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ATTENTION: Mr. Cory MacPhee

Phase I Environmental Site Assessment Field Program Memo
Former Mill Village Mine Site, Charleston, Nova Scotia
Property Identification Designation Number (PID No.): 70169214

Introduction

The following document has been prepared to summarize the findings of the Phase I Environmental Site Assessment (ESA) completed at the Former Mill Village Mine Site in Charleston, Nova Scotia (herein referred to as the "subject property" or the "site"), and to identify the specific field activities that will be pursued to facilitate the Phase II ESA. Based on the results of the Phase I ESA, we propose the collection of soil and groundwater samples focused in areas where mining and milling operations occurred at ground surface. Dillon has proposed analysis of metals (including mercury and sulphur), general chemistry parameters, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs), Total Sulphides, and energetics (residual products of explosives). One area of Potential Environmental Concern (APEC) was identified, proposed sample locations are present on Figure 1 (attached).

Site Information

The former Mill Village Mine Site is located in Charleston, Queens County, Nova Scotia. For assessment purposes, the site is considered industrial land use, as there are active mineral claims on the PID and the site is generally not accessed by the public. The site can be accessed using Zwicker Road off Medway River Road. No perennial surface water bodies were noted within the assessment area. Gold mineralization was found in the Mill Village Gold district in the 1860s and prospecting was conducted over the area, identifying several deposits. The Thompson Vein was discovered on the subject property (and adjacent third-party property), and two shafts were reported to have been sunk to target the gold mineralization. A stamp mill was built for ore processing on the adjacent third-party property and is believed to have burnt down in the early 1900s. Additional mine shafts were constructed in the 1940s, and mining operations ceased in the early 1950s. Various companies conducted exploration programs on the subject property in attempts to identify gold mineralization through the 1980s and into the 2010s. However, no further gold

exploration activities were recorded beyond the early 2010s. Mercury amalgam is believed to have been used to process the ore, however, based on available information this ore processing may have taken place at the near-by Gold Eagle Mine, and not within the study area or subject property boundaries. One APEC was identified onsite and is centered around the area previously identified as a tailings pile. Field observations indicate that this pile is more consistent with a waste rock pile, as the material is cobble to boulder sized slate rock. Based on document review, it appears the site buildings and ore processing areas surrounded this waste rock pile both on the subject property and on the adjacent third-party property. Surrounding land uses are primarily resource forest and provincial forest. The site is not serviced by municipal water and sewer. The topographic gradient suggests that the regional groundwater flow direction is likely North/Northeast toward Tumblin' Down Brook.

Phase 1 ESA Summary

The Phase I ESA was completed based on a review of the available records, photographs/images, and documents associated with the site (current and historical). Dillon identified one APEC as well as corresponding contaminants of potential concern (COPCs) related to the historical mining operations that will require assessment. These COPCs include, but are not limited to the following:

- Metals (specifically arsenic, barium, lead, mercury, sulphur, and strontium);
- General Chemistry;
- PHCs (i.e., benzene, toluene, ethylbenzene, and xylenes (BTEX), and modified total petroleum hydrocarbons (mTPH));
- PAHs;
- Total Sulphides and
- Energetics (i.e., residual products of explosives including nitrotoluenes, glycerines, perchlorates, and bromate).

It is noted that one waste rock pile, which was made up of slate rock that is potentially sulphide bearing and acid producing, was identified on site. Based on the age of the historical mining operations at the site (1860s to 1950s), the potential for acid rock drainage (ARD) COPCs from waste rock piles to be present at the site is considered to be low. Weathering of sulphide bearing materials occurs rapidly during the first few years of exposure, however, after this initial rapid oxidation, reaction rates decline over the decades asymptotically. However, visual signs of iron oxidation were observed on the surface of the rock pile during the Phase I ESA site visit. Dillon has included one sample from within the rock pile to be tested for ARD COPCs (Total sulphides, and, if warranted, acid-base accounting (ABA)), and, if drilling conditions

permit, will collect additional soil sample volumes from the drilled boreholes to be held for ABA. Sulphide concentrations in the drilled boreholes and rock sample will be reviewed and if significant (i.e., more than 0.4% sulphide by weight) sulphide is found to be present in a sample, further testing through ABA may be recommended.

Historical documents for the site identify the presence of an explosives storage building, but do not specify where it was located. One soil sample will be collected from the APEC and analyzed for energetics (i.e., residual products of explosives including nitrotoluenes, glycerines, perchlorates, and bromate) to confirm presence/absence of energetics.

Field Program

The proposed field program is based on limited visual observations made during the site visit, a review of available historical records, and available information filed with government or other regulatory agencies. Visual observations during the site visit were limited to areas that could be safely accessed. No perennial surface water bodies were observed during the Phase I ESA site visit and, as such, no surface water or sediment sampling has been included in the field program, as described below.

The identified APEC, and corresponding COPCs, are illustrated on the attached figure and identified in Table 1, below. The proposed locations of the monitoring wells, hand auger, surficial soil and background sampling locations are also presented on the attached figure. Rationale behind the selection of each sampling point is presented in Table 2.

Table 1: Summary of Identified Relevant APECs and COPCs

APEC No.	APEC	COPCs	Media of Concern	Comments
1	Waste Rock/Tailings Area	Metals, General Chemistry*, Sulphur, energetics	Soil, GW	One (1) waste rock/tailings area with potentially sulphide bearing materials. The stamp milling area and potential explosive storage area are considered part of this APEC as they appear to have been located in the same general area as the waste rock pile, or on the adjacent third-party property (which is not being assessed under this scope).

APEC No.	APEC	COPCs	Media of Concern	Comments
Assessment of Naturally Occurring Background Conditions				
Background Locations		Metals, General Chemistry*, Sulphur, PHCs, PAHs	Soil, GW	Based on available topographic data and inferred groundwater flow direction, background conditions will be assessed at an upgradient location, as demonstrated on Figure 1.

Notes:

- *General chemistry analysis is only completed on water.
- GW denotes groundwater.
- PHCs denotes petroleum hydrocarbons (i.e., BTEX, modified TPH), PAHs denotes polycyclic aromatic hydrocarbons.
- Metals analysis for all media to include analysis of mercury and Sulphur.
- Metals analysis to entail dissolved metals for groundwater.
- Inferred groundwater flow direction in the area is to the North/Northeast toward Tumblin' Down Brook.

To effectively assess the site and characterize soil and groundwater conditions across the site, Dillon is proposing a network of three (3) groundwater monitoring wells, one (1) of which would be utilized as a background location while the remaining two (2) would be completed to assess shallow groundwater conditions (assuming approximately 6 metres (m) depth) in the area of the tailings/waste rock pile (and located slightly down gradient). The background monitoring well will be completed upgradient of the assessment area to establish background conditions of inorganic parameters that may have naturally elevated concentrations (e.g., metals), and thus, could be used to compare to onsite concentrations in accordance with the Nova Scotia Contaminated Sites Regulations (NS CSRs) and associated Ministerial Protocols.

Continuous split spoon soil sampling will be performed while drilling each well, and soil samples will be collected and held; one sample from each borehole will be submitted for analysis initially, and additional samples may be recommended if contamination is found. One (1) waste rock sample and three (3) soil samples will be collected from within the waste rock pile, if possible. Four hand auger holes will be advanced around the perimeter of the waste rock/tailings area, with one sample from each being held for analysis, and one being submitted as part of the initial assessment. Hand auguring presents a cost-effective approach to supplement the soil data collected during the drilling program while increasing the area assessed in an expeditious manner. We are proposing to complete 6 hand auger locations (denoted by HA in Table 2), including two background locations. Additionally, nine surficial "step out" samples will be collected at a greater distance from the waste rock pile

than the hand auger samples. Additional samples will not be analyzed but kept in archive in the event that contaminants of concern (CoCs) are found above the environmental quality standards in the initial samples and require further delineation or characterization to satisfy provincial protocols and be useful when evaluating a potential risk-managed solution; adopting this approach will minimize the need to return to the site to do further characterization and thus positively affect the schedule and budget. The costs associated with having these samples analysed will be communicated to BNS in advance of sample submission.

The background soil samples will be collected from outside the assessment area and will serve to establish background conditions of organic and inorganic parameters that may have naturally elevated concentrations (e.g., metals, PAHs) and, thus, could be used to compare to onsite concentrations in accordance with the Nova Scotia Contaminated Sites Regulations (NS CSRs) and associated Ministerial Protocols.

Rationale behind the selection of each sampling points is presented in Table 2, below.

Table 2: Rationale of Selected Sampling Locations

Sampling Point	Rationale	COPCs	Media
MW1	Background Location: To quantify naturally occurring levels of pertinent parameters	Metals, General Chemistry*, PAHs	Soil, GW
MW2 & MW3	Assessing soil and groundwater conditions near the APEC (Tailing/Waste rock pile)	Metals, General Chemistry*, PHCs, PAHs	Soil, GW
HA1 to HA2	Background Locations: To quantify naturally occurring levels of pertinent parameters in surficial soil	Metals, PAHs	Soil
SS1 to SS3	Assessing soil conditions within the waste rock pile	Metals, PHCs, PAHs, Energetics	Soil
HA3 to H6	Assessing surficial soil immediately adjacent to the waste rock pile and within the APEC	Metals, PHCs, PAHs	Soil
SS4 to SS15	Assessing surficial soil conditions near the waste rockpile and APEC	Metals	Soil
Rock	Assessing acid producing potential of waste rock	Total Sulphides, Acid Base Accounting	Soil

Notes:

- *General chemistry analysis is completed only on water.
- **Denotes upstream location within assessment boundary that is safely accessible.
- GW denotes groundwater, SED denotes sediment, SW denotes surface water.
- PHCs denotes petroleum hydrocarbons (i.e., BTEX, modified TPH), PAHs denotes polycyclic aromatic hydrocarbons.

- Metals analysis in all media to include analysis of mercury and sulphur.
- Metals analysis of GW to entail dissolved metals.
- Energetics denotes residual products of explosives including nitrotoluenes, glycerines, perchlorates, and bromate.
- Inferred groundwater flow direction in the area is to the North/Northeast toward Tumblin' Down Brook.

The number of analytical samples, including Quality Assurance/Quality Control (QA/QC) samples, included with the proposed field program are presented in Table 3. It is noted that additional samples may be recommended for analysis from the step-out locations based on field screening and/or analytical results.

Table 3: Number of Analytical Samples

Media	Metals		General Chemistry *		PHCs		PAHs		Energetics	
	Reg	QA/QC	Reg	QA/QC	Reg	QA/QC	Reg	QA/QC	Reg	QA/QC
Soil	10	1	N/A	N/A	3	1	5	1	3	0
GW	3	1	3	1	2	1	3	1	0	0
Rock	One (1) sample will be collected of the waste rock and submitted for the analysis of Total Sulphides and, if warranted, acid-base accounting									

Notes:

- *General chemistry analysis is only completed on water.
- GW denotes groundwater.
- QA/QC denotes quality assurance/quality control sample (i.e., blind field duplicate(s)).
- N/A denotes Not applicable.
- PHCs denotes petroleum hydrocarbons (i.e., BTEX, modified TPH), PAHs denotes polycyclic aromatic hydrocarbons.
- Metals analysis in all media to include analysis of mercury and sulphur.
- Metals analysis of GW to entail dissolved metals.
- Energetics denotes residual products of explosives including nitrotoluenes, glycerines, perchlorates, and bromate.
- Inferred groundwater flow direction in the area is to the North/Northeast toward Tumblin' Down Brook.

In addition to field duplicates, the field QA/QC program will include the collection of one (1) trip blank sample and one (1) equipment blank sample. Analysis of the trip blank sample will be limited to PHCs only. Analytical samples will be submitted to ALS laboratories (ALS) in Dartmouth, NS, for analysis. ALS is accredited by the Standards Council of Canada (SCC) for the analytical methods to be employed. Sampling storage, transportation, and chain of custody protocols will be in adherence with those of ALS and standard industry best practices.

Methodology

Utility Locates

Prior to any ground-intrusive activities, Dillon will arrange and document completion of public and, if appropriate, private utility locates at the subject property. If private locates are deemed appropriate, this will be at additional cost.

Tree Clearing

Based on field observations during the Phase I ESA site visit, tree clearing of select areas is required. Clearing along the access road off Zwicker Road will be required in order to widen the road to approximately 10ft to permit vehicle/drill rig access. Additionally, tree clearing will be required within the assessment area in order for drilling equipment to access the proposed monitoring well locations. It is assumed that DNRR will be responsible for tree clearing, however, it can be added to Dillon's scope at additional cost, if needed. With BNS' approval, Dillon will work with BNS and DNRR to complete species at risk surveys as well as any other requirements deemed appropriate in order to obtain a letter of authority granting permission to conduct the tree clearing and intrusive sampling work.

Drilling/Monitoring Well Installation Program

Dillon will conduct soil sampling and monitoring well installations at the proposed locations to assess potential soil and groundwater contamination associated with the APEC. Dillon proposes to use a track mounted geotechnical rig to complete the drilling program as they can typically access more rugged terrain, like that present at the site. Based on the geological information available from the NSDNR Geoscience Atlas, it is assumed that the monitoring wells will be able to be installed within overburden materials, and that the shallow monitoring wells would be installed to approximately 6 m depth. With respect to potential soil delineation requirements, it was assumed that bedrock would be encountered marginally deeper than 8 m based on the available geological information. Further, it is assumed that the drilling program can be completed using standard augers and split-spoon samplers. Should a rock-coring drilling method be required, additional costs may be incurred. It is assumed that any drill cuttings or return water encountered during the drilling program will be suitable to remain onsite following the field program.

A continuous geological/hydrogeological log will be recorded during the advancement of each monitoring well. These logs will include a description of the stratigraphy encountered. The presence/absence of evidence of potential contamination (i.e., visual staining and olfactory indications) will be documented as well. Field screening

will also be completed with the collection of Volatile Organic Compound (VOC) headspace measurements where PHC impacts are suspected based on the summary of Phase I ESA findings (i.e., in the drilled boreholes adjacent to the waste rock pile). Samples collected for analysis of PHCs will be collected using Terra Core™ samplers and placed directly into laboratory supplied containers preserved with methanol. Samples collected for other analyses will be collected as a grab sample and placed directly into laboratory supplied containers. Standard industry practices regarding sample preservation and storage, and the cleaning of sampling apparatus will be followed.

Monitoring wells will be installed using 50 mm diameter solid riser and PVC screen (0.025 cm slot). The wells will be installed per industry standard, with a sufficient length and position of well screen (to be determined based on observed conditions and depth to groundwater), and silica sand filter pack installed within the annular space surrounding the well screen. To reduce the potential for surficial water to enter the well, a bentonite plug will be situated within the annular space of the borehole above the screened section. Each monitoring well will be sealed with a J-plug and completed above surface with above-grade steel casing protection with varmint proof well covers.

If field observations made during the field program warrant alterations to the program, Dillon will communicate the observations and discuss changes to the program with BNS before proceeding with any additional work outside of the proposed scope.

Groundwater Development and Sampling Program

Following the drilling program, monitoring wells will be developed in accordance with standard industry practices. In order to reduce the potential of cross contamination between wells, wells will be outfitted with dedicated tubing and foot valves to facilitate development. Wells will be left undisturbed for a period of at least 24 hours between the initial well development and purging in preparation for sampling to allow the wells to recover. It has been assumed that field conditions will allow sufficient groundwater recharge to develop monitoring wells on the same day as installation.

Groundwater monitoring activities will be completed in accordance with Dillon Standard Environmental Field Procedures that meet industry accepted practices. One groundwater sampling event will be conducted following well development at the site. Groundwater monitoring wells will be sampled using the low-flow methodology. Low-flow sampling reduces the potential for the introduction of sediments into water samples. Non-dedicated equipment (i.e., water level meter or oil-water interface

probe) will be decontaminated between each location using a phosphate free detergent. For purging and sampling using low flow techniques, each well will be equipped with new silicone tubing and low density polyethylene (LDPE) tubing and treated as single use. Low-flow sampling will include the use of a peristaltic pump and flow-through cell to measure water quality field parameters (i.e., temperature, pH, and dissolved oxygen). Upon stabilization of those field parameters, and water level, analytical samples will be collected in clean, laboratory supplied, sampling containers, depending upon relevant COPCs. The samples will then be placed in coolers with ice to keep them cool upon delivery to the laboratory.

In the event a groundwater well cannot be sampled using low-flow methodology, a sample will be collected using a bailer or Waterra tubing and foot valve.

In order to supplement the development of a conceptual site model (CSM) for the site, Dillon staff will also complete single-well response tests in each monitoring well as a means to estimate hydraulic conductivity values for the underlying aquifer. Hydraulic conductivity is measure of the degree of which a fluid (i.e., groundwater) flows through the pore space of voids or factures in soil and rock. An understanding of this data would help to understand potential contamination migration and would be used to assess the variance of hydrogeological conditions at the site between potential waste soil/rock areas and native geology in the area. It is assumed that hydraulic conductivity testing will be able to be completed in conjunction with well development activities.

Hand Auger Borehole Program

Dillon will conduct additional soil sampling by way of a hand auger sampling program. Boreholes will be completed using a hand auger to a maximum depth of 1 m. Representative samples will be collected at surface and at the final borehole depth; however, only the surficial sample will be submitted for analysis from each borehole. Additional samples collected could be submitted to the laboratory following identification of any contamination in the surficial samples.

A continuous geological/hydrogeological log will be recorded during the advancement of each borehole and will describe the stratigraphy encountered. The presence/ absence of evidence of potential contamination (i.e., visual staining and olfactory indications) will be documented as well. Field screening will be completed with the collection of VOC headspace measurements where PHC impacts are suspected based on the summary of Phase I ESA findings (i.e., within the waste rock pile and immediately adjacent to it). Samples collected for analysis of PHCs will be collected using Terra Core™ samplers and placed directly into laboratory supplied containers preserved with methanol. Samples collected for other analyses will be collected as a

grab sample and placed directly into laboratory supplied containers. Standard industry practices regarding sample preservation and storage, and the cleaning of sampling apparatus will be followed.

GPS Survey

During the field program, Dillon will record lateral and vertical GPS coordinates/ elevations from the sampling locations. This information is required to assess groundwater elevations and groundwater flow directions across the site. It is assumed that the GPS survey can be completed by Dillon using a Trimble GPS unit with sub-metre accuracy (i.e., no subcontractor costs will be incurred).

Quality Assurance/Quality Control

A Quality Assurance/Quality Control (QA/QC) program will be developed and implemented for the field program to demonstrate that the data collected is of suitable quality to characterize the site conditions to the appropriate remedial criteria. Dillon will establish criteria to demonstrate that the data will have an acceptable level of precision, accuracy, representativeness, comparability, and completeness. A typical QA/QC program would entail the following components:

- Collection of field duplicate samples (approximately 10% per COPC grouping in each media);
- Collection of a trip blank sample and an equipment blank sample (GW only);
- Standard field and laboratory procedures following industry standards;
- Calculation and comparison of relative percent differences (RPDs) between parent and field duplicate samples;
- Analysis of laboratory surrogate recoveries and spike samples; and
- Documentation of representativeness and completeness of the analytical program.

Upon confirmation of quality of the analytical data collected, in order to assess for potential unacceptable levels of risk to onsite present/future human health receptors and offsite ecological receptors, Dillon will compare the data to the NS Tier 1 Environmental Quality Standards (EQS). Where relevant COPCs are observed in the samples, and the NS Tier 1 EQS do not present a guideline value, other criteria (i.e., Atlantic RBCA Risk-Based Screening Levels, Canadian Council of Ministers of the Environment (CCME), Canada-wide Standards (CWS), and Guidelines for Canadian Drinking Water Quality (GCDWQ)) may be referred to in order to present a guideline for comparison.

Data Assessment

Dillon will use the data management software ESdat™ for the management of field and laboratory data for this project. Across Canada, laboratories provide Dillon with a standard electronic data deliverable containing analytical results that are easily uploaded into ESdat™, reducing the probability of transcription errors and increasing the speed of reporting, which is a key consideration for a site with as many individual monitoring points as proposed for this site. ESdat also allows for uploading of water levels and field parameters, which automatically uploads this field data to our database, increasing the speed of reporting. By using ESdat™, the field results and analytical results are connected together and can be tailored to client specific outputs such as exceedance tables, graphs, borehole logs, and maps. This approach will provide enhanced accuracy and speed for the management and reporting of the analytical data.

Next Steps

Findings from the field program will be incorporated into a Phase II ESA report. If contamination is identified, Dillon will identify the subsequent path to closure based on the outcome of the proposed Phase II ESA activities in accordance with the NS CSRs and associated Ministerial Protocols including, as necessary, additional assessment, risk assessment, remedial option analysis, remedial action plan, remediation, confirmation of remediation, and/or completion of the record of site condition.

Through the use of bi-weekly progress reporting and field updates (via email), Dillon will keep BNS informed throughout the field program so that relevant information can be incorporated into the closure planning process.

Should contamination be encountered above the applicable NS Tier 1 EQS, then as per the NS CSRs, completion and submission to NSE of a Notification of Contamination (FRM-100) shall be required for the subject property within 90 days of the identification of the contamination. Upon submission of FRM-100, additional reporting and assessment work would be required, and would be submitted under mandated timeframes. Additional reporting requirements, and their associated checklists, would include:

- Notification of Contamination (FRM-100); and
- Phase 2 ESA – CHK-400 (including collection and reporting of the necessary data required to meet the requirements of CHK-400).

Once the remedy has been implemented, the following checklists (and the required work associated with each) will need to be completed as part of that future project scope:

- Remedial Action Plan – CHK-600;
- Confirmation of Remediation – CHK-700; and
- Record of Site Condition – FRM-700.

Closing

We trust this is sufficient for your purposes at this time. However, if you have any questions or concerns, please contact the undersigned at your convenience.

Yours truly,

DILLON CONSULTING LIMITED

Asia Reid, B.Sc.
Project Manager

AVR:lmk
Attachment:
Figure 1: Proposed Sampling Locations

Our File: 23-6446

BUILD NOVA SCOTIA
FORMER MILL VILLAGE MINE SITE
PHASE I & II ESA

PROPOSED SAMPLE PLAN
FIGURE 1

Build NOVA SCOTIA

Background Sample
Hand Auger Sample
Soil/Tailings Sample
Step-out Surficial Soil Sample
Rock Sample
Proposed MW Location
Contours_5m
Proposed Access Road
Mine Openings Buffer (10m)
Mine Opening
AccessRoute
Assessment Area
Subject Parcel
Tailings Area

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY GeoNova, NSDNRR

MAP CREATED BY: SCM
MAP CHECKED BY: AVR
MAP PROJECTION: NAD 1983 UTM Zone 20N

0 12.5 25 50 Meters

SCALE 11,226

N W E S

PROJECT: 23-6446

Date: 2023-08-10

Document Path: \\dillon.ca\DILLON_DFS_projects\GIS\2023\236446\product\Client\SamplePlan\F1_MillVillageSamplePlan.mxd