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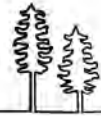
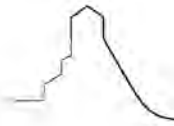
# **Giant Mine Remediation Project**

## **Proposed Surveillance Network Program**

### **(SNP)**

Version 1.0

January 2019



### 1 PREAMBLE

The Giant Mine Remediation Project (GMRP) has developed this proposed Surveillance Network Program (SNP) for reviewer and Mackenzie Valley Land and Water Board's (MVLWB) consideration (Tables 1-1 to 1-3 and Figure 1-1). In doing so, the GMRP is communicating its proposed approach to SNP monitoring on the site during implementation of the GMRP. The GMRP understands that the MVLWB will issue a final SNP as an annex to the Type A Water Licence at the end of the Water Licence process, prior to the GMRP commencing remediation activities.

The proposed SNP includes existing monitoring stations (i.e., stations that have been monitored as part of the former Water Licence N1L2-0043) as well as proposed future stations; however, exact locations of future stations will be determined in conjunction with completion of further detailed design. The proposed SNP encompasses surface water stations, ground water wells (shallow and deep multi-port), minewater, and surface runoff.

The proposed monitoring network was evaluated based on:

- Location: Does each station meet a specific monitoring need? What areas are contributing to water reporting to sumps and surface drainage features?
- Frequency: Is the monitoring frequency appropriate for each station based on patterns in long-term data set and predicted future site conditions?
- Parameter suites: Are the parameter suites appropriate for the potential water quality concerns during remediation?
- Monitoring methods: Are the monitoring methods appropriate for collecting the required data, in terms of frequency, where the sampling is conducted, parameters and appropriate detection limits.

In addition to the SNP, the GMRP monitors treated effluent and surface water quality to meet requirements of the Metal and Diamond Mining Effluent Regulation (MDMER) (Government of Canada 2012), including the Environmental Effects Monitoring (EEM) program. Additional monitoring is also completed as part of the Operational Monitoring Program (OMP). The Water Management and Monitoring Plan (CIRNAC and GNWT 2019a) and the Standard Operating Procedures for Effluent and Water Monitoring (CIRNAC and GNWT 2019b) contain additional information related to water monitoring that is relevant to the SNP, MDMER/EEM, and OMP programs.

Table 1-1 Giant Mine Remediation Project - Proposed Surveillance Network Program

Station <sup>(a,b)</sup>	Status	Project Phase <sup>(f)</sup>	Location description	Rationale	Frequency	Sample Type	Assumptions	Parameters <sup>(g,h,i)</sup>
SNP 43-1 <sup>(d,e)</sup>	Active	Phase 1, Phase 2	ETP discharge	Point of effluent discharge	Water Quality: Daily (OMP) Weekly (SNP and MDMER/EEM) during discharge Monthly (SNP and MDMER/EEM) during discharge Toxicity: Acute (SNP and MDMER/EEM) - Monthly during discharge Sublethal SNP and MDMER/EEM - Once per calendar quarter for the most sensitive species	Autosampler (daily/weekly) <sup>(j)</sup> Grab (monthly)	Will discontinue when new WTP operational (existing ETP will cease discharge and be decommissioned)	Water Quality: Daily: Total arsenic Weekly: GMRP Parameter List, TPH Monthly: GMRP Parameter List, fecal coliforms, cyanide, sulphide, radium-226 Toxicity: Acute (multi-concentration) - Rainbow Trout and <i>Daphnia magna</i> Chronic - <i>Pseudokirchneriella subcapitata</i> , <i>Lemna minor</i> , <i>Ceriodaphnia dubia</i> or <i>Pimephales promelas</i>
SNP 43-1A <sup>(d,e)</sup>	Future monitoring station	Phase 2, Phase 3	Outfall for the new WTP - exact location to be determined	Discharge for new WTP	Assume daily (OMP), weekly year-round (SNP, MDMER/EEM)	Autosampler (daily/weekly) <sup>(j)</sup> Grab (monthly)	Will become active with new WTP. Assume reduced radium-226 and cyanide testing will continue once confirmation period is complete <sup>(f, g)</sup>	Daily: Total arsenic (OMP) Weekly: GMRP Parameter List (SNP, MDMER/EEM), TPH (SNP) Once per calendar quarter: cyanide & radium-226 (MDMER/EEM) <sup>(h,i)</sup>
SNP 43-23	Future monitoring station	Phase 2, Phase 3	Baker Creek, Reach 1	Monitor water quality at Baker Creek upstream of input from landfill and Joe Lake watershed	Weekly during open water season	Grab	Will continue as SNP station when new WTP is operational	GMRP Parameter List
SNP 43-24	Future monitoring station	Phase 2	Raw water intake from Yellowknife Bay	Activated only if new freshwater intake is installed	TBD	Grab	Activated if new freshwater intake is installed; potential active station in 2021	GMRP Parameter List, intake water volume
SNP 43-5 <sup>(c)</sup>	Active	Phase 1, Phase 2, Phase 3	Baker Creek just prior to entering Yellowknife Bay	Station that combines water leaving Baker Creek to Yellowknife Bay including input from adjacent lake	Twice monthly during open water season	Grab	Will continue as SNP station when new WTP is operational	GMRP Parameter List
SNP 43-11 <sup>(c,d)</sup>	Active	Phase 1, Phase 2, Phase 3	Baker Creek, upstream of SNP 43-1 (instream reference area)	Provides characterization of water entering Site Required under MDMER/EEM	Monthly during open water season	Grab	Will continue as SNP station when new WTP is operational	GMRP Parameter list, TPH, Radium-226
Baker Creek Exposure Point <sup>(d)</sup>	Active	Phase 1, Phase 2	Baker Creek, downstream of Baker Pond and discharge point at junction of Reaches 5 and 6.	First receiving environment stations downstream of existing ETP discharge Required under MDMER/EEM	Monthly during discharge	Grab	Discontinue after new WTP is operational	GMRP Parameter list, TPH, Radium-226
SNP 43-12 <sup>(c)</sup>	Active	Phase 1, Phase 2, Phase 3	End of breakwater at the outlet of Baker Creek to Back Bay (sampled from the Great Slave Sailing Club)	Maintains long-term dataset, characterizes initial mixing in Yellowknife Bay (related to EA Measure 13)	Monthly during open water season	Grab	Will continue as SNP after new WTP is operational, but may be relocated to become SNP 43-25 (below)	GMRP Parameter List
SNP 43-25 <sup>(c)</sup>	Future monitoring station	Phase 2, Phase 3	New location to be determined. This is a new station that will be activated once SNP 43-12 is moved/discontinued.	Maintains long-term dataset, characterizes initial mixing in Yellowknife Bay (related to EA Measure 13)	Monthly during open water season	Grab	See SNP 43-12	GMRP Parameter List
SNP 43-16	Active	Phase 1, Phase 2, Phase 3	Trapper Creek below the Northwest Pond tailings dams (Dams 21A, B, C, and D) and above the confluence of Trapper Creek and Baker Pond/Baker Creek	To characterize runoff, lateral seepage, and upstream loadings to Baker Creek	Monthly during open water season and periods of flow	Grab	Removed from previous SNP when highway realignment occurred (letter from MVLWB on file). Reactivating as an SNP station.	GMRP Parameter List
SNP 43-17	Active	Phase 1, Phase 2	Minewater from the Supercrest area at 750L (overflow of High Test Line to Northwest Pond)	Activated as needed for supplemental pumping of underground minewater into Northwest Pond	Monthly when pumps are active	Grab	Station is activated as needed for supplemental pumping. Station will not be required after new Akaitcho submersible pumps are operational.	GMRP Parameter List
SNP 43-21	Active with existing Akaitcho pumps	Phase 1, Phase 2	Akaitcho Shaft pumping minewater from underground to Northwest Pond	Minewater pumped from underground to Northwest Pond	Weekly year-round and corresponding with SNP 43-1 during discharge	Autosampler	Station will be deactivated once new submersible pumps at Akaitcho area are operational	GMRP Parameter List, TPH, fecal coliforms
SNP 43-21A	Future monitoring station	Phase 1, Phase 2	New submersible Akaitcho pumps transferring water to Northwest Pond	Sample minewater influent at the new Akaitcho pump location	Weekly year-round and corresponding with SNP 43-1 during discharge	Autosampler	Will be activated once new Akaitcho pumps are operational. Will be deactivated once new WTP is operational, assuming pump location is relocated to C Shaft area.	Weekly: GMRP Parameter List, TPH
SNP 43-26a	Future monitoring station(s)	Phase 2, Phase 3	New sump(s) at on-site non-hazardous landfill	Monitor seepage from the on-site non-hazardous landfill	Monthly during open water season	Grab	May need more than one sump station depending on seepage flow conditions - continue numbers from SNP 43-26d onwards.	GMRP Parameter List, pump-back volume
SNP 43-26b								
SNP 43-26c								
SNP 43-27a <sup>(c)</sup>	Future monitoring station(s)	Phase 2, Phase 3	Edge of mixing zone station 1	Monitor water quality at the edge of the mixing zone and compare to water quality objectives	Water Quality: Monthly during discharge Toxicity: Under review <sup>(i)</sup>	Water Quality: Grab Toxicity: Composite <sup>(i)</sup>	n/a	Water Quality: GMRP Parameter List Toxicity: Under review <sup>(i)</sup>
SNP 43-27b <sup>(c)</sup>			Edge of mixing zone station 2					
SNP 43-27c <sup>(c)</sup>			Edge of mixing zone station 3					
SNP 43-28 Minewater at C Shaft	Future monitoring station	Phase 2, Phase 3	TBD once new pumps installed at C-Shaft area	Sample minewater influent at the new pump location at C-Shaft	Weekly year-round	Autosampler	Will be activated once new pumps installed and commissioned in C Shaft area.	GMRP Parameter List
SNP 43-29	Active	Phase 1, Phase 2	Sump for South Pond - formerly SMP-1	Assess seepage from South Pond - includes pumpback from Dam 11	Monthly during open water season	Grab	Station will be deactivated once South Pond tailings are relocated and the South Pond cover installed and runoff is directed towards the spillway.	GMRP Parameter List, pump-back volume
SNP 43-30	Active	Phase 1, Phase 2, Phase 3	Sump on north end of Northwest Pond - formerly SMP-2	Assess seepage from Northwest Pond - includes pumpback from Dam 22 and existing landfill	Monthly during open water season	Grab	n/a	GMRP Parameter List, pump-back volume
SNP 43-31	Active	Phase 1, Phase 2, Phase 3	Sump on north end of North Pond - formerly SMP-3	Assess seepage from North Pond and Dam 3 - close to Yellowknife River	Monthly during open water season	Grab	n/a	GMRP Parameter List, pump-back volume
SNP 43-32	Active	Phase 1, Phase 2, Phase 3	Sump downstream of Dam 1 and Polishing Pond - formerly SMP-4	Assess seepage from the Polishing Pond	Monthly during open water season	Grab	n/a	GMRP Parameter List, pump-back volume
SNP 43-33	Active	Phase 1, Phase 2, Phase 3	Sump south of B2 Pit near Brock Pit - formerly SMP-5	Assess surface runoff	Monthly during open water season	Grab	n/a	GMRP Parameter List, pump-back volume
SNP 43-34	Future monitoring station	Phase 2, Phase 3	Runoff from Mill Pond cover	Assess surface runoff from Mill Pond before flow to Baker Creek	Weekly during freshet	Grab	n/a	GMRP Parameter List
SNP 43-35	Future monitoring station	Phase 2, Phase 3	Runoff from B4 Pit	Assess surface runoff from B4 Pit before flow to Trapper Creek	Weekly during freshet	Grab	n/a	GMRP Parameter List
SNP 43-36	Future monitoring station	Phase 2, Phase 3	Runoff from C1 Pit	Assess surface runoff from C1 Pit before flow to Baker Creek	Weekly during freshet	Grab	n/a	GMRP Parameter List
SNP 43-37	Future monitoring station	Phase 2, Phase 3	Runoff from B1 Pit	Assess surface runoff from B1 Pit before flow to Baker Creek	Weekly during freshet	Grab	n/a	GMRP Parameter List
SNP 43-38	Future monitoring station	Phase 2, Phase 3	Runoff from A2 Pit to Baker Creek	Assess surface runoff from A2 Pit before flow to Baker Creek	Weekly during freshet	Grab	n/a	GMRP Parameter List
SNP 43-39	Future monitoring station	Phase 2, Phase 3	Runoff from covered Northwest Pond	Assess surface runoff from covered Northwest Pond before flow into Trapper Creek	Weekly during freshet	Grab	n/a	GMRP Parameter List
SNP 43-40	Future monitoring station	Phase 2, Phase 3	Runoff from covered Polishing Pond to Baker Creek	Assess surface runoff from Polishing Pond before flow to Baker Creek	Weekly during freshet	Grab	n/a	GMRP Parameter List
MW00-02	Active	Phase 1, Phase 2, Phase 3	Shallow Groundwater Well - South of Northwest Pond	Monitor groundwater quality between Northwest Pond and Trapper Creek	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
MW00-03A/B	Active	Phase 1, Phase 2, Phase 3	Shallow Groundwater Well - North of Northwest Pond	Monitor groundwater quality between Northwest Pond and Trapper Lake	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
MW01-2A/B	Active	Phase 1, Phase 2, Phase 3	Shallow Groundwater Well - Within the Foreshore Tailings	Monitor groundwater quality in Foreshore Tailings area	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
MW00-04A/B	Active	Phase 1, Phase 2, Phase 3	Shallow Groundwater Well - North Tailings release, northwest of North Pond	Monitor groundwater quality between Northwest Pond and Yellowknife River	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
S-DIAND-001	Active	Phase 1, Phase 2, Phase 3	Deep Multi-port Groundwater Well - Near Baker Creek and Y Bay zones 4, 8 & 10	Monitor and characterize bedrock groundwater quality near Baker Creek and Yellowknife Bay	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
S-DIAND-022	Active	Phase 1, Phase 2, Phase 3	Deep Multi-port Groundwater Well - East of Northwest Pond zones 2, 4 & 11	Monitor and characterize bedrock groundwater quality east of Northwest Pond	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
S-DIAND-023	Active	Phase 1, Phase 2, Phase 3	Deep Multi-port Groundwater Well - South of North Pond and north of Central Pond zones 2 & 10	Monitor and characterize bedrock groundwater quality south of North Pond and north of Central Pond	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
S-1954	Active	Phase 1, Phase 2, Phase 3	Deep Multi-port Groundwater Well - South of South Pond, near the Foreshore Tailings and towards Yellowknife Bay zones 2 & 5	Monitor and characterize bedrock groundwater quality south of South Pond, near the Foreshore Tailings and towards Yellowknife Bay	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
S-1955	Active	Phase 1, Phase 2, Phase 3	Deep Multi-port Groundwater Well - Shoreline of Yellowknife Bay zones 2 & 6	Monitor and characterize bedrock groundwater quality	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
S-1956	Active	Phase 1, Phase 2, Phase 3	Deep Multi-port Groundwater Well - East of South Pond, towards Yellowknife Bay zones 4 & 10	Monitor and characterize bedrock groundwater quality	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List

Table 1-1 Giant Mine Remediation Project - Proposed Surveillance Network Program

Station <sup>(a,b)</sup>	Status	Project Phase <sup>(f)</sup>	Location description	Rationale	Frequency	Sample Type	Assumptions	Parameters <sup>(g,h,i)</sup>
S-2224	Active	Phase 1, Phase 2, Phase 3	Deep Multi-port Groundwater Well - North of North Pond and Dam 3C zones 3 & 9	Monitor and characterize bedrock groundwater quality north of North Pond and Dam 3C, in the North tailings release area	Twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
<b>MW19-1<sup>(f)</sup></b>	Future monitoring station. Assume groundwater well installation in 2011	Phase 1, Phase 2, Phase 3	West of the Northwest Pond	Monitor lateral shallow migration toward Trapper Creek	Monthly water level for first year Chemistry twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
<b>MW19-2<sup>(f)</sup></b>	Future monitoring station. Assume groundwater well installation in 2011	Phase 1, Phase 2, Phase 3	South of the Northwest Pond	Monitor lateral shallow migration south to Trapper Creek and Baker Pond	Monthly water level for first year Chemistry twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
<b>MW19-3<sup>(f)</sup></b>	Future monitoring station. Assume groundwater well installation in 2011	Phase 1, Phase 2, Phase 3	North-northeast of Dam 3C toward Yellowknife Bay	Assess lateral groundwater flow as part of RRP	Monthly water level for first year Chemistry twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
<b>MW19-4<sup>(f)</sup></b>	Future monitoring station. Assume groundwater well installation in 2011	Phase 1, Phase 2, Phase 3	East-northeast of Dam 3D - toward Yellowknife Bay	Assess lateral groundwater flow as part of RRP	Monthly water level for first year Chemistry twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
<b>MW19-5<sup>(f)</sup></b>	Future monitoring station. Assume groundwater well installation in 2011	Phase 1, Phase 2, Phase 3	East of North Pond	Monitor groundwater migration from North Pond to Yellowknife Bay	Monthly water level for first year Chemistry twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
<b>MW19-6<sup>(f)</sup></b>	Future monitoring station. Assume groundwater well installation in 2011	Phase 1, Phase 2, Phase 3	East of Central Pond	Monitor groundwater migration from Central Pond to Yellowknife Bay	Monthly water level for first year Chemistry twice per year (spring/fall)	Grab	n/a	GMRP Parameter List
<b>New station(s) - TBD<sup>(f)</sup></b>	Future monitoring stations as required. Assume groundwater well installation in 2019	Phase 2, Phase 3	TBD in the Landfill, Calcine and Mill Pond Area	Monitor and characterize shallow groundwater quality between the Pond areas and Baker Creek and in the vicinity of the landfill	Monthly water level for first year Chemistry twice per year (spring/fall)	Grab	n/a	GMRP Parameter List

(a) Stations in bold indicate a new station that is proposed for future monitoring.

(b) Grey shading indicates existing active station that will be removed from SNP as a result of remediation activities.

(c) SNP station is also incorporated in the Aquatic Effects Monitoring Program (AEMP) for Baker Creek and/or Yellowknife Bay.

(d) Station sampled to meet MDMER/EEM requirements.

(e) Station sampled as part of the OMP.

(f) As defined in the GMRP Closure and Reclamation Plan, Phase 1 is Existing Condition, Phase 2 is Active Remediation and Adaptive Management, and Phase 3 is Post-closure Monitoring and Maintenance.

(g) Total petroleum hydrocarbon analysis includes volatile organic compounds (VOCs) (i.e., benzene, toluene, ethylbenzene, and xylene [BTEX]) and petroleum hydrocarbon (PHC) fractions F1 to F4.

(h) MDMER requires cyanide to be initially tested in the effluent for 12 consecutive months to confirm monthly mean concentrations are below 0.010 mg/L (i.e., 10% of MDMER limit); once confirmed, sampling can be reduced to once per calendar quarter. Based on effluent quality from the existing ETP it is anticipated that the WTP will operate on a reduced cyanide schedule.

(i) MDMER requires radium-226 to be initially tested in the effluent for 10 consecutive weeks to confirm concentrations are below 0.037 Bq/L; sampling can then be reduced to once per calendar quarter. Based on effluent quality from the existing ETP it is anticipated that the WTP will operate on a reduced radium-226 schedule.

(j) Both daily and weekly samples are 24-hour composites.

(k) Exact locations, frequency and test species will be determined through the detailed AEMP Design Plan for Yellowknife Bay.

(l) Depth of groundwater well(s) will be determined prior to installation (i.e., shallow or deep multi-port)

SNP = Surveillance Network Program; OMP = Operational Monitoring Program; MDMER = Metal and Diamond Mine Effluent Regulations; EEM = Environmental Effects Monitoring; WL = Type A Water Licence; ETP = effluent treatment plant (existing); WTP = water treatment plant (new); GMRP = Giant Mine Remediation Project; TPH = Total Petroleum Hydrocarbons; TBD = to be determined; n/a = not applicable; - = not available.

Table 1-2 Giant Mine Remediation Project - Proposed Surveillance Network Program Station Coordinates

Station	Latitude	Longitude	Latitude	Longitude	UTM Coordinates, Zone 11		Comments and Previous Station Names
	(degrees minutes seconds)		(decimal degrees)		Easting	Northing	
<b>Surveillance Network Program - Surface Water Stations</b>							
SNP 43-1	N62°30'38.11"	W114°21'5.34"	62.5105849	-114.3514839	636367	6933862	
<b>SNP 43-1A</b>	TBD	TBD	TBD	TBD	TBD	TBD	Future: Discharge from new WTP
SNP 43-5	N62°29'14.2"	W114°21'45.91"	62.48727646	-114.3627538	635893	6931243	
<b>SNP 43-23</b>	TBD	TBD	TBD	TBD	TBD	TBD	Baker Creek Reach 1 - upstream from input from landfill and Joe Lake watershed
<b>SNP 43-24</b>	TBD	TBD	TBD	TBD	TBD	TBD	Activate only if raw water intake from Yellowknife Bay installed.
SNP 43-11	N62°30'40.63"	W114°21'49.96"	62.51128701	-114.3638764	635726	6933914	
Baker Creek Exposure Point	N62°30'20.55"	W114°21'42.71"	62.50570738	-114.3618633	635855	6933297	
SNP 43-12	N62°31'9.72"	W114°21'54.52"	62.5193673	-114.3651447	635624	6934811	End of breakwater at the outlet of Baker Creek to Back Bay (sampled from the Great Slave Sailing Club) - may be relocated with WTP to become SNP 43-25
<b>SNP 43-25</b>	TBD	TBD	TBD	TBD	TBD	TBD	Establish after SNP 43-12 is moved/discontinued - see above
SNP 43-16	N62°30'40.17"	W114°21'30.83"	62.51115943	-114.3585638	636000	6933911	
SNP 43-17	N62°31'10.13"	W114°20'57.67"	62.51948089	-114.3493528	636436	6934857	Samples in 2018 collected at end-of-pipe - spigot not working in shack.
SNP 43-21	N62°31'28.12"	W114°20'53.34"	62.52447863	-114.3481504	636475	6935416	
SNP 43-21A							New Akaitcho pumps
<b>SNP 43-26a</b>	TBD	TBD	TBD	TBD	TBD	TBD	New stations at sumps to monitor seepage from on-site landfill
<b>SNP 43-26b</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-26c</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-27a</b>	TBD	TBD	TBD	TBD	TBD	TBD	Monitor water quality at the edge of the mixing zone and compare to water quality objectives
<b>SNP 43-27b</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-27c</b>	TBD	TBD	TBD	TBD	TBD	TBD	
SNP 43-28	TBD	TBD	TBD	TBD	TBD	TBD	Minewater at C Shaft
SNP 43-29	N62°29'56.65"	W114°20'54.97"	62.49906973	-114.3486018	636568	6932586	SMP-1
SNP 43-30	N62°31'33.52"	W114°21'10.43"	62.52597895	-114.3528964	636224	6935573	SMP-2
SNP 43-31	N62°30'48.98"	W114°20'6.66"	62.51360614	-114.3351842	637192	6934233	SMP-3
<b>SNP 43-32</b>	N62°30'38.08"	W114°21'7.23"	62.51057692	-114.3520092	636340	6933860	SMP-4
<b>SNP 43-33</b>	N62°29'58.77"	W114°22'2.39"	62.49965861	-114.3673313	635601	6932612	SMP-5
<b>Surveillance Network Program - Surface Runoff Stations:</b>							
<b>SNP 43-34</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-35</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-36</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-37</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-38</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-39</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>SNP 43-40</b>	TBD	TBD	TBD	TBD	TBD	TBD	
<b>Shallow Groundwater Wells</b>							
MW00-02	N62°30'53.720"	W114°21'31.809"	62.514922	-114.358836	635969	6934326	
MW00-03A/B	N62°31'32.417"	W114°21'19.563"	62.525671	-114.355434	636095	6935530	
MW00-04A/B	N62°30'48.518"	W114°19'58.460"	62.513477	-114.332906	637310	6934220	
MW01-2A/B/C	N62°29'47.465"	W114°20'48.940"	62.496518	-114.346928	636666	6932302	
New location(s) to replace lost wells due to infill of Mill pond	TBD	TBD	TBD	TBD	TBD	TBD	
<b>Deep Multi-Port Groundwater Wells</b>							
S-DIAND-001	N62°29'15.682"	W114°21'50.405"	62.487689	-114.364001	635827	6931283	
S-DIAND-022	N62°31'18.230"	W114°20'18.684"	62.521731	-114.338523	636983	6935127	
S-DIAND-023	N62°30'24.457"	W114°20'21.942"	62.506794	-114.339428	637005	6933462	
S-1954	N62°29'51.517"	W114°20'39.281"	62.497643	-114.344245	636799	6932433	
S-1955	N62°29'41.910"	W114°21'2.927"	62.494975	-114.350813	636473	6932122	
S-1956	N62°30'3.030"	W114°20'34.341"	62.500842	-114.342873	636855	6932792	
S-2224	N62°30'50.838"	W114°20'11.614"	62.514122	-114.33656	637119	6934284	
<b>Permanent Wells</b>							
MW19-1	TBD	TBD	TBD	TBD	TBD	TBD	
MW19-2	TBD	TBD	TBD	TBD	TBD	TBD	
MW19-3	TBD	TBD	TBD	TBD	TBD	TBD	
MW19-4	TBD	TBD	TBD	TBD	TBD	TBD	
MW19-5	TBD	TBD	TBD	TBD	TBD	TBD	
MW19-6	TBD	TBD	TBD	TBD	TBD	TBD	
New station(s) TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD in landfill, Calcine and Mill Pond areas

Notes:  
TBD = To Be Determined.

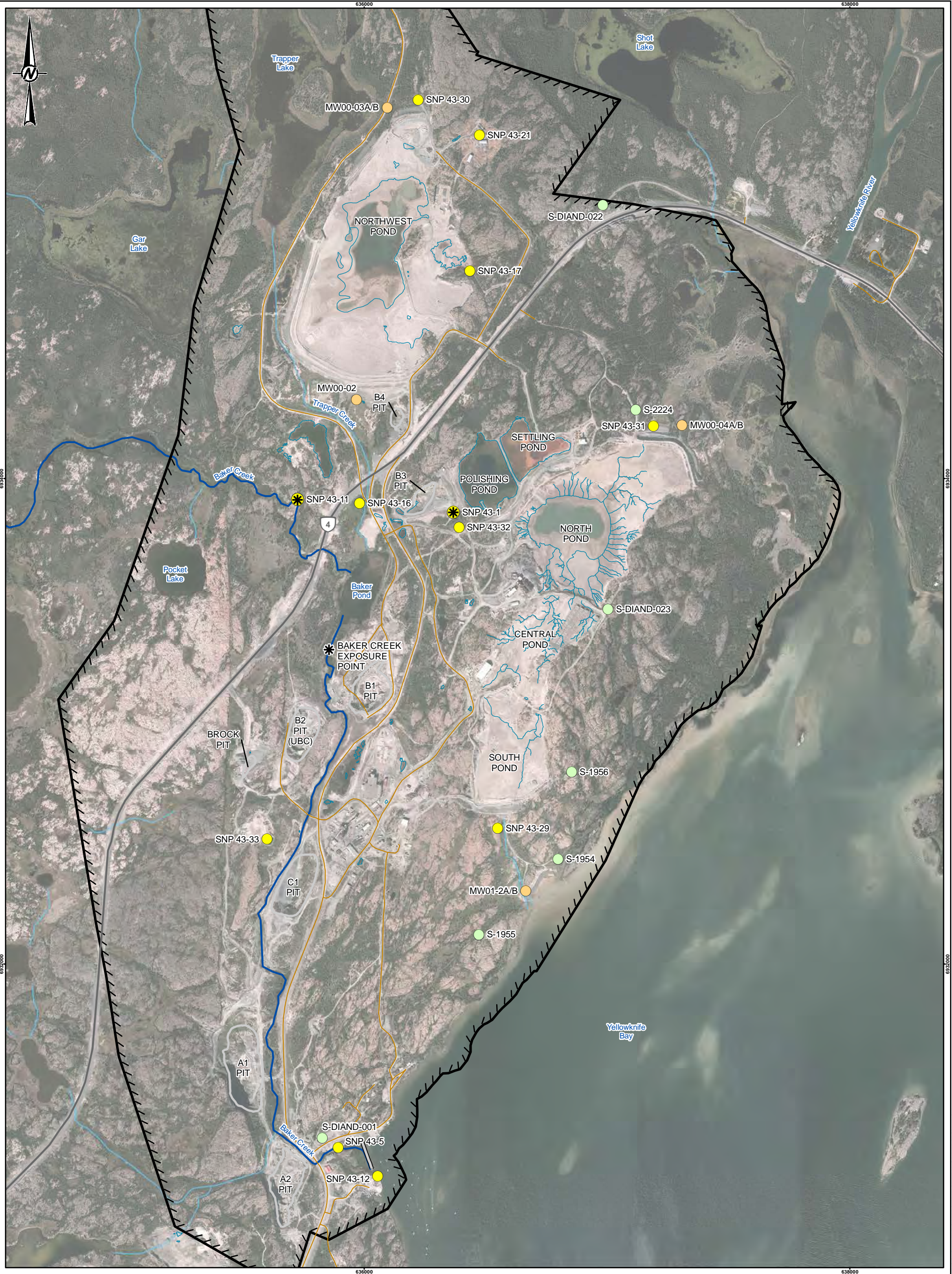
**Table 1-3: Giant Mine Remediation Project - Proposed Water Quality Parameter List**

<b>Field Parameters</b>
Temperature
Dissolved oxygen
pH
Turbidity
Specific conductivity
<b>Conventional (Routine) Parameters</b>
pH
Specific conductivity
Hardness (as CaCO <sub>3</sub> )
Total alkalinity (as CaCO <sub>3</sub> )
Total dissolved solids
Total suspended solids
Total organic carbon
Dissolved organic carbon
Turbidity
<b>Major Ions</b>
Bicarbonate (as CaCO <sub>3</sub> )
Calcium
Carbonate (as CaCO <sub>3</sub> )
Chloride
Fluoride
Magnesium
Potassium
Sodium
Sulphate
Reactive silica
<b>Nutrients</b>
Nitrate
Nitrite
Total ammonia
Total phosphorus
<b>Total and Dissolved Metals and Metalloids</b>
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Cesium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Manganese
Mercury
Molybdenum
Nickel
Rubidium
Selenium
Silver
Strontium
Sulphur
Thallium
Tin
Titanium
Uranium
Vanadium
Zinc
Zirconium
<b>Program-Specific Parameters</b>
Total cyanide(a)
Sulphide(b)
Total petroleum hydrocarbons(c,d)
Radium-226(e)
Fecal coliforms(f)
Dissolved phosphorus(g)

**Notes:**

- (a) Sampled monthly/quarterly for the MDMER/EEM program at SNP 43-1/SNP 43-1A.
  - (b) Sampled monthly for the MDMER/EEM program at SNP 43-1.
  - (c) Total petroleum hydrocarbon analysis includes volatile organic compounds (VOCs); i.e., benzene, toluene, ethylbenzene and xylene (BTEX) and petroleum hydrocarbons (PHC) fractions F1 to F4.
  - (d) Sampled weekly at SNP 43-1/SNP 43-1A, SNP 43-21/SNP 43-21A; monthly at Baker Creek Exposure Point and
  - (e) Sampled monthly/quarterly at SNP 43-1/SNP 43-1A; monthly at Baker Creek Exposure Point and SNP 43-11.
  - (f) Sampled monthly at SNP 43-1 and weekly at SNP 43-21; may be removed from program once sewage disposal options are refined.
  - (g) Sampled at all stations up to 2018; analytical methods and RDLs are under development and dissolved phosphorus may be removed from the parameter list in the future.
- MDMER/EEM = Metal and Diamond Mining Effluent Regulations/Environmental Effects Monitoring; SNP = Surveillance Network Program; RDL = reported detection limit.





- LEGEND**
- DEEP MULTI-PORT GROUNDWATER WELL
  - ✱ METAL AND DIAMOND MINING EFFLUENT REGULATIONS (MDMER)
  - SHALLOW GROUNDWATER WELL
  - SNP SURFACE STATION
  - BAKER CREEK
  - BREAKWATER
  - THE GIANT MINE SITE BOUNDARY
  - HIGHWAY
  - ROAD
  - INDUSTRIAL WATER
  - WATERCOURSE
  - PIT BOUNDARY



**REFERENCE(S)**  
 HYDROLOGY AND TRANSPORTATION DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA.  
 DATUM: NAD 83 PROJECTION: UTM ZONE 11

PROPOSER

Crown-Indigenous Relations and Northern Affairs Canada	Relations Couronne-Autochtones et Affaires du Nord Canada
YYYY-MM-DD	2019-02-13
DESIGNED	DP
PREPARED	AA
REVIEWED	ANDREA MARKEY
APPROVED	KATHERINE HARRIS

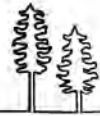
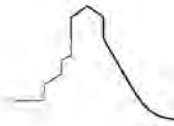
PROJECT

Giant Mine Remediation Project

**TITLE**  
**PROPOSED SURVEILLANCE NETWORK PROGRAM LOCATIONS AT THE GIANT MINE SITE**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A4S B





## 2 REFERENCES

CIRNAC (Crown-Indigenous Relations and Northern Affairs Canada). 2019a. Standard Operating Procedures for Water and Effluent Sampling. Submitted to the Mackenzie Valley Land and Water Board. Yellowknife NT Canada.

CIRNAC 2019b. Water Management and Monitoring Plan. Submitted to the Mackenzie Valley Land and Water Board. Yellowknife NT Canada.

Government of Canada 2012. Metal Mining Effluent Regulations. Canada Gazette Part II, Vol. 136, No.13. Registration SOR/2002-222.