Appendix 2.2A-5
Construction Sediment and Erosion Control Plan

NEW GOLD INC.
BLACKWATER GOLD PROJECT

CONSTRUCTION SEDIMENT AND EROSION CONTROL PLAN

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VA101-457/6-10
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November 29, 2013

Knight Piésold
CONSULTING
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BLACKWATER GOLD PROJECT

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Rev	Description	Date	Approved
0	Issued in Final	November 29, 2013	KJB

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EXECUTIVE SUMMARY

The Blackwater Gold Project Construction Sediment and Erosion Control Plan (the Plan) has been developed to proactively manage water, erosion and sedimentation throughout the construction phases of the project. Contact water will be treated for sedimentation within the project footprint in sediment control ponds; and will be stored in the tailings storage facility (TSF) upon completion of the TSF starter embankments. Potential groundwater impacts are negligible since the principle source of contamination considered in the Plan is suspended sediment, which will be effectively removed during settling in the SCPs.

This document provides strategies and design objectives with appropriate flexibility to allow the facilities to be field fitted to suit the conditions encountered during construction and ultimately over the life of the project. The Plan provides a summary of site locations and associated erosion and sediment control issues, identifies site-specific objectives for best management practices (BMPs), and provides BMPs that may be appropriate for each site location that will be implemented during various stages of construction.

Water management in the early stages of construction (beginning of Year -2) will focus on diverting non-contact water away from working areas and intercepting contact water in collection ditches leading to SCPs for treatment of suspended sediment. Water management during the later stages of construction (end of Year -2 and all of Year -1) will include collection of mine surface runoff in the TSF to ensure that an adequate supply of water is available for use in the mill upon project start-up. In some instances, the Plan will include diversion of non-contact water to reduce the total volume of contact water to manage via ditches and sediment control ponds, with the aim of alleviating the strain on the water management system. Where final slopes are created, native vegetation will be planted to facilitate progressive closure and reclamation of the project.

The Plan includes the construction of seven SCPs, which will be used to manage construction surface water from disturbed surfaces. Three of the SCPs (SCP5, SCP6, and SCP7) will be constructed in-stream founded on sand and gravel deposits to facilitate infiltration. The discharge from the remaining four SCPs (SCP1, SCP2, SCP3, and SCP4) will be directed into the permeable glaciofluvial deposits.

The operational water management system is designed as a closed system to minimize the use of external fresh surface water or groundwater sources through maximizing recycle of process water. Surplus water will be stored on-site within the TSF and any additional water requirements will be made up from Tatelkuz Lake via the fresh water reservoir and water supply pipeline, as necessary.

Regular monitoring of implemented BMPs will ensure success of the Plan. The contractor and Environmental Monitoring Technicians (EMTs) will inspect all erosion control measures periodically and after each runoff-producing rainfall event. Frequent and proper maintenance will allow for prolonged use instead of allowing the measures to be destroyed and in need of full replacement.

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ABBREVIATIONS

Blackwater Gold Project	the project
BMP	best management practice
EMT	Environmental Monitoring Technician
ha	hectare(s)
IDF	inflow design flood
KP	Knight Piésold Ltd.
LGS	low-grade stockpile
MSC	Meteorological Services of Canada
NAG	non-acid generating
PAG	potentially acid generating
PMP	Probable Maximum Precipitation
RECP	rolled erosion control products
SCP	sediment control pond
SECP	Sediment and Erosion Control Plan
TSF	tailings storage facility
WRD	waste rock dump

1 – INTRODUCTION

1.1 PROJECT DESCRIPTION

The Blackwater Gold Project (the project) is a large gold-silver deposit located approximately 112 km southwest of Vanderhoof in Central British Columbia, as shown on Figure 1.1. The major components of the project include: an open pit, tailings storage facilities (TSFs), fresh water reservoir and supply system, a plant site, and infrastructure to support the mining operation. Knight Piésold Ltd. (KP) was retained by New Gold Inc. (New Gold) to complete the construction sediment and erosion control plan.

The water management planning objective is to control site runoff in a manner that provides sufficient water to support the mill water requirements. Water will be controlled to minimize erosion in areas disturbed by construction activities and prevent release of contact water to the receiving environment. This includes collection and diversion of surface water runoff, sediment control ponds, seepage collection systems, and pumpback systems.

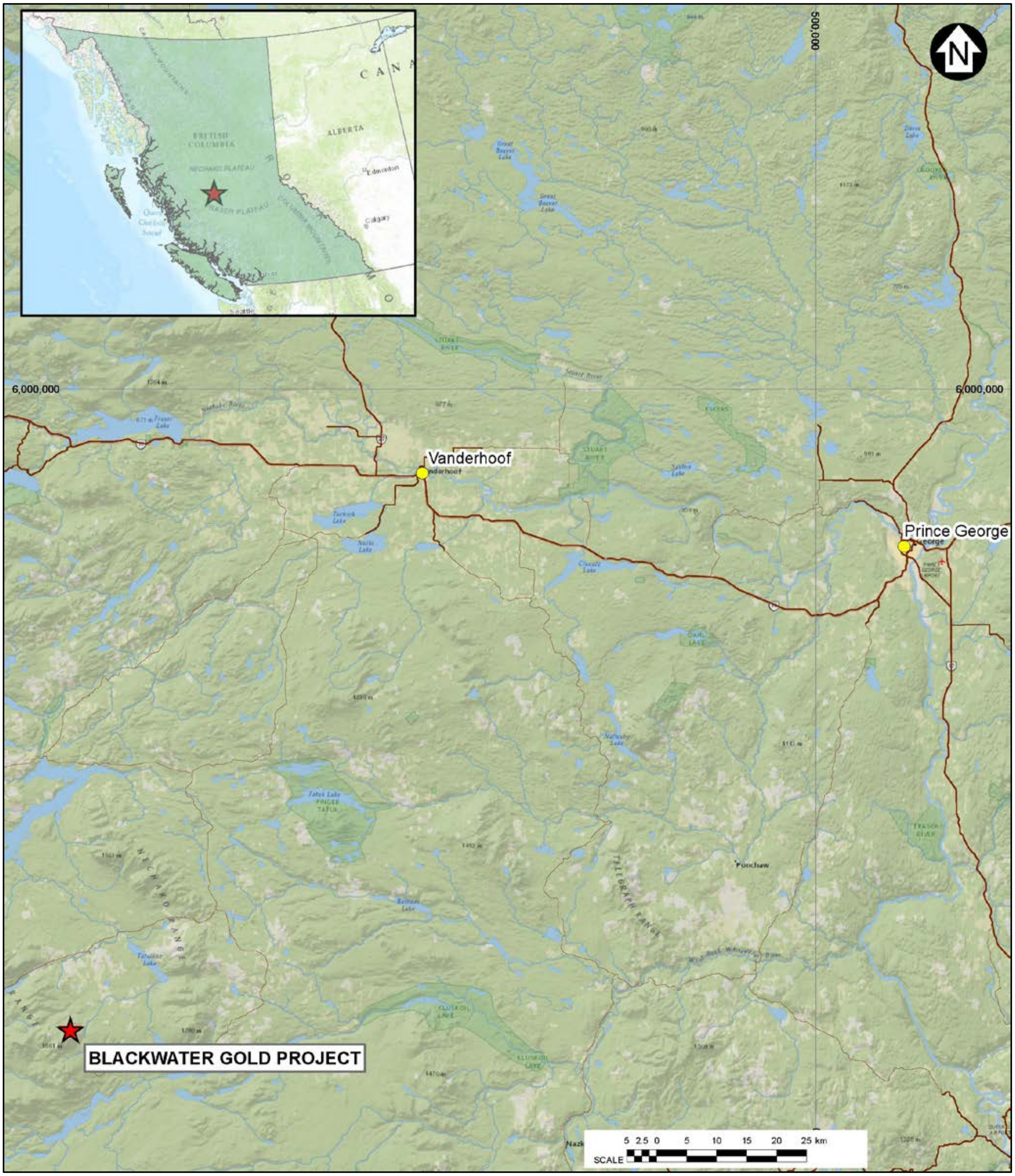

Figure 1.1 Project Location Map

1.2 SITE DESCRIPTION

The Blackwater Project is situated on the Nechako Plateau, which is characterized by gently undulating northwest trending hills cut by small to medium sized drainages. The elevation of the Blackwater property ranges from just over 1,000 m in low-lying areas northeast of the proposed mine site to 1,800 m at the summit of Mt. Davidson on the southwest side of the property. The deposit is located on the northern flanks of Mt. Davidson.

The project geomorphology presents a pattern of ice-marginal and sub-glacial meltwater channels, which indicates that high areas in the vicinity of the mine site became ice-free before low areas. Late during deglaciation, glacier ice appears to have stagnated in the valley of Davidson Creek, producing ice-stagnation landforms such as kettles and kames. A large amount of glacial meltwater was channeled along Davidson Creek and other valleys in the area, producing eskers and ablation till. An estimated 80% of the surficial cover in the Blackwater Valley is classified as glacial till, with the other 20% made up of glaciofluvial, glaciolacustrine, fluvial, and organic material. The glacial till in this region can range up to 100 metres thick, and it is therefore extremely rare to encounter large areas of naturally exposed bedrock.

The 2013 *Geotechnical Characterization Report* (Knight Piésold, 2013c) indicates that the surficial material and weathered bedrock at the Project site has been grouped using the following material types (generally described from the surface down):

- Holocene deposits – topsoil layer (OL, Pt).
- Glaciofluvial esker deposits – coarse grained soils (GW-GP).
- Coarse grained glaciofluvial deposits – coarse grained soils with sands and fines (GM-GP, SM-SP).
- Fine grained glaciofluvial deposits – coarse grained soils with sands and fines (SP-SM).
- Glacial till deposits – coarse grained soils with gravels and fines (SM-SC and GM-GC).
- Glaciolacustrine deposits – fine grained soils silts and clays (ML-CL).
- Regolith derived (in-situ and reworked) – coarse grained soils gravels with plastic fines (GC) to fine grained soils (CL).

The climate at the Blackwater property is sub-continental and characterized by warm summers and cold winters. The climate is influenced by cold arctic air and moisture-laden weather systems moving west along the Kitimat Ranges. Temperatures range from -40 °C in winter to a maximum of 32 °C in summer.

1.3 CONSTRUCTION WATER MANAGEMENT OVERVIEW

Construction of the project will commence early in Year -2 with logging and site preparation. The initial phase of development will include the following areas:

- Construction laydown, truck shop, and earthworks contractor laydown
- Primary crusher, wetland conveyor and plant site
- Construction camp, and
- Aggregate borrow pit development.

The access roads to the above areas will also be developed during this period.

The second phase of development will commence late in Year -2. The work will include preparation and development of the TSF, open pit stripping, and preparation of the waste rock storage areas.

The construction of the project will require specific surface water control elements and measures to minimize erosion and prevent sediment discharge into surrounding areas. Subsurface water will be controlled by the use of sump pits, wells, or removable pumping stations to draw down the natural water table and provide dry stable construction areas. Excavations will be kept stable and workable by pumping water collected in the excavation sump pits to sediment control devices such as temporary holding ponds, sediment basins, or sediment filter bags where required. A sediment control pond (SCP) has been designed for each major area of disturbance, and will be discussed in Section 3.3.3 of this report.

1.4 SCOPE OF PLAN

This Construction Sediment and Erosion Control Plan (the Plan) has been developed to proactively manage water, erosion and sedimentation throughout the construction phases of the project.

The intent of this document is to provide strategies and design objectives with appropriate flexibility to allow the facilities to be field fit to suit the conditions encountered during construction (i.e., adaptive management approach). The Plan describes best management practices (BMPs) that will be implemented prior to and during construction. The overall objective of the Plan is to manage contact water within the project footprint, such as to prevent this runoff from potentially impacting adjacent watercourses.

The term “contact water” is used in this Plan to describe water that has come into contact with mine facilities and/or any construction disturbed areas. Conversely, “non-contact water” is used to describe water that has not come into contact with any project facilities. Contact water during construction requires treatment for sedimentation only, which is done through the best management practices described in this Plan.

Contact water will be treated for sedimentation within the project footprint in sediment control ponds; and will be stored in the TSF upon completion of the TSF starter embankments. Potential groundwater impacts are negligible since the principle source of contamination considered in the Plan is suspended sediment, which will be effectively removed during settling in the SCPs.

2 – HYDROMETEOROLOGY

2.1 GENERAL

The hydrometeorology details for the Blackwater Gold Project site were presented in the Knight Piésold report *Preliminary Engineering Hydrometeorology Report*, Ref. No. VA101-457, 2013. The study indicated that the available site and regional dataset was adequate to describe and quantify the meteorological characteristics of the project area for the purpose of water balance modelling, engineering design, and environmental assessment. The key findings of the study have been summarized in the sections that follow.

2.2 MEAN ANNUAL PRECIPITATION

The long-term mean annual precipitation for the project area is estimated to be 636 mm, for an elevation of approximately 1,470 m. This value is a result of interpretation of two project site meteorological stations and several regional stations operated by the Meteorological Services of Canada (MSC) branch of Environment Canada and the BC Forest Service Wildfire Management Branch.

2.3 MONTHLY PRECIPITATION DISTRIBUTION

The monthly distribution of precipitation was estimated for the purpose of water management planning. Approximately 47% of the annual precipitation at the project site falls as snow between November and March. The remaining 53% of the annual precipitation falls as rain, which may occur in any month of the year, but largely falls in the period of April to October. The monthly precipitation statistics that define these distributions are summarized in Table 2.1.

Table 2.1 Monthly Precipitation Statistics

Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Precip. (mm)	73	45	39	20	50	66	52	51	47	47	74	72
% of annual total	12	7	6	3	8	10	8	8	7	7	12	11
Rain (mm)	0	0	0	13	50	66	52	51	47	31	0	0
% Precip. as Rain/Month	0	0	0	65	100	100	100	100	100	65	0	0
Snow – SWE (mm)	73	45	39	7	0	0	0	0	0	16	74	72
% Precip. as Snow/Month	100	100	100	35	0	0	0	0	0	35	100	100

NOTES:
1. SWE = “SNOW WATER EQUIVALENT”.

2.4 INTENSITY-DURATION-FREQUENCY DATA

Extreme rainfall values were estimated according to the procedure presented in the *Rainfall Frequency Atlas of Canada* (Hogg et al., 1985) (RFAC). Extreme precipitation events for the project site are summarized in Table 2.2.

Table 2.2 Design Storm Events

Return Period (years)	24-Hour Extreme Rainfall (mm)
2	37
10	50
100	66
200	71
1000	82
PMP	195

NOTES:
1. TABLE FROM BLACKWATER GOLD PROJECT PRELIMINARY ENGINEERING HYDROMETEOROLOGY REPORT, VA101-457/4-1 (KNIGHT PIESOLD, 2013a).

2.5 MEAN ANNUAL RUNOFF

The annual stream hydrographs in the Blackwater Gold Project area are typically characterized by a very pronounced period of high flows during the spring freshet, followed by an extended period of steady low, with limited autumn storms. All creeks are affected by ice formation during the winter and the smaller systems typically freeze over for extended periods during cold snaps. Estimates of mean monthly and annual unit runoffs are summarized in Table 2.3.

Table 2.3 Mean Monthly and Annual Unit Runoff

Station	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
H1	Unit Runoff (l/s/km^2)	0.0	0.0	0.9	1.2	4.5	4.0	1.2	0.6	0.4	0.5	0.6	0.2	1.2
	Discharge (L/s)	0	0	24	31	119	107	33	15	11	13	16	5	31
	Runoff (mm)	0	0	2	3	12	11	3	1	1	1	2	1	37
	% of Total Runoff	0%	0%	7%	8%	32%	29%	9%	4%	3%	4%	4%	1%	100%
H2	Unit Runoff (l/s/km^2)	1.6	1.7	3.0	6.0	18.5	17.4	6.3	4.0	3.4	3.7	2.6	1.6	5.81
	Discharge (L/s)	76	81	143	281	873	820	297	188	160	173	124	76	274
	Runoff (mm)	4	4	8	15	50	45	17	11	9	10	7	4	184
	% of Total Runoff	2%	2%	4%	9%	27%	25%	9%	6%	5%	5%	4%	2%	100%
H5	Unit Runoff (l/s/km^2)	1.6	1.7	3.0	4.2	10.4	9.8	4.4	2.8	2.4	2.6	2.6	1.6	3.9
	Discharge (L/s)	957	1022	1808	2508	6173	5830	2646	1653	1457	1527	1566	954	2342
	Runoff (mm)	4	4	8	11	28	25	12	7	6	7	7	4	125
	% of Total Runoff	3%	4%	6%	9%	22%	21%	9%	6%	5%	5%	6%	3%	100%

NOTES:

1. STATION H2 IS REPRESENTATIVE OF THE PROJECT AREA DUE TO ITS ELEVATION AND DRAINAGE AREA BEING SIMILAR TO THAT OF THE PROJECT AREA FACILITIES.
2. THE WINTER ESTIMATION AT H2 IS DERIVED FROM H5 BY SCALING BY CATCHMENT AREA.
3. THE CALCULATION OF RUNOFF IN mm ASSUMES 28 DAYS IN FEBRUARY.
4. TABLE FROM BLACKWATER GOLD PROJECT PRELIMINARY ENGINEERING HYDROMETEOROLOGY REPORT, VA101-457/4-1 (KNIGHT PIESOLD, 2013a).

The station locations are shown on Figure 2.1 below.

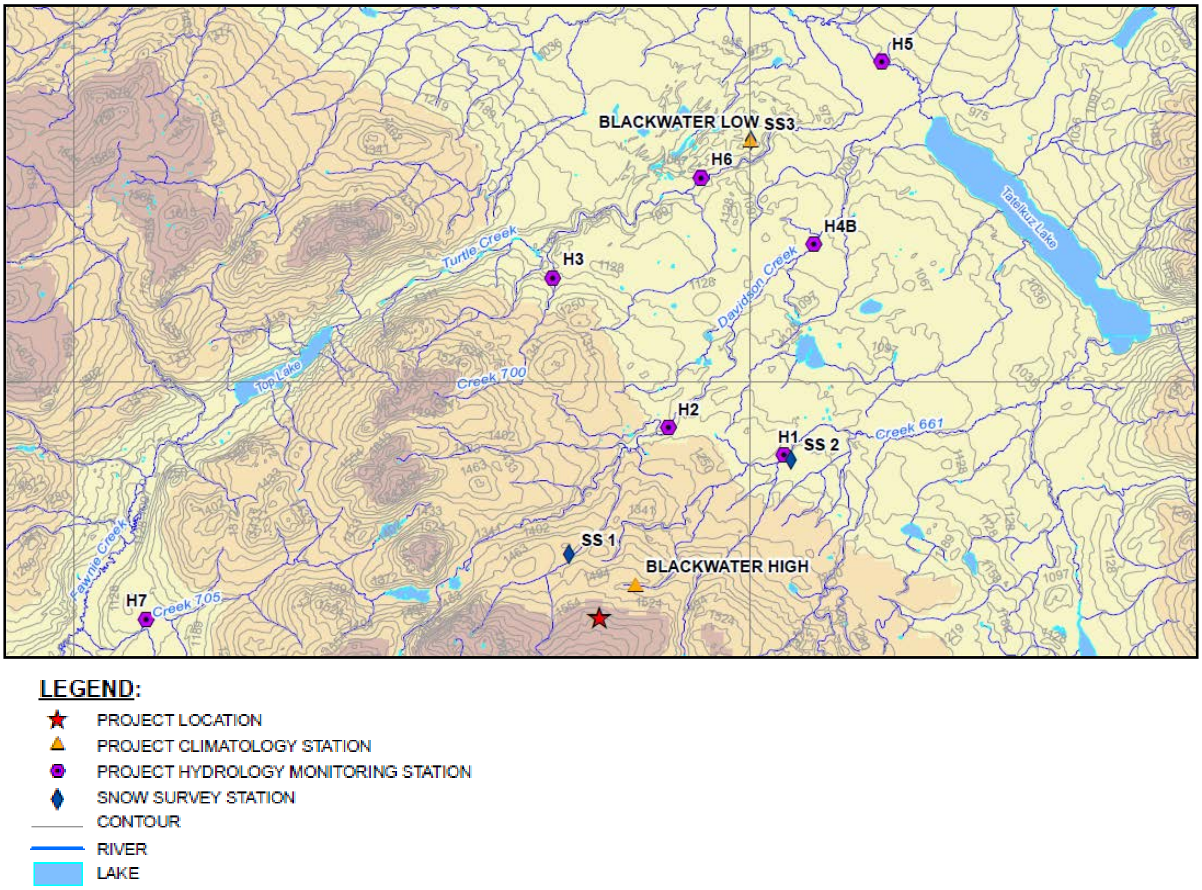

Figure 2.1 Project Monitoring Stations

2.6 WET MONTH RUNOFF

Wet monthly flow values were estimated for the project area on the basis of the variability of the long-term flow series developed for one of the project streamflow stations. The monthly return period values were estimated in the Hydrometeorology Report (Knight Piésold, 2013a).

The return period ratios are shown in Table 2.4. These ratios are to be applied to the mean monthly discharge to obtain the wet monthly discharge of each return period. Note that winter return period ratios are unavailable at this time due to a lack of concurrent winter data.

Table 2.4 Wet Monthly Return Period Streamflow Relationships

Month	Return Period Ratio of Mean Monthly Discharge			
	Mean	5 year	10 year	20 year
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	1.0	1.29	1.63	1.98
May	1.0	1.39	1.86	2.32
June	1.0	1.34	1.85	2.44
July	1.0	1.16	1.58	2.13
August	1.0	1.19	1.48	1.81
September	1.0	1.21	1.59	2.05
October	1.0	1.22	1.47	1.74
November	-	-	-	-
December	-	-	-	-

NOTES:

1. TABLE FROM BLACKWATER GOLD PROJECT PRELIMINARY ENGINEERING HYDROMETEOROLOGY REPORT, VA101-457/4-1 (KNIGHT PIESOLD, 2013a)

3 – CONSTRUCTION WATER MANAGEMENT APPROACH

3.1 OBJECTIVES

This Construction Sediment and Erosion Control Plan (SECP) describes design elements and provides guidance for control of all water originating from, or brought into, the mine site area during construction. Water will be controlled in a manner that minimizes erosion in areas disturbed by construction activities and prevents the release of untreated construction water, which could adversely affect the water quality of receiving waters (namely Davidson Creek). This includes the collection and diversion of surface water runoff, temporary groundwater dewatering and the use of holding ponds and pump back systems.

3.2 STRATEGIES

Water management in the early stages of construction (beginning of Year -2) will focus on diverting non-contact water away from working areas and intercepting contact water in collection ditches leading to SCPs for treatment of suspended sediment. Water management during the later stages of construction (end of Year -2 and all of Year -1) will include collection of mine surface runoff in the TSF basin for water supply for use in the mill upon project start-up. In some instances, the Plan will include diversion of non-contact water to reduce the total volume of contact water to manage via ditches and sediment control ponds, with the aim of alleviating the strain on the water management system. Where final slopes are created, native vegetation will be planted to facilitate progressive closure and reclamation of the project.

3.2.1 Operational Water Management Strategies

In order to provide context for the project's construction water management strategies, this section provides an overview of the operations-phase water management. The operational water management system is designed as a closed system to minimize the use of external fresh surface water or groundwater sources through maximizing recycle of process water. Water will be stored on-site within the TSF and any additional water requirements will be made up from Tatelkuz Lake via the fresh water reservoir and water supply pipeline, as necessary.

Water supply and make-up sources for the project are as follows:

- Precipitation runoff from the mine site facilities
- Water recycle from the TSF supernatant ponds
- Groundwater from open pit dewatering and depressurization
- Constant fresh water supply from Tatelkuz Lake for plant fresh water needs, and to mitigate flow reductions in lower Davidson Creek
- Occasional water supply from Tatelkuz Lake to supplement requirements for processing or to saturate PAG within the TSF, if required, and
- Treated black and grey water, in small quantities, from the mill and truck shop.

3.2.2 Erosion Management and Sediment Control Strategies

Erosion management and sediment control at the project will be a process of establishing diversion and collection ditches to manage surface water runoff, constructing sediment control ponds, stabilizing disturbed land surfaces to minimize erosion, establishing temporary vegetation cover, and re-establishing vegetation that is similar in structure to natural vegetation where final slopes are created. Collected runoff and contact water will be pumped back or gravity fed to the TSF for storage once the TSF Site C started embankment is constructed. The project has the advantage that the open pit and mine infrastructure are situated upgradient from the TSF allowing runoff from the majority of the facilities to flow by gravity to the TSF for containment.

Activities that have the potential to result in erosion at the project include:

- Vegetation clearing and topsoil stripping
- Excavation, grading and filling
- Stockpiling of topsoil, and
- Construction of roads and infrastructure.

Potential effects from the above activities in the absence of planned mitigation measures include:

- Increased surface erosion from disturbed and rehabilitated areas
- Increased sediment load entering the natural water system, and
- Siltation or erosion of watercourses and water bodies.

The Plan addresses the above potential hazards to ensure effective management of surface water and contact runoff during construction. Sediment mobilization and erosion will be minimized by:

- Limiting the extent of land disturbance to the practical minimum
- Reducing water velocities across the ground using surface roughening, and re-contouring, particularly on exposed surfaces and in areas where water concentrates
- Progressively rehabilitating disturbed land and constructing drainage controls to improve stability of rehabilitated land
- Protecting natural drainages and watercourses by constructing appropriate sediment control devices such as collection and diversion ditches, sediment traps, in-channel rock energy dissipaters, and sediment basins
- Installing rock riprap, rock channel lining, sediment filters or other suitable measures on steep gradients, as required
- Restricting access to rehabilitated areas
- Directing all surface runoff from plant site grading, open pit development, TSF construction, and waste rock storage area development to the TSF basin
- Constructing appropriate temporary BMP measures (e.g., silt fences, hay bales) downslope of disturbed sites (where more permanent sediment control measures are not appropriate, or in combination with more permanent measures), and
- Implementing soil bioengineering techniques to contain sediment and enable disturbed surfaces to recover.

Installation of temporary erosion and sediment control features or “Best Management Practices” (BMPs) will be the first step towards controlling erosion and sedimentation during construction. All temporary sediment and erosion control features will require maintenance and inspection after each significant rainfall. These temporary features will be reclaimed after achieving soil and sediment stabilization. Typical sediment and erosion design elements and BMPs are described in Section 3.3 below.

3.3 DESIGN ELEMENTS

3.3.1 General

Water management and erosion and sediment control measures will be implemented and maintained as required to prevent and mitigate erosion. The BMPs described in Section 3.3.4 are shown on Drawings D0136, D0137 and D0138 and will be required during construction of the mine facilities.

This section describes both the generic BMPs that will be used where required throughout the site (e.g., silt fences) as well as site specific water management elements. The sequencing of the site development activities and associated construction water management plans are described in Section 4.0.

3.3.2 TSF Basin Cofferdams

The Site C and D cofferdams have been designed to store the 1 in 10 year wet runoff for the exposure months in their respective construction periods. The exposure time of the cofferdams is defined as the period the cofferdam is in use prior to the construction of each respective starter embankment. Details on the design criteria for the cofferdams area discussed further in Sections 3.4 and 3.5. The cofferdams will consist of low permeability glacial till earthfill dams constructed at the locations shown on Drawings D0131 and D0132, to the elevations and heights shown on those Drawings. These two cofferdams will provide, as a minimum, a combined capacity for water storage of 650,000 m^3 at the maximum fill level.

3.3.3 Sediment Control Ponds (SCPs)

The Project site will have a total of seven sediment control ponds. The initial four ponds (SCP1-4) will be constructed in the beginning of Year -2. SCP5 through SCP7 are in-stream ponds that will be constructed directly in a stream on sand and gravel deposits without basin preparation to facilitate infiltration. These ponds will discharge treated water directly back into their respective streams. The following table outlines the general locations, construction dates, decommissioning dates, and the discharge strategies of the Project SCPs. Note that SCP3 and SCP4 will be in commission for the life of mine.

Table 3.1 Sediment Control Ponds Locations and Discharge Strategies

Pond	General Area	Start of Construction	Discharge Strategy	Date of Decommissioning	Post Decommissioning Runoff Routing
SCP#1	Construction laydown and truck shop	Beginning of Year -2	Permeable glaciofluvial deposits	End of Year -2	To TSF Site C basin via West Ditch
SCP#2	Plant site	Beginning of Year -2	Permeable glaciofluvial deposits	End of Year -2	To TSF Site C basin via West Ditch
SCP#3	Camp	Beginning of Year -2	Permeable glaciofluvial deposits	N/A	N/A
SCP#4	Aggregate screening area	Beginning of Year -2	Permeable glaciofluvial deposits	N/A	N/A
SCP#5	East waste dump area	Late Year -2	Creek 661	End of Year -1	To TSF Site C basin via collection ditch
SCP#6	Downstream of Site C cofferdam	Late Year -2	Davidson Creek	End of Year -1	SCP is in TSF basin footprint, water stays in TSF basin
SCP#7	Downstream of Site D cofferdam	Late Year -2	Davidson Creek	End of Year -1	SCP becomes obsolete, structure is in place and can be used if needed

The SCPs were designed following the *Guidance for Assessing the Design, Size and Operation of Sedimentation Ponds Used in Mining* (BC MOELP, 2001). A report was prepared by AMEC detailing the treatability of construction runoff at the Blackwater Project using flocculent (AMEC, 2013). The study concluded that the retention time of the SCPs should be at least 24 hours when iron and lime are added to the inflow prior to entering the pond. The ponds were subsequently sized to settle out sediment particles sized 0.01 mm (and larger), while providing a retention time of at least 24 hours.

The SCPs were designed to accommodate a live storage equal to the 1 in 10 year 24-hour storm event with at least a half meter of freeboard. Design storms are detailed in Table 2.2 of this report. The ponds were designed with spillways to withstand a flood event from a 1 in 200 year 24-hour storm event in accordance with the sedimentation pond design manual (BC MOELP, 2001). A typical SCP plan and outlet structure details are shown on Drawing D0136.

The ponds have been classified as small dams since the embankment heights are greater than 2.5 m and some of the ponds are capable of storing more than 30,000 m^3 of water. As such, they were designed in accordance with the *Dam Safety Guidelines* (CDA, 2007), and classified as a SIGNIFICANT dams. The suggested inflow design flood (IDF) for SIGNIFICANT dam structures (i.e., the spillways) is between the 1 in 100 and 1 in 1,000 year flood. The spillways were designed to pass a 1 in 200 year 24-hour storm, which meets the CDA guidelines for these structures.

The initial measures that will be implemented early in Year -2 are the construction of four sediment control ponds: SCP1 through SCP4.

By the end of Year -2, the continued development of the project will require the construction of three additional in-stream ponds (SCP5 through SCP7).

The table below summarizes the specifications of the ponds.

Table 3.2 Sediment Control Pond Design Specifications

	Pond	Surface Area at Primary Outlet Invert (m^2)	Height of Embankment (m)	1 in 10 Year 24-Hour Storm Retention Time (hr)	Dead Storage Capacity (m^3)	Maximum Storage Capacity (m^3)
Early Year -2	SCP#1	5,600	5	44	15,900	17,800
	SCP#2	9,000	5	39	24,900	32,300
	SCP#3	4,900	5	35	11,000	16,800
	SCP#4	6,800	5	42	19,000	23,000
Late Year -2	SCP#5	32,000	16	196	162,000	172,500
	SCP#6	9,600	4.5	42	21,000	25,500
	SCP#7	14,000	6	56	29,000	36,000

NOTES:
1. DEAD STORAGE CAPACITY INCLUDES ANY STORAGE BELOW THE LOWEST OUTLET OF THE POND.
2. MAXIMUM STORAGE CAPACITY INCLUDES STORAGE AT THE SPILLWAY INVERT ELEVATION.

The locations, dimensions and outlet details of ponds SCP1 through SCP4 are shown on Drawing D0130, while ponds SCP5 through SCP7 are shown on Drawings D0131, D0132, and D0133.

The 1 in 10 year 24-hour storm event will be detained for a minimum of 24 hours. The anticipated retention times for each pond for this storm event are shown in Table 3.1. The storm will be passed via the primary outlet. A secondary outlet, a spillway, has been incorporated to safely pass floods larger than a 1 in 10 year 24-hour storm event, up to the 1 in 200 year 24-hour storm event. The outlet specifications for SCPs 1 through 4 are summarized in the table below.

Table 3.3 Sediment Control Ponds 1 through 4 – Outlet Specifications

Pond	Berm Crest Elevation (m)	1:10 Year Storm Event Primary Outlet (Riser Pipe)			1:200 Year Storm Event Secondary Outlet (Spillway)		
		Diameter (m)	Invert Elevation (m)	Max. Water Elevation (m)	Width (m)	Invert Elevation (m)	Max. Water Elevation (m)
SCP#1	1345.0	0.30	1343.7	1343.8	5	1344.0	1344.2
SCP#2	1365.0	0.30	1363.3	1363.8	5	1364.0	1364.2
SCP#3	1250.0	0.10	1248.0	1247.7	5	1249.0	1249.1
SCP#4	1130.0	0.40	1128.5	1128.7	5	1129.0	1129.1

NOTES:

1. THE MAX. WATER ELEVATION IS THE MAXIMUM LEVEL THAT THE WATER REACHES DURING THE CORRESPONDING STORM EVENT.

The in-stream ponds (SCP5 through SCP7) were designed with a compound weir spillway system, which utilizes a smaller weir to pass the 1 in 10 year 24-hour storm event and the larger weir to pass the 1 in 200 year 24-hour storm event.

The outlet details for the in-stream ponds are summarized in the table below.

Table 3.4 Sediment Control Ponds 5 through 7 – Outlet Specifications

Pond	Berm Crest Elevation (m)	Outlet Invert Elevation (m)	1:10 Year Storm Event Primary Outlet	1:200 Year Storm Event Secondary Outlet
			Max. Water Elevation (m)	Max. Water Elevation (m)
SCP#5	1426.0	1424.6	1425.1	1425.5
SCP#6	1247.0	1246.0	1246.3	1246.5
SCP#7	1188.0	1186.5	1186.8	1187.1

3.3.4 Best Management Practices (BMPs)

Erosion control BMPs reduce erosion by stabilizing exposed soil or by reducing surface runoff flow velocities. There are generally two types of erosion control BMPs:

- Source control BMPs for protection of exposed surfaces, and
- Conveyance BMPs for control of runoff.

Erosion control BMPs will be implemented prior to and during construction to minimize erosion and sediment discharge into surrounding areas.

Descriptions of the planned BMPs are provided below:

Vegetation Management and Re-vegetation

Natural vegetation is one of the best and most cost effective methods of reducing the potential for erosion and sedimentation. Vegetation keeps soil secure and ground cover reduces raindrop velocities. In order to preserve vegetation, a "no-entry" vegetation buffer will be maintained to prevent excess clearing, particularly around water bodies, prior to clearing vegetation from surrounding areas. If preserving natural vegetation is not a viable option, cleared areas that will not include infrastructure will be re-vegetated as soon as practical after construction activities have ended.

Mulching

Mulching is the application of a uniform protective layer of straw, wood fiber, wood chips, or other acceptable material on, or incorporated into, the soil surface of a seeded area to allow for the immediate protection of the seed bed. The purpose of mulching is to protect the soil surface from the forces of raindrop impact and overland flow, foster the growth of vegetation, increase infiltration, reduce evaporation, insulate the soil, and suppress weed growth. Mulching helps hold fertilizer, seed, and topsoil in place in the presence of wind, rain, and runoff, while reducing the need for watering.

Mulching may be utilized in areas that have been seeded either for temporary or permanent covers. There are two basic types of mulches: organic mulches and chemical mulches. Organic mulches may include straw, hay, wood fiber, wood chips and bark chips. This type of mulch is usually spread by hand or by machine (mulch blower) after seed, water, and fertilizer have been applied. Chemical mulches, also known as soil binders or tackifiers, are composed of a variety of synthetic materials, including emulsions or dispersions of vinyl compounds, rubber, asphalt, or plastics mixed with water. Chemical mulches are usually mixed with organic mulches as a tacking agent to aid in the stabilization process, and are not used as stand-alone mulch, except in cases where temporary dust and/or erosion control is required.

Hydroseeding, sometimes referred to as hydromulching, consists of mixing a tackifier, specified organic mulch, seed, water, and fertilizer together in a hydroslurry and spraying a layer of the mixture onto a surface or slope with hydraulic application equipment. The choice of materials for mulching will be based on soil conditions, season, type of vegetation, and the size of the area.

Rolled Erosion Control Products

Rolled erosion control products (RECP) are geosynthetic or organic materials composed of two layers of coarse mesh that contain a central layer of permeable fibres in between. These products take the form of flexible sheet materials that are often composed of organic materials that decompose over time. When intended for long-term use, RECPs are made from UV-stable synthetics such as polypropylene. RECPs are used to cover un-vegetated cut or fill slopes in order to provide erosion control when seeding or mulching alone is unsuccessful. RECP sheets must be anchored with special stakes or rocks and must be in direct, tight contact with the soil surface in order to perform effectively.

Slope Roughening

Cut and fill slopes will be roughened with tracked machinery or by other means, to reduce runoff velocity, increase infiltration, reduce erosion, and to aid in the establishment of vegetative cover with seed. Roughening will typically be carried out by a tracked machine moving up and down the slope, creating undulations on the soil surface. This procedure is simple, inexpensive and provides immediate short-term erosion control for bare soil, where vegetative cover is not yet established. Compared to hard, compacted smooth surfaces a rough soil surface provides more favorable moisture conditions, which will aid in seed germination. Slope roughening works best on flat and moderately sloped areas.

Re-contouring

Re-contouring the soil surface can also reduce the effect of erosion by shortening the length of the accumulation and movement of water as well as decreasing its slope. Creating undulations or troughs will also reduce overland water movement velocity. These types of improvements are beneficial as they are easily planned and constructed on site. However, both surface roughening and re-contouring are only temporary erosion control methods and more permanent structures are needed over time.

Silt Fencing

Silt fencing is a perimeter control type BMP used to intercept sheet flow runoff and used in conjunction with other BMPs. Typical silt fencing comprises a geotextile fabric anchored to posts driven into the ground. Silt fencing promotes sediment control by filtering water that passes through the fabric and increases short term retention time, allowing suspended sediments to settle. A typical silt fence installation is shown on Drawing D0137.

Silt fences will be placed parallel to slope contours in order to maximize ponding efficiency. Barrier locations are informally chosen based on site features and conditions (e.g., soil types, terrain features, sensitive areas, etc.), design plans, existing and anticipated drainage courses, and other available erosion and sediment controls. Typical barrier sites are catch points beyond the toe of fill or on side slopes above waterways or drainage channels. Silt fences will not be used for wide low-flow, low-velocity drainage ways, for concentrated flows, in continuous flow streams, for flow diversion, or as check dams. Silt fencing will be installed in backfilled trenches to ensure that it is properly anchored.

All silt fences will be inspected and maintained, as required, following major rainfall events. Proper installation and frequent maintenance is required for effective sediment control.

Temporary Sediment Traps and Sediment Basins

A sediment trap/basin is a temporary structure used to detain runoff from small drainage areas (generally less than 2 hectares (ha)) to allow sediment to settle out. Sediment traps/basins are generally used for relatively small drainage areas and will be located in areas where access can be maintained for sediment removal and proper disposal. A sediment trap/basin can be created by excavating a basin, utilizing an existing depression, or constructing a small dam on a slight slope downward from the work area. Contact runoff from the disturbed site is conveyed to the trap/basin via ditches, slope drains, or diversion dikes. The trap/basin is a temporary measure, with a nominal design life of approximately six months, and is to be maintained until the site is permanently protected against erosion by vegetation and/or structures.

Temporary sediment traps and sediment basins will be constructed at the end of collection ditches to detain sediment-laden runoff long enough to allow the majority of the sediment to settle out. The size of the temporary sediment trap/basin is dependent on the ditch design flows. The exact locations and final geometry of each trap will be field fitted to integrate with the terrain to minimize disturbance. The Engineer or Environmental Monitor will review and approve the sizing and location of these basins prior to construction. The sediment traps/basins will be checked regularly for sediment cleanout; if the sediment trap/basin has accumulated sediment and/or debris, the trap will be cleaned.

Two sizes of sediment basins designated SB1 and SB2 have been developed for the site and will be used for different size drainage areas. The sizing and dimensions of the two sediment basins are summarized as follows:

Table 3.5 Temporary Sediment Basin Design Specifications

	Sediment Basin size 1 (SB1)	Sediment Basin size 2 (SB2)
Drainage Area (ha)	<1	1 – 2
Width (m)	10	12
Length (m)	20	25
Depth of Wet Storage (m)	1	1
Minimum Spillway Weir Length (m)	2	4

The width and length dimensions correspond to the top of the wet storage area, at the base of the outlet structure. Typical details are shown on Drawing D0138.

Filter Bags

Filter bags, shown on Drawing D0138, are generally constructed from a sturdy non-woven geotextile capable of filtering particles larger than 150 microns. Filter bags are typically installed at the discharge end of pumped diversions, via fabric flange fittings, to remove fine grained materials before discharging to the environment.

If necessary for fine grained materials, filter bags will be installed on flat, stable, non-erodible foundations, or in well vegetated areas. The pumping rate will be no greater than specified by the manufacturer. Discharge from filter bags will be routed to lined areas (i.e. rock aprons, rip rap, etc.) to reduce water velocity and minimize erosion.

A smaller variety of filter bags, referred to as filter socks, can be installed on the discharge ends of gravity flow pipes, such as slope drains, to filter silt particles before discharging to the environment.

Filter bags will be maintained in the following manner:

- Inspected daily for defects, rips, tears, sediment accumulation, and erosion of the surrounding area, and
- When sediment fills one half of the volume of the filter bag, the filter bag will be removed from service and replaced.

Spare bags will be kept nearby to minimize time required to recommence pumping activities. Once the used bag is fully drained, the bag and its contents can be disposed of on site.

Flocculants

The term flocculation is used to describe the aggregation of small particles clumping together and settling out of suspension. In sediment and erosion control applications, flocculation is achieved with the use of chemical or natural additives (e.g. corn starch, chitosan, guar gum, etc.). A flocculent dosing system is typically installed at the inlet to a sedimentation pond, which allows the flocculation process to begin immediately upon discharge to the pond. The flocculants accelerate the natural settling process as the sediment-laden water flows through the pond, and therefore the required pond retention time is reduced. Additionally, flocculants can be added at specific points along collection ditches to initiate the settling process prior to arrival at the water management pond. This system may be required in steep topographic areas where:

- The calculated surface area for the design particle size is not practical, and
- Where the clay component is high, as clay soil types have a lower settling velocity than other particles.

Flocculent application was investigated by AMEC, as reported in the *Treatability Testing of Construction Runoff for New Gold's Blackwater Site* (AMEC, 2013).

Collection Ditches

A collection ditch intercepts contact water runoff from disturbed areas and diverts it to a stabilized area where it can be effectively managed. Collection ditches are used within construction areas to collect runoff and convey it to the appropriate sediment control measures. Coarse non-acid generating (NAG) rock and equipment to build ditches and dams are easily obtained on site, and require little further maintenance, making them effective improvements. A typical collection ditch is shown on Drawing D0137.

General locations and conditions may include:

- Below disturbed existing slopes to divert contact water to control facilities
- At or near the perimeter of a construction area to prevent contact runoff from leaving the site, and
- Below disturbed areas before stabilization to prevent erosion.

Collection ditches may be either temporary or permanent structures and will be sized to convey the runoff from a 1 in 10 year 24-hour return period storm event assuming that the entire footprint area has been disturbed and contributes contact runoff to the seepage collection and recycle ponds. The ditch designs are based on steady, uniform flow analysis.

Diversion Ditches

Diversion ditches will be constructed up-gradient of disturbed areas to intercept clean surface water runoff. A diversion ditch is a channel lined with vegetation, riprap, or other flexible, erosion resistant material. The main design considerations are the design flow and velocity of the water expected in the channel. All diversion ditches have been designed to carry the appropriate peak flow. All diversion ditches will discharge through a stabilized outlet designed to handle the expected runoff velocities and flows from the ditch without scouring. The selection of a type of lining has been based upon the design flow velocities. A typical diversion ditch is shown on Drawing D0137.

The ditches will be sized to convey the 1 in 10 year 24-hour peak storm for the estimated catchment size. Where fine grain soils have been exposed, appropriate erosion protection materials will be installed based on the estimated magnitude of flow and the flow velocity.

Culverts

Permanent culverts will be sized to convey the 1 in 100 year 24-hour peak storm event for small catchments and the 1 in 200 year 24-hour peak storm event for stream crossings.

In general, while variations may occur due to site-specific conditions, it is assumed that culverts will be installed at a slope of 2% with an inflow along a smooth headwall. A small stilling basin will be constructed at the upstream end of each culvert to reduce sedimentation. The culvert will consist of corrugated metal pipe or corrugated polyethylene tubing bedded in sandy material and the backfill material will be carefully compacted around the pipe to support the pipe haunches to prevent crushing.

3.3.5 Monitoring Strategies

Regular monitoring of implemented BMPs will ensure success of the Plan. The contractor and Environmental Monitoring Technicians will inspect all erosion control measures periodically and after each significant runoff-producing rainfall event.

Silt fences, sediment traps/basins, ditches, culverts, and sediment control ponds will be visually inspected for the following:

- Excess sediment build-up
- Structural/physical integrity, and
- Anticipated wear and tear.

Sediment removal and proper disposal will be performed as required.

3.4 DESIGN CRITERIA

The design criteria for the cofferdams, sediment control ponds, and diversion/collection ditches are summarized in the table below.

Table 3.6 Design Criteria Table

Design Element	Design Criteria	Anticipated Exposure Time
Site C Cofferdam	Storage of runoff from: 1 in 10 year return period wet August through October plus the 1 in 10 year 24-hour return period storm.	3 months
Site D Cofferdam	Storage of runoff from: 1 in 10 year return period wet October through December plus the 1 in 10 year 24-hour return period storm.	18 months
Sediment Control Ponds	Storage of 1 in 10 year 24-hour return period storm, spillway design flow of 1 in 200 year 24-hour return period storm	See Table 3.1
Diversion Ditches	1 in 10 year return period 24 hour storm	Construction and operations
Collection Ditches	1 in 10 year return period 24 hour storm	Construction and operations

3.5 TSF SITE C AND SITE D COFFERDAM STORAGE CAPACITY EVALUATION

A storage capacity evaluation was conducted for the Site C and D cofferdams to determine the embankment height requirements to manage Davidson Creek streamflows and surface water runoff for various hydrological scenarios during initial construction activities. TSF Site C was evaluated under the following scenarios:

- Average monthly precipitation during the construction period in August, September and October
- 1 in 10 year wet monthly precipitation during the construction period in August, September and October, and
- 1 in 10 year 24-hour return period storm event.

The total design inflow at the TSF Site C cofferdam is 382,000 m^3 from the following projected sources:

- 68,000 m^3 from the 1 in 10 year 24-hour return period storm, and
- 314,000 m^3 from the 1 in 10 year wet August to October.

The TSF Site C cofferdam design provides 550,000 m^3 of storage capacity at the design crest elevation of 1,285 m.

TSF Site D was evaluated slightly differently, as it will be constructed in October of Year -2, and its exposure time is until July of Year 1. The following scenarios were considered:

- Average monthly precipitation during the construction period in October, November and December
- 1 in 10 year wet monthly precipitation during the construction period in October, November and December
- 1 in 10 year 24-hour return period storm event, and
- 1 in 200 year 24-hour return period storm event.

The total design inflow for the TSF Site D cofferdam is 243,000 m^3 from the following projected sources:

- 57,000 m^3 from the 1 in 10 year 24-hour return period storm, and
- 186,000 m^3 from the 1 in 10 year wet October to December.

The TSF Site D cofferdam was sized to safely pass the 1 in 200 year 24-hour return period storm, through the spillway, due to the longer exposure time of the dam. The cofferdam does not store this volume, only pass it via a spillway, hence it was not included in the design inflow calculations.

The TSF Site D cofferdam design provides 360,000 m^3 of storage capacity at the design crest elevation of 1,215 m. The design inflows and available storage volumes for both TSF Site C and D are summarized in Table 3.6.

Table 3.7 Cofferdam Storage Capacity Evaluation Summary

	Description	Cofferdam	
		Site C	**Site D**
Design Inflow Volumes (m^3)	1 in 10 year, 24-hour return period storm	68,000	57,000
	1 in 10 year, wet August	112,000	-
	1 in 10 year, wet September	99,000	-
	1 in 10 year, wet October	103,000	88,000
	1 in 10 year, wet November	-	60,000
	1 in 10 year, wet December	-	38,000
	Potential Inflow Volume Subtotal	382,000	243,000
Available Storage (m^3)	Minimum Design Storage Volume	400,000	250,000
	Freeboard Storage	150,000	110,000
	Maximum Available Storage Volume	550,000	360,000

4 – CONSTRUCTION WATER MANAGEMENT PLAN

4.1 GENERAL

This section provides an overview of the construction activities during the first year of construction (Year -2) followed by the sequence of construction water management works. The plan summarizes the construction that will continue into Year -1 and Year 1. Construction surface water management facilities and sediment and erosion control BMPs are shown on Drawings D0130 through D0138.

4.2 YEAR -2 CONSTRUCTION

4.2.1 Overview of Construction Activities

Construction in Year -2 will focus on the following work areas:

- Logging
- Preparing the construction laydown, truck shop, earthworks contractor laydown areas
- Developing the primary crusher, overland conveyor, and plant site platform area
- Constructing the construction and permanent camps
- Developing the aggregate screening areas
- Construction of the fresh water reservoir
- Constructing the TSF Site C dam
- Constructing the TSF Site D cofferdam
- Preparing the TSF Site C Basin area, and
- Constructing the West Ditch to TSF Site C Basin area.

4.2.2 Logging

Logging will commence in Year -2 and continue into the operations phase of the project. Clearing and grubbing of logged areas will follow in stages as required. Non-merchantable timber and vegetation will be mulched and decked, with a portion incorporated into the topsoil stockpiles. The site will be assessed after completion of logging and brushing activities to determine if the establishment of supplemental sediment and erosion control measures is required after the fact. These may include surface roughening, collection ditches and sediment basins (see Drawings D0136 – D0138).

The topsoil stockpile area is shown on Drawing D0132. Collection ditches will be constructed at the toe of the topsoil stockpile area leading to a temporary sediment basin. Silt fences will be placed downslope of the collection ditches prior to establishing the stockpile.

4.2.3 Development of the Aggregate Screening Area

The aggregate screening area is required to produce aggregate for construction activities. It will involve establishing a crushing and screening plant to produce various construction materials. Surface water runoff will be directed to a sediment control pond.

Construction water management at the aggregate screening area will involve construction of collection ditches and SCP4 downstream of the area, as shown on Drawings D0130 and D0135.

The following sequence of activities and construction water management will be followed:

1. Construct an access road to the aggregate processing area while installing appropriate sediment control BMPs along the route that may include road camber, coarse material road surfacing, culverts, vegetative buffer leave strips near watercourses, silt fences and check dams.
2. Construct SCP4 according to the specifications outlined in Drawing D0136.
3. Construct a collection ditch on the west side of the work area and a second one on the east side of the esker. The two ditches should meet on the northeast side of the esker, where they will join and continue to SCP4.
4. Establish the aggregate excavation and processing area.
5. Construct haul roads from the esker borrow area to the TSF basin by upgrading existing logging roads or constructing new haul roads. Use BMPs as defined in step 1 above where appropriate.

4.2.4 Construction of the Fresh Water Supply System

The fresh water supply system consists of:

- Tatelkuz Lake intake
- Fresh water supply pipeline
- Booster pump stations, and
- Fresh water reservoir.

The fresh water reservoir will be constructed in Year -2, as per the Knight Piésold letter *Blackwater Gold Project – Fresh Water Supply System Design* dated July 17, 2013, in order to commission the system for operation by April of Year -1. The letter outlines the design basis, intake and pipeline system, and the fresh water reservoir designs. The location of the fresh water reservoir is shown on Drawing D0135.

Water management during the construction of the fresh water supply system will be accomplished by implementing BMPs at each specific work area. Some of the measures will include:

- Vegetation management
- Slope roughening
- Silt fencing
- Ditching, and
- Installation of Temporary sediment basins.

A sediment basin will be constructed downstream of the fresh water reservoir area to treat construction water from the fresh water reservoir embankments and reservoir construction. This basin will be constructed in-stream founded on sands and gravel deposits to allow infiltration and filtering. A floating silt curtain will be installed at the Tatelkuz Lake intake site around the construction work area to minimize siltation and disturbance in the lake. Silt fences and vegetation barriers will be implemented along the water supply pipeline and in the vicinity of the booster pump stations. Slope roughening will be applied to all cut and fill slopes.

4.2.5 Development of Southern Portion of Project Site

The southern extent of the project site includes the laydown areas, crusher, conveyor, plant site, and construction camp. These facilities will be developed in Year -2 prior to preparation of the TSF basin. Each area will incorporate a sediment control pond sized for the disturbed area.

Water management in the southern project area will involve construction of collection ditches that direct runoff to sediment ponds and SCP1, SCP2 and SCP3, as shown on Drawings D0130 and D0134.

The following sequence of activities and construction water management works will be followed:

1. Construct access roads to the camp, plant site and laydown areas from the main mine access road. Install appropriate sediment control BMPs along the routes that may include road camber, coarse material road surfacing, culverts, vegetative buffer leave strips near watercourses, silt fences and check dams.
2. Construct SCPs 1 through 3 according to the criteria outlined on Drawing D0136.
3. Construct the collection ditches around the perimeter of the camp as shown on Drawing D0134. Ensure that silt fences are placed on the downslope side of spoil piles adjacent to collection ditches.
4. Construct the collection ditches around the perimeter of the plant site and crusher as shown on Drawing D0130.
5. Construct the collection ditches around the perimeter of the laydown areas as shown on Drawing D0130 and D0133.
6. Develop the camp site, plant site and crusher and laydown areas.
7. Construct haul roads from the plant site area and the laydown areas to the TSF basin. Use BMPs as defined in step 1 above where appropriate.

4.2.6 Construction of TSF Site C Cofferdam

The TSF Site C dam will be constructed to elevation 1,300 m in Year -2 using borrow materials obtained from the local borrow adjacent to the Site C dam and from the aggregate screening area. The Site C cofferdam will be constructed as part of the starter dam. The exposure time of the cofferdam is three months (August, September and October) before the starter dam is constructed to the adequate elevation.

Construction of the TSF Site C cofferdam will include the following activities:

- Construct haul roads to the cofferdam by upgrading existing logging roads and pioneer roads
- Strip topsoil from footprint of the cofferdam and place in topsoil stockpile, and
- Construct the TSF Site C cofferdam to elevation 1,285 m as shown on Drawing D0131.

The construction water management plan for the TSF Site C cofferdam construction is shown on Drawing D0131 and the sequence is described below:

1. Construct access roads (e.g., KH1, KH2, and KH3) employing temporary sediment and erosion control BMPs as depicted on Drawings D0137 and D0138.
2. Install a temporary bypass diversion pumping system on Davidson Creek to provide a temporary clean water diversion while the cofferdam and SCP6 are constructed. The bypass diversion pumping will involve construction of a temporary stream diversion structure. A series of pumps will be set up with a pipeline to pump water around the work area discharging flow into Davidson Creek using a rock energy dissipater with the configuration shown on Drawing D0138.
3. Install BMPs and establish site isolation around the Site C cofferdam construction area as shown on Drawing D0131. This includes the collection ditch running from the end of road KH3 to the natural pond adjacent to SCP6. This ditch will alleviate the total inflow to SCP6 thereby reducing the design size of the sediment control pond.

4. Construct SCP6 to the criteria shown on Drawing D0131 and described in Section 3.3.3 of this report.
5. Strip the foundation areas for the Site C cofferdam and store the material in the topsoil stockpile. Construct the cofferdam from Zone S material to elevation 1,285 m.

4.2.7 Construction of TSF Site D Cofferdam

Construction of the TSF Site D dam will begin in Year -2. The Site D dam will include a cutoff trench, which will be excavated after the construction of the Site D cofferdam. The Site D cofferdam will not form the upstream toe of the Site D starter embankment. Instead, it will be built upstream of the starter dam toe in order to maintain a dry working environment for the cutoff trench excavation. The exposure time of the cofferdam is 18 months (October of Year -2 to April of Year 1). An emergency spillway has been designed for the Site D cofferdam due to its long exposure time and vital role of keeping the cutoff trench working area safe and dry.

Construction of the TSF Site D cofferdam will include the following activities:

- Construct haul roads to the cofferdam by upgrading existing logging roads and pioneer roads
- Strip topsoil from footprint of the cofferdam and place in topsoil stockpile, and
- Construct Site D cofferdam to elevation 1,215 m as shown on Drawing D0132, with an emergency spillway that bypasses the cutoff trench and starter embankment working area.

The construction water management plan for the TSF Site D cofferdam construction is shown on Drawing D0132 and the sequence is described below:

1. Construct the access roads employing temporary sediment and erosion control BMPs as described on Drawings D0137 and D0138.
2. Install a temporary bypass diversion pumping system on Davidson Creek to provide a temporary clean water diversion while the cofferdam and sediment control pond 7 are constructed. The bypass diversion pumping will involve construction of a temporary stream diversion structure. A series of pumps will be set up with a pipeline to pump water around the work area discharging flow into Davidson Creek using a rock energy dissipater with the configuration shown on Drawing D0138.
3. Install BMPs and establish site isolation around the Site D cofferdam construction area.
4. Construct SCP7 to the criteria shown on Drawing D0132 and described in Section 3.3.3 of this report.
5. Strip the foundation areas for the Site D cofferdam and store the material in the topsoil stockpile. Construct the cofferdam from Zone S material to elevation 1,215 m. Construct the emergency spillway, which is capable of safely passing the 1 in 200 year 24-hour return period storm event.
6. Establish the water pump back system from the Site D cofferdam to the Site C starter dam, as shown on Drawing D0132. Water collected behind the Site D cofferdam will be pumped behind the TSF Site C dam to store water for mill start-up. The pumpback system is designed to transfer up to 1,500 m^3/hr of water in order to capture a large portion of the spring and summer freshet flows. At lower flow times of year, the water behind the cofferdam will accumulate at a slower rate and will be pumped down as required.

4.2.8 West Ditch to TSF Site C Basin Area

A ditch will be constructed to convey runoff from the southern portion of the project to the TSF Site C basin upon completion of the TSF Site C Main Dam to elevation 1,300 m (end of Year -2). The ditch will follow road KH3 from the cut-off point to a point roughly x meters west of the TSF Site C dam embankment. The trapezoidal ditch will have a 1 m wide base and will be 2.5 m deep. The ditch was designed to safely convey the runoff from a 1 in 200 year 24-hour storm event with 0.6 m of freeboard during the peak flow. The riprap D_{50} is sized at 0.33 m and will comprise a layer 0.66 m deep.

This ditch will allow the runoff from the southern portion of the project to be detained in the TSF Site C basin for use in mill start-up. The southern project area is shown on Drawing D0133.

4.3 YEAR -1 AND 1 CONSTRUCTION

4.3.1 Overview of Construction Activities

Construction in Year -1 will focus on raising the Site C Main Dam to elevation 1,340 m and constructing the Site D Main Dam to elevation 1,240 m. In Year 1, the Site C dam will be raised to elevation 1,353 m. The Site D dam footprint will be expanded outwards at elevation 1,240 m.

4.3.2 Site C Main Dam Raise

Construction of the Site C dam will include the following sequence:

1. Prepare the abutment foundation areas for construction of the Site C dam raise.
2. Extend the embankment drainage system longitudinal drain up the abutments to elevation 1,340 m.
3. Construct the Site C dam to elevation 1,340 m by the end of Year -1.
4. The same sequence of activities will be repeated in Year 1 to reach elevation 1,353 m.

4.3.3 Site D Main Dam Construction and Expansion

The construction of the Site D Main Dam will include the following sequence:

1. Remove topsoil and unsuitable materials from the Site D Main Dam footprint and place in the topsoil stockpile.
2. Prepare the abutment foundation areas for construction of the Site D Main Dam.
3. Extend the cutoff trench from the abutments at elevation 1,240 m to the invert of the creek. Excavate a minimum of 1 m into the dense low-permeability foundation.
4. Backfill the cutoff trench with compacted Zone S and F materials.
5. Construct the embankment drainage system longitudinal drain up the abutments to elevation 1,240 m.
6. Construct the Site D Main Dam to elevation 1,240 m by the end of Year -1.
7. Expand the dam footprint upstream and downstream at elevation 1,240 m as shown on the construction drawings. The upstream footprint will encompass the cofferdam and render it obsolete.

Construction water management for the above activities will involve operation and maintenance of SCP7. Water accumulation upstream of the Site D cofferdam will continue to be pumped to the

TSF Site C basin area for storage. Surface water runoff from the plant site, open pit area, and site roads will be directed and stored behind the Site C Main Dam.

5 – REFERENCES

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6 – CERTIFICATION

This report was prepared, reviewed and approved by the undersigned.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. HODZIC Nov. 29, 2013

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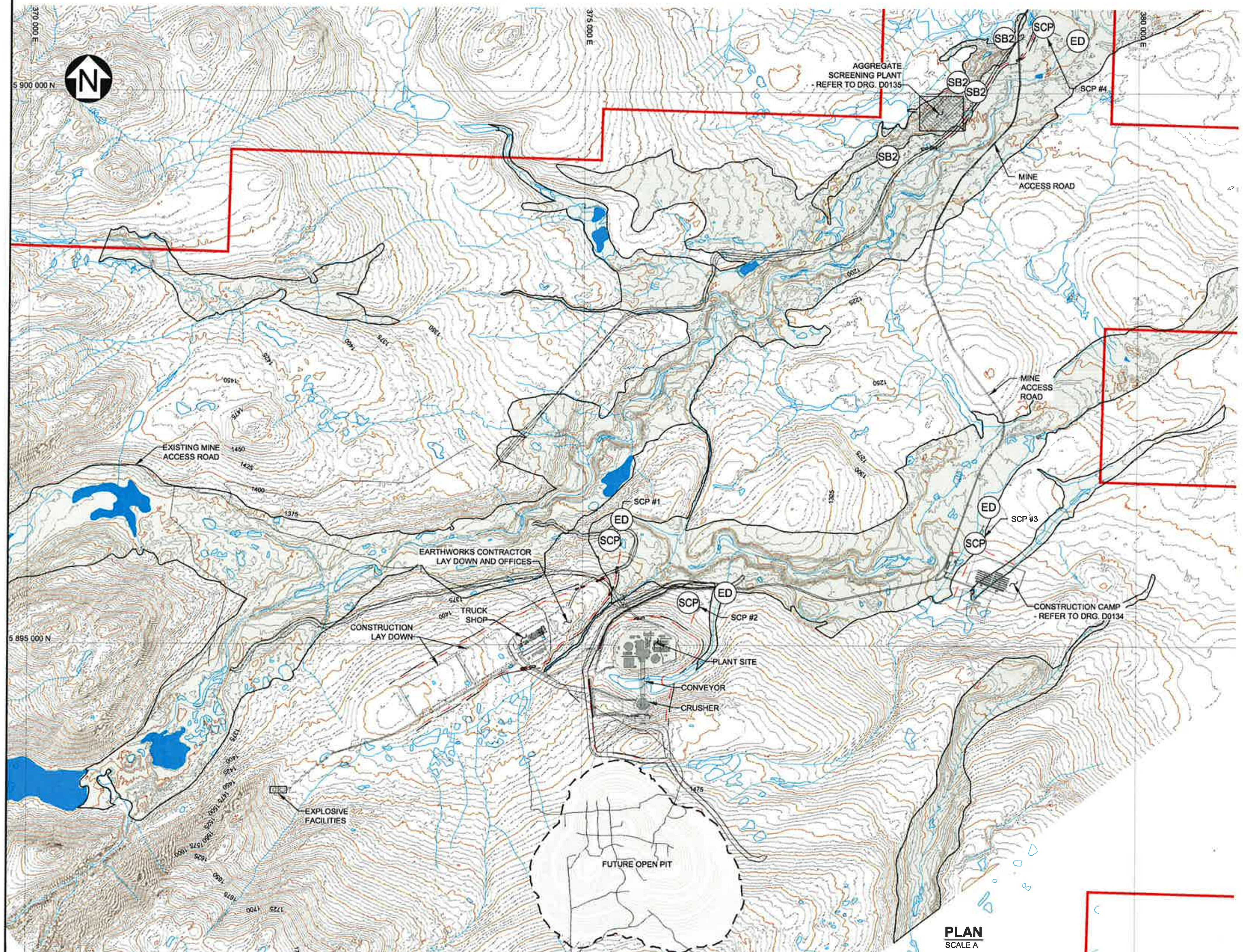
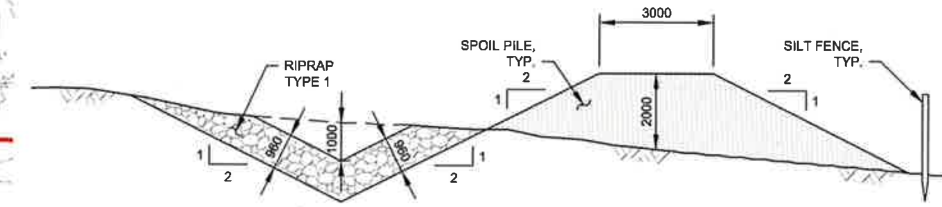
Ken Brouwer, P.Eng.
President



PLAN
SCALE A



TYPICAL SECTION
CD COLLECTION CHANNEL
SCALE NTS

SEDIMENT CONTROL POND				
NO.	DIMENSIONS (m) (W X L X D)	SURFACE AREA AT PRIMARY OUTLET INVERT (m²)	POND INVERT ELEVATION (m)	BERM ELEVATION (m)
SCP #1	25 X 125 X 5	5,600	1340	1345
SCP #2	35 X 175 X 50	9,000	1360	1365
SCP #3	15 X 170 X 5	4,900	1245	1250
SCP #4	30 X 140 X 5	6,800	1125	1130

LEGEND:

- MELTWATER CHANNEL (SUFICIAL SAND AND GRAVEL DEPOSITS, GLACIAL FLUVIAL DEPOSITS)
- SCP OUTLET
- COLLECTION CHANNEL
- SILT FENCE
- NEW GOLD PROPERTY BOUNDARY
- SCP SEDIMENT CONTROL POND
- SB SEDIMENT BASIN
- ED ENERGY DISSIPATER

NOTES:

1. CONTOUR INTERVAL IS 5 METRES.
2. DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.

NOT FOR CONSTRUCTION

SCALE A 400 200 0 400 800 1200 1600 2000 m

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP

REF	NUMBER	TITLE
	REFERENCES	

STAMP/SEAL
PROFESSIONAL PROVINCE OF BRITISH COLUMBIA ENGINEER
Nov 29, 2013

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APPROVED FOR ______

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: FEASIBILITY STUDY

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
VA101-457/6		DES	MH	20SEP13
SCALE	PACKAGE CODE	DRN	AT	20SEP13
AS SHOWN		CHK	RR	29Nov13
		APP	KJB	2Dec13

newgold

Knight Piésold CONSULTING

SUBJECT: SEDIMENT AND EROSION CONTROL PLAN YEAR −2

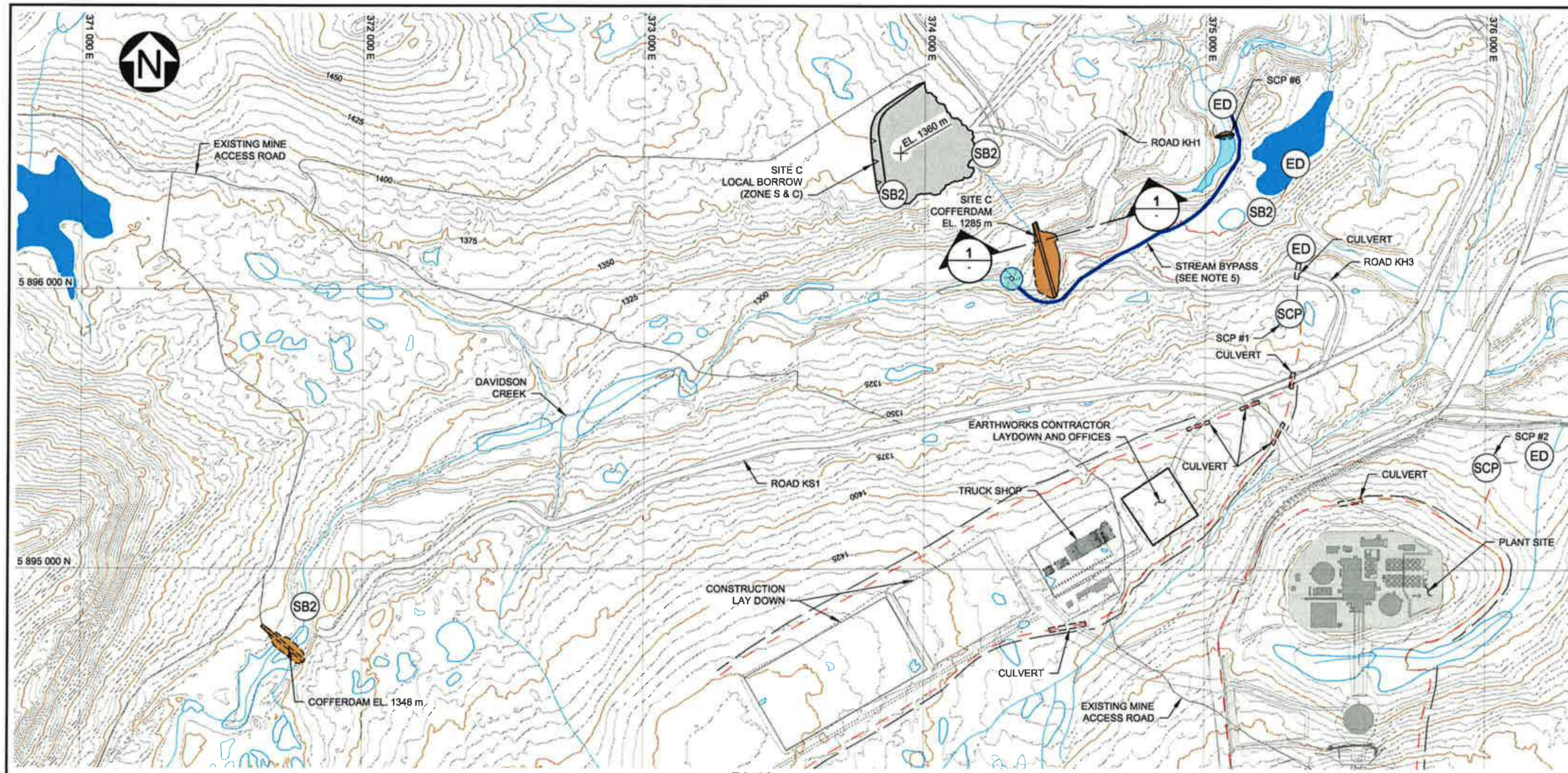
AREA

CLIENT DWG. NO.

DRAWING NO. D0130

REV. 0

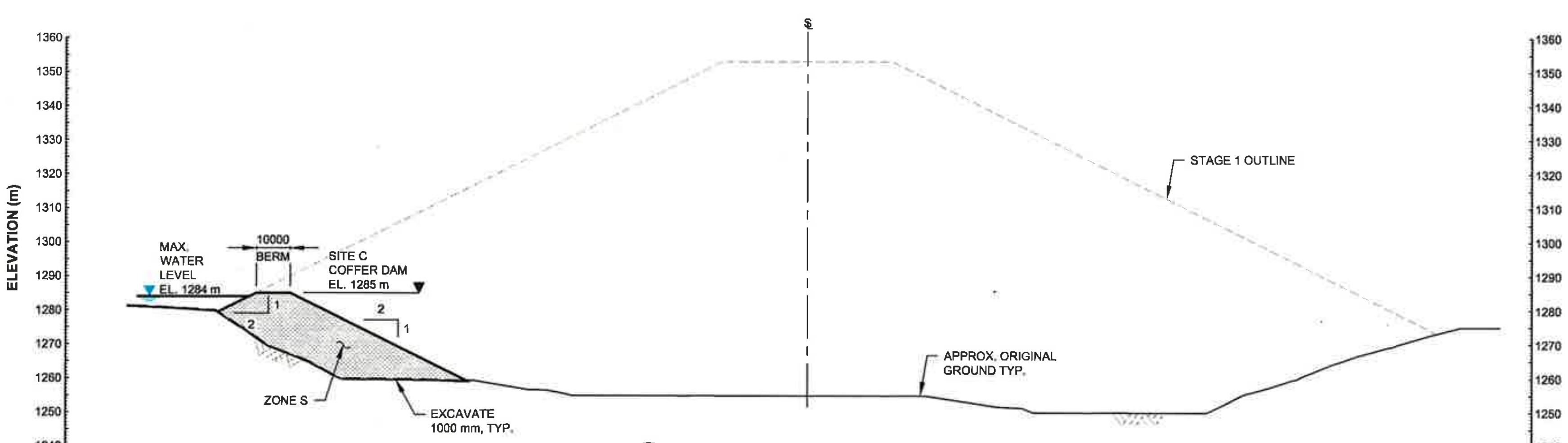
SAVED: 29–Nov–13 4:04 PM PLOTTED: 29–Nov–13 4:04 PM USER: ABBAS NASIR



PLAN

SITE C COFFERDAM AT EL. 1285 m

SCALE A



1 TYPICAL MAXIMUM SECTION

SITE C COFFERDAM

SCALE B

SITE C - COFFERDAM DESIGN CRITERIA		
PARAMETER	VALUE	UNITS
1 IN 10 YEAR, 24 HOUR STORM	50	mm
1 IN 10 YEAR, 24 HOUR STORM VOLUME	68,000	m^3
1 IN 10 YEAR, WET AUGUST VOLUME	112,000	m^3
1 IN 10 YEAR, WET SEPTEMBER VOLUME	99,000	m^3
1 IN 10 YEAR, WET OCTOBER VOLUME	103,000	m^3
TOTAL DESIGN VOLUME	382,000	m^3
DESIGN COFFERDAM CAPACITY (EL. 1283 m)	400,000	m^3
MAXIMUM COFFERDAM CAPACITY (EL.1285 m)	550,000	m^3

SEDIMENT CONTROL POND				
NO.	DIMENSIONS (m) (W X L X D)	SURFACE AREA AT PRIMARY OUTLET INVERT (m^2)	POND INVERT ELEVATION (m)	BERM ELEVATION (m)
SCP #1	25 X 125 X 5	5,600	1340	1345
SCP #2	35 X 175 X 5	9,000	1360	1365
SCP #6	-	9,600	1242.5	1247

SEDIMENT CONTROL POND OUTLETS				
NO.	1 IN 10 YEAR STORM EVENT		1 IN 200 YEAR STORM EVENT	
	TYPE	INVERT ELEVATION (m)	TYPE	INVERT ELEVATION (m)
SCP #1	1 X 0.30 m DIAMETER RISER PIPE	1343.7	5 m WIDE SPILLWAY	1344.0
SCP #2	1 X 0.30 m DIAMETER RISER PIPE	1363.3	5 m WIDE SPILLWAY	1364.0
SCP #6	V-NOTCH WEIR SPILLWAY	1246.0	2 m WIDE COMPOUND WEIR SPILLWAY	1246.4

LEGEND:

- MINE WATER
- FRESH WATER
- EMBANKMENT FILL
- BORROW AREA (ZONE S & C)
- ZONE S (OVERBURDEN / GLACIAL TILL)
- COLLECTION DITCH
- SCP OUTLET
- EXISTING ACCESS TRAILS
- ED ENERGY DISSIPATER
- SCP SEDIMENT CONTROL POND
- SB SEDIMENT BASIN
- SILT FENCE
- PUMP

NOTES:

1. CONTOUR INTERVAL IS 5 m.
2. DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
3. EXPECTED EXPOSURE TIME OF COFFERDAM IS THREE MONTHS (AUGUST - OCTOBER, 2015.)
4. SEE DRAWINGS D0136, D0137, D0138 FOR EROSION CONTROL BMP SECTION AND DETAILS.
5. THE PRESSURIZED SECTION OF PIPE IS 18" DIAMETER AND THE GRAVITY SECTION IS 20" DIAMETER. THE PIPELINE TRANSITION TO GRAVITY FLOW APPROXIMATELY THE CREST OF THE COFFERDAM.

SCALE B 20 10 0 20 40 60 80 100 m

SCALE A 200 100 0 200 400 600 800 1000 m

NOT FOR CONSTRUCTION

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REF	NUMBER	TITLE

REFERENCES

STAMP / SEAL: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, M. HODZIC, Nov 29 2013

APPROVED FOR ________

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: FEASIBILITY STUDY

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
VA101-457/6		DES	DDF	15NOV13
		DRN	AN	15NOV13
SCALE: AS SHOWN	PACKAGE CODE	CHK	BB	29NOV13
		APP	KB	29NOV13

newgold

Knight Piésold CONSULTING

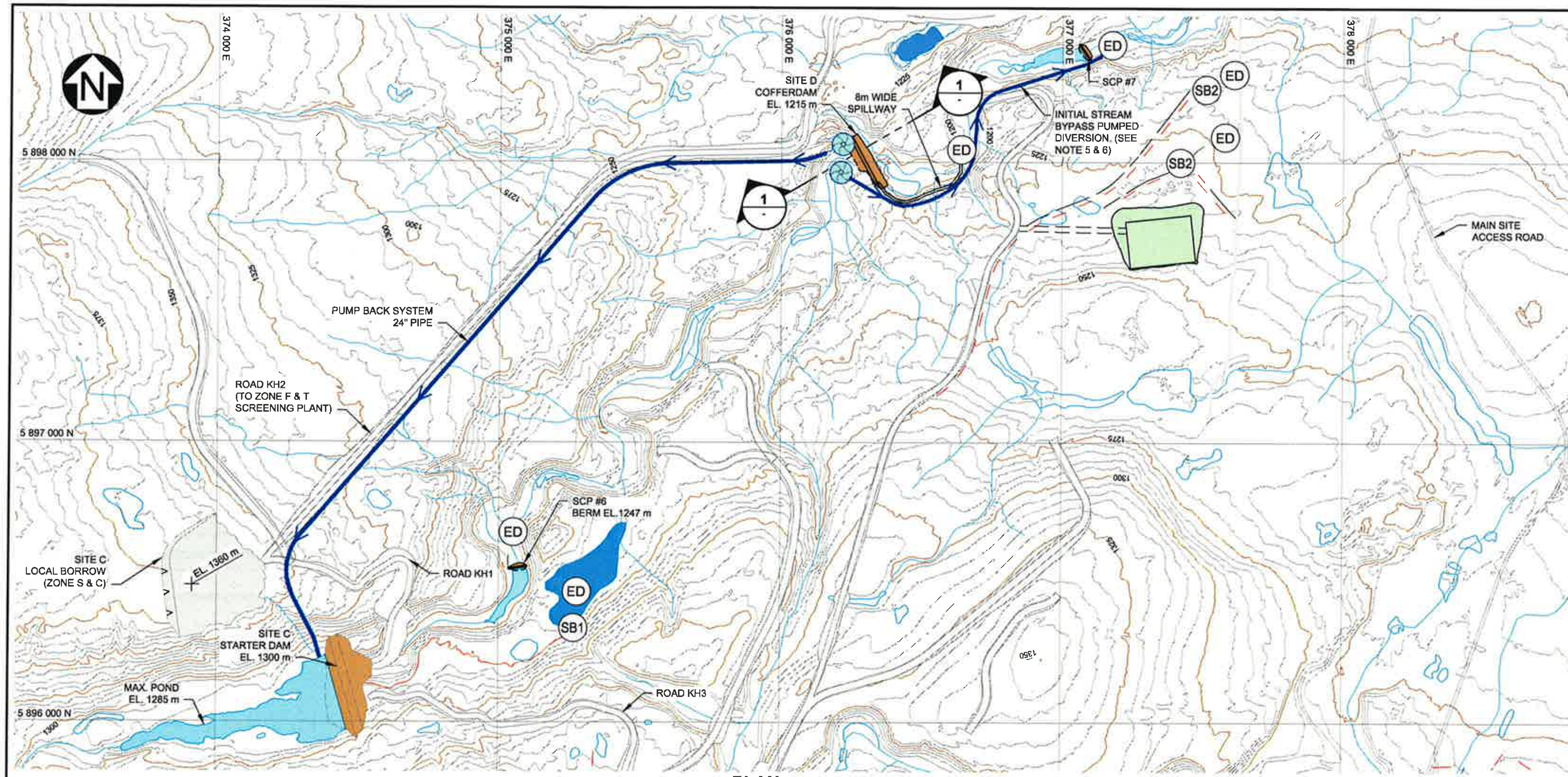
SUBJECT: SEDIMENT AND EROSION CONTROL PLAN TAILINGS STORAGE FACILITY SITE C COFFERDAM YEAR -2

AREA

CLIENT DWG. NO.

DRAWING NO. D0131 REV. 0

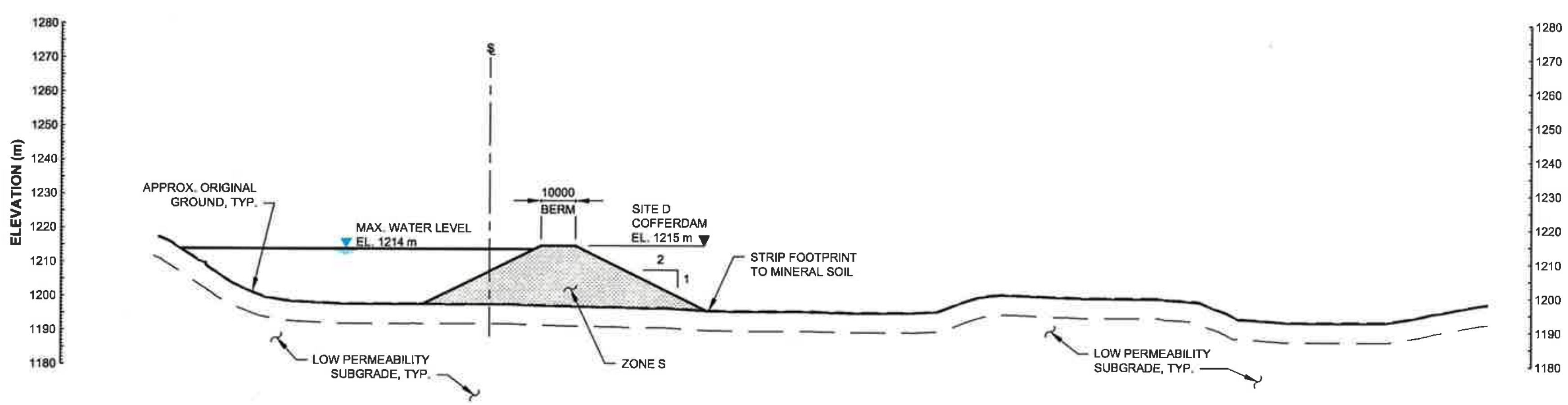
SAVED: 29-Nov-13 4:02 PM PLOTTED: 29-Nov-13 4:05 PM USER: ABBAS NASIRI



PLAN

SITE D COFFERDAM AT EL. 1215 m

SCALE A



1 TYPICAL SECTION

SITE D COFFERDAM

SCALE B

SITE D - COFFERDAM DESIGN CRITERIA

PARAMETER	VALUE	UNITS
1 IN 10 YEAR, 24 HOUR STORM	50	mm
1 IN 10 YEAR, 24 HOUR STORM VOLUME	57,000	m^3
1 IN 10 YEAR, WET OCTOBER VOLUME	88,000	m^3
1 IN 10 YEAR, WET NOVEMBER VOLUME	60,000	m^3
1 IN 10 YEAR, WET DECEMBER VOLUME	38,000	m^3
TOTAL DESIGN VOLUME	243,000	m^3
DESIGN COFFERDAM CAPACITY (EL. 1214 m)	250,000	m^3
MAXIMUM COFFERDAM CAPACITY (EL.1215 m)	360,000	m^3

SEDIMENT CONTROL POND

NO.	DIMENSIONS (m) (W X L X D)	SURFACE AREA AT PRIMARY OUTLET INVERT (m^2)	POND INVERT ELEVATION (m)	BERM ELEVATION (m)
SCP #1	25 X 125 X 5	5,600	1340	1345
SCP #3	15 X 170 X 5	4,900	1245	1250
SCP #6	-	9,600	1242.5	1247
SCP #7	-	14,000	1182	1188

SEDIMENT CONTROL POND OUTLETS

NO.	1 IN 10 YEAR STORM EVENT		1 IN 200 YEAR STORM EVENT	
	TYPE	INVERT ELEVATION (m)	TYPE	INVERT ELEVATION (m)
SCP #1	1 X 0.30 m DIAMETER RISER PIPE	1343.7	5 m WIDE SPILLWAY	1344.0
SCP #3	1 X 0.10 m DIAMETER RISER PIPE	1248.0	5 m WIDE SPILLWAY	1249.0
SCP #6	V-NOTCH WEIR SPILLWAY	1246.0	2 m WIDE COMPOUND WEIR SPILLWAY	1246.4
SCP #7	V-NOTCH WEIR SPILLWAY	1186.5	2 m WIDE COMPOUND WEIR SPILLWAY	1186.9

LEGEND:

- TOPSOIL
- MINE WATER
- FRESH WATER
- EMBANKMENT FILL
- ZONE S (OVERBURDEN / GLACIAL TILL)
- COLLECTION DITCH
- SCP OUTLET
- ED ENERGY DISSIPATER
- SCP SEDIMENT CONTROL POND
- SB SEDIMENT BASIN
- SILT FENCE
- PUMP

NOTES:

1. CONTOUR INTERVAL IS 5 m.
2. DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
3. EXPECTED EXPOSURE TIME OF COFFERDAM IS THREE MONTHS (AUGUST - OCTOBER, 2015.)
4. SEE DRAWINGS D0136, D0137, D0138 FOR EROSION CONTROL BMP SECTION AND DETAILS.
5. THE INITIAL STREAM BYPASS PUMPED DIVERSION SYSTEM WILL BE INSTALLED PRIOR TO COFFERDAM CONSTRUCTION. THIS PIPELINE WILL BE REMOVED ONCE THE PUMP BACK SYSTEM PIPELINE IS OPERATIONAL.
6. THE PRESSURIZED SECTION OF PIPE IS 18" DIAMETER AND THE GRAVITY SECTION IS 20" DIAMETER. THE PIPELINE TRANSITIONS TO GRAVITY AT FLOW APPROXIMATELY THE CREST OF THE COFFERDAM.

SCALE B: 20 10 0 20 40 60 80 100 m

SCALE A: 200 100 0 200 400 600 800 1000 m

NOT FOR CONSTRUCTION

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REF	NUMBER	TITLE

REFERENCES

STAMP / SEAL: PROFESSIONAL PROVINCE OF BRITISH COLUMBIA M. HODZIC ENGINEER — Nov. 29, 2013

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APPROVED FOR ______

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: FEASIBILITY STUDY

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
VA101-457/6		DES	DDF	15NOV13
SCALE	PACKAGE CODE	DRN	AN	15NOV13
PLAN		CHK	BB	29Nov13
		APP	KJB	29Nov13

newgold

Knight Piésold CONSULTING

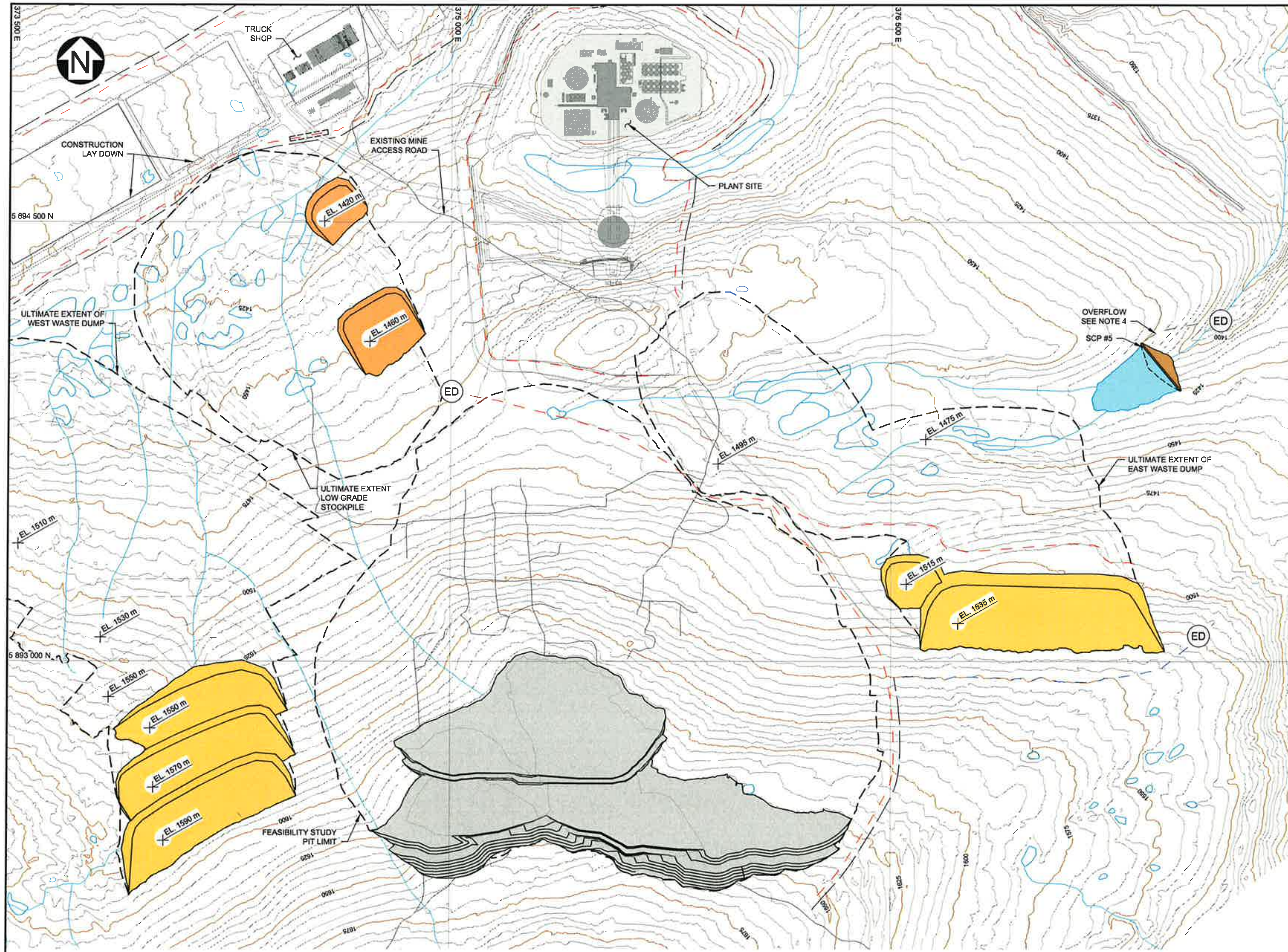
SUBJECT: SEDIMENT AND EROSION CONTROL PLAN TAILINGS STORAGE FACILITY SITE D COFFERDAM YEAR −2

AREA

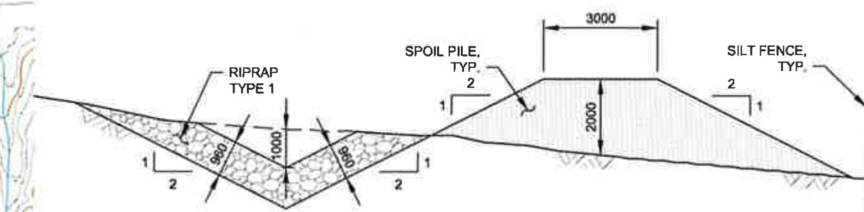
CLIENT DWG. NO.

DRAWING NO. D0132 REV. 0

SAVED: 29-Nov-13 4:01 PM PLOTTED: 29-Nov-13 4:05 PM USER: ABBAS NASIRI



PLAN
SCALE A



TYPICAL SECTION
COLLECTION DITCH (CD)
SCALE NTS

SEDIMENT CONTROL POND OUTLETS						
NO.	BERM ELEVATION (m)	SURFACE AREA AT PRIMARY OUTLET INVERT (m^2)	1 IN 10 YEAR STORM EVENT		1 IN 200 YEAR STORM EVENT	
			TYPE	INVERT ELEVATION (m)	TYPE	INVERT ELEVATION (m)
SCP #5	1426	32,000	0.15 m WIDE COMPOUND WEIR SPILLWAY	1424.6	2.0 m WIDE COMPOUND WEIR SPILLWAY	1425.1

LEGEND:

- BORROW AREA (ZONES S, C, AND ROCKFILL)
- MINE WATER
- EMBANKMENT FILL
- COLLECTION DITCH
- DIVERSION DITCH
- SCP OUTLET
- SILT FENCE
- EXISTING ACCESS TRAILS
- OPEN PIT BOUNDARY
- (ED) ENERGY DISSIPATER
- (SB) SEDIMENT BASIN

NOTES:

1. CONTOUR INTERVAL IS 5 METRES.
2. DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
3. SEE DRAWINGS D0136, D0137, D0138 FOR EROSION CONTROL BMP SECTION AND DETAILS.
4. DURING OPERATION OVERFLOW TO BE ROUTED TO COLLECTION DITCH DRAINING TO TSF.

NOT FOR CONSTRUCTION

SCALE A 150 75 0 250 500 750 m

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
M. HODZIC
29224
Nov. 29, 2013

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APPROVED FOR ____________
CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.
PROJECT PHASE: FEASIBILITY STUDY

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
VA101-457/6		DES	MH	04OCT13
SCALE	PACKAGE CODE	DRN	AT	04OCT13
AS SHOWN		CHK	BR	29Nov13
		APP	KJB	2Dec13

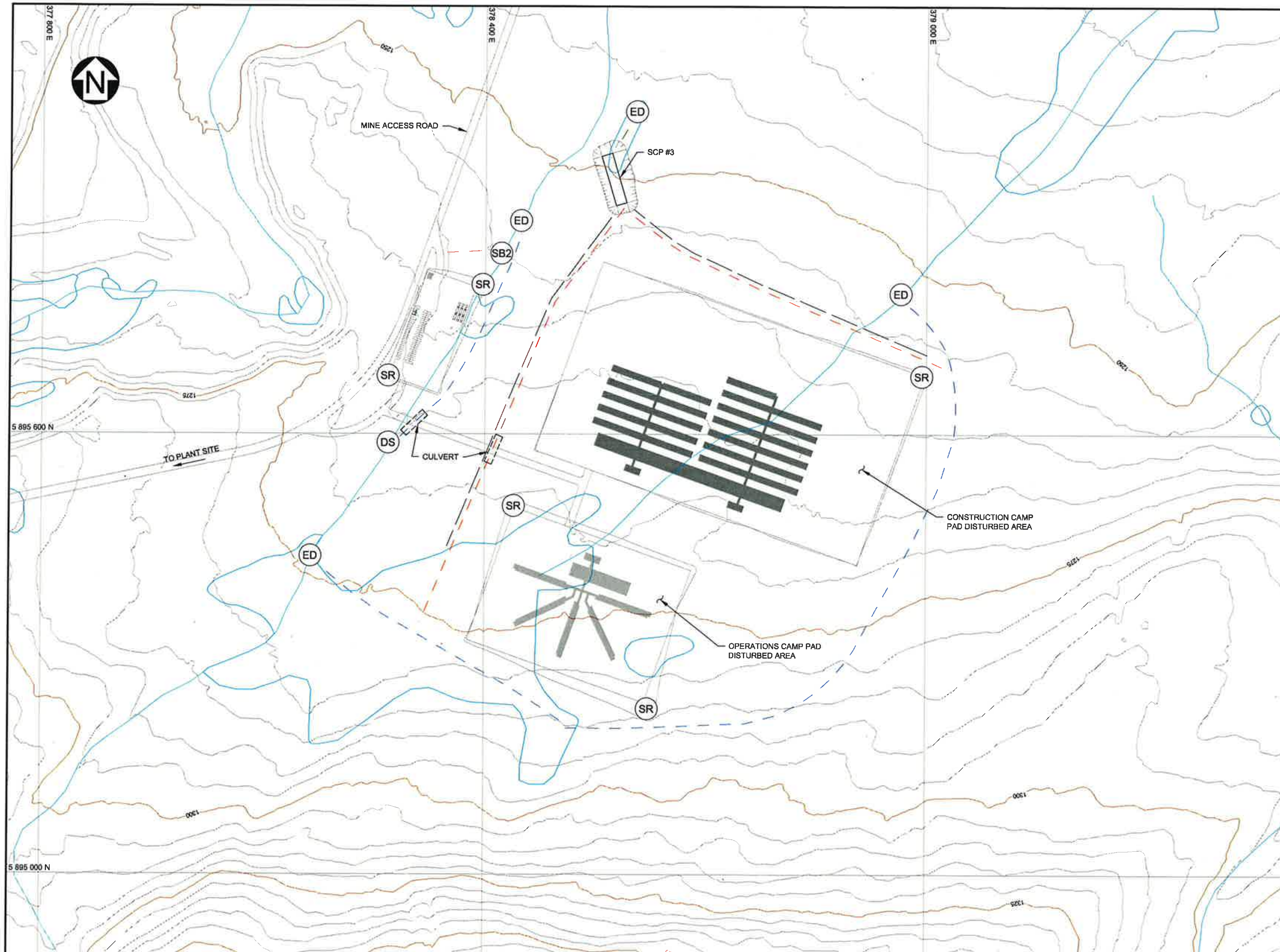
newgold

SUBJECT
SEDIMENT AND EROSION CONTROL PLAN
WASTE DUMPS & OPEN PIT
YEAR –2

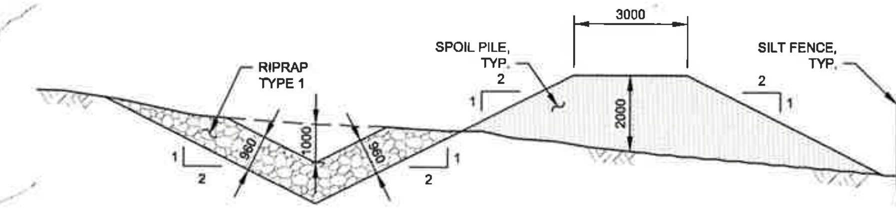
Knight Piésold CONSULTING

AREA
CLIENT DWG. NO.
DRAWING NO. D0133
REV. 0

SAVED: 29–Nov–13 4:00 PM PLOTTED: 29–Nov–13 4:06 PM USER: ABBAS NAS



PLAN
SCALE A



TYPICAL SECTION
COLLECTION DITCH (CD)
SCALE NTS

SEDIMENT CONTROL POND OUTLETS						
NO.	DIMENSIONS (m) (W X L X D)	POND INVERT ELEVATION (m)	1 IN 10 YEAR STORM EVENT		1 IN 200 YEAR STORM EVENT	
			TYPE	INVERT ELEVATION (m)	TYPE	INVERT ELEVATION (m)
SCP #3	15 X 170 X 5	1245	1 X 0.10 m DIAMETER RISER PIPE	1248	5 m WIDE SPILLWAY	1249

LEGEND:

- DIVERSION DITCH
- COLLECTION DITCH
- SCP OUTLET
- SILT FENCE
- (DS) DIVERSION STRUCTURE
- (ED) ENERGY DISSIPATER
- (SR) SLOPE ROUGHENING
- (SB) SEDIMENT BASIN

NOTES:

1. CONTOUR INTERVAL IS 5 METRES.
2. DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
3. SEE DRAWINGS D0136, D0137, D0138 FOR EROSION CONTROL BMP SECTION AND DETAILS.

NOT FOR CONSTRUCTION

SCALE A 60 30 0 100 200 300 m

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, M. HODZIC, # 2922[illegible], Nov 29, 2013

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APPROVED FOR ____________

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: FEASIBILITY STUDY

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
VA101-457/6		DES	MH	20SEP13
		DRN	AT	20SEP13
SCALE: AS SHOWN	PACKAGE CODE	CHK	BB	29Nov13
		APP	KB	29Nov13

newgold

Knight Piésold CONSULTING

SUBJECT: SEDIMENT AND EROSION CONTROL PLAN
CAMP AREA
YEAR -2

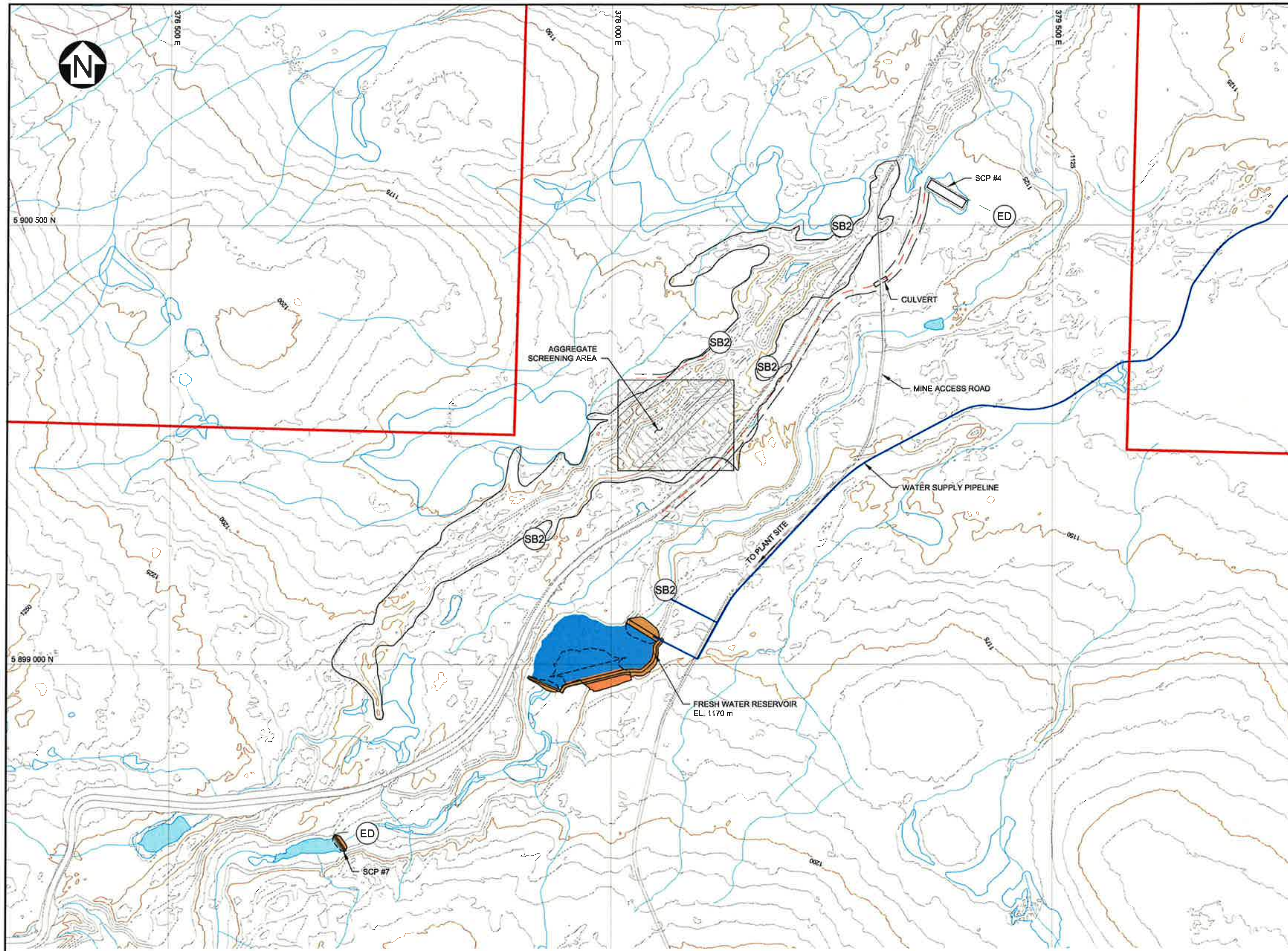
AREA:

CLIENT DWG. NO.:

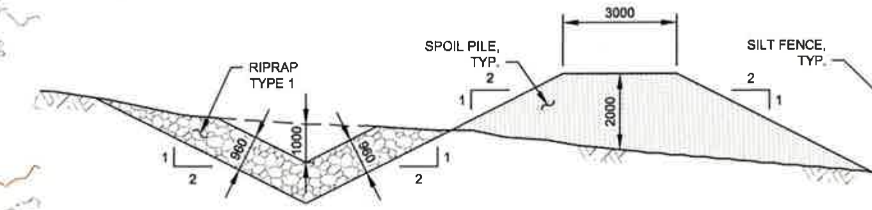
DRAWING NO.: D0134

REV.: 0

SAVED: 29-Nov-13 3:58 PM PLOTTED: 29-Nov-13 4:06 PM USER: ABBAS NAS



PLAN
SCALE A



(CD) TYPICAL SECTION
COLLECTION CHANNEL
SCALE NTS

SEDIMENT CONTROL POND

NO.	DIMENSIONS (m) (W X L X D)	SURFACE AREA AT PRIMARY OUTLET INVERT (m²)	POND INVERT ELEVATION (m)	BERM ELEVATION (m)
SCP #4	30 X 140 X 5	6,800	1125	1130
SCP #7	-	14,000	1182	1188

SEDIMENT CONTROL POND OUTLETS

NO.	1 IN 10 YEAR STORM EVENT		1 IN 200 YEAR STORM EVENT	
	TYPE	INVERT ELEVATION (m)	TYPE	INVERT ELEVATION (m)
SCP #4	1 X 0.40 m DIAMETER RISER PIPE	1128.5	5 m WIDE SPILLWAY	1129
SCP #7	0.15 m WIDE COMPOUND WEIR SPILLWAY	1186.5	2 m WIDE COMPOUND WEIR SPILLWAY	1186.9

LEGEND:

- MINE WATER
- FRESH WATER
- EMBANKMENT FILL
- COLLECTION CHANNEL
- SCP OUTLET
- SILT FENCE
- NEW GOLD PROPERTY BOUNDARY
- (ED) ENERGY DISSIPATER
- (SB) SEDIMENT BASIN

NOTES:

1. CONTOUR INTERVAL IS 5 METRES.
2. DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
3. SEE DRAWINGS D0136, D0137, D0138 FOR EROSION CONTROL BMP SECTION AND DETAILS.

NOT FOR CONSTRUCTION

SCALE A 150 75 0 250 500 750 m

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

PROFESSIONAL PROVINCE OF BRITISH COLUMBIA
M. HODZIC
#39224
ENGINEER
Nov. 29, 2013

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APPROVED FOR ____________

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: FEASIBILITY STUDY

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
VA101-457/6		DES	MH	20SEP13
		DRN	AT	20SEP13
SCALE: AS SHOWN	PACKAGE CODE	CHK	BB	29Nov13
		APP	KJB	29Nov13

newgold

Knight Piésold CONSULTING

SUBJECT
SEDIMENT AND EROSION CONTROL PLAN
AGGREGATE BORROW AND
FRESH WATER RESERVOIR AREA
YEAR -2

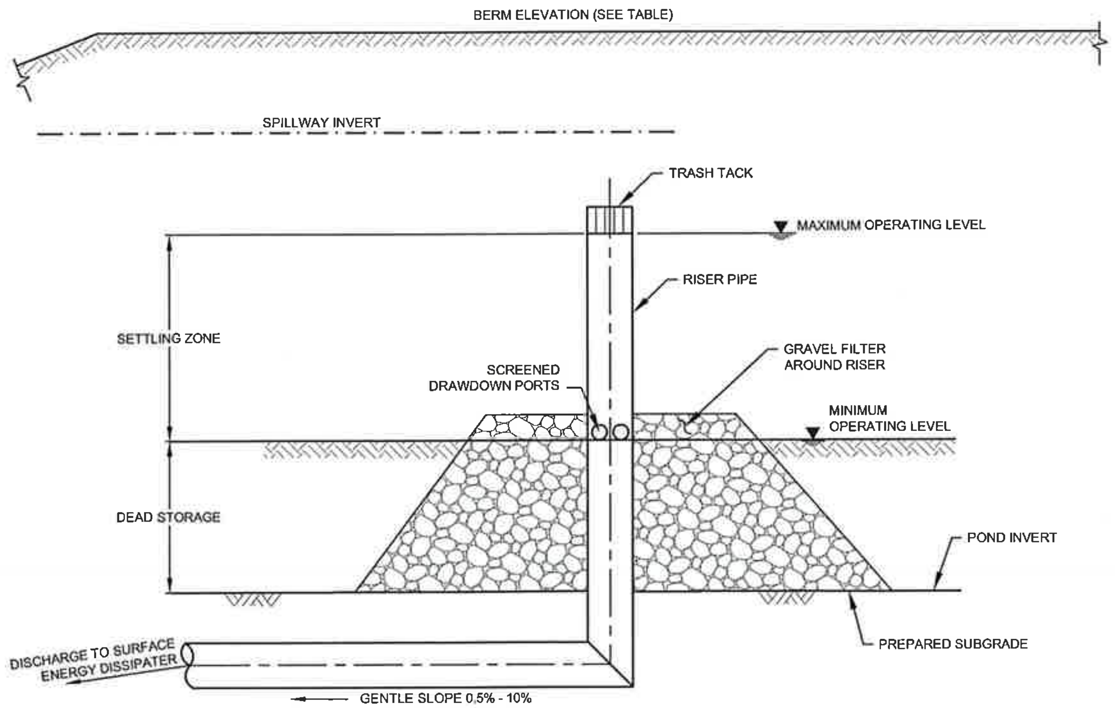
AREA

CLIENT DWG. NO.

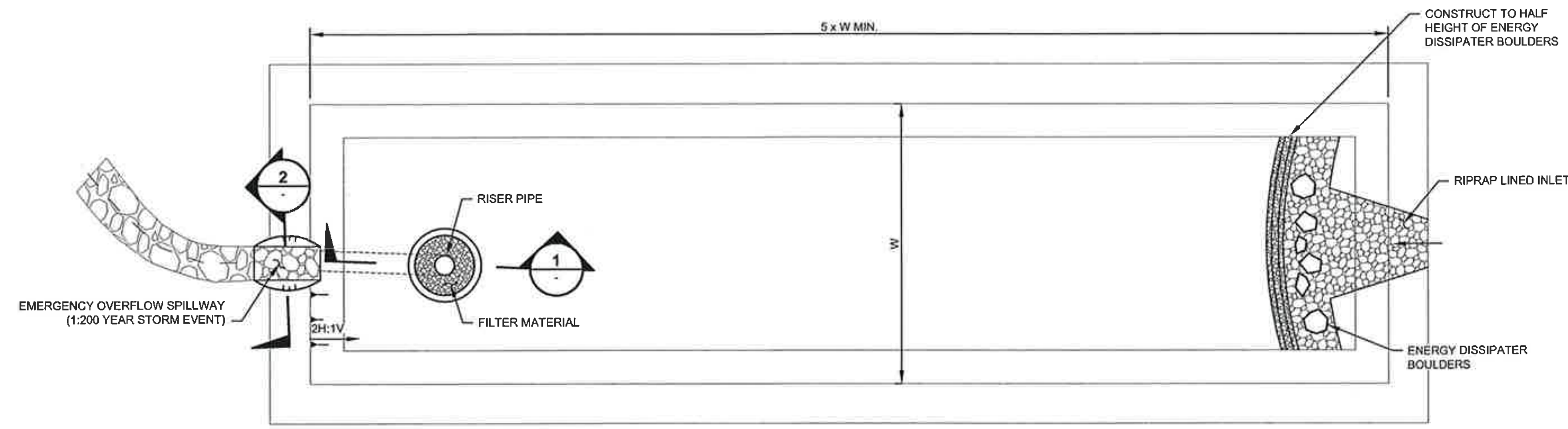
DRAWING NO. D0135

REV. 0

SAVED: 29-Nov-13 3:57 PM PLOTTED: 29-Nov-13 4:06 PM USER: ABBAS NAS

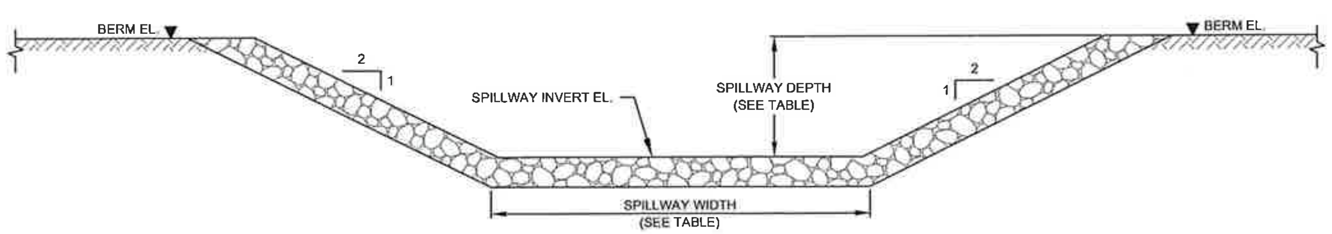


1 RISER SECTION
NTS



PLAN VIEW
SCALE A

SEDIMENT CONTROL POND OUTLETS							
NO.	DIMENSION (m) (W x L x D)	POND INVERT ELEVATION (m)	BERM ELEVATION (m)	1 IN 10 YEAR STORM EVENT		1 IN 200 YEAR STORM EVENT	
				TYPE	INVERT ELEVATION (m)	TYPE	INVERT ELEVATION (m)
SCP #1	25 x 125 x 5	1340	1345	1 X 0.30 m DIAMETER RISER PIPE	1343.7	5 m WIDE SPILLWAY	1344
SCP #2	35 x 175 x 5	1360	1365	1 X 0.30 m DIAMETER RISER PIPE	1363.3	5 m WIDE SPILLWAY	1364
SCP #3	15 x 170 x 5	1245	1250	1 X 0.10 m DIAMETER RISER PIPE	1248	5 m WIDE SPILLWAY	1249
SCP #4	30 x 140 x 5	1125	1130	1 X 0.40 m DIAMETER RISER PIPE	1128.5	5 m WIDE SPILLWAY	1129
SCP #5	-	1410	1426	0.15 m WIDE COMPOUND WEIR SPILLWAY	1424.6	2 m WIDE COMPOUND WEIR SPILLWAY	1425.1
SCP #6	-	1242.5	1247	V-NOTCH WEIR SPILLWAY	1246	2 m WIDE COMPOUND WEIR SPILLWAY	1246.4
SCP #7	-	1182	1188	V-NOTCH WEIR SPILLWAY	1186.5	2 m WIDE COMPOUND WEIR SPILLWAY	1186.9



2 SPILLWAY SECTION
NTS

NOTES:

1. POND LINING SUBJECT TO ENGINEER'S REVIEW OF FOUNDATION MATERIAL.
2. DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS NOTED OTHERWISE.

NOT FOR CONSTRUCTION

SCALE A 10 5 0 10 20 30 40 50 m

REV | DDMMMYY | REVISION / ISSUE DESCRIPTION | DRN | CHK | APP | APP | APP | APP
REF | NUMBER | TITLE
REFERENCES

STAMP/SEAL
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. HODZIC
NOV 29, 2013

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CLIENT PROJECT MGR. | DEPARTMENT MGR. | PROJECT MGR.
PROJECT PHASE: FEASIBILITY STUDY
PROJECT NO.: VA101-457/6 | ACTIVITY NO.
SCALE: AS SHOWN | PACKAGE CODE

	BY	DDMMMYY
DES	MH	10SEP13
DRN	AT	10SEP13
CHK	BB	29Nov13
APP	KJB	29Nov13

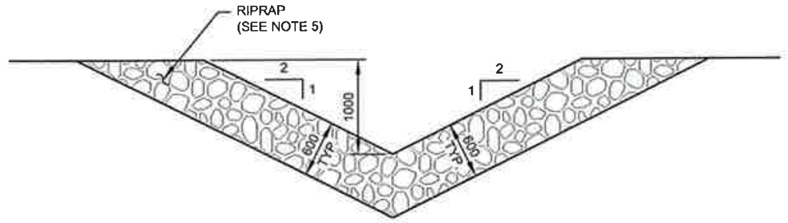
newgold

SUBJECT: EROSION CONTROL BMP SECTIONS AND DETAILS SHEET 1 OF 3

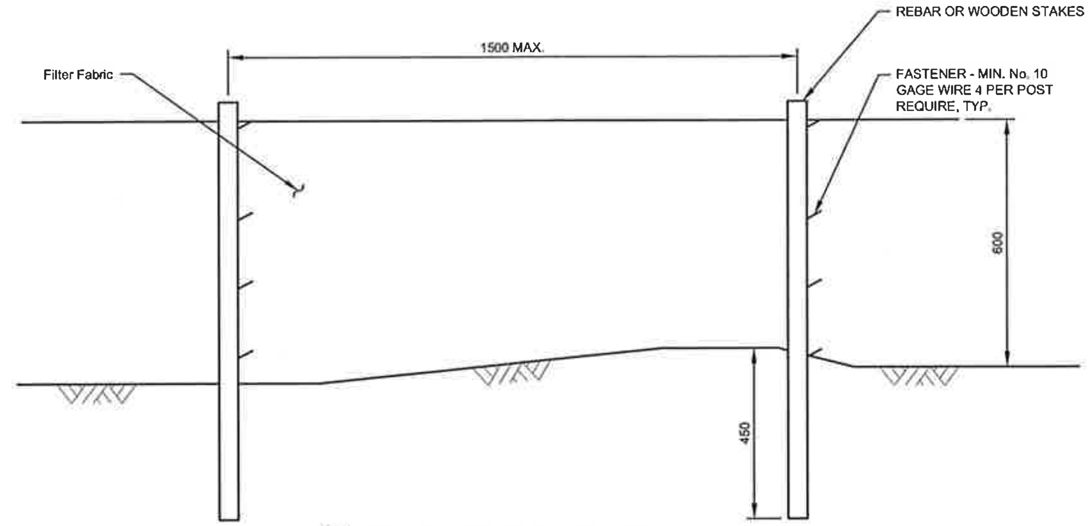
Knight Piésold CONSULTING

AREA
CLIENT DWG. NO.
DRAWING NO. D0136 | REV. 0

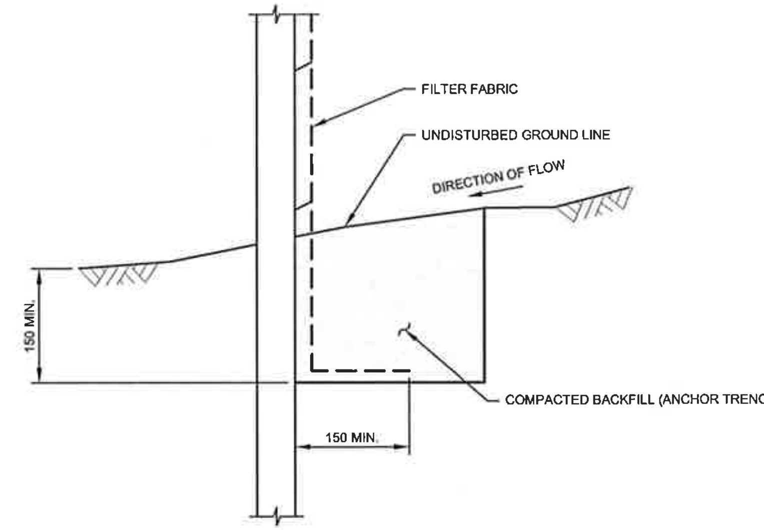
SAVED: 29-Nov-13 3:56 PLOTTED: 29-Nov-13 4:07 PM USER: ABBAS NASIM



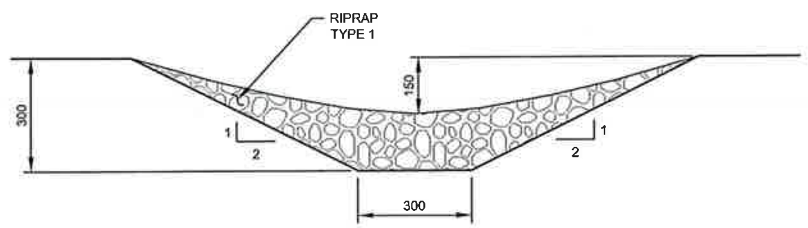
(CD)(DD) **COLLECTION AND DIVERSION DITCH**
NTS



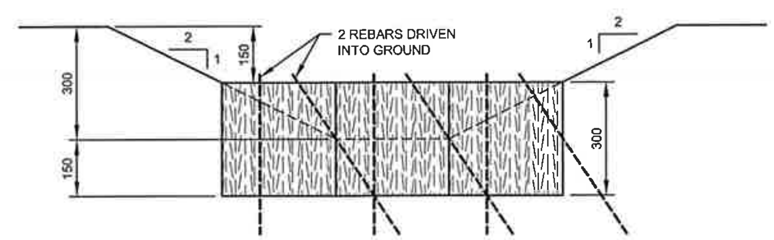
(SF) **SILT FENCING PROFILE**
SCALE A



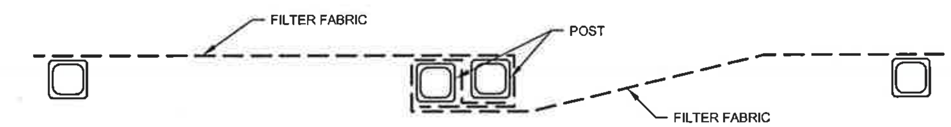
(SF) **SILT FENCING CROSSING SECTION**
SCALE B



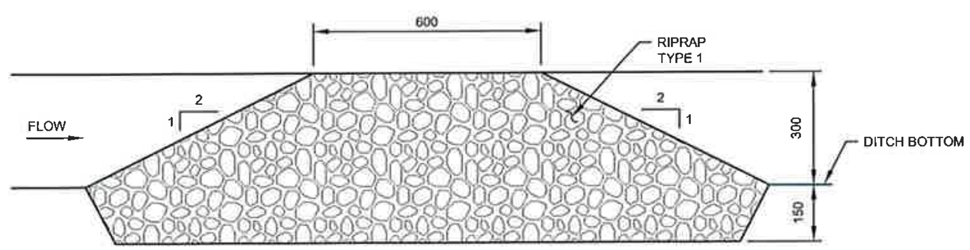
(RD) **ROCK DAM CROSSING SECTION**
SCALE A



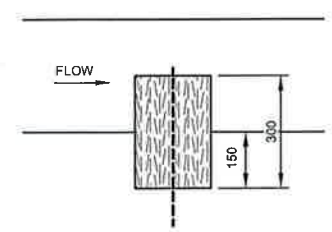
(ST) **STRAW BALE CROSSING SECTION**
SCALE A



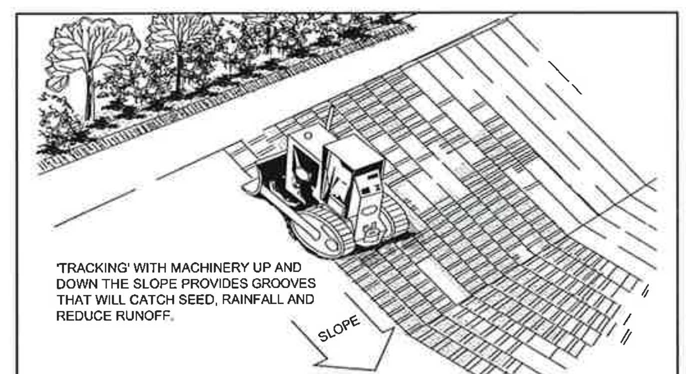
(SF) **ATTACHING TWO SILT FENCES**
SCALE B



(RD) **ROCK DAM PROFILE**
SCALE A



(ST) **STRAW BALE PROFILE**
SCALE A



(SR) **SLOPE ROUGHENING**
NTS

NOTES:

1. ALL SEDIMENT AND EROSION CONTROL MEASURES MUST BE CONSTRUCTED, STABILIZED AND FUNCTIONAL BEFORE SITE DISTURBANCE BEGINS.
2. SITE GRADING SURFACE WATER RUNOFF TO BE DIRECTED TO THE SEDIMENT TRAPS AT ALL TIMES DURING SITE DISTURBANCE ACTIVITIES UNTIL FINAL STABILIZATION IS ACHIEVED.
3. THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
4. AN AREA IS CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER TO RESIST ACCELERATED SURFACE EROSION.
5. ONLY REQUIRED WHEN ERODIBLE SOILS HAVE BEEN EXPOSED.

NOT FOR CONSTRUCTION

SCALE B: 100 50 0 100 200 300 400 500 m

SCALE A: 200 100 0 200 400 600 800 1000 m

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, M. HODZIC, # 30224, Nov. 29, 2013

APPROVED FOR ______

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: FEASIBILITY STUDY

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
VA101-457/6		DES	MH	20SEP13
		DRN	AT	20SEP13
SCALE	PACKAGE CODE	CHK		
AS SHOWN		APP		

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SUBJECT: EROSION CONTROL BMP SECTIONS AND DETAILS SHEET 2 OF 3

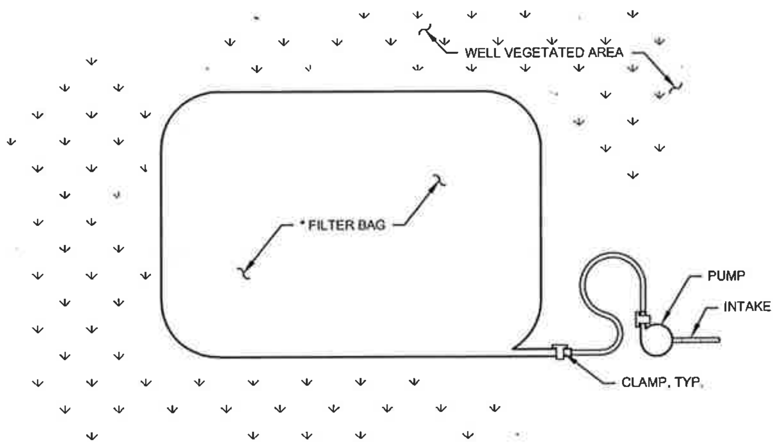
Knight Piésold CONSULTING

AREA

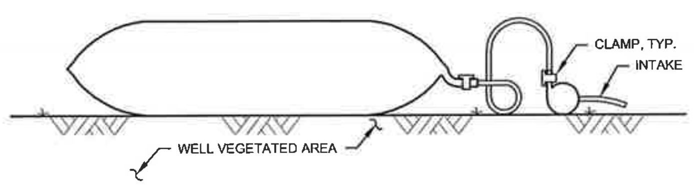
CLIENT DWG. NO.

DRAWING NO. D0137 — REV. 0

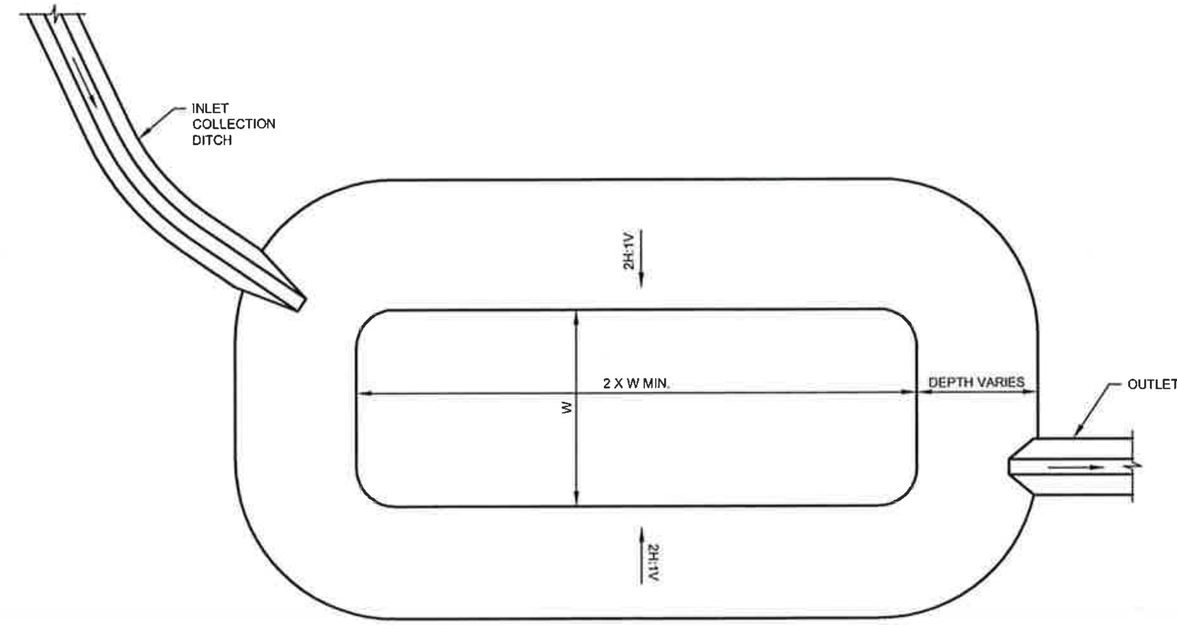
SAVED: 29-Nov-13 3:56 PLOTTED: 29-Nov-13 4:07 PM



FB **FILTER BAG PLAN**
SCALE A



FB **FILTER BAG ELEVATION**
SCALE A



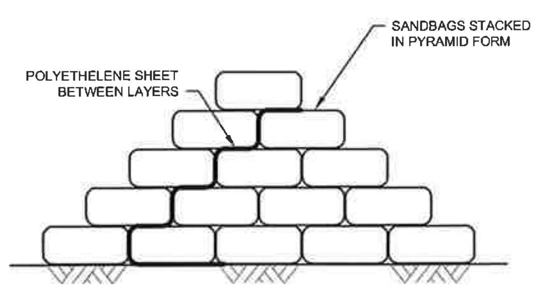
SB **SEDIMENT BASIN PLAN**
SCALE B

SEDIMENT BASIN GENERAL NOTES:

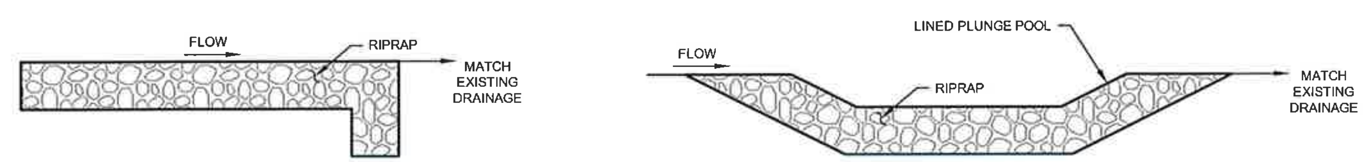
1. SEDIMENT BASINS DETAIN STORMWATER RUNOFF FROM A DISTURBED AREA FOR AN EXTENDED TIME, ALLOWING SEDIMENT TO SETTLE.
2. SEDIMENT BASINS MAY REMAIN IN PLACE DURING OPERATIONS, AS INDICATED IN THE PLANS OR AS DIRECTED BY THE ENGINEER, OR SITE EMT.
3. SEDIMENT BASINS MAY HAVE PUMP OR OUTLET CHANNEL TO COLLECTION DITCH.
4. RELEASES FROM SEDIMENT BASINS REQUIRE FURTHER WATER MANAGEMENT/BMPS (EX. PUMPBACK, DISCHARGE TO COLLECTION DITCHES, FILTER BAGS, AND VEGETATED BUFFER STRIPS.)
5. SEDIMENT BASINS TO BE FIELD FIT TO OPTIMIZE CUT AND FILL QUANTITIES TO ACHIEVE MINIMUM SPECIFIED DIMENSIONS.

SEDIMENT FILTER BAG GENERAL NOTES:

1. NON-WOVEN GEOTEXTILE FILTER BAG WHICH RETAINS ALL SEDIMENT PARTICLES LARGER THAN 150 MICRONS.
2. PLACE FILTER BAGS ON STABLE OR WELL VEGETATED AREAS WHICH ARE FLATTER THAN 5% AND WILL NOT ERODE WHEN SUBJECTED TO BAG DISCHARGE
3. CLAMP PUMP DISCHARGE HOSE SECURELY INTO FILTER BAGS.
4. THE PUMPING RATE SHALL BE NO GREATER THAN 750 gpm OR ½ THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED.
5. WHEN SEDIMENTS FILL ½ THE VOLUME OF A FILTER BAG, IMMEDIATELY REMOVE THAT BAG FROM SERVICE. PROPERLY DISPOSE OF SPENT BAGS WITH THEIR SEDIMENTS. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FILLED.
6. THE DISCHARGE FROM THE FILTER BAG SHOULD NOT PASS THROUGH A DISTURBED AREA OR CAUSE AN EROSION PROBLEM DOWN SLOPE.
7. VEGETATED BUFFER STRIP WILL BE LEFT DOWNSTREAM OF THE FILTER BAG.
8. FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED PUMPING SHALL CEASE AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.



DS **TEMPORARY STREAM DIVERSION STRUCTURE**
NTS



TYPE 1
SMALL DRAINAGES (FLOWS < 0.5 m³/s)

TYPE 2
LARGER DRAINAGES (FLOWS > 0.5 m³/s)

ED **ROCK ENERGY DISSIPATER**
NTS

NOT FOR CONSTRUCTION

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	REF	NUMBER	TITLE

REFERENCES

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APPROVED FOR ___________

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PROJECT PHASE: FEASIBILITY STUDY

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VA101-457/6		DES	MH	20SEP13
		DRN	AT	20SEP13
SCALE	PACKAGE CODE	CHK	BB	29Nov13
AS SHOWN		APP	KJB	29Nov13

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SUBJECT: EROSION CONTROL BMP SECTIONS AND DETAILS SHEET 3 OF 3

Knight Piésold CONSULTING

AREA

CLIENT DWG. NO.

DRAWING NO. D0138 REV. 0

SAVED: 29-Nov-13 3:53 PM PLOTTED: 29-Nov-13 4:08 PM USER: ABBAS NASIR