

12.4.2 Baseline Programs

12.4.2.1 Methods

Baseline aquatic studies conducted for the Project included fish and fish habitat surveys and aquatic health assessments. These studies focused on both lotic and lentic aquatic ecosystems. Lotic ecosystems are characterized as faster moving bodies of water, such as streams, creeks and rivers, while lentic ecosystems are characterized as slower moving bodies of water such as lakes, ponds, and open water wetlands. The goal of these studies was to establish the baseline conditions of aquatic resources within the Fish and Fish Habitat LSA and Project footprint.

The fish and fish habitat surveys included fish habitat assessments, instream flow and calcite assessments, fish inventory and community assessments (i.e., spring and fall spawning, rearing, overwintering surveys, and distribution and habitat use), and benthic invertebrate community sampling in lotic habitats. The aquatic health assessments included fish tissue, benthic invertebrate tissue, periphyton tissue, and sediment quality sampling in lotic habitats, as required by the provincial AIR (EAO, 2018). Benthic invertebrate community and tissue and sediment sampling were also conducted in select lotic ecosystems. Water quality sampling and analysis was conducted throughout the Fish and Fish Habitat LSA and is briefly summarized in this section as it relates to aquatic health within lentic ecosystems; further details on lotic water quality sampling are discussed in Chapter 11. The following subsections provide a brief overview of the methods used to conduct the baseline surveys. Additional details on the fish and fish habitat and aquatic health baseline programs are provided in Appendices 12-A, 12-B, and 12-C.

12.4.2.1.1 Lotic Ecosystems

Twenty-two lotic sites were surveyed for fish and fish habitat within Alexander Creek, West Alexander Creek, four unnamed tributaries on West Alexander Creek (Unnamed West Alexander Creeks 1 to 3 and 1b), Grave Creek, and two unnamed tributaries on Grave Creek (Unnamed Grave Creek 1 and 2; Table 12.4-1, Figure 12.4-5). Streams categorized as "defaults to non-fish bearing" on Figure 12.4-5 and subsequent figures are watercourses obtained from the provincial Freshwater Atlas that were observed in the field to be ephemeral or contain no visible channel, with a slope gradient of >20%. These watercourses were typically steep draws and avalanche paths and were therefore not considered to have the potential to measurably contribute to downstream (downslope) fish bearing habitat. This classification of non-fish bearing status is in line with the *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators* (B.C. Ministry of Environment, 2016), and the *Fish-stream Identification Guidebook* (Forest Practices Code of British Columbia [FPCBC]; 1998).

Reach break establishment followed standard *Reconnaissance 1:20,000 Fish and Fish Habitat Inventory Standards and Procedures* (RISC; RISC, 2001). Alexander Creek Reaches 10 and 11 and Grave Creek Reach 4 were considered reference areas for the Project since they are upstream of potential aquatic effects that may result from the Project (Figure 12.4-5). Ten lotic sites were also surveyed for aquatic health within Grave Creek (Reaches 3 and 4), an unnamed tributary of Grave Creek (Reach 1), Alexander Creek (Reaches 1 to 2 and 7 to 10), and West Alexander Creek (Reach 1; Table 12.4-2, Figure 12.4-5).

Table 12.4-1: Summary of Fish and Fish Habitat Lotic Survey Locations within the Fish and Fish Habitat LSA

Aquatic Feature ID	Reach ID	Site Code	Easting	Northing
Alexander Creek	1	ALE1	660765	5504374
	2	ALE2	662307	5503804
	7	ALE7	664473	5513786
	8	ALE8	664364	5516713
	9	ALE9	664742	5519044
	10	ALE10	664692	5521766
	11	ALE11	664516	5521918
West Alexander Creek	1	WAL1d/s	663965	5516285
	1	WAL1u/s	662700	5518396
	2	WAL2	662288	5520645
	3	WAL3	662156	5520803
	4	WAL4	661801	5521215
Unnamed Tributary to West Alexander Creek 1	1	UWA1	662511	5519231
Unnamed Tributary to West Alexander Creek 1b	1	UWA1b-1	662331	5520612
	2	UWA1b-2	662413	5520677
Unnamed Tributary to West Alexander Creek 2	1	UWA2	662254	5520843
Unnamed Tributary to West Alexander Creek 3	1	UWA3	662127	5520848
Grave Creek	3	GRA3	659720	5523889
	4	GRA4	661656	5524410
Unnamed Tributary to Grave Creek 1	1	UTG1	660960	5524122
Unnamed Tributary to Grave Creek 2	2	UTG2-1	661679	5524330
	2	UTG2-2	662161	5523814

Table 12.4-2: Summary of Aquatic Health Lotic Survey Locations within the Fish and Fish Habitat LSA

Aquatic Feature ID	Reach ID	Site Code	Easting	Northing
Alexander Creek	1	ALE1	660862	5504407
	2	ALE2	662141	5503876
	7	ALE7	664536	5513907
	8	ALE8	664492	5517051
	9	ALE9	664752	5519023
	10	ALE10	664659	5521791
West Alexander Creek	1	WAL1	663976	5516257
Grave Creek	3	GRA3	660113	5524110
	4	GRA4	661656	5524410
Unnamed Tributary to Grave Creek	1	UTG1	661692	5524324