Appendix 2.2
Habitat Suitability Indices

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Appendix 2.2. Habitat Suitability Indices

Habitat Suitability Indices and Descriptions	
HSI Value	**Habitat Description**
1.00	Optimal
0.75	Above Average
0.50	Average
0.25	Below Average
0.00	**Unsuitable**

Note: HSI = Habitat Suitability Index

Lake Habitat Suitability Indices by Habitat Type					
Species	**Habitat Type**	**Spawning/Nursery**	**Rearing**	**Foraging**	**Overwintering**
Arctic Grayling	Nearshore with fine sediment (< 2.5 m)	0.00	0.00	0.25	0.00
	Nearshore with large substrate (< 4 m)	0.00	0.50	0.50	0.25
	Deepwater (> 4 m) plus > 2.5 m with fine sediment	0.00	0.00	0.25	0.75

Stream Habitat Suitability Indices by Habitat Type					
Species	**Habitat Type**	**Spawning**	**Nursing**	**Rearing**	**Foraging (adult)**
Arctic Grayling	Organics	0.00	0.25	0.00	0.00
	Fines	0.00	1.00	0.00	0.00
	Gravel	1.00	0.50	0.25	0.25
	Cobble	0.00	0.50	1.00	1.00
	Boulder	0.00	0.25	0.75	0.75
	Bedrock	0.00	0.00	0.00	0.00

Source: Diavik 1998; Debeers 2002; Stewart et al. 2007; Golder 2013; Mainstream Aquatics 2004; Evans et al. 2002

Appendix 3.1

Rascal Stream East Reach Characteristics and Site Photos

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Appendix 3.1. Rascal Stream East Reach Characteristics and Site Photos

Table A3.1-1. Characteristics of RSE Reaches, 2013

Attribute	Units	Rascal-Goose Stream						
		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7
Site number	n/a	300	301	302	305	306	307	308
Morphology	n/a	Run	Run	Riffle	Riffle	Run	Riffle	Boulder Garden
Secondary Habitat	n/a	Braided	OCH	OCH	Braided	-	-	Braided
Reach Length	m	385.9	257.6	536.9	806.0	545.0	313.7	740.6
Mean Gradient	%	1.0	0.0	1.0	1.0	0.0	4.0	1.0
Mean Bankfull Width	m	1.5	18.0	2.5	3.7	7.1	8.0	17.0
Mean Wetted Width	m	2.0	20.0	2.5	5.1	13.5	10.0	17.4
Mean Bankfull Depth	m	0.35	0.35	0.20	0.25	0.32	0.20	0.19
Mean Wetted Depth	m	0.35	0.60	0.20	0.30	0.35	0.25	0.19
Bankfull area	m^2	579	4,637	1,342	2,982	3,870	2,510	12,590
Spawning	n/a	Good	None	Poor	Fair	None	None	Fair
Overwintering	n/a	None	None	None	None	None	None	None
Rearing	n/a	Good	Fair	Fair	Fair	Poor	Fair	Good
Overall	n/a	Important	Important	Important	Important	Marginal	Important	Important

Braided = braided channel morphology
OCH = off-channel habitat
n/a = not applicable
Dashes indicate data not available

Table A3.1-2. Weighted Mean Habitat Characteristics of RSE Reaches, 2013

Attribute	Units	Rascal-Goose Stream						
		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7
Site number	n/a	300	301	302	305	306	307	308
Organics	%	5	98	0	0	0	4	0
Fine	%	0	0	0	0	60	0	0
Gravel	%	30	2	0	10	10	0	0
Cobble	%	40	0	75	60	20	3	20
Boulder	%	25	0	25	30	10	82	80
Bedrock	%	0	0	0	0	0	11	0
Compaction	n/a	Medium	Medium	Low	Medium	Medium	High	Medium
Bank Stability	n/a	Unstable	Unstable	Unstable	Unstable	Unstable	Stable	Unstable
Bank Substrate	n/a	Fines	Fines	Fines	Fines	Fines	Boulder	Fines

Table A3.1-2. Weighted Mean Habitat Characteristics of RSE Reaches, 2013

Attribute	Units	Rascal-Goose Stream						
		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7
Pool	%	2	0	0	0	0	3	0
Boulder	%	0	3	2	2	1	7	20
Instream Vegetation	%	2	0	1	1	1	0	0
Overhead Vegetation	%	0	0	0	0	0	0	0
Undercut Bank	%	1	2	3	0	0	0	0
Total Cover	%	5	5	6	2	2	9	20
Number of Pools	no.	0	0	0	0	0	1	0
Mean Maximum Pool Depth	m	-	-	-	-	-	1.0	-
Mean Crest Depth	m	-	-	-	-	-	0.3	-
Residual Pool Depth	m	-	-	-	-	-	0.7	-
Riffle	no.	0	0	1	1	0	1	0
Pool	no.	0	0	0	0	0	1	0
Run	no.	1	1	0	0	1	1	0
Cascade	no.	0	0	0	0	0	0	0
Boulder Garden	no.	0	0	0	0	0	0	1
Other	no.	0	0	0	0	0	0	0

n/a = not applicable
Dashes indicate data not available
No. = number

Plate A3.1-1. Braided channels with mixed cobble, gravel, and boulder substrate at Reach 1 of RSE, June 16, 2013.

Plate A3.1-2. Off-channel habitat was present in wetted areas outside the bankfull width at Reach 2 of RSE, June 16, 2013.

Plate A3.1-3. Ephemeral fish habitat at a flooded area west of Reach 2 of RSE, June 16, 2013.

Plate A3.1-4. Upstream view of riffle habitat at Reach 3 of RSE, June 16, 2013.

Plate A3.1-5. Braiding at Reach 4 of RSE, June 16, 2013.

Plate A3.1-6. Low gradient channel at Reach 5 of RSE, June 16, 2013.

Plate A3.1-7. Riffle and pool habitat at Reach 6 of RSE, June 16, 2013.

Plate A3.1-8. Boulder-dominated substrate at Reach 7 of RSE, June 16, 2013.

Appendix 3.2

Rascal Stream West Reach Characteristics and Site Photos

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Appendix 3.2. Rascal Stream West Reach Characteristics and Site Photos

Table A3.2-1. Characteristics of RSW (Gander Pond) Stream Reaches, 2013

Attribute	Units	Gander Pond Stream Reach		
		1	2	3
Site	n/a	101	804	-
Morphology	n/a	Run	Run	NCD
Secondary Habitat	n/a	Braided	Intermittent Channelization	-
Reach Length	m	473	385	254
Mean Gradient	%	2	1	-
Mean Bankfull Width	m	0.7	1.2	-
Mean Wetted Width	m	1.1	4.5	-
Mean Bankfull Depth	m	0.15	0.15	-
Mean Wetted Depth	m	0.20	0.31	-
Bankfull area	m^2	331	462	-
Spawning	n/a	Fair	Poor	None
Overwintering	n/a	None	None	None
Rearing	n/a	Good	Fair	None
Overall	n/a	Important	Marginal	None

NCD = non-classified drainage
Dashes indicate data not available
n/a = not applicable

Table A3.2-2. Weighted Mean Habitat Characteristics of Gander Pond Stream Reaches, 2013

Attribute	Units	Gander Pond Stream Reach		
		1	2	3
Organics	%	40	0	-
Fine	%	2	70	-
Gravel	%	16	5	-
Cobble	%	25	20	-
Boulder	%	17	25	-
Bedrock	%	0	0	-
Compaction	n/a	Medium	Medium	-
Bank Stability	n/a	Stable	Stable	-
Bank Substrate	n/a	Cobble	Fines	-
Number of Pools	no.	3	0	-
Mean Maximum Pool Depth	m	0.53	-	-
Mean Crest Depth	m	0.18	-	-
Mean Residual Depth	m	0.35	-	-
Pool	%	16	0	-

Table A3.2-2. Weighted Mean Habitat Characteristics of Gander Pond Stream Reaches, 2013

Attribute	Units	Gander Pond Stream Reach		
		1	2	3
Boulder	%	8	2	-
Instream Vegetation	%	3	5	-
Overhanging Vegetation	%	1	0	-
Undercut Bank	%	1	1	-
Total Cover	%	29	8	-
Riffle	no.	1	0	-
Pool	no.	3	0	-
Run	no.	2	1	-
Cascade	no.	1	0	-
Boulder Garden	no.	0	0	-
Other	no.	0	0	-

No. = number; Dashes indicate data not available; n/a = not applicable

Plate A3.2-1. View of intermittent channelization at Reach 2 of Gander Pond Stream, facing north-west towards Gander Pond, June 22, 2013.

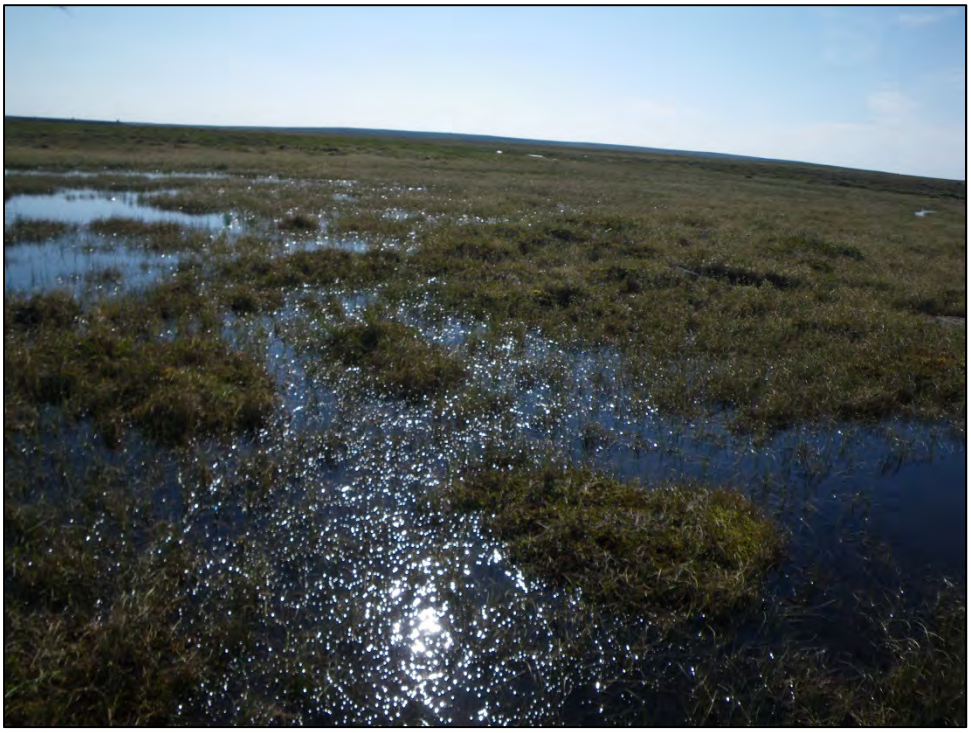

Plate A3.2-2. Non-channelized ephemeral wetted areas at Reach 3 of Gander Pond Stream, June 22, 2013.

Appendix 5.1

Habitat Loss Calculations for Rascal Stream East

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Appendix 5.1. Habitat Loss Calculations for Rascal Stream East

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
2013 Report Name: Main Goose Pit Stream – Reach 1	Arctic Grayling	Organics	16.35	0.00	0.0000	0.25	4.0875	0.00	0.0000	0.00	0.0000	4.0875
		Fines	0.00	0.00	0.0000	1.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Gravel	0.00	1.00	0.0000	0.50	0.0000	0.25	0.0000	0.25	0.0000	0.0000
		Cobble	0.00	0.00	0.0000	0.50	0.0000	1.00	0.0000	1.00	0.0000	0.0000
		Boulder	0.00	0.00	0.0000	0.25	0.0000	0.75	0.0000	0.75	0.0000	0.0000
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		16.35		0.0000		4.0875		0.0000		0.0000	
	Total HU											4.09

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
2013 Report Name: Main Goose Pit Stream – Reach 2	Arctic Grayling	Organics	0.00	0.00	0.0000	0.25	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Fines	0.00	0.00	0.0000	1.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Gravel	116.66	1.00	116.6622	0.50	58.3311	0.25	29.1656	0.25	29.1656	233.3244
		Cobble	816.64	0.00	0.0000	0.50	408.3177	1.00	816.6355	1.00	816.6355	2041.5887
		Boulder	233.32	0.00	0.0000	0.25	58.3311	0.75	174.9933	0.75	174.9933	408.3177
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		1166.62		116.6622		524.9799		1020.7943		1020.7943	
	Total HU											2683.23

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
2013 Report Name: Main Goose Pit Stream – Reach 3	Arctic Grayling	Organics	0.00	0.00	0.0000	0.25	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Fines	0.00	0.00	0.0000	1.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Gravel	173.80	1.00	173.8037	0.50	86.9019	0.25	43.4509	0.25	43.4509	347.6075
		Cobble	1738.04	0.00	0.0000	0.50	869.0186	1.00	1738.0373	1.00	1738.0373	4345.0932
		Boulder	1564.23	0.00	0.0000	0.25	391.0584	0.75	1173.1752	0.75	1173.1752	2737.4087
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		3476.07		173.8037		1346.9789		2954.6633		2954.6633	
	Total HU											7430.11

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Appendix 5.1. Habitat Loss Calculations for Rascal Stream East

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
2013 Report Name: Main Goose Pit Stream – Reach 4	Arctic Grayling	Organics	21.76	0.00	0.0000	0.25	5.4406	0.00	0.0000	0.00	0.0000	5.4406
		Fines	0.00	0.00	0.0000	1.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Gravel	0.00	1.00	0.0000	0.50	0.0000	0.25	0.0000	0.25	0.0000	0.0000
		Cobble	0.00	0.00	0.0000	0.50	0.0000	1.00	0.0000	1.00	0.0000	0.0000
		Boulder	0.00	0.00	0.0000	0.25	0.0000	0.75	0.0000	0.75	0.0000	0.0000
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		21.76		0.0000		5.4406		0.0000		0.0000	
	Total HU											5.44

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
2013 Report Name: Rascal to Goose Stream – Reach 1	Arctic Grayling	Organics	19.29	0.00	0.0000	0.25	4.8233	0.00	0.0000	0.00	0.0000	4.8233
		Fines	0.00	0.00	0.0000	1.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Gravel	115.76	1.00	115.7600	0.50	57.8800	0.25	28.9400	0.25	28.9400	231.5199
		Cobble	154.35	0.00	0.0000	0.50	77.1733	1.00	154.3466	1.00	154.3466	385.8666
		Boulder	96.47	0.00	0.0000	0.25	24.1167	0.75	72.3500	0.75	72.3500	168.8166
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		385.87		115.7600		163.9933		255.6366		255.6366	
	Total HU											791.03

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
2013 Report Name: Rascal to Goose Stream – Reach 2	Arctic Grayling	Organics	908.74	0.00	0.0000	0.25	227.1855	0.00	0.0000	0.00	0.0000	227.1855
		Fines	0.00	0.00	0.0000	1.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Gravel	69.90	1.00	69.9032	0.50	34.9516	0.25	17.4758	0.25	17.4758	139.8064
		Cobble	279.61	0.00	0.0000	0.50	139.8064	1.00	279.6129	1.00	279.6129	699.0322
		Boulder	139.81	0.00	0.0000	0.25	34.9516	0.75	104.8548	0.75	104.8548	244.6613
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		1398.06		69.9032		436.8951		401.9435		401.9435	
	Total HU											1310.69

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Appendix 5.1. Habitat Loss Calculations for Rascal Stream East

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
2013 Report Name: Rascal to Goose Stream – Reach 4	Arctic Grayling	Organics	0.00	0.00	0.0000	0.25	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Fines	0.00	0.00	0.0000	1.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Gravel	223.79	1.00	223.7852	0.50	111.8926	0.25	55.9463	0.25	55.9463	447.5704
		Cobble	1342.71	0.00	0.0000	0.50	671.3557	1.00	1342.7113	1.00	1342.7113	3356.7783
		Boulder	671.36	0.00	0.0000	0.25	167.8389	0.75	503.5167	0.75	503.5167	1174.8724
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		2237.85		298.3803		1268.1162		2536.2325		2536.2325	
	Total HU											4979.22

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Conversion of Stream Naming Conventions between this Report and Previous Baselines

2013 Report Name	2014 Report Name
Main Goose Pit Stream – Reach 1	Main Goose Pit Stream – Reach 1
Main Goose Pit Stream – Reach 2	Main Goose Pit Stream – Reach 2
Main Goose Pit Stream – Reach 3	Main Goose Pit Stream – Reach 3
Main Goose Pit Stream – Reach 4	Main Goose Pit Stream – Reach 4
Rascal to Goose Stream – Reach 1	Rascal Stream East Reach 1
Rascal to Goose Stream – Reach 2	Rascal Stream East Reach 2
Rascal to Goose Stream – Reach 4	Rascal Stream East Reach 4

Appendix 5.2

Habitat Loss Calculations for Rascal Stream West

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Appendix 5.2. Baseline Habitat Calculations for Rascal Stream West

A. Stream Reaches

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning		Nursery		Rearing		Foraging		Total
				HSI	WSA	HSI	WSA	HSI	WSA	HSI	WSA	WSA
2013 Report Name: Gander Stream Reach 1*	Arctic Grayling	Organics	0.00	0.00	0.0000	0.25	0.0000	0.00	0.0000	0.00	0.0000	0.0000
		Fines	230.98	0.00	0.0000	1.00	230.9840	0.00	0.0000	0.00	0.0000	230.9840
		Gravel	23.10	1.00	23.0984	0.50	11.5492	0.25	5.7746	0.25	5.7746	46.1968
		Cobble	92.39	0.00	0.0000	0.50	46.1968	1.00	92.3936	1.00	92.3936	230.9840
		Boulder	115.49	0.00	0.0000	0.25	28.8730	0.75	86.6190	0.75	86.6190	202.1110
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		461.97		23.0984		317.6030		184.7872		184.7872	
	Total HU											710.28

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

** Rescan. 2014a. Back River Project: 2013 Fish and Fish Habitat Baseline Report. Prepared for Sabina Gold & Silver Corp. by Rescan Environmental Services Ltd., an ERM Company: Vancouver, BC.*

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning		Nursery		Rearing		Foraging		Total
				HSI	WSA	HSI	WSA	HSI	WSA	HSI	WSA	WSA
2013 Report Name: Gander Stream Reach 2*	Arctic Grayling	Organics	82.88	0.00	0.0000	0.25	20.7204	0.00	0.0000	0.00	0.0000	20.7204
		Fines	16.58	0.00	0.0000	1.00	16.5763	0.00	0.0000	0.00	0.0000	16.5763
		Gravel	33.15	1.00	33.1526	0.50	16.5763	0.25	8.2881	0.25	8.2881	66.3052
		Cobble	132.61	0.00	0.0000	0.50	66.3052	1.00	132.6104	1.00	132.6104	331.5260
		Boulder	66.31	0.00	0.0000	0.25	16.5763	0.75	49.7289	0.75	49.7289	116.0341
		Bedrock	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	Total Area		331.53		33.1526		136.7545		190.6274		190.6274	
	Total HU											551.16

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

** Rescan. 2014a. Back River Project: 2013 Fish and Fish Habitat Baseline Report. Prepared for Sabina Gold & Silver Corp. by Rescan Environmental Services Ltd., an ERM Company: Vancouver, BC.*

Appendix 5.2. Baseline Habitat Calculations for Rascal Stream West

B. Ponds

Habitat Type	Habitat Area (m^2)	Spawning/Nursery		Rearing		Foraging		Overwintering		Total
		HSI	WSA	HSI	WSA	HSI	WSA	HSI	WSA	WSA
Gander Pond										
Nearshore with fines (< 2.5 m)	33446.00	0.00	0.0	0.00	0.0	0.25	8361.5	0.00	0.0	8361.5
Nearshore with large substr. (< 4 m)	0.00	0.00	0.0	0.50	0.0	0.50	0.0	0.25	0.0	0.0
Deepwater (> 4 m) plus > 2.5 with fines	0.00	0.00	0.0	0.00	0.0	0.25	0.0	0.75	0.0	0.0
Total HU	33446.00		0.0		0.0		8361.5		0.0	8361.5

Habitat Type	Habitat Area (m^2)	Spawning/Nursery		Rearing		Foraging		Overwintering		Total
		HSI	WSA	HSI	WSA	HSI	WSA	HSI	WSA	WSA
Gosling Pond 2										
Nearshore with fines (< 2.5 m)	4477.00	0.00	0.0	0.00	0.0	0.25	1119.3	0.00	0.0	1119.3
Nearshore with large substr. (< 4 m)	0.00	0.00	0.0	0.50	0.0	0.50	0.0	0.25	0.0	0.0
Deepwater (> 4 m) plus > 2.5 with fines	0.00	0.00	0.0	0.00	0.0	0.25	0.0	0.75	0.0	0.0
Total HU	4477.00		0.0		0.0		1119.3		0.0	1119.3

Habitat Type	Habitat Area (m^2)	Spawning/Nursery		Rearing		Foraging		Overwintering		Total
		HSI	WSA	HSI	WSA	HSI	WSA	HSI	WSA	WSA
Gosling Pond 1										
Nearshore with fines (< 2.5 m)	14427.00	0.00	0.0	0.00	0.0	0.25	3606.8	0.00	0.0	3606.8
Nearshore with large substr. (< 4 m)	0.00	0.00	0.0	0.50	0.0	0.50	0.0	0.25	0.0	0.0
Deepwater (> 4 m) plus > 2.5 with fines	0.00	0.00	0.0	0.00	0.0	0.25	0.0	0.75	0.0	0.0
Total HU	14427.00		0.0		0.0		3606.8		0.0	3606.8

Note: Overwintering WSA was set to zero to reflect the high liklihood that ponds will freeze to bottom in winter.

Conversion of Stream Naming Conventions between this Report and Previous Baselines

2013 Report Name	2014 Report Name
Gander Stream Reach 1	Rascal Stream West Reach 1
Gander Stream Reach 2	Rascal Stream West Reach 2

Appendix 5.3

Habitat Gain Calculations for Rascal Stream West

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Appendix 5.3. Habitat Gain Calculations for Rascal Stream West

A. Stream Reaches

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
Gander Stream Reach 1*	Arctic Grayling	Organics	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
		Fines	2695.0	0.0	0.0	1.0	2695.0	0.0	0.0	0.0	0.0	2695.0
		Gravel	269.5	1.0	269.5	0.5	134.7	0.3	67.4	0.3	67.4	539.0
		Cobble	1078.0	0.0	0.0	0.5	539.0	1.0	1078.0	1.0	1078.0	2695.0
		Boulder	1347.5	0.0	0.0	0.3	336.9	0.8	1010.6	0.8	1010.6	2358.1
		Bedrock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total Area		5390.0		269.5		3705.6		2156.0		2156.0	
	Total HU											8287.0

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Culvert loss accounted for by removing proportion stream occupied by culverts (22 m = 7.8%)

Rescan. 2014a. Back River Project: 2013 Fish and Fish Habitat Baseline Report. Prepared for Sabina Gold & Silver Corp. by Rescan Environmental Services Ltd., an ERM Company: Vancouver, BC.

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
Gander Stream Reach 2*	Arctic Grayling	Organics	1274.2	0.0	0.0	0.3	318.6	0.0	0.0	0.0	0.0	318.6
		Fines	254.8	0.0	0.0	1.0	254.8	0.0	0.0	0.0	0.0	254.8
		Gravel	509.7	1.0	509.7	0.5	254.8	0.3	127.4	0.3	127.4	1019.4
		Cobble	2038.8	0.0	0.0	0.5	1019.4	1.0	2038.8	1.0	2038.8	5096.9
		Boulder	1019.4	0.0	0.0	0.3	254.8	0.8	764.5	0.8	764.5	1783.9
		Bedrock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total Area		5096.9		509.7		2102.5		2930.7		2930.7	
	Total HU											8473.6

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Rescan. 2014a. Back River Project: 2013 Fish and Fish Habitat Baseline Report. Prepared for Sabina Gold & Silver Corp. by Rescan Environmental Services Ltd., an ERM Company: Vancouver, BC.

Stream Reach	Species	Habitat Type	Habitat Area (m^2)	Spawning HSI	Spawning WSA	Nursery HSI	Nursery WSA	Rearing HSI	Rearing WSA	Foraging HSI	Foraging WSA	Total WSA
Gander Stream Reach 3*	Arctic Grayling	Organics	1864.5	0.0	0.0	0.3	466.1	0.0	0.0	0.0	0.0	466.1
		Fines	372.9	0.0	0.0	1.0	372.9	0.0	0.0	0.0	0.0	372.9
		Gravel	745.8	1.0	745.8	0.5	372.9	0.3	186.5	0.3	186.5	1491.6
		Cobble	2983.3	0.0	0.0	0.5	1491.6	1.0	2983.3	1.0	2983.3	7458.2
		Boulder	1491.6	0.0	0.0	0.3	372.9	0.8	1118.7	0.8	1118.7	2610.4
		Bedrock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total Area		7458.2		745.8		3076.5		4288.4		4288.4	
	Total HU											12399.2

Notes: HSI = Habitat Suitability Index, WSA = Weighted Suitable Area

Rescan. 2014a. Back River Project: 2013 Fish and Fish Habitat Baseline Report. Prepared for Sabina Gold & Silver Corp. by Rescan Environmental Services Ltd., an ERM Company: Vancouver, BC.

Appendix 5.3. Habitat Gain Calculations for Rascal Stream West

B. Ponds

Gain of Habitat Units Calculated for Arctic Grayling in Rascal Lake to Goose Lake Stream Realignment Option										
	Habitat	Spawning/Nursery		Rearing		Foraging		Overwintering		Total
Habitat Type	Area (m^2)	HSI	WSA	HSI	WSA	HSI	WSA	HSI	WSA	WSA
Gander Pond										
Nearshore with fines (< 2.5 m)	36340.01	0.00	0.0	0.00	0.0	0.25	9085.0	0.00	0.0	9085.0
Nearshore with large substr. (< 4 m)	2137.65	0.00	0.0	0.50	1068.8	0.50	1068.8	0.25	534.4	2672.1
Deepwater (> 4 m) plus > 2.5 with fines	0.00	0.00	0.0	0.00	0.0	0.25	0.0	0.75	0.0	0.0
Total HU	42752.95		0.0		1068.8		10153.8		534.4	11757.1

Gain of Habitat Units Calculated for Arctic Grayling in Rascal Lake to Goose Lake Stream Realignment Option										
	Habitat	Spawning/Nursery		Rearing		Foraging		Overwintering		Total
Habitat Type	Area (m^2)	HSI	WSA	HSI	WSA	HSI	WSA	HSI	WSA	WSA
Gosling Pond 2										
Nearshore with fines (< 2.5 m)	12279.06	0.00	0.0	0.00	0.0	0.25	3069.8	0.00	0.0	3069.8
Nearshore with large substr. (< 4 m)	341.08	0.00	0.0	0.50	170.5	0.50	170.5	0.25	85.3	426.4
Deepwater (> 4 m) plus > 2.5 with fines	0.00	0.00	0.0	0.00	0.0	0.25	0.0	0.75	0.0	0.0
Total HU	13643.40		0.0		170.5		3240.3		85.3	3496.1

Gain of Habitat Units Calculated for Arctic Grayling in Rascal Lake to Goose Lake Stream Realignment Option										
	Habitat	Spawning/Nursery		Rearing		Foraging		Overwintering		Total
Habitat Type	Area (m^2)	HSI	WSA	HSI	WSA	HSI	WSA	HSI	WSA	WSA
Gosling Pond 1										
Nearshore with fines (< 2.5 m)	26591.78	0.00	0.0	0.00	0.0	0.25	6647.9	0.00	0.0	6647.9
Nearshore with large substr. (< 4 m)	738.66	0.00	0.0	0.50	369.3	0.50	369.3	0.25	184.7	923.3
Deepwater (> 4 m) plus > 2.5 with fines	0.00	0.00	0.0	0.00	0.0	0.25	0.0	0.75	0.0	0.0
Total HU	29546.42		0.0		369.3		7017.3		184.7	7571.3

Note: Overwintering WSA was set to zero to reflect the high liklihood that ponds will freeze to bottom in winter.

Conversion of Stream Naming Conventions between this Report and Previous Baselines

2013 Report Name	2014 Report Name
Gander Stream Reach 1	Rascal Stream West Reach 1
Gander Stream Reach 2	Rascal Stream West Reach 2
Gander Stream Reach 3	Rascal Stream West Reach 3

APPENDIX L

SABINA BACK RIVER PROJECT CONSULTATION LOG

Appendix C. Record of Meetings and Major Correspondence with Community and Stakeholder Groups

Date	Individual(s) / Organization	Type of Activity
Cambridge Bay		
February 14, 2012	Brenda Sitatak, HTO Manager	Introductions and information sharing
February 14, 2012	Renee Krucas Executive Director, Kitikmeot Heritage Society	Introductions and information sharing
February 14, 2012	Connie Kapolak High School Principal	Introductions and information sharing
March 27, 2012	Brenda Sitatak, HTO Manager	Introductions and update
March 27, 2012	Stephen King, Senior Administrative Officer Jim McEchrean, Economic Development Officer Hamlet of Cambridge Bay	Project introduction
April 5, 2012	Renee Krucas Executive Director, Kitikmeot Heritage Society	Letter / invitation to nominate representatives to the Cambridge Bay Community Advisory Group
April 5, 2012	Stephen King, Senior Administrative Officer Hamlet of Cambridge Bay	Letter / invitation to nominate representative to the Cambridge Bay Community Advisory Group
April 5, 2012	Brenda Sitatak HTO Manager	Letter / invitation to nominate representative to the Cambridge Bay Community Advisory Group
June 14, 2012	General public	Call-in radio show
June 14, 2012	Jessie Lyall, HTO Board Member Brenda Sitatak, HTO Manager	Project introduction
June 14, 2012	General public	Public meeting - Project overview
June 14, 2012	Hamlet council and administration	Project introduction
June 15, 2012	Cambridge Bay Community Advisory Group	Project introduction
September 11-12, 2012	Cambridge Bay Community Advisory Group	Sabina hosted a dinner and meeting for the Cambridge Bay and Kugluktuk Community Advisory Groups (CAGs) in Cambridge Bay on September 11, 2012. The CAGs also visited the Back River Project site on September 12, 2012.
September 27-29, 2012	Interviews conducted with a number of individuals representing a variety of interests in the community including: government administration; health, wellness and social services; safety and protection services; business and economic development; and education and training	Socio-economic baseline data collection; documentation of expected Project benefits, Project concerns, and suggested mitigation measures

Date	Individual(s) / Organization	Type of Activity
November 19, 2012	High school students and staff	Mining and geology presentation
November 19, 2012	General public	Public open house
November 19, 2012	Cambridge Bay Community Advisory Group	Project update
November 30 - December 1, 2012	Local hunters from Cambridge Bay	Land use focus group
February 5 - 6, 2013	General public	Sabina representatives participated in NIRB's scoping meetings for the Project and were available to the public for questions and information sharing
February 5, 2013	Cambridge Bay Community Advisory Group	Project update
April 23, 2013	General public	Public meeting - Project overview/update
April 23, 2013	Cambridge Bay HTO	Project overview/update
August 20, 2013	General public	Sabina provided an overview of the Back River Project and its traditional knowledge study
August 20, 2013	General public	The Kitikmeot Inuit Association provided an overview of the Naonaiyaotit Traditional Knowledge Project (NTKP) report completed for the Back River Project and additional traditional knowledge workshops being conducted
August 21 - 23, 2013	Selected elders and knowledge holders	A series of traditional knowledge workshops were held with selected elders and local knowledge holders for Sabina's traditional knowledge study. These workshops focused on the topics of 'heritage and land use', 'terrestrial environment' and 'marine environment'.
November 19, 2013	General public	Public meeting - Project overview/update & DEIS submission overview
November 19, 2013	Cambridge Bay Community Advisory Group	Project update
November 19, 2013	Cambridge Bay high school students	Project overview and discussion of future employment opportunities
November 19, 2013	General public	Radio update
January 23, 2014	General public	Career fair participation
February 2014	Kitikmeot Heritage Society	Letter – Update on January 2014 DEIS submission to NIRB and NWB. DEIS Plain Language Summary included.
February 2014	Cambridge Bay Community Advisory Group	Letter – Update on January 2014 DEIS submission to NIRB

Date	Individual(s) / Organization	Type of Activity
		and NWB. DEIS Plain Language Summary included.
February 2014	Hamlet of Cambridge Bay	Letter – Update on January 2014 DEIS submission to NIRB and NWB. DEIS Plain Language Summary included.
February 2014	Cambridge Bay HTO	Letter – Update on January 2014 DEIS submission to NIRB and NWB. DEIS Plain Language Summary included.
March 25, 2014	General public	NIRB held community information sessions for the Project's DEIS and were available to the public for questions and information sharing. Note – Sabina representatives were unable to attend due to flight cancellations.
March 28, 2014	Cambridge Bay Community Advisory Group	Project update
April 27, 2014	General public	Radio update / call-in radio show
April 28, 2014	Jim McEchrean, Economic Development Officer, Hamlet of Cambridge Bay	Project update
April 28, 2014	Brendan Griebel, Executive Director, Kitikmeot Heritage Society	Introductions and Project update/overview
April 28, 2014	General public	Radio update / call-in radio show
June 7 - 10, 2014	Selected elders and knowledge holders	A series of traditional knowledge interviews were held with selected elders and local knowledge holders as a component of proposed fish compensation activities in the Bernard Harbour, Nunavut area.
July 14 - 15, 2014	Cambridge Bay Community Advisory Group	Sabina hosted the Cambridge Bay and Kugluktuk Community Advisory Groups at the Back River Project site on July 14-15. Site tours were provided and Project information was shared.
Kugluktuk		
April 11, 2012	Barbara Adjun HTO Manager	Letter / invitation to nominate representative to the Kugluktuk Community Advisory Group
April 26, 2013	Donald LeBlanc, Senior Administrative Officer Hamlet of Kugluktuk	Letter / invitation to nominate representative to the Kugluktuk Community Advisory Group
June 12, 2012	Kugluktuk HTO	Project introduction
June 12, 2012	General public	Public meeting - Project overview
June 13, 2012	Donald LeBlanc, Senior Administrative Officer	Project introduction

Date	Individual(s) / Organization	Type of Activity
	Hamlet of Kugluktuk	
June 13, 2012	Kugluktuk Community Advisory Group	Project introduction
September 11-12, 2012	Kugluktuk Community Advisory Group	Sabina hosted a dinner and meeting for the Kugluktuk and Cambridge Bay Community Advisory Groups (CAGs) in Cambridge Bay on September 11, 2012. The CAGs also visited the Back River Project site on September 12, 2012.
October 1-3, 2012	Interviews conducted with a number of individuals representing a variety of interests in the community including: government administration; health, wellness and social services; safety and protection services; business and economic development; and education and training	Socio-economic baseline data collection; documentation of expected Project benefits, Project concerns, and suggested mitigation measures
November 21, 2012	High school students and staff	Mining and geology presentation
November 21, 2012	General public	Public meeting - Project overview/update
November 21, 2012	Kugluktuk Community Advisory Group	Project update
November 27, 2012	Local hunters from Kugluktuk	Land use focus group
February 7-8, 2013	General public	Sabina representatives participated in NIRB's scoping meetings for the Project and were available to the public for questions and information sharing
February 8, 2013	Kugluktuk Community Advisory Group	Project update
April 22, 2013	General public	Public meeting - Project overview/update
April 22, 2013	Kugluktuk Community Advisory Group	Project update
August 12, 2013	General public	Sabina provided an overview of the Back River Project and its traditional knowledge study
August 13, 2013	General public	The Kitikmeot Inuit Association provided an overview of the Naonaiyaotit Traditional Knowledge Project (NTKP) report completed for the Back River Project and additional traditional knowledge workshops being conducted
August 14-16, 2013	Selected elders and knowledge holders	A series of traditional knowledge workshops were held with selected elders and local knowledge holders for Sabina's traditional knowledge study. These workshops focused on the topics of 'heritage and land use', 'terrestrial environment' and 'marine environment'.

Date	Individual(s) / Organization	Type of Activity
November 18, 2013	General public	Public meeting - Project overview/update & DEIS submission overview
November 18, 2013	Kugluktuk Hamlet council	Project update
November 18, 2013	Kugluktuk Community Advisory Group	Project update
November 18, 2013	Kugluktuk high school students	Project overview and discussion of future employment opportunities
January 24, 2014	General public	Career fair participation
February 12, 2014	Donald LeBlanc, Senior Administrative Officer Hamlet of Kugluktuk	Letter / invitation to nominate representative to the Kugluktuk Community Advisory Group
February 2014	Kugluktuk Community Advisory Group	Letter – Update on January 2014 DEIS submission to NIRB and NWB. DEIS Plain Language Summary included.
February 2014	Hamlet of Kugluktuk	Letter – Update on January 2014 DEIS submission to NIRB and NWB. DEIS Plain Language Summary included.
February 2014	Kugluktuk HTO	Letter – Update on January 2014 DEIS submission to NIRB and NWB. DEIS Plain Language Summary included.
March 19, 2014	David Nivingalok (Chairperson) and Kevin Klengenberg (Secretary-Treasurer), Kugluktuk HTO	Teleconference to discuss proposed fisheries offsetting work to be conducted at Bernard Harbour.
March 24, 2014	General public	Sabina representatives participated in NIRB's community information sessions for the Project's DEIS and were available to the public for questions and information sharing
March 24, 2014	Kugluktuk Community Advisory Group	Project update
March 25, 2014	Kugluktuk HTO	Meeting to discuss proposed fisheries offsetting work to be conducted at Bernard Harbour and associated TK study.
April 29, 2014	Kugluktuk HTO	Meeting to discuss Kugluktuk HTO-Sabina Bernard Harbour Restoration Project Agreement.
April 30, 2014	Kugluktuk Community Readiness Initiative Committee	Sabina met with Kugluktuk's Community Readiness Initiative Committee in Kugluktuk to discuss the plans and goals of the committee and how Sabina might contribute.
April 30, 2014	Donald LeBlanc, SAO, Hamlet of Kugluktuk	Project update
May 2, 2014	Kugluktuk Community Readiness Initiative Committee	Sabina met with Kugluktuk's Community Readiness Initiative Committee in Yellowknife to discuss the plans and goals of the committee and how Sabina might contribute.

Date	Individual(s) / Organization	Type of Activity
June 1-6, 2014	Selected elders and knowledge holders	A series of traditional knowledge interviews were held with selected elders and local knowledge holders as a component of proposed fish compensation activities in the Bernard Harbour, Nunavut area. A project overview meeting/presentation was also held with local study participants prior to the interviews commencing.
July 13, 2014	Bernard Harbour TK study participants; HTO chairperson and acting manager	A TK study results verification meeting was held with participants in the Bernard Harbour TK study and with the Kugluktuk HTO chairperson and acting manager. Various clarifications were made by the participants, which were later incorporated into the final TK study report.
July 14-15, 2014	Kugluktuk Community Advisory Group	Sabina hosted the Cambridge Bay and Kugluktuk Community Advisory Groups at the Back River Project site on July 14-15. Site tours were provided and Project information was shared.
July 17, 2014	Kugluktuk HTO chairperson	The chairperson of the Kugluktuk HTO accompanied Sabina representatives and various other attendees during a day-long site visit to the Bernard Harbour stream restoration project.
Kingaok		
April 5, 2012	Sam Kapolak, Chairperson Bathurst Inlet HTO	Letter / invitation to nominate representative to the Cambridge Bay Community Advisory Group
November 18, 2012	Various residents of Kingaok	Sabina hosted a Project information meeting in Cambridge Bay specifically for residents of Kingaok and Omingmaktok
November 30 - December 1, 2012	Local hunters from the Bathurst Inlet area	Land use focus group
Fall 2012	Interviews conducted with selected individuals from the community for Sabina's socio-economic study	Socio-economic baseline data collection; documentation of expected Project benefits, Project concerns, and suggested mitigation measures
January 1, 2013	Boyd Warner President, Bathurst Inlet Lodge	Project discussion (via phone)
August 14-16, 2013 (in Kugluktuk) August 21-23 (in Cambridge Bay)	Selected elders and knowledge holders from or familiar with the Bathurst Inlet area	A series of traditional knowledge workshops were held with selected elders and local knowledge holders for Sabina's traditional knowledge study. These workshops focused on

Date	Individual(s) / Organization	Type of Activity
		the topics of 'heritage and land use', 'terrestrial environment' and 'marine environment'.
November 19, 2013	Resident of Kingaok	Project update in Cambridge Bay specifically for residents of Kingaok and Omingmaktok and the Cambridge Bay community advisory group
Omingmaktok		
April 5, 2012	Peter Kapolak, Chairperson Omingmaktok HTO	Letter / invitation to nominate representative to the Cambridge Bay Community Advisory Group
November 18, 2013	Various residents of Omingmaktok	Sabina hosted a Project information meeting in Cambridge Bay specifically for residents of Kingaok and Omingmaktok
November 30 - December 1, 2012	Local hunters from the Bathurst Inlet area	Land use focus group
Fall 2012	Interview conducted with individual from the community for Sabina's socio-economic study	Socio-economic baseline data collection; documentation of expected Project benefits, Project concerns, and suggested mitigation measures
August 14-16, 2013 (in Kugluktuk) August 21-23 (in Cambridge Bay)	Selected elders and knowledge holders from or familiar with the Bathurst Inlet area	A series of traditional knowledge workshops were held with selected elders and local knowledge holders for Sabina's traditional knowledge study. These workshops focused on the topics of 'heritage and land use', 'terrestrial environment' and 'marine environment'.
November 19, 2013	Various residents of Omingmaktok	Project update in Cambridge Bay specifically for residents of Kingaok and Omingmaktok and the Cambridge Bay community advisory group
February 2014	Omingmaktok HTO	Letter – Update on January 2014 DEIS submission to NIRB and NWB. DEIS Plain Language Summary included.
Gjoa Haven		
June 20, 2012	Hamlet council members and staff	Project introduction
June 20, 2012	General public	Public meeting - Project overview
September 17-19, 2012	Interviews conducted with a number of individuals representing a variety of interests in the community including: government administration; health, wellness and social services; business and economic development; and education and training	Socio-economic baseline data collection; documentation of expected Project benefits, Project concerns, and suggested mitigation measures
February 12, 2013	General public	Sabina representatives participated in NIRB's scoping