BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

RED CHRIS DEVELOPMENT COMPANY LTD.

RED CHRIS TAILINGS FACILITY

2014 DAM SAFETY INSPECTION REPORT

PROJECT NO.:	0866001.14.7	DISTRIBUTION:	
DATE:	November 24, 2014	RCDC:	4 copies
DOCUMENT NO.:	0866001.14.002	BGC:	e-copy

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Suite 800 - 1045 Howe Street
Vancouver, BC Canada V6Z 2A9
Telephone (604) 684-5900
Fax (604) 684-5909

November 24, 2014
Project No.: 0866001.14.7

Mr. Tim Fisch
General Manager
Red Chris Development Company Ltd.
#200 – 580 Hornby Street
Vancouver, B.C., V6C 3B6

Dear Mr. Fisch,

Re: Red Chris Tailings Facility – 2014 Dam Safety Inspection Report

Enclosed please find the Red Chris Tailings Facility - 2014 Dam Safety Inspection Report.

Please do not hesitate to contact us should you have any questions.

Yours sincerely,

BGC ENGINEERING INC.
per:

Daryl Dufault, P.Eng.
Senior Geotechnical Engineer

EXECUTIVE SUMMARY

This report documents the results of the 2014 Dam Safety Inspection (DSI) of the dams forming part of the Red Chris tailings impoundment area (TIA). The Red Chris project is under construction, and the TIA in its final projected configuration, at the end of an anticipated 30-year mine life, will comprise 5 dams. At present, with the TIA yet to be commissioned, only two of the dams are constructed: the North Reclaim Dam (NRD), complete to its final configuration, and the North Starter Dam, which will be progressively raised on an annual basis throughout the mine life. Both dams were inspected by Todd Martin, P.Eng., P.Geo., on September 3 and 4, 2014, as part of the preparation of this report.

Discharge of tailings into the TIA is not expected to begin until the process plant commissioning begins in the late fall of 2014. Ramping up to full mill production (nameplate capacity 30,000 tpd) is expected to take several months thereafter.

This report has been prepared consistent with the B.C. Ministry of Energy and Mines (MEM) document "Guidelines for Annual Dam Safety Inspection Reports", dated August 2013.

The consequence classifications assigned the two dams, in their final configurations, based on the scheme presented in Table 2-1 of the Canadian Dam Association (CDA) guidelines (CDA, 2007) are as follows:

- North Dam – Very High
- North Reclaim Dam – Low.

These same classifications were assigned by AMEC (2011) in the design report for the dams, and BGC considers them appropriate. The North Dam in its final configuration will be approximately 105 m in height. As of September 2014, the North Starter Dam was only 23 m in height impounding a water pond with a maximum depth of about 13 m. Nonetheless, the North Dam is assigned a Very High consequence classification even for its starter configuration.

The North Reclaim Dam is a maximum 7 m in height, and impounds a reservoir with a maximum depth (relative to dam crest elevation) of 5 m and a maximum storage capacity of 96,000 m^3. Relative to the spillway elevation, the maximum depth is 3.2 m, and the storage capacity is 39,000 m^3.

To date, instrumentation installed for monitoring of the two dams comprises 17 vibrating wire piezometers installed within the foundation soils underlying the North Starter Dam. No piezometers are installed within the North Reclaim Dam or its foundation. There are groundwater monitoring wells installed between the North Starter Dam and the North Reclaim Dam reservoir, and downstream of the North Reclaim Dam. Both dams began impounding water in the fall of 2013. The foundation piezometers underlying the North Starter Dam have not demonstrated any discernible response to the impounding of the reservoir against the dam; however, they have shown a marked response to pumping, over about the first two weeks of

November 2014, from the monitoring wells between the North Starter Dam and the North Reclaim Dam.

During the construction of the two dams in 2013, the Northwest Diversion Ditch directed runoff from the west side of the valley around both dams. At the end of the 2013 construction season, the diversion berm at the inlet of this ditch, within Beaver Creek, was deliberately breached to direct creek flows into the North Starter Dam reservoir. The breach remains, such that there is minimal flow within the diversion ditch.

As of the preparation of this DSI report, the Operations, Maintenance, and Surveillance (OMS) manual for the TIA was in preparation. The first draft of that document, and of the Emergency Preparedness and Response Plan (EPRP), will be issued to the MEM prior to the commencement of operations, anticipated to be by mid-December, 2014. The dam break and inundation studyis submitted along with this DSI report.

Formal dam safety reviews (DSR's) are to be carried out at five year intervals for all of the Red Chris TIA dams (regardless of the consequence classification). This frequency is consistent with CDA recommendations for Very High and Extreme consequence classifications. With the Red Chris TIA to be commissioned in late 2014, it is therefore recommended that the first DSR be conducted in or before 2019.

The inspections of the dams indicate the dams to be in good condition, with no stability concerns. There are, however, a number of recommendations arising from the inspection, and these are documented in the recommendations registry in Section 12.0 of this report.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF DRAWINGS

LIMITATIONS

BGC Engineering Inc. (BGC) prepared this document for the account of Red Chris Development Company Ltd. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation. Any use which a third party makes of this document or any reliance on decisions to be based on it is the responsibility of such third parties. BGC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

As a mutual protection to our client, the public, and ourselves, all documents and drawings are submitted for the confidential information of our client for a specific project. Authorization for any use and/or publication of this document or any data, statements, conclusions or abstracts from or regarding our documents and drawings, through any form of print or electronic media, including without limitation, posting or reproduction of same on any website, is reserved pending BGC's written approval. A signed and sealed copy of this document is on file at BGC. That copy is the record document, and takes precedence over any other copy or reproduction of this document.

1.0 INTRODUCTION

1.1. Background

The Red Chris project represents the construction, operation, maintenance, reclamation, closure, and monitoring of an open pit mining and milling operation for the production of copper and gold in concentrate form, from deposits located on the Todagin Plateau. The project is situated in the traditional territory of the Tahltan First Nation, between Ealue and Kluea Lakes in north-western British Columbia, approximately 18 km southeast of the village of Iskut and 450 km north of the town of Smithers. A location plan is shown on Drawing 01. The project will include:

- Two open pits (Main and East Zone) that will eventually merge into a single pit
- A processing plant for the production of copper concentrate
- A waste rock dump
- Low grade ore stockpiles
- A tailings impoundment area (TIA), including three tailings dams (North, South and Northeast), and two downstream runoff and seepage reclaim dams (North and South)
- Runoff diversions, as required, to reduce non mine-affected waters reporting to the tailings impoundment
- A run-off collection system to direct mine-affected waters to the tailings impoundment, via the process plant
- A 18 km access road to link with Highway 37
- A new power line from the nearest BC Hydro Grid to the minesite
- Concentrate storage and ship-loading facilities at the Port of Stewart.

The process plant design is based on a milling rate of 30,000 tons of ore per day, to produce a daily average of approximately 318 tons of concentrate containing copper and gold. The concentrate will be trucked to the Stewart Bulk Terminals via the site access road and Highway 37.

The property is located within the designated area for mineral resource development in the Cassiar Iskut-Stikine Land and Resource Management Plan. The minesite is accessed by a new 18 km long access road which intersects Highway 37 on the south side of Coyote Creek. The Red Chris area includes the northeastern portion of the Todagin Plateau, with elevations around 1500 metres or higher. The north-northwest trending Klappan River is at approximately 800 metres elevation at the eastern limit of the Red Chris project area. South and southwesterly trending valleys draining into Kluea Lake divide an area of rolling to ridged uplands averaging 1200 metres elevation from the higher Todagin Plateau to the west.

The Red Chris project site is located on a terrace at the boundary of two regional watersheds: the Klappan and Iskut Rivers (see Drawing 02). The project area drains to the northeast via Quarry and Nea' Creeks, to the northwest via Red Rock and White Rock Canyons and to the

south via Trail Creek. Quarry and Nea' Creeks flow directly into the Klappan River approximately 13 km and 5 km, respectively, northeast of the site.

The locations of the three dams that will provide containment for the ultimate TIA, the North Dam, South Dam, and the Northeast Dam, are shown on Drawing 02. At present, the mine remains under construction, including the starter embankment for the North Dam. The North Reclaim Dam situated downstream of the North Dam, has been constructed to its final configuration. An aerial view of the TIA, and of these two dams, as of the fall of 2013, is provided in Figure 1-1, which also shows borrow areas and construction runoff diversions. Figure 1-2 is an aerial image of the site taken on October 25, 2014.

1.2. Scope of work

This document constitutes the 2014 Dam Safety Inspection (DSI) report for the North Dam and the North Reclaim Dam. The scope and contents of this report are based on the B.C. Ministry of Energy and Mines (MEM) document entitled "Guidelines for Annual Dam Safety Inspection Reports" (B.C. MEM, 2013). Although those guidelines are tailored to active or inactive tailings facilities, they have been applied for this DSI even though the TIA has yet to be activated via the onset of tailings discharge.

The scope of work documented herein included:

- Inspection of both dams by Todd Martin, P.Eng., of BGC on September 3 and 4, 2014.
- Inspection of the downstream toes of both dams to evaluate seepage conditions by BGC construction monitoring personnel on October 3 and 4, 2014.
- Acquisition and review of site climate data, surface water flows data, and instrumentation data.
- Preparation of this report.

1.3. Key Reference Documents

Key reference documents pertaining to the Red Chris TIA and the associated dams are as summarized in Table 1-1.

Table 1-1. Key Reference Documents for the Red Chris TIA Dams.

Author	Date	Report Title	Contents Summary
AMEC	June 6, 2011	Red Chris Project, Tailings Storage Facility Detailed Design Report	Design report for the dams. Includes design criteria, consequence classification, design details, supporting analyses
BGC	Sept. 30, 2014	Tailings Impoundment Area – 2013 Construction Records Report	Documents the 2013 construction of the North Reclaim Dam (to its current configuration) and the first phase of the North Starter Dam.

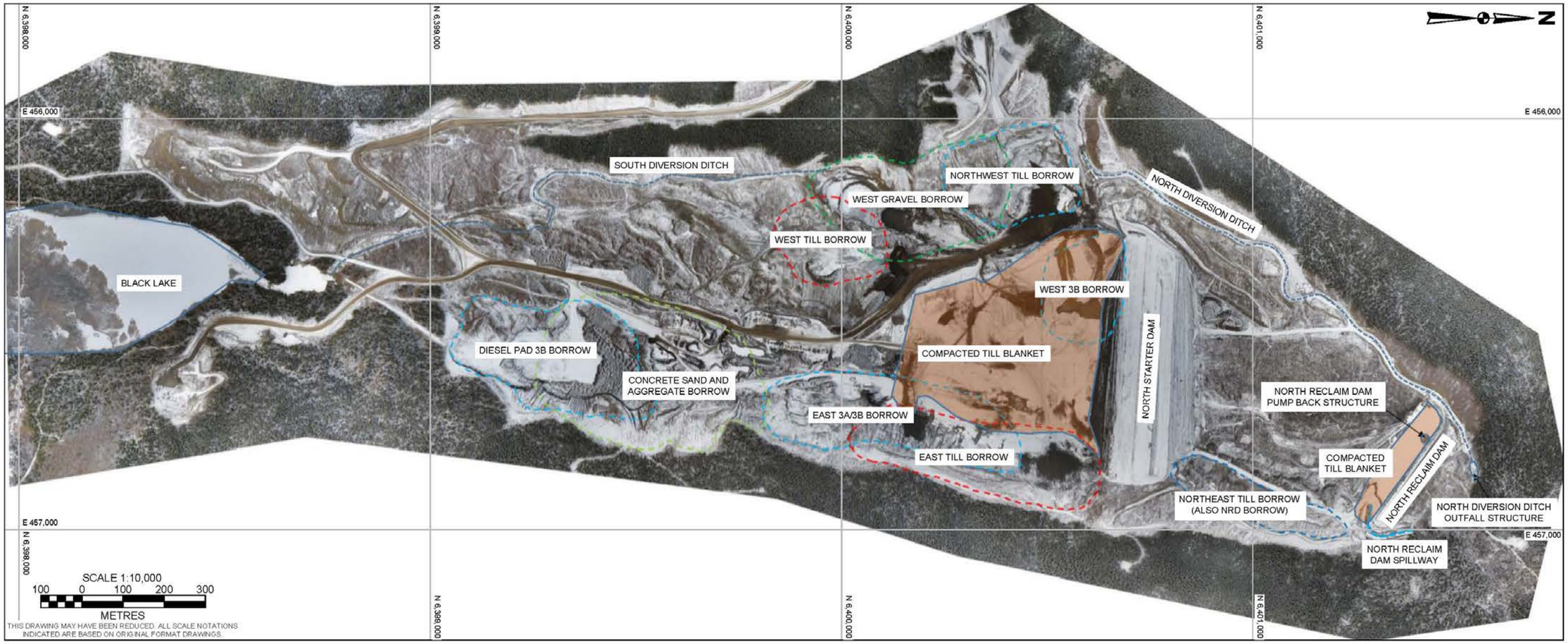


Figure 1-1. Aerial view of the TIA work site (November 7, 2013).

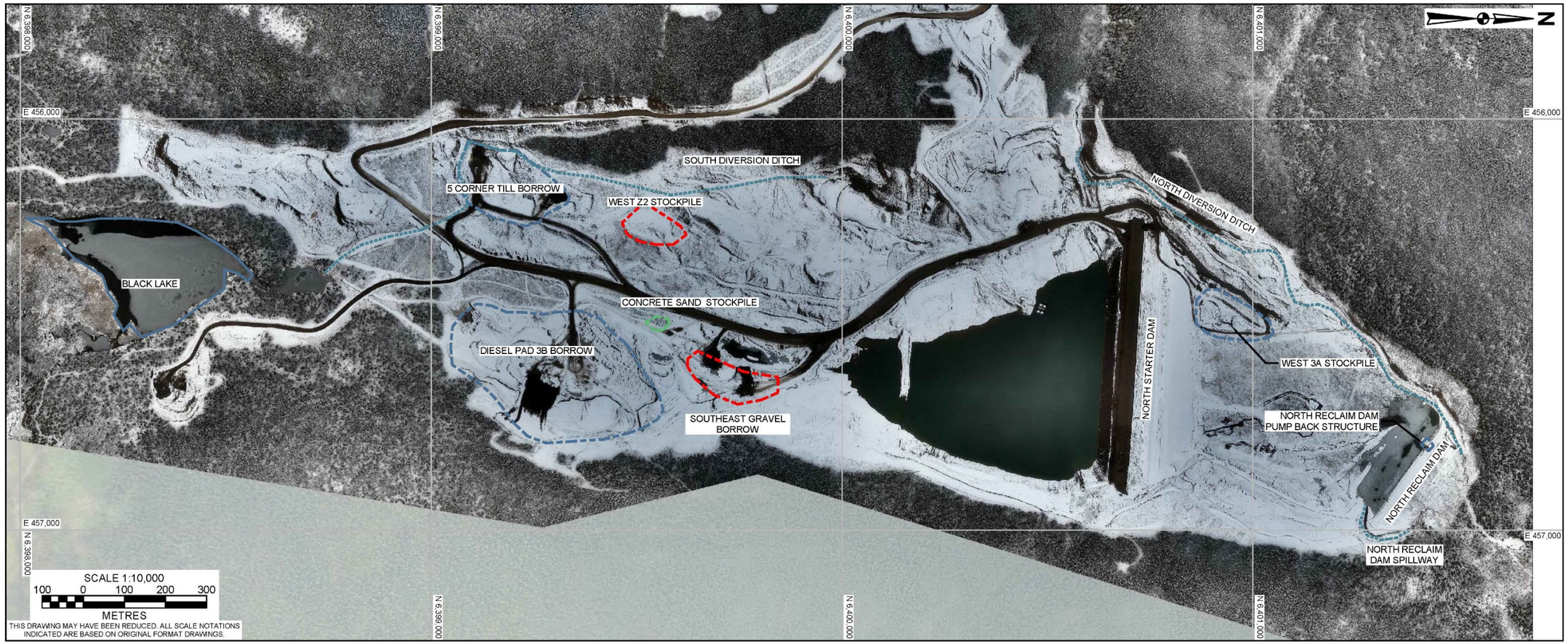


Figure 1-2. Aerial view of the TIA work site (October 25, 2014).

1.4. Organization of Report

This report is structured as follows:

- The executive summary at the beginning of the report presents the information as laid out by MEM (2013) for the summary of DSI reports.
- Section 1 provides a brief background to the project, and describes the scope of work.
- Section 2 provides a brief description of the design of the dams and their current configurations. This section references the drawings issued in the 2013 construction records report (BGC, 2014), which are included in this DSI report for ease of reference.
- Section 3 provides a brief summary of the construction of the dams, referencing the BGC (2014) report which provides detailed construction documentation.
- Section 4 summarizes the failure consequence classifications assigned to the two dams, based on the CDA (2007) guidelines.
- Section 5 describes the inspections of the dams undertaken by BGC personnel in September and October 2014. Annotated photographs taken during these inspections are provided in Appendices A through C.
- Section 6 presents instrumentation and monitoring data for the dams, which is limited to foundation piezometers for the North Starter Dam, and spillway flow discharge from the North Reclaim Dam reservoir.
- Section 7 discusses site climate data, a recent reassessment of site hydrology (AMEC, 2014b), and water balance issues.
- Section 8 discusses the current flood storage and freeboard capacity for the two dams.
- Section 9 discusses surface water control with regards to temporary construction diversions, and water management during ongoing North Starter Dam construction.
- Section 10 summarizes the status of the Operations, Maintenance and Surveillance (OMS) manual for the TIA, the dam breach and inundation study, and the Emergency Response and Preparedness Plan (EPRP).
- Section 11 discusses the recommended frequency of Dam Safety Reviews (DSR's) for the Red Chris tailings dams, and the recommended date for the first such review.
- Section 12 presents recommendations arising from this DSI. Each recommendation is accompanied by a recommended date for implementation/completion.

2.0 DESCRIPTION OF THE DAMS

2.1. General

The design of the dams is described by AMEC (2011). Some design modifications were made subsequent to that report, and are reflected in the construction record drawings in BGC (2014). A number of those drawings are included within this DSI report.

The descriptions that follow are based on the dam configurations as they were during the September 2014 inspection, which were little changed from the configurations presented in BGC (2014) and the drawings appended herein.

2.2. North Starter Dam

The North Starter Dam is shown in plan on Drawings 03, 0866-CRR-XD-01-01 and 0866-CRR-XD-02-01, and in typical sections on Drawing 0866-CRR-XD-02-02. The sections illustrate the eventual planned configuration of the North Starter Dam, at crest El. 1118 m. The ultimate crest elevation of the North Dam is planned to be 1180 m.

At the time of the September 2014 site inspection, the crest elevation of the dam was about 1097 m. The crest width was about 130 m, and the crest length about 570 m. The dam had slopes of 2.5H:1V on the upstream side, and 2.5H:1V on the downstream side. At crest El. 1097 m, the North Starter Dam had a maximum height (crest to downstream toe) of about 30 m. The maximum height from the crest to the upstream toe was about 22 m.

At the time of the site inspection, the reservoir impounded by the North Starter Dam was at about El. 1086.3 m, with a maximum depth (at the toe of the dam) of about 11 m.

The North Starter Dam is a zoned embankment, zoned as follows from upstream to downstream:

- Zone 2 upstream – sand and gravel to provide upstream support for the Zone 1 core, erosion protection, and to provide a platform for the tailings discharge line, once operations commence.
- Zone 1 – glacial till core of low hydraulic conductivity –the seepage reduction element of the dam.
- Zone 3A – chimney filter/drain –the downstream filter to protect the Zone 1 till core against internal erosion.
- Zone 3B chimney drain – filter compatible with Zone 3A, to provide additional chimney drainage capacity downstream of the core.
- Zone 2, 2B, 3B – downstream shell of the dam, providing structural support to the Zone 1 core and adjoining filter/drainage zones.

At the base of the dam, Zones 3A (finger drains) and 3B (blanket drain) provide drainage capacity, to maintain a low phreatic surface within the dam), and to relieve any seepage pressures due to potential upwelling seepage from the underlying foundation soils.

A compacted glacial till blanket, connected to the Zone 1 core, extends about 480 m to the upstream (south) of the North Starter Dam reference line, extends to El. 1098 m on the west rim of the reservoir, and ties into native till along the east rim, as indicated on Drawings 0866-CRR-XD-01-01 and 0866-CRR-XD-02-01. The function of the till blanket is to reduce seepage losses from the start-up water reservoir, until the tailings deposit is developed to the degree that it can serve this function.

The North Starter Dam is not equipped with an emergency overflow spillway. Flood storage capacity is discussed in Section 8.0.

All zones within the dam are compacted, as outlined in BGC (2014). The degree of compaction required is reduced for the Zone 3A chimney filter, where cohesionless behavior rather than shear strength is critical to its function as a filter for the core, and for the Zone 3A basal finger drains, where hydraulic conductivity rather than shear strength is important.

2.3. North Reclaim Dam

The North Reclaim Dam is shown in plan on Drawings 03, 0866-CRR-XD-01-01 and 0866-CRR-XD-03-01, and in typical sections on Drawing 0866-CRR-XD-03-02. The dam was completed to its final crest El. 1053 m in 2013. The maximum height of the dam is about 7 m. The crest width of the dam is about 11 m, and the crest length about 330 m. The upstream (Zone 1) and downstream slopes of the dam are a nominal 2.5H:1V and 2.25H:1V respectively, the upstream rip rap zone has been placed at about 1.75H:1V.

The North Reclaim Dam is an earthfill embankment, zoned as follows from upstream to downstream:

- Riprap zone to provide erosion protection for the upstream slope of the dam;
- Zone 1 – glacial till core of low hydraulic conductivity – the seepage reduction element of the dam.
- Zone 3A – chimney filter/drain –the downstream filter to protect the Zone 1 till core against internal erosion.
- Zone 3B downstream shell – filter compatible with Zone 3A, and providing structural support for the dam to the downstream side.

At the base of the dam, 10-m wide Zone 3A finger drains provide drainage capacity, to maintain a low phreatic surface within the dam, and to relieve any seepage pressures due to potential upwelling seepage from the underlying foundation soils. Section A on Drawing 0866-CRR-XD-03-02 is cut through one of the finger drains.

A compacted glacial till blanket, connected to the Zone 1 core, extends about 55 m to the upstream (south) of the dam reference line, and extends to El. 1053 m along its west and east sides. The function of the till blanket is to reduce seepage losses from the North Reclaim Dam reservoir.

All zones within the dam are compacted, as outlined in BGC (2014). The degree of compaction required is reduced for the Zone 3A chimney filter where cohesionless behavior rather than shear strength is critical to its function as a filter for the core, and for the Zone 3A basal finger drains, where hydraulic conductivity rather than shear strength is important.

An overflow spillway, at invert El. 1051.2 m, is constructed through the right abutment of the North Reclaim Dam, as shown on Drawings 0866-CRR-XD-03-01and 0866-CRR-XD-04-01. The spillway is lined with bituminous geomembrane, and is approximately 170 m in length from inlet to outfall. An erosion resistant outfall structure has yet to be constructed at the outlet, with the result that some scour is occurring and undermining the bituminous geomembrane lining.

3.0 CONSTRUCTION SUMMARY

Construction of both the North Starter Dam and the North Reclaim Dam commenced in 2013. The North Reclaim Dam was completed to its final configuration in 2013. Construction of the North Starter Dam is ongoing and was in progress at the time of the September and October 2014 inspections of the dams.

The 2013 construction of the dams is documented in BGC (2014). That report provides a description of the construction procedures, and of the construction quality control (QC) and quality assurance (QA) activities and testing. The construction of the dams was monitored dayshift and nightshift by BGC representatives. In 2013, fill volumes placed for the construction of the two dams was estimated, based on survey, as follows:

- North Starter Dam – 2,065,000 m^3
- North Reclaim Dam – 72,000 m^3.

Other construction in 2013 documented in BGC (2014) included:

- The North Reclaim Dam spillway
- The Northwest Diversion Ditch (see Section 9.0), and its associated outfall structure
- The Southwest Diversion Ditch.

BGC (2014) also describes foundation preparation, borrow area development activities and piezometer installation in the foundation of the North Starter Dam (further discussed in Section 6.0).

4.0 CONSEQUENCE CLASSIFICATION

AMEC (2011) provided recommended consequence classifications for all of the dams constituting the Red Chris TIA. The consequence classifications were based on Table 2-1 of the CDA (2007) guidelines, re-produced herein as Table 4-1. The consequence classifications assigned the two dams constructed to date were as follows:

- North Dam – Very High
- North Reclaim Dam – Low.

For the North Dam, which will retain potentially acid generating (PAG) tailings, the Very High classification is judged appropriate on the basis of environmental and cultural values. It is noted that the North Dam design criteria relevant to the consequence classification rating, namely the inflow design flood and the maximum design earthquake, would satisfy even an Extreme consequence classification rating.

For the North Reclaim Dam, which is only a low water-retaining structure, and impounds a reservoir with a capacity of 39,000 m^3 up to the spillway invert elevation (1051.2 m), the low rating is judged appropriate on the basis of both environmental/cultural values, and economic losses. For low consequence classifications, Table 6-1 of the CDA (2007) guidelines suggests the 1 in 100 year return inflow design flood as appropriate. The design adopted for the North Reclaim Dam incorporates the ability to route a 1 in 200 year return period flood.

At the time of preparation of this DSI report, BGC was also in the process of completing a dam break and inundation study for the North Dam, Northeast Dam, and South Dam, all in their final configurations. The results of that study support the “Very High” consequence classification assigned to the North Dam.

Table 4-1. CDA (2007) Consequence Classification Scheme.

Dam Class	Population at Risk [note 1]	Incremental Losses		
		Loss of Life [note 2]	Environmental and Cultural Values	Infrastructure and Economics
Low	None	0	Minimal short-term loss No long-term loss	Low economic losses; area contains limited infrastructure or services
Significant	Temporary only	Unspecified	No significant loss or deterioration of fish or wildlife habitat Loss of marginal habitat only Restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
High	Permanent	10 or fewer	Significant loss or deterioration of *important* fish or wildlife habitat Restoration or compensation in kind highly possible	High economic losses affecting infrastructure, public transportation, and commercial facilities
Very High	Permanent	100 or fewer	Significant loss or deterioration of *critical* fish or wildlife habitat Restoration or compensation in kind possible but impractical	Very high economic losses affecting important infrastructure or services (e.g. highway, industrial facility, storage facilities for dangerous substances)
Extreme	Permanent	More than 100	Major loss of *critical* fish or wildlife habitat Restoration or compensation in kind impossible	Extreme losses affecting critical infrastructure or services (e.g. hospital, major industrial complex, major storage facilities for dangerous substances)

Notes:

1. Definitions for population at risk:

   None – There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure.

   Temporary – People are only temporarily in the dam-breach inundation zone (e.g. seasonal cottage use, passing through on transportation routes, participating in recreational activities)

   Permanent – The population at risk is ordinarily located in the dam-breach inundation zone (e.g. as permanent residents); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimates of potential loss of life (to assist in decision-making if the appropriate analysis is carried out).

2. Implications for loss of life:

   Unspecified – The appropriate level of safety required at a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example, might not be higher if the temporary population is not likely to be present during the flood season.

5.0 DAM INSPECTIONS

5.1. General

In support of preparation of this DSI report, inspections of the dams were carried out as outlined in Table 5-1.

Table 5-1. DSI Inspections.

Date	Scope of Inspection	BGC Personnel Conducting the Inspection
September 3 & 4, 2014	North Starter Dam and North Reclaim Dam – crest, upstream and downstream slopes, downstream toe Photographs provided in Appendix A	Todd Martin, P.Eng.
October 3, 2014	North Reclaim Dam toe, with emphasis on observation of seepage conditions, and for collection of representative foundation soil samples for gradation analyses. Photographs provided in Appendix B.	Steven Richards, EIT and Danika Medinski, EIT BGC personnel on site for dam construction monitoring.
October 4, 2014	North Starter Dam toe, with emphasis on observation of seepage conditions. Photographs provided in Appendix C.	

5.2. North Starter Dam

The North Starter dam appeared in good condition. There were no indications of slope instability or significant erosion on either of the upstream or downstream slopes. There were no indications of wave erosion of the Zone 2 fill at or near the water line. There were no indications of crest settlement, although this would be difficult to discern in any case given the active state of dam construction. An attempt was made to obtain and compare 2013 end-of-construction crest survey data with pre-construction surveys from 2014, but no overlapping surveys were available.

One issue noted, near the upstream left abutment of the dam, is the ongoing erosion of the compacted till seepage reduction blanket due to discharge from a culvert (see Photo 7). This discharge represents the flow from Beaver Creek (the diversion of which was deliberately breached in 2013 – see Photo 6), along with pumpback flow from the North Reclaim Dam reservoir. An unsuccessful attempt to arrest this ongoing erosion with geotextile was made. It is recommended that the till blanket erosion be repaired, and that it be protected from further concentrated erosion in this area.

Near the downstream edge of the crest, at about Sta. 0+200 m, two small depressions were noted (see Photo 20). This area was identified by BGC construction monitoring personnel, flagged, and is being evaluated for any indications of ongoing settlement. As of issuance of this report, none has been noted.

Seepage was noted in various locations from the finger/blanket drain at the toe of the dam during the September 3 & 4 inspection. The October 4 inspection of the toe followed a spell of wet weather, making it more difficult to distinguish between seepage from the base of the dam, and seepage from infiltration of the downstream shell of the dam. In general, seepage discharge from the base of the dam is discernible only by numerous wet locations, at most of which the flow rate is too low to be estimated. The seepage discharge reports to a small ditch (see Photo 28), at the edge of the drainage blanket. The low spot along the North Starter Dam toe occurs near the original creek channel towards the right abutment, at finger drain 0+200 (see Photos 29 and 30). The flow emerging from that finger drain was estimated, visually, at less than 5 litres/minute. However, moving downstream along the original creek channel from the finger drain, the flow in the channel increased rapidly (see Photos 29 through 34), fed primarily by groundwater discharge, along with surface runoff from the valley slopes, particularly the slope to the east (see Photo 37). Visually, the flow rate entering the North Reclaim Dam reservoir, about 600 m downstream of the North Starter Dam toe, is about 70 litres/sec, about two orders of magnitude higher than visible seepage from the toe of the North Starter Dam. Flow conditions between the North Starter Dam and the North Reclaim Dam reservoir are discussed further in Section 6.0.

During the inspection, dark areas on the downstream shell, above the base of the dam, corresponding to wetter areas were noted, and these tended to be at a constant elevation of about 1080 m to 1082 m (see Photos 25, 30 and 31). There is no discernible flow from these areas, and the features are believed to be the result of lagged discharge of infiltration to the downstream shell fills following rainfall events. BGC site personnel monitor these features, and have reported that they are not present after periods of sustained dry weather even when the pond level has remained relatively constant.

5.3. North Reclaim Dam

The North Reclaim Dam appeared in good condition during the inspections. The reservoir was at about El. 1051.2 m (spillway invert, the spillway was flowing) at the time of the inspections. There were no indications of instability on the upstream slope, and the riprap facing appeared in good condition. An apparent crack was observed near the upstream crest (see Photo 42), but this appears to be the result of the relative fine grained crest road topping migrating into the coarse riprap over which it was placed.

There was no visually discernible crest settlement or deformation.

The downstream slope of the dam appeared in good condition, with no indications of sloughing, and no significant erosion.

Wet conditions prevail along most of the toe of the North Reclaim Dam. In numerous areas, upwelling seepage was noted, although there were no indications of associated internal erosion. Such conditions were encountered during the 2013 construction of the North Reclaim Dam, consistent with this area being a natural groundwater discharge zone. Although there were no indications of internal erosion, and there is minimal hydraulic head across the dam, it

is recommended that a weighted filter blanket be constructed, extending from Sta. 0+020 to 0+300 m.

Contributing to the wet conditions at the toe of the dam is the discharge from artesian groundwater well 11-NPW2 (see Photo 55). The discharge from this well should be capped off, or directed to the downstream.

5.4. North Reclaim Dam Spillway

The North Reclaim Dam spillway was flowing at the time of the inspection. The spillway is shown in Photos 49 through 54; a record of the spillway flows is on Figure 9-1. The following were noted during the inspection:

- There was some floating debris in the pond and within the spillway channel itself. Such debris should be removed.
- There were no indications of flow occurring below the bituminous geomembrane – such conditions if present could potentially lead to undermining and eventual tearing of the geomembrane.
- Some cobbles were noted at the crest of the geomembrane liner slopes (see Photo 52). Such stones should be removed.
- An armored outlet has yet to be constructed at the downstream termination of the geomembrane. As a result, scour is occurring and is undermining the geomembrane. The outlet should be constructed, and the scour and undermining that has occurred, should be repaired.

6.0 INSTRUMENTATION

6.1. General

Instrumentation installed to date for monitoring of the dams comprises:

- 16 vibrating wire piezometers installed in the foundation soils and one into bedrock, all below the North Starter Dam
- 6 groundwater monitoring wells installed in the area between the North Starter Dam and the North Reclaim Dam reservoir, and 6 downstream of the North Reclaim Dam.
- 4 weirs for monitoring of surface flows.

The locations of the piezometers, groundwater monitoring wells, and weirs are shown on Drawing 03.

6.2. North Dam Piezometers

Seventeen vibrating wire piezometers are installed in the foundation below the North Starter Dam. The piezometer locations are shown in plan on Drawings 03 and 0866-CRR-XD-05-01, and in sections on Drawings 0866-CRR-XD-05-02 through 04, which also indicate the piezometric elevation heads as of September 5, 2014. The piezometers were installed at different elevations in order to evaluate vertical hydraulic gradients.

Time history plots for the piezometers are provided in Figure 6-1 through Figure 6-6. These plots also include the North Starter Dam reservoir level, the North Starter Dam crest elevation, and the elevation of original natural ground (i.e. foundation level for the dam) at the piezometers location.

Vertical gradient trends are inconsistent between the various piezometer locations. For the piezometer study section located mid valley (see Drawing 0866-CRR-XD-05-03), generally upward gradients appear to exist. This is also the case for the piezometer study section nearer the left dam abutment (see Drawing 0866-CRR-XD-05-04). For the study section nearer the right abutment, however (see Drawing 0866-CRR-XD-05-02), vertical gradients are generally downward.

Viewing the piezometer data against the North Starter Dam reservoir level, it is difficult to discern any clear piezometric response to the impounding of the reservoir. There were only two readings of the piezometers undertaken prior to the 2014 construction season, so potential seasonal fluctuations in groundwater pressures are difficult to evaluate based on currently available data.

A number of the piezometers, generally those at depth, showed a marked response to pumping from groundwater well 11-NPW2, located downstream of the NRD (see Drawing 03), from November 1 to November 13.

It will be important to read the piezometers at least bi-weekly going forward, so that seasonal effects can be discerned and distinguished from response to the reservoir level and changes once tailings discharge commences.

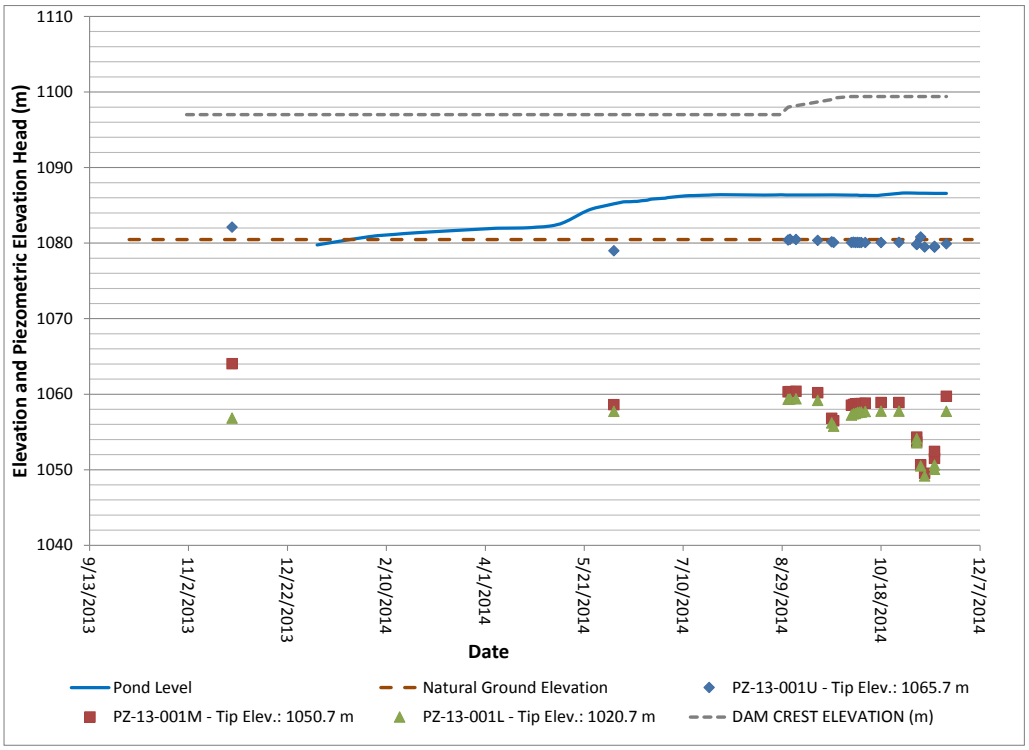


Figure 6-1. Piezometer PZ-13-001 time history plots.

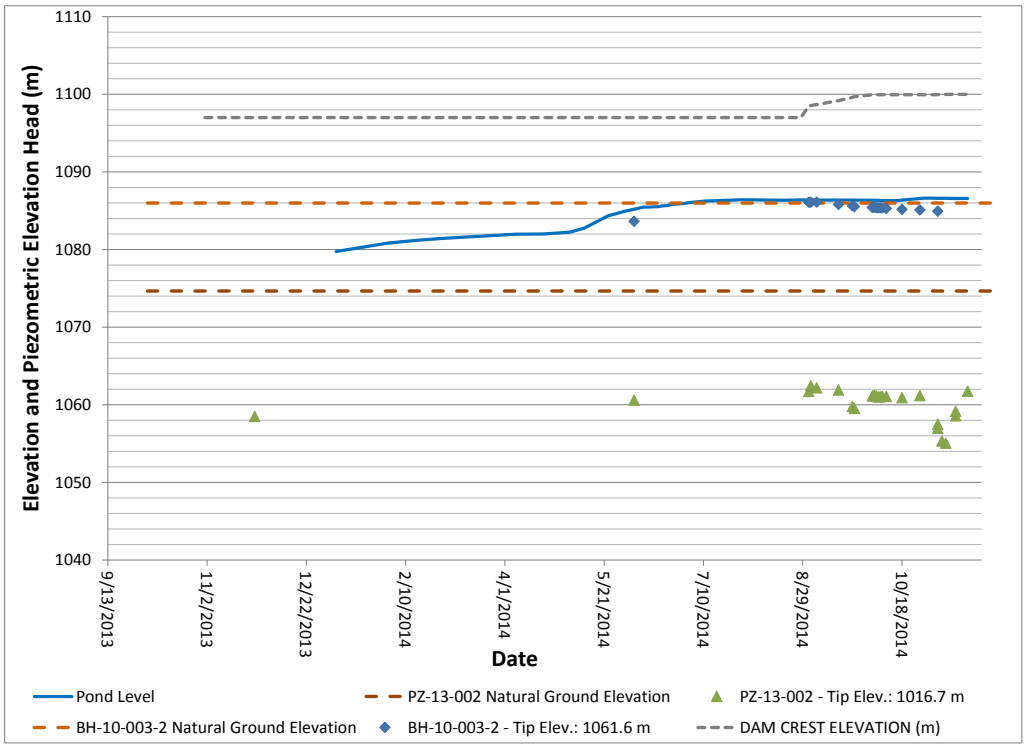


Figure 6-2. Piezometers PZ-13-002 & BH-10-003-02 time history plots.

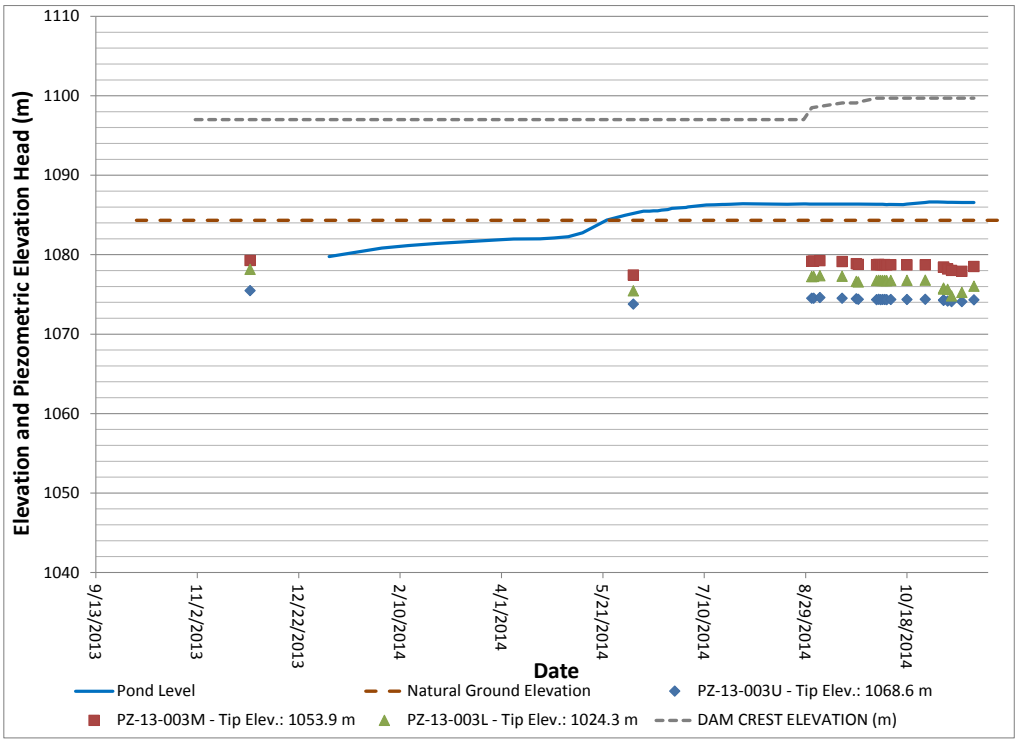


Figure 6-3. Piezometer PZ-13-003 time history plots.

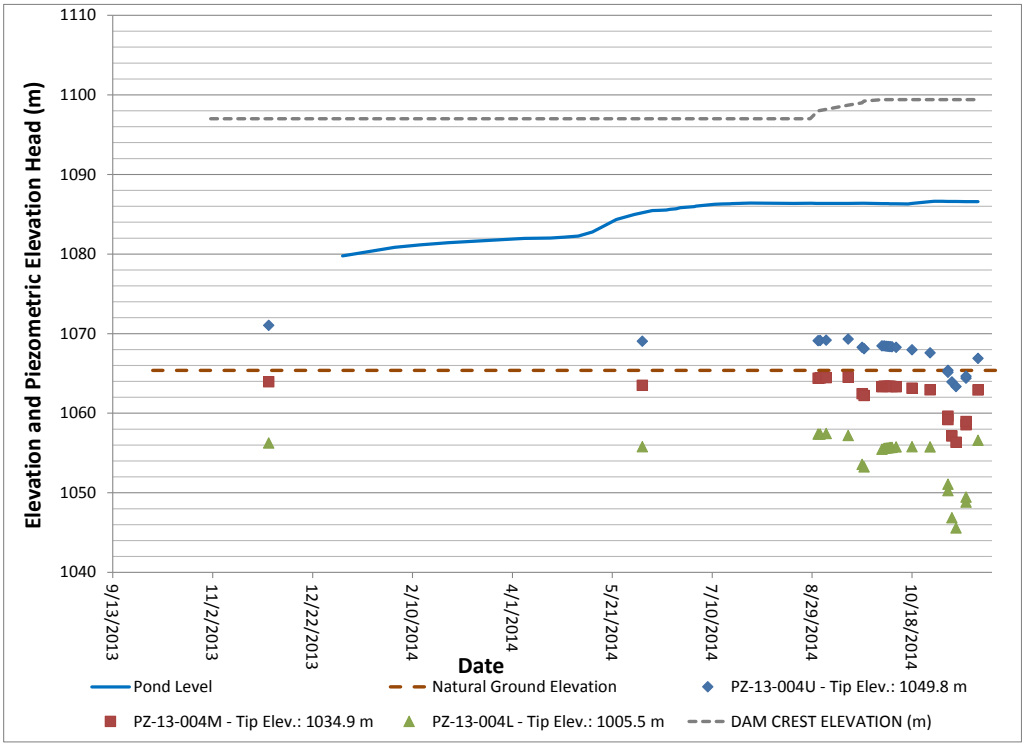


Figure 6-4. Piezometer PZ-13-004 time history plots.

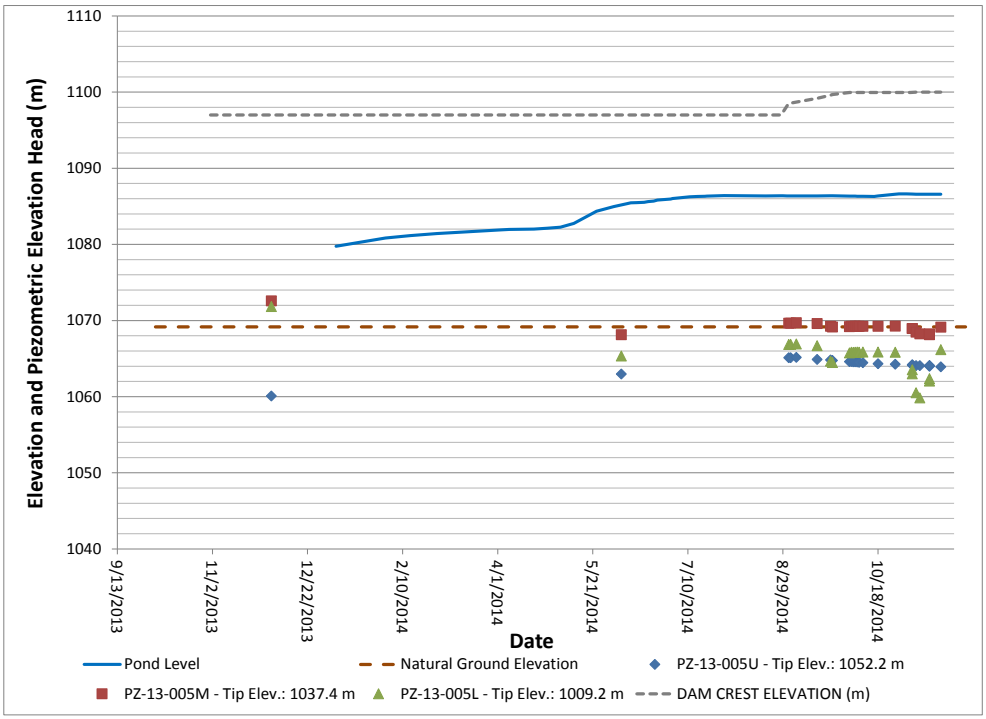


Figure 6-5. Piezometer PZ-13-005 time history plots.

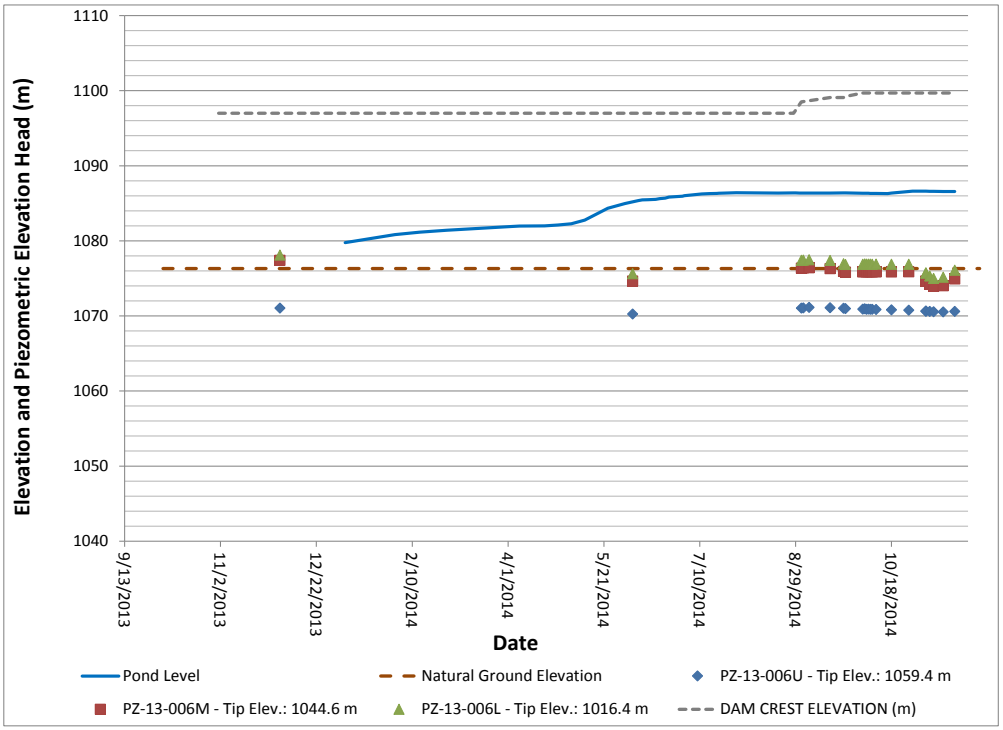


Figure 6-6. Piezometer PZ-13-006 time history plots.

6.3. Groundwater Monitoring Wells

AMEC (2014a) provides a summary of groundwater monitoring well installations completed to date at the site. Drawing 03 shows the locations of these wells, along with the foundation piezometers discussed in Section 6.2. The well details, and measured water levels as of April 4, 2014, as reported by AMEC (2014a) are as given in Table 6-1. A number of the wells indicate artesian conditions, and are visibly flowing. The wells are not equipped with pressure gauges, which would allow shut-in pressures (i.e. formation pressures) to be measured. Installation of such gauges is recommended for all of the wells with artesian flow.

Table 6-1. Groundwater Wells at North Starter Dam and North Reclaim Dam.

Well ID	Ground Elevation (masl)	Water Level (masl) (Apr.4/2014)	Diameter/Well Depth (m)	Well Screen Interval (masl)	Screened Formation
MW13-4D	1052	1055.3	0.15/41.1	1011-1013	Gravelly Sand
MW13-4S	1052	1053.2	0.05/24.7	1027-1030	Silty Sand
MW13-5	1038	>1040	0.15/36.6	1001	Sandy Gravel
MW13-21D	1056.6	1054.1	0.05/61.6	995.0-999.6	Sand
MW13-21S	1055.6	1054.9	0.05/12.2	1043.4-1044.9	Sand
MW13-22D	1056.6	1052.7	0.05/73.2	983.4-988.0	Sand
MW13-22S	1056.6	1055.0	0.05/18.3	1038.3-1042.9	Sandy Gravel
MW13-23D	1058.9	1050.0	0.05/90.4	968.5-973.1	Sand
MW13-23S	1058.9	1057.4	0.05/12.2	1046.7-1048.3	Sand
NMW11-1	1052	>1052	0.15/44.8	1007.2-1010.5	Sand
NPW11-1	1052	>1052	0.30/51.5	1000.5-1014.2	Sand
NPW11-2	1052	1054.1	0.30/69.8	982.2-990.6	Sand

Note: MW refers to monitoring wells, PW refers to pumping wells.

6.4. Seepage Flows

Seepage flows downstream of the North Starter Dam and the North Reclaim Dam are currently monitored only on a visual basis, and via the weir installed between the two dams, located as shown on Drawing 03. It is recommended that additional weirs be established, as close to the toes of the dams as practical, to allow for measurement of seepage rates. Additional weirs should be established at other points further downstream of both dams, to quantify increased downstream flows given groundwater discharge conditions, which are particularly notable between the North Starter Dam and the North Reclaim Dam reservoir.

On September 15, 2014, AMEC personnel undertook a survey of groundwater discharge and surface flows between the North Starter Dam and the North Reclaim Dam. This survey also included temperature measurements. Seepage discharge from the 0+200 toe drain at the toe of the North Starter Dam (see Photo 29 in Appendix A) was measured at a temperature of

9.1°C. Temperatures further downstream, where the flows increased significantly, were in the range of 7.3°C to 7.6°C. As noted in AMEC (2014c), these results are consistent with the low flow rate at the toe of the North Starter Dam representing warmer seepage from the reservoir, and the higher flow rates to the downstream (see Photos 30 through 34 in Appendix A) being dominated by cooler natural groundwater discharge.

Once tailings discharge operations commence, all inflows to the North Reclaim Dam reservoir, comprising runoff, groundwater discharge, and drainage from hydraulic fill operations for North Dam raising, are to be pumped back to the tailings impoundment, with the spillway only flowing under upset conditions. Given the substantial contribution of groundwater discharge to the inflows to the North Reclaim Dam reservoir, it is recommended that the planned pumping capacity for North Reclaim Dam pumpback be reviewed, with a view to determining if an increase in installed pumping capacity is required.

6.5. North Reclaim Dam

No instrumentation currently exists within or below the North Reclaim Dam. Given that the dam is in a natural groundwater discharge area, it is recommended that vibrating wire piezometers be installed within the dam foundation at three locations (Sta. 0+050 m, 0+150 m, and 0+250 m) drilled from the dam crest. Piezometers should be installed at depths of 0 m, 5 m, 10 m, 20 m and 40 m relative to the base of the dam. These piezometers will facilitate the hydrogeologic characterization of the area, and will provide key monitoring points for any pumping of the groundwater wells downstream of the dam.

This work can be undertaken in the summer of 2015.

7.0 CLIMATE AND WATER BALANCE REVIEW

Red Chris has established two climate stations on the Todagin Plateau, designated the Upper WX and Lower WX stations. AMEC (2014b) described an updated analysis of hydrological parameters for the Red Chris site, and noted significant local variation in precipitation values, possibly owing to orographic effects. AMEC (2014b) recommended the following for hydrological parameters for the site:

- Annual average precipitation: 541 mm to 603 mm
- Annual average evaporation: 234 mm
- Annual runoff: 100 mm to 410 mm.

Precipitation and runoff are presented as ranges owing to the significant spatial variability of precipitation and runoff between the west and east sides of the site. Given that variability, and that the TIA is at a significantly lower elevation than the Todagin Plateau where the two existing climate stations reside, additional stations should be established at lower elevations more representative of much of the catchment area for the TIA. AMEC should be consulted as to the appropriate number and locations of such stations.

AMEC has developed a detailed spreadsheet water balance model for the site that is linked to water quality predictions and source terms. That model however applies to the operational phase of the project. Water balance during the present pre-operational phase was not tracked until October 2014. Initially, the only flow measured, on a periodic basis, was the discharge from the North Reclaim Dam spillway (see Section 9.3.1 and Figure 9-1). Other flows that were not measured, until October 2014, were:

- Seepage discharge from the North Starter Dam toe (discussed in Section 6.4)
- Inflows to the North Reclaim Dam reservoir (could be measured via weir, see Photos 33 and 34 in Appendix A)
- Inflows to the North Starter Dam reservoir from Beaver Creek (see Photo 6 in Appendix A) and any other significant inflow streams
- Pumpback flows from the North Reclaim Dam reservoir to the North Starter Dam reservoir (see Photo 5 in Appendix A).

In October, RCDC installed four weirs at the locations indicated on Drawing 03, summarized below:

- Weir 1 – measures inflow from Beaver Creek
- Weir 2 – approximately mid-way between the NSD and the NRD
- Weir 3 – about 400 m downstream of the NRD
- Weir 4 – at the outlet of the NRD spillway.

An additional weir, or alternative means of flow rate measurement, is recommended for installation at the toe of the NSD, at about Sta. 0+200 m, at the location indicated on Drawing 03. This weir (or alternative, such as a pipe allowing for flow rate measurement via bucket and stopwatch) should be installed as close as possible to the dam, the objective being to obtain measurements of seepage discharge from the dam, rather than natural groundwater discharge

further to the downstream that is measured at Weir 2. An additional weir or two might be required along the dam toe, further to the north, to fully capture seepage discharge at the toe of the NSD.

8.0 FLOOD STORAGE CAPACITY AND FREEBOARD

8.1. North Starter Dam

The storage-elevation curve for the North Starter Dam, to crest El. 1097, is shown in Figure 8-1. Between the crest elevation and September 2014 pond level of 1086.3 m, the reservoir had 3.75 Mm^3 of storage capacity.

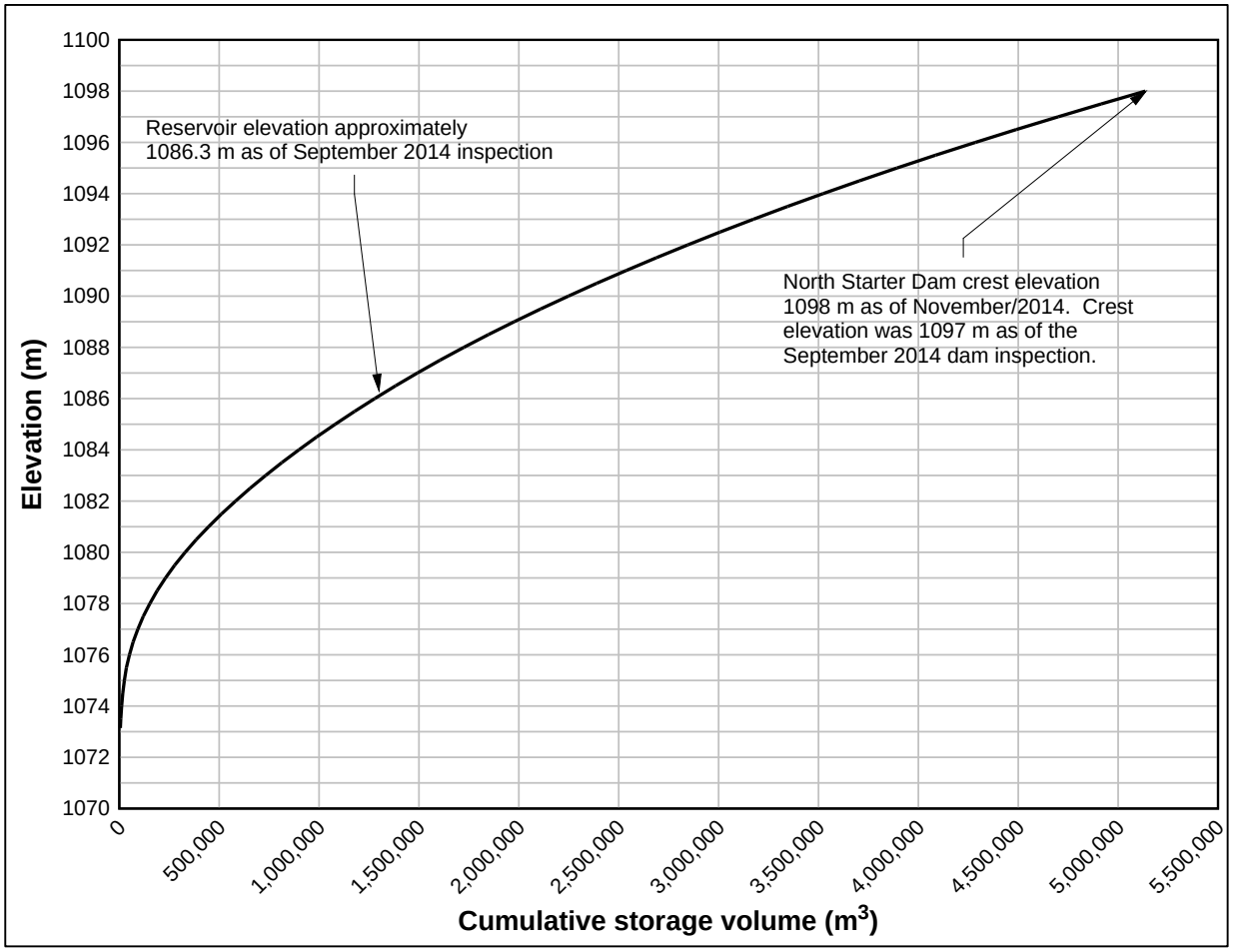


Figure 8-1. Storage-elevation curve for the North Starter Dam reservoir.

AMEC (2011) recommended two inflow design flood (IDF) events for the TIA, as follows:

- With an overflow spillway: IDF = 24 hour duration Probable Maximum Precipitation (PMP) event (200 mm) on top of a 1 in 100 year return period snowmelt (30 mm over 24 hours), amounting to a total of 230 mm of runoff. For the North Starter Dam catchment, with a catchment of about 766 ha, this is equivalent to about 1.76 Mm^3 of inflow. The reservoir and spillway would together be required to attenuate and safely pass this IDF,.
- Without an overflow spillway: IDF = 10-day duration PMP (233 mm) coincident with a 1 in 100 year return period snowmelt (30 mm per day over 10 days), amounting to a

total of 533 mm of runoff. For the North Starter Dam catchment, this would be equivalent to about 4.08 Mm^3 of inflow.

AMEC (2011) specified freeboard of 2 m above the pond levels resulting from both the IDF events defined above.

For a pond elevation of 1086.3 m as shown above on Figure 8-1, and with no spillway, the North Starter Dam reservoir has the capacity to contain a 24-hour duration Probable Maximum Flood (PMF) with more than 2 m of freeboard, but insufficient capacity to accommodate the 10-day duration PMF.

At the date of issue of this report, RCDC was in the process of evaluating PMF contingencies to maximize the tailings storage capacity achievable given the current crest elevation of the NSD. These options comprise:

- An open channel overflow spillway along the right abutment of the NSD; and
- Installing sufficient pumps, pipelines, and backup power, triggering points and reservoir operating rules, for management of PMF inflows via a combination of storage capacity and pump-out capacity.

8.2. North Reclaim Dam

The storage-elevation curve for the North Reclaim Dam reservoir is given in Figure 8-2.

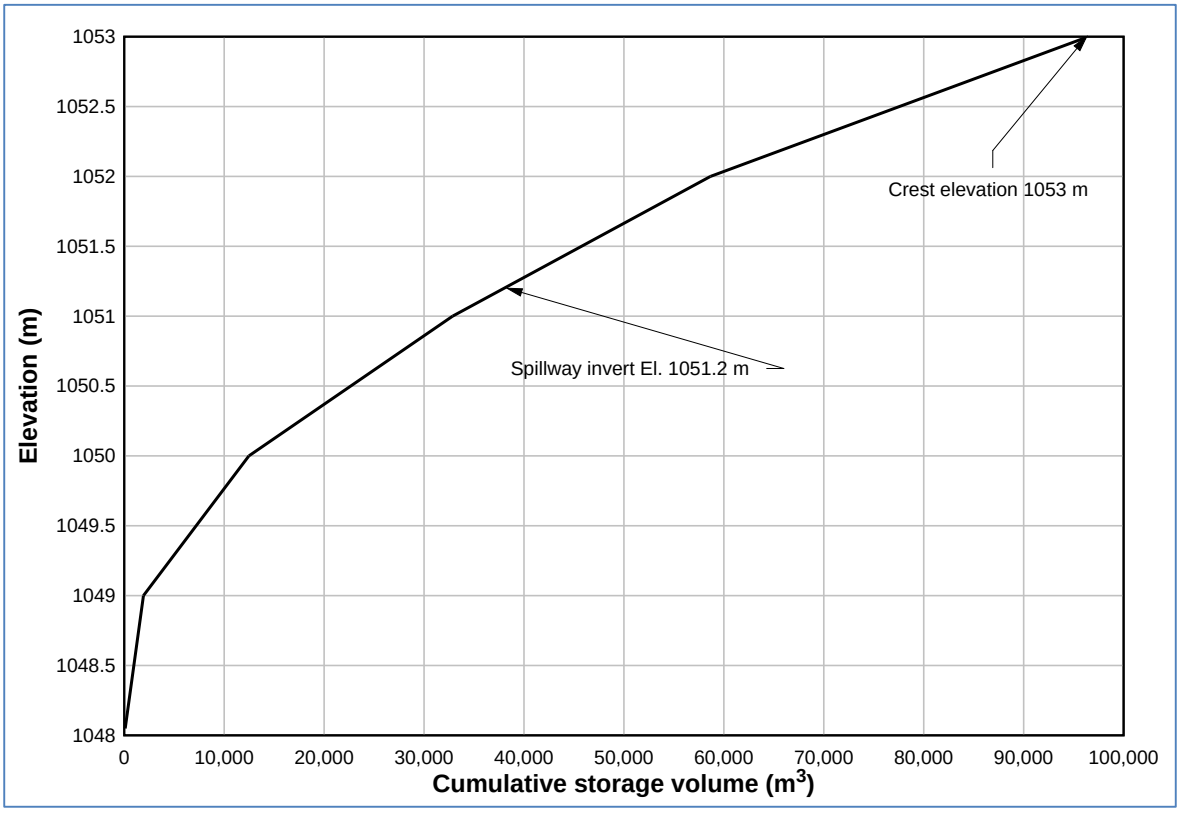


Figure 8-2. Storage-elevation curve for the North Reclaim Dam reservoir.

Per AMEC (2011), the North Reclaim Dam and its spillway are designed to accommodate an IDF comprising the 1 in 200-year return period 24-hour duration rainfall event, with minimum freeboard of 0.5 m above the peak routed pond level.

9.0 SURFACE WATER CONTROL AND SURFACE EROSION

9.1. Northwest Diversion Ditch

The Northwest Diversion Ditch was constructed in 2013 as a temporary construction measure. This ditch was to direct flow from Beaver Creek around the west sides of the North Starter Dam and North Reclaim Dam work areas. The alignment of the ditch is shown on the construction record drawings. The construction of the ditch is documented in BGC (2014).

At the end of the 2013 construction season, the diversion berm within Beaver Creek was deliberately breached (see Photo 6 in Appendix A) to direct the flow into the North Starter Dam reservoir to provide water for process plant commissioning. That breach remains in place. The remainder of the ditch collects relatively minor flows and continues to discharge these downstream of the North Reclaim Dam.

9.2. South Diversion Ditch

The South Diversion Ditch was required only during the 2013 construction season, to direct runoff from the west valley slope to the south of the North Starter Dam construction area (i.e. to Black Lake). The alignment of this ditch, now deactivated, is as shown on the construction record drawings in BGC (2014).

9.3. North Reclaim Dam Spillway Discharge

9.3.1. Flow Rates

Flow rates from the North Reclaim Dam spillway are measured by RCDC as part of their monitoring program. Figure 9-1 provides the discharge data gathered by RCDC. The period of zero to near-zero flows represents the period during which pumpback from the North Reclaim Dam reservoir occurred at a rate sufficient to keep up with inflows. The peak in July may be because inflows, largely dominated by natural groundwater discharge as discussed in Section 6.4, increased in a lagged response to increased groundwater recharge during the freshet period.

The depth of flow in the North Reclaim Dam spillway has remained well below the requisite freeboard (0.5 m) level.

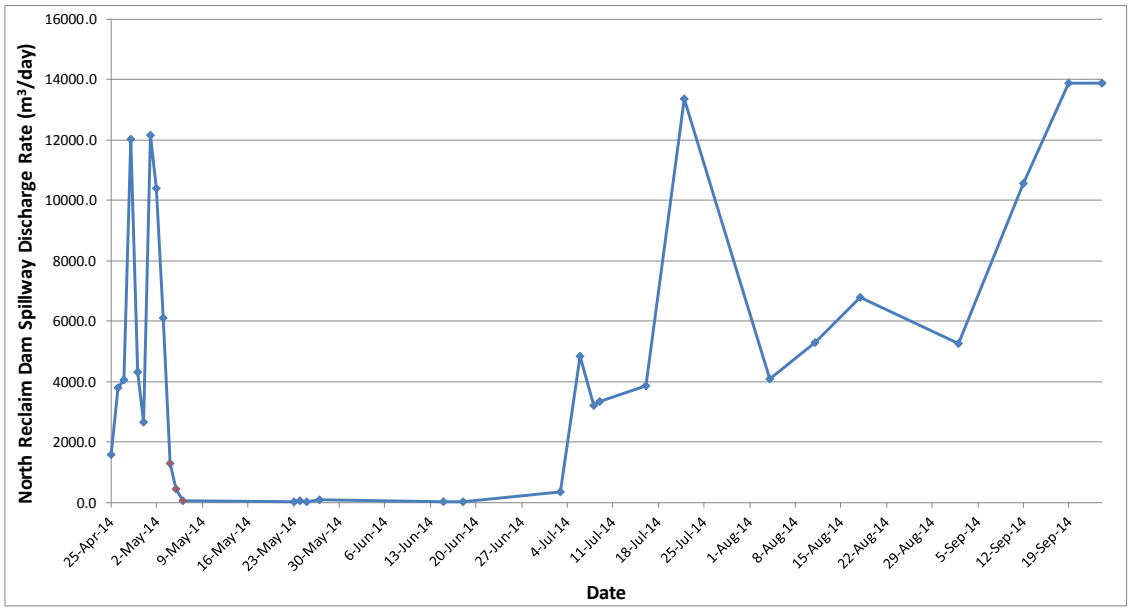


Figure 9-1. Discharge data for the North Reclaim Dam spillway.

9.3.2. Water Quality Monitoring

RCDC has been sampling surface water and groundwater as part of their monitoring program. With tailings discharge operations not yet having commenced, this sampling and testing is providing useful baseline data. Surface water quality monitoring data are provided in Appendix D, and groundwater quality data in Appendix E.

10.0 STATUS OF OPERATIONS MANUAL AND EMERGENCY PLANS

The OMS manual for the Red Chris TIA was under preparation at the time of this DSI report. The first draft of the OMS manual, along with the EPRP, will be issued prior to the commencement of operations, anticipated to be by mid-December, 2014.

The dam break and inundation study, being prepared by BGC, will be issued on or before December 1, 2014.

11.0 SCHEDULED DATE FOR DAM SAFETY REVIEW

Based on the “Very High” consequence classification assigned the North Dam and the South Dam, the CDA guidelines recommend DSR’s be conducted at five year intervals. Accordingly, the first such DSR for the Red Chris TIA dams should be carried out in or before 2019.

12.0 RECOMMENDATIONS REGISTRY

This section presents recommendations arising from the DSI documented herein. The recommendations have been assigned a priority ranking per the descriptions given in Table 12-1. The recommendations are provided in Table 12-2.

Table 12-1. Description of Priority Rankings for DSI Recommendations.

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

No Priority 1 issues or associated recommendations arose from the DSI.

Three Priority 2 issue recommendations were made on the basis of the inspections of the dams. As of issuance of this report, these recommendations have already been addressed and completed, or were in the process of being addressed with completion scheduled for prior to the end of 2014.

The recommendations are each assigned a recommending timing for completion, commensurate with the priority ranking. There is more flexibility in the timing for completion of lower priority issues (3 and 4) than is the case for higher priority issues (2). .

Table 12-2. DSI Recommendations Registry.

Number	Description	Priority Ranking	Comments/Photo References/Report Page Reference	Recommended Completion Date
2014-1	Repair erosion in till blanket near the left abutment of the North Starter Dam.	3	See Photo 7, and Section 5.2. This will require alternative means of discharging Beaver Creek and North Reclaim Dam pumpback flows into the North Starter Dam reservoir.	By end of Q4, 2014. Scheduled for completion by November 30.
2014-2	Construct a filter blanket along the toe of the North Reclaim Dam.	2	Design for this filter blanket in progress. Gradation analyses of foundation soils samples confirm that 3B material will suffice for both drainage and filter compatibility. See Section 5.3.	Construction in progress, expected completion by end November 2014.
2014-3	Direct discharge from flowing artesian groundwater well 11-NPW2 to the downstream, and prevent this water from ponding against the toe of the North Reclaim Dam.	4	See Photo 55, and Section 5.3.	Completed.
2014-4	Floating debris should be removed from the North Reclaim Dam reservoir, and the spillway channel cleared of accumulated debris.	3	See Photos 49 and 50, and Section 5.4.	By end of Q4, 2014
2014-5	Cobbles near the crest of the North Reclaim Dam spillway slopes, which could fall into and damage the geomembrane, should be removed.	3	See Photo 52, and Section 5.4.	By end of Q3, 2015
2014-6	Construct armored outfall structure at North Reclaim Dam Spillway outlet, and repair scour that has occurred to date.	2	See Photos 53 and 54, and Section 5.4.	By end of Q4, 2014
2014-7	Read North Starter Dam piezometers at least bi-weekly going forward.	3	See Section 6.2. Data-loggers could be considered, to facilitate data gathering over the winter months.	Complete: bi-weekly readings implemented.

Number	Description	Priority Ranking	Comments/Photo References/Report Page Reference	Recommended Completion Date
2014-8	Install pressure gauges on artesian monitoring wells and pumping wells to allow measurement of shut-in pressures.	4	See Photo 56, and Section 6.3.	By end of Q2, 2015
2014-9	Install weir(s), or alternate such as pipes) allowing for flow measurement via bucket and stopwatch, for measurement of seepage from the toe of the North Starter Dam. Measurements to be obtained as close to the toes of the dams as is practical.	3	See Section 6.4, Drawing 03, and Photos 28 and 29, Appendix A. If toe seepage can be routed to a single weir/pipe location, that is optimal, but not essential, and may not be practical in any case.	By end of Q4, 2014.
2014-10	Install 3 sets of nested vibrating wire piezometers below the North Reclaim Dam.	4	See Section 6.5. Install piezometers at depths of 0, 5, 10, 20 and 40 m relative to the base of the dam. Piezometers can be single cable with multiple tips, and grouted into the boreholes.	By end of Q3, 2015
2014-11	Establish additional climate stations on site at lower elevations more representative of the TIA catchment.	4	See Section 7.0. The existing two climate stations are on the Todagin Plateau. Orographic effects and apparent spatial variability indicate a need to obtain data over	By end of Q3, 2015
2014-12	Establish weirs for monitoring of Beaver Creek inflows to the North Starter Dam Reservoir, and flows entering the North Reclaim Dam reservoir.	4	See Section 7.0. Quantification of these flows is important to establish current water balance, and for calibration of future modeling efforts. Particularly important is measurement of inflow from the groundwater discharge area, between the North Starter Dam and the North Reclaim Dam, into the North Reclaim Dam reservoir.	Completed. Weir locations indicated on Drawing 03.
2014-13	Monitor pumpback volumes from North Reclaim Dam reservoir to North Starter Dam reservoir.	4	See Section 7.0, and Photo 5, Appendix A.	By end of Q2, 2015.

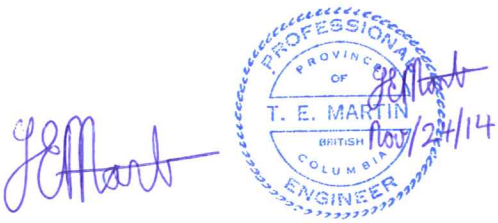
Number	Description	Priority Ranking	Comments/Photo References/Report Page Reference	Recommended Completion Date
2014-14	Review installed pumping capacity for North Reclaim Dam pumpback, and determine if increase in installed pumping capacity is required.	3	See Section 8.2. Groundwater discharge appears a dominant contributor to inflows to the North Reclaim Dam reservoir. Validation of the adequacy of the planned pumpback capacity is required, particularly once flows increase due to drainage of cyclone sand construction water.	By end of Q4, 2014.
2014-15	Confirm tailings and water/IDF capacity based on achieved 2014 North Starter Dam Crest elevation, and design overflow spillway, and/or pumping facilities and contingencies, as required.	2	See Section 8.1. Confirm tailings storage capacity available before North Starter Dam can be raised in 2015. Flood routing analysis will be required to support spillway design and freeboard requirement.	By end of Q4, 2014

13.0 CLOSURE

We trust the above satisfies your requirements at this time. Should you have any questions or comments, please do not hesitate to contact us.

Yours sincerely,

BGC ENGINEERING INC.
per:



Todd E. Martin, P.Eng., P.Geo.
Principal Engineer

Reviewed by:

Roy T. Mayfield, Ph.D., P.E. (Washington)
Principal Engineer

TM/RM/rm/cm

REFERENCES

AMEC, 2011. Red Chris Project, Tailings Storage Facility Detailed Design Report, 06 June.

AMEC, 2014a. Hydrogeology of North and South Dam Areas – Red Chris Mine. May.

AMEC, 2014b. Red Chris Project – Update of the Hydrological Parameters for the Water Balance Model. July 8.

AMEC, 2014c. Field Report. September 25.

B.C. Ministry of Energy and Mines 2013. Guidelines for annual dam safety inspection reports. Updated in August 2013.

BGC Engineering Inc. 2014. Tailings Impoundment Area – 2013 Construction Records Report. September 30.

Canadian Dam Association 2007. Dam Safety Guidelines.

APPENDIX A
DSI INSPECTION PHOTOS: SEPTEMBER 3 AND 4, 2014

View of the NSD reservoir (white arrow) and the NRD reservoir (yellow arrow) from the Red Chris TSF access road.

PHOTO 1

View of the crest and upstream face of the NSD, looking northwest, from vantage point on the TSF access road. Note ponds on dam surface due to recent rainfall.

PHOTO 2

Looking north to the NRD and the NRD reservoir. NSD crest in the foreground (white arrow).

PHOTO 3

Left abutment of the NSD, looking north (towards the NRD). Construction in progress on the NSD at time of inspection visit.

PHOTO 4

Looking to west side of valley, with Beaver Creek gully (white arrow). Yellow arrow indicates pipeline discharge with pumpback water from the NRD reservoir.

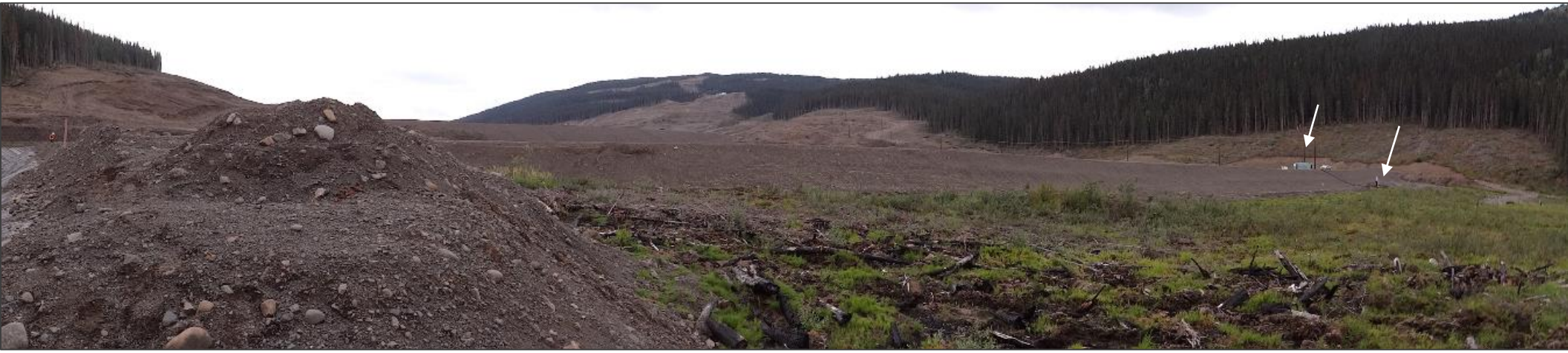
PHOTO 5

Breached diversion embankment in Beaver Creek, to allow flows to discharge into the NSD reservoir.

PHOTO 6

Looking west from the crest of the NSD. Discharge from the culvert (white arrow) represents Beaver Creek flow and pumpback from the NRD reservoir. Note that the discharge has caused erosion damage to the upstream till seepage reduction blanket. Attempt to arrest erosion with geotextile (yellow arrow) has been of limited effectiveness..

PHOTO 7



Panorama showing the downstream face of the NRD. Artesian well and the pumphouse indicated by the arrows.

NSD reclaim and surplus water discharge pump barges. Not in operation at the time of the dam inspection.

PHOTO 9

Panorama of the NSD reservoir, reclaim/discharge water barges in the center. Reservoir elevation approximately 1086.3 m at the time of the site inspection visit. Looking towards the east side of the valley.

PHOTO 10

Panorama of the NSD reservoir, looking towards the west side of the valley. NSD to the right, reclaim/discharge water barges in the center. Reservoir elevation approximately 1086.3 m at the time of the site inspection visit.

PHOTO 11

NSD reservoir, looking north-northwest. NSD indicated by the white arrow, reclaim/discharge water barges by the yellow arrow. Reservoir elevation approximately 1086.3 m at the time of the site inspection visit.

PHOTO 12

Crest of the NSD. Smooth drum vibratory roller working on Zone 3 b chimney. Bracket indicates Zone 3A chimney filter. Light plant situated on Zone 1 till core.

PHOTO 13

Crest of the NSD. Zone 3A chimney filter (white arrow) and Zone 3B chimney filter (yellow arrow) under construction. Survey stakes in place to control the construction. Zone 1 till core (no 2014 construction on the core prior to the inspection visit) to the left of Zone 3A.

PHOTO 14

Crest of the NSD, looking east towards the right abutment. Zones 3A and 3B indicated by white and yellow arrows respectively. Waste/spoil on the core (to the right of 3A) will require removal prior to core preparation for additional till placement.

PHOTO 15

NSD crest, looking towards the west (left) abutment.

PHOTO 16

NSD upstream facing, looking west towards the left abutment. No indications of erosion or slope instability.

PHOTO 17

NSD upstream facing, looking east towards the right abutment. No indications of erosion or slope instability.

PHOTO 18

NSD crest and downstream slope (2.5H:1V), looking west towards the left abutment. No indications on slope of instability, erosion, seepage break-out.

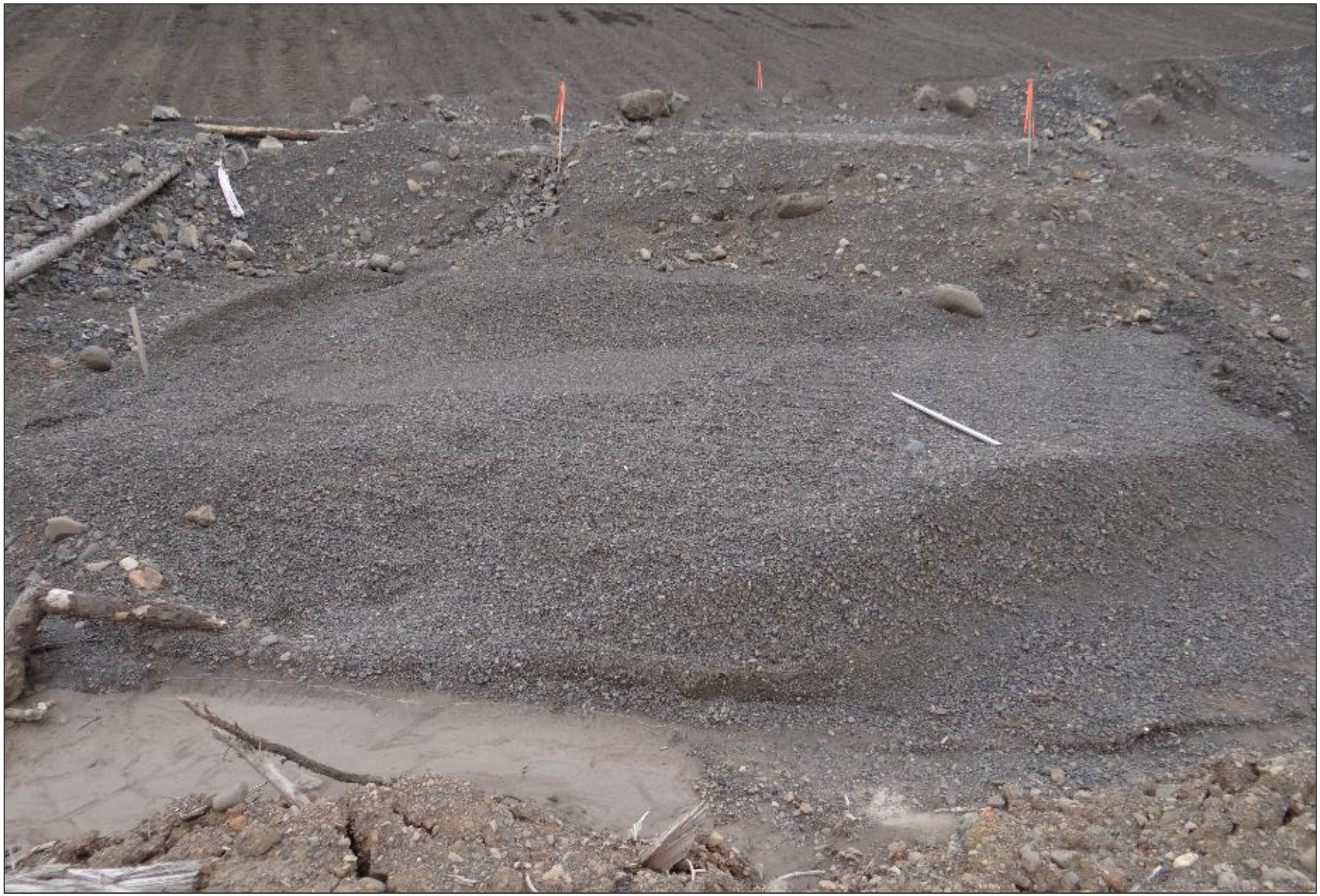
PHOTO 19

Crest of NSD. Flagging and paint delineates an area of a minor depression, within the downstream (Zone 2) shell of the dam, being monitored at the time of the inspection. No additional settlements have been noted. At about Sta. 0+200 m, on the El. 1,118 m bench.

PHOTO 20

Toe of NSD looking up the left abutment. Finger drain 0+500 indicated by the arrow. Evidence of minor runoff erosion down the abutment, but no visible seepage discharge from the dam.

PHOTO 21



Finger drain 0+500 at toe of NSD near the left abutment.

PHOTO 22

Toe of NSD looking east towards the right abutment. No indications of erosion or instability of the downstream slope of the dam. No indications of elevated seepage discharges on the dam face.

PHOTO 23

Toe of NSD looking towards the right abutment.

PHOTO 24

Toe of NSD looking east towards the right abutment. Wet patches on dam face judged to represent lagged discharge of infiltration from recent rains preceding the site visit. Minimal seepage indicated at the toe of the dam. Note wet spots on the surface of the drainage blanket (see arrow).

PHOTO 25

Toe of NSD looking east towards the right abutment. Minimal seepage indicated at the toe of the dam. No indications of erosion or slope instability. Drainage blanket indicated by arrow.

PHOTO 26

Seepage at toe of NSD, at about Sta. 0+250 m, where slope of the dam meets the drainage blanket. No flow rate discernible. No indications of fines in seepage discharge.

PHOTO 27

Toe of NSD, looking west towards the left abutment. Drainage blanket adjacent to access road. Seepage in the ditch along the road visually estimated at less than 0.1 litres/sec.

PHOTO 28

Toe of NSD, finger drain 0+200, looking downstream towards the NRD. Finger drain discharge visually estimated at 0.2 litres/sec. Flow in the channel increases progressively moving downstream, indicating the area between the NSD and the NRD to represent a groundwater discharge area.

PHOTO 29

Looking towards downstream slope of the NSD. White arrow indicates the 0+200 finger drain. In creek channel, flow rate increases steadily moving downstream of the finger drain, indicating an area of groundwater discharge. Line of dark spots on the downstream face of the dam (yellow arrows, at about El. 1076 m) judged to represent lagged discharge of infiltration into the dam from recent rainfall events – concentration along a single elevation likely the result of a lift with relatively higher fines content that encourages lateral rather than downward flow.

PHOTO 30

Looking south towards downstream slope of the NSD. Increased flows and springs/ponds moving progressively downstream from NSD to NRD. Note again moist spots at consistent elevations on the downstream face of the dam, representing lagged discharge of rainfall infiltration to the downstream shell of the dam, rather than seepage from the NSD reservoir. No discernible flow at any of these locations.

PHOTO 31

Looking south towards downstream slope of the NSD, again noting increased flows due to groundwater discharge in the area between the NSD and the NRD.

PHOTO 32

Looking north towards the NRD. Flow rates continuing to increase moving towards the NRD reservoir from the NSD toe.

PHOTO 33

Inlet to the NRD reservoir. NRD in the background, pumphouse indicated by the arrow.

PHOTO 34

Looking north towards the NRD and associated reservoir. Groundwater monitoring wells 13-21D and 13-21S. Both wells indicate slightly artesian groundwater levels.

PHOTO 35

Panorama from crest of NSD near the right abutment, looking downstream towards the toe of the NSD (left), the area of groundwater discharge between the NSD toe and the NRD, and the NRD reservoir.

PHOTO 36

Looking west towards the left abutment of the NRD. Note surface flow to the groundwater discharge area – source is groundwater discharge from the west-facing slope. There are numerous such creeks/springs along the valley slopes in the area between the NSD toe and the NRD reservoir.

PHOTO 37

Looking north from crest of the NSD, near the left abutment. 3A filter stockpile to the left (white arrow). NRD reservoir in the background.

PHOTO 38

Crest of the NRD, looking east towards the right abutment. No indications of crest settlement, and no indications of upstream slope instability. Riprap on upstream face appears stable.

PHOTO 39

Looking west along the NRD crest, towards the left dam abutment. Pumphouse indicated by the white arrow. Artesian groundwater well 11-NPW2 indicated by the yellow arrow. Discharge from this well is ponding at the downstream toe of the NRD (blue arrow). Downstream slope shows no indications of instability or erosion.

PHOTO 40

Looking east along the NRD crest and downstream slope, towards the right dam abutment and overflow spillway. Note ponding water and wet conditions along the downstream toe.

PHOTO 41

Looking west along the NRD crest and upstream slope, towards the left dam abutment. Apparent crack indicated by arrow appears to be the result of granular road surfacing eroding into the underlying riprap. No indications of upstream slope instability or crest settlement. No indications of riprap instability.

PHOTO 42

Looking west along the NRD crest and upstream slope, towards the left dam abutment. Pipeline is for pumpback from the NRD reservoir to the NSD reservoir. No indications of upstream slope instability or crest settlement. No indications of riprap instability.

PHOTO 43

Looking west along the NRD toe, towards the left dam abutment. Note wet conditions owing to this being a groundwater discharge area. No indications of internal erosion, but clear indications of upwelling seepage. A sand and gravel drainage blanket is recommended for construction in the toe area, to protect against potential internal erosion.

PHOTO 44

Looking west along the NRD toe, towards the left dam abutment. Discharge from artesian groundwater well 11-NPW2, and upwelling seepage, resulting in water ponding at the toe of the dam. A filter blanket is to be constructed at the toe of the dam to reduce potential for internal erosion of foundation soils.

PHOTO 45

Looking east along the NRD toe and downstream face, towards the right dam abutment. Note wet toe conditions.

PHOTO 46

Arrow indicates upwelling seepage at the toe of the NRD – to be remediated via a filter blanket.

PHOTO 47

Downstream face of the NRD, looking east towards the right dam abutment.

PHOTO 48

Inlet to the bituminous geomembrane-lined open channel spillway from the NRD reservoir. Note floating wood debris in the reservoir and in the channel. This material needs to be cleared.

PHOTO 49

Open channel spillway from the NRD reservoir. Flow rate from the NRD reservoir is monitored continually by RCDC using a datalogger.

PHOTO 50

Open channel spillway from the NRD reservoir, looking downstream towards the outlet.

PHOTO 51

Open channel spillway from the NRD reservoir, looking downstream towards the outlet.

PHOTO 52

Outlet of the NRD spillway channel. The channel outfall and outlet structure has not yet been constructed, with the result that there is scour occurring and the geomembrane is being undermined. These works need to be completed and the existing scour repaired.

PHOTO 53

Spillway discharge into meadow downstream of the NRD.

PHOTO 54

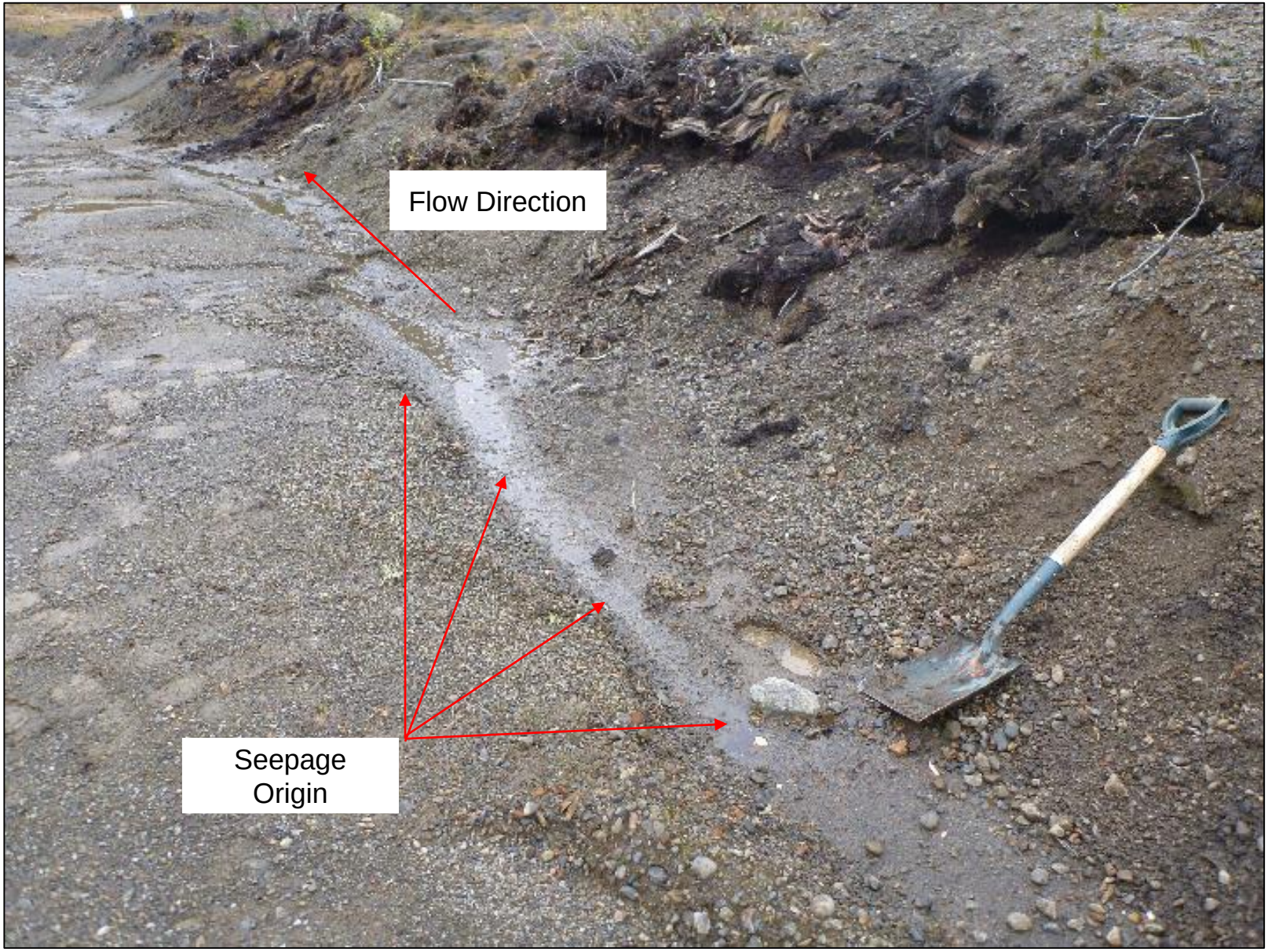
Area downstream of the NRD. Arrows indicate groundwater monitoring wells.

PHOTO 55

Groundwater monitoring well MW13-4S downstream of the NRD, indicating artesian conditions. Pressure gauges should be installed on all artesian wells so that shut-in pressures can be recorded.

PHOTO 56

APPENDIX B
NORTH RECLAIM DAM TOE SEEPAGE INSPECTION: OCTOBER 3, 2014

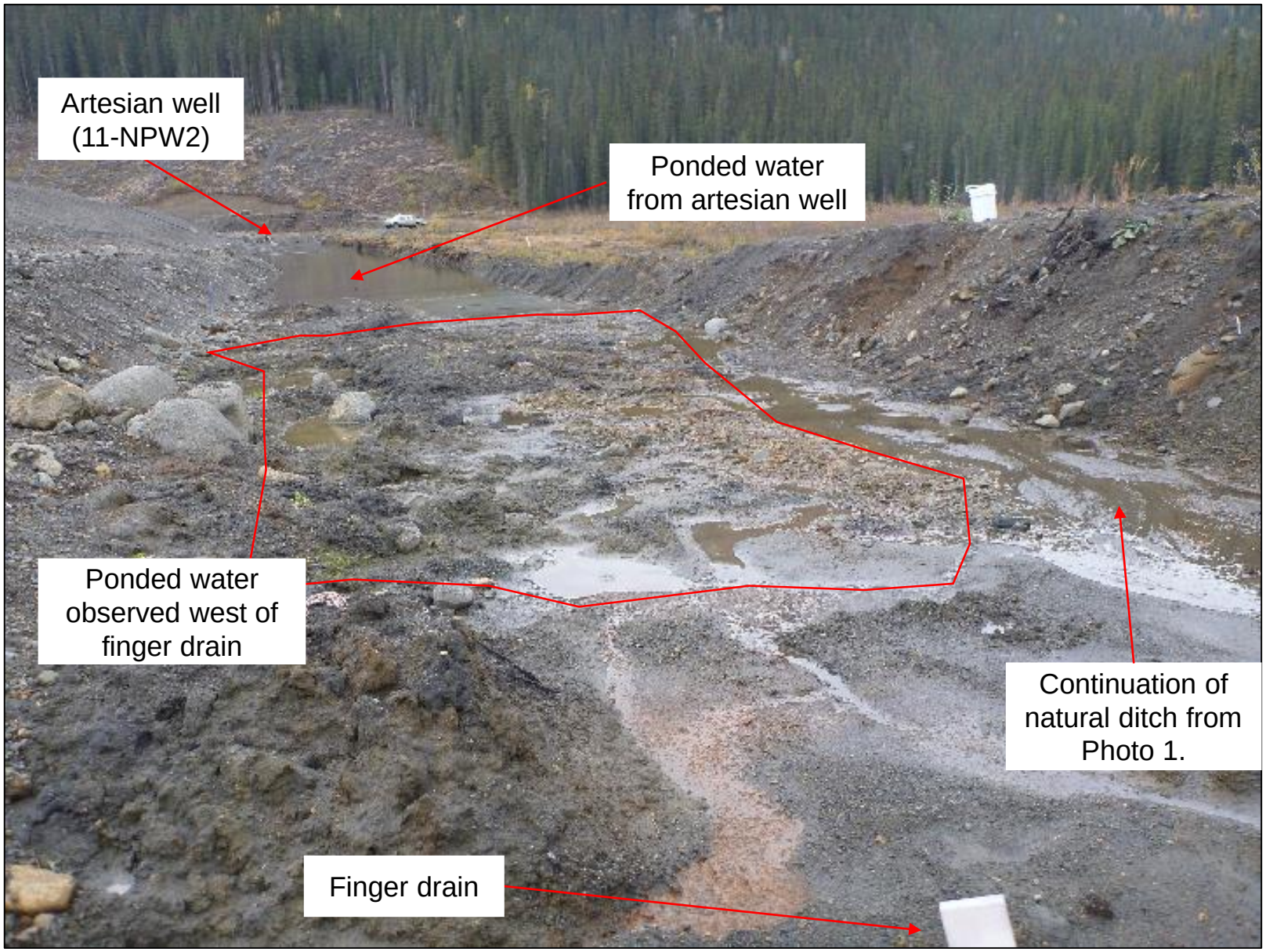


Chainage 0+050: Water seen flowing through small natural ditch. Water not observed up slope (east) of this point. Water is clear. Looking west parallel to North Reclaim Dam alignment.

PHOTO 1

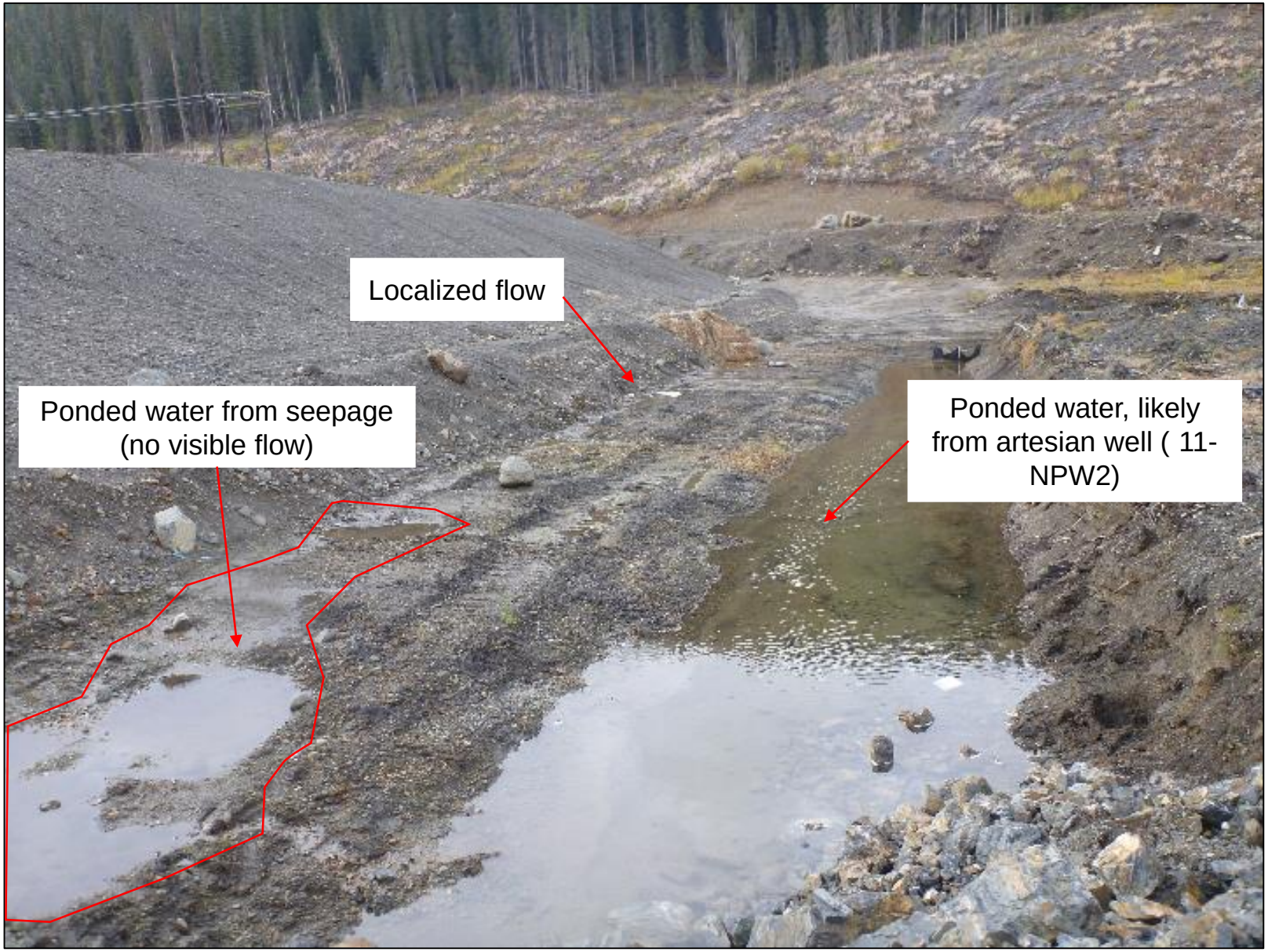
Chainage 0+080: Water observed trickling from dam toe. Orange staining in location of seepage.

PHOTO 2



Chainage 0+085: Seepage is clear west of artesian well. Seepage observed at dam toe, though flowing water was not observed. Orange staining in location of seepage. Photo taken west of finger drain, looking west.

PHOTO 3

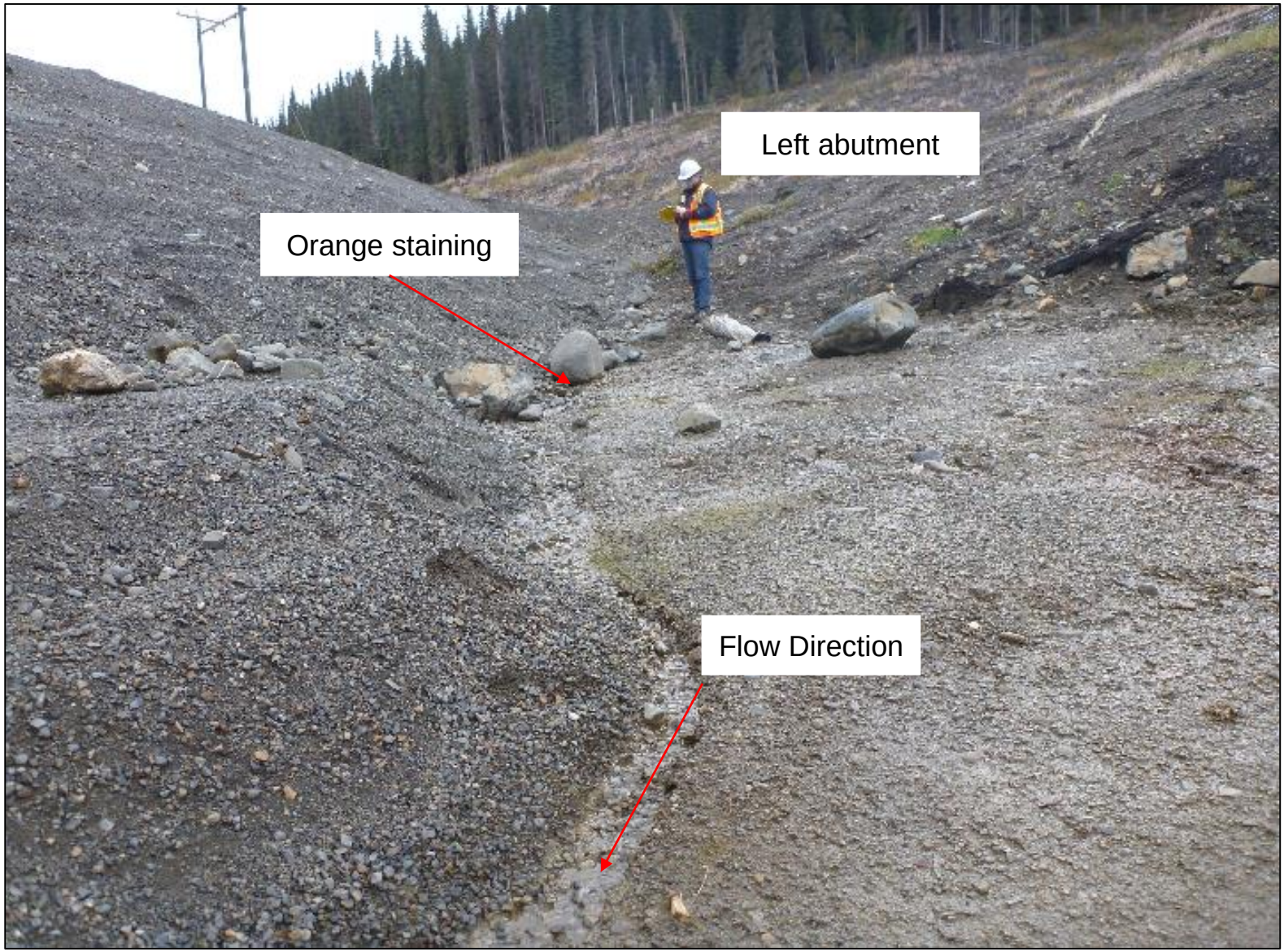


Chainage 0+250: Localized flow (~0.25 L/min) and ponded water was observed at dam toe though water flowing into pond was not observed. Photo taken west of artesian well (11-NPW2), looking west.

PHOTO 4

Chainage 0+250: Localized flow (~0.25 L/min), noted in Photo 4. Looking west.

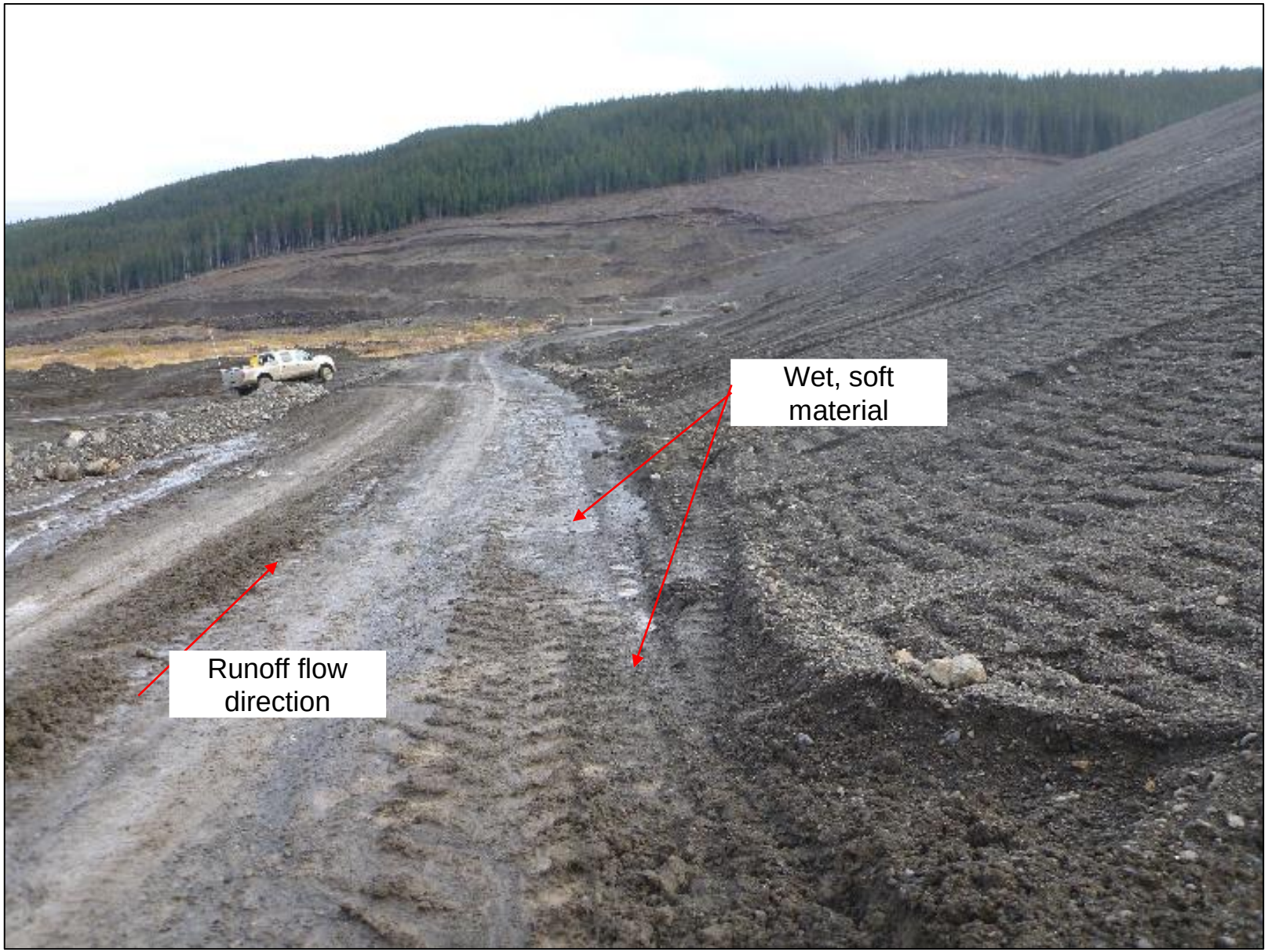
PHOTO 5



Chainage 0+290: Seepage originating from left abutment, visibly flowing along toe for approximately 50 m. Likely some seepage contribution from toe. Water is clear. Seepage elsewhere not visibly flowing but soil is damp nearby. Orange staining in location of seepage. Looking west.

PHOTO 6

APPENDIX C
NORTH STARTER DAM TOE SEEPAGE INSPECTION: OCTOBER 4, 2014



Chainage 0+472: Wet, soft material and ponding water observed at toe of dam. Runoff from access road observed on left (north).

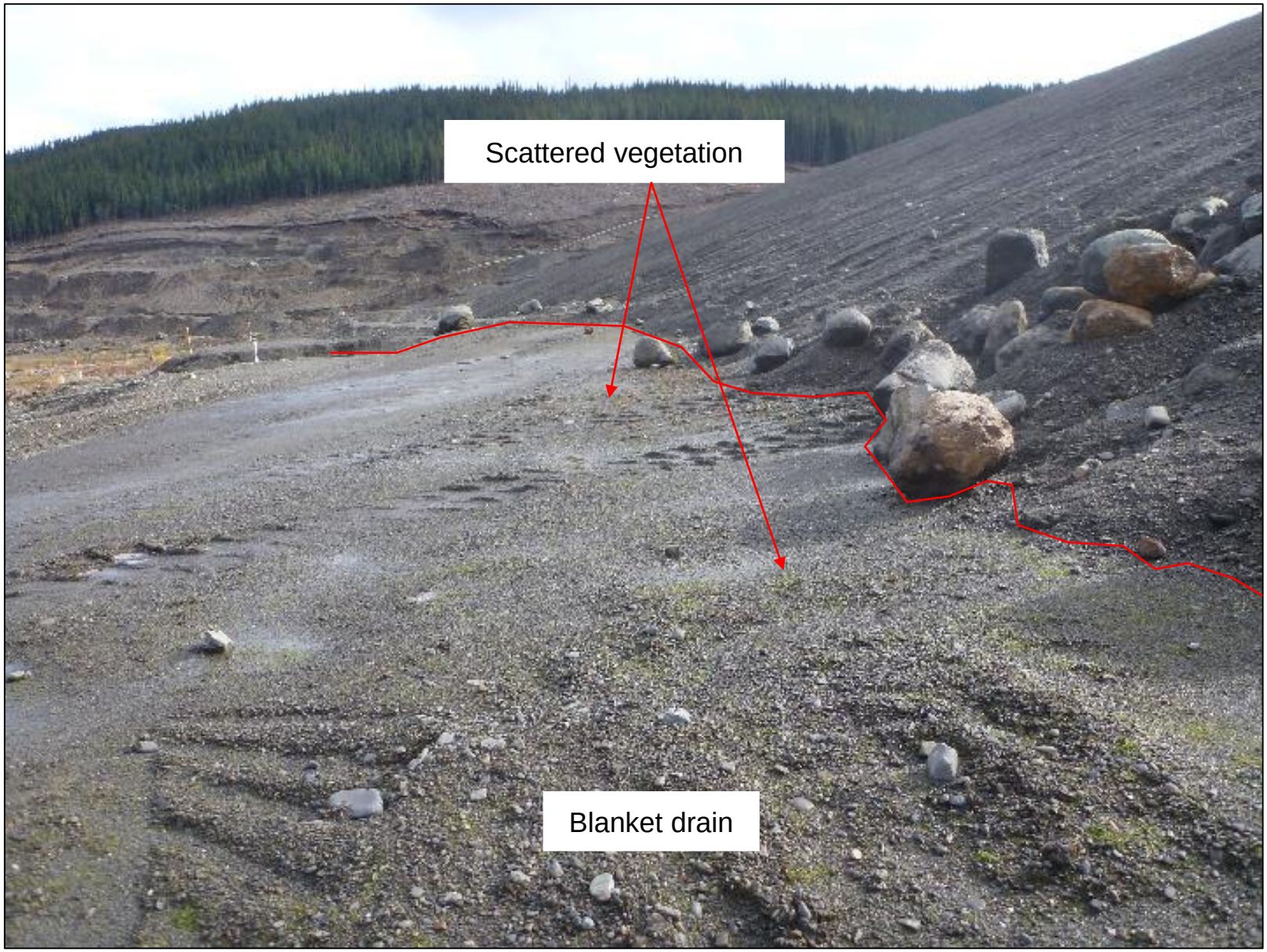
PHOTO 1

Chainage 0+470: Localized ponding and wet material at toe of NSD. No flowing water observed. Looking east.

PHOTO 2

Chainage 0+470: Localized ponding (noted in Photo 2) with visibly wet track marks above. Track mark appeared wetter than others in the area. No flowing water visible. Photo taken at dam toe, looking south.

PHOTO 3



Chainage 0+420: Blanket drain that extends beyond downstream toe appears wet on surface. Small vegetation visible. No flowing water observed. Looking east.

PHOTO 4

Chainage 0+400: Finger drain with no visible seepage or ponding water. Looking south from access road below NSD toe.

PHOTO 5

Chainage 0+390: Ponding water at toe of NSD east of finger drain. Extends approximately 8 m along toe. No flowing water observed. Looking west.

PHOTO 6

Chainage 0+325: Ponding water and saturated material at toe of dam, not visibly flowing. Appears wet for ~5 m where downstream toe meets blanket drain. Footsteps appear wet once stepped on. Looking west.

PHOTO 7

Chainage 0+270: Blanket drain appears wet at surface with scattered vegetation. Drainage ditch along toe. Looking east.

PHOTO 8

Chainage 0+250: Ponded water where downstream slope meets blanket drain. Footsteps appear wet once stepped on. Looking south toward the downstream toe from blanket drain.

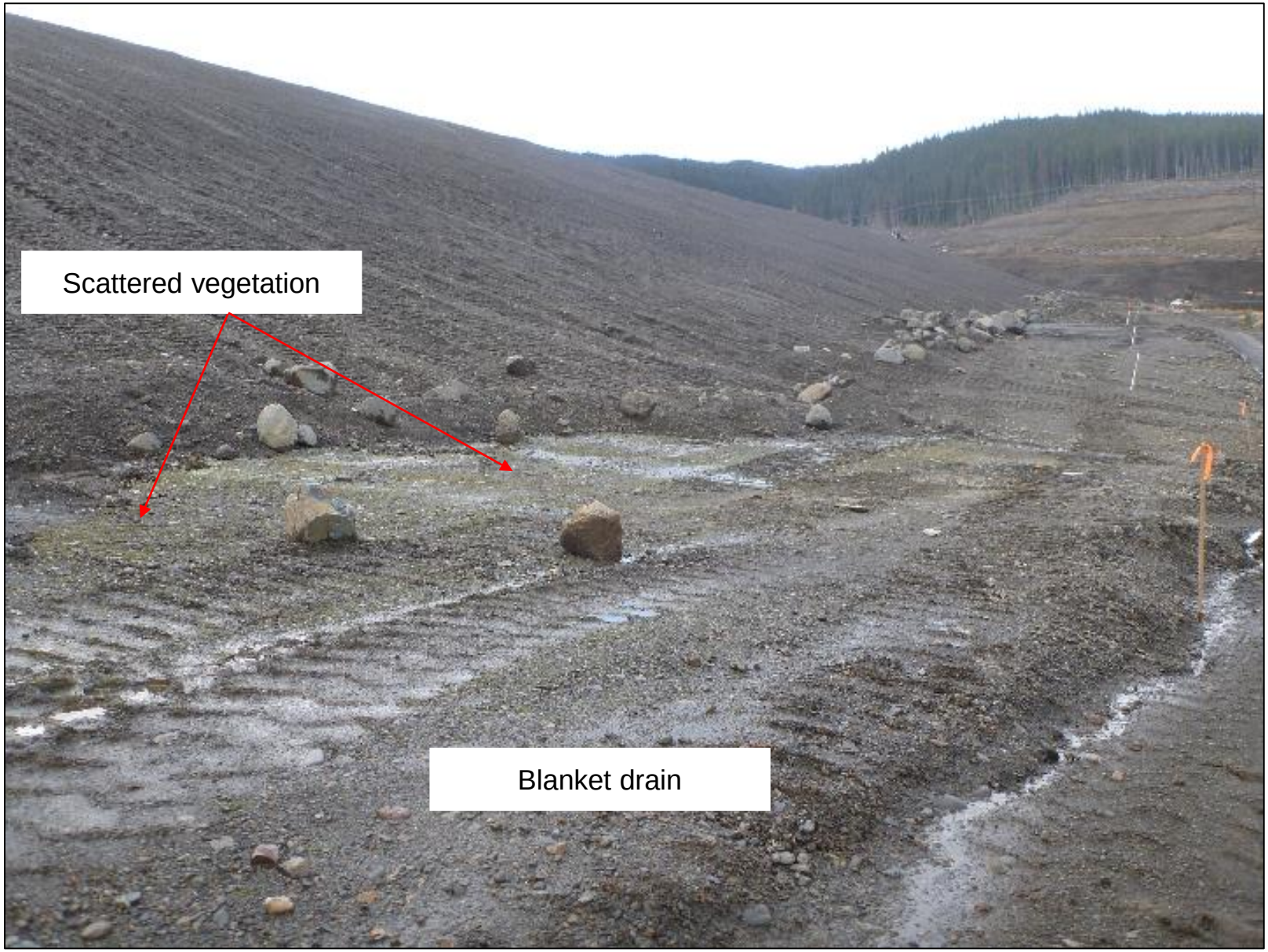
PHOTO 9

Chainage 0+215: Trickling water noted on the blanket drain; this location is a low point on the downstream toe and blanket drain near where a natural creek flowed before dam construction. Looking south from NSD toe.

PHOTO 10

Chainage 0+215: Trickling water on access road below NSD; this location is a low point on the downstream toe and blanket drain near where a natural creek flowed before dam construction. Looking north from NSD toe.

PHOTO 11



Chainage 0+200: Wet at surface where blanket drain extends beyond downstream slope. Thin layer of vegetation noted on drain surface. Looking west.

PHOTO 12

Chainage 0+195: Ponded water observed in depressions caused by side cast rocks from the 1118 Bench above. Looking east.

PHOTO 13

Chainage 0+135: No seepage noted at elevations higher than this point. Ponding water observed in ruts. Looking west.

PHOTO 14

APPENDIX D
WATER QUALITY DATA – DISCHARGE TO QUARRY CREEK

Project RED CHRIS
Report To Jack Love, RED CHRIS DEVELOPMENT COMPANY LTD.
ALS File No. L1506836
Date Received 22-Aug-14 15:30
Date 15-Sep-14

RESULTS OF ANALYSIS

Sample ID	BC Aquatic Life Max Guideline	BC Aquatic Life 30-Day Guideline	NRDD	NRDD	NRDD	NRDD	NRDD	NRDD	NRDD	NRRD	NRDD	NRDD	NRDD	NRDD	NRDD	NRDD	NRDD				
Date Sampled			29-Nov-13	8-Dec-13	28-Apr-14	19-May-14	27-May-14	1-Jun-14	12-Jun-14	30-Jun-14	6-Jul-14	16-Jul-14	22-Jul-14	28-Jul-14	5-Aug-14	11-Aug-14	2-Sep-14				
Time Sampled			07:30	13:00	15:30	11:36	07:30	09:30	10:30	00:00	00:00	07:40	07:00	08:30		03:30	12:00				
ALS Sample ID			L1398297-1	L1401816-1	L1448675-1	L1457533-3	L1461107-1	L1463842-1	L1470800-1	L1506836-1	L1482713-1	L1487864-1	L1490673-1	L1495672-1	L1497255-3	L1501103-1	L1512237-1				
Matrix			Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water				
																		Count	Min	Max	Mean
Physical Tests																					
Conductivity			325								327							2	325	327	326
Hardness (as CaCO3)			182	186	171	155	192	178	177	192	187	185	193	177	195	181	175	14	155	195	182
pH	6.5-9.0		8.16		8.38	8.33	8.33	8.32	8.38	8.14	8.37	8.39	8.35	8.31	8.23	8.22	8.11	13	8.14	8.39	8.30
Total Suspended Solids			<3.0		31.2	3.1	<3.0	<3.0	<3.0	<3.0	12.5	<3.0	<3.0	<3.0	<3.0	<3.0	6.0	13	3.1	31.2	15.6
Total Dissolved Solids			174								210							2	174	210	192
Turbidity			0.64								12.3							2	0.64	12.30	6.47
Cyanides																					
Cyanide, Total				<0.0050	<0.0050	<0.0050			0.0076									4	0.005	0.005	0.005
Anions and Nutrients																					
Acidity (as CaCO3)			1.1								<1.0						<0.0050	2	1.1	1.1	1.1
Alkalinity, Bicarbonate (as CaCO3)			172								162							2	172	172	172
Alkalinity, Carbonate (as CaCO3)			<2.0								<1.0							2	1	2	2
Alkalinity, Hydroxide (as CaCO3)			<2.0								<1.0							2	<MDL	<MDL	<MDL
Alkalinity, Total (as CaCO3)			172								162							2	172	172	172
Ammonia, Total (as N)	20.2 (1)	1.81 (1)	0.0050								<0.0050							2	0.0050	0.0050	0.0050
Bromide (Br)			<0.050								<0.050							2	<MDL	<MDL	<MDL
Chloride (Cl)	600.0	150.0	<0.50								<0.50							2	<MDL	<MDL	<MDL
Fluoride (F)			0.043								0.049							2	0.043	0.043	0.043
Nitrate (as N)	32.8	3.0	0.130								0.0878							2	0.130	0.130	0.130
Nitrite (as N)	0.1		0.0014								0.0019							2	0.0014	0.0014	0.0014
Orthophosphate-Dissolved (as P)			<0.0010								<0.0010							2	<MDL	<MDL	<MDL
Phosphorus (P)-Total Dissolved			0.0033								0.0026							2	0.0033	0.0033	0.0033
Phosphorus (P)-Total			0.0080								0.0186							2	0.0080	0.0080	0.0080
Sulfate (SO4)	270.0		19.4								21.8							2	19.4	19.4	19.4
Organic / Inorganic Carbon																					
Dissolved Organic Carbon			9.64								3.47						2.95	2	9.64	9.64	9.64
Total Organic Carbon			2.46						4.16		3.88						2.72	3	2.46	2.46	2.46
Total Metals																					
Aluminum (Al)-Total			0.0142	0.0194	0.943	0.314	0.0921	0.0406	0.0402	0.0291	0.568	0.0128	0.0177	0.0237	0.0859	0.0266	0.222	14	0.0142	0.0194	0.0168
Antimony (Sb)-Total	0.020 (2)		0.00018	0.00021	0.00024	0.00021	0.00021	0.00020	0.00022	0.00017	0.00033	0.00023	0.00023	0.00018	0.00019	0.00018	0.00020	14	0.00018	0.00021	0.00020
Arsenic (As)-Total			0.00102	0.00150	0.00161	0.00127	0.00091	0.00099	0.00104	0.00120	0.00227	0.00138	0.00136	0.00115	0.00118	0.00123	0.00151	14	0.00102	0.00150	0.00126
Barium (Ba)-Total	5.0	1.0	0.0641	0.0701	0.0693	0.0648	0.0672	0.0672	0.0685	0.0740	0.0763	0.0766	0.0753	0.0692	0.0750	0.0704	0.0752	14	0.0641	0.0701	0.0671
Beryllium (Be)-Total			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	14	<MDL	<MDL	<MDL
Bismuth (Bi)-Total			<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	14	<MDL	<MDL	<MDL
Boron (B)-Total	1.2		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	14	<MDL	<MDL	<MDL
Cadmium (Cd)-Total	0.00004 (3)		0.000013	0.000017	0.000032	0.000019	0.000011	<0.000010	0.000011	<0.000010	0.000027	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000015	14	0.000013	0.000017	0.000015
Calcium (Ca)-Total			51.3	53.0	47.7	43.7	51.1	49.7	49.4	54.2	50.6	51.6	55.1	49.8	55.9	51.4	51.3	14	51.3	53.0	52.2
Chromium (Cr)-Total			0.00019	0.00020	0.00303	0.00117	0.00047	0.00026	0.00032	0.00026	0.00171	0.00022	0.00021	0.00030	0.00023	0.00022	0.00106	14	0.00019	0.00020	0.00020
Cobalt (Co)-Total			<0.00010	0.00020	0.00073	0.00032	0.00018	0.00012	0.00012	0.00011	0.00056	0.00014	0.00013	0.00011	0.00013	0.00012	0.00027	14	0.00020	0.00020	0.00020
Copper (Cu)-Total	0.011 (4)	0.004 (4)	<0.00050	0.00052	0.00268	0.00140	0.00078	0.00081	0.00073	0.00053	0.00243	0.00087	0.00061	0.00058	0.00060	0.00059	0.00125	14	0.00052	0.00052	0.00052
Iron (Fe)-Total	1.0		0.071	0.135	1.30	0.487	0.196	0.125	0.136	0.136	0.934	0.126	0.129	0.124	0.154	0.152	0.474	14	0.071	0.135	0.103
Lead (Pb)-Total	0.082 (4)	0.006 (4)	<0.000050	<0.000050	0.000229	<0.00015	<0.000050	0.000152	<0.000050	<0.000050	0.000244	<0.000050	<0.000050	<0.000050	0.000157	<0.000050	0.000211	14	<MDL	<MDL	<MDL
Lithium (Li)-Total			0.00127	0.00105	0.00178	0.00160	0.00173	0.00110	0.00115	0.00157	0.00114	0.00153	0.00135	0.00138	0.00131	0.00160	0.00157	14	0.00105	0.00127	0.00116
Magnesium (Mg)-Total			12.8	13.1	12.6	11.2	15.6	13.1	12.6	13.9	13.3	13.5	13.4	12.9	13.4	12.7	12.8	14	12.8	13.1	13.0
Manganese (Mn)-Total	1.6 (4)	1.0 (4)	0.0694	0.168	0.102	0.0862	0.0673	0.0536	0.0570	0.0884	0.0930	0.105	0.101	0.0815	0.0917	0.0997	0.0821	14	0.0694	0.1680	0.1187
Molybdenum (Mo)-Total	2.0000	1.0000	0.00250	0.00217	0.00198	0.00182	0.00211	0.00202	0.00201	0.00206	0.00190	0.00218	0.00208	0.00193	0.00203	0.00193	0.00197	14	0.00217	0.00250	0.00234
Nickel (Ni)-Total	0.065 (6)		<0.00050	0.00051	0.00364	0.00180	0.00075	0.00050	0.00051	<0.00050	0.00247	<0.00050	0.00055	<0.00050	<0.00050	<0.00050	0.00129	14	0.00051	0.00051	0.00051
Phosphorus (P)-Total			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	14	<MDL	<MDL	<MDL
Potassium (K)-Total			1.46	1.99	1.33	1.35	1.30	1.30	1.31	1.20	1.42	1.43	1.32	1.17	1.21	1.19	1.21	14	1.46	1.99	1.73
Selenium (Se)-Total			0.00099	0.00090	0.00105	0.00092	0.00112	0.00100	0.00099	0.00101	0.00096	0.00094	0.00100	0.00093	0.00105	0.00095	0.00094	14	0.00090	0.00099	0.00095
Silicon (Si)-Total			3.44	3.85	5.35	3.33	3.24	2.88	2.73	3.23	3.83	2.87	2.98	2.86	3.28	3.06	3.55	14	3.44	3.85	3.65
Silver (Ag)-Total	0.0001 (7)	0.00005 (7)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	14	<MDL	<MDL	<MDL
Sodium (Na)-Total			2.27	2.46	2.28	2.02	2.57	2.33	2.29	2.51	2.36	2.74	2.51	2.32	2.38	2.37	2.38	14	2.27	2.46	2.37
Strontium (Sr)-Total			0.191	0.210	0.173	0.178	0.213	0.201	0.198	0.224	0.214	0.225	0.226	0.209	0.219	0.207	0.212	14	0.191	0.210	0.201
Thallium (Tl)-Total			<0.000010	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	14	<MDL	<MDL	<MDL
Tin (Sn)-Total			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	14	<MDL	<MDL	<MDL
Titanium (Ti)-Total	2.0		<0.010	<0.010	0.034	0.014	0.011	<0.010	<0.050	<0.010	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	14	<MDL	<MDL	<MDL
Uranium (U)-Total			0.000117	0.000116	0.000139	0.000117	0.000183	0.000144	0.000115	0.000111	0.000135	0.000120	0.000113	0.000114	0.000139	0.000110	0.000114	14	0.000116	0.000117	0.000117
Vanadium (V)-Total			<0.0010	<0.0010	0.0033	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	0.0022	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	14	<MDL	<MDL	<MDL
Zinc (Zn)-Total	0.040 (8)	0.015 (8)	<0.0030	<0.0030	0.0059	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0049	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0039	14	<MDL	<MDL	<MDL
Dissolved Metals																					
Dissolved Metals Filtration Location			LAB						LAB		LAB						LAB				
Aluminum (Al)-Dissolved	0.10 (9)	0.05 (9)	0.0017						0.0022		0.0058						0.0032	3	0.0017	0.0017	0.0017
Antimony (Sb)-Dissolved			0.00017						0.00021		0.00020						0.00016	3	0.00017	0.00017	0.00017
Arsenic (As)-Dissolved			0.00074						0.00085		0.00108						0.00089	3	0.00074	0.00074	0.00074
Barium (Ba)-Dissolved			0.0650						0.0665		0.0709						0.0704	3	0.0650	0.0650	0.0650
Beryllium (Be)-Dissolved			<0.00010						<0.00010		<0.00010						<0.00010	3	<MDL	<MDL	<MDL
Bismuth (Bi)-Dissolved			<0.00050						<0.00050		<0.00050						<0.00050	3	<MDL	<MDL	<MDL
Boron (B)-Dissolved			<0.010						0.014		<0.010						<0.010	3	<MDL	<MDL	<MDL
Cadmium (Cd)-Dissolved			<0.000010						<0.000010		<0.000010						<0.000010	3	<MDL	<MDL	<MDL
Calcium (Ca)-Dissolved			52.0						50.0		52.8						49.8	3	52.0	52.0	52.0
Chromium (Cr)-Dissolved			0.00010						0.00025		0.00011						<0.00010	3	0.00010	0.00010	0.00010
Cobalt (Co)-Dissolved			<0.00010						<0.00010		0.00010						<0.00010	3	<MDL	<MDL	<MDL
Copper (Cu)-Dissolved			0.00024						0.00055		0.00074						0.00042	3	0.00024	0.00024	0.00024
Iron (Fe)-Dissolved			0.030						<0.010		<0.010						0.017	3	0.030	0.030	0.030
Lead (Pb)-Dissolved			<0.000050						<0.000050		<0.000050						<0.000050	3	<MDL	<MDL	<MDL
Lithium (Li)-Dissolved			0.00123						0.00118		0.00081						0.00127	3	0.00123	0.00123	0.00123
Magnesium (Mg)-Dissolved			12.7						12.6		13.5						12.4	3	12.7	12.7	12.7
Manganese (Mn)-Dissolved			0.0653						0.000213		0.0477						0.0513	3	0.0653	0.0653	0.0653
Molybdenum (Mo)-Dissolved			0.00242						0.00207		0.00203						0.00202	3	0.00242	0.00242	0.00242
Nickel (Ni)-Dissolved			<0.00050						<0.00050		<0.00050						<0.00050	3	<MDL	<MDL	<MDL
Phosphorus (P)-Dissolved			<0.30						<0.30		<0.30						<0.30	3	<MDL	<MDL	<MDL
Potassium (K)-Dissolved			1.50						1.31		1.38						1.14	3	1.50	1.50	1.50
Selenium (Se)-Dissolved			0.00099						0.00096		0.00100						0.00091	3	0.00099	0.00099	0.00099
Silicon (Si)-Dissolved			3.44						2.58		2.85						3.02	3	3.44	3.44	3.44
Silver (Ag)-Dissolved			<0.000010						<0.000010		<0.000010						<0.000010	3	<MDL	<MDL	<MDL
Sodium (Na)-Dissolved			2.22						2.25		2.45						2.31	3	2.22	2.22	2.22
Strontium (Sr)-Dissolved			0.192						0.206		0.217						0.212	3	0.192	0.192	0.192
Thallium (Tl)-Dissolved			<0.000010						<0.000010		<0.000010						<0.000010	3	<MDL	<MDL	<MDL
Tin (Sn)-Dissolved			<0.00010						<0.00010		<0.00010						<0.00010	3	<MDL	<MDL	<MDL
Titanium (Ti)-Dissolved			<0.010						<0.050		<0.010						<0.010	3	<MDL	<MDL	<MDL
Uranium (U)-Dissolved			0.000115						0.000115		0.000129						0.000111	3	0.000115	0.000115	0.000115
Vanadium (V)-Dissolved			<0.0010						<0.0010		<0.0010						<0.0010	3	<MDL	<MDL	<MDL
Zinc (Zn)-Dissolved			0.0015						0.0010		<0.0010						0.0013	3	0.0015	0.0015	0.0015
Hydrocarbons																					
TEH10-30				<0.25				<0.25	<0.25									3			
Radium-226			0.0062	0.0056	0.0061	0.0046	0.0066	0.0042	0.0037	0.0037	0.0026	0.0056	0.0055	0.0057							

(1) For a pH of 7.0 and a summer temperature of 12 degrees Celcius
(2) Proposed Ontario guideline
(3) When hardness is 120 mg/L CaCO3
(4) When hardness is 100 mg/L CaCO3
(5) 30-Day average guideline when the methyl mercury (MeHg) constitutes less than or equal to 0.5% of the total mercury concentration
(6) Maximum at hardness of 60 to 1290 mg/L as CaCO3
(7) Hardness less than or equal to 100 mg/L
(8) Hardness equal to 30-Day average of 100 mg/L as CaCO3
(9) When pH is greater than 6.5

APPENDIX E
GROUNDWATER MONITORING WELLS: WATER QUALITY DATA

Red Chris Monitoring Wells - Groundwater Quality Data

Report To Jack Love, RED CHRIS DEVELOPMENT COMPANY LTD.
ALS File No. L1426041
Date Received 25-Feb-14 17:00
Date 05-Mar-14

RESULTS OF ANALYSIS

Sample ID	MW14-1D	MW14-3D	MW13-21D	MW13-22D	MW13-23D	NPW2
Date Sampled	22-FEB-14	22-FEB-14	23-FEB-14	23-FEB-14	23-FEB-14	23-FEB-14
Time Sampled	00:00	00:00	14:45	14:00	00:00	00:00
ALS Sample ID	L1426041-1	L1426041-2	L1426041-3	L1426041-4	L1426041-5	L1426041-6
Matrix	Water	Water	Water	Water	Water	Water
Physical Tests						
Conductivity	273	838	10700	354	899	386
Hardness (as CaCO3)	140	109	573	78.8	29.2	215
pH	8.29	9.01	12.47	8.92	8.68	8.28
Total Suspended Solids	<3.0	9700	129	343	14100	<3.0
Total Dissolved Solids	174	460	2900	192	276	229
Turbidity	0.41	1990	16.3	97.1	>4000	0.40
Anions and Nutrients						
Acidity (as CaCO3)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO3)	118	124	<1.0	127	225	179
Alkalinity, Carbonate (as CaCO3)	2.0	24.6	125	20.5	17.7	<2.0
Alkalinity, Hydroxide (as CaCO3)	<1.0	<1.0	2380	<1.0	<1.0	<2.0
Alkalinity, Total (as CaCO3)	120	149	2510	147	242	179
Ammonia, Total (as N)	0.0151	1.17	3.18	0.275	8.24	<0.0050
Bromide (Br)	<0.050	<0.50	<2.5	<0.050	<0.50	<0.050
Chloride (Cl)	<0.50	30.9	<25	<0.50	<5.0	<0.50
Fluoride (F)	0.082	0.51	1.3	0.112	0.79	0.094
Nitrate (as N)	0.0086	0.426	0.39	0.0076	1.91	0.0497
Nitrite (as N)	0.0033	0.068	0.089	0.0013	0.064	<0.0010
Orthophosphate-Dissolved (as P)	0.0079	0.0019	<0.0010	0.0036	0.0024	<0.0010
Phosphorus (P)-Total Dissolved	0.0085	0.0108	0.0047	0.0071	0.0209	<0.0020
Phosphorus (P)-Total	0.0084	4.83	0.0100	0.160	6.05	<0.0020
Sulfate (SO4)	24.5	232	75	43.4	214	37.0
Organic / Inorganic Carbon						
Dissolved Organic Carbon	0.66	47.5	21.0	3.13	135	0.53
Total Organic Carbon	0.91	86.6	20.4	4.5	126	0.76
Dissolved Metals						
Dissolved Metals Filtration Location	LAB	LAB	LAB	LAB	LAB	LAB
Aluminum (Al)-Dissolved	0.0062	1.74	0.0717	0.0366	2.37	<0.0010
Antimony (Sb)-Dissolved	<0.00010	0.00347	0.00054	<0.00010	0.00154	<0.00010
Arsenic (As)-Dissolved	0.00030	0.00386	0.00162	0.00098	0.00166	0.00016
Barium (Ba)-Dissolved	0.0611	0.0368	1.98	0.0490	0.0328	0.0378
Beryllium (Be)-Dissolved	<0.00010	0.00013	<0.00050	<0.00010	0.00022	<0.00010
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.0025	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	0.011	0.032	<0.050	0.013	0.013	0.014
Cadmium (Cd)-Dissolved	0.000013	0.000036	<0.000050	<0.000010	0.000130	<0.000010
Calcium (Ca)-Dissolved	40.0	30.0	230	11.8	7.54	56.9
Chromium (Cr)-Dissolved	0.00027	0.00880	0.0120	0.00041	0.00206	<0.00010
Cobalt (Co)-Dissolved	<0.00010	0.00042	<0.00050	<0.00010	0.00103	<0.00010
Copper (Cu)-Dissolved	<0.00020	0.00295	0.0018	0.00036	0.00314	<0.00020
Iron (Fe)-Dissolved	<0.010	0.754	<0.050	0.014	1.26	0.010
Lead (Pb)-Dissolved	<0.000050	0.00173	<0.00025	0.000051	0.00411	<0.000050
Lithium (Li)-Dissolved	0.00291	0.0121	0.526	0.0178	0.0294	0.00314
Magnesium (Mg)-Dissolved	9.65	8.26	<0.10	12.0	2.51	17.7
Manganese (Mn)-Dissolved	0.0387	0.0327	0.00029	0.00182	0.153	0.000406
Molybdenum (Mo)-Dissolved	0.00165	0.0133	0.0133	0.00964	0.0113	0.00694
Nickel (Ni)-Dissolved	0.00053	0.00273	<0.0025	<0.00050	0.00337	<0.00050
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	0.755	3.10	205	7.79	2.38	0.876
Selenium (Se)-Dissolved	0.00015	0.00228	0.00112	<0.00010	0.00571	0.00085
Silicon (Si)-Dissolved	3.75	15.4	1.21	4.42	15.3	3.95
Silver (Ag)-Dissolved	<0.000010	0.000018	<0.000050	<0.000010	0.000023	<0.000010
Sodium (Na)-Dissolved	6.41	104	869	42.0	177	4.54
Strontium (Sr)-Dissolved	0.201	0.250	24.0	0.418	0.0891	0.300
Thallium (Tl)-Dissolved	<0.000010	0.000032	<0.000050	0.000014	0.000041	<0.000010
Tin (Sn)-Dissolved	<0.00010	0.00048	<0.00050	<0.00010	0.00049	<0.00010
Titanium (Ti)-Dissolved	<0.010	0.031	0.015	<0.010	0.062	<0.010
Uranium (U)-Dissolved	0.000198	0.00521	<0.000050	0.000489	0.0133	0.000316
Vanadium (V)-Dissolved	<0.0010	0.0051	<0.0050	<0.0010	0.0010	<0.0010
Zinc (Zn)-Dissolved	<0.0010	0.0119	<0.0050	0.0023	0.0112	<0.0010

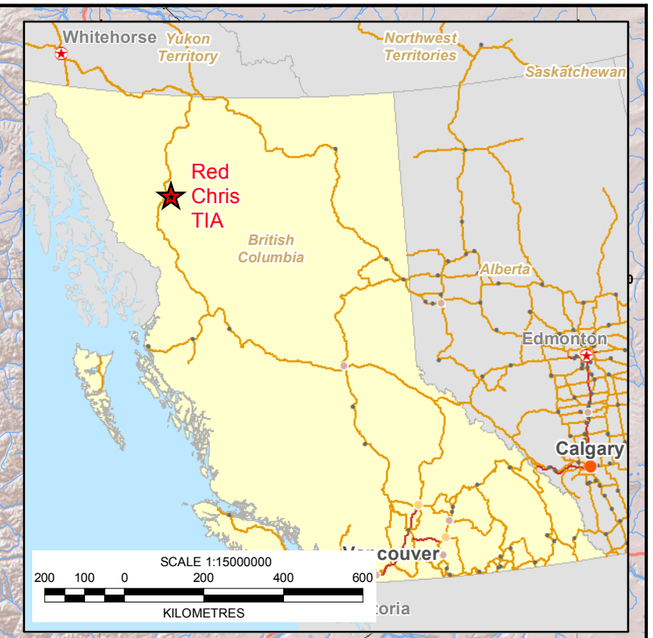
DRAWINGS

N

Dease Lake
Telegraph Creek
Iskut
Red Chris TIA
Mount Edziza Park
Kinaskan Lake Park
Spatsizi Plateau Wilderness Park
Stone Mountain Park
Kwadacha Wilderness Park
37
Bob Quinn
Stikine River
Stewart
Williston Lake
29
Dawson Creek
49
97
2
59
Mackenzie
Gwillim Lake Park
16-37
Smithers
Trembleur Lake
Tezzeron Lake
Carp Lake Park
Monkman Park
Terrace
Salt Lake Park
Prince Rupert
16
Kitimat
Morice Lake
Prince George
Tweedsmuir Park
Bowron Lake Park

600000 800000 1000000 1200000 1400000

1400000 1200000 1000000



SCALE 1:2500000
50 25 0 50 100 150
KILOMETRES

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "2014 DAM SAFETY INSPECTION," AND DATED NOVEMBER 24, 2014.
3. PROJECTION IS NAD 1983 BC ENVIRONMENT ALBERS.
4. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

SCALE:	AS SHOWN
DATE:	NOV 2014
DRAWN:	JS
CHECKED:	CB
APPROVED:	TM

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris, an Imperial Metals company

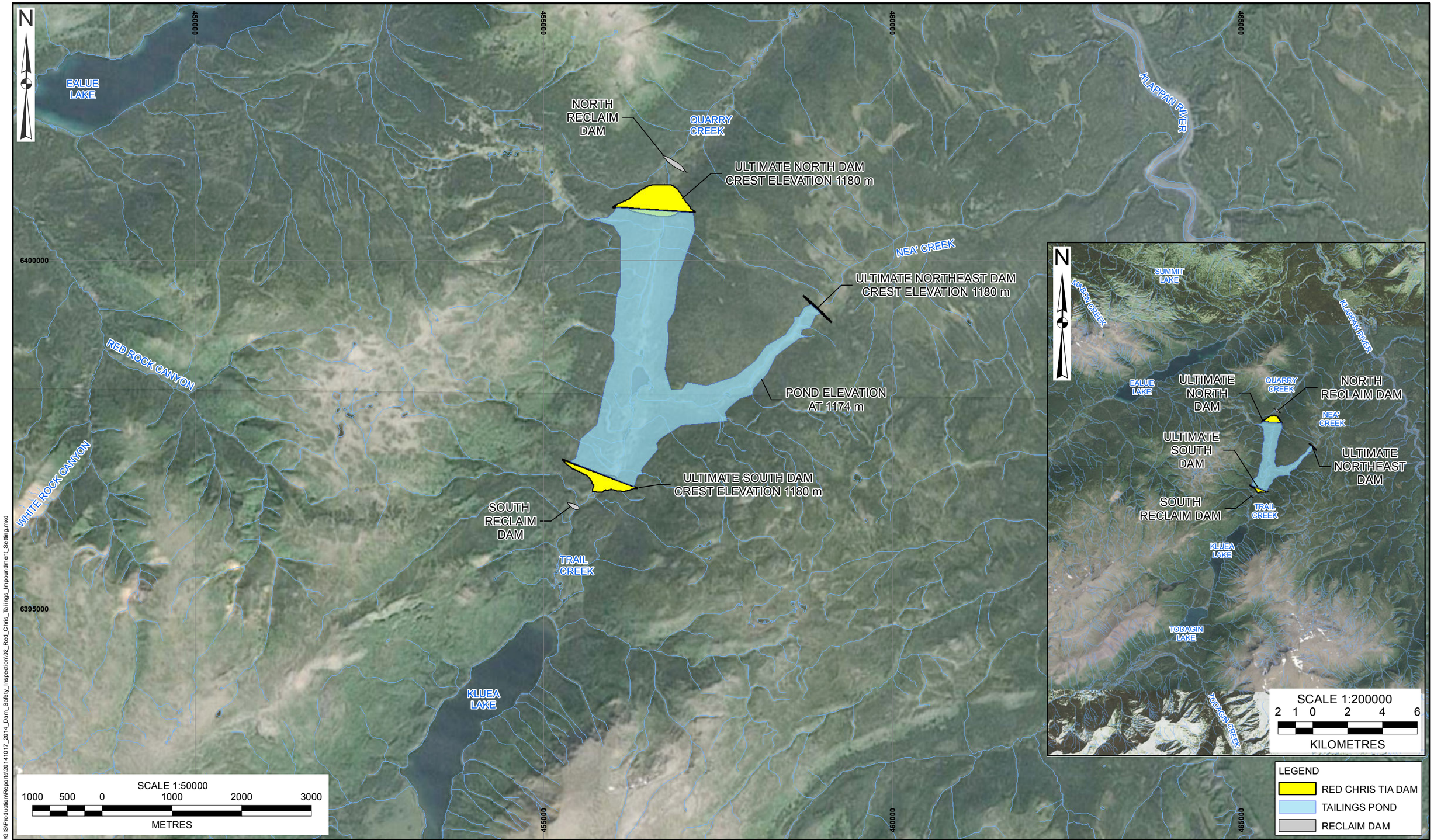
PROJECT: 2014 DAM SAFETY INSPECTION

TITLE: RED CHRIS PROJECT - LOCATION PLAN

PROJECT No.: 0866001.14

DWG No. 01

X:\Projects\0866 Red Chris\001\GIS\Production\Reports\20141017_2014_Dam_Safety_Inspection\01_Red_Chris_Project_Location_Plan.mxd



X:\Projects\0866 Red Chris\001\GIS\Production\Reports\20141017_2014_Dam_Safety_Inspection\02_Red_Chris_Tailings_Impoundment_Setting.mxd

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "2014 DAM SAFETY INSPECTION," AND DATED NOVEMBER 24, 2014.
3. IMAGERY FROM MICROSOFT BING MAPS.
4. PROJECTION IS NAD 1983 UTM ZONE 9N.
5. FINAL DAM CONFIGURATIONS ARE SHOWN FOR THE NORTH DAM, SOUTH DAM, AND NORTHEAST DAM, ALONG WITH THE FINAL PROJECTED IMPOUNDMENT OUTLINE.
6. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

SCALE:	1:50000
DATE:	NOV 2014
DRAWN:	LL, IL
CHECKED:	CB
APPROVED:	TM

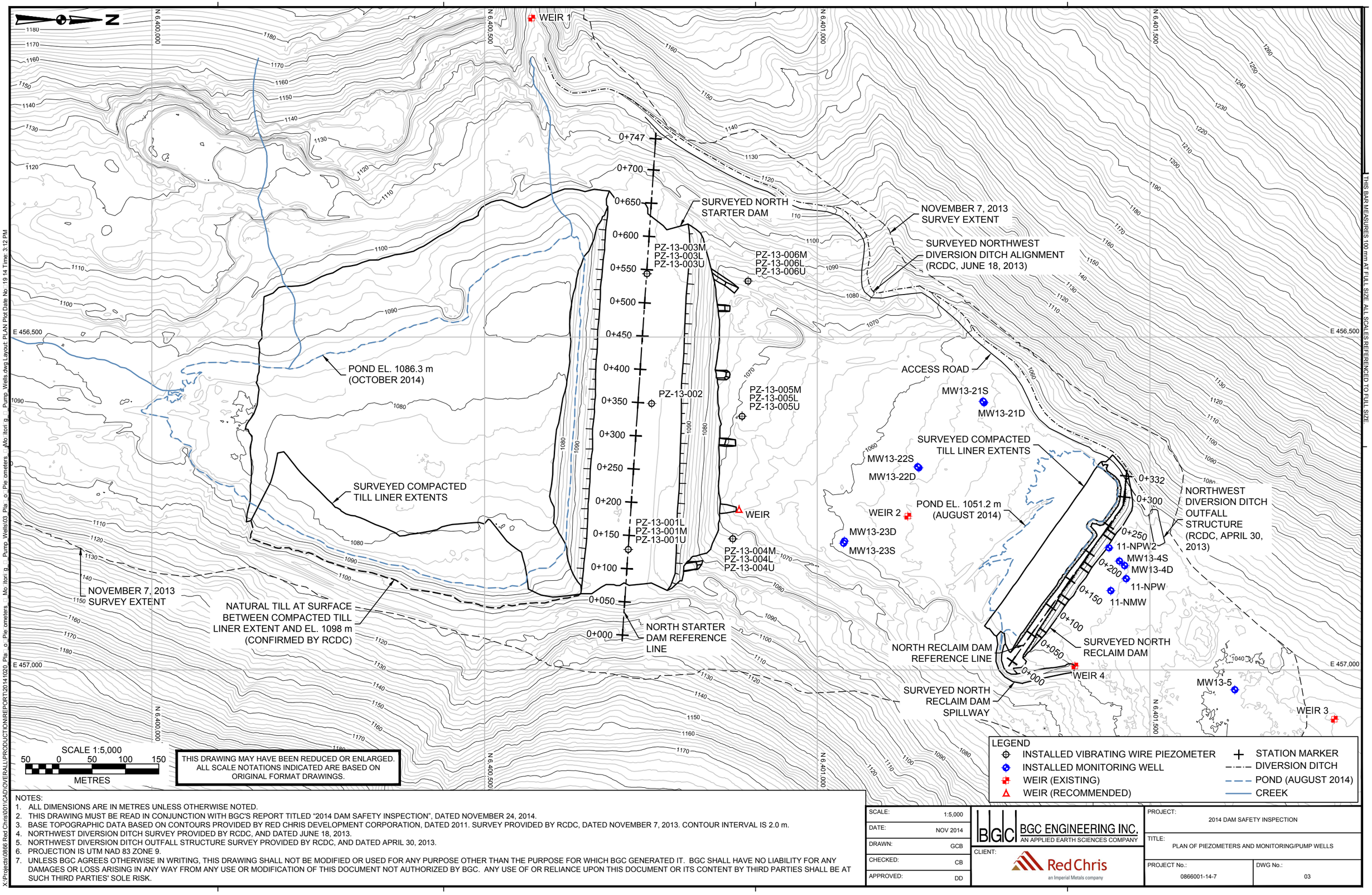
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: RED CHRIS DEVELOPMENT COMPANY

PROJECT: 2014 DAM SAFETY INSPECTION

TITLE: RED CHRIS TAILINGS IMPOUNDMENT SETTING

PROJECT No.:	DWG No.:
0866001-14-7	02



NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "2014 DAM SAFETY INSPECTION", DATED NOVEMBER 24, 2014.
3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS PROVIDED BY RED CHRIS DEVELOPMENT CORPORATION, DATED 2011. SURVEY PROVIDED BY RCDC, DATED NOVEMBER 7, 2013. CONTOUR INTERVAL IS 2.0 m.
4. NORTHWEST DIVERSION DITCH SURVEY PROVIDED BY RCDC, AND DATED JUNE 18, 2013.
5. NORTHWEST DIVERSION DITCH OUTFALL STRUCTURE SURVEY PROVIDED BY RCDC, AND DATED APRIL 30, 2013.
6. PROJECTION IS UTM NAD 83 ZONE 9.
7. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

SCALE:	1:5,000
DATE:	NOV 2014
DRAWN:	GCB
CHECKED:	CB
APPROVED:	DD

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris
an Imperial Metals company

PROJECT: 2014 DAM SAFETY INSPECTION

TITLE: PLAN OF PIEZOMETERS AND MONITORING/PUMP WELLS

PROJECT No.:	DWG No.:
0866001-14-7	03

X:\Projects\0866 Red Chris\001\CAD\OVERALL\PRODUCTION\REPORT\20141020_Pla...o_Piezometers_Mo itori g_...Pump_Wells\03_Pla...o_Piezometers_Mo itori g_...Pump_Wells.dwg Layout: PLAN Plot Date No.: 19 14 Time: 3:12 PM

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS PROVIDED BY RED CHRIS DEVELOPMENT CORPORATION, DATED 2011. SURVEY PROVIDED BY RCDC, DATED NOVEMBER 7, 2013. CONTOUR INTERVAL IS 2.0 m.
4. NORTHWEST DIVERSION DITCH SURVEY PROVIDED BY RCDC, AND DATED JUNE 18, 2013.
5. NORTHWEST DIVERSION DITCH OUTFALL STRUCTURE SURVEY PROVIDED BY RCDC, AND DATED APRIL 30, 2013.
6. PROJECTION IS UTM NAD 83 ZONE 9.
7. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SHIFT THIRD PARTIES' SOLE RISK.

SEE DWG 0866-CRR-XD-02-01

SEE DWG 0866-CRR-XD-03-01

SURVEYED NORTH STARTER DAM

NOVEMBER 7, 2013 SURVEY EXTENT

SURVEYED NORTHWEST DIVERSION DITCH ALIGNMENT (RCDC, JUNE 18, 2013)

ACCESS ROAD

SURVEYED COMPACTED TILL LINER EXTENTS

NORTHWEST DIVERSION DITCH OUTFALL STRUCTURE (RCDC, APRIL 30, 2013)

SURVEYED COMPACTED TILL LINER EXTENTS

NOVEMBER 7, 2013 SURVEY EXTENT

NATURAL TILL AT SURFACE BETWEEN COMPACTED TILL LINER EXTENT AND EL. 1098 m (CONFIRMED BY RCDC)

NORTH STARTER DAM REFERENCE LINE

NORTH RECLAIM DAM REFERENCE LINE

SURVEYED NORTH RECLAIM DAM

SURVEYED NORTH RECLAIM DAM SPILLWAY

LEGEND
- STATION MARKER
- DIVERSION DITCH
- POND (AUGUST 2014)
- CREEK

SCALE 1:2,500

50 0 50 100 150

METRES

THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON ORIGINAL FORMAT DRAWINGS.

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

X:\Projects\0866 Red Chris\001\NORTH DAM\PRODUCTION\FC\20140718_CRR_REV0_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION_0866-CRR-XD-01-01_REV_0.dwg Layout: 01-01 Plot Date: Sep 30 14 Time: 10:52 AM

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	GCB	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris, an Imperial Metals company

PROJECT: TAILINGS IMPOUNDMENT AREA 2013 CONSTRUCTION RECORDS REPORT

TITLE: TAILINGS IMPOUNDMENT AREA NORTH - GENERAL ARRANGEMENT PLAN

SCALE:	DWG No.:	REV.:
1:2,500	0866-CRR-XD-01-01	0

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS PROVIDED BY RED CHRIS DEVELOPMENT CORPORATION, DATED 2011. SURVEY PROVIDED BY RCDC, DATED NOVEMBER 7, 2013. CONTOUR INTERVAL IS 1.0 m.
4. NORTHWEST DIVERSION DITCH SURVEY PROVIDED BY RCDC, AND DATED JUNE 18, 2013.
5. PROJECTION IS UTM NAD 83 ZONE 9.
6. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

N

SURVEYED NORTHWEST DIVERSION DITCH (RCDC, JUNE 18, 2013)

NOVEMBER 7, 2013 SURVEY EXTENT

ACCESS ROAD

0+747 0+700 0+650 0+600 0+550 0+500 0+450 0+400 0+350 0+300 0+250 0+200 0+150 0+100 0+050 0+000

FINGER DRAIN AT 0+500 AND 0+600

FINGER DRAIN AT 0+400

FINGER DRAIN AT 0+300

FINGER DRAIN AT 0+200

FINGER DRAIN AT 0+100

NORTH STARTER DAM CREST EL. 1097 m

UPSTREAM COMPACTED TILL LINER

SURVEYED COMPACTED TILL LINER EXTENTS

NATURAL TILL AT SURFACE BETWEEN COMPACTED TILL LINER EXTENT AND EL. 1098 m (CONFIRMED BY RCDC)

NOVEMBER 7, 2013 SURVEY EXTENT

SURVEYED NORTH STARTER DAM

NORTH RECLAIM DAM REFERENCE LINE

A 02-02

B 02-02

N 6,399,500 N 6,400,000 N 6,400,500 N 6,401,000

E 456,500 E 457,000

SCALE 1:2,000

50 0 50 100 150

METRES

THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON ORIGINAL FORMAT DRAWINGS.

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

LEGEND
- STATION MARKER
- DIVERSION DITCH
- POND (AUGUST 2014)
- CREEK

X:\Project\0866 Red Chris\001\NORTH DAM\PRODUCTION\FC\20140718_CRR_REV0_STAGE_1_TAILINGS IMPOUNDMENT AREA_CONSTRUCTION 0866-CRR-XD-02-01_REV_0.dwg Layout: 02-01 Plot Date: Sep 30 14 Time: 11:07 AM

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	GCB	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

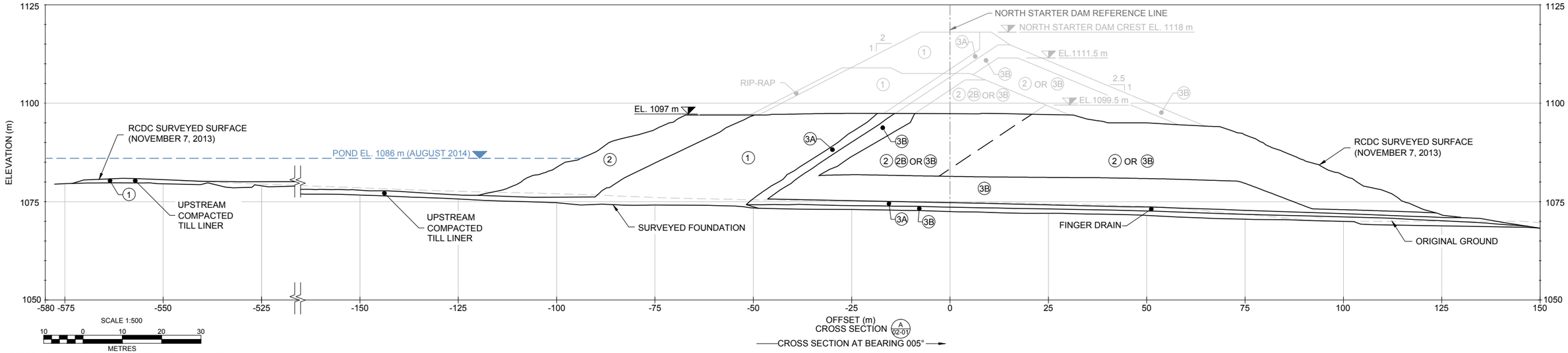
CLIENT: Red Chris, an Imperial Metals company

PROJECT: TAILINGS IMPOUNDMENT AREA 2013 CONSTRUCTION RECORDS REPORT

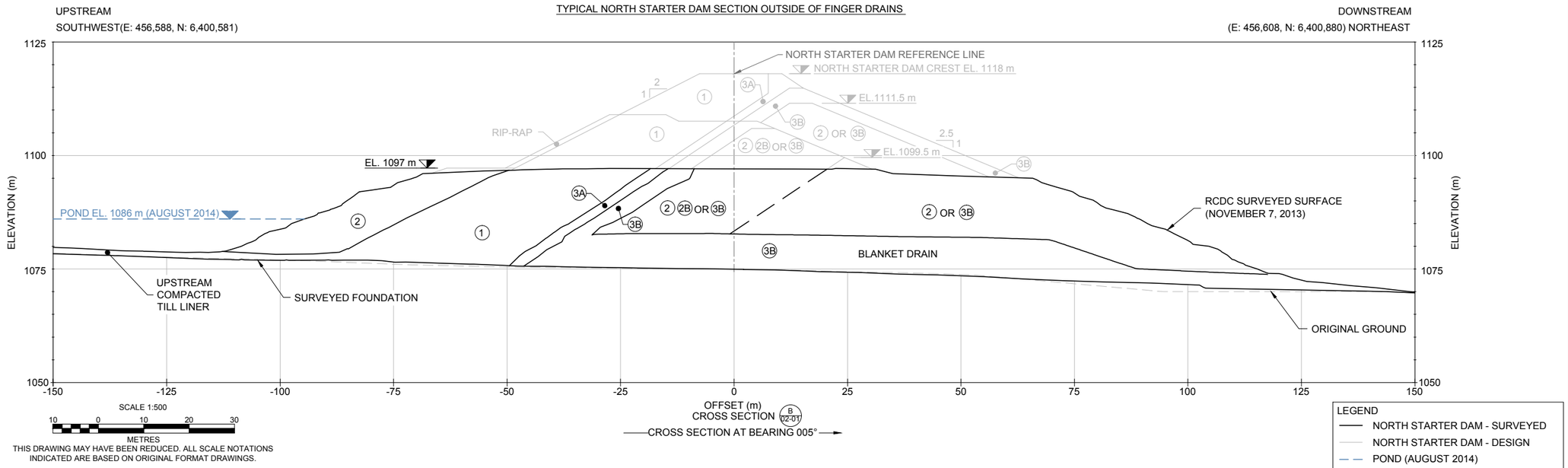
TITLE: NORTH STARTER DAM PLAN

SCALE:	DWG No.:	REV.:
1:2,000	0866-CRR-XD-02-01	0

TYPICAL NORTH STARTER DAM SECTION THROUGH FINGER DRAINS



TYPICAL NORTH STARTER DAM SECTION OUTSIDE OF FINGER DRAINS



LEGEND
- NORTH STARTER DAM - SURVEYED
- NORTH STARTER DAM - DESIGN
- POND (AUGUST 2014)
- (1) GLACIAL TILL (MIN. 25% FINES)
- (2) SAND AND GRAVEL (MAX. 15% FINES)
- (2B) SAND AND GRAVEL (MAX. 20% FINES)
- (3A) SAND AND GRAVEL (MAX. 6.5% FINES)
- (3B) SAND AND GRAVEL (MAX. 10% FINES)

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
3. INTERNAL DAM DETAILS PROVIDED BY RCDC.
4. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	GCB	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris, an Imperial Metals company

PROJECT: TAILINGS IMPOUNDMENT AREA 2013 CONSTRUCTION RECORDS REPORT

TITLE: NORTH STARTER DAM SECTION AND DETAILS

SCALE:	DWG No.:	REV.:
1:500	0866-CRR-XD-02-02	0

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

X:\Projects\0866 Red Chris\001\NORTH DAM\PRODUCTION\IFC\20140718_CRR_REV0_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION_0866-CRR-XD-02-02_REV_0.dwg Layout: 02-02 Plot Date Sep 30 14 Time: 11:10 AM

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS PROVIDED BY RED CHRIS DEVELOPMENT CORPORATION, DATED 2011. SURVEY PROVIDED BY RCDC, DATED NOVEMBER 7, 2013. CONTOUR INTERVAL IS 1.0 m.
4. NORTHWEST DIVERSION DITCH SURVEY PROVIDED BY RCDC, AND DATED JUNE 18, 2013.
5. NORTHWEST DIVERSION DITCH OUTFALL STRUCTURE SURVEY PROVIDED BY RCDC, AND DATED APRIL30, 2013.
6. PROJECTION IS UTM NAD 83 ZONE 9.
7. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

NOVEMBER 7, 2013 SURVEY EXTENT

SURVEYED OUTLINE OF NORTHWEST DIVERSION DITCH OUTFALL STRUCTURE (RCDC, APRIL 30, 2013)

LIMIT OF NORTHWEST DIVERSION DITCH SURVEY (RCDC JUNE 18, 2013)

SEE DWG 0866-CRR-XD-03-03

SEE DWG 0866-CRR-XD-04-01

MW13-4D
MW13-4S
11-NPW
11-NPW2
11-NMW
BH-10-008

NRD-R1
Δ = 29°
RADIUS = 20 m

FINGER DRAIN AT 0+240

FINGER DRAIN AT 0+180

FINGER DRAIN AT 0+120

FINGER DRAIN AT 0+060

NORTH RECLAIM DAM REFERENCE LINE

NORTH RECLAIM DAM SPILLWAY REFERENCE LINE

NORTH RECLAIM DAM CREST EL. 1053 m

SURVEYED NORTH RECLAIM DAM COMPACTED TILL LINER EXTENT

ACCESS ROAD

SURVEYED NORTHWEST DIVERSION DITCH ALIGNMENT (RCDC, JUNE 18, 2014)

NOVEMBER 7, 2013 SURVEY EXTENT

LEGEND
- STATION MARKER
- RADIUS MARKER
- EXISTING GROUNDWATER WELL
- EXISTING PIEZOMETER
- DIVERSION DITCH
- POND (AUGUST 2014)

SCALE 1:1,000

25 0 25 50 75
METRES

THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON ORIGINAL FORMAT DRAWINGS.

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE.

X:\Projects\0866 Red Chris\0011\NORTH DAM\PRODUCTION\FC\20141020_CRR_REV1_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION\0866-CRR-XD-03-01_REV_1.dwg Layout: 0866-CRR-XD-03-01 Plot Date: Oct 20 14 Time: 1:39 PM

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	GCB	DD	DD	TM	CONSTRUCTION RECORDS REPORT
1	14	10	20	AH	DD	DD	TM	INCLUSION OF FINGER DRAIN LAYOUT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

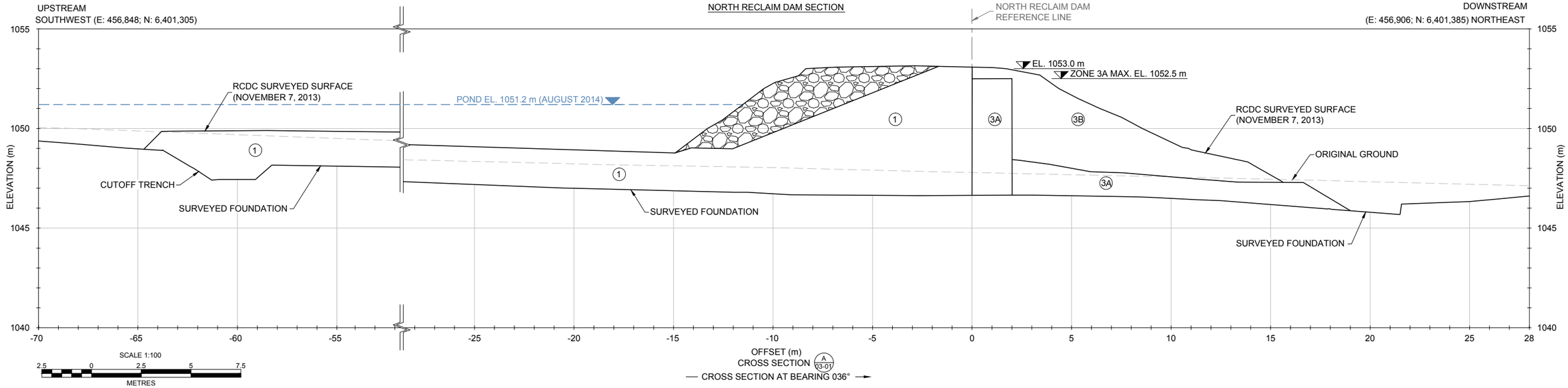
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris, an Imperial Metals company

PROJECT: TAILINGS IMPOUNDMENT AREA 2013 CONSTRUCTION RECORDS REPORT

TITLE: NORTH RECLAIM DAM PLAN

SCALE:	DWG No.:	REV.:
1:1,000	0866-CRR-XD-03-01	1



THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

LEGEND
- NORTH RECLAIM DAM - SURVEYED
- POND (AUGUST 2014)
- RIP RAP
- (1) GLACIAL TILL (MIN. 25% FINES)
- (3A) SAND AND GRAVEL (MAX. 6.5% FINES)
- (3B) SAND AND GRAVEL (MAX. 10% FINES)

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
3. INTERNAL DAM DETAILS PROVIDED BY RCDC.
4. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN any WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	GCB	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

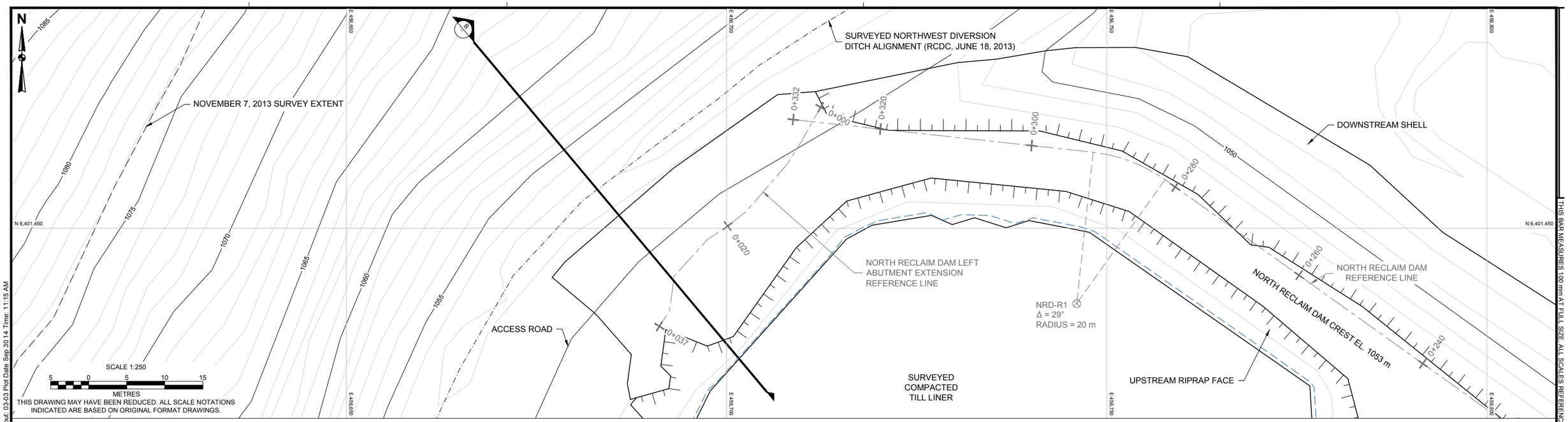
CLIENT: Red Chris
an Imperial Metals company

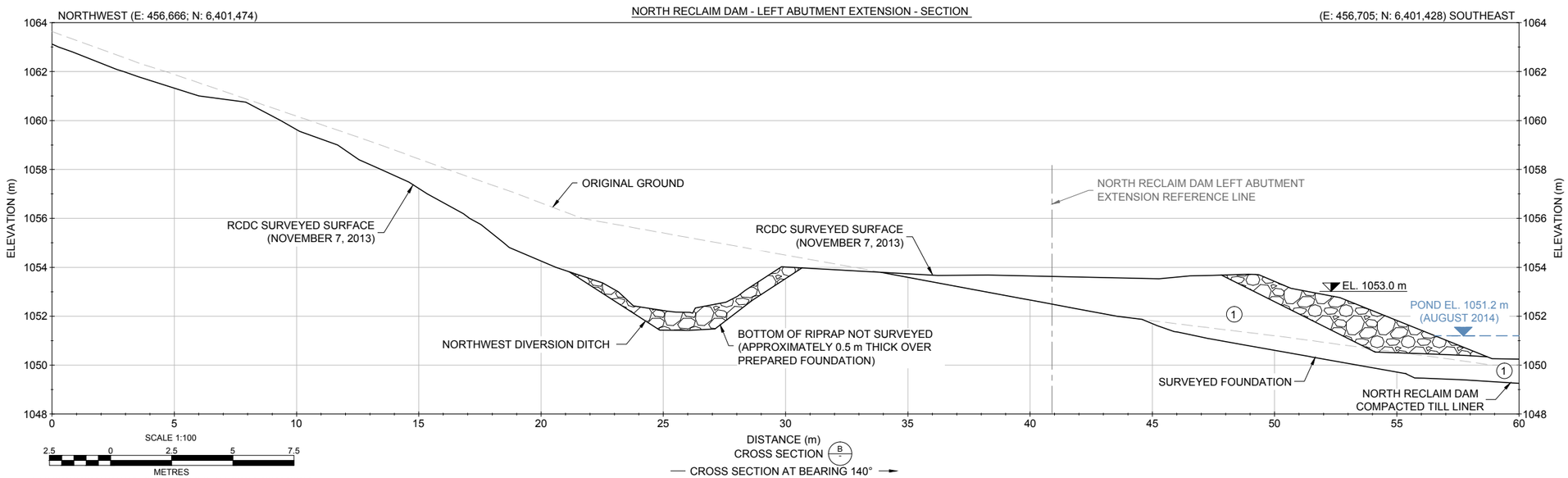
PROJECT: TAILINGS IMPOUNDMENT AREA
2013 CONSTRUCTION RECORDS REPORT

TITLE: NORTH RECLAIM DAM SECTION AND DETAILS (SHEET 1 OF 2)

SCALE:	DWG No.:	REV.:
1:100	0866-CRR-XD-03-02	0

X:\Projects\0866 Red Chris\0011NORTH DAM\PRODUCTION\FC\20140718_CRR_REV0_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION_0866-CRR-XD-03-02_REV_0.dwg Layout: 03-02 Plot Date: Sep 30 14 Time: 11:13 AM





NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS PROVIDED BY RED CHRIS DEVELOPMENT CORPORATION, DATED 2011. SURVEY PROVIDED BY RCDC, DATED NOVEMBER 7, 2013. CONTOUR INTERVAL IS 1.0 m.
4. NORTHWEST DIVERSION DITCH SURVEY PROVIDED BY RCDC, AND DATED JUNE 18, 2013.
5. PROJECTION IS UTM NAD 83 ZONE 9.
6. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

LEGEND
- STATION MARKER
- RADIUS MARKER
- NORTH RECLAIM DAM - SURVEYED
- DIVERSION DITCH
- POND (AUGUST 2014)
- RIP RAP
- (1) GLACIAL TILL (MIN. 25% FINES)

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	GCB	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris, an Imperial Metals company

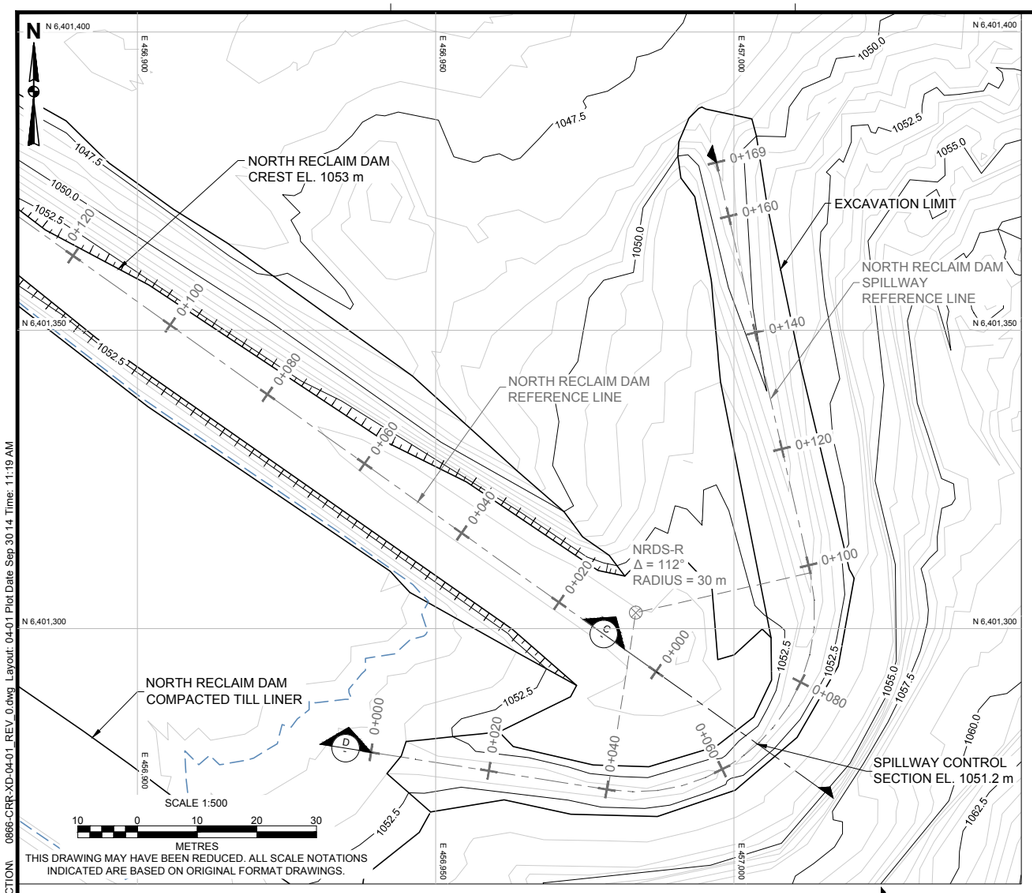
PROJECT: TAILINGS IMPOUNDMENT AREA
2013 CONSTRUCTION RECORDS REPORT

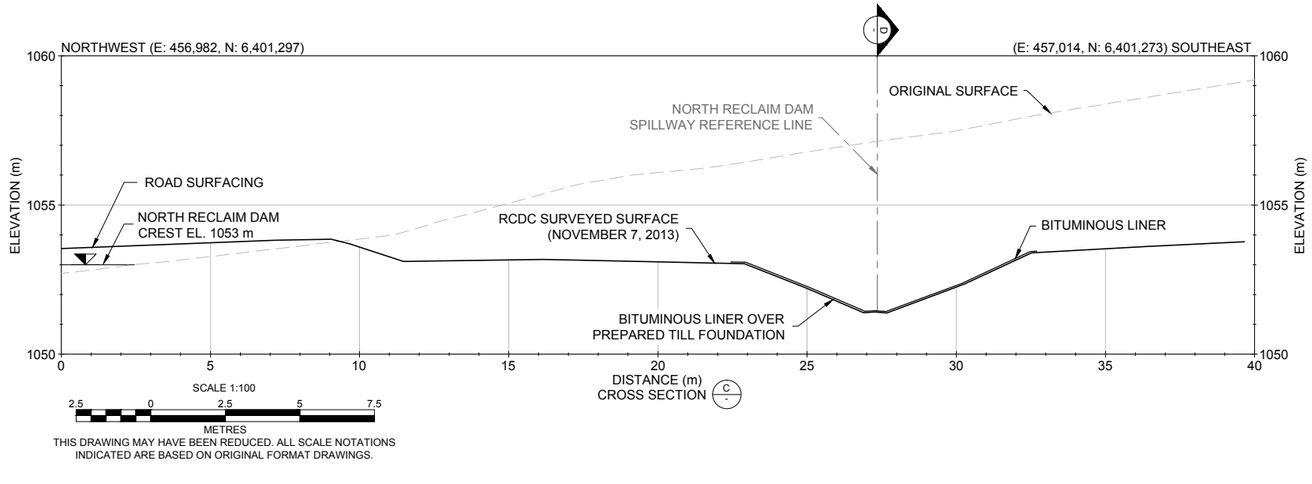
TITLE: NORTH RECLAIM DAM SECTION AND DETAILS (SHEET 2 OF 2)

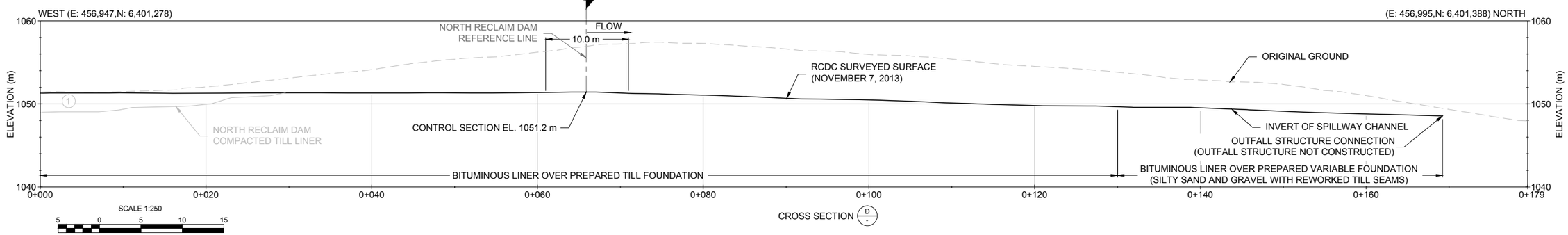
SCALE:	DWG No.:	REV.:
AS SHOWN	0866-CRR-XD-03-03	0

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

X:\Projects\0866 Red Chris\001\NORTH DAM\PRODUCTION\IFC\20140718_CRR_REV0_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION_0866-CRR-XD-03-03_REV_0.dwg Layout: 03-03 Plot Date: Sep 30 14 Time: 11:15 AM







NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS PROVIDED BY RED CHRIS DEVELOPMENT CORPORATION, DATED 2011. SURVEY PROVIDED BY RCDC, DATED NOVEMBER 7, 2013. CONTOUR INTERVAL IS 0.5 m.
4. PROJECTION IS UTM NAD 83 ZONE 9.
5. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

LEGEND
- STATION MARKER
- RADIUS MARKER
- NORTH RECLAIM DAM SPILLWAY - SURVEYED
- POND (AUGUST 2014)
- (1) GLACIAL TILL (MIN. 25% FINES)

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	GCB	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris, an Imperial Metals company

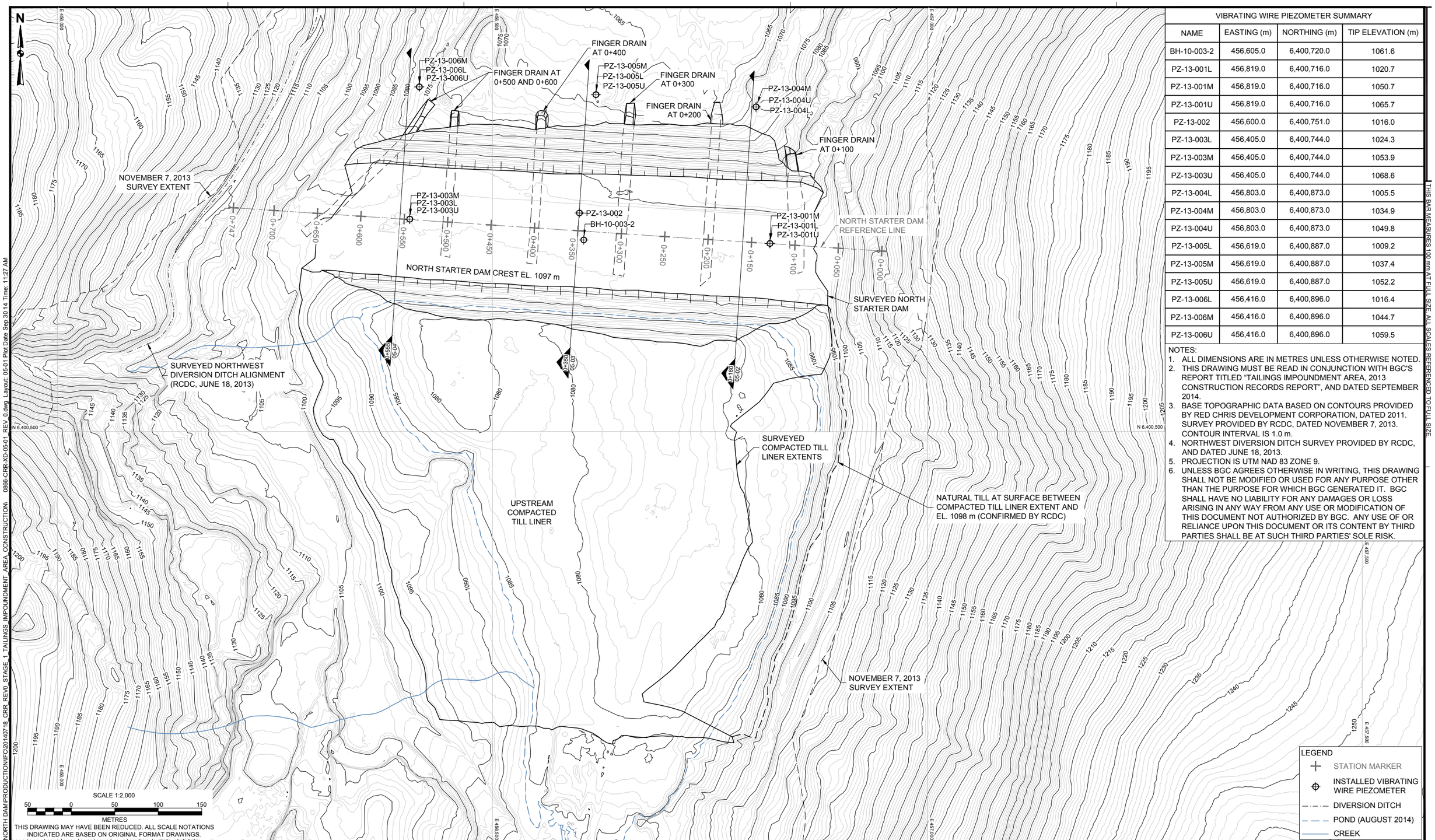
PROJECT: TAILINGS IMPOUNDMENT AREA
2013 CONSTRUCTION RECORDS REPORT

TITLE: NORTH RECLAIM DAM SPILLWAY PLAN AND PROFILE

SCALE:	DWG No.:	REV.:
AS SHOWN	0866-CRR-XD-04-01	0

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

X:\Projects\0866 Red Chris\001\NORTH DAM\PRODUCTION\IFC\20140718_CRR_REV0_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION_0866-CRR-XD-04-01_REV_0.dwg Layout: 04-01 Plot Date: Sep 30 14 Time: 11:19 AM



VIBRATING WIRE PIEZOMETER SUMMARY			
NAME	EASTING (m)	NORTHING (m)	TIP ELEVATION (m)
BH-10-003-2	456,605.0	6,400,720.0	1061.6
PZ-13-001L	456,819.0	6,400,716.0	1020.7
PZ-13-001M	456,819.0	6,400,716.0	1050.7
PZ-13-001U	456,819.0	6,400,716.0	1065.7
PZ-13-002	456,600.0	6,400,751.0	1016.0
PZ-13-003L	456,405.0	6,400,744.0	1024.3
PZ-13-003M	456,405.0	6,400,744.0	1053.9
PZ-13-003U	456,405.0	6,400,744.0	1068.6
PZ-13-004L	456,803.0	6,400,873.0	1005.5
PZ-13-004M	456,803.0	6,400,873.0	1034.9
PZ-13-004U	456,803.0	6,400,873.0	1049.8
PZ-13-005L	456,619.0	6,400,887.0	1009.2
PZ-13-005M	456,619.0	6,400,887.0	1037.4
PZ-13-005U	456,619.0	6,400,887.0	1052.2
PZ-13-006L	456,416.0	6,400,896.0	1016.4
PZ-13-006M	456,416.0	6,400,896.0	1044.7
PZ-13-006U	456,416.0	6,400,896.0	1059.5

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS PROVIDED BY RED CHRIS DEVELOPMENT CORPORATION, DATED 2011. SURVEY PROVIDED BY RCDC, DATED NOVEMBER 7, 2013. CONTOUR INTERVAL IS 1.0 m.
4. NORTHWEST DIVERSION DITCH SURVEY PROVIDED BY RCDC, AND DATED JUNE 18, 2013.
5. PROJECTION IS UTM NAD 83 ZONE 9.
6. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

REVISION INFORMATION	REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
	0	14	09	30	GCB	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

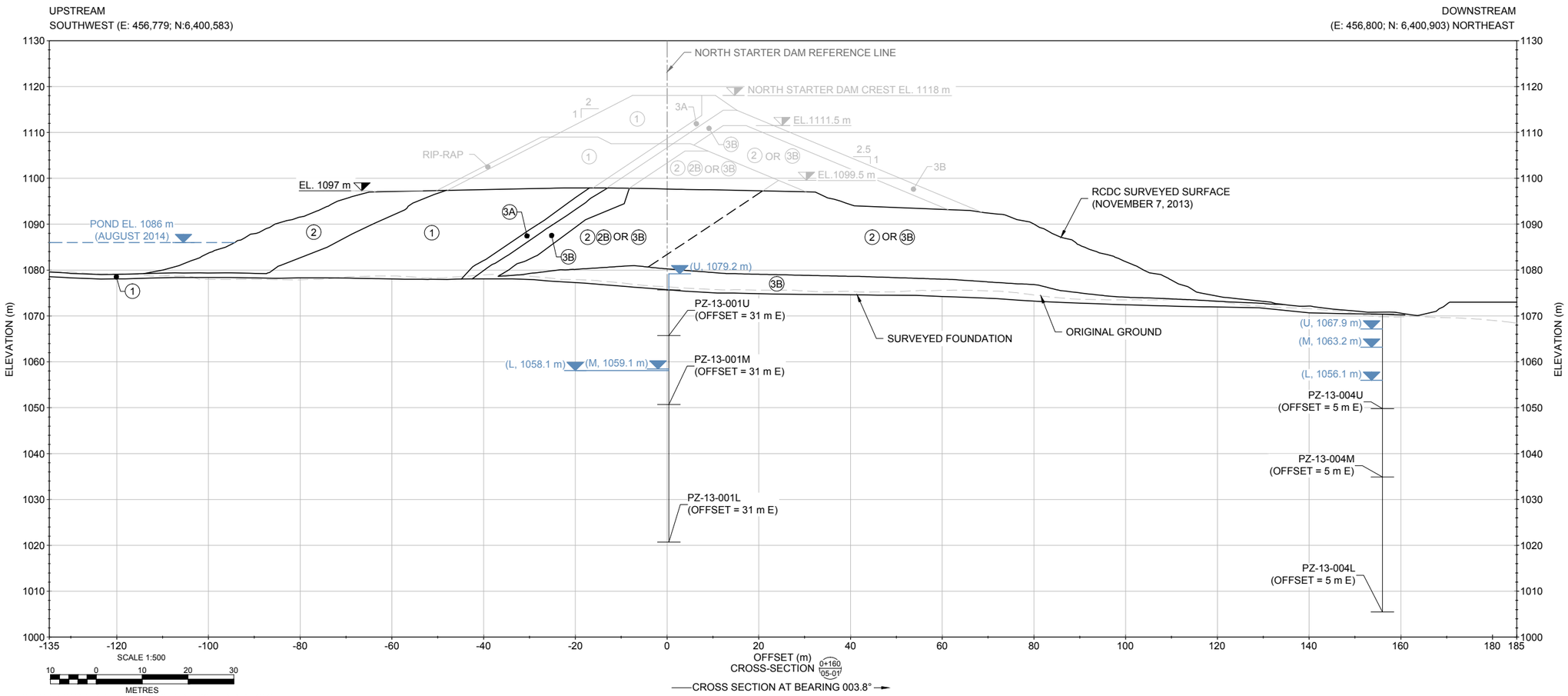
CLIENT: Red Chris, an Imperial Metals company

PROJECT: TAILINGS IMPOUNDMENT AREA 2013 CONSTRUCTION RECORDS REPORT

TITLE: NORTH DAM INSTRUMENTATION PLAN

SCALE:	DWG No.:	REV.:
1:2,000	0866-CRR-XD-05-01	0

X:\Projects\0866 Red Chris\001\NORTH DAM\PRODUCTION\FC\20140718_CRR_REV0_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION_0866-CRR-XD-05-01_REV_0.dwg Layout: 05-01 Plot Date: Sep 30 14 Time: 11:27 AM



LEGEND
- NORTH STARTER DAM - SURVEYED
- NORTH STARTER DAM - DESIGN
- PIEZOMETRIC LEVEL (SEE NOTE 2)
- POND (AUGUST 2014)
- (1) GLACIAL TILL (MIN. 25% FINES)
- (2) SAND AND GRAVEL (MAX. 15% FINES)
- (2B) SAND AND GRAVEL (MAX. 20% FINES)
- (3A) SAND AND GRAVEL (MAX. 6.5% FINES)
- (3B) SAND AND GRAVEL (MAX. 10% FINES)

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. PIEZOMETRIC LEVEL READING DATED SEPTEMBER 5, 2014. UPPER (U), MIDDLE (M), AND LOWER (L).
3. INTERNAL DAM DETAILS PROVIDED BY RCDC.
4. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED “TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT”, AND DATED SEPTEMBER 2014.
5. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	AH	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris, an Imperial Metals company

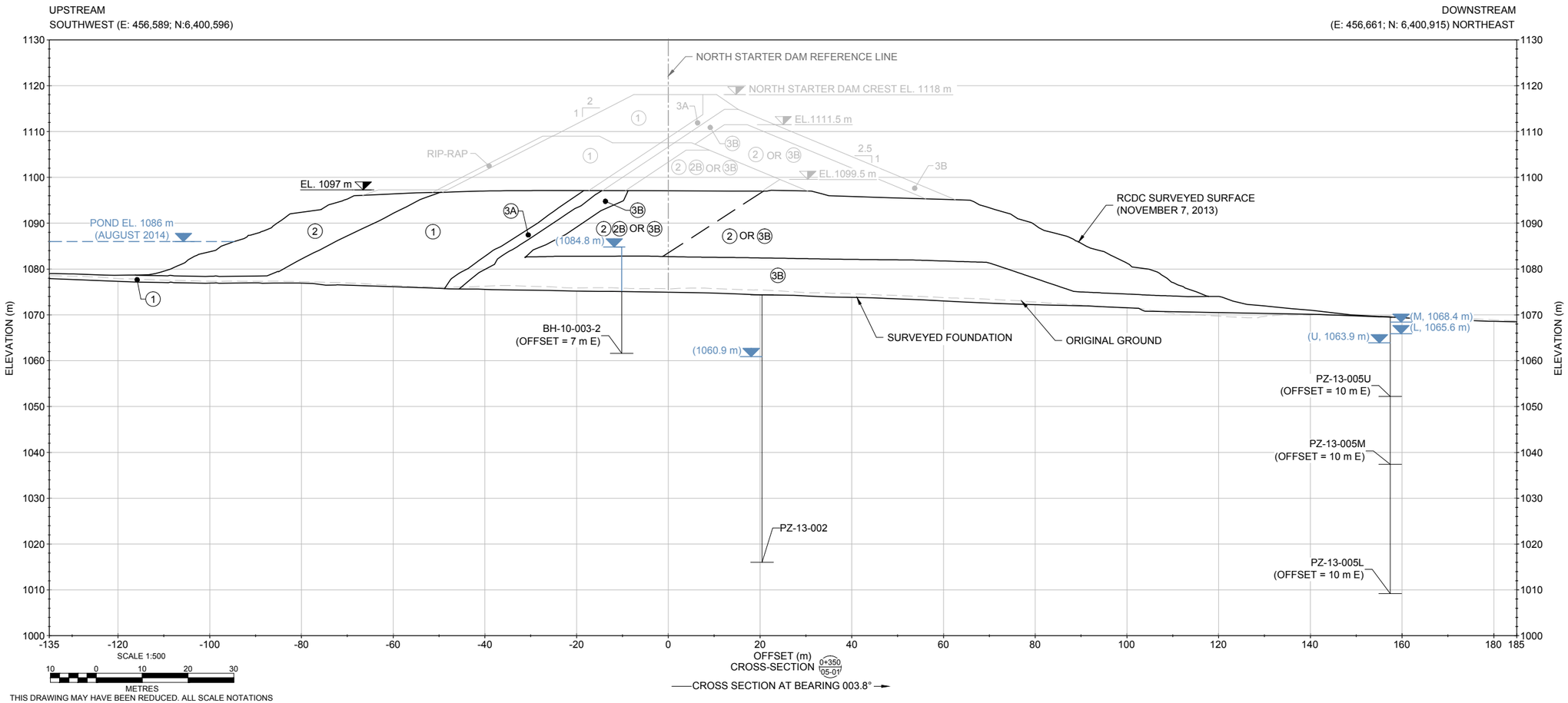
PROJECT: TAILINGS IMPOUNDMENT AREA
2013 CONSTRUCTION RECORDS REPORT

TITLE: NORTH DAM INSTRUMENTATION SECTIONS (SHEET 1 OF 3)

SCALE:	DWG No.:	REV.:
1:500	0866-CRR-XD-05-02	0

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

X:\Projects\0866 Red Chris\001\NORTH DAM\PRODUCTION\FC\20140718_CRR_REV0_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION_0866-CRR-XD-05-02_REV_0.dwg Layout: 05-02 Plot Date Sep 30 14 Time: 11:31 AM



THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

LEGEND
- NORTH STARTER DAM - SURVEYED
- NORTH STARTER DAM - DESIGN
- PIEZOMETRIC LEVEL (SEE NOTE 2)
- POND (AUGUST 2014)
- (1) GLACIAL TILL (MIN. 25% FINES)
- (2) SAND AND GRAVEL (MAX. 15% FINES)
- (2B) SAND AND GRAVEL (MAX. 20% FINES)
- (3A) SAND AND GRAVEL (MAX. 6.5% FINES)
- (3B) SAND AND GRAVEL (MAX. 10% FINES)

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. PIEZOMETRIC LEVEL READING DATED SEPTEMBER 5, 2014. UPPER (U), MIDDLE (M), AND LOWER (L).
3. INTERNAL DAM DETAILS PROVIDED BY RCDC.
4. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT", AND DATED SEPTEMBER 2014.
5. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	AH	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

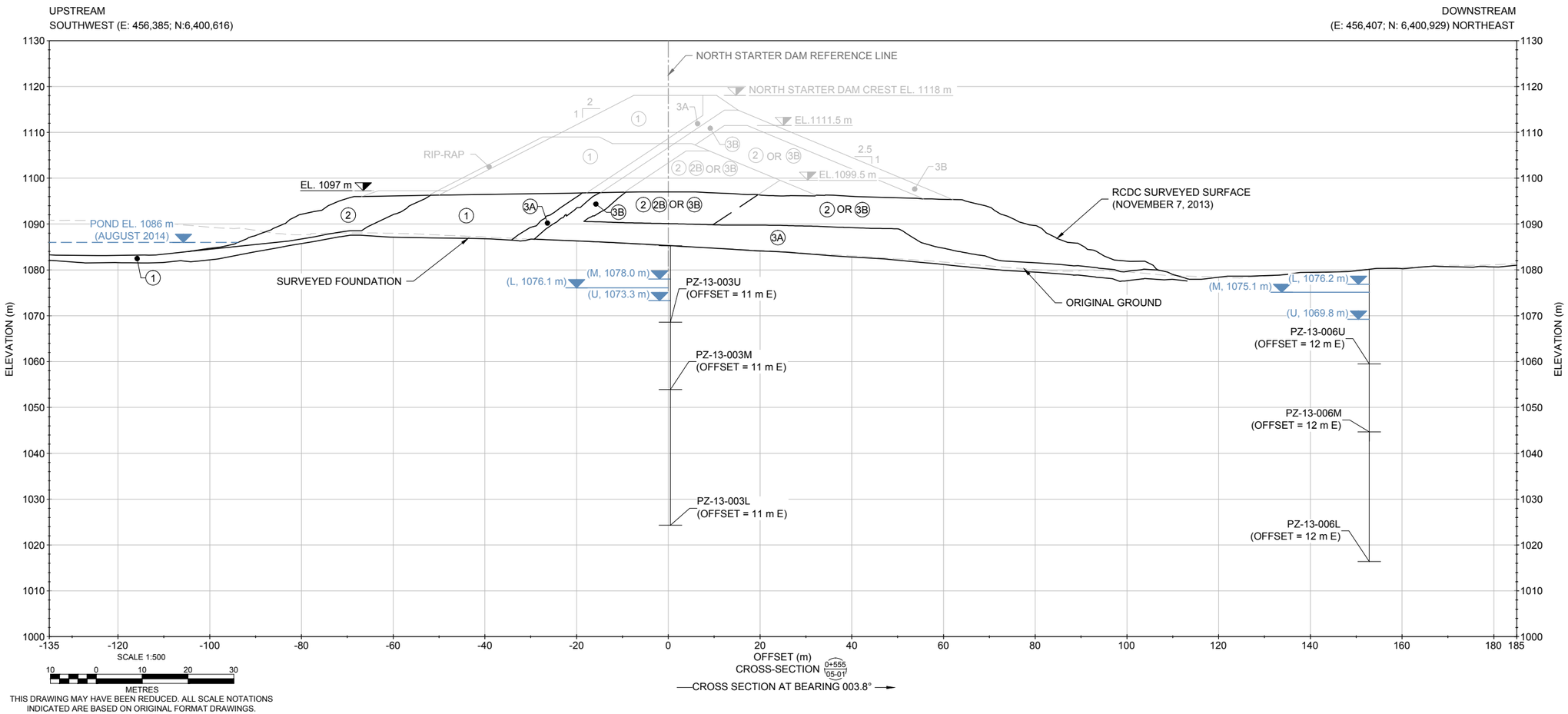
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris, an Imperial Metals company

PROJECT: TAILINGS IMPOUNDMENT AREA
2013 CONSTRUCTION RECORDS REPORT

TITLE: NORTH DAM INSTRUMENTATION SECTIONS (SHEET 2 OF 3)

SCALE:	DWG No.:	REV.:
1:500	0866-CRR-XD-05-03	0



LEGEND
- NORTH STARTER DAM - SURVEYED
- NORTH STARTER DAM - DESIGN
- PIEZOMETRIC LEVEL (SEE NOTE 2)
- POND (AUGUST 2014)
- (1) GLACIAL TILL (MIN. 25% FINES)
- (2) SAND AND GRAVEL (MAX. 15% FINES)
- (2B) SAND AND GRAVEL (MAX. 20% FINES)
- (3A) SAND AND GRAVEL (MAX. 6.5% FINES)
- (3B) SAND AND GRAVEL (MAX. 10% FINES)

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. PIEZOMETRIC LEVEL READING DATED SEPTEMBER 5, 2014. UPPER (U), MIDDLE (M), AND LOWER (L).
3. INTERNAL DAM DETAILS PROVIDED BY RCDC.
4. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED “TAILINGS IMPOUNDMENT AREA, 2013 CONSTRUCTION RECORDS REPORT”, AND DATED SEPTEMBER 2014.
5. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	14	09	30	AH	DD	DD	TM	CONSTRUCTION RECORDS REPORT

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: GCB	CHECK DRAWING: CJT/LS
DESIGN BY: TM	CHECK DESIGN: DD
LEAD ENGINEER: TM	APPROVAL DATE: SEPTEMBER 30, 2014
PROJECT MANAGER: DD	APPROVAL DATE: SEPTEMBER 30, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Red Chris
an Imperial Metals company

PROJECT: TAILINGS IMPOUNDMENT AREA
2013 CONSTRUCTION RECORDS REPORT

TITLE: NORTH DAM INSTRUMENTATION SECTIONS (SHEET 3 OF 3)

SCALE:	DWG No.:	REV.:
1:500	0866-CRR-XD-05-04	0

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE

X:\Projects\0866 Red Chris\001\NORTH DAM\PRODUCTION\FC\20140718_CRR_REV0_STAGE_1_TAILINGS_IMPOUNDMENT_AREA_CONSTRUCTION_0866-CRR-XD-05-04_REV_0.dwg Layout: 05-04 Plot Date: Sep 30 14 Time: 11:33 AM