CanWhite Sands Corp.

Vivian Sand Extraction Project

Environment Act Proposal

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

Prepared for:
CanWhite Sands Corp.
Suite 1930, 440 2nd Ave. S.W.
Calgary, AB T2P 5E9

Date: July 23, 2021
Project #: 60640258

Distribution List

# Hard Copies	PDF Required	Association / Company Name
	✓	CanWhite Sands Corp.
	✓	AECOM Canada Ltd.

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

T: 204.477.5381
F: 431 800 1210

Feisal Somji
President and Chief Executive Officer
CanWhite Sands Corp.
Suite 1930, 440 2nd Ave. S.W.
Calgary, AB T2P 5E9

July 23, 2021

Project #
60640258

Dear Mr. Somji:

Regarding: Vivian Sand Extraction Project Environment Act Proposal

AECOM Canada Ltd. (AECOM) is pleased submit our report regarding the above-referenced project. If you have any questions, please do not hesitate to contact Marlene Gifford directly at 204-928-9210.

Sincerely,
AECOM Canada Ltd.

[redacted]

Marlene Gifford, M.Sc., P.Biol., R.P.Bio.
Biologist, Environmental Assessor
marlene.gifford@aecom.com

[redacted]

Clifton Samoiloff, B.Sc., EP(CEA)
Mining Market Sector Lead, Canada
cliff.Samoiloff@aecom.com

MG:rz
Encl:

Statement of Qualifications and Limitations

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

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

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

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

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

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

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

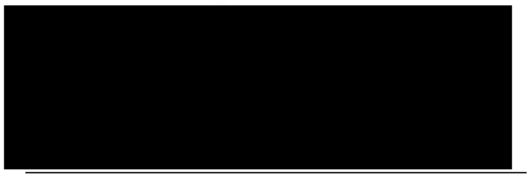
AECOM accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any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

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

AECOM: 2015-04-13

Quality Information

Report Prepared By:



Marlene Gifford, M.Sc., P.Biol., R.P.Bio.
Biologist, Environmental Assessor

Report Reviewed By:

Clifton Samoiloff, B.Sc., EP(CEA)
Mining Market Sector Lead, Canada
Senior Environmental Scientist

Executive Summary

This report has been prepared in support of an Environment Act Licence application submitted by CanWhite Sands Corp. ('CanWhite') for consideration by Manitoba Conservation and Climate (MBCC) Environmental Approvals Branch for proposed sand extraction activities using a method similar to standard water well drilling. Extraction of the sand resource will be reviewed under *The Environment Act* by MBCC as a "mine" which is a Class 2 development in section 3 of the Classes of Development Regulation under group 5 *"*Mining*"*. This Environment Act Proposal report contains the information described in the Manitoba Sustainable Development "Information Bulletin – Environment Act Proposal Report Guidelines" (Manitoba Sustainable Development 2018).

CanWhite is proposing to extract high purity silica sand from the Winnipeg Sandstone aquifer (approximately 61 m, or 200 ft below ground) within the Winnipeg Sandstone geological formation southwest of the hamlet of Vivian, Manitoba and approximately 26 km east of the City of Winnipeg from the border of the CanWhite mining claims. The proposed extraction of silica sand, i.e., the Vivian Sand Extraction Project (the 'Project'), is being developed for the purpose of supplying high purity silica sand for use in a variety of markets such as the renewable energy industry (e.g. solar panel production), metallurgical silicon (lithium ion batteries), telecommunications (e.g. fibre optics), smart glass, precipitated silica (e.g. tires, medical and dental), silica carbides (e.g. electronics, cellphones, computer chips) silicon enhanced alloys (e.g. aluminum components for aerospace and automobile), low iron glass (architectural envelopes) and ceramics.

The Project will not be using an open pit quarry method due to the depth of the target sand deposit. Instead, water well drilling rigs will be used to drill extraction wells and install casing to the target sand deposit. The extraction wells will be between 16 inches (40.6 cm) and 8 inches (20.3 cm) in diameter. Using compressed air, silica sand will be brought to the surface with groundwater from approximately 61 m (200 ft) below ground surface depending on the formation depth in the area. Extraction activities will occur April through November (and winter, weather dependant) each year of operation, while well drilling activities will occur year-round.

Key activities and components of the Project will include:

- Establishment of temporary access trails to annual sand extraction areas to accommodate water well drilling rigs.
- Extraction well drilling year-round.
- Sand extraction April to November (and winter, weather dependant) at an initial average of 56 well clusters of seven extraction wells per cluster, annually.
- Maximum of up to seven extraction wells operating simultaneously for 5 to 7 days each.
- Separation of water from sand at the extraction site where excess water is returned to the sandstone aquifer via the sand producing well after UV treatment, and sand enters the slurry transport loop.
- Pre-screening of sand and water slurry at the extraction site to remove material that is too large ('overs') such as concretions (calcified sand), with additional screening occurring at the proposed Processing Facility.
- Temporary contained storage at the well cluster of the overs material and well drill cuttings for disposal or for use in annual progressive closure and decommissioning (i.e. sealing) of extraction wells. Usage for well sealing activities will only be for approved cuttings and may include sandstone or carbonate (limestone).

- Construction of above-ground temporary slurry line (high density polyethylene tubing) and associated pumping stations, to transport the pre-screened sand directly to the Processing Facility and transport recycled water from the Processing Facility back to the extraction sites for re-use.
- Dismantling and relocating the above-ground slurry and water return lines and pumping stations, as needed, to the subsequent annual sand extraction area.
- Treatment of groundwater separated from the sand and water slurry at the extraction site using a UV system before returning excess groundwater to the aquifer via extraction wells.
- Progressive decommissioning (sealing) of annual extraction wells and well cluster areas.
- Progressive annual rehabilitation of temporary drill rig access trails, equipment laydown areas, slurry line trails and return water line trails.

At no time will dry silica sand be left exposed at the Project Site. Sand will be wet and will either be contained within the extraction well lines or the slurry line. Material that is too large ('overs'), such as concretions (calcified sand), will be stored in appropriate containment prior to removal from site or for use in well sealing activities. Therefore, the risk of silica sand dust dispersal is eliminated.

The sand Processing Facility and associated infrastructure, including the rail loop and interconnection with the existing Canadian National Railway, are being reviewed by Manitoba Conservation and Climate (MBCC) as a separate project requiring a separate Environment Act Licence to proceed. Therefore, the Processing Facility and associated infrastructure components are not assessed within this Environment Act Proposal.

Extraction activities will gradually progress further from the Processing Facility each year within blocks of land adjacent to previous year extraction activity land areas over the anticipated 24-year life of the Project. CanWhite is currently applying for an Environment Act Licence for extraction activities up to and including 2025 because advancements in extraction methods and operations are expected to increase efficiency and reduce overall footprint after 2025. This will be explained in subsequent Notices of Alteration for the future potential extraction years, with the information and review process for Notices of Alteration of an Environment Act Licence for the Project being as required under Section 14 of *The Environment Act*. Therefore, the scope of this Environment Act Proposal is limited to the proposed activities and Project spatial extent up to and including 2025.

Following provincial and municipal regulatory approval of the proposed Project, the initial year of extraction activities will begin Q3/Q4[1] 2021, then April through November (and winter, weather dependant) for each extraction year thereafter. Activities will occur 24 hours per day, seven days/week (24/7) up to and including 2025. Extraction well drilling will occur year-round.

The results of the environmental and socioeconomic effects assessment are summarized as follows:

Geology/Topography

Impacts on topography and geology have been assessed as being minor.

While measurable disturbances will be imposed on topographic features during Project construction and operation, disturbances will be limited to the Project site. Effects on topography will be minimized by using existing roads, trails and other previously disturbed areas to the extent feasible to minimize disturbance to the natural topography. Levelling and grading will occur upon Project decommissioning to return the landscape to elevations typical to the surrounding area.

[1] *Note: QX = year quarter (e.g. Q1 = January through April timeframe)*

Impacts to geology are assessed as being minor due to the abundance of remaining silica sand resource with approximately 1.06% of sand removed through the 24 year life of the project, and approximately 0.18% up to and including 2025 in the target regional aquifer geological layer within the Project Site.

Soils

The potential for soil erosion and associated adverse impacts to the surrounding environment are anticipated to be minor and restricted to the Project site.

The sequential extraction activity areas disturbed during Project operations will be revegetated as quickly as feasible to stabilize the soil and minimize soil erosion. An Erosion and Sediment Control Plan will be implemented for all phases of the Project. During the progressive annual decommissioning activities, after Project components have been removed, the landscape will be leveled and graded, and disturbed areas will be revegetated as quickly as feasible to stabilize the soil and minimize soil erosion.

Groundwater

The potential risks to groundwater are assessed to be minor, seasonal in duration and reversible. Water levels in local area domestic groundwater wells in the Winnipeg Sandstone and Red River Carbonate aquifers in the areas surrounding active sand extraction wells are expected to recover 80% in first two days with the remaining 20% recovering over a period of 20 to 80 days following the end of the extraction activities each year.

The slurry loop system for transporting sand to the facility is designed to not require any additional water which allows for the majority of the water that comes from the extraction well to be returned to the aquifer within a short period of time. Therefore, very little extraction of groundwater from the aquifer is required.

A comprehensive hydrogeological and geochemical assessment was undertaken involving field investigation, data analysis, numerical groundwater modelling and geochemical modelling, with the results described in an extensive, peer-reviewed hydrogeology and geochemistry assessment report. Overall, drawdown effects associated with sand extraction were simulated to be localized, with limited to no effects beyond 1,500 m (4921 ft) from the active extraction wells when the majority of the groundwater is reinjected. During a pumping test, little to no decline (0.02 m to 0.77 m) in water levels was observed in the existing domestic wells near the Project site in the Winnipeg Sandstone or Red River Carbonate aquifers and no negative impacts were reported by well owners. Water levels in the observation well network declined by up to 8.5 m (Winnipeg Sandstone) and 1.5 m (Red River Carbonate) at a distance of 89.3 m from the pumping well. Drawdown effects are largely restricted to the Project Site boundary, but minor effects are anticipated to extend beyond it during and immediately following operation of extraction wells close to the boundary.

Based on a comprehensive geochemical assessment that included geochemical modelling, the overall quality of groundwater within the maximum footprint of the Project will be largely preserved. The activities associated with Project operations and post-closure phases of the Project were determined to have a temporary and minor impact on groundwater quality. For some constituents, the impact was simulated to be positive due to reduction of concentrations of iron and manganese when oxygen (air) is introduced into the aquifer or is allowed to mix with water containing lower concentrations of those elements.

The following measures are expected to mitigate groundwater withdrawal effects and potential for groundwater contamination:

- Process water will be recycled in a loop system for reuse, which reduces the quantity of water required from groundwater;
- When each well is drilled, casing will be installed and grouted in place to isolate the Red River Carbonate and Winnipeg Sandstone aquifers from one another and thereby preventing vertical mixing of waters;
- Extraction wells will be progressively (sequentially) established and sealed (decommissioned) during the ongoing sand and groundwater extraction activities in accordance with applicable guidance documents such as 'Constructing and Sealing Wells in Manitoba' (Province of Manitoba, 2018) and Environment Act Licence requirements;
- Geochemical modelling has indicated that reinjection of groundwater (which will be UV-treated) back to the sandstone aquifer will not adversely affect groundwater quality in either the sandstone or carbonate aquifers; and
- A Waste Characterization and Management Plan, Water Management Plan, Groundwater Monitoring and Impact Mitigation Plan and Progressive Well Abandonment Plan will be developed and implemented to protect groundwater quality and guide responses to any potential impacts to groundwater quantity and quality. Measures will be developed to avoid and/or mitigate any well interference issues as required by *The Water Rights Act* of Manitoba.

With the application of the above mitigation measures and utilization of groundwater at sustainable rates as determined by ongoing hydrogeological testing and monitoring, impacts to groundwater are anticipated to be minor, seasonal in duration and reversible. Considering there will not be a continuous and unsustainable drawdown on the regional groundwater aquifer for Project processes and that the majority of the water that comes from the extraction well will be returned to the aquifer within a short period of time, effects on groundwater quantity in the regional aquifer can be managed by adhering to a Water Management Plan and by implementing a Groundwater Monitoring and Impact Mitigation Plan. The aquifer will also continue to be recharged through natural groundwater recharge processes (i.e. rain and snow melt) and lateral groundwater flow. Effects on groundwater quality will be minor and, in some cases, positive. Risks to groundwater quality will be mitigated through application of a Waste Characterization and Management Plan, Progressive Well Abandonment Plan and a Groundwater Monitoring and Impact Mitigation Plan.

Air Quality

The impact of the Project on air quality is assessed as minor to negligible.

Project activities are expected to have a negligible effect on air quality due to dust generated by movement of drill rigs and other mobile equipment, and due to exhaust emissions including nitrogen dioxide (NO_2), carbon monoxide (CO) and sulfur dioxide (SO_2).

At no time will dry silica sand be left exposed at the Project Site. Sand will be wet and will either be contained within the extraction well lines or the slurry line, or material that is too large ('overs'), such as concretions (calcified sand), will be stored in appropriate containment prior to removal from site or use in well sealing activities. Therefore, the risk of silica sand dust dispersal is eliminated.

Measures that will be applied to minimize potential Project effects on air quality include the following:

- Minimizing idling of motorized equipment to the extent feasible;
- Applying water on gravel roads to control dust, as required; and
- Equipment and vehicles will be properly maintained.

With the application of the above measures, impacts on air quality are expected to be sufficiently mitigated.

Climate/Greenhouse Gases (GHGs)

The impact of the Project on GHG contributions to the atmosphere is assessed as negligible.

Overall, the Project is estimated to generate 0.006797411 tonnes (Mt) of CO2e annually with the application of the above mitigation measures, which is 0.0296% of the reported Manitoba emissions in 2019 which were 23 Mt CO2e, about 0.000931% of the reported 730 Mt CO2e from Canada in 2019.

Noise

The impact of the Project on noise levels at nearest points of reception (e.g. nearest residences) is assessed as minor to moderate with intermittent duration and short-term frequency.

Example noise sources associated with Project activities include mobilization of extraction well drilling equipment, drilling of wells and operation of pump stations.

The following measures will be implemented to reduce noise generated from Project activities:

- Vegetation clearing will be minimized to the extent feasible.
- Project activities will setback a minimum of 100 m from nearest residences.
- Mobile equipment and vehicles will be kept well maintained and will be fitted with mufflers, and other noise mitigation equipment as required.
- Unnecessary idling and revving of engines will be avoided.
- Additional noise mitigation measures will be applied (e.g. portable noise barriers) as required.

In consideration of the above measures to minimize noise levels due to Project activities, it is anticipated that noise levels will be adequately attenuated.

Surface Water

The impacts on surface water are assessed as negligible.

Due to the absence of natural waterbodies such as wetlands in the Project site and immediately adjacent local area that may be potentially affected due to a temporary drawdown effect from sand extraction activities, Project operations are not expected to affect surface water quantity.

Project operations do not involve the use of, or discharge of, any surface water of any kind. Drainage ditching will be constructed along Project access trails and at disturbed areas, as required, to assist in directing runoff flow from rain and snow and maintaining natural drainage pathways through low areas. Portable toilets will be located at active well cluster sites which will be regularly pumped out by a licensed local contractor for proper disposal to prevent potential contamination of local waterbodies with potentially harmful substances. An Erosion and Sediment Control Plan will be implemented for all phases of the Project. Therefore, Project activities are not expected to impact surface water quality.

Fish and Fish Habitat

Project related impacts on fish and fish habitat are not anticipated due to the lack of fish habitat within the Project Site, and application of an Erosion and Sediment Control Plan.

Vegetation

The overall Project impacts to vegetation are assessed as minor within the Project site and negligible within the local area.

The total amount of naturally vegetated area requiring clearing for annual Project operations will vary considering the variable amounts of natural vegetation present within each annual block of Project development lands within the Project Site (which consists of 31% agriculture lands and 13% 'developed' land). No land cover considered rare for the regional area was observed in the Project site during terrestrial reconnaissance of the Project site. Vegetation species at risk are not expected to occur within the Project site.

The annual footprint area requiring clearing to accommodate other Project components will be minor and temporary, with disturbed areas allowed to revegetate naturally and will be augmented using an approved native seed mixture and native plantings if required. Considering progressive closure, rehabilitation and revegetation of extraction activity areas will be done each year, it is expected that most natural vegetation will be very well established after approximately four years, with reestablishment of trees and shrubs expecting to be evident within five to 10 years following closure.

A Revegetation Monitoring Program will be implemented to determine the success of the revegetation program and determine if follow-up reseeding or replanting is required.

Wildlife

Project impacts on the regional wildlife populations are assessed as negligible.

The types of naturally vegetated land cover (wildlife habitat) that will be cleared (i.e., forest, meadow and willow/alder) are common within the regional area. The amount of naturally vegetated area that will need to be cleared for the Project during each year of operation is minor considering approximately 44% of the Project site is previously disturbed landcover due to human development such as agriculture, roads and aggregate quarries. Project components will be located on previously disturbed land to the extent feasible.

Minimizing vegetation clearing to the extent feasible will limit adverse effects to wildlife habitat and will assist in mitigating noise from Project activities. Noise will also be minimized by the measures described above for the noise topic. Wildlife species present in the vicinity of the Project are anticipated to be accustomed (habituated) to some level of noise due to the presence of existing developments (e.g. agriculture activities, residential areas, roads and aggregate quarries).

Vegetation clearing will take place outside of the spring and summer months to the maximum extent feasible to avoid disturbance to breeding birds and other spring breeding wildlife species. Vegetation clearing will not take place during the breeding bird season (April 14 – August 24).

The minor increase in vehicle traffic in the regional area as a result of Project construction and operation activities is anticipated to result in a minor increase in the risk of vehicle collisions with wildlife given the relatively small spatial scale of the Project site and overall minor increase in regional area traffic.

In summary, the Project is not anticipated to have a measurable effect on wildlife populations, including Species at Risk, within the Interlake Plain Ecoregion.

Labour Force and Employment

Employment opportunities associated with the Project will be a positive, long-term and continuous benefit for the regional area within a reasonable commute time to the Project Site.

Approximately 35 to 45 people will be employed during Project operation activities such as annual site clearing, extraction well drilling, extraction activities and relocation and assembly of temporary Project

components. The need for local suppliers and other business to support Project activities is likely to provide an additional 100 to 120 indirect employment opportunities.

Infrastructure and Services

The Project is expected to have minor impacts on regional emergency services because an Emergency Response Plan will be available on-site during Project operations that will clearly outline appropriate emergency response protocols. Standard mitigation measures to avoid accidents and malfunctions will also be applied.

Land and Resource Use

Project activities will occur on CanWhite mining claims sequentially from 2021 to 2025 which will result in temporary use of a very limited portion of the Project Site land each year of the Project. Land use for Project activities will occur in accordance with municipal and provincial approvals and legislative requirements.

Use of the land for other purposes will not be available in the locations of annual Project activities. However, due to the progressive annual reclamation of extraction sites and other Project-related disturbed areas, parcels of land used for Project activities during any given year of Project operation will be available for other uses the following year or once the activities are complete. Sand Extraction activities occur over weeks in one area rather then months, with individual wells over days. Therefore, the Project is anticipated to result in an overall minor temporary adverse impact to land use within the Project site.

Human Health

The measures that will be applied to minimize adverse effects on air quality and noise (as summarized above) are expected to adequately mitigate adverse effects on human health both on and off the Project site.

All CanWhite employees will abide by the standards, procedures and training required under *The Workplace Safety and Health Act* as well as with CanWhite's internal Health and Safety Program and Emergency Response Plan. Employee Orientation and Safety training will be mandated for all new hires in addition to required yearly safety reviews for existing staff. All required personal protective equipment (PPE) will be provided to employees. Where required, visitor orientation and PPE will be provided when visitors enter employee only areas. Therefore, the risk of adverse impacts on human health is determined to be negligible.

Indigenous and Treaty Rights

The Project is not expected to adversely impact the exercise of Indigenous or Treaty rights because:

- The Project Site consists of private land with private surface rights that do not have public access unless by permission;
- No fish or fish habitat will be affected by the Project;
- The residual environmental impact of the Project on vegetation beyond the Project site is assessed to be negligible; and
- The residual environmental impact of the Project on regional wildlife populations is assessed to be negligible.

Heritage Resources

Results of an on-site archaeological investigation found the Project Site to have substantial previous disturbances and concluded that there were no heritage concerns regarding development of the Project at

the Project site. If heritage resources are discovered within the Project site, work will be stopped, Historic Resources Branch will be advised, and the discovered historic resources will be recorded by an archaeologist and adequately protected as required.

With the application of the above described mitigation measure and given the opinion of a qualified archaeologist indicating no heritage concerns regarding development of the Project at the Project site, the impacts on heritage resources are assessed as minor.

Traffic

The increase in regional area traffic will be not substantial because the sand will be transported to the sand Processing Facility by slurry line rather than by haul truck which will limit traffic associated with the Project staff and contractors during the Project construction and operation Project staff will be limited to approximately 35 to 45 personnel during Project operations with staff arrivals and departures being staggered daily to accommodate the 24 hours, seven days/week (24/7) operation schedule. Traffic will travel within the Project Site along the PR 302 (Ostenfield Road) for up to 5 km or along municipal road 42E (Queens Valley Road) for up to 1.8 km, south from PTH 15. Therefore, the overall annual increased use of regional roads will be minor.

Aesthetics

The impact of the Project on the aesthetics of the Local Project Area is anticipated to be minor because land disturbances and Project components will be temporary within a very limited area in the Project site during each year of operation. Most of the Project site will remain in the current condition, and vegetation clearing to accommodate the Project footprint will be minimized to the extent feasible. Annual well cluster sites and wells will be progressively closed / sealed each year, and disturbed areas will be rehabilitated throughout each year of Project operation. Setback distances where no activity will occur (e.g. from residences) will be maintained.

Public and Indigenous Engagement

CanWhite has had, and will continue to have, discussions with residents, businesses, local stakeholders, all levels of government and local Indigenous communities in the area. The opportunity for public review of the proposed Project, including the hydrogeological impact assessment study report, will occur during the public review period for this Environment Act Proposal, during which time CanWhite will hold a public meeting to provide Project information and respond to public comments and questions on the proposed Project.

Follow-up Plans and Overall Assessment

The follow-up plans and monitoring programs that will be implemented include, but are not necessarily limited to, the following: Waste Characterization and Management Plan, Water Management Plan, Progressive Well Abandonment Plan, Groundwater Monitoring and Impact Mitigation Plan, Erosion and Sediment Control Plan, Emergency Response Plan, Revegetation Monitoring Program, Heritage Resources Protection Plan and Closure Plan.

It is recommended that mitigation measures, follow-up plans, and monitoring programs described in this report be implemented to avoid or minimize potential environmental effects and/or identify any unanticipated adverse effects early so that appropriate adaptive management action can be undertaken.

In summary, based on the proposed Project description and with the application of the proposed mitigation measures and follow-up plans outlined in this Environment Act Proposal, adverse residual environmental

impacts resulting from the Project are expected to be sufficiently mitigated. The success of the Project is anticipated to be a substantial benefit to the local and regional area communities in terms of training, employment, and potential business opportunities related to the services that will be required for the Project and the tax revenue that will be realized with the proposed Project being located in the RM of Springfield.

List of Abbreviations

CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	'Carbon Dioxide equivalent' – amount of CO_2 that would have equivalent global warming impact as the effect of different greenhouse gases
COSEWIC	Committee on the Status of Endangered Wildlife in Canada.
EAB	Environmental Assessment Branch
EAP	Environment Act Proposal
EC	Environmental Component
ELC	Ecological Land Classification
EPM	East of the Prime Meridian
GHG	Greenhouse Gas(es)
gpm	U.S. gallons per minute (metric l/min units also provided throughout)
ha	Hectares
HRB	Historic Resources Branch
HRIA	Heritage Resources Impact Assessment.
km	Kilometre
kVA	Kilo-volt-ampere; tells you how much power the overall system is using
kW	Kilowatt
L	Litre
l/min	Litres per minute
m	Metre
m^3	Cubic metres
MAAQC	Manitoba Ambient Air Quality Criteria
masl	Metres above sea level
MBCC	Manitoba Conservation and Climate
MBESEA	*The Endangered Species and Ecosystems Act of Manitoba*
N_2O	Nitrous Oxide
NO_2	Nitrogen Dioxide
PM	Particulate matter
PR	Provincial Road
PTH	Provincial Trunk Highway
RCMP	Royal Canadian Mounted Police
RM	Rural Municipality
RoW	Right-of-Way
SARA	*Species at Risk Act*
SC	Social Component
UV	Ultraviolet

Terms / Glossary

Abandonment/Sealing	The act of filling a well or a test hole with a material or a mixture of materials in a manner that is sufficient to prevent the vertical movement of water or other substances within the well or test hole.
Aesthetics	Subjective principles concerned with the perception of beauty, such as the visual appeal of the natural landscape.
Aquifer	An underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials (such as sand).
Compressor	For the purpose of this Project, a diesel-powered mechanical device that increases air pressure by reducing its volume.
Drill cuttings	Broken bits of solid material brought to surface from the borehole while drilling a well.
Extraction well	A borehole drilled into the ground like a groundwater well, but for the extraction of minerals. For this Project, both sand and groundwater will be extracted as a slurry through extraction wells.
Hydrogeology	The area of geology that studies the distribution and movement of groundwater in the soil and rocks of the earth's crust (commonly in aquifers).
Monitoring Well	A water well that is used for the purpose of collecting groundwater information such as groundwater level, quality and other parameters as needed.
Processing Facility	This is referring to the Vivian Sand Facility Project, that is currently under regulatory review, which will process the sand extracted by this proposed sand extraction Project.
Sealed	Refers to the decommissioning of sand extraction wells in accordance with *The Groundwater and Water Well Act*.
Slurry	For this Project, a semi-liquid mixture of silica sand and recycled water. The proportion of sand and water within the slurry will vary during the extraction process at each extraction well.
Slurry line	Fully enclosed, temporary 14-inch (35.6 cm) line to transport sand and water slurry from extraction site to sand Processing Facility site. Line is made from HDPE (high-density polyethylene).
UV	Ultraviolet (UV) water treatment systems use UV rays to destroy 99.99% of harmful microorganisms without adding chemicals and are commonly used in municipal water treatment facilities.
Viewscape	The visible landscape.
Well Construction	Refers to any work in relation to the drilling, installing, modifying or repairing of a well or test hole.
Well Cluster	For this Project, an area 50 m to 60 m in diameter where a cluster of seven sand extraction wells are located approximately 18 m apart. The distance between each well cluster is a minimum of 60 m.
Extraction site	The location of the well area and extraction equipment.

Table of Contents

List of Figures

List of Tables

Appendices

1. General Project Information

1.1 Project Overview

CanWhite Sands Corp. ('CanWhite') is proposing to extract high purity silica sand from the Winnipeg Sandstone aquifer (approximately 61 m, or 200 ft below ground) within the Winnipeg Sandstone geological formation southwest of the hamlet of Vivian, Manitoba and approximately 26 km east of the City of Winnipeg from the border of the CanWhite mining claims. The proposed extraction of silica sand, i.e., the Vivian Sand Extraction Project (the 'Project'), is being developed for the purpose of supplying high purity silica sand for use in a variety of markets such as the renewable energy industry (e.g. solar panel production), metallurgical silicon (lithium ion batteries), telecommunications (e.g. fibre optics), smart glass, precipitated silica (e.g. tires, medical and dental), silica carbides (e.g. electronics, cellphones, computer chips), silicon enhanced alloys (e.g. aluminum components for aerospace and automobile), low iron glass (architectural envelopes) and ceramics.

The Project will not be using an open pit quarry method due to the depth of the target sand deposit. Instead, water well drilling rigs will be used to drill extraction wells and install casing to the target sand deposit. The extraction wells will be between 16 inches (40.6 cm) and 8 inches (20.3 cm) in diameter. Using compressed air, silica sand will be brought to the surface with groundwater from approximately 61 m (200 ft) below ground surface depending on the formation depth in the area. Extraction activities will occur April through November (and winter, weather dependant) each year of operation while well drilling activities will occur year-round.

The water portion of the sand and groundwater slurry that is brought to surface through extraction wells will be separated from the sand at the extraction site. This groundwater is then returned to the aquifer via the sand producing well after being treated with ultraviolet light (UV), which is a treatment technique commonly used in municipal water treatment facilities. The sand then enters a movable slurry transport system via a small-diameter 14-inch (35.6 cm) slurry line to transport the sand slurry to a proposed sand Processing Facility located south of the hamlet of Vivian. This slurry transport system is part of a recycled water loop using the same water to move sand from the extraction site to the Processing Facility. A one-time water draw at the beginning of the initial extraction year is needed to prime the sand slurry transport system. After that, the initial one-time water draw remains in the slurry transport loop system while the sand enters and exists the loop system. The water component of the slurry will consist of recycled water that will remain in the system constantly flowing in a loop from the extraction sites to the Processing Facility. During the winter months, the water in the system is stored on site in tankage to eliminate the need to draw additional water at the start of each extraction season (April). Therefore, a minimal amount of groundwater is used by sand extraction activities each year of operation.

The slurry line will be relocated as the water well drilling rigs relocate between sequential extraction sites. Upon arrival to the facility, the sand and water are separated, with water first passing through a water treatment process before returning into the loop system for re-use. The procedure for sand processing and water treatment at the proposed facility is described within a separate Environment Act Proposal currently under regulatory review.

A thorough and complete hydrogeological study was conducted on the potential impacts of the extraction activities on the aquifer. Details of the hydrogeological study are outlined in this proposal, with the

Hydrogeological Assessment Final Report provided in **Appendix A**, and peer-review comments and responses on the report provided in **Appendix B**.

Progressive annual closure and rehabilitation of each extraction year area will be done once sand extraction is completed at each group of well cluster areas which will minimize the annual above-ground Project footprint. Annual sand extraction activities will occur sequentially within blocks of mineral leased land parcel areas south, east and west of the sand Processing Facility. Extraction activities will gradually progress further from the Processing Facility each year within blocks of land adjacent to previous year extraction activity land areas over the anticipated 24-year life of the Project. CanWhite is currently applying for an Environment Act Licence for extraction activities up to and including 2025 because advancements in extraction methods and operations are expected to increase efficiency and reduce overall footprint after 2025. This will be explained in a subsequent Environment Act Proposal for the future potential extraction years. Therefore, the scope of this Environment Act Proposal is limited to the proposed activities and Project spatial extent up to and including 2025.

The sand Processing Facility and associated infrastructure, including the rail loop and interconnection with the existing Canadian National Railway, are being reviewed by Manitoba Conservation and Climate (MBCC) as a separate project requiring a separate Environment Act Licence to proceed. Therefore, the Processing Facility and associated infrastructure components are not assessed within this Environment Act Proposal.

Key activities and components of the Project will include:

- Establishment of temporary access trails to annual sand extraction areas to accommodate water well drilling rigs.
- Extraction well drilling year-round.
- Sand extraction April to November (and winter, weather dependant) at an initial average of 56 well clusters of seven extraction wells per cluster, annually.
- Maximum of up to seven extraction wells operating simultaneously for 5 to 7 days each.
- Separation of water from sand at the extraction site where excess water is returned to the sandstone aquifer via the sand producing well after UV treatment, and sand enters the slurry transport loop.
- Pre-screening of sand and water slurry at the extraction site to remove material that is too large (‘overs’) with additional screening occurring at the proposed Processing Facility.
- Temporary contained storage at the well clusters of the overs material and well drill cuttings for disposal or for use in annual progressive closure and decommissioning (i.e. sealing) of extraction wells. Usage for well sealing activities will only be for approved cuttings and may include sandstone or carbonate (limestone).
- Construction of above-ground temporary slurry line (high density polyethylene tubing) and associated pumping stations, to transport the pre-screened sand directly to the Processing Facility and transport recycled water from the Processing Facility back to the extraction sites for re-use.
- Dismantling and relocating the above-ground slurry and water return lines and pumping stations, as needed, to the subsequent annual sand extraction area.
- Treatment of groundwater separated from the sand and water slurry at the extraction site using a UV system before returning excess groundwater to the aquifer via extraction wells.
- Progressive decommissioning (sealing) of annual extraction wells and well cluster areas.
- Progressive annual rehabilitation of temporary drill rig access trails, equipment laydown areas, slurry line trails and return water line trails.

At no time will dry silica sand be left exposed at the Project Site. Sand will be wet and will either be contained within the extraction well line or the slurry line. Material that is too large ('overs'), such as concretions (calcified sand), will be stored in appropriate containment prior to removal from site or use in well sealing activities. Therefore, the risk of silica sand dust dispersal is eliminated.

Land area within which extraction wells will be established will occupy approximately 1.2 km^2 during each annual extraction activity year. To produce the initial ramp up phase of 1,176,000 tonnes of silica sand (with an eventual increase to 1,360,000 tonnes of silica sand product annually at the Processing Facility) an average of 56 well clusters consisting of seven (7) wells each will be sequentially developed and progressively decommissioned and rehabilitated each year. Once drilled, these wells will be producing for 5 to 6 days. All wells within a well cluster may not be operating at the same time. The objective is to keep the slurry supply continuously moving to the facility at an optimal and manageable rate. Therefore, although up to seven extraction wells may be operating simultaneously in one well cluster at any given time, this maximum number of wells operating simultaneously maybe spread across two adjacent well clusters (e.g. four operating wells in one cluster and three in an adjacent well cluster). The operations will move in a pattern from one well cluster to the next, with wells being progressively sealed. This will occur sequentially over the April to November timeframe with all wells being sealed (i.e. decommissioned) sequentially and the disturbed areas rehabilitated yearly.

Details regarding Project activities and components are provided in the Project Description (**Section 2**).

1.2 Proponent Contact Information

Table 1-1: Proponent Contact Information

Name of Proponent	CanWhite Sands Corp.
Address of Proponent	Suite 1930, 440 – 2nd Ave SW Calgary, AB T2P 5E9
Principal Contact Person for the EAP	**Feisal Somji** President and Chief Executive Officer info@viviansandproject.com Ph: 1-888-436-5238

1.3 Company Profile

CanWhite Sands Corp. (CanWhite) is a private Alberta company registered to carry on business in Manitoba. CanWhite is the legal owner of mineral claims in and around the RM of Springfield. The mineral deposits covered by these claims contain a silica sand resource (SiO_2 [Silica Dioxide]) which is unique to Manitoba and North America. The purity of the sand resource, averaging 99.85%, is within international standards for high purity silica use. This positions southeastern Manitoba as a viable supplier of high purity silica sand utilized in green and renewable energy businesses as well as electronics, specialty/medical glass, and other industries supplied by high purity silica.

CanWhite aims to be the lowest cost supplier of high purity silica sand using environmentally sustainable methods while providing benefits to the local community. CanWhite proposes to develop this Manitoba-based Project using local resources and services to deliver the sand product by rail to markets in Canada, the United States and internationally.

- Corporation ID: 2019935051
- Business Number: 75100 0324 RC0001
- Incorporation Date: 09/15/2016

1.4 Project Location and Land Tenure

The Project will be located on private land covered under private surface rights within the Rural Municipality (RM) of Springfield as illustrated in **Figure 1-1**, within CanWhite mineral claims and private mineral holdings (**Figure 1-2**) and land parcels as listed in **Appendix C**. Negotiations are in progress to finalize agreements for surface and mineral rights within other land parcels that will encompass Project activities and operations where they are not already under CanWhite's surface right and/or mineral claims. Mineral rights permit use and occupation of the land for the purpose of prospecting, exploring for, developing, mining or production of minerals on, in, or under the land. Land agreements will be issued in advance of any work occurring on private property.

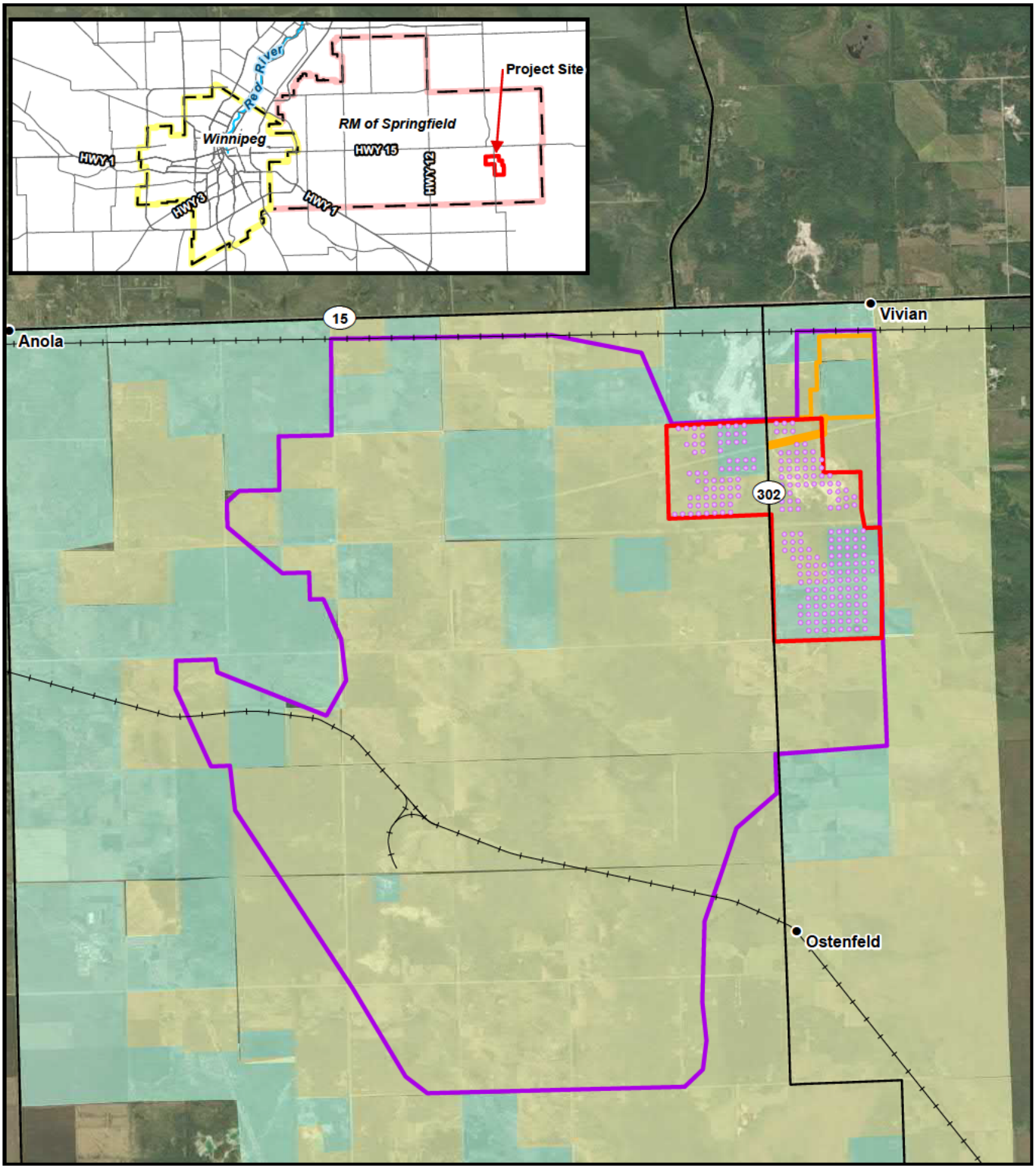
Where an existing road crossing or property crossing not owned or under agreement with CanWhite is required for the slurry line system or temporary access trails, a separate application / agreement will be filed / issued in advance of operations.

1.4.1 Setbacks

The location of the Project components will be setback at least 15 m from the centre of a Manitoba Hydro Right-of-Way (RoW) or easement. Unless otherwise indicated in a landowner agreement, statutory requirement or licence requirement as applicable, Project components will also have the following setbacks:

- 100 m from a dwelling and the dwelling's drinking water well.
- 100 m from a hamlet.
- 50 m from a private property line.
- 100 m from any Manitoba Hydro utilities.

The location of extraction drill holes will also be sited to protect existing water wells and waterbodies, as discussed in **Section 6** (Environmental Assessment and Mitigation Measures).

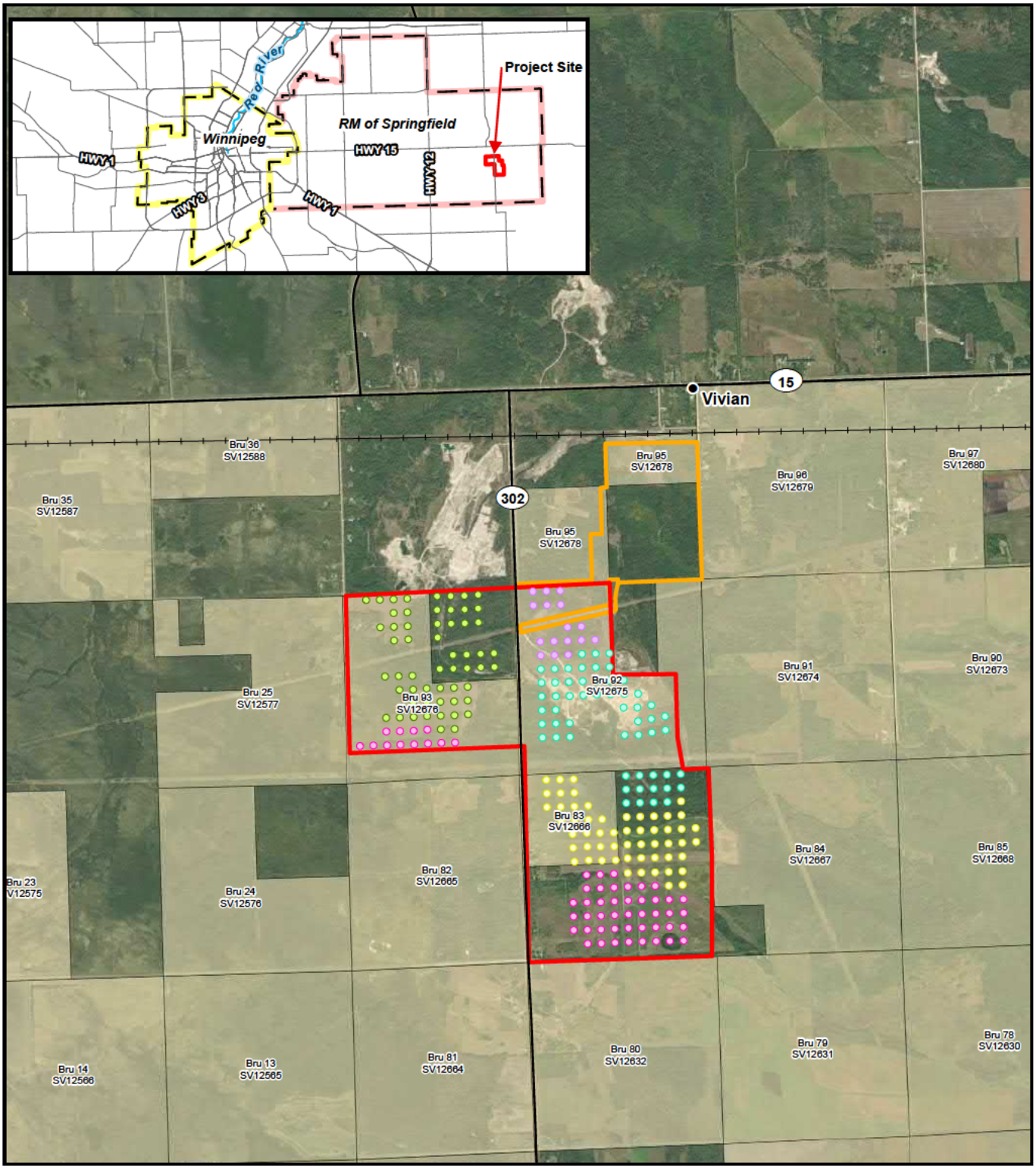


Last saved by: PAIGE.CROSSMAN (2021-06-14) Project No.: 60625356 Date: 2021-06-14
Filename: L:\ENVIRONMENT\GIS\STEPHAN E CLARKE\WINNIPEG\VIVIAN_60625656\02_MXDS\VIVIAN SAND EXTRACTION PROJECT - EA\VH001-1_60625356_PROJECTSITELOCATIONLANDOWNERSHIP.MXD ANSI A 215.9mm x 279.4mm
Project Management Initials: Designer: Checked: Approved:

Vivian Sand Extraction Project
Project Site Location and Land Ownership
CanWhite Sands Corp.

AECOM

Figure: 1-1



Last saved by: PAIGE.CROSSMAN (2021-06-14) Project No.: 60625356 Date: 2021-06-14 Project Management Initials: Designer: Checked: Approved: ANSI A 215.9mm x 279.4mm
Filename: L:\ENVIRONMENT\GIS\STEPHAN.E.CLARKE\WINNIPEG\VIVIAN_60625656\02_MXDS\VIVIAN SAND EXTRACTION PROJECT - EA\VH001-2_60625356_PROJECTSITEMINERALRIGHTSL.MXD

Vivian Sand Extraction Project
Project Site Area Mineral Rights
CanWhite Sands Corp.

AECOM

Figure: 1-2

1.5 Previous Exploration

CanWhite's previous sand deposit exploration activities occurred from 2017 to 2020 in southern Manitoba east of Winnipeg within an approximate 20 km west to east width area extending from approximately 30 km south of Steinbach, north to PTH 15 near Anola. The target underground silica sand deposit known geologically as the Carmen Sand Member spans a wide area in Manitoba and was the focus of CanWhite's exploration activities due to the high purity silica sand within this deposit.

These early exploration activities were conducted under mining claim permits, borehole licences and landowner agreements for private land access to determine the most productive silica sand deposit that was also within proximity to a suitable location for a sand Processing Facility with access to railway and other existing infrastructure such as roads and available electrical power line options. To minimize environmental impacts and costs associated with trucking extracted sand to a sand Processing Facility, CanWhite chose an alternative solution whereby the extracted sand resource and water would be transported via slurry line directly to a sand Processing Facility which is undergoing regulatory review under a separate Environment Act Licence application. The processed silica sand product is then proposed to be transported from the Processing Facility by direct loading to railcar for transportation of the product to markets in Canada, the United States and internationally. Therefore, locating the Project primarily within the RM of Springfield was determined to be the most feasible location for the Project.

1.6 Project Planning Phases

CanWhite is planning to initiate clearing to accommodate temporary access trails for extraction well drill rigs, well cluster areas and temporary trails for slurry lines and water return lines for the first year of extraction activities in Q3 2021[2] and begin initial Project operations (silica sand slurry extraction) in Q4 2021 upon the issuance of regulatory permits and approvals required for Project construction and operation. Details of planned Project phases, activities and scheduling are provided in the Project Description (**Section 2**).

Project phases include the following:

- Planning and Permitting phase
  - Current phase of the proposed Project
- Construction phase (during each sequential extraction year)
  - Includes clearing for and establishment of:
    - Temporary drilling rig access trails and temporary trails for slurry line and return water line
    - Well cluster (50 m to 60 m diameter each) which includes equipment laydown areas within each annual mineral leased extraction area block
    - Drilling of extraction wells (seven within each well cluster with approximately 18 m between each extraction well)
    - Construction/placement of slurry lines, water return lines and associated pumping stations
- Operation phase
  - Extraction of silica sand and groundwater to surface using compressed air and water well development methods
  - Separation of the water and silica sand at surface at the extraction site
  - Return of this groundwater to the well (also known as 'reinjection') following an ultraviolet (UV) light treatment

[2] **Note:** QX = year quarter (e.g. Q3 = July through September timeframe)

  - Pumping of silica sand to the sand Processing Facility via slurry lines and separate recycled water from the facility
  - Return of treated slurry line water from the facility to the extraction site for reuse to bring sand to the facility in a loop system.
- Decommissioning and Closure (annual)
  - Annual progressive (sequential) closure and decommissioning (sealing) of extraction wells
  - Progressive annual rehabilitation of well cluster areas, temporary drill rig access trails, slurry line and return water line trails and associated pumping station locations as needed.

The annual Project operation activity will occur 24 hours per day, 7 days per week April through November (and winter, weather dependant), and may extend somewhat beyond this timeframe if ambient temperatures allow for extraction activates to continue. Extraction well drilling will occur year-round.

1.7 Regulatory Framework

1.7.1 The Environment Act

This Project will be reviewed by MBCC under *The Environment Act* as a “mine” which is a Class 2 development in section 3 of the Classes of Development Regulation under group 5 “*Mining*”. The Environment Act Licence application for this Project, and scope of this current Environment Act Proposal document, is for extraction years up to and including 2025. Notices of Alteration will be submitted to the Environmental Assessment Branch for each subsequent four-year block of future proposed extraction activities for the 24-year life of the Project. The application information and review process for Notices of Alteration of an Environment Act Licence for the Project will be as required under Section 14 of *The Environment Act*.

Processing of the extracted sand resource at a proposed Processing Facility is currently being reviewed as a separate Environment Act Licence application under *The Environment Act* as a Class 2 development (a ‘manufacturing and industrial plant’) under the Classes of Development Regulation.

CanWhite has submitted an Environment Act Licence application for the Processing Facility separately and in advance of this extraction Project because:

- The Processing Facility consists of a permanent building and related infrastructure similar to other manufacturing operations located in urban or semi-urban settings;
- By contrast, CanWhite anticipates that special license conditions will have to be contemplated for extraction which will involve changing of extraction sites on a relatively frequent basis, which is not typical for Environment Act Licenses and which will not be relevant to the Processing Facility;
- In the future, the Processing Facility could be operated on a commercial basis to process and transfer sand that is not mined by the same owner provided that the sand is of the same nature and quality as the resource to which CanWhite has rights; and
- Construction of the Processing Facility will take time to achieve, whereas extraction involves portable drills and other portable components which will move frequently and for which no permanent structures are required to be constructed.

1.7.2 The Mines and Minerals Act

Sand extraction activities are proposed to occur within mining claims issued to CanWhite under provisions of *The Mines and Minerals Act* and under borehole licences issued under Part 3 of the Drilling Regulation.

The current mining claims that are included within the Project Site where Project activities will occur (**Figure 1-2**) are being converted to mineral leases for production extraction of sand.

A Closure Plan will be developed and submitted to MBCC for this Project in accordance with the Manitoba Mine Closure Regulation 67/99 General Closure Plan Guidelines (**Section 8.9**).

1.7.3 Other Approvals

In addition to seeking licensing under *The Environment Act,* CanWhite will apply to Manitoba for:

- Work permits, as required, in accordance with *The Crown Lands Act* and applicable regulations;
- Water rights license(s) for the extraction of groundwater as described in **Section 2.6**;
- Injection permit(s) for return of water to the sandstone aquifer; and
- Burning permits to dispose of woody debris will be sought, as required, in accordance with Section 19(1) of *The Wildfires Act*.

CanWhite is in discussions with the RM of Springfield, other local stakeholders and Manitoba Infrastructure to coordinate the development of Project temporary extraction equipment access trail intersections to existing municipality roads and PR 302, and to develop sand and groundwater slurry line and water return line crossings over and/or under existing municipality roads and PR 302.

No federal permits or approvals are expected to be required for the Project.

1.8 Project Funding

Development of the Project will be funded entirely by CanWhite and will be owned and operated by CanWhite.

1.9 Project Schedule

The proposed Project schedule is provided in **Table 1-2**.

Table 1-2: Proposed Scheduling

Project Phases and Activity	Proposed Schedule (subject to the results of Regulatory review)
Construction	
Progressive, sequential extraction site preparation. Clearing vegetation to accommodate temporary drill rig access trails; well clusters; slurry line and water return line trails and placement of pumping stations. Placement/construction of slurry line and groundwater return line. Drilling of extraction wells.	Q3/Q4 2021 for initial production extraction year, then April through November (and winter, weather dependant) for each extraction year thereafter. Activities will occur 24 hours per day, seven days/week (24/7). Necessary vegetation clearing each year will occur during winter months to the extent feasible and will be done outside of the breeding bird season (April 14 – August 24). Year-round (24/7).
Operation	
Pumping of sand and water slurry via slurry lines to the sand Processing Facility and return of water from the Processing Facility to the aquifer at the extraction sites.	Q3/Q4 2021 for initial production extraction year, then April through November (and winter, weather dependant) for each extraction year thereafter. Activities will occur 24/7.
Decommissioning and Closure	Annual sequential (progressive) decommissioning of well clusters/capping of extraction wells, decommissioning of slurry line, water return line and pumping stations, rehabilitation of disturbed extraction sites and other temporarily disturbed areas (access trails, slurry line placement areas, well clusters, pumping station areas).

Note: QX = year quarter (e.g. Q4 = October through December timeframe)

2. Project Description

CanWhite is proposing to extract high purity silica sand and groundwater in a slurry using water well drilling rigs and a standard water well airlift extraction method on private land overlaying the sandstone geological formation southwest of the hamlet of Vivian, Manitoba, and approximately 26 km east of the City of Winnipeg from the border of the CanWhite mining claims. Sand extraction activities will occur 24/7 from April through November (and winter, weather dependant) while extraction well drilling will occur year-round.

The water portion of the sand and groundwater slurry that will be brought to surface through extraction wells will be separated from the sand at the extraction site. This groundwater is then returned to the aquifer via the sand producing well after being treated with UV light, which is a treatment technique commonly used in municipal water treatment facilities. The sand, then enters a movable slurry transport system via a small-diameter 14-inch (35.6 cm) slurry line to transport the sand slurry to a proposed sand Processing Facility located south of the hamlet of Vivian. This slurry transport system is part of a recycled water loop using the same water to move sand from extraction to facility. A one-time water draw at the beginning of the initial extraction year is needed to prime the sand slurry transport system. After that, the initial one-time water draw remains in the slurry transport loop system while the sand enters and exists the loop system. The water component of the slurry will consist of recycled water that will remain in the system constantly flowing in a loop from the extraction sites to the proposed Processing Facility. In the winter months, the water in the system is stored on site in tankage to eliminate the need to draw additional water at the start of each extraction season (April). Therefore, a minimal amount of groundwater is used by sand extraction activities each year of operation. The sand Processing Facility is being reviewed by regulators under a separate Environment Act Licence application.

The amount of sand within the target geological formation, i.e. the Carman Sand Member, within CanWhite's mining claims for this Project is much more than can be economically extracted. CanWhite is planning to target approximately 0.18% of that sand resource for extraction over the first four years of the Project.

Section 2.1 provides additional information for the Project components and activities.

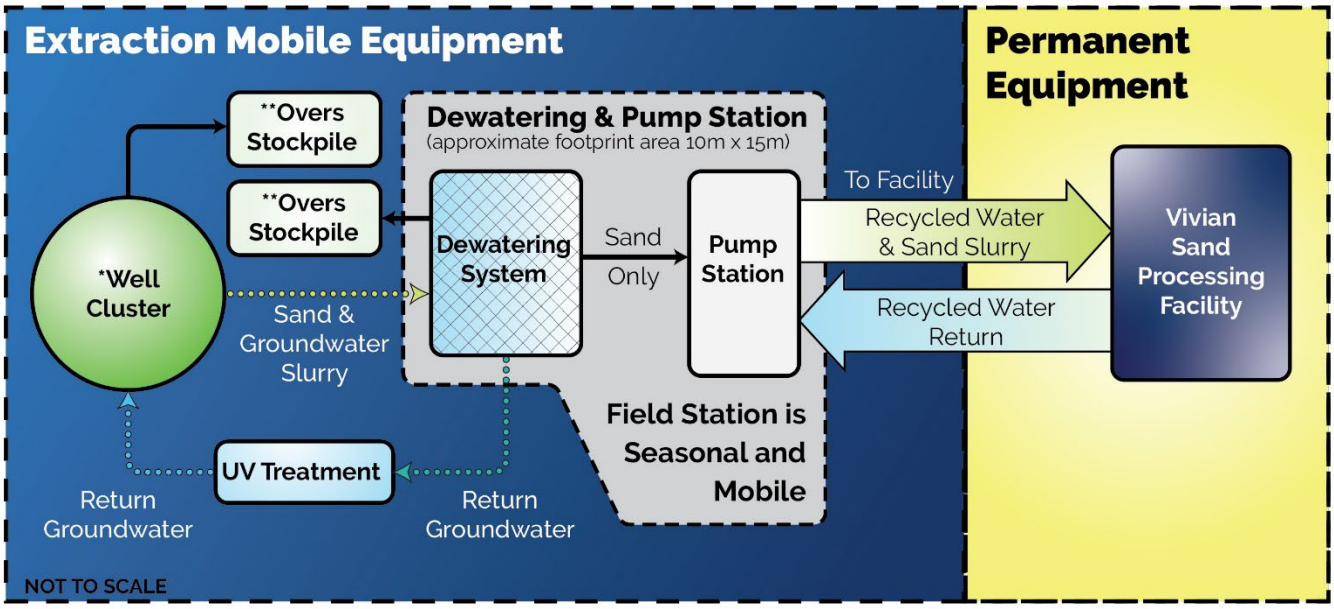
2.1 Components and Activities

The proposed Project will consist of the following key activities and components proposed to be permitted under an Environment Act Licence:

- Establishment of temporary access trails to annual sand extraction areas to accommodate water well drilling rigs.
- Extraction well drilling year round.
- Sand extraction April to November (and winter, weather dependant).
- Separation of water from sand at the extraction site where excess water is returned to the sandstone aquifer via the sand producing well after UV treatment, and sand enters the slurry transport loop.

- Pre-screening of sand and water slurry at the extraction site to remove material that is too large ('overs'), such as concretions (calcified sand), with additional screening occurring at the proposed Processing Facility[3].
- Temporary contained storage at the well clusters of the overs material and well drill cuttings for disposal or for use in annual progressive sealing and decommissioning of extraction wells. Usage for well sealing activities will only be for approved cuttings and may include sandstone or limestone.
- Temporary contained stockpiling at the well clusters of the overs material and well drill cuttings for disposal at a licenced facility.
- Construction of above-ground temporary slurry line and associated pumping stations, to transport the pre-screened sand directly to the Processing Facility and transport recycled water from the Processing Facility back to the extraction sites for re-use.
- Dismantling and relocating the above-ground slurry and water return lines and pumping stations to the subsequent annual sand extraction area.
- Treatment of groundwater separated from the sand and water slurry at the extraction site using a UV system before returning excess groundwater to the aquifer via extraction wells.
- Progressive decommissioning (well sealing) of annual extraction wells and well cluster areas.
- Progressive annual rehabilitation of temporary drill rig access trails; equipment laydown areas; slurry line trails and return water line trails.

Figure 2-1 is a general illustration of the sand extraction circuit process.



*maximum of 7 wells in each cluster
**the overs stockpile is stored in appropriate containment until it is removed for disposal

Figure 2-1: Sand Extraction Circuit Process

[3] *The sand Processing Facility is being reviewed by the Environmental Assessment Branch as a separate Environment Act Licence application.*

The land parcels where sequential sand extraction activities will occur by year for the first four years of the Project are illustrated in **Figure 1-2**. The first four years of sand extraction activities are expected to result in improvements and efficiencies to this proposed new sand extraction method. Therefore, the site layout and ancillary infrastructure for the subsequent four-year blocks of sand extraction areas (after the first four years of Project operation) up to the 24-year life of the Project (**Figure 1-1**) will be submitted to MBCC as Notices of Alteration to an Environment Act Licence for the Project.

Clearing of natural vegetation to accommodate the establishment of sand extraction well cluster sites, temporary access trails, temporary trails for slurry lines and water return lines and area for pumping stations will occur outside of the peak breeding bird season for the Project area (i.e. April 25 – August 15) to avoid contravening the federal *Migratory Birds Convention Act, 1994*. This vegetation clearing activity restriction will also reduce adverse effects to wildlife young during this sensitive seasonal time period. Mitigation measures to avoid or minimize adverse effects to wildlife are fully described in **Section 6**. Project activities will occur on previously disturbed areas to the maximum extent feasible to minimize Project effects on vegetation and associated wildlife.

Progressive annual decommissioning of extraction wells and ancillary components (e.g. temporary access trails; slurry line), and progressive annual rehabilitation of disturbed areas, will be done in accordance with a Closure Plan as indicated in **Section 7**.

2.2 Silica Sand Extraction Process

The Project will be developed as a sequential extraction well drilling operation with progressive annual closure/sealing of extraction wells and progressive annual rehabilitation of temporarily disturbed areas. Temporarily disturbed areas include areas to accommodate the extraction wells, drilling rig access trails, equipment laydown areas (within well cluster areas) and trails to accommodate the slurry lines and water return lines.

CanWhite anticipates extracting sand as a sand and water slurry from up to 467 extraction wells per year at an approximate depth of 61 m (200ft) in Winnipeg Sandstone aquifer. Operations will start out with lower numbers of wells (up to 392 extraction wells), with the number of extraction wells gradually increasing over the first few years of operations. Not all extraction wells during each year of operations will be operating simultaneously (i.e. at the same time). As indicated in **Section 1.1**, a maximum of seven extraction wells will be operating simultaneously. The sand and water slurry will be transported directly to an adjacent sand Processing Facility via above-ground slurry lines that may be diverted underground at road crossings, as required. Pumping stations will be installed as necessary along the slurry line and water return line trails to facilitate transport of the sand and water slurry to the sand Processing Facility and water return from the sand Processing Facility. This method of silica sand extraction will minimize above-ground disturbance and eliminate the need for sand transportation truck traffic as well as dust related to trucking or open pit digging. Additional details regarding the sand extraction method, how the slurry is transported to the sand Processing Facility and how excess water is returned to the aquifer at the extraction site are provided below in **Sections 2.2.1** to **2.2.6**.

2.2.1 Extraction Method

Silica sand will be extracted from the Winnipeg Sandstone aquifer using an airlift extraction method which uses a compressor to circulate air into the bottom of the installed production pipe within each extraction well to extract the sand which is then placed in a slurry line for transportation directly to a sand Processing Facility. The extraction method sequence of activities is described as follows:

1) Drilling of extraction wells will occur year-round. Clusters of up to seven (7) extraction wells will be drilled (**Section 2.2.2**) in advance of extraction activities occurring using a water well rig and using standard industry practice water well drilling techniques. Seven extraction wells are the maximum number of wells expected to be operating simultaneously (i.e. at the same time). These seven active extraction wells may be spread across two adjacent well clusters.
    a) When each well is drilled, casing will be installed and grouted in place to isolate between the various formation layers to prevent vertical mixing of the different aquifers present. For additional details explaining how the extraction wells will be installed, refer to Section 2.2 of the Hydrogeological Study provided in **Appendix A**.
    b) Wells will be drilled into the sandstone over one to two days. Once a well is drilled and casing is in place with cement as per *The Groundwater and Water Well Act* requirements, wells are securely capped until sand extraction activities begin.
2) Sand extraction activities will occur 24/7 from April through November (and winter, weather dependant). Up to seven extraction wells will be operating simultaneously with active wells in up to two adjacent clusters operating at any time.
    a) A production pipe will be installed in the extraction well with an air line installed inside the production pipe for air to circulate and facilitate movement of sand and water to the surface. This activity is a standard water well production method.
    b) The sand and groundwater slurry brought to surface will pass through vibrating screens installed over a sump pit at the extraction site which will capture overs such as concretions (calcified sand) which are commonly encountered.
    c) The sand and groundwater slurry will then move to a dewatering station at the extraction site where the sand will be separated from the groundwater.
    d) This groundwater will then be returned to the aquifer via the sand producing extraction well after being treated with ultraviolet (UV) light, which is a water treatment technique commonly used in municipal water treatment facilities.
    e) The construction method of the extraction well will prevent water that is returned to the sandstone from contacting any potential source of contamination.
    f) The water that is returned to the sandstone aquifer comes from the sandstone aquifer and returns to the same place after UV treatment described above.
    g) The sand will then enter a movable slurry transport system via a slurry line that will transport the sand slurry to the proposed sand Processing Facility located south of the hamlet of Vivian.
    h) This slurry transport system will contain recycled water from the facility that is traveling in a continuous loop. The sand enters the loop at the extraction site, travels in the slurry line to the facility and is removed from the slurry line for washing and drying. The Vivian Sand Facility Project Environment Act Proposal (AECOM 2020) that is currently under regulatory review describes how the sand is processed once it arrives at the facility.
    i) Once the water no longer contains sand and has been through the treatment process (as outlined in the Facility Environment Act Proposal), the water returns back to the extraction site via a dedicated water return line. This water then feeds back into the sand slurry line to move more sand back to the facility in a continuous loop process.
    j) Each well will operate for five to seven days before the well is capped and equipment is moved to the next well.
    k) Water well rigs that are the typical size used to install domestic water wells will be used to install the sand extraction wells.
    l) When a well is no longer producing sand, the production piping will be removed, the slurry line connection will be disconnected, and the well will be capped. All equipment will then be moved to the next well in the cluster and re-connected.

m) While this is occurring, the other wells (up to seven) will continue to operate so that the slurry loop system continues to supply sand to the facility for processing.
n) Once the production piping is removed from the extraction well, the well will be sealed as per *The Groundwater and Water Well Act* requirements to prevent movement of water vertically between the aquifers.

The slurry loop system for transporting sand to the facility is designed to not require any additional water. **This allows for the majority of the water that comes from the extraction well to be returned to the aquifer within a short period of time. Therefore, very little extraction of groundwater from the aquifer is required.**

Approximately 10 gpm of water from the extraction activities per cluster remains with the sand as it enters the slurry loop system because the dewatering system at the extraction site will not remove 100% of the water from the extracted sand. The sand will remain wet as it enters the slurry loop system.

It should be noted that for the start-up of the extraction process each spring, a one-time water draw at the beginning of the initial extraction year is needed to prime the sand slurry transport system. After that, the initial one-time water draw remains in the slurry transport loop system while the sand enters the loop system at the extraction site and exists the loop system at the Processing Facility. In the winter months, the water in the system is stored on site in tankage to eliminate the need to draw additional water at the start of each extraction season (April). Therefore, a minimal amount of groundwater is used by sand extraction activities each year of operation.

A schematic illustrating the extraction method is shown in **Figure 2-2**.

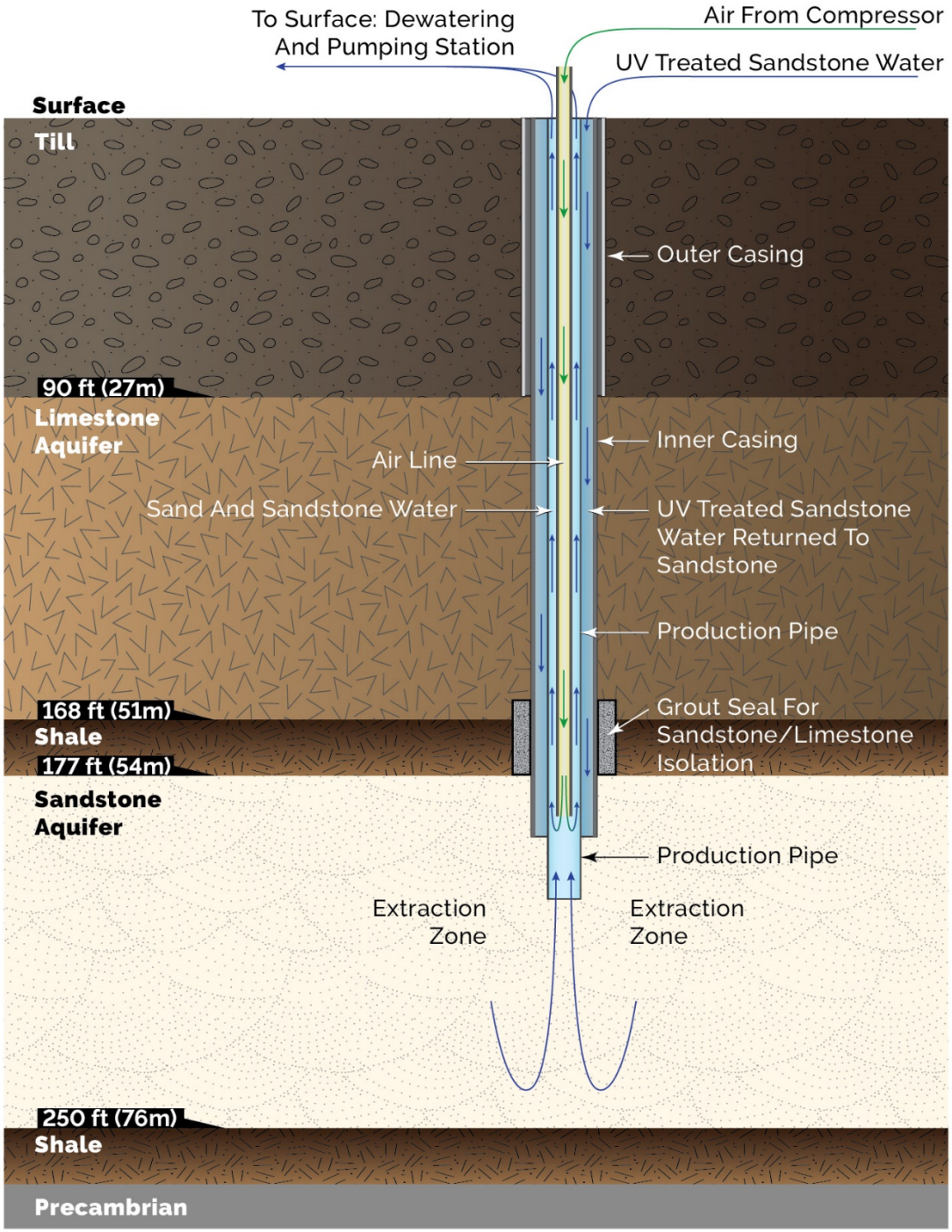


Figure 2-2: Silica Sand Well Extraction Method

2.2.2 Layout of Sand Extraction Sites

During each year of sand extraction operations, extraction wells will be clustered in groups of seven (7) wells within 50 m to 60 m diameter well cluster areas. Extraction wells will be located approximately 18 m apart. To produce the initial ramp up phase of 1,176,000 tonnes (with an eventual increase to 1,360,000 tonnes of silica sand product annually at the Processing Facility) an average of 56 well clusters consisting of seven (7) wells each will be sequentially developed and progressively decommissioned and rehabilitated each year.

A conceptual diagram illustrating how the extraction wells within each well cluster will be configured is shown in **Figure 2-3**.

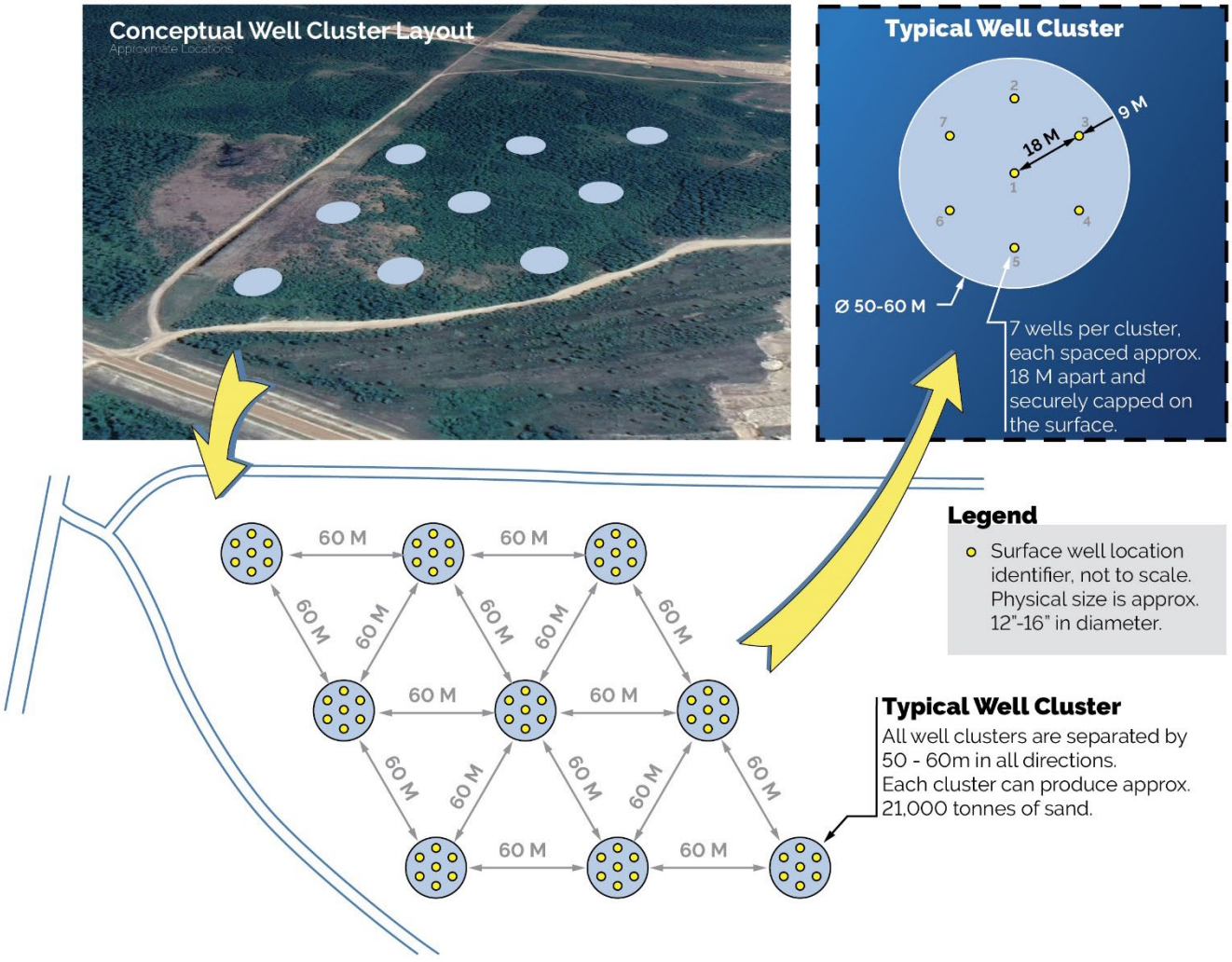


Figure 2-3: Conceptual Extraction Well and Well Cluster Layout

2.2.3 Sand Slurry Pre-Screening and Overs/Fines Temporary Stockpiling

As the groundwater and sand is brought to surface the sand and groundwater will pass through vibrating screens installed over a sump pit (or tank) to capture overs such as concretions (calcified sand) which are commonly encountered. The vibrating screens will allow the sand grains and water to pass through, but no material larger than 20 mesh (841µm) such as larger hard compacted sand material (concretions) or other small rocks.

These 'overs' that are captured will be temporarily stockpiled in a containment tank on site before being removed off site for disposal at a licenced facility.

2.2.4 Sand Slurry Conveyance to Processing Facility

The sand and water brought to the surface from each extraction well feeds via a 15 cm (6-inch) thick-walled high density polyethylene (HDPE) line to a temporary (mobile) dewatering and pumping station at the extraction site where the water is separated and sent back to the extraction well (after UV treatment) and the sand enters the main slurry loop system with the recycled water (**Figure 2-1**). The slurry loop system is a temporary line made of high-density polyethylene (HDPE) tubing fused together to create one continuous line that is 35.6 cm (14-inches) in diameter which transports sand to the facility site.

The dewatering and pumping station is designed to be moved once per season. The lines feeding into the dewatering and pumping station are smaller (15 cm [6-inches]) and will be moved more regularly as extraction wells are operated then sequentially decommissioned. During the first year of extraction activities, the well clusters will be closer to the Processing Facility than subsequent years of operations. Therefore, during the first year of operations, one pumping station (located with the dewatering station) will be needed to move the sand slurry to the Processing Facility. When the slurry line increases in length during subsequent years of operations, a pumping station will be needed approximately every 450 m to 550 m along the length of slurry line. The footprint area for the pumping stations along the slurry line is small (approximately 63 m^2).

The slurry loop will typically operate at approximately 15% sand and 85% water, with the ratio of sand and water varying by up to approximately 35%. This ratio of sand and water in the slurry loop system allows the system to be started form a complete stop by the pumping station(s), as required, and also minimizes the potential for the slurry system to clog and potentially break as a result. This also removes the need to potentially drain or remove sand or cut the line.

Prior to the mobile slurry lines being moved between extraction well sites, the slurry line segments are emptied via periodic access points in the slurry line to eliminate any spills or leaks of water onto the ground.

The silica sand Processing Facility and associated infrastructure is being reviewed by MBCC as a project under a separate Environment Act Licence application.

2.2.5 Groundwater Treatment and Return to the Aquifer

The groundwater removed from the extraction well by air circulation first passes through a 15 cm (6-inch) line to the dewatering station where the sand is removed at the extraction well site. The groundwater separated from the sand at the dewatering station then passes through a UV treatment system before being immediately returned to the extraction well and to the sandstone aquifer the groundwater was originally extracted from (**Figure 2-1**). The groundwater is not exposed to the atmosphere after the UV treatment to

prevent any potential for contamination (e.g. bacteria). The UV treatment is a technique commonly used in municipal water treatment facilities, including the city of Winnipeg.

UV treatment uses Ultraviolet (UV) light that is invisible to the human eye as a safe and environmentally friendly method to disinfect water. It does not require any chemicals or long contact time, only a few seconds of UV light exposure. UV light acts very rapidly by rending any bacteria, viruses or protozoa that may be present inert when they are exposed to the UV light making these organisms, if present, incapable of growing or infecting the water. The process adds nothing to the water but UV light, has no impact on chemical composition or dissolved oxygen content, and does not create disinfection by-products (Trojan Technologies EBook, 2020).

The UV treatment resembles that of fluorescent lamps. The groundwater flows past a series of UV lamps that expose the water to UV light and renders all bacteria and other microorganisms inactive (**Figure 2-4**). The UV lamps contain ionized gas mixtures that when electrified illuminate the lamp. To protect the lamps and not compromise the light emitted from the lamps, a fused silica or quartz sleeve is used. This is because quartz is transparent to UV light. After the water flows past the UV lamps, the groundwater remains contained within the extraction process tubing to avoid the potential for contamination from the atmosphere before being immediately returned underground to the aquifer.

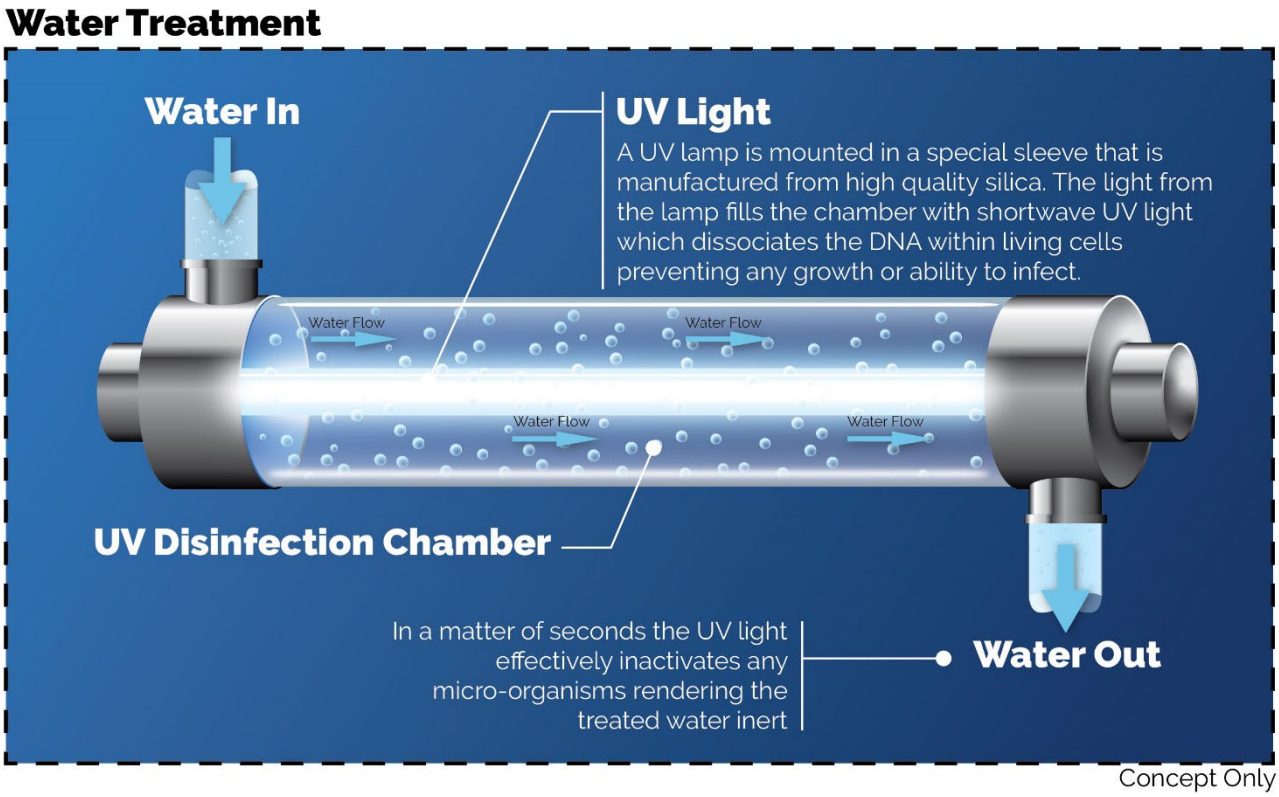


Figure 2-4: UV Water Treatment

The water contained within the line returns between the grouted in place casing (that goes to the sandstone) and the production tubing. This removes the risk of the UV treated water entering either the limestone or shale layers above the sandstone aquifer and has no other place to flow to except the sandstone aquifer.

This process resembles that of a typical geothermal loop system as water is returned to the aquifer.

2.2.6 Progressive Annual Closure and Rehabilitation of Extraction Wells

After sand extraction is complete at a well, the extraction piping is removed. The well is then sealed in accordance with *The Groundwater and Water Well Act* using a grout plug with layers mimicking that of the formation using materials such as pea gravel, native material and/or bentonite on top to prevent any vertical movement between aquifers.

Progressive decommissioning (well sealing) of annual extraction wells and well cluster areas will occur each extraction year in addition to progressive annual rehabilitation of temporary drilling rig access trails; equipment laydown areas; slurry line trails and return water line trails. Disturbed areas will be allowed to revegetate naturally and will be augmented using an approved native seed mixture and native plantings if required. Details of the progressive annual closure and rehabilitation of the extraction wells will be provided in a Closure Plan in accordance with the Manitoba Mine Closure Regulation 67/99 General Closure Plan Guidelines (**Section 1.7.2** and **Section 8.9**).

2.3 Waste Management

2.3.1 Wastewater

There will be no discharge of wastewater during the sand extraction process. Wastewater associated with sand processing, was described and assessed in a separate Environment Act Licence application. Sandstone groundwater in the sand slurry from the extraction process is separated from the sand and returned to the sandstone aquifer after a UV treatment as described in **Section 2.2.5**. The slurry loop system uses a continuous loop of recycled water. Therefore, there is no wastewater in the extraction process.

Portable toilets will be located at active well cluster sites which will be regularly pumped out by a licensed local contractor.

2.3.2 Solid Waste and Hazardous Materials

Domestic and commercial waste will be removed from the Project site by a licensed local contractor and disposed of at a licensed landfill. A portable toilet rented through a licenced commercial company will be provided at well cluster sites that are actively under development to accommodate work crews as needed. Recyclable materials will be collected in designated recycling containers and transported to a recycling facility.

Hazardous materials such as fuel, oils and lubricants will be transported, handled, stored and disposed of in accordance with applicable federal, provincial and municipal regulations and requirements. Diesel fuel, oil, lubricant, chemical and hazardous wastes storage areas will be maintained and monitored in accordance with applicable legislation and associated regulations and guidelines, including *The Dangerous Goods Handling and Transportation Act* of Manitoba and applicable regulations.

Sand slurry brought to surface at the extraction wells will be pre-screened to remove ‘overs’ such as concretions (calcified sand) which will be temporarily stockpiled in a containment tank on site before being removed off site for disposal at a licenced facility (**Section 2.2.3**). Drill cuttings will be managed as described in **Section 2.3.3**.

2.3.3 Drill Cuttings

When the extraction wells are drilled, they generate drill cuttings from the Quaternary Sediments, (till), Red River Carbonate (limestone), Red River Shale and Winnipeg Sandstone. These cuttings will be captured separately and contained during drilling. As containment fills up, these cuttings will be disposed of in accordance with applicable regulations.

It is the intention of CanWhite to keep drill cuttings separate, so that limestone and till cuttings can be used in the well sealing process in the corresponding sections of the well. Drill cuttings used in the well sealing process will not have metal leaching or acid rock drainage (ML/ARD) potential.

Refer to the hydrogeology study provided in **Appendix A** for further details on the geochemistry and ML/ARD data.

2.4 Ancillary Components

Sections 2.4.1 to **2.4.5** describe component of the Project other than the extraction wells which are described in **Section 2.2.1**). **Figure 2-5** illustrates the conceptual general layout of the mobile slurry and water lines, and temporary access trails to the sand extraction areas.

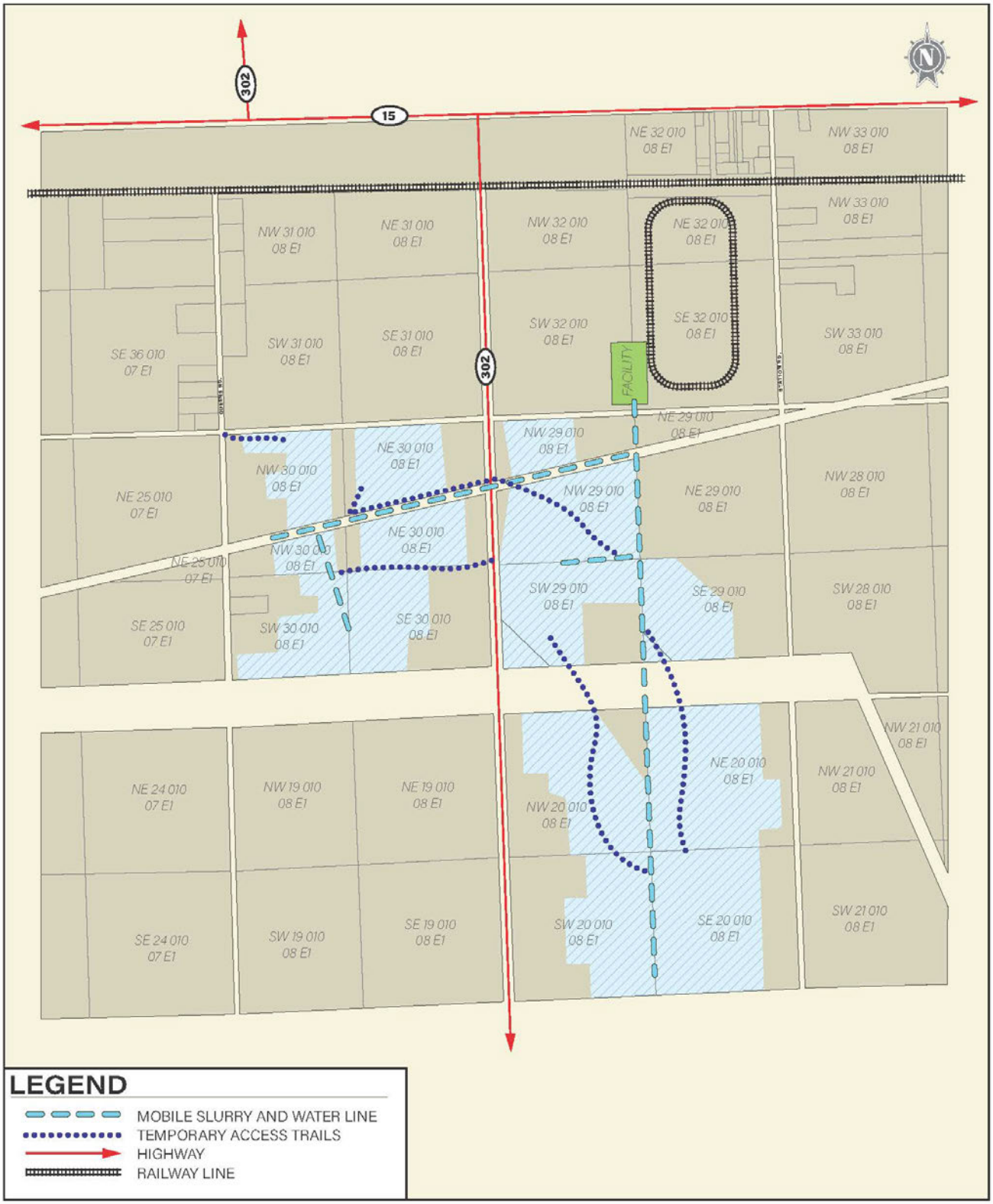


Figure 2-5: General layout of Mobile Slurry and Water Lines and Temporary Access Trails

2.4.1 Temporary Drill Rig Access Trails

Temporary access trails to accommodate extraction well drill rigs will be established within previously disturbed areas (e.g. existing trails) to the extent feasible. Temporary access trails will be approximately four m in width and up to approximately eight m in width at turning points to accommodate required drill rig turning areas.

As indicated in **Section 1.7.3**, CanWhite will coordinate with the RM of Springfield and Manitoba Infrastructure, as required, regarding approvals for the development of Project temporary extraction equipment access trail intersections to existing municipality roads and PR 302.

2.4.2 Slurry Lines and Water Return Lines

Slurry lines constructed of 15 cm (6-inch) and 35.6 cm (14-inch) HDPE tubing will be used to directly transport the sand and water slurry to a sand Processing Facility[4]. The trails to accommodate the slurry lines will be approximately two meters wide. The slurry lines will be positioned at ground level. At road and/or trail crossings, the slurry lines will go temporarily below the road and trails using existing culverts where possible. If required, slurry lines may be elevated over crossings and will be determined on a case-by-case basis. Each cluster will feed with a 15 cm (6-inch) slurry line into the main slurry line. Each cluster will have a dedicated 35.6 cm (14-inch) slurry line, with a total of two slurry lines feeding to the facility. The slurry lines may vary from 500 m long to 3.5 km long at the greatest sand transport distance (length) in year 2025.

Slurry lines are fused for sectional length and flanged together through the length of the system which allows for easy access for inspection and maintenance, and substantially reduces the risk of a leak. Constant flow, pressure and visually monitoring will occur 24/7 while slurry lines are in use.

As previously described in **Section 2.2.4**, the 15 cm (6-inch) slurry line from each extraction cluster feed to the main 35.6 cm (14-inch) slurry line. This is where the sand is dewatered and enters the recycled water loop (14-inch slurry line) and is pumped to the facility. The dewatering equipment is designed to handle large volumes of water and has been sized appropriately to handle fluctuations in water volumes to avoid overflows.

Water return lines will be used to transport water from the dewatering and pumping station back to the extraction wells and a separate set of water return lines will be used to loop the slurry loop water back from the facility to the dewatering and pumping station at the extraction area to pick up more sand. These water-only lines will follow the same route as the slurry lines and all the same protocols exist (e.g. controls for prevention of leaks /spills).

If access is required to the slurry line or water return lines, the flanged connections can be used as access points in addition to specific access points that will be built into the line periodically and close to major wear areas such as corners. The specific section of the line will be closed off with valves, and water/sand in the line will be removed prior to the line being opened. To do this, access points will be equipped with vacuum truck connections to void the line of material. Material removed from this section of line will be returned into the system with the water at the dewatering and pumping station.

[4] *The sand Processing Facility is being reviewed by the Environmental Assessment Branch as a separate Environment Act Licence application.*

During the winter months and prior to start up of the slurry line each season, a full inspection for wear of seals and connections will be conducted. Slurry lines will be replaced based on a maintenance schedule or early wear.

The slurry lines will be positioned adjacent to, and in parallel with, the water return lines. The following general line routing criteria will be used:

- Using previously cleared/disturbed areas, where available, to minimize clearing requirements;
- Following existing linear right-of-ways (RoWs), such as municipal road RoWs, where possible; and
- Avoiding water crossings (e.g. drainage channels) to the extent feasible.

Due to the characteristics of the Project area topography (**Section 4.1.2**), rock outcrops are not expected to be encountered or will be minor in area extent if encountered. Therefore, rock blasting to accommodate slurry line routes will not be required as slurry line routes will avoid such barriers if encountered.

As indicated in **Section 2.4.1**, CanWhite will coordinate with the RM of Springfield and Manitoba Infrastructure, as required, regarding approvals for the development of slurry line and water return line crossings over and/or under existing municipality roads and PR 302.

2.4.3 Dewatering and Pumping Stations

As described in **Section 2.2.4**, the sand and groundwater brought to the surface from each extraction well feeds via a 15 cm (6-inch) HDPE tubing to a temporary (mobile) dewatering and pumping station at the extraction site where the groundwater is separated and sent back to the extraction well (after UV treatment) and the sand enters the main slurry loop system with the recycled water (**Figure 2-1**). The pumping station will be powered by an extension of a local power line and will be used to pump the sand and recycled water slurry through lines described in **Section 2.4.2** directly to the sand Processing Facility. Back-up power will be supplied by an onsite diesel generator if necessary, which will be buffered by sound barriers for noise suppression if required.

As described in **Section 2.2.4**, during the first year of extraction activities, the well clusters will be closer to the Processing Facility than subsequent years of operations. Therefore, during the first year of operations, one pumping station will be needed to move the sand slurry to the Processing Facility. When the slurry line increases in length during subsequent years of operations, a pumping station will be needed approximately every 450 m to 550 m along the length of slurry line. The footprint area for the pumping stations along the slurry line is small (approximately 63 m^2).

The dewatering and pumping station will be dismantled and relocated as needed to optimal locations to facilitate movement of the sand and recycled water slurry thorough the slurry lines to the sand Processing Facility. This is movement is anticipated to be once per year.

2.4.4 Propane Tanks / Fuel Storage

Diesel fuel will be stored at the extraction site area in a central location for fuelling of the extraction rigs in accordance with regulatory requirements for the transportation, storage and handling of hazardous materials.

2.4.5 Real-time Extraction Control Office (RECO)

During extraction operations, a small mobile office unit will move around with the extraction equipment. This office will act as the control centre for all field operations, where the monitoring software, controls and

communications will be housed. Personnel will monitor operations such as production, slurry density and flow rates from mobile control office when not directly inspecting or operating equipment. The dewatering and pumping station will also be monitored from this mobile office unit.

2.5 Employees

There will be no worker camp on-site due to the proximity of the Project site to the City of Winnipeg. The workers required for the establishment of the well cluster sites, associated slurry lines and pumping stations, will be required for the decommissioning and re-establishment of new extraction wells, slurry line routes and water return line routes as the sand extraction process progressively advances with each operation year.

The number of employees required within a given year of operations during the on-going sand extraction process will be approximately 35 to 45 staff (with 70% to 85% of those staff being seasonal) and 100 to 120 indirect jobs in addition to contractors for specialty activities such as water well drilling and will include the following positions:

- Drill Rig Operators
- Helpers/laborers
- Heavy Equipment operators
- Truck Drivers
- Drilling manager
- Extraction manager
- Millwright
- Welder
- Rig Electrician
- Rig mechanic
- Environment, Safety and Health, Quality control Professional
- Fleet Manager
- Consumables Supervisor

2.6 Water Use

Both silica sand and groundwater will be extracted from the wells**.** The extracted groundwater portion of the sand and water slurry will be separated from the sand at the extraction site and treated with UV then returned to the sandstone aquifer immediately after.

A separate loop of recycled water from the extraction facility will move the sand to the facility. The treatment of this separate loop system water is outlined and proposed in the sand Processing Facility which is being reviewed by regulatory authorities under a separate Environment Act Licence application and is therefore not a component of this sand extraction Project.

The slurry loop system needs approximately 350,500 gal to operate, which is approximately 1,325 m^3 of water. This is a gradual one-time groundwater draw volume to fill the system the first time the system is started up. During the winter months, the water in the system will be drained into storage tanks located at the Processing Facility site for re-use the following year. As indicated in **Section 2.2.1**, the slurry loop system for transporting sand to the facility is designed to not require any additional water which allows for the majority of the water that comes from the extraction well to be returned to the aquifer within a short period of time. Therefore, very little extraction of groundwater from the aquifer is required.

Hydrogeological testing has been completed in 2020/2021 to determine sufficient and sustainable temporary groundwater extraction volumes for the sand extraction processes while preserving the integrity of the aquifer (**Appendix A)**. CanWhite will operate the sand extraction activities in accordance with mitigation measures and monitoring recommended in the hydrogeological report for this Project (**Appendix A**).

2.7 Power Use

Generally, power for all the extraction equipment will either be supplied by a generator on site or the equipment will have its own power generation, such as the water well rigs or light plant. A diesel generator will be used to power the slurry pumps, vibrating screens and other support functions such as the Real-time Extraction Control Office at the extraction site (**Section 2.4.5**).

The dewatering and pump station will be powered via direct mainline from Manitoba Hydro to reduce diesel consumption. It is expected that the dewatering and pump station will require 1460 connected hp to operate.

2.8 Equipment Use

Table 2-1 presents the heavy equipment use expected during Project construction and operation phases which are ongoing during the sequential progressive annual sand extraction activities.

Table 2-1: Project Heavy Equipment Use

Equipment	Units*
Construction Phase (Site Set-up and Well Drilling)	
Excavator	1
4 x 4 pick-up trucks	1
Drill rigs	2
Water Truck	2
Grouting System	2
Operation Phase (Extraction)	
HDPE Tubing Welding machine	1
Extraction Rigs - Diesel	10
4 x 4 pick-up trucks	2
Compressor - Diesel	2
Excavator	2
Light plant	8
Flat Deck Truck	2
Zoom boom/Telescopic handler	2
Welding Truck	1
Mechanical Service Truck	1
Vac Truck	1
Collection Sump with Scalping screen	5
Slurry Pumps (varying sizes depending on location)	16
Water pumps	20
Diesel Generator	2
Cyclone	8
Dewatering Screen	4
Real-time Extraction Control Office	1
Compartment Collection Sump	2
Decommissioning (Well Sealing and Site Clean-up / Rehabilitation)	
Drilling Rig	1
Picker Truck	1
Excavator	1
4 x 4 pick-up truck	1

* Not all operating simultaneously during any given phase.

2.9 Traffic

The traffic associated with the construction, operation and decommissioning phases of the Project will vary throughout the year as the construction and decommissioning will be occurring progressively through the calendar year. However, the operation phase will occur within designated extraction year land areas from April through November during the life of the Project. Therefore, the number of drill rig(s), pick-up trucks and other vehicles and machinery as described in **Section 2.8** will be reduced in the winter months compared to the warmer months throughout the Project life. Most of the equipment and vehicles will not be back and forth on the local roads, as the equipment will stay in and around the extraction site area. The sand and water slurry will be transported to the sand Processing Facility by slurry line. Therefore, traffic related to all Project phases will only be associated with the drilling of wells, decommissioning/well sealing and site preparation and rehabilitation. Most employees will be traveling directly to the extraction site for

their shift where they may park their personal vehicles. However, some employees will travel to the facility first to collect a maintenance vehicle or a water well rig, then will travel to the extraction site for their shift. Employees driving company vehicles located at the Processing Facility, will park their personal vehicles at the facility in a designated employee parking area. Some services such as mechanic or fuel will provide deliveries to the extraction sites. Traffic impact will be minimal with 13-20 employees arriving twice per day for their shift in addition to occasional parts and services deliveries. Most Project-related traffic will travel on PTH 15 and then south on PR 302, or municipality roads heading south from PTH 15, to access the specific annual extraction sites within the Project Site.

3. Scope of the Assessment

To assess the potential environmental impact of the proposed Project, spatial and temporal boundaries were defined as follows:

3.1 Temporal Boundaries

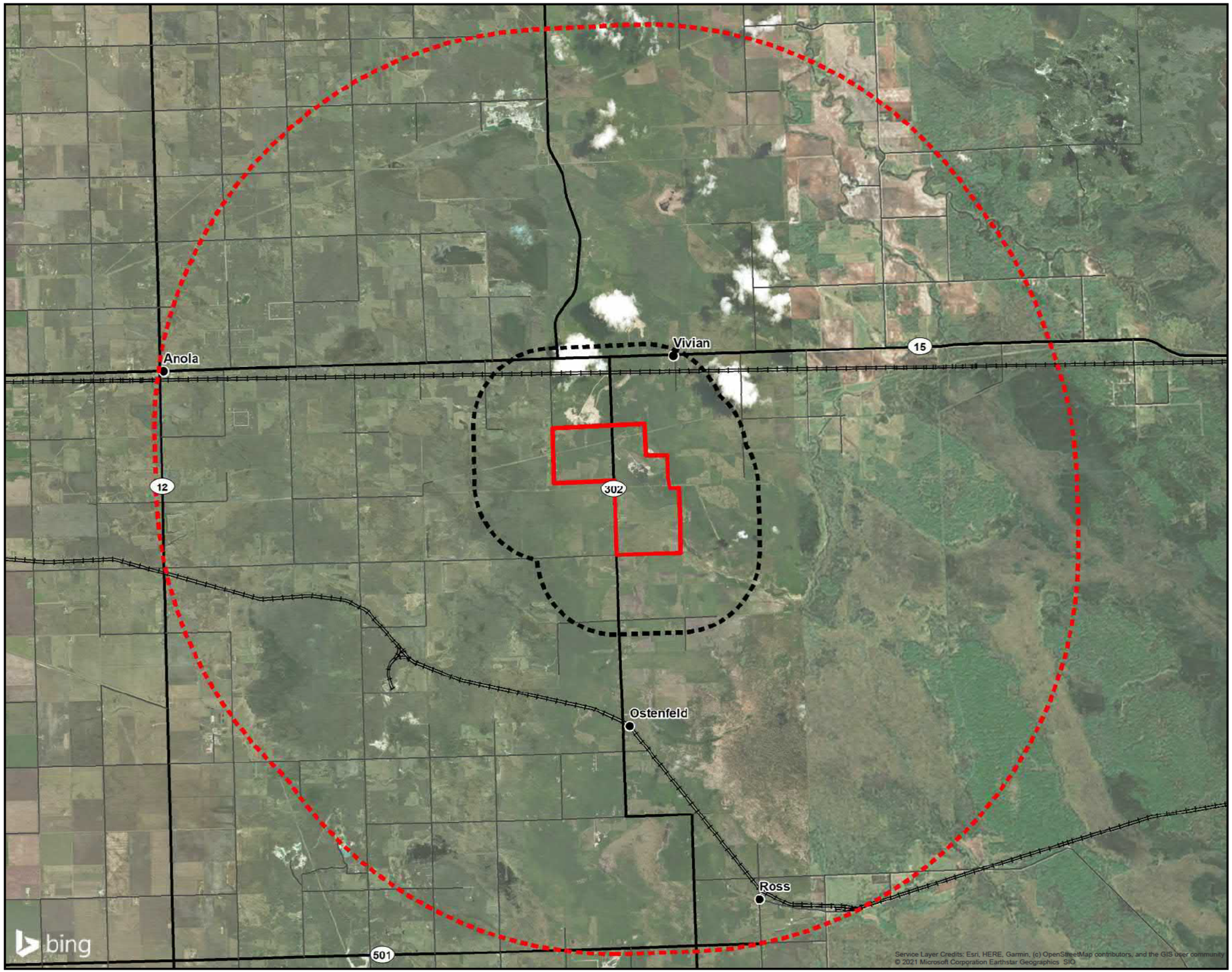
The temporal boundaries of the assessment are divided as follows:

- **Construction Phase**: Includes clearing for, and establishment of temporary drill rig access trails, well pad areas, drilling of extraction wells, construction/placement of slurry lines and water return lines, and associated pumping stations.
  - Q4 2021 - 2025
- **Operation Phase** – Includes pumping of sand and water slurry via slurry lines to the sand Processing Facility and immediate return of UV treated groundwater to the aquifer at the extraction site.
  - Q4 2021 - 2025
- **Decommissioning and Closure Phase:**
  - Q4 2021 - 2025: Annual progressive (sequential) sealing of extraction wells (**Section 2.2.6**), decommissioning of slurry line and pumping stations, rehabilitation of well clusters and other temporarily disturbed areas (access trails, slurry line and water return line trails, pumping station areas). All Project components and disturbed areas will be decommissioned and rehabilitated in accordance with a regulator-approved Closure Plan (**Section 7**).

3.2 Spatial Boundaries

Spatial boundaries used for the assessment are described below and shown in **Figure 3-1**. However, where specifically noted, the boundaries may be adjusted to suit the Environmental Component (EC) or Social Component (SC) affected.

- **Project Site** – includes the Project Footprint, which is the area that will encompass the land on which Project components are located, and immediate surrounding area that will be directly affected by the Project. For the purpose of this environmental assessment, the Project Footprint has been determined for the operation years 2021 to 2025 as per the temporal scope of this Environment Act Proposal described in **Section 3.1**.
- **Local Project Area** – is comprised of an area 2 km beyond the Project Site, which is intended to take into account the majority of direct and indirect effects of the Project on ECs (such as wildlife habitat loss related to vegetation clearing and noise; temporary groundwater drawdown effects). The Local Project Area extent for project effects on SCs includes the RM of Springfield, within which Project related activities will occur.
- **Regional Project Area** – is comprised of an area up to 10 km beyond the Project Site which is intended to account for the maximum spatial extent of potential effects of the Project unless otherwise indicated.



Legend

- Project Site
- Local Project Area
- Regional Project Area

General Features

- Highway
- Road
- Canadian National Railway

NOTE:
- The spatial boundaries may be adjusted to suit the Environmental Component (EC) or Social Component (SC) affected.
- See Figure 4-8 for information on Local Project Area land use, and Figure 4-9 for the RM of Springfield and RM of Taché Development Plan Designations.

N
W E
S

1:100,000
NAD 1983 UTM Zone 14N

1 0.5 0 1 2 3
km

Basemap: Canvec

AECOM

Figure: 3-1

Vivian Sand Extraction Project
Spatial Boundaries for the Environmental Impact Assessment
CanWhite Sands Corp.

Last saved by: PAIGE.CROSSMAN (2021-06-14) Last Plotted: Thu Jul 16, 2021
Filename: L:\ENVIRONMENT\GIS\STEPHANIE CLARKE\WINN PEG\VIVIAN_6062565\02_MXDS\VIVIAN SAND EXTRACTION PROJECT - EALUH003-1_60625356_EXTRACTION_SPATIALBOUNDARIES.MXD
Project Management Initials: Designer: Checked: Approved:
ANSI B 279.4mm x 431.8mm

3.3 Biophysical and Socioeconomic Components

- In accordance with the Manitoba Sustainable Development 'Information Bulletin – Environment Act Proposal Report Guidelines' (Manitoba Sustainable Development 2018), the scope of the environmental assessment has included potential Project effects on the:
- Biophysical environment
  - Including wildlife, fisheries, surface water, groundwater and forestry resources.
- Impact of such effects on the socioeconomic environment
  - Including human health and safety.
  - Potential impacts on Indigenous communities such as resource use and cultural or traditional activities.

Environmental assessment methods, including a specific list of the environmental components included within this assessment due to the potential for interactions with the Project, are described in **Section 6.1**.

4. Existing Environment

Baseline information regarding the Local and Regional Project Areas was gathered using:

- Available desktop information;
- Environmental studies that overlapped with Project Local and Regional Areas from 2018 to 2020;
  - Spring auditory amphibian survey (May 2018) focused in wetland areas
  - Baseline noise data (May and August 2018)
  - Summer vegetation survey (June 2018) in representative vegetation communities
  - Fall vegetation survey (September and October 2018) with additional emphasis on wetland areas and the Project Site
  - Fish and fish habitat survey (Milani, 2013)

4.1 Physical Environment

4.1.1 Physical Setting

The physiographical location of the Project can be described using the Ecological Land Classification (ELC) system, used for overseeing ecological resources within Canada in a geographical representation. The Project is categorized as being within the following subsets of the ELC, which are also illustrated in **Figure 4-1**:

- **Boreal Plain Ecozone**, which encompasses the;
- **Interlake Plain Ecoregion**, which contains the;
- **Steinbach Ecodistrict** within which the Project is located.

The Steinbach Ecodistrict has an annual average temperature of 2.4°C and annual precipitation is approximately 510 mm, of which approximately 410mm as snow (Smith, et al., 1998). Summers are typically short and warm, with winters being long and cold. Vegetation within the Steinbach Ecodistrict is dominated primarily by trembling aspen and some balsam poplar, with willow and red-osier dogwood being typically understory shrub species (Smith, et al., 1998). A substantial area of the Ecodistrict is cultivated for agricultural use (Smith, et al., 1998).

4.1.2 Geology/Topography

The topography of the Steinbach Ecodistrict can be described as smooth relief with gentle slopes that range from level to 5% (Smith et al., 1998). These slopes are characteristic of glaciolacustrine plain and gently undulating glacial till and glaciofluvial terraced plain (Smith et al., 1998). The topography of this Ecodistrict slopes at approximately 1.0m per km northwestward towards the Red River. Changes in topography have been noted in areas where sandy and ridged terraces occur (Smith et al., 1998).

Topography elevations in the Project Site and surrounding area are illustrated in **Figure 4-2** and in Figure 5-1 of **Appendix A**. Within the Project Site, elevations range from 269 masl in the east to 280 masl in the northwest.

Within the Project Site, the geological stratigraphy is consistent with major geologic units consisting of Quaternary sediments, carbonate and shale intervals of the Red River Formation, unconsolidated sand, sandstone and shale of the Winnipeg Formation and Archean-age granitoid basement (Figure 5-4 to Figure

5-8 of **Appendix A**). The unconsolidated sand interval of the Winnipeg Formation, which is known as the Carman Sand Member, is the target interval for this Project (Ferguson and Grasby, 2007).