

Sio Silica - Simba Sand Extraction Project .

Without Prejudice

I would like to take this opportunity to thank the Director for the opportunity to submit the following documents on behalf of concerned Residents from the RM of Springfield .

I am sure the Director and Environment staff will be undated with a large number of relevant documents and submissions by individuals that are well educated in the process and therefore qualified to interpret the scope and scale of Sio's new application to excavate and mine silica in the same aquifer as we draw our fresh water supply .

Obviously the mining application must demonstrate the extraction method is safe and able to be stringently monitored to assure the quality of life for all residents are not interrupted .

I am also aware of a new policy which was recently passed by the United Nations (exhibit 1&2) where the Precautionary Principal is now being implemented and will be included to all forms of Mining enterprises .

I believe there are two primary factors to consider prior to a Licence to mine Silica being issued .

*The extraction ,storage and transportation of minerals will clearly demonstrate that the quality of the existing fresh water aquifer will not be compromised for any Springfield Residents.

*That the applicant including the principals can clearly demonstrate by their previous actions that they are miners of the highest conviction and of good moral charter .

I agree it will be the senior positioned staff ,shareholders and board members that will be largely responsible for the environmental success of the delicate extraction process being proposed . How did this Developemnt come to being ?Who were the early principals? There are many suggestions and variations however the one stands out the most: The early investors may well have been Manitobans ,,most likely in the aggregate industry and or geology engineering related companies ,who were familiar with the Carmen Trend silica deposit which was well identified by Manitoba minerals staff geologists (Gunter and Biczok.) (a crown corp of the Manitoba Government in the eighties and nineties) . Why is silica sand so important .

Oil and Gas well drilling is exploding in western Canada . There will be five export terminals completed at tide water in BC by 2030 .

Each well requires 5000 tonnes of silica to drill into production .

That why the Vivian Plant has a planned 110 train car loop ajoined to the processing plant .

So the deposit was well know as early as the 80's however it was prohibitive to mine via open pit as the deposit is well over 200 feet below surface . Tunnel mining is cost prohibitive and pillar mining is

also challenging as the overburden does not have mineralogy characteristics to support below ground excavation without (slumping) cave-ins . So the Silica Deposits stayed in view but out of play . New technology arrived in the early 2000's (called fracking) .

Fracking (exhibit3) is using water pressure and chemicals to fracture the rock. Once fractured oil and gas flow(pumped) to surface . The process requires vast amounts of water .

The early investors now realized there was a way to extract the sand using the same basic technology as fracking however there were concerns about the extraction process leaving giant holes 200 ft below surface and the potential collapse of the overburden ,as it lacked the integral strength to support the excavated cavity . Concerns were also raised about the extremely high volume of water required in the excavation /slurry process . Recirculating the slurried well water might be the solution ,however the water becomes oxidized and saturated with minerals and debris disturbed during the slurry process . The process could definitely affect the quality of the water for drinking purposes including taste and smell .

There were also existing government laws ,rules and regulations pertaining to fresh water aquifers that would have to be overcome to allow such a new excavation process to be used .

To what extent the full impact and risk of Contamination to residents fresh water supply was not fully known or prioritized as important .

Did the risk out way the opportunity? If an environmental application failed or if permitted and contamination of hundreds of fresh water wells occurred how would the Manitoba investors be viewed .

A decision was most likely made to mitigate the risk to investors by approaching an oil well and driller junior company in Alberta to access the opportunity and confirm the deposit was consistent for extraction by fracking techniques . Partnering with the person or persons to act as the lead was also a benefit worth pursuing.

It appears that's when Mr. Feisal Somji became involved . And early investigation of Mr. somji's involvement in the oil patch appeared uneventful ,,however regulatory bodies in Alberta ordered "cease trade orders " in Somji's Prize Mining corporation.

With Somji's on board a plan needed to be developed to determine the size and scope of the deposit , what licensing hurdles were involved and how the deposit could be flipped for a sizeable profit .

Funds required for the entire campaign were probably estimated somewhere between 15 and 20 million dollars . The corporation White Can Sands was formed . Money was raised from PIPED INVESTORS .

Note White Can Sands changed to Sio Silica .

Size and scope of Deposit . Previous Manitoba mines and mineral files were easily obtained from the provincial library . Friesen Drillers started to drill out the deposit . Friesen and Maple Leaf Drilling

also had records of their drill reports from previous residential and commercial well drilling which could have been used as references .

Mineral Claims were Registered on 85,000 hectares .

10,000 8 inch and 12 inch casing wells could be drilled over 20 years .

What were the licencing and political hurdles .

Municipal and Provincial support was essential . Early " Piped Investors " and or "friends " with political influence with the currant PC government would both be essential to get regulatory approval prior to the upcoming election .

A senior PC organizer ,Marni Larkin attached to the Premier's office would join Sio Silica on the day to day ,,as a paid public relations officer .

David Filmon (MLT Aikins) joined Sio's board to review big picture and Michel Pyle was added to the board to watch the money flow as lead of Sio's audit committee .

Springfield became the only Municipality to entertain Sio Silica's mining opportunity . Eight other municipalities formed an association with a mandate to stop Sio from mining silica in their jurisdiction as the risks versus reward were too great . Updating their municipal bylaws seemed to be the best option .

Tiffany Fell councillor , then Mayor of Springfield and a past Stienbach Credit Union arbitration officer and Patrick Therrien later Mayor of Springfield took up the torch to support Sio's efforts . All drill Shots / Wells for the first 20 years would be located in the RM of Springfield . The processing plant was to be located ,in the RM ,,on the main CN Line at Vivian Manitoba .

Enclosed documents are examples demonstrating there may have been a concerted effort to speed through the Sio Environmental Licience application without due process .

Vivian is at the very far eastern edge of the RM Springfield . As far away from the Dugald , Oakbank Corridor as possible .

Pyrophyte Chairman and CEO Bernard Duroc -Danner is no stranger to controversy , DANNER HELD A KEY EXECUTIVE ROLE of Chairman and CEO Weatherford International, an oil well services company . The company was fined 250 million dollars and 100 million dollars by U. S. Regulators for inappropriate corporate activities .

Exhibits enclosed

It is believed ,,Danner is the new Chair and CEO of Pyrophyte is in the process of acquiring Sio Silica . The corporation is to be listed on the New York Stock Exchange .

The transfer requires the regulatory Environment and Climate Licence and any outstanding

regulatory requirements from the Manitoba Government

Pyrophyte 's claims Sio's assets at listing are believed to be valued 800 million U.S. dollars .

The corporation is listed in the Cayman Islands .

Redemption agreement enclosed .

Piped Investors , will not be able to immediately sell their shares as there is a cooling period after the merger .

However when investor shares are sold the rewards would be a minimum of 10x . (the company Sio silica has stated costs estimated to get into production is 60 million Canadian dollars . The merger / acquisitions value I'd listed at 800 million .

Early Shareholders could receive far higher returns for their shares , if they waited for the Pyrophyte Shares to be listed and traded on the New York stock exchange . It is not known what the multiple of book value would be at this time .

I believe that Environment and Climate should take into consideration whether the principals in Sio Silica and Pyrophyte have the credibility and earned the trust of the Minister to responsibly and ethically mine Silicates in the RM of Springfield

Thank You



Exhibits

1 & 2 Precautionary Principal

3.What is fracking

4 Papadopoulos Expert Report ,engineer Chris Neville . A review of the Sio Silica mining application commissioned by mayor Fell RM Springfield ,, received by MayorTherrien Jan 12th 2023 the Peer review is very critical of the mining proposal . CAO Draper and Therrien refuse to release to council members Miller and Kuczynski. Report obtained by Springfield taxpayers Rights Corp via FIPPA .

5. Letter from CAO Draper to Manitoba Clean Environment. Springfield will not have legal or engineering representation at the CEC hearing . The RM is taking a Neutral stance . The letter was never introduced or approved via resolution by Springfield Council .

6.Letter ,,MLT Aikins threatens Councillors Miller and Kuczynski with misfeasance of public office which could result in vicarious liability .

7. Ruling Weatherford International fined 250 million U.S? Dollars

8. Ruling Weatherford international fined 100 million U.S. dollars

9. Feisal Somji "interim order" Alberta Securities Commission

10. Non Redemption Agreement between Pyrophyte and Sio Silica .

11. What is a "Piped In" investor

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MARINE AND COASTAL // PRECAUTIONARY APPROACH

MONDAY // 11.13.2006

Precautionary Approach

Principle 15 of the [Rio Declaration on Environment and Development](#), adopted by the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, 1992, states that:

"In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

In the [preamble of the Convention on Biological Diversity](#) it is noted that:

"Where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat."

[Decision II/10](#) on conservation and sustainable use of marine and coastal biological diversity, adopted by the Conference of the Parties at its second meeting in Jakarta in November 1995, states that:

"The work [of the Secretariat on marine and coastal biological diversity] should not be impeded by the lack of full scientific information and will incorporate explicitly the precautionary approach in addressing conservation and sustainable use issues."

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Manitoba got its Environment Act in 1988 and, at the time, it was at the forefront of care for nature. But the arc from the birth of environmental care policy to the current disconnect from nature has left us in a bad place, with digital spaces largely owned and polluted with exploitative capitalist marketing. We need to talk about new environmental regulations for this generation and all our future kin.

Yet we're hearing from our shiny new prime minister that we need to reduce red tape on projects as a way to build our nation, along with regulations being too costly from companies. We know the cost estimates of not acting on the biodiversity crisis and the climate crisis are astronomical and debilitating to all governments. But the scientific data unequivocally show we need more regulation, not less.

Meanwhile, Manitobans regularly tell pollsters they want more care for nature, to support our mental and physical well-being.

Which brings us back to sand. At the heart of environmental understanding the world recognized nearly 40 years ago was the precautionary principle.

Sio Silica's plan to drill into aquifers and then suck sand out is risky. To even consider this project flies in the face of the precautionary principle: there is a "threat of serious harm" to our water.

After the Manitoba government rejects Sio Silica's zombie sand mine plan, we need to immediately jump on passing an Environmental Rights Act. This is what Sio Silica has given. Manitoba: the immediate need for new guidance on the environment.

In 2015 and 2016, Manitoba introduced the Environmental Rights Act. The simple guidances are the precautionary principle, the polluter pays principle, the principle of sustainable development, the principle of intergenerational equity and the principle of environmental justice.

The Environmental Rights Act did not become law as the NDP lost power in 2016. By itself, the act isn't perfect, but it reinforces the guiding principles that we need right now. It offers us aspirations to live up to and a clear direction for how we should care for nature under capitalism.

Profiteers can continue to fill public messaging channels with misinformation and complaints about red tape or government controls, but good policy can still keep them in line.

The public discourse shouldn't be questioning whether we will trade Sio Silica's profits for our healthy water, but how our new Environmental Rights Act will protect us and nature against the corporate hunger for never-ending profit.

Eric Reder is the wilderness and water campaigner for the Wilderness Committee.

Recognizing the precautionary principle

ERIC REDER

SIO Silica's recent Environment Act proposal shows that Manitoba is losing sight of past progress toward a harmonious relationship with nature.

The revival of this ridiculous drinking water risk from a rejected sand mine shines a light on our current regulatory failings in Manitoba, and the need for rejuvenation. A 50-year arc of increasing care for nature is in a steep descent as we are forced to consider proposals to contaminate aquifers for private profiteers.

The precautionary principle, first adopted worldwide in the 1990s, should have kept us from wasting public discourse considering this absurd idea.

The precautionary principle became gold-standard guidance around the globe when it was adopted in the 1992 Rio Declaration on Environment and Development. In Manitoba's proposed Environmental Rights Act it is explained as: If an activity raises threats of serious harm to the environment, precautionary measures should be taken even if it has not been fully established scientifically that the activity is harmful.

In this context, the proponent of the activity, rather than the public, should bear the burden of proof.

The two truths we need to understand our current situation are that healthy functioning nature is fragile and that capitalist interests are guided only by making money in whatever process is legal. In recognizing this, we can draw a straight line from the needs of nature to the increasing regulations we need to implement.

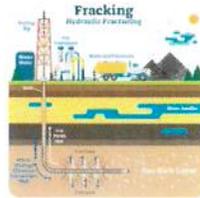
For decades, we as a global society have been trying to take better care of the Earth. The reality is that few places in the world have healthy, stable, natural ecosystems: the loss of plants and animals is occurring everywhere. The core of the solution is more environmental regulations and, in fact, environmental rights.

G what is fracking and how does it work



Sign in

Fracking, or hydraulic fracturing, is a technique used to extract oil and natural gas from deep rock formations by injecting a high-pressure mixture of water, sand, and chemicals into a well to create cracks. The "fracking fluid" creates and widens



fractures in the rock, and the sand, called a proppant, holds these fractures open after the pressure is released, allowing the oil and gas to flow to the surface. The process is typically done after drilling a vertical well that transitions to a horizontal one to access more of the rock formation. 📌

This video explains the fracking process in simple terms:

Fracking Explained in Simple Words for Beginners

Science ABC
YouTube • Feb 17, 2025



How it works

- **Drilling:** A well is drilled vertically into the earth, and then turns to drill horizontally through the rock formation, such as shale, where the oil and gas are trapped.
- **Casing:** Steel pipes are inserted into the well and cemented in place to prevent leaks.
- **Perforating:** A specialized gun is used to create small holes in the casing, penetrating the surrounding rock.
- **Fracking:** A high-pressure fluid, composed of over 90% water, sand, and chemicals, is pumped into the well.
- **Fracturing:** This fluid creates and extends fractures in the rock, which releases the trapped oil and gas.
- **Propping:** Sand or small glass beads are pumped in to prop these fractures open, allowing the oil and gas to flow freely to the wellbore after the pressure is released.

What You Need to Know About Fracking In Canad...

What Is Fracking? Fracking is a technique to blast a mixtur...



The Narwhal

Fracking - Wikipedia

Fracking (also known as hydraulic fracturing, fracing,...

Wikipedia



Fracking 101 - NRDC

How does fracking work? It involves blasting fluid deep...



NRDC

Show all

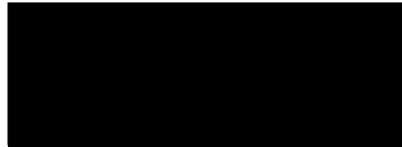
Manitoba Clean Environment Commission

**Expert Report on the Sio Silica Proposed
Vivian Silica Sand Project**

Prepared for:

The Rural Municipality of Springfield, Manitoba

Prepared by:



Christopher J. Neville, M.Sc., P.Eng.



S.S. PAPADOPULOS & ASSOCIATES, INC.
Waterloo, Ontario

January 12, 2023

Executive Summary

The Rural Municipality of Springfield (RM of Springfield) has retained Christopher J. Neville, M.Sc., P.Eng., to advise the municipality on the proposed groundwater aspects of the Vivian Silica Sand Project to be developed by Sio Silica (previously CanWhite Sands Corp.). Mr. Neville has reviewed the technical submissions presented in the report *Vivian Sand Extraction Project – Environmental Act Proposal* (AECOM, 2021a) and Appendix A of that report, *Hydrogeology and Geochemistry Assessment Report* (AECOM, 2021b). This expert report has been prepared to identify issues of potential concern for the groundwater resources of the RM of Springfield. These issues may be conveyed to the Manitoba Clean Environment Commission (CEC), which will advise the Province of Manitoba. The ultimate decision to approve the proposal, and the conditions that may be attached to that approval, rest with the Province.

There is much uncertainty regarding this proposal. Some of this uncertainty is related to the testing that has been conducted during the site investigations, some is related to the interpretations made of the data, and some is related to the approach that has been adopted to assess the potential impacts of mining. The material presented in the *Vivian Sand Extraction Project – Environmental Act Proposal* and the *Hydrogeology and Geochemistry Assessment Report* raises concerns that the site investigations have not adequately characterized the essential elements of the site and the potential impacts to groundwater resources in the RM of Springfield.

Creating a slurry of the Winnipeg Sandstone and extracting silica sand is expected to result in the development of horizontal arrays of “rooms and pillars” in the Winnipeg Sandstone. The proponent has referred to the loss of strength of the sandstone and has also referred to pilot testing that has been conducted. However, there is no indication of whether the loss of strength was assessed during the pilot testing. The proponent has indicated that “Some collapse of the overlying strata may occur but collapse is expected to be limited and not to spread to the surface.” It is not clear from the project documentation whether this is an assumption, or data have been collected and analyzed to support this expectation. In the absence of data, it may be safer to assume that the operations will result in a mass of loose sand with the potential for progressive, large-scale collapse of the overlying strata.

By any standard, the proposal project will require a large number of wells to be subsequently abandoned. The wells will extend across and may connect the otherwise isolated Red River Carbonate and Winnipeg Sandstone. Improperly abandoned wells may act as preferential pathways for the migration of surface contamination into deeper aquifers. The practices adopted for well abandonment will be of particular concern for this project. It is suggested on Page iv of the Executive Summary of the *Vivian Sand Extraction Project – Environmental Act Proposal* that well drill cuttings may be included in the materials used to seal wells. It is also suggested on Page vii that calcified sand (“overs”) may be used in well sealing activities. I caution against using drill cuttings and “overs” for this purpose. Wells should be sealed with bentonite and/or grout to surface to ensure that over the long term they can never act to connect the two aquifers. Furthermore, wells that are no longer in operation should be sealed in a continuous abandonment program rather than being left as open holes until groups of wells are abandoned.

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Section 1

Introduction

I am a professional engineer registered in the Province of Manitoba, #48048. I am the Chief Hydrogeologist of S.S. Papadopoulos & Associates, Inc. (SSP&A), environmental and water-resource consultants. SSP&A operates under Engineers Geoscientists Manitoba Certificate of Authorization No. 7922. I was educated as a civil engineer and I have advanced training in the discipline of hydrogeology. I have over 30 years of professional experience. I am recognized internationally as an expert in the quantitative analysis of groundwater flow and solute transport. In my role of Chief Hydrogeologist and director of SSP&A's Canadian operations I synthesize hydrogeologic data, evaluate groundwater resources, and develop regional and site-scale analyses of groundwater flow and solute transport. My resumé is included as appendix to this report.

The Rural Municipality of Springfield (RM of Springfield) has retained me to advise the municipality on the proposed groundwater aspects of the Vivian Sand Project to be developed by Sio Silica (previously CanWhite Sands Corp.). My role consists of reviewing the technical submissions presented in the report *Vivian Sand Extraction Project – Environmental Act Proposal* (AECOM, 2021a) and Appendix A of that report, *Hydrogeology and Geochemistry Assessment Report* (AECOM, 2021b). My role as a hydrogeology peer reviewer involves identifying issues of potential concern for the RM of Springfield. These issues may be conveyed to the Manitoba Clean Environment Commission (CEC), which will advise the Province of Manitoba. The ultimate decision to approve the proposal, and the conditions that may be attached to that approval, rest with the Province.

My role as hydrogeology peer reviewer for the RM of Springfield has involved the following activities.

1. Supporting the RM of Springfield in its application for Participant Standing for the Clean Environment Commission Panel. The RM of Springfield was granted standing on October 12, 2022.
2. With the assistance of Mr. Mark Prydon, conversion of the requests for clarifications in my May 13, 2022 letter into Information Requests (IRs) in the format required by the Clean Environment Commission. A total of 18 IRs were submitted on November 16, 2022.
3. Preparation of a note summarizing my major concerns regarding the development on December 14, 2022. On December 21, 2022 I attended a virtual meeting with Council to discuss these concerns and respond to questions.
4. Preparation of this expert report.

Section 2

Overview of the major concerns related to the hydrogeologic aspects of the proposed Vivian Sand Extraction Project

The following elements are essential to the assessment of the potential impacts of any major proposal:

- Identification of the natural resources that are potentially affected;
- Prediction of the potential impacts to those resources;
- Evaluation of potential mitigation measures; and
- Evaluation of contingency measures in case the potential mitigation measures are either not feasible or not effective.

The proposed Vivian Sand Extraction Project is a major undertaking involving the fluidization and removal of a portion of the Winnipeg Sandstone aquifer with potential impacts to the overlying Red River Carbonate aquifer. It is indicated in the *Environmental Act Proposal* report that in the area of the Project Site, groundwater in the Red River Carbonate and Winnipeg Sandstone aquifers is used extensively to meet demands for a variety of water uses.¹ It is critical to ensure the groundwater supply is not negatively affected by project operations, and that the Red River Carbonate and Winnipeg Sandstone continue to meet the needs of the community.

It is clear from the reporting that a substantial effort has been involved in conducting the field investigations and developing and documenting the analyses of potential impacts. In my opinion the work has been conducted to a high technical standard. However, at the end of my review I was left two major concerns:

- That the impact assessment may not adequately address the impacts to the Winnipeg Sandstone and the Red River Carbonate aquifers; and
- The drilling and relatively rapid abandonment of a large number of wells may compromise the integrity of the Winnipeg Sandstone and Red River Carbonate aquifers and introduce preferential pathways for the vertical migration of contaminants into the aquifers

By design, the mining will locally alter the properties of the Winnipeg Sandstone. In particular, the Winnipeg Sandstone will be made into a slurry that will be extracted. It is indicated that “the removal of sand will permanently increase the effective porosity and storativity of the Winnipeg Sandstone aquifer within the Project Site through the extraction of material and resulting creation of void space.”² I anticipate that the hydraulic conductivity of the Winnipeg Sandstone will also change substantially, both due to an increase in its porosity and to the collapse of its structure. The analyses conducted for the assessment do not consider the potential effects of the changes in the properties of the Winnipeg Sandstone, either during mining or following the progression of mining around the site.

¹ AECOM, 2021a: *Environmental Act Proposal*, p. 36

² AECOM, 2021b: *Hydrogeology and Geochemistry Assessment Report*, Page 81

It is indicated on Page 75 of the *Hydrogeology and Geochemistry Assessment Report* that for the predictive scenarios one production well is specified at any one time, since production is occurring at one well cluster. However, by the time the wells in cluster 213 have been activated, the Winnipeg Sandstone will have been extensively disturbed by the fluidization and extraction of sand at the other clusters that have been operated in 2025. In my opinion, the assessment of potential impacts of the proposal does not address the cumulative impact of the removal of the sandstone.

It is not clear whether there are data that can support an assessment of the effects of changes in the sandstone properties. I am left with the concern that changes in the properties of the sandstone may invalidate the predictions of local and temporary changes in water levels. It is assumed that the drawdown effects associated with sand extraction are expected to be localized³. In my opinion, it is important to recognize that this assumes that the fluidized sandstone will eventually returns to its pre-mining condition and that mining does not lead to progressive, widespread collapse of the formation.

The Winnipeg Sandstone regional aquifer is protected by the overlying Winnipeg Shale. It is acknowledged in the assessment that mining may result in degradation of the shale and enhanced hydraulic connection between the Red River Carbonate and the Winnipeg Sandstone within the Project Area. It is indicated that degradation of the shale may occur due to fractures and borehole annuli extending across the Winnipeg Shale aquitard. After completing my review, I was left questioning whether any geotechnical analyses have been undertaken to rule out the possibility of widespread collapse of the shale due to its being undermined.

It is indicated that if the impacts of mining exceed expectations, pumps installed near the current elevation of the piezometric surface can be lowered, or alternative water supplies could be provided. There is no analysis to suggest that these mitigation measures might be feasible and whether the provision of alternative water supplies is an acceptable mitigation measure.

I have never encountered a project with as many production wells proposed to be drilled, operated and abandoned. I estimate from the information on the preliminary design that has been provided that almost 400 wells are planned to be abandoned during each year of operation:

$$56 \frac{\text{clusters}}{\text{year}} \times 7 \frac{\text{wells}}{\text{cluster}} = 392 \frac{\text{wells}}{\text{year}}$$

By any standard this is a large number of wells that will have to be abandoned. The wells will extend across and may connect the otherwise isolated Red River Carbonate and Winnipeg Sandstone. Improperly abandoned wells may act as preferential pathways for the migration of surface contamination into deeper aquifers. The practices adopted for well abandonment will be of particular concern for this project. Furthermore, the proponent must commit to initiate abandonment procedures immediately following the end of operations at each well, rather than waiting until operations have ceased at a large number of wells.

³ AECOM, 2021b: *Hydrogeology and Geochemistry Assessment Report*, p. 67

Section 3

Major comments regarding the hydrogeologic aspects of the proposed Vivian Sand Extraction Project

1. It is indicated at the beginning of Section 4.1.4 of the *Environmental Act Proposal* report that groundwater in the vicinity of the Project is obtained from Red River Carbonate Formation and the Winnipeg Sandstone Formation. Referring to Page 16 Figure 1-3 of the *Hydrogeology and Geochemistry Assessment Report*, there are relatively large numbers of existing groundwater users in the Quaternary Sediments, the Red River Carbonate and the Winnipeg Sandstone in the Regional Project Area:

- Number of registered wells within the limits of the groundwater flow model: 10,879;
- Number of registered wells within the Regional Project Area: 1,612; and
- Number of registered wells within the Local Project Area: 406.

In response to RM of Springfield Information Request RMSF-IR-001(a), the proponent has indicated that within the Project Site Area there are an estimated 19 wells completed in the Winnipeg Sandstone aquifer, 62 wells completed in the Red River Carbonate aquifer and 5 wells completed in the overburden aquifer.

Referring to Figure 1-3 of the of the *Hydrogeology and Geochemistry Assessment Report*, there also appear to be 17 existing users in the Winnipeg Shale within the Regional Project Area. In response to RM of Springfield Information Request RMSF-IR-001(b), the proponent confirmed that it is unlikely that groundwater users rely on the Winnipeg Shale for supply. The proponent's reply highlighted the uncertainties associated with the well database.

Screen intervals were not available for all wells. Further, well databases are known to contain information that may not be accurate or is out of date. It is possible that some wells were incorrectly assigned to the Winnipeg Shale, but that cannot be verified without detailed information on screen intervals, well yield and geology in some cases. This is a known uncertainty associated with work completed to date and is best addressed by completing site-specific well surveys in advance of any groundwater or sand extraction activities.

At a minimum, the proponent will need to conduct a detailed survey of neighboring wells to confirm the locations and details of the open intervals and the non-pumping levels in the wells within the Project Site Area.

2. It is indicated on Page 7 of the of the *Hydrogeology and Geochemistry Assessment Report* that the waste materials (calcified sand, bedrock cuttings and shale) “have been deposited on ground surface during the advancement of nearly every water supply well drilled in southern Manitoba for over a century without any reported water quality issues linked to ML/ARD [metal leaching/acid rock drainage]”. While this may be true, it is important to note that the number of wells that are proposed to be drilled over a relatively small area is unprecedented.
3. It is indicated on Page 22 of the of the *Hydrogeology and Geochemistry Assessment Report* that water extracted from the slurry will be passed through an ultraviolet treatment system prior to being re-injected into the Winnipeg Sandstone. In my experience, ultraviolet treatment is effective only if the water is filtered prior to passing through the UV lamps. In response to RM of Springfield Information Request RMSF-IR-002(a), the proponent has confirmed that filtration will be included in the treatment system. In response to RM of Springfield Information Request RMSF-IR-002(b), the proponent has committed to appropriate handling of the materials collected from the filtration system.
4. It is indicated on Page 67 of the *Environmental Act Proposal* report that the effects of mining are reversible (i.e., the aquifer will recharge over time). In my opinion, the indication that the that the effects of mining will be reversible is only an *assumption*. There are no data to assess whether the assumption of reversibility depends on the properties of the Winnipeg Sandstone and the overlying shale. The changes to these wells will not be reversible. In response to RM of Springfield Information Request RMSF-IR-003(a), the proponent has indicated that:

The sensitivity of modelling results and recovery to the properties of the fine-grained materials that overlie the Red River Carbonate was not directly evaluated.

In response to RM of Springfield Information Request RMSF-IR-003(a), the proponents indicate, “The influence of variable hydraulic conductivity of the shale on recovery rates could be further evaluated as part of future modelling updates.” It is important to note that the assessment of the properties of the shale must go well beyond the sensitivity of modelling results. The proponent would have to commit to detailed monitoring of each hydrostratigraphic unit and evaluation of the data during operations.

The proponent indicates that groundwater flow conditions in the Red River Carbonate aquifer and the Winnipeg Formation are likely to recover relatively quickly following mining: *Both aquifers are relatively permeable and connected to a known significant source of recharge below the Sandilands Glaciofluvial Complex* (response to RM of Springfield Information Request RMSF-IR-003(b)). However, the proponent has noted that, “*The sensitivity of the predicted recoveries in the Red River Carbonate Formation and the Winnipeg Formation to recharge in areas where the aquifers are in direct contact with coarse-grained sediments at surface was not directly evaluated.*” In my opinion, the recovery of the aquifer system to mining is an important uncertainty of the proposal.

5. It is indicated on Page 24 of the *Hydrogeology and Geochemistry Assessment Report* that the field investigation was focused on characterizing the hydrogeology of the Local Project Area. Referring to Figure 1-4 and Figure 3-1 of the report, it is important to note that the characterization is actually limited to a small portion of the Local Project Area. Only two wells, Bru 121 and Bru-146 were installed beyond the limits of the yellow rectangle shown in Figure 3-1.

6. It is difficult to draw any general conclusions regarding the potential long-term effects of mining from the available data. The site characterization included a constant-rate test with pumping from a single well at a rate of 372 USgpm for 3 days. In contrast, referring to Figures 6-7 and 6-8 of the *Hydrogeology and Geochemistry Assessment Report*, during each year of operation there will be continuous pumping from an array of 7 wells at a combined rate of 550 USgpm for about 210 days (the arrays will move around during this time). Applying the results of the pumping test to the overall impact assessment therefore necessarily involves a large degree of extrapolation. Referring to the pumping test analysis files included in Appendix E.2 of the *Hydrogeology and Geochemistry Assessment Report*, while water levels in the test pumping well (Bru 95-7) appeared to stabilize, water levels in the observation wells in the Winnipeg Sandstone were continuing to decline at the end of the pumping test. From the available data it is not possible to infer the likely magnitudes of the long-term changes in groundwater levels that would be observed during operations.

Section 4

Detailed comments regarding the assessment of potential groundwater impacts of the proposed Vivian Sand Extraction Project

4.1 References for the *Hydrogeology and Geochemistry Assessment Report*

1. The references in the *Hydrogeology and Geochemistry Assessment Report* are incomplete. Some, but not all, of the missing references are included in Section 10 of the *Environmental Act Proposal* (AECOM, 2021a). No references are provided for the following documents cited in the *Hydrogeology and Geochemistry Assessment Report* (AECOM, 2021b).
 - Matile and Keller (2004)
 - Teller and Fenton (1980)
 - Peltier (1994)
 - Betcher (1986)
 - Ferguson (2004)
 - Matile and Keller (2011)
 - Simpson et al. (1987)
 - Cherry (2000)
 - Friesen (2015)
 - Johnston (1934)
 - Charron (1965)

4.2 Details on proposed project operations

2. A mining plan for the first five years of operations is presented in Figure 6-5 of the *Hydrogeology and Geochemistry Assessment Report*. Referring to the excerpt from this figure shown here in Figure 1, each blue dot represents a cluster of 7 wells that will be drilled, operated and abandoned during 2025. The corresponding schedule of pumping is shown in Figure 6-7 of the report. During each year, pumping will shift from one cluster to the next (for example, from Cluster 213 to Cluster 214).

In response to RMSF-IR-004, the proponent clarified the pumping rates assumed in the impact assessment. Each well in the cluster is planned to be operated for approximately 4 days at a variable rate ranging from 262 m³/day to 654 m³/day (48 to 120 USgpm). If all 7 wells in a cluster were operating continuously this would correspond to 1,834 m³/day to 4,578 m³/day (336 to 840 USgpm). It is indicated in the response that the overall average combined production rate is expected to be 2,943 m³/day. For the predictive simulations, during each year's simulated operating period the cumulative pumping is assumed to be 2,998 m³/day (540 USgpm), slightly higher than the expected average. The cumulative pumping of 2,998 m³/day corresponds to 550 USgpm, which is the rate assumed in the impact assessment, as indicated in Figure 6-7 of the *Hydrogeology and Geochemistry Assessment Report*.

3. The responses to RMSF-IR-005 clarify that there may be extraction pumping at the same time as treated pumped water is re-injected at wells in the same cluster. The *net* groundwater withdrawals may therefore vary from 100% to some smaller fraction of the 550 USgpm, depending on the rate at which water is re-injected.
4. It is indicated on Page 22 of the *Hydrogeology and Geochemistry Assessment Report* that extraction wells within each cluster will be located “approximately 22 m apart”. This is not consistent with the conceptual layout shown in Figure 2-B (see Figure 1 below), which suggests that the wells will be spaced 18 m apart. In response to RMSF-IR-006, the proponent has indicated that the text in Section 2.3 and Figure 2-B of the *Hydrogeology and Geochemistry Assessment Report* should have reflected a well spacing of 18 m.

The proponent has also indicated in the response to RMSF-IR-006 that “new efficiencies have been realized” that may allow for an increase in the distance between wells to produce the same amount of sand. It is my understanding that these efficiencies are inferred from updated geotechnical analyses, but they may also have been inferred from pilot testing referred to the response to RMSF-IR-005. The critical factor controlling the spacing between wells will be the stability of the rock that overlies the Winnipeg Sandstone. This implies that the geotechnical investigations and analyses will have a critical bearing on the final design of the project.

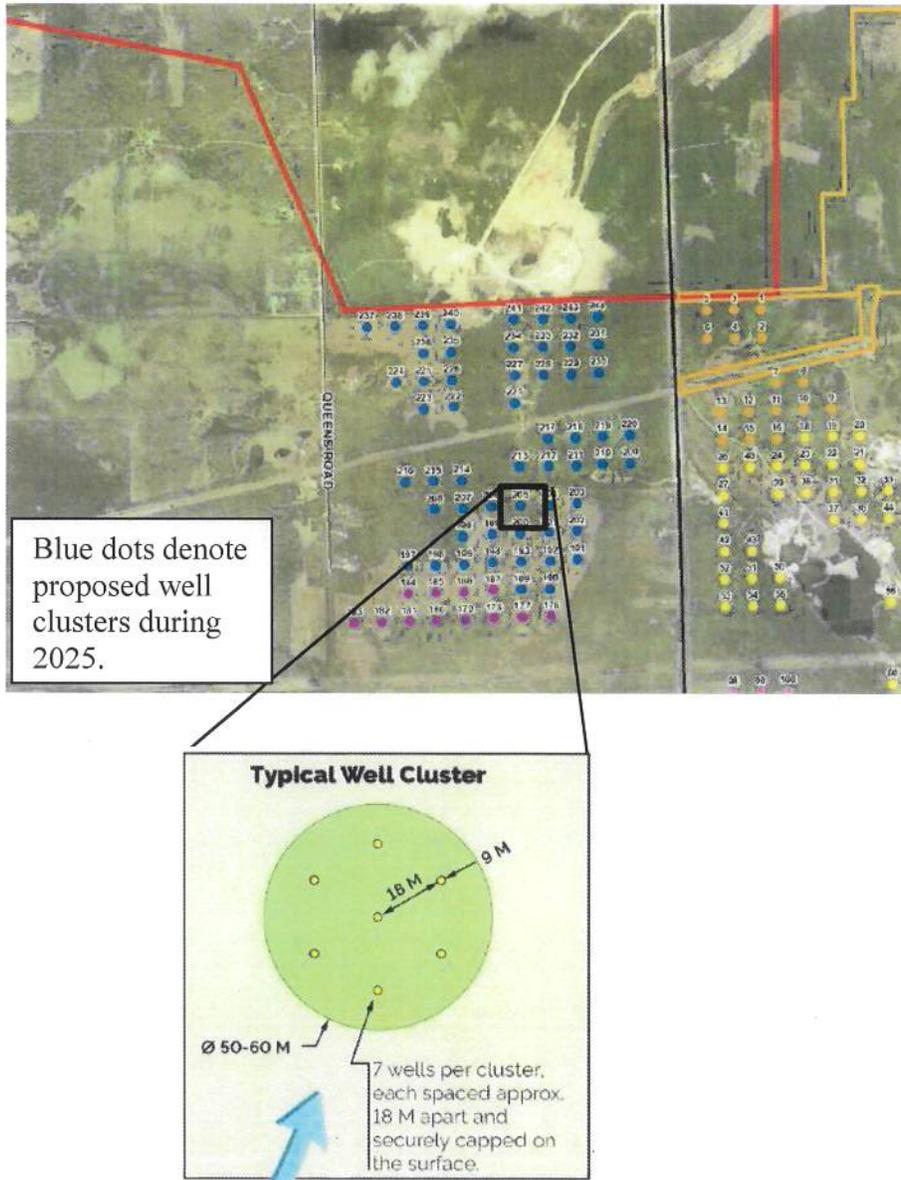


Figure 1. Concept for the proposed well layout during operations

5. It is indicated on Page 19 of the *Hydrogeology and Geochemistry Assessment Report* that the proponent proposes to extract Winnipeg Sandstone from an approximate depth of 51 m to 76 m. However, the conceptual illustration in Figure A-2 suggests that the Winnipeg Shale lies at a depth of 51 m to 54 m. In RMSF-IR-007 it was asked whether the extraction depth of the sandstone should be at least 54 m. The proponent has provided a detailed response to RMSF-IR-007, explaining that the elevations shown in Figure 2-A referred to only one well at a specific location and were included only for illustration purposes.

The sedimentary rocks dip to the west. Based on the available logs for water wells, the interpreted elevations of the top of the Winnipeg Sandstone range from 240 masl to 180 masl across the Project Site Area and the elevations of the base of the Winnipeg Sandstone range from 200 masl to 160 masl. The response to RMSF-IR-007 (b) refers to the estimated depth to the top of the Winnipeg Sandstone indicated in the response to RMSF-IR-007 (a). However, only the elevations of the top and bottom of the Winnipeg Sandstone are indicated in the response, not the depth to the top of the unit. Estimating a ground surface elevation of about 290 masl from Figure 5-1, the estimated depths to the top of the Winnipeg Sandstone range from 50 m to 110 m.

6. It is indicated on Page vi of the *Environmental Act Proposal* that through 2025, “approximately” 0.18% of the silica sand resource will removed and that over the full 24-year lifespan of the project “approximately” 1.06% of the silica sand will be removed. In the response to RMSF IR-008, the proponent has provided the basis for the values. Since these calculations are not developed elsewhere in the documentation, the values are checked here.
- Sio Silica has been granted mineral claims over an area that was estimated in 2019 to contain 3,202 Mt of sand-in-place. The proponent has proposed extracting 5,628,000 tonnes of sand over the initial 4 years of operation.

$$\frac{5,628,000 \text{ tonnes}}{3,202 \text{ Mt} \left| \frac{1,000,000 \text{ tonnes}}{\text{Mt}} \right|} \times 100 = 0.18\% \checkmark$$

- Sio Silica has proposed extracting 1,360,000 tonnes of sand per year for 24 years. This corresponds to a total extraction of 32,640,000 tonnes.

$$\frac{32,640,000 \text{ tonnes}}{3,202 \text{ Mt} \left| \frac{1,000,000 \text{ tonnes}}{\text{Mt}} \right|} \times 100 = 1.02\% \checkmark$$

4.3 Site characterization

7. As part of the site investigation, a constant-rate pumping test was conducted at well Bru 95-7, which is open across the Winnipeg Sandstone. As shown in Figure 1-4 and Figure 3-1 of the *Hydrogeology and Geochemistry Assessment Report* and here in Figure 2, a relatively large number of domestic wells in the vicinity of Bru 95-7 were identified from the Manitoba provincial database. In the response to RMSF-IR-011 it is confirmed that only three of these wells were monitored during the pumping test, Obs 23901, Obs 66124 and Obs S1. Obs 23901 and Obs 66124 are open across the Red River Carbonate Formation and are located 660 m and 491 m from the pumping well, respectively.

Only Obs S1 is open across the same formation as the pumping well and it is located 960 m from the pumping well. It is indicated in the response to RMSF-IR-011 that well Obs S1 is a geoexchange well. The yellow dots in Figure 2 denote the locations of wells indicated the water well database as being open across the Winnipeg Sandstone. It is not indicated in the report whether Obs S1 was the nearest accessible domestic well in the Winnipeg Sandstone.

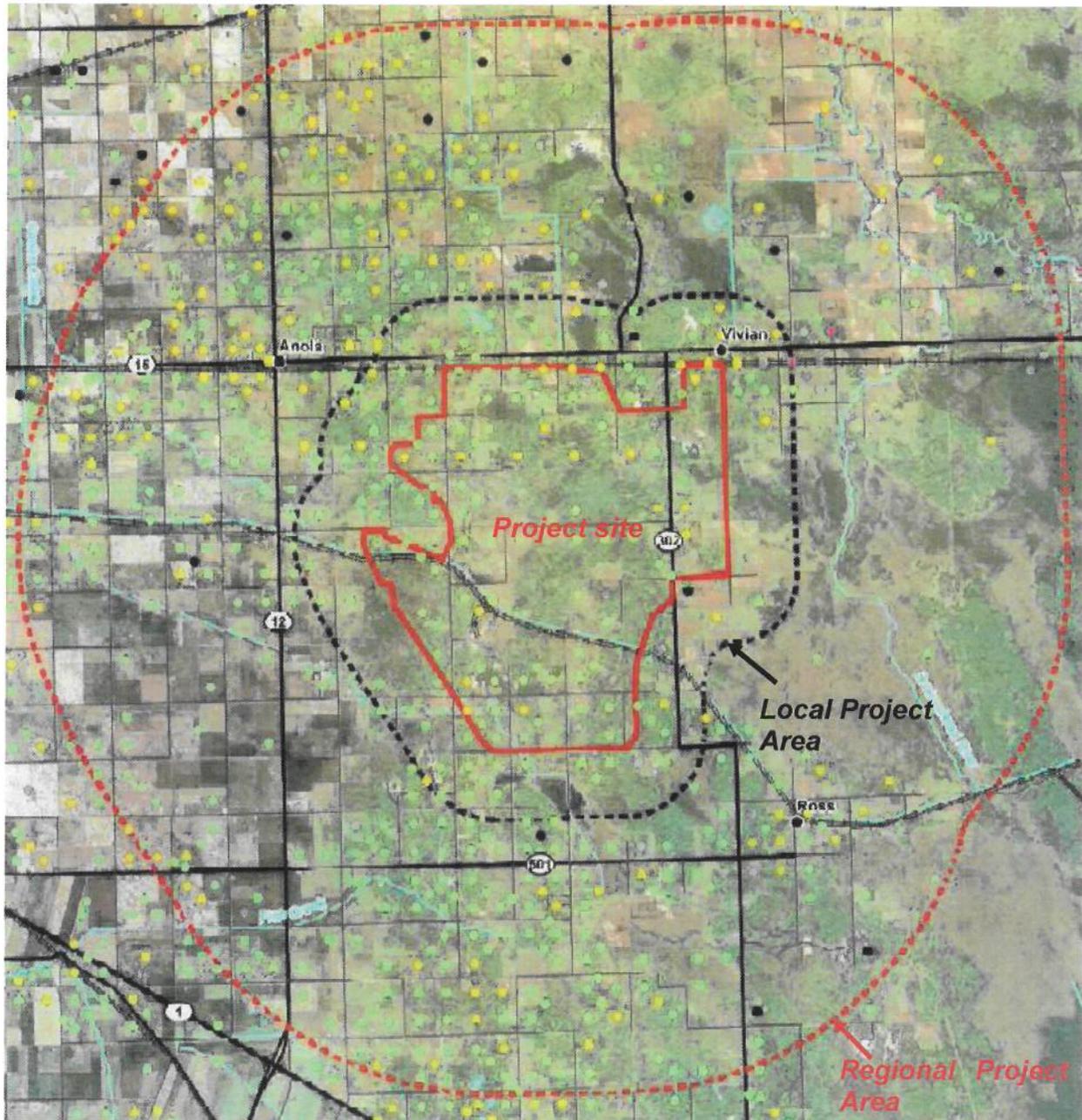


Figure 2. Map of existing groundwater users, colour-coded by aquifer
(Excerpt from AECOM, 2021b, Figure 1-3)

8. Although it is indicated on Page 29 of the *Hydrogeology and Geochemistry Assessment Report* that a step test was conducted at the pumping well Bru 95-7 prior to the constant-rate pumping test, no data or analyses are reported. It is indicated that “Evaluating the hydraulic efficiency of the pumping well was not part of the scope of work.” It is unfortunate that the data from the step test were not analyzed. In my experience, distance-drawdown analyses provide the most reliable estimates of the bulk-average transmissivity. As shown in the distance-drawdown plot reproduced from Appendix E shown here in Figure 3, the data from only three observation wells were considered in the proponent’s estimation of the representative bulk-average transmissivity of the Winnipeg Sandstone. This is important here because the transmissivity of the Winnipeg Sandstone is the key parameter for the prediction of the propagation of the effects of pumping.
9. The data from step drawdown tests can frequently be used to identify additional well losses so that the drawdowns from the pumping well can be treated as if the well was another observation well. The data from the step test may have provided valuable insights explaining the relatively low efficiency of the pumping well (the observed drawdown at the end of pumping of about 32.5 m is about double that inferred from the distance-drawdown analysis).

It is suggested on Page 31 of the *Hydrogeology and Geochemistry Assessment Report* that the “excess drawdown” in the pumping well was due primarily to residual drilling mud in the sand pack and surrounding formation. This does not appear to be consistent with the text on Page 26 of the report, which indicates that an extensive development effort was undertaken prior to conducting the constant-rate pumping test.

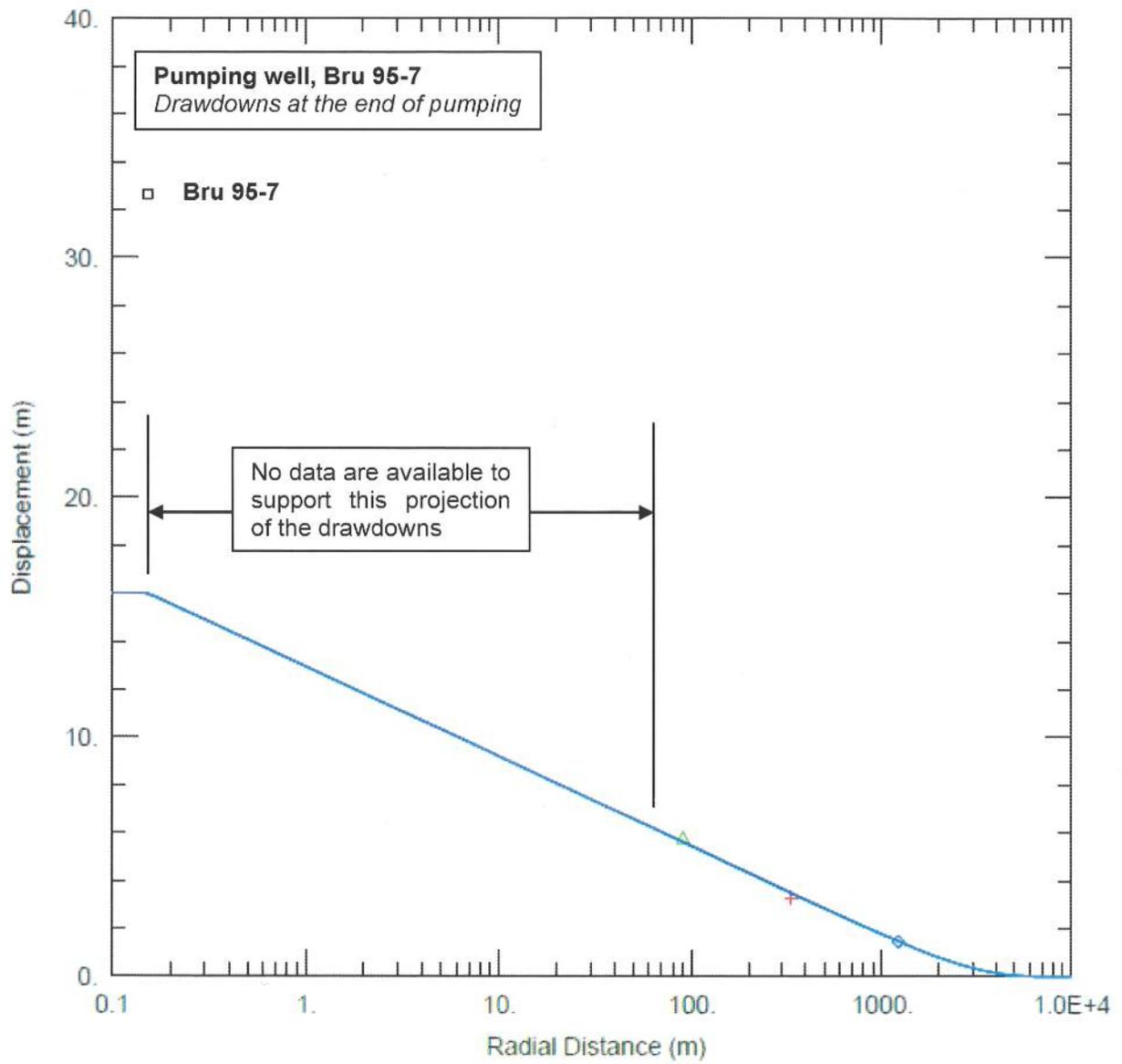


Figure 3. Distance-drawdown analysis for Bru 95-7 pumping test
Adapted from AECOM (2021; Appendix E.2)

10. The analytical models used to match the observations from the Bru 95-7 pumping test are based on the Theis (1935) model of an ideal confined aquifer. Among the most important assumptions of the Theis solution is that the aquifer is homogeneous. Some of the results of the analyses listed on Table 3-C of the *Hydrogeology and Geochemistry Assessment Report* are consistent with this assumption, while others are not. The transmissivities estimated from matching the observation well drawdowns with the Theis solution and the Cooper and Jacob (1946) straight-line analysis are consistent, as they should be when applied in a consistent manner. In contrast, the matching of the pumping well drawdowns with the Theis solution yields a transmissivity that is about half of the value estimated for the observation wells. The transmissivity estimated by matching the observed pumping well drawdowns with the Theis (1935) solution is not reliable here, as the analysis is affected by additional well losses. As shown in Figure 4 here, the Cooper-Jacob analysis effectively filters the additional well losses and the transmissivity estimated for the pumping well is consistent with the observation wells.

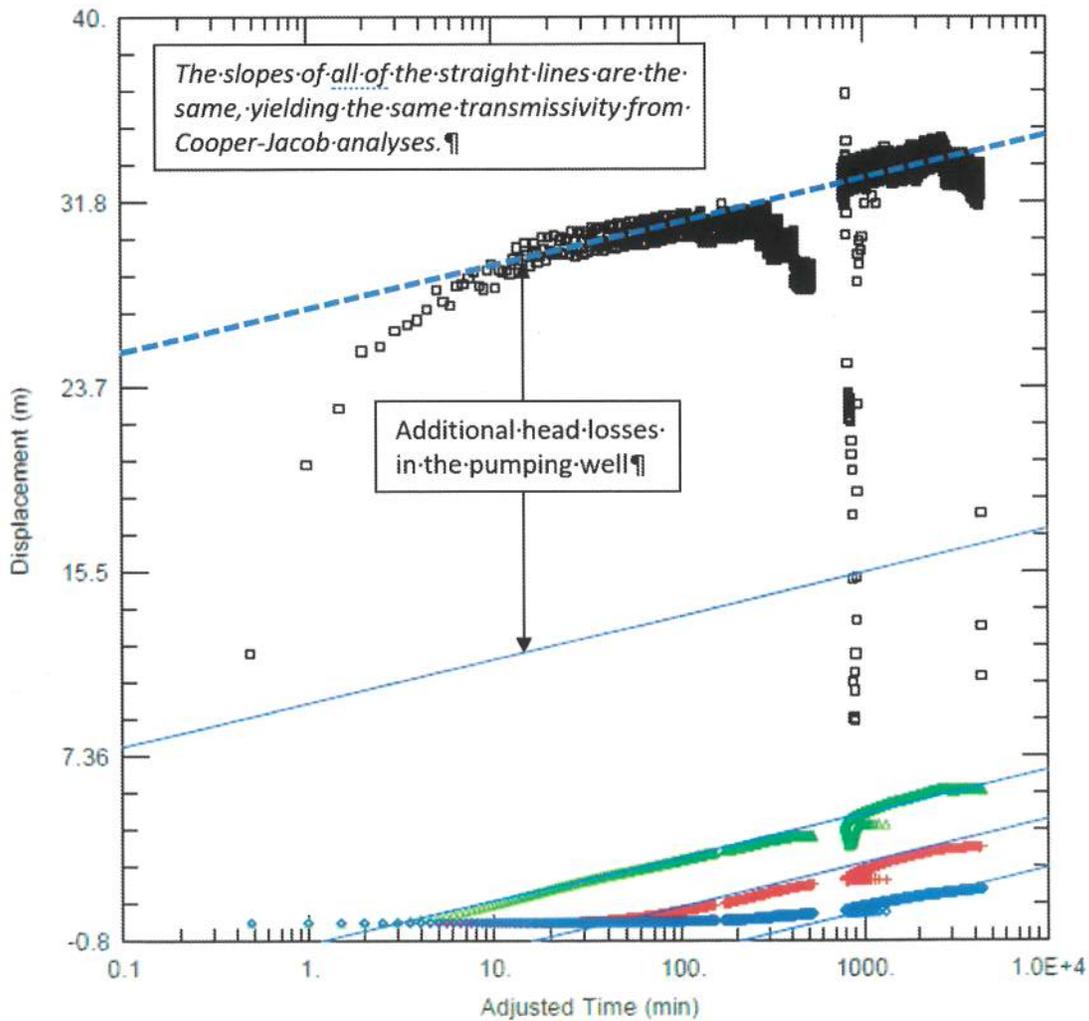


Figure 4 Inference of additional well losses in Bru 95-7
Adapted from AECOM (2021; Appendix E.2)

11. The responses observed following the end of pumping are complex. In an ideal confined aquifer, the recovery data for the pumping well and observation wells should eventually approximate a single straight line that approaches the asymptotic value of zero residual drawdown as t/t' approaches a value of 1.0 (indicated by the red circle in Figure 5). The data satisfy neither of these conditions. The fact that the recovery records approach values of zero drawdown for values of t/t' of about 9, 20 and 25 rather than 1.0 suggests that the drawdown cone at the end of pumping is replenished by a source of water in addition to confined storage.

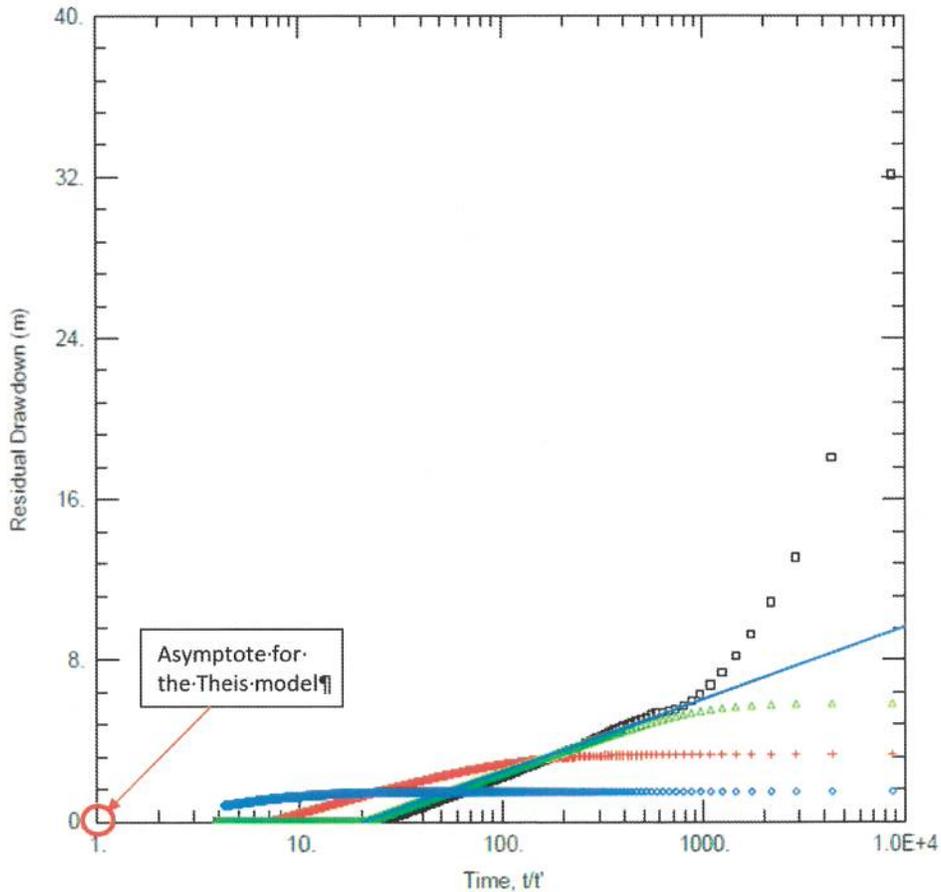


Figure 5. Recovery analysis for the Bru 95-7 pumping test
Adapted from AECOM (2021; Appendix E.2)

12. The additional source of water that is inferred from the recovery portion of the pumping test may be leakage across the Winnipeg Shale. A drawdown of 2.8 m was observed at the vibrating wire piezometer in the shale (Bru 95-8 VW3). Drawdowns in the Red River Carbonate Formation were observed during the pumping test. Variable, but detectible, drawdowns (s) at the end of the pumping test are estimated from the hydrographs.

- Bru 96-2: $s = 0.18$ m
- Bru 95-5: $s = 0.4$ m
- Bru 95-8 (VW2): $s = 1.2$ m
- Bru 95-8 (VW1): $s = 0.3$ m

The properties of the Winnipeg Shale are important with respect to the assessment, as this unit controls the hydraulic connection between the Winnipeg Sandstone and the Red River Carbonate. The report provides conflicting assessments of the Winnipeg Shale. It is indicated on page 32 of the report that in the area of proposed operations the Winnipeg Shale is “an effective hydraulic barrier to interaction” between the Winnipeg Sandstone and the Red River Carbonate. However, it is indicated on Page 60 of the *Hydrogeology and Geochemistry Assessment Report* that the shale “is not well understood” and that its thickness is variable, ranging in thickness from 1 m to 24 m (citing Stantec, 2019). Only one slug test was conducted in the Winnipeg shale (Bru 95-9) and the vertical hydraulic gradients reported on Page 32 of the *Hydrogeology and Geochemistry Assessment Report* are based on only one monitoring located in the shale (Bru 95-8 VW3). In my opinion, there is limited evidence to support the conclusion that the shale is an effective hydraulic barrier between the sandstone and the shale.

13. The interpretations of the vertical hydraulic gradients and directions of vertical groundwater flow on Pages 64-65 of the *Hydrogeology and Geochemistry Assessment Report* are consistent with the values reported on Table 5-B. However, they are not consistent with the sign convention for the gradient adopted in Figures 5-12 to 5-14.

G05SA003 – G050SA013 [G05SA013] (Figure 5-12)

- G05SA003 is the upper well, open in the Red River Carbonate.
- G050SA013 is the lower well, open in the Winnipeg Sandstone.
- The water levels in G05SA003 are almost always lower than in G050SA013. Therefore, the hydraulic gradient is *negative*, not positive as indicated in Figure 5-12. Vertical groundwater flow should almost always be upwards.

G05SA014 – G050SA015 [G05SA015] (Figure 5-13)

- G05SA014 is the upper well, open in the Red River Carbonate.
- G05SA015 is the lower well, open in the Winnipeg Sandstone.
- The water levels in G05SA014 are always higher than in G05SA015. Therefore, the hydraulic gradient is *positive*, not negative as indicated in Figure 5-13. Vertical groundwater flow should always be downwards.

G050J163 – G050J175 (Figure 5-14)

- G050J163 is the upper well, open in the Red River Carbonate.
- G050J175 is the lower well, open in the Winnipeg Sandstone.
- The water levels in G050J163 are always higher than in G050J175. Therefore, the hydraulic gradient is *positive*, not negative as indicated in Figure 5-14. Vertical groundwater flow should always be downwards.

G050J176 – G050J177

Hydrographs for the fourth pair of wells listed on Table 5-B, G050J176 and G050J177, were not included in the *Hydrogeology and Geochemistry Assessment Report*. The hydrographs have been included in the response to RMSF-OR-013. Contrary to what is suggested on Table 5-B, the vertical hydraulic gradient at this location is generally not neutral. The data shown in the hydrograph suggest that during the spring the water level in G050J177 was higher than in G050J176, while through the summer and fall of 2020 the water level in G050J176 was higher. These data suggest that the vertical hydraulic gradient changes direction during the year.

14. It is indicated on Page 66 of the *Hydrogeology and Geochemistry Assessment Report* that the difference between water levels in the Red River Carbonate Formation and the Winnipeg Sandstone Formation suggest that the two aquifers are “not highly interconnected in the immediate vicinity of the observation wells listed on Table 5-B”. The data that are presented do not support this suggestion. Inspection of Figures 5-12 through 5-14 suggests there is a direct connection between the two aquifers. In the case of wells G05SA003 and G050SA013 (Figure 5-12), the water levels in the two wells are nearly identical. In the cases of wells G05SA014/G050SA015 and G050J175/G050J163 (Figure 5-13 and Figure 5-14), the trends in the water levels are similar and the daily fluctuations in the records in the two wells at each location track each other closely.

The data suggest it is likely that the natural variability in the thickness/spatial extent and hydraulic properties of the Winnipeg Shale are the most important contributors to the exchange of water between the two aquifers.

4.4 Groundwater modelling

15. The groundwater model includes single layers representing the Red River Carbonate (model layer 4) and the Winnipeg Shale (model layer 5). In my experience, where carbonate rocks are the uppermost rocks, it is typical to encounter an interval of weathered rock that has properties quite distinct from the underlying rock. It is generally appropriate modelling practice to incorporate a separate layer representing the top-of-rock zone.
16. I concur that recharge is a key driver of the regional flow balance. Referring to Table 6-B of the *Hydrogeology and Geochemistry Assessment Report*, I note that recharge accounts for 98% of the simulated inflows to the groundwater model. Calibrated hydraulic conductivity values are reported on Table 6-C and calibrated recharge rates are reported on Table 6-D. The recharge rates and vertical hydraulic conductivities of the surficial sediments are directly correlated and cannot be estimated independently. The reporting does not include any indication of how the correlation between hydraulic conductivity and recharge has been addressed in the analyses.
17. In my opinion, it is possible that the recharge over the model area is overestimated. It is indicated on Page 73 of the *Hydrogeology and Geochemistry Assessment Report* that the recharge is related to the mean annual precipitation at the Ostenfeld climate station for 1981-2020, 639 mm. Depending on the source, it appears that the average annual precipitation near Winnipeg is substantially less, between about 450 mm and 520 mm (see for example, (<https://weather-and-climate.com/average-monthly-precipitation-Rainfall-inches.winnipeg.Canada> and <https://www.weather-atlas.com/en/canada/winnipeg-climate#snowfall>). Referring to the excerpt from the Atlas of Canada reproduced here in Figure 6, the average annual precipitation over the study area is about 21 inches (530 mm).

A simplified analysis of the precipitation surplus (Precipitation – Evapotranspiration), which represents the maximum amount of water that is available to recharge the water table, has been developed with the Thornthwaite-Mather analysis. According to the results of my calculations shown in Figure 7, the average annual surplus is about 130 mm. The implied annual evapotranspiration from the Thornthwaite-Mather analysis is 400 mm, which is roughly consistent with the average annual value of 450 mm mapped in Morton (1975) [see Figure 8].

The recharge rates applied for the Birds Hill and Sandilands areas of the groundwater model are substantially larger than 130 mm (250 mm/yr and 189 mm/yr, respectively). Specification of too high recharge rates will have the effect of attenuating the simulated effects of the proposed development. In my opinion, it is appropriate practice to obtain water budgets from the Engineering Climate Services of Environment Canada for several climate stations around the study area (ec.scg-ecs.ec@canada.ca).

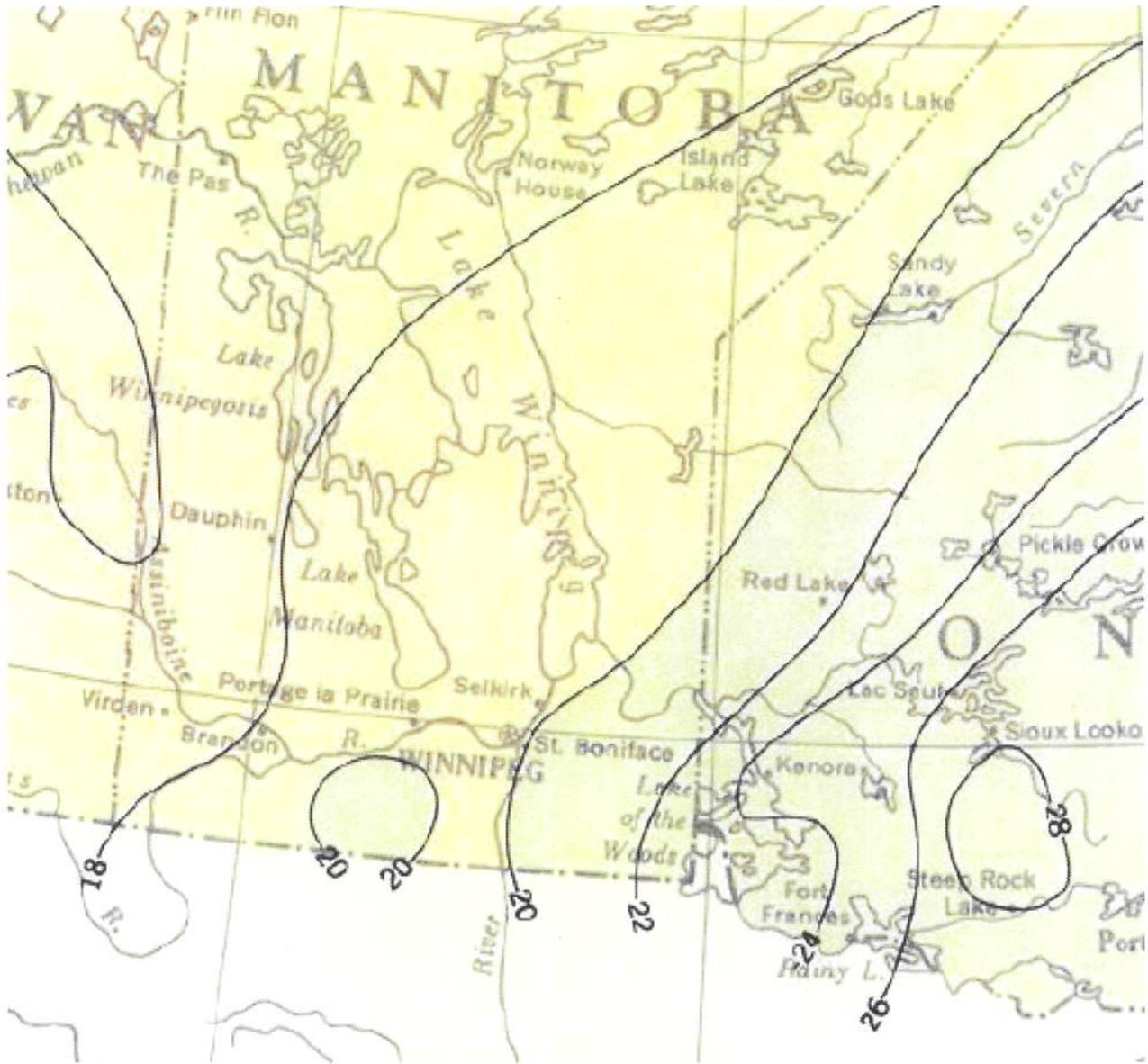


Figure 6. Average annual precipitation (inches)

Reproduced from Atlas of Canada (Meteorological Division, Department of Transport, 1957)

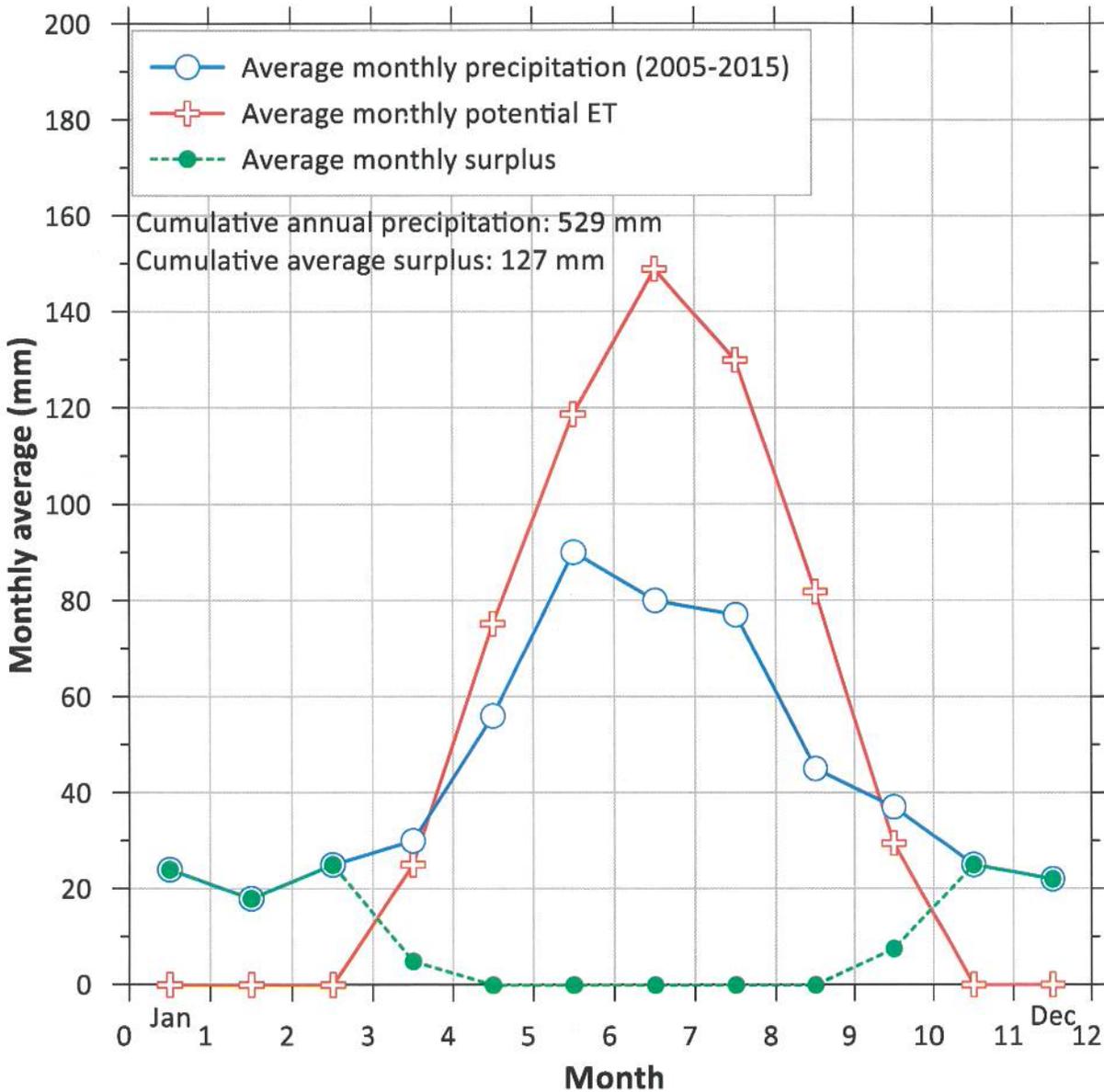


Figure 7. Simplified Thornthwaite-Mather analysis to estimate the average annual surplus

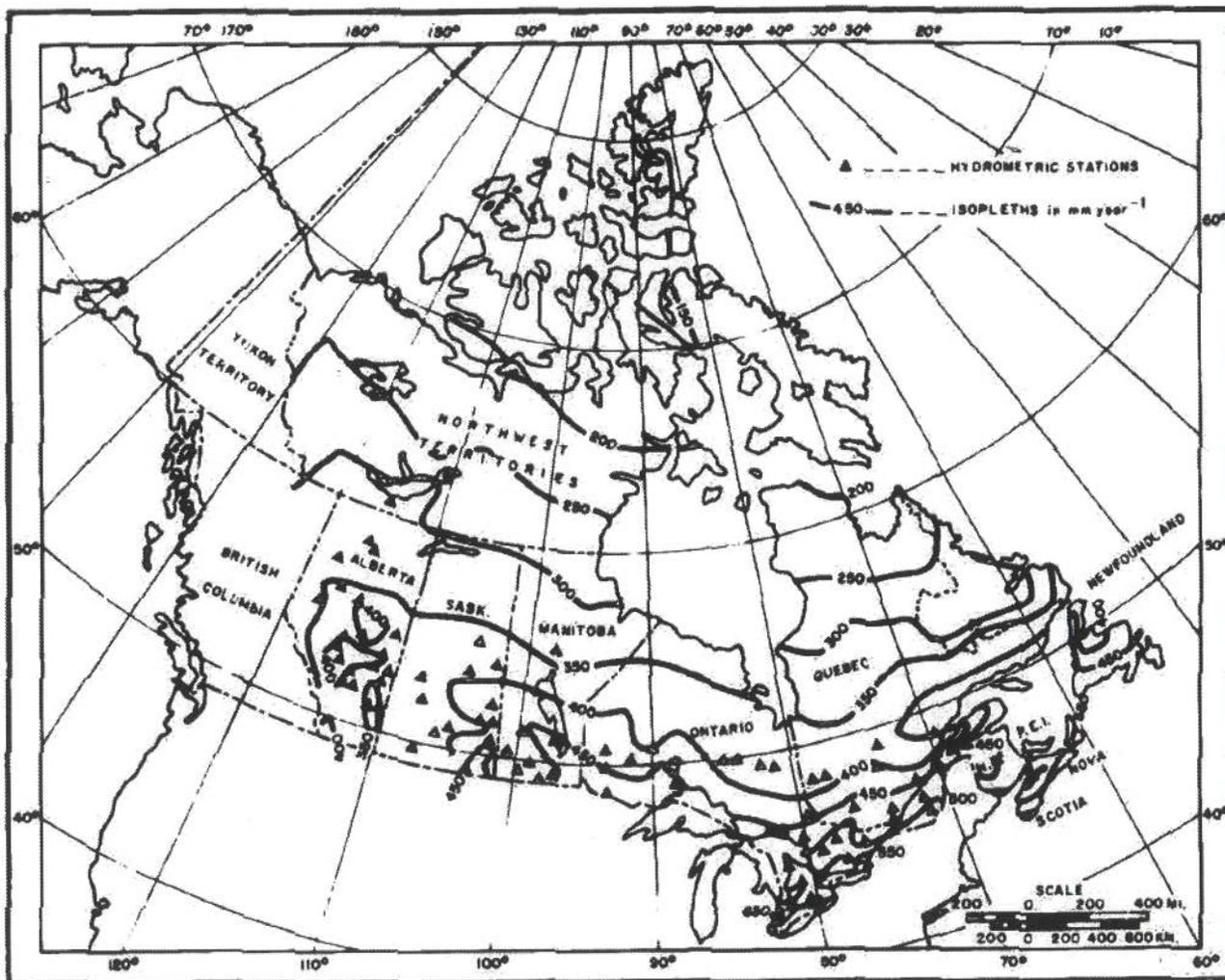


Figure 8. Average annual evapotranspiration (mm)
(Reproduced from Morton, 1975)

18. A scatterplot comparing the model results against the targets for the steady-state calibration is presented in Figure 6-2 of the *Hydrogeology and Geochemistry Assessment Report* and reproduced here in Figure 9. In my opinion, the scatterplot does not provide a convincing demonstration that the model has been adequately calibrated. I base my opinion on the following observations.

- No distinction is made between the reliability of the water levels that are used as targets. Average water levels estimated for dedicated observation wells installed for the project and the wells from the Manitoba Provincial Monitoring Program should be assigned higher weights in the calibration. In terms of the graphical presentation, the symbols for these wells should be prominent.
- As shown in Figure 9, the model exhibits a clear bias to overpredict water levels. The mean residual is 3.27 m.
- As indicated by the red dashed lines added in Figure 9, at the location of any particular target it appears that the mismatch of the model is likely on the order of ± 15 m. It may be debated that the Root Mean Square Error (RMSE) is a better measure of the local mismatch than the range of the errors estimated here by eye. Acknowledging this, it is still important to note that for this model the RMSE of 5.46 m is relatively large compared to the anticipated effects of the proposed operations.
- Although the Normalized Root Mean Square Error (NRMSE) is frequently adopted as a measure of the model goodness-of-fit, it is important to note that it is open to mis-application. In particular, the value of the NRMSE depends on the interpreted range of the observed water level targets. The NRMSE is defined as:

$$NRMSE (\%) = \frac{RMSE}{Range\ of\ Observations} \times 100$$

Noting that the reported RMSE is 5.46 m and the reported NRMSE is 1.70%, the back-calculated Range of Observations is 321.2 m. As shown in Figure 9, the range of the observations is more likely 125 m. With this range the NRMSE is re-calculated as 4.3%.

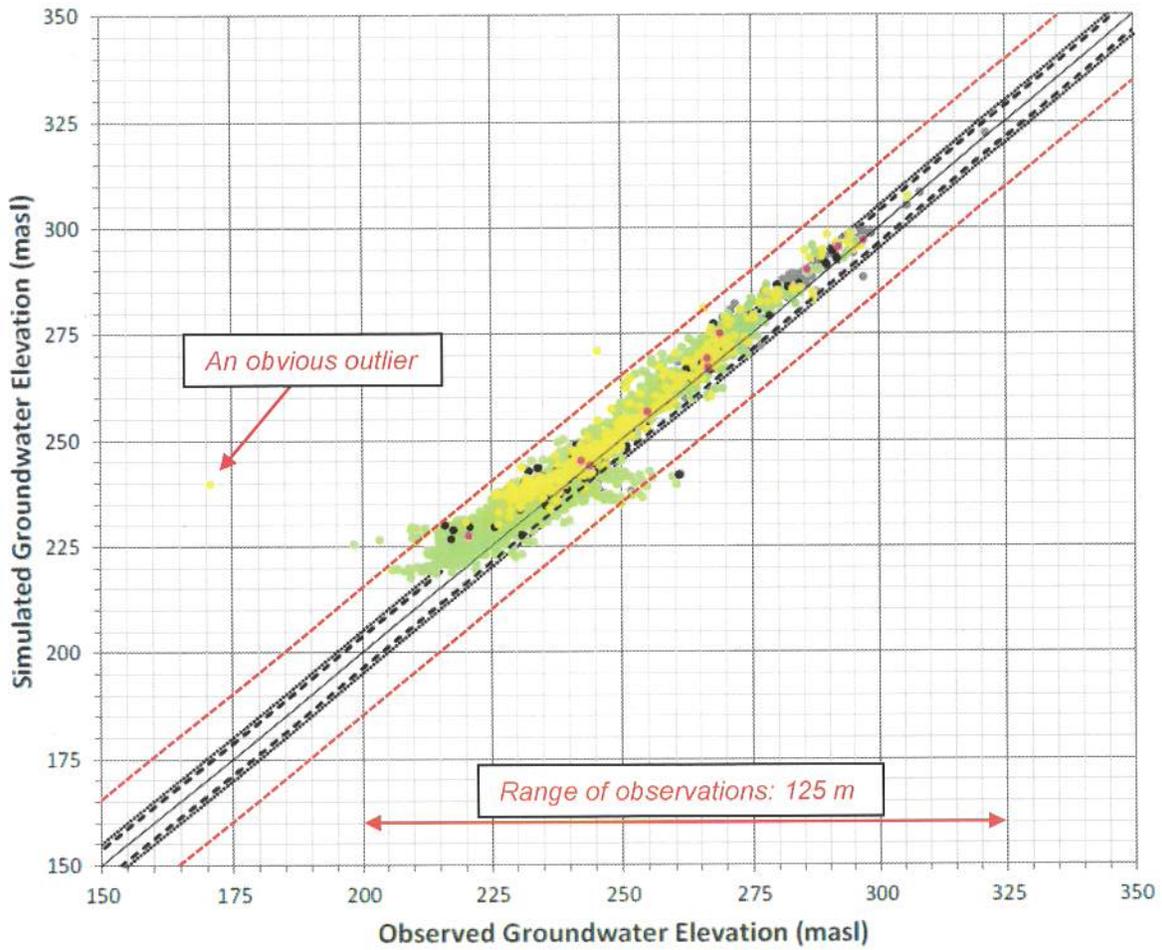


Figure 9. Scatterplot for the steady-state model calibration
Adapted from AECOM (2021b; Figure 6-2)

19. It is indicated on Page 72 the *Hydrogeology and Geochemistry Assessment Report* that at lower elevations, the calibrated steady-state groundwater model simulates groundwater levels that are higher than observed. The mismatch near Winnipeg is attributed to increased groundwater use in the area east of Winnipeg that is not accounted for in the modelling analysis. Based on my examination of Figure 6-3, the mismatch along the Red River is more suggestive of a problem with the model structure. As shown in the excerpt from Figure 6-3 shown here in Figure 10, there is an area close to Winnipeg where the simulated water levels are more than 10 m *lower* than observed (red circles; observed – simulated > 10 m). North of this area there is an area close to Red River Floodway where the simulated water levels are more than 10 m *higher* than observed (pink circles; observed – simulated < - 0 m). The large positive and negative residuals suggests that the boundary conditions may not be assigned appropriately.

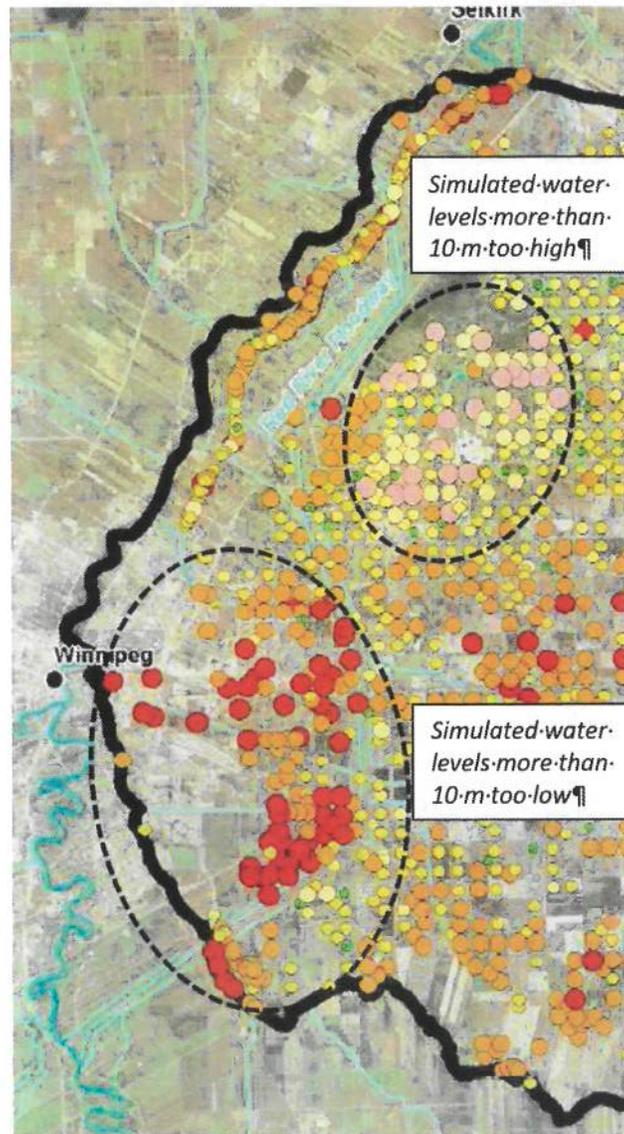


Figure 10. Detail of calibration residuals near Winnipeg
Excerpt from AECOM (2021b; Figure 6-3)

20. It is indicated on page 73 of the *Hydrogeology and Geochemistry Assessment Report* that at distances greater than 300 m the groundwater model simulates smaller drawdowns than were observed during the pumping test. This is highlighted in the comparison between observed and simulated drawdowns at the end of the pumping test. The drawdowns have been estimated from Figure 6-4. The results shown here in Figure 11 suggest that there is a systematic underestimation of the drawdowns at more distant locations in the Winnipeg Sandstone. This has important implications with respect to the impact assessment, as it is an indication that potential impacts on neighboring private wells may be underestimated.

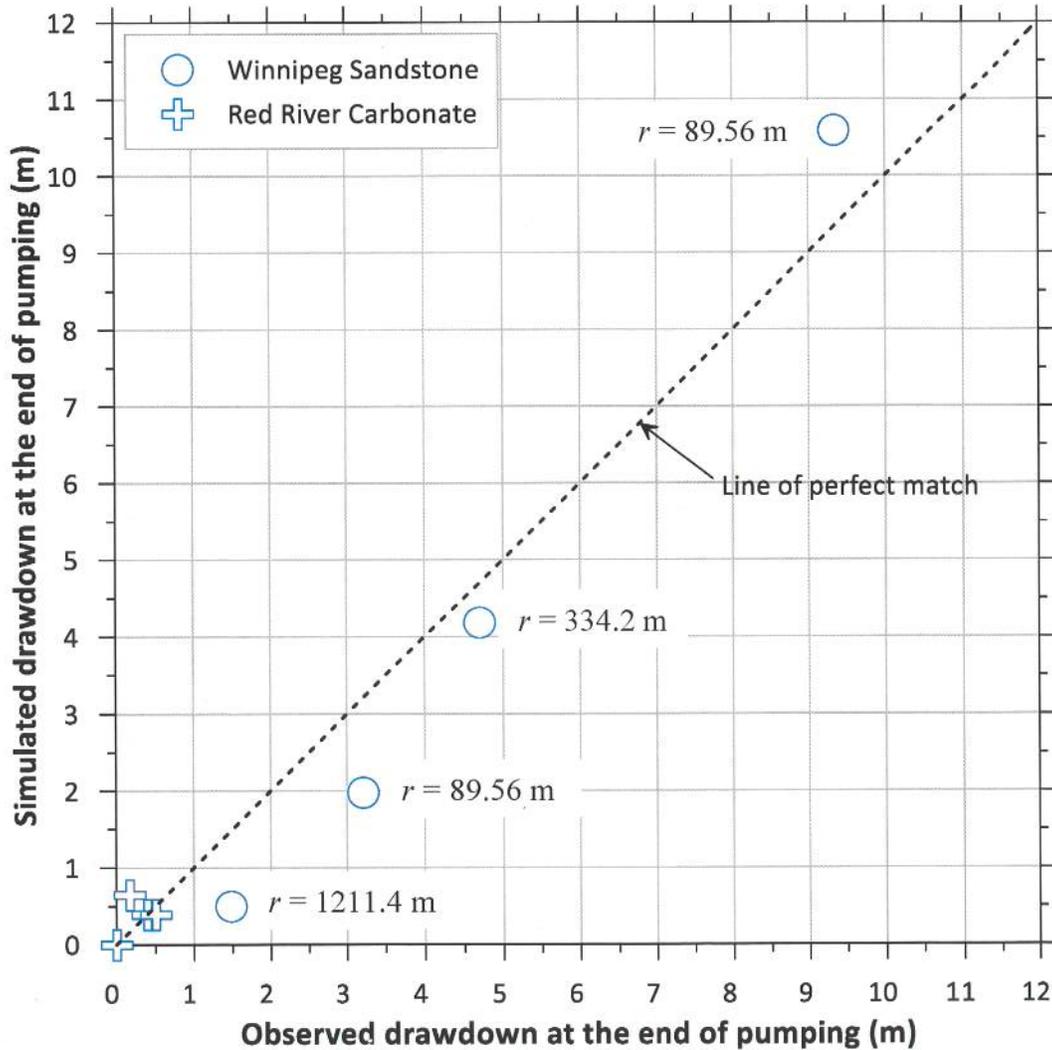


Figure 11. Comparison of observed and simulated drawdowns for the Bru 95-7 pumping test

21. Limited data are available to assess whether representative values of the hydraulic conductivities of the Winnipeg Sandstone and the Red River Carbonate have been inferred through model calibration. As shown here in Figure 12, although the value of the hydraulic conductivity of the Winnipeg Sandstone specified in the groundwater model is consistent with the estimates obtained from the two slug tests, it is substantially lower than the value inferred from the pumping test. The hydraulic conductivity of the Red River Carbonate specified in the groundwater model is within the range of the two estimates obtained from slug tests, but the most important conclusion that might be drawn from the comparison is that the two slug test estimates vary by a factor of about 25.

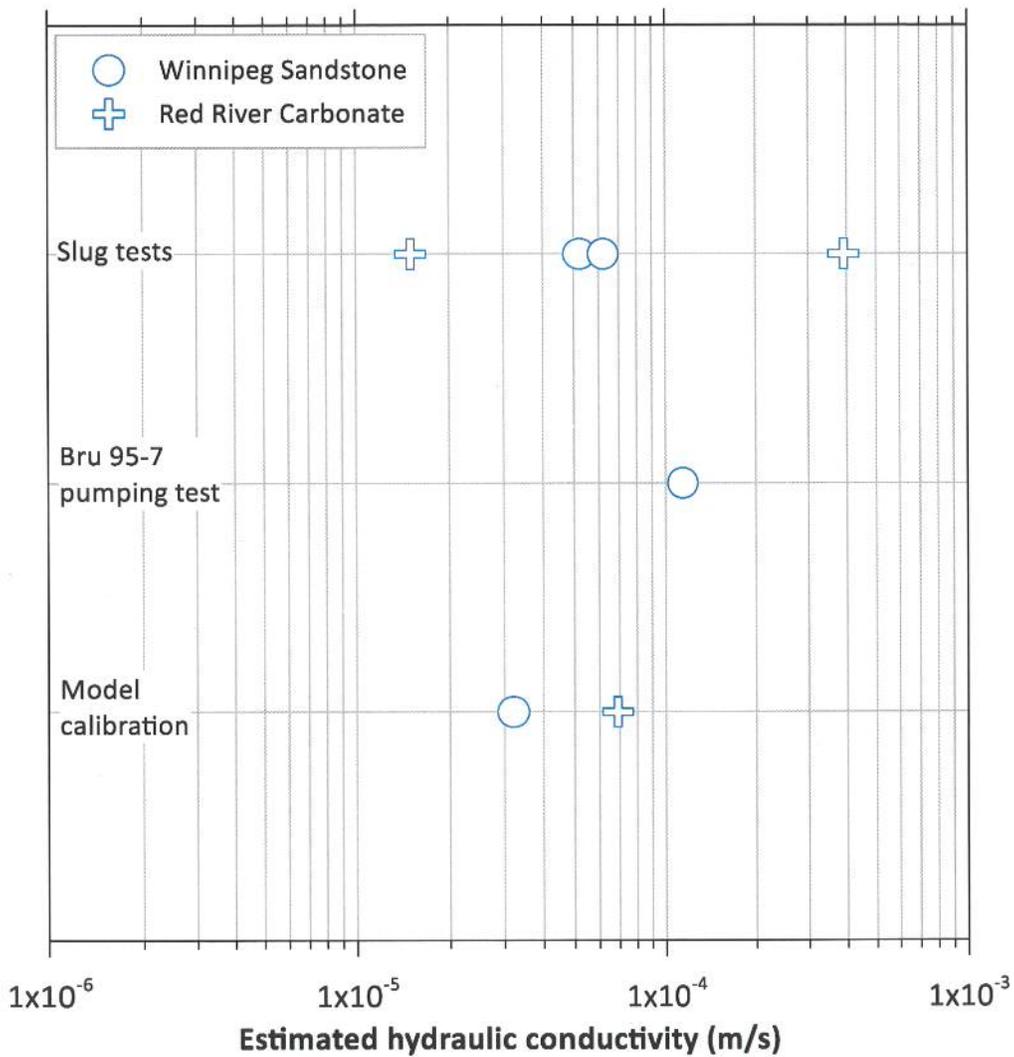


Figure 12. Summary of hydraulic conductivity estimates

22. Certain other aspects of the presentation of the calibrated aquifer properties in Section 6.9.3 are not clear in the documentation.

- Referring to Figure 5-4 of the *Hydrogeology and Geochemistry Assessment Report*, the Lower Shale/Precambrian Bedrock is represented with a model layer that extends to an elevation of 0.0 m (i.e., mean sea level). The model layer is assigned a hydraulic conductivity that is 7 orders of magnitude less than the overlying Winnipeg Sandstone. It was not clear from documentation what data were available to constrain the assignment of the hydraulic conductivity of the Lower Shale/Precambrian bedrock. Details for supporting the specification of the of the hydraulic conductivity of the Lower Shale/Precambrian bedrock are provided in response to RMSF-IR-014.

“It is acknowledged that the hydraulic properties of these very deep units are poorly constrained, but they are not likely important to the conclusions and recommendations of the Hydrogeology and Geochemistry Assessment given their depth and likely low permeability in comparison to the overlying units.”

- The basis for assigning the vertical hydraulic conductivities of the stratigraphic units was not indicated in the documentation. In the response to RMSF-IR-014 it is indicated that with the exception of the Red River Carbonate, a vertical anisotropy ratio of 1:10 was simply assumed. It is also indicated in the response that sensitivity analyses were not conducted to assess the significance of the vertical hydraulic conductivity with respect to the model calibration and predictions. It is not clear whether the vertical hydraulic conductivities specified in the groundwater model have an important influence on the prediction of potential impacts of the development. Of greater significance is the potential large-scale change in the properties of the Red River Carbonate and the Winnipeg Sandstone arising from collapse of the intervening shale.
- In response to RMSF-IR-014 it is indicated that although a sensitivity analysis with respect to values of the specific storage was not conducted, the results “are relatively well constrained by literature values”.

4.5 Impact assessment

23. For the case of 0% re-injection, the pumped water is simply removed from the model. From the perspective of the impact assessment, this simulation will yield worst-case results, that is, it will have the effect of exaggerating the potential impacts.
24. Referring to the response to RMSF-IR-015, it is my understanding that the re-injection of groundwater is not explicitly simulated. Instead, for the case of 50% re-injection an “effective” pumping rate equal to about half the extraction rate from the equivalent well at the center of a cluster is specified. The relatively small difference between 550 USgpm/2 and the rates of 265 USgpm and 275 USgpm cited in the response to RMSF-IR-015 reflects the residual moisture on the extracted sandstone.
25. Referring to Pages 5-6 and Figures 6-9 to 6-13 of the *Hydrogeology and Geochemistry Assessment Report*, the limits of groundwater impacts are defined as the 1.0 m drawdown contour. It is indicated that changes in groundwater levels of this magnitude are similar to those experienced due to natural seasonal variability. This interpretation should be confirmed with a review of the magnitudes of the natural fluctuations in the water levels in the wells in the Manitoba groundwater monitoring program within the model area (Figure 6-1).
26. The predictions shown in Figure 6-7 of the *Hydrogeology and Geochemistry Assessment Report* should correspond to Scenario 4 (p. 74) and the predictions shown in Figure 6-8 should correspond to Scenario 5. However, the same pumping histories are shown in Figures 6-7 and 6-8. The following correction is issued in the response to RMSF-IR-016.

The pumping history shown on Figure 6-8 does not reflect the pumping history simulated by Scenario 5. This graph should reflect pumping rates that follow a similar temporal pattern to those shown, but vary in magnitude from approximately 280 US gpm to 0 US gpm seasonally as illustrated in Appendix H of the Hydrogeology and Geochemistry Assessment Report.

27. Mining is assumed to have no effect on the properties of the Winnipeg Sandstone, either during or after pumping. The basis for the assumption is presented in the response to RMSF-IR-017.

The project proposes to remove a very small proportion of the overall volume of sand in the Winnipeg Sandstone aquifer and will leave residual water-filled voids where the sand has been extracted. It is understood that this will increase the overall storativity of the aquifer as the effective porosity of the water-filled void will be 100%. Between the voids, the sandstone aquifer will not be disturbed by mining and will remain intact. Local hydrogeological properties (e.g., hydraulic conductivity and storativity) will be quite variable depending on whether measurements are collected within a water-filled void or within the intact aquifer between the voids. However, the scale of the project is regional, and the response of the aquifer to sand removal will be governed by regional aquifer properties as measured at the scale of the Representative Elementary Volume (REV), as the source of recharge is from both surface and distal inputs near the Sandilands Complex east of the project.

Reasonable efforts were undertaken to simulate the effects of sand extraction and groundwater reinjection on the aquifer and adjacent well users. Similar to other conventional underground mining projects, it is not possible to directly measure the magnitude of any change in aquifer properties prior to completion of mining. The numerical groundwater model developed for this assessment implemented time-variant changes in hydraulic properties around the production wells, in an effort to simulate the response of the aquifer to sand extraction.

The assumption that between the voids created by mining the Winnipeg Sandstone aquifer will not be disturbed by mining and will remain intact is a very strong assumption. While there is no evidence that sand extraction will lead to widespread collapse of the Winnipeg Sandstone and the rock units that overlie it, there is no evidence that this possibility can be discounted outright. In the response to RMSF-IR-017 it is indicated that the scale of the project is regional. It is possible that the scale of the *impacts* of sandstone mining will also be regional in scale. In the response to RMSF-IR-005 reference is made to pilot testing. However, no descriptions of the pilot testing are presented and there are no indications as to whether displacements of rock unit were measured during the testing. Although it may not be possible to directly measure the magnitude of any change in aquifer properties prior to completion of mining, it is certainly possible to measure ground movements and changes in groundwater conditions around the site during operations.

In the response to RMSF-IR-018 it is indicated that the areas with the potential for degradation of the Winnipeg Shale are estimated to be 188 ha (Year 0) to 691 ha (Years 1 through 4), “based on the simplified assumptions taken during groundwater modelling”. These areas are sufficiently large to support detailed monitoring, which is the only real way to test the assumptions incorporated in the analyses. As the center of production shifts through time, the extent of zone of degraded shale is assumed to expand. Referring to the excerpt from Figure 6-5 of *Hydrogeology and Geochemistry Assessment Report*, shown here in Figure 13, the extent of the degraded shale is assumed to extend 200 m beyond the limits of the 2025 wells. It is indicated in the response to RMSF-IR-018 that the extent of the degraded zone will be “validated during operations”. This validation will be essential to demonstrate that the effects of mining are understood, controllable and limited to the Project Site Area.

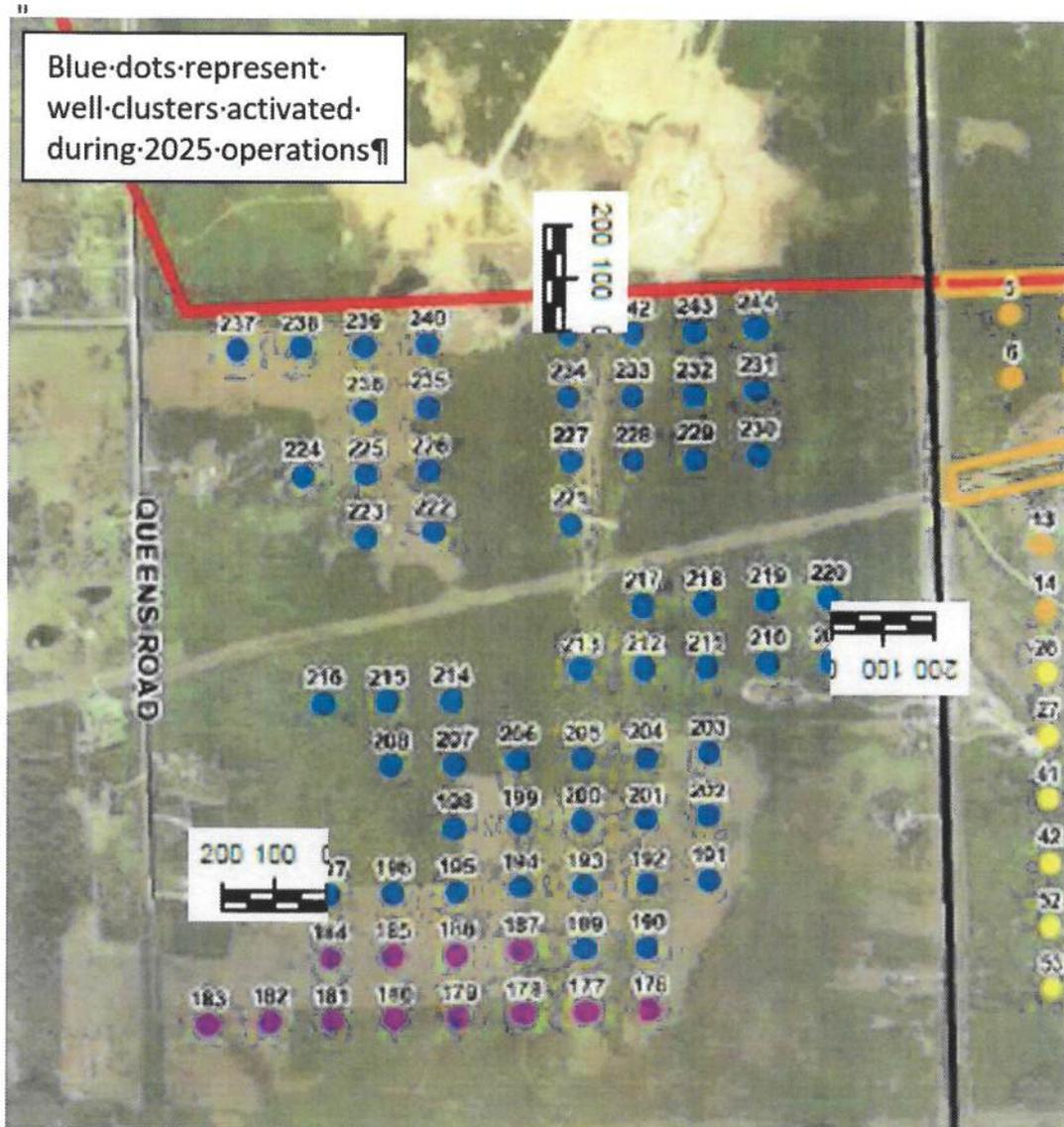


Figure 13. Well clusters activated during 2025
Adapted from AECOM (2021b; Figure 6-5)

28. In theory, it should be feasible to conduct a back-of-the-envelope check on the results for the steady-state analysis of Scenario 3 (0% re-injection, no degradation of Winnipeg Shale). Referring to Table 6-1, steady-state drawdowns of 0.9 m and 0.0 are reported for G05SA014 and G05OJ163, respectively. The Theis (1935) solution is applied here with the parameter values listed on Table 6-C, assuming an aquifer thickness of 21.1 m and specifying the approximate radial distances between 30-10-8E1 and G05SA014 and G05OJ163. It is not clear why the results of the groundwater model are so much smaller than those estimated with the Theis solution. My expectation is that the steady-state analysis would provide conservative upper-bound estimates on the drawdown.

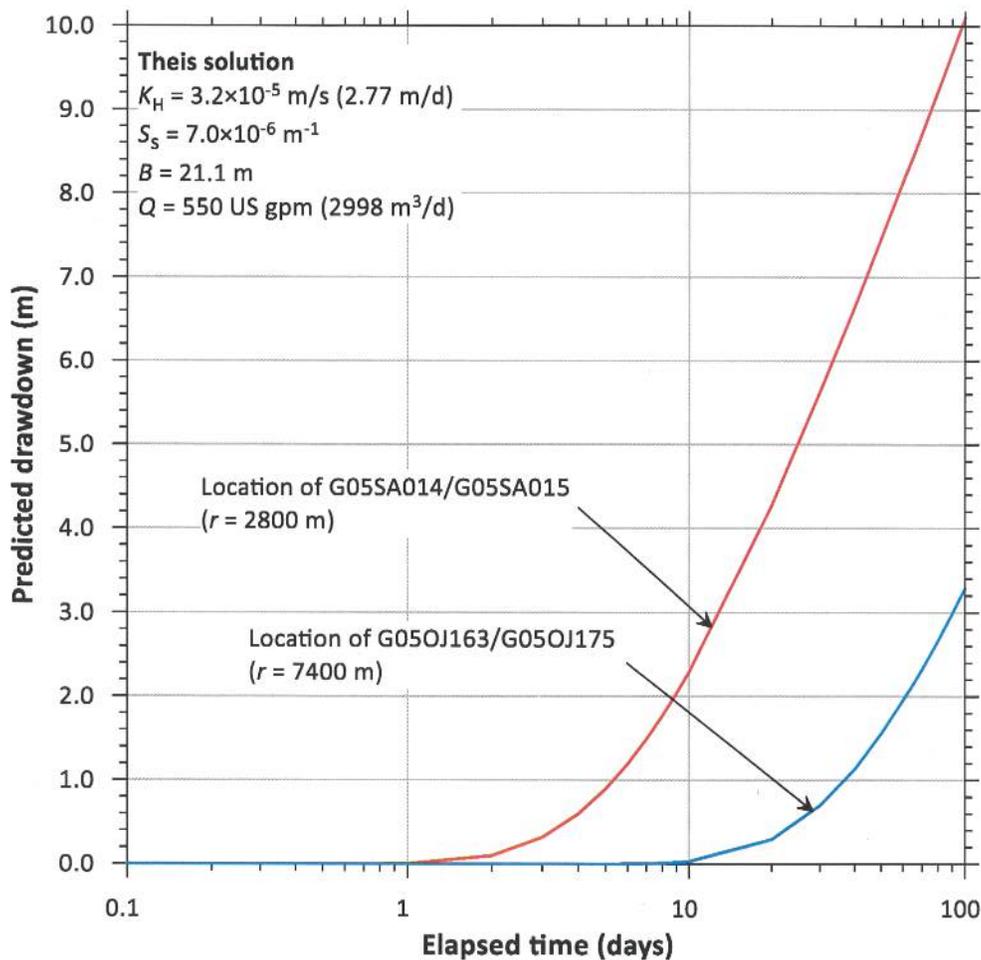


Figure 14. Results of simplified analysis of the transient response to pumping near well 30-10-8E1

29. It is not clear that the predictions of transient drawdowns are consistent with the results of the steady-state analyses presented in the *Hydrogeology and Geochemistry Assessment Report*. To compare the results between the scenarios, I have identified the time when pumping is closest to observation well 20-10-8E1 and extracted the results for well 20-10-8E1 from Table 6-1, Figure 6-7 and Figure 6-8. For the transient scenarios, the drawdowns listed below are estimated as the maximum drawdowns from the figures. Comparing the results of Scenarios 1 and 2, and Scenarios 4 and 5, it appears that the drawdowns scale with respect to the amount of re-injection. However, I cannot reconcile the differences in the magnitudes of the drawdowns for steady-state and transient conditions. It is physically realistic to expect the steady-state results to provide a conservative upper bound on the potential drawdowns; however, the reported steady-state drawdowns are small fractions of the transient results.

Scenario	Winnipeg Sandstone drawdown (m)	Red River Carbonate drawdown (m)
1 0% re-injection Shale degradation Steady-state	0.9	0.9
2 50% re-injection Shale degradation Steady-state	0.4	0.4
3 0% re-injection No shale degradation Steady-state	1.2	0.9
4 0% re-injection Shale degradation Transient	18.4	6.2
5 50% re-injection Shale degradation Transient	9.2	3.0

Section 5

Summary of peer review findings

The Rural Municipality of Springfield (RM of Springfield) has retained me to advise the municipality on the proposed groundwater aspects of the Vivian Sand Project to be developed by Sio Silica (previously CanWhite Sands Corp.). My role as hydrogeology peer reviewer for the RMSF involves identifying issues of potential concern for the RM of Springfield. These issues will be conveyed to the Manitoba Clean Environment Commission, which will in turn advise the Province of Manitoba. The ultimate decision to approve the proposal, and the conditions that may be attached to that approval, rest with the Province.

1. The material presented in *Hydrogeology and Geochemistry Assessment Report* does not alleviate my concerns that the site investigations have not adequately characterized the essential elements of the site and the potential impacts to groundwater resources in the RM of Springfield.
2. Creating a slurry of the Winnipeg Sandstone and extracting silica sand is expected to result in the development of horizontal arrays of “rooms and pillars” in the Winnipeg Sandstone. Referring to the response to RMSF-IR-010, the “rooms” refer to the combined voids created at each well cluster, and the “pillars” refer to zone of intact sandstone between the well clusters. Reference is made in the response to the loss of strength of the sandstone. Elsewhere in the responses, the proponent refers to pilot testing that has been conducted but there is no indication of whether the loss of strength was assessed during the pilot testing. It is indicated in the response to RMSF-IR-009 that “Some collapse of the overlying strata may occur but collapse is *expected* to be limited and not to spread to the surface.” It is not clear from the project documentation whether this is an assumption, or data have been collected and analyzed to support this expectation. In the absence of data, it may be more appropriate to assume that the operations will result in a mass of loose sand with the potential for progressive, large-scale collapse of the overlying strata.
3. I support the indication that the following additional formal documents will be prepared:
 - Waste Characterization and Management Plan;
 - Groundwater Monitoring and Impact Mitigation Plan;
 - Water Management Plan; and
 - Progressive Well Abandonment Plan.
4. I support the indication that although the complete project has an anticipated lifespan of 24 years, the current proposal will extend only for 4.5 years (nominally half of 2021, and 2022 through 2025). This will provide an opportunity to assess the impacts of mining and the annual rehabilitation prior to the full scale-up of operations. I recommend that a formal report on the first year of performance during operations also be required.

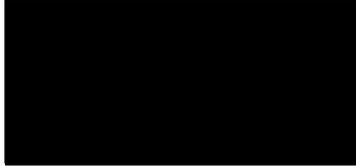
5. If the proposal is approved, a detailed monitoring program will have to be implemented to ensure that widespread collapse of the units overlying the Winnipeg Sandstone is not occurring. The monitoring program will have to include an early-warning system that will halt operations if widespread collapse does occur and propagates to the ground surface.

The monitoring program required to validate the assumptions of the analyses must include monitoring of groundwater levels in the Winnipeg Sandstone, the Carbonate Aquifer, and detailed geotechnical monitoring of ground movements.

6. The practices adopted for well abandonment will be of particular concern for this project, as the wells will extend across and may connect the otherwise isolated Red River Carbonate and Winnipeg Sandstone. In my experience, improperly abandoned wells have acted as preferential pathways for the migration of surface contamination into deeper aquifers. It is suggested on Page iv of the Executive Summary of the *Vivian Sand Extraction Project – Environmental Act Proposal* that well drill cuttings may be included in the materials used to seal wells. It is also suggested on Page vii that calcified sand (“overs”) may be used in well sealing activities. I caution against using drill cuttings and “overs” for this purpose. Wells should be sealed with bentonite and/or grout to surface to ensure that over the long term they can never act to connect the two aquifers. Furthermore, wells that are no longer in operation should be sealed in a continuous abandonment program rather than being left as open holes until groups of wells are abandoned.

Section 6 Signature page

This report was prepared by Mr. Christopher J. Neville, M.Sc., P.Eng., Chief Hydrogeologist of S.S. Papadopoulos & Associates, Inc.



January 12, 2023



Section 7

References

- AECOM, 2021a: CanWhite Sands Corp.: Vivian Sand Extraction Project Environmental Act Proposal, prepared by AECOM Canada Ltd., Winnipeg, Manitoba, July 23, 2021.
- AECOM, 2021b: Vivian Sand Extraction Project – Hydrogeology and Geochemistry Assessment Report, July 2021.
- Cooper, H.H., Jr., and C.E. Jacob, 1946: A generalized graphical method for evaluating formation constants and summarizing well-field history, *Transactions of the American Geophysical Union*, vol. 27, no. 4, pp. 526-534.
- Morton, F.I., 1975: Potential evaporation – significance and measurement, in Report Series No. 42, pp. 9-12, Research Program, Environment Canada, Hydrology Research Division, Summaries of Progress and Short Progress Reports, Inland Waters Directorate, Water Resources Branch, Ottawa.
- Meteorological Division, Department of Transport, 1957: Mean Annual Precipitation, 1921-1950, Atlas of Canada 3rd edition, compiled from information supplied by the, current publisher Natural Resources Canada, <https://open.canada.ca/data/en/dataset/53377276-6db5-5ad6-82e6-dc9b7c70a321>.
- Theis, C.V., 1935: The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using ground-water storage, *Transactions of the American Geophysical Union*, 16th Annual Meeting, Part 2, pp. 519-524.

APPENDIX

CHRISTOPHER J. NEVILLE, M.Sc., P.ENG.

Chief Hydrogeologist

AREAS OF EXPERTISE

- Quantitative Interpretation of Hydrogeologic Data
- Groundwater Flow Modeling
- Solute Transport Modeling
- Peer review
- Litigation Support and Expert Testimony
- Professional Instruction

SUMMARY OF QUALIFICATIONS

Mr. Neville directs the Canadian operations of S.S. Papadopoulos & Associates, Inc. from its Waterloo, Ontario office. His primary area of expertise is the quantitative analysis of groundwater flow and solute transport. He synthesizes hydrogeologic data, evaluates groundwater resources, develops regional and site-scale analyses of groundwater flow and solute transport, and evaluates remedial measures.

Mr. Neville has developed and documented large-scale three-dimensional numerical models for industrial, mining, and government clients, and has reviewed numerous site-specific hydrogeologic analyses and groundwater modeling codes. He has extensive experience in the development of work plans for groundwater projects and in directing groundwater modeling studies. He serves as a senior peer-reviewer and provides technical support for litigation. Mr. Neville is actively involved in the development of professional short courses in the interpretation of pumping tests and groundwater modeling, and he has assisted in teaching graduate courses at the University of Waterloo.

REPRESENTATIVE EXPERIENCE

INTERPRETATION OF HYDROGEOLOGIC AND GEOCHEMICAL DATA

- **Hanford Nuclear Reservation, Washington** — Provided senior technical review of the interpretation of slug tests in the 100 Area, the FR 3 area, and the BC 5 area. Provided technical review of the design and testing program for groundwater withdrawal wells in the 200 ZP 1 area. Reviewed the results of preliminary step drawdown tests of well EW 1. Directed and reviewed the interpretation of well development data and slug testing (100-Area). Interpreted step test and constant-rate pumping test data. Provided internal senior review of probabilistic analyses of horizontal and vertical groundwater velocity in the 100 Area. Directed, reviewed and documented the interpretation of RUM aquifer tests. Directed the interpretation of Cr (VI) column data and the development of nonequilibrium transport models to predict the progress of remediation.
- **Reid Gardner Generating Station, Moapa, Nevada** – Developed and documented the technical approach for estimating horizontal and vertical hydraulic gradients from monitoring data collected at the Reid Gardner Generating Station (RGS) site. Applied an extended version of Darcy's Law to accommodate variations in water density.
- **Onondaga, New York** — Developed a solute-transport analysis to estimate Darcy flux through lakebed sediments from concentration profiles.

YEARS OF EXPERIENCE: 30+

EDUCATION

MSc, Earth Sciences (Hydrogeology),
University of Waterloo, 1992

MEng, Course work for Geotechnical
Engineering, University of Alberta,
1985–1987

BEng, Civil Engineering, McGill
University, 1985

REGISTRATIONS

Professional Engineer

Ontario (PEO) #100013705

Manitoba (EGM) #48048

PROFESSIONAL HISTORY

S.S. Papadopoulos & Associates, Inc.,
Senior-Staff Hydrogeologist to Chief
Hydrogeologist, 1993 –1996, 1999 to
present

Conestoga-Rovers & Associates, Inc.
Senior Hydrogeologist, 1998

Klohn-Crippen Consultants Ltd.
Senior Hydrogeologist, 1997

University of Waterloo

Dept. of Earth Sciences, Research
Assistant, Research Associate in
Hydrogeology, 1987–1992

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Chief Hydrogeologist

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- **Region of Waterloo**, Middleton Street Well Field — Interpreted hydraulic testing data for a municipal well field in fractured-karstic rock.
- **Schlage Lock Company**, Colorado Springs, Colorado — Modified and applied an axisymmetric finite-difference model for the interpretation of aquifer pumping tests.
- **Chem-Dyne Site**, Hamilton, Ohio — Developed and applied models for the interpretation of stepped-rate aquifer tests.
- **Texas-Eastern Gas Transmission Company**, Houston, Texas — Prepared a closure plan for a pump-and-treat remediation system of a BTEX plume in fractured porous-media.

SENIOR PEER REVIEW

- **Hanson Brick Co., Oakville**, Ontario, Canada — Provided senior peer review for the Region of Halton for the assessment of a proposed shale quarry.
- **Nelson Quarry, Burlington**, Ontario, Canada — Provided senior peer review for the Region of Halton for the assessment of a proposed expansion of a dolostone quarry.
- **Ontario Ministry of the Environment** — Served on the peer review panel for the development of guidance documents for Source Water Protection.
- **Credit Valley, Toronto and Region, and Central Lake Ontario Conservation Authority (CTC) Source Water Protection Region**, Canada — Served as senior peer review for the development of water budget studies and water quantity risk assessment.
- **Lake Erie Source Water Protection Region**, Canada — Served on a peer review panel for the development of water budget studies and water quantity risk assessment for the Long Point, Kettle Creek, and Catfish Creek Conservation Authorities.
- **York-Peel-Durham-Toronto (YPDT) Oak Ridge Moraine Groundwater Model**, Ontario, Canada — Provided senior peer review for the development and application of a large-scale regional groundwater flow model of the Oak Ridge Moraine area.
- **Waste Management Canada Richmond Landfill**, Ontario, Canada — Provided senior peer review for the analysis of the impacts of landfill expansion.
- **Arnell Spring Grounds, City of Guelph**, Ontario, Canada — Provided senior peer review in the analysis of impacts of increased water takings.
- **Vancouver Wharves Berth 1 Site**, Canada — Provided senior peer review for the modeling of measures to remediate groundwater contaminated with heavy metals.
- **CH2M HILL-Canada, Alder Creek Groundwater Study, Region of Waterloo** — Provided senior peer review in the development of the Alder Creek regional groundwater flow model.
- **Region of Waterloo** Ontario, Canada — Reviewed the delineation of capture zones for municipal supply wells in the Waterloo Moraine.
- **Smithville Phase IV**, Ontario, Canada — Reviewed groundwater-flow and solute-transport models for the evaluation of remedial alternatives for the Smithville PCB contamination site.

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GROUNDWATER FLOW MODELING FOR WATER RESOURCES DEVELOPMENT AND PROTECTION

- **Region of Waterloo**, Ontario — Directed the groundwater modeling to support the updated characterization of the Middleton Street wellfield.
- **Region of Waterloo**, Ontario — Directed the groundwater modeling to support increased takings from the Blair Road wellfield.
- **Region of Waterloo**, Ontario — Directed the development of a groundwater model to support an application for additional water takings in the Cambridge East area.
- **Itapúa**, Paraguay — Directed the development of a regional groundwater flow model of the Guaraní transboundary aquifer for the region adjacent to the Paraná River in eastern Paraguay.
- **Prey Veng and Svay Rieng Provinces**, Cambodia — Directed the development of a regional groundwater flow model of southeastern Cambodia for the evaluation of the feasibility of the development of large-scale groundwater withdrawals for irrigation.
- **Town of Colgan**, Ontario — Developed a regional groundwater flow model to delineate a wellhead protection area for a proposed new municipal supply well.
- **Region of Waterloo**, Middleton Street Well Field — Directed the development of groundwater modeling analyses to support the delineation of capture zones and the estimation of the sustainable yield of the well field.
- **Region of Waterloo**, Greenbrook Well Field — Developed analyses to predict water-level recoveries following the shutdown of the well field.
- **Region of Waterloo**, Cedar Creek Groundwater Study — Directed the development of a groundwater model to evaluate groundwater resources and to anticipate the potential effects of large-scale gravel extraction.
- **Region of Waterloo**, Mannheim Well Field — Directed the delineation of capture zones for municipal supply wells.
- **Town of Marathon**, Ontario — Directed the development of a groundwater model to delineate wellhead protection areas for municipal wells.
- **Denver, Colorado** – Directed groundwater modeling to estimate potential inter-aquifer flows during operation of a proposed geothermal system at the Colorado State Capitol.
- **Itapúa**, Paraguay — Directed the development of a regional groundwater flow model of the Guaraní transboundary aquifer for the region adjacent to the Paraná River in eastern Paraguay.
- **Prey Veng and Svay Rieng Provinces**, Cambodia — Directed the development of a regional groundwater flow model of southeastern Cambodia for the evaluation of the feasibility of the development of large-scale groundwater withdrawals for irrigation.

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GROUNDWATER FLOW AND SOLUTE TRANSPORT MODELING TO SUPPORT THE DESIGN AND EVALUATION OF REMEDIAL MEASURES AT CONTAMINATED SITES

- **SABIC (National Methanol Company) Ibn Sina**, Saudi Arabia — Developed the site conceptual model and directed the analysis of the migration and fate of MTBE.
- **Glenn Springs Holdings, Inc. (Occidental Chemical Corporation), Hyde Park Landfill**, Niagara Falls, New York — Directed the development of a large-scale groundwater model to evaluate capture of contaminated groundwater and to optimize remedial actions. Assignments included the development of work plans for data collection and interpretation, the supervision of hydraulic testing and analysis, and supervision of groundwater modeling.
- **Gurabo**, Puerto Rico — Directed numerical flow- and solute-transport modeling conducted to evaluate the performance of a pump-and-treat system.
- **Massachusetts Military Reservation**, Cape Cod — Developed an analysis to predict the extent of groundwater mounding due to the re-injection of treated groundwater.
- **Schlage Lock Company, Colorado Springs**, Colorado — Developed a groundwater model to assist in the evaluation of alternative pump-and-treat designs for remediation of a PCE plume.
- **Pacific Gas & Electric Company**, California — Developed and documented a groundwater flow and transport model for simulating the evolution of a plume of chromium-contaminated groundwater. Developed and documented analyses for the evaluation of remedial pumping alternatives.
- **Oregon Department of Environmental Quality**, Portland — Developed and applied a method of analysis for optimizing the placement of recovery wells for remediation of a large plume of TCE-contaminated groundwater and for protection of the City of Portland's emergency water supply.
- **Eastman Kodak Company**, Rochester, New York — Assisted in the development of a regional groundwater model that had automatic telescopic mesh refinement capabilities. Developed a user manual for the model, and provided a training course to enable Kodak staff to evaluate proposed remedial measures at the facility. Directed the updating of the model.
- **Pyrite Canyon Group**, California — Developed numerical air-flow and groundwater-flow models to assist in the evaluation of remedial measures at the Stringfellow Acid Pits. Conducted analyses for feasibility studies of remediation of shallow organic contamination, using dewatering and soil vapor extraction. Developed analyses for evaluating the performance data from a horizontal well constructed in fractured bedrock and for predicting the long-term efficacy of the well for plume remediation.

TECHNICAL SUPPORT FOR THE GROUNDWATER ASPECTS OF INFRASTRUCTURE DEVELOPMENT

- **Toronto Spadina Yonge Subway Extension** — Provided peer review of dewatering requirements and interpretation of hydrogeologic tests for the Steeles West and Finch West stations.
- **Eglinton Crosstown LRT, Toronto** – Conducted analyses to support the 30% design for the proposed Bathurst, Dufferin, Caledonia and Keele Stations. Analyses included the interpretation of hydraulic tests, estimation of groundwater pressures on Support of Excavation, estimation of groundwater inflows to station box excavations and analytical and numerical modeling to support the design of groundwater control measures. Assisted in the development of the work plan for supplemental investigations to guide the estimation of dewatering requirements.
- **San Manuel Band of Mission Indians, Highland, California** –Developed a groundwater model to assist in the evaluation of the potential effects of alternative methods of construction of the MWD Arrowhead East tunnel on the water resources of the San Manuel Tribe. Conducted an extensive follow-up studies to establish the model as a reliable tool for reconstructing past conditions and predicting future changes in groundwater conditions in the vicinity of the San Manuel Indian Reservation.

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Chief Hydrogeologist

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LITIGATION SUPPORT

- **Reko Diq Mine**, Pakistan — Served as water resources expert to the government of Pakistan and provided testimony at the International Centre for Settlement of Investment Disputes, London, UK (ICSID Case no. ARB/12/1). Provided expert opinion of the predictions of potential declines in groundwater levels the proposed Reko Diq project. Conducted independent analyses of the data from 21 days of pumping in the Fan Sediments northwest of the proposed mine.
- **Timbro Ranch**, Colorado (Colorado Water Court consolidated cases 2013CW3144 and 2014CW3134 — Developed on behalf of Denver Water independent interpretations of data collected during pumping tests to support a non-tributary water assessment.
- **Pinnacle Heights Golf Course**, Orangeville, Ontario — Provided expert opinion on the reliability of groundwater modeling conducted to evaluate the potential impacts of irrigation pumping for a proposed golf course.
- **Thomson Facility**, Marion, Indiana — Provided expert opinion on the groundwater velocity at the site. The analysis was developed within a stochastic framework.
- **Homestead Golf Course**, Michigan — Reviewed the environmental impact of a proposed golf course development adjacent to a sensitive river.
- **Cities of Vaughn and Pickering**, Ontario — Evaluated the design calculations for proposed municipal waste landfills having complex liners. Reviewed the methods for predicting leakage through composite geomembrane liners, and reviewed the methods to predict the development of groundwater mounds due to failure of leachate collection systems. Performed benchmarking of the solute transport code POLLUTE.
- **Duntroon Quarry Expansion, Singhampton**, Ontario — Served as expert witness for the Niagara Escarpment Commission for the assessment of hydrogeologic aspects of the proposed extension of the Duntroon Quarry. Prepared expert witness reports and provided testimony for the Joint Board under the *Consolidated Hearings Act*.
- **Nelson Quarry Expansion**, Burlington, Ontario — Served as expert witness for Halton Region for the assessment of hydrogeologic aspects of the proposed extension of the Nelson Quarry. Prepared expert witness reports and assisted counsel in preparation of cross-examination for the Joint Board under the *Consolidated Hearings Act*.
- **MAQ Highland Quarry**, Singhampton, Ontario — Directed the Experts Meeting and prepared the *Statement of Agreed Facts* for the proposed MAQ Highland Quarry.

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HYDROGEOLOGY TRAINING

- **Critical Thinking in Aquifer Test Interpretation** — Developer and instructor of a professional short course on hydrogeologic testing. The course has now been taught over 35 times in Canada, the United States, Brazil and China.
- **International Ground-Water Modeling Center, Colorado School of Mines, Golden, Colorado** — Provided professional short courses in MT3D solute transport modeling.
- **Environment Institute for Continuing Education** — Developed and presented Internet-based seminars.
- **Midwest Geosciences** — Presented short-course lectures. Developed and presented Internet-based seminars on the interpretation of aquifer tests.
- **Kingdom of Cambodia Ministry of Water Resources and Meteorology** — Provided training for groundwater modeling expertise in Cambodia.
- **Eastman Kodak Company, Region of Waterloo** — Developed and led training courses for site-specific models and technology transfer.

LANGUAGES

French, Portuguese, Spanish

AWARDS AND HONORS

Citation for Leadership Recognition, National Ground Water Association, 2018

Graduate Scholarship, University of Waterloo, 1990

Citation for Reviewing Excellence, Water Resources Research, 2005

PROFESSIONAL SOCIETIES

International Association of Hydrogeologists

National Ground Water Association

American Geophysical Union

Canadian Geotechnical Society

American Society of Civil Engineers

International Mine Water Association

APPOINTMENTS

2007 – present: Co-Chair of the Kitchener-Waterloo Hydrogeology Seminar Series

2016 – 2017: Chair of the National Ground Water Association Groundwater Advisory Panel Group #2 (Stepwise modeling)

2015: Co-Technical Chair of the IAH-CNC Waterloo 2015 Hydrogeology Conference

2010 – 2013: Canadian Geotechnical Society, Chair of the Hydrogeology Division

2006 – 2009: University of Waterloo, Department of Earth Sciences, Adjunct Lecturer

1999 – 2009: Canadian National Chapter of the International Association of Hydrogeologists, Vice President

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PUBLICATIONS AND PRESENTATIONS

BOOKS

- Neville, C., and V. Bedekar, 2016. Chapter 17: Simulation of Flow and Transport in Fractured Rocks: An Approach for Practitioners. *in Groundwater Assessment, Modeling, and Management*. M. Thangarajan and V.P. Singh, eds. Boca Raton, FL: CRC Press, pp. 269-282.
- Cohen, H., and C. Neville, 2006. Chapter 8: Fate, Transport, and Modeling of Perchlorate in Groundwater. *in Perchlorate: A Scientific, Legal, and Economic Assessment*. 1st ed., E. Hagstrom, ed. Tucson, AZ: Lawyers & Judges Publishing Company, pp. 267-294.

THESES

- Neville, C.J., 1992. An Analytical Solution for Solute Transport with Multiprocess Nonequilibrium Sorption. MS thesis: Department of Earth Sciences, University of Waterloo, Ontario.

PEER-REVIEWED JOURNAL PAPERS

- Neville, C.J., 2022. Alternative Interpretation of the Pressure Front Displacement Pulse for Pumping Tests in Confined Aquifers, *Hydrological Processes*, doi/10.1002/hyp.14744.
- Neville, C.J, and C.B. Andrews, 2020. Containment of Sources of Groundwater Contamination: Analysis of Mass Fluxes, *Groundwater*, vol. 58, no. 2, pp. 183-188.
- Priebe, E.H., F.R. Brunton, D.L. Rudolph, C.J. Neville, 2019. Geologic Controls on Hydraulic Conductivity in a Karst-Influenced Carbonate Bedrock Groundwater System in Southern Ontario, Canada, *Hydrogeology Journal*, v. 27, no. 4, pp. 1291-1308.
- Wang, X., and C.J. Neville, 2019. A Semi-Analytical Solution for the Transport of Solutes with Complex Sequences of First-Order Reactions, *Computers and Geosciences*, v. 123, pp. 121-136.
- Neville, C.J, and X. Wang, 2018. Analysis of solute transport from a source with finite leachable mass, *Groundwater*, v. 56, no. 6, pp. 1002-1006.
- Priebe, E.H., C.J. Neville, D.L. Rudolph, 2017. Enhancing the spatial coverage of a regional high-quality hydraulic conductivity dataset with estimates made from domestic water-well specific-capacity tests, *Hydrogeology Journal*, <https://doi.org/10.1007/s10040-017-1681-2>, 14 p.
- Neville, C.J., 2017. Comment on "Automatic estimation of aquifer parameters using long-term water supply pumping", *Hydrogeology Journal*, v. 25, pp. 2207-2209.
- Priebe, E.H., C.J. Neville, and F.R. Brunton, 2017. Discrete, High-Quality Hydraulic Conductivity Estimates for the Early Silurian Carbonates of the Guelph Region, Ontario Geological Survey, Groundwater Resources Study 16, 50 p.
- Priebe, E.H., C.J. Neville, and F.R. Brunton, 2014. Evaluating the influence of geological features on hydraulic conductivity variability in Early Silurian carbonate rock aquifers of the Guelph Region, in Summary of Field Work and Other Activities 2014, Ontario Geological Survey, Open File Report 6300, pp. 35-1 to 35-8.
- Neville, C., 2013. Discussion of A Constant-Head Pumping Test Method Using Direct-Push Equipment for In Situ Hydraulic Conductivity Measurements, by T. Kobayashi, N. Onoue, S. Oba, N. Yasufuku and K. Omine, *Géotechnique*, v. 63, no. 6, pp. 525-527.
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EXHIBIT 5



February 13, 2023

Writer's email: cdraper@rmofspringfield.ca
MPrydun@rmofspringfield.ca

Mr. Peter Crocker, Secretary
Manitoba Clean Environment Commission
305-155 Carlton Street
Winnipeg MB R3C 3H8

Dear Mr. Crocker:

Re: Vivian Silica Sand Extraction Project Submission of Rural Municipality of Springfield

Thank you for this opportunity to provide a submission to the Clean Environment Commission (CEC) on behalf of the Rural Municipality of Springfield (RM Springfield) regarding the review of the Vivian Silica Sand Extraction Project (the "project") under The Environment Act.

Introduction

The RM of Springfield directed the preparation of an expert peer review of the technical submissions for the Vivian Sand Project.¹ To maintain a neutral position with respect to the proposed project, the RM of Springfield has elected not to provide pre-hearing written evidence, to not present opening and closing arguments and to not provide testimony of expert witness(es). While the report prepared by Mr. Neville is not being filed as evidence, there is sufficient filed documentation to suggest the majority of concerns raised will be covered by other Participants. It is understood that an opportunity also remains to file the report later if requested by the CEC panel. Although Mr. Neville's expert report is not being submitted, pursuant to 3.06(b) and (c) the RM of Springfield wishes to use this opportunity to make a general opening statement.

¹ Christopher J. Neville, M.Sc., P.Eng., 2023: Expert Report on the Sio Silica Proposed Vivian Silica Sand Project, prepared for the Rural Municipality of Springfield, S.S. Papadopoulos & Associates, Inc., January 12, 2023.

Statement of the RM of Springfield

At this time, the RM of Springfield has a neutral position with respect to the Vivian Silica Sand Project.

The RM of Springfield trusts that any concerns or doubts that have been raised by other participants will be discussed and reviewed thoroughly by the CEC panel. The position of the RM of Springfield is that all questions and concerns raised about the mining process and activity of Sio Silica must be addressed completely. Without all concerns being addressed, the RM of Springfield will not consider supporting any operations that have the potential to affect the environment, specifically the groundwater resources of southern Manitoba and their protection.

With this submission, the RM of Springfield requests the right to question other participants if the evidence is adverse in interest to the RM of Springfield.

Thank you,



Colleen Draper
Chief Administrative Officer
Rural Municipality of Springfield

CC: CEC Mailing List

EXHIBIT 6.

MLT AIKINS
WESTERN CANADA'S LAW FIRM

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August 11, 2023

VIA E-MAIL

Hill Sokalski Walsh LLP
Suite 2670 – 360 Main Street
Winnipeg, Manitoba
R3C 3Z3

Fast Trippier Wittman LLP
10 Donald Street
Winnipeg, Manitoba
R3C 1L5

Attention: Dave Hill

Attention: Faron Trippier

Dear Sirs,

Re: Sio Silica Corporation
Re-Zoning of Lands for Processing Facility and
Pending Development Agreement
Notice of Potential Action against Mark Miller and Andy Kuczynski
MLT Aikins File No: 0156726-00001

This is further to our letter dated August 3, 2023.

We are writing to address the actions of Councillors Mark Miller and Andy Kuczynski, particularly as it relates to their continued attempts to delay and disrupt both the re-zoning of our client's lands and the development agreement previously negotiated with representatives of the Rural Municipality of Springfield (the "Municipality").

Background

As your clients are aware, the Municipality was ordered by the Municipal Board to alter Zoning By-law 08-01 and create a new zoning district that would permit the development of Sio Silica's processing facility. The only condition imposed by the Board was that the parties enter into a development agreement. The Board also made it clear in its March 8, 2023 Order that the proposed zoning amendment for the processing facility was to be considered *separate and apart* from the regulatory approval process for the extraction activities.

During the course of the June 19, 2023 Special Meeting of Council, Councillors Miller and Kuczynski pursued every conceivable option to *delay* the re-zoning and development agreement as it served their personal, political and/or strategic interests to do so. They made no attempt to deal with the substance of the agreement as it pertains to the processing facility. Instead, they have conflated and continue to conflate the development of the processing facility and off-site extraction activities over which the Municipality has no jurisdiction.

Councillors Miller and Kuczynski apparently believe that approval of the development agreement for the processing facility will, in some way, indirectly “green light” *The Environment Act* approval of the proposed extraction activities. That misguided assumption has caused them to utilize whatever procedural mechanism might be available to stall and delay the development agreement.

Councillors Miller and Kuczynski have also recklessly advanced the position that the Municipality has the legal right to somehow regulate off-site extraction activities through the development agreement itself. That is, of course, plainly wrong.

Potential Action for Misfeasance in Public Office

But for Councillors’ Miller and Kuczynski’s deliberate and bad faith attempt to disrupt the land use planning process, the development agreement would undoubtedly have been approved months ago. Construction of the processing facility this Fall would be on track.

The Fall construction season, in all likelihood, has now been lost.

Please be advised that our client is considering an action for misfeasance in public office against both Councillors Miller and Kuczynski on account of their continued attempt to exercise their power for an improper purpose with reckless disregard for the lawfulness of their conduct and the financial consequences to our client. Any such finding of liability against these two Council members would in our view result in vicarious liability for the Municipality.

As you are aware, two City of Winnipeg planners were recently found liable for the tort of misfeasance in public office on account of their unwarranted attempts to delay or “slow down” a land development for *non-planning* related reasons. The Court found that they did so with little or no regard for the costs or implications to the plaintiffs. Damages of \$5 million were awarded against the two City planners and the City of Winnipeg was held vicariously liable.

Notwithstanding this recent decision, Councillors Miller and Kuczynski remain undeterred. They have made overtures of calling a “referendum” on the extraction project and, through Mr. Hill’s office, have served notice that they are contemplating a Court action to quash the Municipality’s Resolution no. 23-216 which did nothing more than formally adopt the Municipal Board’s order

to alter Zoning By-law 08-01. This is only further evidence of their bad faith attempt slow down the re-zoning of lands that has already been approved by the Municipal Board.

In the interim, Sio Silica awaits the outcome of a Municipal Board appeal hearing on the development agreement which should never have been made necessary.

The end result of all of this is millions of dollars in incremental delay costs and expenses to our client, and needless cost to the Municipality.

Request to Approve the Development Agreement

In order to mitigate any further damages that have already been sustained on account of the actions described above, we request that the Municipality re-convene a meeting of Council to reverse its Resolution No. 23-219 and formally approve the development agreement without further delay.

Yours truly,

MLT AIKINS LLP

Per: 

JAMES A. MERCURY

JAM:lja

cc. Sio Silica Corporation



**U.S. Securities and
Exchange Commission**

EXHIBIT

①

[Home](#) / [Newsroom](#) / [Press Releases](#) / SEC Charges
Weatherford International With FCPA Violations

PRESS RELEASE

SEC Charges Weatherford International With FCPA Violations

FOR IMMEDIATE RELEASE | 2013-252

Washington D.C., Nov. 26, 2013 — The Securities and Exchange Commission today charged oilfield services company Weatherford International with violating the Foreign Corrupt Practices Act (FCPA) by authorizing

bribes and improper travel and entertainment for foreign officials in the Middle East and Africa to win business, including kickbacks in Iraq to obtain United Nations Oil-for-Food contracts.

The SEC alleges that Weatherford and its subsidiaries falsified its books and records to conceal not only these illicit payments, but also commercial transactions with Cuba, Iran, Syria, and Sudan that violated U.S. sanctions and export control laws. Weatherford failed to establish an effective system of internal accounting controls to monitor risks of improper payments and prevent or detect misconduct. The company reaped more than \$59.3 million in profits from business obtained through improper payments, and more than \$30 million in profits from its improper sales to sanctioned countries.

Swiss-based Weatherford, which has substantial operations in Houston, has agreed to pay more than \$250 million to settle the SEC's charges and parallel actions by the Department of Justice's Fraud Section, U.S. Attorney's Office for the Southern District of Texas, Department of Commerce's Bureau of Industry and

Security, and Department of Treasury's Office of Foreign Assets Control.

“The nonexistence of internal controls at Weatherford fostered an environment where employees across the globe engaged in bribery and failed to maintain accurate books and records,” said Andrew Ceresney, co-director of the SEC's Enforcement Division. “They used code names like ‘Dubai across the water’ to conceal references to Iran in internal correspondence, placed key transaction documents in mislabeled binders, and created whatever bogus accounting and inventory records were necessary to hide illegal transactions.”

Kara N. Brockmeyer, chief of the SEC Enforcement Division's FCPA Unit, added, “Whether the money went to tax auditors in Albania or officials at the state-owned oil company in Angola, bribes and improper payments were an accustomed way for Weatherford to conduct business. While the profits may have seemed bountiful at the time, the costs far outweigh the benefits in the end as coordinated law enforcement efforts have unraveled the widespread schemes and heavily sanctioned the misconduct.”

Middle East. From 2005 to 2011, Weatherford and its subsidiaries awarded more than \$11.8 million in improper “volume discounts” to the distributor – money intended for the creation of a slush fund to pay foreign officials.

According to the SEC’s complaint, the misconduct went beyond the use of agents or other third parties.

Weatherford provided improper travel and entertainment to officials of a state-owned company in Algeria with no legitimate business purpose. For example, Weatherford paid for a 2006 FIFA World Cup trip by two of the officials, the July 2006 honeymoon of an official’s daughter, and an October 2005 religious trip to Saudi Arabia by an official and his family that was improperly recorded as a donation in Weatherford’s books and records. Weatherford’s Middle East subsidiary also made more than \$1.4 million in improper payments to obtain nine contracts under the Oil-for-Food program in 2002. Iraqi ministries demanded improper “inland transportation fees” in an effort to subvert the UN program. Weatherford’s subsidiary complied with the Iraqi demands and paid more than \$115,000 in fees despite invoices that included charges

According to the SEC's complaint filed in federal court in Houston, the misconduct occurred from at least 2002 to 2011. In Angola, for example, Weatherford's legal department permitted its subsidiary to use an agent who insisted that an FCPA clause be omitted from the consultancy agreement. The company took no steps to determine whether the agent was paying bribes to foreign officials, and the agent used sham work orders and invoices to pay bribes that ensured the renewal of a lucrative oil services contract for Weatherford in Angola. The same agent made illicit payments to obtain commercial contracts for Weatherford in Congo. The company also allowed its subsidiary to enter into a joint venture agreement with companies whose beneficial owners included Angolan oil company officials and a relative of an Angolan Minister in order to win business. A Weatherford employee reported in a 2006 ethics questionnaire that Weatherford personnel were making payments to government officials in Angola and elsewhere, but the company failed to investigate.

The SEC's complaint also alleges that Weatherford failed to perform due diligence on a distributor suggested by an official at a national oil company in the

inconsistent with the actual deliveries. Weatherford obtained more than \$7 million in profits from the misconduct.

The SEC further alleges that managers at Weatherford's subsidiary in Italy flouted the lack of internal controls and misappropriated more than \$200,000 in company funds, some of which was improperly paid to Albanian tax auditors. The managers misreported cash advances, diverted payments on previously paid invoices, misappropriated government rebate checks, and received reimbursement for such purchases as golf equipment and perfume that did not relate to business activities.

According to the SEC's complaint, Weatherford employees created false accounting and inventory records from 2002 to 2007 to hide the illegal commercial sales to Cuba, Syria, Sudan, and Iran. During this time period, exporting or re-exporting goods or services from the U.S. to these sanctioned countries was prohibited. The falsified financial statements and books and records of Weatherford subsidiaries involved

Updates in progress

We are transitioning to a new website. Content on bis.gov is the most up-to-date. For content that redirects to this site or where there is not new information on bis.gov, the information here remains valid.

[Go to bis.gov](http://bis.gov)



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Texas Company to Pay \$100 Million for Export Violations to Iran, Syria, Cuba, and Other Countries

BUREAU OF INDUSTRY AND SECURITY
Office of Congressional and Public Affairs

For Immediate Release: November 26, 2013
Contact -- BIS Public Affairs: [202-482-2721](tel:202-482-2721)

Texas Company to Pay \$100 Mi [How can we improve this site?](#)

Iran, Syria, Cuba, and Other Countries

Fine is largest civil penalty ever levied by the Bureau of Industry and Security

WASHINGTON, D.C.- The U.S. Commerce Department's Bureau of Industry and Security (BIS) today announced Weatherford International Ltd. in Houston, Texas, and four of its subsidiaries (collectively, "Weatherford") have agreed to pay a \$50 million civil penalty following allegations that Weatherford exported oil and gas equipment to Iran, Syria and Cuba in violation of the Export Administration Regulations (EAR) and the Iranian Transactions and Sanctions Regulations (ITSR). BIS also alleged that Weatherford exported items controlled for nuclear non-proliferation reasons to Venezuela and Mexico. The fine is the largest civil penalty ever levied by BIS.

In a related action, the Department of Justice also announced today it has imposed a \$48 million monetary penalty on Weatherford International Ltd. pursuant to a deferred prosecution agreement. Justice is also imposing \$2 million in criminal fines pursuant to guilty pleas by two of Weatherford's subsidiaries, for a combined total penalty of \$100 million from the U.S. government.

"Serious consequences ensue when companies evade U.S. sanctions and export controls," said Under Secretary for Industry and Security Eric L. Hirschhorn.

Hirschhorn praised BIS's Dallas Field Office and the Office of Chief Counsel, along with the Office of Foreign Asset Control (OFAC) and the U.S. Attorney's Office for the Southern District of Texas for their outstanding work on the case. "Today's settlement is an example of the tremendous tools that the Special Agents of the Office of Export Enforcement use to further national security," Hirschhorn said.

"OEE, which is the only law enforcement entity dedicated solely to export control enforcement, will continue its aggressive efforts to ferret out those who illegally divert goods and technology," he added.

Background on Charges

Weatherford International Ltd.: BIS charged that between 2004 and 2007 Weatherford International Ltd. transferred oil and gas equipment for drilling operations, and valued in total at as much as \$12 million, for export from the United States to Iran, via Weatherford's Dubai, UAE based subsidiary, with knowledge that a violation would occur.

BIS also charged that between 2005 and 2007 Weatherford International Ltd. transferred oil and gas equipment from the United States to Cuba via Canada with knowledge that a violation would occur. The items included essential oil and gas equipment such as mud motors, measuring-while-drilling orientation modules, and drill collars, and stabilizers which were valued in total at as much as \$20 million.

BIS also charged that between 2002 and 2007 Weatherford International Ltd. violated the Regulations by exporting pulse neutron decay tools which are controlled for reasons of nuclear non-proliferation, to Venezuela and Mexico without the required Department of Commerce licenses.

Weatherford Oil Tool Middle East Ltd.: Weatherford Oil Tool Middle East Ltd., a subsidiary of Weatherford International Ltd., evaded the EAR in connection with the export of oil and gas equipment from the United States to Iran and Syria between 2002 and 2008, charged BIS. Working with its parent company, Weatherford International Ltd., Weatherford Oil Tool Middle East Ltd. concealed that Iran and Syria were the ultimate destinations of the items.

Weatherford Production Optimisation (UK) Ltd.: Weatherford Production Optimisation (UK) Ltd., a subsidiary of Weatherford International Ltd., evaded the EAR in connection with the export of items for oil well production optimization between 2003 and 2006, charged BIS. Weatherford Production Optimisation (UK) Ltd. concealed that Iran was the ultimate destination of the items.

Precision Energy Services ULC: Precision Energy Services ULC, Canada, an affiliate of Weatherford International Ltd., transferred items that were to be exported to Cuba with knowledge that a violation would occur, between 2005 and 2006, charged BIS. The items included essential oil and gas equipment such as mud motors, measuring-while-drilling orientation modules, drill

collars, and stabilizers.

Precision Energy Services Colombia Ltd.: Precision Energy Services Colombia Ltd. evaded the EAR in connection with the export and reexport of various items including essential oil and gas equipment, to Cuba, between 2006 and 2007, charged BIS. Precision Energy Services Colombia Ltd. concealed Cuba as the destination items to that included mud motors, measuring-while-drilling orientation modules, drill collars, and stabilizers.

Weatherford agreed, as part of the settlement agreement, to hire an unaffiliated third-party expert in U.S. export control laws to audit Weatherford's compliance with U.S. export control laws with respect to all exports or re-exports to Cuba, Iran, North Korea, Sudan, and Syria for calendar years 2012, 2013, and 2014.

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ALBERTA SECURITIES COMMISSION

INTERIM ORDER

Citation: Re Prize Mining Corporation, 2019 ABASC 32

Date: 20190212

Prize Mining Corporation (also known as Prize Mining Corp.), Michael McPhie, Feisal Somji, David Schmidt, BridgeMark Financial Corp., Anthony Kevin Jackson, Justin Edgar Liu, Seungkap Kim, Kyung Kim Yoon, Lisa Jackson, Detona Capital Corp., Tryton Financial Corp. and Rockshore Advisors Ltd. (formerly Cam Paddock Enterprises)

Background

1. Staff (**Staff**) of the Alberta Securities Commission (the **Commission**) issued a Notice of Application dated December 21, 2018 (the **Notice of Application**).
2. The Notice of Application named Prize Mining Corporation (also known as Prize Mining Corp.) (**Prize**), Michael McPhie, Feisal Somji, David Schmidt, BridgeMark Financial Corp., Anthony Kevin Jackson, Justin Edgar Liu, Seungkap Kim, Kyung Kim Yoon, Lisa Jackson, Detona Capital Corp., Tryton Financial Corp. and Rockshore Advisors Ltd. (formerly Cam Paddock Enterprises) as respondents (the **Respondents**).
3. On January 14, 2019, the Commission issued an order (the **Cease Trade Order**, cited as *Re Prize Mining Corp.*, 2019 ABASC 8) directing that:
 - (a) the hearing in respect of the Notice of Application is adjourned until 10:00 am on Friday, February 1, 2019;
 - (b) pending the determination of the hearing in respect of the Notice of Application,
 - (i) all trading in securities of Prize must cease; and
 - (ii) Prize must cease trading in all securities, and all exemptions contained in Alberta securities laws do not apply to Prize.
4. The Notice of Application indicated that Staff are investigating whether Prize contravened Alberta securities laws.
5. Staff seek an interim order pursuant to sections 33 and 198 of the *Securities Act* (Alberta) (the **Act**), that:

- (a) all trading in or purchasing cease in respect of the securities of Prize and Prize be denied all exemptions contained in the Alberta securities laws; or, alternatively
- (b) all trading in or purchasing by the Respondents (with the exception of Prize) cease in respect of the securities of Prize; or, alternatively
- (c) Prize disseminate to the public information relating to a \$6,500,000 private placement that occurred in July 2018; and
- (d) any other relief as this Commission deems appropriate in the public interest.

6. The Commission has received and considered documentary evidence and submissions.

Order

7. Considering that the length of time required to conduct a hearing and render a decision could be prejudicial to the public interest and that it is in the public interest to make this order, the Commission orders under sections 33 and 198(1) of the Act that:

- (a) all trading in or purchasing of securities of Prize must cease, and all of the exemptions contained in Alberta securities laws do not apply to Prize;
- (b) Prize must disseminate to the public a news release (the **Required Release**) issued through a widely circulated news or wire service and promptly filed on SEDAR, the substantive content of which must be limited to the identification and disclosure of the following:
 - (i) commitments by several investors to provide Prize with the \$6.5 million financing that closed in July 2018 (the **July Financing**) were conditional on Prize entering into 18 consulting agreements (the **Consulting Agreements**) with various parties;
 - (ii) immediately upon receipt of the proceeds of the July Financing, aggregate consideration of \$5.5 million was to be paid by Prize to the parties to the Consulting Agreements;
 - (iii) some of the investors in the July Financing were directly or indirectly parties to some of the Consulting Agreements; and
 - (iv) a number of the Consulting Agreements purported to provide Prize with the same or similar services; and

NON-REDEMPTION AGREEMENT

THIS NON-REDEMPTION AGREEMENT (this "Agreement") is made and entered into as of November 13, 2023 by and among Pyrophyte Acquisition Corp., a Cayman Islands exempted company ("Pyrophyte" or the "Issuer"), Verition Multi-Strategy Master Fund Ltd., a Cayman Islands exempted company with limited liability and a holder of certain Pyrophyte Class A Shares (as defined below) (the "Pyrophyte Shareholder"), and Sio Silica Incorporated, a newly-formed Alberta corporation formed solely for the purposes of engaging in the Transaction (as defined below) and wholly owned by Feisal Somji, a nominee of Sio (as defined below) ("Sio Newco" and following the consummation of the transactions contemplated by the Business Combination Agreement (as defined below), "New SPAC"). Each of Pyrophyte, the Pyrophyte Shareholder, and Sio Newco will individually be referred to herein as a "Party" and, collectively, as the "Parties". Capitalized terms used but not otherwise defined herein shall have the meanings ascribed to such terms in the Business Combination Agreement.

WHEREAS, concurrently with the execution and delivery of this Agreement, Pyrophyte, Sio Silica Corporation, an Alberta corporation ("Sio"), Sio Newco and Snowbank Newco Alberta ULC, an Alberta unlimited liability corporation and wholly-owned subsidiary of Pyrophyte ("Pyrophyte Newco"), entered into a Business Combination Agreement, dated as of the date hereof (as amended, modified, supplemented or waived from time to time in accordance with its terms, the "Business Combination Agreement"), pursuant to which, among other things, (i) Pyrophyte shall transfer by way of continuation from the Cayman Islands to Alberta in accordance with the Cayman Islands Companies Act (as revised) and continue as an Alberta corporation in accordance with the applicable provisions of the Business Corporations Act (Alberta), (ii) Pyrophyte shall amalgamate with Sio Newco (the "SPAC Amalgamation") to form New SPAC, which shall, as a result of the SPAC Amalgamation and prior to the consummation of the transactions contemplated hereunder, assume all rights, covenants and obligations of Sio Newco, including the rights, covenants and obligations under this Agreement (the "Assumption") and (iii) Sio and Pyrophyte Newco shall amalgamate, and the entity resulting from such amalgamation shall be wholly owned by New SPAC and continue the business operations currently undertaken by Sio (such transactions contemplated by the Business Combination Agreement, the "Transaction");

WHEREAS, concurrently with the execution and delivery of this Agreement, certain accredited investors (collectively, the "PIPE Investors") are each entering into a subscription agreement, substantially in the form attached to the Business Combination Agreement (the "Subscription Agreement" and collectively, the "Subscription Agreements") with Pyrophyte and Sio Newco, pursuant to which, among other things, the PIPE Investors have agreed, subject to the satisfaction or waiver of the conditions set forth therein, to subscribe for and purchase, and Sio Newco has agreed, following the SPAC Amalgamation and Assumption and substantially concurrently with the consummation of the Transaction, to issue and sell to the PIPE Investors the number of common shares of Sio Newco (the "Sio Newco Common Shares") provided for in the applicable Subscription Agreement in exchange for the purchase price set forth therein (the equity financing under the Subscription Agreements is hereinafter referred to as the "PIPE Financing"), in each case on the terms and subject to the conditions set forth in the relevant Subscription Agreement;

WHEREAS, as of the date of this Agreement, the Pyrophyte Acquisition LLC, a Delaware limited liability company (the "Sponsor"), owns 5,031,250 Class A ordinary shares, par value \$0.0001 per share, of Pyrophyte (the "Pyrophyte Class A Shares");

WHEREAS, as of the date hereof, the Pyrophyte Shareholder is the beneficial owner of 100,000 Pyrophyte Class A Shares (collectively, the "Subject Pyrophyte Ordinary Shares");

WHEREAS, in connection with the Transaction, Pyrophyte's shareholders will have the opportunity to redeem their ordinary shares of Pyrophyte in connection with Pyrophyte's extraordinary general meeting of shareholders to approve the Transaction;

WHEREAS, pursuant to the SPAC Amalgamation, each then issued and outstanding Pyrophyte Class A Share will be exchanged, on a one-for-one basis, for Sio Newco Common Shares; and

WHEREAS, in consideration of the Pyrophyte Shareholder's commitment to, among other things, not redeem the Subject Pyrophyte Ordinary Shares, and subject to the conditions set forth herein, Pyrophyte desires to issue and sell and the Pyrophyte Shareholder desires to subscribe for the Additional Shares (as defined below).

NOW, THEREFORE, in consideration of the foregoing and the mutual representations, warranties and covenants, and subject to the conditions, herein contained, and intending to be legally bound hereby, the parties hereto hereby agree as follows:

1. Agreement to Vote. The Pyrophyte Shareholder hereby unconditionally and irrevocably agrees, with effect from the date hereof and until the earlier of (x) the date on which this Agreement is terminated in accordance with Section 7 hereof and (y) the Closing Date (the "Voting and Lock-Up Period"), to be present at any meeting of the shareholders of Pyrophyte, and to vote (in person or by proxy), or consent to any action by written consent or resolution with respect to, all of the Subject Pyrophyte Ordinary Shares (i) in favor of the Transaction Proposals (as defined in the Business Combination Agreement) and (ii) in opposition to any and all other proposals (1) that could reasonably be expected to delay, impair, or adversely affect the ability of Pyrophyte to consummate the transactions contemplated by the Business Combination Agreement or any Ancillary Agreement (as defined in the Business Combination Agreement) or (2) which are in competition with or materially inconsistent with the Business Combination Agreement, the Transaction and the transactions contemplated thereby, provided that the obligations set forth in this Section 1 shall terminate if there is an Intervening Event that causes a Change in Recommendation.
2. No Redemption. The Pyrophyte Shareholder hereby agrees that it shall not redeem, or submit a request to Pyrophyte's transfer agent or otherwise exercise any right to redeem, any Subject Pyrophyte Equity Security. Prior to the Closing and after the last date for redemption of Pyrophyte Class A Shares, the Pyrophyte Shareholder shall deliver to Pyrophyte and Sio Newco evidence that it continues to hold the Subject Pyrophyte Ordinary Shares and that such Subject Pyrophyte Ordinary Shares have not been submitted for redemption. For the avoidance of doubt, the restrictions set forth in this Section 2 shall not apply to any Pyrophyte Class A Shares held by the Pyrophyte Shareholder other than the Subject Pyrophyte Ordinary Shares.
3. Lock-Up of Subject Pyrophyte Ordinary Shares. The Pyrophyte Shareholder hereby agrees that, with effect from the date hereof and during the Voting and Lock-Up Period, it shall not, directly or indirectly (including by operation of law), (i) sell, assign, transfer, exchange, offer, assign, swap, convert, place a lien on, pledge, or otherwise dispose or encumber any of the Subject Pyrophyte Ordinary Shares, (ii) deposit any of the Subject Pyrophyte Ordinary Shares into a voting trust or enter into a voting agreement or arrangement or grant any proxy or power of attorney with respect to any of the Subject Pyrophyte Ordinary Shares that conflicts with any of the covenants or agreements set forth in this Agreement, (iii) publicly announce any intention to effect, or enter into any contract, option or other arrangement or undertaking with respect to, any transaction specified in clause (i) or (ii) with respect to the Subject Pyrophyte Ordinary Shares, (iv) engage in any hedging or other transaction which is designed to, or which would (either alone or in connection with one or more events, developments or events (including the satisfaction or waiver of any conditions precedent)), lead to or result in a sale or disposition of the Subject Pyrophyte Ordinary Shares even if such Subject Pyrophyte Ordinary Shares would be disposed of by a Person (as defined in the Business Combination Agreement) other than the Pyrophyte Shareholder or (v) take any action that would have the effect of preventing or materially delaying the performance of its obligations under this Agreement (the covenants under (i)-(v) hereof, the "Lock-Up"). For the avoidance of doubt, the restrictions set forth in this Section 3 shall not apply to any Pyrophyte Class A Shares held by the Pyrophyte Shareholder other than the Subject Pyrophyte Ordinary Shares.

4. Issuance and Subscription.

- 4.1 In consideration of the Pyrophyte Shareholder's performance of its obligations described herein, Pyrophyte agrees to issue and sell and the Pyrophyte Shareholder agrees to subscribe for, immediately prior to the Domestication, an additional 58,570 Pyrophyte Class A Shares (the "Additional Shares"), on the terms and subject to the conditions set forth in this Agreement. Each of the Parties hereto acknowledges and agrees that the Additional Shares will be issued in accordance with the terms of this Agreement.
- 4.2 The consummation of the transactions contemplated in this Section 4 shall occur immediately prior to the Domestication. Upon written notice from (or on behalf of) Pyrophyte to the Pyrophyte Shareholder (the "Closing Notice") at least five (5) Business Days prior to the date that Pyrophyte reasonably expects all conditions to the consummation of the Amalgamations to be satisfied (the "Expected Closing Date"), the Pyrophyte Shareholder shall deliver to Pyrophyte no later than two (2) Business Days prior to the date that Pyrophyte reasonably expects the Domestication to occur any information that is reasonably requested in the Closing Notice in order for Pyrophyte to issue the Additional Shares including, without limitation, the legal name of the person in whose name such Additional Shares are to be issued and allotted (or the Pyrophyte Shareholder's nominee in accordance with its delivery instructions) and a duly completed and executed Internal Revenue Service Form W-9 or Form W-8, as applicable. On the Closing Date, prior to the Domestication, Pyrophyte shall issue to the Pyrophyte Shareholder (or the funds and accounts designated by the Pyrophyte Shareholder if so designated by the Pyrophyte Shareholder, or its nominee in accordance with its delivery instructions) or to a custodian designated by the Pyrophyte Shareholder, as applicable, the Additional Shares, free and clear of any liens or other restrictions whatsoever (other than those arising under this Agreement, the governing and organizational documents of Pyrophyte and state or federal securities laws), which Additional Shares, unless otherwise determined by Pyrophyte, shall be uncertificated, with record ownership reflected only in the register of shareholders of Pyrophyte.
- 4.3 In connection with the SPAC Amalgamation and the Closing of the Transaction, each then issued and outstanding Pyrophyte Class A Share, including the Additional Shares, will be exchanged, on a one-for-one basis, for Sio Newco Common Shares. Sio Newco shall provide evidence from its transfer agent showing the Pyrophyte Shareholder as the owner of the Additional Shares (which shares shall be Sio Newco Common Shares after the Transaction) on and as of the Closing Date within two (2) Business Days of the Closing Date. If the Transaction is not consummated within five (5) Business Days after the Expected Closing Date, any Additional Shares that had been issued shall be cancelled.
- 4.4 The obligations of Pyrophyte and Sio Newco pursuant to this Section 4 shall be subject to the satisfaction, or waiver by Pyrophyte and Sio Newco, of the following conditions:
- (a) the Pyrophyte Shareholder shall have fully complied with, performed and satisfied its obligations set out in Sections 1-3 hereof, and shall have performed, satisfied and complied in all material respects with all other covenants, agreements and conditions required by this Agreement to be performed, satisfied or complied with by it at or prior to the date of the Domestication; and

- (b) all representations and warranties of the Pyrophyte Shareholder contained in this Agreement shall be true and correct in all material respects (other than representations and warranties that are qualified as to materiality, which representations and warranties shall be true and correct in all respects) at and as of the date of the Domestication (except for representations and warranties made as of a specific date, which shall be true and correct in all material respects (other than representations and warranties that are qualified as to materiality, which representations and warranties shall be true and correct in all respects) as of such date).

4.5 The consummation of the transactions pursuant to this Section 4 shall be subject to the satisfaction, or waiver in writing by each of the parties hereto, of the conditions that, on the date of the Domestication:

- (a) all conditions precedent to the closing of the Transaction set forth in Article VII of the Business Combination Agreement shall have been satisfied (as determined by the parties to the Business Combination Agreement) or waived in writing by the person(s) with the authority to make such waiver (other than those conditions which, by their nature, are to be satisfied at the closing of the Transaction pursuant to the Business Combination Agreement), and the closing of the Transaction shall be scheduled to occur substantially concurrently with the Closing;
- (b) no governmental authority shall have enacted, issued, promulgated, enforced or entered any judgment, order, law, rule or regulation which is then in effect and has the effect of making the consummation of the transactions contemplated hereby illegal or otherwise restraining or prohibiting consummation of the transactions contemplated hereby, and no governmental authority shall have instituted or threatened in writing a proceeding seeking to impose any such restraint or prohibition;
- (c) a license under the Environment Act (Manitoba) has been obtained by Sio that would permit Sio to extract high purity silica sand from the Winnipeg Sandstone geological formation situated within Sio's mining claims and leases located southwest of Vivian, Manitoba at an annual extraction rate of up to 1.34 million tonnes; and
- (d) the Sio Newco Common Shares shall be approved for listing on the New York Stock Exchange or such other national securities exchange as agreed to by Pyrophyte and Sio (the "Stock Exchange"), subject only to official notice of issuance.

4.6 The obligations of the Pyrophyte Shareholder pursuant to this Section 4 shall be subject to the satisfaction, or waiver by the Pyrophyte Shareholder, of the following conditions

- (a) each of Pyrophyte and Sio Newco shall have performed, satisfied and complied in all material respects with all covenants, agreements and conditions required by this Agreement to be performed, satisfied or complied with by it at or prior to the date of the Domestication; and
- (b) all representations and warranties of each of Pyrophyte and Sio Newco contained in this Agreement shall be true and correct in all material respects (other than representations and warranties that are qualified as to materiality, which representations and warranties shall be true and correct in all respects) at and as of the date of the Domestication (except for representations and warranties made as of a specific date, which shall be true and correct in all material respects (other than representations and warranties that are qualified as to materiality, which representations and warranties shall be true and correct in all respects) as of such date).

5. Representations and Warranties.

5.1 Pyrophyte Representations and Warranties. Pyrophyte represents and warrants as of the date hereof and as of the Closing Date to the Pyrophyte Shareholder as follows:

- (a) Pyrophyte (i) is validly existing and in good standing under the laws of its jurisdiction of incorporation, (ii) has the requisite corporate power and authority to own, lease and operate its properties, to carry on its business as it is now being conducted and to enter into and perform its obligations under this Agreement, and (iii) is duly licensed or qualified to conduct its business and, if applicable, is in good standing under the laws of each jurisdiction (other than its jurisdiction of incorporation and only to the extent such concept exists in such jurisdiction) in which the conduct of its business or the ownership of its properties or assets requires such license or qualification, except, with respect to the foregoing clause (iii), where the failure to be so licensed, qualified or in good standing would not reasonably be expected to have a Pyrophyte Material Adverse Effect. For purposes of this Agreement, a "Pyrophyte Material Adverse Effect" means an event, change, development, occurrence, condition or effect with respect to Pyrophyte and its subsidiaries that, individually or in the aggregate, would reasonably be expected to have a material adverse effect on the business or financial condition of Pyrophyte and its subsidiaries, taken together as a whole (on a consolidated basis).
- (b) As of the Closing Date, the Pyrophyte Class A Shares representing the Additional Shares will be duly authorized and, when issued and delivered to the Pyrophyte Shareholder against full payment therefor in accordance with the terms of this Agreement, will be validly issued, fully paid and non-assessable, free and clear of all liens or other restrictions (other than those arising under this Agreement, the governing and organizational documents of Pyrophyte or applicable securities laws and other than those imposed by or on the Pyrophyte Shareholder or the Pyrophyte Shareholder's assets), and will not have been issued in violation of, or subject to, any preemptive or similar rights created under Pyrophyte's governing and organizational documents or the laws of its jurisdiction of incorporation.
- (c) This Agreement and the Business Combination Agreement (the "Transaction Documents") have been duly authorized, validly executed and delivered by Pyrophyte and, assuming that the Transaction Documents constitute valid and binding obligations of the other parties thereto, are valid and legally binding obligations of Pyrophyte, and are enforceable against Pyrophyte in accordance with their terms, except as may be limited or otherwise affected by (i) bankruptcy, insolvency, fraudulent conveyance, reorganization, moratorium or other laws relating to or affecting the rights of creditors generally and (ii) principles of equity, whether considered at law or equity.

- (d) Assuming the accuracy of the representations and warranties of Sio Newco and the Pyrophyte Shareholder set forth in Section 5.2 and Section 5.3, respectively, of this Agreement, the execution and delivery of this Agreement, the issuance and allotment of the Additional Shares hereunder (upon satisfaction or waiver of the conditions set forth in Section 2), the compliance by Pyrophyte with all of the provisions of this Agreement and the consummation of the transactions contemplated herein will not (i) conflict with or result in a breach or violation of any of the terms or provisions of, or constitute a default under, or result in the creation or imposition of any lien, charge or encumbrance upon any of the property or assets of Pyrophyte pursuant to the terms of any indenture, mortgage, deed of trust, loan agreement, lease, license or other agreement or instrument to which Pyrophyte is a party or by which Pyrophyte is bound or to which any of the property or assets of Pyrophyte is subject, (ii) result in any violation of the provisions of the organizational documents of Pyrophyte, or (iii) result in any violation of any statute or any judgment, order, rule or regulation of any court or governmental agency or body, domestic or foreign, having jurisdiction over Pyrophyte or any of its properties that, in the case of clauses (i) and (iii), would reasonably be expected to have a Pyrophyte Material Adverse Effect or materially impact the consummation of the Transaction.
- (e) As of the date hereof, the authorized share capital of Pyrophyte consists of (i) 200,000,000 Pyrophyte Class A Shares, (ii) 20,000,000 Class B ordinary shares of Pyrophyte, par value \$0.0001 per share ("Pyrophyte Class B Shares"), and (iii) 1,000,000 preference shares, par value \$0.0001 per share. As of the date hereof, (i) 14,005,087 Pyrophyte Class A Shares, (ii) no Pyrophyte Class B Shares are issued and outstanding, all of which are validly issued, fully paid and non-assessable and not subject to any preemptive rights. As of the date of this Agreement, there are no preference shares of Pyrophyte issued and outstanding. As of the date hereof and, except as described in the Pyrophyte SEC Documents (as defined below) and pursuant to the Business Combination Agreement, at the Closing Date, there are no outstanding options, warrants or other rights to subscribe for, purchase or acquire from Pyrophyte any shares or other equity interests in Pyrophyte (collectively, "Pyrophyte Equity Interests") or securities convertible into or exchangeable or exercisable for Pyrophyte Equity Interests. Except as set forth in the Business Combination Agreement, as of the date hereof and as of the Closing, Pyrophyte has no subsidiaries and does not own, directly or indirectly, interests or investments (whether equity or debt) in any person, whether incorporated or unincorporated. Except as described in the Pyrophyte SEC Documents, as of the date hereof and as of the Closing Date, there are no shareholder agreements, voting trusts or other agreements or understandings to which Pyrophyte is a party or by which it is bound relating to the voting of any Pyrophyte Equity Interests, other than as contemplated by the Business Combination Agreement. There are no securities or instruments issued by or to which Pyrophyte is a party containing anti-dilution or similar provisions that will be triggered by the issuance of the Additional Shares or the Transaction, except in each case for such anti-dilution or similar provisions the application of which has been effectively waived.
- (f) Assuming the accuracy of the representations and warranties of Sio Newco and the Pyrophyte Shareholder set forth in Section 5.2 and Section 5.3, respectively of this Agreement, Pyrophyte is not required to obtain any consent, waiver, authorization or order of, give any notice to, or make any filing or registration with, any court or other provincial, territorial, federal, state, local or other governmental authority, self-regulatory organization or other person in connection with the execution, delivery and performance of this Agreement (including, without limitation, the issuance of the Additional Shares), other than (i) filings required by applicable state securities laws, (ii) the filing of the Registration Statement (as defined below), (iii) filings required by the Securities Act of 1933, as amended (the "Securities Act"), the Securities Exchange Act of 1934, as amended (the "Exchange Act"), the rules of the United States Securities and Exchange Commission (the "SEC"), including the registration statement on Form F-4 with respect to the Transaction and the proxy statement/prospectus included therein, (iv) filings or consents required by the Stock Exchange, including with respect to obtaining shareholder approval of the Transaction, if applicable, (v) if the Pyrophyte Shareholder is located in the United States or is a U.S. Person as defined in Regulation S promulgated under the Securities Act ("Regulation S")

(such Pyrophyte Shareholder, a "U.S. Shareholder"), the filing of a Notice of Exempt Offering of Securities on Form D with the SEC under Regulation D under the Securities Act, if applicable, (vi) filings required to consummate the Transaction as provided under the Business Combination Agreement, (vii) the filing of notification under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended ("HSR Act"), if applicable, and (viii) those filings, the failure of which to obtain would not reasonably be expected to have a Pyrophyte Material Adverse Effect.

- (g) Except for such matters as have not had and would not reasonably be expected to have a Pyrophyte Material Adverse Effect, there is no (i) suit, action, proceeding or arbitration before a governmental authority or arbitrator pending, or, threatened in writing against Pyrophyte, (ii) judgment, decree, injunction, ruling or order of any governmental authority or arbitrator outstanding against Pyrophyte or (iii) written communication from a governmental entity that alleges that Pyrophyte is not in compliance or is in default or violation of any applicable law.
- (h) Pyrophyte is in compliance with all applicable laws and has not received any written communication from a governmental entity that alleges that Pyrophyte is not in compliance with, or is in default or violation of any applicable law, except where such non-compliance, default, or violation would not, individually or in the aggregate, reasonably be expected to have a Pyrophyte Material Adverse Effect.
- (i) As of their respective dates, or, if amended, as of the date of such amendment, which shall be deemed to have superseded such original filing, each form, report, statement, schedule, prospectus, proxy, registration statement and other document required to be filed by Pyrophyte with the SEC on or prior to the Closing Date (collectively, as amended and/or restated since the time of their filing, the "Pyrophyte SEC Documents") and, together with the Sio Newco SEC Documents (as defined below), the "SEC Documents") complied in all material respects with the requirements of the Securities Act (as defined below) and the Exchange Act (as defined below), and the rules and regulations of the SEC promulgated thereunder, and none of the Pyrophyte SEC Documents, when filed, or if amended prior to the Closing Date (such amended Pyrophyte SEC Documents, the "Amended Pyrophyte SEC Documents"), as of the date of such amendment with respect to those disclosures that were amended, contained any untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading. The financial statements of Pyrophyte included in the Pyrophyte SEC Documents or, if amended, in the Amended Pyrophyte SEC Documents, comply in all material respects with applicable accounting requirements and the rules and regulations of the SEC with respect thereto as in effect at the time of such filing and fairly present in all material respects the financial position of Pyrophyte as of and for the dates thereof and the results of operations and cash flows for the periods then ended, subject, in the case of unaudited statements, to normal, year-end audit adjustments. Pyrophyte has filed each report, statement, schedule, prospectus, and registration statement that Pyrophyte was required to file with the SEC since its initial registration of the Pyrophyte Class A Shares with the SEC and through the date hereof. There are no material outstanding or unresolved comments in comment letters from the Staff (as defined below) with respect to any of the Pyrophyte SEC Documents.

- (j) Pyrophyte has not taken any steps to seek protection pursuant to any law or statute relating to bankruptcy, insolvency, reorganization, receivership, liquidation or winding up, nor does Pyrophyte have any knowledge that any of its creditors intends to initiate involuntary bankruptcy proceedings.
- (k) No broker or finder is entitled to any brokerage or finder's fee or commission or any other payment solely in connection with the issuance of the Additional Shares to the Pyrophyte Shareholder.
- (l) Except as provided in this Agreement and the Subscription Agreements, none of Pyrophyte or any of its affiliates, nor any person acting on their behalf has, directly or indirectly, made any offers or sales of any security or solicited any offers to buy any security, under circumstances that would require registration of the issuance of any of the Additional Shares under the Securities Act, whether through integration with prior offerings pursuant to Rule 502(a) of the Securities Act or otherwise.
- (m) The issued and outstanding Pyrophyte Class A Ordinary Shares are registered pursuant to Section 12(b) of the Exchange Act and are listed for trading on the New York Stock Exchange under the symbol "PHYT." As of the date of this Agreement, there is no action pending or, to the knowledge of Pyrophyte, threatened in writing against Pyrophyte by the New York Stock Exchange or the SEC with respect to any intention by such entity to deregister the Pyrophyte Class A Ordinary Shares or terminate the listing of Pyrophyte on the New York Stock Exchange.
- (n) Pyrophyte is not, and immediately after consummation of the transactions contemplated by this Agreement, will not be, an "investment company" within the meaning of the Investment Company Act of 1940 (the "Investment Company Act").
- (o) Pyrophyte has not taken any steps to seek protection pursuant to any law or statute relating to bankruptcy, insolvency, reorganization, receivership, liquidation or winding up, nor does Pyrophyte have any knowledge that any of its creditors intends to initiate involuntary bankruptcy proceedings.
- (p) Pyrophyte has not entered into any non-redemption agreement with any other investor on terms that are more favorable to such other investor as to the Pyrophyte Shareholder hereunder.

5.2 Sio Newco Representations and Warranties. Sio Newco represents and warrants as of the date hereof and as of the Closing Date to the Pyrophyte Shareholder as follows:

- (a) Sio Newco (i) is validly existing and in good standing under the laws of its jurisdiction of incorporation, (ii) has the requisite corporate power and authority to own, lease and operate its properties, to carry on its business as it is now being conducted and to enter into and perform its obligations under this Agreement, and (iii) is duly licensed or qualified to conduct its business and, if applicable, is in good standing under the laws of each jurisdiction (other than its jurisdiction of incorporation and only to the extent such concept exists in such jurisdiction) in which the conduct of its business or the ownership of its properties or assets requires such license or qualification, except, with respect to the foregoing clause (iii), where the failure to be so licensed, qualified or in good standing would not reasonably be expected to have a Sio Newco Material Adverse Effect. For purposes of this Agreement, a "Sio Newco Material Adverse Effect" means an event, change, development, occurrence, condition or effect with respect to Sio Newco and its subsidiaries that, individually or in the aggregate, would reasonably be expected to have a material adverse effect on the business or financial condition of Sio Newco and its subsidiaries, taken together as a whole (on a consolidated basis).

- (b) As of the Closing Date, the Sio Newco Common Shares that will be exchanged for the Additional Shares pursuant to the Transaction will be duly authorized and, when issued and delivered to the Pyrophyte Shareholder against full payment therefor in accordance with the terms of this Agreement, will be validly issued, fully paid and non-assessable, free and clear of all liens or other restrictions (other than those arising under this Agreement, the governing and organizational documents of Sio Newco or applicable securities laws and other than those imposed by or on the Pyrophyte Shareholder or the Pyrophyte Shareholder's assets), and will not have been issued in violation of, or subject to, any preemptive or similar rights created under Sio Newco's governing and organizational documents or the laws of its jurisdiction of incorporation.
- (c) This Agreement has been duly authorized and validly executed and delivered by Sio Newco, and assuming the due authorization, execution and delivery of the same by Sio, the Pyrophyte Shareholder and Pyrophyte, this Agreement shall constitute the valid and legally binding obligation of Sio Newco, enforceable against Sio Newco in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization, moratorium and similar laws affecting creditors generally and by the availability of equitable remedies.
- (d) Assuming the accuracy of the representations and warranties of Pyrophyte and the Pyrophyte Shareholder set forth in Section 5.1 and Section 5.3, respectively, of this Agreement, and the execution and delivery of this Agreement, the issuance and allotment of the Additional Shares hereunder (upon satisfaction or waiver of the conditions set forth in Section 2), the compliance by Sio Newco with all of the provisions of this Agreement and the consummation of the transactions contemplated herein will not (i) conflict with or result in a breach or violation of any of the terms or provisions of, or constitute a default under, or result in the creation or imposition of any lien, charge or encumbrance upon any of the property or assets of Sio Newco pursuant to the terms of any indenture, mortgage, deed of trust, loan agreement, lease, license or other agreement or instrument to which Sio Newco is a party or by which Sio Newco is bound or to which any of the property or assets of Sio Newco is subject, (ii) result in any violation of the provisions of the organizational documents of Sio Newco, or (iii) result in any violation of any statute or any judgment, order, rule or regulation of any court or governmental agency or body, domestic or foreign, having jurisdiction over Sio Newco or any of its properties that, in the case of clauses (i) and (iii), would reasonably be expected to have a Sio Newco Material Adverse Effect.
- (e) Assuming the accuracy of the representations and warranties of Pyrophyte and the Pyrophyte Shareholder set forth in Section 5.1 and Section 5.3, respectively, of this Agreement, Sio Newco is not required to obtain any consent, waiver, authorization or order of, give any notice to, or make any filing or registration with, any court or other provincial, territorial, federal, state, local or other governmental authority, self-regulatory organization or other person in connection with the execution, delivery and performance of this Agreement (including, without limitation, the issuance of the Additional Shares pursuant to the Transaction), other than (i) filings required by applicable state securities laws, (ii) the filing of the Registration Statement, (iii) filings required by the Securities Act, the Exchange Act, the rules of the SEC, including the registration statement on Form F-4 with respect to the Transaction and the proxy statement/prospectus included therein, (iv) filings or consents required by the Stock Exchange, including with respect to obtaining shareholder approval of the Transaction, if applicable, (v) if the Pyrophyte Shareholder is located in the United States or is a U.S. Shareholder, the filing of a Notice of Exempt Offering of Securities on Form D with the SEC under Regulation D under the Securities Act, if applicable, (vi) filings required to consummate the Transaction as provided under the Business Combination Agreement, (vii) the filing of notification under the HSR Act, if applicable, and (viii) those filings, the failure of which to obtain would not reasonably be expected to have a Sio Newco Material Adverse Effect.

- (f) Except for such matters as have not had and would not reasonably be expected to have a Sio Newco Material Adverse Effect, there is no (i) suit, action, proceeding or arbitration before a governmental authority or arbitrator pending, or, threatened in writing against Sio Newco, (ii) judgment, decree, injunction, ruling or order of any governmental authority or arbitrator outstanding against Sio Newco or (iii) written communication from a governmental entity that alleges that Sio Newco is not in compliance or is in default or violation of any applicable law.
- (g) Sio Newco is in compliance with all applicable laws and has not received any written communication from a governmental entity that alleges that Sio Newco is not in compliance with, or is in default or violation of any applicable law, except where such non-compliance, default, or violation would not, individually or in the aggregate, reasonably be expected to have a Sio Newco Material Adverse Effect.
- (h) As of the Closing Date, the Sio Newco Common Shares will be eligible for clearing through The Depository Trust Company (the “DTC”), through its Deposit/Withdrawal At Custodian (DWAC) system, and New SPAC will be eligible and participating in the Direct Registration System (DRS) of DTC with respect to the Sio Newco Common Shares.
- (i) As of their respective dates, or, if amended, as of the date of such amendment, which shall be deemed to supersede such original filing, each form, report, statement, schedule, prospectus, proxy, registration statement and other document required to be filed by Sio Newco with the SEC on or prior to the Closing Date (collectively, as amended and/or restated since the time of their filing, the “Sio Newco SEC Documents”) complied in all material respects with the requirements of the Securities Act and the Exchange Act, and the rules and regulations of the SEC promulgated thereunder, and none of Sio Newco SEC Documents, when filed, or if amended prior to the Closing Date (such amended Sio Newco SEC Documents, the “Amended Sio Newco SEC Documents”), as of the date of such amendment with respect to those disclosures that were amended, contained any untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading. The financial statements of Sio Newco included in the Sio Newco SEC Documents or, if amended, in the Amended Sio Newco SEC Documents, comply in all material respects with applicable accounting requirements and the rules and regulations of the SEC with respect thereto as in effect at the time of such filing and fairly present in all material respects the financial position of Sio Newco as of and for the dates thereof and the results of operations and cash flows for the periods then ended, subject, in the case of unaudited statements, to normal, year-end audit adjustments. There are no material outstanding or unresolved comments in comment letters from the staff of the Division of Corporation Finance (the “Staff”) of the SEC with respect to any of the Sio Newco SEC Documents as of the date hereof.

- (j) As of the date hereof, the authorized share capital of Sio Newco consists of an unlimited number of common shares and an unlimited number of preferred shares. As of the date hereof: 100 common shares were issued and outstanding. All 100 common shares issued and outstanding have been duly authorized and validly issued, are fully paid and non-assessable and are not subject to preemptive rights or similar. As of the date hereof, except pursuant to (1) the Subscription Agreements, or (2) the Business Combination Agreement, there are no outstanding options, warrants or other rights to subscribe for, purchase or acquire from Sio Newco any shares or other equity interests in Sio Newco (collectively, "Sio Newco Equity Interests") or securities convertible into or exchangeable or exercisable for Sio Newco Equity Interests. Except as set forth in the Business Combination Agreement, as of the date hereof, Sio Newco has no subsidiaries and does not own, directly or indirectly, interests or investments (whether equity or debt) in any person, whether incorporated or unincorporated. As of the date hereof, there are no shareholder agreements, voting trusts or other agreements or understandings to which Sio Newco is a party or by which it is bound relating to the voting of any Sio Newco Equity Interests, other than as contemplated by the Business Combination Agreement. There are no securities or instruments issued by or to which Sio Newco is a party containing anti-dilution or similar provisions that will be triggered, by the issuance of the Additional Shares, or the Transaction, except in each case for such anti-dilution or similar provisions the application of which has been effectively waived.
- (k) There is no suit, action, proceeding or investigation pending or, to the knowledge of Sio Newco, threatened against Sio Newco by the SEC, the Stock Exchange, the applicable securities commission or securities regulatory authority in each of the provinces and territories of Canada, or other securities commission or securities regulatory authority with respect to any intention by such entity to prohibit the registration of the Sio Newco Common Shares or prohibit the listing of the Sio Newco Common Shares on the Stock Exchange.
- (l) Upon consummation of the Transaction, the issued and outstanding Sio Newco Common Shares are expected to be registered pursuant to Section 12(b) of the Exchange Act and listed for trading on the Stock Exchange, subject only to official notice thereof.
- (m) Sio Newco is not, and immediately after consummation of the Transaction, will not be, an "investment company" within the meaning of the Investment Company Act.
- (n) Sio Newco has not taken any steps to seek protection pursuant to any law or statute relating to bankruptcy, insolvency, reorganization, receivership, liquidation or winding up, nor does Sio Newco have any knowledge that any of its creditors intends to initiate involuntary bankruptcy proceedings.

5.3 Pyrophyte Shareholder Representations and Warranties. The Pyrophyte Shareholder hereby represents and warrants as of the date hereof and as of the Closing Date to Pyrophyte and Sio Newco as follows:

- (a) If the Pyrophyte Shareholder is a legal entity, the Pyrophyte Shareholder (i) has been duly formed and is validly existing and in good standing under the laws of its jurisdiction of formation or incorporation and (ii) has the requisite power and authority to enter into, and perform its obligations under, this Agreement. If the Pyrophyte Shareholder is an individual, the Pyrophyte Shareholder has the legal competence and capacity to enter into and perform its obligations under this Agreement.
- (b) If the Pyrophyte Shareholder is an entity, this Agreement has been duly authorized, validly executed and delivered by the Pyrophyte Shareholder. If the Pyrophyte Shareholder is an individual, the Pyrophyte Shareholder's signature is genuine and the signatory has the legal competence and capacity to execute this Agreement. Assuming the due authorization, execution and delivery of the same by Sio, Sio Newco and Pyrophyte, this Agreement shall constitute the valid and legally binding obligation of the Pyrophyte Shareholder, enforceable against the Pyrophyte Shareholder in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization, moratorium and similar laws

- (c) The execution, delivery and performance of this Agreement, and the execution of the transactions contemplated herein do not and will not (i) conflict with or result in a breach or violation of any of the terms or provisions of, or constitute a default under, or result in the creation or imposition of any lien, charge or encumbrance upon any of the property or assets of the Pyrophyte Shareholder pursuant to the terms of any indenture, mortgage, deed of trust, loan agreement, lease, license or other agreement or instrument to which the Pyrophyte Shareholder is a party or by which the Pyrophyte Shareholder is bound or to which any of the property or assets of the Pyrophyte Shareholder is subject; (ii) if the Pyrophyte Shareholder is a legal entity, result in any violation of the provisions of the organizational documents of the Pyrophyte Shareholder; or (iii) result in any violation of any statute or any judgment, order, rule or regulation of any court or governmental agency or body, domestic or foreign, having jurisdiction over the Pyrophyte Shareholder or any of its properties that in the case of clauses (i) and (iii), would have a Pyrophyte Shareholder Material Adverse Effect. For purposes of this Agreement, a “Pyrophyte Shareholder Material Adverse Effect” means an event, change, development, occurrence, condition or effect with respect to the Pyrophyte Shareholder that would reasonably be expected to have a material adverse effect on the Pyrophyte Shareholder’s ability to consummate the transactions contemplated hereby.
- (d) The execution, delivery and performance of this Agreement, the receipt of the Additional Shares hereunder, the compliance by the Pyrophyte Shareholder with all of the provisions of this Agreement and the consummation of the transactions contemplated herein will not conflict with or result in a breach or violation of any relevant laws and regulations applicable to the issue of the Additional Shares, and the Pyrophyte Shareholder will not cease to be in compliance if the Additional Shares are acquired.
- (e) The Pyrophyte Shareholder (i) is a “qualified institutional buyer” (as defined in Rule 144A under the Securities Act), an “accredited investor” (within the meaning of Rule 501(a) under the Securities Act) or a non-U.S. Person, as defined in Regulation S, in each case, satisfying the applicable requirements set forth on Annex A hereto, and accordingly the Pyrophyte Shareholder understands that the issuance of the Additional Shares hereunder meets the exemptions from filing under FINRA Rule 5123(b)(1)(C) or (J), (ii) is acquiring the Additional Shares only for its own account and not for the account of others, or in the case of a Pyrophyte Shareholder that is located in the United States or is a U.S. Person (as defined in Regulation S), if the Pyrophyte Shareholder is receiving the Additional Shares as a fiduciary or agent for one or more investor or trust accounts, each owner of such account is a “qualified institutional buyer” (as defined in Rule 144A under the Securities Act), an “accredited investor” (within the meaning of Rule 501(a) under the Securities Act) or such other person that satisfies the requirements of Annex A hereto and the Pyrophyte Shareholder has sole investment discretion with respect to each such account, and the full power and authority to make the acknowledgements, representations and agreements herein on behalf of each owner of each such account, (iii) is not acquiring the Additional Shares with a view to, or for offer or sale in connection with, any distribution thereof in violation of the Securities Act, (iv) is resident in or otherwise subject to applicable securities laws of the jurisdiction set out on the signature page hereto and (v) has provided Sio Newco and Pyrophyte with the requested information on Annex A and Annex B (to the extent applicable) following the signature page hereto and the information contained therein is accurate and complete. The Pyrophyte Shareholder is not an entity formed for the specific purpose of acquiring the Additional Shares, unless such newly formed entity is an entity in which all of the equity owners are “accredited investors” (within the meaning of Rule 501(a) under the Securities Act).

affecting creditors generally and by the availability of equitable remedies.

- (f) If the Pyrophyte Shareholder is a resident of or otherwise subject to applicable securities laws of any jurisdiction other than the United States, it confirms, represents and warrants that: (i) the Pyrophyte Shareholder is knowledgeable of, or has been independently advised as to, the applicable securities laws of the jurisdiction in which the Pyrophyte Shareholder is resident (the "International Jurisdiction") and which would apply to the acquisition of the Additional Shares; and (ii) the Pyrophyte Shareholder is acquiring the Additional Shares pursuant to exemptions from the prospectus or registration requirements or equivalent requirements under applicable securities laws or, if such is not applicable, the Pyrophyte Shareholder is permitted to acquire the Additional Shares under the applicable securities laws of the International Jurisdiction without the need to rely on any exemptions; (iii) the applicable securities laws of the International Jurisdiction do not require Pyrophyte and Sio Newco to make any filings or seek any approvals of any kind whatsoever from any securities regulator of any kind whatsoever in the International Jurisdiction in connection with the issue and sale or resale of the Additional Shares; and (iv) the acquisition of the Additional Shares by the Pyrophyte Shareholder does not trigger: (A) any obligation to prepare and file a prospectus or similar document, or any other report with respect to such acquisition in the International Jurisdiction; or (B) any continuous disclosure reporting obligation of the Issuer in the International Jurisdiction; and (C) the Pyrophyte Shareholder will, if requested by the Issuer, deliver to the Issuer a certificate or opinion of local counsel from the International Jurisdiction which will confirm the matters referred to in subsections (ii), (iii) and (iv) above to the satisfaction of the Issuer, acting reasonably.
- (g) The Pyrophyte Shareholder acknowledges and agrees that the Additional Shares are being issued in a transaction not involving any public offering within the meaning of the Securities Act and that the Additional Shares have not been registered under the Securities Act or the securities laws of any state, province or territory of Canada, or other jurisdiction and that Sio Newco is not required to register the Additional Shares except as set forth in Section 6 of this Agreement. The Pyrophyte Shareholder acknowledges and agrees that the Additional Shares may not be offered, resold, transferred, pledged or otherwise disposed of by the Pyrophyte Shareholder in the United States absent an effective registration statement under the Securities Act or in Canada from four months and a day after Sio Newco becoming a "reporting issuer" in any province or territory of Canada, except (i) in respect of a sale by a U.S. Shareholder, to Sio Newco or a subsidiary thereof, (ii) in respect of sales to a U.S. Shareholder, pursuant to an applicable exemption from the registration requirements of the Securities Act (including without limitation a private resale pursuant to so called "Section 4(a)1½"), provided that all of the applicable conditions thereof are met, (iii) in an ordinary course pledge such as a broker lien over account property generally, (iv) to non-U.S. Persons pursuant to offers and sales that occur outside the United States within the meaning of Regulation S, and, in each of clauses (i)-(iv), in accordance with any applicable securities laws of the states and other jurisdictions of the United States (including, if applicable, Canada Securities Laws), and that any certificates or account entries representing the Additional Shares shall contain a restrictive legend to such effect; or (v) in respect of any sale subject to applicable securities laws and regulations of the provinces and territories of Canada, pursuant to an applicable exemption from the prospectus requirements in Canada as provided for in NI 45-106. The Pyrophyte Shareholder acknowledges and agrees that the Additional Shares may not be offered, resold, transferred, pledged or otherwise disposed of by the Pyrophyte Shareholder in Canada from four months and a day after Sio Newco becoming a "reporting issuer" in any province or territory of Canada, except pursuant to an applicable exemption from the prospectus requirements in Canada as provided for in NI 45-106, and that any certificates or account entries representing the Additional Shares shall contain a restrictive legend to such effect. The Pyrophyte Shareholder acknowledges and agrees that the Additional Shares will be subject to these securities law transfer restrictions, and as a result of these transfer restrictions, the Pyrophyte Shareholder may not be able to readily offer, resell, transfer, pledge or otherwise dispose of the Additional Shares and may be required to bear the financial risk of an investment in the Additional Shares for an indefinite period of time. The Pyrophyte Shareholder acknowledges and agrees that the Additional Shares may not be immediately eligible for offer, resale, transfer, pledge or disposition pursuant to Rule 144 promulgated under the Securities Act, as amended ("Rule 144"), until the end of

any applicable holding period. The Pyrophyte Shareholder acknowledges and agrees that it has been advised to consult legal counsel prior to making any offer, resale, pledge or transfer of any of the Additional Shares.

- (h) The Pyrophyte Shareholder understands and agrees that the Pyrophyte Shareholder is acquiring the Additional Shares directly from Pyrophyte. The Pyrophyte Shareholder further acknowledges that, except pursuant to Sections 5.1 and 5.2 hereto, there have been no representations, warranties, covenants or agreements made to the Pyrophyte Shareholder by Pyrophyte, Sio Newco, Sio or any of their respective affiliates or any control persons, officers, directors, employees, partners, agents or representatives, expressly or by implication.
- (i) The Pyrophyte Shareholder further acknowledges that there have not been, and the Pyrophyte Shareholder hereby agrees that it is not relying on, any statements, representations, warranties, covenants or agreements made to the Pyrophyte Shareholder by Pyrophyte or Sio Newco or its subsidiaries (collectively, the "Acquired Companies") or any of their respective affiliates or any control persons, officers, directors, employees, partners, agents or representatives, any other party to the Transaction or any other person or entity, expressly or by implication, other than those representations, warranties, covenants and agreements of Sio Newco and Pyrophyte set forth in this Agreement.
- (j) In the case of a Pyrophyte Shareholder located in the United States or that is a U.S. Person (as defined in Regulation S), the Pyrophyte Shareholder represents and warrants that its acquisition and holding of such Additional Shares will not constitute or result in a non-exempt prohibited transaction under section 406 of the Employee Retirement Income Security Act of 1974, as amended ("ERISA"), section 4975 of the Internal Revenue Code of 1986, as amended (the "Code"), or any applicable similar law.

- (k) In making its decision to enter into this Agreement and acquire the Additional Shares, the Pyrophyte Shareholder has relied solely upon its independent investigation made by the Pyrophyte Shareholder and the representations of Pyrophyte, and Sio Newco in Sections 5.1 and 5.2 of this Agreement, respectively. The Pyrophyte Shareholder acknowledges and agrees that the Pyrophyte Shareholder has received such information as the Pyrophyte Shareholder deems necessary in order to make an investment decision with respect to the Additional Shares, including with respect to Pyrophyte, the Acquired Companies and the Transaction, and made its own assessment and is satisfied concerning the relevant financial, tax and other economic considerations relevant to the Pyrophyte Shareholder's investment in the Additional Shares. Without limiting the generality of the foregoing, the Pyrophyte Shareholder acknowledges that it has reviewed Sio Newco's and Pyrophyte's filings with the SEC. The Pyrophyte Shareholder represents and agrees that the Pyrophyte Shareholder and the Pyrophyte Shareholder's professional advisor(s), if any, have had the full opportunity to ask such questions, receive such answers and obtain such information as the Pyrophyte Shareholder and the Pyrophyte Shareholder's professional advisor(s), if any, have deemed necessary to make an investment decision with respect to the Additional Shares. The Pyrophyte Shareholder acknowledges that certain information provided by Sio Newco or Pyrophyte was based on projections, and such projections were prepared based on assumptions and estimates that are inherently uncertain and are subject to a wide variety of significant business, economic and competitive risks and uncertainties that could cause actual results to differ materially from those contained in the projections. The Pyrophyte Shareholder further acknowledges that the information provided to the Pyrophyte Shareholder was preliminary and subject to change, including in the registration statement and the proxy statement and/or prospectus that will be filed with the SEC in connection with the Transaction (which will include substantial additional information about Pyrophyte, the Acquired Companies and the Transaction and will update and supersede the information previously provided to the Pyrophyte Shareholder, including without limitation with respect to any financial statements and other financial information (whether historical or in the form of financial forecasts or projections) of the Acquired Companies, which may have been prepared and reviewed solely by each of Pyrophyte and Sio Newco and their respective officers and employees, as the case may be, and have not been reviewed by any outside party or, except as expressly set forth therein, certified or audited by an independent third-party auditor or audit firm), and that any changes to such information, including, without limitation, any changes based on updated information or changes in terms of the Transaction, shall in no way affect the Pyrophyte Shareholder's obligation to comply with the terms of this Agreement.
- (l) The Pyrophyte Shareholder became aware of transactions contemplated by this Agreement solely by means of direct contact between the Pyrophyte Shareholder and Sio Newco, Pyrophyte or by means of contact from a representative of Sio Newco or Pyrophyte, and the Additional Shares were offered to the Pyrophyte Shareholder solely by direct contact between the Pyrophyte Shareholder and Sio Newco, Pyrophyte or their respective representatives. The Pyrophyte Shareholder did not become aware of the transactions contemplated by this Agreement, nor were the Additional Shares offered to the Pyrophyte Shareholder, by any other means. The Pyrophyte Shareholder acknowledges that Pyrophyte represents and warrants that the Additional Shares (i) were not offered by any form of general solicitation or general advertising (within the meaning of Regulation D under the Securities Act) and (ii) are not being offered in a manner involving a public offering under, or in a distribution in violation of, the Securities Act or any state securities laws.
- (m) If the Pyrophyte Shareholder is or is acting on behalf of a Plan, the Pyrophyte Shareholder represents and warrants that none of Pyrophyte, Sio Newco, Sio or any of their respective affiliates (the "Transaction Parties") has acted as the Plan's fiduciary, or has been relied on for advice, with respect to its decision to acquire and hold the Additional Shares, and none of the Transaction Parties shall at any time be relied upon as the Plan's fiduciary with respect to any decision to acquire, continue to hold or transfer the Additional Shares.
- (n) [Reserved].

- (o) The Pyrophyte Shareholder acknowledges that it is aware that there are substantial risks incident to the ownership of the Additional Shares, including those set forth in the SEC Documents. The Pyrophyte Shareholder is able to fend for itself in the transactions contemplated herein and has such knowledge and experience in financial and business matters as to be capable of evaluating the merits and risks of an investment in the Additional Shares, and the Pyrophyte Shareholder has had an opportunity to seek, and has sought, such accounting, legal, business and tax advice as the Pyrophyte Shareholder has considered necessary to make an informed investment decision. The Pyrophyte Shareholder (i) in respect of issuances to a U.S. Shareholder, is an institutional account as defined in FINRA Rule 4512(c), an "accredited investor" as defined in Rule 501(a) under the Securities Act or is a person that otherwise satisfies the requirements of Annex A hereto, (ii) is a sophisticated investor, experienced in investing in private equity transactions and capable of evaluating investment risks independently, both in general and with regard to all transactions and investment strategies involving a security or securities, and (iii) has exercised independent judgment in evaluating its participation in the transactions contemplated by this Agreement, including the acquisition of the Additional Shares. The Pyrophyte Shareholder understands and acknowledges that the issuance of the Additional Shares hereunder meets, in respect of issuances to a U.S. Shareholder, (i) the exemptions from filing under FINRA Rule 5123(b)(1)(A) and (ii) the institutional customer exemption under FINRA Rule 2111(b).
- (p) The Pyrophyte Shareholder has adequately analyzed and fully considered the risks of an investment in the Additional Shares and determined that the Additional Shares are a suitable investment for the Pyrophyte Shareholder and that the Pyrophyte Shareholder is able at this time and in the foreseeable future to bear the economic risk of a total loss of the Pyrophyte Shareholder's investment in Pyrophyte. The Pyrophyte Shareholder acknowledges specifically that a possibility of total loss exists.
- (q) The Pyrophyte Shareholder understands and agrees that no federal, state or provincial agency has passed upon or endorsed the merits of the issuance of the Additional Shares or made any findings or determination as to the fairness of this investment.
- (r) The Pyrophyte Shareholder is not (i) a person or entity named (a "Person") on the List of Specially Designated Nationals and Blocked Persons administered by the U.S. Treasury Department's Office of Foreign Assets Control ("OFAC") or in any Executive Order issued by the President of the United States and administered by OFAC ("OFAC List"), or a person or entity prohibited by any OFAC sanctions program, (ii) owned or controlled by, or acting on behalf of, a person, that is named on an OFAC List, (iii) organized, incorporated, established, located, resident or born in, or a citizen, national, or the government, including any political subdivision, agency, or instrumentality thereof, of Cuba, Iran, North Korea, Syria, the Crimea region of Ukraine, or any other country or territory embargoed or subject to substantial trade restrictions by the United States (each a "Sanctioned Country"), (iv) a Designated National as defined in the Cuban Assets Control Regulations, 31 C.F.R. Part 515, or (iii) a non-U.S. shell bank or providing banking services indirectly to a non-U.S. shell bank. The Pyrophyte Shareholder agrees to provide law enforcement agencies, if requested thereby, such records as required by applicable law, provided that the Pyrophyte Shareholder is permitted to do so under applicable law (collectively "Sanctions"). If the Pyrophyte Shareholder is a financial institution subject to the Bank Secrecy Act (31 U.S.C. Section 5311 et seq.) (the "BSA"), as amended by the USA PATRIOT Act of 2001 (the "PATRIOT Act"), and its implementing regulations (collectively, the "BSA/PATRIOT Act"), the Pyrophyte Shareholder maintains policies and procedures reasonably designed to comply with applicable obligations under the BSA/PATRIOT Act. To the extent required, the Pyrophyte Shareholder maintains policies and procedures reasonably designed for the screening of its investors against the OFAC sanctions programs, including the OFAC List. To the extent required, the Pyrophyte Shareholder maintains policies and procedures reasonably designed to ensure that the funds held by the Pyrophyte Shareholder and used to purchase the Additional Shares were legally derived.

- (s) No foreign person (as defined in 31 C.F.R. Part 800.224) in which the national or subnational governments of a single foreign state have a substantial interest (as defined in 31 C.F.R. Part 800.244) will acquire a substantial interest in Sio Newco as a result of the issuance of the Additional Shares hereunder such that a declaration to the Committee on Foreign Investment in the United States would be mandatory under 31 C.F.R. Part 800.401, and no foreign person will have control (as defined in 31 C.F.R. Part 800.208) over Pyrophyte from and after the Closing as a result of the issuance of the Additional Shares hereunder.
- (t) In the case of a Pyrophyte Shareholder located in the United States or that is a U.S. Person (as defined in Regulation S), if the Pyrophyte Shareholder is an employee benefit plan that is subject to Title I of ERISA, a plan, an individual retirement account or other arrangement that is subject to section 4975 of the Code or an employee benefit plan that is a governmental plan (as defined in section 3(32) of ERISA), a church plan (as defined in section 3(33) of ERISA), a non-U.S. plan (as described in section 4(b)(4) of ERISA) or other plan that is not subject to the foregoing but may be subject to provisions under any other federal, state, local, non-U.S. or other laws or regulations that are similar to such provisions of ERISA or the Code, or an entity whose underlying assets are considered to include "plan assets" of any such plan, account or arrangement (each, a "Plan") subject to the fiduciary or prohibited transaction provisions of ERISA or section 4975 of the Code, the Pyrophyte Shareholder represents and warrants that (i) it has not relied on Sio Newco, Pyrophyte or any of their respective affiliates (the "Transaction Parties") for investment advice or as the Plan's fiduciary with respect to its decision to acquire and hold the Additional Shares, and none of the Transaction Parties shall at any time be relied upon as the Plan's fiduciary with respect to any decision to acquire, continue to hold or transfer the Additional Shares and (ii) the decision to invest in the Additional Shares has been made at the recommendation or direction of an "independent fiduciary" ("Independent Fiduciary") within the meaning of U.S. Code of Federal Regulations 29 C.F.R. section 2510.3-21(c), as amended from time to time (the "Fiduciary Rule") who is (1) independent of the Transaction Parties; (2) is capable of evaluating investment risks independently, both in general and with respect to particular transactions and investment strategies (within the meaning of the Fiduciary Rule); (3) is a fiduciary (under ERISA and/or section 4975 of the Code) with respect to the Pyrophyte Shareholder's investment in the Additional Shares and is responsible for exercising independent judgment in evaluating the investment in the Additional Shares; and (4) is aware of and acknowledges that (A) none of the Transaction Parties is undertaking to provide impartial investment advice, or to give advice in a fiduciary capacity, in connection with the acquirer's or transferee's investment in the Additional Shares, and (B) the Transaction Parties have a financial interest in the acquirer's investment in the Additional Shares on account of the fees and other remuneration they expect to receive in connection with transactions contemplated by this Agreement.
- (u) The Pyrophyte Shareholder acknowledges that it is not relying upon, and has not relied upon, any statement, representation or warranty made by any person, firm or corporation (including, without limitation, Sio Newco or Pyrophyte or any of their respective affiliates or any of its or their respective control persons, officers, directors, employees, agents or representatives), other than the representations and warranties of and Pyrophyte and Sio Newco contained in Sections 5.1 and 5.2 of this Agreement, respectively, in making its investment or decision to invest in Pyrophyte.

- (v) No broker or finder has acted on behalf of the Pyrophyte Shareholder in connection with the issuance of the Additional Shares pursuant to this Agreement in such a way as to create any liability to Sio Newco or Pyrophyte.
- (w) The Pyrophyte Shareholder hereby agrees that neither it, nor any person or entity acting on its behalf or pursuant to any understanding with the Pyrophyte Shareholder, shall, directly or indirectly, engage in any hedging activities, derivative transactions or execute any Short Sale or other transaction that would have a similar effect, with respect to the securities of Sio Newco or the Subject Pyrophyte Ordinary Shares prior to the Closing or the earlier termination of this Agreement in accordance with its terms. "Short Sales" shall include, without limitation, all "short sales" as defined in Rule 200 of Regulation SHO under the Exchange Act and all types of direct and indirect stock pledges (other than pledges in the ordinary course of business as part of prime brokerage arrangements), forward sale contracts, options, puts, calls, swaps and similar arrangements (including on a total return basis), and sales and other transactions through non-U.S. broker dealers or foreign regulated brokers.
- (x) Except as expressly disclosed in a Schedule 13D or Schedule 13G (or amendments thereto) filed by the Pyrophyte Shareholder with the SEC with respect to the beneficial ownership of Pyrophyte's outstanding securities prior to the date of this Agreement, the Pyrophyte Shareholder is not currently (and at all times through Closing will refrain from being or becoming) a member of a "group" (within the meaning of Section 13(d)(3) or Section 14(d)(2) of the Exchange Act, or any successor provision), including any group acting for the purpose of acquiring, holding or disposing of equity securities of Pyrophyte or Sio Newco (within the meaning of Rule 13d-5(b)(1) under the Exchange Act).
- (y) The Pyrophyte Shareholder will not acquire a substantial interest (as defined in 31 C.F.R. Part 800.244) in Pyrophyte or Sio Newco as a result of the issuance of the Additional Shares.
- (z) The Pyrophyte Shareholder acknowledges its obligations under applicable securities laws with respect to the treatment of non-public information relating to Sio Newco and Pyrophyte.
- (aa) The Pyrophyte Shareholder acknowledges that (i) Pyrophyte and Sio Newco, and any of their respective affiliates, control persons, officers, directors, employees, agents or representatives currently may have, and later may come into possession of, information regarding Pyrophyte and Sio Newco that is not known to the Pyrophyte Shareholder and that may be material to a decision to enter into this Agreement and (ii) the Pyrophyte Shareholder has determined to enter into this Agreement notwithstanding its lack of knowledge of such information.

6. Registration Rights.

6.1 Sio Newco agrees that, within thirty (30) calendar days following the Closing Date, New SPAC will file with the SEC (at New SPAC's sole cost and expense) a registration statement (the "Registration Statement") registering the resale by the Pyrophyte Shareholder of the Additional Shares (the "Registrable Securities"), and New SPAC shall use its commercially reasonable efforts to have the Registration Statement declared effective as soon as practicable after the filing thereof, but in any event no later than sixty (60) calendar days after the Closing Date (the "Effectiveness Deadline"); provided, that the Effectiveness Deadline shall be extended to one hundred twenty (120) calendar days after the Closing Date if the Registration Statement is reviewed by, and comments thereto are provided from, the SEC; provided, further, that New SPAC shall have the Registration Statement declared effective within ten (10) Business Days after the date New SPAC is notified (orally or in writing, whichever is earlier) by the staff of the SEC that the Registration Statement will not be "reviewed" or will not be subject to further review; provided, further, that (i) if the Effectiveness Deadline falls on a Saturday, Sunday or other day that the SEC is closed for business, the Effectiveness Deadline shall be extended to the next Business Day on which the SEC is open for business and (ii) if the SEC is closed for operations due to a government shutdown, the Effectiveness Deadline shall be extended by the same number of Business Days in which the SEC remains closed. Upon the Pyrophyte Shareholder's timely request, New SPAC shall provide a draft of the Registration Statement to the Pyrophyte Shareholder for review at least two (2) Business Days in advance of the date of filing the Registration Statement with the SEC (the "Filing Date"), and the Pyrophyte Shareholder shall provide any comments on the Registration Statement to New SPAC no later than the day immediately preceding the Filing Date. Unless otherwise agreed to in writing by the Pyrophyte Shareholder prior to the filing of the Registration Statement, the Pyrophyte Shareholder shall not be identified as a statutory underwriter in the Registration Statement; provided, that if the SEC requests that the Pyrophyte Shareholder be identified as a statutory underwriter in the Registration Statement, the Pyrophyte Shareholder will have the opportunity to withdraw from the Registration Statement upon its prompt written request to New SPAC. Notwithstanding the foregoing, if the SEC prevents New SPAC from including any or all of the shares proposed to be registered under the Registration Statement due to limitations on the use of Rule 415 of the Securities Act for the resale of the Registrable Securities by the applicable shareholders or otherwise, such Registration Statement shall register for resale such number of Registrable Securities which is equal to the maximum number of Registrable Securities as is permitted by the SEC. In such event, the number of Registrable Securities or other shares to be registered for each selling shareholder named in the Registration Statement shall be reduced pro rata among all such selling shareholders and as promptly as practicable after being permitted to register additional shares under Rule 415 under the Securities Act, New SPAC shall amend the Registration Statement or file one or more new Registration Statement(s) (such amendment or new Registration Statement shall also be deemed to be a "Registration Statement" hereunder) to register such additional Registrable Securities and cause such amendment or Registration Statement(s) to become effective as promptly as practicable after the filing thereof.

- 6.2 Sio Newco agrees that, except for such times as New SPAC is permitted hereunder to suspend the use of the prospectus forming part of a Registration Statement, New SPAC will use its commercially reasonable efforts to cause such Registration Statement to remain effective with respect to the Pyrophyte Shareholder, including to prepare and file any post-effective amendment to such Registration Statement or a supplement to the related prospectus such that the prospectus will not include any untrue statement or a material fact or omit to state any material fact necessary to make the statements therein, in light of the circumstances under which they were made, not misleading, until the earlier of (i) two (2) years from the effective date of the Registration Statement, (ii) the date on which the Pyrophyte Shareholder ceases to hold any Registrable Securities or (iii) on the first date on which the Pyrophyte Shareholder can sell all of its Registrable Securities (or shares received in exchange therefor) under Rule 144 of the Securities Act without limitation as to the manner of sale or the amount of such securities that may be sold and without the requirement for New SPAC to be in compliance with the current public information required under Rule 144(c)(1) (or Rule 144(i)(2), if applicable) and New SPAC shall use its commercially reasonable efforts to obtain the withdrawal of any order suspending the effectiveness of any Registration Statement as soon as reasonably practicable. For so long as the Registration Statement shall remain effective, New SPAC will use commercially reasonable efforts to file all reports, and provide all customary and reasonable cooperation, necessary to enable the Pyrophyte Shareholder to resell the Registrable Securities pursuant to the Registration Statement, qualify the Registrable Securities for listing on the Stock Exchange and update or amend the Registration Statement as necessary to include Registrable Securities. New SPAC will use its commercially reasonable efforts to, for so long as the Pyrophyte Shareholder holds Registrable Securities, make and keep public information available (as those terms are understood and defined in Rule 144) and file with the SEC in a timely manner all reports and other documents required of New SPAC under the Exchange Act so long as New SPAC remains subject to such requirements to enable the Pyrophyte Shareholder to resell the Registrable Securities pursuant to Rule 144. The Pyrophyte Shareholder agrees to disclose its beneficial ownership, as determined in accordance with Rule 13d-3 of the Exchange Act, of Registrable Securities to New SPAC (or its successor) upon request to assist New SPAC in making the determination described above.
- 6.3 New SPAC's obligations to include the Registrable Securities in the Registration Statement are contingent upon the Pyrophyte Shareholder furnishing in writing to New SPAC a completed selling shareholder questionnaire in customary form that contains such information regarding the Pyrophyte Shareholder, the securities of New SPAC held by the Pyrophyte Shareholder and the intended method of disposition of the Registrable Securities as shall be reasonably requested by New SPAC to effect the registration of the Registrable Securities, and the Pyrophyte Shareholder shall execute such documents in connection with such registration as New SPAC may reasonably request that are customary of a selling shareholder in similar situations, including providing that New SPAC shall be entitled to postpone and suspend the effectiveness or use of the Registration Statement (i) during any customary blackout or similar period or as permitted hereunder and (ii) as may be necessary in connection with the preparation and filing of any post-effective amendments to the Registration Statement to address any financial statement updates required by Item 8.A of Form 20-F; provided, that New SPAC shall request such information from the Pyrophyte Shareholder, including the selling shareholder questionnaire, at least five (5) Business Days prior to the anticipated Filing Date of the Registration Statement; and provided, further, under no circumstances shall the Pyrophyte Shareholder be required to sign any type of lock-up agreement. In the case of the registration effected by New SPAC pursuant to this Agreement, New SPAC shall, upon reasonable request, inform the Pyrophyte Shareholder as to the status of such registration. The Pyrophyte Shareholder shall not be entitled to use the Registration Statement for an underwritten offering of Registrable Securities. Notwithstanding anything to the contrary contained herein, New SPAC may delay or postpone filing of such Registration Statement, and from time to time require the Pyrophyte Shareholder not to sell under the Registration Statement or suspend the use of any such Registration Statement if it determines in good faith that in order for the registration statement to not contain a material misstatement or omission, an amendment thereto would be needed, or if such filing or use could materially affect a bona fide business or financing transaction of New SPAC or could require premature disclosure of information that would materially adversely affect New SPAC (each such circumstance, a "Suspension Event"); provided, that, (x) New SPAC shall not so delay filing or so suspend the use of the Registration Statement for a period of more than sixty (60) consecutive days or more than three (3) times in any three hundred sixty (360) day period, and (y) New SPAC shall use commercially reasonable efforts to make such registration

statement available for the sale by the Pyrophyte Shareholder of such securities as soon as practicable thereafter.

- 6.4 Upon receipt of any written notice from New SPAC of the happening of (i) an issuance by the SEC of any stop order suspending the effectiveness of any Registration Statement or the initiation of any proceedings for such purpose, which notice shall be given no later than three (3) Business Days from the date of such event, (ii) any Suspension Event during the period that the Registration Statement is effective, which notice shall be given no later than three (3) Business Days from the date of such Suspension Event, or (iii) or if as a result of a Suspension Event the Registration Statement or related prospectus contains any untrue statement of a material fact or omits to state any material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made (in the case of the prospectus) not misleading, the Pyrophyte Shareholder agrees that (1) it will immediately discontinue offers and sales of the Registrable Securities under the Registration Statement until the Pyrophyte Shareholder receives copies of a supplemental or amended prospectus (which New SPAC agrees to promptly prepare) that corrects the misstatement(s) or omission(s) referred to above and receives notice that any post-effective amendment has become effective or supplement has been filed or unless otherwise notified by New SPAC that it may resume such offers and sales, and (2) it will maintain the confidentiality of, and will not use, any information included in such written notice delivered by New SPAC unless otherwise required by law, subpoena or regulatory request or requirement; provided no notice given pursuant to this Section 6 shall contain material non-public information concerning New SPAC. If so directed by New SPAC, the Pyrophyte Shareholder will deliver to New SPAC or, in the Pyrophyte Shareholder's sole discretion destroy, all copies of the prospectus covering the Registrable Securities in the Pyrophyte Shareholder's possession; provided, however, that this obligation to deliver or destroy all copies of the prospectus covering the Registrable Securities shall not apply (w) to the extent the Pyrophyte Shareholder is required to retain a copy of such prospectus (A) in order to comply with applicable legal, regulatory, self-regulatory or professional requirements or (B) in accordance with a bona fide pre-existing document retention policy or (x) to copies stored electronically on archival servers as a result of automatic data back-up.
- 6.5 The Pyrophyte Shareholder may deliver written notice (an "Opt-Out Notice") to New SPAC requesting that the Pyrophyte Shareholder not receive notices from New SPAC otherwise required by this Section 6; provided, however, that the Pyrophyte Shareholder may later revoke any such Opt-Out Notice in writing. Following receipt of an Opt-Out Notice from the Pyrophyte Shareholder (unless subsequently revoked), (i) New SPAC shall not deliver any such notices to the Pyrophyte Shareholder and the Pyrophyte Shareholder shall no longer be entitled to the rights associated with any such notice and (ii) each time prior to the Pyrophyte Shareholder's intended use of an effective Registration Statement, the Pyrophyte Shareholder will notify New SPAC in writing at least two (2) Business Days in advance of such intended use, and if a notice of a Suspension Event was previously delivered (or would have been delivered but for the provisions of this Section 6.5) and the related suspension period remains in effect, New SPAC will so notify the Pyrophyte Shareholder, within one (1) Business Day of the Pyrophyte Shareholder's notification to New SPAC, by delivering to the Pyrophyte Shareholder a copy of such previous notice of Suspension Event, and thereafter will provide the Pyrophyte Shareholder with the related notice of the conclusion of such Suspension Event promptly following its availability.
- 6.6 For purposes of this Section 6, (i) "Registrable Securities" shall mean, as of any date of determination, the Additional Shares and any other equity security issued or issuable with respect to the Registrable Securities by way of share split, dividend, distribution, recapitalization, merger, exchange, or replacement, and (ii) "the Pyrophyte Shareholder" shall include any affiliate of the Pyrophyte Shareholder to which the rights under this Section 6 shall have been duly assigned.

- 6.7 Sio Newco shall indemnify and hold harmless the Pyrophyte Shareholder (to the extent the Pyrophyte Shareholder is a seller under the Registration Statement), the officers, directors, members, managers, partners, agents, investment advisors and employees of the Pyrophyte Shareholder, each person who controls the Pyrophyte Shareholder (within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act) and the officers, directors, members, managers, partners, agents and employees of each such controlling person, to the fullest extent permitted by applicable law, from and against any and all reasonable out-of-pocket losses, claims, damages, liabilities, costs (including, without limitation, reasonable and documented attorneys' fees) and expenses (collectively, "Losses") that arise out of or are based upon any untrue or alleged untrue statement of a material fact contained in the Registration Statement, any prospectus included in the Registration Statement or any form of prospectus or in any amendment or supplement thereto or in any preliminary prospectus, or arising out of or relating to any omission or alleged omission to state a material fact required to be stated therein or necessary to make the statements therein (in the case of any prospectus or form of prospectus or supplement thereto, in light of the circumstances under which they were made) not misleading, except to the extent that such untrue statements, alleged untrue statements, omissions or alleged omissions are based upon information regarding the Pyrophyte Shareholder furnished in writing to Sio Newco by or on behalf of the Pyrophyte Shareholder expressly for use therein or that the Pyrophyte Shareholder has omitted a material fact from such information. Sio Newco shall notify the Pyrophyte Shareholder promptly of the institution, threat or assertion of any proceeding arising from or in connection with the transactions contemplated by this Section 6 of which Sio Newco is aware. Such indemnity shall remain in full force and effect regardless of any investigation made by or on behalf of an indemnified party and shall survive the transfer of the Registrable Securities by the Pyrophyte Shareholder. Notwithstanding the forgoing, Sio Newco's indemnification obligations shall not apply to amounts paid in settlement of any Losses or action if such settlement is effected without the prior written consent of New SPAC (which consent shall not be unreasonably withheld or delayed).
- 6.8 The Pyrophyte Shareholder shall, severally and not jointly with any selling shareholder named in the Registration Statement, indemnify and hold harmless Sio Newco, its directors, officers, members, managers, partners, agents and employees, each person who controls Sio Newco (within the meaning of Section 15 of the Securities Act and Section 20 of the Exchange Act), and the directors, officers, members, managers, partners, agents or employees of such controlling persons, to the fullest extent permitted by applicable law, from and against all Losses arising out of or based upon any untrue or alleged untrue statement of a material fact contained in any Registration Statement, any prospectus included in the Registration Statement, or any form of prospectus, or in any amendment or supplement thereto or in any preliminary prospectus, or arising out of or relating to any omission or alleged omission of a material fact required to be stated therein or necessary to make the statements therein (in the case of any prospectus, or any form of prospectus or supplement thereto, in light of the circumstances under which they were made) not misleading to the extent, but only to the extent, that such untrue statements, alleged untrue statements, omissions or alleged omissions are based upon information regarding the Pyrophyte Shareholder furnished in writing to Sio Newco by or on behalf of the Pyrophyte Shareholder expressly for use therein. In no event shall the liability of the Pyrophyte Shareholder be greater in amount than the dollar amount of the net proceeds received by the Pyrophyte Shareholder upon the sale of the Registrable Securities giving rise to such indemnification obligation. Notwithstanding the forgoing, the Pyrophyte Shareholder's indemnification obligations shall not apply to amounts paid in settlement of any Losses or action if such settlement is effected without the prior written consent of the Pyrophyte Shareholder (which consent shall not be unreasonably withheld or delayed).

- 6.9 Any Person or entity entitled to indemnification herein shall (A) give prompt written notice to the indemnifying party of any claim with respect to which it seeks indemnification (provided that the failure to give prompt notice shall not impair any person's or entity's right to indemnification hereunder to the extent such failure has not prejudiced the indemnifying party) and (B) unless in such indemnified party's reasonable judgment a conflict of interest between such indemnified and indemnifying parties may exist with respect to such claim, permit such indemnifying party to assume the defense of such claim with counsel reasonably satisfactory to the indemnified party. If such defense is assumed, the indemnifying party shall not be subject to any liability for any settlement made by the indemnified party without its consent (but such consent shall not be unreasonably withheld, conditioned or delayed). An indemnifying party who is not entitled to, or elects not to, assume the defense of a claim shall not be obligated to pay the fees and expenses of more than one counsel for all parties indemnified by such indemnifying party with respect to such claim, unless in the reasonable judgment of any indemnified party a conflict of interest may exist between such indemnified party and any other of such indemnified parties with respect to such claim. No indemnifying party shall, without the consent of the indemnified party (which consent shall not be unreasonably withheld or delayed), consent to the entry of any judgment or enter into any settlement which cannot be settled in all respects by the payment of money (and such money is so paid by the indemnifying party pursuant to the terms of such settlement), which settlement shall not include a statement or admission of fault and culpability on the part of such indemnified party, and which settlement shall include as an unconditional term thereof the giving by the claimant or plaintiff to such indemnified party of a release from all liability in respect to such claim or litigation.
- 6.10 The indemnification provided for under this Agreement shall remain in full force and effect regardless of any investigation made by or on behalf of the indemnified party or any officer, director or controlling person or entity of such indemnified party and shall survive the transfer of the Registrable Securities acquired pursuant to this Agreement.
- 6.11 If the indemnification provided under this Section 6 from the indemnifying party is unavailable or insufficient to hold harmless an indemnified party in respect of any losses, claims, damages, liabilities and expenses referred to herein, then the indemnifying party, in lieu of indemnifying the indemnified party, shall contribute to the amount paid or payable by the indemnified party as a result of such losses, claims, damages, liabilities and expenses in such proportion as is appropriate to reflect the relative fault of the indemnifying party and the indemnified party, as well as any other relevant equitable considerations; provided, however, that the liability of the Pyrophyte Shareholder shall be limited to the net proceeds received by the Pyrophyte Shareholder from the sale of Registrable Securities giving rise to such contribution obligation. The relative fault of the indemnifying party and indemnified party shall be determined by reference to, among other things, whether any action in question, including any untrue or alleged untrue statement of a material fact or omission or alleged omission to state a material fact, was made by (or not made by, in the case of an omission), or relates to information supplied by (or not supplied by, in the case of an omission), such indemnifying party or indemnified party, and the indemnifying party's and indemnified party's relative intent, knowledge, access to information and opportunity to correct or prevent such action. The amount paid or payable by a party as a result of the losses or other liabilities referred to above shall be deemed to include, subject to the limitations set forth in this Section 7, any legal or other fees, charges or expenses reasonably incurred by such party in connection with any investigation or proceeding. No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution pursuant to this Section 6.11 from any person or entity who was not guilty of such fraudulent misrepresentation. Notwithstanding anything to the contrary herein, in no event will any party be liable for consequential, special, exemplary or punitive damages in connection with this Agreement or the transactions contemplated hereby.
7. Termination. This Agreement shall terminate and be void and of no further force and effect, and all rights and obligations of the parties hereunder shall terminate without any further liability on the part of any party in respect thereof, upon the earlier of (a) such date and time as the Business Combination Agreement is terminated in accordance with its terms and (b) the mutual written agreement of the parties hereto to terminate this Agreement; provided, that nothing herein will relieve any party from liability for any willful breach hereof prior to the time of

termination, and each party will be entitled to any remedies at law or in equity to recover losses, liabilities or damages arising from such breach. Pyrophyte shall notify the Pyrophyte Shareholder of the termination of the Business Combination Agreement promptly after the termination thereof.

8. Trust Account Waiver. The Pyrophyte Shareholder hereby acknowledges that, as described in Pyrophyte's prospectus relating to its initial public offering (the "IPO") dated October 26, 2021 available at www.sec.gov, Pyrophyte has established a trust account (the "Trust Account") containing the proceeds of the IPO and from certain private placements occurring simultaneously with the IPO (including interest accrued from time to time thereon) for the benefit of Pyrophyte, its public shareholders and certain other parties (including the underwriters of the IPO), and that, except as otherwise described in such prospectus, Pyrophyte may disburse monies from the Trust Account only to (x) its public shareholders in the event they elect to have their Pyrophyte Class A Shares redeemed for cash in connection with the consummation of Pyrophyte's initial business combination, an amendment to its amended and restated memorandum and articles of association to extend the deadline by which Pyrophyte must consummate its initial business combination, or Pyrophyte's failure to consummate an initial business combination by such deadline, (y) pay certain taxes from time to time, or (z) Pyrophyte after or concurrently with the consummation of its initial business combination. For and in consideration of Pyrophyte entering into this Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Pyrophyte Shareholder, on behalf of itself and its affiliates, hereby (a) agrees that it does not now and shall not at any time hereafter have any right, title, interest or claim of any kind in or to any assets held in the Trust Account, and shall not make any claim against the Trust Account, arising out or as a result of, in connection with or relating in any way to this Agreement, and regardless of whether such claim arises based on contract, tort, equity or any other theory of legal liability (any and all such claims are collectively referred to hereafter as the "Released Claims"), (b) irrevocably waives any Released Claims that it may have against the Trust Account now or in the future as a result of, or arising out of, this Agreement, and (c) will not seek recourse against the Trust Account as a result of, in connection with or relating in any way to this Agreement; provided, however, that nothing in this Section 8 shall (i) serve to limit or prohibit the Pyrophyte Shareholder's right to pursue a claim against Pyrophyte for legal relief against assets held outside the Trust Account (so long as such claim would not affect Pyrophyte's ability to fulfill its obligation to effectuate any redemption right with respect to any securities of Pyrophyte), for specific performance or other equitable relief, (ii) serve to limit or prohibit any claims that the Pyrophyte Shareholder may have in the future against Pyrophyte's assets or funds that are not held in the Trust Account (including any funds that have been released from the Trust Account and any assets that have been purchased or acquired with any such funds) (so long as such claim would not affect Pyrophyte's ability to fulfill its obligation to effectuate any redemption right with respect to any securities of Pyrophyte) or (iii) be deemed to limit the Pyrophyte Shareholder's right to distributions from the Trust Account in accordance with Pyrophyte's amended and restated memorandum and articles of association in respect of any redemptions by the Pyrophyte Shareholder in respect of Pyrophyte Class A Shares acquired by any means other than pursuant to this Agreement. The Pyrophyte Shareholder acknowledges and agrees that such irrevocable waiver is a material inducement to Pyrophyte to enter into this Agreement, and further intends and understands such waiver to be valid, binding, and enforceable against the Pyrophyte Shareholder in accordance with applicable law. Notwithstanding anything in this Agreement to the contrary, the provisions of this Section 8 shall survive termination of this Agreement.

9. Miscellaneous.

- 9.1 All notices, requests, demands, claims, and other communications hereunder shall be in writing. Any notice, request, demand, claim, or other communication hereunder shall be deemed duly given (i) when delivered personally to the recipient, (ii) when sent by electronic mail, with no mail undeliverable or other rejection notice, on the date of transmission to such recipient, if sent on a Business Day prior to 5:00 p.m. New York City time, or on the Business Day following the date of transmission, if sent on a day that is not a Business Day or after 5:00 p.m. New York City time on a Business Day, (iii) one (1) Business Day after being sent to the recipient via overnight mail by reputable overnight courier service (charges prepaid), or (iv) four (4) Business Days after being mailed to the recipient by certified or registered mail, return receipt requested and postage prepaid, and, in each case, addressed to the intended recipient at its address specified on the signature page hereof or to such electronic mail address or address as subsequently modified by written notice given in accordance with this Section 9.1. A courtesy electronic copy of any notice sent by methods (i), (iii), or (iv) above shall also be sent to the recipient via electronic mail if an electronic mail address is provided in the applicable signature page hereof or to an electronic mail address as subsequently modified by written notice given in accordance with this Section 9.1.
- 9.2 The Pyrophyte Shareholder acknowledges that Sio Newco and Pyrophyte will rely on the acknowledgments, understandings, agreements, representations and warranties of the Pyrophyte Shareholder contained in this Agreement. Prior to the Closing, the Pyrophyte Shareholder agrees to promptly notify Sio Newco and Pyrophyte if it becomes aware that any of the acknowledgments, understandings, agreements, representations and warranties of the Pyrophyte Shareholder set forth herein are no longer accurate in all material respects. Sio Newco and Pyrophyte acknowledge that the Pyrophyte Shareholder will rely on the acknowledgments, understandings, agreements, representations and warranties of Sio Newco and Pyrophyte contained in this Agreement. Prior to the Closing, each of Sio Newco and Pyrophyte agrees to promptly notify the Pyrophyte Shareholder if it becomes aware that any of their respective acknowledgments, understandings, agreements, representations and warranties set forth herein are no longer accurate in all material respects.
- 9.3 Each of Sio Newco, Pyrophyte and the Pyrophyte Shareholder is irrevocably authorized to produce this Agreement or a copy hereof to any interested party in any administrative or legal proceeding or official inquiry with respect to the matters covered hereby.
- 9.4 Each party hereto shall pay all of its own expenses in connection with this Agreement and the transactions contemplated herein.
- 9.5 Sio Newco shall be responsible for the fees of its transfer agent, stamp taxes, if applicable, and all of the DTC's fees associated with the issuance of the Registrable Securities.
- 9.6 Neither this Agreement nor any rights that may accrue to the Pyrophyte Shareholder hereunder (other than the Registrable Securities acquired hereunder and the rights set forth in Section 6) may be transferred or assigned by the Pyrophyte Shareholder. Neither this Agreement nor any rights that may accrue to Sio Newco or Pyrophyte hereunder may be transferred or assigned by Pyrophyte (provided, that, for the avoidance of doubt, Sio Newco or Pyrophyte may transfer its rights hereunder solely in connection with the consummation of the Transaction and the Assumption). Notwithstanding the foregoing, the Pyrophyte Shareholder may assign its rights and obligations under this Agreement to one or more of its affiliates (including other investment funds or accounts managed or advised by the investment manager who acts on behalf of the Pyrophyte Shareholder) or, with Sio Newco's prior written consent, to another person; provided, that in the case of any such assignment, the assignee(s) shall become a the Pyrophyte Shareholder hereunder and have the rights and obligations and be deemed to make the representations and warranties of the Pyrophyte Shareholder provided for herein to the extent of such assignment and provided further that no such assignment shall relieve the assigning the Pyrophyte Shareholder of its obligations hereunder if any such assignee fails to perform such obligations, unless Sio Newco has given its prior written consent to such relief.

- 9.7 All the agreements, representations and warranties made by each party hereto in this Agreement shall survive the Closing.
- 9.8 Sio Newco may request from the Pyrophyte Shareholder such additional information as Sio Newco may reasonably deem necessary to evaluate the eligibility of the Pyrophyte Shareholder to acquire the Additional Shares and to register the Registrable Securities for resale, and the Pyrophyte Shareholder shall promptly provide such information as may be reasonably requested; to the extent readily available and to the extent consistent with its internal policies and procedures; *provided*, that Sio Newco agrees to keep any such information provided by the Pyrophyte Shareholder confidential, except (A) as required by the federal securities laws, rules or regulations and (B) to the extent such disclosure is required by other laws, rules or regulations, at the request of the staff of the SEC or other regulatory agency or under the regulations of the Stock Exchange. The Pyrophyte Shareholder acknowledges that Sio Newco and Pyrophyte may file a form of this Agreement with the SEC as an exhibit to a current or periodic report of Sio Newco and/or Pyrophyte or a registration statement of Sio Newco and/or Pyrophyte.
- 9.9 This Agreement may not be amended, modified or waived except by an instrument in writing, signed by each of the parties hereto.
- 9.10 This Agreement constitutes the entire agreement, and supersedes all other prior agreements, understandings, representations and warranties, both written and oral, among the parties, with respect to the subject matter hereof.
- 9.11 Except as otherwise provided herein, this Agreement is intended for the benefit of the parties hereto and their heirs, executors, administrators, successors, legal representatives, and permitted assigns and is not for the benefit of, nor may any provision hereof be enforced by, any other person. Except as provide herein, this Agreement shall not confer any rights or remedies upon any person other than the parties hereto, and their respective successors and assigns, and the parties hereto acknowledge that such persons so referenced are third party beneficiaries of this Agreement for the purposes of, and to the extent of, the rights granted to them, if any, pursuant to the applicable provisions:
- 9.12 The parties hereto acknowledge and agree that irreparable damage would occur in the event that any of the provisions of this Agreement were not performed in accordance with their specific terms or were otherwise breached and that money or other legal remedies would not be an adequate remedy for such damage. It is accordingly agreed that the parties shall be entitled to equitable relief, including in the form of an injunction or injunctions to prevent breaches or threatened breaches of this Agreement and to enforce specifically the terms and provisions of this Agreement, this being in addition to any other remedy to which such party is entitled at law, in equity, in contract, in tort or otherwise. The parties hereto further acknowledge and agree: (x) to waive any requirement for the security or posting of any bond in connection with any such equitable remedy; (y) not to assert that a remedy of specific enforcement pursuant to this Section 9.12 is unenforceable, invalid, contrary to applicable law or inequitable for any reason; and (z) to waive any defenses in any action for specific performance, including the defense that a remedy at law would be adequate.
- 9.13 If any provision of this Agreement shall be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions of this Agreement shall not in any way be affected or impaired thereby and shall continue in full force and effect.

- 9.14 No failure or delay by a party hereto in exercising any right, power or remedy under this Agreement, and no course of dealing between the parties hereto, shall operate as a waiver of any such right, power or remedy of such party. No single or partial exercise of any right, power or remedy under this Agreement by a party hereto, nor any abandonment or discontinuance of steps to enforce any such right, power or remedy, shall preclude such party from any other or further exercise thereof or the exercise of any other right, power or remedy hereunder. The election of any remedy by a party hereto shall not constitute a waiver of the right of such party to pursue other available remedies. No notice to or demand on a party not expressly required under this Agreement shall entitle the party receiving such notice or demand to any other or further notice or demand in similar or other circumstances or constitute a waiver of the rights of the party giving such notice or demand to any other or further action in any circumstances without such notice or demand.
- 9.15 This Agreement may be executed and delivered in one or more counterparts (including by electronic mail, in .pdf or other electronic submission) and by different parties in separate counterparts, with the same effect as if all parties hereto had signed the same document. All counterparts so executed and delivered shall be construed together and shall constitute one and the same agreement.
- 9.16 This Agreement shall be governed by, and construed in accordance with, the laws of the State of Delaware, without regard to the principles of conflicts of laws that would otherwise require the application of the law of any other state.
- 9.17 EACH PARTY AND ANY PERSON ASSERTING RIGHTS AS A THIRD PARTY BENEFICIARY HEREBY WAIVES ITS RESPECTIVE RIGHTS TO A TRIAL BY JURY OF ANY CLAIM OR CAUSE OF ACTION BASED UPON OR ARISING OUT OR RELATED TO THIS SUBSCRIPTION AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY IN ANY ACTION, PROCEEDING OR OTHER LITIGATION OF ANY TYPE BROUGHT BY ANY PARTY AGAINST ANY OTHER PARTY OR ANY AFFILIATE OF ANY OTHER SUCH PARTY, WHETHER WITH RESPECT TO CONTRACT CLAIMS, TORT CLAIMS OR OTHERWISE. THE PARTIES AGREE THAT ANY SUCH CLAIM OR CAUSE OF ACTION SHALL BE TRIED BY A COURT TRIAL WITHOUT A JURY. WITHOUT LIMITING THE FOREGOING, THE PARTIES FURTHER AGREE THAT THEIR RESPECTIVE RIGHT TO A TRIAL BY JURY IS WAIVED BY OPERATION OF THIS SECTION AS TO ANY ACTION, COUNTERCLAIM OR OTHER PROCEEDING WHICH SEEKS, IN WHOLE OR IN PART, TO CHALLENGE THE VALIDITY OR ENFORCEABILITY OF THIS SUBSCRIPTION AGREEMENT OR ANY PROVISION HEREOF. THIS WAIVER SHALL APPLY TO ANY SUBSEQUENT AMENDMENTS, RENEWALS, SUPPLEMENTS OR MODIFICATIONS TO THIS SUBSCRIPTION AGREEMENT.
- 9.18 The parties agree that all disputes, legal actions, suits and proceedings arising out of or relating to this Agreement must be brought exclusively in the Court of Chancery of the State of Delaware and any state appellate court therefrom within the State of Delaware (or, if the Court of Chancery of the State of Delaware declines to accept jurisdiction over a particular matter, any federal court within the State of Delaware or, in the event each federal court within the State of Delaware declines to accept jurisdiction over a particular matter, any state court within the State of Delaware) (collectively the "Designated Courts"). Each party hereby consents and submits to the exclusive jurisdiction of the Designated Courts. No legal action, suit or proceeding with respect to this Agreement may be brought in any other forum. Each party hereby irrevocably waives all claims of immunity from jurisdiction, and any objection which such party may now or hereafter have to the laying of venue of any suit, action or proceeding in any Designated Court, including any right to object on the basis that any dispute, action, suit or proceeding brought in the Designated Courts has been brought in an improper or inconvenient forum or venue. Each of the parties also agrees that delivery of any process, summons, notice or document to a party hereof in compliance with Section 10.1 of this Agreement shall be effective service of process for any action, suit or proceeding in a Designated Court with respect to any matters to which the parties have submitted to jurisdiction as set forth above.

- 9.19 This Agreement may only be enforced against, and any claim, action, suit or other legal proceeding based upon, arising out of, or related to this Agreement, or the negotiation, execution or performance of this Agreement, may only be brought against the entities that are expressly named as parties hereto.
- 9.20 Pyrophyte shall, by 9:00 a.m., New York City time, on the first (1st) Business Day immediately following the date of this Agreement, file with the SEC a Current Report on Form 8-K (the "Disclosure Document") disclosing all material terms of this Agreement and the transactions contemplated hereby and thereby and the Transaction, and including as exhibits to the Disclosure Document, the form of this Agreement and the Other Agreement (in each case, without redaction). Notwithstanding anything in this Agreement to the contrary, neither Sio Newco nor Pyrophyte shall publicly disclose the name of the Pyrophyte Shareholder or any of its affiliates or advisers, or include the name of the Pyrophyte Shareholder or any of its affiliates or advisers (i) in any press release, without the prior written consent of the Pyrophyte Shareholder and (ii) any filing with the SEC or any regulatory agency or trading market, without the prior written consent of the Pyrophyte Shareholder, except (A) as required by the federal securities laws, rules or regulations and (B) to the extent such disclosure is required by other laws, rules or regulations, at the request of the staff of the SEC or other regulatory agency or under the regulations of the Stock Exchange, in which case of clause (A) or (B), Sio Newco or Pyrophyte, as the case may be, shall provide the Pyrophyte Shareholder with prior written notice (including by e-mail) of such permitted disclosure, and shall reasonably consult with the Pyrophyte Shareholder regarding such disclosure. The Pyrophyte Shareholder will promptly provide any information reasonably requested by either Sio Newco or Pyrophyte for any regulatory application or filing made or approval sought in connection with the Transaction (including filings with the SEC).
- 9.21 The headings herein are for convenience only, do not constitute a part of this Agreement and shall not be deemed to limit or affect any of the provisions hereof. The language used in this Agreement will be deemed to be the language chosen by the parties hereto to express their mutual intent, and no rules of strict construction will be applied against any party. Unless the context otherwise requires, (i) all references to Sections, Schedules or Exhibits are to Sections, Schedules or Exhibits contained in or attached to this Agreement, (ii) each accounting term not otherwise defined in this Agreement has the meaning assigned to it in accordance with GAAP, (iii) words in the singular or plural include the singular and plural and pronouns stated in either the masculine, the feminine or neuter gender shall include the masculine, feminine and neuter, (iv) the use of the word "including" in this Agreement shall be by way of example rather than limitation, and (v) the word "or" shall not be exclusive.

[signature page follows]

IN WITNESS WHEREOF, each of the Parties has caused this Agreement to be duly executed on its behalf as of the day and year first above written.

PYROPHYTE ACQUISITION CORP.

By: /s/ Sten Gustafson

Name: Sten Gustafson

Title: Chief Financial Officer

Address for Notices:

Pyrophyte Acquisition Corp.
3262 Westheimer Road, Suite 706
Houston, Texas 77098
Attention: Sten Gustafson

with a copy (not to constitute notice) to:

White & Case LLP
1221 Avenue of the Americas
New York, New York 10020
Attention: Elliott Smith

SIO SILICA INCORPORATED

By: /s/ Feisal Somji

Name: Feisal Somji

Title: Director

Address for Notices:

Sio Silica Incorporated
Suite 1930, 440 – 2nd Avenue SW
Calgary, Alberta
T2P 5E9
Canada
Attention: Feisal Somji

with a copy (not to constitute notice) to:

DLA Piper LLP (US)
1251 Avenue of the Americas, 27th Floor
New York, New York 10020
Attention: Stephen Alicanti

**VERITION MULTI-STRATEGY MASTER
FUND LTD.**

By: Verition Fund Management, LLC, solely in
its capacity as investment manager

By: /s/ William Anderson

Name: William Anderson

Title: Chief Financial Officer

Address for Notices:

VERITION MULTI-STRATEGY MASTER
FUND LTD.

c/o Verition Fund Management LLC

One American Lane

Greenwich, CT 06831

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AI Overview

A PIPE investment, or private investment in public equity, is when a public company sells its stock or other securities directly to private investors, typically at a discount to the current market price. This method allows companies to raise capital quickly, with fewer regulatory hurdles than a traditional public offering, for purposes like debt reduction, expansion, or acquisitions. Investors, often institutions or accredited individuals, get a chance to buy shares at a lower price.

How it works

- A public company and a private investor (or group of investors) negotiate a deal to sell shares.
- The investors commit to buying a certain number of shares directly from the company.
- The shares are typically sold at a discount to the current market price to attract investors.
- The company then usually files a resale registration statement so the investors can eventually sell the shares to the public.
- PIPE deals can include common stock, convertible securities, or preferred stock, and the terms are often tailored to the specific needs of both parties.

Why companies use PIPE investments

- **Speed:** They are a faster way to raise capital than traditional public offerings.
- **Reduced regulatory burden:** They bypass the extensive regulatory requirements of a public offering, making them a more streamlined process.
- **Flexibility:** They are ideal for a variety of needs,

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Investopedia



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A private investment in public equity, often called a PIPE deal, involves the selling of...

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"PIPE" stands for "private investment in public equity...."

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such as funding acquisitions, strengthening a balance sheet, or supporting research and development. 

- **Market conditions:** They can be used when market volatility makes other fundraising options less attractive. 

Key considerations for investors

- **Discounted price:** Investors can acquire shares at a lower price than the public market rate. 
- **Potential for profit:** If the company's stock price increases, investors can profit from their investment as the business grows. 
- **Risk:** The investment can be risky due to market volatility and the potential for shareholder dilution, which can impact the value of existing shares. 

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Understanding Private Investment in Public Equity (PIPE)

A PIPE is when **accredited investors buy shares directly from public companies** at a discount, below market value, for faster capital raising.

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