BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

BREAKWATER RESOURCES LTD.

RECLAMATION OF MINE OPENINGS
AS-BUILT REPORT

NANISIVIK MINE, NU

FINAL REPORT

PROJECT NO.: 0255-012-03
DATE: APRIL 30, 2008

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Project No. 0255-012-03
April 30, 2008

Mr. Bob Carreau
Vice President, CSR and Sustainability
Breakwater Resources Ltd.
Suite 950, 95 Wellington Street West
Toronto, ON
M5J 2N7

RE: RECLAMATION OF MINE OPENINGS,
AS-BUILT REPORT

Dear Mr. Bob Carreau:

Please find attached our above referenced report dated April 30, 2008. This report presents the as-built information collected by BGC Engineering Inc. during the reclamation of various surface mine openings at the Nanisivik Mine site.

Should you have any questions or comments, please contact me at the number listed above.

Regards,
BGC Engineering Inc.
per:

Geoff Claypool, P.Eng
Geological Engineer

encl: Final Report, Figures, Appendices

GKC/sf

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LIMITATIONS OF REPORT

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1.0 INTRODUCTION

1.1 Background

Nanisivik Mine is wholly owned by CanZinco Limited ("CanZinco"), which is a division of Breakwater Resources Limited ("Breakwater"). The Nanisivik Mine is located on the Borden Peninsula on northern Baffin Island in the Canadian Arctic at approximately 73º north latitude (Figure 1). The mine site is located on the south shore of Strathcona Sound, approximately 30 kilometres from Admiralty Inlet.

The Nanisivik Mine began production of zinc and lead concentrates in 1976. The current owner of the mine, CanZinco Ltd. (CanZinco), has been in possession of the mine since 1996. Prior to mid-2002, the Nanisivik Mine was scheduled to operate until the depletion of economic ore reserves in 2004 or 2005. However, depressed international base-metal prices necessitated a re-evaluation of the mine production plan in mid-2002. This assessment resulted in a reduction of economic ore reserves such that these reserves were depleted in September 2002. Mining operations were permanently ceased at that time.

The Final Closure and Reclamation Plan (FCRP) for the Nanisivik Mine was submitted to the Nunavut Water Board (NWB) by CanZinco in March 2004. Approval of the FCRP was conveyed by the NWB in a letter to CanZinco dated July 6, 2004. The Letter of Approval also outlined several terms and conditions which must be adhered to as part of the closure process. Item 13, point III of the Letter of Approval states the following:

> *The Licensee shall submit for NWB review, by November 30, 2004, detailed engineering designs, stamped by an engineer, for the closure of mine portals, vent raises and all other mine openings to surface.*

As such, a Mine Openings Closure Plan report (BGC, 2005) was prepared to satisfy this condition of the Letter of Approval. The report provided the following information:

- an engineering design for the construction of all thermal covers for at site,
- recommended construction and engineering supervision practices, and
- a performance monitoring plan.

Reclamation construction began at the Nanisivik Mine site in August 2004. The majority of the construction work was completed in 2005 and 2006, including the reclamation of most of the mine openings at site. This current report provides a summary of as-built information collected during reclamation of the mine openings.

1.2 BGC Scope of Work

BGC was retained by Breakwater to conduct on-site construction monitoring during construction of many of the reclamation measures undertaken at Nanisivik Mine, including closure of the mine openings. During construction, a BGC Field Representative was on-site during construction of the reclamation measures to document the following aspects of the work:

- construction schedule;
- material quantities;
- QA/QC test results;
- technical decisions and field modifications made to the original design and the associated rational;
- construction photos; and
- to provide direction to surveyors such that sufficient survey information is collected to prepare accurate as-built drawings of each reclamation measure.

The information recorded by the Field Representative forms the basis of this current report, which provides a summary of as-built information collected during construction.

It should be noted that some reclamation work was undertaken by mine site staff during progressive reclamation of the mine site. This work was not supervised by BGC and this work is identified throughout the report, where appropriate.

2.0 GENERAL DESIGN CONCEPTS AND OBJECTIVES

The reclamation requirements for each specific mine opening were summarized in BGC (2005). The following sections outline the general design concepts and objectives for each type of opening.

2.1 Portals

The general reclamation design concept for mine portals involves construction of a portal plug comprised of rockfill into each of the portals. The portal plug would satisfy the design criteria by providing the following:

- prevent any access to the underground workings;
- provide some support for the portal crown pillars;
- cover sulphide exposures on highwalls adjacent to the portals to mitigate the potential for metal leaching and acid generation; and
- provide a surface environment that blends into natural conditions.

It should be noted that support for the portal crown pillars is not considered to be required for long term stability, according to the analysis completed by Mr. Guy Lauzier, P.Eng. (NML 2002). However, as a conservative design measure, limited support for the crown pillar is provided in the reclamation design by including the placement of some backfill within each portal.

Portals directly encased in rock were to be backfilled with waste rock or shale as far back into the portal as practically and safely as possible, to a maximum portal depth of 5 m. It was not expected that the plug would be tight to the crown (roof) of the portal, due to practical construction considerations. Since it was not a design requirement, placement of backfill into the portal was to be completed on an “as much as practical” basis and was only to be completed, if deemed safe to do so.

The construction details of the portal plug were to depend on the type of rockfill used.

If the rockfill was comprised of shale, the following construction sequence was to be followed:

- the plug was to extend out of the portal opening,
- the outside face was to be contoured to an appropriate grade (no steeper than 3H:1V), and
- a minimum thickness of 0.25 m of armour material was to be applied to the shale surface.

If the rockfill was comprised of waste rock, the following construction sequence was to be followed:

- A thermal cover consisting of a 1.95 m (minimum thickness) cover of shale was to be applied to the outside face of the waste rock,
- The outside face of the thermal cover was to be contoured to an appropriate grade (no steeper than 3H:1V), and
- A 0.25 m (minimum thickness) layer of armouring material was to be applied to the shale surface.

For culverted portals, a similar construction sequence was to occur:

- The top portion of the culvert was to be removed,
- Shale or waste rock was to be placed into the portal as far as possible and was to extend to the front of the opening,
- The surface of the backfill (top and front face) was to be covered with a minimum thickness of 1.95 m of shale and sloped to a maximum steepness of 3H:1V, and
- A minimum thickness of 0.25 m of armouring material was to be applied to the surface of the shale to prevent erosion.

The following additional points apply to both culverted and rock portal plug designs:

- If an ice plug was encountered within 5 m of the portal entrance, the placement of rockfill was to extend only to the ice plug.
- For culverted portals, the backfill was to cover the remaining portion of the culvert or associated concrete pony wall that was to be left in place.
- Armour material was to be non-acid generating and resistant to weathering, similar to the Twin Lakes sand and gravel.
- The plug and thermal cover were to be constructed such that all sulphide exposures on highwalls adjacent to the portals were covered by a minimum thickness of 1.95 m of shale and 0.25 m of armour material.
- Remnant highwalls were either to be graded into the portal cover, or scaled and sloped sufficiently that only residual risks, similar to those presented by the surrounding natural conditions, remain.

2.2 Raises

The general reclamation design concept for mine raises involved backfilling each of the raises to surface and constructing a surface mound. The objective of the surface mound was to provide geothermal protection to underlying materials and to offset potential future surface deformation.

The following construction sequence was to be followed during the reclamation of each of the mine raises:

- any surface structure was to be removed,
- the raises were to be backfilled with rockfill (shale or waste rock) to 1.5 m below surface,

- the remaining portion of the raise was to be backfilled with shale to surface, and
- a surface mound consisting of a minimum of 1.95 m of shale and 0.25 m of armouring material was to be constructed at surface. This mound was to accommodate minor amounts of surface subsidence and to ensure the rockfill within the raise plug remains in a frozen condition year round.

It should be noted that the raises had already been backfilled with rockfill, and most surface mounds had been constructed, prior to 2005 during progressive reclamation of the mine site. BGC was not on site during these backfilling operations. However, information supplied by the mine site has been incorporated within the report as part of the as-built record. This information is assumed to be accurate and could not be independently verified by BGC.

2.3 Design Validation

In addition to the technical work documented in NML (2002), the following validation of the proposed reclamation measures is provided in Table 1. This information provides further context for the proposed reclamation measures.

Table 1 Summary of Potential Failure Modes

Potential Failure Mode	Potential Consequence	How each potential failure mode is addressed by reclamation plan
Failure of the crown pillar above the opening	Settlement on surface but no opening into the underground workings.	Sufficient crown pillar thickness to maintain stability.
Delamination of the back of the portal along the bedding planes		Placement of some backfill in portal openings to minimize surface deformation in unlikely event of crown pillar failure.
Wedge failure of the rock in the crown pillar		
Spawling of the rock along the face of the crown pillar	Potential opening into underground workings.	Backfilling against highwall to maintain stability.
Creep of ice plug in raise		Excess material mounded at surface of raise plug.

Although these potential failure modes are considered unlikely, backfilling of the raises and portals, and the adjacent highwalls, as per the reclamation plan, is considered to provide the ability to prevent or nearly completely mitigate the potential of catastrophic failure adjacent to the opening. Additionally, if surface settlement is observed post-reclamation, it could likely be remediated with minor grading efforts.

3.0 CONSTRUCTION PRACTICES

Construction of the reclamation measures at the Nanisivik Mine was challenging due to the remoteness of the site, short construction season, extreme climatic conditions and various complexities associated with the construction materials and ground conditions encountered throughout the construction process. Thus, a comprehensive, but adaptive, approach to reclamation was required to ensure the reclamation measures were constructed to the original design intent. The following sections summarize the personnel, equipment, and construction practices successfully utilized to implement the FCRP at Nanisivik Mine.

3.1 Construction/Administration Personnel

The Owner, Breakwater, was represented on site during the reclamation period by the following personnel:

- Site Manager – Mr. Murray Markle.
- Contract Administrator – Mr. Mike Weirmeir.
- Geotechnical Consultant – BGC Engineering Inc. (Project Engineer – Mr. Geoff Claypool, P.Eng.).
- Geo-Environmental Consultant – Gartner Lee Ltd. (Project Scientist – Ms. Arlene Laudrum, P.Geol.).

The primary Reclamation Contractor was ATCON Construction Inc. (ATCON), who were on-site between August 2004 and October 2005. They were represented on site by the following personnel:

- Project Manager – Mr. Bruce Surek.
- Site Foremen – Mr. Leighton Taylor, Mr. Peter Sims and Mr. Ron Leblanc.

Additional personnel and sub-contractors were utilized for small scale projects at various stages of the reclamation process.

3.2 Construction Equipment Summary

The following construction equipment was transported to site by ATCON, via the sea lift, in August 2004:

- 4, CAT 775D haul trucks;
- 1, CAT D8R dozer;
- 1, CAT 385ME excavator;
- 1, CAT CS-583C vibrating drum roller compactor; and,
- 2, SCH 5000 blasting drills (subcontractor Consbec).

The following mine fleet equipment was also utilized by the Contractor during construction:

- 1, CAT D8R dozer;
- 1, CAT D8N dozer
- 2, 980 series loaders;
- 1, John Deere 892LC excavator; and
- 1, CAT 140H grader.

3.3 Construction Monitoring

A BGC Field Representative was on-site during construction of most reclamation measures associated with the mine openings. As stated previously, some reclamation efforts were undertaken previously by mine staff prior to BGC staff being on-site. The Field Representative was responsible for managing the QA/QC program, as well as providing technical direction to the Contractor, as required. Daily reports were developed by the Field Representative documenting activities undertaken on a daily basis including estimated volumes of material moved/placed, problems encountered during construction activities and any technical decisions made. Detailed weekly reports were also developed by the Field Representative and submitted to the Contract Administrator. These weekly reports contained the following:

- A summary of the weekly activities including an estimate of material volumes quarried and placed;
- Problems encountered during construction activities;
- Technical decisions made and the rationale behind them;
- A summary of visual observations made during construction; and
- A summary of any other reclamation activities undertaken at site by the mine staff.

These daily and weekly reports have been compiled but are not included within this current report. The information contained within the reports has been used as a basis for developing the as-built report.

3.4 Construction Materials

All portal covers at the Nanisivik Mine were constructed from locally sourced granular materials. The materials are broadly classified as shale or armour. The following sections provide a general description of each material type. Detailed descriptions of the materials incorporated into each individual cover including sources, volumes and material quality are discussed in Section 5.

Shale

Shale comprised the bulk of the granular material used in the construction of the portal covers. The mineralogy of the shale material was observed to be mainly composed of black, friable shale interceded with a dark to medium grey, friable dolomitic mudstone. The quarried shale fill material was observed to be primarily composed of gravel and cobble sized material. The shale was observed to breakdown due to mechanical crushing during construction and rapidly breakdown along the bedding planes when exposed to surface conditions. Shale for construction was sourced from several deposits around the Nanisivik Mine site.

Armour

The armouring material placed on the surface of the portal covers was intended to provide erosion protection for the underlying shale materials, as well as providing beneficial thermal properties by providing a light-coloured surface. The armour materials were sourced from various locations depending on the location of the opening. For example, armour materials for the reclamation covers constructed over the portal plugs at the West Open Pit were derived from the 09S/17N Road deposit located between the 09S and 17N portals. Armour materials for the covers constructed over the portal plugs at the East Open Pit were derived from the Chris Creek and Kuhulu Lake Road deposits. The materials derived from each deposit were comprised of dolostone cobbles and gravel with a matrix of sand and silt sized shale particles.

3.5 Quarrying

The shale deposits were developed using typical quarrying techniques, generally as described in the Quarry Development and Reclamation Plan (BGC 2004b). The overburden was stripped over the quarry area and stockpiled for future use as bulk fill or used in haul road construction. The deposits were then developed using drill and blast techniques. Blasting was typically undertaken on a 20 by 20 m pattern using ANFO as a blasting agent. The blast pattern was modified, on an as required basis, to produce the desired grain size distribution. The material was excavated in benches approximately 7 m wide and 5 m high. Upon exhaustion of the material in each deposit, the benches were typically re-sloped with rockfill to approximately 3(H):1(V) and the floor of the quarry was graded such that ponding would not occur.

It should be noted that the shale deposits were often found to be ice-rich. Extensive ice seams, ice wedges and ice lenses were observed in many quarry walls. This complicated both the quarrying and shale placement operations. The high ice-content was observed to limit breakage during blasting operations, thereby producing coarse grain size distributions in the blasted material. Shale fill with high ice content was not desired for fill placement due to the potential for post-placement deformation related to melting of the entrained ice. As a result, shale fill considered to be excessively ice-rich was often stockpiled to allow the entrained ice to melt. After the ice had melted, the material was considered adequate for incorporation as cover material. Additionally, covers were often overbuilt and constructed in stages to allow for melting of some entrained ice without decreasing the cover thickness to less than the design requirements.

The armour deposits were developed to near surface depths only. As such, no blasting was required during quarrying operations. Typically the materials were excavated until frozen ground was encountered, 1 to 2 m below ground surface. The material was excavated using the 385ME excavator and transported to the individual covers using the 775D haul trucks. The exception was the Chris Creek deposits which were only surficially excavated (0.2 to 0.3 m bgs) to limit the potential for post- construction surface deformation in the quarry area.

Once the quarry development was completed in the armour deposits, the side slopes of the excavation were graded to approximately 3(H):1(V) and the remnant surface was graded to prevent any significant ponding from occurring. Due to the typical flatness of the floor of most quarries, small isolated ponding may still occur, but would be expected to be limited in both depth and aerial extent.

3.6 Placement Methods

The following sections provide a general description of material placement methods used during construction of the portal plugs.

Plug Construction

As stated previously, the portal and raise plugs were either constructed of waste rock or granular shale fill. The plug was constructed by placing the fill material into the portal using a D8 dozer. During construction of the portal plugs, the dozer would push the fill material into the opening. The fill would be placed as far back into the individual portal as possible, without the cab of the dozer proceeding beneath the crown pillar above of the portal opening. The fill placement would proceed until the fill level was as close to the top of the portal opening as possible. Thus the portal plug typically was constructed to be 4 to 5 m from the entrance of the portal and within 1 m of the top of the portal opening. It should be noted that, due to safety concerns, no direct measurement of the placed backfill was undertaken. Instead, approximate measurements were recorded based on field observations by the Field Representative. Once the portals were backfilled, the outside face of the plug was constructed and appropriately graded to provide a base for subsequent cover construction.

Shale

Placement of shale during the construction of the portal covers was completed in several lifts. A 0.3 to 0.5 m thick base lift of shale was applied to the portal plug surface, which was usually comprised of waste rock. Subsequent lifts were applied to bring the shale layer to nearly the design surface grade. A thin finishing lift (0.1 to 0.2 m thick) was generally required to bring the cover to final grade. Each lift of shale was spread using a D8 dozer and compacted with at least three passes of the CS-583C vibrating drum roller compactor and numerous passes of loaded and unloaded haul truck traffic, prior to the construction of the subsequent lift of shale.

Armour

Placement of armour material during construction of the surface cover was generally completed in a single lift. Due to the coarseness of the material, derived from all armour deposits, the design thickness of 0.25 m was difficult to construct. As such the constructed armour layer thickness generally varied between 0.25 and 0.45 m thick, with an average thickness of approximately 0.35 m. The armour material was spread and compacted with two passes of a D8 dozer and further compacted with the at least one pass with the CS-583C vibrating drum roller compactor.

3.7 Surface Grades

Prior to the construction of each portal cover, the surface of the portal backfill plug was surveyed. This survey data was used to provide survey control during construction of the portal cover. After the second lift of shale cover material was placed, the surface of the cover was surveyed and grades stakes were placed to guide placement of the final lift of shale. A verification survey of the final surface of the cover was completed to verify the minimum shale thickness had been applied. Additionally, the shale thickness was checked by the Field Representative by excavating test pits as part of the QA/QC program.

Grade staking for the armour layer was also completed to guide material placement operations. In general, less detailed staking efforts were required due to the consistency of the required thickness.

4.0 QA/QC PROGRAM OVERVIEW

A Quality Assurance/Quality Control (QA/QC) Program for the construction of all surface reclamation covers was developed in 2004, prior to initiation of reclamation activities. This QA/QC Plan (BGC 2004c) also applies to portal covers constructed as part of the reclamation of the mine openings. This section provides an overview of the QA/QC testing requirements. The results of the testing are discussed in Section 5. The requirements of the QA/QC Program, as outlined in BGC (2004c) are outlined in Table 2.

Table 2 Summary of QA/QC Testing Requirements for Mine Portal Covers

Test	Shale	Armour
Grain Size Analysis	1 every 5,000 m^3	1 every 2,500 m^3
Moisture Content	1 every 5,000 m^3	1 every 2,500 m^3
In-situ Density Test Pits	1 every 20,000 m^3	-
Thickness Spot Checks	1 every 5,000 m^3	1 every 2,500 m^3
Acid Base Accounting	1 every 20,000 m^3	1 per location

The testing rates in Table 2 were subject to modification by the Field Representative, if deemed appropriate to do so.
The following sections provide an overview of the QA/QC testing requirements, as outlined in BGC (2004c). The results of the testing are discussed in Section 5.

4.1 Grain Size Distribution Analysis

The grain size specifications for the shale fill and armour materials were originally provided in the design report (BGC 2004a) and are provided in this current report in Table 3. The specifications were developed to provide satisfactory geothermal and physical long term performance of the covers. It should be noted that no grain size specifications were developed for the backfill materials placed beneath the cover.

Table 3 Grain Size Specifications

Sieve Opening Size (mm)	Shale Fill Percent Passing (%)	Armour Material Percent Passing (%)
300	100	-
150	100 – 95	100
75	100 – 83	100 – 86
50	100 – 70	100 – 75
25.4	95 – 45	83 – 53
19	92 – 37	77 – 47
12.5	83 – 25	70 – 35
9.5	77 – 18	61 – 29
4.75	58 – 13	46 – 15
2.38	40 – 18	32 – 9
1.16	28 – 7	26 – 6
0.6	24 – 6	21 – 4
0.3	19 – 5	17 – 3
0.15	17 – 4	10 – 1
0.075	15 – 2	5 – 0

All samples submitted for grain size distribution analysis were collected by the Field Representative. The samples were collected from throughout the cover profile during construction. Testing was completed on-site, using mechanical sieve analysis methods. All testing was completed on samples comprised of approximately -100 mm material. Larger particles, although they existed in the fill, were not included in the sample during collection due to testing limitations.

No moisture content specification was provided in the original design specifications due to the assumption that the shale will saturate from infiltration of surface water over time. Nonetheless, the samples collected for grain size analysis required drying and weighing regardless. Thus, moisture content calculations were completed using the available data. Additionally, calculation of “placed” moisture content may provide an opportunity for future comparison of “in-situ” moisture contents which could demonstrate the change in degree of saturation of the fill over time. During testing, the samples were weighed “wet” after collection and then dried in an oven and reweighed in order to obtain a dry weight. The gravimetric moisture content was then calculated for each sample using this data.

4.2 Thickness Test Pits

Several thickness test pits were excavated in the reclamation covers during construction to verify that appropriate fill thicknesses were being applied by the Contractor. The following aspects were to be documented during the test pit program:

- Shale/ Armour fill thickness;
- Physical characteristics (rock lithology and grain size distribution by visual inspection);
- Fill density (qualitative); and
- Moisture conditions (qualitative by visual inspection).

Each test pit was excavated in the presence of the Field Representative. The Field Representative documented the visual observations and completed a photographic record of each test pit.

4.3 Compaction

The QA/QC plan (BGC 2004c) provided performance-based compaction requirements for the shale and armour layers. The compaction requirements stated that each lift of shale material should be compacted with at least three passes of roller compactor after spreading is completed with a D8 dozer. It should be noted that due to practical construction and safety considerations, no compaction of backfill materials beneath the brow of the portal were specified.

Additionally, a methodology of physically assessing the degree of compaction was proposed. This included excavation of density test pits in the shale materials. During the excavation of density test pits, the excavated material was collected in pails and weighed, the test pit was lined with plastic and filled with a measured volume of water. Using the volume of the test pit and the mass of the excavated material, an in-situ density was calculated. A sample of the excavated material was selected for moisture content analysis. Using the calculated moisture content and the measured in-situ density, the dry density of the placed material was calculated.

During construction, both visual and physical assessments of compaction were undertaken. It should be noted that the physical assessment method (excavating density test pits) did not have a high level of precision due to the testing methodology and results were observed to be variable. Thus, the visual assessment (observing the appropriate compactive effort was applied) remained the primary method of determining the appropriate level of compaction was achieved.

Compaction of the armour materials was assessed visually only. The armour layer was to be compacted to a reasonably tight final surface.

4.4 Acid Base Accounting Analysis

Samples of shale and armour materials were selected for Acid Base Accounting (ABA) analysis. This testing was completed to confirm the non acid-generating nature of the cover materials. Samples were collected from various depths and areas of each cover during test pitting operations. The samples were tested for the following parameters:

- Fizz Rating
- Neutralization Potential (NP)
- Maximum Potential Acidity (MPA)
- Net Neutralization Potential (NNP)
- Ratio of Net Neutralization Potential to Maximum Potential Acidity (NP:MPA)
- Paste pH
- Total Sulphur (S)

All ABA analyses were undertaken by ALS Chemex Ltd. of North Vancouver, British Columbia. The analyses were undertaken utilizing the Modified-Sobek method of analysis.

4.5 Visual Observations

A significant portion of the QA/QC program consisted of visual observations of construction operations to verify the reclamation measures are constructed to design specifications and intent. The Field Representative made daily observations of the following activities:

- Quarrying operations;
- Portal plug construction;
- Condition of rock in visible portion of highwalls and crown pillars, including presence of sulphide outcroppings;
- Shale placement and compaction methods;
- Subgrade conditions; and
- Surface grades.

Documentation of these observations consisted of a log of digital photographs, as well as production of daily and weekly reports. Any variation from the design specifications or intent was documented and reported to the Contractor and Contract Administrator. Additionally, any discussions with the Contractor regarding construction operations were documented in the daily and weekly reports.

5.0 AS-BUILT RECORD

This section describes the activities that were undertaken as part of the reclamation of mine openings at Nanisivik Mine undertaken from September 2004 through October 2006. For each mine opening, the following information is provided:

- General description of the mine opening prior to reclamation;
- Detailed description of construction activities undertaken including schedule, equipment usage, material volumes and difficulties encountered during construction;
- Documentation of design modifications and associated rational;
- As-built information including survey information and results of QA/QC testing; and

Information obtained from other sources, such as mine site records, is documented where appropriate.

The following sections provide the information outlined above as they apply to the reclamation of each specific mine opening.

5.1 Lower Adit

5.1.1 Pre-Reclamation Conditions

The Lower Adit is located at the western end of the mine near the mill site, as illustrated on Figure 2. The Lower Adit provided the main access into the underground crusher and fine ore bin, as well as secondary access to the Main Ore Zone.

Presently, the Lower Adit remains open to provide ventilation to the underground mine workings. The Lower Adit is expected to remain open until the underground waste disposal program is complete. As-built information for this portal plug will be provided in an addendum when the information is available.

5.2 00 and 01 Portals

5.2.1 Pre-Reclamation Conditions

The 00 and 01 Portals were located at the western end of the mine, as illustrated on Figure 2. The 00 Portal was the principal access at the western extremity of the mine. The portal measured approximately 5 by 5 m in cross section. The brow immediately above the portal was approximately 4 to 5 m high. The brow was bolted and there was a fenced catch bench directly above the brow. The 01 Portal housed the main ventilation fans during mining operations which were mounted in a plate steel bulkhead. The bulkhead was constructed on a rockfill pad approximately 18 m wide by 12 m high and extending 10 m into the underground side of the opening. The rockfill pad consisted of mine waste and shale in a permanently frozen state. The size of the steel bulkhead was approximately 0.2 m wide, 22 m long and 4 m high. The brow immediately above the portal was approximately 4 to 5 m high. The brow was bolted and there was a fenced catch bench directly above the brow.

5.2.2 Reclamation Construction

The plugs for the 00 and 01 Portals were constructed in late September and early October, 2005. The as-built survey information documenting the construction of the portal plugs is provided on Figures 3 and 4. Photos documenting the reclamation of the portal are provided on Figures 5 and 6.

The following points summarize the construction sequence during the reclamation of the 00 and 01 Portals:

- The fans were removed from the bulkhead in the 01 Portal.
- Waste rock was placed inside the 01 Portal to the bulkhead using a D8 dozer to an approximate depth of 5 m.
- Waste rock was placed inside the 00 Portal to approximately 5 m from the portal entrance.
- The waste rock backfill was placed to within approximately 1 m of the crown of each of the portals.
- The outside face of the portal plug was sloped at approximately 3H:1V.
- The sulphide outcropping in the highwall adjacent to the portal was covered with waste rock.

A thermal cover was subsequently constructed over the portal plugs as part of the overall surface reclamation cover of the West Open Pit. No as-built survey information for the West Open pit is yet available. As such, as-built information for the West Open Pit cover will be provided in an addendum when the information is available.

5.2.3 QA/QC Results

The QA/QC testing undertaken on the materials used to construct the surface reclamation cover over the 00 and 01 portal plugs was completed in conjunction with testing undertaken for the entire West Open Pit cover. As such, the QA/QC testing results will also be incorporated in the as-built report for the West Open Pit cover, which will be issued as an addendum at a later date.

5.2.4 00/01 Rib Pillar

The 00/01 Rib Pillar was located between the 00 and 01 Portals, as shown on Figure 3. During the later stages of mining, a portion of this rib pillar was removed as part of the pillar recovery program. The removed portion of the rib pillar was approximate 20 m long. After recovery of the rib pillar, a number of steel pipes were placed against the remaining portion of the highwall and the face of the pipes was backfilled with DMS reject material (a gravel sized material consisting of pieces of dolostone generated during the mineral processing operations). After recovery of the rib pillar, a tension crack developed in the crown pillar over the rib pillar recovery area. In 2004, BGC conducted an inspection of the pillar and provided remedial recommendations for the crown pillar (BGC, 2004d). The proposed reclamation plan for the crown pillar involved blasting down the crown pillar over the rib pillar recovery zone, backfilling the remnant opening and incorporating the area into the overall cover for the West Open Pit.

In September 2005, during reclamation construction in the West Adit area, a decision was made by the Mine Manager, Contractor and Field Representative that the reclamation plan, as proposed, could not be implemented. This was due to access limitations and safety concerns regarding the weight of the available drill and the stability of the crown pillar. Therefore, the reclamation plan was revised and it was proposed that a fill pillar be constructed under the crown pillar, in the rib pillar recover zone. The purpose of the fill pillar would be to prevent an opening to the underground from developing, in the event of crown pillar collapse.

In September 2005, the fill pillar was constructed by mine site staff. The construction of the fill pillar is documented on Figure 7. The fill pillar consisted of waste rock derived from the 02S waste rock pile, located adjacent to the West Open Pit. The waste rock was placed using a D8 dozer, which pushed the material to within 1.5 m of the top of the opening. This fill pillar was constructed over the entire length of the recovered portion of the 00/01 rib pillar.

Although the completed reclamation measures are a deviation from the original reclamation plan, the combination of the fill pillar and the buttressing effect of the pit backfilling and cover construction completed for the West Open Pit are considered to achieve the stated reclamation goals. Additionally, as stated in Section 2.3, the reclamation measures undertaken are considered to have the ability to prevent or nearly completely mitigate the potential of catastrophic failure of the crown pillar. In the unlikely event of crown pillar collapse, the effects would likely be limited to minor surface deformation. It should be noted that visual monitoring of the crown pillar areas will continue throughout the closure period, as specified in the Reclamation and Closure Monitoring Plan (GLL 2004).

5.3 09 South Portal

5.3.1 Pre-Reclamation Conditions

The 09 South Portal is located at the western end of the mine, as shown on Figure 2. The 09 South Portal is a culverted entry giving access to the Main Ore Zone. The 09 South drift is approximately 5 by 5 m in cross section. The culvert is round with a diameter of 5 m and a length of 28 m. The bottom of the culvert is filled with rockfill to provide a smooth floor. The culvert extends 13 m inside the shale bedrock of 09 south drift, leaving 15 m exposed on surface, a portion of which is covered with talus from the slope above.

Presently, the 09 South Portal remains open to provide access to the underground workings for disposal of demolition waste materials. The 09 South Portal is expected to remain open until the underground waste disposal program is complete. The as-built information for this portal plug will be issued in an addendum when this information is available.

5.4 17 North Portal

5.4.1 Pre-Reclamation Conditions

The 17 North Portal was a culverted portal giving access to the Main Ore Zone. The location of the portal is illustrated on Figure 2. The 17 North Decline was approximately 5 by 5 m in cross section and the culvert was half round with a diameter of 5 m and a length of 28 m. The culvert was supported by a 0.25 m thick by 2 m high concrete wall on both sides and extended 5 m inside the dolostone bedrock of the drift. The entrance to the 17 North Portal was plugged with rockfill material after mining operations ceased in September 2002, to provide temporary closure.

5.4.2 Reclamation Construction

Reclamation of the 17 North Portal was completed in July 2005. The as-built survey information documenting the construction of the portal plug is provided on Figures 8 and 9. Photos documenting the reclamation of the 17 North Portal are shown in Figure 10. In total, approximately 1,900 m^3 of shale and 500 m^3 of armour material were used in the construction of the 17N Portal plug.

The following points summarize the construction sequence during the reclamation of the 17 North Portal:

- The temporary rockfill plug was removed from the culvert entrance and the culvert was removed.
- The snow and ice that had built up at the portal entrance was excavated and relocated.
- Granular shale fill derived from the Shale Hill borrow area was placed inside 17 North Portal to a depth of approximately 4 m from the portal entrance. The shale plug was constructed to within 1 m of the crown of the portal entrance.
- Shale was then used to cover the concrete pony wall and contour the area adjacent to the portal entrance to match the surrounding topography.
- A 0.35 m thick armouring layer of sand and gravel, derived from Kuhulu Lake Road borrow area, was applied over the shale.

5.4.3 QA/QC Results

The QA/QC program outlined in Section 4 was implemented during the construction of the 17N Portal Plug by the BGC Field Representative. Table 4 summarizes the QA/QC testing completed.

Table 4 Summary of QA/QC Testing Completed for 17 North Portal Plug

Test	Shale	Armour
Grain Size Analysis	1	1
Moisture Content	1	1
In-situ Density Test Pits	Visual during placement	Visual during placement
Thickness Spot Checks	0	Visual during placement
ABA	0	0

The results of the QA/QC testing completed for the 17 North Portal cover are provided in Appendix I. The results are summarized by the following:

- The results of the grain size distribution analyses indicate that the shale fill and the armour materials generally meet the grain size specifications provided in the original design documents. The shale fill is slightly deficient in fines (particle size < 2 mm diameter), which is typical for the blasted shall fill used in all reclamation covers.
- The results of the moisture content testing indicate that the shale fill had a moisture content of approximately 4% upon placement. The armour material had a moisture content of approximately 7% upon placement.
- No compaction testing was completed during construction of the thermal cover at the 17 North Portal. Visual verification of compactive effort was completed during construction which was deemed to be sufficient by the Field Representative.
- Since no waste rock was used in construction of the portal plug, no minimum shale thickness was required. Visual confirmation of the armour layer thickness during placement was achieved utilizing grade stakes.
- No ABA testing was completed on the materials used in construction of the 17 North Portal plug since numerous tests completed on the same material (shale and armour) used at other locations had already suggested that the materials were non acid-generating.

5.5 39 Portal/ 38-11 Stope Opening

5.5.1 Pre-Reclamation Conditions

The 39 Portal was the main access into the east end of the Main Ore Zone for much of the mine life. The location of the portal is shown on Figure 2. During the final stages of mining, a portion of the rib pillar between the 39 Portal and the East Open Pit was removed, resulting in an opening over 50 m wide by 12 to 15 m high. In 2002, the crown pillar between the 39 portal and the East Open pit was blasted down in order to block access to the underground and increase the thickness of the remnant crown pillar. This blast effectively removed the 39 Portal, but left an opening into the adjacent 38-11 stope. This opening was temporarily blocked using muck from the blast to prevent access to the underground.

5.5.2 Reclamation Construction

The plug for the remnant 39 Portal/38-11 stope opening was constructed in June and July, 2005. The as-built survey information documenting the construction of the plug is provided on Figures 11 and 12. Photos documenting the plug construction are shown in Figure 13. The material quantities used in construction of the thermal cover portion of the 38-11 stope opening are included in the overall quantities for the East Open Pit, which are provided in the surface reclamation covers as-built report (BGC 2008).

The following points summarize the construction sequence during the reclamation of the 39 Portal/ 38-11 stope opening:

- The opening was exposed by excavating the waste rock that was placed in front of the opening.
- The excavator placed the waste rock inside the stope opening to approximately 4 m from the entrance of the opening.
- The D8 dozer was used to compact the waste rock and pushed additional waste rock in the portal/ stope until it reached the top of the opening near the entrance of the opening.
- Approximately 1,000 m^3 of hydrocarbon contaminated soils were placed as backfill against the stope plug.
- The area in front of the opening was backfilled with waste rock and overburden strippings to create a nearly level platform within 6 m of the top of the highwall.

A thermal cover was subsequently constructed over the portal plug as part of the overall surface reclamation cover of the East Open Pit. Details regarding the construction of this cover are provided in the surface reclamation covers as-built report (BGC 2008).

5.5.3 QA/QC Results

The QA/QC testing undertaken on the materials used to construct the thermal cover over the 38-11 stope opening plug was completed in conjunction with testing undertaken for the entire East Open Pit thermal cover. As such, the QA/QC testing results have been incorporated in the as-built report for the East Open Pit cover (BGC 2008).

5.6 88 Portal

5.6.1 Pre-Reclamation Conditions

The 88 Portal was an entrance at the east end of the lower lenses of the mine. The location of the portal is illustrated on Figure 2. This portal was used as the main access at the east end of the mine during the later portion of the mine life. The 88 Portal has a cross section of approximately 5 by 5 m and a brow height of approximately 3 m.

5.6.2 Reclamation Construction

The plug for the 88 Portal was constructed in July, 2005. The as-built survey information documenting the construction of the plug is provided on Figures 14 and 15. Photos documenting the portal reclamation activities are provided in Figure 16.

The following points summarize the construction sequence during the reclamation of the 88 Portal:

- The ice and snow that had accumulated in the immediate vicinity of the portal entrance was removed.
- Hydrocarbon contaminated soil (approximately 500 m^3) was pushed approximately 5 m inside the portal using the D8 dozer.
- The portal plug was constructed of waste rock placed in lifts with the D8 dozer until it was within approximately 1 m of the crown of the portal.
- The outside face of the portal plug was sloped at approximately 3H:1V.
- The sulphide outcropping in the highwall adjacent to the portal was covered with waste rock.

A thermal cover was subsequently constructed over the portal plug as part of the overall surface reclamation cover of the East Open Pit. Details regarding the construction of this cover are provided in the surface reclamation covers as-built report (BGC 2008).

5.6.3 QA/QC Results

The QA/QC testing undertaken on the materials used to construct the thermal cover over the 88 Portal plug was completed in conjunction with testing undertaken for the entire East Open Pit cover. As such, the QA/QC testing results have been incorporated in the East Open Pit section of the surface reclamation covers as-built report (BGC 2008).

5.7 K-Baseline Portal

5.7.1 Pre-Reclamation Conditions

The K-Baseline portal was a culverted entry used to access the K-Baseline orebody. The location of the portal is illustrated on Figure 2. The K-Baseline decline was approximately 5 by 5 m in cross section and the culvert was half round with a diameter of 5 m and a length of 28 m. The culvert was supported by two concrete pony walls, 1 m wide by 2.4 m high, on both sides. The concrete pony walls extended approximately 3 m inside the dolostone bedrock of the drift.

The portal had been inactive for a period of nearly 10 years and ice had completely filled the access to a point 20 m inside the culvert. The portal entrance was blocked with rockfill after mining operations ceased in September 2002. In October 2004, the top of the culvert was removed and the inside was backfilled with waste rock by mine staff. The presence of an ice-plug in the culvert was confirmed by mine staff during these operations. It should also be noted that the concrete pony walls were left in-place. Although this work was not supervised by BGC, this information provided by Breakwater, as documented by mine site staff, has been included for the sake of completeness.

5.7.2 Reclamation Construction

Reclamation of the K-Baseline Portal was completed in May and June, 2005. The as-built survey information documenting the construction of the plug is provided on Figures 17 and 18. Photos documenting the plug construction are shown in Figure 19. In total, approximately 12,000 m^3 of shale and 1,500 m^3 of armour material were used during reclamation of the K-Baseline Portal and adjacent areas.

The following points summarize the construction sequence during the reclamation of the K-Baseline Portal:

- The snow and ice that had accumulated over the K-Baseline portal area was removed.
- A thermal cover consisting of a minimum thickness of 1.95 m of granular shale rockfill and 0.35 m of armour materials was placed over the waste rock plug. The construction of the cover was completed as per the practices noted in Section 3.
- A surficial cover of granular shale rockfill, approximately 0.3 m thick, was placed in areas adjacent to the K-Baseline portal to improve surficial drainage.

It should also be noted that a thermal cover was constructed over the an area downslope of the K-Baseline portal to cover an area of remnant waste rock and mineralized soils identified by the Mine's geo-environmental consultant.

5.7.3 QA/QC Results

The QA/QC program outlined in Section 4 was implemented during the construction of the K-Baseline Portal Plug by the BGC Field Representative. Table 5 summarized the QA/QC testing that was completed.

Table 5 Summary of QA/QC Testing Completed for K-Baseline Portal Plug

Test	Shale	Armour
Grain Size Analysis	2	1
Moisture Content	2	1
In-situ Density Test Pits	Visual during placement	Visual during placement
Thickness Spot Checks	1	Visual during placement
ABA	1	1

The results of the QA/QC testing completed for the K-Baseline Portal cover are provided in Appendix II. The results are summarized by the following:

- The results of the grain size analyses indicate that the shale fill and the armour material both meet the grain size specifications provided in the original design documents.
- The results of the moisture content testing indicate that the shale fill had a moisture content of between 3 and 10% upon placement.
- The results of the moisture content testing indicate that the armour material had a moisture content of between 1 and 5% upon placement.
- No compaction testing was completed during construction of the thermal cover at the K-Baseline Portal. Visual verification of compactive effort was completed during construction which was deemed to be sufficient by the Field Representative.
- The thickness test pit excavated indicated a shale thickness of approximately 2.1 m. This indicates that the minimum required material thicknesses were achieved and exceeded during construction of the thermal cover at the K-Baseline portal.
- The results of ABA testing suggests that both the shale and the armouring material are non-acid generating (NP:MPA >3).

5.8 Oceanview Portal

5.8.1 Pre-Reclamation Conditions

The Oceanview Portal was a bare rock entrance into the north side of the Oceanview underground workings. The location of the portal is illustrated on Figure 2. The Oceanview decline had a cross section of approximately 5 by 5 m. The brow was approximately 5 m in height.

Prior to 2004, the portal had been backfilled by mine staff with waste rock and covered over with overburden strippings from the Oceanview pit. During backfilling operations it was noted that the portal was blocked with an ice plug. This work is documented in Nanisivik Mine (2002). Although this work was not supervised by BGC, this information provided by Breakwater, as documented by mine site staff, has been included for the sake of completeness.

5.8.2 Reclamation Construction

Reclamation of the Oceanview Portal was completed in June and July, 2005. The as-built survey information documenting the construction of the plug is provided on Figures 20 and 21. Photos documenting the reclamation of the Oceanview Portal are shown in Figure 22. In total, approximately 9,500 m^3 of shale and 2,500 m^3 of armour material were used in the construction of the Oceanview Portal plug.

The following points summarize the construction sequence during the reclamation of the Oceanview Portal:

- The snow and ice that had accumulated over the Oceanview portal area was removed.
- A thermal cover consisting of a minimum thickness of 1.95 m of granular shale rockfill and 0.35 m of armour materials was placed over the existing portal plug. The construction of the cover was completed as per the practices noted in Section 3.
- The thermal cover was extended to the north and east of the portal to cover the remnant waste rock area adjacent to the portal entrance.
- A water deflection berm was constructed upslope of the extended portion of the thermal cover to limit surficial run-off over this area.
- A surficial cover of shale, approximately 0.3 m thick was placed in the area immediately to the west of the portal to improve surficial drainage.

5.8.3 QA/QC Results

The QA/QC program outlined in Section 4 was implemented during the construction of the Oceanview Portal Plug by the BGC Field Representative. Table 6 summarized the QA/QC testing completed.

Table 6 Summary of QA/QC Testing Completed for Oceanview Portal Plugs

Test	Shale	Armour
Grain Size Analysis	2	1
Moisture Content	2	1
In-situ Density Test Pits	Visual during placement	Visual during placement
Thickness Spot Checks	1	Visual during placement
ABA	2	1

The results of the QA/QC testing completed for the Oceanview Portal cover are provided in Appendix III. The results are summarized by the following:

- The results of the grain size analyses indicate that the shale fill and the armour material generally meet the grain size specifications provided in the original design documents. The shale fill is slightly deficient in fines (particle size < 2 mm diameter), which is typical for the blasted shale fill used in all reclamation covers.

- The results of the moisture content testing indicate that the shale fill had a moisture content of between 2 and 6% upon placement. The armour material had a moisture content of approximately 6% upon placement.
- No compaction testing was completed during construction of the thermal cover at the Oceanview Portal. Visual verification of compactive effort was completed during construction which was deemed to be sufficient by the Field Representative.
- The thickness test pit excavated indicated a shale thickness of approximately 2.0 m. This indicates that the minimum required shale thickness was achieved during construction of the thermal cover.
- The ABA testing suggests that both the shale and the armouring material are non-acid generating (NP:MPA >3).

In general, the results of the QA/QC program verify the reclamation of the Oceanview portal was completed to design intent.

5.9 Area 14 Portal

The Area 14 Portal was a bare rock portal that provided access to the Area 14 underground workings. Mining ceased in this area around 1987 and the portal was backfilled with waste rock. The waste rock was covered and contoured with shale in 1987 and 1988. This work was documented in mine site records supplied to BGC by Breakwater. Although this work was not supervised by BGC, this information provided by Breakwater, as documented by mine site staff, has been included for the sake of completeness.

A 0.35 m thick layer of armour material was applied to the Area 14 Portal in 2007 to complete the reclamation of this portal. Photos of the portal area prior to and after application of the armour materials are provided on Figure 23.

5.10 Shale Hill Raise

The Shale Hill Raise provided ventilation for the underground workings in the Shale Hill area. The location of the raise is illustrated on Figure 2. The 3 m diameter raise was approximately 47 m deep. During mining operations, the raise was sealed with a 3 m diameter steel tank with the bottom cut out and with two adaptors in the top for 36 inch ventilation fans. The tank was fixed to a cemented collar at the top of the raise.

Prior to 2005, the Shale Hill raise was backfilled with waste rock and a surface mound of shale was constructed at surface. This work was documented in mine site records supplied to BGC by Breakwater. Although this work was not supervised by BGC, this information provided by Breakwater, as documented by mine site staff, has been included for the sake of completeness.

In 2005, the surface mound was increased to approximately 3 m to accommodate possible future settlement and armour material was applied. Figure 24 illustrates the condition of the Shale Hill Raise, as per the anecdotal information supplied by the mine site staff.

5.11 Oceanview East Raise

The Oceanview East Raise was situated at the extreme east end of the Oceanview underground workings. The location of the raise is illustrated on Figure 2. The 4 by 4 m raise was approximately 10 m deep and provided ventilation for the underground workings in the Oceanview area. During mining operations, the raise was covered with a wooden wind deflector with a locked door.

In 2002, the wooden deflector was removed and the raise was backfilled with locally derived overburden as part of the progressive reclamation of the mine site. During backfilling, it was noted that an ice plug was present in the raise at a depth of approximately 1.5 m below ground surface. As such, backfill was placed only to this depth. A 3 m high mound was placed on top of the raise to accommodate for possible future settlement of the ice plug. Figure 25 illustrates the condition of the Oceanview East Raise, as per the anecdotal information supplied by the mine site staff.

It should be noted that the reclamation of this raise was documented in mine site records which were supplied to BGC by Breakwater. Although this work was not supervised by BGC, this information provided by Breakwater, as documented by mine site staff, has been included for the sake of completeness.

5.12 Oceanview West Raise

The Oceanview West raise was located near the west end of the Oceanview underground workings. The 3 m diameter raise is approximately 26 m deep and provided ventilation for the underground workings. The raise was covered by a steel enclosure with a locked wooden cover.

In 2002, the steel enclosure was removed and the raise was backfilled with locally derived overburden as part of the progressive reclamation of the mine site. During backfilling, it was noted that an ice plug was present in the raise at a depth of approximately 1.5 m below ground surface. As such, backfill was placed only to this depth. A 3 m high mound was placed on top of the raise to accommodate for possible future settlement of the ice plug. Figure 26 illustrates the condition of the Oceanview West Raise, as per the anecdotal information supplied by the mine site staff.

It should be noted that the reclamation of this raise was documented in mine site records which were supplied to BGC by Breakwater. Although this work was not supervised by BGC, this information provided by Breakwater, as documented by mine site staff, has been included for the sake of completeness.

5.13 Area 14 Raise

The location of the Area 14 Raise is illustrated on Figure 2. The raise had a cross section of 5 by 5 m and an approximate depth of 8 m. Mining ceased in this area around 1987 and the raise was completely backfilled to the floor of the underground workings. Backfilling was completed with waste rock and the surface was then covered and contoured with shale in the summer of 1987 and 1988. This work was documented in mine site records supplied to BGC by Breakwater. Although this work was not supervised by BGC, this information provided by Breakwater, as documented by mine site staff, has been included for the sake of completeness.

During the 2007 annual geotechnical inspection it was observed that a layer of armour material had been applied over the raise area, but no surface mound had been constructed. It is anticipated that a surface mound will be constructed at a later date. Figure 27 illustrates the current closure condition of the Area 14 Raise, as per the anecdotal information supplied by the mine site staff.

6.0 DESIGN VERIFICATION

In general, the reclamation of the mine openings has been completed to original design intent and have achieved the design objectives by demonstrating the following:

- Access to the underground workings is prevented by the portal and raise plugs, and associated covers;
- Some support for the portal crown pillars is provided by the backfill that was placed in each portal;
- The sulphide exposures on highwalls adjacent to the portals have been covered to mitigate the potential for metal leaching and acid generation; and
- Each portal and raise plug provides a surface environment that blends into natural conditions.

7.0 POST-CONSTRUCTION MONITORING AND MAINTENANCE

As per the Reclamation and Closure Monitoring Plan (GLL 2004), monitoring the performance and physical stability of the raise plugs and mine portal covers during the Closure Period will be undertaken as part of the Annual Geotechnical Inspection of Nanisivik Mine. The geotechnical assessment will include

- A visual inspection of each raise plug and portal plug and associated cover to assess the physical integrity. Visual inspections will focus particularly on looking for signs of surface erosion or settlement. The crown pillar adjacent to each portal will also be inspected for visual signs of surface deformation.
- Ongoing review of geotechnical monitoring data obtained from various covers.
- Review of water quality results collected as part of the mine's Reclamation Performance Monitoring Plan.

The results of the geotechnical inspection will be included in the Annual Environmental Report submitted annually to the Nunavut Water Board by Breakwater.

8.0 LIMITATIONS

The report supplied herein attempts to document as-built information for a number of mine openings at Nanisivik Mine. Some of the reclamation work was either undertaken before BGC was on-site, or when BGC staff were undertaking other activities. As such, some as-built information was supplied by the Contractor, along with Nanisivik Mine site staff. As such, BGC has relied upon this information, which has been assumed to be accurate. BGC may have not independently verified the information supplied. In addition, due to safety issues, some of the plug information was estimated from a distance rather than by direct measurement.

9.0 CLOSURE

This report summarizes the as built information associated with the reclamation of various mine openings at Nanisivik Mine, NU. The report is based on observations and measurements undertaken during construction by BGC staff while on site. While the reclamation measures are considered to have been constructed to original design intent, some design modifications were required due to various complexities associated with the construction materials and ground conditions encountered throughout the construction process. These design modifications, and associated rational, are documented throughout the report, where required.

We trust that this report meets your needs at this current time. Should you have any questions or comments concerning the information provided within this report, please contact the undersigned.

BGC Engineering Inc.
Per:

Geoff Claypool, B.Sc., P.Eng.
Geological Engineer

Jim Cassie, M.Sc., P. Eng.
Specialist Geotechnical Engineer

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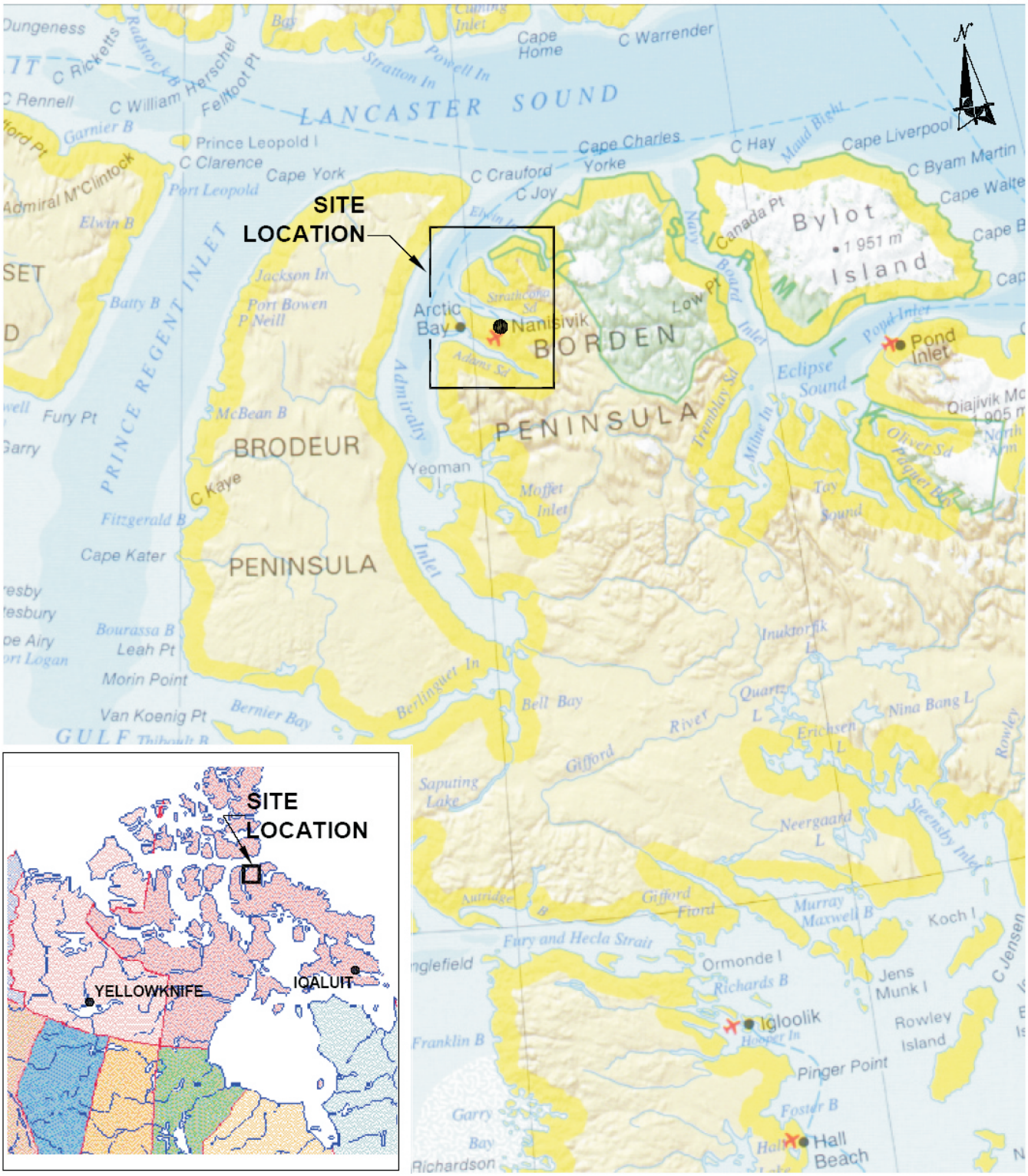
FIGURES



SCALE:	N/A	DESIGNED:	GKC
DATE:	APRIL 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

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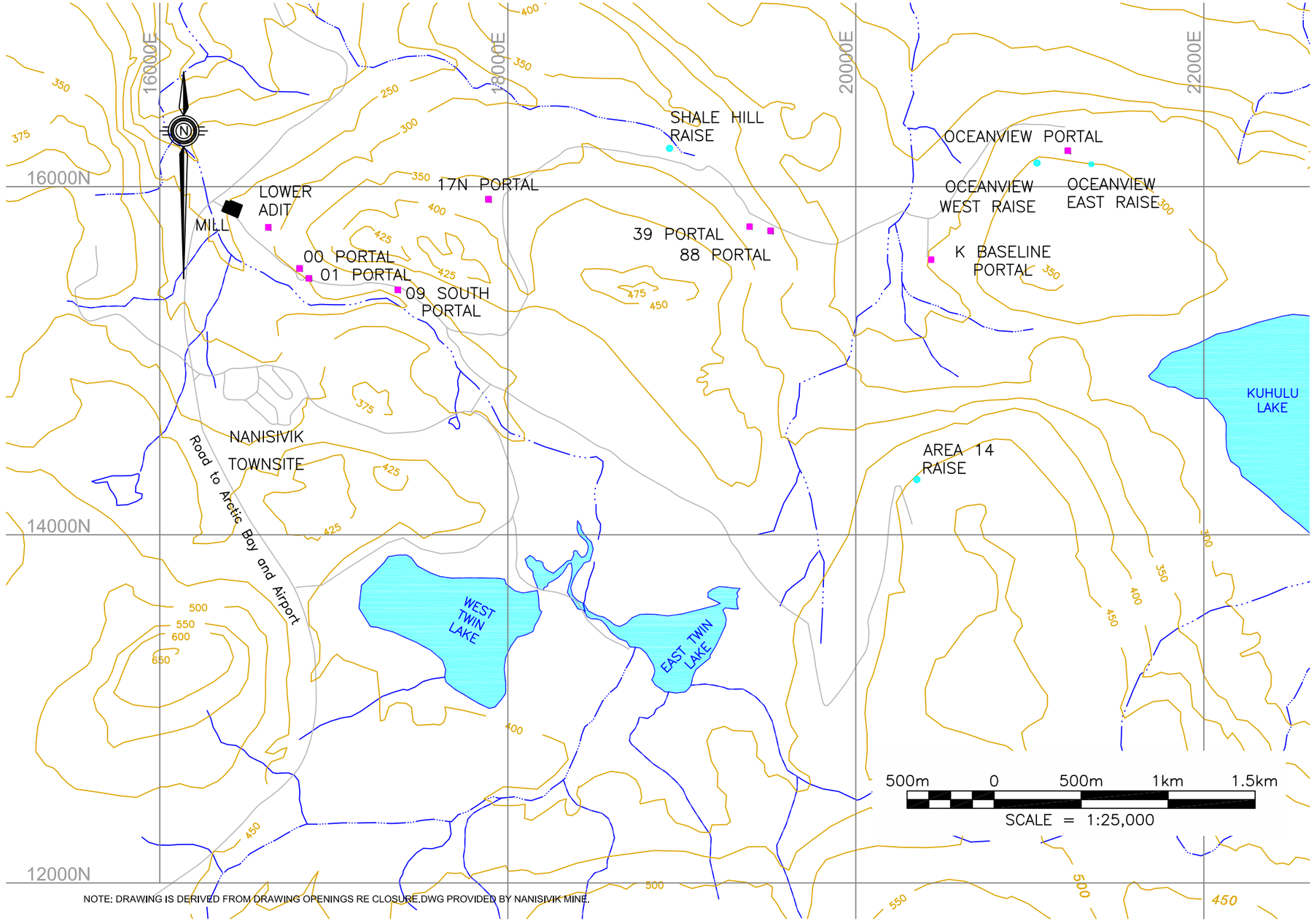
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: PROJECT LOCATION MAP

PROJECT No.	FIGURE No.	REV.
0255-012-03	1	0



LEGEND

- PORTAL
- RAISE
- MAIN ROADWAY
- STREAM DRAINAGE
- TOPOGRAPHIC CONTOUR

NOTE:

GRID IS PROVIDED IN MINE GRID COORDINATE SYSTEM.

NOTE: DRAWING IS DERIVED FROM DRAWING OPENINGS RE CLOSURE.DWG PROVIDED BY NANISIVIK MINE.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
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CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: LOCATION OF MINE OPENINGS

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	2	

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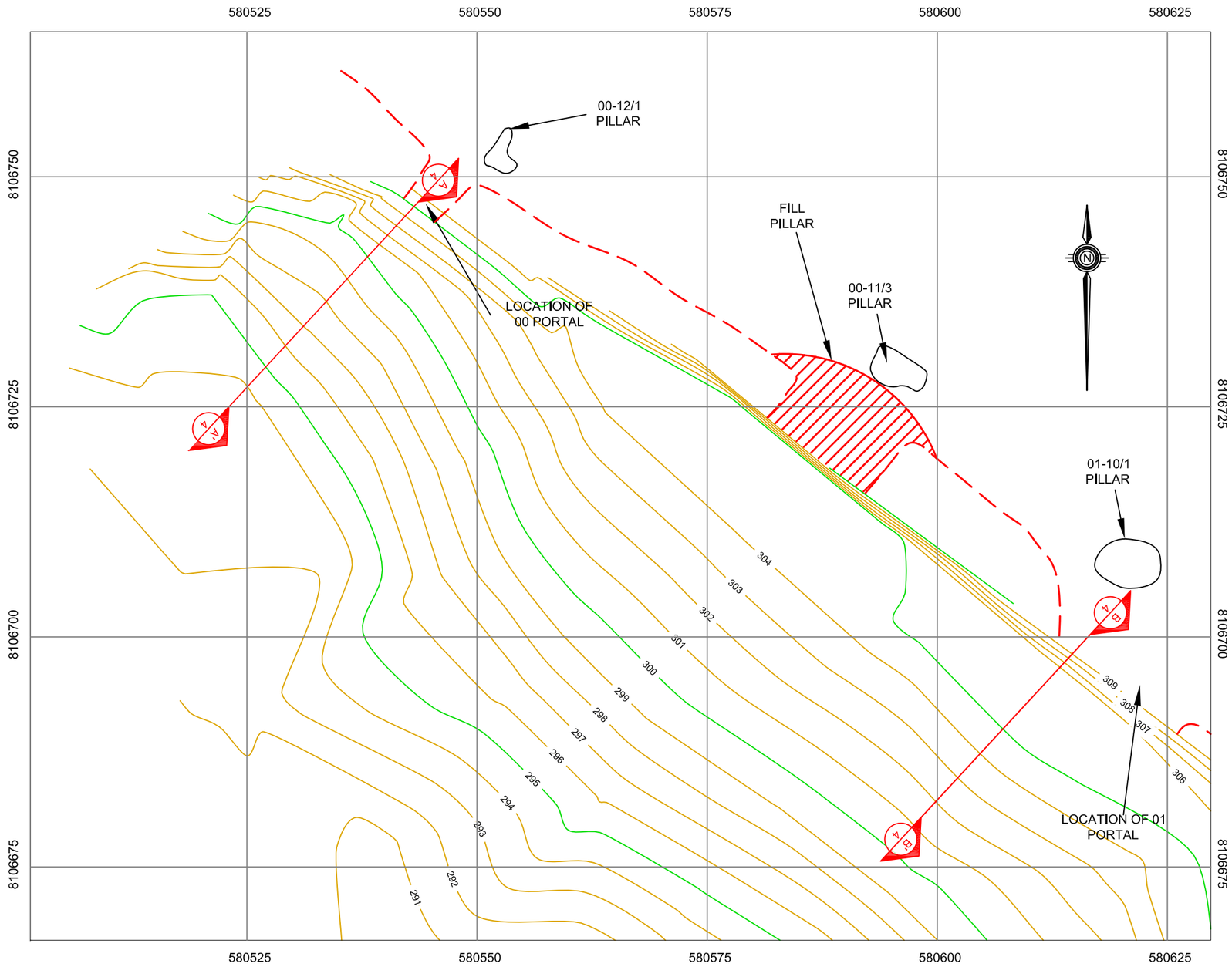


NOTES:

1. ELEVATIONS ARE PROVIDED IN METRES.
2. GRID IS IN UTM NAD 83, ZONE 16 COORDINATE SYSTEM.
3. CONTOUR INTERVAL = 1,0 m
4. CONTOURS ARE OF WASTE ROCK BACKFILL SURFACE.
5. SURVEY DATA PROVIDED BY ATCON CONSTRUCTION LTD. (FILE ABOCO5D1)
6. SEE FIGURE 4 FOR SECTION VIEWS.
7. UNDERGROUND MINE WORKINGS DETIALS ARE DERIVED FROM MINE RECORDS AND ARE CONSIDERED APPROXIMATE.

8m 0 8m 16m 24m

Scale 1:500

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE: AS SHOWN
DATE: APRIL 2008
DRAWN: JL
DESIGNED: KFM
CHECKED: GKC
APPROVED: JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

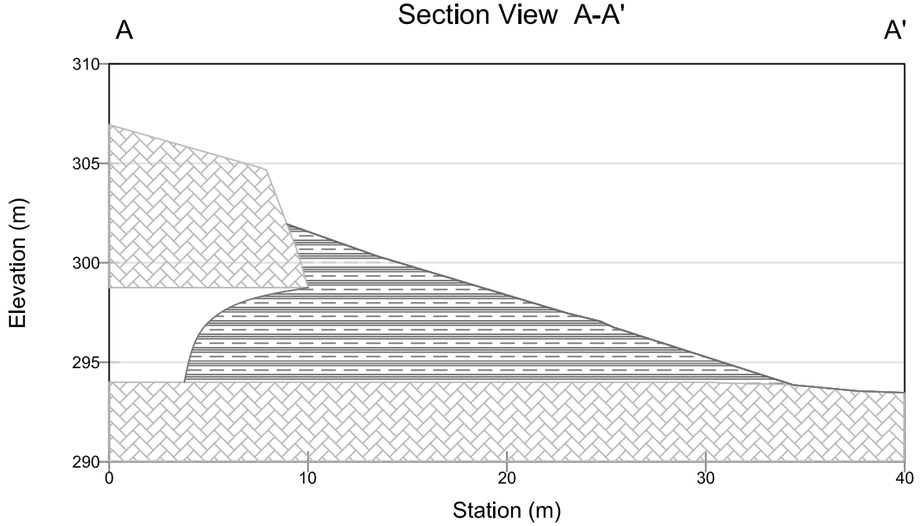
PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

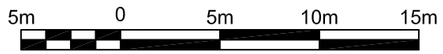
TITLE: 00 AND 01 PORTALS BACKFILL
AS-BUILT PLAN VIEWS

PROJECT No.: 0255-012-03
FIGURE No. 3
REV.:

K:\Projects\0255 Can2Inco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 WOP.dwg Layout: Figure 3 Plot Date May 2 08 Time: 10:59 AM

00 Portal Backfill
Section View A-A'



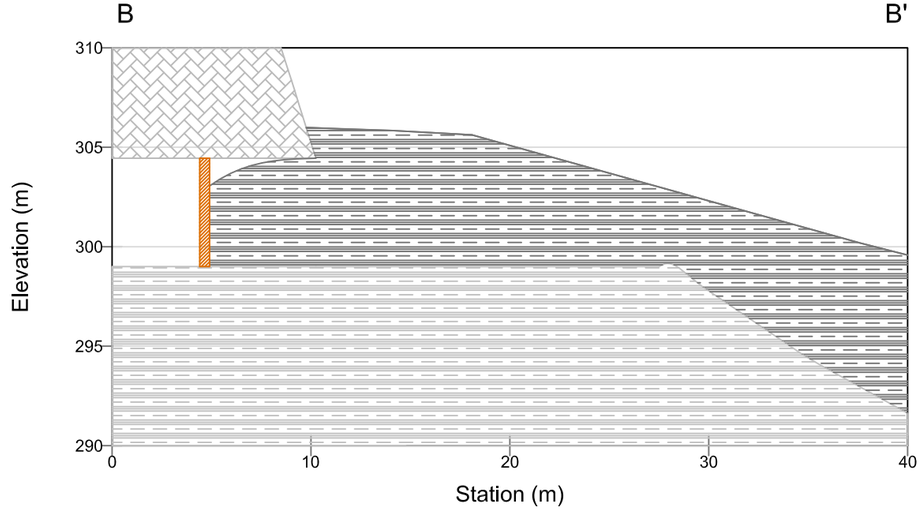


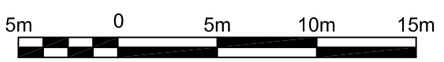
Scale 1:300

LEGEND:

- WASTE ROCK (PREVIOUS FILL)
- WASTE ROCK (RECENT FILL)
- BEDROCK
- STEEL BULK HEAD

01 Portal Backfill
Section View B-B'





Scale 1:300

NOTES:

1. ELEVATIONS ARE PROVIDED IN METRES.
2. SEE FIGURE 3 FOR LOCATION OF SECTIONS.
3. PORTAL BACKFILL DETAILS ARE ESTIMATED BASED ON VISUAL OBSERVATIONS RECORDED DURING CONSTRUCTION.
4. SURFACE RECLAMATION COVER WAS SUBSEQUENTLY CONSTRUCTED OVER PIT BACKFILL. DETAILS REGARDING THE COVER CONSTRUCTION CAN BE FOUND IN THE SURFACE RECLAMATION COVERS AS BUILT REPORT (BGC JOB No.0255-012-02)

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT:
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE:
00 AND 01 PORTALS BACKFILL
AS-BUILT SECTION VIEWS

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	4	

K:\Projects\0255 Can\Zinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 WOP.dwg Layout: Figure 4 Plot Date May 2 08 Time: 8:55 AM

Photo 1 - 00 Portal prior to closure.
Date: October 2, 2005

Photo 2 - 00 Portal partially closed.
Date: October 2, 2005

Photo 3 - D8 placing waste rock into the 00 Portal.
Date: October 2, 2005

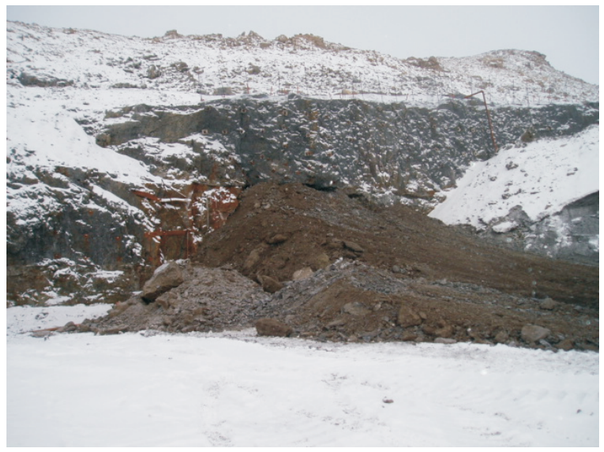


Photo 4 - Backfilled 00 Portal.
Date: October 2, 2005

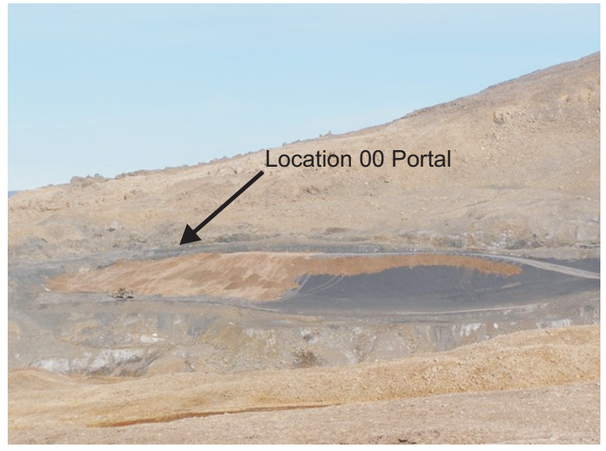


Photo 5 Partially completed WOP.
Date: August 24, 2006

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	APRIL 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE
00 PORTAL BACKFILLING
AS-BUILT CONSTRUCTION PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	5	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185

Photo 1 - 01 Portal prior to backfill.
Date: July 24, 2005

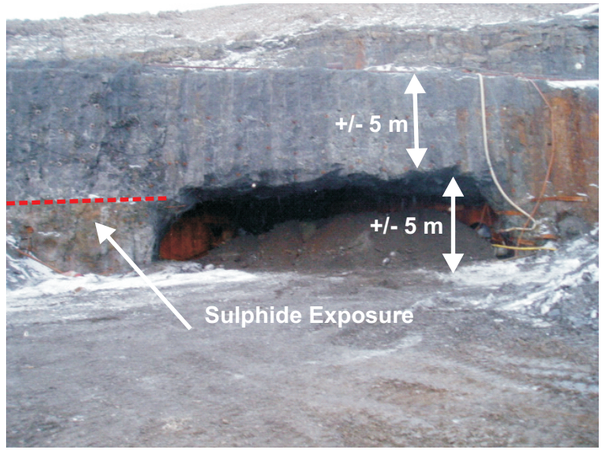


Photo 2 - Backfill material pushed up against the bulk head in 01 Portal.
Date: September 29, 2005

Photo 3 - Backfilled 01 Portal.
Date: September 30, 2005

Photo 4 - Backfilled 01 Portal.
Date: September 30, 2005

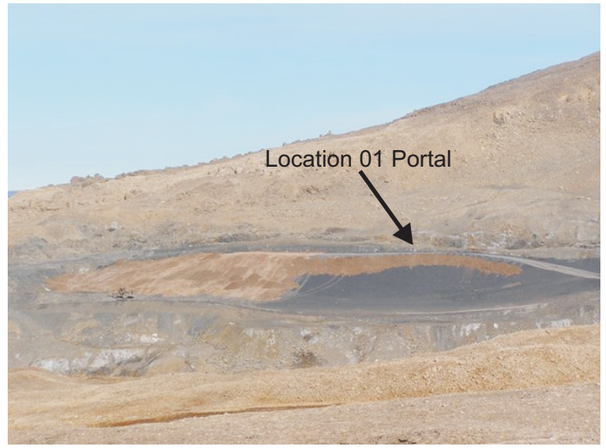


Photo 5 Partially completed WOP.
Date: August 24, 2006

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	APRIL 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

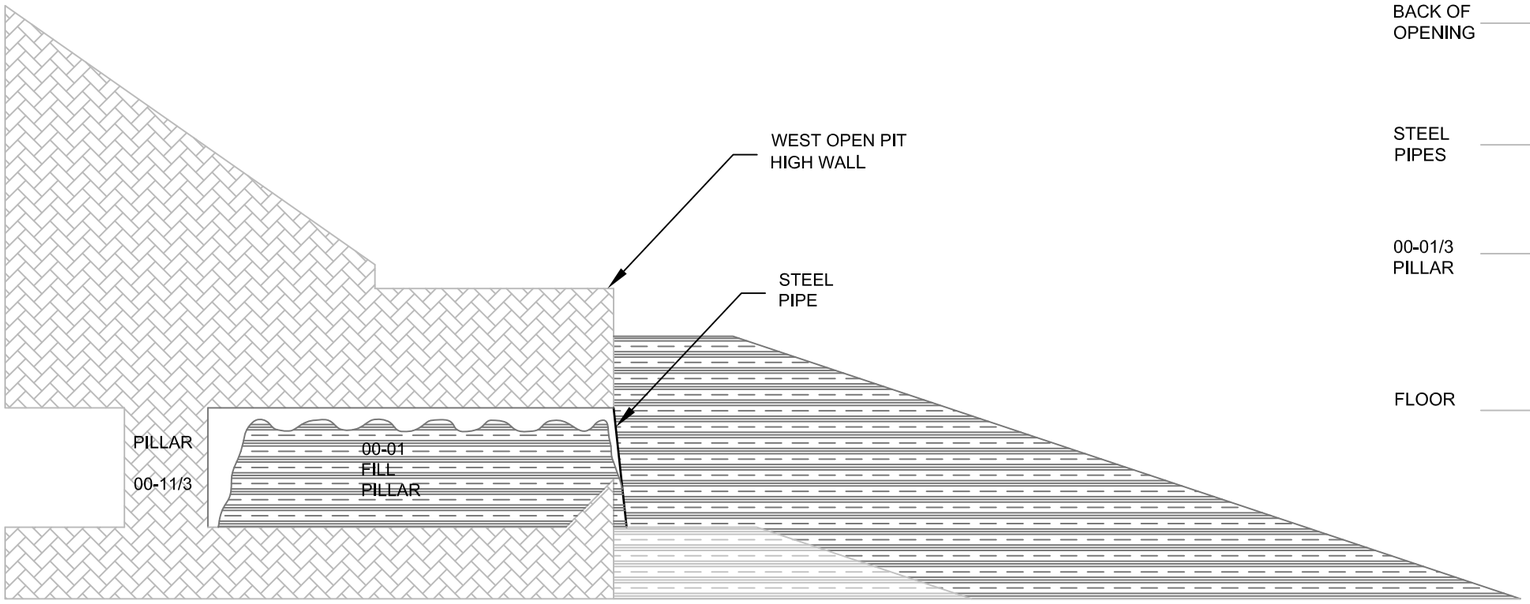
PROJECT
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE
01 PORTAL BACKFILLING
AS-BUILT CONSTRUCTION PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	6	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

00-01 FILL PILLAR AS-BUILT SCHEMATIC



5m 0m 5m 10m 15m

Scale 1:250

LEGEND:

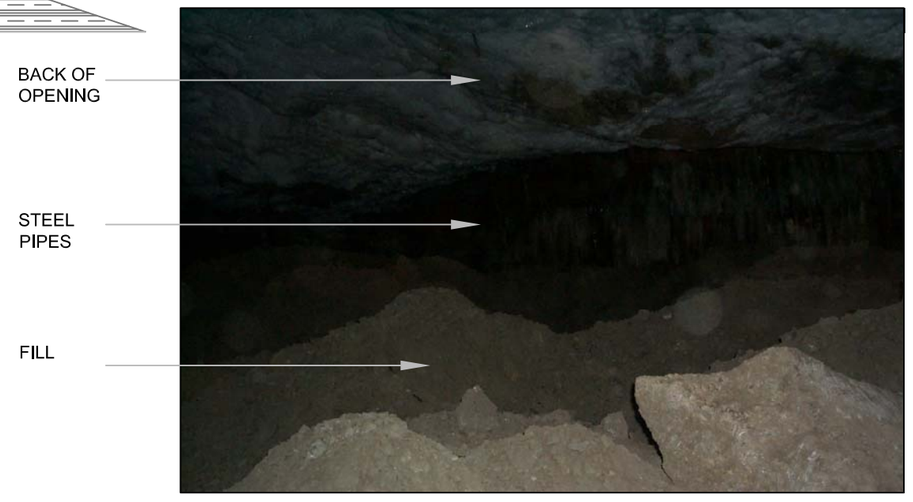
- DOLOSTONE BEDROCK
- WASTE ROCK BACKFILL (RECENT)
- WASTE FOCK BACKFILL (PREVIOUS)

NOTES:

1. DRAWING IS A SCHEMATIC TO ILLUSTRATE BACKFILL DETAILS FOR 00-01 FILL PILLAR. ALL DIMENSIONS ARE BASED ON VISUAL OBSERVATIONS AND ARE CONSIDERED APPROXIMATE.
2. SURFACE RECLAMATION COVER WAS SUBSEQUENTLY CONSTRUCTED OVER PIT BACKFILL. DETAILS REGARDING THE COVER CONSTRUCTION CAN BE FOUND IN THE SURFACE RECLAMATION COVERS AS BUILT REPORT (BGC JOB No.0255-012-02)

DATE: SEPTEMBER 2004.

EXCAVATED AREA OF 00-01 RIB PILLAR.
NOTE STEEL PIPES PLACED AGAINST OPENING.



DATE: OCTOBER 2005

FILL PILLAR CONSTRUCTED IN EXCAVATED AREA 00-01 RIB PILLAR.
NOTE BACKFILL LEVEL IN REFERENCE TO STEEL PIPES IN BACKGROUND.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

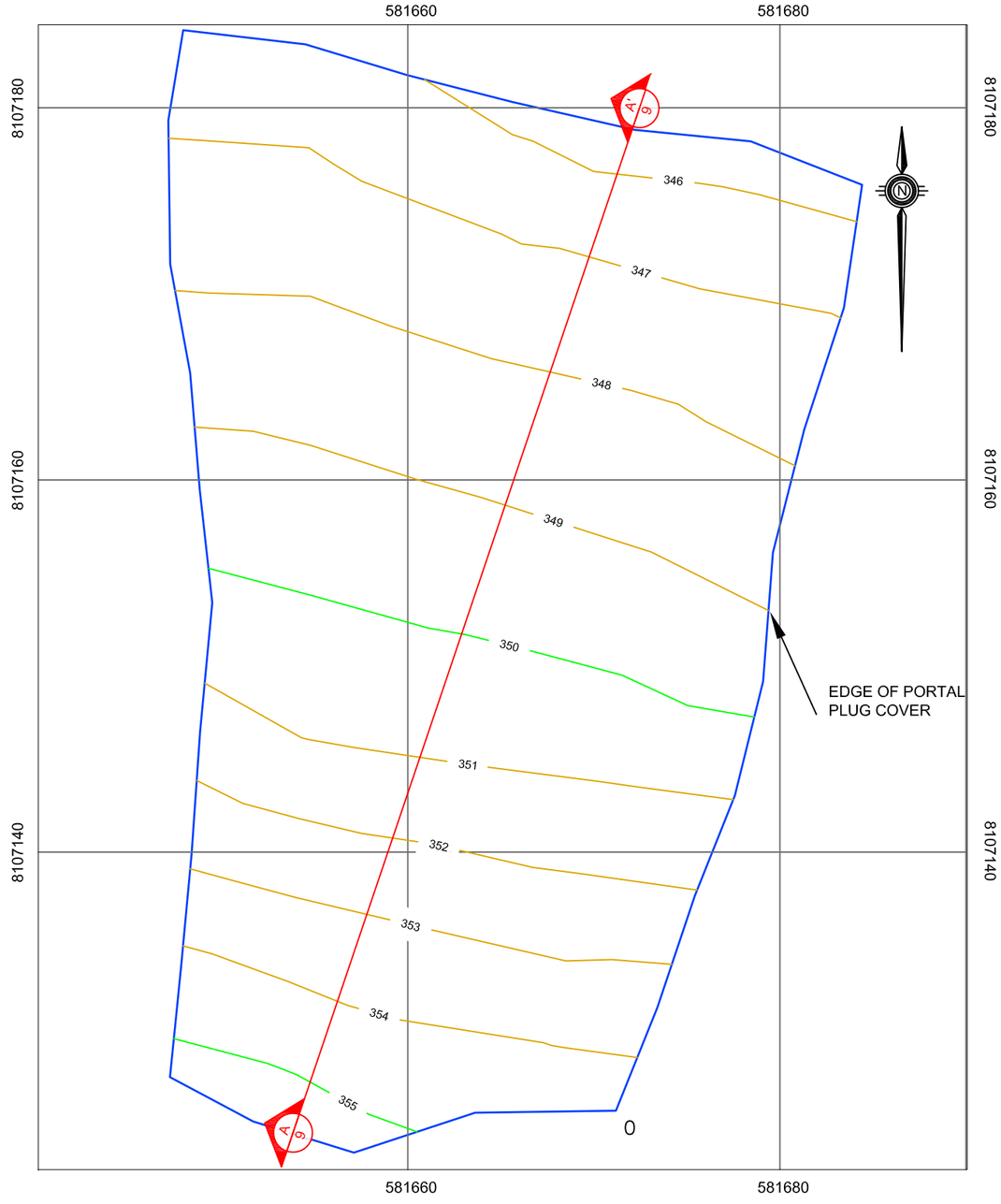
CLIENT: BREAKWATER RESOURCES LTD

PROJECT:
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE:
00-01 FILL PILLAR
AS-BUILT INFORMATION

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	7	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-005-10 005 PORTALS.dwg Layout: Figure 7 Plot Date Apr 16 07 Time: 4:23 PM



NOTES:

1. ELEVATIONS ARE PROVIDED IN METRES.
2. GRID IS IN UTM NAD 83, ZONE 16 COORDINATE SYSTEM.
3. CONTOUR INTERVAL = 1.0 m
4. CONTOURS ARE OF ARMOUR SURFACE.
5. SURVEY DATA PROVIDED BY ATCON CONSTRUCTION LTD. (FILE ABAU18M1)
6. SEE FIGURE 9 FOR SECTION VIEW.

5m 0 5m 10m 15m

Scale 1:300

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

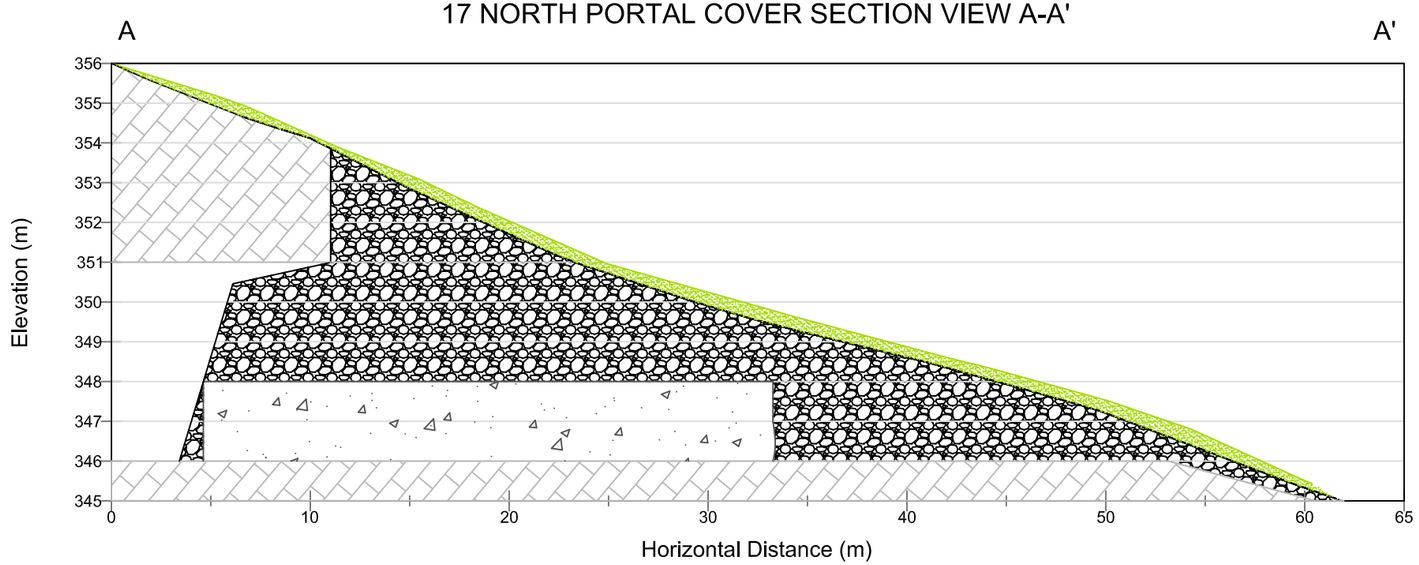
PROJECT:
NANISIVIK MINE RECLMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE:
17 NORTH PORTAL BACKFILL/COVER
AS-BUILT PLAN VIEW

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	8	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 17NPortal.dwg Layout: Figure 8 Plot Date Apr 30 08 Time: 4:40 PM

17 NORTH PORTAL COVER SECTION VIEW A-A'

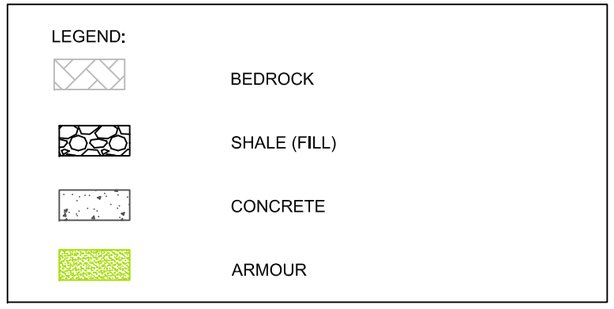


NOTES:

1. ALL ELEVATIONS ARE PROVIDED IN METRES.
2. SEE FIGURE 8 FOR LOCATION OF SECTION.
3. PROFILE OF SHALE AND ARMOUR LAYERS BASED ON SURVEY INFORMATION PROVIDED BY ATCON ONSTRUCTION LTD. (FILE ABAU18M1)
4. PORTAL BACKFILL DETAILS ARE ESTIMATED BASED ON VISUAL OBSERVATIONS RECORDED DURING CONSTRUCTION.
5. ORIGINAL GROUND IS INFERRED. NO SURVEY DATA IS AVAILABLE.

Horizontal Scale 1:300

VERTICAL EXAGGERATION: 2x



REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: 17 NORTH PORTAL BACKFILL/COVER AS-BUILT SECTION VIEW

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	9	

Photo 1- 17 North Portal prior to closure.
Date: July 21, 2005

Photo 2 - 17 North Portal partially filled.
Date: July 22, 2005

Photo 3 - 17 North Portal partially covered.
Date: July 23, 2005

Photo 4 - Completed shale cover over 17 North Portal.
Date: July 23, 2005

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

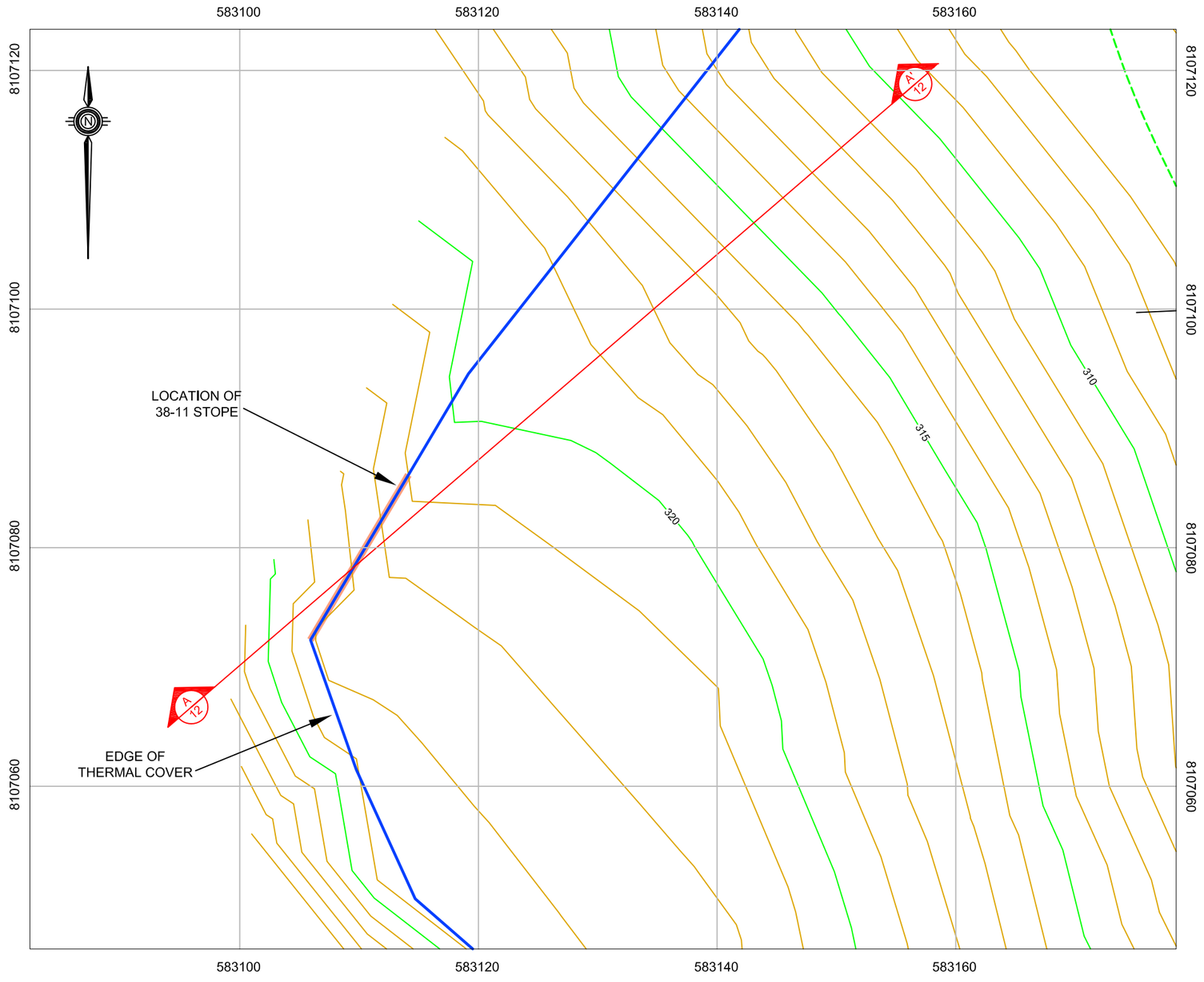
SCALE:	N/A
DATE:	APRIL 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE
17 NORTH PORTAL PLUG
AS-BUILT CONSTRUCTION PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	10	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185



NOTES:

1. ELEVATIONS ARE PROVIDED IN METRES.
2. GRID IS IN UTM NAD 83, ZONE 16 COORDINATE SYSTEM.
3. CONTOURS ARE OF ARMOUR SURFACE.
4. SURVEY DATA PROVIDED BY ATCON CONSTRUCTION LTD. (ABSEO1M1)
5. SEE FIGURE 12 FOR SECTION VIEW.

10m 0 10m 20m 30m

Scale 1:400

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	GKC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

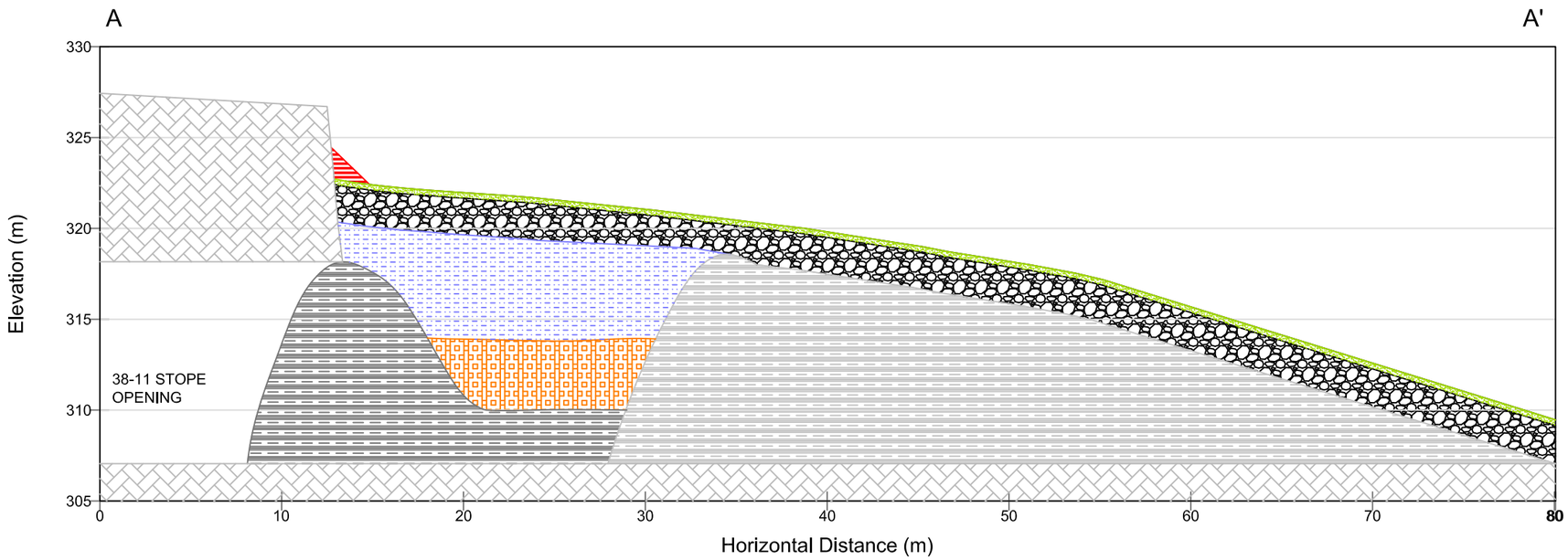
PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: 38-11 STOPE BACKFILL/COVER
AS-BUILT PLAN VIEW

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	11	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\FIGURE 11.dwg Layout: Figure 11 Plot Date May 2 08 Time: 2:50 PM

38-11 STOPE CLOSURE COVER SECTION VIEW A-A'



5m 0 5m 10m 15m

Scale 1:300

LEGEND:

- BEDROCK
- SHALE (FILL)
- WASTE ROCK BACKFILL (RECENT)
- WASTE ROCK BACKFILL (PREVIOUS)
- ARMOUR
- OVERBURDEN STRIPPINGS BACKFILL
- HYDROCARBON CONTAMINATED SOIL
- COARSE ARMOUR ROCK

NOTES:

1. ALL ELEVATIONS ARE PROVIDED IN METERS.
2. SEE FIGURE 11 FOR LOCATION OF SECTION.
3. PROFILE OF SHALE AND ARMOUR LAYERS ARE BASED ON SURVEY INFORMATION PROVIDED BY ATCON CONSTRUCTION LTD. (ABSEO1M1)
4. STOPE BACKFILL DETAILS ARE ESTIMATED BASED ON LIMITED OBSERVATIONS RECOREDED DURING CONSTRUCTION.
5. FOR ADDITIONAL DETAILS REGARDING THE CONSTRUCTION OF THE SURFACE RECLAMATION COVER AT THE EAST OPEN PIT REFERENCE THE SUFACE RECLAMATION COVERS AS-BUILT REPORT (BGC JOB No. 0255-012-02)

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: 38-11 STOPE BACKFILL/COVER
AS-BUILT SECTION VIEW

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	12	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 EOP.dwg Layout: Figure 12 Plot Date May 2 08 Time: 9:21 AM

Photo 1 - Backfilling 38-11 stope opening.
Date: June 27, 2005

Photo 2 -38-11 stope opening after partial backfilling.
Date: June 27, 2005

Photo 3 - Backfilling 38-11 stope.
Date: July 9, 2005

Photo 4 - Coarse fill in 38-11 stope after levelling.
Date: July 3, 2005

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

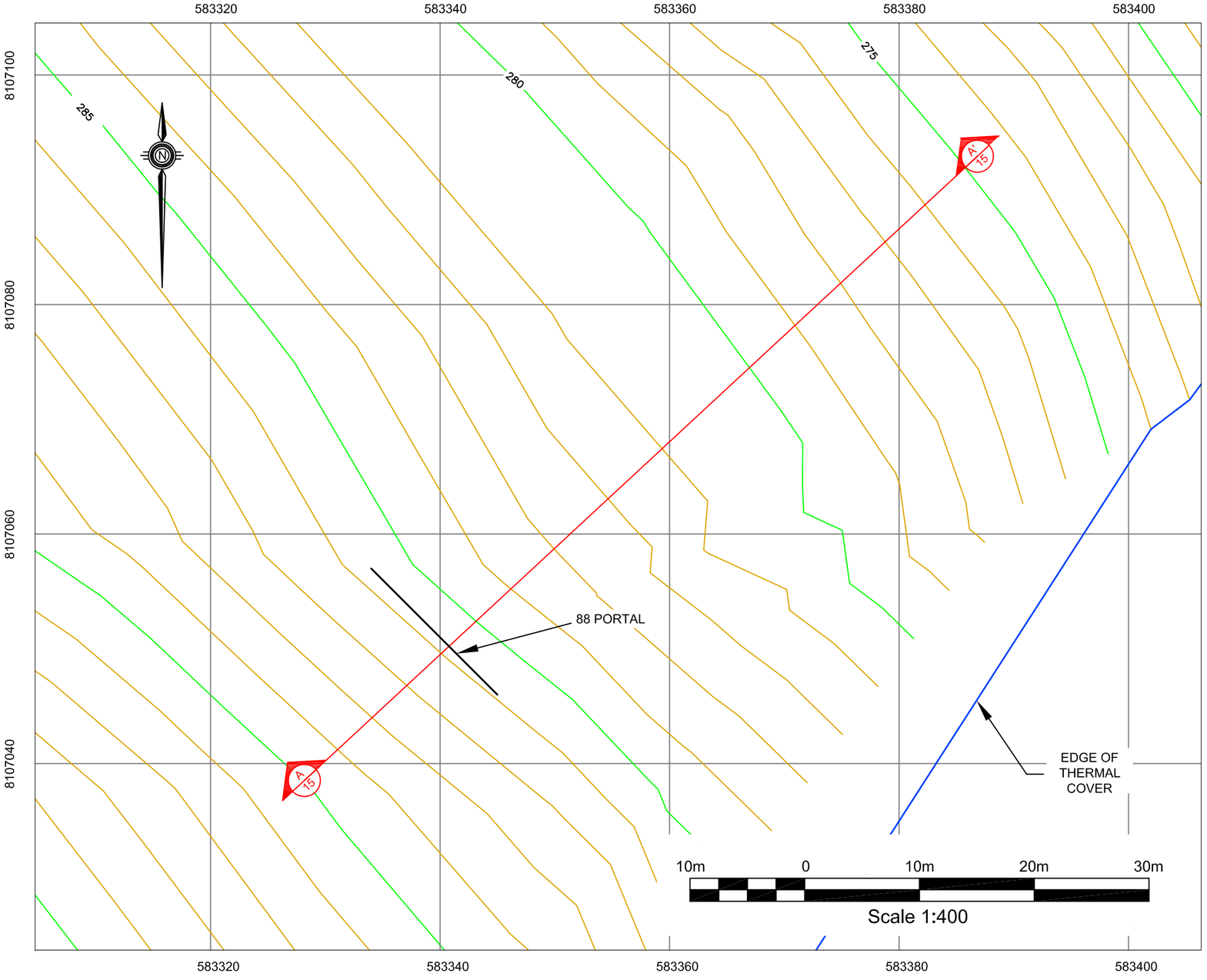
SCALE:	N/A
DATE:	APRIL 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE
38-11 STOPE PLUG
AS-BUILT CONSTRUCTION PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	13	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185



NOTES:

1. ELEVATIONS ARE PROVIDED IN METRES.
2. GRID IS IN UTM NAD 83, ZONE 16 COORDINATE SYSTEM.
3. CONTOUR INTERVAL = 1.0 m
4. CONTOURS ARE OF ARMOUR SURFACE.
5. SURVEY DATA PROVIDED BY ATCON CONSTRUCTION LTD. (FILE ABSEO1M1)
6. SEE FIGURE 15 FOR SECTION VIEW.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

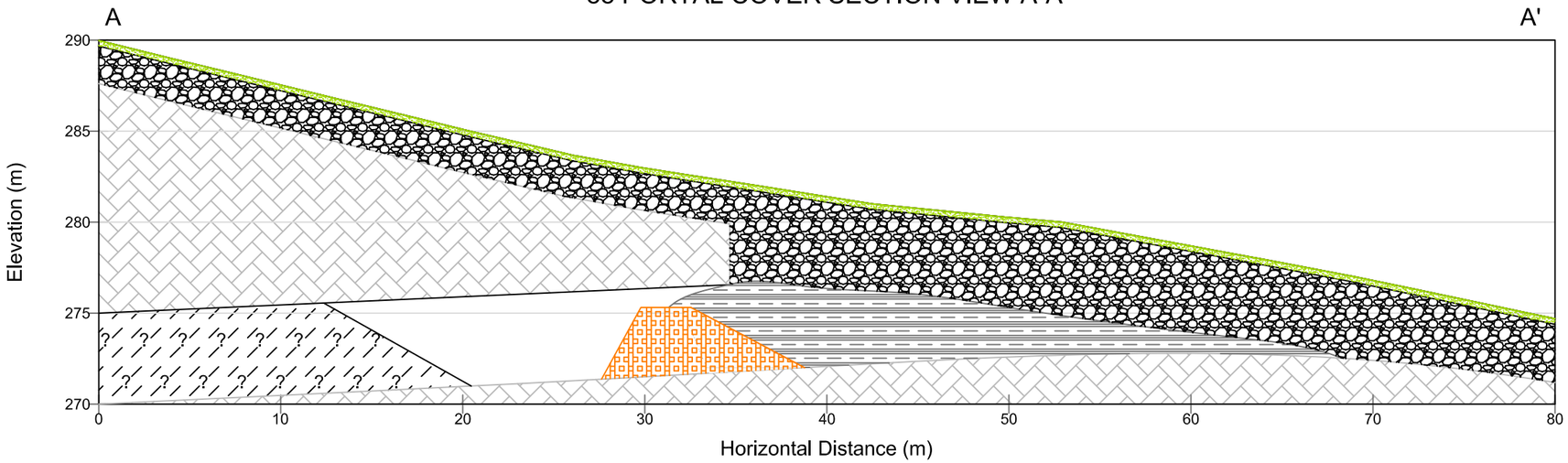
PROJECT: NANAISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: 88 PORTAL BACKFILL/COVER
AS-BUILT PLAN VIEW

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	14	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 EOP.dwg Layout: Figure 14 Plot Date May 2 08 Time: 9:26 AM

88 PORTAL COVER SECTION VIEW A-A'



Scale 1:300

LEGEND:

- BEDROCK
- SHALE (FILL)
- WASTE ROCK (FILL)
- ARMOUR
- ICE PLUG
- HYDROCARBON CONTAMINATED SOIL

NOTES:

1. ALL ELEVATIONS ARE PROVIDED IN METERS.
2. SEE FIGURE 14 FOR LOCATION OF SECTION.
3. PROFILE OF SHALE AND ARMOUR LAYERS BASED ON SURVEY INFORMATION PROVIDED BY ATCON CONSTRUCTION LTD. (FILE ABSEO1M1)
4. PORTAL BACKFILL DETAILS ARE ESTIMATED BASED ON LIMITED OBSERVATIONS RECOREDED DURING CONSTRUCTION.
5. FOR ADDITIONAL DETAILS REGARDING THE CONSTRUCTION OF THE SURFACE RECLAMATION COVER AT THE EAST OPEN PIT REFERENCE THE SUFACE RECLAMATION COVERS AS-BUILT REPORT (BGC JOB No. 0255-012-02)

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: 88 PORTAL BACKFILL/COVER AS-BUILT SECTION VIEW

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	15	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 EOP.dwg Layout: Figure 15 Plot Date May 2 08 Time: 9:27 AM

Photo 1 - 88 Portal prior to closure.
Date: August 1, 2005

Photo 2 - D8 placing fill inside the 88 Portal.
Date: August 1, 2005

Photo 3 - 88 Portal partially backfilled.
Date: August 1, 2005

Photo 4 - 88 Portal partially backfilled.
Date: August 1, 2005

Photo 5 - 88 Portal completely backfilled with waste rock.
Date: August 1, 2005

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

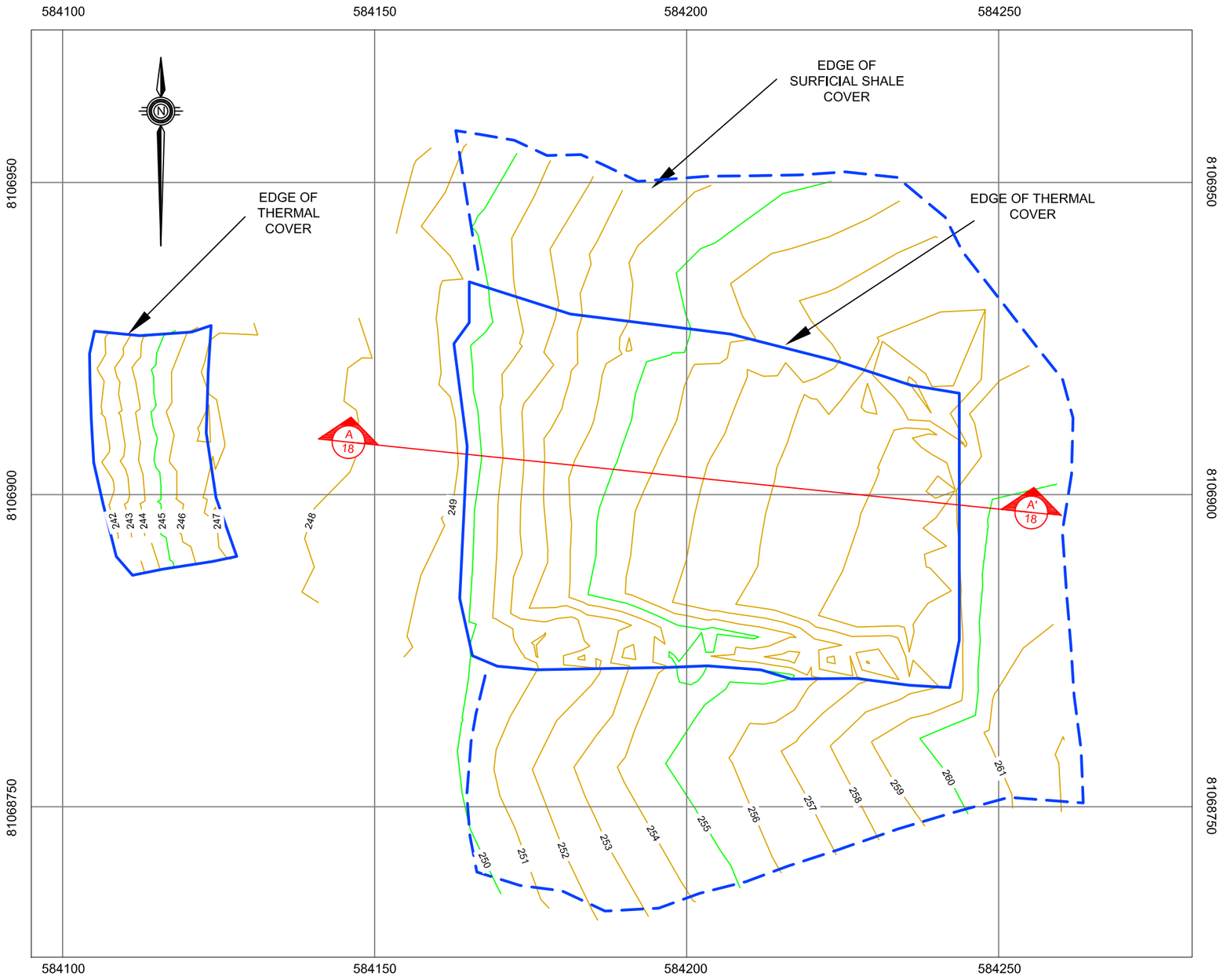
SCALE:	N/A
DATE:	APRIL 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE
88 PORTAL BACKFILL/COVER
AS-BUILT CONSTRUCTION PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	16	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185



NOTES:

1. ELEVATIONS ARE PROVIDED IN METRES.
2. GRID IS IN UTM NAD 83, ZONE 16 COORDINATE SYSTEM.
3. CONTOUR INTERVAL = 1.0 m
4. CONTOURS ARE OF ARMOUR SURFACE.
5. SURVEY DATA PROVIDED ATCON CONSTRUCTION LTD. (FILE ABAUO5M1, ABAUO5M2)
6. SEE FIGURE 18 FOR SECTION VIEW.

15m 0 15m 30m 45m

Scale 1:750

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE: AS SHOWN
DATE: APRIL 2008
DRAWN: JL
DESIGNED: KFM
CHECKED: GKC
APPROVED: JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

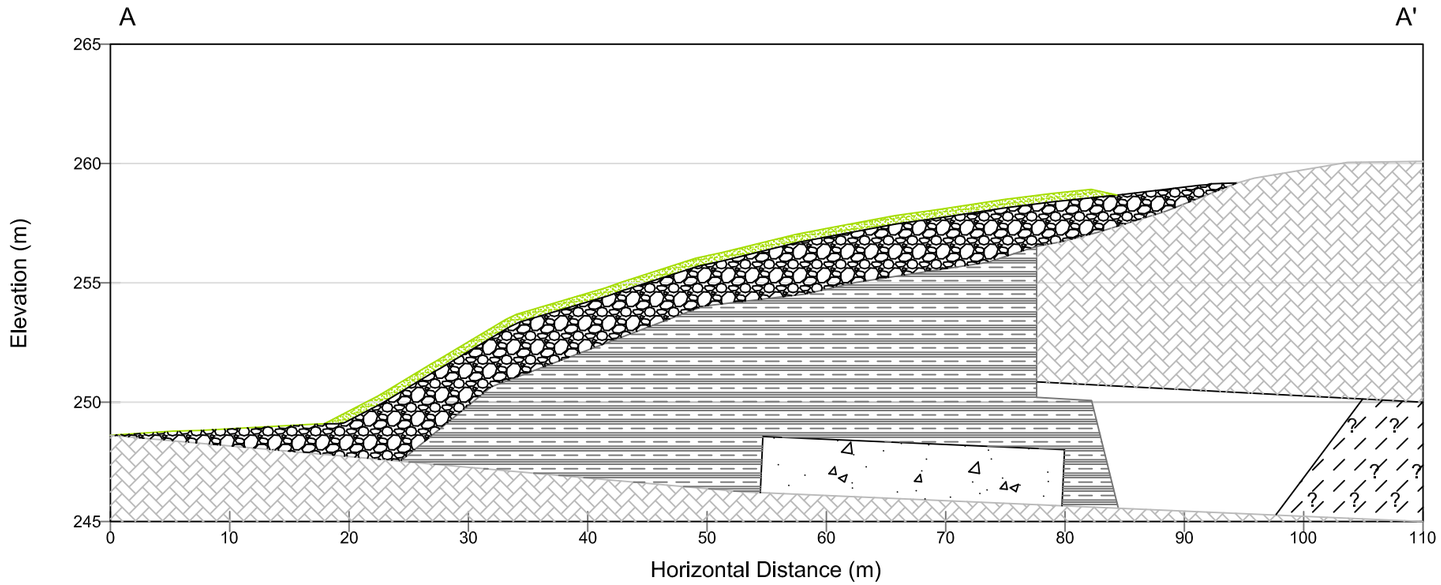
PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: K-BASELINE PORTAL COVER
AS-BUILT PLAN VIEW

PROJECT No.: 0255-012-03
FIGURE No.: 17
REV.:

K:\Projects\0255 Can\Znoc\012 As Built Report\03 Portal Closures\Graphics\Drawings\0255-012-03 KBaseline.dwg Layout: Figure 17 Plot Date Apr 30 08 Time: 4:42 PM

K-Baseline Portal Cover Section View A-A'



LEGEND:

- BEDROCK
- SHALE (FILL)
- WASTE ROCK (FILL)
- ARMOUR
- ICE PLUG
- CONCRETE

10m 0 10m 20m 30m

Scale 1:500

VERTICAL EXAGGERATION: 2x

NOTES:

1. ELEVATIONS ARE PROVIDED IN METERS.
2. SEE FIGURE 17 FOR LOCATION OF SECTION.
3. PROFILES OF SHALE AND ARMOUR LAYERS BASED ON SURVEY INFORMATION PROVIDED BY ATCON CONSTTRUCTION LTD. (FILES ABAUO5M1, ABAUO5M2)
4. PORTAL BACKFILL DETAILS ESTIMATED BASED IN INFORMATION PROVIDED BY SITE STAFF.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: K-BASELINE PORTAL COVER
AS-BUILT SECTION VIEW

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	18	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 KBaseline.dwg Layout: Figure 18 Plot Date May 2 08 Time: 9:29 AM

Photo 1 - K-Baseline Portal prior to backfilling.
Date: July 23, 2004

Photo 2 - Constructing thermal cover at K-Baseline Portal.
Date: May 28, 2005

Photo 3 - K-Baseline Portal cover construction.
Date: May 29, 2005

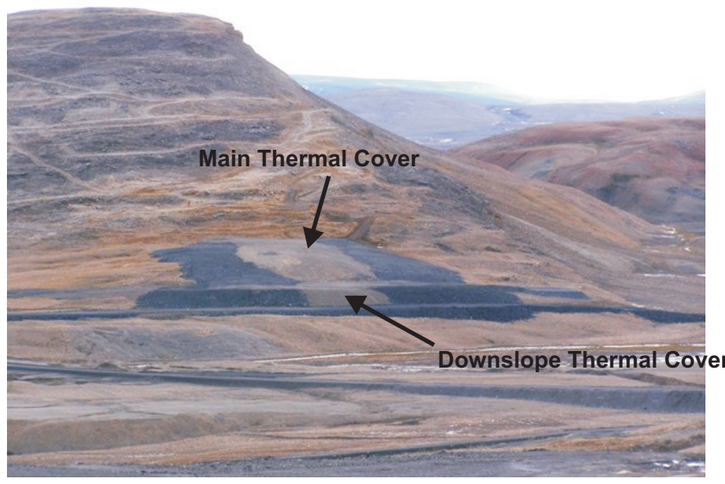


Photo 4 - Completed K-Baseline portal and waste rock cover.
Date: August 24, 2006

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

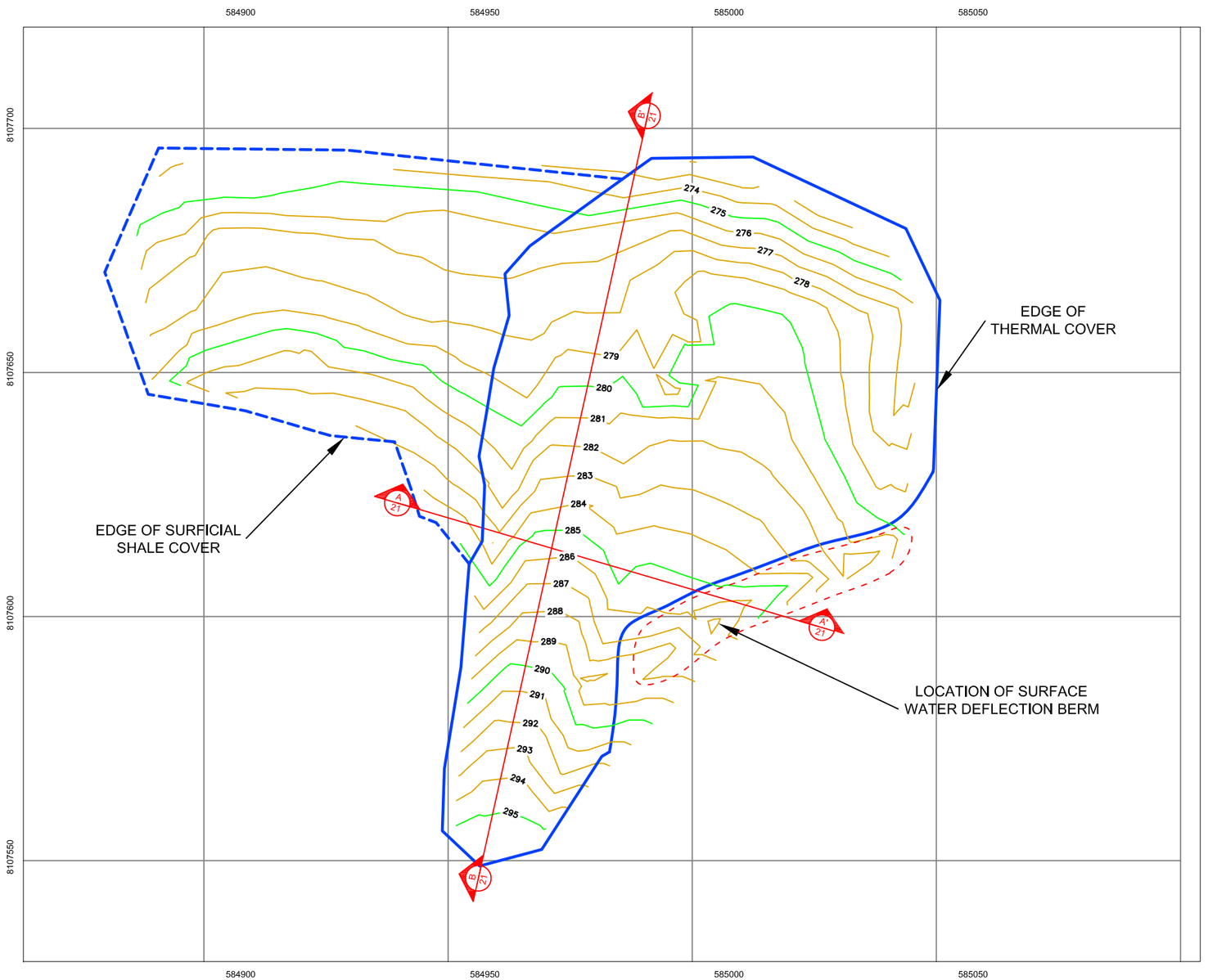
SCALE:	N/A
DATE:	APRIL 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE
K-BASELINE PORTAL COVER
AS-BUILT CONSTRUCTION PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	19	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185



NOTES:

1. ELEVATIONS ARE PROVIDED IN METRES.
2. GRID IS IN UTM NAD 83, ZONE 16 . COORDINATE SYSTEM.
3. CONTOUR INTERVAL = 1.0 m
4. CONTOURS ARE OF ARMOUR SURFACE.
5. SURVEY DATA PROVIDED BY ATCON CONSTRUCTION LTD. (ABJL28D2, ABAU27M1)
6. SEE FIGURE 21 FOR SECTION VIEWS.

0 10 20 30 40 50 m

SCALE 1:1000

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

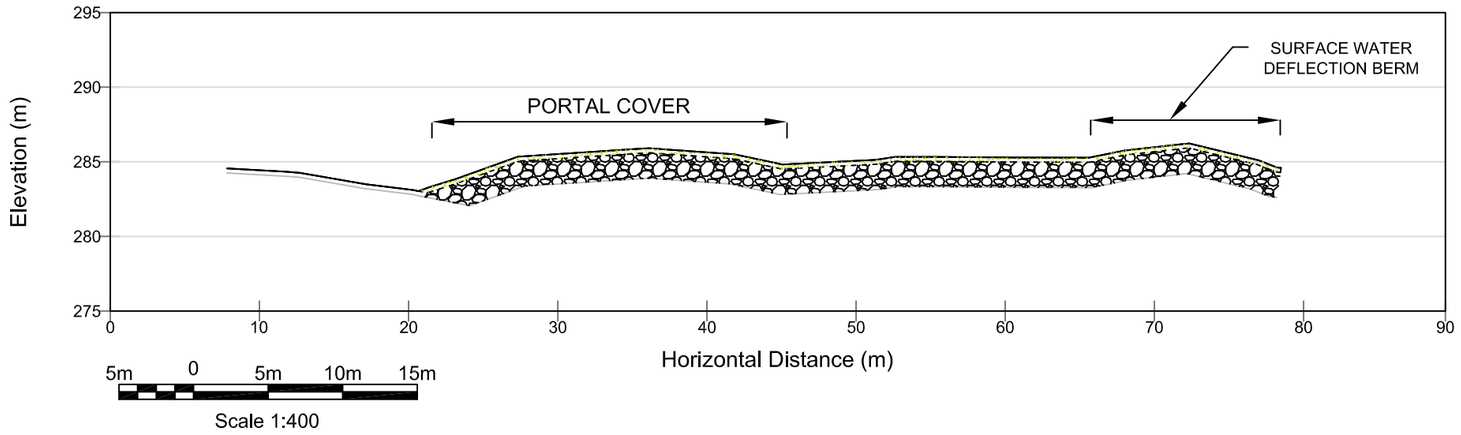
PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: OCEANVIEW PORTAL COVER
AS-BUILT PLAN VIEW

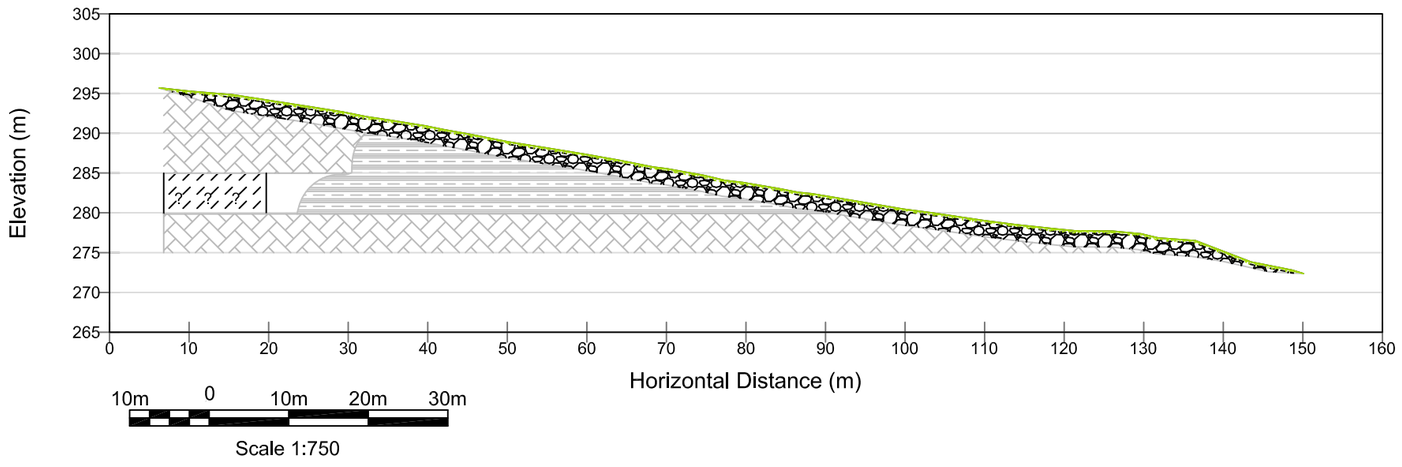
PROJECT No.:	FIGURE No.	REV.:
0255-012-03	20	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 OV Portal.dwg Layout: Figure 20 Plot Date: May 2 08 Time: 9:36 AM

Oceanview Portal Cover Section View A-A'



Oceanview Portal Cover Section View B-B'



NOTES:

1. ELEVATIONS ARE PROVIDED IN METRES.
2. SEE FIGURE 20 FOR LOCATION OF SECTION.
3. PROFILE OF SHALE AND ARMOUR LAYERS BASED ON SURVEY INFORMATION PROVIDED BY ATCON CONSTRUCTION LTD. (ABJL28D2, ABAU27M1)
4. PORTAL BACKFILL DETAILS DERIVED FROM MINE SITE RECORDS. NO DIRECT OBSERVATIONS WERE MADE BY BGC.

LEGEND:

- SHALE (FILL)
- ARMOUR
- ICE PLUG
- ROCK FILL
- BEDROCK

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: OCEANVIEW PORTAL COVER
AS-BUILT SECTION VIEWS

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	21	

K:\Projects\0255 CanZinco\012 As Built Reports\03 Portal Closures\Graphics\Drawings\0255-012-03 OV Portal.dwg Layout: Figure 21 Plot Date May 2 08 Time: 9:44 AM

Photo 1 - Initial lift of shale for Oceanview Portal cover.
Date: May 28, 2005

Photo 2 - Compacting initial lift of shale for Oceanview Portal cover.
Date: May 28, 2005

Photo 3 - Constructing second lift of shale for Oceanview Portal cover.
Date: May 29, 2005

Photo 4 - Completed Oceanview Portal cover.
Date: May 30, 2005

Photo 5 - Oceanview Portal Extension Cover.
Date: August 21, 2005

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	APRIL 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE
OCEANVIEW PORTAL COVER
AS-BUILT CONSTRUCTION PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	22	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

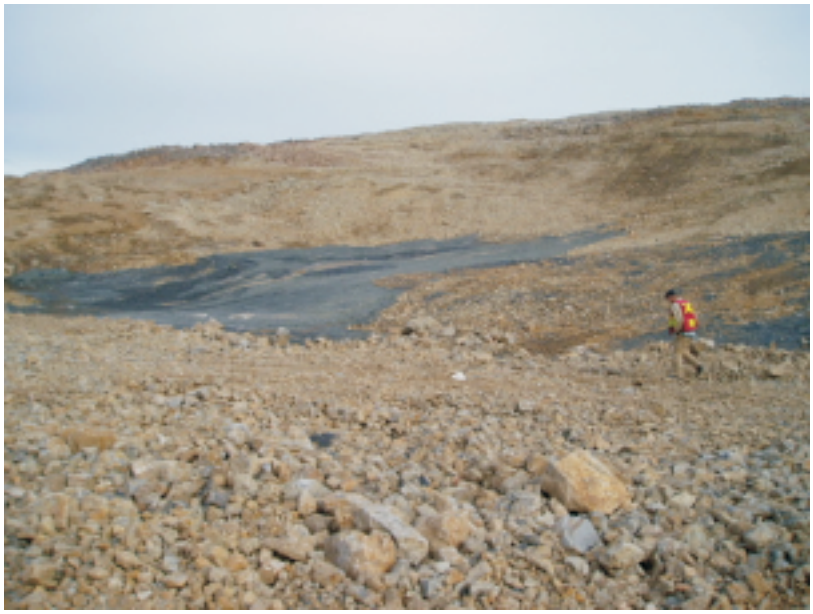


Photo 1 - Area 14 Portal prior to armour placement.
Note portal is surfaced with shale.
Date: August 18, 2005

Photo 2 - Area 14 Portal after armour placement.
Date: August 30, 2007

SCALE:	N/A	DESIGNED:	GKC
DATE:	APRIL 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

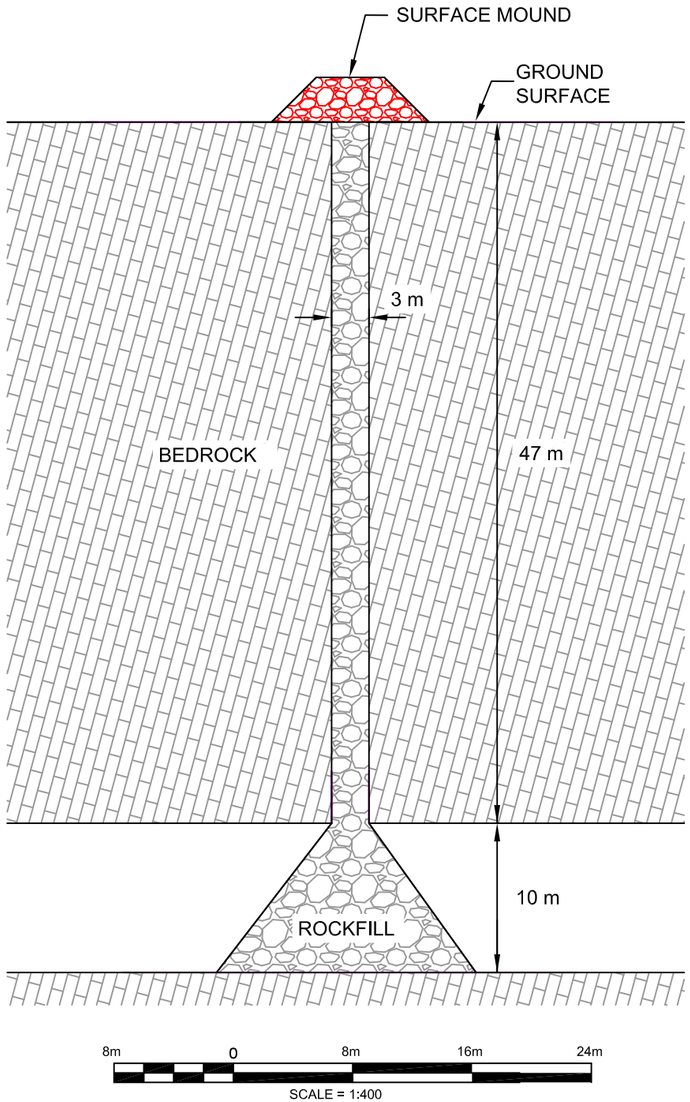
TITLE: AREA 14 PORTAL PLUG
AS-BUILT CONSTRUCTION PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	23	0

VIEW OF SHALE HILL RAISE PRE-RECLAMATION (SEPTEMBER 2002).

VIEW OF SHALE HILL RAISE POST-RECLAMATION (AUGUST 2006).

SHALE HILL RAISE CONCEPTUAL CROSS-SECTION



NOTES:

1) CROSS SECTION DRAWING OF RAISE IS A SCHEMATIC AND IS BASED ON AVAILABLE INFORMATION SUPPLIED BY THE MINE SITE.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

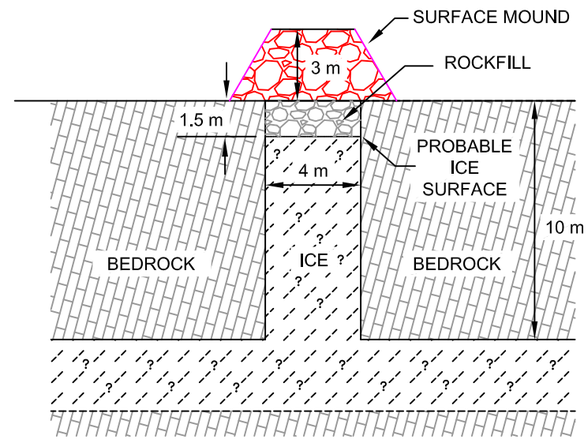
TITLE: SHALE HILL RAISE
AS-BUILT INFORMATION

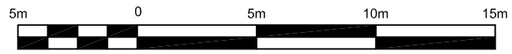
PROJECT No.:	FIGURE No.	REV.:
0255-012-03	24	

VIEW OF OCEANVIEW EAST RAISE PRE-RECLAMATION (SEPTEMBER 2002).

VIEW OF SHALE CAP ON OCEANVIEW EAST RAISE POST-RECLAMATION (SEPTEMBER 2002).

OCEANVIEW EAST RAISE CONCEPTUAL CROSS-SECTION





SCALE = 1:250

NOTES:

1) CROSS SECTION DRAWING OF RAISE IS A SCHEMATIC AND IS BASED ON AVAILABLE INFORMATION SUPPLIED BY THE MINE SITE.

2) EXTENT OF ICE FILLING IN RAISE AND MINE WORKINGS IS UNCERTAIN.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	KFM
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

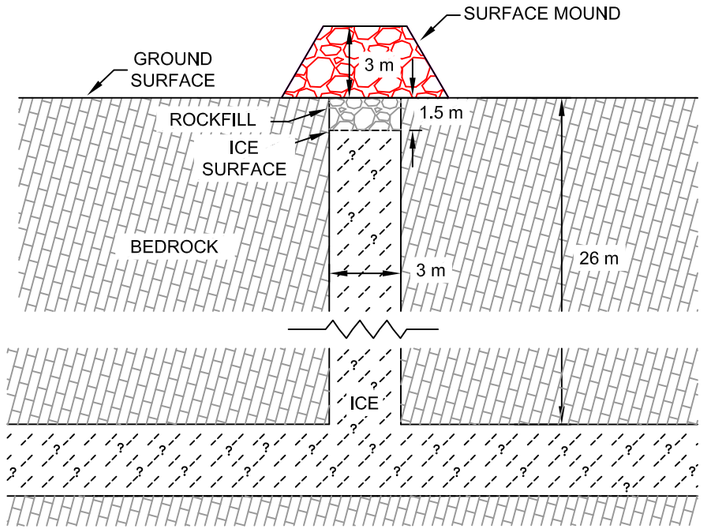
TITLE: OCEANVIEW EAST RAISE AS-BUILT INFORMATION

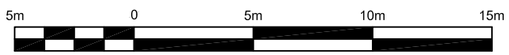
PROJECT No.:	FIGURE No.	REV.:
0255-012-03	25	

VIEW OF OCEANVIEW WEST RAISE PRE-RECLAMATION (SEPTEMBER 2002).

VIEW OF SHALE CAP ON OCEANVIEW WEST RAISE (AUGUST 2006).

OCEANVIEW WEST RAISE CONCEPTUAL CROSS-SECTION





SCALE = 1:250

NOTES:

1) CROSS SECTION DRAWING OF RAISE IS A SCHEMATIC AND IS BASED ON AVAILABLE INFORMATION SUPPLIED BY THE MINE SITE.

2) EXTENT OF ICE FILLING IN RAISE AND MINE WORKINGS IS UNCERTAIN.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINERECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

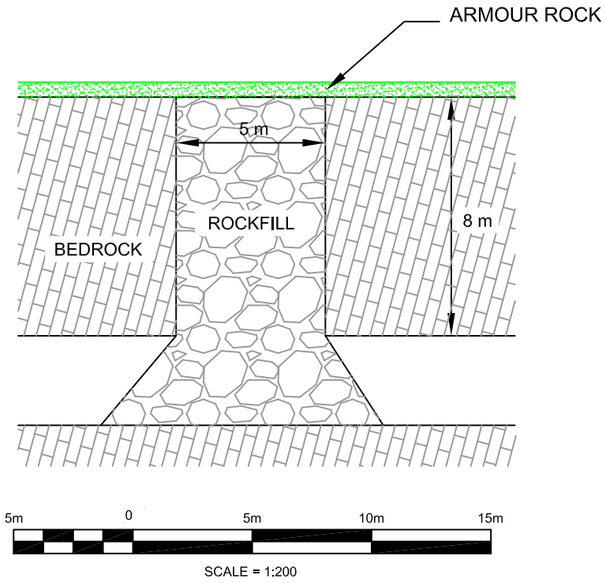
TITLE: OCEANVIEW WEST RAISE AS-BUILT INFORMATION

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	26	

PHOTO OF AREA 14 RAISE (AUGUST 2006).

PHOTO OF AREA 14 RAISE (AUGUST 2006).

AREA 14 RAISE CONCEPTUAL CROSS-SECTION



SCALE = 1:200

NOTES:

1) CROSS SECTION DRAWING OF RAISE IS A SCHEMATIC AND IS BASED ON AVAILABLE INFORMATION SUPPLIED BY THE MINE SITE.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	APRIL 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

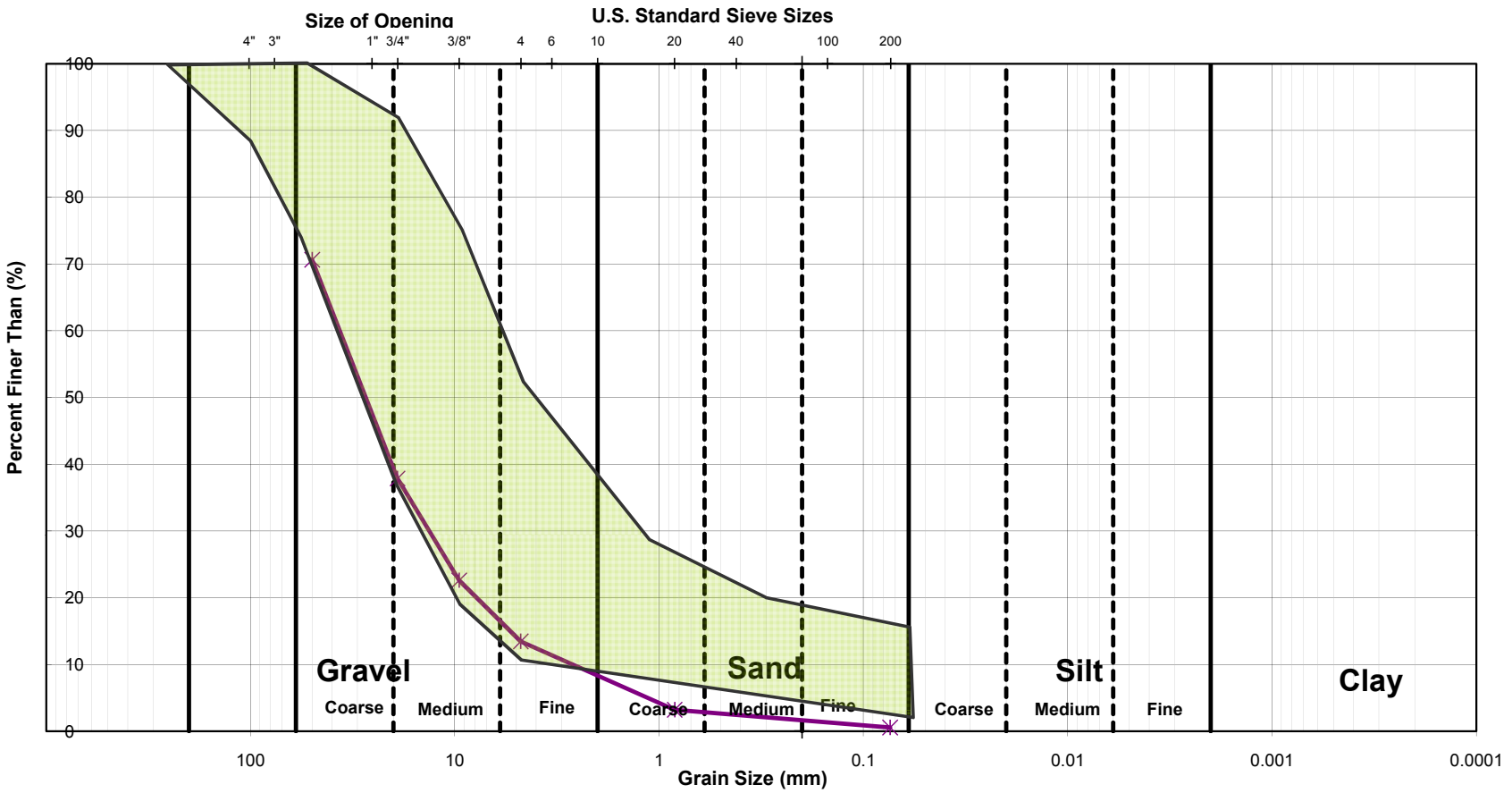
CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: AREA 14 RAISE
AS-BUILT INFORMATION

PROJECT No.:	FIGURE No.	REV.:
0255-012-03	27	

APPENDIX I
17 NORTH PORTAL
QA/QC TESTING RESULTS



Shale Fill Grain Size Specifications

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

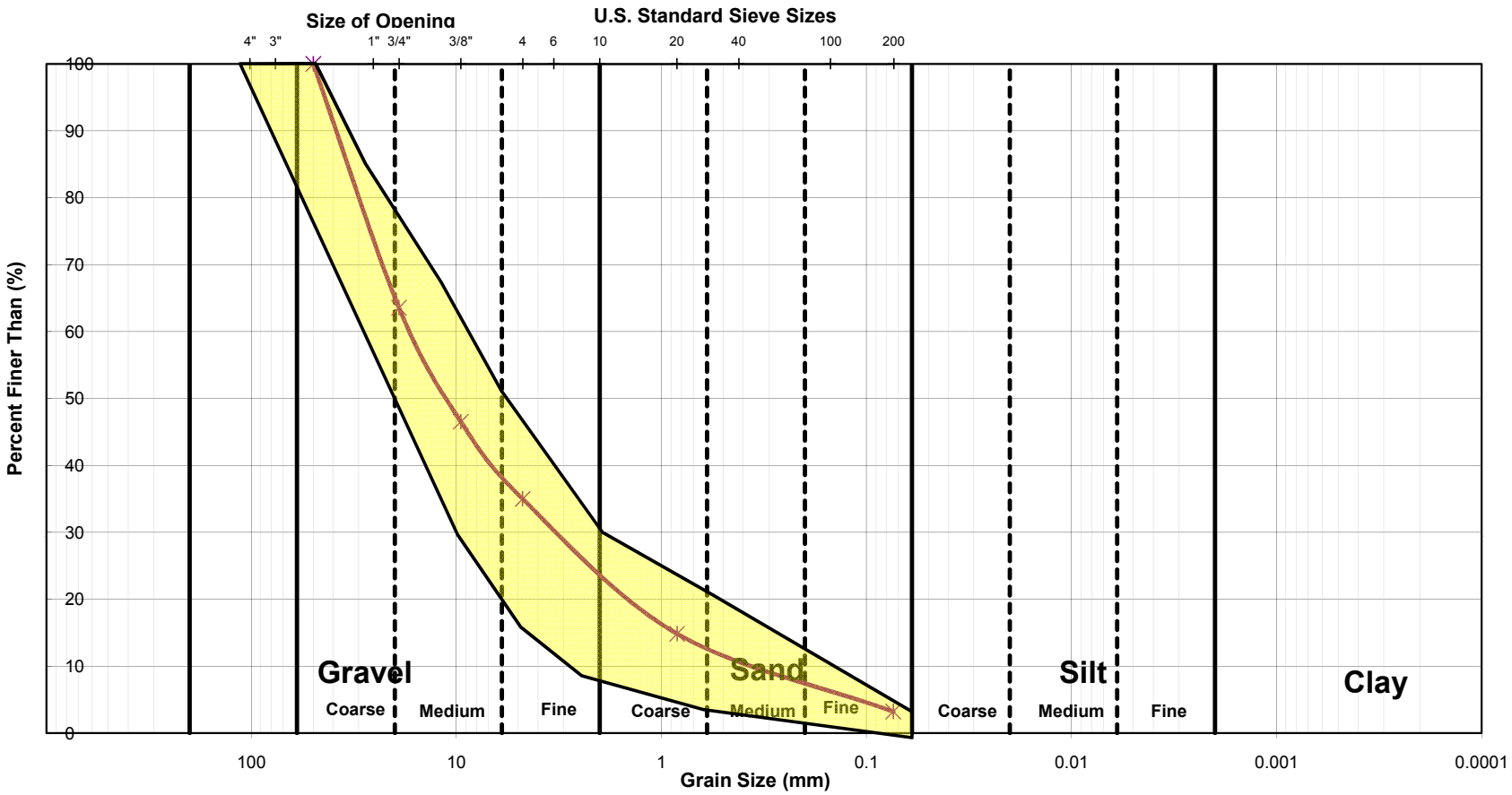
CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: 17 NORTH PORTAL
SHALE GRAIN SIZE DISTRIBUTION ANALYSES

PROJECT NO. 0255-012-03

DWG. NO. I-1



Armour material Grain Size Specifications

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: 17 NORTH PORTAL
ARMOUR MATERIAL GRAIN SIZE DISTRIBUTION ANALYSES

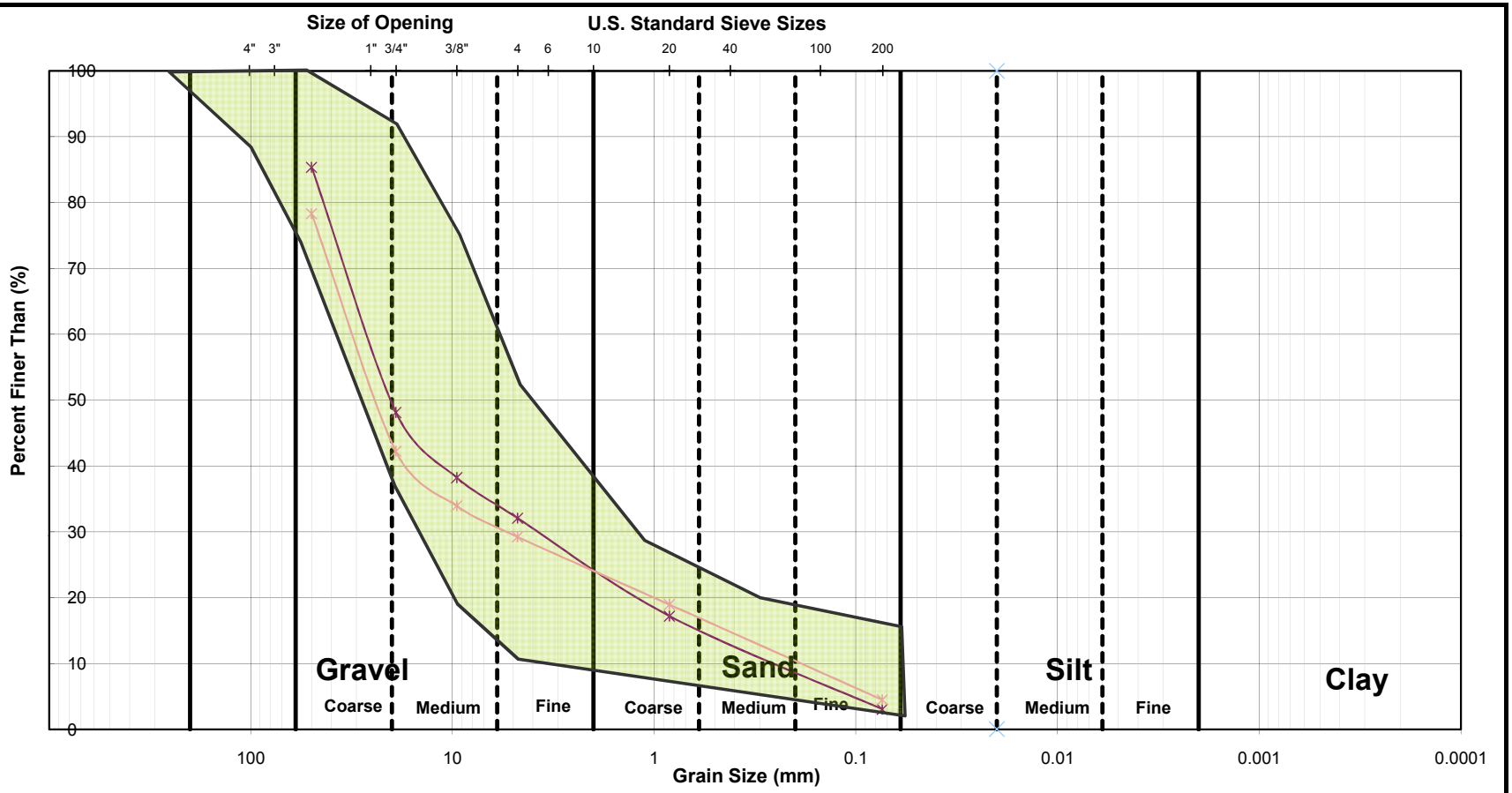
PROJECT NO. 0255-012-03

FIG. NO. I-2

Table I-1 - Moisture Content Testing Results 17 North Portal Cover

Sample	Moisture Content (%)
17N Portal Shale 1	4
17N Portal Armour 1	7

APPENDIX II
K-BASELINE PORTAL
QA/QC TESTING RESULTS



Shale Fill Grain Size Specifications

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

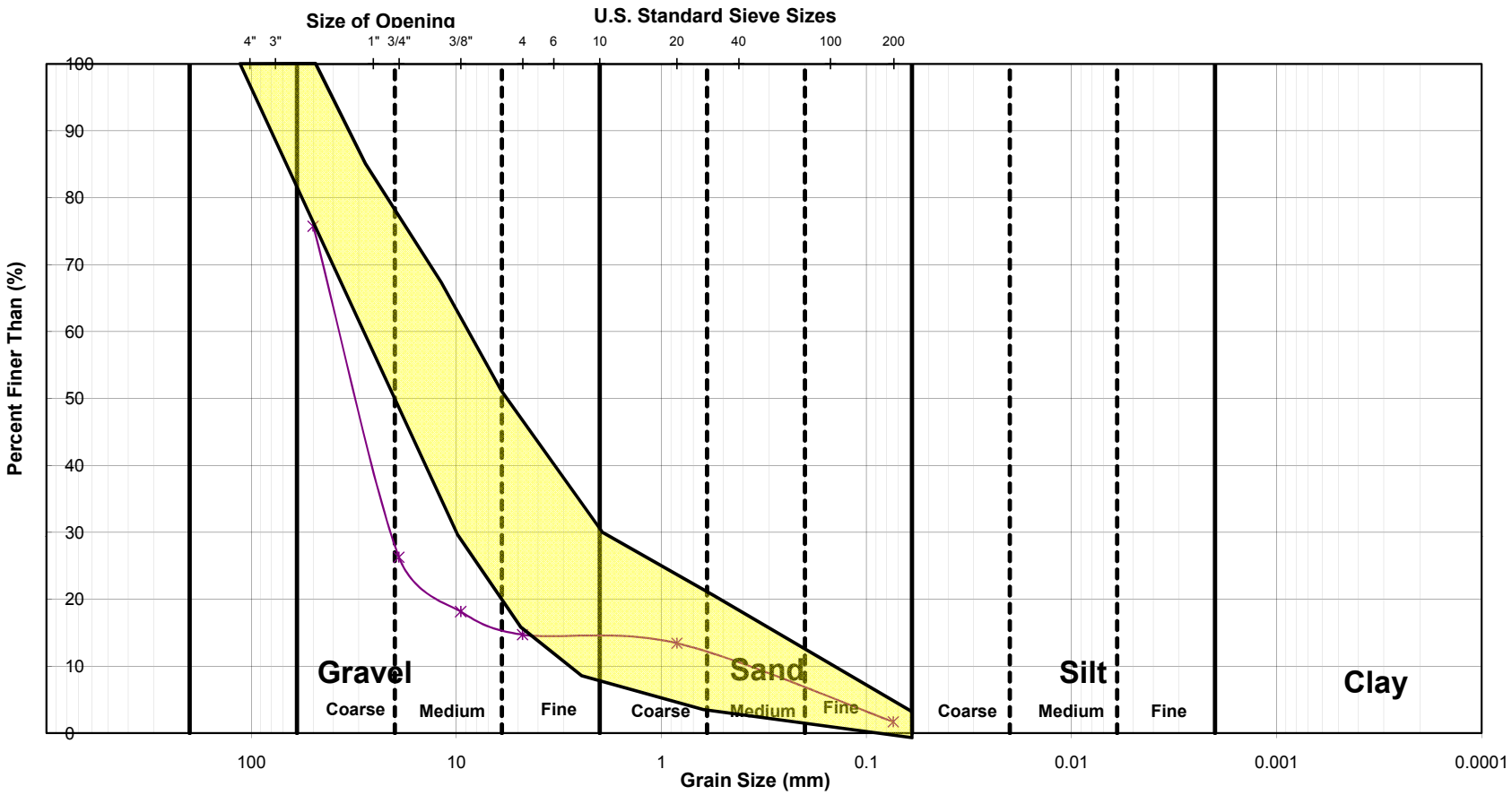
CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: K-BASELINE PORTAL
SHALE GRAIN SIZE DISTRIBUTION ANALYSES

PROJECT NO. 0255-012-03

FIG. NO. II-1



Armour material Grain Size Specifications

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: K-BASELINE PORTAL
ARMOUR MATERIAL GRAIN SIZE DISTRIBUTION ANALYSES

PROJECT NO. 0255-012-03

FIG. NO. II-2

June 22, 2005
K-Baseline Portal Cover thickness test pit.
Note particle size distribution of shale file.

June 22, 2005
K-Baseline Portal cover thickness test pit.
Note particle size distribution and thickness of armour material.

SCALE:	N/A	DESIGNED:	GKC
DATE:	APRIL 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: RECLAMATION OF MINE OPENING AS-BUILT REPORT

TITLE: K-BASELINE PORTAL COVER THICKNESS TEST PIT PHOTOS

PROJECT No.	FIGURE No.	REV.
0255-012-03	II-3	0

Table II-1 - ABA Testing Results K-Baseline Portal Cover

Sample	FIZZ RATING	NNP	NP	pH	MPA	Ratio (NP:MPA)	S
	Unity	t CaCO3/ 1000 t ore	t CaCO3/ 1000 t ore	Unity	t CaCO3/ 1000 t ore	Unity	%
K-Baseline Portal Shale 1	3	392	417	8.2	25	16.7	0.80
K-Baseline Portal Armour 1	3	390	397	8.6	6.6	60.5	0.21

ABA Testing completed by ALS Chemex of North Vancouver, BC.

Legend:

NNP: Net Neutralization Potential

NP: Neutralization Potential

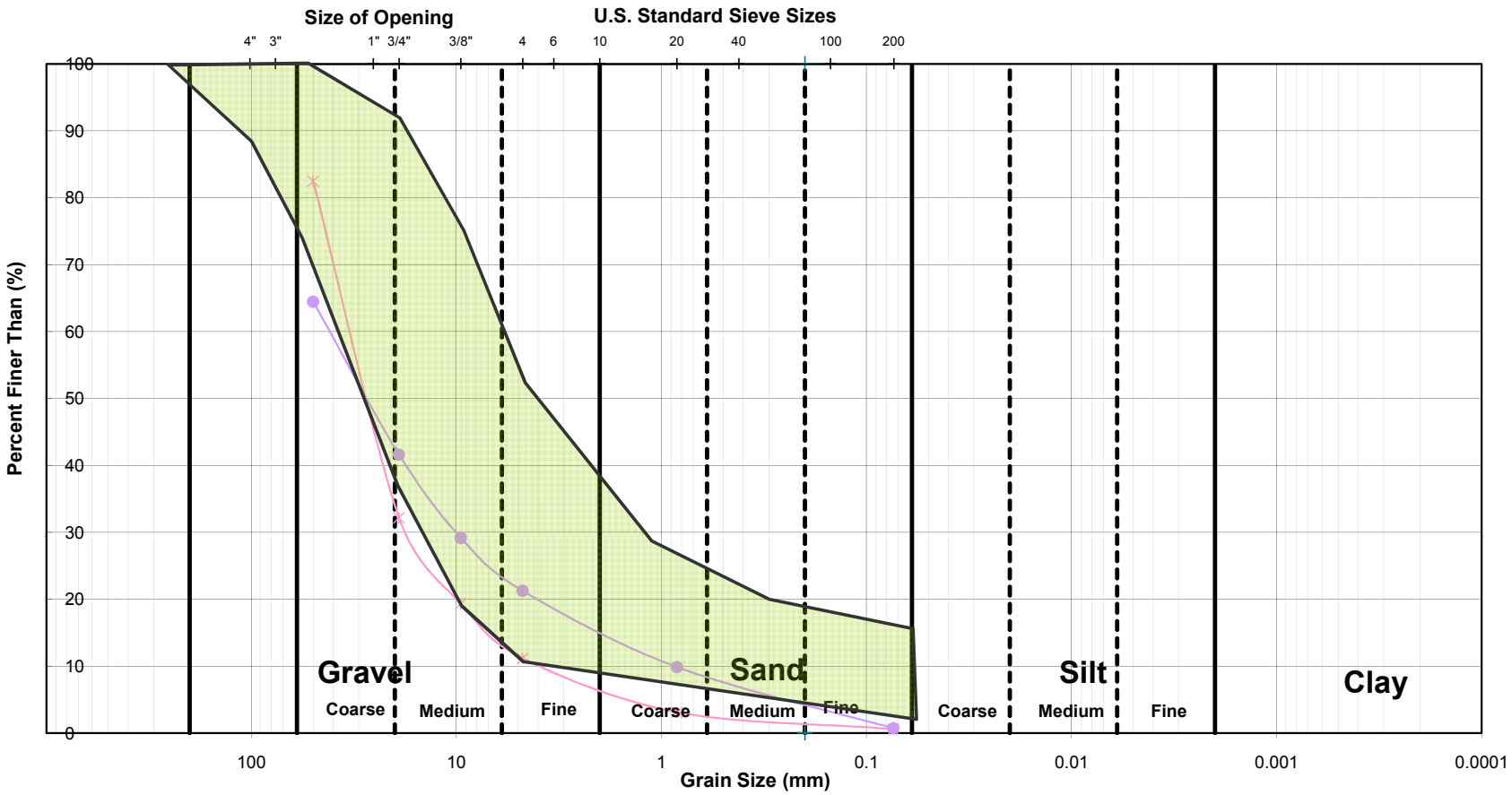
MPA: Maximum Potential Acidity

S: Total Sulphur

Table II-2 - Moisture Content Testing Results K-Baseline Portal Cover

Sample	Moisture Content (%)
KBL Portal Shale 1	4
KBL Portal Shale 2	10
KBL Portal Armour 1	5

APPENDIX III
OCEANVIEW PORTAL
QA/QC TESTING RESULTS



Shale Fill Grain Size Specifications

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

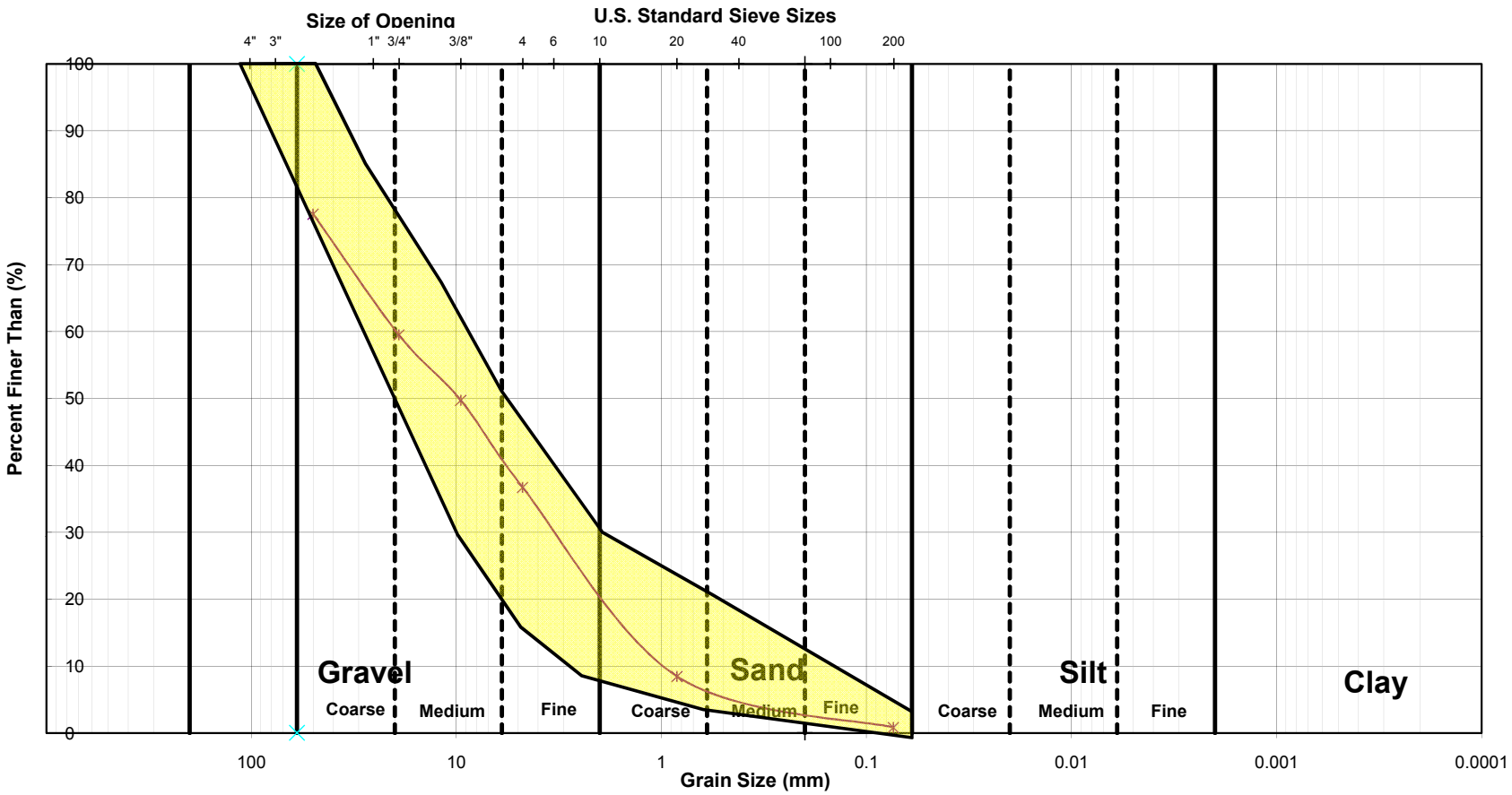
CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: OCEANVIEW PORTAL
SHALE GRAIN SIZE DISTRIBUTION ANALYSES

PROJECT NO. 0255-012-03

FIG. NO. III-1



Armour material Grain Size Specifications

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION RECLAMATION OF MINE OPENINGS AS-BUILT REPORT

TITLE: OCEANVIEW PORTAL
ARMOUR MATERIAL GRAIN SIZE DISTRIBUTION ANALYSES

PROJECT NO. 0255-012-03

FIG. NO. III-2

Table III-1 - ABA Test Results Oceanview Portal Cover

Sample	FIZZ RATING	NNP	NP	pH	MPA	Ratio (NP:MPA)	S
	Unity	t CaCO3/ 1000 t ore	t CaCO3/ 1000 t ore	Unity	t CaCO3/ 1000 t ore	Unity	%
OV Portal Shale 1	3	384	435	8.0	51.3	8.5	1.64
OV Portal Shale 2	3	378	410	8.1	32.2	12.7	1.03
OV Portal Armour 1	3	428	431	8.1	3.1	137.9	0.10

ABA Testing completed by ALS Chemex of North Vancouver, BC.

Legend:

NNP: Net Neutralization Potential

NP: Neutralization Potential

MPA: Maximum Potential Acidity

S: Total Sulphur

Table III-2 - Moisture Content Testing Results Oceanview Portal Cover

Sample	Moisture Content (%)
OV Portal Shale 1	2
OV Portal Shale 2	6
OV Portal Armour	6