BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

YUKON GOVERNMENT

NORTH FORK ROCK DRAIN, SEEPAGE INTERCEPTION SYSTEM, FARO MINE

AS-BUILT REPORT UPSTREAM ELEMENTS

FINAL

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Mar. 19, 2015
Project No.: 0533-010-07

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Dear Mr. Brassard,

Re: As-Built Report, Upstream Elements, NFRD Seepage Interception System, Faro Mine

Please find the as-built report for the upstream elements of the North Fork Rock Drain (NFRD) Seepage Interception System (SIS) Project. As requested, the other aspects of the project are contained in the separate report on the downstream elements and piping system.

We thank you for the opportunity to provide service once again at Faro Mine and we look forward to continuing our relationship with the Yukon Government.

Yours sincerely,

BGC ENGINEERING INC.
per:

ISSUED AS DIGITAL DOCUMENT.
SIGNED HARDCOPY ON FILE WITH
BGC ENGINEERING INC.

James W. Cassie, M.Sc., P.Eng.
Principal Geotechnical Engineer

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ACRONYMS AND ABBREVIATIONS

AANDC	Aboriginal Affairs and Northern Development Canada
BGC	BGC Engineering Inc.
CAT330	Caterpillar 330C excavator
CAT365	Caterpillar 365C excavator
CAT773	Caterpillar 773B haul truck
CAT988	Caterpillar 988 front loader
CH2M	CH2M Hill Canada Ltd.
Creek	North Fork Rose Creek
D6	Caterpillar D6R dozer
D9	Caterpillar D9L dozer
Deere400	John Deere 400D articulated truck
Deere loader	John Deere TC54H front loader
DS	Downstream
DSAR	Downstream Access Road
DSR	day shift report
DSSC	Downstream Seepage Collection System
E	east
ECL	Elemental Controls Limited
ELR	Ecological Logistics & Research Ltd.
FM	Field Memorandum
FMC	Faro Mine Complex
FPMT	Faro Project Management Team
GCL	geosynthetic clay liner
GPS	Global Positioning System
grader	Caterpillar 14H grader
GRF	General Rock Fill (unsorted)
IFC	issued-for-construction
L	liter
Laberge	Laberge Environmental Services
m	meter
Minnow	Minnow Environmental Inc.
N	north
NFRC	North Fork Rose Creek

NFRD	North Fork (of Rose Creek) Rock Drain
NF2	Water Quality Station NF2
NF2A	Water Quality Station NF2A
NF2B	Water Quality Station NF2B
PCL	Pelly Construction Ltd.
ppm	parts-per-million
Rev	Revision
RGC	Robertson Geoconsultants Inc.
ROM	run-of-mine
RPF	Rock Protection Fill (sorted)
s	second
SIS	Seepage Interception System
SFRC	South Fork Rose Creek
TEES	Tlicho Engineering and Environmental Services Ltd.
TP	test pit
Underhill	Underhill Geomatics Ltd.
US	Upstream
USAR	Upstream Access Road
USPD	Upstream Plug Dyke
UTM	Universal Transverse Mercator
XRF	X-Ray Fluorescence
YG	Government of Yukon
Zn	zinc

LIMITATIONS

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1.0 INTRODUCTION

1.1. Background

The Government of Yukon (YG) and Aboriginal Affairs and Northern Development Canada (AANDC) are responsible for the management of the abandoned Faro Mine Complex (FMC), located in the south-central Yukon, approximately 20 km north of the Town of Faro and the Pelly River.

In November 2013, contaminated seepage was noted at the toe of the North Fork (of Rose Creek) Rock Drain (NFRD), while water in the headpond was compliant. The North Fork Rose Creek (NFRC) [the "Creek"] flows in a southwesterly direction around the southeast side of the mine, as shown on Figure 1-1, connecting up with the South Fork Rose Creek (SFRC) just upstream (or east) of the Original Tailings Impoundment.

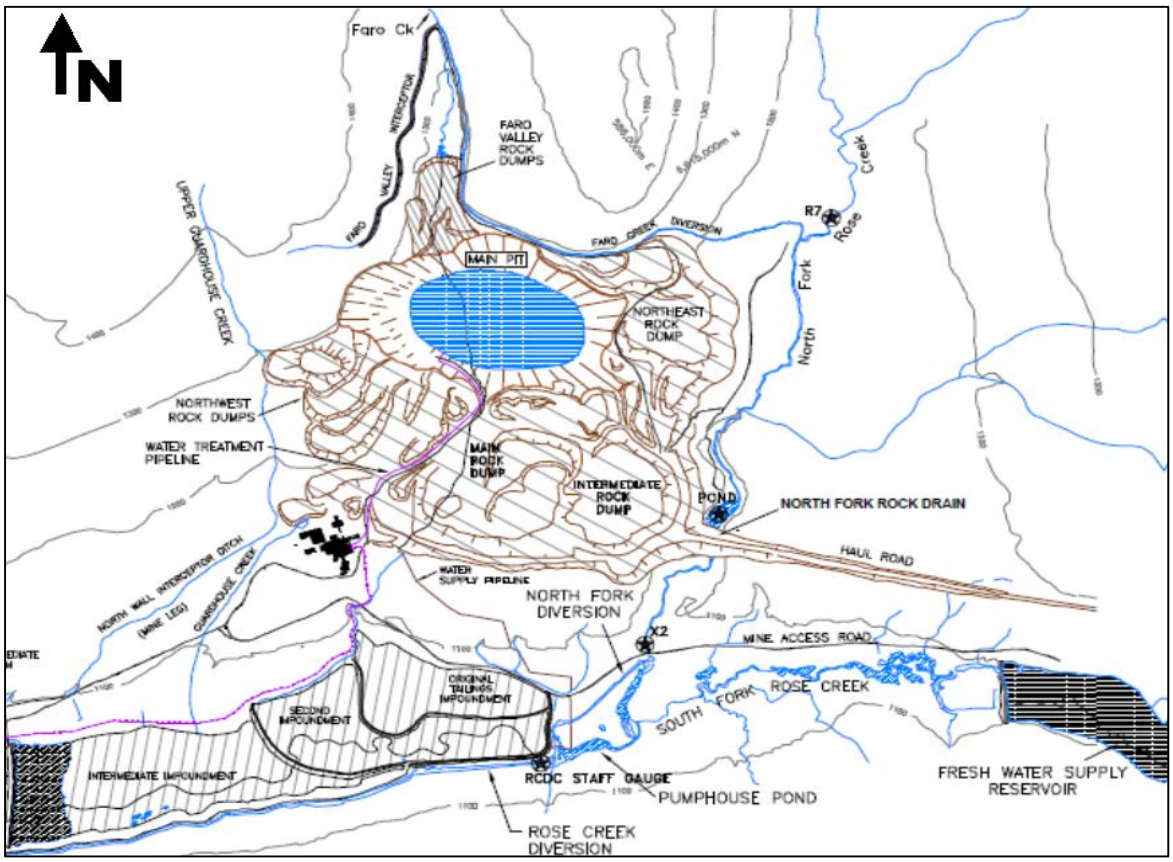


Figure 1-1. Location Plan for the North Fork Rock Drain along east side of the Faro Mine. Note that the Fresh Water Supply Reservoir shown is now decommissioned.

Higher than typical and non-compliant concentrations of zinc (Zn) (0.5 mg/l is the maximum allowed) were noted at Water Quality Station NF2A (located on the right hand side of the discharge looking downstream) while seepage water at Station NF2B (located on the left side) had compliant levels of Zn. RGC (2014) indicated that highly impacted seepage, likely from

the Intermediate Dump (possibly the “Sulphide Cell”), was entering the NFRD underneath the haul road embankment. A February-March 2014 drilling program was initiated by RGC and 6 wells were drilled and tested but no contaminated seepage was located within these wells where measured. During the 2014 summer high flow periods, the concentration of Zn in the seepage water was still elevated but within acceptable limits. It was expected that unacceptable zinc concentrations, as were observed in the winter of 2013/2014, would again prevail this winter (2014/2015), if no mitigation measures were undertaken.

BGC Engineering Inc. (BGC) was contracted to complete designs and supervise construction for the interim measures, which were aimed at mitigating the concentration of zinc in the NFRC during winter of 2014/15. These measures were interim and not meant to be long term measures.

As part of the construction management services provided by BGC, an as-built report was to be prepared to document the finally constructed works. YG requested that the as-built report be separated into two separate documents, one for the upstream and one for the downstream elements. This report therefore documents the works constructed on the upstream side of the rock drain; the downstream mitigation measures are documented under separate cover.

1.2. Project Overview and Report Contents

Following the initial review of options in late-July as summarized in BGC (2014a), YG elected to proceed with the option that relied upon partial collection of the impacted seepage as summarized in BGC (2014a). YG retained BGC to provide design engineering and construction management for the NFRD Seepage Interception System (SIS), comprised of four major aspects, as follows:

1. Upstream Access Road (USAR) – Construction of access road and turn-around / laydown areas upstream of the rock drain.
2. Upstream Plug Dyke (USPD) – Installation of an upstream plug-dyke to divert fresh water input from the headpond aiming to reduce the quantity of seepage at the downstream toe.
3. Downstream Access Road (DSAR) – Construction of access road and turn-around / laydown area downstream of the rock drain.
4. Downstream Seepage Collection System (DSSC) – Construction of seepage collection sump on the downstream side, along with required pump infrastructure, power supply and heat traced pipeline to the Faro Pit.

Given the short time frame for proposed design and construction activities (proposed to be completed by fall 2014), the lack of design input values and design criteria and the numerous uncertainties with proposed interim water segregation and mitigation measures, this project was undertaken on a “best efforts” approach. Also, no specific water quality objectives, resultant water quantities or compliance locations were specified as design criteria for the SIS, although compliance with the water discharge criteria was hoped be the final outcome.

Additional details on the design objectives and the project aspects, elements and design changes are provided in Section 2.0.

At this stage, it is important to note that the USPD element was cancelled just before its construction was to begin. Therefore, this as-built document only covers the construction of the USAR over a period of approximately one month, from the start of clearing and grubbing activities on September 20, 2014 to completion of re-conditioning of borrow areas on October 29, 2014. The development of borrow areas required for the construction of the USPD is also included in this document. This as-built report therefore covers the following main topics:

- Key personnel and responsibilities
- Design objectives and elements
- Significant design changes
- Summary of construction activities and schedule, including as-built details
- Summary of construction management activities.

The design and layout of the USAR were provided originally in the issued-for-construction (IFC) Revision 0 of the Drawings and Specifications dated September 3, 2014, and the Revision 1 dated September 17, 2014. Given the number of design changes, the issued-for-approval (IFA) and IFC drawings are not included in this document, although some of their drawing numbers are referred to in the text. This design was superseded and this as-built report documents those changes, including as-built drawings provided in Appendix A.

1.3. Project Personnel and Responsibilities

YG and AANDC manage the FMC site and hence, acts in the role of the Owner. YG's and AANDC's responsibilities included the decision making on methods and elements, overall direction and delivery of the planned construction work, contract management, environmental management and coordination between the different consultants, contractors and the care and maintenance contractor currently working on FMC.

BGC was retained to support the development of seepage collection options, engineering design of the NFRD SIS and the related construction management, given that field fitting would be required. BGC responsibilities included construction monitoring and field verification of the works, field decisions on design and construction modifications and measurement of the Work for payment purposes. In addition, BGC was also requested to develop a Sediment and Erosional Control Plan (not provided herein). The performance of these measures noted on the plan was monitored by an independent environmental monitor contracted by YG, comprised of the following companies; Minnow Environmental Inc. (Minnow), Ecological Logistics & Research Ltd. (ELR) and Laberge Environmental Services (Laberge). The environmental monitoring results obtained from this program are not included herein.

Pelly Construction Ltd. (PCL) was retained by YG to provide construction services for the NFRD SIS. PCL responsibilities included construction of the work in accordance with construction documents (drawings and specifications) and associated contractual

requirements. Further, PCL was responsible for all health and safety aspects and environmental protection of the works.

Tlicho Engineering and Environment Services Ltd. (TEES) was contracted by YG to provide on-going care and maintenance services for the entire FMC. TEES is also responsible for overall health, safety and security control at FMC.

Underhill Geomatics LTD. (Underhill) was retained by BGC to provide professional surveying and geomatics support services for the NFRD SIS project. As part of the construction process, Underhill provided both baseline (preconstruction) and layout survey of the NFRD SIS elements and an as-built survey of the elements constructed by PCL.

1.3.1. Key Personnel

The following is a list of the key personnel involved in the course of the project:

- Faro Mine Care and Maintenance Project Manager – Karen Furlong (YG)
- NFRD SIS Project Manager – Chad Brassard (YG, on secondment from CH2M Hill Canada Ltd. [CH2M])
- Regulatory Manager – Patricia Randell (YG)
- Senior Project Manager – Dustin Rainey (YG)
- Faro Mine Site Managers – Boyd Barstad / Barry Wilson (TEES)
- Design Project Manager – Jim Cassie (BGC)
- Construction Field Engineer – Joan Roca (BGC)
- Field Verification (Night Shift) – Chris Pederson (BGC)
- Construction Project Manager – Dan Russell (Pelly)
- Construction Site Superintendent – John Garvice (Pelly)
- Environmental Management – Patricia Randell (YG) / Erik Pit (YG)
- Environmental - Fisheries and Aquatics – Cynthia Russel (Minnow) / Chris Jastrebski (ELR)
- On-Site Environmental Monitoring – Nicholas de Graff / Doug Davidge (Laberge).

The organization chart of the NFRD SIS project can be found on Figure 1-2.

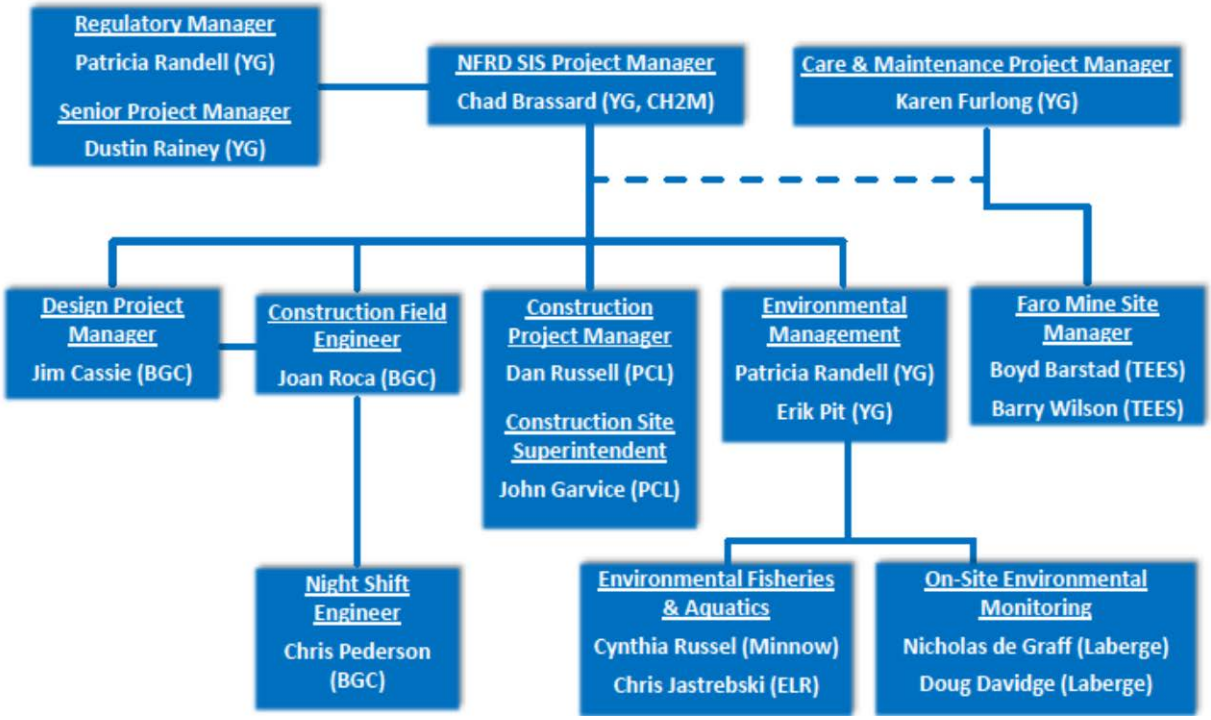


Figure 1-2. Organization chart for the NFRD SIS Project.

1.3.2. Site Visits

Regular site visits were conducted by YG representatives and staff. Dates and participants for each site visit are provided as follows:

- September 17, 2014 – Chad Brassard and Dustin Rainey (site visit)
- September 22 to 23, 2014 – Chad Brassard (construction kick-off meeting and site visit)
- October 8 to 10, 2014 – Chad Brassard (site visit at end of USAR works)

2.0 ORIGINAL DESIGN AND CHANGES

2.1. Design Objectives

The NFRD structure forms a hydraulic constraint between the headpond on the upstream (US) side (Photo 1) and the seepage discharge on the downstream (DS) side (Photo 2).



Photo 2-1. View of the headpond on the upstream side of the rock drain (July 2014) with waste dumps on the far left. Note the North Fork Rose Creek inflow channel on the far right.

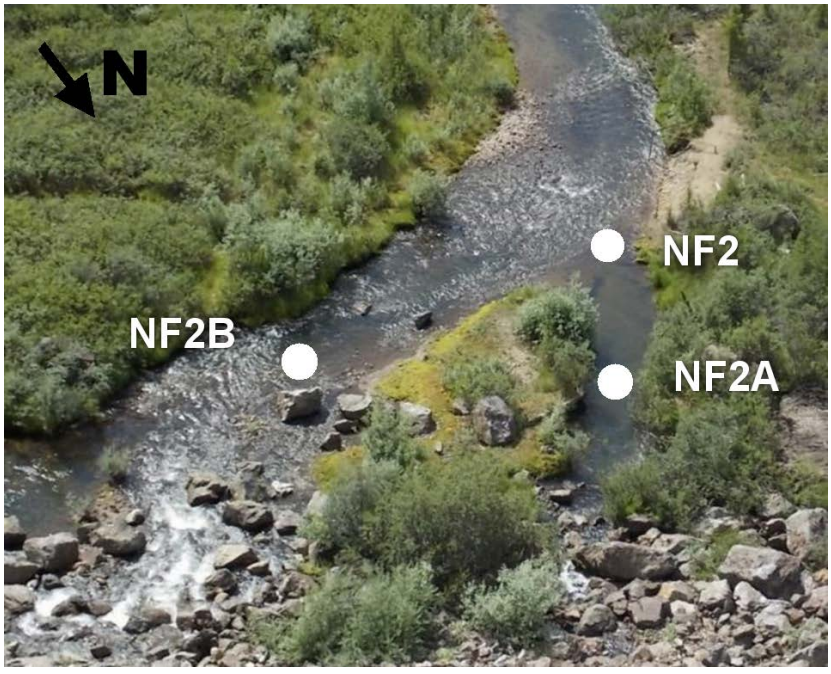


Photo 2-2. View of the seepage discharge on the downstream side of the rock drain with island located between the two streams (July 2014). Note the approximate locations of water quality stations referenced herein (NF2A on the right, NF2B on the left and NF2 in the background, by the right bank clearing).

As shown on Photo 2-2, the seepage discharge at the toe of the rock drain occurs in two separate streams of flow with an “island” separating the two streams. The impacted seepage has only been noted in the right stream (represented by Station NF2A) while the left side flow (represented by Station NF2B) does not contain any elevated Zn concentrations. As such, the objective of the NFRD SIS project was to collect and pump impacted water from NF2A side up to the Faro Pit, given it was the only potential water storage available on site. The pumping rate for seepage collection of 5 L/s was selected as the Faro Pit was nearly full, and it was necessary to preselect and procure a practically sized pump and associated pipeline system ahead of time. Given that the flow quantity on the NF2A side is highly unknown but thought to vary up to 800 L/s, it was necessary to segregate the impacted seepage on the far right side from the fresh water flow on the left. Therefore, an USPD was specified in an attempt to divert fresh water input from the headpond, with the objective being that this will reduce the quantity of impacted seepage at NF2A. On the downstream side, water diversion berms, a collection sump and pump arrangement and associated water pipeline were designed to complete the system.

As noted earlier, the design basis for this system was best efforts, in that no specific design criteria were developed and no specific investigations or assessments were done to support the development or design of the mitigation works. In addition, there was some significant uncertainty with the potential performance of some of the proposed elements, including segregation effectiveness of the USPD. Given that context, aspects of field fitting for project components, along with observation aspects and project modifications, were proposed. The original design considered the phased construction of the upstream and downstream elements in order to maximize the probability of collecting as much zinc load as possible. A monitoring stage between the construction of the upstream and downstream elements was proposed to assess the impact of the upstream activities on the distribution of flows and impacted seepage within NF2A. If required, the DSSC design could be revaluated based on the observations performed after the installation of the USPD.

BGC (2014a) contains a full description of the design objectives, as well as a discussion on the design assumptions, limitations and risks, before the construction was initiated.

2.2. Original Design and Elements

Section 1.2 summarizes the four main element of the SIS. Given the context of this report, the following two sections provide a brief overview of the USAR, USPD and associated borrow areas only.

2.2.1. Upstream Access Road

The purpose of the USAR is to provide access for the construction of the plug-dyke in the upstream headpond by haul trucks, followed by longer term access for smaller vehicles. The IFC version of Drawing FRNF-XD-02-04_Rev 1 (attached to Field Memorandum 1 in Appendix

B) shows the original design for the access road and laydown areas. The total original length of the USAR was approximately 817 m long, distributed on four different sections, as follows:

1. First section (design Stations 0+000 to 0+400) – From the top of the existing haul road to the natural ground at a longitudinal grade of 7.6%. 15 m wide. Placement of run-of-mine (ROM) followed by a capping layer of sand and gravel.
2. Second section (design Stations 0+400 to 0+540) – On existing natural ground. 15 m wide. Placement of a capping layer of sand and gravel.
3. Third section (design Stations 0+540 to 0+650) – Common excavation to a maximum depth of 4 m at a longitudinal grade of 8%. 9 m wide. Placement of a capping layer of sand and gravel.
4. Fourth section (design Stations 0+650 to 0+817) – Fill and cut at a longitudinal grade of 8% down to the US headpond shore. 9 m wide. Placement of common fill followed by a capping layer of sand and gravel.

A turn-around space was located on the transition from section three to section four. ROM safety berms were also required along the edge of the road crest.

Note that the IFC Drawing also contained the Specifications for the USAR construction, including but not limited to the clearing and grubbing of the existing ground, the identification (proof roll test) and treatment (sub-excavation and backfilling) of soft spots, and the local wasting of unsuitable material at the designated spoil area.

2.2.2. Upstream Plug-Dyke

The purpose of the proposed USPD was to divert fresh water input from the headpond to the left side of the rock drain. As shown on the IFA Drawings FRNF-XD-02-05_Rev B and FRNF-XD-02-06_Rev B, the original design noted the installation of a till plug at the right hand side (looking downstream) of the headpond to divert the fresh water towards the left hand side.

The following is a summary of the activities required as part of the installation of the till plug:

- Installation of a floating turbidity curtain into the headpond.
- Clearing and grubbing and removal of debris within the Work area.
- Installation of a rock fill dyke for construction access. At a first stage, permeable (screened) Rock Protection Fill (RPF) had to be installed at the left hand side to allow drainage. Then, the use of unscreened General Rock Fill (GRF) was required to complete the dyke.
- Installation of till plug phase 1. Dewatering and placement of approved till, underlain by a layer of geotextile. Likely placed under water.
- Installation of till plug phase 2. Dewatering and placement of approved fill on the remaining of the area, underlain by a Geosynthetic Clay Liner (GCL).

Note that the IFA Drawings also contain the Specifications for the execution of the USPD.

2.3. Associated Borrow Areas

Several borrow areas were to be developed as part of the construction of the USAR and USPD. Specific details for the borrow areas, including location for the borrow areas, are included on the IFC Drawing FRNF-XD-01-03_Rev 0 (attached to Field Memorandum 1). Specifications for the construction materials are included on the relevant design drawings for each structure.

2.3.1. Borrow Area A

Borrow A is a natural deposit of granular soil located at the southern side of the existing haul road, approximately 0.5 km from the USAR. This borrow area was the source for sand and gravel and clean sand for the construction of the USAR and USPD.

2.3.2. Borrow Areas B

Borrow areas B1, B2 and B3 are potential sources of till, proposed for low permeability fill for the USPD. They are approximately located at 8.4 km (B1), 7.5 km (B2) and 0.2 km (B3) respectively from the USPD.

2.3.3. Borrow Area C

Borrow C is located on the Northeast Rock Dump, approximately 2.7 km from the USPD. This borrow area was the source for any rock fill to be used in stream or within the area of exclusion (30 m wide area from the headpond shore), including the GRF and RPF required for the construction of the USPD. The rock fill material consisted of hard, durable calcium-silicate rockfill with some hard, durable green volcanic rock, deemed as suitable by YG.

2.3.4. Borrow Area D

The Borrow D site is the active haul road material from the Faro Mine side to the Vangorda/Grum Mine area. Borrow D is located approximately 0.2 km from the USAR. The development of Borrow D was required to provide the ROM fill required for the construction of the USAR. This borrow area consists of rock fill material overlain by a capping layer of sand and gravel.

2.4. Design Changes

Several design changes were introduced during construction in response to the site conditions encountered or input received during construction from YG. The following is a summary of the key modifications introduced to the design drawings and specifications. A description of the design changes is also included on the daily Day Shift reports prepared by BGC which are attached in Appendix C.

2.4.1. USAR Alignment

The alignment for the USAR from Station 0+600 to the end of the road was shifted uphill (towards the south) a maximum of 26.5 m (measured at the original design Station 0+740).

In addition, the longitudinal gradient was modified from the initial 8% to a maximum gradient of 10%, as per Contractor's recommendations and conversations with YG. As a result, no fill was placed inside the creek or upstream headpond. Also, the road could be located on a flatter area, requiring shallower excavations and smaller common fill volumes.

Construction as per the new alignment required the placement of construction fill up to approximately Station 0+650 on a flatter ground. Then, the Contractor performed common excavation up to the end of the road.

Conversations on the need were initiated due to the concerns raised by both PCL and BGC regarding the site conditions observed. It should be noted that no pre-construction site investigative program was undertaken to confirm ground conditions during the design phase. During construction, both BGC and PCL had a better understanding of the ground conditions based on observations performed during the construction monitoring. The main concerns that triggered the need of a new alignment are as follows:

- Possible delays on clearing and grubbing activities
- Risk of instabilities during road fill placement on natural slopes
- Possible delays on common excavation activities caused by the presence of frozen ground
- Risk of failures along the 4 to 5 m high cut walls excavated on fine grained soils
- Uncertainties related to the placement of fill into the headpond, including the delays introduced by the placement of a turbidity curtain and the salvaging of fish
- The weather conditions were changing quickly and ice was forming at the US headpond, so early completion of the USAR to construct the plug-dyke was recommended.

The new USAR alignment was approved by the Engineer on September 29, 2014 (refer to day shift report 20140929_NFRDSIS_DSR_21). Construction of the new alignment started on September 30, 2014.

2.4.2. USAR Centerline Shift

The Contractor abandoned the curve and turn-around area constructed 18 m past Station 0+600. Then, a new curve and turn-around area were created using Borrow D ROM material. The new elements were located at an earlier station (approximately 10 m towards the west). This change required the field fit of the road alignment for an approximate length of 15 m to return to the intended USAR alignment.

This change was required due to the observation of a small instability which occurred during the night shift from September 30 to October 1, 2014. That night, the Contractor suspended all construction activities when approximately 175 m^3 of the Borrow A gravel and sand fill being placed after the curve were affected by a slump.

A site visit was organized at the beginning of the following shift to observe the area affected. Based on field observations, the Engineer concluded that the movement was probably caused

by the peat ripping under the construction fill, possibly following initial sliding movement of the construction fill on top of the frozen ground, with or without some localized pore pressures.

After the visit (October 1, 2014), the Engineer approved the modification of the alignment to avoid the affected area. As per conversations with PCL and YG, the correction of the slump to continue with construction as per the initial alignment was not practical due to time constraints. Construction as per the modified alignment started the same shift.

Note that the Contractor removed material from the top of the affected zone to increase its stability and re-shaped the affected fill to facilitate water drainage. No further movement of the affected material was observed throughout construction.

2.4.3. Clearing and Grubbing

The Contractor placed approved construction fill directly on top of the superficial layer of moss from Stations 0+600 to 0+650. No problems were reported during the placement of approved construction fill on top of the layer of moss. Note that the trees located within the road footprint were cleared and moved to the local spoil area as the Engineer considered that they could cause settlements (degradation of logs under the road fill).

As recommended by the Contractor, the layer of moss would not be removed as it was protecting (insulating) the frozen ground underneath. This recommendation was triggered by problems observed during clearing and grubbing operations.

As per conversations with YG, the Engineer approved this change on the Specifications on September 30, 2014. Also, it should be noted that additional settlement and related road grading may be required following this field decision.

2.4.4. Construction Fill

The USAR design required the placement of a capping layer of sand and gravel from Borrow A. At the fourth road section, approved common fill material had to be placed to achieve the required longitudinal road slope. For the large volumes of fill, the Contractor hauled either Borrow D ROM (outside the exclusion area) or Borrow C GRF (close to the headpond). As a capping layer, the Contractor intermittently used the local source of fine to coarse sand and gravel located at the northern side of road (at the limit between the USAR and the spoil area).

The need for alternative construction materials was identified based on the following:

- The sand and gravel hauled from Borrow A was found to be too fine
- YG noted that the borrow area A was only available source for sand and gravel and use should be minimized where possible
- Borrow D fill could not be used close to the headpond for environmental reasons
- The common material being excavated could not be reused as it was partly frozen (depth to frozen ground from 0.5 to 1 m deep) or saturated
- The common material at the spoil area (frozen aggregates) could not be reused due to schedule or weather.

As per conversations with YG, the use of Borrow D ROM fill was approved on October 1, 2014. The use of Borrow C GRF was approved on October 3, 2014. The use of the local source of fine to coarse sand and gravel was approved on September 28, 2014.

2.4.5. USAR Fill Thickness

The Contractor modified the road fill thickness on two large areas. On the first one, from Stations 0+570 to 0+600 (field estimate), the Contractor installed a 0.5 m thick layer of sand and gravel underlain by a geotextile on top of partly frozen greyish sands and gravels. On the second one, from Stations 0+645 to 0+740 (field estimate), the Contractor installed a 1 m thick layer of Borrow C GRF underlain by a geotextile on top of a large section presenting areas with soft spots and areas with fine grained frozen grounds.

As per conversations with YG and PCL, the placement of an increased fill thickness without sub-excavation was based on the following:

- Sub-excavation of large areas was not practical (“build up” approach instead of sub-excavation). Equivalent fill thicknesses were provided.
- Sub-excavation of frozen areas was not practical.
- Risks associated to the disturbance of fine grained saturated soils (silty clay).
- Risk of exposing saturated silty clay layers that could be underlying superficial layers of sand and gravel.
- Robust solutions are justified based on the possible long term use of the road.

The Engineer approved the placement of geotextile and increased fill thickness on the first area on September 30, 2014. Placement at the second area was approved on October 3, 2014, as per communications with YG.

2.4.6. Addition of Turn-Around Locations

A total of six turn-around points for haul trucks were added during construction; four along the first road section (at the northeastern side), one at the end of the second road section (at the western corner) and one along the fourth road section (at the northern side).

This change was introduced to mitigate health and safety risks associated with the reversing and backing up procedures of haul trucks on downhill slopes.

As communicated with YG, the Engineer approved the change on September 24, 2014.

2.4.7. Ramp to Headpond Shore

A ramp to provide access to the upstream headpond shore from the USAR end was constructed. This activity required the removal of large boulders, debris and organics from the headpond shore. The sporadic use of an excavator equipped with a rock hammer was required. At a later stage, some of the boulders were relocated to create a platform as per Contractor’s recommendations. Then, the Contractor placed a layer of geotextile overlain by non-local GRF from Borrow C to form the final surface of the ramp.

Access to the headpond was needed for the installation of a turbidity curtain and construction of the USPD.

This change was approved the Engineer on October 4, 2014. As commented with YG, the placement of boulders reduced the volume of non-local fill to be hauled and placed. Also, they reduced the risk of future settlements due to the presence of saturated fine grained soils at the pond shore.

2.4.8. Upstream Plug Dyke Cancelled

On October 8, 2014, the development of materials from Borrow Area C was suspended as YG informed BGC that the need for an USPD was being revisited with AANDC. On October 10, 2014, YG suspended construction activities at the US area pending direction from AANDC. Both PCL and BGC demobilized from the Faro Mine site at the end of the shift.

On October 20, 2014, the YG officially cancelled the installation of the USPD.

On October 21, 2014, YG instructed PCL to complete the required work to close the activities suspended at the US area on October 10th. The activities included the conditioning of developed borrow areas, protection of the upstream headpond (sediment control elements) and closure of USAR pending activities. On October 24, 2014, PCL re-mobilized to site in order to complete to the USAR construction activities and the closure of borrow areas.

2.4.9. Addition of Drainage Ditches

Longitudinal and transversal ditches/trenches were excavated along the USAR to collect and divert water emerging from cut walls. The main ditches executed were:

- Longitudinal ditch from Stations 0+500 to 0+600 at the toe of the southeastern excavation wall sloping towards the northeast.
- Transversal trench at Station 0+675 (field estimate) backfilled with RPF and geotextile to facilitate drainage of seepage on excavated wall (estimated flow of 0.5 L/minute). Saturated fine grained silty clay was observed at both the excavation floor and wall.
- Longitudinal ditch from Stations 0+650 to 0+754 sloping towards the west to collect water emerging from the southern excavation wall. At the downstream end of the ditch, a berm and an infiltration sump was created to facilitate infiltration into the existing NFRD.

The addition of diches was required to drain the seepage along the excavation cut walls away from the USAR fills. Approval for the addition of trenches was performed on September 28, 2014.

3.0 CONSTRUCTION

3.1. Construction Description

This section documents the construction activities performed by PCL during the construction of the USAR and associated borrow areas from September 16, 2014 to October 29, 2014. Note that the complete demobilization by PCL from the site was not completed until January 30, 2015. Also, that the Contractor was working on double shifts (day shift and night shift) from September 22 to October 3, 2014. As-built drawings are attached in Appendix A.

The USAR is located on the northeastern side of the existing haul road from the Faro Mine to the Vangorda/Grum Mine area. As shown on Photo 3-1, the access road starts at the top of the haul road and runs down to the original ground. From there, the road makes a turn and runs down to the southeastern shore of the headpond on the upstream side of the rock drain. The as-built configuration of the USAR is shown on Drawing FRNF-XD-US-01 (refer to Appendix A).



Photo 3-1. View of the Upstream Access Road from the top of the existing haul road (October 2014).

The borrow areas A, C and D were the main sources for the construction fill used during construction of the USAR. As shown on Photo 3-2, Borrow A was previously in use for years before the beginning of the USAR construction works. Borrow C and Borrow D areas had to be developed by the Contractor for this project. Note that the development of till borrow areas B (B1, B2 and B3) was not required since the USPD element was cancelled. Also, a local source of sand and gravel was discovered as part of the road construction and used for a part of the USAR.

A compilation of the ground conditions observed during construction, together with recommendations for future works in the area, is included on the BGC Field Memorandum 2 (refer to Appendix B).

A photographic record of the USAR construction activities and development of borrow areas is included on the Day Shift Reports prepared by BGC as part of the construction management responsibilities (refer to Appendix C).



Photo 3-2. View of the Borrow area A from the top of the existing haul road (September 18, 2014). Note that the borrow area was previously developed.

3.2. Construction Activities

The following is a summary of the construction activities performed by PCL at the US side of the NFRD and borrow areas:

3.2.1. Mobilization

On September 16, 2014, the Contractor mobilized the required equipment to a laydown area within Borrow A. The haul road was also temporarily used as an intermediate laydown area during the assembly of the heavier pieces of equipment mobilized.

A list of the equipment mobilized by PCL can be found on Section 3.4.

3.2.2. Clearing and Grubbing

The clearing and grubbing, initiated on September 20, 2014, was completed to the limits marked by Underhill during the pre-construction baseline survey. On these areas, the Contractor removed the vegetation and the superficial layer of organics by means of heavy equipment (dozer or excavator) and hand tools (power saw). The material cleared was moved to the spoil area and stored separately from common excavation material, as approved by the Engineer.

The second USAR leg (Stations 0+600 to 0+650) was not cleared with heavy equipment to preserve the superficial layer of moss. On this area, the Contractor only removed the vegetation above ground level by means of hand tools.

A local source for fine to coarse sand and gravel was identified during clearing and grubbing northeast to Stations 0+385 to 0+450.

3.2.3. Proof Roll Test and Sub-Excavation

As soon as the road reached the natural ground at the toe of the haul road fill, the Contractor initiated the execution of proof roll tests (September 27, 2014). The tests were completed with support from the available haul trucks (loaded), excavators or dozers. Based on the visual observation of the proof roll test, the areas presenting excessive deformation were marked by the Contractor and Engineer. Marked areas were sub-excavated with an excavator to an approximate depth of 0.5 m and measured. A layer of geotextile was then placed at the bottom of excavation. Finally, the area was backfilled with approved sand and gravel fill from Borrow A or the local source of sand and gravel. The sand and gravel fill was then compacted using a minimum of two passes of the loaded haul trucks or dozer.

3.2.4. Execution of Exploration Test Pits

On September 25, 2014, the Contractor excavated three test pits (TP) along the USAR center line from Stations 0+550 to 0+600. The purpose of the TP's was to observe the ground conditions prior to the execution of the required common excavation.

A summary of the observations performed by the Contractor and BGC during the execution of the TP's can be found below:

- TP1 (4.2 m long x 1.2 m wide x 1.1 m deep) – A top layer of poorly graded coarse grained sand and gravel (0.4 to 0.5 m thick), underlain by saturated low plasticity silty clay with some sand. Maximum particle size 0.55 m. Water seeps on walls 0.45 to 0.5 m below ground surface (bgs) at top of the test pit. Water ponded in the test pit, but the walls did not collapse. UTM coordinates for this test pit were E 584,994 m / N 6,913, 118 m (hand held GPS).
- TP2 (4.4 m long x 1.1 m wide x 1.3 m deep) – A top layer of poorly graded coarse grained sand and gravel (0.2 to 0.3 m thick), underlain by saturated low plasticity silty clay with trace to some sand. Maximum particle size 0.42 m. Water seeps on walls 0.3 m bgs at top of the test pit. Water ponded in the test pit. Walls collapsed after 30 to 45 minutes. UTM coordinates for this test pit were E 585,006 m / N 6,413,127 m (hand held GPS).
- TP3 (4.5 m long x 1.3 m wide x 1.1 m deep) – A top layer of poorly graded coarse grained sand and gravel (0.1 to 0.2 m thick), underlain by saturated low to medium plasticity silty clay with trace sand. Maximum particle size 0.38 cm. Water seeps on walls 0.05 to 0.15 m bgs at top of the test pit. Water ponded in the test pit. Walls collapsed after 30 to 45 minutes. UTM coordinates for this test pit were E 585,013 m / N 6,413,135 m (hand held GPS).
- The presence of water seeps and the collapse of TP walls could partially be associated to the melting of ground ice. Given the depth of permafrost, subsurface water flows are also possible.

Based on the observations listed above, the Contractor and Engineer decided to perform the required common excavation in two stages. After the first stage, to a depth of 2 m, ground

conditions were re-evaluated to identify possible instabilities. Then, common excavation continued to the required depth.

3.2.5. Common Excavation

The Contractor completed the common excavation to the lines and grades shown on IFC Drawing FRNF-XD-02-04_Rev 1 between Stations 0+500 and 0+600 from September 28 to 30, 2014. These limits were marked by Underhill during the pre-construction baseline survey. Between Stations 0+650 and 0+745, the common excavation was completed to the field marks and grades as per the new USAR alignment approved on September 29, 2014. These limits were marked by the Contractor and Engineer.

The common excavation was performed by means of an excavator. The support from a dozer was required intermittently to rip hard frozen ground encountered in some areas (depth to frozen ground from 0.5 to 1 m deep). As a result, the common excavation floor was irregular.

The Contractor hauled the excess of common excavation material to the spoil area, and then segregated it in different piles based on its characteristics, such as grain size or moisture content. If approved by the Engineer, the excavated material will be reused as common fill for the USAR.

The same till deposits described during the execution of the TP's were encountered during the common excavation along the third road section. Similar observations were made during the excavation from Stations 0+650 to 0+754). On this section, the Contractor encountered a heterogeneous poorly graded till deposit, presenting areas with a saturated greyish silty clay and sand (with trace gravel and trace cobbles), and areas with light brown gravel and sand (with some silty clay). The maximum particle size observed was 0.6 m.

The execution of longitudinal and transversal ditches was required to collect water emerging from cut walls and divert it away from USAR construction fills.

Some small slumps were also observed during common excavation on areas with fine grained glacial deposits. The bigger one, affecting an approximate volume of 40 m^3 of material at the uphill cut wall (Station 0+650), was recorded by the Contractor during common excavation at the fourth road section. The Contractor removed the slump and placed Borrow C GRF to buttress the slope. It is important to note that, although no slumps have been observed on completed excavation cut walls at 2H:1V, the monitoring of the completed cut walls during this spring (2015) is recommended to identify possible instabilities.

3.2.6. Fill Placement

The placement and spreading of construction fill on top of the prepared ground was completed with haul trucks and a dozer. Fill was compacted using a minimum of two passes of the equipment. The final road grading was achieved by means of a grader.

Four different construction materials were used, as outlined below:

- First section (September 21 to 27, 2014) – Borrow D ROM placed on the existing ground to create the ramp, overlain by a 0.3 m thick layer of Borrow A sand and gravel. Borrow D ROM was also used to create safety berms along the road edge. From September 21 to 27, 2014.
- Second section (September 27 to 28, 2014) – Borrow A sand and gravel was used to create the trafficable surface. When the Borrow A fill was found to be too fine, sand and gravel from the local source located beside the USAR was used to backfill areas sub-excavated in lieu of Borrow A sand.
- Along the third and fourth road sections (September 29 to October 4, 2014) – Outside the 30 m width exclusion zone from the headpond shoreline, Borrow D ROM was used as a common fill and to create safety berms along the road. Inside the exclusion area, the Contractor used Borrow C GRF.

No common excavation material could be reused as a construction fill due to cost or schedule constraints. Given that the common excavated material piled at the spoil area consisted of frozen aggregates of granular soils or saturated granular soils, the use of this material was not acceptable unless it was reworked.

3.2.7. Sediment and Control Measures

The required sediment and control measures were described on the Sediment and Erosion Control Plan (BGC 2014b). The description of the sediment and control measures implemented during construction are outlined as follows:

- The limits for the required clearing and grubbing were clearly marked on the field. The activities were minimized to reduce disturbance of vegetated buffers.
- Diversion ditches and berms were installed to intercept water streams, runoff water or seeps. The water was diverted away from construction areas to prevent the erosion and transport of construction fills.
- When required, drainage openings were created on the safety berms installed along the road edge.
- Approximately 171 m of silt fences were installed along the headpond shore to intercept sediment rich drainage water.
- A fish fence was installed across the US headpond by the independent environmental monitor, who then, completed the salvaging of fish.
- A turbidity curtain was installed across the US headpond once the environmental team (ELR) completed the salvaging of fish. The installation of the turbidity curtain was a requirement for the execution of the USPD. The curtain was fixed at both ends by means of ropes. Along the fence, wooden poles were driven into the bottom of the pond sediment to retain the curtain.

3.2.8. Development of Borrow A

The development of Borrow A was for the construction of the USAR, DSAR and DSSC. The only improvement introduced by PCL was the installation of a safety berm at the access ramp to Borrow A.

Drawing FRNF-XD-US-02 shows the pre and post construction configuration of the borrow area (Appendix A). As shown on drawing, PCL mined the natural deposit of sand and gravel located at the existing working face in the borrow pit (southwestern end of the borrow area). The granular soil was excavated with a front loader and then loaded into haul trucks.

The development of a specific area for clean sand was not required. The small volume of sand required was obtained from the existing working face within the borrow area.

3.2.9. Development of Borrow C

Two different zones were developed within the Borrow C area; the upper platform and the lower platform. Some road conditioning and maintenance was completed by PCL in order to provide independent access to the two zones, including the installation of culverts on drainage crossings (2 crossings).

The GRF was obtained from the lower platform area by mining the existing rock dump with an excavator or front loader. The GRF was directly loaded into haul trucks and hauled to the USAR construction area.

The RPF was obtained by mechanically sorting material from the rock dump with an excavator at both the upper and lower platforms. The sorted RPF was piled in front of the mined rock dump. Note that the intermittent use of an excavator equipped with a rock hammer to break down large rock boulders was approved on September 22, 2014 to increase productivity.

Given that the construction of the USPD was cancelled, approximately 3,500 m^3 of sorted RPF (generally cobbles and boulders up to 700 mm diameter) segregated in different piles were not removed from the borrow area. The post development configuration of the borrow area is shown on Drawing FRNF-XD-US-03 (Appendix A).

As part of the borrow development, BGC provided the results from XRF testing performed on rock samples collected from the borrow area. The XRF results supplemented visual monitoring (e.g. surface staining) assisting the Contractor to identify areas with clean rockfill. As a result, some areas within the Borrow C area were discarded as a potential source for construction fill.

3.2.10. Development of Borrow D

The development of Borrow D was required for the construction of the USAR. Coordination with TEES was required to ensure that the haul road was opened to traffic during development. The implementation of special measures, such as the installation of traffic signs or the installation of a safety berm, was required.

The Borrow D was mainly developed by means of excavators. A front loader and a dozer were also used on this area. Once excavated, the ROM was directly loaded into haul trucks and hauled to the construction area.

At the end of construction, the haul road had two different trafficable platforms running in parallel at different elevations. As a result, the need to create two access ramps to the lower platform with a longitudinal grade of 10% slope was required. The post development configuration of the borrow area is shown on Drawing FRNF-XD-US-04 (Appendix A).

3.2.11. Closure of USAR Construction Activities

Once the USPD construction was cancelled, the implementation of additional measures and completion of outstanding tasks was required to close the USAR construction works. YG requested that PCL should only complete critical tasks, as approved by the Engineer, which was done.

As per discussions with YG, the Engineer prepared a list of tasks to be completed before PCL could demobilize from site. The list was submitted to PCL on October 22, 2014. A description of the main activities included on the “punch list” and the activities performed by PCL are summarized below:

- Reconditioning of Borrow C area. PCL re-established traffic at the area. No further activity was required
- Reconditioning of Borrow D area:
  - Open the lower platform to traffic. The Contractor removed the excess of material at the lower platform. The material excavated was used to create the required access ramps, buttress the existing cut slopes, surface the lower platform and to create safety berms. Note that the final grading of the trafficable surface with a grader was not practical as the ground was frozen.
  - Re-establish drainage. The contractor maintained the existing drainage. Also, new openings and ditches were executed. No further activity was required.
  - Safety berm. The safety berm was re-constructed. No further activity was required.
- Sediment and control measures USAR:
  - Silt fences. The existing silt fences were repaired. When required, new fences were installed. No further activity was required.
  - Re-establish drainage. PCL maintained the existing ditches and installed a new ditch at the end of the first road section. No further activity was required.
  - Drainage at the end of USAR. PCL installed interception ditches and berms at the end of the USAR to prevent the accumulation of runoff water that could reach the headpond, as approved by the environmental monitor and the Engineer. In addition, an infiltration pond was executed at the toe of the NFRD to allow the infiltration of the collected water. No further activity was required.
  - Removal of turbidity curtain from the US headpond. The Contractor mobilized personnel and equipment to the headpond to remove the turbidity curtain. This

activity was not possible as the curtain was found to be trapped in the ice on top of the pond. It is important to note that the turbidity curtain was still in place at the time of preparing this report.

Before demobilization from the Faro Mine site, all the required activities were completed except the removal of the turbidity curtain and the final grading of the haul road area. As per conversations with YG, these activities will be completed at a later stage by others.

3.2.12. Demobilization

PCL personnel were demobilized from site on October 29, 2014 after completion of the activities on the US area. As approved by YG, the Contractor did not demobilize all equipment from the Faro Mine site until January 30, 2015.

3.3. Schedule

The following summarizes the key activities associated with the construction at the upstream side of the NFRD:

- September 16, 2014 – Mobilization to Faro Mine site (PCL, BGC and Underhill).
- September 19, 2014 – Start of development for Borrow C area.
- September 20, 2014 – Start of USAR construction activities. PCL started clearing and grubbing the road section further west to Station 0+350, including road footprint, and turn-around and spoil/laydown areas.
- September 21, 2014 – Start of development of Borrow D. Start of ROM fill placement from the top of the haul road.
- September 23, 2014 – The presence of soft saturated soils was reported by the Contractor (both by the D6 and CAT330 operators) during clearing and grubbing.
- September 25, 2014 – The CAT 330 had to be recovered with the D6 as it was trapped (on an area with soft saturated soils exposed during clearing and grubbing activities) close to the turn-around area located at Station 0+600.
- September 27, 2014 (night shift) – Completion of the fill section from the top of the haul road (Station 0+000) to the natural ground (Station 0+350). Start of fill placement on original ground. Start of development of Borrow A.
- September 28, 2014 – Start of excavation between Stations 0+500 and 0+610, including the execution of three exploration test pits to observe ground conditions.
- September 30, 2014 – Completion of excavation between Stations 0+500 and 0+610, and start of clearing and grubbing and fill placement as per the new USAR alignment approved by the Engineer on September 29, 2014.
- September 30, 2014 (night shift) – Construction activities were suspended due to the observation of a small instability. The Contractor continued USAR construction on October 1, 2014 by shifting the curve to an earlier station.
- October 1, 2014 – Completion of fill section from Stations 0+600 to 0+650, and started common excavation between Stations 0+650 and 0+745.

- October 2, 2014 (night shift) – Completion of common excavation between Stations 0+650 and 0+745.
- October 3, 2014 – Start of fill placement between Stations 0+650 and 0+745.
- October 5, 2014 – Completion of USAR construction. Some outstanding issues, such as the remediation of the small slump or the closure of borrow areas, were still not resolved.
- October 6, 2014 – Installation of turbidity curtain on the upstream headpond.
- October 8, 2014 – Activities at Borrow C were suspended.
- October 10, 2014 – Construction activities suspended. Demobilization of PCL.
- October 16, 2014 – BGC mobilizes to assess conditions within NF2A.
- October 21, 2014 – YG communicates that the USPD construction is cancelled. The development of Borrow C is also cancelled. PCL was instructed to re-mobilize to complete the outstanding USAR activities and to close the borrow areas.
- October 24, 2014 – PCL re-mobilizes to Faro Mine site.
- October 29, 2014 – PCL completes the outstanding USAR activities and demobilizes.
- January 30, 2015 – PCL completes de demobilization of equipment from the Faro Mine site.

3.4. Equipment

The following equipment was used during construction of the USAR:

- A CAT 330C excavator (CAT330) was used to sort RPF at Borrow C, sub-excavate areas failing proof roll test, backfill excavations, assist on the clearing and grubbing operations, and to create ditches and trenches for drainage.
- A CAT 365C excavator (CAT365) was used to develop Borrow D, load ROM fill to haul trucks, execute the common excavation at USAR footprint and to remove/relocate rocks and logs at the US headpond shore.
- A CAT D9L dozer (D9) was used to spread construction fill, assist on the excavation of frozen soils (with the ripper), and assist on the development of Borrow areas C and D.
- A CAT D6R dozer (D6) was used to clear and grub the required areas, spread construction fill, create berms along the USAR and to maintain access roads (removal of snow/mud).
- Three CAT 773B haul trucks (CAT773) were used to haul organic material from the areas cleared and grubbed to the spoil area, haul excavated materials to the spoil areas, haul construction fill from Borrow areas A, C and D to USAR area, compact the fill spread at the USAR, and perform proof roll tests along the USAR footprint.
- A Deere 400D articulated truck (Deere400) was intermittently used to support the CAT773 trucks when hauling construction fill from Borrow areas C and D.
- A CAT 988H front loader (CAT988) was used to load construction fill into haul trucks at borrow areas A, C and D, as well as to assist on the development of Borrow area D.
- A Deere TC54H front loader (Deere loader) was used to load construction fill into haul trucks at Borrow area A and to unload parts delivered to the field, such as rolls of geotextile.

- A CAT 14H grader (grader) was used to grade the USAR, maintain access roads (removal of snow/mud), and to create drainage ditches.
- Two light towers (an Ingersoll Rand and an Allmand ML8) were used to illuminate the construction areas.

4.0 CONSTRUCTION MANAGEMENT

4.1. Daily Inspection Reports

During the complete construction period, BGC completed daily shift reports (DSR) to record the key field activities, conversations and agreements between the different parties involved on the construction, including PCL, and to provide an update on the issues recorded. A copy of day shift report was submitted daily to YG and PCL.

The prepared day shift reports cover the period from the mobilization of PCL's equipment (September 16, 2014) to the demobilization of PCL's personnel upon completion of USAR construction activities (October 29, 2014), including night shifts. The following is a summary of the BGC personnel present on site during construction:

- September 16 to September 21, 2014 – Joan Roca
- September 22 to October 4, 2014 – Joan Roca and Chris Pederson
- October 5 to 10, 2014 – Joan Roca
- October 16 to 17, 2014 – Jim Cassie and Joan Roca
- October 21, 2014 – Joan Roca
- October 24 to 29, 2014 – Joan Roca

Note that no reports were produced during the standby time, including the period from the demobilization on October 10, 2014 to the remobilization on October 24, 2014.

A compilation of the day shift reports produced by BGC during the construction activities at the upstream side of the NFRD is included on Appendix C. Note that YG requested that the original shift reports be separated into two separate documents on the basis of upstream versus downstream elements. The shift reports on Appendix C therefore cover the work constructed on the upstream side of the rock drain; the downstream works are documented under separate cover.

4.2. XRF Analyzer Surveys

The design specifications required the execution of field tests to identify the presence of material showing extensive alteration of sulphides. As stated on the design drawings, materials showing alteration and high metals content could not be used as construction fill close to the Creek due to potential for environmental impact.

As part of the construction management activities, BGC completed a testing program to identify fill sources that may contain high metals content. This section summarizes the XRF testing activities performed by BGC.

4.2.1. XRF Analyzer

The portable X-Ray Fluorescence (XRF) analyzer is a device widely used due to its low-cost and rapid turn-around for results. The XRF analyzer provides elemental concentrations, determined by XRF spectrometry, of samples collected on the field.

The main advantage of this testing equipment is that the samples can be prepared and tested on site. There is no need to ship the samples to a conventional laboratory. As a result, the execution of field tests provides rapid test results, allowing for an increased sample density and ability to make field decisions regarding the use of construction materials.

The equipment used by BGC was a Thermo Scientific Niton XRF Analyzer, model XL3t 500. It was rented from Elemental Controls Limited (ECL). A certificate of calibration for the XRF analyzer used by BGC was issued by ECL when the equipment was rented and shipped (refer to Appendix D for a copy of the certificates).

4.2.2. Sample Collection and Preparation

The primary objective of the BGC sampling was to characterize fill sources for the material to be placed close to or into the upstream headpond and Creek. The selection of the number and location of samples was performed based on the dimensions of the borrow areas, the volume of fill to be hauled to the construction area, the construction progress and the available resources.

BGC collected a total of 81 fill samples; 7 grab samples of unsorted GRF from Borrow C, 48 grab samples of sorted RPF from Borrow C and 26 grab samples for Borrow D ROM. The location of the samples collected during construction activities is shown on Drawing FRNF-XD-US-05 (Appendix D).

The samples were collected at different construction phases. Sampling before and during PCL's activities at the borrow areas, as well as during fill placement operations, was completed by BGC.

After collection, the samples were stored in plastic zip-lock bags. A unique reference number was given to each sample collected. The samples were transported to the XRF testing location and logged on the BGC testing data sheets.

Before testing, the samples were dried to reduce the moisture content. According to the ECL, the moisture on samples could attenuate the beam of x-Ray, affecting the test results. When possible, the samples were air dried. In some occasions, the samples were dried with a heater due to time constraints.

4.2.3. XRF Test Results

The XRF analyzer was calibrated every time it was turned on (daily basis). At a first stage, a routine factory calibration was automatically performed by the XFR analyzer. Then, BGC performed tests on reference materials provided by ECL. The results were checked against the available laboratory certificates of analysis for the reference materials. These tests were performed to ensure the ongoing performance of the equipment. Finally, BGC performed a verification of the analyzer settings to ensure that the equipment was reading the required parameters.

Upon verification, the available fill samples were tested by BGC either on the field, workshop, or main office. The testing station located at the workshop is shown on Photo 4-1. A total of 102 tests were completed by BGC as part of the characterization of the construction fills.



Photo 4-1. XRF testing location. Workshop located at the main gate area, Faro Mine (September 25, 2014).

In some cases, more than one test was performed on some of the collected samples at the discretion of the BGC personnel. These additional tests were performed to compare different specimens within the same sample. For example, rock samples showing red or orange staining were compared to rock samples with no staining. This information was used to provide information to be used during the field visual verifications of construction fill.

Figure 4-1 illustrate the Zinc (Zn) concentrations, expressed in parts-per-million (ppm), measured by the XRF analyzer. A complete record of the results returned by the XRF analyzer, showing elemental concentrations for each sample tested, is included on Appendix D.

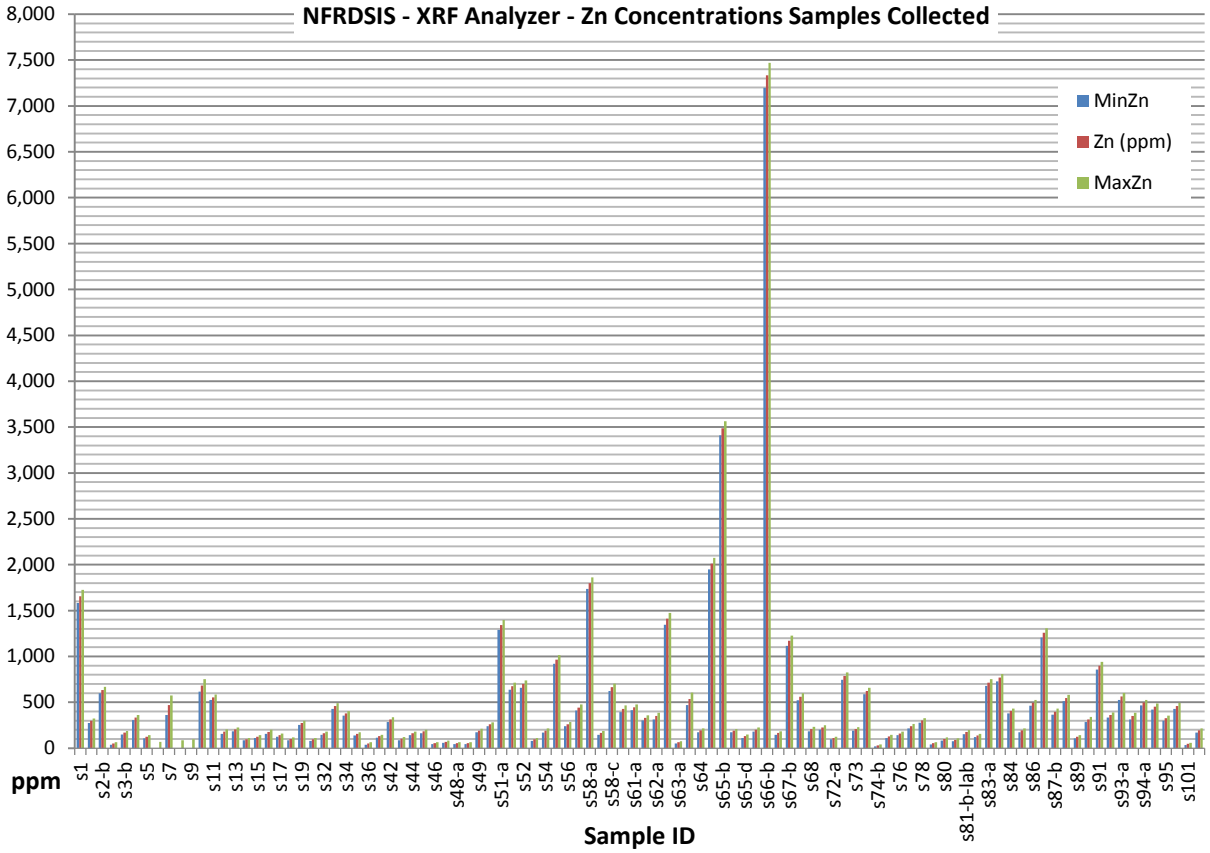


Figure 4-1. Summary of Zn concentrations returned by the XRF analyzer during field tests performed on samples collected during construction activities at USAR and borrow areas.

As shown on Figure 4-1, 93 samples returned Zn concentrations below 0.1% (1,000 ppm). The maximum Zn concentration observed during testing was almost 0.75% (7,500 ppm), with the average Zn concentration from all tests being 0.05% (474 ppm). Note that the 7 samples showing reddish or orangish staining on fracture faces returned concentrations above 0.1% (1,000 ppm). Only 2 of the 3 samples presenting yellowish staining reported concentrations below 0.1% (1,000 ppm).

Based on the observations and testing results, the Engineer marked areas not suitable as a source for approved construction fill. In general, the Engineer did not approve the use of fill from areas where XRF analyzer tests returned Zn concentrations above 1% (1,000 ppm), including a bench in between the upper and lower platforms, the central area of the upper platform and existing piles in front of the dump at the lower platform (refer to Drawing FRNF-XD-US-05). In addition, BGC recommended that close monitoring from PCL field supervisors was required when developing areas where a test result was showing concentrations close to 1%. As noted previously, the selection of the sources for approved fill was based on the visual observation of the fill at the borrow source, and then supported by the XRF analyzer.

4.2.4. Testing of Existing NFRD Rock Fill

Additional samples from the existing NFRD rock fill were collected and tested as guidance for acceptable fill material. The purpose of this test was to observe the Zn concentrations on the existing NFRD rock fill for comparison purposes.

A total of 11 samples were collected at the toe of the existing NFRD. Samples from both the upstream and downstream sides, as well as from the NF2A and NF2B sides, were collected. For ease of reference, Samples S21 to S24 where collected at the downstream toe of the NFRD within NF2A channel. Samples S25 to S27 were collected at the downstream toe of the NFRD within NF2B channel. Samples S28 and S29 at were collected at the upstream toe of the NFRD (at NF2B side of the headpond). Samples S30 and S31 were collected at the US toe of the NFRD (at the NF2A side of the US headpond). After collection, the samples were prepared and tested with the XRF analyzer.

A summary of the Zn concentrations, expressed in parts-per-million (ppm), returned by the XRF analyzer on samples from the existing NFRD, is shown on Figure 4-2. The complete record of the results returned by the XRF analyzer, showing elemental concentrations for each sample tested, is included on Appendix D.

As shown on Figure 4-2, the samples collected at the toe of the NFRD within NF2A area presented higher concentrations than the samples collected at the NF2B side. In general, the test results returned Zn concentrations below 0.16% (1,600 ppm). Note that the maximum values returned by the XRF analyzer (Samples S28 and S29-b) are test results performed on samples presenting intense orange staining on all sample faces.

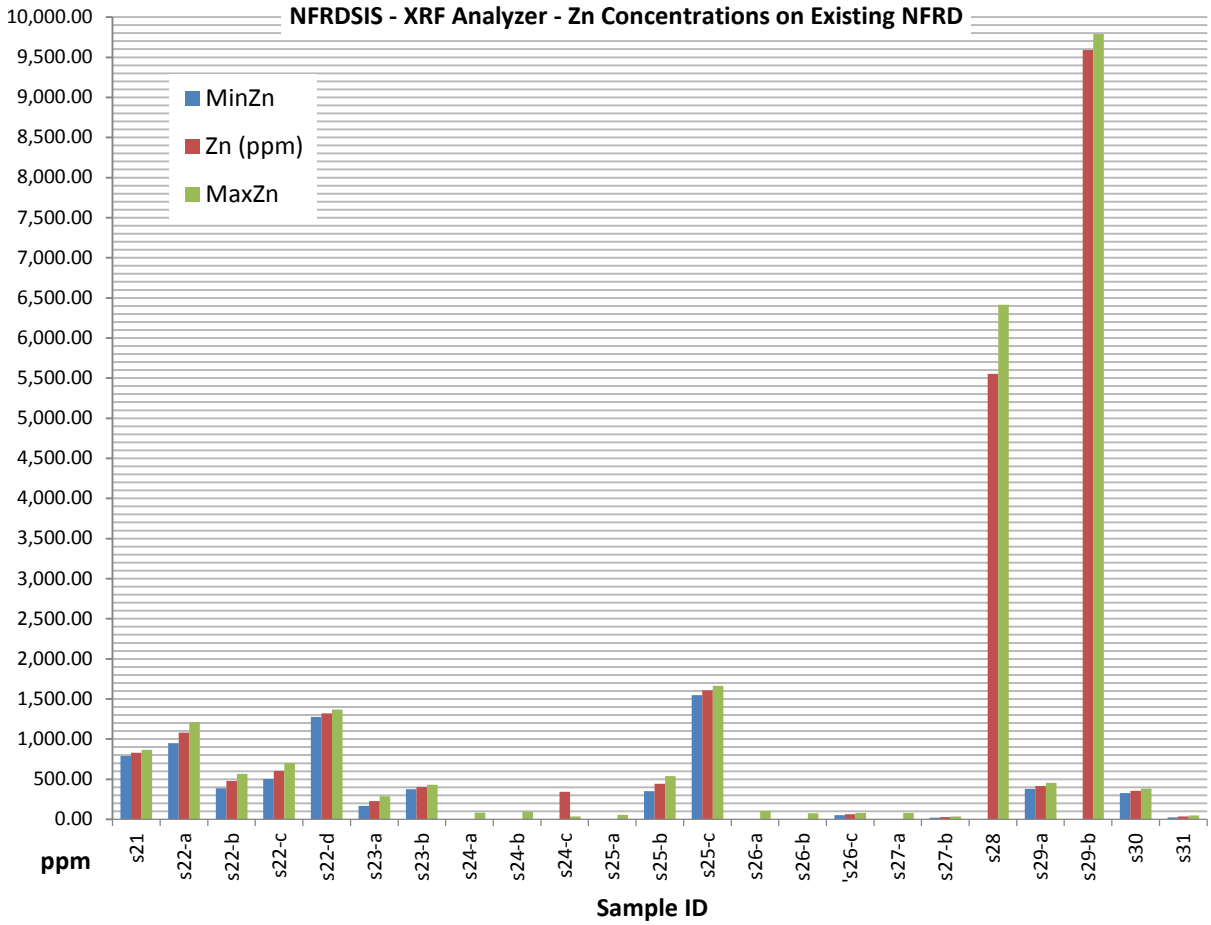


Figure 4-2. Summary of Zn concentrations returned by the XRF analyzer during field tests performed on samples collected on the existing NFRD toe (upstream and downstream areas).

4.2.5. XRF Comparison to Traditional Laboratory Methods

On November 20, 2014, BGC shipped 5 representative samples to SGS Canada Inc. for the execution of elemental analysis at a conventional laboratory. The purpose of this test was to compare the Zn concentrations obtained at the laboratory with the Zn concentrations returned by the XRF field analyzer to understand how spectrometer is affected by field procedures.

A comparison between the laboratory test results and the field test results is presented on Table 4-1. Comparable Zn concentrations were returned from the laboratory and field tests. Sample S67 is the one presenting the greatest difference, being the laboratory Zn concentration 331.89 ppm lower than the lower limit returned during the field tests. In general, the field tests returned higher Zn concentrations than the laboratory test, except for the tests performed on Sample S47 which are comparable (27.66 ppm difference). This could indicate the field test results are conservative (on the upper side). Therefore, the acceptance/rejection of construction fill based on the results returned by field tests will also be conservative.

Results indicate that in-field XRF spectrometry is comparable to traditional laboratory methods and provides the additional benefits of rapid analysis and fast data integration into construction procedures.

Table 4-1. Summary of Zn concentrations returned by conventional XRF laboratory tests and XRF field tests.

ID	Zn Lab Concentration (ppm)*	Zn Field XRF Concentration (ppm)**	
		Lower Limit	Upper Limit
Sample S47	110	57.66	82.34
Sample S61	180	302.21	355.79
Sample S67	190	521.89	599.87
Sample S81	120	153.49	196.09
Sample S100	80	85.08	111.90

*Zn concentrations reported on the laboratory certificate of analysis are expressed in % and not ppm. Laboratory technicians converted % to ppm as per BGC request for information only.
**XRF Field Zn readings (ppm) were expressed as: Sample 47 = 70 +/- 12.34; Sample 61 = 329 +/- 26.79; Sample 67 = 560.88 +/- 38.99; Sample 81 = 174.79 +/- 21.30; Sample 100 = 98.49 +/- 13.41.

4.3. Environmental

As part of the construction management activities, BGC observed the performance of the sediment and control measures installed by PCL. The observations performed by BGC are summarized on the daily shift reports (refer to Appendix C).

All construction areas were protected by the Contractor as per the requirements listed on the sediment and control plan, as approved by the independent environmental monitor and the Engineer.

4.4. As-Built and Pay Quantities

As part of the construction management services, the collection of field data was required in order to evaluate the progress of the Works and to provide recommendations for certification to YG. The observations performed by BGC were also used to assess whether the Work completed conformed generally with the design documents. At a final stage, the information collected was used to prepare the as-built documents and drawings.

The collection of construction data was performed on two approaches. Firstly during construction, BGC and PCL performed field measurements of the various constructed elements. Secondly, an independent surveyor was mobilized to the Faro Mine to complete post-construction borrow and as-built surveys.

The information collected by BGC and Pelly on site was recorded on the daily shift reports produced by BGC (refer to Section 4.1). Information included, but was not limited to the following:

- Daily progress of the works
- PCL equipment and manpower present on site
- Dimensions of the areas sub-excavated after failing proof-roll tests (in m^3)
- Dimensions of the areas covered by geotextile (in m^2)
- USAR dimensions and longitudinal grading (in m and %)
- USAR fill thicknesses (in m)
- Distribution of fill types along the USAR
- Usage for equipment working at hourly rates (mainly at Borrow C)
- Field estimates for the volume of RPF sorted at Borrow C (in m^3)
- Location and quantity for the sediment and erosion elements installed (in m)
- Materials delivered to the Faro Mine site by PCL.

A description of the activities completed by the independent surveyor and the information compiled is included on Section 4.5.

At the end of construction, the information collected was used to validate the invoices produced by PCL for the different NFRD SIS elements, and to produce a set of as-built drawings. Meetings between YG, BGC and PCL held to present the backup information for the various invoice bill items.

4.5. Surveying

As part of the construction services, Underhill provided a baseline and layout surveys of SIS elements. At the end of construction, Underhill provided post-construction borrow and as-built surveys of elements completed by PCL. In addition, Underhill provided post-construction documentation including calculation of borrow quantities (reviewed and signed) and provision of digital as-built surveys.

On September 16, 2014, Underhill mobilized two surveyors to the Faro Mine site to complete the baseline and layout surveys. Underhill completed the baseline and layout surveys of SIS elements on September 19, 2014, once the Engineer and Contractor confirmed that no more elements or control stakes were required in order to complete the works as per the design documents. A complete description of the activities completed by Underhill is included on the BGC Field Memorandum 1 (*20140930_NFRDSIS_FM1_Baseline Survey*). This field memorandum can be found in Appendix B of this document.

On October 28, 2014, Underhill mobilized a surveyor to the Faro Mine site to complete the post-construction borrow and as-built surveys. This activity was completed by Underhill on October 29, 2014. At a later stage, Underhill provided calculations of borrow quantities and the digital as-built surveys of the NFRD SIS elements. The description of the post-construction activities performed by Underhill as well as the documents produced is included in Appendix E. A table of quantities for the USAR construction is included on as-built Drawing FRNF-XD-US-01 (Appendix A).

5.0 SUMMARY

This report documents the activities performed by PCL and BGC at the upstream side of the NFRD during construction of the USAR and development of associated borrow areas. A description of the original design is also included on this document, but design drawings are not included herein.

The design changes, introduced during construction in response to unfavorable ground conditions, are included in Section 2.3. Notwithstanding the deviations from the original Drawings and Specifications, the USAR was constructed in general conformance with the original design and it is expected to perform according to the design intent. Some additional maintenance may be required following thawing conditions in the spring.

Comments on the outstanding activities are listed on Section 3.2.11, including the removal of the turbidity curtain from the headpond and the grading of haul road area. As commented with YG, the outstanding activities will be completed by others at a later stage. The completion of these activities is assumed to occur in spring and summer 2015.

Based on the observations performed during construction monitoring, BGC recommends the following be considered:

- Visual monitoring of USAR fill/cut slopes stability should be undertaken during frost-free conditions. If required, the cut slopes shall be graded or modified.
- Maintenance of ditches and silt fences along the USAR is recommended to prevent erosion of road fill and to prevent saturation of the subgrade.
- Grading of the USAR and Borrow D trafficable surface after the winter season should be considered during frost free conditions.
- Visual monitoring of stockpiled material in the spoil area should be undertaken during and after rain events. If required, the piles shall be graded or modified. In addition, new sediment and control measured shall be implemented.
- Visual monitoring of Borrow C RPF should be undertaken during frost-free conditions. If required, the cut slopes shall be graded or modified.
- Water quality monitoring should be completed during spring/summer 2015.

Based on the experience gained during construction of the USAR, the following key learnings (especially for north and northwest facing slopes) are provided:

- The execution of site investigations to observe existing ground conditions in advance of design and construction is recommended, especially where permafrost and ground ice conditions are anticipated.
- The surface layer of moss should be preserved to the extent possible to reduce disturbance of the frozen ground underneath.
- The installation of drainage trenches is recommended so water does not pond adjacent to road fills.

- The execution of shallow excavation cut walls is recommended to reduce the risk of instabilities, subject to appropriate site investigation assessments.
- The thickness of construction fill placed on natural slopes should be reduced to the extent possible, subject to appropriate site investigation assessments.

6.0 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:

ISSUED AS DIGITAL DOCUMENT. SIGNED HARDCOPY ON FILE WITH BGC ENGINEERING INC.

Joan Roca, M.Sc., E.I.T. (BC)
Geotechnical Engineer

ISSUED AS DIGITAL DOCUMENT. SIGNED HARDCOPY ON FILE WITH BGC ENGINEERING INC.

James W. Cassie, M.Sc., P.Eng.
Principal Geotechnical Engineer

Reviewed by:

Gerry Ferris, M.Sc., P.Eng.
Principal Geotechnical Engineer

JR/JWC/GF/gc/mm

REFERENCES

Robertson Geoconsultants Inc. 2014. Progress Report – 2014 Winter Drilling Program, NFRC Reach, Faro Mine, Yukon. Letter report prepared for Yukon Government, Project No. 118026, March 31, 2014.

BGC Engineering Inc., 2014a. Design Brief, NFRD Seepage Interception System, Faro Mine. Draft report prepared for the Yukon Government September 22, 2014, comprising 24 pages and two appendixes.

BGC Engineering Inc. 2014b. Sediment and Erosion Control Plan, NFRD Seepage Interception System, Faro Mine. Plan prepared for the Yukon Government, September 25, 2014.

APPENDIX A
AS-BUILT DRAWINGS

LIST OF AS-BUILT DRAWINGS

Drawing Number	Drawing Title	Drawing Date
FRNF-XD-US-01	USAR As-Built General Arrangement and Typical Cross-Sections	March 17, 2015
FRNF-XD-US-02	Borrow A As-Built General Arrangement	March 17, 2015
FRNF-XD-US-03	Borrow C As-Built General Arrangement	March 17, 2015
FRNF-XD-US-04	Borrow D As-Built General Arrangement	March 17, 2015

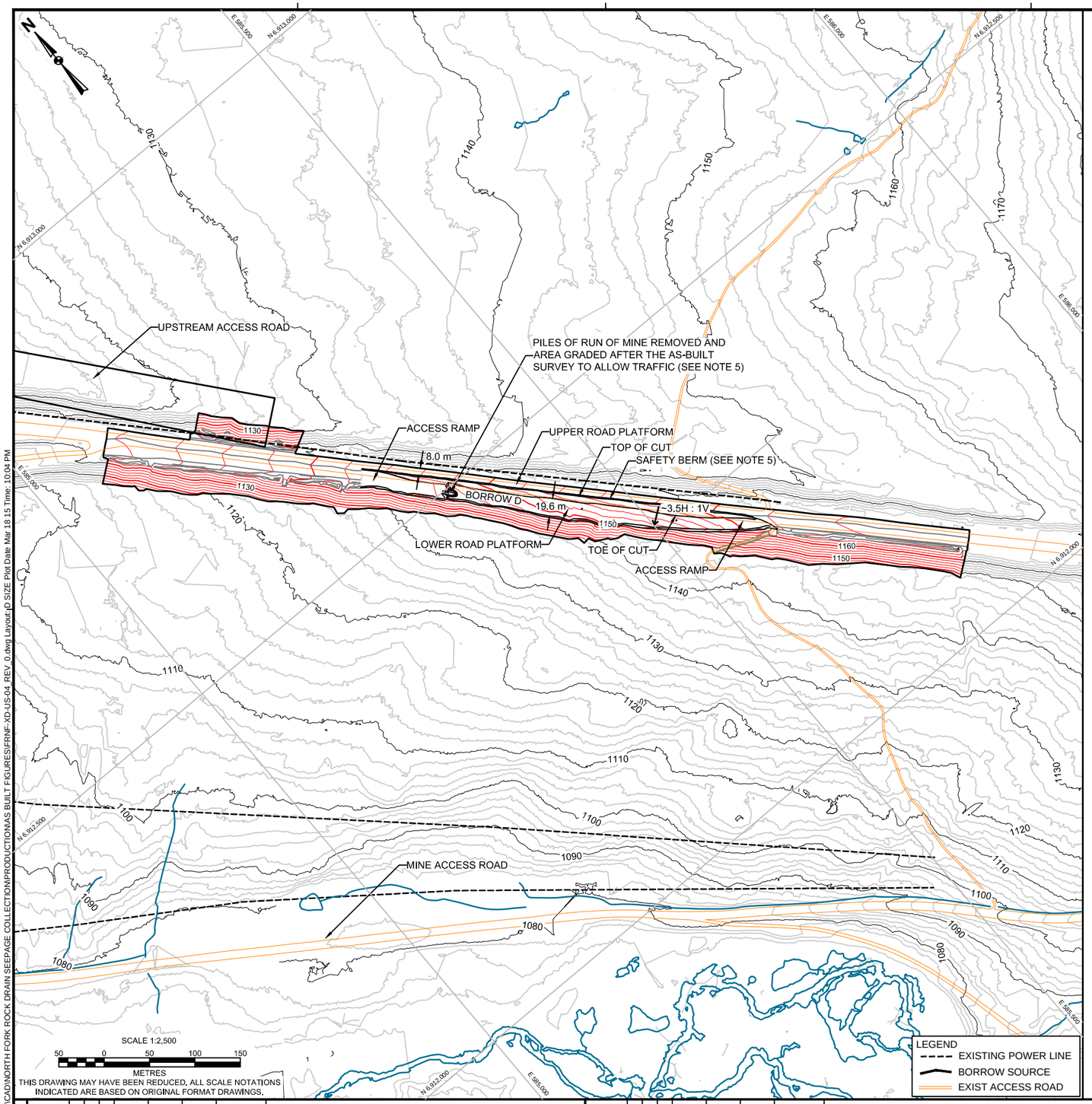


TABLE 1: TOTAL BORROW VOLUME

DESIGNATION	VOLUME (m³)
RUN-OF-MINE	34,581

TABLE NOTES:
1. THE TOTAL VOLUME OF RUN-OF-MINE REPORTED WAS USED ON THE CONSTRUCTION OF THE UPSTREAM ACCESS ROAD. REFER TO DRAWING FRNF-XD-US-01 FOR DETAILS OF THE UPSTREAM ACCESS ROAD CONSTRUCTION.
2. TOTAL BORROW VOLUME AS REPORTED BY UNDERHILL GEOMATICS LTD. FROM AS-BUILT SURVEY COMPLETED ON OCTOBER 27, 2014.

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT. 2012. CONTOUR INTERVAL IS 2 m.
3. PROJECTION IS NAD83, UTM ZONE 8N.
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.

BORROW NOTES:
1. BORROW SOURCE D CONSISTS OF ROCK FILL MATERIAL OVERLAIN BY SAND AND GRAVEL AND MAKES UP A SECTION OF THE HAUL ROAD. HAUL DISTANCE FROM BORROW C TO THE UPSTREAM ROAD IS APPROXIMATELY 0.2 km.
2. MATERIAL FROM BORROW D WAS NOT USED WITHIN THE AREA OF EXCLUSION (30 m FROM THE UPSTREAM HEADPOND SHORE) AS PER REQUIREMENTS FROM THE YUKON GOVERNMENT.
3. BORROW D MATERIAL WAS TESTED USING XRF ANALYZER AS PART OF ONGOING BORROW DEVELOPMENT. APPROVAL OF FILL WAS SUPPLEMENTED BY VISUAL MONITORING.
4. BORROW D IS THE ACTIVE ACCESS ROAD BETWEEN THE FARO AND GRUM SIDES OF THE FARO MINE COMPLEX AND WAS MAINTAINED AS AN ACTIVE ROAD THROUGH ANY BORROW WORK. COORDINATION BETWEEN THE CONTRACTOR AND THE FARO MINE MANAGEMENT WAS REQUIRED TO MAINTAIN ACCESS THROUGH CONSTRUCTION.
5. AS-BUILT BORROW SURVEY COMPLETED BY UNDERHILL GEOMATICS LTD. ON OCTOBER 27, 2014. BORROW D CONFIGURATION WAS MODIFIED AFTER COMPLETION OF THE AS-BUILT SURVEY TO PRODUCE A FINAL SURFACE ACCEPTABLE FOR USE AS A HAUL ROAD. FINAL BORROW D CONFIGURATION INCLUDES TWO ACCESS RAMPS AT AN APPROXIMATE LONGITUDINAL GRADIENT OF 10% SLOPE FOR ACCESS TO THE LOWER PLATFORM ROAD. A SAFETY BERM (APPROXIMATELY 1.5 m HIGH) WAS INSTALLED ALONG THE EDGE OF THE UPPER PLATFORM ROAD AS PER REQUIREMENTS OF FARO MINE SITE MANAGEMENT.
6. DRAINAGE OPENINGS ON THE SAFETY BERMS ON THE SOUTH SIDE OF THE ROAD WERE OPENED AS DIRECTED BY THE ENGINEER TO PROVIDE DRAINAGE ON LOWER POINTS. THE EXISTING DRAINAGE OPENINGS WERE ALSO MAINTAINED.

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	15	03	17	WKL	JR	JWC	GWF	AS-BUILT 2015

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

DRAWN BY: WKL	CHECK DRAWING: GCB
DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: BORROW D - AS-BUILT GENERAL ARRANGEMENT

SCALE:	DWG NO.:	REV.:
1:2,500	FRNF-XD-US-04	0

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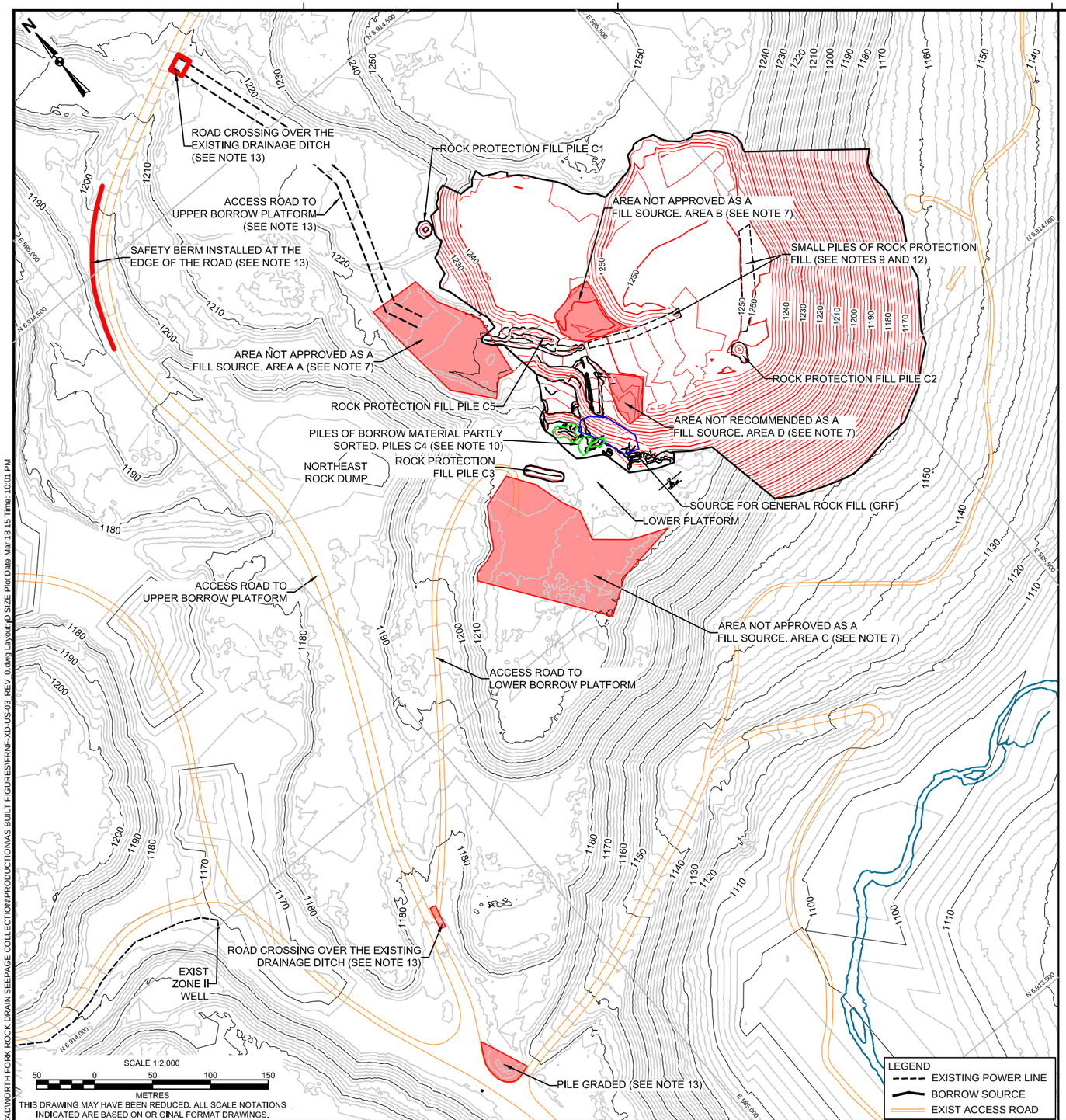


TABLE 1: TOTAL BORROW VOLUME

DESIGNATION	VOLUME (m³)
RPF PILE C1	230
RPF PILE C2	216
RPF PILE C3	406
RPF PILE C5	1,589
RPF DISPERSED PILES (GREEN AREAS)	226
GRF HAULED FOR CONSTRUCTION	1,763
OTHERS	851

TABLE NOTES:
1. OTHERS INCLUDES PILES PARTLY SORTED, PILES OF FINER FILL RESULTING FROM THE SORTING PROCESS AND OTHER MATERIAL MOVED AS PART OF THE DEVELOPMENT OF THE AREA.

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT. 2012. CONTOUR INTERVAL IS 2 m.
3. PROJECTION IS NAD83, UTM ZONE 8N.
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BORROW NOTES:
1. BORROW C IS LOCATED AT THE NORTH ROCK DUMP. HAUL DISTANCE FROM BORROW C TO UPSTREAM ACCESS ROAD IS APPROXIMATELY 2.7 km. FOR LOCATION OF BORROW C REFER TO DRAWING FRNF-XD-US-02.
2. BORROW SOURCE C CONSISTS OF SULPHIDE-FREE, HARD, DURABLE CALCIUM-SILICATE ROCKFILL WITH SOME HARD, DURABLE GREEN VOLCANIC ROCK.
3. BORROW C WAS THE SOURCE FOR ANY ROCKFILL USED FOR THE CONSTRUCTION OF THE UPSTREAM ACCESS ROAD, INCLUDING ROCK PROTECTION FILL (RPF) AND GENERAL ROCK FILL (GRF). THE FILL FROM BORROW C WAS APPROVED FOR PLACEMENT WITHIN THE EXCLUSION LIMIT (30 m WIDE AREA FROM THE EDGE OF THE UPSTREAM HEADPOND).
4. ROCK PROTECTION FILL PRODUCED BY MECHANICALLY SORTING MATERIAL FROM THE ROCK DUMP. THE INTERMITTENT USE OF A ROCK HAMMER WAS APPROVED BY THE ENGINEER TO INCREASE PRODUCTIVITY.
5. GENERAL ROCK FILL OBTAINED BY MINING THE EXISTING ROCK DUMP SLOPE WITH AN EXCAVATOR OR FRONT LOADER.
6. AS PART OF THE ONGOING DEVELOPMENT OF THE BORROW AREA, THE ENGINEER TESTED ROCK SAMPLES USING AN XRF ANALYZER. THE APPROVAL OF THE DIFFERENT BORROW AREAS WITHIN BORROW C WAS PERFORMED BASED ON VISUAL MONITORING OF THE ROCK FILL SLOPES SUPPLEMENTED BY THE RESULTS FROM THE XRF ANALYZER. REFER TO DRAWING FRNF-XD-US-05 FOR LOCATION OF THE XRF SAMPLES COLLECTED.
7. THE AREAS MARKED IN RED WERE NOT APPROVED BY THE ENGINEER AS A SOURCE OF FILL AS THEY SHOWED EXTENSIVE DEGRADATION OF SULPHIDES OR HIGH METAL CONTENT. IN ADDITION, NOTE THAT SOME SPECIFIC PILES OF ROCK FILL LOCATED IN FRONT OF THE ROCK DUMP FACES HAD TO BE REMOVED AND DISCARDED AS THEY PRESENTED VISIBLE ALTERATION. AREAS NOT APPROVED INCLUDED THE FLOOR AT THE ACCESS TO THE UPPER PLATFORM PRESENTING YELLOWISH MATERIAL (AREA A), A SMALL PLATFORM LOCATED AT THE UPPER PLATFORM WITH ROCK PRESENTING ALTERATION (AREA B) AND AN AREA AT THE LOWER PLATFORM WITH PILES OF MIXED FILLS (AREA C). AREA D SHOWS AN AREA NOT RECOMMENDED BASED ON VISUAL OBSERVATIONS AS THE SEGREGATION OF THE FILL FRACTION PRESENTING ALTERATION WAS TIME CONSUMING.
8. PILES OF SORTED ROCK PROTECTION FILL REMAINED AT THE BORROW AREA AFTER CONSTRUCTION. APPROXIMATE VOLUMES FOR THE DIFFERENT PILES OF SORTED ROCK PROTECTION FILL ARE PRESENTED ON TABLE 1.
9. SMALL PILES OF ROCK PROTECTION FILL (APPROXIMATELY 21 m3 EACH) WERE CREATED BY THE CONTRACTOR ON THE AREAS MARKED BY SORTING EXISTING PILES OF MATERIAL. INDIVIDUAL PILES NOT SHOWN FOR CLARITY. REFER TO TABLE 1 FOR APPROXIMATE COMBINED TOTAL VOLUME OF THE SMALL PILES.
10. SMALL PILES OF PARTLY SORTED MATERIAL REMAINED AT THE LOWER PLATFORM. THESE PILES WERE BEING SORTED BY THE CONTRACTOR WHEN THE ACTIVITIES AT BORROW AREA C WERE CANCELLED. NO VOLUME ESTIMATE IS PROVIDED FOR THESE PILES AS THEY REQUIRE ADDITIONAL WORK BEFORE THEY CAN BE USED AS ROCK PROTECTION FILL.
11. THE INFORMATION PRESENTED ON THIS DRAWING IS BASED ON THE AS-BUILT BORROW SURVEY COMPLETED BY UNDERHILL GEOMATICS LTD. BETWEEN OCTOBER 28 AND OCTOBER 29, 2014.
12. THE TOTAL VOLUME FOR SMALL PILES AT THE LOWER PLATFORM (PILES C4) AND THE SMALL PILES AT THE UPPER PLATFORM ARE APPROXIMATE AND ARE PROVIDED FOR REFERENCE ONLY. THESE VOLUMES WERE BASED ON VISUAL ESTIMATES.
13. ROAD MAINTENANCE AND CONDITIONING WAS REQUIRED FOR THE ACCESS TO BORROW C, INCLUDING REGULAR GRADING OF THE TRAFFICABLE SURFACE, THE INSTALLATION OF A SAFETY BERM ALONG THE ACCESS ROAD (BY TEES), THE GRADING OF A PILE OF MATERIAL REDUCING VISIBILITY AND THE INSTALLATION OF CULVERTS AT THE CROSSING OVER EXISTING DRAINAGE.
14. PILES OF FINER FILL CAN ALSO BE FOUND AT BORROW C. THESE PILES ARE THE FINER FRACTION REMOVED DURING THE SORTING OF ROCK PROTECTION FILL.

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

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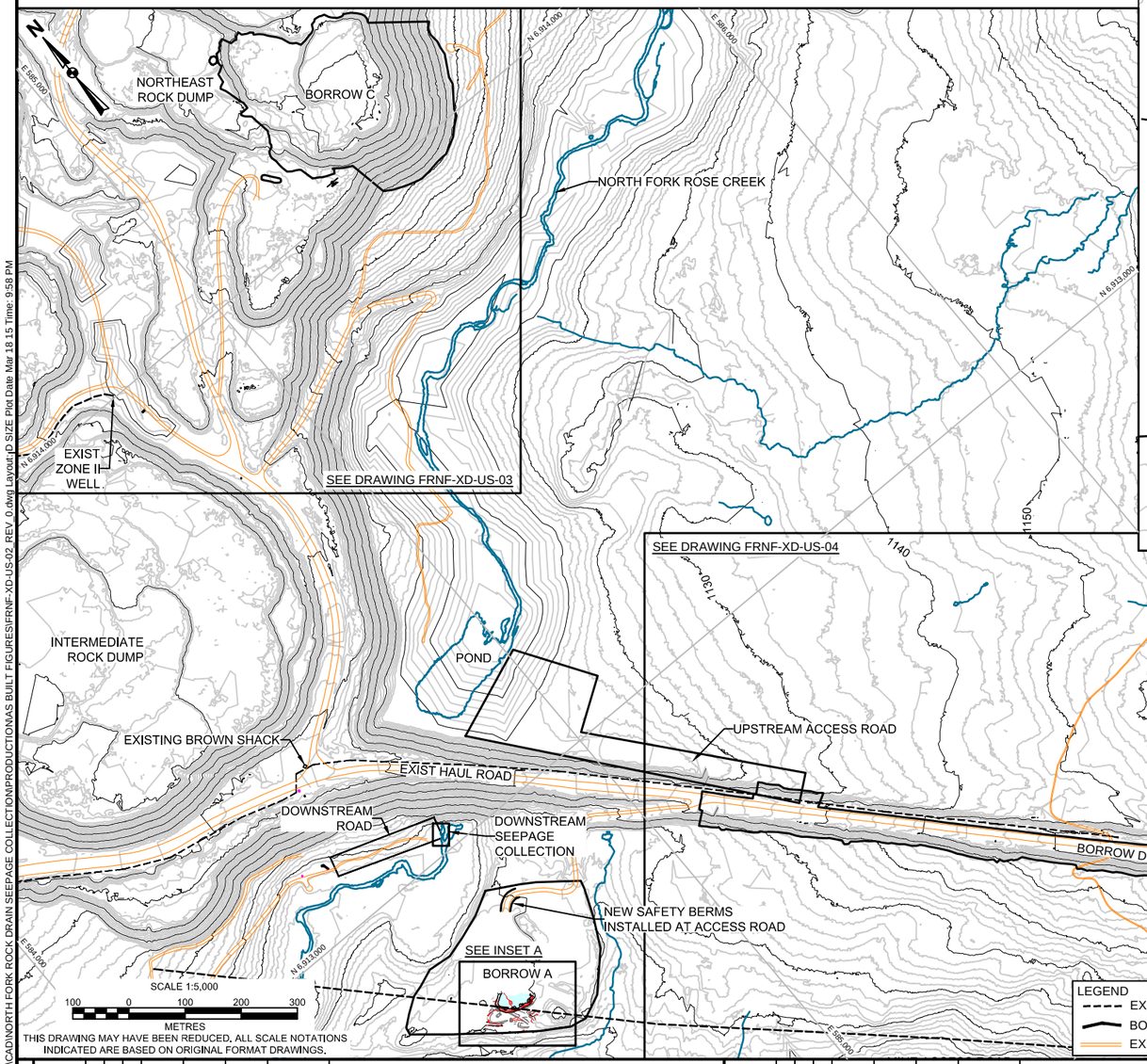
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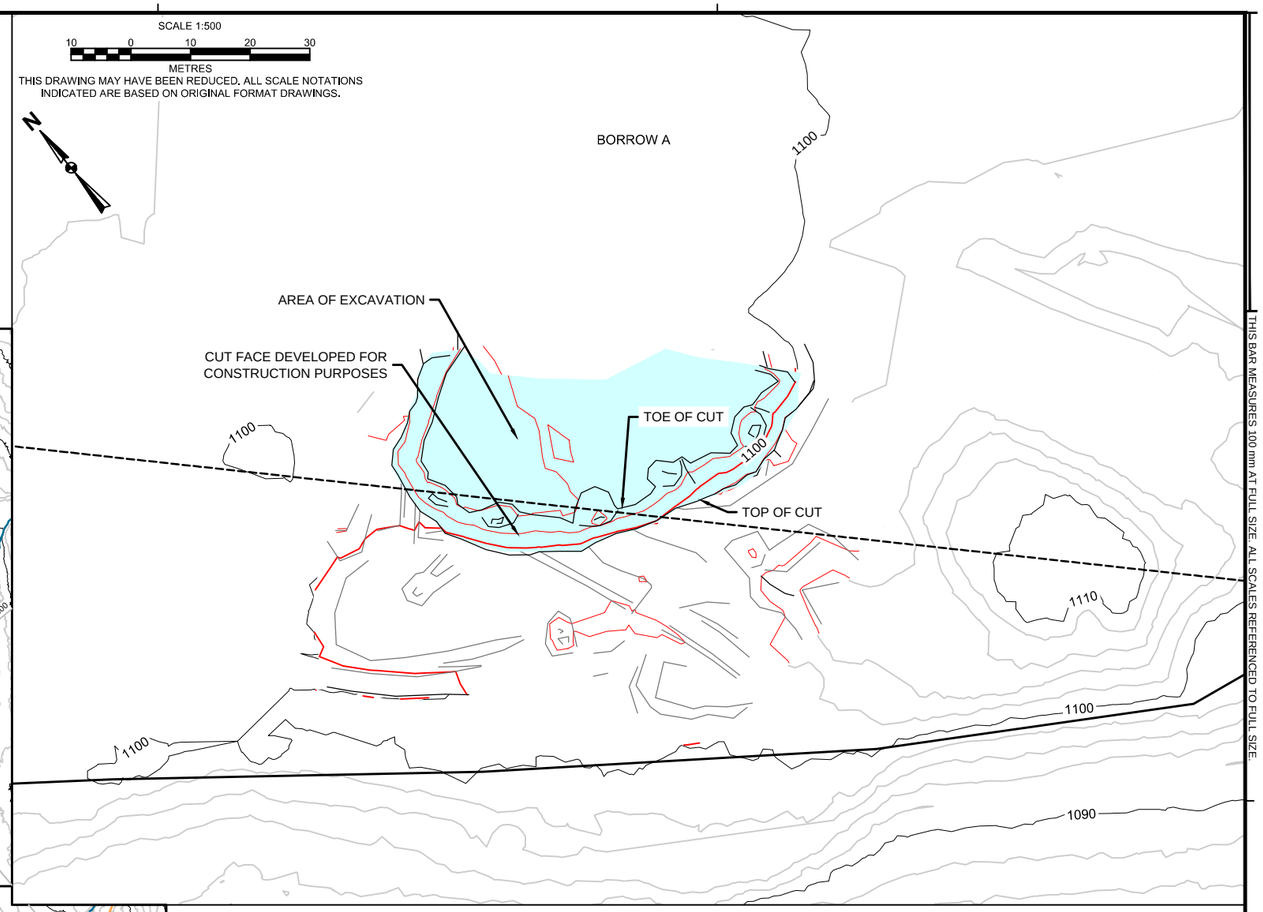
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DESIGN BY: JR	CHECK DESIGN: GWF		TITLE: BORROW C - AS-BUILT GENERAL ARRANGEMENT
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015	CLIENT: Yukon Government	SCALE: 1:2,000 / DWG NO.: FRNF-XD-US-03 / REV.: 0
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015		

TABLE 1: TOTAL BORROW VOLUME

DESIGNATION	VOLUME (m³)
SAND AND GRAVEL	3,264

TABLE NOTES:
1. THE TOTAL VOLUME OF SAND AND GRAVEL REPORTED INCLUDES CONSTRUCTION OF UPSTREAM AND DOWNSTREAM ELEMENTS AND ROAD CONDITIONING. FOR VOLUME USED AS PART OF THE UPSTREAM ACCESS ROAD CONSTRUCTION REFER TO DRAWING FRNF-XD-US-01.





INSET A

BORROW NOTES:
1. BORROW A CONSISTS OF GRANULAR SOIL USED AS PART OF THE CONSTRUCTION FOR THE UPSTREAM ACCESS ROAD DOWNSTREAM ELEMENTS. SAND AND GRAVEL TO BE TAKEN FROM EXIST WORKING FACE IN BORROW PIT. HAUL DISTANCE FROM BORROW A TO UPSTREAM ROAD IS APPROXIMATELY 0.5 km.
2. HAUL DISTANCE FROM BORROW C TO UPSTREAM BERM IS APPROXIMATELY 2.7 km. REFER TO DRAWING FRNF-XD-US-03 FOR AS-BUILT DETAILS OF BORROW C.
3. HAUL DISTANCE FROM BORROW D TO THE UPSTREAM ACCESS ROAD IS APPROXIMATELY 0.2 km. REFER TO DRAWING FRNF-XD-US-04 FOR AS-BUILT DETAILS OF BORROW D.
4. MATERIAL FROM BORROW A, C AND D WAS TESTED USING XRF ANALYZER AS PART OF ONGOING BORROW DEVELOPMENT. ONLY FILL APPROVED BY THE ENGINEER WAS PLACED WITHIN 30 m FROM THE UPSTREAM HEADPOND SHORE. THE XRF TESTING WAS SUPPLEMENTED BY VISUAL MONITORING.
5. THE BORROW A CONFIGURATION SHOWN ON THIS DRAWING IS AS PER THE AS-BUILT SURVEY COMPLETED BY UNDERHILL GEOMATICS LTD. ON OCTOBER 27, 2014.
6. THE LOCATION AND DIMENSIONS FOR THE NEW SAFETY BERM INSTALLED AT THE ACCESS RAMP TO BORROW A ARE APPROXIMATE.

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT. 2012. CONTOUR INTERVAL IS 2 m.
3. PROJECTION IS NAD83, UTM ZONE 8N.
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REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	15	03	17	WKL	JR	JWC	GWF	AS-BUILT 2015

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

DRAWN BY: WKL	CHECK DRAWING: GCB
DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

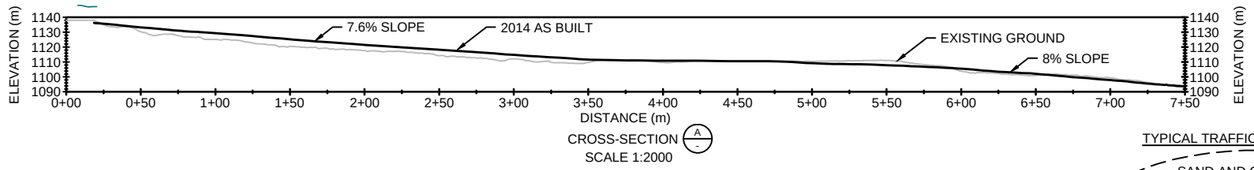
PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

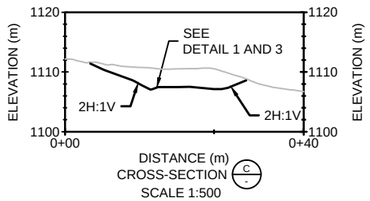
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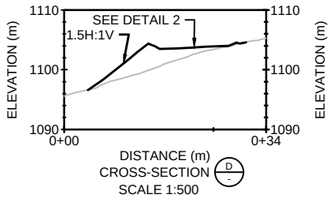
SCALE:	DWG NO.:	REV.:
AS SHOWN	FRNF-XD-US-02	0

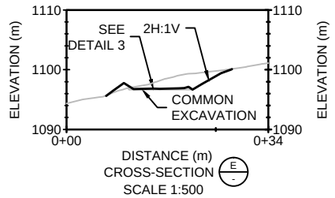
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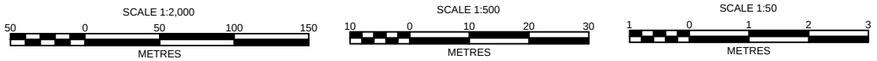
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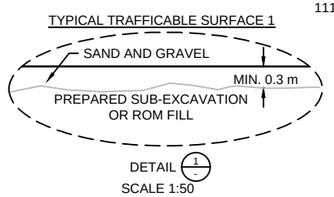




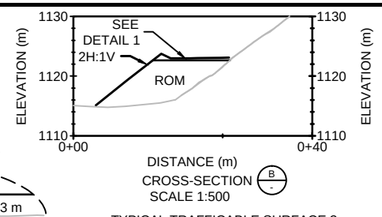




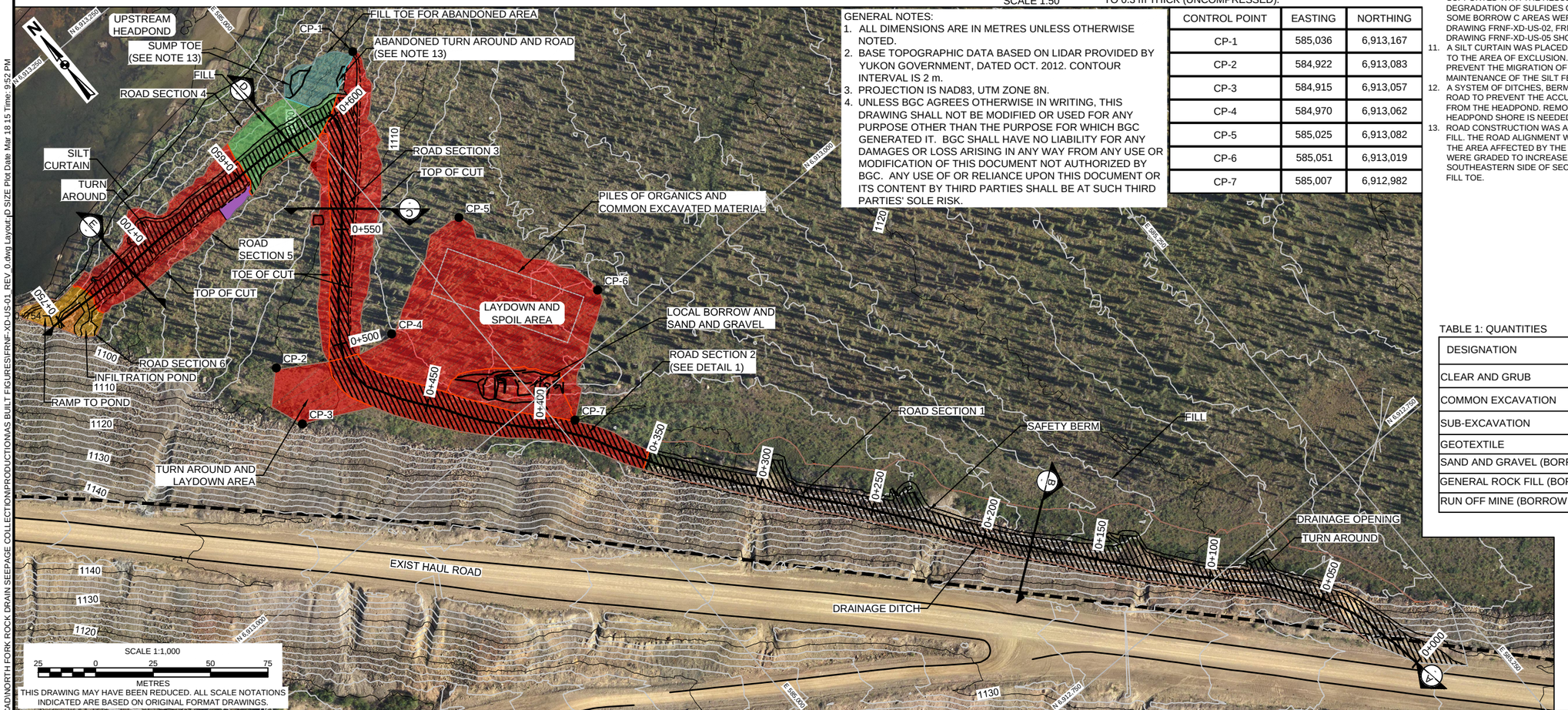




DETAIL 2 NOTE:
1. LAYER OF MOSS WAS TYPICALLY 0.15 m TO 0.3 m THICK (UNCOMPRESSED).



1. ROAD SECTION 1 - PLACEMENT OF BORROW D RUN-0F-MINE (ROM) FILL ON EXISTING GROUND. FILL SLOPE TO ANGLE OF REPOSE. PLACEMENT OF A 0.3 m THICK LAYER OF SAND AND GRAVEL FROM BORROW A AS A TRAFFICABLE SURFACE.
2. ROAD SECTION 2 - PLACEMENT OF A MINIMUM OF 0.3 m THICK LAYER OF BORROW A SAND AND GRAVEL ON EXISTING GROUND AFTER COMPLETION OF PROOF-ROLL TEST AND REMOVAL OF SOFT MATERIAL. SOME FINE TO COARSE SAND AND GRAVEL FROM THE LOCAL BORROW SOURCE WAS USED FROM STATION 0+450 TO 0+600. FILL THICKNESSES ADJUSTED TO ACHIEVE A FLAT TRAFFICABLE SURCE. SOFT SOIL REMOVED TO A DEPTH OF 0.5 m OR UP TO COMPETENT GROUND AND BACKFILLED WITH SAND AND GRAVEL UNDERLAIN WITH A GEOTEXTILE.
3. ROAD SECTION 3. PLACEMENT OF A MINIMUM OF 0.3 m THICK LAYER OF BORROW A SAND AND GRAVEL AFTER COMPLETION OF COMMON EXCAVATION. A LAYER OF GEOTEXTILE OVERPLAIN BY A MINIMUM OF 0.5 m OF BORROW A FILL WAS USED ON AREAS FAILING PROOF-ROLL TESTS. FILL THICKNESS ADJUSTED AS REQUIRED TO ACHIEVE THE REQUIRED LONGITUDINAL GRADIENT AS SHOWN ON CROSS-SECTION A.
4. ROAD SECTION 4. PLACEMENT OF BORROW D ROM OR BORROW C GENERAL ROCK FILL (GRF) OVERPLAIN BY A 0.3 m THICK LAYER OF BORROW A SAND AND GRAVEL AS A TRAFFICABLE SURFACE. FILL PLACEMENT COMPLETED AFTER CLEARING AND GRUBBING (SEE NOTE 7).
5. ROAD SECTION 5. PLACEMENT OF A GEOTEXTILE AT THE BOTTOM OF COMMON EXCAVATION OVERLAIN BY 1 m THICK LAYER OF BORROW C.
6. ROAD SECTION 6. PLACEMENT OF A MINIMUM OF 0.5 m THICK LAYER OF BORROW C GRF ON TOP OF A PLATFORM OF ROCKS GREATED WITH ROCKS REMOVED FROM THE EDGE OF THE UPSTREAM HEADPOND. GRF FILL THICKNESSES ADJUSTED TO ACHIEVE THE REQUIRED LONGITUDINAL GRADING. A RAMP TO THE HEADPOND SHORE WAS CREATED WITH BORROW C GRF TO CREATE ACCESS TO THE HEADPOND.
7. CLEARING AND GRUBBING COMPLETED BY MEANS OF AN EXCAVATOR AND A DORZER. MATERIAL REMOVED AS PART OF THE CLEARING AND GRUBBING WAS LOCALLY WASTED AT THE SPOIL AREA. COMPLETION OF CLEARING AND GRUBBING ON ROAD SECTION 4 (GREEN SHADING) INCLUDED REMOVAL OF LARGE VEGETATION WITH HAND TOOLS ONLY (POWER SAW). ROAD FILL WAS PLACED ON TOP OF THE LAYER OF MOSS AS IT WAS SHOWN TO BE INSULATING THE FROZEN GROUND.
8. THE REMOVAL OF BOULDERS, ORGANICS, AND DEBRIS FROM THE HEADPOND SHORE WAS REQUIRED (ROAD SECTION 6). THE BOULDERS WERE LOCALLY RELOCATED TO CREATE A PLATFORM AS A BASE FOR THE ROAD FILL. THE ORGANICS AND OTER UNSUITABLE MATERIAL WAS LOCALLY WASTED AT THE SPOIL AREA.
9. BORROW D ROM WAS NOT USED WITHIN THE AREA OF EXCLUSION (30 m FROM THE HEADPOND SHORE) AS REQUESTED BY THE YUKON GOVERNMENT. BORROW C WAS USED AS COMMON FILL WITHIN THE AREA OF EXCLUSION.
10. FILL SAMPLES COLLECTED AT BORROW SOURCES AND DURING FILL PLACEMENT. TESTING COMPLETED WITH AN XRF ANALYZER. ACCEPTANCE OF FILL FOR CONSTRUCTION BASED ON VISUAL OBSERVATIONS SUPPORTED WITH THE RESULTS FROM THE XRF ANALYZER TESTING. MATERIAL SHOWING VISIBLE DEGRADATION OF SULFIDES OR HIGH METAL CONTENT WAS NOT APPROVED. AT BORROW SOURCE, SOME BORROW C AREAS WERE NOT APPROVED AS A SOURCE FOR CONSTRUCTION FILL. REFER TO DRAWING FRNF-XD-US-02, FRNF-XD-US-03 AND FRNF-XD-US-04 FOR LOCATION OF BORROW SOURCES. DRAWING FRNF-XD-US-05 SHOW THE LOCATION FOR SAMPLING COMPLETED BY THE ENGINEER.
11. A SILT CURTAIN WAS PLACED ALONG HEADPOND SHORE WHEN ROAD FILL WAS BEING PLACED CLOSE TO THE AREA OF EXCLUSION. THE SILT FENCES WERE MAINTAINED DURING CONSTRUCTION TO PREVENT THE MIGRATION OF SEDIMENT TO THE HEADPOND. THE ONGOING MONITORING AND MAINTENANCE OF THE SILT FENCES DURING OPERATIONS IS REQUIRED.
12. A SYSTEM OF DITCHES, BERMS AND AN INFILTRATION POND WERE INSTALLED AT THE END OF THE ROAD TO PREVENT THE ACCUMULATION OF SEDIMENT RICH RUN-OFF WATER AND DIVERT IT AWAY FROM THE HEADPOND. REMOVAL OF THE BERMS WILL BE REQUIRED IF VEHICLE ACCESS TO THE HEADPOND SHORE IS NEEDED.
13. ROAD CONSTRUCTION WAS AFFECTED BY A SLUMP AFFECTING APPROXIMATELY 175 m3 OF BORROW A FILL. THE ROAD ALIGNMENT WAS MODIFIED BY CREATING A CURVE AT AN EARLIER STATION. NOTE THAT THE AREA AFFECTED BY THE FAILURE AND THE TURN AROUND AND CURVE PREVIOUSLY CONSTRUCTED WERE GRADED TO INCREASE STABILITY AND FACILITATE WATER DRAINAGE. THE DITCH AT THE SOUTHEASTERN SIDE OF SECTION 3 WAS EXTENDED SO WATER WILL BE DISCHARGED AWAY FROM THE FILL TOE.



GENERAL NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT. 2012. CONTOUR INTERVAL IS 2 m.
3. PROJECTION IS NAD83, UTM ZONE 8N.
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CONTROL POINT	EASTING	NORTHING
CP-1	585,036	6,913,167
CP-2	584,922	6,913,083
CP-3	584,915	6,913,057
CP-4	584,970	6,913,062
CP-5	585,025	6,913,082
CP-6	585,051	6,913,019
CP-7	585,007	6,912,982

TABLE 1: QUANTITIES

DESIGNATION	AREA (m²)	VOLUME (m³)
CLEAR AND GRUB	13116	-
COMMON EXCAVATION	-	6597
SUB-EXCAVATION	-	590
GEOTEXTILE	2712	-
SAND AND GRAVEL (BORROW A)	-	2883
GENERAL ROCK FILL (BORROW C)	-	1745
RUN OFF MINE (BORROW D)	-	34581

TABLE NOTES:
1. QUANTITIES AS PER INFORMATION PROVIDED BY UNDERHILL GEOMATICS LTD. AFTER SURVEY COMPLETED ON OCTOBER 28, 2014.

LEGEND
- CONSTRUCTION LIMITS
- BERMS
- DRAINAGE DITCH
- ROAD
- CLEAR AND GRUB AREA
- REMOVAL OF LARGE VEGETATION
- FILL GRADED
- ROCK BUTTRESS (GENERAL ROCK FILL)
- REMOVAL OF DEBRIS AND ORGANICS. RELOCATION OF ROCKS

REVISION INFORMATION	REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
	0	15	03	17	DK	JR	JWC	GWF	AS-BUILT 2015

DRAWN BY: DK	CHECK DRAWING: CJT
DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: UPSTREAM ACCESS ROAD - AS-BUILT GENERAL ARRANGEMENT

SCALE:	DWG NO.:	REV.:
AS SHOWN	FRNF-XD-US-01	0

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

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APPENDIX B
BGC FIELD MEMORANDUMS

LIST OF FIELD MEMORANDUM

Reference	Title	Date
20140930_NFRDSIS_FM1	North Fork Rock Drain SIS Construction. Baseline Survey	September 30, 2014
20141024_NFRDSIS_FM2	USAR Construction Experience	October 24, 2014
20150217_NFRDSIS_FM4	Outstanding Activities and Recommendations	February 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Field Memorandum

Project Name:	NFRD Drain SIS	**To:**	Dan Russell
Project #:	0533-010-02	**Copied:**	Chad Brassard, Jim Cassie
Company:	BGC Engineering Inc.	**From:**	Joan Roca
Date:	20140930	**Record #:**	*20140930_NFRDSIS_FM1_ Baseline Survey*

Subject: North Fork Rock Drain SIS Construction. Baseline Survey

1.0. Introduction:

On September 4, 2014, BGC Engineering Inc. (BGC) was retained to support the Yukon Government (YG) with construction management related to North Fork Rock Drain (NFRD) Seepage Interception System (SIS).

BGC requested Underhill Geomatics LTD. (Underhill) to provide professional surveying and support services for the NFRD SIS project. As part of the consulting services, Underhill agreed to provide a baseline and layout surveys of SIS elements including borrow areas, two access roads, associated berms and pipeline.

On September 12, 2014, YG requested Pelly Construction Ltd. (PCL) to provide construction services for some of the NFRD SIS elements, including access roads and development of borrow areas.

2.0. Site Visit:

On August 14, 2014, YG organized a pre-bid site visit to observe the site conditions at the different work areas, and to comment on the details of the SIS elements to be constructed.

The following persons attended to the site visit:

- YG – Dustin Rainey, Deborah Pitt, Chad Brassard (CH2M/YG), and Cam Malloch (CH2M)
- BGC – Gerry Ferris, and Joan Roca
- PCL – Dan Russell, Jess Jewell, and John Garvice
- Tlicho Engineering LTD. (TEES) – Boyd Barstad

3.0. Underhill Activities:

On September 16, 2014, Underhill mobilized two surveyors to complete a baseline and layout surveys of SIS elements, including but not limited to:

- Identification of existing bench marks;
- Installation of bench marks at each work area, including borrow areas and pipe crossings, for construction monitoring purposes;

- Definition of area of “no disturbance” from US pond and DS water bodies. Orange crosses were installed to mark the 30 m wide area of no disturbance;
- Definition of clearing and grubbing limits at both upstream access road (USAR) and downstream access road (DSAR). Clearing and grubbing limits were marked with blue and orange topographic tape;
- Definition of laydown, spoil and turn around areas at both USAR and DSAR. The limits were marked with orange topographic tape;
- Identification of construction control points at USAR, DSAR, upstream plug-dike (USPD), and downstream seepage interception (DSSI) work areas. Stakes indicating the location and reference of each control point was installed;
- Installation of stakes along the center line for both USAR and DSAR, showing information relative to depth of fill or cut to road invert level, and station (STN), and offset hubs;
- Installation of stakes along the contact (intersection) between the existing Haul Road rock fill slope and the USAR platform to be constructed at 7.6 % slope;
- Installation of control stake at the intersection of USAR ramp at 7.6% with the flat natural ground;
- Measurement of clearance under transmission line located at the crest of the Haul Road;
- Installation of stakes to indicate the top of cut at 2H:1V slopes for the common excavation at USAR;
- Installation of control stakes and painted mark on the existing North Fork Rock Drain (NFRD) fill to indicate elevations 1091.5 m and 1092.0 m respectively;
- Installation of stakes for contact between Rock Protection Fill and General Rock Fill at the upstream plug-dike (USPD);
- Installation of stakes for USPD STNs 0+000 and 0+104;
- Installation of control stakes at pipe crossings located at approximate STN 0+360 to 0+380, and STN 1+240 to 1+260;
- Baseline survey for borrow areas A, B1, C, D, and a potential borrow source for Till located immediately northeast to control point CP-12 (USAR area); and
- Collection of a mesh of survey points at USAR area (points collected every 50 m).

Underhill completed the baseline and layout surveys of SIS elements on September 19, 2014, once Engineer and Contractor confirmed that no more elements or control stakes were required in order to complete the works as per the relevant Drawings and Technical Specifications.

4.0. Kick-off Meeting:

On September 22, 2014, YG organized a kick-off meeting at the Faro Mine site. The following items were covered during the meeting:

- Project background
- Scope of work
- Project schedule
- Roles and responsibilities
- H&S ownership, requirements and lessons learned
- Environmental management
- Communications
- Contacts
- Signed and stamped set of construction Drawings

The following persons attended to the kick-off meeting:

- YG – Chad Brassard, Erik Pit, and Cam Malloch
- BGC – Joan Roca, and Chris Pederson
- PCL – Dan Russell, and John Garvice
- TEES – Boyd Barstad
- Ecological Logistics & Research Ltd. (ELR) – Chris Jastrebski

Note that the main representatives from each party are listed above. A total of thirteen PCL employees and three ELR employees also attended the meeting.

5.0. Underhill Deliveries:

On September 24, 2014, Underhill submitted to Contractor and Engineer digital copies of the information collected during the baseline survey, as follows:

a. *D14-148 Borrow D and road OG (5 sheets)* – PDF file containing baseline survey for Borrow D area, potential borrow source for till close to control point CP-12, and grid of survey points at USAR area.

b. *D14-149 Borrow C and stockpile area* – PDF file containing the baseline survey for the Borrow C area, including the stockpile area.

c. *D14-150 Borrow B1* – PDF file containing the baseline survey for the Borrow B1 area.

d. *D14-151 Borrow A Pitrun and Sand* – PDF file containing the baseline survey for the Borrow A area, including the area with sand and gravel and the area with sand.

e. *D14-152 Borrow C Surveyed Area* – PDF file containing an orthophoto showing the limits of the area covered with survey points as part of the baseline survey.

f. *2014-09-22 Control and Benchmarks* – PDF file containing a list of the 9 control points and 2 bench marks installed for construction monitoring purposes.

g. *D14-147 Powerline Clearance* – PDF file containing a sketch showing the clearances under the transmission line at the crest of existing Haul Road.

CSV files containing the "raw" data collected were also submitted for the easy of reference.

On September 29, 2014, Underhill processed the available data to create surfaces (triangulations) as per PCL request from September 28, 2014. The following files were produced and sent to PCL:

h. *Borrow A pitrun and Sand breaklines.dxf* – DXF file covering the Borrow A areas, including containing the area with sand and gravel and the area with sand.

i. *Borrow C and stockpile area breaklines.dxf* – DXF file covering the Borrow C and stockpile areas.

j. *Borrow D and Road OG Breaklines.dxf* – DXF file covering the Borrow D area, potential borrow source for till close to control point CP-12, and USAR area.

6.0. Site Photos:

Photos showing the pre-construction site conditions at the different construction areas can be found attached to this memorandum (refer to Photos 1 to 51 attached).

Note that the attached photos were taken by the Engineer during the site visits performed to observe the works being performed by Underhill, or during the pre-bid site visit.

7.0. Closure:

BGC prepared this document for the account of YG. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation.

Based on the stated on this field memorandum, we understand that the baseline survey has been completed according to the scope of work to the satisfaction of all parties, and that all the deliverables have been submitted, unless additional services are requested by YG.

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

8.0. Attachments:

The following documents can be found attached to this field memorandum:

- Attachment 1: Photos collected during different site visits to record pre-construction site conditions (Photos 1 o 51).

- Attachment 2: Signed and stamped set of construction Drawings (5 drawings), as submitted during the kick-off meeting held on the Faro Mine site on September 22, 2014.
- Attachment 3: PDF files submitted by Underhill, as per Section 5.0 above (11 pages).

BGC Representatives:	Joan Roca	**Date:**	20140930
Reviewed by:	Jim Cassie	**Date:**	20140930

Attachment 1: Photos



Photo 1: 20140918_NFRDSIS_USAR_Pre-construction conditions at USAR_STN 0+060_Looking NW



Photo 2: 20140916_NFRDSIS_USAR_Pre-construction conditions at USAR_STN 0+040_Looking E



Photo 3: 20140916_NFRDSIS_USAR_Pre-construction conditions at USAR STN 0+080_Looking S



Photo 4: 20140916_NFRDSIS_USAR_Pre-construction conditions at Haul Road fill toe_Looking NW



Photo 5: 20140916_NFRDSIS_USAR_Pre-construction conditions at Haul Road fill toe area



Photo 6: 20140919_NFRDSIS_USAR_Pre-construction conditions at USAR area_Looking NE



Photo 7: 20140919_NFRDSIS_USAR_Pre-construction conditions close to 30 m wide area of exclusion_Looking W



Photo 8: 20140919_NFRDSIS_USAR_Pre-construction conditions at STN 0+689_Looking W



Photo 9: 20140919_NFRDSIS_USAR_Pre-construction conditions at CP-12_Looking W



Photo 10: 20140919_NFRDSIS_USAR_Pre-construction conditions at STN 0+780_Looking E



Photo 11: 20140919_NFRDSIS_USPD_Pre-construction conditions at USPD area_Looking NE



Photo 12: 20140919_NFRDSIS_USPD_Pre-construction conditions at USPD area_Looking N



Photo 13: 20140919_NFRDSIS_USPD_Pre-construction conditions at USPD_Looking NW



Photo 14: 20140916_NFRDSIS_DSAR_Pre-construction conditions at DSAR_STN 0+160_Looking NW



Photo 15: 20140916_NFRDSIS_DSAR_Pre-construction conditions east to STN 0+000_Looking W



Photo 16: 20140916_NFRDSIS_DSAR_Pre-construction conditions at STN 0+000_Looking NW



Photo 17: 20140916_NFRDSIS_DSAR_Monitoring wells between STN 0+000 and 0+020_Looking SE



Photo 18: 20140916_NFRDSIS_DSAR_Pre-construction conditions at STN 0+040_Looking W



Photo 19: 20140916_NFRDSIS_DSAR_Pre-construction conditions at STN 0+080_Looking W

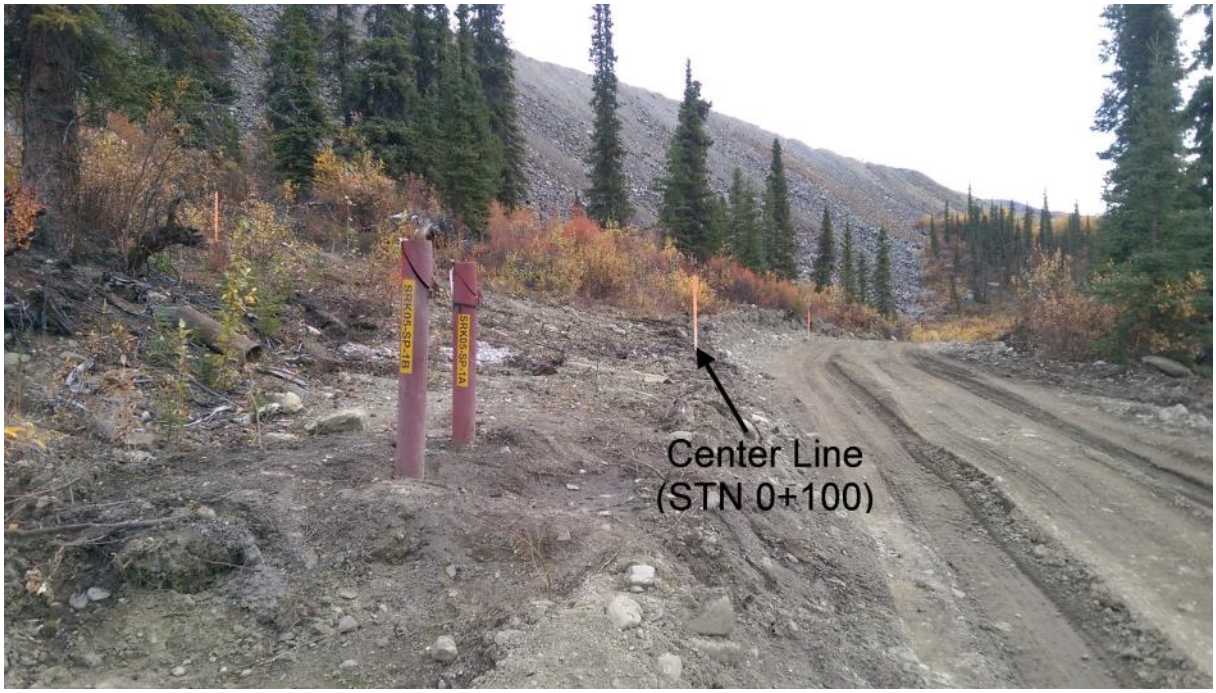


Photo 20: 20140916_NFRDSIS_DSAR_Pre-construction conditions at STN 0+100_Looking SE



Photo 21: 20140916_NFRDSIS_DSAR_Pre-construction conditions at STN 0+120_Looking w



Photo 22: 20140916_NFRDSIS_DSAR_Pre-construction conditions_STN 0+160_Looking NW



Photo 23: 20140916_NFRDSIS_DSSC_Pre-construction conditions at DSSC area_Looking SW



Photo 24: 20140916_NFRDSIS_DSSC_Pre-construction conditions at right side bank_Looking SW



Photo 25: 20140916_NFRDSIS_DSSC_Existing rocks at NF2A_Looking SW



Photo 26: 20140916_NFRDSIS_DSSC_Pre-construction conditions at NF2A _Looking SW



Photo 27: 20140916_NFRDSIS_DSSC_Pre-construction conditions at NF2A and island_Looking NE



Photo 28: 20140917_NFRDSIS_DSSC_Pre-construction conditions at NF2B and island_Looking NE



Photo 29: 20140917_NFRDSIS_DSSC_Pre-construction conditions at island_Looking NE



Photo 30: 20140917_NFRDSIS_DSSC_Pre-construction conditions at control station_Looking SW



Photo 31: 20140916_NFRDSIS_DSSC_Pre-construction conditions at right side bank_Looking SW



Photo 32: 20140916_NFRDSIS_DSSC_Pre-construction conditions at right side bank_Looking SW



Photo 33: 20140916_NFRDSIS_DSSC_Pre-construction conditions at right side bank_Looking SW



Photo 34: 20140916_NFRDSIS_DSSC_Pre-construction conditions at right side bank_Looking SW



Photo 35: 20140916_NFRDSIS_DSSC_Pre-construction conditions at right side bank_Looking SE



Photo 36: 20140918_NFRDSIS_BA_Pre-Construction conditions at Borrow A_Looking SE



Photo 37: 20140918_NFRDSIS_BA_Pre-Construction conditions at Borrow A_Looking NW



Photo 38: 20140918_NFRDSIS_BA_Pre-Construction conditions at Borrow A_Looking SW



Photo 39: 20140918_NFRDSIS_BA_Pre-Construction conditions at Borrow A_Sand area_Looking NE



Photo 40: 20140916_NFRDSIS_BB1_Pre-construction conditions at Borrow B1_Looking NW



Photo 41: 20140919_NFRDSIS_BC_Pre-construction conditions at Borrow C_Upper Bench_Upper platform_Looking NW



Photo 42: 20140919_NFRDSIS_BC_Pre-construction conditions at Borrow C_Upper Bench_Road from upper platform to lower platform_Looking W



Photo 43: 20140919_NFRDSIS_BC_Pre-construction conditions at Borrow C_Upper Bench_Lower platform_Contractor already sorted material_Looking NW



Photo 44: 20140919_NFRDSIS_BC_Pre-construction conditions at Borrow C_Lower Bench_ Looking NW



Photo 45: 20140814_NFRDSIS_BC_Pre-Construction conditions at Borrow C_Lower Bench_ Looking NW



Photo 46: 20140916_NFRDSIS_Haul Road_Pre-construction conditions at Haul Road_Looking SE



Photo 47: 20140916_NFRDSIS_Haul Road_Pre-Construction conditions at Haul Road_Looking SE



Photo 48: 20140916_NFRDSIS_Haul Road_Pre-Construction conditions at Haul Road_Looking SE



Photo 49: 20140918_NFRDSIS_PL_Pre-construction conditions at Haul Road crossing (STN 0+360 to 0+380)_Looking NE



Photo 50: 20140918_NFRDSIS_PL_Pre-construction conditions at road crossing (STN 1+240 to 1+260)_Looking NE



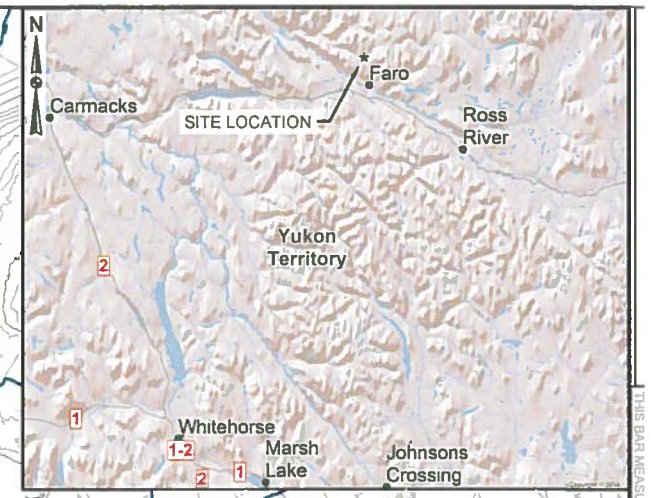
Photo 51: 20140918_NFRDSIS_PL_Pre-construction conditions at road crossing (approx. STN 0+180 to 0+360)_Looking N

Attachment 2: Signed and stamped set of construction Drawings (5 drawings), as submitted during the kick-off meeting held on the Faro Mine site on September 22, 2014.

PERMIT TO PRACTICE
Signature
Date Sept 3, 2014
PERMIT NUMBER: PR092
Association of Professional Engineers of Yukon

PROFESSIONAL ENGINEER YUKON TERRITORY GERALD FERRIS Sept 3, 2014

FARO PIT
NORTHEAST ROCK DUMP
BORROW SOURCE C
EXISTING ZONE II PUMP
PROPOSED PIPELINE LOCATION
NORTH FORK ROSE CREEK
INTERMEDIATE ROCK DUMP
MAIN ROCK DUMP
POND
PROPOSE UPSTREAM BERM
EXISTING NORTH FORK ROCK DRAIN
PROPOSED UPSTREAM ROAD
SEE DWG FRNF-XD-02-07
PROPOSED DOWNSTREAM ROAD
EXISTING HAUL ROAD
BORROW SOURCE D
BORROW B1
SEE DWG FRNF-XD-02-04
NF2A
EXISTING S-WELLS CLUSTER
PROPOSED DOWNSTREAM BERM
BORROW SOURCE A
SEE DWG FRNF-XD-02-13
MINE ACCESS ROAD
X2
BORROW B2
SECURITY GATE
SEE DWG FRNF-XD-02-03



SCALE 1:5,000
100 0 100 200 300
METRES
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON ORIGINAL FORMAT DRAWINGS.

LEGEND
- EXISTING POWER LINE
- PROPOSED SEEPAGE PIPELINE
- EXISTING ROAD

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT. 2012. CONTOUR INTERVAL IS 2 m.
3. PROJECTION IS NAD83, UTM ZONE 8N
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6. THE CONTRACTOR SHALL PRESERVE THE EXISTING POWER LINE AND ROADS THROUGHOUT CONSTRUCTION. ACTIVITIES WHICH TEMPORARY REMOVED ACCESS ROADS OR REQUIRE POWER SHUT DOWNS WILL BE CO-ORDINATED WITH THE SITE MAINTENANCE CONTRACTOR.
7. THE CONTRACTOR SHALL ALLOW ACCESS TO WORK AREAS, SUBJECT TO CO ORDINATION AND SAFETY REQUIREMENTS OF SITE MAINTENANCE CONTRACTOR FOR THE PURPOSES OF SAMPLING AND TESTING AS REQUESTED BY THE ENGINEER.

REVISION INFORMATION

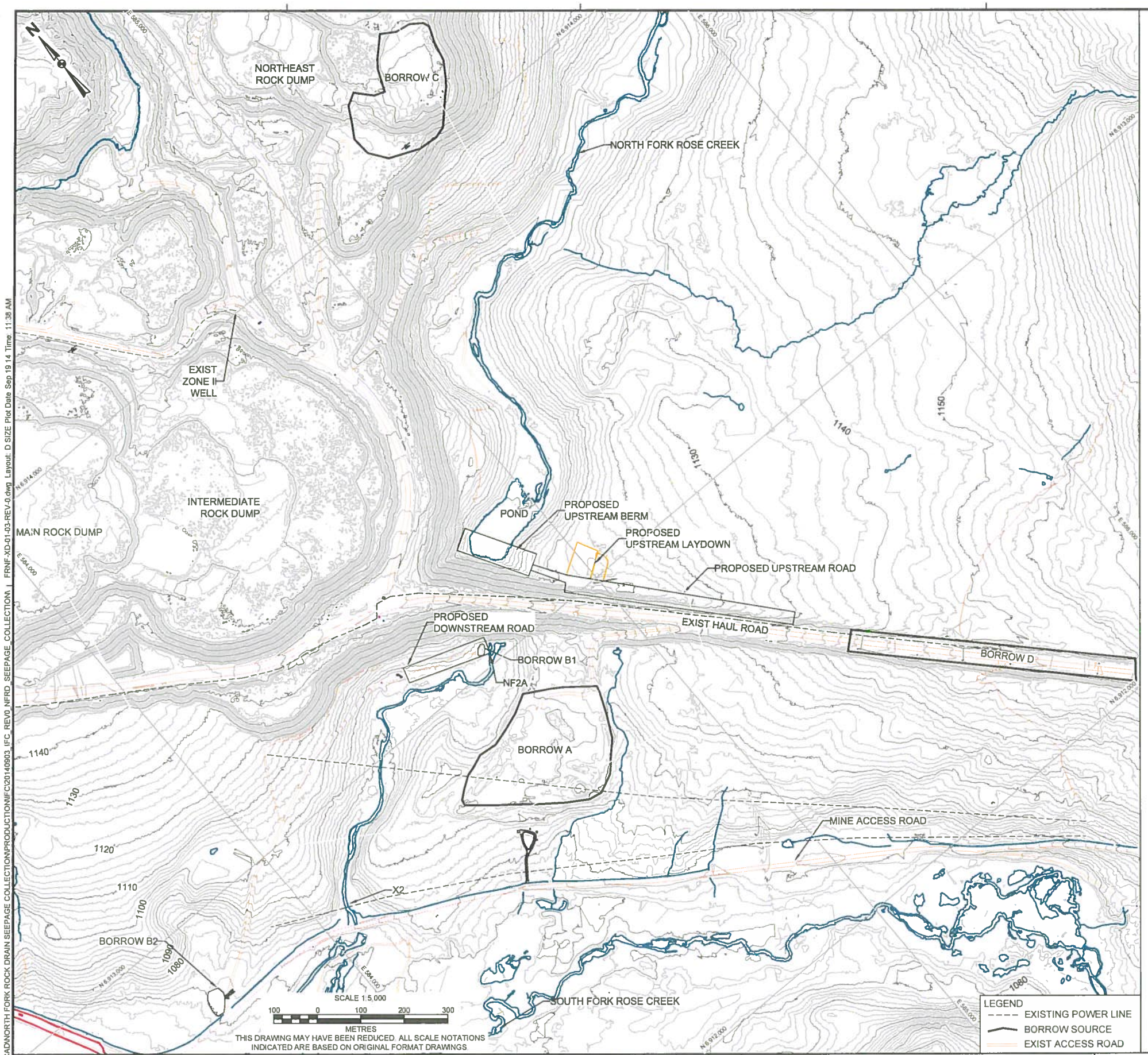
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0	14	09	03	DK	SN	GWF	JC	ISSUED FOR CONSTRUCTION

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

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DESIGN BY: SN	CHECK DESIGN: GWF		TITLE: PROJECT AREA AND ACCESS
LEAD ENGINEER: GWF	APPROVAL DATE: AUGUST 6, 2014	CLIENT: Yukon Government	SCALE: 1:5,000 / DWG NO.: FRNF-XD-01-02 / REV.: 0
PROJECT MANAGER: JC	APPROVAL DATE: AUGUST 6, 2014		

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



BORROW NOTES:

1. BORROW A CONSISTS OF GRANULAR SOIL AND IS TO BE USED AS PART OF THE UPSTREAM AND DOWNSTREAM ACCESS ROADS. SAND AND GRAVEL TO BE TAKEN FROM EXIST WORKING FACE IN BORROW PIT. SOURCE OF CLEAN SAND IS TO BE DEVELOPED IN SOUTH EAST CORNER OF BORROW A, NO CURRENT FACE IS AVAILABLE. ALTERNATIVE DEVELOPMENT LOCATIONS FOR SAND AND GRAVEL WITHIN BORROW A TO BE APPROVED BY THE ENGINEER. HAUL DISTANCE FROM BORROW A TO UPSTREAM ROAD IS APPROXIMATELY 0.5 km. HAUL DISTANCE FROM BORROW A TO DOWNSTREAM ROAD IS APPROXIMATELY 7.9 km.
2. BORROW SOURCE B1 CONSISTS OF TILL. HAUL DISTANCE FROM BORROW B1 TO UPSTREAM BERM IS APPROXIMATELY 8.4 km. HAUL DISTANCE FROM BORROW B1 TO DOWNSTREAM BERM IS APPROXIMATELY 0.14 km.
3. BORROW SOURCE B2 CONSISTS OF TILL. HAUL DISTANCE FROM BORROW SOURCE B2 TO UPSTREAM BERM IS APPROXIMATELY 7.5 km.
4. BORROW SOURCE B3 IS A POTENTIAL SOURCE FOR TILL SOIL TO BE USED AS PART OF THE UPSTREAM BERM CONSTRUCTION. THIS IS NOT A PROVEN RESOURCE, AND IS CURRENTLY BEING TESTED FOR POTENTIAL USE IN THE UPSTREAM BERM. APPROVAL FOR USE MAY BE GRANTED BY THE ENGINEER DEPENDING ON THE TESTING RESULTS. HAUL DISTANCE FROM THE POTENTIAL BORROW B3 AREA TO THE UPSTREAM BERM IS APPROXIMATELY 0.2 KM.
5. BORROW SOURCE C CONSISTS OF SULPHIDE-FREE, HARD, DURABLE CALCIUM-SILICATE ROCKFILL WITH SOME HARD, DURABLE GREEN VOLCANIC ROCK. THIS IS THE SOURCE FOR ANY ROCKFILL TO BE USED IN STREAM, BOTH GENERAL ROCKFILL AND ROCK PROTECTION FILL. HAUL DISTANCE FROM BORROW C TO UPSTREAM BERM IS APPROXIMATELY 2.7 km. HAUL DISTANCE FROM BORROW C TO DOWNSTREAM BERM IS APPROXIMATELY 8.1 km.
6. BORROW SOURCE D CONSISTS OF ROCK FILL MATERIAL OVERLAIN BY SAND AND GRAVEL AND MAKES UP A SECTION OF THE HAUL ROAD. HAUL DISTANCE FROM BORROW C TO THE UPSTREAM ROAD IS APPROXIMATELY 0.2 km.
7. MATERIAL FROM BORROW A, B1, B2, C WILL BE USED FOR IN STREAM WORK AND WILL BE TESTED USING XRF EQUIPMENT AS PART OF ONGOING BORROW DEVELOPMENT. ONLY FILL APPROVED BY THE ENGINEER CAN BE PLACED IN STREAM. THE XRF TESTING WILL BE SUPPLEMENTED BY VISUAL MONITORING.
8. BORROW AREAS B1, B2 AND POTENTIAL BORROW AREA B3 (IF USED) ARE TO BE DEVELOPED IN SUCH A WAY THAT THE BASE IS LEVEL OR SLOPED TO DRAIN FROM THE BORROW PIT AND NOT ALLOW WATER PONDING.
9. BORROW D IS THE ACTIVE ACCESS ROAD BETWEEN THE FARO AND GRUM SIDES OF THE FARO MINE COMPLEX AND MUST BE MAINTAINED AS AN ACTIVE ROAD THROUGH ANY BORROW WORK. THE CONTRACTOR IS TO COORDINATE ANY WORKS WITH THE SITE SERVICES CONTRACTOR TO MAINTAIN ACCESS THROUGH CONSTRUCTION AND MUST PRODUCE A FINAL SURFACE ACCEPTABLE FOR USE AS A HAUL ROAD. THROUGHOUT BORROW ACTIVITIES THE EXISTING POWER LINES ON THE NORTH SIDE OF THE HAUL ROAD NEED TO BE PROTECTED FROM DAMAGE.

GENERAL NOTES:

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PROFESSIONAL ENGINEER
YUKON TERRITORY
GERALD FERRIS
Sept 3, 2014

PERMIT TO PRACTICE
Signature
Date Sept 3, 2014
PERMIT NUMBER: PP092
Association of Professional Engineers of Yukon

REVISION INFORMATION

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B	14	08	27	JL	SN	GWF	GD	ISSUED FOR CLIENT REVIEW
0	14	09	03	DK	SN	GWF	GD	ISSUED FOR CONSTRUCTION

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

DRAWN BY: JL	CHECK DRAWING: GCB
DESIGN BY: SN	CHECK DESIGN: GWF
LEAD ENGINEER: GWF	APPROVAL DATE: AUGUST 6, 2014
PROJECT MANAGER: JC	APPROVAL DATE: AUGUST 6, 2014

BGC ENGINEERING INC.
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CLIENT: Yukon Government

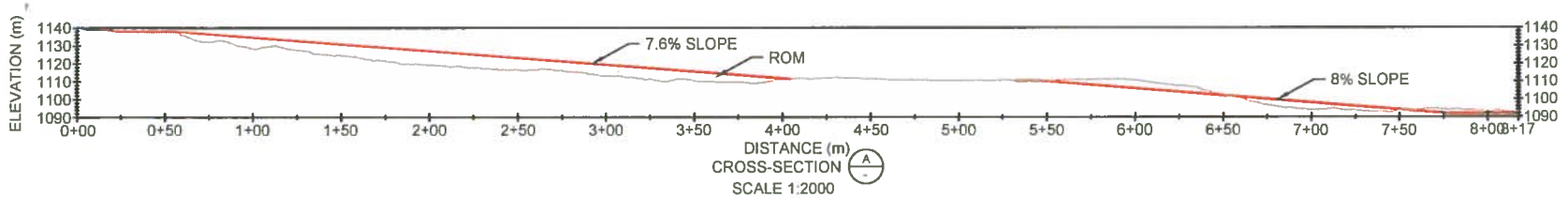
PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

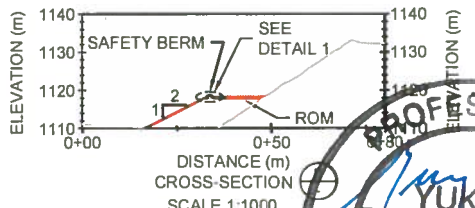
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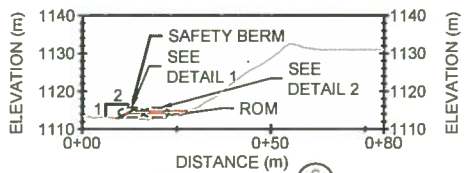
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THIS BAR MEASURES 100 mm AT FULL SIZE ALL SCALES REFERENCED TO FULL SIZE

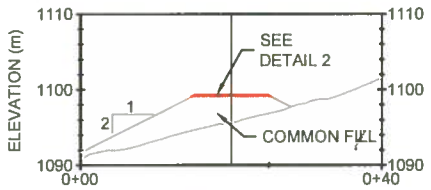
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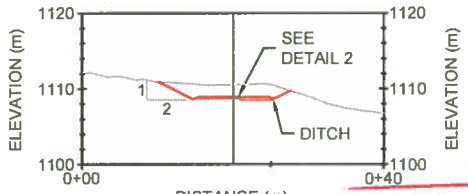


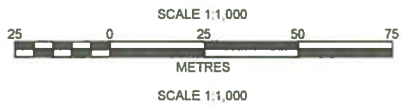


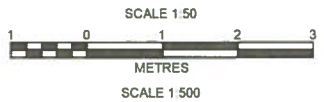


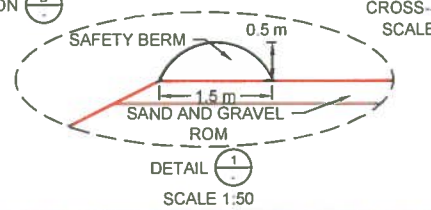


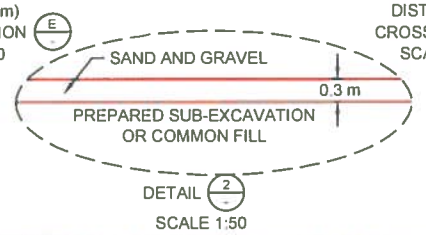


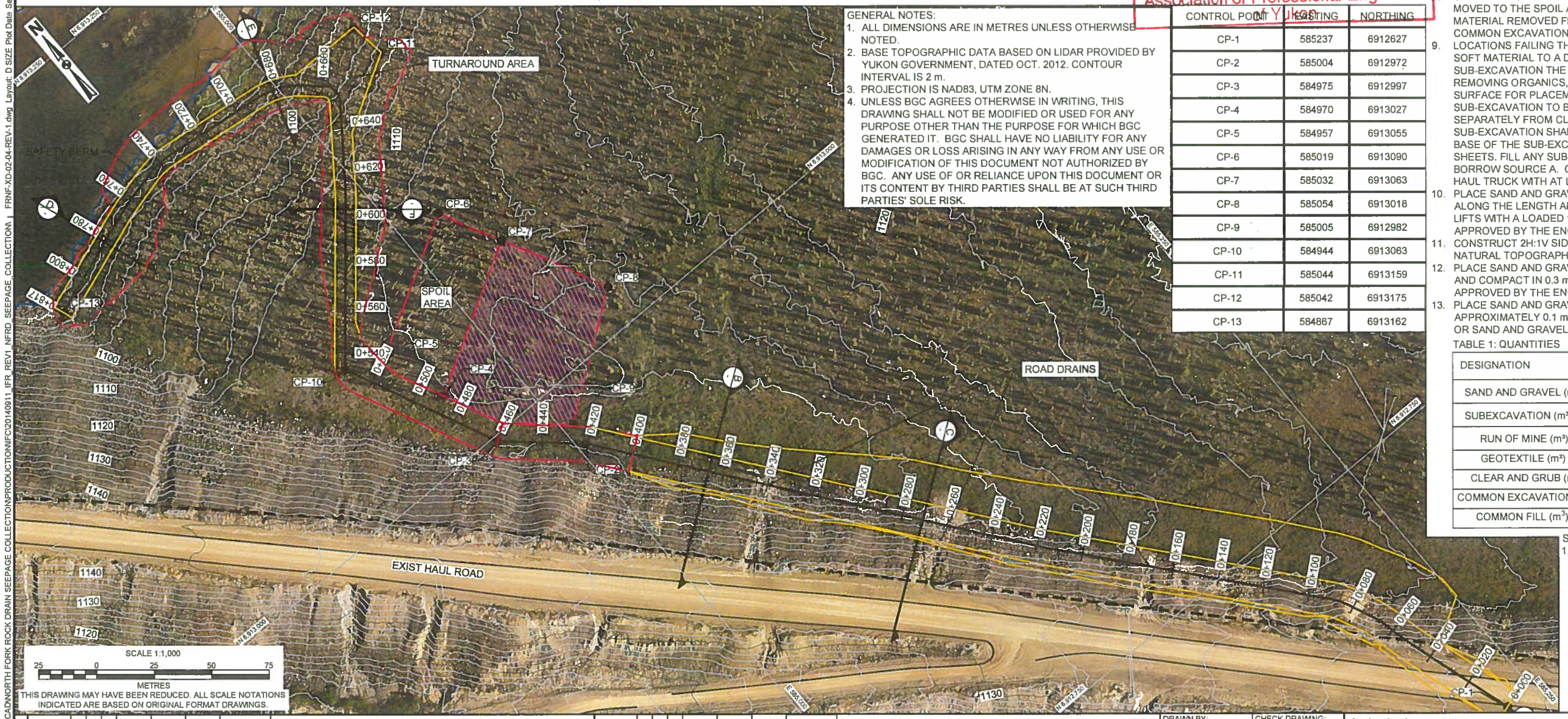












GENERAL NOTES:

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CONTROL POINT	EASTING	NORTHING
CP-1	585237	6912627
CP-2	585004	6912972
CP-3	584975	6912997
CP-4	584970	6913027
CP-5	584957	6913055
CP-6	585019	6913090
CP-7	585032	6913063
CP-8	585054	6913018
CP-9	585005	6912982
CP-10	584944	6913063
CP-11	585044	6913159
CP-12	585042	6913175
CP-13	584867	6913162

CONSTRUCTION NOTES:

1. PLACE RUN OF MINE (ROM) ROCKFILL FROM BORROW D TO THE LINES ON GRADES SHOWN BETWEEN STA 0+00 AND STA 0+380. ROM MATERIAL SHOWING EXTENSIVE DEGRADATION OF SULPHIDES IN EXCESS OF TYPICAL LEVELS, AS MEASURED BY THE XRF, ARE TO BE HAULED TO THE FARO MINE WASTE DUMP, AS DIRECTED BY THE ENGINEER.
2. PLACE A THIN LIFT OF SAND AND GRAVEL FROM BORROW A ON THE SURFACE OF THE ROM FILL BETWEEN STA 0+00 AND STA 0+380 TO CREATE A TRAFFICABLE LAYER, TYPICALLY 0.2 m THICKNESS AS NEEDED FOR CONSTRUCTION ACCESS OR AS DIRECTED BY THE ENGINEER.
3. PLACE A SAFETY BERM AS SHOWN BETWEEN STA 0+00 AND STA 0+380 SO THAT A CONTINUOUS SAFETY BERM IS CREATED BETWEEN EXIST SAFETY BERM AT APPROXIMATELY STA 0+020 TO THE NATURAL GROUND. GAPS FOR DRAINS TO THE LEFT IN SAFETY BERM AT LOCATIONS SHOWN FOR ROAD DRAIN.
4. INSTALL ROAD DRAINS AT STATIONS SHOWN, THAT CONSISTS OF A LOW POINT IN THE ROAD EXTENDING FROM THE EXITING DRAINAGE AREAS ON THE FACE OF THE HAUL ROAD TO THE GAPS PROPOSED IN THE SAFETY BERM. THE ROAD/DRAINS NEEDS TO BE SLOPED TO DRAIN AS DIRECTED BY THE ENGINEER.
5. COMPLETE COMMON EXCAVATION OR COMMON FILL PLACEMENT TO THE LINES AS GRADES SHOWN. EXCESS COMMON EXCAVATION TO BE WASTED IN THE LOCAL SPOIL AREA. PLACEMENT AREA FOR COMMON FILL TO HAVE THE REMOVAL OF THE EXISTING ORGANIC SOIL AND BE PROOF-ROLLED USING AT LEAST TWO COVERAGES BY A LOADED 10 T TANDEM HAUL TRUCK OR APPROVED ALTERNATIVE. COMMON FILL PLACEMENT TO CONSIST OF PLACEMENT OF A MAXIMUM LIFT THICKNESS OF 0.3 m AND FOLLOWED BY COMPACTION USING THREE PASSES OF A D9 DOZER OR ALTERNATIVE APPROVED BY THE ENGINEER.
6. COMPLETE PROOF ROLL USING AT LEAST TWO CONTINUOUS PASSES OF A LOADED 10 T TANDEM HAUL TRUCK AS APPROVED BY THE ENGINEER. THE TURN AROUND AREAS TO BE PREPARED TO THE SAME STANDARD AS THE ACCESS ROAD.
7. THE TOE ON THE NORTHEASTERN SIDE OF THE ROM ACCESS ROAD IS SHOWN AS 2H:1V, BUT CAN BE AT ANGLE OF REPOSE.
8. CLEAR AND GRUB TO THE EXTENTS SHOWN. MATERIAL CLEARED SHOULD BE MOVED TO THE SPOIL AREA SHOWN AND STORED SEPARATELY FROM ANY MATERIAL REMOVED FROM SUB-EXCAVATION AREAS OR GENERATED FROM THE COMMON EXCAVATION.
9. LOCATIONS FAILING THE PROOF TEST REQUIRE. SUB-EXCAVATION TO REMOVE SOFT MATERIAL TO A DEPTH OF 0.5 m. UPON COMPLETION OF THE SUB-EXCAVATION THE BASE OF THE SUB-EXCAVATION SHALL BE SMOOTHED, REMOVING ORGANICS, ROOTS AND ROCKS TO FORM A CONTINUOUS SMOOTH SURFACE FOR PLACEMENT OF THE GEOTEXTILE MATERIAL REMOVED FROM SUB-EXCAVATION TO BE TAKEN TO SPOIL AREA SHOWN AND STOCKPILED SEPARATELY FROM CLEAR AND GRUB MATERIAL. GEOTEXTILE AT THE BASE OF THE SUB-EXCAVATION SHALL CONSIST OF NILEX 4553 OR EQUIVALENT, COVERING THE BASE OF THE SUB-EXCAVATION WITH AN OVERLAP OF 0.3 m BETWEEN ADJACENT SHEETS. FILL ANY SUB-EXCAVATED AREAS WITH SAND AND GRAVEL FROM BORROW SOURCE A. COMPACT IN 0.3 m THICK LIFTS WITH A LOADED 10 T TANDEM HAUL TRUCK WITH AT LEAST TWO PASSES.
10. PLACE SAND AND GRAVEL FROM BORROW SOURCE A TO A THICKNESS OF 0.3 m ALONG THE LENGTH AND WIDTH OF THE ROAD SHOWN. COMPACT IN 0.3 m THICK LIFTS WITH A LOADED 10 T TANDEM HAUL TRUCK USING AT LEAST TWO PASSES AS APPROVED BY THE ENGINEER.
11. CONSTRUCT 2H:1V SIDE SLOPES ALONG THE EDGES OF THE ROAD, MEETING NATURAL TOPOGRAPHY AS SHOWN.
12. PLACE SAND AND GRAVEL TO A THICKNESS OF 0.3 m IN THE TURNAROUND AREAS AND COMPACT IN 0.3 m THICK LIFTS WITH A LOADED 10 T TANDEM HAUL TRUCK AS APPROVED BY THE ENGINEER.
13. PLACE SAND AND GRAVEL IN THE LAYDOWN AREA TO A THICKNESS OF APPROXIMATELY 0.1 m TO FORM A SMOOTH SURFACE. COMPACT THE SUBGRADE OR SAND AND GRAVEL IF NEEDED.

TABLE 1: QUANTITIES

DESIGNATION	ROAD	LAYDOWN AREA
SAND AND GRAVEL (m³)	3400	400
SUBEXCAVATION (m³)	1050	-
RUN OF MINE (m³)	51100	-
GEOTEXTILE (m²)	1250	1300
CLEAR AND GRUB (m²)	9100	5900
COMMON EXCAVATION (m³)	8090	
COMMON FILL (m³)	6900	

TABLE NOTES:

1. QUANTITIES ASSUME 30% OF THE ROAD NOT IN CUT OR FILL REQUIRES SUB-EXCAVATION.

SAND & GRAVEL SPECIFICATIONS:

1. SOUND, DURABLE, CHEMICALLY INERT SAND AND GRAVEL OBTAINED FROM BORROW A, TO BE APPROVED BY THE ENGINEER, AND MEETING THE FOLLOWING GRADATION LIMITS: 100% PASSING 100 mm; <8% PASSING 0.075 mm.

LEGEND
- PROPOSED TOPOGRAPHY
- CLEAR AND GRUB
- TOE
- ROAD
- LAYDOWN

PROFESSIONAL ENGINEER
YUKON TERRITORY
GERALD FERRIS
Sept 17, 2014

PERMIT TO PRACTICE
Signature
Date Sept 17, 2014
PERMIT NUMBER: PP092
Association of Professional Engineers of Yukon

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
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B	14	08	29	JL	SN	GWF	GD	ISSUED FOR CLIENT REVIEW
0	14	09	03	DK	SN	GWF	GD	ISSUED FOR CONSTRUCTION
1	14	09	17	DK	GWF	JWC	JWC	REVISION OF ROAD FROM STATION 0+480 TO 0+755

REVISION INFORMATION

DRAWN BY: JL	CHECK DRAWING: GCB
DESIGN BY: SN	CHECK DESIGN: GWF
LEAD ENGINEER: GWF	APPROVAL DATE: AUGUST 8, 2014
PROJECT MANAGER: JC	APPROVAL DATE: AUGUST 8, 2014

BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

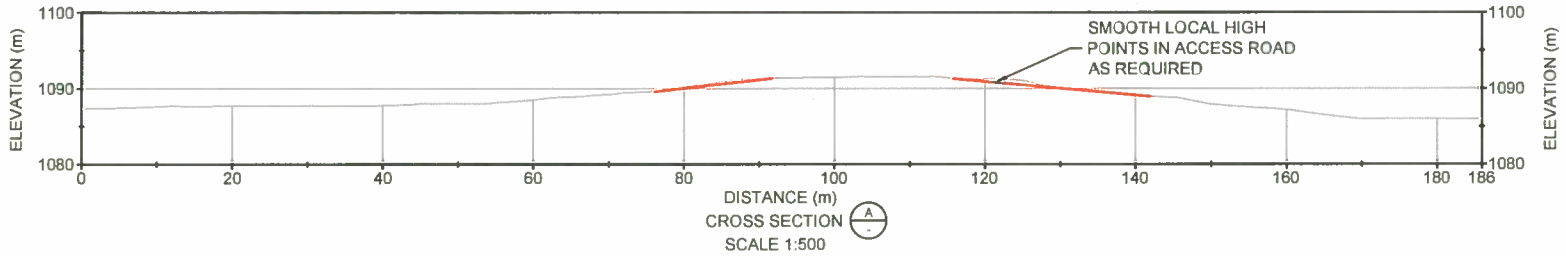
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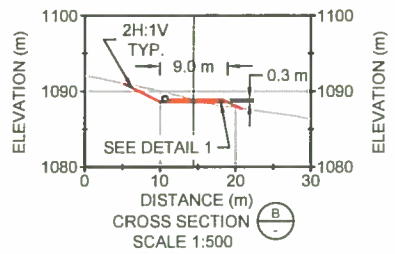
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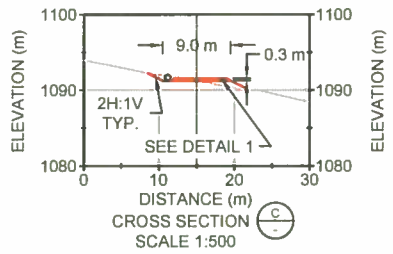
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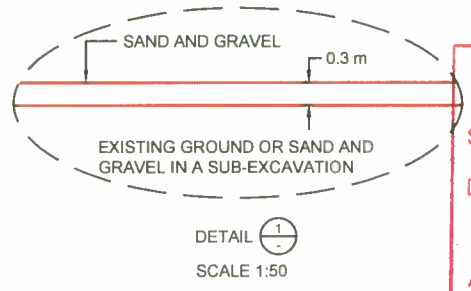
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PROFESSIONAL ENGINEER
YUKON TERRITORY
GERALD FERRIS
Sept 3, 2014









SCALE 1:50
METRES

SCALE 1:500
METRES

PERMIT TO PRACTICE
Signature
Date Sept 3, 2014
PERMIT NUMBER: PP092
Association of Professional Engineers of Yukon

CONSTRUCTION NOTES:
1. CLEAR AND GRUB TO THE EXTENTS SHOWN. MATERIAL REMOVED AS PART OF CLEAR AND GRUB TO BE PLACED IN A SEPARATE LOCATION WITHIN THE DESIGNATED SPOIL AREA FROM THE MATERIAL REMOVED AS SUB-EXCAVATION.
2. COMPLETE PROOF ROLL USING A LOADED 10 T TANDEM TRUCK. LOCATIONS FAILING THE PROOF TEST REQUIRE SUB-EXCAVATION TO REMOVE SOFT MATERIAL TO A DEPTH OF 0.5 m. UPON COMPLETION OF THE SUB-EXCAVATION THE BASE OF THE SUB-EXCAVATION SHALL BE SMOOTHED, REMOVING ORGANICS, ROOTS AND ROCKS TO FORM A CONTINUOUS SMOOTH SURFACE FOR PLACEMENT OF THE GEOTEXTILE. GEOTEXTILE AT THE BASE OF THE SUB-EXCAVATION SHALL CONSIST OF NILEX 4553 OR EQUIVALENT, COVERING THE BASE OF THE SUB-EXCAVATION WITH AN OVERLAP OF 0.3 m BETWEEN ADJACENT SHEETS. FILL ANY SUB-EXCAVATED AREAS WITH SAND AND GRAVEL FROM BORROW SOURCE A. COMPACT IN 0.3 m THICK LIFTS WITH A LOADED 10 T TANDEM HAUL TRUCK AS APPROVED BY ENGINEER.
3. PLACE SAND AND GRAVEL MEETING SPECIFICATION TO A THICKNESS OF 0.3 m ALONG THE LENGTH AND WIDTH OF THE ROAD SHOWN. COMPACT IN 0.3 m THICK LIFTS WITH A LOADED 10 t TANDEM TRUCK WITH AT LEAST TWO PASSES AS APPROVED BY ENGINEER. SPACE TO BE LEFT ON THE NORTH SIDE OF THE ACCESS ROAD FOR THE PLACEMENT OF THE PIPELINE AS SHOWN IN SECTION B AND C. THE PIPELINE IS TO BE UNDERLAIN BY APPROXIMATELY 0.1 m OF SAND AND GRAVEL.
4. COMPLETE A CUT AND FILL ALONG THE ALIGNMENT OF THE ROAD AS SHOWN IN SECTION B AND C TO PRODUCE A NEAR LEVEL FINAL ROAD SURFACE, THE LOCAL CUT MATERIAL CAN BE USED AS FILL IF IT PASSES THE PROFF ROLL TESTING THAT IS COMPLETED FOLLOWING PLACEMENT. COMPACT THE FILL MATERIAL USING AT LEAST THREE CONTINUOS PASSESS OF A LOADED 10 t TANDEM HAUL TRUCK OR A METHOD APPROVED BY THE ENGINEER.
5. CONSTRUCT 2H:1V SIDE SLOPES ALONG THE EDGES OF THE ROAD, MEETING NATURAL TOPOGRAPHY.
6. PROOF ROLL TURNAROUND AREA SHOWN USING A LOADED 10 t TANDEM TRUCK. REMOVE SOFT MATERIAL TO A DEPTH OF 0.5 m. PLACE WOVEN GEOTEXTILE AND FILL ANY SUB-EXCAVATED AREAS WITH SAND AND GRAVEL FROM BORROW SOURCE A. COMPACT IN 0.3 m THICK LIFTS WITH A LOADED 10 t TANDEM TRUCK. PLACE SAND AND GRAVEL TO A THICKNESS OF 0.3 m AND COMPACT IN 0.3 m THICK LIFTS WITH A LOADED 10 t TANDEM HAUL TRUCK. CONSTRUCT 2H:1V SIDE SLOPES FOR THE TURNAROUND AREA, MEETING NATURAL TOPOGRAPHY AS APPROVED BY ENGINEER.
7. PLACE SAND AND GRAVEL IN THE LAYDOWN AREA TO A THICKNESS OF 0.1 m.
8. PREPARE WINTER PREP PUMPHOUSE PAD BY FIRST PROOF ROLLING THE AREA USING A LOADED 10 t TANDEM TRUCK COMPLETING AT LEAST TWO CONTINUOUS PASSES. REMOVE SOFT MATERIAL TO A DEPTH OF 0.5 m. PLACE WOVEN GEOTEXTILE AND FILL ANY SUB-EXCAVATED AREAS WITH SAND AND GRAVEL FROM BORROW SOURCE A. COMPACT IN 0.3 m THICK LIFTS WITH A LOADED 10T TANDEM HAUL TRUCK. PLACE SAND AND GRAVEL TO A THICKNESS OF 0.3 m AND COMPACT IN 0.3 m THICK LIFTS WITH A LOADED HAUL TRUCK. CONSTRUCT 2H:1V SIDE SLOPES FOR THE TURNAROUND AREA, MEETING NATURAL TOPOGRAPHY AS APPROVED BY ENGINEER..

CONTROL POINT	EASTING	NORTHING	CONTROL POINT	EASTING	NORTHING
CP-1	584534	6913104	CP-5	584675	6913026
CP-2	584640	6913035	CP-6	584691	6913013
CP-3	584654	6913019	CP-7	584726	6913037
CP-4	584665	6913016	CP-8	584685	6913067



LEGEND
- EXISTING TOPOGRAPHY
- PROPOSED TOPOGRAPHY
- CLEAR AND GRUB
- PIPELINE
- PUMPHOUSE - SUMMER POSITION
- PUMPHOUSE - WINTER POSITION
- ROAD
- PUMPHOUSE PAD
- LAYDOWN

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT. 2012. CONTOUR INTERVAL IS 2 m.
3. PROJECTION IS NAD83, UTM ZONE 8N.
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TABLE 1: QUANTITIES

DESIGNATION	AREA (m²)	VOLUME (m³)
SAND AND GRAVEL	-	1300
CLEAR AND GRUB	4222	N/A
GEOTEXTILE	660	N/A

TABLE NOTES:
1. QUANTITIES ASSUME 30% OF THE ROAD AND PUMPHOUSE PAD REQUIRES SUB-EXCAVATION.

SAND AND GRAVEL SPECIFICATIONS:
1. SOUND, DURABLE, CHEMICALLY INERT SAND AND GRAVEL OBTAINED FROM BORROW A, TO BE APPROVED BY THE ENGINEER, AND MEETING THE FOLLOWING GRADATION LIMITS: 100% PASSING 100 mm; < 8% PASSING 0.075 mm.

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

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
A	14	08	01	JL	SN	GWF	GD	ISSUED FOR CLIENT REVIEW
B	14	08	29	JL	SN	GWF	GD	ISSUED FOR CLIENT REVIEW
0	14	09	03	DK	SN	GWF	JC	ISSUED FOR CONSTRUCTION

DRAWN BY: JL	CHECK DRAWING: GCB
DESIGN BY: SN	CHECK DESIGN: GWF
LEAD ENGINEER: GWF	APPROVAL DATE: AUGUST 1, 2014
PROJECT MANAGER: JC	APPROVAL DATE: AUGUST 1, 2014

BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: DOWNSTREAM ROAD ACCESS AND LAYDOWN AREAS

SCALE:	DWG NO.:	REV.:
AS SHOWN	FRNF-XD-02-07	0

X:\Projects\0533 YK-Gov\007\CAD\NORTH FORK ROCK DRAIN SEEPAGE COLLECTION\PRODUCTION\FC\20140903 IFC REV0 NFRD SEEPAGE COLLECTION | FRNF-XD-02-07-REV-0.dwg Layout: D SIZE Plot Date: Sep 19 14 Time: 11:43 AM

PROFESSIONAL ENGINEER
YUKON TERRITORY
GERALD FERRIS
Sept 3, 2014

PERMIT TO PRACTICE
Signature
Date Sept 3, 2014
PERMIT NUMBER: PP092
Association of Professional Engineers of Yukon

MW 14-08

4" HDPE DR11 PIPELINE CONNECTING PERMANENT PIPE TO THE DISCHARGE FROM PUMP. CONNECTIONS TO BE FLANGE FITTINGS.

TERMINATION OF THE PERMANENT INSULATED PIPELINE SEE DRAWING FRND-XD-02-14

EXISTING NORTH FORK ROCK DRAIN

TOE OF ROCK PROTECTION FILL

TOP OF GENERAL ROCK FILL

TOP OF TILL

GUIDES TO BE INSTALLED ON BOTH SIDE OF MANHOLE FOR C-CAN.

INTAKE PIPE(S) AS DIRECTED IN FIELD BY ENGINEER

EXISTING GROUND SURFACE TO BE GRADED AND INCLUDE THE PLACEMENT OF COMPACTED SAND AND GRAVEL, AS PER SPECIFICATIONS FOR ROAD PROVIDED ON DRAWING FRNF-XD-002-07 SO THAT A LEVEL AND SMOOTH PLATFORM IS CREATED FOR C-CAN MOVEMENT

MW 14-11

ROADWAY TO BE CLEARED SEE DRAWING FRNF-XD-02-07

LARGE BOULDER TO BE BROKEN AND REMOVED AS APPROVED BY THE ENGINEER

TOE OF GENERAL ROCK FILL

PUMP MANHOLE

TOE OF ROCK PROTECTION FILL

FINAL ALIGNMENT OF C-CAN TO BE FIELD FIT

STREAM DIVERSION

CONTROL POINT A
N6913023.08
E584697.21

PROPOSED LIMITS OF TILL AND ROCK PROTECTION FILL - TO BE FIELD FIT AS APPROVED BY THE ENGINEER

EXISTING STREAM BOUNDARY

CENTER LINE OF DOWNSTREAM BERM

TOP OF TILL

CONTROL POINT B
N6913020.99
E584701.31

TOE OF ROCK PROTECTION FILL BERM

TOP OF ROCK PROTECTION FILL

EXISTING ISLAND

NOTES:
1. C-CAN GUIDE SHOULD BE TIMBER OR C SECTION STEEL THAT WILL BE PARTLY BURIED AND ALLOW THE SKIDS OF THE C-CAN TO BE ALIGNED SO THAT IT CAN BE PUSHED INTO POSITION AND LINE UP OVER THE SUMP.
2. EXISTING MONITORING WELLS ARE TO BE REMOVED BY THE CONTRACTOR PRIOR TO CONSTRUCTION BY CUTTING OFF THE STICK-UP OF THE WELLS AND ABANDON BY POURING IN BENTONITE CHIPS AS DIRECTED BY THE ENGINEER. THE REMOVAL OF OTHER WELLS SHOULD BE MINIMIZED, AND IF REQUIRED ARE TO BE ABANDONED USING THE SAME PROCEDURE BUT WILL REQUIRE APPROVAL OF ENGINEER.
3. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
4. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT 2011. CONTOUR INTERVAL IS 0.5 m.
5. PROJECTION IS NAD 83, UTM ZONE 8N.
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LEGEND
- LAND
- EXISTING STREAM BOUNDARY
- MONITORING WELL

NORTH FORK ROSE CREEK

FLOW

SILT FENCE TO BE INSTALLED ACROSS NORTH FORK ROSE CREEK

TEMPORARY DAM (REMOVE ONCE DOWNSTREAM BERM INSTALLED)

MATE LOCATION
AMPLING POINT
TECTED

SCALE 1:50
1 0 1 2 3
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\0533 YK-Gov\007\CAD\NORTH FORK ROCK DRAIN SEEPAGE COLLECTION\PRODUCTION\FC\20140903_IFC_REV0_NFRD_SEEPAGE_COLLECTION\ | FRNF-XD-02-08-REV-0.dwg | Layout: D SIZE Plot Date: Sep 19 14 Time: 11:54 AM

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
A	14	08	08	DO	GD	GWF	JC	ISSUED FOR CLIENT REVIEW
B	14	08	25	DO	GD	GWF	JC	ISSUED FOR CLIENT REVIEW
0	14	09	03	DO	GD	GWF	JC	ISSUED FOR CONSTRUCTION

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

DRAWN BY: DO	CHECK DRAWING: GD
DESIGN BY: GD	CHECK DESIGN: GWF
LEAD ENGINEER: GWF	APPROVAL DATE: AUGUST 8, 2014
PROJECT MANAGER: JC	APPROVAL DATE: AUGUST 8, 2014

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: DOWNSTREAM BERM, SUMP AND SEEPAGE COLLECTION

SCALE:	DWG NO.:	REV.:
1:50	FRNF-XD-02-08	0

Attachment 3: PDF files submitted by Underhill, as per Section 5.0 above (11 pages).

UNDERHILL

Coordinates are NAD83 (CSRS) Zone 8 derived from a dual frequency RTK GPS observations holding values of control stations **"294**" fixed in 3D.
Coordinates of station **"294"** are derived from from a dual frequency RTK GPS observations holding values of control stations **"2010-P4**" fixed in 3D.
Coordinates of station **"2010-P4"** are derived from a Previous Survey not conducted by Underhill

Point Number	Northing	Easting	Elevation	Description
294	**6913142.60**	**584773.96**	**1146.55**	**Main Control Point on Haul Road Berm**
295	6913083.87	584629.40	1093.53	Downstream Benchmark
296	6913057.02	584677.76	1089.45	Downstream Benchmark
297	6913195.85	584832.73	1092.20	Upstream Benchmark by by Plug dyke
298	6913149.82	584877.93	1095.66	Upstream Benchmark by by Plug dyke
299	6914281.12	584886.45	1157.91	Benchmark by pipe discharge at 1+600
300	6913011.95	584686.19	1085.51	Downstream Benchmark by water gauge
301	6913288.41	584599.01	1156.74	Benchmark at pipe/road crossing
302	6913992.11	584766.08	1164.78	Benchmark at pipe/road crossing
303	6913171.10	585055.42	1103.84	Upstream Benchmark by Truck Turnaround
2010-CP4	**6914202.677**	**582192.825**	**1118.245**	

4081 4th Ave.
Whitehorse, YT
Y1A 1H4

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Professional Land Surveyors
Geomatics Engineers

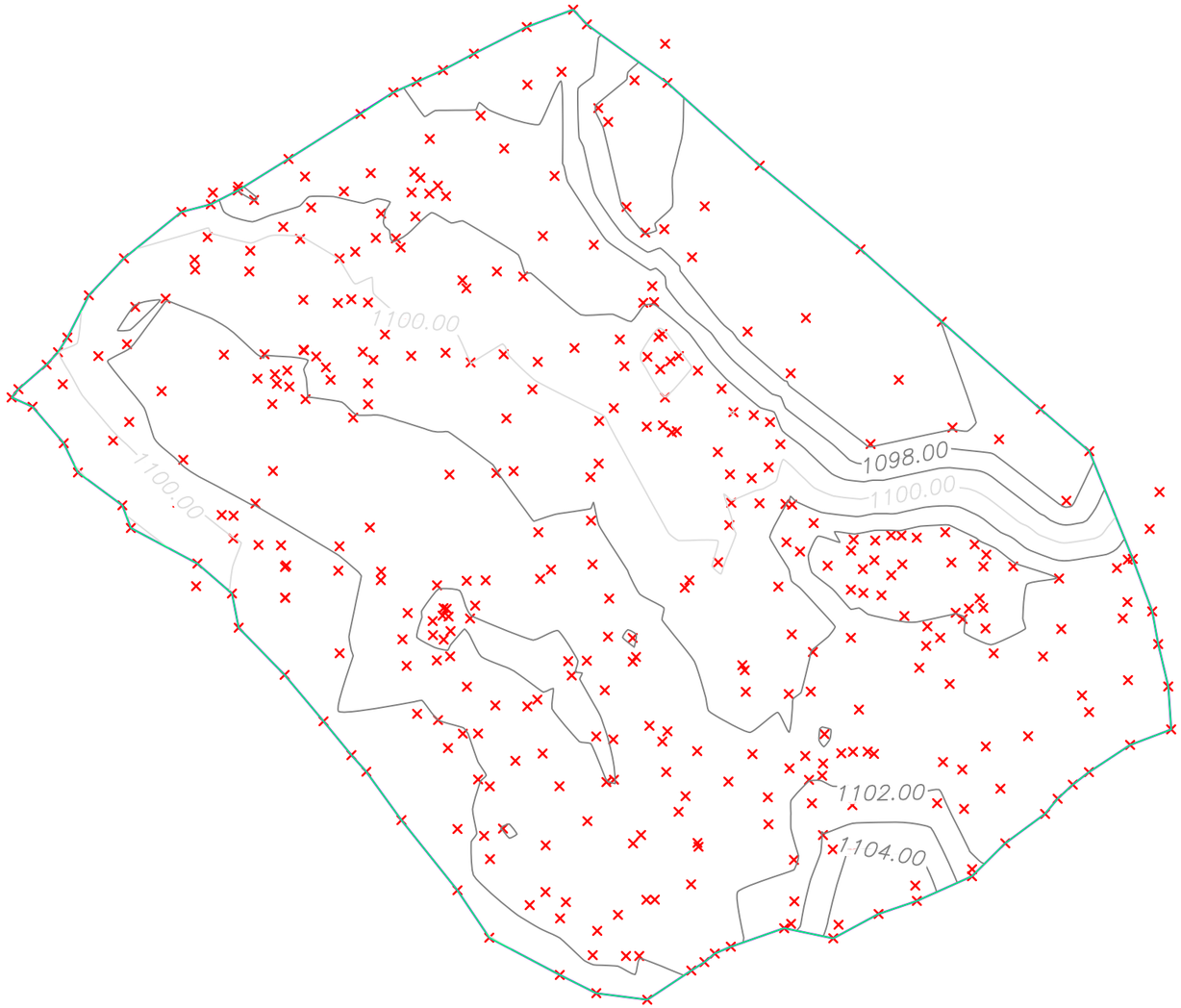
867-668-2048
whse@underhill.yk.ca

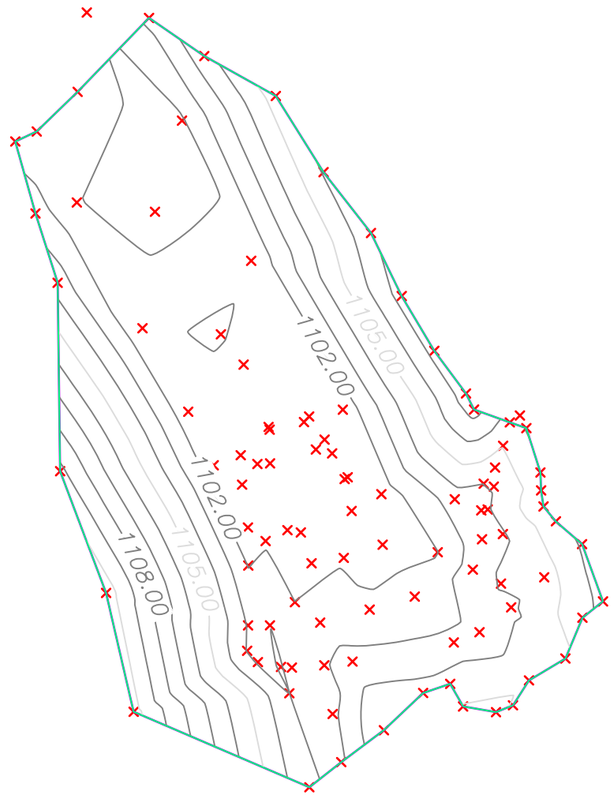
Borrow Area A

Pitrun and Sand

Contour Intervals 1.0m

Data point shown thus . . . . . ×







Scale 1:500

10 0 5 10 20 30 40 50 metres

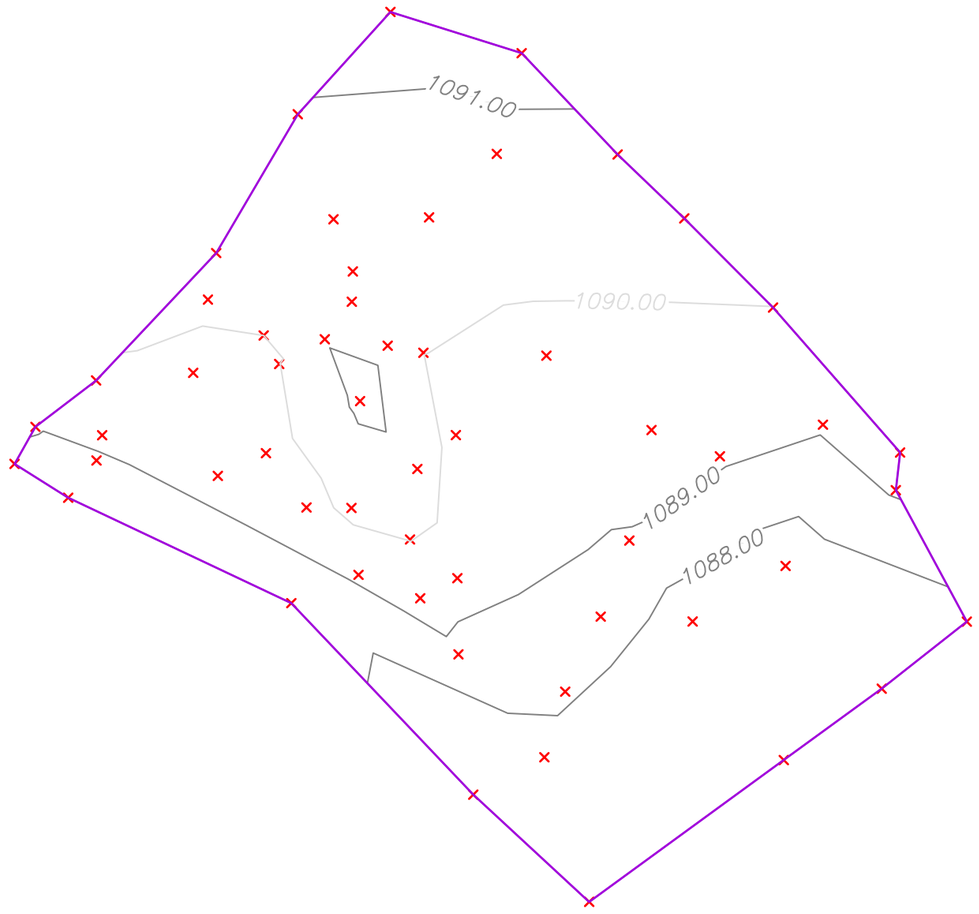
UNDERHILL GEOMATICS LTD.
PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157

D14–151 SC

Borrow Area B1

Contour Intervals 1.0m

Data point shown thus . . . . . ×





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PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157

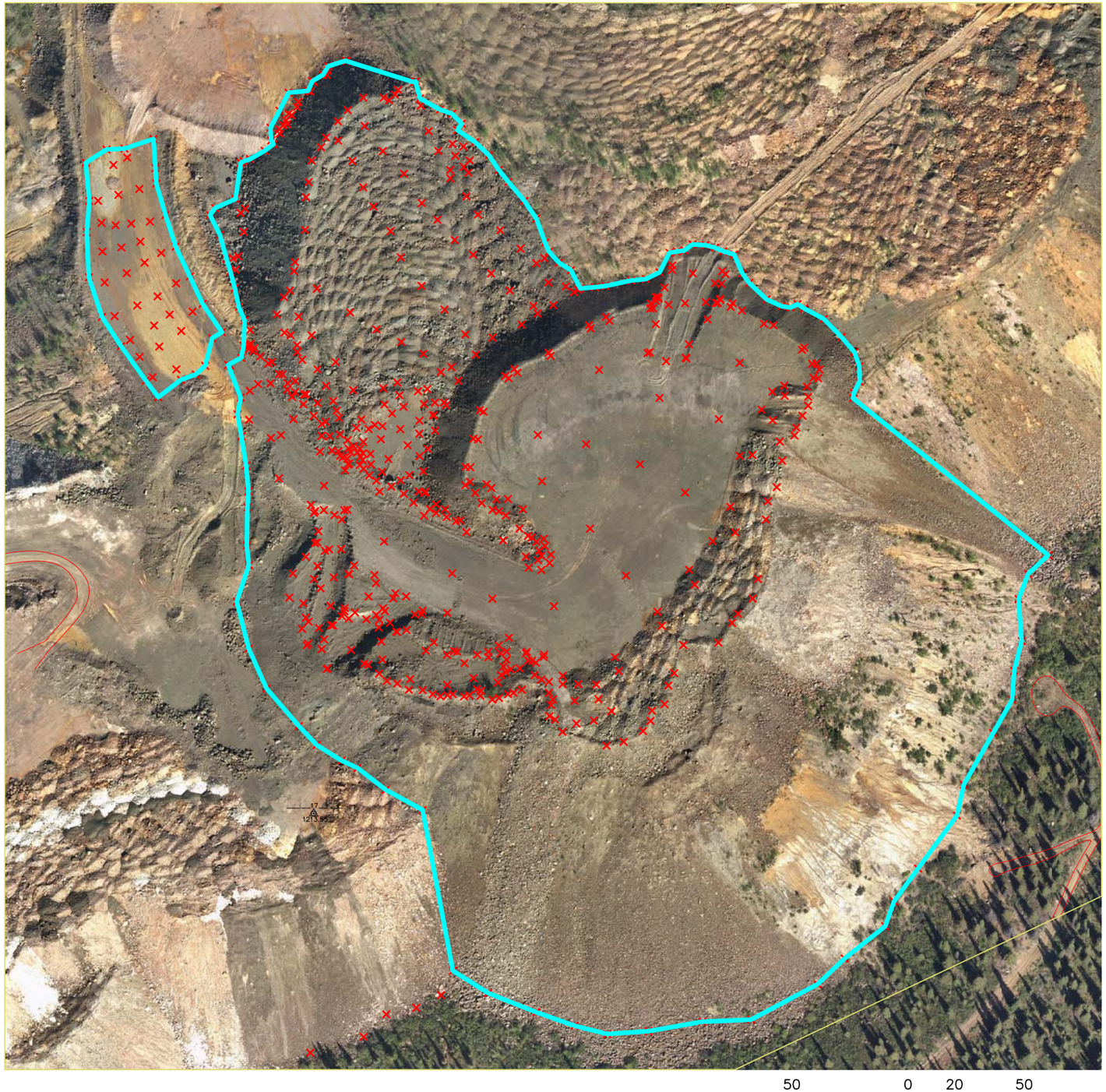
Scale 1:150

3 0 1.5 3 6 9 12 15 metres

D14–150 SC

Borrow Area C
Surveyed Area

Data point shown thus . . . . . ×
Outline of Survey shown thus. . . . . ———



Scale 1:2000

50 0 20 50 100 150 200 metres

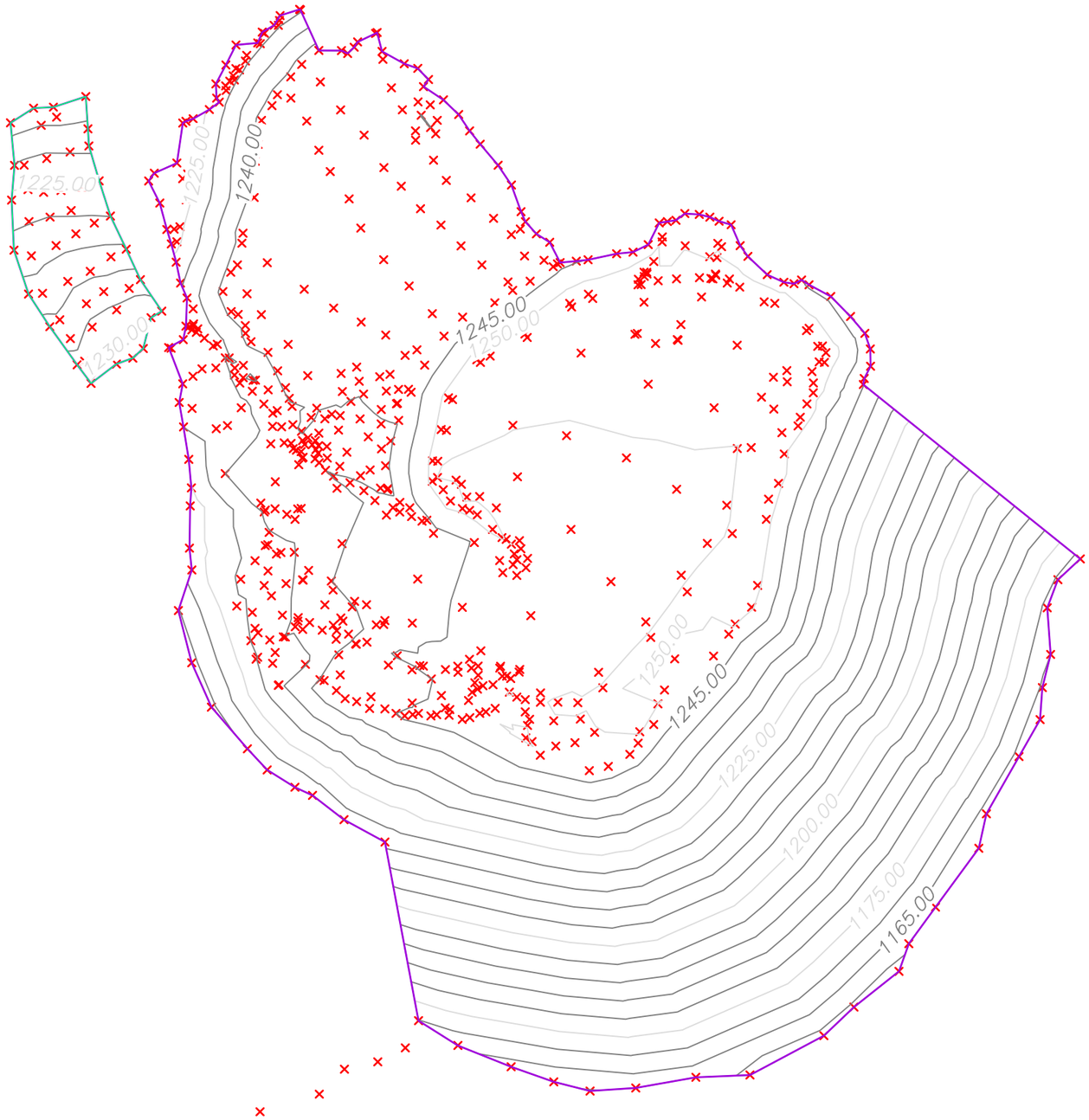
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Job: W14157

D14–152 *SC*

Borrow Area C

Contour Intervals 5.0m

Data point shown thus . . . . . ×





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Job: W14157

Scale 1:2000

50 0 20 50 100 150 200 metres

D14–149 SC

Borrow Area D and Access Road OG

Sheet 1 of 5

Contour Intervals 5.0m

Data point shown thus . . . . . ×



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WHITEHORSE, YUKON
Job: W14157

Scale 1:1000

20 0 10 20 40 60 80 100 metres

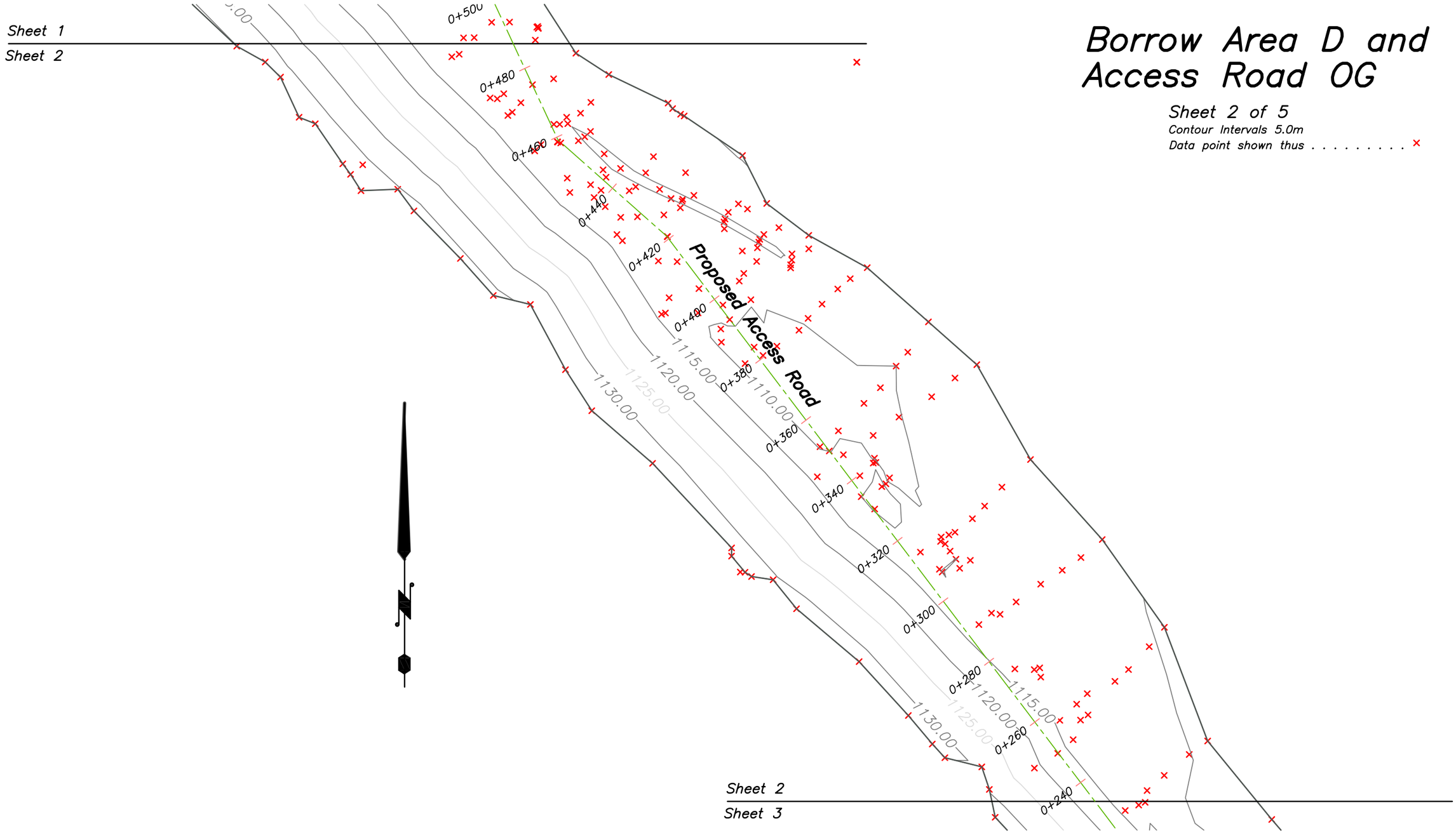
D14–148 Sheet 1 SC

Borrow Area D and Access Road OG

Sheet 2 of 5

Contour Intervals 5.0m

Data point shown thus . . . . . ×



Scale 1:1000

20 0 10 20 40 60 80 100 metres

UNDERHILL GEOMATICS LTD.
PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157

D14–148 Sheet 2 SC

Sheet 2

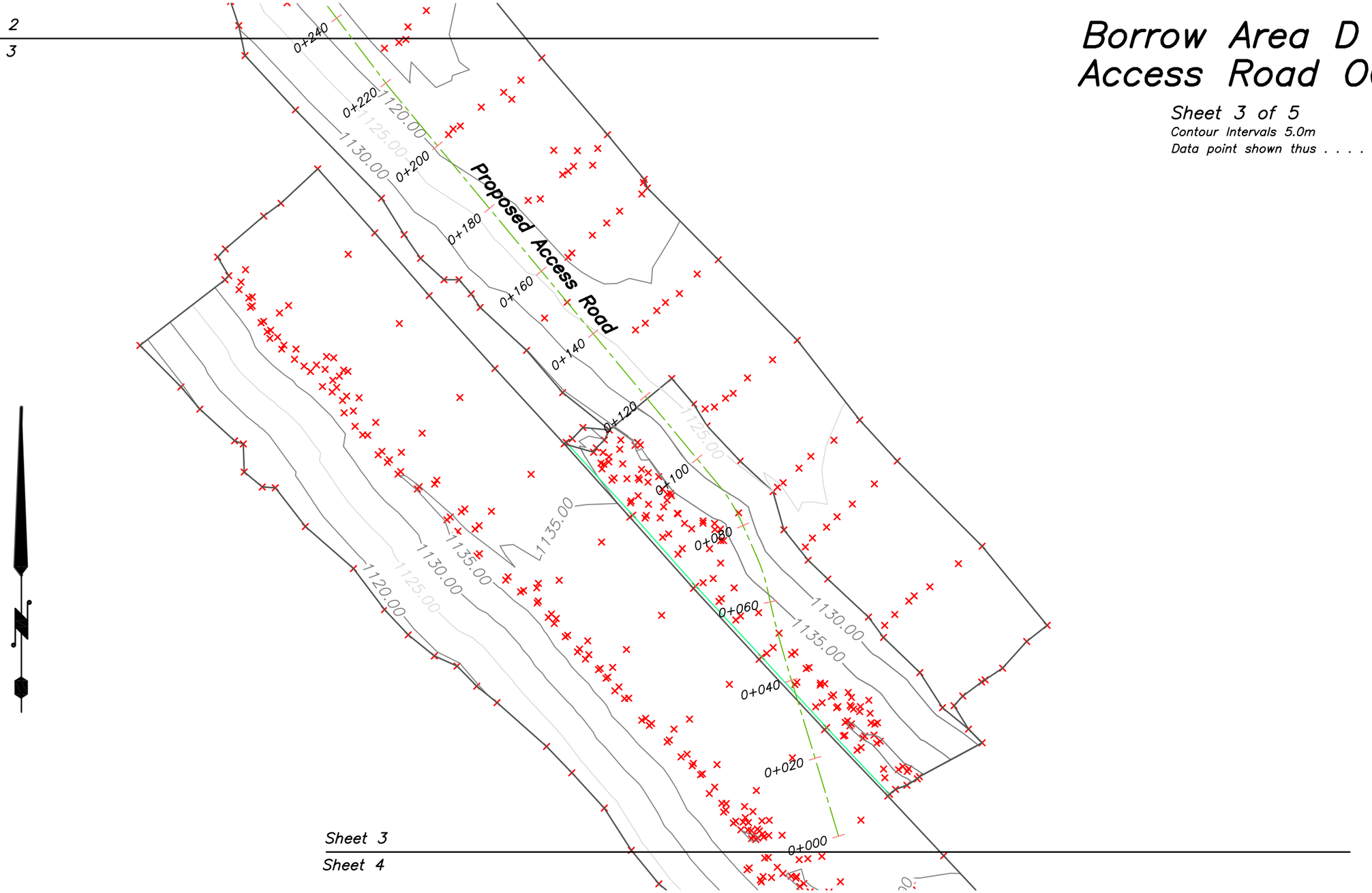
Sheet 3

Borrow Area D and Access Road OG

Sheet 3 of 5

Contour Intervals 5.0m

Data point shown thus . . . . . ×



Sheet 3

Sheet 4

UNDERHILL GEOMATICS LTD.
PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157

Scale 1:1000

20 0 10 20 40 60 80 100 metres

D14–148 Sheet 3 SC

Borrow Area D and Access Road OG

Sheet 4 of 5

Contour Intervals 5.0m

Data point shown thus . . . . . ×

Sheet 3

Sheet 4

0+000

1140.00

1135.00

1130.00

1145.00

1140.00

1135.00

1150.00

1145.00

1140.00

Sheet 4

Sheet 5

Scale 1:1000

20 0 10 20 40 60 80 100 metres

UNDERHILL GEOMATICS LTD.
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WHITEHORSE, YUKON
Job: W14157

D14–148 Sheet 4 SC

Borrow Area D and Access Road OG

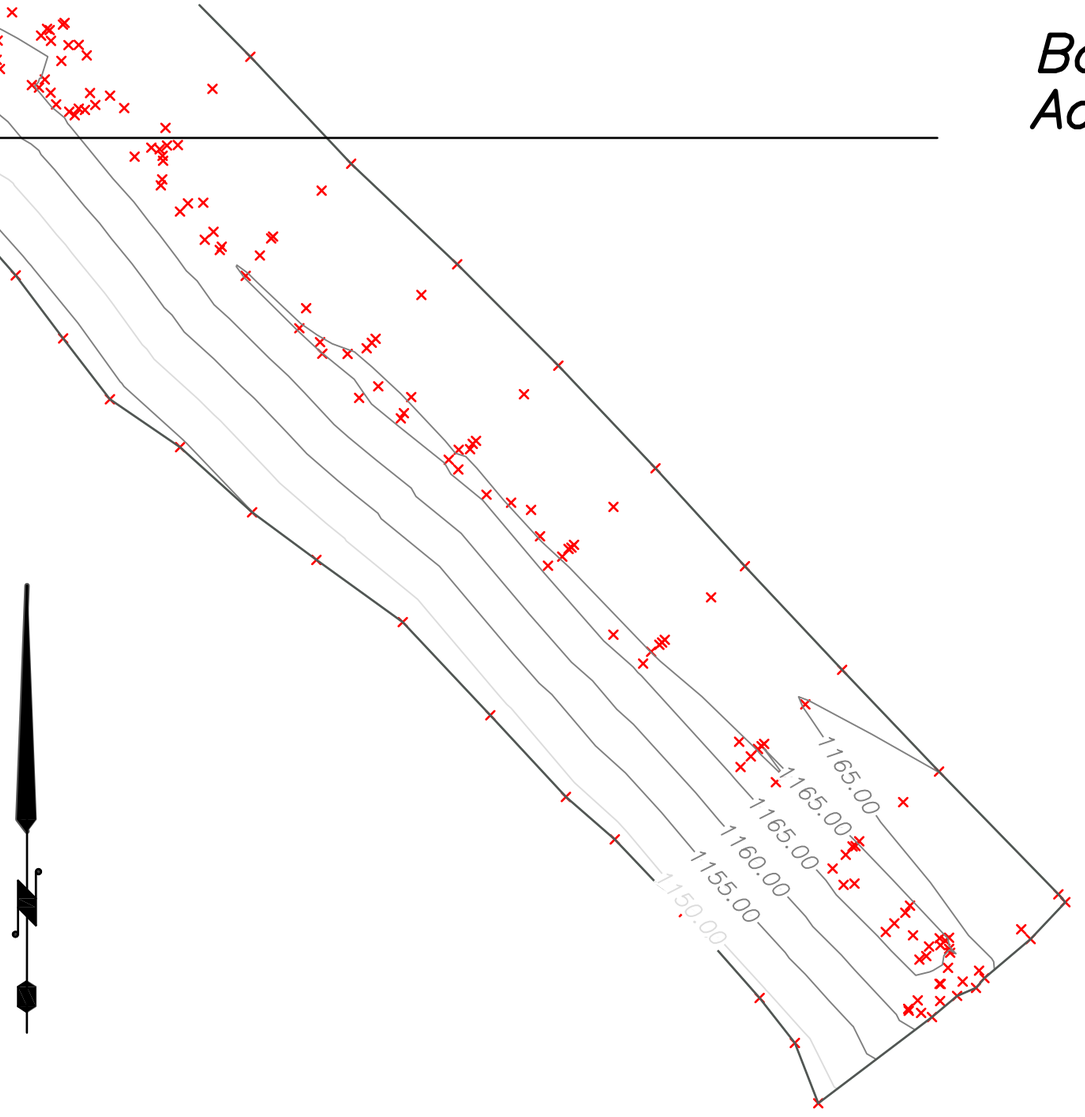
Sheet 5 of 5

Contour Intervals 5.0m

Data point shown thus . . . . . ×

Sheet 5

Sheet 6

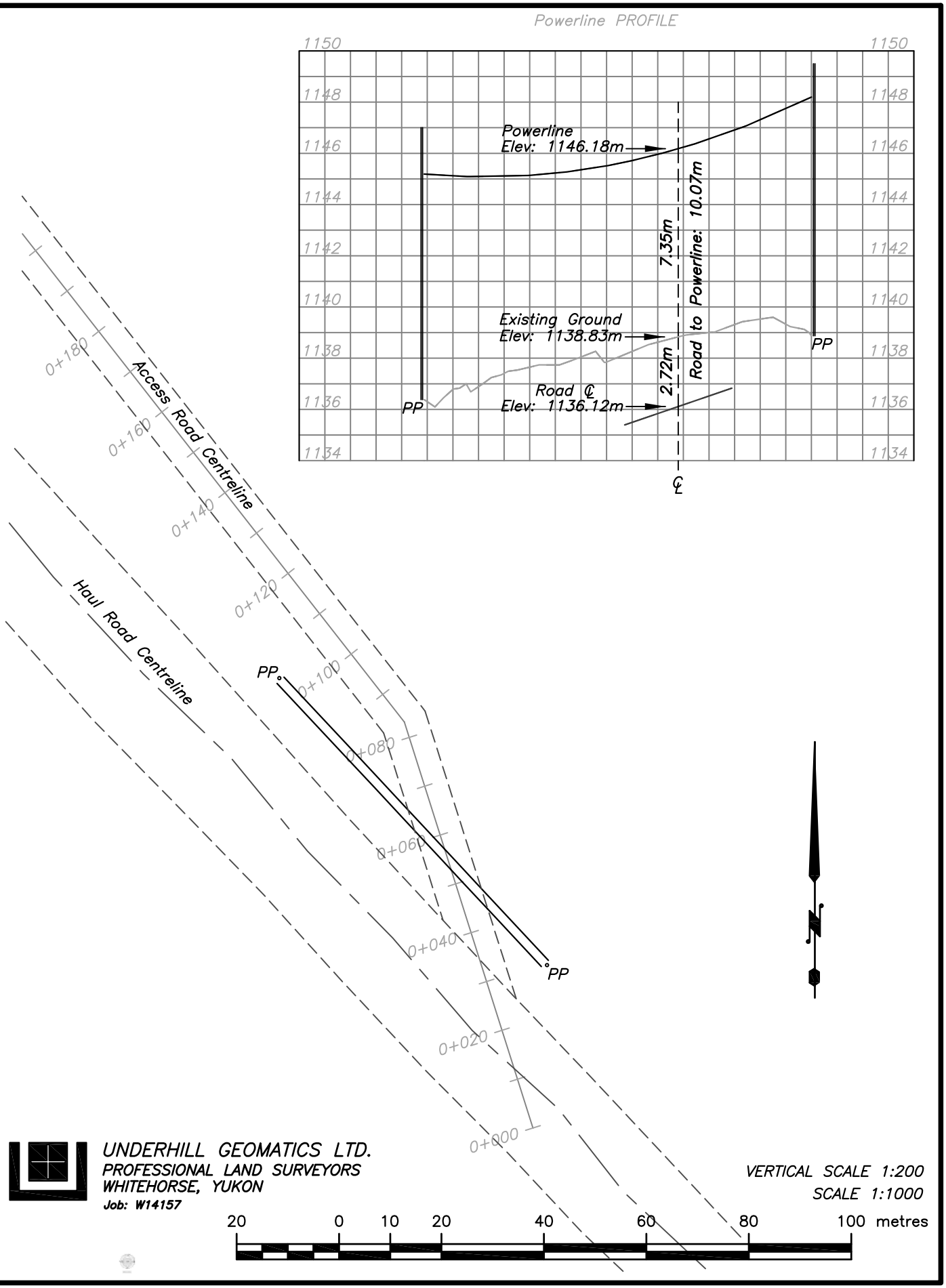


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PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157

Scale 1:1000

20 0 10 20 40 60 80 100 metres

D14–148 Sheet 5 SC


Powerline PROFILE
1150
1148
1146
1144
1142
1140
1138
1136
1134
Powerline
Elev: 1146.18m
Existing Ground
Elev: 1138.83m
Road ℄
Elev: 1136.12m
7.35m
2.72m
Road to Powerline: 10.07m
PP
PP
℄
Access Road Centreline
Haul Road Centreline
0+180
0+160
0+140
0+120
0+100
0+080
0+060
0+040
0+020
0+000
PP
PP
UNDERHILL GEOMATICS LTD.
PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157
VERTICAL SCALE 1:200
SCALE 1:1000
20 0 10 20 40 60 80 100 metres

D14–147

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Field Memorandum

Project Name:	NFRD Drain SIS	**To:**	Chad Brassard
Project #:	0533-010-06	**Copied:**	Jim Cassie, Dustin Rainey
Company:	BGC Engineering Inc.	**From:**	Joan Roca
Date:	20141024	**Record #:**	*20141024_NFRDSIS_FM2_ USAR Construction Experience*

Subject: NFRD SIS Construction. USAR Construction Experience

1.0. Introduction

On September 4, 2014, BGC Engineering Inc. (BGC) was retained to support the Yukon Government (YG) with construction management related to North Fork Rock Drain (NFRD) Seepage Interception System (SIS) at Faro Mine.

On September 12, 2014, YG requested Pelly Construction Ltd. (PCL) to provide construction services for some of the NFRD SIS elements, including the Upstream Access Road (USAR). Construction of the USAR was initiated by PCL on September 20, 2014, after a site visit with BGC, organized to observe the pre-construction conditions at the USAR area, including but not limited to, the topographic marks installed by Underhill Geomatics LTD. (Underhill). A summary of the pre-construction conditions at the USAR area, as shown on Photos 1 to 7, can be found on Field Memorandum 1 (*20140930_NFRDSIS_FM1_Baseline Survey*).

The purpose of this Field Memorandum (FM) is to document the conditions encountered by PCL during the USAR construction, as well as the observations performed by YG, BGC and PCL during construction monitoring. In addition, a summary of the design changes introduced during construction of the USAR is provided herein. Note that these design changes were implemented to adapt the initial design to the ground conditions observed during construction. As no site testing was completed at an earlier stage, the continuous collection of site data was required to have a good understanding the ground conditions. The ultimate goal was to increase the construction efficiency, reducing the construction schedule and associated cost.

2.0. USAR Design

One of the main elements of the proposed mitigation design project prepared by BGC was the construction of an access road and turnaround / laydown areas at the upstream (US) side of the NFRD in order to construct the plug-dyke in the US headpond.

The purpose of the road is to provide temporary access for the construction by haul trucks for the plug-dyke, followed by longer term access for smaller vehicles for monitoring. It should be noted that final closure measures for the South Fork of Rose Creek (SFRC) may include its relocation across the alignment of this temporary access road.

As shown on the attached Drawing FRNF-XD-02-04_Rev 1, issued for construction on September 17, 2014, the designed access road was approximately 817 m long. It initially ran

parallel to the existing haul road, which crossed over top of the NFRD, and then turns and doubles back in parallel direction with the pond shoreline. Longitudinal grade for the access road was 7.6% slope in the upper portion and 8% slope down to the turnaround platform at elevation 1092 m. A laydown and spoil areas were located on the northeast side of the access road while a turnaround space was located at the corner in the lower road.

Clearing and grubbing was required in the areas shown on the drawing, including the road section further west from design Station (Stn.) 0+400 turnaround, laydown and spoil areas. Soft spots identified after proof rolling by two passes of a loaded 10 T tandem haul truck were to be excavated to a depth of 0.5 m and replaced with geotextile and appropriate backfill.

The access road section from the top of the existing haul road to design Stn. 0+400 comprised two non-local materials; run-of-mine (ROM) fill (from Borrow D on the haul road) placed initially on the ground surface followed by 0.3 m thick layer of sand and gravel from Borrow A (done in 2 layers). Side slopes of 2H:1V are shown for the ROM fill but the northeastern face could be placed at the angle of repose.

The lower portion of the road is partly in a cut and partly in fill. It was assumed (no testing completed) that the local common excavation would be suitable for use as common fill. The design implied an excess fill volume of approximately 1,000 m^3, which allowed for some local wasting, if the common excavation was unsuitable for use as fill. Capping of the lower portion of the road with 0.3 m thick layer of sand and gravel from Borrow A was also required.

3.0. USAR Construction Summary

On September 20, 2014, PCL started clearing and grubbing activities at the road section further west to Stn. 0+350, including the turnaround, spoil and laydown areas. The Contractor mobilized a CAT D6 dozer (D6) to the US area and started clearing trees inside the limits marked by Underhill.

On September 21, 2014, the Contractor started spreading ROM fill from the top of the existing haul road as part of the construction of the upper portion. PCL completed the ROM fill section up to Stn. 0+350 during the night shift from September 27 to 28.

On September 23, 2014, the Contractor mobilized a CAT 330 excavator to the US area to assist with the clearing and grubbing activities. The presence of soft saturated soils was reported by the Contractor (dozer and excavator operators) during clearing and grubbing operations. On September 25, 2014, the CAT 330 had to be recovered with the D6 as it was trapped (on an area with soft saturated soils exposed during clearing and grubbing activities) close to the turnaround area located at Stn. 0+600 (refer to Section 4.0 below).

The Contractor completed the excavation between Stn.'s 0+500 and 0+600 with the CAT 330 excavator from September 28 to 30, 2014. Details on the excavation performed, including observations on exploration test pits (TP) excavated by the Contractor to observe ground conditions between Stn.'s 0+550 and 0+600, are explained further in Section 5.

On September 30, 2014, the Contractor started placing and spreading fill as per the new alignment approved by the Engineer on September 29, 2014 (refer to day shift report *20140929_NFRDSIS_DSR_21*). The need for a new alignment from Stn.'s 0+600 to 0+754 was agreed between YG, BGC and PCL due to the concerns raised by both PCL and BGC. Note that no pre-construction investigative tests, such as TP or boreholes, were available to confirm assumptions made by BGC during the design phase. At this stage, both BGC and PCL had a better understanding of the ground conditions based on observations performed during the construction monitoring. The main concerns that triggered the need of a new alignment are listed below:

- Possible delays on clearing and grubbing activities caused by the presence of highly saturated and soft fine grained soils.
- Risk of instabilities during road fill placement on natural slopes (approx. 4H:1V), especially on areas presenting saturated fine grained soils.
- Possible delays on common excavation activities caused by the presence of frozen ground (permafrost observed at 0.5 to 1 m deep).
- Risk of failures along the 4 to 5 m high cut walls excavated on saturated fine grained soils.
- Uncertainties related to the placement of fill into the US headpond, including the delays introduced by the placement of a turbidity curtain and the salvaging of fish.
- The weather conditions were changing fast and ice was forming at the US headpond, so early completion of the USAR to construct the plug-dyke was recommended.

Construction as per the new alignment, located some meters uphill (towards the south), required the placement of construction fill up to approx. Stn. 0+650 on flatter ground. Then, the Contractor performed common excavation up to the end of the road. Note that the new alignment was possible due to the increase of the longitudinal road grade from 8% to 10%, as per Contractor's recommendations. As a result, the new road alignment was located on a flatter area. Also, the new alignment required shallower excavations and smaller road fill thicknesses.

On the night shift from September 30 to October 1, 2014, the Contractor suspended construction activities due to the observation of a small instability. Approximately 175 m^3 of the Borrow A gravel and sand being placed at Stn. 0+610 were affected by a slump (refer to Section 6.0). The Contractor continued USAR construction by shifting the curve to an earlier station, as approved by BGC.

The Contractor completed the fill section from Stn.'s 0+600 to 0+650 on October 1, 2014, and started common excavation between Stn.'s 0+650 and 0+754. Common excavation was completed from October 1 to 2, 2014. Details on common excavation and fill placement can be found on Sections 5.0 and 6.0, respectively.

On October 3, 2014, the Contractor started placing a geotextile on the excavation subgrade, overlain by a 1 m thick layer of Borrow C General Rock Fill, as approved by BGC after conversations with YG. Note that Borrow D ROM fill was not acceptable as these construction activities were inside the 30 m width exclusion zone from the headpond shoreline, and that Borrow A material was found to be too fine. Also, common material excavated was a saturated mix of silty clay, sand and gravel, and was partly frozen (see ground ice and frozen aggregates on Photo 11).

USAR road construction was completed on October 5, 2014. Note that the removal of logs and other debris at the left side bank of the US headpond was also completed. This activity facilitated that the relocation of the existing rock boulders at the end of the road. The relocation of the rock boulders and the placement of Borrow C General Rock Fill were required to create a working platform at the edge of the US headpond shoreline.

4.0. Clearing and Grubbing

PCL completed clearing and grubbing within the limits marked by Underhill, as approved by BGC, with the noted dozer and excavator.

The Contractor reported some problems when circulating with both the dozer and excavator on areas with underlying soft and saturated fine grained materials once the 0.2 to 0.3 m thick layer of moss was removed (Photo 8) and the natural ground exposed.

At the end of the Day Shift on September 24, 2014, the Contractor informed that the CAT 330 was trapped during clearing and grubbing operations close to Stn. 0+600. The Engineer visited the area on September 25 and observed that the excavator was partly trapped on an area with saturated greyish soft silty clay (Photo 9). Also, observed lenses of ice at a depth of 0.5 m from original ground (Photo 10) on a shallow cut located close to the excavator. Liquefaction probably occurred as pore-water pressures increased when the excavator started working on the area and/or water from the melt of excess ice (permafrost) was generated faster than it could drain.

The excavator had to be recovered with support from D6, so activities at the USAR road were temporarily suspended, slowing down construction activities. This incident triggered discussions on the need of a new road alignment from Stn. 0+600 onwards. Also, it opened a debate on the removal of the superficial layer of moss as part of the clearing and grubbing.

The Contractor recommended that the superficial layer of moss should not be removed as it was protecting (insulating) the frozen ground underneath. Also, that the cleared trees should be placed under the construction fill to reinforce the foundation. It was agreed that the fill section from Stn.'s 0+600 to 0+650 will be completed without the removal of the layer of moss. Note that trees were cleared and moved to the local spoil area as Engineer considered that they could cause settlements (degradation of logs under the road fill). No problems were reported by the Contractor during the placement of General Rock Fill on top of the layer of moss. It is possible that additional settlement and related road grading may be required following this field decision.

5.0. Common Excavation

On September 25, 2014, the Contractor excavated three TP along the USAR center line from Stn.'s 0+550 to 0+600. The purpose of the TP was to observe the ground conditions prior to the execution of the required common excavation. Note that the Contractor was concerned about the stability of the 4 to 5 m high excavation walls if saturated fine grained soils were encountered.

A summary of the observations performed by the Contractor and BGC during the execution of the TP's can be found below:

- TP1 (4.2 m long x 1.2 m wide x 1.1 m deep) – It was excavated by the Contractor after clearing and grubbing (hand held GPS coordinates E 584,994 m / N 6,913,118 m). A poorly graded coarse grained sand and gravel was observed at the first 0.4 to 0.5 m of excavation, underlain by low plasticity silty clay with some sand (Photo 16). The maximum particle size observed was 0.55 m. Water seeps were observed at excavation walls below 0.45 to 0.5 m from the top of the TP. Some water was ponded at the bottom of excavation, but the TP walls did not collapse.
- TP2 (4.4 m long x 1.1 m wide x 1.3 m deep) – It was excavated by the Contractor after clearing and grubbing (hand held GPS coordinates E 585,006 m / N 6,413,127 m). A poorly graded coarse grained sand and gravel was observed at the first 0.2 to 0.3 m of excavation, underlain by low plasticity silty clay with trace to some sand. The maximum particle size observed was 0.42 m. Water seeps were observed at excavation walls below 0.3 m from the top of the TP. Some water was ponded at the bottom of excavation, and TP walls collapsed between 30 to 45 minutes after excavation (Photo 17).
- TP3 (4.5 m long x 1.3 m wide x 1.1 m deep) – It was excavated by the Contractor after clearing and grubbing (hand held GPS coordinates E 585,013 m / N 6,413,135 m). A poorly graded coarse grained sand and gravel was observed at the first 0.1 to 0.2 m of excavation, underlain by low to medium plasticity silty clay with trace sand (Photos 18 and 19). The maximum particle size observed was 0.38 cm. Water seeps were observed at excavation walls below 0.05 to 0.15 m from the top of the TP. Some water was ponded at the bottom of excavation, and TP walls collapsed between 30 to 45 minutes after excavation.
- The upper coarse grained soils were described as: Sand and Gravel, GP/SP, fine to coarse, some cobbles and trace boulders, compact (very dense when frozen), maximum particle size 0.55 m, flat and sub rounded particles, light brown, no odor, moist, heterogeneous, and no cementation.
- The fine grained soils were described as: Silty Clay, CL, trace sand, low plasticity, soft (hard when frozen), brownish grey, no odor, wet, heterogeneous and fissured due to frost, no cementation, no dilatancy, and very high dry strength.

- The presence of water seeps and the collapse of TP walls could probably be associated to the melt of ground ice. Note that fissures due to frost were observed on the fine grained soils at all the TP's. Also, that the first 0.20 to 0.25 m of sand and gravel close to the surface were frozen (Photo 18).
- Contractor did not backfilled the TP's at the end of the shift. The three TP's were found to be filled with water emerging from the TP walls during a site visit performed on the following day shift.

Based on the observations listed above, the Contractor and Engineer decided to perform the required common excavation in two stages. After the first stage, to a depth of 2 m, ground conditions had to be evaluated to identify possible instabilities. Then, common excavation could continue to the required depth.

On September 28, 2014, the Contractor started the required common excavation at Stn. 0+500 with the CAT 365 excavator (CAT 365). The same glacial deposits described during the execution of the TP's were encountered during the common excavation.

Similar observations were made during the excavation at the lower section of road (approximately from Stn.'s 0+650 to 0+754). Contractor encountered a heterogeneous poorly graded glacial deposit, presenting areas with a saturated greyish silty clay and sand (with trace gravel and trace cobbles), and areas with light brown gravel and sand (with some silty clay). The maximum particle size observed was 0.6 m.

The natural ground was found to be frozen along the common excavation areas (depth to frozen ground from 0.5 to 1 m deep). Note that the CAT 365 was not able to progress into the frozen ground. As a result, the common excavation floor was irregular. The Contractor decided to use the ripper on CAT D9 dozer (D9) to break the frozen ground so as to achieve the required excavation depth (Photo 20). Note that this staged excavation resulted on a slower construction process.

The Contractor reported seepage at various points along the excavation cut walls. As shown on Photo 12, frozen seeps can still be observed some weeks after the completion of the common excavation. Longitudinal and transversal ditches were excavated to collect and divert water emerging from cut walls. It is important to note the transversal trench executed by the Contractor at Stn. 0+675. Contractor reported that the CAT 365 was almost trapped on an area presenting soft fine grained soils. The Engineer observed saturated fine grained silty clay at both the excavation floor and cut wall. A water seep was also identified at the excavation wall (estimated flow of 0.5 L/minute). The Contractor excavated a trench to remove the unsuitable soft soil, as agreed with the Engineer, and then backfilled the trench with Protection Rock Fill (PRF) and geotextile (Photo 21).

Some small slumps were observed during common excavation on areas with fine grained glacial deposits. The bigger one, affecting an approximate volume of 40 m^3 of material at the uphill cut wall (Stn. 0+650), was recorded by the Contractor during common excavation at the lower portion or road. As shown on Photos 13 and 14, the Contractor removed the slump

and placed Borrow C General Rock Fill (GRF) to buttress the slope. It is important to note that no slumps have been observed on completed excavation cut walls at 2H:1V.

6.0. Fill Placement

Proof roll tests were performed to identify soft areas. The available CAT 778 haul trucks, excavator or dozer were used to execute the proof roll tests. Note that proof roll tests performed on frozen subgrade also showing deformation. As commented on Section 4.0, soft areas were found after the removal of the layer of moss on frozen subgrade.

The local sub-excavation of soft soils to a depth of 0.5 m was required in areas failing the proof roll test. The sub-excavation was then backfilled with geotextile and approved gravel and sand fill as per BGC specifications. No sub-excavation was performed when the area failing the proof roll test was found to be too large. As discussed with YG and the Contractor, the sub-excavation of large areas was not practical. As approved by the Engineer, large areas failing proof roll test will be covered with a geotextile, and then overlain by a 1 m thick layer of approved construction fill. The execution of this new option resulted on an increased construction speed.

The placement and spreading of construction fill was completed with CAT 773 haul trucks and a dozer (D6 or D9). During construction, the Contractor placed Borrow A fill (sand and gravel), Borrow D ROM fill, Borrow C GRF, and fill (sand and gravel) from a local borrow source. The selection of the material type and source was based on the volume of fill required, construction fill requirements, proximity to the US headpond (environmental limitations), and the characteristics of the fill observed at the borrow source.

On the night shift from October 30 to September 1, a slump affecting approximately 175 m^3 of the sand and gravel fill was observed at Stn. 0+610. No seepage or further movement was reported by the Contractor or BGC during the remaining of the night shift. A site visit was organized at the beginning of the following shift to observe the area affected. The following observations were recorded by the Engineer:

- No seeps or surface water were observed close to the affected area.
- The affected fill toe (before failure) was approximately located on the area where the CAT 330 was trapped during clearing and grubbing operations (refer to Section 4.0 above). Contractor explained that the area was smoothed with the CAT 330 prior to the placement of construction fill.
- A 0.3 to 0.4 m thick layer of moss completely rolled and folded immediately in front of the slump toe was observed (Photo 22).
- Ice lens and frozen ground close to surface (0.5 m deep) were observed close to the area affected.
- The construction fill was placed on a natural slope (approx. 4H:1V slope).

The Engineer concluded that the movement was probably caused by the peat ripping under the construction fill, possibly following initial sliding movement of the construction fill on top of the frozen ground with or without some localized pore pressures. Construction continued by shifting the road alignment, as agreed between BGC and PCL. No further movement of the affected material was observed throughout construction.

7.0. Common Material (Spoil Area):

The Contractor mobilized the common excavation material to the local spoil area by means of haul trucks. The common excavation material, including organics from clearing and grubbing, was segregated in different piles by the Contractor based on visual observations. Once segregated, the material could be evaluated to identify suitable fill, including the following:

- Sand and gravel meeting a grain size limit of 100% passing 100 mm and < 8% passing 0.075 mm (USAR and USPD construction);
- Common fill for USAR construction; and
- Till for the USPD construction meeting the following gradation limits:

Table 1. Gradation limits for USPD Till Soil.

Particle Size (mm)	Percent Passing by Mass	
	Minimum	Maximum
25.4	93	100
2.0	67	85
0.075	33	46
0.002	4	14

The common excavated material piled at the spoil area consisted of frozen aggregates of sand and gravel or aggregates of fine grained silty clay with sand. The piled material was also saturated. In addition, the existing haul road fill was creating a shadow on the USAR areas (Photo 7). As a result, both the natural ground and common excavated materials remained frozen during sunny days.

During construction, BGC noted that the piled material could not be reused as construction fill unless it could be extended or reworked to melt the ice or break down the aggregate particles. This activity could not be completed due to schedule or weather constraints. Therefore, no common excavation material was reused as construction fill. Thus, the complete characterization of the materials stockpiled at the spoil area was not undertaken.

The observations recorded by the Engineer included the following:

- A potential till source was identified close to CP-11; it was logged as Silty Clay (CL), some sand, low plasticity, soft, grey, wet, homogeneous, no odor, no cementation, and very high dry strength.
- A potential source of till was identified at the southeastern excavation wall between Stn's. 0+570 to 0+600. Silty Clay (CL), trace sand, low plasticity, soft, grey, wet, heterogeneous and fissured due to frost, no odor, no cementation, no dilatancy, and very high dry strength.
- A potential source for till and sand and gravel was observed from Stn.'s 0+570 to 0+600. A summary of the observations recorded can be found on Section 5.0.
- An heterogeneous mix of sand, gravel and silty clay was observed during excavation from Stn.'s 0+650 to 0+754. The Contractor noted that the segregation of the materials was difficult so it was identified as a potential source for common fill.
- The local source of sand and gravel at the southwestern limit of the spoil area was approved. Sand and Gravel, GP/SP, fine to coarse, some cobbles, trace boulders, gap graded, compact (very dense when frozen), maximum particle size 0.45 m, flat and sub rounded particles, brown and yellowish brown, moist, heterogeneous, no cementation and no odor.

Note that no laboratory tests were performed on samples collected during construction. Therefore, no information regarding its properties was available. Thus, the materials listed above are not a proven source for construction fill and should be tested for potential use in future constructions activities. Approval for use may be granted by the Engineer or Construction Manager depending on testing results.

If the material identified during the USAR construction is to be reused for future construction purposes, BGC recommends the collection of representative samples in order to perform an assessment of those materials, including moisture contents and compaction densities. The number of samples collected, as well as the quantity and type of tests to be performed, will depend on the nature of the future construction work. In addition to basic geotechnical tests, the samples should be examined for geochemical parameters.

8.0. Conclusions and Recommendations:

PCL started the construction of the USAR as per the BGC design shown on Drawing FRNF-XD-02-04_Rev 1. A construction summary is provided in Section 3.0.

Field observations were recorded during construction monitoring so as to have a better understanding of the ground conditions at the USAR area. A summary of the observations performed during the execution of three TP's is provided in Section 5.0.

USAR construction activities were affected by unfavorable ground conditions, including the following aspects:

- Equipment trapped on highly saturated soft soils (likely due to thaw of ground ice) after the execution of clearing and grubbing (refer to Sections 4.0 and 5.0).
- Slower excavation rates during common excavation associated with the presence of frozen ground and the occurrence of small slumps (refer to Section 5.0).
- A small slump affected fill placement operations on a natural strong slope (refer to Section 6.0).

Engineer, Contractor and YG noted the need of adjusting the initial design to the observed ground conditions. A list of the main design changes introduced to increase construction efficiency can be found below:

- New road alignment from Stn.'s 0+600 to 0+754 (refer to Section 3.0).
- Contractor preserved the superficial layer of moss to the extent possible. Construction fill was placed directly on top of the layer of moss (refer to Section 4.0).
- Placement of geotextile and a 1 m think layer of approved construction fill directly on top of large areas failing proof roll test (refer to Section 6.0).

The introduction of these changes mitigated some of the risks identified by the Contractor, Engineer and YG. These changes also resulted in an increased construction speed, and the reduction of construction costs.

Additional observations recorded during construction monitoring included the following:

- The frozen common excavation material piled at spoil area could not be reused due to schedule and weather constraints.
- Seepage was observed along the excavated walls on fine grained materials.
- Frozen ground, including ground ice, was observed close to ground surface.

Based on the observations listed above, BGC recommends the following aspects be considered in future works in the area, especially for north and northwest facing slopes:

- The execution of site investigations to observe existing ground conditions is recommended, including specifically permafrost and ground ice conditions.
- The surface layer of moss should be preserved to the extent possible to reduce disturbance of the frozen ground underneath.
- The installation of drainage trenches is recommended so water could not pond adjacent to road fills.
- The execution of shallow excavation cut walls is recommended to reduce the risk of instabilities.
- The thickness of construction fill placed on natural slopes should be reduced to the extent possible.

- The execution of laboratory testing to characterize the potential sources of fill identified is recommended before they could be used as approved construction fill.

9.0. Closure:

BGC prepared this document for the account of YG. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation.

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

10.0. Attachments:

The following documents can be found attached to this field memorandum:

- Attachment 1: Photos taken during site visits to observe construction activities.
- Attachment 2: Signed and stamped Drawing FRNF-XD-02-04_Rev 1, as submitted during the kick-off meeting held on the Faro Mine site on September 22, 2014.

BGC Representative:	Joan Roca	**Date:**	20141024
Reviewed by:	Jim Cassie, P.Eng.	**Date:**	20141027

Attachment 1: Photos



Photo 1: 20140918_NFRDSIS_USAR_Pre-construction conditions at USAR_Stn. 0+060_Looking NW



Photo 2: 20140916_NFRDSIS_USAR_Pre-construction conditions at Haul Road fill toe_Looking NW



Photo 3: 20140916_NFRDSIS_USAR_Pre-construction conditions at Haul Road fill toe area



Photo 4: 20140919_NFRDSIS_USAR_Pre-construction conditions at USAR area_Looking NE



Photo 5: 20140919_NFRDSIS_USAR_Pre-construction conditions at CP-12_Looking W



Photo 6: 20140919_NFRDSIS_USAR_Pre-construction conditions at Stn. 0+780_Looking E



Photo 7: 20140919_NFRDSIS_USPD_View of shadow created by the existing Haul Road_Looking NE



Photo 8: 20141021_NFRDSIS_USAR_Detail of layer of moss on top of natural ground at USAR area



Photo 9: 20140925_NFRDSIS_USAR_P72_CAT330 trapped close to no disturbance limit_Looking N



Photo 10: 20140925_NFRDSIS_USAR_P73_Ice observed on ground close to area disturbed by CAT330



Photo 11: 20141002_NFRDSIS_USAR_Detail of frozen common excavation material showing ground ice and frozen aggregates of sand, gravel and cobbles



Photo 12: 20141021_NFRDSIS_USAR_Frozen seeps observed at excavation cut wall_Looking E



Photo 13: 20141003_NFRDSIS_USAR_P163_ Small slump observed at excavated cut wall_Looking NW



Photo 14: 20141003_NFRDSIS_USAR_BC Protection Rock Fill placed to buttress cut wall_Looking NW



Photo 15: 20140925_NFRDSIS_USAR_Location of the three TP excavated at USAR_Looking S



Photo 16: 20140925_NFRDSIS_USAR_Water ponded at the bottom of TP1_Looking SW



Photo 17: 20140925_NFRDSIS_USAR_TP walls collapsed after 1 hr at TP2_Looking N



Photo 18: 20140925_NFRDSIS_USAR_TP3 wall showing superficial layer of gravel and sand_Looking E



Photo 19: 20140925_NFRDSIS_USAR_P75_Details of material excavated from TP3



Photo 20: 20141002_NFRDSIS_USAR_D9 equipped with a ripper to break frozen ground_Looking NW



Photo 21: 20141001_NFRDSIS_USAR_Transverse drainage trench backfilled with PRF_Looking NW



Photo 22: 20141021_NFRDSIS_USAR_ Detail of the layer of moss rolled at slump toe_Looking W

Attachment 2: Stamped version of Drawing FRNF-XD-02-04_Rev 1, as submitted during the kick-off meeting held on the Faro Mine site on September 22, 2014.

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Field Memorandum

Project Name:	NFRD Drain SIS	**To:**	Chad Brassard
Project #:	0533-010-06	**Copied:**	Jim Cassie
Company:	BGC Engineering Inc.	**From:**	Joan Roca
Date:	20150217	**Record #:**	*20150217_NFRDSIS_FM4_ Outstanding Activities and Recommendations*

Subject: NFRDSIS Construction. Outstanding Activities and Recommendations

1.0. Introduction

On January 30, 2015, Pelly Construction Ltd. (PCL) mobilized to the Faro Mine to complete the construction activities related to the NFRD SIS project. As commented with YG, some activities could not be completed before demobilization and will have to be completed by others at a later stage. The purpose of this Field Memorandum is to record the outstanding activities and recommendations for its completion.

2.0. Outstanding Issues and Recommendations

A complete description of the outstanding is included in the BGC Day Shift Reports. The following is a summary of the outstanding construction activities not completed by PCL:

- **Installation of earth anchor piles along the pipeline**. The installation of anchor piles each 20 m shall be as per Detail 7 on Drawing FRNF-XD-02-16_Rev 0.
- **Relocation of pipeline inside the protection flume** (toe of rock fill slope, S-Wells area).
- **Installation of heater inside shelter #4** (and associated electrical installation).
- **Secondary containment for the 500 kVA transformer** (and associated earthworks). No concept design was available at the time of producing this memorandum.
- **Removal of turbidity curtain (upstream headpond)**
- **Grading of haul road trafficable surface (Borrow D and pipeline crossing areas)**
- **Completion of the Operating and Maintenance Manual.** At the time of producing this memorandum, BGC has no records showing that the issues listed on the email from February 10, 2015 have been addressed.

The completion of these activities is assumed to occur in spring and summer 2015.

In addition, BGC recommends the following activities be performed:

- Temperature monitoring of components inside the air/vacuum and drain valve structures (shelters #1, #2, #3, #4 and #5) during operations on cold weather.
- Temperature monitoring of water at pipeline inlet (C-Can) and outlet (pipeline discharge) during operations on cold weather.

- Visual monitoring of USAR fill/cut slopes stability during frost-free conditions. If required, the cut slopes shall be graded or modified.
- Maintenance of ditches and silt fences to prevent erosion of road fill and to prevent saturation of the subgrade.
- Grading of the USAR and DSAR trafficable surface after the winter season (during frost free conditions).
- Visual monitoring of stock piled material at spoil areas during and after rain events. If required, the piles shall be graded or modified and new sediment and control measures implemented.
- Monitoring of water flows and Zn concentrations at emerging points, diversion channels, pumping sump and NF2A channel. If required, modify the diversion berms at the toe of the rock drain or interrupt the pumping of water at the C-Can. It may also be necessary to modify or change the location or depth of the sump pump at NF2A feeding the manhole sump.
- Removal/relocation of pumping system (downstream to NF2A water sampling station). The completion of this activity is assumed to occur at the end of this winter (2015).

3.0. Closure:

BGC prepared this document for the account of YG. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation.

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

BGC Representative:	Joan Roca	**Date:**	20150217
Reviewed by:	Jim Cassie, P.Eng.	**Date:**	20150217

APPENDIX C
BGC DAY SHIFT REPORTS

LIST OF DAY SHIFT REPORTS

Day Shift Report Reference	Shift	Date
20140916_NFRDSIS_DSR_1_US As-Built	Day	September 16, 2014
20140917_NFRDSIS_DSR_2_US As-Built	Day	September 17, 2014
20140918_NFRDSIS_DSR_3_US As-Built	Day	September 18, 2014
20140919_NFRDSIS_DSR_4_US As-Built	Day	September 19, 2014
20140920_NFRDSIS_DSR_5_US As-Built	Day	September 20, 2014
20140921_NFRDSIS_DSR_6_US As-Built	Day	September 21, 2014
20140922_NFRDSIS_DSR_7_US As-Built	Day	September 22, 2014
20140922-23_NFRDSIS_DSR_8_NS_US As-Built	Night	September 22 - 23, 2014
20140923_NFRDSIS_DSR_9_US As-Built	Day	September 23, 2014
20140923-24_NFRDSIS_DSR_10_NS_US As-Built	Night	September 23 - 24, 2014
20140924_NFRDSIS_DSR_11_US As-Built	Day	September 24, 2014
20140924-25_NFRDSIS_DSR_12_NS_US As-Built	Night	September 24 - 25, 2014
20140925_NFRDSIS_DSR_13_US As-Built	Day	September 25, 2014
20140925-26_NFRDSIS_DSR_14_NS_US As-Built	Night	September 25 - 26, 2014
20140926_NFRDSIS_DSR_15_US As-Built	Day	September 26, 2014
20140926-27_NFRDSIS_DSR_16_NS_US As-Built	Night	September 26 - 27, 2014
20140927_NFRDSIS_DSR_17_US As-Built	Day	September 27, 2014
20140927-28_NFRDSIS_DSR_18_NS_US As-Built	Night	September 27 - 28, 2014
20140928_NFRDSIS_DSR_19_US As-Built	Day	September 28, 2014
20140928-29_NFRDSIS_DSR_20_NS_US As-Built	Night	September 28 - 29, 2014
20140929_NFRDSIS_DSR_21_US As-Built	Day	September 29, 2014
20140929-30_NFRDSIS_DSR_22_NS_US As-Built	Night	September 29 - 30, 2014
20140930_NFRDSIS_DSR_23_US As-Built	Day	September 30, 2014
20140930-1001_NFRDSIS_DSR_24_NS_US As-Built	Night	September 30 – October 1, 2014
20141001_NFRDSIS_DSR_25_US As-Built	Day	October 1, 2014
20141001-1002_NFRDSIS_DSR_26_NS_US As-Built	Night	October 1 - 2, 2014
20141002_NFRDSIS_DSR_27_US As-Built	Day	October 2, 2014
20141002-03_NFRDSIS_DSR_28_NS_US As-Built	Night	October 2 - 3, 2014

Day Shift Report Reference	Shift	Date
20141003_NFRDSIS_DSR_29_US As-Built	Day	October 3, 2014
20141004_NFRDSIS_DSR_30_US As-Built	Day	October 4, 2014
20141005_NFRDSIS_DSR_31_US As-Built	Day	October 5, 2014
20141006_NFRDSIS_DSR_32_US As-Built	Day	October 6, 2014
20141007_NFRDSIS_DSR_33_US As-Built	Day	October 7, 2014
20141008_NFRDSIS_DSR_34_US As-Built	Day	October 8, 2014
20141009_NFRDSIS_DSR_35_US As-Built	Day	October 9, 2014
20141010_NFRDSIS_DSR_36_US As-Built	Day	October 10, 2014
20141024_NFRDSIS_DSR_37_US As-Built	Day	October 24, 2014
20141025_NFRDSIS_DSR_38_US As-Built	Day	October 25, 2014
20141026_NFRDSIS_DSR_39_US As-Built	Day	October 26, 2014
20141027_NFRDSIS_DSR_40_US As-Built	Day	October 27, 2014
20141028_NFRDSIS_DSR_41_US As-Built	Day	October 28, 2014
20141029_NFRDSIS_DSR_42_US As-Built	Day	October 29, 2014

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:00 am	6:15 pm
Project #:	0533-010-06	**Weather:**	Cloudy	Sunny with some clouds
Subject:	Day Shift Report	**Work Areas*:**	USAR & BC	
Date:	20140916	**Record #:**	*20140916_NFRDSIS_DSR_1*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, S. Cooke (Underhill), J. Revel (Underhill)

Mean daily temperature at the Faro Airport: +9.8 °C (Max = +16.8 °C; Min = +2.8 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	BGC HASP reviewed with Tees H&S personnel and updated.
1.2	Ongoing/ New RFIs	-
1.3	New Inspection Instruction	-
1.4	New Field Memorandum	-
1.5	Ongoing/ New NCRs	-
1.6	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

Personnel *(name, company, and work area)*
Dan Russell (Pelly), USAR and Borrow C (BC)
John Garvis (Pelly), USAR and BC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT330C, yellow, parking area on top of haul road, no activity). **Photo 3**
Dozer (CAT D6R, #1604, yellow, parking area on top of haul road, no activity). **Photo 3**

4. Summary of activities:

Upstream Access Road (USAR)
Underhill measured some distances to calculate the clearance under the transmission line and started laying down construction points for the access road (**Photo 4**). Also, placed a local control station on top of the haul road to ensure good GPS signal at the USAR area (**Photo 2**).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	Status at the end of the shift (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B	-	-	-	-
C	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes: Underhill to continue with the baseline survey on the following day shift (Sept. 17, 2014).

Photos:



Photo 1: 20140916_NFRDSIS_P_1_Underhill setting up the GPS station and radio_Looking NE



Photo 2: 20140916_NFRDSIS_P_2_Underhill placing a local control station at haul road_Looking SE



Photo 3: 20140916_NFRDSIS_P_3_Equipment parked on top of the haul road_Looking W



Photo 4: 20140916_NFRDSIS_P_5_Stick placed by Underhill showing the USAR_Looking S



Photo 5: 20140916_NFRDSIS_P_6_Overview of US area _Looking N

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:45 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Sunny with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	USAR, BA, BB1, BC	
Date:	20140917	**Record #:**	*20140917_NFRDSIS_DSR_2*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, S. Cooke (Underhill), J. Revel (Underhill)

Mean daily temperature at the Faro Airport: +7.3°C (Max = +16.2°C; Min = -1.7°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (CH2M), USAR and Borrow C
Dustin Rainey (YG), USAR
John Garvis (Pelly), Borrow C and USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT330C, #3302, yellow, parking area on top of haul road, no activity)
Excavator (CAT 365C, yellow, parking area on top of haul road, no activity)
Dozer (CAT D6R, #1604, yellow, parking area on top of haul road, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parking area on top of haul road, no activity)
Front Loader (Deere TC54H, yellow, parking area on top of haul road, no activity). **Photo 2**

4. Summary of activities:

Upstream Access Road (USAR)
Underhill continued marking center line, control points, clearing limits, and the 30 m wide area of no disturbance from the headpond shore.

Upstream Plug Dike (USPD)
Underhill marked elements on the ground, including but not limited to the required Stations, control points and temporary bench mark.

5. Communications

1	02:50 pm. Chad, John and Joan visited the Borrow C area.	
	Discussion and Recommendations	
	The development of Borrow C was discussed. It was agreed that there is enough space at the borrow area to stock pile the required volume of material. Different piles of material could be created according to its characteristics, and then measured for payment. John commented that they could develop the borrow area with an excavator and a grader only. The discontinuous use of a dozer was also commented. Joan noted that the existing floor/surface could be a source for contamination so the development of the area should be done carefully.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

1. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	N/A	N/A	Underhill completed baseline survey	-
B1	N/A	N/A	Underhill completed baseline survey	-
C	-	-	-	-
D	-	-	-	-

2. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

3. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

4. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

5. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

6. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

7. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

9. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Underhill to continue with the baseline survey on the following day shift (Sept. 18, 2014).
- A kick of meeting was held on the main office building to comment on the H&S requirements, scope and schedule of work, roles and responsibilities, environmental management, communications and contact list. Attendees: Chad B. (CH2M), Dustin R. (YG), Cam M (CH2M), John G. (Pelly), Joan R. (BGC), Boyd B. (TEES), Erik P. (YG), Luca.

Photos:

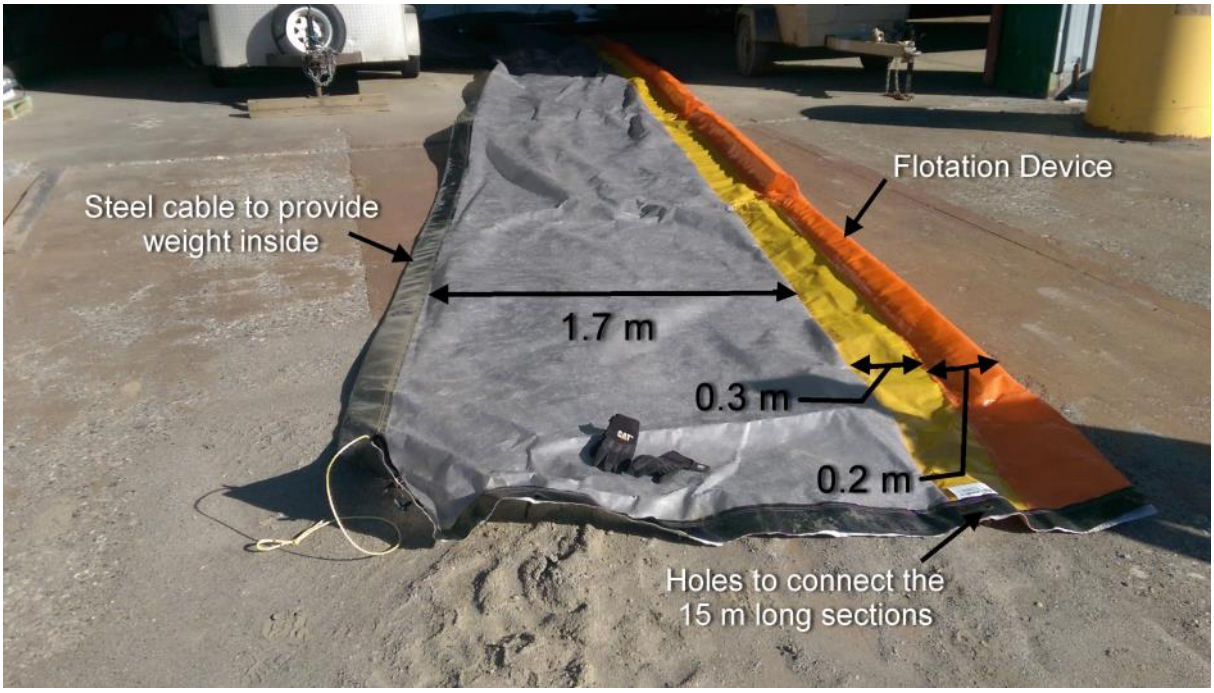


Photo 1: 20140917_NFRDSIS_MSC_SF_P8_Details of turbidity barrier available on site



Photo 2: 20140917_NFRDSIS_MSC_P12_Equipment being delivered at Faro Mine entrance gate

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:15 am	5:40 pm
Project #:	0533-010-06	**Weather:**	Overcast with some sun at noon	
Subject:	Day Shift Report	**Work Areas*:**	BC, BD	
Date:	20140918	**Record #:**	*20140918_NFRDSIS_DSR_3*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, S. Cooke (Underhill), J. Revel (Underhill)

Mean daily temperature at the Faro Airport: +8.4°C (Max = +13.4°C; Min = -3.4°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	John and Boyd drafted a traffic management plan. Final version is expected be Monday.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), USAR, Borrow D
Boyd Barstad (Tees), USAR, Borrow D
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, parking area on top of haul road, no activity)
Excavator (CAT 365C, yellow, parking area on top of haul road, no activity)
Dozer (CAT D6R, #1604, yellow, parking area on top of haul road, no activity)
Dozer (CAT D9L, #DZ952, yellow, parking area on top of haul road, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parking area on top of haul road, no activity)
Grader (CAT 14H, #1407, yellow, parked at Borrow A, no activity)
Front Loader (Deere TC54H, yellow, parking area on top of haul road, no activity)
Haul Truck (CAT 773B, #317, yellow, parking area on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parking area on top of haul road, no activity). **Photo 1**

4. Summary of activities:

Upstream Access Road (USAR)
No activity.
Upstream Plug Dike (USPD)
No activity (**Photo 2**).

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	12:00 pm. John and Joan commented the activities that they want to initiate on Sept. 19th.	
	Discussion and Recommendations	
	John commented that they will install some H&S elements on top of the haul road, as per discussion with Boyd, and then start working on the clearing and grubbing at the USAR area (with a small dozer). Also, that they will probably start developing the Borrow C area. Joan commented that they should inform Faro Security before they move heavy equipment. Also, that Boyd commented that the dozer could access the USAR area by means of an existing ramp located further E if required. Regarding Borrow C, a meeting on Sept 19th will be required to comment on Pelly's development plan and specifications of materials to be stockpiled.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	04:00 pm. John, Boyd and Joan visited the Borrow D to comment on H&S measures to be implemented.	
	Discussion and Recommendations	
	John commented that they want to install a safety berm to segregate traffic. Boyd requested a clearance of 15 m for traffic. Joan commented that the 15 m clearance will give Pelly limited space to work with the heavy equipment. Several dimensions were marked on the existing road surface and it was agreed that the clearance will be 10 m (and not 15 m). Boyd commented that 10 m will be appropriate for traffic once the excavation of borrow area is completed. The berm will be in place for at least one day before the development of borrow D begins, so Boyd will have time to reassess.	
	Corrective Actions or Improvements	
	Install a safety berm at the crest of the haul road, at 10 m from the existing safety berm at the upstream (NE) side of the road. Reflective elements will be installed on top of the new safety berm. Pelly informed that they will start on the next shift, by means of a grader.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	N/A	N/A	Underhill completed baseline survey	3
D	N/A	N/A	Underhill completed baseline survey	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Underhill to complete the baseline survey on the following day shift (Sept. 19, 2014) and then demobilized.

Photos:



Photo 1: 20140918_NFRDSIS_Haul Road_P14_Haul truck delivered to site in the afternoon



Photo 2: 20140918_NFRDSIS_US_P18_Overview of US area from Haul Road crest_Looking E



Photo 3: 20140918_NFRDSIS_BC_P19_Surveyor taking points for the baseline survey_Looking E

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:30am	6:00 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	BC, BD, USAR, USPD	
Date:	20140919	**Record #:**	*20140919_NFRDSIS_DSR_4*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, S. Cooke (Underhill), J. Revel (Underhill)

Mean daily temperature at the Faro Airport: +10.9°C (Max = +16.2°C; Min = +5.5°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Borrow C, Borrow D, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, parked at Borrow A, no activity)
Excavator (CAT 365C, yellow, development of BC, 5 hours)
Dozer (CAT D6R, #1604, yellow, parked on top of Haul Road, see Borrow D below)
Dozer (CAT D9L, #DZ952, yellow, parked on top of Haul Road, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, parked on top of haul road, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, parking area on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
Underhill continued marking shoulders for 2H:1V cut shown on drawings, and prepared a baseline survey for the USAR area with points every 50 m (**Photo 2**). Also, completed baseline survey for a potential borrow source for Till located close to CP-12 (refer to Section 6 below).
Upstream Plug Dike (USPD)
Underhill installed more bench marks and marked some relevant elevations with spray paint and sticks on the existing NFRD to control plug dike fill elevations. (**Photo 5**)

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	09:00 am. John and Joan visited the Borrow C area to comment on the borrow development plan and to see examples of general rock fill, coarse rock protection fill and fine rock protection fill.	
	Discussion and Recommendations	
	• The face of Borrow C was observed to identify areas with material that will meet the granulometry for general rock fill, coarse rock protection fill and fine rock protection fill. The idea was to use those areas as an example for the Contractor. Engineer commented that boulders will have to be pushed away as they will not meet the specifications. • The surface of the existing esplanade at the borrow source was scratched to see if the yellowish material observed was superficial. The yellowish material was found to be present in the first 20 – 30 cm from surface, so the removal of that material to prevent contamination of stockpiles will not be practical. Engineer reminded that the referred yellowish material will not be accepted as plug-dike fill.	
	Corrective Actions or Improvements	
	John to comment the observations described above with the operators.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**
2	09:15 am. John commented that the development of Borrow C will be started with the excavator CAT365.	
	Discussion and Recommendations	
	Joan noted that YG and Pelly did not reached an agreement on the unit rates ($/hour) for the activities of the excavator CAT365, as no rate had been delivered to YG. Therefore, reminded to Contractor that any work performed by the CAT365 will be at their own risk. Also, commented that the mobilization/demobilization time for an excavator will be counted only once. John commented that they will not work with the CAT365 until the situation is solved.	
	Corrective Actions or Improvements	
	10:45 am. A rate for the CAT365 was agreed between Pelly and YG so Contractor informed that they will mobilize the excavator to Borrow C and start developing the borrow area.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**

3	12:00 pm. Engineer requested Underhill to collect more points at the USAR area.	
	Discussion and Recommendations	
	Underhill suggested that a mesh with survey points every 50 m on the existing ground could be obtained so as to provide more data to control future fill/cut works by the Contractor. Engineer verified with Pelly that the proposed density of survey points was appropriate for measurement purposes.	
	Corrective Actions or Improvements	
	Pelly agreed on the density of points, and Underhill completed the mesh of survey points.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
4	2:40 pm. Engineer observed that the Contractor was not working at the USAR (clearing and grubbing) and Borrow D (installation of a safety berm with a grader).	
	Discussion and Recommendations	
	John informed that they postponed the works at the USAR (clearing and grubbing) and Borrow D (safety berm at the crest of Haul Road). Also, commented that clearing and grubbing at the USAR will start during the next shift (September 20th), whereas the installation of the safety berm will be delayed as there was a mechanical problem with the grader. In the meantime, reflective bollards will be located to segregate traffic.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
Potential source close to CP-12 (USAR)	Potential Till	N/A	A potential source for Till was reported by Dustin R. (YG). Engineer visited the area and observed a dark grey clay with some sands that could be used as a source. Engineer requested Underhill to prepare a baseline survey in case it is approved as a source once more information is collected.	8
B1	-	-	-	-
C	Protection Rock Fill	CAT365	Excavator started to sort protection rock fill material at the borrow source	6, 7
D	N/A	Dozer	Dozer pushed some material at the NE hand side of the haul road to provide more traffic clearance. Activity not completed	9

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes: Underhill completed the baseline survey and left site at 03:45 pm.

Photos:



Photo 1: 20140919_NFRDSIS_USAR_P20_Mark for 30 m area of no disturbance_Looking W



Photo 2: 20140919_NFRDSIS_USAR_P21_Surveyors taking baseline survey points with GPS_Looking E



Photo 3: 20140919_NFRDSIS_USAR_P22_Mark for access road center line with required fill to invert



Photo 4: 20140919_NFRDSIS_USPD_P23_Overview of the plug dyke area_Looking E

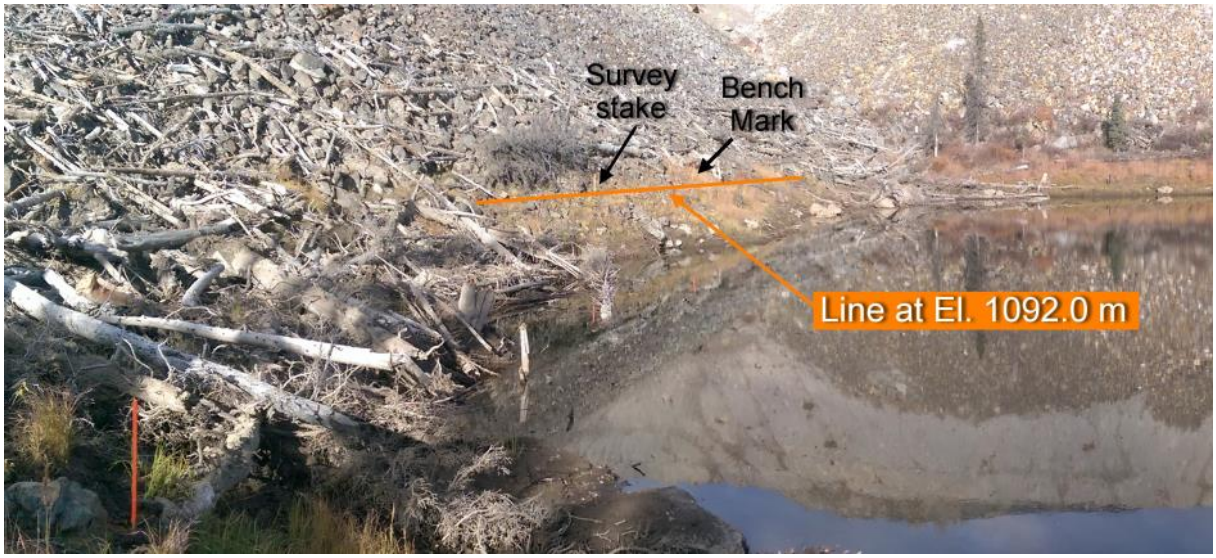


Photo 5: 20140919_NFRDSIS_USPD_P24_View of some elements marked by Underhill_Looking E



Photo 6: 20140919_NFRDSIS_BC_P25_CAT365 sorting material at borrow C area_Looking NE



Photo 7: 20140919_NFRDSIS_BC_P26_Overview of borrow C area at the end of the shift_Looking N



Photo 8: 20140919_NFRDSIS_USAR_P27_Potential till material close to CP-12



Photo 9: 20140919_NFRDSIS_BD_P28_Material pushed to create more traffic clearance_Looking NW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:00 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Overcast, intermittent light rains	
Subject:	Day Shift Report	**Work Areas*:**	BC, USAR	
Date:	20140920	**Record #:**	*20140920_NFRDSIS_DSR_5*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +6.6°C (Max = +12.1°C; Min = +1.0°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Engineer reminded to Contractor that all field personnel (or supervisor) must have access to mine site radio at all times.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Borrow C, Borrow D, USAR
Dean Serelo (Pelly), Borrow C, Borrow D
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, development of BC, 1 hour). See Communication 1 below
Excavator (CAT 365C, yellow, development of BC, 9.5 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 2 hours)
Dozer (CAT D9L, #DZ952, yellow, parked on top of Haul Road, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, parked at Borrow A, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
After a site visit with the Engineer to observe the topographic marks installed by Underhill, Pelly started clearing and grubbing (see Section 8 below).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	01:30 pm. John informed that they are going to mobilize excavator CAT330 to Borrow C so as to perform a test with the rock hammer.	
	Discussion and Recommendations	
	The Contractor explained that they want to use excavator CAT330 equipped with the rock hammer for an hour at their expense to break big rock boulders so as to see if they have good performance. The Contractor suggested that they could use the hammer to break boulders in place instead of spending excavator time collecting them and pulling them apart.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	01:45 pm. John and Joan visited the USAR in order to observe the area to be cleared and grubbed, as per the limits marked by Underhill.	
	Discussion and Recommendations	
	The limits for clearing and grubbing were identified, as well as the topographic marks indicating the shoulder for cut at 2H:1V and the road center line. Engineer pointed out that, to the extent possible, Contractor should not break/remove the topographic marks as they will be used for future reference. Contractor commented that there will no clear on the area defined by road section from STN 0+540 to 0+660, road section from STNs 0+660 to 0+817, and existing haul road fill unless they need to. Also, explained that clearing and grubbing will be performed so the material will be pushed at one side (uphill side) to expose the natural ground and observe it. Contractor started with clearing and grubbing.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-

C	Protection Rock Fill	CAT330, CAT365	CAT365 continued sorting protection rock fill material at the borrow source. Excavator CAT330 performed a test with rock hammer to see its productivity when breaking big boulders.	1, 3, 4
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+540 to 0+620	N/A	The area being cleared was observed to identify possible streams that could erode/transport sediments. No running water was identified.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+540 to 0+620	CAT D6R	Contractor started the clearing and grubbing on the area so as to expose the natural ground.	6, 7, 8

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
Borrow C	Upper bench	CAT330	Test performed at Borrow C area. The rock boulders (sizes > 400 mm) encountered during development of Borrow C were broken with the rock hammer.	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
Borrow C	Upper Bench	Protection Rock Fill	Engineer collected samples at borrow source to perform tests with the XRF Analyzer. Samples: S1 containing yellowish material from the floor, and S2 to S5 containing protection rock fill.	1, 2

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Contractor plans to continue the development of Borrow C, start development of Borrow D, and continue with clearing and grubbing at USAR.

Photos:



Photo 1: 20140920_NFRDSIS_BC_P29_Testing of samples collected at borrow area_Looking E



Photo 2: 20140920_NFRDSIS_BC_P30_View of yellowish material at borrow floor_Looking E



Photo 3: 20140920_NFRDSIS_BC_P31_CAT365 sorting protection RF at borrow C_Looking NE



Photo 4: 20140920_NFRDSIS_BC_P32_Vew of protection rock fill stockpile at end of shift_Looking NE



Photo 5: 20140920_NFRDSIS_USPD_P33_Overview of working area_Looking SE



Photo 6: 20140920_NFRDSIS_USAR_P34_CATD6 clearing trees at CP-10_Looking NE



Photo 7: 20140920_NFRDSIS_USAR_P35_CATD6 clearing trees on road footprint_Looking NE



Photo 8: 20140920_NFRDSIS_USAR_P36_View of working area at the end of the shift_Looking NE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Overcast, light rain (afternoon)	
Subject:	Day Shift Report	**Work Areas*:**	BC, USAR	
Date:	20140921	**Record #:**	*20140921_NFRDSIS_DSR_6*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +5.4°C (Max = +7.6°C; Min = +3.1°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The need of a safety berm on the access road to Borrow C is discussed (see Communication 2 below).
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Borrow C, Borrow D, USAR
Dean Serelo (Pelly), USAR, Borrow D
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, development of BC, 0.5 hour)
Excavator (CAT 365C, yellow, development of BC and development of BD, 2 hours)
Dozer (CAT D6R, #1604, yellow, parked on top of Haul Road, no activity)
Dozer (CAT D9L, #DZ952, yellow, USAR, 2.5 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, parked at Borrow A, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A and assembling equipment parts)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 1.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 2.5 hours)

4. Summary of activities:

Upstream Access Road (USAR)
After a site visit with the Engineer to observe the topographic marks installed by Underhill, Pelly started constructing the access road by end dumping and pushing material from Borrow D.
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	08:30 am. John and Joan visited Borrow C area.	
	Discussion and Recommendations	
	• Engineer commented that test performed on the yellowish material at the borrow area floor confirmed the presence of Zn, and recommended that it should not be disturbed to prevent contamination of the material being sorted. • Contractor and Engineer observed the rock broken during the previous shift with CAT330 equipped with rock hammer. The use of the rock hammer seems an effective way to break boulders instead of wasting equipment time pulling them apart, based on the work performed the previous day. During the current shift, Engineer observed the CAT330 for 30 min and requested a second test as soon as the activity will resume.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	09:40 am. John and Joan visited a section of the access road to Borrow C.	
	Discussion and Recommendations	
	A section of access road without safety berm was identified by the Contractor (berm missing at the downhill side of a curve). Engineer observed a 4 m high 2H:1V slope (field estimate). Contractor commented that a safety berm should be installed for safety reasons. Engineer commented that permission from Boyd (Tees) should be obtained before they could install the berm. Contractor and Engineer to comment this point with Tees.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	**Material**	**Equipment**	**Description**	**Photo**
A	-	-	-	-
B1	-	-	-	-
C	Protection Rock Fill	CAT330, CAT365	CAT365 continued sorting rock protection fill material. Then, operator moved to the CAT330	-

			and was breaking some boulders. All activities at Borrow C were cancelled due to the beginning of USAR construction. CAT365 was mobilized to Borrow D.	
D	Run-off-mine	CAT365	Excavator was excavating run-off-mine and hauling it to trucks (USAR construction).	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+000 to 0+060	Dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed downhill the existing safety berm located at the NE side of the road and then pushed material dumped by the two haul trucks working in the area. The location of the transmission line was shown to all the operators at the beginning of the activity.	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
Borrow C	Upper bench	CAT330	Some boulders were broken with the rock hammer.	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
Borrow C	Upper Bench	Rock Protection Fill	Engineer collected samples at borrow source to perform tests with the XRF Analyzer. Samples: S6 to S10 containing rock protection fill.	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Contractor plans to continue the development of Borrow D and construction activities at USAR.
- Kick-off meeting is scheduled for September 22, 2014 at 1:00 pm.

Photos:



Photo 1: 20140921_NFRDSIS_BC_P37_Testing of samples collected at borrow area



Photo 2: 20140921_NFRDSIS_BC_P38_View of CAT330 breaking rocks and CAT365 parked_Looking S



Photo 3: 20140921_NFRDSIS_BD_P39_Overview of some signalling installed at BD area_Looking NW



Photo 4: 20140921_NFRDSIS_BD_P40_CAT365 developing BD_Looking NW



Photo 5: 20140921_NFRDSIS_USAR_P41_Dozer pushing the existing safety berm_Looking SE



Photo 6: 20140921_NFRDSIS_USAR_P42_Haul truck dumping material at haul road crest_Looking SE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Raining	
Subject:	Day Shift Report	**Work Areas*:**	BC, BD, USAR	
Date:	20140922	**Record #:**	*20140922_NFRDSIS_DSR_7*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: +6.3°C (Max = +8.9°C; Min = +3.6°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Pelly presented the HASP during the Kick-off meeting.
1.2	Environmental	YG and ELR presented the main aspects of the EMP during the Kick-off meeting.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	A signed and stamped Issue For Construction copy of the following Drawings is submitted to YG, Pelly and Tees: - FRNF-XD-01-02_REV 0 - FRNF-XD-01-03_REV 0 - FRNF-XD-02-04_REV 1

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (CH2M), BC, BD, USAR
Dan Russell (Pelly), BD, USAR
John Garvis (Pelly), BC, BD, USAR
Dean Serelo (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, development of BC, 1 hour)
Excavator (CAT 365C, yellow, development of BD, 7 hours)
Dozer (CAT D6R, #1604, yellow, parked on top of Haul Road, no activity)
Dozer (CAT D9L, #DZ952, yellow, USAR, 7 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)

Grader (CAT 14H, #1407, yellow, parked at Borrow A, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A and assembling equipment parts)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 7 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 3 hours)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer (Photos 2, 3 and 4).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	Dan, John, Chad, Joan. The need to provide some test pits at the USAR is discussed.	
	Discussion and Recommendations	
	Contractor commented that they would like to dig test pits to observe the natural ground on the footprint of the road and other possible locations. Chad reminded the need to keep 30 m distance from the pond (no disturbance area). Joan commented that the natural ground is exposed at the area already cleared so they could observe it. Contractor commented that they would like to do a deeper test-pit to see what they would encounter when performing the excavation shown on Drawings, and check subgrade on alternative alignments for the road. Finally, informed that the test-pits will start on the next day shift (Sept. 23, 2014).	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	Dan, John, Chad, Joan. The performance of the rock-hammer at BC was discussed.	
	Discussion and Recommendations	
	Engineer commented that the hours of rock-hammer per day could be agreed as the use of hammer for a long time was not required, and it was not efficient to change the bucket for the hammer (or vice versa) more than one time per day. Contractor commented that the use of hammer could vary from one day to another, depending on the material encountered on the borrow source. They pile some boulders on the go and change the bucket for the hammer when a sufficient volume to be broken is accumulated. Engineer to keep track of development of BC to see performance.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Protection Rock Fill	CAT330	CAT330 was breaking some boulders.	1
D	Run-off-mine	CAT365	Excavator was excavating run-off-mine and hauling it to trucks (USAR construction).	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+000 to 0+080	Dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area.	2,3,4

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
Borrow C	Upper bench	CAT330	Some boulders were broken with the rock hammer.	1

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- All the field personnel attended the Construction Kick-off meeting at the Faro Mine lunch room. A list of the actions from the meeting are listed below:
    - Pelly to ensure that evacuation procedures align with TEES' and that site access restrictions are implemented following evacuation.
    - Pelly to finalize the Traffic Management Plan with TEES, including but not limited to signage for each work area, procedures for providing haul truck right of way, and access requirements to Pelly's work areas.
    - TEES to circulate TMP to CH2M HILL and other third parties as appropriate.
    - Pelly to add third party communications and check in requirements for their work areas to the HASP.
- During the following shift (night shift), Contractor plans to continue construction activities at USAR and BD.

Photos:



Photo 1: 20140922_NFRDSIS_BC_P43_Excavator breaking rocks with rock hammer_Looking SE



Photo 2: 20140922_NFRDSIS_USAR_P44_Haul truck dumping material from BD_Looking SE



Photo 3: 20140922_NFRDSIS_USAR_P45_Overview of access road at the end of the shift_Looking N



Photo 4: 20140922_NFRDSIS_USAR_P46_Piles of run-off-mine ready to be pushed_Looking NE

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30 am
Project #:	0533-010-06	**Weather:**	Overcast, light rain, clear	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140922-23	**Record #:**	*20140922-23_NFRDSIS_DSR_8*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: Contractor installed light tower on the crest of the existing haul road to illuminate the work area (Photo 2)
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Dale Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 365C, yellow, development of BD, 11.5 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 6.5 hours)
Dozer (CAT D9L, #DZ952, yellow, USAR, 5.0 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked along north margin of Haul Road, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR, 0. 5 hours)
Excavator (CAT 330C, #3302, yellow, parked at Borrow C, no activity)

Front Loader (Deere TC54H, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 11.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 11.5 hours)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity

4. Summary of activities:

Upstream Access Road (USAR)
Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer (Photos 1 and 2).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	Status at the end of the shift (Open, Closed or N/A)	-

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	Run-off-mine	CAT 365C	Excavating run-off-mine material from BD, and filling haul trucks	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+080 to 0+140	Two dozers and two haul trucks	Run-off-mine (ROM)	BD	Dozers pushed material dumped by the two haul trucks working in the area.	1,2

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
Borrow D	Along excavation path	Rock Protection Fill	Engineer collected five samples at borrow source to perform tests with the XRF Analyzer (Samples S11to S15).	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- D9L Dozer stalled when idled down a bit too far at 12:50 AM, was unable to restart until other Pelly personnel arrived late in shift to assist. Work continued around it as there was plenty of room for the D6R and haul trucks to get around safely. See photo 2.
- During the following shift (day shift), Contractor plans to continue construction activities at USAR, BD, BC.

Photos:



Photo 1: 20140922-23_NFRDSIS_USAR_P47_Dozer (D9L) spreading BD fill dumped by haul truck_Looking SE



Photo 2: 20140922-23_NFRDSIS_USAR_P48_Smaller dozer (D6R) taking over for larger D9L dozer following stall_Looking SE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Raining	
Subject:	Day Shift Report	**Work Areas*:**	BC, BD, USAR	
Date:	20140923	**Record #:**	*20140923_NFRDSIS_DSR_9*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +5.4°C (Max = +10.5°C; Min = +0.2°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Contractor to install a turnaround point at the ramp (downhill side) during the night shift to prevent trucks from backing up a long distance.
1.2	Environmental	Installation of silt fences on USAR close to the pond will start on the next day shift, once they will be delivered to site.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (CH2M), BC, BD, USAR
Dan Russell (Pelly), BD, USAR
John Garvis (Pelly), BC, BD, USAR
Dean Serelo (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, development of BC, 8 hours sorting and 1.5 hours breaking)
Excavator (CAT 365C, yellow, development of BD, 8 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 1 hour)
Dozer (CAT D9L, #DZ952, yellow, USAR, 7 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)

Grader (CAT 14H, #1407, yellow, parked at Borrow A, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A and assembling equipment parts)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 8 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 3 hours)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer (Photos 2, 3 and 4).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	Dan, John, Chad, Joan. The need to provide some test pits at the USAR is discussed.	
	Discussion and Recommendations	
	The Contractor commented that they will mobilize the CAT330 to the USAR to perform test-pits and help with the clearing and grubbing of the area. The Engineer comments that the ground is exposed in the area already cleared, so they could see the natural ground. The Contractor explained that they want to see the material they will encounter during the excavation for the road.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Dean, Joan. Slope ratio of constructed USAR	
	Discussion and Recommendations	
	The Engineer observed that the Contractor was placing additional fill on the first section of the ramp (**Photo 6**). The Contractor explained that they measured a slope of 10% so the slope had to be corrected. The Engineer pointed out that the material was not being placed on the proper manner. A new layer was being extended along the length of the road. Given that the slope was too steep, the Contractor should only place fill at the downstream section (place a "wedge" of material) to raise the bottom of the ramp. Instead, the Contractor was spreading a uniform layer of fill (fill was being placed at the top of slope). As a result, a new ramp at a higher elevation was being created with the same slope (too steep). Contractor to rework the area in order to create a wedge of material (and not a layer of uniform thickness).	
	Corrective Actions or Improvements	
	Contractor reworked the fill placed and the slope ratio on the ramp was corrected. (**Photo 7**)	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

3	John, Dean, Joan. Reference points along the USAR ramp	
	Discussion and Recommendations	
	Contractor pointed out that more reference points should be added to provide guidance to the Dozer operators so the final road being constructed is closer to the required grading and fewer corrections will be required. Engineer agreed on the need of installing more marks in between marks placed by Underhill, but reminded that no GPS is available on site so the ramp grading will have to be verified as required to ensure grading.	
	Corrective Actions or Improvements	
	Engineer painted an orange line on the existing Haul Road fill, and placed some marks for the use of the Contractor.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT330	CAT330 was breaking some boulders and selecting rock protection fill.	-
D	Run-off-mine	CAT365	Excavator was excavating run-off-mine and hauling it to trucks (USAR construction).	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+080 to 0+150	Dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area, and corrected slope ratio on the first section of the ramp already constructed	2, 3, 4, 6 & 7

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
Borrow C	Upper bench	CAT330	Some boulders were broken with the rock hammer.	1

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), Contractor plans to continue construction activities at USAR and BD.
- Contractor to update construction schedule taking into account the production rates from the first days, and the introduction of the night shift.

Photos:



Photo 1: 20140923_NFRDSIS_USAR_P49_Dozer spreading run-off-mine at USAR_Looking NE



Photo 2: 20140923_NFRDSIS_USAR_P50_Access road at the beginning of the shift_Looking N



Photo 3: 20140923_NFRDSIS_USAR_P51_Haul truck delivering fill from BD_Looking N



Photo 4: 20140923_NFRDSIS_USPD_P52_View of debris on top of existing rock drain_Looking NW



Photo 5: 20140923_NFRDSIS_US_P53_Overview of US area and USAR being constructed_Looking SE



Photo 6: 20140923_NFRDSIS_USAR_P54_Material spread on top of existing ramp surface_Looking S



Photo 7: 20140923_NFRDSIS_USAR_P55_Dozer removing excess of fill from ramp surface_Looking S

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30 am
Project #:	0533-010-06	**Weather:**	Clear, Partly Cloudy	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140923-24	**Record #:**	*20140923-24_NFRDSIS_DSR_10_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: Contractor installed two light towers on the crest of the existing haul road to illuminate the work area (Photo 4)
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 365C, yellow, development of BD, 11.5 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 10.5 hours)
Dozer (CAT D9L, #DZ952, yellow, USAR, 1.0 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked overlooking excavation at Borrow D, 10 hours)

Light Tower/Generator (Allmand ML8, yellow, parked along the north margin of Haul Road, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR, no activity)
Excavator (CAT 330C, #3302, yellow, parked at Borrow C, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 11.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 11.5 hours)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer (Photos 1, 2, 3, 4).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	Run-off-mine	CAT 365C	Excavating run-off-mine material from BD, and filling haul trucks	2

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+150 to 0+165	Two dozers and two haul trucks	Run-off-mine (ROM)	BD	Dozers pushed material dumped by the two haul trucks working in the area.	1, 3, 4

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
Borrow D	Along excavation path	Rock Protection Fill	Engineer collected five samples at borrow source to perform tests with the XRF Analyzer (S16 to S20).	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to continue construction activities at USAR, BC, and BD.

Photos:



Photo 1: 20140923-24_NFRDSIS_USAR_P56_Dozer (D6R) and completed turn-around point_Looking SE



Photo 2: 20140923-24_NFRDSIS_BD_P57_Excavator loading haul truck with run-of-mine, D9L dozer parked after smoothing access ramp_Looking W



Photo 3: 20140923-24_NFRDSIS_USAR_P58_Haul truck dumping run-of-mine, D6R dozer preparing to spread across ramp_Looking SE



Photo 4: 20140923-24_NFRDSIS_USAR_P59_D6R dozer spreading fill across ramp_Looking SE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Raining	
Subject:	Day Shift Report	**Work Areas*:**	BC, BD, USAR, USPD	
Date:	20140924	**Record #:**	*20140924_NFRDSIS_DSR_11*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +2.8°C (Max = +8.7°C; Min = +-3.2°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	Contractor installed a silt fence to prevent the transport of sediment when working on clearing and grubbing close to the 30 m limit marks indicating area of exclusion (no disturbance).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BC, BD, USAR
Dean Serelo (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, development of BC, clearing and grubbing USAR, 7 hours)
Excavator (CAT 365C, yellow, development of BD, 9 hours)
Dozer (CAT D6R, #1604, yellow, USAR)
Dozer (CAT D9L, #DZ952, yellow, USAR)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, parked at Borrow A)
Front Loader (Deere TC54H, yellow, parked at Borrow A)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)

Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer. Also, continued with clearing and grubbing for the laydown and spoil areas.
Upstream Plug Dike (USPD)
Engineer collected some samples from the existing rock drain material.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	Dan, John, Joan. USAR ramp dimensions.	
	Discussion and Recommendations	
	The Engineer reminded the need to control both width and slope of ramp to verify that it is constructed as per design. The Contractor and Engineer measured the slope and width, and it was found to be 8% and 14.5 m wide. The Engineer reminded the ramp should be constructed as narrow and steep as possible as turning points were provided for the haul trucks. Also, that stakes installed should always be visible on the existing slope as ramp fill should be lower.	
	Corrective Actions or Improvements	
	Contractor and Engineer to continue monitoring width and slope for road.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Dean, Joan. Slopes at Borrow D cuts.	
	Discussion and Recommendations	
	The Engineer observed that the cut being provided by the Contractor at BD along the Haul Road was very steep (ranging from 0.5H:1V to 1H:1V). The Contractor commented that the slopes provided are safe. The Engineer requested the Contractor to reevaluate slope stability, and to comment during the following day shift (Sept 25, 2014).	
	Corrective Actions or Improvements	
	Contractor and Engineer to comment on the stability of BD cut walls.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	John, Joan. USAR alignment.	
	Discussion and Recommendations	
	The Engineer showed to the Contractor an alternative alignment that can be used. The alignment was located on the flatter area uphill to the designed road centerline. Some measurements were collected so as to have an idea of possible options. The Contractor continued clearing and grubbing the area with the excavator CAT330 (USAR footprint) and Dozer D6 (lay down area) as per the limits marked by Underhill.	

	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT330	CAT330 was breaking some boulders and sorting material. Then, excavator was mobilized to USAR area.	-
D	Run-off-mine	CAT365	Excavator was excavating run-off-mine and hauling it to trucks (USAR construction).	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+680	Hand Tools	The Contractor installed silt fence close to the pond shore line to prevent sediments from reaching the pond. Excavator was working close to the 30 m limit of exclusion (no disturbance).	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+680, and lay down area	CAT330, CATD6	The Contractor continued clearing and grubbing at road footprint, and continued clearing trees at laydown area	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+160 to 0+180	Dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area.	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
Borrow C	Upper bench	CAT330	Some boulders were broken with the rock hammer.	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
US	USPD and USSC	ROM	The Engineer collected samples S21 to S31 for comparison with BD and BC materials (XRF Analyzer, Zn concentrations).	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), Contractor plans to continue construction activities at USAR and BD.

Photos:



Photo 1: 20140924_NFRDSIS_USAR_P60_Dozer spreading run-off-mine at USAR_Looking NE



Photo 2: 20140924_NFRDSIS_USPD_P61_View of USPD and access road_Looking SE



Photo 3: 20140924_NFRDSIS_BD_P62_View of CAT365 excavating existing haul road_Looking S



Photo 4: 20140924_NFRDSIS_USAR_P63_Truck turning at the turning point created_Looking SE



Photo 5: 20140924_NFRDSIS_DSPD_P64_Sample of existing rock drain collected by Engineer

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30 am
Project #:	0533-010-06	**Weather:**	Clear, Partly Cloudy, Breezy	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140924-25	**Record #:**	*20140924-25_NFRDSIS_DSR_12_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: The Contractor installed two light towers on the crest of the existing haul road to illuminate the work area (Photo 3)
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2	Borrow D cut slopes. No update. OPEN	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 365C, yellow, development of BD, 11.5 hours)
Dozer (CAT D6R, #1604, yellow, USAR, no activity)
Dozer (CAT D9L, #DZ952, yellow, USAR, 11.5 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked overlooking excavation at Borrow D, 10 hours)

Light Tower/Generator (Allmand ML8, yellow, parked along the north margin of Haul Road, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR, no activity)
Excavator (CAT 330C, #3302, yellow, USAR, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 11.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 11.5 hours)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
The Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer (Photos 1, 2, 3, 4).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	8:30 PM, 10:00 PM, 11:30 PM, 5:30 Amp; C. Pederson and L. Buyck; USAR; Measurements revealed road width exceeding design width by 0.5 – 1.5m	
	Discussion and Recommendations	
	C. Pederson recommended narrowing road width as construction progressed to design width or narrower by operator's digression.	
	Corrective Actions or Improvements	
	Narrowment of road to design width (15 m including road and berm).	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	Run-off-mine	CAT 365C	Excavating run-off-mine material from BD, and filling haul trucks	2

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+175 to 0+190	Two dozers and two haul trucks	Run-off-mine (ROM)	BD	Dozers pushed material dumped by the two haul trucks working in the area.	1, 2, 3, 4

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
Borrow D	Along excavation path	Run-off-mine	Engineer collected five samples at borrow source to perform tests with the XRF Analyzer (S32 to S37).	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

15. General notes:

- Second turn-around point was constructed at approximate Station 0+180.
- During the following shift (day shift), the Contractor plans to continue construction activities at USAR, BC, and BD.

16. Photos:



Photo 1: 20140924-25_NFRDSIS_USAR_P65_Dozer (D9L) and progress from day shift_Looking SE



Photo 2: 20140924-25_NFRDSIS_USAR_P66_7.5% grade line marked by orange posts, D9L dozer and haul truck continuing construction_Looking SE



Photo 3: 20140924-25_NFRDSIS_USAR_P67_D9L dozer spreading fill on ramp, light towers in the center lighting the ramp and Borrow D (larger and smaller lights respectively)_Looking SE



Photo 4: 20140924-25_NFRDSIS_USAR_P68_Haul truck using new turn-around point to prepare for dump of run-of-mine, D9LR dozer waiting at ramp end_Looking NW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140925	**Record #:**	*20140925_NFRDSIS_DSR_13*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +0.8°C (Max = +8.2°C; Min = +-6.7°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	The Engineer provided comments to the Contractor on the installation of Silt Fences (see Communication 3 and Section 7 below).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D cut slopes	The Contractor explained that the Borrow D steep cut slopes will be trimmed back at a later stage (refer to Communication 2 below). OPEN	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BC, BD, USAR
Dean Serelo (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, clearing and grubbing USAR, 2 hours)
Excavator (CAT 365C, yellow, development of BD, 10 hours)
Dozer (CAT D6R, #1604, yellow, clearing and grubbing USAR, 6 hours)
Dozer (CAT D9L, #DZ952, yellow, USAR, 10 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)

Grader (CAT 14H, #1407, yellow, parked at Borrow A)
Front Loader (Deere TC54H, yellow, parked at Borrow A)
Front Loader (CAT988H, #2316, yellow, parked on top of Haul Road, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 10 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 10 hours)

4. Summary of activities:

Upstream Access Road (USAR)
The Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer. Also, continued with clearing and grubbing for the road, laydown and spoil areas. The Engineer collected samples from test-pits excavated by the Contractor to evaluate ground conditions (**Photo 6**).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	Dan, John, Joan. USAR ramp alignment.
	Discussion and Recommendations
	• The Contractor informed that the CAT330 was trapped in a "sinkhole" during the clearing and grubbing close to STN 0+670 (field estimate). As shown on **Photo 4**, the Engineer observed that the excavator was partly trapped on one side and with the bucket on the ground. Based on field observations of the area, including the observation of three test pits excavated by the Contractor close to STN 0+640 (approx. 1.2 m deep). The Engineer commented that excavator was trapped on an area with fine grained materials that could have excess-water pressures (liquefaction probably occurred as pore-water pressures increased when excavator started working on the area and/or water from the melt of excess ice was generated faster than it could drain). Ice was observed at a depth of 0.5 m from original ground (**Photo 5**). • The excavator was recovered with support from D6 dozer. • The Contractor commented that, based on previous experience on similar soils, similar problems could occur during the construction of the road, slowing down construction activities. Alternative road alignments were discussed on the field. The Contractor and Engineer collected control points along a flatter area located uphill to the designed access road to see if the road could be pushed uphill to prevent construction on steeper natural slopes, fill into the pond, and work outside the 30 m of no disturbance area. • The Contractor incorporated control points collected into the available LIDAR to see if acceptable grading for the road could be obtained with reasonable small cuts/fills.

	Corrective Actions or Improvements	
	Contractor to comment on constructability of proposed alignment.	
	Status at the end of the shift (Open, Closed or N/A)	**Open**
2	John, Joan. Cut slopes at Borrow D. Refer to 20140924_NFRDSIS_DSR_11_2	
	Discussion and Recommendations	
	• The Engineer observed that Contractor was providing a slope that was at least 1H:1V on areas being excavated. • The Contractor informed that steep cut slopes will be trimmed back with an excavator as part of the excavation to be performed to create ramps for traffic on the lower bench. As a result, a lower road will be available at the higher bench (existing Haul Road invert). • The Engineer reminded that a road beside the transmission line shall be provided in case that maintenance to the transmission line is required. Also, that Tees should comment on the planned excavation plan as they will be the final users of the road.	
	Corrective Actions or Improvements	
	Obtain comments from Tees and, if no issues raised by Tees, Contractor to flatten excavated slopes as part of Borrow D development.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	John, Joan, Dean. Silt fences installed at close to pond at STN 0+680 (field estimate). **Photo 3**	
	Discussion and Recommendations	
	The Engineer observed that there was a gap in between the natural ground and the fence installed during the previous shift. The Engineer reminded that fences shall be connected to the ground so as to ensure that sediment rich flow is not going through.	
	Corrective Actions or Improvements	
	Contractor to complete proper installation of silt fence.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	Run-off-mine	CAT365	Excavator was excavating run-off-mine and hauling it to trucks (USAR construction).	1

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+680, close to pond	Hand Tools	The Engineer observed silt fences that should be reinstalled (see conversation 3 above). Note that works are being performed outside the 30 m area of no disturbance but the Contractor installed the fence as they were very close to the limit. Also, that no rain was expected during the day, as well as during the following shift.	3

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Lay down and spoil areas	CAT330, CATD6	The Contractor continued clearing and grubbing at laydown and spoil areas. Material will be piled close to the NE limit to create space closer to the road for laydown and spoil of other materials.	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+190 to 0+220	Dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area.	2

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
US	USPD and USSC	ROM	The Engineer collected samples from the three test pits excavated by the Contractor close to STN 0+640 to see if fine grained material observed could be used as a source of Till for USPD construction.	7,6

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), the Contractor plans to continue construction activities at USAR and BD.

Photos:



Photo 1: 20140925_NFRDSIS_BD_P69_CAT365 excavating existing Haul Road material_Looking S



Photo 2: 20140925_NFRDSIS_USAR_P70_Haul truck dumping material beside dozer D9 _Looking N



Photo 3: 20140925_NFRDSIS_USAR_P71_View of silt fence installed by Contractor_Looking W



Photo 4: 20140925_NFRDSIS_USAR_P72_CAT330 trapped close to no disturbance limit_Looking N



Photo 5: 20140925_NFRDSIS_USAR_P73_Ice observed on ground close to area disturbed by CAT330



Photo 6: 20140925_NFRDSIS_USAR_P74_Material excavated at test-pit 3_Looking S



Photo 7: 20140925_NFRDSIS_USAR_P75_Details of material excavated from test-pit 3

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30 am
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140925-26	**Record #:**	*20140925-26_NFRDSIS_DSR_14_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: The Contractor installed two light towers on the crest of the existing haul road to illuminate the work area (Photo 5)
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140925_NFRDSIS_DSR_13_1 USAR Alignment	Contractor to comment on constructability of proposed alignment. **OPEN**	Contractor
20140924_NFRDSIS_DSR_13_2 Borrow D cut slopes	Input from Tees is required before the activity can be completed. **OPEN**	Contractor
20140925_NFRDSIS_DSR_13_3 Silt Fences	Contractor to complete the proper installation of silt fences. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR

Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 365C, yellow, development of BD, 11.5 hours)
Dozer (CAT D6R, #1604, yellow, USAR, no activity)
Dozer (CAT D9L, #DZ952, yellow, USAR, 11.5 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked overlooking excavation at Borrow D, 10 hours)
Light Tower/Generator (Allmand ML8, yellow, parked along the north margin of Haul Road, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR, no activity)
Excavator (CAT 330C, #3302, yellow, USAR, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 11.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 11.5 hours)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Front Loader (CAT 988H, yellow, USAR, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer (Photos 1, 2, 3, 4, 5).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	**Material**	**Equipment**	**Description**	**Photo**
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	Run-off-mine	CAT 365C	Excavating run-off-mine material from BD, and filling haul trucks	3, 4

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+220 to 0+270	One dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area.	1, 2, 5

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
Borrow D	Along excavation path	Run-off-mine	The Engineer collected five samples at borrow source to perform tests with the XRF Analyzer (S41 to S45).	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to continue construction activities at USAR, BC, and BD.

Photos:



Photo 1: 20140925-26_NFRDSIS_USAR_P76_Dozer (D9L) and loaded haul truck viewed from first turn-around point_Looking NW



Photo 2: 20140925-26_NFRDSIS_USAR_P77_D9L dozer and haul truck continuing construction_Looking NW



Photo 3: 20140925-26_NFRDSIS_BD_P78_Excavator (CAT 365C) positioned on bench preparing to load approaching haul truck_Looking S



Photo 4: 20140925-26_NFRDSIS_BD_P79_Excavator (CAT 365C) loading haul truck in Borrow D_Looking S



Photo 5: 20140925-26_NFRDSIS_USAR_P80_Haul truck backing out of new turn-around point to prepare for dump of run-of-mine, D9LR dozer waiting at ramp end_Looking NW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140926	**Record #:**	*20140926_NFRDSIS_DSR_15*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +0.9°C (Max = +9.0°C; Min = -7.3°C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	Engineer reminded to Contractor that the Silt Fences shall be installed properly.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140925_NFRDSIS_DSR_13_1 USAR Alignment	Contractor commented risks associated to the original design (see Communication 1). Discussion on the need of a new alignment still to be closed. **OPEN**	Contractor Engineer
20140924_NFRDSIS_DSR_11_2 Borrow D cut slopes	Contractor to complete the following: • Trim back steep cut slopes; • Provide smooth ramps for future traffic (8% slopes); and • Prepare a drawing showing proposed haul road configuration Refer to Communication 2 below. **OPEN**	Contractor
20140925_NFRDSIS_DSR_13_3 Silt Fences	Contractor to install Silt Fence as per Engineer's recommendations. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, USAR

Dean Serelo (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, clearing and grubbing USAR)
Excavator (CAT 365C, yellow, development of BD)
Dozer (CAT D6R, #1604, yellow, clearing and grubbing USAR)
Dozer (CAT D9L, #DZ952, yellow, USAR)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, parked at Borrow A)
Front Loader (Deere TC54H, yellow, parked at Borrow A)
Front Loader (CAT988H, #2316, yellow, parked on top of Haul Road, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)

4. Summary of activities:

Upstream Access Road (USAR)
The Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer. Also, continued with clearing and grubbing for the road, laydown and spoil areas.
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	Dan, John, Joan. USAR ramp alignment.
	Discussion and Recommendations
	The Contractor evaluated two different road alignments in order to increase productivity and to prevent the placement of fill into the pond. The options presented the following problems: • Option 1. Road straight to the pond: Design requires deep cuts into the ground very close to the existing Haul Road fill (about 10 m deep cuts to achieve 8% slopes). Instabilities along both cut walls could occur (either during construction or during the next summer when ice will melt). About 25.000 m3 of material will have to be excavated. Also, road will collect runoff water and it will end up on the Plug-Dike construction area. • Option 2. Road as per Engineers proposed alignment: Design requires deep cuts (including a turn-around area) into the ground (about 6 m deep cuts to achieve 10% slopes). Instabilities along both cut walls could occur (either during construction or during the next summer when ice will melt). About 13.000 m3 of material will have to be excavated. The risks associated with the designed road alignment were commented, including:

	1. A 4 m deep cut into the ground to achieve a 8% slope is required. The reduction of cut volume if instabilities are observed during construction is discussed (will require the placement of more fill at the curve and a steep section at 10% after the curve). Possible measures to stabilize the slope, if required, are commented. 2. A cut into the ground will also be required at the lower section. The reduction of cut volume if instabilities are observed during construction is discussed (will require the relocation of the road downhill and the placement of more fill into the pond). Possible measures to stabilize the slope, if required, are commented. 3. Common material excavated might not be suitable as a fill (too fine grained and saturated). The use of Borrow D material is evaluated. Also, the use of boulders at the bottom as an erosion protection (close to the river). 4. Disturbance introduced by machinery during clearing and grubbing can be a problem as moss is protecting (isolating) the ground. Contractor recommended not grubbing the area (clear trees only). 5. The need of salvaging fish and installing a turbidity curtain at an earlier stage is commented. The point was frozen during a visit performed during the afternoon (**Photo 3**). Also, the need of installing silt fences before Contractor access the area of no disturbance (30 m from pond). Dan (phone conversation) confirmed that salvaging of fish will occur on October 4th.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan. Cut slopes at Borrow D. Refer to 20140924_NFRDSIS_DSR_11_2	
	Discussion and Recommendations	
	The Contractor explained that a site visit was organized with Tees to comment on the final configuration of the Haul Road once the development of Borrow D is completed: • A wide road will be available for traffic at the lower bench • A smaller road will be available at the upper bench (at previous Haul Road invert elevation) to provide maintenance to the transmission line. • Steep cut slopes at 0.5H:1V will be trimmed back, and the ramps at both ends of Borrow D area will be smoothed to create suitable ramps for traffic on the lower bench. The Engineer requested a drawing (plan view) showing the proposed configuration of the area once the development of Borrow D area will be completed so as to inform YG.	
	Corrective Actions or Improvements	
	Contractor to trim back steep cut slopes, to provide smooth ramps for future traffic, and to prepare a drawing showing proposed Haul Road configuration.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	Run-off-mine	CAT365	Excavator was excavating run-off-mine and hauling it to trucks (USAR construction).	2

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+680, close to pond	Hand Tools	The Engineer observed that installed Sit Fences were not corrected by the Contractor. A gap between the fence fabric and the ground was still present. Light rain is expected for the following day shift.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Lay down and spoil areas	CAT330, CATD6	The Contractor continued clearing and grubbing at laydown and spoil areas. Material will be piled close to the NE limit to create space closer to the road for laydown and spoil of other materials.	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+220 to 0+240	Dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area.	1

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
US	Workshop (beside CH2M offices)	ROM and Borrow C	The Engineer tested samples collected during the previous light shift with the XRF analyzer.	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), Contractor plans to continue construction activities at USAR and BD.

Photos:



Photo 1: 20140926_NFRDSIS_USAR_P81_CAT D6 pushing ROM fill_Looking W



Photo 2: 20140926_NFRDSIS_BD_P82_ CAT365 creating transition ramp into existing HR_Looking W



Photo 3: 20140926_NFRDSIS_USPD_P83_Overview of the pond at the end of the shift_Looking N



Photo 4: 20140926_NFRDSIS_USAR_P84_Engineer taking GPS points along fill toe_Looking SW

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30 am
Project #:	0533-010-06	**Weather:**	Cloudy, drizzly, breezy	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140926-27	**Record #:**	*20140926-27_NFRDSIS_DSR_16_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: The Contractor installed two light towers on the crest of the existing haul road to illuminate the work area (Photo 4)
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20140925_NFRDSIS_DSR_13_1 USAR Alignment	Contractor commented risks associated to the original design (see Communication 1). Discussion on the need of a new alignment still to be closed. **OPEN**	Contractor Engineer
20140924_NFRDSIS_DSR_11_2 Borrow D cut slopes	Contractor to complete the following: • Trim back steep cut slopes; • Provide smooth ramps for future traffic (8% slopes); and • Prepare a drawing showing proposed haul road configuration Refer to Communication 2 below. **OPEN**	Contractor
20140925_NFRDSIS_DSR_13_3 Silt Fences	Contractor to install Silt Fence as per Engineer's recommendations. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 365C, yellow, development of BD, 10.5 hours)
Dozer (CAT D6R, #1604, yellow, USAR, no activity)
Dozer (CAT D9L, #DZ952, yellow, USAR, 10.5 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked overlooking excavation at Borrow D, 9.5 hours)
Light Tower/Generator (Allmand ML8, yellow, parked along the north margin of Haul Road, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR, no activity)
Excavator (CAT 330C, #3302, yellow, USAR, 0.5 hours)
Front Loader (Deere TC54H, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 10.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 10.5 hours)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Front Loader (CAT 988H, yellow, USAR, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the crest of the existing haul road with a dozer (Photos 1, 2, 3, 4, 5).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	Run-off-mine	CAT 365C	Excavating run-off-mine material from BD, and filling haul trucks.	3, 4

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Station 0+240 to 0+270	One dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area.	1, 2, 5

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
Borrow D	Along excavation path	Run-off-mine	The Engineer collected five samples at borrow source to perform tests with the XRF Analyzer (S46 to S50).	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Idling time during breaks (2x15min) and lunch (30min) not included on estimated working time for machinery in Section 2 above.
- During the following shift (day shift), Contractor plans to continue construction activities at USAR, and BD.

Photos:



Photo 1: 20140926-27_NFRDSIS_USAR_P85_Dozer (D9L) starting construction, photo taken from road where ramp is to intersect_Looking SE



Photo 2: 20140926-27_NFRDSIS_USAR_P86_D9L dozer above third turn-around point constructed during day shift_Looking E



Photo 3: 20140926-27_NFRDSIS_BD_P87_Excavator (CAT 365C) loading haul truck_Looking W



Photo 4: 20140925-26_NFRDSIS_BD_P88_Excavator (CAT 365C) carving out new excavation in Borrow D under light tower_Looking W

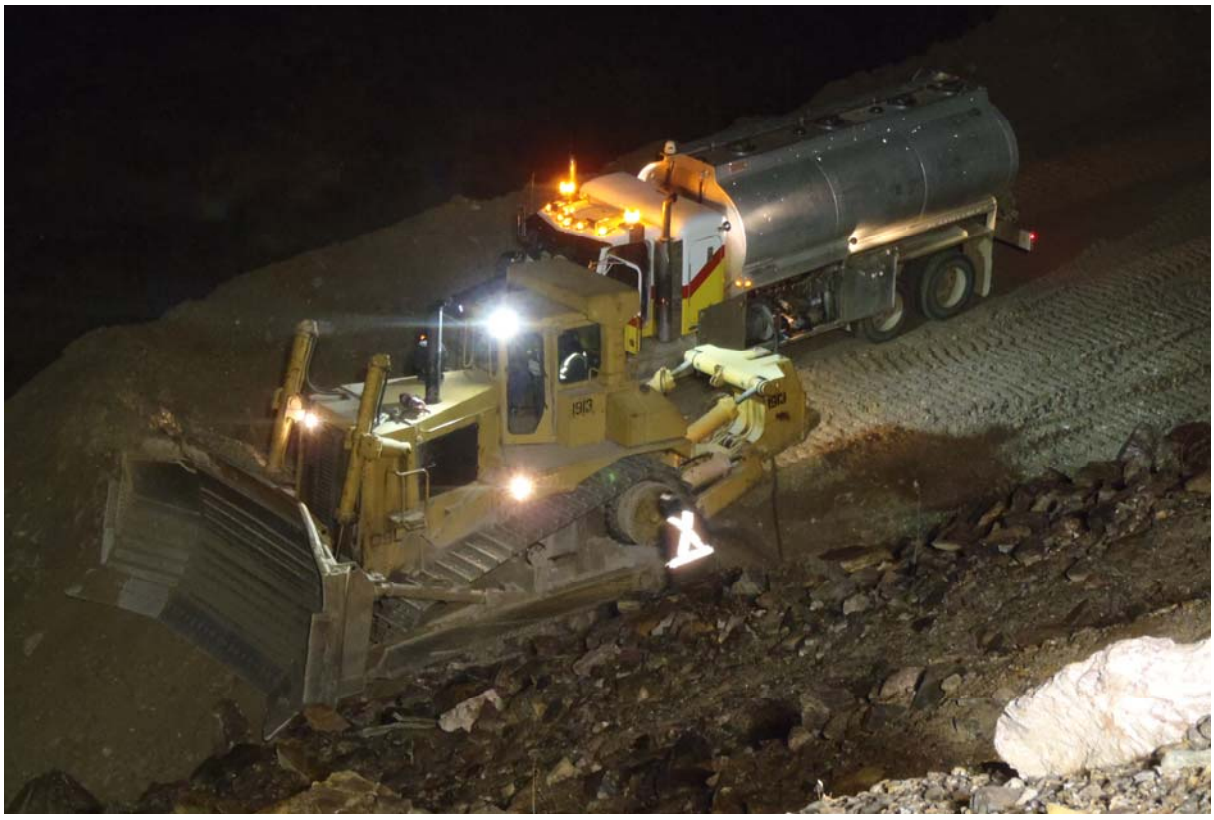


Photo 5: 20140926-27_NFRDSIS_USAR_P89_ D9LR dozer getting refueled during break near ramp end_Looking E

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:40 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Overcast and light rain	
Subject:	Day Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140927	**Record #:**	*20140927_NFRDSIS_DSR_17*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +8.4 °C (Max = +11.9 °C; Min = +4.9 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	The Engineer reminded to Contractor that the Silt Fences shall be installed properly.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140925_NFRDSIS_DSR_13_1 USAR Alignment	Contractor commented risks associated to the original design (see Communication 1). Discussion on the need of a new alignment still to be closed. **OPEN**	Contractor Engineer
20140924_NFRDSIS_DSR_11_2 Borrow D cut slopes	Contractor to complete the following: • Trim back steep cut slopes; • Provide smooth ramps for future traffic (8% slopes); and • Prepare a drawing showing proposed haul road configuration Refer to Communication 2 below. **OPEN**	Contractor
20140925_NFRDSIS_DSR_13_3 Silt Fences	Contractor to install Silt Fence as per Engineer's recommendations. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, USAR
Dean Serelo (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, clearing and grubbing USAR, and BC, 8 hours)
Excavator (CAT 365C, yellow, development of BD)
Dozer (CAT D6R, #1604, yellow, clearing and grubbing USAR)
Dozer (CAT D9L, #DZ952, yellow, USAR)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, USAR and Haul Road)
Front Loader (Deere TC54H, yellow, parked at Borrow A)
Front Loader (CAT988H, #2316, yellow, parked on top of Haul Road, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)

4. Summary of activities:

Upstream Access Road (USAR)
The Contractor continued delivering run-off-mine material from BD with haul trucks and pushing it from the road platform being constructed. Also, completed clearing and grubbing for laydown, spoil and road footprint up to STN 0+640 (**Photo 2**). The activities to be performed during the night shift once the ramp will be at STN 0+420 (natural ground) are discussed.
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	John, Joan. Roots and other organic material to be removed from ramp footprint.	
	Discussion and Recommendations	
	The Engineer requested the removal of big roots and other organic material located close to the area in which the ramp being created will be intersecting the original ground (**Photo 3**)	
	Corrective Actions or Improvements	
	Contractor removed the organics with dozer D6.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
2	John, Joan. USAR alignment.	
	Discussion and Recommendations	
	The Contractor and Engineer commented on the distribution of excavated materials on the	

laydown/spoil area, and the location for turn-around areas (**Photo 1**). Also, commented the activities to be initiated during the night shift once the ramp will hit the natural ground (STN 0+420):

- Proof-roll the area cleared with haul trucks to identify soft spots and mark them.
- Complete sub-excavation of areas marked to a depth of 0.5 m, smooth excavation bottom, place a geotextile, back fill with sand and gravel from Borrow A, and compact.
- If a significant area (close to 50%) is found to be soft (requiring sub-excavation), Engineer and Contractor will evaluate other options, such as the placement of a geotextile, overlain by a layer of 0.5 m of Borrow D (without sub-excavation), and compaction.
- Capping of road platform with Borrow A material as per design.
- Excavation to be started at STN 0+540 with 2H:1V cut walls and 8% gradient to a maximum depth of 2 m. Then, continue excavation progressing horizontally (0% gradient) until it daylights at STN 0+640 approximately. A ditch to collect water at the upstream side of the excavation floor needs to be provided to divert water/seeps on the wall. Engineer to assess stability of excavated walls to identify areas of concern (stability). Possible stabilization measures were discussed, such as the placement of some rock (permeable) to buttress the slope.
- Following construction activities will be evaluated at the beginning on the day shift based on the observation of the excavated walls and floor.

Corrective Actions or Improvements	
N/A	
<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**

1. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330	Excavator was sorting rock protection fill and creating a stock pile.	-
D	Run-off-mine	CAT365	Excavator was excavating run-off-mine and hauling it to trucks (USAR construction).	-

2. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+680, close to pond	N/A	Contractor commented that the silt fence will be reinstalled at the pond's edge during the night shift.	-

3. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Lay down and spoil areas	CAT330, CATD6	Contractor completed clearing and grubbing at laydown, spoil, turn-around and road footprint. Material was being piles close to the NE limit.	2

4. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+270 to 0+400	Dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area.	3

5. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

6. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

7. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
US	Borrow C	Rock Protection Fill	The Engineer collected samples S51 to S59 from Borrow C. Samples to be tested with the XRF analyzer during the following day shift.	4

9. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), the Contractor plans to continue construction activities at USAR, including sub-excavation, development of BA and BD, placement of geotextiles, and common excavation.

Photos:

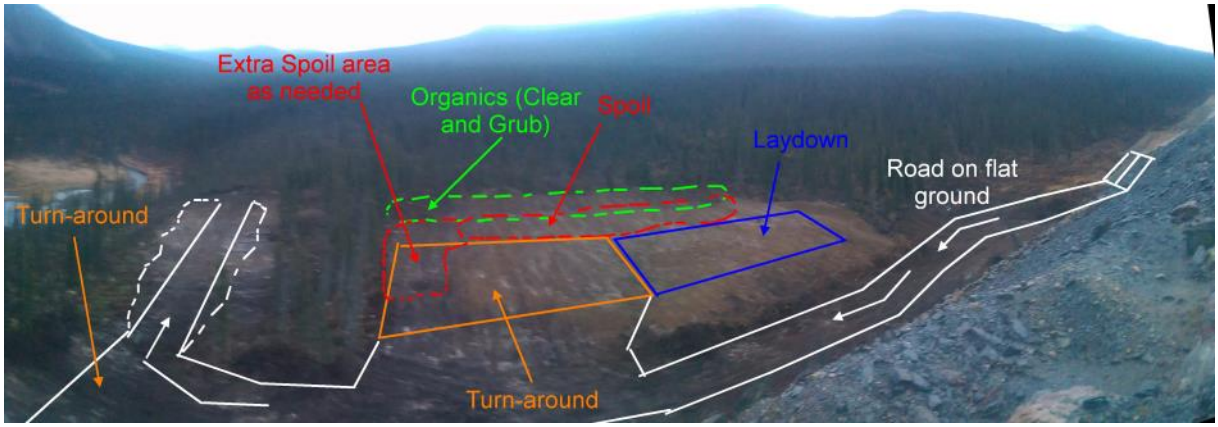


Photo 1: 20140927_NFRDSIS_USAR_P90_Proposed configuration for working areas_Looking NE



Photo 2: 20140927_NFRDSIS_USAR_P91_ Dozer completing clearing and grubbing_Looking E



Photo 3: 20140927_NFRDSIS_USAR_92_Organics to be removed from the ramp footprint_Looking S



Photo 4: 20140927_NFRDSIS_BC_P93_Overview of borrow showing material being sorted_Looking S

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30 am
Project #:	0533-010-06	**Weather:**	Cloudy, rainy, breezy	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140927-28	**Record #:**	*20140927-28_NFRDSIS_DSR_18_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: The Contractor installed two light towers on the crest of the existing haul road to illuminate the work area (Photo 1)
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20140925_NFRDSIS_DSR_13_1 USAR Alignment	Contractor commented risks associated to the original design (see Communication 1). Discussion on the need of a new alignment still to be closed. **OPEN**	Contractor Engineer
20140924_NFRDSIS_DSR_11_2 Borrow D cut slopes	Contractor to complete the following: • Trim back steep cut slopes; • Provide smooth ramps for future traffic (8% slopes); and • Prepare a drawing showing proposed haul road configuration Refer to Communication 2 below. **OPEN**	Contractor
20140925_NFRDSIS_DSR_13_3 Silt Fences	Contractor to install Silt Fence as per Engineer's recommendations. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 365C, yellow, development of BD, 9 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 9 hours)
Dozer (CAT D9L, #DZ952, yellow, USAR, 2 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked overlooking excavation at Borrow D, 8 hours)
Light Tower/Generator (Allmand ML8, yellow, parked along the north margin of Haul Road, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR, 5 hours)
Excavator (CAT 330C, #3302, yellow, USAR, no activity)
Front Loader (Deere TC54H, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 10.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 10.5 hours)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Front Loader (CAT 988H, yellow, USAR, no activity)
Forklift (Unknown designation, yellow, USAR, 1 hour)

4. Summary of activities:

Upstream Access Road (USAR)
-The Contractor continued delivering run-off-mine material from BD with haul trucks to the toe of the ramp which was spread by the D9L dozer (Photo 1). -Upon completion of the ramp a proof roll was completed across cleared ground to assess material strength (Photo 2). -Two separate zones showing soft and unfavorable ground were observed along a 50 m long road section. The road on this area was 7 m wide. The excavation of the top 0.5m of soft material (or until competent ground was encountered) was completed, underlain with geotextile and backfilled with fine material from Borrow A (Photos 3 and 4). -A lift of 0.5 m of coarser material from Borrow D was placed on top of that which was tapered to the design thickness of 0.3 m, and sourced from Borrow A once favorable ground was reached (Photo 5).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	1:30 AM, C. Pederson, J. Foster, USAR, fill source and lift thicknesses.	
	Discussion and Recommendations	
	Material use and lift thickness pertaining to road construction over the filled excavation of soft ground: -Borrow D material would impart greater stability due to coarser grain size distribution, and thicker lifts (0.5 m as opposed to 0.3 m of design) would help absorb settlement etc. -Design calls for 0.3 m lifts of Borrow A material (sandy but finer than BD).	
	Corrective Actions or Improvements	
	Compromise: -Use of Borrow D material and thicker lift (0.5 m) from the end of the ramp across the soft zone that was excavated and filled with geotextile and Borrow A fill (from 0+400 to 0+460). -Use of Borrow A material at the design lift height (0.3 m) over competent ground (from 0+460 onward).	
	Status at the end of the shift (Open, Closed or N/A)	**Closed**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Sand and Gravel	Front Loader	Excavating fill material from BA, and filling haul trucks.	-
B1	-	-	-	-
C	-	-	-	-
D	Run-off-mine	CAT 365C	Excavating run-off-mine material from BD, and filling haul trucks.	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+400 to 0+520	One dozer	Removal of loose surface material prior to proof roll.	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Stations 0+380 to 0+460	One dozer and two haul trucks	Run-off-mine (ROM)	BD	Dozer pushed material dumped by the two haul trucks working in the area. Borrow D material used as road base from the ramp across the unfavorable zone. Note that the lift thickness was 0.5 m from Stations 0+400 to 0+460.	1, 5
USAR	Stations 0+460 to 0+520	One dozer and two haul trucks	Run-off-mine (ROM)	BD, BA	Dozer pushed material dumped by the two haul trucks working in the area. Borrow A used for fill directly over Geotextile (0.3 m thick layer).	4

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Stations 0+400 to 0+460	CAT 365C, D9L Dozer	The two separate areas that failed proof-roll-test (18 m x 7 m and 30 m x 7 m) were excavated to an average depth of 0.3 m. A total of 100 m^3 of soft and unfavorable material were excavated. Note that competent ground was encountered at a shallow elevation so sub-excavation did not progressed up to a depth of 0.5 m.	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Stations 0+460 to 0+480	CAT 365C and D6R dozer	A total of Soft, unfavorable material excavated and replaced with 200 m^2 geotextile liner and fill sourced from Borrow A.	3

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), the Contractor plans to continue construction activities at USAR, BA, and BD.

Photos:



Photo 1: 20140927-28_NFRDSIS_USAR_P95_Dozer (D9L) continuing ramp construction close to completion_Looking SE



Photo 2: 20140927-28_NFRDSIS_USAR_P96_Ramp completed preparing for proof roll, CAT 365C for soft material excavation, CAT grader 14H smoothing ramp, forklift (headlights) carrying geotextile rolls (5x)_Looking N



Photo 3: 20140927-28_NFRDSIS_USAR_P97_J. Foster and D. Clair rolling out geotextile, excavator (CAT 365C) excavating soft material_Looking NW



Photo 4: 20140927-28_NFRDSIS_USAR_P98_Excavator (CAT 365C) tidying organic soil on road margin, D6R dozer spreading Borrow A fill over geotextile (0.3m)_Looking NE



Photo 5: 20140927-28_NFRDSIS_USAR_P99_ D6R dozer smoothing lift of Borrow D material (0.5m) over filled excavation (soft soil removal, see above photo 3, 4)_Looking E

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:45 am	6:00 pm
Project #:	0533-010-06	**Weather:**	Overcast and light rain	
Subject:	Day Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140928	**Record #:**	*20140928_NFRDSIS_DSR_19*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +7.5 °C (Max = +8.9 °C; Min = +6.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	The Engineer performed a site visit to observe the US pond and creek so as to identify any impact caused by the USAR construction being performed by Contractor. No sediments or organics were observed on the water streams reaching the pond at the left side bank. No turbidity observed on the pond.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D cut slopes	A grader was working on the area but the activity was not completed (the Engineer measured 10 % slope grading on the SE ramp). **OPEN**	Contractor
20140925_NFRDSIS_DSR_13_3 Silt Fences	No activity. **OPEN**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, USAR, BC
Dean Serelo (Pelly), BD, USAR, BC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, 9 hr.)
Excavator (CAT 365C, yellow, USAR excavation)

Dozer (CAT D6R, #1604, yellow, USAR)
Dozer (CAT D9L, #DZ952, yellow, USAR)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, USAR and Haul Road)
Front Loader (Deere TC54H, yellow, parked at Borrow A)
Front Loader (CAT988H, #2316, yellow, parked on top of Haul Road, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor performed sub-excavation on areas that failed proof roll test, backfilled with gravel and sand locally sourced, and completed access road up to Station 0+540 (beginning of excavation). CAT365 started excavation as per Drawing FRNF-XD-02-04-REV_1 to a depth of 2 m and then progressed horizontally. Gravel and sand was found during excavation (**Photo 5**). Contractor stock-piled the excavated material as it could be reused as construction fill material. Note that excavation geometry was irregular due to the presence of areas with frozen gravel and sand (frozen ground observed at a depth of 0.5 m to 1 m from original ground after clearing and grubbing). Excavation of frozen gravel and sand was slow, so Contractor decided to postpone the excavation of hard frozen ground areas. Contractor commented that their plan is to use a dozer with a ripper during the night shift.
Upstream Plug Dike (USPD)
Engineer observed the pond and creek so as to identify any impact from USAR construction located uphill (**Photo 6**).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. Sub-excavation and backfill required at USAR (Station 0+520)
	Discussion and Recommendations
	• The Contractor completed sub-excavation of an area that failed proof-roll test (approximately 15 m x 6 m). Gravel and sand was found to be at the bottom of sub-excavation once the soft material was excavated so no geotextile was placed. The Engineer and Contractor identified a local source of suitable gravel and sand immediately beside the sub-excavation, and decided to use the local source instead of importing material from Borrow A. Gravel and sand will be pushed with Dozer D9 directly into the area sub-excavated. • As second area with soft material was identified beside the one previously excavated (30 m

	x 6 m). Contractor started sub-excavation of the area. • The Contractor and Engineer commented that the second area could also be backfilled with the gravel and sand locally sourced, by pushing material with the D9. Then, local sand and gravel could be used to create the required 0.3 m think layer of fill to cap the road. • The use of local gravel and sand will be paid by hourly rate of D9 as no haulage of material was required. Contractor completed activity in 0.5 hours.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan. Borrow D. Refer to Issue 20140924_NFRDSIS_DSR_11_2	
	Discussion and Recommendations	
	The Engineer reminded that the SE ramp at Borrow D area was too steep (ramp was found to be at 10 % after some measurements performed by the Engineer with the clinometer).	
	Corrective Actions or Improvements	
	Contractor to verify ramp slopes at Borrow D.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	John, Dean, Joan. USAR alignment.	
	Discussion and Recommendations	
	• A site visit to comment on the alignment of access road was organized. Contractor raised some concerns on the fill required at Station 0+690 and the cut at Station 0+780. • Based on the material found during the excavation of the first section of the road, The Contractor commented that the new alignment presented past week (Option 2 located uphill, road at 8 %, 6 m deep cuts, minimal fill) was a good option, and requested permission to dig test-pits along the proposed alignment. For the easy of reference, note that Option 1 was the straight road to the pond showing a 12 m deep cut, and about 25.000 m^3 of common excavation. • The Engineer commented that, based on the field observations, fine saturated soils could be found at the bottom of a 6 m deep excavation, overlain by frozen gravel and sand. This could create instabilities at the uphill cut wall either during construction or on the following summer. Also, that deep test-pits will be required to confirm those hypotheses, and deep test-pit will not be practical due to the ground conditions observed. • The Engineer and Contractor commented the details of a new road alignment (Option 3) located in between Option 2 and the design road. Minimal cut/fill will are anticipated so GPS coordinates were collected to perform a fast check with CAD.	
	Corrective Actions or Improvements	
	Contractor to comment on Option 3	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN.** Note that the discussions on the alignment will not be tracked as issue.

4	Dean, Joan. Borrow C, rock protection fill being sorted.	
	Discussion and Recommendations	
	The Engineer observed some orangish rocks that were removed from an existing berm (west end of the sorted pile). There was a risk that the orangish rocks could be incorporated into the sorted pile. The Engineer reminded to Contractor that, based on test performed on Borrow C samples with the XRF analyzer, the reddish, yellowish and orangish rocks could have a higher content of zinc, and will not be accepted as construction fill.	
	Corrective Actions or Improvements	
	Contractor to comment the observations with CAT330 operator.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

1. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	N/A	N/A	No fill imported. All gravel and sand used was locally sourced.	-
USAR Local Source	Sand and Gravel	Dozer D9	Fine to coarse sand and gravel from the local borrow area located at the limit between the spoil area and the USAR was excavated and pushed down to the road.	3
B1	-	-	-	-
C	Rock Protection Fill	CAT 330	Excavator was sorting rock protection fill and creating a stock pile.	-
D	-	-	-	-

2. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR and US Pond	Along pond shore	N/A	Engineer visited the area to observe possible impacts created by the USAR construction immediately uphill. Normal levels of sediments and organics transported by the water streams identified were observed (water was clean and transparent). Pond water was also clean and transparent along the left side bank.	6

3. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

4. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Station 0+520 to 0+540	Dozer and two haul trucks (compaction)	Gravel and Sand	Local Borrow	Dozer pushed material from local gravel and sand source to backfill areas sub-excavated and to cap the road sections being constructed.	3

5. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+520	CAT 365	An area failing proof-roll was identified. Engineer and Contractor measured the area (45 m long x 6 m wide x 0.5 m deep).	2

6. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

7. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
US	Borrow C	Rock Protection Fill and General Rock Fill	The Engineer collected samples S60 to S79 from Borrow C (material being sorted and upper bench). Samples to be tested with the XRF analyzer during the following day shift.	-

9. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), Contractor plans to continue construction activities at USAR, including common excavation, sub-excavation (if any), and associated back-fill.

Photos:



Photo 1: 20140928_NFRDSIS_USAR_P100_Compaction of BA layer placed during night shift. Note piles of Borrow A sand and gravel placed during the previous night shift to be spreaded_Looking W



Photo 2: 20140928_NFRDSIS_USAR_P101_Material from subexcavation being loaded on haul truck. Note the piles of BA sand and gravel placed during the previous night shift_Looking N



Photo 3: 20140928_NFRDSIS_USAR_102_Dozer pushing gravel and sand from local source_Looking E



Photo 4: 20140928_NFRDSIS_USPD_P103_Overview of USPD and USAR _Looking SE



Photo 5: 20140928_NFRDSIS_BC_P104_Excavation of sand and gravel above frozen layer_Looking E



Photo 6: 20140928_NFRDSIS_Pond_P105_Detail of transparent water at the eastern end of pond

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30 am
Project #:	0533-010-06	**Weather:**	Cloudy, rainy, breezy	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140928-29	**Record #:**	*20140928-29_NFRDSIS_DSR_20_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: The Contractor installed two light towers on the crest of the existing haul road to illuminate the work area.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D cut slopes	A grader was working on the area but the activity was not completed (the Engineer measured 10 % slope grading on the SE ramp). **OPEN**	Contractor
20140925_NFRDSIS_DSR_13_3 Silt Fences	No activity. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 365C, yellow, 10 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 5 hours)

Dozer (CAT D9L, #DZ952, yellow, USAR, 10 hours)
Light Tower/Generator (Ingersoll Rand, light brown, 10 hours)
Light Tower/Generator (Allmand ML8, yellow, parked along the north margin of Haul Road, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR, 3 hours)
Excavator (CAT 330C, #3302, yellow, Borrow C, no activity)
Front Loader (Deere TC54H, yellow, USAR, 1 hour)
Haul Truck (CAT 773B, #318, yellow, USAR, 8 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 10.5 hours)
Haul Truck (CAT 773B, #317, yellow, parked at Borrow A, no activity)
Front Loader (CAT 988H, yellow, USAR, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
-Proof-roll-test on a road section showed the presence of soft and unfavorable ground. Sub-excavation was completed and inlaid with geotextile and backfilled with sand and gravel material from Borrow A (Photos 3, 4, 5). -Excavation of cut slope began, slow progress due to frozen ground that was encountered near surface (depth <1 m). D9L dozer broke it up with hook but progress was slow. 365C excavator removed as much loose, thawed material as possible, D6R dozer assisted (Photo 1).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	**Material**	**Equipment**	**Description**	**Photo**
A	Sand and Gravel	CAT 988H	Excavating fill material from BA, and filling haul trucks	-
B1	-	-	-	-
C	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	STN 0+500 to 0+530	One dozer and two haul trucks	Sand and gravel	BA	Dozer pushed material dumped by the two haul trucks. Also, backfilling of sub-excavations by placing fill (107.6 m^3) directly over geotextile.	4

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
USAR	0+520	CAT 365C	2 zones of soft, unfavorable material were sub-excavated. The first area, a triangle of 9.7 m x 8 m, was sub-excavated to a depth of 0.5 m. The second one, a rectangle of 6.3 m x 14 m, was sub-excavated to a depth of 1 m to remove the soft greyish clay observed.	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
USAR	0+520	CAT 365C and D6R dozer	Soft, unfavorable material excavated and replaced with 260 m^2 geotextile liner	3, 4

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to continue construction activities at USAR, and BA.

Photos:



Photo 1: 20140928-29_NFRDSIS_USAR_P106_Overview of work area at shift start_Looking N



Photo 2: 20140928-29_NFRDSIS_USAR_P107_Overview of work area_Looking E



Photo 3: 20140928-29_NFRDSIS_USAR_P108_J. Foster and F. Maxfield installing geotextile on excavation floor (0+520)_Looking NE



Photo 4: 20140928-29_NFRDSIS_USAR_P109_Excavation with geotextile lining the bottom prior to backfilling with Borrow A material_Looking N



Photo 5: 20140928-29_NFRDSIS_USAR_P110_ 365C excavator loading material scraped by the D9L dozer on haul truck_Looking N

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:40 am	6:00 pm
Project #:	0533-010-06	**Weather:**	Overcast and light snow	
Subject:	Day Shift Report	**Work Areas*:**	BD, BC, USAR	
Date:	20140929	**Record #:**	*20140929_NFRDSIS_DSR_21*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +4.5 °C (Max = +7.3 °C; Min = +1.7 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	The Engineer performed a site visit to observe the area immediately downhill of the works being performed by the Contractor. No sign of sediment rich water transporting sediment into the pond or erosion of exposed soil was observed. Note that all construction activities were being performed outside the 30 m area of no activity. The silt fence previously installed by the Contractor, showing some installation deficiencies, was removed at the end of the shift once the conditions were evaluated, and Engineer concluded that the fence was not required. Engineer closed Issue ref. 20140925_NFRDSIS_DSR_13_3, and reminded that silt fences shall be installed along the pond shoreline prior to any activity on the 30 m area of exclusion.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	The Contractor prepared a sketch showing the proposed Borrow D configuration. Tees accepted the sketch concept and signed it. The Engineer requested additional dimensions to be included on the sketch. **OPEN. See Communication 1**.	Contractor

20140925_NFRDSIS_DSR_13_3 Proper installation of silt fence	Site conditions were evaluated by the Contractor and Engineer, and the silt fence was removed. See Section 1.2 above. **CLOSED**	N/A

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, USAR, BC
Dean Serelo (Pelly), BD, USAR, BC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR)
Excavator (CAT 365C, yellow, USAR excavation)
Dozer (CAT D6R, #1604, yellow, USAR)
Dozer (CAT D9L, #DZ952, yellow, USAR)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, USAR and Haul Road)
Front Loader (Deere TC54H, yellow, Borrow A)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity). **Photo 5**

4. Summary of activities:

Upstream Access Road (USAR)
The Contractor continued common excavation at the section between Station 0+620 to 0+640 (field estimate) with a CAT365 and two haul trucks. Gravel and sand, underlain by fine silty greyish clay was found during excavation (**Photo 3**). The Contractor stock-piled the excavated gravel and sand material as it could be reused as construction fill material. Note that excavation walls were trimmed to provide 2H:1V cut slopes as per design. The need for a geotextile on the excavation floor before placing road fill is discussed in case of frozen fine grained soils are found.
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	Dean, Joan, John. USAR alignment.	
	Discussion and Recommendations	
	The Engineer and Contractor installed marks showing the center line for the new access road alignment (Option 3). Contractor will continue construction as per the new proposed alignment, as follows: • Turn-around area for haul trucks at Station 0+650. • Curve from Station 0+650 to control point E 585.005 m / N 6.913.142 m (field fit). The curve will be at a higher elevation than initial design so there is no need for a 4 m deep cut at Station 0+640. Specifications for fill placement will be as per notes on Drawing FRNF-XD-02-04-REV-1. Borrow D fill will be used as the curve is outside the exclusion area (30 m from pond), and the suitable common excavated material will be preferably used on fill sections close to the pond. To the extent practical, minimize the disturbance of the moss. • Small amounts of fill/cut will be then required for about 60 m (between control points E 585.005 m / N 6.913.142 and E 584.947 m / N 6.913.162 m). The excavation geometry and specifications will be as per Drawing FRNF-XD-02-04-REV-1. Ditches will be excavated by the Contractor to divert water from fill/cut areas, as required by the Engineer. • Then road will be in fill until road reaches the pond at elevation 1091.5 m (center line defined by control point E 584.913 m / N 6.913.158 m and the end of the road at Station 0+817 shown on Drawing FRNF-XD-02-04-REV-1). As commented above, common excavation material shall be used for this section of the road. Alternative borrow sources can be identified if there is no enough volume of common excavated fill. Specifications for fill placement will be as per notes on Drawing FRNF-XD-02-04-REV-1. The estimated cut and fill volumes for this alignment are 3.300 m^3 and 1.200 m^3 respectively.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan. Borrow D. Refer to Issue 20140924_NFRDSIS_DSR_11_2	
	Discussion and Recommendations	
	The Contractor presented a sketch showing the configuration of Borrow D and proposed upgrades (see attached). The sketch was reviewed and approved by Tees (as per signature at the bottom of the sketch). Tees commented that traffic modifications and other major upgrades shall be performed on a weekend as there is less traffic on the area. The Engineer requested additional dimensions at the lower bench and entrance/exit ramps for the easy of reference. In addition, The Engineer pointed out that there is a section of the safety berm that needs to be repaired (it is too low), and reminded that slopes at 0.5H:1V still need to be trimmed back.	

	Corrective Actions or Improvements	
	Contractor to include additional dimensions on the sketch, to increase the height of the safety berm, and to trim back excavated slopes.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	Joan, John. Piles of organic material.	
	Discussion and Recommendations	
	The Engineer reminded that the piles of organic material from clearing and grubbing activities left behind by the Contractor have to be removed and wasted at the spoil area (**Photo 4**). The Contractor commented that they will complete the removal of piles during the night shift.	
	Corrective Actions or Improvements	
	Contractor to remove piles of organic material.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
4	Joan, John. Capping of excavation floor from Stations 0+550 to 0+540.	
	Discussion and Recommendations	
	The Contractor commented that large areas of soft soil could be found at the bottom of excavation, based on the observations of the test-pits excavation some days before. The Engineer and Contractor commented that a geotextile will be placed at excavation floor if large areas failing proof-roll test are observed, as sub-excavation of the large area will not be practical. A 0.5 m thick layer of Borrow A fill (or Borrow D fill if Borrow A is found to be too fine) will be placed on top and compacted.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330	Excavator was sorting rock protection fill and creating a stock pile. Then, it was mobilized to USAR area.	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+660	N/A	The Engineer visited the USAR area to identify signs of sediment transport/erosion within the working area. No water flowing on the surface or signs of erosion were observed, so the removal of the silt fence was recommended.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

1. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
US	Borrow C	Rock Protection Fill and General Rock Fill	The Engineer tested some of the samples collected at Borrow C with the XRF analyzer.	-

13. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), the Contractor plans to continue construction activities at USAR, including common excavation, sub-excavation (if any), associated back-fill, removal of piles of organic material, capping of ramp constructed from Stations 0+040 to 0+420.

Photos:



Photo 1: 20140929_NFRDSIS_USPD_P111_General overview of USAR and USPD_Looking SE



Photo 2: 20140929_NFRDSIS_USAR_P111_Overview of excavation area from CP-10_Looking NE



Photo 3: 20140929_NFRDSIS_USAR_112_View of right side excavation wall showing gravel and sand underlain by gray silty clay_Looking S



Photo 4: 20140929_NFRDSIS_USAR_P113_Pile of organic material to be removed_Looking E



Photo 5: 20140929_NFRDSIS_Faro Mine_P114_Articulated truck arriving to Faro Mine_Looking N

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30 am
Project #:	0533-010-06	**Weather:**	Cloudy, snow/sleet	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20140929-30	**Record #:**	*20140929-30_NFRDSIS_DSR_22_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: The Contractor installed two light towers, one in the work area and one on the crest of the existing haul road to illuminate the work area (Photo 3)
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140929_NFRDSIS_DSR_21_2 Borrow D configuration	No update. **OPEN**	Contractor
20140929_NFRDSIS_DSR_21_3 Piles of organics at USAR	The Engineer reminded that the piles of organic material had to be removed and wasted at the spoil area. The Contractor removed the organic material. **CLOSED**	N/A

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, no activity)

Excavator (CAT 365C, yellow, USAR excavation, 2 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 9 hours)
Dozer (CAT D9L, #DZ952, yellow, USAR 2 hours)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, 10 hours)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR and Haul Road, 1 hour)
Front Loader (Deere TC54H, yellow, Borrow A, 1 hour)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity, 8 hours)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 10.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR 10.5 hours)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity).

4. Summary of activities:

Upstream Access Road (USAR)
-Removal of organic material from margins of access road to the spoils area (Photo 2). -Covered the completed excavation with geotextile (475 m^2) and 0.3 m of compacted Borrow A sand and gravel (235 m^3). Photos 3 and 4. -Began capping of access ramp with 0.3 m of Borrow A sand and gravel (Stations 0+040 to 0+220, Photo 5).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	Status at the end of the shift (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Sand and Gravel	CAT 988H	Excavating fill material from BA, and filling haul trucks.	-
B1	-	-	-	-
C	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	0+440	CAT 365C and 2 haul trucks	Organic material removed and dumped in spoil area.	2

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Station 0+560 to 0+630	One dozer and two haul trucks	Sand and Gravel	BA	Dozer pushed material dumped by the two haul trucks used for fill over geotextile (237.5 m^3), and access ramp (513 m^3).	4, 5

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+580 to 0+630	CAT 365C and D6 dozer	Excavation covered with geotextile liner (50 m x 9.5 m)	3, 4

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to continue construction activities at USAR, and BA.

Photos:



Photo 1: 20140929-30_NFRDSIS_USAR_P115_Overview of work area at shift start_Looking N



Photo 2: 20140929-30_NFRDSIS_USAR_P116_365C excavator loading haul truck with organic material to be transported to laydown area_Looking N

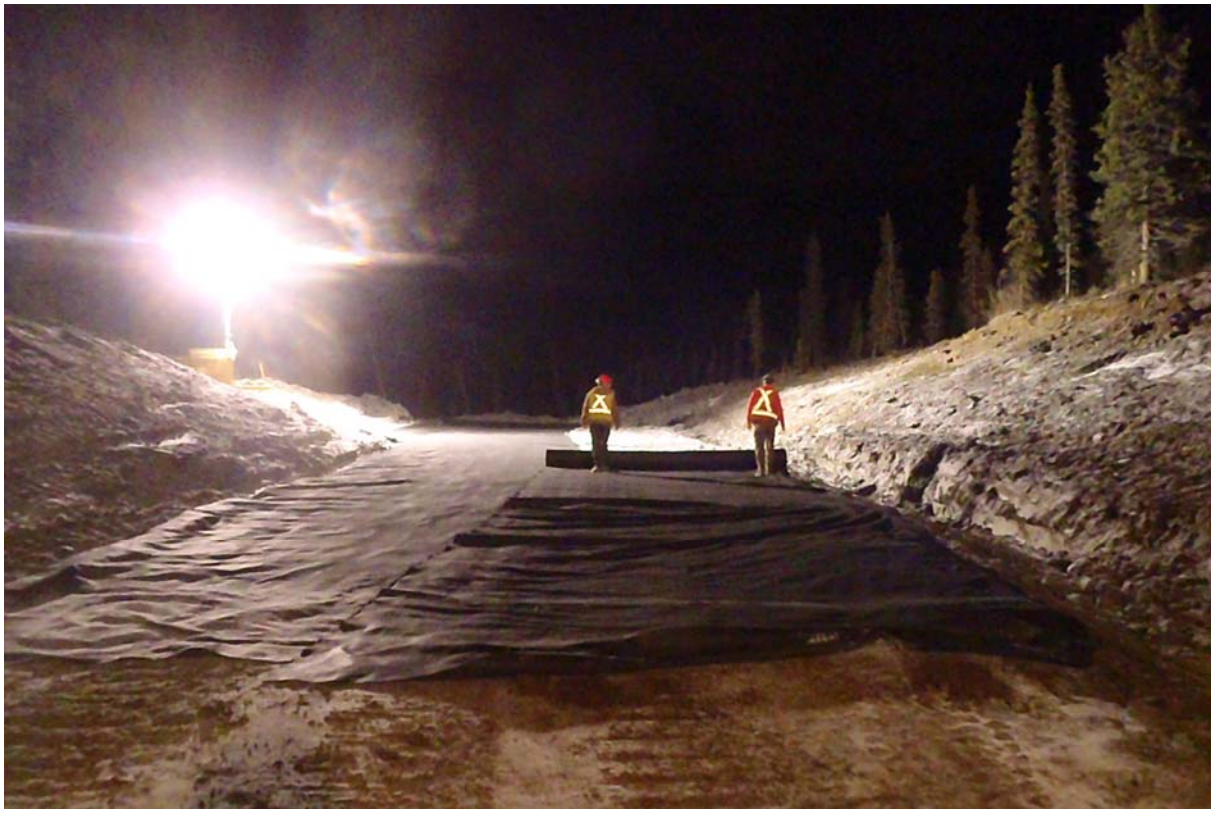


Photo 3: 20140929-30_NFRDSIS_USAR_117_J. Foster and D. Clair rolling out geotextile along excavation_Looking NE



Photo 4: 20140929-30_NFRDSIS_USAR_118_Geotextile covered with 0.5 m thick layer of Borrow A sand and gravel_Looking SW



Photo 5: 20140928-29_NFRDSIS_USAR_P119_ Haul truck dumping Borrow A material on access ramp, D6R dozer preparing to smooth it out_Looking NE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Snowing	
Subject:	Day Shift Report	**Work Areas*:**	BD, BC, USAR	
Date:	20140930	**Record #:**	*20140930_NFRDSIS_DSR_23*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +0.3 °C (Max = +2.0 °C; Min = -1.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Intense snow during the afternoon. The use of extreme caution when driving both inside and outside the Faro Mine site was recommended. Also, the use of appropriate winter clothing.
1.2	Environmental	Contractor installed 58 m of silt fence along the shoreline prior to the placement of fill close to the exclusion limit (30 m from water pond). Note that construction activities were being performed outside the limit but fences were installed to prevent any impact on the pond below. (**Photo 7**)
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140929_NFRDSIS_DSR_21_2 Borrow D configuration	No update. Activities at Borrow D will continue as fill is required for the construction of USAR. **OPEN. See 20140924_NFRDSIS_DSR_11_2**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, USAR, BC
Dean Serelo (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 10 hours)

Excavator (CAT 365C, yellow, USAR construction)
Dozer (CAT D6R, #1604, yellow, USAR construction)
Dozer (CAT D9L, #DZ952, yellow, parked at USAR, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, USAR and Haul Road)
Front Loader (Deere TC54H, yellow, Borrow A)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
The Contractor continued construction towards the NE. Excavation and foundation preparation (to create a flat surface) at the USAR between Stations 0+640 to 0+670 (field estimate) and the turn-around area (further NE) were performed in sections (excavation, foundation preparation, fill placement, and then transition to the next section ahead). The Contractor laid a geotextile on top of soft greyish silty clay that was observed at excavation floor, and placed a lift of 0.5 m of Borrow A material on the first section (about 10 m long), and Borrow D material for the following section (about 19 m long). Areas failing prof-roll were found along and across the road so the sub-excavation of soft soil was not practical. Then, the Contractor continued placing fill from Borrow D on natural ground to complete the turn-around area (progressing towards the NE), and then progressed towards the W to create the curve as per new alignment (refer to *20140930_NFRDSIS_DSR_23* for reference). Curve not completed by the end of the day shift (to be continued during the night shift). Note that Borrow D (run-off-mine) was used as Borrow A was found to be too fine (sand with some gravel).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. USAR alignment.
	Discussion and Recommendations
	The Engineer and Contractor observed the marks placed along the new USAR alignment so as to identify the required thickness of fill to be placed, and the required depth of common excavation to be performed to achieve acceptable road gradients (between 8 and 10 %). Elevation and dimensions of turn around area were marked and construction progressed as

	per new alignment (Option 3) with Borrow D fill, as Borrow A fill was found to be too fine (sands with some gravel). In addition, Engineer reminded the following: • Road width will be 9 m; • Compaction of the fill placed is required as per Specs; • Fill/excavation volumes will be minimized by adjusting alignment (field fit); • The removal of organic soil from the area disturbed by an excavator on Sept 25, 2014 is required; and • Capping, if required, will be a 0.3 m thick lift of Borrow A material.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan. USAR Construction.	
	Discussion and Recommendations	
	The Contractor pointed out that the removal of trees will disturb the moss if it had to be performed with a dozer or excavator. Therefore, recommended the use of a hand saw to clear trees and big bushes. Also, pointed out that it will be faster. Engineer recommended piling the logs outside the road footprint so they could be removed/collected from the road platform, if required, once the road is completed.	
	Corrective Actions or Improvements	
	Contractor to clear trees from road footprint.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED. Trees with a hand saw.**
3	Joan, John. Sub-Excavation at USAR	
	Discussion and Recommendations	
	The Contractor pointed out that greyish silty clay was observed at the excavation floor (approximately Station 0+640 onwards), and recommended that a geotextile should be laid on the floor to cover the area in order to prevent migration of fines into the overlying construction fill. The Engineer observed that some of the areas presenting greyish silty clay were soft. Also, noted that the rest were not soft because the soil was frozen. The Engineer pointed out that the sub-excavation of the area was not practical, so agreed on the need of placing a geotextile, overlaid by Borrow A fill (0.5 m thick). See section below for approximate dimensions. In addition, the Engineer recommended that, if more than one adjacent layers of geotextile had to be placed, the downhill geotextile should be overlapped by the uphill geotextile laid on the floor.	
	Corrective Actions or Improvements	
	The Contractor to place geotextile and to cover it with approved Borrow A fill.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED. Action completed.**

4	Joan, John. Capping of completed ramp from crest of Haul Road. USAR	
	Discussion and Recommendations	
	The Engineer observed excess of Borrow A fill (sand and some gravel) at the ramp from the crest of the Haul Road, to the natural ground, including piles of fill at the turn-around areas (**Photo 1**). This fill was placed during the previous night shift. The Engineer reminded to contractor that the road shall be capped with 0.3 m of material, so the excess of material will not be considered. Finally, recommended that all excess of material should be removed and reused within the construction areas. The Contractor removed excess of gravel and sand from the road platform with a grader (**Photo 6**), but material at turn around areas was not reused.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

1. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Sand and gravel	Front loader	Front loader was excavating material and loading it on haul trucks.	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330	Excavator was sorting rock protection fill and creating a stock pile. Then, it was mobilized to USAR area.	-
D	Run-off-mine	CAT 365	Excavator was excavating material at existing Haul Road and loading it on haul trucks.	-

2. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+680 to 0+740	N/A	Fill was being placed close to the marks showing the limit for area of exclusion (30 m from pond), so the Contractor installed 58 m of silt fence along the shoreline.	7, 9

3. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+680 to 0+740	-	The Contractor cleared trees with hand saw and piled the logs along the road centerline (outside road footprint).	8

4. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	0+640 to 0+650 (field estimate)	Dozer and two haul trucks	Sand and gravel	A	Contractor was delivering, placing, spreading and compacting a 0.5 m think layer of gravel and sand on top of geotextile, for approximately a 10 m long section of road. Compaction performed with haul trucks.	5
USAR	0+650 to 0+670 (field estimate)	Dozer and two haul trucks	Run-off-mine	D	Contractor continued the road by placing fill towards the NW (between 0.5 and 1.5 m thick layer). The turn-around was completed, and then fill placement progressed towards the SE to create the new curve. Activity not completed by the end of the shift.	-

5. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
USAR	0+660 (approx. at turn around)	CAT330	Two soft areas at the end of the excavation/turn around (12 m x 4 m and 12 m x 8 m). Average 0.5 m deep.	-

6. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
USAR	0+640 to 0+670	Hand tools	Contractor placed 3 rolls of geotextile (overlapped) on the excavation floor for 12 m, and then 2 rolls (overlapped) for 17 m. Estimate 386 m^2 (not considering overlaps).	3, 4, 5

7. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

9. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), Contractor plans to continue construction activities at USAR, including the placement of Borrow D fill towards the SE, and clearing.

Photos:



Photo 1: 20140930_NFRDSIS_USAR_P120_Excess of gravel and sand on turn around area_Looking NE



Photo 2: 20140930_NFRDSIS_USAR_P121_Ditch at uphill side collecting water from excavation wall



Photo 3: 20140930_NFRDSIS_USAR_122_View of section completed with Borrow A fill and excavator mobilizing to the next section ahead_Looking SW



Photo 4: 20140930_NFRDSIS_USAR_P123_Excavator creating a flat surface prior to the placement of fill_Looking SW



Photo 5: 20140930_NFRDSIS_USAR_P124_Geotextile being covered with BA fill_Looking SE



Photo 6: 20140930_NFRDSIS_USAR_P125_Grader removing excess of BA fill from ramp_Looking S



Photo 7: 20140930_NFRDSIS_USAR_P126_Silt fence installed at shoreline_Looking W



Photo 8: 20140930_NFRDSIS_USAR_P127_Contractor clearing trees from road footprint_Looking SE



Photo 9: 20140930_NFRDSIS_USAR_P128_Contractor digging shallow trench during silt fence installation_Looking W



Photo 10: 20140930_NFRDSIS_USAR_P129_Overview of USAR and USPD areas_Looking E

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	12:30 am
Project #:	0533-010-06	**Weather:**	Cloudy, small flurries	
Subject:	Night Shift Report	**Work Areas*:**	BD, USAR	
Date:	20141001-1002	**Record #:**	*20141001-1002_NFRDSIS_DSR_26_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: Contractor installed one light tower, one in the work area to illuminate the work area.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140929_NFRDSIS_DSR_21_2	Activities at Borrow D will not continue as fill cannot be placed inside the exclusion area. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, no activity)
Excavator (CAT 365C, yellow, USAR excavation, 4 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 4 hours)
Dozer (CAT D9L, #DZ952, yellow, USAR 1 hours)

Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, 5 hours)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity, 5 hours)
Grader (CAT 14H, #1407, yellow, USAR and Haul Road, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 4 hours)
Haul Truck (CAT 773B, #319, yellow, USAR 4 hours)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity).

4. Summary of activities:

Upstream Access Road (USAR)

- Continued construction of access road. Widening turn-around to design width of 9 m (Photo 1).
- Following the addition of approximately 250 m^3 of sand and gravel from local borrow (located on the southern margin of the laydown area) a slump occurred on the downslope side of the turn-around point (Station 0+660) (See Sketch).
  - **Slump size and composition:** (See sketch for details)
    - The slump was approximately 175 m^3 in volume.
    - Consisted of gravel and sand from local borrow and some Borrow A.
    - Formed a scarp 12 m across the margin of the turn-around point (Station 0+660).
    - Came to a stop approximately 10 m downslope from the toe of the fill.
    - A bunched-up carpet of organic material surrounded the toe including moss, brush and trees that were sheared off the permafrost during movement.
    - No groundwater seepage was observed in the exposed scarp or from the base of the toe.
  - **Slump occurrence** (C. Pederson was offsite, accounts taken from Pelly personnel that observed):
    - The failure occurred at 11:15 pm in one smooth movement, coming to rest 10 m downslope from the base of the fill in a matter of seconds.
    - No accounts of developing and/or widening tension cracks were given, slump likely developed on the downslope side of safety berm as the road was being widened to design width (9 m) and progressed through the berm at which point it was noticed by construction crew.
    - Equipment in the immediate area included D6R dozer (L. Buyck, operator) and one haul truck (uncertain operator), neither of which were impacted by failure.
    - All personnel and equipment in the immediate area were successfully evacuated.
  - **Slump Response:**
    - Immediately following the slump failure, material was excavated from the head of the slump to reduce the driving force of the failure using 365C Excavator (D. Clair, operator) (approximately 10 m^3).

- Construction was then suspended following discussion with Pelly until site visit could be conducted at the start of day shift (Photos 3, 4, 5).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	11:30 pm, C. Pederson, J. Foster, USAR, Response to slope failure	
	Discussion and Recommendations	
	-Following failure C. Pederson and J. Foster agreed to carefully remove material from the head of the slide to enhance stability and then halt construction activity until a site visit could be conducted by senior Pelly staff in the morning to decide how to proceed (Photo 4).	
	Corrective Actions or Improvements	
	-Shut down site, return at 5 am for site visit.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
Local Borrow (CP-5, USAR)	Sand and Gravel	CAT 365C	Excavating sand and gravel material from local borrow, a natural deposit adjacent to laydown area, and filling haul trucks.	2
B1	-	-	-	-
C	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Station 0+660	One dozer and two haul trucks	Sand and Gravel	Local Borrow (CP-5, USAR)	Dozer pushed material dumped by the two haul trucks to construct access road (approximately 250 m^3)	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Slump failure halted progress at approximately 11:30 pm, site visit planned for start of day shift to determine future action.
- All personnel left site at 12:30 am following equipment shut down.
- During the following shift (day shift), the Contractor plans to make a decision regarding the slump failure and its impact on the design. Then, continue construction activities at USAR, and BA.

Photos:



Photo 1: 20140930-01_NFRDSIS_USAR_P131_Turn-around point at shift start_Looking N



Photo 2: 20140930-01_NFRDSIS_USAR_P132_365C excavator loading haul truck with sand and gravel material from pile along laydown area margin for use in road construction_Looking N



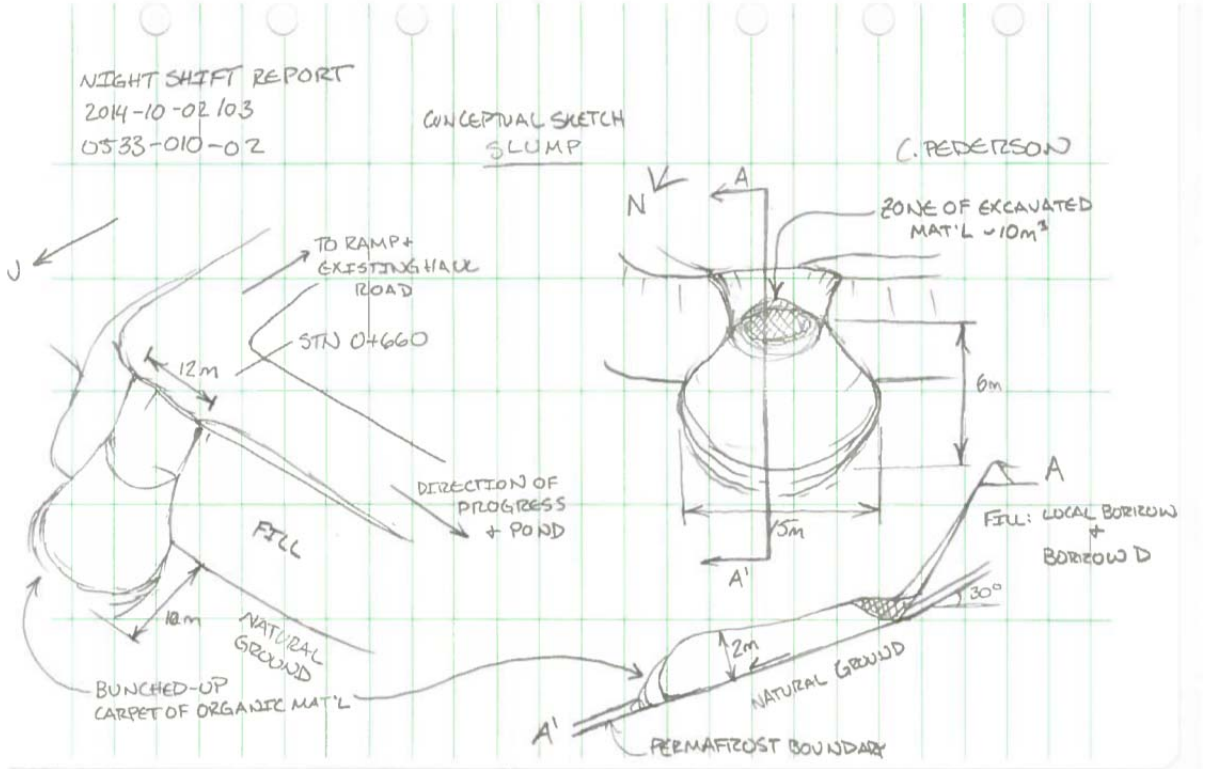
Photo 3: 20140930-01_NFRDSIS_USAR_133_Toe of the slump including crumpled layer of organic material scraped off the permafrost_Looking SE



Photo 4: 20140930-01_NFRDSIS_USAR_134_Head of the slump following excavation of topmost material to enhance stability (CAT 365C)_Looking NW



Photo 5: 20140930-01_NFRDSIS_USAR_P135_Extent of the slump with silt fence and pond in background_Looking NW



Sketch 1: 20140930-01_NFRDSIS_USAR_Sketch1_Conceptual sketch of the slump with dimensions, orientation and contacts with the natural ground and fill

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	BD, BC, USAR	
Date:	20141001	**Record #:**	*20141001_NFRDSIS_DSR_25*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -1.6 °C (Max = +1.5 °C; Min = -4.6 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	• The Contractor installed 50 m of silt fence along the shoreline prior to the placement of fill or excavation activities inside the area of exclusion (30 m from water pond). • ELR performed a site visit to define activities at USPD.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140929_NFRDSIS_DSR_21_2 Borrow D configuration	No update. **OPEN.**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, BC, USAR
Shipeng Zheng (Pelly), BD, USAR
Chris Jastrebski (ELR), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 8 hours)
Excavator (CAT 365C, yellow, USAR construction)
Dozer (CAT D6R, #1604, yellow, USAR construction)
Dozer (CAT D9L, #DZ952, yellow, parked at USAR, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)

Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, USAR)
Front Loader (Deere TC54H, yellow, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
The Engineer and Contractor inspected the road fill area affected by a slump during the previous night shift (approximate Station 0+650), and evaluated the stability conditions of the road fill placed. Once the possible options were discussed (refer to Communication 1 below), the road construction continued by shifting the alignment 3-4 m uphill, and then progressing towards the W with Borrow D material (run-off-mine), delivered by two haul trucks and pushed with a dozer. Road fill progressed until the Contractor reached the natural ground (transition into excavation). The Contractor started excavation with CAT365 (activity not completed before the end of the shift).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. Slump affecting road fill at approximate STN 0+650. Photos 1, 2, 3 & 4
	Discussion and Recommendations
	The Engineer and Contractor visited the area affected by a slump during the previous night shift to assess the stability conditions of the road fill not affected by the slump, and to define the actions to be implemented in order to continue with the road construction. As reported on the night shift report (refer to night shift report for dimensions of slump), a slump affecting a section with gravel and sand at the NE corner of the road was observed (downhill side of the road). The Engineer noted that no tension cracks were observed at the top of the road fill close to the scar, and that no movement was recorded since 11:30 pm (previous shift). The Engineer observed a 0.4-0.5 m thick layer of moss completely rolled and folded immediately in front of the slump toe. Also, noted that no seeps or water flowing close to the affected area were observed, and that the surface of the affected fill was frozen. The Engineer commented that the movement was probably caused by the peat ripping under the fill, possibly following initial sliding movement of the fill on top of a frozen layer (ice and frozen layers of ground were observed close to the toe at 0.5 m deep). The Contractor commented that a local source of gravel and sand (and not Borrow D run-off-mine) was being used to fill the area, as filling

	activities were very close to the exclusion limit. Based on the observations, the Engineer commented that the movement could not be related to the type of fill. The Engineer and Contractor commented possible actions to be implemented, such as: a. Buttress of the toe with rock boulders placed from the top of the road with an excavator to improve stability of the area, and continue construction. b. Controlled removal of some material from the toe with an excavator to expose the foundation, and to place coarser material and rebuild the affected area by progressing upwards. c. Shifting the alignment so as to prevent disturbance of the affected area. The Engineer recommended the shifting of the road as the other options were time consuming and there was sufficient room to create the curve some meters uphill. The Contractor installed a safety berm close to the affected area, and continued fill placement as with Borrow D material (fill placement was still outside the exclusion area) per Engineer's recommendation. Engineer also reminded that some work willwork will be required at a later stage to prevent water from ponding on the failed fill (**Photo 8**).	
	Corrective Actions or Improvements	
	Engineer to monitor affected area for 12-24 hours.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN. No movement was observed**
2	John, Joan, Chris. USPD fish net and turbidity curtain installation.	
	Discussion and Recommendations	
	A meeting was organized at the US area to comment on the activities to be performed by ELR and possible interferences with Pelly. It was agreed that the fish fence will be placed 20 m upstream to the center line for the plug dike (as indicated by marks installed by Underhill). Also, that the turbidity curtain will be installed downstream to the fish fence.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	Joan, John. Borrow C, sorting of Rock Protection Fill.	
	Discussion and Recommendations	
	CAT 330 operator informed that fine material was being encountered at the upper bench so the mobilization of the excavator to a new point was recommended. The Contractor and Engineer visited the lower bench at the Borrow C area to identify an area with coarse rocks (200-400 mm). The Contractor mobilized CAT330 to the lower bench to obtain a higher productivity. The use of rock hammer was commented by the Contractor, as piles with rock boulders were observed (Photo 7). The Engineer showed to Contractor and excavator operator the area of the lower bench that was covered by the baseline survey, as well as the piles that were not accepted as construction fill as they were probably contaminated (high Zn	

	content).	
	Corrective Actions or Improvements	
	Contractor mobilized CAT330 to the lower bench and continued sorting Rock Protection Fill	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330	Excavator was sorting rock protection fill and creating a stock pile.	-
-	Run-off-mine	CAT 365	Excavator was excavating material at existing Haul Road and loading it on haul trucks, until Contractor started common excavation at the USAR, and no more fill was required.	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+740 to 0+790	N/A	The Contractor continued installation of silt fences along the shoreline (50 m). Note that fill placement activities were outside the area of exclusion (30 m from water pond). Fence was installed to prevent disturbance of the pond.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	STN 0+740 to 0+760	CAT365	The Contractor started clearing and grubbing once the road transitioned from fill section to common excavation area. Not completed at the end of the shift.	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	Station 0+650 to 0+740 (field estimate)	-	-	-	The Contractor was delivering, placing, spreading and compacting run-off-mine from Borrow D, on top of the moss (moss not removed to prevent disturbance of the underlying frozen ground). Approximately 900 m3 of fill was placed. Note that thickness was variable to accommodate irregularities of existing natural ground. Compaction performed with haul trucks.	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), Contractor plans to continue construction activities at USAR, including clearing and grubbing, and common excavation towards the SE.

Photos:



Photo 1: 20141001_NFRDSIS_USAR_P136_Location of slump occurred at night_Looking SE



Photo 2: 20141001_NFRDSIS_USAR_P137_Overview of slump affecting gravel and sand_Looking W

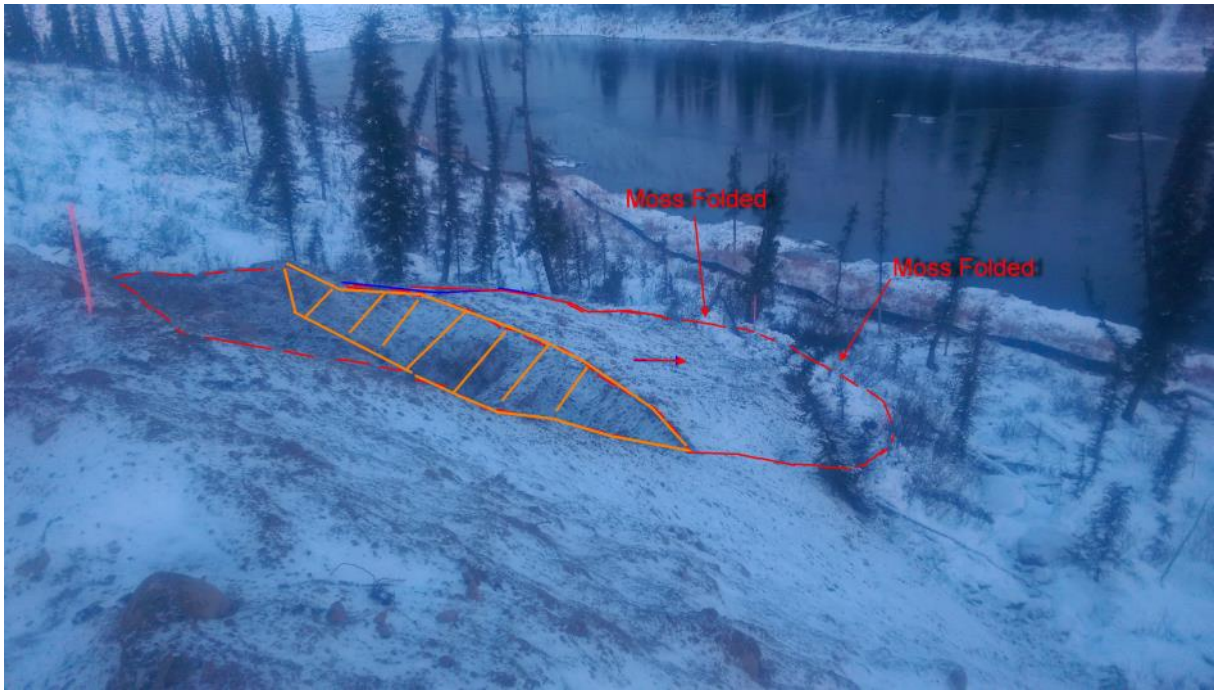


Photo 3: 20141001_NFRDSIS_USAR_138_View of slump from the top of road fill_Looking NW

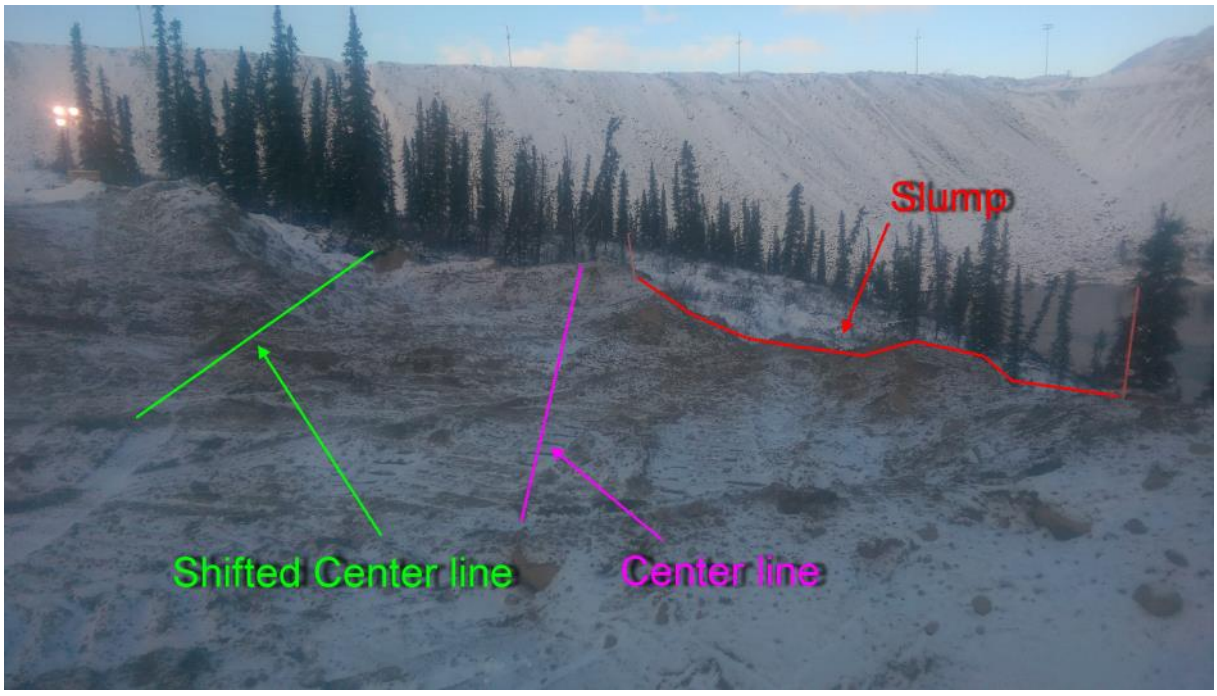


Photo 4: 20141001_NFRDSIS_USAR_P139_Location for recommended alignment_Looking SW



Photo 5: 20141001_NFRDSIS_USAR_P140_Detail of moss layer rolled at slump toe



Photo 6: 20141001_NFRDSIS_USAR_P141_Control points to monitor slump movement_Looking W



Photo 7: 20141001_NFRDSIS_BC_P142_Piles of rocks at the lower bench that could be broken with rock hammer_Looking S



Photo 8: 20141001_NFRDSIS_USAR_P143_View of test-pit at slump face to be shaped



Photo 9: 20141001_NFRDSIS_USPD_P144_Overview of USPD area_Looking SE

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	6:30am
Project #:	0533-010-06	**Weather:**	Cloudy, small flurries	
Subject:	Night Shift Report	**Work Areas*:**	BC, BA, USAR	
Date:	20141001-02	**Record #:**	*20141001-02_NFRDSIS_DSR_26_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: The Contractor installed one light tower in the work area to illuminate the work area.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20140929_NFRDSIS_DSR_21_2 Borrow D Configuration	No update. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR
Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 1.5 hrs)
Excavator (CAT 365C, yellow, USAR excavation, 9 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 5 hours)
Dozer (CAT D9L, #DZ952, yellow, USAR 1 hours)
Light Tower/Generator (Ingersoll Rand, light brown, USAR, no activity)

Light Tower/Generator (Allmand ML8, yellow, USAR, 10 hours)
Grader (CAT 14H, #1407, yellow, USAR and Haul Road, 1 hour)
Front Loader (Deere TC54H, yellow, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 8 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 8 hours)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity).

4. Summary of activities:

Upstream Access Road (USAR)
- Survey of slump: No movement observed. - Clearing and grubbing of loose surficial material was planned to provide a temporary path for equipment (D9L Dozer and 365C Excavator) so as to begin excavation at the end of the access road (approximately Station 0+817), working back towards the transition from fill to excavation (approximately Station 0+710). - Began removal of organic material piled at the end of the road by day shift. Material returned to separate pile in spoil area. - 9:30 pm: Within the first 3 m of clearing, excavator sank up to underbelly in soft, saturated material. Managed to safely back out onto stable ground. - Sub-excavation of soft ground was carried out, saturated material continued to flow into the excavation pit from the upslope bank. Approximately 80 m^3 was removed before stability of the excavation was achieved. Then, sub-excavation continued to ensure all saturated and soft material was removed. - A groundwater seep was observed in the upslope wall of the excavation approximately 1 m below surface. Flow rate estimated 0.5 L per minute. The sound of water trickling into the excavation could be heard over the noise of the excavator motor which sat idling at the excavation margin (Photo 1). - 11:30 pm: All personnel left site to return to Faro to consult with Pelly about design of drain system. Backfill of coarse Borrow C material to promote drainage, covered by geotextile, covered by Borrow A material was agreed upon and carried out upon return to site. - 4:30 am: Construction of the drain was completed and clearing/grubbing of piled organic material continued (approximately 150 m^3 organics). - Once the organic piles were cleared, shallow excavation of loose, surficial material began to create temporary access road as described above (approximately 180 m^3 waste).
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	12:00 am, C. Pederson, J. Foster, J. Garvice, Faro, Drain Construction	
	Discussion and Recommendations	
	-Following excavation of soft ground and exposure of active groundwater seep, C. Pederson and J. Foster agreed the use of coarse and clean material would be necessary for backfilling of excavation to promote drainage. - J. Garvice agreed and recommended usage of Borrow C material (2 truck loads) to fill the floor of the excavation, followed by a layer of geotextile, and Borrow A material to backfill the remainder. The geotextile would prevent finer Borrow A material from infiltrating and clogging the coarse Borrow C material. The use of Borrow D material in place of Borrow A for the remainder of the backfill was prohibited due to the proximity of the excavation to the pond.	
	Corrective Actions or Improvements	
	-Drain was constructed as described, and work continued.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Sand and Gravel	CAT 988H	50 m^3 of sand and gravel used to backfill excavation following placement of Borrow C material and geotextile.	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330C	40 m^3 of cobbles and boulders removed from lower bench of Borrow C for use in drain construction at USAR.	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Stations 0+720 to 0+760	Excavator 365C Two Haul Trucks	Removal of loose organic material from ground surface in preparation of temporary access to the end of the access road approximately Station 0+817.	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Station 0+730	Excavator 365C and two haul trucks	Sand and Gravel	Borrow A	50 m^3 sand and gravel used to backfill sub-excavation once drain was constructed.	4
USAR	Station 0+730	Excavator 365C and two haul trucks	Rock Protection Fill	Borrow C	40 m^3 cobbles and boulders placed in floor of sub-excavation to promote drainage of groundwater seep.	2

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+730	Excavator 365C 2 Haul trucks	Following identification of soft ground, excavation of soft material was carried out. Due to introduction of water by groundwater seep, saturated fine material continued to flow into excavation once the design depth of 0.5 m for typical sub-excavation was reached. C. Pederson and contractors agreed to continue excavation to ensure all unstable saturated material was removed, resulting in an excavation approximately 12 m across x 4 m wide x 2 m deep, oriented slope-parallel cutting across the road.	1

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+730	-	55 m^2 of geotextile was installed over the boulders and cobbles of Borrow C in the sub-excavation to prevent finer material from Borrow A from infiltrating and inhibiting drainage.	3

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
USAR	Station 0+680	Borrow D	The Engineer collected three samples from access road berm to perform tests with the XRF Analyzer (S100 to S102).	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- 9:30 pm: Groundwater seep encountered. Sub-excavation and installation of drain prevented progress of road construction until 4:30 am.
- During the following shift (day shift), the Contractor plans to continue construction activities at USAR, and BA.

Photos:



Photo 1: 20141001-02_NFRDSIS_USAR_145_Pond of seepage that accumulated during 2 hour trip to Faro and back in sub-excavation, approximately 15 cm deep at max_Looking SW



Photo 2: 20141001-02_NFRDSIS_USAR_146_Borrow C RPF installed on the floor of subexcavation_Looking E



Photo 3: 20141001-02_NFRDSIS_USAR_P147_Geotextile installed over the top of Borrow C boulders and cobbles in subexcavation_Looking NE



Photo 4: 20141001-02_NFRDSIS_USAR_P148_Backfilling remainder of sub-excavation with Borrow A material_Looking SW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	BD, BC, USAR	
Date:	20141002	**Record #:**	*20141002_NFRDSIS_DSR_27*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -1.5 °C (Max = +1.2 °C; Min = -4.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	• The Contractor completed the installation of silt fence up to the end of the road (Station 0+817 approximately). • ELR installed a fish net across the USPD and started salvaging fish (**Photo 5**).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	FM1, summarizing the activities performed by Underhill as part of the baseline survey, was submitted to the Contractor on October 1, 2014. Document also included copies of stamped Issue For Construction Drawings, photos showing the pre-construction conditions at the different work areas, and PDF copies of the documents produced by Underhill after the baseline survey.
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20140929_NFRDSIS_DSR_21_2 Borrow D configuration	The Engineer and Contractor visited the area to identify work that will be required to open the lower bench to traffic. There was no activity at Borrow D during the shift. **OPEN.**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, BA, BC, USAR

Shipeng Zheng (Pelly), BA, BD, USAR
Chris Jastrebski (ELR), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 3 hours)
Excavator (CAT 365C, yellow, USAR construction)
Dozer (CAT D6R, #1604, yellow, USAR construction)
Dozer (CAT D9L, #DZ952, yellow, parked at USAR, USAR construction)
Light Tower/Generator (Ingersoll Rand, light brown, parked on top of Haul Road, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked on top of Haul Road, no activity)
Grader (CAT 14H, #1407, yellow, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, no activity)
Articulated truck (Deere 400D, #7402, yellow, USAR)

4. Summary of activities:

Upstream Access Road (USAR)
The Contractor continued common excavation at USAR up to the end of the road (Station 0+817, field estimate). Excavation floor was irregular due to the presence of hard frozen ground (**Photos 8 and 11**). Areas with sand and gravel were observed in some areas (**Photos 9 and 10**). Saturated silty clay was observed on other areas (soft areas). Once excavation was completed, the road invert slopes were measured, and depth of cut to achieve the desired road grading (10%) was marked. Then, the Contractor continued excavation from the end of the road with a Dozer D9 and excavator CAT 365, progressing backwards (towards the E). At the same time, excavator was trimming back the excavated cut wall as it was too steep (design required cut slope at 2H:1V). Some small seeps were observed on the uphill cut wall.
Upstream Plug Dike (USPD)
ELR installed fish fence across the US pond, and started the salvaging of fish. A thin layer of ice was present on the pond, so it had to be locally broken so as to install the fence and salvage fish.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. USAR construction
	Discussion and Recommendations
	Based on the observations performed during the common excavation, and the presence of frozen ground, the Contractor recommended the installation of a geotextile along and across the whole length of the remaining of the road floor (after common excavation), overlapped by

	a 1 m thick layer of Borrow C material. The Engineer commented that there was no need for a 1 m thickness and geotextile as this road will not be used by heavy equipment on the long term. The Engineer recommended to continue as per design, and, in case that the material observed after the common excavation will be too soft, commented that a 0.7 m thick layer of Borrow A (0.5 m equivalent to the sub-excavation + 0.3 m equivalent to the capping layer) could be placed once the problematic areas will be covered with a geotextile. The Contractor commented that maintenance will probably be required during the next summer if construction progresses as per Engineer's recommendations, so commented that a 1 m thick layer underlain by a geotextile is required if the road will become an access for the long term. The Contractor and Engineer agreed to continue with the common excavation, and to confirm with YG their views on the future use of the road.	
	Corrective Actions or Improvements	
	Engineer to confirm with YG the future needs for the access road.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**OPEN**
2	John, Joan. Safety berm on the access to Borrow A.	
	Discussion and Recommendations	
	The Engineer observed a safety berm constructed at both sides of the access ramp to Borrow A. Coarse gravel and sand from Borrow A was used to build the road. The Engineer commented to Contractor that the Engineer shall be informed of the use of fill from Borrow areas. Also, that safety berms shall be built with fill that it is not suitable for construction. Note that coarse gravel and sand was used for the safety berm. The Engineer informed that the volume of fill used to create the berms will be measured and deducted from the total Borrow A material used for construction.	
	Corrective Actions or Improvements	
	N/A	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**
3	Joan, John. Slump occurred during the night shift of September 30 to October 1, 2014.	
	Discussion and Recommendations	
	The Engineer commented that the area affected by the slump was monitored during 24 hours and that no movement was observed. In addition, reminded that some activities will be required to ensure that no water is ponding at the crest of the slump, and that the ditch immediately uphill will be extended to divert water away from the slump area.	
	Corrective Actions or Improvements	
	Contractor and Engineer to define remedial measures to be implemented at slump area.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**Open**
4	John, Joan. USAR. Water ponded on downhill side of the road.	
	Discussion and Recommendations	
	The Engineer observed water ponded at the downhill side of the road (**Photo 2**), and	

	recommended that a ditch or opening should be excavated to facilitate the drainage of water. Also, reminded that the ditch created before the curve (Station 0+650, field estimate) had to be extended to ensure that water was not eroding the toe of the road fill placed.	
	Corrective Actions or Improvements	
	Contractor provided drainage for the ponded water, but did not extend the ditch.	
	Status at the end of the shift (Open, Closed or N/A)	**Open**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	N/A	N/A	The Contractor and Engineer visited the borrow area so as to identify an area with coarse gravel and sand to be used as approved backfill at sub-excavations. The Engineer observed the presence of a gravel and sand layer, underlain by layers of fine to medium sands. An area with coarse material was observed at the southern corner. The local source of gravel and sand located at the SW limit of the laydown/spoil area was also observed. Suitable sand and gravel was identified (**Photo 4**).	3
B1	-	-	-	-
C	Rock Protection Fill	CAT 330	Excavator was sorting rock protection fill and creating a stock pile (started at 3:30 pm).	-
D	-	-	The Engineer and Contractor visited the area so as to see the current state of the borrow area. No continuous road for traffic was observed at the lower bench as excavation was not completed (borrow D activity was interrupted as road was entering the area of exclusion).	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+790 to 0+817	N/A	The Contractor completed installation of silt fences along the shoreline up to the end of the road. Note that common excavation was being performed inside	-

			the area of exclusion (30 m from water pond). Fence was installed to prevent disturbance of the pond.	

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Stations 0+740 to 0+760	CAT365	The Contractor continued clearing and grubbing. Clearing and grubbing being performed in stages by excavator (clearing and grubbing, common excavation, mobilization to the next section). Organic material removed was being segregated in USAR spoil area being cleared.	7

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (night shift), the Contractor plans to complete common excavation at USAR, and complete the installation of signs on work areas and access roads as per Pelly's Traffic Management Plan.
- The Engineer visited the area affected by a slump on the night shift from September 30 to October 1, and did not observe any movement.

Photos:



Photo 1: 20141002_NFRDSIS_USAR_P148_Excavator performing common excavation_Looking W



Photo 2: 20141002_NFRDSIS_USAR_P149_Water ponded at the downhill side of road_Looking NW

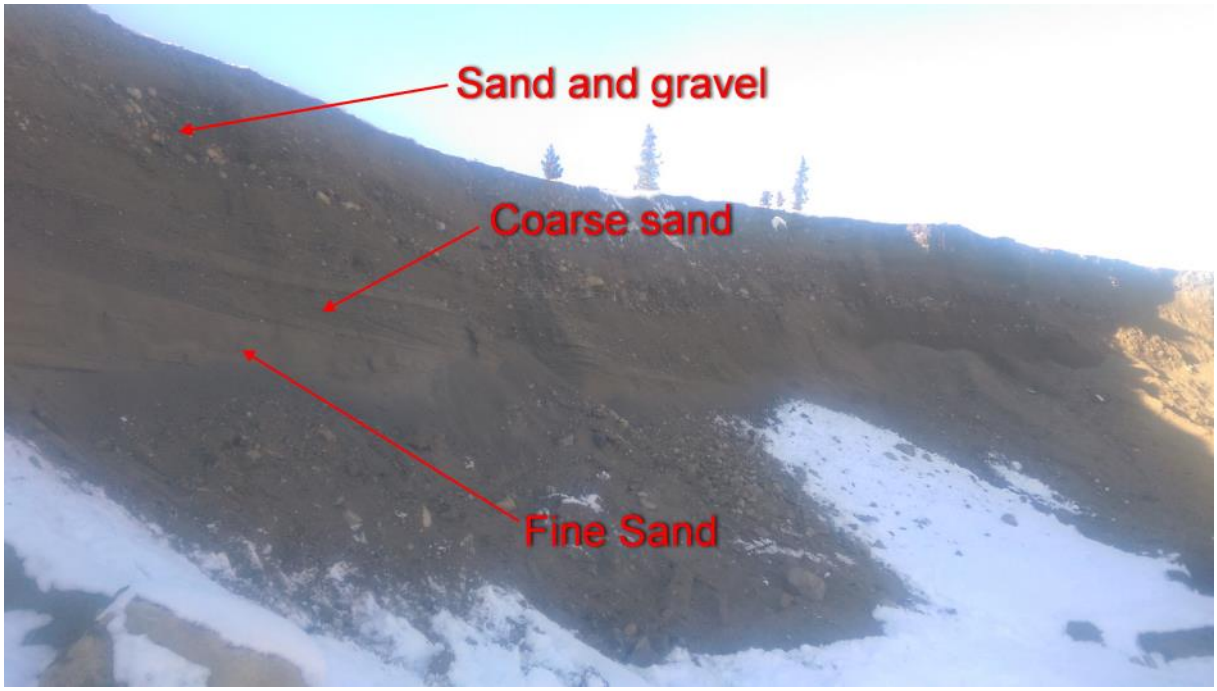


Photo 3: 20141002_NFRDSIS_BA_150_View of borrow area being mined by Contractor_Looking SW



Photo 4: 20141002_NFRDSIS_USAR_P151_Local borrow source for gravel and sand_Looking NE



Photo 5: 20141002_NFRDSIS_USPD_P152_ELR salvaging fish from the pond_Looking NW



Photo 6: 20141002_NFRDSIS_USAR_P153_Excavator loading haul truck with common excavated material_Looking NW



Photo 7: 20141002_NFRDSIS_USAR_P154_Excavator clearing and grubbing area to be excavated_Looking E



Photo 8: 20141002_NFRDSIS_USAR_P155_Detail of frozen excavated material (gravel and sand)



Photo 9: 20141002_NFRDSIS_USAR_P156_Sand and gravel excavated at approximately Station 0+750



Photo 10: 20141001_NFRDSIS_USPD_P157_Detail of fine to medium sand found during common excavation (at approximately Station 0+750)



Photo 11: 20141002_NFRDSIS_USAR_P158_Dozer ripping hard frozen ground during common excavation_Looking NE

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Night Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:00 pm	11:00 pm
Project #:	0533-010-06	**Weather:**	Cloudy, breezy	
Subject:	Night Shift Report	**Work Areas*:**	BC, BA, USAR	
Date:	20141002-03	**Record #:**	*20141002-03_NFRDSIS_DSR_28_NS*	
Prepared By:	C. Pederson			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca, C. Pederson

Mean daily temperature at the Faro Airport: Refer to day shift report for mean daily temperature.

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Night conditions: The Contractor installed one light tower in the work area to illuminate the work area.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140919_NFRDSIS_DSR_21_2 Configuration of Borrow D	No update. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_1 USAR fill thickness – New Option	Engineer to comment the option proposed by the Contractor based on the future needs of the road. **OPEN**	Engineer
20141002_NFRDSIS_DSR_27_3 Slump	Engineer and Contractor to comment on additional measures to be implemented. **OPEN**	Contractor and Engineer
20141002_NFRDSIS_DSR_27_4 Water ponded at road surfacing	Contractor to extend the drainage ditch so water is drained away fromplaced construction fill. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Jeff Foster (Pelly), BD, USAR
Larry Buyck (Pelly), BD, USAR

Fred Maxfield (Pelly), BD, USAR
Darcy Clair (Pelly), BD, USAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, no activity)
Excavator (CAT 365C, yellow, USAR excavation, 4 hours)
Dozer (CAT D6R, #1604, yellow, USAR, 2 hours)
Dozer (CAT D9L, #DZ952, yellow, USAR 3 hours)
Light Tower/Generator (Ingersoll Rand, light brown, USAR, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, 5 hours)
Grader (CAT 14H, #1407, yellow, USAR and Haul Road, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR, 3.5 hours)
Haul Truck (CAT 773B, #319, yellow, USAR, 3.5 hours)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity).

4. Summary of activities:

Upstream Access Road (USAR)
- Survey of slump: No movement observed. - Continued excavation of access road from (approximately Station 0+800) to the transition from excavation to fill (approximately Station 0+710). Grade of approximately 10% maintained (Photos 1, 2, 3, 4) - Night shift was terminated following completion of excavation at 11:00 pm, in accordance with Pelly construction plan. Fill placement to be completed during day shift following decision regarding fill material/thickness by Pelly and YG.
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
Local Borrow (CP-5, USAR)	Sand and Gravel	CAT 365C Excavator	20 m^3 of sand and gravel from local borrow loaded into haul truck by excavator	4
B1	-	-	-	-
C	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Station 0+715	D6R Dozer and one Haul Truck	Sand and Gravel	Local Borrow (CP-5, USAR)	20 m^3 sand and gravel used to cover small soft spot encountered right at transition of excavation and fill (Station 0+710) and to build temporary ramp from fill grade to excavation grade for transport during following day shift.	4

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Last night shift. Pelly night crew demobilized at the end of the shift. C. Pederson to overlap partial day shift with J. Roca Friday October 3, 2014 before demobilizing.
- During the following shift (day shift), the Contractor plans to continue construction activities at USAR.

Photos:



Photo 1: 20141002-03_NFRDSIS_USAR_159_Excavation progress, 365C excavator removing material and loading into haul trucks, D9L dozer smoothing road to grade behind_Looking N



Photo 2: 20141002-03_NFRDSIS_USAR_160_365C Excavator loading haul truck with excavated material_Looking N



Photo 3: 20141002-03_NFRDSIS_USAR_P161_D6R Dozer maintaining pile of waste material in spoil area_Looking N



Photo 4: 20141002-03_NFRDSIS_USAR_P162_D6R Dozer smoothing temporary ramp from excavation grade to fill grade at transition point (Station 0+710)_Looking N

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:35 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	BD, BC, USAR	
Date:	20141003	**Record #:**	*20141003_NFRDSIS_DSR_29*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: C. Pederson, J. Roca

Mean daily temperature at the Faro Airport: +2.0 °C (Max = +5.0 °C; Min = -1.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The presence of ice on the road from Faro town to the mine was reported. Extreme caution while driving and walking is recommended, as surfaces could be slippery.
1.2	Environmental	• Contractor corrected some deficiencies observed on the silt fence sections recently installed, as per Engineer's recommendations. Some gaps were observed between sections and under fence fabric at two locations. • ELR continued salvaging fish from USPD area.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. Borrow C material was being used (USAR) as Borrow D could not be placed on exclusion area. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_1	YG approved the placement of USAR capping as per Contractor's proposal (see Communication 1 below). **CLOSED**	Engineer
20141002_NFRDSIS_DSR_27_3	Contractor and Engineer to define remedial measures to be implemented at slump area. **OPEN**	Contractor Engineer
20141002_NFRDSIS_DSR_27_4	Contractor extended the ditch so as to divert water away from USAR fill toe. **CLOSED (Photo 7)**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, BA, BC, USAR
Shipeng Zheng (Pelly), BA, BD, USAR
Chris Jastrebski (ELR), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 10 hours)
Excavator (CAT 365C, yellow, USAR construction)
Dozer (CAT D6R, #1604, yellow, USAR spoil area)
Dozer (CAT D9L, #DZ952, yellow, USAR construction)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, no activity)
Grader (CAT 14H, #1407, yellow, USAR, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow C, USAR construction)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)
Articulated truck (Deere 400D, #7402, yellow, USAR)

4. Summary of activities:

Upstream Access Road (USAR)
The Contractor continued USAR construction by placing geotextile on the excavation floor (2 overlapped sheets), overlain by a 1 m thick layer of General Rock Fill, as per Contractor's proposal (see Communication 1). Fill was being loaded by a front loader at Borrow C, hauled by three trucks to the USAR area, and spread/compacted by dozer CAT D9. No Borrow D material was used as fill was being performed inside the exclusion area (30 m from pond). Contractor removed a small slump observed at excavated cut wall (approximately Station 0+740), and placed 42 m^3 of fill to cover the area. In addition, seepage and water ponded on top of soft soils were observed on excavation wall and floor, so a ditch backfilled with geotextile and coarse rocks were placed to facilitate drainage across the road (**Photo 9**).
Upstream Plug Dike (USPD)
ELR continued salvaging fish from the USPD (net installed 20 m from the Plug-Dike center line).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. USAR construction
	Discussion and Recommendations
	Engineer exposed the different alternatives to Chad (YG/CH2M):

	• Design – Proof-roll of the area, 0.5 m deep sub-excavation as required (including back fill with gravel and sand), and capping with 0.3 m of fill from Borrow A. • Contractor's proposal – Installation of a geotextile along and across the whole length of the road after common excavation, overlapped by a 1 m thick layer of Borrow C material. No sub-excavation or capping to be performed. • Intermediate solution (Engineer) – Installation of geotextile on problematic areas (mainly, soft silty clay), and then placement 0.7 m thick layer of Borrow A (gravel and sand) Based on the possible long term use of the road, YG decided to continue the construction of the road as per Contractor's proposal. Engineer communicated the decision to Contractor and construction continued by placing a geotextile (Photo 8), overlain by a 1 m think layer of General Rock Fill from Borrow C.	
	Corrective Actions or Improvements	
	Contractor continued with USAR construction.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
2	John, Joan. USAR. Slump protection and material dumped at the downhill side of the road.	
	Discussion and Recommendations	
	Engineer observed that the Contractor removed the saturated silty clay that was affected by a small slump (**Photo 1**) at the excavation cut wall (approx. Station 0+740), and replaced the material with Borrow C material (about 42 m3). Also, observed that the material excavated was dumped beside the USAR (at the downhill side of the berm). Engineer reminded that Contractor that all excavation material shall be wasted on approved spoil area, and that Engineer shall be informed of problems/repairs performed.	
	Corrective Actions or Improvements	
	Contractor to remove the material dumped at the side of the road, and haul it to approved spoil area (**Photo 4**).	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	Joan, John. Seepage and water ponded under the road.	
	Discussion and Recommendations	
	Contractor recommended that coarse rock should be placed to provide drainage on an area were water was ponding (seepage observed on excavation cut wall). Engineer recommended that a ditch should be also created to drain water outside of the road footprint.	
	Corrective Actions or Improvements	
	Contractor created the ditch and placed coarse rocks from the General Rock Fill being dumped by haul trucks (**Photo 9**).	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330	Excavator was breaking boulders at the lower bench, and front loader was piling the broken rocks in between loading cycles for USAR construction (2 hr). Then, excavator started sorting with bucket (1 hr).	-
	General Rock Fill	CAT988H	Front loader was mining and loading fill to haul trucks for USAR construction.	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+790 to 0+817	N/A	Contractor corrected some deficiencies observed by the Engineer on the silt fence sections recently installed. USAR construction activities were being performed inside the exclusion area (30 m from pond).	2

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Station 0+731 to 0+817	Dozer D9	General Rock Fill	BC	Dozer was spreading a 1 m thick layer of fill on top of geotextile (field estimate approx. 900 m3)	9

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
USAR	0+760	Excavator	Ditch across the road for drainage purposes (approx. 23 m^2 x 1.5 m).	9

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+731 to 0+817	Hand tools	The Contractor installed two adjacent layers of geotextile (uphill overlapped on downhill) for 86 m (approx. 774 m2)	3, 8
USAR	Station 0+760	Hand tools	The Contractor installed 23 m^2 of geotextile at the drainage ditch to prevent migration of fines.	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
Borrow C	Lower Bench	CAT 330	Excavator was breaking boulders that will be incorporated to stockpiles of Rock Protection Fill by a front loader.	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Contractor cancelled the night shift.
- During the following shift (day shift), Contractor plans to complete USAR road construction and remove logs, organics and other unsuitable material from the pond shore so as to create a working platform to start the USPD (**Photo 6**).
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 three times (beginning, noon and middle of the shift), and did not observe any movement.

Photos:



Photo 1: 20141003_NFRDSIS_USAR_P163_ Slump observed at excavated cut wall_Looking NW



Photo 2: 20141003_NFRDSIS_USPD_P164_Silt fence protecting the pond and fish net_Looking N



Photo 3: 20141003_NFRDSIS_USAR_165_Excavator flattening excavation floor before the placement of the geotextile_Looking SE



Photo 4: 20141003_NFRDSIS_USAR_P166_Overview of laydown/spoil area_Looking NE



Photo 5: 20141003_NFRDSIS_USPD_P167_ Overview of USPD and USAR excavation_Looking NE



Photo 6: 20141003_NFRDSIS_USAR_P168_Detail of logs and rocks at the end of the road_Looking N



Photo 7: 20141003_NFRDSIS_USAR_P169_Ditch excavated to divert water (Station 0+650)_Looking NE



Photo 8: 20141003_NFRDSIS_USAR_P170_Geotextile installed at the excavation floor_Looking E



Photo 9: 20141003_NFRDSIS_USAR_P171_Coarse rock placed on the ditch to drain water away from road footprint_Looking N

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:35 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds, windy	
Subject:	Day Shift Report	**Work Areas*:**	BD, BC, USAR	
Date:	20141004	**Record #:**	*20141004_NFRDSIS_DSR_30*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: C. Pederson, J. Roca

Mean daily temperature at the Faro Airport: +6.4 °C (Max = +11.7 °C; Min = + 1.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Contractor's plan is to install the turbidity fence on the following day shift (October 5). Engineer reminded that the use of the appropriate H&S equipment will be required to install the turbidity curtain in the pond (with a boat). Also, requested Pelly to contact their H&S supervisor to inform about this activity and to inform Faro Mine site security when they start/finish activities into the pond.
1.2	Environmental	• Contractor relocated some silt fences at the end of the road to provide space to remove the debris at the end of the road, and to create a turn-around by relocating the existing big rocks. New silt fences were installed if the existing ones were damaged. • ELR continued salvaging fish from USPD area.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_3	Contractor and Engineer visited the slump area to define corrective measures to be implemented. Engineer to expose the options to YG. **OPEN**	Engineer

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, BC, USAR
Shipeng Zheng (Pelly), BC, USAR
Chris Jastrebski (ELR), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 8 hours)
Excavator (CAT 365C, yellow, USAR construction)
Dozer (CAT D6R, #1604, yellow, USAR construction)
Dozer (CAT D9L, #DZ952, yellow, parked at USAR, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, no activity)
Grader (CAT 14H, #1407, yellow, maintaining access roads)
Front Loader (Deere TC54H, yellow, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow C)
Haul Truck (CAT 773B, #317, yellow, USAR)
Haul Truck (CAT 773B, #318, yellow, USAR)
Haul Truck (CAT 773B, #319, yellow, USAR)
Articulated Truck (Deere 400D, #7402, yellow, USAR)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor and Engineer visited the USAR to observe the current state of the works. Measurements of road width were performed and some areas were the road was narrower than 9 m were identified (between 7 to 8 m wide sections). Also, the need of a turn around so as to continue with construction activities at USPD, and the need to widen the curve at Station 0+650. Contractor placed more General Rock Fill from Borrow C so as to increase the width on the narrow areas identified (**Photo 4**). Then, started the removal of logs, organics and other unsuitable material at the end of the road, along the pond shore (southwestern end of the pond). Big boulders (max 2 m diameter were observed) were temporarily removed (**Photos 6** and **7**) to provide better access and to ensure that no disturbance of the water pond was created (silt fences were previously installed on the shore). Once the unsuitable material were removed and wasted on the designated spoil area, Contractor relocated the rocks previously removed (including some big boulders) to create a platform for the trucks to turn, and unload construction fill during the following stages of construction (**Photo 8**). Then, some general rock fill was placed on top of the platform of rocks to fill the gaps in between the rocks and create a trafficable platform (**Photo 12**). Activity not completed before the end of the shift.
Upstream Plug Dike (USPD)
ELR continued salvaging fish from the USPD (net installed 20 m from the Plug-Dike center line).

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Joan. USAR construction	
	Discussion and Recommendations	
	Engineer and Contractor visited the USAR area to measure completed road (both width and gradients). Some narrow sections of about 7 to 8 m wide were observed. Contractor commented that the more material shall be added to make the road at least 9 m wide for safety. Also, that that the curve was too steep and that a curve with a bigger radius had to be provided. Engineer recommended the Contractor not to place material close to the area affected by the slump on the night shift from September 30 to October 1. Also, that Borrow D should be used on the curve and on the first section to be widened (of about 30 m), as they were outside the area of exclusion. Contractor decided to continue construction with Borrow C material, including the curve, safety berms and sections to be widened. Also, placed fill very close to the crest of the scar created during the slump mentioned above (**Photo 3**). Engineer monitored the area and no movement of the material affected by the slump was observed.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan. USAR. Removal of logs and rocks at the end of the road.	
	Discussion and Recommendations	
	Engineer observed that an excavator was working very close to the water without a silt fence, and reminded to the Contractor that no work shall be performed in stream until the salvaging of fish is completed (both US and DS), and the turbidity curtain is in place. For works close to the shore, a silt fence shall be in place at water shore to intercept sediments.	
	Corrective Actions or Improvements	
	Contractor to install a silt fence on the shore to protect the pond.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED. Construction activities continued and silt fence installed at the end of the shift.**
3	Joan, John. Borrow C. Sorting of Rock Protection Fill	
	Discussion and Recommendations	
	Contractor informed that the CAT330, which was sorting fill at the lower bench, will be mobilized to the upper bench as the productivity at the lower bench was very low. Engineer and Contractor discussed possible areas that could be suitable for this activity. Contractor also informed that CAT365 will be mobilized to Borrow C at the beginning of the following shift to increase the productivity.	

	Corrective Actions or Improvements	
	Contractor to mobilize excavator to a better location at the upper bench.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
4	John, Chris, Joan. USAR. Area showing deformation (**Photo 2**)	
	Discussion and Recommendations	
	Contractor commented that an area showing deformation of the road platform is slowing down the hauling of fill for construction purposes. Engineer observed an area of about 11 m x 8 m showing deformation at the left hand side of the road, and progressing towards the right hand side of the road. Contractor commented that the capping layer placed was too thin, as the area was proof rolled, no soft spot was identified, and the road is now showing deformation. Also, pointed that they recommended a 1 m thick layer of fill. Finally, recommended the placement of fill on top to cover the area showing deformation. According to Engineer's records, the area showing deformation was not proof rolled during a night shift as it was not part of the road initially constructed. The road had a curve due to the presence of a higher spot at the left hand side (alignment of the road was field fit). Once the road was completed, Contractor trimmed the higher spot at the left hand side of the road to make the road wider. No proof roll of the area incorporated was performed. Also, commented that the deformation could also be caused by water ponded under the road. Contractor commented that water was draining under the Borrow D fill on another location (upstream). Engineer requested the Contractor to provide details of their proposal to repair the road. Also, commented that they will inform YG about the presence of this area to be repaired.	
	Corrective Actions or Improvements	
	Contractor to present details of the proposed solution to repair the road. Engineer to inform YG and to comment on possible solutions to repair the road.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330	Excavator was sorting material at the lower bench and then was mobilized to the upper bench. Front loader was piling sorted material.	1
	General Rock Fill	CAT988H	Front loader was mining and loading fill to haul trucks for USAR construction.	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+817	Hand tools	Engineer reminded that silt fences shall be installed at all times until the salvaging of fish is completed and the turbidity curtain is in place. Contractor installed a silt fence at the end of the shift to intercept sediments.	5

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
USAR	Various sections along the road from Stations 0+650 to 0+817	Dozer D9 and Haul Trucks	General Rock Fill	BC	Dozer was pushing the existing safety berm downhill and spreading nose fill delivered by Haul Trucks.	4
USAR	Station 0+817	Dozer D9 and Haul Trucks	General Rock Fill	BC	Dozer was pushing general rock fill on top of the platform of rocks created by CAT365 to create an access to the pond.	11, 12

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
USAR	Stations 0+770, 0+790, 0+800	General Rock Fill	Engineer collected fill samples S86, S87 and S88. Samples will be tested with XRF analyzer	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to complete the removing of logs and rocks close to the pond (if practical due to the proximity to the water), install the turbidity fence at the USPD, and continue sorting Rock Protection Fill.
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 three times (8 am, 12 pm, 6 pm), and did not observe any movement.

Photos:



Photo 1: 20141004_NFRDSIS_BC_P172_Front loader piling sorted Protection Rock Fill_Looking NE



Photo 2: 20141004_NFRDSIS_USPD_P173_Deformation observed at the end of the ramp_Looking W



Photo 3: 20141004_NFRDSIS_USAR_174_Fill placed to widen the curve on top of scar_Looking N



Photo 4: 20141004_NFRDSIS_USAR_P175_Haul truck dumping general rock fill_Looking E



Photo 5: 20141004_NFRDSIS_USPD_P176_Disturbed area not protected by a silt fence_Looking NW



Photo 6: 20141004_NFRDSIS_USAR_P177_Excavator moving rocks to remove debris_Looking SW



Photo 7: 20141004_NFRDSIS_USAR_P178_Excavator removing rocks, logs and organics_Looking NE



Photo 8: 20141004_NFRDSIS_USAR_P179_Rocks being relocated to create a platform_Looking SW



Photo 9: 20141004_NFRDSIS_USAR_P180_Overview of fill affected by the slump_Looking NE



Photo 10: 20141004_NFRDSIS_USAR_P181_Turbidity curtain piled at laydown area_Looking SW



Photo 11: 20141004_NFRDSIS_USAR_P182_Truck dumping general rock fill on top of platform of rocks created_Looking N



Photo 12: 20141004_NFRDSIS_USAR_P183_Dozer spreading general rock fill on top of rock platform_Looking N



Photo 13: 20141004_NFRDSIS_USPD_P184_Overview of upstream pond_Looking SE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	7:30 pm
Project #:	0533-010-06	**Weather:**	Cloudy, light snow (afternoon)	
Subject:	Day Shift Report	**Work Areas*:**	BC, USPD, USAR	
Date:	20141005	**Record #:**	*20141005_NFRDSIS_DSR_31*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +3.5 °C (Max = +6.9 °C; Min = + 0.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The installation of the turbidity curtain has been postponed until October 6, 2014.
1.2	Environmental	• Contractor installed a section of silt fence along the ramp created to provide access to the USPD (a boat will be used) • ELR continued salvaging fish from US area.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_3 Corrective measures at slump	No update. **OPEN**	Engineer
20141004_NFRDSIS_DSR_31_4 Road showing deformation	Contractor to present details of the proposed solution to repair the road. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, BC, USAR
Shipeng Zheng (Pelly), BC, USAR
Chris Jastrebski (ELR), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 9 hours)

Excavator (CAT 365C, yellow, USAR construction, BC, 5 hours)
Dozer (CAT D6R, #1604, yellow, USAR construction)
Dozer (CAT D9L, #DZ952, yellow, parked at USAR, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, no activity)
Grader (CAT 14H, #1407, yellow, maintaining access roads)
Front Loader (CAT988H, #2316, yellow, Borrow C)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, yellow, parked at BA, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
Contractor created a ramp to the USPD to provide access for the boat required to install the turbidity curtain into the pond (DS to the fish net installed by ELR). The installation of the turbidity curtain was postponed until the following shift. Contractor created openings for drainage at the USAR downhill safety berm from Station 0+040 to 0+400, and mobilized the CAT 365 to Borrow C. CAT 330 and CAT 365 were sorting Rock Protection Fill at the upper platform of BC.
Upstream Plug Dike (USPD)
ELR continued salvaging fish from the USPD.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	John, Joan. USPD construction	
	Discussion and Recommendations	
	Contractor informed that sorting and stockpiling of Rock Protection Fill will continue for two more days, and then placement Rock Protection Fill will start as part of USPD construction (October 8). Engineer recommended that no activity shall commence until the contract for USPD is ready.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan, Shipeng. BC. Sorting of Rock Protection Fill	
	Discussion and Recommendations	
	Contractor informed that sorting of Rock Protection Fill was not productive due to the presence of too many fines. Engineer and Contractor visited the BC so as to find an area with coarser calcium silicate rocks. Four areas were identified, 3 at the upper bench and 1 at the lower bench (refer to yellow circles on **Photo 1**). Engineer performed some tests with the XRF	

	analyzer on samples collected from the three areas and informed that one of them, the entrance towards the NE presenting brownish/reddish rocks on top of the pile face, had concentrations of Zn on the higher range (7.335 ± 137 ppm and 1.171 ± 56 ppm). Engineer recommended that Contractor should move the CAT 365 to the higher area of the upper bench and start sorting.	
	Corrective Actions or Improvements	
	Contractor to mobilize excavator to identified areas.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**CLOSED.**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330 CAT 365	Two excavators were sorting fill at the upper bench.	2, 3
	General Rock Fill	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+817	Hand tools	Contractor installed short sections of silt fence to prevent the transport of sediments into the pond. Engineer reminded that silt fences shall be installed at all times until the salvaging of fish is completed (US and DS) and the turbidity curtain is in place.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
USAR	Refer to Photo 1	Potential General Rock Fill	Engineer tested samples collected from USAR construction and Borrow C. Also, performed tests on site to observe Zn concentrations of samples collected from areas identified during the visit to BC with the Contractor.	5, 6, 7, 8

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Contractor plans to continue sorting Protection Rock Fill.
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 two times (9:00 am, 5:30 pm), and did not observe any movement.

Photos:

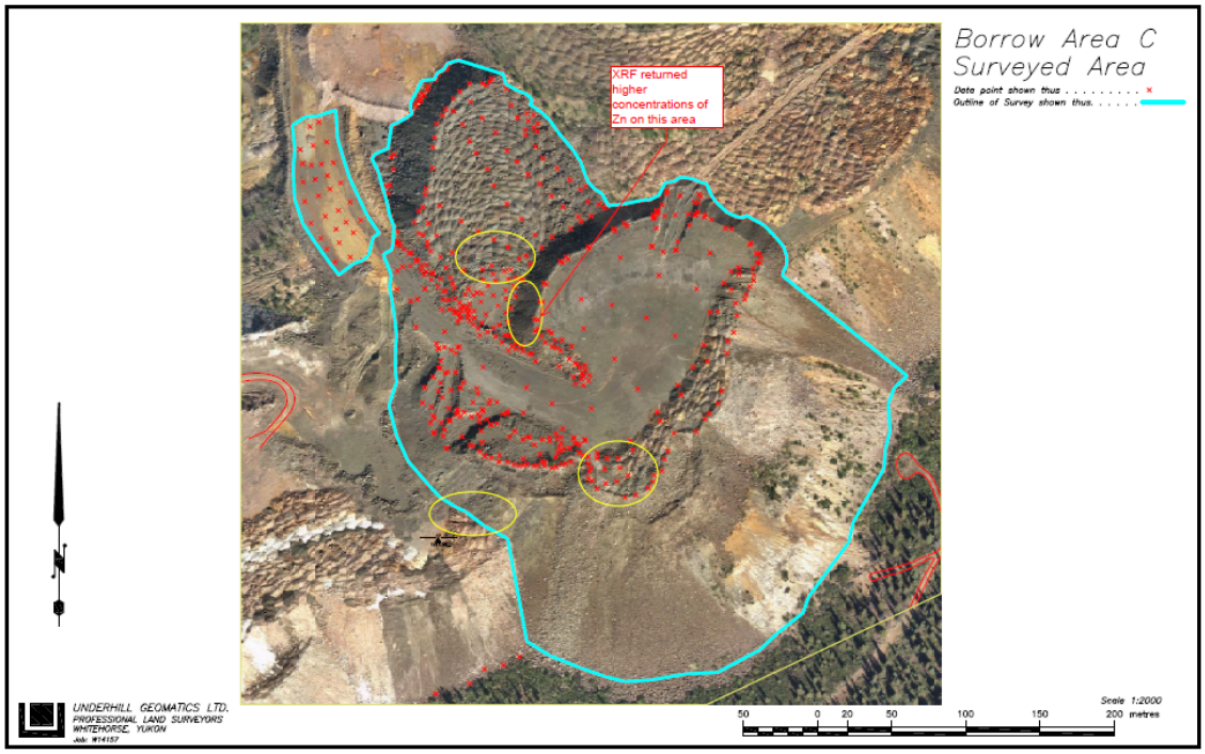


Photo 1: 20141005_NFRDSIS_BC_P185_Orthophoto showing possible source for Rock Protection Fill (yellow circles), and survey points obtained by Underhill during the baseline survey.



Photo 2: 20141005_NFRDSIS_BC_P186_Rock Protection Fill stockpiled at upper bench_Looking E



Photo 3: 20141004_NFRDSIS_BC_187_Excavator CAT330 sorting Rock Protection Fill at the upper bench _Looking NE



Photo 4: 20141005_NFRDSIS_USAR_P188_Pile of logs removed from the end of the road at spoil area_Looking E



Photo 5: 20141005_NFRDSIS_P189_Yellowish brown sample returning higher Zn concentration



Photo 6: 20141005_NFRDSIS_P190_Greyish sample from BC returning lower Zn concentrations

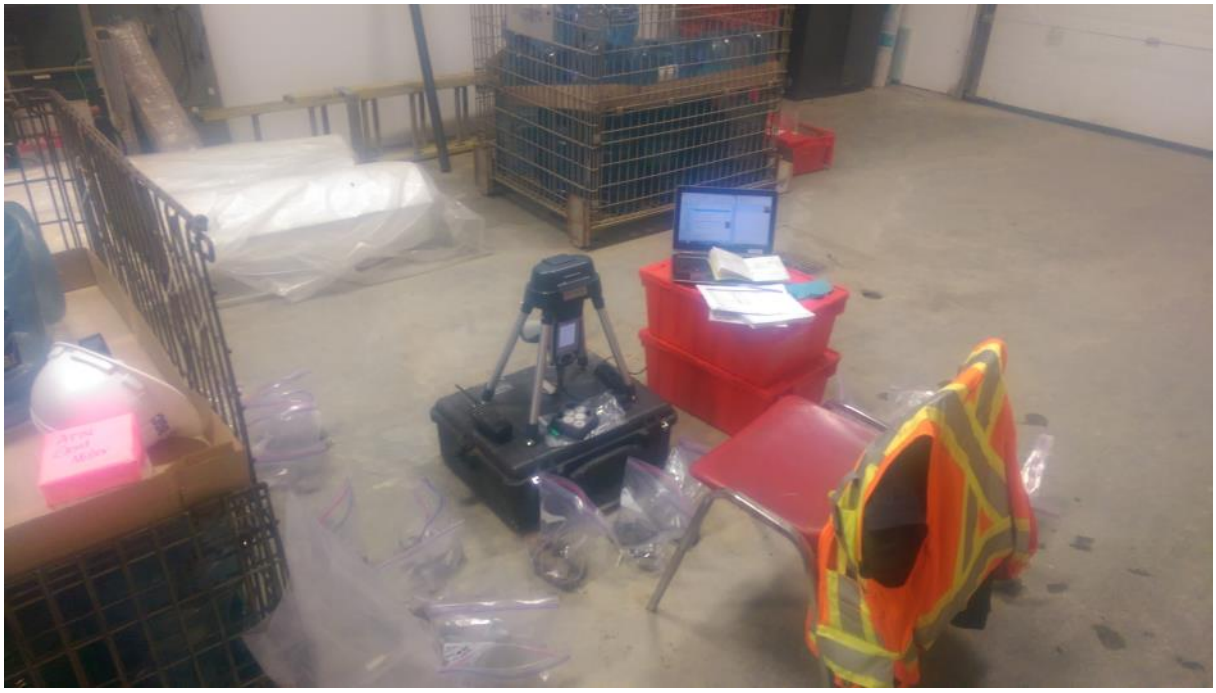


Photo 7: 20141005_NFRDSIS_P191_Testing of samples collected from USAR and BC with XRF analyzer

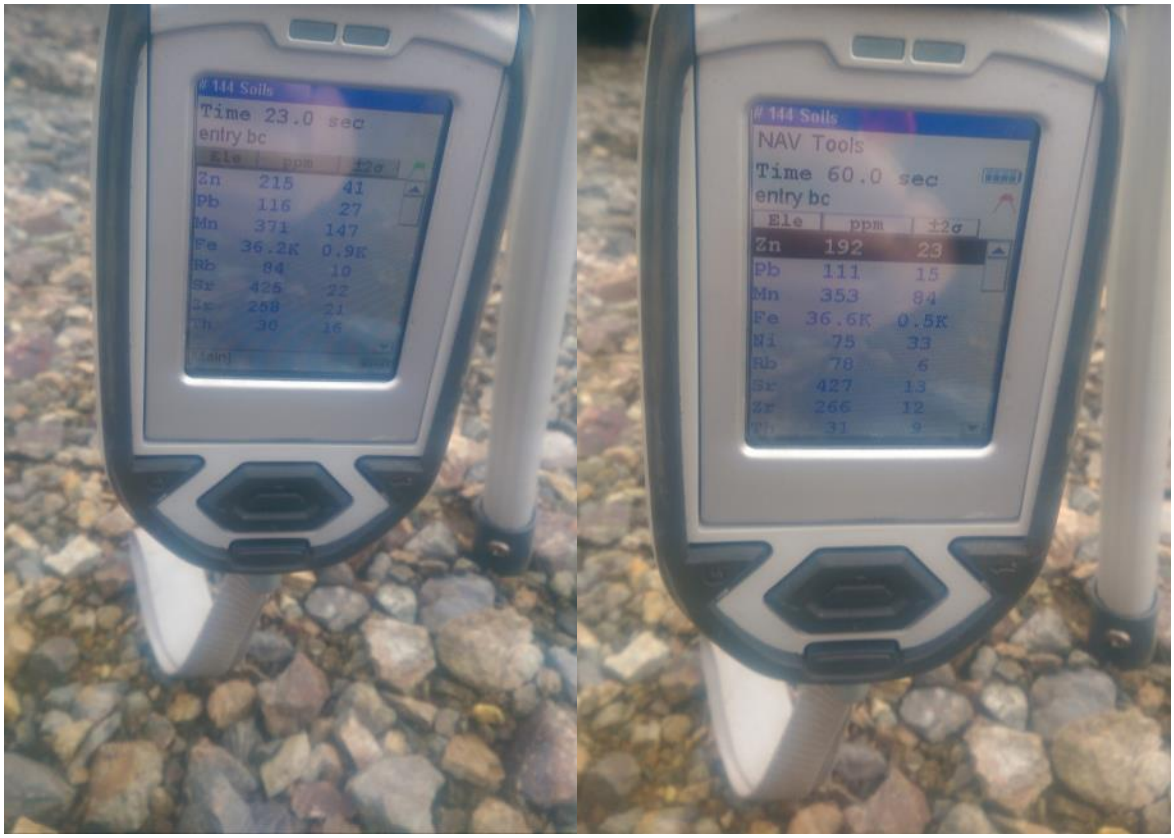


Photo 8: 20141005_NFRDSIS_BC_P192_Field tests with XRF analyser returning low Zn concentrations

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:00 am	8:00 pm
Project #:	0533-010-06	**Weather:**	Overcast, snowing	
Subject:	Day Shift Report	**Work Areas*:**	BC, USPD	
Date:	20141006	**Record #:**	*20141006_NFRDSIS_DSR_32*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +2.8 °C (Max = +6.4 °C; Min = -0.9 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Contractor installed turbidity curtain at USPD. A specific H&S meeting took place before Contractor started activities into the pond. In addition, some sand was placed on the access ramp as surface was slippery due to the presence of ice and snow.
1.2	Environmental	• Contractor installed a turbidity curtain into the pond DS to the fish fence previously installed by ELR. • ELR continued salvaging fish from US area.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_3 Corrective measures at slump	No update. **OPEN**	Engineer
20141004_NFRDSIS_DSR_31_4 Road showing deformation	Contractor to present details of the proposed solution to repair the road. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Erik Pit (YG), USPD, NF2A, NF2B, NF2
Dan Russell (Pelly), BC

John Garvis (Pelly), BA, BC, USAR
Shipeng Zheng (Pelly), BC, USAR
Chris Jastrebski (ELR), USPD, NF2A, NF2B, NF2
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, 10 hours)
Excavator (CAT 365C, yellow, BC, 4 hours)
Dozer (CAT D6R, #1604, yellow, parked at USAR, no activity)
Dozer (CAT D9L, #DZ952, yellow, BC)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, illuminating USPD area)
Grader (CAT 14H, #1407, yellow, parked on top of haul road, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow C, no activity)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, yellow, parked at BA, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
No activity.
Upstream Plug Dike (USPD)
• ELR continued salvaging fish from the USPD. • Contractor installed turbidity curtain downstream to the fish fence previously installed by ELR at the USPD area. Some wooden poles were driven into the pond bottom downstream to the curtain to keep the curtain in place. A water depth of approx. 1.5 m was reported by Contractor. • Engineer installed graduated rods to observe water pond elevations during construction. • Contractor continued sorting Protection Rock Fill with two excavators (CAT 365 and CAT 330). Then, started pushing rocks from the intermediate platform to the lower platform with the dozer D9 (refer to communication 2 below). Operator then returned to CAT 365 to sort more material at the upper bench and CAT 330 was mobilized to the lower bench.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	John, Sean, Joan. USPD. Installation of turbidity curtain.
	Discussion and Recommendations
	Contractor informed that the current at the northwestern side of the pond was too strong. The current was displacing the turbidity curtain downstream, and the poles could not hold the curtain in place. More poles were installed by the Contractor to withstand the curtain. Contractor also informed that the pins connecting the 15 m long sections of curtain were too

	weak and there was a chance that they will break in case of strong current. Engineer commented that, if openings are created due to strong currents, suspended sediments should not be able to go on an upstream direction through the openings. Anyway, recommended the Contractor to monitor the curtain joints.	
	Corrective Actions or Improvements	
	Contractor to monitor the turbidity curtain installed.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN (not tracked as an issue)**
2	John, Dan, Joan, Shipeng. BC. Sorting of Rock Protection Fill	
	Discussion and Recommendations	
	• Engineer observed that the CAT 365 was parked at the upper platform (receiving maintenance), and that the CAT 330 was sorting material at a location that was not productive (according to the comments performed during the previous shift, which triggered a visit to BC so as to identify new locations for the excavators). Also, observed the dozer D9 pushing material from the intermediate platform down to the lower platform. • Contractor informed that the location identified at the upper bench (refer to yellow circle on **Photo 1**) was abandoned as reddish material was observed, and then decided to use the dozer D9 to push material, as no more suitable locations had been identified. • Engineer commented the following: o The use of dozer had not been previously approved. It should be communicated to Engineer and then approved by YG. o Contractor should communicate unexpected changes on the characteristics of the material being sorted, especially if the area was previously identified as a suitable source by both Engineer and Contractor. o The need for a new location shall be communicated to Engineer, and a new location shall be identified instead of returning to an area where low productivity was already reported by the Contractor. • Engineer and Contractor visited the area discarded at the upper bench. Engineer commented that the observed rocks were acceptable as a construction fill (**Photo 8**). Also, noted that reddish material, already observed at the floor in front of the suitable piles, should not be considered as they were localized. Contractor commented that there was a chance that layers of different materials could be present on the area. If so, sorting will not be productive. Due to the presence of snow covering the piles, Engineer requested to resume activities so more material will be exposed. Also, that they should continue sorting until unsuitable material is found, and then inform by radio to perform a site visit. • Engineer suggested that Contractor could mobilize and excavator to the borrow rock face located at the northern side of BC area, next to the access road to the upper platform (refer to pink circle on **Photo 1**, and **Photo 9**). Contractor commented that access to the referred area will be too complicated due to soft ground, so the hauling cost will be too high. • One hour later, Engineer checked the status at the upper bench, and Contractor informed	

	that more reddish material was encountered, and area discarded. Engineer visited the area and did not observe reddish material, other than the one on the floor. Engineer collected 5 samples from different piles to confirm that the rock was suitable for construction activities. Also, observed that CAT 330 was at the lower bench sorting the rocks pushed by the dozer (**Photos 1** and 7), and that the CAT 365 was at the intermediate bench (no activity).
	Corrective Actions or Improvements
	Engineer to test samples collected to confirm suitability of rock at upper bench. Contractor to mobilize equipment to the suitable areas identified.
	Status at the end of the shift (Open, Closed or N/A) — **OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330 CAT 365 CAT D9	Two excavators were sorting fill at the upper bench. Then, operator of CAT 365 was changed to the CAT D9 and pushed some material from intermediate bench to the lower bench. Then, returned to CAT 365 and started sorting material at upper bench.	2, 3
	General Rock Fill	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USPD	US to plug dike center line, DS to the fish fence installed by ELR	Hand tools, boat	Contractor installed a turbidity curtain downstream to the fish net previously installed by ELR. Some wooden poles were driven into the bottom of the pond with a hammer to keep the curtain in place. Contractor noted that the current was stronger than expected and that the curtain was being displaced (poles bended).	2, 4, 5
USPD	Right bank, US to turbidity curtain, DS to fish fence installed by ELR	Hand tools	Engineer installed two graduated wooden rods to observe the water pond elevation during construction of the plug-dike. The first one (1.10 m long) was installed to	6

			measure water elevations before construction (a decrease on water pond elevations is expected). The second one (3.0 m long) was installed to record a possible increase of the water elevation. Engineer measured a water pond elevation of 1,090.25 m by means of a level. Water was at 0.55 m mark on the first rod and 0.70 m mark on the second rod.	

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
Borrow C	Upper bench, SE corner (refer to yellow circle on Photo 1)	General Rock Fill	Engineer collected samples S89 to S93 to observe Zn concentrations on the area discarded by the Contractor. Tests could not be performed as samples were wet.	1, 9

Borrow C	Lower bench, next to the ramp to upper platform (refer to green circle on Photo 1)	General Rock Fill	Engineer collected samples S94A, S94B and S94C to observe Zn concentrations on material pushed downhill by dozer D9.	1, 7

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Contractor plans to continue sorting Protection Rock Fill at Borrow C with two excavators.
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 two times (10:00 am, 4:30 pm), and did not observe any movement.

Photos:

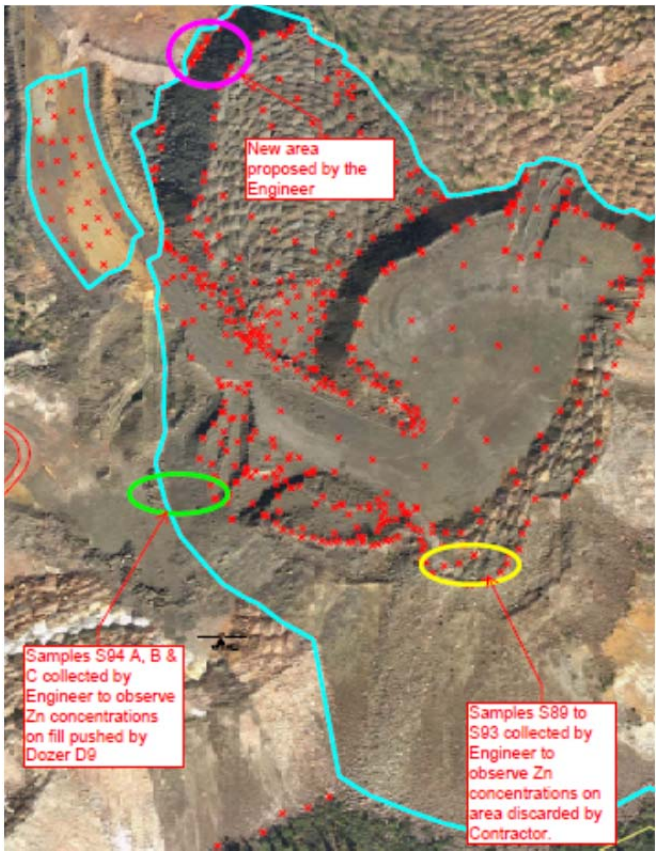


Photo 1: 20141006_NFRDSIS_BC_P196_Orthophoto showing location of samples collected by Engineer to observe Zn concentrations and new proposed borrow (north up).



Photo 2: 20141006_NFRDSIS_USPD_P197_Installation of poles to hold turbidity curtain_Looking NW



Photo 3: 20141006_NFRDSIS_USPD_198_Sand spread on the pedestrian access to USPD_Looking S



Photo 4: 20141006_NFRDSIS_USPD_P199_Turbidity curtain being installed on the pond_Looking NW



Photo 5: 20141006_NFRDSIS_USPD_P200_Turbidity curtain being displaced by current_Looking NW



Photo 6: 20141006_NFRDSIS_USPD_P201_Graduated wooden rods installed by Engineer to observe water pond elevations



Photo 7: 20141006_NFRDSIS_BC_P204_Rocks pushed to lower platform by a dozer_Looking NE



Photo 8: 20141006_NFRDSIS_BC_P205_Borrow source recommended by Engineer at upper bench



Photo 9: 20141006_NFRDSIS_BC_P206_New borrow source recommended by Engineer at the entrance to lower platform_Looking SE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:45 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	BC, USPD	
Date:	20141007	**Record #:**	*20141007_NFRDSIS_DSR_33*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -2.5 °C (Max = -0.6 °C; Min = -4.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_3 Corrective measures at slump	No update. Engineer to visit the area with Chad B. on October 8, 2014. **OPEN**	Engineer
20141004_NFRDSIS_DSR_31_4 Road showing deformation	Contractor to present details of the proposed solution to repair the road. **OPEN**	Contractor
20141006_NFRDSIS_DSR_32_2	Engineer tested samples and confirmed lower concentrations of Zn (refer to Communication 1 below). **CLOSED**	-

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Erik Pit (YG), USPD
John Garvis (Pelly), BC, USPD
Shipeng Zheng (Pelly), BC
Chris Jastrebski (ELR), USPD

Equipment ***(brand, model, reference #, colour, work area, and estimated working hours)***
Excavator (CAT 330C, #3302, yellow, BC)
Excavator (CAT 365C, yellow, BC)
Dozer (CAT D6R, #1604, yellow, USAR, removing snow)
Dozer (CAT D9L, #DZ952, yellow, BC)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, illuminating USPD area)
Grader (CAT 14H, #1407, yellow, USAR, removing snow)
Front Loader (CAT988H, #2316, yellow, Borrow C, no activity)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, yellow, parked at BA, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
No activity.
Upstream Plug Dike (USPD)
• ELR maintained the fish net at the USPD. • Engineer measured water elevation (1,090.14 m). • Contractor continued sorting Protection Rock Fill with two excavators (CAT 365 and CAT 330). Dozer D9 provided access to one of the sorting areas for 0.5 hr.

5. Communications

ID	**Summary** ***(time, personnel, work area and description)***
1	John, Joan. BC.
	Discussion and Recommendations
	• Engineer informed that the 5 samples collected at the upper bench (refer to previous shift report for locations) returned acceptable concentration levels of Zinc, confirming the visual observations performed during the visits. This confirmed that the area could be accepted as a borrow source, so CAT365 could return to the area and continue sorting material. • Contractor exposed material at the area identified as a possible source at the entrance of BC, upper bench (refer to previous shift report). All samples tested by the Engineer returned lower concentrations of Zn (**Photos 2** and **6**). Engineer commented to Contractor that the area was suitable for sorting and Contractor started sorting with CAT365 (**Photo 7**). The piles of yellowish material in front of the borrow face were removed and piled beside the borrow face. • Engineer informed that there was some debate on the need for a USPD. Contractor and Engineer agreed that, based on the available information, there was no need for two

	excavators sorting rock protection fill at BC to increase the productivity. CAT 365 will continue sorting fill, and CAT330 will be mobilized to the DS area, together with the D6 dozer.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan. Snow removal (**Photos 4** and **5**)	
	Discussion and Recommendations	
	Contractor informed that they will clean the road from Borrow C to the USPD so as to be ready when filling operations will start (activity programmed for the following day shift (October 8, 2014). Engineer recommended the Contractor to delay this activity in case it will snow during the afternoon or night. Contractor commented that the removal of snow had to be performed during the shift so as to be prepared to haul fill to USPD at the beginning of the next day shift.	
	Corrective Actions or Improvements	
	Contractor removed snow from the road from BC to USPD.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	CAT 330 CAT 365 CAT D9	Two excavators were sorting fill at the upper bench. CAT330 was not working for the whole shift (refer to Communication 1 above). CAT D9 pushed some existing material to provide access to sorted fill (0.5 hours).	1, 7
	General Rock Fill	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Along shore line	N/A	Engineer visited the area to observe the silt fences installed. No issues were observed	-
USPD	US to center line	N/A	Measured water pond El. 1,090.14 m. No damage was observed on turbidity curtain and fish fence from the shore.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Contractor plans to start construction of USPD by end dumping and spreading Rock Protection Fill into the pond, once the remaining of logs and other unsuitable debris had been removed from the face of existing rock drain.
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 one time (9:00 am), and did not observe any movement.

Photos:



Photo 1: 20141007_NFRDSIS_BC_P207_CAT330 sorting material at the lower bench_Looking S



Photo 2: 20141007_NFRDSIS_BC_P208_CAT365 exposed material at borrow source_Looking SE



Photo 3: 20141007_NFRDSIS_USPD_209_Overview of water pond_Looking N



Photo 4: 20141007_NFRDSIS_USAR_P210_Snow on access ramp from haul road crest _Looking SE



Photo 5: 20141007_NFRDSIS_USPD_P211_Overview of USPD and USAR areas_Looking SE



Photo 6: 20141007_NFRDSIS_BC_P212_Results from XRF analyser from sample collected at BC



Photo 7: 20141007_NFRDSIS_BC_P213_CAT365 sorting material at new location at upper bench_Looking E

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	BC, USPD, USAR	
Date:	20141008	**Record #:**	*20141008_NFRDSIS_DSR_34*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -6.6 °C (Max = -1.7 °C; Min = -11.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Engineer postponed the installation of a new graduated rod into the frozen water pond as support was required for health and safety reasons.
1.2	Environmental	• ELR maintained fish fences at US area.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. Contractor to open lower platform to traffic. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_3 Corrective measures at slump	Engineer and YG visited the area and the possible remedial measured discussed. Engineer and Contractor to agree on the appropriate timing to perform this activity based on work schedule and climatologic conditions. **OPEN**	Engineer Contractor
20141004_NFRDSIS_DSR_31_4 Road showing deformation	Contractor to present details of the proposed solution to repair the road. **OPEN**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (YG/CH2M), USPD, BD, BA, USAR
Erik Pit (YG), USPD

John Garvis (Pelly), BC, USPD
Shipeng Zheng (Pelly)
Chris Jastrebski (ELR), USPD
Doug Davidge (Labarge), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, no activity)
Excavator (CAT 365C, yellow, BC, no activity)
Dozer (CAT D6R, #1604, yellow, no activity)
Dozer (CAT D9L, #DZ952, yellow, parked at BC, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, illuminating USPD area)
Grader (CAT 14H, #1407, yellow, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow C, no activity)
Front Loader (Deere TC54H, yellow, Haul Road, no activity)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, yellow, parked at BA, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
No activity (**Photo 1**).
Upstream Plug Dike (USPD)
Engineer observed that the pond water level was about 1 m lower than the previous day. No reading of water elevation was possible as the graduated rod installed was found to be above the water level. Engineer will have to prepare a new graduated rod, break the ice, and install it at the water pond. This activity is postponed until the next day shift as support is required (H&S risk).

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	Chad, John, Joan. USAR Slump (Issue 20141002_NFRDSIS_DSR_27_3)
	Discussion and Recommendations
	YG and Engineer visited the USAR to observe the area affected by the slump, and to comment on the possible actions to be undertaken. The need of reshaping the affected fill located DS to the access road was identified to prevent water/snow from ponding, creating future instabilities. Engineer commented with Contractor that the activity had to be incorporated on the work schedule taking into account availability of equipment (CAT 330) and climatologic conditions.

	Corrective Actions or Improvements	
	Engineer and Contractor to agree on the timing for this activity.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
2	John, Joan. BC	
	Discussion and Recommendations	
	Based on the available information regarding to the discussions on the need of a plug-dike at the upstream side of the rock drain, Engineer and Contractor decided to postpone the activities on Borrow C. Activity will continue as soon as a confirmation from YG is received.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USPD	US to center line	N/A	Water level decreased about 1 m since the previous shift (estimated water pond elevation 1,089.15 m). Engineer will have to install a new graduated rod as the previous one installed is currently above water pond elevation. Activity postponed until the following shift. Ice was accumulating close to the turbidity curtain and fish fence, but no damage to the turbidity curtain or fish fence was observed by the Engineer from the shore.	1, 2

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 and did not observe any movement.

Photos:



Photo 1: 20141008_NFRDSIS_USPD_P214_Overview of USAR and USPD areas_Looking NE



Photo 2: 20141008_NFRDSIS_USPD_P215_Overview of USPD area_Looking W

BGC INTERNATIONAL
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	7:00 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	USPD, BC, USAR	
Date:	20141009	**Record #:**	*20141009_NFRDSIS_DSR_35*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -3.5 °C (Max = +0.4 °C; Min = -7.3 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. Contractor to open lower platform to traffic. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_3 Corrective measures at slump USAR	Contractor to shape the material affected by the slump. Activity to be performed before the end of the following shift. **OPEN**	Contractor
20141004_NFRDSIS_DSR_31_4 Road showing deformation USAR	Contractor to present details of the proposed solution to repair the road. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (YG/CH2M), USPD, BC, USAR
Erik Pit (YG), USPD
Chris Jastrebski (ELR), USPD
Doug Davidge (Labarge), USPD
John Garvis (Pelly), BC
Shipeng Zheng (Pelly)

Equipment ***(brand, model, reference #, colour, work area, and estimated working hours)***
Excavator (CAT 330C, #3302, yellow, no activity)
Excavator (CAT 365C, yellow, BC, no activity)
Dozer (CAT D6R, #1604, yellow, no activity)
Dozer (CAT D9L, #DZ952, yellow, parked at BC, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, no activity)
Grader (CAT 14H, #1407, yellow, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A)
Front Loader (Deere TC54H, yellow, no activity)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
No activity.
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary** ***(time, personnel, work area and description)***	
1	John, Joan. USPD Turbidity Curtain	
	Discussion and Recommendations	
	Engineer commented that the turbidity curtain was fixed on one of the existing monitoring wells at the right side bank. ELR and Labarge pointed out that the protective casing for the monitoring well was slightly bended so the turbidity curtain should be anchored to another element, such as one of the trees near to the water pond.	
	Corrective Actions or Improvements	
	Contractor to anchor the turbidity curtain to a different element.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	**Material**	**Equipment**	**Description**	**Photo**
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USPD	Pond	N/A	Pond water elevation increased about 0.2 cm since the previous shift (estimated water pond elevation 1,089.3 m).	1, 2

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Activities at Borrow C are still on hold. No activity is expected during the following shift.
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 and did not observe any movement.

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	8:30 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	USPD, BC, USAR	
Date:	20141010	**Record #:**	*20141010_NFRDSIS_DSR_36*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +4.4 °C (Max = +8.4 °C; Min = +0.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. Contractor to open lower platform to traffic. **OPEN**	Contractor
20141002_NFRDSIS_DSR_27_3 Corrective measures at slump USAR	Contractor reworked the material affected by the slump with an excavator to prevent water/snow from ponding on the top (**Photo 2**). **CLOSED**	N/A
20141004_NFRDSIS_DSR_31_4 Road showing deformation USAR	Contractor to present details of the proposed solution to repair the road. **OPEN**	Contractor
20141009_NFRDSIS_DSR_35_1 Anchoring of turbidity curtain	No update. Contractor to anchor turbidity curtain to a different element, as the casing for the monitoring well was bending. **OPEN**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (YG/CH2M), USAR
John Garvis (Pelly), BC, BA

Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, USAR)
Excavator (CAT 365C, yellow, BC, no activity)
Dozer (CAT D6R, #1604, yellow, no activity)
Dozer (CAT D9L, #DZ952, yellow, parked at BC, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, USAR, no activity)
Grader (CAT 14H, #1407, yellow, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Front Loader (Deere TC54H, yellow, no activity)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, no activity)
Haul Truck (CAT 773B, #319, yellow, no activity)
Articulated Truck (Deere 400D, #7402, yellow, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
CAT 330 shaped the material affected by slump (see 20141002_NFRDSIS_DSR_27_3 above and Photo 2).
Upstream Plug Dike (USPD)
Engineer measured water pond elevation (El. 1,090.22 m).

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	3
B1	-	-	-	-
C	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USPD	Pond	N/A	Pond water elevation increased about 1 m since the previous shifts (estimated water pond elevation 1,090.22 m).	1

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- No activity is expected on site until discussions on USPD are closed.
- Contractor parked all equipment at Borrow A area at the end of the shift and demobilized.

- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 and did not observe any movement prior or after the remedial action implemented by the Contractor.

Photos:



Photo 1: 20141010_NFRDSIS_USPD_P266_Overview of US pond at the beginning of shift_Looking W



Photo 2: 20141010_NFRDSIS_USAR_P273_Overview of the area affected by the slump at the end of the shift_Looking N



Photo 3: 20141010_NFRDSIS_BA_P274_Overview of Borrow A at the end of shift_Looking NW



Photo 4: 20141010_NFRDSIS_USAR_P275_Overview of USAR at the end of shift_Looking NW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-02	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	-	
Date:	201410024	**Record #:**	*20141024_NFRDSIS_DSR_37*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +0.1 °C (Max = +2.9 °C; Min = -2.8 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. Contractor informed that the required actions will be performed after the as-built survey (by Underhill). **OPEN**	Contractor
20141004_NFRDSIS_DSR_31_4 Road showing deformation USAR	No further activities will be required at USAR or USPD areas. Therefore, no more heavy equipment will access the US area. Future access to the US area will be for small vehicles only. After conversations with YG, it was concluded that the repairs identified are not needed at this stage as the road is on good conditions for traffic with small vehicles. USAR conditions will have to be revaluated if access for heavy vehicles is required at a later stage. **CLOSED**	N/A
20141009_NFRDSIS_DSR_35_4 Anchoring of turbidity curtain	Contractor anchored the turbidity curtain to a tree located at the right side bank. **CLOSED**	N/A

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA
Jake Conn (Pelly), BA
Darcy Clair (Pelly), BA
Jeff Foster (Pelly), BA
Nick de Graff (Labarge), USPD
Jonathan Lowey (ELR), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 7 hours)
Excavator (CAT 365C, yellow, Borrow A, no activity)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Dozer (CAT D9L, #DZ952, yellow, Borrow A, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, Borrow A, no activity)
Articulated truck (Deere 400D, #7402, yellow, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
No activity.
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The execution of the USPD, and associated borrow areas, have been cancelled by the YG. Contractor will close the pending activities for the USAR.
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 one time (beginning of the shift). No movement was observed.

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:40 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	USAR, USPD	
Date:	201410025	**Record #:**	*20141025_NFRDSIS_DSR_38*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -4.4 °C (Max = -0.5 °C; Min = -8.2 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	• The Engineer, ELR and Labarge organized a site visit to observe conditions at construction areas (see Communication 1). The sediment control elements to be installed by the Contractor were discussed. Also, the existing sediment and control elements were inspected.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, USPD
Jake Conn (Pelly), BA, USPD
Darcy Clair (Pelly), BA, USPD
Jeff Foster (Pelly), BA, USPD
Nick de Graff (Labarge), USPD
Jonathan Lowey (ELR), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 1.5 hours respectively)
Excavator (CAT 365C, yellow, Borrow A, no activity)

Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Dozer (CAT D9L, #DZ952, yellow, Borrow A, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, Borrow A, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, 2 hours)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, Borrow A, no activity)
Articulated truck (Deere 400D, #7402, yellow, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
At the end of the shift, Contractor mobilized CAT 330 to install a berm and create a ditch at the end of the road. These elements were required so the sediment rich runoff water from USAR will not reach the US headpond. Activity not completed at the end of the shift.
Upstream Plug Dike (USPD)
Contractor started the removal of the turbidity curtain. Activity not completed at the end of the shift as the curtain is trapped by the ice on the pond.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	Nick, Jonathan, Joan. USAR and USPD sediment and control elements
	Discussion and Recommendations
	A site visit was organized to observe the working area and evaluate the need of sediment of control measures. Engineer pointed out that an email with observations from ELR was received. A summary of the observations performed can be found below: 1. Removal of the turbidity curtain. Environmental monitor recommended that this activity should be completed as soon as possible as the volume of water at the pond was decreasing. Also, noted that ice was forming on the surface. 2. A berm at the end of the USAR was required to close the ramp into the pond. This activity is required to intercept the sediment rich runoff water that could flow on the road platform and uphill ditch. A ditch or infiltration pond could be installed so water can infiltrate into the existing rock drain at the end of the road. 3. A new section of silt fence is required along the last section of USAR. 4. Repair damage observed on the existing silt fence, as well as the sections that were not properly installed. Note that some small boulders ruled downhill during construction activities. The rocks were intercepted by the silt fence.

	5. Ditches at the end of the ramp (approx. Stn. 0+400) are required to drain water. Engineer noted that water could pond on the flat section during a rain event. 6. Some logs and 2 small piles of disturbed organic material were observed (approx. 8 m3 each). The removal of the referred elements is not required. 7. A small berm and a ditch at the turn around area are required to divert water away from the area affected by the slump. Note that the area was re-worked by the Contractor on a previous shift to improve stability conditions.
	Corrective Actions or Improvements
	Engineer commented the observations and required actions with the Contractor. The required actions were not completed before the end of the shift. Contractor to continue during the next day shift.
	Status at the end of the shift (Open, Closed or N/A) — **OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USPD and USAR	Along the USAR and USPD right hand shore	Hand tools	A site visit to observe the US construction areas was organized (see Communication 1). Contractor installed the berm and crated a new ditch at the end of the road. The rest of the required activities were not completed before the end of the shift.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to continue with the installation and maintenance of sediment control elements at USAR area. Also, plans to re-open ditches and drainage outlets at haul road and at the access to Borrow C area.
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 one time (at noon), and did not observe any movement.
- The mobilization time for the CAT330 excavator to USAR was approximately 1 hour.

Photos:



Photo 1: 20141025_NFRDSIS_USPD_P290_View of US headpond and turbidity curtain_Looking N

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:25 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Overcast, light snow	
Subject:	Day Shift Report	**Work Areas*:**	USAR, Haul Road	
Date:	201410026	**Record #:**	*20141026_NFRDSIS_DSR_39*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -4.9 °C (Max = -2.0 °C; Min = -7.7 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	Contractor completed the installation of sediment and control measures at the USAR / USPD area (refer to Sections 2, 4 and 7 below).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. **OPEN**	Contractor
20141025_NFRDSIS_DSR_38_4	Contractor completed the installation and maintenance of sediment control elements at USAR area (**Photo 5**). **CLOSED**	N/A

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, USAR, USPD
Jake Conn (Pelly), BA, USAR, USPD
Darcy Clair (Pelly), BA, USAR, USPD
Jeff Foster (Pelly), BA, USAR, USPD
Nick de Graff (Labarge), USPD
Jonathan Lowey (ELR), USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, USAR, 5.5 hours)

Excavator (CAT 365C, yellow, Borrow A, no activity)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Dozer (CAT D9L, #DZ952, yellow, USAR, ripping frozen ground at USAR, 1 hour including mobilization time)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, Borrow A, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, Borrow A, no activity)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
CAT 330 completed the execution of ditches and berms to control runoff water along the road (**Photo 5**). Some support from CAT D9 dozer was required to break the frozen ground with the ripper. Then, CAT 330 was mobilized to the haul road to re-open the existing drainage outlets. Afterwards, Contractor returned to USAR area to install new silt fences. The sections damaged or the ones presenting deficiencies were also re-installed (two persons, 2 hours each).
Upstream Plug Dike (USPD)
Contractor did not continue with the removal of the turbidity curtain as a boat was required to remove the curtain. No boat was available during the shift. Note that the removal of the curtain was not completed during the previous shift as it was trapped by the ice on the pond.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Jeff, Joan. USAR sediment and control elements.
	Discussion and Recommendations
	A site visit was organized to observe the berm and infiltration pond installed by the Contractor at the end of the previous day shift (approximate Station 0+817). Engineer recommended that a ditch across the road should be installed (approximate Station 0+810). The ditch will intercept the surface water on the road and divert it to the infiltration pond. Also, recommended that the downstream end of the infiltration pond should be cleaned to increase permeability (at the rock drain face). The need for a small opening at the right hand side safety berm (approximate Station 0+400), and a ditch to drain water from Station 0+420 to 0+455 was also commented during the visit. Water ponded at the referred locations was observed by the Engineer on previous day shifts.

	Corrective Actions or Improvements	
	Contractor installed the ditch across the USAR end and cleaned the DS end of the infiltration pond as per Engineer's recommendations. Also, created a ditch at the right hand side from Station 0+420 to 0+455 (field estimate). Finally, opened a small section of the existing safety berm at the right hand side (Station 0+400) to allow free drainage of water. Some support from the D9 dozer was required as the ground was frozen.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Sand and gravel	Hand tools	Contractor placed some sand and gravel (less than 2 m^3) to anchor the silt fences. The excavation of trenches by hand was very complicated as the ground was frozen.	-
B1	-	-	-	-
C	-	-	-	-
	-	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
USAR	Station 0+400	CAT 330	Contractor opened a drain on the right hand side safety berm. Water ponding at this location was observed on a previous day shift.	-
USAR	Station 0+420 to 0+455	CAT 330	Contractor installed a ditch at the right hand side of the road to drain water. Water ponding at this location was observed on a previous day shift.	-
USAR	Station 0+810 to 0+817	CAT 330	Contractor installed a ditch across the USAR road at Station 0+810 (field estimate). Then, cleaned the downstream wall of the infiltration sump at the end of the USAR to increase permeability.	-
USAR	Along the USAR (US headpond left hand shore)	Hand tools	Contractor installed a new section of silt fence. A new section was required to close the ramp at the end of USAR road. Also, Contractor maintained the existing silt fences (installed by the Contractor on previous day shifts)	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to start with the activities on Borrow D, and to re-open ditches at the access to Borrow C area.
- Engineer visited the area affected by a slump on the night shift from September 30 to October 1 one time (at 4:30 pm), and did not observe any movement.
- Underhill is mobilizing personnel to the Faro Mine site so the as-built survey can start during the following shift. Ideally, Underhill should start at Borrow D. Then, the Contractor can re-open the lower platform to traffic.

Photos:



Photo 1: 20141026_NFRDSIS_USAR_P303_Berm installed at the abandoned turn around to divert water away from area affected by the slump_Looking N

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	Haul Road	
Date:	201410027	**Record #:**	*20141027_NFRDSIS_DSR_40*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -4.8 °C (Max = -3.0 °C; Min = -6.5 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	Turbidity curtain at the upstream headpond has not been removed by the Contractor (see Communication 2).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	No update. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, USAR, USPD
Jake Conn (Pelly), BA, USAR, USPD
Darcy Clair (Pelly), BA, USAR, USPD
Jeff Foster (Pelly), BA, USAR, USPD
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, no activity)
Excavator (CAT 365C, yellow, Borrow A, no activity)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Dozer (CAT D9L, #DZ952, yellow, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, no activity)

Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, Borrow A, no activity)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
No activity (**Photo 2**).
Upstream Plug Dike (USPD)
No activity (**Photo 2**).

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Joan. Turbidity curtain at US headpond.	
	Discussion and Recommendations	
	Engineer reminded that the removal of the turbidity curtain was still pending. The Contractor commented that the ice at the pond was too thick. The curtain was trapped so removal from the shore was not practical. Also, commented that the use of a boat to reach the curtain sections trapped was not safe due to the presence of ice.	
	Corrective Actions or Improvements	
	Contractor and Engineer to comment on possible options to remove the turbidity curtain.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	John, Joan. As-Built survey and Borrow D configuration.	
	Discussion and Recommendations	
	Engineer commented that Underhill personnel will start the as-built survey within the day shift. The plan was to start with Borrow D survey so as to allow the Contractor to do the required activities to reestablish the traffic at the lower platform.	
	Corrective Actions or Improvements	
	Underhill arrived at 3:00 pm. As-built survey for Borrow D was completed during the afternoon. In the meantime, the Contractor was working at the pipeline crossings.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	N/A	GPS	Underhill completed the as-built survey at the borrow area.	1
B1	-	-	-	-
C	-	-	-	-
D	N/A	GPS	Underhill completed the as-built survey at the borrow area.	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), the Contractor plans to start with the activities on Borrow D.
- Underhill arrived at 3:00 pm and started activities at Borrow A. Underhill completed the survey of borrow areas A and D. The plan for the next shift is to complete the as-built survey for USAR and then start with the survey activities at Borrow C.

Photos:



Photo 1: 20141027_NFRDSIS_BA_P313_Underhill collecting GPS points at Borrow A_Looking NW



Photo 2: 20141027_NFRDSIS_USPD_P315_View of the US area_Looking NE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	Haul Road	
Date:	201410028	**Record #:**	*20141028_NFRDSIS_DSR_41*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -5.8 °C (Max = -3.9 °C; Min = -7.6 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The safety berm between the lower and upper platforms at Borrow D was re-shaped.
1.2	Environmental	The Contractor could not remove the turbidity curtain from the right hand side shore (see Communication 1).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	Contractor started activities at Borrow D (see Communication 1). Not completed before the end of the shift. **OPEN**	Contractor
20141027_NFRDSIS_DSR_40_2 Removal of turbidity curtain	The removal of the turbidity curtain was not completed (**Photos 1** and **3**). Contractor to complete the removal of the curtain from the US headpond. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Erik Pit (YG), USPD
John Garvis (Pelly), BA, USAR, USPD
Jake Conn (Pelly), BA, USAR, USPD
Darcy Clair (Pelly), BA, USAR, USPD
Jeff Foster (Pelly), BA, USAR, USPD
John John (Underhill), USAR, BC

Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, various, a total of 9 hours including mobilization time)
Excavator (CAT 365C, yellow, Borrow A, no activity)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Dozer (CAT D9L, #DZ952, yellow, Borrow D, a total of 7.5 hours including mobilization time)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, Borrow A, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow D, 1.5 hours)
Haul Truck (CAT 773B, #317, yellow, Haul Road, no activity)
Haul Truck (CAT 773B, #318, yellow, Haul Road, no activity)
Haul Truck (CAT 773B, #319, yellow, Haul Road, no activity)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
Underhill completed the as-built survey for the access road and the associated sediment and control elements installed by Pelly. Then, started the as-built survey of Borrow C area.
Upstream Plug Dike (USPD)
The Contractor mobilized the CAT 330 excavator to assist with the removal of the turbidity curtain (a total of 2 hours including mobilization time). The removal could not be completed as the curtain was trapped on the ice (**Photo 3**). The Engineer noted that the surface of the US head pond was all frozen (**Photo 1**).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. Borrow D activities
	Discussion and Recommendations
	The Engineer observed that the Contractor was pushing existing material at the lower platform with the D9 dozer. The Engineer reminded that the excess of material could be used to buttress the cut wall created during the borrow activities. Also, that some material could be used to increase the dimensions of the safety berm between the upper and lower platforms. Finally, reminded that openings for drainage were required at the southwestern safety berm. The Contractor explained that the dozer will be ripping and piling the existing material. Then, the front loader will be used to buttress the cut slope. Also, that the CAT 330 will be used to execute the required activities along the safety berms. In addition, the Contractor noted that the ground was frozen so the excavation of existing material was slow.

	Corrective Actions or Improvements	
	The Contractor continued with the activities at Borrow D.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan. Turbidity curtain at US headpond.	
	Discussion and Recommendations	
	The Engineer reminded that the removal of the turbidity curtain was required due to environmental reasons. As commented with YG, the removal if the curtain is required to return the isolated areas of the pond to the fish. The Contractor commented that the removal of the turbidity curtain with a boat was not safe. Also, informed that they will mobilize the CAT 330 excavator to the right hand side shore to pull the curtain. The Engineer informed that existing elements at the right hand side shore shall be preserved, including the 6 monitoring wells and a topographical bench mark located on a tree beside the access road. Also, recommended that the excavator should try to break the ice from the shore to the extent possible.	
	Corrective Actions or Improvements	
	The Contractor mobilized the excavator to the right hand side shore. Then, pulled the turbidity curtain. The removal of the turbidity curtain could not be completed as the connection pins failed. As a result, some sections of curtain remained in the pond (**Photo 3**). Contractor to comment on possible options to remove the remaining sections of turbidity curtain from the pond.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	John, Joan. Borrow D activities.	
	Discussion and Recommendations	
	Engineer observed that the Contractor was reworking some areas at the lower platform of Borrow D. The Contractor informed that more work was required as the lower platform was not practical as it was too irregular. Therefore, the Contractor decided to move more material with the D9 dozer to create a homogeneous platform.	
	Corrective Actions or Improvements	
	Contractor did not complete the activities before the end of the shift.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	GPS	Underhill started the as-built survey at the borrow area (lower platform). Activity not completed during the day shift.	-
D	N/A	CAT 330 excavator, D9 dozer and CAT 988 front loader	The Contractor removed the excess of material at the lower platform with the dozer. The front loader was used to buttress the toe of the existing cut walls. At the same time, the excavator was shaping the existing safety berm between the lower and upper. CAT 330 was at Borrow D a total of 3 hours (including mobilization time).	2

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to complete activities at the Borrow D and demobilize from the Faro Mine site.
- During the following shift (day shift), Underhill will complete the as-built survey, including the Borrow C.

Photos:



Photo 1: 20141028_NFRDSIS_USPD_P318_Overview of the US area_Looking E



Photo 2: 20141028_NFRDSIS_BD_P327_Excavator shaping the safety berm_Looking SE

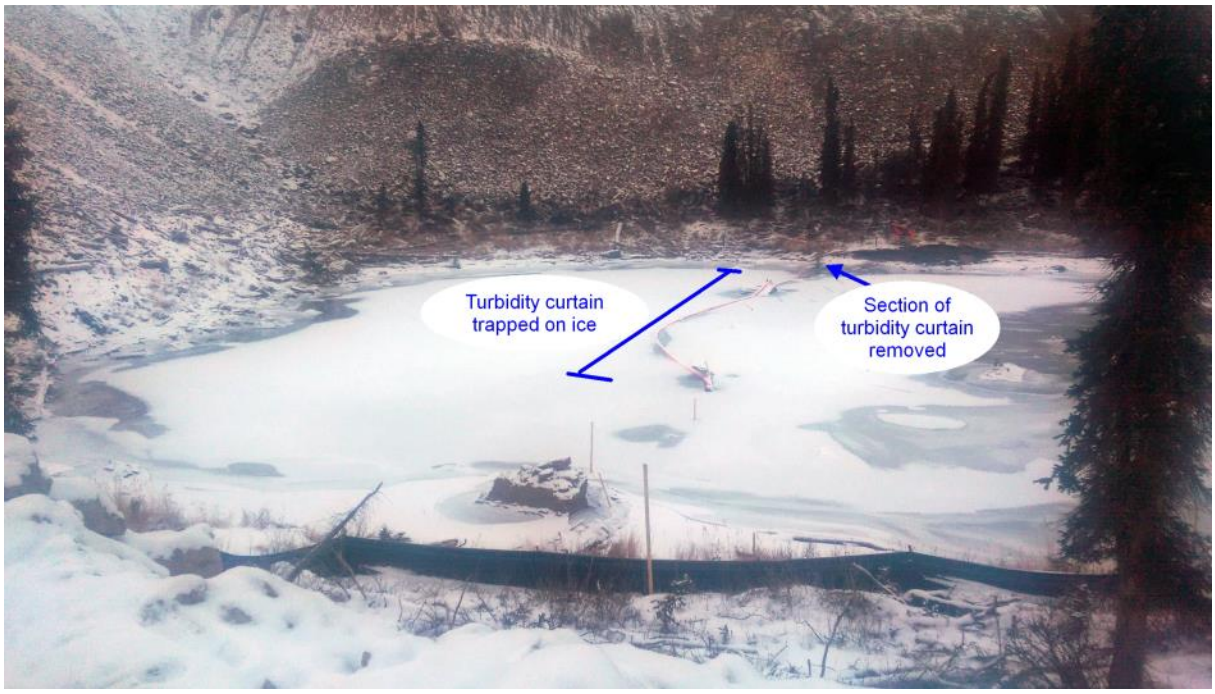


Photo 3: 20141028_NFRDSIS_USPD_P328_Sections of turbidity curtain that remained on the pond_Looking NW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:00 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	Haul Road	
Date:	20141029	**Record #:**	*20141029_NFRDSIS_DSR_42*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -5.1 °C (Max = -1.9 °C; Min = -8.3 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20140924_NFRDSIS_DSR_11_2 Borrow D configuration	Contractor completed activities at Borrow D as per the requirements from Tees. No further comments were received from Tees regarding the Borrow D configuration. **CLOSED**	-
20141027_NFRDSIS_DSR_40_2 Removal of turbidity curtain	No activity. Refer to Communication 1. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, BA, Workshop, Haul Road
Jake Conn (Pelly), BD, BA
Darcy Clair (Pelly), BD, BA
Jeff Foster (Pelly), BD, BA
Shipeng Zheng (Pelly), BD, Workshop, Haul Road
John John (Underhill), BC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, Borrow D, a total of 3.5 hours including mobilization time)

Excavator (CAT 365C, yellow, Borrow A, no activity)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Dozer (CAT D9L, #DZ952, yellow, Borrow D, a total of 3 hours including mobilization time)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, Haul Road, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Haul Road, no activity)
Haul Truck (CAT 773B, #317, yellow, Haul Road, no activity). **Photo 2**
Haul Truck (CAT 773B, #318, yellow, Haul Road, no activity). **Photo 2**
Haul Truck (CAT 773B, #319, yellow, Haul Road, no activity). **Photo 2**
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Upstream Access Road (USAR)
No activity.
Upstream Plug Dike (USPD)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John (Pelly), Joan. Turbidity curtain at US headpond.	
	Discussion and Recommendations	
	The Engineer reminded that the turbidity curtain was still trapped (**Photo 1**). As discussed during previous shifts, the Contractor commented that the removal of the curtain with a boat was not safe. Also, informed that their plan is to wait some weeks and then cut the thick ice with a power saw. The Engineer reminded that the removal of the curtain was required before the pond area US to the curtain will be frozen. If so, some fish trapped at the US side of the pond could die.	
	Corrective Actions or Improvements	
	No action was performed before the end of the shift.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
2	Joan, John (Underhill), Chad B. (CH2M/YG). Borrow C and USAR activities.	
	Discussion and Recommendations	
	The Engineer commented to YG that there was no sufficient time to complete the survey of the sorted Protection Rock Fill piles (RPF) at Borrow C before the end of the shift. The survey of the piles at the spoil areas could not be completed either. Also, explained that Underhill will have to return the following shift to complete the activities if completion was required.	

	Corrective Actions or Improvements	
	The as-built survey of the referred elements was not required to validate TA bill items. Therefore, the as-built of the sorted RPF piles at BC and the piles of material at the spoil area (USAR) were not completed. Underhill was demobilized at the end of the shift. The Engineer informed the Contractor before Underhill was demobilized.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**
4	Joan, John (Pelly), R. Anderson (Tees). Demobilization of equipment.	
	Discussion and Recommendations	
	Pelly informed Tees that some equipment will be parked on top of the haul road (**Photo 2**). The Contractor explained that the trucks used to haul the referred equipment will not be able to drive on the ramp to the Borrow A area. Also, informed that their plan was to demobilize equipment every time they have a truck available so some equipment could be parked at the Faro Mine for some weeks. Tees commented that there was enough space on the haul road so the equipment could be parked on the southwestern side of the road. In addition, the Engineer recommended the Contractor that all the parts and elements should be properly stored, including the geotextiles and silt fences not used during construction.	
	Corrective Actions or Improvements	
	The Contractor parked the excavators, haul trucks, front loader and dozers on top of the haul road. Also, informed that the geotextiles and other parts were stored either on the haul road or the workshop.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	N/A	GPS	Underhill completed the as-built survey at the borrow area. As per conversations with YG, some of the small piles of sorted PRF were not surveyed. This activity was not completed as there was no time before the end of the shift. Underhill was demobilized from site. Note that the Engineer has field volume estimates for the PRF piles not surveyed by Underhill.	-
D	N/A	CAT 330 excavator and D9 dozer	The Contractor removed the excess of material at the lower platform with the dozer. Also, created a uniform platform for traffic. Finally, excavated some openings for drainage on the southwestern safety berm with the excavator.	3, 4, 5

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor completed the construction activities approved by YG and demobilized from site. USAR construction completed.
- Underhill completed the as-built survey, including the Borrow C. Underhill demobilized from site at the end of the shift.
- BGC demobilized from site at the end of the shift.

Photos:



Photo 1: 20141029_NFRDSIS_USPD_P329_View of the sections of turbidity curtain trapped at the US headpond_Looking E



Photo 2: 20141029_NFRDSIS_Haul Road_P332_Haul trucks parked at the haul road_Looking SE



Photo 3: 20141029_NFRDSIS_BD_P333_Oppening on safety berm for drainage_Looking SW



Photo 4: 20141029_NFRDSIS_BD_P334_Upper platform and safety berm_Looking NW



Photo 5: 20141029_NFRDSIS_BD_P335_View of the material placed to buttress the toe of existing cut wall_Looking E

APPENDIX D
XRF TESTING PROGRAM

XRF TESTING PROGRAM - LIST OF CONTENTS

ID	Description	Date
1	Drawing FRNF-XD-US-05 – Sampling locations	March 17, 2015
2	XRF Test Results (Table)	November 19, 2014
3	XRF Test Results – Existing NFRD Rock Fill (Table)	November 19, 2014
4	Certificate of Calibration for XRF Analyzer from Elemental Controls Ltd.	July / August, 2014
5	Certificate of Analysis for XRF Analyzer from Elemental Controls Ltd.	January 11, 2007
6	XRF Laboratory Test Results - Certificate of Analysis - SGS Canada Inc.	November 25, 2014

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "AS-BUILT REPORT UPSTREAM ELEMENTS," AND DATED FEBRUARY 2015.
3. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT 2011. CONTOUR INTERVAL IS 1 m.
4. PROJECTION IS NAD 83, UTM ZONE 8N.
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.

BORROW C - UPPER PLATFORM

BORROW C - LOWER PLATFORM

UPSTREAM HEADPOND

HAUL ROAD

BORROW D

NORTH FORK ROSE CREEK

BORROW A

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
- XRF ANALYZER - SAMPLING LOCATION
- XRF ANALYZER - CALIBRATION

X:\Projects\05S3 YK-Gov\00\CAD\NORTH FORK ROCK DRAIN SEEPAGE COLLECTION\PRODUCTION\AS BUILT FIGURES\FRNF-XD-US-05_REV_0.dwg Layout: D-SIZE Plot Date: Mar 18,15 Time: 10:09 PM

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	15	03	17	WKL	JR	JWC	GWF	AS-BUILT 2015

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

DRAWN BY: WKL	CHECK DRAWING: GCB
DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: UPSTREAM XRF TEST AND CALIBRATION SAMPLING LOCATION

SCALE:	DWG No.:	REV.:
1:2,000	FRNF-XD-US-05	0

NFRD SIS (FARO MINE) - XRF TESTING PROGRAM
FILL SAMPLES FOR CONSTRUCTION OF UPSTREAM ELEMENTS

Sample ID	Sample By	Fill Type	Approximate Location			XRF Test Details			Comments
			Work Area	Easting	Northing	Test By	Zn (ppm)	Error (±)	
s1	JR	RPF	BC	585,234	6,914,244	JR	1,654.98	71.32	Yellowish material present at borrow floor. Entrance to upper bench. Material not approved. Do not mix.
s2-a	JR	RPF	BC	585,264	6,914,223	JR	298.61	25.26	Sample from pile of sorted RPF at upper platform. First pile. Approved
s2-b	JR	RPF	BC	585,264	6,914,223	JR	634.73	34.90	Sample from pile of sorted RPF at upper platform. First pile. Approved
s3-a	JR	RPF	BC	585,273	6,914,218	JR	51.54	14.30	Sample from pile of sorted RPF at upper platform. First pile. Approved
s3-b	JR	RPF	BC	585,273	6,914,218	JR	168.44	18.85	Sample from pile of sorted RPF at upper platform. First pile. Approved
s4	JR	RPF	BC	585,276	6,914,216	JR	334.20	27.96	Sample from pile of sorted RPF at upper platform. First pile. Approved
s5	JR	RPF	BC	585,278	6,914,214	JR	123.23	16.84	Sample from pile of sorted RPF at upper platform. First pile. Approved
s6	JR	RPF	BC	585,269	6,914,233	JR	<LOD	69.94	Sample from rocks broken with the CAT 330 and rock hammer. Upper platform. First pile. Approved
s7	JR	RPF	BC	585,275	6,914,231	JR	468.07	105.88	Sample from rocks broken with the CAT 330 and rock hammer. Test on rocks with fines attached for comparison. Approved.
s8	JR	RPF	BC	585,277	6,914,226	JR	<LOD	86.47	Sample from rocks broken with the CAT 330 and rock hammer. Upper platform. First pile. Approved
s9	JR	RPF	BC	585,301	6,914,187	JR	<LOD	97.97	Sample from rocks broken with the CAT 330 and rock hammer. Upper platform. First pile. Clean rock fragments. Approved.
s10	JR	RPF	BC	585,297	6,914,204	JR	683.85	66.92	Sample from rocks broken with the CAT 330 and rock hammer. Upper platform. First pile. Rocks with fines attached. Approved.
s11	CP	ROM	BD	585,431	6,912,414	JR	553.90	29.34	At borrow D. Fill for USAR ramp construction . Run off mine, fine fraction. Approved
s12	CP	ROM	BD	585,435	6,912,410	JR	180.50	23.78	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s13	CP	ROM	BD	585,441	6,912,404	JR	204.47	19.85	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s14	CP	ROM	BD	585,446	6,912,399	JR	97.15	12.61	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s15	CP	ROM	BD	585,452	6,912,393	JR	125.90	13.96	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s16	CP	ROM	BD	585,460	6,912,389	JR	177.39	22.03	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s17	CP	ROM	BD	585,463	6,912,386	JR	141.69	17.26	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s18	CP	ROM	BD	585,465	6,912,383	JR	100.77	16.42	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s19	CP	ROM	BD	585,468	6,912,380	JR	274.33	22.64	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s20	CP	ROM	BD	585,472	6,912,377	JR	95.93	15.61	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s32	CP	ROM	BD	585,487	6,912,360	JR	162.64	17.56	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s33	CP	ROM	BD	585,492	6,912,356	JR	459.11	29.91	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s34	CP	ROM	BD	585,496	6,912,351	JR	379.63	23.55	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s35	CP	ROM	BD	585,501	6,912,346	JR	156.85	17.66	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s36	CP	ROM	BD	585,506	6,912,342	JR	52.13	13.57	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s41	CP	ROM	BD	585,531	6,912,307	JR	130.41	15.16	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s42	CP	ROM	BD	585,531	6,912,307	JR	311.09	24.76	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s43	CP	ROM	BD	585,538	6,912,304	JR	101.50	17.45	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s44	CP	ROM	BD	585,541	6,912,302	JR	160.82	19.22	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s45	CP	ROM	BD	585,547	6,912,300	JR	182.39	19.04	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s46	CP	ROM	BD	585,366	6,912,481	JR	53.97	10.38	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s47-lab	CP	ROM	BD	585,380	6,912,474	JR	70.05	12.34	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s48-a	CP	ROM	BD	585,383	6,912,467	JR	53.74	10.85	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s48-b	CP	ROM	BD	585,383	6,912,467	JR	53.04	10.79	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s49	CP	ROM	BD	585,390	6,912,464	JR	191.03	19.33	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s50	CP	ROM	BD	585,393	6,912,463	JR	260.47	20.45	At borrow D. Fill for USAR ramp construction. Run off mine. Approved.
s51-a	JR	RPF	BC	585,284	6,914,243	JR	1,341.79	53.92	Sample from pile of sorted RPF. Upper bench. Rock with alteration (reddish). Not approved. Do not recommend continuing to North as there is more.
s51-b	JR	RPF	BC	585,284	6,914,243	JR	675.06	38.53	Sample from pile of sorted RPF. Upper bench. Second test from same sample bag. Elevated but acceptable. Recommend caution and close monitoring.
s52	JR	RPF	BC	585,291	6,914,243	JR	698.52	39.22	Sample from pile of sorted RPF. Upper bench. Approved.
s53	JR	RPF	BC	585,295	6,914,228	JR	94.82	15.81	Sample from pile of sorted RPF. Upper bench. Approved.
s54	JR	RPF	BC	585,298	6,914,225	JR	192.12	21.81	Sample from pile of sorted RPF. Upper bench. Approved.
s55	JR	RPF	BC	585,312	6,914,220	JR	965.66	47.40	Sample from pile of sorted RPF. Upper bench. Some reddish staining. Approved but close monitoring.
s56	JR	RPF	BC	585,303	6,914,205	JR	261.41	23.46	Sample from pile of sorted RPF. Upper bench. Approved.
s57	JR	RPF	BC	585,298	6,914,198	JR	443.24	31.56	Sample from pile of sorted RPF. Upper bench. Approved.
s58-a	JR	RPF	BC	585,292	6,914,215	JR	1,797.80	61.74	Sample from pile of sorted RPF. Upper bench. Reddish staining. Elevated, test more specimens from same sample bag.
s58-b	JR	RPF	BC	585,292	6,914,215	JR	165.79	22.36	Sample from pile of sorted RPF. Upper bench. Grey. Same sample bag and low. Perform a third test. Approved
s58-c	JR	RPF	BC	585,292	6,914,215	JR	663.09	40.14	Sample from pile of sorted RPF. Upper bench. Some reddish staining. Area approved but close monitoring.

NFRD SIS (FARO MINE) - XRF TESTING PROGRAM
FILL SAMPLES FOR CONSTRUCTION OF UPSTREAM ELEMENTS

Sample ID	Sample By	Fill Type	Approximate Location			XRF Test Details			Comments
			Work Area	Easting	Northing	Test By	Zn (ppm)	Error (±)	
s59	JR	RPF	BC	585,292	6,914,202	JR	428.76	37.28	Sample from pile of sorted RPF. Upper bench. Approved.
s61-a	JR	RPF	BC	585,254	6,914,077	JR	444.68	31.39	BC Lower Bench (no activity by Contractor)
s61-b-lab	JR	RPF	BC	585,254	6,914,077	JR	329.36	26.79	BC Lower Bench (no activity by Contractor)
s62-a	JR	RPF	BC	585,301	6,914,070	JR	349.54	35.67	BC Lower Bench (no activity by Contractor). Pile in front of dump face. Test one on sample with no staining (grey). Ok.
s62-b	JR	RPF	BC	585,301	6,914,070	JR	1,410.03	63.87	BC Lower Bench (no activity by Contractor). Pile in front of dump face. Test two. Reddish staining, sort with care or remove. Removed.
s63-a	JR	RPF	BC	585,306	6,914,073	JR	63.94	12.39	BC Lower Bench (no activity by Contractor). Test on greyish sample. Approved.
s63-b	JR	RPF	BC	585,293	6,914,081	JR	536.76	68.49	BC Lower Bench (no activity by Contractor). Test on sample with yellowish/orangish staining for comparison on same sample bag. Approved.
s64	JR	RPF	BC	585,293	6,914,081	JR	193.21	21.19	BC Lower Bench (no activity by Contractor). Greyish sample. Approved.
s65-a	JR	RPF	BC	585,280	6,914,095	JR	2,011.61	62.53	BC Lower Bench (no activity by Contractor). Red staining. Remove pile. Test another to check other rocks with alteration.
s65-b	JR	RPF	BC	585,280	6,914,095	JR	3,485.42	76.87	BC Lower Bench (no activity by Contractor). Pile in front of dump face. Test 2, sample with reddish/yellowish staining. Remove pile. Test a grey sample.
s65-c	JR	RPF	BC	585,280	6,914,095	JR	189.24	17.52	BC Lower Bench (no activity by Contractor). Pile in front of dump face. Test 3 on grey sample. Better remove pile as there are too many rocks with alteration.
s65-d	JR	RPF	BC	585,280	6,914,095	JR	130.27	18.47	BC Lower Bench (no activity by Contractor). Dump rock slope. Material behind the pile. Grey sample. Approved.
s66-a	JR	RPF	BC	585,273	6,914,110	JR	202.61	22.21	BC Lower Bench (no activity by Contractor). Pile in front of dump face. Test on grey sample
s66-b	JR	RPF	BC	585,273	6,914,110	JR	7,334.94	136.69	BC Lower Bench (no activity by Contractor). Pile in front of dump face. Test on sample with red staining (same bag). Remove pile, do not mix. Removed
s67-a	JR	RPF	BC	585,264	6,914,124	JR	165.10	19.21	BC Lower Bench (no activity by Contractor). Pile in front of dump face. Grey sample
s67-b	JR	RPF	BC	585,264	6,914,124	JR	1,170.70	55.97	BC Lower Bench (no activity by Contractor). Pile in front of dump face. Second test on same sample bag. Reddish staining. Monitoring required or remove.
s67-d-lab	JR	RPF	BC	585,264	6,914,124	JR	560.88	38.99	BC Lower Bench (no activity by Contractor). Grey sample. Sample sent to Lab
s68	JR	RPF	BC	585,249	6,914,139	JR	207.73	22.90	BC Lower Bench (no activity by Contractor). Grey sample. Approved for GRF and RPF if required
s69	JR	RPF	BC	585,308	6,914,164	JR	224.81	23.32	BC Intermediate Bench (no activity by Contractor). Grey sample. Approved
s72-a	JR	RPF	BC	585,328	6,914,208	JR	111.54	14.28	BC upper bench, flat area north to main platform. There are a lot of rocks presenting alteration. This is a greyish sample. Approved.
s72-b	JR	RPF	BC	585,328	6,914,208	JR	786.35	40.39	BC upper bench, flat area north to main platform. There are a lot of rocks presenting alteration. This is a sample with organism staining. Sort with monitoring.
s73	JR	RPF	BC	585,350	6,914,205	JR	209.01	20.29	BC upper bench, flat area north to main platform. There are a lot of rocks presenting alteration. This is a greyish sample. Approved.
s74-a	JR	RPF	BC	585,344	6,914,180	JR	622.64	34.02	BC upper bench, flat area north to main platform. There are a lot of rocks presenting alteration. This is a sample with yellowish staining. Sort with monitoring.
s74-b	JR	RPF	BC	585,344	6,914,180	JR	31.08	10.80	BC upper bench, flat area north to main platform. There are a lot of rocks presenting alteration. This is a greyish sample. Approved.
s75	JR	RPF	BC	585,372	6,914,164	JR	128.44	17.75	BC upper bench, alongside of road to highest area at upper platform. Greyish sample. Approved.
s76	JR	RPF	BC	585,394	6,914,149	JR	160.59	20.59	BC upper bench, alongside of road to highest area at upper platform. Greyish sample. Approved.
s77	JR	RPF	BC	585,394	6,914,173	JR	240.86	24.42	BC upper bench, highest area at upper platform. Greyish sample. Approved.
s78	JR	RPF	BC	585,373	6,914,194	JR	303.28	24.20	BC upper bench, highest area at upper platform. Greyish sample. Approved.
s79	JR	RPF	BC	585,374	6,914,209	JR	53.58	12.45	BC upper bench, highest area at upper platform. Greyish sample. Approved.
s80	CP	GRF	USAR	585,004	6,913,152	JR	99.86	17.14	GRF from BC being placed at USAR. Approved.
s81-a	CP	GRF	USAR	584,992	6,913,157	JR	90.52	16.78	GRF from BC being placed at USAR. Approved.
s81-b-lab	CP	GRF	USAR	584,992	6,913,157	JR	174.79	21.30	GRF from BC being placed at USAR. Approved.
s82	CP	GRF	USAR	584,969	6,913,158	JR	139.43	17.57	GRF from BC being placed at USAR. Approved.
s83-a	CP/JR	GRF	USAR	584,893	6,913,146	JR	714.88	37.59	GRF from BC being placed at USAR. Approved but monitor.
s83-b	CP/JR	GRF	USAR	584,893	6,913,146	JR	769.03	40.25	GRF from BC being placed at USAR. Approved but monitor.
s84	CP/JR	GRF	USAR	584,912	6,913,166	JR	405.98	26.13	GRF from BC being placed at USAR. Approved.
s85	CP/JR	GRF	USAR	584,932	6,913,163	JR	193.59	21.30	GRF from BC being placed at USAR. Approved.
s86	JR	GRF	BC	585,408	6,914,147	JR	495.58	31.42	BC Lower bench. GRF being hauled to USAR. Approved.
s87	JR	GRF	BC	585,261	6,914,143	JR	1,256.47	51.08	BC Lower bench. GRF being hauled to USAR. Test on sample presenting alteration (reddish). Do second test but recommend monitoring.
s87-b	JR	GRF	BC	585,261	6,914,143	JR	397.40	32.67	BC Lower bench. GRF being hauled to USAR. Test on sample presenting some alteration (minor) but mainly grey. Approved but continue monitoring.
s88	JR	GRF	BC	585,269	6,914,135	JR	544.99	35.10	BC Lower bench. GRF being hauled to USAR. Some reddish but mainly grey. Approved.
s89	JR	RPF	BC	585,408	6,914,082	JR	123.78	17.05	BC Upper bench corner. Test performed to confirm good quality fill to be sorted as Contractor wants to abandoned the area due to presence of altered material.
s90	JR	RPF	BC	585,403	6,914,080	JR	312.01	27.76	BC Upper bench corner. Test performed to confirm good quality fill to be sorted as Contractor wants to abandoned the area due to presence of altered material.
s91	JR	RPF	BC	585,408	6,914,078	JR	899.61	41.84	BC Upper bench corner. Test performed to confirm good quality fill to be sorted as Contractor wants to abandoned the area due to presence of altered material.
s92	JR	RPF	BC	585,415	6,914,074	JR	361.38	26.64	BC Upper bench corner. Test performed to confirm good quality fill to be sorted as Contractor wants to abandoned the area due to presence of altered material.

NFRD SIS (FARO MINE) - XRF TESTING PROGRAM
FILL SAMPLES FOR CONSTRUCTION OF UPSTREAM ELEMENTS

Sample ID	Sample By	Fill Type	Approximate Location			XRF Test Details			Comments
			Work Area	Easting	Northing	Test By	Zn (ppm)	Error (±)	
s93-a	JR	RPF	BC	585,423	6,914,074	JR	564.11	38.81	BC Upper bench corner. Test performed to confirm good quality fill to be sorted as Contractor wants to abandoned the area due to presence of altered material.
s93-b	JR	RPF	BC	585,423	6,914,074	JR	349.46	35.42	BC Upper bench corner. Test performed to confirm good quality fill to be sorted as Contractor wants to abandoned the area due to presence of altered material.
s94-a	JR	RPF	BC	585,255	6,914,134	JR	496.96	29.87	Lower bench. Material pushed down with D9 from the intermediate benches. Approved.
s94-b	JR	RPF	BC	585,255	6,914,134	JR	452.93	33.49	Lower bench. Material pushed down with D9 from the intermediate benches. Approved.
s95	JR	RPF	BC	585,285	6,914,338	JR	325.27	27.81	Entrance to Borrow C. Test performed on the borrow material behind the yellow piles. Approved. Piles removed and Contractor started sorting behind.
s96	JR	RPF	BC	585,281	6,914,341	JR	460.12	32.04	Entrance to Borrow C. Test performed on the yellow material from the piles in front of the wall. Piles removed for safety.
s101	JR	RPF	BC	585,272	6,914,242	JR	46.43	12.48	Entrance to Borrow C. Test performed on the protection rock fill sorted. Approved
s102	JR	RPF	BC	585,278	6,914,351	JR	192.49	22.56	Entrance to Borrow C. Test performed on the protection rock fill sorted. Approved.

Notes:
1) BA = Borrow A
2) GRF = General Rock Fill. Unsorted rock fill (Borrow C)
3) RPF = Rock Protection Fill. Sorted rock fill (Borrow C)
4) Samples tested at the Faro Mine site with a Thermo Scientific Niton XRF Analyzer (model XL3t 500) rented to Elemental Controls Limited (ECL)

Table by: JOAN ROCA (BGC)

YUKON GOVERNMENT

Date: November 19, 2014

NFRD SIS (FARO MINE) - XRF TESTING PROGRAM
FILL SAMPLES FROM EXISTING ROCK FILL (NFRD)

Sample ID	Sample By	Fill Type	Approximate Location (m)			XRF Test Details			Comments
			Work Area	Easting	Northing	Test By	Zn (ppm)	Error (±)	
s21	JR	Existing Rock Fill	NF2A	584,696	6,913,038	JR	828.92	37.05	Samples collected under water from more impacted side within NF2A. Test on rock with orange precipitate
s22-a	JR	Existing Rock Fill	NF2A	584,703	6,913,046	JR	1,081.06	131.73	Samples collected from more impacted side within NF2A. Test on rock with orange precipitate
s22-b	JR	Existing Rock Fill	NF2A	584,703	6,913,046	JR	477.72	89.97	Samples collected from more impacted side within NF2A. Grey sample.
s22-c	JR	Existing Rock Fill	NF2A	584,703	6,913,046	JR	601.75	100.45	Samples collected from more impacted side within NF2A. Grey sample.
s22-d	JR	Existing Rock Fill	NF2A	584,703	6,913,046	JR	1,321.48	45.99	Samples collected from more impacted side within NF2A. Test on rock with orange precipitate
s23-a	JR	Existing Rock Fill	NF2A	584,717	6,913,037	JR	226.98	58.90	Samples collected from less impacted side within NF2A. Grey sample.
s23-b	JR	Existing Rock Fill	NF2A	584,717	6,913,037	JR	401.64	28.17	Samples collected from less impacted side within NF2A. Grey sample.
s24-a	JR	Existing Rock Fill	NF2A	584,714	6,913,050	JR	<LOD	84.90	Samples collected within NF2A at a higher elevation. Grey sample.
s24-b	JR	Existing Rock Fill	NF2A	584,714	6,913,050	JR	<LOD	95.32	Samples collected within NF2A at a higher elevation. Grey sample.
s24-c	JR	Existing Rock Fill	NF2A	584,714	6,913,050	JR	342.80	35.75	Samples collected within NF2A at a higher elevation. Grey sample.
s25-a	JR	Existing Rock Fill	NF2B	584,725	6,913,037	JR	<LOD	54.77	Samples collected close to seep points at NF2B. No orange staining observed
s25-b	JR	Existing Rock Fill	NF2B	584,725	6,913,037	JR	444.76	92.69	Samples collected close to seep points at NF2B. No orange staining observed
s25-c	JR	Existing Rock Fill	NF2B	584,725	6,913,037	JR	1,607.22	58.08	Samples collected close to seep points at NF2B. Orange staining observed
s26-a	JR	Existing Rock Fill	NF2B	584,728	6,913,032	JR	<LOD	105.07	Samples collected close to seep points at NF2B. No orange staining observed
s26-b	JR	Existing Rock Fill	NF2B	584,728	6,913,032	JR	<LOD	74.70	Samples collected close to seep points at NF2B. No orange staining observed
s26-c	JR	Existing Rock Fill	NF2B	584,728	6,913,032	JR	65.52	13.19	Samples collected close to seep points at NF2B. No orange staining observed
s27-a	JR	Existing Rock Fill	NF2B	584,732	6,913,035	JR	<LOD	80.74	Samples collected close to seep points at NF2B. No orange staining observed

Table by: JOAN ROCA (BGC)

YUKON GOVERNMENT

Date: November 19, 2014

BGC INTERNATIONAL
AN APPLIED EARTH SCIENCES COMPANY

NFRD SIS (FARO MINE) - XRF TESTING PROGRAM
FILL SAMPLES FROM EXISTING ROCK FILL (NFRD)

Sample ID	Sample By	Fill Type	Approximate Location (m)			XRF Test Details			Comments
			Work Area	Easting	Northing	Test By	Zn (ppm)	Error (±)	
s27-b	JR	Existing Rock Fill	NF2B	584,732	6,913,035	JR	29.38	7.78	Samples collected close to seep points at NF2B. No orange staining observed
s28	JR	Existing Rock Fill	US	584,850	6,913,185	JR	5,553.76	860.65	Soil sample collected in between rock boulders at the rock drain (US-NF2B side)
s29-a	JR	Existing Rock Fill	US	584,876	6,913,183	JR	416.37	38.26	Sample from rock drain (US-NF2B side). Grey sample
s29-b	JR	Existing Rock Fill	US	584,876	6,913,183	JR	9,588.24	200.09	Sample from rock drain (US-NF2B side). Red/orange staining on rock
s30	JR	Existing Rock Fill	US	584,833	6,913,196	JR	356.16	27.23	Sample from rock drain (US-NF2A side)
s31	JR	Existing Rock Fill	US	584,818	6,913,211	JR	36.61	12.11	Sample from rock drain (US-NF2A side). Rock broken with rock geological hammer. Test on fresh fracture face. Grey

Notes:
1) Samples tested at the Faro Mine site with a Thermo Scientific Niton XRF Analyzer (model XL3t 500) rented to Elemental Controls Limited (ECL)

Table by: JOAN ROCA (BGC)

YUKON GOVERNMENT

Date: November 19, 2014

ELEMENTAL CONTROLS

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Tel: 905-282-9974
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www.elementalcontrols.com

Certificate of Calibration - Standard Mining

Model:	XL3t 500	**Software:**	8.4A
Serial:	32536	**Source:**	X-Ray Tube
Resolution:	178.52 eV / Escale: 7.92	**Date:**	July-18-14
Resolution 2:	N/A		

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
SiO2 Blank	Sn	0	0	0.10	0.00	0.00	OK	< LOD
	Pd	0	0	0.10	0.00	0.00	OK	< LOD
	Ag	0	0	0.10	0.00	0.00	OK	< LOD
	Bal	100.00	98.00	100.00	99.91	0.00	OK	
	Mo	0	0	0.10	0.00	0.00	OK	< LOD
	Nb	0	0	0.10	0.00	0.00	OK	< LOD
	Zr	0	0	0.10	0.00	0.00	OK	< LOD
	Bi	0	0	0.10	0.00	0.00	OK	< LOD
	As	0	0	0.10	0.00	0.00	OK	< LOD
	Pb	0	0	0.10	0.00	0.00	OK	
	W	0	0	0.10	0.00	0.01	OK	< LOD
	Zn	0	0	0.10	0.00	0.00	OK	< LOD
	Cu	0	0	0.10	0.00	0.00	OK	< LOD
	Re	0	0	0.10	-	-	-	
	Ta	0	0	0.10	-	-	-	
	Hf	0	0	0.10	-	-	-	
	Ni	0	0	0.10	0.00	0.00	OK	< LOD
	Co	0	0	0.10	0.00	0.00	OK	< LOD
	Fe	0	0	0.10	0.00	0.00	OK	< LOD
	Mn	0	0	0.10	0.00	0.01	OK	< LOD
	Cr	0	0	0.10	0.02	0.00	OK	
	V	0	0	0.10	0.01	0.00	OK	
	Ti	0	0	0.10	0.00	0.00	OK	< LOD

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST 25D	Sn	-	-	-	0.00	0.01	-	
	Pd	-	-	-	0.00	0.00	-	
	Ag	-	-	-	0.00	0.00	-	
	Bal	45.50	33.00	46.00	38.80	1.77	OK	
	Mo	-	-	-	0.00	0.00	-	
	Nb	-	-	-	0.00	0.00	-	
	Zr	-	-	-	0.00	0.00	-	
	Bi	-	-	-	0.00	0.00	-	
	As	-	-	-	0.00	0.00	-	
	Pb	-	-	-	0.00	0.00	-	
	W	-	-	-	0.00	0.02	-	
	Zn	-	-	-	0.06	0.01	-	
	Cu	-	-	-	0.05	0.01	-	
	Re	-	-	-	-	-	-	
	Ta	-	-	-	-	-	-	
	Hf	-	-	-	-	-	-	
	Ni	-	-	-	0.04	0.01	-	
	Co	-	-	-	0.10	0.03	-	
	Fe	2.74	2.00	4.00	3.21	0.12	OK	
	Mn	51.78	50.00	65.00	56.63	1.65	OK	
	Cr	-	-	-	0.00	0.01	-	
	V	-	-	-	0.02	0.02	-	
	Ti	-	-	-	0.10	0.03	-	

Standard	Ele	Expected	Low	High	Measured	Error	Check
BS 103	Sn	-	-	-	0.01	0.01	-
	Pd	-	-	-	0.00	0.00	-
	Ag	-	-	-	0.00	0.00	-
	Bal	40.10	30.00	50.00	37.12	2.22	OK
	Mo	-	-	-	0.00	0.00	-
	Nb	-	-	-	0.00	0.00	-
	Zr	-	-	-	0.00	0.00	-
	Bi	-	-	-	0.00	0.00	-
	As	-	-	-	0.01	0.00	-
	Pb	-	-	-	0.00	0.00	-
	W	-	-	-	0.00	0.03	-
	Zn	-	-	-	0.03	0.01	-
	Cu	-	-	-	0.00	0.01	-
	Re	-	-	-	-	-	-
	Ta	-	-	-	-	-	-
	Hf	-	-	-	-	-	-
	Ni	-	-	-	0.00	0.02	-
	Co	-	-	-	0.00	0.08	-
	Fe	59.40	55.00	70.00	61.00	2.18	OK
	Mn	0.50	0.40	1.00	0.57	0.04	OK
	Cr	-	-	-	0.02	0.01	-
	V	-	-	-	0.00	0.02	-
	Ti	-	-	-	0.03	0.02	-

Standard	Ele	Expected	Low	High	Measured	Error	Check
BCS 355	Sn	31.42	29.40	33.40	31.73	1.63	OK
	Pd	-	-	-	0.00	0.00	-
	Ag	-	-	-	0.00	0.00	-
	Bal	-	-	-	48.52	2.31	-
	Mo	-	-	-	0.00	0.00	-
	Nb	-	-	-	0.00	0.00	-
	Zr	-	-	-	0.00	0.00	-
	Bi	0.02	-	-	0.01	0.00	-
	As	0.14	0.05	0.25	0.09	0.01	OK
	Pb	0.01	-	-	0.01	0.00	-
	W	0.35	0.28	0.42	0.29	0.03	OK
	Zn	0.06	0.02	0.10	0.05	0.01	OK
	Cu	0.09	0.04	0.14	0.07	0.01	OK
	Re	-	-	-	-	-	-
	Ta	-	-	-	-	-	-
	Hf	-	-	-	-	-	-
	Ni	-	-	-	0.01	0.01	-
	Co	-	-	-	0.00	0.04	-
	Fe	17.08	15.70	18.70	16.50	0.62	OK
	Mn	-	-	-	0.16	0.03	-
	Cr	-	-	-	0.02	0.01	-
	V	-	-	-	0.00	0.02	-
	Ti	0.37	0.29	0.45	0.34	0.03	OK

Standard	Ele	Expected	Low	High	Measured	Error	Check
BCS 308	Bal	60.00	50.00	70.00	59.22	1.29	OK
	Cr	28.39	22.40	34.40	28.24	0.82	OK
	V	-	-	-	0.12	0.02	-
	Ti	-	-	-	0.05	0.03	-

This certificate is issued in accordance with Thermo Fisher Scientific factory specifications.
The measurements were found to be within specification limits at the time of manufacture and calibration.

Standards are traceable to National Institute of Standards & Technology (NIST) standards, or other government bodies.

Technician: N. Dhakal

Signed: Dhakal

ELEMENTAL CONTROLS

3230 Wharton Way
Mississauga, ON L4X 2C1
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Certificate of Calibration - Standard Soil

Model:	XL3t 500	**Software:**	8.4A
Serial:	32536	**Source:**	X-Ray Tube
Resolution:	175.78 eV / Escale: 7.92	**Date:**	July-21-14
Resolution 2:	N/A		

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
SiO2 Blank	Ba	0	-200	200	6.94	35.34	OK	< LOD
	Cs	0	-260	260	16.61	11.53	OK	< LOD
	Te	0	-220	220	17.44	35.68	OK	< LOD
	Sb	0	-120	80	-2.92	12.83	OK	< LOD
	Sn	0	-120	70	-1.98	12.89	OK	< LOD
	Cd	0	-50	50	3.70	9.11	OK	< LOD
	Ag	0	-30	30	6.29	6.12	OK	< LOD
	Pd	0	-50	50	13.48	10.19	OK	< LOD
	Mo	0	-10	10	0.26	2.25	OK	< LOD
	Zr	0	-10	10	0.61	1.78	OK	< LOD
	Sr	0	-10	10	0.10	1.03	OK	< LOD
	U	0	-10	10	-1.48	2.56	OK	< LOD
	Rb	0	-10	210	0.38	1.10	OK	< LOD
	Th	0	-10	10	-1.47	2.35	OK	< LOD
	Pb	0	-10	10	0.20	3.67	OK	< LOD
	Se	0	-20	20	0.07	1.42	OK	< LOD
	As	0	-10	10	-0.81	2.60	OK	< LOD
	Hg	0	-10	10	-0.57	2.78	OK	< LOD
	Zn	0	-10	10	-0.12	3.85	OK	< LOD
	W	0	-60	60	-12.64	19.77	OK	< LOD
	Cu	0	-20	20	1.09	7.51	OK	< LOD
	Ni	0	-70	70	11.62	15.20	OK	< LOD
	Co	0	-50	50	0.30	8.61	OK	< LOD
	Fe	0	-50	50	-10.55	13.43	OK	< LOD
	Mn	0	-100	300	2.81	17.22	OK	< LOD
	Cr	0	-120	120	5.17	12.19	OK	< LOD
	V	0	-160	160	1.54	10.26	OK	< LOD
	Ti	0	-700	700	6.35	28.78	OK	< LOD
	Sc	0	-100	100	2.66	4.66	OK	< LOD
	Ca	0	-2000	2000	2.61	51.74	OK	< LOD
	K	0	-3000	3000	-57.21	69.45	OK	< LOD
	S	0	-140000	140000	29.38	210.30	OK	< LOD

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST LOW	Ba	968	638	1238	914.958	63.799	OK	
	Cs	5.3	-300	300	34.294	13.679	OK	
	Te	-	-300	300	2.988	41.725	OK	< LOD
	Sb	7.9	-90	100	-3.512	15.039	OK	< LOD
	Sn	-	-100	100	11.593	15.458	OK	< LOD
	Cd	0.38	-60	60	2.661	10.648	OK	< LOD
	Ag	0.41	-40	40	11.084	7.339	OK	
	Pd	-	-60	60	0.289	11.432	OK	< LOD
	Mo	2	-10	10	-1.448	2.805	OK	< LOD
	Zr	160	120	200	148.645	7.498	OK	
	Sr	231	-	-	222.661	7.423	-	
	U	3	-80	80	-1.518	7.211	OK	< LOD
	Rb	96	-	-	58.585	4.048	-	
	Th	11	-80	80	10.362	4.965	OK	
	Pb	18.9	0	35	1.741	6.213	OK	< LOD
	Se	1.57	-30	30	1.177	2.008	OK	< LOD
	As	17.7	0	35	15.099	5.794	OK	
	Hg	1.4	-10	10	1.45	3.894	OK	< LOD
	Zn	106	50	160	79.393	12.637	OK	
	W	2	-80	80	-2.103	28.056	OK	< LOD
	Cu	34.6	0	60	27.246	14.571	OK	
	Ni	88	0	125	71.918	23.751	OK	
	Co	13.4	-250	250	49.972	87.258	OK	< LOD
	Fe	35000	25000	35000	30531.422	406.981	OK	
	Mn	538	0	700	447.294	69.572	OK	
	Cr	130	50	200	110.297	25.027	OK	
	V	112	-300	400	147.626	50.357	OK	
	Ti	3420	2700	4100	3553.119	148.304	OK	
	Sc	NR	-250	250	38.989	37.816	OK	< LOD
	Ca	18900	13900	23900	19844.287	374.355	OK	
	K	20300	15300	25300	17564.73	453.877	OK	
	S	890	-150000	150000	103.341	708.209	OK	< LOD

NIST HIGH	Ba	707	507	907	810.15	70.47	OK	
	Cs	107	0	400	71.02	15.63	OK	
	Te	-	-300	300	95.24	47.76	OK	
	Sb	38.4	-100	110	55.26	17.75	OK	
	Sn	-	-100	100	43.04	17.76	OK	
	Cd	21.8	-10	50	29.05	12.49	OK	
	Ag	35.3	0	60	46.92	9.34	OK	
	Pd	-	-70	70	1.18	12.73	OK	< LOD
	Mo	19	0	30	14.04	3.71	OK	
	Zr	-	-	-	139.14	9.68	-	
	Sr	330	280	380	323.57	10.47	OK	
	U	25	10	40	24.64	13.24	OK	
	Rb	120	80	160	90.37	6.21	OK	
	Th	13	-80	80	66.69	28.42	OK	
	Pb	5532	5400	5700	5475.59	84.68	OK	
	Se	NR	-30	30	2.49	5.22	OK	< LOD
	As	626	510	750	689.81	65.29	OK	
	Hg	32.6	0	50	22.17	9.78	OK	
	Zn	6952	6700	7250	6978.83	117.37	OK	
	W	93	0	400	106.12	77.98	OK	< LOD
	Cu	2950	2700	3200	2829.93	85.48	OK	
	Ni	14.3	0	105	34.55	29.10	OK	< LOD
	Co	10	-270	270	-92.24	112.82	OK	< LOD
	Fe	33800	30420	37180	34439.21	476.41	OK	
	Mn	10100	9500	11000	9925.23	312.42	OK	
	Cr	39	-100	120	43.70	25.58	OK	
	V	76.6	-200	300	120.29	49.23	OK	
	Ti	2830	2260	3400	2676.40	141.77	OK	
	Sc	8.7	-160	160	55.89	32.00	OK	
	Ca	12500	8000	17000	10843.01	309.43	OK	
	K	21100	16100	26100	17614.92	483.48	OK	
	S	2400	-140000	140000	3021.30	970.56	OK	

RCRA	Ba	500	-	-	624.134	46.273	-	
	Cs	-	-	-	36.197	13.572	-	
	Te	-	-	-	19.233	41.48	-	
	Sb	0	-	-	-2.625	16.23	-	
	Sn	0	-	-	32.105	16.769	-	
	Cd	500	-	-	550.271	19.802	-	
	Ag	500	400	600	529.858	17.234	OK	
	Pd	-	-	-	30.44	13.452	-	
	Mo	-	-	-	1.407	3.173	-	
	Zr	-	-	-	243.055	7.234	-	
	Sr	-	-	-	187.783	6	-	
	U	-	-	-	1.512	6.816	-	
	Rb	-	-	-	92.132	5.119	-	
	Th	-	-	-	24.258	6.912	-	
	Pb	500	400	600	400.609	21.161	OK	
	Se	500	400	600	442.954	15.03	OK	
	As	500	400	600	417.491	20.451	OK	
	Hg	-	-	-	3.577	4.788	-	
	Zn	-	-	-	59.248	9.851	-	
	W	-	-	-	15.31	29.538	-	
	Cu	-	-	-	17.931	11.425	-	
	Ni	-	-	-	16.745	21.483	-	
	Co	-	-	-	18.04	75.689	-	
	Fe	-	-	-	14916.551	237.801	-	
	Mn	-	-	-	292.555	55.347	-	
	Cr	-	-	-	967.936	34.836	-	
	V	500	-	-	90.022	39.6	-	
	Ti	-	-	-	3734.367	153.057	-	
	Sc	-	-	-	12.902	25.527	-	
	Ca	-	-	-	13686.744	333.832	-	
	K	-	-	-	34651.57	695.01	-	
	S	-	-	-	1262.821	671.689	-	

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST MED	Ba	726	500	900	651.263	62.059	OK	
	Cs	6.1	-300	300	31.819	13.769	OK	
	Te	-	-300	300	21.079	42.139	OK	< LOD
	Sb	19.4	-80	100	25.193	15.668	OK	
	Sn	-	-90	90	20.633	15.624	OK	< LOD
	Cd	41.7	0	70	55.896	11.921	OK	
	Ag	4.63	-30	40	16.199	7.542	OK	
	Pd	-	-60	60	-0.215	11.478	OK	< LOD
	Mo	1.6	-10	10	2.974	3.147	OK	< LOD
	Zr	230	30	430	311.188	10.041	OK	
	Sr	245.3	180	300	226.237	7.649	OK	
	U	2.6	-15	15	3.294	8.368	OK	< LOD
	Rb	110	60	115	78.521	4.788	OK	
	Th	14	-20	50	18.247	10.124	OK	
	Pb	1162	1000	1200	1104.577	33.858	OK	
	Se	1.52	-10	15	2.297	2.781	OK	< LOD
	As	105	65	145	103.157	29.732	OK	
	Hg	6.25	-10	15	3.066	4.59	OK	< LOD
	Zn	350.4	250	450	307.044	22.665	OK	
	W	3	-80	80	15.79	31.413	OK	< LOD
	Cu	114	74	154	105.614	19.391	OK	
	Ni	20.6	-30	100	23.937	22.574	OK	< LOD
	Co	10	-200	200	165.28	81.907	OK	
	Fe	28900	20000	40000	24483.787	371.175	OK	
	Mn	638	300	700	452.292	69.763	OK	
	Cr	47	-250	300	46.295	21.329	OK	
	V	81.6	-300	350	110.973	41.879	OK	
	Ti	3060	2450	3670	2844.74	123.993	OK	
	Sc	9	-300	300	77.515	41.043	OK	
	Ca	28800	20160	37440	27026.629	406.039	OK	
	K	24500	17150	31850	20562.055	460.306	OK	
	S	420	-160000	160000	1103.969	746.32	OK	< LOD

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
TILL4	Ba	395	195	595	567.844	63.445	OK	
	Cs	12	-300	300	51.415	14.357	OK	
	Te	-	-300	300	75.915	44.325	OK	
	Sb	1	-100	100	4.066	15.76	OK	< LOD
	Sn	-	-100	100	56.043	16.615	OK	
	Cd	-	-70	70	3.056	11.084	OK	< LOD
	Ag	-	-50	50	-3.847	7.105	OK	< LOD
	Pd	-	-60	60	16.774	12.537	OK	< LOD
	Mo	16	0	30	11.405	3.465	OK	
	Zr	385	185	585	415.512	11.155	OK	
	Sr	109	50	150	111.949	5.593	OK	
	U	5	-20	20	1.25	9.17	OK	< LOD
	Rb	161	100	210	115.609	5.694	OK	
	Th	17.4	-40	70	49.205	7.834	OK	
	Pb	50	30	70	44.038	9.603	OK	
	Se	-	-15	15	0.85	2.622	OK	< LOD
	As	111	80	140	109.596	11.696	OK	
	Hg	-	-15	15	1.534	5.731	OK	< LOD
	Zn	70	45	95	56.421	13.119	OK	
	W	204	130	270	184.274	41.153	OK	
	Cu	237	200	280	215.375	24.592	OK	
	Ni	17	-50	90	35.491	23.604	OK	
	Co	8	-300	300	46.271	99.959	OK	< LOD
	Fe	39700	29700	49700	37843.348	467.498	OK	
	Mn	490	300	600	344.611	68.329	OK	
	Cr	53	-50	150	38.232	23.763	OK	
	V	67	-150	250	108.63	50.307	OK	
	Ti	4840	3870	5808	4756.468	156.378	OK	
	Sc	10	-150	150	41.75	26.853	OK	
	Ca	-	-	-	7421.025	264.395	-	
	K	-	-	-	24373.996	541.652	-	
	S	800	-130000	130000	382.502	745.456	OK	< LOD

Standard	Ele	Expected	Low	High	Measured	Error	Check
DL1a	Ba	-	-	-	236.503	52.628	-
	Cs	-	-	-	1.256	12.168	-
	Te	-	-	-	-10.89	37.52	-
	Sb	-	-	-	1.119	13.632	-
	Sn	-	-	-	-6.351	13.621	-
	Cd	-	-	-	-7.577	9.391	-
	Ag	-	-	-	4.312	6.418	-
	Pd	-	-	-	10.639	10.681	-
	Mo	-	-	-	2.589	2.756	-
	Zr	-	-	-	95.856	5.567	-
	Sr	-	-	-	16.386	2.396	-
	U	116	93	140	113.169	11.794	OK
	Rb	-	-	-	70.289	4.596	-
	Th	76	60	92	80.44	8.8	OK
	Pb	-	-	-	53.426	9.114	-
	Se	-	-	-	0.692	2.006	-
	As	-	-	-	1.818	6.287	-
	Hg	-	-	-	0.549	3.512	-
	Zn	-	-	-	47.739	9.8	-
	W	-	-	-	12.102	24.874	-
	Cu	-	-	-	34.785	13.232	-
	Ni	-	-	-	11.838	17.506	-
	Co	-	-	-	36.992	37.418	-
	Fe	9000	-	-	5160.472	145.944	-
	Mn	-	-	-	73.856	34.227	-
	Cr	-	-	-	8.937	14.704	-
	V	-	-	-	72.266	23.613	-
	Tl	900	-	-	900.289	63.655	-
	Sc	-	-	-	1.672	11.044	-
	Ca	3000	-	-	2302.513	127.033	-
	K	2000	-	-	20725.002	349.919	-
	S	4000	-	-	702.008	430.067	-

This certificate is issued in accordance with Thermo Fisher Scientific factory specifications.
The measurements were found to be within specification limits at the time of manufacture and calibration.

Standards used for factory calibrations are certified reference materials (CRM) or reference materials (RM) where available.
Certificates of Analysis are available upon request.

Technician: N. Dhakal

Signed: 

ELEMENTAL CONTROLS

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Inventory Checklist

Model: XL3+-500 **Date Out:** Aug 28/2014

Serial: 32536 **Date In:**

		Qty Out	Qty In	Location	Notes
1	Analyzer case and foam	1			
2	Lead foam insert	1			
3	Holster	1			
4	Holster belt	1			
5	Batteries	2			
6	Stylus	2			
7	Battery case	1			
8	Case lock	1			
9	Battery charger	1			
10	Charger cable	1			
11	Charger base (XL3)	1			
12	RS-232 Download cable	1			
13	USB Download Cable	1			
14	Reference Standard(s)	1 set			5 std's
15	NDT software	1			
16	Quick Start Guide	1			
17	Quick Start Reference Sheet	1			
18	Weld mask	N/A			
19	Leak Test Certificate *(if applicable)*	N/A			

Analyzer Accessories/Peripherals

1	Mobile Test Stand	1			
2	Sample Cups	1			
3	Film / Mylar	1			
4					
5					
6					
7					
8					
9					
10					

Verfication
(For internal use only)

Outgoing: 180.79 eV 1ej.

Incoming:

ELEMENTAL CONTROLS

3230 Wharton Way
Mississauga, ON L4X 2C1
Tel: 905-282-9974
Fax: 905-282-9519
www.elementalcontrols.com

Quality Control Inspection - Standard Soil

Model: XL3t 500
Serial: 32536
Resolution: 180.79 eV / Escale: 7.92

Software: 8.4A
Source: X-Ray Tube
Date: August-26-14

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST HIGH	Ba	707	507	907	766.20	69.85	OK	
	Cs	107	0	400	62.26	15.51	OK	
	Te	-	-300	300	90.18	47.53	OK	
	Sb	38.4	-100	110	30.87	17.29	OK	
	Sn	-	-100	100	35.01	17.55	OK	
	Cd	21.8	-10	50	26.12	12.38	OK	
	Ag	35.3	0	60	37.36	9.00	OK	
	Pd	-	-70	70	8.18	13.00	OK	< LOD
	Mo	19	0	30	11.78	3.65	OK	
	Zr	-	-	-	135.80	9.51	-	
	Sr	330	280	380	322.88	10.41	OK	
	U	25	10	40	30.50	13.50	OK	
	Rb	120	80	160	92.77	6.27	OK	
	Th	13	-80	80	32.15	25.05	OK	< LOD
	Pb	5532	5400	5700	5499.39	84.45	OK	
	Se	-	-30	30	2.28	5.07	OK	< LOD
	As	626	510	750	631.78	64.77	OK	
	Hg	32.6	0	50	24.30	9.44	OK	
	Zn	6952	6700	7250	6834.59	115.61	OK	
	W	93	0	400	44.61	74.69	OK	< LOD
	Cu	2950	2700	3200	2850.66	85.34	OK	
	Ni	14.3	0	105	18.85	28.88	OK	< LOD
	Co	10	-270	270	87.19	113.53	OK	< LOD
	Fe	33800	30420	37180	33408.82	467.39	OK	
	Mn	10100	9500	11000	9941.83	311.03	OK	
	Cr	39	-100	120	36.97	25.76	OK	< LOD
	V	76.6	-200	300	105.22	49.83	OK	
	Ti	2830	2260	3400	2708.34	144.61	OK	
	Sc	8.7	-160	160	33.23	31.78	OK	< LOD
	Ca	12500	8000	17000	10650.51	312.96	OK	
	K	21100	16100	26100	17458.64	490.78	OK	
	S	2400	-140000	140000	4265.59	1072.31	OK	

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
TILL4	Ba	395	195	595	508.059	61.928	OK	
	Cs	12	-300	300	49.037	14.11	OK	
	Te	-	-300	300	52.179	43.307	OK	< LOD
	Sb	1	-100	100	10.722	15.608	OK	< LOD
	Sn	-	-100	100	49.199	16.259	OK	
	Cd	-	-70	70	4.771	10.942	OK	< LOD
	Ag	-	-50	50	2.707	7.212	OK	< LOD
	Pd	-	-60	60	4.537	11.841	OK	< LOD
	Mo	16	0	30	10.243	3.48	OK	
	Zr	385	185	585	448.374	11.564	OK	
	Sr	109	50	150	116.79	5.712	OK	
	U	5	-20	20	-1.881	10.161	OK	< LOD
	Rb	161	-	-	112.456	5.618	-	
	Th	17.4	-40	70	56.396	8.837	OK	
	Pb	50	30	70	43.341	9.661	OK	
	Se	-	-15	15	3.388	2.827	OK	< LOD
	As	111	80	140	97.932	10.149	OK	
	Hg	-	-15	15	-0.497	5.488	OK	< LOD
	Zn	70	45	95	54.585	12.944	OK	
	W	204	130	270	166.418	40.023	OK	
	Cu	237	200	280	228.132	25.092	OK	
	Ni	17	-50	90	16.144	23.508	OK	< LOD
	Co	8	-300	300	212.553	102.962	OK	
	Fe	39700	29700	49700	33326.059	411.104	OK	
	Mn	490	300	600	380.523	69.996	OK	
	Cr	53	-50	150	30.519	23.855	OK	< LOD
	V	67	-150	250	127.837	51.349	OK	
	Ti	4840	3870	5808	4824.445	158.658	OK	
	Sc	10	-150	150	46.7	27.363	OK	
	Ca	-	-	-	7527.25	267.762	-	
	K	-	-	-	24180.563	544.172	-	
	S	800	-130000	130000	1257.017	823.304	OK	

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST 2780	Ba	993	844	1142	1210.32	70.57	Review	
	Cs	13	-10	100	82.38	15.04	OK	
	Te	-	0	150	125.16	46.00	OK	
	Sb	160	100	250	185.70	18.88	OK	
	Sn	-	-20	100	54.88	17.20	OK	
	Cd	12.1	5	30	25.08	11.85	OK	
	Ag	27	0	120	38.14	8.67	OK	
	Pd	-	-15	15	16.44	12.81	Review	< LOD
	Mo	11	0	20	6.23	3.36	OK	
	Zr	176	131	220	209.36	9.77	OK	
	Sr	217	195	239	228.51	8.32	OK	
	U	4	-20	20	7.96	12.33	OK	< LOD
	Rb	175	140	210	127.10	6.55	Review	
	Th	12	0	55	73.39	23.59	Review	
	Pb	5770	4904	6635	5066.16	76.30	OK	
	Se	5	-10	10	2.76	4.57	OK	< LOD
	As	48.8	0	90	23.66	55.20	OK	< LOD
	Hg	0.71	-15	15	1.74	6.33	OK	< LOD
	Zn	2570	1800	3340	2176.59	61.43	OK	
	W	-	-100	100	26.02	47.06	OK	< LOD
	Cu	215.5	151	280	188.36	25.75	OK	
	Ni	-	-100	100	10.24	24.29	OK	< LOD
	Co	-	-200	200	24.59	88.64	OK	< LOD
	Fe	27840	22272	33408	23402.38	361.90	OK	
	Mn	462	415	508	368.02	71.65	Review	
	Cr	-	0	70	22.72	22.03	OK	< LOD
	V	268	150	350	321.73	59.15	OK	
	Ti	6990	6291	7689	7206.62	178.64	OK	
	Sc	-	-20	20	12.93	15.71	OK	< LOD
	Ca	1950	1000	3000	1481.83	172.60	OK	
	K	33800	30420	37180	31894.10	566.52	OK	
	S	12630	5000	15000	12338.87	1309.64	OK	

Standards used for factory calibrations are certified reference materials (CRM) or reference materials (RM) where available.
Certificates of Analysis are available upon request.

Technician: C. Castillo

Signed: C. Castillo

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Quality Control Inspection - Mining Mode

Model:	XL3t 500	**Software:**	8.4A
Serial:	32536	**Source:**	X-Ray Tube
Resolution:	172.51 eV / Escale: 7.92	**Date:**	August-26-14
Resolution 2:	N/A		

Standard	Ele	Expected (%)	Low	High	Measured	Error	Check	<LOD?
BCS 355	Ba	-	0	0.1	0.00	0.05	OK	< LOD
	Sb	-	0	0.1	0.00	0.01	OK	< LOD
	Sn	31.42	26.7	36.1	30.44	1.55	OK	
	Cd	-	0	0.1	0.02	0.01	OK	
	Pd	-	0	0.02	0.00	0.00	OK	< LOD
	Ag	-	0	0.02	0.00	0.00	OK	< LOD
	Bal	36.5	-	-	49.62	2.21	-	
	Mo	-	0	0.02	0.00	0.00	OK	< LOD
	Nb	-	0	0.02	0.00	0.00	OK	
	Zr	0.059	0	0.1	0.01	0.00	OK	
	Sr	-	0	0.05	0.00	0.00	OK	
	Rb	-	0	0.05	0.00	0.00	OK	
	Bl	0.015	0	0.025	0.01	0.00	OK	
	Se	-	0	0.05	0.00	0.00	OK	< LOD
	As	0.14	0.05	0.25	0.09	0.01	OK	
	Pb	0.012	0	0.05	0.00	0.00	OK	
	W	0.35	0.28	0.42	0.27	0.03	Review	
	Zn	0.06	0.02	0.1	0.04	0.01	OK	
	Cu	0.085	0.04	0.14	0.06	0.01	OK	
	Ni	-	0	0.05	0.01	0.01	OK	
	Co	-	0	0.05	0.00	0.04	OK	< LOD
	Fe	17.08	14	20	15.87	0.59	OK	
	Mn	-	0.1	0.5	0.18	0.03	OK	
	Cr	-	0	0.05	0.01	0.01	OK	
	V	-	0	0.05	0.02	0.01	OK	< LOD
	Ti	0.37	0.29	0.5	0.33	0.03	OK	
	Ca	2.63	1.6	6	2.09	0.12	OK	
	K	-	0	1.5	0.23	0.19	OK	< LOD
	S	0.5	0.3	0.7	0.69	0.52	OK	< LOD

Standard	Ele	Expected (%)	Low	High	Measured	Error	Check	<LOD?
NIST 2709	Ba	0.0979	-	-	0.060	0.007	-	
	Sb	-	-	-	0.000	0.001	-	< LOD
	Sn	-	-	-	0.000	0.002	-	< LOD
	Cd	-	-	-	0.000	0.001	-	< LOD
	Pd	-	-	-	0.000	0.001	-	< LOD
	Ag	-	-	-	0.000	0.001	-	< LOD
	Bal	-	-	-	91.108	0.199	-	
	Mo	-	-	-	0.001	0.001	-	< LOD
	Nb	-	-	-	0.002	0.001	-	
	Zr	0.0195	-	-	0.015	0.001	-	
	Sr	0.0239	-	-	0.021	0.001	-	
	Rb	0.0099	-	-	0.010	0.001	-	
	Bl	-	-	-	0.002	0.001	-	
	Se	-	-	-	0.000	0.001	-	< LOD
	As	0.00105	-	-	0.001	0.001	-	< LOD
	Pb	0.00173	-	-	0.002	0.001	-	
	W	-	-	-	0.000	0.009	-	< LOD
	Zn	0.0103	-	-	0.011	0.002	-	
	Cu	0.00339	-	-	0.004	0.003	-	< LOD
	Ni	0.0085	-	-	0.006	0.004	-	< LOD
	Co	-	-	-	0.000	0.015	-	< LOD
	Fe	3.36	-	-	3.910	0.102	-	
	Mn	0.0529	-	-	0.053	0.01	-	
	Cr	0.013	-	-	0.030	0.003	-	
	V	0.011	-	-	0.021	0.007	-	
	Ti	0.336	-	-	0.331	0.015	-	
	Ca	1.91	-	-	1.966	0.061	-	
	K	2.11	-	-	2.087	0.091	-	
	S	-	-	-	0.360	0.316	-	< LOD

TILL 4	Ba	-	-	-	0.02	0.01	-	
	Sb	-	-	-	0.00	0.00	-	< LOD
	Sn	-	-	-	0.00	0.00	-	< LOD
	Cd	-	-	-	0.00	0.00	-	< LOD
	Pd	-	-	-	0.00	0.00	-	< LOD
	Ag	-	-	-	0.00	0.00	-	< LOD
	Bal	-	-	-	90.85	0.21	-	
	Mo	-	-	-	0.00	0.00	-	
	Nb	-	-	-	0.00	0.00	-	
	Zr	-	-	-	0.04	0.00	-	
	Sr	-	-	-	0.01	0.00	-	
	Rb	-	-	-	0.02	0.00	-	
	Bl	-	-	-	0.01	0.00	-	
	Se	-	-	-	0.00	0.00	-	< LOD
	As	-	-	-	0.01	0.00	-	
	Pb	-	-	-	0.01	0.00	-	
	W	-	-	-	0.03	0.01	-	
	Zn	-	-	-	0.01	0.00	-	
	Cu	-	-	-	0.03	0.00	-	
	Ni	-	-	-	0.00	0.00	-	< LOD
	Co	-	-	-	0.00	0.02	-	< LOD
	Fe	3.97	3.5	5	4.71	0.12	OK	
	Mn	-	-	-	0.05	0.01	-	
	Cr	-	-	-	0.02	0.00	-	
	V	-	-	-	0.02	0.01	-	
	Ti	0.484	-	-	0.43	0.02	-	
	Ca	-	-	-	0.80	0.05	-	
	K	2.68	2.3	3.5	2.93	0.11	OK	
	S	-	-	-	0.00	0.37	-	< LOD

Standards are traceable to National Institute of Standards & Technology (NIST) s

Technician: C. Castillo

Signed: C. Castillo

National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 2780

Hard Rock Mine Waste

This Standard Reference Material (SRM) is intended for use in the evaluation of methods and for the calibration of apparatuses used to determine heavy metals and other elements in hard rock mine waste and materials of a similar matrix. SRM 2780 is composed of material collected from a waste pile of an abandoned mine site near Silverton, CO. A unit of SRM 2780 consists of approximately 50 g of material of which 90 % passes a 150 µm (No. 100) sieve.

Certified Mass Fraction Values: Certified mass fraction values for 12 elements are listed in Table 1. A NIST certified value is a value for which NIST has the highest confidence in its accuracy in that all known or suspected sources of bias have been investigated or taken into account. All values are reported as mass fractions [1], on a dry-mass basis (see "Instructions for Drying"), and are based on measurements using a sample mass of at least 250 mg.

Reference Mass Fraction Values: Reference mass fraction values for seven elements are provided in Table 2. A NIST reference value is a noncertified value that is the best estimate of the true value based on available data; however, the value does not meet the NIST criteria for certification and is provided with associated uncertainties that may reflect only measurement reproducibility, may not include all sources of uncertainty, or may reflect a lack of sufficient statistical agreement among multiple analytical methods. Mass fraction values are on a dry-mass basis.

Information Mass Fraction Values: Information mass fraction values for 28 elements are provided in Table 3. An information value is a value that may be of use to the SRM user, but insufficient information is available to assess adequately the uncertainty associated with the value.

Expiration of Certification: The certification of **SRM 2780** is valid, within the measurement uncertainty specified, until **31 December 2014**, provided the SRM is handled and stored in accordance with instructions given in this certificate (see "Instructions for Use"). This certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

The overall direction and coordination of the technical measurements leading to the certification of this SRM were performed by G.C. Turk of the NIST Chemical Sciences Division.

Analytical measurements at NIST were performed by C.M. Beck II, W.R. Kelly, S.E. Long, J.L. Mann, A.F. Marlow, J.R. Sieber, R.D. Vocke, Jr., and L.L. Yu of the NIST Chemical Sciences Division.

Statistical consultation was provided by S.D. Leigh and D.D. Leber of the NIST Statistical Engineering Division.

Mine waste sample collection, preparation of the SRM, and contributing chemical analyses were performed by the U.S. Geological Survey (USGS) under the direction of S.A. Wilson. Details are described [3] in USGS Open-File Report 99-370 and is available by contacting the USGS Earth Science Information Center: telephone (303) 202-4210; or e-mail infoservices@usgs.gov.

Carlos A. Gonzalez, Chief
Chemical Sciences Division

Robert L. Watters, Jr., Director
Office of Reference Materials

Gaithersburg, MD 20899
Certificate Issue Date: 11 October 2012
Certificate Revision History on Last Page

Thermo Scientific™ Niton™ XRF Analyzers

CERTIFICATE OF ANALYSIS



Type P/N Element	RM 180-646 Till-4	CRM 180-649 NIST 2709a	Blank 180-647 SiO2 99.995%	QC Material 180-673 USGS SAR-M	QC Material 180-661 RCRA1
Ba Barium 56	395	979	<10	801	1000
Cs Cesium 55	12		<10		
Te Tellurium 52			<10	<10	
Sb Antimony 51	<30	<30	<10	<30	
Sn Tin 50			<10	2.76	
Cd Cadmium 48		<10	<10	5.27	500
Ag Silver 47			<10	<10	500
Pd Palladium 46			<10		
Mo Molybdenum 42	16		<10	13.1	
Zr Zirconium 40	385	195	<10		
Sr Strontium 38	109	239	<10	151	
U Uranium 92	<20	<10	<10	<10	
Rb Rubidium 37	161	99	<10	146	
Th Thorium 90	17.4	10.9	<10	17.2	
Pb Lead 82	50	17.3	<10	982	500

Type P/N Element	RM 180-646 Till-4	CRM 180-649 NIST 2709a	Blank 180-647 SiO2 99.995%	QC Material 180-673 USGS SAR-M	QC Material 180-661 RCRA1
Au Gold 79	<10		<10	<10	
Se Selenium 34			<10	<10	500
As Arsenic 33	111	10.5	<10	38.8	500
Hg Mercury 80		0.9	<10		
Zn Zinc 30	70	103	<10	930	
W Tungsten 74	204		<10		
Cu Copper 29	237	33.9	<10	331	
Ni Nickel 28	<60	85	<10		
Co Cobalt 27		<50	<10	<50	
Fe Iron 26	39700	33600	<10	29900	
Mn Manganese 25	490	529	<10	5220	
Cr Chromium 24	<65	130	<10	79.7	500
V Vanadium 23	67	110	<10	67.2	
Ti Titanium 22	4840	3360	<10	3800	
Sc Scandium 21	<90	11.1	<10	<90	

Part Number: 410-014a

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—continued next page

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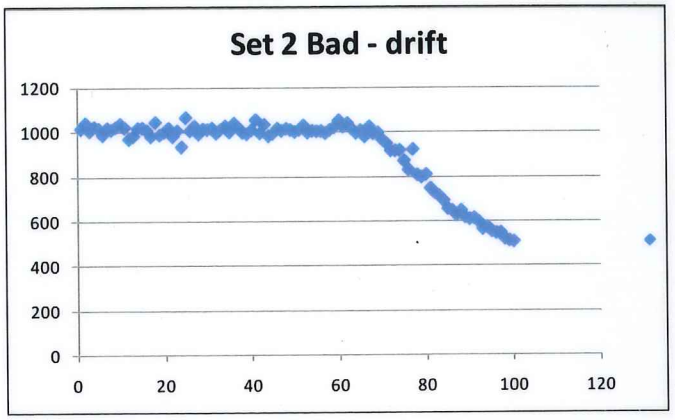
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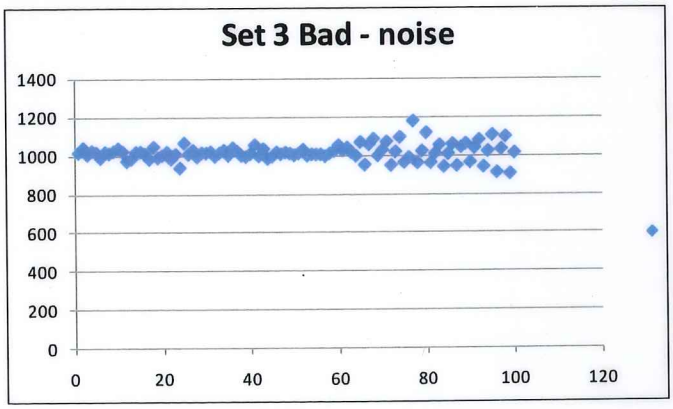
CERTIFICATE OF ANALYSIS — PAGE 2

Type P/N Element	RM 180-646 Till-4	CRM 180-649 NIST 2709a	Blank 180-647 SiO2 99.995%	QC Material 180-673 USGS SAR-M	QC Material 180-661 RCRA1
Ca Calcium 20		19100	<10	6100	
K Potassium 19		21100	<10	29400	
Cl Chlorine 17					
S Sulfur 16	800		<10		
P Phosophorus 15	880	688	<10	70	
Si Silicon 14	303833	303000	<10	338000	
Al Aluminum 13	20400	73700	<10	63000	
Mg Magnesium 12	7598	14600	<10	5000	

Requires GOLDD technology for mining & minerals mode







Notes:

- All results are listed in ppm (mg/kg).
- To convert to %, divide by 10,000; e.g. 39700ppm Fe (Till-4) is 3.97%.
- Original certificates of analysis (if available) are on TOPS and can be requested from customer support.
- While every effort is made to ensure the high quality of these reference samples and their data, the use of the materials and interpretation of the results is the sole responsibility of the user.

Use of reference materials

The reference materials provided with your analyzer are to help ensure the ongoing performance of your analyzer. These standards should be analyzed on a daily basis and the values obtained checked against this certificate of analysis. For quality assurance purposes you may wish to keep a running chart of the values obtained and monitor them for consistency.

If one or more of the elements begins to change in terms of reported concentration outside of the normal expected variability, the sample may have become damaged or contaminated. This may occur for a number of reasons. For example, oils and salts may transfer from hand contact onto the surface, dust or lint from the surroundings may be deposited onto the sample, or the thin film on the front of the cup may have pinholes or have been torn. If the cup film has torn or has been damaged in any other way, it should be replaced immediately; this will prevent loss of the material and prevent contamination of the instrument and other samples.

If the film has been torn and the sample exposed for a period of time, then it may be best to assume the sample is contaminated. Dispose of it following your local regulations, and then replace it as soon as possible. Also check the front window of the instrument and clean or replace it if necessary.

Examples of daily quality assurance charts are shown above; learn to understand normal variance and recognize drift and noise. Results from your instrument may be as much as +/-20% of the listed values, depending on the model you have. However, by using the same integration time every time, your results should be consistent with themselves. If you have more questions, please refer to the Statistical Aspects of Spectrometry section of the manual under Reference Documents, or call our Customer Support group.

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Analytical Reference Materials International

Provisional Certificate of Analysis

Certified Reference Material

Grade: 1-1/4Cr 1/2Mo / UNS K11572

Part Number (Q.A. NO.): **IARM 35HN**

Certificate Date: **01/11/2007** Certificate No.: **35HN-01112007-IARM-P** Revision Date: **01/11/2007**

Interpretation of Data

1. Certified values listed below reflect analysis results submitted by qualified analytical laboratories using a combination of methods and instrumentation that emulate actual methods and instrumental techniques currently utilized in the analytical community and are reported as % wt. unless otherwise noted.
2. Any data reported and enclosed by a **parentheses ( ) is a "best estimate" and is NOT CERTIFIED.** This data could not be quantified sufficiently for certification. It was however, reported by enough laboratories to be considered as potentially present in the matrix of the material being examined.
3. The "Inter-laboratory Analysis Program" (ILAP) utilized in the establishment of the data are an ongoing program with permanent membership. Certain elements may be selected by a consensus of the members for more extensive testing. Therefore the data in **brackets [ ] indicates further testing is in process.**
4. The **"±Estimated Uncertainty"** is enclosed by a **parentheses ( ) below** the individual **element's concentration** and is based on a Confidence Interval at 95%. Included in this estimated uncertainty, are the combined effects of method imprecision, material inhomogeneity, and any bias between methods.

Important: A "User Registration Card" accompanies all shipments. This card should be completed immediately upon receipt of materials with the appropriate user information. This is the only way in which ARMI can guarantee customer updates or possible data modifications!

Aluminum	Arsenic	Boron	Carbon	Calcium	Cobalt	Chromium	Copper
[0.027]	[0.003]	[0.0003]	[0.13]		[0.004]	[1.11]	[0.031]
[(0.002)]	[(0.001)]	[(0.0001)]	[(0.002)]		[(0.001)]	[(0.01)]	[(0.002)]
Manganese	**Molybdenum**	**Nitrogen**	**Niobium**	**Nickel**	**Oxygen**	**Phosphorus**	**Lead**
[0.57]	[0.48]	[0.0074]	[0.002]	[0.071]	[0.002]	[0.004]	[<0.001]
[(0.01)]	[(0.01)]	[(0.0003)]	[(0.0004)]	[(0.001)]	[(0.001)]	[(0.001)]	
Sulfur	**Antimony**	**Silicon**	**Tin**	**Titanium**	**Vanadium**	**Tungsten**	**Zirconium**
[0.028]	[<0.002]	[0.56]	[0.002]	[0.002]	[0.004]	[0.004]	[<0.002]
[(0.001)]		[(0.01)]	[(0.0003)]	[(0.0003)]	[(0.0004)]	[(0.001)]	

The laboratories participating in the "Inter-Laboratory Analysis Program" (ILAP) and certification of this material are as follows:

AK Steel - Middletown, OH
ATI Allvac - Lockport, NY
Bodycote Materials Testing - Portland, OR
Colonial Metals Co. - Columbia, PA
Deloro Stellite, Inc. - Belleville, ON
IMR Test Labs - Lansing, NY
Koppel Steel - Koppel, PA
MetalTek International, Inc. - Waukesha, WI
Special Metals IncoTest - Hereford, UK
Tensile Testing - Cuyahoga Hts., OH
Algoma Steel, Inc. - Sault Ste. Marie, ON
Bodycote Materials Testing - Chicago, IL
Cannon Muskegon Corp. - Muskegon, MI
Crucible Research - Pittsburgh, PA
Ellwood National Steel - Irvine, PA
Jorgensen Forge Corp. - Seattle, WA
Laboratory Testing, Inc. - Hatfield, PA
MSI Testing & Engineering, Inc. - Melrose Park, IL
Staveley Services Materials Testing - Gary, IN
The Timken Company - Canton, OH
Anderson Laboratories, Inc. - Greendale, WI
Bodycote Materials Testing - Los Angeles, LA
Carpenter Technology Corporation - Reading, PA
Crucible Specialty Metals - Syracuse, NY
Ellwood Quality Steel - New Castle, PA
Kalco Metals, Inc - Farrell, PA
Lockheed Martin Astronautics - Littleton, CO
Outokumpu Stainless OY - Tornio Finland
Stork Materials Testing and Inspection - Huntington Beach, CA
Wheeling Pittsburgh Steel Corp. - Mingo Junction, OH

Traceability: All members of the "Inter-Laboratory Analysis Program" (ILAP) listed above validate test methods and instrument performance utilizing SRMs produced by the National Institute of Standards and Technology, (NIST) as well as other CRMs and RMs produced by recognized Certifying Bodies from around the world. The specific SRMs, CRMs and RMs applicable to the material covered by this certificate are: NIST 1262A, 1264A, BS 60C, 61C, 68C, 1962, 2941, 4931, NIST 361, IARM 35C, BS 2-1, LECO 501-643, 501-644, BS 3941, IARM 35A, 35B, LECO 501-501, 501-510, 501-550, NIST 1261A, 1263A, ALPHA AR873, LECO 501-550, IARM 35A, 35B, 35C, 35D, LECO 501-503, 501-550, IARM 35C, LECO 501-643, BCS 409, 351, 454/1, 462/1, LECO 501-551, 502-102, R5657, NIST 1263A, 1763, BS 12D, 46, ALPHA AR872, AR890, LECO 501-550, NIST 1761, 1762, 1763, 1764, 1765, 1766, 1767, NIST 1217, 1225, 1763, NIST 1166, 1263, 1265, 1765, BS 45, 61D, 3931, XCCS, 12X12749, ALPHA AR 1653, LECO 501-676, NIST 293, 337A, 361, 1160, 1161, 1162, 1163, 1164, 1754, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, BAS 401/1, 402/1, 403/1, 404/1, 405/1, 406/1, 407/2, 408/1, 409/1, 410/2, JSS ST01, IARM 31D, LECO 501-510, 501-645,SUS INOX, RE 12/19, C/17, D/18, BS CSN-3, CSN-4, LECO 501-871, NIST 1286, IARM 30B,

A specific line of traceability is established to NIST and other Certifying Bodies for those elements that are noted as "Certified Values" on the Certificates of Analyses referenced above.

See Reverse Side for Statistical Data and Additional Information Regarding this Material.

700 Corporate Cr., Suite A • Golden, Colorado 80401 • Telephone (303) 216-2621 • FAX (303) 216-2649

The following data and accompanying statements represent all pertinent information reported in the ILAP as it applies to the chemical characterization of this material as of 01/11/2007.

35H	Al	As	B	C	Co	Cr	Cu	Mn	Mo	N	Nb	Ni	O	P	Pb
1	0.029	0.0024	0.0002	0.144	0.0037	1.14	0.03	0.56	0.49	0.0074	0.001	0.07	0.0013	0.006	0.0002
2	0.030	0.0017	0.0005	0.1353	0.0066	1.108	0.031	0.564	0.4704	0.00735	0.0020	0.072	0.0021	0.0055	0.001
3	0.0268	0.0039	0.0001	0.1355	0.0036	1.104	0.0332	0.5521	0.4588	0.0081	0.0019	0.0717	0.000758	0.00565	0.0003
4	0.0274	0.002	0.00024	0.1346	0.0073	1.075	0.0340	0.549	0.47	0.0063	0.0016	0.076	0.0034	0.0031	0.0012
5	0.031	0.0023	0.00013	0.130	0.0040	1.091	0.041	0.571	0.474	0.00733	0.0028	0.073	0.0042	0.0045	0.0009
6	0.0293	0.0030	0.0002	0.134	0.0026	1.120	0.026	0.571	0.484	0.0070	0.003	0.072	0.0022	0.003	0.0014
7	0.0269	0.004	0.0003	0.1318	0.005	1.111	0.027	0.569	0.466	0.0069	0.0025	0.0668	0.0011	0.002	0.00115
8	0.023	0.0027	0.00020	0.135	0.004	1.098	0.032	0.583	0.470	0.00695	0.003	0.070	0.0009	0.0048	
9	0.032	0.0035	0.0004	0.133	0.002	1.103	0.0372	0.5749	0.4735	0.0065	0.001	0.076	0.00422	0.0051	
10	0.0205	0.0035	0.0006	0.137	0.004	1.102	0.019	0.562	0.469	0.0079	0.002	0.071	0.0018	0.007	
11	0.0250	0.0012		0.1337	0.0030	1.120	0.035	0.579	0.485	0.00841	0.0014	0.0686	0.00096	0.0016	
12	0.024	0.00245		0.144	0.0036	1.109	0.031	0.559	0.479	0.00876	0.0024	0.072	0.0013	0.0053	
13	0.0252			0.137		1.098	0.0314	0.553	0.4696	0.0079	0.0017	0.072		0.0041	
14	0.028			0.129		1.121	0.031	0.577	0.510	0.0083	0.0035	0.071		0.005	
15	0.02017			0.12538		1.13218	0.031	0.550	0.462	0.00730		0.070		0.0047	
16	0.0292			0.134		1.105	0.032	0.558	0.465	0.0067		0.0721		0.0031	
17	0.0268			0.1316		1.0855	0.01894	0.55192	0.48012	0.0072		0.0694		0.00416	
18	0.0245			0.1331		1.107	0.034	0.566	0.477			0.0681		0.0038	
19							0.0318	0.5638	0.4740					0.0045	
20							0.0345	0.591	0.4969					0.0038	
21							0.0251		0.505					0.00195	
Mean	0.0266	0.0027	0.0003	0.1343	0.0041	1.1072	0.0308	0.5652	0.4776	0.0074	0.0021	0.0712	0.0020	0.0042	0.0009
STDV.	0.0033	0.0009	0.0002	0.0045	0.0015	0.0158	0.0053	0.0117	0.0135	0.0007	0.0008	0.0024	0.0013	0.0014	0.0005
Certified	**0.027**	**0.003**	**0.0003**	**0.13**	**0.004**	**1.11**	**0.031**	**0.57**	**0.48**	**0.0074**	**0.002**	**0.071**	**0.002**	**0.004**	**<0.001**
95% C.I.	**0.002**	**0.001**	**0.0001**	**0.002**	**0.001**	**0.01**	**0.002**	**0.01**	**0.01**	**0.0003**	**0.0004**	**0.001**	**0.001**	**0.001**	
Methods	X,A,I,O	H,I,O	I,O	C,O	X,I,O	X,W,A,I,O	X,A,I,O	X,A,I,O	X,A,I,O	F,O	X,I,O	X,A,I,O	F	X,I,O	X,H,A,I,O

Legend: W = Classical, C = Combustion, F = Fusion, A = AA or GFAA, I = ICP or DCP, D = DC Arc, O = OE, X = XRF, G = GDMS, H = Hollow Cathode OE

35H	S	Si	Sn	Ti	V	W	Bi	Ca	Cd	Mg	Sb	Se	Ta	Zn	Zr
1	0.025	0.60	0.002	0.0022	0.003	0.0039	0.0065	0.00055		0.0007	0.0029	0.0035	0.014	0.0031	0.0022
2	0.026	0.545	0.0021	0.0015	0.0045	0.0051	0.0009	0.0002		0.0003	0.0010	<0.00003	<0.001	0.0027	0.003
3	0.0295	0.5658	0.0031	0.0023	0.0056	0.0042	<0.00003	0.001		0.00006	<0.001	0.00001	0.001	0.0010	0.0001
4	0.0276	0.558	0.0019	0.0017	0.0046	0.005	0.00004	<0.001			0.0008		0.001	0.0012	<0.001
5	0.0297	0.570	0.0026	0.0021	0.0046	0.0033	<0.001	<0.0001			<0.005		<0.001	0.0026	0.0004
6	0.027	0.551	0.002	0.002	0.0050	0.0021		0.00538			0.0054		0.00015	0.0019	0.0005
7	0.0306	0.565	0.0027	0.001	0.004	0.005					<0.0001				0.0008
8	0.0286	0.5729	0.0027	0.0017	0.004	0.0037					0.000542				
9	0.0277	0.547	0.0011	0.0013	0.005	0.0031									
10	0.0282	0.573	0.002	0.003	0.0033										
11	0.0259	0.543	0.0026	0.0017	0.0051										
12	0.0289	0.539	0.0010	0.0006	0.00472										
13	0.029	0.567	0.0019	0.0021	0.0042										
14	0.0252	0.552	0.0017	0.0021	0.0046										
15	0.028	0.576	0.0011	0.00135	0.0035										
16	0.02612	0.551			0.0032										
17	0.0286	0.5586													
18	0.0287	0.593													
19	0.0263														
20	0.02745														
Mean	0.0277	0.5626	0.0020	0.0018	0.0043	0.0039	0.0025	0.0018		0.0004	0.0021	0.0018	0.0040	0.0021	0.0012
STDV.	0.0016	0.0167	0.0006	0.0006	0.0008	0.0010	0.0035	0.0024		0.0003	0.0021	0.0025	0.0067	0.0009	0.0012
Certified	**0.028**	**0.56**	**0.002**	**0.002**	**0.004**	**0.004**					**<0.002**			**<0.003**	**<0.002**
95% C.I.	**0.001**	**0.01**	**0.0003**	**0.0003**	**0.0004**	**0.001**									
Methods	C,I,O	X,W,A,I,O	X,H,I,O	X,I,O	X,I,O	X,I,O					H,I,O			H,I,O	X,I,O

Legend: W = Classical, C = Combustion, F = Fusion, A = AA or GFAA, I = ICP or DCP, D = DC Arc, O = OE, X = XRF, G = GDMS, H = Hollow Cathode OE

The International Standards Organization (ISO) definitions, expressed in ISO Guide 30-1981-(E) list the following:

Certifying Body: A technically competent body (organization or firm, public or private) that issues a Reference Material Certificate. The only generally accepted certifying body in the United States is the U. S. Department of Commerce, National Institute of Standards & Technology, (NIST), Gaithersburg, MD.

Reference Material (RM): A material or substance with one or more properties which are sufficiently well established to be used for calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

Certified Reference Material (CRM): A reference material with one or more properties whose values are certified by a technically valid procedure accompanied by or traceable to a certificate or other documentation, which is issued by a Certifying Body.

Inter-Laboratory Analysis Program (ILAP): Although ASTM Standard E691-87 applies to inter-laboratory studies to "Determine the Precision of a Single Test Method", it is also a well thought out and logical plan for conducting an inter-laboratory program involving multiple techniques. Therefore, the planning, conducting, analyzing, protocol, and treatment of data resulting from this inter-laboratory program were performed utilizing the guidelines established in ASTM E691-87.

Methods of Analysis: In view of the fact, that the "Inter-Laboratory Analysis Program" entails a wide variety of materials, no single analytical method would provide optimum data results. Therefore, the methods utilized were a combination of ASTM Standard Methods for classical wet chemistry, ICP, AA, Optical Emission and X-Ray spectrometric methods. The determinations for Carbon, Sulfur, Nitrogen, and Oxygen are the result of combustion instrument procedures.

Selection of Materials: A **"batch"** or **"series"** is defined as a single bar of one continuous length and heat. The majority of materials are in wrought condition; other methods of manufacture are utilized as a less desirable resort. ILAP samples are taken by removing a section, a minimum of, every one-twelfth of total length from the entire bar. A portion of the section is converted to chips and thin (pin) disk for analysis by classical wet chemistry, ICP, AA, and combustion procedures, and the balance remains as a thick disk for OES and X-Ray analysis. Each member of the ILAP is furnished a sample pack from a specific location on the batch bar. This systematic sampling procedure results in the homogeneity being reflected as a product of the overall statistics and certified data. This method of homogeneity testing is in accordance with ISO Guide 34, regarding the systematic selection and testing of a representative number of units for the assessment of homogeneity.

William D. Britt, President & General Manager
Analytical Reference Materials International Corporation

Certificate No.: 35HN-01112007-IARM-P
Certificate Date: 01/11/2007
Revision Date/No.: 01/11/2007

Certificate of Analysis

Work Order : VC143661

[Report File No.: 0000009552]

To: **ACCOUNTS PAYABLE**
F406201 SGS CEMI INC.
3260 Production Way
BURNABY BC V5A 4W4

Date: Nov 25, 2014

P.O. No.	:	PO:3741/ PROJ: 1454 Faro
Project No.	:	-
No. Of Samples	:	5
Date Submitted	:	Nov 21, 2014
Report Comprises	:	Pages 1 to 2 (Inclusive of Cover Sheet)

Distribution of unused material:
Active files:

Certified By :

Cam Chiang
Assistant Operations Manager

SGS Minerals Services Geochemistry Vancouver conforms to the requirements of ISO/IEC 17025 for specific tests as listed on their scope of accreditation which can be found at http://www.scc.ca/en/search/palcan/sgs

Report Footer:

L.N.R. = Listed not received
n.a. = Not applicable
I.S. = Insufficient Sample
-- = No result

*INF = Composition of this sample makes detection impossible by this method

M after a result denotes ppb to ppm conversion, % denotes ppm to % conversion

Methods marked with an asterisk (e.g. *NAA08V) were subcontracted
Elements marked with the @ symbol (e.g. @Cu) denote assays performed using accredited test methods

This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was (were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativity of the goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted. The findings report on the samples provided by the client and are not intended for commercial or contractual settlement purposes. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Final : VC143661 Order: PO:3741/ PROJ: 1454 Faro

Report File No.: 0000009552

Element	Zn
Method	GO_XRF77B
Det.Lim.	0.01
Units	%
Sample 47	0.01
Sample 61	0.02
Sample 67	0.02
Sample 81	0.01
Sample 100	<0.01
*Rep Sample 100	<0.01
*Std ME-4	1.11
*Blk BLANK	<0.01

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WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was (were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativity of the goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted. The findings report on the samples provided by the client and are not intended for commercial or contractual settlement purposes. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

APPENDIX E

UNDERHILL AS-BUILT SURVEYS AND QUANTITY ESTIMATES

UNDERHILL AS-BUILT SURVEYS AND QUANTITY ESTIMATES

ID	Description	Date
1	Certification Report	February 23, 2015
2	Borrow C Volumes Report.pdf Borrow D Render.png USAR Points.pdf Borrow A Volume Report.pdf Borrow D Haul Road Volume Report.pdf D14-193 Borrow C.pdf	November 6, 2014
3	D14-193 Borrow C.pdf D14-194 DSAR.pdf Excavation C4 Volume Report.pdf USAR A1 Volumes .html USAR Review.pdf	November 10, 2014
4	D14-194 DSAR Thickness.pdf USAR Surface A1.pdf USAR Surface A6.pdf USAR Surface A7.pdf Borrow A Final.pdf Borrow C Final.pdf Borrow D Final.pdf USAR Final.pdf	November 13, 2014

* Pre-construction documents produced by Underhill are included on Field Memorandum 1.
** This attachment only includes those documents related to the downstream construction required for the calculations of the USAR quantities.

Certification Report

Faro Mine Site Reclamation Survey Services executed on Sept. 16 to 19, 2014 and Oct. 27 to 29, 2014 by Underhill Geomatics Ltd under the supervision of Mr. G. C. Friesen, PEng, CLS, BCLS, FEC. This survey was performed under the instructions of BGC Engineering and the information provided, shown below, is true and accurate.

Location of Survey	**Date on site**
Faro Mine Site Reclamation	Original Ground Survey: Sept. 16 to 19, 2014 As-built Survey: Oct. 27 to 29, 2014

The following digital files have been transmitted:

Original Ground Survey:

- 2014-09-23
  - 2014-09-22 Control and Benchmarks.pdf
  - 2014-09-22 Control and Benchmarks.xls
  - D14-147 Powerline Clearance.pdf
- 2014-09-24
  - Borrow A pitrun and Sand breaklines.dxf
  - Borrow A Pitrun and Sand.csv
  - Borrow B1.csv
  - Borrow C and stockpile area breaklines.dxf
  - Borrow C and stockpile Area.csv
  - Borrow D and Road OG Breaklines.dxf
  - Borrow D and Road OG.csv
  - D14-148 Borrow D and road OG.pdf
  - D14-149 Borrow C and stockpile area.pdf
  - D14-150 Borrow B1.pdf
  - D14-151 Borrow A Pitrun and Sand.pdf
  - D14-152 Borrow C Surveyed Area.pdf
- 2014-09-29
  - Borrow A pitrun and Sand breaklines.dwg
  - Borrow C and stockpile area breaklines.dwg
  - Borrow D and Road OG Breaklines.dwg

As-built survey:

- 2014-11-06
  - Borrow C Volumes Report.pdf
  - Borrow D Render.png
  - DSAR 1 ortho.pdf
  - DSAR 1.pdf
  - USAR Points.pdf
  - Borrow A Volume Report.pdf
  - Borrow D Haul Road Volume Report.pdf
  - D14-193 Borrow C.pdf
  - D14-194 DSAR.pdf

- 2014-11-10
    - D14-193 Borrow C.pdf
    - D14-194 DSAR.pdf
    - Excavation C4 Volume Report.pdf
    - USAR A1 Volumes .html
    - USAR Review.pdf
- 2014-11-13
    - D14-194 DSAR Thickness.pdf
    - USAR Surface A1.pdf
    - USAR Surface A6.pdf
    - USAR Surface A7.pdf
    - Borrow A Final.csv
    - Borrow A Final.dxf
    - Borrow A Final.pdf
    - Borrow C Final.csv
    - Borrow C Final.dxf
    - Borrow C Final.pdf
    - Borrow D Final.csv
    - Borrow D Final.dxf
    - Borrow D Final.pdf
    - DSAR Final 1.pdf
    - DSAR Final 2.pdf
    - DSAR Final 3.pdf
    - DSAR Final.csv
    - DSAR Final.dxf
    - USAR Final.csv
    - USAR Final.dxf
    - USAR Final.pdf
- 2015-02-19
    - Road Crossings .pdf
    - Road Crossings.csv
    - Road Crossings.dxf

CERTIFIED CORRECT:

Date: February 23rd, 2015 _____

Gerhard Charles Friesen
PEng, CLS, BCLS, FEC



Underhill Geomatics Ltd

4081 Fourth Ave

Whitehorse, Yukon Y1A 1H3

Surface Report

Project Name: J:\2014\W14157 Faro Reclamation Project for BGC\Cad\Borrow C\D14-193 Borrow C Final.dwg

Report Date: 06/11/2014 4:10:46 PM

Client: Asphalt

Project Description:

Prepared by: Sandy Cooke

Linear Units: meter	**Area Units:** squareMeter	**Volume Units:** cubicMeter

Surface: Vols C1
Description: Description

Area 2D: 153.583	Area 3D: 186.761
Elevation Max: 3.770	Elevation Min: 0.000
Number of Points: 75	Number of Triangles: 132

Surface: Vols C2
Description: Description

Area 2D: 179.616	Area 3D: 222.292
Elevation Max: 4.404	Elevation Min: -1.083
Number of Points: 98	Number of Triangles: 158

Surface: Vols C3
Description: Description

Area 2D: 301.231	Area 3D: 360.564
Elevation Max: 2.912	Elevation Min: 0.000
Number of Points: 60	Number of Triangles: 98

Surface: Vols C5
Description: Description

Area 2D: 1154.166	Area 3D: 1358.402
Elevation Max: 5.435	Elevation Min: -1.923
Number of Points: 483	Number of Triangles: 881

Volume Surface: Vols C1
Description: Description

Volume Cut: 0.000	Volume Fill: 230.700	Volume Total: 230.700

Compare Surface: C1

Base Surface: C1 Base

Volume Surface: Vols C2
Description: Description

Volume Cut: 8.276	Volume Fill: 224.196	Volume Total: 215.920

Compare Surface: C2
Base Surface: Borrow C OG

Volume Surface: Vols C3
Description: Description

Volume Cut: 0.000	Volume Fill: 406.337	Volume Total: 406.337

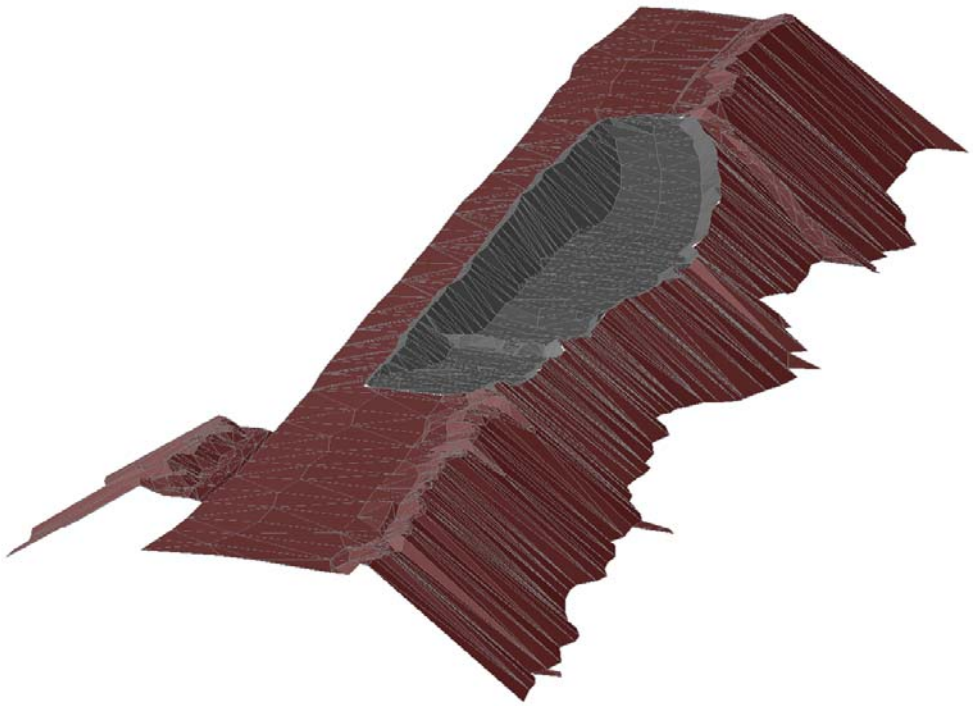
Compare Surface: C3
Base Surface: C3 Base

Volume Surface: Vols C5
Description: Description

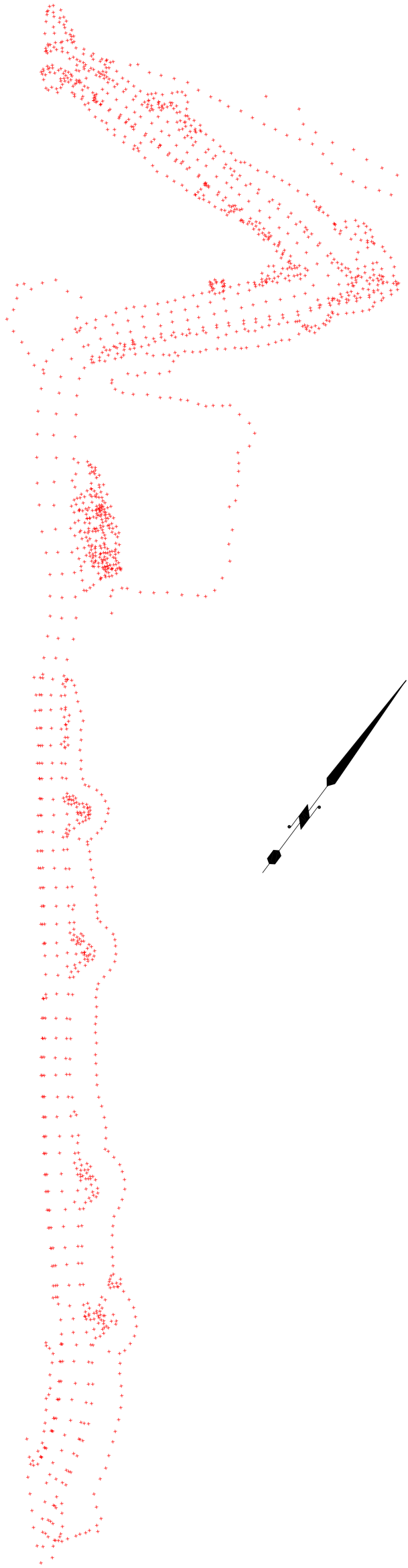
Volume Cut: 79.899	Volume Fill: 1668.407	Volume Total: 1588.508

Compare Surface: C5
Base Surface: Borrow C OG

2014-11-06_Borrow D Render - Underhill Geomatics Ltd.



20141106_USAR Points.pdf - Underhill Geomatics Ltd.



20141106_Borrow A Volume Report.pdf

Underhill Geomatics Ltd

4081 Fourth Ave

Whitehorse, Yukon Y1A 1H3

Surface Report

Client: Asphalt

Project Name: J:\2014\W14157 Faro Reclamation Project for BGC\Cad\Borrow A\Borrow A Pit Run Final.dwg

Project Description:

Report Date: 06/11/2014 8:34:18 AM

Prepared by: Sandy Cooke

Linear Units: meter	**Area Units:** squareMeter	**Volume Units:** cubicMeter

Surface: Pitrun Volumes

Description: Description

Area 2D: 1665.647

Area 3D: 1878.004

Elevation Max: 0.515

Elevation Min: -5.302

Number of Points: 1287

Number of Triangles: 2413

Volume Surface: Pitrun Volumes

Description: Description

Volume Cut: 3276.520

Volume Fill: 12.670

Volume Total: -3263.850

Compare Surface: Borrow A Pitrun

Base Surface: Pitrun OG

20141106_Borrow D Haul Road Volume Report.pdf

Underhill Geomatics Ltd

4081 Fourth Ave

Whitehorse, Yukon Y1A 1H3

Surface Report

Client: Asphalt

Project Name: J:\2014\W14157 Faro Reclamation Project for BGC\Cad\Borrow D\Borrow D Final.dwg

Project Description:

Report Date: 06/11/2014 8:52:49 AM

Prepared by: Sandy Cooke

Linear Units: meter	**Area Units:** squareMeter	**Volume Units:** cubicMeter

Surface: Volume Borrow D

Description: Description

Area 2D: 10967.536

Area 3D: 12973.985

Elevation Max: 1.010

Elevation Min: -8.345

Number of Points: 3043

Number of Triangles: 5783

Volume Surface: Volume Borrow D

Description: Description

Volume Cut: 34953.786

Volume Fill: 372.523

Volume Total: -34581.263

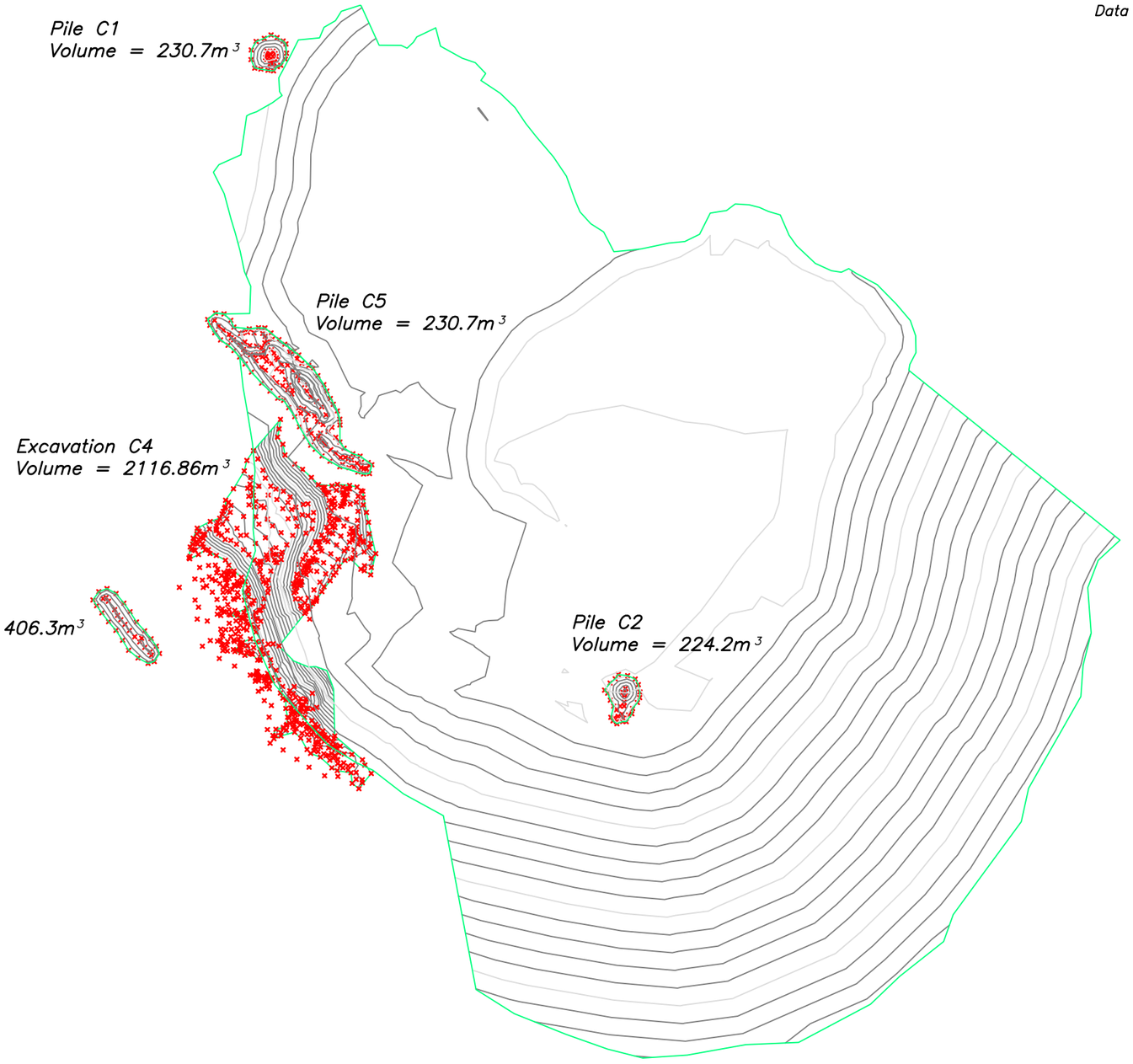
Compare Surface: Borrow D Final

Base Surface: Borrow D Haul Rd OG

20141106_D14-193 Borrow C.pdf - Underhill Geomatics Ltd.

Borrow Area C

Contour Intervals 5.0m
Data point shown thus . . . . . ×



UNDERHILL GEOMATICS LTD.
PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157

Scale 1:2000

50 0 20 50 100 150 200 metres

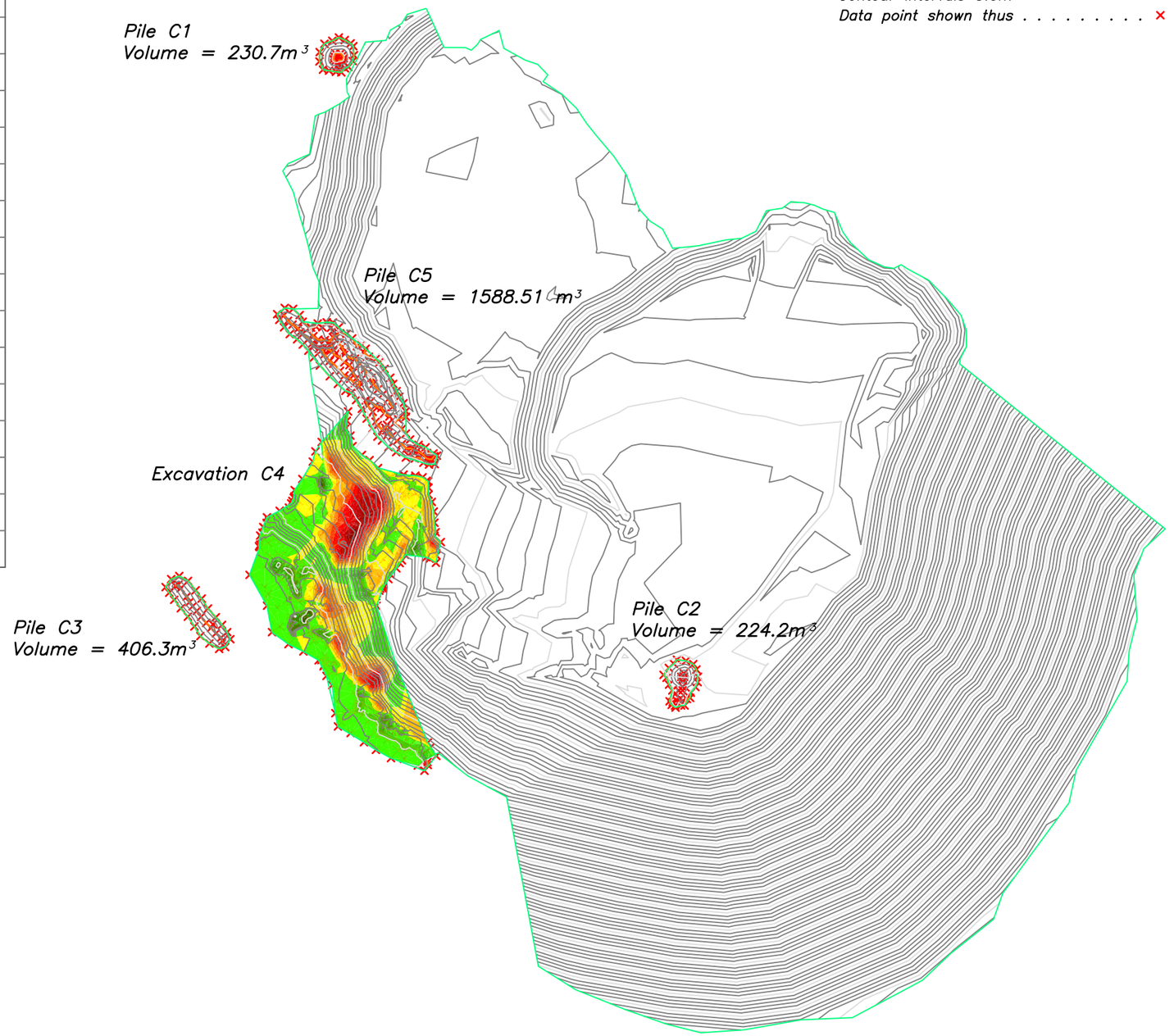
D14–193 SC

20141110_D14-193 Borrow C_2.pdf

Borrow Area C

Contour Intervals 5.0m
Data point shown thus . . . . . ×

Elevations Table				
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	−4.50	−4.00	1.51	
2	−4.00	−3.50	21.67	
3	−3.50	−3.00	108.10	
4	−3.00	−2.50	134.06	
5	−2.50	−2.00	136.12	
6	−2.00	−1.50	192.08	
7	−1.50	−1.00	368.79	
8	−1.00	−0.50	681.55	
9	−0.50	0.00	1155.10	
10	0.00	0.50	2252.10	
11	0.50	1.00	467.48	
12	1.00	1.50	157.78	
13	1.50	2.00	58.93	
14	2.00	2.50	5.37	





UNDERHILL GEOMATICS LTD.
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WHITEHORSE, YUKON
Job: W14157

Scale 1:2000

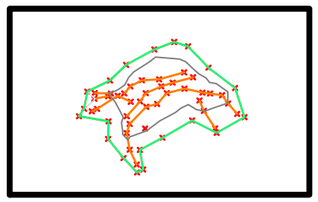
50 0 20 50 100 150 200 metres

D14−193 SC

20141110_D14-194 DSAR_2.pdf

Down Stream Access Road

Data point shown thus . . . . . ×



Detail: Pile at Road entrance
Scale 1:500
Volume 44.4m³

Match Line

Road Shoulder Volume 122.4 m³

Road CL

Cleared Road

Previously Cleared

Brush Pile

Toe of Pile

Brush Pile

Laydown Area
516.88 m²

Silt Fence 24.6m

Area 4
22.40 m²

Area 3
101.06 m²

Area 2
89.67 m²

Area 1
258.57 m²

Silt Fence 36.6m

Red Area 372.17 m²

Blue Area 427.48 m²

Road CL

Match Line

Scale 1:500

10 0 5 10 20 30 40 50 metres

UNDERHILL GEOMATICS LTD.
PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157

D14–194 SC

20141110_Excavation C4 Volume Report.pdf

Underhill Geomatics Ltd

4081 Fourth Ave

Whitehorse, Yukon Y1A 1H3

Surface Report

Client: Asphalt

Project Name: J:\2014\W14157 Faro Reclamation Project for BGC\Cad\Borrow C\D14-193 Borrow C Final.dwg

Project Description:

Report Date: 07/11/2014 11:09:46 AM

Prepared by: Sandy Cooke

Linear Units: meter	**Area Units:** squareMeter	**Volume Units:** cubicMeter

Surface: Vols C4

Description: Description

Area 2D: 5740.648

Area 3D: 6106.178

Elevation Max: 2.428

Elevation Min: -4.162

Number of Points: 2066

Number of Triangles: 4002

Volume Surface: Vols C4

Description: Description

Volume Cut: 2614.031

Volume Fill: 850.870

Volume Total: -1763.161

Compare Surface: C4

Base Surface: Borrow C OG

20141110_USAR A1 Volumes.pdf

Underhill Geomatics Ltd

4081 Fourth Ave

Whitehorse, Yukon Y1A 1H3

Surface Report

Project Name: J:\2014\W14157 Faro Reclamation Project for BGC\Cad\USAR\USAR Final.dwg

Report Date: 13/11/2014 8:46:50 AM

Client: Asphalt

Project Description:

Prepared by: Sandy Cooke

Linear Units: meter	**Area Units:** squareMeter	**Volume Units:** cubicMeter

Surface: Vols A1 Borrow A
Description: Description

Area 2D: 3796.398
Area 3D: 3799.718
Elevation Max: 0.855
Elevation Min: 0.343
Number of Points: 797
Number of Triangles: 663

Surface: Vols A1 Borrow D and A
Description: Description

Area 2D: 9394.826
Area 3D: 11252.920
Elevation Max: 9.552
Elevation Min: -3.512
Number of Points: 3141
Number of Triangles: 5931

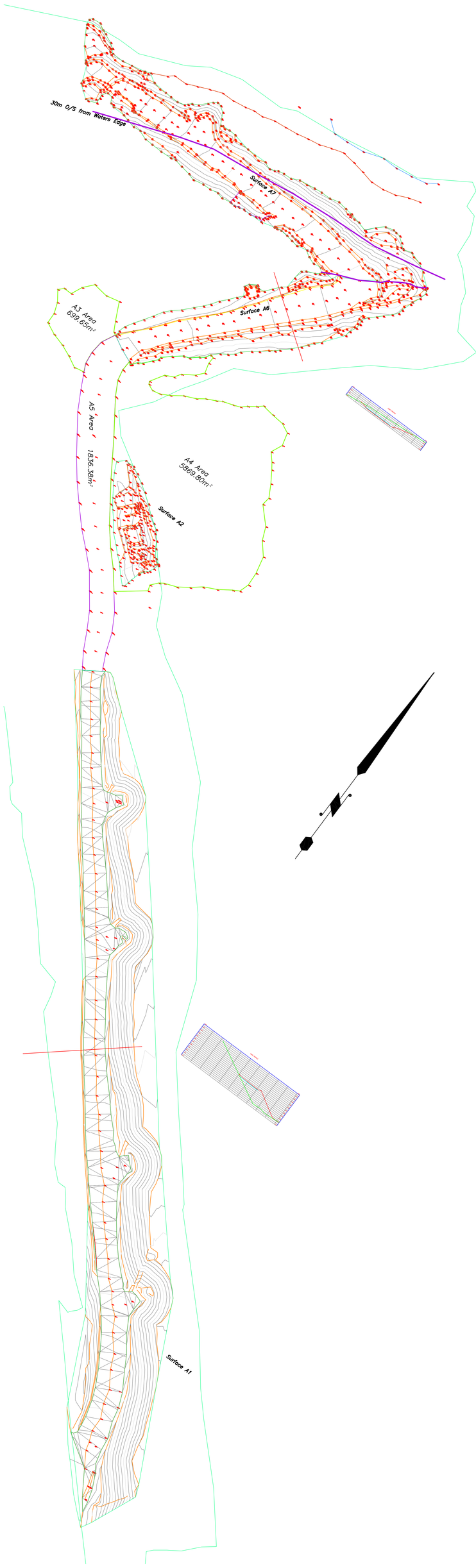
Volume Surface: Vols A1 Borrow A
Description: Description

Volume Cut: 0.000
Volume Fill: 1979.559
Volume Total: 1979.559
Compare Surface: A1 Fill Borrow D
Base Surface: A1 Capping Borow A

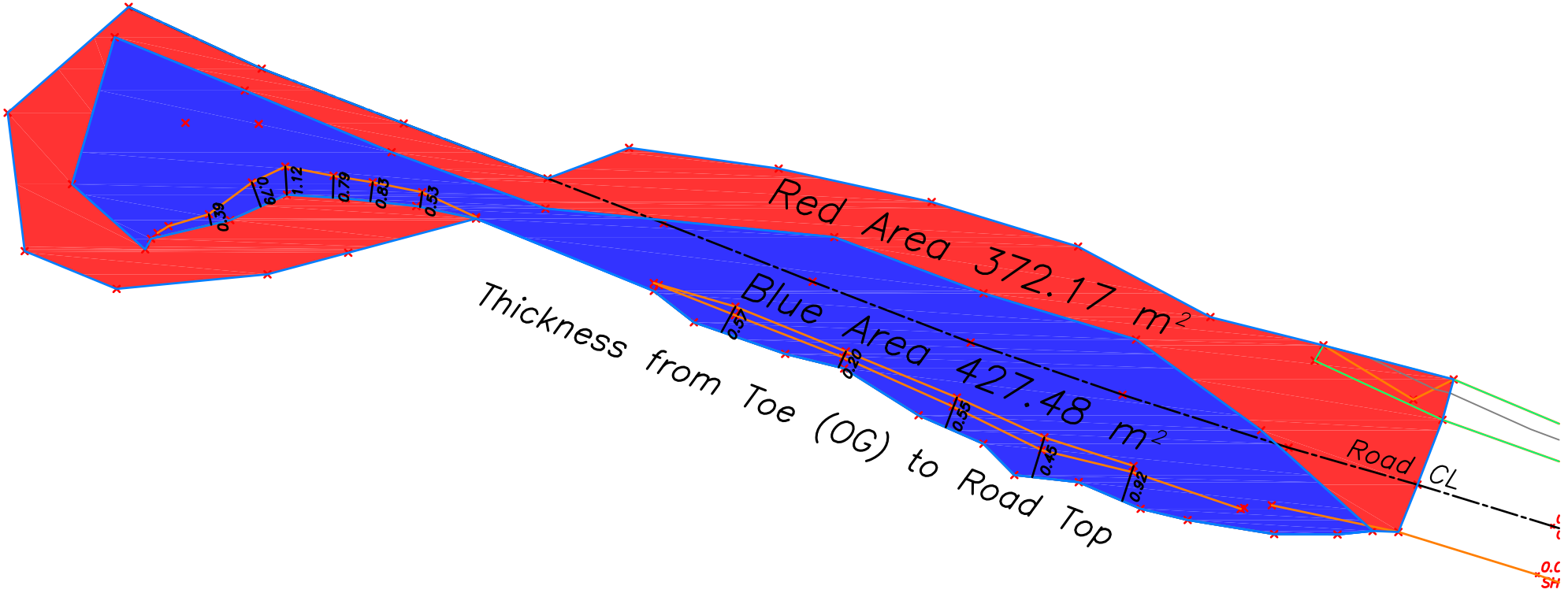
Volume Surface: Vols A1 Borrow D and A
Description: Description

Volume Cut: 671.656
Volume Fill: 33595.412
Volume Total: 32923.756
Compare Surface: A1 Fill Borrow D
Base Surface: Access Rd OG

20141110_USAR Review - Underhill Geomatics Ltd.



20141113_D14-194 DSAR Thickness.pdf - Underhill Geomatics Ltd.



20141113_USAR Surface A1.pdf

Underhill Geomatics Ltd

4081 Fourth Ave

Whitehorse, Yukon Y1A 1H3

Surface Report

Project Name: J:\2014\W14157 Faro Reclamation Project for BGC\Cad\USAR\USAR Final.dwg

Report Date: 13/11/2014 8:46:50 AM

Client: Asphalt

Project Description:

Prepared by: Sandy Cooke

Linear Units: meter	**Area Units:** squareMeter	**Volume Units:** cubicMeter

Surface: Vols A1 Borrow A
Description: Description

Area 2D: 3796.398
Area 3D: 3799.718
Elevation Max: 0.855
Elevation Min: 0.343
Number of Points: 797
Number of Triangles: 663

Surface: Vols A1 Borrow D and A
Description: Description

Area 2D: 9394.826
Area 3D: 11252.920
Elevation Max: 9.552
Elevation Min: -3.512
Number of Points: 3141
Number of Triangles: 5931

Volume Surface: Vols A1 Borrow A
Description: Description

Volume Cut: 0.000
Volume Fill: 1979.559
Volume Total: 1979.559
Compare Surface: A1 Fill Borrow D
Base Surface: A1 Capping Borow A

Volume Surface: Vols A1 Borrow D and A
Description: Description

Volume Cut: 671.656
Volume Fill: 33595.412
Volume Total: 32923.756
Compare Surface: A1 Fill Borrow D
Base Surface: Access Rd OG

20141113_USAR Surface A6.pdf

Underhill Geomatics Ltd

4081 Fourth Ave

Whitehorse, Yukon Y1A 1H3

Surface Report

Project Name: J:\2014\W14157 Faro Reclamation Project for BGC\Cad\USAR\USAR Final.dwg

Report Date: 13/11/2014 9:34:32 AM

Client: Asphalt

Project Description:

Prepared by: Sandy Cooke

Linear Units: meter	**Area Units:** squareMeter	**Volume Units:** cubicMeter

Surface: Vols A6 Capping
Description: Description

Area 2D: 1305.382
Area 3D: 1340.792
Elevation Max: 0.794
Elevation Min: -1.213
Number of Points: 372
Number of Triangles: 665

Surface: Vols A6 Excavation
Description: Description

Area 2D: 2799.870
Area 3D: 2980.028
Elevation Max: 4.476
Elevation Min: -3.420
Number of Points: 860
Number of Triangles: 1567

Volume Surface: Vols A6 Capping
Description: Description

Volume Cut: 7.514
Volume Fill: 456.542
Volume Total: 449.028
Compare Surface: A6 Capping
Base Surface: A6 Excavation

Volume Surface: Vols A6 Excavation
Description: Description

Volume Cut: 3129.389
Volume Fill: 696.011
Volume Total: -2433.378
Compare Surface: A6 Excavation
Base Surface: Access Rd OG

20141113_USAR Surface A7.pdf

Underhill Geomatics Ltd

4081 Fourth Ave

Whitehorse, Yukon Y1A 1H3

Surface Report

Project Name: J:\2014\W14157 Faro Reclamation Project for BGC\Cad\USAR\USAR Final.dwg

Report Date: 13/11/2014 9:37:20 AM

Client: Asphalt

Project Description:

Prepared by: Sandy Cooke

Linear Units: meter	**Area Units:** squareMeter	**Volume Units:** cubicMeter

Surface: Vols A7 Capping
Description: Description

Area 2D: 1312.687
Area 3D: 1313.966
Elevation Max: 0.411
Elevation Min: -0.091
Number of Points: 660
Number of Triangles: 462

Surface: Vols A7 Excavation
Description: Description

Area 2D: 3939.489
Area 3D: 4291.716
Elevation Max: 5.225
Elevation Min: -2.551
Number of Points: 1546
Number of Triangles: 2871

Volume Surface: Vols A7 Capping
Description: Description

Volume Cut: 0.002
Volume Fill: 333.826
Volume Total: 333.824
Compare Surface: A7
Base Surface: A7 Capping

Volume Surface: Vols A7 Excavation
Description: Description

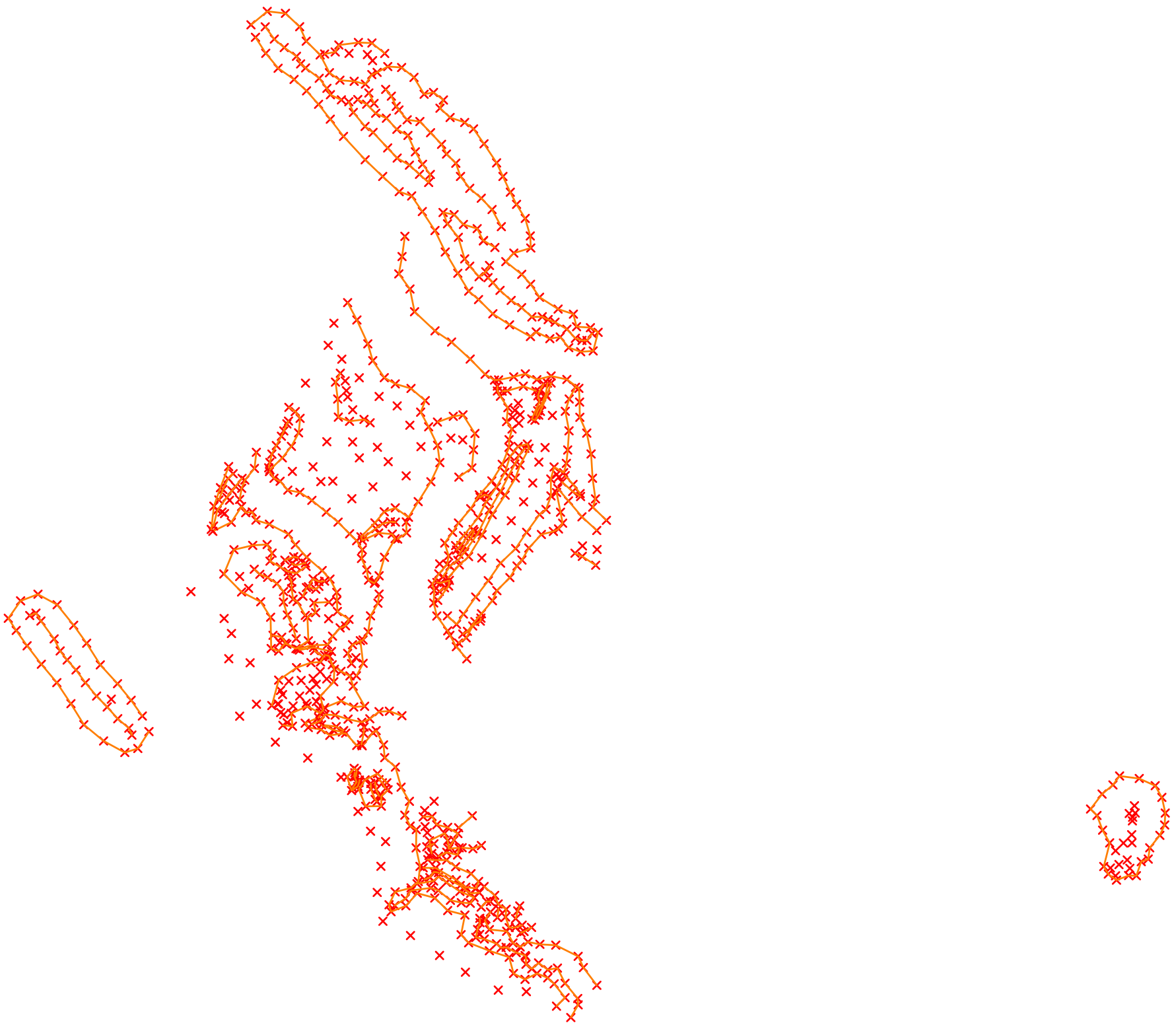
Volume Cut: 784.223
Volume Fill: 4948.198
Volume Total: 4163.975
Compare Surface: A7
Base Surface: Access Rd OG

20141113_Borrow A Final.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "Borrow A Final.dxf" created with the points listed on the excel file "Borrow A Final.csv")

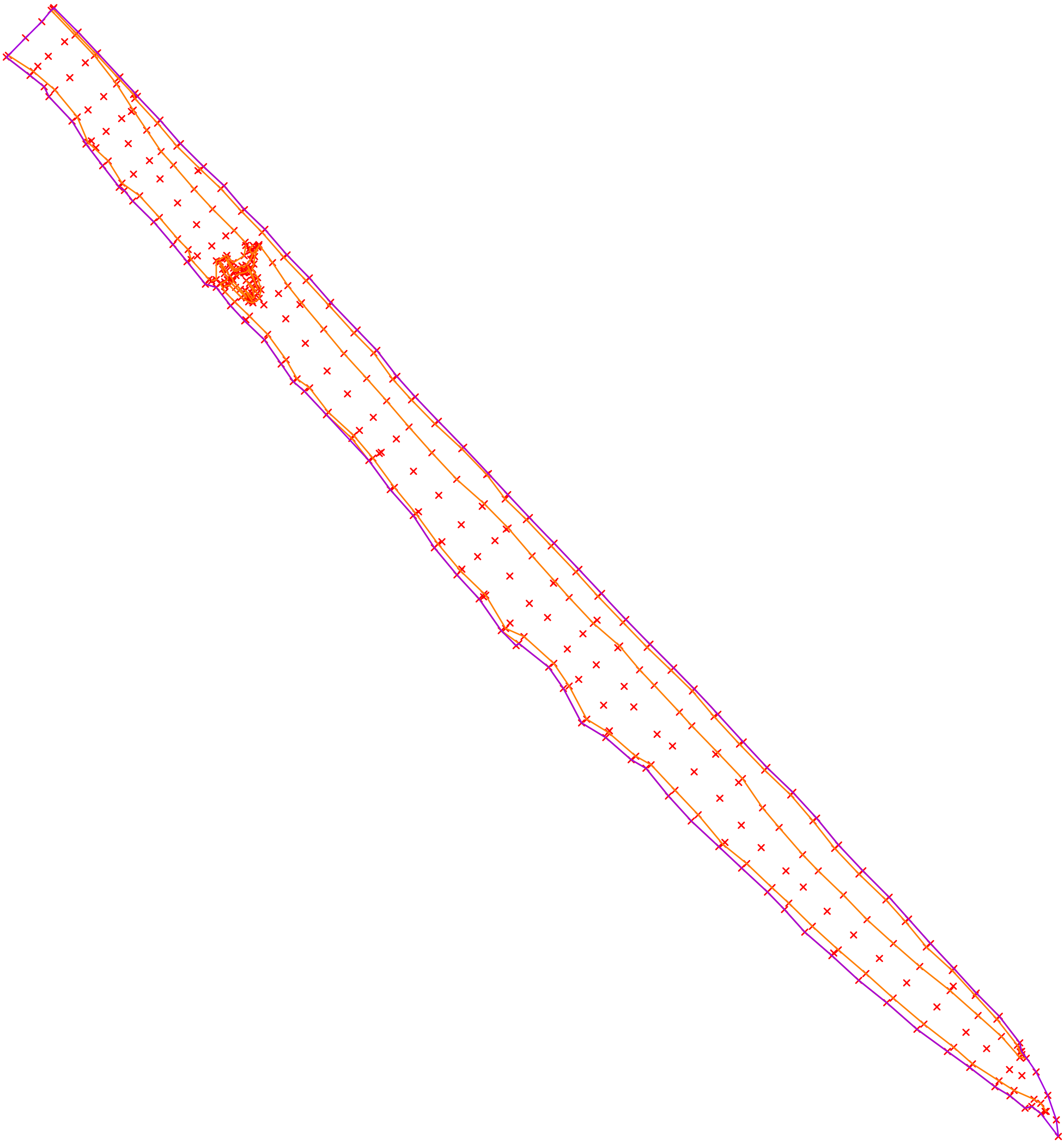


20141113_Borrow C Final.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "Borrow C Final.dxf" created with the points listed on the excel file "Borrow C Final.csv")





20141113_Borrow D Final.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "Borrow D Final.dxf" created with the points listed on the excel file "Borrow D Final.csv")



20141113_USAR Final.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "USAR Final.dxf" created with the points listed on the excel file "USAR Final.csv")

