden, or rockfill.

It is therefore not possible to evaluate the performance of the structure relative to its design until construction is complete; however, a significant decrease in movement rates has been observed on every one of the 11 active hubs along the crest of the south wall. Table 6-1 shows current movement rates, measured by plotting trendlines through recent movement on the displacement/time graphs of each survey point, compared to peak movement rates.

Hub	Date of Peak Movement Rate	Peak Rate (mm/d)	Nov 2012 rate (mm/d)	% Change
M73	Oct 2011	5.20	2.80	-46%
M74	Oct 2011	4.50	2.40	-47%
M75	Oct 2011	2.85	0.85	-70%
M76	Oct 2011	1.10	0.50	-55%
M77	Oct 2011	1.70	0.35	-79%
M78	Nov 2011	5.00	2.80	-44%
M79	Nov 2011	3.60	1.90	-47%
M80	Nov 2011	2.00	1.00	-50%
M81	Installed July 2012	n/a	0.35	n/a
M63	June 2011	1.50	0.00	-100%
M64	n/a	0.00	0.00	n/a
M67	Aug 2011	19.00	4.40	-77%
M69	Sep 2011	9.20	4.30	-53%

Table 6-1: Movement rates of survey hubs on the south wall of the Area 1 pit.

Movement rates are calculated by drawing trendlines through plots of displacement vs. time, as illustrated in Figure 6-11.

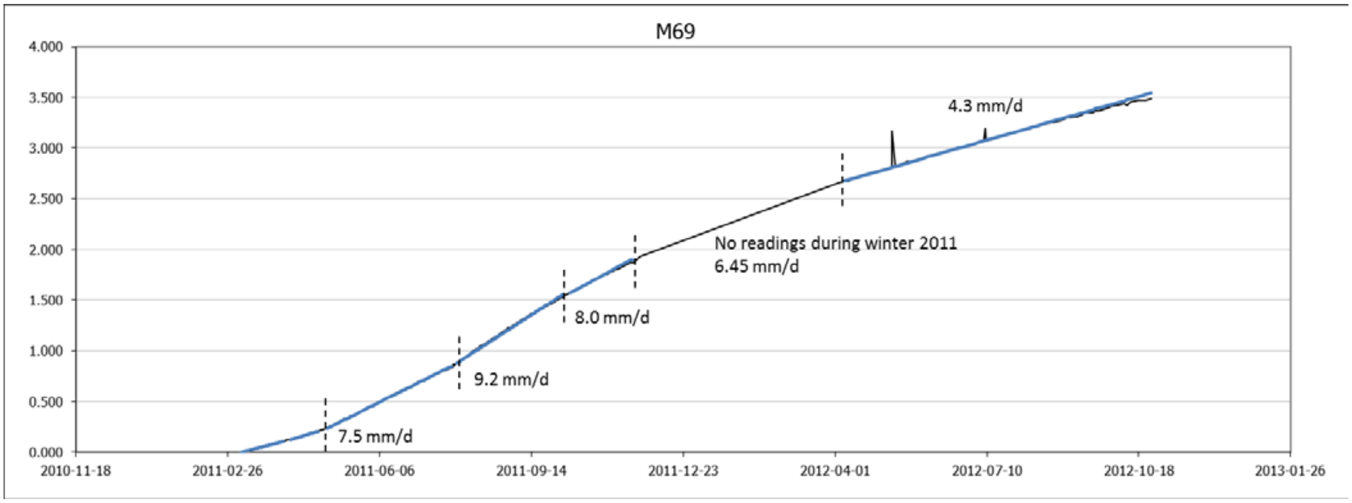


Figure 6-11: Displacement vs. time plot for M73.

Plots for the other Area 1 survey hubs are similar: all show a long period of constant-rate movement, followed by a gradual rate decrease beginning in late 2011, continuing to the most current data.

Figures 6-12 through 6-24 contain graphs that represent survey hubs around the Area 1 pit's south wall failure.

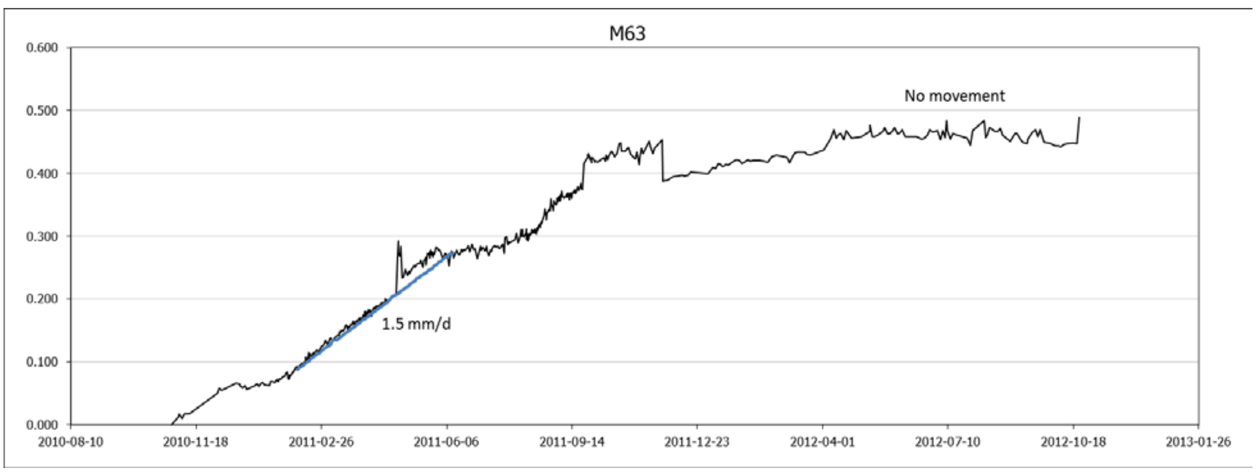


Figure 6-12: Area 1 pit survey hub data

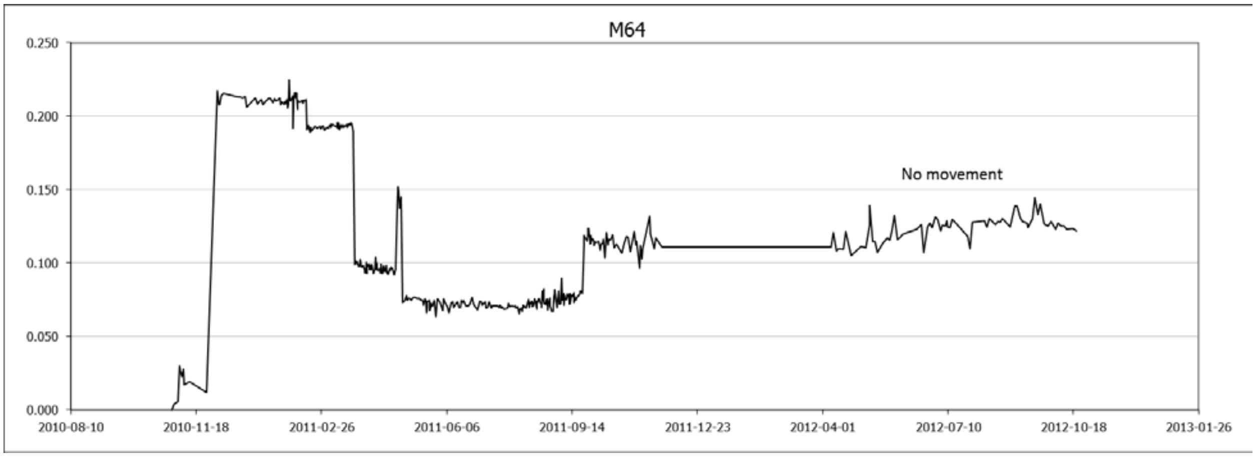


Figure 6-13: Area 1 pit survey hub data

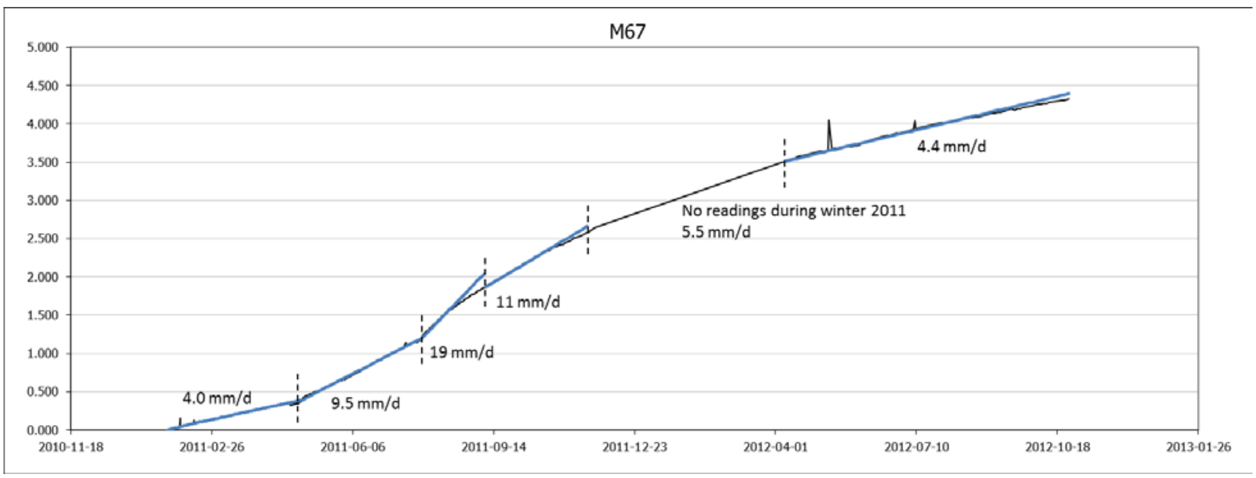


Figure 6-14: Area 1 pit survey hub data

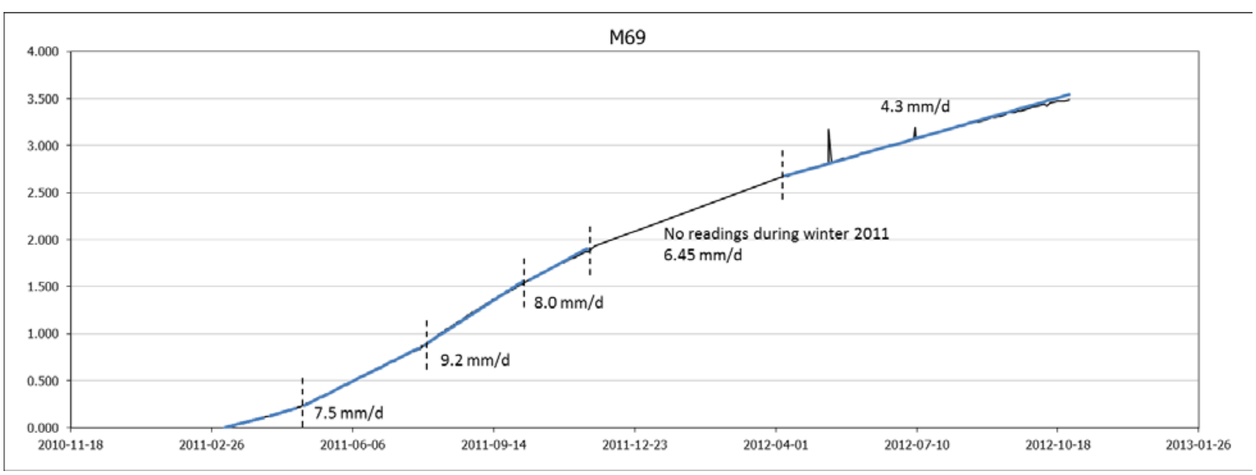


Figure 6-15: Area 1 pit survey hub data

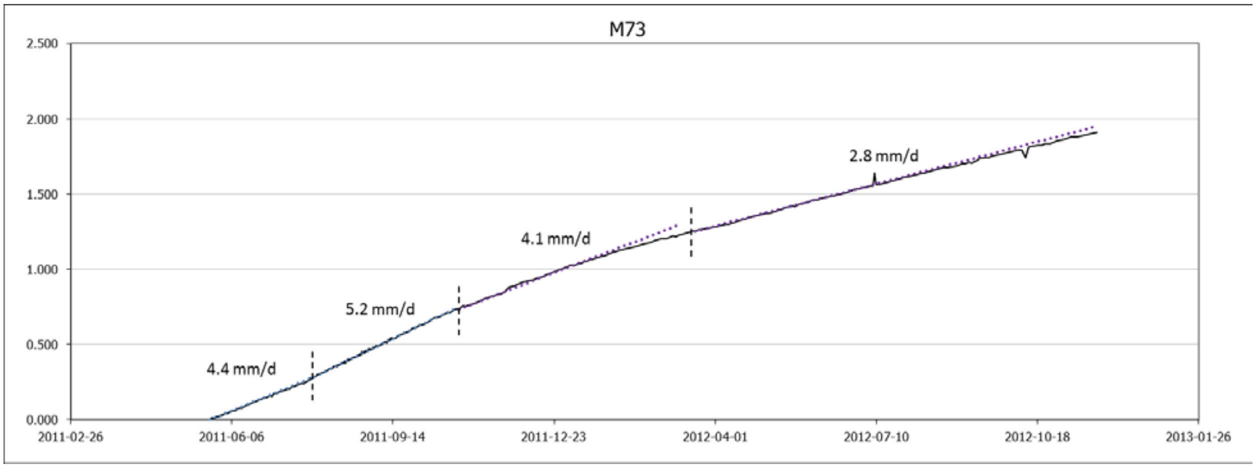


Figure 6-16: Area 1 pit survey hub data

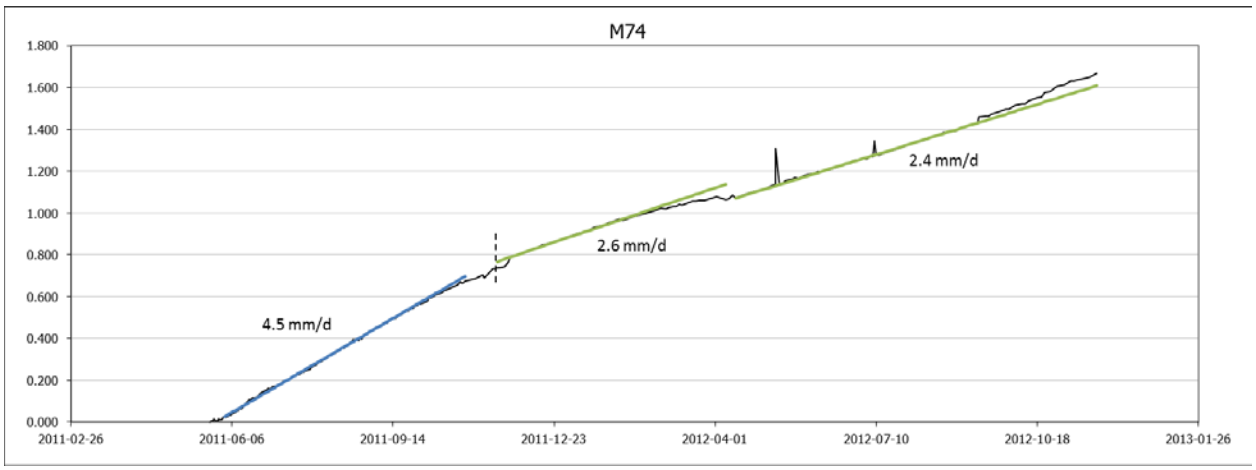


Figure 6-17: Area 1 pit survey hub data

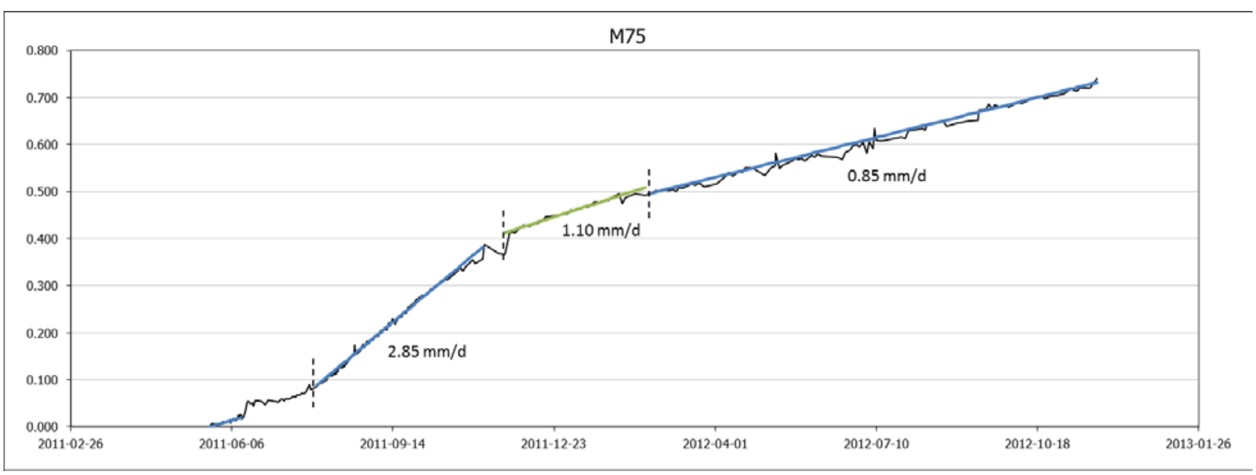


Figure 6-18: Area 1 pit survey hub data

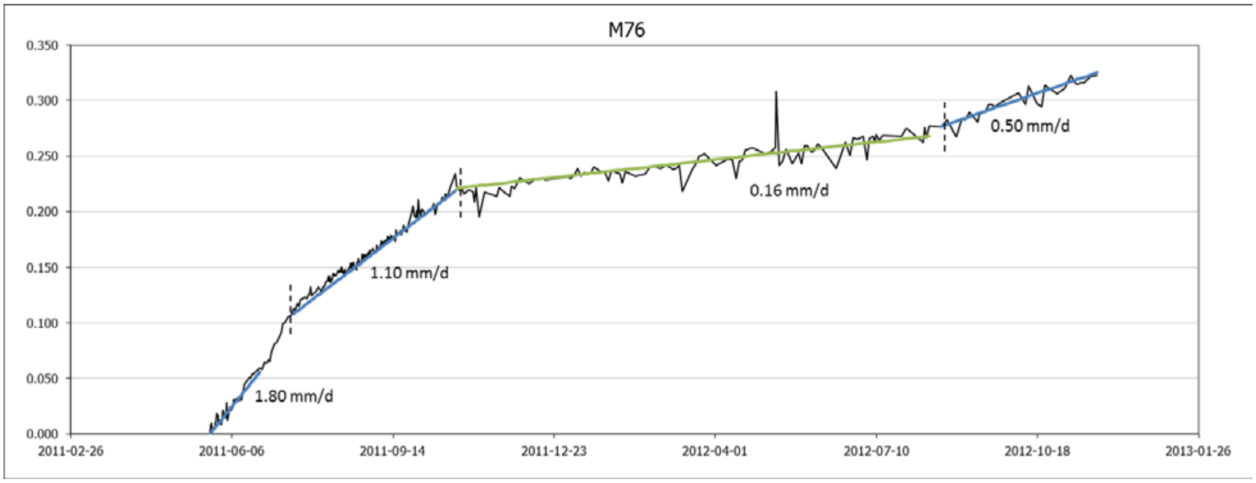


Figure 6-19: Area 1 pit survey hub data

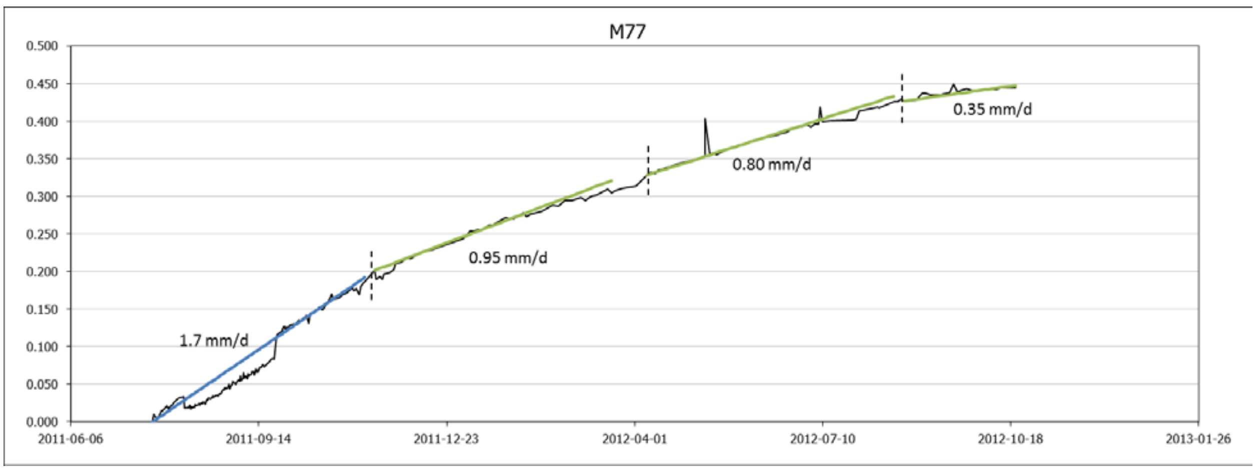


Figure 6-20: Area 1 pit survey hub data

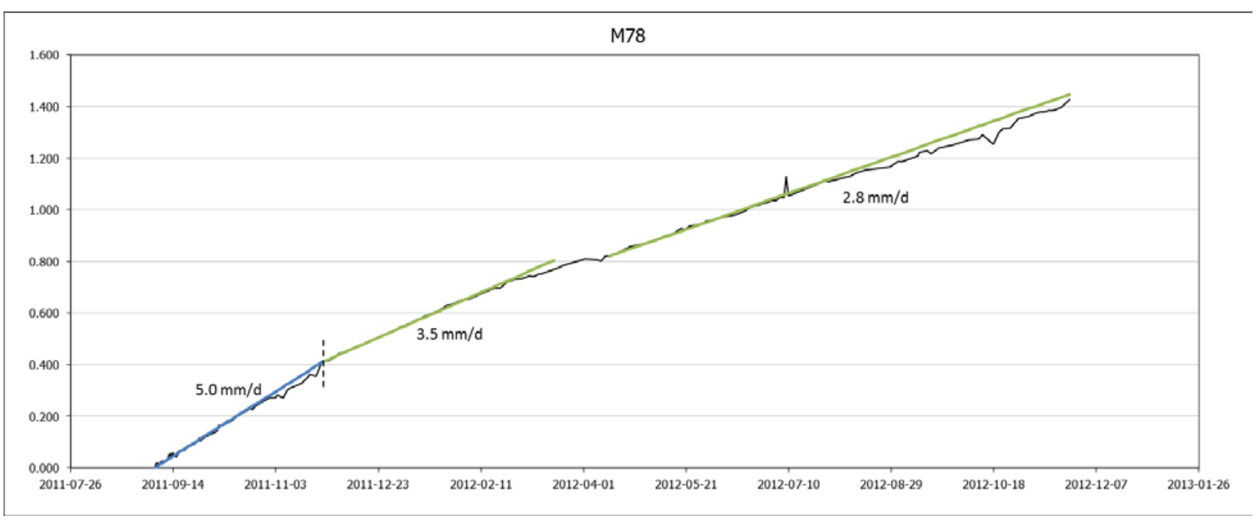


Figure 6-21: Area 1 pit survey hub data

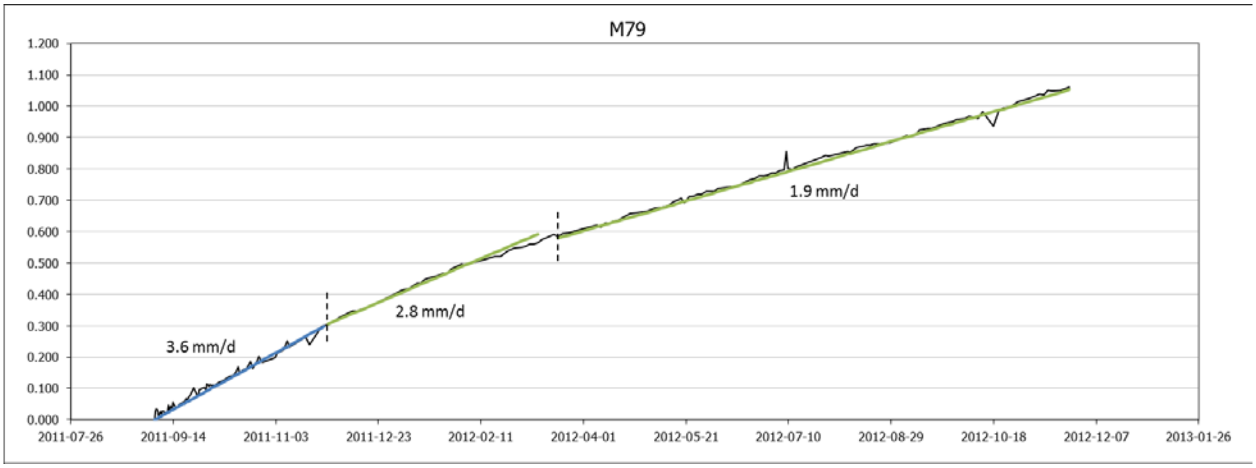


Figure 6-22: Area 1 pit survey hub data

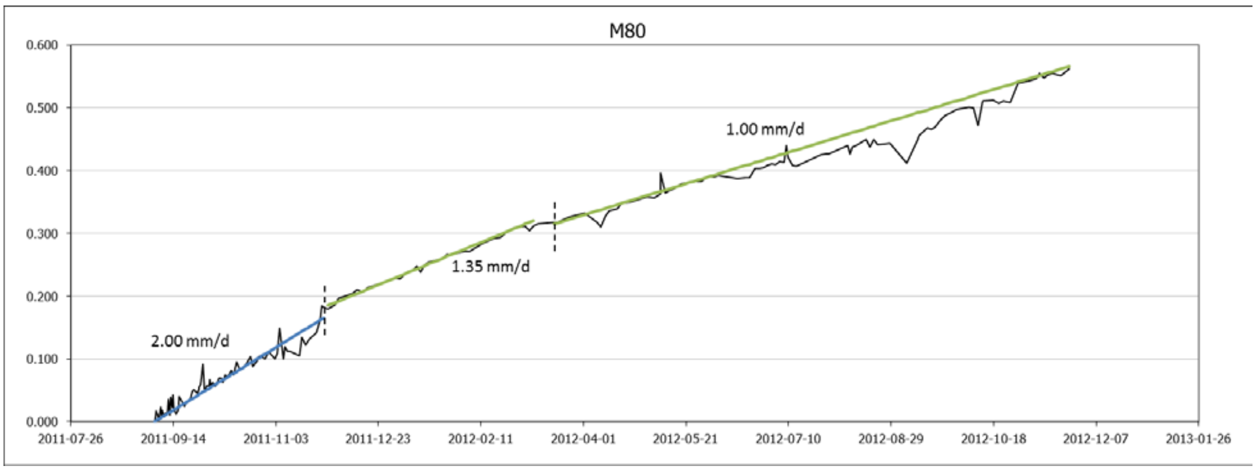


Figure 6-23: Area 1 pit survey hub data

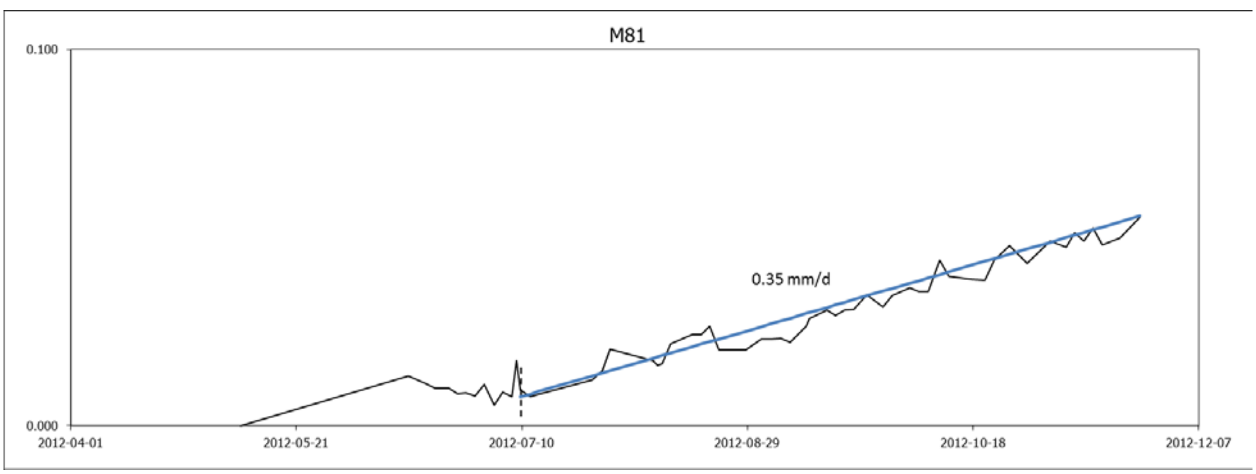


Figure 6-24: Area 1 pit survey hub data

6.6 Inclinometer Data – Area 1 Pit

Ten inclinometers have been installed around the South Wall Failure since 2009; none are currently readable, as they generally fail when they experience approximately 15-20cm of displacement along a single shear plane. The orientation of the failure plane and the nature of the soils are well understood, and measurements of movement at surface have proven reliable; no further inclinometers are planned for the Area 1 Pit.

7 Dry Stack Tailings Storage Facility

The Dry Stack Tailings Storage Facility has been undergoing slow creep movement along a foundational ice rich clay slip plane, several meters above bedrock. In response, Minto has constructed a buttress, the Mill Valley Fill Extension, to provide long term stability for the material. Numerous monitoring instruments have also been installed, as shown in Figure 7-1.

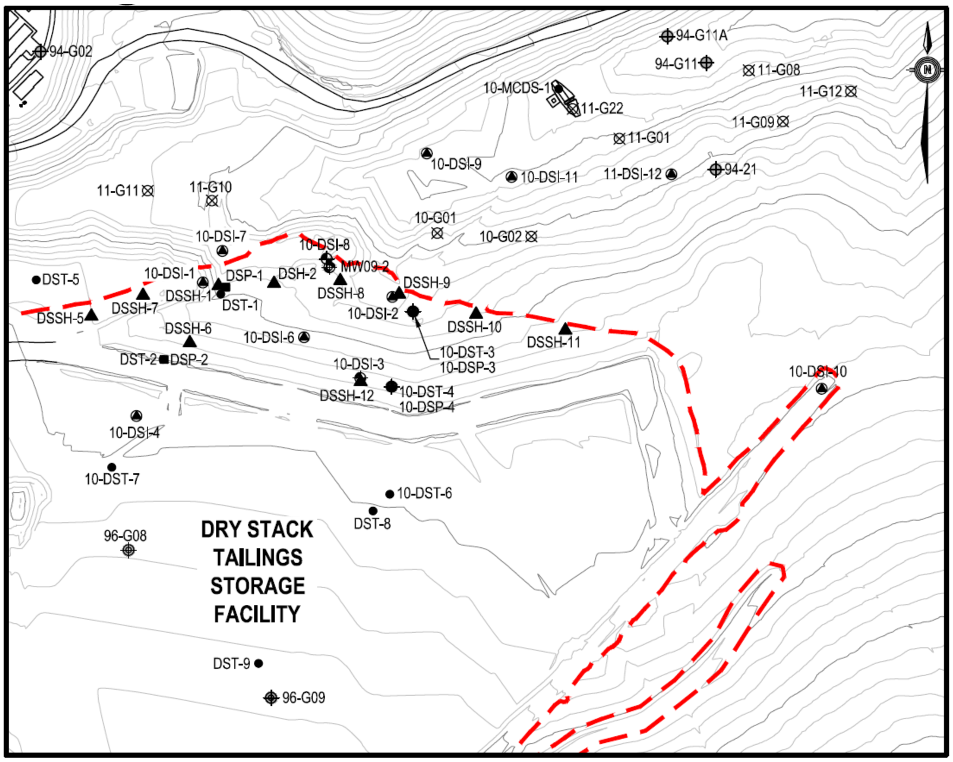


Figure 7-1: Dry Stack Tailings Storage Facility monitoring instruments

Ongoing monitoring has shown a slowing of the movement of the Dry Stack Tailings Storage Facility. Movement rates at November 10th, 2012 are shown below.

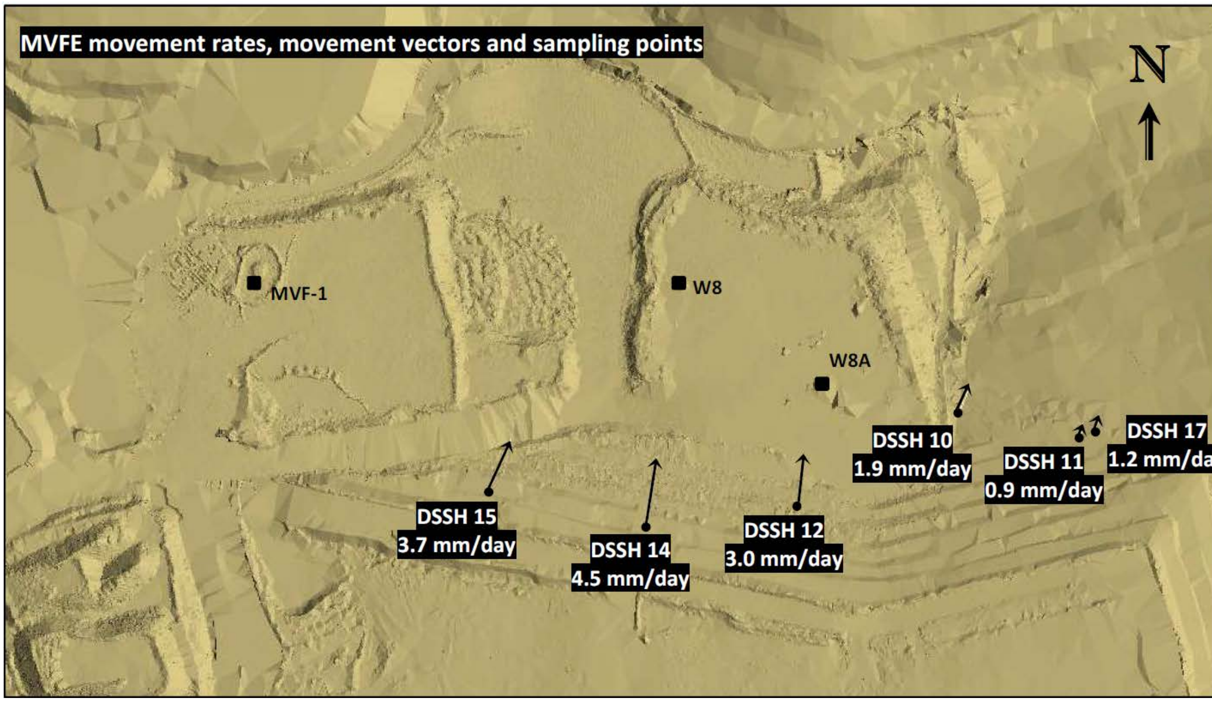


Figure 7-2: DSTSF movement rates (November 10, 2012)

Further details on DSTSF monitoring and associated results can be found in the *Dry Stack Tailings Storage Facility Deformation Monitoring Plan and Report* submitted to the Yukon Water Board November 12, 2012.

8 Site Instrumentation Monitoring Frequency

The monitoring frequency of site instrumentation is outlined in Table 8-1 .

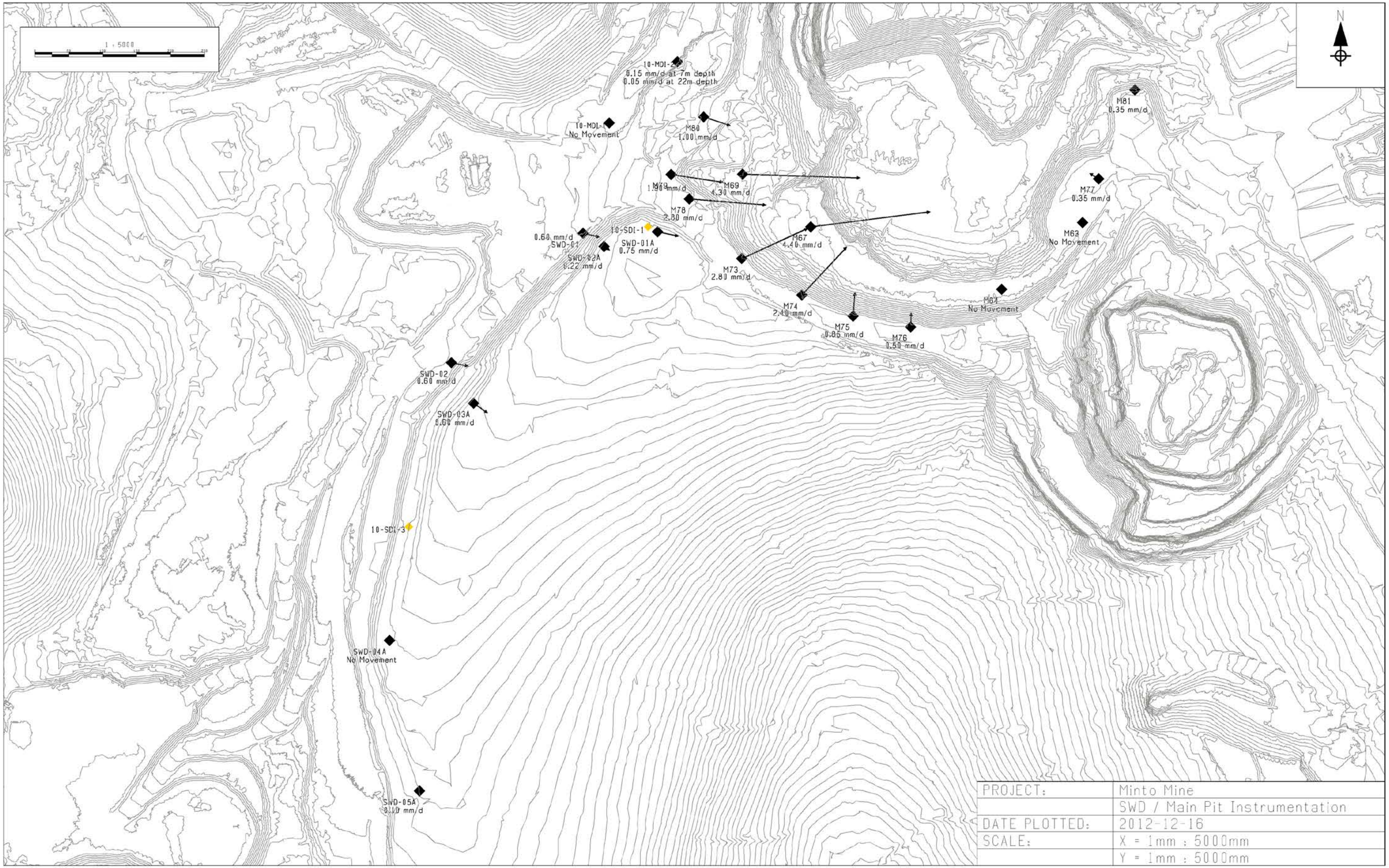
Instrument	Frequency
Monitoring of site survey hubs	Bi-weekly
Monitoring of prisms	Weekly for active mining, Bi-weekly for non-active
Monitoring of inclinometers	Monthly
Monitoring of ground temperature cables	Monthly
Monitoring of piezometers	Monthly

Table 8-1: Site instrumentation monitoring frequency

9 Conclusion

Minto hopes that this document fulfills the requirements of clause 80 of the WUL. Monitoring movement of the various waste facilities will continue as outlined in this plan, and details of the monitoring may be amended from time to time should conditions warrant.

Appendix A – Southwest Dump / Area 1 Pit Instrumentation and Movement Vectors


1 : 5000
N
10-MDI-2
0.15 mm/d at 7m depth
0.05 mm/d at 22m depth
10-MDI-1
No Movement
M80
1.00 mm/d
M81
0.35 mm/d
M79
1.90 mm/d
M69
4.30 mm/d
M78
2.80 mm/d
M77
0.35 mm/d
M63
No Movement
0.60 mm/d
SWD-01
10-SDI-1
SWD-01A
0.75 mm/d
SWD-02A
0.22 mm/d
M67
4.40 mm/d
M73
2.80 mm/d
M74
2.40 mm/d
M64
No Movement
M75
0.85 mm/d
M76
0.50 mm/d
SWD-02
0.60 mm/d
SWD-03A
0.60 mm/d
10-SDI-3
SWD-04A
No Movement
SWD-05A
0.10 mm/d
PROJECT:
Minto Mine
SWD / Main Pit Instrumentation
DATE PLOTTED:
2012-12-16
SCALE:
X = 1mm : 5000mm
Y = 1mm : 5000mm