NIBLACK PROJECT

Underground Exploration Plan of Operations
2012 Post-Construction Update

Prepared for

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
Anaconda	Anaconda Minerals Company
BMP	best management practice
CBG	CBR Gold Corporation
Cominco	Cominco American Incorporated
gpm	gallons per minute
gph	gallons per hour
HDPE	high-density polyethylene
Lac	Lac Minerals (USA) Incorporated
LAD	land application/dispersion
NAG	non-acid-generating
NMC	Niblack Mining Corporation
Noranda	Noranda Exploration Incorporated
NPLLC	Niblack Project LLC
Occidental	Occidental Minerals Corporation
PAG	potentially acid-generating
PNR	Pacific Northwest Resources
QAPP	quality assurance project plan
SWPPP	Storm Water Pollution Prevention Plan
VMS	volcanogenic massive sulfide
USFS	U.S. Forest Service

1 INTRODUCTION

The Niblack Exploration Project is a copper-gold-zinc-silver prospect located off Moira Sound on southeastern Prince of Wales Island, approximately 30 miles southwest of the town of Ketchikan, Alaska (Figure 1-1). The project is limited to development within Patented Claim holdings, with the exception of the tideland lease area managed by the Alaska Department of Natural Resources (ADNR). Niblack Project LLC (NPLLC) is the sole owner and operator of the property. The Niblack Project operates under the Alaska Department of Environmental Conservation (ADEC) Waste Management Permit 2006-DB0037 (the Permit). The Permit covers both the disposal of non-domestic wastewater and the management and disposal of solid waste material associated with project development activities, exploration drift dewatering, and underground drilling.

This report describes the Niblack Exploration Project construction and underground project activities conducted since active exploration began at the site in September 2007. Underground construction and excavation of the drift commenced on September 21, 2007 and was completed on July 12, 2008. At the end of drift construction, drift length totaled 3,288 ft, and produced approximately 6,000 yd^3 of potentially acid-generating (PAG) and 33,000 yd^3 of non-acid-generating (NAG) waste rock. At this time no additional drift excavation is planned; however, operational plans based on the full proposed drift length of 6,000 ft are discussed here to allow for possible future expansion of project activities.

This report updates the Underground Exploration Plan of Operations (NMC 2007b), which was an update of the Underground Exploration Plan of Operations, Rev 0 submitted June, 2006, and later revised December 15, 2006. The original 2006 report was prepared by Knight Piésold Consulting on behalf of Niblack Mining Corporation (NMC). The second report, prepared by NMC in 2007, included revisions recommended by ADNR and ADEC. Changes to the Underground Exploration Plan of Operations (NMC 2007b) presented in this 2012 Post-Construction Update include:

- Presentation of waste rock volumes produced during underground construction completed to date
- Incorporation of as-built facility drawings
- Updates to the water quality monitoring program
- Updates to the reclamation and closure plans and bond estimate.

Additional plans and documents referred to herein include the following:

- Reclamation and Closure Plan 2012 Post-Construction Update (Integral 2012a)
- Reclamation and Closure Plan (RTR 2007b)

- Stormwater Pollution Prevention Plan (SWPPP; RTR 2006)
- Quality Assurance Project Plan (QAPP; Integral 2007)
- Operational Characterization Plan (Knight Piésold 2007a)
- Niblack Wastewater Treatment and Disposal Application 2012 Post-Construction Update (Integral 2012b)
- Niblack Wastewater Treatment and Disposal Application under the Waste Management Permit (RTR 2007a)
- Niblack Industrial Waste Monofill Solid Waste Permit Application (NPLLC 2012a)
- Niblack Industrial Solid Waste Landfill Application under the Waste Management Permit (NMC 2007a).

Table 1-1 summarizes permits, notices, and approvals relevant to the Niblack Project.

Sampling and analysis of groundwater and surface water are performed as required by the Permit, and as described in the Niblack Water Quality Monitoring Plan 2012 Post-Construction Update (Integral 2012c). Water quality monitoring results are reported quarterly to ADEC, as well as in annual reports (e.g., Integral 2012d), which are comprehensive summaries of current and historical water quality.

Surface drilling activities operate under the Plan of Operation for Mineral Exploration (NPLLC 2012b) prepared in support of the Annual Placer Mining Application and are not discussed in detail here.

2 SITE OVERVIEW

The Niblack property is located approximately 30 miles southwest of the town of Ketchikan in the mouth of Moira Sound, Prince of Wales Island (Figure 1-1). The property is composed of 17 patented claims, 298 staked federal lode claims, and 7 Alaska State tideland claims. The claims are shown on Figure 2-1 and listed in Table 2-1. The claims are within Township 78 South, Range 88 East, Copper River Meridian, Sections 27, 28, 29, 32, 33, 34 and 35; and Township 79 South, Range 88 East, Copper River Meridian, Sections 1, 2, 3 and 4, Ketchikan Recording District, Alaska. All claims are owned 100 percent by NPLLC. The camp sits at the head of the anchorage above a small tidal flat. The property is accessed by float plane, boat, or helicopter. Site facilities are shown on Figure 2-2 (site overview) and Figure 2-3 (site detail). Figure 2-4 outlines the exploration drift construction.

2.1 CLIMATE

Climatic conditions are typical of the Alaska Panhandle region with warm summers and relatively wet, cool winters. Temperatures are moderate and rainfall is high. Typical temperatures for the region average 45.6°F and range from 28°F to 65°F (Table 2-2). Figure 2-5 presents the long-term average regional temperatures and precipitation. Figure 2-6 shows temperature and precipitation measured at the Niblack site from 2008 to 2011. Total precipitation averages 138 in. annually, and is generally greatest from September through February (Integral 2012d). Because of the mild temperatures, most precipitation falls as rain, with less than 40 in. of annual snowfall on average. Air temperature and precipitation measured at the Niblack Project site and at Ketchikan Airport are presented in the annual reports (e.g., Integral 2012d). Snow cover can be heavy at higher elevations. The area encompassed by the claims is covered by temperate rainforest at lower elevations, giving way to sparse sub-alpine vegetation at the highest elevations.

2.2 TOPOGRAPHY

The terrain is mountainous and rugged, with steep to moderate slopes. Elevations range from sea level to peaks of 2,600 ft and greater. The underground exploration drift is constructed at the 380-ft level within Lookout Mountain, which has an elevation of 2,300 ft. The slopes are covered with temperate rain forest that gives way to sparse vegetation only at the highest elevations, generally 1,800 ft and above. In the lower elevations of the Project area much of the land surface is occupied by wetlands that are classified as saturated needleleaf forest wetlands and saturated needleleaf forest/broadleaf scrub-shrub mix wetlands. Wetlands and surface hydrology features are shown on Figure 2-2.

2.3 REGIONAL GEOLOGY AND LITHOGRAPHY

The Project area is underlain by a bimodal sequence of volcanic flows and volcaniclastic rocks that have undergone regional greenschist facies metamorphism. Zircon U-Pb age dating of a quartz crystal rhyolite places the age of the rock units at 595 million years. The sequence has undergone three episodes of folding. Hydrothermal alteration has been documented visually and chemically, as has gossan development. Stratabound massive sulfide mineralization is found dominantly within the felsic rocks. Gossanous gold-rich material is present in spatial association with the massive sulfide.

For the purposes of discussing stratigraphy and accounting for facies changes, the property is divided into four geographic areas of which the latter three correspond to areas of mineralization: Wascal, Dama, Lookout, and Niblack Mine. The lithogeochemical study that has been used in concert with hand sample and thin section observations to determine stratigraphy is an ongoing process. The problems of recognizing primary lithologies through the veil of hydrothermal alteration have been addressed, and identifying stratigraphic units is still challenging in some places. Recognition of volcanogenic massive sulfide (VMS)-related alteration facies (both mineralogical and chemical) that may cross-cut stratigraphy is also a continuing process. Over 1,500 rock and core samples have been analyzed for trace and major elements. Lithogeochemical statistical analyses of data will likely continue to take place.

Within the Project area, there are seven stratigraphic units on the property. From oldest to youngest they are classified as:

- Sediments
- Mafic Flows and Sediments
- Aphyric Felsic Flow/Intrusive
- Quartz-Feldspar Porphyry Rhyolite
- Rhyolite Flows
- Rhyolite Volcaniclastics
- Pillowed Mafic Flows and Tuffs.

The thickness of the units varies due to facies changes and structural complications. As well, six distinct mafic dykes have been identified.

Within the Lookout area, stratigraphy comprises three main units: the Footwall unit, the Hanging Wall unit, and the Lookout unit. Alteration is common in both the Lookout and Footwall units, whereas the Hanging Wall unit is generally unaltered. The Footwall unit consists of three dominant rock types: andesitic laminated sediments; massive rhyolite and magnetic mafic flows; and amygdaloidal flows. The Lookout unit, which contains the

mineralization, consists of two rock types: crystalline rhyolite tuffs, and massive polylithic breccias and flows. The Hanging Wall unit is composed of mafic flows and andesitic laminated sediments. Lookout zone drilling has been located on an overturned limb of a property scale fold structure. Within this area, the stratigraphic footwall becomes the structural footwall to mineralization.

The Niblack prospect has the reputation of being highly deformed, and thus is interpreted to have complex and disrupted geology. Nevertheless, a structural model has been developed for the Project area that has proved successful in predicting geology at depth and defining additional zones of mineralization. The bimodal sequence of volcanics has been folded into large scale broad moderately recumbent folds (F1), with an associated S1 schistosity. These F1 folds are overprinted by small 1- to 2-ft scale drag/isoclinal folds (F2) of unclear distribution. Local small scale F3 folds have also been observed. These episodes of folding are thought to influence ore distribution to varying degrees. L1 lineations have been observed in the form of elongate clasts or grains but are not aligned with the F1 fold axis direction. Late brittle deformation is in evidence in the form of a few property-scale faults of unclear offset. These have been mapped as the Niblack Fault, the Conundrum Fault, the Blue Belle Fault and the Dama "Baseline" Fault.

Composition and style of mineralization at the Niblack Project area is relatively consistent with that of classical VMS deposits. Three general styles of mineralization are present:

- Massive and locally banded Cu-rich +/- Zn-rich
- Interstitial/matrix Zn-rich +/- Cu-rich
- Limonitic Au-Ag rich.

Lead is uncommon, but generally restricted to the interstitial style. Gold and silver are ubiquitous within the aforementioned types of mineralization.

Manganese alteration associated with jasper-chert-magnetite has been thought to be a stratigraphic equivalent to the VMS-bearing exhalitive horizon, thus the distribution of manganese alteration (piedmontite) is used as an exploration tool. Areas of strong quartz-sericite alteration are also considered to be indicators of proximity to mineralization.

Gold-rich VMS mineralization is currently known to be present in four areas of the Niblack Project area: Dama, Lookout, Lindsy/88 and Niblack Mine. Massive pyritic VMS mineralization has also been found at other areas on surface.

Sulfides are in steeply dipping lenses at Dama, Lookout and the historic Niblack Mine area. Plunge direction is variable and may be shallow to 45°. Lens dimensions are best understood at Lookout, where maximum strike length is 1,600 ft and dip extent is 800 ft, open down plunge and down dip.

2.3.1 Seismicity

The USGS seismic hazard map shows relatively low seismic risk for the Niblack Project area (USGS 2012; http://earthquake.usgs.gov/earthquakes/states/alaska/hazards.php). A geotechnical analysis of the areas used as the temporary PAG and NAG waste rock disposal areas was presented in Appendix A of the original Niblack Solid Waste Landfill Application under the Waste Management Permit (NMC 2007a). The geotechnical evaluation/seismic study showed that the waste rock storage facilities are stable.

The following summary of seismicity was included in the Niblack Wastewater Treatment and Disposal Application submitted in 2007 (RTR 2007a).

> The seismotectonic setting of southeastern Alaska is influenced directly by the interaction between the Pacific and North American plates. Stresses in the crust derived from movement of the plates are accommodated by a series of faults and fault systems. Several major active faults in southern Alaska have generated large crustal earthquakes within the last century. The most likely sources for an earthquake significant to the project site are the Fairweather-Queen Charlotte fault and the Chatham Strait Fault. These faults are both located approximately 90 miles west of the project site. There are no active faults in the project area. The Fairweather-Queen Charlotte fault system is capable of generating large earthquakes of approximately magnitude 8.0-8.3. There is potential for earthquakes of up to approximately magnitude 7.0 occurring along the Chatham Strait Fault. These fault systems present the greatest earthquake hazard to southeast Alaska. A map of active earthquakes in Alaska is available at http://www.aeic.alaska.edu/html_docs/pdf_files/earthquakes_in_Alaska.pg.pdf - Earthquakes in Alaska: Haeussler, P.J and Plafker, 2004, US Geological Survey publication.

2.4 WATER RESOURCES

The Project is located along the bottom and lower slopes of a small, steep-sided watershed that drains directly into Niblack Anchorage. Four perennial streams referred to as Waterfall Creek, Camp Creek, Unnamed Creek 1, and Unnamed Creek 2 flow through the Project area, as shown on Figure 2-7. Many small intermittent drainages, swales, and rivulets flow through the area and eventually feed into these streams, or directly into Niblack Anchorage.

Groundwater in the Project area is present in two domains: 1) low-residence time, near-surface, colluvial groundwater at 10–30 ft and 2) deeper, longer residence time groundwater at approximately 30 ft. Data from road cuts, groundwater wells, existing exploration drill holes, and soil borings from wetland delineation work appear to indicate or suggest channelized or

conduit-like, highly variable flow in colluvial groundwater, which is directly related to precipitation (RTR 2007a).

A wetlands delineation survey was conducted in March 2006. Of the 83 acres surveyed, approximately 7.4 acres were classified as wetlands. These areas are shown in Figure 2-3. The survey also found that both hydric and non-hydric soil conditions exist in the area. Non-hydric soils have a shallow to moderately deep (3–7 in.) organic horizon overlying mineral soils. Specific characteristics of the site soils and wetland vegetation are presented in the Preliminary Jurisdictional Wetlands Delineation (HDR Alaska 2006).

As stated in the Niblack Waste Management Permit (2006-DB0037), Section 1.13, ADEC has determined that natural water quality in surface water and groundwater at the Niblack site exceeds water quality standards. For this reason, site-specific natural condition-based water quality criteria have been established for the Niblack Project, as discussed in Section 5.1.

2.4.1 Surface Hydrology

Stream stage data for the Niblack Project are recorded via a pressure transducer and an automatic datalogger hydrology station that was established in August 2006 in Camp Creek, just upstream from station WQ6 (Figure 2-7). Automated stage data are available for a 2-year period from August 2006 through August 2008 and for a 7-month period from June through December 2011. Manual stream flow and discharge estimates were collected from August 2007 through May 2008. Due to various uncertainties with the pressure transducer data, a reliable stage – discharge rating curve could not be developed. As a result, a continuous record of flow in Camp Creek is not available at this time. Discharge estimates, based on the 14 manual measurements (multiple measurements collected at the same time were averaged) indicate that Camp Creek flows ranged from 0.5 to 48.6 cubic feet per second when the measurements were made (Table 2-3).

For comparison, average, maximum, and minimum flows for nearby streams are presented in Table 2-4. Although flow conditions vary from watershed to watershed, flows from nearby streams give some indication of regional hydrology over a long period of record.

2.5 PROJECT AREA HISTORY

The Niblack area has been explored for minerals since the initial copper discovery at Niblack Anchorage in 1899. The Project area was first developed in 1902-3 by the Wakefield Mineral Lands Company and in 1904 was leased by the Niblack Copper Company. Available records show that the mine shipped ore from 1905 through 1908, producing just over 30,000 tons, grading about 3.2% copper, 0.04 oz/t gold and 0.68 oz/t silver, as shown on Table 2-5.

Previous site owner and operator NMC obtained documents that purport to contain production records for the Niblack Mine. Among these is an undated one-page letter on the letterhead of the "Trustees Estate of George M. Wakefield", 746 Wells Building, Milwaukee, Wisconsin. Table 2-5 summarizes the data contained in the Wakefield letter. The grades quoted have been calculated from tonnages shipped and total metal reported. It is not known with certainty whether these totals are based on assayed heads or represent recovered metal, but appear to be the former.

The historic Niblack Mine was developed on five levels to a depth of about 230 ft below sea level, with access by a now collapsed shaft inclined at 70° to the south, located in the present camp yard. Mine plans show that ore was won from lenses dipping south at approximately 70° and varying in thickness from 2 to 30 ft. In late 1908, litigation between the Niblack Copper Company and Wakefield Mineral Lands Company caused closure of the mine. Several exploration adits were driven in the general area, at unspecified dates. Most are very short and some are still accessible for mapping and sampling.

In the period of 1974 to 1976, Cominco American Incorporated (Cominco) optioned the patented claims from Wakefield, and staked an additional 33 mining claims. Work consisted of line cutting, geological mapping, soil sampling, and geophysical surveys. Six diamond drill holes totaling 2,893 ft were completed in the area of the Niblack Mine. Three holes intersected short intervals of copper mineralization, but the results of the overall program were not encouraging. Therefore, Cominco withdrew from the project and allowed the option to lapse.

In 1977, the Anaconda Company (later Anaconda Minerals Company [Anaconda]) staked 118 claims, acquired the patented claims from Wakefield, and carried out line cutting, geology, and geochemistry studies. Gold-bearing limonitic mineralization was discovered on surface at Lookout Mountain, at the "Anaconda Pit." One diamond drill hole (LO-01) extended for 1,132 ft, remaining in hanging wall strata throughout its entire length.

In 1982, Noranda Exploration Incorporated (Noranda) optioned the property, with the underlying obligations, from Anaconda, who retained a 15% net profits interest. This net profits interest was later acquired and is retained by Cook Inlet. Noranda entered into a joint venture with Occidental Minerals Corporation (Occidental), whose interest was subsequently acquired by Nerco Minerals Company, to be held by its subsidiary, NERCO Metals Inc. and thence by Pacific Northwest Resources (PNR). Noranda conducted geological mapping and geophysical surveys, and diamond-drilled 18 holes in the Lookout Mountain area.

In 1984, Lac Minerals (USA) Incorporated (Lac) entered into a joint venture with Noranda and at the same time acquired the PNR interests. Over the next six years, work consisted of detailed geological mapping, soil geochemical sampling, and two electromagnetic surveys. From 1984 to 1989, Lac completed 20 diamond drill holes. The property was then held on care and maintenance until the 1992 field season.

Lac resumed work in 1992, initially focusing on re-logging of drill core, extensive rock sampling for a lithogeochemical study, detailed structural geology studies, and various ground and airborne geophysical surveys, including electromagnetic, magnetics, induced polarization and radiometrics. A further 15 diamond drill holes were completed in 1992 and 1993. In late 1994, Lac was acquired and retained as a subsidiary by Barrick Gold Corporation.

In early 1995, Abacus Mining and Exploration Corp. acquired the rights (and obligations) in the Niblack Project area from Lac and Noranda in return for cash, shares and share purchase options, and provision for payment of a Net Smelter Return Royalty to Lac. Details of the arrangements are available from Niblack Mining Corp. and the Company's counsel. Teck-Cominco (formerly Teck Corporation) owned a "back-in" option on the Niblack property that was gained through a financing agreement with Abacus. The agreement grants Teck-Cominco the right to back in to a 51 percent participating position on the property. This back-in right would involve, upon receipt of a positive pre-feasibility study from NMC, Teck-Cominco financing a formal feasibility study and, if warranted, putting a mine into production.

Abacus explored the Niblack property between 1995 and 1997. Work included compilation of existing data, an extensive line-cutting program, soil geochemical sampling, geophysical surveys, trenching in the area of the old Niblack Mine, prospecting and geological mapping, and structural geology studies.

In 1996, Abacus purchased the PNR interest for a combination of cash and shares. As part of the original arrangement with Lac and Noranda, Abacus acquired a 38% interest in two centrally located patented claims (the "Trio and Broadgauge claims"). In May and June of 1997, the Company entered into agreements to acquire the rights of six parties owning the residual 62% interest in these claims, for a combination of cash and shares. The completion of the agreement is subject to a final US$10,000 payment. This will give Abacus (NMC) full control of the Trio and Broadgauge claims and thus of the entire Niblack property, subject to the various obligations and third party rights as outlined above.

In 2005, NMC acquired the rights (and obligations) in the Niblack property through a Plan of Arrangement with Abacus. Since acquisition, NMC has performed extensive review and reinterpretation of existing data, and completed seven diamond drill holes, totaling 6,200 ft. In 2006, NMC acquired an option to terminate the Teck-Cominco's 51 percent back-in right for shares and warrants, and the issuance of stock on commercial production. Exploration on the property included 32 drill holes totaling 27,400 ft. In addition, 5,000 ft of road workings were completed to facilitate the proposed underground program.

NMC was acquired as the principal asset of Abacus Alaska Inc. by Committee Bay Resources Ltd. on October 1, 2008, which subsequently underwent a corporate name change to CBR Gold Corporation (CBG). NPLLC acquired 100 percent ownership interest in the Niblack Exploration Project in early 2012. Table 2-6 summarizes drilling conducted from 1975 to the end of 2011.

3 SUMMARY OF SITE ACTIVITIES

This section summarizes construction activities conducted since the Niblack Exploration Project was initiated on September 21, 2007. The current phase of underground construction and excavation commenced on September 21, 2007 and was completed on July 12, 2008. Placement of NAG material at construction sites was completed shortly thereafter, as was the loading of the temporary PAG waste rock storage facility, completed in spring 2008. Construction of the sediment ponds, and piping from the adit portal to the ponds was complete prior to commencement of excavation activity in 2007. Land application of effluent water from the settling ponds began in October 2007. Site facilities are shown on Figure 2-2 (site overview) and Figure 2-3 (site detail). Figure 2-4 outlines the exploration drift construction.

No additional expansion of the underground workings, or associated production of waste rock, is anticipated at this time. However, if future expansion does occur, the site design plans presented in the Niblack Solid Waste Landfill Application under the Waste Management Permit (NMC 2007a) and the Underground Exploration Plan of Operations (NMC 2007b) will be followed.

3.1 SURFACE FEATURES

The total surface area cleared or disturbed at the Project site is 13.5 acres. This total includes access roads and an existing land camp site constructed prior to 2007. Photographs of site facilities are presented in Appendix A.

Surface features are shown on the site-wide as-built maps (Figures 2-2 and 2-3) and include the following:

- Access roads
- Ditches, culverts, and settling basins/sediment traps for stormwater management
- Construction of laydown areas for equipment/supply storage, including a fuel storage facility, magazine sites (currently decommissioned), portal area, shop area (old camp)
- Settling ponds and land application/dispersion (LAD) water discharge system
- Barge landing and dock facilities
- Surface drilling landing
- Temporary PAG waste rock storage facility
- Temporary mineralized ore stockpile
- NAG waste disposal area

- Topsoil and growth media stockpiles.

3.1.1 Waste Rock Excavation and Storage

The total underground development consists of 2,772 linear ft on the main access drift, 372 ft of short cross-cuts and utility bays, and 144 ft for two sumps, one near the portal and the other near the end of the drift (Figure 2-4). The total volume excavated during the access drift construction period (2007 through 2008) was approximately 66,150 tons (39,300 yd^3).

The Niblack exploration drift totals 3,288 linear ft (main drift plus cross-cuts and sumps) and was constructed with a total of 286 blast rounds. Of this total, 43 rounds constituting 495 linear ft of drifting (approximately 9,960 tons or 5,920 yd^3) were determined to consist of PAG materials, the majority of which (26 rounds for 299 linear ft) consisted of sulfide mineralization within the Lookout Rhyolite, and related footwall alteration, at the end of the drift. The first four rounds excavated from the Lookout Rhyolite (48 linear ft of the drift representing approximately 965 tons or 574 yd^3 of material) consisted of well-mineralized rock and was set aside for future test work. This material is stored in the covered and lined temporary mineralized ore stockpile (Figure 3-1). The remainder of the PAG material (approximately 8,995 tons or 5,346 yd^3 of material) was placed on the temporary PAG storage site. NAG waste rock, dominated by mafic volcanic rocks and mafic dykes, totaled 2,793 linear ft of the total excavation and represented some 56,200 tons, or 33,400 yd^3 of material. All NAG waste rock has been used in construction activities, including the laydown areas expansion, the NAG site access roads and berms, the base for the temporary PAG storage facility, and road maintenance. Material from the lower NAG haul road (placed in 2008) has been, and will continue to be, sorted through a 6-in. grizzly to create small fines stockpile (Figure 2-2) that is used for road maintenance on an as-needed basis.

Table 3-1 summarizes the waste rock volumes produced during construction of the initial 3,288 ft of adit excavation. Table 3-2 presents the estimate of the total amount of PAG material anticipated if the underground workings were developed to the full design extent of 6,000 ft. Table 3-3 presents the same information for NAG material. The estimates in Tables 3-2 and 3-3 are reproduced from Table 1 of the Niblack Project Operational Characterization Plan (Knight Piésold 2007a).

The temporary PAG waste rock storage site (Figure 2-2) was constructed on a foundation of crushed rock overlain by a 6-in. layer of compacted sand, and lined with 80-mil high-density polyethylene (HDPE) (geo-membrane) between two layers of geotextile fabric. The liner system was overlain by another 6-in. layer of compacted sand as a service layer. Waste rock storage size designs, assumptions, and operating considerations are described in the Geotechnical Summary of Niblack Project Waste Rock Dumps (NMC 2007a, Appendix A). The PAG temporary storage facility is built on a cut platform and the full base liner is sloped to collect and convey all PAG runoff and leachate to the PAG collection pond, as shown on Figure 3-1.

Figure 3-2 details the engineered liner construction at the PAG site; Detail B of this figure shows how runoff captured on the PAG liner flows to the PAG pond. Quality assurance tests were conducted during the liner installation, generally following the installation QA/QC plan outlined in NMC 2007a, Appendix C.

The PAG pile is uncovered to allow for larger-scale kinetic testing to monitor waste rock weathering. A waiver of the intermediate cover requirement (18 AAC 60.243) under the Niblack Waste Management Permit (2006-DB0037) was granted by ADEC on January 26, 2009 (Buteyn 2009, pers. comm.). The leachate and runoff water captured in the PAG pond is monitored on a weekly basis, and monthly PAG monitoring reports are submitted to ADEC.

During drift construction, 574 yd^3 of well-mineralized PAG material was stockpiled for future geochemical test work and processing (Figure 2-2). This material is stored in a temporary, lined and covered stockpile adjacent to the PAG temporary storage facility. The pile is covered with 80-mil HDPE geomembrane so as to prevent any introduction of surface water onto the pile. If the mineralized ore stockpile is not removed from the site for processing, it will be hauled back underground with the PAG materials and the stockpile site will be reclaimed.

All of the NAG material removed during underground excavation was utilized in the construction of site roads and facilities. A portion of this material, originally placed on the lower NAG haul road, has been sorted and stored in a small fines stockpile (Figure 2-2) that is used for road maintenance. If additional underground development occurs, NAG waste will be utilized onsite and/or placed in the NAG disposal area, following the design plans presented in the Niblack Solid Waste Landfill Application under the Waste Management Permit (NMC 2007a) and the Underground Exploration Plan of Operations (NMC 2007b).

3.1.2 Waste Rock Characterization

A geochemical characterization program was conducted during drift excavation in order to determine the potential for the rock comprising each blast round to be potentially acid generating or metals leaching. PAG and NAG materials were segregated as described in the Niblack Project Operational Characterization Plan (Knight Piésold 2007a) and 2008 agreement with ADNR (McGroarty 2008, pers. Comm.). The following criteria were followed for separating PAG and NAG materials:

- PAG rock: total sulfur equal to or greater than 0.4 percent[1], ratio of acid neutralizing potential to acid generating potential (ANP:AGP) equal to or less than 3, and/or visible zinc or copper sulfide minerals present in the waste rock

[1] The original total sulfur cut-off value for segregation of PAG and NAG materials specified in the Niblack Operational Characterization Plan was 0.22 percent. In 2008, ADNR agreed to increase the total sulfur cut-off value to 0.4 percent for the Hanging Wall Unit and associated mafic dykes (McGroarty 2008, pers. Comm.).

- NAG rock: total sulfur less than 0.4 percent, ANP:AGP greater than 3

Segregation of PAG versus NAG waste rock was determined by onsite analysis of samples of blast-hole drill cuttings collected from each round of development rock for total sulfur and pH following oxidation with hydrogen peroxide. Additional waste rock characterization conducted during drift construction included acid/base accounting and total metals analysis. Analytical results are included within a master acid base accounting geochemical database, which has not changed following completion of the current phase of excavation in 2008. The database is included in the appendices of the 2007, 2008, and 2009 Niblack Annual Reports (Integral 2008, 2009, 2010). Based on the quality assurance and quality control verification analyses conducted as part of the geochemical characterization program, the material in the PAG pile averages approximately 1 percent total sulfur, predominately as sulfide-sulfur.

Ongoing monitoring of waste rock weathering is described in Section 4.3.1 and in the Niblack Water Quality Monitoring Plan 2012 Post-Construction Update (Integral 2012c).

3.1.3 Water Management Features

Figure 2-7 presents streams, surface water bodies, and water quality monitoring stations. Stormwater and surface water control features, including diversion ditches at the PAG and NAG areas, the PAG runoff capture pond, the settling/treatment ponds, and sediment traps adjacent to the access road, are shown on Figures 2-2, 2-3, 3-1, and 3-2. The PAG temporary storage facility was designed to route all run-on around the facility. PAG facility runoff and leachate are routed to the PAG pond, and then piped to the site settling/treatment ponds. The settling ponds also receive underground water from the exploration drift, which is piped from the adit portal. If necessary, water may be pumped from the first pond through a water-treatment chemical mixing tank, which can be used to increase pH and reduce trace element concentrations through lime addition and flocculation. The second pond allows for additional precipitation and settling of trace elements. From the settling ponds, water is routed to the LAD system, where it is discharged through a network of low-flow emitters for infiltration into site soils and final polishing.

The water management and treatment systems are shown by facility in Figure 3-3 and summarized in the general site flow chart on Figure 3-4. To date, low concentrations of trace elements in effluent water and passive treatment through settling and natural soil attenuation have controlled effluent water quality, and chemical water treatment has not been necessary. The water treatment plant was tested for effectiveness in September 2009 and is ready to begin the treatment of mine wastewater should the need arise. Regular surface water and groundwater quality monitoring is conducted, as described in the Water Quality Monitoring Plan 2012 Post-Construction Update (Integral 2012c). Water quality monitoring results are summarized in quarterly and annual reports; e.g., the Niblack Exploration Project 2011 Annual Report (Integral 2012d) submitted to ADEC on March 30, 2012.

3.2 EXPLORATION DRILLING

Overall, a total of over 300 core boreholes have been drilled on the Niblack Project area between 1975 and late 2011, for a total of over 300,000 ft. NPLLC has drilled approximately 183,727 ft in 146 holes (136 underground and 10 surface) since 2009. Table 2-6 summarizes drilling conducted at the Niblack site from 1975 to 2011. Historical drilling is described in more detail in Section 2.5.

In May and June 2011, a helicopter-supported surface drill rig was added to the Niblack exploration program to test exploration targets in the area of Lookout Mountain and the historic Niblack Mine. Surface drilling and associated reclamation activities were and will continue to be conducted as described in the Plan of Operation for Mineral Exploration at the Niblack Project (NPLLC 2012b). The four areas of surface drilling are shown as black circles and lines in Figure 3-5. Seven surface holes totaling approximately 5,000 ft were drilled. Surface disturbance in 2011 was approximately 0.1 acre, including all drill sites and helicopter landing zones. The majority of surface drilling activity in 2011 took place on patented claims; nevertheless, these sites were reclaimed according to the standards for state or federal land. One location was inside the boundaries of the Tongass National Forest; the drill pad was only partially completed and no drilling activity took place before the end of the program.

3.3 RECLAMATION

Construction reclamation and interim reclamation activities have been conducted at the site in accordance with the Niblack Project Reclamation and Closure Plan (RTR 2007b). Post-closure reclamation and monitoring are discussed in detail in the Niblack Reclamation and Closure Plan 2012 Post-Construction Update (Integral 2012a).

3.3.1 Construction Reclamation

Construction reclamation activities are those activities that occur during and directly after the exploration tunnel and associated facilities are constructed. This phase of reclamation involves the removal and storage of topsoil and growth media from disturbed areas. During construction, vegetation was cleared from the surfaces that were developed, primarily from the PAG and water treatment facility. Topsoil and soil-like growth media were removed where possible and stockpiled for reclamation. Stockpiles are located along the outer edge of access roads and laydown areas (Figure 2-3). Following the construction of the majority of the site facilities and access roads in 2007, there have been only minor construction reclamation activities. This was limited to the completion of the NAG site, which consisted of the felling of trees and construction of access roads, run-on diversion ditches, and berms. Concurrent reclamation of the lower NAG haul road included placement of topsoil along the lower side of the road and berm.

3.3.2 Interim Reclamation

Interim reclamation is defined as temporary measures for reducing the potential for erosion and sedimentation, and other activities required to protect surface water and groundwater resources. Interim reclamation has been undertaken to stabilize road cuts, stockpiles, and other disturbances resulting from construction activities. Interim reclamation measures completed in 2009 included seeding over road cuts, installing and maintaining sedimentation control systems, and employing other best management practices (BMPs) commonly used for construction and exploration projects.

3.3.3 Surface Drilling Reclamation

The majority of surface drilling activity took place on patented claims; nevertheless, these sites were reclaimed according to the standards for state or federal land. The final location of the season was inside the boundaries of the Tongass National Forest. Drill pad construction began at this station before the end of the 2011 drill season, but no drilling activity occurred. The drill pad was left as-is and in place as Niblack plans to resume surface operations in 2012 at this location. All areas disturbed during the course of the surface activities were restored to the extent possible, and reasonable measures were taken to prevent and undo unnecessary degradation. Any areas leveled to assist in drill pad construction were rebuilt to approximate topography before drilling operations. Where possible, felled trees were used in pad construction and all trees were bucked, limbed, and laid flat on the ground during reclamation activities.

3.4 PLANNED FUTURE ACTIVITIES

Upcoming Project plans include work to support the completion of a Preliminary Economic Assessment, advancement of geotechnical studies, and additional metallurgical test work for a prefeasibility study. NPLLC will also continue the surface drilling exploration program.

4 UNDERGROUND EXPLORATION PROGRAM OPERATIONS

This section summarizes the Niblack Exploration Project facilities, management systems, and operational procedures. The information presented herein is unchanged from the 2007 Plan of Operations, except where otherwise noted. Site activities, constructed facilities, and waste rock produced to date are described in detail in Section 3. From 2007 to 2008, the underground exploration drift was developed to approximately 3,000 ft, site construction was completed, and waste rock materials were deposited at the PAG temporary storage area. No expansion of the exploration drift or associated generation of waste rock material is currently anticipated; however, if future exploration-related expansion does occur, the original site design plans presented in the Niblack Solid Waste Landfill Application under the Waste Management Permit (NMC 2007a) and the Reclamation and Closure Plan for the Niblack Underground Exploration Project (RTR 2007b) will guide construction activities.

Proposed facility design drawings and supporting information were presented in the original Niblack Solid Waste Landfill Application under the Waste Management Permit (NMC 2007a) and the Reclamation and Closure Plan for the Niblack Underground Exploration Project (RTR 2007b). The design plans provide useful context for the post-construction layout of site facilities. In Appendix B, Figures B-1 (general site plan overview) and B-2 (site plan detail) present the as-built facility drawings, superimposed over the original proposed designs for comparison. Figure B-3 is a conceptual diagram of post-construction water flow paths for the site. The original design drawings are reproduced as Figures B-4 through B-10 in Appendix B of this plan of operations. During site construction, deviations from design proposals were minimal. The following summarizes changes from the original proposals:

- The drift length excavated during the 2007–2008 construction period totals approximately 3,300 ft, including cross-cuts and sumps. Original designs anticipated a total drift length of approximately 6,000 ft.
- Based on the original proposals and geochemical analyses, approximately 14,300 yd^3 of PAG material and 46,600 yd^3 of NAG material were anticipated to be produced during drift excavation. During drift construction, 5,900 yd^3 of PAG material and mineralized ore and 33,400 yd^3 of NAG material were produced. No additional waste rock material is expected at this time.
- Limited NAG material stored in NAG disposal area – All NAG waste rock has been used in construction activities. Material from the lower NAG haul road (placed in 2008) has been, and will continue to be, sorted through a 6-in. grizzly to create a small fines stockpile that is stored in the NAG disposal area (Figure 2-2). .
- Addition of ore stockpile – During drift construction, 574 yd^3 of well-mineralized material was stockpiled for future geochemical test work and processing. This material

is stored in a temporary lined and covered stockpile adjacent to the PAG temporary storage facility (Figure 2-2). If the ore stockpile remains at the time of site closure, it will be hauled back underground with the PAG materials and the stockpile site will be reclaimed.

- PAG pile uncovered – A waiver of the intermediate cover requirement (18 AAC 60.243) under the Niblack Waste Management Permit (2006-DB0037) was granted by ADEC on January 26, 2009. In January 2009, former site owners Committee Bay Resources requested approval to leave the pile uncovered for large-scale kinetic testing (Kleespies 2009, pers. comm.). The leachate and runoff water captured in the PAG pond is monitored on a weekly basis, and monthly PAG monitoring reports are submitted to ADEC. The PAG effluent is entirely captured and controlled through the liner and PAG pond system. A cover will be placed on the PAG pile if required due to a change in the chemistry of the PAG effluent or at the request of ADEC or ADNR.
- No flocculent or lime addition – Original design plans allowed for addition of flocculent at the underground adit sumps to promote settling of solids prior to routing water out of the access drift. Additionally, a water treatment system was constructed at the settling ponds. If necessary, water may be pumped from the first pond through a water-treatment chemical mixing tank, which can be used to increase pH and reduce trace element concentrations through lime addition and flocculation. The second pond allows for additional precipitation and settling of trace elements. From the settling ponds, water is routed to the LAD system, where it is discharged through a network of low-flow emitters for infiltration into site soils and final polishing via natural attenuation in site soils. To date, low concentrations of trace elements in effluent water and passive treatment through settling and natural soil attenuation have controlled effluent water quality and chemical water treatment has not been necessary. Regular surface water and groundwater quality monitoring is conducted, as described in the Niblack Water Quality Baseline and Site Monitoring Plan (Knight Piésold 2007b). Water quality monitoring results are summarized in quarterly and annual reports; e.g., the Niblack Exploration Project 2011 Annual Report (Integral 2012d) submitted to ADEC on March 30, 2012.

NPLLC will conform to all applicable regulations of the Mine Safety and Health Administration, the Alaska Department of Labor's Occupational Safety and Health Section of the Labor Standards and Safety Division, and the Alaska Workers' Compensation Act. Furthermore, the hiring protocols of NPLLC will give preference to Alaskan residents, wherever practical.

4.1 UNDERGROUND ACCESS DRIFT

The entrance to the underground workings is located at the 380-ft elevation on the north slope of Lookout Mountain. An access road connects the portal area to Project facilities and the barge landing, as shown on Figure 2-2.

The underground development totals approximately 3,300 ft, consisting of 2,772 linear ft on the main access drift, 372 ft of short cross-cuts and utility bays, and 144 ft for two sumps, one near the portal and the other near the end of the drift (Figure 2-4). The adit dimensions are approximately 14.5 ft x 13 ft, which is consistent with the proposed design. Original design plans called for 3,090 ft of access drift from which a footwall drift of some 920 ft and a hanging wall drift of 1,140 ft would be driven. Two additional 500 ft-long drifts were planned near the portal, for a total combined 6,150 ft of underground workings. Design drawings are presented in Appendix B for comparison, and to inform future construction if additional excavation were initiated at the site.

Plan and section views of the drift are presented on Figure 2-4. As shown on this figure, the drift was driven at a down dip for approximately 200 ft, at which point a short cross-cut was driven to accommodate the front sump. From the grade break at the front sump, the drift was driven at a +6% grade for approximately 1,800 ft to the second grade break. The drift slopes downward at approximately -9% grade to the end of the drift and rear sump.

The underground development was designed so that the back portion of the main access drift is a decline, and configured to allow for a concrete plug to be installed if the drift is abandoned. Upon closure, the design allows for submersion of PAG waste rock at the back of the main access drift thereby preventing oxidation and mitigating the potential for acid generation. Conceptual reclamation and closure plans are presented in the Niblack Reclamation and Closure Plan 2012 Post-Construction Update (Integral 2012a). A final closure plan including specific designs for PAG storage and the adit plug will be submitted prior to closing the site.

In order for the development to proceed in a safe and efficient manner, remuck stations were driven at approximately 500-ft intervals and safety bays (refuge stations) were installed as per the prevailing safety regulations. The drift is ventilated by forced air fans and flexible ducting.

In the event that operations are temporarily terminated, the drift entrance will be covered to ensure that no person can inadvertently enter the drift. Temporary closure procedures are discussed in more detail in the Niblack Reclamation and Closure Plan 2012 Post-Construction Update (Integral 2012a).

4.2 SURFACE FACILITIES

4.2.1 Access Road

An access road for the site was built between June and October, 2006. Construction of the road, which provides access from tidewater to the portal site and land camp area, was initiated after securing necessary permits. These include Nationwide Permit 14, issued by the U.S. Army Corps of Engineers (File No. OA-2006-511-D), and Fish Habitat Permit (FH-06-VII-0014), which followed onsite inspection of stream crossing locations by a fish habitat specialist. A detailed wetlands survey was commissioned by NMC in February 2006 (HDR Alaska 2006), and a Preliminary Jurisdictional Determination covering the area of proposed development received U.S. Army Corps of Engineers approval on March 31, 2006. No areas of wetland were disturbed during the road construction.

Figure 2-2 presents the layout of the access road. The road is at a gradient of up to 8% with a 16-ft-wide running surface. Total estimated length of the road is approximately 5,000 ft. Where appropriate, culverts were installed where minor drainages occur. Camp Creek is crossed by a single log-stringer style bridge. The road surface consists of blasted rock that was quarried on site. Acid base accounting and multi-element analysis was performed on the quarry rock and it was determined to be NAG material with low metal content (average ratio of neutralization potential to maximum potential acidity [NP:MPA] of 15.84). Aside from the staging area near the foreshore, the road is away from the beach in heavily forested areas. Minimal visual evidence of the road is apparent from Niblack Anchorage. Emphasis was placed on erosion control during access road construction; BMPs are discussed in Section 5.

The type of equipment used for road development consisted of two back-hoes, a single boom tracked mounted drill, and two articulated dump trucks. The excavation was a typical cut and fill operation, where the road was excavated by ripping and the broken material deposited on the open side of the roadway.

4.2.2 Barge and Dock Landing Facilities

A dock and a barge camp were constructed at Niblack Anchorage to accommodate docking of float planes and barges and to house site staff (Figure 2-2). The dock facility was designed to accommodate the 20-ft tide variance and to allow for heavy equipment to be unloaded. The barge landing consists of a bulkhead constructed from concrete blocks and backfill. The dock consists of a float and walkway secured to pilings. The barge landing and dock facility were designed to facilitate minimal disturbance of areas below high tide levels. A staging area constructed above the barge landing facility will accommodate loading and off-loading of supplies and equipment. Additional detail on the barge landing and dock facility are provided in relevant permit and lease applications, including the ADNR Tideland Lease ADL 107544.

An eelgrass survey was conducted in 2007 to map and inventory the distribution of eelgrass within the lower intertidal and offshore areas surrounding the site (HDR Alaska 2007). The survey indicates that eelgrass is absent within the immediate area around the barge and dock landing facilities. To protect important eelgrass habitat in the lower intertidal and offshore areas, propulsion systems will not be used on landing craft, tugs, self-propelled barges or other craft using the barge landing site when tidal stage is less than half (7.6 ft mean lower low water).

Minor supply needs and emergency requirements will be provided by float plane, boat and/or helicopter.

A 24-man barge camp for housing personnel is secured to the dock facility with shore access provided by a walkway (Figure 2-2). The camp includes a wastewater treatment system and drinking water plant. ADNR authorized domestic use of water in the floating camp through agreement TWUP#F2011-118. Core logging, sampling, and preparation are conducted at the historic camp site.

4.2.3 Portal and Ancillary Facilities

The portal excavation was completed to provide both the entrance to the underground and also a level working area of sufficient size to allow for equipment repair shop/lunchroom, diesel generating facilities, ventilation equipment and a laydown area for supplies to ensure efficient operation of the development. Laydown areas located at switchbacks in the road near to the portal provide additional areas for generator and compressor equipment. The generator will power underground equipment, ventilation fans, and auxiliary lighting. Laydown areas will also be available for temporary waste rock staging before routing to the appropriate waste rock storage site.

4.2.4 Fuel Storage

A fuel storage facility is located at the laydown area near the dock as shown on Figure 2-2. Estimated daily fuel consumption for the underground work is 600 gallons of diesel per day. All vehicles, heavy equipment and support generators (camp and water treatment facility) are diesel powered and consume approximately an extra 200 gallons per day. Based on a 14-day delivery schedule and a 7-day safety margin, onsite storage for 21,000 gallons of fuel was constructed. An additional 8,000 gallons (2 each at 4,000 gallons) of fuel may be stored on the barge to supply the on-board generator, which uses approximately 100 gallons per day. An additional 1,000 gallons (maximum) of gasoline may be stored onsite for small pumps, generators and site watercraft. During helicopter-supported activities, a 3,000-gallon tank for Jet A fuel storage is leased from a Ketchikan vendor and placed near the helipad. Only authorized and properly-trained personnel conduct fueling activities, and appropriate

containment structures (sized at 110 percent of the holding capacity) were constructed at the fuel storage and fueling facilities to contain potential spills.

4.2.5 Magazine Locations

A powder magazine was temporarily stored between the PAG facility and the barge landing, at the bottom of the road leading to the portal, during construction. The materials were stored at a distance from camp and portal locations, with every effort made to isolate the magazine using existing topography. Detonating caps were stored within a second magazine at an appropriate separation distance from the main powder magazine. These facilities were removed at the end of construction activity; currently, no explosive material is stored on the Project.

4.3 WASTE ROCK MANAGEMENT

Construction of the Niblack exploration drift and associated waste rock production is discussed in Section 3.1.1. During drift construction, approximately 6,000 yd^3 of PAG material and mineralized ore and 33,000 yd^3 of NAG material was produced. No additional waste rock material is expected at this time; however, site facilities were constructed based on the original proposals for total drift development to approximately 6,000 ft. Table 3-1 summarizes the waste rock volumes produced during construction of the initial 3,300 ft of adit excavation. Tables 3-2 and 3-3 present the estimates of the total amount of PAG and NAG material anticipated if the underground workings were developed to the full design extent of 6,000 ft.

The PAG temporary storage facility, mineralized ore stockpile, and NAG disposal area are described in Section 3.1. Reclamation and closure plans are outlined in the Niblack Reclamation and Closure Plan 2012 Post-Construction Update (Integral 2012a).

4.3.1 Waste Rock Characterization

The purpose of determining the chemical composition of the various stratigraphic units and rock types is to obtain a detailed understanding of the major constituents that make up the rock mass. These studies are also necessary to determine if metals are in sufficient concentrations within the host rock to be of environmental concern, should they be rapidly mobilized and allowed to enter the environment.

The Operational Characterization Plan (Knight Piésold 2007a) guides waste rock management for the Niblack Project. The plan includes details on the methodology used to characterize waste rock (NAG versus PAG) during the underground excavation, as well as details on waste rock segregation, handling, and storage. The waste rock management guidelines were followed during drift excavation, and will continue to be followed for ongoing waste rock handling and storage, and if future drift excavation is conducted.

The waste rock handling plan includes the following:

- Storage location identification for PAG and NAG waste rock facilities
- Waste rock characterization sampling program and segregation guidelines
- Waste rock visual inspection guidelines

During drift excavation, PAG and NAG materials were segregated as described in the Niblack Project Operational Characterization Plan (Knight Piésold 2007a).[2] Segregation of PAG versus NAG waste rock was determined by onsite analysis of sample of blast-hole drill cuttings collected from each round of development rock for total sulfur and pH following oxidation with hydrogen peroxide. Additional waste rock characterization conducted during drift construction included acid/base accounting and total metals analysis.

Analytical results of the waste rock characterization program are included within a master acid base accounting geochemical database which has not changed following completion of the current phase of excavation in 2008. The database is included in the appendices of the 2007, 2008, and 2009 Niblack Annual Reports (Integral 2008, 2009, 2010).

Ongoing monitoring of waste rock weathering is conducted with three field barrel kinetic tests located east of the PAG waste rock pile (Figure 3-1). The barrels are loaded with different sources of PAG rock. Additionally, per agreement with ADEC (Buteyn 2009, pers. comm.), the PAG temporary storage pile is uncovered in order to allow for large, field-scale monitoring and evaluation of the weathering behavior of the PAG material. NPLLC, with support from pHase Geochemistry Inc., presents the results of barrel and PAG pile monitoring in monthly reports to ADEC.

The 2007 Plan of Operations (NMC 2007b) presents geochemical results from analyses performed on samples collected from drill core and surface outcrop of the main geological units (the Footwall unit, the Hanging Wall unit, and the Lookout unit [Figure B-4]) and sub-units.

4.4 WATER MANAGEMENT

The approach to Niblack Exploration Project water management practices is shown with site facilities on Figure 3-3 and as a general flowchart on Figure 3-4. Post-construction handling of wastewater generally follows the plans described in the original Niblack Wastewater Treatment and Disposal Application submitted in 2007 (RTR 2007a), and the original facility designs are reproduced in Appendix B to this application. Additional wastewater management and

[2] In an agreement with ADNR approved on March 6, 2008, the total sulfur cut-off value for the determination of PAG versus NAG material was adjusted from 0.22% to 0.40% for the Hanging Wall Unit and associated Mafic Dykes (McGroarty 2008, pers. comm.).

treatment information is presented in the Niblack Wastewater Treatment and Disposal Application 2012 Post-Construction Update (Integral 2012b).

Two lined settling ponds (Figure 2-2) capture water from the mine portal, the PAG waste rock storage facility, and direct precipitation. From the settling ponds, water is discharged through the LAD system, which is a network of drip irrigation emitters spread over approximately 2.9 acres (Figure 2-2). Water from the settling ponds is routed to different zones of the LAD system, and applied to the land through an array of perforated pipes. Table 4-1 presents settling pond and LAD system inflow volumes for each month since mine exploration began in September 2007. If necessary, water may be pumped from the first pond through a water-treatment chemical mixing tank, which can be used to increase pH and reduce trace element concentrations through lime addition and flocculation.

The original proposed drift excavation wastewater management program was designed to involve a three-step wastewater treatment process that included 1) minimization and pre-treatment underground, 2) settling in a frac tank and treatment in the water treatment facility (additional settling, chemical coagulation/precipitation treatment if necessary), and 3) dispersion through the LAD system and land infiltration for final polishing. The following changes to the original proposals have been adopted:

- Underground flocculent addition and settling in a frac tank have not been initiated
- Chemical water treatment at the settling ponds has not been initiated.

To date, low concentrations of trace elements in effluent water and passive treatment through settling and natural soil attenuation have controlled effluent water quality, and chemical water treatment has not been necessary. The water treatment plant was tested for effectiveness in September 2009 and is ready to begin the treatment of mine wastewater should the need arise.

Water management also involves water quality monitoring at downgradient surface water and groundwater compliance points. The water quality monitoring program is summarized in Section 5.1 below, and outlined in detail in the Niblack Water Quality Monitoring Plan 2012 Post-Construction Update (Integral 2012b). Monitoring locations are presented on Figure 2-7. Data from this monitoring program is evaluated and reported to ADEC in quarterly and annual reports. NPLLC reviews the monitoring results to evaluate the efficacy and efficiency of the water management BMPs and facilities.

4.4.1 Water Minimization

Minimization of water flows into the access drift is an important component of site water management practices. Minimization includes grouting and packing and other water management controls involving polymer coating (i.e., Mineguard or Rockguard™) over rock

fissures and surfaces to stabilize and/or retard groundwater inflow/infiltration into the excavation area.

Run-on storm water is diverted around both the NAG and PAG waste rock storage sites. Diverted water is routed back into existing stream channels or is dispersed to the forest floor. Note that the only NAG material stored at this time is the stockpiled fine material taken from the lower NAG haul road for use in road maintenance. The NAG sediment ponds included in original design plans (Appendix B) were not constructed during the 2007–2008 construction period; however, runoff is controlled via sediment traps and a drainage diversion below the fines stockpile. Stormwater and surface water control features, including diversion ditches at the PAG and NAG areas, the PAG runoff capture pond, the settling/treatment ponds, and sediment traps adjacent to the access road, are shown on Figures 2-2, 2-3, 3-1, and 3-2.

Original design plans specified that the PAG waste rock pile would be covered to prevent stormwater from infiltrating the pile. A waiver of the intermediate cover requirement (18 AAC 60.243) under the Permit was granted by ADEC on January 26, 2009 (Buteyn 2009, pers. comm.). In January 2009, former site owners Committee Bay Resources requested approval to leave the pile uncovered for large-scale kinetic testing (Kleespies 2009, pers. comm.). The uncovered pile provides an opportunity to evaluate the weathering behavior of the PAG rock and provides quantitative information for waste management practices for possible future site development. The leachate and runoff water captured in the PAG pond is monitored on a weekly basis, and monthly PAG monitoring reports are submitted to ADEC. The PAG effluent is entirely captured and controlled through the liner and PAG pond system. A cover will be placed on the PAG pile if required due to a change in the chemistry of the PAG effluent or at the request of ADEC or ADNR. Water management plans are detailed in the SWPPP (RTR 2006), and relevant permit applications submitted to ADEC (Wastewater Treatment and Discharge Application under the Waste Management Permit [RTR 2007a] and the Industrial Solid Waste Application under the Waste Management Permit [NMC 2007a]). A summary of facility-specific water management is provided below. Additional mitigation measures and best management practices to protect water quality are listed in Section 5.

4.4.2 Waste Rock Storage Sites Water Management

The temporary PAG waste rock storage facility (Figure 2-2) is designed such that direct precipitation and any undiverted upland run-on water is collected and temporarily stored in a lined detention/sediment pond at the toe of facility. The PAG site is fully lined with 80-mil HDPE geomembrane between two layers of geotextile fabric. The liner system is sloped to collect and convey all PAG runoff and leachate to the PAG collection pond, as shown on Figure 3-1. Figure 3-2 details the engineered liner construction at the PAG site; Detail B of this figure shows how runoff captured on the PAG liner flows to the PAG pond. The PAG pile is uncovered to allow for larger-scale kinetic testing to monitor waste rock weathering (Buteyn

2009, pers. comm.). The leachate and runoff water captured in the PAG pond is monitored on a weekly basis, and monthly PAG monitoring reports are submitted to ADEC.

As described above, all NAG material was used during site construction and no material is currently stored in the NAG disposal area other than the stockpiled fines material. The NAG disposal area was designed to manage runoff as follows: 1) minimization by diverting upland run-on around the facility and using dispersion terraces to route the runoff into heavily vegetated forest areas or back into existing channels; 2) natural infiltration through the waste pile and the highly permeable talus substrate beneath it; 3) infiltration through the forest floor between the toe of the NAG pile and the sedimentation ponds; 4) collection of surface runoff downgradient of the NAG site and intervening forest floor in sediment traps.

4.4.3 Discharge Water Volume

Water flow volumes and rates observed since underground exploration began in September 2007 are presented in Table 4-1. As shown on this table, LAD system flows average about 122 gallons per minute (gpm), ranging from 8 to 224 gpm. Of the overall flow to the site settling ponds and LAD system, approximately 95 percent comes from drainage from the underground exploration drift. Approximately 3 percent is attributed to runoff and leachate captured in the PAG pond, and approximately 2 percent is from precipitation falling directly on the settling ponds.

The overall water management and treatment system is dependent on accurate hydrologic interpretation and flow modeling. In Appendix B, Figure B-5 shows the original site plan detail used in the hydrologic flow calculations. (For comparison, Figure B-2 presents the current as-built drawings superimposed over the original designs.) To determine water management volumes, facility sizing, and ultimate water treatment needs, the hydrologic criteria were superimposed over the original site plans (Figure B-5). Based on the 24-hour/25-year storm event, peak discharge from the Niblack Lookout Unit exploratory drift was estimated at between 60 and 120 gpm, whereas peak discharge from the PAG facility was estimated at 20 gpm. Combined total peak discharge to the water treatment facility from the adit and PAG temporary storage facility was estimated at 140 gpm.

4.4.4 Water Treatment and Land Application

Water from the portal and PAG pile settling pond are routed to a common water treatment holding pond lined with an impermeable HDPE liner. If necessary, water may be pumped from the first pond through a water-treatment chemical mixing tank, which can be used to increase pH and reduce trace element concentrations through lime addition and flocculation. The second pond allows for settling. From the settling ponds, water is routed to the LAD system, where it is discharged through a network of low-flow emitters for infiltration into site soils and

final polishing. The water management and treatment systems are shown by facility in Figure 3-3 and summarized in the general site flow chart on Figure 3-4.

As described above in Section 4.4.3, the water treatment facility was originally designed to accommodate a combined peak flow from the exploration drift adit and PAG facility discharge of 140 gpm. Since project activity began in September 2007, total flows to the settling ponds and LAD system averaged 119 gpm (Table 4-1), with a peak flow of 224 gpm. The original designs outlined in the Niblack Wastewater Treatment and Disposal Application submitted in 2007 (RTR 2007a) described four application/dispersion zones, sized at about 1.5 to 2 acres each, for a total LAD system area of 6 to 8 acres. The original LAD layout is shown in Appendix B, Figures B-1 and B-5. LAD design calculations are presented in Appendix 2 to the original Niblack Wastewater Treatment and Disposal Application submitted in 2007 (RTR 2007a). Final construction layout of the LAD system involves 10 individual LAD zones spread over 2.9 acres, as shown on Figure 2-2. The size of the system as-built was designed for up to 300 gpm when fully operational. Additional information on stormwater calculations, site infiltration rates, and water treatment methods is presented in the Niblack Wastewater Treatment and Disposal Application 2012 Post-Construction Update (Integral 2012b).

The original wastewater discharge limit for the Niblack Exploration Project was 150 gpm, as specified in Section 1.4 of Permit 2006-DB0037. During initial underground construction in 2007 and 2008, groundwater flows exceeded pre-project estimates and necessitated grouting to remain below the original permitted wastewater discharge limit of 150 gpm. To reduce flows, grout was applied along almost the entire length of the exploration drift. On August 13, 2008, approval was granted by ADEC for an increase in the permitted wastewater discharge limit to 250 gpm (George 2008, pers. comm.). An additional increase in the permitted wastewater discharge limit up to 300 gpm was approved by ADEC on December 31, 2009 (Nakanishi 2009, pers. comm.).

Natural attenuation of metals in the site soils underlying the LAD system will not occur when the system is operated on flooded ground. The site is a wet environment with local bog-type meadows and pot-hole saturated depressions. The system must be monitored to ensure that flooded conditions do not occur. If ground beneath the LAD system becomes oversaturated, the affected LAD zones must be rested to allow the discharge water to infiltrate into the site soils. Onsite percolation tests were performed at the site, as described in Appendix 2 to the Niblack Wastewater Treatment and Disposal Application (RTR 2007a). The four percolation test values ranged from 3.2 to 24 in./day. A design infiltration rate of 6 in./day was selected for design of the drip emitter systems. Review of published literature and Natural Resources Conservation Service information suggests that land application/attenuation criteria to forested areas with silty and sandy soils ranges from 2.4 to 7.2 in./day, which is within the proposed range for Niblack.

In early 2010, NPLLC staff incorporated several measures to reduce the possibility of freezing conditions or oversaturation preventing proper functioning of the LAD system. System improvements included replacing the existing LAD system emitters, which discharged at a rate of 6 gallons per hour (gph), with higher-volume 12 gph emitters in approximately 75 percent of the LAD zone areas. Regular alternation of LAD zones was initiated to allow extra time for discharge water and precipitation to percolate through system soils. Upline of the LAD system, screen filters were installed to removed suspended solids and reduce clogging in the LAD emitters. Coil water heaters were also installed, for use during the winter, to prevent discharge water from freezing in the LAD lines.

4.5 HAZARDOUS MATERIALS

4.5.1 Identification of Hazardous Materials

The project activities require three groups of hazardous materials:

- Water gel explosive, stick powder, blasting caps
- Diesel
- Gasoline and lubricating oils.

Material Safety Data Sheets for each substance will be made available onsite.

4.5.2 Pollutant Control

Fuel and other petroleum products at the site are stored in above ground tanks surrounded by earthen berms. These berms have impervious liners on their sides and bottoms, and are capable of containing 110% of the total capacity of the fuel tanks.

4.5.3 Spill Prevention and Response

A Project Spill Contingency Plan (C-Plan) to handle accidental spills of fuel and other potentially hazardous products will be in place for the duration of the project activities. NMC's current C-Plan, which was implemented for the 2006 surface exploration program at Niblack, will be updated as required by the Permit once all personnel have been hired and specific Spill Response Duties have been assigned.

The purpose of the C-Plan is to outline the response to spills of potentially hazardous substances at and near the Project site which may affect the environment. This planning exercise will facilitate the rapid deployment of personnel and resources to spills, so that the environmental disturbance and the resultant hazard to humans, aquatic systems, and wildlife are minimized. The C-Plan follows the format recommended by the Oil Discharge Prevention

and Contingency Plan, Application Review Guidelines, July, 1994, as required by ADEC and the U.S. Coast Guard.

5 ENVIRONMENTAL BASELINE DATA AND MITIGATION MEASURES

5.1 WATER QUALITY AND HYDROLOGY

This section summarizes water quality monitoring and reporting plans for the Niblack Exploration Project, as well as water management BMPs. A detailed description of the water quality monitoring program is described in the Niblack Water Quality Monitoring Plan 2012 Post-Construction Update (Integral 2012c) and the QAPP (Integral 2007). A more comprehensive discussion of BMPs is provided in the SWPPP (RTR 2006).

5.1.1 Water Quality Monitoring

NPLLC implements a regular water quality monitoring program as described in the Niblack Water Quality Monitoring Plan 2012 Post-Construction Update (Integral 2012c) and the QAPP (Integral 2007). The monitoring plan is a key component of the overall Plan of Operations conducted by NPLLC. The data collected following the monitoring plan supports definition of environmental conditions prior to initiation of Project activities in 2007 and assessment of the potential effects of active operations. The monitoring plan also describes a water quality monitoring program to be implemented as part of site reclamation and closure following cessation of project activities. It is designed to evaluate compliance with site-specific water quality standards and support long-term protection of State of Alaska water resources, land, fisheries and wildlife.

The site monitoring plan consists of the following elements:

- Monitoring stations/locations
- Monitoring frequency
- Sample collection procedures
- Transmittal of samples (chain of custody)
- Field measurements and analytical parameter selection
- Laboratory procedures and analyses (quality assurance and quality control)
- Data management
- Visual monitoring
- Reporting
- Corrective action protocol.

As stated in the Niblack Waste Management Permit (2006-DB0037), Section 1.13, ADEC has determined that natural water quality in surface water and groundwater at the Niblack site exceeds water quality for parameters including pH, aluminum, cadmium, copper, lead, nickel, silver, and zinc. For this reason, site-specific natural condition-based water quality criteria have been established for the Niblack Project for surface water and shallow wetland groundwater. Specific procedures for establishing site-specific water quality parameters are described in the QAPP (Integral 2007) and are based on ADEC's Guidance for the Implementation of Natural-Condition Based Water Quality (ADEC 2006).

If site-specific water quality measures are exceeded, the cause of the exceedance will be determined. If natural occurrences cause the exceedance, as determined by ADEC, monitoring per the guidelines set forth in this plan will be sufficient. If the exceedance is due to waste rock leachate, a plan for additional monitoring and remediation will be submitted to ADEC.

5.1.1.1 Water Quality Monitoring Stations and Frequency

Surface water monitoring is designed to evaluate compliance with site-specific water quality standards. Section 1.6.3 of the Permit describes the following guidelines for determination of compliance with site-specific water quality criteria:

> For surface streams, downstream water quality shall not be statistically significantly higher in any parameter than upstream water unless the reason for that increase can be shown to be natural.

Groundwater monitoring provides information on water quality trends in groundwater within the wetlands downslope of the Project facilities, for compliance review. Permit Section 1.6.4 outlines groundwater quality guidelines:

> For shallow groundwater in the wetlands, water quality shall be maintained at or better than the natural background water quality determined before commencement of any exploratory activity.

Surface water and groundwater quality monitoring locations are shown on Figure 2-7. Currently active monitoring stations are shown in blue. Stations shown in green and orange are not monitored on a regular basis at this time, as discussed in more detail below. Table 5-1 presents station coordinates, descriptions, and activity status, and purpose. Generally, the points for evaluating compliance with site-specific natural condition criteria are downstream surface water sites and downgradient wetland groundwater sites. The sections below present additional detail about each monitoring station.

As described in the Niblack Water Quality Monitoring Plan 2012 Post-Construction Update (Integral 2012c), in 2008 ADEC approved changes to the Permit requirements for sampling and analysis of groundwater and surface water (George 2008, pers. comm.). These changes included reduction in the location and frequency of surface water and groundwater monitoring. In

particular, regular water quality monitoring was discontinued at upstream (i.e., concurrent monitoring) surface water locations on Waterfall Creek (WQ8), Camp Creek (WQ7), and Unnamed Creek 1 (WQ12) and at upgradient/offsite groundwater sites MW7, MW8, and MW9. These changes were implemented beginning in Q3 2008 and are incorporated into the guidelines for future monitoring. Since Q3 2008, surface water stations WQ4, WQ6, WQ10, and WQ13, and groundwater wells MW1, MW2, MW3, and MW4 have been monitored on a regular basis. These are also the locations of planned future monitoring during active site exploration.

The monitoring program also includes monitoring of mine water and waste rock leachate/runoff. These stations provide information for site operations and are not used to evaluate compliance with water quality standards. Station EFF1 is located in the site settling ponds (Figure 2-7). Sample water is collected from within the ponds at the outlet pipe which flows to the LAD system. Water sampled at station EFF1 is representative of the water which is discharged from the LAD system emitters. Runoff and leachate from the PAG waste rock pile is monitored at the PAG pond (Figure 2-7). A visual monitoring station was established below the PAG waste disposal area as part of a leak detection system. This site is called PAG Leak Detection. No water is anticipated to collect at this point unless there is a breach in the liner. Three field barrel kinetic testing cells (HW1, LO1, and LO2) are operated on the Niblack Project area to evaluate waste rock weathering. The field barrels are located north of the PAG waste rock pile (Figure 2-2).

Table 5-2 summarizes the water quality samples collected since 2007. Under the Permit, monthly monitoring of surface water and groundwater sites is required until 20 valid samples have been collected, after which the monitoring frequency becomes quarterly. The minimum requirement of 20 valid samples has been met at monitoring stations identified in the Permit, including surface water stations WQ4, WQ6, WQ7, WQ8, WQ10, WQ12, and WQ13; and groundwater stations MW1, MW2, MW3, MW4, and MW7, as shown on Table 5-2. Fifteen valid samples were collected at reference monitoring wells MW8 and MW9 prior to discontinuation of these stations per agreement with ADEC (George 2008, pers. comm.). The Permit requires a reversion to monthly monitoring if statistically significant increases over natural levels are observed, or if significant upward concentration trends are observed, unless the cause is shown to be natural or corrected (if caused by Project activity).

A quarterly monitoring program was implemented beginning in Q3 2008 at the active surface water stations WQ4, WQ6, WQ10, and WQ13 and groundwater wells MW1, MW2, MW3, and MW4. Because the minimum number of samples had been collected at baseline/reference surface water stations WQ7, WQ8, and WQ12, and reference groundwater well MW7, sampling was discontinued at these stations beginning in Q3 2008. These changes are incorporated into the guidelines for future monitoring presented in the monitoring plan. Future monitoring at surface water and groundwater stations will continue on a quarterly schedule as described in Table 5-3. Mine water and waste rock runoff monitoring at station EFF1, the PAG pond, and

the three field barrels (HW1, LO1, and LO2) is conducted weekly for field parameters and quarterly (EFF1) or monthly (PAG pond and field barrels) for water chemistry.

5.1.2 Surface Water Quality Results

Sampling and analysis of groundwater and surface water are performed as required by the Permit, with the parameter list, monitoring frequency, and monitoring location changes as approved by Kenwyn George of ADEC (George 2008, pers. comm.). The changes were implemented beginning in the third quarter of 2008 and are described in detail in the 2008 Annual Report (Integral 2009).

A detailed review of baseline surface water and groundwater quality data collected during seven sampling events from 1996 though 2006 is presented in Niblack Water Quality Baseline and Site Monitoring Plan (Knight Piésold 2007b). Up-to-date water quality monitoring results are reported and evaluated in reports that are submitted to ADEC on a regular schedule. The annual reports (Integral 2008, 2009, 2010, 2011a, 2012d) are comprehensive summaries of current and historical water quality. These reports include water quality monitoring results presented as time series plots, statistical analyses, screening against Alaska water quality standards, quality assurance and quality control evaluations, tabulated data, and visual monitoring logs. Quarterly reports (e.g., Integral 2011b) present water quality monitoring results for a given quarter. To date, 15 quarterly reports have been submitted to ADEC, beginning with Q3 2007. Results of onsite waste rock kinetic tests and effluent settling pond monitoring are reported monthly (e.g., pHase 2011). Twenty-two PAG reports have been submitted to ADEC since the reporting requirement began in Q3 2008.

5.1.3 Inshore Marine Water Quality

Baseline marine water monitoring required under Section 3.3 of the *Revised Tideland Lease Development Plan for the Niblack Exploration Project Marine Dock and Barge Landing Facilities* (RTR 2007c) was performed in May 2007. Construction-phase water quality monitoring was performed on October 2, 2008, during construction of the tidelands lease development. A summary of sampling procedures and results from marine water quality monitoring is presented in the 2007 Niblack Underground Exploration Project Annual Report (Integral 2008).

5.1.4 Mitigation Measures and Best Management Practices to Protect Water Quality

The Niblack SWPPP (RTR 2006) provides defined protocols for the management of stormwater encountered during the course of the project activities. The summary of BMPs presented below is largely unchanged from the discussion included in the 2007 Underground Exploration Plan of Operations (NMC 2007b). Management of wastewaters associated with the adit and PAG facility is described under separate cover in the Niblack Industrial Waste Monofill Solid Waste

Permit Application (NPLLC 2012a) and Niblack Waste Water Treatment and Disposal Application under the Waste Management Permit (NMC 2007a). A summary of typical BMPs is provided below. As described above, additional underground excavation and associated construction of surface features is not anticipated at this time; however, the BMPs detailed in the SWPPP (RTR 2006) would guide sediment and water management.

The BMPs described below include practices that were followed during site construction, as well as BMPs that will be followed for maintenance of the existing features or future construction.

5.1.4.1 General Sediment Source Controls

The following common sediment source control BMPs are followed at the Niblack site:

- Vegetation was and will continue to be removed only from those areas directly affected by Project activities.
- Salvageable timber was and will continue to be utilized on site for mine development, and in the construction of other surface facilities as practical.
- Disturbance to highly erosive soils was and will continue to be avoided where possible.
- Appropriate interim reclamation and drainage controls have been and will continue to be implemented in a timely manner, with progressive reclamation activities implemented to ensure the site remains in a stable condition during operation of the Project. Progressive reclamation activities will include fill placement and grading, growth media placement, scarification, and seeding.
- Both temporary diversions and sedimentation control systems are and will continue to be monitored on a routine basis. These systems will be cleaned, repaired, and altered as necessary.

5.1.4.2 Sediment Source Control for Roads

The following BMPs for sediment source control on roadways were followed at the Niblack site during construction of the access road. These practices would also apply to any future road construction at the site:

- Roads were constructed on properly surveyed alignment and grades.
- Road cross-culverts were installed at the time of road construction.
- The use of equipment in drainage channels was minimized to only essential activities.
- Alteration of stream banks was minimized and disturbed stream banks were stabilized to prevent erosion and sedimentation.

- Cut-and-fill slopes were stabilized by reducing their angle whenever possible.
- Permanent erosion control measures at the roads were constructed to last the life of the Project, and repaired on an as-needed basis. Erosion control measures included drainage ditches that divert flow into areas of undisturbed forest floor, dispersion terraces, and silt fences.
- The road surface was covered with shot rock to reduce erosional features.
- Visual monitoring was conducted for signs of erosion or vegetative stress.

5.1.4.3 Culverts and Stream Crossings

Camp Creek is crossed by a single span bridge. Requirements for the design, installation, and operation of the Camp Creek bridge include maintaining a free passage for fish, as specified in Fish Habitat Permit FH-06-VII0014. The following list includes BMPs that were followed during installation of culverts and the stream crossing, as well as BMPs that will be followed for maintenance of the existing features or future construction:

- Alteration of stream banks was minimized and disturbed stream banks were stabilized to prevent erosion and sedimentation. These practices would also be followed for any new construction.
- Installations, replacements, and modifications of water body crossing structures will be conducted in a manner that maintains fish and wildlife habitats.
- Stream crossings will not be constructed of any wood treated with a preservative containing creosote or pentachlorophenol.
- Stream crossings in identified fish habitat will be avoided where possible.
- Any stream crossings in fish habitat will:
    - Be made from bank to bank in a direction substantially perpendicular to stream flow
    - Be constructed at a location with gradually sloping banks, not at locations with sheer or undercut banks
    - Be designed to allow for free passage of fish
    - Be constructed using bump logs to protect banks and to cushion the stream bed from machinery
    - Utilize the sediment control measures mentioned in the sediment control section

- Incorporate sediment control measures such as brow logs and filter fabric in the bridge design to prevent road material and other sediment from entering the creek.

5.1.4.4 Barge Landing

The following BMPs were followed during development of the barge landing site and are currently practiced:

- Impacts to the intertidal zone were minimized by limiting the size of the disturbed areas, reducing the time of exposure, and using sediment control devices.
- To protect important eelgrass habitat in the lower intertidal and offshore areas, propulsion systems were not be used on landing craft, tugs, self-propelled barges or other craft using the barge landing site when tidal stage is less than half (7.6 ft mean lower low water).

Additional information regarding the construction and use of the barge landing facility is included in the ADNR Tideland Lease 107544 and the Determination of Consistency with the Alaska Coastal Management Program (Donohue 2007, pers. comm.).

5.1.4.5 Waste Rock Storage Areas and Water Settling Ponds

Management practices to control water, stability, and erosion at the site waste rock and wastewater management areas are described in detail in the SWPPP (RTR 2006), the Waste Management Permit (2006-DB0037), the Niblack Industrial Solid Waste Landfill Application under the Waste Management Permit (NMC 2007a), and the Niblack Wastewater Treatment and Disposal Application 2012 Post-Construction Update (Integral 2012b). These management practices include:

- All runoff and leachate draining from the PAG waste rock temporary storage area is collected and routed to the site settling ponds.
- Discharge from the underground exploration drift and from the PAG facility is routed through settling ponds (including chemical treatment tanks which would be used as-needed based on water quality). The water is discharged through the land application system which allows discharge water to infiltrate through site soils.
- Sediment traps will be utilized to manage runoff and control sedimentation from the NAG waste rock storage site.
- Water run-on at the temporary mineralized ore stockpile is prevented though diversion ditching. Additionally, the pile is fully lined and covered.

- The PAG, NAG, and mineralized ore storage areas are visually monitored for signs of erosion, stress to nearby vegetation, and wear to facility structures and materials. Surface and groundwater monitoring is conducted downgradient of these facilities. Visual and water quality monitoring is described in the Niblack Water Quality Monitoring Plan 2012 Post-Construction Update (Integral 2012c).

5.1.4.6 Winter Water Management

The LAD system is susceptible to freezing during winter months. In early 2010, NPLLC staff incorporated several measures to reduce the possibility that freezing conditions during normal winter conditions or clogging of the pipes or emitters would impair the functioning of the LAD system. System improvements included the following:

- Replacement of the existing LAD system emitters, which discharged at a rate of 6 gph, with higher-volume 12 gph emitters
- Installation of screen filters upline of the LAD system to reduce clogging in the LAD emitters
- Installation of coil water heaters, for use during the winter, to prevent discharge water from freezing in the LAD lines
- Increasing pressure in the system through passive management (e.g., alternating zone closures to force more water through open zones)
- Initiating a weekly process of system checks to monitor the LAD system function.

During extreme winter conditions, additional management practices which may be implemented to further protect the system from freezing include:

- Routing the water through the enclosed water treatment facility (without treatment unless necessary due to water quality) and using coil tank heaters to further heat the water before discharge
- Active use of the underground pumps to keep water underground for longer periods before pumping to settling ponds, resulting in shorter duration of exposure to environment
- Installation of aeration pipes in settling ponds to prevent surface freezing
- During period of extreme freezing, Niblack may seek authorization from ADEC to temporarily discharge directly from the ends of ½-in. or 2–in. pipes for periods to increase water velocity and prevent freezing. Such requests would involve constant monitoring of forest environment and rotation of zones or lines to prevent pooling, channeling, or stress to vegetation and would be reviewed on an individual basis.

5.1.4.7 Spill Prevention and Response

A Project Spill Contingency Plan to handle accidental spills of fuel and other potentially hazardous products outlines the response to spills of potentially hazardous substances at and near the Project site. The Niblack C-Plan is discussed in more detail in Section 4.6.3.

5.2 BIOLOGICAL RESOURCES

Fish and wildlife species and habitat are and will continue to be protected by the following management practices:

- Signs are posted in conspicuous places that inform employees and contractors of all applicable laws and regulations governing hunting, fishing, and trapping.
- Employees are prohibited from feeding animals or leaving edible materials in construction zones or work areas.
- Service and access roads were sited to avoid critical wildlife habitats.
- Work vehicles are operated at safe speeds at all times.
- Raptor nesting sites will be evaluated to assess protective measures. If bald eagle nesting is found to occur near the project area, a buffer zone will be maintained near active nests.
- Stream flows are maintained to provide minimum instream flow requirements necessary to support existing resident and anadromous fisheries.
- Formal consultation will occur with the U.S. Fish and Wildlife Service and the National Marine Fisheries Services on threatened and endangered species, and any applicable requirements will be adhered to.

5.3 METEOROLOGY

In May of 1997, an automated weather station was installed near the personnel camp. It recorded the following hourly:

- Air temperature
- Precipitation
- Wind speed
- Wind direction.

All recorded data was stored in a datalogger, which was downloaded in November 8, 1997. When the operators returned to the site in April 2005, the meteorological station and datalogger

were found to be missing and presumed stolen. A new station was installed on site in the fall of 2006. Meteorological data collection will continue throughout the life of the Niblack Project. Temperature and precipitation data is reported in the annual reports.

Meteorological data is also available from the Alaska Climate Research Centre for a station at Ketchikan, Alaska. Average monthly and annual temperature, precipitation and snowfall for 1949 to 2011 are presented in Table 2-2. Figure 2-5 presents the long-term average regional temperatures and precipitation. Figure 2-6 shows temperature and precipitation measured at the Niblack site from 2008 to 2011.

5.4 LAND USE

5.4.1 Federal and State Parks and/or Protected Areas

The Niblack Project area can be accessed by float plane, boat, or helicopter. The Niblack Project is surrounded by the Tongass National Forest, managed by the U.S. Forest Service (USFS). Operations on USFS land in the area are governed by the Tongass Land Management Plan. The underground project activities and associated surface disturbances occur entirely on patented claims.

5.4.2 Recreation

NPLLC employs the following management practices with regard to recreation and public access:

- Public access is restricted in the active work areas.
- All Project-related roads will be constructed in compliance with current road construction requirements.
- NPLLC will protect existing public recreation access in the Project area, especially for hunters or anglers, where access will not endanger or impede the public or project operations.
- No unsupervised public access will be allowed to the immediate Project area.
- Public access to the area will be regulated as required to facilitate the operations and to protect the public and, to the extent possible, wildlife from safety hazards associated with the project activities.

5.5 WETLANDS

The National Wetlands Inventory has classified and mapped the wetlands surrounding the Niblack Project. A wetlands delineation study was performed on the Project site in February 2006, using approved U.S. Army Corps of Engineers specifications and procedures. This study, titled Niblack Property Prince of Wales Island, Alaska Preliminary Jurisdictional Determination (HDR Alaska 2006), was included as Appendix 1 to the Niblack Project Underground Exploration Plan of Operations (NMC 2007b). The Preliminary Jurisdictional Determination received approval by the U.S. Army Corps of Engineers in a letter dated March 31, 2006. Based on the Preliminary Jurisdictional Determination, none of the development work will disturb area designated as wetland.

An eelgrass survey was conducted in 2007 to map and inventory the distribution of eelgrass within the lower intertidal and offshore areas surrounding the site (HDR Alaska 2007). The survey indicates that eelgrass is absent within the immediate area around the barge and dock landing facilities. To protect important eelgrass habitat in the lower intertidal and offshore areas, propulsion systems will not be used on landing craft, tugs, self-propelled barges or other craft using the barge landing site when tidal stage is less than half (7.6 ft mean lower low water).

5.6 GOVERNMENT SERVICES / PUBLIC FACILITIES

The USFS operates back-country "wilderness" cabins on Prince of Wales Island. There are two such Public Use Cabins operated in the vicinity of the Niblack Project. The Kegan Cove Cabin is 30 air miles southwest of Ketchikan, or can be accessed by boat (although boat access is difficult at low tide). The Kegan Creek Cabin is located just to the north of the Kegan Cove Cabin, on the southern tip of Kegan Lake. There is a half-mile long trail which links the two cabins. Both cabins allow access to hunting and fishing, during regulated seasons. The Kegan Cove Cabin is available year-round, while the Kegan Creek Cabin is only available April through November.

The activities at the Niblack Project are located approximately 3.5 miles to the north of the Kegan Creek and Kegan Cove cabins. In addition, Niblack Project activities will be separated from the cabins by a headland of high relief with elevations of 1,850 feet. Operations at the Niblack Project are not expected to detract from the use of either cabin in any way.

5.7 CULTURAL AND PALEONTOLOGICAL RESOURCES

In a letter dated June 16, 2006 (Bittner 2006, pers. comm.), the Alaska State Historic Preservation Officer documented review of the Niblack Project for conflicts with cultural resources under the National Historic Preservation Act. The review noted that the historical Niblack mine camp,

established in 1901, is an Alaska Heritage Resource Survey Site which has not been evaluated for eligibility for the National Register of Historic Places. The letter requests that Niblack Project staff and activities avoid the historical mine camp and other historic features. Any objects of historic or archaeological interest or articles of potential significance discovered as a result of construction and/or operation at the Niblack Project will be brought to the attention of the State Historic Preservation Officer. Construction and/or operating activities which adversely impact objects of historic or archaeological interest will cease until appropriate clearances are issued.

6 RECLAMATION AND CLOSURE PLANS

Reclamation and closure plans, as well as cost estimates, are presented in the Niblack Reclamation and Closure Plan 2012 Post-Construction Update (Integral 2012a), and are summarized here. This plan updates the Reclamation and Closure Plan (RTR 2007b) submitted in 2007 as Appendix 6 to the Underground Exploration Plan of Operations (NMC 2007b). The plan addresses conceptual reclamation principles and facility-specific reclamation plans that have been developed as a key component of the Plan of Operations for closure of the Project area. The plan also includes a cost estimate to be used for bonding purposes. A summary of NPLLC's corporate environmental policy, reclamation goals, and reclamation and closure principles are provided below.

6.1 NPLLC CORPORATE ENVIRONMENTAL PRINCIPLES AND RECLAMATION GOALS

NPLLC is committed to responsible development of projects and to the sustainable development of communities in which they work. NPLLC follows corporate Principles of Responsible Mineral Development (HDI 2012), which include principles related to environmental actions. Specifically, NPLLC uses land, water, and energy resources responsibly, strives to maintain the integrity and diversity of ecological systems, and applies environmental BMPs in the planning, design, and implementation of activities. These principles guide the reclamation goals described here.

NPLLC's long-term goals of reclamation during and after underground activities are to return the land to a safe and stable condition, consistent with the establishment of productive post-project closure land uses. The designated post-project closure uses for the Project area are defined as mineral development or other commercial use. Wildlife habitat and recreation will also be a consideration for post-project closure use.

NPLLC will develop and implement the following reclamation goals at the Project site:

1. Stabilization and protection of soil materials from wind and water erosion

2. Stabilization of steep slopes through recontouring and leveling to provide rounded landforms and suitable growth media surfaces for natural invasion and recolonization by native plants

3. Establishment of long-term, self-sustaining vegetation communities by reseeding with native plants and promoting natural recolonization and succession

4. Protection of surface water and groundwater quality, and compliance with all applicable water quality standards during operation and at closure

5. Protection of public health by reducing potential hazards typically associated with construction sites

6. Protection of fisheries, wildlife habitat, and recreational resources

7. Minimization of long-term closure requirements, especially for ongoing care and maintenance.

6.2 SUMMARY OF SITE-SPECIFIC RECLAMATION GOALS

The first step in the reclamation process involves the removal and storage of topsoil and other growth media from all areas to be disturbed, prior to facility construction. Stockpiled topsoil and growth media was seeded or covered with salvaged vegetation to reduce the potential for erosion during storage and to maintain viability. Topsoil stockpiles generated during the site construction period (2007–2008) are located adjacent to the access road, as shown on Figure 2-2.

Project closure will commence following cessation of all project activities. At that time, PAG material will be relocated from the temporary storage site to the underground drift for permanent storage. Portal closure, including installation of a cement plug, will commence after all PAG material has been relocated to the back of the adit. Other reclamation will include recontouring and topsoil placement at the PAG site, NAG site, and water treatment facility/settling ponds. Later stages of final reclamation may include the removal of stormwater diversions and sedimentation ponds/sediment traps where they are no longer needed. All reclaimed areas will be seeded to aid erosion control and re-establish natural vegetation. Finally, a monitoring program will be implemented to track reclamation success.

Roads will remain in place as required for post-closure monitoring activities and for designated post-closure land use (mineral development and other commercial uses). Post-closure operation and maintenance of the road, including culverts and bridge crossing, will be in accordance with the terms and conditions of the ADNR Office of Habitat Management and Permitting Fish Habitat Permit (FH-09-VII-0021) and U.S. Army Corps of Engineers Permit (POA-1982-290-N).

Reclamation of barge landing and mooring facilities will occur upon termination of the Tideland Lease, and is bonded (performance guarantee) separately from the rest of the Project site. Operation, maintenance, and ultimate reclamation of the barge landing and mooring facility will be in accordance with the terms and conditions of the ADNR Division of Mining, Land and Water Tideland Lease (ADL 107544), and U.S. Army Corps of Engineers Permits (POA-1982-290-N).

6.3 RECLAMATION AND CLOSURE PRINCIPLES

In addition to the goals discussed above, the following general reclamation and closure principles will apply for the life of the Project and during closure:

1. The reclamation plan will describe reclamation requirements as they relate to interim reclamation, temporary closure, and final reclamation at closure.

2. All surface mining disturbances associated with the Niblack Construction and Exploration Project will be bonded for an amount equal to the actual cost estimate of reclaiming the disturbed areas.

3. Bond release criteria will be developed for all reclamation activities.

4. Soil or soil-like growth media (organic material and/or suitable subsoil) will be inventoried for volume and general reclamation suitability and stored for future reclamation use. Protection from erosion will be provided.

5. Disturbed areas no longer involved in project activities will receive reclamation treatment within 2 years, as described in this reclamation plan.

6. BMPs for interim drainage stabilization and erosion control will be implemented during the life of the Project.

7. Sediment control facilities such as dispersion terraces, ponds, dikes, and infiltration basins will be designed and installed before surface-disturbing activities begin. These facilities will be inspected regularly, and maintained according to the schedule defined in the SWPPP (RTR 2006).

8. Following construction, cut-and-fill embankments and growth media stockpiles will be seeded with native grasses or covered with salvaged vegetation to reduce the potential for soil erosion and to enhance natural plant reinvasion.

9. Unchanneled runoff from disturbed surface areas will be dispersed into undisturbed forest areas, to the extent practicable.

Engineered facilities and associated construction materials will be monitored during construction, operation, and a defined post-closure period. This will enhance waste management and recycle opportunities.

7 PROJECT OWNERSHIP

The Niblack Project is owned by Niblack Project LLC of Vancouver, British Columbia, Canada. Administrative information for the Niblack Project is presented below:

Owner/Operator:	Niblack Project LLC 1040 W. Georgia St., 15th Floor Vancouver, British Columbia Canada V6E 4H8
U.S. Incorporation:	Niblack Project LLC c/o Corporation Service Company 2711 Centerville Road, Suite 400 Wilmington, Delaware 19808 U.S.A.
Contact:	Patrick Smith President and CEO Niblack Project LLC 1040 W. Georgia St., 15th Floor Vancouver, British Columbia Canada V6E 4H8 Telephone: (604) 684-6365

All notices or other communication related to this Underground Exploration Plan of Operations or referenced documents are to be directed to the Contact listed above.

8 REFERENCES

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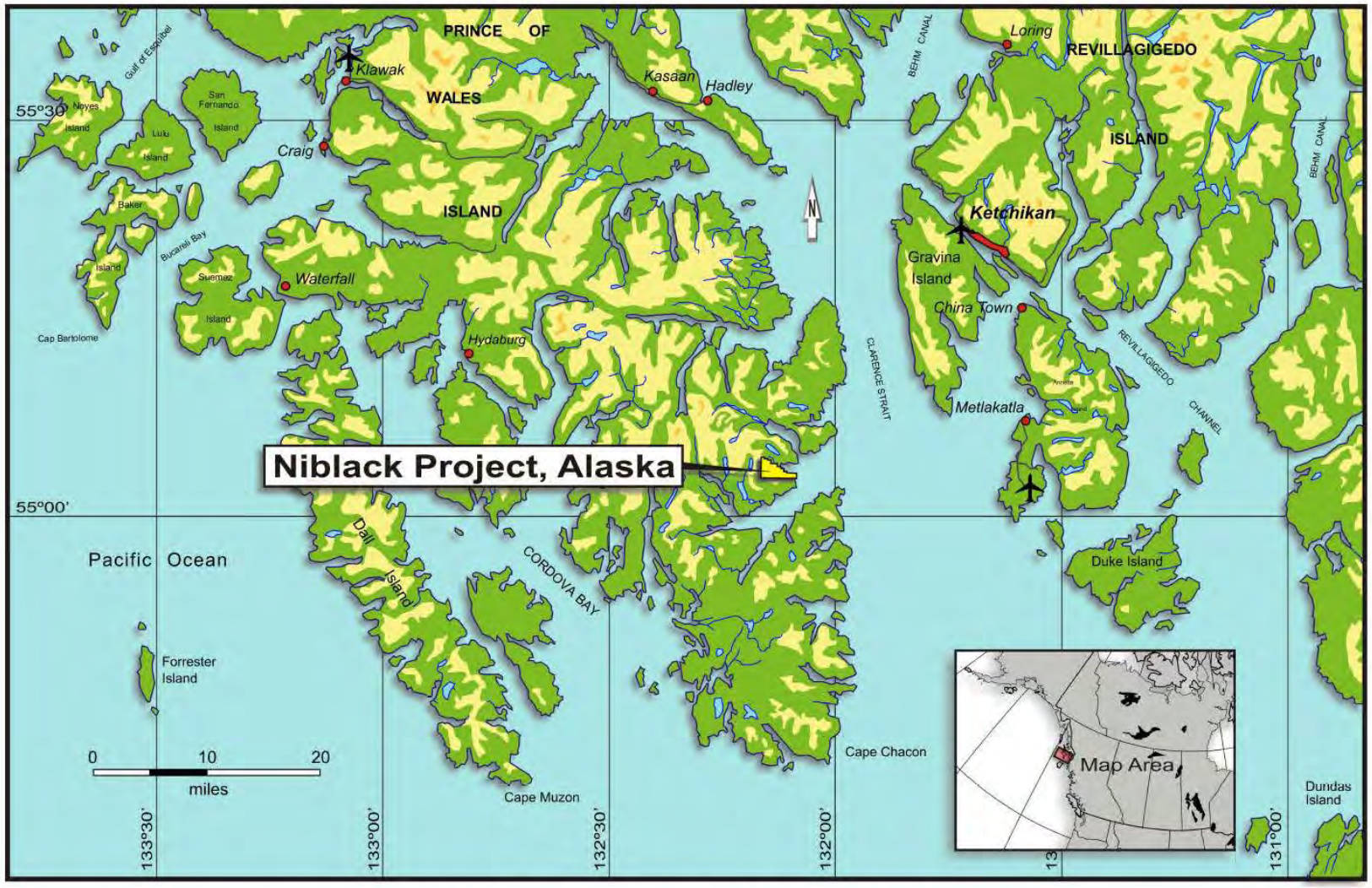
FIGURES



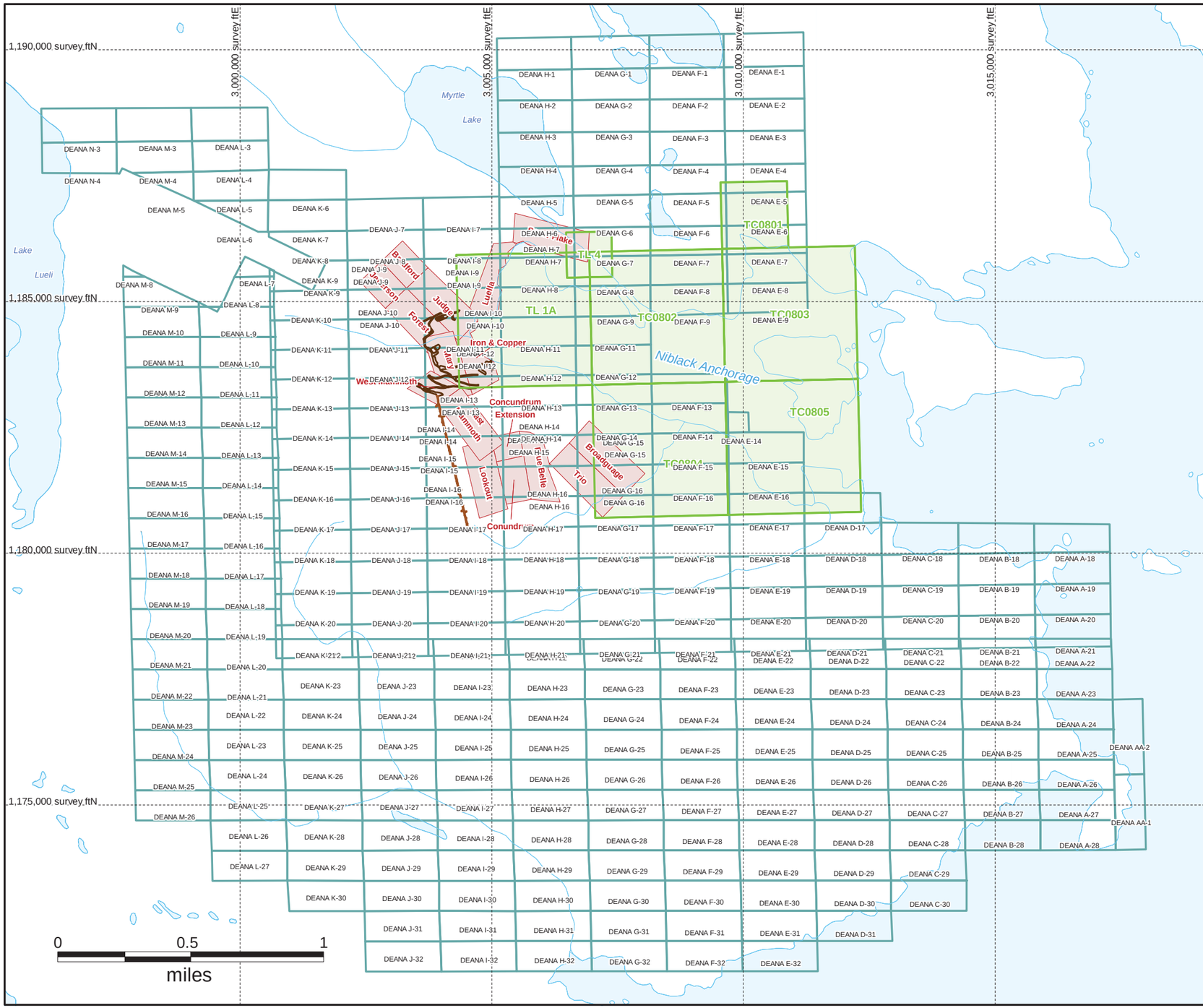
Niblack Project Location Map

May, 2006

NIBLACK PROJECT LLC

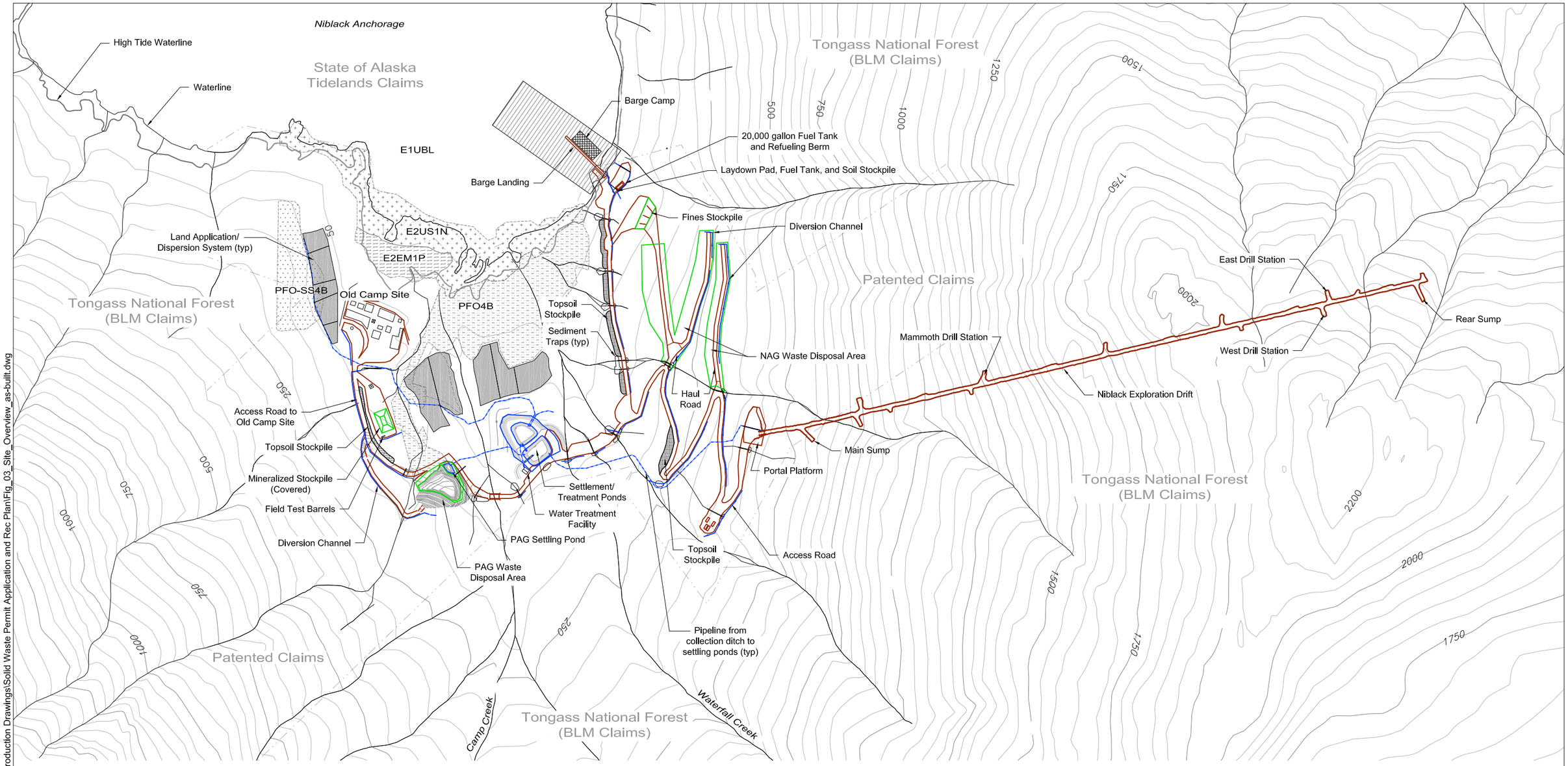
integral consulting inc.

Figure 1-1
Niblack Project Location Map
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



NIBLACK PROJECT LLC integral consulting inc.

Figure 2-1
Claims Map
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



LEGEND

- E1UBL Estuarine - Subtidal
- E2US1N Estuarine - Unvegetated Intertidal
- E2EM1P Estuarine - Emergent Intertidal
- PFO-SS4B - Needleleaf Forest/Scrub - Shrub Wetland
- PFO4B - Needleleaf Forest Wetland
- Land Application Areas
- Tideland Lease Area
- Property/Patented Claim Boundary
- Waste Rock Storage Facilities
- Water Management Features
- Roads and Exploration Access Drift

NOTE

1. All dimensions and elevations are in feet unless otherwise noted

SOURCES

1. As-built drawings provided by Niblack Project LLC (2011)
2. Land application area boundaries from Turner (2009, personal communication)

NIBLACK PROJECT LLC

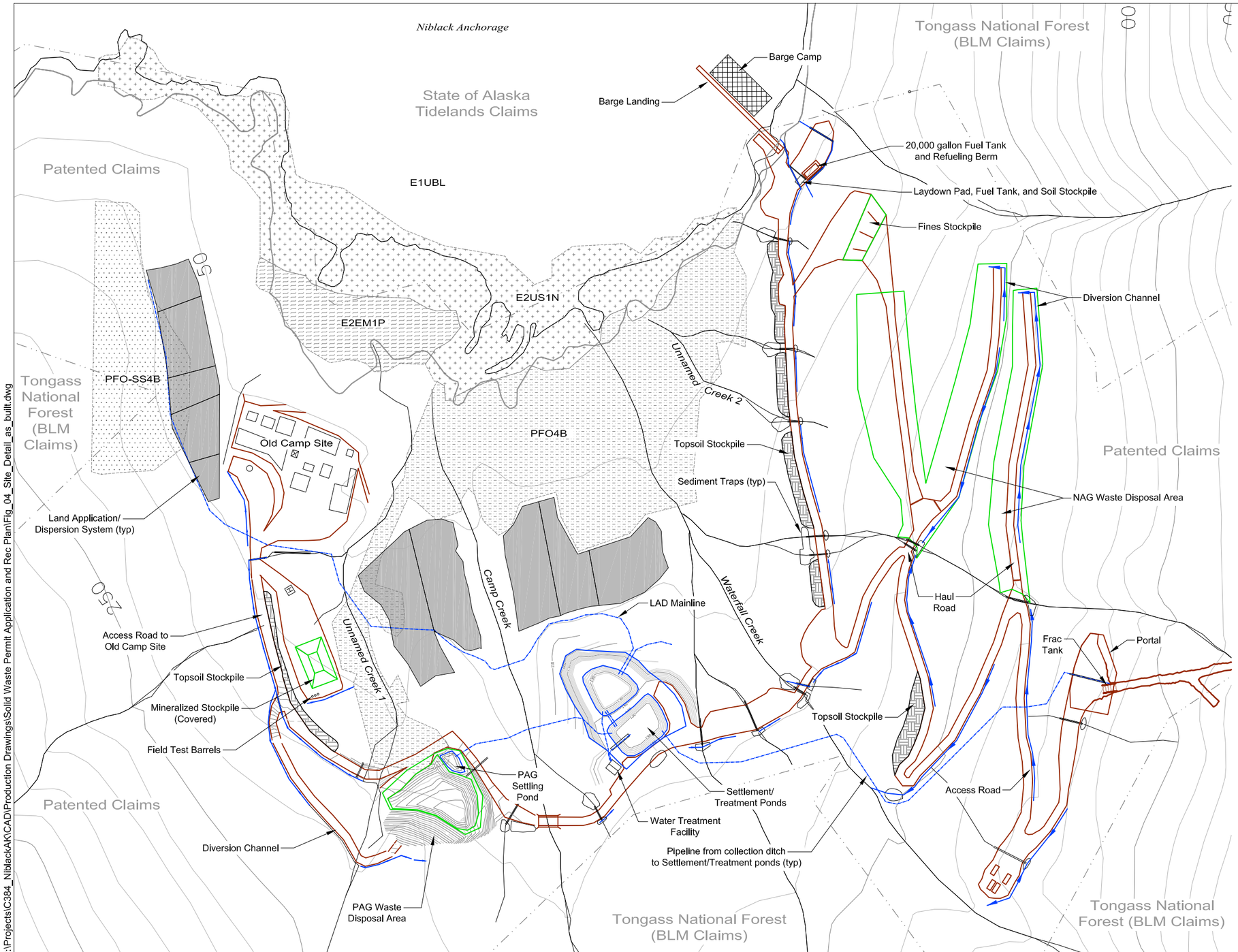
integral consulting inc.

0 200 400 Feet

N

Figure 2-2
General Site Plan
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update

P:\Projects\C384_NiblackAK\CAD\Production Drawings\Solid Waste Permit Application and Rec Plan\Fig_03_Site_Overview_as-built.dwg



LEGEND

- E1UBL Estuarine - Subtidal
- E2US1N Estuarine - Unvegetated Intertidal
- E2EM1P Estuarine - Emergent Intertidal
- PFO-SS4B - Needleleaf Forest/Scrub - Shrub Wetland
- PFO4B - Needleleaf Forest Wetland
- Land Application Areas
- Property/Patented Claim Boundary
- Waste Rock Storage Facilities
- Water Management Features
- Roads and Exploration Access Drift

NOTE

1. All dimensions and elevations are in feet unless otherwise noted

SOURCES

1. As-built drawings provided by Niblack Project LLC (2011)
2. Land application area boundaries from Turner (2009, personal communication)

NIBLACK PROJECT LLC

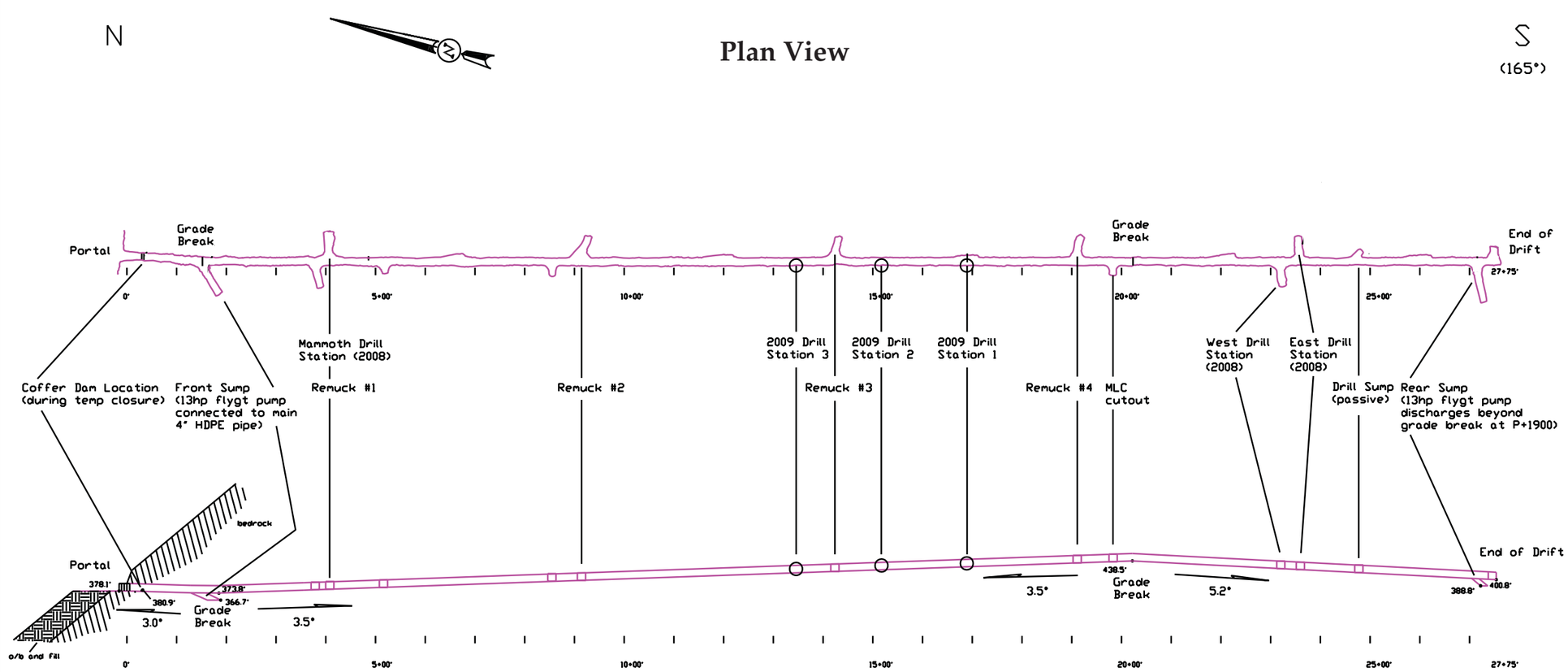
integral consulting inc.

0 100 200 Feet

N

Figure 2-3
Site Plan Detail
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update

P:\Projects\C384_Niblack\AK\CAD\Production Drawings\Solid Waste Permit Application and Rec Plan\Fig_04_Site_Detail_as_built.dwg

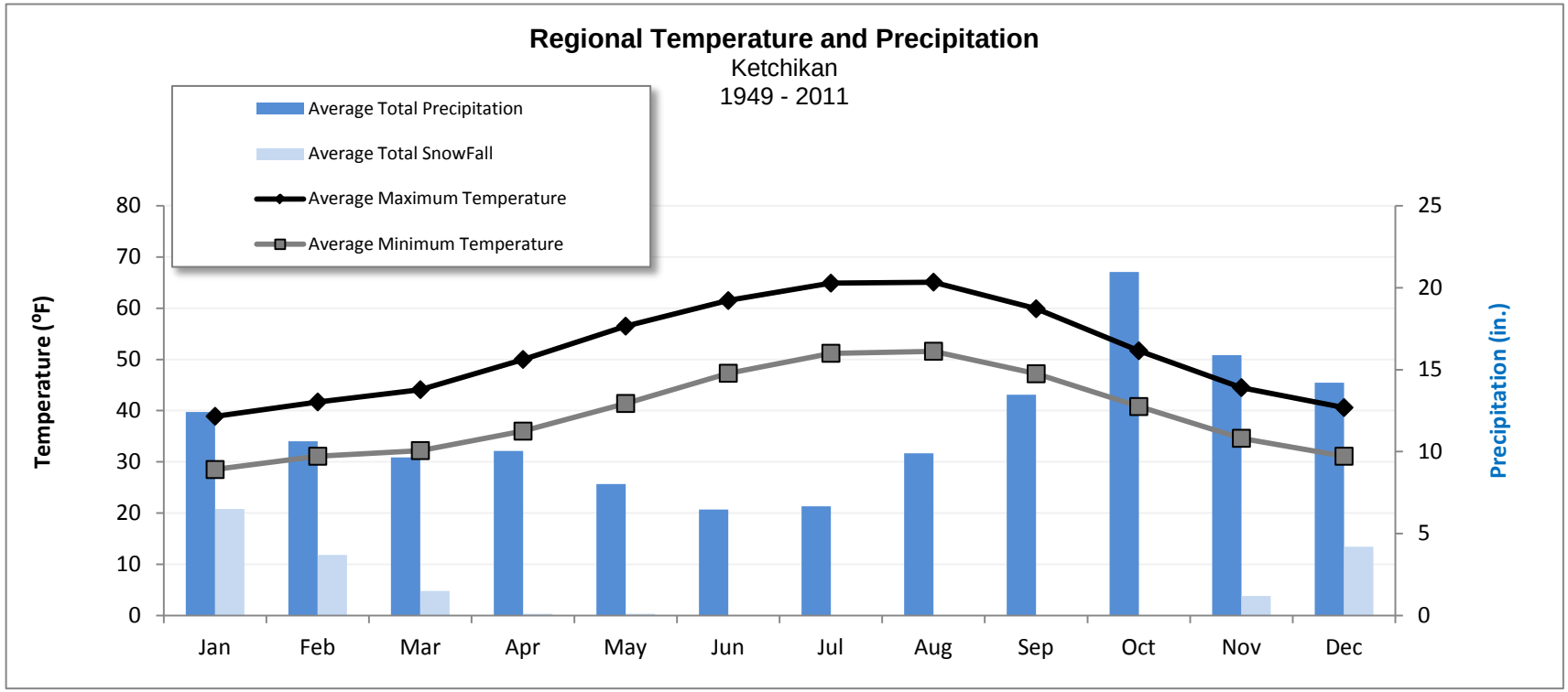


NIBLACK PROJECT LLC

Figure 2-4
Niblack Project Exploration Drift
Plan and Section Views

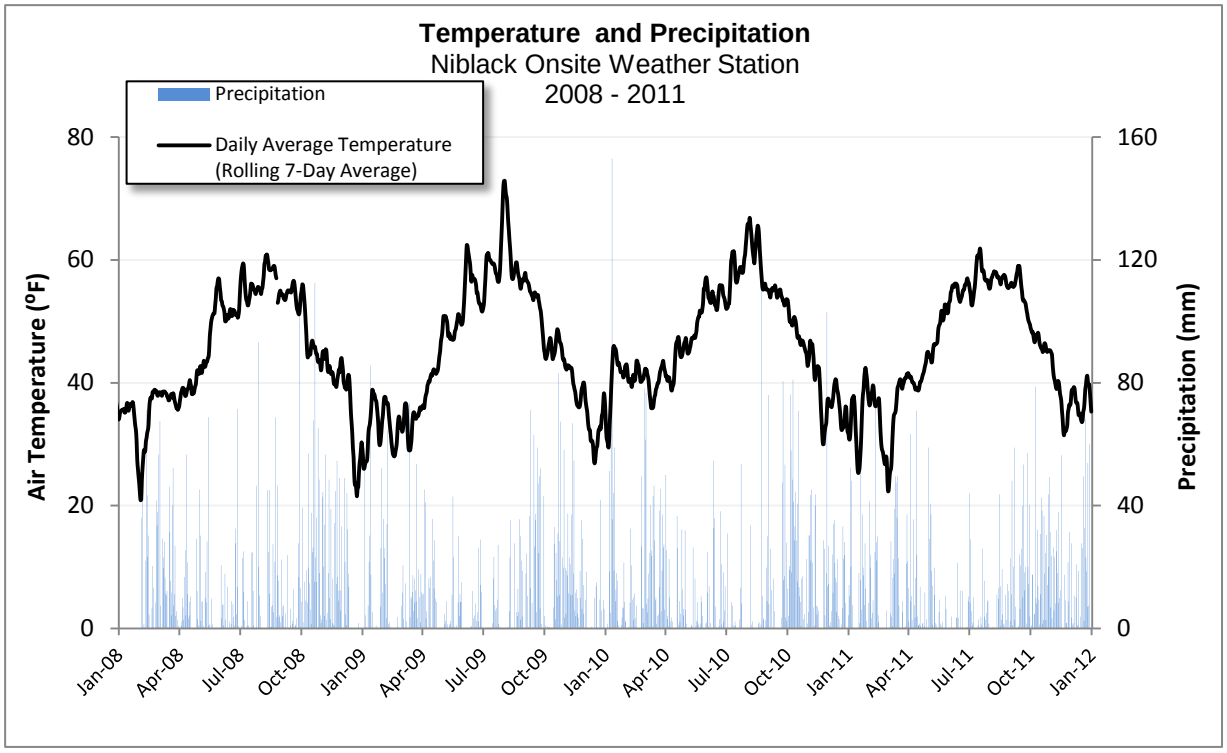
Scale in Feet: 0 50 100 150 200 400
Scale in metres: 0 125

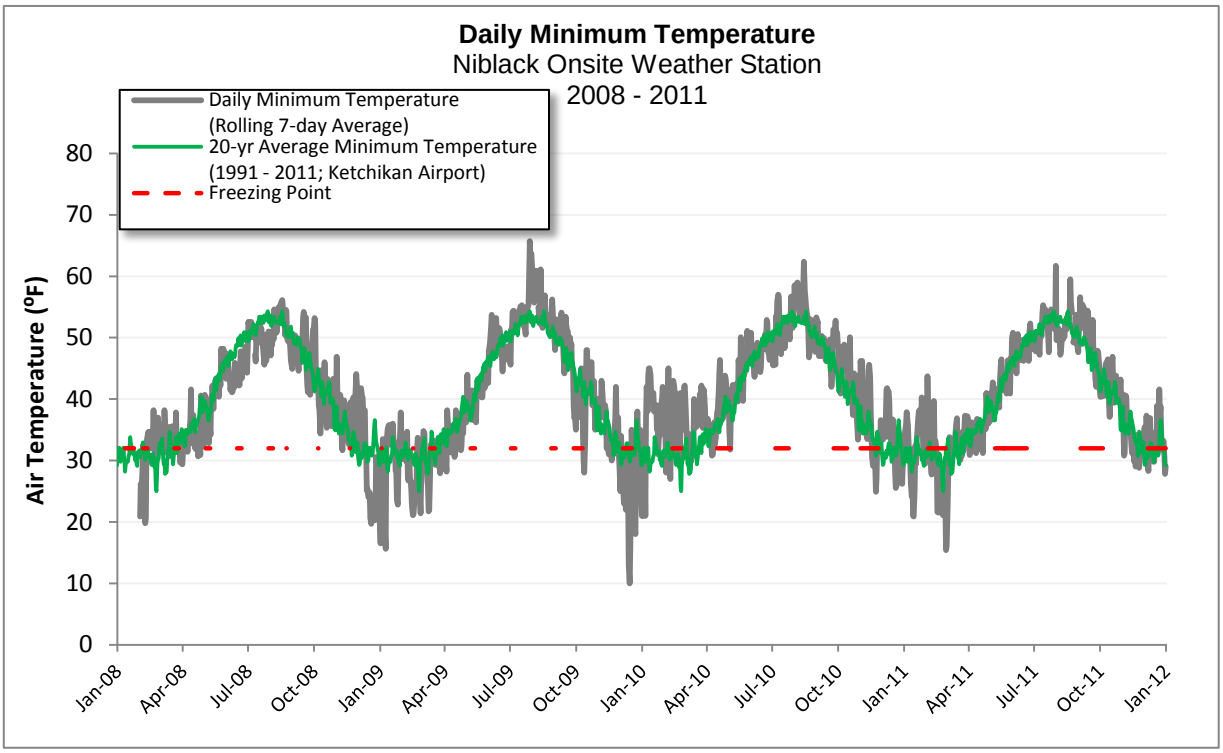
DATE:	23 November 2009	MODIFIED BY:	A. Turner
DWG:	Portal_091123.dwg	SCALE:	1" : 300'



NIBLACK PROJECT LLC integral consulting inc.

Figure 2-5
Regional Temperature and Precipitation
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update

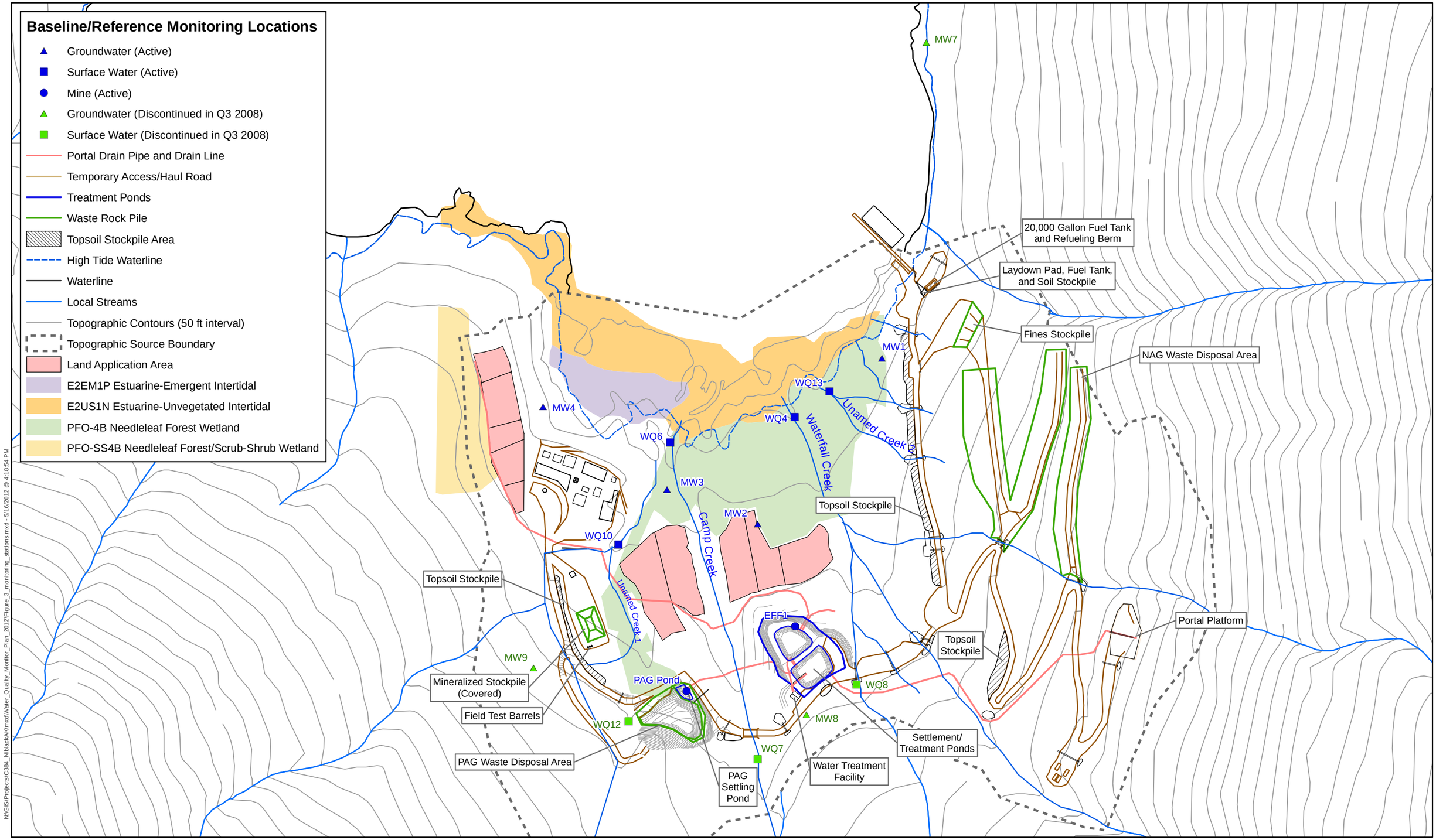




Note: Onsite weather station was not available from 9/18/2009 - 2/27/2009 due to instrument malfunction. Daily temperature and precipitation data for the Ketchikan Airport NOAA weather station are shown for this time period.

NIBLACK PROJECT LLC integral consulting inc.

Figure 2-6
Niblack Project Site Temperature and Precipitation
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



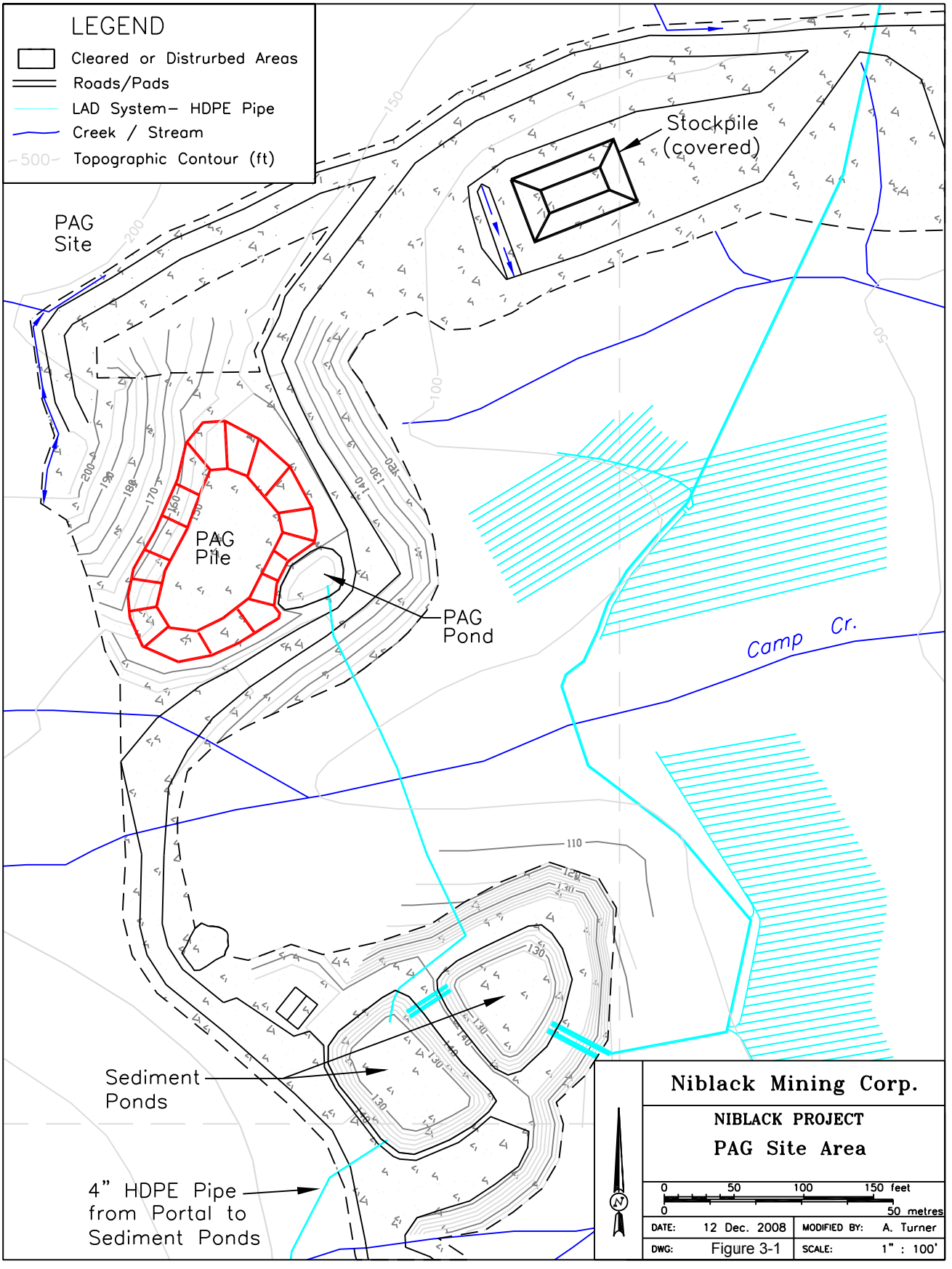
N:\GIS\Projects\C384_NiblackAK\mxd\Water_Quality_Monitor_Plan_2012\Figure_3_monitoring_stations.mxd - 5/16/2012 @ 4:18:54 PM

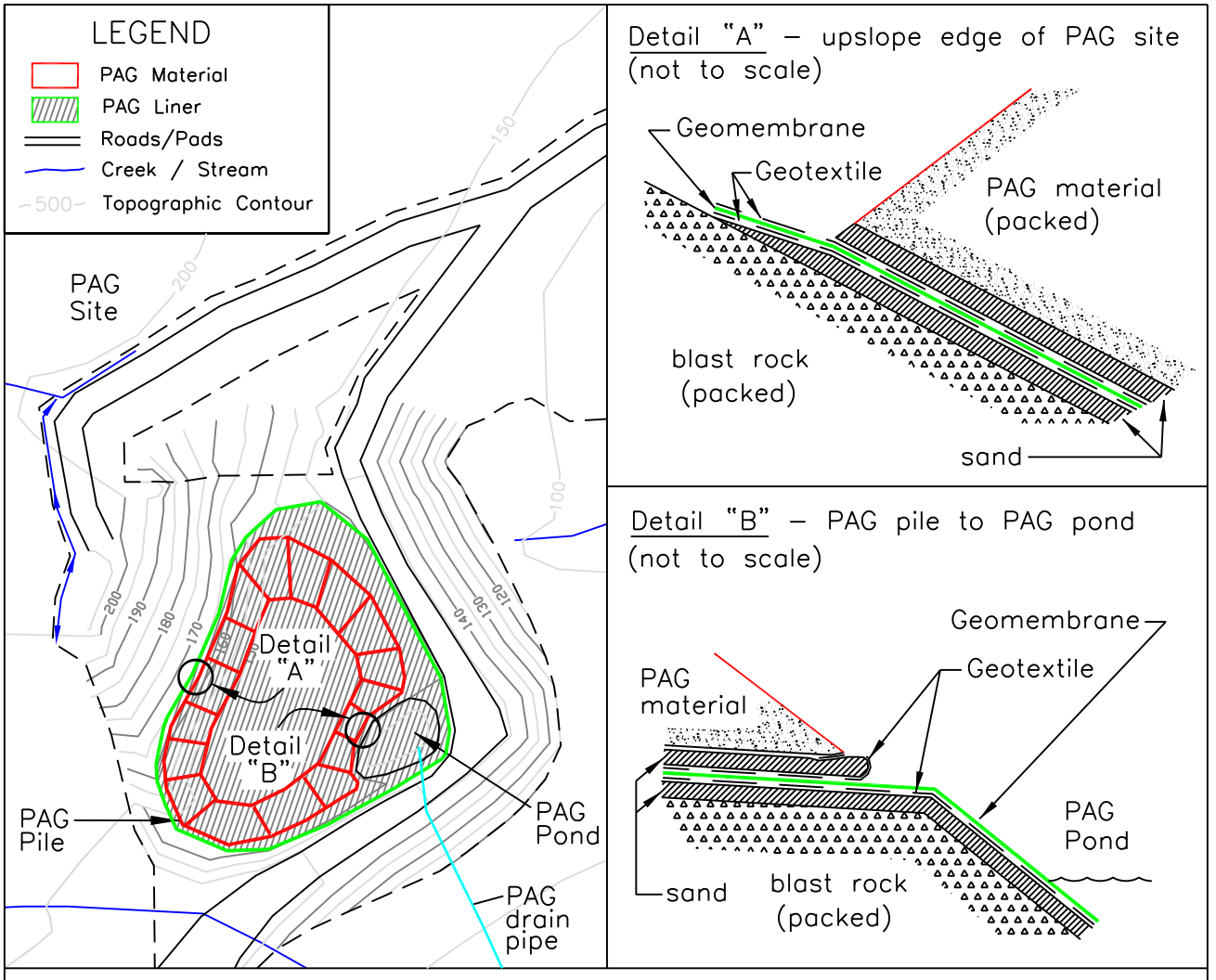
NIBLACK PROJECT LLC

integral consulting inc.

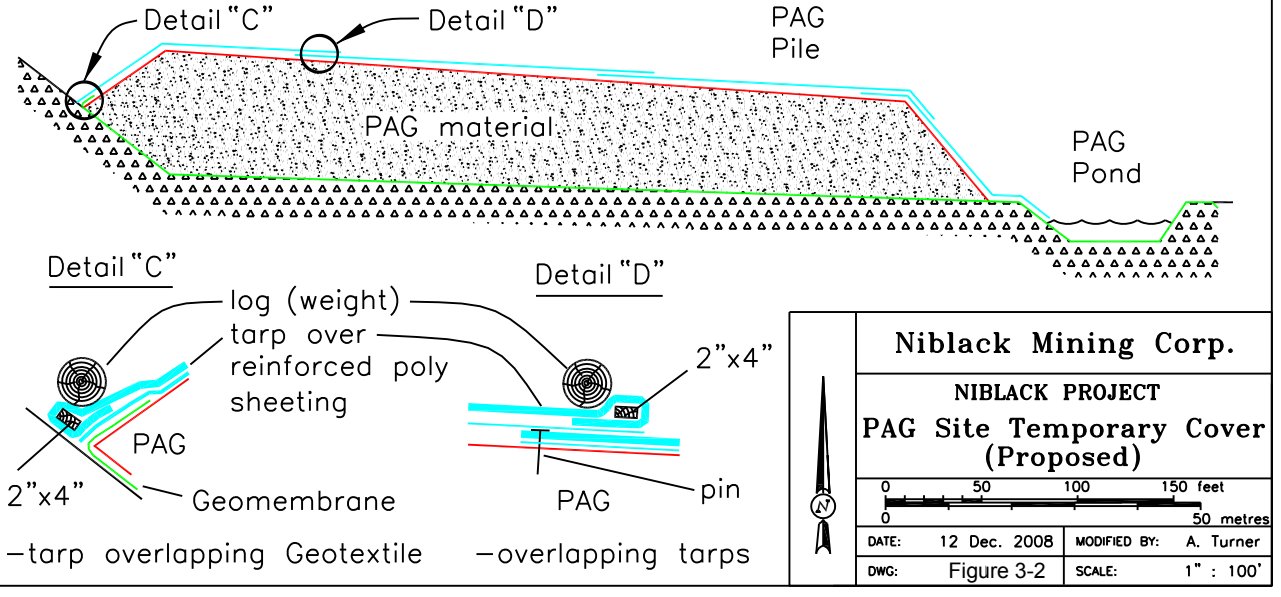
Feature Sources:
Base layers from Knight Piesold, 2007. Water Quality Baseline and Site Monitoring Plan.
Land Application Area from Turner, 2009. Personal communication.
Waste rock areas, portal drains, roads, and ground cover zones from Niblack Project LLC.

Figure 2-7
Water Quality Monitoring Stations
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update


LEGEND
Cleared or Disturbed Areas
Roads/Pads
LAD System– HDPE Pipe
Creek / Stream
500 Topographic Contour (ft)
PAG Site
Stockpile (covered)
PAG Pile
PAG Pond
Camp Cr.
Sediment Ponds
4" HDPE Pipe from Portal to Sediment Ponds
Niblack Mining Corp.
NIBLACK PROJECT
PAG Site Area
0 50 100 150 feet
0 50 metres
DATE: 12 Dec. 2008
MODIFIED BY: A. Turner
DWG: Figure 3-1
SCALE: 1" : 100'



PAG Pile Profile and Propsed Cover (tarps with Visqueen poly sheeting)
(not to scale)



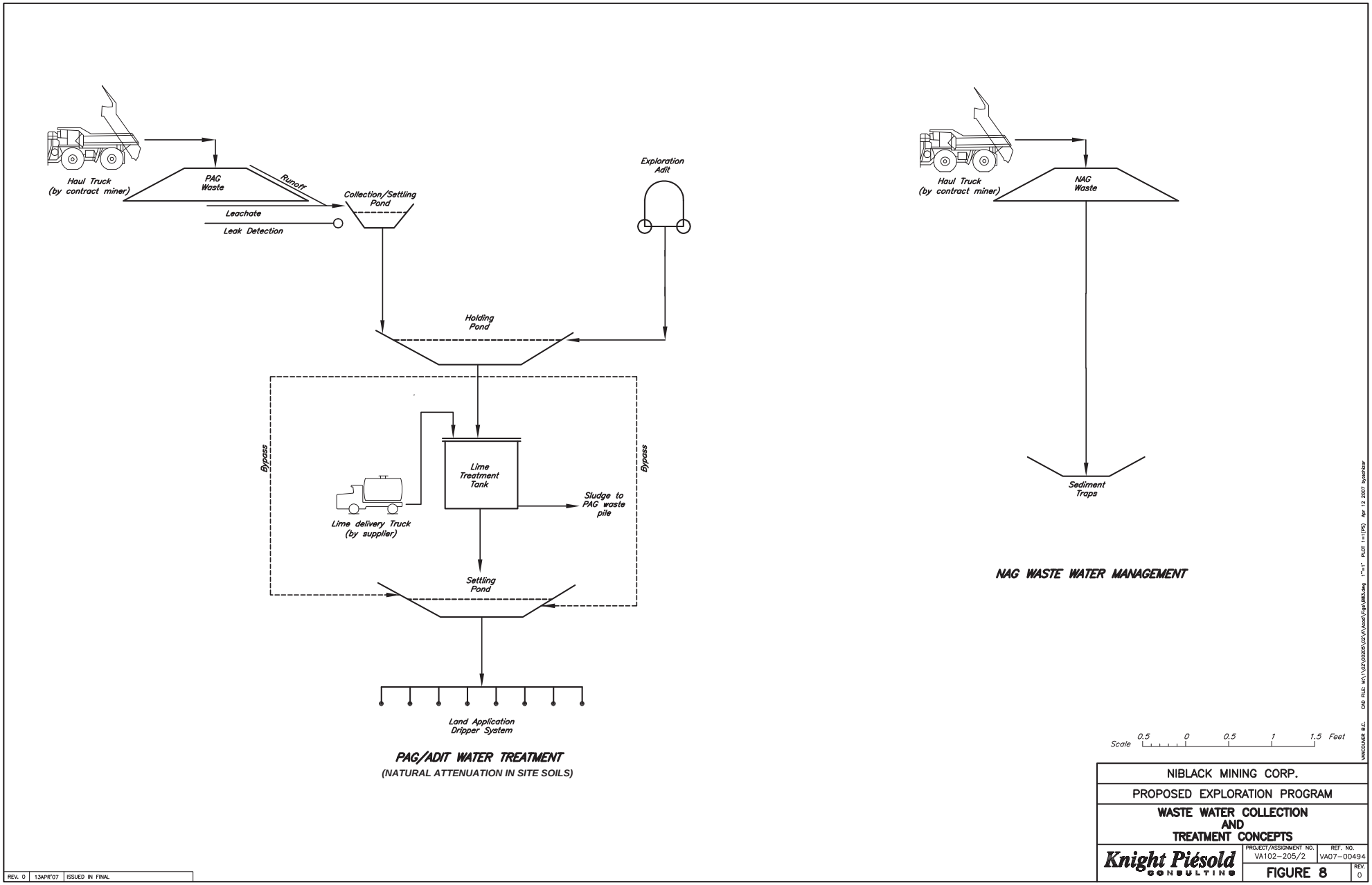
Niblack Mining Corp.

NIBLACK PROJECT

PAG Site Temporary Cover (Proposed)

0 50 100 150 feet
0 50 metres

DATE:	12 Dec. 2008	MODIFIED BY:	A. Turner
DWG:	Figure 3-2	SCALE:	1" : 100'

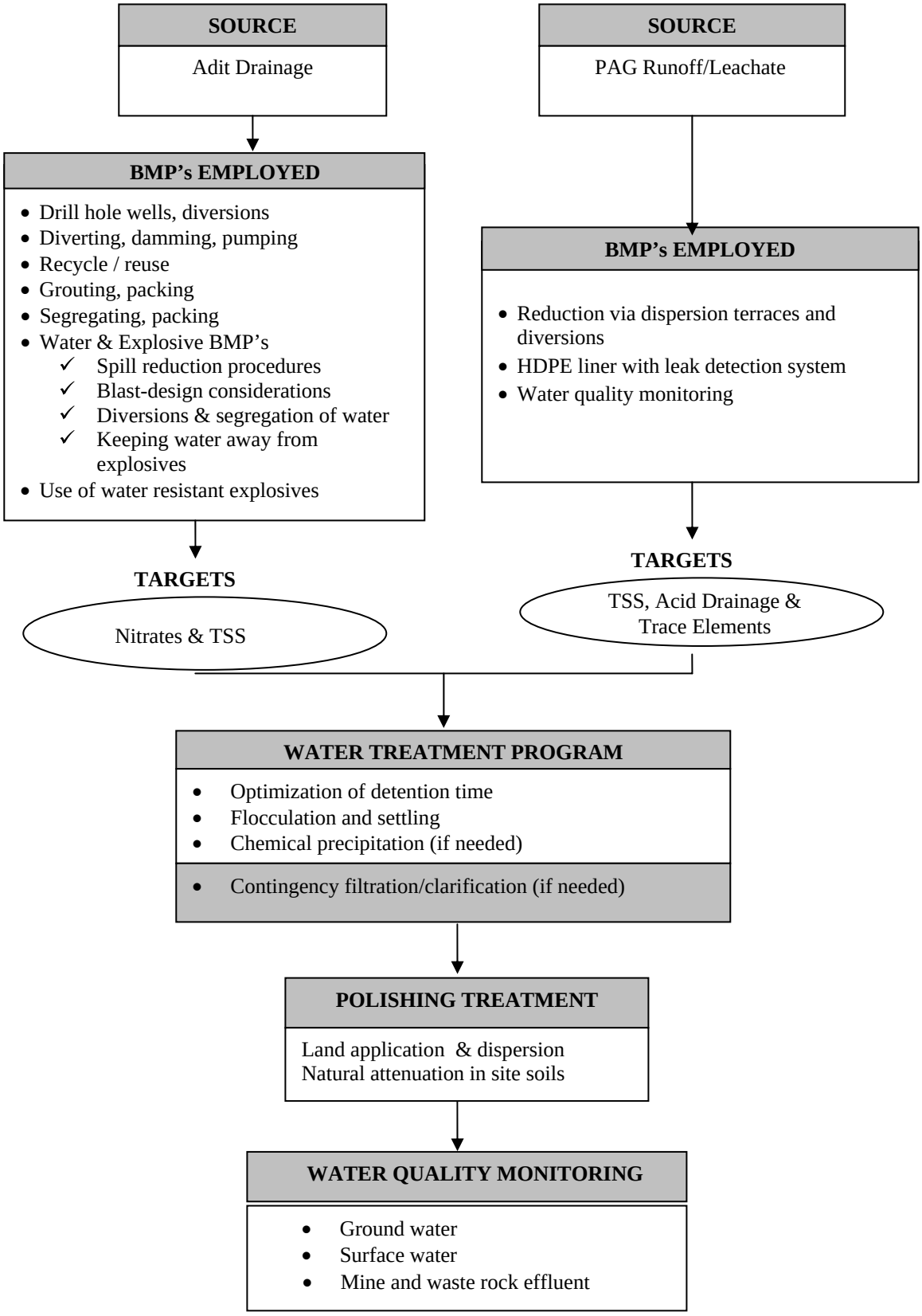


NIBLACK PROJECT LLC

integral consulting inc.

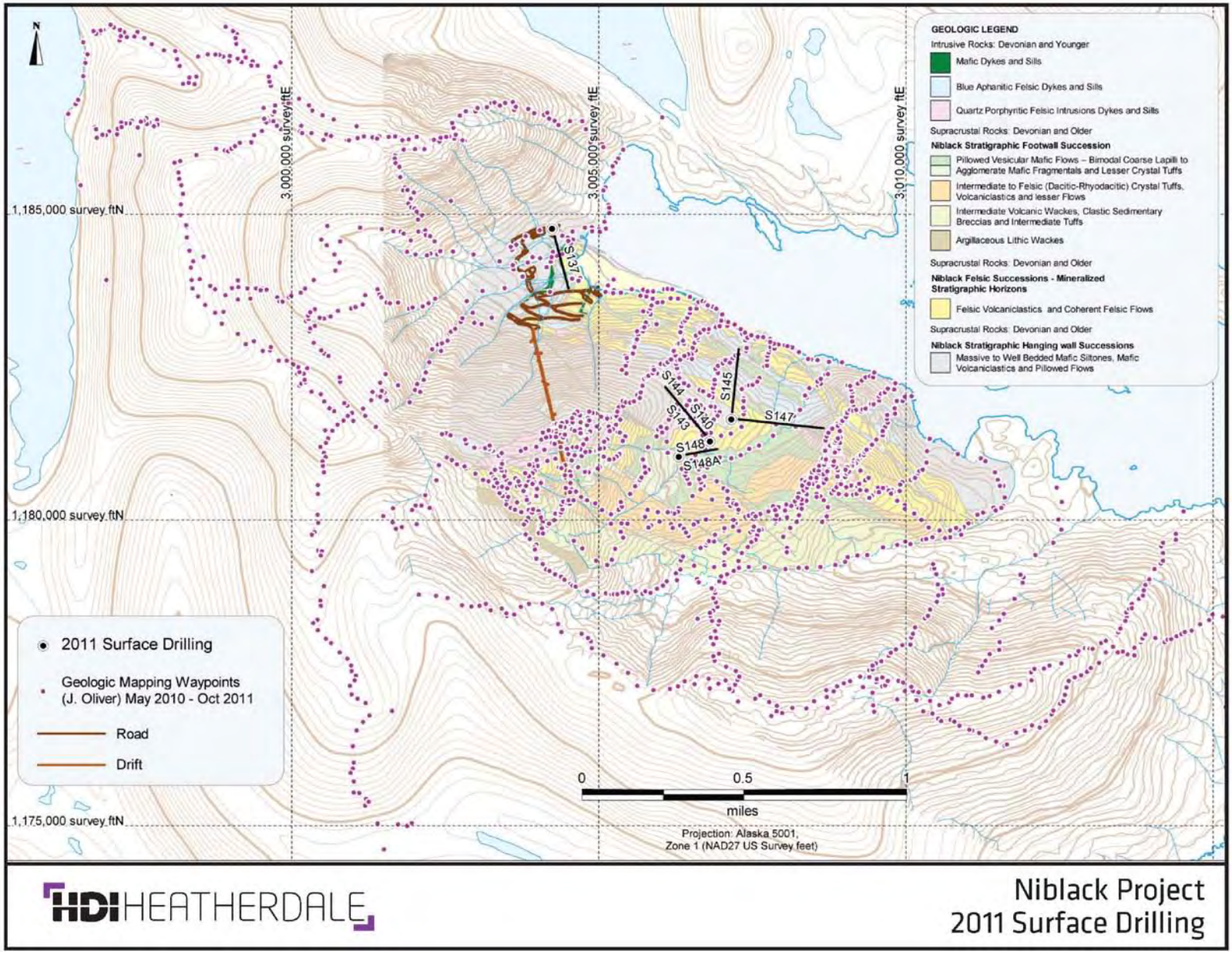
Figure 3-3
Wastewater Collection and Treatment Concepts
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update

Niblack Construction Wastewater Treatment Conceptual Flow Chart



NIBLACK PROJECT LLC integral consulting inc.

Figure 3-4
Niblack Construction Wastewater Treatment Conceptual Flow Chart
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



Source: Heatherdale (2011)

NIBLACK PROJECT LLC integral consulting inc.

Figure 3-5
Niblack Project Surface Drilling, 2011
Niblack Underground Plan of Operations
2012 Post-Construction Update

TABLES

Table 1-1. Summary of Permits, Notices, and Approvals for the Niblack Underground Exploration Project

Permit	Permitting Agency	Issued Date	Permit ID	Status	Notes	Document Website Link
Waste Management Permit	ADEC	6/29/2007	2006-DB0037	Valid through 6/28/2012. An Industrial Solid Waste Monofill Application and request for approval were submitted in May 2012.	Permit covers the disposal of non-domestic solid waste and wastewater management	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf2/niblackwmp.pdf
Reclamation Plan Approval	ADNR	6/29/2007	J072711	Valid through 6/29/2012. A updated reclamation plan and request for approval were submitted in May 2012.	Approval for the Reclamation Plan for the Niblack Underground Exploration Project	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf2/niblackrpa.pdf
Tideland Lease	ADNR	8/1/2009	ADL 107544	Effective from 8/1/2009 - 7/31/2019	Permit issued for the use, maintenance, and development of a marine terminal consisting of a barge landing camp, dock, seaplane float, and camp barge.	
Land Use Permit (Tidelands)	ADNR	4/15/2007	LAS 25727	Valid through 4/14/2012	Permit issued for the purpose of mooring a camp barge to house employees	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf/tide.pdf
Determination of consistency with the Alaska Coastal Management Program (ACMP)	ADNR	6/22/2007	State ID No. AK 0703-01J	Final decision for the project; renewal not needed	Confirmation that the floating barge camp is consistent with ACMP policies	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf2/niblackacmp.pdf
Department of the Army Permit Modification	DA	4/16/2007	File No. POA-1982-290-M	Valid through 4/30/2008, during development and construction period. Renewal not needed.	Modification to permit originally issued in 1982 to construct the log float plane dock	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf/acoetemp.pdf
Department of the Army Permit	DA	7/12/2007	File No. POA-1982-290-N	Valid through 7/31/2012, during development and construction period. Renewal not needed.	Authorization of construction of marine barge landing facility, barge camp, and dock.	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf2/nibacoe.pdf
General Permit for Marine Disposal of Secondary Treated Domestic Wastewater from Housing and Kitchen Facilities Built on Shore or Floating Barges	ADEC	8/4/2006	0240DB004-1132	Valid through 6/10/2012, with additional administration extensoin beyond that date until statewide general permit has been developed by ADEC.	Permit to discharge domestic wastewater associated with the barge camp.	

Table 1-1. Summary of Permits, Notices, and Approvals for the Niblack Underground Exploration Project

Permit	Permitting Agency	Issued Date	Permit ID	Status	Notes	Document Website Link
Temporary Water Use Authorization	ADNR	Updated application in progress.	TWUP# F2011-118	Valid through 10/28/2012. Updated renewal application in progress.	Authorization for use of water for domestic use in the floating barge camp. Original application (TWUP#J2005-06 Amended) specified surface stream as water source. Updated application will specify groundwater well as water source.	
Temporary Water Use Authorization	ADNR	7/15/2005	TWUP#J2005-07	Valid through 7/15/2010	Authorization for use of water for exploration drilling	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf/twup0507.pdf
Temporary Water Use Authorization	ADNR	6/29/2007	TWUP#J2007-01	Valid through 6/28/2012	Authorization for use of water intercepted by the exploration drift for adit development and exploration drilling	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf2/niblacktwup.pdf
Authorization Under Nationwide Permit (NWP) No. 14, Linear Transportation Projects	ACOE	6/13/2006	File No. POA-2006-511-D	Valid until the NWP is modified, reissued, or revoked	Authorization to place dredge and/or fill material into waters of the U.S., associated with application to place culverts and fill drainage areas for transportation crossings.	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf/acoenw.pdf
Jurisdictional Wetlands Determination	ACOE	3/31/2006	File No. POA-2006-511-9	No expiration	Determination that the property contains wetlands under the regulatory jurisdiction of the ACOE	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf/poo1.pdf
State Historic Preservation	ADNR	n/a	File No. 3130-1R COE	No expiration	In a letter dated 6/16/2006, the Alaska State Historic Preservation Officer requested that the Niblack project avoid the historic mine camp and any other historic features.	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf/shpo.pdf
Fish Habitat Permit	ADNR	6/13/2006	FH-06-VII-0014	Valid for the life of the project	Approval to construct a bridge over Camp Creek.	http://dnr.alaska.gov/mlw/mining/largemine/niblack/pdf/fish.pdf

Notes:
ACMP = Alaska Coastal Management Program
ACOE = Army Corps of Engineers
ADEC = Alaska Department of Environmental Conservation
ADNR = Alaska Department of Natural Resources
DA = Department of the Army
EPA = Environmental Protection Agency
NWP = Nationwide Permit
POO = Plan of Operations

Table 2-1. Patented Claims Controlled by Niblack Project LLC

Patented Claims Controlled by Niblack Project LLC		
Mineral Survey #	**Recording District**	**Claim(s)**
533	Ketchikan[a]	Parcel No. 1: Lookout Lode (Mining Claim), Conundrum Lode (Mining Claim), Conundrum Extension Lode (Mining Claim), Blue Bell[b] Lode (Mining Claim), West Mammoth Lode (Mining Claim), East Mammoth Lode (Mining Claim)
644	Ketchikan	Parcel No. 2: Judge Lode (Mining Claim), Bradford Lode (Mining Claim), Jefferson Lode (Mining Claim), Forest Lode (Mining Claim), Iron and Copper Lode (Mining Claim), Luella Lode (Mining Claim)
1437	Ketchikan	Parcel No. 3: Mary Lode (Mining Claim)
1438	Ketchikan	Parcel No. 4: Pride Lode (Mining Claim)
1436	Ketchikan	Parcel No. 5: Snow Flake (Mining Claim)
1585	Ketchikan	Parcel No. 6: Beach Lode (Mining Claim)
1009	Ketchikan	Trio Lode (Mining Claim), Broadgauge Lode (Mining Claim)

Notes: [a] Ketchikan Recording District, First Judicial District, State of Alaska
[b] In some documentation, listed as Blue Belle claim

Table 2-2. Monthly Climate Summary for Ketchikan, Alaska

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Maximum Temperature (°F)	38.9	41.7	44.1	50	56.5	61.5	64.9	65.1	59.9	51.7	44.5	40.6	51.7
Average Minimum Temperature (°F)	28.5	31.1	32.2	36	41.4	47.3	51.2	51.6	47.2	40.8	34.6	31.1	39.5
Average Total Precipitation (in.)	12.42	10.63	9.65	10.04	8.02	6.46	6.67	9.9	13.47	20.97	15.89	14.2	138.32
Average Total SnowFall (in.)	6.5	3.7	1.5	0.1	0.1	0	0	0	0	0	1.2	4.2	17.3

Data Source:
Western Regional Climate Center
Station 504590, Ketchikan, Alaska
Period of Record : 9/ 1/1949 to 12/31/2011
http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak4590

Table 2-3. Summary of Camp Creek Streamflow

	2007	2008
	Manual Measurements	
Date	Discharge (CFS)	
March 7	--	33.4
March 9	--	29.8
April 11	--	38.3
May 24	--	48.6
August 10	1.86[a]	--
August 11	0.5[a]	--
August 12	0.38[a]	--
August 17	1.79[a]	--
August 22	--	27.9
October 4	--	2.12
October 11	3.4[a]	--
November 3	3.5	--
November 10	32.9	--
November 11	4.07	--

Notes:
cfs = cubic feet per second
[a]Value represents average of multiple discharge estimates from same day measurements.

Table 2-4. Hydrology for Streams Near the Niblack Exploration Project

	Discharge (ft^3/s)			Discharge (m^3/s)			Unit Area Discharge ($L/s/km^2$)		
	Monthly Average	Monthly Maximum	Monthly Minimum	Monthly Average	Monthly Maximum	Monthly Minimum	Monthly Average	Monthly Maximum	Monthly Minimum
Stanley Creek, Craig, Alaska [a]									
January	380	896	24	10.8	25.4	0.7	80.6	189.9	5.1
February	348	636	16	9.9	18	0.4	73.8	134.8	3.4
March	263	436	102	7.5	12.4	2.9	55.8	92.5	21.7
April	384	1151	146	10.9	32.6	4.1	81.5	244	31
May	348	659	116	9.9	18.7	3.3	73.7	139.6	24.6
June	187	304	60	5.3	8.6	1.7	39.5	64.3	12.8
July	124	288	38	3.5	8.2	1.1	26.2	61	8
August	163	359	24	4.6	10.2	0.7	34.5	76.2	5
September	416	917	24	11.8	26	0.7	88.1	194.3	5
October	774	1546	276	21.9	43.8	7.8	164	327.6	58.6
November	552	1374	147	15.6	38.9	4.2	117	291.2	31.1
December	472	1133	113	13.4	32.1	3.2	100.1	240.2	23.9
Indian Creek, Hollis, Alaska [b]									
January	81	235	4	2.3	6.7	0.1	100	291.4	4.9
February	75	151	5	2.1	4.3	0.1	93	186.7	6.5
March	62	110	14	1.8	3.1	0.4	77	135.8	17
April	99	160	34	2.8	4.5	0.9	122.9	198.7	41.5
May	112	204	32	3.2	5.8	0.9	139	253.5	40
June	63	159	3	1.8	4.5	0.1	78	196.7	4.2
July	28	68	9	0.8	1.9	0.3	34.9	84.9	11.4
August	40	77	4	1.1	2.2	0.1	50.1	95.1	4.5
September	75	112	28	2.1	3.2	0.8	92.7	138.3	34.2
October	159	286	59	4.5	8.1	1.7	196.6	354.4	73.3
November	117	198	50	3.3	5.6	1.4	144.6	246	61.6
December	119	192	27	3.4	5.4	0.8	148.1	238.6	33.3
Cabin Creek, Kasaan, Alaska [c]									
January	88	100	77	2.5	2.8	2.2	109.4	123.4	95.5
February	108	112	104	3.1	3.2	2.9	133.4	138.4	128.4
March	33	35	31	0.9	1	0.9	40.5	42.9	38.1
April	62	63	61	1.7	1.8	1.7	76.2	77.4	75.1
May	63	86	40	1.8	2.4	1.1	78.3	106.7	49.8
June	70	105	39	2	3	1.1	86.6	129.5	47.7
July	31	47	15	0.9	1.3	0.4	38.7	57.6	18.1

Table 2-4. Hydrology for Streams Near the Niblack Exploration Project

	Discharge (ft^3/s)			Discharge (m^3/s)			Unit Area Discharge ($L/s/km^2$)		
	Monthly Average	Monthly Maximum	Monthly Minimum	Monthly Average	Monthly Maximum	Monthly Minimum	Monthly Average	Monthly Maximum	Monthly Minimum
August	25	39	9	0.7	1.1	0.2	30.5	48.2	10.8
September	64	82	48	1.8	2.3	1.3	78.8	101	58.9
October	156	208	104	4.4	5.9	3	193.4	257.6	129.3
November	121	149	92	3.4	4.2	2.6	149.6	185.1	114.2
December	149	166	132	4.2	4.7	3.7	184.7	205.4	164
Myrtle Creek, Prince of Wales Island, Alaska [d]									
January	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--
April	--	--	--	--	--	--	--	--	--
May	--	--	--	1.9	2	1.8	145.1	152.8	137.5
June	--	--	--	2.2	4.2	1.9	168.1	320.9	145.1
July	--	--	--	1.8	2.3	1.6	137.5	175.7	122.2
August	--	--	--	1.8	2.8	1.3	137.5	213.9	99.3
September	--	--	--	1.7	1.7	1.7	129.9	129.9	129.9
October	--	--	--	--	--	--	--	--	--
November	--	--	--	--	--	--	--	--	--
December	--	--	--	--	--	--	--	--	--

Source:
Data reproduced from Tables 3.1, 3.2, 3.3, and 3.4, Underground Exploration Plan of Operations (NMC 2007b).

Notes:
[a] Station No. 15081500, Elevation 2.0, 55deg48minutes, 133degress07minutes, Drainage area 51.60 miles
Period of record: October 1964 - September 1981

[b] (Station No. 1324141, Elevation 52', 55026', 132041', Drainage Area 8.82 $miles^2$) 22.84 km^2
Period of record: July 1949 - September 1964

[c] (Station No. 15085300, Elevation 5', 55025', 132028', Drainage Area 8.83 $miles^2$) 22.87 km^2
Period of record: June 1962 - September 1964

[d] (Elevation 5', 55deg4', 132deg07', Drainage Area 5.1 $miles^2$) 22.87 km^2
Period of record: May 1997 - September 1997

-- = Data not available.

Table 2-5. Summary of Ore Production at the Niblack Mine, 1905 to 1908

Year	Tons Shipped	Cu (%)	Au (opt)	Ag (opt)
1905	4,236	4.42	0.038	0.96
1906	10,502	2.78	0.032	0.48
1907	9,025	3.05	0.033	0.6
1908	6,705	3.32	0.082	0.93
	30,467	3.2	0.044	0.68

Source:
Table reproduced from Table 2.1, Underground Exploration Plan of Operations (NMC 2007c)

Notes:
opt = ounce per ton

Table 2-6. Summary of Drilling at the Niblack Site, 1975 to 2011

Year	Company	# of Holes	Drilling Length (feet)
1975	Cominco	6	2,893
1978	Anaconda	1	1,132
1982-83	Noranda	18	8,536
1984-89	Lac	20	10,912
1992-93	Lac	14	15,712
1995	Abacus	19	12,755
1996	Abacus	45	34,612
1997	Abacus	37	36,373
2005	NMC	7	6,215
2006	NMC	32	27,369
2007	NMC	3	1,617
2008	CBG	25	19,765
2009	CBG	8	8,610
2009 - 2011	NPLLC	136	183,727

Source:

Drilling information from 1975 - 2006 reproduced from Table 2.2, Underground Exploration Plan of Operations (NMC 2007c)

Drilling information for 2007 from Niblack Underground Exploration Project Annual Report (Integral 2008)

Drilling information for 2008 - 2011 from Niblack Exploration Project 2011 Annual Report (Integral 2012)

Table 3-1. Volumes of Potentially Acid-Generating and Non-Acid-Generating Waste Rock Produced during Excavation of the Niblack Exploration Drift

Description	Volume Generated (cubic yards)	Volume Generated (tons)	Drift Length (linear feet)	Number of Blast Rounds	Primary Composition	Notes
PAG Waste Rock	5,346	8,995	447	39	Sulfide mineralization within the Lookout Rhyolite and related footwall alteration	Stored in temporary PAG facility
Mineralized Ore Stockpile	574	965	48	4	Lookout Rhyolite	Well-mineralized PAG material stockpiled for potential future testing; stored adjacent to temporary PAG facility
NAG Waste Rock	33,400	56,200	2,793	243	Mafic volcanic rocks and mafic dykes	All NAG materials were used in site construction
Totals	**39,320**	**66,160**	**3,288**	**286**		

Source: Monthly Report. December 2011. Uncovered (PAG) Waste Rock Storage Facility, Monitoring Program.
Niblack Project, Alaska. Report prepared for Niblack Project LLC. pHase Geochemistry, Vancouver, BC. February 29, 2012.

Notes:
NAG = non-acid-generating
PAG = potentially acid generating

Table 3-2. Estimated Volumes of Potentially Acid-Generating Waste Rock Produced by the Niblack Exploration Drift

	2007 Volume Estimates from Design Plans								
			Chemical Analyses				PAG Rock[a]		
Unit	Tunnel Length (ft)	PAG[a] NP/MPA <3 (number samples)	NAG[b] NP/MPA >3 (number samples)	PAG[a] (%)		Tunnel Length (ft)	Volume in-situ[c] (ft^3)	Volume in-situ[d] (yd^3)	Volume as waste[e] (yd^3)
Hanging Wall	4,440	6	52	10%		459	86,810	3,247	4,383
Lookout	275	11	15	42%		116	21,989	822	1,110
Foot Wall	1,225	14	7	67%		817	154,350	5,773	7,793
Totals:	5,940	31	74	- -		1,392	263,149	9,842	14,300[f]

Source:

The waste rock estimates presented here are reproduced from Table 1 of the Niblack Project Operational Characterization Plan (Knight Piésold 2007a).

Notes:

[a] PAG = Potentially acid-generating/potentially metals-leaching rock, defined as: (neutralizing potential) / (maximum potential acidity) <= 3.

[b] NAG = Non-acid-generating rock, defined as: (neutralizing potential) / (maximum potential acidity) >3

[c] Nominal 13.5 X 14 ft tunnel dimension - multiply linear footage totals by 189 to get cubic footage (unbroken).

[d] Volume in cubic yards = cubic ft * 0.0374.

[e] Waste volume assumes 45% expansion of waste relative to in-situ volume.

[f] Adjusted for additional expansion factor.

Table 3-3. Estimated Volumes of Non-Acid-Generating Waste Rock Produced by the Niblack Exploration Drift

	2007 Volume Estimates from Design Plans								
			Chemical Analyses				NAG Rock[b]		
Unit	**Length Tunnel (ft)**	**PAG[a] NP/MPA <3 (number samples)**	**NAG[b] NP/MPA >3 (number samples)**	**NAG[b] (%)**		**Tunnel Length (ft)**	**Volume in-situ[c] (ft^3)**	**Volume in-situ[d] (yd^3)**	**Volume as waste[e] (yd^3)**
Hanging Wall	4,440	6	52	90%		3,981	752,350	28,138	37,986
Lookout	275	11	15	58%		159	29,986	1,121	1,514
Foot Wall	1,225	14	7	33%		408	77,175	2,886	3,897
Totals:	5,940	31	74	- -		4,548	859,511	32,146	**46,600[f]**

Source:

The waste rock estimates presented here are reproduced from Table 1 of the Niblack Project Operational Characterization Plan (Knight Piésold 2007a).

Notes:

[a] PAG = Potentially acid-generating/potentially metals-leaching rock, defined as: (neutralizing potential) / (maximum potential acidity) <= 3.

[b] NAG = Non-acid-generating rock, defined as: (neutralizing potential) / (maximum potential acidity) >3

[c] Nominal 13.5 X 14 ft tunnel dimension - multiply linear footage totals by 189 to get cubic footage (unbroken).

[d] Volume in cubic yards = cubic ft * 0.0374.

[e] Waste volume assumes 45% expansion of waste relative to in-situ volume.

[f] Adjusted for additional expansion factor.

Table 4-1. Niblack Exploration Project Water Flow Volumes, 2007 – 2011

Year	Month	Adit Flow (gal)	PAG Runoff (gal)	Direct Precipitation (gal)	Flow to LAD System (gal)	Portal Flow (gpm)	PAG Runoff (gpm)	Direct Precipitation (gpm)	Flow to LAD System (gpm)
2007	September	-	-	-	-	-	-	-	-
	October	89,280	-	-	342,080	2	-	-	8
	November	331,200	-	142,352	473,552	8	-	3	11
	December	267,840	-	156,704	-	6	-	4	-
2008	January	923,138	5,423	4,426	-	21	0	0	-
	February	918,720	140,486	121,550	423,834	23	3	3	11
	March	982,080	208,243	180,813	1,371,136	22	5	4	31
	April	1,562,400	96,699	85,415	1,746,514	36	2	2	40
	May	2,115,072	104,122	90,406	2,309,600	47	2	2	52
	June	3,033,893	107,375	93,231	3,234,500	70	2	2	75
	July	4,315,694	133,080	115,551	4,564,325	97	3	3	102
	August	4,609,457	153,146	132,973	4,895,575	103	3	3	110
	September	4,273,104	115,185	100,012	4,488,300	99	3	2	104
	October	3,416,630	299,458	260,012	3,976,100	77	7	6	89
	November	1,932,900	271,492	234,044	1,932,900	45	6	5	45
	December	514,500	79,381	68,432	514,500	12	2	2	12
2009	January	909,673	139,375	120,151	1,169,200	20	3	3	26
	February	1,900,759	92,661	79,880	2,073,300	47	2	2	51
	March	2,374,606	149,239	128,655	2,652,500	53	3	3	59
	April	2,186,859	120,587	103,954	2,411,400	51	3	2	56
	May	1,923,299	76,904	66,297	2,066,500	43	2	1	46
	June	2,328,634	51,967	44,799	2,425,400	54	1	1	56
	July	2,512,114	43,170	37,216	2,592,500	56	1	1	58
	August	2,692,699	99,675	85,927	2,878,300	60	2	2	64
	September	4,493,402	271,042	233,657	4,998,100	104	6	5	116
	October	6,793,690	194,252	167,459	7,155,400	152	4	4	160
	November	8,558,062	223,428	192,610	8,974,100	198	5	4	208
	December	7,149,228	142,300	122,672	7,414,200	160	3	3	166
2010	January	7,327,766	239,805	206,729	7,774,300	164	5	5	174
	February	8,605,501	82,972	71,528	8,760,000	213	2	2	217
	March	9,202,702	282,104	243,194	9,728,000	206	6	5	218
	April	9,125,046	124,729	107,525	9,357,300	211	3	2	217
	May	9,279,383	39,696	34,221	9,353,300	208	1	1	210
	June	8,088,966	123,644	106,590	8,319,200	187	3	2	193
	July	6,860,095	55,640	47,966	6,963,700	154	1	1	156
	August	8,268,126	87,093	75,081	8,430,300	185	2	2	189
	September	7,994,709	182,104	156,987	8,333,800	185	4	4	193
	October	9,228,185	316,269	272,646	9,817,100	207	7	6	220
	November	8,689,276	217,137	187,187	9,093,600	201	5	4	211
	December	6,318,029	158,894	136,978	6,613,900	142	4	3	148

Table 4-1. Niblack Exploration Project Water Flow Volumes, 2007 – 2011

Year	Month	Adit Flow (gal)	PAG Runoff (gal)	Direct Precipitation (gal)	Flow to LAD System (gal)	Portal Flow (gpm)	PAG Runoff (gpm)	Direct Precipitation (gpm)	Flow to LAD System (gpm)
2011	January	6,842,917	165,076	142,307	7,150,300	153	4	3	160
	February	8,103,109	126,790	109,302	8,339,200	201	3	3	207
	March	8,405,986	194,469	167,646	8,768,100	188	4	4	196
	April	8,435,083	122,668	105,749	8,663,500	195	3	2	201
	May	8,493,017	115,293	99,391	8,707,700	190	3	2	195
	June	9,626,275	34,599	29,827	9,690,700	223	1	1	224
	July	9,032,587	78,200	67,414	9,178,200	202	2	2	206
	August	8,282,926	70,499	60,775	8,414,200	186	2	1	188
	September	8,339,317	231,454	199,529	8,770,300	193	5	5	203
	October	5,039,835	258,135	222,530	5,520,500	113	6	5	124
	November	4,291,840	163,775	141,185	4,596,800	99	4	3	106
	December	3,850,972	195,228	168,300	4,214,500	86	4	4	94

Notes:
LAD system flows measured at an automatic flow meter at the outlet from the settling ponds to the LAD system.
PAG pile runoff and leachate calculated based on the monthly rainfall measured at the site multiplied by the PAG pile surface area (17,400 ft^2).
Direct precipitation to the site settling ponds calculated based on the monthly rainfall measured at the site multiplied by the settling pond surface area (15,000 ft^2).
Discharge from the underground exploration drift adit calculated as the total LAD system flow minus the sum of the PAG and direct precipitation flows.

- = no data available
gpm = gallons per minute
LAD = land application/dispersion system
PAG = potentially acid generating

Table 5-1. Water Quality Monitoring Stations

Monitoring Point	Location	Coordinates (NAD27, UTM Zone 8N) Easting	Northing	Status	Purpose: Pre-project Reference Conditions	Compliance Location	Information Only	Post-closure Monitoring
Effluent								
EFF1	Settling ponds at point of discharge to LAD	682103.6	6105572.1	Active			X	
PAG	PAG leak detection system	--	--	Active (no water) [c]			X [b]	
PAG Pond	PAG leachate/runoff capture pond	682046.3	6105664.3	Active			X	
Surface Waters								
WQ1	Off-site at Deer Pasture Creek – downstream	684358.0	6104664.0	Inactive			X	
WQ2	Off-site at Lookout Creek – downstream	683575.0	6105162.0	Inactive			X	
WQ3	Off-site at Myrtle Creek – downstream	683179.0	6105980.0	Inactive			X	
WQ4	Waterfall Creek – downstream	682283.3	6105575.9	Active	X	X		X
WQ8	Waterfall Creek – upstream	682054.7	6105518.6	Active	X			
WQ5	Camp Creek – middle reach of creek	682054.7	6105518.6	Inactive	X			
WQ6	Camp Creek – downstream	682259.5	6105682.2	Active	X	X		
WQ7	Camp Creek – upstream	681989.1	6105602.1	Discontinued [a]	X			
WQ10	Unnamed Creek 1 – downstream	682171.0	6105725.0	Discontinued [a]	X	X		
WQ12	Unnamed Creek 1 – upstream	682019.5	6105713.6	Discontinued [a]	X			
Seep	Unnamed Creek 1 – upstream groundwater seep	682306.0	6105546.4	Inactive	X			
WQ13	Unnamed Creek 2 – downstream	682306.0	6105546.4	Active	X			X
WQ14	Unnamed Creek on South side of Lookout Mountain	682955.0	6101933.0	Discontinued [b]			X	X
Groundwater Wells								
MW1	Wetlands below NAG site	682335.3	6105502.0	Active	X	X [c]		X
MW2	Wetlands below settling ponds and LAD area	682191.0	6105606.0	Active	X	X [c]		X

Table 5-1. Water Quality Monitoring Stations

Monitoring Point	Location	Coordinates (NAD27, UTM Zone 8N) Easting	Northing	Status	Purpose: Pre-project Reference Conditions	Compliance Location	Information Only	Post-closure Monitoring
MW3	Wetlands below PAG site and LAD area	682219.1	6105684.2	Active	X	X [c]		X
MW4	Wetlands below and LAD area	682288.0	6105792.0	Active	X	X [c]		X
MW7	Wetlands – offsite and to the east of the project	682607.0	6105469.0	Discontinued [a]	X			
MW8	Upgradient of LAD area and MW3	682028.0	6105561.0	Discontinued [a]			X [d]	
MW9	Upgradient of and LAD area and MW4	682064.0	6105796.0	Discontinued [a]			X [d]	
GW1	Pre-existing drill hole	682134.0	6105711.0	Inactive	X			
GW2	Upgradient of and LAD area and MW6	682178.0	6105640.0	Inactive	X			

Notes:

ADEC = Alaska Department of Environmental Conservation
LAD = land application/dispersion
NAG = non-acid-generating
PAG = potentially acid-generating

[a] Removed from the water quality monitoring network subsequent to Q3 2008, as per agreement with ADEC.

[b] Monitoring at station WQ14 was discontinued following collection of 20 baseline samples in the second quarter of 2012.

[c] A visual monitoring station was established below the PAG waste disposal area as part of a leak detection system. No water is anticipated to collect at this point unless there is a breach in the liner

[d] MW1, MW2, MW3, and MW4 will be used to monitor changes to natural water quality in wetlands water when compared to historical values and remote wetland wells.

[e] MW8 and MW9 will be used to determine background groundwater quality for information purposes only.

Table 5-2. Summary of Water Quality Monitoring Conducted through 2011 at Onsite Monitoring Stations

			Compliance Stations		Reference/Background Stations				Mine Water and Waste Rock Monitoring		
Year	Quarter	Month	Surface Water (WQ4, WQ6, WQ10, WQ13)	Monitoring Wells (MW1, MW2, MW3, MW4)	Surface Water (WQ7, WQ8, WQ12)[a]	Surface Water (WQ14)	Monitoring Wells (MW7, MW8, MW9)	Monitoring Wells & Seep (GW1, GW2, SEEP)[c]	Settling Ponds (EFF1)	PAG Pond (PAG)	Kinetic Test Barrels (LO1, LO2, HW1)
2012	Q1	Jan	X	X					X	X	X
		Feb									
		Mar									
	Q2	Apr				X					
		May									
		Jun									
	Q3	Jul									
		Aug									
		Sep									
	Q4	Oct									
		Nov									
		Dec									
2011	Q1	Jan	X	X		X			X	X	
		Feb				X				X	
		Mar				X					
	Q2	Apr	X	X		X			X	X	X
		May				X				X	
		Jun				X				X	
	Q3	Jul	X	X		X			X	X	X
		Aug				X				X	
		Sep									
	Q4	Oct									
		Nov								X	X
		Dec	X	X					X		
2010	Q1	Jan	X	X		X			X	X	X
		Feb				X				X	X
		Mar				X				X	
	Q2	Apr	X	X		X			X	X	
		May				X				X	X
		Jun				X				X	
	Q3	Jul				X				X	X
		Aug	X	X		X			X	X	
		Sep				X				X	X
	Q4	Oct	X	X		X			X	X	X
		Nov				X					
		Dec				X				X	X

Table 5-2. Summary of Water Quality Monitoring Conducted through 2011 at Onsite Monitoring Stations

			Compliance Stations		Reference/Background Stations				Mine Water and Waste Rock Monitoring		
Year	Quarter	Month	Surface Water (WQ4, WQ6, WQ10, WQ13)	Monitoring Wells (MW1, MW2, MW3, MW4)	Surface Water (WQ7, WQ8, WQ12)[a]	Surface Water (WQ14)	Monitoring Wells (MW7, MW8, MW9)	Monitoring Wells & Seep (GW1, GW2, SEEP)[c]	Settling Ponds (EFF1)	PAG Pond (PAG)	Kinetic Test Barrels (LO1, LO2, HW1)
2009	Q1	Jan									
		Feb									
		Mar	X	X		X			X	X	
	Q2	Apr									
		May	X	X		X			X	X	X
		Jun								X	
	Q3	Jul	X	X		X			X	X	X
		Aug								X	
		Sep				X				X	
	Q4	Oct	X	X		X			X	X	X
		Nov									
		Dec				X				X	
2008	Q1	Jan	X	X	X		X		X		
		Feb	X	X	X		X		X		
		Mar	X	X	X		X		X		
	Q2	Apr	X	X	X		X		X		
		May	X	X	X		X		X		
		Jun	X	X	X		X		X		
	Q3	Jul	X	X	X		X[b]		X		X
		Aug		X					X	X	X
		Sep		X					X	X	X
	Q4	Oct	X	X					X	X	X
		Nov									
		Dec									
2007	Q1	Jan									
		Feb	X	X	X		X[b]				
		Mar									
	Q2	Apr	X	X	X		X[b]				
		May	X	X	X		X[b]				
		Jun	X	X	X		X[b]	X			
	Q3	Jul	X	X	X		X				
		Aug	X	X	X		X				
		Sep	X	X	X		X				
	Q4	Oct	X	X	X		X				
		Nov	X	X	X		X		X		
		Dec	X	X	X		X		X		

Notes:
Monitoring for full analyte list (does not include field parameter-only monitoring events)

[a] Surface Water station WQ5 (Camp Creek middle reach) was monitored 6 times from 1996 - 2006. No samples have been collected since 2006.
[b] Monitoring at MW7 only. Completion and monitoring of wells MW8 and MW9 began in July 2007.
[c] Preliminary Monitoring Wells GW1 and GW2 were also sampled in October and December 2006. The SEEP station was also monitored in August, October, and December 2006.

Table 5-3. Exploration Phase Water Quality Monitoring Stations and Schedule

			Compliance Stations				Mine Water and Waste Rock Monitoring					
			Surface Water (WQ4, WQ6, WQ10, WQ13)		Monitoring Wells (MW1, MW2, MW3, MW4)		Settling Ponds (EFF1)		PAG Pond		Kinetic Test Barrels (LO1, LO2, HW1)	
Quarter	Month	Week	Field Parameters	Analytical Chemistry	Field Parameters	Analytical Chemistry	Field Parameters	Analytical Chemistry	Field Parameters	Analytical Chemistry	Field Parameters	Analytical Chemistry
Q1	Jan	1	1 sample per quarter	1 sample per quarter	1 sample per quarter	1 sample per quarter	X	1 sample per quarter	X	1 sample per quarter	X	1 sample per quarter
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
	Feb	1					X		X		X	
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
	Mar	1					X		X		X	
		2					X		X			
		3					X		X		X	
		4					X		X		X	
Q2	Apr	1	1 sample per quarter	1 sample per quarter	1 sample per quarter	1 sample per quarter	X	1 sample per quarter	X	1 sample per quarter	X	1 sample per quarter
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
	May	1					X		X		X	
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
	Jun	1					X		X		X	
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
Q3	Jul	1	1 sample per quarter	1 sample per quarter	1 sample per quarter	1 sample per quarter	X	1 sample per quarter	X	1 sample per quarter	X	1 sample per quarter
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
	Aug	1					X		X		X	
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
	Sep	1					X		X		X	
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	

Table 5-3. Exploration Phase Water Quality Monitoring Stations and Schedule

			Compliance Stations				Mine Water and Waste Rock Monitoring					
			Surface Water (WQ4, WQ6, WQ10, WQ13)		Monitoring Wells (MW1, MW2, MW3, MW4)		Settling Ponds (EFF1)		PAG Pond		Kinetic Test Barrels (LO1, LO2, HW1)	
Quarter	Month	Week	Field Parameters	Analytical Chemistry	Field Parameters	Analytical Chemistry	Field Parameters	Analytical Chemistry	Field Parameters	Analytical Chemistry	Field Parameters	Analytical Chemistry
Q4	Oct	1	1 sample per quarter	1 sample per quarter	1 sample per quarter	1 sample per quarter	X	1 sample per quarter	X	1 sample per quarter	X	1 sample per quarter
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
	Nov	1					X		X		X	
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	
	Dec	1					X		X		X	
		2					X		X		X	
		3					X		X		X	
		4					X		X		X	

Notes:
The analytical chemistry analyte list includes the conventional analyses, cations/anions, and metals listed in Table 3.
Field parameters include conductivity, dissolved oxygen, pH, temperature, and turdbidity.
Sulfate is measured in the field at mine water and wate rock stations (EFF1, PAG pond, HW1, LO1, LO2).

APPENDIX A

PHOTOGRAPHS OF SITE FACILITIES

SITE DEVELOPMENT

Photo 1. Aerial view of site, looking southwest (March 2008).

Photo 2. Mine portal (October 2009).

Photo 3. Surface drill setup at the landing just up from Old Camp (May 2011).

STORMWATER MANAGEMENT STRUCTURES

Photo 4. Roadside ditch including culvert and straw bale sediment trap.

Photo 5. Sediment trap located along road down slope of NAG waste rock site. Photo taken during period of heavy rainfall.

Photo 6. Culvert and sump near sediment ponds.

TOPSOIL STOCKPILE AND ROAD CONSTRUCTION

Photo 7. Topsoil stockpile.

Photo 8. Road cut and topsoil.

Photo 9. Road cut and topsoil, alternate view.

SEDIMENT POND AND LAND APPLICATION AREAS – WATER TREATMENT FACILITY

Photo 10. Sediment pond construction, including sand bedding layer (water treatment plant in background).

Photo 11. Sediment pond construction, showing geotextile placement, anchor trench, and HDPE liner.

Photo 12. Sediment pond construction, showing HDPE liner installation.

Photo 13. Completed sediment ponds (2009).

Photo 14. Partially completed water treatment facility, showing treatment tanks and mixers.

Photo 15. HDPE pipes exiting water treatment facility/sediment ponds and leading to Land Application Area.

Photo 16. Land Application Area, distribution system with 6-in. main line connecting to 2-in. pipe that services drip emitter lines for a single land application zone.

PAG TEMPORARY WASTE ROCK STORAGE SITE

Photo 17. Crushed rock base of PAG site prior to compaction, placement of sand layer, and liner installation (November 2007).

Photo 18. PAG site (2009).

Photo 19. PAG Pond capturing runoff from PAG Pile (May 2011).

Photo 20. PAG Pond (July 2011).

ENVIRONMENTAL LAB FOR OPERATIONAL CHARACTERIZATION PLAN AND GEOCHEMICAL ANALYSIS OF WASTE ROCK

Photo 21. Sample preparation lab for on-site XRF analysis, including crusher and pulverizer.

Photo 22. Sample preparation lab for on-site XRF analysis, including drying oven, riffle splitter, and press.

FLOAT, RAMP, AND BARGE CAMP

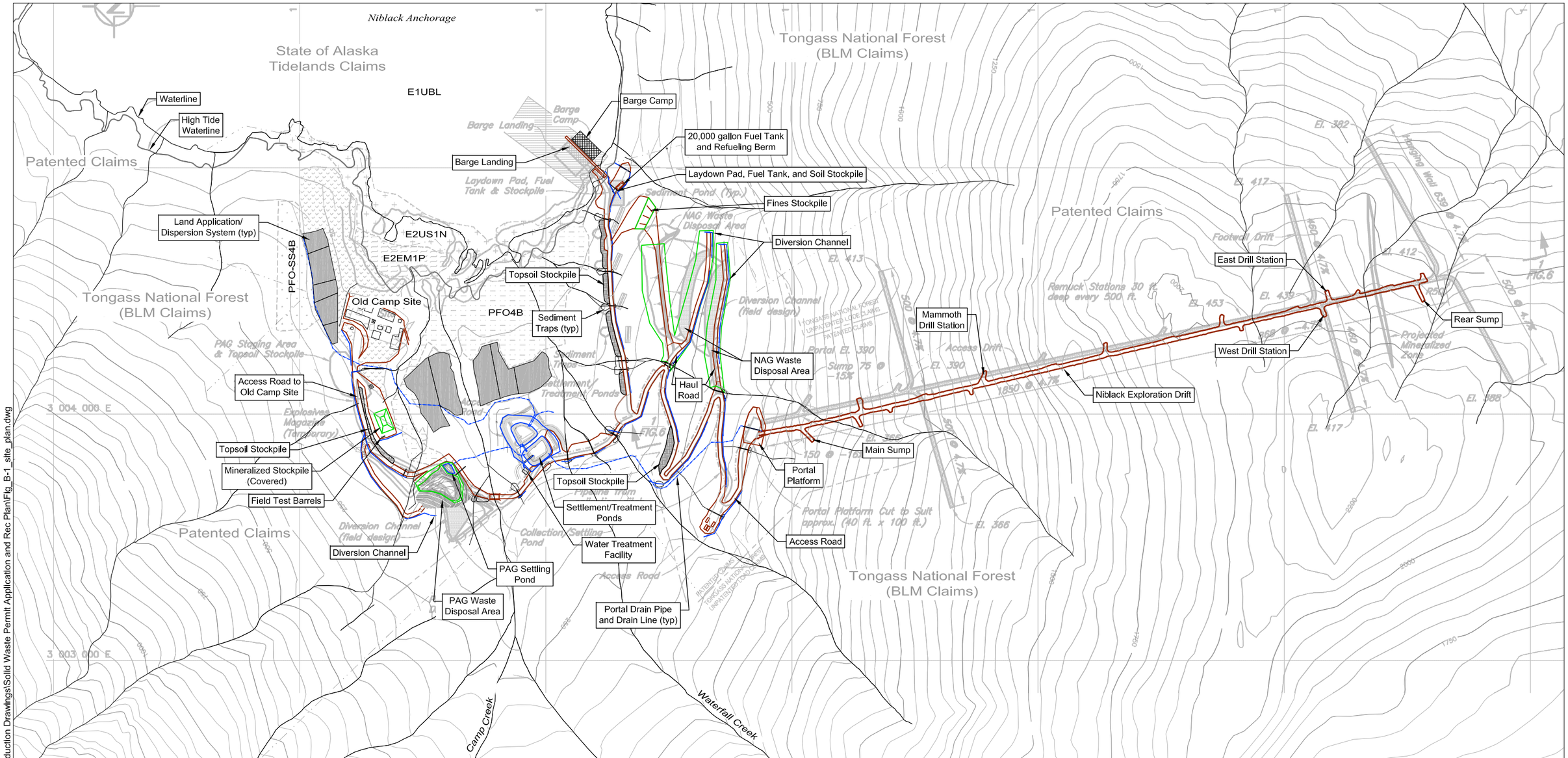
Photo 23. Barge ramp, float dock, and floating barge camp.

Photo 24. Barge camp (September 2009).

Photo 25. Old Camp and Niblack Anchorage (January 2011).

APPENDIX B

NIBLACK EXPLORATION PROJECT DESIGN DRAWINGS



LEGEND

- E1UBL Estuarine - Subtidal
- E2US1N Estuarine - Unvegetated Intertidal
- E2EM1P Estuarine - Emergent Intertidal
- PFO-SS4B - Needleleaf Forest/Scrub - Shrub Wetland
- PFO4B - Needleleaf Forest Wetland
- Land Application Areas
- Land Application Areas (2007)
- Tideland Lease Area
- Property/Patented Claim Boundary
- 2007 Design Plan (RTR 2007)
- Waste Rock Storage Facilities
- Water Management Features
- Roads and Exploration Access Drift

NOTE

1. All dimensions and elevations are in feet unless otherwise noted

SOURCES

1. Original design drawings reproduced from Figure 2 of the Reclamation and Closure Plan for the Niblack Underground Exploration Project (RTR 2007)
2. As-built drawings provided by Niblack Project LLC (2011)
3. Land application area boundaries from Turner (2009, personal communication)

NIBLACK PROJECT LLC

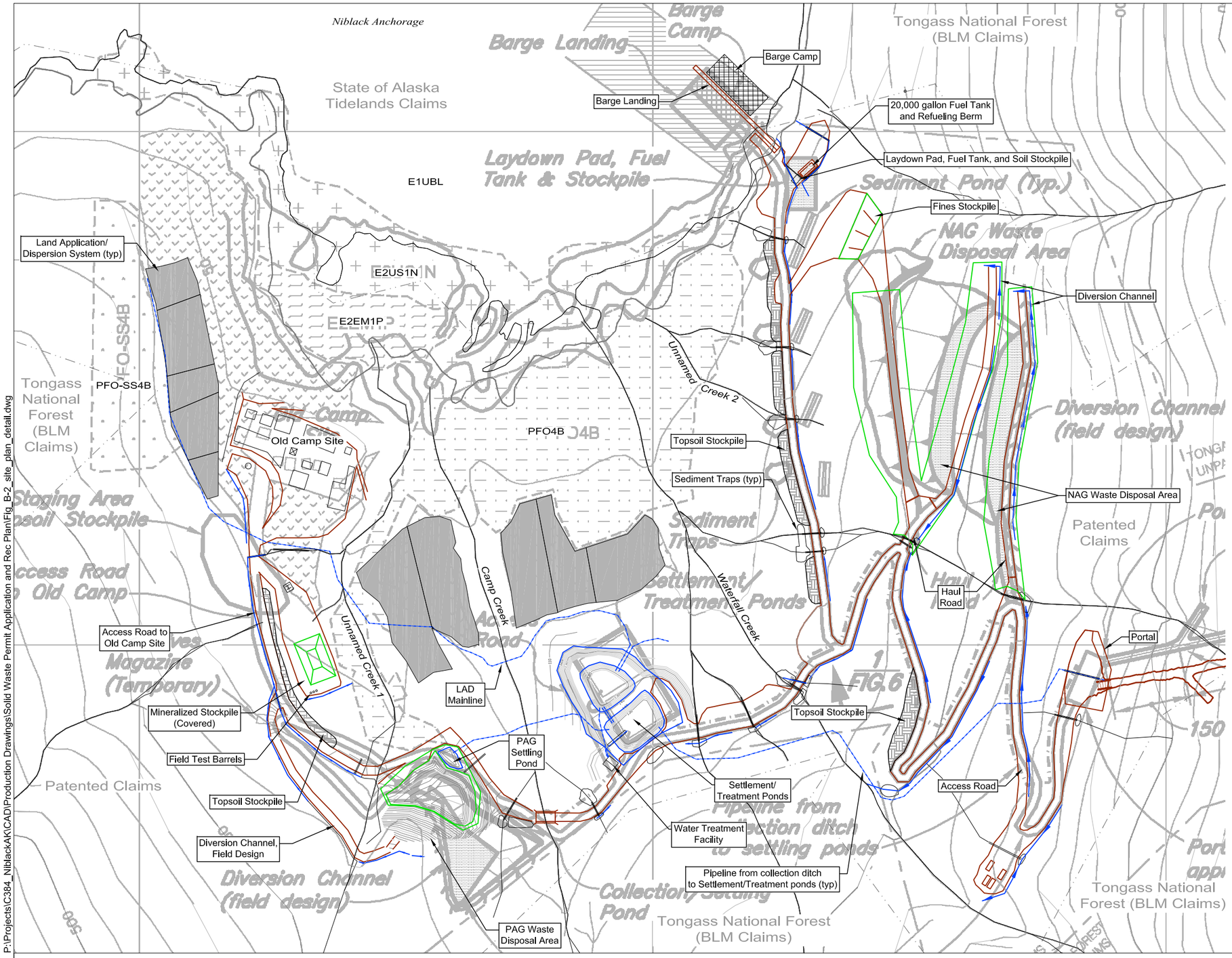
integral consulting inc.

0 200 400 Feet

N

Figure B-1
General Site Plan - As-built Drawings and Design Plans
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update

P:\Projects\C384_NiblackAK\CAD\Production Drawings\Solid Waste Permit Application and Rec Plan\Fig_B-1_site_plan.dwg



LEGEND

- E1UBL Estuarine - Subtidal
- E2US1N Estuarine - Unvegetated Intertidal
- E2EM1P Estuarine - Emergent Intertidal
- PFO-SS4B - Needleleaf Forest/Scrub - Shrub Wetland
- PFO4B - Needleleaf Forest Wetland
- Land Application Areas (2007)
- Land Application Areas
- Property/Patented Claim Boundary
- 2007 Design Plan (RTR 2007)
- Waste Rock Storage Facilities
- Water Management Features
- Roads and Exploration Access Drift

NOTE

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SOURCES

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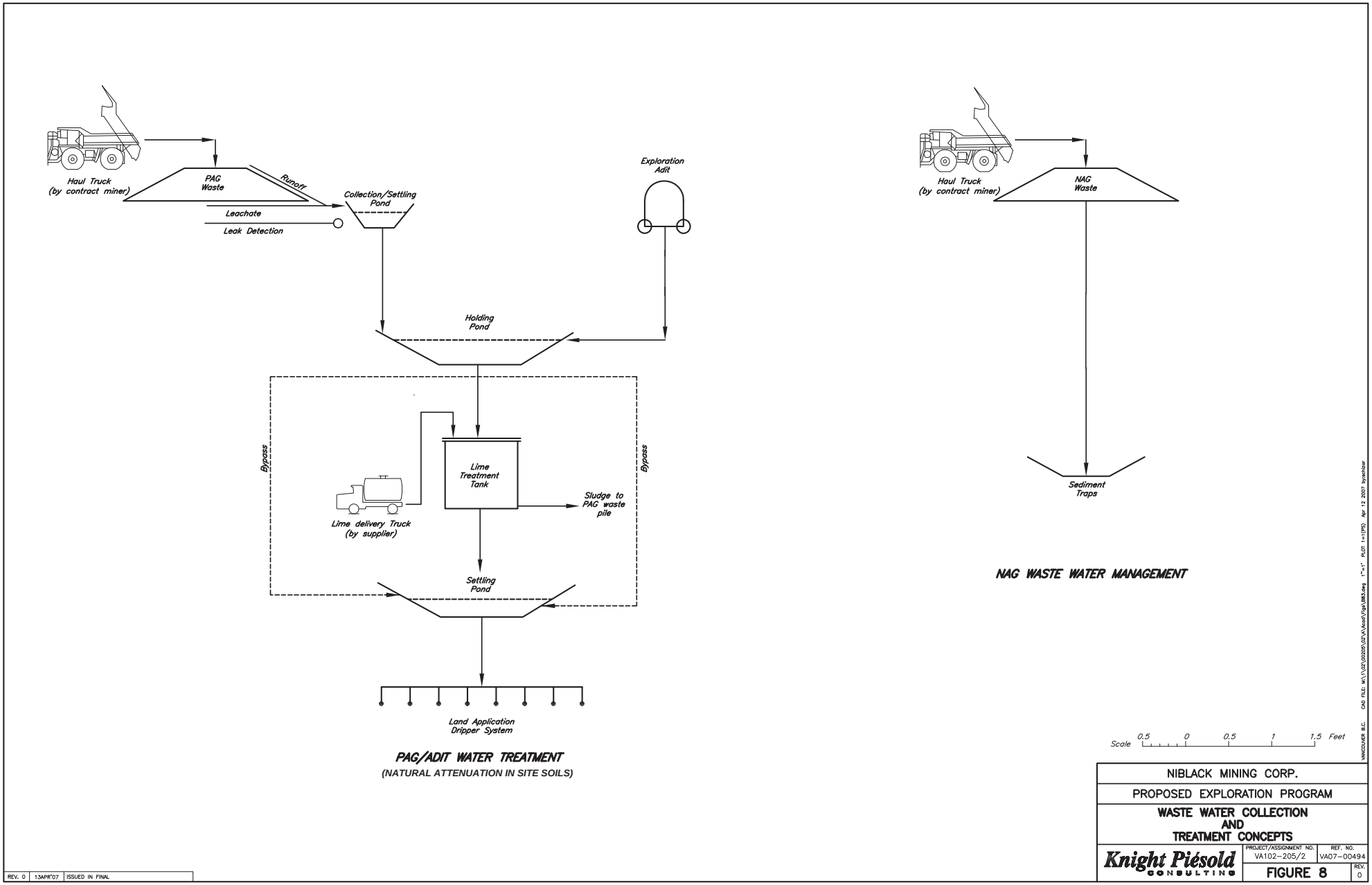
2. As-built drawings provided by Niblack Project LLC (2011)
3. Land application area boundaries from Turner (2009, personal communication)

NIBLACK PROJECT LLC

integral consulting inc.

Figure B-2
Site Plan Detail - As-built Drawings and Design Plan
Niblack Underground Exploration Plan of Operations
Solid Waste Permit Application

P:\Projects\C384_NiblackAK\CAD\Production Drawings\Solid Waste Permit Application and Rec Plan\Fig_B-2_site_plan_detail.dwg

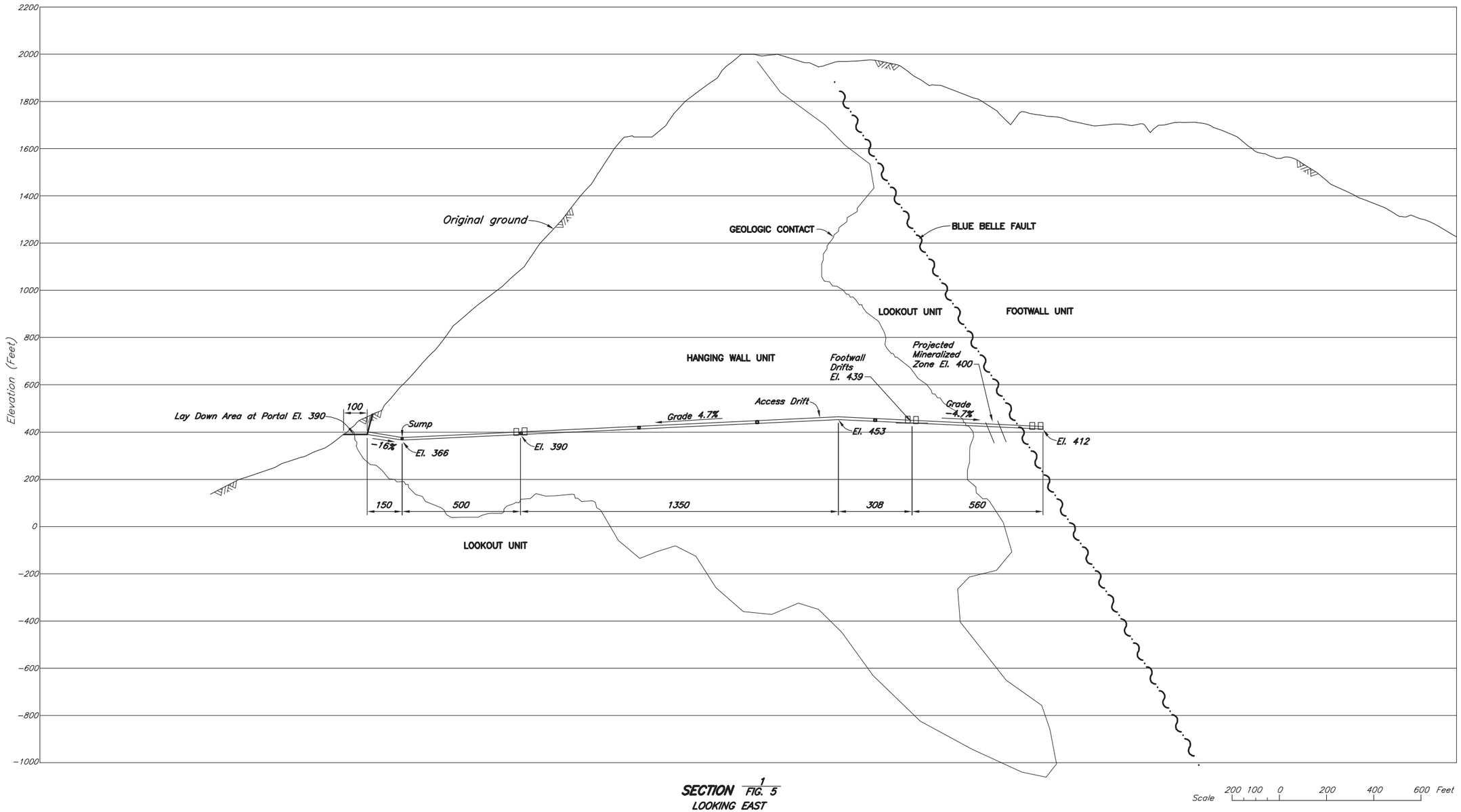


NIBLACK PROJECT LLC

integral consulting inc.

Figure B-3

Wastewater Collection and Treatment Concepts
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



SECTION 1 FIG. 5
LOOKING EAST

NOTES

1. This figure produced from information provided by Beacon Hill Consultants (1988) Ltd.
2. All dimensions and elevations are in feet unless otherwise noted.

NIBLACK MINING CORP.

PROPOSED EXPLORATION PROGRAM

PROPERTY SECTION

Knight Piésold CONSULTING

PROJECT/ASSIGNMENT NO.	REF. NO.
VA102-205/2	VA07-00494

FIGURE 6 REV. 0

REV.	DATE	ISSUED
0	13APR'07	ISSUED IN FINAL

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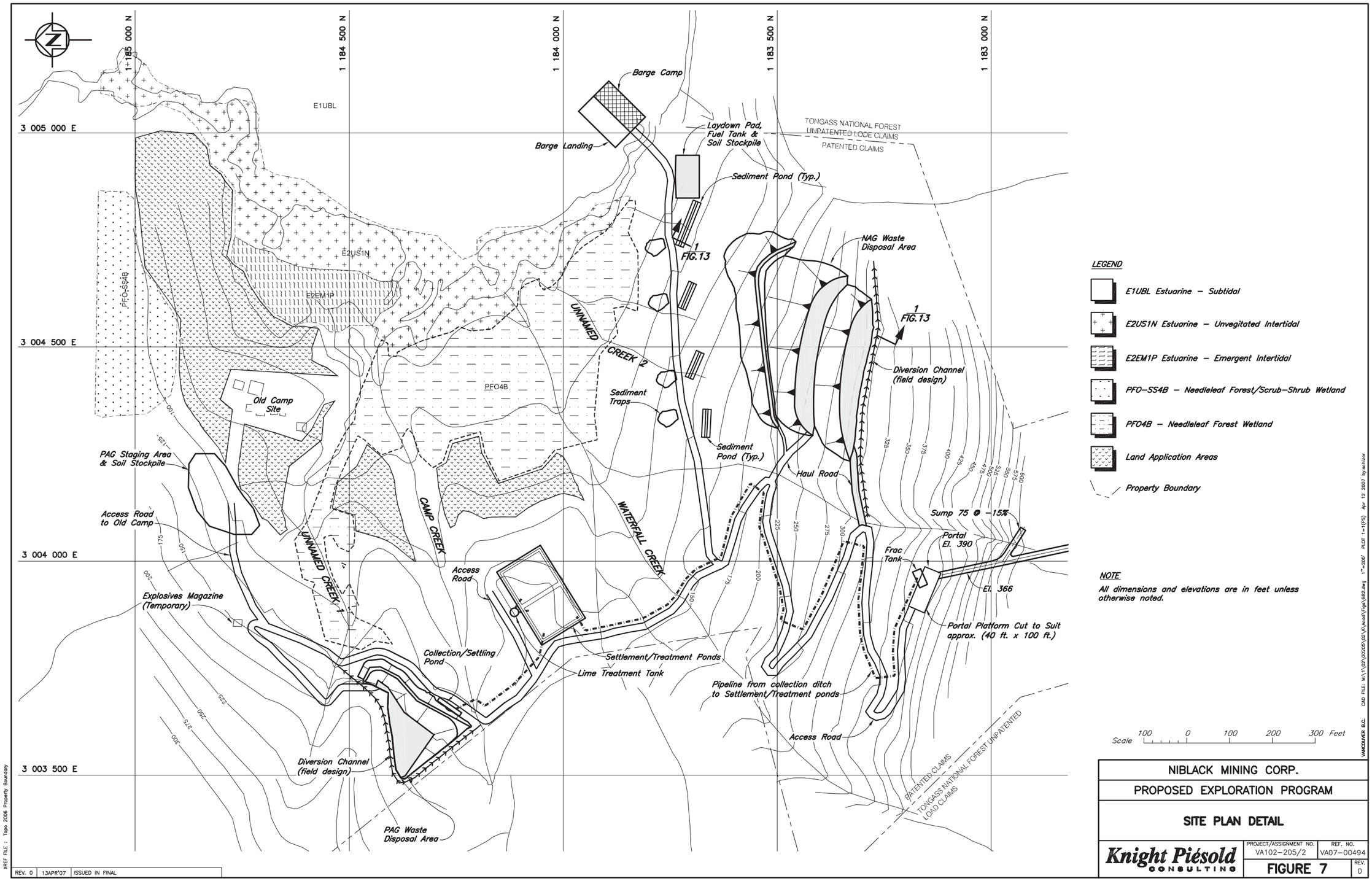
XREF FILE :

NIBLACK PROJECT LLC integral consulting inc.

Source: NMC 2007a

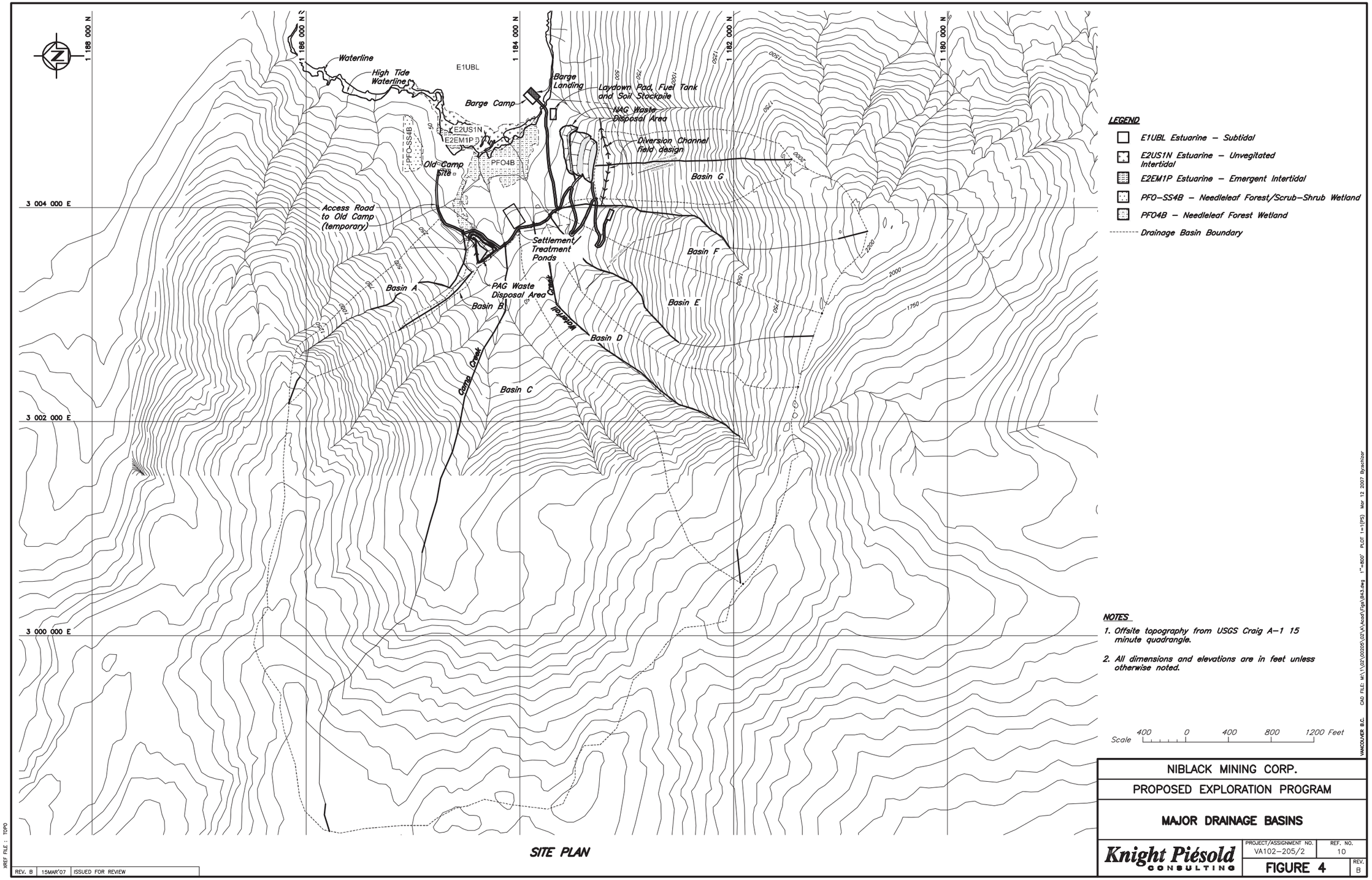
Figure B-4
Property Section
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



NIBLACK PROJECT LLC integral consulting inc.

Source: NMC 2007a

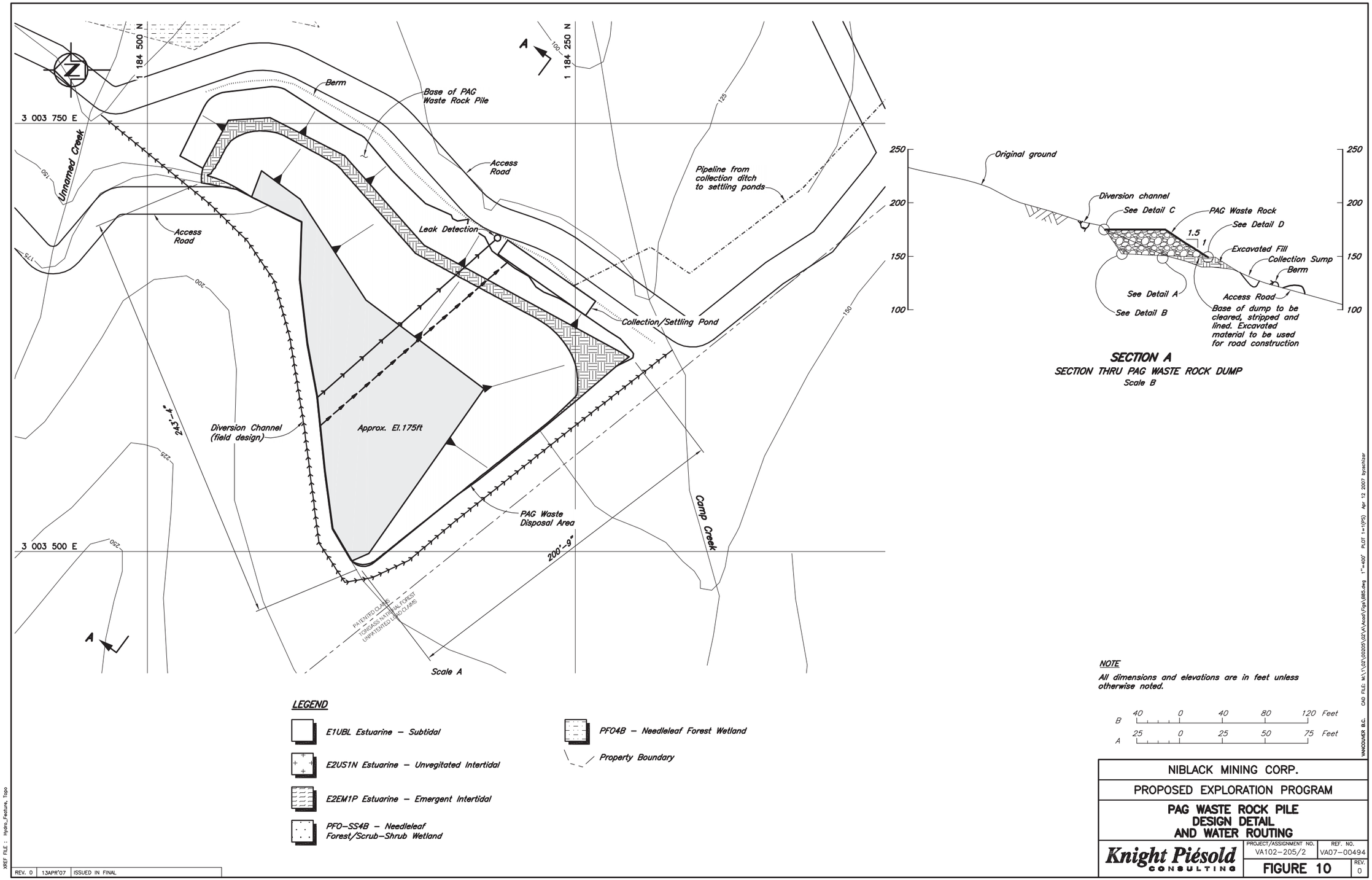
Figure B-5
Site Plan Detail
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



NIBLACK PROJECT LLC integral consulting inc.

Source: NMC 2007a

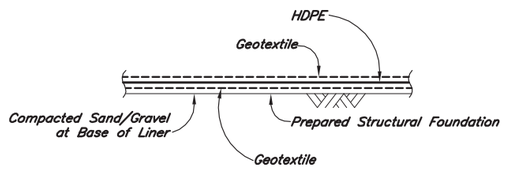
Figure B-6
Major Drainage Basins
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



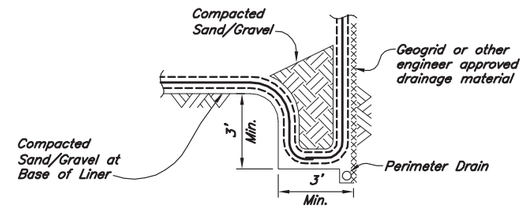
NIBLACK PROJECT LLC integral consulting inc.

Source: NMC 2007a

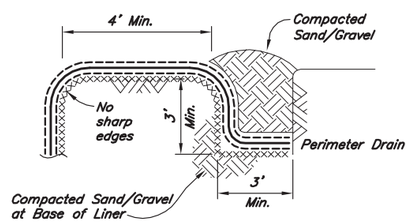
Figure B-7
PAG Waste Rock Design Detail and Water Routing
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



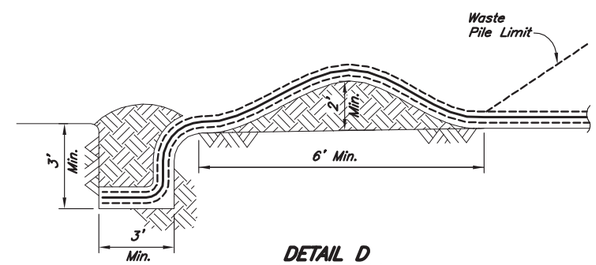
DETAIL A
TYPICAL LINER BASE
NTS



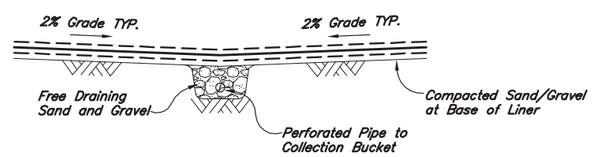
DETAIL B
LINER ANCHOR
(BACK FACE OF PAG WASTE ROCK DUMP)
NTS



DETAIL C
LINER ANCHOR
(CREST OF BACK FACE OF PAG WASTE ROCK DUMP)
NTS



DETAIL D
LINER ANCHOR
(TOE OF PAG WASTE ROCK DUMP)
NTS



DETAIL E
LEAK DETECTION
(CENTER OF PAG WASTE ROCK DUMP)
NTS

LEGEND
- Geotextile
- HDPE Liner
- Geogrid Drainage Layer

VANCOUVER B.C. CAD FILE: M:\1\02\00205\02\A\Acad\Figs\B86.dwg 1"=1' PLOT 1=1(PS) Apr 12, 2007 by:schlizer Time @ 11:57

NIBLACK MINING CORP.	
PROPOSED EXPLORATION PROGRAM	
PAG LINER DETAILS	
Knight Piésold CONSULTING	PROJECT/ASSIGNMENT NO. VA102-205/2 · REF. NO. VA07-00494 · FIGURE 11 · REV. 0

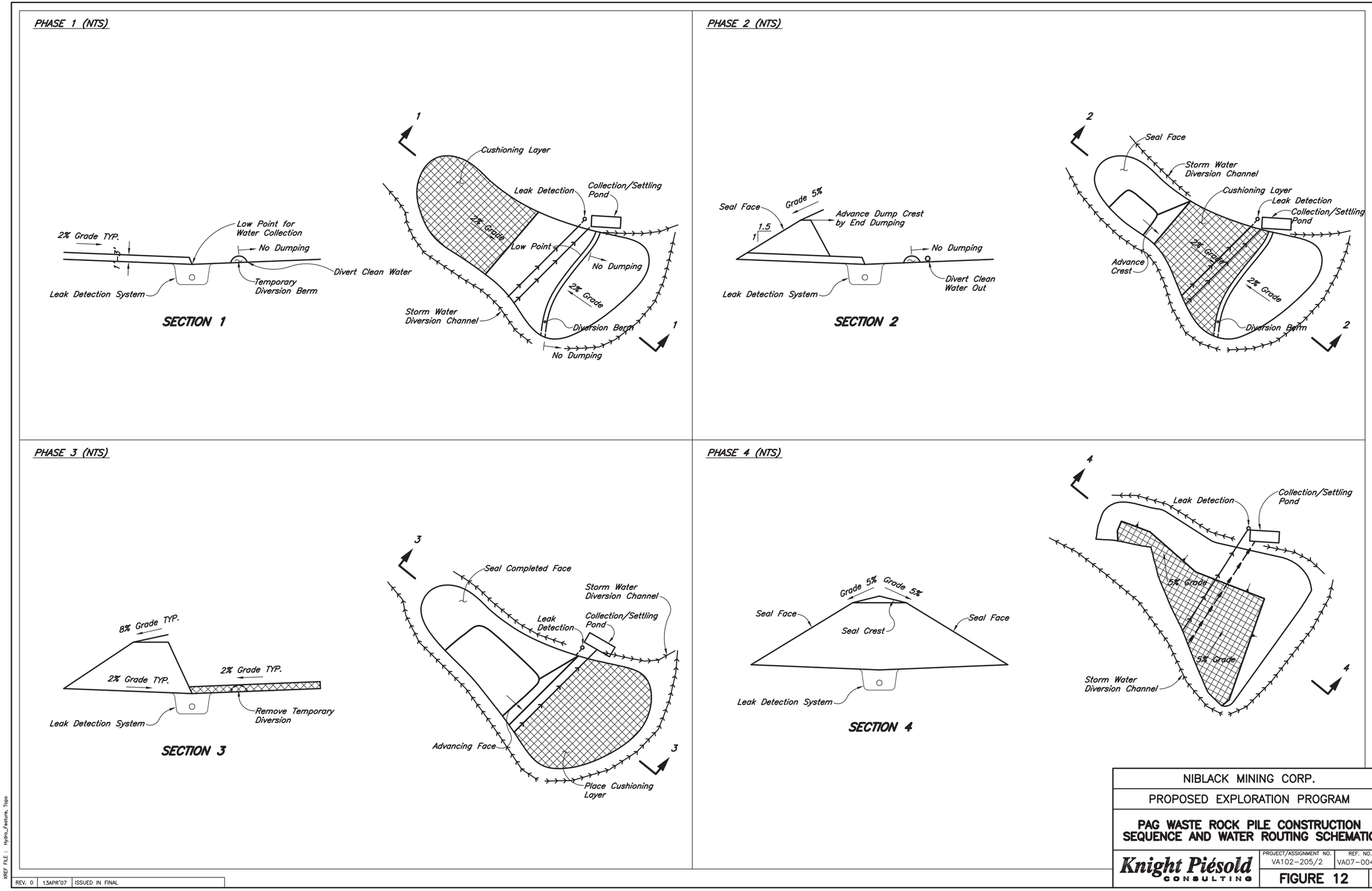
REV.	DATE	ISSUED
0	13APR'07	ISSUED IN FINAL

VREF FILE : -

NIBLACK PROJECT LLC integral consulting inc.

Source: NMC 2007a

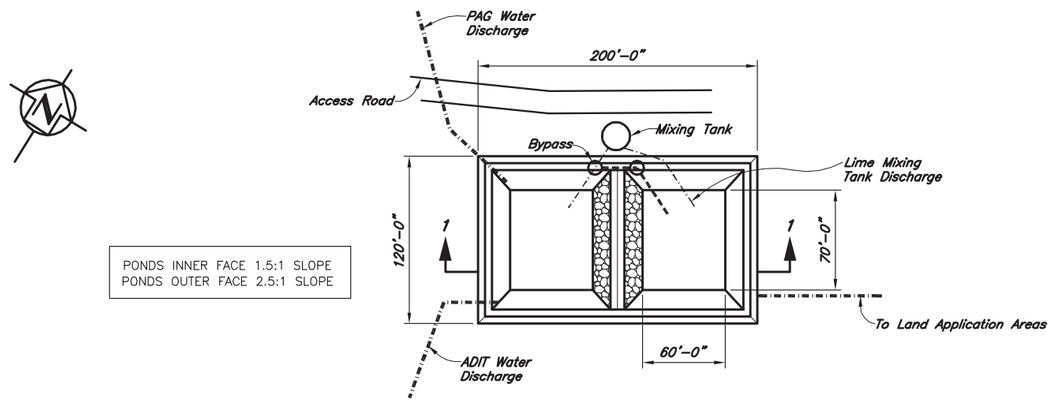
Figure B-8
PAG Liner Details
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update



NIBLACK PROJECT LLC integral consulting inc.

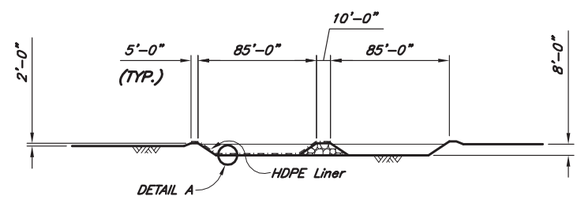
Source: NMC 2007a

Figure B-9
PAG Waste Rock Pile Construction Sequence and Water Routing Schematic
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update

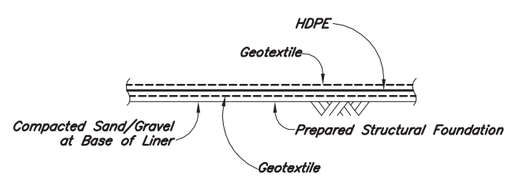


PONDS INNER FACE 1.5:1 SLOPE
PONDS OUTER FACE 2.5:1 SLOPE

SETTLEMENT/TREATMENT PONDS PLAN



SECTION 1



DETAIL A
TYPICAL LINER BASE
NTS

Scale 50 0 50 100 150 Feet

VANCOUVER B.C. CAD FILE: M:\1\02\00200\02\A\Acad\Figs\B868.dwg 1"=100' PLOT 1=1(PS) Apr 12 2007 bycchtor Time @ 13:41

NIBLACK MINING CORP.		
PROPOSED EXPLORATION PROGRAM		
SETTLEMENT/TREATMENT POND SECTION		
Knight Piésold CONSULTING	PROJECT/ASSIGNMENT NO. VA102-205/2	REF. NO. VA07-00494
	FIGURE 13	REV. 0

REV.	DATE	DESCRIPTION
0	13APR'07	ISSUED IN FINAL

XREF FILE : -

NIBLACK PROJECT LLC integral consulting inc.

Source: NMC 2007a

Figure B-10
Settlement/Treatment Pond Section
Niblack Underground Exploration Plan of Operations
2012 Post-Construction Update