AECOM

Vivian Sand Extraction Project

Waste Characterization and Management Plan

Sio Silica

Project number: 60640258

February 6, 2023

DRAFT

Delivering a better world

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time..

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

AECOM agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but AECOM makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by AECOM represent AECOM's professional judgement in light of its experience and the knowledge and inFormation available to it at the time of preparation. Since AECOM has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, AECOM, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by AECOM and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

AECOM accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information ("improper use of the Report"), except to the extent those parties have obtained the prior written consent of AECOM to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2015-04-13

Quality information

Prepared by	Prepared by	Verified by	Approved by
Kun Jia, M.Sc., P.Geo. Hydrogeologist/Geochemist	Cheibany Ould Elemine, PhD., P.Geo. Senior Geochemist	Ryan Mills, M.Sc., P.Geo. Senior Hydrogeologist	Ryan Mills, M.Sc., P.Geo., Senior Hydrogeologist

Revision History

Revision	Revision date	Details	Authorized	Name	Position
0	February 1, 2023	Draft for Internal Review	RM	Ryan Mills	Senior Hydrogeologist
1	February 6, 2023	Draft for Review	RM	Ryan Mills	Senior Hydrogeologist

Distribution List

# Hard Copies	PDF Required	Association / Company Name
0	1	Sio Silica
0	1	AECOM

Prepared for:

Sio Silica Corporation
Suite 1930, 440- 2nd Ave SW
Calgary, AB, T2P 5E9
Canada

Prepared by:

AECOM Canada Ltd.
99 Commerce Drive
Winnipeg, MB R3P 0Y7
Canada

T: 204.477.5381
F: 431.800.1210
aecom.com

Table of Contents

Figures

Tables

1. Introduction

1.1 Initiation

AECOM Canada Ltd. (AECOM) was retained by Sio Silica Corporation. (Sio Silica) to develop a Waste Characterization and Management Plan for use during the operation of the Vivian Sand Project located near Vivian, Manitoba. The project involves extraction of silica sand from the Carman Sand Member of the Winnipeg Formation using a series of boreholes (extraction wells) over a period of five years. The Waste Characterization and Management Plan was a recommendation of the Hydrogeology and Geochemistry Assessment (AECOM 2021) and is required to meet regulatory requirements and protect groundwater quantity and groundwater quality.

1.2 Objectives

The objectives of this Waste Characterization and Management Plan (the Plan) are to:

- Describe protocols for sampling and characterizing waste materials to determine or confirm their potential for acid rock drainage and metal leaching (ARD/ML) prior to and during operations.
- Define appropriate end uses for each waste rock type based on its ARD/ML potential.
- Describe measures that can be implemented to mitigate ARD/ML and its impact on the receiving environment by following industry standards protocols and best practice.
- Describe protocols for managing and monitoring waste stockpiles, surface water and groundwater to assess the performance of mitigation measures against design goals.

This Plan is a living document and will be updated regularly as new geochemical data becomes available or the mine plan is updated.

1.2 Background

Sio Silica intends to develop and operate an in-situ sand extraction operation in southeastern Manitoba, and approximately 35 km east of Winnipeg. It will involve extraction of sand resources of the Carman Sand Member of the Winnipeg Formation for commercial and industrial use.

Silica sand outcrops along some shorelines in the southern basin of Lake Winnipeg and along the northern edge of the Williston Basin, between Athapapuskow and Wekusko lakes. The Winnipeg Formation occurs mostly continuously across the Williston Basin at variable depths and thicknesses. Historically, economic deposits of the silica sand of the Winnipeg Formation have been quarried from Black Island area on Lake Winnipeg. The Sio silica projects target the Carman Sand Member of the Winnipeg Formation near Steinbach, located southeast of Winnipeg. The Carman Sand Member is a Crown mineral and is under the purview of the *Mines and Minerals Act*.

Sio Silica has developed a proprietary method for sand extraction using airlift pumping methods which use a series of vertical production boreholes. The method utilizes vertical boreholes advanced through the overburden, Red River Carbonate and Winnipeg Shale to the top of the Carman Sand Member of the Winnipeg Formation. The construction of these extraction wells will generate drilling waste comprised of overburden, carbonate and shale wastes that would require adequate handling and management depending on their geochemical characteristics.

Sio Silica has completed feasibility assessments for the project and is currently seeking regulatory approvals under the *Environment Act* for the extraction and processing of the sand at the processing facility. In 2020, AECOM conducted a detailed Hydrogeology and Geochemistry Assessment (AECOM 2021) of the proposed *in-situ* silica sand extraction operation. The study focused on assessing potential impacts of the project on the quantity and quality of groundwater in the Red River Carbonate and Winnipeg Formation aquifers. Potential impacts of the project on surface water quality due to extraction and storage of other geologic materials (e.g., drill cuttings) was also evaluated.

The assessment involved characterizing the risk of geologic materials produced to generate acidic drainage or release metals into the receiving environment when drill cuttings, refered to herein as waste rock, are exposed to

atmospheric weathering conditions. This assessment showed that the Red River Carbonate had potential for the release aluminum and selenium and the Winnipeg Shale had the potential for acid generation and the release concentrations of aluminum and selenium above the limit permitted by applicable water quality guidelines and may require mitigation and management.

Overall, project activities were found to have only a minor, short-term and reversible impact on groundwater quantity and quality provided the following monitoring and mitigation plans were implemented:

1. Waste Characterization and Management Plan
2. Water Management Plan
3. Progressive Well Abandonment Plan
4. Groundwater Monitoring and Mitigation Plan

This Waste Characterization and Management Plan (the Plan) was developed to provide a framework and measures to adequately assess and manage the waste rock generated by the project to prevent potential adverse effects on the receiving environment.

2. Guidelines and Regulatory Context

In addition to the *Mines and Minerals Act and Environment Act* and *Water Rights Act* governing the project, there are also policies and guidelines that guide how solid waste and aqueous phases on mine sites should be characterized and managed. Guidelines and policies describing mine wastes and water characterization and the mitigation and management of disturbed and excavated mine wastes and drainages are common in Canada. The government of British Columbia (BC) and Mine Effluent Neutral Drainage (MEND) initiative have developed policies, guidelines and best practice that have become standards worldwide. In recent years, the Global Acid Rock Drainage Guide (INAP) built upon these early initiatives and continuously expands upon the existing guidelines for the management and mitigation of mine wastes, surface water and groundwater at mine sites and major infrastructure projects where large volumes of rock are frequently excavated and where ARD/ML may become an issue. Guidelines and policies pertaining to ARD/ML assessment and mitigation applicable to this project include but are not limited to:

- Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (Price 1997).
- Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (Price and Errington 1998).
- Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (BC MEM and BC MELP 1998).
- Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials - MEND Report 1.20.1 (Price 2009).
- MEND Manual Volume 4, 5 and 6 (MEND 2000a, b, 2001).
- Evaluating the Potential for ARD/ML at Quarries, Rock cut sites and from Stockpiled Rock or Talus Material used by the MOTI (BC MOTI 2013).
- Global Acid Rock Drainage Guide (INAP 2009).

These documents form industry standard practice in the characterization, evaluation, management and mitigation of impacts associated with soils and rock produced by industrial activities and were consulted during development of this Waste Characterization and Management Plan.

3. Mine Plan

The silica sand will be extracted from the Winnipeg Sandstone using an airlift extraction method. This approach is commonly used in the water well drilling industry to advance boreholes through unconsolidated and consolidated geological formations by injecting compressed air into the bottom of a borehole to extract drill cuttings. Sio Silica anticipates extracting the sand as a sand and groundwater slurry at an approximate depth of 51 m to 76 m below ground surface (mbgs). Approximately 330 extraction wells will be drilled per year and used to extract the sand. The extraction wells will be sequentially drilled, operated, and progressively decommissioned over time.

The extraction boreholes are cased and grouted to isolate the overlying aquifers in the Red River Carbonate and Winnipeg Shale Formations. Production casing will be lowered and utilized to extract the sand using pressurized air and water which may be to a maximum depth of 25 m below the top of the Winnipeg Sandstone to form a cone extending from the bottom of the Carman Sand Member to the base of the Winnipeg Shale. The extraction cone pattern is planned to extend laterally by successively extracting from new boreholes across the extraction area in a room and pillar style in accordance with the geotechnical model. A schematic illustrating the silica sand extraction method is shown **Figure A**.

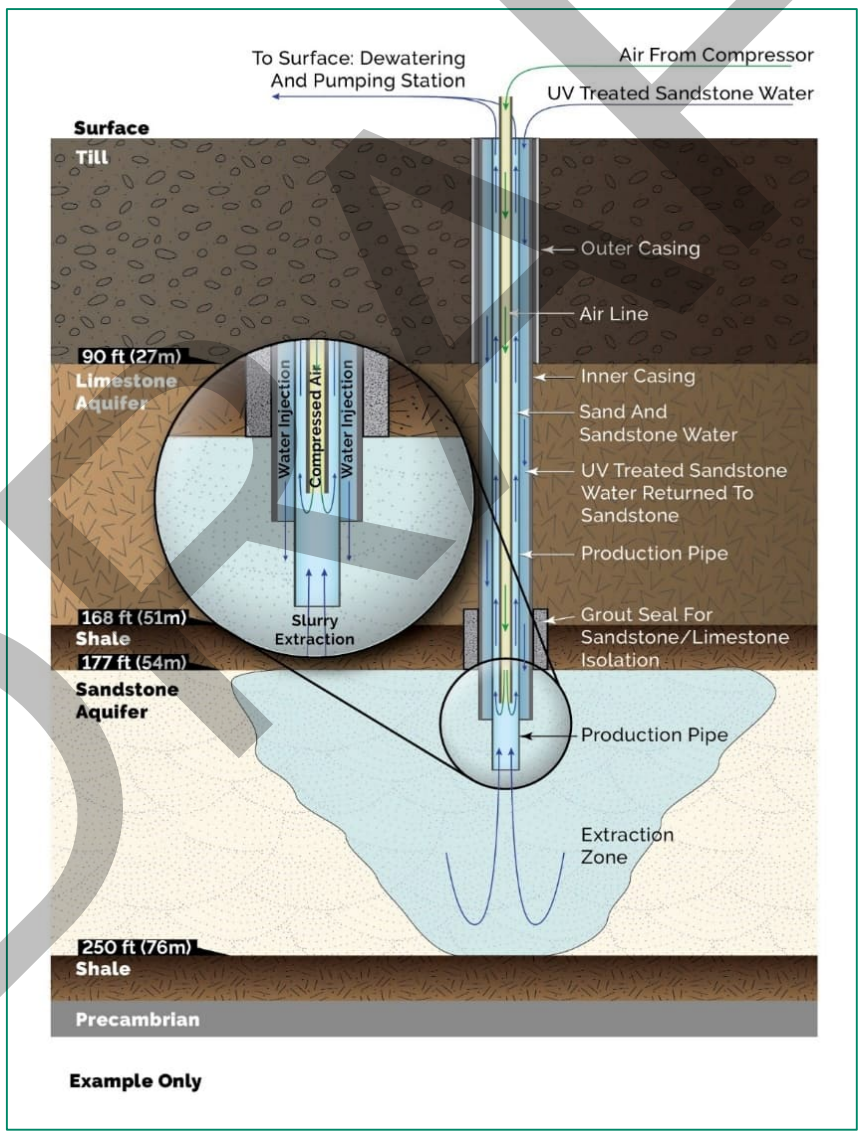

Figure A. Conceptual Illustration of Silica Sand Well Extraction Method

The following waste rock and soil will be generated during well drilling and operations:

- Overburden Quaternary Sediments;
- Red River Carbonate; and
- Winnipeg Shale.

Over 86% of the waste material extracted during drilling and operations will consist of quaternary glacial sediments similar to those currently exposed at ground surface within the Project Area. A much smaller fraction of the waste material will be comprised of bedrock cuttings from the Red River Carbonate (12%) and Winnipeg Shale (2%). The estimated volume of each type of waste material generated over the first five years of operation are summarized in **Table A.**

Table A. Estimated Waste Material Production by Waste Type During First 5 years

Lithology[1]	Assumed Thickness		Borehole Diameter		Extraction Wells	Estimated Volume of Waste[2,3]		
	(ft)	(m)	(inches)	(m)	(Total number)	(m^3/well)	(m^3)	(tonnes)
Quaternary Sediments	118	36	16	0.406	1,680	4.66	7,830	15,660
Red River Carbonate	43	13	10	0.254	1,680	0.66	1,107	2,878
Winnipeg Shale	10	3	10	0.254	1,680	0.15	255	689

Notes:

1. *Winnipeg Sandstone will not be a waste stream.*
2. *No bulking factor applied to volumes*
3. *Using bulk density: 2, 2.6 and 2.7 g/cm^3 for Quaternary Sediment, Red River Carbonates and Winnipeg Shale, respectively.*

4. Geochemical Characterization

The ARD/ML geochemical characterization of the material that will be excavated during project development was conducted during the 2020 Hydrogeology and Geochemical Assessment (AECOM 2021). Nine (9) samples; three (3) from each of the three formations (i.e., Red River Carbonate, Winnipeg Shale and Winnipeg Sandstone) were taken from the core stored indoors in Steinbach and tested. The results indicated that the Red River Carbonate Formation consisted predominantly of carbonates with minor quartz and feldspar. The Winnipeg Sandstone Formation consisted mostly of quartz with trace calcite, albite, calcium and iron. The Red River Carbonate and Winnipeg Sandstone formation did not contain any sulphide minerals and had low potential for acid generation. The Winnipeg Shale Formation consisted of a mixture of quartz and aluminosilicates, contained low to trace amounts of pyrite, carbonates, and minerals indicative of weathering such as hematite, goethite, and gypsum. Based on the results of the 2020 Hydrogeology and Geochemical Assessment, the materials were classified as follows:

- Red River Carbonate (3 samples): Not Potentially Acid Generating (Non-PAG)
- Winnipeg Sandstone (3 samples): Non-PAG
- Winnipeg Shale: Uncertain (2 samples) or Non-PAG (1 sample).

The geochemical data showed that the samples with total sulphur less than 0.1% were all Non-PAG and samples with total sulphur greater than 0.1% were Uncertain. This means that additional tests (i.e., net acid generation) should be completed on Winnipeg Shale samples with total sulphur greater than 0.1% to clarify their ARD potential (Non-PAG or PAG). If the Winnipeg Shale is confirmed to be PAG then the 0.1% total sulphur value could be further explored as a threshold for segregating Non-PAG and Uncertain/PAG material during operations.

Shake flask extraction (SFE) results suggested that there was a potential for elevated leachable concentrations of aluminum and/or selenium associated with Red River Carbonate (aluminum and selenium), Winnipeg Shale (selenium) and Winnipeg Sandstone (aluminum). Sporadically elevated arsenic and uranium concentrations were

also documented. This indicated that metal release may occur independent of the ARD potential, and it is important to understand the short-term and long-term metal release rates.

AECOM recommended additional characterization of the Winnipeg Shale and Red River Carbonate Formations prior to operations to better understand their ARD potential and the likelihood of the release of elevated concentrations of aluminum and selenium as indicated by the leach SFE test. This additional characterization may include kinetic testing to determine the long-term acid generation, estimate the lag time to acid generation and confirm the potential for metal leaching. The results of this program will provide an indication on how long the material could be stored at ground surface before becoming acid without any mitigation.

AECOM also recommended geochemical characterization of the overburden glacial sediments since this material represents nearly 86% of the waste material excavated during project development and has never been assessed. This material could be used for various construction and mitigation purposes if it has low potential for ARD/ML but must be carefully managed if the ARD/ML risk is elevated. Confirmatory ARD/ML testing and monitoring during operations to confirm the geochemical findings and inform management of waste materials should also be carried out. Samples should also be collected and sent to the laboratory for testing if new rock types are encountered or changes of facies occur.

Until new ARD/ML data has been developed, the Red River Carbonate and Winnipeg Shale wastes should be considered an environmental risk and managed conservatively in accordance with this Plan. This conservative approach is routinely employed in metal and coal mining, and for other industrial and infrastructure projects.

The 2020 Hydrogeology and Geochemical Assessment has also shown that groundwater in the three aquifers is fresh and has good quality as indicated by the calcium, sodium and carbonates water types, low total and dissolved solids (<500 mg/L) and metal concentrations. Groundwater was not impacted by ARD/ML. The concentrations of groundwater constituents were within the limits of the Canadian and Manitoba water quality guidelines except notably turbidity, iron, manganese, fluoride, and sulphides. These constituents exceeded their respective applicable guidelines in all or some of the samples (AECOM 2021). The aquifers were recharged by local meteoric water infiltrating in the eastern part of the region, but the shallower aquifers (carbonate and shale aquifers) showed enriched isotopic composition because of evaporation, climatic conditions, and water rock interaction processes.

5. Operational Waste Rock Screening

The characterization of shales in other regions of Manitoba has shown that it can be locally enriched in heavy metals (Fedikow et al., 1995) and highly acid generating due to its elevated pyrite content (up to 14%; unpublished study). Until further geochemical characterization has been conducted to capture the spatial variability of ARD/ML within the formations at the site, it is recommended to develop and implement a waste screening protocol to determine the ARD/ML potential of excavated material and adequately mitigate the risk.

5.1 Training of Personnel

One or more qualified professional geoscientists should be appointed to manage the ARD/ML characterization and mitigation program. The staff should be trained to:

- Recognize and visually determine various rock types in hand specimen.
- Conduct waste sampling, documentation and processing and shipping of samples following standard chain of custody procedures.
- Visually identify and estimate sulphide and carbonate minerals contents.
- Conduct basic field tests such as paste pH and acid tests.

5.2 Waste Rock Sampling

5.2.1 Pre and Early Operational Sampling

Drill cuttings will be sourced from boreholes advanced to establish the groundwater monitoring well network in advance of operations and sent to laboratory for ARD/ML testing. During early operations, drill cuttings from boreholes, monitoring wells or extraction wells will also be collected from well clusters and composited to create a 2-3 kg composite for each type of waste. Early operational testing and analysis should be conducted based on the volume of each type of waste rock generated as follows:

- One (1) sample should be tested per 2,000 tonnes of Quaternary Sediments
- One (1) sample should be tested for every 700 tonnes of Red River Carbonate
- One (1) sample should be tested for every and 200 tonnes of Winnipeg Shale.

5.2.2 Routine Operational Sampling

The sampling frequency for each waste rock type can later be reduced to the frequency below once the ARD/ML conditions and spatial variability have been adequately evaluated and are judged to be acceptable by a professional geoscientist with specific expertise in the characterization and management of waste rock and ARD/ML assessment:

- One (1) sample per 5,000 tonnes of Quaternary Sediments
- One (1) sample per 2,000 tonnes of Red River Carbonate
- One (1) sample per 500 tonnes of Winnipeg Shale

5.2.3 Evaluation of Screening Results

The procedure for assessing the drill cuttings and conducting the field classification is summarized in the flowchart in **Figure B**. Approximately 150-200-gram grab samples should be collected from drill cuttings. They should be visually examined to confirm the waste rock type and determine the presence and percentage of sulphide and carbonates minerals. Then, the samples should be documented, photographed, sealed in sampling bags, and stored in pails following standard chain of custody procedures. After an adequate number of samples has been collected as per the defined sampling intensity, the samples should be shipped to a designated accredited laboratory for analysis with instructions for creating composites for each waste type. The waste rock material at the Site will be segregated and stored in such a way that they are isolated from air and water pending laboratory results then managed appropriately.

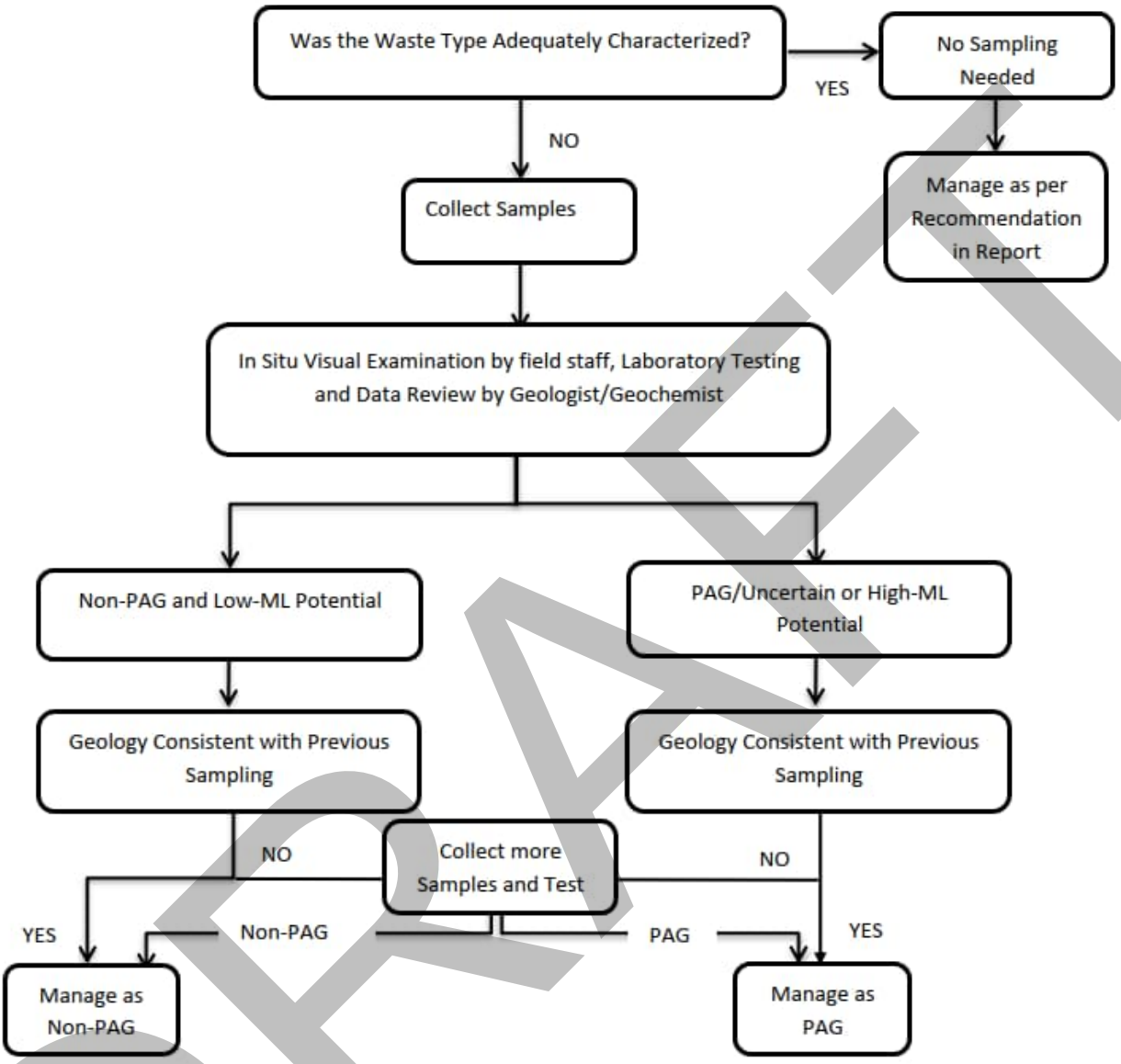

Figure B. Operational Field Screening and Waste Management

5.2.4 Laboratory Testing

The recommended static tests for the waste rock material are summarized in **Table B**. After adequate testing has been completed and the ARD/ML potential has been well defined, the laboratory testing plan may be modified or terminated after consultation with a qualified professional geoscientist with expertise in the evaluation of ARD/ML.

Table B. Recommended Geochemical Testing for Each Waste Type

Waste Type	Current ARD/ML Potential	Total Metals	Mineralogy	Net Acid Generation	Acid-Base Accounting	Shake Flask Extraction
Quaternary Sediments	ND	Yes	No	No	Yes	Yes
Red River Carbonate	Low ARD & possible ML	No	No	No	Yes	Yes
Winnipeg Shale	High ARD & possible ML	Yes	Yes	Yes	Yes	Yes

Notes:
ND: Not Determined

6. Waste Rock Management

6.1 Waste Classification Framework

During site preparation and operations, waste rock materials will be visually identified and segregated based on their geological characteristics (i.e., colour, texture, structure, etc.). The designated field staff will be trained to distinguish between quaternary sediments, carbonate, and shale to correctly segregate the wastes. The determination and segregation of material from the same Formation according to ARD/ML is a difficult task and should be carried out by or under the supervision of a qualified professional with expertise and experience in geology and geochemistry. Field classification of waste materials will consider both the results of laboratory static tests (i.e., acid-base accounting [ABA], SFE, whole rock and mineralogy) conducted before operations, future tests including kinetic testing and field screening results where available.

Waste materials will be classified as either PAG, Uncertain or Non-PAG based on the results of ABA testing. Material will be classified as PAG if the neutralization potential ratio (NPR) is less than one (NPR < 1). Material with NPR > 2 will be classified as Non-PAG and material with 1 ≤ NPR ≤ 2 will be classified as Uncertain and managed as PAG unless kinetic data is available and confirm otherwise. The waste materials could also be classified using a site-specific NPR criterion developed from kinetic testing if the data is available. Criteria for segregation of waste materials should be established by a qualified professional with expertise and experience in geology and geochemistry.

The waste rock will also be classified according to the potential for metal leaching (i.e., either Low-ML or High-ML) based on the results of the SFE, kinetic testing or water quality data. Materials with potential for High-ML include those material for which the SFE, kinetic and/or water quality monitoring data show high sulphate or metal concentrations exceeding applicable water quality guidelines, standards, or objectives for one or more constituents in at least 5% of the samples. Low-ML waste materials will consist of all material with leachable or measurable sulphate and metal concentrations below water quality applicable guidelines, standards, or objectives.

Based on current geochemical assessment results, there is a potential for the release of elevated concentrations of aluminum and selenium from the Red River Carbonate and Winnipeg Shale Formations under conditions similar to those during SFE tests (i.e. oxic). Waste rock from these Formations will be conservatively managed as PAG until further testing has been carried out and showed that they are Non-PAG and have low ML risk. Water quality monitoring results prior to, during and following operations will be helpful in this regard.

6.2 Mitigation Measures

The mitigation and control of ARD/ML consists of one of three following actions:

- Avoid the occurrence of ARD/ML by preventing the contact of reactive material with oxygen and water. This consists of limiting the excavation of material with high ARD/ML risk or materials that are difficult to mitigate, and storing PAG, Uncertain or High-ML material in suitably designed waste dumps or stockpiles.
- Limit the migration of water impacted by ARD/ML, commonly known as contact water, by collecting the drainages before they reach the receiving environment and ensuring that they meet discharge criteria before release. This type of mitigation and control measures also involve the capture and diversion of clean surface runoff before it contacts with reactive material.
- Treat contact water and other effluents using passive or active treatment methods.

The proposed mitigation measures for the Project at the current screening level geochemical characterization are:

- Store the Red River Carbonate and Winnipeg Shale in covered bins or mobile tanks for hauling to a licensed offsite landfill or waste facility for disposal.
- Monitor groundwater quality at the site.

The proper handling of the overburden material will be decided based on future geochemical tests or field screening results. ARD/ML mitigations and control measures will be developed and implement by or under the supervision of a qualified professional with expertise and experience in the characterization and management of ARD/ML.

6.2.1 Waste Rock Management

All drill core cuttings from the Red River Carbonate and Winnipeg Shale Formations will be segregated from Quaternary Sediments due to their possible high potential for ARD (shale) or ML (shale and carbonate). These materials will be conservatively flagged as PAG, stored in covered bins or tanks then hauled to a designated licensed landfill/waste facility for long-term disposal or storage. The requirement for disposal will be discussed with the operators of the facility and met before the material is shipped.

7. Monitoring

The *Groundwater Monitoring and Impact Mitigation* Plan developed for the monitoring of groundwater at the site will be used provide information on potential occurrence of ARD/ML due to the Project. Groundwater monitoring will be conducted quarterly during the open water season (i.e., spring, summer, fall) during operations. The monitoring will focus on water quality and water level in wells located around operations. Water quality monitoring will include general parameters (i.e., pH, temperature, electric conductivity, dissolved oxygen, redox potential), major ions, nutrients, dissolved organic carbon total and dissolved metals. Refer to the *Groundwater Monitoring and Impact Mitigation* Plan for more detail.

8. Reporting

Annual monitoring reports outlining the characterization work carried out during the year, material classification, and management will be prepared and provided to relevant authorities in accordance with reporting requirements or upon request. The reports will summarize the results of geochemical testing and provide the volumes and types of waste generated per year. Recommendations for changes or improvements to the waste characterization, testing, classification, management, and monitoring programs will also be discussed in the report. The report will be prepared under the direction of a professional geoscientist with expertise and experience in the evaluation of ARD/ML.

9. References

AECOM. (2021). Vivian Sand Extraction Project – Hydrogeology and Geochemistry Assessment Report. Prepared for CanWhite Sands Corporation. July 2021.

AECOM. (2022). Water Management Plan – Vivian Sand Extraction Project. Prepared for CanWhite Sands Corporation. August 2022.

AECOM. (2022). Groundwater Monitoring and Impact Mitigation Plan – Vivian Sand Extraction Project. Prepared for CanWhite Sands Corporation. August 2022.

APEX Geoscience. (2021). Inferred Resource Estimation on Canadian Premium Sand Inc.'s Wanipigow Silica Sand Glass Project In Manitoba, Canada. NI 43-101 Technical Report. October 14, 2021.

Bowell, R., Dey, M., Pooley, F., and Williams, K.P. (2000). ARD In Waste Rock: Preventive Methods. Mining Environmental Management, May 2000.

British Columbia Ministry of Energy and Mines and British Columbia Ministry of Environment, Lands and Parks (BC MEM and BC MELP). (1998). Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia. British Columbia Ministry of Energy and Mines and 3 British Columbia Ministry of Environment, Lands and Parks.

British Columbia Ministry of Transportation and Infrastructure (BC MOTI). (2013). Evaluating the Potential for Acid Rock Drainage and Metal Leaching at Quarries, Rock cut sites and from Stockpiled Rock or Talus Material used by the MOTI.

Fedikow, M.A.F., Bamburak, J.D. and Weitzel, J. (1995). Geochemistry of Ordovician Winnipeg Formation black shale, sandstone and their metal-rich encrustations, Black Island, Lake Winnipeg (NTS 62P/I); in Report of Activities, 1995, Manitoba Energy and Mines, Minerals Division, p. 128-135.

International Network for Acid Prevention (INAP). (2009).Global Acid Rock Drainage Guide.

Mine Environment Neutral Drainage (MEND). (2000a). MEND Manual Volume 5 - Treatment. MEND Report 5.4.2e.

Mine Environment Neutral Drainage (MEND). (2000b). MEND Manual Volume 6 - Monitoring. MEND Report 5.4.2f.

Mine Environment Neutral Drainage (MEND). (2001). MEND Manual Volume 4 - Prevention and Control. MEND Report 5.4.2d.

Price, W.A. (1997). Draft Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia.

Price, W.A. and Errington, J.C. (1998). Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia. British Columbia Ministry of Energy and Mines.

Price, W.A. (2009), Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. Version CANMET – Mining and Mineral Sciences Laboratories, Smithers, BC.

aecom.com