Appendix A

CEC Recommendations Concordance Table

APPENDIX A: CEC RECOMMENDATIONS CONCORDANCE TABLE

CEC Report Recommendations[a]	Project Revision	Location in EAP with More Information
#1 The government seek a legal opinion with respect to sections 2(e) and 3(1) of the Well Standards Regulation under The Groundwater and Water Well Act and section 6(1) of the Drilling Regulation under The Mines and Minerals Act, regarding the interconnection between the Winnipeg Formation and any overlying aquifer, including aquifers within the Stonewall, Stony Mountain or Red River Formations.	N/A[b]	N/A
#2 If work on this project continues, it should be done on a step-wise basis to improve the level of confidence that no significant adverse effects will occur to impair the quality and quantity of water available from the affected aquifers. While the commission defers to the expertise of qualified professionals to design a detailed step-wise program, the following considerations should be taken into account:	Sio has heard the feedback from the public and the province on its original Environment Act Proposal (EAP) the previously proposed Vivian Sand Extraction Project (AECOM 2021). Sio is submitting this new EAP for review for a revised Project which describes a stepwise phased approach that substantially reduces the extracted sand volumes for the first five years of the Project.	Section 1.2 - Project Overview Section 1.7 - Project Planning Section 1.7.1 - Phased Approach
i) As a general principle, full-scale production should only proceed if and when the body of scientific and engineering evidence confirms that the risks are adequately understood and manageable.	Sio will initiate the first year of operations at a location that allows for a reduced number of wells in a cluster, some as small as one or two wells, but with no more than five wells per cluster. Sio will start sand extraction activities using a stepwise phased approach that includes initiating a limited number of well clusters with a small number of wells. During the initial phase of Project operations, Project design assumptions and geotechnical and geological modeling (**Appendix C**) will be confirmed by monitoring. The number of well clusters and wells will gradually be increased if monitoring data and associated reporting results verify that this can be done without risk of significant adverse effects during the initial small-scale operations. Based on on-going monitoring results, minor adjustments to the Project design may be done during the initial phase of operations (e.g., number of wells and spacing of wells within each well cluster, and spacing of each well cluster). Should monitoring results yield requirements for Project operation parameter changes, Sio will advise the EAB of Project operation changes in accordance with provisions in an Environment Act Licence (EAL) for the Project.	Section 1.7.1 - Phased Approach Appendix C - Geotechnical Analysis Report
ii) The proponent must add to the body of evidence relating to the possible heterogeneity of the geological structures in the production area so that the risks of subsidence and propagation and impact of extraction voids over time are defined to a higher level of confidence. This must include **inclined drilling** in order to determine if vertical fractures exist in the limestone that could affect the stability of the layer.	Sio will conduct geotechnical, hydrogeological and geochemistry assessments/installations for monitoring and sampling in accordance with an EAL for the Project. Geotechnical investigations are proposed to include: - Angled bore-hole testing to verify presence of vertical fractures - Acoustic Televiewer/Optical Televiewer (ATV/OTV) surveys - Coring to confirm overburden, and competent caprock thickness - Side scan sonar to confirm cavity development and long-term cavity shape	Section 1.7 - Project Planning
iii) The proponent must carry out full-scale well-cluster extraction tests in order to provide information on the potential effects of extracting the planned 21,000 tonnes of sand from a single cluster. This should be completed from several clusters in different parts of the project area.	Sio will initiate the first year of operations at a location that allows for a reduced number of wells in a cluster, some as small as one or two wells, but with no more than five wells per cluster. Sio will start sand extraction activities using a stepwise phased approach that includes initiating a limited number of well clusters with a small number of wells. During the initial phase of Project operations, Project design assumptions and geotechnical and geological modeling (**Appendix C**) will be confirmed by monitoring. The number of well clusters and wells will gradually be increased if monitoring data and associated reporting results verify that this can be done without risk of significant adverse effects during the initial small-scale operations. Based on on-going monitoring results, minor adjustments to the Project design may be done during the initial phase of operations (e.g., number of wells and spacing of wells within each well cluster, and spacing of each well cluster). Should monitoring results yield requirements for Project operation parameter changes, Sio will advise the Environmental Approvals Branch (EAB) of Project operation changes in accordance with provisions in an EAL for the Project.	Section 1.7.1 - Phased Approach Appendix C - Geotechnical Analysis Report

CEC Report Recommendations[a]	Project Revision	Location in EAP with More Information
iv) During extraction tests, cavities must be monitored to determine their likely long- term shape and size and establish whether they are likely to continue to grow over time. A representative number of cavities reflecting the potential variability of geological conditions should be monitored to indicate that the cavities have remained stable over time.	Sio will conduct geotechnical, hydrogeological and geochemistry assessments/installations for monitoring and sampling in accordance with an EAL for the Project. Geotechnical investigations are proposed to include: - Angled bore-hole testing to verify presence of vertical fractures - Acoustic Televiewer/Optical Televiewer (ATV/OTV) surveys - Coring to confirm overburden, and competent caprock thickness - Side scan sonar to confirm cavity development and long-term cavity shape	Section 1.7 - Project Planning
#3 The minister appoint a project monitoring committee with membership from municipal and provincial government departments to receive and assess relevant information as the proponent undertakes step-wise development. This should include member(s) of the affected municipal government(s), senior leadership from Environment and Climate, and technical experts from the government related to mining, groundwater and environmental licensing and enforcement. The committee should be provided with additional resources and technical expertise as required. The guiding principles for the monitoring process should include: i) sharing of scientific and engineering findings between the proponent and the monitoring committee; ii) regular, defined reporting requirements by the proponent to the monitoring committee, and; iii) regular, defined reporting jointly by the monitoring committee and the proponent to the public	Sio is receptive to working cooperatively with the province and a project monitoring committee appointed by the province.	N/A
#4 The proponent be required to complete the following detailed plans and distribute them for comment. In so doing, it is recognized that these plans may continually evolve on the basis of additional information, as it is available. i) Waste Characterization and Management Plan ii) Water Management Plan iii) Progressive Well Abandonment Plan iv) Groundwater Monitoring and Impact Mitigation Plan v) Erosion and Sediment Control Plan vi) Environmental Emergency Response Plan vii) Revegetation Monitoring Plan viii) Heritage Resource Protection Plan viii) Trigger Action Response Plan(s) ix) Closure Plan	Sio has proposed these same plans in this EAP for review by the EAB prior to initiating Project activities. Some of these plans are included in draft form as appendices in the EAP (Waste Characterization and Management Plan; Groundwater Monitoring and Impact Mitigation Plan; Closure Plan). Others will be prepared prior to commencing Project activities. Draft plans will be updated to reflect any specific EAL requirements information.	Section 7 - Closure Plan Section 8 - Follow Up Plans
#5 The proponent demonstrate the full-scale performance of water-treatment processes for the re-injection of the water that has been separated from the extracted sand.	Sio will start sand extraction activities using a stepwise phased approach that includes initiating a limited number of well clusters with a small number of wells. During the initial phase of Project operations, the water treatment processes and preformance will be demonstrated.	Section 1.7 - Project Planning
#6 Extraction be planned and operated in a manner that is compliant with the engineering limits suggested by the proponent's experts, required by the Manitoba government and/or as amended based on more data-gathering.	The Project design reflects recommendations in a geotechnical analysis report (**Appendix C**) based on a no subsidence scenario. Sio is committed to following the Project design as recommended in the geotechnical analysis report (**Appendix C**). Additionally, Sio will be implementing a geotechnical Trigger Action Response Plan (TARP) that will be developed during Phase 1 of the Project for extraction locations. The TARP will include criteria for determining thresholds of change that require action to be taken to respond. The TARP will include a risk assessment for the Project including 'worst case scenarios', and will describe response methods for specific scenarios, including an early warning system that will halt operations.	Section 6.2.1 - Geology/Topography Section 8.12 - Trigger Action Response Plan

CEC Report Recommendations[a]	Project Revision	Location in EAP with More Information
# 7 The proponent be required to carry out a risk assessment that considers the probability of worst-case scenarios (collapse of the limestone layer leading to sinkholes, failure of well-sealing) and the consequences of these scenarios and what the response would be to remediate such damage.	Monitoring of void space using sonar during and after extraction including long-term monitoring will occur as recommended in the geotechnical analysis report (**Appendix C**). Also see response above for recommendation **#6** regarding implementation of a TARP which will include surface, caprock and piezometric monitoring and review during and after extraction. The geotechnical analysis model will be updated as more data becomes available for the extraction boreholes, and will include any surface settlement data.	Section 6.2.1 - Geology/Topography Section 8.12 - Trigger Action Response Plan Appendix C - Geotechnical Analysis Report
#8 A cumulative effects assessment for the full 24-year life of the project be carried out and its impact be considered in light of other existing and foreseeable projects in the area.	A Cumulative Effects Assessment (CEA) is not an information requirement for Environment Act Proposals under the current Environment Act Proposal Guidelines (Manitoba Government 2023). Therefore, no CEA has been conducted at this time. This Environment Act Licence application fully addresses years 0 to 4 of extraction activities. Any change in potential environmental impact that could result from relocating operations in subsequent years will be addressed through the Notice of Alteration process set out in section 14 of *The Environment Act* . Each future Notice of Alteration for proposed extraction activities beyond year 4 will: - project a block of proposed annual extraction areas; - describe in detail the existing environment in that block; and - will include a thorough environmental assessment using monitoring data collected during extraction operations and the follow-up activities proposed in the EAP (**Section 8**). The conceptual hydrogeological model, numerical groundwater model and geochemical assessments presented in **Appendix B** were developed using previous regional studies, provincial water supply records and field data collected for this Project. Therefore this information, and the follow-up monitoring data collected during Project operation, can provide the basis for a future CEA for the regional area.	

[a]Manitoba Clean Environment Commission (CEC) Report on the Vivian Sand Extraction Project (CEC 2023)

[b]N/A = Not Applicable