

# Vivian Sand Extraction Project

Permitting, Water Treatment and Business Panel  
Manitoba Clean Environment Commission Hearing  
February/March 2023

Water Treatment and Permitting

# Mohsen Barkh, P.Eng., PMP

## Senior Mine Water Treatment Engineer

Years of Experience

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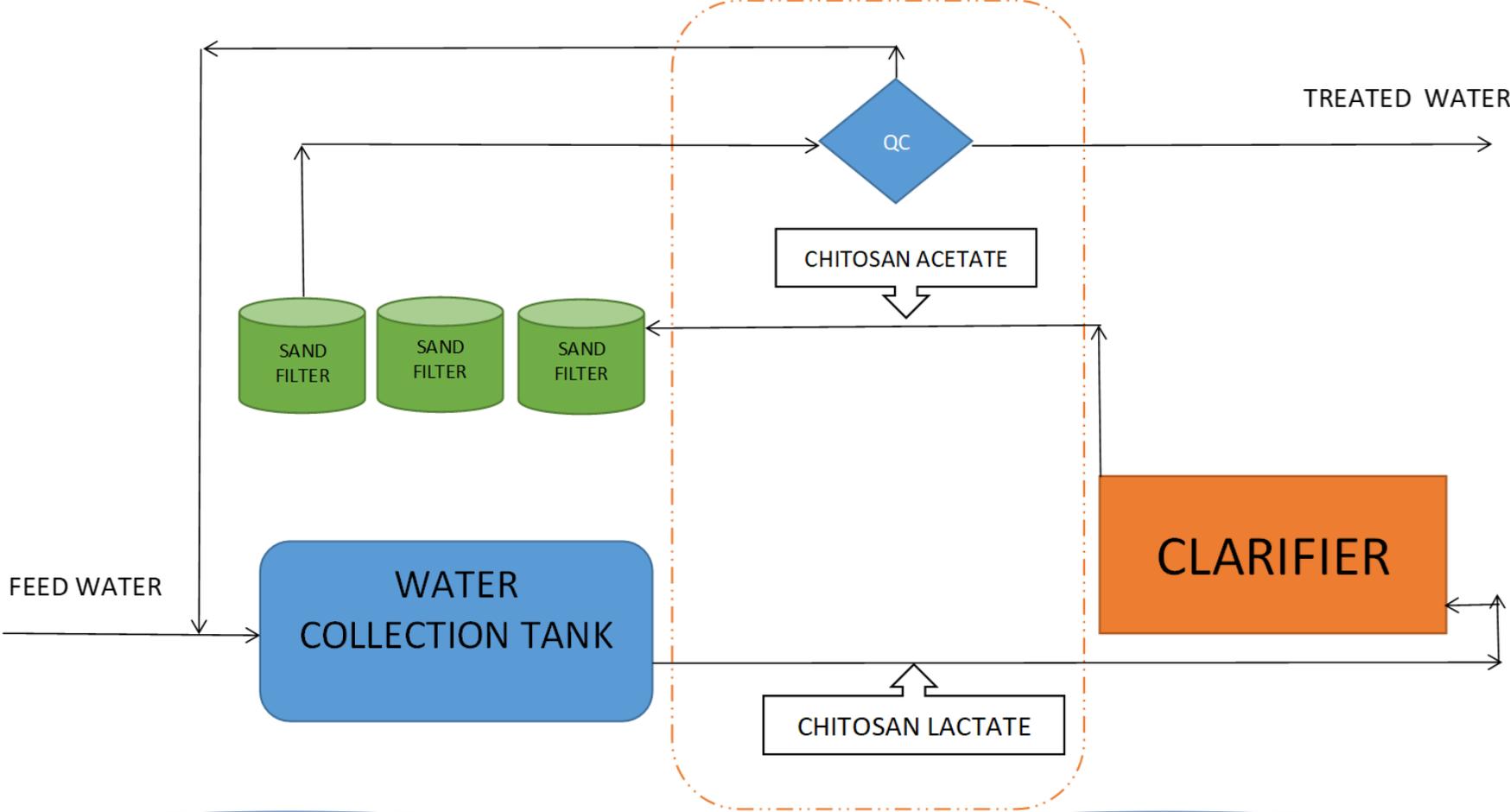
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- Specialist in several critical areas of water treatment with an emphasis on industrial and wastewater treatment projects
- Thorough understanding of all aspects of project management and treatment facility development and technical issues
- Certified Project Management Professional
- Member of Association of Professional Engineers and Geoscientists of the Province of British Columbia and Project Management Institute (PMI)

## Water Treatment – Topics Discussed:

- How will the groundwater extracted with the sand be treated so that it can be safely returned to the aquifer?
- Which organic compound will be used to treat the water to help remove particulates?
- What else does this organic compound do?
- Is this clarifying organic compound safe?
- How will the organic compound be used?

# Chitosan Enhanced Sand Filtration (CESF) Operation



# What is Chitosan

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Chitosan is a polysaccharide composed of repeated units of N-acetyl-2-amino-2-D-glucopyranose and 2-amino-2-deoxy-D-glucopyranose, which are linked by  $\beta$ -(1 $\rightarrow$ 4)-glycosidic bonds. Chitosan is the second most abundant natural polymer found in nature.

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Chitosan is derived from crab and shrimp shells, and it is the source of many materials consumed by humans including glucosamine and dietary supplement.

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**Chitosan is biodegradable and does not persist in the environment.** The functionality of chitosan and its unique qualities have led to its application to many fields, including dietary supplements, hemostatic bandages, agriculture, and water treatment.

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Chitosan's affinity for dirt and other negatively charged particles has made it an excellent tool for clarifying water in swimming pools, potable water treatment plants, sewage treatment plants, industrial wastewater treatment facilities, and stormwater treatment.

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# Basic Facts about Chitosan

- The active polymer, CHITOSAN, combines quickly with dirt, and becomes insoluble, thus coming out in the filter, or if for some reason dirt is not present, the pH of all natural stormwaters is between 6 and 9, where chitosan is not soluble, and it precipitates out.
- Chitosan not only removes the suspended particulate, but also removes metals and can remove the attached hydrocarbons to metals or other solids as well.
- The quality of the water that results is repeatable, safe, and can be discharged back to the environment
- The reliability of the systems once in place, is clearly observed.

# Filtration Process with CESF

There are two filtration options available in CESF operation, sand filter & multimedia filter.

- Sand Filter Operation;
  - Filter vessels filled by sand & gravel
  - Particle larger than 20 microns will be removed
- Multimedia Filter Operation;
  - Filter vessels filled by assorted sand & quartzes
  - Particle larger than 5 microns will be removed



# Project Permitting

AECOM Permitting / Project Team Leads

Permitting Process Overview

Why two separate Sio Projects?

Why Environment Act Licence Application for only four years?

Why no Cumulative Impacts Assessment as part of Project Review?

What's Next?

# Cliff Samoiloff, B.Sc., EP(CEA)



## Project Manager, Senior Scientist

Years with AECOM

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16

With Other Firms

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13

- Project Lead and Senior Technical Support for various market sectors such as:
  - Mining & Mineral Processing; Manufacturing; Pulp & Paper; Chemical; Food & Beverage; Transportation
- **Over 28 years experience** in environmental assessment and permitting, environmental toxicology and chemistry, site assessment and remediation, Environment, Health & Safety (EH&S) compliance auditing, environmental management and stakeholder engagement

### Professional Affiliations:

- ECO Canada, Environmental Practitioner - Certified
  - Certified Environmental Auditor (EP [CEA])
- Standards Council of Canada, Laboratory Technical Assessor for the Program for Accreditation of Laboratories in Canada (PALCAN) – Former Technical Assessor
- Mining Association of Canada (MAC), Toward Sustainable Mining - Qualified Verifier
- Member, Manitoba Environmental Industries Association (MEIA)

# Marlene Gifford, M.Sc., P.Biol. (AB), R.P.Bio. (BC), Adv. GIS Dipl.



## Biologist, Environmental Assessor

Years with AECOM

>5

With Other Firms

23

- Environmental permitting specialist and terrestrial and aquatic biologist supporting various market sectors such as:
  - Mining & Mineral Processing; Renewable Energy; Manufacturing; Transportation and other Linear Infrastructure; Water Control
- **Over 28 years experience** in environmental assessment and permitting, terrestrial and aquatic studies, and public and Indigenous engagement

### Professional Affiliations:

- Alberta Society of Professional Biologists
- College of Applied Biology British Columbia

### Training & Certifications:

- Advanced training (Feb. 2020) on the federal Impact Assessment Process: *Impact Assessment Act*
- Fisheries and Oceans Canada (DFO) 2-day *Fisheries Act* workshop, May 2015
- First Nations Cultural Awareness Workshop (Keeyask Generation Project), 2009

# *The Environment Act*

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- *The Environment Act* outlines the environmental assessment and licensing process for “developments” in Manitoba that may have potential for significant environmental and / or human health effects.
- The licensing process exists to ensure:
  - Environmental and human health protection,
  - Encourage and allow for early public participation,
  - Ensure economic development occurs in an environmentally responsible manner.
- Certain developments must apply for and receive an Environment Act License prior to construction and operation.

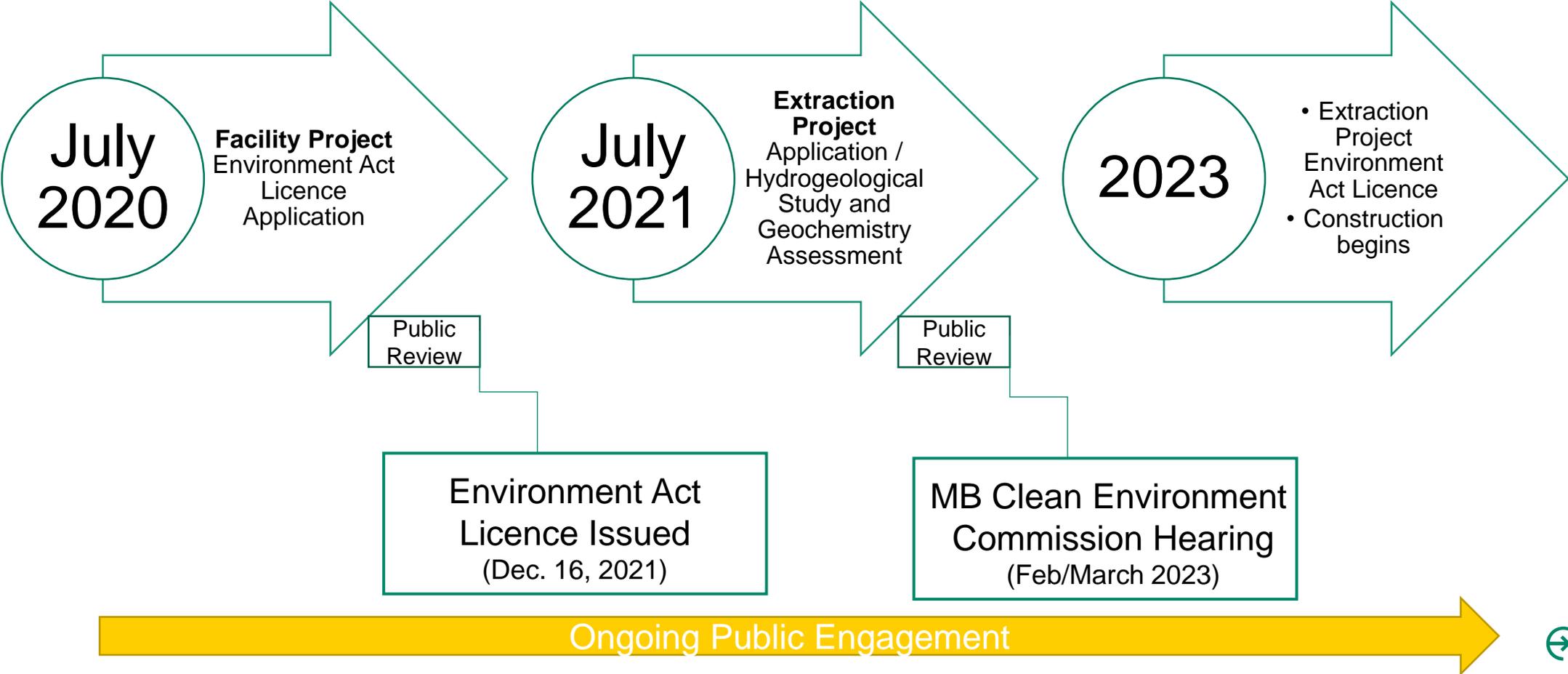
# The Classes of Development Regulation

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- The Classes of Development Regulation (Manitoba Regulation 164/88) lists the types of projects which are defined as developments.
- Metal mines and processing facilities in Manitoba are considered as “Class 2” Development under The Classes of Development Regulation.
- Developments must undergo the environmental assessment and licensing process and receive an Environment Act License prior to construction and operation.

# Environment Act Approvals

- Sio is following the Government of Manitoba's environmental approvals process:



# Development of the Environment Act Proposal (EAP)

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- The EAP is submitted early in the project life cycle.
- The information and data required to complete an EAP is much different than would be required for “detailed design” or finalization of management plans guiding construction & operation.
- Data required at EAP development stage must be sufficient to provide the environmental assessment team with the ability to properly determine, with confidence, the potential for environmental effects and appropriate mitigation(s).

# Development of the Environment Act Proposal (EAP)

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- As the design process and associated studies progress, information that is collected is considered in the development of operating procedures and monitoring and mitigation plans.
- For mining projects, the design process and associated studies will also support the development of a closure plan and associated closure costs and financial assurance.
- Development of a closure plan and closure cost is a standard requirement in EAL's for mining projects.

# Why Two 'Separate' Sio Projects?

## Vivian Sand Processing Facility Project:

- Permanent Components
- Timeline to design and construct is lengthy
- Project is potentially viable on its own without the nearby sand extraction project component
  - Sand could be sourced from elsewhere

## Vivian Sand Extraction Project:

- No Permanent Components
- Timeline to assemble mobile temporary components and drill & decommission wells is shorter
- Project is potentially viable on its own without the nearby sand processing facility
  - Sand could be transported and processed at a different facility

Sio's Current Business Plan: Own and Operate Both Projects

# Why Environment Act Licence Application for only four years?

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## Rationale:

- Ongoing monitoring during initial operation years will inform extraction wells locations for next four years
- Land ownership and land use may change during proposed 24-year 'Life of Project' area
  - Four-year time blocks provide a reasonable timeframe for land acquisition and/or land agreements for extraction activities
- Extraction technology may be refined and advanced over the years which may influence number and locations of wells and extraction areas required
- Environmental Approvals Branch environmental protection requirements may change in future years and are better reflected in successive 4-year Environment Act Licences (rather than one licence for 24-years)

# Why no Cumulative Impact Assessment as part of Project Review?

## Rationale:

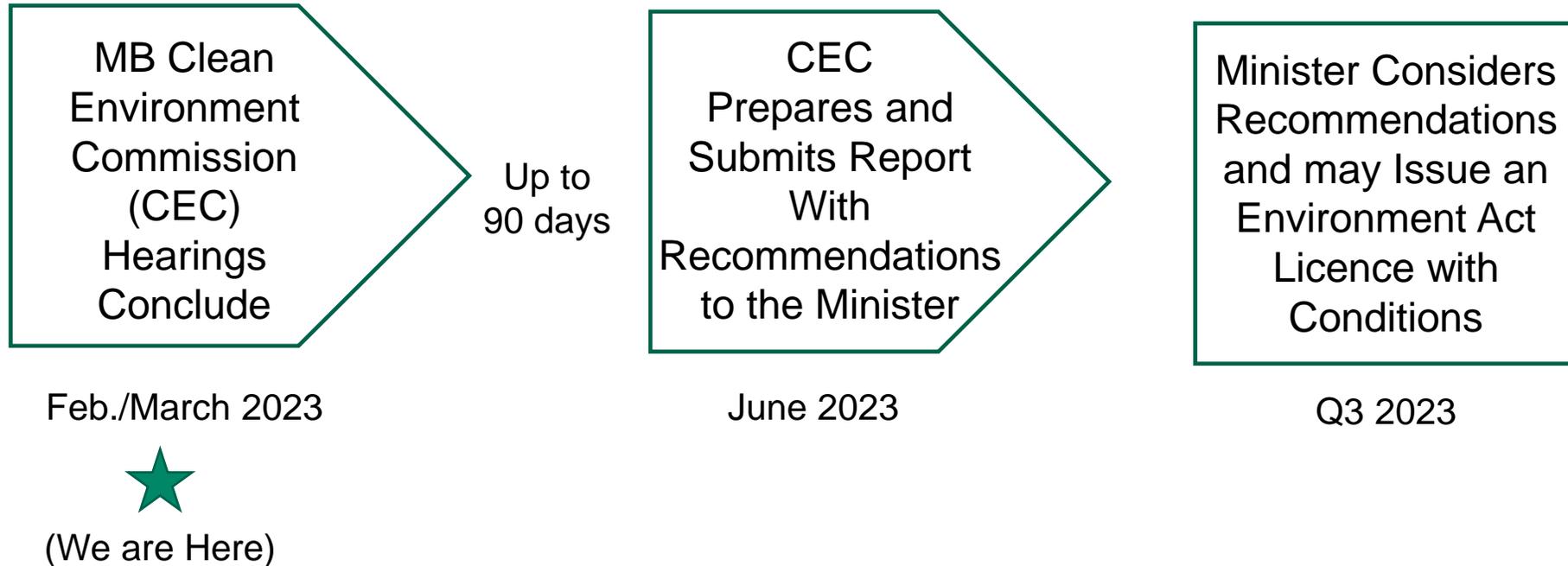
- The ***Environment Act Proposal Report Guidelines*** prepared by the Province of Manitoba, and which applies to all Environment Act Proposals (EAPs), does not include completion and inclusion of a cumulative effects assessment
- Cumulative effects assessments are most relevant for large projects with residual effects after mitigation that when combined with impacts of past, present and reasonably foreseeable future activities and natural process, can potentially have substantial adverse environmental effects (e.g., large 400 MW hydro dam and transmission line)

## However:

- Cumulative effects were considered in the Hydrogeology Studies
  - Studies Considered:
    - ✓ Presence of historical and existing wells and impact on existing users
    - ✓ Diverse range of groundwater usage including domestic, industrial, irrigation and livestock
    - ✓ Expanded spatial Project (24-year)
    - ✓ Impact of pumping and development on the aquifer structure

# What's Next?

## Next Steps:

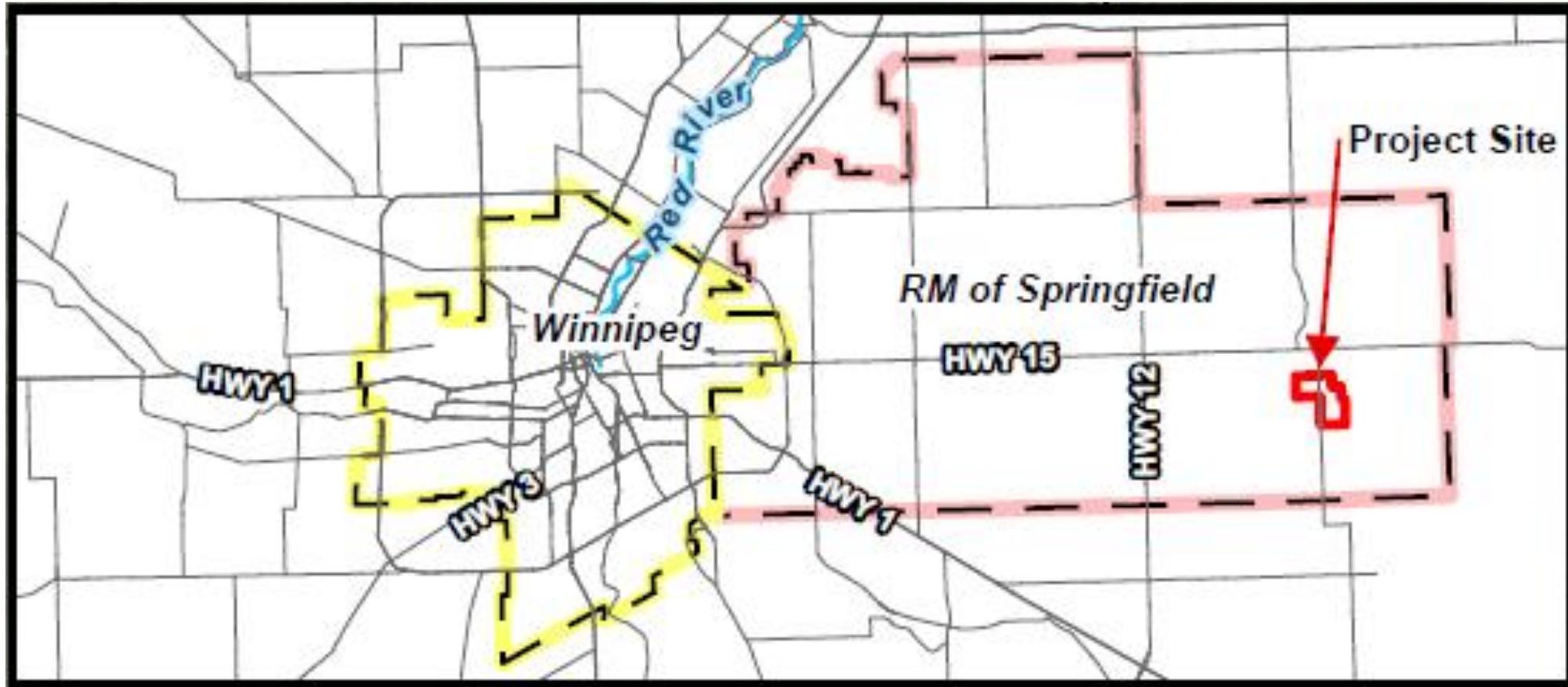


# Project Description

UPDATE to the Environment Act Proposal:  
Revised Extraction Plan (Jan. 24, 2023)

Progressive Closure & Rehabilitation

# Project Location & Original Project Site Boundary



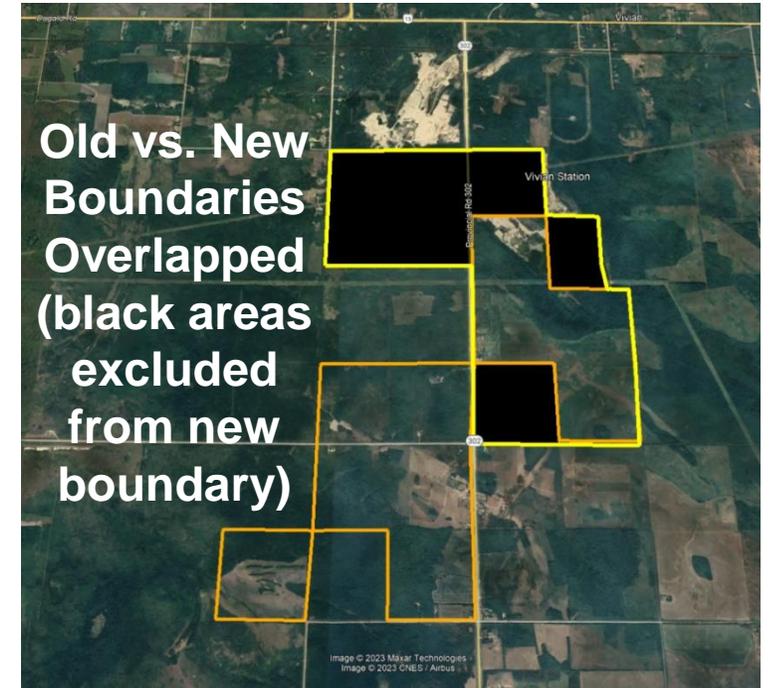
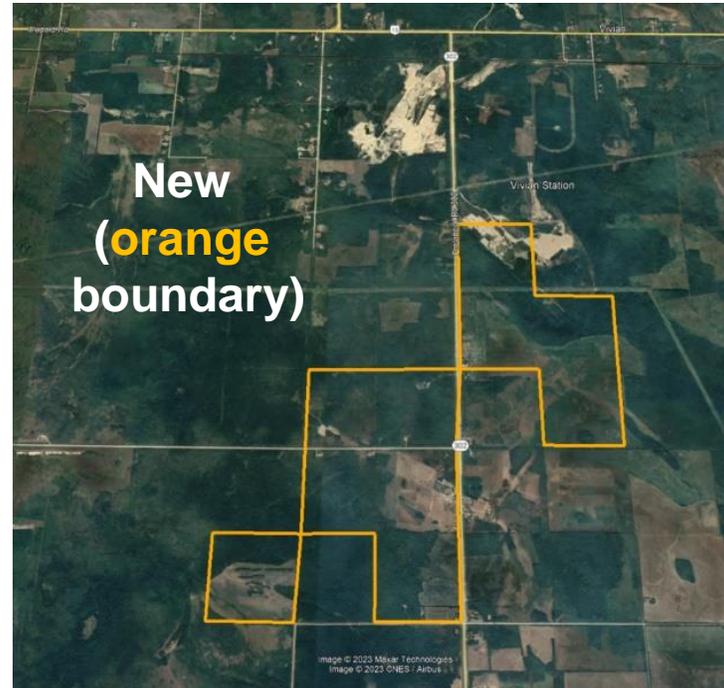
# Revised Extraction Plan (Jan. 24, 2023)

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## Proposed Extraction Plan Revisions:

- Overall number of wells has been reduced (by 401 wells) compared to the original extraction plan
- The number of wells in each well cluster has also been reduced from seven wells to a variable number of wells, but less than six
  - depending upon cap rock thickness in the extraction area
- Project Site boundary relocated a short distance away from original
- Overall Project Site area (633 ha) is slightly smaller than originally proposed (649 ha)

# Revised Project Site Boundary

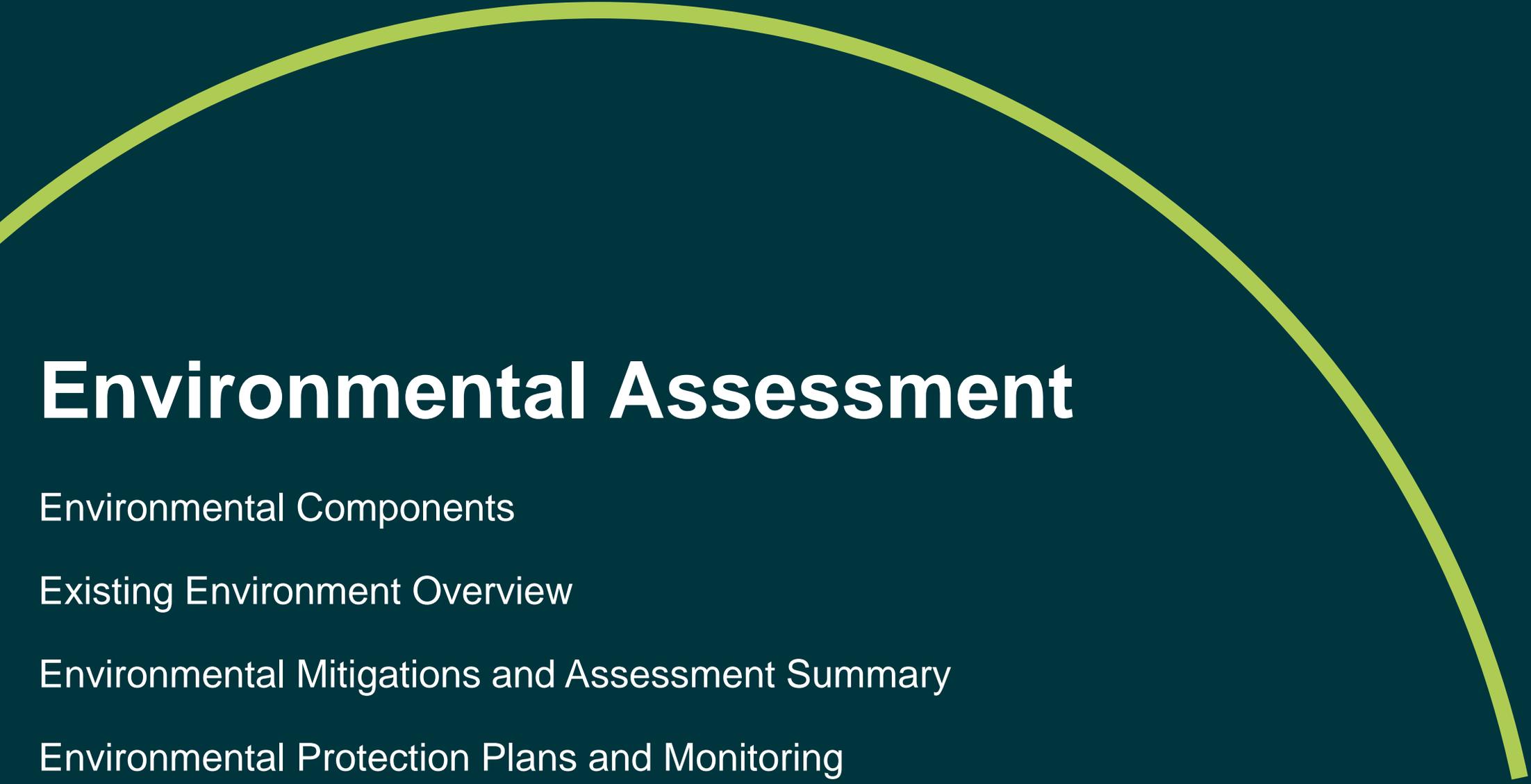


# Extraction Wells – Progressive Closure & Rehabilitation

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## Closure Steps:

1. After sand extraction complete at a well – extraction piping removed
2. Well is sealed to prevent vertical movement between aquifers
  - Progressive Well Abandonment Plan – in accordance with *The Groundwater and Water Well Act*
3. Progressive annual rehabilitation of temporarily disturbed areas
  - Details will be provided in a Closure Plan to Manitoba Government
  - Disturbed areas allowed to revegetate naturally and will be augmented using approved native seed mixture and native plantings if required
    - Landowner input will influence revegetation planning
  - Revegetation Monitoring Program – for up to approximately 5 years
    - Excessive weed growth controlled as needed using MB government-approved applications



# Environmental Assessment

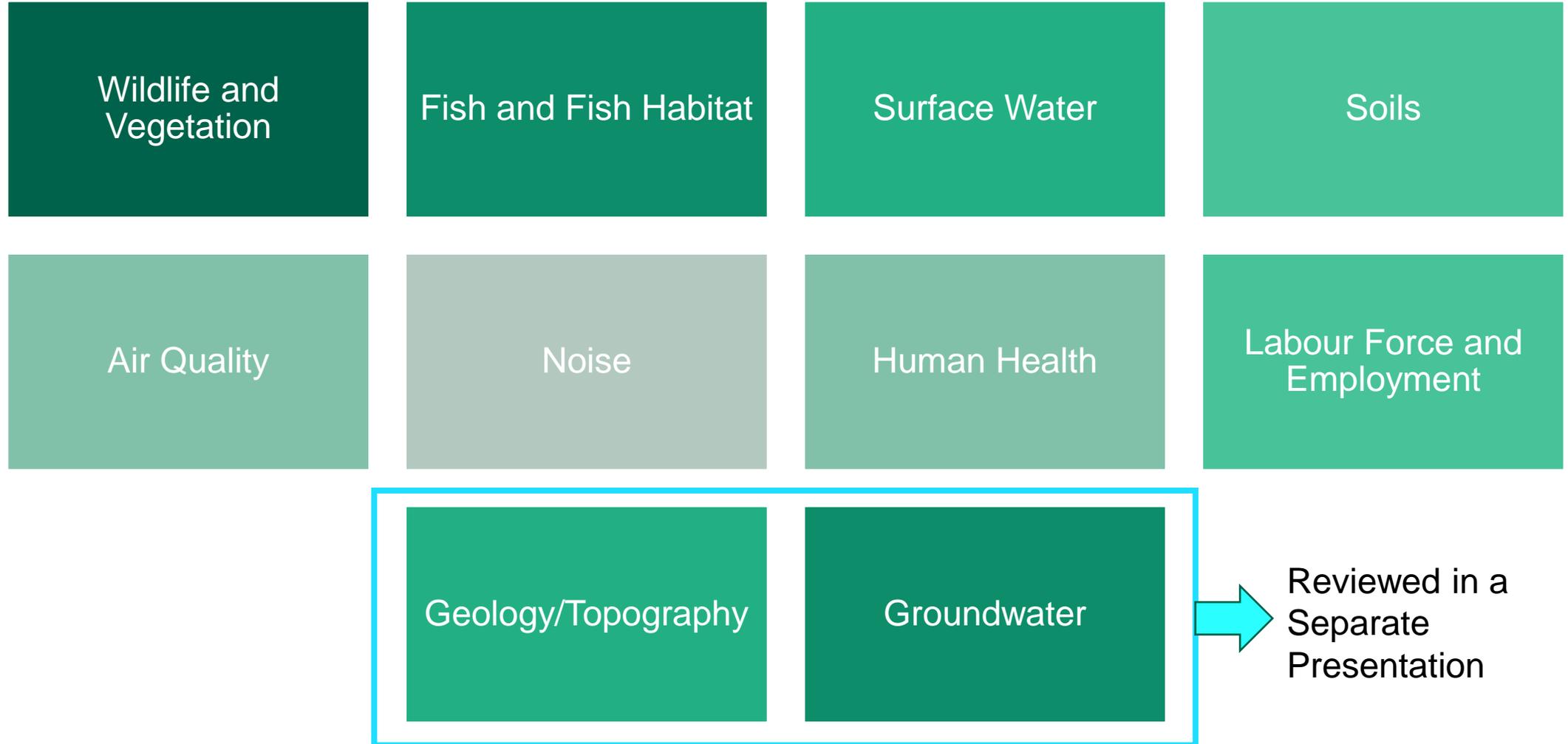
Environmental Components

Existing Environment Overview

Environmental Mitigations and Assessment Summary

Environmental Protection Plans and Monitoring

# Environmental Components



# Existing Environment Overview

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## For Revised Extraction Plan Area:

- Similar to Original Project Site in EAP
  - Developed and Agricultural Land similar between the Old Project Site (44%) and the New Project Site (43%)
  - No fish habitat
- More forested land in New Project Site (51%) compared to Old Project Site (45%)
  - Same mitigation measures proposed (e.g., minimizing vegetation clearing; revegetation program; no clearing during breeding bird season)
- Heritage Resources
  - The revised Project Site boundary and planned extraction areas will be submitted to Historic Resources Branch (HRB) for review
  - A Heritage Resources Impact Assessment (if required) will identify any historic resources requiring mitigation

# EAP - Conclusions Overview

Component	Impact Summary	Key Mitigations
Wildlife and Vegetation	<p>Project site previously disturbed</p> <p>No measurable impacts expected on regional wildlife populations including Species at Risk</p>	<p>Natural vegetation removal minimized by maximum use of previously disturbed areas</p> <p>No vegetation clearing during breeding bird season (April 14 – Aug. 24)</p> <p>Disturbed areas will be revegetated</p>
Fish and Fish Habitat	<p>No fish habitat at Project site</p>	<p>An Erosion and Sediment Control Plan will mitigate potential for off-site run-off</p>
Surface Water	<p>No natural waterbodies at Project site; Project operations do not use or discharge to surface waterbodies</p>	<p>An Erosion and Sediment Control Plan will mitigate potential for off-site run-off</p>
Soils	<p>Minor impacts restricted to Project site</p>	<p>Disturbed areas revegetated progressively and quickly each year to minimize soil erosion</p>
Air Quality	<p>Minor to negligible impacts</p>	<p>No silica sand will be left exposed</p>
Noise	<p>Minor to moderate impacts on nearest receptors</p>	<p>Activities will be setback min. of 100 m from residences and short-term; Noise mitigation will be applied as needed</p>
Human Health	<p>Groundwater / drinking water will be protected</p>	<p>Ongoing mitigation and monitoring plans</p>
Labour Force and Employment	<p>Positive long-term benefits (Extraction and Facility projects combined):</p> <ul style="list-style-type: none"> <li>• 90 to 100 people employed during Operations</li> <li>• Up to 250 indirect employment opportunities</li> </ul>	

# Environmental Protection Plans and Monitoring

## As Proposed in EAP and Responses to EAP Review:

- ✓Waste Characterization and Management Plan\*
- ✓Water Management Plan\*
- ✓Progressive Well Abandonment Plan\*
- ✓Groundwater Monitoring and Impact Mitigation Plan\*
- ✓Erosion and Sediment Control Plan\*
- ✓Environmental Emergency Response Plan
- ✓Revegetation Monitoring Program
- ✓Heritage Resources Protection Plan
- ✓Noise Mitigation Plan
- ✓Closure Plan

✓ **Additional  
Monitoring Plans  
Under Development or  
To Be Developed As  
Required**

\*Drafts submitted to MB CEC



# Public Participation & Input

Sio's Engagement Program – Major Events

Manitoba Government Mandated Public Review Opportunities

# Sio's Engagement Program – Major Public Events

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## Vivian Sand Extraction Project:

- ✓ Online Community Meeting – Aug. 24, 2021 by Zoom with phone-in option
  - Approx. 70 people attended
  - Advertised in advance (Steinbach Online; Clipper Newspaper; Winnipeg Free Press)
  - 5,800 announcement flyers mailed to residents in area
  - Others informed of event as previously requested
  
- ✓ In-Person Meeting – Anola Community Club (Nov. 29, 2021)
  - Approx. 25 people attended
  - Invitations dropped off at residents nearby the project area
  - AECOM's specialists (e.g., hydrogeologist) available for questions

# Sio's Engagement Program – Other Meetings

## Additional Meetings:

- In-Person:
  - Anola – May 2017
  - La Broquerie; Anola and Richer
    - April 9, 10 & 11, 2019
- Virtual:
  - May 26 & Dec. 15, 2020
- ✓ Indigenous Groups - more than seven meetings all together
- ✓ Municipalities (7) & Town of Beausejour and Town of Ste Anne
  - more than 22 meetings all together



# MB Government Mandated – Public Review Opportunities

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- ✓ Approx. 30-Day Review Period of Environment Act Proposal
  - Public submits questions/concerns
  - Proponent provide responses
  - MB Environmental Approvals Branch uploads Project information (including Responses to Pubic) to Public Registry
  
- ✓ For this Project – CEC Hearings (Feb. & March 2023)
  - Opportunity to participate
  - Opportunity to present & provide written submission

**Thank you.**

[www.viviansandproject.com](http://www.viviansandproject.com)

Email: [info@viviansandproject.com](mailto:info@viviansandproject.com)

Telephone: [1-888-436-5238](tel:1-888-436-5238)