SIO SILICA SUPPLEMENTAL INFORMATION

Document #3 – Progressive Well Abandonment and Site Closure Additional Information

Vivian Sand Extraction Project

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Purpose

This document is provided to the Clean Environment Commission in response to inquiries received for additional information on the closure and progressive reclamation processes. At this time, a detailed Closure Plan has not yet been submitted as the development of such a document is completed after the approval of the proposed Vivian Sand Extraction Project (the "Project"). Current plans and details available are outline herein.

1.0 Progressive Annual Closure and Rehabilitation of Extraction Wells

Progressive closure and rehabilitation of extraction wells and their associated sites will occur throughout the year. After sand extraction is complete at a well, all removable equipment is removed from the well and surrounding site. The well is then sealed in accordance with *The Groundwater and Water Well Act* using a grout plug with layers mimicking that of the formation using materials such as pea gravel, native material and/or bentonite on top to prevent any vertical movement between aquifers.

Progressive decommissioning (well sealing or well abandonment) of annual extraction wells and well cluster areas will occur each extraction year in addition to progressive annual rehabilitation of temporary drilling rig access trails; equipment laydown areas; slurry line trails and return water line trails. Disturbed areas will be allowed to revegetate naturally and will be augmented using an approved native seed mixture and native plantings if required.

Many sites selected for the first 3-4 years of activities are sites that have been previously disturbed, such as gravel quarries, or do not already contain many trees. However, in areas where there are trees encountered, Sio Silica will make efforts to reduce impact as much as possible. The way in which this will be done, are carefully planned access trails that access as many extraction sites as possible on one single access, not multiple, as well as utilizing a tree spade to move established trees to another area either temporarily or permanently. Additional measures are outlined in **Section 1.3** below.

A Revegetation Monitoring Program will be implemented annually after the first year of Project operations to determine the success of the revegetation program and determine if follow-up reseeding or replanting is required. The monitoring program will include monitoring during the growing season until the seedlings appear to be established.

Details of the progressive annual closure and rehabilitation of the extraction wells will be provided in a Closure Plan in accordance with the Manitoba Mine Closure Regulation 67/99 General Closure Plan Guidelines. Details will also be provided in a Progressive Well Abandonment Plan.

1.1 Progressive Well Abandonment Plan

The purpose of the Progressive Well Abandonment Plan (PWAP) is to provide an operational plan for progressive closure of each extraction well to ensure groundwater resource remains protected. The PWAP is developed in a manner that is consistent with industry standard practice and meets or

exceeds the requirements of *The Groundwater and Water Well Act* and its supporting regulations, including the Groundwater and Water Well Regulation and the Well Standards Regulation. The PWAP will also meet borehole abandonment requirements of *The Mines and Minerals Act* and borehole licences issued under Part 3 of the Drilling Regulation.

Wells will be abandoned (also known as well sealing) in accordance with *The Groundwater and Water Well Act* and with guidance from the Construction and Sealing Wells in Manitoba – Information for Well Driller and Well Sealers document (Manitoba Government, 2018).

The following procedures will be used to abandon or seal Project wells:

1. A mechanical plug will be placed at the predetermined depth to isolate the movement of water within the already cemented casing between the sandstone and limestone aquifers. Then a bentonite plug will be placed prior to cementing to ensure the cement does not dilute or leak into the water prior to setting.
2. Above this plug, a several foot-thick cement plug will be placed and allowed to set. Cement will be pumped into place using a tremie grout system and allowed to set overnight. The cement plug will be confirmed by manual contact prior to proceeding to the next step.
3. Once set, layers of bentonite and pea gravel or native material will be used, or a benitoite grout to 5 feet (1.5 m) within surface.
4. Where pea gravel or native material and bentonite are used, no more than 15 feet (4.6 m) of pea gravel will be used before another layer of bentonite. In addition, careful attention will be paid to the layering of bentonite across any interfaces between aquifers (e.g., the limestone to the till interface) to prevent vertical mixing of the aquifers.
5. A 5 feet (1.5 m) thick cement cap will be placed at the very top, allowed to set and then the topsoil/organics are replaced on top of the cement to allow for vegetation regrowth/remediation of the surface land to occur.
6. Detailed logs will be kept of the well abandonment and depths of each layer, in addition to the GPS coordinates of each well.

This procedure will be used in all extraction wells and wells that exceed 2 inches (5 cm) in diameter. Where a monitoring well exists, these are often nested 5-inch (12.7 cm) and 2-inch (5 cm) PVC (polyvinyl chloride) casing sizes. As per the above referenced guidelines (Manitoba Government, 2018), the 2-inch (5 cm) casing is grouted the entire length of the well as other sealing materials like bentonite chips can bridge off (expand and create a blockage) in the small diameter PVC casing.

1.2 Closure Plan

A proposed Closure Plan will be developed for review and approval by The Mines Branch should a licence be issued for the proposed Project.

The proposed Closure Plan will outline detailed mitigation and monitoring activities that will be implemented to rehabilitate the Project Site during the closure phase of the Project. Pending provincial review of a proposed Closure Plan, the Closure Plan may be revised to reflect changes or additional requirements that may be needed due to requirements of the EAL. As part of a Closure Plan submission, closure cost estimates and financial assurances are required and will be submitted by Sio Silica to the province as part of the Project licensing process.

1.3 Existing Vegetation, Site Planning and Revegetation Monitoring Plan

The total amount of naturally vegetated area requiring clearing for annual Project operations will vary considering the variable amounts of natural vegetation present within each annual block of Project development lands within the Project Site (which consists of 31% agriculture lands and 13% 'developed land). There will be no permanent components associated with the extraction Project. Therefore, progressive annual rehabilitation/revegetation of Project activity sites will minimize the long-term effects on vegetation within the Project Site. Direct impacts on vegetation through annual clearing activities will be restricted to the Project Site in consideration of setback distances as described in **Section** Error! Reference source not found. in the Vivian Sand Extraction Project Environment Act Proposal.

The footprint area of each well cluster will be minor (i.e. 0.20 ha to 0.28 ha), with only a few well clusters active any one time and other well clusters being progressively rehabilitated and revegetated. The pathway required to accommodate the parallel slurry and water return line will be very narrow (2 m wide), with temporary access trails limited to approximately four meters in width and up to approximately eight meters in width at turning points to accommodate required drill rig turning areas. Routing of these lines and the temporary access trails will be located within previously disturbed/cleared areas to the extent feasible. Therefore, these annual pathway routes will not represent a substantial annual footprint area where natural vegetation will need to be cleared. The number and locations of pumping stations required along the slurry line routes will also vary annually with increasing distance from the Processing Facility. The footprint area of the pumping stations will also be minor; approximately 63 m^2 each.

Project activities and temporary components will be located on previously disturbed land to the extent feasible within a Project Site that consists of approximately 56% natural vegetation cover. Therefore, the amount of naturally vegetated area requiring clearing each year is expected to be minor.

The types of naturally vegetated land cover that will be cleared (i.e., forest, meadow and willow/alder) are common within the Regional Project Area.

Considering progressive closure, rehabilitation and revegetation of extraction activity areas will be done each year, it is expected that most natural vegetation will be very well established after approximately four years, with reestablishment of trees and shrubs expecting to be evident within five to 10 years following closure.

The following mitigation measures will be implemented to avoid or minimize potential effects of clearing on vegetation:

- Areas to be cleared of vegetation will be minimized to the extent feasible and will be clearly marked to avoid clearing more than required.
- Usable trees/wood will be cut and stacked at the Project Site for local use as firewood for no longer than one year or disposed of in accordance with applicable regulations.
- Disturbed areas will be allowed to revegetate naturally and will be augmented using an approved native seed mixture and native plantings if required.
- Utilization of a tree spade to move established trees to another area either temporarily or permanently.

- A Revegetation Monitoring Program will be implemented annually after the first year of Project operations to determine the success of the revegetation program and determine if follow-up reseeding or replanting is required. The monitoring program will include monitoring during the growing season until the seedlings appear to be established.
- Mitigation measures to control dust from access and vehicle traffic will be applied.

As previously mentioned, Revegetation Monitoring Program will be implemented to determine the success of the revegetation program and determine if follow-up reseeding or replanting is required using approved native seed mixture and native plantings. Where reseeding or replanting is required, Sio Silica will communicate with regional MBCC staff to determine strategies for potentially enhancing revegetation of disturbed areas to benefit wildlife species such as the Golden-winged Warbler which is a Species at Risk that may occur in the Regional Project Area.

The revegetation monitoring program will include monitoring during the growing season until the seedlings appear to be established.

2.0 References

AECOM. 2021. Vivian Sand Extraction Project Environment Act Proposal. Prepared for CanWhite Sands Corp. July 2021.

Manitoba Government. 2018. Construction and Sealing Wells in Manitoba. Information for Well Drillers and Well Sealers. Retrieved from Government of Manitoba: https://www.gov.mb.ca/water/pubs/water/groundwater/publication/constructing_and_sealing_wells_contractors.pdf