



Appendix 5.1.2.1A
Tables

BLACKWATER GOLD PROJECT

APPLICATION FOR AN
 ENVIRONMENTAL ASSESSMENT CERTIFICATE /
 ENVIRONMENTAL IMPACT STATEMENT
 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS



Table 1: Estimated Baseline Average, Wet, and Dry Monthly and Annual Surface Water Flows for the Project

Mine Phase	Estimated Monthly and Annual Surface Water Flows (L/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Turtle Creek													
H3 (WQ11 in Upper Watershed on Tributary Creek 700)													
1 in 50 Dry	1.4	1.0	0.8	0.9	124	51	15	5.4	2.8	1.4	1.2	1.4	17
1 in 20 Dry	1.8	1.3	1.1	1.6	139	64	18	6.8	3.8	2.3	1.9	2.0	20
1 in 10 Dry	2.3	1.7	1.4	2.8	153	79	22	8.4	5.0	3.5	3.0	2.6	24
1 in 5 Dry	3.0	2.2	1.9	5.5	173	101	28	11	7.0	5.9	5.0	3.8	29
Average	6.1	4.3	4.3	52	226	185	49	21	18	31	27	9.8	53
1 in 5 Wet	8.8	6.2	6.3	70	275	263	68	28	24	42	39	15	70
1 in 10 Wet	12	8.1	8.6	138	310	338	86	37	34	71	66	21	94
1 in 20 Wet	15	10	11	240	343	415	104	45	44	109	102	28	122
1 in 50 Wet	19	13	15	447	384	524	130	57	60	175	167	39	169
H6 (Mid-point of Watershed)													
1 in 50 Dry	53	46	40	61	339	166	128	104	85	57	50	54	99
1 in 20 Dry	61	53	48	82	389	205	142	112	94	69	62	63	115
1 in 10 Dry	69	61	55	106	439	248	156	121	102	82	75	73	132
1 in 5 Dry	80	71	66	145	510	312	175	132	114	101	94	86	157
Average	112	99	102	325	710	550	225	159	143	168	165	126	241
1 in 5 Wet	142	126	133	481	897	749	272	184	170	221	222	162	313
1 in 10 Wet	165	146	159	659	1,041	943	305	201	189	272	278	192	379
1 in 20 Wet	187	166	185	853	1,176	1,139	335	216	206	322	336	220	445
1 in 50 Wet	215	191	219	1,143	1,350	1,410	373	234	227	390	414	257	535
1-TC (WQ 13 Upstream of Confluence with Chedakuz Creek)													
1 in 50 Dry	72	65	58	81	377	194	158	132	111	78	69	74	122
1 in 20 Dry	82	74	67	106	430	237	174	142	122	93	83	85	141
1 in 10 Dry	92	82	77	134	483	284	190	152	131	108	99	96	161

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
1 in 5 Dry	105	94	90	179	557	352	211	164	144	130	121	112	188
Average	143	128	130	368	764	596	263	194	176	201	199	158	277
1 in 5 Wet	177	159	166	534	958	801	313	222	206	260	262	200	355
1 in 10 Wet	204	182	196	711	1,104	995	347	241	227	313	322	233	423
1 in 20 Wet	228	204	223	901	1,241	1,189	378	257	245	364	380	264	490
1 in 50 Wet	259	232	259	1,176	1,416	1,452	416	277	267	431	459	304	579
Davidson Creek													
11-DC (Upper Extents of Watershed Upstream of Proposed TSF)													
1 in 50 Dry	0.0	0.0	0.0	0.0	22	12	2.7	0.5	0.1	0.0	0.0	0.0	3.1
1 in 20 Dry	0.0	0.0	0.0	0.0	25	15	3.5	0.7	0.1	0.0	0.0	0.0	3.7
1 in 10 Dry	0.0	0.0	0.0	0.0	29	19	4.3	0.9	0.2	0.0	0.0	0.0	4.4
1 in 5 Dry	0.0	0.0	0.0	0.0	34	24	5.7	1.2	0.3	0.0	0.0	0.0	5.5
Average	0	0	0	8	49	46	11	3	1	2	2	0	10
1 in 5 Wet	0.0	0.0	0.0	20	63	66	16	3.7	1.5	0.7	0.2	0.0	14
1 in 10 Wet	0.0	0.0	0.0	29	74	86	21	5.0	2.3	2.4	0.6	0.1	18
1 in 20 Wet	0.1	0.0	0.0	35	85	107	27	6.4	3.3	6.7	2.3	0.5	23
1 in 50 Wet	0.4	0.1	0.0	41	99	136	34	8.4	5.1	21	11	2.2	30
H2 (WQ10 Midpoint of Watershed Immediately Downstream of Proposed TSF)													
1 in 50 Dry	58	53	50	34	374	308	184	136	107	88	57	57	125
1 in 20 Dry	90	84	57	46	432	369	204	145	116	99	91	65	150
1 in 10 Dry	98	91	84	60	491	434	224	153	124	110	102	99	173
1 in 5 Dry	108	100	93	83	573	529	250	165	136	125	117	111	199
Average	133	123	115	204	816	834	318	191	163	166	160	141	281
1 in 5 Wet	156	145	136	280	1,036	1,116	382	215	190	203	198	169	352
1 in 10 Wet	172	159	150	385	1,210	1,358	427	231	207	231	227	189	412
1 in 20 Wet	186	172	162	502	1,375	1,596	468	245	222	256	254	207	471
1 in 50 Wet	203	189	178	675	1,588	1,915	519	262	241	288	288	230	548

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Mine Phase	Estimated Monthly and Annual Surface Water Flows (L/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
H4B (WQ26)													
1 in 50 Dry	80	73	70	67	461	364	227	169	118	90	78	79	156
1 in 20 Dry	103	94	79	87	529	434	251	182	148	105	93	91	183
1 in 10 Dry	114	104	101	109	597	507	275	194	159	119	108	117	209
1 in 5 Dry	129	117	113	144	692	612	308	210	174	158	145	134	245
Average	168	152	145	297	964	949	391	246	210	215	210	183	345
1 in 5 Wet	205	184	176	411	1,214	1,257	470	281	244	266	267	228	433
1 in 10 Wet	231	208	197	542	1,407	1,519	525	304	267	305	313	262	507
1 in 20 Wet	256	229	217	680	1,589	1,774	575	324	287	342	358	294	577
1 in 50 Wet	286	256	241	878	1,822	2,113	637	348	312	388	415	334	669
4-DC													
1 in 50 Dry	92	84	80	90	503	373	230	171	136	104	90	90	170
1 in 20 Dry	104	94	91	115	577	446	256	184	148	120	106	104	195
1 in 10 Dry	115	104	101	143	652	522	281	197	160	136	123	118	221
1 in 5 Dry	131	118	116	186	756	633	316	214	176	160	148	137	258
Average	174	156	155	362	1,053	991	406	254	216	229	227	192	369
1 in 5 Wet	214	191	192	504	1,328	1,316	491	292	254	290	295	243	467
1 in 10 Wet	243	217	220	656	1,539	1,595	551	316	279	339	353	282	549
1 in 20 Wet	270	241	245	814	1,739	1,869	606	338	302	386	410	319	628
1 in 50 Wet	304	270	278	1,038	1,994	2,233	675	365	330	446	485	367	732
1-DC (WQ7 Upstream of Confluence with Chedakuz Creek)													
1 in 50 Dry	113	105	100	112	540	403	259	198	161	126	110	111	195
1 in 20 Dry	127	117	112	141	617	478	286	213	175	144	129	127	222
1 in 10 Dry	140	128	124	172	694	557	313	226	188	162	148	142	250
1 in 5 Dry	157	144	141	220	801	671	349	244	205	187	175	163	288
Average	203	185	184	404	1,104	1,033	441	286	247	260	258	223	403
1 in 5 Wet	246	223	225	557	1,384	1,361	527	326	287	324	330	277	506

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
1 in 10 Wet	277	250	254	712	1,598	1,640	588	351	313	375	391	318	589
1 in 20 Wet	306	275	281	870	1,798	1,911	643	374	337	422	448	356	668
1 in 50 Wet	341	305	315	1,091	2,053	2,270	711	401	365	482	523	405	772
Creek 661													
H1 (WQ5)													
1 in 50 Dry	1.3	1.1	0.9	0.6	38	31	14	6.4	3.2	1.9	1.4	1.3	8.4
1 in 20 Dry	1.7	1.4	1.1	0.8	47	39	17	7.6	4.0	2.5	1.9	1.8	10
1 in 10 Dry	2.1	1.7	1.3	1.0	56	49	20	8.8	4.9	3.3	2.6	2.3	13
1 in 5 Dry	2.7	2.2	1.7	1.5	70	64	24	11	6.1	4.6	3.8	3.2	16
Average	6	4	3	20	117	122	38	16	11	11	11	8	31
1 in 5 Wet	7.6	5.7	4.6	19	162	175	51	22	15	16	15	11	42
1 in 10 Wet	10	7.3	5.9	44	202	228	62	26	18	22	22	15	55
1 in 20 Wet	12	8.9	7.3	88	242	283	72	31	22	28	29	19	70
1 in 50 Wet	16	11	9.3	179	296	361	87	36	28	39	41	26	94
1-505659 (Upper Extents of Watershed on a Tributary Potentially Impacted by Mine Footprint)													
1 in 50 Dry	2.3	1.2	0.5	0.6	149	96	33	15	8.1	3.8	2.8	2.7	26
1 in 20 Dry	3.1	1.7	0.8	1.2	168	116	40	17	10	5.5	4.2	3.8	31
1 in 10 Dry	4.0	2.3	1.2	2.3	188	138	47	20	12	7.6	6.0	5.0	36
1 in 5 Dry	5.5	3.3	1.9	4.8	214	170	56	24	15	11	9.2	7.0	44
Average	12	9	8	60	289	275	89	36	26	37	34	17	75
1 in 5 Wet	18	14	12	81	356	372	117	47	35	51	47	25	98
1 in 10 Wet	25	21	19	170	407	458	142	56	44	77	73	36	127
1 in 20 Wet	32	28	29	313	454	543	166	64	52	106	104	47	162
1 in 50 Wet	43	40	45	622	513	657	199	76	64	154	155	64	219
1-661 (Upstream of Confluence with Chedakuz Creek Upstream of Tatelkuz Lake)													
1 in 50 Dry	48	44	40	34	439	250	135	97	68	42	37	45	107
1 in 20 Dry	55	49	46	49	505	312	157	107	77	53	48	53	126

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
1 in 10 Dry	62	55	52	67	572	379	180	116	86	66	60	62	146
1 in 5 Dry	71	63	60	99	665	481	212	129	98	86	79	74	176
Average	97	85	82	293	934	852	307	162	134	169	164	114	283
1 in 5 Wet	121	105	103	424	1,184	1,186	393	192	163	230	226	148	373
1 in 10 Wet	139	120	119	621	1,378	1,504	462	214	187	298	297	177	460
1 in 20 Wet	156	134	133	851	1,561	1,828	529	233	208	369	373	205	548
1 in 50 Wet	177	152	152	1,214	1,796	2,278	614	257	236	470	481	243	672
Creek 705													
6-705 (WQ16 in Upper Extents of Watershed Downstream of Fish Compensation)													
1 in 50 Dry	0.0	0.0	0.0	0.0	60	49	11	3.6	1.4	0.1	0.5	0.0	10
1 in 20 Dry	0.0	0.0	0.0	0.0	69	53	13	4.4	1.9	0.8	0.6	0.0	12
1 in 10 Dry	0.0	0.0	0.0	0.0	78	57	15	5.4	2.5	1.3	0.8	0.0	13
1 in 5 Dry	0.1	0.0	0.0	0.0	91	62	19	6.7	3.4	2.2	1.2	0.2	16
Average	2	1	1	18	130	75	29	12	9	12	10	4	25
1 in 5 Wet	4.0	2.2	1.7	37	165	87	38	16	12	17	12	7.1	33
1 in 10 Wet	4.9	2.5	2.1	58	193	95	46	20	17	28	24	9.5	42
1 in 20 Wet	5.8	2.7	2.5	74	219	102	54	25	22	44	42	12	50
1 in 50 Wet	6.9	3.0	2.9	95	253	111	64	30	30	72	74	15	63
4-705 (Midpoint of Watershed)													
1 in 50 Dry	0.0	0.0	0.0	0.0	186	125	31	7.5	3.2	0.5	0.5	0.0	29
1 in 20 Dry	0.0	0.0	0.0	0.0	217	141	37	9.7	3.7	0.9	0.7	0.0	34
1 in 10 Dry	0.0	0.0	0.0	0.0	250	157	43	12	4.3	1.6	0.9	0.0	39
1 in 5 Dry	0.1	0.0	0.0	0.0	296	179	53	16	5.5	3.3	1.5	0.3	46
Average	5	2	1	74	437	238	85	33	23	38	33	11	82
1 in 5 Wet	9.1	3.1	2.3	161	564	294	112	46	30	50	25	24	110
1 in 10 Wet	12	3.7	3.3	243	668	334	137	61	53	102	66	29	143
1 in 20 Wet	15	4.2	4.2	314	768	372	161	76	84	184	145	32	180

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
1 in 50 Wet	18	4.9	5.2	403	898	420	193	99	136	358	328	37	242
H7 (Lower Extents of Watershed)													
1 in 50 Dry	1.9	0.1	0.0	9.4	517	290	81	29	14	6.3	4.3	5.2	80
1 in 20 Dry	2.7	0.1	0.0	12	601	338	97	36	19	10	7.3	6.5	94
1 in 10 Dry	4.0	0.3	0.2	15	688	388	114	44	24	15	11	8.6	109
1 in 5 Dry	6.9	1.7	1.5	22	811	459	139	55	33	26	20	13	132
Average	27	17	16	252	1,181	670	222	100	80	131	116	46	239
1 in 5 Wet	41	28	28	249	1,512	868	294	134	110	180	166	68	306
1 in 10 Wet	58	35	33	569	1,781	1,026	358	170	151	301	290	95	405
1 in 20 Wet	74	41	39	1,100	2,038	1,177	420	205	195	425	410	122	521
1 in 50 Wet	97	49	45	1,869	2,372	1,374	505	255	261	640	630	158	688
1-705 (Upstream of Confluence of Fawnie Creek)													
1 in 50 Dry	11	8.7	7.8	22	542	307	93	39	22	11	9.1	11	90
1 in 20 Dry	14	11	9.9	26	629	357	110	47	28	17	14	14	106
1 in 10 Dry	17	13	12	31	718	409	128	56	35	24	21	19	124
1 in 5 Dry	22	17	16	42	843	481	154	69	46	38	33	26	149
Average	41	30	31	282	1,218	694	239	114	94	146	132	61	258
1 in 5 Wet	58	42	43	334	1,555	895	313	151	128	204	190	88	333
1 in 10 Wet	75	53	56	664	1,826	1,053	376	186	167	318	302	122	433
1 in 20 Wet	92	64	69	1,147	2,084	1,204	438	221	208	457	442	159	549
1 in 50 Wet	117	80	88	2,011	2,419	1,401	521	268	266	688	678	215	729
Van Tine (WSC Regional Station ID # 08JA014)													
1 in 50 Dry	35	26	28	146	1,633	848	257	119	72	103	32	35	278
1 in 20 Dry	45	33	32	209	1,882	1,014	312	147	93	108	50	49	331
1 in 10 Dry	57	42	39	288	2,135	1,187	371	176	117	114	75	65	389
1 in 5 Dry	76	55	54	426	2,490	1,440	459	220	155	127	122	93	476
Average	153	110	165	1,215	3,533	2,244	766	385	330	548	517	237	854

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
1 in 5 Wet	222	159	237	1,886	4,463	2,992	1,025	515	452	776	766	354	1,154
1 in 10 Wet	294	210	328	2,789	5,204	3,627	1,266	644	598	1,230	1,242	503	1,495
1 in 20 Wet	371	264	419	3,846	5,904	4,248	1,506	774	754	1,794	1,848	672	1,867
1 in 50 Wet	482	341	539	5,523	6,805	5,076	1,832	952	978	2,747	2,891	930	2,425
Chedakuz Creek													
15-CC (Outlet of Tatelkuz Lake)													
1 in 50 Dry	604	626	705	548	959	973	659	445	334	424	630	598	625
1 in 20 Dry	659	677	763	685	1,240	1,238	788	522	411	503	723	666	740
1 in 10 Dry	712	726	819	835	1,558	1,533	923	601	496	587	817	734	862
1 in 5 Dry	782	789	892	1,062	2,056	1,990	1,120	713	622	706	949	825	1,042
Average	954	942	1,071	2,027	4,301	3,913	1,811	1,070	1,123	1,106	1,341	1,066	1,727
1 in 5 Wet	1,117	1,087	1,236	2,654	5,908	5,355	2,335	1,369	1,472	1,433	1,674	1,288	2,244
1 in 10 Wet	1,227	1,183	1,347	3,377	7,798	6,948	2,833	1,625	1,847	1,726	1,944	1,449	2,775
1 in 20 Wet	1,325	1,268	1,446	4,115	9,796	8,606	3,320	1,872	2,226	2,011	2,197	1,595	3,315
1 in 50 Wet	1,445	1,370	1,565	5,143	12,665	10,952	3,970	2,194	2,745	2,389	2,523	1,778	4,062
H5 (Midway between Davidson Creek and Turtle Creek Confluences)													
1 in 50 Dry	908	941	1,059	824	1,441	1,462	990	669	501	637	946	898	940
1 in 20 Dry	991	1,018	1,147	1,029	1,864	1,860	1,184	784	618	757	1,086	1,001	1,112
1 in 10 Dry	1,070	1,090	1,230	1,255	2,341	2,304	1,387	903	745	881	1,228	1,102	1,295
1 in 5 Dry	1,175	1,186	1,341	1,596	3,090	2,990	1,683	1,072	934	1,062	1,426	1,240	1,566
Average	1,434	1,416	1,609	3,047	6,464	5,880	2,721	1,607	1,688	1,662	2,015	1,602	2,595
1 in 5 Wet	1,678	1,634	1,858	3,988	8,878	8,047	3,509	2,057	2,213	2,153	2,516	1,936	3,372
1 in 10 Wet	1,843	1,778	2,025	5,074	11,719	10,442	4,257	2,443	2,776	2,594	2,921	2,177	4,171
1 in 20 Wet	1,991	1,905	2,173	6,184	14,721	12,933	4,989	2,813	3,344	3,022	3,302	2,398	4,981
1 in 50 Wet	2,171	2,059	2,352	7,729	19,033	16,458	5,966	3,297	4,125	3,590	3,791	2,673	6,104

Source: Knight Piésold, 2013b (Appendix 5.1.2.4C1B)

Note: L/s = litre per second; TSF = tailings storage facility; WSC = Water Survey of Canada

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Table 2: Estimated 7Q10 and 7Q20 Baseline Low Flows for the Project

Return Period	7 Day Low Flows (L/s)																	
	Turtle Creek			Davidson Creek				Creek 661			Creek 705				Van Tine	Chedakuz		
	H3	H6	1-TC	11-DC	H2	H4B	4-DC	1-DC	H1	1-505659	1-661	6-705	4-705	H7	1-705	WSC	15-CC	H5
1 in 10 Year	0.9	43.1	59.1	0.0	63.7	75.4	75.7	93.6	0.8	0.8	41.0	0.0	0.0	8.5	9.1	26.0	468.9	704.7
1 in 20 Year	0.7	41.0	56.0	0.0	60.7	71.6	71.8	89.1	0.6	0.4	39.8	0.0	0.0	7.9	8.5	21.8	459.4	690.3

Source: Knight Piésold, 2013b (Appendix 5.1.2.4C1B)

Note: 7Q10 = seven-day, consecutive low flow with a 10-year return frequency; 7Q20 = seven-day, consecutive low flow with a 20-year return frequency;
 L/s = litre per second; WSC = Water Survey of Canada