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GOVERNMENT OF YUKON ENERGY, MINES AND RESOURCES - ASSESSMENT AND ABANDONED MINES

Clinton Creek Long-Term Monitoring Program

2014 Survey Results

307071-01009-00-SS-REP-0001

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PROJECT 307071-01009 - CLINTON CREEK LONG-TERM MONITORING PROGRAM

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Any questions concerning the information or its interpretation should be directed to A. Timmis or J. Gentles.

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1. INTRODUCTION

WorleyParsons Canada Services Ltd. (WorleyParsons) was engaged by the Government of Yukon Energy, Mines and Resources - Assessment and Abandoned Mines (AAM) to provide engineering services for multiple phases of the Clinton Creek Long-Term Geotechnical Monitoring Program (the program). This includes a site inspection, the preparation of this report, and presenting the results of the 2014 Survey of the former Clinton Creek asbestos mine site (the site) completed by Underhill Geomatics Ltd. (Underhill).

The content and structure of this report are based on AAM's Scope of Work dated August 13, 2014 and WorleyParsons Proposal No. 307071-00987-00-LET-0032, Revision 1, dated September 3, 2014.

1.1 Site Overview

1.1.1 Site Components

The site includes the following infrastructure and natural / anthropogenic features (the components) that comprise the program:

- Gabion drop structures;
- Clinton Creek channel;
- Hudgeon Lake outlet;
- Clinton Creek access road;
- Clinton Creek crossings;
- Clinton Creek waste rock piles;
- Wolverine Creek channel;
- Wolverine Creek tailings piles;
- Wolverine Creek ponds;
- Porcupine Pit; and
- Snowshoe Pit.

The site components are identified on Figures 1001 through 1016, included in Appendix 1.

1.1.2 Site Background

The site is a former asbestos mine which was in operation between 1968 and 1978. The site is located 80 km northwest of Dawson City, Yukon (YT), near the confluence of Fortymile River and the Yukon River (Figure A). During operation, waste rock was placed along the south valley wall of Clinton Creek while tailings from the milling operation were placed along the west valley wall of Wolverine Creek (Figure B). Subsequent movement of the waste rock and tailings have since blocked Clinton Creek and Wolverine Creek, respectively.

Clinton Creek and Hudgeon Lake

The blockage of Clinton Creek resulted in impoundment of approximately 10M m³ (UMA 2002) of runoff from the surrounding natural portion of the watershed and the formation of Hudgeon Lake. Water quality testing indicates that the water impounded in Hudgeon Lake is largely anoxic. Piers were recently constructed at the outlet of Hudgeon Lake to anchor log booms that will retain debris in the lake, which could otherwise collect at one of the drop structures and impede flow.

Discharge from Hudgeon Lake is conveyed southeast by Clinton Creek to Fortymile River. Four rock gabion drop structures (DS1, DS2, DS3, and DS4) were constructed across the upper portion of Clinton Creek between 2002 and 2004 to stabilize the waste rock pile to the south and promote aeration of discharge from Hudgeon Lake; however, DS4 was destabilized in 2010 (believed to be the result of the conveyance of an extreme flow caused by a blockage of the Hudgeon Lake outlet or intense precipitation) and the channel immediately downstream continues to degrade due to downcutting.

Site Access Road

The site is accessible through Dawson City via a gravel access road connected to the Top of the World Highway near the village of Forty Mile. The site access road crosses Clinton Creek at the following two points:

- Crossing No. 1, 560 m downstream of DS4; and
- Crossing No. 2 at the Hudgeon Lake Outlet.

Downstream of Crossing No. 1, the site access road is located on the north side of Clinton Creek. Between Crossing Nos. 1 and 2, the site access road is located adjacent to and across the waste rock dump. Beyond Crossing No. 2, the site access road continues along the edge of Hudgeon Lake before switching back to climb the slope above Clinton Creek. The site access road ends at the former Mill site above the tailings pile.

Wolverine Creek

The blockage of Wolverine Creek resulted in the formation of two ponds (collectively the Wolverine Creek ponds) separated by the north lobe of the tailings pile and upstream of the south lobe. Discharge from the ponds is conveyed south by Wolverine Creek to its confluence with Clinton Creek near the site entrance.

Waste Rock Dumps and Pits

In addition to the Clinton Creek waste rock dump, waste rock was also placed to the south in the Porcupine Pit waste rock dump.

There are two open pits located at the site:

- Porcupine Pit located between the Clinton Creek and Porcupine Pit waste rock dumps; and
- Snowshoe Pit located southeast of the Clinton Creek waste rock dump.

Mill and Tailings Pile

The former mill site is located at the top of the slope above Clinton Creek and Wolverine Creek. The tailings pile extends from the mill site to the east down the slope where it crosses the Wolverine Creek valley. The bottom portion of the tailings pile formed the north and south lobes, divided by the lower Wolverine Pond.

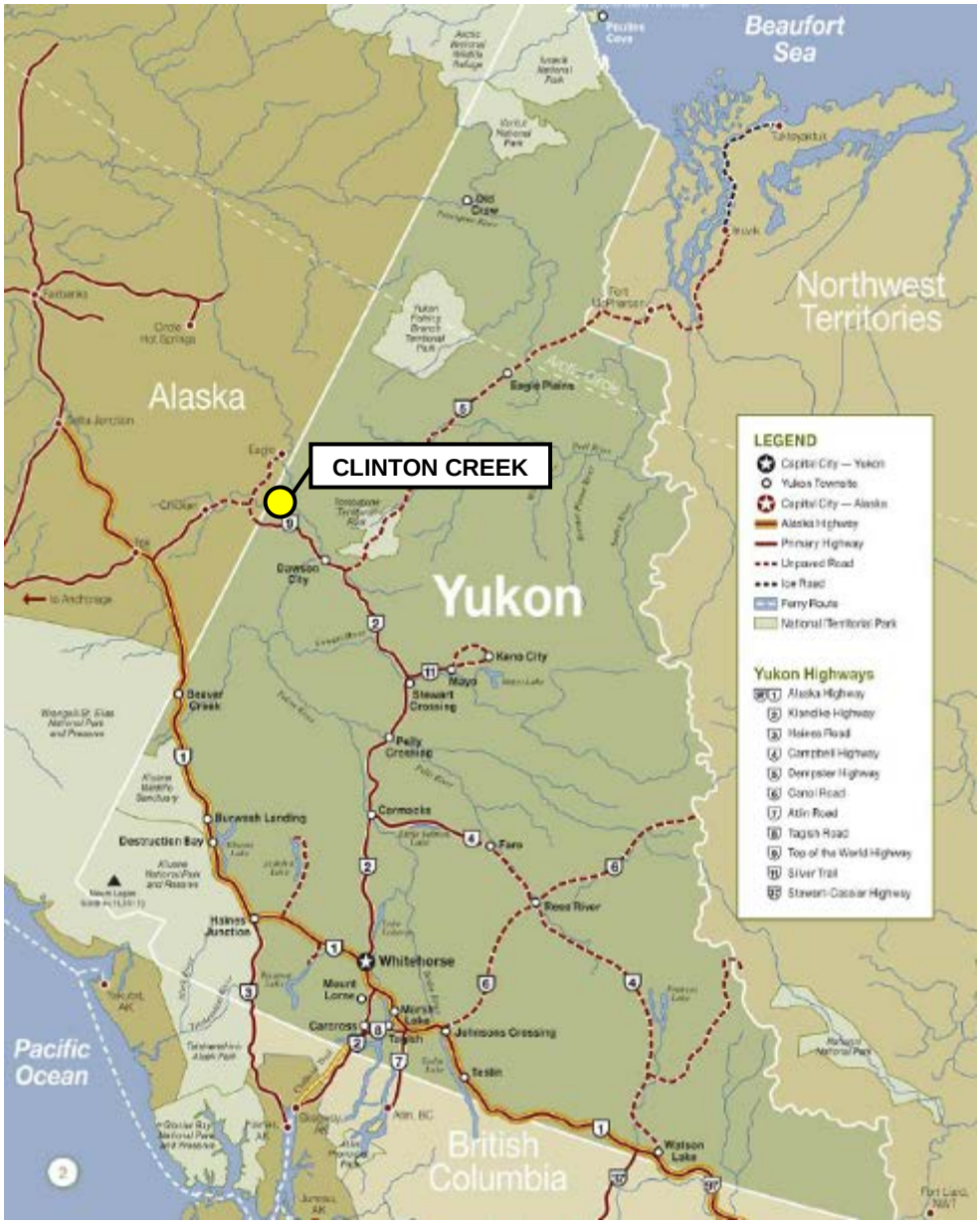


Figure A Clinton Creek Location Map

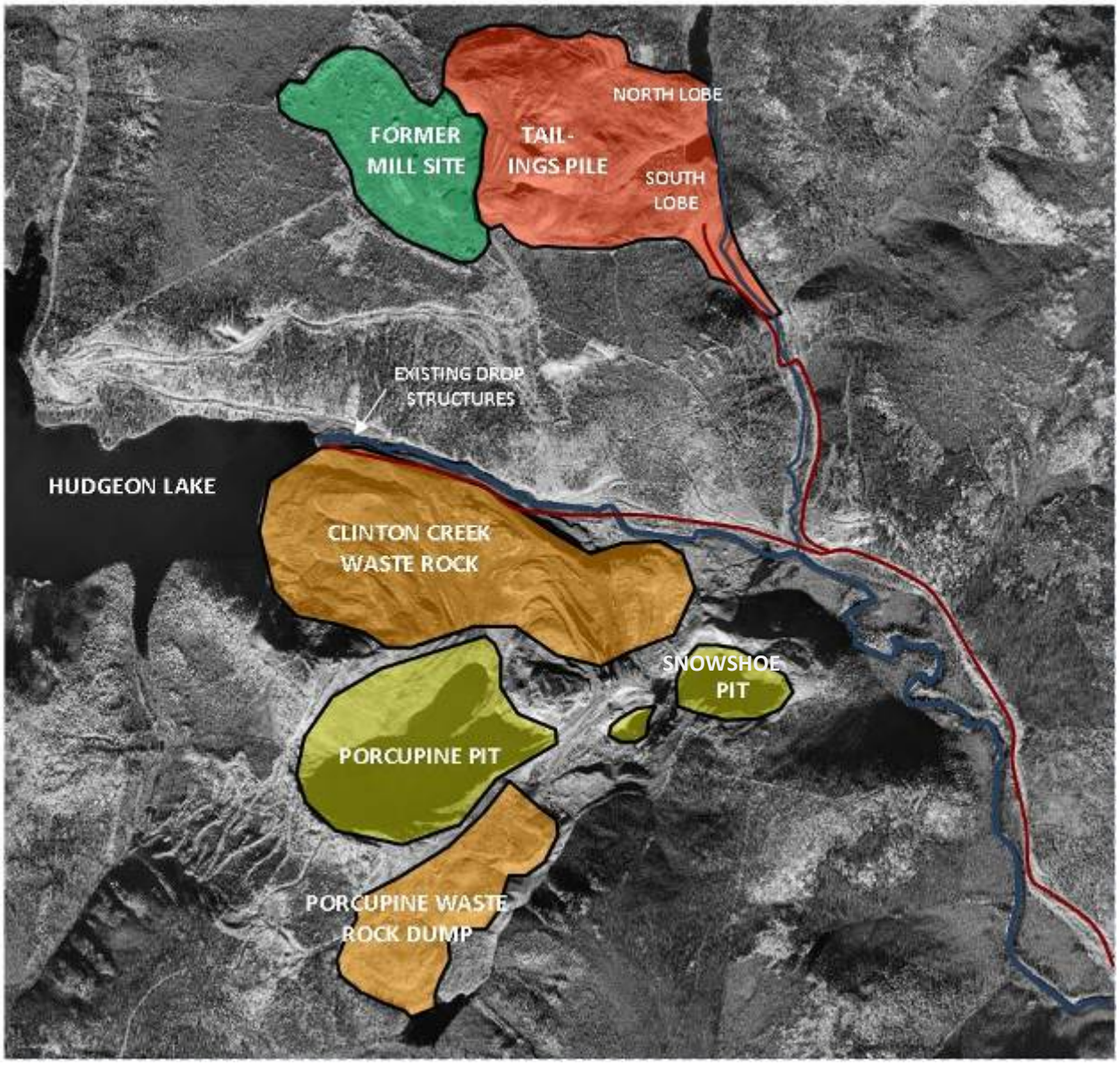


Figure B Clinton Creek Site Map

1.2 Program Overview

The survey program began with the first monitoring cycle in 2004 and the first program report in 2006 (R22 UMA). Subsequent monitoring has generally been completed on a biennial basis with the previous monitoring cycle completed in 2012 (R104, AE 2013).

1.2.1 Objectives

The program was developed to monitor, track, and evaluate the topographical changes that occur at the site to achieve the following objectives:

- Capture the year-to-year changes of the site components;
- Assess risk for failure of stabilization works (e.g., the gabion drop structures); and
- Evaluate the movement of the waste rock and tailings pile slopes for indications of increased mobility of the material that could pose a hazard to the environment, human safety, traditional land use, or site access that would require preventative intervention.

1.2.2 Components

The program is comprised of the following components:

- Site inspection completed by WorleyParsons on August 25, 2014;
- 2014 Topographical Survey by Underhill based on the Survey Criteria Letter presented in Appendix 2; and
- Comparison of the 2014 Topographical Survey data to data collected during previous monitoring cycles (discussed in Section 3.9) to calculate year-to-year movement rates and geomorphological changes to Clinton Creek and related components (e.g., gabion drop structures, Hudgeon Lake) as well as Wolverine Creek.

2. SITE INSPECTION

The August 25, 2014 site visit was conducted by the following WorleyParsons staff:

- Lee Martin;
- Margaret McBride; and
- Jake Gentles.

Transportation to and from the site was achieved by helicopter (Trans North Helicopters in Dawson City). Site reconnaissance was generally conducted on foot supplemented by helicopter flyovers of inaccessible areas and areas where an elevated vantage point was advantageous. The observations made during the site visit are summarized in Table A. Site visit photographs can be found in Appendix 3.

Table A Summary of Site Visit Observations

Location	Access Method	Observations
Site Access Roads - Forty Mile Bridge to First Ford	Flyover	Road is accessible. Site access gate at Wolverine Creek confluence damaged and unlocked (note that the gate cannot be secured without repairs).
Site Access Roads - First Ford	On foot	Although the ford was not used during the site visit, it appeared to be geotechnically stable and passable by 4WD vehicles.
Site Access Roads - First Ford to Hudgeon Lake	Primarily on foot	Road is accessible with some minor rill erosion damage located periodically along route. Some of these rills may become impassible to vehicle traffic from ongoing erosion if not filled in.
Site Access Roads - Hudgeon Lake to Mill Site	Flyover	Road appears accessible.
Hudgeon Lake Outlet[1]	On foot	Outlet is in good condition; however, ford may be impassable due to high water depth. Although the boom abutments have been installed and appeared to be stable, the boom itself was not in place at the time of the visit. Though the beaver lodge located along the lakeshore (approximately 150 m west of the outlet) was not identified during the site visit, it can be seen in the background of photographs taken at the lake outlet.
Hudgeon Lake Surrounding Slopes	Flyover	No visible signs of recent slope movement or failures in the area surrounding Hudgeon Lake.
Gabion DS1	On foot	Large woody debris constricting flow at upstream side of DS1. Damage to gabion basket on north side of second drop structure tier. One basket displaced horizontally in channel. Tension cracks located along the south top of bank between DS1 and DS2.
Gabion DS2	On foot	Large woody debris located above water line. Baskets are in good condition. Tension cracks (4 m in length) located along south top of bank.

Location	Access Method	Observations
Gabion DS3	On foot	Large woody debris located primarily above water line. Baskets are in generally good condition. One basket installed downstream of drop structure along channel bottom displaced vertically.
Gabion DS4	On foot	Woody debris located in channel. In channel baskets significantly damaged beginning 3 m to 4 m above plunge pool. Baskets below this height have failed, including baskets on north and south banks. Failed basket material observed approximately 15 m downstream. Tension cracks (5 m to 6 m in length) located along south top of bank. WorleyParsons completed a site visit in 2013 (attended by Lee Martin and Alex Timmis) to review the condition of DS4 and to inform the development of a repair strategy. The condition of DS4 does not appear to be significantly different than last year, based on a comparison of photos taken during the 2013 and 2014 site visit.
Clinton Creek Channel and Site Access Road	On foot and flyover	Slope failures along north and south banks. Significant tension cracks (6 m to 7 m in length) located along south top of bank. Undercutting of bedrock along toe of north bank.
Clinton Creek Waste Rock Pile	On foot and flyover	Some rill erosion damage on south slope. Note that the rill damage was not located near the unstable section of the Clinton Creek embankment, adjacent to the closed portion of the access road.
Wolverine Creek Tailings Pile	Flyover	Tension cracks located at the following locations: • Upper slope of the south lobe; • Lower slope of the south lobe (concentrated at southeast corner); • Upper slope of the north lobe (concentrated at north face of the slope); • Mid slope of the north lobe (located at the north side of the east face of the slope).
Wolverine Creek Tailings Pile Ponds	Flyover	Although there is woody debris located at the outlets of both the north and south ponds, it does not appear that the debris is constricting discharge from the ponds. It should be noted that a beaver dam has been observed upstream of the north lobe pond by AAM staff but was not observed during the site visit. The channel connecting the north and south ponds does not appear to be obstructed by debris or tailings material.
Wolverine Creek Rock Lined Channel	On foot	Rock weirs and rock protection are in good condition. No significant erosion sites identified. Wolverine culvert is unobstructed and headwall is in good condition.
Porcupine Pit	On foot and flyover	Tension cracks located along top of north pit wall. No observed indication of recent slope failures.
Snowshoe Pit	Flyover	No observed indication of recent slope failures.

[1]Based on discussions with AAM staff, it was understood that while the boom was originally constructed during the summer of 2013, it was not installed in 2014. The boom is intended to be installed post freshet each year and removed in the fall. In 2014, AAM completed regular debris removal manually from drop structures through the open water season; where it was safe to do so.

3. SURVEY DATA

3.1 2014 Survey

Underhill completed a topographical survey (the 2014 Survey) of the site components listed in Section 1.1.1 over six days from September 9, 2014 to September 14, 2014 using a two-person crew (Robin Cunningham and Josh Smith), global positioning system (GPS) real time kinetic (RTK) equipment (Trimble model R8), and GEOLAB 2001 software (version 9.20.0). The components surveyed, weather, and relevant hydrological data for each field day are summarized in a checklist presented in Appendix 4. A compilation of the processed survey data is presented in Appendix 5.

3.2 Coordinate System

The 2014 Survey data was provided using the coordinate system attributes presented in Table B.

Table B 2014 Survey Attributes

Attribute	Value
North American Datum (NAD)	NAD83
Zone	Zone 7
Vertical Datum	CGVD28
Geoid	Model HTv2.0

3.3 Survey Control

To facilitate the collection of survey data using two remote receivers (rovers), Underhill established a base station at Control Point Nos. 2834 or 2835, depending on the portion of the site being surveyed. The coordinates of the stable Control Station Nos. 1086 and 1192 were held by the base station to continuously derive its coordinates using a least square adjustment of GPS observations. The coordinates of the control points and control stations are presented in Table C.

Table C Control Coordinates

ID	Northing (m)	Easting (m)	Orthometric Height (masl)
No. 2834	7,148,172.673	513447.724	606.823
No. 2835	7147272.790	513147.057	432.669
No. 1086	7147972.219	513176.710	590.955
No. 1192	7147563.984	512278.758	441.231

3.4 Quality Control (QC)

During survey collection, the base station and rover would receive and process the same satellite signal to establish GPS coordinates. GEOLAB software was used to complete three-dimensional (3D) least square adjustments based on the variance between coordinates derived from the satellite signal and those derived from the control stations. As variance / co-variance information from GPS software can generally be overly optimistic, software parameters were changed to scale the variance / co-variance matrices for constrained adjustments by the a posteriori variance factor. The base station would then transmit correction data to the rover.

Underhill reported 95% confidence limits for the precision of the RTK survey results of less than 3 cm horizontally and vertically. This does not include the survey points for the Wolverine Creek centreline presented in Table D, for which precision was greater than 3 cm due to a high concentration of trees affecting the satellite signal.

Table D Low Precision Wolverine Creek Centreline Points

Point ID	Horizontal Accuracy (cm)	Vertical Accuracy (cm)
11641	2.3	4.4
11649	2.9	4.7
11650	7.1	11.8
11651	4.1	79
11652	4	74
11653	3.3	5
11657	4.9	1.07
11661	7.9	1.14

These points were recorded along the upper portion of the creek, starting at the outlet of the south pond and extending downstream for approximately 200 m. It is recommended that a secondary control point is established that provides line of sight to this portion of the channel to improve survey accuracy.

3.5 Quality Assurance (QA)

Underhill employed the following quality assurance (QA) procedures to limit the collection of inaccurate survey data and promote the overall accuracy of the survey data:

- Various checks were performed to confirm the coordinates and elevation of the base station during setup and prior to shutting down (e.g., comparing the height measured using both metric and imperial units, checking the correct coordinates of control points and control stations);
- The rod height for the two rovers were measured each day;

- During base station setup, coordinates were recorded for at least one known point to confirm the base station coordinates were accurate. Prior to shutting down the base station, a similar process was undertaken to confirm that the base station had not changed since it was set-up;
- Rover units utilized a lock survey style and could only save coordinates based on a fixed solution; and
- Rover units continuously provided horizontal and vertical precision and alerted the surveyors when precision was greater than 3 cm.

3.6 Data Collection

The 2014 Survey included the collection of data for the following 107 monitoring points: 54 located on the Clinton Creek waste rock dump (tabulated in Section 5.5), two located on the natural slope north of Clinton Creek, 53 located on the Wolverine Creek tailings pile (tabulated in Section 6.2), and two located on the natural slope east of Wolverine Creek.

3.7 New and Replacement Monitoring Points

To facilitate monitoring of the movement of the natural slopes north of Clinton Creek and east of Wolverine Creek, the monitoring pins are summarized in Table E.

Table E New Monitoring Points

Pin ID	Northing (m)	Easting (m)	Elevation (masl)	Location Description
183	7147439.777	513029.363	422.973	54 m north of the Clinton Creek centreline at Sta. 0+169
184	7147362.163	513218.859	419.982	42 m north of the Clinton Creek centreline at Sta. 0+199
160	7147967.824	514047.033	425.916	63 m northeast of the Wolverine Creek centreline at Sta. 1+005
163	7147722.775	514226.349	399.100	73 m northeast of the Wolverine Creek centreline at Sta. 0+794

Two monitoring points could not be located during the survey and were consequently replaced with the monitoring points summarized in Table F.

Table F Replacement Monitoring Points

Old ID	New ID	Northing (m)	Easting (m)	Elevation (masl)	Description
SL-1	175	7148077.636	513968.438	420.519	Located on slide located on Wolverine Tailings Pile lower south slope

3.8 Non-surveyed Components

The following components were not surveyed due to the danger posed by unstable materials (e.g., steep channel banks on Clinton Creek and undercutting of DS4):

- Lower gabion baskets of DS4 including downstream DS4 cross-section between monitoring points 1464 and 1465;
- Points on Clinton Creek slope (north and south banks) through Cross-Sections D, E, and F (i.e., 5 m minimum point spacing could not be achieved on the creek banks, spacing increased to 10 m to 20 m); and
- Points on Wolverine Creek tailings pile through Cross-Section I (i.e., the clear top of bank west of Wolverine Creek could not be identified as the slope extends from the creek bottom up the tailings pile at a consistent grade, the cross section extends 25 m west of the creek centreline) .

3.9 Previous Surveys

The results of previous survey programs were used for comparative purposes (e.g., changes to creek channel profiles) and to calculate movement and movement rates of monitoring points. The previous survey programs used to complete these analyses are summarized in Table G.

Table G Previous Survey Programs

Period	Engineering Consultant	Reference Document
August 2003	UMA	R03
July 2006	UMA	R24
July 2010	AECOM	R51
September 2010	AECOM	R51
August 2011	AECOM	R103
August 2012	Associated Engineering Ltd. (AE)	R104
August 2013	AE	R55

3.10 Timeframes

Timeframes were selected to reflect, where possible, four significant periods:

1. Prior to the 2010 extreme flow event (pre-July 2010);
2. Immediately before and after the 2010 extreme flow event (July to September 2010);
3. The two years following the 2010 extreme flow event (September 2010 to August 2012); and
4. The previous two years.

In some circumstances, these periods were revised based on the availability of survey data for specific site components.

By categorizing the data into these timeframes, results could be averaged or aggregated to facilitate comparison between periods and the identification of trends.

The timeframes presented in Table H were defined by start and end dates. Site components associated with the timeframe (i.e., data and results from this timeframe were categorized using this timeframe) are also indicated.

Table H Timeframes

Start Date	End Date	Site Components Analyzed
July 2003	September 2012	• Wolverine Creek channel
July 2003	September 2014	• Wolverine Creek channel
July 2003	July 2010	• Clinton Creek waste rock / drop structure monitoring points • Porcupine Pit monitoring points
July 2004	September 2010	• Clinton Creek channel
July 2006	July 2010	• Clinton Creek waste rock / drop structure monitoring points • Porcupine Pit monitoring points • Wolverine Creek tailings pile monitoring points
July 2010	September 2010	• Clinton Creek waste rock / drop structure monitoring points • Porcupine Pit monitoring points • Wolverine Creek tailings pile monitoring points
September 2010	August 2012	• Clinton Creek waste rock / drop structure monitoring points Clinton Creek channel • Porcupine Pit monitoring points • Wolverine Creek tailings pile monitoring points
August 2012	August 2013	• Clinton Creek drop structure monitoring points • Clinton Creek drop structure cross-sections
August 2012	September 2014	• Site Access Road • Clinton Creek waste rock / drop structure monitoring points • Clinton Creek channel • Porcupine Pit monitoring points • Wolverine Creek tailings pile monitoring points • Wolverine Creek channel
August 2013	September 2014	• Clinton Creek drop structure monitoring points • Clinton Creek drop structure cross-sections

4. METHODOLOGY

The following section discusses the methodology used to assess the results of the 2014 Survey.

4.1 Comparison

The following comparisons between previous survey data and the 2014 Survey data were completed with results presented in Sections 5 and 6 of this report within the individual site component subsections.

4.1.1 Monitoring Points

The incremental and total horizontal movement vectors (including azimuth and magnitude) at each monitoring point were determined by calculating the distance between the coordinates recorded for each point over the various monitoring period. These movements were the basis for the annual movement rate statistics (mean, maximum, and minimum) that are presented and discussed in this report.

4.1.2 Alignments, Profiles, and Cross-Sections

The 2014 alignments and profiles for Clinton Creek and Wolverine Creek, based on the creek centreline coordinates, were compared to the alignments and profiles presented in previous program reports. The following measurements between the 2014 and previous program alignments / profiles were calculated along the creek centreline:

- Horizontal displacement - horizontal movement of the creek centreline;
- Downcutting - downward vertical movement indicative of localized channel erosion; and
- Deposition - upward vertical movement indicative of localized soil deposition.

A total of 11 creek channel cross-sections were recorded in 2014 (six of Clinton Creek and five of Wolverine Creek). On Clinton Creek, Cross-Sections A through E were recorded in 2012 while Cross-Sections F was established in 2014. On Wolverine Creek, Cross-Sections J through N were established in 2014. The following measurements were taken from the 2014 and 2012 cross-sections:

- Cross-sectional area;
- Channel width;
- Side slopes; and
- Invert elevation.

These measurements are indicative of geomorphological changes the creeks have experienced between monitoring periods.

4.1.3 Imagery

AAM compiled a report entitled “Clinton Creek - Visual Comparisons” (AAM 2014) that established locations at which ground based images should be taken during future monitoring cycles.

4.2 Triggers and Monitoring Recommendations

During the course of the program, various triggers have been established and linked to site components. For the purposes of the program, a trigger is defined as a qualitative value assigned to a specific attribute of a site component that, when exceeded, should prompt a pre-defined response to address the stability of the component.

Similarly, various monitoring recommendations, linked to site components, have been made by previous consultants. Note that recommendations related to the operation or safety of the site are discussed in the Engineering Review and Assessment - Parts 1 and 2 reports.

A summary of the Clinton Creek triggers and monitoring recommendations is presented in Appendices 7 and 8.

Assessment of the triggers included the following steps:

1. Evaluate whether the trigger has been exceeded;
2. Evaluate whether the appropriate action was taken and, if not, identify any mitigating factors that prevented action from being taken; and
3. Determine whether the trigger is appropriate or requires revision.

Assessment of the monitoring recommendations included the following steps:

1. Confirm that the recommendation has been implemented;
2. Identify any mitigating factors that prevented the implementation; and
3. Determine whether the recommendation remains valid or requires revision.

The results of these assessments are discussed in Sections 5 and 6 in the individual site component subsections.

5. PERFORMANCE MONITORING - CLINTON CREEK

The following section presents and discusses the survey results for site components contained within the Clinton Creek catchment (Figure 1001, Appendix 1).

5.1 Clinton Creek Site Access Road - Closed Portion

Based on observations made during the 2012 program, a portion of the Clinton Creek site access road, from Stations 0+340 to 0+410, was closed due to the presence of extensive tension cracks and embankment failures. The portion of the site access road was blocked using chains attached to concrete lock blocks at the east end and an earth berm at the west end (Photo A) with the site access road relocated across the waste rock pile.

Photo A Closed Portion of Clinton Creek Site Access Road - Looking East (Downstream)

This portion of the site access road was surveyed as part of the 2012 program. A baseline was established, offset to the south from the edge of the Clinton Creek channel embankment, with metal spikes set every 3 m. The movement of these spikes as well as changes to the location of the edge of embankment were calculated and discussed below. Note that survey was limited to the closed portion of the site access road.

5.1.1 Survey

The survey of the closed portion of the Clinton Creek site access road was accomplished by recording coordinates for the following points (established in 2012):

- Twenty-three (23) metal spikes installed along the established baseline;
- Along the edge of the Clinton Creek channel bank; and
- The location of visible tension cracks perpendicular to the metal spikes.

5.1.2 Survey Results

Based on a comparison of survey results from 2014 and 2012 (when the baseline was established), the baseline has generally shifted horizontally to the north east by an average of 3.3 cm and vertically downwards by an average of 2.5 cm. Due to ongoing erosion of the Clinton Creek channel embankment, the edge of the access road has been cut back to the south by an average of 32 cm. Representative data for the movement of the baseline and loss of the embankment is presented in Table I.

Table I Clinton Creek Access Road Movement (2012 to 2014)

Category	Parameters	2012 to 2014 Value
Baseline	Maximum horizontal movement (cm)	6.6
Baseline	Average horizontal movement (cm/y)	1.6
Baseline	Average horizontal movement azimuth	354°
Baseline	Maximum vertical movement (cm)	6.4 (lower)
Baseline	Average vertical movement (cm/y)	1.2 (lower)
Edge	Surface area lost (m^2/y)	30.9
Edge	Average offset (cm/y) - south	15
Edge	Maximum offset (cm) - south	210

Coordinates of tension cracks were recorded. These were limited to points on the tension cracks coinciding with a cross-section taken at each spike, perpendicular to the baseline, rather than the start and end of each tension crack. Consequently, it is not possible to ascertain the lengths of the individual tension cracks for comparison to 2012 survey results

Statistical data based on width and depth measurements taken at each tension crack point is presented in Table J.

Table J Tension Crack Statistics

Statistic	Width (cm)	Depth (cm)
Maximum	54.0	26.0
Average	9.8	10.1

5.1.3 Discussion

Between 2012 (when the baseline was established) and 2014, the top of the Clinton Creek embankment migrated south an average of 15 cm/y due to the loss of embankment material likely caused by instability at the toe. As this value is 10 times the average movement of the baseline, the loss of the embankment was attributed to slope instability due to erosion at the toe. The baseline horizontal and vertical movement rates were similar (i.e., the baseline is moving downward at a 1H:1V slope). A large segment of the embankment was lost with a maximum offset from the 2012 top of embankment of 2.1 m as shown on Figure 1002-2, Appendix 1.

5.1.4 Triggers and Monitoring Recommendations

No triggers were established for the closed portion of the Clinton Creek access road in previous reports; however, new triggers are presented in Table K.

Table K Clinton Creek Access Road (Closed Portion) Triggers

ID	Description	Value	Action
AR-1 (new)	Average horizontal movement of baseline from previous year	10 cm less the average reported accuracy of baseline shots[1]	Develop mitigation plan
AR-2 (new)	Loss of embankment based on offset from previous year	1.0 m	Develop mitigation plan
AR-3 (new)	Total length of observed tension cracks[2]	Increase by 20% from previous year	Develop mitigation plan
AR-4 (new)	Average number of cracks observed perpendicular to each baseline pins	Increase by 20% from previous year	Develop mitigation plan

[1]Horizontal accuracy of the baseline survey not to exceed ±5 cm.

[2]Trigger AR-3 requires the implementation of recommendation AR-D

The monitoring recommendations relevant to the closed portion of the Clinton Creek access road are presented in Table L.

Table L Clinton Creek Site Access Road (Closed Portion) Monitoring Recommendation

ID	Description	Implementation	Validity
AR-A (R51)	Monitor (i.e., inspect and survey) the tension cracks along the closed portion of the site access road on an annual basis	Inspection and survey data collection completed in 2014	Valid- practice should continue
AR-B (R104)	Install depth gauge at Clinton Creek Ford #1 (R104)	Completed	Completed
AR-C (new)	Extend the baseline to the north and south by 15 m	Should be implemented as part of 2015 Long-Term Monitoring Program (LTMP) survey	To improve monitoring of the embankment
AR-D (new)	Survey points recorded at the start, end, and changes in direction (greater than 30 deg.) of each tension crack	Should be implemented as part of 2015 LTMP survey	To facilitate measurement of the tension cracks

5.2 Hudgeon Lake Outlet

The Hudgeon Lake outlet is located approximately 70 m upstream of DS1. The outlet consists of two metal abutments (complete with rock armouring) located on the north and south sides of the inlet of the Clinton Creek channel. AAM plans to install a polyvinyl chloride (PVC) boom attached to the abutments (Photo B) to intercept debris prior to its entering the Clinton Creek Channel following the 2015 freshet. The boom will be in service each year between freshet and winter freeze-over. Debris intercepted by the boom will be regularly removed while the boom is in service. The second Clinton Creek access road crossing (Ford No. 2), linking to the former mill site, is also located at the outlet. The key features of the Hudgeon Lake outlet are shown on Figure 1004, Appendix 1.

Photo B Hudgeon Lake Outlet Abutments - Looking Northwest

5.2.1 Survey

The survey of the Hudgeon Lake outlet was accomplished by recording coordinates for the following points:

- Water surface elevation along the banks of Hudgeon Lake and the Clinton Creek channel;
- Top of bank of Hudgeon Lake and the Clinton Creek channel;
- Ground shots beyond the top of bank;
- Top of the abutment structure (i.e., the top of the three vertical steel members, on centre);
- Extents of the rock armouring surrounding the abutment structure; and
- Two cross-sections across the throat of the opening.

During the collection of survey data at Hudgeon Lake, Underhill recorded water surface elevations (WSELs) based on readings from a staff gauge located south of the outlet (Photo C).

Photo C Hudgeon Lake Staff Gauge - Looking West

The Hudgeon Lake outlet infrastructure (i.e., log boom abutments) was installed following the 2012 Survey; consequently, the 2014 survey data was not compared to data from previously completed surveys.

5.2.2 2014 Results

Water Surface Elevation (WSEL)

The staff gauge (Photo C) was surveyed to establish the elevation of the 0.0 m reading at 411.68 metres above sea level (masl). During the survey period, the mean WSEL in Hudgeon Lake was 411.643 masl, based on the daily readings summarized in Table M.

Table M Daily Hudgeon Lake Water Surface Elevation Readings

Reading	Gauge Level (m)	WSEL (masl)
September 09, 2014 - p.m.	-0.035	411.645
September 10, 2014 - a.m.	-0.024	411.656
September 10, 2014 -p.m.	-0.037	411.643
September 11, 2014 - a.m.	-0.041	411.639
September 11, 2014 - p.m.	-0.043	411.637
September 12, 2014 - a.m.	-0.031	411.649
September 12, 2014 - p.m.	-0.032	411.648
September 13, 2014 - a.m.	-0.040	411.640
September 13, 2014 - p.m.	-0.040	411.640
September 14, 2014 - a.m.	-0.048	411.632

Available Freeboard

The estimated freeboard depth at the boom abutment armouring presented in Table N are based on the average WSEL of 411.643 masl recorded during the survey. The lowest elevation at the top of each feature was selected to calculate the freeboard. The extreme WSEL of 412.54 masl, corresponding to the extreme flow that damaged DS3 and DS4, was estimated based on visual observations of debris at the outlet (R100) following the 2010 blockage. The overbank feature is based on a point located within 5 m to 10 m of the rock armouring.

Table N Freeboard Estimates

Feature	Elevation (masl)	Freeboard - 2014 WSEL (m)	Freeboard - Extreme WSEL (m)
North rock armouring	412.24	0.60	-0.30
North overbank	412.88	1.24	0.34
South rock armouring	412.43	0.79	-0.11
South overbank	413.68	2.04	1.14

Based on these estimates, the top of the rock armouring protection on the north and south side of the outlet would likely be below the surface of moving water if the Hudgeon Lake were to reach the estimated level corresponding to the 2010 extreme flow event. This would expose the un-armoured bank material to erosion and could potentially impact the stability of the abutment structure.

Abutment Structures

The abutment structures at the Hudgeon Lake outlet were constructed in the summer of 2013 by Boreal Engineering and are comprised of structural steel members welded together and embedded in granular backfill. Rock armouring (consisting of locally sourced angular rock measuring approximately 100 mm dia. to 150 mm dia.) was installed around the abutment extending below the water line.

The coordinates for the six vertical steel members that comprise the two abutments are presented in Table O.

Table O Abutment Coordinates

Feature	Northing (m)	Easting (m)	Elevation (m)
North Abutment No. 1	7,147,419.071	512,819.092	413.63
North Abutment No. 2	7,147,418.075	512,821.645	413.18
North Abutment No. 3	7,147,416.336	512,819.504	413.16
South Abutment No. 1	7,147,390.579	512,829.464	413.32
South Abutment No. 2	7,147,392.780	512,827.803	413.23
South Abutment No. 3	7,147,393.110	512,830.525	413.24

The survey results indicate the following riprap surface areas, visible above the water line:

- North abutment: 15.0 m²
- South abutment: 18.1 m²

5.2.3 Discussion

The freeboard allowance above the rock armouring surrounding the abutments would be exceeded if the 2010 flow and impoundment conditions that resulted in the damage to DS3 and DS4 were repeated. Although water levels are periodically recorded, it would be beneficial to install an automated remote monitoring level gauge so that the annual Hudgeon Lake water level record can be analyzed, with statistics based on this record presented and discussed in future program reports.

The suitability of the rock armouring at the abutments cannot be confirmed as a detailed scour protection design was not prepared for the abutments. Additional assessments (e.g., rock sampling and testing, scour analysis) may be required if signs of deterioration of the rock armouring (e.g., mobilization) are noted during regular inspection of the abutments.

5.2.4 Triggers and Monitoring Recommendations

No triggers were established for the Hudgeon Lake outlet in previous reports; however, new triggers are presented in Table P.

Table P Hudgeon Lake Triggers

ID	Description	Value	Action
HL-1 (new)	Lake water surface critical elevation	412.0 masl	Mobilize to site to check outlet for blockage, remove blockage if present, and inspect downstream infrastructure (e.g., drop structures and channel). Refer to recommendation HL-A
HL-2 (new)	Movement of boom abutment structures from previous monitoring period	Horizontal: 0.30 m less reported average horizontal accuracy of abutment shots, and/or Vertical: 0.10 m less reported vertical accuracy of abutment shots[1]	Investigate base structure and develop mitigation plan as required
HL-3 (new)	Loss of riprap at the boom abutment structures from previous monitoring period	10% surface area from previous monitoring period[2]	Review riprap diameter and extents and develop mitigation plan as required

[1]Horizontal and vertical accuracy of the abutment shots not to exceed ±5 cm.

[2]Taking into consideration changes to water level and the resulting exposure of the riprap.

The monitoring recommendations relevant to the Hudgeon Lake outlet are summarized in Table Q.

Table Q Hudgeon Lake Monitoring Recommendations

ID	Description	Implementation	Validity
HL-A (R104)	Monitor outlet for debris accumulations and damage to boom (monthly during the summer and following major rainfall or flood event)	Ongoing	Valid - practice should continue
HL-B (R104)	Consider installation of automated remote water level monitor to notify AAM when lake water level rises indicating possible blockage of outlet	Not implemented	Valid - should be implemented in 2015
HL-C (R104)	Complete additional topographic survey to confirm freeboard	Completed in 2014	Complete
HL-D (new)	Inspect abutments (including condition of rock armouring) monthly during summer by AAM staff and annually by a consultant (preferably following freshet)	Should be implemented in 2015	Required to monitor condition of abutments and rock armouring
HL-E (new)	Assess abutment rock protection (including rock gradation, durability, specific weight, and hardness, as well as a scour analysis) if signs of deterioration of the rock armouring are noted	To be implemented as required	May be required to address rock armouring issues

5.3 Gabion Drop Structures

Four gabion drop structures, constructed in 2004, are located between 70 m and 250 m downstream of the Hudgeon Lake outlet. Each drop structure is comprised of metal gabion baskets filled with rock installed in successive layers installed across the creek channel (Photos D and E).

The drop structures were installed to stabilize the creek channel which had undergone significant geomorphological changes (e.g., significant erosion and scour), following the waste rock failure that blocked the Clinton Creek valley. The installation of the drop structures resulted in four significant changes to channel invert elevation concentrated over short lengths such that the remainder of the channel can be relatively flat, limiting flow velocities and erosion.

DS3 and DS4 were significantly damaged due to extreme flows driven by a large precipitation event, and a possible blockage of Hudgeon Lake, in August 2010 (R100, AECOM 2010). The following emergency repairs to the drop structures were completed in 2011 (R94, AECOM 2011):

- Filled gabion baskets - Tiers 1 to 4 (DS1 and DS3) and Tiers 1 to 5 (DS2);
- Filled floor gabion baskets - DS1;
- Installed riprap downstream of DS2 end sill; and
- Installed new end sill, downstream gabion baskets, and riprap at DS3.

Although repairs to DS4 were planned for fall 2011, they were not completed due to access and safety issues. A proposed remediation to DS4 was prepared by WorleyParsons in 2014 (WorleyParsons 2014).

The location and key features of the drop structures are shown on Figures 1002 and 1009 to 1012, Appendix 1.

Photo D Aerial View of the Drop Structures - Looking South

Photo E Gabion Drop Structure - Looking Northwest (Upstream)

Permanent monitoring points (located on the north and south banks of the channel, upstream and downstream of the drop structures) were installed in September 2006 to enable the collection of cross-sections at the same locations year to year. Prior to 2006, the extent of survey data collection at the drop structures was limited and, therefore, was not used to calculate movement rates.

5.3.1 Survey

The 2014 Survey of the gabion drop structures was accomplished by recording coordinates for the following points:

- Ground level at monitoring points located on the north and south banks of the channel, upstream and downstream of the drop structure - 16 total;
- Two cross-sections at each drop structure between the monitoring points capturing the top extents, toes, centreline, and water level - seven total (the cross-section downstream of DS4 was not collected due to slope hazard concerns); and
- Additional topographic features at DS4 to improve base drawing accuracy for proposed mitigation work.

5.3.2 Results

For the purposes of this analysis the following timeframes were considered:

- July 2006 to July 2010 (TF-DS-A);
- July to September 2010 (TF-DS-B);
- September 2010 to August 2012 (TF-DS-C);
- August 2012 to August 2013 (TF-DS-D); and
- August 2013 to September 2014 (TF-DS-E).

These timeframes were selected to simplify the data analysis by categorizing results based on periods over which it was estimated that hydraulic and geomorphological conditions were largely similar from year to year. This includes the timeframe TF-DS-B which extends between the monitoring surveys completed prior to and following the extreme flow event in the summer of 2010. Timeframes with one year durations were selected to analyse recent surveys results (in 2012, 2013, and 2014) to improve the understanding of recent and current site conditions.

Cross-Section Geometry

Geometrical data for the gabion drop structures was collected as part of previous program surveys, beginning in 2006. The movement rates for each drop structure section (calculated as the average movement of the two monitoring points that comprise each section, irrespective of direction, over five timeframes) are summarized in Table R. A graph of horizontal movement rates, averaged for each drop structure's four monitoring points, over the five timeframes is presented as Figure C.

Table R Drop Structure Movement (cm/y)

Location	TF-DS-A	TF-DS-B	TF-DS-C	TF-DS-D	TF-DS-E
DS1 - Upstream	0.99	0.56	2.56	4.88	1.68
DS1 - Downstream	1.38	0.25	0.54	4.05	6.55
DS2 - Upstream	0.98	0.56	1.89	5.00	2.30
DS2 - Downstream	2.47	0.46	5.68	3.77	2.97
DS3 - Upstream	2.98	0.64	1.14	4.92	3.92
DS3 - Downstream	0.45	0.18	0.00	5.56	4.80
DS4 - Upstream	1.41	0.36	3.6	5.19	2.03
DS4 - Downstream	1.53	0.81	7.82	4.90	2.66

Note that six drop structure monitoring points (Nos. 1453, 1454, 1459, 1460, 1461, and 1462) were either disturbed or lost between September 2010 and August 2012 and reestablished in August 2012. Movement rates calculated for these monitoring points for TF-DS-C were not included in the analysis.

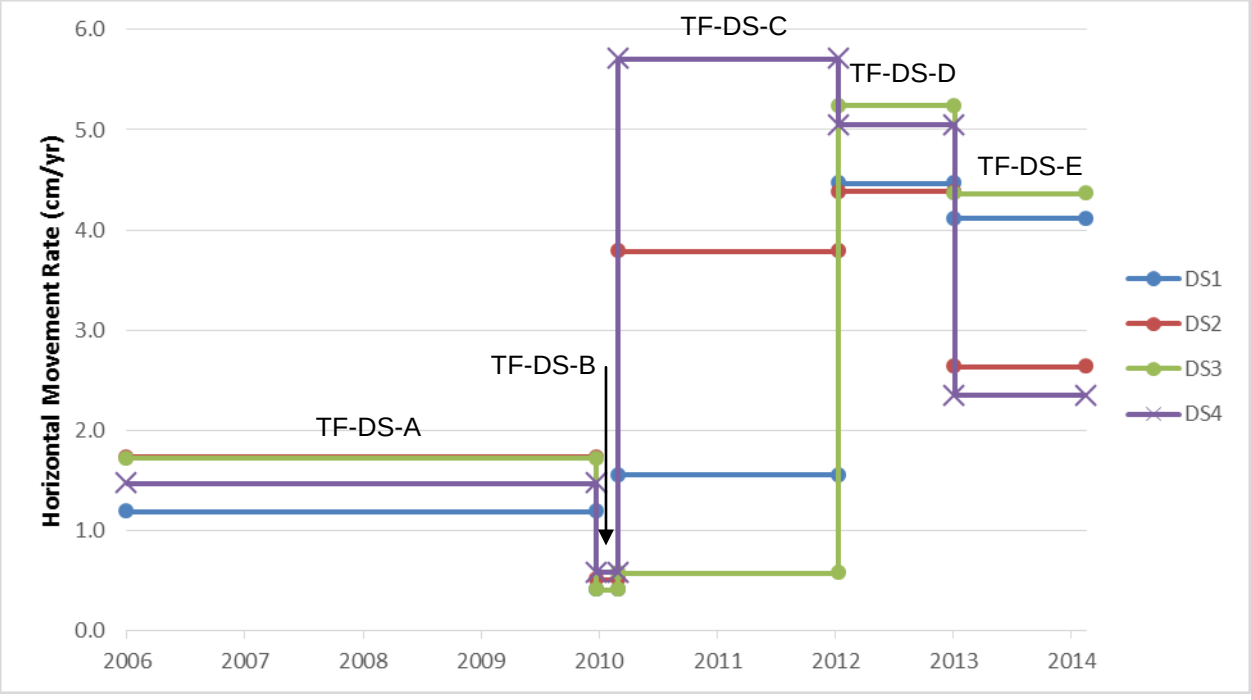


Figure C Horizontal Movement Rates

The line for DS1 at timeframe TF-DS-B (2010) is obscured by the line for DS3 (corresponding to a horizontal movement rate of 0.4 cm/y).

Selected drop structure dimensions based on 2012 and 2014 surveys, along with their relative percent change (RPC), are presented in Table S through Table V.

Table S Selected DS1 Parameters (2012 to 2014)

Parameter	2006 (Baseline)	2012	2013	2014	RPC / Δ (2012 to 2013)	RPC / Δ (2013 to 2014)
Average bottom width (m)[1]	6.9	6.8	7.05	8.2	3.7%	16.3%
Average side slopes[2]	3.2H:1V	3.2H:1V	3.3H:1V	3.7H:1V	2.7%	13.5%
Upstream Invert Elevation (masl)[3]	411.27	411.06	411.05	411.15	Δ = -1 cm	Δ = +10 cm
Downstream Invert Elevation (masl)[3]	409.76	409.66	409.75	409.90	Δ = +9 cm	Δ = +15 cm
Average End Area (m^2)[4]	30.6	31.2	30.5	28.9	-2.2%	-5.3%

Table T Selected DS2 Parameters (2012 to 2014)

Parameter	2006 (Baseline)	2012	2013	2014	RPC / Δ (2012 to 2013)	RPC / Δ (2013 to 2014)
Average bottom width (m)[1]	6.3	5.8	5.6	7.7	-2.6%	37.5%
Average side slopes[2]	3.1H:1V	3.2H:1V	3.3H:1V	3.5H:1V	1.9%	5.7%
Upstream Invert Elevation (masl)[3]	409.76	409.57	409.53	409.54	Δ = -4 cm	Δ = +1 cm
Downstream Invert Elevation (masl)[3]	407.14	406.90	406.85	406.99	Δ = -5 cm	Δ = +14 cm
Average End Area (m^2)[4]	34.5	31.9	32.2	33.5	1.1%	3.9%

Table U Selected DS3 Parameters (2012 to 2014)

Parameter	2006 (Baseline)	2012	2013	2014	RPC / Δ (2012 to 2013)	RPC / Δ (2013 to 2014)
Average bottom width (m)[1]	6.3	7.1	5.8	7.8	-17.7%	34.5%
Average side slopes[2]	3.2H:1V	2.9H:1V	3.2H:1V	3.6H:1V	11.2%	10.1%
Upstream Invert Elevation (masl)[3]	406.97	406.64	406.61	406.69	Δ = -3 cm	Δ = +8 cm
Downstream Invert Elevation (masl)[3]	404.83	404.49	404.56	404.42	Δ = +7 cm	Δ = -14 cm
Average End Area (m^2)[4]	36.0	35.9	38.0	35.9	-5.9%	-5.4%

Table V Selected DS4 Parameters (2012 to 2014)

Parameter	2006 (Baseline)	2012	2013	2014[5]	RPC / Δ (2012 to 2013)	RPC / Δ (2013 to 2014)
Average bottom width (m)[1]	7.8	9.9	9.4	N/A	-4.6%	N/A
Average side slopes[2]	3.1H:1V	2.3H:1V	2.6H:1V	N/A	13.2%	N/A
Upstream Invert Elevation (masl)[3]	404.77	404.53	404.57	404.62	Δ = -3 cm	N/A Δ = +5 cm
Downstream Invert Elevation (masl)[3]	404.32	400.74	400.63	N/A	Δ = +7 cm	N/A
Average End Area (m^2)[4]	38.8	47.6	44.2	N/A	-7.2%	N/A

[1]Average bottom width measurement was based on the distance between the estimated channel toes identified on the surveyed drop structure cross-section.

[2]The initial slope measured from the bottom of the channel to approximately half way up the slope.

[3]Invert elevations were based on the lowest point identified on the surveyed drop structure cross-section.

[4]End area boundaries were defined by the channel bottom, between the assumed outside edges of the gabion baskets.

[5]Due to unsafe conditions at the downstream section of DS4, a complete cross-section was not completed across the desired alignment (i.e., between monitoring points 1464 and 1465). Consequently, drop structure parameters were not calculated for DS4 in 2014, except for upstream invert elevation.

It is recommended that key drop structure features (e.g., top / toe of embankment) are recorded and clearly identified in the field during survey of drop structure cross-sections to facilitate the measurement of the selected drop structure parameters listed in the above tables.

The rate of change to invert elevations for the upstream and downstream sections for all drop structures between 2012 and 2014 are shown in Figure D.

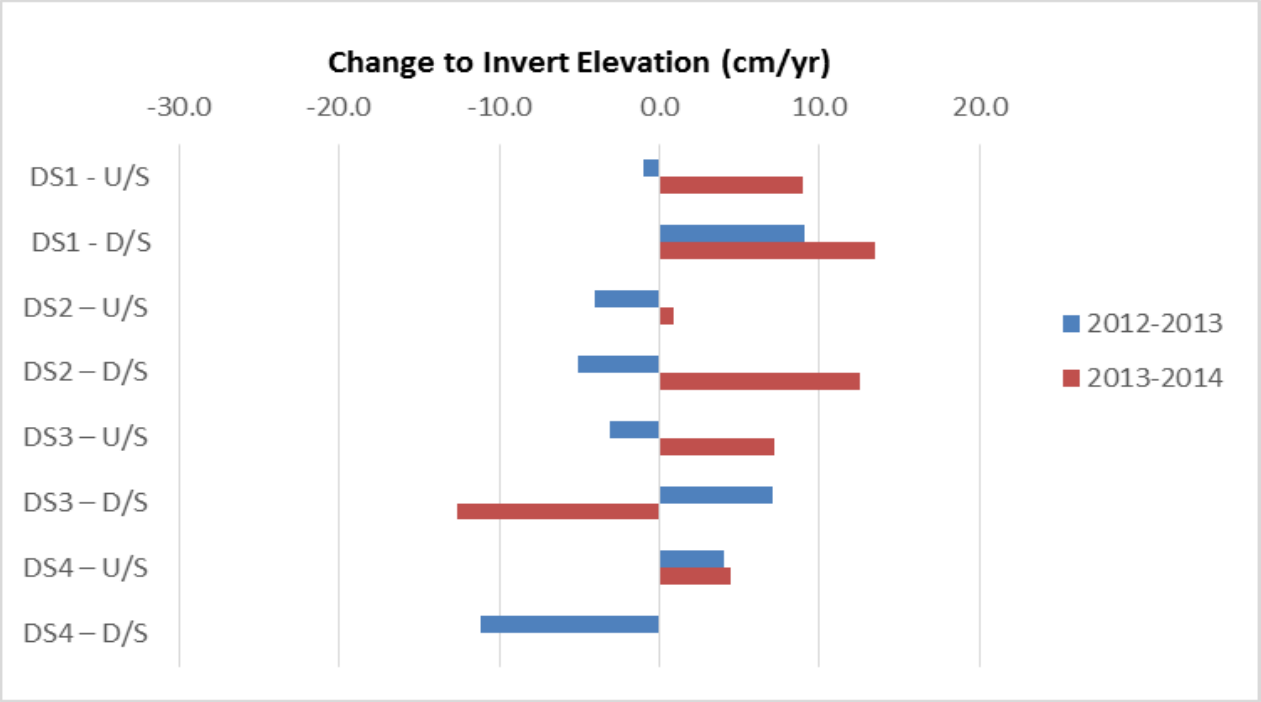


Figure D Rate of Change to Drop Structure Invert Elevations

Freeboard

The estimated freeboard depth at each drop structure is presented in Table W. These estimates are based on the hydraulic calculations completed as part of the design of the drop structures and a 50-year peak design flow of 34 m^3/s (R22, UMA 2003); however, the longitudinal slope variable was changed from 0.1% to 1.0% to reflect current channel conditions. The cross-sectional area and wetted perimeter were also changed based on the 2014 survey results. This altered the estimated flow depth and, consequently, the estimated freeboard at each drop structure. The freeboard depth was calculated based on the distance between the estimated water surface during the 50-year peak flow condition and the top of the gabion baskets as recorded in the 2014 survey.

Table W Freeboard Estimates at Drop Structure Monitoring Cross-sections

Drop Structure	Estimated Gabion Basket Elevation (masl)	2014 Surveyed Flow Elevation (m)	Freeboard at Time of Survey (m)	Estimated Flow Depth (m)[1]	Estimated Flow Elevation (masl)[1]	Estimated Freeboard (m)[1]
DS1 (U/S)	413.38	411.50	1.88	0.81	411.98	1.40
DS1 (D/S)	411.63	410.38	1.25	0.98	410.88	0.75
DS2 (U/S)	411.86	409.66	2.20	0.98	410.44	1.42
DS2 (D/S)	409.01	407.62	1.39	1.52	408.50	0.51
DS3 (U/S)	408.86	406.86	2.00	0.99	407.69	1.17
DS3 (D/S)	406.48	405.35	1.13	1.76	406.18	0.30
DS4 (U/S)[2]	406.95	405.28	1.67	0.93	405.73	1.22

[1] During 50-year peak flow conditions.

[2] DS4 downstream section parameters could not be measured or calculated as safety concerns prevented the survey of the downstream monitoring cross-section.

5.3.3 Movement Triggers

The triggers associated with the drop structures are based on the following measurements:

- Drop structure side slopes;
- Freeboard measured between the 50-year design flow of 33.8 m³/s (R48, UMA 2003) and top of gabion baskets upstream of the structure (note that the original calculation were based on a longitudinal slope of 0.1%. Updated calculations based on a 1.0% longitudinal slope, which reflects in-situ hydraulic conditions based on the survey data, and the design section indicate that the baseline freeboard value would be 1.2 m);
- Width of the drop structure at the drawdown reduction weir (between the upper monitoring points). As only DS1 was constructed with a drawdown reduction weir, it is recommended that this trigger is revised based on the width of the drop structure between the upstream monitoring points; and
- Width of the drop structure at the end sill (between the lower monitoring points).

The surveyed trigger results for DS1 to DS4 are presented in Table X to Table AA. Red text indicates an exceeded trigger level.

Table X DS1 Trigger Results

Measurement	Trigger Value	Baseline Value[2]	2014 Value
Average north side slope	<2H:1V	3H:1V	4.1 H:1V
Average south side slope	<2H:1V	3H:1V	3.4H:1V
Freeboard (m)[1]	<0.2	1.2	1.47
DS width at drawdown weir (m)	<20.5	21.0	23.0
DS width at end sill (m)	<20.5	21.0	20.5

Table Y DS2 Trigger Results

Measurement	Trigger Value	Baseline Value	2014 Value
North side slope	<2H:1V	3H:1V	3.0H:1V
South side slope	<2H:1V	3H:1V	2.8H:1V
Freeboard (m)	<0.2	1.20	1.32
DS width at drawdown weir (m)	<20.7	21.2	21.2
DS width at end sill (m)	<20.7	21.2	20.8

Table Z DS3 Trigger Results

Measurement	Trigger Value	Baseline Value	2014 Value
North side slope	<2H:1V	3H:1V	2.9H:1V
South side slope	<2H:1V	3H:1V	2.7H:1V
Freeboard (m)	<0.2	1.20	1.41
DS width at drawdown weir (m)	<21.0	21.5	20.6
DS width at end sill (m)	<21.0	21.5	21.2

Table AA DS4 Trigger Results

Measurement	Trigger Value	Baseline Value	2014 Value
North side slope	<2H:1V	3H:1V	2.7H:1V[3]
South side slope	<2H:1V	3H:1V	2.7H:1V[3]
Freeboard (m)	<0.2	1.20	1.55
DS width at drawdown weir (m)	<21.0	21.5	20.5
DS width at end sill (m)	<21.0	21.5	19.9

[1] Distance from estimated peak water surface elevation (based on 50-year design flow) and the top of the gabion baskets at the upstream end of the drop structure.

[2] Based on design values presented on Drawing 04 in the 2005 Long Term Performance Monitoring Program report (R22, UMA, 2006)

[3] The 2014 slope values for DS4 are based on the upstream cross-section as the downstream cross-section could not be safely surveyed. Note the north and side south slope at the DS4 downstream cross-section have likely exceeded the slope trigger based on that based on site observations.

5.3.4 Discussion

Following the extreme flow event in 2010, it appears that the movement of DS1, DS2, and DS3 has generally stabilized, with a reduced movement rate measured at all structures, when compared to the period from September 2010 to August 2012. This stabilization could be the result of reduced shear stresses acting against the gabion baskets due to reduced flows conveyed through the channel (when compared to 2010).

Between 2013 and 2014, the drop structure invert elevations increased between 1 cm and 15 cm for all sections except for DS3 downstream (decreased by 14 cm) and DS4 downstream (which was not measured).

The drop structure cross section areas were altered between 2013 and 2014, with an estimated change in average cross sectional areas ranging from -5.4% (DS3) to 3.9% (DS2), this may indicate ongoing destabilization of these structures. It should be noted that the accuracy of this calculation may be low due to its reliance on an assumed location of the edge of the gabion baskets (this location was not identified on the 2012 or 2013 cross-sections). This measurement could be used as a trigger value as it combines the various cross-section measurement into a single value indicative of overall changes to the cross-section, including deposition or uplifting of gabion baskets (as is the case at DS1).
It is recommended that the change in cross sectional area trigger be set at > ±10% between monitoring periods (i.e., greater than the RPC value calculated for DS4 between 2012 and 2013).

The drop structure width at DS3 is less than the value which triggers the preparation of a repair plan; however, it should be taken into consideration that DS3 was repaired in 2011, following the baseline survey. A Moderate risk rating was assigned to DS3 in the draft Engineering Review and Assessment report (Part 2). Consequently, it is not recommended that DS3 is repaired at this time and that the baseline value should be updated to reflect the 2011 repair.

Similarly, the end sill widths at DS1 and DS2 are at or near, but not exceeding, the reported trigger level. A Moderate risk rating was assigned to DS1 and DS2 in the draft Engineering Review and Assessment report (Part 2).It is recommended that the trigger value for the drop structure bottom width is increased to 1.0 m < the baseline width.

The downstream portion of DS4 could not be safely accessed at the time of the survey. Consequently, the downstream monitoring cross-section was not recorded in 2014 between monitoring point Nos. 1464 and 1464. It is recommended that a new monitoring cross-section is established approximately 8 m downstream of the existing monitoring cross-section (near the cross-section recorded in 2014) and recorded in future surveys.

DS4 has continued to destabilize since 2010 with an average horizontal movement rate of 3.9 cm/y, and a change in cross-sectional area of -7.2% between 2012 and 2013. As the trigger values relating to minimum drop structure width have been exceeded, it is recommended that DS4 is repaired as soon as practically possible.

The results of updated flow calculations indicate that the available freeboard during the conveyance of the design flow (50-year return period peak instantaneous flow of 33.8 m^3/s) would be approximately 1.2 m. It is recommended that the trigger value relating to drop structure freeboard is changed to <1.0 m for all drop structures.

5.3.5 Triggers and Monitoring Recommendations

Existing and new triggers associated with the gabion drop structures are presented in Table BB.

Table BB Drop Structure Triggers

ID	Description	Value	Action	Status
DS-1 (R22)	Change to drop structure geometry: steepened side slope	<2H:1V	Develop mitigation plan for drop structures at which trigger has been exceeded	Not triggered
DS-2 (R22)	Change to drop structure geometry: minimum freeboard at design flow	<0.20 m	Develop mitigation plan for drop structures at which trigger has been exceeded	Not triggered; however, recommend that the trigger level is changed to <0.3 m freeboard (as measured from the top of the gabion baskets at each drop structure cross-section) during conveyance of the 50-year return period flood flow

ID	Description	Value	Action	Status
DS-3 (R22)	Change to drop structure geometry: width at drawdown or width at end sill decreased from baseline	>0.50 m	Develop mitigation plan for drop structures at which trigger has been exceeded	DS4 repair plan should be implemented as soon as practically possible. Repair of DS1, DS2, and DS3 is not required due to Moderate risk rating and recommended increase of trigger value to 1.0 m. Recommend that upstream trigger is changed to the width measured between the upstream monitoring points as only DS1 was installed with a drawdown weir.
DS-4 (R22)	Visual evidence of water flowing below gabion baskets or undermining baskets	N/A	Immediate appropriate repair prior to the end of the construction season	Triggered at DS4. DS4 repair plan should be implemented as soon as practically possible
DS-5 (R22)	Visual evidence of damage to gabion mesh	N/A	Repair wire mesh and SPENAX rings as appropriate prior to the end of construction season	Triggered at DS4. DS4 repair plan should be implemented as soon as practically possible Triggered at DS1 and DS3. DS4 repair plan to include minor repairs to DS1 and DS3
DS-6 (new)	Change to cross-sectional end area since previous monitoring period	>10% RPC	Develop mitigation plan for drop structures at which trigger has been exceeded	Should be used as trigger in future LTMPs

The monitoring recommendations relevant to the drop structures are summarized in Table CC.

Table CC Drop Structure Monitoring Recommendations

ID	Description	Implementation	Validity
DS-A (R51)	Monitor (i.e., inspect and survey) drop structures on an annual basis	Ongoing - inspection and survey of all drop structures completed in 2013 and 2014	Valid - practice should continue
DS-B (R104)	Undertake further geotechnical investigation and evaluation to provide a more in-depth discussion on possible causes for differing movement rates between the gabion monitors and waste rock dump monitors	Not implemented	Valid - should be completed prior to site-wide remediation
DS-C (new)	Install additional monitoring points along the waste rock dump toe aligned with the drop structures.[1] A total of eight points should be installed with each point located 20 m south of the monitoring point on the south creek embankment	Should be implemented during 2015 LTMP survey	To improve understanding of influence of waste rock movement on drop structures

ID	Description	Implementation	Validity
DS-D (new)	Establish new monitoring points and cross-section downstream of DS4 that can be safely accessed	Should be implemented during 2015 LTMP survey	Existing monitoring cross-section at downstream end of DS4 can no longer be safely accessed
DS-E (new)	Future survey should include the clear and explicit identification of break points (e.g., toe and top of embankment) through drop structure cross-sections and the edges of each course of gabion baskets along the drop structure centerline	Should be implemented during 2015 LTMP survey	To facilitate the measurement of drop structure cross-section parameters and the review of drop structure profiles
DS-F (new)	Change trigger DS-2 from <0.2 m freeboard to <0.3 m freeboard during conveyance of the 50-year peak flow and adopt revised design flows shown on Figures 1009 to 1012, Appendix 1	Included on 2014 LTMP drawings	To reflect revised peak flow depth and current hydraulic design practices
DS-G (new)	Change trigger DS3 to measure the drop structure width between the upstream and downstream monitoring points rather than at the upstream drawdown weir and between the downstream monitoring points	Should be implemented as part of 2015 LTMP	Only DS1 was installed with a drawdown weir.

[1]A total of eight monitoring points should be installed. Each point should be located such that it aligns with a drop structure section (i.e., in line with the paired set of drop structure monitoring points located on the north and south creek embankments). Each point should be located approximately 20 m south of the drop structure monitoring point on the south creek embankment.

5.4 Clinton Creek Channel

Downstream of DS4, the Clinton Creek channel continues south east to the confluence with Wolverine Creek. Following the large flow event in 2010, the portion of the creek channel immediately downstream of DS4 has eroded down to bedrock and compromised the south channel embankment and the closed portion of the Clinton Creek Access Road (Section 5.1). At that time, the alignment of the lower portion of the creek, beyond station 0+700, shifted south to the toe of the waste rock.

Figures showing the following Clinton Creek channel components are included in Appendix 1:

- Centreline alignments - Figure 1002;
- Cross-sections A-F - Figure 1003; and
- Vertical profiles - Figures 1005 to 1008.

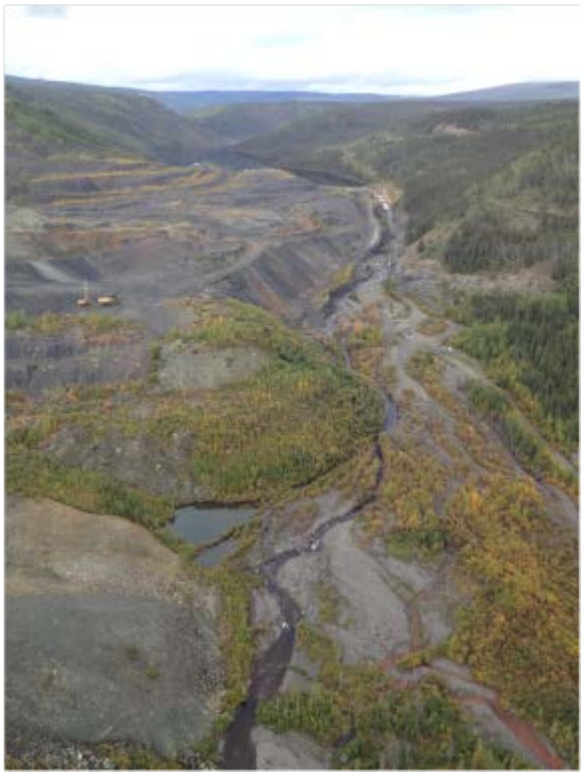


Photo F **Aerial View of Clinton Creek Channel - Looking West (Upstream)**

5.4.1 Survey

The Clinton Creek channel centreline was surveyed from the Hudgeon Lake outlet to the confluence with Wolverine Creek to establish the horizontal and vertical alignment of the channel. Six channel cross-sections were also surveyed (A to F), extending beyond the top of the channel embankment.

Clinton Creek is comprised of the following sections:

- Drop structures, Sta. 0+000 to Sta. 0+250: DS1 to DS4 discussed in 5.3;
- Upper Creek, Sta. 0+250 to Sta. 0+680: aligned through the canyon and adjacent to the closed portion of the Clinton Creek access road;
- Mid Creek, Sta. 0+680 to Sta. 0+913: beyond the re-aligned channel (post-2010 extreme flow event); and
- Lower Creek, Sta. 0+913 to Sta. 3+621: from the merged channel to the confluence with Wolverine Creek.

5.4.2 Results

The previous profile data indicates that the upper section and mid-section of the Clinton Creek channel underwent the geomorphological changes presented in Table DD between 2004 (when the baseline was established) and 2014. For the purposes of this analysis the following timeframes were considered:

- July 2004 to September 2010 (TF-CC-A);
- September 2010 to August 2012 (TF-CC-B); and
- August 2012 to September 2014 (TF-CC-C).

Vertical profiles and horizontal alignments recorded at the start and end of each timeframe were compared in Autodesk Civil3D with various functions in this program used to calculate the results shown.

Table DD Upper Clinton Creek and Drop Structure Transition Zone Geomorphological Changes (2004 to 2014)

Measurement	Sta. 0+200 to Sta. 0+420			Sta. 0+420 to Sta. 0+680		
	TF-CC-A	TF-CC-B	TF-CC-C	TF-CC-A	TF-CC-B	TF-CC-C
Channel length - downcutting (m)[1]	220	77	99	72	157	223
Average channel downcutting (cm)[2]	206	14	12	38	22	24
Maximum channel downcutting (cm)	449	51	57	105	87	66
Channel length - deposition (m)[1]	0	143	121	188	103	37
Average channel deposition (cm)[2]	N/A	13	14	72	22	14
Maximum channel deposition (cm)	N/A	47	57	180	53	41
Average channel centreline horizontal shift (m)[3]	8.4 south	1.7 north	0.7 south	0.9 north	0.4 north	1.5 north
Maximum channel centreline horizontal shift (m)	20.9 south	6.7 north	4.2 south	8.7 north	2.4 north	8.2 north

[1]Channel length - downcutting / deposition based on length of channel over which downcutting/deposition was observed.

[2]Average calculated as the area between the profiles divided by the length of channel over which downcutting / deposition was observed (e.g., “Average channel downcutting” = downcut area measured between profiles / “Channel length - downcutting”).

[3]Average horizontal shift calculated as the area between the centrelines - in the predominant north/south direction - divided by the total channel length (e.g., “Average channel centreline horizontal shift” = area measured between centrelines [one side only] / channel length).

Table EE Mid-Clinton Creek Geomorphological Changes (2010 to 2014)

Measurement	Sta. 0+680 to 0+913	
	TF-CC-B	TF-CC-C
Channel length - downcutting (m)	222	225
Average channel downcutting (cm)	20	67
Maximum channel downcutting (cm)	64	142
Channel length - deposition (m)	111	8
Average channel deposition (cm)	8	30
Maximum channel deposition (cm)	21	21
Average channel centreline horizontal shift (m)	1.0 north	1.2 north
Maximum channel centreline horizontal shift (m)	6.2 north	5.9 north

These results were used to calculate the average downcutting and deposition rates (expressed as change in measurement / m of channel / year) and RPCs over the three time frames, presented in Table FF and Table GG.

Table FF Clinton Creek Rates of Change (2004 to 2014) - Upper Creek

Rate	TF-CC-A	TF-CC-B	TF-CC-C	RPC TF-CC-A to TF-CC-B	RPC TF-CC-B to TF-CC-C
Average channel downcutting (cm/m/y)[1]	13.8	5.1	6.5	-63%	+27%
Average channel deposition (cm/m/y)[1]	4.5	4.6	2.2	+1%	-52%

[1]Average channel downcutting/deposition calculated as the total downcutting measured along the channel section divided by the total length of the channel section.

The results in Table EE provide an overall indication of how much the channel is experiencing downcutting or deposition as a whole, and the difference between the two values is an approximation of the net change. For example between August 2012 and September 2014, the channel underwent 7.2 cm/y downcutting and 2.5 cm/y deposition, with an approximate net downcutting of 4.7 cm.

Table GG Clinton Creek Rates of Change (2012 to 2014) - Mid Creek

Rate	TF-CC-B	TF-CC-C	RPC TF-CC-B to TF-CC-C
Average channel downcutting (cm /y)	10.1	30.9	+206%
Average channel deposition (cm/y)	0.2	0.5	+150%

The 2012 and 2014 survey results for Cross-Sections A through F are summarized in Table HH to Table LL.

Table HH Clinton Creek Cross-Section A (Sta. 0+122) Summary[1]

Parameter	2012	2014	RPC
Bottom width (m)	4.3	5.8	+34.9%
Average side slopes[2]	2.6	2.9	N/A
Channel Invert Elevation (masl)	406.64	406.54	<0.1%
Top of Bank Elevation (masl)	409.50	409.51	<0.1%
End Area (m^2)[3]	39.5	45.0	+13.9%

[1]2012 cross-section data was supplied by Underhill.

[2]Side slope estimated based on coordinates recorded at top and bottom of slope and does not consider intermediary slope changes.

[3]End area defined by the primary channel cross-section during high flow. The top width of this area was defined by the top of embankment on both sides of the channel, with the top of embankment with the lower elevation used as the upper limit of the primary channel.

Table II Clinton Creek Cross-Section B (Sta. 0+166) Summary

Parameter	2012	2014	RPC
Bottom width (m)	8.3	5.9	-28.9%
Average side slopes	2.7	3.3	N/A
Channel Invert Elevation (masl)	406.67	404.88	-0.4%
Top of Bank Elevation (masl)	409.45	407.63	-0.4%
End Area (m^2)	45.0	52.2	+16.0%

Table JJ Clinton Creek Cross-Section C (Sta. 0+201) Summary

Parameter	2012	2014	RPC
Bottom width (m)	7.3	7.0	-4.1%
Average side slopes	1.3	1.6	N/A
Channel Invert Elevation (masl)	399.49	397.80	-0.4%
Top of Bank Elevation (masl)	408.20	409.00	+0.2%
End Area (m^2)	185	286	+54.9%

Table KK Clinton Creek Cross-Section D (Sta. 0+455) Summary

Parameter	2012	2014	RPC
Bottom width (m)	14.3	9.4	-34.3%
Average side slopes	1.0	1.1	N/A
Channel Invert Elevation (masl)	390.71	389.74	-0.2%
Top of Bank Elevation (masl)	407.50	405.27	-0.5%
End Area (m^2)	390	317	-18.6%

Table LL Clinton Creek Cross-Section E (Sta. 0+558) Summary

Parameter	2012	2014	RPC
Bottom width (m)	7.0	14.1	+101.4%
Average side slopes	1.1	1.3	N/A
Channel Invert Elevation (masl)	386.94	385.06	-0.5%
Top of Bank Elevation (masl)	398.08	406.25	+2.1%
End Area (m^2)	201	229	+13.7%

Cross-Section F was recorded for the first time in 2014 and is summarized in Table MM.

Table MM Clinton Creek Cross-Section F (Sta. 0+378) Summary

Parameter	2014
Bottom width (m)	21.5
Average side slopes	2.1
Channel Invert Elevation (masl)	392.9
Top of Bank Elevation (masl)	41.29
End Area (m^2)	691

5.4.3 Discussion

The majority of the geomorphological change to the upper Clinton Creek channel (Sta. 0+250 to 0+680) occurred between 2004 (baseline) and 2010, specifically between July and September of 2010. During this period, the channel section extending 220 m downstream of DS4 was downcut, on average, 1.7 m with a maximum of 4.5 m immediately downstream of DS4, and has shifted south (towards the waste rock dump) by an average of 8.4 m.

Since September 2010, the rate of downcutting of the channel section immediately downstream of DS4 has significantly reduced (0.26 m total average downcut from September 2010 to September 2014). Between September 2010 and September 2014, the average rate of downcutting along the entire upper creek length has decreased by approximately 53%. This reduced rate of downcutting is most likely a result of the channel being downcut through the waste rock and into the bedrock (or competent material) below. Over this period, the average rate of deposition along the upper creek has increased, possibly as a result of the mobilization of gabion rock and waste rock from DS4.

The mid-Clinton Creek channel (Sta. 0+680 to 0+913) was re-surveyed in September 2010 following the realignment of the channel to the south to along the toe of the waste rock dump. Average downcutting and deposition rates were significantly higher between August 2012 and September 2014 (67.2 cm and 30.1 cm, respectively) than during the preceding timeframe (19.7 cm/y and 8.4 cm/y, respectively). The majority of the mid-Clinton Creek channel was downcut over both timeframes (downcutting length of 225 m compared to a deposition length of 8 m between August 2012 and September 2014). Since September 2010, the mid-creek channel has experienced an average centreline shift of 2.2 m to the north.

Cross-Sections A, B, C, and E underwent similar geomorphological changes between 2012 and 2014 with steepened side slopes resulting in increased cross-sectional area (ranging from 13.7% to 54.9%). While the side slopes of Cross-Section D also steepened, the bottom width and top of bank elevation decreased at this location, resulting in a decreased cross-sectional end area (-18.6% RPC).

It is important to note that, as the survey of these cross-sections was not based on an alignment easily identified in the field by monitoring points, it is difficult to reproduce exactly the same cross-section during separate monitoring cycles. This may have distorted the variance to the cross-section dimensions and affected the results reported above.

5.4.4 Triggers and Monitoring Recommendations

Existing and new triggers for the Clinton Creek channel downstream of DS4 are presented in Table NN. The new triggers are based on the observations made following the 2010 extreme flow event. They are based on current site conditions and should not be applied to historical data (i.e., although the trigger values may have been exceeded during previous timeframes, the recommended action should only be taken if the trigger value is exceeded during future monitoring periods).

Table NN Clinton Creek Channel Triggers

ID	Description	Value	Action	Status
CC-1 (R22)	Channel downcut over the 50 m channel segment downstream of DS4 to Sta. 0+250	>0.5 m (from 2006 baseline)	Begin planning for channel and waste rock stabilization	Triggered in 2010 site-wide remediation planning underway
CC-2 (R22)	Channel downcut over a measurable (>50m) stretch of the channel downstream of Sta. 0+250	>1.5 m (from 2006 baseline)	Begin planning for channel and waste rock stabilization	Triggered in 2010 site-wide remediation planning underway

ID	Description	Value	Action	Status
CC-3 (new)	Channel deposition downstream of DS4 over channel segment (minimum length of 50 m)	>0.3 m from previous monitoring period	Develop localized mitigation plan	Should be used as a trigger in future LTMPs
CC-4 (new)	Mid-creek channel centreline shifts south, into the waste rock dump	>5 m from previous monitoring period	Develop localized mitigation plan	Should be used as a trigger in future LTMPs

The monitoring recommendations relevant to the Clinton Creek channel are summarized in Table OO.

Table OO Clinton Creek Channel Monitoring Recommendations

ID	Description	Implementation	Validity
CC-A (R51)	Environmental assessment to determine impacts of stabilization measures at Clinton Creek channel	Not completed	Valid - should be completed prior to site-wide remediation
CC-B (R51)	Inspect and survey the Clinton Creek channel on an annual basis (R104)	Inspection and survey completed in 2014	Valid - practice should continue
CC-C (R104)	Survey of cross-sections A-E along Clinton Creek should be completed on a biennial basis	Survey completed in 2014	Valid - practice should continue
CC-D (R104)	Install additional monitoring pins adjacent to where Clinton Creek has relocated closer to the waste rock area	Not completed	Valid - refer to recommendation CC-G below
CC-E (R104)	Complete geotechnical investigation of Clinton Creek waste rock dump	Not completed	Valid - should be completed prior to site wide remediation
CC-F (new)	Survey of Cross-Section F along Clinton Creek should be completed on a biennial basis	Should be completed in subsequent LTMPs	Survey required to compare cross-section to previous years and identify geomorphological / topographical changes
CC-G (new)	AAM should consider installing monitoring pins along south slope of Clinton Creek near Stations 0+700, 0+800, and 0+900	Should be implemented as part of 2016 LTMP survey	Will provide additional movement monitoring pins at critical locations along waste rock toe

5.5 Clinton Creek Waste Rock Dump

The Clinton Creek waste rock dump (Photo G) generally slopes north from a peak northwest of Porcupine Pit (approximate elevation of 477.3 m) to the south embankment of the Clinton Creek channel. The waste rock is comprised of weak argillite material composed primarily of sand and gravel sized rock fragments with some cobbles and boulders. The results of a stability analysis completed in 2002 indicate that the ongoing waste rock movement is the result of a very weak foundation layer and the thawing of permafrost underneath the waste rock (R47, UMA 2002).

Photo G Aerial View of Waste Rock Dump - Looking Southeast

The waste rock dump is divided into three segments:

- Upper slope - above the 450 masl;
- Mid slope - between the 450 masl and 420 masl; and
- Lower slope - below the 420 masl.
- Total movement rates (i.e., calculated based on the difference between the original coordinates of the monitoring point and the 2014 coordinates) and incremental movement rates (i.e., calculated based on the difference between the 2012 and 2014 monitoring point coordinates) for the waste rock dump are shown on Figures 1017 and 1018, Appendix 1.

5.5.1 Survey

The 2014 Survey of the waste rock dump was accomplished by recording the coordinates of the monitoring points used to assess waste rock movement presented in Table PP which includes the segment of the waste rock dump in which the monitoring point is located and the year in which it was established. Monitoring points that were not surveyed in 2014 are indicated in bold. Two new monitoring points were established on the natural slope north of Clinton Creek in 2014: 183 and 184.

Table PP Summary of 2014 Waste Rock Dump Monitoring Points

Segment	Monitoring Point	Year Established	Segment	Monitoring Point	Year Established
Upper Slope	81-1	2001	Lower Slope	80-13	2003
	223	2003		80-14[1]	2003
	225	2003		84-1[2]	2001
	1195	2001		189	2014
	1834	2003		217[3]	2001
	2836	2012		218[4]	2001
	BH-2	2010		219[5]	2001
	BH-4	2012		220[6]	2001
	186	2012		222[7]	2001
	300	2012		228[8]	2003
Mid Slope	4	2001		1833	2003
	19	2001		P2	2001
	19A	2010		P3	2001
	20A	2001		P4	2001
	21A	2001		P5	2001
	22A	2001		XS-A[9]	2001
	68	2001		XS-B	2003
	81-2	2001		XS-E[10]	2003
	224	2003		XS-G[11]	2001
	226	2003		69	2001
	227	2003		987[12]	2014
	229	2003		988	2012
	1194	2001		989	2012
	1196	2001		990	2012
	1831	2003		991	2012
	BH-1	2010		992	2012
	BH-1 (Cable)	2012		993	2012
	570	2012		994	2012
	187	2012		995	2012
	188	2012		1824	---

Notes:

[1]80-14 was lost in 2011 and replaced by 991 in 2012.

[2]84-1 was lost in 2010 and replaced by 987 in 2012.

[3]217 was lost in 2010 and replaced by 993 in 2012.

[4]218 was lost in 2010 and replaced by 990 in 2012.

[5]219 was relocated in 2010.

[6]220 was lost in 2010 and replaced by 988 in 2012.

[7]222 was relocated in 2010.

[8]228 was lost in 2011 and replaced by 995 in 2012.

[9]XS-A was relocated in 2006, lost in 2010, and replaced by 992 in 2012.

[10]XS-E was lost in 2010 and replaced by 989 in 2012.

[11]XS-G was lost in 2006 and replaced by 989 in 2012.

[12]987 was lost in 2014 and replaced by 189 in 2014.

5.5.2 Results

For the purposes of this analysis the following timeframes were considered:

- July 2003 to July 2010 (TF-WR-A);
- July to September 2010 (TF-WR-B);
- September 2010 to August 2012 (TF-WR-C); and
- August 2012 to September 2014 (TF-WR-D).

July 2003 was selected as the starting date for this analysis as the majority of monitoring points were established during this monitoring period. Table QQ summarizes the waste rock dump horizontal average (with average azimuths) and maximum movement rates (with azimuths) between four timeframes.

Table QQ Waste Rock Dump Horizontal Movement Rates (2003 to 2014)

Period	Average Movement Rates (cm/y)			Maximum Movement Rates (cm/y)		
	Upper Slope	Mid Slope	Lower Slope	Upper Slope	Mid Slope	Lower Slope
July 2003 to July 2010 (TF-WR-A)	1.67 (348°)	2.59 (351°)	1.60 (315°)	2.78 (332°)	6.01 (333°)	5.26 (323°)
July to September 2010 (TF5-WR-B)	19.8 (108°)	12.9 (255°)	15.7 (86°)	33.1 (99°)	27.8 (101°)	27.8 (79°)
September 2010 to August 2012 (TF-WR-C)	2.76 (339°)	3.39 (353°)	2.80 (5.1°)	4.42 (339°)	5.70 (319°)	6.97 (0°)
August 2012 to September 2014 (TF-WR-D)	3.31 (75°)	3.24 (82°)	2.51 (352°)	8.92 (83°)	11.8 (135°)	9.75 (322°)

Average movement rates corresponding to each time frame and for each slope are plotted in Figure E and Figure F.

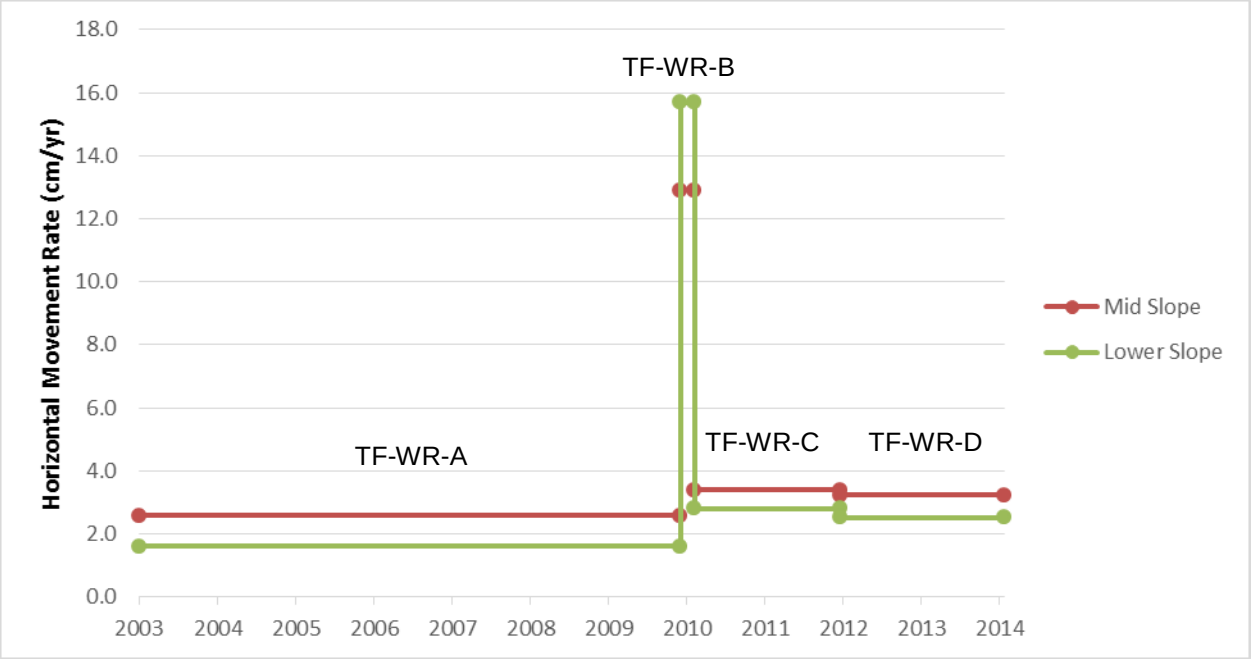


Figure E Average Waste Rock Dump Horizontal Movement Rates - Mid and Lower Slopes

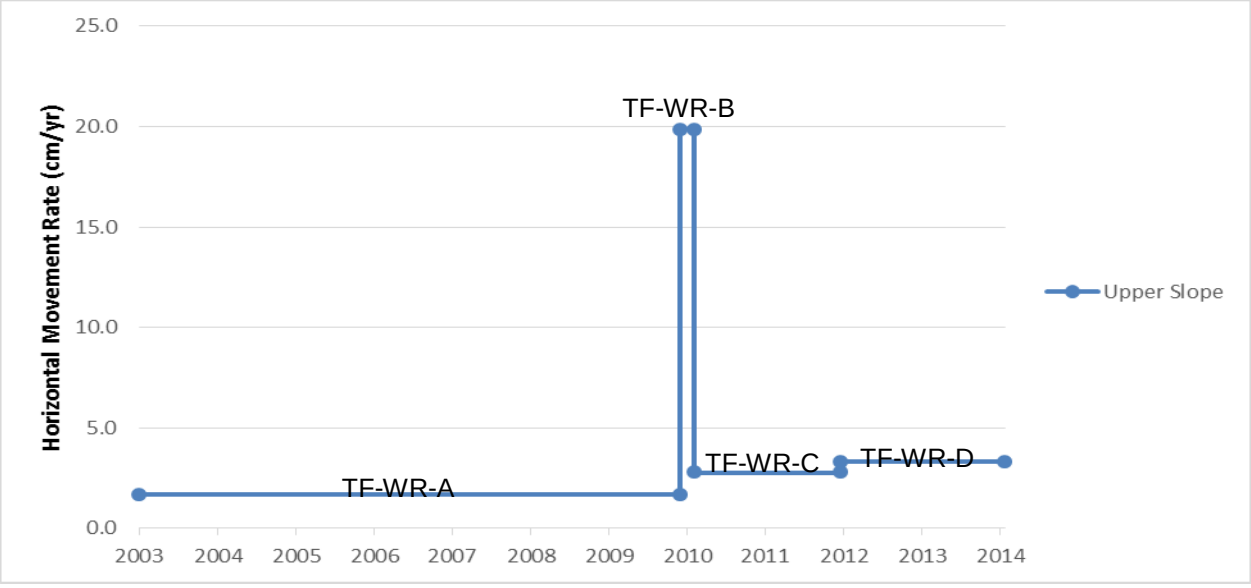


Figure F Average Waste Rock Dump Horizontal Movement Rates - Upper Slope

The data was used to calculate change to average movement and azimuth between the timeframes, presented in Table RR, and between the slope sections, presented in Table SS.

Table RR Waste Rock Dump Change in Movement by Timeframe

Timeframe	Upper Slope		Mid Slope		Lower Slope	
	Δ Avg. Movement (RPC)[1]	Δ Avg. Azimuth[2]	Δ Avg. Movement (RPC)	Δ Avg. Azimuth	Δ Avg. Movement (RPC)	Δ Avg. Azimuth
WR-A to WR-B	+1,089%	121°	+399%	96°	+879%	132°
WR-B to WR-C	-86%	130°	-74%	99°	-82%	93°
WR-C to WR-D	+20%	96°	-5%	89°	-10%	3°

[1]Change in movement calculated as (Average movement rate in TF-WR-B - Average movement rate in TF-WR-A) / Average movement rate in TF-WR-A and represented as a relative percent change. (e.g., for upper slope TF-WR-A to TF-WR-B [19.83 - 1.67] / 1.67 = 1,089%)

[2]Change in average azimuth calculated as the difference between the average movement vector azimuth (i.e., the average direction in which the monitoring points in a slope section are moving, relative to north) between two time frames. (e.g., for mid slope TF-WR-B to TF-WR-C [353°- 254° = 99°]). Note that changes in azimuth must be less than 180º.

Table SS Waste Rock Dump Comparative Change in Movement by Section[1]

Timeframe	Mid Slope to Upper Slope		Lower Slope to Upper Slope		Lower Slope to Mid Slope	
	Avg. Movement (RPC)	Δ Avg. Azimuth	Avg. Movement (RPC)	Δ Avg. Azimuth	Avg. Movement (RPC)	Δ Avg. Azimuth
WR-A	55%	3°	-4%	4°	-38%	35°
WR-B	-35%	146°	-21%	21°	22%	167°
WR-C	23%	15°	1%	1°	-17%	2°
WR-D	-2%	7°	-24%	24°	-22%	90°

[1]RPC values were calculated by subtracting the movement rate of Slope 2 from Slope 1 and dividing the difference by Slope 2 (e.g., [mid slope rate - Upper Slope rate] / Upper Slope Rate).

5.5.3 Discussion

Maximum horizontal waste rock movement rates were observed during TF-WR-B (July to September 2010), the survey results show a significant increase of average waste movement over this period compared to the previous timeframe (TF-WR-A): 1,089% increase on the upper slope; 399% increase on the mid slope; and 879% on the lower slope. During this timeframe, the direction of slope movement also changed from predominantly north (perpendicular to the Clinton Creek Valley) during TF-WR-A, to predominantly east-southeast (parallel to the Clinton Creek Valley) through the upper and lower slopes and to the west-southwest during TF-WR-B.

Between TF-WR-B and TF-WR-C, the rate of waste movement slowed significantly (average of 81% reduction in rate of movement on the upper, mid-, and lower slopes).

Between TF-WR-C (September 2010 to August 2012) and TF-WR-D (August 2012 to September 2014), the average rate of waste rock movement decreased on the mid and lower slopes by 5% and 10%, respectively, and increased on the upper slope by 20%. Over this period the average direction of movement also changed between 3° and 96°, shifting from a predominantly north direction to a northeast direction.

During TF-WR-D, the waste rock average movement rates ranged from 2.51 cm/y on the lower slope to 3.31 cm/y on the mid slope. The direction of waste rock movement was variable over this timeframe, with 90 deg. variation between the movement azimuths. The movement rates between the slopes varied; the lower slope moved on average 24% less than the upper slope and 22% less than the mid slope; the mid slope moved 2% less than the upper slope. Only the upper slope experienced an increased rate of movement when compared to TF-WR-C (2.76 cm/y in TF-WR-C versus 3.31 cm/y in TF-WR-D).

During TF-WR-A and TF-WR-C, the average rate of movement through the mid slope was more than those calculated for the upper and lower slopes; however, during TF-WR-B, the average movement rate was less than those calculated for the upper and lower slopes and during TF-WRD, the average movement rate was less than that calculated for the upper slope and more than that calculated for the lower slope. This may indicate that since September 2010, the mid slope may have become less stable compared to the upper and lower slopes.

Between the September 2010 to August 2011 and August 2011 to August 2012 monitoring cycles, a similar acceleration of the average movement rate was calculated for the mid slope (from 6 cm/y to 7 cm/y [based on results reported in document R104, AE 2013]).

It should be noted that 18additional mid slope monitoring points (BH-4, 2836, 300, 186 on the upper slope; BH-1 Cable, 570, 188, and 187 on the mid slope; as well as 987 to 995 and 1824 on the lower slope) were included in the August 2012 and September 2014 monitoring programs. This was to replace nine lost monitoring points (80-14, 84-1, 217, 218, 220, 228, XS-A, XS-E, and XS-G) and to improve movement monitoring. The monitoring points added to the upper slope may have skewed the average movement rate calculated for the upper slope. An average movement for these four points was calculated as 5.67 cm/y during TF-WR-D compared to an average movement rate of 1.43 calculated for the five points established in 2003 over the same timeframe.

Due to the skewing of the TF-WR-D upper slope average movement rate caused by the addition of monitoring points, it is recommended that the upper slope movement points are surveyed in 2015 to determine whether rate of movement of the upper slope section of the waste rock dump is increasing. An increase rate of the waste rock movement may indicate the slope is approaching a complete failure.

5.5.4 Triggers and Monitoring Recommendations

Triggers associated with the waste rock dump are presented in Table TT.

Table TT Waste Rock Dump Triggers

ID	Description	Value	Action	Status
WR-1 (new)	Average monitoring point horizontal movement rate – per slope section	Movement rate (cm/y) > than movement rate from previous monitoring cycle	If movement rate increase is between 0% and 30%, monitoring points should be surveyed the following year. If movement rate increase is 30% or greater or if movement rate has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required	Potentially triggered for upper slope during TF-WR-D - to be confirmed with survey in 2015

The monitoring recommendations relevant to waste rock dump are summarized in Table UU.

Table UU Waste Rock Dump Monitoring Recommendations

ID	Description (Reference Document)	Implementation	Validity
WR-A (R51)	Visual inspection of the waste rock dump should be completed on an annual basis with survey completed on a biennial basis	Inspection and survey completed in 2014	Valid - practice should continue
WR-B (R104)	Trigger level for waste rock monitors should be further investigated and implemented	Included in 2014 report	Completed
WR-C (new)	Survey upper slope monitoring points in 2015 and compare to 2014 data	Should be completed as part of 2015 LTMP survey	Required to determine if upper slope waste rock movement is accelerating

5.6 Porcupine Pit and Snowshoe Pit

Porcupine Pit is located southeast of the waste rock dump upper slope. The open pit occupies a footprint of approximately 35 ha, with pit walls extending approximately 70 m high. Snowshoe Pit is located east of Porcupine Pit.

Total movement rates (i.e., calculated based on the difference between the original coordinates of the monitoring point and the 2014 coordinates) and incremental movement rates (i.e., calculated based on the difference between the 2012 and 2014 monitoring point coordinates) for the Porcupine pit are shown on Figures 1017 and 1018, Appendix 1.

5.6.1 Survey

The 2014 Survey of the Porcupine Pit was completed by recording the coordinates of the monitoring points, used to assess soil movement in the area surrounding the pit. The following Porcupine Pit monitoring points were established in 2003 and included in the 2014 survey program: Nos. 1493, 1830, 1832, 1837, 1838, and 1839. There are no monitoring points established for Snowshoe Pit.

5.6.2 Results

For the purposes of this analysis the following timeframes were considered:

- July 2003 to July 2010 (TF-PP-A);
- July to September 2010 (TF-PP-B);
- September 2010 to August 2012 (TF-PP-C); and
- August 2012 to September 2014 (TF-PP-D).

Table VV summarizes the Porcupine Pit horizontal average (with average azimuths) and maximum movement rates (with azimuths) between four timeframes.

Table VV Porcupine Pit Horizontal Movement Rates (2003 to 2014)

Period	Average Movement Rate (cm/y)	Maximum Movement Rate (cm/y)
July 2006 to July 2010 (TF-PP-A)	1.79 (354 deg.)	6.86 (352 deg.)
July to September 2010 (TF-PP-B)	7.32 (180 deg.)	12.2 (207 deg.)
September 2010 to August 2012 (TF-PP-C)	3.49 (326 deg.)	9.13 (3 deg.)
August 2012 to September 2014 (TF-PP-D)	1.31 (332 deg.)	3.31 (1 deg.)

The average Porcupine Pit movement rates are plotted in Figure G.

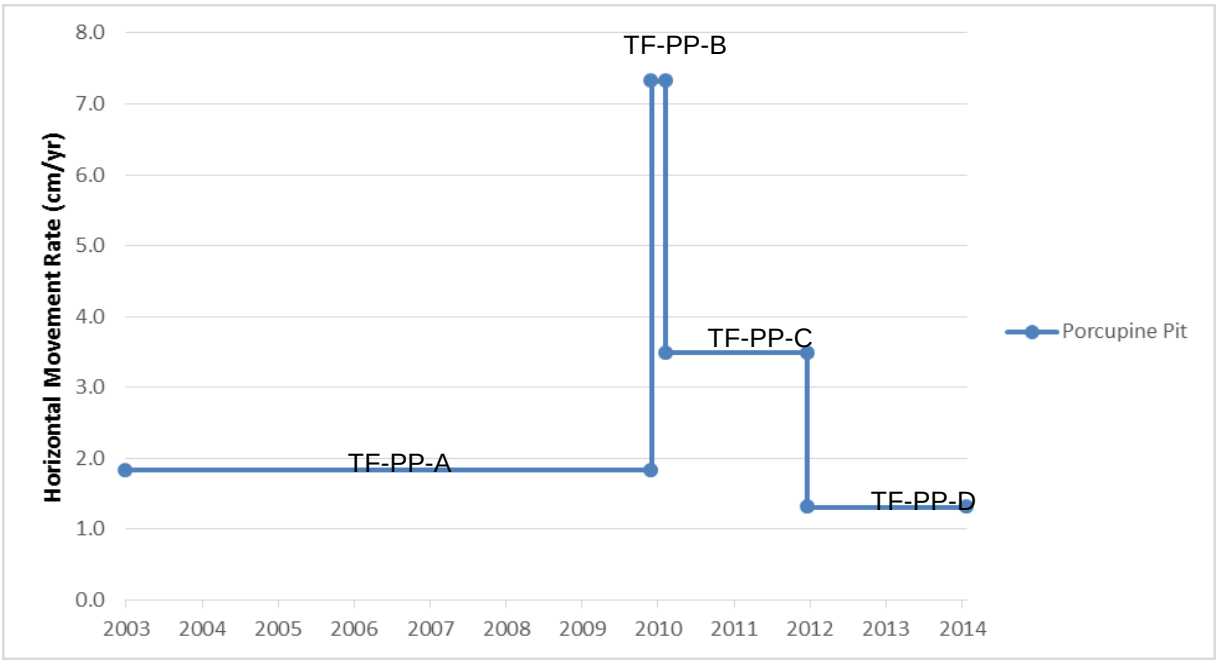


Figure G Average Horizontal Porcupine Pit Movement Rates

The data was used to calculate change to average movement and azimuth between the timeframes, presented in Table WW.

Table WW Porcupine Pit Change in Movement by Timeframe

Timeframe	Upper Slope	
	Avg. Movement (RPC)	Δ Avg. Azimuth
PP-A to PP-B	+301%	174°
PP-B to PP-C	-52%	146°
PP-C to PP-D	-63%	6°

5.6.3 Discussion

Similar to the waste rock dump, the maximum horizontal movement rate of the monitoring points surrounding Porcupine Pit was observed during TF-PP-B (July to September 2010), with an average movement rate during this timeframe of 7.32 cm/y. During this timeframe the direction of monitoring point movement also changed from predominantly north to predominantly south. Between TF-PP-B and TF-PP-C, the rate of horizontal movement slowed significantly (52% decrease from TF-PP-B to TF-PP-C and 63% decrease from TF-PP-C to TF-PP-D).

5.6.4 Triggers and Monitoring Recommendations

Triggers associated with Porcupine Pit are presented in Table XX.

Table XX Porcupine Pit Dump Triggers

ID	Description	Value	Action	Status
PP-1 (new)	Average monitoring point horizontal movement rate – per slope section	Movement rate (cm/y) > than movement rate from previous monitoring cycle	If movement rate increase is between 0% and 30%, monitoring points should be surveyed the following year. If movement rate increase is 30% or greater or if movement rate has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required	N/A

Monitoring recommendations relevant to Porcupine Pit and Snowshoe Pit are summarized in Table YY.

Table YY Porcupine Pit and Snowshoe Pit Monitoring Recommendations

ID	Description (Reference Document)	Implementation	Validity
PP-A (new)	Inspect Porcupine Pit and Snowshoe Pit on an annual basis and survey Porcupine Pit monitoring points on a biennial basis	Survey and inspection completed in 2014	Required to monitor pit conditions and movement rates
PP-B (new)	Establish four monitoring points around Snowshoe Pit	Should be completed as part of 2016 LTMP survey	Required to monitor movement rates in and around Snowshoe Pit

6. PERFORMANCE MONITORING WOLVERINE CREEK

The following subsections present and discuss the survey results for site components contained within the Wolverine Creek catchment (Figure 1013, Appendix 1).

6.1 Wolverine Creek Channel

Downstream of the south Wolverine pond, the Wolverine Creek channel (Photo J) continues south to the confluence with Clinton Creek. The upper portion of the channel was formed through the tailings pile in 1974, following a breach of the south Wolverine pond, transporting eroded tailings several hundred metres downstream. In 1978, a rock lined channel, with the following properties, was constructed through the downstream face of the south lobe to stabilize the channel:

- Width: 9 m
- Lined depth: 1.2 m
- Median rock diameter: 0.9 m

Photo H Wolverine Creek Channel through the Tailings Pile - Looking Southeast (Downstream)

Rock weirs were also installed along the channel (Photo K) to control flow velocities, sediment loading, and channel stability.

Figures showing the following Wolverine Creek channel components are included in Appendix 1:

- Centreline alignments - Figure 1013;
- Vertical profiles - Figures 1014 and 1015; and
- Cross-sections I-M - Figure 1016.

Photo I Wolverine Creek Channel Rock Weir - Looking Northeast (Upstream)

6.1.1 Survey

The Wolverine Creek channel centreline was surveyed from the south Wolverine pond outlet to the confluence with Clinton Creek to establish horizontal and vertical channel alignments. Six channel cross-sections were also surveyed (I to N), extending beyond the top of the channel embankments.

Wolverine Creek is comprised of the following sections:

- Upper Creek, Stations 1+025 to 1+300: unarmoured cross-section aligned through the tailings pile at an average grade of 2.5%;
- Mid Creek, Stations 0+655 to 1+025: armoured cross-section aligned through the tailings pile at an average grade of 8.0%; and
- Lower Creek, Stations 0+000 to 0+655: unarmoured cross-section aligned through the natural creek valley and deposited tailings at an average grade of 2.0%.

6.1.2 Results

The previous profile data indicates that the upper section and mid-section of the Wolverine Creek channel underwent the geomorphological changes presented in Table ZZ between 2003 and 2014. For the purposes of this analysis, the following timeframes were considered:

- July 2003 to August 2012 (TF-WC-A) - Upper and Mid Creeks;
- July 2003 to September 2014 (TF-WC-B) - Lower Creek only; and
- August 2012 to September 2014 (TF-WC-C) - Upper and Mid Creeks.

Table ZZ Upper and Mid Wolverine Creek Geomorphological Changes (2003 to 2014)

Measurement	Upper Creek (Sta. 1+025 to Sta. 1+300)		Mid Creek (Sta. 0+655 to Sta. 1+025)		Lower Creek (Sta. 0+000 to Sta. 0+655)
	TF-WC-A	TF-WC-C	TF-WC-A	TF-WC-C	TF-WC-B
Channel length - downcutting (m)[1]	206	157	48	346	246
Average channel downcutting (cm)[2]	21.8	21.4	17.0	45.0	34.6
Maximum channel downcutting (cm)	68	82	64	196	111
Channel length - deposition (m)[1]	69	118	322	24	409
Average channel deposition (cm)[2]	18.0	10.4	52.2	17.7	46.5
Maximum channel deposition (cm)	100	35	180	27	136
Average channel centreline horizontal shift (m)[3]	1.7 - East	0.25 - West	0.8 - West	0.2 - East	1.5 - East
Maximum channel centreline horizontal shift (m)	18 - East	2.1 - West	7.0 - West	1.4 - East	15 - East

[1]Channel length - downcutting / deposition based on length of channel over which downcutting/deposition was observed.

[2]Average calculated as the area between the profiles divided by the length of channel over which (e.g., "Average channel downcutting" = downcut area measured between profiles / "Channel length - downcutting").

[3]Average horizontal shift calculated as the area between the centrelines - in the predominant north/south direction - divided by the total channel length (e.g., "Average channel centreline horizontal shift" = area measured between centrelines [one side only] / channel length).

The lower section of the Wolverine Creek channel underwent the geomorphological changes presented in Table ZZ between 2003 and 2014. Note that the Lower Creek was not surveyed in 2012; therefore, the Lower Creek was analyzed using only TF-WC-B.

These results were used to calculate the average downcutting and deposition rates (expressed as change in measurement / m of channel / year) and RPCs over the various time frames, presented Table AAA.

Table AAA Wolverine Creek Rates of Change (2003 to 2014)

Rate	Upper Creek			Mid-Creek			Lower Creek
	TF-WC-A	TF-WC-C	RPC TF-WC-A to TF-WC-C	TF-WC-A	TF-WC-C	RPC TF-WC-A to TF-WC-C	TF-WC-B
Average channel downcutting (cm/y)[1]	1.82	5.82	+220%	0.24	20.1	N/A[2]	1.17
Average channel deposition (cm/y)[1]	0.50	2.13	N/A[2]	5.07	0.54	-89%	2.62

[1]Average channel downcutting / deposition calculated as the total downcutting measured along the channel section divided by the total length of the channel section.

[2]Where downcutting/deposition measurement rates during TF-WC-A were <1 cm, the RPC was not calculated.

Cross-Sections I through N were recorded across Wolverine Creek for the first time in 2014 and are summarized in Table BBB. Cross-Sections were recorded at the outlets and inlets of the North Pond and South Pond and are summarized in Table CCC.

Table BBB Wolverine Cross-Section Summary

Parameter	I	J	K	L	M	N
Bottom width (m)	1.8	3.3	4.1	3.9	3.5	12.5
Average side slopes	1.2H:1V	5.0H:1V	3.5H:1V	1.8H:1V	1.6H:1V	1.0H:1V
Channel Invert Elevation (masl)	405.89	398.34	382.557	380.32	372.81	368.87
Top of Bank Elevation (masl)	406.56	400.40	384.51	381.49	373.35	370.37
Average End Area (m^2)	1.7	21.4	18.9	5.7	1.3	16.4

Table CCC Pond Cross-Section Summary

Parameter	South Pond Outlet	South Pond Inlet	North Pond Outlet
Bottom width (m)	1.7	0.0	0.0
Average side slopes	4.2H:1V	4.5H:1V	1.7H:1V
Channel Invert Elevation (masl)	406.73	407.12	407.85
Top of Bank Elevation (masl)	410.50	408.00	410.36
Average End Area (m^2)	60.6	3.7	15.1

6.1.3 Discussion

During TF-WC-A, the upper Wolverine Creek (Sta. 1+025 to 1+300) was primarily downcut by an average of 1.82 cm/y over the length of the channel, compared to 0.50 cm/y of deposition. Over the length of the mid-creek (Sta. 0+655 to 1+025) the invert elevation increased as a result of an average deposition rate of 5.07 cm/y, compared to 0.24 cm/y of downcutting. During TF-WC-A, the horizontal alignment of Wolverine Creek shifted between 7.0 m west and 18 m east (maximum values).

During TF-WC-C, the upper creek was predominantly downcut by an average of 5.82 cm/y over the length of the channel, compared to 2.14 cm/y of deposition. Over the length of the mid creek the invert elevation decreased as a result of an average downcutting rate of 20.1 cm/y, compared to 0.54 cm/y of deposition. During TF-WC-C, the horizontal alignment of Wolverine Creek shifted between 2.1 m west and 1.4 m east (maximum values).

Between TF-WC-A and TF-WC-C the rate of downcutting through the upper and mid creek increased significantly while deposition also increased through the upper creek but decreased through the mid creek. During TF-WC-B, the lower creek (Sta. 0+000 to 0+655) invert elevation was predominantly increased with an average deposition rate of 2.62 cm/y, compared to a downcutting rate of 1.17 cm/y.

6.1.4 Triggers and Monitoring Recommendations

Triggers associated with the Wolverine Creek are presented in Table DDD.

Table DDD Wolverine Creek Channel Triggers

ID	Description	Value	Action	Status
WC-1 (R22)	Channel downcut over a measurable stretch of the channel from Sta. 1+025 to 1+300	>1.0 m from baseline	Begin planning for channel stabilization works	Not triggered in 2014
WC-2 (R22)	Channel downcut over a measurable stretch of the channel from Sta. 0+655 to 1+025	>0.5 m from baseline	Begin planning for channel stabilization works	Trigger exceeded in 2014. Site-wide remediation planning is underway
WC-3 (R22)	Visual observations of channel instability	Indications of erosion at top of channel bank or channel re-alignment	Begin planning for channel stabilization works	Not triggered in 2014
WC-4 (new)	Average channel deposition through upper/mid/lower creek section	>0.3 m from previous monitoring period	Develop localized mitigation plan	Should be used as a trigger in future LTMPs
WC-5 (new)	Channel centreline shift	>5 m (average) from previous monitoring period	Develop localized mitigation plan	Should be used as a trigger in future LTMPs

The monitoring recommendations relevant to the Wolverine Creek channel are summarized in Table EEE.

Table EEE Wolverine Creek Channel Monitoring Recommendations

ID	Description	Implementation	Validity
WC-A (R104)	Visual inspection and survey of the rock lined channel and weirs on Wolverine Creek should be completed on a biennial basis	Inspection and survey completed in 2014	Valid - but clarification required, refer to recommendations WC-B and WC-C below
WC-B (new)	Visual inspection of the Wolverine Creek channel from the confluence with Clinton Creek to the outlet at the south pond, from the inlet of the south pond to the outlet of the north pond, and approximately 100 m north of the north pond inlet should be completed on an annual basis	Should be completed as part of future LTMPs	Required to identify potential and existing failures of creek channel components and provide a recommendation regarding potential repair strategy
WC-C (new)	Survey of the Wolverine Creek channel (as described above) should be completed on a biennial basis	Should be completed as part of future LTMPs	To facilitate monitoring of channel movement (e.g., downcutting) between monitoring periods
WC-D (new)	Establish secondary control point above Wolverine Creek with line of sight to the 200 m portion of the creek extending downstream from the outlet of the south pond	Should be implemented as part of 2016 LTMP survey	To reduce survey signal interference from trees and improve survey accuracy

6.2 Wolverine Creek Tailings Pile

The Wolverine Creek tailings pile (Photo H) generally slopes east from the former mill site (approximate elevation of 609 masl) across the Wolverine Creek Valley.

The tailings slope is comprised of silty sand reject from the former crushing operation and are coarser than traditional tailings. The results of a stability analysis completed in 2003 indicate that the mode of failure was a translational slide (resulting from a steep foundation slope and build-up of pore water pressure) with the failure plane located within the overburden and/or weathered argillite layers (R21, UMA 2003).

Photo J Aerial View of Tailings Slope - Looking Northwest

The lower tailings slope is divided into a north lobe and south lobe, separated by one of two ponds. Discharge from the ponds has created a channel through the tailings resulting in chronic loading of suspended tailings material in Wolverine Creek.

The tailings slope is divided into the following segments:

- Upper Slope - above 529 masl;
- Mid Slope - between 529 masl and 425 masl; and
- Lower Slope - below 425 masl.

Total movement rates (i.e., calculated based on the difference between the original coordinates of the monitoring point and the 2014 coordinates) and incremental movement rates (i.e., calculated based on the difference between the 2012 and 2014 monitoring point coordinates) for the tailings pile are shown on Figures 1019 and 1020, Appendix 1.

6.2.1 Survey

The 2014 Survey of the tailings pile was accomplished by recording the coordinates of the monitoring points presented in Table FFF and Table GGG. The tables include the segment of the tailings pile in which the monitoring point is located and the year in which it was established. Monitoring points that were not surveyed in 2014 are indicated in bold. Two new monitoring points were established on the natural slope east of Wolverine Creek in 2014: 160 and 163.

Table FFF Summary of North Tailings Pile Monitoring Points

Segment	Monitoring Point	Year Established	Segment	Monitoring Point	Year Established
Upper Slope	80-1	2003	Lower Slope	80-7	2003
	80-2	2003		1083	2003
	26	2003		1489	2003
	26-A	2003		350-3A	2003
	BH-14	2003		NL-1	2004
	1483	2003		NL-2	2008
	1495	2003		NL-3	2004
Mid Slope	80-4	2003		NL-4	2004
	80-5	2003		NL-5	2004
	1085	2003			
	500-1	2003			
	500-2	2003			
	650-1	2003			
	650-2	2003			
	350-1A	2003			
	350-2A	2003			
	1491	2003			

Table GGG Summary of South Tailings Pile Monitoring Points

Segment	Monitoring Point	Year Established	Segment	Monitoring Point	Year Established
Upper Slope	1492	2003	Lower Slope	80-9	2003
	24	2003		1484	2003
Mid Slope	1084	2003		996	2012
	1485	2003		24D	2003
	BH-16 (T8)	2003		25B	2003
	24A	2003		SL-1	2004
	24B	2003		SL-2	2004
	NL-Base	2005		SL-3	2004
	2005-01	2005		SL-4	2004
	2005-02	2005		SL-5	2006
	2005-03	2005		2005-07	2006
	2005-04	2005		2005-08	2006
	2005-05	2005		**2005-09**[1]	2006
	2005-06	2005		2005-10	2006
				2005-11	2006

[1]2005-09 was lost in 2011 and replaced by 996 in 2012.

6.2.2 Results

For the purposes of this analysis the following timeframes were considered:

- July 2006 to July 2010 (TF-TP-A);
- July to September 2010 (TF-TP-B);
- September 2010 to August 2012 (TF-TP-C); and
- August 2012 to September 2014 (TF-TP-D).

July 2006 was selected as the starting date for this analysis as the majority of monitoring points were established either during or before this monitoring period. Table HHH and Table III summarize the tailings pile horizontal average (with average azimuths) and maximum movement rates (with azimuths) between four timeframes.

Table HHH North Tailings Horizontal Movement Rates (2006 to 2014)

Period	Average Movement Rates (cm/y)			Maximum Movement Rates (cm/y)		
	Upper Slope	Mid Slope	Lower Slope	Upper Slope	Mid Slope	Lower Slope
July 2006 to July 2010 (TF-TP-A)	2.10 (82°)	8.02 (85°)	5.95 (104°)	3.77 (90°)	25.9 (78°)	7.82 (82°)
July to September 2010 (TF-TP-B)	16.4 (87°)	32.6 (91°)	21.2 (98°)	21.8 (90°)	109.5 (84°)	27.2 (90°)
September 2010 to August 2012 (TF-TP-C)	2.73 (64°)	7.59 (78°)	4.47 (83°)	5.36 (90°)	24.7 (77°)	5.39 (84°)
August 2012 to September 2014 (TF-TP-D)	4.08 (80°)	5.27 (78°)	3.08 (105°)	9.78 (65°)	19.1 (76°)	6.31 (99°)

Table III South Tailings Horizontal Movement Rates (2006 to 2014)

Timeframe	Average Movement Rates (cm/y)			Maximum Movement Rates (cm/y)		
	Upper Slope	Mid Slope	Lower Slope	Upper Slope	Mid Slope	Lower Slope
TP-A	5.64 (89°)	40.6 (79°)	24.9 (58°)	7.14 (80°)	56.9 (82°)	39.9 (34°)
TP-B	11.5 (166°)	52.9 (87°)	35.0 (77°)	12.2 (153°)	71.0 (94°)	51.7 (72°)
TP-C	4.69 (83°)	36.0 (79°)	21.4 (57°)	5.60 (73°)	72.0 (78°)	34.0 (52°)
TP-D	2.23 (107°)	22.8 (81°)	15.2 (55°)	2.27 (100°)	36.0 (83°)	24.2 (55°)

The average movement rates are plotted in Figure H and Figure I.

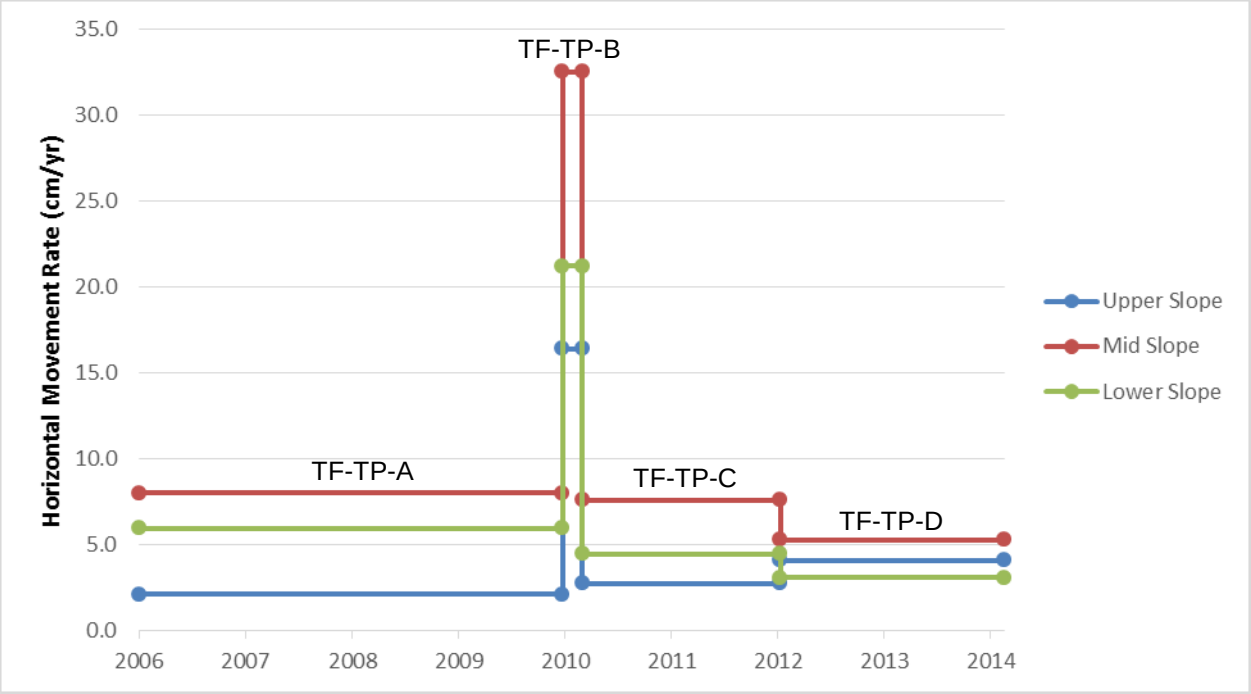


Figure H Average North Tailings Pile Horizontal Movement Rates

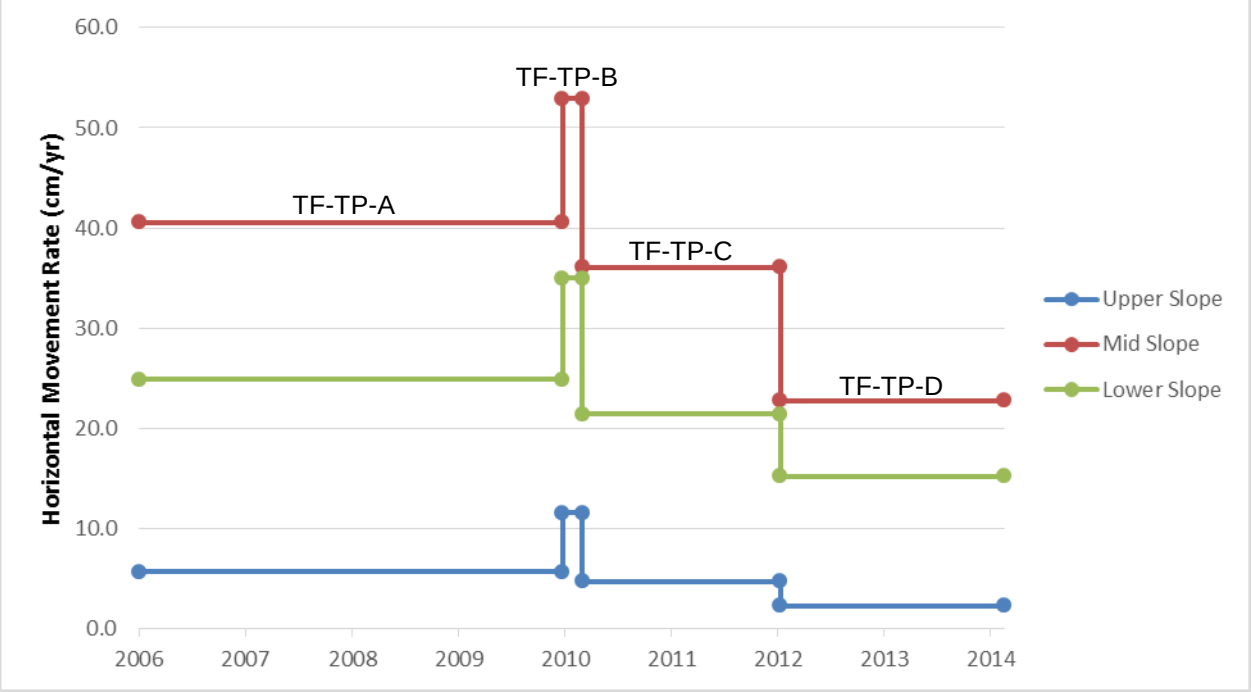


Figure I Average South Tailings Pile Horizontal Movement Rates

Data was used to calculate change to average movement and azimuth between timeframes (Table JJJ and Table KKK), between slope sections (Table LLL and Table MMM), and between north and south lobes (Table NNN).

Table JJJ North Tailings Pile Change in Movement by Timeframe

Timeframe	Upper Slope		Mid Slope		Lower Slope	
	Δ Avg. Movement (RPC)	Δ Avg. Azimuth	Δ Avg. Movement (RPC)	Δ Avg. Azimuth	Δ Avg. Movement (RPC)	Δ Avg. Azimuth
TP-A to TP-B	679%	6°	306%	23°	257%	16°
TP-B to TP-C	-83%	6°	-77%	13°	-79%	0°
TP-C to TP-D	49%	6°	-31%	15°	-31%	22°

Table KKK South Tailings Pile Change in Movement by Timeframe

Timeframe	Upper Slope		Mid Slope		Lower Slope	
	Δ Avg. Movement (RPC)	Δ Avg. Azimuth	Δ Avg. Movement (RPC)	Δ Avg. Azimuth	Δ Avg. Movement (RPC)	Δ Avg. Azimuth
TP-A to TP-B	104%	77°	30%	8°	41%	19°
TP-B to TP-C	-59%	83°	-32%	8°	-39%	20°
TP-C to TP-D	-53%	24°	-37%	2°	-29%	2°

Table LLL North Tailings Pile Comparative Change in Movement by Section

Timeframe	Mid Slope to Upper Slope		Lower Slope to Upper Slope		Lower Slope to Mid Slope	
	Avg. Movement (RPC)	Δ Avg. Azimuth	Avg. Movement (RPC)	Δ Avg. Azimuth	Avg. Movement (RPC)	Δ Avg. Azimuth
TP-A	281%	4°	183%	22°	-26%	19°
TP-B	99%	4°	30%	11°	-35%	7°
TP-C	178%	14°	64%	18°	-41%	4°
TP-D	29%	2°	-24%	24°	-41%	27°

Table MMM South Tailings Pile Comparative Change in Movement by Section

Timeframe	Mid Slope to Upper Slope		Lower Slope to Upper Slope		Lower Slope to Mid Slope	
	Avg. Movement (RPC)	Δ Avg. Azimuth	Avg. Movement (RPC)	Δ Avg. Azimuth	Avg. Movement (RPC)	Δ Avg. Azimuth
TP-A	619%	9°	341%	31°	-39%	21°
TP-B	359%	79°	203%	89°	-34%	10°
TP-C	668%	4°	356%	26°	-41%	22°
TP-D	921%	26°	582%	51°	-33%	26°

Table NNN Tailings Pile Slope Comparative Change in Movement by Lobe

Timeframe	South Lower Slope to North Lower Slope		South Mid Slope to North Mid Slope	
	Avg. Movement (RPC)	Δ Avg. Azimuth	Avg. Movement (RPC)	Δ Avg. Azimuth
TP-A	318%	46º	406%	6º
TP-B	65%	21º	63%	4º
TP-C	378%	25º	375%	1º
TP-D	393%	49º	332%	3º

6.2.3 Discussion

General

Maximum horizontal tailings pile movement rates were observed during TF-TP-B (July to September 2010), the survey results show an increase of average tailings movement over this period compared to the previous timeframe (TF-TP-A): 104% to 679% increase on the upper slope; 30% to 306% increase on the mid slope; and 41% to 257% on the lower slope. During this period, the direction of north lobe slope movement remained consistently east across the Wolverine Creek valley, while the south slope movement changed from predominantly north east in TF-TP-A to predominantly east in TF-TP-B. Between TF-TP-B and TF-TP-C, the rate of waste movement slowed significantly (average of 62% reduction in rate of movement on the upper, mid-, and lower slopes through both lobes).

Movement rates through the south lobe have consistently been higher than the movement rates through the north lobe across all timeframes, from 63% to 406%. The direction of movement on the mid slopes of both lobes has not varied significantly (between 1 deg. and 6 deg.) while the lower slopes have varied between 21 deg. and 49 deg. through the timeframes. The mid slopes have consistently had higher movement rates than the upper and lower slopes on both the north and south lobes.

North Lobe

Between TF-TP-C (September 2010 to August 2012) and TF-TP-D (August 2012 to September 2014), the average rate of north lobe tailings movement decreased on the mid and lower slopes by 31%, and increased on the upper slope by 49%. Over this period the average direction of north lobe movement also changed between 0deg. and 23 deg., shifting from a predominantly east-northeast direction to a predominantly east-southeast direction.

During TF-TP-D the north lobe tailings average movement rates ranged from 3.08 cm/y on the lower slope to 5.27 cm/y on the mid slope. The direction of upper and mid slope tailings movement was consistent over this timeframe, with only 2 deg. variation between the movement azimuths; however, the direction of the lower slope varied by 20 deg. The movement rates between the slopes varied: the lower slope moved on average 24% less than the upper slope and 41% less than the mid slope; the mid slope moved 29% more than the upper slope. Only the north lobe upper slope experienced an increased rate of movement when compared to TF-TP-C (2.73 cm/y in TF-TP-C versus 4.08 cm/y in TF-TP-D).

South Lobe

Between TF-TP-C and TF-TP-D the average rate of south lobe tailings movement decreased between 29% and 53%. Over this period the average direction of south lobe movement also changed between 2 deg. and 24 deg.

During TF-TP-D the south lobe tailings average movement rates ranged from 2.22 cm/y on the upper slope to 22.8 cm/y on the mid slope. The direction of upper and mid slope tailings movement varied significantly over the timeframe, from 55° (lower slope) to 107° (upper slope). The movement rates between the slopes also varied significantly: the lower slope moved on average 582% more than the upper slope and 33% less than the mid slope; the mid slope moved 921% more than the upper slope. The south lobe movement rates across all slope sections decreased from TF-TP-C to TF-TP-D.

6.2.4 Triggers and Monitoring Recommendations

Triggers associated with the tailings pile are presented in Table OOO.

Table OOO Tailings Pile Triggers

ID	Description	Value	Action	Status
TP-1 (new)	Average monitoring point horizontal movement rate – per slope section	Movement rate (cm/y) > than movement rate from previous monitoring cycle	If movement rate increase is between 0 and 50%, monitoring points should be surveyed the following year. If movement rate increase is greater than 50% or if movement rate has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required	The trigger level was exceeded for the north lobe, upper slope; however, the movement rate through this slope section (4.08 cm/y) was relatively small and the RPC (49%) was less than the trigger value. This slope section should be surveyed in 2015 to confirm the result

The monitoring recommendations relevant to tailings pile are summarized in Table PPP.

Table PPP Tailings Pile Monitoring Recommendations

ID	Description	Implementation	Validity
TP-A (R104)	Visual inspection and survey of the Wolverine Creek tailings pile should be completed on a biennial basis	Inspection and survey completed in 2014	Valid - but clarification required, refer to recommendations TP-C and TP-D below
TP-B (R104)	Complete geotechnical investigation and assessment of the north and south lobes of the Wolverine Creek tailings pile	Not completed	Valid - required to improve understanding of variance in average movement rates between north and south lobes; however this investigation is not considered urgent (i.e., not required in the next year) and can be completed prior to site wide remediation unless required sooner due to tailings slope acceleration (see above)
TP-C (new)	Visual inspection of the Wolverine Creek tailings pile should be completed on an annual basis	Should be completed as part of future LTMPs	Required to identify visible tension cracks and slumping to determine if further investigation is required in that year
TP-D (new)	Survey of the Wolverine Creek tailings pile should be completed on a biennial basis	Should be completed as part of future LTMPs	Required to monitor movement rates through the tailings pile

6.3 Wolverine Creek Tailings Pile Ponds

The tailings pile slope failures resulted in the impoundment of water in Wolverine Creek and the creation of the south pond, upstream of the south lobe, in 1974 and the north pond, upstream of the north lobe, by 1988 (R21, UMA 2003). There is evidence of beaver activity in the channel connecting the ponds. The location of the Wolverine ponds is shown in Figure 1013, Appendix 1.

Photo K Aerial View of Wolverine Ponds

6.3.1 Survey

The 2014 Survey of the wolverine ponds was accomplished by recording the coordinates of the following points:

- Water's edge to establish the boundaries of the pond;
- Cross-sections at the inlet and outlet of the ponds; and
- Centreline of the channel between the ponds.

6.3.2 2014 Results

Topographic survey of the ponds was not completed prior to the 2014 Survey.

Measurements of key features of the north and south ponds are presented in Table QQQ.

Table QQQ Wolverine Pond Key Features

Feature	North Pond Measurement	South Pond Measurement
Area (m^2)	5,700	5,000
Outlet Width (m)	2.6	4.5
Outlet Invert Elevation (masl)	407.85	407.50

6.3.3 Triggers and Recommendations

Triggers associated with the Wolverine Creek Tailings Pile ponds are presented in Table RRR.

Table RRR Wolverine Pond Triggers

ID	Description	Value	Action
WP-1 (new)	Pond surface area	>25% from previous monitoring period	Develop localized mitigation plan
WP-2 (new)	Pond outlet width	>15% reduction from previous monitoring period	Develop localized mitigation plan
WP-3 (new)	Pond outlet invert elevation	±0.5 m from previous monitoring period	Develop localized mitigation plan

The monitoring recommendations relevant to the Wolverine ponds are summarized in Table SSS.

Table SSS Wolverine Pond Monitoring Recommendations

ID	Description (Reference Document)	Implementation	Validity
WP-A (R104)	Visual inspection of the Wolverine ponds should be completed on an annual basis with survey completed on a biennial basis, including cross-sections taken at the outlet of each pond	Inspection and survey completed in 2014	Valid - required to check for debris accumulation and blockage

7. MATERIAL STOCKPILES

A total of nine material stockpiles, containing granular material of varying diameters (determined based on visual observations made by Underhill during the 2014 survey), are located at the site, either east of the site gate or at near the Hudgeon Lake outlet as shown on Figure 1001in Appendix 1. The stockpile details are summarized in Table TTT.

Table TTT Material Stockpiles Summary

Pile No.	Location	Material dia. (mm)	Footprint (m^2)	Height (m)	Volume (m^3)
1	Hudgeon Lake	38	266	1.5	312
2	Hudgeon Lake	150 to 200	304	1.4	290
3	Hudgeon Lake	38	73	1.2	49
4	Hudgeon Lake	150 to 200	100	1.0	51
5	Hudgeon Lake	>300	360	1.3	381
6	Site Gate	38	74	1.4	66
7	Site Gate	150	230	1.7	258
8	Site Gate	200	28	1.3	15
9	Site Gate	38	244	2.2	355

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

The conclusions presented in the following sections are based on observations made during the site inspection and results of the analyses of survey data. The results for all site components are compiled in Appendix 9.

8.1.1 Clinton Creek Access Road

The closed portion of the Clinton access road is shifting north due to the movement of the waste rock while the embankment adjacent to the road is failing due to slope instability caused by erosion at the slope toe. This portion of the access road should be regularly inspected for signs of increased tension cracking and surveyed on an annual basis to monitor the stability of the slope (based on loss of embankment material) and the movement of the baseline.

8.1.2 Hudgeon Lake Outlet

The Hudgeon Lake outlet should be inspected and surveyed on a biennial basis. The boom structure at the outlet (including PVC boom, abutments, and rock armouring) should continue to be inspected on a monthly basis by AAM staff while the boom is in service and on an annual basis by a consultant (preferably before the boom is put into service following freshet). The installation of an automated remote water level monitor is recommended to notify AAM when water levels near the outlet reach critical water levels which could indicate that the outlet is blocked.

8.1.3 Gabion Drop Structures

Based on the results of the analyses and trigger values, DS1 and DS2 have shown relatively little movement. Continued annual inspection and survey are recommended given that DS1 and DS2 are nearing the end of their anticipated service life of 15 years.

DS3 has experienced higher movement rate (compared to the drop structures DS1 and 2) and there was an exceedance of a trigger DS3. Further assessment as part of the Engineering Review and Assessment report (Part 2), is required to determine if a mitigation plan is required to repair DS3 at this time.

DS4 was considered to be at a high risk of failure due to ongoing structural failure at the downstream end as well as the large change in cross-sectional end area observed between 2012 and 2013. As DS4 was assigned a High risk rating (based on a cascading failure of the Clinton Creek channel) in the draft Engineering Review and Assessment report (Part 1), it is recommended that DS4 is repaired as soon as practically possible.

It is anticipated that minor repairs to DS1 and DS3 (i.e., limited to repairs of single baskets as required) and a major repair to DS4 (i.e., infill of the channel at the downstream end of the drop structure and placement of a concrete revetment mat) will be completed in 2015.

All drop structures should continue to be inspected and surveyed on an annual basis.

8.1.4 Clinton Creek Channel

Downcutting of the Clinton Creek channel increased between TF-CC-B (September 2010 and August 2012) and TF-CC-C (August 2012 and September 2014). If this trend continues, it could further destabilize the waste rock toe, possibly resulting in increased movement of the waste rock dump. It is recommended to continue annual inspection and survey of the channel (including channel centreline and cross-sections).

8.1.5 Clinton Creek Waste Rock Dump

Average horizontal movement of the upper and lower waste rock dump decreased between TF-WR-C and TF-WR-D. These slope sections should continue to be inspected and surveyed on a biennial basis.

Movement of the upper slope increased between these timeframes; however, this data may have been skewed due to the addition of additional monitoring points in 2012. This accelerated movement may indicate that the upper slope is unstable, relative to the mid and lower slopes. Based on the results of this analysis, the upper slope section should be inspected and surveyed in 2015 to confirm that movement rates are increasing. If movement rates continue to increase, planning should begin for a geotechnical assessment to determine whether stabilization is required.

8.1.6 Porcupine Pit and Snowshoe Pit

The average horizontal movement of the Porcupine pit monitoring points decreased between TF-PP-C and TF-PP-D. The pits should be surveyed and inspected on a biennial basis.

8.1.7 Wolverine Creek Channel

Downcutting of the Wolverine Creek channel increased between TF-WC-C and TF-WC-D and trigger WC-2, relating to downcutting through the mid creek (Stations 0+655 to 1+025), was exceeded in 2014. The action associated with this trigger has already been implemented as planning for site wide remediation is already underway. The channel should continue to be surveyed (including channel centreline and cross-sections) on a biennial basis and visually inspected on an annual basis.

8.1.8 Wolverine Creek Tailings Pile

Average horizontal movement decreased between TF-TP-C and TF-TP-D through all sections of the tailing pile except the north lobe upper slope. The south lobe and north lobe should continue to be surveyed on a biennial basis and visually inspected on an annual basis.

The increase in movement rate of the north lobe upper slope may indicate that this slope section is unstable, relative to the other slope sections. The north lobe upper slope should be inspected and surveyed in 2015 to confirm that movement rates are increasing. If movement rates continue to increase, planning should begin for a geotechnical assessment to determine whether stabilization is required.

8.1.9 Wolverine Creek Ponds

Based on the visual survey there do not appear to have been significant changes to the Wolverine Creek ponds. This was the first topographic survey of the ponds, so no comparison to previous survey results could be made. The ponds should continue to be surveyed on a biennial basis and visually inspected on an annual basis.

8.2 Recommendations

New trigger levels included in this report are compiled in Table UUU. A compilation of all triggers, including those provided in previous reports, is included in Appendix 7.

Table UUU Compilation of New Triggers

ID	Description	Trigger Value	2014 Value	Action
AR-1 (new)	Average horizontal movement of baseline from previous year	10 cm less the average reported accuracy of baseline shots	1.6 cm	Develop mitigation plan
AR-2 (new)	Loss of embankment based on horizontal offset from previous year	1.0 m	0.15 m	Develop mitigation plan
AR-3 (new)	Total length of observed tension cracks	Increase by 20% from previous year	N/A	Develop mitigation plan
AR-4 (new)	Average number of cracks observed perpendicular to each baseline pins	Increase by 20% from previous year	3.9	Develop mitigation plan
HL-1 (new)	Lake water surface critical elevation	412.0 masl	411.643 masl (at time of survey)	Mobilize to site to check outlet for blockage, remove blockage if present, and inspect downstream infrastructure (e.g., drop structures and channel)
HL-2 (new)	Movement of boom abutment structures from previous monitoring period	H: 0.30 m less reported horizontal accuracy of abutment shots And/or V: 0.10 m less reported vertical accuracy of abutment shots	N/A	Investigate base structure and develop mitigation plan as required
HL-3 (new)	Loss of riprap at the boom abutments from previous monitoring period	10% surface area from previous monitoring period	N/A	Review riprap diameter and extents and develop mitigation plan as required

ID	Description	Trigger Value	2014 Value	Action
DS-6 (new)	Change to cross-sectional end area since previous monitoring period	>10% RPC	-7.2% to 1.1%	Develop mitigation plan for drop structures at which trigger has been exceeded
CC-3 (new)	Average channel deposition through upper/mid/lower creek section	>0.3 m from previous monitoring period	0.01 m to 0.03 m (approx.)	Develop localized mitigation plan
CC-4 (new)	Mid-creek channel centreline shifts south, into the waste rock dump	>5 m (average) from previous monitoring period	1.2 m - north	Develop localized mitigation plan
WR-1 (new)	Average monitoring point horizontal movement rate – per slope section	Movement rate (cm/y) > than movement rate from previous cycle	Upper slope: +20% Mid slope: -5% Lower slope: --10%	If movement rate increase is between 0 and 30%, monitoring points should be surveyed the following year. If movement rate increase is 30% or greater or if movement rate has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required
PP-1 (new)	Average monitoring point horizontal movement rate	Movement rate (cm/y) > than movement rate from previous cycle	-63%	If movement rate increase is between 0 and 30%, monitoring points should be surveyed the following year. If movement rate increase is 30% or greater or if movement rate has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required
WC-4 (new)	Average channel deposition through upper/mid/lower creek section	>0.3 m from previous monitoring period	0.005 m to 0.025 m (approx.)	Develop localized mitigation plan
WC-5 (new)	Channel centreline shift	>5 m (average) from previous monitoring period	0.2 m - east	Develop localized mitigation plan

ID	Description	Trigger Value	2014 Value	Action
TP-1 (new)	Average monitoring point horizontal movement rate – per slope section	Movement rate (cm/y) > than movement rate from previous cycle	North Lobe: -31% to 49% South Lobe: -53% to -29%	If movement rate increase is between 0 and 50%, monitoring points should be surveyed the following year. If movement rate increases more than 50% or if it has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required.
WP-1 (new)	Pond surface area	>25% from previous monitoring period	North pond: 5,700 m^2 South pond: 5,000 m^2	Develop localized mitigation plan
WP-2 (new)	Pond outlet width	>15% reduction from previous monitoring period	North pond: 2.6 m South pond: 4.5 m	Develop localized mitigation plan
WP-3 (new)	Pond outlet invert elevation	±0.5 m from previous monitoring period	North pond: 407.85 m South pond:407.40 m	Develop localized mitigation plan

New monitoring recommendations included in this report are compiled in Table VVV. A compilation of all monitoring recommendations, including those provided in previous reports, is included in Appendix 8.

Table VVV Compilation of New Monitoring Recommendations

ID	Description	Rationale
AR-C (new)	Extend the baseline to the north and south by 15 m	To improve monitoring of the embankment
AR-D (new)	Survey points recorded at the start, end, and changes in direction (greater than 30 deg.) of each tension crack	To facilitate measurement of the tension cracks
HL-D (new)	Inspect abutments (including condition of rock armouring) monthly during summer by AAM staff and annually by a consultant (preferably following freshet)	Required to monitor condition of abutments and rock armouring
HL-E (new)	Assess abutment rock protection (including rock gradation; durability ; specific weight; and hardness, as well as a scour analysis) if signs of deterioration of the rock armouring are noted	May be required to address rock armouring issues
DS-C (new)	Install additional monitoring points along the waste rock dump toe aligned with the drop structures. A total of eight points should be installed with each point located 20 m south of the monitoring point on the south creek embankment	Improve understanding of influence of waste rock movement on drop structures
DS-D (new)	Establish new monitoring points and cross-section downstream of DS4 that can be safely accessed	Existing monitoring cross-section at downstream end of DS4 can no longer be safely accessed

ID	Description	Rationale
DS-E (new)	Future survey should include the clear and explicit identification of break points (e.g., toe and top of embankment) through drop structure cross-sections and the edges of each course of gabion baskets along the drop structure centerline	To facilitate the measurement of drop structure cross-section parameters and the review of drop structure profiles
DS-F (new)	Change trigger DS-2 from <0.2 m freeboard to <0.3 m freeboard during conveyance of the 50-year peak flow and adopt revised design flows shown on Figures 1009 to 1012, Appendix 1	To reflect revised peak flow depth and current hydraulic design practices
DS-G (new)	Change trigger DS3 to measure the drop structure width between the upstream and downstream monitoring points rather than at the upstream drawdown weir and between the downstream monitoring points	Only DS1 was installed with a drawdown weir.
CC-F (new)	Survey of cross-section F along Clinton Creek should be completed on a biennial basis	Survey required to compare cross-section to previous years and identify geomorphological / topographical changes
CC-G (new)	AAM should consider installing monitoring pins along south slope of Clinton Creek near stations 0+700, 0+800, and 0+900	Will provide additional movement monitoring pins at critical locations along waste rock toe
WR-C (new)	Survey upper slope monitoring points in 2015 and compare to 2014 data	Required to determine if upper slope waste rock movement is accelerating
PP-A (new)	Inspect Porcupine Pit and Snowshoe Pit on an annual basis and survey Porcupine Pit monitoring points on an biennial basis	Required to monitor pit conditions and movement rates
PP-B (new)	Establish four monitoring points around Snowshoe Pit	Required to monitor movement rates in and around Snowshoe Pit
WC-B (new)	Visual inspection of the Wolverine Creek channel from the confluence with Clinton Creek to the outlet at the south pond, from the inlet of the south pond to the outlet of the north pond, and approximately 100 m north of the north pond inlet should be completed on an annual basis	Required to identify potential and existing failures of creek channel components and provide a recommendation regarding potential repair strategy
WC-C (new)	Survey of the Wolverine Creek channel (as described above) should be completed on a biennial basis	To facilitates monitoring of channel movement (e.g., downcutting) between monitoring periods
WC-D (new)	Establish secondary control point above Wolverine Creek with line of sight to the 200 m portion of the creek extending downstream from the outlet of the south pond	To reduce survey signal interference from trees and improve survey accuracy
TP-C (new)	Visual inspection of the Wolverine Creek tailings pile should be completed on an annual basis	Required to identify visible tension cracks and slumping to determine if further investigation is required in that year
TP-D (new)	Survey of the Wolverine Creek tailings pile should be completed on a biennial basis	Required to monitor movement rates through the tailings pile

9. REFERENCES

AAM (2014): Clinton Creek - Visual Comparisons

R21 UMA Engineering (2003): Environmental Liability Report

R22 UMA Engineering (2006): Long-Term Performance Monitoring Results 2005

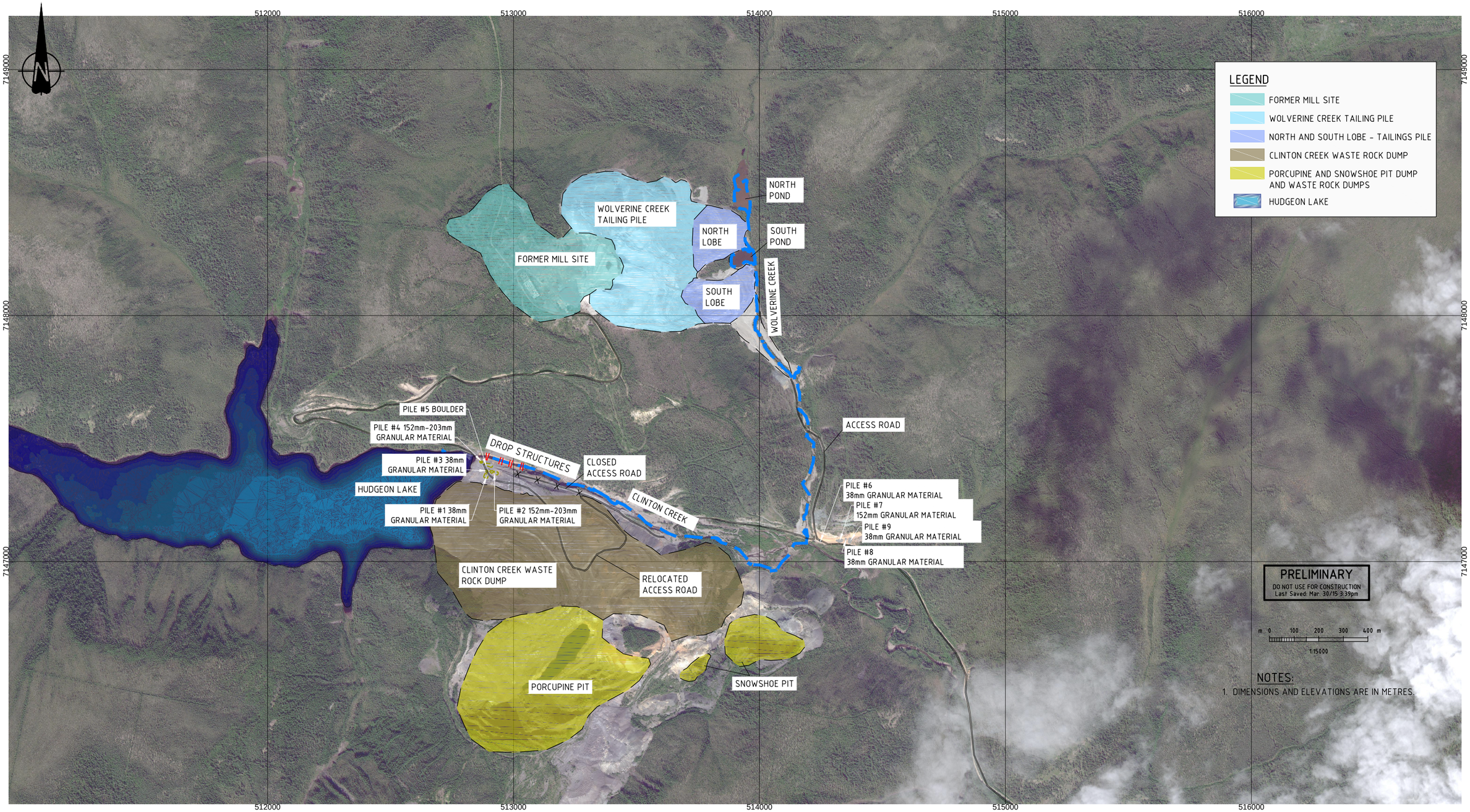
R51 AECOM (2011): Long-Term Performance Monitoring 2010

R94 AECOM (2011): Emergency Drop Structure Repairs Construction Activity Report 2011

R104 Associated Engineering (2013): Long Term Performance Monitoring 2012

WorleyParsons (2014): Clinton Creek Drop Structure No. 4 Repair - Design Summary

Appendix 1 Figures



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B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

WorleyParsons resources & energy

CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
OVERALL SITE PLAN

DRG No 307071-01009-00-SS-DGA-1001

REV 0

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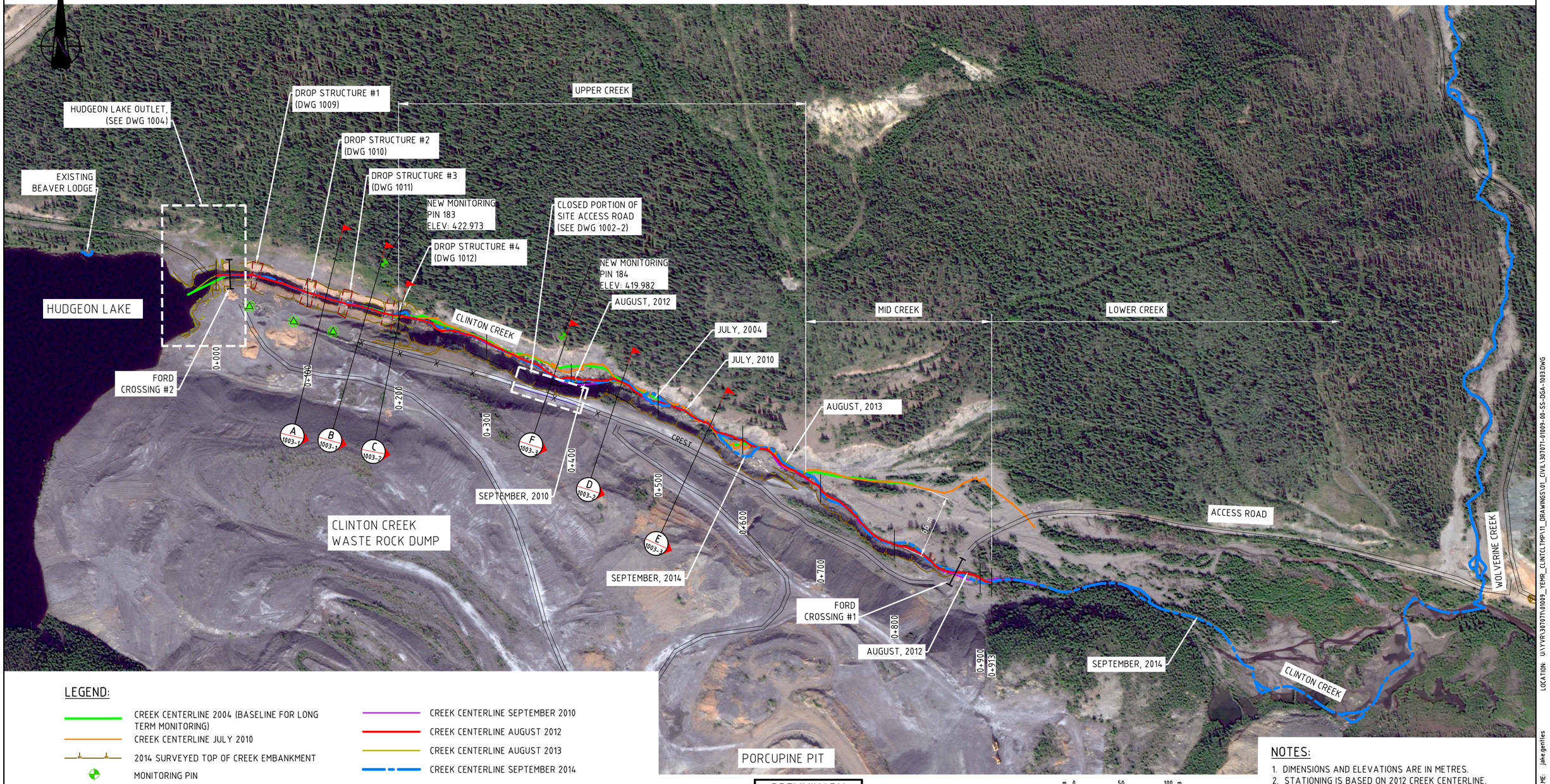

LEGEND:

- CREEK CENTERLINE 2004 (BASELINE FOR LONG TERM MONITORING)
- CREEK CENTERLINE JULY 2010
- 2014 SURVEYED TOP OF CREEK EMBANKMENT
- MONITORING PIN
- RECOMMENDED FUTURE MONITORING POINTS (2 AT EACH LOCATIONS)
- CREEK CENTERLINE SEPTEMBER 2010
- CREEK CENTERLINE AUGUST 2012
- CREEK CENTERLINE AUGUST 2013
- CREEK CENTERLINE SEPTEMBER 2014
- ACCESS ROAD
- CLOSED ACCESS ROAD

PRELIMINARY
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NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. STATIONING IS BASED ON 2012 CREEK CENTERLINE.
3. OFFSETS ARE SHOWN RELATIVE TO 2014 AND 2004 CENTER LINES.

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A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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WorleyParsons Resources & energy

CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
CLINTON CREEK PLAN

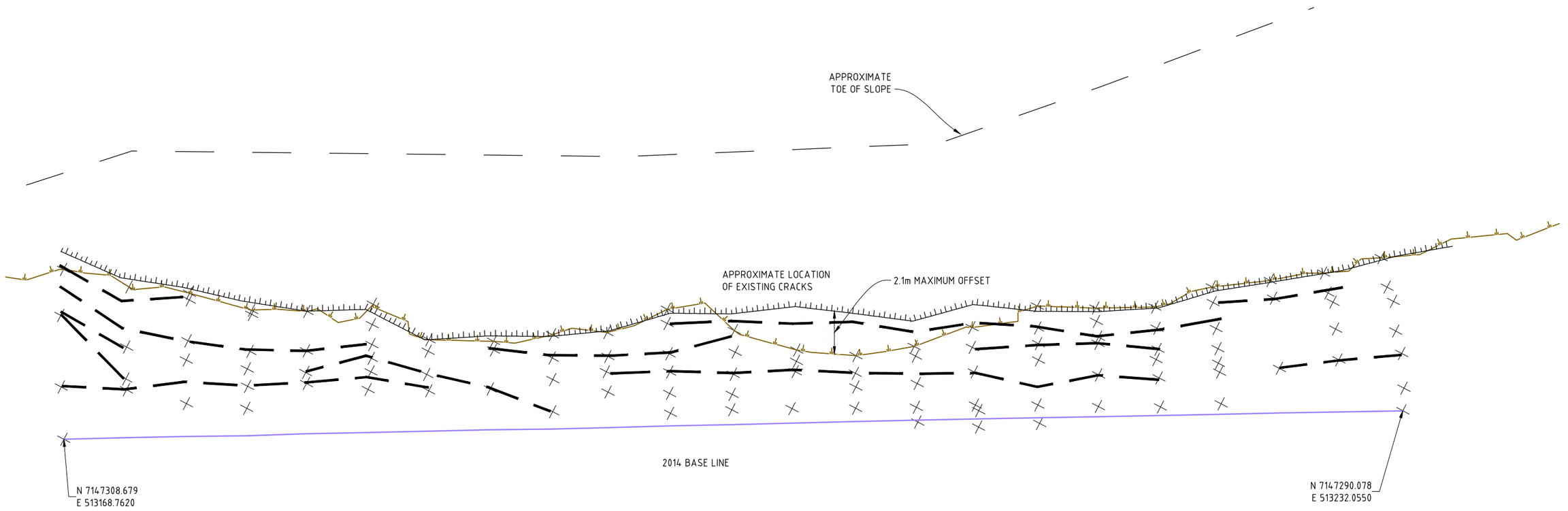
DRG No 307071-01009-00-SS-DGA-1002-1

REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1003.DWG
USER NAME: jake.gentles
PLOT DATE & TIME: 31/3/2015 10:18:12 AM
SAVE DATE & TIME: 30/3/2015 3:41:55 PM

LEGEND:

- 2012 TENSION CRACKS
- 2012 TOP OF BANK
- 2014 TOP OF BANK
- 2014 TENSION CRACK POINTS



2014 TENSION CRACKS PLAN

m 0 1 2 3 4 5 m

1:200

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 3:41pm

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. 2014 TENSION CRACKS POINTS DENOTE A TENSION CRACK PERPENDICULAR TO THE BASELINE AT A BASELINE PIN.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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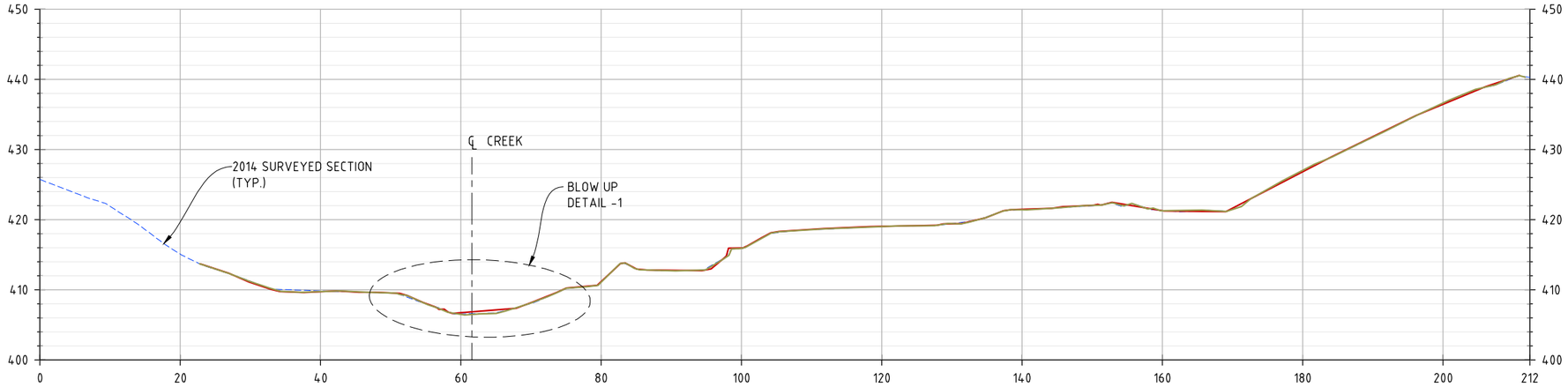
WorleyParsons
resources & energy

CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
TENSION CRACKS PLAN

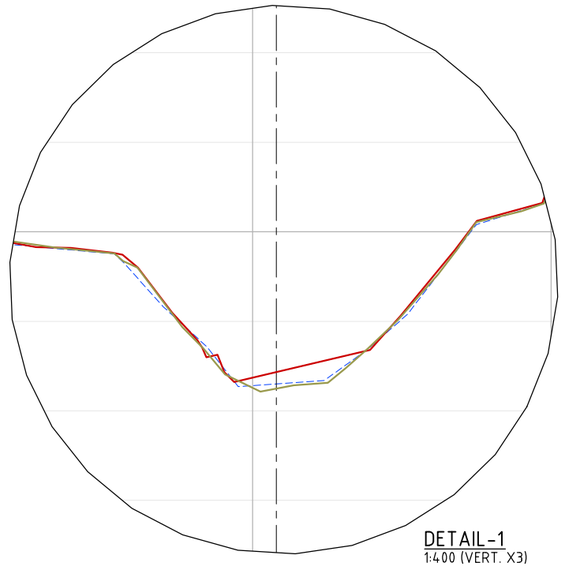
DRG No 307071-01009-00-SS-DGA-1002-2

REV 0

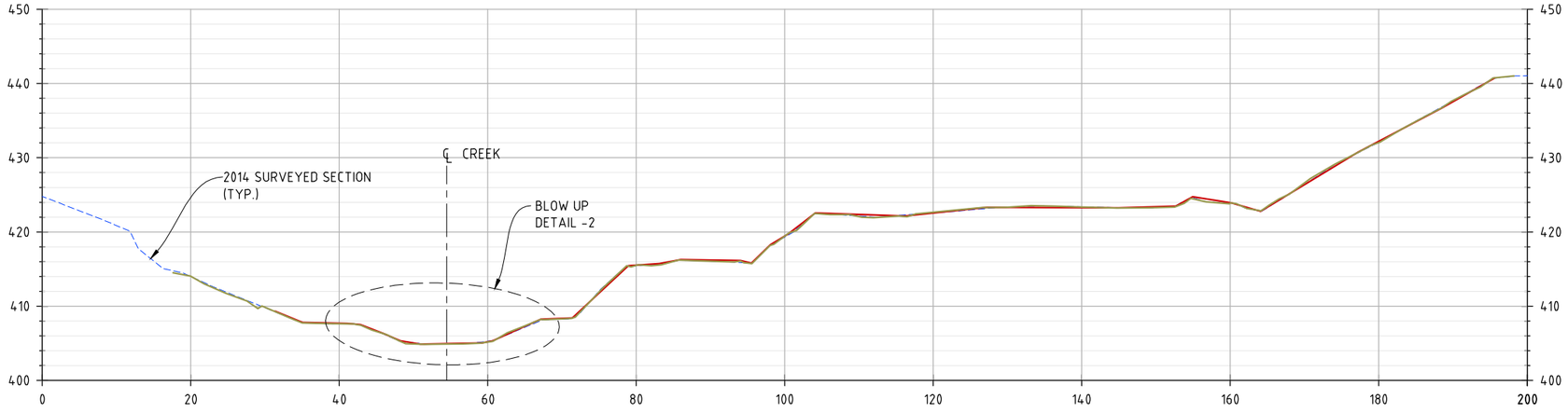
LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\1T_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1003.DWG
USER NAME: jakegentles
PLOT DATE & TIME: 31/3/2015 10:21:26 AM
SAVE DATE & TIME: 30/3/2015 3:41:55 PM



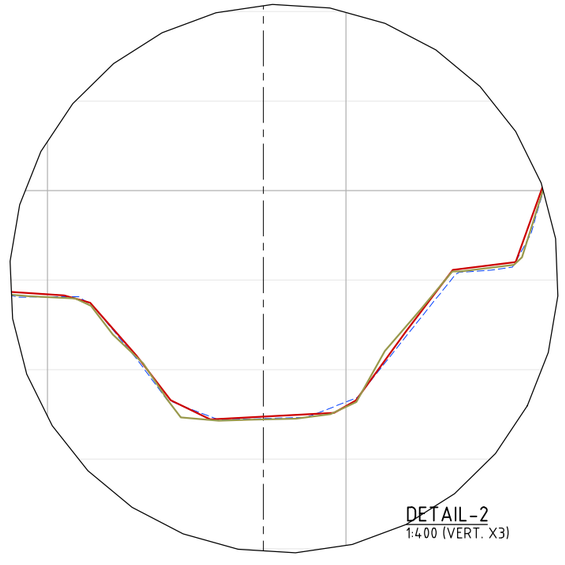
SECTION A-A
1:750



DETAIL-1
1:400 (VERT. X3)



SECTION B-B
1:750



DETAIL-2
1:400 (VERT. X3)

LEGEND

- 2014 SURVEYED GROUND
- 2013 SURVEYED GROUND
- 2012 SURVEYED GROUND

m 0 5 10 m
1:400

m 0 5 10 15 20 m
1:750

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METERS.
2. THE CROSS-SECTIONS SHOWN WERE RECORDED AT SLIGHTLY DIFFERENT STATIONS (OFFSET BY ±0.3m) IN EACH MONITORING PERIOD AND ARE NOT NECESSARILY REPRESENTATIVE OF THE EXACT SAME SECTION OF THE CHANNEL.

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 3:41pm

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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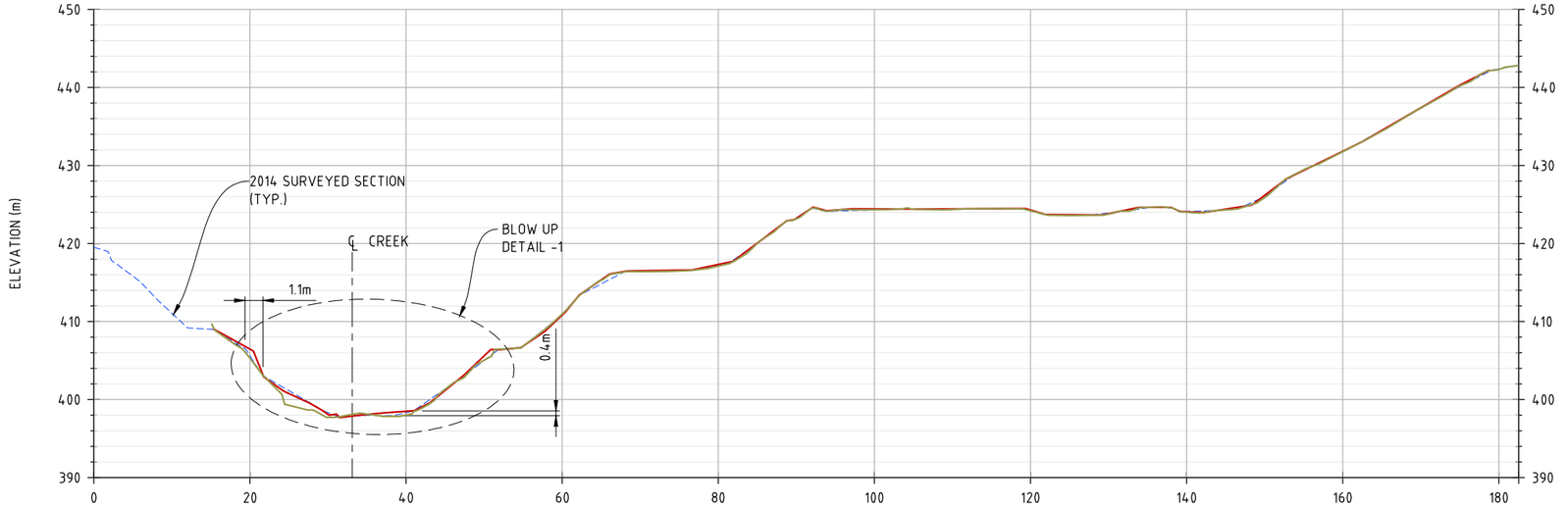
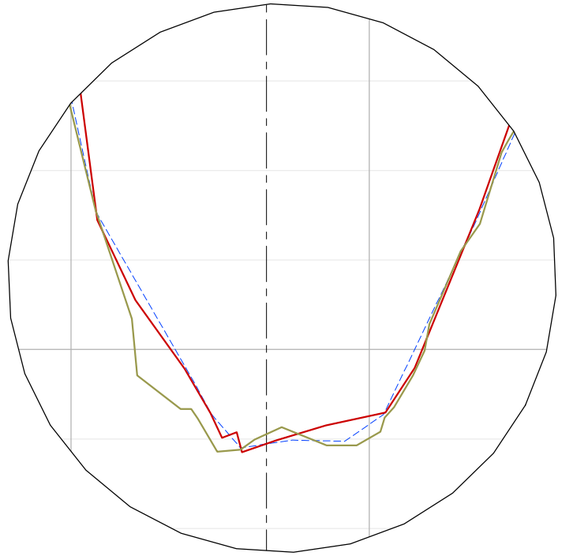
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
CLINTON CREEK
SURVEYED SECTIONS A AND B

DRG No: 307071-01009-00-SS-DGA-1003-1
REV: 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\1T_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1003.DWG
USER NAME: jakegentles
PLOT DATE & TIME: 31/3/2015 10:22:37 AM
SAVE DATE & TIME: 30/3/2015 3:41:55 PM



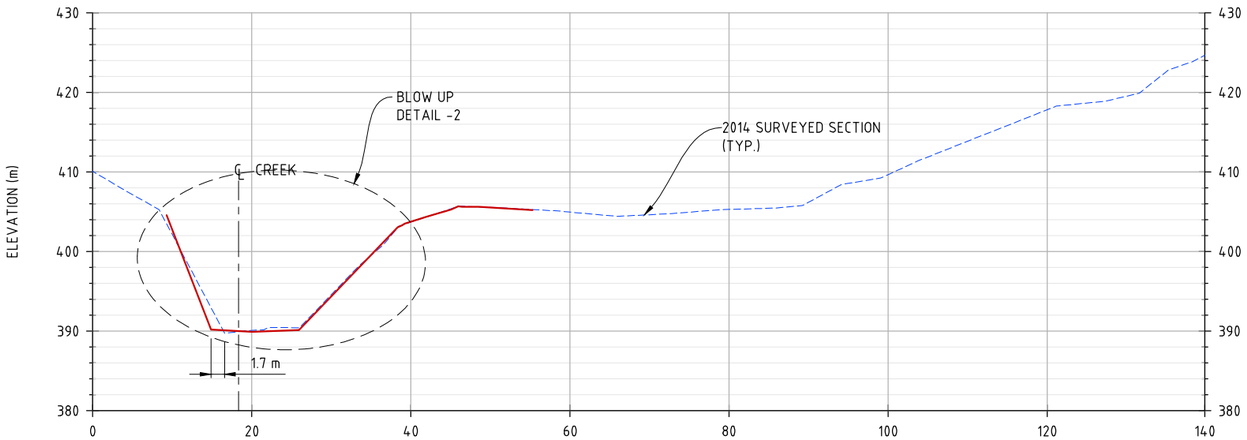
SECTION C-C
1:750



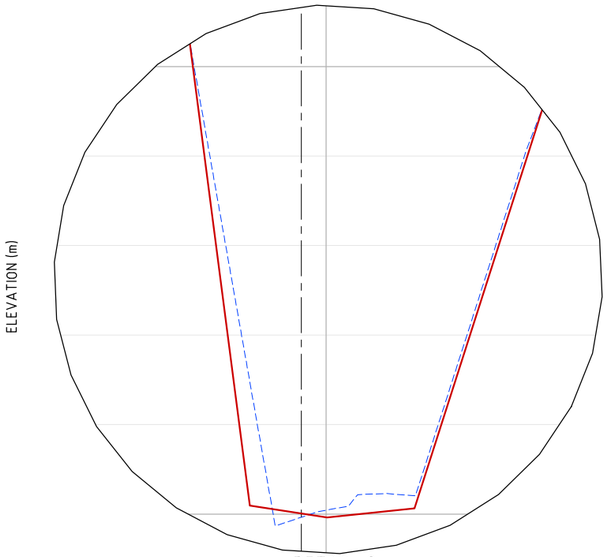
DETAIL-1
1:400 (VERT. X3)

m 0 5 10 m
1:400

m 0 5 10 15 20 m
1:750



SECTION D-D
1:750



DETAIL-2
1:400 (VERT. X3)

LEGEND

- 2014 SURVEYED GROUND
- 2013 SURVEYED GROUND
- 2012 SURVEYED GROUND

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METERS.
2. THE CROSS-SECTIONS SHOWN WERE RECORDED AT SLIGHTLY DIFFERENT STATIONS (OFFSET BY ±0.3m) IN EACH MONITORING PERIOD AND ARE NOT NECESSARILY REPRESENTATIVE OF THE EXACT SAME SECTION OF THE CHANNEL.
3. THE PORTIONS OF CROSS SECTIONS D, LOCATED BETWEEN THE TOP AND TOE OF THE EMBANKMENT WERE NOT SURVEYED DUE TO THE STEEPNESS OF THE EMBANKMENT.

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 3:41pm

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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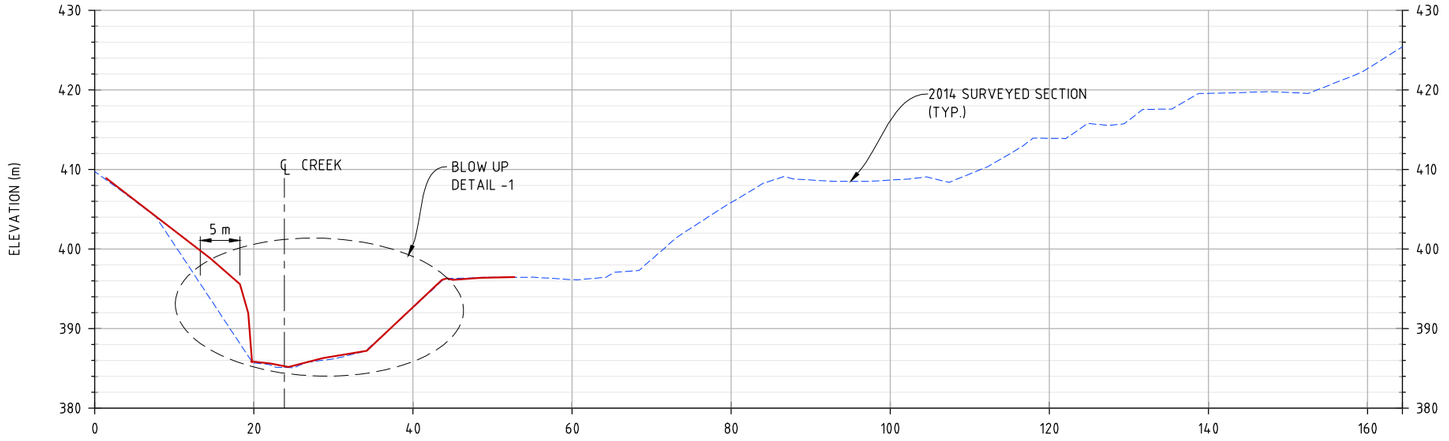
resources & energy

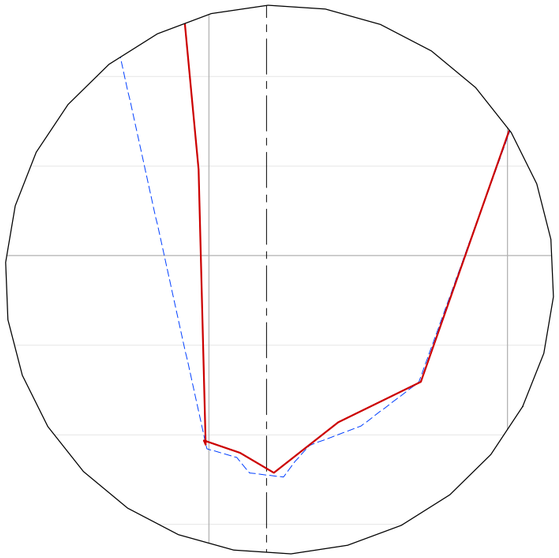
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
CLINTON CREEK
SURVEYED SECTIONS C AND D

DRG No 307071-01009-00-SS-DGA-1003-2 | REV 0

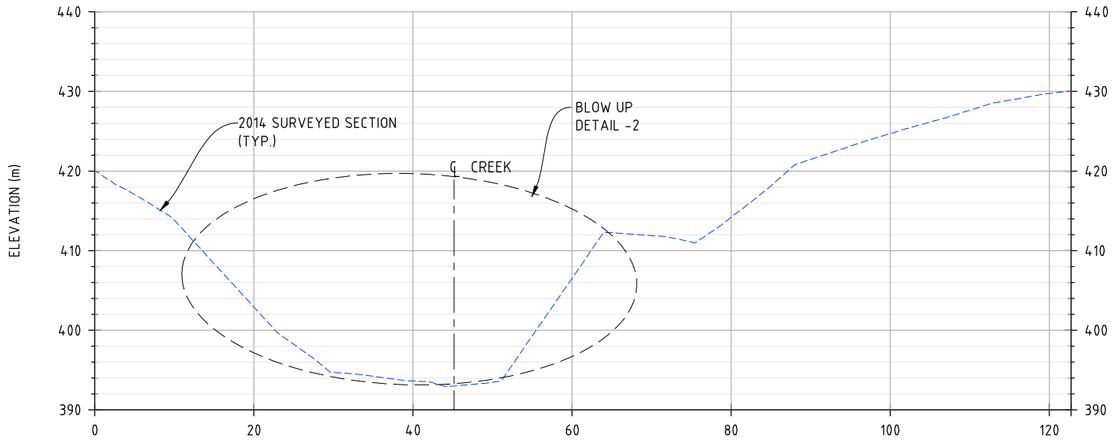
LOCATION: U:\YVR\307071\01009_YEMR_CLINT\CLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1003.DWG
USER NAME: jake.gentles
PLOT DATE & TIME: 31/3/2015 10:23:56 AM
SAVE DATE & TIME: 30/3/2015 3:41:55 PM



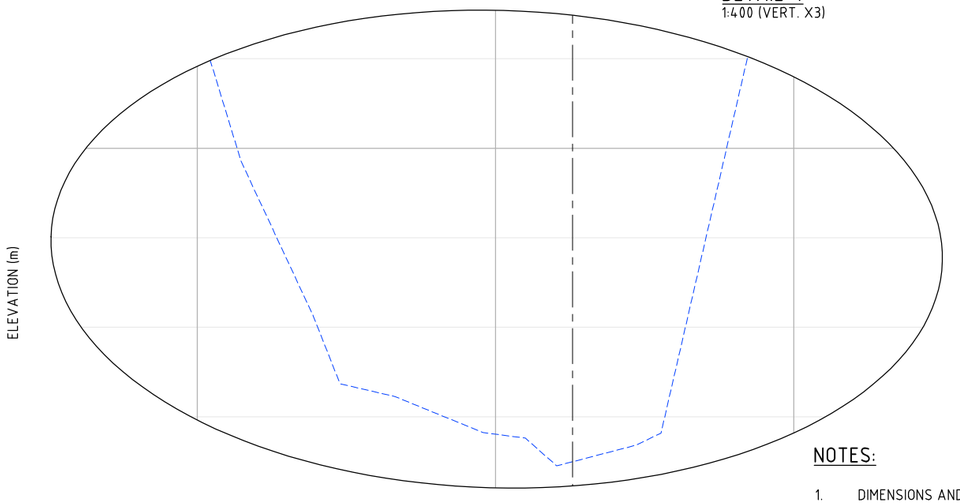
SECTION E-E
1:750



DETAIL-1
1:400 (VERT. X3)



SECTION F-F
1:750



DETAIL-2
1:400 (VERT. X3)

LEGEND

- 2014 SURVEYED GROUND
- 2013 SURVEYED GROUND
- 2012 SURVEYED GROUND

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METERS.
2. THE CROSS-SECTIONS SHOWN WERE RECORDED AT SLIGHTLY DIFFERENT STATIONS (OFFSET BY ±0.3m) IN EACH MONITORING PERIOD AND ARE NOT NECESSARILY REPRESENTATIVE OF THE EXACT SAME SECTION OF THE CHANNEL.
3. THE PORTIONS OF CROSS SECTIONS E AND F LOCATED BETWEEN THE TOP AND TOE OF THE EMBANKMENT WERE NOT SURVEYED DUE TO THE STEEPNESS OF THE EMBANKMENT.

m 0 5 10 m
1:400

m 0 5 10 15 20 m
1:750

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 3:41pm

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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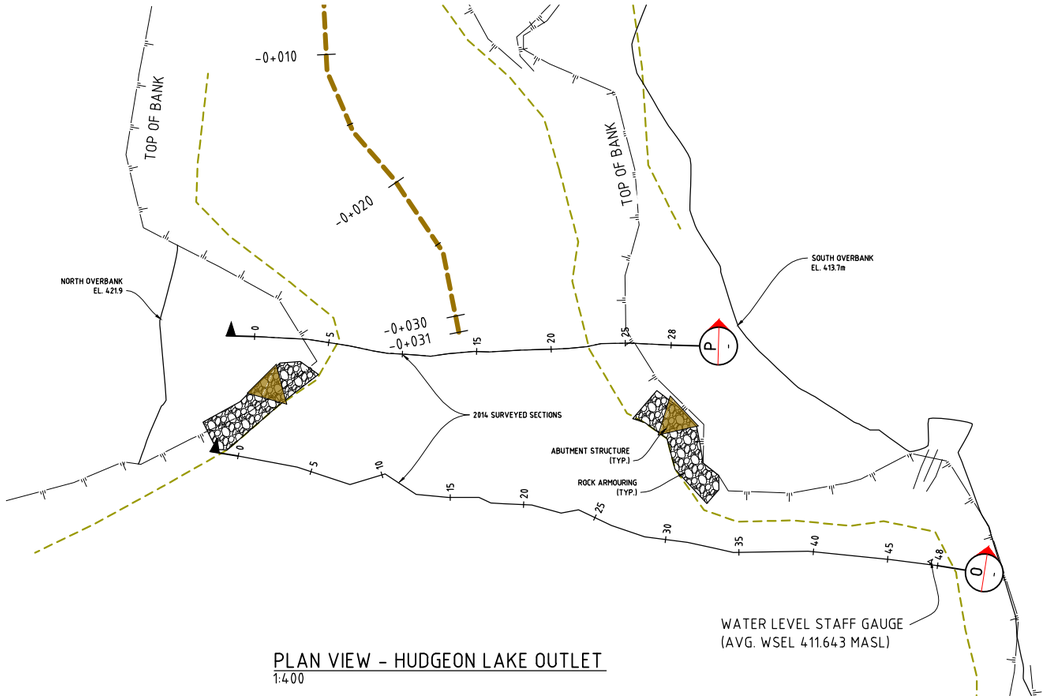
RESOURCES & ENERGY

CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
CLINTON CREEK
SURVEYED SECTIONS E AND F

DRG No 307071-01009-00-SS-DGA-1003-3 | REV 0

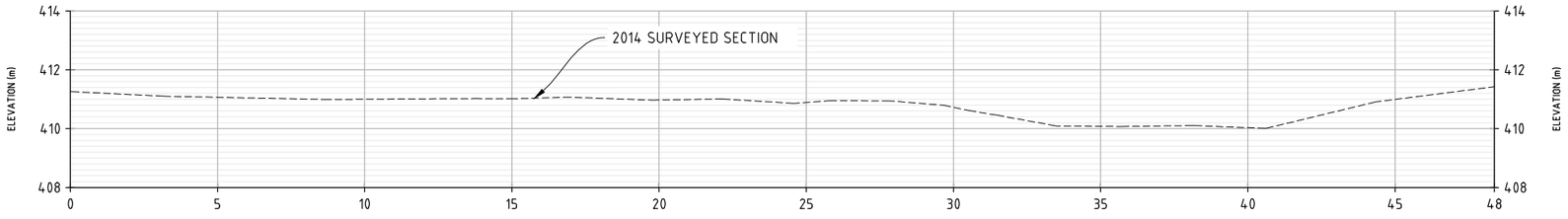
LOCATION: U:\YVR\307071\01009_YEMR_CLINT\CLTMP\1T_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1003.DWG
USER NAME: jake.gentles
PLOT DATE & TIME: 31/3/2015 10:25:50 AM
SAVE DATE & TIME: 30/3/2015 3:41:55 PM



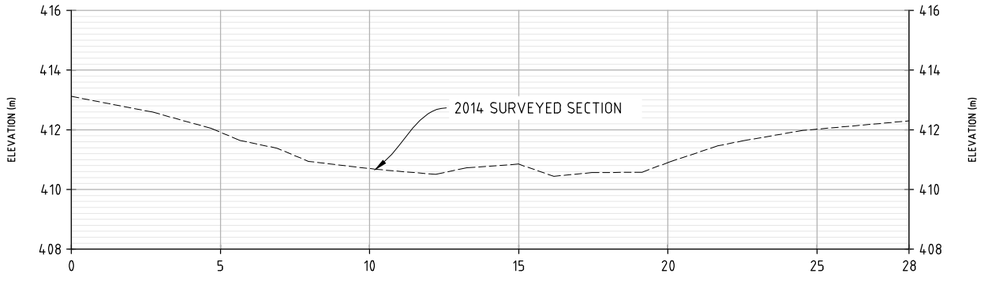
PLAN VIEW - HUDGEON LAKE OUTLET
1:400

LEGEND:

- 2014 CREEK CENTRELINE
- 2014 SURVEYED CREEK TOP OF BANK
- 2014 SURVEYED WATERLINE (AVG. EL. = 411.643m)



SECTION O-O
1:200



SECTION P-P
1:200

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 18/15 4:06pm

m 0 5 10 m
1:400

m 0 1 2 3 4 5 m
1:200

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.

REV	DATE DD-MMM-YY	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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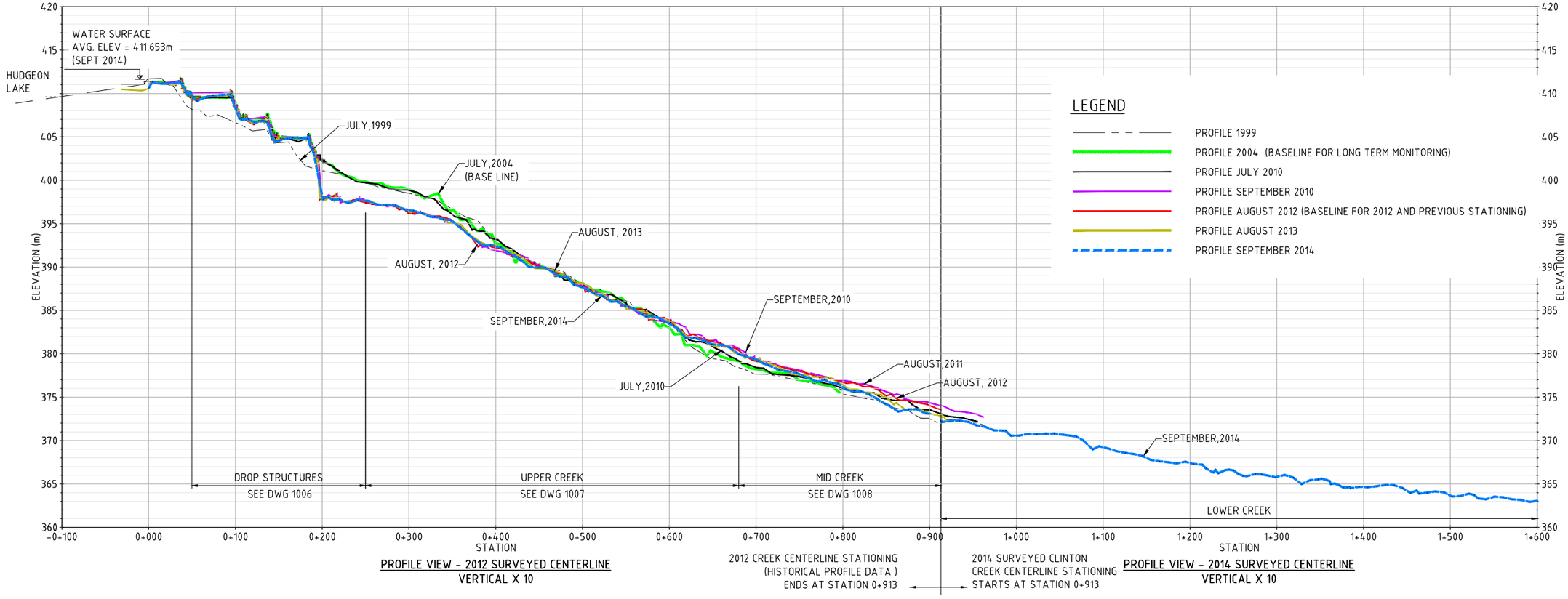
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
HUDGEON LAKE OUTLET

DRG No 307071-01009-00-SS-DGA-1004 | REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CVIL\307071-01009-00-SS-DGA-1004.DWG
USER NAME: jakegentles
PLOT DATE & TIME: 31/3/2015 10:28:26 AM
SAVE DATE & TIME: 18/3/2015 4:06:02 PM



PROFILE VIEW - 2012 SURVEYED CENTERLINE
VERTICAL X 10

2012 CREEK CENTERLINE STATIONING
(HISTORICAL PROFILE DATA)
ENDS AT STATION 0+913

2014 SURVEYED CLINTON
CREEK CENTERLINE STATIONING
STARTS AT STATION 0+913

PROFILE VIEW - 2014 SURVEYED CENTERLINE
VERTICAL X 10

m 0 50 100 150 m
1:5000

STATION	NORTHING	EASTING
0+000	7,147,427	512,863
0+250	7,147,366	513,113
0+500	7,147,272	513,363
0+750	7,147,204	513,613

COORD: UTM ZONE 7W NAD83

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 05/15 4:30pm

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. STATIONING BETWEEN STA. -0+150 TO SA 0+913 IS BASED ON 2012 REFERENCE LINE.
3. PROFILES OF THE CHANNEL FROM MONITORING SURVEYS COMPLETED IN 1983, 1984,2001,2006,2007,2008, AND 2011 ARE NOT SHOWN FOR THE SAKE OF CLARITY.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE
OneWay
WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER
Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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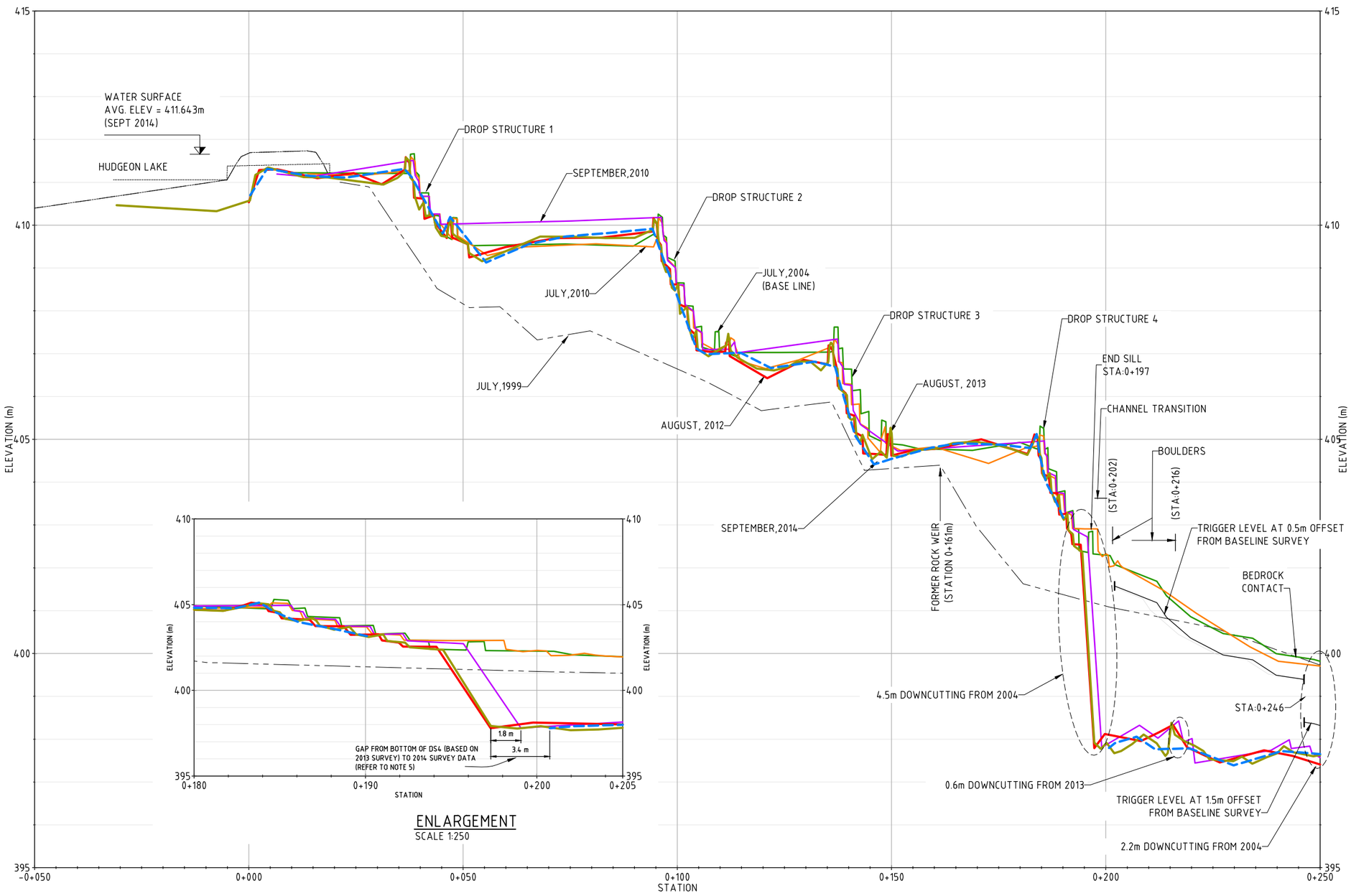
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
CLINTON CREEK CHANNEL PROFILE

DRG No 307071-01009-00-SS-DGA-1005
REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCL\MP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1005.DWG
USER NAME: jake.gentles
PLOT DATE & TIME: 31/3/2015 10:31:28 AM
SAVE DATE & TIME: 5/3/2015 4:30:28 PM



ENLARGEMENT
SCALE 1:250

PROFILE VIEW - 2012 SURVEYED CENTERLINE
VERTICAL X 10

LEGEND

- PROFILE 1999
- PROFILE 2004 (BASELINE FOR LONG TERM MONITORING)
- PROFILE JULY 2010
- PROFILE SEPTEMBER 2010
- PROFILE AUGUST 2012
- PROFILE AUGUST 2013
- PROFILE SEPTEMBER 2014

m 0 2.5 5.0 7.5 m
1:250

m 0 5 10 15 20 25 m
1:1000

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 27/15 11:00am

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. STATIONING IS BASED ON 2012 CREEK CENTER LINE WITH THE START OF THE CENTERLINE AT STATION 0+000.
3. PROFILES OF THE CHANNEL FROM MONITORING SURVEYS COMPLETED IN 1983,1984,2001,2006,2007,2008,AND 2011 ARE NOT SHOWN FOR THE SAKE OF CLARIFY.
4. DOWNCUTTING / DEPOSITION LABELS ARE SHOWN RELATIVE TO THE 2004 PROFILE.
5. THE CHANNEL SECTION BETWEEN STA 0+190 AND 0+201 COULD NOT BE SURVEYED IN 2014 AS IT COULD NOT BE SAFELY ACCESSED.

REV	DATE DD-MMM-YY	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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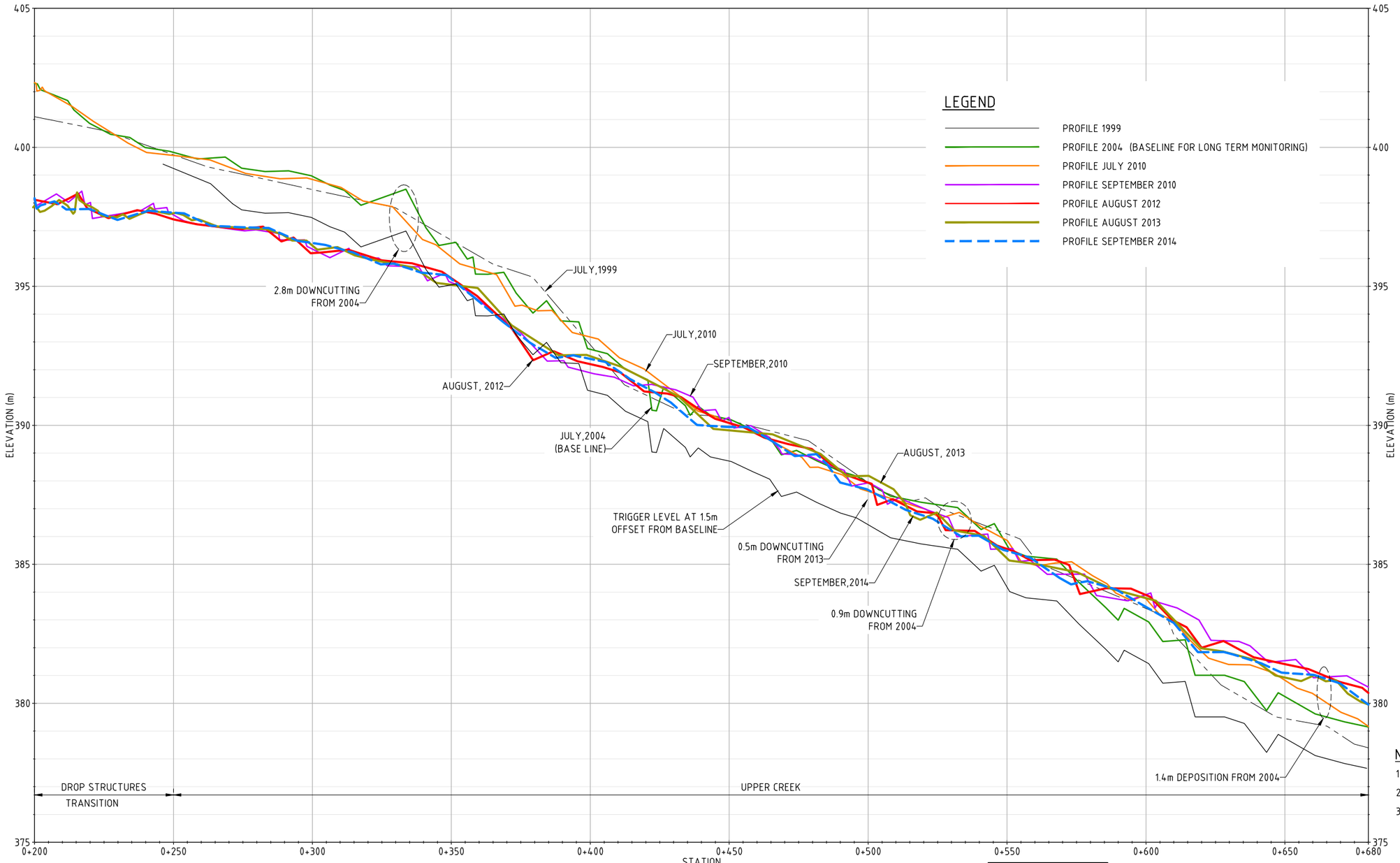
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
CLINTON CREEK CENTERLINE PROFILE
STA 0+000 TO STA 0+200

DRG No 307071-01009-00-SS-DGA-1006 | REV 0

PLOT DATE & TIME: 31/3/2015 10:32:46 AM
SAVE DATE & TIME: 27/3/2015 11:00:19 AM
USER NAME: jakegenlles
LOCATION: U:\YYWR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1008.DWG



m 0 10 20 30 40 m

1:1500

PROFILE VIEW - 2012 SURVEYED CENTERLINE
VERTICAL X 10

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. STATIONING IS BASED ON 2012 CREEK CENTER LINE.
3. PROFILES OF THE CHANNEL FROM MONITORING SURVEYS COMPLETED IN 1983,1984,2001,2006,2007,2008,AND 2011 ARE NOT SHOWN FOR THE SAKE OF CLARIFY.

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 27/15 11:00am

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
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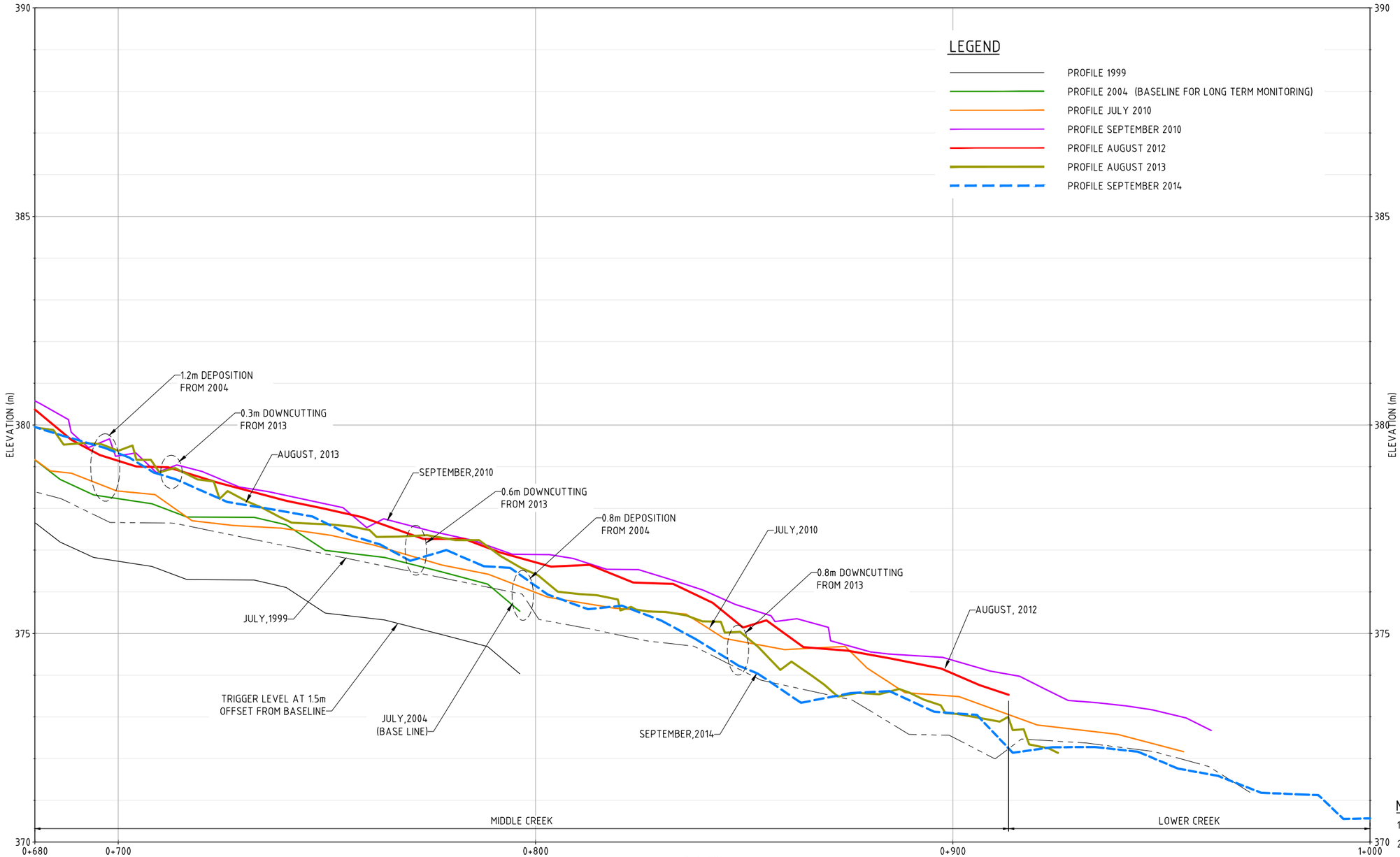
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
CLINTON CREEK CENTERLINE PROFILE
STA 0+200 TO STA 0+680

DRG No 307071-01009-00-SS-DGA-1007 | REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1008.DWG
USER NAME: jakegentles
PLOT DATE & TIME: 31/3/2015 10:35:43 AM
SAVE DATE & TIME: 27/3/2015 11:00:19 AM



PROFILE VIEW – 2012 ALIGNMENT
VERTICAL X 10
0+680 TO 1+000

m 0 5 10 15 20 25 m
1:1000

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 27/15 11:00am

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. STATIONING IS BASED ON 2012 CREEK CENTER LINE.
3. PROFILES OF THE CHANNEL FROM MONITORING SURVEYS COMPLETED IN 1983,1984,2001,2006,2007,2008,AND 2011 ARE NOT SHOWN FOR THE SAKE OF CLARIFY.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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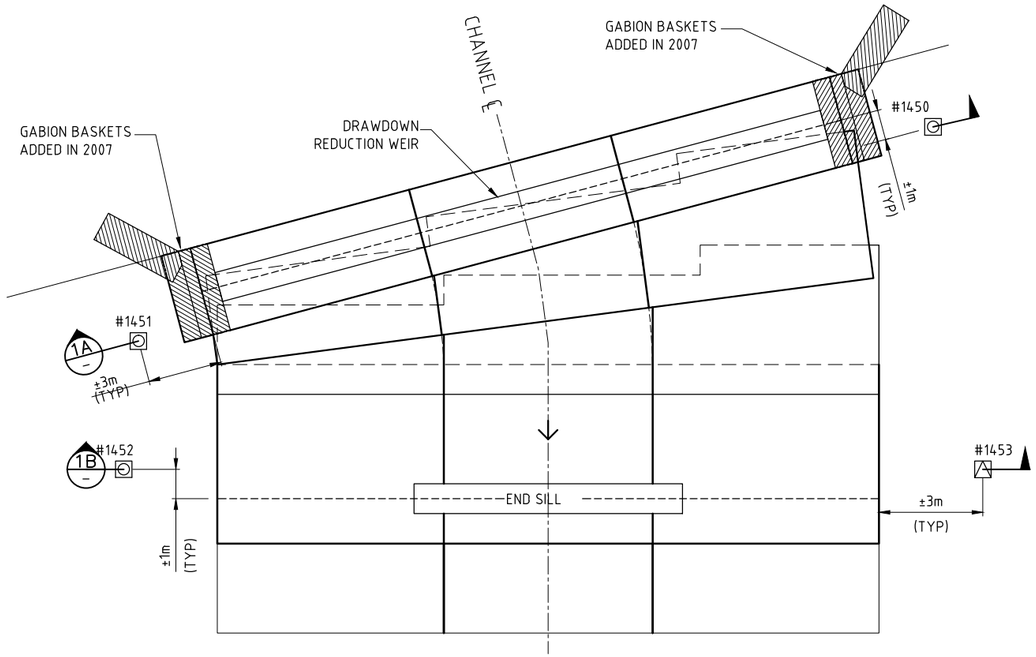
WorleyParsons resources & energy

CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
CLINTON CREEK CENTERLINE PROFILE
STA 0+680 TO STA 0+1000

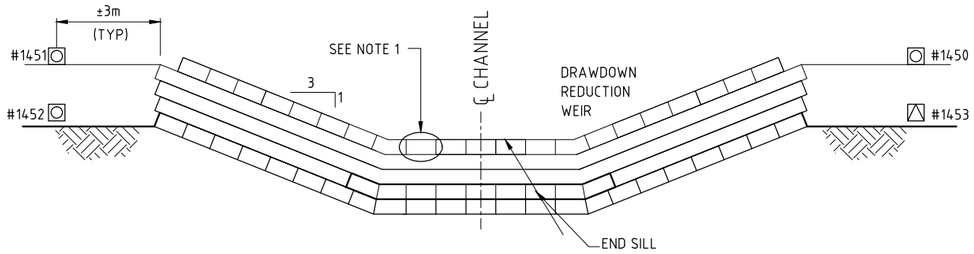
DRG No 307071-01009-00-SS-DGA-1008 | REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1008.DWG
USER NAME: jake.gentles
PLOT DATE & TIME: 31/3/2015 10:36:44 AM
SAVE DATE & TIME: 27/3/2015 11:00:19 AM



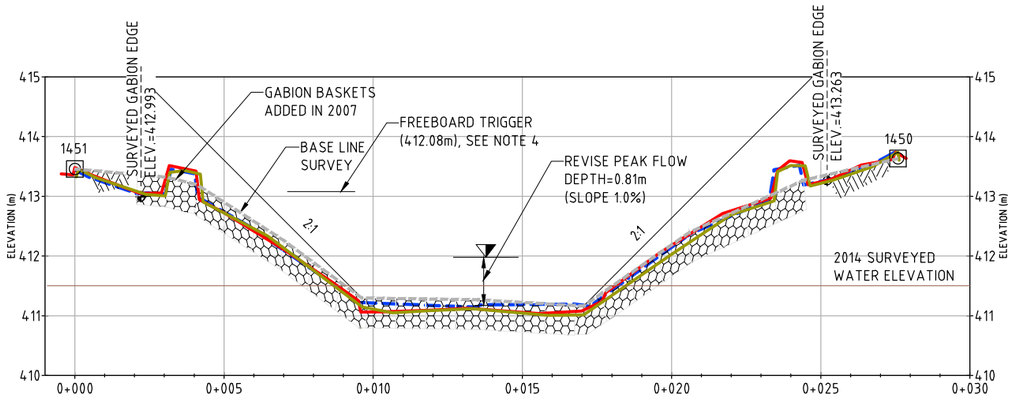
DROP SRUCTURE #1 PLAN VIEW

SCALE: 1:200

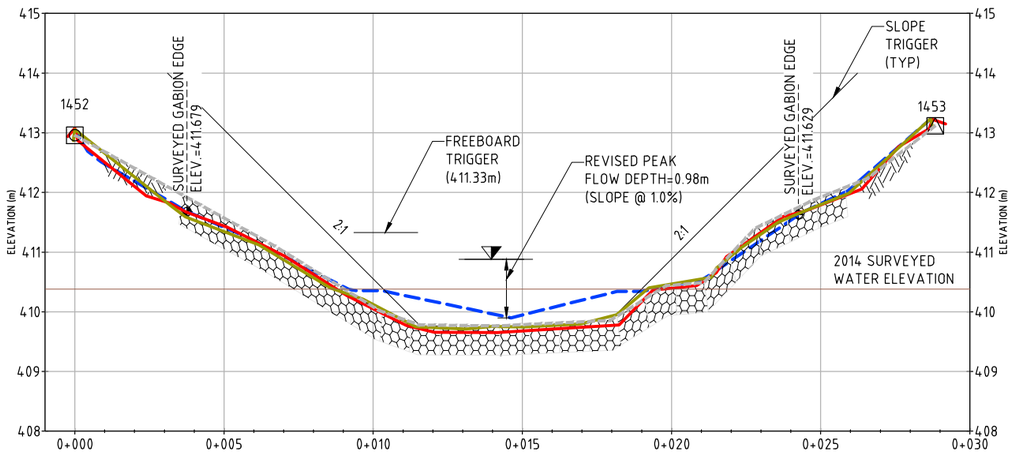


DROP SRUCTURE #1 END VIEW

SCALE: 1:200



SECTION 1A
VET x2



SECTION 1B
VERT x2

- ◎ CHANNEL CLOSURE MOVEMENT MONITOR (19mm Ø STEEL PIN) INSTALLED DURING 2006 SURVEY.
- ◬ CHANNEL CLOSURE MOVEMENT MONITOR INSTALLED IN 2012 (TYP.)

NOTE 1: GABION FILL REMOVED FROM THIS CELL OF THE DRAWDOWN WEIR IN 2007 TO FACILITATE DRAWING DOWN HUDGEON LAKE WATER LEVEL DURING LOW FLOW PERIODS.
NOTE 2: REFER TO AECOM's "FORMER CLINTON CREEK ASBESTOS MINE - EMERGENCY DROP STRUCTURE REPAIRS, CONSTRUCTION ACTIVITY REPORT, 2011" R94 FOR 2011 REPAIR DETAILS.
NOTE 3: FREE BOARD TRIGGER SHOWN AT 300mm BELOW GABION BASKETS (REFER 2014 RECOMMENDATION DS-F).
NOTE 4: FREEBOARD TRIGGER MEASURED FROM TOP OF BASKETS ADDED IN 2007.

LEGEND

- BASELINE SURVEY (2006)
- SURVEY (AUGUST 2012)
- SURVEY (AUGUST 2013)
- SURVEY (SEPTEMBER 2014)

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 31/15 10:05am

m 0 1 2 3 4 5 m
1:200

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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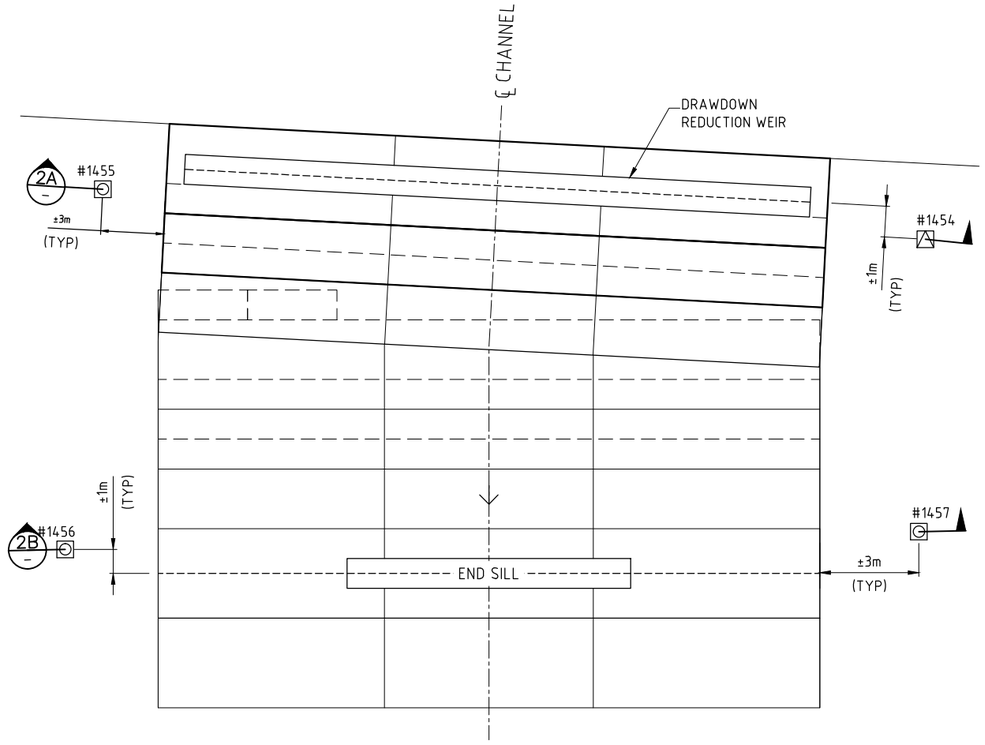
WorleyParsons resources & energy

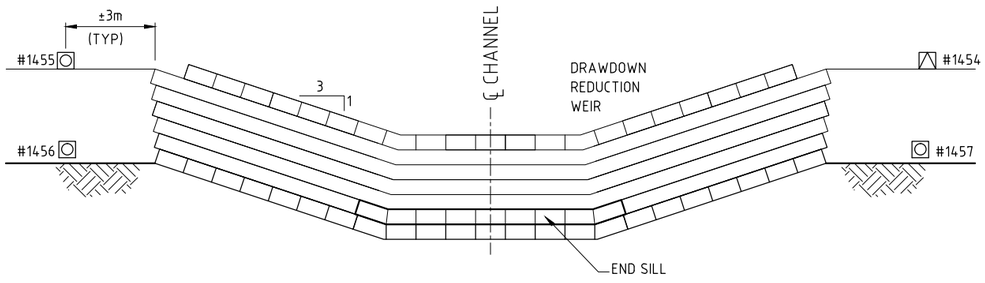
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
2014 - DROP STRUCTURE #1
MONITORING SECTIONS

DRG No 307071-01009-00-SS-DGA-1009
REV 0

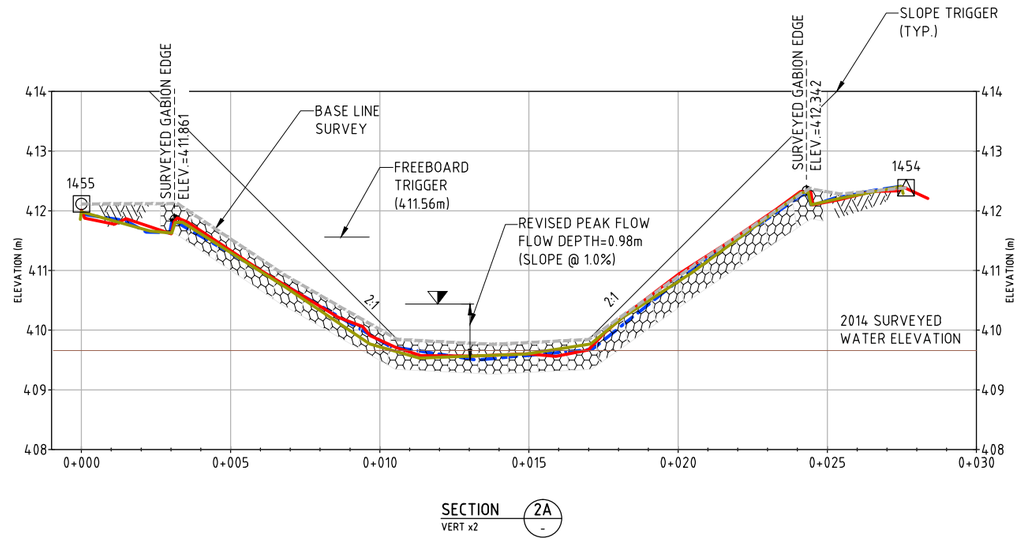
LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\1I_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1012.DWG
USER NAME: Jake.gentles
PLOT DATE & TIME: 31/3/2015 10:38:28 AM
SAVE DATE & TIME: 31/3/2015 10:05:31 AM



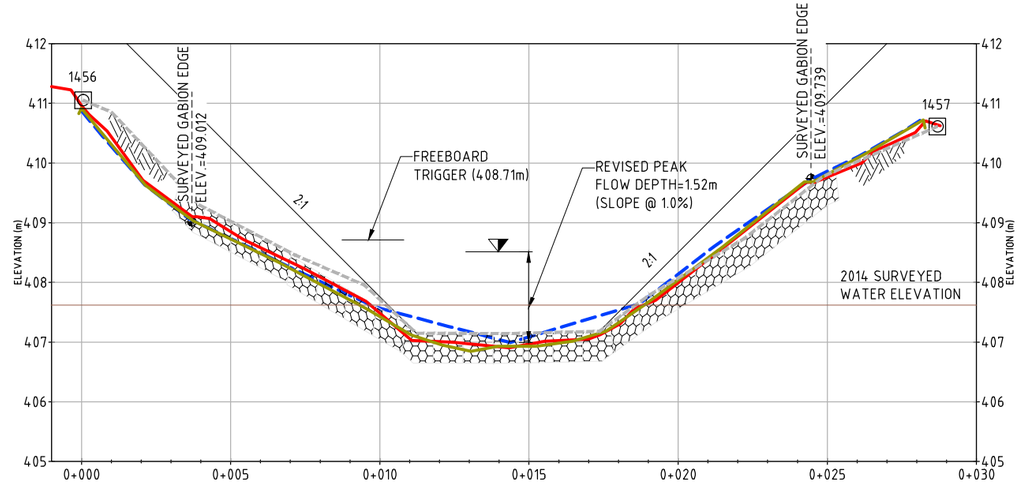
DROP SRUCTURE #2 PLAN VIEW
SCALE: 1:200



DROP SRUCTURE #2 END VIEW
SCALE: 1:200



SECTION 2A
VERT x2



SECTION 2B
VERT x2

NOTE 1: REFER TO AECOM's "FORMER CLINTON CREEK ASBESTOS MINE - EMERGENCY DROP STRUCTURE REPAIRS, CONSTRUCTION ACTIVITY REPORT, 2011" FOR 2011 REPAIR DETAILS.
NOTE 2: FREE BOARD TRIGGER SHOWN AT 300mm BELOW GABION BASKETS (REFER 2014 RECOMMENDATION DS-F).

CHANNEL CLOSURE MOVEMENT MONITOR INSTALLED IN 2012 (TYP.)

CHANNEL CLOSURE MOVEMENT MONITOR (19mm Ø STEEL PIN) INSTALLED DURING 2006 SURVEY.

LEGEND
- BASELINE SURVEY (2006)
- SURVEY (AUGUST 2012)
- SURVEY (AUGUST 2013)
- SURVEY (SEPTEMBER 2014)

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 31/15 10:05am

m 0 1 2 3 4 5 m
1:200

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER
Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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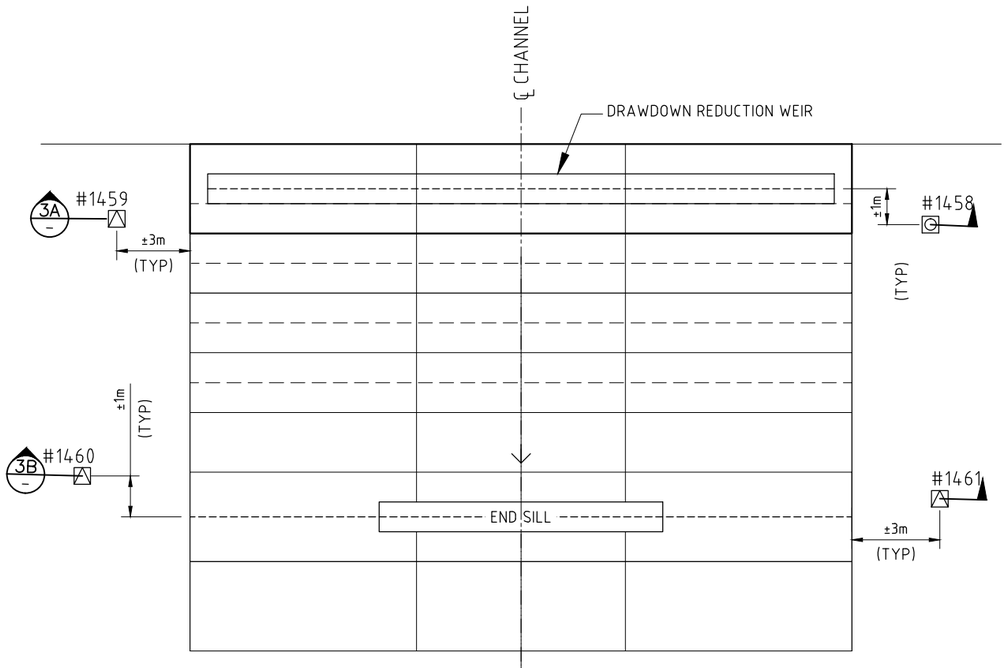
WorleyParsons resources & energy

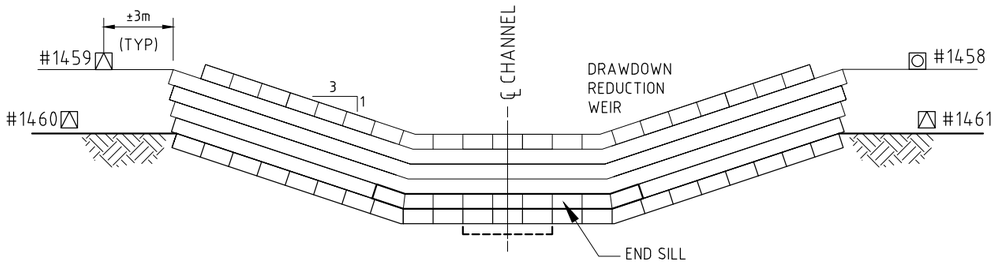
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
2014 - DROP STRUCTURE #2

DRG No 307071-01009-00-SS-DGA-1010
REV 0

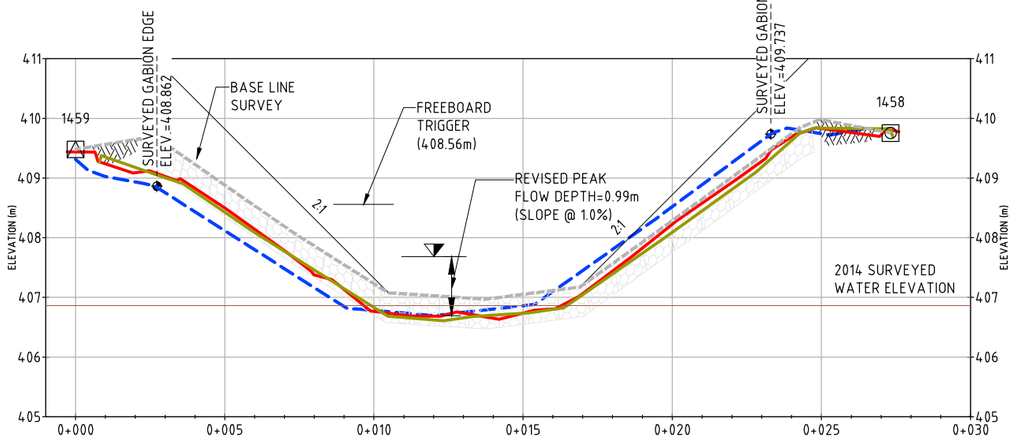
LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-S
USER NAME: jake.gentles
PLOT DATE & TIME: 31/3/2015 10:39:11 AM
SAVE DATE & TIME: 31/3/2015 10:05:31 AM



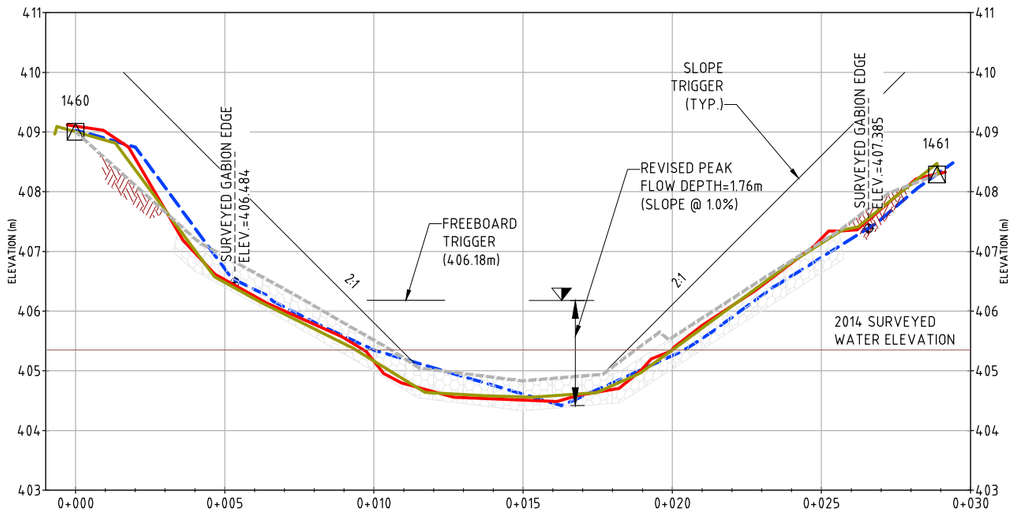
DROP SRUCTURE #3 PLAN VIEW
SCALE: 1:200



DROP SRUCTURE #3 END VIEW
SCALE: 1:200



SECTION 3A
VERT x2



SECTION 3B
VERT x2

NOTE 1: REFER TO AECOM's "FORMER CLINTON CREEK ASBESTOS MINE - EMERGENCY DROP STRUCTURE REPAIRS, CONSTRUCTION ACTIVITY REPORT, 2011" FOR 2011 REPAIR DETAILS.
NOTE 2: FREE BOARD TRIGGER SHOWN AT 300mm BELOW GABION BASKETS (REFER 2014 RECOMMENDATION DS-F).

CHANNEL CLOSURE MOVEMENT MONITOR INSTALLED IN 2012 (TYP.)

CHANNEL CLOSURE MOVEMENT MONITOR (19mm ϕ STEEL PIN) INSTALLED DURING 2006 SURVEY.

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 31/15 10:05am

m 0 1 2 3 4 5 m
1:200

LEGEND
- BASELINE SURVEY (2006)
- SURVEY (AUGUST 2012)
- SURVEY (AUGUST 2013)
- SURVEY (SEPTEMBER 2014)

NOTES:
1. DIMENSIONS AND ELEVATIONS ARE IN METRES.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER
Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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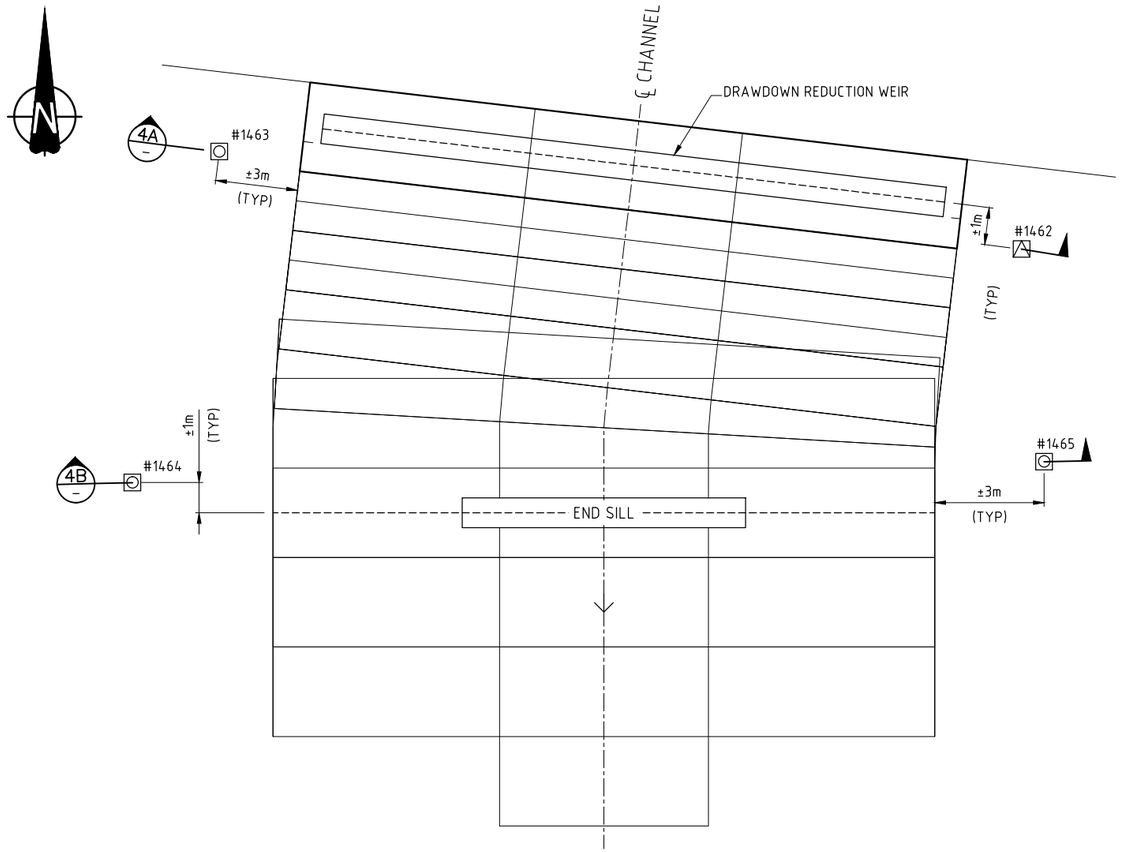
WorleyParsons resources & energy

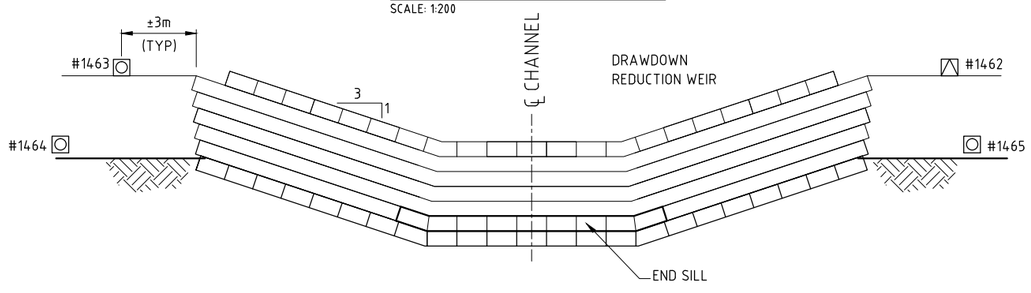
CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
2014-DROP STRUCTURE #3

DRG No 307071-01009-00-SS-DGA-1011 | REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1012.DWG
USER NAME: jake.gentles
PLOT DATE & TIME: 31/3/2015 10:40:01 AM
SAVE DATE & TIME: 31/3/2015 10:05:31 AM



DROP SRUCTURE #4 PLAN VIEW
SCALE: 1:200

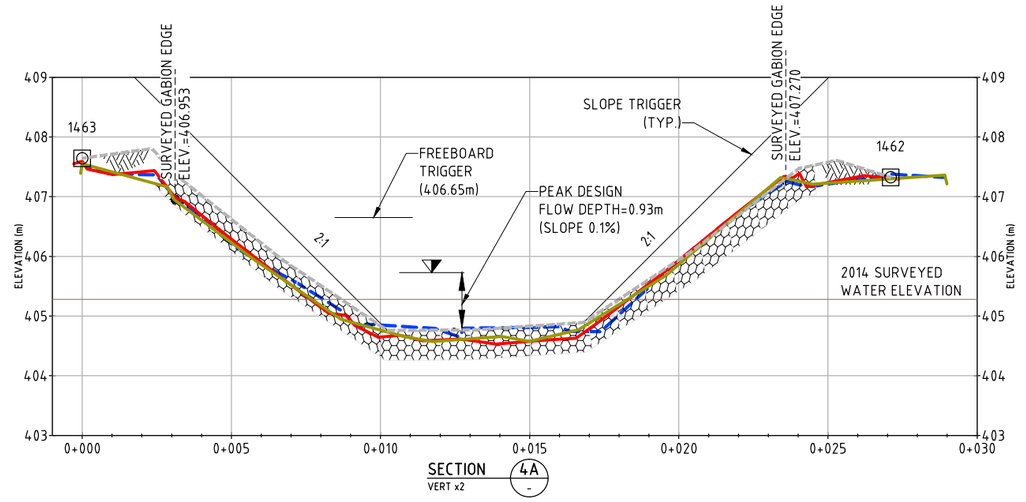


DROP SRUCTURE #4 END VIEW
SCALE: 1:200

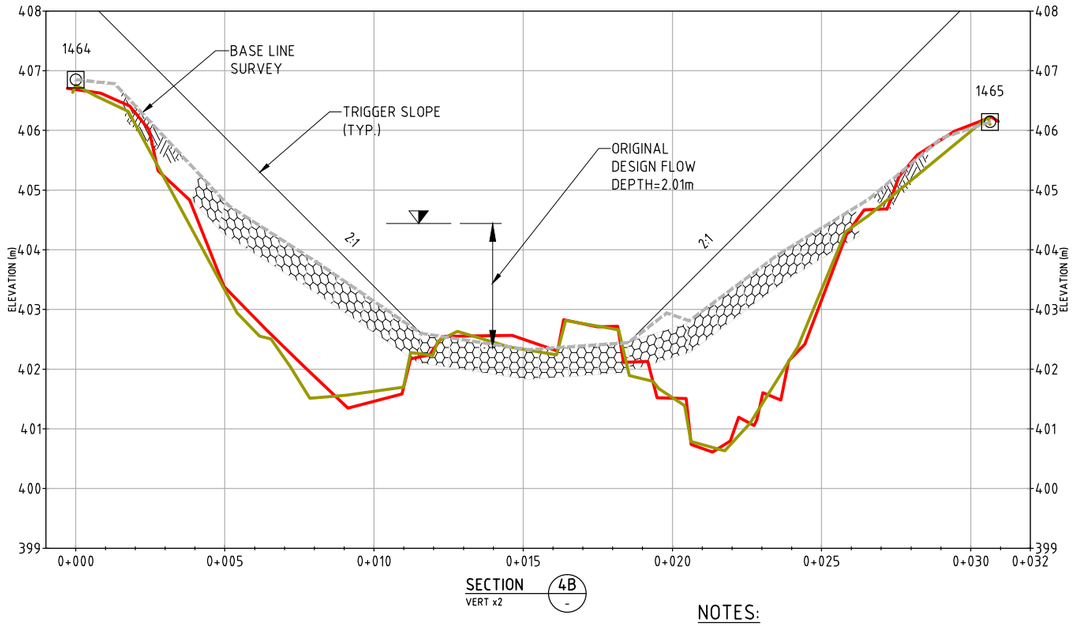
CHANNEL CLOSURE MOVEMENT MONITOR (19mm ⌀ STEEL PIN) INSTALLED DURING 2006 SURVEY.

NOTE 1: REFER TO AECOM's "FORMER CLINTON CREEK ASBESTOS MINE - EMERGENCY DROP STRUCTURE REPAIRS, CONSTRUCTION ACTIVITY REPORT, 2011" FOR 2011 REPAIR DETAILS, SECTION 4A ONLY. REPAIRS TO SECTION 4B WERE NOT COMPLETED IN 2011 DUE TO SAFETY CONCERNS.

NOTE 2: FREE BOARD TRIGGER SHOWN AT 300mm BELOW GABION BASKETS (REFER 2014 RECOMMENDATION DS-F).



SECTION 4A
VERT x2



SECTION 4B
VERT x2

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 31/15 10:05am

m 0 1 2 3 4 5 m
1:200

LEGEND
- BASELINE SURVEY (2006)
- SURVEY (AUGUST 2012)
- SURVEY (AUGUST 2013)
- SURVEY (SEPTEMBER 2014)

NOTES:
1. IN 2014 THE DOWNSTREAM CROSS-SECTION AT DS4 COULD NOT BE RECORDED DUE TO LIMITED SITE ACCESSIBILITY CAUSED BY INSTABILITY OF THE GABION BASKETS.
2. REVISED PEAK FLOW DEPTH NOT CALCULATED DUE TO SURVEY GAP IN 2014.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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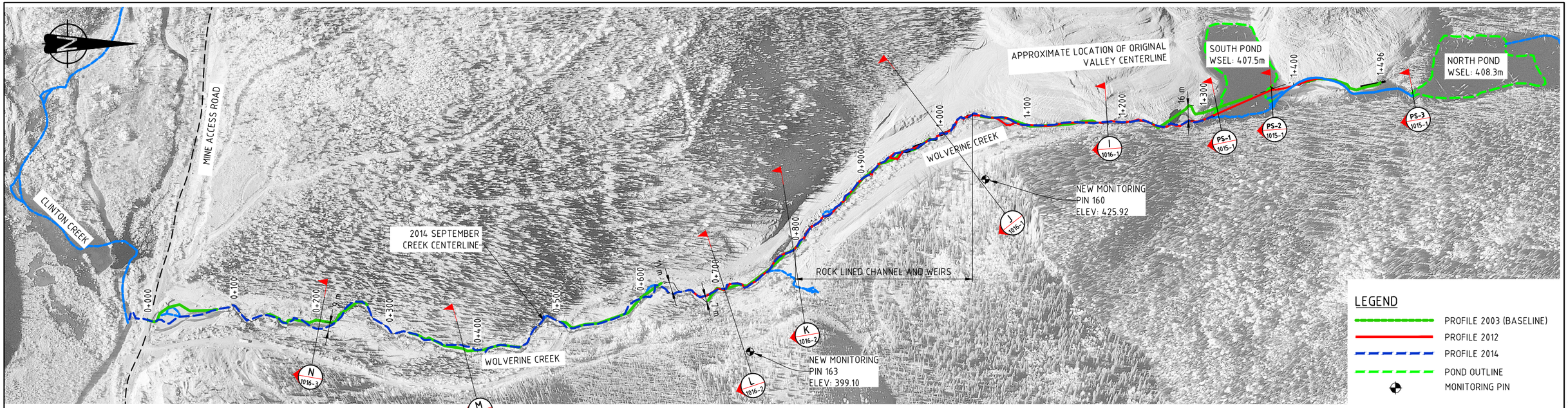
WorleyParsons resources & energy

CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
2014- DROP STRUCTURE #4

DRG No 307071-01009-00-SS-DGA-1012
REV 0

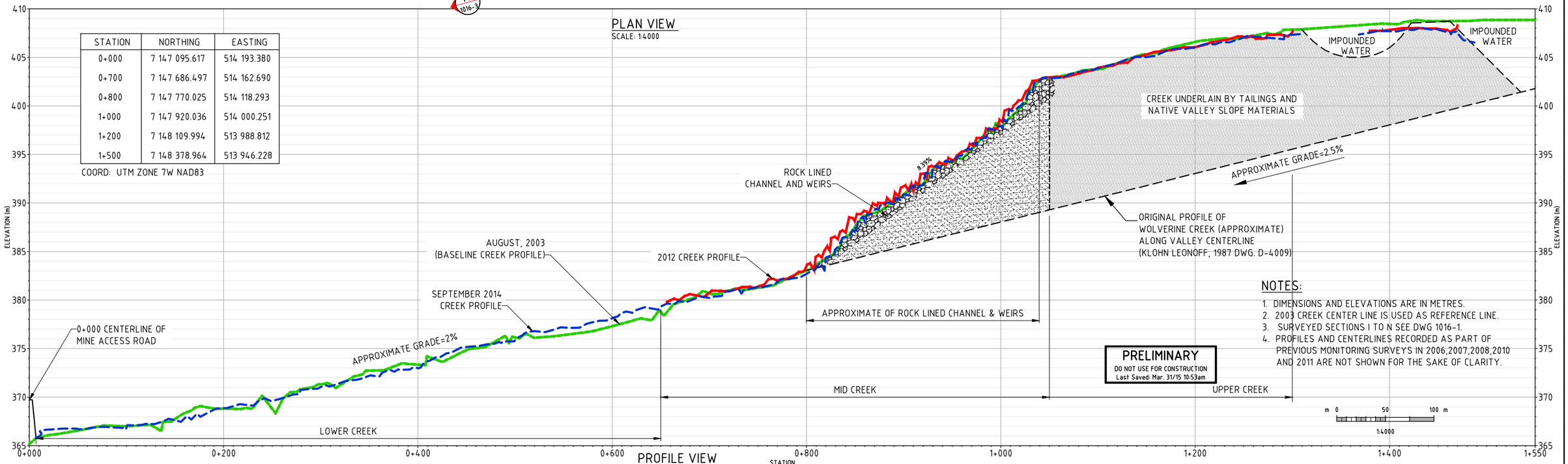
LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1012.DWG
USER NAME: jakegentles
PLOT DATE & TIME: 31/3/2015 10:45:53 AM
SAVE DATE & TIME: 31/3/2015 10:05:31 AM



STATION	NORTHING	EASTING
0+000	7 147 095.617	514 193.380
0+700	7 147 686.497	514 162.690
0+800	7 147 770.025	514 118.293
1+000	7 147 920.036	514 000.251
1+200	7 148 109.994	513 988.812
1+500	7 148 378.964	513 946.228

COORD: UTM ZONE 7W NAD83

PLAN VIEW
SCALE: 1:4000



PROFILE VIEW

NOTES:
1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. 2003 CREEK CENTER LINE IS USED AS REFERENCE LINE.
3. SURVEYED SECTIONS I TO N SEE DWG 1016-1.
4. PROFILES AND CENTERLINES RECORDED AS PART OF PREVIOUS MONITORING SURVEYS IN 2006,2007,2008,2010 AND 2011 ARE NOT SHOWN FOR THE SAKE OF CLARITY.

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 31/15 10:53am

m 0 50 100 m
1:4000

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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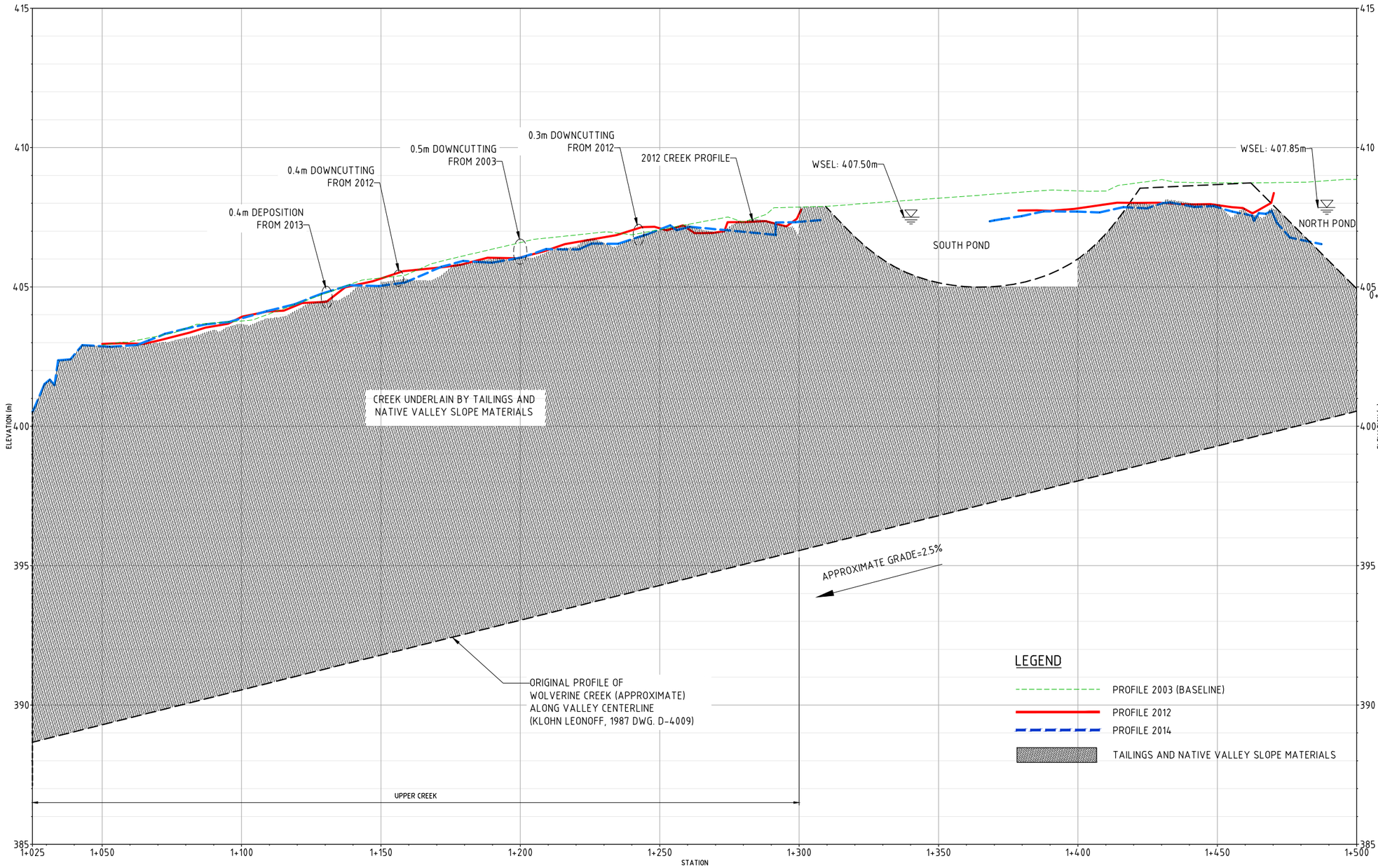
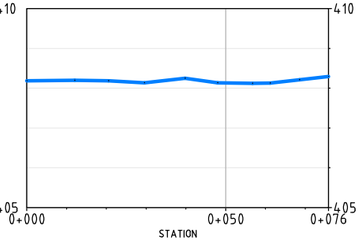
WorleyParsons resources & energy

CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
WOLVERINE CREEK
PLAN AND PROFILE

DRG No 307071-01009-00-SS-DGA-1013
REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1013.DWG
USER NAME: Jake.gentles
PLOT DATE & TIME: 31/3/2015 12:12:41 PM
SAVE DATE & TIME: 31/3/2015 10:53:14 AM





PROFILE - NORTH OF NORTH POND INLET

UPPER WOLVERINE CREEK PROFILE STA 1+050 TO STA 1+550

m 0 10 20 30 40 m
1:1500

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 31/15 9:38am

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. 2003 CREEK CENTER LINE IS USED AS REFERENCE LINE.
3. PROFILES AND CENTERLINES RECORDED AS PART OF PREVIOUS MONITORING SURVEYS IN 2006,2007,2008,2010 AND 2011 ARE NOT SHOWN FOR THE SAKE OF CLARITY.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			
B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

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Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
WOLVERINE CREEK
UPPER CREEK PROFILE

DRG No 307071-01009-00-SS-DGA-1014 | REV 0

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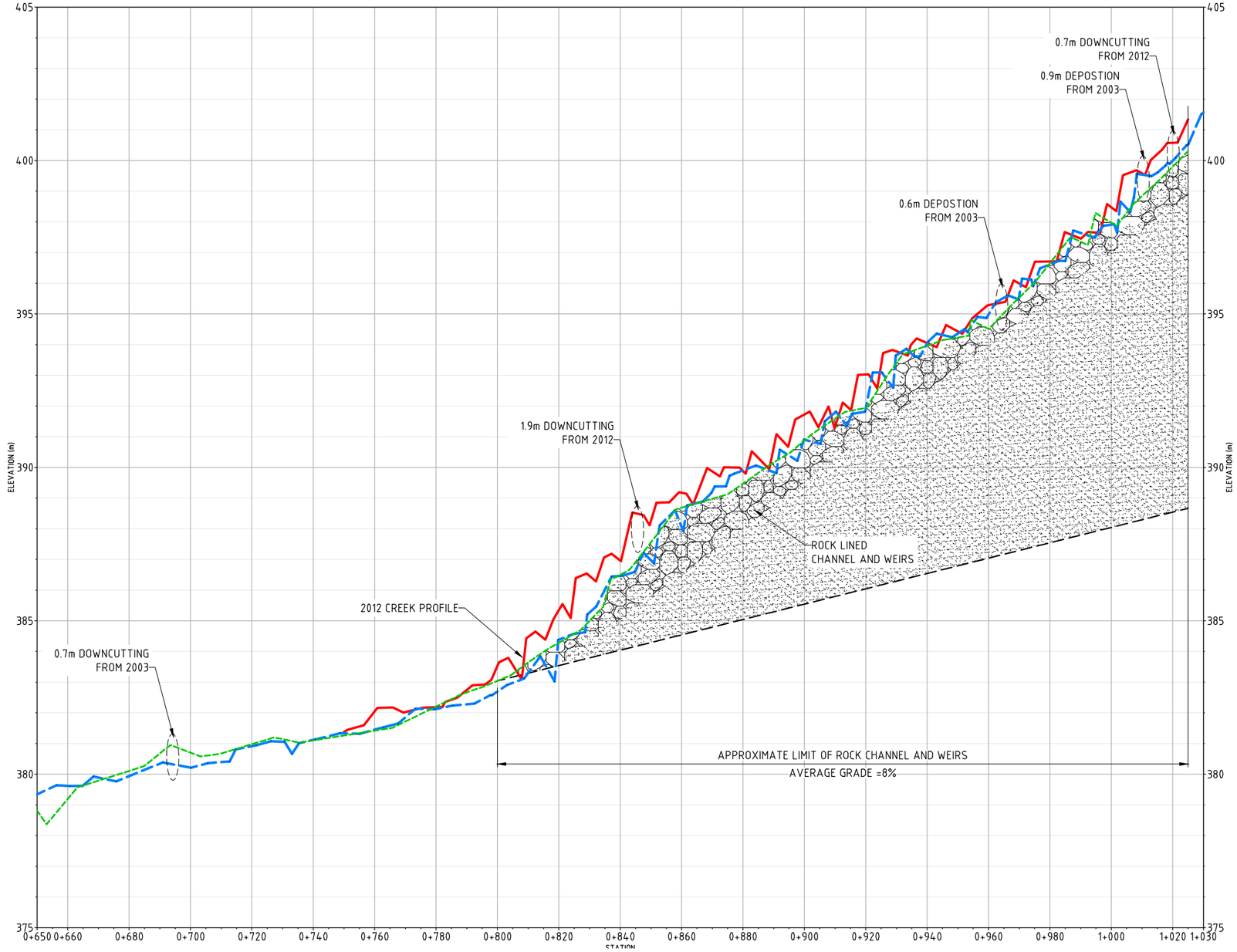
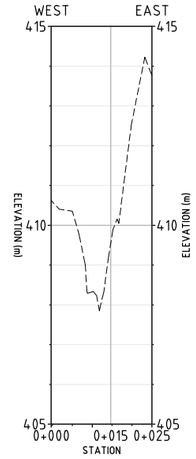
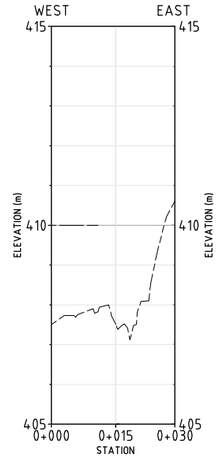
SAVE DATE & TIME: 31/3/2015 9:38:25 AM



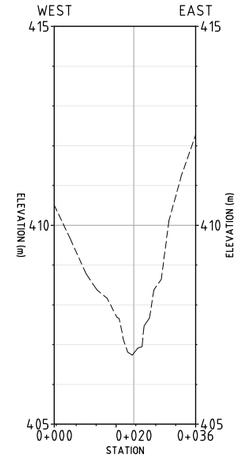
MID WOLVERINE CREEK PROFILE STA 0+650 TO STA 1+025



POND SECTION-1
(PS-1)



POND SECTION-2
(PS-2)



POND SECTION-3
(PS-3)

m 0 10 20 30 40 m

1:1500

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 4:12pm

LEGEND

- PROFILE 2003 (BASELINE)
- PROFILE 2012
- PROFILE 2014

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. 2003 CREEK CENTER LINE IS USED AS REFERENCE LINE.
3. PROFILES AND CENTERLINES RECORDED AS PART OF PREVIOUS MONITORING SURVEYS IN 2006,2007,2008,2010 AND 2011 ARE NOT SHOWN FOR THE SAKE OF CLARITY.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
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B	10-DEC-14	RE-ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			
A	08-DEC-14	ISSUED FOR CLIENT REVIEW	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
WOLVERINE CREEK
MID CREEK PROFILE

DRG No 307071-01009-00-SS-DGA-1015-1 | REV 0

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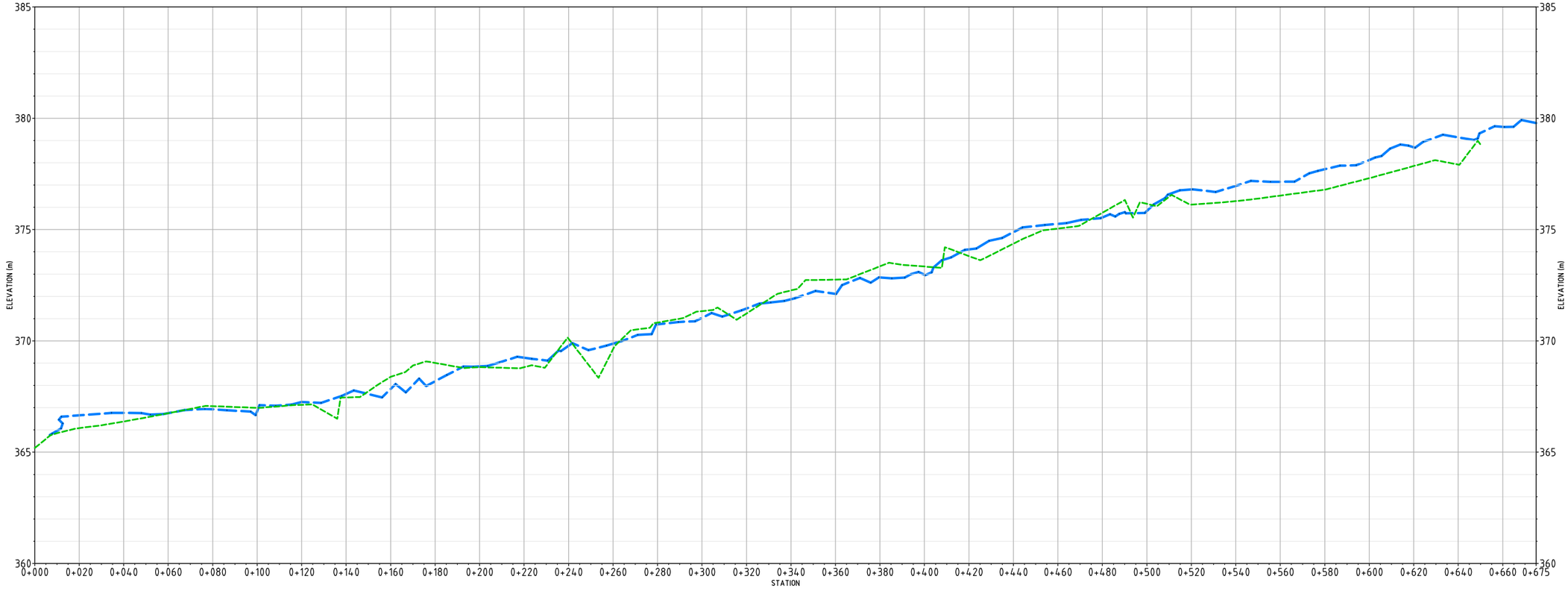

LOWER WOLVERINE CREEK PROFILE STA 0+000 TO STA 0+650

m 0 10 20 30 40 50 m

1:2000

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 4:12pm

LEGEND

- PROFILE 2003 (BASELINE)
- PROFILE 2014

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.
2. 2003 CREEK CENTER LINE IS USED AS REFERENCE LINE.
3. PROFILES AND CENTERLINES RECORDED AS PART OF PREVIOUS MONITORING SURVEYS IN 2006,2007,2008,2010 AND 2011 ARE NOT SHOWN FOR THE SAKE OF CLARITY.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon
Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
WOLVERINE CREEK
LOWER CREEK PROFILE

DRG No 307071-01009-00-SS-DGA-1015-2 | REV 0

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USER NAME: jiangh
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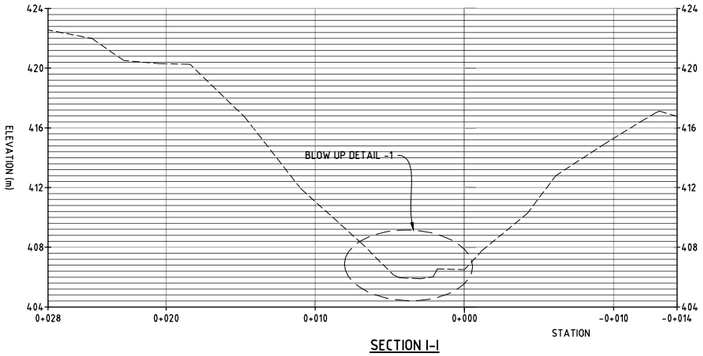
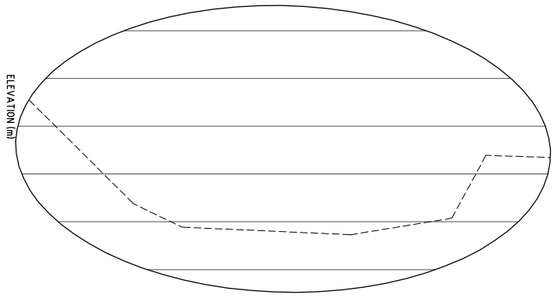
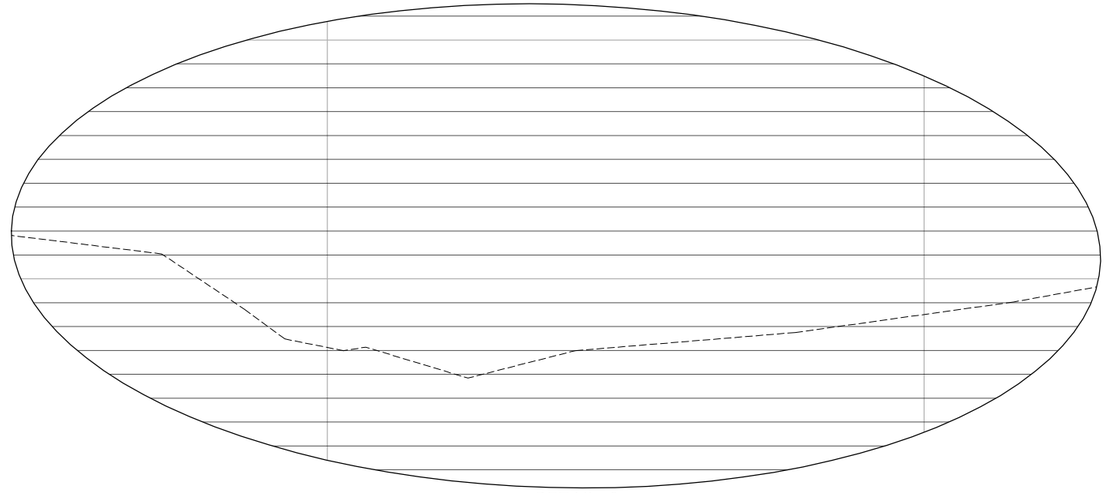
SAVE DATE & TIME: 30/3/2015 4:12:50 PM



SECTION I-I



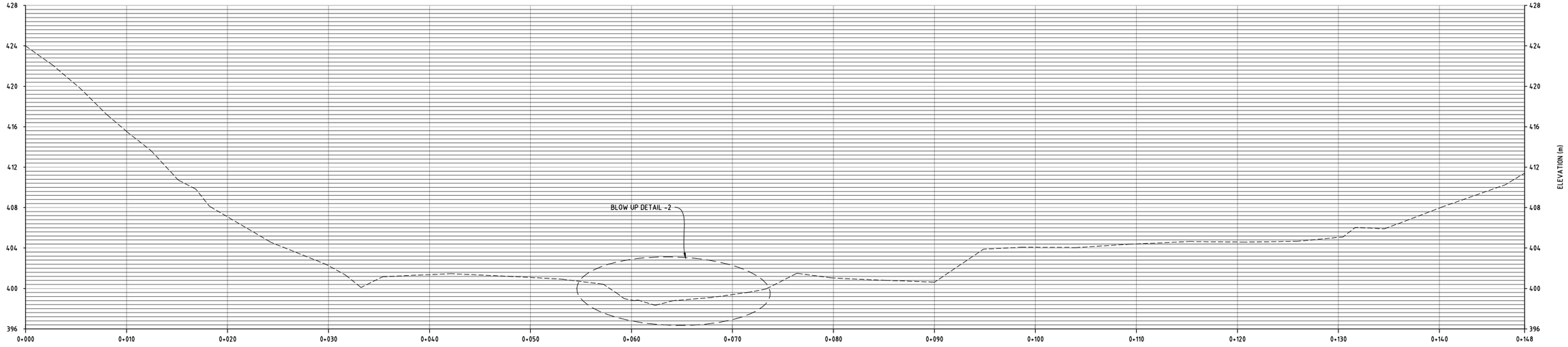
DETAIL-1
1:50



DETAIL-2
1:100

LEGEND

2014 SURVEYED GROUND



SECTION J-J AT STA 1+006

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 4:05pm

mm 0 500 1000 1500 mm — 1:50
mm 0 500 1000 2500 mm — 1:100
m 0 5 10 m — 1:400

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.

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0	31-MAR-15	RE-ISSUED FOR USE	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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CLINTON CREEK MINE SITE
LONG TERM MONITORING PROGRAM (2014)
WOLVERINE CREEK
SURVEYED SECTIOINS I-I' AND J-J'

DRG No 307071-01009-00-SS-DGA-1016-1 | REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1016.DWG
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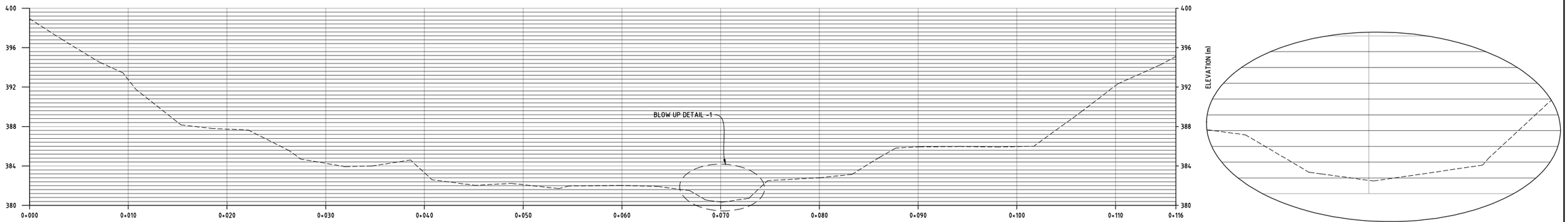
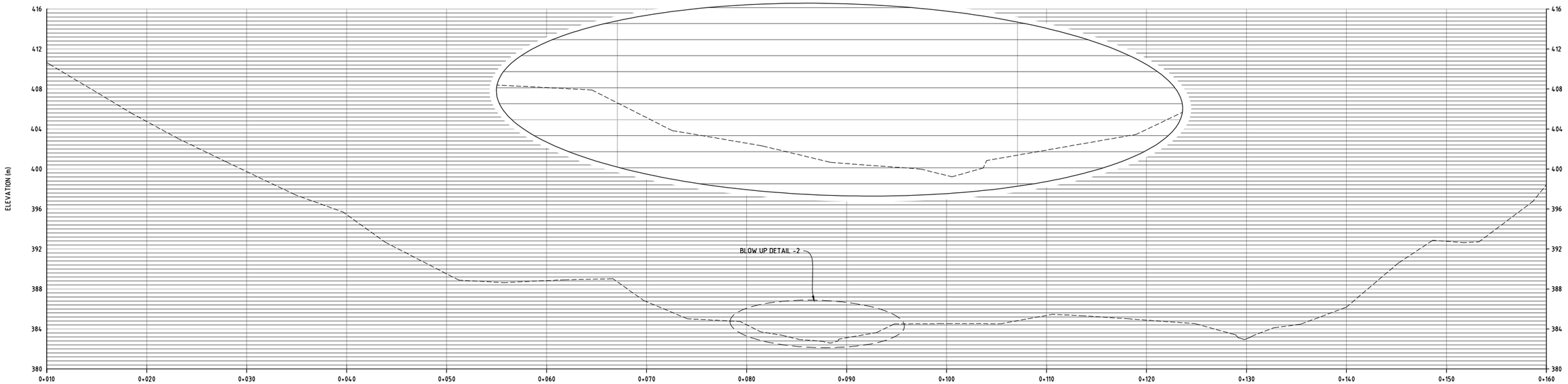


SECTION L-L AT STA 0+712

DETAIL-1
1:100

DETAIL-2
1:100



SECTION K-K AT STA 0+798

LEGEND

2014 SURVEYED GROUND

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 4:05pm

m 0 5 10 m mm 0 500 1000 2500 mm
1:400 1:100

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
WOLVERINE CREEK
SURVEYED SECTIONS K-K' AND L-L'

DRG No 307071-01009-00-SS-DGA-1016-2 | REV 0

LOCATION: U:\YVR\307071\01009_YEMR_CLINTCLTMP\11_DRAWINGS\01_CIVIL\307071-01009-00-SS-DGA-1016.DWG
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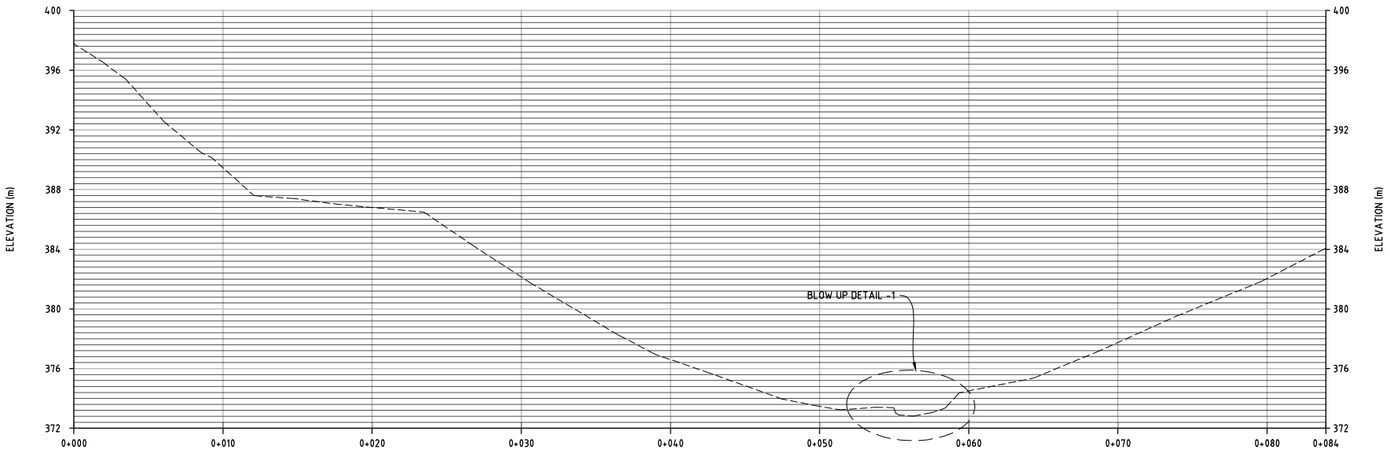
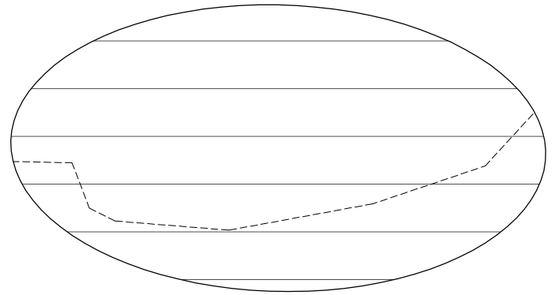
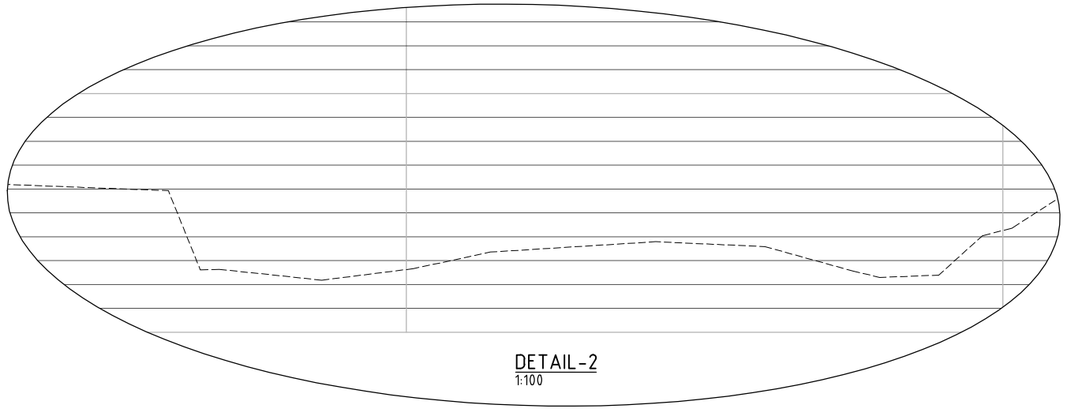


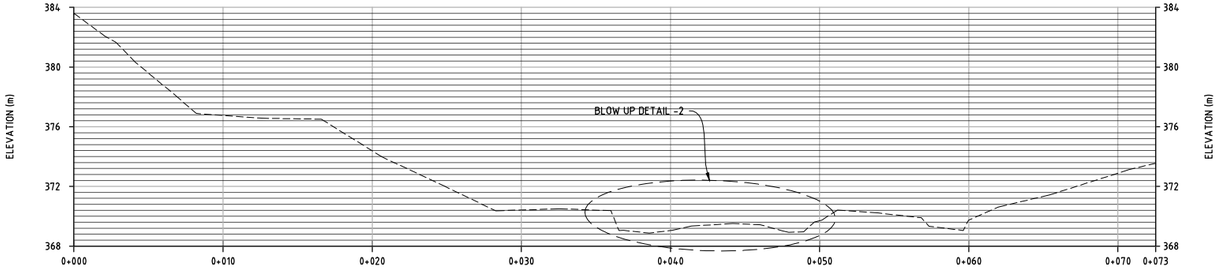
SECTION M-M AT STA 0+389



DETAIL-1
1:50



DETAIL-2
1:100



SECTION N-N AT STA 0+204

mm 0 500 1000 1500 mm
1:50

mm 0 500 1000 2500 mm
1:100

m 0 5 10 m
1:400

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Mar. 30/15 4:05pm

LEGEND

2014 SURVEYED GROUND

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN METRES.

REV	DATE DD-MMM-YYY	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
0	31-MAR-15	ISSUED FOR USE	JH		TB	JG	AT			

D SHEET | SCALE

OneWay

WORLEYPARSONS PROJECT No
307071-01009

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines

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CLINTON CREEK SITE
LONG TERM MONITORING PROGRAM (2014)
WOLVERINE CREEK
SURVEYED SECTIONS M-M' AND N-N'

DRG No 307071-01009-00-SS-DGA-1016-3 | REV 0

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USER NAME: jiang.hu
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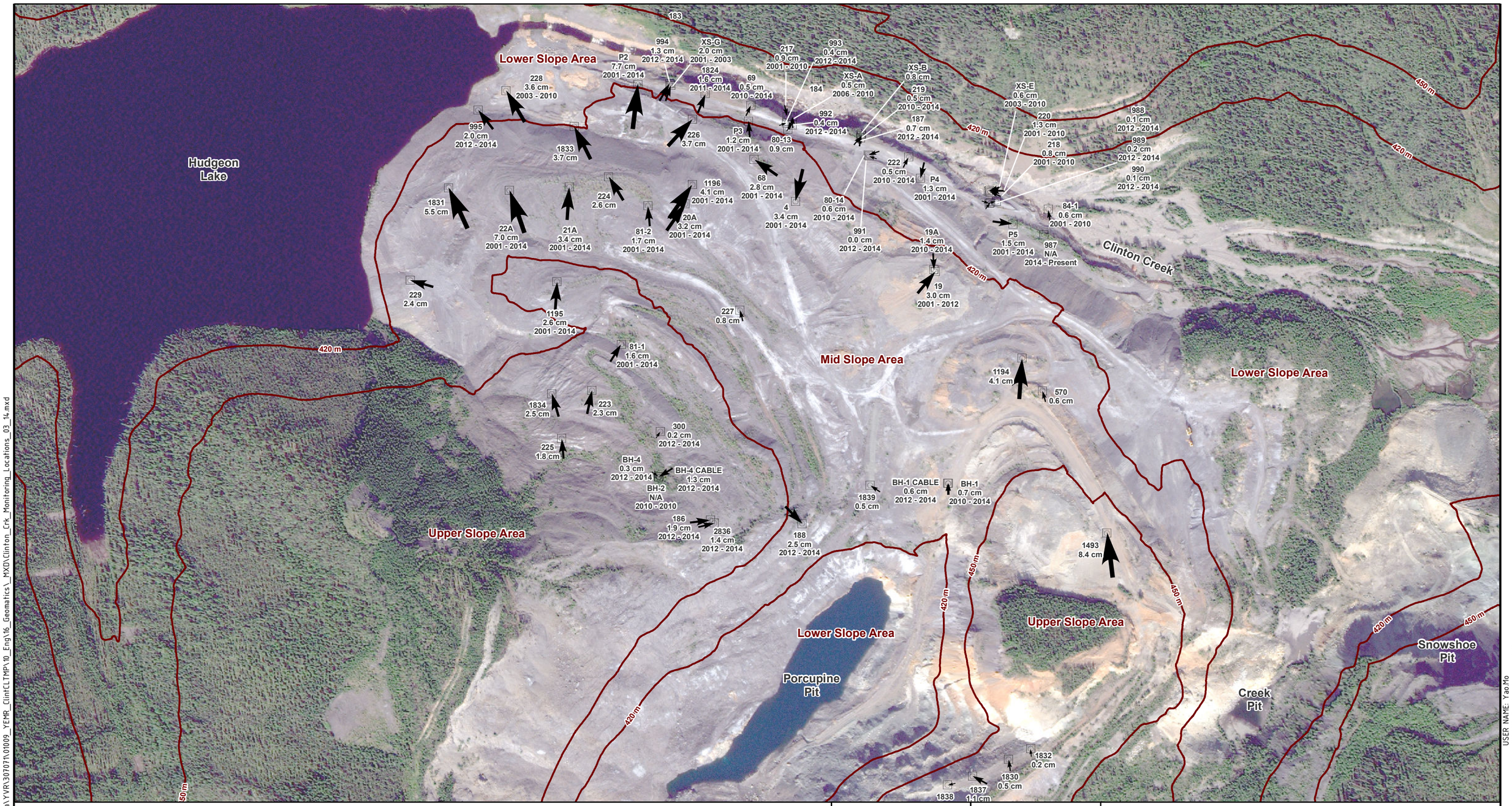

Legend

- 2014 Monitoring Station
- Slope Zone Boundary

Upper Slope: Elevation > 450 m
Mid Slope: 420 m < Elevation < 450 m
Lower Slope: Elevation < 420 m

Monitoring Station Movement (cm)

- 0.5
- 2.0
- 3.5
- 5.0

BH-1 - Monitoring Location ID
0.7 cm - Vector Movement
2010 - 2014 - Start/End Year *

Note:
*: the default start/end year is 2003 - 2014 when the year is not labelled.

N

1:4,500

0 50 100

Meters

B SHEET SCALE: SHOWN

OneWay™ to zero harm

Date:	31/03/2015
Drawn By:	Y.M.
Edited By:	T.B.
App'd By:	J.G.

CUSTOMER

Yukon Government

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Clinton Creek Site
Long Term Monitoring Program (2014)
Clinton Creek Waste Rock Dump
Movement from 2001 – 2014

WORLEYPARSONS PROJECT No:	FIG No:	REV
307071-01009	1017	0

FILE LOCATION: \\WorleyParsons.com\CA\Data\YVR\307071\01009_YEMR_ClinClTMP\10_Eng\16_Geomatics_MXD\Clinton_Crk_Monitoring_Locations_03_14.mxd

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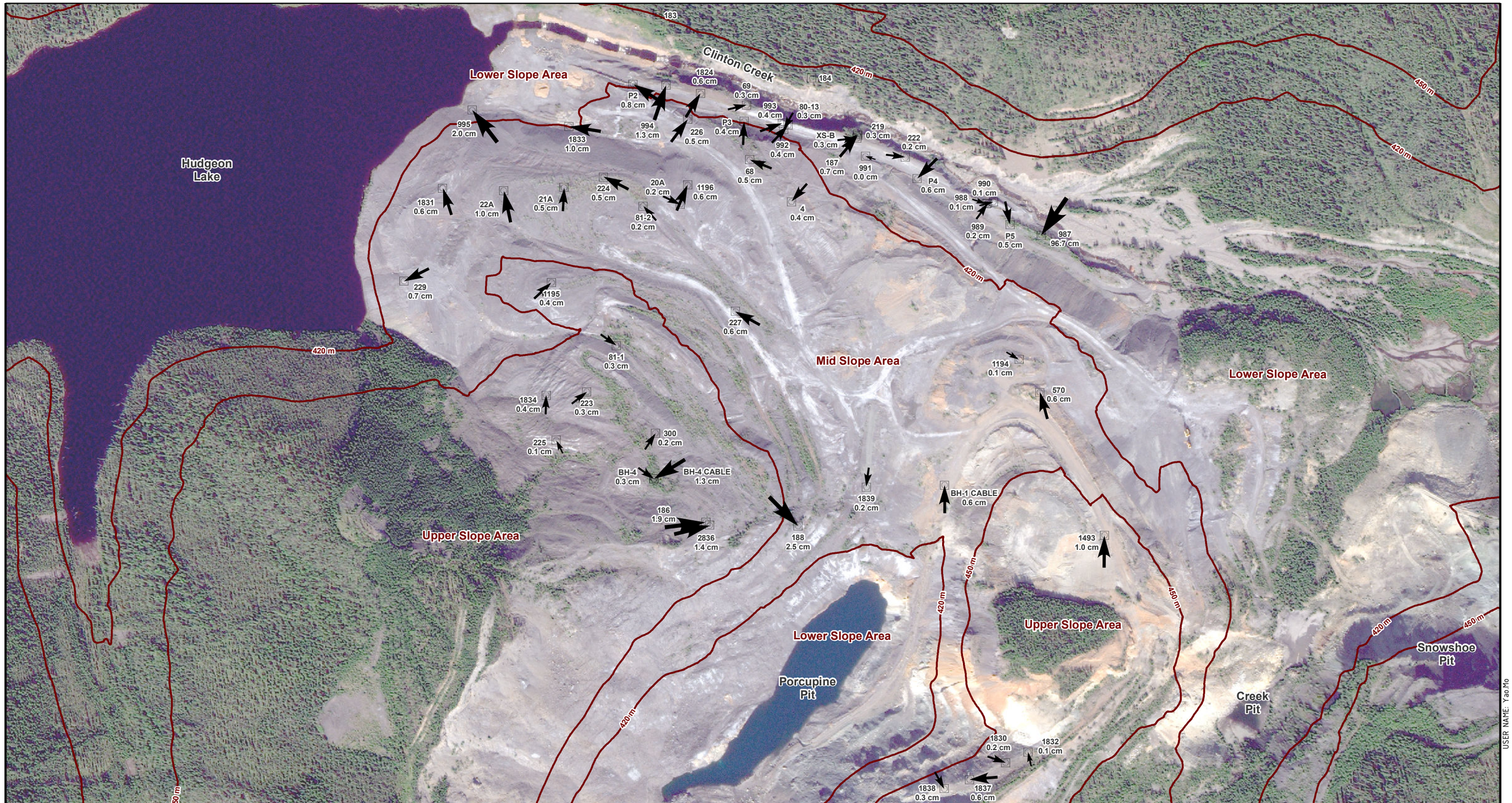
SAVE DATE & TIME:05/03/2015 12:25:06 PM

USER NAME: Yao.Mo
ISSUING OFFICE: Burnaby GIS



Legend

- 2014 Monitoring Station
- Slope Zone Boundary

Upper Slope: Elevation > 450 m
Mid Slope: 420 m < Elevation < 450 m
Lower Slope: Elevation < 420 m

Monitoring Station Movement (cm)

- < 0.1
- 0.5
- 1.5
- >2.5

N

1:4,500

0 50 100

Meters

B SHEET	SCALE: SHOWN
OneWay™ to zero harm	
Date:	31/03/2015
Drawn By:	Y.M.
Edited By:	T.B.
App'd By:	J.G.

CUSTOMER: Yukon Government

WorleyParsons resources & energy

Clinton Creek Site
Long Term Monitoring Program (2014)
Clinton Creek Waste Rock Dump
Movement from 2012 – 2014

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WORLEYPARSONS PROJECT No:	FIG No:	REV
307071-01009	1018	0

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ISSUING OFFICE: Burnaby GIS
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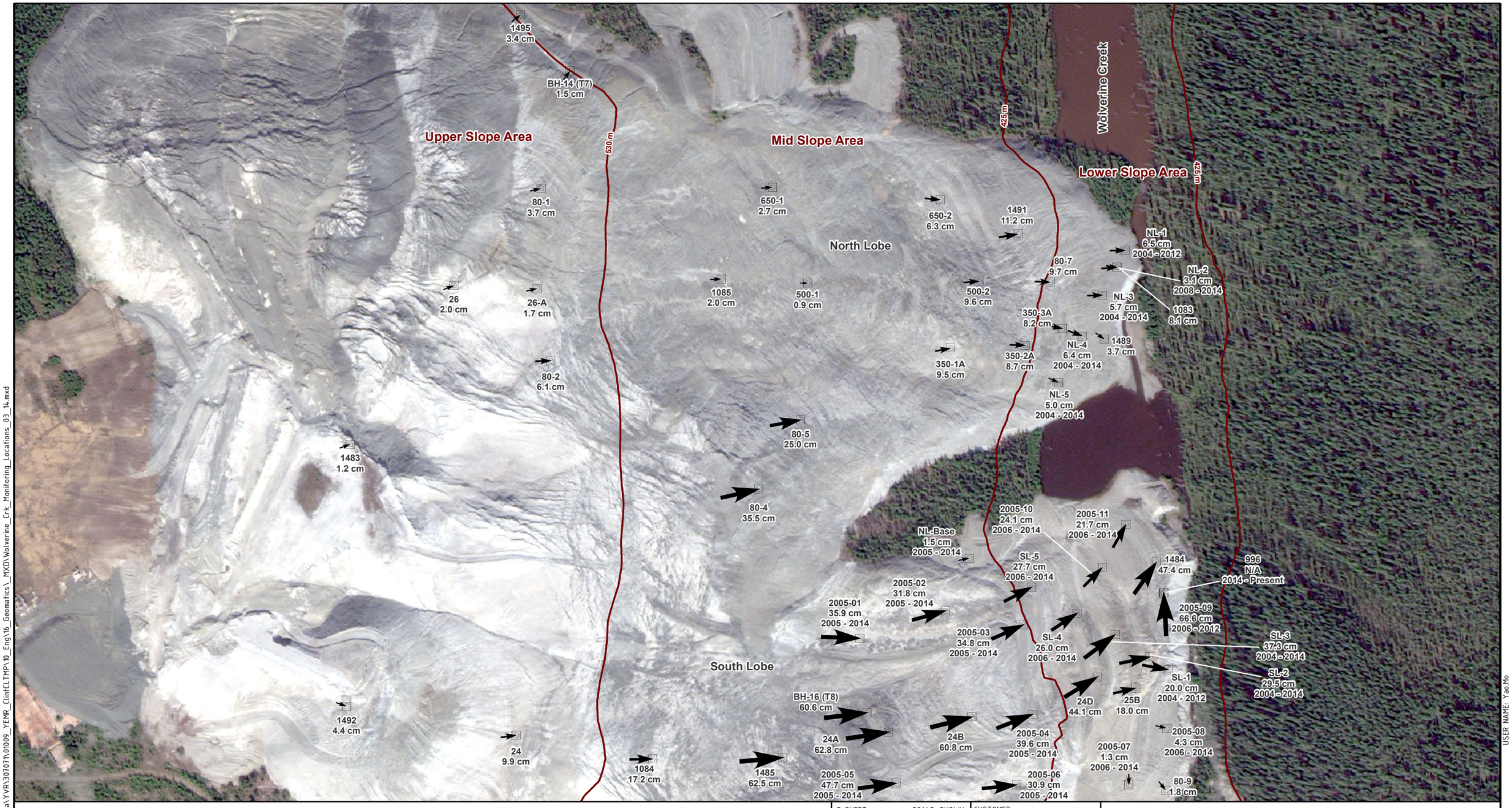

B SHEET SCALE: SHOWN

OneWay™ to zero harm

Date:	31/03/2015
Drawn By:	Y.M.
Edited By:	T.B.
App'd By:	J.G.

CUSTOMER

Yukon Government

WorleyParsons resources & energy

Clinton Creek Site
Long Term Monitoring Program (2014)
Wolverine Creek Tailings Pile
Movement from 2003 – 2014

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WORLEYPARSONS PROJECT No:	FIG No:	REV
307071-01009	1019	0

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USER NAME: Yao.Mo
ISSUING OFFICE: Burnaby GIS

PLOT DATE & TIME:31/03/2015 10:40:17 AM
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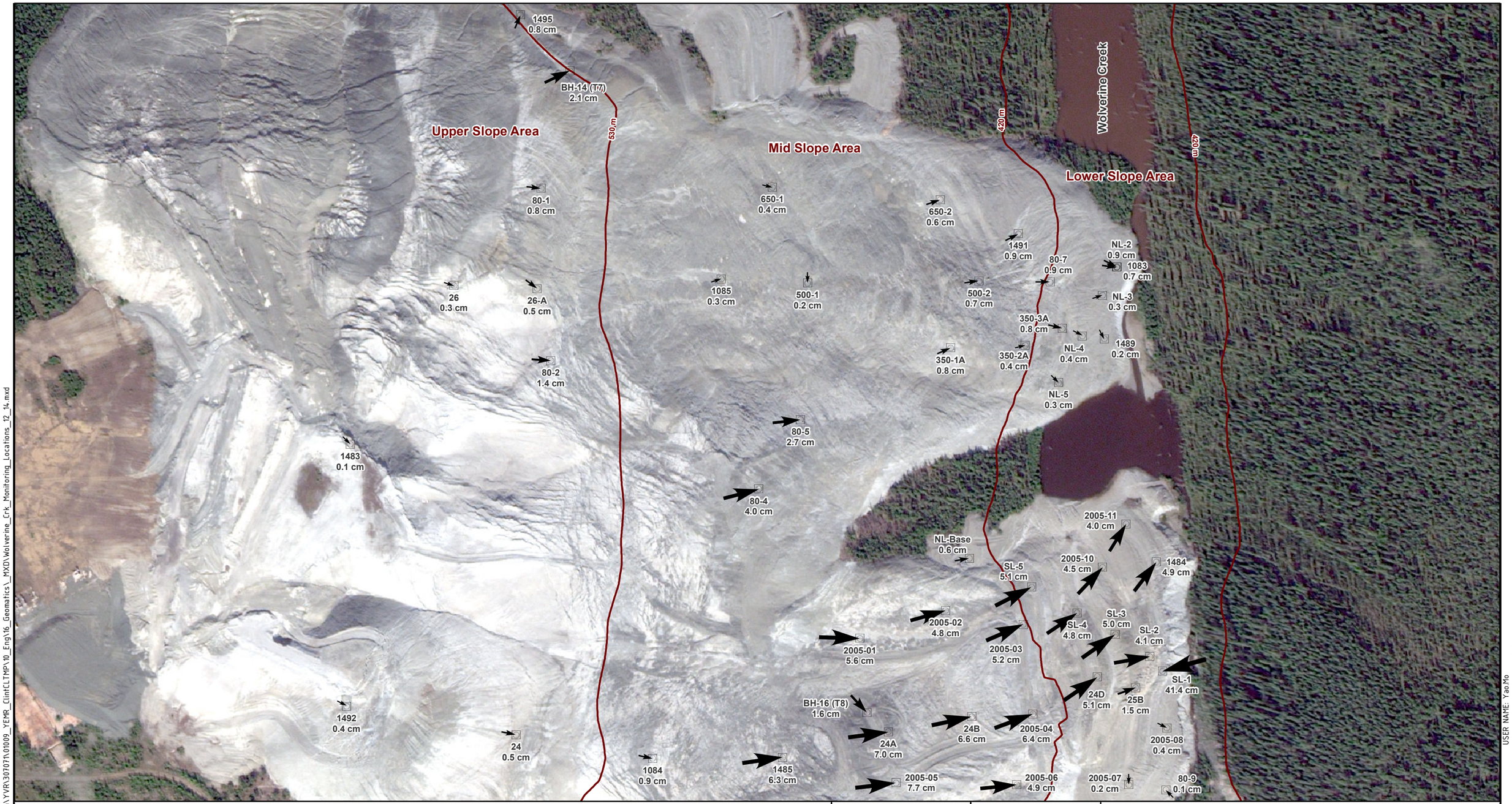

Legend

2014 Monitoring Location

Slope Zone Boundary

Upper Slope: Elevation > 530 m
Mid Slope: 425 m < Elevation < 530 m
Lower Slope: Elevation < 425 m

Station 160 and 163 are located outside the visible extent.

Monitoring Station Movement (cm)

< 0.5

2

5

10

N

1:2,500

0 20 40 80

Meters

B SHEET SCALE: SHOWN

OneWay™ to zero harm

Date:	31/03/2015
Drawn By:	Y.M.
Edited By:	T.B.
App'd By:	J.G.

CUSTOMER

Yukon Government

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Clinton Creek Site
Long Term Monitoring Program (2014)
Wolverine Creek Tailings Pile
Movement from 2012 – 2014

WORLEYPARSONS PROJECT No:	FIG No:	REV
307071-01009	1020	0

FILE LOCATION: \\WorleyParsons.com\CA\Data\YVR\307071\01009_YEMP_ClinfCLTMP\10_Eng\16_Geomatics_MXD\Wolverine_Crk_Monitoring_Locations_12_14.mxd

USER NAME: Yao.Mo
ISSUING OFFICE: Burnaby GIS

PLOT DATE & TIME:31/03/2015 10:40:03 AM
SAVE DATE & TIME:31/03/2015 10:39:38 AM

Appendix 2 Survey Criteria Letter

WorleyParsons Canada
Suite 600, 4321 Still Creek Drive
Burnaby, BC V5C 6S7 CANADA
Phone: +1 604 298 1616
Facsimile: +1 604 298 1625
www.worleyparsons.com

9 September 2014

Proj. No.: 307071-00987-0032
File Loc.: Burnaby

Underhill Geomatics Ltd.
4081 4th Avenue
Whitehorse, YT
Y1H 1H4 Canada

Attention: Jean-Louis Salesse

Dear Mr. Salesse:

RE: CLINTON CREEK SURVEY CRITERIA

1. INTRODUCTION

As part of the Clinton Creek Long Term Geotechnical Monitoring Program (the Project), Ms. Josée Perron of Energy, Mines and Resources: Assessment and Abandoned Mines (AAM) has requested that WorleyParsons Canada Services Ltd. (WorleyParsons) prepare a survey criteria document (the Criteria) to support the completion of a field survey program (the Survey) by Underhill Geomatics Ltd. (Underhill). The Criteria outlines the following elements of the Survey:

- Clinton Creek site components to be surveyed, including:
  - Description of the site component;
  - Approximate location including coordinates where applicable;
  - Definition of the survey information required specific to each component;
- Survey benchmarks and monuments to be installed or replaced;
- Level of accuracy;
- Checklist;
- Communication procedures; and
- Reporting.

2. SITE COMPONENTS

The Survey is comprised of the site components presented in

Table A and shown on Sketch Nos. 001 and 002 included as Appendix 1.

Table A Site Components to be Surveyed

Component	Description	Approximate Location(s)[1]	Required Survey Information[2]
Clinton Creek access road	Tension cracks located along the access road	Downstream of Drop Structure No. 4 (Stations 0+250 to 0+650)	1. Coordinates (northing, easting, elevation [NEZ]) at either end of the tension cracks or significant changes in direction of the tension crack (i.e., > 30 deg. bend in the crack) 2. Photos of the cracks 3. Any comments regarding the crack (e.g., distance from edge, approximate width and depth) 4. Offset points can be used if slope appears to be unstable 5. 2012 baseline coordinates at each stake (NEZ)
Hudgeon Lake outlet	The lake water level and log boom location	The upstream end of Clinton Creek (70 m upstream of Drop Structure No. 1)	1. Top of bank freeboard coordinates at minimum of five locations (NEZ) 2. Lake water level elevation with a corresponding shot on and reading of the water level gauge located south of the outlet 3. Detailed pickup of log boom abutment and foundation including (but not limited to): extents of rock armouring, feature points of abutment structures, and top of bank above abutments 4. Comments regarding the condition of the abutment infrastructure including visible damage, debris collection, or erosion
Gabion Drop Structure No. 1	Top of bank freeboard at upstream and downstream end of Drop Structure No. 1 and associated slope monitors installed along channel bank	Station 0+050	1. Top of bank on north and south side of Drop Structure No. 1 at upstream and downstream ends (NEZ) 2. Creek water surface elevation 3. Cross-sections (across the channel) between slope monitor pin Nos. 1,450 to 1,453 4. Survey ground level at the base of the pin on the side of the pin furthest from the creek 5. Photos of the slope monitors 6. Comments regarding the condition of the slope monitors (e.g., vertical or horizontal displacement) and gabion baskets (e.g., signs of erosion above gabion baskets, damaged gabion baskets, debris)

Component	Description	Approximate Location(s)[1]	Required Survey Information[2]
Gabion Drop Structure Nos. 2 and 3	Survey of associated slope monitors installed along channel banks	Stations 0+100 and 0+150	1. Cross sections (across the channel) between slope monitor pin Nos. 1,454 to 1,461 2. Survey ground level at the base of the pin on the side of the pin furthest from the creek 3. Photos of the slope monitors 4. Comments regarding the condition of the slope monitors (e.g., vertical or horizontal displacement)
Gabion Drop Structure No. 4	Detailed topographic survey of the drop structure and associated slope monitors installed along channel banks	210 m downstream of Hudgeon Lake outlet	1. Minimum of five cross-sections extending either 10 m beyond the north and south extents of the existing gabion baskets or to top of bank, whichever is greater, and including cross-sections between slope monitor pin Nos. 1,462 to 1,465 Shots to be taken at top of slope, mid-slope, bottom of slope, centreline, and at the top of every course of gabion basket (NEZ). 2. Photos looking across the channel corresponding to the cross-section locations 3. Profile surveys along top and bottom of gabion slope on both sides of the channel extending 20 m beyond the east and west extents of the existing gabion baskets Shots to be taken every 5 m (minimum) and at significant break points (i.e., grade change > 5%) (NEZ) 4. Additional break lines defining significant topographic or infrastructure features (e.g., start of drop structure chute, damaged gabion baskets, etc.) (NEZ) 5. Photos looking upstream and downstream taken at the upstream and downstream ends of Drop Structure No. 4 6. Comments regarding the condition of the slope monitors (e.g., vertical or horizontal displacement) and gabion baskets (e.g., signs of erosion above gabion baskets, damaged gabion baskets, debris) 7. Survey ground level at the base of the pin on the side of the pin furthest from the creek 8. Photos of slope monitors
Clinton Creek channel profile	Profile survey of the Clinton Creek channel invert	First ford to Hudgeon Lake (Stations 0+020 to 1+000)	1. Profile survey along the centre of the channel (or deepest part of the channel). Shots to be taken every 10 m, at significant grade breaks (> 5%), and at channel bends (> 15% change of direction) 2. Photos taken every 50 m and at significant grade breaks and channel bends 3. Comments regarding the condition of the creek channel (e.g., erosion / failure of the north and south slopes, debris, blockages)

Component	Description	Approximate Location(s)[1]	Required Survey Information[2]
Clinton Creek channel cross-sections	Cross-sectional survey of the Clinton Creek channel	A. Immediately downstream of Drop Structure No. 2 (Station 0+120) B. Immediately downstream of Drop Structure No. 3 (Station 0+155) C. Immediately downstream of Drop Structure No. 4 (Station 0+210) D. 250 m downstream of Drop Structure No. 4 (Station 0+450) E. 360 m downstream of Drop Structure No. 4 (Station 0+560) F. 200 m downstream of Drop Structure No. 4 (Station 0+400)	1. Cross-sectional survey extending to the top of bank on the north side of the channel and to the 420 m contour (approximately) on the south side of the channel Shots to be taken every 5 m (minimum), and at significant grade breaks (> 5%) and prominent topographic features (e.g., top of slope, mid-slope, bottom of slope and creek centreline) (NEZ) 2. Photos taken looking across the channel corresponding to the cross-section location 3. Comments regarding the condition of the channel (e.g., signs of erosion, debris, or blockage) the access road (e.g., signs of erosion or tension cracks) and the waste rock dump (e.g., signs of erosion, tension cracks, or slope failures) along the cross-section 4. Offset points can be used if slope appears to be unstable
Clinton Creek waste rock pile	Survey of waste rock pile monitors	Throughout the waste rock dump	1. Slope monitor pin coordinates (NEZ) 2. Survey ground level at the base of the pin on the side of the pin furthest from the creek
Clinton Creek natural slope	Survey of new slope monitor pins located on north slope of Clinton Creek channel	Opposite waste rock pile slope	1. Slope monitor pin coordinates (NEZ) 2. Survey ground level at the base of the pin on the side of the pin furthest from the creek 3. Location of new monitor pins discussed in Section 3**Error! Reference source not found.**
Porcupine Pit	Survey of Porcupine Pit slope monitors	300 m east of the impounded water at the bottom of porcupine pit	1. Slope monitor pin coordinates (NEZ) 2. Survey ground level at the base of the pin on the side of the pin furthest from the creek

Component	Description	Approximate Location(s)[1]	Required Survey Information[2]
Wolverine Creek tailings pile	Survey of tailings pile slope monitors	Throughout the tailings pile slope	1. Slope monitor pin coordinates (NEZ) 2. Survey ground level at the base of the pin on the side of the pin furthest from the creek
Wolverine Creek tailings pile ponds	Survey of the extents of the Wolverine Creek ponds	Below the Wolverine Creek tailings pile (1,200 m upstream of the confluence with Clinton Creek	1. Pond extents (i.e., outer boundary of standing water in the ponds) (NEZ) 2. Cross-section at the pond outlets, including the tops of slope, bottoms of slope, and centreline
Wolverine Creek channel profile	Profile survey of the Wolverine Creek channel invert	From tailings pile ponds to confluence with Clinton Creek (approximately 1,300 m)	1. Profile survey along the centre of the channel (or deepest part of the channel). Shots to be taken every 10 m (minimum), at rock weirs (upstream and downstream), at significant grade breaks (> 5%), and at channel bends (> 15% change of direction) 2. Photos taken every 50 m and at significant grade breaks and channel bends 3. Comments regarding the condition of the creek channel (e.g., erosion / failure of the east and west slopes, damage to rock weirs, debris, blockages)
Wolverine Creek cross-sections	Cross-sectional survey of the Wolverine Creek channel	Every 200 m (Stations 0+200 to 1+200) from tailings pile ponds to confluence with Clinton Creek	1. Cross-sectional survey extending to the top of bank on the undisturbed natural slopes to the east and west of the Wolverine Creek channel Shots to be taken every 5 m (minimum), and at significant grade breaks (> 5%) and prominent topographic features (e.g., top of slope, mid-slope, bottom of slope and creek centreline) (NEZ) 2. Photos taken looking across the channel corresponding to the cross-section location 3. Comments regarding the condition of the channel (e.g., signs of erosion, debris, or blockage) the access road (e.g., signs of erosion or tension cracks) and the waste rock dump (e.g., signs of erosion, tension cracks, or slope failures) along the cross-section 4. Offset points can be used if slope appears to be unstable 5. Cross-sections locations are to be selected based on accessibility and channel composition (i.e., cross-section should be surveyed at a location that is best representative of each 200 m of creek channel based on its width, depth, vegetative cover, distance to natural slope, and rock armouring)
Wolverine Creek natural slope	Survey of new slope monitor pins located on east slope of Wolverine Creek valley	Opposite tailings pile slope	1. Slope monitor pin coordinates (NEZ) 2. Survey ground level at the base of the pin on the side of the pin furthest from the creek 3. Location of new monitor pins discussed in Section Section 3

Component	Description	Approximate Location(s)[1]	Required Survey Information[2]
Existing rock stockpiles	Quantity survey of existing rock stockpiles	Near Hudgeon Lake and at the site entrance	1. Quantity survey to determine the volume of rock stockpiles located in the vicinity of Hudgeon lake and at the entrance to the site (NEZ) 2. Breaklines sufficient to construct a digital elevation model (DEM)

[1]Clinton Creek stationing begins at the outlet of Hudgeon Lake (Station -0+020) and continues downstream to the first ford (Station 1+000).

[2]NEZ acronym refers to northing / easting coordinates and elevation.

3. SURVEY BENCHMARKS AND MONUMENTS

The requirements for the installation and replacement of monuments and monitor pins are presented in Table B.

Table B Monument and Monitor Pin Requirements

Type	Purpose	Installation Criteria
Existing monuments	To replace monuments destroyed, damaged, or made otherwise unstable since the completion of the 2012 survey program	Install a replacement monument as close to the location of the existing monument as practicable. If the surrounding area has become unstable, a new location will be selected that is assumed to be stable (i.e., will not be impacted by nearby slope failures) and provides line of site to control points U2836 or U2834.
Existing slope monitors	To replace monitor pins destroyed, damaged, or made otherwise unstable since the completion of the 2012 survey program	Install a replacement monitor pin as close to the location of the existing monitor pin as practicable. If the surrounding area has become unstable, a new location will be selected that is assumed to be stable (i.e., will not be impacted by nearby slope failures) and provides line of site to control points U2836 or U2834.
Clinton Creek natural slope monitors	To install pins to monitor the movement of the natural slope above Clinton Creek	Install two monitor pins on the natural slope north of Clinton Creek. The pins should be installed at or near Stations 0+150 and 0+320, set back approximately 10 m from the top of bank.
Wolverine Creek natural slope monitors	To install pins to monitor the movement of the natural slope above Wolverine Creek	Install two monitor pins on the natural slope east of Wolverine Creek. The pins should be installed at or near Stations 1+000 and 0+600, set back approximately 10 m from the top of bank.
Cross-section markers	To install monitor pins to demark the extents of cross-sections F, and I through N	Install monitor pins corresponding to the beginning and end of the surveyed cross section.

Care should be taken to install the natural slope monitor pins in a location that is influenced by the movement of the slope but is not likely to be damaged due to a slope failure. It is recommended that, prior to installation, the proposed locations of the natural slope monitors are staked out in the field. Photos of the proposed location and an approximate location identified on Figures 1 or 2 should be sent to WorleyParsons upon Underhill's return to Dawson City. WorleyParsons will review the proposed locations and provide confirmation, via e-mail, that the locations are acceptable prior to Underhill departing for site the next morning.

4. SURVEY PRACTICES

4.1 Level of Accuracy

Throughout the Survey, Underhill will maintain a horizontal and vertical accuracy of ±2 cm to 3 cm. If this level of accuracy is not achievable, Underhill will make note of the level of accuracy achieved, the reason(s) for the loss of accuracy, (e.g., signal loss, line of site constraints, distance constraints), and which survey points were affected.

4.2 Data Collection

Underhill shall use Real Time Kinematic (RTK) technology to collect survey data with RTK base stations established on top of control point U2836 (for Clinton Creek surveys) or U2834 (for Wolverine Creek surveys). It is assumed that line of sight can be maintained from these control points to all site components including the creek channels and existing and proposed slope monitoring points.

Various control points located throughout the site will be checked following each set up to verify the position of the RTK base station.

The recommended survey conventions to be used to complete the Survey are presented in Table C.

Table C Survey Conventions

Component	Recommended Convention
Slope monitor pins	Survey reading should be taken at ground level at the base of the pin on the side of the pin farthest from the creek or pit
Clinton Creek access road	Face Clinton Creek when taking survey readings
Hudgeon Lake outlet	Face centre of outlet when taking survey readings
Clinton Creek drop structures, profile, cross-sections, and natural slope monitor pins	Face Clinton Creek when taking survey readings
Waste rock pile	Face Clinton Creek when taking survey readings
Porcupine Pit	Face the pit when taking survey readings
Tailings pile	Face Wolverine Creek when taking survey readings
Wolverine Creek ponds	Face centre of pond when taking survey readings
Wolverine Creek profile, cross-sections, and natural slope monitor pins	Face Wolverine Creek when taking survey readings
Existing rock stockpiles	Face centre of stockpile when taking survey readings

4.3 Geodetic Reference System

Survey results are to be provided in reference to the UTM NAD83, Zone 7 projection.

5. CHECKLIST

A checklist detailing the site components requiring survey, slope monitor repairs / replacements, and anticipated field practices that comprise the survey program is included in Appendix 2 and as a separate digital file.

Following the final day of field activities, Underhill will forward the checklist to WorleyParsons. The checklist will be used by both parties to confirm that the field portion of the Survey is complete and will identify any portions of the Survey that were not completed (in addition to the site constraints that resulted in their incompletion).

6. COMMUNICATION PROCEDURES

During the Survey, it is understood that Underhill will maintain a satellite phone to facilitate communication with WorleyParsons. This method of communication with WorleyParsons should be used for all urgent field matters (e.g., requests for clarification of instructions, identification of site constraints).

For all non-urgent matters (e.g., progress updates, project management, etc.) it is proposed that e-mail will be the primary form of communication.

WorleyParsons staff contact information is summarized in the Table D.

Table D WorleyParsons Staff Contact Information

Staff (Role)	Role	Contact Information
Jake Gentles	Water Resource Engineer	Office: +1 778-945-5467 Cellular: +1 778-549-4378 E-mail: Jake.Gentles@WorleyParsons.com
Lee Martin	Project Manager	Office: +1 778-945-5234 E-mail: Lee.Martin@WorleyParsons.com
Alex Timmis	Senior Water Resource Engineer	Office: +1 778-945-5503 E-mail: Alex.Timmis@WorleyParsons.com

7. REPORTING

Underhill will submit the following information to WorleyParsons at, or prior to, the completion of the Survey program:

- Completed checklist (refer to Appendix 2);
- Copies of field notes;
- Photos taken at the site;
- Spreadsheet, in .xls or .xlsx format, containing survey information including point identifiers, coordinates, elevations, as well as associated photo numbers and comments;
- Drawing file, in .dwg format, containing individual survey points and breaklines; and
- Detailed description of survey methodologies including quality control procedures.

WorleyParsons will include the above listed items in its report to the AAM.

We trust that this report provides sufficient information to support the completion of the Survey program.

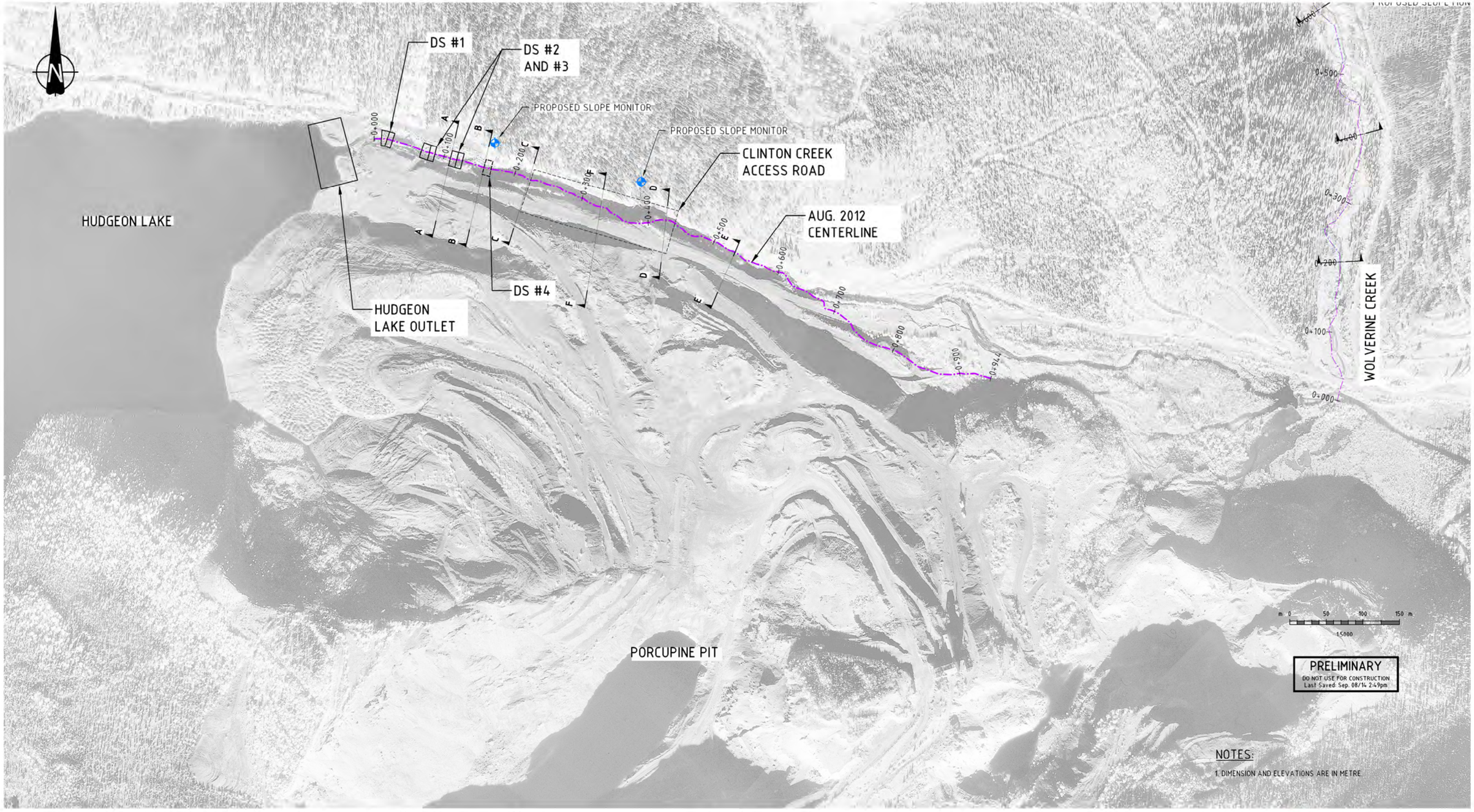
Sincerely,

Alex Timmis, P. Eng.
Senior Water Resource Engineer
BC Business Unit
Infrastructure & Environment
WorleyParsons Canada Services Ltd.

JRG/lmv
encl.

cc: Lee Martin, WorleyParsons Canada Services Ltd.
Jake Gentles, WorleyParsons Canada Services Ltd.

Appendix 1 Sketches



NOTES:

1. DIMENSION AND ELEVATIONS ARE IN METRE

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A	04-SEP-14	ISSUED FOR REVIEW	JH	-	JG	AT	AT			

D SHEET SCALE

OneWay to zero harm

WORLEYPARSONS PROJECT No

307071-00997

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

"This drawing is prepared for the use of the contractual customer of WorleyParsons Canada Services Ltd. and WorleyParsons Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing."

WorleyParsons
resources & energy

CLINTON CREEK
LONG TERM GEOTECHNICAL
MONITORING PROGRAM
CLINTON CREEK SITE COMPONENTS

DRG No 307071-00997-00-CI-1000-01

REV 0

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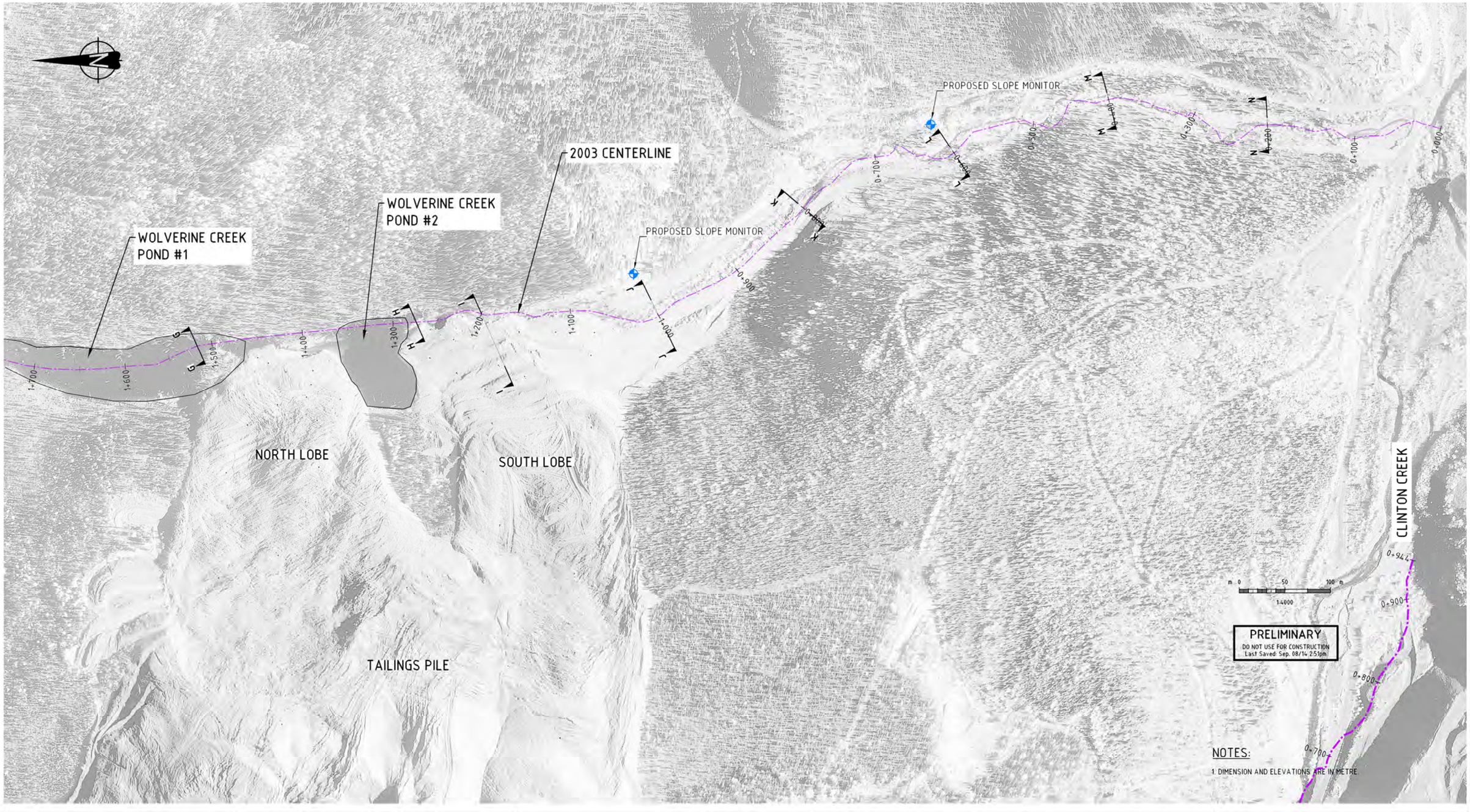

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A	04-SEP-14	ISSUED FOR REVIEW	JH	-	JG	AT	AT	-		

D SHEET | SCALE

OneWay to zero harm

WORLEYPARSONS PROJECT No
307071-00997

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

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resources & energy

CLINTON CREEK
LONG TERM GEOTECHNICAL
MONITORING PROGRAM
WOLVERINE CREEK SITE COMPONENTS

DRG No 307071-00997-00-CI-1000-02 | REV 0

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SAVE DATE & TIME: 8/9/2014 2:51:09 PM

Appendix 2 Site Component Survey Checklist

WorleyParsons resources & energy	**Clinton Creek: Long Term Geotechnical Monitoring Program Site Component Survey Checklist**	
Underhill Surveyors		
Sheet	Project No.	**307071-00997**

Field Day 1 – __-SEP-2014			
Weather			
Hudgeon Lake WL - AM		Hudgeon Lake WL - PM	
Ford-1 WL - AM		Ford-1 WL - PM	
Estimated Flow Velocity		Estimated Flow Depth	
Site Components Surveyed			
Field Day 2 – __-SEP-2014			
Weather			
Hudgeon Lake WL - AM		Hudgeon Lake WL - PM	
Ford-1 WL - AM		Ford-1 WL - PM	
Estimated Flow Velocity		Estimated Flow Depth	
Site Components Surveyed			
Field Day 3 – __-SEP-2014			
Weather			
Hudgeon Lake WL - AM		Hudgeon Lake WL - PM	
Ford-1 WL - AM		Ford-1 WL - PM	
Estimated Flow Velocity		Estimated Flow Depth	
Site Components Surveyed			
Field Day 4 – __-SEP-2014			
Weather			
Hudgeon Lake WL - AM		Hudgeon Lake WL - PM	
Ford-1 WL - AM		Ford-1 WL - PM	
Estimated Flow Velocity		Estimated Flow Depth	
Site Components Surveyed			
Field Day 5 – __-SEP-2014			
Weather			
Hudgeon Lake WL - AM		Hudgeon Lake WL - PM	
Ford-1 WL - AM		Ford-1 WL - PM	
Estimated Flow Velocity		Estimated Flow Depth	
Site Components Surveyed			

WorleyParsons resources & energy	**Clinton Creek: Long Term Geotechnical Monitoring Program Site Component Survey Checklist**	

Underhill Surveyors			
Sheet		Project No.	**307071-00997**

Field Day 6 – __-SEP-2014			
Weather			
Hudgeon Lake WL - AM		Hudgeon Lake WL - PM	
Ford-1 WL - AM		Ford-1 WL - PM	
Estimated Flow Velocity		Estimated Flow Depth	
Site Components Surveyed			
Field Day 7 – __-SEP-2014			
Weather			
Hudgeon Lake WL - AM		Hudgeon Lake WL - PM	
Ford-1 WL - AM		Ford-1 WL - PM	
Estimated Flow Velocity		Estimated Flow Depth	
Site Components Surveyed			

Site Components				
Clinton Creek Access Road	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Hudgeon Lake Outlet	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Gabion DS #1	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Gabion DSs #2 and #3	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Gabion DS #4	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Clinton Creek Channel Profile	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Clinton Creek Channel Cross-Sections	Date Completed		All Information Collected	**Y / N**
	Not Collected			

WorleyParsons resources & energy	**Clinton Creek: Long Term Geotechnical Monitoring Program Site Component Survey Checklist**	
Underhill Surveyors		
Sheet		Project No. **307071-00997**
	Reason	

Site Components (continued)				
Clinton Creek Waste Rock Pile	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Clinton Creek Natural Slope	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Porcupine Pit	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Wolverine Creek Tailings Pile	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Wolverine Creek Ponds	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Wolverine Creek Channel Profile	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Wolverine Creek Cross-Sections	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Wolverine Creek Natural Slope	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			
Existing Rock Stockpiles	Date Completed		All Information Collected	**Y / N**
	Not Collected			
	Reason			

	Completed By	**Confirmed By**	**Accepted By**

WorleyParsons resources & energy	**Clinton Creek: Long Term Geotechnical Monitoring Program Site Component Survey Checklist**	
Underhill Surveyors		
Sheet		Project No. **307071-00997**

Survey Lead			
Organization			
Sign			
Date			

Appendix 3 Site Photographs

Photo 1: Access Road north of Porcupine Pit looking east.

Photo 2: Access Road north of Porcupine Pit looking south.

Photo 3: Access Road east of DS4 looking north.

Photo 4: Access Road east of DS4 looking east.

Photo 5: Access road north of Snowshoe Pit looking northwest.

Photo 6: Access road north of Snowshoe Pit looking west.

Photo 7: Access road north of Snowshoe Pit looking west.

Photo 8: **Decommissioned access road and Clinton Creek east of DS4 looking west.**

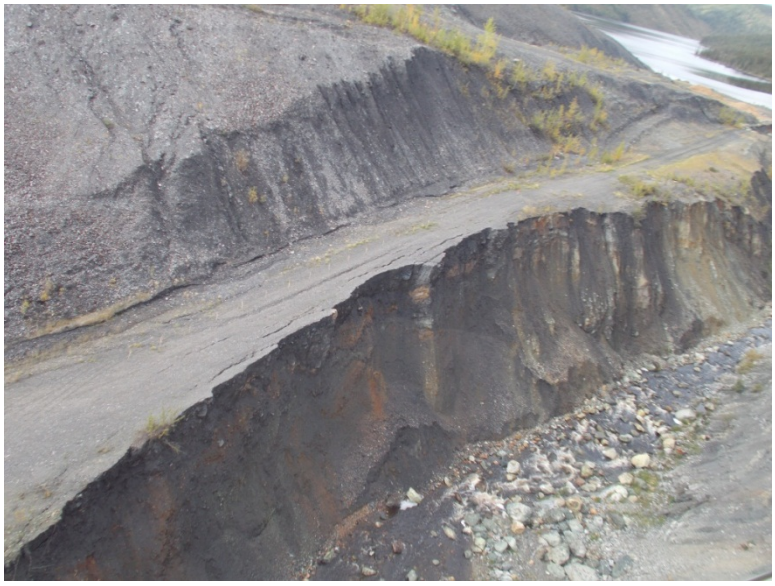

Photo 9: Decommissioned access road east of DS4 looking southwest.

Photo 10: Decommissioned access road east of DS4 looking southwest.

Photo 11: Decommissioned access road and Clinton Creek east of DS4 looking west.

Photo 12: Decommissioned access road and Clinton Creek east of DS4 looking west.

Photo 13: Decommissioned access road east of DS4 looking north.

Photo 14: Decommissioned access road east of DS4 looking east.

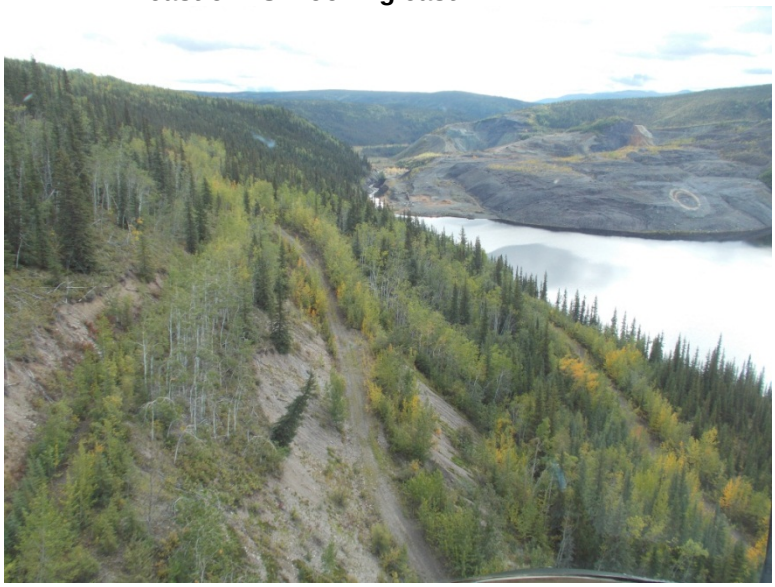

Photo 15: Mill access road north of Hudgeon Lake looking east.

Photo 16: Mill access road north of Hudgeon Lake looking east.

Photo 17: Mill access road north of Clinton Creek looking northeast.

Photo 18: Access Road at Primary Ford Crossing looking south.

Photo 19: Access road west of confluence of Clinton Creek and Wolverine Creek looking northeast.

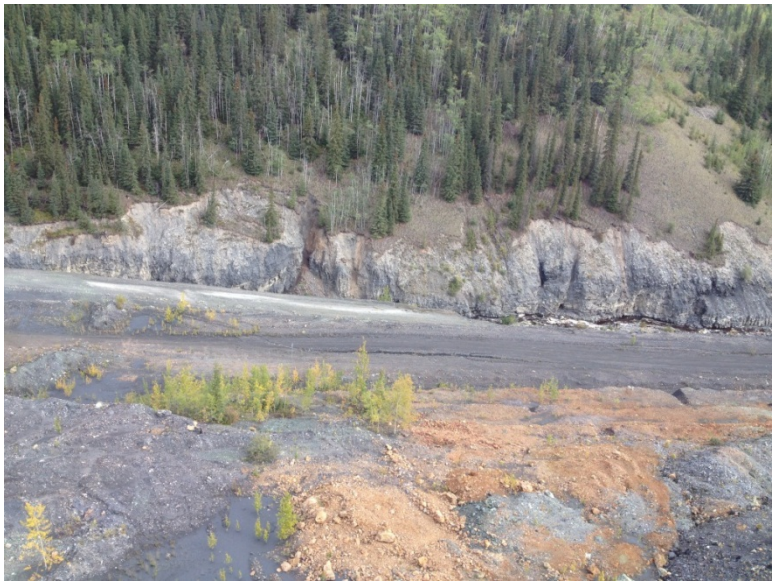

Photo 20: Access road north of Snowshoe Pit looking north.

Photo 21: Access road north of Snowshoe Pit looking northwest.

Photo 22: Access road at confluence of Clinton Creek and Wolverine Creek looking southwest.

Photo 23: Access road at primary ford crossing looking south.

Photo 24: DS1 looking north.

Photo 25: DS1 looking north.

Photo 26: Tension cracks located along south bank of DS1 looking east (downstream).

Photo 27: DS2 looking northwest.

Photo 28: DS3 looking north.

Photo 29: Vertically displaced gabion basket at DS3 looking northeast.

Photo 30: DS3 looking northwest.

Photo 31: DS3 looking northwest.

Photo 32: Vertically displaced gabion basket at DS3 looking north.

Photo 33: DS4 looking north.

Photo 34: DS4 looking north.

Photo 35: Failed gabion basket downstream (east) of DS4.

Photo 36: Tension cracks along south bank of DS4 looking west (upstream).

Photo 37: DS4 looking northwest.

Photo 38: DS4 looking north.

Photo 39: DS4 looking northwest.

Photo 40: DS4 looking northwest.

Photo 41: DS4 in 2013 looking north.

Photo 42: DS4 in 2013 looking north.

Photo 43: Drop structures looking northwest.

Photo 44: Drop structures looking east.

Photo 45: Drop structures looking north.

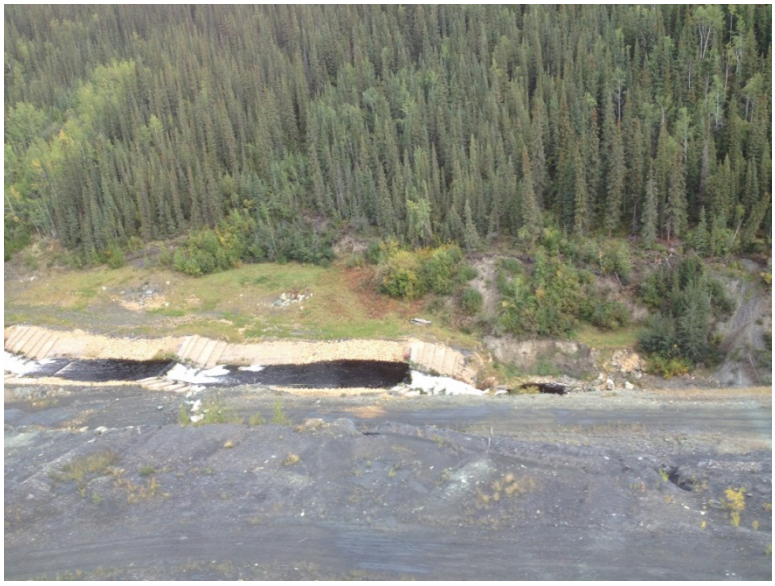

Photo 46: Drop structures looking north.

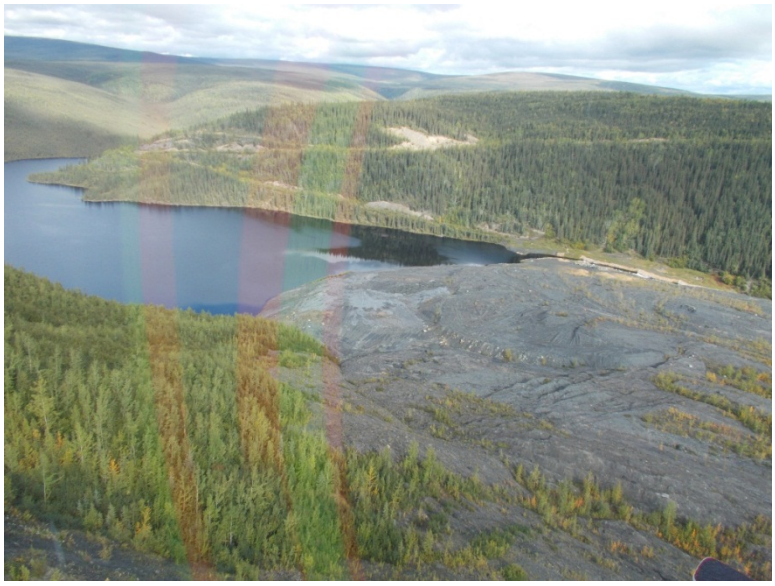

Photo 47: Waste dump looking northwest.

Photo 48: Waste dump looking southeast.

Photo 49: Hudgeon Lake outlet looking northwest.

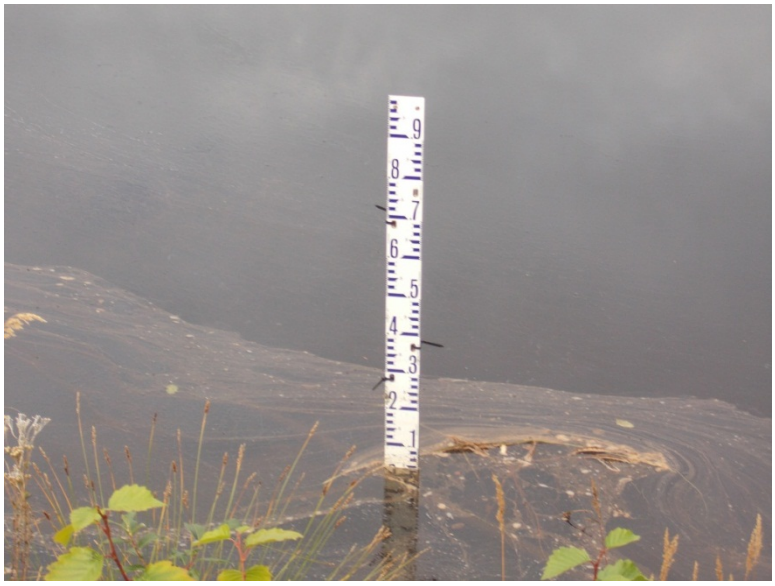

Photo 50: Hudgeon Lake water level gauge looking west.

Photo 51: Hudgeon Lake water level gauge looking west.

Photo 52: Porcupine Pit looking southwest.

Photo 53: Porcupine Pit looking northeast.

Photo 54: Snowshoe Pit looking south.

Photo 55: Tailings slope looking north.

Photo 56: Tailings slope looking west.

Photo 57: Tailings slope looking southeast.

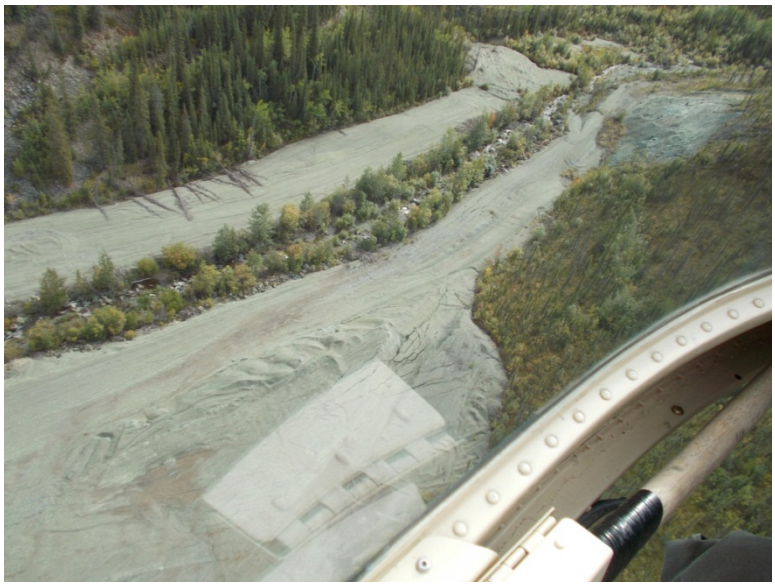

Photo 58: Tailings slope and Wolverine Creek looking southeast.

Photo 59: Tailings slope looking northwest.

Photo 60: Tailings slope looking northwest.

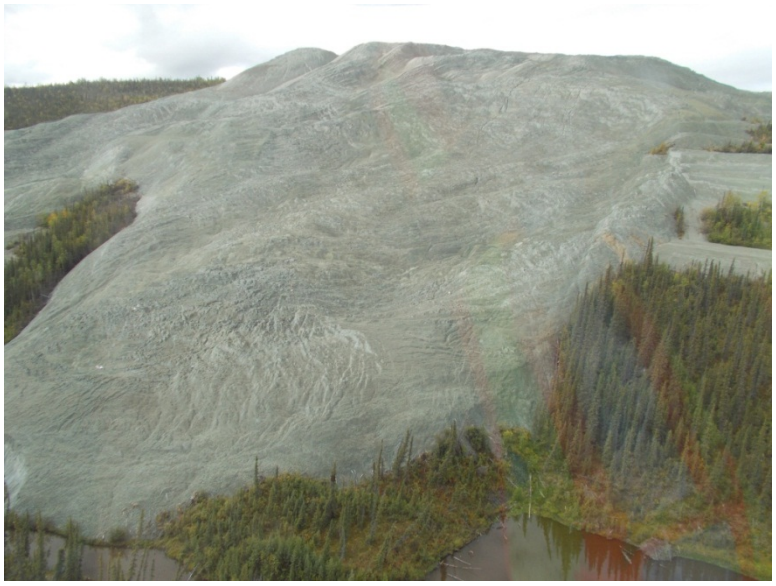

Photo 61: Tailings slope looking west.

Photo 62: Tailings slope looking southwest.

Photo 63: Tailings slope and tailings pond looking west.

Photo 64: Tailings slope and tailings pond looking west.

Photo 65: Tailings slope and tailings pond looking south.

Photo 66: Tailings slope looking southwest.

Photo 67: Mill site looking south.

Photo 68: Wolverine Creek looking southeast.

Photo 69: Wolverine Creek at confluence with Clinton Creek looking east.

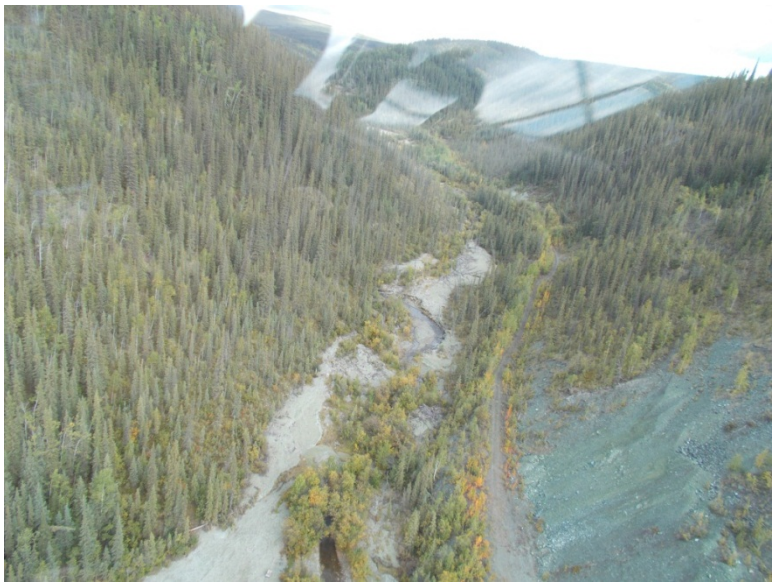

Photo 70: Wolverine Creek looking southeast.

Photo 71: Wolverine Creek at confluence with Clinton Creek looking southeast.

Photo 72: Wolverine Creek near confluence with Clinton Creek looking south (downstream toward access road).

Photo 73: Wolverine Creek north of confluence with Clinton Creek looking north.

Photo 74: Wolverine Creek north of confluence with Clinton Creek looking northeast (upstream).

Photo 75: Wolverine Creek north of confluence with Clinton Creek looking north (upstream).

Photo 76: Wolverine Creek north of confluence with Clinton Creek looking east.

Photo 77: Wolverine Creek north of confluence with Clinton Creek looking east.

Photo 78: Wolverine Creek north of confluence with Clinton Creek looking east.

Photo 79: Wolverine Creek north of confluence with Clinton Creek looking east.

Photo 80: Wolverine Creek north of confluence with Clinton Creek looking northeast.

Photo 81: Wolverine Creek tailings ponds looking southeast.

Appendix 4 Survey Checklist

WorleyParsons resources & energy	**Clinton Creek: Long Term Geotechnical Monitoring Program Site Component Survey Checklist**		
Underhill Surveyors	**Robin Cunningham, Josh Smith**		
Sheet		Project No.	**307071-00997**

Field Day 1 – _09_-SEP-2014			
Weather	**Sunny 13 degrees**		
Hudgeon Lake WL - AM	**NA**	Hudgeon Lake WL - PM	**411.645**
Ford-1 WL - AM	**NA**	Ford-1 WL - PM	**NA**
Estimated Flow Velocity	**NA**	Estimated Flow Depth	**NA**
Site Components Surveyed	**Hudgeon lake topog Gabion X-Sections stockpiles at Hudgeon lake**		
Field Day 2 – _10_-SEP-2014			
Weather	**Sunny 16 degrees**		
Hudgeon Lake WL - AM	**411.656**	Hudgeon Lake WL - PM	**411.643**
Ford-1 WL - AM	**NA**	Ford-1 WL - PM	**2014-09-10 pt#10743**
Estimated Flow Velocity	**.7m per second**	Estimated Flow Depth	**NA**
Site Components Surveyed	**Clinton creek profile porcupine pit Clinton creek waste pile Baseline cracks Stockpiles at entrance to mine site**		
Field Day 3 – _11_-SEP-2014			
Weather	**Sunny 16 Degrees**		
Hudgeon Lake WL - AM	**411.639**	Hudgeon Lake WL - PM	**411.637**
Ford-1 WL - AM	**-.05m on gauge**	Ford-1 WL - PM	**-.05m on gauge**
Estimated Flow Velocity	**.85m per second**	Estimated Flow Depth	**.23m**
Site Components Surveyed	**Clinton creek profile Clinton creek x-sections Clinton creek waste pile**		
Field Day 4 – _12_-SEP-2014			
Weather	**Overcast 13 degrees**		
Hudgeon Lake WL - AM	**-.031m on gauge**	Hudgeon Lake WL - PM	**-0.032 on gauge**
Ford-1 WL - AM	**-0.06m on gauge**	Ford-1 WL - PM	**NA-0.06m on gauge**
Estimated Flow Velocity	**0.72m per second**	Estimated Flow Depth	**0.22m**
Site Components Surveyed	**Wolverine Tailing s monitors Wolverine Ponds and small Creek Part of the profile for wolverine creek**		
Field Day 5 – 13-SEP-2014			
Weather	**Sun with clouds 15 degees**		
Hudgeon Lake WL - AM	**-0.04m on gauge**	Hudgeon Lake WL - PM	**-0.04m on gauge**
Ford-1 WL - AM	**-0.07m on gauge**	Ford-1 WL - PM	**-0.07m on gauge**

WorleyParsons resources & energy	**Clinton Creek: Long Term Geotechnical Monitoring Program Site Component Survey Checklist**	

Underhill Surveyors	**Robin Cunningham, Josh Smith**		
Sheet		Project No.	**307071-00997**

Estimated Flow Velocity	**0.68m per second**	Estimated Flow Depth	**0.21m**
Site Components Surveyed	**Wolverine creek profile Wolverine X-Sections Wolverine slope monitors**		

Field Day 6 – _14_-SEP-2014			
Weather	**12 degrees, overcast**		
Hudgeon Lake WL - AM	**-0.48 on gauge**	Hudgeon Lake WL - PM	**NA**
Ford-1 WL - AM	**-0.69 on gauge**	Ford-1 WL - PM	**NA**
Estimated Flow Velocity	**.7m per second**	Estimated Flow Depth	**0.21m**
Site Components Surveyed	**Picked up additional information at the Drop Structures (1-4) and at the abutment**		

Field Day 7 – __-SEP-2014			
Weather			
Hudgeon Lake WL - AM		Hudgeon Lake WL - PM	
Ford-1 WL - AM		Ford-1 WL - PM	
Estimated Flow Velocity		Estimated Flow Depth	
Site Components Surveyed			

Site Components				
Clinton Creek Access Road	Date Completed	**2014-09-10**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Hudgeon Lake Outlet	Date Completed	**2014-09-10**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Gabion DS #1	Date Completed	**2014-09-09**	All Information Collected	**Y / N YES**
	Not Collected	**SLIGHT DAMAGE ON FIRTST AND THIRD DROP**		
	Reason			
Gabion DSs #2 and #3	Date Completed	**2014-09-09**	All Information Collected	**Y / N YES**
	Not Collected	**BOTH GABION STRUCTURES LOOK GOOD**		
	Reason			
Gabion DS #4	Date Completed	**2014-09-09**	All Information Collected	**Y / N NO**
	Not Collected	**Some damaged Gabion baskets and top and botto of chute**		
	Reason	**Unstable Gabion structure, unsafe.**		
Clinton Creek Channel Profile	Date Completed	**2014-09-11**	All Information Collected	**Y / N YES**
	Not Collected			

WorleyParsons resources & energy	**Clinton Creek: Long Term Geotechnical Monitoring Program Site Component Survey Checklist**	
Underhill Surveyors	**Robin Cunningham, Josh Smith**	
Sheet	Project No.	**307071-00997**

	Reason			
Clinton Creek Channel Cross-Sections	Date Completed	**2014-09-11**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			

Site Components (continued)				
Clinton Creek Waste Rock Pile	Date Completed	**2014-09-11**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Clinton Creek Natural Slope	Date Completed	**2014-09-11**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Porcupine Pit	Date Completed	**2014-09-10**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Wolverine Creek Tailings Pile	Date Completed	**2014-09-13**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Wolverine Creek Ponds	Date Completed	**2014-09-12**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Wolverine Creek Channel Profile	Date Completed	**2014-09-13**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Wolverine Creek Cross-Sections	Date Completed	**2014-09-13**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Wolverine Creek Natural Slope	Date Completed	**2014-09-13**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			
Existing Rock Stockpiles	Date Completed	**2014-09-10**	All Information Collected	**Y / N YES**
	Not Collected			
	Reason			

WorleyParsons resources & energy	**Clinton Creek: Long Term Geotechnical Monitoring Program Site Component Survey Checklist**	
Underhill Surveyors	**Robin Cunningham, Josh Smith**	
Sheet	Project No.	**307071-00997**

	Completed By	**Confirmed By**	**Accepted By**
Survey Lead			
Organization			
Sign			
Date			

Appendix 5 Processed Survey Data

CLINTON CREEK LONG TERM PERFORMANCE MONITORING PROGRAM
SEPTEMBER 2014
UTM COORDINATES
NAD 83, Zone 7, 141° West

WorleyParsons
resources & energy

CONTROL			
POINT ID	**NORTHING**	**EASTING**	**OTHOMETRIC HEIGHT**
1086	7147972.219	513176.710	590.955
1192	7147563.984	512278.758	441.231
2834	7148172.673	513447.724	606.823
2835	7147272.790	513147.057	432.669

CLINTON CREEK WASTE ROCK DUMP MOVEMENT MONITORING				
POINT ID	**NORTHING**	**EASTING**	**ORTHOMETRIC HEIGHT**	**COMMENT**
2835	7147272.790	513147.057	432.669	Real Time Kinematic base for Markers shown below
68	7147262.139	513142.233	434.020	
224	7147241.314	512963.193	444.523	
226	7147311.803	513066.612	425.930	
229	7147113.598	512718.907	437.188	
1195	7147112.086	512899.548	456.343	
1196	7147231.499	513066.375	443.609	
1831	7147227.677	512766.422	432.352	
1833	7147303.035	512921.083	418.405	
1834	7146973.857	512893.361	460.943	
20-A	7147207.970	513057.231	445.421	
21-A	7147228.479	512915.073	446.097	
22-A	7147224.765	512841.180	444.382	
81-2	7147205.387	513011.585	443.531	
BH-10 (P2)	7147354.884	512999.361	415.776	
4	7147210.978	513193.592	434.821	
19-A	7147126.603	513363.543	428.293	
MM80-13	7147299.322	513183.804	413.100	
MM81-1	7147034.843	512978.964	455.037	
223	7146978.271	512942.787	467.014	
225	7146918.900	512905.205	474.977	
227	7147076.918	513124.759	439.305	
1194	7147017.624	513472.480	432.899	
BH-9 (P3)	7147309.412	513135.542	414.907	
BH-7 (P4)	7147239.399	513347.459	397.175	
BH-8 (P5)	7147182.891	513461.410	387.194	
XS-B	7147293.729	513274.213	404.301	
19-B	7147124.350	513365.730	428.400	
2836	7146814.744	513093.054	477.320	
222	7147265.377	513333.054	399.650	
219	7147288.625	513273.603	405.604	
69	7147329.218	513138.553	416.367	
1824	7147343.390	513082.351	415.723	
BH-4	7146871.269	513025.138	470.963	
BH-4CABLE	7146871.260	513025.107	470.960	
BH-1	7146863.978	513381.471	422.796	
BH-1CABLE	7146863.950	513380.954	422.844	
570S?	7146977.705	513497.384	436.535	
NO TAG(300)	7146927.574	513026.976	468.830	Add Tag 300
NO TAG (186)	7146818.509	513088.805	477.504	Add Tag 186
NO TAG (188)	7146813.852	513201.389	443.101	Add Tag 188
NO TAG (187)	7147292.215	513274.665	404.580	Add Tag 187
MM994	7147353.846	513040.053	416.007	
MM993	7147307.443	513182.346	414.575	
MM992	7147304.491	513189.139	413.707	
MM991	7147266.391	513284.237	403.597	
MM987(189 NEW)	7147169.924	513499.255	386.093	Did not found Replace-Add Tag 189
MM988	7147208.178	513432.056	388.860	
MM989	7147209.039	513433.414	388.682	
MM990	7147211.003	513440.581	388.350	
MM995	7147323.242	512802.355	413.598	

Note: Coordinates are NAD 83 UTM grid, derived from a least squares adjustment of GPS observations holding values of stations 1192 and 1086 fixed in 3D.

CONTROL				
POINT ID	**NORTHING**	**EASTING**	**ORTHOMETRIC HEIGHT**	**COMMENT**
2835	7147272.790	513147.057	432.669	Real Time Kinematic base for Markers shown below

PORCUPINE PIT AREA MOVEMENT MONITORING			
	NORTHING	EASTING	ORTHOMETRIC HEIGHT
1839	7146861.379	513285.137	428.063
1838	7146491.908	513380.512	468.346
1837	7146502.925	513411.370	470.215
1830	7146523.822	513455.673	471.664
1832	7146537.079	513483.128	473.627
U1493	7146802.392	513576.561	452.526

CROSS SECTION OF GABION NOS. 1 TO 4
MOVEMENT MONITORS (NOS. 1450 TO 1465)

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
2835	7147272.790	513147.057	432.669	Real Time Kinematic base for Gabion cross sections

GABION NO. 1A

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
10019	7147441.263	512890.144	413.627	GROUND MONITORING 1450
10018	7147441.229	512890.136	413.732	TOP MONITORING 1450
10074	7147440.388	512890.135	413.508	OG
10073	7147438.992	512889.994	413.263	GABIONEDGE
10072	7147438.226	512889.939	413.181	GABIONTOE3
10071	7147438.078	512889.933	413.521	GABIONTOP3
208570	7147437.851	512889.033	413.547	GABION 1 FEEBOARD
10070	7147437.222	512889.826	413.446	GABIONTOP2
10069	7147437.08	512889.805	412.959	GABIONTOE2
10068	7147434.303	512889.668	412.326	GS
10067	7147430.948	512889.576	411.112	WE1
20184	7147428.374	512888.238	411.607	GABION H20
20183	7147428.367	512888.212	411.516	GABION
10066	7147427.289	512889.221	411.134	CL
10065	7147423.467	512889.027	411.195	WE
10064	7147420.383	512888.749	412.245	GS
10063	7147418.007	512888.563	412.923	GABIONTOE1
10062	7147417.91	512888.601	413.365	GABIONTOP1
208560	7147417.606	512887.517	413.449	GABION 1 FEEBOARD
10061	7147416.976	512888.505	413.455	GABIONTOP
10060	7147416.765	512888.466	412.98	GABIONTOE
10059	7147416.048	512888.443	412.993	GABIONEDGE
10058	7147414.369	512888.183	413.311	OG
10016	7147413.849	512888.129	413.439	TOP MONITORING 1451
10015	7147413.822	512888.131	413.333	GROUND MONITORING 1451

GABION NO. 1B

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
10020	7147438.992	512901.488	413.228	TOP MONITORING 1453
10021	7147438.992	512901.488	413.218	GROUND MONITORING 1453
10075	7147436.381	512900.45	412.009	OG
10076	7147434.898	512899.858	411.629	GABIONEDGE
10077	7147431.91	512898.797	410.558	GS
10078	7147430.044	512898.02	410.38	WE2
20185	7147428.305	512894.121	410.291	GABION
20186	7147428.268	512894.121	410.42	GABION H20
10079	7147425.865	512896.483	409.811	CL
10032	7147420.751	512894.764	410.394	WELEV
10080	7147420.5	512894.703	410.412	WE3
10081	7147417.344	512893.669	411.265	GS
10082	7147415.519	512893.187	411.679	GABIONEDGE
10083	7147415.007	512893.05	411.837	OG
10084	7147412.78	512892.313	412.508	GS
10013	7147411.953	512892.002	413.046	TOP MONITORING 1452
10014	7147411.928	512891.972	412.874	GROUND MONITORING 1452

GABION NO. 2A

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
10034	7147423.203	512948.577	412.293	GROUND MONITORING 1454
10033	7147423.174	512948.557	412.409	TOP MONITORING 1454
10097	7147422.25	512948.134	412.351	GS
10096	7147421.041	512947.65	412.251	OG
10095	7147420.3	512947.513	412.108	GABIONTOE5
10094	7147420.196	512947.473	412.342	GABIONTOP5
10093	7147416.461	512946.344	410.987	GS
10092	7147413.103	512945.424	409.617	WE5
10091	7147409.648	512944.147	409.484	CL
10090	7147406.97	512943.291	409.695	WE4
10089	7147403.588	512942.123	410.74	GS
10088	7147400.074	512940.846	411.861	GABIONTOP4
10087	7147399.987	512940.822	411.637	GABIONTOE4
10086	7147399.256	512940.536	411.654	OG

GABION NO. 2A

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
10085	7147398.544	512940.35	411.842	GS
10055	7147397.091	512939.938	411.947	TOP MONITORING 1455
10056	7147397.07	512939.916	411.834	GROUND MONITORING 1455

GABION NO. 2B

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
10036	7147420.478	512957.997	410.602	GROUND MONITORING 1457
10035	7147420.443	512957.979	410.713	TOP MONITORING 1457
10098	7147420.007	512957.755	410.57	GS
10099	7147418.415	512957.323	410.107	OG
10100	7147416.919	512956.981	409.739	GABIONEDGE
10101	7147413.739	512956.338	408.604	GS
10102	7147411.314	512955.824	407.641	WE6
10103	7147407.074	512954.836	406.988	CL
10104	7147402.635	512953.516	407.6	WE7
10105	7147398.701	512952.755	408.544	GS
10106	7147396.696	512952.324	409.012	GABIONEDGE
10107	7147395.202	512951.894	409.617	OG
10108	7147393.859	512951.45	410.434	GS
10053	7147393.128	512951.337	410.875	TOP MONITORING 1456
10054	7147393.095	512951.331	410.794	GROUND MONITORING 1456

GABION NO. 3A

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
10038	7147412.143	512986.894	409.705	GROUND MONITORING 1458
10037	7147412.105	512986.886	409.825	TOP MONITORING 1458
10119	7147411.032	512986.584	409.724	GS
10118	7147409.615	512986.178	409.853	OG
10117	7147409.087	512986.152	409.737	GABIONEDGE
10116	7147405.329	512985.14	408.304	GS
10115	7147401.509	512984.385	406.886	WE9
10114	7147398.092	512983.433	406.691	CL
10113	7147395.102	512982.794	406.816	WE8
10112	7147392.323	512981.829	407.803	GS
10111	7147389.18	512980.943	408.862	GABIONEDGE
10110	7147388.766	512980.851	408.911	OG
10109	7147387.464	512980.575	409.029	GS
10051	7147386.522	512980.341	409.313	TOP MONITORING 1459-A
10052	7147386.501	512980.341	409.212	GROUND MONITORING 1459-A

GABION NO. 3B

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
10040	7147410.133	512995.894	408.32	GROUND MONITORING 1461
10039	7147410.095	512995.884	408.485	TOP MONITORING 1461
10120	7147408.928	512995.621	408.062	GS
10121	7147407.55	512995.274	407.455	OG
10122	7147407.344	512995.211	407.385	GABIONEDGE
10123	7147404.259	512994.532	406.377	GS
10124	7147401.444	512993.581	405.35	WE10
10125	7147397.394	512992.613	404.414	CL
10126	7147391.137	512991.12	405.352	WE11
10127	7147388.112	512990.084	406.136	GS
10128	7147386.812	512989.789	406.484	GABIONEDGE
10129	7147383.66	512988.76	408.753	OG
10130	7147382.302	512988.639	408.942	GS
10049	7147381.621	512988.525	409.026	TOP MONITORING 1460-A
10050	7147381.575	512988.519	408.903	GROUND MONITORING 1460-A

GABION NO. 4 AND EXTENDED TOPOG

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
12540	7147421.083	513032.709	415.971	GS
12541	7147420.081	513034.761	415.932	GS
12539	7147419.389	513032.309	415.688	TOP81
12544	7147418.626	513035.798	415.958	GS
12542	7147418.599	513033.9	416.05	TOP81
12545	7147418.486	513037.38	416.189	GS
12548	7147417.744	513037.844	416.298	GS
12549	7147417.392	513038.964	416.813	GS
12543	7147417.145	513035.159	415.882	TOP81

GABION NO. 4 AND EXTENDED TOPOG

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
12552	7147417.138	513040.663	417.327	GS
12553	7147416.858	513042.231	418.235	GS
12546	7147416.673	513036.231	416.131	TOP81
12555	7147416.65	513043.617	418.397	GS
12547	7147416.311	513037.282	416.09	TOP81
12550	7147415.944	513038.578	416.621	TOP81
12551	7147415.301	513039.995	417.075	TOP81
12556	7147414.911	513043.353	418.185	TOP81
12554	7147414.886	513041.034	417.251	TOP81
12538	7147413.624	513041.001	415.838	GS
12537	7147413.233	513042.8	416.104	GS
12536	7147412.341	513044.555	416.143	GS
12526	7147411.878	513031.966	409.661	GS
12535	7147411.412	513046.223	416.293	GS
12527	7147410.656	513034.019	409.383	GS
12528	7147410.264	513035.531	410.034	GS
12529	7147409.802	513037.061	410.475	GS
12530	7147408.888	513038.335	410.941	GS
12501	7147408.12	513028.76	407.467	TOE80
12531	7147407.961	513039.664	411.039	GS
12532	7147407.359	513041.262	410.904	GS
12533	7147406.962	513042.343	410.973	GS
12534	7147406.68	513044.35	411.566	GS
12502	7147406.636	513030.371	407.529	TOE80
10146	7147405.664	513033.794	407.547	GS
12503	7147405.423	513033.72	407.467	TOE80
10147	7147405.173	513034.721	407.238	GS
12504	7147405.166	513034.807	407.203	TOE80
12505	7147404.494	513035.945	407.005	TOE80
20288	7147404.295	513009.913	407.567	TOP21
10175	7147404.141	513036.198	406.866	GS
20287	7147404.092	513013.566	407.58	TOP21
12506	7147403.902	513036.811	406.731	TOE80
105420	7147403.838	513014.42	407.632	TOP3
12507	7147403.601	513038.246	406.582	TOE80
10176	7147403.426	513038.039	406.566	GS
20286	7147402.928	513018.006	407.476	TOP21
12508	7147402.155	513039.056	406.365	TOE80
10214	7147402.084	513039.312	406.395	GS
10042	7147401.902	513033.735	407.195	GROUND MONITORING 1462-A
10041	7147401.855	513033.713	407.322	TOP MONITORING 1462-A
12509	7147401.452	513040.906	406.172	TOE80
20285	7147401.138	513023.118	407.474	TOP21
12510	7147400.94	513042.238	405.962	TOE80
10213	7147400.723	513038.811	406.316	GS
12525	7147400.686	513025.136	407.466	TOP80
10145	7147400.602	513032.022	407.494	GS
20277	7147400.376	513052.61	408.276	TOP21
10148	7147400.256	513033.155	407.392	GS
10177	7147400.191	513036.992	406.637	GS
20280	7147399.909	513043.889	406.007	TOP21
12513	7147399.906	513043.47	405.931	TOP80
12511	7147399.852	513043.116	405.855	TOE80
10174	7147399.685	513034.45	407.211	GS
12514	7147399.58	513043.031	405.838	TOP80
20278	7147399.467	513049.14	406.745	TOP21
10044	7147399.449	513040.354	406.125	GROUND MONITORING 1465
10043	7147399.415	513040.344	406.245	TOP MONITORING 1465
11183	7147399.379	513049.1	406.732	TOP53
12524	7147399.355	513027.418	407.44	TOP80
12512	7147399.351	513045.209	406.166	TOP80
105600	7147399.343	513049.493	406.578	TOP5
20279	7147399.227	513046.044	406.653	TOP21
20284	7147399.017	513027.676	407.398	TOP21
12523	7147398.595	513029.581	407.492	TOP80
12522	7147398.548	513031.416	407.45	TOP80
12515	7147398.438	513042.57	405.728	TOP80
10178	7147398.202	513036.286	406.701	GS
20276	7147397.993	513056.86	406.027	TOP21
10144	7147397.942	513031.459	407.456	OG

GABION NO. 4 AND EXTENDED TOPOG

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20290	7147397.94	513012.641	405.323	TOE23
20289	7147397.906	513008.31	405.331	TOE23
12521	7147397.675	513032.386	407.215	TOP80
10212	7147397.667	513038.134	406.345	GS
20283	7147397.662	513032.52	407.176	TOP21
20281	7147397.587	513042.649	405.619	TOP21
10149	7147397.389	513032.415	407.192	OG
12518	7147397.249	513037.984	406.224	TOP80
12517	7147397.219	513039.697	405.674	TOP80
12519	7147397.216	513036.181	406.632	TOP80
20291	7147397.195	513017.49	405.309	TOE23
12516	7147397.178	513042.539	405.5	TOP80
20282	7147397.013	513037.511	406.133	TOP21
10143	7147397.005	513031.307	407.284	GABIONEDGE
12520	7147396.83	513033.976	406.837	TOP80
10150	7147396.781	513032.239	407.27	GABIONEDGE
10173	7147396.717	513033.807	406.866	OG
10179	7147396.524	513035.782	406.423	OG
10172	7147396.451	513033.761	406.87	GABIONEDGE
10211	7147396.235	513037.768	405.652	OG
10142	7147395.984	513030.966	406.873	GABIONTOE7
20292	7147395.973	513021.54	405.345	TOE23
10180	7147395.854	513035.621	406.172	GABIONEDGE
10141	7147395.747	513030.899	407.213	GABIONTOP7
10210	7147395.079	513037.514	405.388	GABIONEDGE
20275	7147394.881	513059.774	405.161	TOP21
20274	7147394.86	513059.762	405.16	TOP21
20293	7147393.938	513026.111	405.334	TOE23
20254	7147393.757	513050.997	399.325	TOE22
20273	7147393.722	513062.247	404.949	TOP21
10171	7147393.619	513032.892	405.744	GS
10140	7147393.229	513030.416	406.244	GS
10209	7147393.169	513036.758	404.507	GS
10151	7147393.127	513031.272	405.854	GS
10181	7147393.03	513034.835	405.171	GS
20255	7147392.967	513055.656	399.273	TOE22
20294	7147392.129	513029.396	405.307	TOE23
20253	7147391.572	513047.808	399.126	TOE22
20251	7147391.227	513053.656	398.539	EDGE WATER1
20271	7147391.211	513066.48	404.578	TOP21
20256	7147391.085	513059.482	399.386	TOE22
20252	7147390.677	513049.297	398.526	EDGE WATER1
20272	7147390.652	513063.324	404.405	TOP21
10208	7147390.454	513035.915	402.79	WE21
20270	7147389.778	513067.839	404.58	TOP21
10139	7147389.58	513029.584	405.291	WE13
10170	7147389.557	513031.778	404.223	WE17
10152	7147389.397	513030.53	404.647	WE14
10182	7147389.379	513033.737	403.904	WE18
20250	7147389.321	513057.947	398.549	EDGE WATER1
20257	7147387.752	513061.924	399.512	TOE22
20217	7147386.438	513008.312	405.322	TOE20
10153	7147386.104	513029.612	404.631	CL
10183	7147385.87	513033.039	403.616	CL
20249	7147385.253	513059.709	398.534	EDGE WATER1
10169	7147385.205	513030.912	403.979	CL
20240	7147384.943	513047.822	398.575	EDGE WATER
10207	7147384.844	513034.904	403.167	CL
20239	7147384.642	513050.872	398.599	EDGE WATER
20218	7147384.37	513014.232	405.335	TOE20
20258	7147384.245	513057.242	397.8	DAMAGED GABION
20262	7147384.168	513056.018	397.596	DAMAGED GABION
20219	7147383.846	513017.934	405.334	TOE20
20248	7147383.773	513063.673	398.403	EDGE WATER1
10137	7147383.384	513027.772	405.283	WE12
10154	7147383.16	513028.835	404.707	WE15
20261	7147383.013	513056.273	397.861	DAMAGED GABION
20243	7147382.386	513048.912	398.57	EDGE WATER
10206	7147382.257	513033.935	403.377	WE20
10168	7147382.247	513029.947	404.391	WE16

GABION NO. 4 AND EXTENDED TOPOG

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20220	7147382.16	513022.988	405.32	TOE20
20259	7147381.956	513058.5	398.088	DAMAGED GABION
20244	7147381.94	513049.405	398.588	EDGE WATER
10184	7147381.81	513031.823	403.93	WE19
20241	7147381.727	513046.98	398.605	EDGE WATER
20260	7147381.677	513057.81	398.293	DAMAGED GABION
20242	7147381.608	513047.547	398.588	EDGE WATER
20221	7147381.536	513026.272	405.32	TOE20
10205	7147381.103	513033.585	403.618	GS
20238	7147380.961	513053.096	398.554	EDGE WATER
20269	7147380.864	513059.155	398.19	DAMAGED GABION
20263	7147380.732	513058.552	398.325	DAMAGED GABION
10136	7147380.3	513026.81	406.192	GS
10185	7147380.14	513031.319	404.198	GS
10186	7147379.523	513031.314	404.22	GABIONTOP9
10204	7147379.481	513033.171	403.671	GABIONTOP10
20201	7147379.381	513011.575	407.916	TOP20
10167	7147379.367	513029.1	405.219	GS
20268	7147379.156	513060.491	397.854	DAMAGED GABION
105520	7147379.109	513008.143	408.175	TOP4
10155	7147378.988	513027.426	406.124	GS
20264	7147378.863	513059.476	398.267	DAMAGED GABION
10203	7147378.717	513032.921	403.189	GS
20245	7147378.617	513048.718	398.577	EDGE WATER
20247	7147378.579	513044.125	398.563	EDGE WATER
10187	7147378.537	513030.878	403.667	GABIONTOE9
20230	7147378.473	513044.733	398.572	TOE21
10202	7147378.089	513032.73	402.893	GABIONTOE10
20229	7147377.999	513040.307	398.625	TOE21
20267	7147377.552	513060.987	398.213	DAMAGED GABION
10135	7147377.372	513025.981	407.325	GABIONTOP6
20246	7147377.3	513048.013	398.565	EDGE WATER
10134	7147377.241	513025.941	407.237	GABIONTOE6
10188	7147377.108	513030.577	404.373	GS
10201	7147377.098	513032.582	403.13	GS
10156	7147377.002	513026.953	406.953	GABIONEDGE
20203	7147376.745	513022.064	407.498	TOP20
20204	7147376.718	513025.005	407.394	TOP20
20228	7147376.709	513039.808	399.581	TOE21
10133	7147376.626	513025.786	407.483	TOP10
20202	7147376.528	513018.075	407.714	TOP20
20205	7147376.52	513026.526	407.354	TOP20
10166	7147376.474	513028.411	406.189	GABIONTOP8
10157	7147376.383	513026.744	407.373	TOP10
10189	7147376.375	513030.379	404.835	GABIONEDGE
20231	7147376.299	513047.251	399.054	TOE21
10165	7147376.294	513028.383	405.922	GABIONEDGE
20227	7147376.287	513038.875	401.019	TOE21
20222	7147376.097	513027.883	406.162	TOE21
10164	7147375.947	513028.21	406.033	OG
10200	7147375.897	513032.527	403.466	GABIONEDGE
10190	7147375.842	513030.343	404.754	OG
20226	7147375.606	513037.74	402.268	TOE21
20265	7147375.453	513059.07	398.268	DAMAGED GABION
20223	7147375.259	513029.598	405.179	TOE21
20224	7147375.151	513032.662	403.895	TOE21
10158	7147374.841	513026.289	407.386	GS
20225	7147374.791	513035.992	403.191	TOE21
10163	7147374.744	513027.728	407.114	TOP10
20266	7147374.551	513059.751	398.218	DAMAGED GABION
10199	7147374.528	513031.89	404.452	GS
20236	7147374.467	513058.754	398.512	EDGE WATER
20237	7147374.343	513055.176	398.55	EDGE WATER
20232	7147374.312	513050.327	399.256	TOE21
10045	7147374.036	513025.996	407.543	TOP MONITORING 1463
10046	7147374.013	513025.989	407.404	GROUND MONITORING 1463
10192	7147373.979	513030.071	405.578	GS
10191	7147373.965	513030.125	405.582	GABIONEDGE
20206	7147373.719	513028.634	407.022	TOP20
10132	7147372.991	513024.801	407.427	GS
10193	7147372.89	513029.512	406.904	TOP10

GABION NO. 4 AND EXTENDED TOPOG

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20235	7147372.853	513061.315	398.526	EDGE WATER
20233	7147372.493	513055.34	399.242	TOE21
10162	7147372.213	513027.08	407.146	GS
10198	7147371.874	513031.206	406.784	TOP10
20207	7147371.87	513031.499	406.732	TOP20
20208	7147371.506	513035.527	406.418	TOP20
20234	7147371.32	513060.013	399.233	TOE21
10159	7147371.053	513025.206	407.362	GS
20209	7147370.933	513040.329	406.128	TOP20
10197	7147370.045	513030.692	406.784	GS
10194	7147369.834	513028.859	407.037	GS
10047	7147369.71	513036.58	406.735	TOP MONITORING 1464
10048	7147369.67	513036.57	406.625	GROUND MONITORING 1464
10131	7147369.386	513023.715	407.399	TOE1
10160	7147368.813	513024.706	407.368	TOE1
10161	7147368.299	513026.034	407.247	TOE1
20210	7147367.901	513043.831	406.348	TOP20
20212	7147367.806	513045.609	406.303	TOP20
20211	7147367.789	513044.914	406.283	TOP20
10195	7147367.781	513028.529	407.062	TOE1
10196	7147367.645	513030.012	406.907	TOE1
20215	7147366.393	513052.78	406.675	TOP20
20213	7147366.367	513047.28	406.438	TOP20
20214	7147366.266	513049.798	406.419	TOP20
20216	7147365.193	513054.846	407.058	TOP20
10240	7147364.624	513054.874	407.236	TOP13
10215	7147363.605	513022.003	412.462	GS
10216	7147363.148	513022.969	412.08	GS
10217	7147362.544	513024.17	412.119	GS
10241	7147362.154	513055.089	409.249	TOP13
10218	7147361.866	513026.051	412.109	GS
10219	7147361.327	513028.054	412.192	GS
10220	7147361.118	513029.769	412.193	GS
10242	7147360.779	513055.751	410.457	TOP13
10243	7147359.134	513056.483	411.7	TOP13
10221	7147358.342	513020.305	416.157	TOP11
10222	7147358.003	513021.329	416.142	TOP11
10223	7147357.711	513022.593	416.121	TOP11
10244	7147357.604	513057.425	412.985	TOP13
10224	7147357.332	513024.066	416.155	TOP11
12572	7147356.942	513017.109	416.663	TOP82
10225	7147356.822	513026.574	416.13	TOP11
10245	7147356.574	513057.695	413.713	TOP13
10246	7147356.334	513057.959	413.815	TOP13
10226	7147356.264	513029.343	416.193	TOP11
10239	7147356.264	513057.609	413.721	TOP12
12574	7147356.089	513019.824	416.505	TOP82
10227	7147355.88	513031.326	416.165	TOP12
12575	7147355.776	513020.801	416.49	TOP82
12576	7147355.43	513022.048	416.471	TOP82
10238	7147355.094	513056.867	414.065	TOP12
12577	7147354.883	513023.516	416.52	TOP82
10228	7147354.72	513036.909	416.157	TOP12
12578	7147354.465	513026.146	416.621	TOP82
12557	7147354.002	513019.361	416.423	GS
10229	7147353.971	513041.195	415.873	TOP12
10230	7147353.812	513042.043	415.692	TOP12
12558	7147353.779	513020.231	416.392	GS
10231	7147353.642	513043.587	416.012	TOP12
12579	7147353.582	513029.277	416.605	TOP82
12559	7147353.35	513021.53	416.421	GS
12580	7147353.32	513031.418	416.568	TOP82
10232	7147353.277	513045.056	415.97	TOP12
12560	7147352.92	513023.083	416.452	GS
12571	7147352.78	513044.876	415.877	BRK
10233	7147352.641	513047.816	415.902	TOP12
12581	7147352.637	513037.517	416.439	TOP82
12561	7147352.47	513024.567	416.436	GS
10234	7147352.433	513048.205	415.67	TOP12
10235	7147352.414	513048.628	415.953	TOP12
12562	7147352.271	513026.853	416.423	GS

GABION NO. 4 AND EXTENDED TOPOG

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
11080	7147352.17	513039.87	416.395	TOP32
10237	7147352.061	513055.391	416.035	TOP12
12570	7147352.031	513047.723	415.886	BRK
12563	7147351.793	513028.523	416.392	GS
10236	7147351.792	513052.442	416.272	TOP12
12582	7147351.639	513040.766	416.396	TOP82
12564	7147351.406	513031.132	416.37	GS
12569	7147351.14	513051.184	416.018	BRK
12615	7147351.004	513037.063	416.389	GS
12568	7147350.995	513053.889	415.923	BRK
12567	7147350.816	513057.365	415.744	BRK
12583	7147350.317	513044.553	416.472	TOP82
12595	7147350.253	513086.836	415.653	TOP82
12565	7147350.131	513060.919	415.64	TOP12
12614	7147350.122	513040.193	416.367	GS
12566	7147349.977	513060.784	415.673	BRK
12596	7147349.689	513087.983	415.09	BRK1
12584	7147349.516	513047.421	416.557	TOP82
12594	7147349.282	513086.257	415.846	TOP82
12585	7147348.936	513051.218	416.642	TOP82
12613	7147348.915	513044.18	416.455	GS
12586	7147348.31	513053.921	416.61	TOP82
12612	7147348.18	513046.981	416.44	GS
12587	7147348.042	513057.244	416.528	TOP82
12597	7147347.407	513087.309	415.43	BRK1
12611	7147347.237	513050.419	416.492	GS
12588	7147346.962	513061.261	416.541	TOP82
12598	7147346.52	513088.113	415.409	GS
12593	7147346.517	513083.512	416.213	TOP82
12610	7147346.48	513053.456	416.512	GS
12609	7147345.796	513056.601	416.495	GS
12589	7147345.548	513067.438	416.57	TOP82
12599	7147345.166	513084.463	415.653	BRK1
12592	7147345.041	513079.318	416.196	TOP82
12608	7147344.643	513060.708	416.384	GS
12600	7147344.195	513085.144	415.654	GS
12591	7147344.04	513076.229	416.212	TOP82
12607	7147343.312	513066.657	416.311	GS
12605	7147343.189	513072.149	416.163	BRK1
12601	7147343.127	513079.96	415.831	BRK1
12603	7147342.996	513076.127	415.981	BRK1
12606	7147342.004	513071.876	416.2	GS
12602	7147341.99	513080.095	415.841	GS
12604	7147341.903	513075.984	416.042	GS

TOP OF BANKS OF GAB+A80ION NOS. A1252 AND 3

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
22651	7147423.589	512937.533	411.961	TOP61
22652	7147422.762	512941.224	412.106	TOP61
22653	7147422.254	512944.875	412.263	TOP61
22654	7147421.104	512948.057	412.178	TOP61
22655	7147420.222	512950.614	411.810	TOP61
22656	7147419.795	512952.803	411.219	TOP61
22657	7147420.389	512956.162	410.717	TOP61
22658	7147418.981	512959.571	410.211	TOP61
22659	7147416.891	512964.305	409.711	TOP61
22660	7147414.062	512968.860	409.445	TOP61
22661	7147412.028	512974.656	409.480	TOP61
22662	7147411.231	512979.475	409.535	TOP61
22663	7147409.841	512984.760	409.792	TOP61
22664	7147409.769	512986.825	409.728	TOP61
22665	7147409.498	512988.594	409.205	TOP61
22666	7147409.315	512991.125	408.514	TOP61
22667	7147409.773	512994.587	408.165	TOP61
22668	7147408.325	512998.617	408.079	TOP61
22669	7147406.767	513003.065	407.822	TOP61
22670	7147406.336	512915.655	413.251	TOP62
22671	7147404.874	512918.506	413.267	TOP62
22672	7147404.009	512921.375	412.727	TOP62
22673	7147402.835	512926.406	412.470	TOP62

TOP OF BANKS OF GAB+A80ION NOS. A1252 AND 3				
POINT ID	**NORTHING**	**EASTING**	**ORTHOMETRIC HEIGHT**	**COMMENT**
22674	7147401.598	512930.189	412.343	TOP62
22675	7147401.029	512934.217	412.186	TOP62
22676	7147398.934	512939.484	411.900	TOP62
22677	7147396.625	512942.689	411.427	TOP62
22678	7147393.878	512945.896	411.475	TOP62
22679	7147392.850	512950.842	411.096	TOP62
22680	7147391.198	512955.945	410.972	TOP62
22681	7147390.094	512963.445	410.484	TOP62
22682	7147388.918	512969.139	410.027	TOP62
22683	7147387.807	512975.628	409.693	TOP62
22684	7147387.102	512980.258	409.119	TOP62
22685	7147384.497	512985.781	408.994	TOP62
22686	7147382.761	512991.339	408.684	TOP62
22687	7147381.417	512997.975	408.385	TOP62
22688	7147380.171	513003.375	408.226	TOP62

CODE	
WE*	Water edge- can be use for water elevation
GS	Random Ground shot
GABION H20	Water elevation near Gabion
OG	Random Ground shot
TOE*	Toe of Slope
TOP*	Top of Slope
TOP MONITORING 1453	Shot taken at top of Rebar
GROUND MONITORING 1453	Shot taken beside rebar on ground

CLINTON CREEK LONG TERM PERFORMANCE MONITORING PROGRAM
SEPTEMBER 2014
UTM COORDINATES
NAD 83, Zone 7, 141° West

WorleyParsons
resources & energy

CLINTON CREEK CENTRE LINE

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Clinton Creek CL
10066	7147427.289	512889.221	411.134	CRK CL
10079	7147425.865	512896.483	409.811	CRK CL
10091	7147409.648	512944.147	409.484	CRK CL
10103	7147407.074	512954.836	406.988	CRK CL
10114	7147398.092	512983.433	406.691	CRK CL
10125	7147397.394	512992.613	404.414	CRK CL
10153	7147386.104	513029.612	404.631	CRK CL
10169	7147385.205	513030.912	403.979	CRK CL
10183	7147385.870	513033.039	403.616	CRK CL
10207	7147384.844	513034.904	403.167	CRK CL
21006	7146990.375	513991.830	366.004	CRK CL
21007	7146986.042	514001.164	365.763	CRK CL
21008	7146980.578	514009.699	366.048	CRK CL
21009	7146974.663	514017.736	365.745	CRK CL
21010	7146969.117	514025.824	364.993	CRK CL
21011	7146963.975	514034.346	365.439	CRK CL
21012	7146961.907	514043.006	365.523	CRK CL
21013	7146962.842	514050.679	365.431	CRK CL
21014	7146962.982	514058.283	365.231	CRK CL
21015	7146964.771	514067.435	364.956	CRK CL
21016	7146966.549	514070.486	364.510	CRK CL
21017	7146961.498	514043.435	365.603	CRK CL
21018	7146959.125	514045.836	365.622	CRK CL
21019	7146956.273	514051.233	365.443	CRK CL
21020	7146953.854	514053.457	365.321	CRK CL
21021	7146952.955	514054.588	364.977	CRK CL
21022	7146953.864	514059.052	365.039	CRK CL
21023	7146956.824	514063.398	364.830	CRK CL
21024	7146959.132	514066.989	364.602	CRK CL
21025	7146963.304	514069.311	364.607	CRK CL
21026	7146965.964	514070.488	364.672	CRK CL
21027	7146972.868	514078.475	364.676	CRK CL
21028	7146981.482	514083.328	364.622	CRK CL
21029	7146990.973	514086.614	364.740	CRK CL
21030	7146999.325	514092.249	364.872	CRK CL
21031	7147006.967	514098.899	364.867	CRK CL
21032	7147011.907	514107.447	364.544	CRK CL
21033	7147017.272	514114.751	363.960	CRK CL
21034	7147023.205	514119.083	364.242	CRK CL
21035	7147025.648	514119.724	363.901	CRK CL
21036	7147034.323	514116.351	363.991	CRK CL
21037	7147043.910	514116.744	364.145	CRK CL
21038	7147053.633	514114.465	364.030	CRK CL
21039	7147062.279	514111.446	363.558	CRK CL
21040	7147071.670	514111.287	363.599	CRK CL
21041	7147079.982	514117.184	363.891	CRK CL
21042	7147084.498	514120.912	363.737	CRK CL
21043	7147083.690	514125.739	363.339	CRK CL
21044	7147077.311	514131.579	363.224	CRK CL
21045	7147073.777	514141.187	363.536	CRK CL
21046	7147070.331	514150.285	363.463	CRK CL
21047	7147069.100	514160.510	363.220	CRK CL
21048	7147069.996	514170.724	363.162	CRK CL
21049	7147071.397	514180.792	362.941	CRK CL
21050	7147073.188	514189.847	363.075	CRK CL
21051	7147074.996	514196.266	362.983	CRK CL
105050	7147426.437	512851.700	410.698	CRK CL
105060	7147426.734	512855.637	411.318	CRK CL
105070	7147427.524	512865.693	411.145	CRK CL
105080	7147427.268	512874.017	411.113	CRK CL
105090	7147427.477	512887.635	411.313	CRK CL
105100	7147425.354	512898.018	410.192	CRK CL
105110	7147424.602	512906.586	409.129	CRK CL
105120	7147421.234	512916.130	409.563	CRK CL
105130	7147417.425	512924.005	409.739	CRK CL
105140	7147413.332	512933.729	409.822	CRK CL
105150	7147410.567	512942.855	409.916	CRK CL
105160	7147407.487	512952.588	407.117	CRK CL

TOP OF CREST ALONG CLINTON CREEK

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Top of Crest
2114	7148412.671	513956.626	408.289	EDGE
10157	7147376.383	513026.744	407.373	TOP10
10163	7147374.744	513027.728	407.114	TOP10
10193	7147372.890	513029.512	406.904	TOP10
10198	7147371.874	513031.206	406.784	TOP10
10240	7147364.624	513054.874	407.236	TOP13
10241	7147362.154	513055.089	409.249	TOP13
10242	7147360.779	513055.751	410.457	TOP13
10243	7147359.134	513056.483	411.700	TOP13
10244	7147357.604	513057.425	412.985	TOP13
10245	7147356.574	513057.695	413.713	TOP13
10246	7147356.334	513057.959	413.815	TOP13
10247	7147356.249	513058.308	413.784	TOP13
10248	7147356.002	513059.184	413.330	TOP13
10249	7147355.223	513061.276	413.447	TOP13
10250	7147355.704	513062.808	413.015	TOP13
10251	7147355.129	513063.463	413.245	TOP13
10252	7147354.671	513063.931	413.452	TOP13
10253	7147353.407	513068.195	413.748	TOP13
10254	7147352.384	513072.623	413.806	TOP13
10255	7147351.498	513075.392	414.244	TOP13
10256	7147351.911	513079.373	414.284	TOP13
10257	7147351.530	513082.297	414.405	TOP13
10258	7147351.502	513084.185	414.477	TOP13
10259	7147351.377	513085.627	414.795	TOP13
10260	7147350.577	513086.897	415.530	TOP13
10261	7147350.134	513088.505	414.899	TOP13
10262	7147349.819	513089.099	414.905	TOP13
10263	7147349.339	513089.035	414.936	TOP13
10264	7147348.923	513089.514	414.975	TOP13
10265	7147348.831	513090.200	414.996	TOP13
10266	7147349.148	513090.434	414.958	TOP13
10267	7147349.586	513091.212	414.868	TOP13
10268	7147348.985	513092.546	415.054	TOP13
10269	7147347.844	513094.986	415.279	TOP13
10270	7147347.427	513096.570	415.190	TOP13
10271	7147347.215	513096.512	415.150	TOP13
10272	7147347.091	513096.089	415.096	TOP13
10273	7147346.732	513096.110	415.098	TOP13
10274	7147346.394	513097.041	415.114	TOP13
10275	7147346.905	513097.888	415.034	TOP13
10276	7147347.090	513098.400	415.104	TOP13
10277	7147346.602	513100.891	415.131	TOP13
10278	7147345.866	513103.579	414.856	TOP13
10279	7147345.732	513103.887	414.519	TOP13
10280	7147345.579	513104.246	414.896	TOP13
10281	7147344.951	513106.329	414.789	TOP13
10282	7147347.107	513107.978	413.491	TOP13
10283	7147347.347	513111.361	412.776	TOP13
10284	7147346.807	513113.837	412.541	TOP13
10285	7147346.457	513114.382	412.159	TOP13
10286	7147345.878	513115.218	412.756	TOP13
10287	7147344.764	513117.667	413.013	TOP13
10288	7147343.089	513120.627	413.628	TOP13
10289	7147341.056	513121.386	414.201	TOP13
10290	7147340.161	513122.429	414.458	TOP13
10291	7147339.800	513124.156	414.658	TOP13
10292	7147339.560	513126.474	414.653	TOP13
10293	7147338.874	513128.563	414.810	TOP13
10294	7147338.666	513129.840	414.684	TOP13
10295	7147337.973	513130.463	414.764	TOP13
10296	7147337.392	513131.444	414.935	TOP13
10297	7147337.088	513132.555	414.921	TOP13
10298	7147336.445	513133.003	414.991	TOP13
10299	7147335.265	513136.695	415.069	TOP13
10300	7147334.162	513139.162	415.191	TOP13
10301	7147333.441	513140.790	415.241	TOP13
10302	7147331.951	513141.384	415.617	TOP13

EDGE OF CAT TRAIL

POINT ID	NORTHING	EASTING	ORTHOMETR	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Clinton Creek CL
10477	7147199.800	513467.443	384.638	TOE2
10478	7147200.451	513467.497	384.309	TOE2
10479	7147200.903	513466.654	384.232	TOE2
10480	7147202.290	513464.832	384.134	TOE2
10481	7147204.959	513461.749	383.924	TOE2
10482	7147207.391	513459.234	383.871	TOE2
10483	7147209.851	513455.756	383.552	TOE2
10484	7147212.186	513452.329	383.293	TOE2
10485	7147214.501	513449.307	383.144	TOE2
10486	7147216.501	513446.118	382.748	TOE2
10487	7147216.283	513442.403	382.527	TOE2
10488	7147217.408	513438.610	382.546	TOE2

CODE	
CRK CL	Creek Centre Line
EDGE	Edge-Top of Crest
TOE*	Toe of Slope
TOP*	Top of Slope

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CLINTON CREEK CENTRE LINE

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Clinton Creek CL
105170	7147404.664	512962.470	407.021	CRK CL
105270	7147402.616	512969.236	406.662	CRK CL
105340	7147399.642	512978.923	406.814	CRK CL
105350	7147398.958	512981.970	406.739	CRK CL
105360	7147397.212	512988.100	405.090	CRK CL
105370	7147395.387	512996.372	404.545	CRK CL
105380	7147393.614	513005.437	404.806	CRK CL
105470	7147391.804	513011.520	404.907	CRK CL
105550	7147389.214	513020.945	404.874	CRK CL
105560	7147387.174	513027.562	404.796	CRK CL
105570	7147386.899	513029.037	405.122	CRK CL
105580	7147386.822	513047.438	397.908	CRK CL
105650	7147386.130	513045.856	397.795	CRK CL
105720	7147387.797	513052.820	398.058	CRK CL
105730	7147383.139	513056.164	397.765	CRK CL
105740	7147380.566	513063.952	397.784	CRK CL
105750	7147378.313	513073.930	397.388	CRK CL
105760	7147373.168	513083.814	397.721	CRK CL
105770	7147371.048	513093.880	397.623	CRK CL
105780	7147368.294	513103.762	397.181	CRK CL
105790	7147365.180	513113.600	397.130	CRK CL
105800	7147362.223	513123.710	397.097	CRK CL
105810	7147358.375	513133.312	396.636	CRK CL
105820	7147353.686	513142.101	396.488	CRK CL
105830	7147348.991	513151.049	396.214	CRK CL
105840	7147345.088	513160.081	395.789	CRK CL
105850	7147343.618	513164.603	395.820	CRK CL
105860	7147337.577	513172.601	395.493	CRK CL
105870	7147334.955	513181.505	395.405	CRK CL
105880	7147331.555	513190.845	394.596	CRK CL
105890	7147325.942	513199.137	393.715	CRK CL
105900	7147320.093	513206.967	392.976	CRK CL
105910	7147315.383	513215.820	392.422	CRK CL
105920	7147315.300	513222.250	392.517	CRK CL
105930	7147313.725	513232.193	392.276	CRK CL
105940	7147315.259	513241.857	391.670	CRK CL
105950	7147315.665	513250.804	391.184	CRK CL
105960	7147312.903	513256.407	390.818	CRK CL
105970	7147314.443	513266.046	390.012	CRK CL
105980	7147316.025	513276.318	389.940	CRK CL
105990	7147315.007	513283.906	389.943	CRK CL
106060	7147309.858	513291.705	389.436	CRK CL
106070	7147304.132	513297.044	388.892	CRK CL
106080	7147300.348	513303.986	388.962	CRK CL
106090	7147301.535	513309.290	388.610	CRK CL
106100	7147301.540	513314.286	387.939	CRK CL
106110	7147298.719	513319.056	387.701	CRK CL
106120	7147294.355	513324.728	387.463	CRK CL
106130	7147289.099	513333.032	386.959	CRK CL
106140	7147299.879	513304.082	388.994	CRK CL
106150	7147295.416	513308.916	388.355	CRK CL
106160	7147294.579	513311.391	388.323	CRK CL
106170	7147291.900	513312.682	388.241	CRK CL
106180	7147291.349	513317.350	388.327	CRK CL
106190	7147288.838	513326.001	387.626	CRK CL
106200	7147289.061	513332.061	386.830	CRK CL
106210	7147286.333	513342.394	386.641	CRK CL
106220	7147281.543	513351.353	386.007	CRK CL
106230	7147276.488	513355.752	386.034	CRK CL
106240	7147273.637	513364.080	385.526	CRK CL
106280	7147270.324	513373.503	385.240	CRK CL
106340	7147263.199	513381.019	384.515	CRK CL
106350	7147259.036	513383.703	384.281	CRK CL
106360	7147256.752	513388.808	384.391	CRK CL
106370	7147254.852	513399.145	384.095	CRK CL
106380	7147253.488	513409.366	383.489	CRK CL
106390	7147248.763	513418.463	382.895	CRK CL
106400	7147244.419	513426.259	381.838	CRK CL

TOP OF CREST ALONG CLINTON CREEK

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Top of Crest
10303	7147330.002	513145.515	415.501	TOP13
10304	7147328.211	513148.062	415.914	TOP13
10305	7147326.969	513150.148	415.873	TOP13
10306	7147326.551	513151.553	415.883	TOP13
10307	7147326.209	513154.538	415.743	TOP13
10308	7147326.020	513155.776	415.529	TOP13
10309	7147325.844	513156.271	415.244	TOP13
10310	7147326.428	513158.285	414.982	TOP13
10311	7147324.650	513160.578	415.142	TOP13
10312	7147323.036	513161.970	415.369	TOP13
10313	7147321.637	513164.096	415.249	TOP13
10314	7147319.778	513165.990	415.258	TOP13
10315	7147318.670	513166.862	415.332	TOP13
10316	7147318.092	513166.912	415.517	TOP13
10317	7147317.596	513167.570	415.624	TOP13
10318	7147316.717	513169.348	415.493	TOP13
10319	7147316.719	513171.050	415.379	TOP13
10320	7147316.476	513171.647	415.379	TOP13
10321	7147316.180	513172.207	415.600	TOP13
10322	7147315.674	513173.400	415.606	TOP13
10323	7147314.688	513174.150	415.502	TOP13
10324	7147314.352	513175.721	415.410	TOP13
10325	7147311.934	513179.558	415.074	TOP13
10326	7147311.590	513180.750	414.995	TOP13
10327	7147311.025	513182.614	414.806	TOP13
10328	7147310.075	513183.385	414.697	TOP13
10329	7147309.953	513184.448	414.596	TOP13
10330	7147310.273	513185.257	414.537	TOP13
10331	7147309.084	513186.672	414.342	TOP13
10332	7147308.483	513186.552	414.307	TOP13
10333	7147307.980	513187.200	414.209	TOP13
10334	7147306.472	513191.368	413.689	TOP13
10335	7147306.326	513194.268	413.413	TOP13
10336	7147305.519	513197.241	413.061	TOP13
10337	7147305.527	513200.892	412.643	TOP13
10338	7147303.546	513202.042	412.403	TOP13
10339	7147301.618	513205.182	411.900	TOP13
10340	7147300.572	513208.577	411.465	TOP13
10341	7147300.513	513212.801	411.032	TOP13
10342	7147300.011	513215.316	410.738	TOP13
10343	7147300.429	513215.447	410.765	TOP13
10344	7147299.397	513219.418	410.341	TOP13
10345	7147298.573	513222.699	409.973	TOP13
10346	7147298.833	513223.884	409.862	TOP13
10347	7147298.175	513227.814	409.458	TOP13
10348	7147297.969	513229.593	409.277	TOP13
10349	7147297.436	513231.590	409.059	TOP13
10350	7147297.827	513232.353	408.998	TOP13
10351	7147297.162	513235.167	408.749	TOP13
10352	7147297.418	513236.885	408.570	TOP13
10353	7147296.842	513239.598	408.346	TOP13
10354	7147296.394	513239.927	408.334	TOP13
10355	7147296.550	513242.362	408.146	TOP13
10356	7147296.271	513245.672	407.783	TOP13
10357	7147296.786	513247.769	407.635	TOP13
10358	7147296.360	513252.314	407.359	TOP13
10359	7147295.660	513254.263	407.212	TOP13
10360	7147297.292	513258.779	405.995	TOP13
10361	7147298.939	513261.281	405.031	TOP13
10362	7147300.480	513262.220	404.509	TOP13
10363	7147300.644	513262.942	404.333	TOP13
10364	7147299.820	513266.460	403.750	TOP13
10365	7147300.873	513270.503	402.668	TOP13
10366	7147296.717	513275.298	403.051	TOP13
10367	7147294.127	513279.173	403.060	TOP13
10368	7147292.905	513282.940	402.703	TOP13
10369	7147292.698	513287.206	401.862	TOP13
10370	7147290.841	513291.218	401.691	TOP13

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CLINTON CREEK CENTRE LINE

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Clinton Creek CL
106410	7147258.461	513383.737	384.402	CRK CL
106420	7147254.052	513386.169	384.434	CRK CL
106430	7147247.925	513392.428	384.207	CRK CL
106440	7147239.974	513400.330	383.924	CRK CL
106450	7147236.369	513407.775	383.328	CRK CL
106460	7147234.378	513411.754	383.212	CRK CL
106470	7147235.290	513417.838	382.831	CRK CL
106480	7147240.976	513422.127	382.609	CRK CL
106490	7147243.353	513424.297	382.223	CRK CL
106500	7147243.902	513426.088	381.782	CRK CL
106510	7147244.213	513436.320	381.845	CRK CL
106520	7147243.134	513439.886	381.755	CRK CL
106530	7147235.869	513447.536	381.441	CRK CL
106540	7147229.250	513451.124	381.103	CRK CL
106550	7147223.801	513460.404	381.022	CRK CL
106560	7147219.353	513468.912	380.717	CRK CL
106570	7147215.405	513479.130	379.946	CRK CL
106580	7147212.669	513485.386	379.742	CRK CL
106590	7147204.200	513491.478	379.451	CRK CL
106600	7147198.258	513493.174	379.219	CRK CL
106610	7147192.112	513495.854	378.860	CRK CL
106620	7147188.692	513500.858	378.701	CRK CL
106630	7147184.780	513512.085	378.153	CRK CL
106640	7147180.136	513521.211	377.989	CRK CL
106650	7147174.152	513529.975	377.804	CRK CL
106660	7147165.791	513535.093	377.339	CRK CL
106670	7147159.431	513537.895	377.137	CRK CL
106680	7147153.792	513542.533	376.742	CRK CL
106690	7147148.574	513549.811	377.000	CRK CL
106700	7147144.174	513558.085	376.613	CRK CL
106710	7147142.599	513564.279	376.575	CRK CL
106720	7147143.143	513573.904	375.931	CRK CL
106730	7147143.434	513583.663	375.583	CRK CL
106740	7147140.037	513591.799	375.668	CRK CL
106750	7147132.775	513599.263	375.309	CRK CL
106760	7147125.519	513604.137	374.868	CRK CL
106770	7147120.276	513613.161	374.231	CRK CL
106780	7147118.656	513617.519	374.040	CRK CL
106790	7147115.822	513627.219	373.339	CRK CL
106800	7147111.737	513637.954	373.572	CRK CL
106810	7147107.003	513646.890	373.618	CRK CL
106820	7147103.430	513656.082	373.123	CRK CL
106830	7147100.778	513664.580	373.047	CRK CL
106840	7147102.344	513674.695	372.142	CRK CL
106850	7147104.067	513684.044	372.274	CRK CL
106860	7147104.816	513694.270	372.278	CRK CL
106870	7147103.211	513704.360	372.167	CRK CL
106880	7147101.709	513713.887	371.762	CRK CL
106890	7147099.165	513723.135	371.586	CRK CL
106900	7147096.456	513733.107	371.183	CRK CL
106910	7147092.620	513742.533	371.138	CRK CL
106920	7147091.609	513745.914	371.126	CRK CL
106930	7147090.815	513751.849	370.556	CRK CL
106940	7147092.932	513761.180	370.574	CRK CL
106950	7147095.776	513770.532	370.770	CRK CL
106960	7147098.422	513780.464	370.732	CRK CL
106970	7147100.289	513790.461	370.785	CRK CL
106980	7147100.675	513800.259	370.796	CRK CL
106990	7147099.829	513810.535	370.678	CRK CL
107000	7147097.028	513818.087	370.565	CRK CL
107010	7147092.088	513823.299	370.455	CRK CL
107020	7147086.725	513829.400	370.017	CRK CL
107030	7147081.050	513838.889	368.990	CRK CL
107040	7147077.212	513845.172	369.341	CRK CL
107050	7147096.735	513818.876	370.463	CRK CL
107060	7147096.036	513823.293	370.354	CRK CL
107070	7147094.509	513829.122	370.301	CRK CL
107080	7147090.304	513835.417	370.101	CRK CL
107090	7147085.084	513840.310	369.755	CRK CL

TOP OF CREST ALONG CLINTON CREEK

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Top of Crest
10371	7147289.670	513292.315	401.814	TOP13
10372	7147288.238	513292.786	402.144	TOP13
10373	7147287.478	513295.054	401.947	TOP13
10374	7147286.805	513296.320	401.776	TOP13
10375	7147285.168	513297.561	402.134	TOP13
10376	7147284.166	513298.197	402.415	TOP13
10377	7147283.710	513299.435	402.317	TOP13
10378	7147282.030	513301.213	402.475	TOP13
10379	7147281.191	513303.322	402.208	TOP13
10380	7147281.834	513305.890	401.352	TOP13
10381	7147280.672	513308.783	401.055	TOP13
10382	7147278.090	513309.801	401.696	TOP13
10383	7147277.054	513312.123	401.333	TOP13
10384	7147277.566	513313.977	400.679	TOP13
10385	7147276.757	513315.955	400.257	TOP13
10386	7147275.603	513316.747	400.617	TOP13
10387	7147274.135	513318.816	400.595	TOP13
10388	7147273.361	513319.097	400.896	TOP13
10389	7147272.513	513321.648	400.504	TOP13
10390	7147270.415	513327.814	399.547	TOP13
10391	7147270.577	513329.478	398.992	TOP13
10392	7147269.291	513331.779	398.855	TOP13
10393	7147268.672	513334.287	398.444	TOP13
10394	7147267.912	513335.565	398.412	TOP13
10395	7147268.247	513336.524	397.898	TOP13
10396	7147267.181	513337.884	397.966	TOP13
10397	7147266.556	513338.997	397.922	TOP13
10398	7147265.574	513339.558	398.037	TOP13
10399	7147264.191	513342.163	397.806	TOP13
10400	7147262.294	513345.818	397.528	TOP13
10401	7147261.760	513347.446	397.197	TOP13
10402	7147261.301	513347.706	397.266	TOP13
10403	7147261.043	513348.887	397.121	TOP13
10404	7147260.039	513351.390	396.828	TOP13
10405	7147258.406	513355.405	396.729	TOP13
10406	7147257.885	513356.493	396.514	TOP13
10407	7147256.732	513358.549	396.369	TOP13
10408	7147256.068	513360.514	396.147	TOP13
10409	7147255.230	513360.926	396.501	TOP13
10410	7147254.131	513363.304	395.904	TOP13
10411	7147253.120	513363.596	396.338	TOP13
10412	7147252.241	513365.962	395.877	TOP13
10413	7147250.299	513367.562	395.859	TOP13
10414	7147249.677	513368.432	395.718	TOP13
10415	7147248.919	513368.912	395.569	TOP13
10416	7147247.575	513371.071	395.393	TOP13
10417	7147246.660	513374.484	395.135	TOP13
10418	7147245.938	513375.653	394.832	TOP13
10419	7147245.801	513376.641	394.761	TOP13
10420	7147245.870	513377.587	394.121	TOP13
10421	7147244.702	513377.421	394.226	TOP13
10422	7147242.884	513378.699	393.618	TOP13
10423	7147240.787	513380.639	393.564	TOP13
10424	7147240.046	513381.248	393.598	TOP13
10425	7147238.360	513383.458	393.229	TOP13
10426	7147235.716	513385.242	392.951	TOP13
10427	7147234.432	513385.706	392.911	TOP13
10428	7147233.217	513387.165	392.683	TOP13
10429	7147231.794	513389.247	392.525	TOP13
10430	7147229.541	513390.744	392.544	TOP13
10431	7147228.397	513393.263	392.160	TOP13
10432	7147227.040	513394.797	392.323	TOP13
10433	7147225.780	513395.635	392.301	TOP13
10434	7147224.984	513398.731	391.797	TOP13
10435	7147224.423	513399.847	391.697	TOP13
10436	7147223.418	513400.667	392.047	TOP13
10437	7147222.302	513403.124	391.909	TOP13
10438	7147221.946	513405.486	391.520	TOP13
10439	7147222.018	513406.095	391.586	TOP13

CLINTON CREEK LONG TERM PERFORMANCE MONITORING PROGRAM
SEPTEMBER 2014
UTM COORDINATES
NAD 83, Zone 7, 141° West

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CLINTON CREEK CENTRE LINE

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Clinton Creek CL
107100	7147082.919	513841.355	369.767	CRK CL
107110	7147080.323	513840.523	369.126	CRK CL
107120	7147073.034	513853.904	369.121	CRK CL
107130	7147070.490	513863.834	368.762	CRK CL
107140	7147067.569	513873.422	368.585	CRK CL
107150	7147066.015	513882.422	368.462	CRK CL
107160	7147063.009	513892.085	368.245	CRK CL
107170	7147058.923	513901.440	367.777	CRK CL
107180	7147054.228	513909.911	367.615	CRK CL
107190	7147048.030	513918.005	367.509	CRK CL
107200	7147040.045	513924.069	367.379	CRK CL
107210	7147031.844	513929.713	367.566	CRK CL
107220	7147023.296	513933.569	367.313	CRK CL
107230	7147015.100	513939.680	367.227	CRK CL
107240	7147013.163	513943.287	366.802	CRK CL
107250	7147009.911	513951.240	366.312	CRK CL
107260	7147007.575	513950.956	366.643	CRK CL
107270	7147004.280	513950.603	366.226	CRK CL
107280	7146996.432	513952.449	366.584	CRK CL
107290	7146992.642	513954.359	366.654	CRK CL
107300	7146987.555	513956.104	366.548	CRK CL
107310	7146984.033	513960.111	366.178	CRK CL
107320	7146986.321	513965.146	365.933	CRK CL
107330	7146987.187	513969.252	365.903	CRK CL
107340	7146996.251	513953.117	366.654	CRK CL
107350	7146993.717	513956.354	366.784	CRK CL
107360	7146991.078	513959.142	366.766	CRK CL
107370	7146989.731	513962.230	366.767	CRK CL
107380	7146988.768	513965.751	366.624	CRK CL
107390	7146987.370	513968.236	365.945	CRK CL
107400	7146990.092	513978.672	366.136	CRK CL
107410	7146991.063	513985.769	366.103	CRK CL

TOP OF CREST ALONG CLINTON CREEK

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Top of Crest
10440	7147221.332	513406.998	391.618	TOP13
10441	7147221.204	513407.880	391.648	TOP13
10442	7147220.171	513409.217	391.819	TOP13
10443	7147219.521	513410.369	391.718	TOP13
10444	7147218.570	513411.215	391.517	TOP13
10445	7147217.653	513411.660	391.766	TOP13
10446	7147217.639	513412.180	391.323	TOP13
10447	7147216.537	513413.008	391.332	TOP13
10448	7147216.224	513414.118	391.420	TOP13
10449	7147215.711	513415.310	391.134	TOP13
10450	7147215.049	513416.161	391.207	TOP13
10451	7147213.641	513418.051	390.760	TOP13
10452	7147212.958	513419.576	390.173	TOP13
10453	7147212.266	513420.812	389.610	TOP13
10454	7147212.094	513422.488	388.971	TOP13
10455	7147212.006	513425.474	388.238	TOP13
10456	7147211.160	513427.035	388.335	TOP13
10457	7147210.859	513430.663	387.541	TOP13
10458	7147210.190	513431.453	388.201	TOP13
10459	7147209.314	513431.810	388.807	TOP13
10460	7147209.558	513433.340	388.819	TOP13
10461	7147209.996	513434.834	388.517	TOP13
10462	7147210.568	513435.531	388.877	TOP13
10463	7147211.154	513437.978	388.643	TOP13
10464	7147211.307	513439.501	388.508	TOP13
10465	7147212.646	513441.257	388.342	TOP13
10466	7147213.084	513443.125	387.925	TOP13
10467	7147212.859	513443.884	387.806	TOP13
10468	7147211.354	513446.717	387.499	TOP13
10469	7147209.608	513450.618	386.724	TOP13
10470	7147208.345	513452.221	386.656	TOP13
10471	7147207.417	513454.917	386.326	TOP13
10472	7147206.489	513457.347	386.022	TOP13
10473	7147204.207	513460.355	385.633	TOP13
10474	7147201.690	513463.701	385.141	TOP13
10475	7147200.680	513465.059	385.067	TOP13
10476	7147199.618	513467.376	384.704	TOP13
10489	7147224.122	513441.531	382.465	TOP14
10490	7147221.427	513445.921	382.420	TOP14
10491	7147218.702	513450.324	383.009	TOP14
10492	7147216.432	513453.894	383.410	TOP14
10493	7147213.402	513458.648	383.770	TOP14
10494	7147210.076	513463.429	384.189	TOP14
10495	7147207.453	513467.341	384.401	TOP14
10496	7147205.652	513470.190	384.733	TOP14
10497	7147204.563	513471.791	384.978	TOP14
10498	7147204.418	513474.211	385.004	TOP14
10499	7147205.581	513472.976	384.445	TOP14
10500	7147205.240	513474.577	384.497	TOP14
10501	7147205.291	513475.503	384.181	TOP14
10502	7147204.376	513477.897	383.949	TOP14
10503	7147203.930	513480.215	383.501	TOP14
10504	7147203.352	513479.974	383.754	TOP14
10505	7147202.844	513479.886	383.599	TOP14
10506	7147201.653	513480.297	383.595	TOP14
10507	7147200.637	513481.381	383.578	TOP14
10508	7147199.943	513483.103	383.309	TOP14
10509	7147197.878	513484.864	383.218	TOP14
10510	7147197.494	513485.859	383.128	TOP14
10511	7147197.730	513487.239	383.004	TOP14
10512	7147197.538	513487.615	382.966	TOP14
10513	7147196.465	513487.805	382.952	TOP14
10514	7147193.827	513488.056	382.786	TOP14
10515	7147192.781	513488.026	382.677	TOP14
10516	7147191.605	513488.735	382.608	TOP14
10517	7147189.515	513489.343	382.492	TOP14
10518	7147188.331	513490.570	382.345	TOP14
10519	7147186.480	513491.107	382.186	TOP14
10520	7147185.347	513492.166	381.799	TOP14

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TOP OF CREST ALONG CLINTON CREEK

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Top of Crest
10525	7147184.813	513492.723	380.495	TOP14
10526	7147184.083	513493.105	380.503	TOP14
10527	7147183.366	513494.014	381.646	TOP14
10528	7147182.601	513494.998	381.596	TOP14
10529	7147181.823	513495.493	381.466	TOP14
10530	7147181.447	513495.525	381.065	TOP14
10531	7147180.879	513495.982	381.113	TOP14
10532	7147180.572	513496.479	381.473	TOP14
10533	7147179.035	513499.038	381.478	TOP14
10534	7147177.330	513500.805	382.278	TOP14
10535	7147177.100	513501.716	381.981	TOP14
10536	7147176.120	513502.982	382.631	TOP14
10537	7147175.619	513504.381	382.335	TOP14
10538	7147175.739	513505.476	381.834	TOP14
10539	7147174.654	513508.185	381.617	TOP14
10540	7147173.585	513510.895	381.635	TOP14
10541	7147173.244	513512.523	381.304	TOP14
10542	7147172.276	513513.129	381.800	TOP14
10543	7147170.474	513512.619	383.224	TOP14
10544	7147169.300	513513.083	383.733	TOP14
10545	7147167.610	513514.675	384.222	TOP14
10546	7147165.899	513515.685	384.932	TOP14
10547	7147164.865	513516.852	385.320	TOP14
10548	7147164.387	513517.889	385.304	TOP14
10549	7147163.623	513518.610	385.474	TOP14
10550	7147162.915	513521.803	385.117	TOP14
10551	7147162.372	513522.557	385.078	TOP14
10552	7147162.043	513524.803	384.534	TOP14
10553	7147160.192	513527.158	384.862	TOP14
10554	7147158.477	513528.682	384.832	TOP14
10555	7147157.116	513529.226	385.029	TOP14
10556	7147154.542	513531.421	384.975	TOP14
10557	7147152.979	513531.140	385.175	TOP14
10558	7147150.378	513533.030	385.160	TOP14
10559	7147148.126	513535.511	385.058	TOP14
10560	7147147.954	513537.432	384.898	TOP14
10561	7147146.736	513539.681	384.864	TOP14
10562	7147144.417	513541.585	384.993	TOP14
10563	7147143.605	513542.789	384.936	TOP14
10564	7147139.945	513545.997	384.844	TOP14
10565	7147137.173	513547.930	384.629	TOP14
10566	7147135.638	513550.405	384.597	TOP14
10567	7147133.573	513552.593	384.203	TOP14
10568	7147132.091	513556.696	384.152	TOP14
10569	7147130.951	513560.654	384.656	TOP14
10570	7147130.208	513564.337	385.136	TOP14
10571	7147129.172	513566.631	384.911	TOP14
10572	7147129.008	513569.006	384.901	TOP14
10573	7147129.026	513571.761	384.917	TOP14
10574	7147128.839	513574.079	384.790	TOP14
10575	7147127.302	513577.451	384.760	TOP14
10576	7147126.221	513581.203	384.829	TOP14
10577	7147125.076	513583.569	384.938	TOP14
10578	7147124.211	513585.836	384.854	TOP14
10579	7147124.203	513586.993	384.871	TOP14
10580	7147123.766	513588.948	385.361	TOP14
10581	7147121.528	513592.158	385.464	TOP14
10582	7147118.830	513594.959	385.622	TOP14
10583	7147116.523	513597.357	385.736	TOP14
10584	7147113.776	513601.472	384.996	TOP14
10585	7147113.109	513603.165	384.518	TOP14
10586	7147112.501	513604.297	383.693	TOP14
10587	7147113.400	513609.843	378.558	TOP14
10588	7147113.586	513612.274	377.927	TOP14
10589	7147113.172	513614.373	377.171	TOP14
10590	7147112.405	513614.822	377.251	TOP14
10591	7147112.129	513615.100	376.804	TOP14
10592	7147111.886	513615.372	377.302	TOP14
10593	7147111.857	513616.646	377.042	TOP14

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TOP OF CREST ALONG CLINTON CREEK

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Top of Crest
10594	7147110.794	513617.810	376.966	TOP14
10595	7147110.149	513617.379	377.301	TOP14
10596	7147108.894	513617.425	377.739	TOP14
10597	7147108.392	513618.805	378.220	TOP14
10598	7147107.830	513620.659	377.834	TOP14
10599	7147107.416	513621.686	377.817	TOP14
10600	7147106.959	513622.547	377.453	TOP14
10601	7147107.641	513626.188	376.063	TOP14
10602	7147108.745	513628.656	375.571	TOP14
10603	7147108.758	513630.281	374.842	TOP14
10604	7147109.325	513631.045	374.796	TOP14
10605	7147109.690	513631.359	374.353	TOP14
12616	7147365.688	513054.121	406.858	TOP83
12617	7147366.417	513052.904	406.704	TOP83
12618	7147366.717	513051.545	406.439	TOP83
12619	7147366.229	513051.394	406.514	TOP83
12620	7147366.304	513049.578	406.458	TOP83
12621	7147366.609	513048.752	406.390	TOP83
12622	7147366.337	513047.313	406.444	TOP83
12623	7147367.903	513045.444	406.312	TOP83
12624	7147367.846	513043.884	406.389	TOP83
12625	7147368.722	513043.493	406.368	TOP83
12626	7147370.147	513042.281	406.232	TOP83
12627	7147370.955	513041.118	405.890	TOP83
12628	7147370.793	513039.602	406.199	TOP83
12629	7147371.658	513037.732	406.026	TOP83
12630	7147371.936	513035.988	406.118	TOP83
12631	7147371.599	513035.677	406.366	TOP83
12632	7147371.575	513033.386	406.621	TOP83
12633	7147371.837	513031.501	406.811	TOP83
20205	7147376.520	513026.526	407.354	TOP20
20206	7147373.719	513028.634	407.022	TOP20
20207	7147371.870	513031.499	406.732	TOP20
20208	7147371.506	513035.527	406.418	TOP20
20209	7147370.933	513040.329	406.128	TOP20
20210	7147367.901	513043.831	406.348	TOP20
20211	7147367.789	513044.914	406.283	TOP20
20212	7147367.806	513045.609	406.303	TOP20
20213	7147366.367	513047.280	406.438	TOP20
20214	7147366.266	513049.798	406.419	TOP20
20215	7147366.393	513052.780	406.675	TOP20
20216	7147365.193	513054.846	407.058	TOP20
105700	7147367.705	513044.273	406.350	TOP6
206960	7147297.589	513233.314	408.881	EDGE
207010	7147297.723	513230.385	409.165	EDGE
207040	7147298.165	513227.763	409.433	EDGE
207110	7147298.729	513224.947	409.719	EDGE
207170	7147298.641	513221.950	410.021	EDGE
207230	7147299.474	513219.165	410.334	EDGE
207290	7147300.439	513216.457	410.614	EDGE
207350	7147300.401	513213.062	410.966	EDGE
207400	7147300.374	513210.069	411.251	EDGE
207440	7147300.811	513207.200	411.586	EDGE
207480	7147301.953	513204.502	411.944	EDGE
207530	7147303.798	513201.862	412.401	EDGE
207590	7147305.793	513199.034	412.845	EDGE
207630	7147305.605	513195.853	413.187	EDGE
207670	7147306.314	513193.262	413.482	EDGE
207700	7147306.880	513190.392	413.797	EDGE
207740	7147307.914	513187.385	414.148	EDGE
207800	7147310.406	513185.299	414.502	EDGE
207840	7147311.061	513182.082	414.830	EDGE
207900	7147311.939	513179.502	415.033	EDGE
207950	7147313.661	513176.837	415.245	EDGE
207990	7147314.862	513174.095	415.508	EDGE
208020	7147316.658	513171.276	415.354	EDGE

CONTROL

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for XS

SECTION A

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11191	7147462.363	512981.964	425.731	GS
11192	7147455.804	512980.273	423.122	GS
11193	7147453.362	512981.085	422.310	TOP55
11194	7147448.841	512980.512	419.399	GS
11195	7147445.134	512979.958	416.584	GS
11196	7147442.683	512979.506	414.986	GS
105180	7147440.089	512978.363	413.592	TL1
11197	7147439.278	512978.286	413.311	GS
105190	7147435.201	512977.419	411.971	GS
105200	7147430.181	512976.559	410.096	TOE1
105210	7147422.549	512974.767	409.807	GS
105220	7147413.048	512972.172	409.505	TOP1
105230	7147412.432	512972.025	409.304	RIPRAP
105240	7147409.965	512971.104	408.325	GS
105250	7147407.088	512970.414	407.419	WE1
105260	7147405.090	512969.913	406.542	GS
105280	7147399.444	512968.682	406.679	GS
105290	7147396.570	512967.960	407.391	WE2
105300	7147394.025	512967.382	408.159	GS
105310	7147390.937	512966.408	409.560	RIPRAP
105320	7147389.585	512966.178	410.162	TOP2
105330	7147385.215	512965.066	410.629	TOE2
11001	7147383.672	512964.487	412.226	GS
11002	7147382.098	512964.322	413.676	TOP20
11003	7147381.773	512964.211	413.688	GS
11004	7147381.342	512964.117	413.683	TOP21
11005	7147379.821	512963.863	412.936	TOE20
11006	7147377.250	512963.102	412.751	GS
11007	7147372.834	512961.808	412.697	GS
11008	7147370.599	512961.286	412.857	TOE21
11009	7147367.856	512960.681	414.486	GS
11010	7147366.671	512960.516	415.810	TOP22
11011	7147365.909	512960.218	415.840	GS
11012	7147365.084	512960.106	415.946	TOE22
11013	7147362.973	512959.448	417.114	GS
11014	7147361.354	512958.939	418.059	TOP23
11015	7147357.529	512957.795	418.488	GS
11016	7147351.816	512956.380	418.744	GS
11017	7147346.660	512955.087	418.992	GS
11018	7147340.991	512953.615	419.149	GS
11019	7147338.463	512952.900	419.161	TOE23
11020	7147333.076	512951.510	419.884	GS
11021	7147329.263	512950.582	421.249	TOP24
11022	7147327.606	512950.200	421.389	GS
11023	7147322.276	512948.762	421.636	GS
11024	7147317.182	512947.447	421.967	GS
11025	7147315.995	512947.197	422.044	TOE24
11026	7147314.601	512946.579	422.449	TOP25
11027	7147312.875	512946.300	421.843	TOE25
11028	7147311.714	512946.071	422.244	TOP26
11029	7147310.846	512945.860	422.107	TOP27
11030	7147308.942	512945.443	421.441	TOE26
11031	7147304.901	512944.656	421.123	GS
11032	7147300.856	512943.798	421.331	GS
11033	7147298.350	512943.208	421.191	TOE27
11034	7147294.563	512942.152	423.210	GS
11035	7147291.480	512941.222	425.074	GS
11036	7147287.852	512940.217	427.063	GS
11037	7147284.101	512939.058	428.907	GS
11038	7147279.928	512937.981	430.917	GS
11039	7147275.491	512936.650	433.185	GS
11040	7147271.098	512935.454	435.458	GS
11041	7147266.422	512934.282	437.618	GS
11042	7147264.094	512933.639	438.561	GS
11043	7147261.458	512932.999	439.188	GS
11044	7147258.223	512932.251	440.506	GS

SECTION A

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11045	7147256.691	512931.815	440.266	GS

SECTION B

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11190	7147443.995	513025.879	424.789	GS
11189	7147436.015	513024.641	421.664	GS
11188	7147432.380	513023.790	420.108	TOP54
11187	7147431.434	513023.204	417.756	TOE53
11186	7147428.165	513022.597	415.073	GS
11185	7147425.624	513021.469	414.444	GS
11184	7147422.159	513019.297	412.562	GS
105390	7147414.919	513017.403	409.540	GS
105400	7147410.850	513016.252	407.824	TOE3
105410	7147407.667	513015.529	407.620	GS
105420	7147403.838	513014.420	407.632	TOP3
105430	7147402.842	513014.226	407.407	RIPRAP
105440	7147400.020	513013.620	406.240	GS
105450	7147398.078	513013.057	405.325	WE3
105460	7147394.683	513012.262	404.877	GS
105480	7147388.975	513010.772	404.936	GS
105490	7147385.741	513009.775	405.377	WE4
105500	7147382.404	513009.004	406.815	GS
20200	7147379.907	513006.719	408.117	TOP20
105510	7147379.357	513008.251	408.124	RIPRAP
105520	7147379.109	513008.143	408.175	TOP4
105530	7147377.072	513007.597	408.222	GS
105540	7147375.659	513007.268	408.288	TOE4
11077	7147374.464	513006.997	409.026	GS
11076	7147371.811	513006.030	412.290	GS
11075	7147368.420	513005.225	415.388	TOP31
11074	7147365.170	513003.788	415.526	GS
11073	7147361.719	513002.767	416.174	GS
11072	7147355.660	513001.012	415.974	GS
11071	7147352.446	512999.857	415.791	TOE31
11070	7147350.221	512999.368	418.098	GS
11069	7147347.086	512998.620	419.909	GS
11068	7147344.320	512997.872	422.466	TOP30
11067	7147340.717	512996.694	422.290	GS
11066	7147336.325	512995.605	421.981	GS
11065	7147331.220	512994.221	422.398	GS
11064	7147325.889	512992.761	422.794	GS
11063	7147320.375	512991.286	423.305	GS
11062	7147314.472	512989.703	423.499	GS
11061	7147308.768	512988.053	423.369	GS
11060	7147301.989	512985.870	423.206	GS
11059	7147297.830	512984.344	423.375	TOE30
11058	7147295.444	512983.939	424.672	TOP29
11057	7147293.515	512983.531	424.053	TOE29
11056	7147289.953	512982.921	423.879	GS
11055	7147288.294	512982.503	423.201	GS
11054	7147286.336	512981.735	422.781	TOE28
11053	7147281.736	512980.452	425.721	GS
11052	7147276.829	512978.953	429.097	GS
11051	7147271.624	512977.526	431.831	GS
11050	7147266.762	512976.038	434.705	GS
11049	7147261.598	512974.680	437.629	GS
11048	7147256.360	512972.948	440.694	TOP28
11047	7147253.507	512972.301	441.026	GS
11046	7147251.925	512971.857	441.050	GS

SECTION C

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11177	7147415.493	513048.410	419.550	GS
11178	7147413.660	513048.178	418.957	TOP52
11179	7147413.255	513048.084	417.862	TOE52
11180	7147409.854	513047.048	415.228	GS
11181	7147407.359	513047.313	412.627	GS
11182	7147403.688	513046.762	409.184	GS
105590	7147402.929	513049.961	409.002	GS

SECTION C

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11183	7147399.379	513049.100	406.732	TOP53
105600	7147399.343	513049.493	406.578	TOP5
105610	7147397.089	513049.086	403.081	GS
105620	7147390.994	513046.483	399.246	TOE5
105630	7147389.942	513046.208	398.569	WE5
105640	7147387.965	513046.150	397.803	GS
105660	7147384.482	513045.832	397.976	GS
105670	7147381.018	513045.429	397.949	GS
105680	7147378.417	513045.489	398.544	WE6
105690	7147372.281	513044.455	402.884	GS
105700	7147367.705	513044.273	406.350	TOP6
105710	7147364.923	513042.870	406.754	TOE6
11078	7147360.496	513041.822	410.348	GS
11079	7147357.729	513041.374	413.388	GS
11080	7147352.170	513039.870	416.395	TOP32
11081	7147347.097	513039.174	416.432	GS
11082	7147342.166	513038.224	416.766	GS
11083	7147339.075	513037.443	417.473	TOE32
11084	7147334.370	513036.717	420.793	TOE32
11085	7147331.830	513036.030	422.878	TOP33
11086	7147330.942	513035.732	423.001	TOE33
11087	7147328.608	513035.317	424.549	TOP34
11088	7147326.987	513034.931	424.134	TOE34
11089	7147321.689	513034.078	424.281	GS
11090	7147317.104	513033.042	424.476	GS
11091	7147311.491	513031.889	424.369	GS
11092	7147306.411	513030.944	424.451	GS
11093	7147301.908	513030.143	424.416	TOP35
11094	7147299.392	513029.466	423.694	TOE35
11095	7147294.164	513028.362	423.615	GS
11096	7147290.286	513027.512	424.043	GS
11097	7147285.834	513026.721	424.684	GS
11098	7147283.342	513026.356	424.548	TOP36
11099	7147282.229	513026.165	424.084	TOE36
11100	7147277.398	513025.024	424.278	GS
11101	7147275.301	513024.509	424.408	TOE37
11102	7147271.919	513023.680	425.955	GS
11103	7147268.390	513022.454	428.696	GS
11104	7147261.596	513021.733	432.032	GS
11105	7147255.163	513020.601	435.594	GS
11106	7147248.876	513018.943	439.342	GS
11107	7147243.374	513017.840	442.237	TOP37
11108	7147239.949	513017.821	442.856	GS

SECTION D

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11172	7147332.475	513287.614	410.087	GS
11171	7147328.487	513286.136	407.573	GS
11170	7147324.955	513284.050	405.272	TOP40
106000	7147316.769	513283.103	389.736	TL1
106010	7147314.203	513281.807	390.053	GS
106020	7147312.321	513281.014	390.180	WE7
106030	7147311.762	513280.793	390.435	TOP7
106040	7147309.974	513280.108	390.459	GS
106050	7147308.162	513279.368	390.407	TOE7
11109	7147301.256	513276.696	398.103	GS
11110	7147298.057	513276.043	400.958	GS
11111	7147296.259	513275.672	403.177	TOP38
21003	7147292.215	513274.665	404.580	NO TAG (187)
11112	7147290.841	513274.134	405.064	GS
11113	7147288.942	513273.881	405.710	TOP39
11114	7147283.115	513272.201	405.458	GS
11115	7147277.045	513270.623	405.106	GS
11116	7147269.916	513268.093	404.422	GS
11117	7147263.531	513265.669	404.765	GS
11118	7147257.722	513263.606	405.261	GS
11119	7147251.270	513261.338	405.457	GS
11120	7147247.912	513260.568	405.773	TOE38
11121	7147243.182	513259.134	408.429	TOP40
11122	7147238.554	513257.558	409.224	TOE39

SECTION D

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11123	7147234.109	513255.807	411.422	GS
11124	7147228.686	513253.953	414.857	GS
11125	7147224.270	513253.272	416.577	GS
11126	7147217.356	513251.368	418.274	GS
11127	7147211.247	513250.313	418.888	GS
11128	7147207.170	513249.162	419.913	GS
11129	7147203.658	513248.241	422.791	TOP41
11130	7147200.658	513247.565	423.871	GS
11131	7147199.137	513247.631	424.647	TOP42

SECTION E

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11169	7147290.890	513385.417	409.718	GS
11168	7147288.103	513383.934	407.449	GS
11167	7147284.197	513381.597	404.016	GS
106250	7147273.541	513375.763	385.686	TOE8
106260	7147271.902	513374.617	385.493	WE8
106270	7147271.309	513373.998	385.148	GS
106290	7147269.495	513372.621	385.055	GS
106300	7147268.816	513372.277	385.399	TOE9
106310	7147267.999	513371.747	385.763	TOP8
106320	7147265.171	513369.752	386.194	GS
106330	7147261.751	513367.927	387.177	TOE10
11132	7147252.343	513364.936	396.253	TOP43
11133	7147247.975	513362.707	396.419	GS
11134	7147242.391	513360.004	396.449	GS
11135	7147237.418	513357.630	396.114	GS
11136	7147234.087	513356.057	396.432	GS
11137	7147233.214	513355.479	397.055	GS
11138	7147230.380	513354.143	397.298	TOE40
11139	7147226.571	513351.299	401.460	GS
11140	7147221.490	513348.921	405.101	GS
11141	7147216.611	513346.889	408.258	TOP44
11142	7147214.120	513346.118	409.098	GS
11143	7147213.116	513345.522	408.780	GS
11144	7147208.692	513343.066	408.501	GS
11145	7147205.135	513340.840	408.484	CRACK 90 BY 35
11146	7147200.611	513338.203	408.783	GS
11147	7147198.548	513337.356	409.052	GS
11148	7147196.169	513335.817	408.366	GS
11149	7147191.791	513333.725	410.324	GS
11150	7147187.669	513332.264	412.896	GS
11151	7147186.450	513331.758	413.926	T0P45
11152	7147182.508	513330.603	413.874	TOE41
11153	7147180.346	513328.909	415.765	TOP46
11154	7147177.737	513328.250	415.532	GS
11155	7147175.954	513327.601	415.728	TOE42
11156	7147173.838	513326.568	417.535	TOP47
11157	7147170.304	513325.604	417.586	GS
11158	7147167.102	513324.548	419.531	TOP48
11159	7147163.264	513323.014	419.607	GS
11160	7147158.824	513321.736	419.772	GS
11161	7147153.901	513320.702	419.556	GS
11162	7147147.380	513319.371	422.168	GS
11163	7147142.464	513317.791	425.399	TOP49

SECTION F

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11176	7147362.152	513220.834	420.077	GS
11166	7147359.505	513220.577	418.281	185 GROUND
1850000	7147359.476	513220.581	418.287	X-SECTION F NORTH PIN Tag 185
11175	7147358.208	513220.415	417.641	GS
11174	7147355.349	513220.061	415.969	GS
11173	7147352.522	513219.771	414.168	TOP41
11219	7147340.011	513215.390	399.707	GS
11218	7147335.773	513213.054	396.252	GS
11213	7147334.151	513212.302	394.739	TOE55
11214	7147330.607	513211.273	394.451	GS
11215	7147325.008	513209.458	393.649	GS

SECTION F

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
11216	7147322.877	513207.564	393.524	WE50
11217	7147321.435	513206.026	392.903	GS
11220	7147316.586	513208.120	393.363	WE51
11221	7147315.071	513207.328	393.634	TOE55
11212	7147303.042	513202.719	412.288	TOP57
11211	7147300.684	513201.977	412.158	GS
11210	7147295.588	513200.276	411.765	GS
11209	7147292.105	513199.187	410.985	TOE54
11208	7147289.467	513198.319	412.834	GS
11207	7147286.079	513197.258	415.562	GS
11206	7147283.358	513196.503	417.815	GS
11205	7147280.175	513195.397	420.783	TOP56
11204	7147277.333	513194.530	421.780	GS
11203	7147272.047	513192.756	423.657	GS
11202	7147266.852	513191.203	425.310	GS
11201	7147262.077	513189.654	426.698	GS
11200	7147256.458	513187.928	428.535	GS
11199	7147250.158	513186.006	429.688	GS
1820000	7147247.114	513184.857	430.048	X-SECTION F SOUTH Tag 182
11198	7147247.096	513184.842	429.955	182 GROUND

CODE

WE*	Water Edge (Also Water Elevation)
RIPRAP	RipRap
TOE*	Toe of slope
TOP*	Top of Slope
CRACK # BY #	Crack Width by Depth
GS	Random Shot

BASE LINE

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
5001	7147308.679	513168.762	415.410	REBAR
5002	7147307.829	513171.700	415.255	SPK
5003	7147307.001	513174.500	415.062	SPK
5004	7147306.123	513177.385	414.814	SPK
5005	7147305.326	513180.248	414.542	SPK
5006	7147304.464	513183.154	414.216	SPK
5007	7147303.617	513186.036	413.880	SPK
5008	7147302.779	513188.915	413.567	SPK
5009	7147301.906	513191.787	413.247	SPK
5010	7147301.077	513194.648	412.902	SPK
5011	7147300.252	513197.528	412.579	SPK
5012	7147299.401	513200.410	412.222	SPK
5013	7147298.560	513203.320	411.855	SPK
5014	7147297.733	513206.182	411.486	SPK
5015	7147296.882	513209.085	411.125	SPK
5016	7147296.038	513211.935	410.769	SPK
5017	7147295.192	513214.802	410.427	SPK
5018	7147294.339	513217.668	410.079	SPK
5019	7147293.479	513220.561	409.755	SPK
5020	7147292.637	513223.418	409.405	SPK
5021	7147291.792	513226.306	409.041	SPK
5022	7147290.930	513229.193	408.722	SPK
5000	7147290.078	513232.055	408.463	REBAR

CRACKS

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
206910	7147291.122	513232.445	408.465	CRACK .005
206920	7147292.786	513232.853	408.583	CRACK .005
206930	7147293.928	513232.906	408.697	CRACK .005
206940	7147295.354	513233.243	408.797	CRACK .005
206950	7147296.121	513233.156	408.840	CRACK .005
206960	7147297.589	513233.314	408.881	EDGE
206970	7147293.420	513229.807	408.891	CRACK .005
206980	7147294.918	513230.116	409.029	CRACK .005
206990	7147296.216	513230.395	409.091	CRACK .005
207000	7147296.720	513230.293	409.121	CRACK .12 BY .24
207010	7147297.723	513230.385	409.165	EDGE
207020	7147293.906	513226.893	409.201	CRACK .12 BY .03
207030	7147297.287	513227.661	409.398	CRACK .24 BY .26
207040	7147298.165	513227.763	409.433	EDGE
207050	7147293.110	513223.627	409.376	CRACK .005
207060	7147294.619	513224.030	409.531	CRACK .005
207070	7147295.059	513224.104	409.565	CRACK .005
207080	7147295.747	513224.299	409.614	CRACK .005
207090	7147296.719	513224.516	409.693	CRACK .005
207100	7147297.982	513224.756	409.734	CRACK .08 BY .08
207110	7147298.729	513224.947	409.719	EDGE
207120	7147293.868	513220.729	409.744	CRACK .46BY .05
207130	7147295.250	513221.096	409.840	CRACK .005
207140	7147296.158	513221.231	409.910	CRACK .005
207150	7147296.614	513221.477	409.936	CRACK .09 BY .04
207160	7147297.612	513221.742	409.969	CRACK .20 BY .12
207170	7147298.641	513221.950	410.021	EDGE
207180	7147294.812	513217.827	410.089	CRACK .50 BY .05
207190	7147296.291	513218.305	410.157	CRACK .005
207200	7147297.785	513218.748	410.250	CRACK .13 BY .02
207210	7147298.070	513218.864	410.239	CRACK .20 BY .05
207220	7147298.836	513219.004	410.326	CRACK .005
207230	7147299.474	513219.165	410.334	EDGE
207240	7147294.894	513214.817	410.389	CRACK .005
207250	7147295.783	513215.006	410.400	CRACK .54 BY .06
207260	7147297.889	513215.706	410.529	CRACK .005
207270	7147298.656	513215.950	410.550	CRACK .005
207280	7147299.406	513216.143	410.582	CRACK .28 BY .11
207290	7147300.439	513216.457	410.614	EDGE
207300	7147295.632	513211.891	410.708	CRACK .005
207310	7147296.396	513212.146	410.758	CRACK .005
207320	7147296.712	513212.066	410.751	CRACK .46 BY .08
207330	7147298.283	513212.509	410.836	CRACK .005
207340	7147299.465	513212.785	410.907	CRACK .005

CRACKS

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
207350	7147300.401	513213.062	410.966	EDGE
207360	7147296.775	513209.111	411.097	CRACK .005
207370	7147297.489	513209.269	411.112	CRACK .37 BY .11
207380	7147298.589	513209.663	411.156	CRACK .005
207390	7147299.903	513209.985	411.248	CRACK .005
207400	7147300.374	513210.069	411.251	EDGE
207410	7147298.347	513206.403	411.487	CRACK .45 BY .16
207420	7147299.340	513206.730	411.501	CRACK .005
207430	7147299.991	513206.906	411.526	CRACK .20 BY .13
207440	7147300.811	513207.200	411.586	EDGE
207450	7147299.271	513203.406	411.864	CRACK .37 BY .07
207460	7147300.963	513204.111	411.912	CRACK .24 BY .24
207470	7147301.430	513204.322	411.940	CRACK .005
207480	7147301.953	513204.502	411.944	EDGE
207490	7147300.114	513200.566	412.237	CRACK .30 BY .05
207500	7147300.837	513200.810	412.239	CRACK .10 BY .15
207510	7147301.764	513201.161	412.286	CRACK .16 BY .15
207520	7147302.770	513201.581	412.350	CRACK .005
207530	7147303.798	513201.862	412.401	EDGE
207540	7147300.864	513197.633	412.596	CRACK .25 BY .05
207550	7147301.810	513197.889	412.647	CRACK .08 BY .05
207560	7147302.816	513198.210	412.718	CRACK .20BY .08
207570	7147303.682	513198.452	412.768	CRACK .12 BY .24
207580	7147305.134	513198.811	412.831	CRACK .15 BY .13
207590	7147305.793	513199.034	412.845	EDGE
207600	7147302.790	513195.017	413.042	CRACK .005
207610	7147303.772	513195.237	413.086	CRACK .06 BY .06
207620	7147304.466	513195.538	413.116	CRACK .20 BY .11
207630	7147305.605	513195.853	413.187	EDGE
207640	7147302.696	513192.125	413.272	CRACK .005
207650	7147304.202	513192.607	413.376	CRACK .005
207660	7147305.221	513192.904	413.407	CRACK .21 BY .11
207670	7147306.314	513193.262	413.482	EDGE
207680	7147304.688	513189.538	413.654	CRACK .13 BY .05
207690	7147306.468	513190.262	413.755	CRACK .18 BY .05
207700	7147306.880	513190.392	413.797	EDGE
207710	7147305.522	513186.616	414.023	CRACK .005
207720	7147306.321	513186.767	414.072	CRACK .18 BY .05
207730	7147307.388	513187.178	414.135	CRACK .005
207740	7147307.914	513187.385	414.148	EDGE
207750	7147306.485	513183.793	414.361	CRACK .005
207760	7147307.270	513184.185	414.413	CRACK .005
207770	7147307.902	513184.401	414.424	CRACK .30 BY .12
207780	7147308.540	513184.638	414.472	CRACK .005
207790	7147309.470	513184.949	414.509	CRACK .005
207800	7147310.406	513185.299	414.502	EDGE
207810	7147307.685	513180.986	414.723	CRACK .005
207820	7147308.214	513181.111	414.763	CRACK .005
207830	7147309.220	513181.468	414.788	CRACK .13 BY .06
207840	7147311.061	513182.082	414.830	EDGE
207850	7147307.408	513177.808	414.919	CRACK .005
207860	7147308.427	513178.181	414.984	CRACK .005
207870	7147309.252	513178.424	415.042	CRACK .005
207880	7147310.035	513178.812	415.050	CRACK .12 BY .07
207890	7147311.752	513179.440	415.073	CRACK .09 BY .15
207900	7147311.939	513179.502	415.033	EDGE
207910	7147308.529	513175.052	415.178	CRACK .005
207920	7147310.579	513175.688	415.306	CRACK .005
207930	7147311.452	513176.057	415.309	CRACK .07 BY .08
207940	7147313.352	513176.728	415.270	CRACK .21 BY .17
207950	7147313.661	513176.837	415.245	EDGE
207960	7147310.074	513172.437	415.409	CRACK .005
207970	7147310.588	513172.570	415.441	CRACK .005
207980	7147312.075	513173.084	415.494	CRACK .005
207990	7147314.862	513174.095	415.508	EDGE
208000	7147311.173	513169.421	415.527	CRACK .005
208010	7147314.537	513170.467	415.579	CRACK .21 BY .07
208020	7147316.658	513171.276	415.354	EDGE

CODE	
REBAR	Rebar
SPK	Spike
CRACK #	Crack +Width
EDGE	Edge -Top of Crest
CRACK # BY #	Crack Width by Depth

HUDGEON LAKE OUTLET

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Hudgeon lake Outlet
10002	7147415.631	512872.155	413.484	TOP
10003	7147416.157	512874.259	413.294	TOP
10004	7147416.172	512877.110	413.453	TOP
10005	7147415.361	512880.636	413.554	TOP
10006	7147415.461	512882.266	413.517	TOP
10007	7147414.981	512886.904	413.460	TOP
10008	7147414.034	512887.736	413.358	TOP
10009	7147411.977	512888.846	413.432	TOP
10010	7147410.027	512891.470	413.404	TOP
10011	7147408.485	512896.209	413.261	TOP
10012	7147406.215	512902.006	413.469	TOP
10017	7147439.829	512876.099	413.868	TOP1
10022	7147439.582	512883.440	413.579	TOP1
10023	7147439.740	512884.974	413.586	TOP1
10024	7147440.061	512886.535	413.934	TOP1
10025	7147440.441	512887.329	413.919	TOP1
10026	7147440.841	512888.619	413.524	TOP1
10027	7147440.848	512892.068	413.512	TOP1
10028	7147438.593	512900.265	412.909	TOP1
10029	7147437.436	512907.322	413.005	TOP1
10030	7147434.325	512911.654	412.697	TOP1
10057	7147413.022	512889.000	413.256	TOP5
12281	7147452.227	512719.919	411.640	WE80
12282	7147449.853	512718.975	411.634	WE80
12283	7147447.985	512717.247	411.619	WE80
12284	7147448.322	512715.668	411.672	WE80
12285	7147448.745	512713.298	411.623	WE80
12286	7147449.406	512712.343	411.625	WE80
12287	7147450.858	512711.799	411.628	WE80
12288	7147451.569	512708.685	411.652	WE80
12289	7147451.743	512716.344	412.740	GS
20005	7147406.475	512857.505	413.641	OG
20006	7147409.733	512857.184	413.290	OG
20007	7147414.096	512856.597	412.645	OG
20008	7147417.879	512856.214	412.218	OG
20009	7147420.701	512855.979	411.758	OG
20010	7147421.782	512855.992	411.649	EDGE WATER
20011	7147424.502	512855.792	411.298	OG
20012	7147426.947	512855.625	411.290	OG
20013	7147429.652	512855.793	411.351	OG
20014	7147432.326	512855.704	411.550	OG
20015	7147433.424	512855.590	411.629	EDGE WATER
20016	7147436.566	512855.411	412.148	OG
20017	7147439.857	512855.425	412.944	OG
20018	7147442.876	512855.292	413.636	OG
20019	7147445.621	512855.105	414.025	OG
20020	7147438.287	512839.340	413.713	OG
20021	7147435.528	512840.129	413.536	TOP10
20022	7147433.503	512840.681	412.658	OG
20023	7147431.442	512841.370	411.617	EDGE WATER
20024	7147430.103	512841.721	411.094	OG
20025	7147428.023	512842.198	410.409	OG
20026	7147422.403	512846.068	410.332	OG
20027	7147421.188	512846.573	410.691	OG
20028	7147419.263	512847.562	411.341	OG
20029	7147418.348	512848.149	411.629	EDGE WATER
20030	7147415.777	512849.337	412.304	OG
20031	7147411.402	512850.504	412.745	OG
20032	7147410.142	512850.589	413.232	OG
20033	7147405.316	512851.187	413.688	OG
20034	7147394.447	512833.656	413.119	OG
20035	7147396.981	512832.675	412.596	OG
20036	7147398.765	512831.838	412.046	OG
20037	7147399.549	512831.272	411.642	EDGE WATER
20038	7147400.628	512830.647	411.381	OG
20039	7147401.565	512830.171	410.941	OG
20040	7147403.591	512829.199	410.678	OG
20041	7147405.375	512828.260	410.505	OG
20042	7147406.344	512827.870	410.726	OG

HUDGEON LAKE OUTLET

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Hudgeon lake Outlet
20043	7147407.852	512827.020	410.851	OG
20044	7147408.849	512826.382	410.439	OG
20045	7147410.055	512825.965	410.566	OG
20046	7147411.623	512825.368	410.577	OG
20047	7147412.520	512825.137	410.923	OG
20048	7147414.104	512824.798	411.461	OG
20049	7147414.920	512824.568	411.633	EDGE WATER
20050	7147416.855	512824.041	411.979	OG
20051	7147420.170	512822.759	412.298	OG
20052	7147426.223	512821.088	412.881	OG
20053	7147430.663	512820.438	413.414	OG
20054	7147372.103	512827.482	411.259	OG
20055	7147375.160	512826.555	411.101	OG
20056	7147380.419	512824.805	410.991	OG
20057	7147384.961	512822.685	411.022	OG
20058	7147386.234	512822.425	411.014	OG
20059	7147388.027	512822.044	411.070	OG
20060	7147390.801	512821.210	410.967	OG
20061	7147393.149	512820.989	411.010	OG
20062	7147395.599	512821.054	410.857	OG
20063	7147396.574	512820.364	410.947	OG
20064	7147398.591	512820.058	410.945	OG
20065	7147400.342	512819.357	410.789	OG
20066	7147401.145	512819.064	410.608	OG
20067	7147402.015	512819.080	410.464	OG
20068	7147403.900	512818.223	410.091	OG
20069	7147405.953	512817.541	410.073	OG
20070	7147408.416	512817.929	410.104	OG
20071	7147410.270	512816.316	410.008	OG
20072	7147413.972	512815.943	410.909	OG
20073	7147417.892	512815.002	411.422	OG
20074	7147430.843	512805.898	414.117	TOP24
20075	7147427.204	512808.874	413.715	TOP24
20076	7147424.777	512811.471	413.234	TOP24
20077	7147423.609	512811.816	412.843	TOP24
20078	7147421.236	512814.760	412.353	TOP24
20079	7147418.380	512818.060	412.127	TOP24
20080	7147416.602	512821.059	412.008	TOP24
20081	7147415.683	512822.949	411.854	TOP24
20082	7147419.694	512825.682	412.051	TOP24
20083	7147424.295	512826.061	412.525	TOP24
20084	7147429.959	512826.356	413.211	TOP24
20085	7147433.028	512830.346	413.490	TOP24
20086	7147434.420	512835.586	413.558	TOP24
20087	7147430.230	512837.557	411.650	TOE24
20088	7147428.396	512831.788	411.648	TOE24
20089	7147427.432	512829.386	411.646	TOE24
20090	7147424.478	512828.213	411.651	TOE24
20091	7147419.476	512827.050	411.649	TOE24
20092	7147415.853	512826.064	411.656	TOE24
20093	7147414.892	512824.889	411.639	TOE24
20094	7147415.194	512821.806	411.650	TOE24
20095	7147416.806	512819.190	411.643	TOE24
20096	7147418.727	512815.074	411.645	TOE24
20097	7147421.791	512810.902	411.638	TOE24
20098	7147424.792	512806.919	411.644	TOE24
20099	7147427.671	512803.506	411.626	TOE24
20100	7147432.782	512808.336	414.161	GS
20101	7147428.581	512812.132	413.728	GS
20102	7147424.303	512816.076	412.969	GS
20103	7147420.490	512818.906	412.421	GS
20104	7147419.254	512822.835	412.235	GS
20105	7147424.754	512822.498	412.686	GS
20106	7147430.499	512821.940	413.349	GS
20107	7147436.114	512821.073	413.855	GS
20108	7147434.953	512816.087	413.826	GS
20109	7147430.279	512817.586	413.516	GS
20110	7147437.712	512826.009	413.932	GS
20111	7147433.679	512827.252	413.576	GS

HUDGEON LAKE OUTLET

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Hudgeon lake Outlet
20112	7147436.280	512836.280	413.702	GS
20113	7147415.226	512822.191	411.745	RIP RAP
20114	7147416.684	512822.479	411.941	RIP RAP
20115	7147417.875	512821.826	412.276	RIP RAP
20116	7147418.510	512820.359	412.268	RIP RAP
20117	7147419.266	512818.375	412.239	RIP RAP
20118	7147420.978	512816.096	412.409	RIP RAP
20119	7147419.396	512814.807	411.643	RIP RAP
20120	7147419.071	512819.092	413.163	STRUCTURE1 TOP
20121	7147416.336	512819.504	413.157	STRUCTURE1 TOP
20122	7147418.075	512821.645	413.182	STRUCTURE1 TOP
20123	7147401.492	512843.406	413.120	TOP25
20124	7147399.711	512840.131	413.108	TOP25
20125	7147399.174	512836.647	412.848	TOP25
20126	7147397.664	512833.385	412.740	TOP25
20127	7147394.342	512831.204	412.823	TOP25
20128	7147390.269	512829.704	412.907	TOP25
20129	7147389.257	512827.328	412.492	TOP25
20130	7147386.949	512826.316	412.421	TOP25
20131	7147383.098	512827.881	412.603	TOP25
20132	7147379.925	512830.044	413.085	TOP25
20133	7147379.156	512830.690	413.443	TOP25
20134	7147376.866	512833.601	413.693	TOP25
20135	7147374.286	512834.155	413.635	TOP25
20136	7147370.036	512831.302	413.715	TOP25
20137	7147365.712	512826.502	413.804	TOP25
20138	7147368.623	512824.310	411.663	TOE25
20139	7147370.787	512827.573	411.712	TOE25
20140	7147373.177	512829.490	411.701	TOE25
20141	7147376.612	512828.724	411.668	TOE25
20142	7147378.498	512827.532	411.647	TOE25
20143	7147382.122	512826.312	411.691	TOE25
20144	7147385.567	512824.675	411.636	TOE25
20145	7147387.913	512824.476	411.628	TOE25
20146	7147390.802	512826.186	411.638	TOE25
20147	7147392.138	512827.834	411.650	TOE25
20148	7147393.922	512828.195	411.672	TOE25
20149	7147395.268	512828.281	411.648	TOE25
20150	7147399.337	512831.161	411.651	TOE25
20151	7147402.263	512834.879	411.637	TOE25
20152	7147402.972	512837.436	411.636	TOE25
20153	7147406.034	512841.221	411.642	TOE25
20154	7147393.110	512830.525	413.239	STRUCTURE2 TOP
20155	7147392.780	512827.803	413.234	STRUCTURE2 TOP
20156	7147390.579	512829.464	413.315	STRUCTURE2 TOP
20157	7147387.929	512824.958	411.786	RIP RAP1
20158	7147387.560	512826.141	412.428	RIP RAP1
20159	7147387.968	512826.992	412.501	RIP RAP1
20160	7147389.862	512828.246	412.536	RIP RAP1
20161	7147390.646	512829.359	412.603	RIP RAP1
20162	7147392.310	512830.073	412.432	RIP RAP1
20163	7147394.079	512830.482	412.646	RIP RAP1
20164	7147394.784	512828.112	411.627	RIP RAP1
20165	7147394.745	512831.902	412.863	GS
20166	7147388.530	512830.280	413.068	GS
20167	7147382.928	512829.528	413.021	GS
20168	7147379.266	512833.476	413.636	GS
20169	7147384.608	512835.822	413.888	GS
20170	7147389.484	512837.762	413.918	GS
20171	7147393.761	512839.653	413.681	GS
20172	7147395.634	512838.673	413.100	GS
20173	7147398.163	512837.424	412.939	GS
20174	7147398.781	512845.277	413.646	GS
20175	7147390.415	512843.631	414.093	GS
20176	7147383.856	512841.552	414.091	GS
20177	7147378.305	512838.188	414.022	GS
20178	7147373.133	512829.073	411.645	WELEV
22501	7147436.104	512842.896	413.352	TOP24
22502	7147437.154	512847.620	413.297	TOP24
22503	7147438.130	512851.028	413.200	TOP24

HUDGEON LAKE OUTLET

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Hudgeon lake Outlet
22504	7147439.442	512851.367	413.241	TOP24
22505	7147441.885	512851.666	413.618	TOP24
22506	7147444.527	512851.812	413.950	TOP24
22507	7147432.371	512843.017	411.826	TOE24
22508	7147433.446	512847.666	411.704	TOE24
22509	7147434.249	512851.138	411.717	TOE24
22510	7147434.488	512852.699	411.723	TOE24
22511	7147436.331	512853.230	412.019	TOE24
22512	7147439.476	512852.870	412.888	TOE24
22513	7147441.863	512852.259	413.517	TOE24
22514	7147445.275	512850.371	414.006	GS
22515	7147446.736	512843.627	414.193	GS
22516	7147441.942	512848.366	413.813	GS
22517	7147437.987	512843.085	413.595	GS
22518	7147441.490	512839.083	413.946	GS
22519	7147442.932	512845.081	413.924	GS
22520	7147440.121	512832.892	414.055	GS
22521	7147440.477	512865.294	413.949	TOP50
22522	7147440.066	512860.958	413.802	TOP50
22523	7147439.716	512859.422	413.699	TOP50
22524	7147439.075	512858.388	413.372	TOP50
22525	7147436.563	512858.416	412.722	TOP50
22526	7147434.743	512858.493	412.114	TOP50
22527	7147433.212	512859.281	411.876	TOP50
22528	7147432.233	512859.644	411.690	TOP50
22529	7147432.708	512858.804	411.585	TOE50
22530	7147435.260	512857.865	412.015	TOE50
22531	7147438.564	512857.570	412.748	TOE50
22532	7147441.351	512857.582	413.344	TOE50
22533	7147443.626	512856.984	413.816	TOE50
22534	7147443.850	512857.946	413.994	BRK50
22535	7147442.230	512858.426	413.923	BRK50
22536	7147440.030	512858.583	413.673	BRK50
22537	7147444.895	512859.351	414.073	GS
22538	7147444.580	512865.407	414.006	GS
22539	7147444.309	512870.990	414.038	GS
22540	7147443.423	512876.192	413.914	GS
22541	7147443.279	512881.772	413.776	GS
22542	7147443.471	512887.797	413.725	GS
22543	7147443.189	512893.959	413.440	GS
22544	7147442.215	512900.200	413.224	GS
22545	7147440.597	512906.521	413.100	GS
22546	7147404.830	512847.598	413.389	TOP25
22547	7147409.594	512847.519	413.126	TOP25
22548	7147411.600	512847.701	412.886	TOP25
22549	7147411.979	512848.548	412.911	TOP25
22550	7147410.942	512850.085	413.117	TOP25
22551	7147410.209	512853.274	413.288	TOP25
22552	7147408.481	512844.070	411.694	TOE25
22553	7147411.658	512845.612	411.675	TOE25
22554	7147415.265	512846.748	411.751	TOE25
22555	7147418.429	512848.597	411.693	TOE25
22556	7147419.862	512851.810	411.683	TOE25
22557	7147419.499	512853.278	411.800	TOE25
22558	7147416.372	512854.633	412.292	TOE25
22559	7147411.984	512855.437	412.927	TOE25
22560	7147408.627	512855.965	413.425	TOE25
22561	7147411.335	512854.638	413.095	BRK51
22562	7147411.098	512851.462	412.854	BRK51
22563	7147411.849	512849.307	412.652	BRK51
22564	7147412.361	512848.268	412.533	BRK51
22565	7147411.617	512847.192	412.442	BRK51
22566	7147410.361	512846.656	412.438	BRK51
22567	7147411.193	512846.492	412.385	BRK52
22568	7147414.042	512847.370	412.263	BRK52
22569	7147416.504	512849.215	412.161	BRK52
22570	7147418.263	512851.427	412.067	BRK52
22571	7147417.380	512853.453	412.183	BRK52
22572	7147415.125	512854.330	412.670	BRK52
22573	7147412.566	512854.737	412.854	BRK52

HUDGEON LAKE OUTLET

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Hudgeon lake Outlet
22574	7147412.945	512851.099	412.648	GS
22575	7147415.605	512853.279	412.604	GS
22576	7147415.874	512850.360	412.390	GS
22577	7147396.734	512846.945	413.936	GS
22578	7147393.629	512851.015	414.314	GS
22579	7147386.167	512848.362	414.374	GS
22580	7147378.791	512846.835	414.357	GS
22581	7147370.724	512842.724	414.311	GS
22582	7147364.881	512837.770	414.351	GS
22583	7147360.728	512830.872	414.177	GS
22584	7147363.691	512823.934	413.840	TOP25-1
22585	7147360.431	512818.243	413.435	TOP25-1
22586	7147361.845	512816.486	413.023	BRK53
22587	7147362.826	512818.370	413.057	BRK53
22588	7147363.026	512820.046	413.398	BRK53
22589	7147363.907	512820.691	413.388	BRK53
22590	7147364.500	512823.126	413.506	BRK53
22591	7147366.634	512821.747	411.739	TOE25-1
22592	7147365.010	512817.965	411.751	TOE25-1
22593	7147363.711	512815.005	411.697	TOE25-1
22594	7147374.735	512834.107	413.638	BRK54
22595	7147374.660	512832.899	413.051	BRK54
22596	7147374.812	512831.735	412.613	BRK54
22597	7147375.260	512832.258	412.675	BRK55
22598	7147375.254	512833.474	413.075	BRK55
22599	7147375.273	512834.588	413.427	BRK55
22600	7147375.817	512834.332	413.679	BRK56
22601	7147375.802	512833.037	413.331	BRK56
22602	7147375.687	512831.527	412.538	BRK56
22603	7147383.967	512836.250	413.973	TOE55
22604	7147383.283	512838.851	414.070	TOE55
22605	7147380.020	512837.253	413.984	TOE55
22606	7147380.915	512834.556	413.788	TOE55
22607	7147397.088	512841.036	413.627	TOE56
22608	7147400.785	512844.044	413.288	TOE56
22609	7147403.819	512849.784	413.773	TOE56
22610	7147406.998	512854.830	413.585	TOE56
22611	7147410.317	512860.758	413.508	TOP60
22612	7147414.159	512859.967	413.480	TOP60
22613	7147415.550	512859.857	413.378	TOP60
22614	7147415.607	512863.448	413.298	TOP60
22615	7147415.386	512867.487	413.343	TOP60
22616	7147421.962	512867.431	411.671	TOE57
22617	7147421.898	512862.676	411.667	TOE57
22618	7147420.943	512859.476	411.697	TOE57
22619	7147419.475	512858.229	412.043	TOE57
22620	7147416.455	512858.234	412.460	TOE57
22621	7147412.293	512859.302	413.019	TOE57
22622	7147409.346	512860.391	413.421	TOE57
22623	7147409.255	512862.023	413.565	GS
22624	7147413.209	512865.971	413.431	GS
22625	7147412.608	512872.139	413.574	GS
22626	7147412.495	512878.617	413.627	GS
22627	7147411.381	512884.085	413.685	GS
22628	7147408.937	512889.487	413.607	GS
22629	7147406.849	512895.225	413.563	GS
22630	7147405.204	512900.743	413.692	GS
22631	7147403.731	512905.427	413.683	GS
22632	7147400.258	512905.303	414.291	GS
22633	7147400.638	512899.417	414.424	GS
22634	7147400.652	512893.872	414.518	GS
22635	7147400.910	512887.743	414.559	GS
22636	7147402.810	512880.206	414.383	GS
22637	7147406.093	512875.316	413.892	GS
22638	7147422.461	512872.147	411.618	TOE57-1
22639	7147422.505	512877.421	411.686	TOE57-1
22640	7147422.117	512881.834	411.701	TOE57-1
22641	7147422.412	512886.457	411.593	TOE57-1
22642	7147432.406	512858.919	411.552	TOE50-1
22643	7147431.757	512859.738	411.568	TOE50-1

HUDGEON LAKE OUTLET

POINT ID	NORTHING	EASTING	ORTHOMETRIC	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Hudgeon lake Outlet
22644	7147432.107	512861.050	411.567	TOE50-1
22645	7147432.662	512865.414	411.644	TOE50-1
22646	7147432.587	512869.779	411.705	TOE50-1
22647	7147431.956	512875.466	411.717	TOE50-1
22648	7147432.339	512879.518	411.678	TOE50-1
22649	7147432.407	512884.376	411.627	TOE50-1
22650	7147432.039	512887.890	411.566	TOE50-1

CODE

TOP*	Top of slope
WE8*	Water edge (Water elevation
GS	Random Ground shot
OG	Random Ground shot
EDGE WATER	Water edge (Water elevation
TOE*	Toe of Slope
RIP RAP+	Riprap
STRUCTURE1 TOP	STRUCTURE1 TOP
STRUCTURE2 TOP	STRUCTURE2 TOP
WELEV	Water elevation
BRK*	Breakline

CLINTON CREEK NATURAL SLOPE

CONTROL

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT	LOCATION
2835	7147272.790	513147.057	432.669	RTK base for Clinton Creek 2 NEW Markers	
1830000	7147439.777	513029.363	422.973	MONITORING PIN 183	Approx. 11.5m from Cliff at Station 0+156.5
11164	7147439.806	513029.383	422.902	183 GROUND	
1840000	7147362.163	513218.859	419.982	MONITORING PIN 184	Approx. 10.3m from Cliff at Station 0+360
11165	7147362.172	513218.866	419.972	184 GROUND	

WOLVERENE CREEK NATURAL SLOPE

CONTROL

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT	LOCATION
2834	7148172.673	513447.724	606.823	RTK base for Wolverene 2 NEW Markers	
16001	7147967.824	514047.033	425.916	SLOPE MONITOR REBAR 160	Approx. 9.5m from Cliff at Station 1+043
16000	7147967.801	514047.05	425.9	160 GROUND	
16300	7147722.775	514226.349	399.1	SLOPE MONITOR REBAR 163	Approx. 10.6m from Edge at Station 0+690 (Station 0+600 too Heavely treed)
16300	7147722.775	514226.349	399.1	163 GROUND	

WOLVERINE CREEK CENTRE LINE

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
2834	7148172.673	513447.724	606.823	RTK base for Wolverine Creek CL and pond water edge

WOLVERINE CREEK CENTRE LINE AND POND WATER EDGE

POINT ID	NORTHING	EASTING	OTHOMETRIC HEIGHT	COMMENT
2112	7148411.557	513956.851	410.358	WE
2113	7148411.942	513957.593	409.951	WE
11529	7148205.963	513978.294	407.441	WE60
11530	7148207.135	513977.581	407.456	WE60
11531	7148207.058	513976.501	407.436	WE60
11532	7148207.777	513975.871	407.459	WE60
11533	7148208.338	513975.28	407.454	WE60
11534	7148209.482	513975.633	407.461	WE60
11535	7148211.127	513975.38	407.471	WE60
11536	7148211.675	513974.958	407.454	WE60
11537	7148211.904	513974.445	407.452	WE60
11538	7148211.704	513973.052	407.463	WE60
11539	7148211.754	513971.406	407.469	WE60
11540	7148213.068	513970.187	407.477	WE60
11541	7148212.779	513969.054	407.462	WE60
11542	7148214.387	513966.588	407.46	WE60
11543	7148214.62	513965.23	407.468	WE60
11544	7148214.195	513964.742	407.461	WE60
11545	7148212.396	513964.614	407.448	WE60
11546	7148212.008	513964.219	407.456	WE60
11547	7148213.757	513960.822	407.456	WE60
11548	7148218	513953.101	407.466	WE60
11549	7148219.069	513949.484	407.469	WE60
11550	7148219.267	513945.361	407.466	WE60
11551	7148217.85	513941.952	407.427	WE60
11552	7148217.794	513939.737	407.47	WE60
11553	7148216.947	513938.279	407.467	WE60
11554	7148210.561	513933.401	407.495	WE60
11555	7148206.779	513930.888	407.473	WE60
11556	7148204.244	513928.295	407.486	WE60
11557	7148200.864	513925.095	407.459	WE60
11558	7148198.184	513920.554	407.466	WE60
11559	7148197.937	513917.866	407.486	WE60
11560	7148196.301	513911.847	407.459	WE60
11561	7148197.28	513903.216	407.457	WE60
11562	7148197.768	513899.392	407.461	WE60
11563	7148198.628	513895.25	407.467	WE60
11564	7148199.475	513889.202	407.46	WE60
11565	7148200.4	513887.637	407.455	WE60
11566	7148204.902	513885.911	407.468	WE60
11567	7148209.201	513884.995	407.496	WE60
11568	7148216.107	513884.8	407.522	WE60
11569	7148225.019	513885.26	407.477	WE60
11570	7148226.344	513884.448	407.498	WE60
11571	7148231.692	513885.235	407.533	WE60
11572	7148238.725	513886.211	407.519	WE60
11573	7148244.227	513888.229	407.493	WE60
11574	7148245.451	513889.335	407.464	WE60
11575	7148248.452	513896.745	407.465	WE60
11576	7148251.528	513902.98	407.468	WE60
11577	7148253.513	513904.91	407.468	WE60
11578	7148254.066	513907.13	407.475	WE60
11579	7148257.317	513911.111	407.463	WE60
11580	7148260.072	513914.995	407.466	WE60
11581	7148263.57	513922.674	407.462	WE60
11582	7148264.339	513926.941	407.472	WE60
11583	7148268.331	513931.94	407.469	WE60
11584	7148271.626	513939.49	407.452	WE60
11585	7148271.769	513940.501	407.46	WE60
11586	7148271.392	513941.323	407.462	WE60
11587	7148270.574	513941.778	407.467	WE60
11588	7148269.17	513945.829	407.472	WE60
11589	7148267.493	513948.112	407.454	WE60
11590	7148265.532	513949.868	407.455	WE60
11591	7148265.275	513950.269	407.461	WE60
11592	7148265.484	513951.315	407.452	WE60

WOLVERINE CREEK CENTRE LINE AND POND WATER EDGE

POINT ID	NORTHING	EASTING	OTHOMETRIC HEIGHT	COMMENT
11593	7148262.393	513952.489	407.473	WE60
11594	7148260.669	513955.261	407.453	WE60
11595	7148259.91	513958.206	407.454	WE60
11596	7148259.288	513959.12	407.458	WE60
11597	7148259.508	513961.952	407.463	WE60
11598	7148261.123	513962.209	407.465	WE60
11599	7148261.642	513962.94	407.455	WE60
11600	7148262.786	513963.395	407.427	WE60
11601	7148263.518	513964.305	407.45	WE60
11602	7148264.968	513965.149	407.481	WE60
11603	7148264.562	513967.938	407.459	WE60
11604	7148264.628	513968.474	407.462	WE60
11605	7148264.897	513968.491	407.478	WE60
11606	7148265.701	513967.973	407.501	WE60
11607	7148270.478	513963.302	407.63	WE60
11608	7148271.9	513964.63	407.673	WE61
11609	7148270.087	513966.303	407.594	WE61
11610	7148269.306	513967.404	407.56	WE61
11611	7148269.058	513968.404	407.543	WE61
11612	7148269.156	513970.325	407.499	WE61
11613	7148264.917	513973.206	407.492	WE61
11614	7148259.235	513976.254	407.504	WE61
11615	7148253.353	513977.858	407.485	WE61
11616	7148249.278	513978.494	407.489	WE61
11617	7148245.941	513978.889	407.508	WE61
11618	7148241.053	513979.421	407.495	WE61
11619	7148238.801	513980.731	407.465	WE61
11620	7148236.834	513980.386	407.482	WE61
11621	7148236.864	513981.234	407.462	WE61
11622	7148234.543	513982.081	407.526	WE61
11623	7148231.908	513981.172	407.494	WE61
11624	7148227.454	513981.716	407.477	WE61
11625	7148225.191	513981.712	407.491	WE61
11626	7148223.992	513981.669	407.484	WE61
11627	7148223.663	513982.441	407.481	WE61
11628	7148223.185	513982.759	407.475	WE61
11629	7148221.568	513981.722	407.538	WE61
11630	7148219.203	513981.469	407.498	WE61
11631	7148217.808	513980.743	407.455	WE61
11632	7148215.251	513981.336	407.494	WE61
11633	7148215.138	513981.971	407.495	WE61
11634	7148213.88	513981.465	407.491	WE61
11635	7148212.129	513981.855	407.512	WE61
11636	7148210.133	513981.818	407.427	WE61
11637	7148207.343	513982.577	407.469	WE61
11638	7148206.956	513982.146	407.485	WE61
11639	7148204.973	513982.644	407.465	WE61
11640	7148204.233	513981.345	407.401	CRK CL60
11641	7148194.87	513985.341	407.321	CRK CL60
11642	7148188.246	513987.137	407.311	CRK CL60
11643	7148183.769	513987.627	407.06	CRK CL60
11644	7148179.738	513985.62	406.868	CRK CL60
11645	7148170.975	513990.57	407.158	CRK CL60
11646	7148164.739	513989.89	407.034	CRK CL60
11647	7148161.002	513988.561	407.211	CRK CL60
11648	7148153.555	513992.674	406.88	CRK CL60
11649	7148144.08	513990.204	406.549	CRK CL60
11650	7148135.22	513986.43	406.554	CRK CL60
11651	7148130.792	513984.588	406.343	CRK CL60
11652	7148119.043	513987.132	406.356	CRK CL60
11653	7148110.133	513987.364	406.05	CRK CL60
11654	7148099.743	513986.911	405.871	CRK CL60
11655	7148089.481	513987.213	405.931	CRK CL60
11656	7148081.495	513988.519	405.72	CRK CL60
11657	7148069.52	513987.869	405.158	CRK CL60
11658	7148059.727	513987.056	405.031	CRK CL60
11659	7148049.556	513987.887	405.065	CRK CL60
11660	7148039.698	513990.03	404.76	CRK CL60
11661	7148030.042	513990.734	404.38	CRK CL60
11662	7148019.99	513990.817	404.13	CRK CL60
11663	7148006.518	513990.337	403.745	CRK CL60

WOLVERINE CREEK CENTRE LINE AND POND WATER EDGE

POINT ID	NORTHING	EASTING	OTHOMETRIC HEIGHT	COMMENT
11664	7147998.789	513987.576	403.658	CRK CL60
11665	7147991.824	513983.838	403.491	CRK CL60
11666	7147985.04	513982.15	403.315	CRK CL60
11667	7147979.272	513982.788	403.08	CRK CL60
11668	7147975.061	513982.933	402.916	CRK CL60
11669	7147998.332	513987.766	403.691	CRK CL61
11670	7147993.392	513990.416	403.484	CRK CL61
11671	7147986.998	513988.676	403.103	CRK CL61
11672	7147982.894	513985.017	403.052	CRK CL61
11673	7147981.551	513983.991	403.026	CRK CL61
11674	7147979.349	513983.311	402.965	CRK CL61
11675	7147978.028	513982.91	402.931	CRK CL61
11676	7147965.543	513981.147	402.856	CRK CL60
11677	7147955.927	513978.072	402.912	CRK CL60
11678	7147951.467	513981.606	402.401	CRK CL60
11679	7147947.694	513982.707	402.363	CRK CL60
11680	7147946.556	513983.18	401.474	CRK CL60
11681	7147944.836	513983.557	401.672	CRK CL60
11682	7147942.16	513981.931	401.513	CRK CL60
11683	7147938.55	513984.817	400.533	CRK CL60
11684	7147938.829	513985.835	400.496	CRK CL60
11685	7147936.718	513988.66	400.091	CRK CL60
11686	7147936.119	513990.693	399.889	CRK CL60
11687	7147934.691	513990.333	399.924	CRK CL60
11688	7147934.189	513990.929	399.832	CRK CL60
11689	7147933.415	513993.722	399.615	CRK CL60
11690	7147932.46	513995.931	399.491	CRK CL60
11691	7147928.181	513998.056	399.568	CRK CL60
11692	7147927.352	513999.794	398.796	CRK CL60
11693	7147925.928	513999.197	398.325	CRK CL60
11694	7147922.442	513998.686	398.658	CRK CL60
11695	7147921.331	513998.81	397.644	CRK CL60
12001	7147076.478	514192.682	362.975	CRK CL70
12002	7147077.068	514189.844	362.986	CRK CL70
12003	7147078.453	514184.824	362.956	CRK CL70
12004	7147080.275	514185.079	363.031	CRK CL70
12005	7147082.149	514189.501	363.506	CRK CL70
12006	7147083.131	514191.747	363.114	CRK CL70
12007	7147086.37	514192.004	364.378	CRK CL70
12008	7147088.759	514191.292	364.893	CRK CL70
12009	7147089.005	514191.392	365.341	INV70
12010	7147102.126	514195.432	365.617	INV71
12011	7147102.137	514195.448	365.775	CRK CL70
12012	7147103.316	514195.553	365.835	CRK CL70
12013	7147106.781	514192.975	366.064	CRK CL70
12014	7147109.933	514193.289	366.29	CRK CL70
12015	7147115.218	514197.072	366.462	CRK CL70
12016	7147118.32	514197.12	366.594	CRK CL70
12017	7147125.23	514191.494	366.766	CRK CL70
12018	7147128.798	514190.024	366.759	CRK CL70
12019	7147128.687	514189.975	366.735	CRK CL71
12020	7147125.568	514188.882	366.773	CRK CL71
12021	7147118.245	514187.318	366.509	CRK CL71
12022	7147115.412	514186.712	366.315	CRK CL71
12023	7147111.005	514188.156	366.299	CRK CL71
12024	7147106.983	514188.836	366.222	CRK CL71
12025	7147105.577	514193.433	366.007	CRK CL71
12026	7147128.956	514189.343	366.745	CRK CL72
12027	7147128.093	514186.136	366.736	CRK CL72
12028	7147125.485	514183.089	366.559	CRK CL72
12029	7147121.89	514180.1	366.566	CRK CL72
12030	7147117.513	514181.126	366.445	CRK CL72
12031	7147116.131	514183.192	366.446	CRK CL72
12032	7147115.492	514186.511	366.301	CRK CL72
12033	7147133.76	514189.569	366.693	CRK CL70
12034	7147143.741	514188.939	366.713	CRK CL70
12035	7147153.109	514187.451	366.89	CRK CL70
12036	7147162.136	514183.951	366.947	CRK CL70
12037	7147171.86	514181.46	366.883	CRK CL70
12038	7147182.39	514179.864	366.824	CRK CL70
12039	7147184.393	514177.958	366.664	CRK CL70

WOLVERINE CREEK CENTRE LINE AND POND WATER EDGE

POINT ID	NORTHING	EASTING	OTHOMETRIC HEIGHT	COMMENT
12040	7147186.627	514178.883	367.114	CRK CL70
12041	7147191.094	514184.673	367.09	CRK CL70
12042	7147195.474	514190.357	367.14	CRK CL70
12043	7147198.666	514193.993	367.257	CRK CL70
12044	7147206.182	514191.527	367.217	CRK CL70
12045	7147214.78	514188.389	367.525	CRK CL70
12046	7147220.268	514188.281	367.776	CRK CL70
12047	7147231.92	514191.707	367.459	CRK CL70
12048	7147235.674	514195.876	368.06	CRK CL70
12049	7147240.442	514196.814	367.687	CRK CL70
12050	7147244.751	514194.58	368.303	CRK CL70
12051	7147247.474	514193.247	368.002	CRK CL70
12052	7147247.649	514191.131	367.973	CRK CL70
12053	7147257.004	514193.909	368.47	CRK CL70
12054	7147265.196	514200.122	368.845	CRK CL70
12055	7147271.497	514202.561	368.837	CRK CL70
12056	7147278.397	514202.616	369.038	CRK CL70
12057	7147287.087	514198.866	369.286	CRK CL70
12058	7147293.724	514193.584	369.196	CRK CL70
12059	7147297.704	514189.385	369.114	CRK CL70
12060	7147300.184	514184.163	369.571	CRK CL70
12061	7147300.316	514182.59	369.545	CRK CL70
12062	7147304.121	514178.877	369.901	CRK CL70
12063	7147309.726	514174.357	369.583	CRK CL70
12064	7147318.701	514174.379	369.784	CRK CL70
12065	7147323.978	514178.323	369.989	CRK CL70
12066	7147326.967	514184.505	370.267	CRK CL70
12067	7147329.097	514190.481	370.3	CRK CL70
12068	7147330.418	514191.942	370.737	CRK CL70
12069	7147339.082	514196.868	370.85	CRK CL70
12070	7147345.479	514200.959	370.878	CRK CL70
12071	7147349.778	514206.917	371.25	CRK CL70
12072	7147353.902	514207.356	371.088	CRK CL70
12073	7147361.997	514205.136	371.369	CRK CL70
12074	7147369.731	514207.161	371.678	CRK CL70
12075	7147374.767	514208.146	371.729	CRK CL70
12076	7147379.78	514211.497	371.791	CRK CL70
12077	7147383.594	514214.433	371.911	CRK CL70
12078	7147392.32	514213.894	372.243	CRK CL70
12079	7147400.843	514217.445	372.111	CRK CL70
12080	7147402.77	514219.514	372.503	CRK CL70
12081	7147410.858	514219.42	372.826	CRK CL70
12082	7147415.76	514219.415	372.618	CRK CL70
12083	7147419.654	514218.66	372.849	CRK CL70
12084	7147429.629	514221.391	372.841	CRK CL70
12085	7147432.43	514221.151	372.996	CRK CL70
12086	7147436.07	514224.448	373.101	CRK CL70
12087	7147439.178	514224.907	372.955	CRK CL70
12088	7147442.003	514224.311	373.082	CRK CL70
12089	7147442.78	514224.036	373.294	CRK CL70
12090	7147447.26	514226.507	373.625	CRK CL70
12091	7147450.421	514222.677	373.746	CRK CL70
12092	7147456.265	514220.594	374.086	CRK CL70
12093	7147461.271	514219.5	374.147	CRK CL70
12094	7147467.018	514219.658	374.498	CRK CL70
12095	7147472.797	514220.623	374.624	CRK CL70
12096	7147481.841	514222.06	375.094	CRK CL70
12097	7147490.674	514217.647	375.208	CRK CL70
12098	7147494.392	514208.73	375.29	CRK CL70
12099	7147497.495	514202.831	375.436	CRK CL70
12100	7147504.244	514197.164	375.508	CRK CL70
12101	7147507.025	514193.956	375.688	CRK CL70
12102	7147507.957	514191.553	375.586	CRK CL70
12103	7147507.809	514188.873	375.707	CRK CL70
12104	7147510.754	514188.206	375.782	CRK CL70
12105	7147512.321	514189.361	375.731	CRK CL70
12106	7147508.432	514191.358	375.656	CRK CL73
12107	7147510.271	514189.317	375.764	CRK CL73
12108	7147511.955	514189.362	375.714	CRK CL73
12109	7147519.819	514193.092	375.746	CRK CL70
12110	7147523.493	514194.756	376.126	CRK CL70

WOLVERINE CREEK CENTRE LINE AND POND WATER EDGE

POINT ID	NORTHING	EASTING	OTHOMETRIC HEIGHT	COMMENT
12111	7147528.301	514197.018	376.418	CRK CL70
12112	7147529.323	514198.177	376.569	CRK CL70
12113	7147531.869	514201.292	376.761	CRK CL70
12114	7147538.834	514202.124	376.808	CRK CL70
12115	7147548.673	514198.988	376.692	CRK CL70
12116	7147557.47	514198.02	376.955	CRK CL70
12117	7147564.377	514197.407	377.189	CRK CL70
12118	7147572.95	514194.975	377.146	CRK CL70
12119	7147583.112	514191.327	377.153	CRK CL70
12120	7147589.166	514188.591	377.523	CRK CL70
12121	7147592.645	514186.75	377.64	CRK CL70
12122	7147596.412	514177.962	377.87	CRK CL70
12123	7147602.537	514173.593	377.888	CRK CL70
12124	7147611.276	514170.138	378.234	CRK CL70
12125	7147613.968	514168.975	378.305	CRK CL70
12126	7147619.007	514169.511	378.633	CRK CL70
12127	7147622.168	514165.915	378.818	CRK CL70
12128	7147623.711	514161.901	378.773	CRK CL70
12129	7147624.039	514157.134	378.682	CRK CL70
12130	7147623.782	514156.969	378.748	CRK CL74
12131	7147618.723	514158.467	378.685	CRK CL74
12132	7147616.294	514161.745	378.441	CRK CL74
12133	7147613.215	514167.279	378.391	CRK CL74
12134	7147611.481	514169.362	378.257	CRK CL74
12135	7147628.794	514157.385	378.945	CRK CL70
12136	7147635.085	514161.135	379.259	CRK CL70
12137	7147638.28	514165.403	379.021	CRK CL70
12138	7147643.014	514166.353	379.096	CRK CL70
12139	7147647.385	514164.245	379.324	CRK CL70
12140	7147654.707	514163.579	379.64	CRK CL70
12141	7147658.767	514162.025	379.612	CRK CL70
12142	7147662.377	514162.51	379.62	CRK CL70
12143	7147664.549	514165.478	379.925	CRK CL70
12144	7147670.624	514169.712	379.767	CRK CL70
12145	7147677.739	514167.864	380.381	CRK CL70
12146	7147686.958	514162.854	380.209	CRK CL70
12147	7147690.827	514160.639	380.36	CRK CL70
12148	7147697.814	514160.988	380.416	CRK CL70
12149	7147698.521	514156.74	380.808	CRK CL70
12150	7147705.106	514155.49	380.94	CRK CL70
12151	7147710.124	514155.228	381.075	CRK CL70
12152	7147714.892	514156.901	381.057	CRK CL70
12153	7147716.788	514159.716	380.661	CRK CL70
12154	7147719.159	514159.337	381.009	CRK CL70
12155	7147724.3	514155.68	381.133	CRK CL70
12156	7147731.107	514151.159	381.333	CRK CL70
12157	7147735.69	514146.64	381.319	CRK CL70
12158	7147742.065	514142.37	381.529	CRK CL70
12159	7147745.063	514138.26	381.656	CRK CL70
12160	7147747.944	514133.079	382.139	CRK CL70
12161	7147752.277	514128.453	382.118	CRK CL70
12162	7147757.267	514125.341	382.239	CRK CL70
12163	7147763.975	514122.724	382.3	CRK CL70
12164	7147768.564	514120.213	382.571	CRK CL70
12165	7147772.251	514116.099	382.908	CRK CL70
12166	7147774.779	514111.197	383.121	CRK CL70
12167	7147779.08	514107.813	383.844	CRK CL70
12168	7147781.054	514103.991	383.022	CRK CL70
12169	7147781.787	514102.98	384.376	CRK CL70
12170	7147784.712	514098.744	384.577	CRK CL70
12171	7147786.414	514096.347	384.624	CRK CL70
12172	7147787.078	514096.229	385.206	CRK CL70
12173	7147789.752	514094.754	385.466	CRK CL70
12174	7147793.593	514092.159	386.441	CRK CL70
12175	7147796.253	514090.011	386.465	CRK CL70
12176	7147798.685	514086.057	386.595	CRK CL70
12177	7147801.422	514085.015	387.217	CRK CL70
12178	7147805.014	514084.35	386.869	CRK CL70
12179	7147806.49	514083.243	388.114	CRK CL70
12180	7147809.447	514079.025	388.599	CRK CL70
12181	7147809.188	514078.781	388.571	CRK CL75

WOLVERINE CREEK CENTRE LINE AND POND WATER EDGE

POINT ID	NORTHING	EASTING	OTHOMETRIC HEIGHT	COMMENT
12182	7147807.619	514078.855	388.723	CRK CL75
12183	7147804.879	514081.362	388.411	CRK CL75
12184	7147804.04	514080.247	388.274	CRK CL75
12185	7147803.393	514080.159	387.724	CRK CL75
12186	7147801.101	514080.847	387.967	CRK CL75
12187	7147798.887	514083.399	387.888	CRK CL75
12188	7147798.835	514085.671	386.845	CRK CL75
12189	7147810.985	514076.932	387.923	CRK CL70
12190	7147811.842	514076.111	388.761	CRK CL70
12191	7147816.404	514073.354	388.888	CRK CL70
12192	7147817.869	514070.888	389.168	CRK CL70
12193	7147819.368	514070.81	389.374	CRK CL70
12194	7147820.763	514067.034	389.379	CRK CL70
12195	7147821.234	514065.932	389.725	CRK CL70
12196	7147821.774	514064.403	389.795	CRK CL70
12197	7147827.825	514060.335	390.059	CRK CL70
12198	7147831.685	514054.957	389.811	CRK CL70
12199	7147832.385	514054.145	390.575	CRK CL70
12200	7147836.066	514049.752	390.214	CRK CL70
12201	7147837.461	514048.089	390.906	CRK CL70
12202	7147841.731	514044.62	390.763	CRK CL70
12203	7147843.041	514043.998	391.5	CRK CL70
12204	7147846.461	514042.436	391.814	CRK CL70
12205	7147849.789	514041.299	391.353	CRK CL70
12206	7147850.086	514038.737	391.746	CRK CL70
12207	7147853.202	514035.658	391.815	CRK CL70
12208	7147854.723	514034.009	393.089	CRK CL70
12209	7147856.32	514031.506	393.09	CRK CL70
12210	7147859.655	514029.713	392.593	CRK CL70
12211	7147860.476	514029.308	393.642	CRK CL70
12212	7147863.418	514028.077	393.864	CRK CL70
12213	7147865.141	514025.685	393.621	CRK CL70
12214	7147866.517	514024.258	393.61	CRK CL70
12215	7147869.444	514024.06	394.101	CRK CL70
12216	7147871.826	514022.629	394.359	CRK CL70
12217	7147874.218	514019.778	394.239	CRK CL70
12218	7147878.994	514018.856	394.508	CRK CL70
12219	7147881.405	514019.797	394.412	CRK CL70
12220	7147881.35	514019.949	394.477	CRK CL76
12221	7147879.651	514021.151	394.641	CRK CL76
12222	7147878.244	514023.185	394.736	CRK CL76
12223	7147875.814	514025.777	393.909	CRK CL76
12224	7147873.886	514025.167	394.254	CRK CL76
12225	7147871.6	514025.259	394.179	CRK CL76
12226	7147870.255	514025.079	394.218	CRK CL76
12227	7147869.379	514024.362	394.141	CRK CL76
12228	7147883.383	514018.073	394.906	CRK CL70
12229	7147886.283	514017.241	394.871	CRK CL70
12230	7147888.871	514015.957	395.376	CRK CL70
12231	7147893.025	514015.702	395.605	CRK CL70
12232	7147896.197	514014.534	395.47	CRK CL70
12233	7147897.439	514014.426	396.153	CRK CL70
12234	7147899.38	514011.834	396.122	CRK CL70
12235	7147899.268	514011.676	396.135	CRK CL77
12236	7147896.943	514011.799	396.271	CRK CL77
12237	7147894.735	514011.873	396.068	CRK CL77
12238	7147892.838	514012.954	395.047	CRK CL77
12239	7147893.514	514014.364	395.36	CRK CL77
12240	7147892.928	514015.545	395.562	CRK CL77
12241	7147899.965	514011.611	395.901	CRK CL70
12242	7147901.968	514010.628	396.487	CRK CL70
12243	7147907.405	514007.299	396.738	CRK CL70
12244	7147909.158	514006.543	396.72	CRK CL70
12245	7147910.65	514005.806	397.717	CRK CL70
12246	7147917.061	514004.507	397.485	CRK CL70
12247	7147918.041	514001.963	397.871	CRK CL70
12248	7147920.837	513999.69	397.92	CRK CL70
12250	7147793.514	514164.566	383.682	CRK CL80
12251	7147791.496	514162.952	383.855	CRK CL80
12252	7147788.323	514159.704	383.658	CRK CL80
12253	7147784.874	514160.81	383.513	CRK CL80

WOLVERINE CREEK CENTRE LINE AND POND WATER EDGE

POINT ID	NORTHING	EASTING	OTHOMETRIC HEIGHT	COMMENT
12254	7147780.762	514161.329	383.264	CRK CL80
12255	7147785.051	514160.831	383.524	CRK CL81
12256	7147787.201	514162.807	383.7	CRK CL81
12257	7147788.962	514163.804	383.775	CRK CL81
12258	7147791.923	514163.358	383.744	CRK CL82
12259	7147788.902	514163.958	383.794	CRK CL82
12260	7147787.435	514164.562	383.684	CRK CL82
12261	7147784.666	514163.313	383.583	CRK CL82
12262	7147782.345	514162.494	383.519	CRK CL82
12263	7147780.98	514161.421	383.305	CRK CL82
12264	7147778.645	514160.365	383.09	CRK CL80
12265	7147773.357	514159.436	383.168	CRK CL80
12266	7147770.815	514158.511	382.997	CRK CL80
12267	7147768.316	514157.02	382.626	CRK CL80
12268	7147767.97	514155.731	382.86	CRK CL80
12269	7147769.491	514152.995	382.687	CRK CL80
12270	7147768.439	514151.137	382.743	CRK CL80
12271	7147768.734	514149.464	382.221	CRK CL80
12272	7147764.605	514148.339	382.596	CRK CL80
12273	7147765.036	514145.539	382.571	CRK CL80
12274	7147762.526	514146.554	382.574	CRK CL80
12275	7147762.191	514146.6	382.254	CRK CL80
12276	7147759.28	514144.114	382.11	CRK CL80
12277	7147755.953	514142.107	382.241	CRK CL80
12278	7147753.496	514141.724	381.944	CRK CL80
12279	7147748.708	514141.814	381.744	CRK CL80
12280	7147742.463	514142.794	381.452	CRK CL80
21527	7148413.38	513956.885	408.315	WE
21528	7148415.751	513953.017	408.325	WE
21529	7148422.729	513949.653	408.306	WE
21530	7148430.576	513943.116	408.363	WE
21531	7148432.894	513938.888	408.293	WE
21532	7148433.234	513931.698	408.331	WE
21533	7148434.847	513924.667	408.332	WE
21534	7148434.4	513921.918	408.331	WE
21535	7148438.195	513913.557	408.353	WE
21536	7148441.038	513903.11	408.263	WE
21537	7148445.652	513897.352	408.264	WE
21538	7148451.94	513897.176	408.295	WE
21539	7148455.103	513898.126	408.311	WE
21540	7148461.511	513898.287	408.357	WE
21541	7148466.742	513898.024	408.367	WE
21542	7148469.361	513898.164	408.376	WE
21543	7148471.815	513900.247	408.345	WE
21544	7148473.762	513900.232	408.31	WE
21545	7148476.152	513897.549	408.363	WE
21546	7148483.125	513896.852	408.297	WE
21547	7148491.196	513898.005	408.34	WE
21548	7148500.24	513897.842	408.325	WE
21549	7148506.734	513899.115	408.33	WE
21550	7148510.194	513903.596	408.332	WE
21551	7148510.157	513905.824	408.189	CRKCL
21552	7148521.948	513903.409	408.197	CRKCL
21553	7148530.25	513901.593	408.185	CRKCL
21554	7148539.053	513899.642	408.138	CRKCL
21555	7148548.984	513897.088	408.251	CRKCL
21556	7148557.144	513897.482	408.138	CRKCL
21557	7148565.023	513901.405	408.121	CRKCL
21558	7148566.34	513905.607	408.127	CRKCL
21559	7148569.839	513912.121	408.211	CRKCL
21560	7148575.306	513916.971	408.294	CRKCL
21561	7148509.202	513912.971	408.307	WE
21562	7148512.055	513917.341	408.296	WE
21563	7148521.097	513918.725	408.3	WE
21564	7148529.111	513918.384	408.302	WE
21565	7148533.626	513917.054	408.283	WE
21566	7148538.541	513918.098	408.264	WE
21567	7148540.726	513927.85	408.303	WE
21568	7148545.203	513935.816	408.277	WE
21569	7148550.315	513942.626	408.305	WE
21570	7148550.9	513947.486	408.272	WE

WOLVERINE CREEK CENTRE LINE AND POND WATER EDGE

POINT ID	NORTHING	EASTING	OTHOMETRIC HEIGHT	COMMENT
21571	7148547.069	513949.721	408.295	WE
21572	7148541.343	513949.266	408.309	WE
21573	7148532.805	513947.048	408.308	WE
21574	7148521.937	513946.888	408.315	WE
21575	7148513.061	513948.748	408.319	WE
21576	7148503.137	513951.442	408.324	WE
21577	7148492.78	513954.275	408.318	WE
21578	7148483.898	513956.53	408.304	WE
21579	7148478.406	513960.35	408.383	WE
21580	7148470.244	513961.526	408.293	WE
21581	7148461.926	513961.74	408.343	WE
21582	7148454.453	513962.093	408.327	WE
21583	7148447.215	513962.422	408.31	WE
21584	7148438.205	513961.827	408.741	WE
21585	7148430.352	513960.783	408.791	WE
21586	7148424.462	513959.367	408.323	WE
21587	7148419.745	513957.818	408.328	WE
21588	7148415.662	513958.937	408.339	WE
21589	7148413.516	513960.587	408.319	WE
21597	7148413.733	513960.468	408.332	WE1
21598	7148413.145	513959.505	407.852	CRKCL1
21600	7148412.708	513958.105	408.332	WE2
21607	7148411.68	513960.319	407.768	CRKCL1
21608	7148410.765	513959.892	408.017	CRKCL1
21609	7148408.138	513957.675	408.208	CRKCL1
21610	7148404.704	513955.938	408.086	CRKCL1
21611	7148401.211	513953.718	408.001	CRKCL1
21612	7148397.291	513952.403	407.173	CRKCL1
21613	7148384.587	513953.582	406.647	CRKCL1
21614	7148372.553	513956.263	406.534	CRKCL1
21615	7148361.552	513956.836	406.773	CRKCL1
21616	7148356.747	513957.212	407.306	CRKCL1
21617	7148352.684	513957.706	407.721	CRKCL1
21618	7148350.467	513957.722	407.621	CRKCL1
21619	7148348.184	513956.643	407.645	CRKCL1
21620	7148346.79	513955.274	407.374	CRKCL1
21621	7148345.298	513953.178	407.558	CRKCL1
21622	7148341.12	513949.417	407.703	CRKCL1
21623	7148335.252	513946.156	407.901	CRKCL1
21624	7148329.125	513944.083	407.869	CRKCL1
21625	7148320.494	513942.368	408.026	CRKCL1
21626	7148317.897	513941.49	408.01	CRKCL1
21627	7148311.768	513941.18	407.817	CRKCL1
21628	7148303.196	513942.135	407.86	CRKCL1
21629	7148294.682	513945.75	407.67	CRKCL1
21630	7148286.945	513950.698	407.701	CRKCL1
21631	7148279.961	513955.612	407.712	CRKCL1
21632	7148273.711	513961.686	407.54	CRKCL1
21633	7148267.795	513966.604	407.43	CRKCL1
21634	7148264.277	513969.425	407.355	CRKCL1
21635	7148268.446	513968.074	407.458	CRKCL2
21636	7148267.38	513970.649	407.391	CRKCL2
21637	7148264.145	513972.173	407.075	CRKCL2
21638	7148276.914	513955.803	407.784	CRKCL3
21639	7148272.195	513958.355	407.764	CRKCL3
21640	7148267.913	513961.154	407.712	CRKCL3
21641	7148263.42	513962.225	407.591	CRKCL3
21642	7148261.395	513962.765	407.405	CRKCL3
21651	7148265.691	513972.397	407.475	WE3
21656	7148265.653	513968.498	407.384	CRKCL5
21657	7148265.684	513967.859	407.494	WE6
21676	7148210.373	513975.411	407.459	WE9
21682	7148211.004	513981.42	407.469	WE10
22058	7147426.158	514220.88	372.814	CRKCL10
22090	7147697.19	514160.957	380.321	CRKCL20
22128	7147776.774	514160.37	382.926	CRKCL30
22183	7147926.087	513998.169	398.337	CRKCL50
22215	7148095.022	513987.051	405.892	CRKCL60

CODE	
CRK CL*	Creek Centre Line
WE*	Pond Water Edge
INV7*	Invert culvert

CONTROL

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
2834	7148172.673	513447.724	606.823	RTK base for Wolverine Creek Pond Xsections1-2-3

SECTION 1

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
2114	7148412.671	513956.626	408.289	EDGE
21606	7148411.983	513947.641	410.625	GS
21605	7148412.456	513949.641	410.402	GS
21604	7148412.484	513952.904	410.356	GS
21603	7148412.625	513954.569	409.784	GS
21602	7148412.707	513956.150	409.010	TOP4
21601	7148412.552	513956.572	408.323	TOE
21600	7148412.708	513958.105	408.332	WE2
21599	7148412.817	513958.930	408.234	GS
21598	7148413.145	513959.505	407.852	CRKCL1
21597	7148413.733	513960.468	408.332	WE1
21596	7148414.100	513961.525	409.155	TOP3
21595	7148413.811	513962.698	409.902	TOP2
21594	7148413.926	513963.689	410.158	TOP1
21593	7148413.959	513964.126	410.049	GS
21592	7148414.282	513967.235	412.511	GS
21591	7148414.783	513970.612	414.226	GS
21590	7148415.599	513972.192	413.769	top

SECTION 2

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
21668	7148265.314	513951.777	407.516	GS
21667	7148265.464	513952.842	407.728	GS
21666	7148265.541	513953.516	407.998	GS
21665	7148265.519	513955.887	407.938	GS
21664	7148265.556	513956.179	407.827	GS
21663	7148265.585	513957.039	407.791	GS
21662	7148265.581	513957.448	407.902	GS
21661	7148265.673	513961.299	407.760	WE8
21660	7148265.740	513961.824	407.689	CRKCL6
21659	7148265.749	513962.215	407.730	WE7
21658	7148265.824	513964.703	407.733	GS
11606	7148265.701	513967.973	407.501	WE60
21656	7148265.653	513968.498	407.384	CRKCL5
21655	7148265.588	513969.319	407.463	WE5
21654	7148265.581	513970.131	407.523	GS
21653	7148265.617	513970.933	407.414	WE4
21652	7148265.580	513971.538	407.119	CRKCL4
21651	7148265.691	513972.397	407.475	WE3
21650	7148265.706	513973.169	407.508	GS
21649	7148265.775	513973.365	407.805	GS
21648	7148266.019	513974.243	408.086	GS
21647	7148266.448	513976.158	408.100	GS
21646	7148266.653	513976.624	408.556	GS
21645	7148266.879	513978.248	409.338	GS
21644	7148266.988	513980.535	410.216	GS
21643	7148267.389	513982.634	410.605	GS

SECTION 3

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
21669	7148206.472	513959.519	410.504	GS
21670	7148207.062	513963.527	409.657	GS
21671	7148207.959	513967.355	408.786	GS
21672	7148208.549	513970.019	408.378	GS
21673	7148209.154	513972.571	408.163	GS
21674	7148210.156	513974.791	407.685	GS
21675	7148210.231	513975.359	407.653	TOP5
21677	7148210.753	513976.297	407.124	GS
21678	7148210.936	513977.344	406.809	GS
21679	7148210.985	513978.459	406.732	CRKCL7
21680	7148211.192	513979.869	406.913	GS
21681	7148211.049	513980.942	406.949	GS
21682	7148211.004	513981.420	407.469	WE10
21683	7148211.104	513982.786	407.666	GS

SECTION 3				
POINT ID	**NORTHING**	**EASTING**	**ELEVATION**	**COMMENT**
21684	7148211.373	513983.884	408.382	TOP6
21685	7148212.069	513985.567	408.637	GS
21686	7148212.272	513987.506	410.111	TOP7
21687	7148212.960	513990.551	411.243	GS
21688	7148213.361	513994.087	412.264	GS

CONTROL

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
2834	7148172.673	513447.724	606.823	RTK base for Wolverine Creek Tailing Pile Monitoring

WOLVERINE CREEK TAILING PILE

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
24	7148033.972	513526.317	549.124	
24-A	7148036.210	513780.887	463.277	
24-B	7148046.560	513838.160	444.137	
24-D	7148073.889	513923.809	422.115	
25-B	7148066.093	513950.044	422.222	
26	7148341.515	513483.722	574.907	
26-A	7148339.339	513540.672	557.529	
80-1	7148408.059	513543.397	555.263	
80-7	7148343.960	513891.699	422.200	
80-2	7148290.073	513550.021	552.138	
80-4	7148202.335	513692.280	500.391	
80-5	7148249.781	513720.802	480.553	
80-9	7147996.299	513970.795	411.110	
350-1A	7148298.754	513823.401	447.662	
350-2A	7148300.487	513874.544	428.320	
350-3A	7148312.057	513899.795	417.066	
500-1	7148343.220	513725.622	474.019	
500-2	7148344.432	513843.032	437.776	
650-1	7148408.754	513701.530	483.702	
650-2	7148400.199	513816.579	439.430	
1083	7148354.063	513937.181	413.920	
1084	7148018.001	513619.665	515.750	
1085	7148346.061	513666.606	488.642	
1483	7148233.054	513412.781	608.719	
1484	7148152.356	513964.257	417.737	
1485	7148018.456	513708.595	478.040	
1489	7148305.011	513928.747	413.473	
1491	7148377.002	513869.895	431.980	
1492	7148053.591	513410.322	609.346	
1495	7148526.801	513529.187	529.000	
62 (2005-01)	7148099.998	513761.483	463.026	
63 (2005-02)	7148119.064	513820.009	446.679	
64 (2005-03)	7148109.573	513873.301	426.991	
66 (2005-04)	7148048.498	513879.725	427.389	
61 (2005-05)	7148001.193	513786.280	463.425	
65 (2005-06)	7148000.028	513868.848	432.313	
68 (2005-07)	7147999.940	513945.394	416.296	
67 (2005_08)	7148038.720	513971.478	415.848	
996	7148131.379	513969.405	419.469	
71 (2005-10)	7148148.677	513927.360	411.826	
70 (2005-11)	7148178.343	513943.398	411.987	
BH-16	7148049.369	513766.870	463.189	
NL-3	7148334.737	513927.445	416.959	
NL-4	7148306.983	513913.604	415.860	
NL-5	7148274.999	513897.411	415.180	
NL-1	7148365.709	513943.231	412.869	
NL-2	7148354.348	513937.345	413.815	
NL BASE	7148154.820	513836.409	431.367	
SL-1(175 REPLACE)	7148077.636	513968.438	420.519	Marker was on Slide- set new Marker 1.38m from Top of Bank- Approx. 4.17m from SL-1 (Add Tag # 175)
SL-2	7148087.61	513959.77	422.77	
SL-3	7148102.789	513936.127	420.846	
SL-4	7148117.339	513910.079	416.352	
SL-5	7148135.135	513878.975	421.914	
BH-16 CABLE	7148049.185	513766.315	462.987	
BH-14 CABLE	7148488.478	513563.096	530.313	

CONTROL

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
2834	7148172.673	513447.724	606.823	RTK base for Wolverine Creek Xsections I-J-K-L-M-N

SECTION I

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
22205	7148092.965	513962.238	422.542	157 GS
15700	7148092.980	513962.248	422.560	REBAR 157
22206	7148093.357	513965.171	421.991	GS
22207	7148093.351	513967.302	420.508	GS
22208	7148093.341	513969.611	420.318	GS
22209	7148093.791	513971.689	420.255	TOP60
22210	7148094.238	513975.325	416.730	GS
22211	7148094.821	513979.036	411.937	GS
22212	7148095.084	513983.161	408.215	GS
22213	7148095.036	513985.245	406.149	TOE50
22214	7148094.946	513985.639	405.955	WE60
22215	7148095.022	513987.051	405.892	CRKCL60
22216	7148094.950	513987.893	406.030	WE61
22217	7148094.924	513988.178	406.556	GS
22218	7148094.770	513989.980	406.495	GS
22219	7148094.702	513991.170	407.786	GS
22220	7148095.038	513994.192	410.288	GS
22221	7148095.837	513995.906	412.801	T0P62
22222	7148095.509	513999.196	414.947	GS
21691	7148097.290	514001.031	416.512	GS
21690	7148097.488	514001.748	416.958	GS
17900	7148097.496	514002.091	417.128	REBAR 179

SECTION J

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
22204	7147872.104	513931.334	411.322	159 GROUND
15900	7147872.126	513931.352	411.390	REBAR 159
22203	7147873.634	513932.497	410.258	GS
22202	7147877.186	513937.541	408.088	GS
22201	7147880.777	513942.078	405.897	GS
22200	7147882.526	513944.369	406.048	GS
22199	7147883.071	513945.462	405.097	GS
22198	7147886.168	513948.815	404.668	GS
22197	7147889.564	513952.909	404.586	GS
22196	7147892.875	513956.940	404.647	GS
22195	7147896.526	513961.790	404.376	GS
22194	7147899.851	513965.809	404.047	GS
22193	7147903.346	513970.062	404.075	GS
22192	7147905.838	513972.808	403.891	TOP56
22191	7147909.044	513976.440	400.628	TOE54
22190	7147912.055	513980.387	400.804	GS
22189	7147915.167	513984.549	401.042	GS
22188	7147917.678	513986.958	401.505	TOP55
22187	7147919.528	513989.412	399.937	GS
22186	7147920.708	513990.772	399.612	TOE53
22185	7147922.853	513993.740	399.100	ROCK
22184	7147925.007	513996.731	398.796	WE51
22183	7147926.087	513998.169	398.337	CRKCL50
22182	7147927.038	513999.594	398.855	GS
11692	7147927.352	513999.794	398.796	CRK CL60
22181	7147927.955	514000.568	398.992	WE50
22180	7147928.465	514001.016	399.490	ROCK
22179	7147929.396	514002.043	400.417	TOP54
22178	7147931.915	514005.373	400.930	GS
22177	7147934.757	514009.483	401.194	GS
22176	7147938.736	514013.812	401.465	GS
22175	7147943.052	514019.054	401.170	TOP53
22174	7147944.357	514020.776	400.098	TOE51
22173	7147945.472	514021.889	401.352	TOP51
22172	7147946.691	514023.399	402.404	GS
22171	7147949.860	514027.788	404.572	GS
22170	7147953.673	514032.540	408.138	GS
22169	7147954.806	514033.271	409.841	GS
22168	7147955.830	514034.641	410.707	GS
22167	7147957.091	514037.039	413.632	GS
22166	7147959.044	514038.214	415.411	GS

SECTION J

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
22165	7147960.025	514040.129	417.233	TOE50
22164	7147961.908	514041.821	419.745	TOP50
22163	7147963.465	514044.120	422.091	GS
22162	7147964.983	514046.298	423.964	158 GS
15800	7147965.018	514046.304	424.019	REBAR 158

SECTION K

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
16200	7147754.060	514033.636	415.500	REBAR 162
22161	7147754.048	514033.651	415.458	162 GS
22160	7147754.577	514039.094	413.328	TOP39
22159	7147755.718	514043.847	410.429	GS
22158	7147757.301	514051.836	405.552	GS
22157	7147757.920	514056.340	403.082	GS
22156	7147758.779	514061.161	400.709	GS
22155	7147760.067	514067.963	397.402	GS
22154	7147760.764	514072.668	395.693	TOP38
22153	7147761.484	514076.815	392.678	GS
22152	7147762.975	514084.060	388.869	TOE37
22151	7147763.522	514088.604	388.641	GS
22150	7147764.571	514094.377	388.913	ACL30
22149	7147765.460	514099.247	389.022	TOP36
22148	7147765.946	514102.275	386.849	GS
22147	7147766.949	514106.542	385.018	TOE36
22146	7147767.634	514111.762	384.743	TOP35
22145	7147768.091	514113.719	383.728	TOE34
22143	7147768.595	514115.897	383.350	ROCK
22144	7147769.555	514117.335	382.933	WE34
22142	7147768.427	514119.290	382.766	WE33
22141	7147768.968	514119.843	382.574	CRKCL30
22140	7147769.389	514120.500	382.795	WE32
22139	7147769.450	514120.561	382.980	TOP33
22138	7147770.058	514124.245	383.633	TOE33
22137	7147770.741	514125.948	384.506	TOP32
22136	7147771.244	514130.994	384.538	GS
22135	7147772.236	514136.498	384.530	GS
22134	7147773.038	514141.580	385.466	GS
22133	7147773.613	514144.385	385.328	GS
22132	7147774.551	514149.091	385.009	GS
22131	7147775.596	514155.567	384.535	GS
22130	7147776.667	514159.491	383.416	GS
22129	7147776.765	514159.740	383.140	WE31
22128	7147776.774	514160.370	382.926	CRKCL30
22127	7147777.115	514160.837	383.169	WE30
22126	7147776.839	514161.051	383.359	GS
22125	7147776.914	514163.062	384.118	GS
22124	7147777.034	514165.719	384.466	TOE32
22123	7147778.029	514170.206	386.175	GS
22122	7147779.236	514175.249	390.586	GS
22116	7147779.798	514178.659	392.864	TOP30
22117	7147780.566	514181.667	392.637	GS
22118	7147780.909	514183.153	392.716	TOE30
22119	7147781.541	514188.506	396.764	GS
22120	7147781.868	514191.229	400.141	TOP31
22121	7147782.462	514194.157	401.768	GS
16100	7147782.940	514196.220	403.009	REBAR 161
22106	7147782.956	514196.251	402.962	161 GS

SECTION L

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
22105	7147682.298	514117.607	395.042	165 GS
16500	7147682.307	514117.644	395.087	REBAR 165
22104	7147682.683	514119.134	394.258	GS
22103	7147684.141	514123.214	392.317	TOP26
22102	7147685.113	514126.754	389.496	GS
22101	7147686.821	514131.252	386.005	TOE26
22100	7147688.343	514134.486	385.919	GS
22099	7147689.523	514138.201	385.976	ACL20
22098	7147690.719	514142.203	385.937	GS
22097	7147691.687	514144.333	385.817	TOP25

SECTION L

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
22096	7147691.954	514145.971	384.866	GS
22095	7147692.625	514148.679	383.143	TOE25
22094	7147693.628	514151.787	382.807	GS
22093	7147695.344	514156.746	382.513	TOP24
22092	7147696.293	514158.209	380.894	TOE24
22091	7147696.389	514158.318	380.724	WE21
22090	7147697.190	514160.957	380.321	CRKCL20
22089	7147697.299	514162.266	380.500	WE20
22088	7147697.222	514162.580	380.543	TOE23
22087	7147697.723	514164.108	381.492	TOP23
22086	7147698.689	514167.187	381.924	GS
22085	7147700.037	514170.841	382.029	GS
22084	7147701.680	514175.746	381.958	GS
22083	7147702.040	514176.657	381.701	GS
22082	7147703.590	514181.213	382.235	GS
22081	7147704.753	514184.677	382.031	GS
22080	7147706.317	514188.755	382.602	TOE22
22079	7147706.620	514190.916	384.603	TOP22
22078	7147707.938	514194.554	384.003	GS
22077	7147708.680	514197.252	383.939	GS
22076	7147710.109	514201.471	384.702	TOE21
22075	7147710.731	514202.465	385.560	GS
22074	7147711.928	514206.411	387.646	TOP21
22073	7147713.580	514209.587	387.796	GS
22072	7147714.102	514212.785	388.160	TOE20
22071	7147715.925	514216.961	391.751	GS
22070	7147715.868	514218.287	393.442	TOP20
22069	7147716.597	514220.518	394.508	GS
22068	7147717.876	514224.118	396.829	GS
16400	7147718.985	514227.206	398.929	REBAR 164
22067	7147718.988	514227.224	398.862	165 GS

SECTION M

POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
18100	7147417.581	514195.013	384.044	REBAR 181
22066	7147417.629	514195.016	383.966	181 GS
22065	7147418.812	514199.154	381.825	GS
22064	7147420.632	514204.459	379.534	GS
22063	7147422.439	514209.342	377.191	GS
22062	7147424.653	514213.146	375.367	GS
22061	7147426.197	514217.894	374.376	TOP15
22060	7147426.534	514218.768	373.353	TOE12
22059	7147426.416	514219.703	373.035	WE11
22058	7147426.158	514220.880	372.814	CRKCL10
22057	7147426.621	514221.715	372.891	GS
22056	7147426.682	514221.922	372.998	WE10
22055	7147426.696	514222.067	373.379	TOP14
22054	7147426.826	514223.273	373.403	GS
22053	7147427.798	514225.412	373.237	GS
22052	7147428.073	514227.029	373.504	TOP13
22051	7147428.866	514229.157	373.961	GS
22050	7147430.762	514233.852	375.771	GS
22049	7147431.191	514237.273	376.953	TOE11
22048	7147432.028	514239.649	378.277	GS
22047	7147433.348	514245.397	381.772	GS
22046	7147435.137	514248.711	384.221	GS
22045	7147436.340	514251.807	386.484	TOP12
22044	7147438.400	514257.265	387.015	ACL1
22043	7147438.579	514260.113	387.391	GS
22042	7147439.514	514262.655	387.592	TOE10
22041	7147440.577	514265.306	390.151	TOP11
22040	7147440.685	514265.962	390.463	GS
22039	7147441.732	514268.260	392.565	GS
22038	7147442.682	514270.619	395.378	TOP10
22037	7147442.674	514272.205	396.567	GS
22036	7147442.798	514274.066	397.741	180 GS
18000	7147442.770	514274.097	397.797	REBAR 180

SECTION N

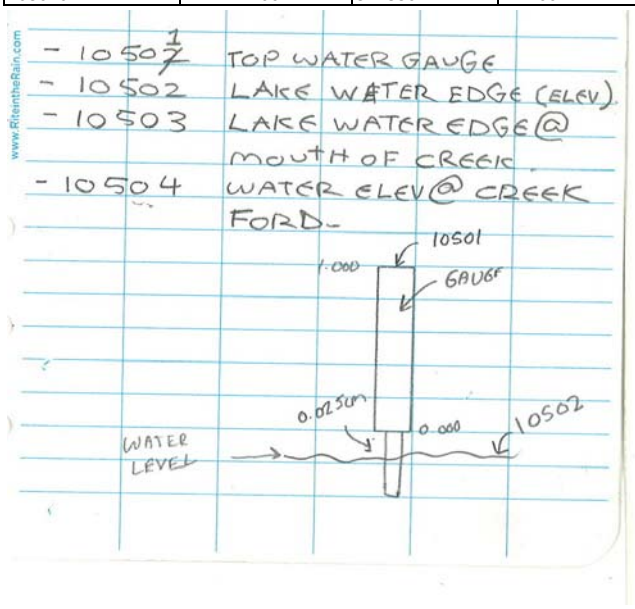
POINT ID	NORTHING	EASTING	ELEVATION	COMMENT
22035	7147279.342	514169.625	373.509	167 GS
16700	7147279.339	514169.643	373.544	REBAR 167
22034	7147278.646	514171.292	373.113	200-400
22033	7147277.668	514176.511	371.426	GS
22032	7147277.281	514179.917	370.622	GS
22031	7147276.786	514181.854	369.740	TOP7
22030	7147276.772	514182.209	369.045	TOE7
22029	7147276.272	514184.447	369.332	TOE6
22028	7147276.082	514184.932	369.898	TOP6
22027	7147275.454	514187.760	370.223	GS
22026	7147275.057	514190.453	370.416	TOP5
22025	7147275.139	514191.494	369.743	TOE4
22024	7147274.659	514191.627	369.615	TOP4
22023	7147274.428	514192.319	368.955	WE3
22022	7147274.518	514193.305	368.918	CRKCL1
22021	7147274.512	514193.747	369.023	WE2
22020	7147274.292	514195.212	369.434	TOP3
22019	7147273.945	514197.012	369.516	GS
22018	7147273.556	514199.750	369.342	GS
22017	7147273.311	514201.019	369.065	WE1
22016	7147272.952	514202.512	368.871	CRKCL
22015	7147272.877	514204.231	369.054	WE
22014	7147272.749	514204.519	369.042	TOE2
22013	7147272.471	514204.978	370.371	TOP2
22012	7147271.771	514208.374	370.505	GS
22011	7147271.099	514212.581	370.361	TOE1
22010	7147270.366	514215.934	372.015	MID SLOPE
22009	7147269.845	514220.102	373.982	MID SLOPE
22008	7147268.985	514224.071	376.507	TOP1
22007	7147268.284	514227.982	376.570	ACL
22006	7147267.481	514232.325	376.893	TOE
22005	7147267.657	514233.658	378.060	GS
22004	7147267.519	514236.399	380.333	GS
22003	7147267.248	514237.685	381.672	TOP
22002	7147267.113	514238.377	382.062	GS
16600	7147266.494	514240.348	383.584	REBAR 166

CODE

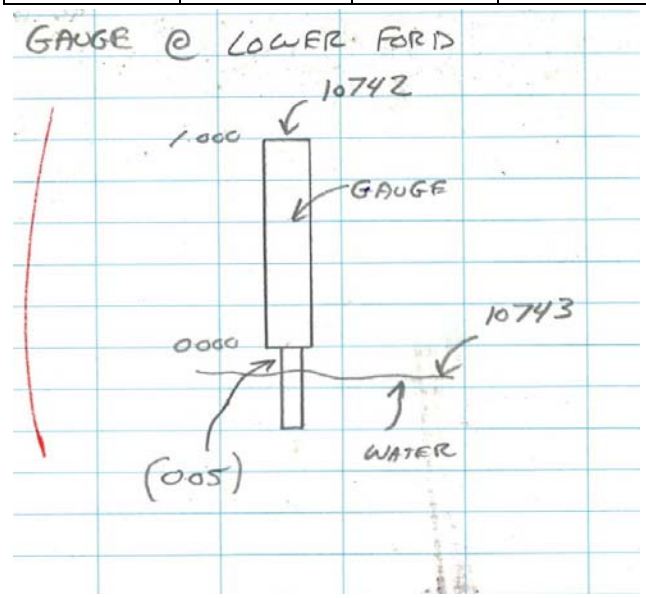
WE*	Water Edge (Also Water Elevation)
CRKCL*	Creek Centre line
TOE*	Toe of slope
TOP*	Top of Slope
CRACK # BY #	Crack Width by Depth
GS	Random Shot
REBAR #	Rebar with Tag #
ROCK	ROCK

CONTROL				
POINT ID	**NORTHING**	**EASTING**	**ORTHOMETRIC HEIGHT**	**COMMENT**
2835	7147272.790	513147.057	432.669	RTK base for Water Gauge and Water

HUDGEON LAKE WATER GAUGE				
POINT ID	**NORTHING**	**EASTING**	**ELEVATION**	**COMMENT**
105010	7147372.792	512827.381	412.680	TOP WATER GAUGE
105020	7147372.774	512828.983	411.653	WELEV
105030	7147398.958	512830.644	411.656	WELEV
105040	7147422.061	512856.714	411.661	WELEV



WATER GAUGE @ LOWER FORD				
POINT ID	**NORTHING**	**EASTING**	**ELEVATION**	**COMMENT**
107420	7147108.922	513640.182	374.899	TOP WATER GAUGE
107430	7147108.468	513637.563	373.850	WELEV



PILE NOS. 1 TO 9

CONTROL

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
2835	7147272.790	513147.057	432.669	RTK base for Piles 1 to 9

PILE NO. 1 (1 1/2 in.) VOLUME 311.65 m³

POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20300	7147343.004	512879.352	415.707	TOE30
20301	7147345.464	512878.910	415.742	TOE30
20302	7147346.130	512879.157	415.612	TOE30
20303	7147349.393	512880.778	415.769	TOE30
20304	7147353.094	512881.255	415.687	TOE30
20305	7147356.586	512882.681	415.588	TOE30
20306	7147357.195	512886.988	415.707	TOE30
20307	7147356.327	512889.274	415.765	TOE30
20308	7147356.088	512892.342	415.711	TOE30
20309	7147355.324	512896.054	415.630	TOE30
20310	7147352.370	512898.023	415.786	TOE30
20311	7147350.474	512896.942	415.941	TOE30
20312	7147345.541	512896.264	416.040	TOE30
20313	7147340.048	512894.772	415.948	TOE30
20314	7147338.201	512892.132	415.804	TOE30
20315	7147339.449	512887.709	415.847	TOE30
20316	7147340.376	512886.502	415.878	TOE30
20317	7147339.860	512883.978	415.819	TOE30
20318	7147341.457	512880.296	415.714	TOE30
20319	7147346.365	512881.309	416.653	BRK
20320	7147343.175	512883.104	416.821	BRK
20321	7147341.781	512886.474	416.772	BRK
20322	7147341.669	512887.257	416.818	BRK
20323	7147340.619	512890.558	417.127	BRK
20324	7147340.715	512892.730	417.100	BRK
20325	7147343.902	512893.656	417.362	BRK
20326	7147348.140	512894.840	417.101	BRK
20327	7147348.688	512886.850	418.629	TOP30
20328	7147347.026	512885.857	418.684	TOP30
20329	7147345.819	512885.123	418.607	TOP30
20330	7147344.912	512885.422	418.591	TOP30
20331	7147344.745	512887.050	418.642	TOP30
20332	7147344.783	512888.001	418.637	TOP30
20333	7147344.565	512888.557	418.471	TOP30
20334	7147344.086	512889.697	418.973	TOP30
20335	7147343.739	512890.652	419.041	TOP30
20336	7147344.025	512891.069	419.027	TOP30
20337	7147345.999	512891.906	418.883	TOP30
20338	7147347.986	512891.890	418.781	TOP30
20339	7147349.088	512891.900	418.715	TOP30
20340	7147348.936	512889.345	418.638	TOP30
20341	7147349.104	512887.698	418.635	TOP30
20342	7147349.276	512892.248	418.510	TOP31
20343	7147350.159	512893.768	417.807	TOP31
20344	7147350.499	512895.053	417.179	TOP31
20345	7147351.407	512895.278	416.977	TOP31
20346	7147353.154	512895.048	416.935	TOP31
20347	7147354.008	512894.352	416.826	TOP31
20348	7147354.734	512893.402	416.620	TOP31
20349	7147354.576	512892.533	416.414	TOP31
20350	7147355.314	512891.432	415.685	TOE31
20351	7147353.679	512891.280	415.841	TOE31
20352	7147353.135	512892.482	415.903	TOE31
20353	7147352.155	512893.917	416.143	TOE31
20354	7147351.829	512893.836	416.189	TOE31
20355	7147351.698	512891.362	415.971	TOE31
20356	7147352.302	512890.450	415.882	TOE31
20357	7147354.236	512889.733	415.858	TOE31
20358	7147355.861	512889.137	415.843	TOE31
20359	7147350.479	512887.566	417.163	TOP32
20360	7147351.656	512887.345	417.186	TOP32
20361	7147353.388	512887.552	417.076	TOP32
20362	7147354.717	512887.719	416.850	TOP32
20363	7147355.118	512886.816	416.767	TOP32
20364	7147355.224	512886.373	416.490	TOP32

PILE NO. 1 (1 1/2 in.) VOLUME 311.65 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20365	7147355.207	512885.782	416.458	TOP32
20366	7147355.295	512885.266	416.769	TOP32
20367	7147355.789	512884.237	416.521	TOP32
20368	7147355.079	512883.400	416.522	TOP32
20369	7147355.024	512883.092	416.294	TOP32
20370	7147353.845	512882.697	416.331	TOP32
20371	7147351.439	512882.702	416.594	TOP32
20372	7147350.099	512882.840	416.646	TOP32
20373	7147348.272	512881.640	416.709	TOP32
20374	7147346.568	512880.347	416.364	TOP32
20375	7147345.353	512883.361	417.569	BRK1
20376	7147346.631	512882.176	417.097	BRK1
20377	7147347.734	512882.300	417.019	BRK1
20378	7147348.112	512883.184	417.346	BRK1
20379	7147347.436	512884.211	417.852	BRK1
20380	7147346.428	512884.496	418.410	BRK1
20381	7147345.654	512884.203	418.102	BRK1
20382	7147347.625	512882.713	416.971	TOE32
20383	7147347.403	512883.685	417.430	TOE32
20384	7147346.008	512883.385	417.310	TOE32
20385	7147346.621	512882.620	417.027	TOE32
20386	7147348.725	512886.198	418.373	BRK2
20387	7147349.177	512884.194	417.326	BRK2
20388	7147350.828	512883.567	416.650	GS
20389	7147354.695	512884.026	416.375	GS
20390	7147354.674	512884.845	416.518	GS
20391	7147351.486	512885.303	416.563	GS
20392	7147350.237	512884.462	416.716	TOE33
20393	7147350.778	512886.191	416.534	TOE33
20394	7147352.954	512886.279	416.511	TOE33
20395	7147354.739	512886.422	416.529	TOE33
20396	7147354.137	512890.573	415.851	GS
20397	7147352.298	512891.933	415.946	GS

PILE NO. 2 (6 in. to 8 in.) VOLUME 289.52 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20505	7147366.006	512903.741	415.447	TOE38
20506	7147369.099	512906.066	415.373	TOE38
20507	7147369.373	512909.071	415.479	TOE38
20508	7147367.210	512909.862	415.826	TOE38
20509	7147367.098	512910.794	415.853	TOE38
20510	7147369.630	512913.731	415.687	TOE38
20511	7147367.696	512917.057	415.521	TOE38
20512	7147366.341	512919.964	415.527	TOE38
20513	7147366.483	512921.076	415.527	TOE38
20514	7147368.285	512923.363	415.537	TOE38
20515	7147367.619	512925.592	415.516	TOE38
20516	7147367.968	512926.884	415.616	TOE38
20517	7147369.609	512928.884	415.646	TOE38
20518	7147368.207	512931.376	415.671	TOE38
20519	7147365.178	512933.864	415.646	TOE38
20520	7147363.159	512933.864	415.716	TOE38
20521	7147362.841	512935.936	415.752	TOE38
20522	7147363.450	512936.993	415.781	TOE38
20523	7147360.116	512937.814	415.686	TOE38
20524	7147356.102	512937.571	415.742	TOE38
20525	7147353.989	512935.604	415.669	TOE38
20526	7147352.383	512933.415	415.657	TOE38
20527	7147353.300	512928.980	415.563	TOE38
20528	7147355.066	512924.983	415.504	TOE38
20529	7147358.264	512922.417	415.746	TOE38
20530	7147359.904	512921.912	415.850	TOE38
20531	7147362.323	512921.240	415.699	TOE38
20532	7147363.973	512921.894	415.638	TOE38
20533	7147364.908	512920.961	415.578	TOE38
20534	7147365.190	512918.495	415.513	TOE38
20535	7147364.940	512917.565	415.556	TOE38
20536	7147362.367	512917.285	415.698	TOE38
20537	7147359.284	512912.847	415.850	TOE38
20538	7147360.289	512908.421	415.762	TOE38

PILE NO. 2 (6 in. to 8 in.) VOLUME 289.52 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20539	7147363.320	512905.436	415.605	TOE38
20540	7147367.473	512906.478	416.269	TOP42
20541	7147365.832	512905.890	416.692	TOP42
20542	7147364.855	512906.784	416.956	TOP42
20543	7147364.100	512908.177	417.335	TOP42
20544	7147363.529	512910.258	417.947	TOP42
20545	7147364.364	512911.610	418.200	TOP42
20546	7147365.466	512912.256	417.783	TOP42
20547	7147365.518	512913.675	418.197	TOP42
20548	7147364.208	512914.057	417.850	TOP42
20549	7147363.531	512913.499	417.399	BRK8
20550	7147365.055	512912.628	417.717	BRK8
20551	7147363.774	512912.439	418.149	BRK9
20552	7147362.142	512911.158	417.519	BRK9
20553	7147362.449	512908.752	417.053	BRK9
20554	7147365.068	512909.652	416.818	BR10
20555	7147365.865	512907.742	416.505	BR10
20556	7147366.879	512906.542	416.238	BR10
20557	7147363.218	512914.894	416.759	TOE39
20558	7147364.661	512915.770	416.454	TOE39
20559	7147365.895	512915.909	416.262	TOE39
20560	7147365.998	512918.779	416.047	TOP43
20561	7147365.666	512916.737	416.317	TOP43
20562	7147364.759	512916.459	416.278	TOP43
20563	7147362.733	512915.626	416.830	TOP43
20564	7147366.491	512915.306	416.720	TOP44
20565	7147366.508	512917.190	416.167	TOP44
20566	7147366.510	512918.755	416.062	TOP44
20567	7147366.207	512920.055	415.669	TOP44
20568	7147365.854	512920.574	415.558	GS
20569	7147361.780	512922.785	416.640	TOP45
20570	7147359.830	512923.910	417.032	TOP45
20571	7147357.790	512925.711	417.213	TOP45
20572	7147357.383	512927.035	417.050	TOP45
20573	7147357.301	512928.266	417.548	TOP45
20574	7147357.007	512929.181	417.870	TOP45
20575	7147356.483	512930.799	417.796	TOP45
20576	7147356.032	512932.355	418.070	TOP45
20577	7147356.907	512933.503	417.727	TOP45
20578	7147358.730	512933.946	417.869	TOP45
20579	7147359.845	512931.744	418.019	TOP45
20580	7147361.219	512929.255	417.810	TOP45
20581	7147362.686	512926.964	417.554	TOP45
20582	7147363.622	512926.051	417.226	TOP45
20583	7147365.146	512925.924	416.618	TOP45
20584	7147364.732	512925.495	416.419	BR11
20585	7147363.647	512924.961	416.392	BR11
20586	7147362.066	512926.231	417.035	BR11
20587	7147360.446	512929.206	417.370	BR11
20588	7147359.040	512928.869	417.485	GS
20589	7147360.376	512925.952	417.148	GS
20590	7147362.262	512924.421	417.029	GS
20591	7147363.450	512924.171	416.352	BR12
20592	7147363.740	512922.380	415.796	BR12
20593	7147366.120	512927.253	415.829	TOE340
20594	7147364.388	512928.760	415.974	TOE340
20595	7147362.922	512930.328	416.458	TOE340
20596	7147362.710	512932.820	415.922	TOE340
20597	7147364.190	512931.920	417.007	TOP46
20598	7147364.304	512930.763	417.024	TOP46
20599	7147365.205	512930.852	416.851	TOP46
20600	7147366.359	512931.156	416.339	BR13
20601	7147365.321	512929.899	416.369	BR13
20602	7147366.797	512930.270	416.919	TOP47
20603	7147367.216	512929.355	416.880	TOP47
20604	7147366.242	512929.048	416.936	TOP47
20605	7147365.046	512924.365	416.996	TOP48
20606	7147366.515	512922.761	416.552	TOP48

PILE NO. 3 (1 1/2 in.) VOLUME 48.52 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20398	7147362.097	512890.108	415.555	TOE34
20399	7147364.264	512887.262	415.427	TOE34
20400	7147366.778	512885.946	415.344	TOE34
20401	7147368.103	512886.127	415.307	TOE34
20402	7147368.859	512886.674	415.293	TOE34
20403	7147370.873	512886.344	415.196	TOE34
20404	7147372.580	512888.283	415.165	TOE34
20405	7147371.914	512890.659	415.255	TOE34
20406	7147370.588	512893.614	415.391	TOE34
20407	7147366.431	512896.308	415.422	TOE34
20408	7147363.692	512894.371	415.467	TOE34
20409	7147362.501	512891.657	415.540	TOE34
20410	7147365.283	512892.743	416.275	BRK3
20411	7147366.773	512891.540	416.065	BRK3
20412	7147367.953	512890.716	416.071	BRK3
20413	7147368.334	512889.914	416.011	BRK3
20414	7147368.650	512887.948	415.798	BRK3
20415	7147368.600	512890.449	415.965	BRK4
20416	7147369.454	512890.639	416.098	BRK4
20417	7147370.391	512891.132	415.940	BRK4
20418	7147367.035	512892.098	416.227	BRK5
20419	7147367.491	512893.094	416.159	BRK5
20420	7147368.105	512894.078	415.991	BRK5
20421	7147366.930	512891.020	416.092	BRK6
20422	7147365.910	512890.310	416.492	BRK6
20423	7147364.667	512889.802	416.394	BRK6
20424	7147366.928	512889.718	416.824	TOP34
20425	7147367.322	512888.759	416.576	TOP34
20426	7147367.405	512887.902	416.422	TOP34
20427	7147366.678	512887.782	416.479	TOP34
20428	7147366.263	512888.605	416.628	TOP34
20429	7147365.921	512889.304	416.816	TOP34
20430	7147366.388	512889.661	416.814	TOP34
20431	7147363.447	512889.973	416.307	TOP35
20432	7147364.390	512890.515	416.734	TOP35
20433	7147365.117	512891.020	416.854	TOP35
20434	7147364.800	512892.560	416.485	TOP35
20435	7147366.397	512892.946	416.703	TOP36
20436	7147367.468	512894.111	416.291	TOP36
20437	7147366.448	512894.694	416.348	TOP36
20438	7147365.795	512893.286	416.682	TOP36
20439	7147368.343	512892.858	416.589	TOP37
20440	7147369.159	512892.259	416.597	TOP37
20441	7147368.660	512891.669	416.569	TOP37
20442	7147368.032	512892.019	416.660	TOP37
20443	7147367.668	512892.189	416.607	TOP37
20444	7147369.978	512890.287	416.452	TOP38
20445	7147370.352	512889.230	416.422	TOP38
20446	7147369.582	512888.840	416.444	TOP38
20447	7147369.049	512889.668	416.429	TOP38
20448	7147369.507	512890.102	416.457	TOP38

PILE NO. 4 (6 in. to 8 in.) VOLUME 50.93 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20449	7147399.979	512870.387	414.164	TOE36
20450	7147400.597	512868.212	413.974	TOE36
20451	7147401.310	512867.590	413.900	TOE36
20452	7147401.365	512865.238	413.826	TOE36
20453	7147404.271	512863.092	413.771	TOE36
20454	7147407.414	512862.806	413.682	TOE36
20455	7147408.846	512862.898	413.589	TOE36
20456	7147411.430	512861.974	413.471	TOE36
20457	7147413.218	512864.261	413.425	TOE36
20458	7147412.060	512866.960	413.541	TOE36
20459	7147409.273	512867.954	413.641	TOE36
20460	7147408.472	512869.310	413.650	TOE36
20461	7147408.696	512871.603	413.695	TOE36
20462	7147407.399	512872.964	413.759	TOE36
20463	7147406.339	512873.334	413.835	TOE36
20464	7147405.466	512874.749	413.932	TOE36

PILE NO. 4 (6 in. to 8 in.) VOLUME 50.93 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
20465	7147403.027	512874.829	414.131	TOE36
20466	7147401.707	512872.887	414.152	TOE36
20467	7147400.504	512871.388	414.143	TOE36
20468	7147408.661	512864.458	414.639	TOP39
20469	7147410.027	512864.264	414.806	TOP39
20470	7147411.005	512863.604	414.595	TOP39
20471	7147411.340	512864.767	414.605	TOP39
20472	7147410.457	512865.520	414.882	TOP39
20473	7147409.383	512865.835	414.715	TOP39
20474	7147408.277	512865.244	414.878	TOP39
20475	7147407.499	512864.347	414.868	TOP39
20476	7147406.563	512864.209	414.835	TOP39
20477	7147405.373	512864.608	414.720	TOP39
20478	7147404.283	512864.173	414.507	TOP39
20479	7147403.020	512864.607	414.438	TOP39
20480	7147402.097	512866.048	414.645	TOP39
20481	7147402.693	512867.538	414.707	TOP39
20482	7147402.967	512868.393	414.770	TOP39
20483	7147402.762	512870.013	415.264	TOP39
20484	7147403.594	512871.012	415.098	TOP39
20485	7147406.329	512872.427	414.353	BRK7
20486	7147405.129	512871.286	414.759	BRK7
20487	7147403.996	512871.272	414.785	BRK7
20488	7147402.500	512871.900	414.537	BRK7
20489	7147404.938	512873.103	415.163	TOP40
20490	7147404.370	512872.023	415.192	TOP40
20491	7147405.982	512871.072	415.127	TOP41
20492	7147407.244	512870.653	414.934	TOP41
20493	7147407.919	512868.552	413.784	TOE37
20494	7147405.343	512869.566	413.954	TOE37
20495	7147404.460	512869.619	414.029	TOE37
20496	7147403.591	512867.391	413.968	TOE37
20497	7147403.902	512865.443	413.724	TOE37
20498	7147404.353	512865.043	413.720	TOE37
20499	7147405.554	512866.639	413.846	TOE37
20500	7147406.700	512865.703	413.863	TOE37
20501	7147408.763	512867.383	413.702	TOE37
20502	7147406.973	512867.583	413.751	GS
20503	7147405.017	512867.279	413.817	GS
20504	7147405.533	512869.065	413.940	GS

PILE NO. 5 (BOULDERS) VOLUME 381.12 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
205010	7147395.173	512881.580	414.954	TOE
205020	7147399.371	512884.896	414.708	TOE
205030	7147399.292	512891.852	414.703	TOE
205040	7147397.995	512901.215	414.751	TOE
205050	7147397.510	512909.023	414.658	TOE
205060	7147394.504	512914.151	414.716	TOE
205070	7147388.378	512915.023	415.032	TOE
205080	7147383.110	512912.216	415.217	TOE
205090	7147383.078	512906.453	415.201	TOE
205100	7147386.872	512898.247	414.978	TOE
205110	7147389.639	512891.206	415.099	TOE
205120	7147391.432	512883.503	415.085	TOE
205130	7147393.228	512880.946	415.018	TOE
205140	7147394.218	512882.436	416.144	TOP
205150	7147392.292	512882.749	416.442	TOP
205160	7147391.680	512887.039	416.695	TOP
205170	7147390.543	512892.330	416.319	TOP
205180	7147389.273	512896.367	416.792	TOP
205190	7147387.629	512900.880	416.831	TOP
205200	7147386.091	512904.867	416.834	TOP
205210	7147384.080	512908.474	416.348	TOP
205220	7147385.804	512909.819	416.355	TOP
205230	7147389.336	512913.343	416.185	TOP
205240	7147393.545	512911.070	416.093	TOP
205250	7147395.899	512904.678	415.744	TOP
205260	7147396.795	512900.341	415.715	TOP
205270	7147396.438	512896.275	416.129	TOP

PILE NO. 5 (BOULDERS) VOLUME 381.12 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
205280	7147397.130	512891.383	416.085	TOP
205290	7147397.011	512888.305	415.815	TOP
205300	7147396.365	512883.336	415.746	TOP
205310	7147394.778	512884.766	416.020	GS
205320	7147394.291	512891.071	416.209	GS
205330	7147391.984	512896.079	416.577	GS
205340	7147391.139	512901.285	416.556	GS
205350	7147389.605	512905.671	416.134	GS
205360	7147386.411	512911.957	415.608	GS
205370	7147392.171	512911.223	415.589	GS

PILE NO. 6 (1 1/2 in.) VOLUME 66.20 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
205380	7147085.564	514241.983	367.206	TOE1
205390	7147081.726	514243.223	367.331	TOE1
205400	7147079.994	514244.474	367.388	TOE1
205410	7147079.541	514248.164	367.289	TOE1
205420	7147079.167	514251.753	367.224	TOE1
205430	7147080.987	514253.610	367.103	TOE1
205440	7147084.081	514253.442	367.075	TOE1
205450	7147086.420	514250.292	367.142	TOE1
205460	7147087.716	514245.935	367.099	TOE1
205470	7147087.950	514243.564	367.135	TOE1
205480	7147086.979	514244.085	367.759	TOP1
205490	7147085.521	514244.110	368.321	TOP1
205500	7147084.207	514244.306	368.373	TOP1
205510	7147082.570	514244.147	367.772	TOP1
205520	7147081.112	514244.235	367.743	TOP1
205530	7147081.092	514244.380	367.706	BRK
205540	7147082.459	514244.439	367.687	BRK
205550	7147084.053	514244.630	368.234	BRK
205560	7147085.491	514245.169	368.250	BRK
205570	7147082.190	514250.144	369.297	TOP2
205580	7147082.861	514248.737	369.437	TOP2
205590	7147083.417	514247.082	369.469	TOP2
205600	7147084.418	514246.482	369.195	TOP2
205610	7147085.333	514245.919	368.608	TOP2
205620	7147083.003	514246.636	369.386	TOP3
205630	7147081.527	514245.705	368.510	TOP3
205640	7147080.795	514244.916	367.954	TOP3

PILE NO. 7 (6 in.) VOLUME 258.03 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
205650	7147082.185	514312.657	366.166	TOE2
205660	7147082.308	514315.181	366.056	TOE2
205670	7147083.586	514316.812	366.036	TOE2
205680	7147081.805	514317.806	366.089	TOE2
205690	7147078.980	514320.065	366.202	TOE2
205700	7147078.052	514325.113	366.072	TOE2
205710	7147078.592	514329.201	366.002	TOE2
205720	7147079.396	514331.692	365.966	TOE2
205730	7147080.662	514333.669	366.001	TOE2
205740	7147081.427	514336.713	366.018	TOE2
205750	7147084.008	514336.727	366.028	TOE2
205760	7147087.355	514338.670	366.018	TOE2
205770	7147089.789	514337.935	366.098	TOE2
205780	7147090.511	514333.088	366.103	TOE2
205790	7147090.651	514329.886	366.329	TOE2
205800	7147090.879	514327.744	367.231	TOE2
205810	7147089.717	514324.903	367.444	TOE2
205820	7147088.383	514322.494	366.886	TOE2
205830	7147088.285	514318.869	366.402	TOE2
205840	7147087.250	514317.543	366.281	TOE2
205850	7147087.663	514315.453	367.074	TOE2
205860	7147086.879	514313.063	367.104	TOE2
205870	7147084.293	514311.742	366.335	TOE2
205880	7147083.386	514313.455	367.088	TOP4
205890	7147085.013	514313.725	367.788	TOP4
205900	7147086.160	514314.381	367.984	TOP4
205910	7147086.187	514316.200	367.677	TOP4

PILE NO. 7 (6 in.) VOLUME 258.03 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
205920	7147086.206	514317.367	366.837	BRK1
205930	7147085.539	514317.384	366.991	BRK1
205940	7147084.536	514317.226	366.517	BRK1
205950	7147085.678	514319.688	368.222	TOP5
205960	7147086.430	514323.119	368.328	TOP5
205970	7147087.037	514324.058	368.136	TOP5
205980	7147088.080	514325.262	368.562	TOP5
205990	7147088.939	514327.756	368.593	TOP5
206000	7147087.958	514329.486	368.622	TOP5
206010	7147087.594	514332.760	368.080	TOP5
206020	7147087.410	514334.732	367.874	TOP5
206030	7147086.902	514334.838	367.868	TOP5
206040	7147084.838	514334.245	367.997	TOP5
206050	7147083.204	514334.026	367.865	TOP5
206060	7147082.458	514331.333	368.137	TOP5
206070	7147081.396	514327.206	368.189	TOP5
206080	7147081.303	514324.495	368.250	TOP5
206090	7147081.926	514324.098	367.962	TOP5
206100	7147082.499	514323.378	367.896	TOP5
206110	7147082.767	514323.293	368.181	TOP5
206120	7147083.161	514323.011	368.134	TOP5
206130	7147083.410	514322.810	367.920	TOP5
206140	7147083.928	514322.022	367.944	TOP5
206150	7147084.238	514321.667	368.253	TOP5
206160	7147085.333	514323.629	368.254	GS
206170	7147083.554	514324.682	368.208	GS
206180	7147083.228	514329.462	368.272	GS
206190	7147086.193	514329.865	368.331	GS

PILE NO. 8 (8 in.) VOLUME 14.62 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
206200	7147091.305	514348.722	366.275	TOE3
206210	7147089.990	514349.802	366.228	TOE3
206220	7147088.046	514349.055	366.045	TOE3
206230	7147087.196	514350.533	366.286	TOE3
206240	7147088.034	514353.487	366.425	TOE3
206250	7147090.066	514354.111	366.320	TOE3
206260	7147093.258	514352.631	366.536	TOE3
206270	7147094.777	514351.916	366.836	TOE3
206280	7147094.355	514349.870	366.732	TOE3
206290	7147091.996	514348.672	366.331	TOE3
206300	7147093.021	514350.691	367.878	TOP6
206310	7147092.103	514351.435	368.060	TOP6
206320	7147091.028	514351.922	367.627	TOP6
206330	7147089.810	514352.115	367.342	TOP6

PILE NO. 9 (1 1/2 in.) VOLUME 355.28 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
206340	7147080.021	514360.551	366.130	TOE4
206350	7147076.920	514362.753	366.104	TOE4
206360	7147076.158	514364.185	366.078	TOE4
206370	7147074.228	514367.341	365.970	TOE4
206380	7147075.459	514370.789	365.920	TOE4
206390	7147078.551	514372.362	366.137	TOE4
206400	7147080.728	514373.368	366.619	TOE4
206410	7147083.280	514375.336	367.195	TOE4
206420	7147085.190	514375.583	367.270	TOE4
206430	7147086.091	514375.453	367.106	TOE4
206440	7147087.109	514375.866	367.320	TOE4
206450	7147088.626	514377.107	366.800	TOE4
206460	7147091.351	514377.014	366.522	TOE4
206470	7147094.390	514374.018	366.518	TOE4
206480	7147095.463	514370.086	366.575	TOE4
206490	7147096.178	514366.757	366.575	TOE4
206500	7147092.949	514363.826	366.412	TOE4
206510	7147087.483	514362.431	366.574	TOE4
206520	7147084.864	514361.841	366.414	TOE4
206530	7147080.540	514360.817	366.183	TOE4
206540	7147091.915	514369.425	368.414	TOE5
206550	7147092.179	514368.768	368.700	TOP7

PILE NO. 9 (1 1/2 in.) VOLUME 355.28 m³				
POINT ID	NORTHING	EASTING	ORTHOMETRIC HEIGHT	COMMENT
206560	7147092.755	514367.841	368.654	TOP7
206570	7147090.759	514366.728	368.703	TOP7
206580	7147090.072	514368.501	368.248	TOE5
206590	7147090.479	514367.447	368.715	BRK2
206600	7147087.124	514365.628	368.761	TOP7
206610	7147086.841	514366.639	368.813	BRK2
206620	7147086.694	514367.299	368.613	TOE5
206630	7147083.679	514366.261	368.213	TOE5
206640	7147083.777	514365.612	368.411	BRK2
206650	7147083.764	514364.719	368.382	TOP7
206660	7147081.564	514364.258	368.604	TOP7
206670	7147081.802	514366.005	368.445	TOE5
206680	7147080.276	514364.966	368.929	TOP7
206690	7147079.386	514366.458	368.267	TOP7
206700	7147080.017	514366.763	368.214	TOE5
206710	7147079.035	514367.807	367.949	TOE5
206720	7147078.567	514368.929	367.856	TOE5
206730	7147077.980	514368.213	368.086	TOP7
206740	7147077.503	514367.631	367.998	TOP8
206750	7147078.500	514366.376	368.004	TOP8
206760	7147081.295	514368.237	369.367	TOP9
206770	7147083.288	514369.384	369.471	TOP9
206780	7147084.534	514370.014	369.785	TOP9
206790	7147085.556	514370.342	369.907	TOP9
206800	7147086.973	514370.814	370.081	TOP9
206810	7147088.558	514371.934	370.032	TOP9
206820	7147089.440	514372.651	369.994	TOP9
206830	7147090.309	514372.185	369.986	TOP9
206840	7147090.209	514371.071	370.027	TOP9
206850	7147088.622	514370.506	370.130	TOP9
206860	7147087.082	514369.902	370.129	TOP9
206870	7147085.875	514369.524	369.950	TOP9
206880	7147084.097	514368.852	369.557	TOP9
206890	7147082.910	514368.082	369.435	TOP9
206900	7147081.940	514367.532	369.379	TOP9

Appendix 6 Compilation of Triggers

APPENDIX 6
COMPILATION OF TRIGGERS

Table 1 Previously Reported Triggers

ID (Source Document)	Description	Trigger Value	2014 Value	Action	Status	Discussion
AR-1 (new)	Average horizontal movement of baseline from previous year	10 cm less the average reported accuracy of baseline shots	1.6 cm	Develop mitigation plan	---	Horizontal accuracy of the baseline survey not to exceed +/- 5 cm
AR-2 (new)	Loss of embankment based on horizontal offset from previous year	1.0 m	0.15 m	Develop mitigation plan	---	---
AR-3 (new)	Total length of observed tension cracks	Increase by 20% from previous year	N/A	Develop mitigation plan	---	Revisions to survey methodology required (refer to Recommendation AR-D)
AR-4 (new)	Average number of cracks observed perpendicular to each baseline pins	Increase by 20% from previous year	3.9	Develop mitigation plan	---	---
HL-1 (new)	Lake water surface critical elevation	412.0 masl	411.643 masl (at time of survey)	Mobilize to site to check outlet for blockage, remove blockage if present, and inspect downstream infrastructure (e.g., drop structures and channel)	---	Installation of automated remote water level monitor is required

ID (Source Document)	Description	Trigger Value	2014 Value	Action	Status	Discussion
HL-2 (new)	Movement of boom abutment structures from previous monitoring period	H: 0.30 m less reported horizontal accuracy of abutment shots And/or V: 0.10 m less reported vertical accuracy of abutment shots	---	Investigate base structure and develop mitigation plan as required	---	Horizontal and vertical accuracy of the abutment shots not to exceed +/- 5 cm
HL-3 (new)	Loss of riprap at the boom abutments from previous monitoring period	10% surface area from previous monitoring period	---	Review riprap diameter and extents and develop mitigation plan as required	---	Taking into consideration changes to water level and the resulting exposure of the rip rap
DS-1 (R22)	Change to drop structure geometry: steepened side slope	<2H:1V	2.7H:1V to 4.1H:1V	Develop mitigation plan for drop structures at which trigger has been exceeded	Not triggered in 2014	N/A
DS-2 (R22)	Change to drop structure geometry: minimum freeboard at design flow (R22)	<0.20 m	1.52 m to 1.34 m	Develop mitigation plan for drop structures at which trigger has been exceeded	Not triggered in 2014	Recommend that the trigger level is changed to <0.3m freeboard during conveyance of the 50-year return period flood flow

ID (Source Document)	Description	Trigger Value	2014 Value	Action	Status	Discussion
DS-3 (R22)	Change to drop structure geometry: width at drawdown or width at end sill decreased from baseline	>0.50 m	0.0 m to 1.9 m	Develop mitigation plan for drop structures at which trigger has been exceeded	Triggered at DS3 and DS4 in 2014	DS4 repair plan should be implemented as soon as practically possible. Full repair of DS1, DS2, and DS3 is not required due to Moderate risk rating.
DS-4 (R22)	Water flowing below the gabion baskets or undermining piping between DS1 and DS4	Visual evidence	---	Immediate appropriate repair prior to the end of the construction season	Triggered at DS4 based on observations made during 2014 inspection	DS4 repair plan should be implemented as soon as practically possible.
DS-5 (R22)	Damage to gabion mesh	Visual evidence	---	Repair wire mesh and SPENAX rings as appropriate prior to the end of construction season	Triggered at DS4 based on observations made during 2014 inspection	DS4 repair plan should be implemented as soon as practically possible. Minor repairs to DS1 and DS3 will be completed as part of DS4 repair
DS-6 (new)	Change to cross-sectional end area since previous monitoring period	>10% RPC	-7.2% to 1.1%	Develop mitigation plan for drop structures at which trigger has been exceeded	Should be used as trigger in future LTMPs	---
CC-1 (R22)	Channel downcut over the 50 m channel segment downstream of DS4 to Sta. 0+250	>0.5 m (from 2006 baseline)	2.5 m to 4.0 m (approx.)	Begin planning for channel and waste rock stabilization	Triggered in 2010	Site-wide remediation planning is underway

ID (Source Document)	Description	Trigger Value	2014 Value	Action	Status	Discussion
CC-2 (R22)	Channel downcut over a measurable (>50 m) stretch of the channel downstream of Sta. 0+250	>1.5 m (from 2006 baseline)	2.5 m to 1.0 m (approx.)	Planning for channel and waste rock stabilization	Triggered in 2010	Site-wide remediation planning is underway
CC-3 (new)	Average channel deposition through upper/mid/lower creek section	>0.3 m from previous monitoring period	0.01 m to 0.03 m (approx.)	Develop localized mitigation plan	Should be used as trigger in future LTMPs	---
CC-4 (new)	Mid-creek channel centerline shifts south, into the waste rock dump	>5 m (average) from previous monitoring period	1.2 m - north	Develop localized mitigation plan	Should be used as trigger in future LTMPs	---
WR-1 (new)	Average monitoring point horizontal movement rate – per slope section	Movement rate (cm/y) > than movement rate from previous cycle	Upper slope: +20% Mid slope: -5% Lower slope: -10%	If movement rate increase is between 0 and 30%, monitoring points should be surveyed the following year. If movement rate increase is 30% or greater or if movement rate has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required	Potentially triggered for upper slope during TF-WR-D	Due to skewing of upper slope data resulting from the addition of monitoring points, the increased movement rate is to be confirmed with 2015 survey data

ID (Source Document)	Description	Trigger Value	2014 Value	Action	Status	Discussion
PP-1 (new)	Average monitoring point horizontal movement rate	Movement rate (cm/y) > than movement rate from previous cycle	-63%	If movement rate increase is between 0 and 30%, monitoring points should be surveyed the following year. If movement rate increase is 30% or greater or if movement rate has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required	Not triggered in 2014	---
WC-1 (R22)	Channel downcut over a measurable stretch of the channel from Sta. 1+025 to 1+300	>1.0 m from baseline	0.43 m total (based on average measurements) since 2003	Begin planning for channel stabilization works	Not triggered in 2014	---
WC-2 (R22)	Channel downcut over a measurable stretch of the channel from Sta. 0+655 to 1+025	>0.5 m from baseline	0.62 m total (based on average measurements) since 2003	Begin planning for channel stabilization works	Triggered in 2014	Site-wide remediation planning is underway
WC-3 (R22)	Visual observations of channel instability	Indications of erosion at top of channel bank or channel re-alignment	N/A	Begin planning for channel stabilization works	Not triggered in 2014	---
WC-4 (new)	Average channel deposition through upper/mid/lower creek section	>0.3 m from previous monitoring period	0.005 m to 0.025 m (approx.)	Develop localized mitigation plan	Should be used as trigger in future LTMPs	---

ID (Source Document)	Description	Trigger Value	2014 Value	Action	Status	Discussion
WC-5 (new)	Channel centerline shift	>5 m (average) from previous monitoring period	0.2 m - east	Develop localized mitigation plan	Should be used as trigger in future LTMPs	---
TP-1 (new)	Average monitoring point horizontal movement rate – per slope section	Movement rate (cm/y) > than movement rate from previous cycle	North Lobe: -31% to 49% South Lobe: -53% to -29%	If movement rate increase is between 0 and 50%, monitoring points should be surveyed the following year. If movement rate increase is greater than 50% or if movement rate has increased over two consecutive years, begin planning for a geotechnical assessment (including drilling and modelling) to determine whether stabilization is required.	Triggered for north upper slope in 2014	The trigger level was exceeded for the north lobe, upper slope; however, the movement rate through this slope section (4.08 cm/y) was relatively small and the RPC (49%) was less than the trigger value. This slope section should be surveyed in 2015 to confirm the result
WP-1 (new)	Pond surface area	>25% from previous monitoring period	North Pond: 5,700 m^2 South Pond: 5,100 m^2	Develop localized mitigation plan	Should be used as trigger in future LTMPs	---
WP-2 (new)	Pond outlet width	>15% reduction from previous monitoring period	North Pond: 0.0 m South Pond: 1.7 m	Develop localized mitigation plan	Should be used as trigger in future LTMPs	---
WP-3 (new)	Pond outlet invert elevation	±0.5 m from previous monitoring period	North Pond: 407.85 m South Pond: 406.73 m	Develop localized mitigation plan	Should be used as trigger in future LTMPs	---

Appendix 7 Compilation of Monitoring Recommendations

APPENDIX 7
COMPILATION OF MONITORING RECOMMENDATIONS

Table 1 Compilation of Recommendations

ID	Description	Implementation	Validity
AR-A (R51)	Monitor (i.e., inspect and survey) the tension cracks along the closed portion of the site access road on an annual basis	Inspection and survey completed in 2014	Valid - practice should continue
AR-B (R104)	Install depth gauge at Clinton Creek Ford No. 1	Completed	Completed
AR-C (new)	Extend the baseline to the north and south by 15 m	Should be implemented as part of 2015 Long-Term monitoring program (LTMP) survey	To improve monitoring of the embankment
AR-D (new)	Survey points recorded at the start, end, and changes in direction (greater than 30 deg.) of each tension crack	Should be implemented as part of 2015 LTMP survey	To facilitate measurement of the tension cracks
HL-A (R104)	Monitor outlet for debris accumulations and damage to boom (monthly during the summer and following major rainfall or flood event)	Ongoing	Valid - practice should continue
HL-B (R104)	Consider installation of automated remote water level monitor to notify AAM when lake water level rises indicating possible blockage of outlet	Not implemented	Valid - should be implemented in 2015
HL-C (R104)	Complete additional topographic survey to confirm freeboard	Completed in 2014	Improve understanding of hydraulic conditions at the outlet
HL-D (new)	Inspect abutments (including condition of rock armouring) monthly during summer by AAM staff and annually by a consultant (preferably following freshet)	Should be implemented in 2015	Required to monitor condition of abutments and rock armouring

ID	Description	Implementation	Validity
HL-E (new)	Assess abutment rock protection (including rock gradation, durability, specific weight; and hardness, as well as a scour analysis) if signs of deterioration of the rock armouring are noted	To be implemented as required	May be required to address rock armouring issues
DS-A (R51)	Monitor (i.e., inspect and survey) drop structures on an annual basis	Ongoing - inspection and survey of all drop structures completed in 2013 and 2014	Valid - practice should continue
DS-B (R104)	Undertake further geotechnical investigation and evaluation to provide a more in-depth discussion on possible causes for differing movement rates between the gabion monitors and waste rock dump monitors	Not implemented	Valid - should be completed prior to site-wide remediation
DS-C (new)	Install additional monitoring points along the waste rock dump toe aligned with the drop structures. A total of eight points should be installed with each point located 20 m south of the monitoring point on the south creek embankment	Should be implemented during 2015 LTMP survey	Improve understanding of influence of waste rock movement on drop structures
DS-D (new)	Establish new monitoring points and cross-section downstream of DS4 that can be safely accessed	Should be implemented during 2015 LTMP survey	Existing monitoring cross-section at downstream end of DS4 can no longer be safely accessed
DS-E (new)	Future survey should include the clear and explicit identification of break points (e.g., toe and top of embankment) through drop structure cross-sections and the edges of each course of gabion baskets along the drop structure centerline	Should be implemented during 2015 LTMP survey	To facilitate the measurement of drop structure cross-section parameters and the review of drop structure profiles
DS-F (new)	Change trigger DS-2 from <0.2 m freeboard to <0.3 m freeboard during conveyance of the 50-year peak flow and adopt revised design flows shown on Figure Nos. 1009 to 1012, Appendix 1	Included on 2014 LTMP drawings	To reflect revised peak flow depth and current hydraulic design practices
DS-G (new)	Change trigger DS3 to measure the drop structure width between the upstream and downstream monitoring points rather than at the upstream drawdown weir and between the downstream monitoring points	Should be implemented as part of 2015 LTMP	Only DS1 was installed with a drawdown weir.
CC-A (R51)	Environmental assessment to determine the impacts of stabilization measures at Clinton Creek Channel	Not completed	Valid - should be completed prior to site-wide remediation

ID	Description	Implementation	Validity
CC-B (R51)	Inspect and survey the Clinton Creek channel on an annual basis	Inspection and survey completed in 2014	Valid - practice should continue
CC-C (R104)	Survey of cross-sections A-E along Clinton Creek should be completed on a biennial basis	Survey completed in 2014	Valid - practice should continue
CC-D (R104)	Install additional monitoring pins adjacent to where Clinton Creek has relocated closer to the waste rock area	Completed by Underhill in 2014	Valid - refer to recommendation CC-G below
CC-E (R104)	Complete geotechnical investigation of Clinton Creek waste rock dump	Not completed	Valid - should be completed prior to site wide remediation
CC-F (new)	Survey of Cross-Section F along Clinton Creek should be completed on a biennial basis	Should be completed in subsequent LTMPs	Survey required to compare cross-section to previous years and identify geomorphological / topographical changes
CC-G (new)	AAM should consider installing monitoring pins along south slope of Clinton Creek near Station Nos. 0+700, 0+800, and 0+900	Should be implemented as part of 2016 LTMP survey	Will provide additional movement monitoring pins at critical locations along waste rock toe
WR-A (R51)	Visual inspection of the waste rock dump should be completed on an annual basis with survey completed on a biennial basis	Inspection and survey completed in 2014	Valid - practice should continue
WR-B (R104)	Trigger level for waste rock monitors should be further investigated and implemented	Included in 2014 report	Completed
WR-C (new)	Survey upper slope monitoring points in 2015 and compare to 2014 data	Should be completed as part of 2015 LTMP survey	Required to determine if upper slope waste rock movement is accelerating
PP-A (new)	Inspect Porcupine Pit and Snowshoe Pit on an annual basis and survey Porcupine Pit monitoring points on an biennial basis	Survey and inspection completed in 2014	Required to monitor pit conditions and movement rates
PP-B (new)	Establish four monitoring points around Snowshoe Pit	Should be completed as part of 2016 LTMP survey	Required to monitor movement rates in and around Snowshoe Pit
WC-A (R104)	Visual inspection and survey of the rock lined channel and weirs on Wolverine Creek should be completed on a biennial basis	Inspection and survey completed in 2014	Valid - but clarification required, refer to recommendations WC-B and WC-C below

ID	Description	Implementation	Validity
WC-B (new)	Visual inspection of the Wolverine Creek channel from the confluence with Clinton Creek to the outlet at the south pond, from the inlet of the south pond to the outlet of the north pond, and approximately 100 m north of the north pond inlet should be completed on an annual basis	Should be completed as part of future LTMPs	Required to identify potential and existing failures of creek channel components and provide a recommendation regarding potential repair strategy
WC-C (new)	Survey of the Wolverine Creek channel (as described above) should be completed on a biennial basis	Should be completed as part of future LTMPs	To facilitates monitoring of channel movement (e.g., downcutting) between monitoring periods
WC-D (new)	Establish secondary control point above Wolverine Creek with line of sight to the 200 m portion of the creek extending downstream from the outlet of the south pond	Should be implemented as part of 2016 LTMP survey	To reduce survey signal interference from trees and improve survey accuracy
TP-A (R104)	Visual inspection and survey of the Wolverine Creek tailings pile should be completed on a biennial basis	Inspection and survey completed in 2014	Valid - but clarification required, refer to recommendations TP-C and TP-D below
TP-B (R104)	Complete geotechnical investigation and assessment of the north and south lobes of the Wolverine Creek tailings pile	Not completed	Valid - required to improve understanding of variance in average movement rates between north and south lobes; however this investigation is not considered urgent (i.e., required within the next year) and can be completed prior to site wide remediation unless required sooner due to tailings slope acceleration (see above)
TP-C (new)	Visual inspection of the Wolverine Creek tailings pile should be completed on an annual basis	Should be completed as part of future LTMPs	Required to identify visible tension cracks and slumping to determine if further investigation is required in that year
TP-D (new)	Survey of the Wolverine Creek tailings pile should be completed on a biennial basis	Should be completed as part of future LTMPs	Required to monitor movement rates through the tailings pile
WP-A (R104)	Visual inspection of the Wolverine ponds should be completed on an annual basis with survey completed on a biennial basis	Inspection and survey completed in 2014	Valid - required to check for debris accumulation and blockage

Appendix 8 Compilation of Select Results

APPENDIX 8
COMPILATION OF SELECT RESULTS

The results of the survey data analyses are presented in Table 1. The included Δ and RPC values are based on the survey data collected during the previous monitoring period.

Table 1 Site Components Select 2014 Results

Site Component	Results
Clinton Creek Access Road	• Maximum baseline movement: 6.6 cm (horizontal) and -6.4 cm (vertical) • Average baseline movement: 1.6 cm/y (horizontal) and -1.2 cm/y (vertical) • Average baseline horizontal movement direction: 354 deg. (North) • Embankment edge surface area: 30.9 m^2/y lost • Embankment edge average offset: 15 cm/y • Embankment edge maximum offset: 210 cm
Hudgeon Lake Outlet	• Average water surface elevation at time of survey 411.643 masl • Riprap visible above water line: 15.0 m² (north abutment) 18.1 m² (south abutment)
Gabion Drop Structures - DS1	• Upstream average monitoring point movement: 1.68 cm/y • Downstream average monitoring point movement: 6.55 cm/y • Average bottom width: 8.2 m (16.3% RPC) • Average side slopes: 3.7H:1V (13.5% RPC) • Upstream invert elevation: 411.15 masl (Δ +10 cm) • Downstream invert elevation: 409.90 masl (Δ +15 cm)

Site Component	Results
Gabion Drop Structures - DS2	• Upstream average monitoring point movement: 2.30 cm/y • Downstream average monitoring point movement: 2.97 cm/y • Average bottom width: 7.7 m (37.5% RPC) • Average side slopes: 3.5H:1V (5.7% RPC) • Upstream invert elevation: 409.54 masl (Δ +1 cm) • Downstream invert elevation: 406.99 masl (Δ +14 cm)
Gabion Drop Structures - DS3	• Upstream average monitoring point movement: 3.92 cm/y • Downstream average monitoring point movement: 4.80 cm/y • Average bottom width: 7.8 m (34.5% RPC) • Average side slopes: 3.6H:1V (10.1% RPC) • Upstream invert elevation: 406.69 masl (Δ +8 cm) • Downstream invert elevation: 404.42 masl (Δ -14 cm)
Gabion Drop Structures - DS4	• Upstream average monitoring point movement: 2.03 cm/y • Downstream average monitoring point movement: 2.66 cm/y • Average bottom width: N/A • Average side slopes: N/A • Upstream invert elevation: 404.62 masl (Δ +5 cm) • Downstream invert elevation: N/A
Clinton Creek Channel - Upper Creek	• Average channel downcutting: 6.5 cm /y • Average channel deposition 2.2 cm /y • Predominant centerline shift: 1.5 m north
Clinton Creek Channel - Mid-Creek	• Average channel downcutting: 30.9 cm /y • Average channel deposition: 0.5 cm /y • Predominant centerline shift: 1.2 m north

Site Component	Results
Clinton Creek Waste Rock Dump	• Upper Slope average horizontal movement: 3.31 cm/y at 75 deg. • Mid Slope average horizontal movement: 3. 24 cm/y at 82 deg. • Lower Slope average horizontal movement: 2.51 cm/y at 352 deg.
Porcupine Pit and Snowshoe Pit	• Porcupine pit monitoring point average horizontal movement: 1.31 cm/y at 332 deg.
Wolverine Creek Channel - Upper Creek	• Average channel downcutting: 5.82 cm /y • Average channel deposition: 2.13 cm/y • Predominant centerline shift: 0.3 m west
Wolverine Creek Channel - Mid-Creek	• Average channel downcutting: 20.1 cm/y • Average channel deposition: 0.54 cm/y • Predominant centerline shift: 0.2 m east
Wolverine Creek Channel – Lower Creek	• Average channel downcutting: 1.7 cm/y • Average channel deposition: 2.62 cm/y • Predominant centerline shift: 1.5 m east
Wolverine Creek Tailings Pile	• North Lobe Upper Slope average horizontal movement: 4.08 cm/y at 80 deg. • North Lobe Mid Slope average horizontal movement: 5.27 cm/y at 78 deg. • North Lobe Lower Slope average horizontal movement: 3.08 cm/y at 105 deg. • South Lobe Upper Slope average horizontal movement: 2.23 cm/y at 107 deg. • South Lobe Mid Slope average horizontal movement: 22.8 cm/y at 81 deg. • South Lobe Lower Slope average horizontal movement: 15.2 cm/y at 55 deg.
Wolverine Creek Ponds - North Pond	• Surface Area: 5,700 m² • Outlet width: 2.6 m • Outlet invert elevation: 407.85 masl
Wolverine Creek Ponds - South Pond	• Surface Area: 5,100 m² • Outlet width: 4.5 m • Outlet invert elevation: 406.73 masl