Appendix G

Kensington Project
Post-Closure Water Quality Standards and Monitoring

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1.0 INTRODUCTION

This appendix to the Kensington Gold Project Reclamation and Closure Plan outlines post-closure monitoring and sampling activities that would occur during the post-closure phase of the mining operation. Post-Closure monitoring would begin once active water treatment is discontinued. Water Quality Standards (WQS) used to determine reclamation success are also identified.

2.0 MONITORING GOALS

The post-closure monitoring program has been developed with the following goals:

- meet ADEC monitoring requirements and comply with applicable state water quality standards contained in 18 AAC 70 as amended;
- ensure that data collected are of known and acceptable quality; and,
- ensure that project-specific methods and procedures are implemented as identified in the Fresh Water Monitoring Plan (FWMP) for the Kensington Gold Project.

The WQS provided below identify statewide and site-specific criteria that have been adopted into 18 AAC 70.020(b). The numeric criteria applicable to the WQS in 18 AAC 70 are those presented in the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances, as amended (ADEC, December 2008). The parameters to be monitored during the post-closure monitoring period are those monitored during compliance monitoring for the APDES permits that are in-place during the active mining phase of the Kensington Gold Project. The water quality standards to be monitored by the most stringent water quality criterion during the post-closure monitoring program are presented in Table 1.

Table 1 - Receiving Water, Post-Closure Water Quality Standards

Parameter	µg/l unless shown otherwise[7,10]	Parameter	µg/l unless shown otherwise[7,10]
Aluminum, Total Recoverable	5,000[3],750 CMC[8], 87 CCC[8]	Silver	[5,8]
Ammonia, Total	Criteria are pH dependent[4]	Zinc	2,000[3]
Arsenic	10[1],50[2],100[3], 340 CMC[8], 150 CCC[8]	Nitrate	10,000[1]
Cadmium	5[1],10[2],10[3], [5,8]	Sulfates	200 mg/l Sherman Creek
Chromium, Total	100[1], 100[3]	Chlorides	860,000 CMC[8], 230,000 CCC[8]
Chromium III, dissolved	[5,8]	Turbidity	[6]
Chromium VI	50[2], 16 CMC[8], 11 CCC[8]	TDS	[6]
Copper	200[3], [5,8]	TSS	[6]
Iron	5,000[1], 1,000 CCC[8]	pH	[6]
Lead	50[2], 5,000[3], [5,8]	Dissolved Oxygen	[6]
Manganese	200[3]	Temperature	[6]
Mercury	2[1], 1.4 CMC[8], 0.77 CCC[8]	Conductivity	-
Nickel	200[3], [5,8]	Hardness	-
Selenium	50[1], 10[2], 20[3], [8,9],5.0 CCC[8]	Color	[6]

[1] Criteria for drinking water were obtained from ADEC, *Alaska Drinking Water Regulations*, as amended through August 20, 2012 in 18 AAC 80.300(b). The drinking water primary maximum contaminant levels are used as water quality criteria to protect the drinking water and contact recreation uses. The criteria for metals will be measured using the total method that is consistent with drinking water regulations measurement protocol.

[2]Criteria for stock-water were obtained from the *Report of the Committee on Water Quality Criteria*, (also known as the Green Book), 1968, Federal Water Pollution Control Administration, p. 135, Table IV-11.

[3]Criteria for irrigation water were obtained from *Water Quality Criteria*, (also known as the Blue Book), 1972, National Academy of Sciences, National Academy of Engineering, Washington, D.C., p. 339, Table V-13. Alaska Department of Environmental Conservation

[4] Based on pH and temperature when early life stages of fish are present. Acute criteria are based on the average concentration of chemical pollutants during a one-hour period. One hour was chosen because it is a substantially shorter period than the length of most acute toxicity tests. Acute and chronic criteria are used together to develop water quality-based effluent limits. The highest four-day average within the 30-day period should not exceed 2.5 times the chronic criterion.

[5] Hardness-dependent criteria, refer to Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances, (as amended ADEC, December 2008) for parameters for calculating freshwater dissolved metals criteria.

[6] Refer to WQS in 18 AAC 70 for criteria applicable for each designated use class.

[7] Receiving water metals analyses shall be dissolved unless otherwise specified.

[8] Aquatic Life Criteria for Fresh Water, acute (CMC) and chronic (CCC).

[9] The CMC = 1/ [(f1/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 g/l and 12.82 g/l, respectively.

[10] For all cases, the most stringent criterion.

In addition to the water quality standards included in Table 1, site-specific standards are applicable to Sherman Creek. Water use classes relevant to Sherman Creek site specific criteria are:

(1) fresh water

(A) water supply

(i) drinking, culinary, and food processing;

(iii) aquaculture

(C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife.

Table 2 provides site specific monitoring criteria required for Sherman Creek.

TABLE 2 - Sherman Creek Site-Specific Criteria

Designated Use Class Affected	Site-Specific Water Quality Standards
(1)(A)(i)	Total dissolved solids (TDS) from all sources may not exceed 1,000 mg/l. Chlorides may not exceed 200 mg/l. Sulfates associated with magnesium and sodium may not exceed 200 mg/l.
(1)(A)(iii)	TDS may not exceed 1,000 mg/l.
(1)(C)	TDS may not exceed 1,000 mg/l.

3.0 SAMPLING SITES

Sampling sites are throughout the Johnson, Slate, and Sherman creek drainages. Sampling locations are described below in Section 3.2. Figures G-1 through G-3 illustrate the location of each sample site.

3.1 Sample Site Identification

Monitoring sites will be clearly identified in the field with a fluorescent orange sign showing the site name written in black lettering on the stream bank at each monitoring location.

Sample site identification numbers are based on systems previously used for historic monitoring for the Kensington Gold Project. The nomenclature previously used includes numeric, alpha, and alpha-numeric designations. For example, for sites located in the Sherman Creek drainage, a three digit numeric designation is used (e.g., 109), in the Slate Creek Drainage sites are designated using the SL- or ML- prefix combined with an alpha designation (e.g., SL-B), and in the Johnson Creek drainage an alpha numeric designation using a JS- prefix with a numeric designation is used (e.g., JS-4). Previous site identification schemes will be maintained to provide consistency with historic monitoring. New sample locations (if required) would be added using the next available designation for each system. Sites will not be renamed or names from abandoned sites reused to avoid confusion and error interpreting historic data.

3.2 Monitoring Site Locations and Monitoring Schedule

The site designation, location, rational for site selection, and monitoring frequency are provided in Table 3. Table 4 provides the monitoring and analytical parameters for each of the monitoring sites specifically associated with the Post-Closure Phase of the mining operation.

Table 3 - Post-Closure Monitoring Schedule

Site	Location	Rationale	Frequency Years 1 & 2	Frequency Years 5, 10, 15, 20, & 30
ML-A	Mid Lake Slate Creek upstream from diversion inlet structure	Background site to evaluate upstream surface water in Mid-Lake Slate Creek	Quarterly	Annually

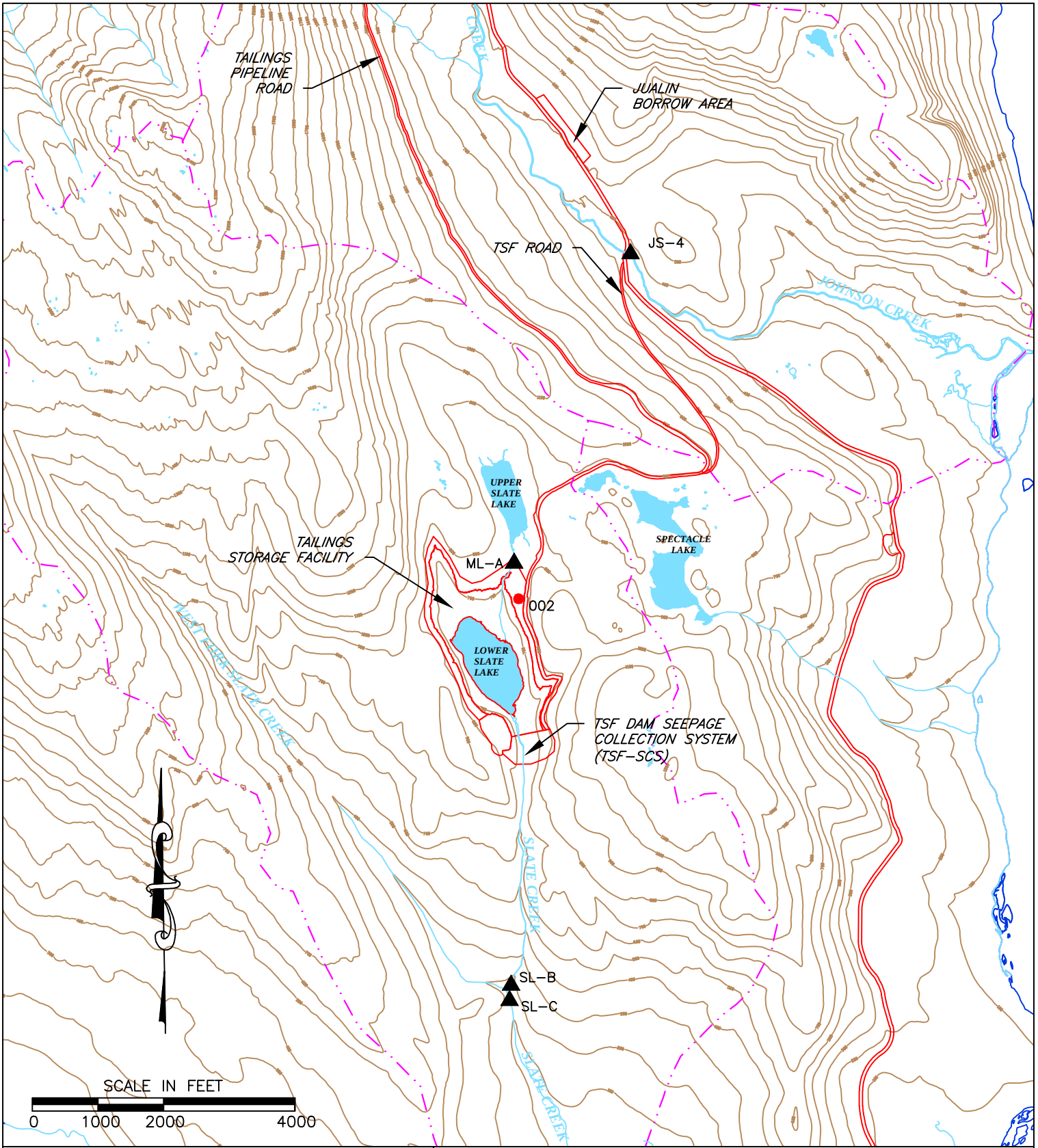
SL-B	East Fork Slate Creek directly up stream of the confluence of the West Fork of Slate Creek	Monitor water quality in East Fork of Slate Creek downstream of the TTF	Quarterly	Annually
SL-C	Slate Creek 30 meters downstream of the confluence between West and East Fork Slate Creeks.	Downstream site to monitor cumulative water quality in Slate Creek below the confluence with the West Fork Slate Creek.	Quarterly	Annually
SH-109	Upper Sherman Creek above the Kensington Mine site.	Background site to evaluate upstream surface water in Sherman Creek. Also the weekly background turbidity sample.	Quarterly	Annually
SH-113	Sherman Creek downstream of Outfall 001	Monitoring site located below Outfall 001 to evaluate water quality down gradient of Outfall 001. Also the weekly downstream hardness site.	Quarterly	Annually
SH-105	Sherman Creek above Comet Beach.	Downstream site to evaluate cumulative water quality down gradient of Kensington mine site.	Quarterly	Annually
SH-103	Ophir Creek	Downstream site to evaluate water quality down gradient of Kensington development rock storage prior to confluence with Sherman Creek.	Quarterly	Annually
JS-2	Johnson Creek above the Jualin process area and development rock storage area.	Background site to evaluate upstream surface water in Johnson Creek.	Quarterly	Annually
JS-5	Johnson Creek approximately 600 feet below the upper Johnson Creek bridge	To assess water quality downstream of process area.	Quarterly	Annually
JS-4	~ 75 meters downstream of lower bridge on Johnson Creek	Monitor water quality down-gradient of the Jualin Landfill Trench	Quarterly	Annually

TABLE 4 – Post Closure Monitoring Analytical Parameters

Site	Parameters
SL-B, ML-A, SL-C	**Dissolved Metals:** Aluminum, Arsenic, Cadmium, Chromium (total), Copper, Iron, Lead, Manganese, Nickel, Selenium, Silver, Zinc, Low Level Mercury **General Parameters:** Sulfate, Turbidity, Total Suspended Solids, Hardness (total), Chloride, Color, Alkalinity as CaCO3 Nutrients: Total Ammonia as N, Nitrate as N
JS-2, JS-5, JS-4	**Dissolved Metals:** Aluminum, Arsenic, Cadmium, Chromium (total), Copper, Iron, Lead, Manganese, Nickel, Selenium, Silver, Zinc, Low Level Mercury **General Parameters:** Sulfate, Turbidity, Total Suspended Solids, Hardness (total), Chloride, Color, Alkalinity as CaCO3 Nutrients: Total Ammonia as N, Nitrate as N
109, 113, 105	**Dissolved Metals:** Aluminum, Arsenic, Cadmium, Chromium (total), Copper, Iron, Lead, Manganese, Nickel, Selenium, Silver, Zinc, Low Level Mercury **General Parameters:** Sulfate, Turbidity, Total Suspended Solids, Hardness (total), Chloride, Color, Alkalinity as CaCO3 Nutrients: Total Ammonia as N, Nitrate as N

4.0 STORM-WATER MONITORING AS REQUIRED IN THE MULTI-SECTOR GENERAL PERMIT (MSGP)

As indicated by section 8.G.3.5 of the MSGP, the reclamation phase is considered part of the mining operation and storm-water monitoring would continue at the site during the reclamation phase consistent with monitoring during the active mining phase as described in the site Stormwater Pollution Prevention Plan (SWPPP). Upon completion of site reclamation and stabilization of the site, stormwater monitoring would be reduced to an annual comprehensive site inspection until such time as the site is "finally stabilized" and all Federal and State reclamation requirements have been implemented at the site. A Notice of Termination (NOT) could then be submitted to terminate permit coverage for the site.



LEGEND

- 002 — NPDES OUTFALL
- SL-E — RECEIVING WATER MONITORING POINT
- DRAINAGE BASIN BOUNDARY

CLIENT/PROJECT

COEUR ALASKA INC./KENSINGTON PROJECT

FRESH WATER MONITORING SITES
SLATE CREEK DRAINAGE

KC HARVEY ENVIRONMENTAL, LLC
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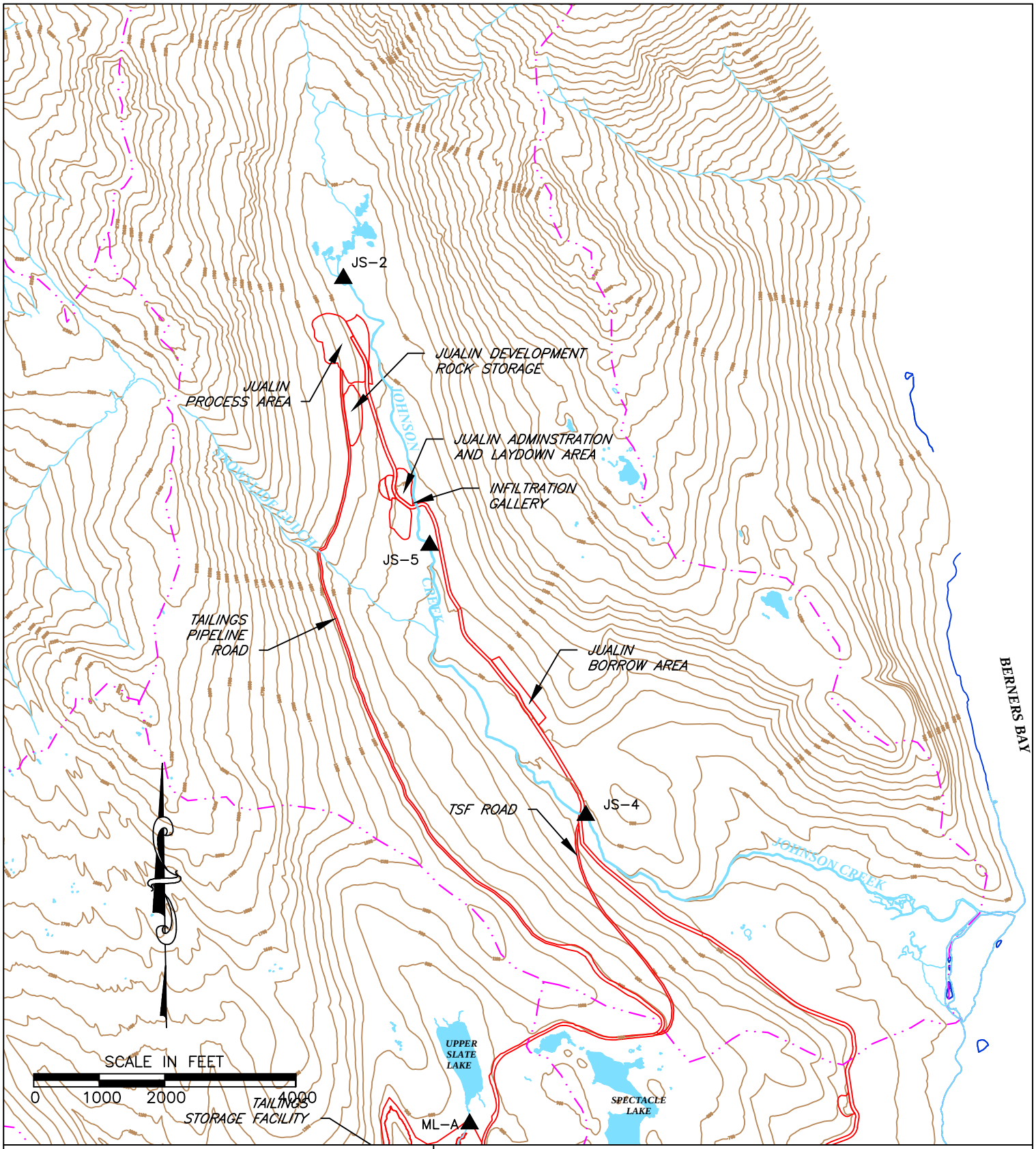
FILE NO.	REV
Appendix_G_Figures_2013.dwg	1
DATE MARCH 2013	FIGURE NO. G1



LEGEND

- 002 — NPDES OUTFALL
- SL-E — RECEIVING WATER MONITORING POINT
- DRAINAGE BASIN BOUNDARY

CLIENT/PROJECT

COEUR ALASKA INC./KENSINGTON PROJECT

FRESH WATER MONITORING SITES
JOHNSON CREEK DRAINAGE

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FILE NO.	REV
Appendix_G_Figures_2013.dwg	1
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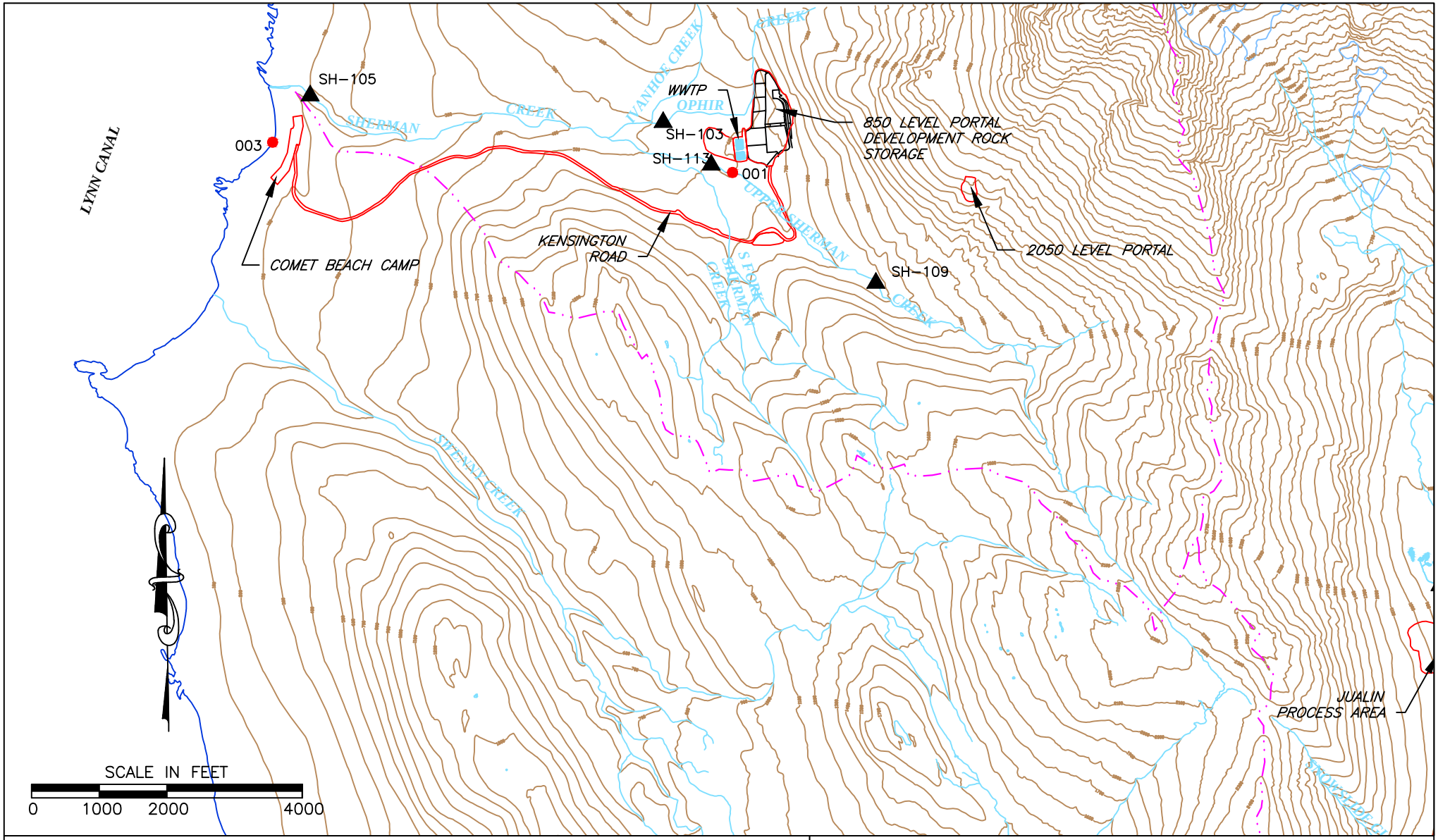

LEGEND

- 002 — NPDES OUTFALL
- SL-E — RECEIVING WATER MONITORING POINT
- DRAINAGE BASIN BOUNDARY

CLIENT/PROJECT

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FRESH WATER MONITORING SITES
SHERMAN CREEK DRAINAGE

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FILE NO. Appendix_G_Figures_2013.dwg

REV 1

DATE March 2013

FIGURE NO. G3