Osler, Hoskin & Harcourt LLP

Final Argument for Sio Silica

CEC Hearing regarding the Vivian Sand Extraction Project

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OSLER

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Outline of Argument

Context	• Important context for this hearing and the CEC's mandate
Main Issues	• The handful of key issues that have been the focus of the hearing, and how the panel should weigh the evidence before it to decide them
Other Issues	• Other ancillary issues that have come up during the hearing
Conclusion	• Short concluding remarks

Context for the Hearing & CEC Focus

Environment Act Proposal (EAP) Requirements

- *The Environment Act*, s. 11(7):

Form of Class 2 proposal

11(7) The proponent shall submit the proposal required under subsection (1) or (6) in a form prescribed by the director, and include matters required by the regulations.

EAP Requirements

- Prescribed EAP form (excerpt from p. 2):

A complete **Environment Act Proposal (EAP)** consists of the following components:

- ☐ **Cover letter**
- ☐ **Environment Act Proposal Form**
- ☐ **Reports/plans supporting the EAP** (see "Information Bulletin - Environment Act Proposal Report Guidelines" for required information and number of copies)
- ☐ **Application fee** (Cheque, payable to Minister of Finance, for the appropriate fee)

EAP Requirements

- EAP Report Guidelines (excerpt from p. 1):

Information Bulletin – Environment Act Proposal Report Guidelines

Manitoba
Environment, Climate and Parks

These guidelines apply to all Environment Act Proposals (EAPs) under The Environment Act. They prescribe what is required in report(s) supporting the EAP, and the quantity and types of copies required.

Separate, supplementary guidelines exist for certain types of developments, indicating additional information required. These guidelines are available on the Environmental Approvals Branch (EAB) webpage (https://www.gov.mb.ca/sd/permits_licenses_approvals/eal/licence/index.html) or by contacting the EAB.

DEVELOPMENT ENVIRONMENTAL ASSESSMENT (EA) REPORT

This information is based on the Licensing Procedures Regulation (Manitoba Regulation 163/88).
Note that where Imperial measurements are used, metric equivalents must be listed as well.

EAP Requirements

- *The Environment Act*, ss. 11(10) & 11(11):

Public hearings

11(10) Notwithstanding subsection (9), where the director receives objections and reasons for the objections with respect to a proposed development, the director may, within such time as set out in the regulations recommend that the minister cause the commission to hold a public hearing; but where the director decides not to recommend a public hearing be held, the director shall provide written reasons to the objector, and advise the objector that the decision can be appealed to the minister.

Notice of decision

11(10.1) If the minister decides not to request a public hearing on a proposal after receiving a recommendation from the director under subsection (10), the minister must give written notice of his or her decision to the objector. The notice must advise the objector that the decision can be appealed under section 28.

EAP Requirements

- Mr. Wiatzka, Arcadis (March 6 transcript, p. 85):

15 experience. And so, these are the kind of things that
16 we're typically seeing, but if it's not required even
17 though they are typically seen, then it's maybe just
18 something about whether someone does more than what is
19 needed or whether it's exactly as required. So, you can't
20 fault someone for doing just what's required. That's
21 okay.

Scope of the CEC's Review of the EAP under *The Environment Act*

- *The Environment Act*, ss. 6(5) & 6(5.1):

Specific duties of Commission

6(5) When requested by the minister, the commission must do one or more of the following in accordance with any terms of reference specified by the minister:

(a) provide advice and recommendations to the minister;

(b) conduct public meetings or hearings and provide advice and recommendations to the minister;

Terms of reference

6(5.1) When requesting the commission to do anything mentioned in subsection (5), the minister may specify the terms of reference that the commission is to follow in carrying out its duties.

Scope of the CEC's Review of the EAP under *The Environment Act*

- Terms of Reference from the Minister:

1. The CEC will conduct a technical review of the Environment Act proposal and the hydrogeology and geochemistry assessment report and provide advice and recommendations to the Minister regarding potential environmental and health effects of the proposed sequential installation, operation and decommissioning of silica sand extraction wells for the silica sand extraction project.

2. In providing advice and recommendations, the CEC will provide members of the public the opportunity for input regarding the CanWhite Sands silica sand extraction project proposal at a public hearing in a location consistent with the affected community.

How the Panel should Weigh the Evidence

- These are highly technical and specialized issues, each requiring expertise
- Sio Silica Rebuttal (March 14), p. 3:

Key Differentiator: Every one of the Technical Experts engaged by Sio has a professional designation and is bound by a Code of Ethics and Professional Conduct to protect the public interest.

We all risk loss of our license, credibility, disciplinary action and our livelihoods if we do not abide by these requirements.

How the Panel should Weigh the Evidence

- *Engineering and Geoscientific Professions Act of Manitoba,* s. 57:

Prohibitions on practice

57 Except as otherwise provided in this Act, no person who is not a member, a holder of a certificate of authorization, a temporary licensee, or a specified scope of practice licensee shall

(a) engage in the practice of professional engineering or the practice of professional geoscience within the province; or

(b) act in such a manner as to lead any person to believe that he or she is authorized to fulfil the office of, or act as, a professional engineer or professional geoscientist within the province.

How the Panel should Weigh the Evidence

- *Engineering and Geoscientific Professions Act of Manitoba,* s. 1:

> **"practice of professional geoscience"** means any act of documenting, analysing, evaluating, interpreting or reporting on the earth's materials or on resources, forms or processes, or managing any of the foregoing, that requires the application of the principles of geology, geophysics or geochemistry and that concerns the safeguarding of life, health, property, economic interests, the public interest or the environment; (« exercice de la profession de géoscientifique »)

How the Panel should Weigh the Evidence

- The Panel must weigh all the evidence, considering:
  - What are the author's qualifications?
  - Have they previously worked on other projects or applications of this nature?
  - Has the information been subject to testing in the form of cross-examination in the hearing?
  - Or was it provided as a written submission or oral presentation or footnote in a slide deck that Sio had no opportunity to test?
- Information that Sio had no opportunity to test <u>must</u> be given less weight

Main Issues during the Hearing

Key Issues in the Hearing

- The issues that have been the focus of the hearing are:
  1. Geotechnical matters
  2. Groundwater quality and quantity
  3. Waste management
  4. Cumulative effects

1. Geotechnical Experts

- Douglas McLachlin, P.Eng.
  - 38 years of experience
  - Manitoba and Ontario professional engineer
  - AECOM geotechnical practice lead for Ontario
  - Subject matter expert for geotechnical and hydrogeological site investigation and assessment
  - Geotechnical lead for mining, tunneling, road and rails, buildings and bridges projects

- Steve Bundrock, P.Eng.
  - 22 years of experience
  - Manitoba, Alberta, British Columbia, Yukon, and Northwest Territories professional engineer
  - Stantec senior principal geotechnical engineer
  - Subject matter expert for site investigation, analysis, design, construction, operation, and surveillance of underground and open pit mines
  - Geotechnical lead for underground and open pit mine projects with experience working on more than 100 projects

- Arash Eshraghian, Ph.D., P.Eng., P.E.
  - 22 years of experience
  - Alberta, British Columbia, and Idaho professional engineer
  - Stantec senior principal geotechnical engineer
  - Subject matter expert for analysis, design, construction, operation, surveillance, and mitigation of underground and open pit mines
  - Geotechnical lead for underground and open pit mine projects

Sio Geotechnical Assessment Summary (February 27), p. 4

1. Geotechnical Matters

Table 1: *List of Contributors*

Name	Consulting Firm	Role	Specialty
Wilhelm Greuer, Ph.D., P.E.	Stantec	Technical Reviewer	Underground rock mechanics specialist
Karl Xiao, Ph.D., P.Eng.	Stantec	Geotechnical Designer	Geotechnical numerical modeling specialist
Jack Yu Guo, Ph.D., P.Eng.	AECOM	Independent Reviewer	Geotechnical & rock mechanics specialist
Taesang Ahn, Ph.D., P.Eng.	AECOM	Independent Reviewer	Geotechnical & rock mechanics specialist

Table 2: *List of Clean Environment Commission (CEC) Reviewers*

Name	Consulting Firm	Role	Specialty
Gerd M. Wiatzka, P.Eng.	Arcadis	CEC Reviewer	Environmental specialist
Tony Brown, M.Sc., P.Eng.	Arcadis	CEC Reviewer	Environmental specialist
Charles Gravelle, M.Sc., P.Eng.	Arcadis	CEC Reviewer	Geotechnical & environmental specialist

Sio Geotechnical Assessment Summary (February 27), p. 5

1. Geotechnical Matters

- Mr. Wiatzka, Arcadis (March 6 transcript, p. 16):

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1 Accidents and malfunctions. You know, as
2 we said, we don't think that surface subsidence will occur
3 based on following the -- the guidance from Stantec.

1. Geotechnical Matters

- Mr. Wiatzka, Arcadis (March 6 transcript, p. 81):

7 MR. DUNCANSON: Thank you, sir.
8 Duncanson speaking. And finally, with respect to the
9 factor of safety that Stantec used, which was 2.0, in your
10 view, is -- is that also an -- an appropriate ---
11
12 MR. WIATZKA: Sorry for cutting you off.
13 Wiatzka speaking. Yes, we -- we concur with that.

1. Geotechnical Matters

- Dr. Eshraghian, Stantec (February 27 transcript, p. 81),

4 Minimum factor of safety used for the stability evaluation
5 in this case is two, which is a reasonably high factor of
6 safety for this type of analysis. For example, for
7 comparison, most extreme consequence dams, that if they
8 fail, cause hundreds of loss of life, or widespread
9 economic effect on the large area, they're designed for,
10 the factor of 1.5. We -- we designed for factor safety
11 two, considering the lifespan -- longest lifespan of the

1. Geotechnical Matters

- Other opinions regarding geotechnical matters were made by non-experts, or by KGS
- KGS acknowledged that they have very limited expertise in geotechnical matters for mining projects [March 9, pages 68-70].
- KGS focused its comments about geotechnical matters largely on the point that geology can be variable across Manitoba and it is possible that the limestone in the project area contains vertical fractures that were not detected during Stantec's geotechnical evaluations.
  - This issue has been responded to and addressed by Stantec, Mr. McLachlin and Sio's proposed collection of additional data from inclined boreholes

2. Groundwater Quality and Quantity

- Two Issues:
  - Groundwater levels and flow: Hydrogeology
  - Groundwater quality: Geochemistry

2. Groundwater Quality and Quantity

- Sio Hydrogeology and Geochemistry Assessment Summary (February 28), p. 3:

Technical Panel Members:	Additional Qualified Professionals and Reviewers:
• Mr. Ryan Mills, M.Sc., P.Geo. (MB, AB, BC) • Dr. Miln Harvey, Ph.D., P.Eng. (MB, ON, NS) • Dr. Cheibany Ould Elemine, Ph.D., P.Geo. (BC, SK, NWT/NU) • Dr. Tom Meuzelaar, Ph.D.	• Dr. Grant Ferguson, Ph.D., P.Geo. (SK) • Dr. Xinglong Ran, M.Sc., Ph.D. (AB) • Dr. Getachew Mohammed, Ph.D., P.Eng. (AB) • Dr. Mehrnoush Javadi, M.Sc., Ph.D. • Mr. Stephen Dickin, P.Geo. (MB, BC) • Ms. Kun Jia, M.Sc., P.Geo. (MB, BC) • Mr. Chris Donnelly, M.Sc., P.Geo. (BC) • Mr. Reuben Dandurand, M.Sc., G.I.T. (BC)

2. Groundwater Quality and Quantity

- Mr. Boutin, Matrix (March 8 transcript, p. 94):

11 MR. DUNCANSON: Duncanson. And again,
12 based on your experience in groundwater modelling and your
13 review of the AECOM model in this circumstance, you would
14 agree that this model was conducted in accordance with
15 industry standards.
16
17 MR. BOUTIN: Boutin speaking. Yes. From
18 what I've reviewed. I do feel like the process that led
19 to this product makes sense, respects standard industry.

2. Groundwater Quality and Quantity

- Mr. Mann, KGS (March 9 transcript, p. 79):

15 defined. However, in thinking about the -- your lines of
16 questioning the other day with the other panelists in
17 terms of very detailed questions about calibration,
18 calibration state, what it means, the various metrics on
19 measuring the calibration of -- of a model like this, in
20 my view, due -- by the -- the various measures and metrics
21 that one would look at a calibration of a model, was it
22 reasonably calibrated? I would say that, yes, it was.

2. Groundwater Quality and Quantity

- Sio Silica Rebuttal (March 14), p. 22:

Groundwater Modelling

Rebuttal (cont'd):

- **Definition of Industry Standard:**
  - Many peer reviewers (Dr. Ferguson, Matrix, KGS) agreed that AECOM followed industry standard protocols.
  - Dr. Hollander did not agree with the others, but he is holding the project to academic research standards (or State of the Art) which is not reasonable or achievable at the scale of the project.
  - It is ***not reasonable*** to hold this project to higher standards than his own work (which did not report calibration statistics) or other projects.
  - This project has gone above and beyond what has been completed for other EAPs in the area.

2. Groundwater Quality and Quantity

- Sio Silica Rebuttal (March 14), p. 29:

Table 4 Water Use Licenses – Groundwater Users RM of Springfield, Manitoba		
License Category	**Number of Licenses**	**Annual Allotment** (dam^3/year)
Industrial-mining	1	4070.00
Heat/Cool	4	3508.00
Other Industrial	1	1100.00
Municipal	5	750.30
Irrigation	5	380.59
Other	3	272.00
Agricultural	3	99.60
Domestic	1	7.40
Fire Fighting	3	3.42
Total	**26**	**10191.3**

Table 4 – Licensed groundwater users within the RM of Springfield. (source – MSD-WUL, 2017)

0% Reinjection

100% Reinjection of Available 85%

2. Groundwater Quality and Quantity

- Sio Hydrogeology and Geochemistry Assessment Summary (February 28), p. 3:

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2. Groundwater Quality and Quantity

- Dr. Ould Elemine, AECOM (February 28 transcript, p. 158):

14 However, it's important to note that in
15 spite of the very conservative approach that we took here,
16 this would -- this condition would require an unlimited
17 supply of oxygen to promote these reactions. These --
18 oxygen is a required ingredient in this recipe, which will
19 not occur in the subsurface. Therefore, the oxidation of
20 sulfide minerals in saturated environments is not a
21 plausible scenario.

2. Groundwater Quality and Quantity

- Sio Silica Rebuttal (March 14), p. 31:

Issue or Statement:

- Collapse of Winnipeg Shale aquitard will increase the vulnerability of the aquifers to surface contamination.

Rebuttal:

- There are thick (~ 100 ft) fine-grained Quaternary sediments overlying all bedrock aquifers in the area, which provides substantial protection to all underlying aquifers.
- Geotechnical modelling and subsidence monitoring indicates sand extraction will not cause failure of the limestone caprock or Quaternary sediments.
- The vertical groundwater gradients do not promote flow between the two aquifers now, and this will not change.
- Collapse of the shale will have no bearing on the vulnerability of the carbonate aquifer, and only minor influence on the vulnerability of the underlying sandstone aquifer.
- Well abandonment will preserve level of protection from surface contamination.

3. Waste Management

- Mr. Samoiloff, AECOM (March 2 transcript, p. 165):

14 waste materials will be characterized. We have a waste
15 characterization plan in place -- draft at this point.
16 That will be updated. We know what materials we would
17 consider as waste and we had earlier discussions with
18 respect to acid generating potential and metal leeching
19 potential. Any material that we feel would meet that
20 criteria would be segregated in storage that's protected
21 from the elements. It would then be transported to a
22 licensed hazardous waste facility by a licensed
23 contractor. Although there's been no sort of detailed
24 discussions with any particular waste hauler, an example
25 would be the facility that's run by Miller Environmental

3. Waste Management

- Mr. Mann, KGS (March 9 transcript, p. 108):

1 apologize, if the waste management plan actually states
2 that there'll be engineered containment then I -- yeah, if
3 it says, that and -- and I might be forgetting, if it
4 does, that's where -- really where I'm getting at. And
5 so, if it says that, and if there's a commitment to do
6 that, then I -- I don't have anything much more to say
7 about that.

4. Cumulative Effects

- Mr. Samoiloff (March 1 transcript, p. 74):

14 Cumulative impacts assessment, and why was
15 this not part of the project review? When we prepare an
16 EAP, we follow the "Environment Act Proposal Report
17 Guidelines" that are prepared by the Province of Manitoba,
18 which applies to all EAP's, and it does not require the
19 completion or include the completion and inclusion of a
20 cumulative effects assessment. Cumulative effects

2. Groundwater Quality and Quantity

- Mr. Boutin, Matrix (March 8 transcript, p. 154):

11 MR. DUNCANSON: Duncanson. Would you
12 agree that the scope of Sio's proposed project is
13 materially different than the scope of the Pembina Valley
14 project that was considered in that proceeding?
15
16 MR. BOUTIN: Boutin speaking. Yes.

2. Groundwater Quality and Quantity

- Sio Silica Rebuttal (March 14), p. 28:

  - Sand extraction over full 24 years of mining is NOT cumulative:
    - Sand extraction is seasonal (approx. 224 days/year).
    - Majority of extracted groundwater is reinjected to the same aquifer.
    - Water levels have been demonstrated to fully recover following operations each year.
    - Only change is the location of project activities associated with sand extraction. Expect similar drawdown and radius of influence for wells installed in the same aquifer.
    - Had we completed the 24 year assessment, it is likely that there would not have been any changes to the conclusions and recommendations.

Other Issues Raised During the Hearing

Uncertainty

- Always exists for projects
- While not required, or ever perfect, models help reduce uncertainty
- Innovative application of technology drives progress
- Focus should be on how to manage uncertainty. Here:
  - Very conservative assumptions
  - Extensive monitoring and additional testing
  - Adaptive management based on new information

Compliance with Regulations

- Well Standards Regulation, s. 2:

Manner of construction and sealing

2 A person must not construct or seal a well or test hole other than in a manner which

(a) is suitable for the geologic and groundwater conditions existing at the site of the well or test hole;

(b) prevents surface water from entering the well or test hole;

(c) prevents contaminants from entering the well or test hole except in the case of an environmental well or environmental test hole;

(d) seals off water bearing formations that contain contaminants except in the case of an environmental well or environmental test hole; and

(e) prevents the interconnection or mixing of groundwater having distinctively different characteristics within the same aquifer or different aquifers.

Compliance with Regulations

- Sio Silica Response to CEC-IR-009a):

a) It is Sio's understanding that the current regulations that prohibit inter-aquifer mixing are in place due to saline and freshwater differences in areas farther to the west of Sio's proposed operation. Where Sio has proposed to operate, both aquifers contain fresh water of a similar quality.

Adequacy of the Record

- Additional work is always done as projects develop through permitting and detailed design
- Sio provided all required information in the EAP
- Sio reasonably responded to all requests for information
- There is more than enough information to fulfill the Terms of Reference
- Additional data and monitoring/mitigation plans after EAL is standard practice

Adequacy of the Record

- Mr. Wiatzka, Arcadis (March 6 transcript, p. 8):

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1 last week, that there are some things and some questions
2 that are still unanswered and that are more in the purview
3 of the regulatory or permitting regime and -- and that's
4 appropriate for all kinds of -- of environmental
5 assessments.

Adequacy of the Record

- Mr. Mann, KSG (March 9 transcript, p. 74):

5 little bit later on. Recognizing that you have experience
6 with hydroelectric projects, among others, do you have
7 experience developing mitigation or monitoring plans for
8 mine projects?
9
10 MR. MANN: Mann speaking. I'll keep it
11 simple and say no.

Adequacy of the Record

- Mr. Mann, KGS (March 9 transcript, p. 101):

9 You covered that. You would agree with me that these
10 types of plans, for a project like this, are typically
11 finalized after issuance of a licence so that the
12 conditions imposed in the licence can be reflected in the
13 final management plans, and so that the management plans
14 can reflect input from local stakeholders like MSSAC,
15 right?
16
17 MR. MANN: Mann speaking. So, what
18 you're saying is correct. You use the word typically or

Literature Extracts

- Two literature extracts from Our Line in the Sand/Manitoba Eco-Network
  - Noble (2015)
  - Ross and Ehrlich (2015)
- Not in evidence
- No prescribed methodology for assessing environmental effects (MBEN/OLS-IR-012 – Round 1, Part 1)

Environmental Assessment Methodology

- Sio Silica Response to MBEN/OLS-IR-012a):

a) The Province of Manitoba's *Information Bulletin – Environment Act Proposal Report Guidelines* do not stipulate any specific environmental assessment document/reference that must be applied to complete the effects assessment in the EAP. There are many published documents available that describe various frameworks, guidelines and methods for environmental assessment. There is no one method that is universally accepted provincially, nationally or globally by all regulatory authorities. The effects assessment approach and methods described in Section 6.1 of the EAP have been used by

been deemed an unacceptable approach by the Manitoba Environmental Approvals Branch.

Well Sealing Practices

- No evidence seals will fail
- Sio is proposing to drill wells that are similar in nature to conventional water wells
- There are already many, many thousands of water wells across the Province
- Sio will employ sound industry practices to drill, seal and close the wells that meet or exceed the requirements under the Drilling Regulations and the Well Standards Regulations.
- The details of Sio's well sealing and monitoring will be contained in the Progressive Well Abandonment Plan and Closure Plan, which will address – among other things – inspection of the wells post-extraction to ensure the long-term integrity of the wells.

Irreversibility of Subsurface Effects is not Unique

- There's resource development around most of society (e.g., quarries, pipelines)
- Projects frequently interact with groundwater and other environmental resources
- By definition, mining irreversibly changes the subsurface (like many other types of projects)
- Those can't be the tests for whether a project like this should proceed

Conclusion

Final Remarks

- Panel should rely on the science and the qualified experts.
- The science shows that this project will be carried out safely, and without any negative effects on the environment.
- Properly weighed, the scientific evidence supports a positive recommendation for the project, subject to conditions that may also be recommended.

Thank you!